

BRAKES

Antilock Brake System - CTS Sedan

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Brake Pipe Fitting - Brake Pressure Modulator Valve From Master Cylinder	32 N.m	24 lb ft
Brake Pipe Fitting - Brake Pressure Modulator Valve To Wheel	18 N.m	13 lb ft
Brake Pressure Modulator Valve Bracket Bolt	8 N.m	71 lb in
Brake Pressure Modulator Valve Bracket Nut	7 N.m	62 lb in
Electronic Brake Control Module Bolt	6 N.m	53 lb in
Vehicle Yaw Sensor Nut	9 N.m	80 lb in
Wheel Speed Sensor Bolt	10 N.m	89 lb in

SCHEMATIC WIRING DIAGRAMS

ANTILOCK BRAKE SYSTEM WIRING SCHEMATICS

Power, Ground, Serial Data and Traction Control Switch

Wheel Speed Sensors

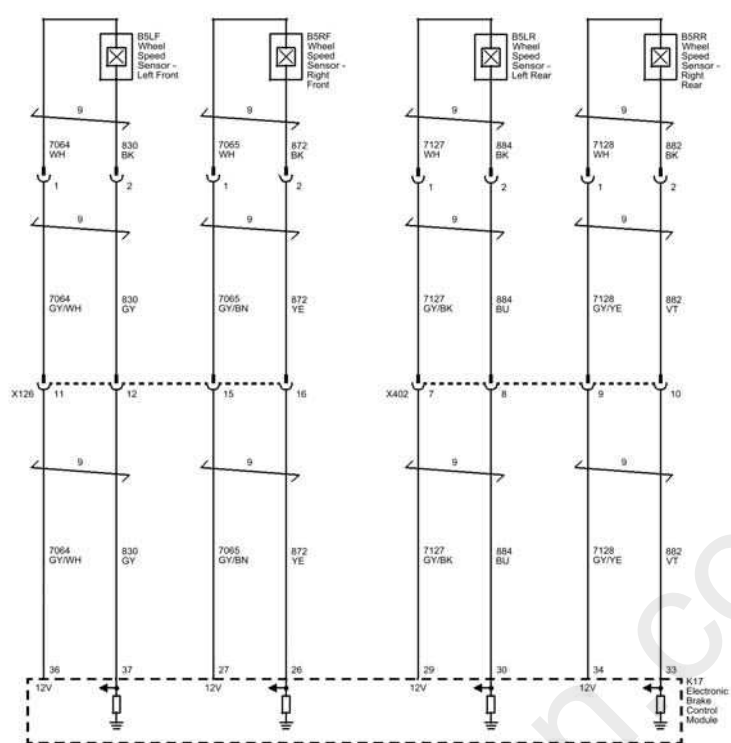


Fig. 2: Wheel Speed Sensors
 Courtesy of GENERAL MOTORS COMPANY

Stability Control Sensors

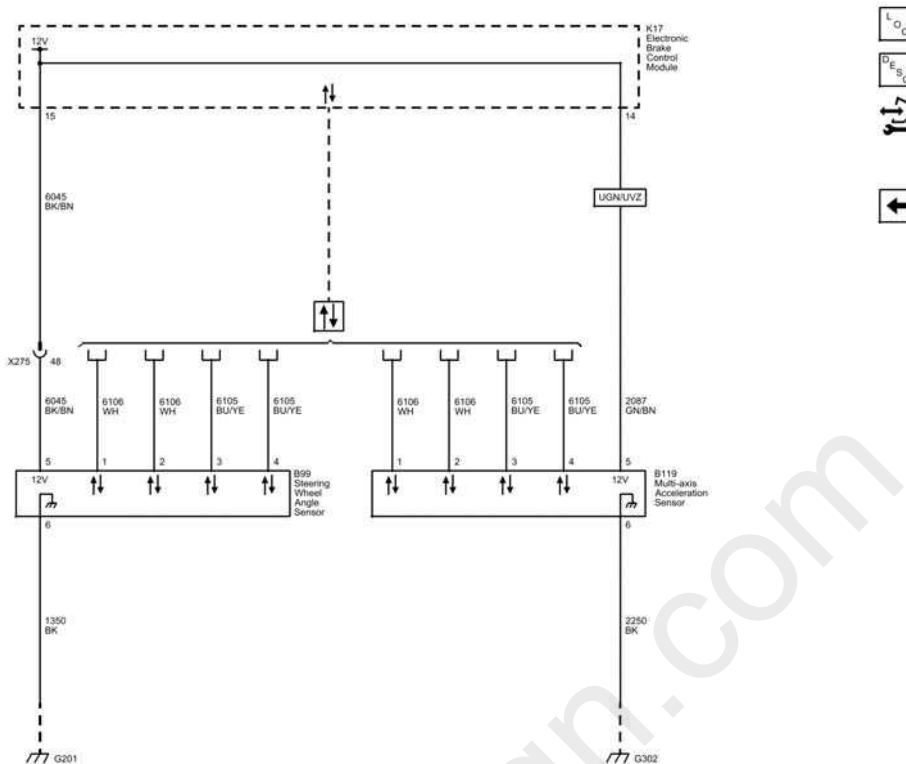


Fig. 3: Stability Control Sensors

Courtesy of GENERAL MOTORS COMPANY

DIAGNOSTIC INFORMATION AND PROCEDURES

DIAGNOSTIC CODE INDEX

DIAGNOSTIC CODE INDEX

DTC	Description
DTC B0000	DTC B0000 Vehicle Speed Information Circuit
DTC B2745	DTC B2745 02 Traction Control Switch Circuit Short to Ground
DTC C0035, C0040, C0045, or C0050	DTC C0035 06 Left Front Wheel Speed Sensor Circuit Low Voltage/Open DTC C0035 08 Left Front Wheel Speed Sensor Circuit Performance - Signal Invalid DTC C0035 0E Left Front Wheel Speed Sensor Circuit Low Resistance DTC C0035 0F Left Front Wheel Speed Sensor Circuit Signal Erratic DTC C0035 18 Left Front Wheel Speed Sensor Circuit Low Signal Amplitude DTC C0035 3A Left Front Wheel Speed Sensor Circuit Incorrect Component Installed DTC C0035 5A Left Front Wheel Speed Sensor Circuit Not Plausible DTC C0040 06 Right Front Wheel Speed Sensor Circuit Low Voltage/Open DTC C0040 08 Right Front Wheel Speed Sensor Circuit Performance - Signal Invalid

	DTC C0040 0E Right Front Wheel Speed Sensor Circuit Low Resistance DTC C0040 0F Right Front Wheel Speed Sensor Circuit Signal Erratic DTC C0040 18 Right Front Wheel Speed Sensor Circuit Low Signal Amplitude DTC C0040 3A Right Front Wheel Speed Sensor Circuit Incorrect Component Installed DTC C0040 5A Right Front Wheel Speed Sensor Circuit Not Plausible DTC C0045 06 Left Rear Wheel Speed Sensor Circuit Low Voltage/Open DTC C0045 08 Left Rear Wheel Speed Sensor Circuit Performance - Signal Invalid DTC C0045 0E Left Rear Wheel Speed Sensor Circuit Low Resistance DTC C0045 0F Left Rear Wheel Speed Sensor Circuit Signal Erratic DTC C0045 18 Left Rear Wheel Speed Sensor Circuit Low Signal Amplitude DTC C0045 3A Left Rear Wheel Speed Sensor Circuit Incorrect Component Installed DTC C0045 5A Left Rear Wheel Speed Sensor Circuit Not Plausible DTC C0050 06 Right Rear Wheel Speed Sensor Circuit Low Voltage/Open DTC C0050 08 Right Rear Wheel Speed Sensor Circuit Performance - Signal Invalid DTC C0050 0E Right Rear Wheel Speed Sensor Circuit Low Resistance DTC C0050 0F Right Rear Wheel Speed Sensor Circuit Signal Erratic DTC C0050 18 Right Rear Wheel Speed Sensor Circuit Low Signal Amplitude DTC C0050 3A Right Rear Wheel Speed Sensor Circuit Incorrect Component Installed DTC C0050 5A Right Rear Wheel Speed Sensor Circuit Not Plausible
<u>DTC C0060-C0095, C0131, C0141, C0146, C0151, or C0156</u>	DTC C0060 00 Left Front Antilock Braking System Solenoid DTC C0065 00 Left Front Antilock Brake System Solenoid 2 DTC C0070 00 Right Front Antilock Braking System Solenoid DTC C0075 00 Right Front Antilock Brake System Solenoid 2 DTC C0080 00 Left Rear Antilock Braking System Solenoid DTC C0085 00 Left Rear Antilock Brake System Solenoid 2 DTC C0090 00 Right Rear Antilock Braking System Solenoid DTC C0095 00 Right Rear Antilock Brake System Solenoid 2 DTC C0131 00 Traction Control System Pressure Circuit DTC C0131 5A Traction Control System Pressure Circuit Not Plausible DTC C0141 00 Traction Control Left Front Prime Solenoid Valve DTC C0146 00 Traction Control Left Front/Right Rear Isolation DTC C0151 00 Traction Control Right Front Prime Solenoid Valve DTC C0156 00 Traction Control Right Front/Left Rear Isolation
<u>DTC C0110</u>	DTC C0110 00 Pump Motor Circuit Malfunction DTC C0110 04 Pump Motor Circuit Open DTC C0110 61 Pump Motor Stuck
<u>DTC C0131</u>	DTC C0131 00 Traction Control System Pressure Circuit DTC C0131 5A Traction Control System Pressure Circuit Not Plausible
<u>DTC C0161</u>	DTC C0161 5A Antilock Braking System Brake Switch Circuit Not Plausible
<u>DTC C0186, C018B,</u>	DTC C0186 5A Lateral Acceleration Sensor Signal Not Plausible (Electronic

<u>C0196, C019B, C027E, or C0287 (With UGN)</u>	Brake Control Module) DTC C0186 71 Lateral Acceleration Sensor Signal Invalid Data (Electronic Brake Control Module) DTC C018B 5A Lateral Acceleration Sensor Signal Not Plausible (Multi-axis Acceleration Sensor Module) DTC C0196 00 Yaw Rate Signal Malfunction (Electronic Brake Control Module) DTC C0196 5A Yaw Rate Signal Not Plausible (Electronic Brake Control Module) DTC C0196 71 Yaw Rate Signal Invalid Data (Electronic Brake Control Module) DTC C019B 5A Yaw Rate Signal Not Plausible (Multi-axis Acceleration Sensor Module) DTC C027E 5A Longitudinal Acceleration Sensor Signal Not Plausible (Multi-axis Acceleration Sensor Module) DTC C0287 4B Longitudinal Acceleration Sensor Signal Calibration Not Learned (Electronic Brake Control Module) DTC C0287 5A Longitudinal Acceleration Sensor Signal Not Plausible (Electronic Brake Control Module) DTC C0287 71 Longitudinal Acceleration Sensor Signal Invalid Data (Electronic Brake Control Module)
<u>DTC C0186, C0196, or C0287 (Without UGN)</u>	DTC C0186 00 Lateral Acceleration Sensor Signal Malfunction (Inflatable Restraint Sensing and Diagnostic Module) DTC C0186 4B Lateral Acceleration Sensor Signal Calibration Not Learned (Electronic Brake Control Module) DTC C0186 5A Lateral Acceleration Sensor Signal Not Plausible (Electronic Brake Control Module) DTC C0186 71 Lateral Acceleration Sensor Signal Invalid Data (Electronic Brake Control Module) DTC C0196 00 Yaw Rate Signal Malfunction (Electronic Brake Control Module and/or Inflatable Restraint Sensing and Diagnostic Module) DTC C0196 5A Yaw Rate Signal Not Plausible (Electronic Brake Control Module) DTC C0196 71 Yaw Rate Signal Invalid Data (Electronic Brake Control Module) DTC C0287 00 Longitudinal Acceleration Sensor Malfunction (Inflatable Restraint Sensing and Diagnostic Module) DTC C0287 4B Longitudinal Acceleration Sensor Signal Calibration Not Learned (Electronic Brake Control Module) DTC C0287 5A Longitudinal Acceleration Sensor Signal Not Plausible (Electronic Brake Control Module) DTC C0287 71 Longitudinal Acceleration Sensor Signal Invalid Data (Electronic Brake Control Module)
<u>DTC C025F</u>	DTC C025F 00 Brake Master Cylinder Inlet and Isolation Valves Calibration Not Learned
<u>DTC C0280</u>	DTC C0280 Stability System Active Too Long Malfunction
<u>DTC C0710</u>	DTC C0710 42 Steering Position Signal Calibration Not Programmed

	DTC C0710 5A Steering Position Signal Not Plausible DTC C0710 71 Steering Position Signal Invalid Data DTC C0710 7F Steering Position Bus Signal Erratic
<u>DTC C124F, C1250, or C1251</u>	DTC C124F Lateral Acceleration Sensor Circuit Low Voltage DTC C1250 Lateral Acceleration Sensor Circuit High Voltage DTC C1251 Lateral Acceleration Sensor Performance
<u>DTC C124F or C1250-C1254</u>	DTC C124F Lateral Acceleration Sensor Circuit Low Voltage DTC C1250 Lateral Acceleration Sensor Circuit High Voltage DTC C1251 Lateral Acceleration Sensor Performance DTC C1252 Longitudinal Acceleration Sensor Circuit Low Voltage DTC C1253 Longitudinal Acceleration Sensor Circuit High Voltage DTC C1254 Longitudinal Acceleration Sensor Performance
<u>DTC P0856</u>	DTC P0856 Traction Control Torque Request Circuit
<u>DTC P1513</u>	DTC P1513 Traction Control Drag Reduction Request Circuit
<u>DTC P15F8</u>	DTC P15F8 Automatic Braking Engine Torque Request Signal Message Counter Incorrect
<u>DTC P2548</u>	DTC P2548 Vehicle Dynamics System Torque Request Signal Message Counter Incorrect

DTC B0000: VEHICLE SPEED INFORMATION CIRCUIT

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

DTC Descriptors

DTC B0000

Vehicle Speed Information Circuit

For symptom byte information refer to **Symptom Byte List** .

Circuit/System Description

The wheel speeds are detected by active wheel speed sensors. Each wheel speed sensor receives ignition voltage from the electronic brake control module and provides an alternating current square wave signal to the electronic brake control module. As the wheel spins, the electronic brake control module uses the frequency of the square wave signal to calculate the wheel speed. The electronic brake control module sends the wheel speed information as a high speed serial data message. Some modules connected to the high speed bus monitor for the wheel speed information. The DTC is set when the wheel speed information has not been received.

Conditions for Running the DTC

Vehicle speed greater than 40 km/h (25 MPH).

Conditions for Setting the DTC

A supervised periodic message that includes the wheel speed serial data has not been received.

Action Taken When the DTC Sets

Specific subsystems will not function or operate in degraded mode.

Conditions for Clearing the DTC

A current DTC clears when the diagnostic runs and passes.

Reference Information

Schematic Reference

Antilock Brake System Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX - SEDAN

Description and Operation

ABS Description and Operation

Electrical Information Reference

- **Circuit Testing**
- **Connector Repairs**
- **Testing for Intermittent Conditions and Poor Connections**
- **Wiring Repairs**

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

1. Drive the vehicle in a straight line at a speed greater than 40 km/h (25 MPH).
2. Verify all scan tool Wheel Speed Sensor parameters are within 4 km/h (2.5 MPH) of each other.
 - **If any parameter is not within 4 km/h (2.5 MPH) of each other**

Refer to Circuit/System Testing.

- If each parameter is within 4 km/h (2.5 MPH) of each other
- 3. All OK.

Circuit/System Testing

1. Ignition ON.
2. Verify that DTC U0121, U2099, C0035, C0040, C0045, or C0050 is not set.
 - If any of the DTCs are set

Refer to **Diagnostic Trouble Code (DTC) List - Vehicle** .

- If none of the listed DTCs are set
- 3. Replace the K17 Electronic Brake Control Module.
- 4. Verify the DTC does not set while operating the vehicle within the Conditions for Running the DTC.
 - If the DTC sets

Replace the module that set the DTC.

- If the DTC does not set
- 5. All OK.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

Control Module References for Control Module replacement, programming and setup.

DTC B2745: TRACTION CONTROL SWITCH CIRCUIT SHORT TO GROUND

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

DTC Descriptor

DTC B2745 02

Traction Control Switch Circuit Short to Ground

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
---------	-----------------	----------------------	------------------	--------------------

Signal	B2745 02	1	1	-
Ground	-	1	-	-
1. Traction control switch inoperative				

Circuit/System Description

The body control module monitors the signal circuit from the traction control switch. When the traction control switch is pressed once, the body control module requests the electronic brake control module via serial data to disable the traction control. The electronic brake control module commands the instrument cluster via serial data to turn the traction control off indicator ON and display the Traction Control Off message on the driver information center to notify the driver of the deactivation.

When the traction control switch is pressed and held for five seconds, the body control module requests the electronic brake control module to disable the traction control and stability control. The electronic brake control module commands the instrument cluster via serial data to turn the traction control off indicator ON and the traction/stability indicator ON to notify the driver of the deactivation.

Conditions for Running the DTC

Ignition ON.

Conditions for Setting the DTC

The body control module detects a short to ground on the signal circuit.

Action Taken When the DTC Sets

The body control module ignores the traction control switch signal input.

Conditions for Clearing the DTC

- The DTC clears when the diagnostic runs and passes.
- The history DTC will clear after 40 consecutive fault-free ignition cycles have occurred.

Reference Information

Schematic Reference

Antilock Brake System Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX - SEDAN

Description and Operation

ABS Description and Operation

Electrical Information Reference

- **Circuit Testing**
- **Connector Repairs**
- **Testing for Intermittent Conditions and Poor Connections**
- **Wiring Repairs**

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

1. Ignition ON.
2. Verify the scan tool Body Control Module Traction Control Switch parameter changes between Active and Inactive when pressing and releasing the traction control switch.
 - **If the parameter does not change**

Refer to Circuit/System Testing.
 - **If the parameter changes**
3. All OK.

Circuit/System Testing

1. Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the S86 Vehicle Stability Control Switch. It may take up to 2 minutes for all vehicle systems to power down.
2. Test for less than 10 ohms between the appropriate ground circuit listed below and ground.
 - Terminal 2 (M3L)
 - Terminal 5 (MYA)
 - **If 10 ohms or greater**
 1. Ignition OFF.
 2. Test for less than 2 ohms in the ground circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, repair the open/high resistance in the ground connection.
 - **If less than 10 ohms**
3. Ignition ON.
4. Verify the scan tool Body Control Module Traction Control Switch parameter is Inactive.
 - **If not Inactive**
 1. Ignition OFF, disconnect the X2 harness connector at the K9 Body Control Module.
 2. Test for infinite resistance between the signal circuit terminal 14 and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.

- If infinite resistance, replace the K9 Body Control Module.
- **If Inactive**
- 5. Install a 3 A fused jumper wire between the circuits listed below.
 - S86 Vehicle Stability Control Switch signal terminal 1 and the ground terminal 2 (M3L)
 - S86 Vehicle Stability Control Switch signal terminal 2 and the ground terminal 5 (MYA)
- 6. Verify the scan tool Traction Control Switch parameter is Active.
 - **If not Active**
 1. Ignition OFF, disconnect the X2 harness connector at the K9 Body Control Module, ignition ON.
 2. Test for less than 1 V between the signal circuit and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V
 3. Test for less than 2 ohms in the signal circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K9 Body Control Module.
 - **If Active**
- 7. Test or replace the S86 Vehicle Stability Control Switch.

Component Testing

1. Ignition OFF, disconnect the harness connector at the S86 Vehicle Stability Control Switch.
2. Test for infinite resistance between the appropriate circuits listed below with the switch in the open position.
 - Terminal 1 and the ground terminal 2 (M3L)
 - Terminal 2 and the ground terminal 5 (MYA)
 - **If less than infinite resistance**

Replace the S86 Vehicle Stability Control Switch.
 - **If infinite resistance**
3. Test for less than 5 ohms between the signal terminal and the ground terminal listed below with the switch in the closed position.
 - Terminal 1 and the ground terminal 2 (M3L)
 - Terminal 2 and the ground terminal 5 (MYA)
 - **If 5 ohms or greater**

Replace the S86 Vehicle Stability Control Switch.
 - **If less than 5 ohms**
4. All OK.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

- **Vehicle Stability Control System Switch Replacement**
- **Control Module References** for Body Control Module replacement, programming and setup

DTC C0035, C0040, C0045, OR C0050: WHEEL SPEED SENSOR CIRCUIT

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

DTC Descriptors

DTC C0035 06

Left Front Wheel Speed Sensor Circuit Low Voltage/Open

DTC C0035 08

Left Front Wheel Speed Sensor Circuit Performance - Signal Invalid

DTC C0035 0E

Left Front Wheel Speed Sensor Circuit Low Resistance

DTC C0035 0F

Left Front Wheel Speed Sensor Circuit Signal Erratic

DTC C0035 18

Left Front Wheel Speed Sensor Circuit Low Signal Amplitude

DTC C0035 3A

Left Front Wheel Speed Sensor Circuit Incorrect Component Installed

DTC C0035 5A

Left Front Wheel Speed Sensor Circuit Not Plausible

DTC C0040 06

Right Front Wheel Speed Sensor Circuit Low Voltage/Open

DTC C0040 08

Right Front Wheel Speed Sensor Circuit Performance - Signal Invalid

DTC C0040 0E

Right Front Wheel Speed Sensor Circuit Low Resistance

DTC C0040 0F

Right Front Wheel Speed Sensor Circuit Signal Erratic

DTC C0040 18

Right Front Wheel Speed Sensor Circuit Low Signal Amplitude

DTC C0040 3A

Right Front Wheel Speed Sensor Circuit Incorrect Component Installed

DTC C0040 5A

Right Front Wheel Speed Sensor Circuit Not Plausible

DTC C0045 06

Left Rear Wheel Speed Sensor Circuit Low Voltage/Open

DTC C0045 08

Left Rear Wheel Speed Sensor Circuit Performance - Signal Invalid

DTC C0045 0E

Left Rear Wheel Speed Sensor Circuit Low Resistance

DTC C0045 0F

Left Rear Wheel Speed Sensor Circuit Signal Erratic

DTC C0045 18

Left Rear Wheel Speed Sensor Circuit Low Signal Amplitude

DTC C0045 3A

Left Rear Wheel Speed Sensor Circuit Incorrect Component Installed

DTC C0045 5A

Left Rear Wheel Speed Sensor Circuit Not Plausible

DTC C0050 06

Right Rear Wheel Speed Sensor Circuit Low Voltage/Open

DTC C0050 08

Right Rear Wheel Speed Sensor Circuit Performance - Signal Invalid

DTC C0050 0E

Right Rear Wheel Speed Sensor Circuit Low Resistance

DTC C0050 0F

Right Rear Wheel Speed Sensor Circuit Signal Erratic

DTC C0050 18

Right Rear Wheel Speed Sensor Circuit Low Signal Amplitude

DTC C0050 3A

Right Rear Wheel Speed Sensor Circuit Incorrect Component Installed

DTC C0050 5A

Right Rear Wheel Speed Sensor Circuit Not Plausible

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Left Front Wheel Speed Sensor Signal	C0035 06	C0035 06	C0035 06	C0035 0E, C0035 0F, C0035 08, C0035 18, C0035 3A, C0035 5A
Left Front Wheel Speed Sensor Low Reference	-	C0035 06	C0035 06	C0035 0E, C0035 0F, C0035 08, C0035 18, C0035 3A, C0035 5A
Right Front Wheel Speed Sensor Signal	C0040 06	C0040 06	C0040 06	C0040 0E, C0040 0F, C0040 08, C0040 18, C0040

				3A, C0040 5A
Right Front Wheel Speed Sensor Low Reference	-	C0040 06	C0040 06	C0040 0E, C0040 0F, C0040 08, C0040 18, C0040 3A, C0040 5A
Left Rear Wheel Speed Sensor Signal	C0045 06	C0045 06	C0045 06	C0045 0E, C0045 0F, C0045 08, C0045 18, C0045 3A, C0045 5A
Left Rear Wheel Speed Sensor Low Reference	-	C0045 06	C0045 06	C0045 0E, C0045 0F, C0045 08, C0045 18, C0045 3A, C0045 5A
Right Rear Wheel Speed Sensor Signal	C0050 06	C0050 06	C0050 06	C0050 0E, C0050 0F, C0050 08, C0050 18, C0050 3A, C0050 5A
Right Rear Wheel Speed Sensor Low Reference	-	C0050 06	C0050 06	C0050 0E, C0050 0F, C0050 08, C0050 18, C0050 3A, C0050 5A

Component	Condition	DTC Symptom Bytes
Wheel Speed Sensor	- Physical damage - Debris on the wheel speed sensor or the tone ring - Loose or improperly mounted sensor - Air gap between the wheel speed sensor and the tone ring too large - Water intrusion in the wiring harness	0F, 08, 18, 3A, or 5A

Circuit/System Description

The wheel speeds are detected by active wheel speed sensors. The tone ring consists of permanent magnets. Each wheel speed sensor receives signal voltage from the electronic brake control module and provides an alternating current square wave signal to the electronic brake control module. As the wheel spins, the electronic brake control module uses the frequency of the high and low signals to calculate the wheel speed.

Conditions for Running the DTC

C0035 06, C0040 06, C0045 06, and C0050 06

Ignition ON.

C0035 08, C0040 08, C0045 08, and C0050 08

- Ignition ON
- Vehicle speed is greater than 35 km/h (22 MPH).

C0035 0E, C0040 0E, C0045 0E, and C0050 0E

Vehicle speed greater than 40 km/h (25 MPH).

C0035 0F, C0040 0F, C0045 0F, and C0050 0F

- Ignition ON
- Vehicle speed is greater than 35 km/h (22 MPH).

C0035 18, C0040 18, C0045 18, and C0050 18

- Ignition ON
- Vehicle speed is greater than 10 km/h (6 MPH).

C0035 3A, C0040 3A, C0045 3A, and C0050 3A

- Ignition ON
- Vehicle speed is greater than 20 km/h (13 MPH).

C0035 5A, C0040 5A, C0045 5A, and C0050 5A

- Ignition ON
- Vehicle speed is greater than 20 km/h (13 MPH).

Conditions for Setting the DTC

C0035 06, C0040 06, C0045 06, or C0050 06

- A short to voltage, or open/high resistance is detected on the wheel speed sensor low reference circuit.
- A short to ground, open/high resistance, or short to voltage is detected on the wheel speed sensor signal circuit.

C0035 08, C0040 08, C0045 08, or C0050 08

- Electromagnetic interference with the wheel speed sensor harness.
- A missing or false wheel speed signal is detected with a change in rotational direction.

C0035 0E, C0040 0E, C0045 0E, or C0050 0E

A detection of wheel speed sensor signal noise.

C0035 0F, C0040 0F, C0045 0F, or C0050 0F

An erratic wheel speed sensor signal is detected.

C0035 18, C0040 18, C0045 18, or C0050 18

A missing wheel speed sensor signal is detected.

C0035 3A, C0040 3A, C0045 3A, or C0050 3A

The wheel speed sensor is not mounted correctly or the wrong sensor is installed.

C0035 5A, C0040 5A, C0045 5A, or C0050 5A

The difference between fastest and slowest wheel speed is greater than fifty percent.

Action Taken When the DTC Sets

- The ABS indicator turns ON.
- The traction off Indicator turns ON.
- The traction/stability control indicator turns ON.
- The Service Stabilitrak message may be displayed on the driver information center.
- The electronic brake control module disables the ABS, and the traction control and stability control for the duration of the ignition cycle.

Conditions for Clearing the DTC

- The DTC clears when the diagnostic runs and passes.
- The history DTC will clear after 40 consecutive fault-free ignition cycles have occurred.

Diagnostic Aids

- Do not use a magnet to clean the tone ring.
- Inspect the sensor and ring for rust or corrosion.
- If two or more wheel speed sensors are inoperative, diagnose each wheel speed sensor individually.
- If any of the symptom codes 0F, 08, 18, 3A, or 5A are set, refer to the Diagnostic Fault Information table for possible mechanical faults or conditions.
- If the customer comments that the ABS indicator is ON only during moist environmental conditions (rain, snow, vehicle wash, etc.), inspect the wheel speed sensor wiring for signs of water intrusion.

Reference Information

Schematic Reference

Antilock Brake System Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX - SEDAN

Description and Operation

ABS Description and Operation

Electrical Information Reference

- **Circuit Testing**
- **Connector Repairs**
- **Testing for Intermittent Conditions and Poor Connections**
- **Wiring Repairs**

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

1. Test drive the vehicle in a straight line at a speed greater than 40 km/h (25 MPH).
2. Verify all scan tool Wheel Speed Sensor parameters are within 4 km/h (2.5 MPH) of each other.
 - **If any parameter is not within 4 km/h (2.5 MPH) of each other**

Refer to Circuit/System Testing.
 - **If each parameter is within 4 km/h (2.5 MPH) of each other**
3. All OK.

