

2017 BRAKES

Antilock Brake System - Encore, Trax

SPECIFICATIONS

FASTENER SPECIFICATIONS

Reusable Threaded Fastener Tightening Specifications

NOTE:

All fasteners listed in this table can be reused after removal.

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)
Vehicle Yaw Sensor Nut	9 N.m (80 lb in)
Wheel Speed Sensor Bolt - Front and Rear	8 N.m (71 lb in)

SCHEMATIC WIRING DIAGRAMS

ANTILOCK BRAKE SYSTEM WIRING SCHEMATICS (BUICK)

Module Power, Ground and Subsystem References (Buick)

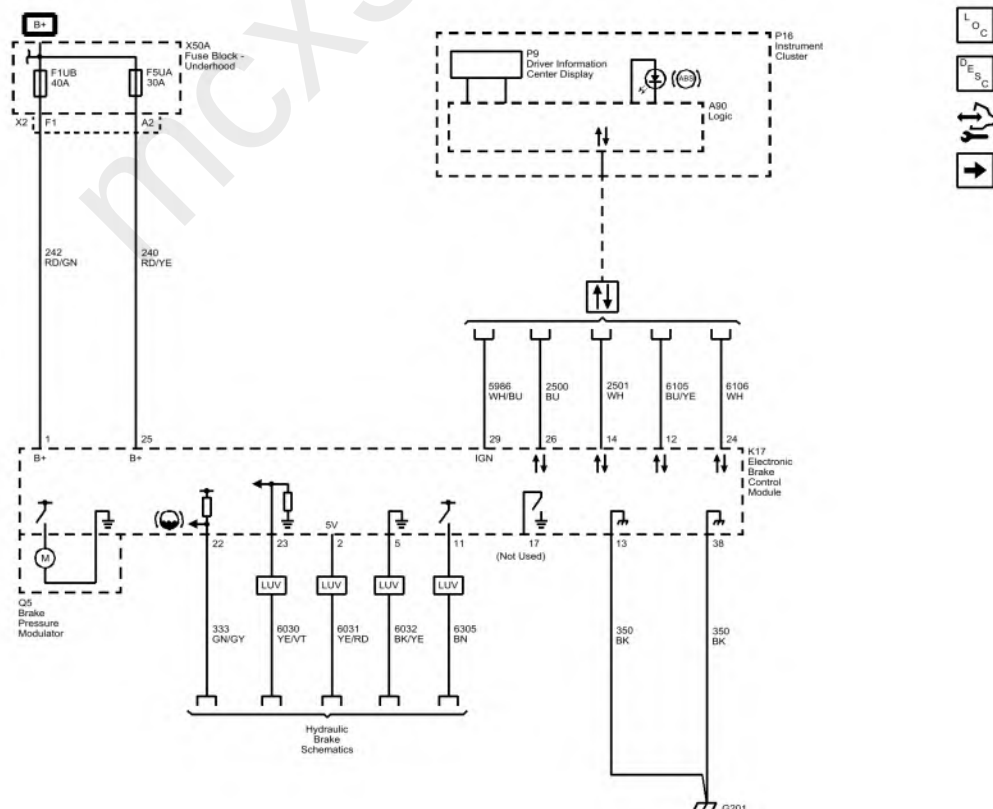


Fig. 1: Module Power, Ground and Subsystem References (Buick).

Courtesy of GENERAL MOTORS COMPANY

Wheel Speed Sensors (Buick)

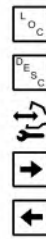
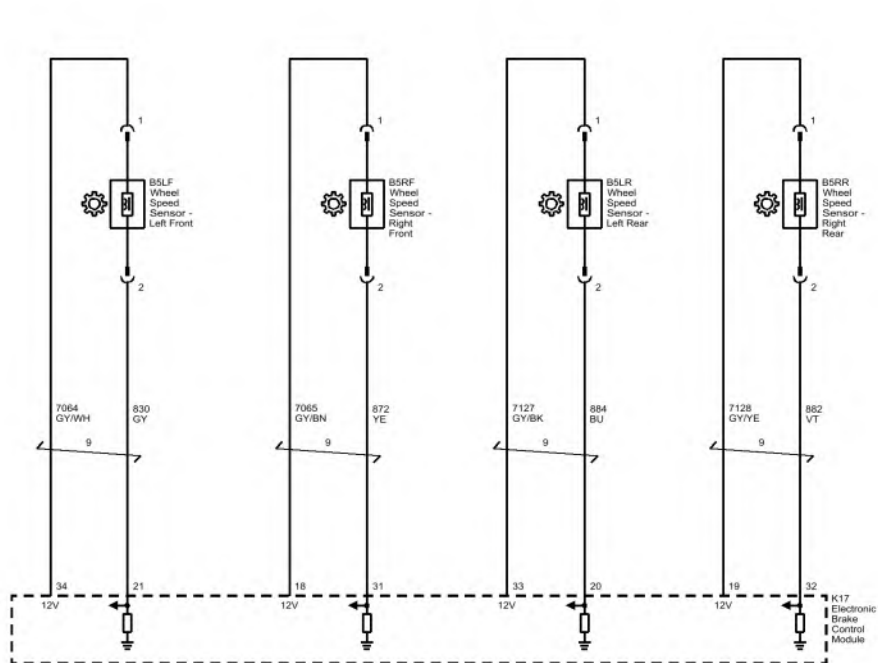


Fig. 2: Wheel Speed Sensors (Buick)
Courtesy of GENERAL MOTORS COMPANY

Stability Control (Buick)

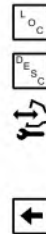
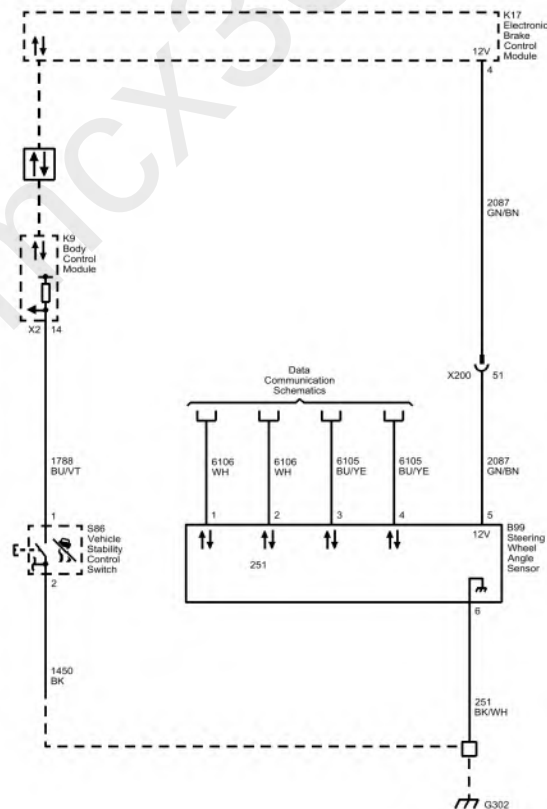


