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NOTES

1.0 INTRODUCTION

The procedures contained in this manual include specifications, instructions, and graphics needed to diagnose the PCM Powertrain System. The diagnostics in this manual are based on the failure condition or symptom being present at time of diagnosis.

Please follow the recommendations below when choosing your diagnostic path.

1. First make sure the DRBIII® is communicating with the appropriate modules; ie., if the DRBIII® displays No Response condition, you must diagnose this first before proceeding.
2. Read DTC's (diagnostic trouble codes) with the DRBIII®.
3. If no DTC's are present, identify the customer complaint.
4. Once the DTC or customer complaint is identified, locate the matching test in the Table of Contents and begin to diagnose the symptom.

All component location views are in Section 8.0. All connector pinouts are in Section 9.0. All system schematics are in Section 10.0.

An * placed before the symptom description indicates a customer complaint.

When repairs are required, refer to the appropriate service manual for the proper removal and repair procedure.

Diagnostic procedures change every year. New diagnostic systems may be added; carryover systems may be enhanced. READ THIS MANUAL BEFORE TRYING TO DIAGNOSE A VEHICLE CODE. It is recommended that you review the entire manual to become familiar with all new and changed diagnostic procedures.

After using this book, if you have any comments or recommendations, please fill out the form at the back of the book and mail it back to us.

1.1 SYSTEM COVERAGE

This diagnostic procedures manual covers the 2001 PT with the 2.0L and 2.4L engines.

1.2 SIX-STEP TROUBLESHOOTING PROCEDURE

Diagnosis of the powertrain control module (PCM) is done in six basic steps:

- verification of complaint
- verification of any related symptoms
- symptom analysis
- problem isolation
- repair of isolated problem
- verification of proper operation

2.0 IDENTIFICATION OF SYSTEM

The Powertrain Control Module (PCM) monitors and controls:

- Fuel System
- Idle Air Control System
- Ignition System
- Charging System
- Speed Control System
- Cooling System
- 1/1 O2 Sensor Heater

3.0 SYSTEM DESCRIPTION AND FUNCTIONAL OPERATION

3.1 GENERAL DESCRIPTION

These Sequential Fuel Injection (SFI) engine systems have the latest in technical advances. The Euro Stage III On-Board Diagnostics incorporated with the powertrain control module (PCM) are intended to assist the field technician in repairing vehicle problems by the quickest means.

3.2 FUNCTION OPERATION

3.2.1 FUEL CONTROL

The PCM controls the air/fuel ratio of the engine by varying fuel injector on time. Mass air flow is calculated using the speed density method using engine speed, manifold absolute pressure, and air temperature change.

Different fuel calculation strategies are used dependent on the operational state of the engine. During crank mode, a prime shot fuel pulse is delivered followed by fuel pulses determined by a crank time strategy. Cold engine operation is determined via an open loop strategy until the O2 sensors have reached operating temperature. At this point, the strategy enters a closed loop mode where fuel requirements are based upon the state of the O2 sensors, engine speed, MAP, throttle position, air temperature, battery voltage, and coolant temperature.

3.2.2 ON-BOARD DIAGNOSTICS

The PCM has been programmed to monitor many different circuits of the fuel injection system. This monitoring is called on-board diagnosis.

Certain criteria, or arming conditions, must be met for a trouble code to be entered into the PCM memory. The criteria may be a range of: engine rpm, engine temperature, and/or input voltage to the PCM. If a problem is sensed with a monitored circuit, and all of the criteria or arming conditions are met, then a trouble code will be stored in the PCM.

It is possible that a trouble code for a monitored circuit may not be entered into the PCM memory even though a malfunction has occurred. This may happen because one of the trouble code criteria (arming conditions) have not been met.

The PCM compares input signal voltages from each input device with specifications (the established high and low limits of the range) that are programmed into it for that device. If the input voltage is not within specifications and other trouble code criteria (arming conditions) are met, a trouble code will be stored in the PCM memory.

The On Board Diagnostics have evolved to the second Generation of Diagnostics referred to as Euro Stage III On-Board Diagnostics.

The following table summarizes the various Euro Stage III OBD monitors operation.

Euro Stage III OBD MONITOR INFORMATION

Comprehensive Components Monitor	**Major Monitors Non Fuel Control & Non Misfire**	**Major Monitors Fuel Control & Misfire**
Run constantly	Run Once Per Trip	Run Constantly
Includes All Engine Hardware - Sensors, Switches, Solenoids, etc.	Monitors Entire Emission System	Monitors Entire System
One Trip Faults - Turns On The MIL and Sets DTC After One Failure	Two Trip Faults - Turns On The MIL and Sets DTC After Two Consecutive Failures	Two Trip Faults - Turns On The MIL and Sets DTC After Two Consecutive Failures
Priority 3	**Priority 1 or 3**	**Priority 2 or 4**
All Checked For Continuity Open Short To Ground Short To Voltage	Done Stop Testing = Yes Oxygen Sensor Heater Oxygen Sensor Response	**Fuel Control Monitor** Monitors Fuel Control System For: Fuel System Lean Fuel System Rich Requires 3 Consecutive *Fuel System Good Trips* To Extinguish The MIL
Inputs Checked For Rationality	Catalytic Converter Efficiency Except EWMA - up to 6 tests per trip and a one trip fault	
Outputs Checked For Functionality	EGR System Evaporative Emission System	**Misfire Monitor** Monitors For Engine Misfire at: 1000 RPM Counter (Type B) **200 RPM Counter (Type A) Requires 3 Consecutive *Misfire Good Trips* To Extinguish the MIL **Type A misfire is a two trip failure. The MIL will illuminate and blink at the first failure.
Requires 3 Consecutive *Global/Alternate Good Trips* to Extinguish the MIL*	Requires 3 Consecutive *Global Good Trips* to Extinguish the MIL*	

***40 Warm Up Cycles** are required to erase DTC's *after* the MIL has been extinguished.

3.2.3 OTHER CONTROLS

Charging system

The charging system is turned on when the engine is started and ASD relay energized. When the ASD relay is on, ASD output voltage is supplied to the ASD sense circuit at the PCM. This voltage is connected in some cases, through the PCM and supplied to one of the generator field terminals (Gen Source +). All others, the Gen field is connected directly to the ASD output voltage. The amount of current produced by the generator is controlled by the Electronic Voltage Regulator (EVR) circuitry, in the PCM. Battery temperature is determined from IAT. This temperature along with sensed line voltage, is used by the PCM to vary the battery charging rate. This is done by cycling the ground path to the other generator field terminal (Gen field driver).

SPEED CONTROL SYSTEM

The PCM controls vehicle speed by operation of the speed control servo vacuum and vent solenoids. Energizing the vacuum solenoid applies vacuum to the servo to increase throttle position. Operation of the vent solenoid slowly releases the vacuum allowing throttle position to decrease. A special dump solenoid allows immediate release of throttle position caused by braking, cruise control switch turned off, shifting into neutral, excessive RPM (tires spinning) depressing the clutch pedal or ignition key off.

3.2.4 PCM OPERATING MODES

As input signals to the powertrain control module (PCM) change, the PCM adjusts its response to output devices. For example, the PCM must calculate a different injector pulse width and ignition timing for idle than it does for wide open throttle. There are several different modes of operation that determine how the PCM responds to the various input signals.

There are two types of engine control operation: **open loop** and **closed loop.**

In open loop operation, the PCM receives input signals and responds according to preset programming. Inputs from the heated oxygen sensors are not monitored.

In closed loop operation, the PCM monitors the inputs from the heated oxygen sensors. This input indicates to the PCM whether or not the calculated injector pulse width results in the ideal air-fuel ratio of 14.7 parts air to 1 part fuel. By monitoring the exhaust oxygen content through the oxygen sensor, the PCM can fine tune injector pulse width. Fine tuning injector pulse width allows the PCM to achieve the lowest emission levels while maintaining optimum fuel economy.

The engine start-up (crank), engine warm-up, and wide open throttle modes are open loop modes. Under most operating conditions, closed loop modes occur with the engine at operating temperature.

IGNITION SWITCH ON (ENGINE OFF) MODE

When the ignition switch activates the fuel injection system, the following actions occur:

1. The PCM determines atmospheric air pressure from the MAP sensor input to determine basic fuel strategy.
2. The PCM monitors the engine coolant temperature sensor and throttle position sensor input. The PCM modifies fuel strategy based on this input.

When the key is in the on position and the engine is not running (zero rpm), the auto shutdown relay and fuel pump relay are not energized. Therefore, voltage is not supplied to the fuel pump, ignition coil, and fuel injectors.

Engine Start-up Mode - This is an open loop mode. The following actions occur when the starter motor is engaged:

1. The auto shutdown and fuel pump relays are energized. If the PCM does not receive the camshaft and crankshaft signal within approximately one second, these relays are de-energized.
2. The PCM energizes all fuel injectors until it determines crankshaft position from the camshaft and crankshaft signals. The PCM determines crankshaft position within one engine revolution. After the camshaft position has been determined, the PCM energizes the fuel injectors in sequence. The PCM adjusts the injector pulse width and synchronizes the fuel injectors by controlling the fuel injectors' ground paths.
3. Once the engine idles within 64 rpm of its target engine speed, the PCM compares the current MAP sensor value with the value received during the ignition switch on (zero rpm) mode. A diagnostic trouble code is written to PCM memory if a minimum difference between the two values is not found.

Once the auto shutdown and fuel pump relays have been energized, the PCM determines the fuel injector pulse width based on the following:

- engine coolant temperature
- manifold absolute pressure
- intake air temperature
- engine revolutions
- throttle position

The PCM determines the spark advance based on the following:

– engine coolant temperature
– crankshaft position
– intake air temperature
– manifold absolute pressure
– throttle position

Engine Warm-Up Mode - This is an open loop mode. The PCM adjusts injector pulse width and controls injector synchronization by controlling the fuel injectors' ground paths. The PCM adjusts ignition timing and engine idle speed. The PCM adjusts the idle speed by controlling the idle air control motor and spark advance.

Cruise or Idle Mode - When the engine is at normal operating temperature, this is a closed loop mode.

Acceleration Mode - This is a closed loop mode. The PCM recognizes an increase in throttle position and a decrease in manifold vacuum as engine load increases. In response, the PCM increases the injector pulse width to meet the increased load. The A/C compressor may be de-energized for a short period of time.

Deceleration Mode - This is a closed loop mode. The PCM recognizes a decrease in throttle position and an increase in manifold vacuum as engine load decreases. In response, the PCM decreases the injector pulse width to meet the decreased load. Full injector shut off may be obtained during high speed deceleration.

Wide Open Throttle Mode - This is an open loop mode. The throttle position sensor notifies the PCM of a wide open throttle condition. Once a wide open throttle is sensed, the PCM de-energizes the A/C compressor clutch relay for 20 seconds.

3.2.5 NON-MONITORED CIRCUITS

The PCM does not monitor the following circuits, systems, and conditions even though they could have malfunctions that result in driveability problems. A diagnostic code may not be displayed for the following conditions. However, problems with these systems may cause a diagnostic code to be displayed for other systems. For example, a fuel pressure problem will not register a diagnostic code directly, but could cause a rich or lean condition. This could cause an oxygen sensor, fuel system, or misfire monitor trouble code to be stored in the PCM.

Engine Timing - The PCM cannot detect an incorrectly indexed timing chain, camshaft sprocket, or crankshaft sprocket. The PCM also cannot detect an incorrectly indexed distributor.(*)

Fuel Pressure - Fuel pressure is controlled by the fuel pressure regulator. The PCM cannot detect a clogged fuel pump inlet filter, clogged in-line filter, or a pinched fuel supply.(*)

Fuel Injectors - The PCM cannot detect if a fuel injector is clogged, the pintle is sticking, or the wrong injectors are installed.(*)

Fuel Requirements - Poor quality gasoline can cause problems such as hard starting, stalling, and stumble. Use of methanol-gasoline blends may result in starting and driveability problems. (See individual symptoms and their definitions in Section 6.0 (Glossary of Terms).

PCM Grounds - The PCM cannot detect a poor system ground. However, a diagnostic trouble code may be stored in the PCM as a result of this condition.

Throttle Body Air Flow - The PCM cannot detect a clogged or restricted air cleaner inlet or filter element.(*)

Exhaust System - The PCM cannot detect a plugged, restricted, or leaking exhaust system.(*)

Cylinder Compression - The PCM cannot detect uneven, low, or high engine cylinder compression.(*)

Excessive Oil Consumption - Although the PCM monitors the exhaust stream oxygen content through the oxygen sensor when the system is in a closed loop, it cannot determine excessive oil consumption.

(*)NOTE: ANY OF THESE CONDITIONS COULD RESULT IN A RICH OR LEAN CONDITION CAUSING AN OXYGEN SENSOR TROUBLE CODE TO BE STORED IN THE PCM, OR THE VEHICLE MAY EXHIBIT ONE OR MORE OF THE DRIVEABILITY SYMPTOMS LISTED IN The TABLE OF CONTENTS.

3.2.6 SKIS OVERVIEW

The Sentry Key Immobilizer System (SKIS) is an immobilizer system designed to prevent unauthorized vehicle operation. The system consists of a Sentry Key Immobilizer Module (SKIM), ignition key(s) equipped with a transponder chip and engine controller. When the ignition switch is turned on, the SKIM interrogates the ignition key. If the ignition key is Valid the SKIM sends a PCI Bus message to the engine controller indicating the presence of a valid ignition key. Upon receiving a ″Valid″ key signal the PCM allows the engine to continue to operate.

3.2.7 SKIM ON-BOARD DIAGNOSTICS

The SKIM has been programmed to transmit and monitor many different coded messages as well as PCI Bus messages. This monitoring is called On-Board Diagnosis.

Certain criteria must be met for a diagnostic trouble code to be entered into the SKIM memory. The criteria may be a range of; Input voltage, PCI Bus message, or coded messages to the SKIM. If all of the criteria for monitoring a circuit or function are met and a fault is sensed, a diagnostic trouble code will be stored in the SKIM memory.

3.2.8 SKIS OPERATION

When ignition power is supplied to the SKIM, the SKIM performs an internal self-test. After the self-test is completed, the SKIM energizes the antenna (this activates the transponder chip) and sends a challenge to the transponder chip. The transponder chip responds to the challenge by generating an encrypted response message using the following:

Secret Key - This is an electronically stored value (identification number) that is unique to each SKIS. The secret key is stored in the SKIM, PCM and all ignition key transponders.

Challenger - This is a random number that is generated by the SKIM at each ignition key cycle.

The secret key and challenge are plugged into an algorithm that produces the encrypted response message. The transponder uses the crypto algorithm to receive, decode and respond to the message sent by SKIM. After responding to the coded message, the transponder sends a transponder ID message to the SKIM. The SKIM compares the transponder ID to the available valid key codes in SKIM memory (8 key maximum). After validating the key, the SKIM sends a PCI Bus message called a Seed Request to the engine controller then waits for a PCM response. If the PCM does not respond, the SKIM will send the seed request again. After three failed attempts the SKIM will stop sending the seed request and store a trouble code. If the PCM sends a seed response, the SKIM sends a valid/invalid key message to the PCM. This is an encrypted message that is generated using the following:

VIN - Vehicle Identification Number.

Seed - This is a random number that is generated by the PCM at each ignition key cycle.

The VIN and seed are plugged into a rolling code algorithm that encrypts the valid/invalid key message. The PCM uses the rolling code algorithm to receive, decode and respond to the valid/invalid key message sent by SKIM. After sending the valid/invalid key message the SKIM waits 3.5 seconds for a PCM status message from the PCM. If the PCM does not respond with a valid key message to the SKIM, a fault is detected and a trouble code stored.

The SKIS incorporates a red warning lamp located in the instrument cluster. The lamp is actuated when the SKIM sends a PCI Bus message to the instrument cluster requesting the lamp on. The SKIM will request lamp operation for the following:

- bulb checks at ignition on
- to alert the vehicle operator to a SKIS malfunction

For all faults except transponder faults and VIN mismatch, the lamp remains on steady. In the event of a transponder fault the light flashes at the rate of 1 Hz (once per second). If a fault is present the lamp will remain on or flashing for the complete ignition cycle. If a fault is stored in SKIM memory which prevents the system from operating properly, the PCM will allow the engine to start and run (for 2 seconds) up to six times. After the sixth attempt, the PCM disables the starter relay until the fault is corrected.

3.2.9 PROGRAMMING THE POWERTRAIN CONTROL MODULE

Important Note: Before replacing the PCM for a failed driver, control circuit or ground circuit, be sure to check the related component/circuit integrity for failures not detected due to a double fault in the circuit. Most PCM driver/control circuit failures are caused by internal failure to components (i.e. relay and solenoids) and short circuits (i.e. 12-volt pull-ups, drivers and ground sensors). These failures are difficult to detect when a double fault has occurred and only one DTC has set.

NOTE: If the PCM and the SKIM are replaced at the same time, program the VIN into the PCM first. All vehicle keys will then need to be replaced and programmed to the new SKIM.

The SKIS Secret Key is an ID code that is unique to each SKIS. This code is programmed and stored in the SKIM, PCM and transponder chip (ignition key). When replacing the PCM it is necessary to program the secret key into the PCM.

1. Turn the ignition on (transmission in park/neutral).
2. Use the DRB and select THEFT ALARM, SKIM then MISCELLANEOUS.
3. Select PCM REPLACED.
4. Enter secured access mode by entering the vehicle four-digit PIN.

NOTE: If three attempts are made to enter the secure access mode using an incorrect PIN, secured access mode will be locked out for one hour. To exit this lockout mode, turn the ignition to the RUN position for one hour then enter the correct PIN. (Ensure all accessories are turned off. Also, monitor the battery state and connect a battery charger if necessary).

5. Press ENTER to transfer the secret key (the SKIM will send the secret key to the PCM).

3.2.10 PROGRAMMING THE SENTRY KEY IMMOBILIZER MODULE

NOTE: If the PCM and the SKIM are replaced at the same time, program the VIN into the PCM first. All vehicle keys will then need to be replaced and programmed to the new SKIM.

1. Turn the ignition on (transmission in park/ neutral).
2. Use the DRB and select THEFT ALARM, ″SKIM″ then MISCELLANEOUS.
3. Select SKIM MODULE REPLACEMENT (GASOLINE).
4. Program the vehicle four-digit PIN into the SKIM.
5. Select COUNTRY CODE and enter the correct country.

NOTE: Be sure to enter the correct country code. If the incorrect country code is programmed into SKIM, the SKIM must be replaced

6. Select UPDATE VIN (the SKIM will learn the VIN from the PCM).
7. Press ENTER to transfer the VIN (the PCM will send the VIN to the SKIM).
8. The DRB will ask if you want to transfer the secret key. Select ENTER to transfer secret key from the PCM. This will ensure the current vehicle ignition keys will still operate the SKIS system.

3.2.11 PROGRAMMING THE IGNITION KEYS TO THE SENTRY KEY IMMOBILIZER MODULE

1. Turn the ignition on (transmission in park/ neutral).
2. Use the DRB and select THEFT ALARM, SKIM then MISCELLANEOUS.
3. Select PROGRAM IGNITION KEYS.
4. Enter secured access mode by entering the vehicle four-digit PIN.

NOTE: A maximum of eight keys can be learned to each SKIM. Once a key is learned to a SKIM it (the key) cannot be transferred to another vehicle.

If ignition key programming is unsuccessful, the DRB will display one of the following messages:

Programming Not Attempted

The DRB attempts to read the programmed key status and there are no keys programmed in the SKIM memory.

Programming Key Failed

(Possible Used Key From Wrong Vehicle) - SKIM is unable to program key due to one of the following:

– faulty ignition key transponder

– ignition key is programmed to another vehicle.

8 Keys Already Learned, Programming Not Done

SKIM transponder ID memory is full.

1. Obtain ignition keys to be programmed from customer (8 keys maximum)
2. Using the DRB, erase all ignition keys by selecting MISCELLANEOUS and ERASE ALL CURRENT IGN. KEYS
3. Program all ignition keys.

Learned Key In Ignition

Ignition key transponder ID is currently programmed in SKIM memory.

3.3 DIAGNOSTIC TROUBLE CODES

Each diagnostic trouble code is diagnosed by following a specific testing procedure. The diagnostic test procedures contain step-by-step instructions for determining the cause of trouble codes as well as no trouble code problems. It is not necessary to perform all of the tests in this book to diagnose an individual code.

Always begin by reading the diagnostic trouble codes using the DRBIII® (See Section 1.0).

3.3.1 HARD CODE

A diagnostic trouble code that comes back within one cycle of the ignition key is a hard code. This means that the defect is there every time the powertrain control module checks that circuit or function. Procedures in this manual verify if the trouble code is a hard code at a the beginning of each test. When it is not a hard code, an intermittent test must be performed.

Codes that are for Euro Stage III OBD monitors will not set with just the ignition key on. Comparing these to non-emission codes, they will seem like an intermittent. These codes require a set of parameters to be performed (The DRBIII® pre-test screens will help with this for MONITOR codes), this is called a “TRIP”. All Euro Stage III OBD DTCs will be set after one or in some cases two trip failures, and the MIL will be turned on. These codes require three successful (no failures) TRIPS to extinguish the MIL, followed by 40 warm-up cycles to erase the code. For further explanation of TRIPS, Pre-test screens, Warm-up cycles, and the use of a the DRBIII®, refer to the On Board Diagnostic training booklet #81-699-97094.

3.3.2 INTERMITTENT CODE

A diagnostic trouble code that is not there every time the PCM checks the circuit is an intermittent code. Most intermittent codes are caused by wiring or connector problems. Defects that come and go like this are the most difficult to diagnose; they must be looked for under specific conditions that

cause them. The following checks may assist you in identifying a possible intermittent problem:

- Visually inspect related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.
- Visually inspect the related harnesses. Look for chafed, pierced, or partially broken wire.
- Refer to any Hotline Newsletters or technical service bulletins that may apply.
- Use the DRBIII® data recorder or co-pilot.
- Use the DRBIII® PEP module lab scope.

3.3.3 RESET COUNTER

The reset counter counts the number of times the vehicle has been started since codes were last set, erased, or the battery was disconnected. The reset counter will count up to 255 start counts.

The number of starts helps determine when the trouble code actually happened. This is recorded by the PCM and can be viewed on the DRBIII® as STARTS since set.

When there are no trouble codes stored in memory, the DRBIII® will display "NO DTC'S Detected" and the reset counter will show "STARTS since clear = XXX."

3.3.4 HANDLING NO TROUBLE CODE PROBLEMS

Symptom checks cannot be used properly unless the driveability problem characteristic actually happens while the vehicle is being tested.

Select the symptom that most accurately describes the vehicle's driveability problem and then perform the test routine that pertains to this symptom. Perform each routine test in sequence until the problem is found. For definitions, see Section 6.0 Glossary of Terms.

SYMPTOM	DIAGNOSTIC TEST
HARD START	CHECKING SECONDARY IGNITION SYSTEM
	CHECKING ENGINE VACUUM
	CHECKING THE FUEL DELIVERY
	CHECKING COOLANT SENSOR CALIBRATION
	CHECKING THROTTLE POSITION SENSOR CALIBRATION
	CHECKING MAP SENSOR CALIBRATION
	CHECKING THE MINIMUM IDLE AIR FLOW
	CHECKING IDLE AIR CONTROL MOTOR OPERATION
	CHECKING ENGINE MECHANICAL SYSTEMS
	CHECKING EVAP EMISSION SYSTEM
	CHECKING EGR SYSTEM (IF EQUIPPED)
	CHECKING IAT SENSOR
START AND STALL	CHECKING SECONDARY IGNITION SYSTEM
	CHECKING PCM POWER AND GND CKT
	CHECKING THE FUEL DELIVERY
	CHECKING COOLANT SENSOR CALIBRATION
	CHECKING THROTTLE POSITION SENSOR CALIBRATION
	CHECKING MAP SENSOR CALIBRATION
	CHECKING THE MINIMUM IDLE AIR FLOW
	CHECKING IDLE AIR CONTROL MOTOR OPERATION
HESITATION/SAG/ STUMBLE	CHECKING SECONDARY IGNITION SYSTEM
	CHECKING PCM POWER AND GND CKT
	CHECKING ENGINE VACUUM
	CHECKING THE FUEL DELIVERY
	CHECKING COOLANT SENSOR CALIBRATION
	CHECKING THROTTLE POSITION SENSOR CALIBRATION
	CHECKING MAP SENSOR CALIBRATION
	CHECKING THE MINIMUM IDLE AIR FLOW
	CHECKING IDLE AIR CONTROL MOTOR OPERATION
	CHECKING ENGINE MECHANICAL SYSTEMS
	CHECKING EVAP EMISSION SYSTEM
	CHECKING EGR SYSTEM (IF EQUIPPED)
	CHECKING IAT SENSOR
	CHECKING PNP SWITCH

SYMPTOM	DIAGNOSTIC TEST
SURGE	CHECKING SECONDARY IGNITION SYSTEM CHECKING PCM POWER AND GND CKT CHECKING THE FUEL DELIVERY CHECKING COOLANT SENSOR CALIBRATION CHECKING THROTTLE POSITION SENSOR CALIBRATION CHECKING MAP SENSOR CALIBRATION CHECKING THE MINIMUM IDLE AIR FLOW CHECKING IDLE AIR CONTROL MOTOR OPERATION CHECKING EVAP EMISSION SYSTEM
LACK OF POWER/ SLUGGISH	CHECKING SECONDARY IGNITION SYSTEM CHECKING PCM POWER AND GND CKT CHECKING THE FUEL DELIVERY CHECKING COOLANT SENSOR CALIBRATION CHECKING THROTTLE POSITION SENSOR CALIBRATION CHECKING MAP SENSOR CALIBRATION CHECKING THE MINIMUM IDLE AIR FLOW CHECKING IDLE AIR CONTROL MOTOR OPERATION CHECKING EGR SYSTEM (IF EQUIPPED)
SPARK KNOCK/ DETONATION	CHECKING SECONDARY IGNITION SYSTEM CHECKING PCM POWER AND GND CKT CHECKING THE FUEL DELIVERY CHECKING COOLANT SENSOR CALIBRATION CHECKING THROTTLE POSITION SENSOR CALIBRATION CHECKING MAP SENSOR CALIBRATION CHECKING THE MINIMUM IDLE AIR FLOW CHECKING IDLE AIR CONTROL MOTOR OPERATON CHECKING EVAP EMISSION SYSTEM
CUTS OUT/MISSES	CHECKING SECONDARY IGNITION SYSTEM CHECKING PCM POWER AND GND CKT CHECKING THE FUEL DELIVERY CHECKING THE MINIMUM IDLE AIR FLOW CHECKING IDLE AIR CONTROL MOTOR OPERATION CHECKING EGR SYSTEM (IF EQUIPPED)
BACKFIRE/POPBACK	CHECKING SECONDARY IGNITION SYSTEM CHECKING PCM POWER AND GND CKT CHECKING THE FUEL DELIVERY CHECKING MAP SENSOR CALIBRATION CHECKING THE MINIMUM IDLE AIR FLOW CHECKING FOR OXYGEN SENSOR SWITCHING CHECKING EGR SYSTEM (IF EQUIPPED)

SYMPTOM	DIAGNOSTIC TEST
RUNS ROUGH/ UNSTABLE/ERRATIC IDLE	CHECKING SECONDARY IGNITION SYSTEM CHECKING PCM POWER AND GND CKT CHECKING ENGINE VACUUM CHECKING THE FUEL DELIVERY CHECKING COOLANT SENSOR CALIBRATION CHECKING THROTTLE POSITION SENSOR CALIBRATION CHECKING MAP SENSOR CALIBRATION CHECKING THE MINIMUM IDLE AIR FLOW CHECKING IDLE AIR CONTROL MOTOR OPERATION CHECKING ENGINE MECHANICAL SYSTEMS CHECKING EVAP EMISSION SYSTEM CHECKING EGR SYSTEM (IF EQUIPPED) CHECKING IAT SENSOR CHECKING PNP SWITCH
POOR FUEL ECONOMY	CHECKING SECONDARY IGNITION SYSTEM CHECKING PCM POWER AND GND CKT CHECKING ENGINE VACUUM CHECKING THE FUEL DELIVERY CHECKING COOLANT SENSOR CALIBRATION CHECKING THROTTLE POSITION SENSOR CALIBRATION CHECKING MAP SENSOR CALIBRATION CHECKING THE MINIMUM IDLE AIR FLOW CHECKING IDLE AIR CONTROL MOTOR OPERATION CHECKING ENGINE MECHANICAL SYSTEMS CHECKING EVAP EMISSION SYSTEM CHECKING EGR SYSTEM (IF EQUIPPED) CHECKING IAT SENSOR CHECKING PNP SWITCH

3.3.5 NO START INFORMATION

Important Note:

If the Powertrain Control Module has been changed and the correct VIN and mileage have not been programmed, a DTC will be set in the ABS, Airbag and SKIM modules when equipped. In addition, if the vehicle is equipped with a Sentry Key immobilizer Module (SKIM), Secret Key data must be updated to enable starting.

3.4 USING THE DRBIII®

Refer to the DRB user's guide for instructions and assistance with reading trouble codes, erasing trouble codes, and other DRB functions.

3.5 DRBIII® ERROR MESSAGES AND BLANK SCREEN

Under normal operation, the DRBIII® will display one of only two error messages:

– User-Requested WARM Boot or User-Requested COLD Boot

This is a sample of such an error message display:

```
ver: 2.14
date: 26 Jul93
file: key_itf.cc
date: Jul 26 1993
line: 548
err: 0x1
User-Requested COLD Boot

Press MORE to switch between this display
  and the application screen.
Press F4 when done noting information.
```

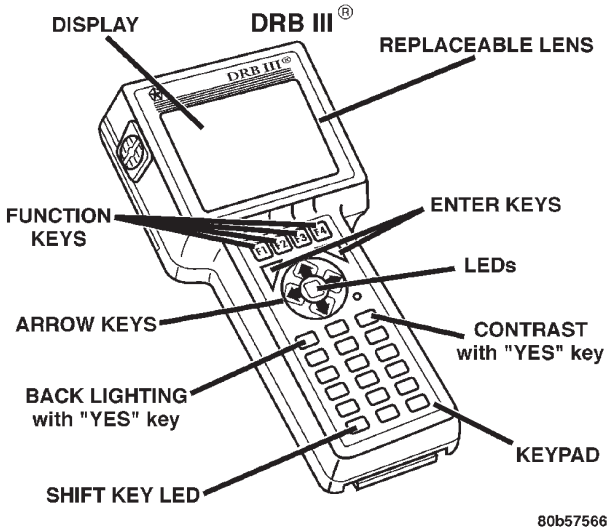
3.5.1 DRBIII® DOES NOT POWER UP

If the LED's do not light or no sound is emitted at start up, check for loose cable connections or a bad cable. Check the vehicle battery voltage (data link connector cavity 16). A minimum of 11 volts is required to adequately power the DRBIII®.

If all connections are proper between the DRBIII® and vehicle or other devices, and the vehicle battery is fully charged, an inoperative DRBIII® may be the result of a faulty cable or vehicle wiring. For a blank screen, refer to the appropriate diagnostics procedure.

3.5.2 DISPLAY IS NOT VISIBLE

Low temperatures will affect the visibility of the display. Adjust the contrast to compensate for this condition.



4.0 DISCLAIMERS, SAFETY, WARNINGS

4.1 DISCLAIMERS

All information, illustrations, and specifications contained in this manual are based on the latest information available at the time of publication. The right is reserved to make changes at any time without notice.

4.2 SAFETY

4.2.1 TECHNICIAN SAFETY INFORMATION

WARNING: ENGINES PRODUCE CARBON MONOXIDE THAT IS ODORLESS, CAUSES SLOWER REACTION TIME, AND CAN LEAD TO SERIOUS INJURY. WHEN THE ENGINE IS OPERATING, KEEP SERVICE AREAS WELL VENTILATED OR ATTACH THE VEHICLE EXHAUST SYSTEM TO THE SHOP EXHAUST REMOVAL SYSTEM.

Set the parking brake and block the wheels before testing or repairing the vehicle. It is especially important to block the wheels on front-wheel drive vehicles; the parking brake does not hold the drive wheels.

When servicing a vehicle, always wear eye protection, and remove any metal jewelry such as watchbands or bracelets that might make an inadvertent electrical contact.

When diagnosing a powertrain system problem, it is important to follow approved procedures where applicable. These procedures can be found in the service manual procedures. Following these procedures is very important to the safety of individuals performing diagnostic tests.

4.2.2 VEHICLE PREPARATION FOR TESTING

Make sure the vehicle being tested has a fully charged battery. If it does not, false diagnostic codes or error messages may occur.

4.2.3 SERVICING SUB-ASSEMBLIES

Some components of the powertrain system are intended to be serviced in assembly only. Attempting to remove or repair certain system subcomponents may result in personal injury and/or improper system operation. Only those components with approved repair and installation procedures in the service manual should be serviced.

4.2.4 DRBIII® SAFETY INFORMATION

WARNING: EXCEEDING THE LIMITS OF THE DRBIII® MULTIMETER IS DANGEROUS. IT CAN EXPOSE YOU TO SERIOUS INJURY. CAREFULLY READ AND UNDERSTAND THE CAUTIONS AND THE SPECIFICATION LIMITS.

Follow the vehicle manufacturer's service specifications at all times.

- Do not use the DRBIII® if it has been damaged.
- Do not use the test leads if the insulation is damaged or if metal is exposed.
- To avoid electrical shock, do not touch the test leads, tips or the circuit being tested.
- Choose the proper range and function for the measurement. Do not try voltage or current measurements that may exceed the rated capacity.
- Do not exceed the limits shown in the table below:

FUNCTION	INPUT LIMIT
Volts	0 - 500 peak volts AC 0 - 500 volts DC
Ohms (resistance)*	0 -1.12 megohms
Frequency Measured Frequency Generated	0 - 10 kHz
Temperature	-58 - 1100°F -50 - 600°C

* Ohms cannot be measured if voltage is present. Ohms can be measured only in a non-powered circuit.

- Voltage between any terminal and ground must not exceed 500v DC or 500v peak AC.

- Use caution when measuring voltage above 25v DC or 25v AC.
- The circuit being tested must be protected by a 10A fuse or circuit breaker.
- Use the low current shunt to measure circuits up to 10A. Use the high current clamp to measure circuits exceeding 10A.
- When testing for the presence of voltage or current, make sure the meter is functioning correctly. Take a reading of a known voltage or current before accepting a zero reading.
- When measuring current, connect the meter in series with the load.
- Disconnect the live test lead before disconnecting the common test lead.
- When using the meter function, keep the DRBIII® away from spark plug or coil wires to avoid measuring error from outside interference.

4.3 WARNINGS AND CAUTIONS

4.3.1 ROAD TEST WARNINGS

Some complaints will require a test drive as part of the repair verification procedure. The purpose of the test drive is to try to duplicate the diagnostic code or symptom condition.

CAUTION: BEFORE ROAD TESTING A VEHICLE, BE SURE THAT ALL COMPONENTS ARE REASSEMBLED. DURING THE TEST DRIVE, DO NOT TRY TO READ THE DRB SCREEN WHILE IN MOTION. DO NOT HANG THE DRB FROM THE REAR VIEW MIRROR OR OPERATE IT YOURSELF. HAVE AN ASSISTANT AVAILABLE TO OPERATE THE DRB.

4.3.2 VEHICLE DAMAGE CAUTIONS

Before disconnecting any control module, make sure the ignition is off. Failure to do so could damage the module.

When testing voltage or continuity at any control module, use the terminal side (not the wire end) of the connector. Do not probe a wire through the insulation; this will damage it and eventually cause it to fail because of corrosion.

Be careful when performing electrical tests so as to prevent accidental shorting of terminals. Such mistakes can damage fuses or components. Also, a second code could be set, making diagnosis of the original problem more difficult.

5.0 RECOMMENDED TOOLS AND EQUIPMENT

DRBIII® (diagnostic read-out box) scan tool
fuel pressure adapter (C-6631) or #6539
fuel pressure kit (C-4799-B) or #5069
fuel release hose (C-4799-1)
Min Air flow fitting #6457
jumper wires
ohmmeter
oscilloscope
vacuum gauge
voltmeter
12 volt test light minimum 25 ohms resistance with probe #6801

CAUTION: A 12 VOLT TEST LIGHT SHOULD NOT BE USED FOR THE FOLLOWING CIRCUITS, DAMAGE TO THE POWERTRAIN CONTROLLER WILL OCCUR.

- 5 Volt Supply
- 8 Volt Supply
- J1850 PCI Bus
- CCD Bus
- CKP Sensor Signal
- CMP Sensor Signal
- Vehicle Speed Sensor Signal
- O2 Sensor Signal

6.0 GLOSSARY OF TERMS

ABS	antilock brake system
backfire, popback	fuel ignites in either the intake or the exhaust system
CKP	crank position sensor
CMP	camshaft position sensor
cuts out, misses	a steady pulsation or the inability of the engine to maintain a consistent rpm
DLC	data link connector (previously called engine diagnostic connector)
detonation, spark knock	a mild to severe ping, especially under loaded engine conditions
ECT	engine coolant temperature sensor
EGR	exhaust gas recirculation valve and system
generator	previously called alternator

hard start	The engine takes longer than usual to start, even though it is able to crank normally.
hesitation, sag, stumble	There is a momentary lack of response when the throttle is opened. This can occur at all vehicle speeds. If it is severe enough, the engine may stall.
IAT	Inlet/intake air temperature sensor
IAC	idle air control valve
JTEC	Combined engine and transmission control module
lack of power, sluggish	The engine has less than expected power, with little or no increase in vehicle speed when the throttle is opened.
LDP	Leak Detection Pump
MAP	manifold absolute pressure sensor
MIL	malfunction indicator lamp
MTV	manifold tuning valve
O2S	oxygen sensor
PCI	programable communications interface
PCM	powertrain control module
PCV	positive crankcase ventilation
PEP	Peripheral Expansion Port
poor fuel economy	There is significantly less fuel mileage than other vehicles of the same design and configuration
rough, unstable, or erratic idle stalling	The engine runs unevenly at idle and causes the engine to shake if it is severe enough. The engine idle rpm may vary (called “hunting”). This condition may cause stalling if it is severe enough.
SBEC	Single Board Engine Controller
SKIM	sentry key immobilizer module
SKIS	sentry key immobilizer system
start and stall	The engine starts but immediately dies.
surge	engine rpm fluctuation without corresponding change in throttle position sensor
TPS	throttle position sensor
TRS	transmission range sensor
VSS	vehicle speed sensor/signal

NOTES

7.0

DIAGNOSTIC INFORMATION AND PROCEDURES

Symptom:
P0622-GENERATOR FIELD NOT SWITCHING PROPERLY

POSSIBLE CAUSES
GENERATOR FIELD WIRING HARNESS INTERMITTENT PROBLEM
GENERATOR FIELD WIRING HARNESS OBSERVABLE PROBLEM
ASD RELAY OUTPUT CIRCUIT OPEN
GENERATOR FIELD DRIVER CIRCUIT OPEN
GENERATOR FIELD DRIVER CIRCUIT SHORTED TO GROUND
GENERATOR FIELD RESISTANCE >= 5.0 OHMS
POWERTRAIN CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, actuate the Generator Field Driver Circuit. Using a 12-volt test light, backprobe the Generator Field Driver Circuit at the back of the Generator. Did the light blink? Yes → Go To 2 No → Go To 4	All
2	Ignition on, engine not running. With the DRBIII® actuate the Generator Field Driver Circuit. **Note: Actuator Test should still be running.** Wiggle Wiring Harness from the Generator to PCM. With the DRBIII®, read DTC's. Does the Generator Field Driver (-) Circuit code return? Yes → Repair as necessary where wiggling caused problem to appear. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 3	All
3	Turn the ignition off. Using the schematic as a guide, inspect the Wiring and Connectors. Were any problems found? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Test Complete.	All
4	Ignition on, engine not running. With the DRBIII®, record all DTC's and freeze frame data, then erase Codes. Carefully inspect all Connectors for corrosion or spread Terminals before continuing. With the DRBIII® actuate the Generator Field Driver Circuit. Backprobe the ASD Relay Output Circuit at back of Generator. Is the voltage above 10.0 volts? Yes → Go To 5 No → Repair the open ASD Relay Output Circuit. Perform POWERTRAIN VERIFICATION TEST VER - 3.	All

P0622-GENERATOR FIELD NOT SWITCHING PROPERLY — Continued

TEST	ACTION	APPLICABILITY
5	Turn the ignition off. Disconnect the PCM harness connector(s). Disconnect the Generator Field harness connector. Measure the Generator Field Driver Circuit from PCM Connector to ground. Is the resistance below 5.0 ohms? Yes → Repair the Generator Field Driver Circuit shorted to ground. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 6	All
6	Turn the ignition off. Disconnect the PCM harness connectors. Disconnect the Generator Field harness connector. **Note: Check Connectors - Clean/repair as necessary.** Measure the Generator Field Driver Circuit from PCM to Generator. Is the resistance below 5.0 ohms? Yes → Go To 7 No → Repair the open Generator Field Driver Circuit. Perform POWERTRAIN VERIFICATION TEST VER - 3.	All
7	Turn the ignition off. Disconnect the Generator Field harness connector at back of the Generator. **Note: Check connectors - Clean/repair as necessary.** Measure resistance across the Generator Field Terminals at the Generator. Is the resistance below 5.0 ohms? Yes → Repair the Generator as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 8	All
8	If there are no possible causes remaining. View repair options. Repair Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 3.	All

Symptom:
P1594-CHARGING SYSTEM VOLTAGE TOO HIGH

POSSIBLE CAUSES
GENERATOR FIELD DRIVER CIRCUIT SHORTED TO GROUND
GENERATOR FIELD SHORTED TO GROUND
PCM (BATTERY TEMPERATURE)
POWERTRAIN CONTROL MODULE (BATTERY VOLTAGE)
POWERTRAIN CONTROL MODULE (GENERATOR RESISTANCE)

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With DRBIII®, actuate the Generator Field Driver. With a 12-volt test light, backprobe the Generator Field Driver Circuit in back of Generator. Did the light blink? Yes → Go To 2 No → Go To 5	All
2	Ignition on, engine not running. With the DRBIII®, actuate the Generator Field Driver. With DRBIII®, stop the Generator Field Driver actuation. With DRBIII®, read the Target Charging voltage. Is the Target Charging voltage above 13 volts? Yes → Go To 3 No → Go To 4	All
3	Start the engine. Manually set the engine speed to 1600 RPM. With DRBIII®, read both the Battery voltage and the Target Charging voltage. Compare the ″Target Voltage″ to the ″Battery Voltage″ reading. Monitor voltage for 5 minutes, if necessary. Look for a 1.0 volt difference or more. Was there more than a 1.0 volt difference? Yes → Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Test Complete.	All
4	Turn the ignition off. **Note: Battery must be fully charged.** **Note: Generator Belt tension and condition must be checked before continuing.** Start engine and allow it to reach operating temperature. With the DRBIII® in Inputs/Outputs, read the Batt/Amb Temperature sensor. Using a Thermometer, measure under hood temperature. Is the temperature within 10 F degrees of Battery temperature? Yes → Test Complete. No → Replace Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 3.	All

P1594-CHARGING SYSTEM VOLTAGE TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
5	Ignition on, engine not running. With the DRBIII®, actuate the Generator Field Driver. With DRBIII®, stop the Generator Field Driver actuation. With DRBIII®, read the Target Charging voltage. Is the Target Charging voltage above 13 volts? Yes → Go To 6 No → Go To 9	All
6	Start the engine. Manually set the engine speed to 1600 RPM. With DRBIII®, read both the Battery voltage and the Target Charging voltage. Compare the ″Target Voltage″ to the ″Battery Voltage″ reading. Monitor voltage for 5 minutes, if necessary. Look for a 1.0 volt difference or more. Was there more than a 1.0 volt difference? Yes → Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 7	All
7	Turn the ignition off. Disconnect the PCM harness connector(s). Disconnect the Generator Field harness connector. Measure the Generator Field Driver Circuit from PCM Connector to ground. Is the resistance below 5.0 ohms? Yes → Repair the Generator Field Driver Circuit shorted to ground. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 8	All
8	Turn the ignition off. Disconnect the Field Harness Connector at back of the Generator. **Note: Check connectors - Clean/repair as necessary.** Measure resistance of the Generator Field Driver Circuit at the Generator to Ground. Is the resistance below 5.0 ohms? Yes → Repair or replace the shorted Generator as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 12	All
9	Turn the ignition off. Disconnect the PCM harness connector(s). Disconnect the Generator Field harness connector. Measure the Generator Field Driver Circuit from PCM Connector to ground. Is the resistance below 5.0 ohms? Yes → Repair the Generator Field Driver Circuit shorted to ground. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 10	All

P1594-CHARGING SYSTEM VOLTAGE TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
10	Turn the ignition off. Disconnect the Field Harness Connector at back of the Generator. **Note: Check connectors - Clean/repair as necessary.** Measure resistance of the Generator Field Driver Circuit at the Generator to Ground. Is the resistance below 5.0 ohms? Yes → Repair or replace the shorted Generator as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 11	All
11	Turn the ignition off. **Note: Battery must be fully charged.** **Note: Generator Belt tension and condition must be checked before continuing.** Start engine and allow it to reach operating temperature. With the DRBIII® in Inputs/Outputs, read the Batt/Amb Temperature sensor. Using a Thermometer, measure under hood temperature. Is the temperature within 10 F degrees of Battery temperature? Yes → Go To 12 No → Replace Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 3.	All
12	If there are no possible causes remaining. View repair options. Repair Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 3.	All

Symptom:
P1682-CHARGING SYSTEM VOLTAGE LOW

POSSIBLE CAUSES
B (+) CIRCUIT HIGH RESISTANCE
GENERATOR GROUND HIGH RESISTANCE
ASD RELAY OUTPUT CIRCUIT OPEN
ASD RELAY OUTPUT CIRCUIT SHORTED TO GROUND
GENERATOR FIELD DRIVER CIRCUIT OPEN
GENERATOR FIELD DRIVER CIRCUIT SHORTED TO GROUND
PCM
PCM (CHARGING SYSTEM VOLTAGE LOW)

TEST	ACTION	APPLICABILITY
1	Ignition on, engine not running. With the DRBIII®, actuate the Generator Field. Measure the voltage at both Generator Field Terminals. Is the voltage below 3.0 volts at either Terminal? Yes → Go To 2 No → Go To 16	All
2	Ignition on, engine not running. With the DRBIII®, record all DTC's and freeze frame data, then erase Codes. Carefully inspect all Connectors for corrosion or spread Terminals before continuing. With the DRBIII® actuate the Generator Field Driver Circuit. Backprobe the ASD Relay Output Circuit at back of Generator. Is the voltage above 10.0 volts? Yes → Go To 3 No → Repair the open ASD Relay Output Circuit. Perform POWERTRAIN VERIFICATION TEST VER - 3.	All
3	Turn the ignition off. **Note: Battery must be fully charged.** **Note: Generator Belt tension and condition must be checked before continuing.** Start the engine. With theDRBIII®, read the target charging voltage. Is the target charging voltage above 15.1 volts? Yes → Go To 4 No → Go To 9	All

P1682-CHARGING SYSTEM VOLTAGE LOW — Continued

TEST	ACTION	APPLICABILITY
4	**Caution: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.** Start the engine. Turn on all accessories, manually set engine speed to 1600 RPM. With DRBIII®, read Target Charging and Charging voltage. Compare the two readings. Is there more than a 1.0 volt difference? Yes → Go To 5 No → Go To 5	All
5	Turn the ignition off. Disconnect the PCM harness connector(s). Disconnect the Generator Field harness connector. Measure the Generator Field Driver Circuit from PCM Connector to ground. Is the resistance below 5.0 ohms? Yes → Repair the Generator Field Driver Circuit shorted to ground. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 6	All
6	Turn the ignition off. Remove the ASD Relay from the PDC. Disconnect the generator field harness connector. **Note: Check Connectors - Clean/repair as necessary.** Measure the ASD Relay Output Circuit from ASD Relay cavity in PDC to ground. Is the resistance below 5.0 ohms? Yes → Repair the ASD Relay Output Circuit shorted to ground. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 7	All
7	Turn the ignition off. Disconnect the PCM harness connectors. Disconnect the Generator Field harness connector. **Note: Check Connectors - Clean/repair as necessary.** Measure the Generator Field Driver Circuit from PCM to Generator. Is the resistance below 5.0 ohms? Yes → Go To 8 No → Repair the open Generator Field Driver Circuit. Perform POWERTRAIN VERIFICATION TEST VER - 3.	All
8	Start the engine. Warm the engine to operating temperature. **Caution: Ensure all wires are clear of the engine's moving parts.** Measure voltage between the Generator case and Battery (-) Post. Is the voltage above 0.1 volt? Yes → Repair Generator Ground for high resistance, Generator Case to Battery (-) side. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 15	All

P1682-CHARGING SYSTEM VOLTAGE LOW — Continued

TEST	ACTION	APPLICABILITY
9	Turn ignition on, engine not running. Measure voltage between the Generator B(+) Terminal and the Battery (+) Post. **Caution: Ensure all wires are clear of the engine's moving parts.** Start the engine. Is the voltage above 0.4 volt? Yes → Repair the B(+) Circuit for high resistance between the Generator and Battery. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 10	All
10	Start the engine. Warm the engine to operating temperature. **Caution: Ensure all wires are clear of the engine's moving parts.** Measure voltage between the Generator case and Battery (-) Post. Is the voltage above 0.1 volt? Yes → Repair Generator Ground for high resistance, Generator Case to Battery (-) side. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 11	All
11	**Caution: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.** Start the engine. Turn on all accessories, manually set engine speed to 1600 RPM. With DRBIII®, read Target Charging and Charging voltage. Compare the two readings. Is there more than a 1.0 volt difference? Yes → Go To 12 No → Go To 12	All
12	Turn the ignition off. Disconnect the PCM harness connector(s). Disconnect the Generator Field harness connector. Measure the Generator Field Driver Circuit from PCM Connector to ground. Is the resistance below 5.0 ohms? Yes → Repair the Generator Field Driver Circuit shorted to ground. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 13	All
13	Turn the ignition off. Remove the ASD Relay from the PDC. Disconnect the generator field harness connector. **Note: Check Connectors - Clean/repair as necessary.** Measure the ASD Relay Output Circuit from ASD Relay cavity in PDC to ground. Is the resistance below 5.0 ohms? Yes → Repair the ASD Relay Output Circuit shorted to ground. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 14	All

P1682-CHARGING SYSTEM VOLTAGE LOW — Continued

TEST	ACTION	APPLICABILITY
14	Turn the ignition off. Disconnect the PCM harness connectors. Disconnect the Generator Field harness connector. **Note: Check Connectors - Clean/repair as necessary.** Measure the Generator Field Driver Circuit from PCM to Generator. Is the resistance below 5.0 ohms? Yes → Go To 15 No → Repair the open Generator Field Driver Circuit. Perform POWERTRAIN VERIFICATION TEST VER - 3.	All
15	If there are no possible causes remaining. View repair options. Repair Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 3.	All
16	Turn the ignition off. **Note: Battery must be fully charged.** **Note: Generator Belt tension and condition must be checked before continuing.** Start the engine. With theDRBIII®, read the target charging voltage. Is the target charging voltage above 15.1 volts? Yes → Go To 17 No → Go To 18	All
17	**Caution: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.** Start the engine. Turn on all accessories, manually set engine speed to 1600 RPM. With DRBIII®, read Target Charging and Charging voltage. Compare the two readings. Is there more than a 1.0 volt difference? Yes → Test Complete. No → Test Complete.	All
18	**Caution: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.** Start the engine. Turn on all accessories, manually set engine speed to 1600 RPM. With DRBIII®, read Target Charging and Charging voltage. Compare the two readings. Is there more than a 1.0 volt difference? Yes → Go To 19 No → Go To 19	All

P1682-CHARGING SYSTEM VOLTAGE LOW — Continued

TEST	ACTION	APPLICABILITY
19	Turn ignition on, engine not running. Measure voltage between the Generator B(+) Terminal and the Battery (+) Post. **Caution: Ensure all wires are clear of the engine's moving parts.** Start the engine. Is the voltage above 0.4 volt? Yes → Repair the B(+) Circuit for high resistance between the Generator and Battery. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 20	All
20	Start the engine. Warm the engine to operating temperature. **Caution: Ensure all wires are clear of the engine's moving parts.** Measure voltage between the Generator case and Battery (-) Post. Is the voltage above 0.1 volt? Yes → Repair Generator Ground for high resistance, Generator Case to Battery (-) side. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Test Complete.	All

Symptom:

***CHECKING CHARGING SYSTEM OPERATION WITH NO DTC'S PRESENT**

POSSIBLE CAUSES
B (+) CIRCUIT HIGH RESISTANCE
GENERATOR GROUND HIGH RESISTANCE
B(+) CIRCUIT HIGH RESISTANCE (1.0 VOLT)
GENERATOR BELT OBSERVABLE PROBLEM
GENERATOR FIELD TERMINAL INTERMITTENT PROBLEM
TROUBLE CODES PRESENT
TROUBLE CODES PRESENT 2000 RPM
PCM (CHARGING SYSTEM NO CODE)

TEST	ACTION	APPLICABILITY
1	Turn the ignition off. **Note: Battery condition must be verified prior to this test.** Inspect the Generator Belt tension and condition. Is the Generator Belt OK? Yes → Go To 2 No → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 3.	All
2	Start the engine. Turn on all accessories. Raise engine speed to 2000 RPM for 30 seconds then return to idle. With the DRBIII®, read DTC's. Are there any ″Charging System″ Trouble Codes? Yes → Refer to Symptom list for problems related to Charging. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 3	All
3	Ignition on, engine not running. With the DRBIII®, actuate the Generator Field. Using a 12-volt test light, backprobe the Generator Field Driver Terminal at the back of the Generator. **Note: The test light should blink On and Off every 1.4 seconds.** While monitoring the 12-volt test light, wiggle the Field Terminals back to the PCM and ASD Relay. Was there any interruption in the normal cycle of the test light? Yes → Repair the wire where wiggling interrupted the voltage cycle. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 4	All

*CHECKING CHARGING SYSTEM OPERATION WITH NO DTC'S PRESENT — Continued

TEST	ACTION	APPLICABILITY
4	Ignition on, engine not running. With the DRBIII®, read DTC's. Are there any ″Charging System″ trouble codes? Yes → Refer to Symptom list for problems related to Charging. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 5	All
5	Turn ignition on, engine not running. Measure voltage between the Generator B(+) Terminal and the Battery (+) Post. **Caution: Ensure all wires are clear of the engine's moving parts.** Start the engine. Is the voltage above 0.4 volt? Yes → Repair the B(+) Circuit for high resistance between the Generator and Battery. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 6	All
6	Start the engine. Warm the engine to operating temperature. **Caution: Ensure all wires are clear of the engine's moving parts.** Measure voltage between the Generator case and Battery (-) Post. Is the voltage above 0.1 volt? Yes → Repair Generator Ground for high resistance, Generator Case to Battery (-) side. Perform POWERTRAIN VERIFICATION TEST VER - 3. No → Go To 7	All
7	Ignition on, engine not running. With the DRBIII®, read the Battery voltage and record the results. Measure Battery voltage B(+) to B(-) Terminal and record the results. Compare the two voltage readings. Is the voltage difference less than one volt? Yes → Test Complete. No → Go To 8	All
8	Ignition on, engine not running. With the DRBIII®, read the Battery voltage and record the results. Turn the Ignition off. Disconnect the PCM harness connector(s). **Note: Check connectors - Clean/repair as necessary.** Ignition on, engine not running. Measure the Fused B(+) at PCM Connector. Is the voltage within one volt of the DRB recorded reading? Yes → Go To 9 No → Repair the B(+) Circuit for high resistance between the PCM and the Battery. Perform POWERTRAIN VERIFICATION TEST VER - 3.	All

*CHECKING CHARGING SYSTEM OPERATION WITH NO DTC'S PRESENT — Continued

TEST	ACTION	APPLICABILITY
9	If there are no possible causes remaining, View repair options. Repair Replace the PCM. Perform POWERTRAIN VERIFICATION TEST VER - 3.	All

Symptom List:

P0600-PCM FAILURE SPI COMMUNICATIONS
P0601-PCM INTERNAL CONTROLLER FAILURE

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0600-PCM FAILURE SPI COMMUNICATIONS.

