Antilock Brake System

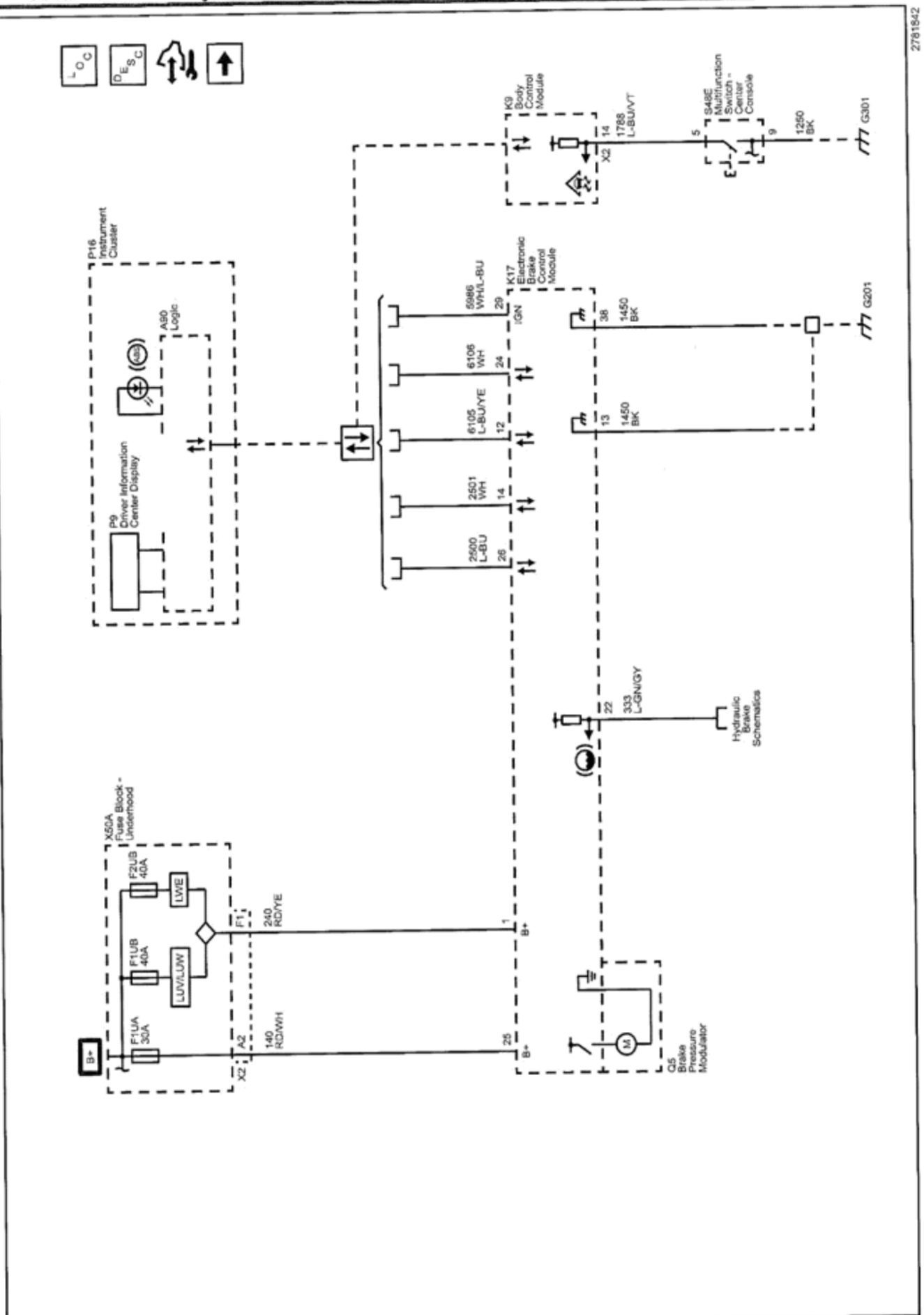
Specifications

Fastener Tightening Specifications

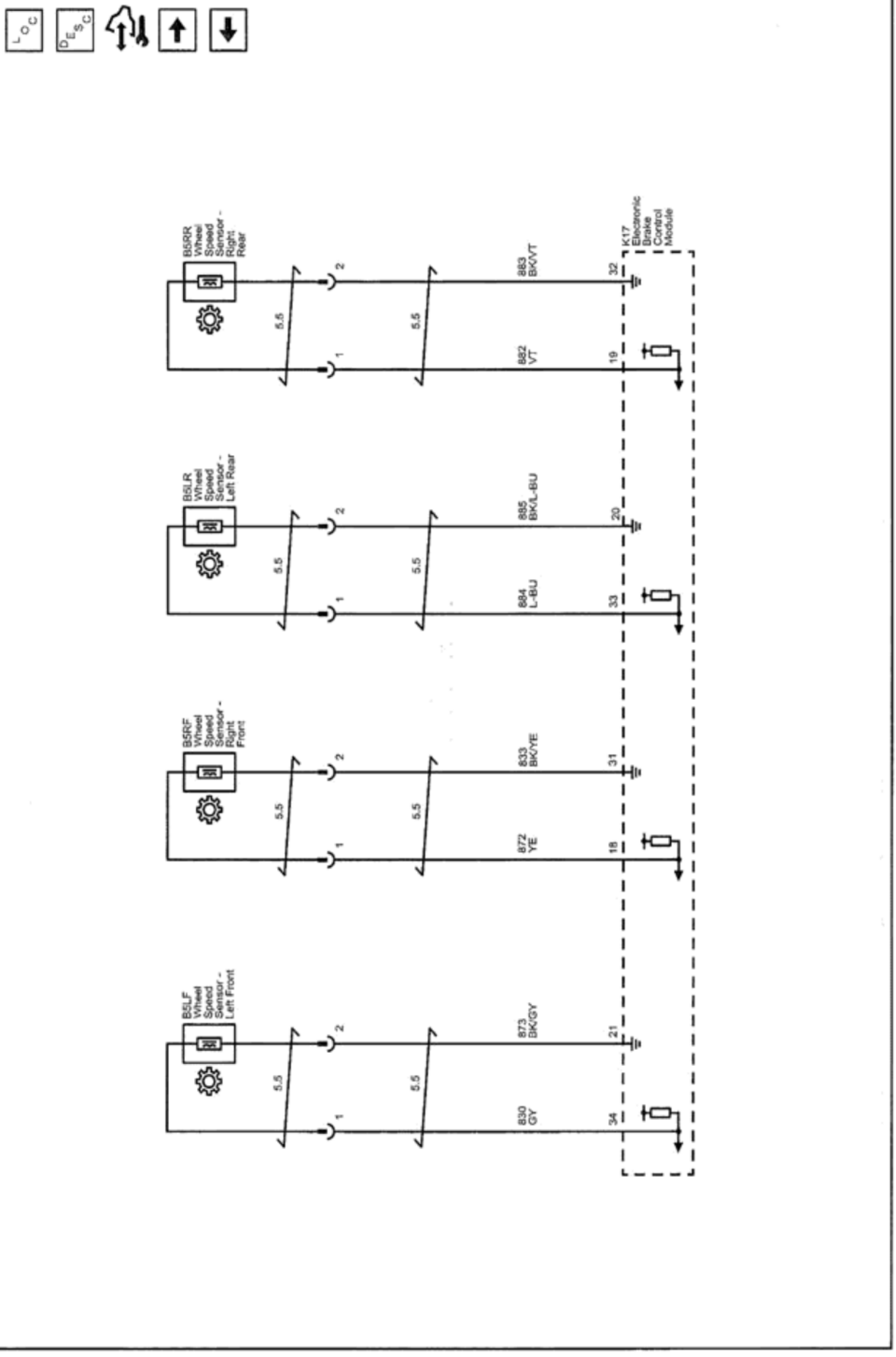
Application	Specification	
	Metric	English
Brake Pipe Fitting	18 N•m	13 lb ft
Brake Pressure Modulator Valve Bolt	11 N•m	97 lb in
Brake Pressure Modulator Valve Bracket Nut	17 N•m	12 lb ft
Electronic Brake Control Module Bolt	3 N•m	26 lb in
Rear Wheel Speed Sensor Connector Cover Nut	2 N•m	18 lb in
Wheel Speed Sensor Bolt- Front and Rear	8 N•m	71 lb in
Yaw Sensor Nut	9 N•m	80 lb in

Schematic and Routing Diagrams

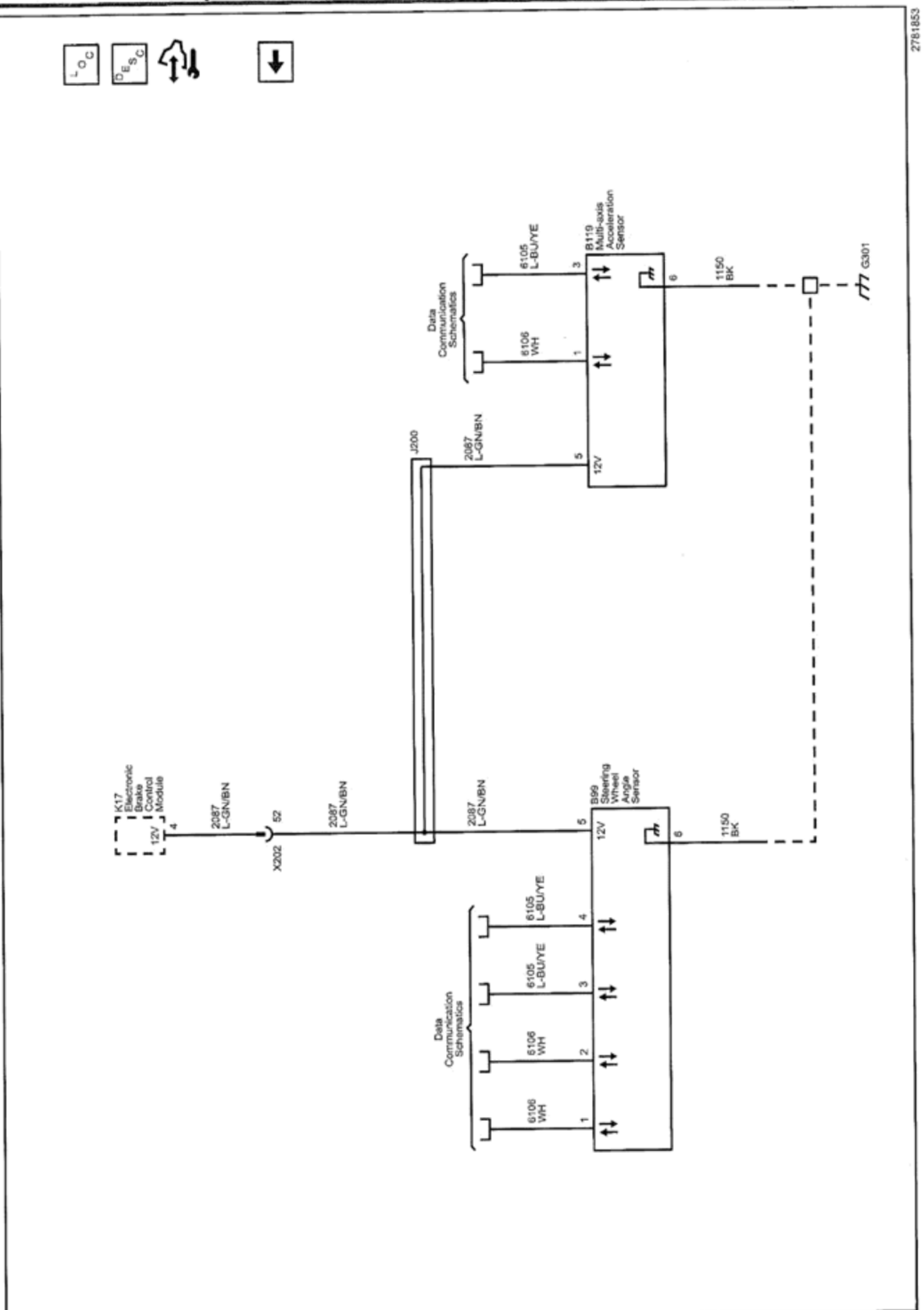
Antilock Brake System Schematics (Module Power, Ground, and Subsystem References)



Antilock Brake System Schematics (Wheel Speed Sensors)



Antilock Brake System Schematics (Stability Control)



Diagnostic Information and Procedures

DTC B2745

Diagnostic Instructions

- Perform the *Diagnostic System Check - Vehicle on page 6-66* prior to using this diagnostic procedure.
- Review *Strategy Based Diagnosis on page 6-58* for an overview of the diagnostic approach.
- *Diagnostic Procedure Instructions on page 6-59* provides an overview of each diagnostic category.

DTC Descriptors

DTC B2745 02: Traction Control Switch Circuit Short to Ground

DTC B2745 71: Traction Control Switch Circuit Invalid Data

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Signal	B2745 02, B2745 71	1	1	B2745 71
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 will request the Electronic Brake Control Module via serial data to disable the traction control. 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 via serial data to turn the Traction Control Off and the Stability Control Off indicator ON to notify the driver of the deactivation.

Conditions for Running the DTC

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

Conditions for Setting the DTC

B2745 02

The Body Control Module detects a short to ground on the signal circuit.

B2745 71

The Body Control Module detects an erratic signal or invalid serial data from the Traction Control Switch.

Action Taken When the DTC Sets

- The Electronic Brake Control Module stores the DTC.
- The Electronic Brake Control Module disables the traction and the stability control for the duration of the ignition cycle.

Conditions for Clearing the DTC

- The conditions for setting the DTC are no longer present.
- The Electronic Brake Control Module clears the history DTC when a current DTC is not detected in 40 consecutive drive cycles.

Reference Information

Schematic Reference

Antilock Brake System Schematics on page 5-6

Connector End View Reference

Component Connector End Views on page 11-269

Description and Operation

ABS Description and Operation on page 5-51

Electrical Information Reference

- *Circuit Testing on page 11-526*
- *Connector Repairs on page 11-548*
- *Testing for Intermittent Conditions and Poor Connections on page 11-531*
- *Wiring Repairs on page 11-537*

Scan Tool Reference

Control Module References on page 6-3 for scan tool information

Circuit/System Verification

1. Ignition ON
2. Verify the Instrument Cluster Traction Control indicator turns ON and OFF when commanding the Instrument Cluster All Indicators ON and OFF with a scan tool.

⇒ **If the indicator does not turn ON and OFF**

Replace the P16 Instrument Cluster

⇓ **If the indicator turns ON and OFF**

3. Verify the scan tool Traction Control Switch parameter changes between Active and Inactive while pressing and releasing the traction 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, scan tool disconnected, and all vehicle systems OFF, disconnect the harness connector at the S48E Multifunction Switch-Center Console. It may take up to 2 minutes for all vehicle systems to power down.
2. Test for less than 10 Ω between the ground circuit terminal 9 and ground.

⇒ **If 10 Ω or greater**

2.1. Ignition OFF

2.2. Test for less than 2 Ω in the ground circuit end to end.

⇒ If 2 Ω or greater, repair the open/high resistance in the circuit.

⇒ If less than 2 Ω, repair the open/high resistance in the ground connection.

⇓ **If less than 10 Ω**

3. Ignition ON.
4. Verify the scan tool Body Control Module Traction Control Switch parameter is Inactive.

⇒ **If not Inactive**

4.1. Ignition OFF, disconnect the X2 harness connector at the K9 Body Control Module.

4.2. Test for infinite resistance between the signal circuit terminal 5 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 signal circuit terminal 5 and the ground circuit terminal 9.
6. Verify the scan tool Traction Control Switch parameter is Active.

⇒ **If not Active**

6.1. Ignition OFF, disconnect the X2 harness connector at the K9 Body Control Module, ignition ON.

6.2. 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

6.3. Test for less than 2 Ω in the signal circuit end to end.

⇒ If 2 Ω or greater, repair the open/high resistance in the circuit.

⇒ If less than 2 Ω, replace the K9 Body Control Module.

⇓ **If Active**

7. Test or replace the S48E Multifunction Switch-Center Console.

Component Testing

1. Ignition OFF, disconnect the harness connector at the S48E Multifunction Switch-Center Console.
2. Test for infinite resistance between the signal terminal 5 and the ground terminal 9 with the switch in the open position.

⇒ **If less than infinite resistance**

Replace the S48E Multifunction Switch-Center Console.

⇓ **If infinite resistance**

3. Test for less than 2 Ω between the signal terminal 5 and the ground terminal 9 with the switch in the closed position.

⇒ **If 2 Ω or greater**

Replace the S48E Multifunction Switch-Center Console.

⇓ **If less than 2 Ω**

4. All OK.

Repair Instructions

Perform the *Diagnostic Repair Verification on page 6-92* after completing the repair.

- *Front Floor Console Multifunction Switch Replacement on page 8-105*.
- *Control Module References on page 6-3* for Body Control Module, Electronic Brake Control Module or Instrument Cluster replacement, programming and setup

DTC C0035, C0040, C0045, or C0050

Diagnostic Instructions

- Perform the *Diagnostic System Check - Vehicle on page 6-66* prior to using this diagnostic procedure.
- Review *Strategy Based Diagnosis on page 6-58* for an overview of the diagnostic approach.
- *Diagnostic Procedure Instructions on page 6-59* provides an overview of each diagnostic category.