Fig. 3: Stability Control (Buick)
Courtesy of GENERAL MOTORS COMPANY

ANTILOCK BRAKE SYSTEM WIRING SCHEMATICS (CHEVROLET)

Module Power, Ground, and Subsystem References (Chevrolet)

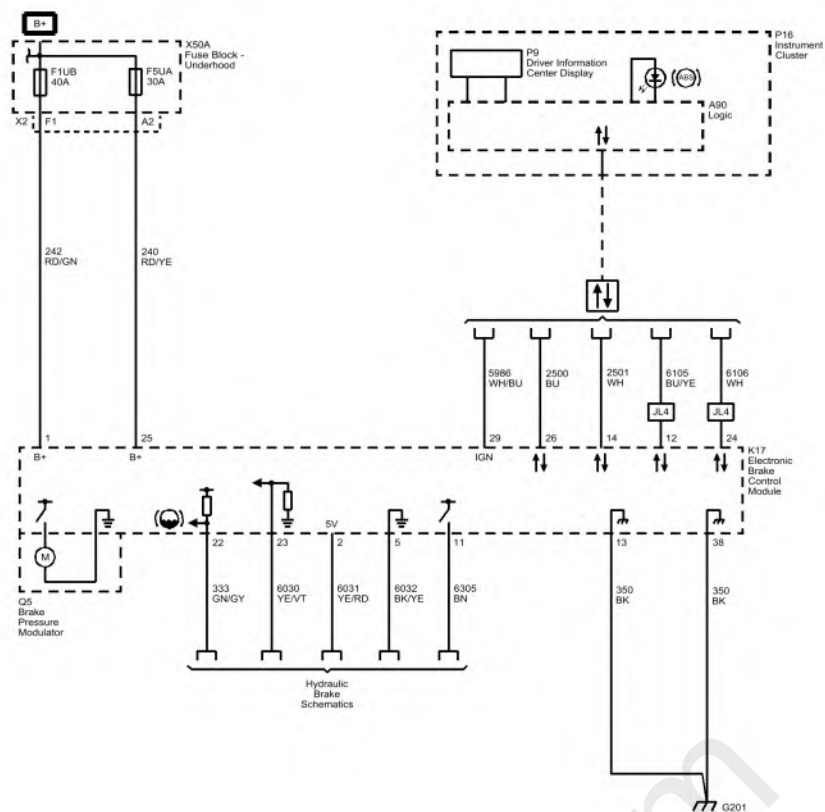


Fig. 4: Module Power, Ground, and Subsystem References (Chevrolet)
 Courtesy of GENERAL MOTORS COMPANY

Wheel Speed Sensors (Chevrolet)

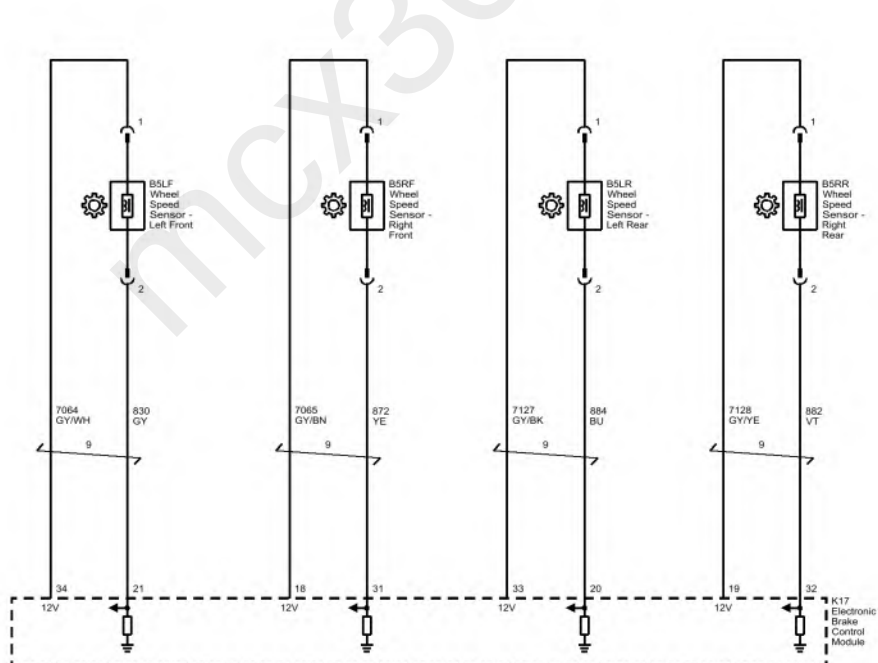


Fig. 5: Wheel Speed Sensors (Chevrolet)
 Courtesy of GENERAL MOTORS COMPANY

Stability Control (Chevrolet with JL4)

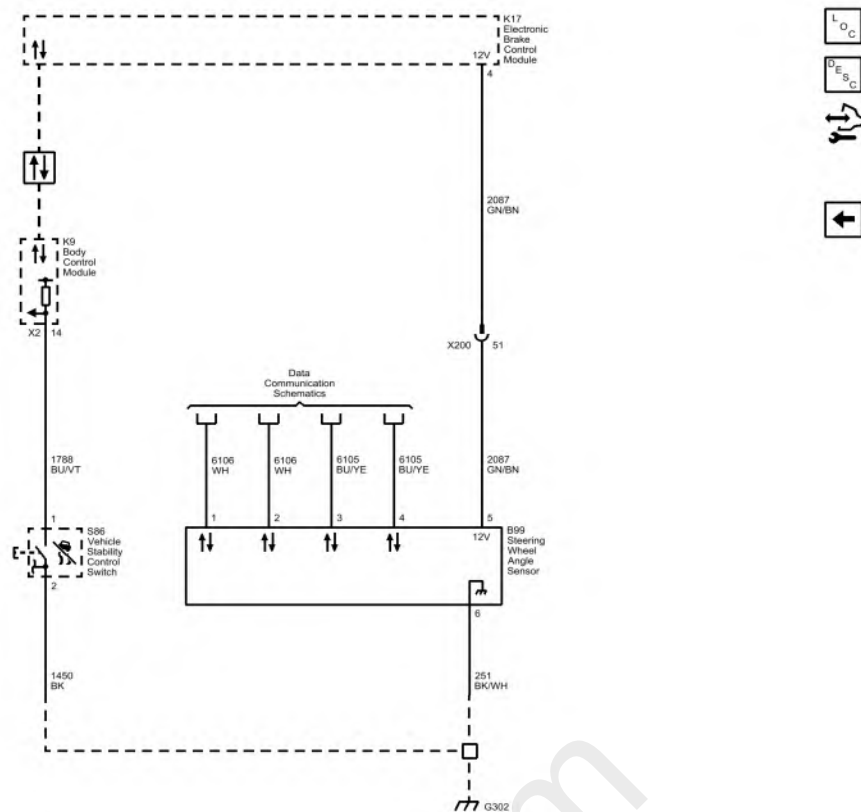


Fig. 6: Stability Control (Chevrolet with JL4)
Courtesy of GENERAL MOTORS COMPANY

DIAGNOSTIC INFORMATION AND PROCEDURES

DTC B2745: TRACTION CONTROL SWITCH (WITH C67/CJ2)

Diagnostic Instructions

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

DTC Descriptors

DTC 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	1	1	B2745 71
Ground	-	1	-	-
1. Traction control switch inoperative				

Circuit/System Description

The instrument cluster illuminates the traction/stability control indicator, the traction control off and the 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. The electronic brake control module will request the instrument cluster to turn the traction control off indicator ON to notify the driver of the deactivation. 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 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 from the traction control switch.