When Monitored and Set Condition:

P0600-PCM FAILURE SPI COMMUNICATIONS

When Monitored: Ignition key on.

Set Condition: Internal Bus communication failure between processors.

P0601-PCM INTERNAL CONTROLLER FAILURE

When Monitored: Ignition key on.

Set Condition: Internal checksum for software failed, does not match calculated value.

POSSIBLE CAUSES
PCM (INTERNAL OR SPI)

TEST	ACTION	APPLICABILITY
1	The Powertrain Control Module is reporting internal errors and must be replaced. View repair. Repair Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

Symptom:
P1685-INVALID SKIM KEY

When Monitored and Set Condition:

P1685-INVALID SKIM KEY

When Monitored: At ignition key on.

Set Condition: This condition exists when the transponder ID (KEY) read by the SKIM does not match any of the transponder ID's stored in the SKIM's memory. The following could be new or does not match, PCM, SKIM, or KEY.

POSSIBLE CAUSES
INCORRECT VIN IN PCM
INVALID SKIM KEY NOT PRESENT
NO COMMUNICATION WITH SKIM
NO VIN PROGRAMMED IN THE PCM
PCM
SKIM TROUBLE CODES SET

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRB, read trouble codes. Is the starts since set counter zero for P1685? Yes → Go To 2 No → Go To 7	All
2	Using the DRB, attempt to communicate with SKIM. Can you communicate with the SKIM? Yes → Go To 3 No → Refer to the Communication category and perform the *Bus +/- Signals open from SKIM symptom. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
3	Using the DRB, check for trouble codes set in SKIM. Are there any trouble codes set in the SKIM? Yes → Repair all trouble codes set in SKIM first. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Go To 4	All
4	With the DRB, read the VIN. Is there a VIN programmed in the PCM? Yes → Go To 5 No → Program the correct VIN into the PCM and retest. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

P1685-INVALID SKIM KEY — Continued

TEST	ACTION	APPLICABILITY
5	With the DRB, display the VIN that is programmed in the PCM. Is the correct VIN programmed in the PCM? Yes → Go To 6 No → Replace the Powertrain Control Module (PCM) and program correct VIN in the PCM and retest. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
6	Turn ignition off. Replace the SKIM. With the DRB, erase all DTC's. Attempt to start and idle the engine. Using the DRB, read the PCM trouble codes. Does the DRB display this code? Yes → Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Test Complete.	All
7	**Note: This DTC could have been set if the SKIM module was disconnected, or replaced recently.** **Note: All keys that the customer uses for this vehicle must be tested to verify they are good.** First verify the correct VIN is in both the PCM and SKIM modules. Turn the Ignition key off. With the next customer key turn the ignition key on and crank the engine to start. If the engine starts that is usually a good key. With the DRB read trouble codes. LOOK FOR P1685 Is the starts since set counter Zero, on the DRB DTC screen for code P1685? Yes → Replace the Ignition Key. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Test Complete. **Note: If this DTC can not be reset, it could have been an actual theft attempt.**	All

Symptom:
P1686-NO SKIM BUS MESSAGE RECEIVED

When Monitored and Set Condition:

P1686-NO SKIM BUS MESSAGE RECEIVED

When Monitored: At ignition key on and continuously during engine operation.

Set Condition: This condition exists when a SKIM status bus message was not received from the SKIM module within the last 20 seconds.

POSSIBLE CAUSES
PCM
WIRING HARNESS INTERMITTENT
LOSS OF SKIM COMMUNICATION
PCI BUS CIRCUIT OPEN FROM PCM TO SKIM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRB, read PCM trouble codes. Is the starts since set counter on the DTC screen for P1686 equal to Zero? Yes → Go To 2 No → Go To 4	All
2	Turn the ignition on, With the DRB, select vehicle Theft Alarm and read SKIM Trouble Codes. **Note: This test will indicate if the Bus is operational from DLC to SKIM.** Were you able to establish communication to the SKIM? Yes → Go To 3 No → Refer to the Communications category and perform the Bus +/- Signals Open From SKIM symptom. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
3	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the SKIM harness connector. Measure the resistance of the PCI Bus circuit between the PCM harness connector and SKIM harness connector. Is the resistance below 5.0 ohms? Yes → Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Repair the PCI Bus circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

P1686-NO SKIM BUS MESSAGE RECEIVED — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. **NOTE: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **NOTE: Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **NOTE: Refer to any Technical Service Bulletins (TSB) that may apply.** Perform a wiggle test on the related wiring harnesses with the engine running. Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Test Complete.	All

Symptom:

P1687-NO CLUSTER BUS MESSAGE

When Monitored and Set Condition:

P1687-NO CLUSTER BUS MESSAGE

When Monitored: With the ignition on.

Set Condition: The PCM has not received an expected MIC status bus message from the Instrument Cluster within the last 20 seconds.

POSSIBLE CAUSES
INSTRUMENT CLUSTER
WIRING HARNESS INTERMITTENT
PCI BUS CIRCUIT OPEN FROM PCM TO MIC

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. Using the DRB, erase PCM codes. Cycle the ignition key on and off several times. With the DRB, read PCM codes. LOOK for P1687. Did the P1687 NO CLUSTER BUS MESSAGE trouble code return? Yes → Go To 3 No → Go To 2	All
2	Turn the ignition on. Does the Odometer in the Instrument Cluster display NO BUS? Yes → Go To 3 No → Go To 4	All
3	Turn the ignition off. Disconnect the PCM harness connectors. Disconnect the Instrument Cluster harness connectors. Measure the resistance of the PCI Bus circuit between the PCM harness connector and the Instrument Cluster harness connector. Is the resistance below 5.0 ohms? Yes → Replace the Instrument Cluster. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Repair the PCI Bus circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

P1687-NO CLUSTER BUS MESSAGE — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. **NOTE: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **NOTE: Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **NOTE: Refer to any Technical Service Bulletins (TSB) that may apply.** Perform a wiggle test on the related wiring harnesses with the engine running. Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Test Complete.	All

Symptom:
P1698-NO CCD/J1850 MESSAGE FROM TCM

When Monitored and Set Condition:

P1698-NO CCD/J1850 MESSAGE FROM TCM

When Monitored: Equipped with automatic transmission, engine running, transmission in drive, vehicle road speed and battery voltage greater than 10.4 volts.

Set Condition: No bus messages from the TCM for 10 seconds, two consecutive trips required.

POSSIBLE CAUSES
POWERTRAIN CONTROL MODULE
INTERMITTENT CONDITION
ATTEMPT TCM COMMUNICATION

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRB, read PCM codes. Is the Good Trip Counter for P-1698 displayed and equal to zero? Yes → Go To 2 No → Go To 3	All
2	Turn the ignition on. Attempt to communicate with the Transmission Control Module (TCM). Can communication be established with the TCM? Yes → Replace the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Refer to symptom NO RESPONSE FROM TCM in the COMMUNICATION category. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

P1698-NO CCD/J1850 MESSAGE FROM TCM — Continued

TEST	ACTION	APPLICABILITY
3	**WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DRB Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Test Complete.	All

Symptom:

***BUS +/- SIGNALS OPEN FROM SKIM**

POSSIBLE CAUSES
SKIM RESPONSE FAILURE
DRB DOES NOT COMMUNICATE WITH SKIM
SKIM FUSED B(+) OPEN
SKIM FUSED IGNITION SWITCH OUTPUT CIRCUIT OPEN
SKIM GROUND CIRCUIT OPEN
PCI BUS OPEN CIRCUIT TO SKIM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. Using the DRB, attempt to communicate with the SKIM. Did you communicate with the SKIM? No → Go To 2 Yes → Refer to the wiring diagrams located in the service information to help isolate a possible intermittent open or short. Perform SKIS VERIFICATION.	All
2	Turn the ignition off. Disconnect the SKIM harness connector. Measure the voltage of the Fused B+ circuit. Is the voltage above 10.0 volts? Yes → Go To 3 No → Repair the Fused B+ circuit for an open. Perform SKIS VERIFICATION.	All
3	Turn the ignition off. Disconnect the SKIM harness connector. Turn the ignition on. Measure the voltage of the Fused Ignition Switch Output circuit. Is the voltage above 10.0 volts? Yes → Go To 4 No → Repair the Fused Ignition Switch Output circuit for an open. Perform SKIS VERIFICATION.	All
4	Turn the ignition off. Disconnect the SKIM harness connector. Measure the resistance between ground and the ground circuit. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the ground circuit for an open. Perform SKIS VERIFICATION.	All

*BUS +/- SIGNALS OPEN FROM SKIM — Continued

TEST	ACTION	APPLICABILITY
5	Turn the ignition off. Disconnect the SKIM harness connector. Connect the DRB III to the Data Link connector. Use Scope input cable CH7058, Cable to Probe adapter CH7062, and the red and black test probes. Connect the scope input cable to the channel one connector on the DRB III. Attach the red and black leads and the cable to probe adapter to the scope input cable. Select DRB Standalone. Select lab scope. Select Live. Select 12 volt square wave. Press F2 for Scope. Press F2 and use the down arrow to set voltage range to 20 volts. Press F2 again when complete. Connect the Black lead to the SKIM ground. Connect the Red lead to the SKIM PCI Bus circuit. Turn the ignition on. Observe the voltage display on the DRB III Lab Scope. What is the voltage display on the scope? Pulse from 0 to approximately 7.5 volts Replace the Sentry Key Immobilizer Module. Perform SKIS VERIFICATION. Steady 0.0 volt Repair the PCI Bus circuit for an open. Perform SKIS VERIFICATION.	All

Symptom:

*NO RESPONSE FROM PCM (PCI BUS)

POSSIBLE CAUSES
FUSED B(+) CIRCUIT OPEN
FUSED IGNITION SWITCH OUTPUT CIRCUIT OPEN
PCM GROUND CIRCUIT(S) OPEN
PCM PCI NO RESPONSE
PCM INTERNAL PCI BUS OPEN
PCM PCI BUS CIRCUIT OPEN

TEST	ACTION	APPLICABILITY
1	Turn Ignition On. **Note: As soon as one or more module communicates with the DRBIII, answer the question.** With the DRBIII, Select THEFT ALARM, then select SKIM. With the DRBIII, Select THEFT ALARM, Then select VTSS. With the DRBIII, Select ANTI-LOCK BRAKES. With the DRBIII, Select BODY, Then Select ELECTRO-MECHANICAL CLUSTER (MIC). With the DRBIII, Select PASSIVE RESTRAINTS, Then select AIRBAG. Were you able to establish communication with any of the modules? Yes → Go To 2 No → Refer to the communication category and perform the PCI Bus Communication Failure symptom. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
2	Turn the ignition off. Disconnect the Powertrain Control Module harness connector. Use a 12 volt test light in the following step. With a 12 V test light connected to ground, probe the Fused B+ circuit in the PCM harness connector. Is the test light illuminated and bright? No → Repair the Fused B+ circuit for an open Perform POWERTRAIN VERIFICATION TEST VER - 1. Yes → Go To 3	All
3	Turn the ignition off. Disconnect the Powertrain Control Module harness connector(s). Use a 12 volt test light in the following step. Connect 12V test light to B(+). Probe the Ground Circuits, one at a time, in the PCM Connector. Does the test light illuminate at each Ground circuit? Yes → Go To 4 No → Repair the ground circuit(s) for an open. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

*NO RESPONSE FROM PCM (PCI BUS) — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the Powertrain Control Module harness connector. Turn the ignition on. Use a 12 volt test light in the following step. With the 12V test light connected to ground, probe the Fused Ignition Switch Output circuit in the PCM Connector. Is the test light illuminated and bright? Yes → Go To 5 No → Repair the Fused Ignition Switch Output circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
5	With the DRB read PCM Diagnostic Trouble Codes. This is to ensure power and grounds to the PCM are operational. **Note: If the DRB will not read PCM DTC's, follow the ″NO RESPONSE TO PCM (SCI only) symptom path, if vehicle will start. For NO START Conditions follow symptom ″NO RESPONSE″ in Starting category .** Turn the ignition off. Disconnect the Powertrain Control Module harness connectors. Connect the DRBIII to the Data Link connector. Use Scope input cable CH7058, Cable to Probe adapter CH7062, and the red and black test probes. Connect the scope input cable to the channel one connector on the DRB. Attach the red and black leads and the cable to probe adapter to the scope input cable. Select DRB Standalone. Select lab scope. Select Live. Select 12 volt square wave. Press F2 for Scope. Press F2 and use the down arrow to set voltage range to 20 volts. Press F2 again when complete. Connect the Black lead to the PCM ground. Connect the Red lead to the PCM PCI Bus circuit. Turn the ignition on. Observe the voltage display on the DRB Lab Scope. What is the voltage display on the scope? Pulse from 0 to approximately 7.5 volts Go To 6 Steady 0 volts Repair the PCI Bus circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
6	The Powertrain Control Module has an internal open PCI Bus and must be replaced. If there are no possible causes remaining, view repair. Repair Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

Symptom:

***NO RESPONSE FROM PCM (SCI ONLY)**

POSSIBLE CAUSES
DRBIII® AND CABLE
TRANSMISSION CONTROL MODULE
GROUND CIRCUIT(S) OPEN TO DATA LINK CONNECTOR
″NO RESPONSE″ DISPLAYED FROM DRB (SCI ONLY)
SCI RECEIVE CIRCUIT SHORTED TO GROUND
SCI RECEIVE CIRCUIT OPEN
SCI TRANSMIT CIRCUIT SHORTED TO GROUND - TRANSMISSION CONTROL MODULE
SCI TRANSMIT CIRCUIT OPEN
PCM (NO RESPONSE-START)

TEST	ACTION	APPLICABILITY
1	Turn the ignition off. Disconnect the DRB from the Data Link Connector. Measure the resistance of each of the ground circuits between the data link connector and a good ground. Is the resistance below 5.0 ohms for both circuits? Yes → Go To 2 No → Repair the ground circuit(s) for an open. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
2	With the DRB, attempt to read trouble codes. Was the ignition on when the ″NO RESPONSE″ message was displayed? Yes → Go To 3 No → Turn ignition on to get a response. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
3	Turn the ignition off. Disconnect the Powertrain Control Module harness connector. Disconnect the DRB from the Data Link Connector. Measure the resistance between ground and the SCI Receive circuit. Is the resistance below 5.0 ohms? Yes → Repair the SCI Receive circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Go To 4	All

*NO RESPONSE FROM PCM (SCI ONLY) — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the Powertrain Control Module harness connector. Disconnect the DRB from the Data Link Connector. Measure the resistance of the SCI Receive circuit between the PCM connector and the Data Link Connector. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the SCI Receive circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
5	Turn the ignition off. Disconnect the Powertrain Control Module harness connector. Disconnect the DRB from the Data Link Connector. Measure the resistance of the SCI Transmit circuit between the PCM connector and the Data Link Connector. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the SCI Transmit circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
6	Turn the ignition off. Disconnect the Powertrain Control Module harness connector. Disconnect the DRB from the Data Link Connector. Measure the resistance between ground and the SCI Transmit circuit. Is the resistance below 5.0 ohms? Yes → Go To 7 No → Go To 8	All
7	Turn the ignition off. Disconnect the Transmission Control Module harness connector. Disconnect the DRB from the Data Link Connector. Measure the resistance between ground and the SCI Transmit circuit. Is the resistance below 5.0 ohms? Yes → Repair the SCI Transmitt circuit for a short to ground. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Replace the Transmission Control Module. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All
8	Connect the DRB to a functional Data Link on another vehicle. Turn the ignition on. With the DRB, attempt to read trouble codes. Did the DRB display No Response? Yes → Repair or replace the DRB and cable as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

Symptom:
*PCI BUS COMMUNICATION FAILURE

POSSIBLE CAUSES
MODULE SHORT TO GROUND
MODULE SHORT TO VOLTAGE
WIRING HARNESS INTERMITTENT
OPEN PCI BUS CIRCUIT AT THE DATA LINK CONNECTOR (DLC)
PCI BUS CIRCUIT SHORTED TO VOLTAGE
PCI BUS CIRCUIT SHORTED TO GROUND

TEST	ACTION	APPLICABILITY
1	**Note: Determine which modules this vehicle is equipped with before beginning.** **Note: When attempting to communicate with any of the modules on this vehicle, the DRB will display 1 of 2 different communication errors: a NO RESPONSE message or a BUS +/- SIGNALS OPEN message.** Turn the ignition on. Using the DRB, attempt to communicate with the following control modules: Airbag Control Module SKIM (SENTRY KEY IMMOBILIZER) RKE (REMOTE KEYLESS ENTRY) MIC (INSTRUMENT CLUSTER) Antilock Brake Control module Was the DRB able to communicate with one or more Module(s)? Yes → Go To 2 No → Go To 3	All
2	Turn the ignition off. **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: If the DRB can not communicate with a single module, refer to the category list for the related symptom.** Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform BODY VERIFICATION TEST - VER 1. No → Test Complete.	All

*PCI BUS COMMUNICATION FAILURE — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the PCM C2 harness connector. Disconnect the DRB from the Data Link Connector (DLC). Disconnect the negative battery cable. Measure the resistance of the PCI Bus circuit between the Data Link Connector (DLC) and the PCM C2 connector. Is the resistance below 5.0 ohms? Yes → Go To 4 No → Repair the PCI Bus circuit for an open. Perform BODY VERIFICATION TEST - VER 1.	All
4	**Note: Reconnect the PCM C2 harness connector and the negative battery cable.** Turn the ignition on. Measure the voltage of the PCI Bus circuit at the Data Link Connector (DLC). Is the voltage above 1.5 volts? Yes → Go To 5 No → Go To 6	All
5	Turn the ignition off. Using a voltmeter, connect one end to the PCI Bus circuit at the DLC, and the other end to ground. **Note: When performing the next step turn the ignition off (wait one minute) before disconnecting any module. When the module is disconnected turn the ignition on to check for a short to voltage.** Turn the ignition on. While monitoring the voltmeter, disconnect each module the vehicle is equipped with one at a time. Is the voltage steadily above 1.5 volts with all the modules disconnected? Yes → Repair the PCI Bus circuit for a short to voltage. Perform BODY VERIFICATION TEST - VER 1. No → Replace the module that when disconnected the short to voltage was eliminated. Perform BODY VERIFICATION TEST - VER 1.	All
6	Turn the ignition off. Disconnect the negative battery cable. Using a ohmmeter, connect one end to the PCI Bus circuit at the DLC, and the other end to ground. While monitoring the ohmmeter, disconnect each module the vehicle is equipped with one at a time. Is the resistance below 1000.0 ohms with all the modules disconnected? Yes → Repair the PCI Bus circuit for a short to ground. Perform BODY VERIFICATION TEST - VER 1. No → Replace the module that when disconnected the short to ground was eliminated. Perform BODY VERIFICATION TEST - VER 1.	All

Symptom:

P0106-BAROMETRIC PRESSURE OUT OF RANGE

When Monitored and Set Condition:

P0106-BAROMETRIC PRESSURE OUT OF RANGE

When Monitored: With the ignition key on at less than 350 milliseconds and engine speed at less than 255 RPM.

Set Condition: The PCM senses the voltage from the MAP sensor to be less than 2.196 volts but above 0.019 volts for 300 milliseconds.

POSSIBLE CAUSES
MAP SENSOR WIRING HARNESS INTERMITTENT PROBLEM
MAP SENSOR WIRING HARNESS OBSERVABLE
MAP SENSOR 5-VOLT SUPPLY CIRCUIT
MAP SENSOR SIGNAL CIRCUIT SHORTED TO SENSOR GROUND CIRCUIT
MAP SENSOR SIGNAL CIRCUIT HIGH RESISTANCE TO GROUND
MAP SENSOR
PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRB, read the MAP Sensor Voltage. Is the voltage below 2.2 volts? Yes → Go To 2 No → Go To 9	All
2	Turn the ignition off. Disconnect the MAP Sensor harness connector. Turn the ignition on. With the DRB, monitor the MAP Sensor Voltage. Cycle the ignition switch from OFF to ON. Is the voltage above 4.9 volts? Yes → Go To 3 No → Go To 6	All
3	Turn the ignition on. Disconnect the MAP Sensor harness connector. Measure the 5 Volt Supply circuit at the MAP Sensor harness connector. Is the voltage above 4.0 volts? Yes → Replace the MAP Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All

P0106-BAROMETRIC PRESSURE OUT OF RANGE — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the MAP Sensor harness connector. Measure the voltage of the MAP Sensor 5-Volt Supply circuit at the MAP Sensor harness connector. Is the voltage above 4.0 volts? Yes → Go To 5 No → Repair the 5-volt supply circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	If there are no possible causes remaining, view repair. Repair Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	Turn the ignition off. Disconnect the MAP Sensor harness connector. Turn the ignition on. With the DRB, monitor the MAP Sensor Voltage. Cycle the ignition switch from off to on. Is the voltage between 2.2 and 4.9 volts? Yes → Repair the high resistance to ground in the MAP sensor signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 7	All
7	Turn the ignition off. Disconnect the MAP Sensor harness connector. Disconnect the Powertrain Control Module harness connector. Measure resistance between the MAP Sensor Signal Circuit and the MAP Sensor Ground Circuit. Is the resistance below 5.0 ohms? Yes → Repair MAP Sensor Signal Circuit shorted to Sensor Ground Circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 8	All
8	If there are no possible causes remaining, view repair. Repair Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
9	Turn the ignition off. Using the wiring diagram as a guide, inspect the MAP Sensor wiring and connectors. Were any problems found? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 10	All

P0106-BAROMETRIC PRESSURE OUT OF RANGE — Continued

TEST	ACTION	APPLICABILITY
10	Start the engine. With the DRB, read the MAP Sensor voltage. Wiggle MAP Sensor Connector & Harness. Monitor the DRB display. Was there any MAP Sensor voltage change? Yes → Repair the Harness or Connector that caused the voltage change. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom:

P0107-MAP SENSOR VOLTS TOO LOW

When Monitored and Set Condition:

P0107-MAP SENSOR VOLTS TOO LOW

When Monitored: With the engine RPM above 416 but less than 3520, the TP sensor voltage less than 1.13 volts, and battery voltage greater than 10.4 volts.

Set Condition: The MAP sensor signal voltage is below 0.1 volt for 2.0 seconds with the engine running.

POSSIBLE CAUSES
MAP SENSOR WIRING HARNESS INTERMITTENT PROBLEM
MAP SENSOR WIRING HARNESS OBSERVABLE
MAP SENSOR 5-VOLT SUPPLY CIRCUIT OPEN
MAP SENSOR 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND
MAP SENSOR SIGNAL CIRCUIT SHORTED TO SENSOR GROUND CIRCUIT
MAP SENSOR SIGNAL CIRCUIT SHORTED TO GROUND
MAP SENSOR
PCM (5-VOLT SUPPLY)
PCM (SIGNAL CIRCUIT)

TEST	ACTION	APPLICABILITY
1	Start the engine. Allow the engine to idle. With the DRB, read the MAP Sensor voltage. Is the MAP Sensor voltage below 0.6 volts? Yes → Go To 3 No → Go To 2	All
2	Turn the ignition on. With the DRB, read the MAP Sensor voltage. Is the MAP Sensor voltage below 3.19 volts? Yes → Go To 3 No → Go To 11	All
3	Turn the ignition off. Disconnect the MAP sensor harness connector. Turn the ignition on. Measure the MAP Sensor 5-Volt Supply circuit at the MAP Sensor harness connector. Is the voltage above 4.5 volts? Yes → Go To 4 No → Go To 8	All

P0107-MAP SENSOR VOLTS TOO LOW — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the MAP Sensor harness connector. **Note: Check connectors - Clean/repair as necessary.** Turn the ignition on. Use the DRB to read MAP Sensor voltage. Is the MAP Sensor voltage above 4.5 volts? Yes → Replace the MAP Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	Turn the ignition off. Disconnect the MAP Sensor harness connector. Disconnect the Powertrain Control Module harness connector. Measure resistance between the MAP Sensor Signal Circuit and the MAP Sensor Ground Circuit. Is the resistance below 5.0 ohms? Yes → Repair MAP Sensor Signal Circuit shorted to Sensor Ground Circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All
6	Turn the ignition off. Disconnect the MAP Sensor harness Connector. Disconnect the Powertrain Control Module harness connector. Measure the resistance of MAP Sensor Signal circuit to ground. Is the resistance below 5.0 ohms? Yes → Repair the MAP Sensor Signal Circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 7	All
7	If there are no possible causes remaining, view repair. Repair Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
8	Turn the ignition off. Disconnect the MAP Sensor harness connector. Disconnect the Powertrain Control Module harness connector. Measure the resistance of the MAP Sensor 5-Volt Supply Circuit between the MAP Sensor harness connector to the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 9 No → Repair the 5-volt supply circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0107-MAP SENSOR VOLTS TOO LOW — Continued

TEST	ACTION	APPLICABILITY
9	Turn the ignition off. Disconnect the MAP Sensor harness connector. Disconnect the Powertrain Control Module hanress connector. Measure the resistance of the 5-Volt Supply circuit to ground. Is the resistance below 5.0 ohms? Yes → Repair the 5-Volt Supply Circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 10	All
10	If there are no possible causes remaining, view repair. Repair Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
11	Turn the ignition off. Using the wiring diagram as a guide, inspect the MAP Sensor wiring and connectors. Were any problems found? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 12	All
12	Start the engine. With the DRB, read the MAP Sensor voltage. Wiggle MAP Sensor Connector & Harness. Monitor the DRB display. Was there any MAP Sensor voltage change? Yes → Repair the Harness or Connector that caused the voltage change. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom:

P0108-MAP SENSOR VOLTS TOO HIGH

When Monitored and Set Condition:

P0108-MAP SENSOR VOLTS TOO HIGH

When Monitored: With the engine RPM above 600 but less than 3500, the TP sensor voltage less than 1 volt.

Set Condition: The MAP sensor signal voltage is greater than 4.9 volts at start or with the engine running for 2.0 seconds.

POSSIBLE CAUSES
MAP SENSOR GROUND CIRCUIT OPEN
MAP SENSOR WIRING HARNESS INTERMITTENT PROBLEM
MAP SENSOR WIRING HARNESS OBSERVABLE
MAP SENSOR SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE
MAP SENSOR SIGNAL CIRCUIT OPEN
MAP SENSOR SIGNAL CIRCUIT SHORTED TO 5-VOLT SUPPLY CIRCUIT
MAP SENSOR
PCM (MAP SENSOR VOLTAGE TOO HIGH)

TEST	ACTION	APPLICABILITY
1	Start the engine. With the DRB, read the MAP Sensor voltage. Is the MAP Sensor voltage above 4.6 volts? Yes → Go To 2 No → Go To 8	All
2	Turn the ignition off. Disconnect the MAP Sensor harness connector. Connect a jumper wire between the Sensor Signal and Sensor Ground Circuits. Turn the ignition on. With the DRB, read the MAP Sensor voltage. Is the voltage below 1.0 volt? Yes → Replace the MAP Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All

P0108-MAP SENSOR VOLTS TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the MAP Sensor harness connector. Turn the ignition on. Measure the voltage of the MAP Sensor Signal Circuit at the MAP Sensor harness connector. Is the voltage above 5.5 volts? Yes → Repair the MAP Sensor Signal circuit shorted to battery voltage. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Turn the ignition off. Disconnect the MAP Sensor harness connector. Measure the resistance of the MAP Sensor Signal circuit to 5-volt Supply Circuit at the MAP sensor harness connector. Is the resistance below 5.0 ohms? Yes → Repair MAP Sensor Signal Circuit shorted to 5-volt Supply Circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	Turn the ignition off. Disconnect the MAP Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the Sensor Ground Circuit between the MAP sensor harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the open MAP Sensor Ground Circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the MAP Sensor harness connector. Measure the MAP Sensor Signal circuit for resistance between the PCM harness connector and the MAP Sensor harness connector. Is the resistance below 5.0 ohms? Yes → Go To 7 No → Repair the MAP Sensor Signal circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
7	If there are no possible causes remaining, view repair. Repair Replace the PCM. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
8	Turn the ignition off. Using the wiring diagram as a guide, inspect the MAP Sensor wiring and connectors. Were any problems found? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 9	All

P0108-MAP SENSOR VOLTS TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
9	Start the engine. With the DRB, read the MAP Sensor voltage. Wiggle MAP Sensor Connector & Harness. Monitor the DRB display. Was there any MAP Sensor voltage change? Yes → Repair the Harness or Connector that caused the voltage change. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom:

P0117-ECT SENSOR VOLTAGE TOO LOW

When Monitored and Set Condition:

P0117-ECT SENSOR VOLTAGE TOO LOW

When Monitored: With the ignition on and battery voltage greater than 10.4 volts.

Set Condition: The engine coolant temperature (ECT) sensor circuit voltage at the PCM goes below 0.5 volt for more than 3 seconds.

POSSIBLE CAUSES
ECT SENSOR SIGNAL CIRCUIT SHORTED TO GROUND
ECT SENSOR SIGNAL CIRCUIT SHORTED TO SENSOR GROUND CIRCUIT
ECT SENSOR
ECT WIRING HARNESS INTERMITTENT
POWERTRAIN CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRB, read the PCM DTCs. Is the Good Trip Counter for P0117 displayed and equal to zero? Yes → Go To 2 No → Go To 6	All
2	Turn the ignition off. Disconnect the ECT Sensor harness connector. Disconnect the PCM harness connectors. Measure the resistance between ground and the ECT Sensor Signal circuit. Is the resistance below 100k ohms? Yes → Repair the ECT Sensor Signal circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All
3	Turn the ignition off. Disconnect the ECT Sensor harness connector. Disconnect the PCM harness connectors. Measure the resistance between the ECT Sensor Signal circuit and the ECT Sensor Ground circuit. Is the resistance below 100k ohms? Yes → Repair the ECT Sensor Signal circuit for a short to the ECT Sensor Ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All

P0117-ECT SENSOR VOLTAGE TOO LOW — Continued

TEST	ACTION	APPLICABILITY
4	Disconnect the ECT Sensor harness connector. With the DRB, read the ENG COOLANT TMP VLT value. Did the ENG COOLANT TMP VLT value change from below 1.0 volt to above 4.5 volts? Yes → Replace the ECT Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	If there are no possible causes remaining, view repair. Repair Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	Turn the ignition off. **NOTE: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any Technical Service Bulletins (TSB) that may apply.** Perform a wiggle test on the related wiring harnesses with the engine running. Watch for the Good Trip Counter to change to 0. Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom:

P0118-ECT SENSOR VOLTAGE TOO HIGH

When Monitored and Set Condition:

P0118-ECT SENSOR VOLTAGE TOO HIGH

When Monitored: With the ignition on and battery voltage greater than 10.4 volts.

Set Condition: The engine coolant temperature (ECT) sensor circuit voltage at the PCM goes above 4.9 volts for more than 3 seconds.

POSSIBLE CAUSES
ECT SENSOR SIGNAL CIRCUIT SHORTED TO VOLTAGE
ECT SENSOR GROUND CIRCUIT OPEN
ECT SENSOR SIGNAL CIRCUIT OPEN
ECT SENSOR
ECT WIRING HARNESS INTERMITTENT
POWERTRAIN CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRB, read the PCM DTCs. Is the Good Trip Counter for P0118 displayed and equal to zero? Yes → Go To 2 No → Go To 7	All
2	Turn the ignition off. Disconnect the ECT harness connector. Start the engine and allow the engine to idle. Measure the voltage on the ECT Sensor Signal circuit. Is the voltage above 5.5 volts? Yes → Repair the ECT Sensor Signal circuit for a short to voltage. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All
3	Turn the ignition off. Disconnect the ECT Sensor harness connector. Measure the resistance between ground and the ECT Sensor Ground circuit. Is the resistance below 5.0 ohms? Yes → Go To 4 No → Repair the ECT Sensor Ground circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0118-ECT SENSOR VOLTAGE TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the ECT Sensor harness connector. Disconnect the PCM harness connectors. Measure the resistance of the ECT Sensor Signal circuit. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the ECT Sensor Signal circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	Turn the ignition off. Disconnect the ECT Sensor harness connector. Turn the ignition on. With the DRB, monitor the ENG COOLANT TMP VLT value. Connect a jumper wire between the ECT Sensor Signal circuit and the ECT Sensor Ground circuit in the ECT Sensor harness connector. **Note: The voltage should change from greater than 4.5 volts to less than 1.0 volt.** Did the ENG COOLANT TMP VLT value change from greater than 4.5 volts to less than 1.0 volt? Yes → Replace the ECT Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All
6	If there are no possible causes remaining, view repair. Repair Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
7	Turn the ignition off. **NOTE: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any Technical Service Bulletins (TSB) that may apply.** Perform a wiggle test on the related wiring harnesses with the engine running. Watch for the Good Trip Counter to change to 0. Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom:
P0121-TPS VOLTAGE DOES NOT AGREE WITH MAP

When Monitored and Set Condition:

P0121-TPS VOLTAGE DOES NOT AGREE WITH MAP

When Monitored: With the engine running and no MAP sensor or TP sensor trouble codes set.

Set Condition: The PCM performs two separate tests. First, when the manifold vacuum is low, the TP sensor signal should be high, RPM between 1000 and 1500. Second, when the manifold vacuum is high, the TP sensor signal should be low, the RPM above 1500. If the proper TP sensor voltage is not detected when the two conditions are met, the DTC will be set after 4 seconds.

POSSIBLE CAUSES
PCM 5 VOLT SUPPLY
INTERMITTENT WIRING & CONNECTORS CONDITIONS
TPS VOLTAGE CHANGE NOT SMOOTH
TPS HARNESS OR CONNECTORS INTERMITTENT
TPS HARNESS/CONNECTORS OBSERVABLE
TPS 5-VOLT SUPPLY CIRCUIT OPEN
TPS 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND
THROTTLE POSITION SENSOR
THROTTLE POSITION SENSOR VOLTAGE (> 1.0 VOLT WITH THROTTLE CLOSED)
MAP SENSOR
POWERTRAIN CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	**Note: Diagnose any MAP sensor or TP sensor DTC's first before continuing.** Review the Freeze Frame RPM information to determine if the throttle voltage failed during the PCM high or low test. Check the throttle plate and linkage for a binding condition. Disconnect the TP sensor harness connector. Inspect TP sensor wire colors for the correct cavities. **Note: Check connectors - Clean/repair as necessary.** Were any problems found? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 2	All

P0121-TPS VOLTAGE DOES NOT AGREE WITH MAP — Continued

TEST	ACTION	APPLICABILITY
2	Turn the ignition on. Using the wiring diagram as a guide, inspect the Throttle Position Sensor wiring and connectors. Were any problems found? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All
3	Turn the ignition on. With the DRBIII®, read TPS VOLTS. While monitoring the DRBIII®, slowly open and close the Throttle. Is the voltage change smooth? Yes → Go To 4 No → Replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
4	Turn the ignition off. Tee in a Vacuum Gauge to a Manifold Vacuum source. Start the engine. Allow the engine to idle. **Note: If the engine will not idle, maintain a constant RPM above idle.** Using the DRB, read the MAP Sensor vacuum. Is the reading within 1″ of the teed-in Vacuum Gauge? Yes → Go To 5 No → Replace the MAP Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	Turn the ignition on. With the DRB, read the Throttle Position Sensor voltage. Is the voltage above 1.0 volt? Yes → Replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All
6	Turn the ignition on. With the DRB, read the Throttle Position Sensor voltage. Open the Throttle Plate to wide open throttle. Is the Throttle Position Sensor voltage above 3.5 volts? Yes → Go To 7 No → Replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
7	Turn the ignition off. Disconnect the Throttle Position Sensor harness connector. **Note: Check connectors - Clean/repair as necessary.** Turn the ignition on. Measure the Throttle Position Sensor 5-Volt Supply circuit at the TPS harness connector. Is the voltage below 4.0 volts? Yes → Go To 8 No → Go To 10	All

P0121-TPS VOLTAGE DOES NOT AGREE WITH MAP — Continued

TEST	ACTION	APPLICABILITY
8	Turn the ignition off. Disconnect the Throttle Position Sensor harness connector. Disconnect the PCM harness connectors. Measure the resistance between the TPS 5-Volt Supply circuit and ground. Is the resistance below 5.0 ohms? Yes → Repair the TPS 5-Volt Supply Circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 9	All
9	Turn the ignition off. Disconnect the Throttle Position Sensor harness connector. Disconnect the PCM harness connectors. Measure the resistance of the TPS 5-Volt Supply Circuit from the TPS harness connector to the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Repair the TPS 5-Volt Supply circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
10	With the DRBIII®, erase DTC's. Attempt to duplicate the condition noted in the Freeze Frame Information. Does the DTC reset? Yes → Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 11	All
11	The conditions necessary to set this DTC are not present at this time.Using the schematics as a guide, inspect the wiring and connectors specific to this circuit. Wiggle the wires while checking for shorts and open circuits. Pay particular attention to the the point where the TPS signal and sensor ground circuits splice off from the engine circuits. Were any problems found? Yes → Repair defective wiring and/or connector as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom:
P0122-THROTTLE POSITION SENSOR VOLTAGE LOW

When Monitored and Set Condition:

P0122-THROTTLE POSITION SENSOR VOLTAGE LOW

When Monitored: With the ignition on and battery voltage above 10.4 volts.

Set Condition: Throttle position sensor voltage at the PCM is 0.2 volt for 0.7 seconds.

POSSIBLE CAUSES
TPS VOLTAGE CHANGE NOT SMOOTH
TPS CONNECTORS/HARNESS INTERMITTENT (D)
TPS HARNESS/CONNECTORS INTERMITTENT (C)
TPS HARNESS/CONNECTORS OBSERVABLE
TPS 5-VOLT SUPPLY CIRCUIT OPEN
TPS 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND
TPS SIGNAL CIRCUIT SHORTED TO GROUND
TPS SIGNAL CIRCUIT SHORTED TO SENSOR GROUND CIRCUIT
THROTTLE POSITION SENSOR (VOLTAGE > 1.0 VOLT WITH THROTTLE CLOSED)
POWERTRAIN CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRB, read the Throttle Position Sensor voltage. Is the Throttle Position Sensor voltage below 0.2 volt? Yes → Go To 2 No → Go To 9	All
2	Turn the ignition off. Disconnect the TP sensor harness connector. Turn the ignition on. With the DRB, read the Throttle Position Sensor voltage. Is the voltage above 1.0 volt? Yes → Replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All

P0122-THROTTLE POSITION SENSOR VOLTAGE LOW — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the Throttle Position Sensor harness connector. **Note: Check connectors - Clean/repair as necessary.** Turn the ignition on. Measure the Throttle Position Sensor 5-Volt Supply circuit at the TPS harness connector. Is the voltage below 4.0 volts? Yes → Go To 4 No → Go To 6	All
4	Turn the ignition off. Disconnect the Throttle Position Sensor harness connector. Disconnect the PCM harness connectors. Measure the resistance between the TPS 5-Volt Supply circuit and ground. Is the resistance below 5.0 ohms? Yes → Repair the TPS 5-Volt Supply Circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	Turn the ignition off. Disconnect the Throttle Position Sensor harness connector. Disconnect the PCM harness connectors. Measure the resistance of the TPS 5-Volt Supply Circuit from the TPS harness connector to the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the TPS 5-Volt Supply circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	Turn the ignition off. Disconnect the Throttle Position Sensor harness connector. Disconnect the Powertrain Control Module harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the TP Sensor Signal circuit to ground at the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Repair the Throttle Position Sensor Signal circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 7	All
7	Turn the ignition off. Disconnect the Throttle Position Sensor harness connector. Disconnect the Powertrain Control Module connector harness. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance between the Sensor Signal Circuit and the Sensor Ground Circuit at the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Repair the Sensor Signal Circuit shorted to Sensor Ground Circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 8	All

P0122-THROTTLE POSITION SENSOR VOLTAGE LOW — Continued

TEST	ACTION	APPLICABILITY
8	If there are no possible causes remaining, view repair. Repair Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
9	Start the engine and allow the engine to idle. **Warning: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.** Wiggle the Throttle Position Sensor connectors and harness. Monitor the engine RPM. Was there any change in engine RPM when wiggled? Yes → Repair the harness or connector that caused the engine RPM to change. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 10	All
10	Turn the ignition on. With the DRBIII®, read TPS VOLTS. While monitoring the DRBIII®, slowly open and close the Throttle. Is the voltage change smooth? Yes → Go To 11 No → Replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
11	Turn the ignition on. With the DRB, read TP Sensor voltage. Wiggle the Throttle Position Sensor Connectors and Harness. Monitor the DRB display. Was there any change in Throttle Position Sensor voltage when wiggled? Yes → Repair the harness or connector that caused the voltage change. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 12	All
12	Turn the ignition on. Using the wiring diagram as a guide, inspect the Throttle Position Sensor wiring and connectors. Were any problems found? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom:

P0123-THROTTLE POSITION SENSOR VOLTAGE HIGH

When Monitored and Set Condition:

P0123-THROTTLE POSITION SENSOR VOLTAGE HIGH

When Monitored: With the ignition on and battery voltage above 10.4 volts.

Set Condition: Throttle position sensor voltage at the PCM goes above 4.5 volts for 0.7 seconds.

POSSIBLE CAUSES
TPS VOLTAGE CHANGE NOT SMOOTH
TPS CONNECTORS/HARNESS INTERMITTENT (D)
TPS HARNESS/CONNECTORS INTERMITTENT (C)
TPS HARNESS/CONNECTORS OBSERVABLE
THROTTLE POSITION SENSOR GROUND CIRCUIT OPEN
TPS SIGNAL OR S/C SWITCH SIGNAL CIRCUIT SHORTED TO VOLTAGE
THROTTLE POSITION SENSOR SIGNAL CIRCUIT OPEN
TPS SIGNAL CIRCUIT SHORTED TO 5-VOLT SUPPLY CIRCUIT
TPS (VOLTAGE < 1.0 VOLT)
POWERTRAIN CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRB, read the Throttle Position Sensor voltage. Is the Throttle Position Sensor voltage above 4.5 volts? Yes → Go To 2 No → Go To 8	All
2	Turn the ignition off. Disconnect the TPS connector harness connector. Disconnect the PCM connector harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the Sensor Ground circuit between the TPS harness connector and the Powertrain Control Module harness connector. Is the resistance below 5.0 ohms? Yes → Go To 3 No → Repair the sensor ground circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0123-THROTTLE POSITION SENSOR VOLTAGE HIGH — Continued

TEST	ACTION	APPLICABILITY
3	Turn the igntion off. Disconnect the Throttle Position Sensor harness connector. **Note: Check connectors - Clean/repair as necessary.** Turn the ignition on. Measure the voltage of the Throttle Position Sensor Signal circuit. Is the voltage above 5.5 volts? Yes → Repair the TP Sensor Signal Circuit for a short to voltage. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Turn the ignition off. Disconnect the Throttle Position Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance between the TP Sensor Signal circuit and the 5 Volt Supply circuit at the TPS harness connector. Is the resistance below 5.0 ohms? Yes → Repair the TP Sensor Signal Circuit shorted to the 5-Volt Supply Circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	Turn the ignition off. Disconnect the Throttle Position Sensor harness connector. **Note: Check connectors - Clean/repair as necessary.** Turn the ignition on. Using the DRB, read the Throttle Position Sensor voltage. Connect a jumper wire between the TP Sensor Signal circuit and Sensor Ground circuit. Is the voltage below 1.0 volt? Yes → Replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All
6	Turn the ignition off. Disconnect the Throttle Position Sensor harness connector. Disconnect the Powertrain Control Module harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of TP Sensor Signal circuit from PCM harness connector to TP Sensor harness connector. Is the resistance below 5.0 ohms? Yes → Go To 7 No → Repair the TP Sensor Signal circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
7	If there are no possible causes remaining, view repair. Repair Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0123-THROTTLE POSITION SENSOR VOLTAGE HIGH — Continued

TEST	ACTION	APPLICABILITY
8	Start the engine and allow the engine to idle. **Warning: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.** Wiggle the Throttle Position Sensor connectors and harness. Monitor the engine RPM. Was there any change in engine RPM when wiggled? Yes → Repair the harness or connector that caused the engine RPM to change. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 9	All
9	Turn the ignition on. With the DRBIII®, read TPS VOLTS. While monitoring the DRBIII®, slowly open and close the Throttle. Is the voltage change smooth? Yes → Go To 10 No → Replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
10	Turn the ignition on. With the DRB, read TP Sensor voltage. Wiggle the Throttle Position Sensor Connectors and Harness. Monitor the DRB display. Was there any change in Throttle Position Sensor voltage when wiggled? Yes → Repair the harness or connector that caused the voltage change. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 11	All
11	Turn the ignition on. Using the wiring diagram as a guide, inspect the Throttle Position Sensor wiring and connectors. Were any problems found? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom:
P0125-CLOSED LOOP TEMP NOT REACHED

When Monitored and Set Condition:

P0125-CLOSED LOOP TEMP NOT REACHED

When Monitored: With battery voltage greater than 10.4 volts and after the engine has been running for ten minutes.

Set Condition: The engine temperature does not go above 15°C (60°F) after 10 minutes of engine run time.

POSSIBLE CAUSES
THERMOSTAT
ECT SENSOR (OUT OF CALIBRATION/HIGH RESISTANCE IN RELATED CIRCUIT)
LOW COOLANT LEVEL
ECT WIRING HARNESS INTERMITTENT

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRB, read the PCM DTCs. Is the Good Trip Counter for P0125 displayed and equal to zero? Yes → Go To 2 No → Go To 5	All
2	**Note: The best way to diagnose this DTC is to allow the vehicle to remain outside overnight in order to have a completely cold soaked engine.** **Note: Extremely cold outside ambient temperatures may cause this DTC to set.** **Warning: Never open the cooling system when the engine is hot. The system is under pressure. Extreme burns or scalding may result. Allow the engine to cool before opening the cooling system.** Using the procedure in the Service Information, check the coolant system to make sure that the coolant is in good condition and at the proper level. Is the coolant level and condition OK? Yes → Go To 3 No → Adjust coolant level as necessary.	All

P0125-CLOSED LOOP TEMP NOT REACHED — Continued

TEST	ACTION	APPLICABILITY
3	**Note: This test works best if performed on a cold engine (cold soaked).** Turn the ignition on. With the DRB, read the ENG COOLANT TMP DEG value. If the engine was allowed to sit overnight (cold soak), the engine temperature value should be a sensible value that is close to the surrounding temperature (ambient temperature). **Note: If engine coolant temperature is above 82° C (180° F), allow the engine to cool until 65° C (150° F) is reached.** Start the engine. During engine warm-up, monitor the ENG COOLANT TMP DEG value. The temp deg value change should be a smooth transition from start up to normal operating temp 82° C (180° F). Also, monitor the actual coolant temperature with a thermometer. **Note: As the engine warms up to operating temperature, the actual coolant temperature (thermometer reading) and the ENG COOLANT TMP DEG value on the DRB should stay relatively close to each other.** Using the appropriate Service Information, determine the proper opening temperature of the thermostat. Did the thermostat open at the proper temperature? Yes → Go To 4 No → Replace the thermostat.	All
4	Did the ENG COOLANT TMP DEG value increase smoothly and reach at least 82° C (180° F)? Yes → Test Complete. No → Check the ECT wiring for high resistance. If OK, replace the Engine Coolant Temperature Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	Turn the ignition off. **NOTE: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any Technical Service Bulletins (TSB) that may apply.** Perform a wiggle test on the related wiring harnesses with the engine running. Watch for the Good Trip Counter to change to 0. Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom List:

P0131-1/1 O2 SENSOR SHORTED TO GROUND
P0137-1/2 O2 SENSOR SHORTED TO GROUND

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0131-1/1 O2 SENSOR SHORTED TO GROUND.

When Monitored and Set Condition:

P0131-1/1 O2 SENSOR SHORTED TO GROUND

When Monitored: At a cold start, engine coolant below 36°C (98°F), ambient/battery sensor reading within -3°C (27°F), and engine coolant temperature above 76°C (170°F) on the previous key off.

Set Condition: The oxygen sensor signal voltage is below 0.156 volts for 5 seconds after starting engine.

P0137-1/2 O2 SENSOR SHORTED TO GROUND

When Monitored: At a cold start, engine coolant below 36°C (98°F), ambient/battery sensor reading within -3°C (27°F), and engine coolant temperature above 76°C (170°F) on the previous key off.

Set Condition: The oxygen sensor signal voltage is below 0.156 volts for 5 seconds after starting engine.

POSSIBLE CAUSES
O2S SIGNAL CIRCUIT SHORT TO GROUND
O2S SIGNAL CIRCUIT SHORT TO SENSOR GROUND CIRCUIT
WIRING HARNESS INTERMITTENT PROBLEM
O2 SENSOR
PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRB, read the DTC's. Is the Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Go To 6	All

P0131-1/1 O2 SENSOR SHORTED TO GROUND — Continued

TEST	ACTION	APPLICABILITY
2	Turn the ignition on. With the DRB, read O2 Sensor Signal voltage. Disconnect the O2 Sensor harness connector. Is the O2 Sensor signal voltage above 0.16 volts? Yes → Check for miswiring in both harness connector and component connector, repair as necessary. If OK, replace the O2 Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All
3	Turn the ignition off. Disconnect the O2 Sensor harness connector. Disconnect the PCM harness connectors. Measure the resistance between the O2 Sensor Signal circuit and the O2S Sensor ground circuit at the O2S harness connector. Is the resistance below 5.0 ohms? Yes → Repair the O2 Sensor Signal circuit for a short to the O2 Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Turn the ignition Off. Disconnect the O2 Sensor harness connector. Disconnect the PCM harness connectors. Measure the resistance between the O2 Sensor Signal circuit and engine ground. Is the resistance below 5.0 ohms? Yes → Repair the O2 Sensor Signal circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	If there are no possible causes remaining, view repair. Repair Replace the PCM. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	Turn the ignition off. **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any Technical Service Bulletins (TSB) that may apply.** Perform a wiggle test on the related wiring harnesses with the engine running. Watch for the Good Trip Counter to change to 0. Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom List:

P0132-1/1 O2 SENSOR SHORTED TO VOLTAGE
P0138-1/2 O2 SENSOR SHORTED TO VOLTAGE

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0132-1/1 O2 SENSOR SHORTED TO VOLTAGE.

When Monitored and Set Condition:

P0132-1/1 O2 SENSOR SHORTED TO VOLTAGE

When Monitored: With engine running for more than 2 minutes and coolant temperature above 76°C (170°F).

Set Condition: The oxygen sensor voltage is above 1.2 volts.

P0138-1/2 O2 SENSOR SHORTED TO VOLTAGE

When Monitored: With engine running for more than 2 minutes and coolant temperature above 76°C (170°F).

Set Condition: The oxygen sensor voltage is above 1.2 volts.