DTC Descriptors

DTC C0035 06: Left Front Wheel Speed Sensor Low Voltage/Open
DTC C0035 0F: Left Front Wheel Speed Sensor Circuit Signal Erratic
DTC C0035 18: Left Front Wheel Speed Sensor Circuit Signal Low Signal Amplitude
DTC C0035 5A: Left Front Wheel Speed Sensor Not Plausible
DTC C0040 06: Right Front Wheel Speed Sensor Low Voltage/Open
DTC C0040 0F: Right Front Wheel Speed Sensor Circuit Signal Erratic
DTC C0040 18: Right Front Wheel Speed Sensor Circuit Signal Low Signal Amplitude
DTC C0040 5A: Right Front Wheel Speed Sensor Not Plausible
DTC C0045 06: Left Rear Wheel Speed Sensor Low Voltage/Open
DTC C0045 0F: Left Rear Wheel Speed Sensor Circuit Signal Erratic
DTC C0045 18: Left Rear Wheel Speed Sensor Circuit Signal Low Signal Amplitude
DTC C0045 5A: Left Rear Wheel Speed Sensor Not Plausible
DTC C0050 06: Right Rear Wheel Speed Sensor Low Voltage/Open
DTC C0050 0F: Right Rear Wheel Speed Sensor Circuit Signal Erratic
DTC C0050 18: Right Rear Wheel Speed Sensor Circuit Signal Low Signal Amplitude
DTC C0050 5A: Right Rear Wheel Speed Sensor Not Plausible

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Left Front Sensor Ignition	C0035 06	C0035 06	—	C0035 0F, C0035 18, C0035 5A
Left Front Sensor Signal	C0035 06	C0035 06	C0035 06	C0035 0F, C0035 18, C0035 5A
Right Front Sensor Ignition	C0040 06	C0040 06	—	C0040 0F, C0040 18, C0040 5A
Right Front Sensor Signal	C0040 06	C0040 06	C0040 06	C0040 0F, C0040 18, C0040 5A
Left Rear Sensor Ignition	C0045 06	C0045 06	—	C0045 0F, C0045 18, C0045 5A
Left Rear Sensor Signal	C0045 06	C0045 06	C0045 06	C0045 0F, C0045 18, C0045 5A
Right Rear Sensor Ignition	C0050 06	C0050 06	—	C0050 0F, C0050 18, C0050 5A
Right Rear Sensor Signal	C0050 06	C0050 06	C0050 06	C0050 0F, C0050 18, C0050 5A

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

Circuit/System Description

The wheel speeds are detected by active wheel speed sensors and encoder rings. The encoder ring consists of permanent magnets. 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.

Conditions for Running the DTC

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

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

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

- Ignition ON.
- Ignition voltage is greater than 8 V.
- Vehicle speed is greater than 20 km/h (12 MPH).

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

- Ignition ON.
- Ignition voltage is greater than 8 V.
- No other wheel speed circuit DTCs are set.
- At least two other wheel speed circuits are not 0 km/h (0 MPH).

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

- Ignition ON.
- Ignition voltage is greater than 8 V.
- The vehicle speed is greater than 20 km/h (12 MPH).

Conditions for Setting the DTC

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

- A short to voltage is detected on a wheel speed signal.
- A short to ground or an open/high resistance is detected on a wheel speed signal.
- A short to ground or an open/high resistance is detected on a wheel speed ignition circuit.

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

- One wheel speed is less than 2 km/h (1.2 MPH).
- The remaining wheel speeds are greater than 10 km/h (6.2 MPH) for 0.154 seconds.
- The difference between the remaining wheel speeds are less than 4 km/h (2.5 MPH) from each other for more than 2 minutes.

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

The electronic brake control module detected a rapid variation in the wheel speed. The wheel speed changes 20 km/h (12 MPH) or more in 0.7 seconds. The change must occur 56 times with no more than 0.7 seconds between occurrences.

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

The difference between fastest and slowest wheel speed is greater than 60% for more than 2 minutes.

Action Taken When the DTC Sets

- The ABS indicator turns ON.
- The traction/stability control indicator turns ON, if equipped with electronic stability control.
- The electronic brake distribution does not function optimally with multiple wheel speed sensor DTCs set.
- 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

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

Diagnostic Aids

- Do not use a magnet to clean the encoder ring.
- Inspect the wheel hub bearing encoder ring for rust or corrosion.
- Inspect the wheel speed sensor for contamination, physical damage, and correct installation.
- If two or more wheel speed sensors are inoperative, diagnose each wheel speed sensor individually.
- If any of the symptom codes 0F, 18 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 on page 5-6

Connector End View Reference

Component Connector End Views on page 11-269

Description and Operation

ABS Description and Operation on page 5-51

Electrical Information Reference

- *Circuit Testing on page 11-526*
- *Connector Repairs on page 11-548*
- *Testing for Intermittent Conditions and Poor Connections on page 11-531*
- *Wiring Repairs on page 11-537*

Scan Tool Reference

Control Module References on page 6-3 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 and all vehicle systems OFF, disconnect the harness connectors at the appropriate B5 Wheel Speed Sensor and the harness connector at the K17 Electronic Brake Control Module, ignition ON.
2. Test for less than 1 V between the appropriate K17 Electronic Brake Control Module harness connector terminals listed below and ground:
   - B5LF Left Front Wheel Speed Sensor – terminal 34 and terminal 21
   - B5RF Right Front Wheel Speed Sensor – terminal 18 and terminal 31
   - B5LR Left Rear Wheel Speed Sensor – terminal 33 and terminal 20
   - B5RR Right Rear Wheel Speed Sensor – terminal 19 and terminal 32

⇒ **If 1 V or greater**

Repair the short to voltage on the circuit.

⇓ **If less than 1 V**

3. Ignition OFF.
4. Test for infinite resistance between the K17 Electronic Brake Control Module harness connector terminals listed below and ground:
   - B5LF Left Front Wheel Speed Sensor – terminal 34 and terminal 21
   - B5RF Right Front Wheel Speed Sensor – terminal 18 and terminal 31
   - B5LR Left Rear Wheel Speed Sensor – terminal 33 and terminal 20
   - B5RR Right Rear Wheel Speed Sensor – terminal 19 and terminal 32

⇒ **If less than infinite resistance**

Repair the short to ground on the circuit.

⇓ **If infinite resistance**

5. Test for less than 2 Ω between the B5 Wheel Speed Sensor harness connector terminal 1 and the K17 Electronic Brake Control Module harness connector terminal listed below:
   - B5LF Left Front Wheel Speed Sensor – terminal 34
   - B5RF Right Front Wheel Speed Sensor – terminal 18
   - B5LR Left Rear Wheel Speed Sensor – terminal 33
   - B5RR Right Rear Wheel Speed Sensor – terminal 19

⇒ **If 2 Ω or greater**

Repair the open/high resistance in the circuit.

⇓ **If less than 2 Ω**

6. Test for less than 2 Ω between the B5 Wheel Speed Sensor harness connector terminal 2 and the K17 Electronic Brake Control Module harness connector terminal listed below:
   - B5LF Left Front Wheel Speed Sensor – terminal 21
   - B5RF Right Front Wheel Speed Sensor – terminal 31
   - B5LR Left Rear Wheel Speed Sensor – terminal 20
   - B5RR Right Rear Wheel Speed Sensor – terminal 32

⇒ **If 2 Ω or greater**

Repair the open/high resistance in the circuit.

⇓ **If less than 2 Ω**

7. Replace the B5 Wheel Speed Sensor.
8. 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**

9. All OK.

Repair Instructions

Perform the *Diagnostic Repair Verification on page 6-92* after completing the repair.

- *Front Wheel Speed Sensor Replacement on page 5-44*
- *Rear Wheel Speed Sensor Replacement on page 5-47*
- *Control Module References on page 6-3* for Electronic Brake Control Module replacement, programming and setup

DTC C0110

Diagnostic Instructions

- Perform the *Diagnostic System Check - Vehicle on page 6-66* prior to using this diagnostic procedure.
- Review *Strategy Based Diagnosis on page 6-58* for an overview of the diagnostic approach.
- *Diagnostic Procedure Instructions on page 6-59* provides an overview of each diagnostic category.

DTC Descriptors

DTC C0110 04: Pump Motor Circuit Open
DTC C0110 06: Pump Motor Circuit Low Voltage/Open
DTC C0110 61: Pump Motor Stuck

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
B+ Terminal 1	C0201 00	C0201 00	—	—
Ground Terminal 13	—	C0110 04, C0110 06	—	—
Ground Terminal 38	—	U0121	—	—

Component	Condition	DTCs
Pump Motor	• Wear • Damage • Lock	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 ABS operation is required the electronic brake control module activates the pump motor relay and battery voltage is provided to the pump motor.

Conditions for Running the DTC

C0110 04 or C0110 06

Ignition ON.

C0110 61

- The vehicle speed is greater than 20 km/h (13 MPH), and brake is not applied.
- The test is initiated once per ignition cycle, when the vehicle speed is greater than 15 km/h (9 MPH), and a fault was set on the last ignition cycle.

Conditions for Setting the DTC

C0110 04 or C0110 06

- The ground circuit is open, and the feedback voltage is greater than 5 V for 0.5 seconds, the pump is not activated.
- The electronic brake control module detects a low voltage in the pump motor supply circuit when the feedback voltage is less than 5 V for greater than 500 ms, and the pump motor is not activated.

C0110 61

The pump motor continues to rotate briefly after deactivation creating a feedback voltage. The electronic brake control module sets the DTC if the measured feedback voltage indicates a binding or stalled pump motor.

Action Taken When the DTC Sets

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

Conditions for Clearing the DTC

- 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 on page 5-6

Connector End View Reference

Component Connector End Views on page 11-269

Description and Operation

ABS Description and Operation on page 5-51

Electrical Information Reference

- *Circuit Testing on page 11-526*
- *Connector Repairs on page 11-548*
- *Testing for Intermittent Conditions and Poor Connections on page 11-531*
- *Wiring Repairs on page 11-537*

Scan Tool Reference

Control Module References on page 6-3 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 ON and OFF 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 min for all vehicle systems to power down.
2. Test for less than 10 Ω between the ground circuit terminals listed below and ground:
   - Terminal 13
   - Terminal 38

⇒ **If 10 Ω or greater**

2.1. Ignition OFF

2.2. Test for less than 2 Ω in the ground circuit end to end.

⇒ If 2 Ω or greater, repair the open/high resistance in the circuit.

⇒ If less than 2 Ω, repair the open/high resistance in the ground connection.

⇓ **If less than 10 Ω**

3. Ignition ON.
4. Verify 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**

4.1. Ignition OFF.

4.2. Test for less than 2 Ω in the B+ circuit end to end.

⇒ If 2 Ω or greater, repair the open/high resistance in the circuit.

⇒ If less than 2 Ω, 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**

4.1. Ignition OFF.

4.2. 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 Q5 Brake Pressure Modulator.

⇓ **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 on page 6-92* after completing the repair.

- *Brake Pressure Modulator Valve Replacement on page 5-40*
- *Control Module References on page 6-3* for Electronic Brake Control Module replacement, programming and setup

DTC C0131

Diagnostic Instructions

- Perform the *Diagnostic System Check - Vehicle on page 6-66* prior to using this diagnostic procedure.
- Review *Strategy Based Diagnosis on page 6-58* for an overview of the diagnostic approach.
- *Diagnostic Procedure Instructions on page 6-59* provides an overview of each diagnostic category.

DTC Descriptors

DTC C0131 00: Traction Control System Pressure Circuit Malfunction
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 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 specified range.

C0131 5A

The electronic brake control module does not detect that the master cylinder pressure changed after driving the vehicle at a speed greater than 40 km/h (25 MPH) and performing three brake stops.

Action Taken When the DTC Sets

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

Conditions for Clearing the DTC

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

Diagnostic Aids

Diagnose all other stop lamp DTCs or Symptoms prior to performing this diagnostic procedure.

Reference Information

Schematic Reference

- *Antilock Brake System Schematics on page 5-6*
- *Exterior Lights Schematics on page 4-85*

Connector End View Reference

Component Connector End Views on page 11-269

Description and Operation

ABS Description and Operation on page 5-51

Electrical Information Reference

- *Circuit Testing on page 11-526*
- *Connector Repairs on page 11-548*
- *Testing for Intermittent Conditions and Poor Connections on page 11-531*
- *Wiring Repairs on page 11-537*

Scan Tool Reference

Control Module References on page 6-3 for scan tool information

Circuit/System Verification

1. Ignition ON.
2. Verify the stop lamps turn ON and OFF while applying and releasing the brake pedal.

⇒ **If the stop lamps do not turn ON and OFF**

Refer to *Symptoms - Lighting on page 4-149*.

⇓ **If the stop lamps turn ON and OFF**

3. Verify the Brake Pedal Position Sensor or the brake pedal are not binding causing residual brake pressure to be detected, while the brake lights operate properly.

⇒ **If a condition is found**

Repair or replace the appropriate component.

⇓ **If a condition is not found**

4. Verify the scan tool Brake Pressure Sensor parameter changes from 0 V to 1 V when the brake pedal is applied.

⇒ **If the Brake Pressure Sensor parameter does not change**

4.1. Replace the Q5 Brake Pressure Modulator.

4.2. 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.

4.3. All OK.

⇓ **If the Brake Pressure Sensor parameter changes**

5. All OK.

Repair Instructions

Perform the *Diagnostic Repair Verification on page 6-92* after completing the repair.

- *Brake Pressure Modulator Valve Replacement on page 5-40*
- *Control Module References on page 6-3* for Electronic Brake Control Module replacement, programming and setup

DTC C0161

Diagnostic Instructions

- Perform the *Diagnostic System Check - Vehicle on page 6-66* prior to using this diagnostic procedure.
- Review *Strategy Based Diagnosis on page 6-58* for an overview of the diagnostic approach.
- *Diagnostic Procedure Instructions on page 6-59* provides an overview of each diagnostic category.

DTC Descriptors

DTC C0161 5A: Antilock Brake System Brake Switch Not Plausible
DTC C0161 71: Antilock Brake System Brake Switch Invalid Data

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 control event.

Conditions for Running the DTC

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

Conditions for Setting the DTC

- The electronic brake control module detects the brake pedal is not applied when the brake pressure is greater 15 bar (218 PSI) for 3 seconds.
- The electronic brake control module does not detect that the stop lamp switch signal changed after driving the vehicle at a speed greater than 40 km/h (25 MPH) and performing three brake stops.

Action Taken When the DTC Sets

- The traction/stability control indicator off turns ON, if equipped with electronic stability control.
- The electronic brake control module disables the traction/stability for the duration of the ignition cycle, and the ABS remains functional.

Conditions for Clearing the DTC

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

Diagnostic Aids

- DTC C0161 may set if the brake pedal is applied while accelerating.
- Diagnose all other stop lamp DTCs or Symptoms prior to performing this diagnostic procedure.

Reference Information

Schematic Reference

Antilock Brake System Schematics on page 5-6

Connector End View Reference

Component Connector End Views on page 11-269

Description and Operation

ABS Description and Operation on page 5-51

Electrical Information Reference

- *Circuit Testing on page 11-526*
- *Connector Repairs on page 11-548*
- *Testing for Intermittent Conditions and Poor Connections on page 11-531*
- *Wiring Repairs on page 11-537*

Scan Tool Reference

Control Module References on page 6-3 for scan tool information

Circuit/System Verification

1. Ignition ON.
2. Verify the stop lamps turn ON and OFF while applying and releasing the brake pedal.

⇒ **If the stop lamps do not turn ON and OFF**

Refer to *Symptoms - Lighting on page 4-149*.

⇓ **If the stop lamps turn ON and OFF**

3. Verify the Brake Pedal Position Sensor or the brake pedal are not binding causing residual brake pressure to be detected, while the brake lights operate properly.

⇒ **If a condition is found**

Repair or replace the appropriate component.

⇓ **If a condition is not found**

4. All OK.

Repair Instructions

Perform the *Diagnostic Repair Verification on page 6-92* after completing the repair.

DTC C0186, C0196, or C0287

Diagnostic Instructions

- Perform the *Diagnostic System Check - Vehicle on page 6-66* prior to using this diagnostic procedure.
- Review *Strategy Based Diagnosis on page 6-58* for an overview of the diagnostic approach.
- *Diagnostic Procedure Instructions on page 6-59* provides an overview of each diagnostic category.

DTC Descriptors

DTC C0186 5A: Lateral Acceleration Sensor Signal Not Plausible
DTC C0186 71: Lateral Acceleration Sensor Signal Invalid Data
DTC C0196 5A: Yaw Rate Circuit Not Plausible
DTC C0196 71: Yaw Rate Circuit Invalid Data
DTC C0287 5A: Longitudinal Acceleration Sensor Circuit Not Plausible
DTC C0287 71: Longitudinal Acceleration Sensor Circuit Invalid Data

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
12 V Reference	U0125	U0125	—	—
Ground	—	U0125	—	—

Circuit/System Description

The Lateral Accelerometer and the Yaw Rate Sensors are combined into one sensor called the Multi-axis Acceleration Sensor. The Electronic Brake Control Module supplies 12 V reference to the Multi-axis Acceleration Sensor. The Multi-axis Acceleration Sensor communicates with the Electronic Brake Control Module via serial data. The module activates the stability control function depending on Multi-axis Acceleration Sensor input.

Conditions for Running the DTC

Ignition ON.

Conditions for Setting the DTC

C0186 5A, C0186 71, C0196 5A, or C0196 71

- The Multi-axis Acceleration Sensor reports an internal failure.
- The Multi-axis Acceleration Sensor learned the wrong offset value.
- Incorrectly mounted Multi-axis Acceleration Sensor.

C0287 5A

The Longitudinal Acceleration Signal may not be plausible with the vehicle speed.

C0287 71

The Electronic Brake Control Module received an invalid Longitudinal Acceleration Signal.