Circuit/System Testing

1. Ignition OFF, disconnect the harness connector at the appropriate B5 Wheel Speed Sensor. It may take up to 2 minutes for all vehicle systems to power down.
2. Test for less than 5 ohms between the low reference circuit terminal 2 and ground.
 - **If 5 ohms or greater**
 1. Ignition OFF, disconnect the harness connector at the K17 Electronic Brake Control Module.
 2. Test for less than 2 ohms in the low reference circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K17 Electronic Brake Control Module.
 - **If less than 5 ohms**
3. Ignition ON.
4. Test for greater than 11 V between the signal circuit terminal 1 and ground.
 - **If less than 11 V**
 1. Ignition OFF, disconnect the harness connector at the K17 Electronic Brake Control Module.

2. Test for infinite resistance between the signal circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance.
3. Test for less than 2 ohms in the signal circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K17 Electronic Brake Control Module.
 - **If 11 V or greater**
5. Install a 3 A fused jumper wire at the signal circuit terminal 1, ignition ON.
6. Verify the scan tool Wheel Speed Sensor parameter changes while rapidly tapping the fused jumper wire to the low reference circuit terminal 2.
 - **If the parameter does not change**
 1. Ignition OFF, disconnect the harness connector at the K17 Electronic Brake Control Module, ignition ON.
 2. Test for less than 1 V between the signal circuit and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V
 3. Replace the K17 Electronic Brake Control Module.
 - **If the parameter changes**
7. Test or replace the B5 Wheel Speed Sensor.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

- **Front Wheel Speed Sensor Replacement**
- **Rear Wheel Speed Sensor Replacement**
- **Control Module References** for Electronic Brake Control Module replacement, programming and setup

DTC C0060-C0095, C0131, C0141, C0146, C0151, OR C0156: ANTILOCK BRAKING SYSTEM SOLENOID/TRACTION CONTROL SYSTEM PRESSURE CIRCUIT

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

DTC Descriptors

DTC C0060 00

Left Front Antilock Braking System Solenoid

DTC C0065 00

Left Front Antilock Brake System Solenoid 2

DTC C0070 00

Right Front Antilock Braking System Solenoid

DTC C0075 00

Right Front Antilock Brake System Solenoid 2

DTC C0080 00

Left Rear Antilock Braking System Solenoid

DTC C0085 00

Left Rear Antilock Brake System Solenoid 2

DTC C0090 00

Right Rear Antilock Braking System Solenoid

DTC C0095 00

Right Rear Antilock Brake System Solenoid 2

DTC C0131 00

Traction Control System Pressure Circuit

DTC C0131 5A

Traction Control System Pressure Circuit Not Plausible

DTC C0141 00

Traction Control Left Front Prime Solenoid Valve

DTC C0146 00

Traction Control Left Front/Right Rear Isolation

DTC C0151 00

Traction Control Right Front Prime Solenoid Valve

DTC C0156 00

Traction Control Right Front/Left Rear Isolation

Circuit/System Description

The valve relay is located within the electronic brake control module and supplies battery voltage to all of the solenoid valves when commanded On. The solenoid valves are integral parts of the brake pressure modulator. The brake pressure modulator contains an isolation solenoid valve and a dump solenoid valve for each wheel. It also contains a traction/stability control prime solenoid valve and isolation solenoid valve for each brake circuit. The solenoid valves are not engaged during normal system operation. When the ABS, the traction/stability operation is required the electronic brake control module turns the required solenoid valves ON or OFF.

Conditions for Running the DTC

- The valve relay is commanded ON.
- The ignition voltage is greater than 10 V.
- Ignition ON begins the initialization of the brake system power-up self test.
- Drive the vehicle at speeds greater than 16 km/h (10 MPH) to complete the active brake system test.

Conditions for Setting the DTC

- The electronic brake control module detects a valve or solenoid malfunction.
- The electronic brake control module detects an open in the B+ circuit to the valve relay.

Action Taken When the DTC Sets

- The ABS Indicator turns ON.
- The traction/stability control indicator turns ON.
- The electronic brake control module disables the ABS, and the traction/stability for the duration of the ignition cycle.

Conditions for Clearing the DTC

- When the condition for setting the DTC is no longer present.
- The history DTC will clear after 40 consecutive fault-free ignition cycles have occurred.

Reference Information

Schematic Reference

Antilock Brake System Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX - SEDAN

Description and Operation

ABS Description and Operation

Electrical Information Reference

- **Circuit Testing**
- **Connector Repairs**
- **Testing for Intermittent Conditions and Poor Connections**
- **Wiring Repairs**

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Testing

1. Ignition ON.
2. Verify that DTC C0060, C0065, C0070, C0075, C0080, C0085, C0090, C0095, C0131, C0141, C0146, C0151, or C0156 is not set.
 - **If any of the DTCs are set**

Replace the K17 Electronic Brake Control Module with the Brake Pressure Modulator.

- **If none of the DTCs are set**
3. All OK.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

- **Brake Pressure Modulator Valve Replacement**
- **Control Module References** for electronic brake control module replacement, programming and setup

DTC C0110: PUMP MOTOR: PUMP MOTOR

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

DTC Descriptors

DTC C0110 00

Pump Motor Circuit Malfunction

DTC C0110 04

Pump Motor Circuit Open

DTC C0110 61

Pump Motor Stuck

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
B+	C0110 00, C0110 04	C0110 00, C0110 04	-	C0110 61
Ground	-	U0121	-	-

Component	Condition	DTCs
Pump Motor	• Wear • Damage • Lock	C0110 00 or C0110 61

Circuit/System Description

The pump motor is an integral part of the brake pressure modulator, while the pump motor relay is integral to the electronic brake control module. The pump motor relay is not engaged during normal system operation. When the ABS, and the traction/stability operation is required, the electronic brake control module activates the pump motor relay and turns the pump motor ON.

Conditions for Running the DTC

Ignition ON.

Conditions for Setting the DTC

- A faulty pump motor or pump motor relay is detected.
- A short to ground or an open/high resistance circuit is detected.

Action Taken When the DTC Sets

- The ABS indicator turns ON.
- The traction/stability control indicator turns ON.
- The electronic brake control module disables the ABS, the traction control, and the stability control for the duration of the ignition cycle.

Conditions for Clearing the DTC

- A current DTC clears when the diagnostic runs and passes.
- The electronic brake control module will turn off the indicators and enable the system functions in the next ignition cycle after driving at a speed of greater than 16 km/h (10 MPH) with no faults detected.

Reference Information

Schematic Reference

Antilock Brake System Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX - SEDAN

Description and Operation

ABS Description and Operation

Electrical Information Reference

- Circuit Testing
- Connector Repairs
- Testing for Intermittent Conditions and Poor Connections
- Wiring Repairs

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

1. Ignition ON.
2. Verify the ABS Pump Motor turns ON and OFF when commanding the ABS Pump Motor Increase and Decrease with a scan tool.

- **If the pump motor does not turn ON and OFF**

Refer to Circuit/System Testing.

- **If the pump motor turns ON and OFF**

3. All OK.

Circuit/System Testing

1. Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the K17 Electronic Brake

Control Module. It may take up to 2 minutes for all vehicle systems to power down.

2. Test for less than 10 ohms between the ground circuit terminal 13 and ground.
 - **If 10 ohms or greater**
 1. Ignition OFF.
 2. Test for less than 2 ohms in the ground circuit end to end.
 - If 2 ohms or greater, repair the open high/resistance in the circuit.
 - If less than 2 ohms, repair open high/resistance in the ground connection.
 - **If less than 10 ohms**
3. Ignition ON.
4. Verify that a test lamp illuminates between the B+ circuit terminal 1 and ground.
 - **If the test lamp does not illuminate and the circuit fuse is good**
 1. Ignition OFF.
 2. Test for less than 2 ohms in the B+ circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, verify the fuse is not open and there is voltage at the fuse.
 - **If the test lamp does not illuminate and the circuit fuse is open**
 1. Ignition OFF.
 2. Test for infinite resistance between the B+ circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the K17 Electronic Brake Control Module.
 - **If the test lamp illuminates**
5. Replace the Q5 Brake Pressure Modulator.
6. Verify the DTC does not set while operating the vehicle within the Conditions for Running the DTC.
 - **If the DTC sets**

Replace the K17 Electronic Brake Control Module.
 - **If the DTC does not set**
7. All OK.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

- **Brake Pressure Modulator Valve Replacement**
- **Control Module References** for Electronic Brake Control Module replacement, programming and setup

DTC C0131: TRACTION CONTROL SYSTEM PRESSURE CIRCUIT

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

DTC Descriptors

DTC C0131 00

Traction Control System Pressure Circuit

DTC C0131 5A

Traction Control System Pressure Circuit Not Plausible

Circuit/System Description

The electronic brake control module monitors the brake pressure sensor which is integral to the brake pressure modulator. The body control module monitors the brake pedal position sensor signal when the brake pedal is applied and sends a serial data message to the electronic brake control module indicating the brake pedal position. The electronic brake control module compares the brake pressure to the actual brake pedal position and uses this information for vehicle stability control.

Conditions for Running the DTC

Ignition ON.

Conditions for Setting the DTC

C0131 00

The electronic brake control module detects the brake pressure is out of the specified range.

C0131 5A

- The brake pressure sensor offset is out of the specified range.
- The electronic brake control module detected an invalid or erratic brake pressure.
- The brake pressure is not plausible with the vehicle acceleration or deceleration.

Action Taken When the DTC Sets

- The traction/stability control indicator turns ON.
- The electronic brake control module disables the traction/stability for the duration of the ignition cycle.

Conditions for Clearing the DTC

- The DTC clears when the diagnostic runs and passes.

- The history DTC will clear after 40 consecutive fault-free ignition cycles have occurred.

Reference Information

Schematic Reference

Antilock Brake System Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX - SEDAN

Description and Operation

ABS Description and Operation

Electrical Information Reference

- Circuit Testing
- Connector Repairs
- Testing for Intermittent Conditions and Poor Connections
- Wiring Repairs

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

1. Ignition ON.
2. Apply and release brake pedal. Verify the brake stop lamps operate properly.
 - **If the brake stop lamps do not operate properly**

Refer to Symptoms - Lighting .

- **If the brake stop lamps operate properly**
3. Verify that DTC C0131 is not set.
 - **If the DTC is set**
 1. Perform the Brake Pressure Modulator Valve Pressure Sensor Calibration.
 2. Verify the DTC does not set.
 - If the DTC sets, replace the Q5 Brake Pressure Modulator.
 - If the DTC does not set
 3. All OK.
 - **If the DTC is not set**

4. All OK.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

- **Brake Pressure Modulator Valve Replacement**
- **Control Module References** for Electronic Brake Control Module replacement, programming and setup

DTC C0161: ANTILOCK BRAKING SYSTEM BRAKE SWITCH CIRCUIT NOT PLAUSIBLE

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

DTC Descriptor

DTC C0161 5A

Antilock Braking System Brake Switch Circuit Not Plausible

Circuit/System Description

When the brake pedal is applied, the body control module sends a serial data message to the electronic brake control module in reference to the brake pedal positions. The electronic brake control module compares the correlation between the brake pedal position and the amount of brake pressure it senses from the brake pressure sensor, which is internal to the brake pressure modulator. It uses this information to control the vehicle during an stability event.

Conditions for Running the DTC

Ignition ON.

Conditions for Setting the DTC

- The electronic brake control module detects four accelerations from standstill to a vehicle speed greater 40 km/h (26 MPH) without any brake pedal position signal changes.
- The electronic brake control module detects the vehicle speed is greater than 20 km/h (13 MPH), the brake pedal is applied for six minutes, and brake pressure is less than 15 bar (218 PSI).

Conditions for Clearing the DTC

A current DTC clears when the diagnostic runs and passes.

Action Taken When the DTC Sets

No actions are taken

Diagnostic Aids

This DTC may set if the brake pedal is applied while accelerating.

Reference Information

Schematic Reference

Antilock Brake System Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX - SEDAN

Description and Operation

ABS Description and Operation

Electrical Information Reference

- **Circuit Testing**
- **Connector Repairs**
- **Testing for Intermittent Conditions and Poor Connections**
- **Wiring Repairs**

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

1. Ignition ON.
2. Verify DTC C0277 or C0890 is not set.
 - **If either DTC is set**

Refer to **DTC C0277 or C0890** .

- **If either DTC is not set**

3. Verify the brake pedal position sensor or the brake pedal is not binding causing residual brake pressure to be detected, while the brake lights operate properly.
 - **If a condition is found**

Repair or replace the applicable component.

- **If a condition is not found**
- 4. Verify the scan tool Electronic Brake Control Module Brake Pedal Position Sensor parameter changes between Active and Inactive while applying and releasing the brake pedal.
 - **If the parameter does not change between Active and Inactive**

Refer to **Symptoms - Lighting** .

- **If the parameter changes between Active and Inactive**
- 5. Refer to Diagnostic Aids, All OK.

DTC C0186, C018B, C0196, C019B, C027E, OR C0287 (WITH UGN): LATERAL ACCELERATION SENSOR/YAW RATE SIGNAL/LONGITUDINAL ACCELERATION SENSOR

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

DTC Descriptors

DTC C0186 5A

Lateral Acceleration Sensor Signal Not Plausible (Electronic Brake Control Module)

DTC C0186 71

Lateral Acceleration Sensor Signal Invalid Data (Electronic Brake Control Module)

DTC C018B 5A

Lateral Acceleration Sensor Signal Not Plausible (Multi-axis Acceleration Sensor Module)

DTC C0196 00

Yaw Rate Signal Malfunction (Electronic Brake Control Module)

DTC C0196 5A

Yaw Rate Signal Not Plausible (Electronic Brake Control Module)

DTC C0196 71

Yaw Rate Signal Invalid Data (Electronic Brake Control Module)

DTC C019B 5A

Yaw Rate Signal Not Plausible (Multi-axis Acceleration Sensor Module)

DTC C027E 5A

Longitudinal Acceleration Sensor Signal Not Plausible (Multi-axis Acceleration Sensor Module)

DTC C0287 4B

Longitudinal Acceleration Sensor Signal Calibration Not Learned (Electronic Brake Control Module)

DTC C0287 5A

Longitudinal Acceleration Sensor Signal Not Plausible (Electronic Brake Control Module)

DTC C0287 71

Longitudinal Acceleration Sensor Signal Invalid Data (Electronic Brake Control Module)

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Ignition	U0125, U0126, C0186 71, C0196 71, C0287 71	U0125, U0126, C0186 71, C0196 71, C0287 71	-	C0186 5A, C0196 5A
Ground	-	U0125, U0126, C0186 71, C0196 71, C0287 71	-	C0186 5A, C0196 5A

Circuit/System Description

The yaw rate, lateral acceleration and longitudinal acceleration sensors are combined into one multi-axis acceleration sensor, external to the electronic brake control module. The electronic brake control module supplies ignition voltage to the multi-axis acceleration sensor. The multi-axis acceleration sensor communicates with the electronic brake control module via serial data. The electronic brake control module activates the ABS, the traction control and the stability control depending on the multi-axis acceleration sensor input.

Conditions for Running the DTC

- Ignition ON begins the initialization of the brake system power-up self test.
- Drive the vehicle at speeds greater than 16 km/h (10 MPH) to complete the active brake system test.

Conditions for Setting the DTC

C0186 00 or C018B 5A

The lateral acceleration signal is out of the specified range.

C0186 5A

The lateral acceleration signal is not plausible with the yaw rate signal, steering angle signal and vehicle speed.

C0186 71

- The electronic brake control module received an invalid lateral acceleration signal.
- An open/high resistance is detected on the multi-axis acceleration ground circuit.
- A short to ground or open/high resistance is detected on the multi-axis acceleration ignition circuit.

C0196 00 or C019B 5A

The yaw rate signal is out of the specified range.

C0196 5A

- The yaw rate signal offset is out of the specified range.
- The yaw rate signal is not plausible with the lateral acceleration signal, the steering angle signal and the vehicle speed.

C0196 71

- A short to ground or open/high resistance is detected on the ignition circuit.
- The electronic brake control module received an invalid lateral acceleration signal.
- An open/high resistance is detected on the multi-axis acceleration ground circuit.

C027E 5A

The longitudinal acceleration signal is not plausible.

C0287 4B

The longitudinal acceleration sensor is not calibrated.

C0287 5A

The longitudinal acceleration signal is not plausible with the vehicle speed.

C0287 71

- An open/high resistance is detected on the multi-axis acceleration ground circuit.
- The electronic brake control module received an invalid longitudinal acceleration signal.
- A short to ground or open/high resistance is detected on the multi-axis acceleration ignition circuit.

Action Taken When the DTC Sets

- The adaptive cruise control is inhibited.
- The traction control Off indicator turns ON.
- The traction/stability control indicator turns ON.
- A Traction Control Off message may be displayed.
- A Service Stabilitrak message may be displayed.
- The electronic brake control module disables the traction control and the stability control for the duration of the ignition cycle.

Conditions for Clearing the DTC

- The DTC clears when the diagnostic runs and passes.
- The history DTC will clear after 40 consecutive fault-free ignition cycles have occurred.

Reference Information

Schematic Reference

Antilock Brake System Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX - SEDAN

Description and Operation

ABS Description and Operation

Electrical Information Reference

- Circuit Testing
- Connector Repairs
- Testing for Intermittent Conditions and Poor Connections
- Wiring Repairs

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Testing

1. Ignition ON.
2. Verify DTC C0186 5A, C018B 5A, C0196 5A, C019B 5A, C027E 5A, C0287 4B, or C0287 5A is not set.

- **If any of the DTCs are set**

1. Perform the **Vehicle Yaw Sensor Learn** procedures to complete the learn.
2. Verify the DTC does not set while operating the vehicle within the Conditions for Running the DTC.
 - If the DTC sets, replace the K17 Electronic Brake Control Module.
 - If the DTC does not set

3. All OK.

- **If none of the DTCs are set**

3. Verify the B119 Multi-axis Acceleration Sensor is installed correctly.

- **If loose or incorrect installation**

Correct the installation of the component.

- **If installed correctly**

4. Ignition OFF, all vehicle system OFF, and the scan tool disconnected, disconnect the harness connector at the B119 Multi-axis Acceleration Sensor. It may take up to 2 min for all vehicle systems to power down.
5. Test for less than 10 ohms between the ground circuit terminal 6 and ground.

- **If 10 ohms or greater**

1. Ignition OFF.
2. Test for less 2 ohms in the ground circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, repair the open/high resistance in the ground connection.

- **If less than 10 ohms**

6. Ignition ON.

7. Verify a test lamp illuminates between the ignition circuit terminal 5 and ground.

- **If the test lamp does not illuminate**

1. Ignition OFF, disconnect the harness connector at the K17 Electronic Brake Control Module.
2. Test for infinite resistance between the ignition circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
3. Test for less than 2 ohms in the ignition circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K17 Electronic Brake Control Module.

- **If the test lamp illuminates**

8. Replace the B119 Multi-axis Acceleration Sensor.

9. Verify the DTC does not set while operating the vehicle within the Conditions for Running the DTC.

- **If the DTC sets**

Replace the K17 Electronic Brake Control Module.

- If the DTC does not set

10. All OK.

Repair Instructions

Perform the Diagnostic Repair Verification after completing the repair.

- Vehicle Yaw Sensor with Vehicle Lateral and Longitudinal Accelerometer Replacement
- Control Module References for Electronic Brake Control Module replacement, programming and setup

DTC C0186, C0196, OR C0287 (WITHOUT UGN): : LATERAL ACCELERATION SENSOR/YAW RATE SIGNAL/LONGITUDINAL ACCELERATION SENSOR

Diagnostic Instructions

- Perform the Diagnostic System Check - Vehicle prior to using this diagnostic procedure.
- Review Strategy Based Diagnosis for an overview of the diagnostic approach.
- Diagnostic Procedure Instructions provides an overview of each diagnostic category.

DTC Descriptors

DTC C0186 00

Lateral Acceleration Sensor Signal Malfunction (Inflatable Restraint Sensing and Diagnostic Module)

DTC C0186 4B

Lateral Acceleration Sensor Signal Calibration Not Learned (Electronic Brake Control Module)

DTC C0186 5A

Lateral Acceleration Sensor Signal Not Plausible (Electronic Brake Control Module)

DTC C0186 71

Lateral Acceleration Sensor Signal Invalid Data (Electronic Brake Control Module)

DTC C0196 00

Yaw Rate Signal Malfunction (Electronic Brake Control Module and/or Inflatable Restraint Sensing and Diagnostic Module)

DTC C0196 5A

Yaw Rate Signal Not Plausible (Electronic Brake Control Module)

DTC C0196 71

Yaw Rate Signal Invalid Data (Electronic Brake Control Module)

DTC C0287 00

Longitudinal Acceleration Sensor Malfunction (Inflatable Restraint Sensing and Diagnostic Module)

DTC C0287 4B

Longitudinal Acceleration Sensor Signal Calibration Not Learned (Electronic Brake Control Module)

DTC C0287 5A

Longitudinal Acceleration Sensor Signal Not Plausible (Electronic Brake Control Module)

DTC C0287 71

Longitudinal Acceleration Sensor Signal Invalid Data (Electronic Brake Control Module)

Circuit/System Description

The yaw rate, lateral acceleration and longitudinal acceleration sensors are combined into one multi-axis acceleration sensor, internal to the inflatable restraint sensing and diagnostic module. The multi-axis acceleration sensor communicates with the electronic brake control module via serial data. The electronic brake control module activates the stability control function depending on the multi-axis acceleration sensor input. The inflatable restraint sensing and diagnostic module uses the multi-axis acceleration sensor to determine if the vehicle is in a roll over or near collision incident.

Conditions for Running the DTC

Ignition ON.

Conditions for Setting the DTC

C0186 00

The lateral acceleration signal is out of the specified range.

C0186 4B

The lateral acceleration sensor is not calibrated.

C0186 5A

The lateral acceleration signal is not plausible with the yaw rate signal, steering angle signal and vehicle speed.

C0186 71

- The electronic brake control module received an invalid lateral acceleration signal.
- An open/high resistance is detected on the multi-axis acceleration signal ground circuit.
- A short to ground or open/high resistance is detected on the multi-axis acceleration ignition circuit.

C0196 00

The yaw rate signal is out of the specified range.

C0196 5A

- The yaw rate signal offset is out of the specified range.
- The yaw rate signal is not plausible with the lateral acceleration signal, the steering angle signal and the vehicle speed.

C0196 71

- A short to ground or open/high resistance is detected on the ignition circuit.
- The electronic brake control module received an invalid lateral acceleration signal.
- An open/high resistance is detected on the multi-axis acceleration signal ground circuit.

C0287 00

The longitudinal acceleration signal is out of the specified range.

C0287 4B

The longitudinal acceleration sensor is not calibrated.

C0287 5A

The longitudinal acceleration signal is not plausible with the vehicle speed.

C0287 71

- The electronic brake control module received an invalid longitudinal acceleration signal.
- An open/high resistance is detected on the multi-axis acceleration signal ground circuit.
- A short to ground or open/high resistance is detected on the multi-axis acceleration signal.

Action Taken When the DTC Sets

C0186 00, C0196 00 and C287 00 set in Inflatable Restraint Sensing and Diagnostic Module

- The Air Bag Indicator turns ON.
- The traction/stability control Off Indicator turns ON.
- The electronic brake control module disables the traction/stability for the duration of the ignition cycle.

C0186 4B, C0186 5A, C0186 71, C0196 00, C0196 5A, C0196 71, C0287 4B, C0287 5A, and C0287 71 set in Electronic Brake Control Module

- The traction/stability control Off indicator turns ON.
- The electronic brake control module disables the traction/stability for the duration of the ignition cycle.

Conditions for Clearing the DTC

- The DTC clears when the diagnostic runs and passes.
- The history DTC will clear after 40 consecutive fault-free ignition cycles have occurred.

Reference Information

Schematic Reference

Antilock Brake System Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX - SEDAN

Description and Operation

ABS Description and Operation

Electrical Information Reference

- **Circuit Testing**
- **Connector Repairs**
- **Testing for Intermittent Conditions and Poor Connections**
- **Wiring Repairs**

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

1. Ignition ON.
2. Perform the **Vehicle Yaw Sensor Learn** procedures to complete the learn.
3. Verify DTC C0186, C0196, or C0287 is not set in the K36 Inflatable Restraint Sensing and Diagnostic Module.
 - **If any of the DTCs are set**

Replace the K36 Inflatable Restraint Sensing and Diagnostic Module

- **If none of the DTCs are set**
- 4. Verify DTC C0186, C0196, or C0287 is not set in the K17 Electronic Brake Control Module.
 - **If any of the DTCs are set**
 - 1. Replace the K36 Inflatable Restraint Sensing and Diagnostic Module.
 - 2. Verify the DTC does not set while operating the vehicle within the Conditions for Running the DTC.
 - If the DTC sets, replace the K17 Electronic Brake Control Module.
 - If the DTC does not set
 - 3. All OK.
 - **If none of the DTCs are set**
- 5. All OK.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

Control Module References for Electronic Brake Control Module or Inflatable Restraint Sensing and Diagnostic Module replacement, programming and setup

DTC C025F: : LATERAL ACCELERATION SENSOR/YAW RATE SIGNAL/LONGITUDINAL ACCELERATION SENSOR

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

DTC Descriptors

DTC C025F 00

Brake Master Cylinder Inlet and Isolation Valves Calibration Not Learned

Circuit/System Description

The solenoid valves are integral parts of the brake pressure modulator that may require calibration. The brake pressure modulator contains an isolation solenoid valve and a dump solenoid valve for each wheel and a traction/stability control supply solenoid valve and isolation solenoid valve for each brake circuit. The solenoid valves are not engaged during normal system operation. When the ABS, the traction, or the stability control operation is required the electronic brake control module turns the required solenoid ON.

Conditions for Running the DTC

Ignition ON

Conditions for Setting the DTC

The isolation solenoid valves are not learned.

Action Taken When the DTC Sets

- The ABS Indicator turns ON.
- The traction/stability control indicator turns ON.
- The electronic brake control module disables the ABS, the traction, and the stability control for the duration of the ignition cycle.

Conditions for Clearing the DTC

The condition for setting the DTC is no longer present.

Reference Information

Schematic Reference

Antilock Brake System Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX - SEDAN

Description and Operation

ABS Description and Operation

Electrical Information Reference

- **Circuit Testing**
- **Connector Repairs**
- **Testing for Intermittent Conditions and Poor Connections**
- **Wiring Repairs**

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

1. Ignition ON.
2. Verify that DTC C0187, C018B, C0196, C019B, or C0710 is not set.
 - **If any of the DTCs are set**

Refer to **Diagnostic Trouble Code (DTC) List - Vehicle** .

- **If none of the DTCs are set**

3. Ignition OFF, allow the hydraulic Brake Pressure Modulator to cool down to ambient temperature.
4. Ignition ON.
5. Verify that DTC C056D 00, C025F 00, or C0274 4B is not set.

- **If any of the DTCs are set**

Reprogram the K17 Electronic Brake Control Module.

- **If none of the DTCs are set**

6. Verify that no DTCs set while driving the vehicle within normal braking conditions.

- **If any of the DTCs are set**

Replace the K17 Electronic Brake Control Module with Brake Pressure Modulator.

- **If none of the DTCs are set**

7. All OK.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

- **Brake Pressure Modulator Valve Replacement**
- **Control Module References** for electronic brake control module replacement, programming and setup

DTC C0280: STABILITY SYSTEM ACTIVE TOO LONG MALFUNCTION

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

DTC Descriptors

DTC C0280

Stability System Active Too Long Malfunction

For symptom byte information, refer to **Symptom Byte List**

Circuit/System Description

The solenoid valves are integral parts of the brake pressure modulator valve. The brake pressure modulator

valve contains an isolation solenoid valve and a dump solenoid valve for each wheel and a traction/ stability control supply solenoid valve and isolation solenoid valve for each brake circuit. The solenoid valves are not engaged during normal system operation. When the ABS, the traction control or the stability control operation is required the electronic brake control module turns the required solenoid valves ON.

Conditions for Running the DTC

- Ignition ON
- Vehicle speed is greater than 22 km/h (13.7 MPH).

Conditions for Setting the DTC

Calculated solenoid valve temperature is greater than threshold.

Action Taken When the DTC Sets

- The ABS indicator turns ON.
- The traction/stability control indicator turns ON.
- A driver information center message may be displayed.
- The electronic brake control module disables the ABS, the traction control, the stability control, and the hill start assist for the duration of the ignition cycle.

Conditions for Clearing the DTC

The condition for setting the DTC is no longer present.

Diagnostic Aids

This DTC may set due to extended operation of the ABS, the traction control or the stability control system.