POSSIBLE CAUSES
O2S SENSOR GROUND CIRCUIT OPEN
O2S SIGNAL CIRCUIT OPEN
O2 SENSOR SIGNAL CIRCUIT SHORT TO VOLTAGE
WIRING HARNESS INTERMITTENT PROBLEM
O2 SENSOR
PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRB, read the DTC's. Is the Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Go To 7	All
2	Disconnect the O2 Sensor harness connector. Start the engine and allow the engine to idle. Using the DRB, monitior the O2 sensor voltage. Is the O2 voltage above 1.2 volts? Yes → Go To 3 No → Replace the O2 Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0132-1/1 O2 SENSOR SHORTED TO VOLTAGE — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the O2 Sensor harness connector. **Note: Ensure the ignition switch has been in the off position for at least 30 seconds.** Measure the resistance between the O2 Sensor Ground circuit and engine ground. Is the resistance below 5.0 ohms? No → Repair the O2 Sensor Ground circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5. Yes → Go To 4	All
4	Turn the ignition off. Disconnect the O2 Sensor harness connector. Start the engine and allow the engine to idle. Measure the voltage of the O2 Sensor Signal circuit at the O2 Sensor harness connector. Is the voltage above 1.2 volts? Yes → Repair the O2 Sensor Signal circuit for a short to voltage. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	Turn the ignition off. Disconnect the O2 Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the O2 Sensor Signal circuit between the O2 Sensor harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? No → Repair the O2 Sensor Signal circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5. Yes → Go To 6	All
6	If there are no possible causes remaining, view repair. Repair Replace the PCM. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
7	Turn the ignition off. **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any Technical Service Bulletins (TSB) that may apply.** Perform a wiggle test on the related wiring harnesses with the engine running. Watch for the Good Trip Counter to change to 0. Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom:

P0133-1/1 O2 SENSOR SLOW RESPONSE

When Monitored and Set Condition:

P0133-1/1 O2 SENSOR SLOW RESPONSE

When Monitored: With ECT greater than 63°C (147°F), after reaching a vehicle speed of 16 kmh (10 mph), and the throttle remaining open (off idle) for 2 minutes, bring the vehicle to a stop and allow the engine to idle with the transmission in DRIVE.

Set Condition: The oxygen sensor signal voltage is switching from below 0.35 volts to above 0.53 volts and back fewer times than required.

POSSIBLE CAUSES
INTERMITTENT CONDITION
EXHAUST LEAK
O2 SENSOR SIGNAL CIRCUIT VOLTAGE DROP
O2 SENSOR GROUND CIRCUIT VOLTAGE DROP
O2 HEATER ELEMENT
O2 SENSOR HEATER CONTROL CIRCUIT OPEN
ASD RELAY OUTPUT CIRCUIT OPEN
O2 SENSOR

TEST	ACTION	APPLICABILITY
1	**NOTE: Record the Freeze Frame Information that was set along with the DTC.** **NOTE: Check for contaminates that may have damaged the O2 Sensor: contaminated fuel, unapproved silicone, oil and coolant.** Turn the ignition on. With the DRBIII®, read DTC's. Is the Good Trip display and equal to zero? Yes → Go To 2 No → Go To 9	All
2	Start the engine. Inspect the exhaust for leak between the engine and the O2 sensor. Inspect the exhaust for leaks between the engine and the appropriate rear O2 Sensor. Are there any exhaust leaks? Yes → Repair or replace the leaking exhaust parts as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All

P0133-1/1 O2 SENSOR SLOW RESPONSE — Continued

TEST	ACTION	APPLICABILITY
3	**NOTE: Ensure the voltmeter leads meet the terminals in the connector and that there is good terminal to wire connection.** **NOTE: Ensure the voltmeter leads are connected for positive polarity** Backprobe between the O2 Sensor Signal circuit at the O2 Sensor harness connector and PCM harness connector. Start the engine. Allow the engine to idle. Is the voltage below 0.10 volt? Yes → Go To 4 No → Repair the high resistance on the O2 Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
4	**NOTE: Ensure the voltmeter leads meet the terminals in the connector and that there is good terminal to wire connection.** **NOTE: Ensure the voltmeter leads are connected for positive polarity** Backprobe between the O2 Sensor ground circuit at the O2 Sensor harness connector and ground. Start the engine. Allow the engine to idle. Is the voltage below 0.10 volt? Yes → Go To 5 No → Repair the high resistance on the O2 Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	**NOTE: Allow the O2 sensor to cool down to room temperature.** Turn the ignition off. Disconnect the O2 Sensor harness connector. Measure the resistance across the O2 Sensor Heater element component side. Is the resistance between 4.0 and 7.0 ohms? Yes → Go To 6 No → Replace the O2 Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	Turn the ignition off. Disconnect the O2 Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the O2 Sensor Heater Control circuit in the O2 Sensor harness connector and the PCM harness connector.. Is the resistance below 5.0 ohms? Yes → Go To 7 No → Repair the O2 Sensor Heater Control circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
7	Turn the ignition off. Disconnect the O2 Sensor harness connector. With the DRBIII®, actuate the O2 Heater Test. Measure the voltage of the ASD Relay Output circuit in the O2 Sensor harness connector. Is the voltage above 11.0 volts? Yes → Go To 8 No → Repair the ASD Relay Output circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0133-1/1 O2 SENSOR SLOW RESPONSE — Continued

TEST	ACTION	APPLICABILITY
8	Replace the O2 Sensor in accordance with the Service Information. Attempt to operate the vehicle within the Freeze Frame parameter that where noted. It may be necessary to operate the vehicle for more than 2 drive cycles. **NOTE: Monitor the O2 Sensor voltage ensure good O2 voltage activity.** Does the DTC reset? Yes → Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All
9	**NOTE: Check for contaminates that may have damaged the O2 Sensor: contaminated fuel, unapproved silicone, oil and coolant.** **WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DRB Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom List:

P0134-1/1 O2 SENSOR STAYS AT CENTER
P0140-1/2 O2 SENSOR STAYS AT CENTER

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0134-1/1 O2 SENSOR STAYS AT CENTER.

When Monitored and Set Condition:

P0134-1/1 O2 SENSOR STAYS AT CENTER

When Monitored: With the engine running for more than 2 minutes and engine temperature greater than 76°C (170°F).

Set Condition: The unpstream oxygen sensor signal voltage is between 0.35 volts and 0.55 volts for 1 minute.

P0140-1/2 O2 SENSOR STAYS AT CENTER

When Monitored: With the engine running for more than 2 minutes and engine temperature greater than 76°C (170°F).

Set Condition: The unpstream oxygen sensor signal voltage is between 0.35 volts and 0.55 volts for 1 minute.

POSSIBLE CAUSES
O2S SENSOR GROUND CIRCUIT OPEN
O2S SIGNAL CIRCUIT OPEN
WIRING HARNESS INTERMITTENT PROBLEM
O2 SENSOR SIGNAL CIRCUIT CHECK WITH DRBIII®
PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRB, read the DTC's. Is the Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Go To 6	All

P0134-1/1 O2 SENSOR STAYS AT CENTER — Continued

TEST	ACTION	APPLICABILITY
2	Turn the ignition off. Disconnect the O2 Sensor harness connector. Turn the ignition on. Connect a test light to battery voltage, probe the 02 Sensor signal circuit at the O2 sensor harness connector. With the DRB, read O2 Sensor voltage. Is the voltage displayed on the DBR above 1.0 volts? No → Go To 3 Yes → Replace the O2 Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
3	Turn the ignition off. Disconnect the O2 Sensor harness connector. **Note: Ensure the ignition switch has been in the off position for at least 30 seconds.** Measure the resistance between the O2 Sensor Ground circuit and engine ground. Is the resistance below 5.0 ohms? No → Repair the O2 Sensor Ground circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5. Yes → Go To 4	All
4	Turn the ignition off. Disconnect the O2 Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the O2 Sensor Signal circuit between the O2 Sensor harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? No → Repair the O2 Sensor Signal circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5. Yes → Go To 5	All
5	If there are no possible causes remaining, view repair. Repair Replace the PCM. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	Turn the ignition off. **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any Technical Service Bulletins (TSB) that may apply.** Perform a wiggle test on the related wiring harnesses with the engine running. Watch for the Good Trip Counter to change to 0. Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom List:

P0135-1/1 O2 SENSOR HEATER FAILURE
P1194-O2 HEATER PERFORMANCE

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0135-1/1 O2 SENSOR HEATER FAILURE.

When Monitored and Set Condition:

P0135-1/1 O2 SENSOR HEATER FAILURE

When Monitored: The O2 Heater Monitor runs during O2 sensor cool-down period, after a hot drive cycle, when engine is shut down with the ignition key turned ″OFF″.

Set Condition: Using O2 sensor signal voltage readings, during O2 sensor cool-down period, with heater OFF compared to O2 sensor signal voltage with heater ON.

POSSIBLE CAUSES
OPEN ASD RELAY OUTPUT CIRCUIT
O2S HEATER CONTROL CIRCUIT OPEN
O2S HEATER CONTROL CIRCUIT SHORTED TO GROUND
WIRING HARNESS INTERMITTENT PROBLEM
O2S
PCM

TEST	ACTION	APPLICABILITY
1	Turn Ignition On. With the DRB, read the DTC's. Is the Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Go To 7	All
2	Turn the ignition off. Disconnect the O2 Sensor harness connector. Turn the ignition on. With the DRB, actuate the O2 Heater Test. Measure the voltage of the ASD Relay Output circuit at the O2 Sensor harness connector. Is the voltage above 11.0 volts? Yes → Go To 3 No → Repair the ASD Relay Output circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0135-1/1 O2 SENSOR HEATER FAILURE — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the O2 Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the O2 Sensor Heater Control circuit from the O2 Sensor harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 4 No → Repair the O2 Sensor Heater Control circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
4	Turn the ignition off. Disconnect the O2 Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance between the O2 Sensor Heater Control circuit to ground at the O2 Sensor harness connector. Is the resistance below 5.0 ohms? Yes → Repair the Heater Control circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	Turn the ignition off. Disconnect the O2 Sensor harness connector. Measurement is taken at the component side of connector. Measure the resistance between the O2 Sensor Heater Feed circuit and the O2 Sensor Heater Control/Ground circuit. Is the resistance between 3.0 and 7.0 ohms? Yes → Go To 6 No → Replace the O2 Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	If there are no possible causes remaining, view repair. Repair Replace the PCM. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
7	Turn the ignition off. **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any Technical Service Bulletins (TSB) that may apply.** Perform a wiggle test on the related wiring harnesses with the engine running. Watch for the Good Trip Counter to change to 0. Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom:

P0139-1/2 O2 SENSOR SLOW RESPONSE

When Monitored and Set Condition:

P0139-1/2 O2 SENSOR SLOW RESPONSE

When Monitored: Continuous for approximately the first 7 minutes operation. After warm-up, 60 - 96 KMH (20 - 60 MPH), 1150 - 2500 RPM and 8.2″ - 15.7 ″ MAP.

Set Condition: The oxygen sensor signal voltage is switching from below 0.35 volts to above 0.53 volts and back fewer times than required.

POSSIBLE CAUSES
INTERMITTENT CONDITION
EXHAUST LEAK
O2 SENSOR SIGNAL CIRCUIT VOLTAGE DROP
O2 SENSOR GROUND CIRCUIT VOLTAGE DROP
O2 HEATER ELEMENT
O2 SENSOR HEATER GROUND CIRCUIT OPEN
ASD RELAY OUTPUT CIRCUIT OPEN
O2 SENSOR

TEST	ACTION	APPLICABILITY
1	**NOTE: Record the Freeze Frame Information that was set along with the DTC.** **NOTE: Check for contaminates that may have damaged the O2 Sensor: contaminated fuel, unapproved silicone, oil and coolant.** Turn the ignition on. With the DRBIII®, read DTC's. Is the Good Trip display and equal to zero? Yes → Go To 2 No → Go To 9	All
2	Start the engine. Inspect the exhaust for leak between the engine and the O2 sensor. Inspect the exhaust for leaks between the engine and the appropriate rear O2 Sensor. Are there any exhaust leaks? Yes → Repair or replace the leaking exhaust parts as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All

P0139-1/2 O2 SENSOR SLOW RESPONSE — Continued

TEST	ACTION	APPLICABILITY
3	**NOTE: Ensure the voltmeter leads meet the terminals in the connector and that there is good terminal to wire connection.** **NOTE: Ensure the voltmeter leads are connected for positive polarity** Backprobe between the O2 Sensor Signal circuit at the O2 Sensor harness connector and PCM harness connector. Start the engine. Allow the engine to idle. Is the voltage below 0.10 volt? Yes → Go To 4 No → Repair the high resistance on the O2 Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
4	**NOTE: Ensure the voltmeter leads meet the terminals in the connector and that there is good terminal to wire connection.** **NOTE: Ensure the voltmeter leads are connected for positive polarity** Backprobe between the O2 Sensor ground circuit at the O2 Sensor harness connector and ground. Start the engine. Allow the engine to idle. Is the voltage below 0.10 volt? Yes → Go To 5 No → Repair the high resistance on the O2 Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	**NOTE: Allow the O2 sensor to cool down to room temperature.** Turn the ignition off. Disconnect the O2 Sensor harness connector. Measure the resistance across the O2 Sensor Heater element component side. Is the resistance between 4.0 and 7.0 ohms? Yes → Go To 6 No → Replace the O2 Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	Turn the ignition off. Disconnect the O2 Sensor harness connector. Measure the resistance of the O2 Sensor Heater ground circuit in O2 Sensor harness connector to ground. Is the resistance below 5.0 ohms? Yes → Go To 7 No → Repair the O2 Sensor Heater ground circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
7	Turn the ignition off. Disconnect the O2 Sensor harness connector. With the DRBIII®, actuate the O2 Heater Test. Measure the voltage of the ASD Relay Output circuit in the O2 Sensor harness connector. Is the voltage above 11.0 volts? Yes → Go To 8 No → Repair the ASD Relay Output circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0139-1/2 O2 SENSOR SLOW RESPONSE — Continued

TEST	ACTION	APPLICABILITY
8	Replace the O2 Sensor in accordance with the Service Information. Attempt to operate the vehicle within the Freeze Frame parameter that where noted. It may be necessary to operate the vehicle for more than 2 drive cycles. **NOTE: Monitor the O2 Sensor voltage ensure good O2 voltage activity.** Does the DTC reset? Yes → Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All
9	**NOTE: Check for contaminates that may have damaged the O2 Sensor: contaminated fuel, unapproved silicone, oil and coolant.** **WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.** **NOTE: The conditions that set the DTC are not present at this time. The following list may help in identifying the intermittent condition.** With the engine running at normal operating temperature, monitor the DRB parameters related to the DTC while wiggling the wiring harness. Look for parameter values to change and/or a DTC to set. Review the DRB Freeze Frame information. If possible, try to duplicate the conditions under which the DTC was set. Refer to any Technical Service Bulletins (TSB) that may apply. Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires. Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals. Were any of the above conditions present? Yes → Repair as necessary Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom:

P0141-1/2 O2 SENSOR HEATER FAILURE

When Monitored and Set Condition:

P0141-1/2 O2 SENSOR HEATER FAILURE

When Monitored: The O2 Heater Monitor runs during O2 sensor cool-down period, after a hot drive cycle, when engine is shut down with the ignition key turned ″OFF″.

Set Condition: Using O2 sensor signal voltage readings, during O2 sensor cool-down period, with heater OFF compared to O2 sensor signal voltage with heater ON.

POSSIBLE CAUSES
OPEN ASD RELAY OUTPUT CIRCUIT
O2S HEATER GROUND CIRCUIT OPEN
WIRING HARNESS INTERMITTENT PROBLEM
O2S
PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRB, read the DTC's. Is the Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Go To 6	All
2	Turn the ignition off. Disconnect the O2 Sensor harness connector. Turn the ignition on. With the DRB, actuate the O2 Heater Test. Measure the voltage of the ASD Relay Output circuit at the O2 Sensor harness connector. Is the voltage above 11.0 volts? Yes → Go To 3 No → Repair the ASD Relay Output circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
3	Turn the ignition off. Disconnect the O2 Sensor harness connector. Measure the resistance of the O2S Heater Ground circuit to ground at the O2 Sensor harness connector. Is the resistance below 5.0 ohms? Yes → Go To 4 No → Repair the O2 Sensor Heater Ground circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0141-1/2 O2 SENSOR HEATER FAILURE — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the O2 Sensor harness connector. Measurement is taken at the component side of connector. Measure the resistance between the O2 Sensor Heater Feed circuit and the O2 Sensor Heater Control/Ground circuit. Is the resistance between 3.0 and 7.0 ohms? Yes → Go To 5 No → Replace the O2 Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	If there are no possible causes remaining, replace the PCM. If there are no possible causes remaining, view repair. Repair Replace the PCM. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	Turn the ignition off. **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any Technical Service Bulletins (TSB) that may apply.** Perform a wiggle test on the related wiring harnesses with the engine running. Watch for the Good Trip Counter to change to 0. Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom:

P0171-1/1 FUEL SYSTEM LEAN

When Monitored and Set Condition:

P0171-1/1 FUEL SYSTEM LEAN

When Monitored: With the engine running in closed loop mode, the ambient/battery temperature above -6°C (20°F) and altitude below 8000 ft.

Set Condition: If the PCM multiplies short term compensation by long term adaptive and a certain percentage is exceeded for two trips, a freeze frame is stored, the MIL illuminates and a trouble code is stored.

POSSIBLE CAUSES
FUEL FILTER/PRESSURE REGULATOR (LOW)
INTERMITTENT FUEL SYSTEM DTC
RESTRICTED FUEL SUPPLY LINE
O2 SENSOR SIGNAL CIRCUIT VOLTAGE DROP
O2 SENSOR GROUND CIRCUIT VOLTAGE DROP
O2 SENSOR
TPS VOLTAGE CHANGE NOT SMOOTH
TPS VOLTAGE GREATER THAN 0.92 VOLTS WITH THROTTLE CLOSED
FUEL PUMP INLET STRAINER PLUGGED
FUEL PUMP MODULE
CHECKING ECT SENSOR
ENGINE MECHANICAL PROBLEM
ECT WIRING HARNESS INTERMITTENT
MAP SENSOR (OUT OF CALIBRATION)

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRB, read the DTC's. Is the Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Go To 16	All

P0171-1/1 FUEL SYSTEM LEAN — Continued

TEST	ACTION	APPLICABILITY
2	**Warning: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.** Install a fuel pressure gauge. Turn the ignition on. With the DRB, actuate the ASD Fuel System test and observe the fuel pressure gauge. **Note: Fuel pressure specification is 400 KPa +/- 34 KPa (58 psi +/- 5 psi).** Turn the ignition off. Choose a conclusion that best matches your fuel pressure reading. Below Specification Go To 3 Within Specification Go To 6 Above Specification Check the fuel return line for kinks or restrictions. If OK, replace the fuel filter/pressure regulator. Perform POWERTRAIN VERIFICATION TEST VER - 5. **Caution: Stop All Actuations.**	All
3	Turn the ignition off. **Warning: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.** Raise vehicle on hoist, and disconnect the fuel pressure line at the fuel pump module. Install special 5/16″ fuel line adapter tool #6539 between disconnected fuel line and the fuel pump module. Attach a fuel pressure test gauge to the ″T″ fitting on tool #6539. Turn the ignition on. With the DRB, actuate the ASD Fuel System test and observe the fuel pressure gauge. **Note: Fuel pressure specification is 400 KPa +/- 34 KPa (58 psi +/- 5 psi).** Is the fuel pressure within specification now? Yes → Repair/replace fuel supply line as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4 **Caution: Stop All Actuations.**	All
4	Turn the ignition off. **Warning: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose,fitting or line, the fuel system pressure must be released.** Remove the Fuel Pump Module and inspect the Fuel Inlet Strainer. Is the Fuel Inlet Strainer plugged? Yes → Replace the Fuel Pump Inlet Strainer. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	If there are no possible causes remaining, view repair. Repair Replace the Fuel Pump Module. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0171-1/1 FUEL SYSTEM LEAN — Continued

TEST	ACTION	APPLICABILITY
6	Start the engine. Allow the engine to reach normal operating temperature. With the DRBIII®, read O2 Sensor voltage. Raise and lower the RPM. Allow the vehicle to idle. Does the O2 Sensor voltage vary from below .35 volts to above .53 volts. Yes → Go To 7 No → Go To 13	All
7	Turn the ignition on. With the DRBIII®, read TPS VOLTS. While monitoring the DRBIII®, slowly open and close the Throttle. Is the voltage change smooth? Yes → Go To 8 No → Replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
8	Turn the ignition on. With the DRB, read TPS VOLTS. Throttle must be against stop. Is the voltage 0.92 or less with the Throttle closed? Yes → Go To 9 No → Check for a binding throttle condition. If OK, replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
9	**Note: For this test to be valid, the thermostat must be operating correctly.** **Note: This test works best if performed on a cold engine (cold soaked).** Turn the ignition on. With the DRB, read the ENG COOLANT TMP DEG value. If the engine was allowed to sit overnight (cold soak), the engine temperature value should be a sensible value that is close to the surrounding temperature (ambient temperature). **Note: If engine coolant temperature is above 82° C (180° F), allow the engine to cool until 65° C (150° F) is reached.** Start the engine. During engine warm-up, monitor the ENG COOLANT TMP DEG value. The temp deg value change should be a smooth transition from start up to normal operating temp 82° C (180° F). The value should reach at least 82° C (180° F). Did the ENG COOLANT TMP DEG value increase smoothly and did it reach at least 82° C (180° F)? Yes → Go To 10 No → Replace the Engine Coolant Temperature Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0171-1/1 FUEL SYSTEM LEAN — Continued

TEST	ACTION	APPLICABILITY
10	Turn the ignition off. **NOTE: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any Technical Service Bulletins (TSB) that may apply.** Perform a wiggle test on the related wiring harnesses with the engine running. Watch for the Good Trip Counter to change to 0. Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 11	All
11	Turn the ignition off. Connect a Vacuum Gauge to a Manifold Vacuum source. Start the engine. Allow the engine to idle. **Note: If engine will not idle, maintain a constant RPM above idle.** Using the DRB, monitor the MAP Sensor vacuum value. Is the DRB reading within 1″ of the Vacuum Gauge reading? Yes → Go To 12 No → Replace the MAP Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
12	Check for any of the following conditions/mechanical problems. ENGINE VACUUM - must be at least 13 inches in neutral ENGINE VALVE TIMING - must be within specifications ENGINE COMPRESSION - must be within specifications ENGINE EXHAUST SYSTEM - must be free of any restrictions or leaks. ENGINE PCV SYSTEM - must flow freely TORQUE CONVERTER STALL SPEED - must be within specifications POWER BRAKE BOOSTER - no internal vacuum leaks FUEL - must be free of contamination FUEL INJECTOR - plugged or restricted injector; control wire not connected to correct injector Are there any engine mechanical problems? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All
13	**NOTE: Ensure the voltmeter leads meet the terminals in the connector and that there is good terminal to wire connection.** **NOTE: Ensure the voltmeter leads are connected for positive polarity** Backprobe between the O2 Sensor Signal circuit at the O2 Sensor harness connector and PCM harness connector. Start the engine. Allow the engine to idle. Is the voltage below 0.10 volt? Yes → Go To 14 No → Repair the high resistance on the O2 Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0171-1/1 FUEL SYSTEM LEAN — Continued

TEST	ACTION	APPLICABILITY
14	**NOTE: Ensure the voltmeter leads meet the terminals in the connector and that there is good terminal to wire connection.** **NOTE: Ensure the voltmeter leads are connected for positive polarity** Backprobe between the O2 Sensor ground circuit at the O2 Sensor harness connector and ground. Start the engine. Allow the engine to idle. Is the voltage below 0.10 volt? Yes → Go To 15 No → Repair the high resistance on the O2 Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
15	Replace the O2 Sensor in accordance with the Service Information. Attempt to operate the vehicle within the Freeze Frame parameter that where noted. It may be necessary to operate the vehicle for more than 2 drive cycles. **NOTE: Monitor the O2 Sensor voltage ensure good O2 voltage activity.** Does the DTC reset? Yes → Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All
16	The conditions required to set the DTC are no longer present. With the DRB read and record the Freeze Frame data and the ″Fuel System Similar Conditions Window″ data. Utilize the data and try to duplicate the operating conditions at which the DTC was set. Pay particular attention to the ECT and RPM for added diagnostics. **Note: Refer to any TSB's that may apply to the symptom.** Was a problem found? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom:

P0172-1/1 FUEL SYSTEM RICH

When Monitored and Set Condition:

P0172-1/1 FUEL SYSTEM RICH

When Monitored: With the engine running in closed loop mode, the ambient/battery temperature above -6°C (20°F) and altitude below 8000 ft.

Set Condition: If the PCM multiplies short term compensation by long term adaptive and the result is below a certain value for two trips, a freeze frame is stored, the MIL illuminates and a trouble code is stored.

POSSIBLE CAUSES
FUEL FILTER/PRESSURE REGULATOR (HIGH)
EVAP SYSTEM FAILURE
INTERMITTENT FUEL SYSTEM DTC
RESTRICTED FUEL SUPPLY LINE
O2 SENSOR SIGNAL CIRCUIT VOLTAGE DROP
O2 SENSOR GROUND CIRCUIT VOLTAGE DROP
O2 SENSOR
TPS VOLTAGE CHANGE NOT SMOOTH
TPS VOLTAGE GREATER THAN 0.92 VOLTS WITH THROTTLE CLOSED
FUEL PUMP INLET STRAINER PLUGGED
FUEL PUMP MODULE
CHECKING ECT SENSOR
ENGINE MECHANICAL PROBLEM
ECT WIRING HARNESS INTERMITTENT
MAP SENSOR (OUT OF CALIBRATION)

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRB, read the DTC's. Is the Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Go To 17	All

P0172-1/1 FUEL SYSTEM RICH — Continued

TEST	ACTION	APPLICABILITY
2	Turn the ignition off. **Warning: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.** Install a fuel pressure gauge. Turn the ignition on. With the DRB, actuate the ASD Fuel System test and observe the fuel pressure gauge. **Note: Fuel pressure specification is 400 KPa +/- 34 KPa (58 psi +/- 5 psi).** Choose a conclusion that best matches your fuel pressure reading. Below Specification Go To 3 Within Specification Go To 6 Above Specification Check the fuel return line for kinks or restrictions. If OK, replace the fuel filter/pressure regulator. Perform POWERTRAIN VERIFICATION TEST VER - 5. **Caution: Stop All Actuations.**	All
3	Turn the ignition off. **Warning: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.** Raise vehicle on hoist, and disconnect the fuel pressure line at the fuel pump module. Install special 5/16″ fuel line adapter tool #6539 between disconnected fuel line and the fuel pump module. Attach a fuel pressure test gauge to the ″T″ fitting on tool #6539. Turn the ignition on. With the DRB, actuate the ASD Fuel System test and observe the fuel pressure gauge. **Note: Fuel pressure specification is 400 KPa +/- 34 KPa (58 psi +/- 5 psi).** Is the fuel pressure within specification now? Yes → Repair/replace fuel supply line as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4 **Caution: Stop All Actuations.**	All
4	Turn the ignition off. **Warning: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose,fitting or line, the fuel system pressure must be released.** Remove the Fuel Pump Module and inspect the Fuel Inlet Strainer. Is the Fuel Inlet Strainer plugged? Yes → Replace the Fuel Pump Inlet Strainer. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	If there are no possible causes remaining, view repair. Repair Replace the Fuel Pump Module. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0172-1/1 FUEL SYSTEM RICH — Continued

TEST	ACTION	APPLICABILITY
6	Start the engine. Allow the engine to reach normal operating temperature. With the DRBIII®, read O2 Sensor voltage. Raise and lower the RPM. Allow the vehicle to idle. Does the O2 Sensor voltage vary from below .35 volts to above .53 volts. Yes → Go To 7 No → Go To 14	All
7	**Note: Engine must be at operating temp and in closed loop to perform this test.** Start engine and run until operating temp and closed loop mode is reached. With the DRB under System Tests, go to Purge Vapors Test. Observe the Short Term Adaptive value and press 3 to flow. **Note: Short Term Adaptive should change.** Did the Short Term Adaptive value change? Yes → Go To 8 No → Refer to the Checking Evaporative Emission System symptom in the Driveability category. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
8	Turn the ignition on. With the DRBIII®, read TPS VOLTS. While monitoring the DRBIII®, slowly open and close the Throttle. Is the voltage change smooth? Yes → Go To 9 No → Replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
9	Turn the ignition on. With the DRB, read TPS VOLTS. Throttle must be against stop. Is the voltage 0.92 or less with the Throttle closed? Yes → Go To 10 No → Check for a binding throttle condition. If OK, replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0172-1/1 FUEL SYSTEM RICH — Continued

TEST	ACTION	APPLICABILITY
10	**Note: For this test to be valid, the thermostat must be operating correctly.** **Note: This test works best if performed on a cold engine (cold soaked).** Turn the ignition on. With the DRB, read the ENG COOLANT TMP DEG value. If the engine was allowed to sit overnight (cold soak), the engine temperature value should be a sensible value that is close to the surrounding temperature (ambient temperature). **Note: If engine coolant temperature is above 82° C (180° F), allow the engine to cool until 65° C (150° F) is reached.** Start the engine. During engine warm-up, monitor the ENG COOLANT TMP DEG value. The temp deg value change should be a smooth transition from start up to normal operating temp 82° C (180° F). The value should reach at least 82° C (180° F). Did the ENG COOLANT TMP DEG value increase smoothly and did it reach at least 82° C (180° F)? Yes → Go To 11 No → Replace the Engine Coolant Temperature Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
11	Turn the ignition off. **NOTE: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any Technical Service Bulletins (TSB) that may apply.** Perform a wiggle test on the related wiring harnesses with the engine running. Watch for the Good Trip Counter to change to 0. Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 12	All
12	Turn the ignition off. Connect a Vacuum Gauge to a Manifold Vacuum source. Start the engine. Allow the engine to idle. **Note: If engine will not idle, maintain a constant RPM above idle.** Using the DRB, monitor the MAP Sensor vacuum value. Is the DRB reading within 1″ of the Vacuum Gauge reading? Yes → Go To 13 No → Replace the MAP Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0172-1/1 FUEL SYSTEM RICH — Continued

TEST	ACTION	APPLICABILITY
13	Check for any of the following conditions/mechanical problems. ENGINE VACUUM - must be at least 13 inches in neutral ENGINE VALVE TIMING - must be within specifications ENGINE COMPRESSION - must be within specifications ENGINE EXHAUST SYSTEM - must be free of any restrictions or leaks. ENGINE PCV SYSTEM - must flow freely TORQUE CONVERTER STALL SPEED - must be within specifications POWER BRAKE BOOSTER - no internal vacuum leaks FUEL - must be free of contamination FUEL INJECTOR - plugged or restricted injector; control wire not connected to correct injector Are there any engine mechanical problems? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All
14	**NOTE: Ensure the voltmeter leads meet the terminals in the connector and that there is good terminal to wire connection.** **NOTE: Ensure the voltmeter leads are connected for positive polarity** Backprobe between the O2 Sensor Signal circuit at the O2 Sensor harness connector and PCM harness connector. Start the engine. Allow the engine to idle. Is the voltage below 0.10 volt? Yes → Go To 15 No → Repair the high resistance on the O2 Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
15	**NOTE: Ensure the voltmeter leads meet the terminals in the connector and that there is good terminal to wire connection.** **NOTE: Ensure the voltmeter leads are connected for positive polarity** Backprobe between the O2 Sensor ground circuit at the O2 Sensor harness connector and ground. Start the engine. Allow the engine to idle. Is the voltage below 0.10 volt? Yes → Go To 16 No → Repair the high resistance on the O2 Sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
16	Replace the O2 Sensor in accordance with the Service Information. Attempt to operate the vehicle within the Freeze Frame parameter that where noted. It may be necessary to operate the vehicle for more than 2 drive cycles. **NOTE: Monitor the O2 Sensor voltage ensure good O2 voltage activity.** Does the DTC reset? Yes → Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

P0172-1/1 FUEL SYSTEM RICH — Continued

TEST	ACTION	APPLICABILITY
17	The conditions required to set the DTC are no longer present. With the DRB read and record the Freeze Frame data and the ″Fuel System Similar Conditions Window″ data. Utilize the data and try to duplicate the operating conditions at which the DTC was set. Pay particular attention to the ECT and RPM for added diagnostics. **Note: Refer to any TSB's that may apply to the symptom.** Was a problem found? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom List:

P0201-INJECTOR #1 CONTROL CIRCUIT
P0202-INJECTOR #2 CONTROL CIRCUIT
P0203-INJECTOR #3 CONTROL CIRCUIT
P0204-INJECTOR #4 CONTROL CIRCUIT

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0201-INJECTOR #1 CONTROL CIRCUIT.

When Monitored and Set Condition:

P0201-INJECTOR #1 CONTROL CIRCUIT

When Monitored: With battery voltage greater than 12 volts, the auto shutdown relay energized, injector pulse width less than 10ms, and engine speed less than 3000 rpm.

Set Condition: This trouble code takes .64 to 10.0 seconds to set when no inductive kick is sensed .18ms after injector turn off, and with no other injectors on.

P0202-INJECTOR #2 CONTROL CIRCUIT

When Monitored: With battery voltage greater than 12 volts, the auto shutdown relay energized, injector pulse width less than 10ms, and engine speed less than 3000 rpm.

Set Condition: This trouble code takes .64 to 10.0 seconds to set when no inductive kick is sensed .18ms after injector turn off, and with no other injectors on.

P0203-INJECTOR #3 CONTROL CIRCUIT

When Monitored: With battery voltage greater than 12 volts, the auto shutdown relay energized, injector pulse width less than 10ms, and engine speed less than 3000 rpm.

Set Condition: This trouble code takes .64 to 10.0 seconds to set when no inductive kick is sensed .18ms after injector turn off, and with no other injectors on.

P0204-INJECTOR #4 CONTROL CIRCUIT

When Monitored: With battery voltage greater than 12 volts, the auto shutdown relay energized, injector pulse width less than 10ms, and engine speed less than 3000 rpm.

Set Condition: This trouble code takes .64 to 10.0 seconds to set when no inductive kick is sensed .18ms after injector turn off, and with no other injectors on.

POSSIBLE CAUSES
WIRING HARNESS INSPECTION
ASD RELAY OUTPUT CIRCUIT
FUEL INJECTOR
FUEL INJECTOR DRIVER CIRCUIT OPEN

P0201-INJECTOR #1 CONTROL CIRCUIT — Continued

POSSIBLE CAUSES
FUEL INJECTOR DRIVER CIRCUIT SHORTED TO GROUND
POWERTRAIN CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTC's. Is the Good Trip Counter displayed and equal to 0 for the DTC? Yes → Go To 2 No → Go To 7	All
2	Turn the ignition off. Disconnect the Fuel Injector harness connector. Turn the ignition on. With the DRB, actuate the ASD Relay. Using a 12 volt test light connected to ground, probe the ASD Relay output circuit in the Fuel Injector harness connector. Does the test light illuminate brightly? Yes → Go To 3 No → Repair the ASD Relay output circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
3	Turn the ignition off. Disconnect the Fuel Injector harness connector. Using a 12 volt test light connected to battery voltage, probe the Fuel Injector driver circuit. With the DRB, actuate the Fuel Injector. Does the test light blink/flicker? Yes → Replace the Fuel Injector. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Turn the ignition off. Disconnect the Fuel Injector harness connector. Disconnect the PCM harness connector. Measure the resistance of the Fuel Injector driver circuit between the Fuel Injector harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the Fuel Injector driver circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	Turn the ignition off. Disconnect the Fuel Injector harness connector. Disconnect the PCM harness connector. Measure the resistance between ground and the Fuel Injector driver circuit in the Fuel Injector harness connector. Is the resistance below 100k ohms? Yes → Repair the Fuel Injector driver circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All

P0201-INJECTOR #1 CONTROL CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
6	If there are no possible causes remaining, view repair. Repair Replace the Powertain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
7	**At this time, the conditions required to set the DTC are not present.** **Note: Use the Freeze Frame Data to help duplicate the conditions that set the DTC. Pay particular attention to the DTC set conditions, such as: VSS, MAP, ECT and Load.** **Note: Visually inspect the related wiring harness, look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any technical service bulletins that may apply.** Perform a wiggle test of the wiring harness and connectors while the engine is running. Listen for the engine to miss or stall. Also, watch for the Good Trip Counter to change to zero. Were any problems found? Yes → Repair the wiring harness/connector as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom List:

P0300-MULTIPLE CYLINDER MIS-FIRE
P0301-CYLINDER #1 MISFIRE
P0302-CYLINDER #2 MISFIRE
P0303-CYLINDER #3 MISFIRE
P0304-CYLINDER #4 MISFIRE

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0300-MULTIPLE CYLINDER MIS-FIRE.

When Monitored and Set Condition:

P0300-MULTIPLE CYLINDER MIS-FIRE

When Monitored: Any time the engine is running, and the adaptive numerator has been successfully updated.

Set Condition: When more than a 2% misfire rate is measured during two trips, or with a 10% to 30% misfire rate during one trip.

P0301-CYLINDER #1 MISFIRE

When Monitored: Any time the engine is running, and the adaptive numerator has been successfully updated.

Set Condition: When more than a 2% misfire rate is measured during two trips, or with a 10% to 30% misfire rate during one trip.

P0302-CYLINDER #2 MISFIRE

When Monitored: Any time the engine is running, and the adaptive numerator has been successfully updated.

Set Condition: When more than a 2% misfire rate is measured during two trips, or with a 10% to 30% misfire rate during one trip.

P0303-CYLINDER #3 MISFIRE

When Monitored: Any time the engine is running, and the adaptive numerator has been successfully updated.

Set Condition: When more than a 2% misfire rate is measured during two trips, or with a 10% to 30% misfire rate during one trip.

P0304-CYLINDER #4 MISFIRE

When Monitored: Any time the engine is running, and the adaptive numerator has been successfully updated.

Set Condition: When more than a 2% misfire rate is measured during two trips, or with a 10% to 30% misfire rate during one trip.

P0300-MULTIPLE CYLINDER MIS-FIRE — Continued

POSSIBLE CAUSES
MIS-FIRE CONDITIONS NO LONGER EXIST
OTHER POSSIBLE CAUSES FOR MIS-FIRE
FUEL SYSTEM PROBLEM
SECONDARY IGNITION OR MECHANICAL PROBLEM
ENGINE MECHANICAL PROBLEM
ERRATIC CAM/CRANK SENSOR SIGNALS

TEST	ACTION	APPLICABILITY
1	**Note: Repair all other PCM DTC's before continuing with this test.** With the DRBIII®, read DTC's. Is the MIS-FIRE GOOD TRIP counter displayed and equal to zero? Yes → Go To 2 No → Go To 3	All
2	At this time the conditions that set the Misfire DTC are present. With the DRBIII®, select DTC's and RELATED FUNCTIONS. Read and record the FREEZE FRAME DATA. Select OBD II MONITORS. Read and record the MIS-FIRE SIMILAR CONDITIONS WINDOW DATA. With these screens, attempt to duplicate the condition(s) that has set this DTC. When the vehicle is operating in the SIMILAR CONDITIONS WINDOW, refer to the WHICH CYLINDER IS MISFIRING screen. Observe the WHICH CYLINDER IS MISFIRING screen for at least one minute. Is the DRBIII® counting mis-fires at this time? Yes → Go To 4 No → Go To 3	All
3	At this time the mis-fire does not exist or is an intermittent problem. **Note: An intermittent problem may have been caused by moisture in the secondary ignition.** With the DRB, select DTC's AND RELATED FUNCTIONS. Read and record the FREEZE FRAME DATA. Select OBD II MONITORS. Read and record MIS-FIRE SIMILAR CONDITIONS WINDOW DATA. With these screens, attempt to duplicate the condition that has set the Misfire DTC. While using FREEZE FRAME DATA, pay particular attention to the DTC setting conditions, such as speed, temp, load, and map vacuum. Does the mis-fire reoccur? Yes → Go To 4 No → Mis-fire DTC conditions no longer exist. Refer to any TSB's that may relate to the symptom. Operate the vehicle for 1 misfire good trip and erase DTC's. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0300-MULTIPLE CYLINDER MIS-FIRE — Continued

TEST	ACTION	APPLICABILITY
4	**Note: Anything that affects the speed of the crankshaft can cause a misfire DTC.** The following are other possible causes for mis-fire: Injector harness connectors, secondary ignition problem, mechanical engine problem, PCM power grounds, irregular cam and crank signal, plugged injectors, restricted exhaust, intake restriction, damaged trigger wheel, contaminated fuel, or vacuum leak. Weak valve springs, carbon deposits on valves, or accessory drive belt (serpentine belt). Check for any TSB's that may relate to a Misfire DTC. Do any of the above causes exist? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	With the DRBIII®, read the FREEZE FRAME DATA. Use the FREEZE FRAME DATA and attempt to determine the cause of the Misfire DTC. In the FREEZE FRAME, are the adaptive fuel percentages greater than +/- 15%? Yes → Refer to the Driveablitiy Category and perform the Checking Fuel Delivery symptom. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All
6	With the DRBIII®, read the FREEZE FRAME DATA. Use the FREEZE FRAME DATA and attempt to determine the cause of the Misfire DTC. In the FREEZE FRAME DATA, is the LOAD VALUE over 50% and the operating temp normal? Yes → Check secondary ignition, compression, and cylinder leakage. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 7	All
7	Check for any of the following conditions/mechanical problems. ENGINE VACUUM - must be at least 13 inches in neutral ENGINE VALVE TIMING - must be within specifications ENGINE COMPRESSION - must be within specifications ENGINE EXHAUST SYSTEM - must be free of any restrictions or leaks. ENGINE PCV SYSTEM - must flow freely TORQUE CONVERTER STALL SPEED - must be within specifications POWER BRAKE BOOSTER - no internal vacuum leaks FUEL - must be free of contamination FUEL INJECTOR - plugged or restricted injector; control wire not connected to correct injector Are there any engine mechanical problems? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 8	All

P0300-MULTIPLE CYLINDER MIS-FIRE — Continued

TEST	ACTION	APPLICABILITY
8	With the DRBIII®, read the FREEZE FRAME DATA. Use the FREEZE FRAME DATA and attempt to determine the cause of the Misfire DTC. In the FREEZE FRAME DATA, is the engine RPM over 3000 and the operating temp normal? Yes → Test CMP and CKP signals with Lab Scope, check valve timing, and perform running vacuum test. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom:

P0320-NO CRANK REFERENCE SIGNAL AT PCM

When Monitored and Set Condition:

P0320-NO CRANK REFERENCE SIGNAL AT PCM

When Monitored: With the ignition in either the start or run position and battery voltage between 4-15 volts.

Set Condition: No signal from the crankshaft position sensor is present when engine vacuum is present or cam signals are present.

POSSIBLE CAUSES
CKP SIGNAL CIRCUIT SHORTED TO VOLTAGE
8 VOLT SUPPLY CIRCUIT OPEN
8 VOLT SUPPLY CIRCUIT SHORTED TO GROUND
8 VOLT SUPPLY CIRCUIT SHORTED TO CKP SIGNAL CIRCUIT
PCM (8 VOLT SUPPLY)
SENSOR GROUND CIRCUIT OPEN
CKP SIGNAL CIRCUIT
IRREGULAR LAB SCOPE PATTERN OF CKP SIGNAL
STRAY SIGNAL FROM THE CAMSHAFT POSITION SENSOR
WIRING HARNESS INTERMITTENT
CKP SIGNAL CIRCUIT SHORTED TO GROUND
CKP SIGNAL CIRCUIT OPEN
CKP SIGNAL CIRCUIT SHORTED TO SENSOR GROUND CIRCUIT
POWERTRAIN CONTROL MODULE (CKP SIGNAL CIRCUIT)

TEST	ACTION	APPLICABILITY
1	With the DRB, monitor the Current CKP Count while cranking the engine. Does the Current CKP Count change while cranking the engine? No → Go To 2 Yes → Go To 13	All
2	Turn the ignition off. Disconnect the Crankshaft Position Sensor harness connector. Turn the ignition on. Measure the voltage of the 8 volt supply circuit at the CKP sensor harness connector. Is the voltage above 7.5 volts? Yes → Go To 3 No → Go To 9	All

P0320-NO CRANK REFERENCE SIGNAL AT PCM — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the Crankshaft Position Sensor harness connector. Measure the sensor ground circuit at the CKP sensor harness connector to ground. Is the resistance below 5.0 ohms? Yes → Go To 4 No → Check for an open sensor ground circuit. If OK, replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
4	Turn the ignition off. Disconnect the Crankshaft Position Sensor harness connector. Turn the ignition on. Measure the voltage of the CKP signal circuit at the CKP Sensor connector. Select a conclusion that best matches your voltage measurement. Less than 4.5 volts Go To 5 Between 4.5 and 5.5 volts Replace the Crankshaft Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. Greater than 5.5 volts Repair the CKP signal circuit for a shorted to voltage. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	Turn the ignition off. Disconnect the Crankshaft Position Sensor harness connector. Disconnect the Powertrain Control Module harness connectors. Measure the resistance between the CKP Sensor signal circuit and ground at the CKP Sensor harness connector. Is the resistance below 5.0 ohms? Yes → Repair the CKP signal circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All
6	Turn the ignition off. Disconnect the Crankshaft Position Sensor harness connector. Disconnect the Powertrain Control Module harness connectors. Measure the resistance of the CKP signal circuit from the CKP sensor harness connector to the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 7 No → Repair the CKP Signal circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0320-NO CRANK REFERENCE SIGNAL AT PCM — Continued

TEST	ACTION	APPLICABILITY
7	Turn the ignition off. Disconnect the Crankshaft Position Sensor harness connector. Disconnect the Powertrain Control Module harness connectors. Measure the resistance between the CKP Sensor Signal circuit and the Sensor Ground circuit at the CKP Sensor harness connector. Is the resistance below 5.0 ohms? Yes → Repair the CKP signal circuit for a short to the sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 8	All
8	If there are no possible causes remaining, view repair. Repair Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
9	Turn the ignition off. Disconnect the Crankshaft Position Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the 8 volt supply circuit from the CKP sensor harness connector to the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 10 No → Repair the 8 volt supply circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
10	Turn the ignition off. Disconnect the Crankshaft Position Sensor harness connector. Measure the resistance of the 8 volt supply circuit at the CKP sensor harness connector to ground. Is the resistance below 5.0 ohms? Yes → Repair the 8 volt supply circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 11	All
11	Turn the ignition off. Disconnect the Crankshaft Position Sensor harness connector. Measure the resistance between the 8 volt supply circuit and the CKP signal circuit at the CKP sensor harness connector. Is the resistance below 5.0 ohms? Yes → Repair the 8 volt supply circuit for a short to the CKP signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 12	All
12	If there are no possible causes remaining, view repair. Repair Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0320-NO CRANK REFERENCE SIGNAL AT PCM — Continued

TEST	ACTION	APPLICABILITY
13	Turn the ignition off. **Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any technical service bulletins that may apply.** Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 14	All
14	Turn the ignition off. Connect the DRB lab scope to the CKP signal circuit. For best results, backprobe at the PCM harness connector using Miller special tool #6801. **Warning: Keep clear of the engine's moving parts.** Start the engine. Observe the lab scope screen while wiggling the wiring harness and connectors. Were there any irregularities in the lab scope pattern? Yes → Check harness and connectors carefully. If OK, replace the Crankshaft Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 15	All
15	Turn the ignition off. Connect the DRB lab scope to the CMP signal circuit. For best results, backprobe at the PCM harness connector using Miller special tool #6801. While observing the lab scope screen, turn ignition on do not start engine. Look for any pulses generated by the Cam sensor. Did the Camshaft Position Sensor generate any pulses? Yes → Replace the Camshaft Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom:

P0340-NO CAM SIGNAL AT PCM

When Monitored and Set Condition:

P0340-NO CAM SIGNAL AT PCM

When Monitored: During engine cranking, after 32 crank position signals.

Set Condition: No camshaft position sensor signal is present with crank signal.

POSSIBLE CAUSES
CMP SIGNAL CIRCUIT SHORTED TO VOLTAGE
8 VOLT SUPPLY CIRCUIT OPEN
8 VOLT SUPPLY CIRCUIT SHORTED TO GROUND
8 VOLT SUPPLY CIRCUIT SHORTED TO CMP SIGNAL CIRCUIT
PCM (8 VOLT SUPPLY)
SENSOR GROUND CIRCUIT OPEN
PROBLEM WITH CMP SIGNAL CIRCUIT
IRREGULAR LAB SCOPE PATTERN OF CMP SIGNAL
WIRING HARNESS INTERMITTENT
STRAY SIGNAL FROM THE CRANKSHAFT POSITION SENSOR
CMP SIGNAL CIRCUIT SHORTED TO GROUND
CMP SIGNAL CIRCUIT OPEN
CMP SIGNAL CIRCUIT SHORTED TO SENSOR GROUND CIRCUIT
POWERTRAIN CONTROL MODULE (CMP SIGNAL CIRCUIT)

TEST	ACTION	APPLICABILITY
1	With the DRB, read the Current CMP Count while cranking the engine. Does the Current CMP Count change while cranking the engine? No → Go To 2 Yes → Go To 13	All
2	Turn the ignition off. Disconnect the Camshaft Position Sensor harness connector. Turn the ignition on. Measure the voltage of the 8 volt supply circuit at the CMP sensor harness connector. Is the voltage above 7.5 volts? Yes → Go To 3 No → Go To 9	All

P0340-NO CAM SIGNAL AT PCM — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the Camshaft Position Sensor harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the Sensor Ground circuit at the Camshaft Position Sensor harness connector to ground. Is the resistance below 5.0 ohms? Yes → Go To 4 No → Repair the Sensor Ground circuit for an open. If OK, replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
4	Turn the ignition off. Disconnect the Camshaft Position Sensor harness connector. Turn the ignition on. Measure the voltage of the Camshaft Position Sensor Signal circuit at the Camshaft Position Sensor harness connector. Select a conclusion that best matches your voltage measurement. Less than 4.5 volts Go To 5 Between 4.5 and 5.5 volts Replace the Camshaft Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. Greater than 5.5 volts Repair the CMP signal circuit shorted to voltage. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	Turn the ignition off. Disconnect the Camshaft Position Sensor harness connector. Disconnect the Powertrain Control Module harness connectors. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance between the Camshaft Position Sensor signal circuit and ground. Is the resistance below 5.0 ohms? Yes → Repair the Camshaft Position Sensor Signal circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All
6	Turn the ignition off. Disconnect the Camshaft Position Sensor harness connector. Disconnect the Powertrain Control Module harness connectors. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the Camshaft Position Sensor Signal circuit from the Camshaft Position Sensor harness connector to the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 7 No → Repair the Camshaft Position Sensor Signal circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0340-NO CAM SIGNAL AT PCM — Continued

TEST	ACTION	APPLICABILITY
7	Turn the ignition off. Disconnect the Camshaft Position Sensor harness connector. Disconnect the Powertrain Control Module harness connectors. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance between the Camshaft Position Sensor signal circuit and the sensor ground circuit at the Camshaft Position Sensor harness connector. Is the resistance below 5.0 ohms? Yes → Repair the Camshaft Position Sensor signal circuit for a short to the sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 8	All
8	If there are no possible causes remaining, view repair. Repair Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
9	Turn the ignition off. Disconnect the Camshaft Position Sensor harness connector. Disconnect the Powertrain Control Module harness connector. Measure the resistance of the 8 volt supply circuit from the CMP Sensor harness connector to the PCM harness connector. Is the resistance below 5.0 ohms. Yes → Go To 10 No → Repair the 8 volt supply circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
10	Turn the ignition off. Disconnect the Camshaft Position Sensor harness connector. Measure the resistance of the 8 volt supply circuit at the CmP sensor harness connector to ground. Is the resistance below 5.0 ohms? Yes → Repair the 8 volt supply circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 11	All
11	Turn the ignition off. Disconnect the Camshaft Position Sensor harness connector. Measure the resistance between the 8 volt supply circuit and the CMP signal circuit at the CMP sensor harness connector. Is the resistance below 5.0 ohms? Yes → Repair the 8 volt supply circuit for a short to the CMP signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 12	All
12	If there are no possible causes remaining, view repair. Repair Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0340-NO CAM SIGNAL AT PCM — Continued

TEST	ACTION	APPLICABILITY
13	Turn the ignition off. Connect the DRB lab scope to the CMP signal circuit. For best results, backprobe at the PCM harness using Miller special tool #6801. **Warning: Keep clear of the engine's moving parts.** Start the engine. Observe the lab scope screen while wiggling the wiring harness and connectors. Were there any irregularities in the lab scope pattern? Yes → Check harness and connectors carefully. If OK, replace the Camshaft Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 14	All
14	Turn the ignition off. **Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any technical service bulletins that may apply.** Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 15	All
15	Turn the ignition off. Connect the DRB lab scope to the CKP signal circuit. For best results, backprobe at the PCM using Miller special tool #6801. While observing the lab scope screen, turn ignition on (do not start engine). Look for any pulses generated by the crank sensor. Did the Crankshaft Position Sensor generate any pulses? Yes → Replace the Crankshaft Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom List:

P0351-IGNITION COIL #1 PRIMARY CIRCUIT
P0352-IGNITION COIL #2 PRIMARY CIRCUIT

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0351-IGNITION COIL #1 PRIMARY CIRCUIT.

When Monitored and Set Condition:

P0351-IGNITION COIL #1 PRIMARY CIRCUIT

When Monitored: With battery voltage greater than 8 volts during engine cranking or greater than 12 volts with engine running, engine rpm less than 2016, and none of the coils in dwell when checked.

Set Condition: Peak current is not achieved with battery based dwell plus 1.5 ms of diagnostic offset. It takes less than 3 seconds during cranking or up to 6 seconds while running to set.

P0352-IGNITION COIL #2 PRIMARY CIRCUIT

When Monitored: With battery voltage greater than 8 volts during engine cranking or greater than 12 volts with engine running, engine rpm less than 2016, and none of the coils in dwell when checked.

Set Condition: Peak current is not achieved with battery based dwell plus 1.5 ms of diagnostic offset. It takes less than 3 seconds during cranking or up to 6 seconds while running to set.