Action Taken When the DTC Sets

- The Traction/stability Control indicator turns ON.
- The Electronic Brake Control Module disables the electronic stability control system for the duration of the ignition cycle.

Conditions for Clearing the DTC

- 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 on page 5-6

Connector End View Reference

Component Connector End Views on page 11-269

Description and Operation

ABS Description and Operation on page 5-51

Electrical Information Reference

- *Circuit Testing on page 11-526*
- *Connector Repairs on page 11-548*
- *Testing for Intermittent Conditions and Poor Connections on page 11-531*
- *Wiring Repairs on page 11-537*

Scan Tool Reference

Control Module References on page 6-3 for scan tool information

Circuit/System Testing

1. Ignition ON.
2. Verify that no communication DTCs are set.

⇒ **If any communication DTCs are set**

Refer to *Diagnostic Trouble Code (DTC) List - Vehicle on page 6-69*.

⇓ **If no communication DTCs are set**

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

⇒ **If 10 Ω or greater**

4.1. Ignition OFF

4.2. Test for less than 2 Ω in the ground circuit end to end.

⇒ If 2 Ω or greater, repair the open/high resistance in the circuit.

⇒ If less than 2 Ω, repair the open/high resistance in the ground connection.

⇓ **If less than 10 Ω**

5. Ignition ON.
6. Verify that a test lamp illuminates between the 12 V reference circuit terminal 5 and ground.

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

6.1. Ignition OFF, disconnect the harness connector at the K17 Electronic Brake Control Module.

6.2. Test for infinite resistance between the 12 V reference circuit and ground.

⇒ If less than infinite resistance, repair the short to ground on the circuit.

⇓ If infinite resistance

6.3. Test for less than 2 Ω in the 12 V reference circuit end to end.

⇒ If 2 Ω or greater, repair the open/high resistance in the circuit.

⇒ If less than 2 Ω, replace the K17 Electronic Brake Control Module.

⇓ **If the test lamp illuminates**

7. Replace the B119 Multi-axis Acceleration Sensor.
8. 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**

9. All OK.

Repair Instructions

Perform the *Diagnostic Repair Verification on page 6-92* after completing the repair.

- *Vehicle Yaw Sensor Replacement on page 5-50*
- *Control Module References on page 6-3* for Electronic Brake Control Module replacement, programming and setup

DTC C0201

Diagnostic Instructions

- Perform the *Diagnostic System Check - Vehicle on page 6-66* prior to using this diagnostic procedure.
- Review *Strategy Based Diagnosis on page 6-58* for an overview of the diagnostic approach.
- *Diagnostic Procedure Instructions on page 6-59* provides an overview of each diagnostic category.

DTC Descriptor

DTC C0201 00: Antilock Braking System Enable Relay Primary Circuit

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
B+ Terminal 1	C0201 00	C0201 00	—	—
Ground Terminal 13	—	C0110 04, C0110 06	—	—
Ground Terminal 38	—	U0121	—	—

Circuit/System Description

Battery positive voltage is supplied to the electronic brake control module at all times through a 40 A fuse located in the underhood fuse block. The electronic brake control module uses this voltage to power the pump motor. 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, 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.
- Ignition voltage is greater than 8 V.

Conditions for Setting the DTC

The pump motor supply voltage is less than 4 V.

Action Taken When the DTC Sets

- The ABS indicator turns ON.
- The traction/stability control indicator turns ON, if equipped with electronic stability control.
- 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

- 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 on page 5-6

Connector End View Reference

Component Connector End Views on page 11-269

Description and Operation

ABS Description and Operation on page 5-51

Electrical Information Reference

- *Circuit Testing on page 11-526*
- *Connector Repairs on page 11-548*
- *Testing for Intermittent Conditions and Poor Connections on page 11-531*
- *Wiring Repairs on page 11-537*

Scan Tool Reference

Control Module References on page 6-3 for scan tool information

Circuit/System Testing

1. Ignition OFF 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 Ω between each ground circuit terminal listed below and ground:
   - Terminal 13
   - Terminal 38

⇒ **If 10 Ω or greater**

2.1. Ignition OFF

2.2. Test for less than 2 Ω in the ground circuit end to end.

⇒ If 2 Ω or greater, repair the open/high resistance in the circuit.

⇒ If less than 2 Ω, repair the open/high resistance in the ground connection.

⇓ **If less than 10 Ω**

3. Ignition ON.

4. Verify 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**

4.1. Ignition OFF.

4.2. Test for less than 2 Ω in the B+ circuit end to end.

⇒ If 2 Ω or greater, repair the open/high resistance in the circuit.

⇒ If less than 2 Ω, 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**

4.1. Ignition OFF.

4.2. 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 Q5 Brake Pressure Modulator.

⇓ **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 on page 6-92* after completing the repair.

- *Brake Pressure Modulator Valve Replacement on page 5-40*
- *Control Module References on page 6-3* for Electronic Brake Control Module replacement, programming and setup

DTC C0242 or P0856

Diagnostic Instructions

- Perform the *Diagnostic System Check - Vehicle on page 6-66* prior to using this diagnostic procedure.
- Review *Strategy Based Diagnosis on page 6-58* for an overview of the diagnostic approach.
- *Diagnostic Procedure Instructions on page 6-59* provides an overview of each diagnostic category.

DTC Descriptors

DTC C0242 00: Powertrain Control Module Indicated Traction Control Malfunction

DTC P0856: Traction Control Torque Request Circuit Malfunction

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 Engine 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 Off turns ON, if equipped with electronic stability control.
- The Electronic Brake Control Module disables the Traction/stability Control for the duration of the ignition cycle.

Conditions for Clearing the DTC

- 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 on page 5-6

Connector End View Reference

Component Connector End Views on page 11-269

Description and Operation

ABS Description and Operation on page 5-51

Electrical Information Reference

- *Circuit Testing on page 11-526*
- *Connector Repairs on page 11-548*
- *Testing for Intermittent Conditions and Poor Connections on page 11-531*
- *Wiring Repairs on page 11-537*

Scan Tool Reference

Control Module References on page 6-3 for scan tool information

Circuit/System Verification

1. Ignition ON.
2. Verify that no other DTCs are set except for C0242 or P0856.

⇒ **If any other DTCs are set**

Refer to the *Diagnostic Trouble Code (DTC) List - Vehicle on page 6-69*.

⇓ **If no other DTCs are set**

3. Replace the K20 Engine Control Module.
4. Verify that DTC C0242 or P0856 does not set while operating the vehicle within the Conditions for Running the DTC.

⇒ **If DTC C0242 or P0856 sets**

Replace the K17 Electronic Brake Control Module.

⇓ **If DTC C0242 or P0856 does not set**

5. All OK.

Repair Instructions

Perform the *Diagnostic Repair Verification on page 6-92* after completing the repair.

Control Module References on page 6-3 for Electronic Brake Control Module and Engine Control Module replacement, programming and setup

DTC C0277

Diagnostic Instructions

- Perform the *Diagnostic System Check - Vehicle on page 6-66* prior to using this diagnostic procedure.
- Review *Strategy Based Diagnosis on page 6-58* for an overview of the diagnostic approach.
- *Diagnostic Procedure Instructions on page 6-59* provides an overview of each diagnostic category.

DTC Descriptors

DTC C0277 4B: Brake Pedal Position Sensor Circuit Calibration Not Learned

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 control event.

Conditions for Running the DTC

- Brakes Applied.
- Battery voltage must be between 9–16 V.

Conditions for Setting the DTC

The body control module sends invalid brake pedal position data to the electronic brake control module.

The DTC may set in the body control module and/or electronic brake control module, when the brake pedal position sensor home position is not learned.

Actions Taken When the DTC Sets

- The ABS indicator is commanded ON.
- The red brake indicator is commanded ON.
- The stop lamps may not activate at the expected brake pedal positions.
- The traction/stability control indicator turns ON, if equipped with electronic stability control.

Conditions for Clearing the DTC

- The condition responsible for setting the DTC no longer exists.
- A DTC will not clear the current status until the next ignition cycle.
- A successful brake pedal position sensor calibration has been performed.
- A history DTC will clear once 40 malfunction-free ignition cycles have occurred.

Reference Information

Schematic Reference

- *Antilock Brake System Schematics on page 5-6*
- *Exterior Lights Schematics on page 4-85*

Connector End View Reference

Component Connector End Views on page 11-269

Description and Operation

- *ABS Description and Operation on page 5-51*
- *Exterior Lighting Systems Description and Operation on page 4-217*

Electrical Information Reference

- *Circuit Testing on page 11-526*
- *Connector Repairs on page 11-548*
- *Testing for Intermittent Conditions and Poor Connections on page 11-531*
- *Wiring Repairs on page 11-537*

Scan Tool Reference

Control Module References on page 6-3 for scan tool information

Circuit/System Verification

1. Verify DTC C0277 is not set in the K9 Body Control Module.

⇒ **If DTC is set**

Refer to *DTC C0277 or C0890 on page 4-145.*

⇓ **If DTC is not set**

2. Ignition ON
3. Verify the scan tool Body Control Module Brake Pedal Position Sensor Learned Released Position is YES.

⇒ **If the released position is not YES**

Perform the Brake Pedal Position Sensor Learn. Refer to *Brake Pedal Position Sensor Calibration on page 4-185.*

⇓ **If the released position is YES**

4. 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**

5. All OK.

Repair Instructions

Perform the *Diagnostic Repair Verification on page 6-92* after completing the repair.

Control Module References on page 6-3 for Electronic Brake Control Module replacement, programming and setup

DTC C027C

Diagnostic Instructions

- Perform the *Diagnostic System Check - Vehicle on page 6-66* prior to using this diagnostic procedure.
- Review *Strategy Based Diagnosis on page 6-58* for an overview of the diagnostic approach.
- *Diagnostic Procedure Instructions on page 6-59* provides an overview of each diagnostic category.

DTC Descriptor

DTC C027C: Front Brake Discs High Temperature

For symptom byte information refer to *Symptom Byte List on page 6-85*.

Circuit/System Description

The electronic brake control module monitors how often the traction control or the stability control system activates in order to calculate an estimate of the front brake discs temperature. In most cases the high temperatures are caused by extended traction control activation. If the electronic brake control module calculates that the front brake components temperatures are too high, the electronic brake control module will temporarily suspend the traction control system function until the front brake discs cool down.

Conditions for Running the DTC

Ignition ON.

Conditions for Setting the DTC

The electronic brake control module detects the calculated temperature of the brake components is higher than 500°C (932°F).

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

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

Diagnostic Aids

DTC C027C does not indicate a malfunction has occurred. This DTC indicates there was excessive traction control or stability control activation that caused the high temperatures.

Reference Information

Schematic Reference

Antilock Brake System Schematics on page 5-6

Connector End View Reference

Component Connector End Views on page 11-269

Description and Operation

ABS Description and Operation on page 5-51

Electrical Information Reference

- *Circuit Testing on page 11-526*
- *Connector Repairs on page 11-548*
- *Testing for Intermittent Conditions and Poor Connections on page 11-531*
- *Wiring Repairs on page 11-537*

Scan Tool Reference

Control Module References on page 6-3 for scan tool information

Circuit/System Verification

Note: Since most occurrences of this DTC are caused by excessive brake usage, review with the customer the conditions under which the DTC set.

1. Allow the brakes to cool down before performing test.
2. Verify that no other DTCs are set.

⇒ **If any other DTCs are set**

Refer to *Diagnostic Trouble Code (DTC) List - Vehicle on page 6-69*.

⇓ **If no other DTCs are set**

3. Verify DTC C027C does not set while driving the vehicle under normal braking conditions. Refer to *Brake System Vehicle Road Test on page 5-141*.

⇒ **If the DTC sets**

Replace the K17 Electronic Brake Control Module.

⇓ **If the DTC does not set**

4. All OK.

Repair Instructions

Perform the *Diagnostic Repair Verification on page 6-92* after completing the repair.

Control Module References on page 6-3 for Electronic Brake Control Module replacement, programming and setup

DTC C0292

Diagnostic Instructions

- Perform the *Diagnostic System Check - Vehicle on page 6-66* prior to using this diagnostic procedure.
- Review *Strategy Based Diagnosis on page 6-58* for an overview of the diagnostic approach.
- *Diagnostic Procedure Instructions on page 6-59* provides an overview of each diagnostic category.

DTC Descriptor

DTC C0292 1A: Multi-Axis Acceleration Sensor Module Circuit Performance - Bias Level Out of Range

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
12 V Reference	U0125, C0292 1A	U0125	—	—
Ground	—	U0125	—	—

Circuit/System Description

The Lateral Accelerometer and the Yaw Rate Sensors are combined into one sensor called the Multi-axis Acceleration Sensor. The Electronic Brake Control Module supplies a 12 V reference to the Multi-axis Acceleration Sensor. The Multi-axis Acceleration Sensor communicates with the Electronic Brake Control Module via serial data. The module activates the stability control function depending on Multi-axis Acceleration Sensor input.

Conditions for Running the DTC

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

Conditions for Setting the DTC

The Electronic Brake Control Module detects that the sensor supply voltage feedback indicates that the voltage level is less or greater than 1 V for more than 100 milliseconds.

Action Taken When the DTC Sets

- The Electronic Brake Control Module shuts down the 12 V reference to the multi-axis acceleration sensor.
- The Electronic Brake Control Module disables the vehicle stability enhancement system for the duration of the ignition cycle.

Conditions for Clearing the DTC

- 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 on page 5-6

Connector End View Reference

Component Connector End Views on page 11-269

Description and Operation

ABS Description and Operation on page 5-51

Electrical Information Reference

- *Circuit Testing on page 11-526*
- *Connector Repairs on page 11-548*
- *Testing for Intermittent Conditions and Poor Connections on page 11-531*
- *Wiring Repairs on page 11-537*

Scan Tool Reference

Control Module References on page 6-3 for scan tool information

Circuit/System Testing

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

⇒ **If loose or incorrect installation**

Correct the installation of the component.

⇓ **If installed correctly**

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

⇒ **If 5 Ω or greater**

3.1. Ignition OFF.

3.2. Test for less than 2 Ω in the ground circuit end to end.

⇒ If 2 Ω or greater, repair the open/high resistance in the circuit.

⇒ If less than 2 Ω, repair the open/high resistance in the ground connection.

⇓ **If less than 5 Ω**

4. Ignition ON.
5. Verify that a test lamp illuminates between the 12 V reference circuit terminal 5 and ground.

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

5.1. Ignition OFF, disconnect the harness connector at the K17 Electronic Brake Control Module.

5.2. Test for infinite resistance between the 12 V reference circuit and ground.

⇒ If less than infinite resistance, repair the short to ground on the circuit.

⇓ If infinite resistance

5.3. Test for less than 2 Ω in the 12 V reference circuit end to end.

⇒ If 2 Ω or greater, repair the open/high resistance in the circuit.

⇒ If less than 2 Ω, replace the K17 Electronic Brake Control Module.

⇓ **If the test lamp illuminates**

6. Replace the B119 Multi-axis Acceleration Sensor.
7. 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**

8. All OK.

Repair Instructions

Perform the *Diagnostic Repair Verification on page 6-92* after completing the repair.

Control Module References on page 6-3 for Electronic Brake Control Module replacement, programming and setup

DTC C0561

Diagnostic Instructions

- Perform the *Diagnostic System Check - Vehicle on page 6-66* prior to using this diagnostic procedure.
- Review *Strategy Based Diagnosis on page 6-58* for an overview of the diagnostic approach.
- *Diagnostic Procedure Instructions on page 6-59* provides an overview of each diagnostic category.

DTC Descriptor

DTC C0561 77: System Disabled Information Stored Engine Speed Out of Range
DTC C0561 78: System Disabled Information Stored Acceleration Pedal Position Out of Range
DTC C0561 79: System Disabled Information Stored Transmission Gear Invalid Data

Circuit/System Description

The electronic brake control module disables the traction and the stability control when other electronic control modules set DTCs for components that effect the operation of the brake system.

Conditions for Running the DTC

- Engine Running.
- Ignition voltage is greater than 8 V.

Conditions for Setting the DTC

The electronic brake control module receives an invalid serial data message from another module more than ten times.

Action Taken When the DTC Sets

- The ABS system remains functional.
- The electronic brake control module disables the stability control for the entire ignition cycle.

Conditions for Clearing the DTC

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

Diagnostic Aids

This DTC indicates there are no problems in the brake system. The body control module, engine control module, and transmission control module should be checked for a possible fault first.

Reference Information

Schematic Reference

Antilock Brake System Schematics on page 5-6

Connector End View Reference

Component Connector End Views on page 11-269

Description and Operation

ABS Description and Operation on page 5-51

Electrical Information Reference

- *Circuit Testing on page 11-526*
- *Connector Repairs on page 11-548*
- *Testing for Intermittent Conditions and Poor Connections on page 11-531*
- *Wiring Repairs on page 11-537*

Scan Tool Reference

Control Module References on page 6-3 for scan tool information

Circuit/System Verification

C0561 77 or C0561 78

1. Ignition ON.
2. Verify there are no other DTCs set.

⇒ **If any other DTCs are set**

Refer to the *Diagnostic Trouble Code (DTC) List - Vehicle on page 6-69*.

⇓ **If no other DTCs are set**

3. Replace the K20 Engine 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 K17 Electronic Brake Control Module.

⇓ **If the DTC does not set**

5. All OK.

C0561 79

1. Ignition ON.
2. Verify there are no other DTCs set.

⇒ **If any other DTCs are set**

Refer to the *Diagnostic Trouble Code (DTC) List - Vehicle on page 6-69*.