Action Taken When the DTC Sets

- The electronic brake control module stores DTC.
- The electronic brake control module disables the vehicle stability 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 (Buick) Antilock Brake System Schematics (Chevrolet)

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX (ENCORE) COMPONENT CONNECTOR END VIEWS - INDEX (TRAX)

Description and Operation

ABS Description and Operation

Electrical Information Reference

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

Scan Tool Reference

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 7 and ground.
 - **If 10 Ω or greater**
 1. Ignition OFF.
 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**
 1. Ignition OFF, disconnect the X2 harness connector at the K9 Body Control Module.
 2. Test for infinite resistance between the signal circuit terminal 14 and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the K9 Body Control Module.
 - **If Inactive**
5. Install a 3 A fused jumper wire between the signal circuit terminal 9 and the ground circuit terminal 7.
6. Verify the scan tool Traction Control Switch parameter is Active.
 - **If not Active**
 1. Ignition OFF, disconnect the X2 harness connector at the K9 Body Control Module, ignition ON.
 2. Test for less than 1 V between the signal circuit and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V
 3. Test for less than 2 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 9 and the ground terminal 7 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 9 and the ground terminal 7 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](#) after completing the repair.

- [Vehicle Stability Control System Switch Replacement \(Buick\)](#) [Vehicle Stability Control System Switch Replacement \(Chevrolet\)](#).
- [Control Module References](#) for Body Control Module, Electronic Brake Control Module or Instrument Cluster replacement, programming and setup

DTC B2745: TRACTION CONTROL SWITCH (WITH C60/C41)

Diagnostic Instructions

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

DTC Descriptors

DTC 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	1	1	B2745 71
Ground	-	1	-	-
1. Traction control switch inoperative				

Circuit/System Description

The instrument cluster illuminates the traction/stability control indicator, the traction control off and the 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. The electronic brake control module will request the instrument cluster to turn the traction control off indicator ON to notify the driver of the deactivation. 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 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 from the traction control switch.

Action Taken When the DTC Sets

- The electronic brake control module stores DTC.
- The electronic brake control module disables the vehicle stability 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 \(Buick\)](#)[Antilock Brake System Schematics \(Chevrolet\)](#)

Connector End View Reference

[COMPONENT CONNECTOR END VIEWS - INDEX \(ENCORE\)](#) [COMPONENT CONNECTOR END VIEWS - INDEX \(TRAX\)](#)

Description and Operation

[ABS Description and Operation](#)

Electrical Information Reference

- [Circuit Testing](#)
- [Connector Repairs](#)
- [Testing for Intermittent Conditions and Poor Connections](#)
- [Wiring Repairs](#)

Scan Tool Reference

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 S75 Traction Control Switch. 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 1 and ground.
 - **If 10 Ω or greater**
 1. Ignition OFF.
 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**
 1. Ignition OFF, disconnect the X2 harness connector at the K9 Body Control Module.
 2. Test for infinite resistance between the signal circuit terminal 14 and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the K9 Body Control Module.
 - **If Inactive**
5. Install a 3 A fused jumper wire between the signal circuit terminal 4 and the ground circuit terminal 1.
6. Verify the scan tool Traction Control Switch parameter is Active.
 - **If not Active**
 1. Ignition OFF, disconnect the X2 harness connector at the K9 Body Control Module, ignition ON.
 2. Test for less than 1 V between the signal circuit and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V
 3. Test for less than 2 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 S75 Traction Control Switch.

Component Testing

1. Ignition OFF, disconnect the harness connector at the S75 Traction Control Switch.
2. Test for infinite resistance between the signal terminal 4 and the ground terminal 1 with the switch in the open position.

- **If less than infinite resistance**

Replace the S75 Traction Control Switch.

- **If infinite resistance**

3. Test for less than 2 Ω between the signal terminal 4 and the ground terminal 1 with the switch in the closed position.

- **If 2 Ω or greater**

Replace the S75 Traction Control Switch.

- **If less than 2 Ω**

4. All OK.

Repair Instructions

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

- **Vehicle Stability Control System Switch Replacement (Buick)****Vehicle Stability Control System Switch Replacement (Chevrolet)**
- **Control Module References** for Body Control Module, Electronic Brake Control Module or Instrument Cluster replacement, programming and setup

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

Diagnostic Instructions

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

DTC Descriptors

DTC 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 \(Buick\)](#)[Antilock Brake System Schematics \(Chevrolet\)](#)****

Connector End View Reference

[COMPONENT CONNECTOR END VIEWS - INDEX \(ENCORE\)](#) **[COMPONENT CONNECTOR END VIEWS - INDEX \(TRAX\)](#)**

Description and Operation

[ABS Description and Operation](#)

Electrical Information Reference

- **[Circuit Testing](#)**
- **[Connector Repairs](#)**
- **[Testing for Intermittent Conditions and Poor Connections](#)**
- **[Wiring Repairs](#)**

Control Module References for scan tool information

Circuit/System Verification

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

Refer to Circuit/System Testing.

- **If each parameter is within 4 km/h (2.5 MPH) of each other**

3. All OK.

Circuit/System Testing

1. Ignition OFF 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 Wheel Speed Sensor - Left Front - terminal 34 and terminal 21
 - B5LR Wheel Speed Sensor - Left Rear - terminal 33 and terminal 20
 - B5RF Wheel Speed Sensor - Right Front - terminal 18 and terminal 31
 - B5RR Wheel Speed Sensor - Right Rear - 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 Wheel Speed Sensor - Left Front - terminal 34 and terminal 21
 - B5LR Wheel Speed Sensor - Left Rear - terminal 33 and terminal 20
 - B5RF Wheel Speed Sensor - Right Front - terminal 18 and terminal 31
 - B5RR Wheel Speed Sensor - Right Rear - 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 Wheel Speed Sensor - Left Front - terminal 34
 - B5LR Wheel Speed Sensor - Left Rear - terminal 33
 - B5RF Wheel Speed Sensor - Right Front - terminal 18
 - B5RR Wheel Speed Sensor - Right Rear - 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 Wheel Speed Sensor - Left Front - terminal 21

- B5LR Wheel Speed Sensor - Left Rear - terminal 20
- B5RF Wheel Speed Sensor - Right Front - terminal 31
- B5RR Wheel Speed Sensor - Right Rear - 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](#) after completing the repair.