POSSIBLE CAUSES
WIRING HARNESS INSPECTION
ASD RELAY OUTPUT CIRCUIT
IGNITION COIL
IGNITION COIL DRIVER CIRCUIT OPEN
IGNITION COIL DRIVER CIRCUIT SHORTED TO GROUND
POWERTRAIN CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRB, read PCM DTCs. Is the Good Trip Counter displayed and equal to 0 for the DTC? Yes → Go To 2 No → Go To 7	All

P0351-IGNITION COIL #1 PRIMARY CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
2	Turn the ignition off. Disconnect the Ignition Coil harness connector. Turn the ignition on. With the DRB, actuate the ASD Relay. Using a 12-volt Test Light connected to ground, probe the ASD Relay Output circuit in the Ignition Coil harness connector. Does the test light illuminate brightly? Yes → Go To 3 No → Repair the ASD Relay output circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
3	Turn the ignition off. Disconnect the Ignition Coil harness connector. Using a 12 volt test light connected to battery voltage, probe the Ignition Coil driver circuit. Crank the engine for 5 seconds while observing the test light. Does the test light blink/flicker? Yes → Replace the Ignition Coil. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Turn the ignition off. Disconnect the Ignition Coil harness connector. Disconnect the PCM harness connector. Measure the resistance of the Ignition Coil Driver circuit. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the Ignition Coil driver circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	Turn the ignition off. Disconnect the Ignition Coil harness connector. Disconnect the PCM harness connector. Measure the resistance between ground and the Ignition Coil Driver circuit in the Ignition Coil harness connector. Is the resistance above 100 kohms? Yes → Go To 6 No → Repair the Ignition Coil driver circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	If there are no possible causes remaining, view repair. Repair Replace the Powertain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0351-IGNITION COIL #1 PRIMARY CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
7	**At this time, the conditions required to set the DTC are not present.** **Note: Use the Freeze Frame Data to help duplicate the conditions that set the DTC. Pay particular attention to the DTC set conditions, such as: VSS, MAP, ECT and Load.** **Note: Visually inspect the related wiring harness, look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any technical service bulletins that may apply.** Perform a wiggle test of the wiring harness and connectors while the engine is running. Listen for the engine to miss or stall. Also, watch for the Good Trip Counter to change to zero. Were any problems found? Yes → Repair the wiring harness/connector as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom:

P0401 - EGR SYSTEM FAILURE

When Monitored and Set Condition:

P0401 - EGR SYSTEM FAILURE

When Monitored: With engine temp greater than 82 degress C (180 degress F) ambient temp above 32 degress C (89 degress F), engine in closed loop, O2 sensor operational, engine under a steady load with the throttle open, and 02 controller not at or near its limits.

Set Condition: Conditions are met, the EGR is turned off and on momentarily. The oxygen sensor signal is monitor for changes in its output signal during this test. If no significant change or too much change is seen, a flag is set.

POSSIBLE CAUSES
EGR SOLENOID
EGR VALVE OPEN AT IDLE
WIRING HARNESS INTERMITTENT
ASD RELAY OUTPUT CIRCUIT OPEN
EGR SOLENOID CONTROL CKT OPEN
EGR SOLENOID CONTROL CKT SHORT TO GND
EGR SOLENOID CONTROL CKT SHORTED TO VOLTAGE
PCM OPEN INTERNALLY
PCM SHORTED INTERNALLY

TEST	ACTION	APPLICABILITY
1	**Note: Inspect all vacuum hoses related to the EGR system before continuing.** Start the engine and allow the engine to reach operating temperature. Allow the engine to idle. Does the engine idle smoothly? Yes → Go To 2 No → Go To 9	All
2	Turn the ignition on. Turn all accessories off. Start the engine. Allow the engine to reach normal operating temperature. With the DRB, enter Engine System Test, then EGR System Test. Actuate the FLOW function in the EGR System Test. Did the engine run rough or stall? Yes → Go To 3 No → Go To 4	All

P0401 - EGR SYSTEM FAILURE — Continued

TEST	ACTION	APPLICABILITY
3	Turn ignition off. **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any Technical Service Bulletins (TSB) that may apply.** Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Test Complete.	All
4	Turn the ignition on. Turn all accessories off. Disconnect the EGR solenoid harness connector. Using a 12-volt Test Light connected to the ASD relay out ckt, probe the EGR solenoid control circuit. With the DRB, actuate the EGR solenoid. Does the 12 volt test light flash on and off? Yes → Replace the EGR valve. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 5	All
5	Turn the igntion off. Disconnect the EGR solenoid harness connector. Turn the ignition on. With the DRB, actuate the ASD Relay. Using a 12-volt Test Light connected to ground, probe the ASD relay output circuit at the EGR solenoid harness connector. Does the 12 volt test light illuminate? Yes → Go To 6 No → Repair the open in the ASD Realy output circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
6	Turn the ignition off. Disconnect the EGR solenoid harness connector. Turn the ignition on. Measure the voltage of the EGR solenoid control circuit in the EGR solenoid connector. Is the voltage above 4.9 volts. Yes → Repair the short to voltage in the EGR solenoid control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 7	All
7	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the EGR solenoid harness connector. Measure the resistance of the EGR solenoid control circuit between the PCM connector and the EGR solenoid connector. Is the resistance below 5.0 ohms? Yes → Go To 8 No → Repair the open in the EGR solenoid control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

P0401 - EGR SYSTEM FAILURE — Continued

TEST	ACTION	APPLICABILITY
8	If there are no possible causes remaining, view repair. Repair Replace the PCM. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
9	Turn the ignition off. Disconnect the EGR Solenoid harness connector. Start engine. Attempt to allow the engine to idle. Does the engine run rough or stall? Yes → Inspect the EGR valve for carbon build up and clean as necessary. If OK, replace the EGR valve. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 10	All
10	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the EGR solenoid harness connector. Measure the resistance of the EGR solenoid control circuit to engine ground at the EGR solenoid connector. Is the resistance below 5.0 ohms? Yes → Repair the short to ground in the EGR solenoid control circuirt. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 11	All
11	If there are no possible causes remaining, view repair. Repair Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

Symptom:

P0403 - EGR SOLENOID CIRCUIT

When Monitored and Set Condition:

P0403 - EGR SOLENOID CIRCUIT

When Monitored: With the ignition on, and the engine running and the battery voltage greater than 10.4 volts.

Set Condition: The EGR solenoid control circuit is not in the expected state when requested to operate by the PCM.

POSSIBLE CAUSES
EGR SOLENOID ASSEMBLY
WIRING HARNESS INTERMITTENT
ASD RELAY OUTPUT CIRCUIT OPEN
EGR SOLENOID CONTROL CKT OPEN
EGR SOLENOID CONTROL CKT SHORT TO GND
EGR SOLENOID CONTROL CKT SHORTED TO SENSOR GND
PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRB, read the DTC's. Is the Global Good Trip counter equal to 0. Yes → Go To 2 No → Go To 8	All
2	Turn the ignition on. Turn all accessories off. Disconnect the EGR solenoid harness connector. Using a 12-volt Test Light connected to the ASD relay out ckt, probe the EGR solenoid control circuit at EGR solenoid harness connector. With the DRB, actuate the EGR solenoid. Does the 12 volt test light flash on and off? Yes → Replace the EGR valve. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 3	All

P0403 - EGR SOLENOID CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
3	Turn the igntion off. Disconnect the EGR solenoid harness connector. Turn the ignition on. With the DRB, actuate the ASD Relay. Using a 12-volt Test Light connected to ground, probe the ASD relay output circuit at the EGR solenoid harness connector. Does the 12 volt test light illuminate? Yes → Go To 4 No → Repair the open in the ASD Realy output circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
4	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the EGR solenoid harness connector. Measure the resistance of the EGR solenoid control circuit to engine ground at the EGR solenoid connector. Is the resistance below 5.0 ohms? Yes → Repair the short to ground in the EGR solenoid control circuirt. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 5	All
5	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the EGR solenoid harness connector. Measure the resistance of the EGR solenoid control circuit between the PCM connector and the EGR solenoid connector. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the open in the EGR solenoid control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
6	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the EGR solenoid harness connector. Measure the resistance of the EGR solenoid control circuit to sensor ground circuit at the EGR solenoid connector. Is the resistance below 5.0 ohms? Yes → Repair the EGR solenoid control circuit for a short to the sensor ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 7	All
7	If there are no possible causes remaining, view repair. Repair Replace the PCM. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

P0403 - EGR SOLENOID CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
8	Turn ignition off. **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any Technical Service Bulletins (TSB) that may apply.** Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Test Complete.	All

Symptom:
P0420-1/1 CATALYTIC CONVERTER EFFICIENCY

When Monitored and Set Condition:

P0420-1/1 CATALYTIC CONVERTER EFFICIENCY

When Monitored: After engine warm up to 76°C (170°F), 180 seconds of open throttle operation, at a speed greater than 32 KMH (20 MHP), with the engine at 1200-1600 rpm and MAP vacuum between 15.0 and 18.0 inches of mercury (Hg).

Set Condition: As catalyst efficiency deteriorates, the switch rate of the downstream O2 sensor approaches that of the upstream O2 sensor. If at any point during the test the switch ratio reaches a predetermined value a counter is incremented by one.

POSSIBLE CAUSES
CATALYST EFFICIENCY DTC DOES NOT REOCCUR
ENGINE MECHANICAL PROBLEM
EXHAUST LEAK
CATALYTIC CONVERTER
UPSTREAM O2 SENSOR OLDER THAN DOWNSTREAM O2 SENSOR

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRB, read the DTCs. Is the Good Trip counter displayed and equal to zero? Yes → Go To 3 No → Go To 2	All
2	At this time the Catalyst Efficiency Failure does not exist or is an intermittent problem. With the DRB, read the FREEZE FRAME data. With this screen, attempt to duplicate the condition that has set this fault. While using FREEZE FRAME pay particular attention to the fault setting conditions, such as speed, temp, load, and map vacuum. Does the Catalyst Efficiency Failure Reoccur? Yes → Go To 3 No → The Catalytic Conveter Efficiency Failure no longer exists. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
3	**Check the exhaust for excessive smoke from internal oil or coolant leaks.** Is there an oil or coolant consumption condition present? Yes → Repair engine mechanical condition as necessary and replace Catalytic Converter. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All

P0420-1/1 CATALYTIC CONVERTER EFFICIENCY — Continued

TEST	ACTION	APPLICABILITY
4	Start Engine and let idle. Check for exhaust leaks between the engine and the appropriate downstream O2 Sensor. Is there any exhaust leaks? Yes → Repair or replace leaking exhaust parts as necessary. No → Go To 5	All
5	**Note: A new Downstream O2 Sensor along with an aging Upstream O2 Sensor may cause this trouble code to set.** Review vehicle repair history. Has the Downstream O2 Sensor been replaced without replacing the Upstream O2 Sensor? Yes → Replace the appropriate Upstream Oxygen Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All
6	If there are no possible causes remaining, view repair. Repair Replace the Catalytic Converter. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom:

P0441-EVAP PURGE FLOW MONITOR

When Monitored and Set Condition:

P0441-EVAP PURGE FLOW MONITOR

When Monitored: With engine temperature greater than 76°C (170°F), fuel control in closed loop, engine idling for 2 minutes, no low fuel, MAP less than 15.7 inches mercury and barometric altitude less than 8,000 feet.

Set Condition: After having passed the Leak Detection Pump (LDP) test, no vapor flow through the evaporative system is detected by the evap monitor.

POSSIBLE CAUSES
EVAP CANISTER
WIRING HARNESS INTERMITTENT
EVAP PURGE HOSE (CANISTER TO FUEL TANK)
EVAP PURGE HOSE (SOLENOID TO CANISTER)
EVAP PURGE SOLENOID VACUUM SUPPLY
EVAP PURGE SOLENOID (LEAKY/STUCK OPEN)
EVAP PURGE SOLENOID (STUCK CLOSED)

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTC's. Is the DTC Specific Good Trip Counter displayed and equal to zero for P-0441? Yes → Go To 2 No → Go To 8	All
2	Visually inspect the Evap canister. Look for any physical damage or any signs of fuel that has entered the canister. Any signs of fuel may indicate a bad rollover valve. Were any problems found? Yes → Repair or Replace as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All
3	Visually inspect the Evap purge hose that goes between the Evap canister and the fuel tank. Look for any physical damage such as a pinched, plugged, ripped or dry rotted hose. Were any problems found? Yes → Repair or replace hose as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All

P0441-EVAP PURGE FLOW MONITOR — Continued

TEST	ACTION	APPLICABILITY
4	Visually inspect the Evap purge hose that goes from the Purge Solenoid to the Evap Canister. Look for any physical damage such as a pinched, plugged, ripped or dry rotted hose. Were any problems found? Yes → Repair or replace hose as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	Turn the ignition off. Carefully inspect the Evap Purge Solenoid vacuum supply hose for proper routing. Also check for a pinched or plugged hose from the throttle body to the Purge Solenoid. Inspect the vacuum nipple at the throttle body for any damage or plugging. Is the vacuum supply hose and throttle body vacuum nipple free from defects? Yes → Go To 6 No → Repair the vacuum supply hose/tube as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	**Note: After disconnecting the Evap Purge Solenoid vacuum connections, inspect the lines and solenoid for any signs of contamination from the EVAP Canister. This may indicate a faulty rollover valve. Replace purge solenoid if contamination is found** Turn the ignition off. Disconnect the vacuum hoses at the Evap Purge Solenoid. Using a hand vacuum pump, apply 10 inches of vacuum to the Evap Purge Solenoid vacuum source port. (component side) Does the Evap Purge Solenoid hold vacuum? Yes → Go To 7 No → Replace the Evap Purge Solenoid. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
7	Using a hand vacuum pump, apply 10 inches of vacuum to the Evap Purge Solenoid vacuum source port. (component side) Turn the ignition on. With theDRBIII®, actuate the ″EVAP Purge Solenoid″ and observe the vacuum gauge. Does the vacuum drop when the solenoid is actuated? Yes → Test Complete. No → Replace the Evap Purge Solenoid. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0441-EVAP PURGE FLOW MONITOR — Continued

TEST	ACTION	APPLICABILITY
8	At this time, the conditions required to set a DTC are not present. **Note: Use the Freeze Frame Data to help you duplicate the conditions that set the DTC. Pay particular attention to the DTC set conditions, such as, VSS, MAP, ECT, and Load.** **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any technical service bulletins that may apply.** Perform a wiggle test of the Evap Purge Solenoid wiring while the circuit is actuated with the DRBIII®. Feel for the solenoid to quit actuating. Also watch for the Good Trip Counter to change to 0. Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom List:

P0442-EVAP LEAK MONITOR MEDIUM (.040) LEAK DETECTED
P0455-EVAP LEAK MONITOR LARGE LEAK DETECTED
P0456-EVAP LEAK MONITOR SMALL (.020) LEAK DETECTED

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0442-EVAP LEAK MONITOR MEDIUM (.040) LEAK DETECTED.

When Monitored and Set Condition:

P0442-EVAP LEAK MONITOR MEDIUM (.040) LEAK DETECTED

When Monitored: Immediately after a cold start, with battery/ambient temperature between 4°C (40°F) and 32°C (90°F) and coolant temperature within -12°C (10°F) of battery/ambient and fuel level between 15% and 85%.

Set Condition: If there is a leak larger than 0.040″ and smaller than 0.080″ in the evaporative system.

P0455-EVAP LEAK MONITOR LARGE LEAK DETECTED

When Monitored: Immediately after a cold start, with battery/ambient temperature between 4°C (40°F) and 32°C (90°F) and coolant temperature within -12°C (10°F) of battery/ambient and fuel level between 15% and 85%.

Set Condition: There is a leak larger than 0.080″ in the evaporative system.

P0456-EVAP LEAK MONITOR SMALL (.020) LEAK DETECTED

When Monitored: Immediately after a cold start, with battery/ambient temperature between 4°C (40°F) and 32°C (85°F) and coolant temperature within -12°C (10°F) of battery/ambient and fuel level between 15% and 85%.

Set Condition: If there is a leak larger than 0.020″ and smaller than 0.040″ in the evaporative system.

POSSIBLE CAUSES
CONFIRMED LEAK IN THE EVAP SYSTEM
INTERMITTENT LDP MONITOR FAILURE

P0442-EVAP LEAK MONITOR MEDIUM (.040) LEAK DETECTED — Continued

TEST	ACTION	APPLICABILITY
1	**Note: A loose gas cap could have caused this DTC to set. Make sure gas cap is tight and in good condition. Ensure the gas cap meets OEM specifications.** Turn the ignition on. With the DRBIII®, read DTC's. Is the DTC Specific Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Go To 4	All
2	To continue testing you will need Miller Tools #6872A (Evap System Pressure Pump) and #8382 (Gas Cap Tester/Adapter). **Warning: The test equipment is designed to be used to pressurize the vehicles Evaporative System only. Using the equipment in a manner for which it was not designed could be harmful.** **Warning: Keep lighted cigarettes, sparks, flames, and other ignition sources away from the test area to prevent the ignition of explosive gases. Keep the test area well ventilated.** **Note: The fuel tank should have between 20% and 80% of fuel tank capacity to properly test the Evap system.** Attach the power source clip (red) of Miller Tool #6872A to Battery (+) and the ground clip (black) to Battery (-). Perform the Evaporative System Pressure Pump self test that is specified on the tester cover. Remove gas cap and install Miller Tool #8382 on vehicle. Install gas cap to Miller Tool #8382. Attach the pressure supply hose from Miller Tool #6872A to the fitting on #8382. Disconnect the vacuum supply hose at the Leak Detection Pump. Connect and apply a continuous vacuum supply (i.e. 20″Hg) to the Leak Detection Pump. A vacuum pump such as an A/C recovery unit works well. Ignition on, engine not running. With the DRBIII® in System Tests, select ″Leak Detect Pump Test.″ Read instructions and then press Enter. Select: #3 - HOLD PSI. On Miller Tool #6872A, set the Pressure/Hold switch to Open and set the Vent switch to Closed. Turn the pump timer On and watch the gauge. **Note: If the pressure does not build up, there is obviously a large leak in the system and the presence of strong fuel odor may be present. A visual inspection should find a leak of substantial size.** When the gauge pressure reaches 14″H2O, turn the Pressure/Hold Valve to Closed. Turn the pump timer off. Note the time and pressure. After 10 sec of stabilization time. Did the pressure drop more than 6″H2O in 2 minutes? Yes → Go To 3 No → Go To 4	All

P0442-EVAP LEAK MONITOR MEDIUM (.040) LEAK DETECTED — Continued

TEST	ACTION	APPLICABILITY
3	**Note: A thorough visual inspection of the Evap system hoses, tubes, and connections may save time in your diagnosis. Look for any physical damage or signs of wetness at connections. The strong smell of fuel vapors may aid diagnosis also.** To continue testing, you will need Miller Tool #6904A (Ultrasonic Leak Detector.) **Note: The LDP System Test should still be running. If the DRB has timed out, restart the System Test.** Using Miller Tool #6872A, set the Pressure/Hold Switch to Open, and the Vent Switch to Closed. Turn the pump timer on to pressurize/re-pressurize the Evap System. Using the Ultrasonic Leak Detector, start listening for leaks in the Evap System. Carefully leak test all hoses, tubes, and connections. Were any leaks heard with the Ultrasonic Leak Detector? Repair or replace the leaking component as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 6.	All
4	At this time, the conditions required to set the DTC are not present. **Note: Use the Freeze Frame Data to help you duplicate the conditions that set the DTC. Pay particular attention to the DTC set conditions, such as, VSS, MAP, ECT, and Load.** **Note: A thorough visual inspection of the Evap system hoses, tubes, and connections may save time in your diagnosis. Look for any physical damage or signs of wetness at connections. The strong smell of fuel vapors may aid diagnosis also.** **Note: Refer to any Technical Service Bulletins (TSB's) that may apply.** With the DRBIII® in System Tests, perform the LDP Monitor Test. This will force the PCM to run the LDP Monitor. If the monitor fails, further diagnosis is required to find faulty component. If the monitor passes, the condition is not present at this time. Were any problems found? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 6. No → Test Complete.	All

Symptom:

P0443-EVAP PURGE SOLENOID CIRCUIT

When Monitored and Set Condition:

P0443-EVAP PURGE SOLENOID CIRCUIT

When Monitored: At ignition key on and the engine running.

Set Condition: Not powering down, not in limp-in and time since last solenoid activation is greater than 72 micro seconds. The PCM will set a trouble code if the actual state of the solenoid does not match the intended state.

POSSIBLE CAUSES
FUSED IGNITION SWITCH OUTPUT CIRCUIT OPEN
WIRING HARNESS INTERMITTENT
EVAP PURGE SOLENOID CONTROL CIRCUIT OPEN
EVAP PURGE SOLENOID CONTROL CIRCUIT SHORTED TO GROUND
EVAP PURGE SOLENOID
POWERTRAIN CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTC's. Is the DTC Specific Good Trip Counter displayed and equal to zero for P0443? Yes → Go To 2 No → Go To 7	All
2	Turn the ignition off. Disconnect the Evap Purge Solenoid connector. Measure the resistance between the terminals of the Evap Purge Solenoid. Is the resistance between 10.0 and 15.0 ohms? Yes → Go To 3 No → Replace the Evap Purge Solenoid. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
3	Turn the ignition off. Disconnect the Evap Purge Solenoid Connector. **Note: Check connectors - Clean/repair as necessary.** Turn the ignition on. Measure the Fused Ignition Switch Output Circuit at the Evap Purge Solenoid Connector. Is the voltage above 10.0 volts? Yes → Go To 4 No → Repair the open Fused Ignition Switch Output Circuit. Perform POWERTRAIN VERIFICATION TEST VER - 6.	All

P0443-EVAP PURGE SOLENOID CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the Evap Purge Solenoid Connector. Disconnect the Powertrain Control Module connectors. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the Evap Purge Solenoid Control Circuit from the Powertrain Control Module connector to the Evap Purge Solenoid connector. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the open Evap Purge Solenoid Control Circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	Turn the ignition off. Disconnect the Evap Purge Solenoid Connector. Disconnect the Powertrain Control Module connectors. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance between the Evap Purge Solenoid Control Circuit and ground (B-). Is the resistance below 5.0 ohms? Yes → Repair the short to ground in the Evap Purge Solenoid Control Circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All
6	If there are no possible causes remaining, replace the Powertrain Control Module. View repair options. Repair Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
7	At this time, the conditions required to set a DTC are not present. **Note: Use the Freeze Frame Data to help you duplicate the conditions that set the DTC. Pay particular attention to the DTC set conditions, such as, VSS, MAP, ECT, and Load.** **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any technical service bulletins that may apply.** Perform a wiggle test of the Evap Purge Solenoid wiring while the circuit is actuated with the DRBIII®. Feel for the solenoid to quit actuating. Also watch for the Good Trip Counter to change to 0. Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom:

P0460-FUEL LEVEL UNIT NO CHANGE OVER MILES

When Monitored and Set Condition:

P0460-FUEL LEVEL UNIT NO CHANGE OVER MILES

When Monitored: Ignition on.

Set Condition: The low fuel sense circuit voltage at the PCM does not change a calibrated amount over a calculated number of miles.

POSSIBLE CAUSES
PHYSICALLY DAMAGED/DEFORMED/OBSTRUCTED FUEL TANK
FUEL LEVEL SENSOR

TEST	ACTION	APPLICABILITY
1	Turn the ignition off. **Warning: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.** Remove the fuel tank. Remove the fuel pump module from the fuel tank. Inspect the inside of the fuel tank for any obstructions or deformities. Is the fuel tank free from defects? Yes → Go To 2 No → Repair or replace the fuel tank as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
2	If there are no possible causes remaining, replace the Fuel Level Sensor. If there are no possible causes remaining, view repair. Repair Replace the fuel level sensor. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

Symptom:

P0462-FUEL LEVEL SENDING UNIT VOLTS TOO LOW

When Monitored and Set Condition:

P0462-FUEL LEVEL SENDING UNIT VOLTS TOO LOW

When Monitored: Ignition on.

Set Condition: The fuel level sensor signal voltage at the PCM goes below 0.1 volt.

POSSIBLE CAUSES
WARM UP CYCLE = 0
FUEL PUMP MODULE WIRING HARNESS INTERMITTENT

TEST	ACTION	APPLICABILITY
1	With the DRBIII®, read DTC's. Is the Warm-up Cycle counter equal to zero for P0462? Yes → Refer to the Instrument Cluster category and perform the Fuel Level Sensor Short symptom. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 2	All
2	**Note: Visually inspect the wiring harness leading to the fuel pump module. Look for any parts of the wiring harness that may be pinched or rubbed through.** Turn the ignition on. With the DRBIII®, monitor the fuel level sensor voltage. Using the wiring diagrams for harness and connector location, wiggle the Fuel Pump Module harness and related connectors. Was there any fuel level sensor voltage change? Yes → Repair the wiring harness as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Test Complete.	All

Symptom:

P0463-FUEL LEVEL SENDING UNIT VOLTS TOO HIGH

When Monitored and Set Condition:

P0463-FUEL LEVEL SENDING UNIT VOLTS TOO HIGH

When Monitored: Ignition on.

Set Condition: The fuel level sensor signal voltage at the PCM goes above 4.5 volts.

POSSIBLE CAUSES
FUEL PUMP MODULE WIRING HARNESS INTERMITTENT
WARM UP CYCLE = 0

TEST	ACTION	APPLICABILITY
1	With the DRBIII®, read DTC's. Is the Warm-up Cycle counter equal to zero for P0463? Yes → Refer to the Instrument Cluster category and perform the Fuel Level Sensor Open symptom. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 2	All
2	**Note: Visually inspect the wiring harness leading to the fuel pump module. Look for any parts of the wiring harness that may be pinched or rubbed through.** Turn the ignition on. With the DRBIII®, monitor the fuel level sensor voltage. Using the wiring diagrams for harness and connector location, wiggle the Fuel Pump Module harness and related connectors. Was there any fuel level sensor voltage change? Yes → Repair the wiring harness as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Test Complete.	All

Symptom:

P0500-NO VEHICLE SPEED SIGNAL

When Monitored and Set Condition:

P0500-NO VEHICLE SPEED SIGNAL

When Monitored: With the engine running more than 31 seconds, transmission not in park or neutral, brakes not applied, ECT above 82°C (180°F), MAP vacuum less than 11″ and engine rpm greater than 1800.

Set Condition: No signal from the vehicle speed sensor for more than 11 seconds.

POSSIBLE CAUSES
INTERMITTENT VEHICLE SPEED SIGNAL
8 VOLT SUPPLY CIRCUIT OPEN
SENSOR GROUND CIRCUIT OPEN
VEHICLE SPEED SIGNAL CIRCUIT OPEN
VEHICLE SPEED SIGNAL CIRCUIT SHORTED TO GROUND
VSS PINION GEAR
VEHICLE SPEED SIGNAL CIRCUIT SHORTED TO VOLTAGE
VEHICLE SPEED SENSOR
POWERTRAIN CONTROL MODULE (VEHICLE SPEED SENSOR)

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRB, read PCM DTCs. Is the Good Trip Counter for P-0500 displayed and equal to 0? Yes → Go To 2 No → Go To 10	All
2	Turn the ignition off. Disconnect the PCM harness connector(s). Disconnect the Vehicle Speed Sensor harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the 8 Volt Supply circuit. Is the resistance above 5.0 ohms? Yes → Repair the 8 Volt Supply circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All

P0500-NO VEHICLE SPEED SIGNAL — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the PCM harness connector(s). Disconnect the Vehicle Speed Sensor harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the Vehicle Speed Sensor Ground circuit. Is the resistance above 5.0 ohms? Yes → Repair the Vehicle Speed Sensor Ground circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Turn the ignition off. Disconnect the PCM harness connector(s). Disconnect the Vehicle Speed Sensor harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the Vehicle Speed Signal circuit between the PCM connector and the VSS connector. Is the resistance above 5.0 ohms? Yes → Repair the Vehicle Speed Signal circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	Remove the Vehicle Speed Sensor. Inspect the Speedometer Pinion Gear. Is the Pinion Gear damaged? Yes → Repair as necessary in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6	All
6	Turn the ignition off. Disconnect the PCM harness connector(s). Disconnect the Vehicle Speed Sensor harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance between ground and the Vehicle Speed Signal circuit. Is the resistance below 5.0 ohms? Yes → Repair the Vehicle Speed Signal circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 7	All
7	Turn the ignition off. Disconnect the Vehicle Speed Sensor harness connector. **Note: Check connectors - Clean/repair as necessary.** Turn the ignition on. Measure the voltage of the Vehicle Speed Signal circuit in the Vehicle Speed Sensor harness connector. Is the voltage above 9.0 volts? Yes → Repair the Vehicle Speed Signal circuit for a short to voltage. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 8	All

P0500-NO VEHICLE SPEED SIGNAL — Continued

TEST	ACTION	APPLICABILITY
8	Turn the ignition off. Disconnect the Vehicle Speed Sensor harness connector. **Note: Ensure the PCM harness connectors are connected before continuing.** Turn the ignition on. Connect a jumper wire to the Vehicle Speed Sensor Signal circuit in the VSS harness connector. With the DRB, monitor the VEHICLE SPEED while tapping the other end of the jumper wire to ground. Does the DRB display KMH (MPH) greater than 0? Yes → Replace the Vehicle Speed Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 9	All
9	If there are no possible causes remaining, view repair. Repair Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
10	At this time, the conditions required to set the DTC are not present. **Note: Use the Freeze Frame Data to help duplicate the conditions that set the DTC. Pay particular attention to the DTC set conditions, such as, VSS, MAP, ECT, and Load.** **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any technical service bulletins that may apply.** Perform a wiggle test of the wiring harnesses and connectors while the engine is running with the vehicle in gear on a hoist. Watch for the Good Trip Counter to change to zero. Were any problems found? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom:

P0505-IDLE AIR CONTROL MOTOR CIRCUITS

When Monitored and Set Condition:

P0505-IDLE AIR CONTROL MOTOR CIRCUITS

When Monitored: At key on and battery voltage greater than 11.5 volts.

Set Condition: The PCM senses a short to ground or battery voltage on any of the four Idle Air Control (IAC) driver circuits for 2.75 seconds while the IAC motor is active.

POSSIBLE CAUSES
IAC MOTOR WIRING HARNESS OBSERVABLE
IAC MOTOR WIRING HARNESS INTERMITTENT
IAC #1 DRIVER CIRCUIT SHORTED TO #2, #3, OR #4
IAC #2 DRIVER CIRCUIT SHORTED TO #3 OR #4
IAC #3 DRIVER CIRCUIT SHORTED TO #4
IAC MOTOR
IAC #1 DRIVER CIRCUIT SHORTED TO GROUND
IAC #2 DRIVER CIRCUIT SHORTED TO GROUND
IAC #3 DRIVER CIRCUIT SHORTED TO GROUND
IAC #4 DRIVER CIRCUIT SHORTED TO GROUND
IAC #1 DRIVER CIRCUIT OPEN
IAC #2 DRIVER CIRCUIT OPEN
IAC #3 DRIVER CIRCUIT OPEN
IAC #4 DRIVER CIRCUIT OPEN
POWERTRAIN CONTROL MODULE (IAC #1 DRIVER)
POWERTRAIN CONTROL MODULE (IAC #2 DRIVER)
POWERTRAIN CONTROL MODULE (IAC #3 DRIVER)
POWERTRAIN CONTROL MODULE (IAC #4 DRIVER)

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRB, read DTC's. Is the Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Go To 22	All

P0505-IDLE AIR CONTROL MOTOR CIRCUITS — Continued

TEST	ACTION	APPLICABILITY
2	Start engine and let idle. Disconnect the IAC Motor harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the voltage of the IAC #1 Driver Circuit. Was the voltage over 5.0 volts at any time? Yes → Go To 3 No → Go To 19	All
3	Start engine and let idle. Disconnect the IAC Motor harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the voltage of the IAC #2 Driver circuit. Was the voltage over 5.0 volts at any time? Yes → Go To 4 No → Go To 16	All
4	Start engine and let idle. Disconnect the IAC Motor harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the voltage of the IAC #3 Driver circuit. Was the voltage over 5.0 volts at any time? Yes → Go To 5 No → Go To 13	All
5	Start engine and let idle. Disconnect the IAC Motor harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the voltage of the IAC #4 Driver circuit. Was the voltage over 5.0 volts at any time? Yes → Go To 6 No → Go To 10	All
6	Turn the ignition off. Disconnect the IAC Motor harness connector. Disconnect the Powertrain Control Module harness connectors. **Note: Check connectors - Clean/repair as necessary.** **Note: The following steps are checking for a short between the IAC Driver Circuits.** Measure the resistance between the IAC #1 Driver circuit and #2, #3, #4 Driver circuits. Is the resistance below 5.0 ohms on any of the Drivers? Yes → Repair the IAC Driver Circuits shorted together. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 7	All

P0505-IDLE AIR CONTROL MOTOR CIRCUITS — Continued

TEST	ACTION	APPLICABILITY
7	Turn the ignition off. Disconnect the IAC Motor harness connector. Disconnect the Powertrain Control Module harness connectors. **Note: Check connectors - Clean/repair as necessary.** **Note: The following steps are checking for a short between the IAC Driver Circuits.** Measure the resistance between the IAC #2 Driver circuit and #3, #4 Driver circuits. Is the resistance below 5.0 ohms on any of the Drivers? Yes → Repair the IAC Driver Circuits shorted together. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 8	All
8	Turn the ignition off. Disconnect the IAC Motor harness connector. Disconnect the Powertrain Control Module harness connectors. **Note: Check connectors - Clean/repair as necessary.** **Note: The following steps are checking for a short between the Driver Circuits.** Measure the resistance between the IAC #3 Driver circuit and the #4 Driver circuit. Is the resistance below 5.0 ohms? Yes → Repair the IAC Driver Circuits shorted together. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 9	All
9	If there are no possible causes remaining, view repair. Repair Replace the Idle Air Control Motor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
10	Ignition Off Disconnect the IAC Motor harness connector. Disconnect the Powertrain Control Module harness connectors. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the IAC #4 Driver circuit from the IAC Motor connector to the PCM connector. Is the resistance below 5.0 ohms? Yes → Go To 11 No → Repair the IAC #4 Driver circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
11	Turn the ignition off. Disconnect the IAC Motor harness connector. Disconnect the Powertrain Control Module harness connectors. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance between ground and the IAC #4 Driver circuit. Is the resistance below 5.0 ohms? Yes → Repair the IAC #4 Driver circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 12	All

P0505-IDLE AIR CONTROL MOTOR CIRCUITS — Continued

TEST	ACTION	APPLICABILITY
12	If there are no possible causes remaining, replace the Powertrain Control Module. If there are no possible causes remaining, view repair. Repair Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
13	Turn the ignition off. Disconnect IAC Motor harness connector. Disconnect the Powertrain Control Module harness connectors. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance between ground and the IAC #3 Driver circuit. Is the resistance below 5.0 ohms? Yes → Repair the IAC #3 Driver circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 14	All
14	Turn the ignition off. Disconnect the IAC Motor Connector. Disconnect the Powertrain Control Module harness connectors. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the IAC #3 Driver circuit from the IAC Motor connector to the PCM connector. Is the resistance below 5.0 ohms? Yes → Go To 15 No → Repair the IAC #3 Driver circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
15	If there are no possible causes remaining, replace the Powertrain Control Module. If there are no possible causes remaining, view repair. Repair Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
16	Turn the ignition off. Disconnect IAC Motor harness connector. Disconnect the Powertrain Control Module harness connectors. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance between ground and the IAC #2 Driver circuit. Is the resistance below 5.0 ohms? Yes → Repair the IAC #2 Driver circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 17	All

P0505-IDLE AIR CONTROL MOTOR CIRCUITS — Continued

TEST	ACTION	APPLICABILITY
17	Turn the ignition off. Disconnect the IAC Motor harness connector. Disconnect the Powertrain Control Module harness connectors. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the IAC #2 Driver circuit from the IAC Motor connector to the PCM connector. Is the resistance below 5.0 ohms? Yes → Go To 18 No → Repair the IAC #2 Driver circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
18	If there are no possible causes remaining, replace the Powertrain Control Module. If there are no possible causes remaining, view repair. Repair Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
19	Turn the ignition off. Disconnect IAC Motor harness connector. Disconnect the Powertrain Control Module harness connectors. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance between ground and the IAC #1 Driver circuit. Is the resistance below 5.0 ohms? Yes → Repair the IAC #1 Driver Circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 20	All
20	Turn the ignition off. Disconnect the IAC Motor harness connector. Disconnect the Powertrain Control Module harness connectors. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the IAC #1 Driver circuit from the IAC Motor connector to the PCM connector. Is the resistance below 5.0 ohms? Yes → Go To 21 No → Repair the IAC #1 Driver circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
21	If there are no possible causes remaining, replace the Powertrain Control Module. If there are no possible causes remaining, view repair. Repair Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0505-IDLE AIR CONTROL MOTOR CIRCUITS — Continued

TEST	ACTION	APPLICABILITY
22	Start the engine. With the DRB in Systems Test, perform the IAC Wiggle Test. **Note: The idle speed should raise and lower with the display.** Wiggle the Wiring Harness from the IAC Motor to the PCM. Observe for the IAC Motor to stop operating. Did the IAC Motor stop operating at any time? Yes → Repair the Harness or Connectors as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 23	All
23	Turn the ignition off. Inspect the IAC Wiring and Connectors from the IAC motor to the PCM. Were any problems found? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Test Complete.	All

Symptom:
P0551-POWER STEERING SWITCH FAILURE

When Monitored and Set Condition:

P0551-POWER STEERING SWITCH FAILURE

When Monitored: With the ignition key on and engine running.

Set Condition: With the vehicle above 80 km/h (50 MPH) for over 30 seconds, the power steering pressure switch remains open.

POSSIBLE CAUSES
WIRING HARNESS INTERMITTENT
POWER STEERING PRESSURE SWITCH GROUND CIRCUIT OPEN
POWER STEERING PRESSURE SWITCH
POWER STEERING PRESSURE SWITCH SENSE CIRCUIT SHORTED TO GROUND
POWER STEERING SWITCH SENSE CIRCUIT OPEN
POWERTRAIN CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRB, read PCM DTCs. Is the Good Trip Counter for P-0551 displayed and equal to zero? Yes → Go To 2 No → Go To 7	All
2	Turn the ignition off. Disconnect the Power Steering Pressure Switch harness connector. Measure the resistance between ground and the Power Steering Pressure Switch Ground circuit. Is the resistance below 5.0 ohms? Yes → Go To 3 No → Repair the Power Steering Pressure Switch Ground circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0551-POWER STEERING SWITCH FAILURE — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the Power Steering Pressure Switch harness connector. Turn the ignition on. Connect a jumper wire to the Power Steering Pressure Switch Sense circuit. While monitoring the Power Steering Switch on the DRB, touch the jumper wire to the Power Steering Pressure Switch Ground circuit in the Power Steering Pressure Switch harness connector several times. Did the Power Steering Switch status change from HI to LOW? Yes → Replace the Power Steering Pressure Switch. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Turn the ignition off. Disconnect the Power Steering Pressure Switch harness connector. Disconnect the PCM harness connectors. Measure the resistance between ground and the Power Steering Pressure Switch Sense circuit. Is the resistance above 100k ohms? Yes → Go To 5 No → Repair the Power Steering Pressure Switch Sense circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	Turn the ignition off. Disconnect the Power Steering Pressure Switch harness connector. Disconnect the PCM harness connectors. Measure the resistance of the Power Steering Pressure Switch Sense circuit. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the Power Steering Pressure Switch Sense circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	If there are no possible causes remaining, view repair. Repair Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
7	Turn the ignition off. **NOTE: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **NOTE: Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **NOTE: Refer to any Technical Service Bulletins (TSB) that may apply.** Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom:
P0703-BRAKE SWITCH SENSE CIRCUIT

When Monitored and Set Condition:

P0703-BRAKE SWITCH SENSE CIRCUIT

When Monitored: With the engine running. The PCM expects the signal to be high for 16 cycles while it monitors the brake switch signal during accel and decel modes.

Set Condition: After the vehicle speed increases, the PCM must accumulate 6 seconds while delta throttle voltage is above 0.02 volts. The count is reset to zero whenever the brake switch indicates a low signal.

POSSIBLE CAUSES
BRAKE LAMP SWITCH GROUND CIRCUIT OPEN
BRAKE LAMP SWITCH SENSE CIRCUIT OPEN
POWERTRAIN CONTROL MODULE (BRAKE SENSE)
BRAKE LAMP SWITCH (SENSE CIRCUIT)
BRAKE LAMP SWITCH SENSE CIRCUIT SHORT TO GROUND

TEST	ACTION	APPLICABILITY
1	Turn the ignition off. Disconnect the Brake Lamp Switch harness connector. Measure the resistance between ground and the Brake Lamp Switch Ground circuit. Is the resistance below 5.0 ohms? Yes → Go To 2 No → Repair the Brake Lamp Switch Ground circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
2	Turn the ignition off. Disconnect the Brake Lamp Switch harness connector. Disconnect the PCM harness connectors. Measure the resistance of the Brake Lamp Switch Sense circuit. Is the resistance below 5.0 ohms? Yes → Go To 3 No → Repair the Brake Lamp Switch Sense circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
3	Turn the ignition off. Disconnect the Brake Lamp Switch harness connector. Measure the resistance between the Brake Lamp Switch Sense terminal and the Ground terminal (measurement taken across switch). Apply and release the Brake Pedal while monitoring the ohmmeter. Does the resistance change from below 5.0 ohms to open circuit? Yes → Go To 4 No → Replace the Brake Lamp Switch. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P0703-BRAKE SWITCH SENSE CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the Brake Lamp Switch harness connector. Disconnect the PCM harness connectors. Measure the resistance between ground and the Brake Lamp Switch Sense circuit. Is the resistance above 100 kohms? Yes → Go To 5 No → Repair the Brake Lamp Switch Sense circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	If there are no possible causes remaining, view repair. Repair Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom:
P1192-INLET AIR TEMP SENSOR VOLTAGE LOW

When Monitored and Set Condition:

P1192-INLET AIR TEMP SENSOR VOLTAGE LOW

When Monitored: With the ignition on and the engine running.

Set Condition: The inlet air temperature sensor voltage at the PCM goes below 0.50 volts.

POSSIBLE CAUSES
IAT SENSOR SIGNAL CIRCUIT SHORTED TO GROUND
IAT SENSOR SIGNAL CIRCUIT SHORTED TO THE SENSOR GROUND CIRCUIT
IAT SENSOR
POWERTRAIN CONTROL MODULE
WIRING HARNESS INTERMITTENT

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRB, read the PCM DTCs. Is the Good Trip Counter for P1192 displayed and equal to zero? Yes → Go To 2 No → Go To 6	All
2	Turn the ignition on. With the DRB, read the INLET AIR TMP VLT value. Turn the ignition off. Disconnect the IAT Sensor harness connector. Turn the ignition on. With the DRB, read the INLET AIR TMP VLT value. Did the INLET AIR TMP VLT value change from below 1.0 volt to above 4.5 volts? No → Go To 3 Yes → Replace the IAT Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
3	Turn the ignition off. Disconnect the IAT Sensor harness connector. Disconnect the PCM harness connectors. Measure the resistance between ground and the IAT Sensor Signal circuit. Is the resistance below 100k ohms? Yes → Repair the IAT Sensor Signal circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All

P1192-INLET AIR TEMP SENSOR VOLTAGE LOW — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the IAT Sensor harness connector. Disconnect the PCM harness connectors. Measure the resistance between the IAT Sensor Signal circuit and the IAT Sensor Ground circuit. Is the resistance below 100k ohms? Yes → Repair the IAT Sensor signal circuit for a short to the IAT Sensor Ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	If there are no possible causes remaining, view repair. Repair Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	Turn the ignition off. **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any Technical Service Bulletins (TSB) that may apply.** Perform a wiggle test on the related wiring harnesses with the engine running. Watch for the Good Trip Counter to change to 0. Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom:
P1193-INLET AIR TEMP SENSOR VOLTAGE HIGH

When Monitored and Set Condition:

P1193-INLET AIR TEMP SENSOR VOLTAGE HIGH

When Monitored: With the ignition on and the engine running.

Set Condition: The inlet air temperature sensor voltage at the PCM goes above 4.9 volts.

POSSIBLE CAUSES
SENSOR GROUND CIRCUIT OPEN
IAT SENSOR SIGNAL CIRCUIT OPEN
IAT SENSOR
IAT SENSOR SIGNAL CIRCUIT SHORTED TO VOLTAGE
POWERTRAIN CONTROL MODULE
WIRING HARNESS INTERMITTENT

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRB, read the PCM DTCs. Is the Good Trip Counter for P1193 displayed and equal to zero? Yes → Go To 2 No → Go To 7	All
2	Turn the ignition off. Disconnect the IAT Sensor harness connector. Start the engine and allow it to idle. Measure the voltage of the IAT Sensor Signal circuit. Is the voltage above 5.5 volts? Yes → Repair the IAT Sensor Signal circuit for a short to voltage. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All
3	Turn the ignition off. Disconnect the IAT Sensor harness connector. Turn the ignition on. With the DRB, monitor the INLET AIR TMP VLT value. Connect a jumper wire between the IAT Sensor Signal circuit and the IAT Sensor Ground circuit in the IAT Sensor harness connector. **Note: The voltage should change from greater than 4.5 volts to less than 1.0 volt.** Did the INLET AIR TMP VLT value change from greater than 4.5 volts to less than 1.0 volt? Yes → Replace the IAT Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All

P1193-INLET AIR TEMP SENSOR VOLTAGE HIGH — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the IAT Sensor harness connector. Measure the resistance between ground and the IAT Sensor Ground circuit. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the IAT Sensor Ground circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	Turn the ignition off. Disconnect the IAT Sensor harness connector. Disconnect the PCM harness connectors. Measure the resistance of the IAT Sensor Signal circuit. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the IAT Sensor Signal circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	If there are no possible causes remaining, view repair. Repair Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
7	Turn the ignition off. **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any Technical Service Bulletins (TSB) that may apply.** Perform a wiggle test on the related wiring harnesses with the engine running. Watch for the Good Trip Counter to change to 0. Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom:
P1195-1/1 O2 SENSOR SLOW DURING CATALYST MONITOR

When Monitored and Set Condition:

P1195-1/1 O2 SENSOR SLOW DURING CATALYST MONITOR

When Monitored: With the engine running, coolant greater than 76°C (170°F), open throttle, steady to slightly increasing vehicle speed greater than 28 KMH (18 MPH) but less than 88 KMH (55 MPH), with a light load on the engine, for a period no less than 5 minutes.

Set Condition: The oxygen sensor signal voltage is switching from below 0.39 volt to above 0.6 volts and back fewer times than required.

POSSIBLE CAUSES
EXCESSIVE ENGINE BLOWBY
EXHAUST LEAK
O2S SENSOR GROUND CIRCUIT VOLTAGE DROP
O2S SIGNAL CIRCUIT VOLTAGE DROP
WIRING HARNESS INTERMITTENT PROBLEM
O2 SENSOR

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRB, read the DTC's. Is the Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Go To 7	All
2	Start engine. Allow the engine to reach normal operating temperature. Check the exhaust for excessive smoke from internal oil or coolant leaks. Is there an oil or coolant consumption condition present? Yes → Repair engine for excessive blowby (oil or coolant) as necessary. No → Go To 3	All
3	Start the engine and allow engine to idle. Check for any exhaust leaks between the engine and the appropriate O2S. Check for exhaust leaks between the engine and the appropriate downstream O2 Sensor. Are there any exhaust leaks? Yes → Repair or replace leaking exhaust parts as necessary. No → Go To 4	All

P1195-1/1 O2 SENSOR SLOW DURING CATALYST MONITOR — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Ensure the voltmeter leads are connected for positive polarity. Backprobe between the O2 Sensor Ground circuit at the O2 Sensor harness connector and the PCM harness connector. Start the engine and allow the engine to reach normal operating temperature. Is the voltage below 0.10 volt? Yes → Go To 5 No → Repair high resistance on O2 Sensor Ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	Turn the ignition off. Ensure the voltmeter leads are connected for positive polarity. Backprobe the O2 Sensor Signal circuit between the O2 Sensor connector and PCM connector. Start the engine and allow the engine to reach normal operating temperature. Is the voltage below 0.10 volt? Yes → Go To 6 No → Repair high resistance in O2 Sensor Signal circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	If there are no potential causes remaining, view repair. Repair Replace the O2S. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
7	Start engine. Allow the engine to reach normal operating temperature. Check the exhaust for excessive smoke from internal oil or coolant leaks. Is there an oil or coolant consumption condition present? Yes → Repair engine for excessive blowby (oil or coolant) as necessary. No → Go To 8	All
8	Start the engine and allow engine to idle. Check for any exhaust leaks between the engine and the appropriate O2S. Check for exhaust leaks between the engine and the appropriate downstream O2 Sensor. Are there any exhaust leaks? Yes → Repair or replace leaking exhaust parts as necessary. No → Go To 9	All
9	Turn the ignition off. **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any Technical Service Bulletins (TSB) that may apply.** Perform a wiggle test on the related wiring harnesses with the engine running. Watch for the Good Trip Counter to change to 0. Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom:

P1281-ENGINE IS COLD TOO LONG

When Monitored and Set Condition:

P1281-ENGINE IS COLD TOO LONG

When Monitored: With the ignition key on, the engine running, the ambient temperature above -24° C (-11° F), and the startup coolant temperature above -7° C (20° F) but below 100° C (212° F).

Set Condition: The engine does not warm to 71° C (160° F) while driving for 20 minutes after start.

POSSIBLE CAUSES
COOLING SYSTEM PROBLEM

TEST	ACTION	APPLICABILITY
1	**Note: The best way to diagnose this DTC is to allow the vehicle to remain outside overnight in order to have a completely cold soaked engine.** **Note: Extremely cold outside ambient temperatures may cause this DTC to set.** Verify that the coolant level is not low and correct as necessary. Start the engine **NOTE: Verify the ECT Sensor is functioning properly before proceeding.** With the DRB, set the engine RPM to 1500 and allow the engine to warm up for 10-15 minutes. With the DRB, monitor the ENG COOLANT TMP DEG value during the warm up cycle. Make sure the transition of temperature change is smooth. Did the engine temperature reach a minimum of 71° C (160° F)? Yes → Test Complete. No → Refer to the Service Information for cooling system performance diagnosis. The most probable cause is a Thermostat problem. Also, refer to any related TSBs.	All

Symptom:

P1282-FUEL PUMP RELAY CONTROL CIRCUIT

When Monitored and Set Condition:

P1282-FUEL PUMP RELAY CONTROL CIRCUIT

When Monitored: With the ignition on and battery voltage above 10 volts.

Set Condition: An open or shorted condition is detected in the fuel pump relay control circuit.

POSSIBLE CAUSES
FUEL PUMP RELAY WIRING HARNESS OBSERVABLE
FUSED IGNITION SWITCH OUTPUT CIRCUIT OPEN
FUEL PUMP RELAY
FUEL PUMP RELAY CONTROL CIRCUIT OPEN
FUEL PUMP RELAY CONTROL CIRCUIT SHORTED TO GROUND
FUEL PUMP RELAY WIRING HARNESS INTERMITTENT
POWERTRAIN CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, actuate the Fuel Pump Relay. Is the Fuel Pump Relay clicking? Yes → Go To 2 No → Go To 4	All
2	Turn the ignition off. Using the wiring diagram as a guide, inspect the fuel pump relay wiring and connectors. Were any problems found? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 3	All
3	Turn the ignition on. With the DRBIII®, actuate the Fuel Pump Relay. Wiggle the wiring harness from the Fuel Pump Relay to the PCM while the relay is actuating. Did the Relay clicking stop or become irregular when wiggling the wires? Yes → Repair Circuit as necessary where wiggling caused clicking to stop or become irregular. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Test Complete.	All

P1282-FUEL PUMP RELAY CONTROL CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Remove the fuel pump relay from the PDC. **Note: Check connectors - Clean/repair as necessary.** Turn the ignition on. Measure the voltage of the fused ignition switch output circuit in the fuel pump relay connector. Is the voltage above 10.0 volts? Yes → Go To 5 No → Repair the open fused ignition switch output circuit. NOTE: Check for a open fuse. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
5	Turn the ignition off. Remove the fuel pump relay from the PDC. **NOTE: Check connectors - Clean/repair as necessary.** Measure the resistance between terminals 1 (85) and 2 (86) of the fuel pump relay. Is the resistance between 50 and 90 ohms? Yes → Go To 6 No → Replace the fuel pump relay. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
6	Turn the ignition off. Remove the fuel pump relay from the PDC. Disconnect the PCM harness connector(s). **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the fuel pump relay control circuit between the fuel pump relay connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 7 No → Repair the open fuel pump relay control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
7	Turn the ignition off. Remove the fuel pump relay from the PDC. Disconnect the PCM harness connector(s). **Note: Check connectors - Clean/repair as necessary.** Measure the resistance between ground and the fuel pump relay control circuit. Is the resistance below 5.0 ohms? Yes → Repair the fuel pump relay control circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 8	All
8	If there are no possible causes remaining, view repair. Repair Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

Symptom:
P1294-TARGET IDLE NOT REACHED

When Monitored and Set Condition:

P1294-TARGET IDLE NOT REACHED

When Monitored: With the engine idling and the transmission in drive, if automatic. There must not be a MAP sensor trouble code or a Throttle Position Sensor trouble code.

Set Condition: The engine idle is not within 200 rpm above or 100 rpm below the target idle for 14 seconds. One bad trip is required to set the DTC.