⇓ **If no other DTCs are set**

3. Replace the K71 Transmission 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 K17 Electronic Brake Control Module.

⇓ **If the DTC does not set**

5. All OK.

Repair Instructions

Perform the *Diagnostic Repair Verification on page 6-92* after completing the repair.

Control Module References on page 6-3 for Electronic Brake Control Module, Engine Control Module, or Transmission Control Module replacement, programming and setup

DTC C056D

Diagnostic Instructions

- Perform the *Diagnostic System Check - Vehicle on page 6-66* prior to using this diagnostic procedure.
- Review *Strategy Based Diagnosis on page 6-58* for an overview of the diagnostic approach.
- *Diagnostic Procedure Instructions on page 6-59* provides an overview of each diagnostic category.

DTC Descriptor

DTC C056D 00: Electronic Control Unit Hardware Malfunction

Circuit/System Description

The Electronic Brake Control Module detects an internal malfunction.

Conditions for Running the DTC

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

Conditions for Setting the DTC

The Electronic Brake Control Module detects an internal malfunction.

Action Taken When the DTC Sets

- The ABS Indicator turns ON.
- The red Brake Warning Indicator turns ON.
- The Traction/stability Control Indicator turns ON, if equipped with electronic stability control.
- The Electronic Brake Control Module disables the ABS, and the Traction/stability for the duration of the ignition cycle.

Conditions for Clearing the DTC

- 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 on page 5-6

Connector End View Reference

Component Connector End Views on page 11-269

Description and Operation

ABS Description and Operation on page 5-51

Electrical Information Reference

- *Circuit Testing on page 11-526*
- *Connector Repairs on page 11-548*
- *Testing for Intermittent Conditions and Poor Connections on page 11-531*
- *Wiring Repairs on page 11-537*

Scan Tool Reference

Control Module References on page 6-3 for scan tool information

Circuit/System Verification

1. Verify that DTC C056D is not set.

⇒ **If the DTC is set**

Replace the K17 Electronic Brake Control Module.

⇓ **If the DTC is not set**

2. All OK.

Repair Instructions

Perform the *Diagnostic Repair Verification on page 6-92* after completing the repair.

Control Module References on page 6-3 for Electronic Brake Control Module replacement, programming and setup

DTC C056E

Diagnostic Instructions

- Perform the *Diagnostic System Check - Vehicle on page 6-66* prior to using this diagnostic procedure.
- Review *Strategy Based Diagnosis on page 6-58* for an overview of the diagnostic approach.
- *Diagnostic Procedure Instructions on page 6-59* provides an overview of each diagnostic category.

DTC Descriptors

DTC C056E 42: Electronic Control Unit Software Calibration Not Programmed
DTC C056E 47: Electronic Control Unit Software VIN Not Programmed

Conditions for Running the DTC

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

Conditions for Setting the DTC

A new service replacement Electronic Brake Control Module contains a unique manufacturing calibration. This DTC will be current whenever a new Electronic Brake Control Module is installed on a vehicle prior to the Service Programming System (SPS) event. The DTC will remain current until the Electronic Brake Control Module has undergone a successful program. Once the program event is completed, the DTC goes into history and can be cleared. After the DTC is cleared it can not return.

Action Taken When the DTC Sets

- The ABS Indicator turns ON.
- The red Brake Warning Indicator turns ON.
- The Traction/stability Control Indicator turns ON, if equipped with electronic stability control.
- The Electronic Brake Control Module disables the ABS,and the Traction/stability for the duration of the ignition cycle.

Conditions for Clearing the DTC

- 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 on page 5-6

Connector End View Reference

Component Connector End Views on page 11-269

Description and Operation

ABS Description and Operation on page 5-51

Electrical Information Reference

- *Circuit Testing on page 11-526*
- *Connector Repairs on page 11-548*
- *Testing for Intermittent Conditions and Poor Connections on page 11-531*
- *Wiring Repairs on page 11-537*

Scan Tool Reference

Control Module References on page 6-3 for scan tool information

Circuit/System Verification

1. Verify that DTC C056E is not set.

⇒ **If the DTC is set**

1.1. Ignition ON
1.2. Program the K17 Electronic Brake Control Module.
1.3. Verify the DTC does not set after driving the vehicle above 40 km/h (25 MPH).

⇒ If the DTC sets, replace the K17 Electronic Brake Control Module.

⇓ If the DTC does not set.

1.4. All OK.

⇓ **If the DTC is not set**

2. All OK.

Repair Instructions

Perform the *Diagnostic Repair Verification on page 6-92* after completing the repair.

Control Module References on page 6-3 for Electronic Brake Control Module replacement, programming and setup

DTC C0710

Diagnostic Instructions

- Perform the *Diagnostic System Check - Vehicle on page 6-66* prior to using this diagnostic procedure.
- Review *Strategy Based Diagnosis on page 6-58* for an overview of the diagnostic approach.
- *Diagnostic Procedure Instructions on page 6-59* provides an overview of each diagnostic category.

DTC Descriptors

DTC C0710 4B: Steering Position Signal Calibration Not Learned
DTC C0710 5A: Steering Position Signal Not Plausible
DTC C0710 71: Steering Position Signal Invalid Data

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
12 V Reference	U0126, C0710 71	U0126, C0710 71	—	C0710 5A
Ground	—	U0126, C0710 71	—	—

Circuit/System Description

The Steering Wheel Angle Sensor receives a 12 V reference 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. The module utilizes this signal to calculate the driver intended driving direction.

Conditions for Running the DTC

The condition for running the DTC will not occur until the initialization phase has been completed. The initialization of the Electronic Brake Control Module occurs when the following conditions have been met:

- Ignition voltage is greater than 8 V.
- The initialization happens once each ignition cycle when the vehicle speed is greater than 20 km/h (12 MPH) and the vehicle is driven in a straight line without the brake pedal being applied.

Conditions for Setting the DTC

C0710 4B

The Steering Wheel Angle Sensor is not calibrated after installation.

C0710 5A

- The Steering Wheel Angle Sensor is out of the specified range.
- The Steering Wheel Angle Sensor offset is out of the specified range.

C0710 71

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

Action Taken When the DTC Sets

- The ABS remains functional.
- The Electronic Brake Control Module disables 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.
- The history DTC will clear after 40 consecutive fault-free ignition cycles have occurred.

Diagnostic Aids

- Improperly mounted or loose Steering Wheel Angle Sensor.
- Inspect the vehicle for proper alignment. The car should not pull in either direction while driving straight 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 on page 5-6

Connector End View Reference

Component Connector End Views on page 11-269

Description and Operation

ABS Description and Operation on page 5-51

Electrical Information Reference

- *Circuit Testing on page 11-526*
- *Connector Repairs on page 11-548*
- *Testing for Intermittent Conditions and Poor Connections on page 11-531*
- *Wiring Repairs on page 11-537*

Scan Tool Reference

Control Module References on page 6-3 for scan tool information

Circuit/System Verification

1. Ignition ON.
2. Verify the scan tool Steering Wheel Position parameter corresponds to the actual steering wheel position as the steering wheel is turned through its entire range of motion.

⇒ **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 OFF all vehicle systems OFF, 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.
2. Test for less than 10 Ω between the ground circuit terminal 6 and ground.

⇒ **If 10 Ω or greater**

2.1. Ignition OFF

2.2. Test for less than 2 Ω in the ground circuit end to end.

⇒ If 2 Ω or greater, repair the open/high resistance in the circuit.

⇒ If less than 2 Ω, repair the open/high resistance in the ground connection.

⇓ **If less than 10 Ω**

3. Ignition ON.
4. Verify that a test lamp illuminates between the 12 reference circuit terminal 5 and ground.

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

4.1. Ignition OFF, disconnect the harness connector at the K17 Electronic Brake Control Module

4.2. Test for infinite resistance between the 12 reference circuit and ground.

⇒ If less than infinite resistance, repair the short to ground on the circuit.

⇓ If infinite resistance

4.3. Test for less than 2 Ω in the 12 reference circuit end to end.

⇒ If 2 Ω or greater, repair the open/high resistance in the circuit.

⇒ If less than 2 Ω, replace the K17 Electronic Brake Control Module.

⇓ **If the test lamp illuminates**

5. Replace the B99 Steering Wheel Angle Sensor.
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 on page 6-92* after completing the repair.

- *Steering Angle Sensor Replacement on page 15-36*
- *Control Module References on page 6-3* for Electronic Brake Control Module replacement, programming and setup

DTC C1251

Diagnostic Instructions

- Perform the *Diagnostic System Check - Vehicle on page 6-66* prior to using this diagnostic procedure.
- Review *Strategy Based Diagnosis on page 6-58* for an overview of the diagnostic approach.
- *Diagnostic Procedure Instructions on page 6-59* provides an overview of each diagnostic category.

DTC Descriptors

DTC C1251: Lateral Acceleration Sensor Performance

For symptom byte information refer to *Symptom Byte List on page 6-85*.

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 stability control function depending on the multi-axis acceleration sensor input. The transmission control module sets this DTC.

Conditions for Running the DTC

Engine running

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 traction/stability control indicator turns ON.
- 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 on page 5-6

Connector End View Reference

Component Connector End Views on page 11-269

Description and Operation

ABS Description and Operation on page 5-51

Electrical Information Reference

- *Circuit Testing on page 11-526*
- *Connector Repairs on page 11-548*
- *Testing for Intermittent Conditions and Poor Connections on page 11-531*
- *Wiring Repairs on page 11-537*

Scan Tool Reference

Control Module References on page 6-3 for scan tool information

Circuit/System Verification

1. Ignition ON.
2. Verify that no other DTCs are set except for C1251 is set.

⇒ **If any other DTCs are set**

Refer to *Diagnostic Trouble Code (DTC) List - Vehicle on page 6-69*.

⇓ **If no other DTCs are set**

3. Replace the K71 Transmission Control Module.
4. Verify that DTC C1251 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 on page 6-92* after completing the repair.

Control Module References on page 6-3 for Electronic Brake Control Module or Transmission 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 on page 6-66* 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 operation in order to familiarize yourself with the system functions. Refer to *ABS Description and Operation on page 5-51*.

Visual/Physical Inspection

- Inspect for aftermarket devices which may affect the operation of the antilock brake system. Refer to *Checking Aftermarket Accessories on page 11-525*.
- Inspect the easily accessible or visible system components, for obvious damage or conditions, which could cause the symptom.
- Inspect the master cylinder reservoir for the correct brake fluid level.

Intermittent

Faulty electrical connections or wiring may be the cause of intermittent conditions. Refer to *Testing for Intermittent Conditions and Poor Connections on page 11-531*.

Symptom List

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

- *ABS Indicator Malfunction on page 5-36*
- *Traction Control/Stability Control Indicator Malfunction on page 5-37*

ABS Indicator Malfunction

Diagnostic Instructions

- Perform the *Diagnostic System Check - Vehicle on page 6-66* prior to using this diagnostic procedure.
- Review *Strategy Based Diagnosis on page 6-58* for an overview of the diagnostic approach.
- *Diagnostic Procedure Instructions on page 6-59* provides an overview of each diagnostic category.

Circuit/System Description

The Instrument Cluster turns the ABS indicator ON for five seconds after the ignition is turned ON, or when the Electronic Brake Control Module detects a fault and sends a serial data message to the Instrument Cluster commanding the indicator ON.

Reference Information

Schematic Reference

Antilock Brake System Schematics on page 5-6

Connector End View Reference

Component Connector End Views on page 11-269

Description and Operation

ABS Description and Operation on page 5-51

Electrical Information Reference

- *Circuit Testing on page 11-526*
- *Connector Repairs on page 11-548*
- *Testing for Intermittent Conditions and Poor Connections on page 11-531*
- *Wiring Repairs on page 11-537*

Scan Tool Reference

Control Module References on page 6-3 for scan tool information.

Circuit/System Verification

1. Ignition ON.
2. Verify that no DTCs are set.

⇒ **If any DTCs are set**

Refer to *Diagnostic Trouble Code (DTC) List - Vehicle on page 6-69*.

⇓ **If no DTCs are set**

3. 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**

4. 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**

5. All OK.

Repair Instructions

Perform the *Diagnostic Repair Verification on page 6-92* after completing the repair.

Control Module References on page 6-3 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 on page 6-66* prior to using this diagnostic procedure.
- Review *Strategy Based Diagnosis on page 6-58* for an overview of the diagnostic approach.
- *Diagnostic Procedure Instructions on page 6-59* 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, B2745 71	1	1	B2745 71
Ground	—	1	—	—
1. Traction Control inoperative				

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 Control Off and the Stability Control Off indicator ON to notify the driver of the deactivation.

Reference Information

Schematic Reference

Antilock Brake System Schematics on page 5-6

Connector End View Reference

Component Connector End Views on page 11-269

Description and Operation

ABS Description and Operation on page 5-51

Electrical Information Reference

- *Circuit Testing on page 11-526*
- *Connector Repairs on page 11-548*
- *Testing for Intermittent Conditions and Poor Connections on page 11-531*
- *Wiring Repairs on page 11-537*

Scan Tool Reference

Control Module References on page 6-3 for scan tool information.

Circuit/System Verification

1. Ignition ON
2. Verify the Instrument Cluster Traction Control indicator turns ON and OFF when commanding the Instrument Cluster All Indicators ON and OFF with a scan tool.

⇒ **If the indicator does not turn ON and OFF**

Replace the P16 Instrument Cluster.

⇓ **If the indicator turns ON and OFF**

3. Verify the scan tool electronic brake control module Traction Control Switch parameter changes between Active and Inactive while pressing and releasing the traction 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, scan tool disconnected, and all vehicle systems OFF, disconnect the harness connector at the S48E Multifunction Switch-Center Console. It may take up to 2 minutes for all vehicle systems to power down.
2. Test for less than 5 Ω between the ground circuit terminal 9 and ground.

⇒ **If 5 Ω or greater**

2.1. Ignition OFF

2.2. Test for less than 2 Ω in the ground circuit end to end.

⇒ If 2 Ω or greater, repair the open/high resistance in the circuit.

⇒ If less than 2 Ω, repair the open/high resistance in the ground connection.

⇓ **If less than 5 Ω**

3. Ignition ON.
4. Verify the scan tool Traction Control Switch parameter is Inactive.

⇒ **If not Inactive**

4.1. Ignition OFF, disconnect the X2 harness connector at the K9 Body Control Module.

4.2. Test for infinite resistance between the signal circuit terminal 5 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 signal circuit terminal 5 and the ground circuit terminal 9.
6. Verify the scan tool Traction Control Switch parameter is Active.

⇒ **If not Active**

6.1. Ignition OFF, disconnect the X2 harness connector at the K9 Body Control Module, ignition ON.

6.2. 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

6.3. Test for less than 2 Ω in the signal circuit end to end.

⇒ If 2 Ω or greater, repair the open/high resistance in the circuit.

⇒ If less than 2 Ω, replace the K9 Body Control Module.

⇓ **If Active**

7. Test or replace the S48E Multifunction Switch-Center Console.

Component Testing

1. Ignition OFF, disconnect the harness connector at the S48E Multifunction Switch-Center Console.
2. Test for infinite resistance between the signal terminal 5 and the ground terminal 9 with the switch in the open position.

⇒ **If less than infinite resistance**

Replace the S48E Multifunction Switch-Center Console.

⇓ **If infinite resistance**

3. Test for less than 2 Ω between the signal circuit terminal 5 and the ground terminal 9 with the switch in the closed position.

⇒ **If 2 Ω or greater**

Replace the S48E Multifunction Switch-Center Console.

⇓ **If less than 2 Ω**

4. All OK.

Repair Instructions

Perform the *Diagnostic Repair Verification on page 6-92* after completing the repair.

- *Front Floor Console Multifunction Switch Replacement on page 8-105*
- Refer to *Control Module References on page 6-3* for Body Control Module, Electronic Brake Control Module or Instrument Cluster replacement, programming and setup

Repair Instructions

Antilock Brake System Automated Bleed

Warning: Refer to Brake Fluid Irritant Warning on page 0-4.

Caution: Refer to *Brake Fluid Effects on Paint and Electrical Components Caution on page 0-7*.

Note: Before performing the Antilock Brake System (ABS) Automated Bleed Procedure, first perform a pressure bleed of the base brake system. Refer to *Hydraulic Brake System Bleeding (Pressure) on page 5-169* or *Hydraulic Brake System Bleeding (Manual) on page 5-170*. The automated bleed procedure is recommended when one of the following conditions exists:

- 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 hydraulic 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 calipers.

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 on page 1-31*.
2. Remove all four tire and wheel assemblies. Refer to *Tire and Wheel Removal and Installation on page 16-60*.
3. Inspect the brake system for leaks and visual damage. Refer to *Symptoms - Hydraulic Brakes on page 5-111* , repair or replace components as needed.
4. Lower the vehicle.

5. Inspect the battery state of charge. Refer to *Battery Inspection/Test on page 9-702*.
6. Install a scan tool.
7. Turn the ignition ON, with the engine OFF.
8. With the scan tool, establish communications with the ABS system. Select Control Functions. Select Automated Bleed from the Control Functions menu.
9. Raise and support the vehicle. Refer to *Lifting and Jacking the Vehicle on page 1-31*.
10. Following the directions given on the scan tool, pressure bleed the base brake system. Refer to *Hydraulic Brake System Bleeding (Pressure) on page 5-169* or *Hydraulic Brake System Bleeding (Manual) on page 5-170*.
11. Follow the scan tool directions until the desired brake pedal height is achieved.
12. 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 on page 6-69* , and diagnose the appropriate DTC.
    - If the brake pedal feels spongy, perform the conventional brake bleed procedure again. Refer to *Hydraulic Brake System Bleeding (Pressure) on page 5-169* or *Hydraulic Brake System Bleeding (Manual) on page 5-170*.
13. When the desired pedal height is achieved, press the brake pedal to inspect for firmness.
14. Lower the vehicle.
15. Remove the scan tool.
16. Install the tire and wheel assemblies. Refer to *Tire and Wheel Removal and Installation on page 16-60*.
17. Inspect the brake fluid level. Refer to *Master Cylinder Reservoir Filling on page 5-145*.
18. Road test the vehicle while inspecting that the pedal remains high and firm.