Reference Information

Schematic Reference

Antilock Brake System Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX - SEDAN

Description and Operation

ABS Description and Operation

Electrical Information Reference

- **Circuit Testing**

- **Connector Repairs**
- **Testing for Intermittent Conditions and Poor Connections**
- **Wiring Repairs**

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Testing

NOTE: Since most occurrences of this DTC are caused by excessive ABS, traction control, or stability control usage, review with the customer the conditions under which the DTC set.

1. Ignition ON.
2. Verify that DTC C0186, C0196, C0287, or C0710 is not set.
 - **If any of the DTCs are set**

Refer to **Diagnostic Trouble Code (DTC) List - Vehicle** .

- **If none of the DTCs are set**
3. Ignition OFF, allow the hydraulic brake modulator valve to cool down to ambient temperature, ignition ON.
 4. Verify the DTC does not set while driving the vehicle under normal braking conditions.
 - **If the DTC sets**
 1. Replace the Q5 Brake Pressure Modulator.
 2. Verify DTC C0280 does not set while driving the vehicle under normal braking conditions.
 - If the DTC does set, replace the K17 Electronic Brake Control Module.
 - If the DTC does not set.
 - 3. All OK.
 - **If the DTC does not set**
 5. All OK.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

- **Brake Pressure Modulator Valve Replacement**
- **Control Module References** for Electronic Brake Control Module replacement, programming and setup.

DTC C0710: STEERING POSITION SIGNAL

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

DTC Descriptor

DTC C0710 42

Steering Position Signal Calibration Not Programmed

DTC C0710 5A

Steering Position Signal Not Plausible

DTC C0710 71

Steering Position Signal Invalid Data

DTC C0710 7F

Steering Position Bus Signal Erratic

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Ignition	U0125, U0126	U0125, U0126	-	C0710 5A, C0710 42, C0710 71, C0710 7F
Ground	-	U0126, C0710.71	-	-

Circuit/System Description

The Steering Wheel Angle Sensor receives ignition voltage from the Electronic Brake Control Module. The Electronic Brake Control Module receives serial data message inputs from the Steering Wheel Angle Sensor identifying the position and direction of the steering wheel rotation. It utilizes this signal to calculate the driver intended driving direction.

Conditions for Running the DTC

- Ignition ON.
- The steering wheel needs to be turned 15° or greater in either direction.

Conditions for Setting the DTC

C0710 42

The Steering Wheel Angle Sensor is not learned.

C0710 5A

The Steering Wheel Angle Signal is not plausible with the Yaw Rate Signal and Lateral Acceleration Signal.

C0710 71

The Steering Wheel Angle Signal is invalid.

C0710 7F

The Steering Wheel Angle Signal is erratic on the bus.

Action Taken When the DTC Sets

- A service message may be displayed.
- The Traction/stability Control indicator Off turns ON.
- The Electronic Brake Control Module disables the Traction/stability for the duration of the ignition cycle.

Conditions for Clearing the DTC

- The DTC clears when the diagnostic runs and passes.
- The history DTC will clear after 40 consecutive fault-free ignition cycles have occurred.

Diagnostic Aids

- Improperly mounted or loose Steering Wheel Angle Sensor.
- The car should not pull in either direction causing the steering wheel to be off center while driving in a straight line on a level surface.
- Confirm that all tires are of the proper size and that all are matching brands. Check and adjust all tires to the stated cold air pressure as identified on the tire placard. If a mis-sized or non-matching brand tire is present, inform the customer that in order for the vehicle stability enhanced system to function normally, tires need to be a uniform size and rolling diameter.

Reference Information

Schematic Reference

Antilock Brake System Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX - SEDAN

Description and Operation

ABS Description and Operation

Electrical Information Reference

- **Circuit Testing**
- **Connector Repairs**
- **Testing for Intermittent Conditions and Poor Connections**
- **Wiring Repairs**

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

1. Ignition ON.
2. Verify the scan tool Steering Column Position parameter corresponds to the actual steering position as the steering wheel is turned through its entire range of motion between -700° and +700°.
 - **If the parameter does not correspond with the steering wheel position or the reading is erratic**

Refer to Circuit/System Testing.
 - **If the parameter reading corresponds with the steering wheel position**
3. All OK.

Circuit/System Testing

1. Ignition ON.
2. Verify that DTC U0125 or U0126 is not set.
 - **If either DTC is set**

Refer to **Diagnostic Trouble Code (DTC) List - Vehicle** .
 - **If none of the DTCs are not set**
3. Verify that DTC C0710 42 is not set.
 - **If the DTC is set**

Refer to **Steering Angle Sensor Centering**.
 - **If the DTC is not set**
4. Verify the B99 Steering Wheel Angle Sensor is installed correctly.
 - **If loose or incorrect installation**

Correct the installation or replace the component.

- **If correct installation**
- 5. Ignition OFF and all vehicle systems OFF with the scan tool disconnected, disconnect the harness connector at the B99 Steering Wheel Angle Sensor. It may take up to 2 minutes for all vehicle systems to power down.
- 6. Test for less than 10 ohms between the ground circuit terminal 6 and ground.
 - **If 10 ohms or greater**
 1. Ignition OFF.
 2. Test for less than 2 ohms in the ground circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, repair the open/high resistance in the ground connection.
 - **If less than 10 ohms**
- 7. Ignition ON.
- 8. Verify a test lamp illuminates between the ignition circuit terminal 5 and ground.
 - **If the test lamp does not illuminate**
 1. Ignition OFF, disconnect the harness connector at the K17 Electronic Brake Control Module.
 2. Test for infinite resistance between the ignition circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
 3. Test for less than 2 ohms in the ignition circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K17 Electronic Brake Control Module.
 - **If the test lamp illuminates**
- 9. Replace the B99 Steering Wheel Angle Sensor.
- 10. Ignition ON.
- 11. Verify that DTC C0710 is not set.
 - **If the DTC is set**

Refer to **Steering Angle Sensor Centering.**
 - **If the DTC is not set**
- 12. Verify the DTC does not set while operating the vehicle within the Conditions for Running the DTC.
 - **If the DTC sets**

Replace the K17 Electronic Brake Control Module.
 - **If the DTC does not set**
- 13. All OK.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

- **Steering Angle Sensor Replacement**
- **Control Module References** for Electronic Brake Control Module replacement, programming and setup

DTC C124F, C1250, OR C1251: LATERAL ACCELERATION SENSOR

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

DTC Descriptors

DTC C124F

Lateral Acceleration Sensor Circuit Low Voltage

DTC C1250

Lateral Acceleration Sensor Circuit High Voltage

DTC C1251

Lateral Acceleration Sensor Performance

For symptom byte information refer to **Symptom Byte List** .

Circuit/System Description

The yaw rate, lateral acceleration and longitudinal acceleration sensors are combined into one multi-axis acceleration sensor, internal to the inflatable restraint sensing and diagnostic module. The multi-axis acceleration sensor communicates with the electronic brake control module and trans control module via serial data. The electronic brake control module activates the stability control function depending on the multi-axis acceleration sensor input. The inflatable restraint sensing and diagnostic module uses the multi-axis acceleration sensor to determine if the vehicle is in a roll over or near collision incident. The transmission control module sets these DTCs.

Conditions for Running the DTC

Vehicle speed is greater than 16 km/h (10 MPH).

Conditions for Setting the DTC

The transmission control module detects a fault that prevents it from performing a hill hold start assist function.

Action Taken When the DTC Sets

- The air bag indicator turns ON.
- The traction/stability control indicator turns ON.
- The electronic brake control module disables the stability control and the hill hold start assist for the duration of the ignition cycle.

Conditions for Clearing the DTC

- The DTC clears when the diagnostic runs and passes.
- The history DTC will clear after 40 consecutive fault-free ignition cycles have occurred.

Reference Information

Schematic Reference

Antilock Brake System Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX - SEDAN

Description and Operation

ABS Description and Operation

Electrical Information Reference

- Circuit Testing
- Connector Repairs
- Testing for Intermittent Conditions and Poor Connections
- Wiring Repairs

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

1. Ignition ON.
2. Verify that no other DTCs are set.
 - If any other DTCs are set

Refer to Diagnostic Trouble Code (DTC) List - Vehicle .

- If no other DTCs are set

3. Replace the K71 Transmission Control Module.
4. Verify that the DTC does not set while operating the vehicle within the Conditions for Running the DTC.
 - **If the DTC sets**

Replace the K17 Electronic Brake Control Module.

- **If the DTC does not set**
5. All OK.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

Control Module References for electronic brake control module or transmission control module replacement, programming and setup

DTC C124F OR C1250-C1254: LATERAL ACCELERATION SENSOR/LONGITUDINAL ACCELERATION SENSOR

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

DTC Descriptors

DTC C124F

Lateral Acceleration Sensor Circuit Low Voltage

DTC C1250

Lateral Acceleration Sensor Circuit High Voltage

DTC C1251

Lateral Acceleration Sensor Performance

DTC C1252

Longitudinal Acceleration Sensor Circuit Low Voltage

DTC C1253

Longitudinal Acceleration Sensor Circuit High Voltage

DTC C1254

Longitudinal Acceleration Sensor Performance

For symptom byte information refer to **Symptom Byte List** .

Circuit/System Description

The yaw rate, lateral acceleration and longitudinal acceleration sensors are combined into one multi-axis acceleration sensor, internal to the inflatable restraint sensing and diagnostic module. The multi-axis acceleration sensor communicates with the electronic brake control module and trans control module via serial data. The electronic brake control module activates the stability control function depending on the multi-axis acceleration sensor input. The inflatable restraint sensing and diagnostic module uses the multi-axis acceleration sensor to determine if the vehicle is in a roll over or near collision incident. The transmission control module sets these DTCs.

Conditions for Running the DTC

Vehicle speed is greater than 16 km/h (10 MPH).

Conditions for Setting the DTC

The transmission control module detects a fault that prevents it from performing a hill hold start assist function.

Action Taken When the DTC Sets

- The air bag indicator turns ON.
- The traction/stability control indicator turns ON.
- The electronic brake control module disables the stability control and the hill hold start assist for the duration of the ignition cycle.

Conditions for Clearing the DTC

- The DTC clears when the diagnostic runs and passes.
- The history DTC will clear after 40 consecutive fault-free ignition cycles have occurred.

Reference Information

Schematic Reference

Antilock Brake System Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX - SEDAN

Description and Operation

ABS Description and Operation

Electrical Information Reference

- **Circuit Testing**
- **Connector Repairs**
- **Testing for Intermittent Conditions and Poor Connections**
- **Wiring Repairs**

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

1. Ignition ON.
2. Verify that no other DTCs are set.
 - **If any other DTCs are set**

Refer to **Diagnostic Trouble Code (DTC) List - Vehicle** .

- **If no other DTCs are set**
3. Replace the K71 Transmission Control Module.
4. Verify that the DTC does not set while operating the vehicle within the Conditions for Running the DTC.
 - **If the DTC sets**

Replace the K17 Electronic Brake Control Module.

- **If the DTC does not set**
5. All OK.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

Control Module References for Electronic Brake Control Module or Transmission Control Module replacement, programming, and setup

DTC P0856: TRACTION CONTROL TORQUE REQUEST CIRCUIT

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

DTC Descriptor

DTC P0856

Traction Control Torque Request Circuit

Circuit/System Description

When traction control is active, the electronic brake control module sends a serial data message to the engine control module requesting torque reduction. When certain electronic brake control module DTCs are set, the engine control module will not be able to perform the torque reduction for traction control. A serial data message is sent to the electronic brake control module indicating that traction control is not allowed.

Conditions for Running the DTC

Engine running.

Conditions for Setting the DTC

The engine control module detects a fault that prevents it from performing a traction control function and sends a serial data message to the electronic brake control module indicating that torque reduction is not allowed.

Action Taken When the DTC Sets

- The traction/stability control indicator turns ON.
- The electronic brake control module disables the traction control and stability control for the duration of the ignition cycle.

Conditions for Clearing the DTC

- A current DTC clears when the diagnostic runs and passes.
- The electronic brake control module will turn OFF the indicator in the next ignition cycle.

Reference Information

Schematic Reference

Antilock Brake System Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX - SEDAN

Description and Operation

ABS Description and Operation

Electrical Information Reference

- **Circuit Testing**
- **Connector Repairs**
- **Testing for Intermittent Conditions and Poor Connections**
- **Wiring Repairs**

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Testing

1. Verify that no other DTCs are set except for P0856.

- **If any other DTCs are set**

Refer to **Diagnostic Trouble Code (DTC) List - Vehicle** .

- **If only DTC P0856 is set**

2. Replace the K20 Engine Control Module.

3. Verify the DTC does not set while operating the vehicle within the Conditions for Running the DTC.

- **If DTC sets**

Replace the K17 Electronic Brake Control Module.

- **If DTC does not set**

4. All OK.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

Control Module References for electronic brake control module and engine control module replacement, programming and setup

DTC P1513: TRACTION CONTROL DRAG REDUCTION REQUEST CIRCUIT

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

DTC Descriptor

DTC P1513

Traction Control Drag Reduction Request Circuit

Circuit/System Description

When traction control is active, the electronic brake control module sends a serial data message to the engine control module requesting torque reduction. When certain DTCs are set, the engine control module will not be able to perform the torque reduction for traction control. A serial data message is sent to the electronic brake control module indicating that traction control is not allowed.

Conditions for Running the DTC

Engine running.

Conditions for Setting the DTC

The engine control module detects a fault that prevents it from performing a traction control function and sends a serial data message to the electronic brake control module indicating that torque reduction is not allowed.

Action Taken When the DTC Sets

- The traction/stability Control Indicator turns ON.
- The electronic brake control module disables the traction/stability for the duration of the ignition cycle.

Conditions for Clearing the DTC

- A current DTC clears when the diagnostic runs and passes.
- The electronic brake control module will turn OFF the indicator in the next ignition cycle.

Reference Information

Schematic Reference

Antilock Brake System Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX - SEDAN

Description and Operation

ABS Description and Operation

Electrical Information Reference

- Circuit Testing
- Connector Repairs
- Testing for Intermittent Conditions and Poor Connections

- **Wiring Repairs**

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Testing

1. Verify that no other DTCs are set except for P1513.

- **If any other DTCs are set**

Refer to **Diagnostic Trouble Code (DTC) List - Vehicle** .

- **If only DTC P1513 is set**

2. Replace the K20 Engine Control Module.

3. Verify the DTC does not set while operating the vehicle within the Conditions for Running the DTC.

- **If DTC sets**

Replace the K17 Electronic Brake Control Module.

- **If DTC does not set**

4. All OK.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

Control Module References for Electronic Brake Control Module and Engine Control Module replacement, programming and setup

DTC P15F8: AUTOMATIC BRAKING ENGINE TORQUE REQUEST SIGNAL

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

DTC Descriptor

DTC P15F8

Automatic Braking Engine Torque Request Signal Message Counter Incorrect

Circuit/System Description

The electronic brake control module and the engine control module simultaneously control the vehicle performance. During a automatic brake event the electronic brake control module sends a serial data message to the engine control module requesting torque reduction. If the engine control module receives corrupt data from the electronic brake control module, DTC P15F8 will set in the engine control module. The engine control module then sends a serial data message to the electronic brake control module that torque reduction is not allowed.

Conditions for Running the DTC

- The ignition is ON.
- Ignition voltage is greater than 8 V.

Conditions for Setting the DTC

The engine control module detects a corrupted data message from the electronic brake control module.

Action Taken When the DTC Sets

- The ABS remains functional.
- DTC P15F8 is a Type B DTC.
- The traction Off indicator turns ON.
- The traction/stability control indicator turns ON.
- The Service Stabilitrak message may be displayed on the driver information center.

Conditions for Clearing the DTC

DTC P15F8 is a Type B DTC.

Diagnostic Aids

Inspect the serial data circuits and connections at the engine control module and the electronic brake control module. They should be free from sources of electromagnetic interference and the connections should be clean and tight.

Reference Information

Schematic Reference

Antilock Brake System Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX - SEDAN

Description and Operation

ABS Description and Operation

Electrical Information Reference

- **Circuit Testing**
- **Connector Repairs**
- **Testing for Intermittent Conditions and Poor Connections**
- **Wiring Repairs**

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Testing

1. Verify that no other DTCs are set except for DTC P15F8.

- **If any other DTCs are set**

Refer to **Diagnostic Trouble Code (DTC) List - Vehicle** .

- **If only DTC P15F8 is set**

2. Replace the K17 Electronic Brake Control Module.

3. Verify the DTC does not set while operating the vehicle within the Conditions for Running the DTC.

- **If DTC sets**

Replace the K20 Engine Control Module.

- **If DTC does not set**

4. All OK.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

Control Module References for electronic brake control module and engine control module replacement, programming and setup

DTC P2548: VEHICLE DYNAMICS SYSTEM TORQUE REQUEST SIGNAL

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

DTC Descriptor

DTC P2548

Vehicle Dynamics System Torque Request Signal Message Counter Incorrect

Circuit/System Description

The electronic brake control module and the engine control module simultaneously control the vehicle performance launch. During a performance launch the electronic brake control module sends a serial data message to the engine control module requesting torque reduction. If the engine control module receives corrupt data from the electronic brake control module, DTC P2548 will set in the engine control module. The engine control module then sends a serial data message to the electronic brake control module that torque reduction is not allowed.

Conditions for Running the DTC

- The ignition is ON.
- Ignition voltage is greater than 8 V.

Conditions for Setting the DTC

The engine control module detects a corrupted data message from the electronic brake control module.

Action Taken When the DTC Sets

- The ABS remains functional.
- DTC P2548 is a Type B DTC.
- The traction Off indicator turns ON.
- The traction/stability control indicator turns ON.
- The Service Stabilitrak message may be displayed on the driver information center.

Conditions for Clearing the DTC

DTC P2548 is a Type B DTC.

Diagnostic Aids

Inspect the serial data circuits and connections at the engine control module and the electronic brake control module. They should be free from sources of electromagnetic interference and the connections should be clean and tight.

Reference Information

Schematic Reference

Antilock Brake System Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX - SEDAN

Description and Operation

ABS Description and Operation

Electrical Information Reference

- **Circuit Testing**
- **Connector Repairs**
- **Testing for Intermittent Conditions and Poor Connections**
- **Wiring Repairs**

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Testing

1. Verify that no other DTCs are set except for DTC P2548.

- **If any other DTCs are set**

Refer to **Diagnostic Trouble Code (DTC) List - Vehicle** .

- **If only DTC P2548 is set**

2. Replace the K17 Electronic Brake Control Module.

3. Verify the DTC does not set while operating the vehicle within the Conditions for Running the DTC.

- **If DTC sets**

Replace the K20 Engine Control Module.

- **If DTC does not set**

4. All OK.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

Control Module References for Electronic Brake Control Module and Engine Control Module replacement, programming and setup

SYMPTOMS - ANTILOCK BRAKE SYSTEM

NOTE: **The following steps must be completed before using the symptom tables.**

1. Perform the **Diagnostic System Check - Vehicle** before using the symptom tables in order to verify that all of the following are true:
 - There are no DTCs set.
 - The control modules can communicate via the serial data link.
2. Review the system description and operation in order to familiarize yourself with the system functions. Refer to **ABS Description and Operation**.

Visual/Physical Inspection

- Inspect for aftermarket devices which could affect the operation of the ABS. Refer to **Checking Aftermarket Accessories**.
- Inspect the easily accessible or visible system components, for obvious damage or conditions, which could cause the symptom.

Intermittent

Faulty electrical connections or wiring may be the cause of intermittent conditions. Refer to **Testing for Intermittent Conditions and Poor Connections**.

Symptom List

Refer to a symptom diagnostic procedure from the following list in order to diagnose the symptom:

- **ABS Indicator Malfunction**
- **Traction Control/Stability Control Indicator Malfunction**
- **Brake Warning Indicator Malfunction**

ABS INDICATOR MALFUNCTION

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

Circuit/System Description

The instrument cluster turns On the ABS indicator for five seconds after the ignition is ON or when the electronic brake control module detects a fault and sends a serial data message to the instrument cluster commanding the ABS indicator ON.

Reference Information

Schematic Reference

Antilock Brake System Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX - SEDAN

Description and Operation

ABS Description and Operation

Electrical Information Reference

- **Circuit Testing**
- **Connector Repairs**
- **Testing for Intermittent Conditions and Poor Connections**
- **Wiring Repairs**

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

1. Ignition ON.
2. Verify the Instrument Cluster ABS Indicator turns On and Off when commanding the All Indicators On and Off with a scan tool.
 - **If the ABS indicator does not turn On and Off**

Replace the P16 Instrument Cluster.
 - **If the ABS indicator turns On and Off**
3. Verify the ABS Indicator turns Off five seconds after the ignition is turned On.
 - **If the ABS indicator does not turn Off**

Replace the K17 Electronic Brake Control Module.
 - **If the ABS indicator turns Off**
4. All OK.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

Control Module References for Electronic Brake Control Module or Instrument Cluster replacement, programming and setup

TRACTION CONTROL/STABILITY CONTROL INDICATOR MALFUNCTION

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.
- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Signal	B2745 02	1	1	-
Ground	-	1	-	-
1. Traction/Stability control switch malfunction				

Circuit/System Description

The instrument cluster illuminates the traction/stability control indicator, traction control off indicator and stability control off indicator for five seconds after the ignition is turned ON. When the electronic brake control module detects a fault it sends a serial data message to the instrument cluster commanding the traction/stability control indicator ON.

The body control module monitors the signal circuit from the traction control switch. When the traction control switch is pressed once, the body control module sends a serial data message to the electronic brake control module to disable the traction control system. When the traction control switch is pressed and held for five seconds, the body control module will request the electronic brake control module to disable the electronic stability control. The electronic brake control module will request the instrument cluster to turn the traction/stability control indicator ON to notify the driver of the deactivation.

Reference Information

Schematic Reference

Antilock Brake System Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX - SEDAN

Description and Operation

ABS Description and Operation

Electrical Information Reference

- **Circuit Testing**
- **Connector Repairs**

- **Testing for Intermittent Conditions and Poor Connections**
- **Wiring Repairs**

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

1. Ignition ON.
2. Verify the instrument cluster indicators listed below turn ON and OFF when commanding the All Indicators ON and OFF with a scan tool.
 - Traction/stability control indicator
 - Traction control off indicator
 - Stability control off indicator
 - **If any indicator does not turn ON and OFF**

Replace the P16 Instrument Cluster.
 - **If all indicator turn ON and OFF**
3. Verify the scan tool Body Control Module Traction Control Switch parameter changes between Active and Inactive when pressing and releasing the S86 Vehicle Stability Control Switch.
 - **If the parameter does not change**

Refer to Circuit/System Testing.
 - **If the parameter changes**
4. All OK.

Circuit/System Testing

1. Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the S86 Vehicle Stability Control Switch. It may take up to 2 minutes for all vehicle systems to power down.
2. Test for less than 10 ohms between the appropriate ground circuit listed below and ground.
 - Terminal 2 (M3L)
 - Terminal 5 (MYA)
 - **If 10 ohms or greater**
1. Ignition OFF.
2. Test for less than 2 ohms in the ground circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, repair the open/high resistance in the ground connection.
 - **If less than 10 ohms**

3. Ignition ON.
4. Verify the scan tool Body Control Module Traction Control Switch parameter is Inactive.
 - **If not Inactive**
 1. Ignition OFF, disconnect the X2 harness connector at the K9 Body Control Module.
 2. Test for infinite resistance between the signal circuit terminal 14 and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the K9 Body Control Module.
 - **If Inactive**
5. Install a 3 A fused jumper wire between the circuits listed below.
 - S86 Vehicle Stability Control Switch signal terminal 1 and the ground terminal 2 (M3L)
 - S86 Vehicle Stability Control Switch signal terminal 2 and the ground terminal 5 (MYA)
6. Verify the scan tool Traction Control Switch parameter is Active.
 - **If not Active**
 1. Ignition OFF, disconnect the X2 harness connector at the K9 Body Control Module, ignition ON.
 2. Test for less than 1 V between the signal circuit and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V
 3. Test for less than 2 ohms in the signal circuit end to end.
 - If 2 ohms or greater, repair the open/high resistance in the circuit.
 - If less than 2 ohms, replace the K9 Body Control Module.
 - **If Active**
7. Test or replace the S86 Vehicle Stability Control Switch.

Component Testing

1. Ignition OFF, disconnect the harness connector at the S86 Vehicle Stability Control Switch.
2. Test for infinite resistance between the appropriate circuits listed below with the switch in the open position.
 - Terminal 1 and the ground terminal 2 (M3L)
 - Terminal 2 and the ground terminal 5 (MYA)
 - **If less than infinite resistance**

Replace the S86 Vehicle Stability Control Switch.
 - **If infinite resistance**
3. Test for less than 5 ohms between the signal terminal and the ground terminal listed below with the switch in the closed position.
 - Terminal 1 and the ground terminal 2 (M3L)
 - Terminal 2 and the ground terminal 5 (MYA)
 - **If 5 ohms or greater**

Replace the S86 Vehicle Stability Control Switch.

- If less than 5 ohms

4. All OK.

Repair Instructions

Perform the **Diagnostic Repair Verification** after completing the repair.

- **Vehicle Stability Control System Switch Replacement**
- **Control Module References** for Body Control Module or Instrument Cluster replacement, programming and setup

REPAIR INSTRUCTIONS

ANTILOCK BRAKE SYSTEM AUTOMATED BLEED

WARNING: Refer to **Brake Fluid Irritant Warning** .

CAUTION: Refer to **Brake Fluid Effects on Paint and Electrical Components Caution** .

NOTE: Before performing the ABS Automated Bleed Procedure, first perform a pressure bleed of the base brake system. Refer to **Hydraulic Brake System Bleeding (Manual)** , **Hydraulic Brake System Bleeding (Pressure)** . The automated bleed procedure is recommended when one of the following conditions exist:

- Base brake system bleeding does not achieve the desired pedal height or feel
- Extreme loss of brake fluid has occurred
- Air ingestion is suspected in the secondary circuits of the brake modulator assembly

The ABS Automated Bleed Procedure uses a scan tool to cycle the system solenoid valves and run the pump in order to purge any air from the secondary circuits. These circuits are normally closed off, and are only opened during system initialization at vehicle start up and during ABS operation. The automated bleed procedure opens these secondary circuits and allows any air trapped in these circuits to flow out toward the brake corners.

Performing the Automated Bleed Procedure

CAUTION: The Auto Bleed Procedure may be terminated at any time during the process by pressing the EXIT button. No further Scan Tool prompts

pertaining to the Auto Bleed procedure will be given. After exiting the bleed procedure, relieve bleed pressure and disconnect bleed equipment per manufacturers instructions. Failure to properly relieve pressure may result in spilled brake fluid causing damage to components and painted surfaces.

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove all four tire and wheel assemblies. Refer to **Tire and Wheel Removal and Installation** .
3. Inspect the brake system for leaks and visual damage. Repair or replace components as needed.
4. Lower the vehicle.
5. Inspect the battery state of charge.
6. Install a scan tool.
7. Turn the ignition ON, with the engine OFF.
8. If the vehicle is equipped with push button start, place the ignition in Service Only Mode.
 - Do not apply the brake pedal.
 - Press and hold the ignition mode switch for a minimum of 5 seconds.
 - Release the ignition mode switch when the switch indicator illuminates green.
9. With the scan tool, establish communications with the ABS system. Select Control Functions. Select Automated Bleed from the Control Functions menu.
10. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
11. Following the directions given on the scan tool, pressure bleed the base brake system. Refer to **Hydraulic Brake System Bleeding (Manual)** , **Hydraulic Brake System Bleeding (Pressure)** .
12. Follow the scan tool directions until the desired brake pedal height is achieved.
13. If the bleed procedure is aborted, a malfunction exists. Perform the following steps before resuming the bleed procedure:
 - If a DTC is detected, refer to **Diagnostic Trouble Code (DTC) List - Vehicle** , and diagnose the appropriate DTC.
 - If the brake pedal feels spongy, perform the conventional brake bleed procedure again. Refer to **Hydraulic Brake System Bleeding (Manual)** , **Hydraulic Brake System Bleeding (Pressure)** .
14. When the desired pedal height is achieved, press the brake pedal to inspect for firmness.
15. Lower the vehicle.
16. Remove the scan tool.
17. If the vehicle is equipped with push button start, remove the vehicle from Service Only Mode.
 - Do not apply the brake pedal.
 - Press the ignition mode switch once and release.
 - The ignition mode switch will no longer be illuminated.
 - The vehicle may be started normally.
18. Install the tire and wheel assemblies. Refer to **Tire and Wheel Removal and Installation** .
19. Inspect the brake fluid level. Refer to **Master Cylinder Reservoir Filling** .
20. Road test the vehicle while inspecting that the pedal remains high and firm.