POSSIBLE CAUSES
THROTTLE BODY
THROTTLE PLATE/LINKAGE BINDING
VACUUM LEAK
THROTTLE BODY DIRTY

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRB, read PCM DTCs. Is the Good Trip Counter for P-1294 displayed and equal to zero? Yes → Go To 2 No → Test Complete.	All
2	Turn the ignition off. Check the throttle plate and linkage for a binding condition. The throttle linkage must be at idle position. Ensure the throttle plate is fully closed and against it's stop. Is the throttle plate and linkage free of damage? Yes → Go To 3 No → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
3	Inspect the Intake Manifold for vacuum leaks. Inspect the Power Brake Booster for any vacuum leaks. Inspect the PCV system for proper operation or any vacuum leaks. Were any problems found? Yes → Repair vacuum leak as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All

P1294-TARGET IDLE NOT REACHED — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the PCV valve hose from the intake manifold nipple. Cap the PCV vacuum nipple at the intake manifold. Disconnect the purge hose from the nipple on the throttle body. Start the engine. Ensure that all accessories are off. Allow the engine to reach operating temperature above 82°C (180°F). With the DRB in System Tests, perform the Minimum Air Flow function. Is the engine RPM between 550 and 1300? Yes → Test Complete. No → Go To 5 **CAUTION: Stop all actuations. Turn the engine off.**	All
5	Turn the ignition off. Remove the Throttle Body. **WARNING: Clean throttle body in a well ventilated area. Wear rubber or butyl gloves. Do not let cleaner come in contact with eyes or skin. Avoid ingesting cleaner. Wash thoroughly after using cleaner.** While holding the throttle open, spray the entire throttle body bore and the manifold side of the throttle plate with Mopar Throttle Body Cleaner. Clean the IAC motor passage also. Use compressed air to dry the throttle body. Re-install the throttle body. **NOTE: Miller Tool #6457 (0.125″ air metering orifice) still attached to the purge nipple on the throttle body.** Start the engine. Ensure that all accessories are off. Allow the engine to reach operating temperature above 82°C (180°F). With the DRB in System Tests, perform the Minimum Air Flow function. Is the engine RPM between 550 and 1300? Yes → Repair complete. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Replace the Throttle Body. Perform POWERTRAIN VERIFICATION TEST VER - 5. **CAUTION: Stop all actuations. Turn the engine off.**	All

Symptom:

P1297-NO CHANGE IN MAP FROM START TO RUN

When Monitored and Set Condition:

P1297-NO CHANGE IN MAP FROM START TO RUN

When Monitored: With engine RPM above 400 but less than 1500 and the throttle blade at closed throttle.

Set Condition: Too small a difference is seen between barometric pressure at ignition on and manifold vacuum (engine running) for 1.76 seconds.

POSSIBLE CAUSES
MAP SENSOR TOO LOW CODE SET
MAP SENSOR WIRING HARNESS INTERMITTENT PROBLEM
VACUUM PORTS RESTRICTED
MAP SENSOR 5-VOLT SUPPLY CIRCUIT OPEN
MAP SENSOR (NO PRESS CHANGE)
MAP SENSOR (PRESS CHANGE)
MAP SENSOR RESTRICTED

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRB, read Codes. Is the MAP Sensor Voltage Too Low code set? Yes → Refer to symptom P0107 MAP SENSOR VOLTS TOO LOW in the DRIVEABILITY category. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 2	All
2	Turn the ignition on. With the DRB, erase codes. Start engine and allow engine to idle for 30 seconds. With the DRB, read the codes. Does the DRB display No Change In MAP From Start To Run? Yes → Go To 3 No → Go To 6	All

P1297-NO CHANGE IN MAP FROM START TO RUN — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the MAP Sensor harness connector. Disconnect the Powertrain Control Module harness connector. Measure the resistance of the MAP Sensor 5-Volt Supply Circuit between the MAP Sensor harness connector to the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 4 No → Repair the 5-volt supply circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
4	Turn the ignition off. Remove the MAP Sensor and inspect condition of vacuum port. Inspect condition of Intake Manifold or Throttle Body vacuum port. Was there a restriction? Yes → Remove the restriction and reinstall the MAP Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	If there are no possible causes remaining, view repair. Repair Replace the MAP Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	Start the engine. With the DRB, set the engine speed to 1500 RPM. With the engine RPM at 1500, read MAP Sensor voltage. While monitoring the voltage, wiggle the wiring from the MAP Sensor to PCM. Did the engine stall or voltage become erratic? Yes → Repair the Wiring or Connector defect between the MAP Sensor and the PCM. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 7	All
7	Start the engine. While monitoring engine vacuum on the DRB display, quickly open and close throttle several times. Did the Vacuum drop below 1.0″? Yes → Test Complete. No → Go To 8	All
8	Turn the ignition off. Remove the MAP Sensor and inspect condition of vacuum port. Inspect condition of Intake Manifold or Throttle Body Vacuum Port. Is there a restriction or defect in the vacuum ports? Yes → Repair the restricted vacuum ports. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 9	All

P1297-NO CHANGE IN MAP FROM START TO RUN — Continued

TEST	ACTION	APPLICABILITY
9	If there are no potential causes remaining, view repair. Repair Replace the MAP Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom:
P1299-VACUUM LEAK FOUND (IAC FULLY SEATED)

When Monitored and Set Condition:

P1299-VACUUM LEAK FOUND (IAC FULLY SEATED)

When Monitored: With the engine running.

Set Condition: The MAP sensor signal does not correlate to the TPS signal.

POSSIBLE CAUSES
VACUUM LEAK
MAP SENSOR (OUT OF CALIBRATION)
TPS DEFECTIVE (VOLTAGE GREATER THAN 1.5 AT REST)
TPS DEFECTIVE (VOLTAGE LESS THAN 3.4 AT WIDE OPEN THROTTLE)
PCM

TEST	ACTION	APPLICABILITY
1	**Note: A large vacuum leak is the most likely cause of this DTC.** Inspect the Intake Manifold for vacuum leaks. Inspect the Power Brake Booster for any vacuum leaks. Inspect the PCV system for proper operation or any vacuum leaks. Were any problems found? Yes → Repair vacuum leak as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 2	All
2	**Note: Throttle must be fully closed and against throttle stop.** Turn the ignition on. With the DRB in Sensors, read the Throttle Position Sensor voltage. Is the voltage 1.5 volts or less with the throttle closed? Yes → Go To 3 No → Replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
3	Turn the ignition off. Tee-in a vacuum gauge to a manifold vacuum source. Start the engine and allow to idle. **Note: If the engine will not idle, maintain a constant RPM above idle.** With the DRB in Sensors, read the MAP Sensor Vacuum value. Is the DRB reading within 1″ of the teed-in vacuum gauge? Yes → Go To 4 No → Replace the MAP Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P1299-VACUUM LEAK FOUND (IAC FULLY SEATED) — Continued

TEST	ACTION	APPLICABILITY
4	Turn ignition on. With the DRB in Sensors, monitor the Throttle Position Sensor voltage while slowly opening the throttle to wide open. Is the maximum voltage at least 3.4 volts at wide open throttle? Yes → Go To 5 No → Replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	If there are no possible causes remaining, view repair. Repair Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom:

P1388-AUTO SHUTDOWN RELAY CONTROL CIRCUIT

When Monitored and Set Condition:

P1388-AUTO SHUTDOWN RELAY CONTROL CIRCUIT

When Monitored: With ignition key on and battery voltage above 10 volts.

Set Condition: An open or shorted condition is detected in the ASD relay control circuit.

POSSIBLE CAUSES
WIRING HARNESS INTERMITTENT
FUSED B+ CIRCUIT OPEN
ASD RELAY CONTROL CIRCUIT OPEN
ASD RELAY CONTROL CIRCUIT SHORTED TO GROUND
ASD RELAY
PCM

TEST	ACTION	APPLICABILITY
1	With the DRBIII®, actuate the Auto Shutdown Relay. Is the Auto Shutdown Relay Clicking? No → Go To 2 Yes → Go To 7	All
2	Turn the ignition off. Remove the ASD relay from the PDC. Disconnect the PCM harness connector(s). Measure the resistance of the ASD relay control circuit from the ASD relay cavity in PDC to the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 3 No → Repair the open ASD relay control circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
3	Turn the ignition off. Remove the ASD relay from the PDC. Measure both Fused B+ circuits at the ASD Relay cavity in PDC for voltage. Is the voltage above 10.0 volts for both B(+) Circuits? Yes → Go To 4 No → Repair the open fused B+ circuit. Note: Check fuse in the PDC. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

P1388-AUTO SHUTDOWN RELAY CONTROL CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Remove the ASD relay from the PDC. Disconnect the PCM harness connector(s). Measure resistance of the ASD relay control circuit to ground. Is the resistance below 5.0 ohms? Yes → Repair the ASD Relay control circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 5	All
5	Turn the ignition off. Remove the ASD relay from the PDC. Measure the resistance between terminals 85 and 86 of the ASD relay. Is the resistance between 50.0 and 90.0 ohms? Yes → Go To 6 No → Replace the ASD Relay. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
6	If there are no possible causes remaining, View repair options. Repair Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
7	At this time, the conditions required to set the DTC are not present. **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any technical service bulletins that may apply.** Perform a wiggle test on the related wiring harnesses with the engine running. Watch for the Good Trip Counter to change to 0. Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Test Complete.	All

Symptom:
P1389-NO ASD RELAY OUTPUT VOLTAGE AT PCM

When Monitored and Set Condition:

P1389-NO ASD RELAY OUTPUT VOLTAGE AT PCM

When Monitored: With ignition key on, battery voltage above 10 volts.

Set Condition: No voltage sensed at the PCM when the ASD relay is energized.

POSSIBLE CAUSES
WIRING HARNESS INTERMITTENT
ASD RELAY OUTPUT CIRCUIT OPEN
FUSED B+ CIRCUIT OPEN
ASD RELAY
PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTC's. Is DTC P1388 set? Yes → Refer to symptom P1388-AUTO SHUTDOWN RELAY CONTROL CIRCUIT in the DRIVEABILITY - GAS category. No → Go To 2	All
2	With the DRBIII®, erase DTC's. Attempt to start the engine. If the engine will not start, crank the engine for at least 15 seconds. Does the DTC reset? If necessary, crank the engine several times. Yes → Go To 3 No → Go To 9	All
3	Attempt to start the engine. If the engine will not start, crank the engine for at least 15 seconds. Did the engine start? Yes → Go To 4 No → Go To 6	All

P1389-NO ASD RELAY OUTPUT VOLTAGE AT PCM — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Remove the ASD relay from the PDC. Disconnect the PCM harness connector(s). Measure the resistance of the ASD relay output circuit from the ASD Relay cavity in PDC to the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the open ASD Relay output circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
5	If there are no possible causes remaining, replace the Powertrain Control Module. View repair options. Repair Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
6	Turn the ignition off. Remove the ASD relay from the PDC. Disconnect the PCM harness connector(s). Measure the resistance of the ASD relay output circuit from the ASD Relay cavity in PDC to the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 7 No → Repair the open ASD Relay output circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
7	Turn the ignition off. Remove the ASD relay from the PDC. Measure both Fused B+ circuits at the ASD Relay cavity in PDC for voltage. Is the voltage above 10.0 volts for both B(+) Circuits? Yes → Go To 8 No → Repair the open fused B+ circuit. Note: Check fuse in the PDC. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
8	Install a substitute relay for the Auto Shutdown Relay. Attempt to start the vehicle. Did the engine start? Yes → Replace the ASD Relay. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Test Complete.	All

P1389-NO ASD RELAY OUTPUT VOLTAGE AT PCM — Continued

TEST	ACTION	APPLICABILITY
9	At this time, the conditions required to set the DTC are not present. **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any technical service bulletins that may apply.** Perform a wiggle test on the related wiring harnesses with the engine running. Watch for the Good Trip Counter to change to 0. Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Test Complete.	All

Symptom:
P1390-TIMING BELT SKIPPED 1 TOOTH OR MORE

When Monitored and Set Condition:

P1390-TIMING BELT SKIPPED 1 TOOTH OR MORE

When Monitored: With the engine running, every 44 ms an inhibit condition is looked for (wide open throttle, large change in rpm, large change in MAP, cold engine, insufficient start to run time, rpm outside of given windows).

Set Condition: If an inhibit condition does not exist, the misalignment between the camshaft and the crankshaft is monitored. When the camshaft position sensor is offset from the crankshaft position sensor one tooth or more.

POSSIBLE CAUSES
VALVE TIMING NOT OUT OF SPECS
VALVE TIMING OUT OF SPECIFICATION

TEST	ACTION	APPLICABILITY
1	**Note: The PCM has detected the Cam and Crank are out of sync.** Using the appropriate service information check the valve timing. Is the valve timing within specifications? Yes → Perform Re-Learn Cam/Crank function with the DRB under Engine, Misc. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Repair valve timing as necessary. After performing the repair, use the DRB under Engine, Misc. and do Re-Learn Cam/Crank. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom:

P1391-INTERMITTENT LOSS OF CMP OR CKP

When Monitored and Set Condition:

P1391-INTERMITTENT LOSS OF CMP OR CKP

When Monitored: During engine running.

Set Condition: When the expected cam signal level disagrees with the actual cam signal level.

POSSIBLE CAUSES
DAMAGED TONE WHEEL/FLEX PLATE (CRANKSHAFT)
DAMAGED TONE WHEEL/PULSE RING (CAMSHAFT)
IRREGULAR LAB SCOPE PATTERN OF CMP SIGNAL
WIRING HARNESS INTERMITTENT
INTERMITTENT CKP SIGNAL LOSS WHEN WIRING IS WIGGLED
IRREGULAR LAB SCOPE PATTERN OF CKP SIGNAL
INTERMITTENT CMP SIGNAL LOSS WHEN WIRING IS WIGGLED
SENSOR CONNECTOR/WIRING
CAMSHAFT POSITION SENSOR
CRANKSHAFT POSITION SENSOR

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRB, read the DTC's. Is the Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Go To 13	All
2	Turn the ignition off. With the DRB lab scope, backprobe the CMP signal circuit at the CMP sensor harness connector using Miller special tool #6801. **Warning: Keep clear of the engine's moving parts.** Start the engine. Observe the CMP sensor voltage pattern on the lab scope screen. Are there any signals missing? Yes → Go To 3 No → Go To 6	All

P1391-INTERMITTENT LOSS OF CMP OR CKP — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. **Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Make sure the Camshaft Position Sensor and/or the Crankshaft Position Sensor is tight.** **Note: Refer to any technical service bulletins that may apply.** Were any problems found? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Turn the ignition off. Disconnect and remove the camshaft position sensor. Inspect the target magnet for looseness and/or physical damage. Is the target magnet free from defects? Yes → Go To 5 No → Repair/replace tone wheel/pulse ring as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	If there are no possible causes remaining, view repair. Repair Replace the Camshaft Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	Turn the ignition off. With the DRB lab scope, backprobe the CKP signal circuit at the CKP sensor harness connector using Miller special tool #6801. **Warning: Keep clear of the engine's moving parts.** Start the engine. Observe the CKP sensor voltage pattern on the lab scope screen. Are there any signals missing? Yes → Go To 7 No → Go To 10	All
7	Turn the ignition off. **Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Make sure the Camshaft Position Sensor and/or the Crankshaft Position Sensor is tight.** **Note: Refer to any technical service bulletins that may apply.** Were any problems found? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 8	All

P1391-INTERMITTENT LOSS OF CMP OR CKP — Continued

TEST	ACTION	APPLICABILITY
8	Turn the ignition off. Disconnect and remove the crankshaft position sensor. Inspect the crankshaft notches for damage, foreign material, or excessive movement. Is the crankshaft free from defects? Yes → Go To 9 No → Repair/replace tone wheel/flex plate as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
9	If there are no possible causes remaining, view repair. Repair Replace the Crankshaft Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
10	Turn the ignition off. **Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Make sure the Camshaft Position Sensor and/or the Crankshaft Position Sensor is tight.** **Note: Refer to any technical service bulletins that may apply.** Were any problems found? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 11	All
11	Turn the ignition off. With the DRB lab scope, backprobe the CKP signal circuit at the PCM connector using Miller special tool #6801. **Warning: Keep clear of the engine's moving parts.** Start the engine. Observe the lab scope screen while wiggling the wiring harness and connectors related to the CKP sensor. Were there any irregularities in the lab scope pattern when the wiggle test was conducted? Yes → Note where wiggling caused a missing CKP sensor signal. Repair CKP sensor wiring as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 12	All
12	Turn the ignition off. With the DRB lab scope, backprobe the CMP signal circuit at the PCM harness connector using Miller special tool #6801. **Warning: Keep clear of the engine's moving parts.** Start the engine. Observe the lab scope screen while wiggling the wiring harness and connectors related to the CMP sensor. Were there any irregularities in the lab scope pattern when the wiggle test was conducted? Yes → Note where wiggling caused a missing CMP sensor signal. Repair CMP sensor wiring as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

P1391-INTERMITTENT LOSS OF CMP OR CKP — Continued

TEST	ACTION	APPLICABILITY
13	Turn the ignition off. Connect the DRB lab scope to the CMP signal circuit. For best results, backprobe at the PCM harness using Miller special tool #6801. **Warning: Keep clear of the engine's moving parts.** Start the engine. Observe the lab scope screen while wiggling the wiring harness and connectors. Were there any irregularities in the lab scope pattern? Yes → Check harness and connectors carefully. If OK, replace the Camshaft Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 14	All
14	Turn the ignition off. **Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any technical service bulletins that may apply.** Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 15	All
15	Turn the ignition off. Connect the DRB lab scope to the CKP signal circuit. For best results, backprobe at the PCM harness connector using Miller special tool #6801. **Warning: Keep clear of the engine's moving parts.** Start the engine. Observe the lab scope screen while wiggling the wiring harness and connectors. Were there any irregularities in the lab scope pattern? Yes → Check harness and connectors carefully. If OK, replace the Crankshaft Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom:
P1398-MIS-FIRE ADAPTIVE NUMERATOR AT LIMIT

When Monitored and Set Condition:

P1398-MIS-FIRE ADAPTIVE NUMERATOR AT LIMIT

When Monitored: Under closed throttle decel with A/C off, ECT above 23°C (75°F), and more than 50 seconds after engine start.

Set Condition: One of the CKP sensor target windows has more than 2.86% variance from the reference window.

POSSIBLE CAUSES
DAMAGED TONE WHEEL/FLEX PLATE (CRANKSHAFT)
CKP SENSOR CONNECTOR/WIRING
CRANKSHAFT POSITION SENSOR
IMPROPERLY INSTALLED/LOOSE CRANKSHAFT POSITION SENSOR

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTC's. Is the Good Trip Counter displayed and equal to zero? Yes → Go To 4 No → Go To 2	All
2	**Note: Check for any TSB's that may apply to this symptom.** Read and record the Freeze Frame Data. Use this information to help you duplicate the conditions that set the DTC. Pay particular attention to the DTC set conditions, such as, VSS, MAP, ECT, and Load. Turn the ignition on. With the DRB in the miscellaneous menu, choose Clear PCM battery disconnect to reset the PCM. With the DRB, choose the ″Mis-Fire Pre-test″ screen. Road test the vehicle and re-learn the adaptive numerator. The adaptive numerator is learned when the Adaptive Numerator Done Learning line on the Mis-fire Pre-test screen changes to ″Yes″. Did the adaptive numerator re-learn? Yes → Go To 3 No → Go To 4	All

P1398-MIS-FIRE ADAPTIVE NUMERATOR AT LIMIT — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. **Note: Visually inspect the Crankshaft Position Sensor and related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Make sure the sensor mounting bolt(s) are tight.** Were any problems found? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All
4	Turn the ignition off. **Note: Visually inspect the Crankshaft Position Sensor and related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Make sure the sensor mounting bolt(s) are tight.** Were any problems found? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	Turn the ignition off. Disconnect the Crankshaft Position Sensor harness connector. **Note: Visually inspect the related wiring harness/connectors. Look for broken, bent, pushed out or corroded terminals.** Inspect the Crankshaft Position Sensor for proper installation and tightness. Is the Crankshaft Position Sensor properly installed and the mounting bolt(s) tight? Yes → Go To 6 No → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	Turn the ignition off. Disconnect and remove the crankshaft position sensor. Inspect the crankshaft notches for damage, foreign material, or excessive movement. Is the crankshaft free from defects? Yes → Go To 7 No → Repair/replace tone wheel/flex plate as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
7	If there are no possible causes remaining, view repair. Repair Replace the Crankshaft Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom:
P1486-EVAP LEAK MONITOR PINCHED HOSE FOUND

When Monitored and Set Condition:

P1486-EVAP LEAK MONITOR PINCHED HOSE FOUND

When Monitored: Immediately after a cold start, with battery/ambient temperature between 4°C (40°F) and 32°C (90°F) and coolant temperature within -12°C (10°F) of battery/ambient and fuel level between 15% and 85%.

Set Condition: The tank pressure read by the LDP is too high within a short lenght of time.

POSSIBLE CAUSES
LEAK DETECTION PUMP
EVAP CANISTER OBSTRUCTED
LDP PRESSURE HOSE OBSTRUCTED
INTERMITTENT LDP MONITOR FAILURE
OBSTRUCTION IN EVAP SYSTEM BETWEEN EVAP CANISTER AND FUEL TANK
OBSTRUCTION IN HOSE/TUBE BETWEEN EVAP CANISTER AND PURGE SOLENOID

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTC's. Is the DTC Specific Good Trip Counter displayed and equal to zero for P1486? Yes → Go To 2 No → Go To 6	All

P1486-EVAP LEAK MONITOR PINCHED HOSE FOUND — Continued

TEST	ACTION	APPLICABILITY
2	To continue testing you will need Miller Tools #6872A (Evap System Pressure Pump) and #8382 (Gas Cap Tester/Adapter). **Warning: The test equipment is designed to be used to pressurize the vehicles Evaporative System only. Using the equipment in a manner for which it was not designed could be harmful.** **Warning: Keep lighted cigarettes, sparks, flames, and other ignition sources away from the test area to prevent the ignition of explosive gases. Keep the test area well ventilated.** **Note: The fuel tank should have between 20% & 80% of full to properly test the Evap system.** Attach the power source clip (red) of Miller Tool #6872A to Battery (+) and the ground clip (black) to Battery (-). Perform the Evaporative System Pressure Pump self test that is specified on the tester cover. Remove gas cap and install Miller Tool #8382 on vehicle. Install gas cap to Miller Tool #8382. Attach the pressure supply hose from Miller Tool #6872A to the fitting on #8382. Disconnect the vacuum supply hose at the Leak Detection Pump. Connect and apply a continuous vacuum supply (i.e. 20″Hg) to the Leak Detection Pump. A vacuum pump such as an A/C recovery unit works well. Ignition on, engine not running. With the DRBIII® in System Tests, select ″Leak Detect Pump Test.″ Read instructions and then press Enter. Select: #3 - HOLD PSI. On Miller Tool #6872A, set the Pressure/Hold switch to Open and set the Vent switch to Closed. Turn the pump timer On and watch the gauge. When the gauge pressure reaches 14″H2O, turn the Pressure/Hold Valve to Closed. Turn the pump timer off. Disconnect the hose at the EVAP Canister that goes to the Fuel Tank. Did the pressure drop when the hose was disconnected? Yes → Go To 3 No → Repair obstruction in the EVAP system between the EVAP Canister and the fuel tank. Perform POWERTRAIN VERIFICATION TEST VER - 6.	All
3	**Note: All previously disconnected hose(s) reconnected.** Re-pressurize the EVAP System. On Miller Tool #6872A, set the Pressure/Hold switch to Open and set the Vent switch to Closed. Turn the pump timer On and watch the gauge. When the gauge pressure reaches 14″H2O, turn the Pressure/Hold Valve to Closed. Turn the pump timer off. Disconnect the LDP Pressure hose at the EVAP Canister. The LDP Pressure hose is the hose that connects the Evap Canister to the Leak Detection Pump. Did the pressure drop when the hose was disconnected? Yes → Go To 4 No → Replace the EVAP Canister. Perform POWERTRAIN VERIFICATION TEST VER - 6.	All

P1486-EVAP LEAK MONITOR PINCHED HOSE FOUND — Continued

TEST	ACTION	APPLICABILITY
4	**Note: All previously disconnected hose(s) reconnected.** Re-pressurize the EVAP System. On Miller Tool #6872A, set the Pressure/Hold switch to Open and set the Vent switch to Closed. Turn the pump timer On and watch the gauge. When the gauge pressure reaches 14″H2O, turn the Pressure/Hold Valve to Closed. Turn the pump timer off. Disconnect the EVAP hoses at the Purge Solenoid. Did the pressure drop when the hose was disconnected? Yes → Go To 5 No → Repair or replace hose/tube as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 6.	All
5	Disconnect and remove the LDP pressure hose. The LDP pressure hose is the hose that connects the EVAP Canister to the Leak Detection Pump. Inspect the LDP pressure hose for any obstructions or physical damage. Is the LDP pressure hose free from defects? Yes → Replace the Leak Detection Pump. Perform POWERTRAIN VERIFICATION TEST VER - 6. No → Repair/replace hose as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 6.	All
6	At this time, the conditions required to set the DTC are not present. **Note: Use the Freeze Frame Data to help you duplicate the conditions that set the DTC. Pay particular attention to the DTC set conditions, such as, VSS, MAP, ECT, and Load.** **Note: A thorough visual inspection of the Evap system hoses, tubes, and connections may save time in your diagnosis. Look for any physical damage or signs of wetness at connections. The strong smell of fuel vapors may aid diagnosis also.** **Note: Refer to any Technical Service Bulletins (TSB's) that may apply.** With the DRBIII® in System Tests, perform the LDP Monitor Test. This will force the PCM to run the LDP Monitor. If the monitor fails, further diagnosis is required to find faulty component. If the monitor passes, the condition is not present at this time. Were any problems found? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 6. No → Test Complete.	All

Symptom:

P1489-HIGH SPEED FAN CONTROL RELAY CIRCUIT

When Monitored and Set Condition:

P1489-HIGH SPEED FAN CONTROL RELAY CIRCUIT

When Monitored: With the ignition key on, battery voltage greater than 10.0 volts and the PCM requests the radiator fan to be turned on.

Set Condition: An open or shorted circuit is detected in the radiator fan relay control circuit.

POSSIBLE CAUSES
RADIATOR FAN CTRL RLY CIRCUIT WIRE HARN INTERMITTENT PROBLEM
RADIATOR FAN CTRL RLY CIRCUIT WIRE HARN OBSERVABLE PROBLEM
FUSED IGNITION SWITCH OUTPUT CIRCUIT OPEN
RADIATOR FAN RELAY CONTROL CIRCUIT OPEN
RADIATOR FAN RELAY CONTROL CIRCUIT SHORTED TO GROUND
RADIATOR FAN RELAY
POWERTRAIN CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRB, actuate the High Speed Radiator Fan Relay. Does the Radiator Fan Motor cycle on and off? Yes → Go To 2 No → Go To 4	All
2	Turn the ignition on. With the DRB, actuate the Radiator Fan Relay. Wiggle the wiring harness between the Radiator Fan Relay(s) and the PCM. Did the wiggling interrupt the Radiator Fan Relay cycling? Yes → Repair as necessary where wiggling caused the cycling to be interrupted. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 3	All
3	Turn the ignition off. Using the schematic as a guide, inspect the wiring and connectors. Were any problems found? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Test Complete.	All

P1489-HIGH SPEED FAN CONTROL RELAY CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Remove the Radiator Fan Relay. Measure the voltage of the Fused Ignition Switch Output circuit in the relay connector. Is the voltage above 10.0 volts? Yes → Go To 5 No → Repair the Fused Ignition Switch Output circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
5	Turn the ignition off. Disconnect the PCM harness connector. Remove the Radiator Fan Relay. Measure the resistance of the Radiator Fan Relay Control circuit. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the Radiator Fan Relay Control circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
6	Turn the ignition off. Remove the Radiator Fan Relay. Disconnect the PCM harness connector. Measure the resistance between ground and the Radiator Fan Relay Control circuit. Is the resistance above 100 kohms? Yes → Go To 7 No → Repair the Radiator Fan Relay Control circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
7	Turn the ignition off. Disconnect the PCM harness connector. Turn the ignition on. Connect a jumper wire to the Radiator Fan Relay Control circuit in the PCM harness connector. Momentarily connect the other end of the jumper wire to ground. Did the Radiator Fan Relay actuate? Yes → Go To 8 No → Replace the Radiator Fan Relay. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
8	If there are no possible causes remaining, view repair. Repair Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

Symptom:

P1490-LOW SPEED FAN CONTROL RELAY CIRCUIT

When Monitored and Set Condition:

P1490-LOW SPEED FAN CONTROL RELAY CIRCUIT

When Monitored: With the ignition on and battery voltage greater than 10 volts.

Set Condition: An open or shorted condition is detected in the low speed fan relay control circuit.

POSSIBLE CAUSES
RADIATOR FAN CTRL RLY CIRCUIT WIRE HARN INTERMITTENT PROBLEM
RADIATOR FAN CTRL RLY CIRCUIT WIRE HARN OBSERVABLE PROBLEM
FUSED IGNITION SWITCH OUTPUT CIRCUIT OPEN
RADIATOR FAN RELAY CONTROL CIRCUIT OPEN
RADIATOR FAN RELAY CONTROL CIRCUIT SHORTED TO GROUND
RADIATOR FAN RELAY
POWERTRAIN CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRB, actuate the Low Speed Radiator Fan Relay. Does the Radiator Fan Motor cycle on and off? Yes → Go To 2 No → Go To 4	All
2	Turn the ignition on. With the DRB, actuate the Radiator Fan Relay. Wiggle the wiring harness between the Radiator Fan Relay(s) and the PCM. Did the wiggling interrupt the Radiator Fan Relay cycling? Yes → Repair as necessary where wiggling caused the cycling to be interrupted. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 3	All
3	Turn the ignition off. Using the schematic as a guide, inspect the wiring and connectors. Were any problems found? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Test Complete.	All

P1490-LOW SPEED FAN CONTROL RELAY CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Remove the Radiator Fan Relay. Measure the voltage of the Fused Ignition Switch Output circuit in the relay connector. Is the voltage above 10.0 volts? Yes → Go To 5 No → Repair the Fused Ignition Switch Output circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
5	Turn the ignition off. Disconnect the PCM harness connector. Remove the Radiator Fan Relay. Measure the resistance of the Radiator Fan Relay Control circuit. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the Radiator Fan Relay Control circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
6	Turn the ignition off. Remove the Radiator Fan Relay. Disconnect the PCM harness connector. Measure the resistance between ground and the Radiator Fan Relay Control circuit. Is the resistance above 100 kohms? Yes → Go To 7 No → Repair the Radiator Fan Relay Control circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
7	Turn the ignition off. Disconnect the PCM harness connector. Turn the ignition on. Connect a jumper wire to the Radiator Fan Relay Control circuit in the PCM harness connector. Momentarily connect the other end of the jumper wire to ground. Did the Radiator Fan Relay actuate? Yes → Go To 8 No → Replace the Radiator Fan Relay. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
8	If there are no possible causes remaining, view repair. Repair Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

Symptom:

P1494-LEAK DETECT PUMP SW OR MECHANICAL FAULT

When Monitored and Set Condition:

P1494-LEAK DETECT PUMP SW OR MECHANICAL FAULT

When Monitored: Immediately after a cold start, with battery/ambient temperature between 4°C (40°F) and 32°C (90°F) and coolant temperature within -12°C (10°F) of battery/ambient and fuel level between 15% and 85%.

Set Condition: The state of the switch does not change when the solenoid is energized.

POSSIBLE CAUSES
WIRING HARNESS INTERMITTENT
LDP SWITCH SENSE CIRCUIT OPEN
LDP SWITCH SENSE CIRCUIT SHORTED TO GROUND
LDP VACUUM SUPPLY
LEAK DETECTION PUMP
POWERTRAIN CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTC's. Is the DTC Specific Good Trip Counter displayed and equal to zero for P-1494? Yes → Go To 2 No → Go To 7	All
2	Turn the ignition off. Disconnect the vacuum supply hose at the Leak Detection Pump. Connect a vacuum gauge to the disconnected vacuum supply hose at the Leak Detection Pump. Start the engine and read the vacuum gauge. Does the vacuum gauge read at least 13 in/Hg? Yes → Go To 3 No → Repair leak or obstruction in vacuum hose as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P1494-LEAK DETECT PUMP SW OR MECHANICAL FAULT — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the Leak Detection Pump electrical connector. Turn the ignition on. With the DRBIII® in Inputs/Outputs, read the ″Leak Detect Pump Sw″ state. While observing the ″Leak Detect Pump Sw″ state, connect a jumper wire between a good 12 volt source (B+) and the LDP Switch Sense circuit. Did the ″Leak Detect Pump Sw″ state change when the jumper was connected? Yes → Replace the Leak Detection Pump. Perform POWERTRAIN VERIFICATION TEST VER - 6. No → Go To 4	All
4	Turn the ignition off. Disconnect the Leak Detection Pump electrical connector. Disconnect the Powertrain Control Module connectors. Measure the resistance of the LDP Switch Sense circuit from the LDP connector to the PCM connector. Is the resistance below 5.0 Ohms? Yes → Go To 5 No → Repair the open LDP Switch Sense Circuit. Perform POWERTRAIN VERIFICATION TEST VER - 6.	All
5	Turn the ignition off. Disconnect the Leak Detection Pump electrical connector. Disconnect the Powertrain Control Module connectors. Measure the resistance between the LDP Switch Sense circuit and ground. Is the resistance below 5.0 Ohms? Yes → Repair the LDP Switch Sense Circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 6. No → Go To 6	All
6	If there are no possible causes remaining, replace the Powertrain Control Module. View repair options. Repair Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 6.	All
7	At this time, the conditions required to set the DTC are not present. **Note: Use the Freeze Frame Data to help you duplicate the conditions that set the DTC. Pay particular attention to the DTC set conditions, such as, VSS, MAP, ECT, and Load.** **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any Technical Service Bulletins (TSB's) that may apply.** Perform a wiggle test of the LDP wiring while the circuit is actuated with the DRB. Listen for the LDP to quit actuating. Also watch for the Good Trip Counter to change to 0. Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 6. No → Test Complete.	All

Symptom:

P1495-LEAK DETECTION PUMP SOLENOID CIRCUIT

When Monitored and Set Condition:

P1495-LEAK DETECTION PUMP SOLENOID CIRCUIT

When Monitored: Immediately after a cold start, with battery/ambient temperature between 40 deg. F and 90 deg. F and coolant temperature within 10 deg. F of battery/ambient.

Set Condition: The state of the solenoid circuit does not match the PCM's desired state.

POSSIBLE CAUSES
LDP SWITCH SENSE CIRCUIT OPEN
LDP SWITCH SENSE CIRCUIT SHORTED TO GROUND
LDP VACUUM SUPPLY
WIRING HARNESS INTERMITTENT
ASD CIRCUIT OPEN
LEAK DETECTION PUMP
LDP SOLENOID CONTROL CIRCUIT SHORTED TO GROUND
LDP SOLENOID CONTROL CIRCUIT OPEN
POWERTRAIN CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTC's. Is the DTC Specific Good Trip Counter displayed and equal to zero for P-1495? Yes → Go To 2 No → Go To 13	All
2	Turn the ignition off. Disconnect the Leak Detection Pump electrical connector. Turn the ignition on. With the DRBIII®, actuate the Leak Detection Pump. Using a 12 volt test light connected to ground (B-), check the Generator Source Circuit at the LDP connector. Does the test light illuminate brightly? Yes → Go To 3 No → Repair the open ASD Circuit. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

P1495-LEAK DETECTION PUMP SOLENOID CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the Leak Detection Pump electrical connector. Connect a 12 volt test light to a good 12 volt source (B+). Turn the ignition on. With the DRBIII®, actuate the Leak Detection Pump. Check the LDP Solenoid Control circuit, with the test light, while the Leak Detection Pump is actuating. Does the test light blink? Yes → Go To 4 No → Go To 6	All
4	Turn the ignition off. Disconnect the vacuum supply hose at the Leak Detection Pump. Connect a vacuum gauge to the disconnected vacuum supply hose at the Leak Detection Pump. Start the engine and read the vacuum gauge. Does the vacuum gauge read at least 13 in/Hg? Yes → Go To 5 No → Repair leak or obstruction in vacuum hose as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
5	Turn the ignition off. Disconnect the Leak Detection Pump electrical connector. Turn the ignition on. With the DRBIII® in Inputs/Outputs, read the ″Leak Detect Pump Sw″ state. While observing the ″Leak Detect Pump Sw″ state, connect a jumper wire between a good 12 volt source (B+) and the LDP Switch Sense circuit. Did the ″Leak Detect Pump Sw″ state change when the jumper was connected? Yes → Replace the Leak Detection Pump. Perform POWERTRAIN VERIFICATION TEST VER - 6. No → Test Complete.	All
6	Turn the ignition off. Disconnect the vacuum supply hose at the Leak Detection Pump. Connect a vacuum gauge to the disconnected vacuum supply hose at the Leak Detection Pump. Start the engine and read the vacuum gauge. Does the vacuum gauge read at least 13 in/Hg? Yes → Go To 7 No → Repair leak or obstruction in vacuum hose as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
7	Turn the ignition off. Disconnect the Leak Detection Pump electrical connector. Turn the ignition on. With the DRBIII® in Inputs/Outputs, read the ″Leak Detect Pump Sw″ state. While observing the ″Leak Detect Pump Sw″ state, connect a jumper wire between a good 12 volt source (B+) and the LDP Switch Sense circuit. Did the ″Leak Detect Pump Sw″ state change when the jumper was connected? Yes → Replace the Leak Detection Pump. Perform POWERTRAIN VERIFICATION TEST VER - 6. No → Go To 8	All

P1495-LEAK DETECTION PUMP SOLENOID CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
8	Turn the ignition off. Disconnect the Leak Detection Pump electrical connector. Disconnect the Powertrain Control Module connectors. Measure the resistance between the LDP Solenoid Control circuit and ground. Is the resistance below 5.0 Ohms? Yes → Repair the LDP Solenoid Control Circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 6. No → Go To 9	All
9	Turn the ignition off. Disconnect the Leak Detection Pump electrical connector. Disconnect the Powertrain Control Module connectors. Measure the resistance of the LDP Solenoid Control circuit from the LDP connector to the PCM connector. Is the resistance below 5.0 Ohms? Yes → Go To 10 No → Repair the open LDP Solenoid Control Circuit. Perform POWERTRAIN VERIFICATION TEST VER - 6.	All
10	Turn the ignition off. Disconnect the Leak Detection Pump electrical connector. Disconnect the Powertrain Control Module connectors. Measure the resistance of the LDP Switch Sense circuit from the LDP connector to the PCM connector. Is the resistance below 5.0 Ohms? Yes → Go To 11 No → Repair the open LDP Switch Sense Circuit. Perform POWERTRAIN VERIFICATION TEST VER - 6.	All
11	Turn the ignition off. Disconnect the Leak Detection Pump electrical connector. Disconnect the Powertrain Control Module connectors. Measure the resistance between the LDP Switch Sense circuit and ground. Is the resistance below 5.0 Ohms? Yes → Repair the LDP Switch Sense Circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 6. No → Go To 12	All
12	If there are no possible causes remaining, replace the Powertrain Control Module. View repair options. Repair Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 6.	All

P1495-LEAK DETECTION PUMP SOLENOID CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
13	At this time, the conditions required to set the DTC are not present. **Note: Use the Freeze Frame Data to help you duplicate the conditions that set the DTC. Pay particular attention to the DTC set conditions, such as, VSS, MAP, ECT, and Load.** **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any Technical Service Bulletins (TSB's) that may apply.** Perform a wiggle test of the LDP wiring while the circuit is actuated with the DRB. Listen for the LDP to quit actuating. Also watch for the Good Trip Counter to change to 0. Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 6. No → Test Complete.	All

Symptom:

P1496-5 VOLT SUPPLY, OUTPUT TOO LOW

When Monitored and Set Condition:

P1496-5 VOLT SUPPLY, OUTPUT TOO LOW

When Monitored: With the ignition on.

Set Condition: The 5-volt supply to the sensors is below 3.5 volts for 4 seconds.

POSSIBLE CAUSES
5 VOLT SUPPLY SHORTED TO GROUND
MAP SENSOR
TPS
WIRING HARNESS INTERMITTENT PROBLEM
PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRB, read the DTC's. Is the Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Go To 7	All
2	Turn the ignition off. Disconnect the Throttle Position Sensor harness connector. Turn the ignition on. Measure the voltage of the 5 Volt Supply circuit at the Throttle Positon Sensor harness connector. Is the voltage below 4.5 Volts? Yes → Go To 3 No → Go To 6	All

P1496-5 VOLT SUPPLY, OUTPUT TOO LOW — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the Throttle Position Sensor harness connector. Turn the ignition on. Connect a voltmeter to the 5 Volt Supply circuit at the Throttle Position Sensor harness connector. Record Voltage Reading. Turn the ignition off. Disconnect the MAP Sensor harness connector. Turn the ignition on. Read and record the 5 Volt Supply Circuit voltage at the Throttle Position Sensor harness connector. Did the 5 Volt Supply go from below 4.5 volts to above 4.5 volts when the MAP was disconnected? Yes → Replace the MAP Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Turn the ignition off. Disconnect the Throttle Position Sensor harness connector. Disconnect the MAP Sensor harness connector. Disconnect the PCM harness connectors. Measure the resistance of the 5 Volt Supply Circuit from the Throttle Position Sensor harness connector to ground. Is the resistance below 5.0 ohms? Yes → Repair the 5 Volt Supply Circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	If there are no possible causes remaining, view repair. Repair Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	**Note: The Throttle Position Sensor harness connector must be connected during this test.** Disconnect the MAP Sensor harness connector. Turn the ignition on. Measure the voltage of the 5 Volt Supply circuit at the MAP Sensor harness connector. Is the Voltage below 4.5 Volts? Yes → Replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 7	All

P1496-5 VOLT SUPPLY, OUTPUT TOO LOW — Continued

TEST	ACTION	APPLICABILITY
7	Turn the ignition off. **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any Technical Service Bulletins (TSB) that may apply.** Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom List:

P1696-PCM FAILURE EEPROM WRITE DENIED
P1697-PCM FAILURE SRI MILE NOT STORED

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P1696-PCM FAILURE EEPROM WRITE DENIED.

When Monitored and Set Condition:

P1696-PCM FAILURE EEPROM WRITE DENIED

When Monitored: With the ignition on.

Set Condition: An attempt to program/write to the internal EEPROM failed, Also checks at powerdown.

P1697-PCM FAILURE SRI MILE NOT STORED

When Monitored: With the ignition on.

Set Condition: An attempt to program/write to the internal EEPROM failed, Also checks at powerdown.

POSSIBLE CAUSES
COMPARE SRI MILEAGE WITH ODOMETER
DRB DISPLAYS SRI MILEAGE INVALID
DRB DISPLAYS WRITE FAILURE
DRB DISPLAYS WRITE REFUSED 2ND TIME

TEST	ACTION	APPLICABILITY
1	With the DRB, perform the SRI Memory Test. Does the DRB display Write Failure? Yes → Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Go To 2	All
2	With the DRB, perform the SRI Memory Test. Does the DRB display Write Refused? Yes → Go To 3 No → Go To 4	All

P1696-PCM FAILURE EEPROM WRITE DENIED — Continued

TEST	ACTION	APPLICABILITY
3	With the DRB, perform the SRI Memory Test a second time. **Note: Retest the SRI Memory two more times.** Does the DRB display Write Refused again? Yes → Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Test Complete.	All
4	With the DRB, perform the SRI Memory Test. Does the DRB display SRI Mileage Invalid? Yes → Update the mileage and retest the SRI Memory. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Go To 5	All
5	Compare the SRI Mileage stored with the Instrument Panel Odometer. Is the mileage within the specified range displayed on the DRB? Yes → Test Complete. No → Update the mileage and retest the SRI Memory. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

Symptom:

*CHECKING ENGINE MECHANICAL SYSTEMS

POSSIBLE CAUSES
ENGINE MECHANICAL PROBLEM

TEST	ACTION	APPLICABILITY
1	**WARNING: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.** Check for any of the following conditions/mechanical problems. ENGINE VACUUM - must be at least 13 inches in neutral with the engine at idle. ENGINE VALVE TIMING - must be within specifications ENGINE COMPRESSION - must be within specifications ENGINE EXHAUST SYSTEM - must be free of any restrictions or leaks. ENGINE PCV SYSTEM - must flow freely TORQUE CONVERTER STALL SPEED - must be within specifications POWER BRAKE BOOSTER - no internal vacuum leaks FUEL - must be free of contamination FUEL INJECTOR - plugged or restricted injector; control wire not connected to correct injector Are there any engine mechanical problems? Yes → Repair mechanical problem as necessary. No → Test Complete.	All

Symptom:
*CHECKING EVAPORATIVE EMISSION SYSTEM

POSSIBLE CAUSES
ROLLOVER VALVE
WIRING HARNESS INTERMITTENT
INTERMITTENT LDP MONITOR FAILURE

TEST	ACTION	APPLICABILITY
1	Start the engine, Allow the engine to reach normal operating temperature. **Note: Engine must be in closed loop.** With the DRBIII®, go to Purge Vapors Test. Press 3 to flow. **Note: Short Term Adaptive should change.** Did Short Term Adaptive change? Yes → Test Complete. No → Go To 2	All
2	At this time, the conditions required to set a DTC are not present. **Note: Use the Freeze Frame Data to help you duplicate the conditions that set the DTC. Pay particular attention to the DTC set conditions, such as, VSS, MAP, ECT, and Load.** **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any technical service bulletins that may apply.** Perform a wiggle test of the Evap Purge Solenoid wiring while the circuit is actuated with the DRBIII®. Feel for the solenoid to quit actuating. Also watch for the Good Trip Counter to change to 0. Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 3	All
3	At this time, the conditions required to set the DTC are not present. **Note: Use the Freeze Frame Data to help you duplicate the conditions that set the DTC. Pay particular attention to the DTC set conditions, such as, VSS, MAP, ECT, and Load.** **Note: A thorough visual inspection of the Evap system hoses, tubes, and connections may save time in your diagnosis. Look for any physical damage or signs of wetness at connections. The strong smell of fuel vapors may aid diagnosis also.** **Note: Refer to any Technical Service Bulletins (TSB's) that may apply.** With the DRBIII® in System Tests, perform the LDP Monitor Test. This will force the PCM to run the LDP Monitor. If the monitor fails, further diagnosis is required to find faulty component. If the monitor passes, the condition is not present at this time. Were any problems found? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 6. No → Go To 4	All

*CHECKING EVAPORATIVE EMISSION SYSTEM — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Remove the Purge Solenoid. Inspect the line from rollover valve to the solenoid. Is liquid fuel in the line? Yes → Replace the Rollover Valve. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Test Complete.	All

Symptom:
*CHECKING FUEL DELIVERY

POSSIBLE CAUSES
FUEL PUMP CAPACITY (VOLUME) OUT OF SPECS

TEST	ACTION	APPLICABILITY
1	**Note: The fuel pressure must be within specification before continuing.** Turn the ignition off. **Warning: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.** Disconnect the fuel supply line at the fuel rail. Connect fuel line adapter #6539(5/16″) or #6631(3/8″) to the disconnected fuel supply line. Insert the other end of the adapter into a graduated container. **Caution: Do not operate the fuel pump for more than 7 seconds in the next step. Fuel pump module reservoir may run empty and damage to the fuel pump will result.** **Note: Specification: A good fuel pump will deliver at least 1/4 liter (1/2 pint) of fuel in 7 seconds.** Turn the ignition on. With the DRB, actuate the ASD Fuel System test for 7 seconds. Is the fuel pump capacity within specification? Yes → Test Complete. No → Check for a kinked/damaged fuel supply line between the fuel tank and fuel rail. If OK, replace the fuel pump module. Perform POWERTRAIN VERIFICATION TEST VER - 5. **Caution: Stop All Actuations.**	All

Symptom:

***CHECKING IAC MOTOR OPERATION WITH NO DTC'S**

POSSIBLE CAUSES
ACTUATOR TEST
CHECKING FOR VACUUM LEAKS
CHECKING FOR OPEN DRIVER CIRCUITS
CHECKING IAC HARNESS CONNECTOR
IAC MOTOR
PCM - IAC MOTOR DRIVER

TEST	ACTION	APPLICABILITY
1	Start and idle the engine. With the DRB III in Engine actuator test, set the engine speed to 1400 RPM and wait 10 seconds. Set the engine speed to 900 RPM and wait 10 seconds. Did the engine speed change from 1400 RPM to 900 RPM? Yes → With the DRB III, stop all tests. Test complete. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 2	All
2	Start and idle the engine. Inspect the engine for any vacuum leak(s). Is there any vacuum leak(s)? Yes → Repair vacuum leak(s) as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 3	All
3	Turn the ignition off. Disconnect the IAC Motor harness connector. Start and idle the engine. Using a test light connected to ground, probe the IAC Driver #1 circuit for 10 seconds. Repeat the above test for the remaining IAC Motor Driver circuits. Does the test light turn on and off while probing each IAC Motor Driver circuit? Yes → Go To 4 No → Go To 7	All
4	Turn the ignition off. Disconnect the IAC Motor harness connector. Start and idle the engine. Using a test light connected to B+, probe the IAC Driver #1 circuit for 10 seconds. Repeat the above test for the remaining IAC Motor Driver circuits. Does the test light turn on and off while probing each IAC Motor Driver circuit? Yes → Go To 5 No → Go To 8	All

*CHECKING IAC MOTOR OPERATION WITH NO DTC'S — Continued

TEST	ACTION	APPLICABILITY
5	Turn the ignition off. Disconnect the IAC Motor harness connector and inspect all connector terminals. **NOTE: Check Connectors - Clean/repair as necessary.** Are there any terminals damaged, pushed out or miswired? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 6	All
6	View Repair. Repair Replace the Idle Air Control Motor. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
7	Turn the ignition off. Disconnect the IAC Motor harness connector. Disconnect the PCM harness connectors. Measure the resistance of the IAC Motor Driver circuit(s) that indicated no test light illumination. Is the resistance below 5.0 ohms? Yes → Go To 8 No → Repair the open IAC Motor Driver circuit(s). Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
8	View repair Repair Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

Symptom:

***CHECKING MAP SENSOR OPERATION WITH NO DTC'S**

POSSIBLE CAUSES
MAP SENSOR (OUT OF CALIBRATION)

TEST	ACTION	APPLICABILITY
1	Turn the ignition off. Connect a Vacuum Gauge to a Manifold Vacuum source. Start the engine. Allow the engine to idle. **Note: If engine will not idle, maintain a constant RPM above idle.** Using the DRB, monitor the MAP Sensor vacuum value. Is the DRB reading within 1″ of the Vacuum Gauge reading? Yes → Test Complete. No → Replace the MAP Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom:
*CHECKING OIL PRESSURE SWITCH

POSSIBLE CAUSES
INSTRUMENT CLUSTER
LOW OIL LEVEL
LOW OIL PRESSURE WARNING LAMP BULB
NO PCI BUS MESSAGE FROM CLUSTER
WARNING LAMP DOES NOT GO OUT
ENGINE OIL PRESSURE SWITCH SENSE CIRCUIT OPEN
ENGINE OIL PRESSURE SWITCH SENSE CIRCUIT SHORTED TO GROUND
OIL PRESSURE SWITCH
OIL PRESSURE SWITCH
POWERTRAIN CONTROL MODULE (SENSE CKT OPEN)
POWERTRAIN CONTROL MODULE (SENSE CKT SHORTED TO GROUND)

TEST	ACTION	APPLICABILITY
1	**CAUTION: Ensure the engine oil level and the engine oil pressure are within specification before proceeding.** Turn the ignition on. Using the DRB, check for any PCM DTCs. Is the P1687 NO CLUSTER BUS MESSAGE trouble code present? Yes → Refer to symptom P1687 No Cluster Bus Message in the Communication category. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 2	All
2	Turn the ignition on. Did the Low Oil Pressure Warning Lamp illuminate? Yes → Go To 3 No → Go To 8	All
3	Start the engine and allow the engine to idle. Did the Low Oil Pressure Warning Lamp go out? Yes → The Low Oil Pressure Warning Lamp is operating properly at this time. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 4	All
4	Turn the ignition off. Check the engine oil level. Is the oil level within specifications? Yes → Go To 5 No → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

*CHECKING OIL PRESSURE SWITCH — Continued

TEST	ACTION	APPLICABILITY
5	Disconnect the Engine Oil Pressure Switch harness connector. Turn the ignition on. Did the Low Oil Pressure Warning Lamp go out? Yes → Replace the Engine Oil Pressure Switch. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 6	All
6	Turn the ignition off. Disconnect the Engine Oil Pressure Switch harness connector. Disconnect the PCM harness connectors. Measure the resistance between ground and the Engine Oil Pressure Switch Sense circuit. Is the resistance above 100 kohms? Yes → Go To 7 No → Repair the Engine Oil Pressure Switch Sense circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
7	If there are no possible causes remaining, view repair. Repair Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
8	Turn the ignition off. Push and hold the Trip Reset Button, located on the cluster, while turning the ignition key on. **Note: This will place the cluster in Self Test Mode.** Observe the Low Oil Pressure Warning Lamp during the Self Test Mode. Does the Low Oil Pressure Warning Lamp illuminate? Yes → Go To 9 No → Go To 12	All
9	Turn the ignition off. Disconnect the Engine Oil Pressure Switch harness connector. Connect a jumper wire between the Engine Oil Pressure Switch Sense circuit and ground. Did the Low Oil Pressure Warning Lamp illuminate? Yes → Replace the Engine Oil Pressure Switch. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 10	All
10	Turn the ignition off. Disconnect the Engine Oil Pressure Switch harness connector. Disconnect the PCM harness connectors. Measure resistance of the Engine Oil Pressure Switch Sense circuit. Is the resistance below 5.0 ohms? Yes → Go To 11 No → Repair the Engine Oil Pressure Switch Sense circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

*CHECKING OIL PRESSURE SWITCH — Continued

TEST	ACTION	APPLICABILITY
11	If there are no possible causes remaining, view repair. Repair Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
12	Inspect the Low Oil Pressure Warning Lamp Bulb in the Instrument Cluster. Is the bulb OK? Yes → Replace the Instrument Cluster. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Replace the Low Oil Pressure Warning Lamp Bulb. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

Symptom:

***CHECKING RADIATOR FAN OPERATION WITH NO DTC'S**

POSSIBLE CAUSES
FUSED B(+) CIRCUIT OPEN
RADIATOR FAN GROUND CIRCUIT OPEN
RADIATOR FAN MOTOR
RADIATOR FAN RELAY OUTPUT CIRCUIT OPEN
RADIATOR FAN RELAY

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRB, actuate the High and Low Speed Radiator Fan Relays. Did the Radiator Fan Motor cycle on and off during both actuations? Yes → Test Complete. No → Go To 2	All
2	Turn the ignition on. With the DRB, actuate both Radiator Fan Relays (one at a time). Using a 12-volt Test Light connected to ground, backprobe the appropriate Radiator Fan Relay Output circuit in the Radiator Fan Motor harness connector. Does the test light cycle on and off? Yes → Go To 3 No → Go To 5	All
3	Turn the ignition off. Disconnect the Radiator Fan Motor harness connector. Measure the resistance between ground and the Radiator Fan Motor Ground circuit. Is the resistance below 5.0 ohms? Yes → Go To 4 No → Repair the Radiator Fan Ground circuit(s) for an open. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
4	If there are no possible causes remaining, view repair. Repair Replace the Radiator Fan Motor. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
5	Turn the ignition off. Remove the Radiator Fan Relays. Using a 12-volt Test Light connected to ground, check the Fused B(+) circuit at both relay connectors. Did the test light illuminate brightly at both relay connectors? Yes → Go To 6 No → Repair the Fused B(+) circuit(s) for an open. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

*CHECKING RADIATOR FAN OPERATION WITH NO DTC'S — Continued

TEST	ACTION	APPLICABILITY
6	Turn the ignition off. Disconnect the Radiator Fan Motor harness connector. Remove Radiator Fan Relays. Measure the resistance of the Radiator Fan Relay Output circuit from each relay to the Radiator Fan Motor harness connector. Is the resistance below 5.0 ohms for both the High and Low Speed Radiator Fan Relay Output circuits? Yes → Go To 7 No → Repair the Radiator Fan Relay Output circuit(s) for an open. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
7	If there are no possible causes remaining, view repair. Repair Replace the Radiator Fan Relay. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

Symptom:
*CHECKING THE ENGINE COOLANT TEMPERATURE SENSOR

POSSIBLE CAUSES
ECT SENSOR (OUT OF CALIBRATION)
ECT WIRING HARNESS INTERMITTENT

TEST	ACTION	APPLICABILITY
1	**Note: For this test to be valid, the thermostat must be operating correctly.** **Note: This test works best if performed on a cold engine (cold soaked).** Turn the ignition on. With the DRB, read the ENG COOLANT TMP DEG value. If the engine was allowed to sit overnight (cold soak), the engine temperature value should be a sensible value that is close to the surrounding temperature (ambient temperature). **Note: If engine coolant temperature is above 82° C (180° F), allow the engine to cool until 65° C (150° F) is reached.** Start the engine. During engine warm-up, monitor the ENG COOLANT TMP DEG value. The temp deg value change should be a smooth transition from start up to normal operating temp 82° C (180° F). The value should reach at least 82° C (180° F). Did the ENG COOLANT TMP DEG value increase smoothly and did it reach at least 82° C (180° F)? Yes → Go To 2 No → Replace the Engine Coolant Temperature Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
2	Turn the ignition off. **NOTE: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any Technical Service Bulletins (TSB) that may apply.** Perform a wiggle test on the related wiring harnesses with the engine running. Watch for the Good Trip Counter to change to 0. Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom:

*CHECKING THE INLET AIR TEMPERATURE SENSOR

POSSIBLE CAUSES
IAT SENSOR (OUT OF CALIBRATION)
WIRING HARNESS INTERMITTENT

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. **Note: Do not allow more than 5 minutes delay between the next steps.** With the DRB, read the INLET AIR TEMP DEG value and record the reading. Turn the ignition off. Disconnect and remove the IAT Sensor. Using a temperature probe, measure the air temperature inside the IAT Sensor opening. Is the recorded IAT temperature value within 10° of the temperature probe reading? Yes → Go To 2 No → Check the IAT wiring for a high resistance condition. If OK, replace the IAT sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
2	Turn the ignition off. **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any Technical Service Bulletins (TSB) that may apply.** Perform a wiggle test on the related wiring harnesses with the engine running. Watch for the Good Trip Counter to change to 0. Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom:

*CHECKING THE PCM POWER AND GROUNDS

POSSIBLE CAUSES
FUSED IGNITION SWITCH OUTPUT CIRCUIT OPEN
PCM GROUND CIRCUIT(S) OPEN
FUSED B(+) CIRCUIT OPEN

TEST	ACTION	APPLICABILITY
1	Turn the ignition off. Disconnect the Powertrain Control Module harness connector. Use a 12 volt test light in the following step. With a 12 V test light connected to ground, probe the Fused B+ circuit in the PCM harness connector. Is the test light illuminated and bright? No → Repair the Fused B+ circuit for an open Perform POWERTRAIN VERIFICATION TEST VER - 1. Yes → Go To 2	All
2	Turn the ignition off. Disconnect the Powertrain Control Module harness connector. Turn the ignition on. Use a 12 volt test light in the following step. With the 12V test light connected to ground, probe the Fused Ignition Switch Output circuit in the PCM Connector. Is the test light illuminated and bright? Yes → Go To 3 No → Repair the Fused Ignition Switch Output circuit for an open. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
3	Turn the ignition off. Disconnect the Powertrain Control Module harness connector(s). Use a 12 volt test light in the following step. Connect 12V test light to B(+). Probe the Ground Circuits, one at a time, in the PCM Connector. Does the test light illuminate at each Ground circuit? Yes → Test Complete. No → Repair the ground circuit(s) for an open. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

Symptom:

***CHECKING THROTTLE POSITION SENSOR OPERATION WITH NO DTC'S**

POSSIBLE CAUSES
TPS VOLTAGE CHANGE NOT SMOOTH
TPS CONNECTORS/HARNESS INTERMITTENT (D)
TPS HARNESS/CONNECTORS INTERMITTENT (C)
TPS HARNESS/CONNECTORS OBSERVABLE
TPS VOLTAGE GREATER THAN 0.92 VOLTS WITH THROTTLE CLOSED

TEST	ACTION	APPLICABILITY
1	Start the engine and allow the engine to idle. **Warning: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.** Wiggle the Throttle Position Sensor connectors and harness. Monitor the engine RPM. Was there any change in engine RPM when wiggled? Yes → Repair the harness or connector that caused the engine RPM to change. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 2	All
2	Turn the ignition on. With the DRBIII®, read TPS VOLTS. While monitoring the DRBIII®, slowly open and close the Throttle. Is the voltage change smooth? Yes → Go To 3 No → Replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
3	Turn the ignition on. With the DRB, read TP Sensor voltage. Wiggle the Throttle Position Sensor Connectors and Harness. Monitor the DRB display. Was there any change in Throttle Position Sensor voltage when wiggled? Yes → Repair the harness or connector that caused the voltage change. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 4	All
4	Turn the ignition on. Using the wiring diagram as a guide, inspect the Throttle Position Sensor wiring and connectors. Were any problems found? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All

*CHECKING THROTTLE POSITION SENSOR OPERATION WITH NO DTC'S — Continued

TEST	ACTION	APPLICABILITY
5	Turn the ignition on. With the DRB, read TPS VOLTS. Throttle must be against stop. Is the voltage 0.92 or less with the Throttle closed? Yes → Test Complete. No → Check for a binding throttle condition. If OK, replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

Symptom:

P0645-A/C CLUTCH RELAY CIRCUIT

When Monitored and Set Condition:

P0645-A/C CLUTCH RELAY CIRCUIT

When Monitored: With the ignition key in the run position and battery voltage above 10.4 volts.