Steering Angle Sensor Centering

The steering angle sensor does not require centering often. Centering of the steering angle sensor might be required after certain service procedures are performed. Some of these procedures are as follows:

- Electronic brake control module (EBCM) replacement
- Steering angle sensor replacement
- Steering gear replacement
- Steering column replacement
- Collision or other physical damage

The 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 (P) position.
3. Install the scan tool to the data link connector.
4. Turn the ignition ON, and the engine OFF.
5. Select Steering Wheel Angle Sensor Reset in the Steering Wheel Angle Sensor Module Control Functions list or in the EBCM Module Setup list.
6. Follow the scan tool directions to complete the learn procedure.
7. Select Steering Wheel Angle Sensor Learn in the Steering Wheel Angle Sensor Module Functions list or in the EBCM Module Setup list.
8. Follow the scan tool directions to complete the learn procedure.
9. Clear any DTCs that may be set.

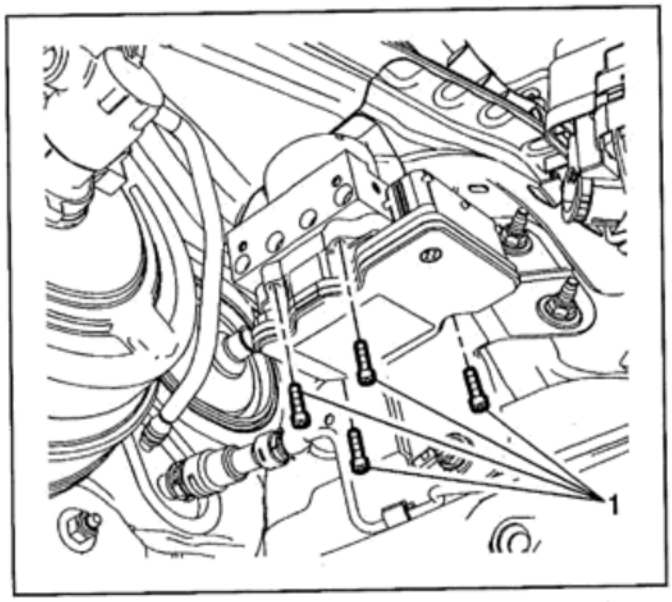
Electronic Brake Control Module Replacement

Removal Procedure

Warning: Refer to Brake Fluid Irritant Warning on page 0-4.

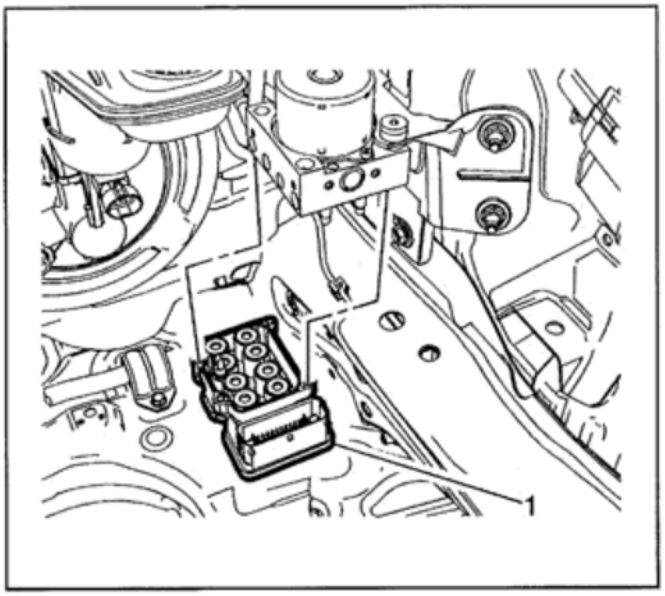
Caution: Refer to *Brake Fluid Effects on Paint and Electrical Components Caution on page 0-7*.

1. Remove the battery tray. Refer to *Battery Tray Replacement on page 9-721*.
2. Disconnect the electronic brake control module (EBCM) electrical connector.



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3. Remove the EBCM bolts (1),

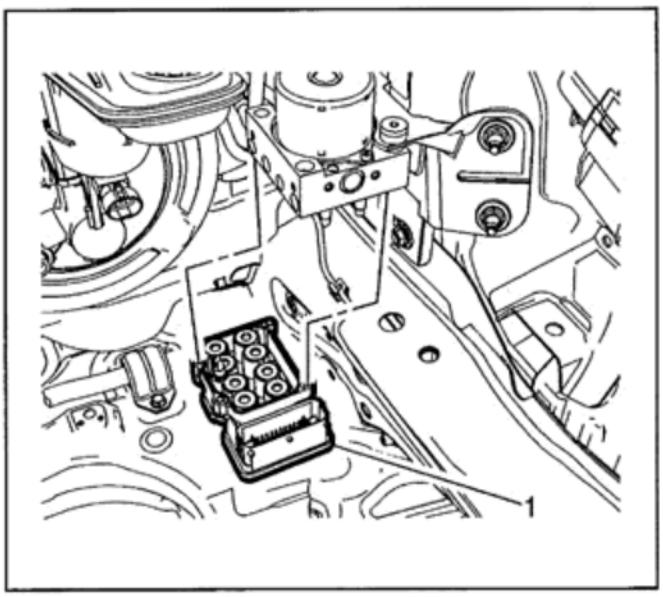


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Note: Do not pry the components apart.

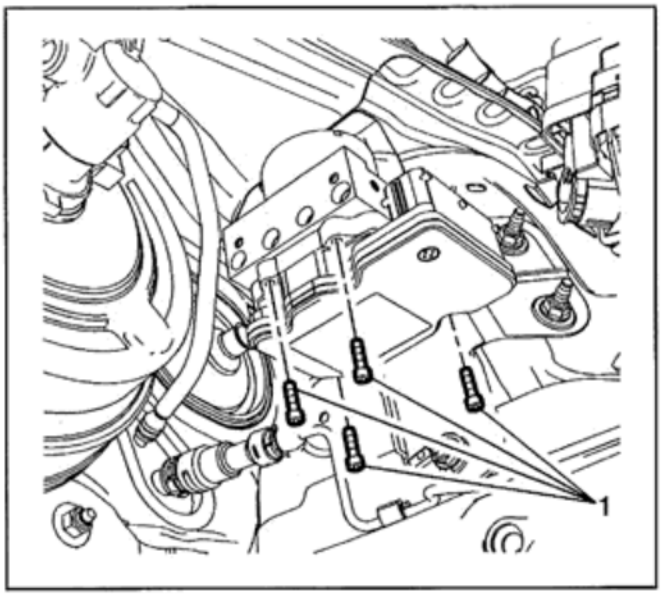
4. Carefully separate the EBCM (1) from the BPMV.
5. Clean the sealing surfaces of the EBCM and the BPMV with denatured alcohol and allow to dry.

Installation Procedure



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



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Caution: Refer to *Fastener Caution on page 0-8*.

2. Install the EBCM bolts (1) and tighten to **3 N•m (26 lb in)**.
3. Connect the EBCM electrical connector.
4. Install the battery tray. Refer to *Battery Tray Replacement on page 9-721*.
5. Program the EBCM. Refer to *Control Module References on page 6-3*.

Brake Pressure Modulator Valve Replacement

Removal Procedure

Warning: Refer to Brake Fluid Irritant Warning on page 0-4.

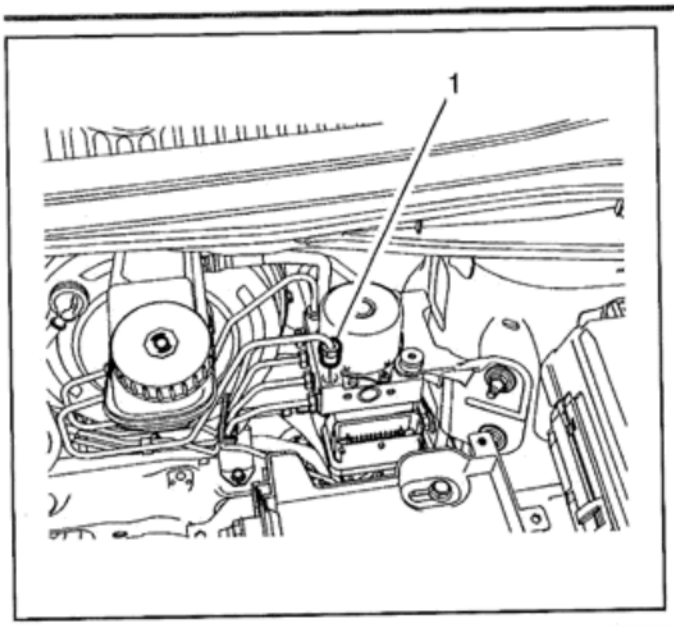
Caution: Refer to *Brake Fluid Effects on Paint and Electrical Components Caution on page 0-7*.

Caution: Always connect or disconnect the wiring harness connector from the EBCM/EBTCM with the ignition switch in the OFF position. Failure to observe this precaution could result in damage to the EBCM/EBTCM.

1. Place the ignition switch in the OFF position.
2. Remove the battery tray. Refer to *Battery Tray Replacement on page 9-721*.

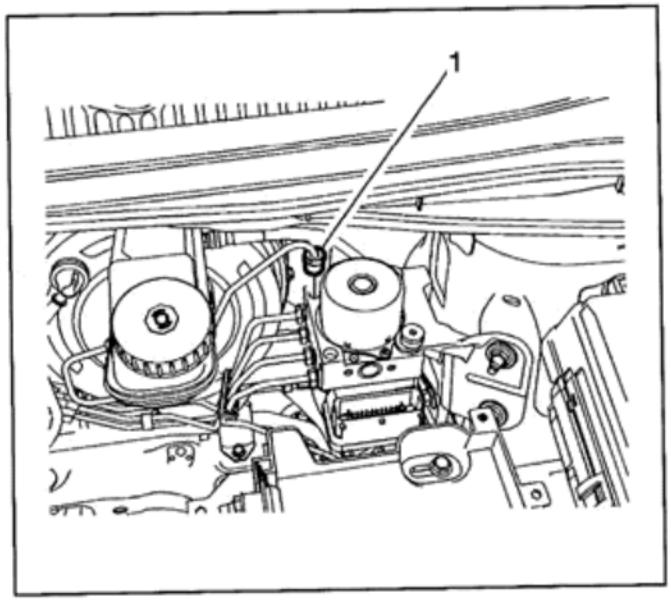
Note: The area around the electronic brake control module (EBCM) and brake pressure modulator valve (BPMV) assembly must be free from loose dirt to prevent contamination of disassembled ABS components.

3. Clean the area surrounding the EBCM/BPMV of any accumulated dirt and debris.
4. Disconnect the EBCM electrical connector.



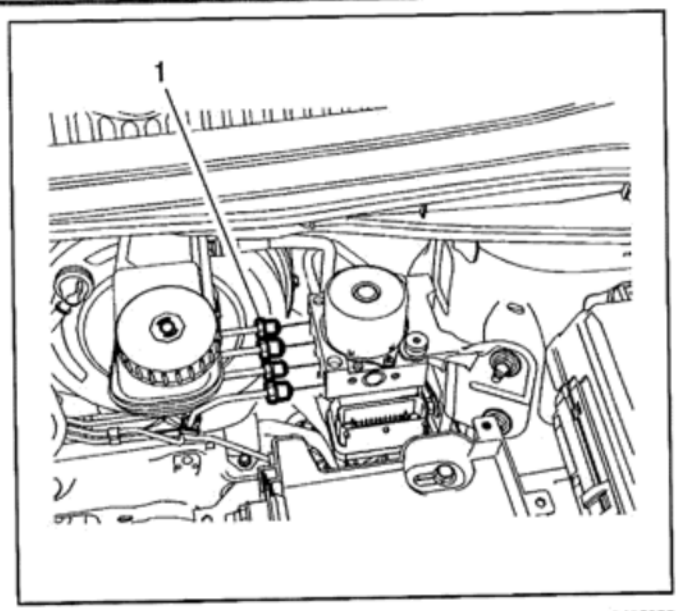
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5. Disconnect the master cylinder secondary brake pipe fitting (1) from the BPMV.
6. Cap the brake pipe fitting and plug the BPMV inlet port to prevent brake fluid loss and contamination.



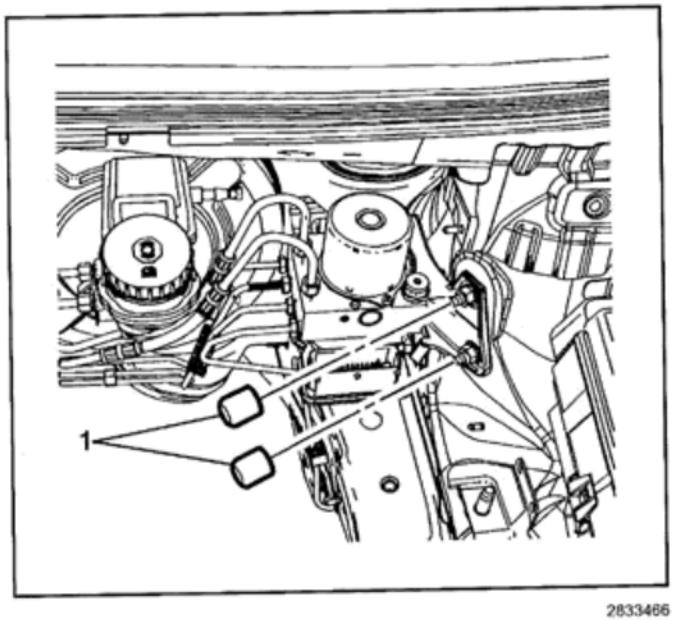
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7. Disconnect the master cylinder primary brake pipe fitting (1) from the BPMV.
8. Cap the brake pipe fitting and plug the BPMV inlet port to prevent brake fluid loss and contamination.



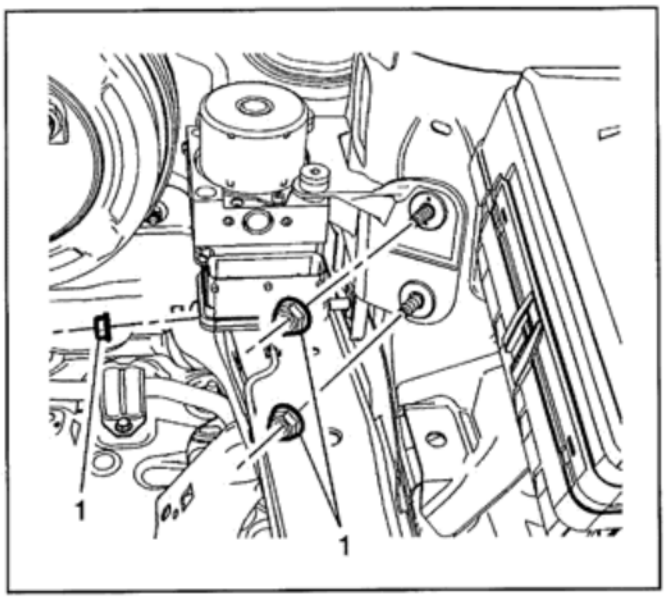
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9. Reference mark the BPMV outlet brake pipe fittings (1) and disconnect the fittings.
10. Cap the brake pipe fittings and plug the BPMV outlet ports to prevent brake fluid loss and contamination.



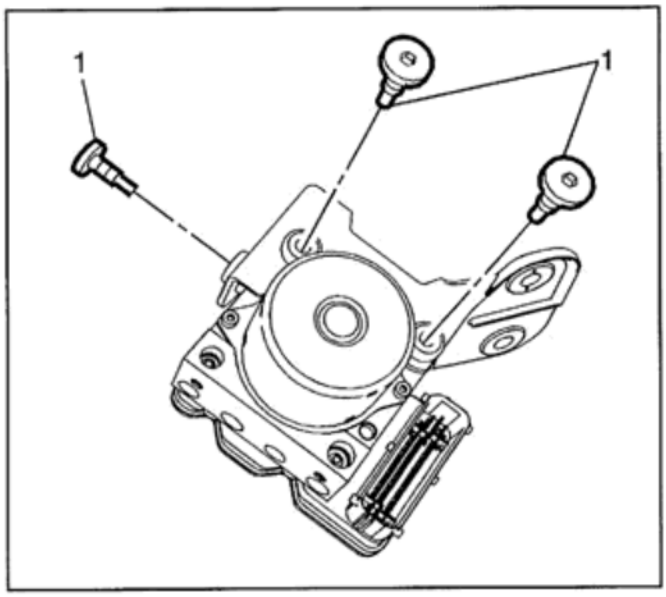
2833466

11. Remove the protective caps (1) from the BPMV bracket nuts.



2535376

12. Remove the EBCM/BPMV and bracket assembly nuts (1).
13. Remove the EBCM/BPMV and bracket assembly from the vehicle.

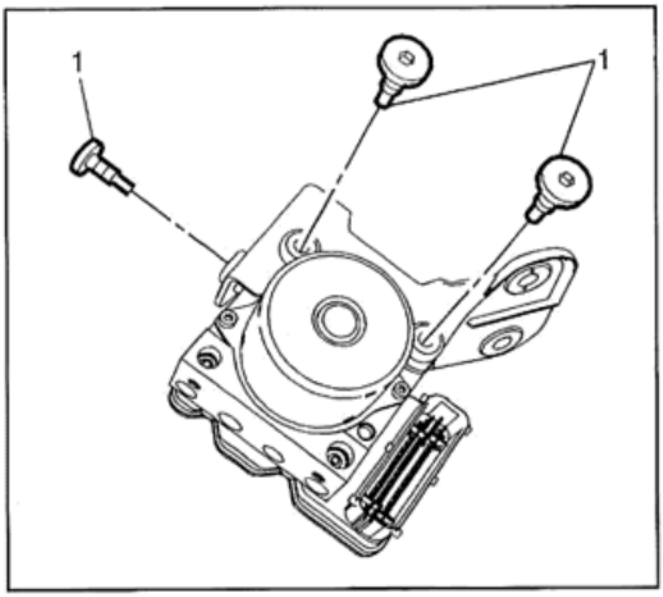


2535379

14. Remove the BPMV bolts (1).
15. Remove the BPMV bracket.
16. If installing a new BPMV, remove the EBCM. Refer to *Electronic Brake Control Module Replacement on page 5-39*.