STEERING ANGLE SENSOR REPLACEMENT

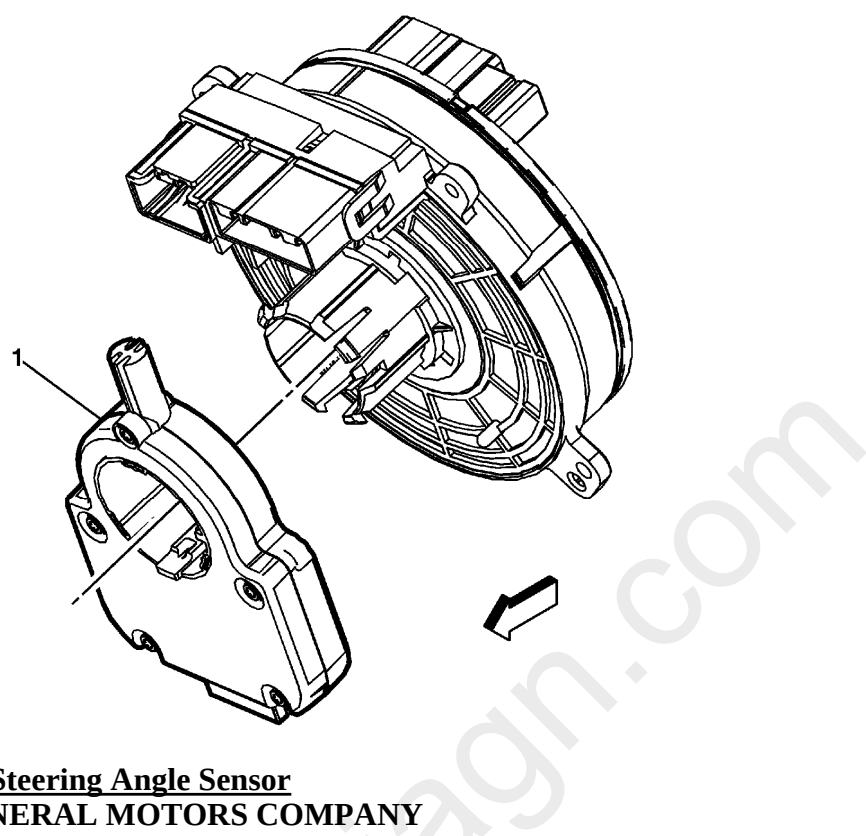


Fig. 4: View Of Steering Angle Sensor
Courtesy of GENERAL MOTORS COMPANY

Steering Angle Sensor Replacement

Callout	Component Name
Preliminary Procedure Remove the steering wheel airbag coil. Refer to <u>Steering Wheel Airbag Coil Replacement</u> .	
1	Steering Angle Sensor
	Procedure 1. Press in the clip on the steering wheel airbag coil in order to remove the steering angle sensor. 2. After the installation is complete, center the steering angle sensor. Refer to <u>Steering Angle Sensor Centering</u> .

STEERING ANGLE SENSOR CENTERING

WARNING: An inaccurate or not centered steering angle sensor could limit the operation of the electric power steering (EPS) and result in personal injury.

The external, column mounted, steering angle sensor does not require a centering often. Centering of the

external steering angle sensor might be required after certain service procedures are performed. Some of these procedures are as follows:

- Wheel alignment
- Steering gear replacement
- Steering column replacement
- Steering angle sensor replacement
- Collision or other physical damage
- Electronic Brake Control Module replacement

The external steering angle sensor centering procedure can be completed with a scan tool using the following steps:

1. Using the steering wheel, align the front wheels forward.
2. Apply the parking brake, or set the transmission in the Park position.
3. Install the scan tool to the data link connector.
4. Ignition ON, engine OFF
5. Select Steering Wheel Angle Sensor Reset in the Steering Wheel Angle Sensor Module Configuration/Reset Functions list.
6. Follow the scan tool directions to complete the reset procedure.
7. Select Steering Wheel Angle Sensor Learn in the Steering Wheel Angle Sensor Module Configuration/Reset Functions list.
8. Follow the scan tool directions to complete the learn procedure.
9. Select Steering Wheel Angle Sensor Learn in the Electronic Brake Control Module Configuration/Reset Functions list.
10. Follow the scan tool directions to complete the learn procedure.
11. Clear any DTCs that may be set.

ELECTRONIC BRAKE CONTROL MODULE REPLACEMENT

Removal Procedure

WARNING: Refer to Brake Fluid Irritant Warning .

CAUTION: Refer to Brake Fluid Effects on Paint and Electrical Components Caution .

1. Turn the ignition OFF.

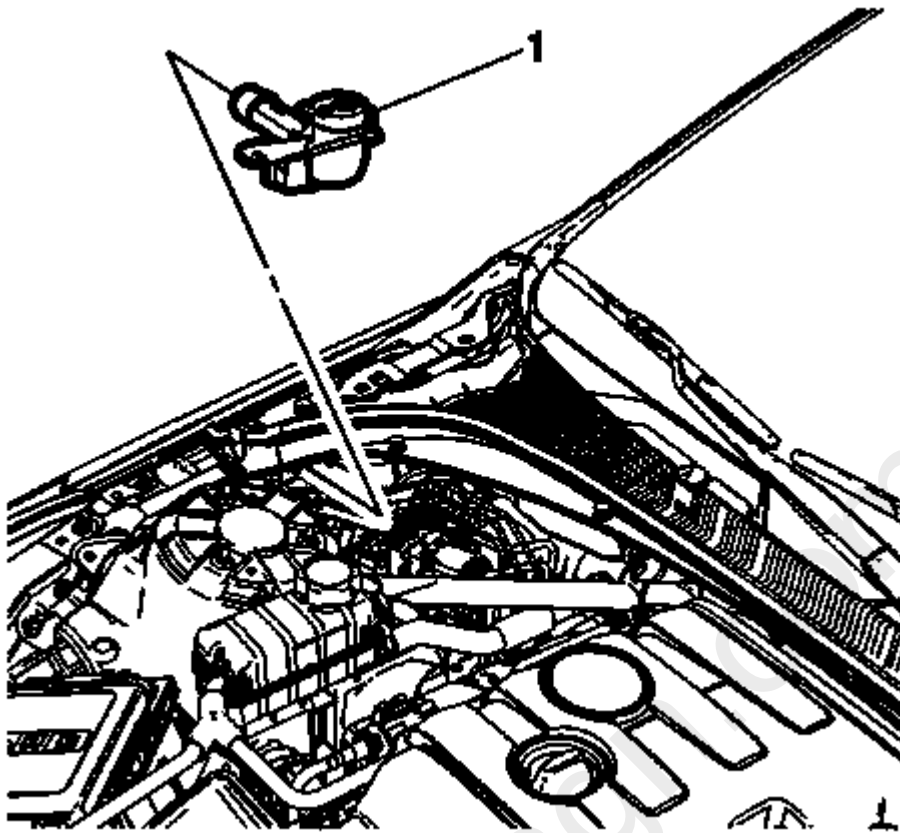


Fig. 5: Windshield Washer Solvent Container Filler Tube
Courtesy of GENERAL MOTORS COMPANY

2. Remove the windshield washer solvent container filler tube (1). Refer to **Windshield Washer Solvent Container Filler Tube Replacement** .
3. Thoroughly clean the electronic brake control module (EBCM) to brake pressure modulator valve (BPMV) area of any accumulated dirt and debris.
4. Disconnect the EBCM electrical connector.

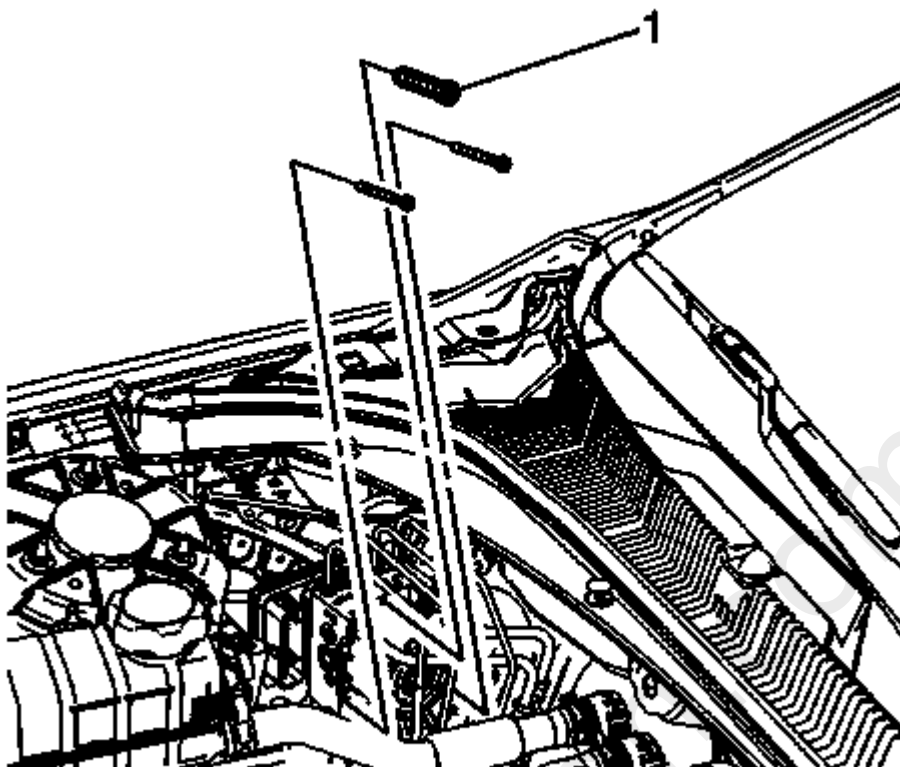


Fig. 6: EBCM bolts

Courtesy of GENERAL MOTORS COMPANY

5. Remove the EBCM bolts (1).

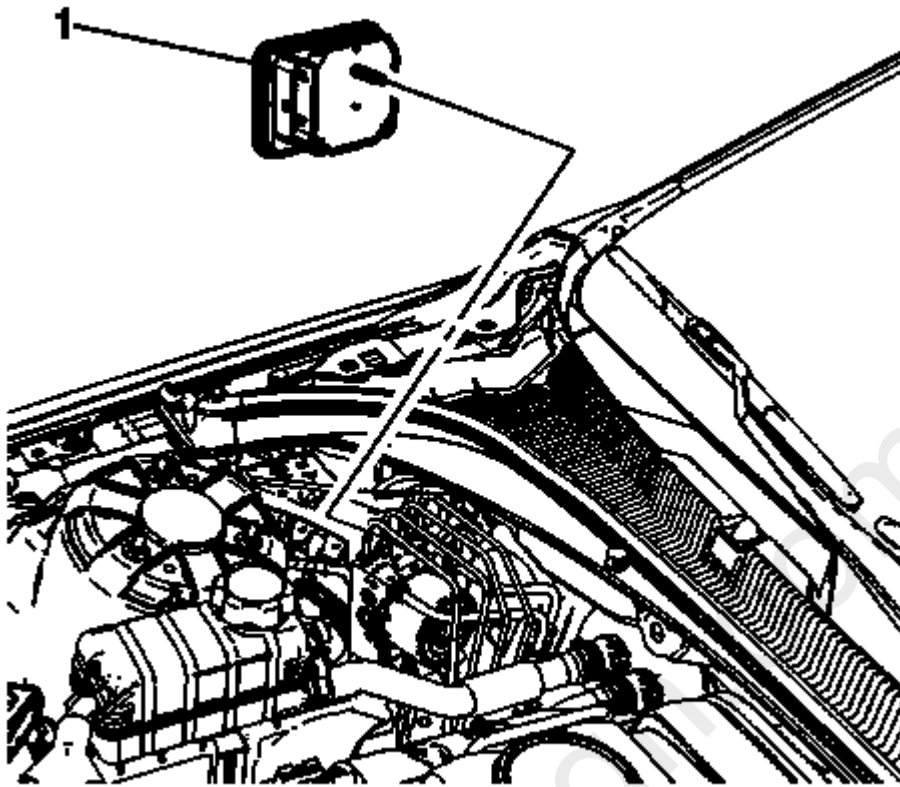


Fig. 7: EBCM

Courtesy of GENERAL MOTORS COMPANY

NOTE: Do not pry the components apart.

6. Remove the EBCM (1) from the BPMV.
7. Clean the sealing surfaces of the EBCM and the BPMV with denatured alcohol and allow to dry.

Installation Procedure

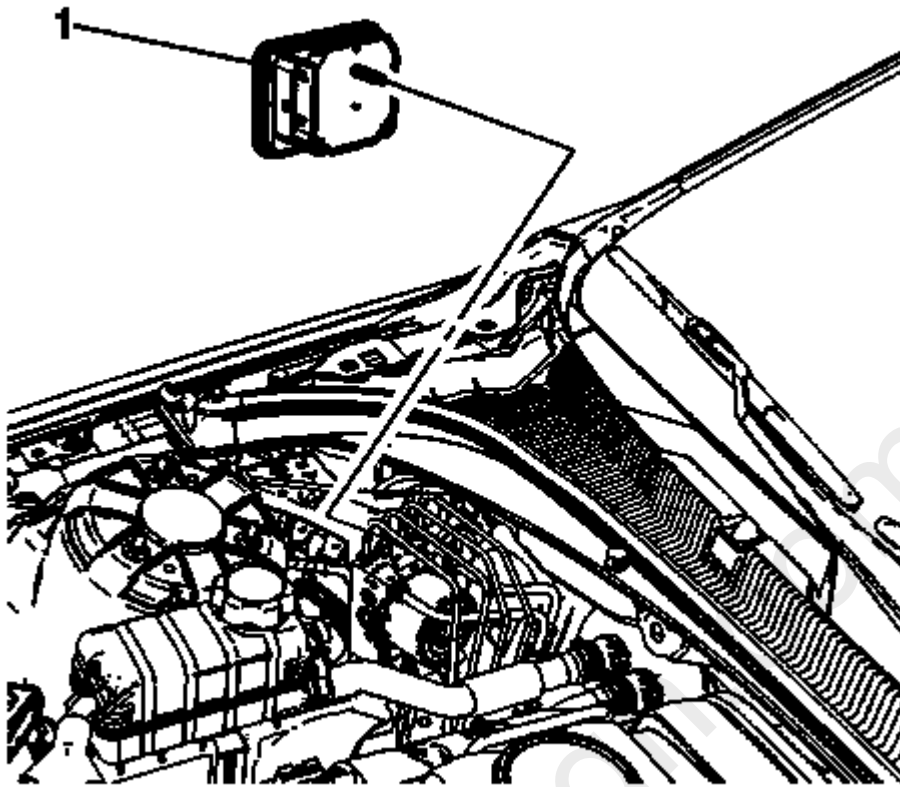


Fig. 8: EBCM

Courtesy of GENERAL MOTORS COMPANY

1. Install the EBCM (1) to the BPMV.

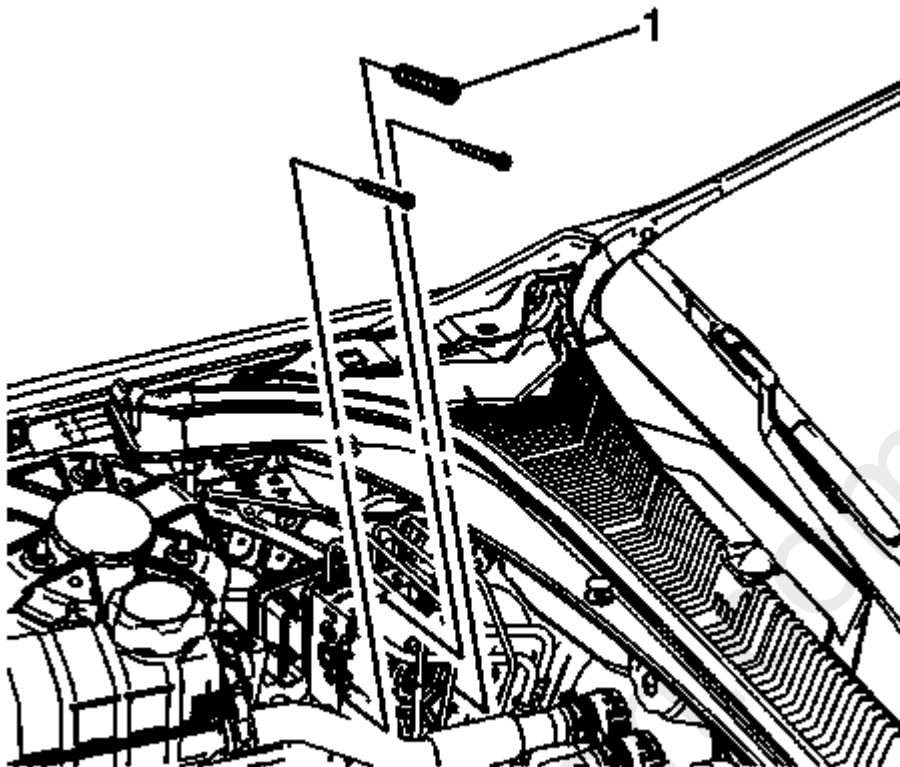


Fig. 9: EBCM bolts

Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Fastener Caution .

2. Install the EBCM bolts (1) and tighten to 6 (53 lb in).
3. Connect the EBCM electrical connector.

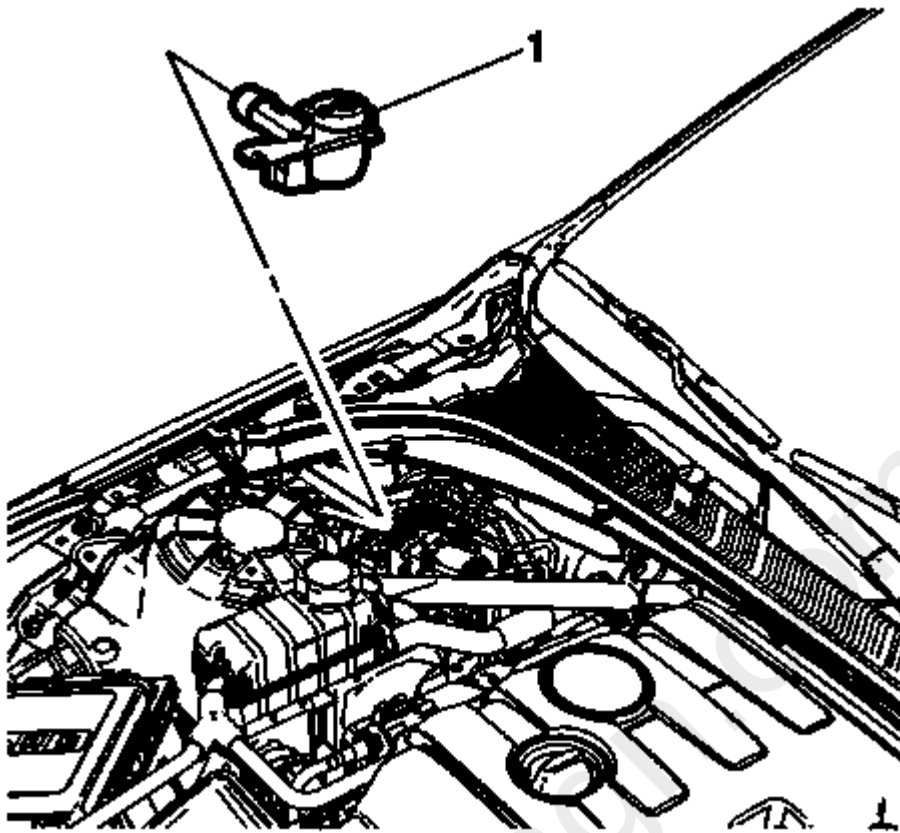


Fig. 10: Windshield Washer Solvent Container Filler Tube
Courtesy of GENERAL MOTORS COMPANY

4. Install the windshield washer solvent container filler tube (1). Refer to **Windshield Washer Solvent Container Filler Tube Replacement** .
5. Program the EBCM. Refer to **Electronic Brake Control Module Programming and Setup** .

BRAKE PRESSURE MODULATOR VALVE REPLACEMENT

Removal Procedure

WARNING: Refer to **Brake Fluid Irritant Warning** .

CAUTION: Refer to **Brake Fluid Effects on Paint and Electrical Components Caution** .

CAUTION: To prevent equipment damage, never connect or disconnect the wiring harness connection from the EBCM with the ignition switch in the ON position.

1. Turn the ignition OFF.
2. Remove the plenum front panel. Refer to **Plenum Front Panel Replacement** .
3. Thoroughly clean the electronic brake control module (EBCM) to brake pressure modulator valve (BPMV) area of any accumulated dirt and debris.
4. Disconnect the EBCM electrical connector.

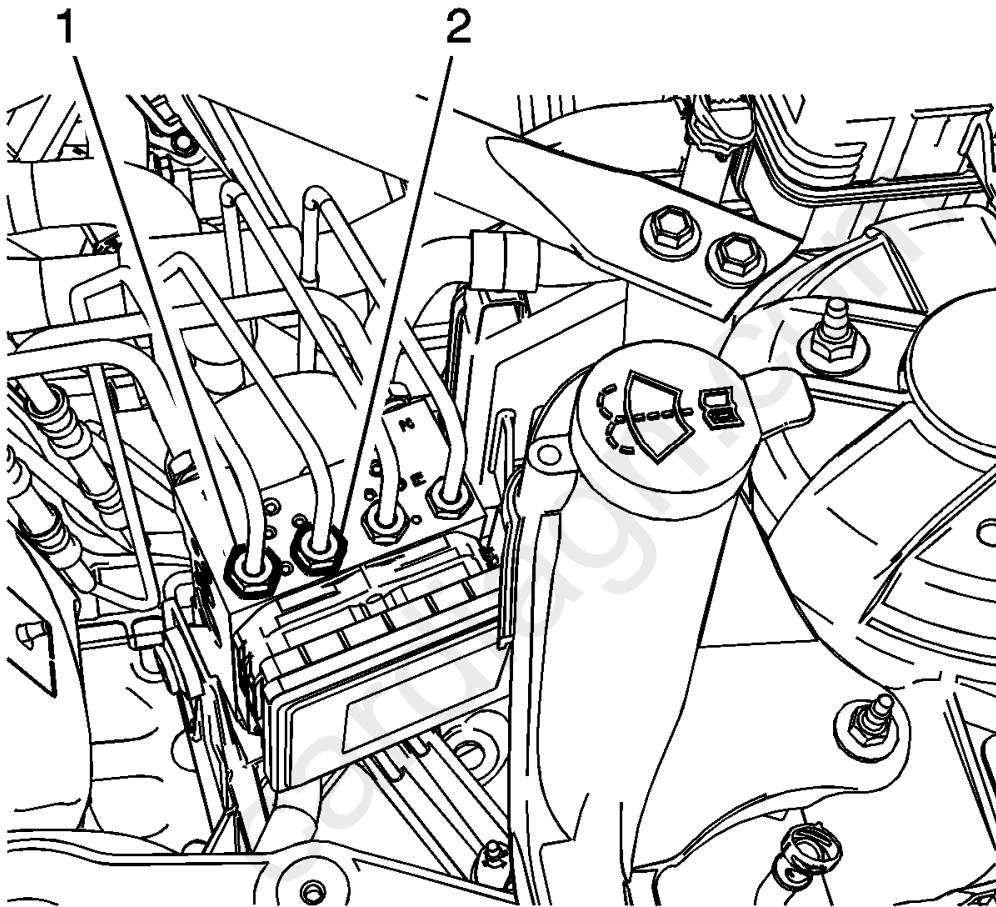


Fig. 11: Brake Pipe Fittings

Courtesy of GENERAL MOTORS COMPANY

5. Disconnect the left front brake pipe fitting (1).
6. Cap the brake pipe fitting and plug the BPMV outlet port to prevent brake fluid loss and contamination.
7. Disconnect the right rear brake pipe fitting (2).
8. Cap the brake pipe fitting and plug the BPMV outlet port to prevent brake fluid loss and contamination.

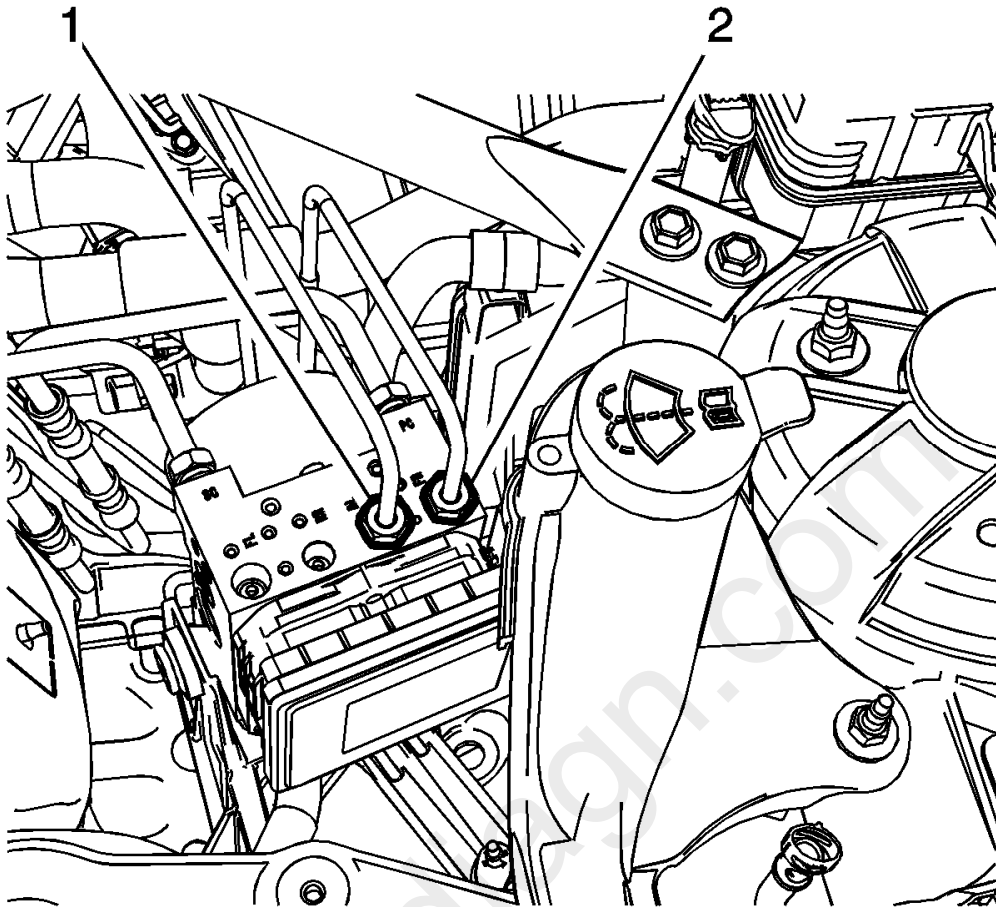


Fig. 12: Brake Pipe Fitting
Courtesy of GENERAL MOTORS COMPANY

9. Disconnect the left rear brake pipe fitting (1).
10. Cap the brake pipe fitting and plug the BPMV outlet port to prevent brake fluid loss and contamination.
11. Disconnect the right front brake pipe fitting (2).
12. Cap the brake pipe fitting and plug the BPMV outlet port to prevent brake fluid loss and contamination.

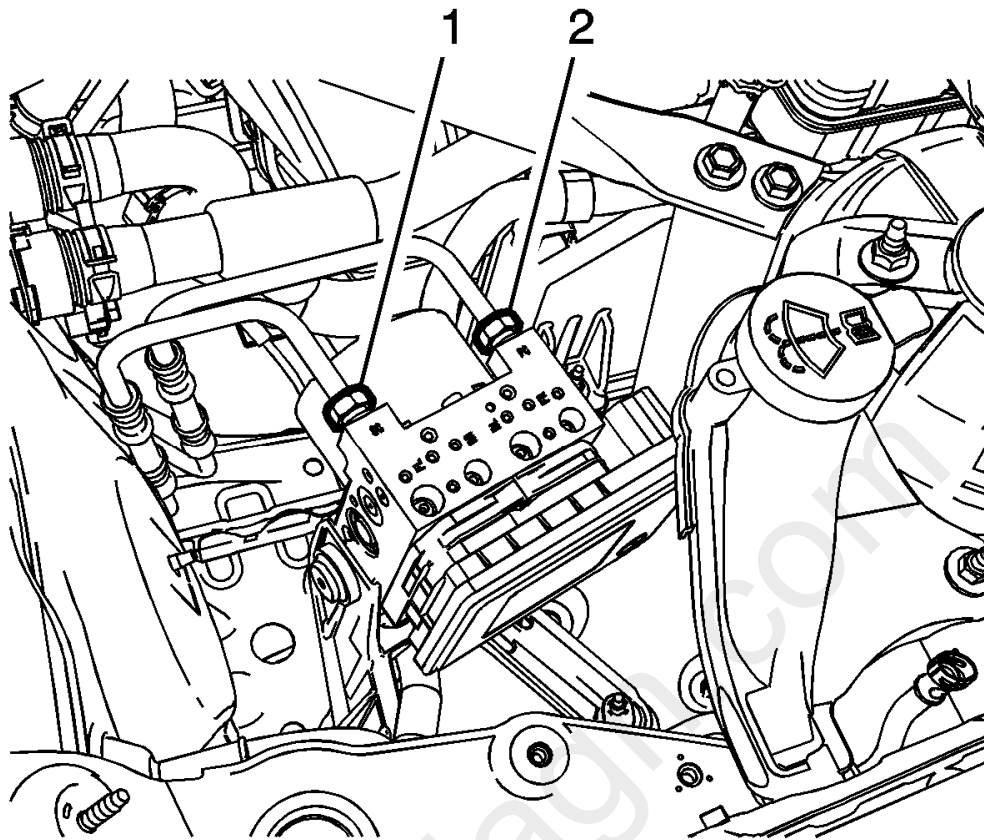


Fig. 13: Secondary Brake Pipe Fitting And Primary Brake Pipe Fitting
Courtesy of GENERAL MOTORS COMPANY

13. Disconnect the master cylinder secondary brake pipe fitting (1).
14. Cap the brake pipe fitting and plug the BPMV inlet port to prevent brake fluid loss and contamination.
15. Disconnect the master cylinder primary brake pipe fitting (2).
16. Cap the brake pipe fitting and plug the BPMV inlet port to prevent brake fluid loss and contamination.