Set Condition: An open or shorted condition is detected in the A/C clutch relay control circuit.

POSSIBLE CAUSES
A/C CLUTCH RLY CIRCUIT WIRING HARNESS OBSERVABLE PROBLEM
A/C CLUTCH RLY CIRCUIT WIRING HARNESS INTERMITTENT PROBLEM
FUSED IGNITION SWITCH OUTPUT CIRCUIT OPEN
A/C CLUTCH RELAY CONTROL CIRCUIT OPEN
A/C CLUTCH RELAY CONTROL CIRCUIT SHORT TO GROUND
A/C CLUTCH RELAY
PCM (A/C CLUTCH RELAY)

TEST	ACTION	APPLICABILITY
1	Ignition On, Engine Not Running With the DRBIII®, actuate the A/C Clutch Relay. Is the A/C Clutch Relay clicking? Yes → Go To 2 No → Go To 4	All
2	Turn the ignition off. Using the schematic as a guide, inspect the Wiring and Connectors. Were any problems found? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 3	All
3	Ignition on, engine not running. With the DRBIII®, actuate the A/C Clutch Relay. Wiggle the Wiring Harness from the Relay to the PCM. Did the wiggling interrupt the clicking? Yes → Repair as necessary where wiggling caused the clicking to be interrupted. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Test Complete.	All

P0645-A/C CLUTCH RELAY CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Remove the A/C Clutch Relay from the PDC. **Note: Check connectors - Clean/repair as necessary.** Turn the ignition on. Measure the Fused Ignition Switch Output Circuit voltage at A/C clutch relay. Is the voltage above 10.0 volts? Yes → Go To 5 No → Repair the open Fused Ignition Switch Output Circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
5	Turn the ignition off. Remove the A/C Clutch Relay from the PDC. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance between Terminals 1(85) and 2 (86) of the A/C Clutch Relay. Is the resistance between 50.0 and 90.0 ohms? Yes → Go To 6 No → Replace the A/C Clutch Relay. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
6	Turn the ignition off. Disconnect the PCM harness connector(s). Remove the A/C Clutch Relay from the PDC. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the A/C Clutch Relay Control Circuit from the Relay cavity in PDC to the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 7 No → Repair open A/C Clutch Relay Control Circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
7	Turn the ignition off. Disconnect the PCM harness connector(s). Remove the A/C Clutch Relay from the PDC. **Note: Check connectors - Clean/repair as necessary.** Measure the A/C Clutch Control Circuit resistance at PCM harness connector to ground. Is the resistance below 5.0 ohms? Yes → Repair the A/C Clutch Relay Control Circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 8	All
8	If there are no possible causes remaining, replace the Powertrain Control Module. View repair options. Repair Replace the PCM. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

Symptom:

***CHECKING A/C SYSTEM OPERATION WITH NO DTC'S**

POSSIBLE CAUSES
REFRIGERATION SYSTEM NOT PROPERLY CHARGED
A/C CLUTCH RELAY OUTPUT CIRCUIT OPEN
A/C COMPRESSOR CLUTCH GROUND CIRCUIT OPEN
FUSED B(+) CIRCUIT OPEN
A/C CLUTCH COIL
A/C CLUTCH RELAY

TEST	ACTION	APPLICABILITY
1	Ignition On, Engine Not Running With the DRBIII®, read DTC's. Is there an A/C Clutch Relay DTC? Yes → Go To 2 No → Go To 2	All
2	Turn the Ignition off. Verify that the Refrigerant System is properly charged per service procedure. Is the Refrigerant System properly charged? Yes → Go To 3 No → Properly charge the Refrigerant System per the service information. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
3	Ignition On, Engine Not Running With the DRBIII®, actuate the A/C Clutch Relay. Did the A/C Clutch actuate? Yes → Go To 4 No → Go To 4	All
4	Turn the ignition off. Disconnect the A/C compressor clutch harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the A/C Compressor Clutch Ground Circuit to ground. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the open A/C compressor clutch ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

*CHECKING A/C SYSTEM OPERATION WITH NO DTC'S — Continued

TEST	ACTION	APPLICABILITY
5	Turn the ignition off. Disconnect the A/C Clutch harness connector. Remove the A/C Clutch Relay from the PDC. **Note: Check connectors - Clean/repair as necessary.** Measure the A/C Clutch Relay Output from the Relay cavity in PDC to the A/C Clutch Coil harness connector. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the open A/C Clutch Relay Output Circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
6	Turn the ignition off. Remove the A/C Clutch Relay from the PDC. **Note: Check connectors - Clean/repair as necessary.** Measure the Fused B(+) at the Relay cavity in PDC. Is the voltage above 11.0 volts? Yes → Go To 7 No → Repair the open Fused B(+) Circuit. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All
7	Turn the engine off (ignition on). With the DRBIII®, actuate the A/C clutch relay. Measure the A/C Clutch Relay Output at the A/C Clutch. Does the voltage fluctuate between 0.0 and 11.0 volts? Yes → Replace the A/C Clutch Coil. Perform POWERTRAIN VERIFICATION TEST VER - 2. No → Go To 8	All
8	If there are no possible causes remaining, replace the A/C Clutch Relay. View repair options. Repair Replace the A/C Clutch Relay. Perform POWERTRAIN VERIFICATION TEST VER - 2.	All

Symptom List:

P1595-SPEED CONTROL SOLENOID CIRCUITS
P1683-SPD CTRL PWR RELAY; OR S/C 12V DRIVER CKT

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P1595-SPEED CONTROL SOLENOID CIRCUITS.

When Monitored and Set Condition:

P1595-SPEED CONTROL SOLENOID CIRCUITS

When Monitored: With the ignition key on, the speed control switched on, the SET switch pressed and the vehicle in drive gear moving between 30-100 mph (45-165 kmh).

Set Condition: The powertrain control module actuates the vacuum and vent solenoids but they do not respond.

P1683-SPD CTRL PWR RELAY; OR S/C 12V DRIVER CKT

When Monitored: With the ignition key on and the speed control switched on.

Set Condition: The speed control power supply circuit is either open or shorted to ground.

POSSIBLE CAUSES
POWERTRAIN CONTROL MODULE
GROUND CIRCUIT AT S/C SERVO CONNECTOR OPEN
P1595/P1683-BR LAMP SWITCH
S/C POWER SUPPLY CIRCUIT OPEN
S/C VACUUM SOLENOID CONTROL CIRCUIT OPEN
S/C POWER SUPPLY CIRCUIT SHORTED TO GROUND
S/C VACUUM SOLENOID CONTROL CKT SHORT TO GROUND
S/C VENT SOLENOID CONTROL CIRCUIT OPEN
S/C BRAKE SWITCH OUTPUT CIRCUIT SHORTED TO GROUND
S/C VENT SOLENOID CONTROL CKT SHORT TO GROUND
P1595/P1683-S/C SERVO
S/C BRAKE SWITCH OUTPUT CIRCUIT OPEN
PCM (12V DRIVER CIRCUIT)

P1595-SPEED CONTROL SOLENOID CIRCUITS — Continued

TEST	ACTION	APPLICABILITY
1	Turn the ignition off. Disconnect the Speed Control Servo harness connector. **Note: Ensure the Brake Pedal is not depressed during the following steps.** Remove the ASD relay and jumper relay socket pins 30 and 87. Turn the ignition on. Turn Speed Control Switch on. With the DRBIII®, actuate the Speed Control Vacuum Solenoid. Using a 12-volt Test Light connected to ground, check the Brake Lamp Switch Output circuit at the Speed Control Servo connector. Is the light illuminated and bright? Yes → Go To 2 No → Go To 8	SPEED CONTROL
2	Turn the ignition off. Disconnect the Speed Control Servo harness connector. Measure the resistance between ground and the Speed Control Servo ground circuit at the Speed Control Servo connector. Is the resistance below 5.0 ohms? Yes → Go To 3 No → Repair open Ground Circuit at S/C Servo Connector. Perform POWERTRAIN VERIFICATION TEST VER - 4.	SPEED CONTROL
3	Turn the ignition off. Disconnect the Speed Control Servo harness connector. Disconnect PCM harness connectors. Measure the resistance of the Speed Control Vacuum Solenoid Control circuit between the PCM connector and the Speed Control Servo connector. Is the resistance below 5.0 ohms? Yes → Go To 4 No → Repair the open S/C Vacuum Solenoid Control Circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4.	SPEED CONTROL
4	Turn the ignition off. Disconnect the Speed Control Servo harness connector. Disconnect PCM harness connectors. Using a 12-volt Test Light connected to 12-volts, check the Speed Control Vacuum Solenoid Control circuit at the Speed Control Servo connector. Is the light illuminated and bright? Yes → Repair the short to ground in the S/C Vacuum Solenoid Control Circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 5	SPEED CONTROL
5	Turn the ignition off. Disconnect the Speed Control Servo harness connector. Disconnect PCM harness connectors. Measure the resistance of the Speed Control Vent Solenoid Control circuit between the Speed Control Servo connector and PCM connector. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the open Speed Control Vent Solenoid Control Circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4.	SPEED CONTROL

P1595-SPEED CONTROL SOLENOID CIRCUITS — Continued

TEST	ACTION	APPLICABILITY
6	Turn the ignition off. Disconnect the Speed Control Servo harness connector. Disconnect PCM harness connectors. Using a 12-volt Test Light connected to 12-volts, check the Speed Contol Vent Solenoid Control circuit at the Speed Control Servo connector. Is the light illuminated and bright? Yes → Repair the short to ground in the S/C Vent Solenoid Control Circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 7	SPEED CONTROL
7	Turn the ignition off. Disconnect the S/C Servo harness connector. Turn the ignition on. With the DRBIII®, actuate the Vacuum and the Vent Solenoids. Using a 12-volt Test Light connected to 12-volts, check the Speed Control Vacuum and Vent Solenoid Control circuits at the Speed Control Servo connector. Does the test light illuminate with each solenoid activation? Yes → Replace the Speed Control Servo. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Replace Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 4.	SPEED CONTROL
8	Turn the ignition off. Disconnect the Brake Lamp Switch harness connector. Disconnect the Speed Control Servo harness connector. Connect a jumper wire between the Brake Lamp S/C Power Supply Input circuit and the Brake Lamp S/C Power Supply Output circuit in the Brake Lamp Switch connector. Remove the ASD relay and jumper relay socket cavities for pins 30 and 87. Turn the ignition on. With the DRBIII®, actuate the Speed Control Vacuum Solenoid. Using a 12-volt Test Light connected to ground, check the Brake Lamp Switch Output circuit at the Speed Control Servo connector. Is the light illuminated and bright? Yes → Adjust or replace the Brake Lamp Switch. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 9	All
9	Turn the ignition off. Disconnect the Brake Lamp Switch harness connector. Disconnect the Powertrain Control Module harness connector. Measure the resistance of the Speed Control Power Supply circuit between the PCM connector and the Brake Lamp Switch connector. Is the resistance below 5.0 ohms? Yes → Go To 10 No → Repair the S/C Power Supply circuit for an open.	All

P1595-SPEED CONTROL SOLENOID CIRCUITS — Continued

TEST	ACTION	APPLICABILITY
10	Turn the ignition off. Disconnect the Brake Lamp Switch harness connector. Disconnect the PCM harness connector. At the Brake Lamp Switch connector, measure the resistance between ground and the Speed Control Power Supply circuit. Is the resistance below 5.0 ohms? Yes → Repair the Speed Control Power Supply circuit for a short to ground. No → Go To 11	All
11	Turn the ignition off. Disconnect the Speed Control Servo harness connector. Disconnect the Brake Lamp Switch harness connector. Measure the resistance between ground and the S/C Brake Switch Output circuit. Is the resistance below 5.0 ohms? Yes → Repair S/C Brake Switch Output circuit for short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 12	SPEED CONTROL
12	Turn the ignition off. Disconnect the S/C Servo harness connector. Disconnect the Brake Lamp Switch harness connector. Measure the resistance of the Speed Control Power Supply circuit between the Brake Lamp Switch connector and the Speed Control Servo connector. Is the resistance above 5.0 ohms? Yes → Repair the open Speed Control Power Supply Circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 13	SPEED CONTROL
13	If there are no possible causes remaining, replace the Powertrain Control Module. View repair options. Repair Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 4.	SPEED CONTROL

Symptom:

***CHECKING SPEED CONTROL OPERATION WITH NO DTC'S PRESENT**

POSSIBLE CAUSES
NTC-CHECK THROTTLE CABLE
NTC-CHECK S/C VACUUM SUPPLY
DRB DOES NOT SHOW P/N SWITCH ″D/R″
SPEED CONTROL SWITCH SIGNAL CKT SHORTED TO VOLTAGE
SPEED CONTROL SW SIG CKT OPEN PCM TO CLOCKSPRING
SW GRD CK OPEN AT CLOCKSPRING
SPEED CONTROL SWITCH GROUND CIRCUIT OPEN CLOCKSPRING TO S/C SWITCH
CLOCKSPRING SHORTED TO GROUND
NTC-S/C SIGNAL CIRCUIT SHORTED TO S/C SW GROUND
NTC-S/C SWITCH SIGNAL CIRCUIT SHORTED TO GROUND
CHECK S/C SWITCH
PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition off. Inspect the throttle cable and linkage for any binding or damage. Is the cable or linkage disconnected or damaged? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 2	SPEED CONTROL
2	Start the engine. Allow engine to idle for 1 minute. Disconnect the vacuum supply line at the S/C servo. Check the vacuum supply at the S/C Servo. Is the vacuum supply OK? Yes → Go To 3 No → Repair the Speed Control Servo Vacuum Supply. Perform POWERTRAIN VERIFICATION TEST VER - 4.	SPEED CONTROL

*CHECKING SPEED CONTROL OPERATION WITH NO DTC'S PRESENT — Continued

TEST	ACTION	APPLICABILITY
3	With the DRBIII®, read the S/C DENIED status. Road test the Vehicle at speeds over 56 kmh (35 MPH) and attempt to set the Speed Control. The following items will not allow the Speed Control to set. The last or most recent cause for Speed Control not to set is indicated by the DENIED status. If ON/OFF Denied message is indicated, the PCM does not see an ON signal from the S/C Switch. If SPEED Denied message is indicated, the Vehicle Speed as seen by the Powertrain Control Module is not greater than 36 MPH. If RPM Denied message is indicated, the Engine RPM is excessively high. If BRAKE Denied message is indicated, the Brake Switch Sense Circuit is open indicating to the PCM that the Brakes are applied. The Sense Circuit is grounded through the Brake Pedal Switch when the brakes are released. If P/N Denied message is indicated, Park/Neutral Switch Sense Circuit is grounded indicating to PCM that Transmission is not in gear. The Sense Circuit is grounded through the P/N Switch when Transmission is in Park or Neutral. If RPM/SPD Denied message is indicated, the PCM senses excessive Engine RPM for a given Vehicle speed. If SOL FLT Denied message is indicated, the Powertrain Control Module senses a Servo Solenoid Circuit trouble code that is maturing or set in memory. Was there a S/C DENIED message seen during road test and DRBIII® monitoring? Yes → Go To 4 No → Go To 5	SPEED CONTROL
4	Turn the ignition on. With the DRBIII® in Inputs/Outputs, read the PARK NEUTRAL POSIT state. While observing the display, move the Gear Selector to DRIVE. Does the DRBIII® display D/R? Yes → Go To 5 No → Refer to the Transmission category and perform the Checking Park/Neutral Switch Operation symptom. Perform POWERTRAIN VERIFICATION TEST VER - 4.	SPEED CONTROL
5	Turn the ignition off. Disconnect the Speed Control Switch harness connector. Remove the ASD relay and connect a jumper wire between cavity 30 and cavity 87. Turn the ignition on. Measure the voltage of the Speed Control Switch Sense circuit in the Speed Control Switch connector. Is the voltage above 6.0 volts? Yes → Repair the Speed Control Switch Signal Circuit for a short to voltage. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 6	SPEED CONTROL

*CHECKING SPEED CONTROL OPERATION WITH NO DTC'S PRESENT — Continued

TEST	ACTION	APPLICABILITY
6	Turn the ignition off. Disconnect the Clockspring harness connector (instrument panel harness side). Disconnect the PCM harness connector. Measure the resistance of the Speed Control Switch Signal circuit from the PCM to the Clockspring Connector. Is the resistance below 5.0 ohms? Yes → Go To 7 No → Repair open Speed Control Switch Signal circuit PCM to Clockspring. Perform POWERTRAIN VERIFICATION TEST VER - 4.	SPEED CONTROL
7	Turn the ignition off. Disconnect the Clockspring harness connector (Instrument Panel harness side). Using a 12-volt Test Light connected to 12-volts, check the Speed Control Switch Ground circuit at the Clockspring connector. Is the test light illuminated and bright? Yes → Go To 8 No → Repair open Speed Control Switch ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 4.	SPEED CONTROL
8	Turn the ignition off. Disconnect the Speed Control Switch harness connector. Disconnect the Clockspring harness connector (Instrument Panel side). Measure the resistance of the Speed Control Switch Ground circuit between the Clockspring connector and the Speed Control Switch connector. Is the resistance below 5.0 ohms? Yes → Go To 9 No → Repair open ground circuit from Clockspring to S/C Switch. Perform POWERTRAIN VERIFICATION TEST VER - 4.	SPEED CONTROL
9	Disconnect the S/C Switch harness connector. Turn the ignition on. With the DRBIII® in Sensors, read and note the S/C SWITCH voltage. Turn the ignition off. Disconnect the Clockspring harness connector (instrument panel wiring side). Turn the ignition on. With the DRBIII® in Sensors, read the S/C Switch volts. Did the S/C Switch volts change to 5.0 volts? Yes → Replace the Clockspring. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 10	SPEED CONTROL
10	Turn the ignition off. Disconnect the Speed Control Switch harness connector. Disconnect the PCM harness connectors. Measure the resistance between the S/C Switch Signal Circuit and the S/C Switch Ground circuit at the Speed Control Switch connector. Is the resistance below 5.0 ohms? Yes → Repair the short between the S/C Switch Signal circuit and the S/C Switch Ground. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 11	SPEED CONTROL

*CHECKING SPEED CONTROL OPERATION WITH NO DTC'S PRESENT — Continued

TEST	ACTION	APPLICABILITY
11	Turn the ignition off. Disconnect the Speed Control Switch harness connector. Disconnect the PCM harness connectors. Measure the resistance between ground and the Speed Control Switch Signal circuit at the S/C Switch connector. Is the resistance below 5.0 ohms? Yes → Repair S/C Switch Signal circuit for a short to ground. Perform POWERTRAIN VERIFICATION TEST VER - 4. No → Go To 12	SPEED CONTROL
12	Turn the ignition on. With the DRBIII® in Sensors, read and record the Speed Control Switch volts while pressing and releasing the ON/OFF, COAST/SET, ACC/RES and CANCEL switches. Switch: ON/OFF 1.02-1.45 COAST/SET 2.14-2.59 ACC/RES 3.06-3.76 Cancel 0.00-0.76 No button pushed 4.18-4.94 Did the Speed Control Switch volts fall within the ranges in the above specifications? Yes → Test Complete. No → Replace the Speed Control Switch. Perform POWERTRAIN VERIFICATION TEST VER - 4.	SPEED CONTROL

Symptom:
*ENGINE CRANKS DOES NOT START

POSSIBLE CAUSES
FUEL FILTER/PRESSURE REGULATOR (HIGH)
FUEL PUMP CAPACITY (VOLUME) OUT OF SPECS
NO START PRE-TEST
POWERTRAIN FUSES OPEN
RESTRICTED FUEL SUPPLY LINE
FUEL PUMP RELAY OUTPUT CIRCUIT OPEN
FUSED B+ CIRCUIT TO FUEL PUMP RELAY OPEN/HIGH RESISTANCE
OPEN/HIGH RESISTANCE IN THE FUEL PUMP GROUND CIRCUIT
FUEL PUMP INLET STRAINER PLUGGED
FUEL PUMP MODULE
FUEL PUMP MODULE
FUEL PUMP RELAY

TEST	ACTION	APPLICABILITY
1	**Note: The following list of items must be checked before continuing with any no start tests.** The battery must be fully charged and in good condition. A low charged battery may produce invalid test results. If the battery is low, charge the battery and then attempt to start the vehicle by cranking the engine for 15 seconds, 3 consecutive times. This will allow any DTC's to set that may have been erased due to a dead battery. Ensure the Powers and Ground to the PCM are ok. Make sure the PCM communicates with the DRB and that there are no DTC's stored in the PCM memory. If the PCM reports a No Response condition, refer to the Communication category for the proper tests. Read the PCM DTC's with the DRB. If any DTC's are present, they must be repaired before continuing with any other No Start diagnostic tests. Refer to the Symptom list for the related P-code that is reported by the PCM. Ensure that the PCI bus is functional. Attempt to communicate with the Instrument Cluster and SKIM, If you are unable to establish communicate refer to the Communication category for the proper symptoms. The Sentry Key Immoblilizer System must be operating properly. Check for proper communication with the DRB and check for DTC's that may be stored in the Sentry Key Immobilizer Module (SKIM). repair the DTC(s) before continuing. If no DTC's are found, using the DRB select Clear PCM (Batt Disconnect). Crank the engine several times. Using the DRB, read DTC's. If a DTC is present perform the DTC diagnostics before continuing. Were any problems found? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Go To 2	All

*ENGINE CRANKS DOES NOT START — Continued

TEST	ACTION	APPLICABILITY
2	Check for any open fuses in the PDC or Fuse Block that may be related to the No Start condition. Are any of the fuses open? Yes → Using the wiring diagram/schematic as a guide, inspect the wiring and connectors, repair as necessary. Replace the Fuse. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Go To 3	All
3	Turn the ignition on. With the DRBIII®, actuate the ASD Fuel System test. **Note: It may be necessary to use a mechanics stethoscope in the next step.** Listen for fuel pump operation at the fuel tank. Does the Fuel Pump operate? Yes → Go To 4 No → Go To 9 **Caution: Stop All Actuations.**	All
4	Turn the ignition off. **Warning: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.** Install a fuel pressure gauge. Turn the ignition on. With the DRB, actuate the ASD Fuel System test and observe the fuel pressure gauge. **NOTE: Fuel pressure specification is 400 KPa +/- 34 KPa (58 psi +/- 5 psi).** Choose a conclusion that best matches your fuel pressure reading. Below Specification Go To 5 Within Specification Go To 8 Above Specification Check the fuel return line for kinks or restrictions. If OK, replace the fuel filter/pressure regulator. Perform POWERTRAIN VERIFICATION TEST VER - 5. **Caution: Stop All Actuations.**	All

*ENGINE CRANKS DOES NOT START — Continued

TEST	ACTION	APPLICABILITY
5	Turn the ignition off. **Warning: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.** Raise vehicle on hoist, and disconnect the fuel pressure line at the fuel pump module. Install special 5/16″ fuel line adapter tool #6539 between disconnected fuel line and the fuel pump module. Attach a fuel pressure test gauge to the ″T″ fitting on tool #6539. Turn the ignition on. With the DRB, actuate the ASD Fuel System test and observe the fuel pressure gauge. **Note: Fuel pressure specification is 400 KPa +/- 34 KPa (58 psi +/- 5 psi).** Is the fuel pressure within specification now? Yes → Repair/replace fuel supply line as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 6 **Caution: Stop All Actuations.**	All
6	Turn the ignition off. **Warning: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose,fitting or line, the fuel system pressure must be released.** Remove the Fuel Pump Module and inspect the Fuel Inlet Strainer. Is the Fuel Inlet Strainer plugged? Yes → Replace the Fuel Pump Inlet Strainer. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 7	All
7	If there are no possible causes remaining, view repair. Repair Replace the Fuel Pump Module. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

*ENGINE CRANKS DOES NOT START — Continued

TEST	ACTION	APPLICABILITY
8	**Note: The fuel pressure must be within specification before continuing.** Turn the ignition off. **Warning: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.** Disconnect the fuel supply line at the fuel rail. Connect fuel line adapter #6539(5/16″) or #6631(3/8″) to the disconnected fuel supply line. Insert the other end of the adapter into a graduated container. **Caution: Do not operate the fuel pump for more than 7 seconds in the next step. Fuel pump module reservoir may run empty and damage to the fuel pump will result.** **Note: Specification: A good fuel pump will deliver at least 1/4 liter (1/2 pint) of fuel in 7 seconds.** Turn the ignition on. With the DRB, actuate the ASD Fuel System test for 7 seconds. Is the fuel pump capacity within specification? Yes → Test Complete. No → Check for a kinked/damaged fuel supply line between the fuel tank and fuel rail. If OK, replace the fuel pump module. Perform POWERTRAIN VERIFICATION TEST VER - 5. **Caution: Stop All Actuations.**	All
9	Turn the ignition off. Disconnect the fuel pump module harness connector. **Note: Check connectors - It is critical that the connector is free from any signs of corrosion or deformities - Clean/repair as necessary.** Using a test light connected to battery voltage, probe the fuel pump ground circuit at the fuel pump module harness connector. Does the test light illuminate brightly? Yes → Go To 10 No → Repair the open/high resistance in the fuel pump ground circuit. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
10	Turn the ignition off. Disconnect the fuel pump module harness connector. **Note: Check connectors - It is critical that the connector is free from any signs of corrosion or deformities - Clean/repair as necessary.** Turn the ignition on. With the DRBIII®, actuate the ASD Fuel System test. Using a 12 volt test light connected to ground, probe the fuel pump relay output circuit at the fuel pump module harness connector. Does the test light illuminate brightly? Yes → Go To 11 No → Go To 12 **Caution: Stop All Actuations.**	All
11	If there are no possible causes remaining, view repair. Repair Replace the Fuel Pump Module. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

*ENGINE CRANKS DOES NOT START — Continued

TEST	ACTION	APPLICABILITY
12	Turn the ignition off. Remove the fuel pump relay from the PDC. **Note: Check connectors - It is critical that the connector is free from any signs of corrosion or deformities - Clean/repair as necessary.** With a 12 volt test light connected to ground, probe the Fuel Pump Relay Fused B+ circuit at the Fuel Pump Relay harness connector. Is the voltage above 10.0 volts? Yes → Go To 13 No → Repair the open/high resistance in the fused B+ circuit. NOTE: Check for open fuse in the PDC. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
13	Turn the ignition off. Remove the fuel pump relay from the PDC. Disconnect the fuel pump module harness connector. **Note: Check connectors - It is critical that the connector is free from any signs of corrosion or deformities - Clean/repair as necessary.** Measure the resistance of the Fuel Pump Relay Output circuit from the relay connector to the fuel pump module connector. Is the resistance below 5.0 ohms? Yes → Go To 14 No → Repair the open fuel pump relay output circuit. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
14	If there are no possible causes remaining, view repair. Repair Replace the fuel pump relay. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

Symptom:

***NO CRANK CONDITION**

POSSIBLE CAUSES
STARTER RELAY (R)
REPAIR MECHANICAL CONDITION
BATTERY CIRCUIT RESISTANCE TOO HIGH
CLUTCH INTERLOCK SIGNAL OPEN
GROUND CIRCUIT OPEN
CLUTCH INTERLOCK/UPSTOP SWITCH
STARTER RELAY OUTPUT CIRCUIT OPEN
PCM (CLUTCH INTERLOCK CIRCUIT)
STARTER RELAY
FUSED B(+) CIRCUIT OPEN
IGNITION SWITCH OUTPUT CIRCUIT OPEN
PARK/NEUTRAL SWITCH SENSE CIRCUIT OPEN
STARTER RELAY CONTROL CIRCUIT OPEN
STARTER
STARTER MOTOR RELAY

TEST	ACTION	APPLICABILITY
1	Turn the engine over by hand to ensure the engine is not seized. Is the engine able to turn over? Yes → If 5SPD MANUAL TRANS, Go To 2 Else, Go To 3 No → Repair the mechanical condition preventing the starter motor from cranking. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
2	Using the DRB, monitor the Clutch Switch status in Input/Outputs. Depress the Clutch Pedal completely to the floor and release all the way up several times. Did the Clutch Switch state change from Open when released to Closed when fully depressed? Yes → Go To 4 No → Go To 12	5SPD MANUAL TRANS

*NO CRANK CONDITION — Continued

TEST	ACTION	APPLICABILITY
3	Turn ignition off. Place gear selector in park or neutral position. Disconnect the Starter Relay. With an Ohmmeter, measure the P/N Position Switch Sense Circuit in the Starter Relay Connector to ground. Is the resistance below 5.0 ohms? Yes → Go To 4 No → Repair the open Park/Neutral Switch Sense Circuit between Starter Relay and splice. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
4	Turn ignition off. Check the Battery Cables for high resistance. (Use service procedure) Did either Battery Circuit have a voltage drop greater than 0.2 volt? Yes → Repair the Battery Circuit for high resistance. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Go To 5	All
5	Turn ignition off. Disconnect the Starter Relay. **Warning: The Parking Brake must be on and the Transmission must be in park for a vehicle equipped with an automatic transmission or the clutch pedal depressed for a vehicle equipped with a manual transmission.** **Warning: The engine may be cranked in the next step. Keep away from moving engine parts.** Briefly connect a jumper wire between Starter Rly B(+) and Output Circuits. Did the Starter Motor crank the engine? Yes → Go To 6 No → Go To 9	All
6	Turn the ignition off. Disconnect the Starter Relay. Turn ignition on. Using a 12-volt test light, check the Ignition Switch Output Circuit at the Starter Relay Connector. While observing 12-volt test light, hold ignition key in the start position. Is the light illuminated and bright? Yes → Go To 7 No → Repair the Ignition Switch Output Circuit for an open or high resistance. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
7	Turn ignition off. Disconnect the Starter Relay. Disconnect the PCM. With an Ohmmeter, measure the Starter Relay Control Circuit from the Relay to the PCM. Is the resistance below 5.0 ohms? Yes → Go To 8 No → Repair the open Starter Relay Control Circuit. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All

*NO CRANK CONDITION — Continued

TEST	ACTION	APPLICABILITY
8	Turn the ignition off. Install a substitute Relay in place of the Starter Motor Relay. Attempt to start the vehicle. Does the engine crank over? Yes → Replace the Starter Motor Relay. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Replace the Powertrain Control Module. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
9	Turn ignition off. Disconnect the Starter Relay. Disconnect the Starter Relay Output Wire from the Starter Solenoid. Using an ohmmeter, measure the resistance of the Starter Relay Output Circuit from the Relay to the Solenoid Connector. Is the resistance below 5.0 ohms? Yes → Go To 10 No → Repair open Starter Relay Output Ckt. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
10	Turn ignition off. Disconnect the Starter Relay. Using a 12-volt test light, check the Fused B(+) Circuit at the Starter Relay. Is the light illuminated and bright? Yes → Go To 11 No → Repair the Fused B(+) Circuit for an open or high resistance. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
11	If there are no possible causes remaining, view repair. Repair Replace the Start Motor. Perform POWERTRAIN VERIFICATION TEST VER - 1.	All
12	Turn the ignition off. Disconnect the Clutch Interlock/Upstop Switch harness connector. Disconnect the PCM harness connectors. Measure the resistance of the Clutch Interlock Switch Signal circuit. Is the resistance below 5.0 ohms? Yes → Go To 13 No → Repair the Clutch Interlock Switch Signal circuit for an open. Perform TRANSMISSION DTC VERIFICATION TEST.	5SPD MANUAL TRANS
13	Turn the ignition off. Disconnect the Clutch Interlock/Upstop Switch harness connector. Using a 12-volt Test Light connected to 12-volts, check the Clutch Interlock/Upstop Switch Ground circuit. Did the test light illuminate brightly? Yes → Go To 14 No → Repair the Clutch Interlock/Upstop Switch Ground circuit for an open or high resistance. Perform TRANSMISSION DTC VERIFICATION TEST.	5SPD MANUAL TRANS

*NO CRANK CONDITION — Continued

TEST	ACTION	APPLICABILITY
14	Disconnect the Clutch Interlock/Upstop Switch harness connector. Connect a jumper wire between the Clutch Interlock/Upstop Switch Ground circuit and the Clutch Interlock Switch Signal circuit in the Clutch Interlock/Upstop Switch harness connector. Using the DRB, monitor the Clutch Switch status in Input/Outputs. Did the Clutch Switch status change to Closed? Yes → Replace the Clutch Interlock/Upstop Switch. Perform TRANSMISSION DTC VERIFICATION TEST. No → Go To 15	5SPD MANUAL TRANS
15	If there are no possible causes remaining, view repair. Repair Replace the Powertrain Control Module. Perform TRANSMISSION DTC VERIFICATION TEST.	5SPD MANUAL TRANS

Symptom:
*START AND STALL CONDITION

POSSIBLE CAUSES
FUEL FILTER/PRESSURE REGULATOR (HIGH)
CHECKING DTCS
CHECKING SKIM
FUEL PUMP CAPACITY (VOLUME) OUT OF SPECS
OTHER POSSIBLE CAUSES FOR START & STALL
RESTRICTED FUEL SUPPLY LINE
TPS VOLTAGE CHANGE NOT SMOOTH
TPS VOLTAGE GREATER THAN 0.92 VOLTS WITH THROTTLE CLOSED
FUEL PUMP INLET STRAINER PLUGGED
FUEL PUMP MODULE
ECT SENSOR (OUT OF CALIBRATION)
ECT WIRING HARNESS INTERMITTENT

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRB, read the DTCs. Are any DTCs present? Yes → Refer to the Driveability Category and perform the appropriate symptom. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 2	All
2	Turn the ignition on. With the DRBIII®, read TPS VOLTS. While monitoring the DRBIII®, slowly open and close the Throttle. Is the voltage change smooth? Yes → Go To 3 No → Replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
3	Turn the ignition on. With the DRB, read TPS VOLTS. Throttle must be against stop. Is the voltage 0.92 or less with the Throttle closed? Yes → Go To 4 No → Check for a binding throttle condition. If OK, replace the Throttle Position Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

*START AND STALL CONDITION — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition on. **NOTE: If you are unable to communicate with the SKIM, refer to the Communication Category and perform the appropriate symptom.** With the DRB, read the SKIM codes. Are there any SKIM DTCs? Yes → Refer to the Category list for problems related to SKIS. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 5	All
5	**Note: For this test to be valid, the thermostat must be operating correctly.** **Note: This test works best if performed on a cold engine (cold soaked).** Turn the ignition on. With the DRB, read the ENG COOLANT TMP DEG value. If the engine was allowed to sit overnight (cold soak), the engine temperature value should be a sensible value that is close to the surrounding temperature (ambient temperature). **Note: If engine coolant temperature is above 82° C (180° F), allow the engine to cool until 65° C (150° F) is reached.** Start the engine. During engine warm-up, monitor the ENG COOLANT TMP DEG value. The temp deg value change should be a smooth transition from start up to normal operating temp 82° C (180° F). The value should reach at least 82° C (180° F). Did the ENG COOLANT TMP DEG value increase smoothly and did it reach at least 82° C (180° F)? Yes → Go To 6 No → Replace the Engine Coolant Temperature Sensor. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All
6	Turn the ignition off. **NOTE: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any Technical Service Bulletins (TSB) that may apply.** Perform a wiggle test on the related wiring harnesses with the engine running. Watch for the Good Trip Counter to change to 0. Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 7	All
7	The following additional items should be checked as a possible cause for a start and stall condition. Refer to any Technical Service Bulletins (TSB's) that may apply to the symptom. Fuel must be free of contamination. The exhaust system must be free of any restrictions. The engine compression must be within specifications. The engine valve timing must be within specifications. The engine must be free from vacuum leaks. The throttle body must be free of carbon buildup and dirt. Do any of the above conditions exist? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 8	All

*START AND STALL CONDITION — Continued

TEST	ACTION	APPLICABILITY
8	Turn the ignition off. **Warning: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.** Install a fuel pressure gauge. Turn the ignition on. With the DRB, actuate the ASD Fuel System test and observe the fuel pressure gauge. **NOTE: Fuel pressure specification is 399 KPa +/- 34 KPa (58 psi +/- 5 psi).** Choose a conclusion that best matches your fuel pressure reading. Below Specification Go To 9 Within Specification Go To 12 Above Specification Check the fuel return line for kinks or restrictions. If OK, replace the fuel filter/pressure regulator. Perform POWERTRAIN VERIFICATION TEST VER - 5. **Caution: Stop All Actuations.**	All
9	Turn the ignition off. **Warning: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.** Raise vehicle on hoist, and disconnect the fuel pressure line at the fuel pump module. Install special 5/16″ fuel line adapter tool #6539 between disconnected fuel line and the fuel pump module. Attach a fuel pressure test gauge to the ″T″ fitting on tool #6539. Turn the ignition on. With the DRB, actuate the ASD Fuel System test and observe the fuel pressure gauge. **Note: Fuel pressure specification is 399 KPa +/- 34 KPa (58 psi +/- 5 psi).** Is the fuel pressure within specification now? Yes → Repair/replace fuel supply line as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 10 **Caution: Stop All Actuations.**	All
10	Turn the ignition off. **Warning: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose,fitting or line, the fuel system pressure must be released.** Remove the Fuel Pump Module and inspect the Fuel Inlet Strainer. Is the Fuel Inlet Strainer plugged? Yes → Replace the Fuel Pump Inlet Strainer. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Go To 11	All
11	If there are no possible causes remaining, view repair. Repair Replace the Fuel Pump Module. Perform POWERTRAIN VERIFICATION TEST VER - 5.	All

*START AND STALL CONDITION — Continued

TEST	ACTION	APPLICABILITY
12	**Note: The fuel pressure must be within specification before continuing.** Turn the ignition off. **Warning: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.** Disconnect the fuel supply line at the fuel rail. Connect fuel line adapter #6539(5/16″) or #6631(3/8″) to the disconnected fuel supply line. Insert the other end of the adapter into a graduated container. **Caution: Do not operate the fuel pump for more than 7 seconds in the next step. Fuel pump module reservoir may run empty and damage to the fuel pump will result.** **Note: Specification: A good fuel pump will deliver at least 1/4 liter (1/2 pint) of fuel in 7 seconds.** Turn the ignition on. With the DRB, actuate the ASD Fuel System test for 7 seconds. Is the fuel pump capacity within specification? Yes → Test Complete. No → Check for a kinked/damaged fuel supply line between the fuel tank and fuel rail. If OK, replace the fuel pump module. Perform POWERTRAIN VERIFICATION TEST VER - 5. **Caution: Stop All Actuations.**	All

Symptom:
P0833-CLUTCH RELEASED SWITCH CIRCUIT

When Monitored and Set Condition:

P0833-CLUTCH RELEASED SWITCH CIRCUIT

When Monitored: During crank or when engine speed is between 1500-2880 RPM and vehicle speed is greater than 40 km/h (25 MPH).

Set Condition: A short to ground is detected during startup. An open circuit is detected when engine speed is between 1500-2880 RPM, vehicle speed is >40 km/h (25 MPH), and delta throttle is >1.1 volts for 4 seconds. This cycle must repeat 5 times per trip for 2 trips.

POSSIBLE CAUSES
WIRING HARNESS INTERMITTENT
GROUND CIRCUIT OPEN
CLUTCH INTERLOCK/UPSTOP SWITCH
CLUTCH UPSTOP SIGNAL CIRCUIT OPEN
CLUTCH UPSTOP SIGNAL SHORTED TO GROUND
POWERTRAIN CONTROL MODULE (UPSTOP SWITCH)

TEST	ACTION	APPLICABILITY
1	Using the DRB, monitor the Clutch Upstop Switch status in Input/Outputs. Depress the Clutch Pedal completely to the floor and release all the way up several times. Did the Clutch Upstop Switch state change from Closed when released to Open when fully depressed? Yes → Go To 2 No → Go To 3	5SPD MANUAL TRANS
2	Turn the ignition off. **NOTE: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **NOTE: Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **NOTE: Refer to any Technical Service Bulletins (TSB) that may apply.** Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform TRANSMISSION DTC VERIFICATION TEST. No → Test Complete.	5SPD MANUAL TRANS

P0833-CLUTCH RELEASED SWITCH CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the Clutch Interlock/Upstop Switch harness connector. Using a 12-volt Test Light connected to 12-volts, check the Clutch Interlock/Upstop Switch Ground circuit. Did the test light illuminate brightly? Yes → Go To 4 No → Repair the Clutch Interlock/Upstop Switch Ground circuit for an open or high resistance. Perform TRANSMISSION DTC VERIFICATION TEST.	5SPD MANUAL TRANS
4	Turn the ignition off. Disconnect the Clutch Interlock/Upstop Switch harness connector. Disconnect the PCM harness connectors. Measure the resistance of the Clutch Upstop Signal circuit. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the open Clutch Upstop Signal Circuit. Perform TRANSMISSION DTC VERIFICATION TEST.	5SPD MANUAL TRANS
5	Turn the ignition off. Disconnect the Clutch Interlock/Upstop Switch harness connector. Disconnect the PCM harness connectors. Measure the resistance between ground and the Clutch Upstop Switch Signal circuit. Is the resistance above 100k ohms? Yes → Go To 6 No → Repair the Clutch Upstop Switch Signal circuit for a short to ground. Perform TRANSMISSION DTC VERIFICATION TEST.	5SPD MANUAL TRANS
6	Disconnect the Clutch Interlock/Upstop Switch harness connector. Connect a jumper wire between the Clutch Interlock/Upstop Switch Ground circuit and the Clutch Upstop Switch Signal circuit in the Clutch Interlock/Upstop Switch harness connector. Using the DRB, monitor the Clutch Upstop Switch status in Input/Outputs. Did the Clutch Upstop Switch status change from Open (jumper disconnected) to Closed? Yes → Replace the Clutch Interlock/Upstop Switch. Perform TRANSMISSION DTC VERIFICATION TEST. No → Go To 7	5SPD MANUAL TRANS
7	If there are no possible causes remaining, view repair. Repair Replace the Powertrain Control Module. Perform TRANSMISSION DTC VERIFICATION TEST.	5SPD MANUAL TRANS

Symptom:
P1899-P/N SWITCH STUCK IN PARK OR IN GEAR

When Monitored and Set Condition:

P1899-P/N SWITCH STUCK IN PARK OR IN GEAR

When Monitored: Continuously with the transmission in Park, Neutral, or Drive and NOT in Limp-in mode.

Set Condition: This code will set if the PCM detects an incorrect Park/Neutral switch state for a given mode of vehicle operation.

POSSIBLE CAUSES
INTERMITTENT PARK/NEUTRAL SWITCH
TRANSMISSION RANGE SENSOR
P/N POSITION SWITCH SENSE CIRCUIT OPEN
P/N POSITION SWITCH SENSE CIRCUIT SHORTED TO GROUND
POWERTRAIN CONTROL MODULE (P/N POSITION SWITCH)

TEST	ACTION	APPLICABILITY
1	With the DRB, read PCM DTCs. Is the Good Trip Counter for P-1899 displayed and equal to 0? Yes → Go To 2 No → Go To 7	All
2	Turn the ignition on. With the DRB, read the Park/Neutral Position Switch input state. While moving the gear selector through all gear positions (Park to 1 and back to Park), watch the DRB display. Did the DRB display show P/N and D/R in the correct gear positions? Yes → Test Complete. No → Go To 3	All
3	Turn the ignition off. Disconnect the PCM harness connectors. Disconnect the Transmission Range Sensor harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the P/N Position Switch Sense circuit. Is the resistance below 5.0 ohms? Yes → Go To 4 No → Repair the P/N Position Switch Sense circuit for an open. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All

P1899-P/N SWITCH STUCK IN PARK OR IN GEAR — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the PCM harness connectors. Disconnect the Transmission Range Sensor harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance between ground and the P/N Position Switch Sense circuit. Is the resistance above 100 kohms? Yes → Go To 5 No → Repair the P/N Position Switch Sense circuit for a short to ground. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All
5	Turn the ignition off. Disconnect the PCM harness connectors. Move the Gear selector through all gear positions, from Park to 1st and back. While moving the gear selector through each gear, measure the resistance between ground and the P/N Position Switch Sense circuit. Did the resistance change from above 10.0 ohms to below 10.0 ohms? Yes → Go To 6 No → Replace the Transmission Range Sensor. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All
6	If there are no possible causes remaining, view repair. Repair Replace the Powertrain Control Module. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All
7	At this time, the conditions required to set the DTC are not present. **NOTE: Use the Freeze Frame Data to help duplicate the conditions that set the DTC. Pay particular attention to the DTC set conditions, such as, VSS, MAP, ECT, and Load.** **NOTE: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **NOTE: Visually inspect the related wiring harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **NOTE: Refer to any technical service bulletins (TSB) that may apply.** Were any problems found? Yes → Repair as necessary. Perform POWERTRAIN VERIFICATION TEST VER - 5. No → Test Complete.	All

Symptom:
*CHECKING PARK/NEUTRAL SWITCH OPERATION

POSSIBLE CAUSES
TRANSMISSION RANGE SENSOR
P/N POSITION SWITCH SENSE CIRCUIT OPEN
P/N POSITION SWITCH SENSE CIRCUIT SHORTED TO GROUND
POWERTRAIN CONTROL MODULE (P/N POSITION SWITCH)

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRB, read the Park/Neutral Position Switch input state. While moving the gear selector through all gear positions (Park to 1 and back to Park), watch the DRB display. Did the DRB display show P/N and D/R in the correct gear positions? Yes → Test Complete. No → Go To 2	All
2	Turn the ignition off. Disconnect the PCM harness connectors. Disconnect the Transmission Range Sensor harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the P/N Position Switch Sense circuit. Is the resistance below 5.0 ohms? Yes → Go To 3 No → Repair the P/N Position Switch Sense circuit for an open. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All
3	Turn the ignition off. Disconnect the PCM harness connectors. Disconnect the Transmission Range Sensor harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance between ground and the P/N Position Switch Sense circuit. Is the resistance above 100 kohms? Yes → Go To 4 No → Repair the P/N Position Switch Sense circuit for a short to ground. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All
4	Turn the ignition off. Disconnect the PCM harness connectors. Move the Gear selector through all gear positions, from Park to 1st and back. While moving the gear selector through each gear, measure the resistance between ground and the P/N Position Switch Sense circuit. Did the resistance change from above 10.0 ohms to below 10.0 ohms? Yes → Go To 5 No → Replace the Transmission Range Sensor. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All

*CHECKING PARK/NEUTRAL SWITCH OPERATION — Continued

TEST	ACTION	APPLICABILITY
5	If there are no possible causes remaining, view repair. Repair Replace the Powertrain Control Module. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1.	All

Symptom List:

ANTENNA FAILURE
COP FAILURE
EEPROM FAILURE
INTERNAL FAULT
RAM FAILURE
SERIAL LINK INTERNAL FAULT
STACK OVERFLOW FAILURE

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be ANTENNA FAILURE.