- [Front Wheel Speed Sensor Replacement](#)
- [Rear Wheel Speed Sensor Replacement](#)
- [Control Module References](#) for Electronic Brake Control Module replacement, programming and setup

DTC C0110: PUMP MOTOR

Diagnostic Instructions

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

DTC Descriptors

DTC C0110 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

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 \(Buick\)](#)[Antilock Brake System Schematics \(Chevrolet\)](#)

Connector End View Reference

[COMPONENT CONNECTOR END VIEWS - INDEX \(ENCORE\)](#) [COMPONENT CONNECTOR END VIEWS - INDEX \(TRAX\)](#)

ABS Description and Operation

Electrical Information Reference

- [Circuit Testing](#)
- [Connector Repairs](#)
- [Testing for Intermittent Conditions and Poor Connections](#)
- [Wiring Repairs](#)

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

1. Ignition ON
2. Verify the ABS pump motor turns ON and OFF when commanding the ABS Pump Motor 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**
 1. Ignition OFF
 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**
 1. Ignition OFF.
 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**
 1. Ignition OFF.
 2. Test for infinite resistance between the B+ circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the 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](#) after completing the repair.

- [Brake Pressure Modulator Valve Replacement](#)
- [Control Module References](#) for Electronic Brake Control Module replacement, programming and setup

DTC C0131: TRACTION CONTROL SYSTEM

Diagnostic Instructions

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

DTC Descriptors

DTC C0131 00

Traction Control System Pressure Circuit 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 \(Buick\)](#) [Antilock Brake System Schematics \(Chevrolet\)](#)
- [Exterior Lights Schematics \(Buick\)](#) [Exterior Lights Schematics \(Chevrolet\)](#)

Connector End View Reference

[COMPONENT CONNECTOR END VIEWS - INDEX \(ENCORE\)](#) [COMPONENT CONNECTOR END VIEWS - INDEX \(TRAX\)](#)

Description and Operation

[ABS Description and Operation](#)

Electrical Information Reference

- [Circuit Testing](#)
- [Connector Repairs](#)
- [Testing for Intermittent Conditions and Poor Connections](#)
- [Wiring Repairs](#)

Scan Tool Reference

[Control Module References](#) for scan tool information

Circuit/System Verification

1. Ignition ON.
2. Verify the 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](#) .
 - **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**
 1. Replace the Q5 Brake Pressure Modulator.
 2. Verify the DTC does not set while operating the vehicle within the Conditions for Running the DTC.
 - If the DTC sets, replace the K17 Electronic Brake Control Module.
 - If the DTC does not set.

3. All OK.

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

5. All OK.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

- [Brake Pressure Modulator Valve Replacement](#)
- [Control Module References](#) for Electronic Brake Control Module replacement, programming and setup

DTC C0161: ANTILOCK BRAKE SYSTEM

Diagnostic Instructions

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

DTC Descriptors

DTC 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 \(Buick\)](#)[Antilock Brake System Schematics \(Chevrolet\)](#)

Connector End View Reference

[COMPONENT CONNECTOR END VIEWS - INDEX \(ENCORE\)](#) [COMPONENT CONNECTOR END VIEWS - INDEX \(TRAX\)](#)

Description and Operation

[ABS Description and Operation](#)

Electrical Information Reference

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- [Connector Repairs](#)
- [Testing for Intermittent Conditions and Poor Connections](#)
- [Wiring Repairs](#)

Scan Tool Reference

[Control Module References](#) for scan tool information

Circuit/System Verification

1. Ignition ON.
2. Verify the 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](#) .
 - **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](#) after completing the repair.

DTC C0186, C0196, OR C0287: LATERAL ACCELERATION SENSOR SIGNAL/YAW RATE SIGNAL

Diagnostic Instructions

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

DTC Descriptors

DTC C0186

Lateral Acceleration Sensor Signal

DTC C0196

Yaw Rate Signal

DTC C0287

Longitudinal Acceleration Sensor Signal

For symptom byte information refer to [Symptom Byte List](#) .

Circuit/System Description

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

Conditions for Running the DTC

C0186 00, C0196 00, or C0287 00

Ignition ON

C0186 5A, or C0287 5A

Drive the vehicle straight ahead with constant velocity greater than 30 km/h (18.6 MPH), then turn right and then turn left.

C0196 5A

Vehicle at standstill for 10 s, then drive the vehicle straight ahead with constant velocity greater than 20 km/h (12.4 MPH).

Conditions for Setting the DTC

C0186 00

- An internal fault in multi-axis acceleration sensor will set this DTC.
- Improperly mounted or loose inflatable restraint sensing and diagnostic module may set this DTC.

C0186 71

The electronic brake control module received an invalid lateral acceleration signal.

C0186 5A

- An internal fault in multi-axis acceleration sensor.
- Improperly mounted or loose inflatable restraint sensing and diagnostic module.
- The lateral acceleration signal is not plausible with the lateral acceleration signal, the steering wheel angle sensor signal and the vehicle speed.

C0196 00

The yaw rate signal is out of the specified range.

C0196 09

The yaw rate signal is changing faster than physically possible.

C0196 71

The electronic brake control module received an invalid lateral acceleration signal.

C0196 5A

- Improperly mounted or loose inflatable restraint sensing and diagnostic module may set this DTC.
- The yaw rate signal is not plausible with the lateral acceleration signal, the steering wheel angle sensor signal and the vehicle speed.

C0287 00

The longitudinal acceleration signal is out of the specified range.

C0287 71

The electronic brake control module received an invalid longitudinal acceleration signal.

C0287 5A

- An internal fault in multi-axis acceleration sensor will set this DTC.
- The longitudinal acceleration signal is not plausible with the vehicle acceleration.

Action Taken When the DTC Sets

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

Conditions for Clearing the DTC

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

Diagnostic Aids

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

Reference Information

Schematic Reference

[Antilock Brake System Schematics \(Buick\)](#)**[Antilock Brake System Schematics \(Chevrolet\)](#)**

Connector End View Reference

[COMPONENT CONNECTOR END VIEWS - INDEX \(ENCORE\)](#) **[COMPONENT CONNECTOR END VIEWS - INDEX \(TRAX\)](#)**

Description and Operation

[ABS Description and Operation](#)

Electrical Information Reference

- **[Circuit Testing](#)**
- **[Connector Repairs](#)**
- **[Testing for Intermittent Conditions and Poor Connections](#)**
- **[Wiring Repairs](#)**

[Control Module References](#) for scan tool information

Circuit/System Verification

1. Verify DTC B101D is not set current or history in the K36 Inflatable Restraint Sensing and Diagnostic Module.
 - **If DTC B101D is set current or history in the K36 Inflatable Restraint and Sensing Diagnostic Module**

Replace the K36 Inflatable Restraint Sensing and Diagnostic Module.
 - **If DTC B101D is not set current or history in the K36 Inflatable Restraint and Sensing Diagnostic Module**
2. Verify the K36 Inflatable Restraint Sensing and Diagnostic Module is installed correctly.
 - **If loose or incorrect installation**

Correct the installation or replace the component.
 - **If correct installation**
3. Verify DTC C0186, C0196, or C0287 is not set in the K36 Inflatable Restraint Sensing and Diagnostic Module.
 - **If any of the DTCs are set**