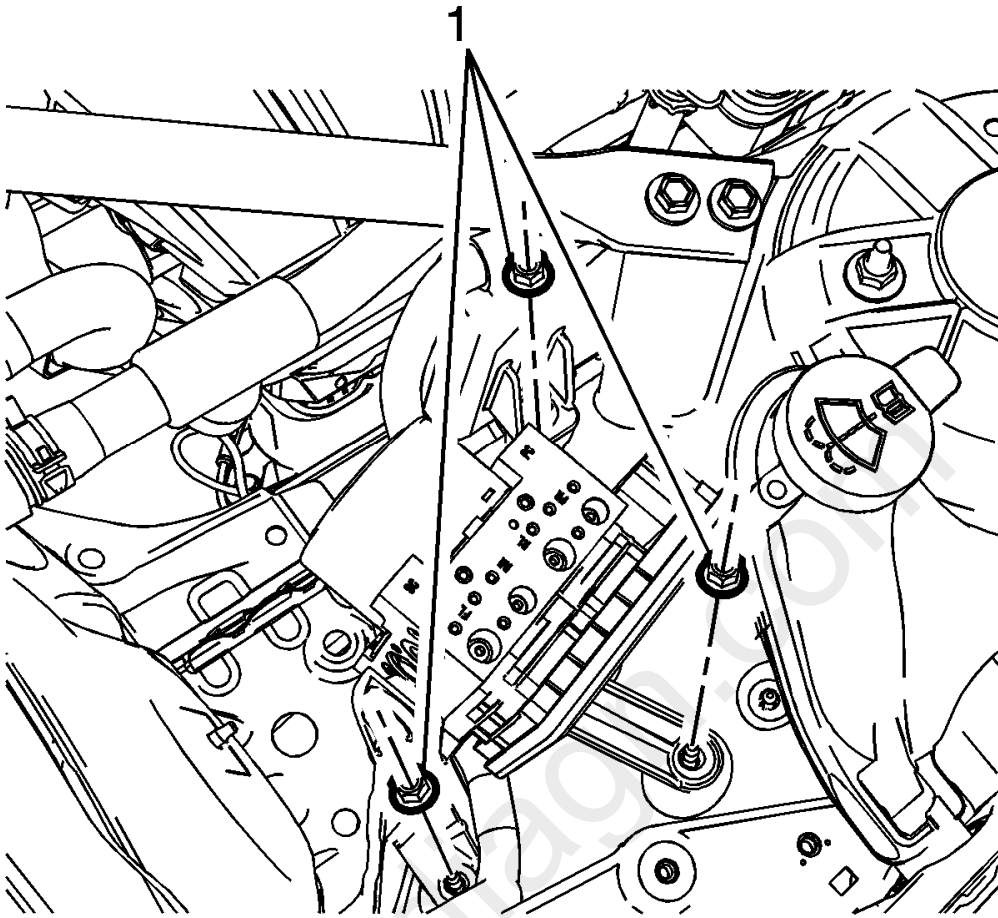


Fig. 14: BPMV Bracket Nuts
Courtesy of GENERAL MOTORS COMPANY

17. Remove the BPMV bracket nuts (1).
18. Remove the BPMV assembly.

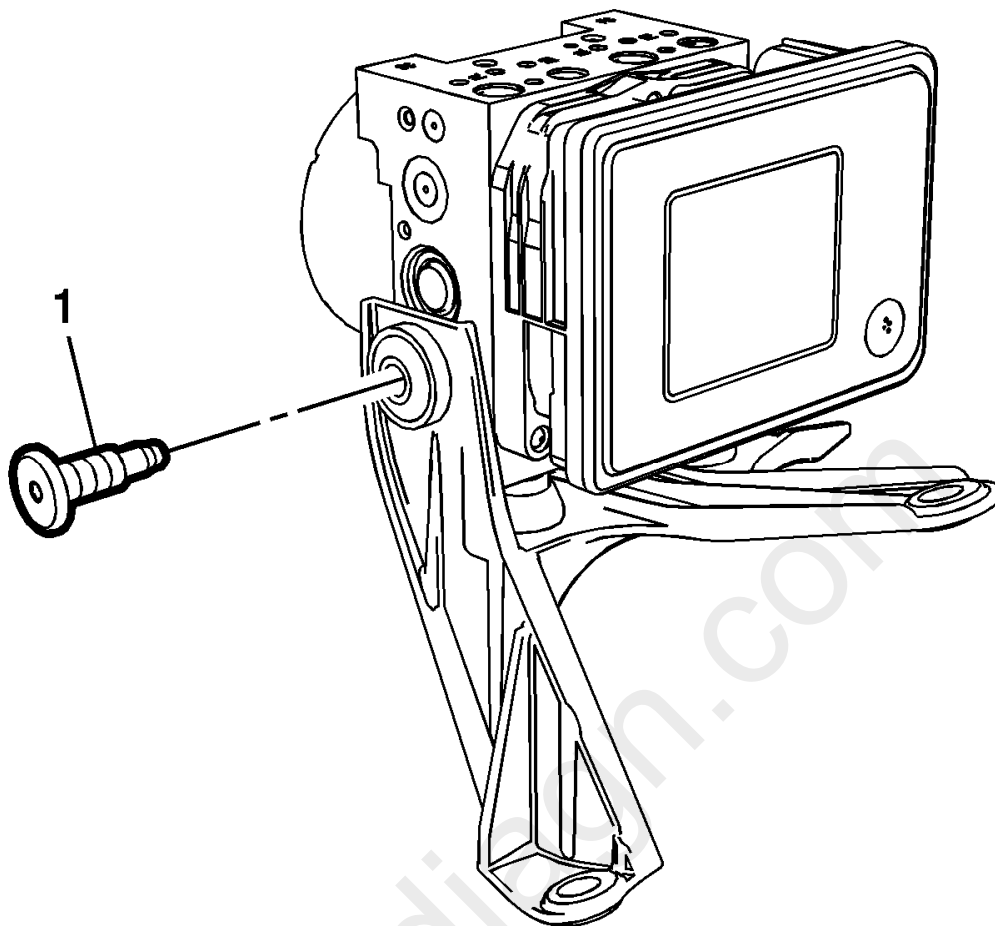


Fig. 15: BPMV Bracket Bolt
Courtesy of GENERAL MOTORS COMPANY

19. Remove the BPMV bracket bolt (1).
20. Carefully separate the BPMV assembly from the bracket.

Installation Procedure

1. Install the BPMV assembly to the bracket.

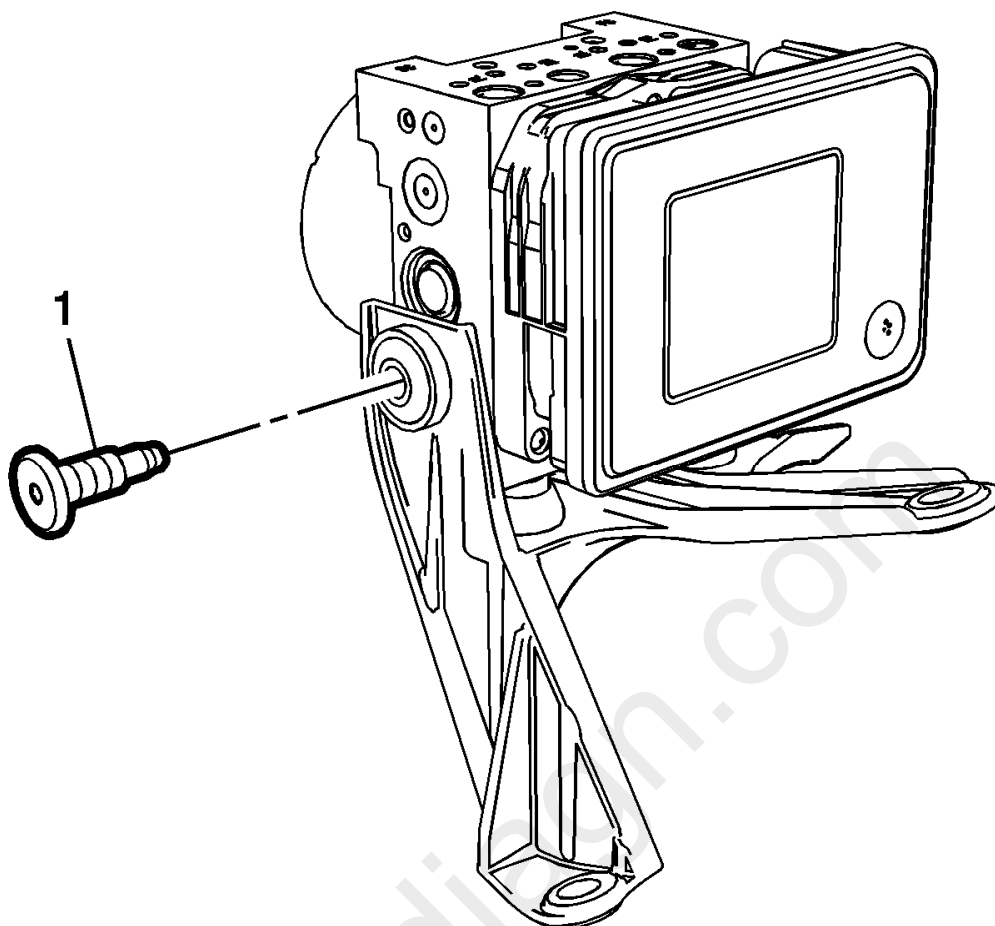


Fig. 16: BPMV Bracket Bolt
Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Fastener Caution .

2. Install the BPMV bracket bolt (1) and tighten to 8 (71 lb in).
3. Install the BPMV assembly.

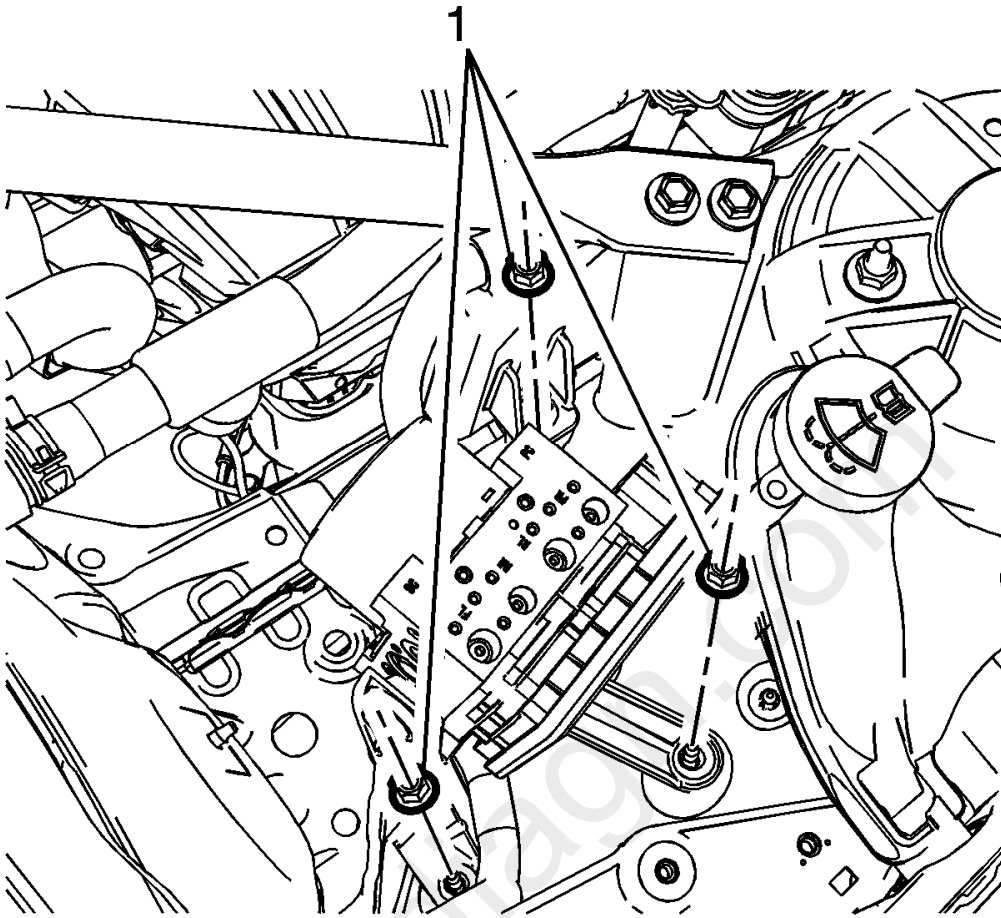


Fig. 17: BPMV Bracket Nuts
Courtesy of GENERAL MOTORS COMPANY

4. Install the BPMV bracket nuts (1) and tighten to 7 (62 lb in).

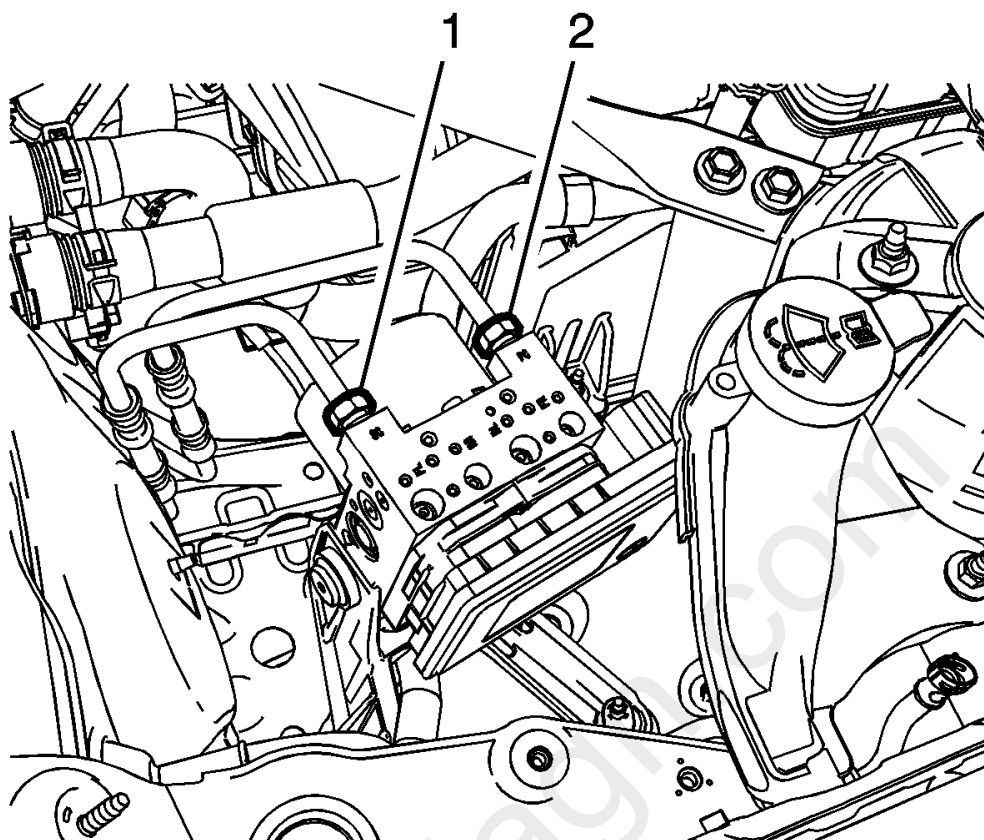


Fig. 18: Secondary Brake Pipe Fitting And Primary Brake Pipe Fitting
Courtesy of GENERAL MOTORS COMPANY

5. Install the master cylinder secondary brake pipe fitting (1) and tighten to 32 (24 lb ft).
6. Install the master cylinder primary brake pipe fitting (2) and tighten to 32 (24 lb ft).

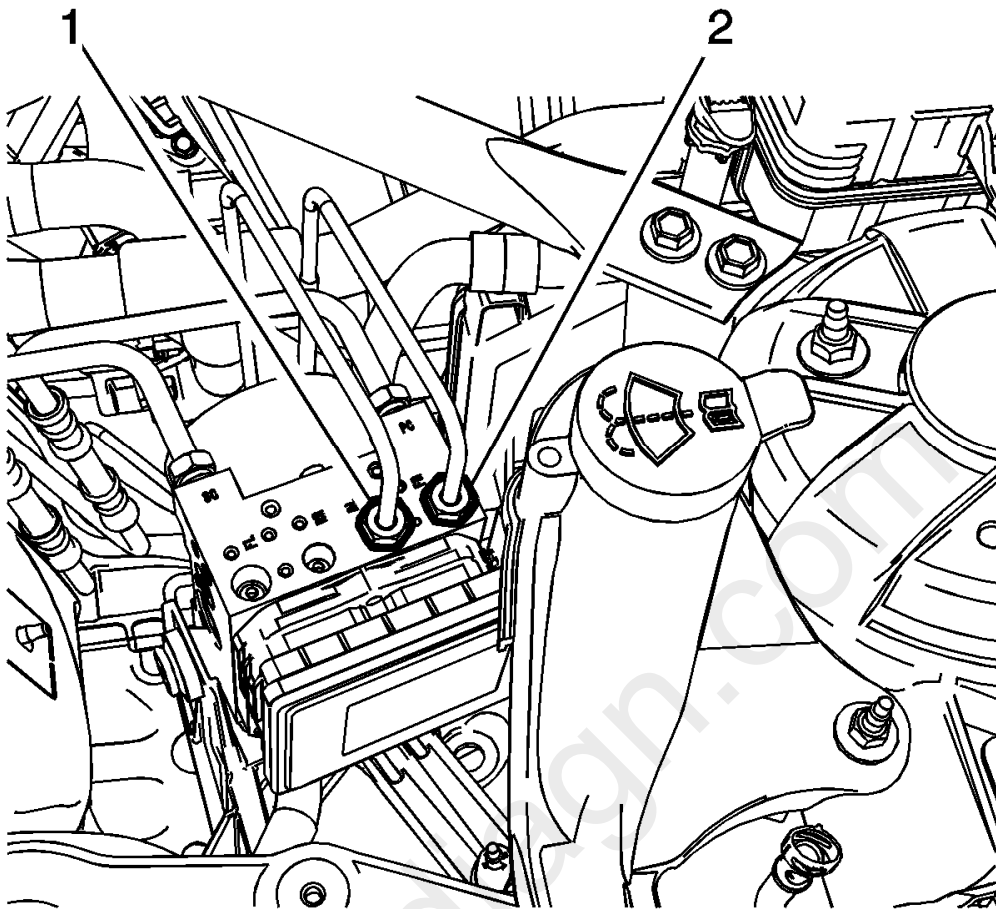


Fig. 19: Brake Pipe Fitting
Courtesy of GENERAL MOTORS COMPANY

7. Install the left rear brake pipe fitting (1) and tighten to 18 (13 lb ft).
8. Install the right front brake pipe fitting (2) and tighten to 18 (13 lb ft).

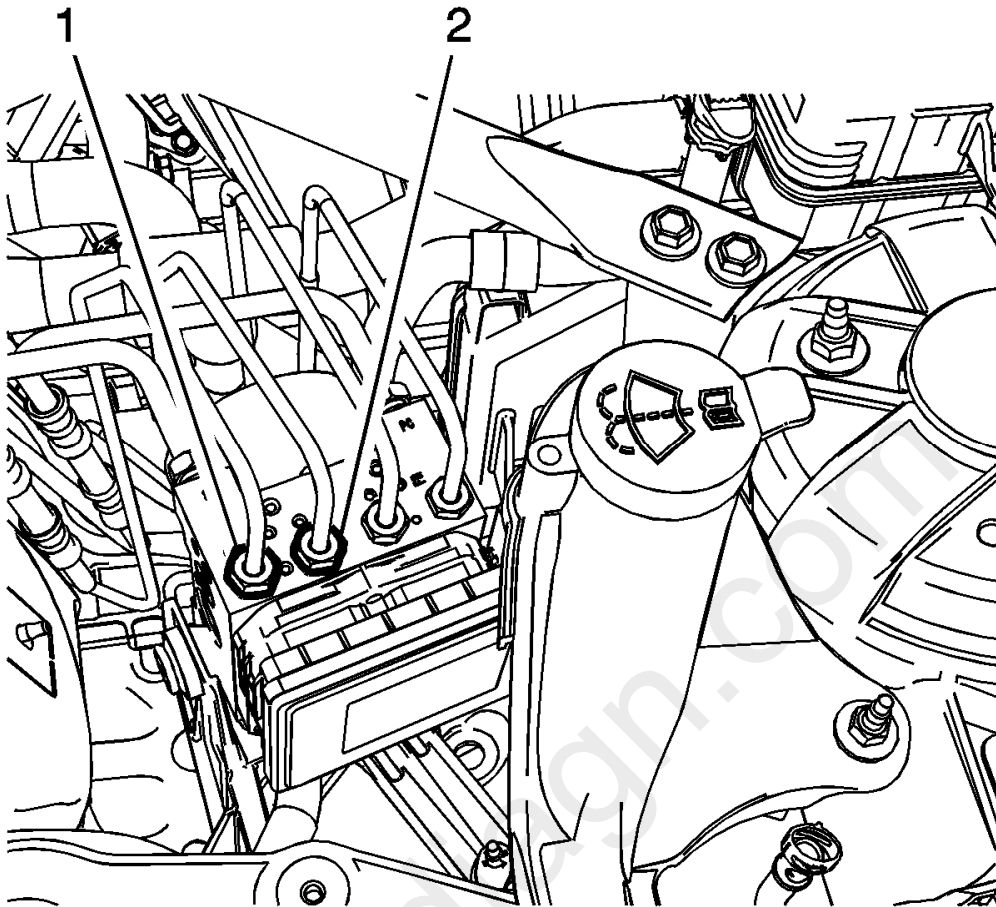


Fig. 20: Brake Pipe Fittings

Courtesy of GENERAL MOTORS COMPANY

9. Install the left front brake pipe fitting (1) and tighten to 18 (13 lb ft).
10. Install the right rear brake pipe fitting (2) and tighten to 18 (13 lb ft).
11. Connect the EBCM electrical connector.
12. Install the plenum front panel. Refer to **Plenum Front Panel Replacement** .
13. Program the EBCM. Refer to **Control Module References** .
14. Bleed the antilock brake system. Refer to **Antilock Brake System Automated Bleed**.
15. Perform the **Diagnostic System Check - Vehicle** .
16. Calibrate the brake pedal position sensor. Refer to **Brake Pedal Position Sensor Calibration** .
17. Center the steering angle sensor. Refer to **Steering Angle Sensor Centering**.

BRAKE PRESSURE MODULATOR VALVE PRESSURE SENSOR CALIBRATION

The brake pressure sensor does not require calibration often. Calibration of the brake pressure sensor might be required after certain service procedures are performed. Some of these procedures are as follows:

- Electronic brake control module (EBCM) replacement
- Brake pressure modulator valve assembly replacement

The Brake Pressure Sensor Calibration procedure can be completed with a scan tool using the following steps:

1. Apply the parking brake, or set the transmission in the P position.
2. Release the brake pedal.
3. Install the scan tool to the data link connector.
4. Ignition ON, engine OFF
5. Select Brake Pressure Sensor Calibration in the EBCM Configuration/Reset Functions list.
6. Follow the scan tool directions to complete the calibration procedure.
7. Clear any DTCs that may be set.

BRAKE PRESSURE MODULATOR VALVE BRACKET REPLACEMENT

Removal Procedure

1. Turn the ignition OFF.
2. Remove the brake pressure modulator valve (BPMV) assembly. Refer to **Brake Pressure Modulator Valve Replacement**.

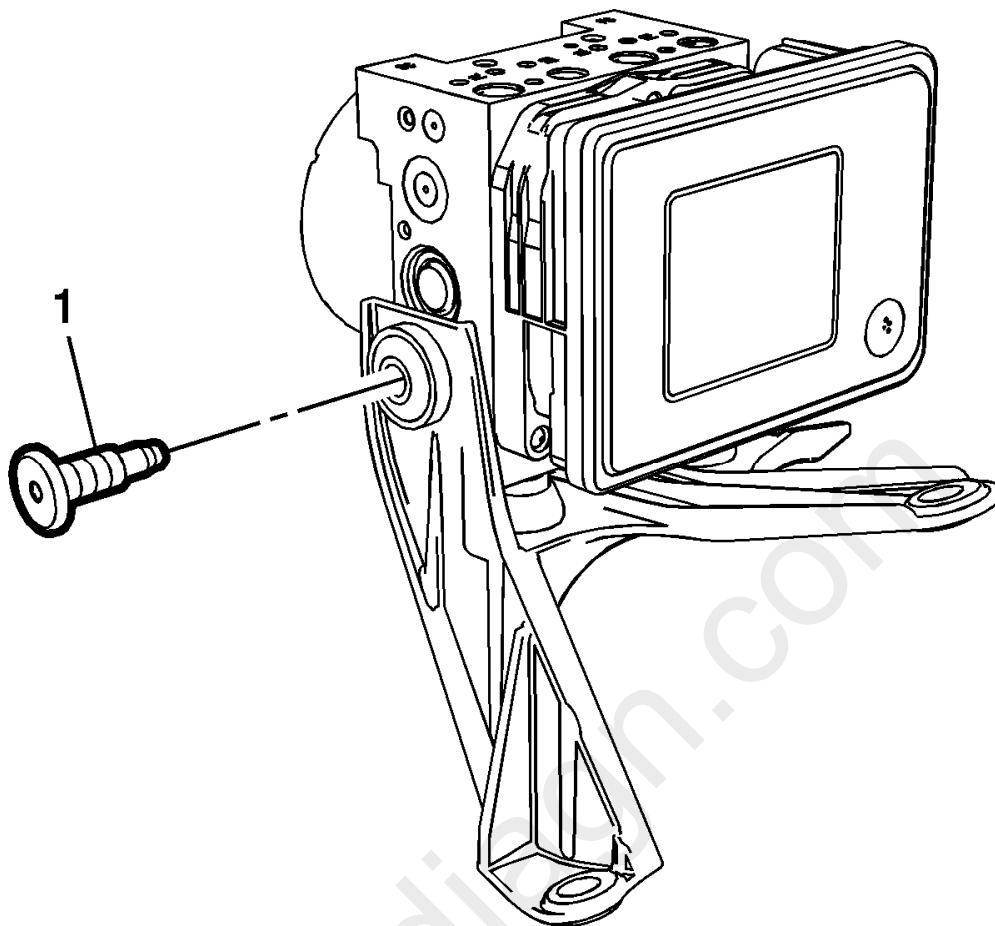


Fig. 21: BPMV Bracket Bolt
Courtesy of GENERAL MOTORS COMPANY

3. Remove the BPMV bracket bolt (1).
4. Carefully remove the BPMV bracket.
5. Inspect the bracket insulators for damage and replace, if necessary.