When Monitored and Set Condition:

ANTENNA FAILURE

When Monitored: Every 250 milliseconds with the ignition on.

Set Condition: The SKIM's microcontroller determines that an antenna circuit fault occurred for 2.0 consecutive seconds.

COP FAILURE

When Monitored: With the ignition on.

Set Condition: The COP timer is not reset by the microcontroller every 65.5 milliseconds.

EEPROM FAILURE

When Monitored: With the ignition on.

Set Condition: When the value written to EEPROM memory does not equal the value read back after the write operation.

INTERNAL FAULT

When Monitored: With the ignition on.

Set Condition: The SKIM has detected a fault during an internal self test.

RAM FAILURE

When Monitored: With the ignition on.

Set Condition: The RAM fails a test that checks the RAM's ability to retain memory.

SERIAL LINK INTERNAL FAULT

When Monitored: With the ignition on.

Set Condition: The SKIM fails an internal J1850 communication self test.

STACK OVERFLOW FAILURE

When Monitored: With the ignition on.

Set Condition: The microcontroller has exceeded its stack space limit.

ANTENNA FAILURE — Continued

POSSIBLE CAUSES
SKIM INTERNAL DTC FAILURE

TEST	ACTION	APPLICABILITY
1	**Note: This trouble code indicates an internal SKIM fault.** With the the DRB, read and record SKIM DTC's and then erase SKIM DTC's Perform 10 key cycles, leaving the key on for a minimum of 90 seconds per cycle. With the DRB, read SKIM trouble codes. Did the same SKIM DTC return? Yes → Replace and program the Sentry Key Immobilizer Module in accordance with the Service Information. Perform SKIS VERIFICATION. No → Test Complete.	All

Symptom List:

PCM STATUS FAILURE
SERIAL LINK EXTERNAL FAULT

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be PCM STATUS FAILURE.

When Monitored and Set Condition:

PCM STATUS FAILURE

When Monitored: With the ignition ON.

Set Condition: This condition exists when a PCM STATUS message was not received from the PCM for at least 20.0 seconds.

SERIAL LINK EXTERNAL FAULT

When Monitored: At ignition ON, after ignition ON during any rolling code handshake that occurs with the PCM due to a SKIM reset or a PCM reset, or during 'Secret Key' transfers to the PCM.

Set Condition: This condition is set when the SKIM does not receive an expected bus message transmission acknowledgment from the PCM after 3 transmit attempts.

POSSIBLE CAUSES
INTERMITTENT WIRING HARNESS PROBLEM
WIRING HARNESS INSPECTION
SKIM/PCM

TEST	ACTION	APPLICABILITY
1	**Note: Ensure the PCM has proper powers and grounds before continuing.** Using the DRB III, read and record SKIM DTC's then erase SKIM DTC's. Turn the ignition off. Wait 2 minutes. Turn the ignition on. Using the DRB, read the codes. Does the DRB display the code that was previously erased? Yes → Go To 2 No → Go To 4	All

PCM STATUS FAILURE — Continued

TEST	ACTION	APPLICABILITY
2	Turn the ignition off. **NOTE: Visually inspect the related wiring harness and CCD/PCI Bus (whichever applicable) circuits. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any Technical Service Bulletins (TSB) that may apply.** Were any problems found? Yes → Repair as necessary. Perform SKIS VERIFICATION. No → Go To 3	All
3	**NOTE: Before proceeding it will be necessary to obtain the SKIM PIN number.** Turn the ignition on. Using the DRB III, display and erase all PCM and SKIM DTC's. Perform 5 key cycles leaving the key on for a minimum of 90 seconds per cycle. Using the DRB III, read SKIM DTC's. Does the code appear? Yes → Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Test Complete.	All
4	Turn the ignition off. **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any Technical Service Bulletins (TSB) that may apply.** Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform SKIS VERIFICATION. No → Test Complete.	All

Symptom List:

ROLLING CODE FAILURE
VIN MISMATCH

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be ROLLING CODE FAILURE.

When Monitored and Set Condition:

ROLLING CODE FAILURE

When Monitored: At ignition ON, after ignition ON during any rolling code handshake that occurs with the PCM due to a SKIM or a PCM reset.

Set Condition: This condition exists when a PCM STATUS message with a Valid Key status is not received by the SKIM within 3.5 seconds of transmitting the last Valid Key Code message to the PCM.

VIN MISMATCH

When Monitored: Monitored with the ignition on.

Set Condition: This condition exists when the VIN received from the PCM does not match the VIN stored in the SKIM's EEPROM.

POSSIBLE CAUSES
PCM
INTERMITTENT WIRING HARNESS PROBLEM
VERIFYING PCM VIN

TEST	ACTION	APPLICABILITY
1	Using the DRB, erase the codes. Turn the ignition off. Wait 10 seconds. Turn the ignition on and wait 2 minutes. Using the DRB, read the codes. Does the DRB display the code that was previously erased? Yes → Go To 2 No → Go To 4	All

ROLLING CODE FAILURE — Continued

TEST	ACTION	APPLICABILITY
2	**NOTE: Ensure that a VIN has been programmed into the PCM. If a VIN is not displayed, attempt to program the PCM with the correct vehicle VIN before continuing.** Turn the ignition on. Using the DRB, select Engine system from the main menu. Display and record the Vehicle Identification Number. Does the VIN recorded from the PCM match the VIN of the vehicle? Yes → Go To 3 No → Replace and program the Powertrain Control Module in accordance with the Service Information. Perform SKIS VERIFICATION.	All
3	Turn the ignition off. Replace and program the Sentry Key Immobilizer Module in accordance with the Service Information. Turn the ignition on. Using the DRB III, display and clear all PCM and SKIM DTC's. Perform 5 key cycles leaving the ignition on for 90 seconds per cycle. Using the DRB III, check for SKIM DTC's. Does the DRB III display the same DTC? Yes → Replace and program the Powertrain Control Module in accordance with the Service Information. Perform POWERTRAIN VERIFICATION TEST VER - 1. No → Test Complete.	All
4	Turn the ignition off. **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any Technical Service Bulletins (TSB) that may apply.** Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform SKIS VERIFICATION. No → Test Complete.	All

Symptom List:

TRANSPONDER (CYCLIC REDUNDANCY CHECK) CRC FAILURE
TRANSPONDER COMMUNICATION FAILURE
TRANSPONDER ID MISMATCH
TRANSPONDER RESPONSE MISMATCH

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be TRANSPONDER (CYCLIC REDUNDANCY CHECK) CRC FAILURE.

When Monitored and Set Condition:

TRANSPONDER (CYCLIC REDUNDANCY CHECK) CRC FAILURE

When Monitored: At ignition ON and during Key Programming Mode.

Set Condition: This condition exists when 5 consecutive transponder signal transmissions are sent to the SKIM with the correct message format but with invalid data.

TRANSPONDER COMMUNICATION FAILURE

When Monitored: At ignition ON and during Key Programming Mode.

Set Condition: This condition exists when the SKIM does not receive a transponder response after 8 consecutive transponder read attempts within 2.0 seconds of ignition on or during Key Programming Mode.

TRANSPONDER ID MISMATCH

When Monitored: At ignition ON and during Key Programming Mode.

Set Condition: This condition exists when the transponder ID read by the SKIM does not match any of the transponder ID's stored in the SKIM's memory.

TRANSPONDER RESPONSE MISMATCH

When Monitored: At ignition ON and during Key Programming Mode.

Set Condition: This condition exists when the transponder's crypto algorithm result fails to match the SKIM's result.

POSSIBLE CAUSES
REPLACE IGNITION KEY
CHECKING MULTIPLE KEY OPERATION
SKIM
INTERMITTENT WIRING HARNESS PROBLEM

TRANSPONDER (CYCLIC REDUNDANCY CHECK) CRC FAILURE — Continued

TEST	ACTION	APPLICABILITY
1	Using the DRB III, read and record SKIM DTC's. Using the DRB III, erase SKIM DTC's **NOTE: Perform the following test several times to ensure the DTC is current.** Turn the ignition off. Wait 10 seconds. Turn the ignition on. Using the DRB, read the codes. Does the DRB display the code that was previously erased? Yes → Go To 2 No → Go To 7	All
2	Are there multiple vehicle ignition keys available? Yes → Go To 3 No → Go To 4	All
3	**NOTE: Perform the following steps using one of the vehicle ignition keys. When finished, repeat the procedure using each of the other vehicle keys one at a time.** Using the DRB III erase SKIM DTC's. Turn the ignition off and wait ten seconds. Turn the ignition on and wait 10 seconds. Using the DRB III, read SKIM DTC's. Is the DTC present for all ignition keys. Yes → Replace the Sentry Key Immobilizer Module in accordance with the Service Information. Perform SKIS VERIFICATION. No → Replace the ignition key(s) that cause the SKIM DTC. Perform SKIS VERIFICATION.	All
4	Using the DRB, attempt to reprogram the ignition keys to the SKIM. Using the DRB, erase SKIM codes. Wait 10 seconds. Turn the ignition on. Using the DRB, read the SKIM codes. Does the code reset? Yes → Go To 5 No → Test Complete.	All
5	Replace the ignition key with a new key. Using the DRB, program the new ignition key to the SKIM. Using the DRB, erase SKIM codes. Turn the ignition off. Wait 10 seconds. Turn the ignition on. Using the DRB, read the codes. Does the code appear? Yes → Go To 6 No → Test Complete.	All

TRANSPONDER (CYCLIC REDUNDANCY CHECK) CRC FAILURE — Continued

TEST	ACTION	APPLICABILITY
6	If there are no possible causes remaining, view repair. Repair Replace and program the Sentry Key Immobilizer Module in accordance with the Service Information. Perform SKIS VERIFICATION.	All
7	Turn the ignition off. **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any Technical Service Bulletins (TSB) that may apply.** Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform SKIS VERIFICATION. No → Test Complete.	All

Verification Tests

41TE TRANSMISSION VERIFICATION TEST - VER 1	APPLICABILITY
1. Connect the DRBIII® to the Data Link Connector (DLC). 2. Reconnect any disconnected components. 3. With the DRBIII®, erase all Transmission DTC's, also erase the PCM DTC's. 4. With the DRBIII®, display transmission temperature. Start and run the engine until the transmission temperature is HOT (above 110 deg. F). 5. Check the transmission fluid and adjust if necessary. Refer to the Service information for the Fluid Fill procedure. **6. NOTE: If the Transmission Control Module or torque converter has been replaced or if the transmission has been repaired or replaced it is necessary to perform the DRBIII® Quick Learn Procedure and reset the "Pinion Factor"** 7. Road test the vehicle. With the DRBIII®, monitor the engine RPM. Make 15 to 20 1-2, 2-3, 3-4 upshifts. Perform these shifts from a standing start to 45 MPH with a constant throttle opening of 20 to 25 degrees. 8. Below 25 MPH, make 5 to 8 wide open throttle kickdowns to 1st gear. Allow at least 5 seconds each in 2nd and 3rd gear between each kickdown. 9. For a specific DTC, drive the vehicle to the Symptom's When Monitored/When Set conditions to verify the DTC repair. 10. Check for Diagnostic Trouble Codes (DTC's) during the road test. If a DTC sets during the road test , return to the Symptom list and follow the path. **11. NOTE: Erase P0700 DTC in the PCM to turn the MIL light off after making transmission repairs. This will turn the MIL off.** Were any Trouble Codes set during the road test? Yes → Refer to the Symptom List for appropriate diagnostic tests. Perform 41TE TRANSMISSION VERIFICATION TEST - VER 1. No → Repair is complete.	All

Verification Tests — Continued

BODY VERIFICATION TEST - VER 1	APPLICABILITY
1. Disconnect all jumper wires and reconnect all previously disconnected components and connectors. 2. If the Sentry Key Immobilizer Module (SKIM) or the Powertrain Control Module (PCM) were replaced, proceed to number 5. If the SKIM or PCM were not replaced, continue to the next number. 3. If the Remote Keyless Entry module was replaced, using the DRBIII® select ″Theft Alarm″ ″VTSS″ ″Miscellaneous″ and ″Configure Module″. If the vehicle is equipped with VTSS, use the DRB and enable VTSS. Program other options as necessary. 4. Using the DRBIII® program all RKE transmitters used with this vehicle. Proceed to number 12. 5. Obtain the Vehicle's unique PIN number assigned to it's original SKIM module from either the vehicle's invoice or from Chrysler's Customer Center (1-800-992-1997). 6. With the DRBIII, select THEFT ALARM, SKIM, MISCELLANEOUS and select ″Skim Module Replaced″ function. Enter the 4 digit PIN number to put SKIM in ″Access Mode″. 7. The DRBIII will prompt you through the following steps. (1) Program the country code into the SKIM's memory. (2) Program the vehicle's VIN number into the SKIM's memory. (3) Transfer the vehicle's Secret Key data from the PCM. 8. Once secured access mode is active, the SKIM will remain in that mode for 60 seconds. 9. Using the DRBIII, program all customer keys into the SKIM's memory. This requires that the SKIM be in secured access mode, using the 4 digit code. 10. Note: If the PCM is replaced, the unique Secret Key data must be transfered from the SKIM to the PCM. This procedure requires the SKIM to be placed in secured access mode using the 4-digit code. 11. Note: If 3 attempts are made to enter secured access mode using an incorrect PIN, secured access mode will be locked out for 1 hour which causes the DRBIII to display ″Bus +\- Signals Open″. To exit this mode, turn ignition to the ″Run″ pos. for 1 hour. 12. Ensure all accessories are turned off and the battery is fully charged. 13. Ensure that the Ignition is on, and with the DRBIII®, erase all Diagnostic Trouble Codes from ALL modules. Start the engine and allow it to run for 2 minutes and fully operate the system that was malfunctioning. 14. Turn the ignition off and wait 5 seconds. Turn the ignition on and using the DRBIII®, read DTC's from ALL modules. 15. If ANY codes are present, select the appropriate symptom from the Symptom List and continue diagnostics. If NO codes are present and the customers complaint cannot be duplicated, the repair is complete.	All

Verification Tests — Continued

POWERTRAIN VERIFICATION TEST VER - 1	APPLICABILITY
1. Inspect the vehicle to ensure that all engine components are properly installed and connected. Reassemble and reconnect components as necessary. 2. Inspect the engine oil for contamination. If it is contaminated, change the oil and filter. 3. Perform the steps 4 through 6 if the PCM has been replaced. Then proceed with the verification. If the PCM has not been replaced skip those steps and continue verification. 4. If PCM has been changed and correct VIN and mileage have not been programmed a DTC will be set in ABS and Air Bag modules. In addition, if vehicle is equipped with a Sentry Key Immobilizer Module (SKIM), Secret Key data must be updated to enable start. 5. For ABS and Air Bag systems: Enter correct VIN and Mileage in PCM. Erase codes in ABS and Air Bag modules. 6. For SKIM theft alarm: Connect DRB to data link conn. Go to Theft Alarm, SKIM, Misc. and place SKIM in secured access mode, by using the appropriate PIN code for this vehicle. Select Update the Secret Key data. Data will be transferred from SKIM to PCM. 7. Attempt to start the engine. 8. If the engine is unable to start, look for any Technical Service Bulletins that may relate to this condition. Return to Symptom List if necessary. 9. If the engine starts and stays running, the repair is now complete.	All

POWERTRAIN VERIFICATION TEST VER - 2	APPLICABILITY
1. Inspect the vehicle to ensure that all engine components are properly installed and connected. Reassemble and reconnect components as necessary. 2. If this verification procedure is being performed after a NO TROUBLE CODE repair, perform steps 3 and 4. 3. Check to see if the initial symptom still exists. If there are no trouble codes or the symptom no longer exists, the repair was successful and testing is complete. 4. If the initial or another symptom exists, the repair is not complete. Check all technical service bulletins or flash updates and return to Symptoms if necessary. 5. If this verification procedure is being performed after a TROUBLE CODE repair, perform steps 6 through 11. 6. Connect the DRB to the data link connector. Using the DRB erase any diagnostic trouble codes and reset all values. 7. If the PCM has been replaced, perform steps 8 through 10, then proceed with the verification. If the PCM has not been replaced, skip those steps and continue verification. 8. If PCM has been replaced and correct VIN and mileage have not been programmed, a DTC will be set in ABS and Air bag modules. In addition, if vehicle is equipped with a Sentry Key Immobilizer System (SKIS), Secret Key data must be updated to enable start. 9. For ABS and Air Bag systems: Enter correct VIN and Mileage in PCM. Erase codes in ABS and Air Bag modules. 10. For SKIS theft alarm: Connect DRB to data link conn. Go to Theft Alarm, SKIM, and Misc. Place SKIM in secured access mode by using the appropriate PIN code for this vehicle. Select Update the Secret Key data. Data will be transferred from SKIM to PCM. 11. Road test the vehicle. If the test is for an A/C DTC, ensure it is operating during the following test. Drive the vehicle for at least 5 minutes. 12. Drive the vehicle at least 64 kmh (40 mph). Ensure the trans shifts through all gears. At some point stop the vehicle, turn off the engine for at least 10 seconds. When finished read DTCs with the DRB. If a DTC has set, return to Symptoms and follow path. 13. If the original DTC did not return and there are no new DTCs, the repair was successful and testing is complete.	All

Verification Tests — Continued

POWERTRAIN VERIFICATION TEST VER - 3	APPLICABILITY
1. Inspect the vehicle to ensure that all engine components are properly installed and connected. Reassemble and reconnect components as necessary. 2. Connect the DRB to the Data Link Connector and erase the codes. 3. If the PCM has been replaced perform steps 4 through 6 then continue the verification. 4. If PCM has been changed and correct VIN and mileage have not been programmed, a DTC will be set in ABS and Air bag modules. In addition, if vehicle is equipped with a Sentry Key Immobilizer Module (SKIM), Secret Key data must be updated to enable start. 5. For ABS and Air Bag systems: Enter correct VIN and Mileage in PCM. Erase codes in ABS and Air Bag modules. 6. For SKIM theft alarm: Connect DRB to data link conn. Go to Theft Alarm, SKIM, Misc. and place SKIM in secured access mode, by using the appropriate PIN code for this vehicle. Select Update the Secret Key data. Data will be transferred from SKIM to PCM. 7. Ensure no other charging system problems remain by doing the following: Start the engine. Perform generator output per service manual. 8. Raise the engine speed to 2000 rpm for at least 30 seconds. 9. Allow the engine to idle. 10. Turn the engine off. 11. Turn the ignition key on. 12. With the DRB, read trouble code messages. 13. If repaired code has reset, or any other one has set, check all pertinent Technical Service Bulletins and return to Symptom List if necessary. 14. If there are no codes, the repair is now complete.	All

Verification Tests — Continued

POWERTRAIN VERIFICATION TEST VER - 4	APPLICABILITY
1. Inspect the vehicle to ensure that all engine components are properly installed and connected. Reassemble and reconnect components as necessary. 2. Connect the DRB to the data link connector and erase all codes. 3. If the PCM has been replaced, perform steps 4 through 6, then continue with the verification. 4. If PCM has been changed and correct VIN and mileage have not been programmed, a DTC will be set in ABS and Air bag modules. In addition, if vehicle is equipped with a Sentry Key Immobilizer Module (SKIM), Secret Key data must be updated to enable start. 5. For ABS and Air Bag systems: Enter correct VIN and Mileage in PCM. Erase codes in ABS and Air Bag modules. 6. For SKIM theft alarm: Connect DRB to data link conn. Go to Theft Alarm, SKIM, Misc. and place SKIM in secured access mode, by using the appropriate PIN code for this vehicle. Select Update the Secret Key data. Data will be transferred from SKIM to PCM. 7. Turn the speed control ON (if equipped, cruise light will be on). 8. Depress and release the SET Switch. If the speed control did not engage, the repair is not complete. Check for TSBs that pertain to speed control problem and then, if necessary, return to Symptom List. 9. Depress and hold the RESUME/ACCEL Switch. If the vehicle speed did not increase by at least 2 mph, the repair is not complete. Check for TSBs that pertain to speed control problem and then, if necessary, return to Symptom List. 10. Press and hold the COAST switch. The vehicle speed should decrease. If it did not decrease, the repair is not complete. Check for TSBs that pertain to speed control problem and then, if necessary, return to Symptom List. 11. Using caution, depress and release the brake pedal. If the speed control did not disengage, the repair is not complete. Check for TSBs that pertain to speed control problem and then, if necessary, return to Symptom List. 12. Bring the vehicle speed back up to 35 MPH. 13. Depress the RESUME/ACCEL switch. If the speed control did not resume the previously set speed, the repair is not complete. Check for TSBs that pertain to speed control problem and then, if necessary, return to Symptom List. 14. Hold down the SET switch. If the vehicle did not decelerate, the repair is not complete. Check for TSBs that pertain to speed control problem and then, if necessary, return to Symptom List. 15. Ensure vehicle speed is greater than 35 mph and release the SET Switch. If vehicle did not adjust and set a new vehicle speed, the repair is not complete. Check for TSBs that pertain to speed control problem and then, if necessary, return to Symptom List. 16. Depress and release the CANCEL switch. If the speed control did not disengage, the repair is not complete. Check for TSBs that pertain to speed control problem and then, if necessary, return to Symptom List. 17. Bring the vehicle speed back up above 35 mph and engage speed control. 18. Depress the OFF switch to turn OFF, (Cruise light will be off). If the speed control did not disengage, the repair is not complete. Check for TSBs that pertain to speed control problem and then, if necessary, return to Symptom List. 19. If the vehicle successfully passed all of the previous tests, the speed control system is now functioning as designed. The repair is now complete.	SPEED CONTROL

Verification Tests — Continued

POWERTRAIN VERIFICATION TEST VER - 5	APPLICABILITY
1. Inspect the vehicle to ensure that all engine components are properly installed and connected. Reassemble and reconnect components as necessary. 2. If any existing diagnostic trouble codes have not been repaired, go to Symptom List and follow path specified. 3. Connect the DRBIII® to the data link connector. 4. Ensure the fuel tank has at least a quarter tank of fuel. Turn off all accessories. 5. Perform steps 6 through 8 if the PCM has been replaced. Then proceed with the verification. If the PCM has not been replaced skip those steps and continue verification. 6. If PCM has been changed and correct VIN and mileage have not been programmed, a DTC will be set in ABS and Air bag modules. In addition, if vehicle is equipped with a Sentry Key Immobilizer Module (SKIM), Secret Key data must be updated to enable start. 7. For ABS and Air Bag systems: Enter correct VIN and Mileage in PCM. Erase codes in ABS and Air Bag modules. 8. For SKIM theft alarm: Connect DRBIII® to data link conn. Go to Theft Alarm, SKIM, Misc. and place SKIM in secured access mode by using the appropriate PIN code for this vehicle. Select Update the Secret Key data. Data will be transferred from SKIM to PCM. 9. If a Comprehensive Component DTC was repaired, perform steps 10-13. If a Major OBDII Monitor DTC was repaired skip those steps and continue verification. 10. After the ignition has been off for at least 10 seconds, restart the vehicle and run 2 minutes. 11. If the Good Trip counter changed to one or more and there are no new DTC's, the repair was successful and is now complete. Erase DTC's and disconnect the DRBIII®. 12. If the repaired DTC has reset, the repair is not complete. Check for any related TSB's or flash updates and return to the Symptom list. 13. If another DTC has set, return to the Symptom List and follow the path specified for that DTC. 14. With the DRBIII®, monitor the appropriate pre-test enabling conditions until all conditions have been met. Once the conditions have been met, switch screen to the appropriate OBDII monitor, (Audible beeps when the monitor is running). 15. If the monitor ran, and the Good Trip counter changed to one or more, the repair was successful and is now complete. Erase DTC's and disconnect the DRBIII®. 16. If the repaired OBDII trouble code has reset or was seen in the monitor while on the road test, the repair is not complete. Check for any related technical service bulletins or flash updates and return to Symptom List. 17. If another DTC has set, return to the Symptom List and follow the path specified for that DTC.	All

Verification Tests — Continued

POWERTRAIN VERIFICATION TEST VER - 6	APPLICABILITY
1. Inspect the vehicle to ensure that all engine components are properly installed and connected. Reassemble and reconnect components as necessary. 2. If the PCM was replaced, perform steps 3 through 5 then continue with the verification. Otherwise, skip those steps and continue. 3. If PCM has been changed and correct VIN and mileage have not been programmed, a DTC will be set in ABS and Air bag modules. In addition, if vehicle is equipped with a Sentry Key Immobilizer Module (SKIM), Secret Key data must be updated to enable start. 4. For ABS and Airbag Systems: Enter correct VIN and Mileage in PCM. Erase codes in ABS and Airbag modules. 5. For SKIM theft alarm: Connect DRB to data link conn. Go to Theft Alarm, SKIM, Misc. and place SKIM in secured access mode, by using the appropriate PIN code for this vehicle. Select Update the Secret Key data. Data will be transferred from SKIM to PCM. 6. If any existing diagnostic trouble codes are not repaired, go to symptom list and follow path specified. After all diagnostic trouble codes have been repaired, return to TEST VER-6A and run LDP Dealer Test Mode under Systems Test in DRBIII. 7. The LDP Monitor Test Mode has been added to the DRBIII to verify repairs to the LDP System. A DRB software program was written which causes the PCM to run the LDP Monitor as part of this test. Test failures will be indicated through a stored DTC. 8. LDP Monitor Test Mode is a useful way to run a total system performance test. Use this test to verify any type of LDP system repair. 9. Software program makes temporary changes to operating mode of PCM. For this reason, it is critical that test not be interrupted. PCM's left in this mode as result of interrupted test will illuminate the MIL for 8-10 mi of driving with no DTC's stored. 10. Erasing DTC's will not change this condition. 11. If a vehicle is found to be stuck in the mode described above, the LDP Dealer Test should be re-run in its entirety so that the software program in the DRBIII can restore the PCM operating mode. 12. Note similarity to LDP Monitor screen found under OBDII Monitors. Failure modes are fewer in this System Test than OBDII LDP Monitor. System Test only stores Small Leak DTC to indicate problem with system. No other type of failure mode indication given. 13. System Test failure may have been, for example, due to a large leak, but the PCM will set the Small Leak DTC to indicate failures that occurred as part of the system test. 14. Connect the DRB to the data link connector. Engine running, turn off all accessories. 15. Note: While test is being performed, PCM must see RPM, minimum MAP, No Vehicle speed and minimum Throttle Position sensor (At idle, in park.) With DRBIII in System Tests, perform the LDP Monitor Test and follow the instructions on the screen. 16. If the LDP Monitor Test failed and a Small Leak DTC has set, the repair is not complete. Check for any related Technical Service Bulletins and return to Symptom List. 17. If any other trouble code has set, return to Symptom List and follow the path specified for that trouble code. If the LDP Monitor Test passed, the repair was successful and testing is now complete.	All

Verification Tests — Continued

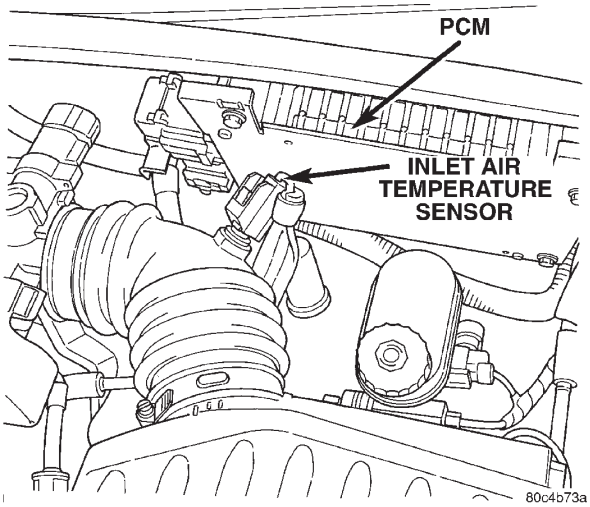
SKIS VERIFICATION	APPLICABILITY
1. Reconnect all previously disconnected components and connectors. 2. Obtain the vehicle's unique Personal Identification Number (PIN) assigned to it's original SKIM. This number can be obtained from the vehicle's invoice or Chrysler's Customer Center (1-800-992-1997). 3. NOTE: When entering PIN, care should be taken because 3 attempts will only be allowed. The SKIM module will then ″lock out″ the DRB III for 1 hour, which will cause the DRB III to display ″Bus +\- Signals Open' to SKIM. 4. To exit ″lock out″ mode, the ignition key needs to remain in the ″On″ position continually for one hour. Turn off all accessories and connect a battery charger, if necessary. 5. With the DRB III, select ″Theft Alarm,″ ″Skim,″ ″Miscellaneous,″ then select desired procedure and follow the steps displayed. 6. If the SKIM was replaced, ensure all of the vehicles keys are programmed into the new SKIM. **7. Note: Prior to returning vehicle to the customer, perform a module scan to be sure all DTC's are erased. Erase ANY DTC's that are found.**	All

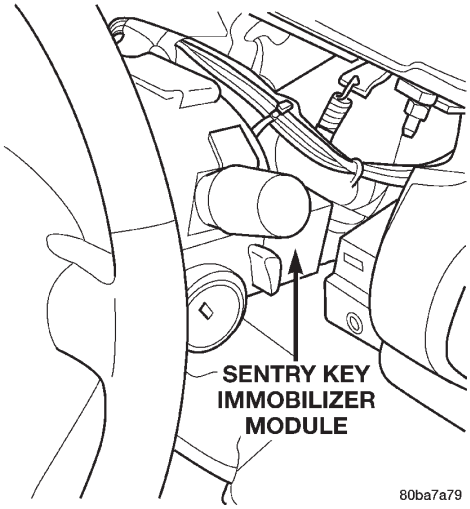
TRANSMISSION DTC VERIFICATION TEST	APPLICABILITY
1. Inspect the vehicle to ensure that all engine components are properly installed and connected. Reassemble and reconnect components as necessary. 2. If any existing diagnostic trouble codes have not been repaired, go to Symptom List and follow path specified. 3. Connect the DRBIII® to the data link connector. 4. Ensure the fuel tank has at least a quarter tank of fuel. Turn off all accessories. 5. Perform steps 6 through 8 if the PCM has been replaced. Then proceed with the verification. If the PCM has not been replaced skip those steps and continue verification. 6. If PCM has been changed and correct VIN and mileage have not been programmed, a DTC will be set in ABS and Air bag modules. In addition, if vehicle is equipped with a Sentry Key Immobilizer Module (SKIM), Secret Key data must be updated to enable start. 7. For ABS and Air Bag systems: Enter correct VIN and Mileage in PCM. Erase codes in ABS and Air Bag modules. 8. For SKIM theft alarm: Connect DRBIII® to data link conn. Go to Theft Alarm, SKIM, Misc. and place SKIM in secured access mode by using the appropriate PIN code for this vehicle. Select Update the Secret Key data. Data will be transferred from SKIM to PCM. 9. Start and run the engine until the transmission temperature is above 43°C (110°F). 10. Check the transmission fluid level. Adjust if necessary. 11. Road test the vehicle. Make 15 to 20 1-2, 2-3 and 3-4 up shifts. Perform these shifts from a standing start to 72 kmh (45 mph) with a constant throttle opening of 20-25%. 12. Below 40 kmh (25 mph), make 5 to 8 wide open throttle kick downs to 1st gear. Allow at least 5 seconds each in 2nd and 3rd between each kick down. 13. For a specific DTC drive the vehicle to the Symptom's When Monitored/When Set conditions to verify the DTC repair. 14. If a DTC sets during the road test, return to symptom list and follow the path. If no DTC is set the repair is complete.	5SPD MANUAL TRANS

NOTES

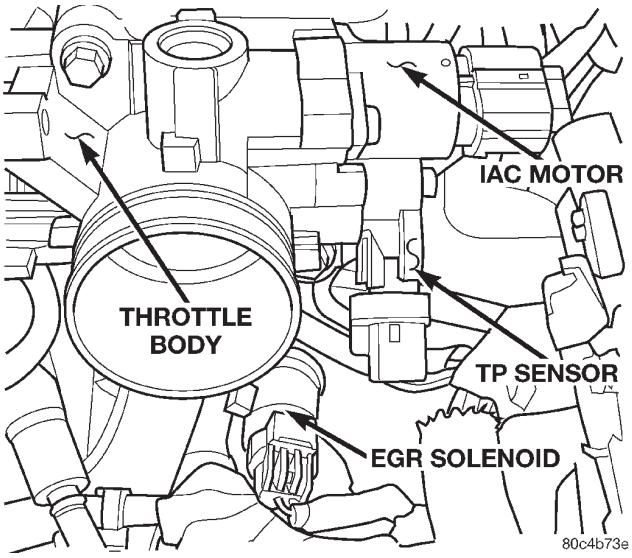
8.0 COMPONENT LOCATIONS

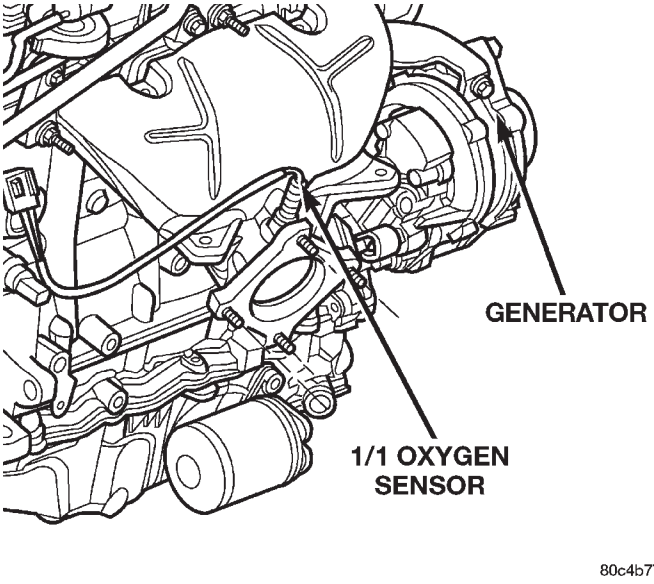
8.1 POWERTRAIN AND SKIM

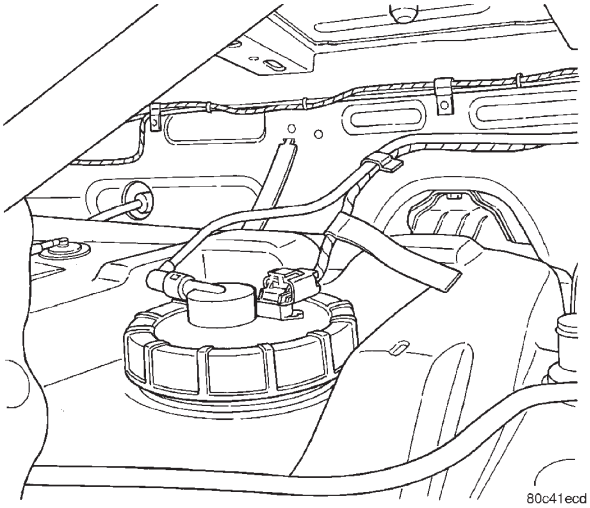


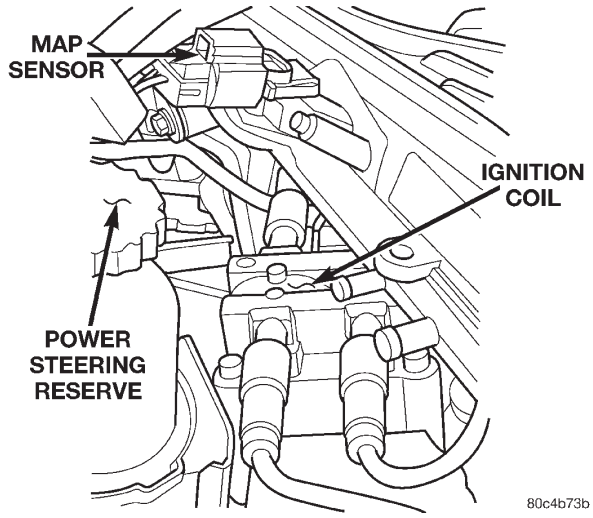


8.2 CONTROLS AND SOLENOIDS

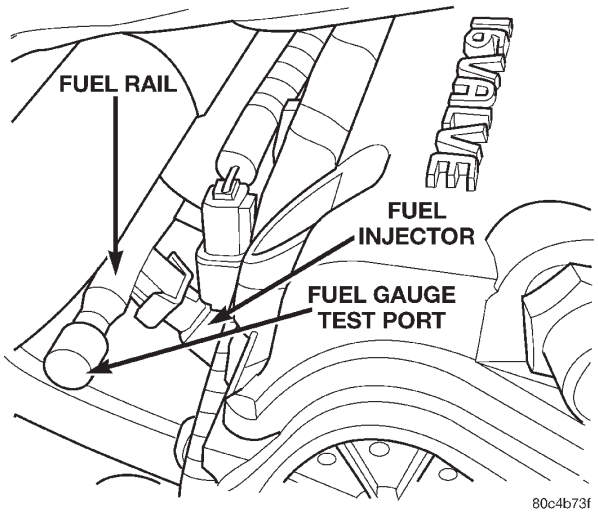


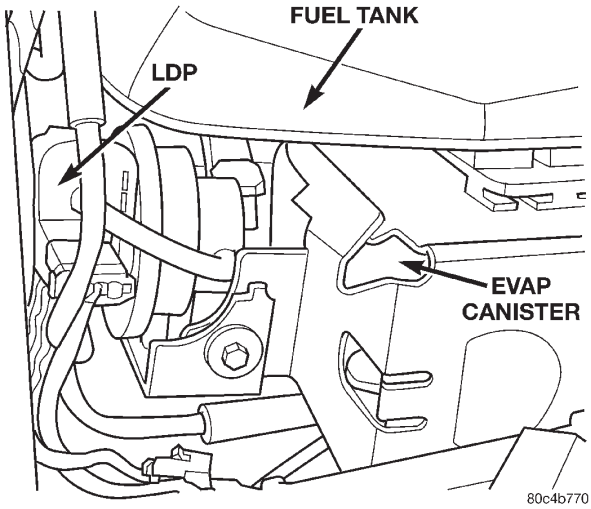


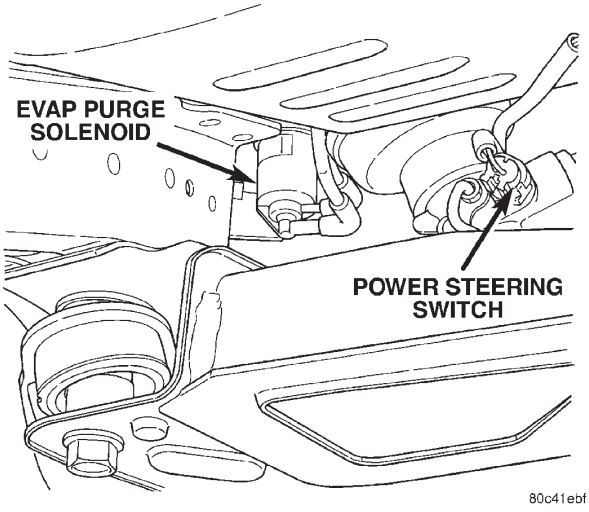


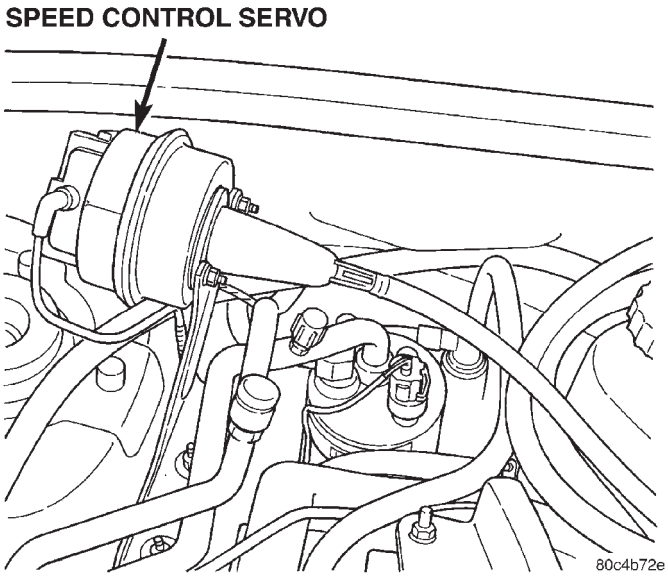


8.2 CONTROLS AND SOLENOIDS (Continued)

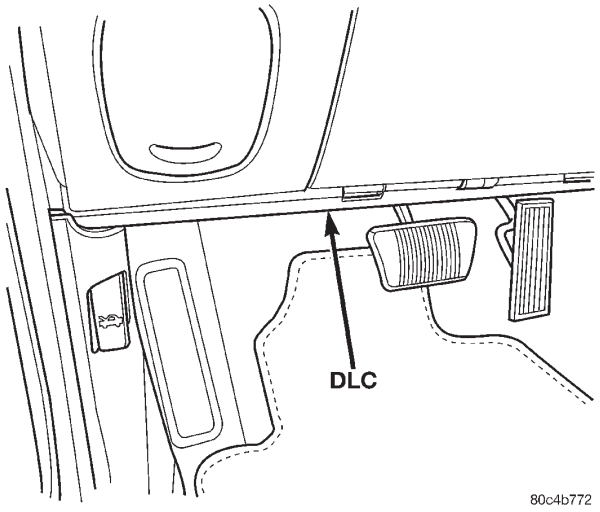




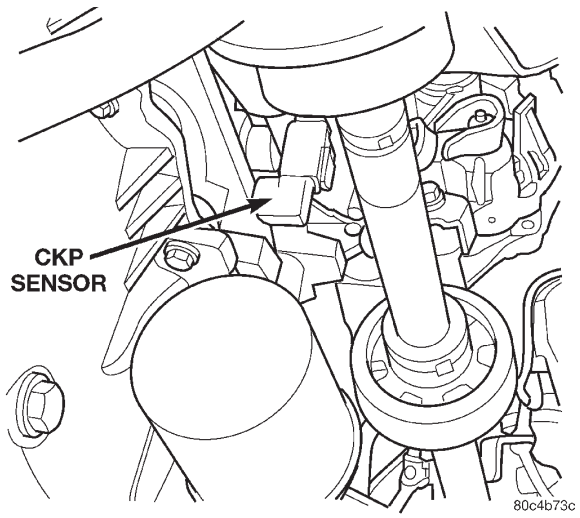


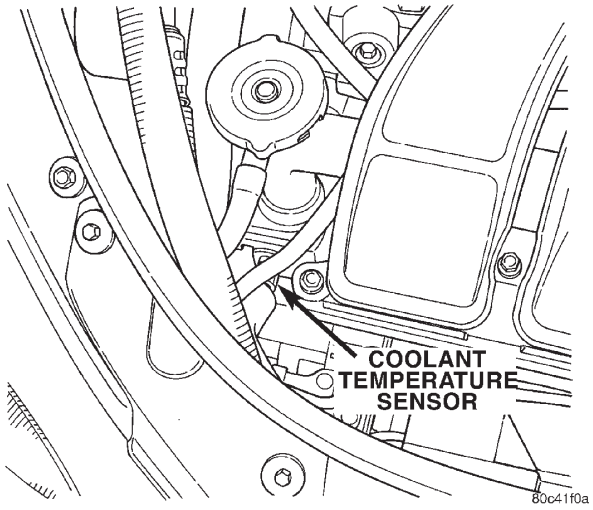


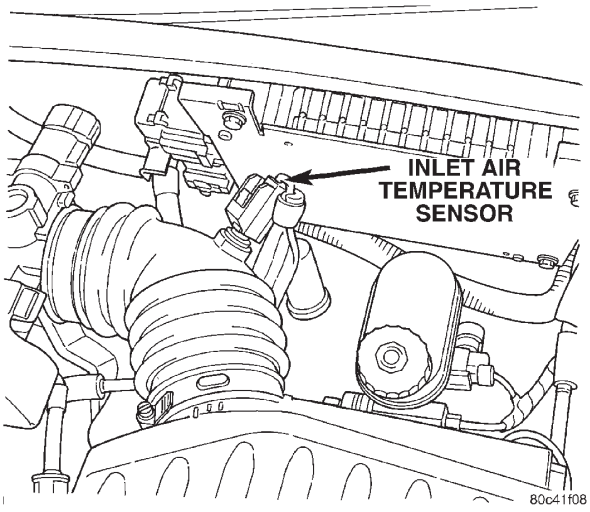
8.3 DATA LINK CONNECTOR



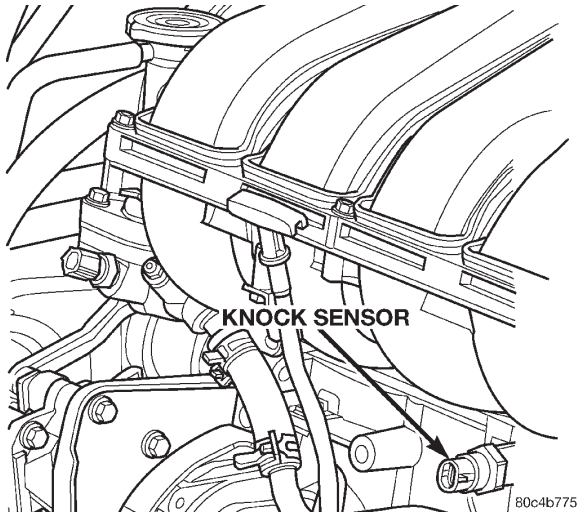
8.4 SENSORS

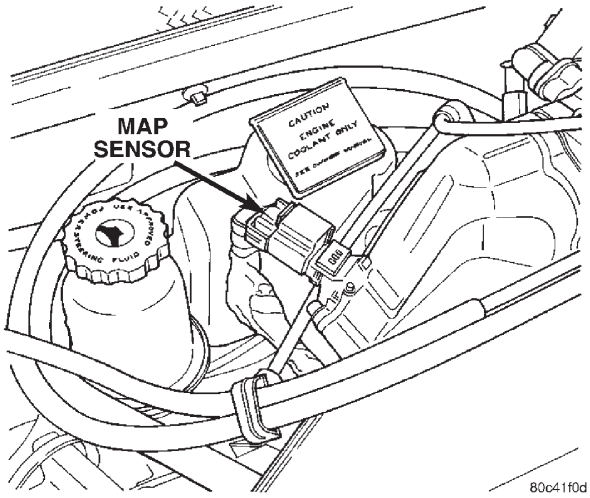


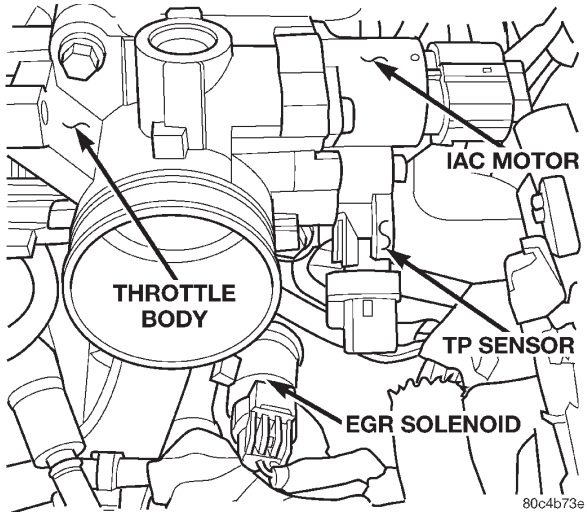




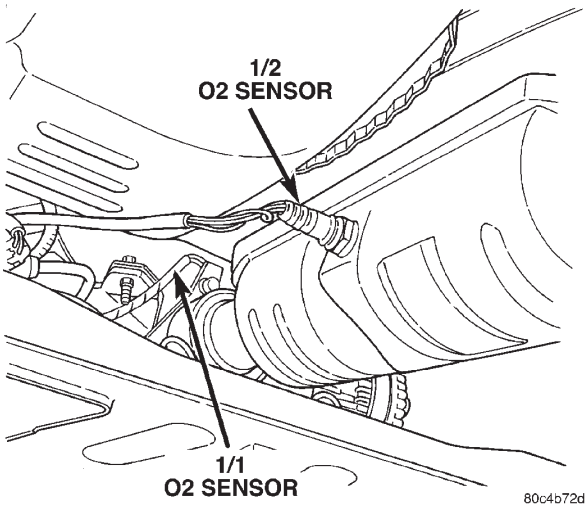
2.4L



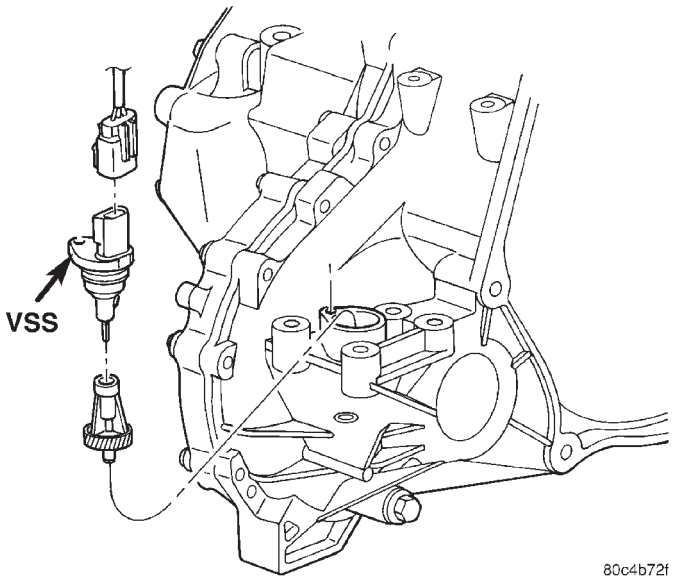




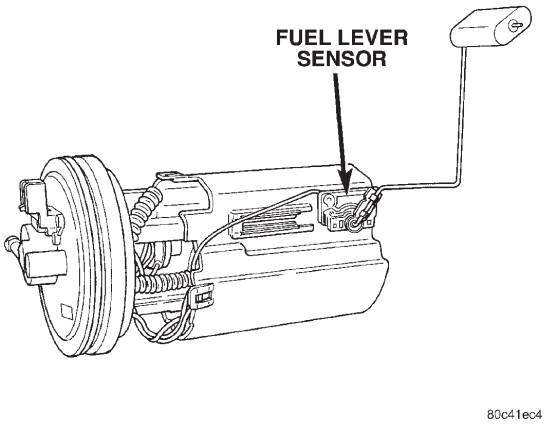
8.4 SENSORS (Continued)