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

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

[Control Module References](#) for Electronic Brake Control Module or Inflatable Restraint Sensing and Diagnostic Module replacement, programming and setup

DTC C0201: ANTILOCK BRAKING SYSTEM ENABLE RELAY PRIMARY CIRCUIT

Diagnostic Instructions

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

DTC Descriptor

DTC 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 \(Buick\)](#)[Antilock Brake System Schematics \(Chevrolet\)](#)

Connector End View Reference

[COMPONENT CONNECTOR END VIEWS - INDEX \(ENCORE\)](#) [COMPONENT CONNECTOR END VIEWS - INDEX \(TRAX\)](#)

Description and Operation

[ABS Description and Operation](#)

Electrical Information Reference

- [Circuit Testing](#)
- [Connector Repairs](#)
- [Testing for Intermittent Conditions and Poor Connections](#)
- [Wiring Repairs](#)

Scan Tool Reference

[Control Module References](#) for scan tool information

Circuit/System Testing

1. Ignition 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**
 1. Ignition OFF
 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**
 1. Ignition OFF.
 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**
 1. Ignition OFF.
 2. Test for infinite resistance between the B+ circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the 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](#) after completing the repair.

- [Brake Pressure Modulator Valve Replacement](#)
- [Control Module References](#) for Electronic Brake Control Module replacement, programming and setup

DTC C0242 OR P0856: ENGINE CONTROL MODULE INDICATED TRACTION CONTROL MALFUNCTION/TRACTION CONTROL TORQUE REQUEST SIGNAL MESSAGE COUNTER INCORRECT

Diagnostic Instructions

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

DTC Descriptors

DTC C0242 00

Engine Control Module Indicated Traction Control Malfunction

DTC P0856

Traction Control Torque Request Signal Message Counter Incorrect

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 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 \(Buick\)](#)[Antilock Brake System Schematics \(Chevrolet\)](#)

Connector End View Reference

[COMPONENT CONNECTOR END VIEWS - INDEX \(ENCORE\)](#), [COMPONENT CONNECTOR END VIEWS - INDEX \(TRAX\)](#)

Description and Operation

[ABS Description and Operation](#)

Electrical Information Reference

- [Circuit Testing](#)
- [Connector Repairs](#)
- [Testing for Intermittent Conditions and Poor Connections](#)
- [Wiring Repairs](#)

Scan Tool Reference

[Control Module References](#) for scan tool information

Circuit/System Verification

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

- **If any other DTCs are set**

Refer to [Diagnostic Trouble Code \(DTC\) List - Vehicle](#) .

- **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 is set**

Replace the K17 Electronic Brake Control Module.

- **If DTC C0242 or P0856 is not set**

5. All OK.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

[Control Module References](#) for Electronic Brake Control Module or Engine Control Module replacement, programming and setup

DTC C0277: BRAKE PEDAL POSITION SENSOR CIRCUIT CALIBRATION NOT LEARNED

Diagnostic Instructions

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

DTC Descriptors

DTC 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 \(Buick\)](#) [Antilock Brake System Schematics \(Chevrolet\)](#)
- [Exterior Lights Schematics \(Buick\)](#) [Exterior Lights Schematics \(Chevrolet\)](#)

Connector End View Reference

[COMPONENT CONNECTOR END VIEWS - INDEX \(ENCORE\)](#) [COMPONENT CONNECTOR END VIEWS - INDEX \(TRAX\)](#)

Description and Operation

- [ABS Description and Operation](#)
- [Exterior Lighting Systems Description and Operation](#)

Electrical Information Reference

- [Circuit Testing](#)
- [Connector Repairs](#)
- [Testing for Intermittent Conditions and Poor Connections](#)
- [Wiring Repairs](#)

Scan Tool Reference

[Control Module References](#) for scan tool information

Circuit/System Verification

1. Verify DTC C0277 is not set in the K9 Body Control Module.
 - **If DTC is set**
Refer to [DTC C0277 or C0890](#) .
 - **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](#) .
 - **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](#) after completing the repair.

[Control Module References](#) for Electronic Brake Control Module replacement, programming and setup

DTC C027C: FRONT BRAKE DISCS HIGH TEMPERATURE

Diagnostic Instructions

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

DTC Descriptor

DTC C027C

Front Brake Discs High Temperature

For symptom byte information refer to [Symptom Byte List](#).

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 500Å,Å°C (932Å,Å°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 \(Buick\)](#)[Antilock Brake System Schematics \(Chevrolet\)](#)

[COMPONENT CONNECTOR END VIEWS - INDEX \(ENCORE\)](#), [COMPONENT CONNECTOR END VIEWS - INDEX \(TRAX\)](#)

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- [Connector Repairs](#)
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- [Wiring Repairs](#)

Scan Tool Reference

[Control Module References](#) 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](#) .
 - **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](#) .
 - **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](#) after completing the repair.

[Control Module References](#) for electronic brake control module replacement, programming, and setup

DTC C0292: MULTI-AXIS ACCELERATION SENSOR MODULE CIRCUIT PERFORMANCE - BIAS LEVEL OUT OF RANGE

[Diagnostic Instructions](#)

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

[DTC Descriptor](#)

DTC 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
Ignition	U0125, C0292 1A	U0125, C0292 1A	-	-
Ground	-	U0125	-	-

Circuit/System Description

The Lateral Acceleration sensor, the Longitudinal Acceleration Sensor and the Yaw Rate Sensors are combined into one sensor called the Multi-axis Acceleration Sensor, which is internal to the inflatable restraint sensing and diagnostic module. The Multi-axis Acceleration Sensor communicates with the Electronic Brake Control Module via serial data. The 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

A short to ground or an open/high resistance is detected on the ignition circuit.

Action Taken When the DTC Sets

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

Conditions for Clearing the DTC

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

Reference Information

Schematic Reference

- [Antilock Brake System Schematics \(Buick\)](#)[Antilock Brake System Schematics \(Chevrolet\)](#)
- [SIR Schematics \(Buick\)](#) [SIR Schematics \(Chevrolet\)](#)

[Antilock Brake System Schematics \(Buick\)](#)[Antilock Brake System Schematics \(Chevrolet\)](#)

Connector End View Reference

[COMPONENT CONNECTOR END VIEWS - INDEX \(ENCORE\)](#), [COMPONENT CONNECTOR END VIEWS - INDEX \(TRAX\)](#)

Description and Operation

[ABS Description and Operation](#)

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- [Connector Repairs](#)
- [Testing for Intermittent Conditions and Poor Connections](#)
- [Wiring Repairs](#)

Control Module References for scan tool information

Circuit/System Testing

1. Ignition OFF, scan tool disconnected, and all vehicle systems OFF, disconnect the X1 and X2 harness connector at the K36 Inflatable Restraint Sensing and Diagnostic Module. It may take up to 2 minutes for all vehicle systems to power down.
2. Test for less than 25 Ω between the ground circuit terminal 19 and ground.
 - **If 25 Ω or greater**
 1. Ignition OFF.
 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 25 Ω**
3. Ignition ON.
4. Verify that a test lamp illuminates between the ignition circuit terminal 17 and ground.
 - **If the test lamp does not illuminate and the circuit fuse is good**
 1. Ignition OFF, remove the test lamp.
 2. Test for less than 2 Ω in the ignition 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 OK and there is voltage at the fuse.
 - **If the test lamp does not illuminate and the circuit fuse is open**
 1. Ignition OFF, remove the test lamp.
 2. Test for infinite resistance between the ignition circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the K36 Inflatable Restraint Sensing and Diagnostic Module.
 - **If the test lamp illuminates**
5. Replace the K36 Inflatable Restraint Sensing and Diagnostic Module.