Installation Procedure

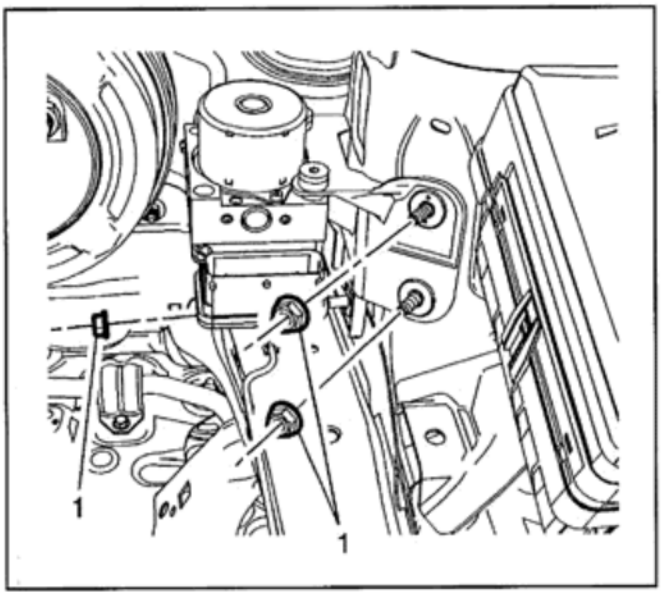
1. If installing a new BPMV, install the EBCM. Refer to *Electronic Brake Control Module Replacement on page 5-39*.
2. Install the BPMV bracket to the BPMV.



2535379

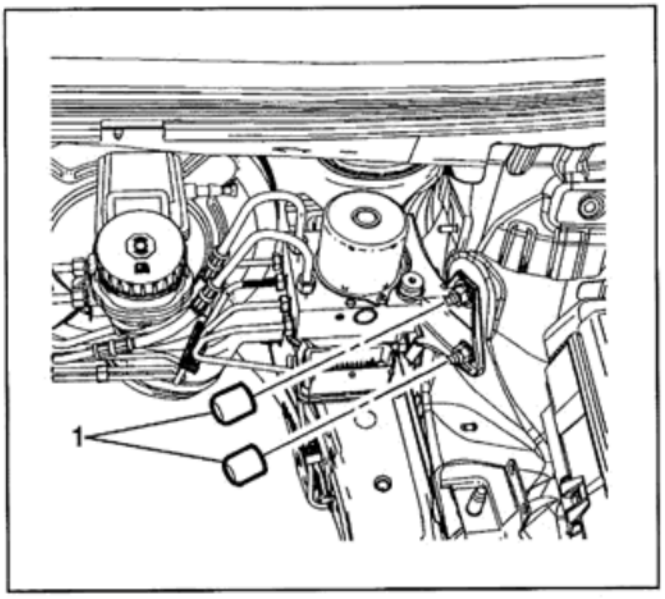
Caution: Refer to *Fastener Caution on page 0-8*.

3. Install the BPMV bolts (1) and tighten to **11** N•m **(97 lb in)**.



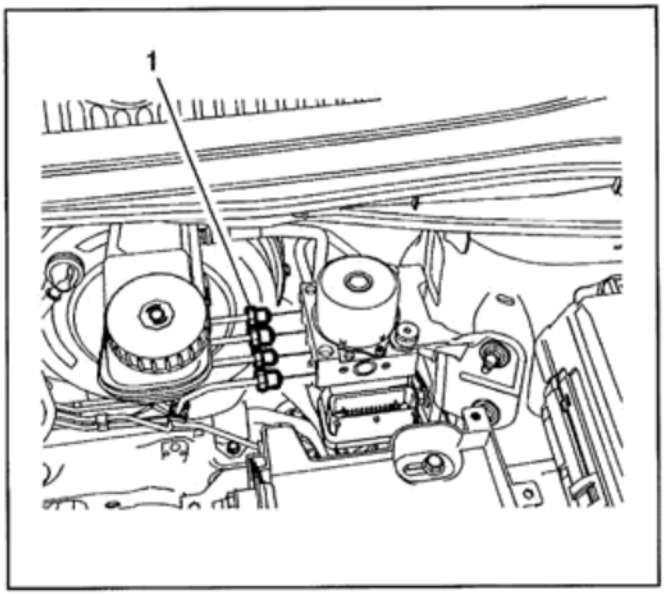
2535378

4. Install the EBCM/BPMV and bracket assembly to the vehicle.
5. Install the EBCM/BPMV and bracket assembly nuts (1) and tighten to **17** N•m **(12 lb ft)**.



2833466

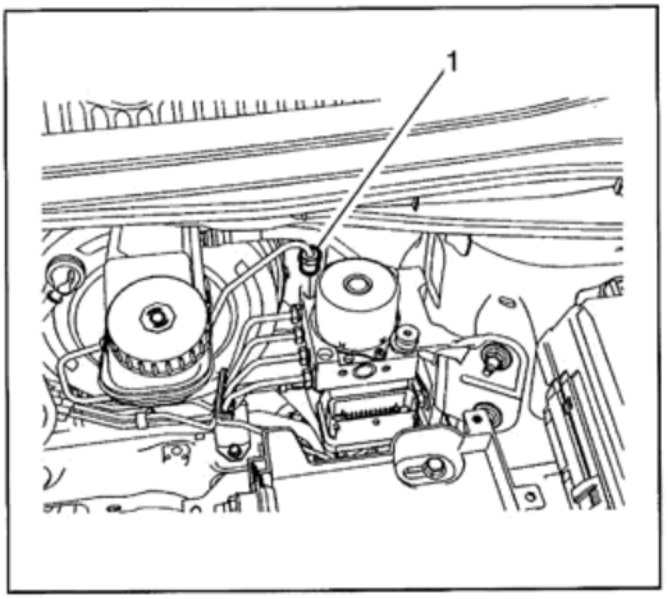
6. Install the protective caps (1) to the BPMV bracket nuts.



2495352

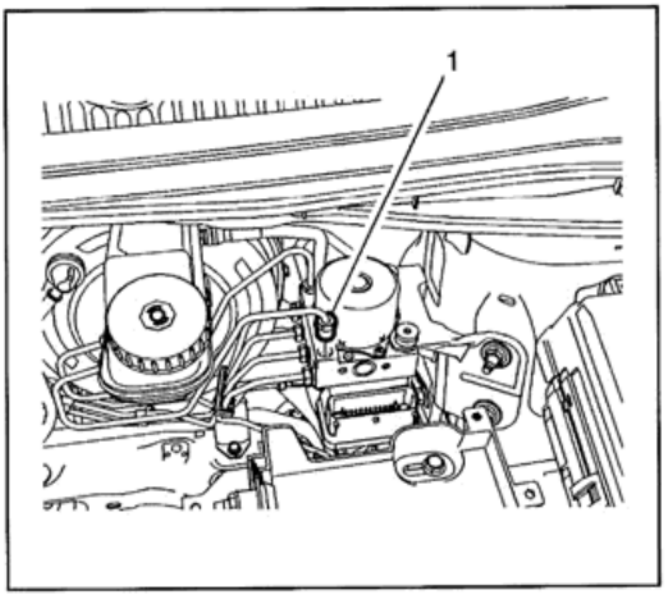
Note: Install the brake pipes in the same locations referenced during removal.

7. Install the BPMV outlet brake pipe fittings (1) to the BPMV outlet ports.
8. Connect the brake pipe fittings and tighten to **18** N•m **(13 lb ft)**.



2495349

9. Connect the master cylinder primary brake pipe fitting (1) to the BPMV and tighten to **18** N•m **(13 lb ft)**.



2495345

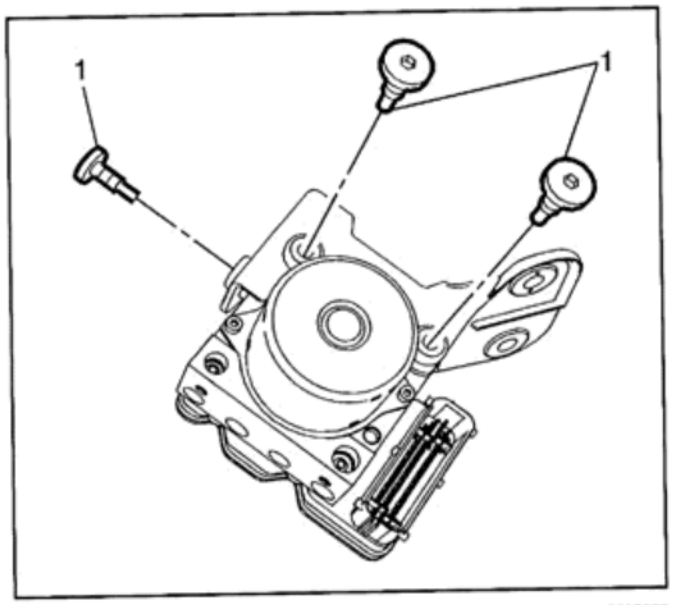
10. Connect the master cylinder secondary brake pipe fitting (1) to the BPMV and tighten to **18** N•m **(13 lb ft)**.
11. Connect the EBCM electrical connector.
12. Install the battery tray. Refer to *Battery Tray Replacement on page 9-721*.
13. Bleed the hydraulic brake system. Refer to *Hydraulic Brake System Bleeding (Pressure) on page 5-169* or *Hydraulic Brake System Bleeding (Manual) on page 5-170*.
14. Perform the *Diagnostic System Check - Vehicle on page 6-66*.

15. Observe the brake pedal feel after performing the diagnostic system check. If the pedal now feels spongy, air may have been in the secondary hydraulic circuit of the brake modulator which may have been introduced into the primary circuit. If the pedal feels spongy, bleed the antilock brake system. Refer to *Antilock Brake System Automated Bleed on page 5-38*.

Brake Pressure Modulator Valve Bracket Replacement

Removal Procedure

1. Remove the brake pressure modulator valve (BPMV) and bracket assembly. Refer to *Brake Pressure Modulator Valve Replacement on page 5-40*.

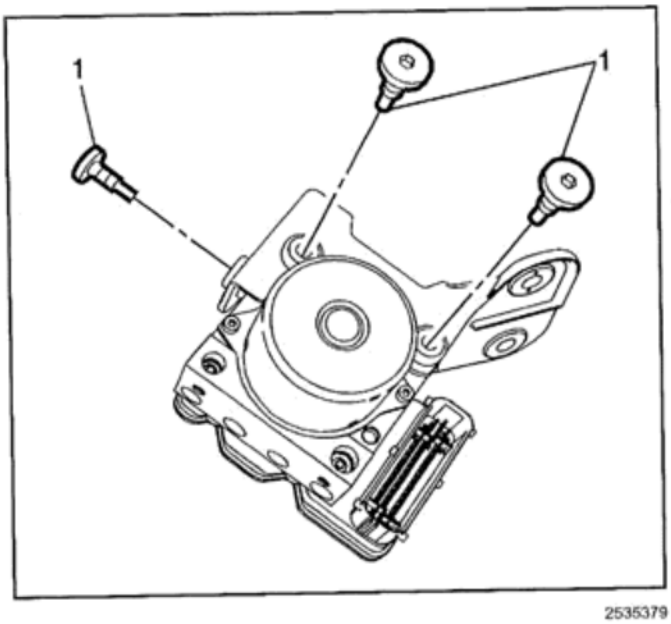


2535379

2. Remove the BPMV bolts (1).
3. Remove the BPMV bracket.

Installation Procedure

1. Install the BPMV bracket to the BPMV.



2535379

Caution: Refer to *Fastener Caution on page 0-8*.

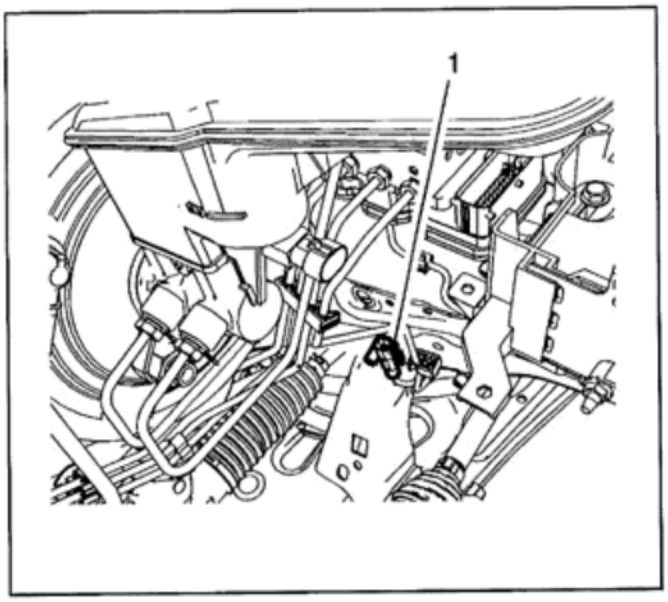
2. Install the BPMV bolts (1) and tighten to **11 N•m (97 lb in)**.
3. Install the BPMV and bracket assembly. Refer to *Brake Pressure Modulator Valve Replacement on page 5-40*.

Front Wheel Speed Sensor Replacement

Removal Procedure

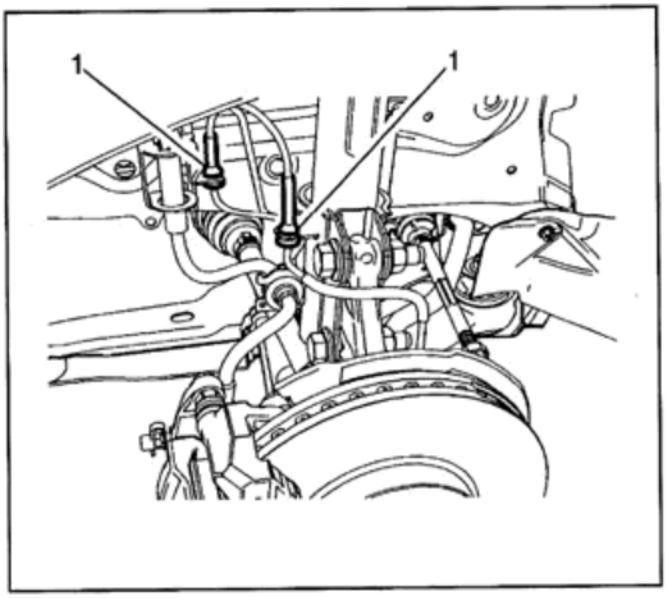
Warning: Refer to Brake Dust Warning on page 0-4.

1. Raise and support the vehicle. Refer to *Lifting and Jacking the Vehicle on page 1-31*.
2. Remove the tire and wheel assembly. Refer to *Tire and Wheel Removal and Installation on page 16-60*.
3. Clean the wheel speed sensor mounting area on the steering knuckle of any accumulated dirt and debris.