Installation Procedure

1. Pressing firmly by hand, install the BPMV bracket until the BPMV assembly is fully seated in the bracket insulators.

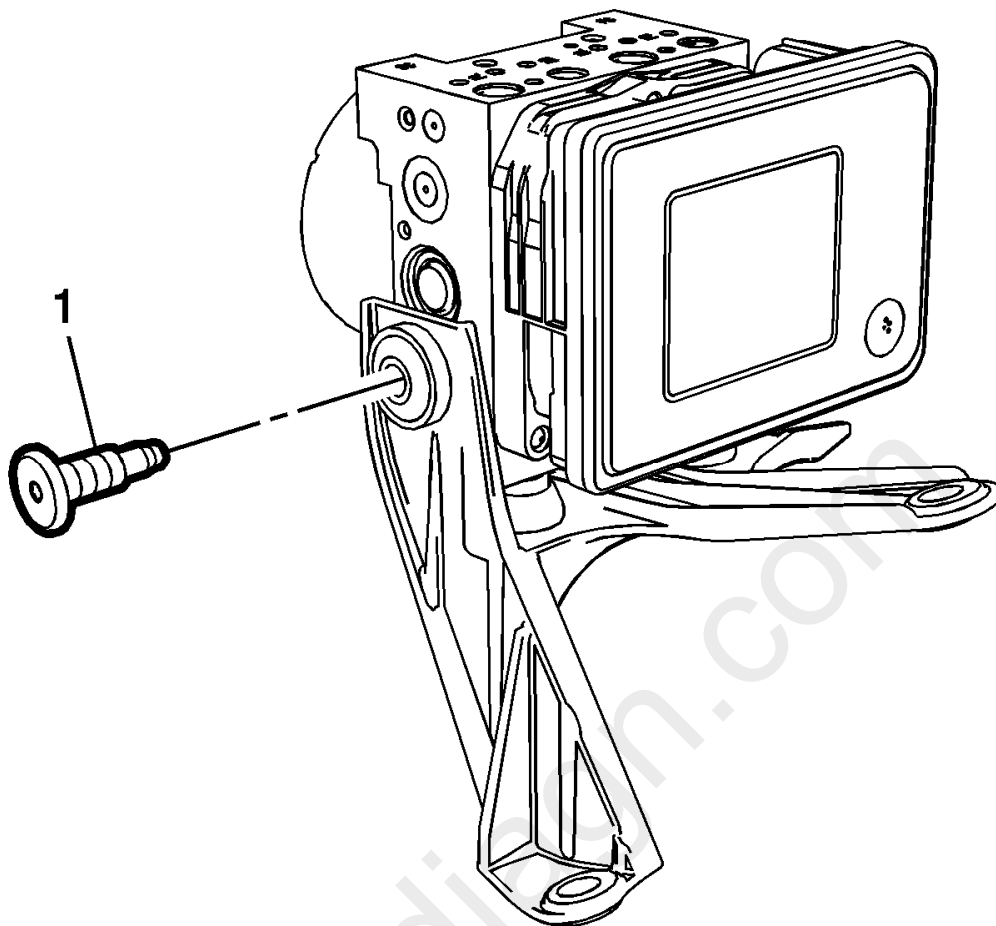


Fig. 22: BPMV Bracket Bolt
Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Fastener Caution .

2. Install the BPMV bracket bolt (1) and tighten to 8 (71 lb in).
3. Install the BPMV assembly. Refer to Brake Pressure Modulator Valve Replacement.

FRONT WHEEL SPEED SENSOR REPLACEMENT

Removal Procedure

WARNING: Refer to Brake Dust Warning .

1. Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle .

2. Remove the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** .
3. Remove the front wheelhouse liner. Refer to **Front Wheelhouse Liner Replacement** .

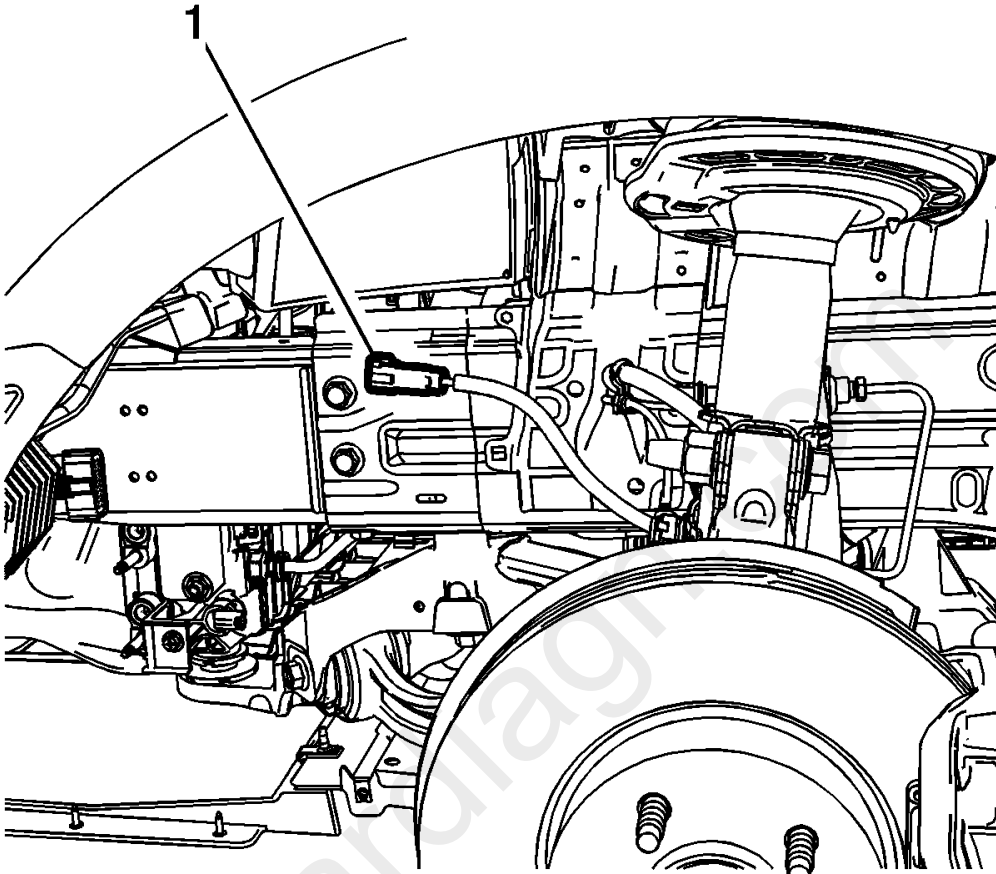


Fig. 23: Wheel Speed Sensor Electrical Connector Clip
Courtesy of GENERAL MOTORS COMPANY

4. Disconnect the wheel speed sensor electrical connector and release the connector clip (1) from the vehicle frame.

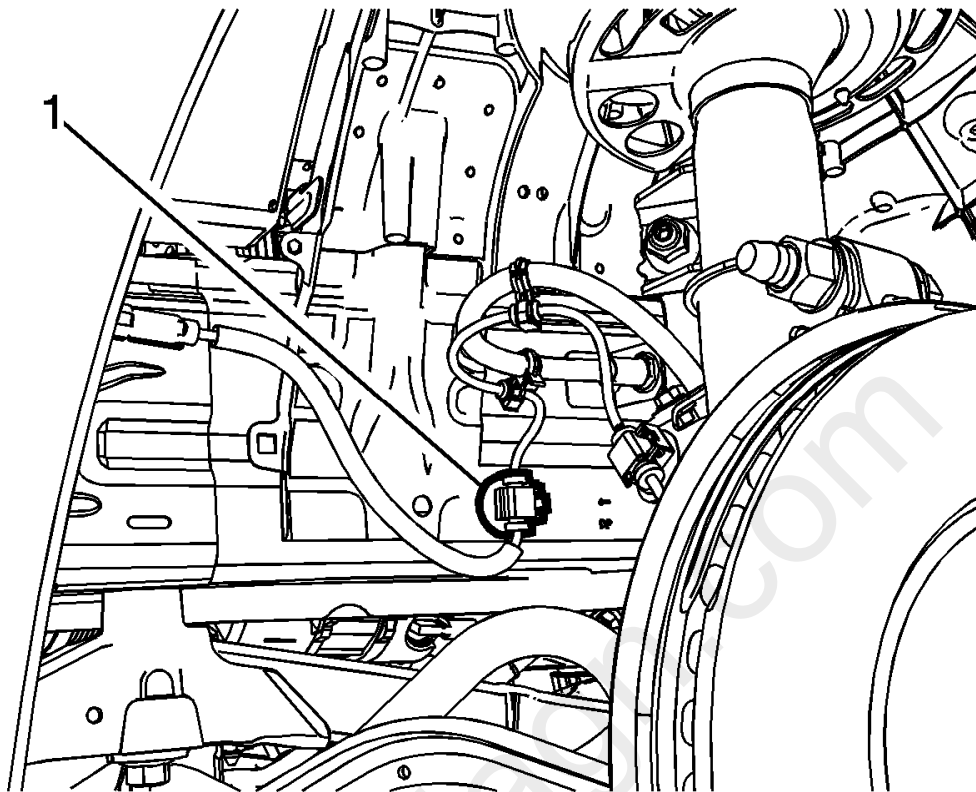


Fig. 24: Wheel Speed Sensor Harness Clip
Courtesy of GENERAL MOTORS COMPANY

5. Release the wheel speed sensor harness clip (1) from the vehicle frame.

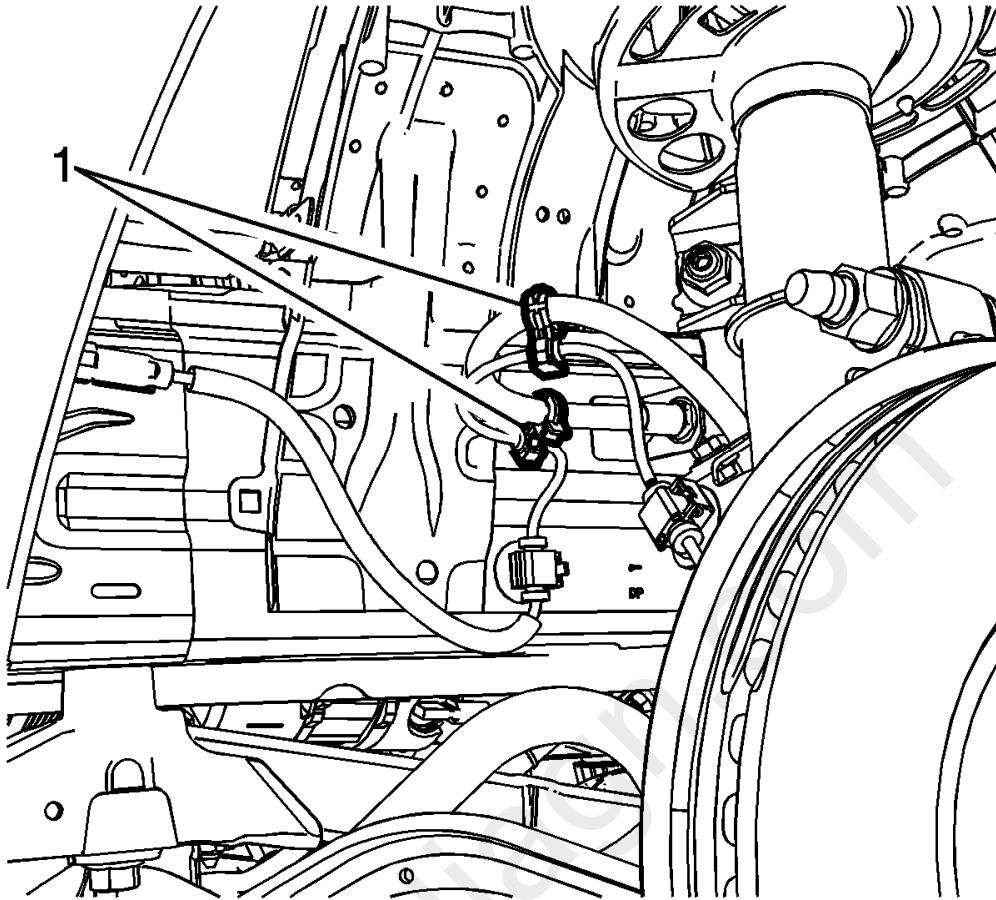


Fig. 25: Wheel Speed Sensor Harness Clips
Courtesy of GENERAL MOTORS COMPANY

6. Release the wheel speed sensor harness clips (1) from the front brake hose.

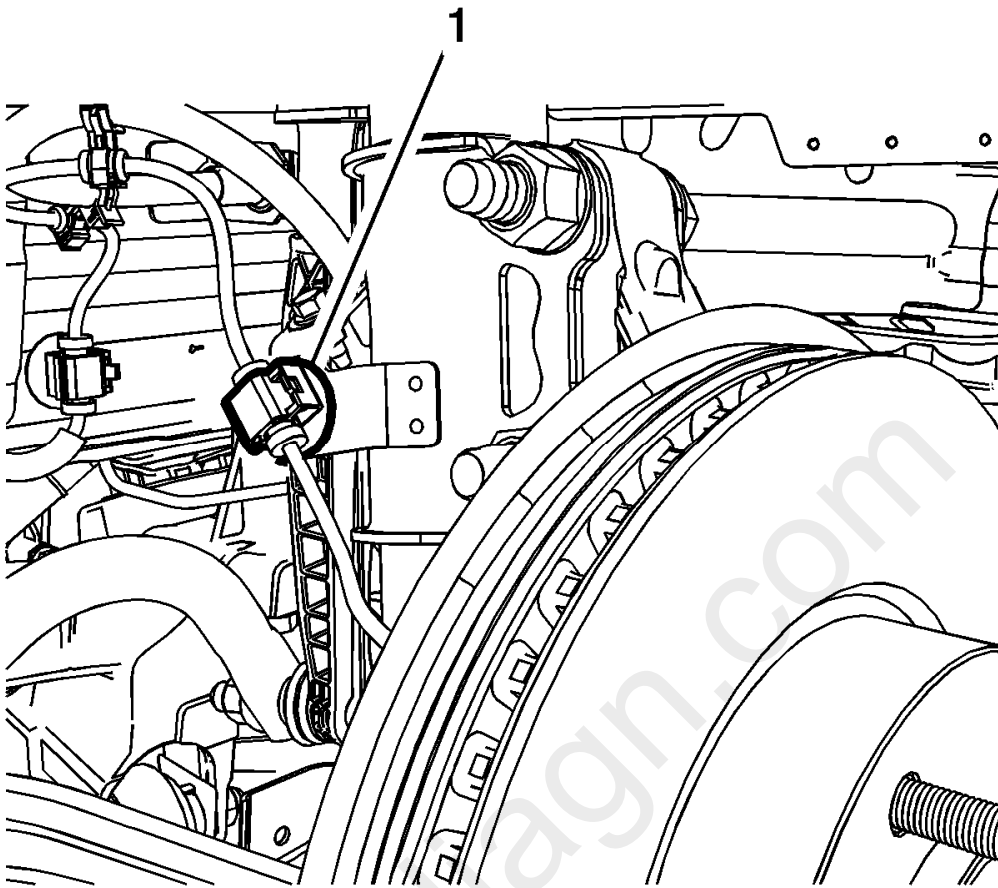


Fig. 26: Wheel Speed Sensor Harness Retainer
Courtesy of GENERAL MOTORS COMPANY

7. Release the wheel speed sensor harness retainer (1) from the strut bracket.
8. Clean the wheel speed sensor mounting area on the steering knuckle of any accumulated dirt and debris.

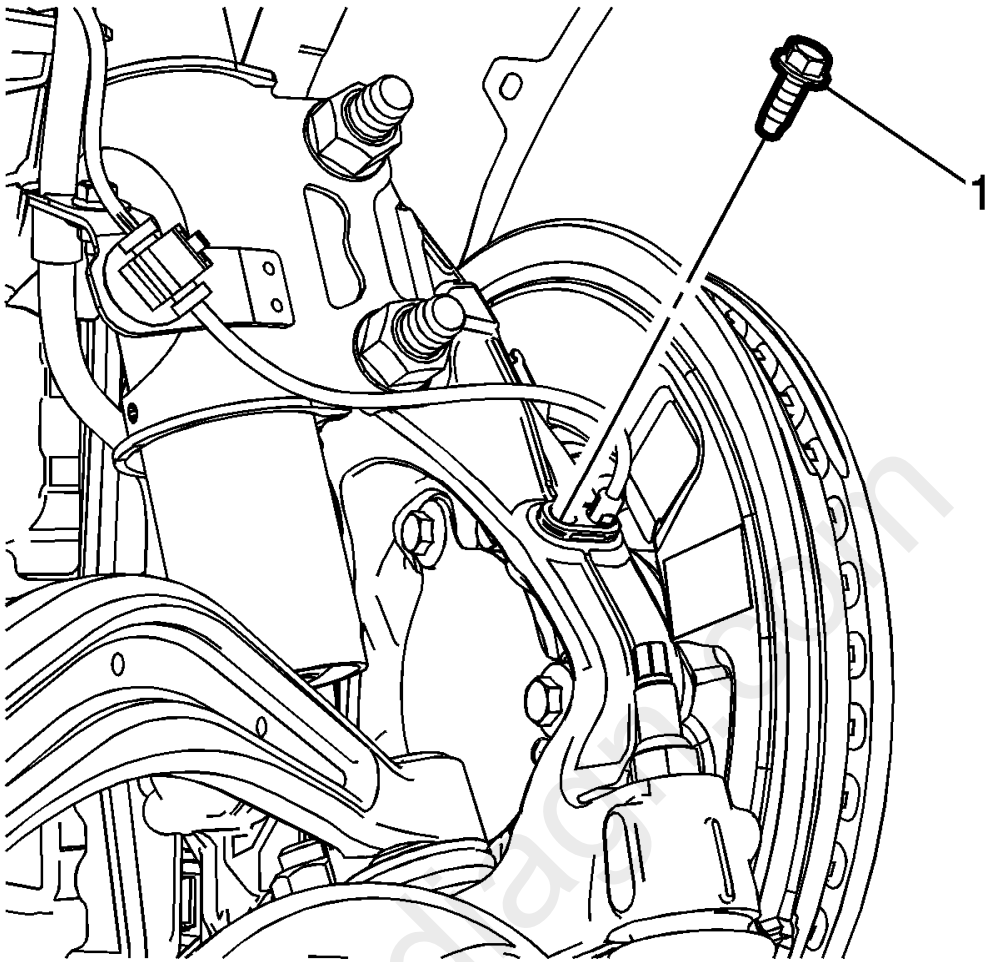


Fig. 27: Wheel Speed Sensor Bolt
Courtesy of GENERAL MOTORS COMPANY

9. Remove the wheel speed sensor bolt (1).
10. Remove the wheel speed sensor from the steering knuckle.

Installation Procedure

1. Install the wheel speed sensor to the steering knuckle.

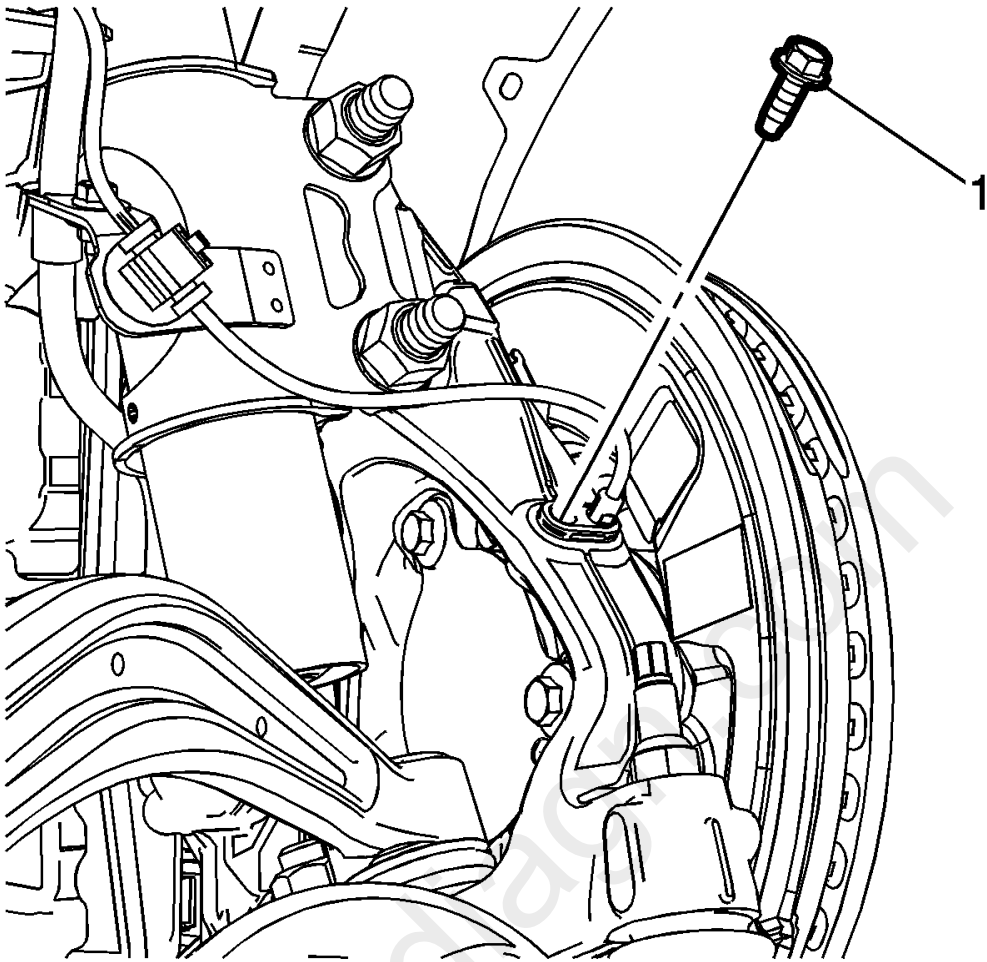


Fig. 28: Wheel Speed Sensor Bolt
Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Fastener Caution .

2. Install the wheel speed sensor bolt (1) and tighten to 10 (89 lb in).

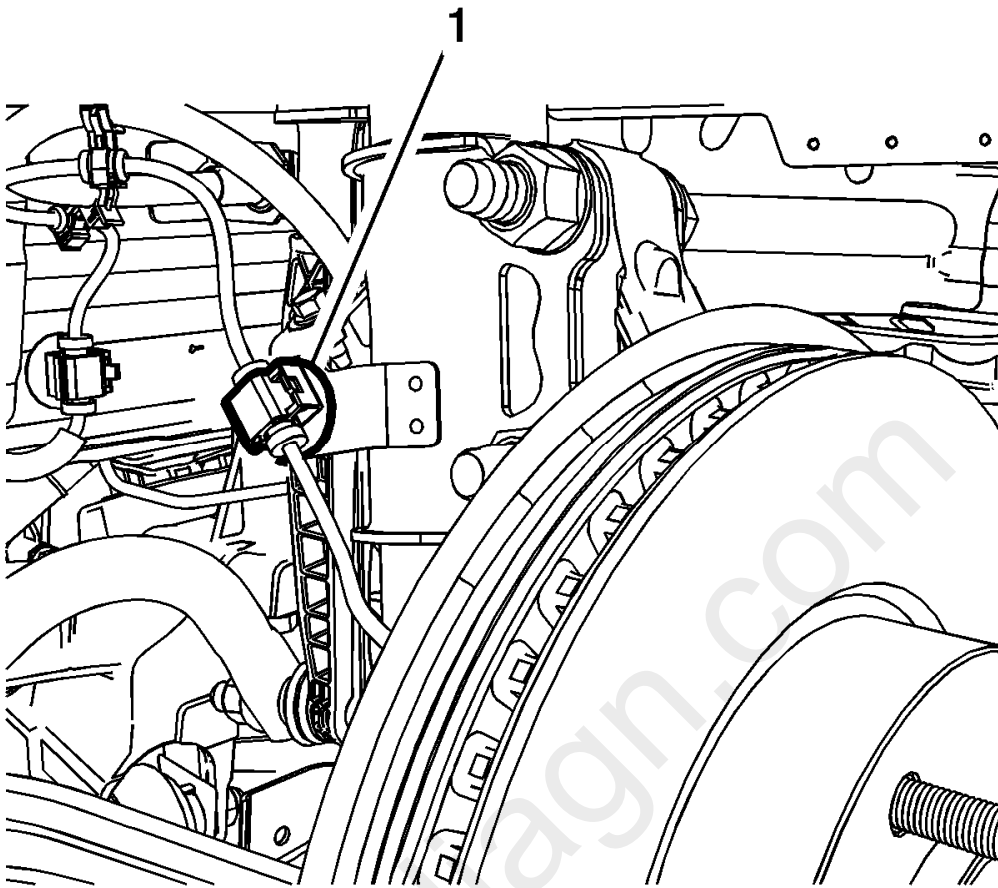


Fig. 29: Wheel Speed Sensor Harness Retainer
Courtesy of GENERAL MOTORS COMPANY

3. Install the wheel speed sensor harness retainer (1) to the strut bracket.

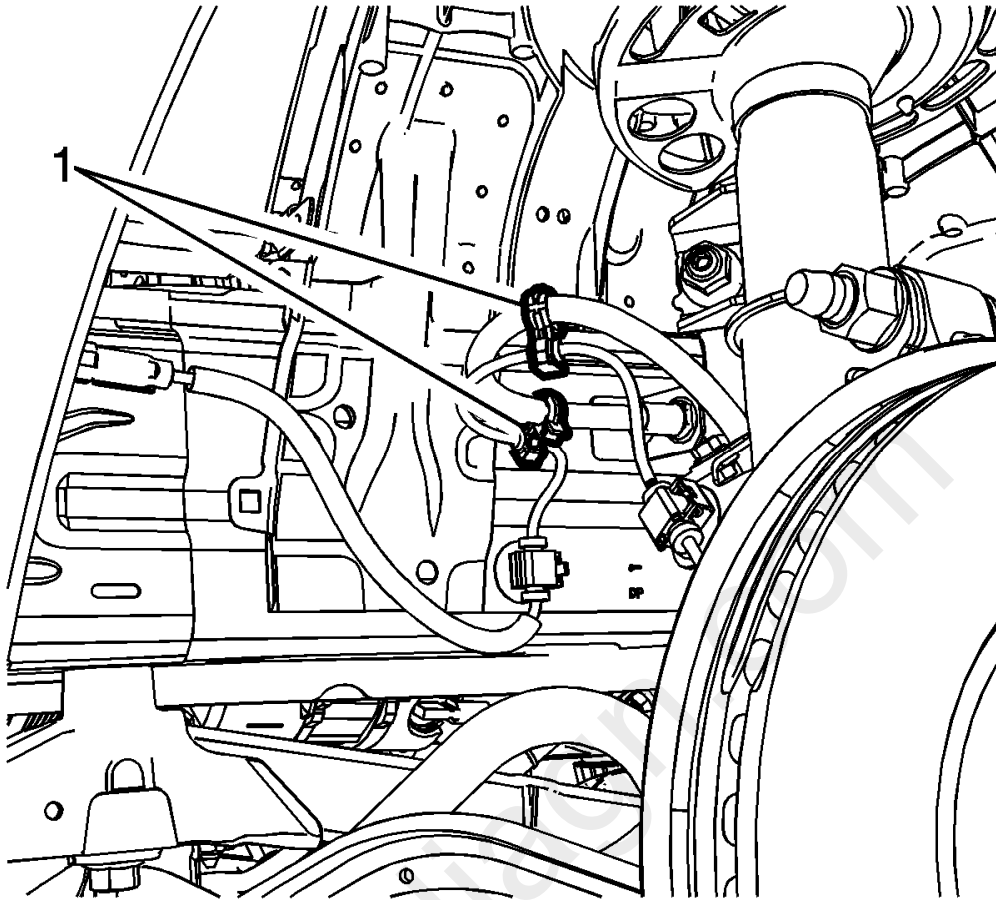


Fig. 30: Wheel Speed Sensor Harness Clips
Courtesy of GENERAL MOTORS COMPANY

4. Install the wheel speed sensor harness clips (1) to the front brake hose.

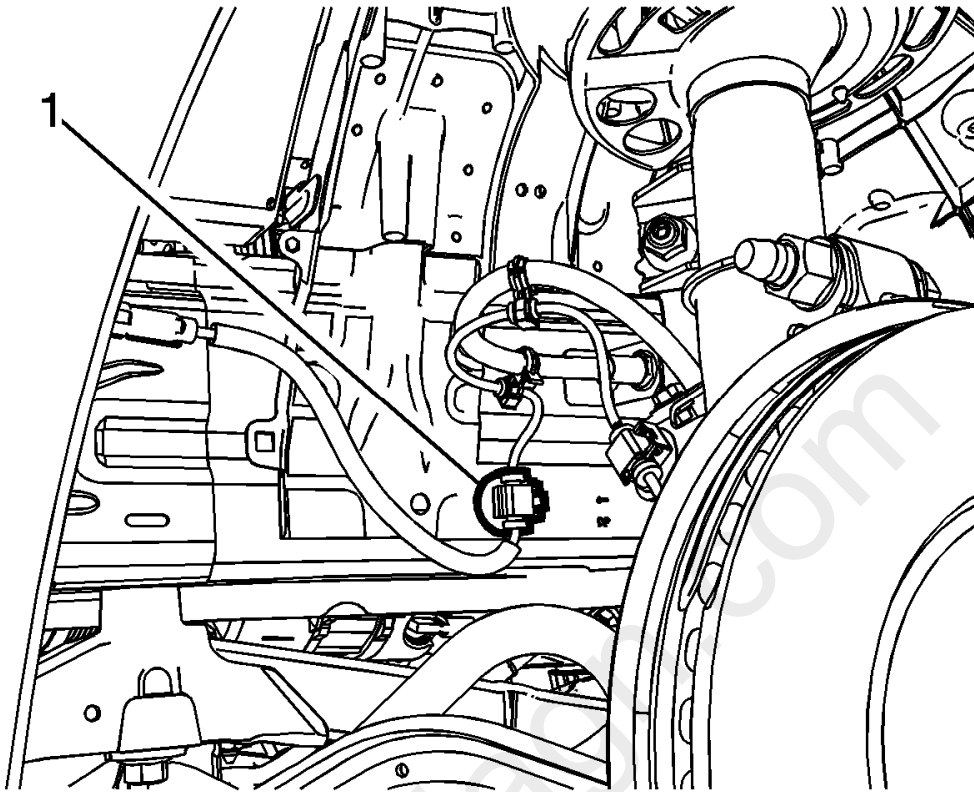


Fig. 31: Wheel Speed Sensor Harness Clip
Courtesy of GENERAL MOTORS COMPANY

5. Install the wheel speed sensor harness clip (1) to the vehicle frame.

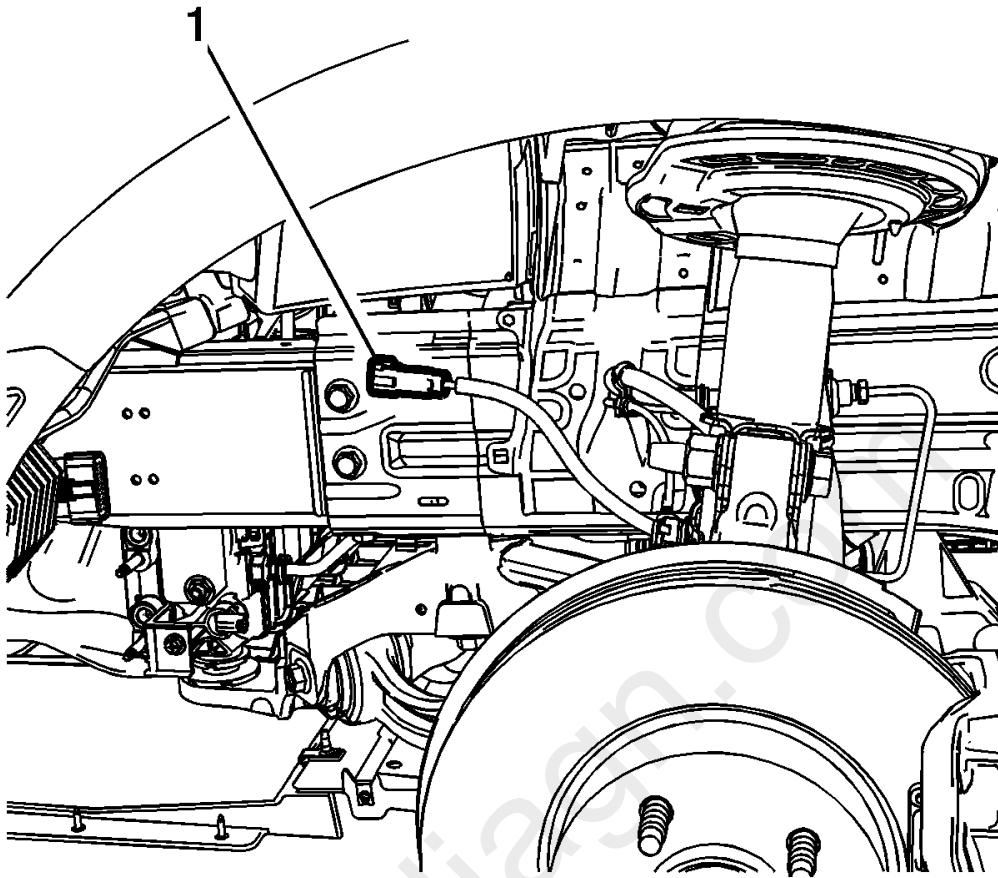


Fig. 32: Wheel Speed Sensor Electrical Connector Clip
Courtesy of GENERAL MOTORS COMPANY

6. Install the wheel speed sensor connector clip (1) to the vehicle frame.
7. Connect the wheel speed sensor electrical connector.
8. Install the front wheelhouse liner. Refer to **Front Wheelhouse Liner Replacement** .
9. Install the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** .
10. Perform the **Diagnostic System Check - Vehicle** .