Repair Instructions

Perform the Diagnostic Repair Verification after completing the repair.

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

DTC C0551: OPTION CONFIGURATION INCORRECT COMPONENT INSTALLED

Diagnostic Instructions

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

DTC Descriptor

DTC C0551 3A

Option Configuration Incorrect Component Installed

Circuit/System Description

The Vehicle Identification Number (VIN) and option content is programmed into the electronic brake control module during initial programming of the module.

Conditions for Running the DTC

Ignition ON

Conditions for Setting the DTC

The electronic brake control module is not properly programmed or configured.

Action Taken When the DTC Sets

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

Conditions for Clearing the DTC

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

Diagnostic Aids

A newly replaced electronic brake control module can set one or more DTCs on its initial ignition ON cycle.

Reference Information

Schematic Reference

[Antilock Brake System Schematics \(Buick\)](#)[Antilock Brake System Schematics \(Chevrolet\)](#)

Connector End View Reference

[COMPONENT CONNECTOR END VIEWS - INDEX \(ENCORE\)](#) [COMPONENT CONNECTOR END VIEWS - INDEX \(TRAX\)](#)

Description and Operation

[ABS Description and Operation](#)

Electrical Information Reference

- [Circuit Testing](#)
- [Connector Repairs](#)
- [Testing for Intermittent Conditions and Poor Connections](#)
- [Wiring Repairs](#)

Scan Tool Reference

[Control Module References](#) for scan tool information

Circuit/System Testing

1. Verify that DTC C0551 is not set.
 - **If the DTC is set**

Reprogram the K17 Electronic Brake Control Module.
 - **If the DTC is not set**
2. Verify the DTC does not set while operating the vehicle within the Conditions for Running the DTC.
 - **If the DTC sets**

Replace the K17 Electronic Brake Control Module.

- If the DTC does not set

3. All OK.

Repair Instructions

Perform the Diagnostic Repair Verification after completing the repair.

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

DTC C0561: SYSTEM DISABLED INFORMATION STORED

Diagnostic Instructions

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

DTC Descriptor

DTC C0561 77

System Disabled Information Stored Engine Speed Invalid Data

DTC C0561 78

System Disabled Information Stored Acceleration Pedal Invalid Data

DTC C0561 79

System Disabled Information Stored Transmission Gear Invalid Data

Circuit/System Description

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

Conditions for Running the DTC

Engine running.

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 indicator turns ON.
- The traction/stability control indicator turns ON.
- 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 the DTC is no longer present.
- The history DTC will clear after 40 consecutive fault-free ignition cycles have occurred.

Diagnostic Aids

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

Reference Information

[Antilock Brake System Schematics \(Buick\)](#)[Antilock Brake System Schematics \(Chevrolet\)](#)

Connector End View Reference

[COMPONENT CONNECTOR END VIEWS - INDEX \(ENCORE\)](#) [COMPONENT CONNECTOR END VIEWS - INDEX \(TRAX\)](#)

Description and Operation

[ABS Description and Operation](#)

Electrical Information Reference

- [Circuit Testing](#)
- [Connector Repairs](#)
- [Testing for Intermittent Conditions and Poor Connections](#)
- [Wiring Repairs](#)

Scan Tool Reference

[Control Module References](#) for scan tool information

[Circuit/System Verification](#)

C0561 77 or C0561 78

1. Ignition ON.
2. Verify that no other DTCs are set.
 - **If any other DTCs are set**
Refer to [Diagnostic Trouble Code \(DTC\) List - Vehicle](#) .
 - **If no other DTCs are set**
3. Replace the K20 Engine Control Module.
4. Verify the DTC does not set while operating the vehicle under 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 that no other DTCs are set.
 - **If any other DTCs are set**
Refer to [Diagnostic Trouble Code \(DTC\) List - Vehicle](#) .
 - **If no other DTCs are set**
3. Replace the K71 Transmission Control Module.
4. Verify the DTC does not set while operating the vehicle under the Conditions for Running the DTC.
 - **If the DTC sets**
Replace the K17 Electronic Brake Control Module.

- If the DTC does not set

5. All OK.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

[Control Module References](#) for Control Module replacement, programming and setup.

DTC C0710: STEERING POSITION SIGNAL

Diagnostic Instructions

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

DTC 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 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 \(Buick\)](#)[Antilock Brake System Schematics \(Chevrolet\)](#)

Connector End View Reference

[COMPONENT CONNECTOR END VIEWS - INDEX \(ENCORE\)](#) [COMPONENT CONNECTOR END VIEWS - INDEX \(TRAX\)](#)

Description and Operation

[ABS Description and Operation](#)

Electrical Information Reference

- [Circuit Testing](#)
- [Connector Repairs](#)
- [Testing for Intermittent Conditions and Poor Connections](#)
- [Wiring Repairs](#)

Scan Tool Reference

[Control Module References](#) for scan tool information

Circuit/System Verification

1. Ignition ON.
2. Verify the scan tool Steering Wheel Angle 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 min 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**
 1. Ignition OFF
 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 V reference circuit terminal 5 and ground.
 - **If the test lamp does not illuminate**
 1. Ignition OFF, disconnect the harness connector at the K17 Electronic Brake Control Module
 2. Test for infinite resistance between the 12 V reference circuit and ground.
 - If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance
 3. Test for less than 2 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**
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](#) after completing the repair.

- [Steering Angle Sensor Replacement](#)
- [Control Module References](#) for Electronic Brake Control Module replacement, programming and setup

DTC C1207, C1208, C1221, C1222, C1225, C1226, C1232, OR C1233: WHEEL SPEED SENSOR

Diagnostic Instructions

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

DTC Descriptors

DTC C1207 00

Left Front Wheel Speed Sensor Circuit High Input

DTC C1208 00

Right Front Wheel Speed Sensor Circuit High Input

DTC C1221 00

Left Front Wheel Speed Sensor Circuit

DTC C1222 00

Right Front Wheel Speed Sensor Circuit

DTC C1225 00

Left Front Wheel Speed Sensor Circuit Performance

DTC C1226 00

Right Front Wheel Speed Sensor Circuit Performance

DTC C1232 00

Left Front Wheel Speed Sensor Circuit Low Input

DTC C1233 00

Right Front Wheel Speed Sensor Circuit Low Input

Circuit/System Description

Each wheel speed sensor receives ignition voltage through the signal high circuit from the electronic brake control module. Wheel speeds are detected by active wheel speed sensors and encoder rings. The magnetic encoder rings consists of multiple north and south pole pairs surrounding the outer circumference. When the encoder ring rotates and passes by the wheel speed sensor; it generates a sign wave in the wheel speed sensor. The sensor converts the signal to a digital square wave; the square wave values switch between 7mA (Low) and 14mA (High) DC current. As the wheel spins, the module uses the frequency of the square wave signal to calculate the wheel speeds.