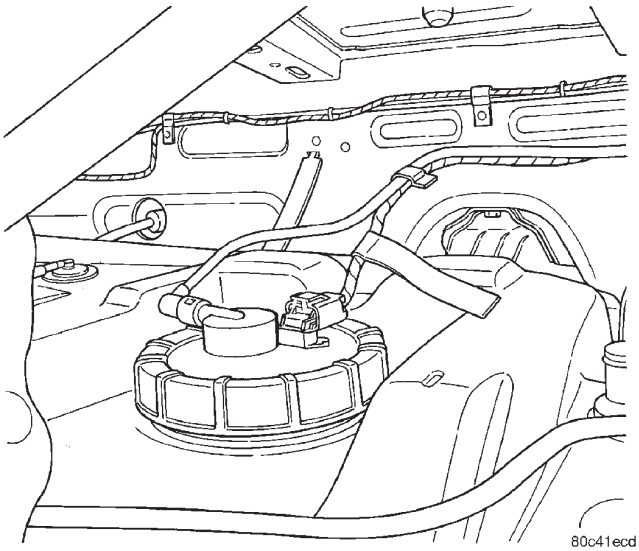


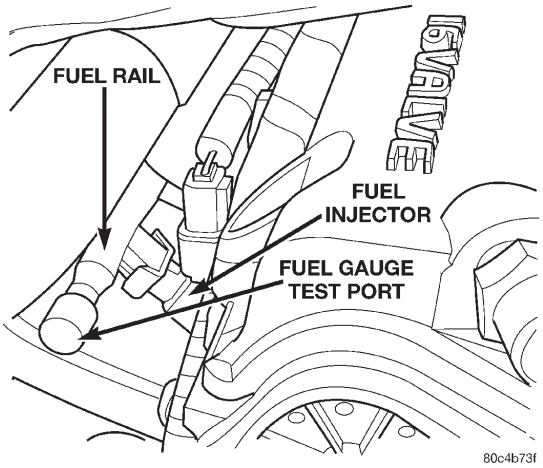
MANUAL TRANS

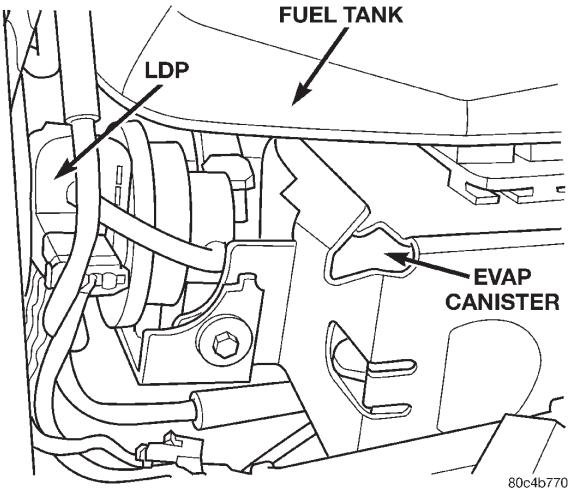


8.5 FUEL SYSTEM

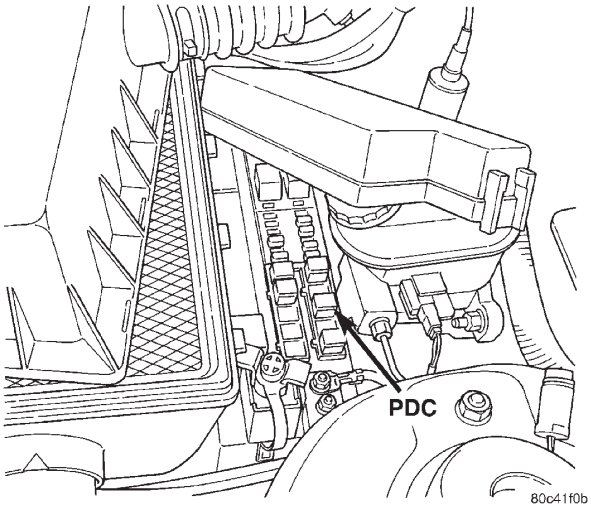




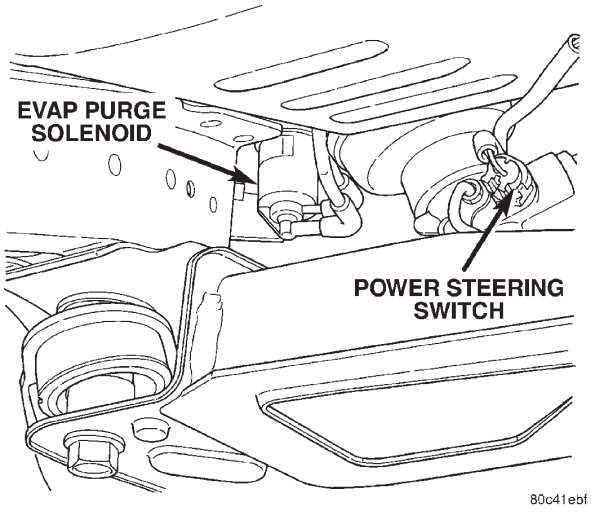


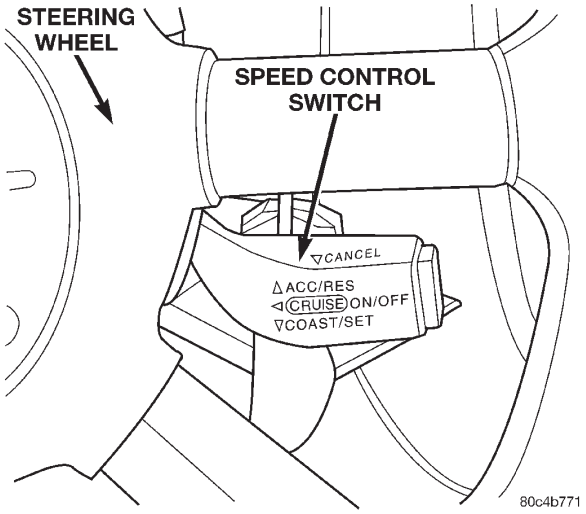


8.6 RELAYS

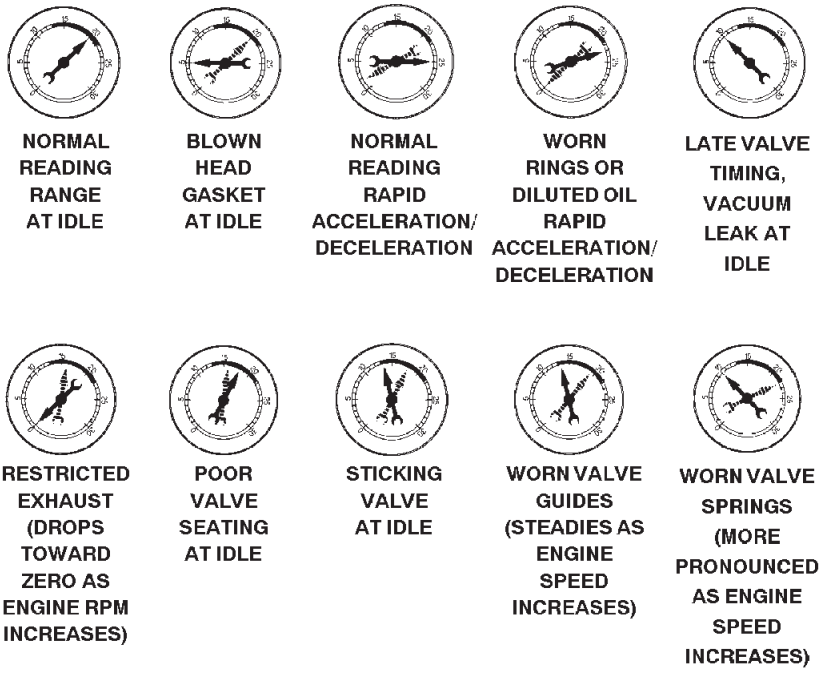


8.7 SWITCHES

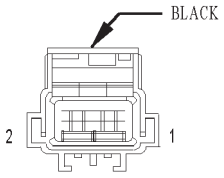




8.7 SPECIFICATIONS



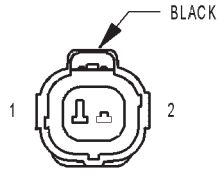
9.0 CONNECTOR PINOUTS



A/C
COMPRESSOR
CLUTCH

A/C COMPRESSOR CLUTCH - BLACK 2 WAY

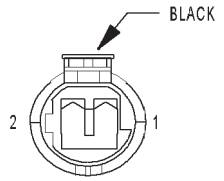
CAV	CIRCUIT	FUNCTION
1	C3 20DB/BK	A/C COMPRESSOR CLUTCH RELAY OUTPUT
2	Z1 20BK	GROUND



A/C LOW
PRESSURE
SWITCH

A/C LOW PRESSURE SWITCH - BLACK 2 WAY

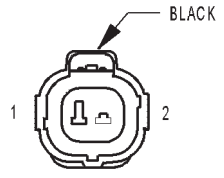
CAV	CIRCUIT	FUNCTION
1	C22 20DB/WT	PRESSURE SWITCH OUTPUT
2	C21 20DB/OR	A/C SWITCH SENSE



A/C
PRESSURE
TRANSDUCER

A/C PRESSURE TRANSDUCER - BLACK 2 WAY

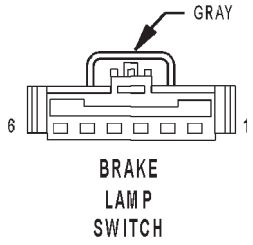
CAV	CIRCUIT	FUNCTION
1	C20 20BR	A/C SWITCH SENSE
2	C22 20DB/WT	PRESSURE SWITCH OUTPUT



AMBIENT
TEMPERATURE
SENSOR

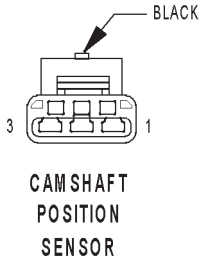
AMBIENT TEMPERATURE SENSOR - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	G31 20VT/LG	AMBIENT TEMPERATURE SENSOR SIGNAL
2	G32 20BK/LB	SENSOR GROUND



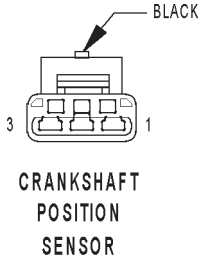
BRAKE LAMP SWITCH - GRAY 6 WAY

CAV	CIRCUIT	FUNCTION
1	F32 18PK/DB	FUSED B(+)
2	L50 18WT/TN	BRAKE LAMP SWITCH OUTPUT
3	V40 20DB/RD	SPEED CONTROL BRAKE LAMP SWITCH OUTPUT
4	V32 20YL/RD	SPEED CONTROL POWER SUPPLY
5	Z1 20BK	GROUND
6	K29 20WT/PK	BRAKE LAMP SWITCH SENSE



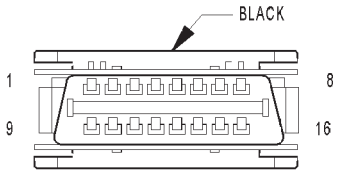
CAMSHAFT POSITION SENSOR - BLACK 3 WAY

CAV	CIRCUIT	FUNCTION
1	K7 20OR	8V SUPPLY
2	K4 20BK/LB	SENSOR GROUND
3	K44 20TN/YL	CAMSHAFT POSITION SENSOR SIGNAL



CRANKSHAFT POSITION SENSOR - BLACK 3 WAY

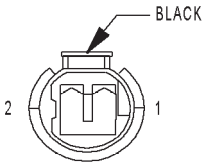
CAV	CIRCUIT	FUNCTION
1	K7 20OR	8V SUPPLY
2	K4 20BK/LB	SENSOR GROUND
3	K24 20GY/BK	CRANKSHAFT POSITION SENSOR SIGNAL



DATA LINK CONNECTOR

DATA LINK CONNECTOR - BLACK 16 WAY

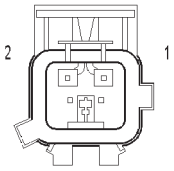
CAV	CIRCUIT	FUNCTION
1	-	-
2	D25 20VT/YL	PCI BUS
3	-	-
4	Z12 20BK/TN	GROUND
5	Z11 20BK/WT	GROUND
6	D20 20LG	SCI RECEIVE
7	D21 20PK	SCI TRANSMIT
8	-	-
9	-	-
10	-	-
11	-	-
12	-	-
13	-	-
14	D6 20PK/LB	SCI RECEIVE (EATX)
15	-	-
16	A14 18RD/WT	FUSED B(+)



EGR SOLENOID

EGR SOLENOID - BLACK 2 WAY

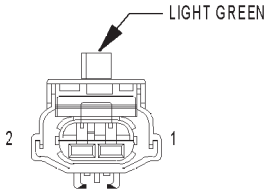
CAV	CIRCUIT	FUNCTION
1	A142 18DG/OR	AUTOMATIC SHUT DOWN RELAY OUTPUT
2	K35 20GY/YL	EGR SOLENOID CONTROL



ENGINE COOLANT TEMPERATURE SENSOR

ENGINE COOLANT TEMPERATURE SENSOR - 2 WAY

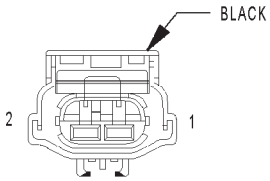
CAV	CIRCUIT	FUNCTION
1	K4 20BK/LB	SENSOR GROUND
2	K2 20TN/BK	ENGINE COOLANT TEMPERATURE SENSOR SIGNAL



ENGINE OIL PRESSURE SWITCH

ENGINE OIL PRESSURE SWITCH - LIGHT GREEN 2 WAY

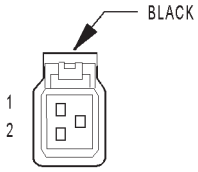
CAV	CIRCUIT	FUNCTION
1	G6 20GY	ENGINE OIL PRESSURE SWITCH SENSE
2	-	-



EVAP PURGE SOLENOID

EVAP PURGE SOLENOID - BLACK 2 WAY

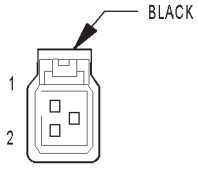
CAV	CIRCUIT	FUNCTION
1	K108 20VT/RD	EVAP PURGE SOLENOID SENSE
2	K52 20PK/BK	EVAP PURGE SOLENOID CONTROL



FUEL INJECTOR NO. 1

FUEL INJECTOR NO. 1 - BLACK 2 WAY

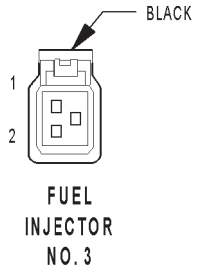
CAV	CIRCUIT	FUNCTION
1	K11 18WT/DB	FUEL INJECTOR NO. 1 DRIVER
2	A142 18DG/OR	AUTOMATIC SHUT DOWN RELAY OUTPUT



FUEL INJECTOR NO. 2

FUEL INJECTOR NO. 2 - BLACK 2 WAY

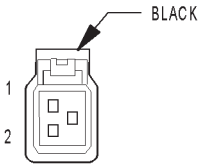
CAV	CIRCUIT	FUNCTION
1	K12 18TN	FUEL INJECTOR NO. 2 DRIVER
2	A142 18DG/OR	AUTOMATIC SHUT DOWN RELAY OUTPUT



FUEL
INJECTOR
NO. 3

FUEL INJECTOR NO. 3 - BLACK 2 WAY

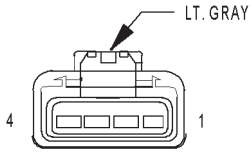
CAV	CIRCUIT	FUNCTION
1	K13 18YL/WT	FUEL INJECTOR NO. 3 DRIVER
2	A142 18DG/OR	AUTOMATIC SHUT DOWN RELAY OUTPUT



FUEL
INJECTOR
NO. 4

FUEL INJECTOR NO. 4 - BLACK 2 WAY

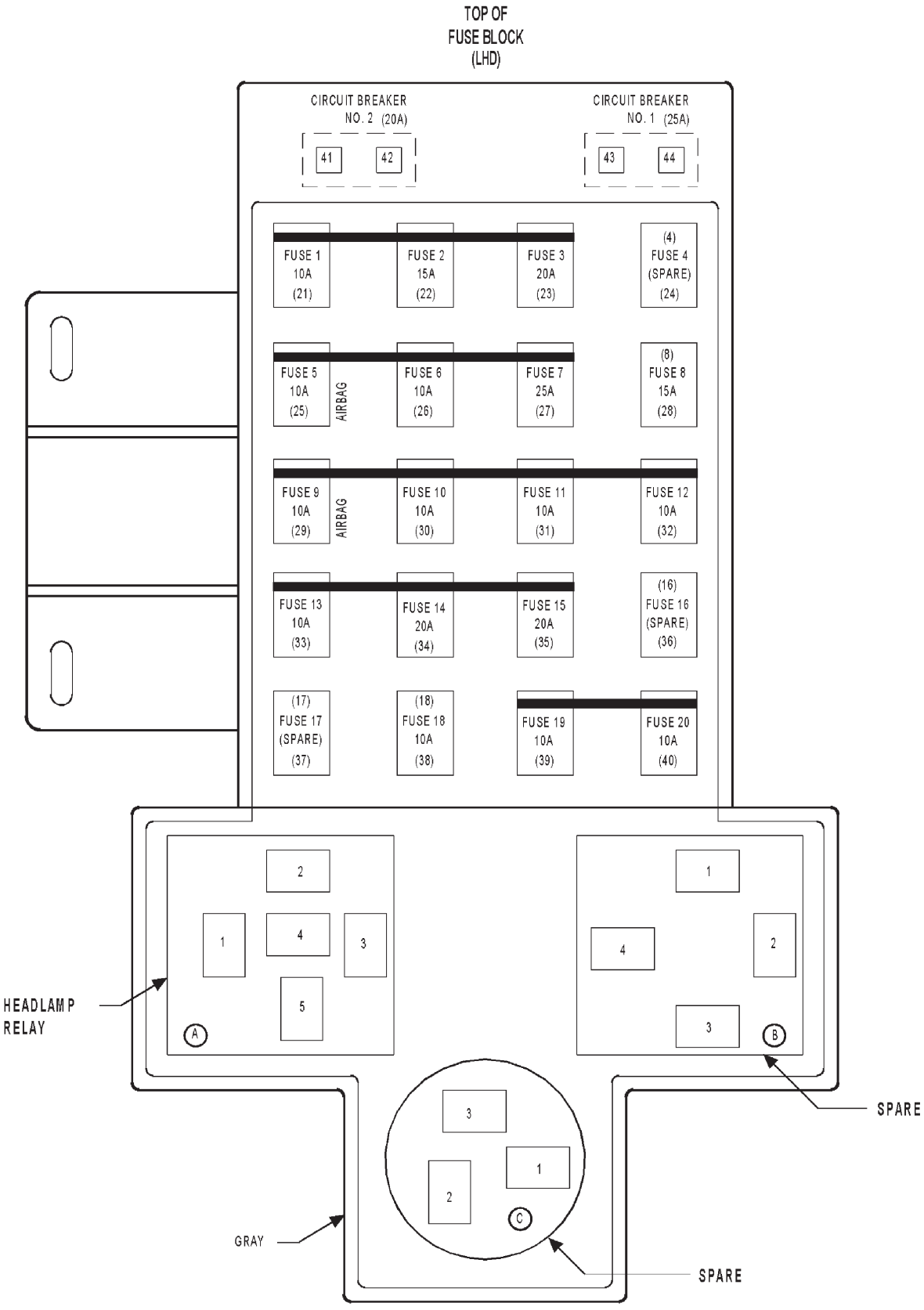
CAV	CIRCUIT	FUNCTION
1	K14 18LB/BR	FUEL INJECTOR NO. 4 DRIVER
2	A142 18DG/OR	AUTOMATIC SHUT DOWN RELAY OUTPUT



FUEL
PUMP
MODULE

FUEL PUMP MODULE - LT. GRAY 4 WAY

CAV	CIRCUIT	FUNCTION
1	Z1 16BK	GROUND
2	Z2 20BK/LG	GROUND
3	G4 20DB	FUEL LEVEL SENSOR SIGNAL
4	A141 16DG/WT	FUEL PUMP RELAY OUTPUT


TOP OF
FUSE BLOCK
(LHD)
CIRCUIT BREAKER
NO. 2 (20A)
41
42
CIRCUIT BREAKER
NO. 1 (25A)
43
44
FUSE 1
10A
(21)
FUSE 2
15A
(22)
FUSE 3
20A
(23)
(4)
FUSE 4
(SPARE)
(24)
FUSE 5
10A
(25)
AIRBAG
FUSE 6
10A
(26)
FUSE 7
25A
(27)
(8)
FUSE 8
15A
(28)
FUSE 9
10A
(29)
AIRBAG
FUSE 10
10A
(30)
FUSE 11
10A
(31)
FUSE 12
10A
(32)
FUSE 13
10A
(33)
FUSE 14
20A
(34)
FUSE 15
20A
(35)
(16)
FUSE 16
(SPARE)
(36)
(17)
FUSE 17
(SPARE)
(37)
(18)
FUSE 18
10A
(38)
FUSE 19
10A
(39)
FUSE 20
10A
(40)
HEADLAMP
RELAY
A
B
C
SPARE
GRAY
SPARE

FUSES

CAV	CIRCUIT	FUNCTION
1	F9 20RD/BK	FUSED B(+)
2	F33 18PK/RD	FUSED B(+)
3	F35 18RD	FUSED B(+)
4	-	-
5	F25 18TN/LG	FUSED IGNITION SWITCH OUTPUT (RUN)
6	F20 18WT	FUSED IGNITION SWITCH OUTPUT (RUN)
7	C1 14DG	FUSED IGNITION SWITCH OUTPUT (RUN)
8	F39 18PK/LG	HEADLAMP RELAY OUTPUT
9	F15 18DG/WT	FUSED IGNITION SWITCH OUTPUT (RUN-START)
10	G5 20DB/BK	FUSED IGNITION SWITCH OUTPUT (RUN-START)
11	F12 20DB/WT	FUSED IGNITION SWITCH OUTPUT (RUN-START)
12	F18 20LG/BK	FUSED IGNITION SWITCH OUTPUT (RUN-START)
12	F18 20LG/BK	FUSED IGNITION SWITCH OUTPUT (RUN-START)
13	X12 18RD/WT	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
14	F10 18YL/RD	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
15	F13 16DB	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
16	-	-
17	-	-
18	C16 20LB/YL	FUSED REAR WINDOW DEFOGGER SWITCH OUTPUT
19	L44 16VT/RD	FUSED RIGHT LOW BEAM OUTPUT
20	L43 18VT	FUSED LEFT LOW BEAM OUTPUT
20	L43 16VT	FUSED LEFT LOW BEAM OUTPUT

CIRCUIT BREAKERS

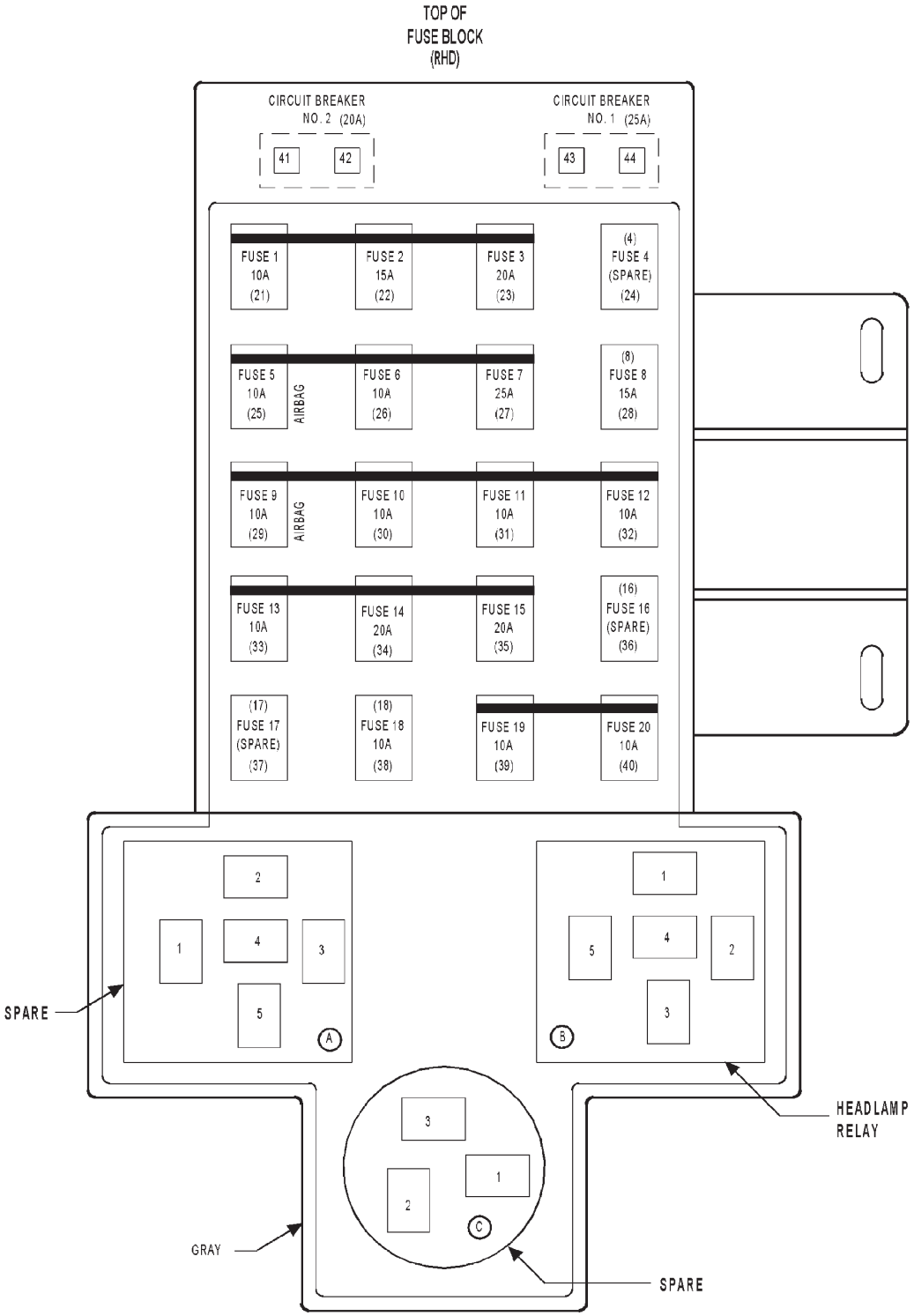
CAV	CIRCUIT	FUNCTION
C.B. NO. 1	F3 16LB/OR	FUSED B(+)
C.B. NO. 2	F21 14TN	FUSED IGNITION SWITCH OUTPUT (RUN)

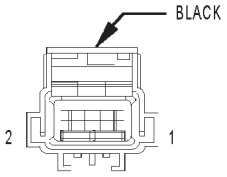
HEADLAMP RELAY (LHD)

CAV	CIRCUIT	FUNCTION
A1	Z1 20BK	GROUND
A2	L4 16VT/WT	HEADLAMP RELAY OUTPUT
A3	L3 16RD/OR	HEADLAMP RELAY CONTROL
A4	F34 18TN/BK	HEADLAMP RELAY OUTPUT
A5	F3 16LB/OR	FUSED B(+)

HEADLAMP RELAY (RHD)

CAV	CIRCUIT	FUNCTION
B1	Z1 20BK	GROUND
B2	L4 16VT/WT	HEADLAMP RELAY OUTPUT
B3	L3 16RD/OR	HEADLAMP RELAY CONTROL
B4	-	-
B5	F3 16LB/OR	FUSED B(+)

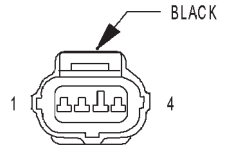




GENERATOR

GENERATOR - BLACK 2 WAY

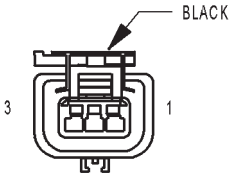
CAV	CIRCUIT	FUNCTION
1	K20 18DG	GENERATOR FIELD
2	A142 18DG/OR	AUTOMATIC SHUT DOWN RELAY OUTPUT



IDLE AIR CONTROL MOTOR

IDLE AIR CONTROL MOTOR - BLACK 4 WAY

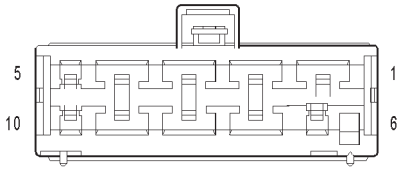
CAV	CIRCUIT	FUNCTION
1	K39 20GY/RD	IDLE AIR CONTROL NO. 1 DRIVER
2	K60 20YL/BK	IDLE AIR CONTROL NO. 2 DRIVER
3	K40 20BR/WT	IDLE AIR CONTROL NO. 3 DRIVER
4	K59 20VT/BK	IDLE AIR CONTROL NO. 4 DRIVER



IGNITION COIL

IGNITION COIL - BLACK 3 WAY

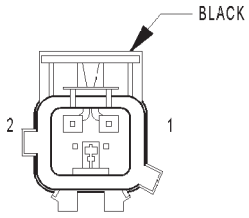
CAV	CIRCUIT	FUNCTION
1	K17 18DB/TN	IGNITION NO. 2 DRIVER
2	A142 18DG/OR	AUTOMATIC SHUT DOWN RELAY OUTPUT
3	K19 18BK/GY	IGNITION COIL NO. 1 DRIVER



IGNITION SWITCH

IGNITION SWITCH - 10 WAY

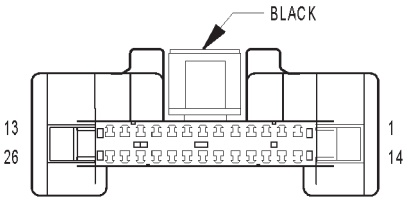
CAV	CIRCUIT	FUNCTION
1	A1 14RD	FUSED B(+)
2	A21 14DB	IGNITION SWITCH OUTPUT (RUN-START)
3	F30 16RD	IGNITION SWITCH OUTPUT (RUN-ACC)
4	F1 16DB/BK	FUSED B(+)
5	G26 20LB	KEY-IN IGNITION SWITCH SENSE
6	A41 14YL	FUSED IGNITION SWITCH OUTPUT (START)
7	A31 14BK/WT	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
8	A22 12BK/OR	FUSED IGNITION SWITCH OUTPUT (RUN)
9	A2 12PK/BK	FUSED B(+)
10	-	-



INLET AIR TEMPERATURE SENSOR

INLET AIR TEMPERATURE SENSOR - BLACK 2 WAY

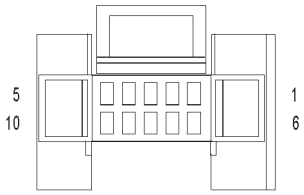
CAV	CIRCUIT	FUNCTION
1	K21 20BK/RD	INLET AIR TEMPERATURE SENSOR SIGNAL
2	K4 20BK/LB	SENSOR GROUND



INSTRUMENT CLUSTER-C1

INSTRUMENT CLUSTER C1 - BLACK 26 WAY

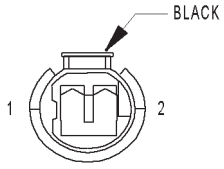
CAV	CIRCUIT	FUNCTION
1	Z1 18BK	GROUND
2	-	-
3	L7 18BK/YL	HEADLAMP SWITCH OUTPUT
4	M1 20PK	FUSED B(+)
5	-	-
6	-	-
7	M2 20YL	COURTESY LAMPS DRIVER
8	-	-
9	G75 20TN	LEFT DOOR AJAR SWITCH SENSE
9	G74 20TN/RD	RIGHT DOOR AJAR SWITCH SENSE
10	L161 18LG/OR	LEFT TURN SIGNAL (OUT)
11	L61 18LG	LEFT TURN SIGNAL (IN)
12	L160 18TN/RD	RIGHT TURN SIGNAL (OUT)
13	L60 18TN	RIGHT TURN SIGNAL (IN)
14	G5 20DB/BK	FUSED IGNITION SWITCH OUTPUT (RUN-START)
15	-	-
16	-	-
17	L4 16VT/WT	DIMMER SWITCH LOW BEAM OUTPUT
18	L3 16RD/OR	DIMMER SWITCH HIGH BEAM OUTPUT
19	G26 20LB	KEY-IN IGNITION SWITCH SENSE
20	G10 20LG/RD	SEAT BELT SWITCH SENSE
21	G9 20GY/BK	RED BRAKE WARNING INDICATOR DRIVER
22	E2 20OR	PANEL LAMPS DRIVER
23	M9 20DB/OR	PASSENGER DOOR AJAR/RKE SENSE
24	G78 20TN/BK	LIFTGATE AJAR SWITCH SENSE
25	-	-
26	D25 20VT/YL	PCI BUS



INSTRUMENT CLUSTER - C2

INSTRUMENT CLUSTER C2 - 10 WAY

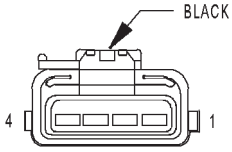
CAV	CIRCUIT	FUNCTION
1	L39 18LB	FOG LAMP SWITCH OUTPUT
2	G69 20BK/OR	VTSS INDICATOR DRIVER
3	-	-
4	-	-
5	-	-
6	L38 18BR/WT	REAR FOG LAMP SWITCH OUTPUT
7	E19 20RD	PANEL LAMPS DIMMER SIGNAL
8	-	-
9	G4 20DB	FUEL LEVEL SENSOR SIGNAL
10	-	-



KNOCK SENSOR

KNOCK SENSOR - BLACK 2 WAY

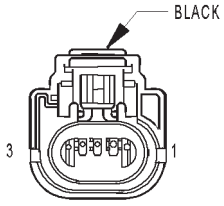
CAV	CIRCUIT	FUNCTION
1	K42 20DB/LG	KNOCK SENSOR SIGNAL
2	K4 20BK/LB	SENSOR GROUND



LEAK DETECTION PUMP

LEAK DETECTION PUMP- BLACK 4 WAY

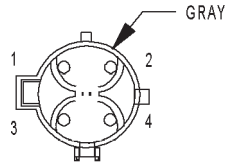
CAV	CIRCUIT	FUNCTION
1	-	-
2	F18 20LG/BK	FUSED IGNITION SWITCH OUTPUT (RUN-START)
3	K106 20WT/DG	LEAK DETECTION PUMP SOLENOID CONTROL
4	K107 20OR/YL	LEAK DETECTION PUMP SWITCH SENSE



MANIFOLD ABSOLUTE PRESSURE SENSOR

MANIFOLD ABSOLUTE PRESSURE SENSOR - BLACK 3 WAY

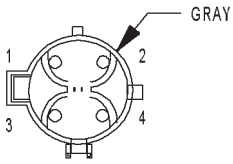
CAV	CIRCUIT	FUNCTION
1	K1 20DG/RD	MAP SENSOR SIGNAL
2	K4 20BK/LB	SENSOR GROUND
3	K6 20VT/WT	5V SUPPLY



OXYGEN SENSOR
1/1 UPSTREAM

OXYGEN SENSOR 1/1 UPSTREAM - GRAY 4 WAY

CAV	CIRCUIT	FUNCTION
1	A142 18DG/OR	AUTOMATIC SHUT DOWN RELAY OUTPUT
2	K79 20OR/RD	OXYGEN SENSOR 1/1 CONTROL
3	K127 20BK/OR	OXYGEN SENSOR GROUND
4	K41 20BK/DG	OXYGEN SENSOR 1/1 SIGNAL

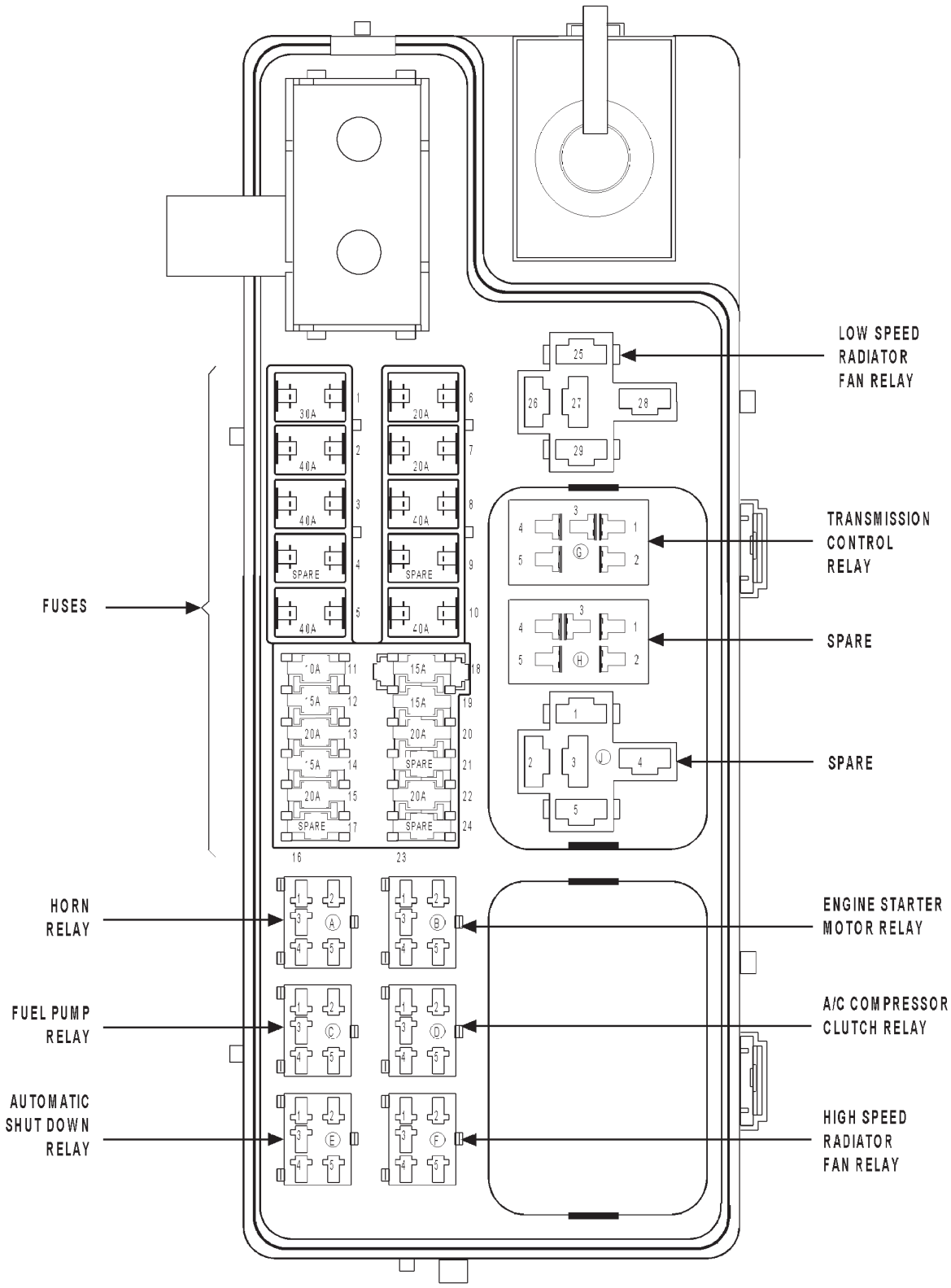


OXYGEN SENSOR
1/2 DOWNSTREAM

OXYGEN SENSOR 1/2 DOWNSTREAM - GRAY 4 WAY

CAV	CIRCUIT	FUNCTION
1	A142 18DG/OR	AUTOMATIC SHUT DOWN RELAY OUTPUT
2	Z1 20BK	GROUND
3	K127 20BK/OR	OXYGEN SENSOR GROUND
4	K141 20TN/WT	OXYGEN SENSOR 1/2 SIGNAL

POWER DISTRIBUTION CENTER



FUSES

CAV	CIRCUIT	FUNCTION
1	A1 14RD	FUSED B(+)
2	A10 12RD/DG	FUSED B(+)
3	A2 12PK/BK	FUSED B(+)
4	-	-
5	A16 12GY	FUSED B(+)
6	A120 16RD/LB	FUSED B(+)
7	A20 12RD/DB	FUSED B(+)
8	A4 12BK/PK	FUSED B(+)
9	-	-
10	A3 12RD/WT	FUSED B(+)
11	A17 20RD/BK	FUSED B(+)
12	F32 18PK/DB	FUSED B(+)
13	A14 18RD/WT	FUSED B(+)
14	F62 20RD	FUSED B(+)
15	A30 16RD/WT	FUSED B(+)
16	-	-
17	-	-
18	M1 20PK	FUSED B(+)
19	A15 18PK/DG	FUSED B(+)
20	F1 16DB/BK	FUSED B(+)
21	-	-
22	F39 18PK/LG	FUSED B(+)
23	-	-
24	-	-

A/C COMPRESSOR CLUTCH RELAY

CAV	CIRCUIT	FUNCTION
D1	C3 20DB/BK	A/C COMPRESSOR CLUTCH RELAY OUTPUT
D2	C28 20DB/OR	A/C COMPRESSOR CLUTCH RELAY CONTROL
D3	-	-
D4	F18 20LG/BK	FUSED IGNITION SWITCH OUTPUT (RUN-START)
D5	A17 20RD/BK	FUSED B(+)

AUTOMATIC SHUT DOWN RELAY

CAV	CIRCUIT	FUNCTION
E1	A142 18DG/OR	AUTOMATIC SHUT DOWN RELAY OUTPUT
E2	K51 20DB/YL	AUTOMATIC SHUT DOWN RELAY CONTROL
E3	-	-
E4	A14 18RD/WT	FUSED B(+)
E5	A14 18RD/WT	FUSED B(+)

ENGINE STARTER MOTOR RELAY

CAV	CIRCUIT	FUNCTION
B1	T40 14BR	ENGINE STARTER MOTOR RELAY OUTPUT
B2	K90 20TN	ENGINE STARTER MOTOR RELAY CONTROL
B3	-	-
B4	A41 14YL	FUSED IGNITION SWITCH OUTPUT (START)
B5	A1 14RD	FUSED B(+)

FUEL PUMP RELAY

CAV	CIRCUIT	FUNCTION
C1	A141 16DG/WT	FUEL PUMP RELAY OUTPUT
C2	K31 20BR	FUEL PUMP RELAY CONTROL
C3	-	-
C4	F12 20DB/WT	FUSED IGNITION SWITCH OUTPUT (RUN-START)
C5	A14 18RD/WT	FUSED B(+)

HIGH SPEED RADIATOR FAN RELAY

CAV	CIRCUIT	FUNCTION
F1	C25 12YL	HIGH SPEED RADIATOR FAN RELAY OUTPUT
F2	C27 20DB/PK	HIGH SPEED RADIATOR FAN RELAY CONTROL
F3	-	-
F4	F18 20LG/BK	FUSED IGNITION SWITCH OUTPUT (RUN-START)
F5	A16 12GY	FUSED B(+)

HORN RELAY

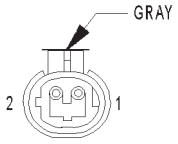
CAV	CIRCUIT	FUNCTION
A1	X2 20DG/RD	HORN RELAY OUTPUT
A2	X3 20BK/RD	HORN RELAY CONTROL
A3	-	-
A4	F62 20RD	FUSED B(+)
A5	F62 20RD	FUSED B(+)

LOW SPEED RADIATOR FAN RELAY

CAV	CIRCUIT	FUNCTION
25	F18 20LG/BK	FUSED IGNITION SWITCH OUTPUT (RUN-START)
26	C23 12DG	LOW SPEED RADIATOR FAN RELAY OUTPUT
27	-	-
28	A16 12GY	FUSED B(+)
29	C24 20YL/RD	LOW SPEED RADIATOR FAN RELAY CONTROL

TRANSMISSION CONTROL RELAY

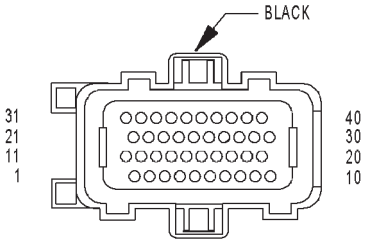
CAV	CIRCUIT	FUNCTION
G1	T16 16RD	TRANSMISSION CONTROL RELAY OUTPUT
G2	Z1 20BK	GROUND
G3	-	-
G4	T15 20LG	TRANSMISSION CONTROL RELAY CONTROL
G5	A30 16RD/WT	FUSED B(+)



POWER STEERING
PRESSURE SWITCH

POWER STEERING PRESSURE SWITCH - GRAY 2 WAY

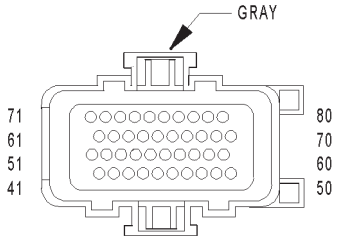
CAV	CIRCUIT	FUNCTION
1	K10 20DB/OR	POWER STEERING PRESSURE SWITCH SENSE
2	Z1 20BK	GROUND



POWERTRAIN
CONTROL
MODULE - C1

POWERTRAIN CONTROL MODULE C1 - BLACK 40 WAY

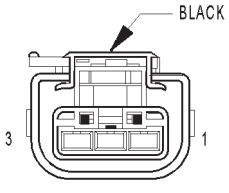
CAV	CIRCUIT	FUNCTION
1	-	-
2	-	-
3	K17 18DB/TN	IGNITION COIL NO. 2 DRIVER
4	-	-
5	V32 20YL/RD	SPEED CONTROL POWER SUPPLY
6	A142 18DG/OR	AUTOMATIC SHUT DOWN RELAY OUTPUT
7	K13 18YL/WT	FUEL INJECTOR NO. 3 DRIVER
8	K20 18DG	GENERATOR FIELD
9	-	-
10	Z12 18BK/TN	GROUND
11	K19 18BK/GY	IGNITION COIL NO. 1 DRIVER
12	G6 20GY	ENGINE OIL PRESSURE SWITCH SENSE
13	K11 18WT/DB	FUEL INJECTOR NO. 1 DRIVER
14	-	-
15	-	-
16	K14 18LB/BR	FUEL INJECTOR NO. 4 DRIVER
17	K12 18TN	FUEL INJECTOR NO. 2 DRIVER
18	K79 20OR/RD	OXYGEN SENSOR 1/1 CONTROL
19	-	-
20	F12 20DB/WT	FUSED IGNITION SWITCH OUTPUT (RUN-START)
21	-	-
22	-	-
23	K119 20LG/BK	CLUTCH UPSTOP SWITCH SIGNAL
24	-	-
25	K42 20DB/LG	KNOCK SENSOR SIGNAL
26	K2 20TN/BK	ENGINE COOLANT TEMPERATURE SENSOR SIGNAL
27	K127 20BK/OR	OXYGEN SENSOR GROUND
28	-	-
29	-	-
30	K41 20BK/DG	OXYGEN SENSOR 1/1 SIGNAL
31	K90 20TN	ENGINE STARTER MOTOR RELAY CONTROL
32	K24 20GY/BK	CRANKSHAFT POSITION SENSOR SIGNAL
33	K44 20TN/YL	CAMSHAFT POSITION SENSOR SIGNAL
34	-	-
35	K22 20OR/DB	THROTTLE POSITION SENSOR SIGNAL
36	K1 20DG/RD	MAP SENSOR SIGNAL
37	-	-
38	C20 20BR	A/C SWITCH SENSE
39	-	-
40	K35 20GY/YL	EGR SOLENOID CONTROL



POWERTRAIN CONTROL MODULE - C2

POWERTRAIN CONTROL MODULE C2 - GRAY 40 WAY

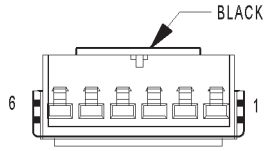
CAV	CIRCUIT	FUNCTION
41	V37 20RD/LG	SPEED CONTROL SWITCH SIGNAL
42	-	-
43	K4 20BK/LB	SENSOR GROUND
44	K7 20OR	8V SUPPLY
45	K10 20DB/OR	POWER STEERING PRESSURE SWITCH SENSE
46	A14 18RD/WT	FUSED B(+)
47	Z11 18BK/WT	GROUND
48	K40 20BR/WT	IDLE AIR CONTROL NO. 3 DRIVER
49	K60 20YL/BK	IDLE AIR CONTROL NO. 2 DRIVER
50	Z12 18BK/TN	GROUND
51	K141 20TN/WT	OXYGEN SENSOR 1/2 SIGNAL
52	K21 20BK/RD	INLET AIR TEMPERATURE SENSOR SIGNAL
53	-	-
54	-	-
55	C24 20YL/RD	LOW SPEED RADIATOR FAN RELAY CONTROL
56	V36 20TN/RD	SPEED CONTROL VACUUM SOLENOID CONTROL
57	K39 20GY/RD	IDLE AIR CONTROL NO. 1 DRIVER
58	K59 20VT/BK	IDLE AIR CONTROL NO. 4 DRIVER
59	D25 20VT/YL	PCI BUS
60	-	-
61	K6 20VT/WT	5V SUPPLY
62	K29 20WT/PK	BRAKE LAMP SWITCH SENSE
63	T10 20YL/DG	TORQUE MANAGEMENT REQUEST SENSE
64	C28 20DB/OR	A/C COMPRESSOR CLUTCH RELAY CONTROL
65	D21 20PK	SCI TRANSMIT
66	G7 20WT/OR	VEHICLE SPEED SENSOR SIGNAL
67	K51 20DB/YL	AUTOMATIC SHUT DOWN RELAY CONTROL
68	K52 20PK/BK	EVAP PURGE SOLENOID CONTROL
69	C27 20DB/PK	HIGH SPEED RADIATOR FAN RELAY CONTROL
70	K108 20VT/RD	EVAP PURGE SOLENOID SENSE
71	G9 20GY/BK	RED BRAKE WARNING INDICATOR DRIVER
72	K107 20OR/YL	LEAK DETECTION PUMP SWITCH SENSE
73	-	-
74	K31 20BR	FUEL PUMP RELAY CONTROL
75	D20 20LG	SCI RECEIVE
76	T41 20BK/WT	CLUTCH INTERLOCK SWITCH SIGNAL
76	T41 20BK/WT	PARK/NEUTRAL POSITION SWITCH SENSE (TRS T41)
77	K106 20WT/DG	LEAK DETECTION PUMP SOLENOID CONTROL
78	K54 20OR/BK	TORQUE CONVERTER CLUTCH SOLENOID CONTROL
79	-	-
80	V35 20LG/RD	SPEED CONTROL VENT SOLENOID CONTROL



RADIATOR FAN MOTOR

RADIATOR FAN MOTOR - BLACK 3 WAY

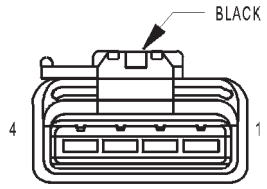
CAV	CIRCUIT	FUNCTION
1	C23 12DG	LOW SPEED RADIATOR FAN RELAY OUTPUT
2	Z1 12BK	GROUND
3	C25 12YL	HIGH SPEED RADIATOR FAN RELAY OUTPUT



SENTRY KEY IMMOBILIZER MODULE

SENTRY KEY IMMOBILIZER MODULE - BLACK 6 WAY

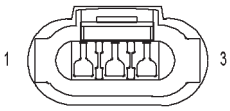
CAV	CIRCUIT	FUNCTION
5	Z2 20BK/LG	GROUND
6	M1 20PK	FUSED B(+)
1	-	-
2	D25 20VT/YL	PCI BUS
3	-	-
4	G5 20DB/BK	FUSED IGNITION SWITCH OUTPUT (RUN-START)



SPEED CONTROL SERVO

SPEED CONTROL SERVO - BLACK 4 WAY

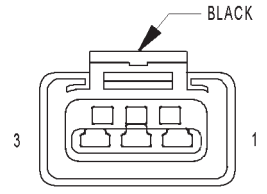
CAV	CIRCUIT	FUNCTION
1	V36 20TN/RD	SPEED CONTROL VACUUM SOLENOID CONTROL
2	V35 20LG/RD	SPEED CONTROL VENT SOLENOID CONTROL
3	V40 20DB/RD	SPEED CONTROL BRAKE LAMP SWITCH OUTPUT
4	Z1 20BK	GROUND



THROTTLE POSITION SENSOR

THROTTLE POSITION SENSOR - 3 WAY

CAV	CIRCUIT	FUNCTION
1	K6 20VT/WT	5V SUPPLY
2	K22 20OR/DB	THROTTLE POSITION SENSOR SIGNAL
3	K4 20BK/LB	SENSOR GROUND



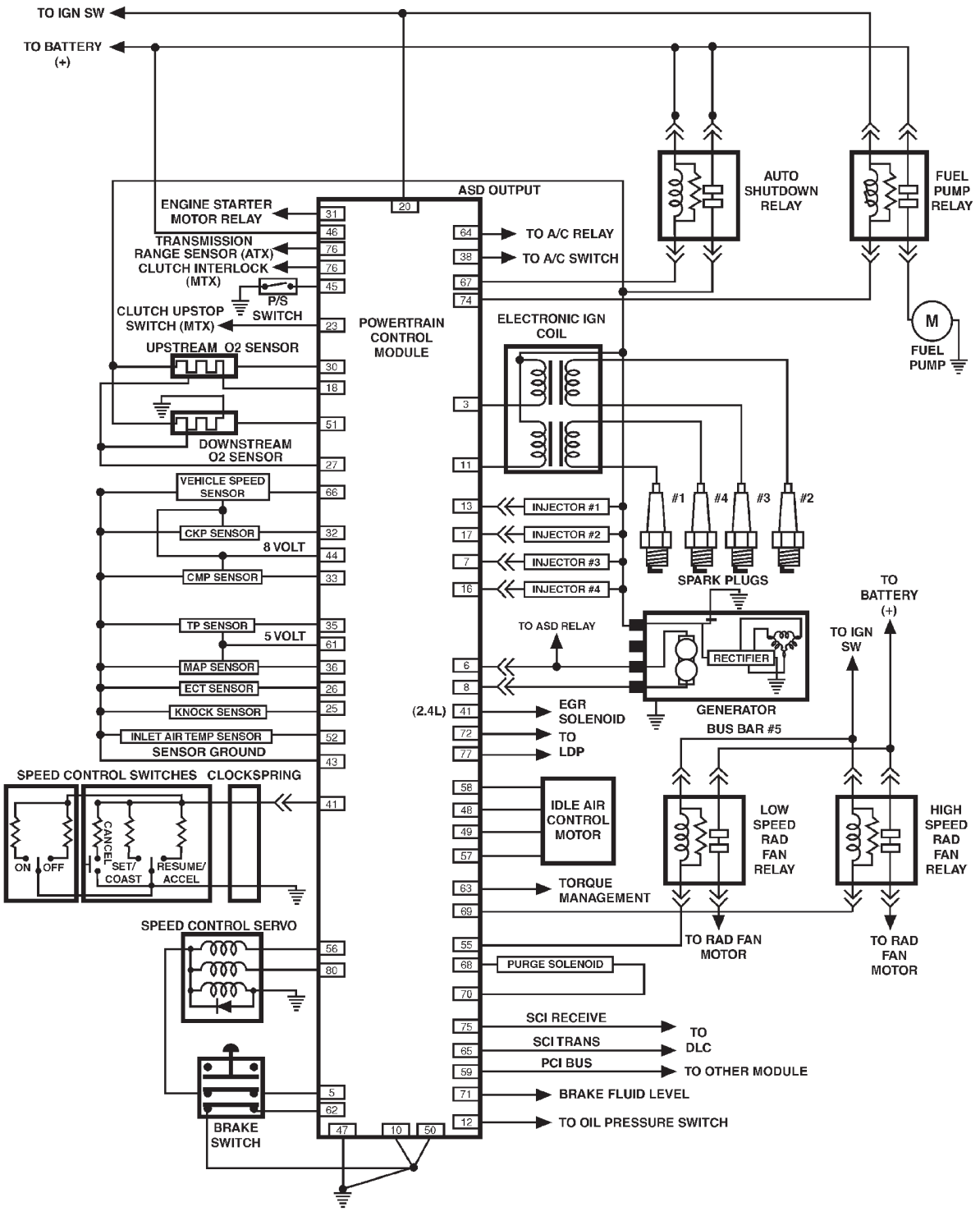
VEHICLE SPEED SENSOR (MTX)

VEHICLE SPEED SENSOR (MTX) - BLACK 3 WAY

CAV	CIRCUIT	FUNCTION
1	K7 20OR	8V SUPPLY
2	K4 20BK/LB	SENSOR GROUND
3	G7 20WT/OR	VEHICLE SPEED SENSOR SIGNAL

10.0 SCHEMATIC DIAGRAMS

10.1 2001 PT 2.0L and 2.4L ENGINES



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NOTES