REAR WHEEL SPEED SENSOR REPLACEMENT

Removal Procedure

WARNING: Refer to **Brake Dust Warning** .

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .

2. Remove the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** .

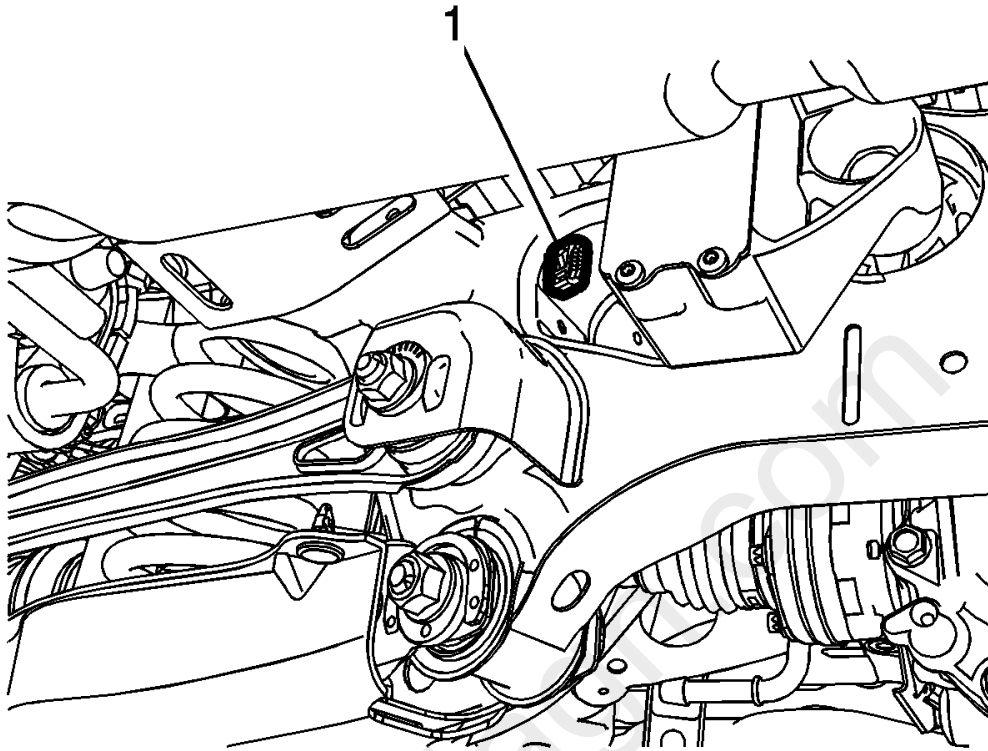


Fig. 33: Wheel Speed Sensor Electrical Connector Clip
Courtesy of GENERAL MOTORS COMPANY

3. Disconnect the wheel speed sensor electrical connector and release the connector clip (1) from the vehicle frame.

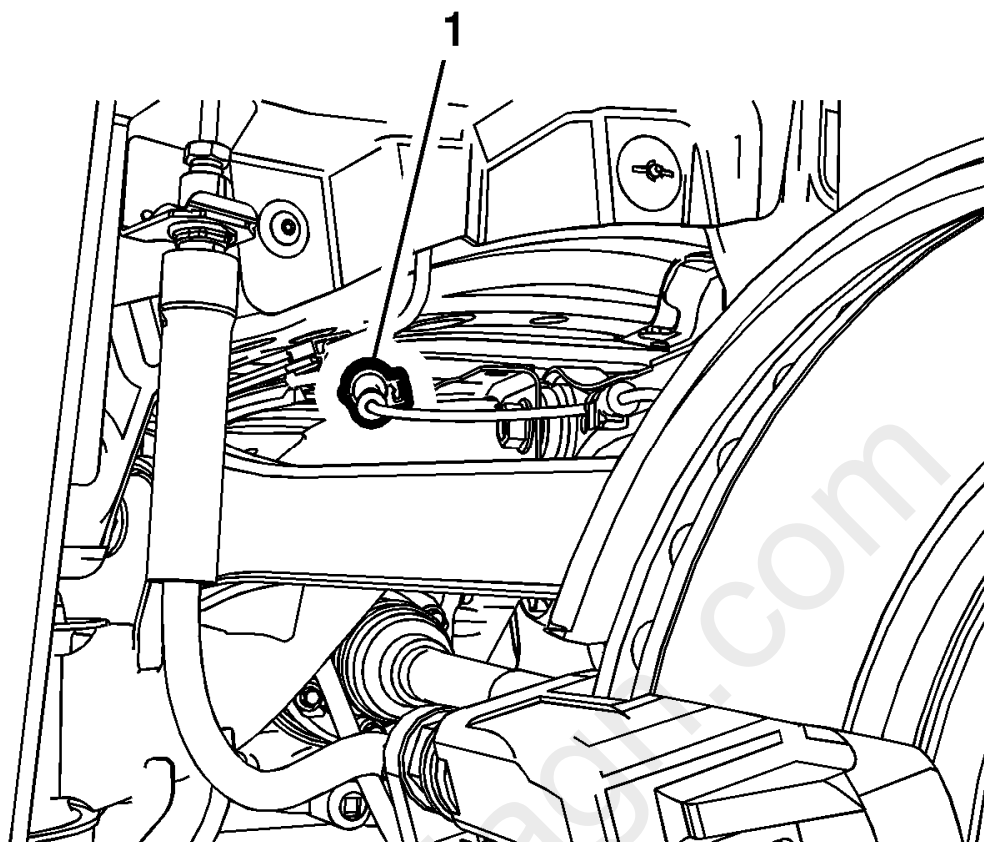


Fig. 34: Wheel Speed Sensor Harness Clip
Courtesy of GENERAL MOTORS COMPANY

4. Release the wheel speed sensor harness clip (1) from the vehicle frame.

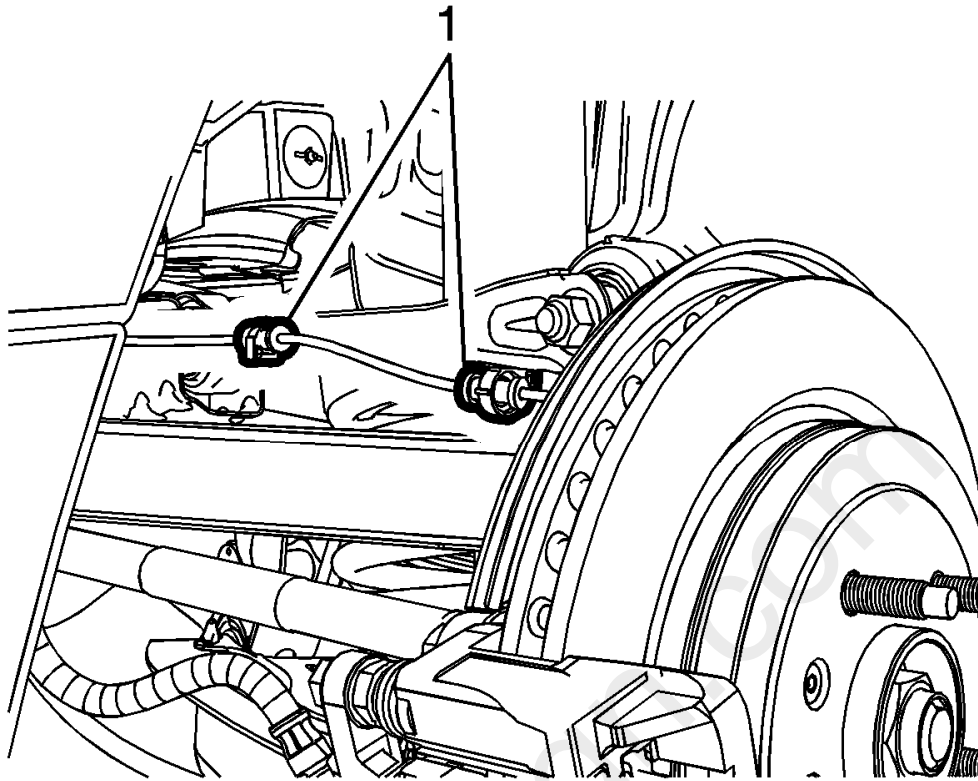


Fig. 35: Wheel Speed Sensor Harness Clip
Courtesy of GENERAL MOTORS COMPANY

5. Release the wheel speed sensor harness clips (1) from the upper suspension arm.
6. Clean the wheel speed sensor mounting area on the steering knuckle of any accumulated dirt and debris.

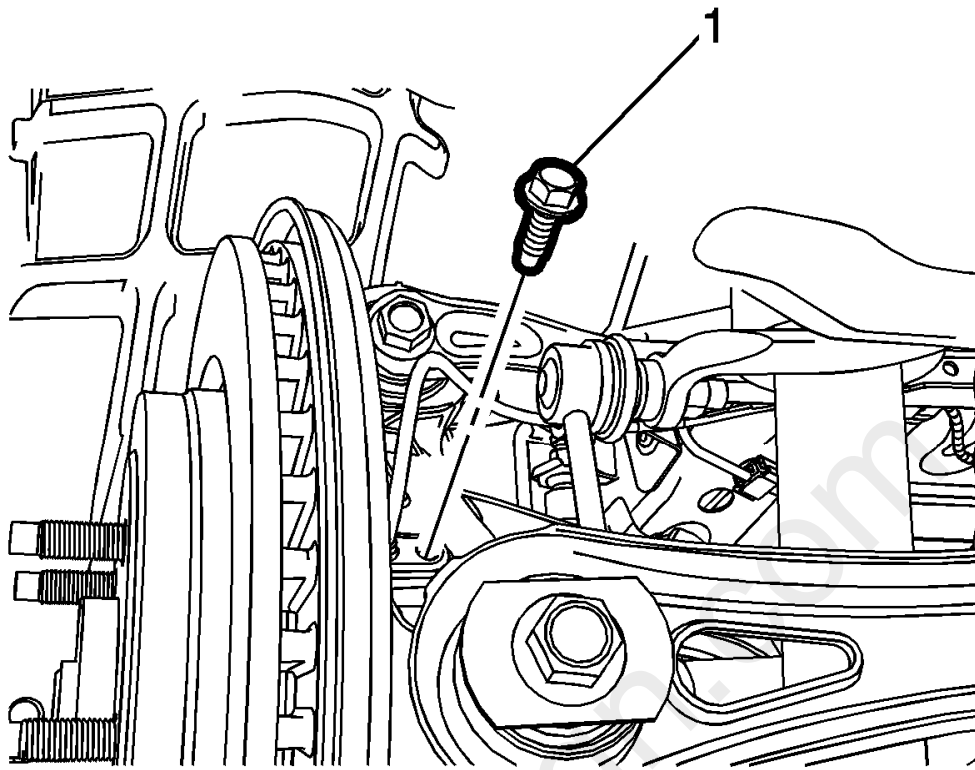


Fig. 36: Wheel Speed Sensor Bolt
Courtesy of GENERAL MOTORS COMPANY

7. Remove the wheel speed sensor bolt (1).
8. Remove the wheel speed sensor from the suspension knuckle.

Installation Procedure

1. Install the wheel speed sensor to the suspension knuckle.

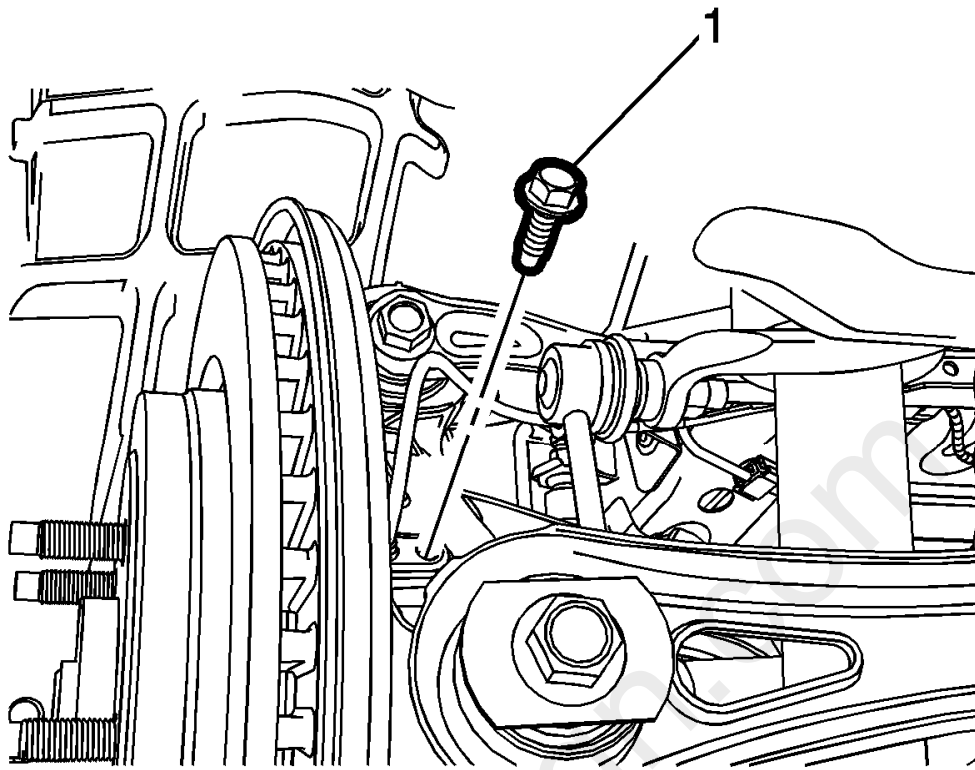


Fig. 37: Wheel Speed Sensor Bolt
Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Fastener Caution .

2. Install the wheel speed sensor bolt (1) and tighten to 10 (89 lb in).

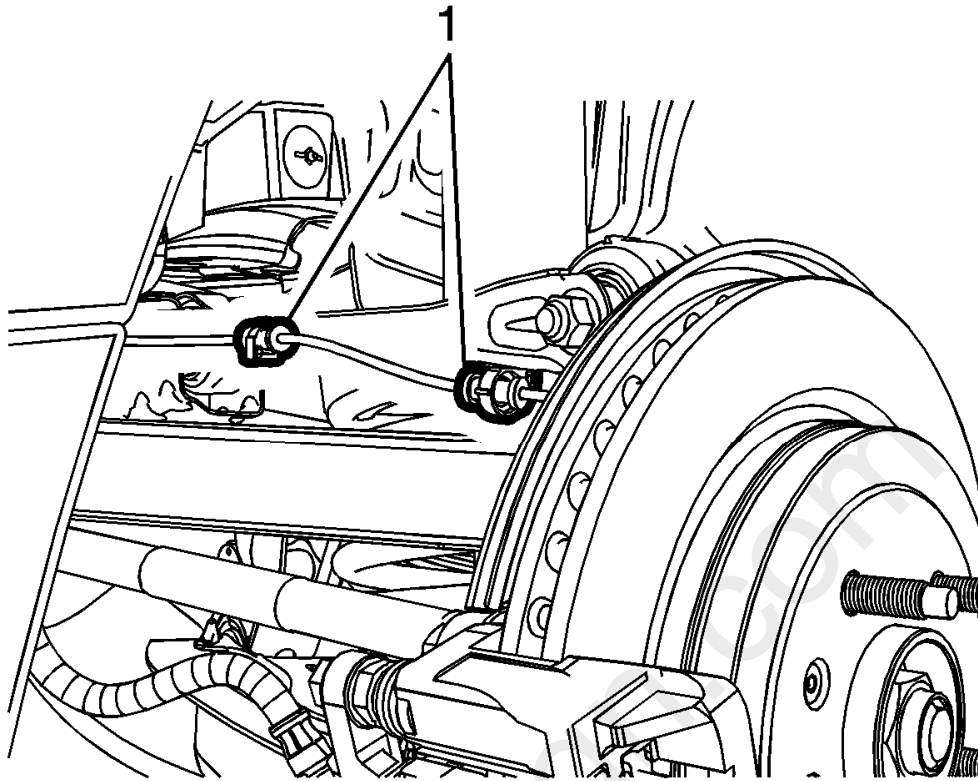


Fig. 38: Wheel Speed Sensor Harness Clip
Courtesy of GENERAL MOTORS COMPANY

3. Install the wheel speed sensor harness clips (1) to the upper suspension arm.

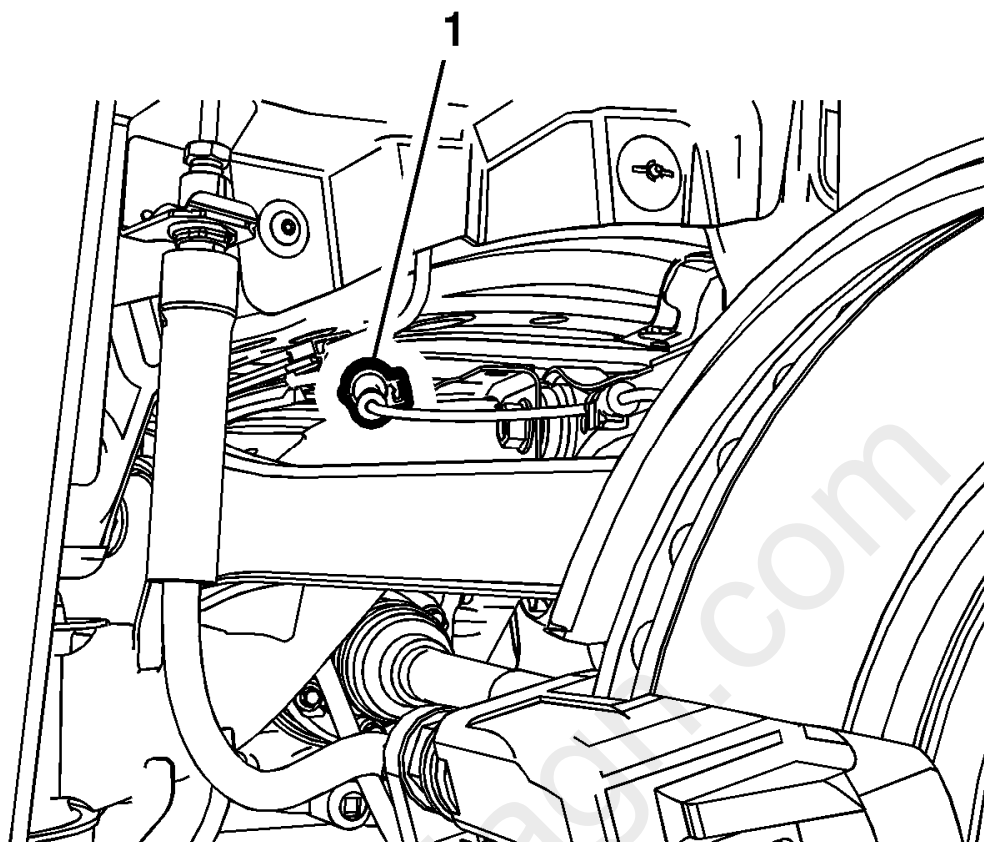


Fig. 39: Wheel Speed Sensor Harness Clip
Courtesy of GENERAL MOTORS COMPANY

4. Install the wheel speed sensor harness clip (1) to the vehicle frame.

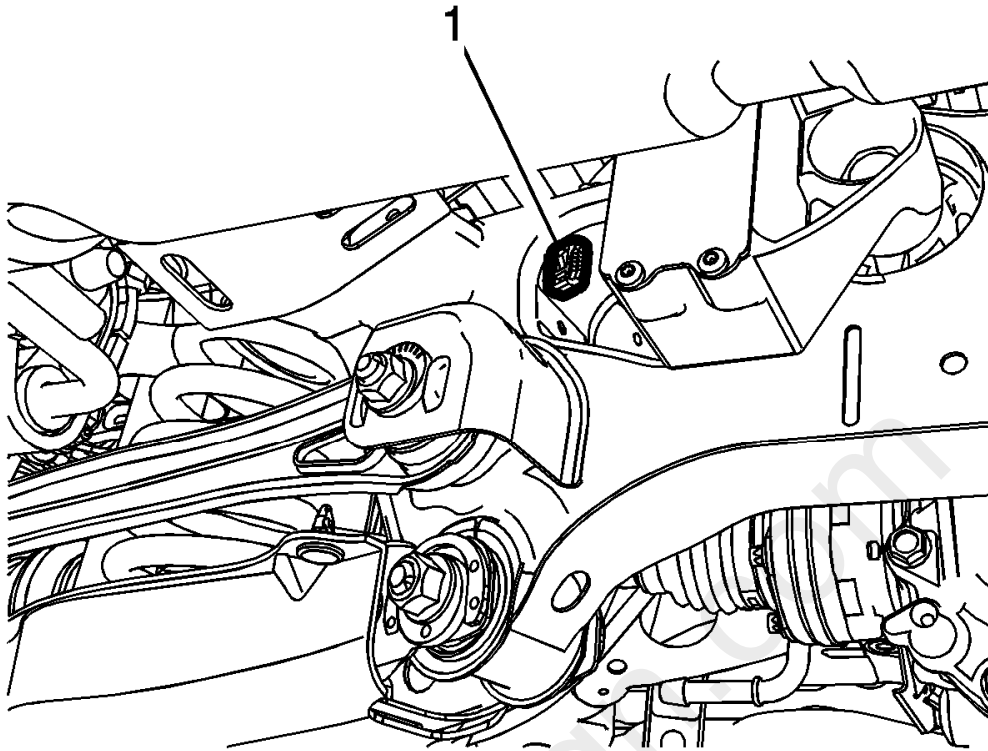


Fig. 40: Wheel Speed Sensor Electrical Connector Clip
Courtesy of GENERAL MOTORS COMPANY

5. Connect the wheel speed sensor electrical connector.
6. Install the connector clip (1) to the vehicle frame.
7. Install the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** .
8. Perform the **Diagnostic System Check - Vehicle** .

VEHICLE STABILITY CONTROL SYSTEM SWITCH REPLACEMENT

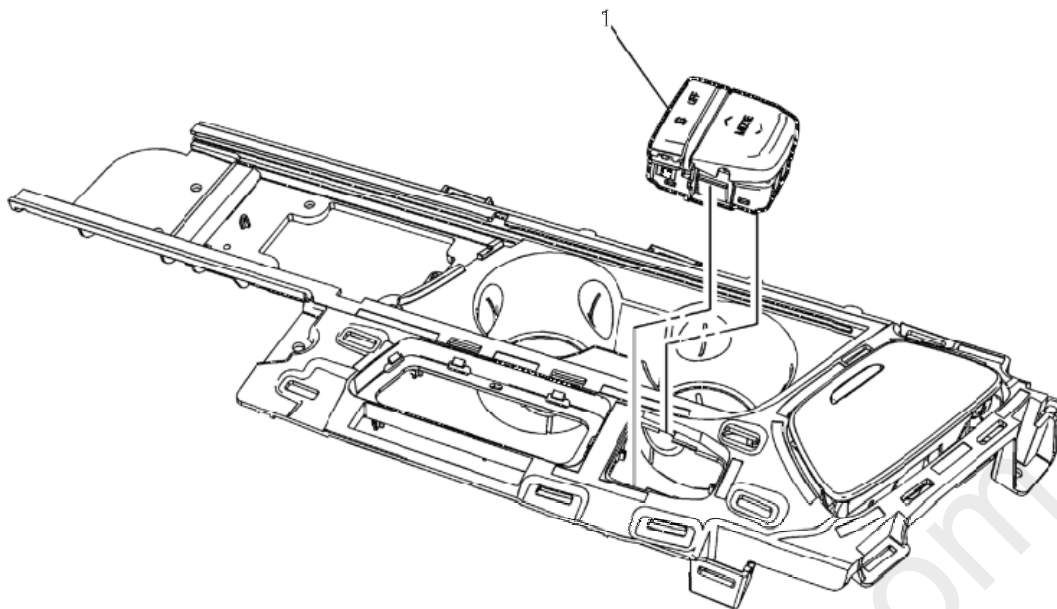


Fig. 41: Vehicle Stability Control System Switch
 Courtesy of GENERAL MOTORS COMPANY

Vehicle Stability Control System Switch Replacement

Callout	Component Name
Preliminary Procedure Remove the front floor console cup holder plate. Refer to <u>Front Floor Console Cup Holder Plate Replacement</u> .	
1	Vehicle Stability Control System Switch Procedure Using the appropriate tool, gently depress the tabs on the switch to remove.

VEHICLE YAW SENSOR LEARN

The yaw rate sensor learn procedure can be completed with a scan tool using the following steps:

1. Place vehicle on a level surface
2. Apply the parking brake, or set the transmission in the P position.
3. Install the scan tool to the data link connector.
4. Ignition ON, engine OFF.
5. Select Yaw Rate Sensor Learn in the Electronic Brake Control Module Configuration/Reset Functions list.
6. Follow the scan tool directions to complete the calibration procedure.
7. Clear any DTCs that may be set.