Conditions for Running the DTC

Vehicle speed is greater than 12.9 km/h (8 MPH).

Conditions for Setting the DTC

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

Action Taken When the DTC Sets

- The traction/stability control indicator turns ON.
- The electric brake control module disables the traction control, the stability control and the hill start assist for the duration of the ignition cycle.

Conditions for Clearing the DTC

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

Reference Information

Schematic Reference

[Antilock Brake System Schematics \(Buick\)](#)[Antilock Brake System Schematics \(Chevrolet\)](#)****

COMPONENT CONNECTOR END VIEWS - INDEX (ENCORE), COMPONENT CONNECTOR END VIEWS - INDEX (TRAX)

Description and Operation

ABS Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

1. Verify DTC C0035, C0040, C0045, or C0050 is not set.
 - **If any of the DTCs are set**
Refer to **DTC C0035, C0040, C0045, or C0050**.
 - **If none of the DTCs are set**
2. Replace the K17 Electronic Brake Control Module.
3. Verify DTC C1207, C1208, C1221, C1222, C1225, C1226, C1232, or C1233 does not set while operating the vehicle within the Conditions for Running the DTC.
 - **If any of the DTCs are set**
Replace the module that set the DTC.
 - **If none of the DTCs are set**
4. All OK.

Repair Instructions

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

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

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

Diagnostic Instructions

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

DTC Descriptors

DTC C124F

Lateral Acceleration Sensor Circuit Low Voltage

DTC C1250

Lateral Acceleration Sensor Circuit High Voltage

DTC C1251

Lateral Acceleration Sensor Performance

DTC C1252

Longitudinal Acceleration Sensor Circuit Low Voltage

DTC C1253

Longitudinal Acceleration Sensor Circuit High Voltage

DTC C1254

Longitudinal Acceleration Sensor Performance

For symptom byte information refer to [Symptom Byte List](#).

Circuit/System Description

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

Conditions for Running the DTC

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

Conditions for Setting the DTC

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

Action Taken When the DTC Sets

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

Conditions for Clearing the DTC

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

Reference Information

Schematic Reference

[Antilock Brake System Schematics \(Buick\)](#)[Antilock Brake System Schematics \(Chevrolet\)](#)

Connector End View Reference

[COMPONENT CONNECTOR END VIEWS - INDEX \(ENCORE\)](#) [COMPONENT CONNECTOR END VIEWS - INDEX \(TRAX\)](#)

Description and Operation

[ABS Description and Operation](#)

Electrical Information Reference

- [Circuit Testing](#)
- [Connector Repairs](#)
- [Testing for Intermittent Conditions and Poor Connections](#)
- [Wiring Repairs](#)

Scan Tool Reference

[Control Module References](#) for scan tool information

Circuit/System Verification

1. Ignition ON.
2. Verify that no other DTCs are set.
 - **If any other DTCs are set**
Refer to [Diagnostic Trouble Code \(DTC\) List - Vehicle](#).
 - **If no other DTCs are set**
3. Replace the K71 Transmission Control Module.
4. Verify that the DTC does not set while operating the vehicle within the Conditions for Running the DTC.
 - **If the DTC sets**
Replace the K17 Electronic Brake Control Module.
 - **If the DTC does not set**
5. All OK.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

[Control Module References](#) for Electronic Brake Control Module or Transmission Control Module replacement, programming, and setup

DTC C1589: MULTI-AXIS ACCELERATION SENSOR/STEERING WHEEL ANGLE SENSOR SUPPLY VOLTAGE CIRCUIT PERFORMANCE

Diagnostic Instructions

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

DTC Descriptor

DTC C1589 1A

Multi-axis Acceleration Sensor/Steering Wheel Angle Sensor Supply Voltage Circuit Performance
- Bias Level Out of Range

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Ignition	U0126	U0126	-	C1589 1A
Ground	-	U0126	-	-

Circuit/System Description

The lateral accelerometer, and the yaw rate sensors are combined into one sensor called the multi-axis acceleration sensor, which is internal to the inflatable restraint sensing and diagnostic module. The electronic brake control module supplies ignition voltage to the steering wheel angle sensor. The steering wheel angle sensor communicates with the electronic brake control module via serial data. The module activates the stability control function depending on multi-axis acceleration sensor and steering wheel angle sensor input.

Conditions for Running the DTC

- Ignition ON.
- The ignition voltage is greater than 10 V.

Conditions for Setting the DTC

The electronic brake control module has detected a short to ground or open on the steering wheel angle sensor ignition circuit.

Action Taken When the DTC Sets

- The ABS indicator turns ON.
- The red brake indicator turns ON.
- The traction/stability control indicator turns ON.
- A message may be displayed on the driver information center.
- The electronic brake control module disables the ABS, the traction control system and the electronic stability control for the duration of the drive 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 drive cycles have occurred.

Reference Information

Schematic Reference

[Antilock Brake System Schematics \(Buick\)](#)[Antilock Brake System Schematics \(Chevrolet\)](#)

Connector End View Reference

[COMPONENT CONNECTOR END VIEWS - INDEX \(ENCORE\)](#) [COMPONENT CONNECTOR END VIEWS - INDEX \(TRAX\)](#)

Description and Operation

[ABS Description and Operation](#)

Electrical Information Reference

- [Circuit Testing](#)
- [Connector Repairs](#)
- [Testing for Intermittent Conditions and Poor Connections](#)
- [Wiring Repairs](#)

Scan Tool Reference

[Control Module References](#) for scan tool information.

Circuit/System Testing

1. Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the B99 Steering Wheel Angle Sensor. 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 terminal 6 and ground.

- **If 10 Ω or greater**

1. Ignition OFF.
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 ignition circuit terminal 5 and ground.

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

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

2. Test for infinite resistance between the ignition circuit and ground.

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

3. Test for less than 2 Ω in the ignition 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.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

- [Steering Angle Sensor Replacement](#)
- [Control Module References](#) for electronic brake control module replacement, programming and setup

DTC P15FD: WHEEL SPEED SENSOR MESSAGE SEQUENCE INCORRECT

Diagnostic Instructions

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

DTC Descriptor

DTC P15FD

Wheel Speed Sensor Message Sequence Incorrect

Circuit/System Description

The wheel speeds are detected by active wheel speed sensors. Each wheel speed sensor receives a 12 V reference voltage from the electronic brake control module (EBCM) and provides an alternating current square wave signal to the EBCM. As the wheel spins, the EBCM uses the frequency of the square wave signal to calculate the wheel speed. The EBCM sends the wheel speed information as a high speed controller area network (CAN) serial data message.