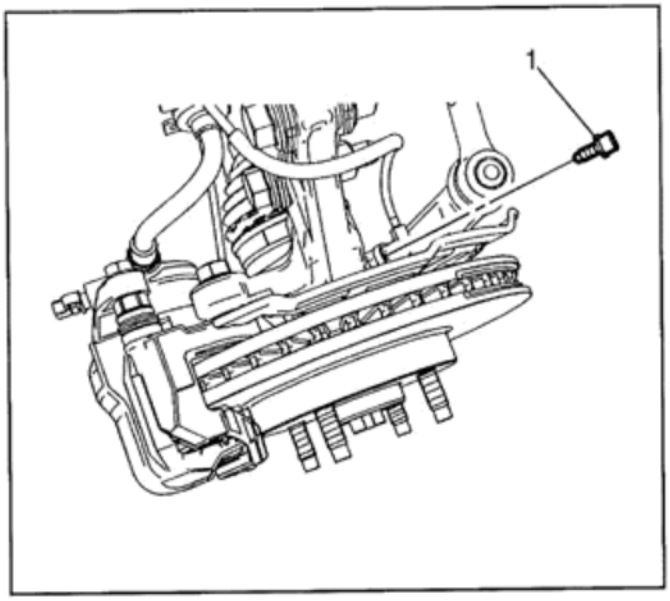
2495364

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



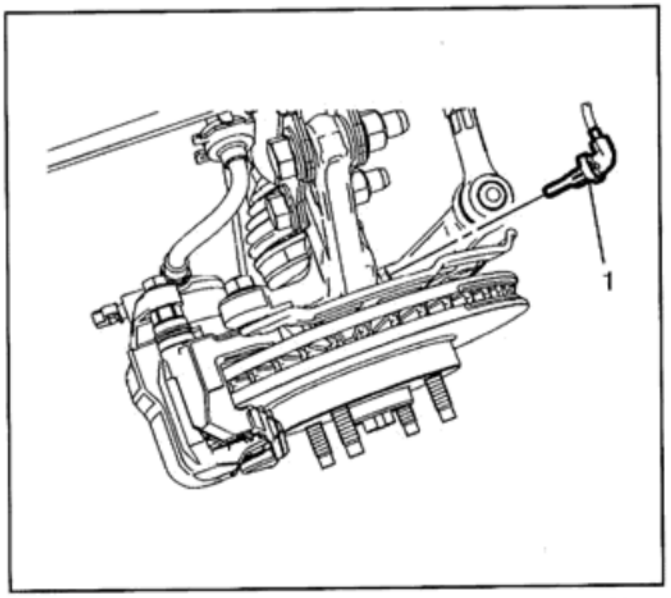
2495367

5. Release the wheel speed sensor harness grommets (1) from the brake hose brackets.



2495371

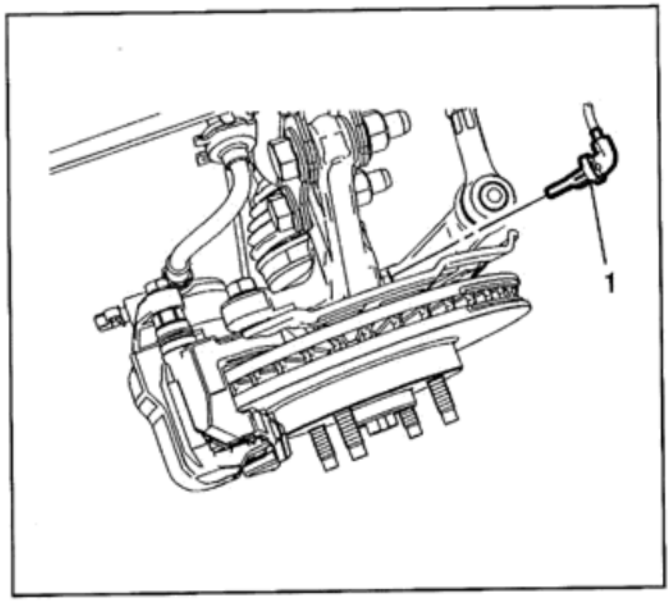
6. Remove the wheel speed sensor bolt (1).



2495375

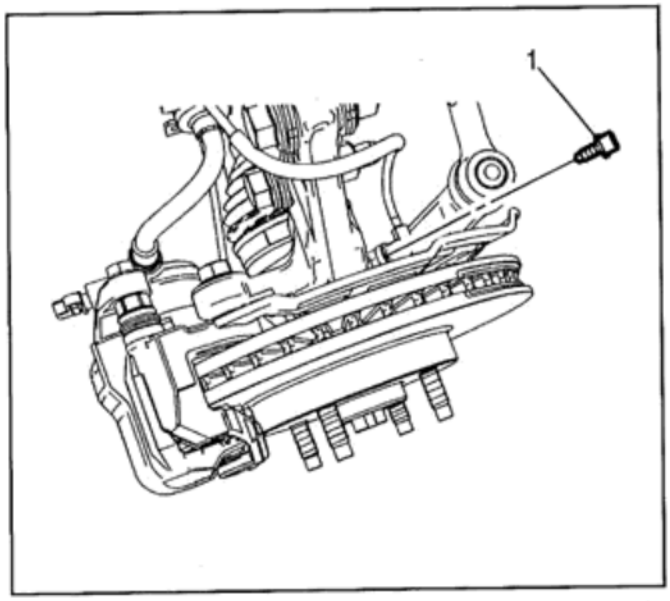
7. Carefully remove the wheel speed sensor (1) from the steering knuckle by pulling the sensor straight upward using a slight twisting motion.

Installation Procedure



2495375

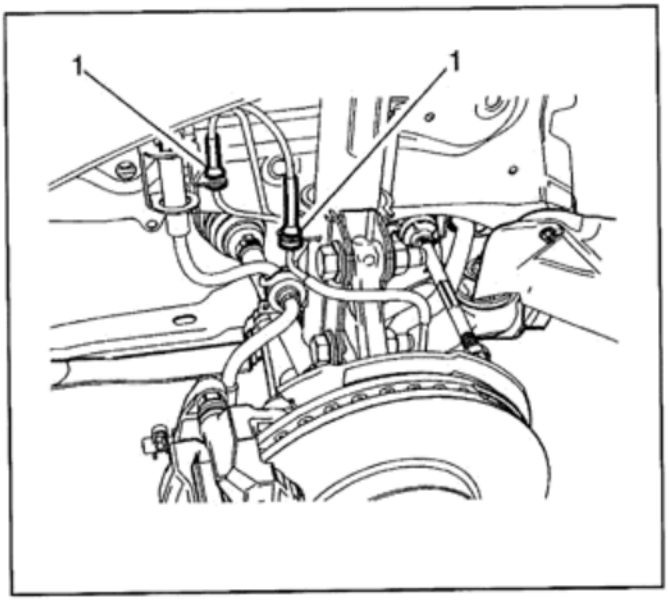
1. Install the wheel speed sensor (1) to the steering knuckle.



2495371

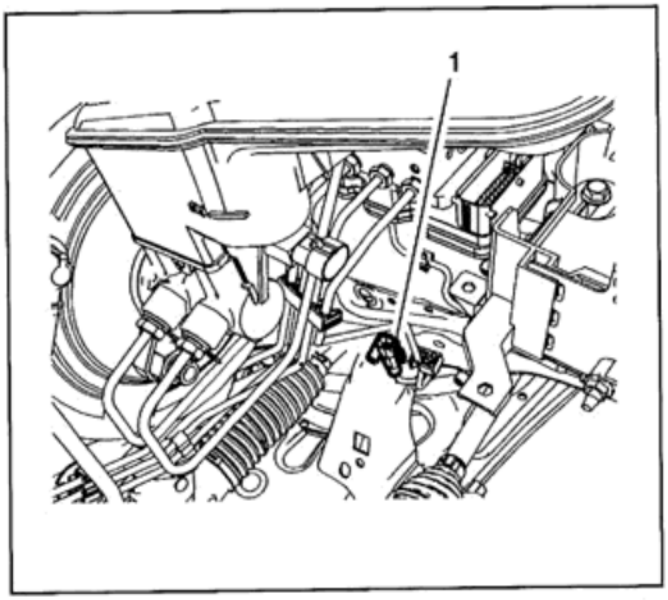
Caution: Refer to *Fastener Caution on page 0-8*.

2. Install the wheel speed sensor bolt (1) and tighten to **8** N•m **(71 lb in)**.



2495367

3. Install the wheel speed sensor harness grommets (1) to the brake hose brackets.



2495364

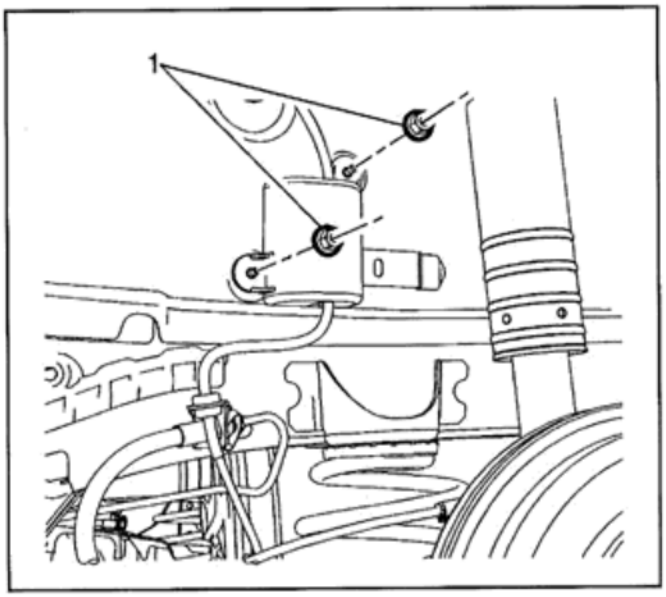
4. Connect the wheel speed sensor electrical connector (1) and install the connector to the vehicle body.
5. Install the tire and wheel assembly. Refer to *Tire and Wheel Removal and Installation on page 16-60*.
6. Perform the *Diagnostic System Check - Vehicle on page 6-66*.

Rear Wheel Speed Sensor Replacement

Removal Procedure

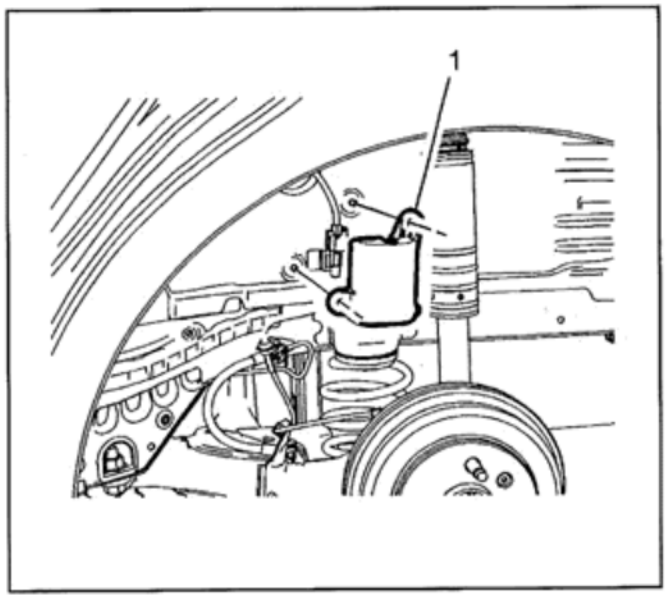
Warning: Refer to Brake Dust Warning on page 0-4.

1. Raise and support the vehicle. Refer to *Lifting and Jacking the Vehicle on page 1-31*.
2. Remove the tire and wheel assembly. Refer to *Tire and Wheel Removal and Installation on page 16-60*.



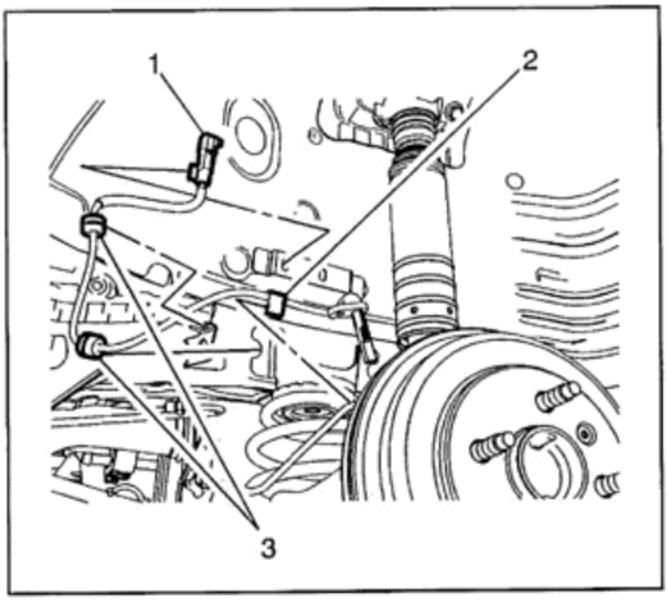
2535380

3. Remove the rear wheel speed sensor harness connector cover nuts (1).



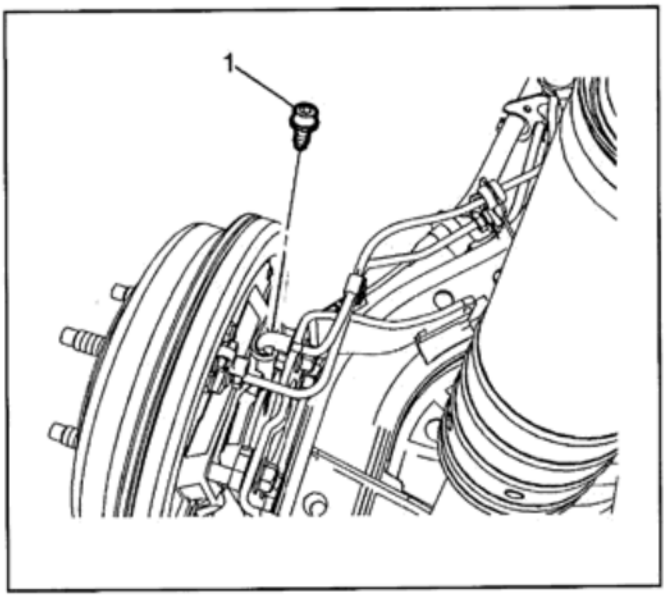
2535381

4. Remove the rear wheel speed sensor harness connector cover (1).
5. Clean the rear drum brake area around the wheel speed sensor of any accumulated dirt and debris.



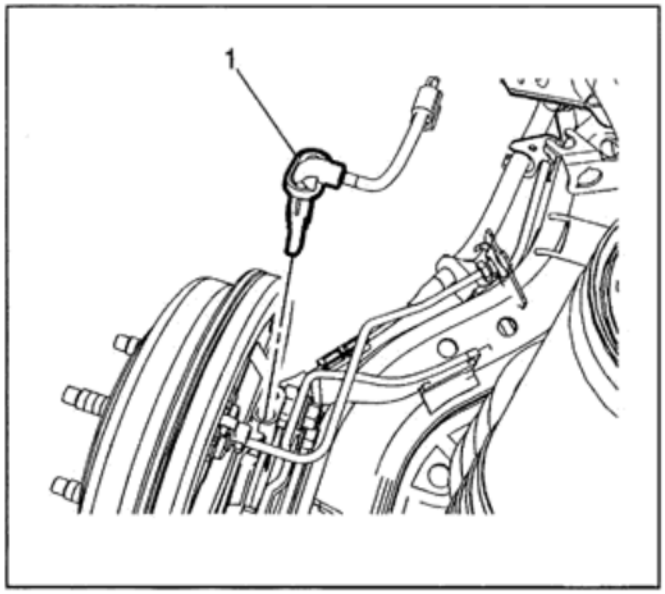
2495379

6. Disconnect the wheel speed sensor electrical connector (1) and release the connector from the wheelhouse bracket.
7. Release the wheel speed sensor harness retainer (2) from the wheel cylinder brake pipe.
8. Release the wheel speed sensor harness grommets (3) from the bracket.



2495386

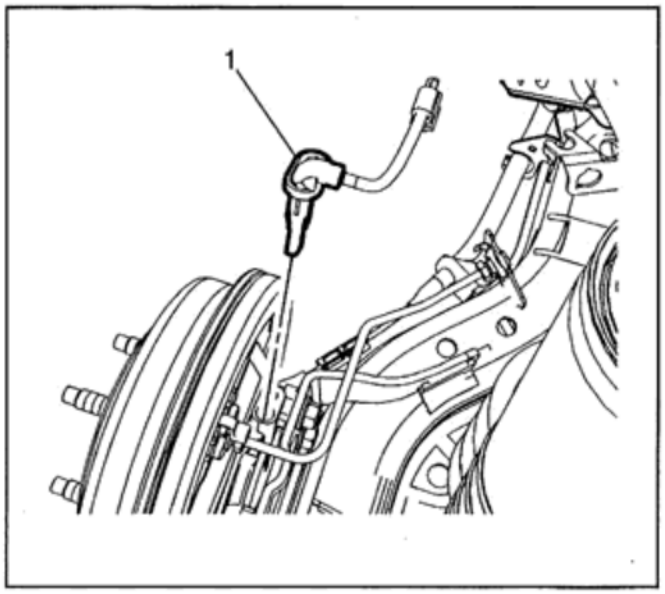
9. Remove the wheel speed sensor bolt (1).



2495387

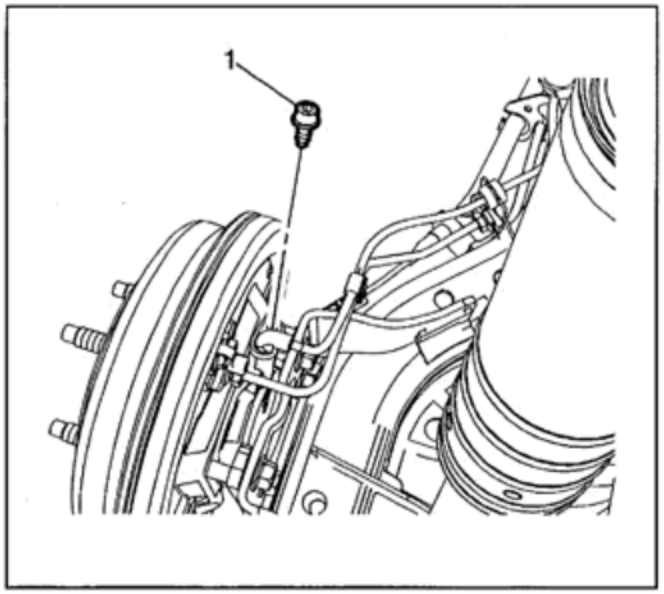
10. Remove the wheel speed sensor (1) from the rear drum brake spacer by pulling the sensor straight upward using a slight twisting motion.