VEHICLE YAW SENSOR WITH VEHICLE LATERAL AND LONGITUDINAL ACCELEROMETER REPLACEMENT

Removal Procedure

NOTE: If the vehicle is not equipped with RPO UGN the vehicle yaw sensor is located internally as a part of the airbag sensing and diagnostic module. Refer to Airbag Sensing and Diagnostic Module Replacement .

1. Turn the ignition OFF.
2. Remove the front floor console compartment. Refer to Front Floor Console Compartment Replacement .
3. Disconnect the vehicle yaw sensor electrical connector.

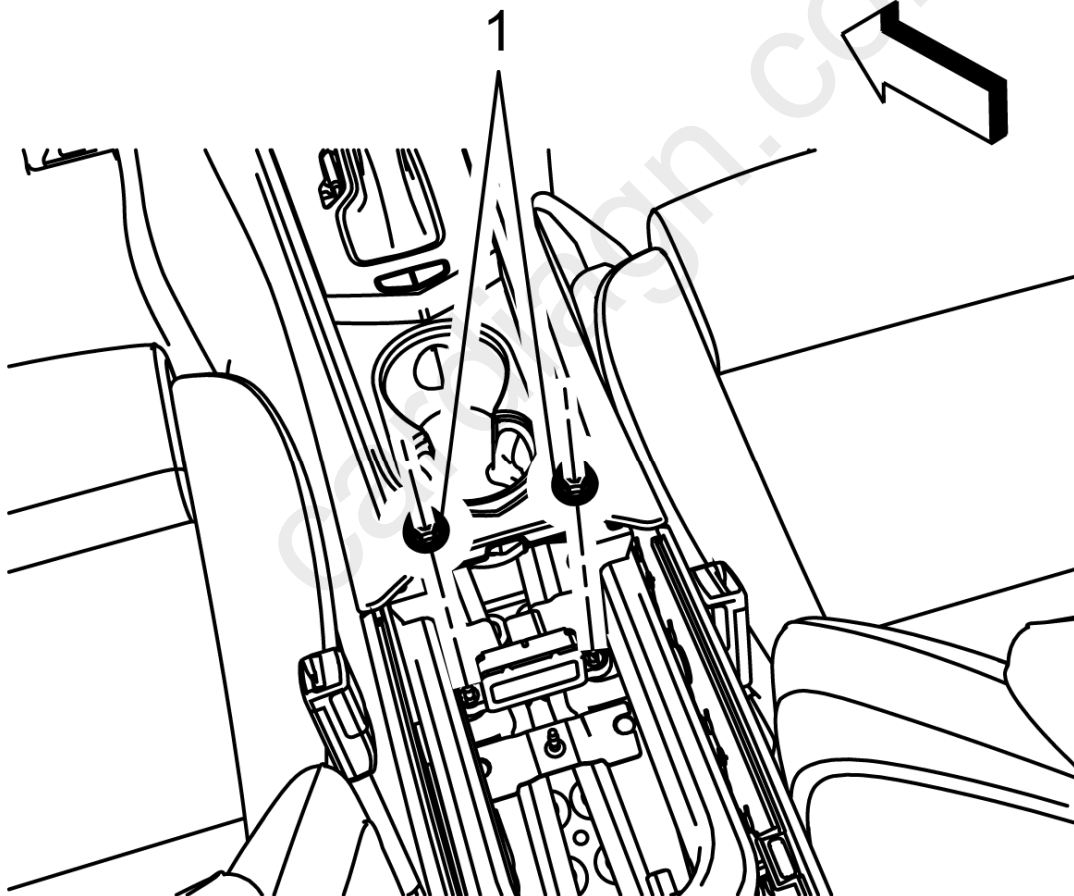


Fig. 42: Vehicle Yaw Sensor Nuts
Courtesy of GENERAL MOTORS COMPANY

4. Remove the vehicle yaw sensor nuts (1).

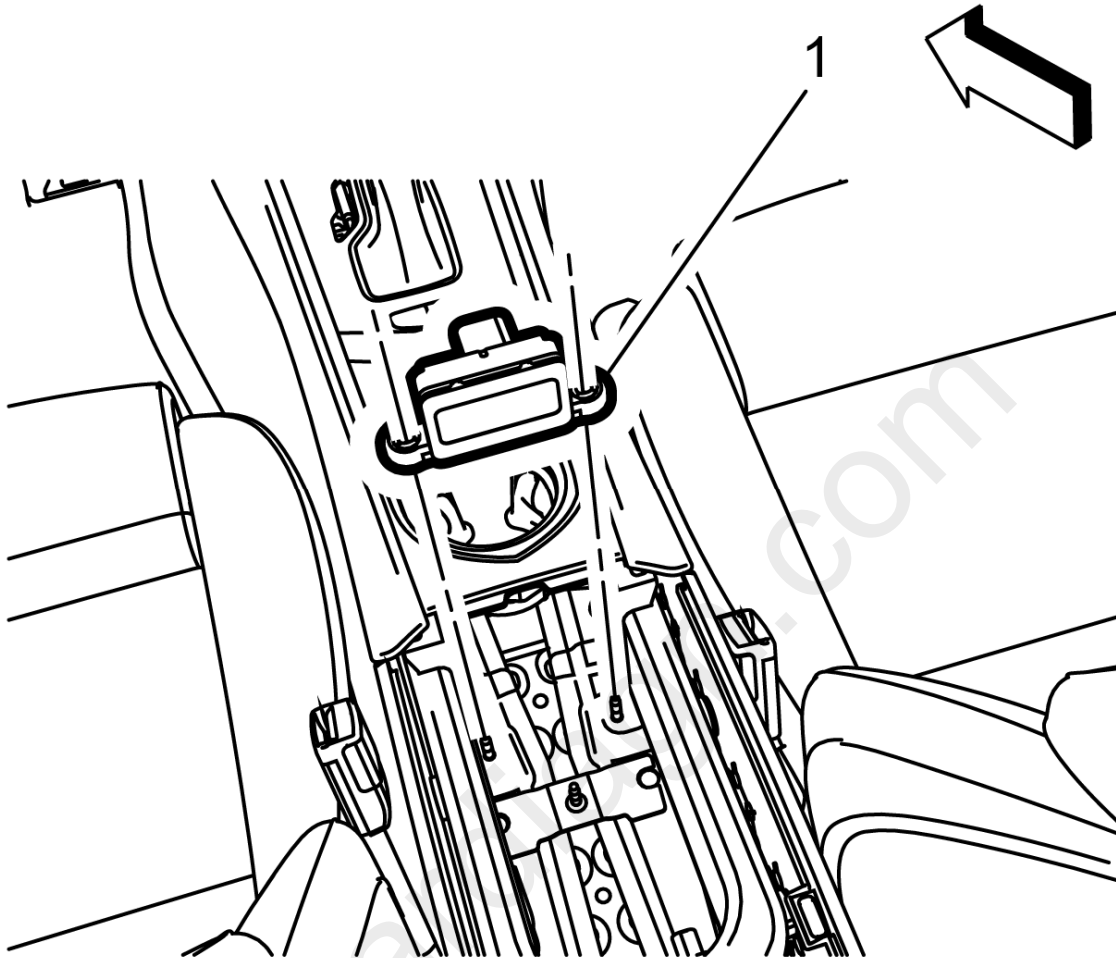


Fig. 43: Vehicle Yaw Sensor
Courtesy of GENERAL MOTORS COMPANY

5. Remove the vehicle yaw sensor (1).

Installation Procedure

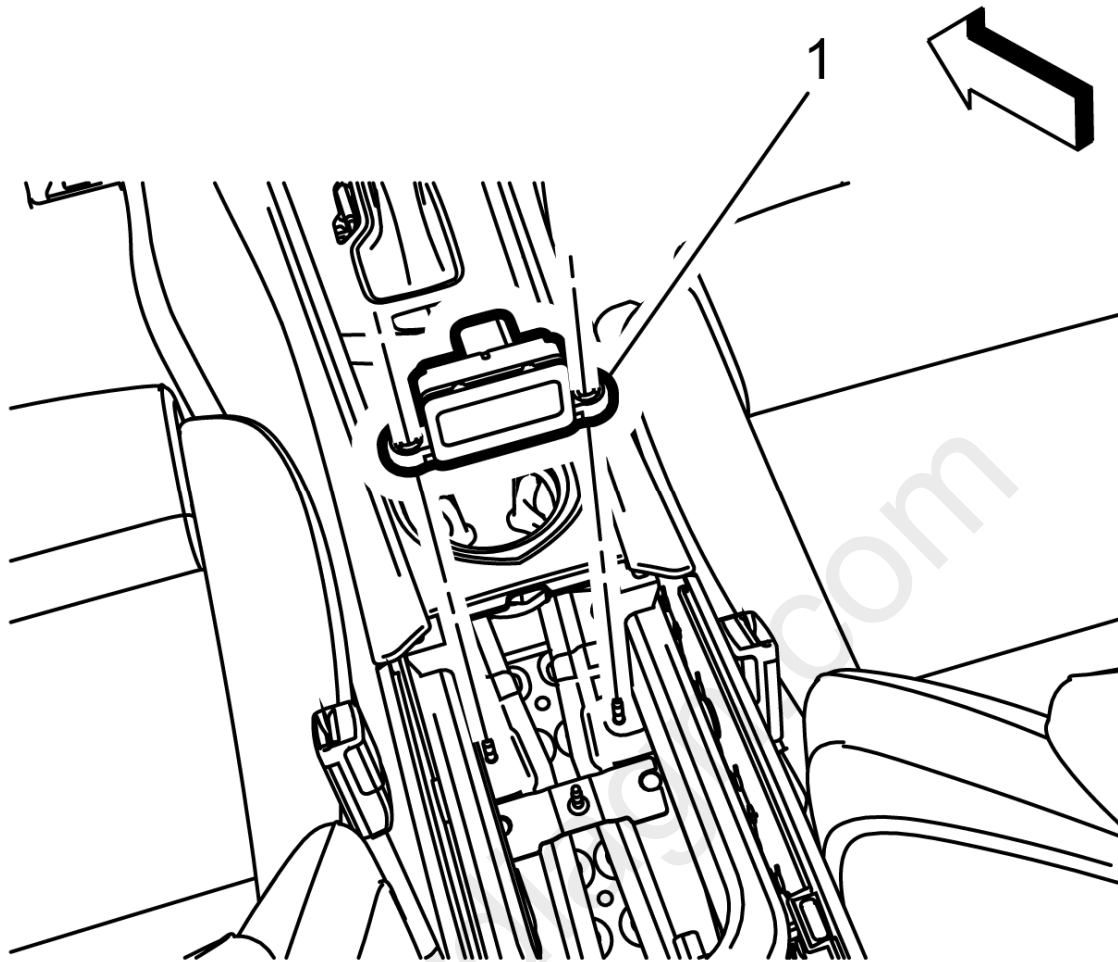


Fig. 44: Vehicle Yaw Sensor
Courtesy of GENERAL MOTORS COMPANY

1. Install the vehicle yaw sensor (1).

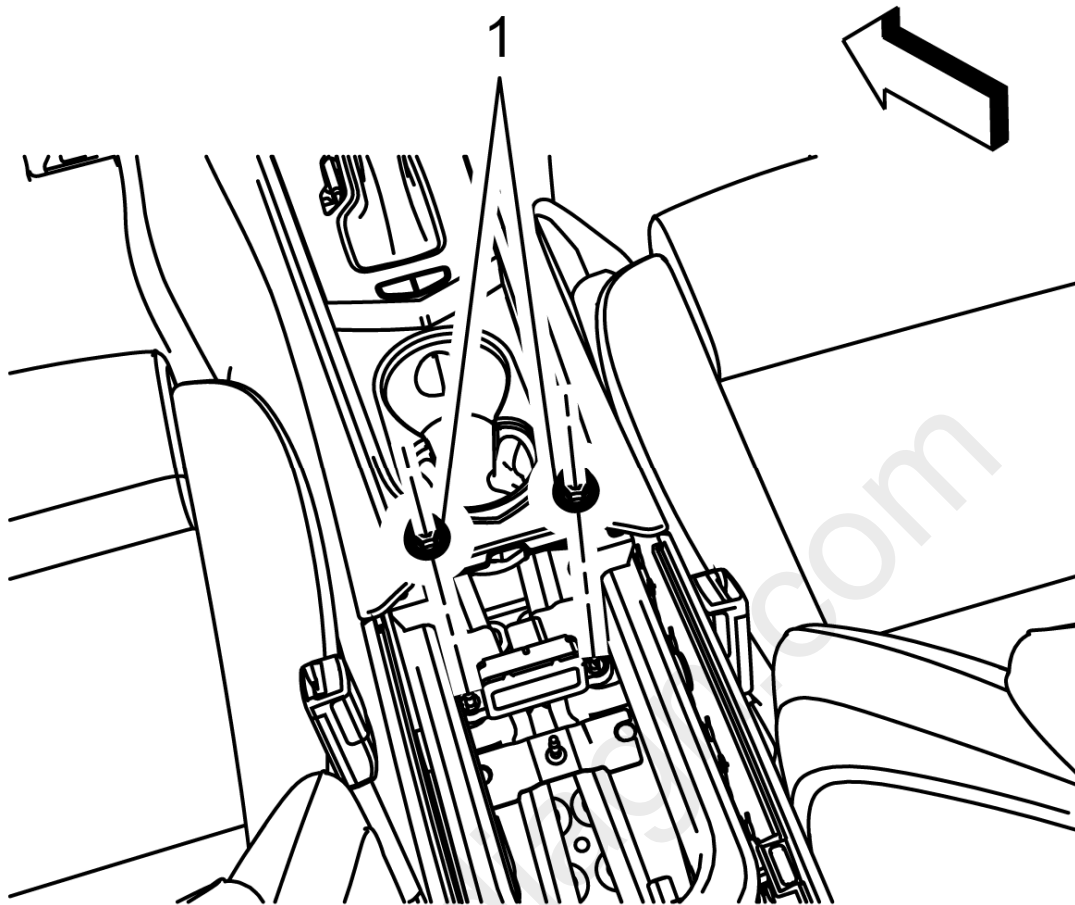


Fig. 45: Vehicle Yaw Sensor Nuts
Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Fastener Caution .

2. Install the vehicle yaw sensor nuts (1) and tighten to 9 (80 lb in).
3. Connect the vehicle yaw sensor electrical connector.
4. Install the front floor console compartment. Refer to Front Floor Console Compartment Replacement .
5. Calibrate the vehicle yaw sensor. Refer to Vehicle Yaw Sensor Learn.

DESCRIPTION AND OPERATION

ABS DESCRIPTION AND OPERATION

This vehicle is equipped with a Continental Teves Mk100 ABS, traction control, electronic stability control and

a hydraulic brake system with diagonal brake circuit split.

The electronic brake control module and the brake pressure modulator is serviced separately. The brake pressure modulator uses a four circuit configuration to control hydraulic pressure to each wheel independently.

Depending on options, the following vehicle performance enhancement systems are provided.

- ABS
- Auto dry brakes
- Traction control
- Stability control
- Dynamic rear proportioning
- Hill hold start assist
- Hydraulic brake assist
- Intelligent brake assist
- Optimized hydraulic braking system

The following components are involved in the operation of the above systems:

- Electronic brake control-The electronic brake control module controls the system functions and detects failures. It supplies voltage to the solenoid valves and pump motor.
- Brake pressure modulator-The brake pressure modulator contains the following components:
 - Hydraulic pump with pump motor
 - Four isolation valves
 - Four dump valves
 - Two traction/stability control supply valves
 - Two traction/stability control isolation valves
 - Brake pressure sensor
- Multi-axis acceleration sensor in vehicles equipped (without UGN)-The yaw rate, lateral acceleration and longitudinal acceleration sensors are combined into one multi-axis acceleration sensor, internal to the inflatable restraint sensing and diagnostic module.
- Multi-axis acceleration sensor in vehicles equipped (with UGN)-The yaw rate, lateral acceleration and longitudinal acceleration sensors are combined into one multi-axis acceleration sensor, external to the electronic brake control module. The electronic brake control module receives serial data message inputs from the yaw rate, lateral acceleration and longitudinal acceleration sensor and activates stability control depending on multi-axis acceleration sensor input.
- Steering wheel angle sensor-This sensor measures the rotation angle, angle velocity and direction of the steering wheel, providing serial data message inputs to the electronic brake control module. The steering wheel angle sensor signal is used to calculate the intended driving direction.
- Traction control switch-The traction control system is manually disabled or enabled by pressing the traction control switch.
- Traction/Stability control switch-The electronic stability control is manually disabled or enabled by

pressing and holding the traction control switch for five seconds.

- **Active wheel speed sensors**-The electronic brake control module sends a signal voltage to each wheel speed sensor. As the wheel spins, the wheel speed sensor produces an alternating current square wave signal. The electronic brake control module uses the frequency of the square wave signal to calculate the wheel speed.

Power-Up-Self Test

The electronic brake control module is able to detect many malfunctions whenever the ignition is ON. However, certain failures cannot be detected unless active diagnostic tests are performed on the components. Shorted solenoid coil or motor windings, for example, cannot be detected until the components are commanded ON by the electronic brake control module. Therefore, a power-up self-test is performed to verify correct operation of system components. The electronic brake control module performs the first phase of the power-up self-test when the ignition is first turned ON. This phase consists of internal self-testing of the electronic brake control module along with electrical checks of system sensors and circuits.

Initialization Sequence

The initialization sequence cycles each solenoid valve and the pump motor, as well as the necessary relays, for approximately thirty milliseconds to check component operation. The electronic brake control module sets a DTC if any error is detected. The initialization sequence may be heard and felt while it is taking place, and is considered part of normal system operation. The active test is initiated by the electronic brake control module at the start of the ignition cycle and the speed of the fastest wheel exceeds 10 km/h (7 MPH).

ABS

When wheel slip is detected during a brake application, an ABS event occurs. During ABS braking, hydraulic pressure in the individual wheel circuits is controlled to prevent any wheel from slipping. A separate hydraulic line and specific solenoid valves are provided for each wheel. The ABS can decrease, hold, or increase hydraulic pressure to each wheel. The ABS does not, however, increase hydraulic pressure above the amount which is transmitted by the master cylinder during braking.

During ABS braking, a series of rapid pulsations is felt in the brake pedal. These pulsations are caused by the rapid changes in position of the individual solenoid valves as the electronic brake control module responds to wheel speed sensor inputs and attempts to prevent wheel slip. These pedal pulsations are present only during ABS braking and stop when normal braking is resumed or when the vehicle comes to a stop. A ticking or popping noise may also be heard as the solenoid valves cycle rapidly. During ABS braking on dry pavement, intermittent chirping noises may be heard as the tires approach slipping. These noises and pedal pulsations are considered normal during ABS operation.

Vehicles equipped with ABS may be stopped by applying normal force to the brake pedal. Brake pedal operation during normal braking is no different than that of previous non ABS systems. Maintaining a constant force on the brake pedal provides the shortest stopping distance while maintaining vehicle stability. The typical ABS activation sequence is as follows.

Pressure Hold

The electronic brake control module closes the isolation valve and keeps the dump valve closed in order to

isolate the slipping wheel when wheel slip occurs. This holds the pressure steady on the brake so that the hydraulic pressure does not increase or decrease.

Pressure Decrease

If a pressure hold does not correct the wheel slip condition, a pressure decrease occurs. The electronic brake control module decreases the pressure to individual wheels during deceleration when wheel slip occurs. The isolation valve is closed and the dump valve is opened. The excess fluid is stored in the accumulator until the pump can return the fluid to the master cylinder or fluid reservoir.

Pressure Increase

After the wheel slip is corrected, a pressure increase occurs. The electronic brake control module increases the pressure to individual wheels during deceleration in order to reduce the speed of the wheel. The isolation valve is opened and the dump valve is closed. The increased pressure is delivered from the master cylinder.

Auto Dry Brakes

The auto dry brakes work in tandem with the automatic rain sense windshield wiper system. The auto dry brakes automatically activates when the windshield wipers are in operation, and the vehicle has been traveling over 32 km/h (20 MPH) continuously for more than 6.4 m (4 mi) without using the cruise control. The operation is initiated by the stability system, when a slight amount of pulsing hydraulic pressure is applied to the brake calipers which in turn applies the brake pads to wipe away water from the brake rotors while the vehicle is in motion.

Traction Control

When drive wheel slip is noted, the electronic brake control module will enter traction control mode.

First, the electronic brake control module requests the engine control module to reduce the amount of torque to the drive wheels via a serial data message. The engine control module reduces torque to the drive wheels and reports the amount of delivered torque.

If the engine torque reduction does not reduce drive wheel slip, the electronic brake control module will actively apply the brakes on the slipping drive wheel. During traction control braking, hydraulic pressure in each drive wheel circuit is controlled to prevent the drive wheels from slipping. The electronic brake control module commands the pump motor and appropriate solenoid valves ON and OFF to apply brake pressure to the slipping wheel.

Traction control can be manually disabled or enabled by pressing the traction control switch.

Stability Control

Stability control provides added stability during aggressive maneuvers. Yaw rate is the rate of rotation about the vehicle's vertical axis. The stability control is activated when the electronic brake control module determines that the desired yaw rate does not match the actual yaw rate as measured by the yaw rate sensor.

The desired yaw rate is calculated by the electronic brake control module using the following inputs:

- Steering wheel position
- Vehicle speed
- Lateral acceleration

The difference between the desired yaw rate and the actual yaw rate is the yaw rate error, which is a measurement of over steer or under steer. When a yaw rate error is detected, the electronic brake control module attempts to correct the vehicle's yaw motion by applying brake pressure to one or more of the wheels. The amount of brake pressure which is applied varies, depending on the correction required. The engine torque may be reduced also, if it is necessary to slow the vehicle while maintaining stability.

Stability control activations generally occur in turns during aggressive driving. When braking during stability control activation, the brake pedal may pulsate.

Stability control can be manually disabled or enabled by pressing and holding the traction control switch for five seconds.

Dynamic Rear Proportioning

The dynamic rear proportioning is a control system that replaces the mechanical proportioning valve. Under certain driving conditions the electronic brake control module will reduce the rear wheel brake pressure by commanding the appropriate solenoid valves ON and OFF.

Hill Hold Start Assist

The hill hold start assist allows the driver to launch the vehicle without a roll back while moving the foot from the brake pedal to the accelerator pedal. The electronic brake control module calculates the brake pressure, which is needed to hold the vehicle on an incline and locks that pressure for a certain time by commanding the appropriate solenoid valves ON and OFF when the brake pedal is released. Hill hold start assist is activated when the electronic brake control module determines that the driver wishes to move the vehicle up-hill, either backwards or forwards.

The following inputs are used for hill hold start assist feature:

- Accelerator pedal position
- Brake switch
- Brake pressure
- Clutch switch, if equipped
- Engine torque
- Longitudinal acceleration
- Reverse gear information
- Vehicle speed

Hydraulic Brake Assist

The hydraulic brake assist function is designed to support the driver in emergency braking situations.

The electronic brake control module receives inputs from the brake pressure sensor. When the electronic brake control module senses an emergency braking situation, it will actively increase the hydraulic brake pressure to a specific maximum by turning the pump motor ON.

Intelligent Brake Assist

The intelligent brake assist function is designed to provide limited braking to help prevent front and rear low speed collisions.

The electronic brake control module receives inputs from the brake pedal position sensor, wheel speed sensors, short range radar and ultrasonic sensors to detect a collision. When the electronic brake control module senses a possible collision, it will actively increase the hydraulic brake pressure to apply the brakes.

Optimized Hydraulic Braking System

With some engines the electronic brake control module monitors the vacuum in the brake booster with a vacuum sensor and controls a brake booster vacuum pump depending on vacuum sensor input. It also has a hydraulic brake boost feature which supplements the brake system to maintain consistent brake performance under conditions of low brake booster vacuum. Low brake booster vacuum conditions can include initial start up after the vehicle has been parked for several hours, very frequent brake stops, or high altitude driving. The hydraulic brake boost system activates only during a brake apply under low vacuum conditions. In this case the electronic brake control module will actively increase and control the hydraulic brake pressure by turning the pump motor ON and the appropriate solenoid valves ON and OFF. When hydraulic brake boost is active, a series of rapid pulsations is felt in the brake pedal.

Driver Information Indicators

Brake Warning Indicator

The instrument cluster turns the brake warning indicator ON when the following occurs:

- The instrument cluster performs the bulb check.
- The electronic brake control module detects a fault and sends a serial data message to the instrument cluster requesting illumination.
- The body control module detects that the park brake is engaged. The instrument cluster receives a serial data message from the body control module requesting illumination.

ABS Indicator

The instrument cluster turns the ABS indicator ON when the following occurs:

- The instrument cluster performs the bulb check.
- The electronic brake control module detects a malfunction which disables the ABS and sends a serial data message to the instrument cluster requesting illumination.

Traction/Stability Control Indicator

The instrument cluster turns the traction/stability control indicator ON when the following occurs:

- The instrument cluster performs the bulb check.
- The electronic brake control module detects a malfunction which disables the traction/stability control and sends a serial data message to the instrument cluster requesting illumination.
- The driver manually disables the traction/stability control by pressing and holding the traction control switch for five seconds. The electronic brake control module sends a serial data message to the instrument cluster requesting illumination.

Traction Control Off Indicator

The instrument cluster turns the traction control off indicator ON when the following occurs:

- The instrument cluster performs the bulb check.
- The driver manually disables the traction control by pressing the traction control switch. The electronic brake control module sends a serial data message to the instrument cluster requesting illumination.

Stability Control Off Indicator

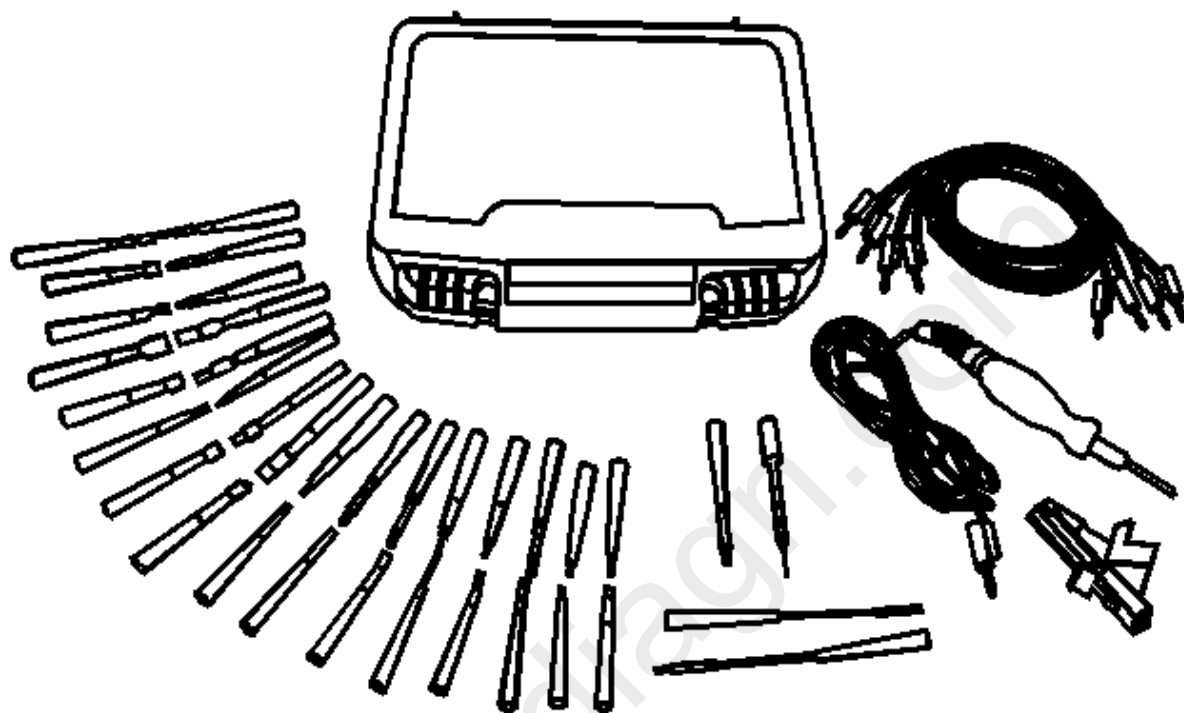
The instrument cluster turns the stability control off indicator ON when the following occurs:

- The instrument cluster performs the bulb check.
- The electronic brake control module sends a serial data message to the instrument cluster requesting illumination.
- The driver manually disables the stability control by pressing and holding the traction control switch for five seconds. The electronic brake control module sends a serial data message to the instrument cluster requesting illumination.

SPECIAL TOOLS AND EQUIPMENT

SPECIAL TOOLS

Illustration	Tool Number/ Description



EL 35616-F
J 35616
Terminal
Test Kit