Installation Procedure



2495387

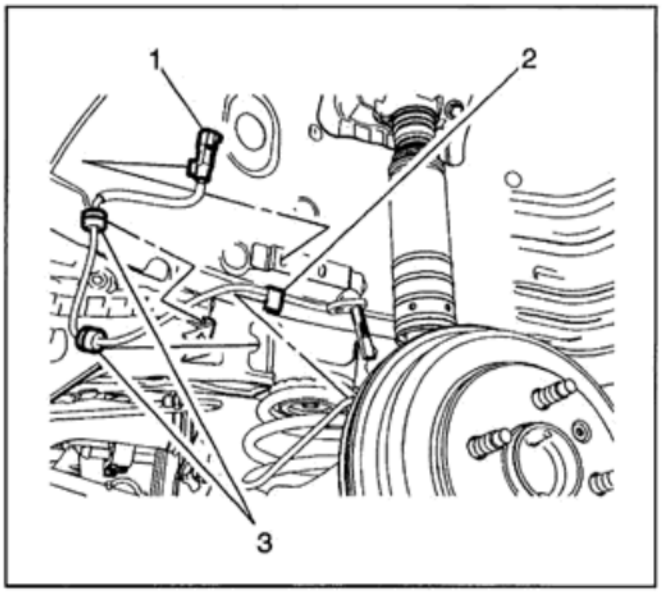
1. Install the wheel speed sensor (1) to the rear drum brake spacer.



2495386

Caution: Refer to *Fastener Caution on page 0-8*.

2. Install the wheel speed sensor bolt (1) and tighten to **8 N•m (71 lb in)**.

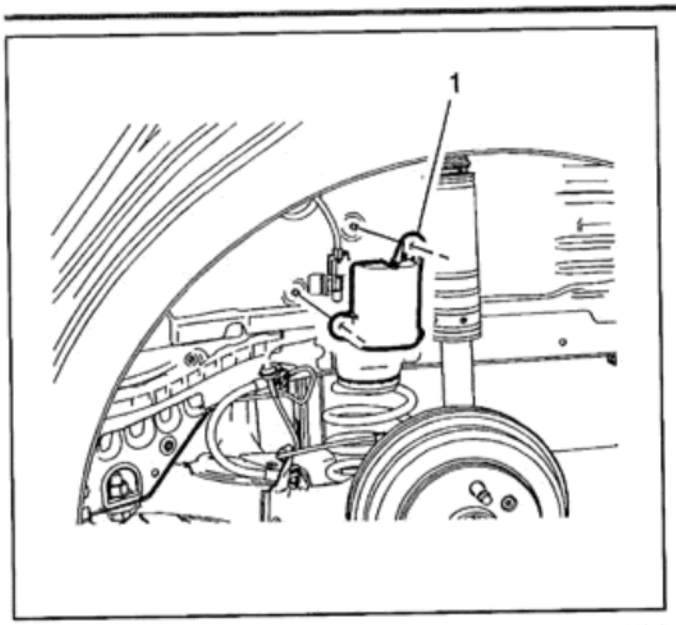


2495379

3. Connect the wheel speed sensor electrical connector (1) and install the connector to the wheelhouse bracket.
4. Install the wheel speed sensor harness retainer (2) to the wheel cylinder brake pipe.

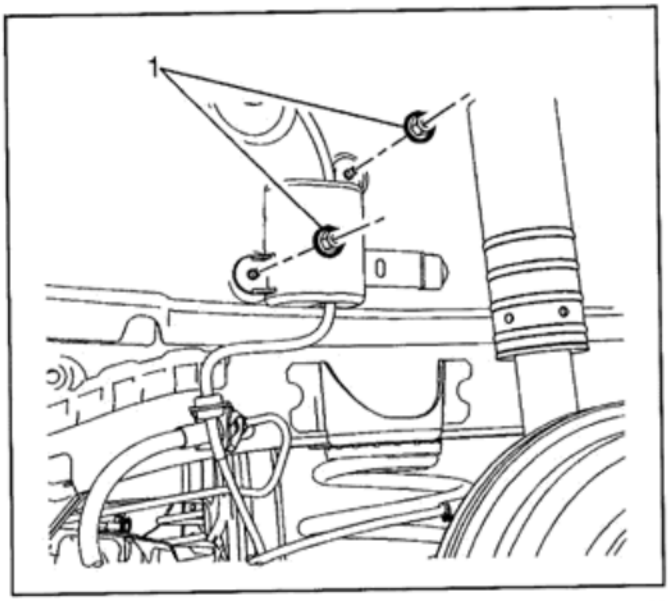
Note: If the wheel speed sensor grommets are equipped with a molded rib, position the grommets with the rib at the open end of the wheel speed sensor harness brackets. Do not twist the wheel speed sensor harness.

5. Install the wheel speed sensor harness grommets (3) to the bracket.



2535381

6. Install the rear wheel speed sensor harness connector cover (1).



2535380

7. Install the rear wheel speed sensor harness connector cover nuts (1) and tighten to **2 N•m (18 lb in)**.
8. Install the tire and wheel assembly. Refer to *Tire and Wheel Removal and Installation on page 16-60*.
9. Perform the *Diagnostic System Check - Vehicle on page 6-66*.

Vehicle Yaw Sensor Learn

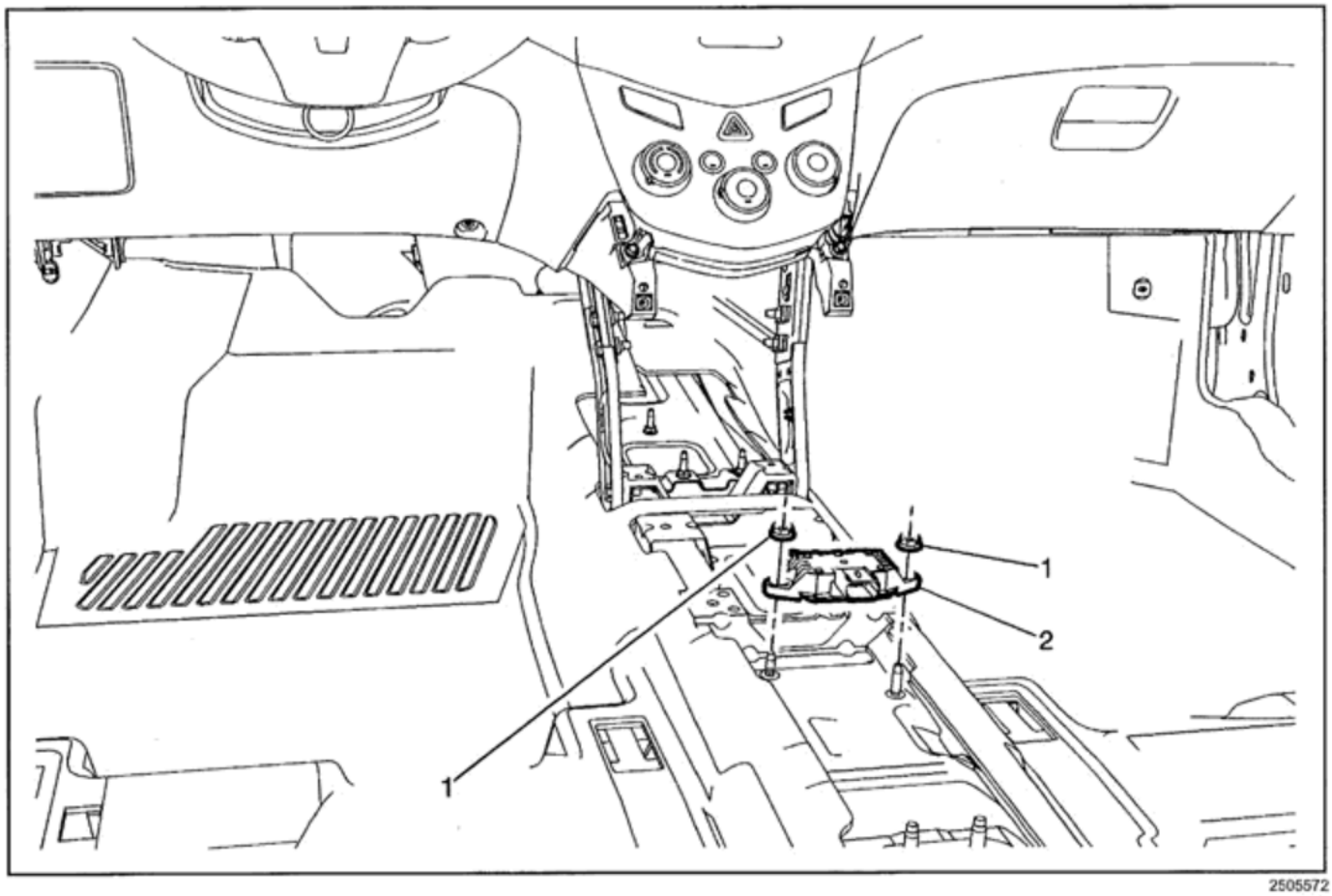
The yaw sensor does not require calibration often. Calibration of the yaw rate sensor might be required after certain service procedures are performed. Some of these procedures are as follows:

- Electronic brake control module (EBCM) replacement
- Multi-axis acceleration sensor replacement

The yaw rate sensor calibration 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 park position.
3. Install the scan tool to the data link connector.
4. Turn the ignition ON, and the engine OFF.
5. Select Yaw Rate Sensor Reset in the Multi-axis Acceleration Sensor Module Control Functions list.
6. Follow the scan tool directions to complete the calibration procedure.
7. Select Yaw Rate Sensor Learn in the Multi-axis Acceleration Sensor Module Control Functions list.
8. Follow the scan tool directions to complete the calibration procedure.
9. Clear any DTCs that may be set.

Vehicle Yaw Sensor Replacement



2505572

Vehicle Yaw Sensor Replacement

Callout	Component Name
Preliminary Procedures 1. Turn the ignition OFF. 2. Remove the front floor console. Refer to *Front Floor Console Replacement on page 2-61*.	
1	Yaw Sensor Nut **Caution:** Refer to *Fastener Caution on page 0-8*. **Tighten** 9 N•m (80 lb in)
2	Vehicle Yaw Sensor with Vehicle Lateral and Longitudinal Accelerometer **Procedure** 1. After the installation is complete, configure the yaw sensor. Refer to *Multi-Axis Acceleration Sensor Module Programming and Setup on page 6-11*. 2. After the installation is complete, perform the *Vehicle Yaw Sensor Learn on page 5-49*.

Description and Operation

ABS Description and Operation

This vehicle is equipped with the MGH 60 Mando electronic stability control antilock brake system. The electronic brake control module and the brake pressure modulator are serviced separately. The brake pressure modulator uses a four circuit configuration to control hydraulic pressure to each wheel independently.

The following vehicle performance enhancement systems are provided.

- ABS
- Electronic brake distribution
- Hill Start Hold
- Traction Control System
- Vehicle Stability Enhancement System

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

- Electronic Brake Control Module—The electronic brake control module controls the system functions and detects failures.
- Brake pressure modulator—The brake pressure modulator contains the hydraulic valves and pump motor that are controlled electrically by the electronic brake control module. The brake pressure modulator uses a four circuit configuration with a diagonal split. The brake pressure modulator directs fluid from the reservoir of the master cylinder to the left front and right rear wheels and fluid from the other reservoir to the right front and left rear wheels. The diagonal circuits are hydraulically isolated so that a leak or malfunction in one circuit will allow continued braking ability on the other.

  The brake pressure modulator contains the following components:

  – Pump motor
  – Inlet valves (one per wheel)
  – Outlet valves (one per wheel)
  – Two traction control/stability control supply valves
  – Two traction control/stability control isolation valves
  – Brake pressure sensor
- Wheel speed sensors – The wheel speed sensors are Active sensors that receive a 12-volt power supply voltage from the electronic brake control module and provides an output signal to the module. As the wheel spins, the wheel speed sensor sends the electronic brake control module a DC square wave signal. The electronic brake control module uses the frequency of the square wave signal to calculate the wheel speed.
- Traction Control Switch – The vehicle stability enhancement system and the engine torque reduction function of the traction control system are manually disabled or enabled by pressing the taction traction control switch.
- Steering Wheel Angle Sensor – The electronic brake control module receives serial data message inputs from the steering wheel angle sensor. The steering wheel angle signal is used to calculate the driver intended driving direction.
- Multi-axis Acceleration Sensor – The yaw rate and lateral 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 and lateral acceleration sensor and activates stability control depending on multi-axis acceleration sensor input.

Initialization Sequence

The electronic brake control module performs one initialization test each ignition cycle. The initialization of the electronic brake control module occurs when both the following conditions occur:

- The vehicle speed is greater than 20 km/h (12 MPH).
- The stop lamp switch is not applied.

The initialization sequence cycles each solenoid valve and the pump motor, as well as the necessary relays, for approximately 1.5 seconds 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 electronic brake control module defines a drive cycle as the completion of the initialization sequence.

Antilock Brake System

When wheel slip is detected during a brake application, the ABS enters antilock mode. During antilock 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 brake. The ABS cannot, however, increase hydraulic pressure above the amount which is transmitted by the master cylinder during braking.

During antilock 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 antilock 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 antilock braking on dry pavement, intermittent chirping noises may be heard as the tires approach slipping. These noises and pedal pulsations are considered normal during antilock 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.

Pressure Hold

The electronic brake control module closes the inlet valve and keeps the outlet valve closed in order to isolate the system when wheel slip occurs. This holds the pressure steady on the brake so that the hydraulic pressure does not increase or decrease.

Pressure Decrease

The electronic brake control module decreases the pressure to individual wheels during a deceleration when wheel slip occurs. The inlet valve is closed and the outlet valve is opened. The excess fluid is stored in the accumulator until the return pump can return the fluid to the master cylinder.

Pressure Increase

The electronic brake control module increases the pressure to individual wheels during a deceleration in order to reduce the speed of the wheel. The inlet valve is opened and the outlet valve is closed. The increased pressure is delivered from the master cylinder.

Electronic Brake Distribution

The electronic brake distribution is a control system that replaces the hydraulic proportioning function of the mechanical proportioning valve in the base brake system. The electronic brake distribution control system is part of the operation software in the electronic brake control module. The electronic brake distribution uses active control with existing ABS in order to regulate the vehicle's rear brake pressure.

The red brake warning indicator is illuminated when the electronic brake distribution function is disabled.

Hill Start Hold

Note: The Hill Start Hold feature will not operate if the Stability control is disabled.

Some vehicles are equipped with the Hill Hold Start technology feature. When stopped on a hill, the Hill Start Hold feature prevents the vehicle from rolling before driving off, whether facing uphill or downhill by holding the brake pressure during the transition between when the driver releases the brake pedal and starts to accelerate. The Electronic Brake Control Module calculates the brake pressure, which is needed to hold the vehicle on an incline or grade greater than 5% and locks that pressure for up to two seconds by commanding the appropriate solenoid valves ON and OFF when the brake pedal is released. The stop lamps will stay illuminated during the Hill-Hold operation even though the brake pedal is released, this is considered normal operation.

The Hill Start Hold feature is determined by the electronic brake control module using the following inputs:

- Accelerator pedal position sensor
- Brake pedal position sensor
- Multi-axis acceleration sensor

Traction Control System

When drive wheel slip is noted while the brake is not applied, 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 the serial data. The engine control module reduces torque to the drive wheels by retarding spark timing and turning off fuel injectors. The engine control module reports the amount of torque delivered to the drive wheels via the serial data circuit.

- Pressure hold
- Pressure increase
- Pressure decrease

Vehicle Stability Enhancement System

The vehicle stability enhancement system adds an additional level of vehicle control to the electronic brake control module.

Yaw rate is the rate of rotation about the vehicles vertical axis. The vehicle stability enhancement system 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 from the following parameters:

- The position of the steering wheel
- The speed of the vehicle
- The lateral acceleration of the vehicle

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. If the yaw error becomes too large, the electronic brake control module attempts to correct the vehicles yaw rate motion by applying differential braking to the appropriate wheel. The amount of differential braking applied to the left or right front wheel is based on both the yaw rate error and side slip rate error.

The vehicle stability enhancement system activations generally occur during aggressive driving, in turns or on bumpy roads without much use of the accelerator pedal. When braking during vehicle stability enhancement system activation, the pedal pulsations feel different than the ABS pedal pulsations. The brake pedal pulsates at a higher frequency during vehicle stability enhancement system activation.

Driver Information Indicator

Brake Warning Indicator

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

- The instrument cluster performs the bulb check.
- The electronic brake control module detects some faults, such as more than two wheel speed sensors are defective or the failure relating to the basic brake system occurs and sends a serial data message to the instrument cluster requesting illumination.
- The park brake is engaged or the brake fluid level is low.

ABS Warning Indicator

The instrument cluster turns the ABS warning 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 Control System/Stability Control System Warning Indicator

The instrument cluster turns the traction control system/ stability control system warning 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 control or stability control and sends a serial data message to the instrument cluster requesting illumination.

Traction Control System 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 one time and releasing it. The body control module and electronic brake control module sends a serial data message to the instrument cluster requesting illumination.
- The electronic brake control module detects a malfunction which disables the traction control and sends a serial data message to the instrument cluster requesting illumination of the Traction Control Off indicator.

Stability Control System OFF Indicator

The instrument cluster turns the Stability Control Off indicator ON when the following occurs:

- The instrument cluster performs the bulb check.
- The driver manually disables the stability control by pressing an holding the traction control switch down for five seconds. The electronic brake control module sends a serial data message to the instrument cluster requesting illumination.
- The electronic brake control module detects a malfunction which disables the stability control system it sends a serial data message to the instrument cluster requesting illumination of the Stability Control Off indicator.

Special Tools and Equipment

Illustration	Tool Number/ Description
 8917	EL 35616-F J 35616 Terminal Test Kit