Conditions for Running the DTC

Ignition ON

Conditions for Setting the DTC

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

Action Taken When the DTC Sets

Specific subsystems will not function or operate in degraded mode.

Conditions for Clearing the DTC

A current DTC clears when the diagnostic runs and passes.

Reference Information

Schematic Reference

[Antilock Brake System Schematics \(Buick\)](#)[Antilock Brake System Schematics \(Chevrolet\)](#)

Connector End View Reference

[COMPONENT CONNECTOR END VIEWS - INDEX \(ENCORE\)](#), [COMPONENT CONNECTOR END VIEWS - INDEX \(TRAX\)](#)

Description and Operation

[ABS Description and Operation](#)

Electrical Information Reference

- [Circuit Testing](#)
- [Connector Repairs](#)
- [Testing for Intermittent Conditions and Poor Connections](#)
- [Wiring Repairs](#)

Scan Tool Reference

[Control Module References](#) for scan tool information

Diagnostic Aids

- This DTC can be set due to an incorrect part wheel speed sensor installed.
- Inspect the wheel encoder ring for rust or corrosion.
- 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.

Circuit/System Verification

Ignition ON, observe the scan tool EBCM Wheel Speed Sensor parameters. The reading should be the same speed on all sensors when driving in a straight line at a speed greater than 20 km/h (13 MPH).

Circuit/System Testing

1. Ignition ON.
2. Verify that DTC C0035, C0040, C0045, or C0050 is not set in the EBCM.

- **If any listed DTC is set**

Refer to [Diagnostic Trouble Code \(DTC\) List - Vehicle](#) to diagnose that DTC prior to this diagnostic.

- **If any listed DTC is not set**

3. Replace the K17 Electronic Brake Control Module.
4. Verify the DTC does not set while operating the vehicle under the Conditions for Running the DTC.

- **If the DTC sets**

Replace the module that set the DTC.

- If the DTC does not set

5. All OK.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

[Control Module References](#) for control module replacement, programming and setup

SYMPTOMS - ANTILOCK BRAKE SYSTEM

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

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

Visual/Physical Inspection

- Inspect for aftermarket devices which may affect the operation of the ABS. Refer to [Checking Aftermarket Accessories](#)
- Inspect the easily accessible or visible system components for obvious damage or conditions which may cause the symptom.

Intermittent

Faulty electrical connections or wiring may be the cause of intermittent conditions. Refer to [Testing for Intermittent Conditions and Poor Connections](#)

Symptom List

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

- [ABS Indicator Malfunction](#)
- [Brake Warning Indicator Malfunction \(Buick\)](#), [Brake Warning Indicator Malfunction \(Chevrolet\)](#)
- [Traction Control/Stability Control Indicator Malfunction \(With C67/CJ2\)](#), [Traction Control/Stability Control Indicator Malfunction \(With C60/C41\)](#)

ABS INDICATOR MALFUNCTION

Diagnostic Instructions

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

Circuit/System Description

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

Reference Information

Schematic Reference

[Antilock Brake System Schematics \(Buick\)](#), [Antilock Brake System Schematics \(Chevrolet\)](#)

COMPONENT CONNECTOR END VIEWS - INDEX (ENCORE), COMPONENT CONNECTOR END VIEWS - INDEX (TRAX)

Description and Operation

ABS Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

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

Refer to **Diagnostic Trouble Code (DTC) List - Vehicle**.
 - **If no DTCs are set**
3. Verify that 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 5 seconds after ignition 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** after completing the repair.

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

TRACTION CONTROL/STABILITY CONTROL INDICATOR MALFUNCTION (WITH C67/CJ2)

Diagnostic Instructions

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

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Signal	B2745 02, B2745 71	1	1	B2745 71
Ground	-	1	-	-
1. Traction control inoperative				

Circuit/System Description

The instrument cluster illuminates the traction/stability control indicator, the traction control off and the 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. The electronic brake control module will request the instrument cluster to turn the traction control off indicator ON to notify the driver of the deactivation. 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 traction control and the electronic stability control. The electronic brake control module will request the instrument cluster to turn the traction control off indicator and the stability control off indicator ON to notify the driver of the deactivation.

Reference Information

Schematic Reference

[Antilock Brake System Schematics \(Buick\)](#)[Antilock Brake System Schematics \(Chevrolet\)](#)

Connector End View Reference

[COMPONENT CONNECTOR END VIEWS - INDEX \(ENCORE\)](#) [COMPONENT CONNECTOR END VIEWS - INDEX \(TRAX\)](#)

Description and Operation

[ABS Description and Operation](#)

Electrical Information Reference

- [Circuit Testing](#)
- [Connector Repairs](#)
- [Testing for Intermittent Conditions and Poor Connections](#)
- [Wiring Repairs](#)

Scan Tool Reference

[Control Module References](#) for scan tool information.

Circuit/System Verification

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

Replace the P16 Instrument Cluster.

- **If all indicators turns On and Off**

3. Verify the scan tool Body 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 min for all vehicle systems to power down.

2. Test for less than 10 Ω between the ground circuit terminal 7 and ground.

- **If 10 Ω or greater**

1. Ignition OFF

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 Traction Control Switch parameter is Inactive.

- **If not Inactive**

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

2. Test for infinite resistance between the signal circuit terminal 14 and ground.

- If less than infinite resistance, repair the short to ground on the circuit.
- If infinite resistance, replace the K9 Body Control Module.

- **If Inactive**

5. Install a 3 A fused jumper wire between the signal circuit terminal 9 and the ground circuit terminal 7.

6. Verify the scan tool Traction Control Switch parameter is Active.

- **If not Active**

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

2. Test for less than 1 V between the signal circuit and ground.

- If 1 V or greater, repair the short to voltage on the circuit.
- If less than 1 V

3. Test for less than 2 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 9 and the ground terminal 7 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 9 and the ground terminal 7 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](#) after completing the repair.

- [Vehicle Stability Control System Switch Replacement \(Buick\)](#)[Vehicle Stability Control System Switch Replacement \(Chevrolet\)](#)
- [Control Module References](#) for Body Control Module, Electronic Brake Control Module or Instrument Cluster replacement, programming and setup

TRACTION CONTROL/STABILITY CONTROL INDICATOR MALFUNCTION (WITH C60/C41)

Diagnostic Instructions

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

Diagnostic Fault Information

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Signal	B2745 02, B2745 71	1	1	B2745 71
Ground	-	1	-	-
1. Traction control inoperative				

Circuit/System Description

The instrument cluster illuminates the traction/stability control 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. The electronic brake control module will request the instrument cluster to turn the traction control off indicator ON to notify the driver of the deactivation. 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 traction control and the electronic stability control. The electronic brake control module will request the instrument cluster to turn the traction control off indicator and the stability control off indicator ON to notify the driver of the deactivation.

Reference Information

Schematic Reference

[Antilock Brake System Schematics \(Buick\)](#)[Antilock Brake System Schematics \(Chevrolet\)](#)

Connector End View Reference

Description and Operation

ABS Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Control Module References for scan tool information.

Circuit/System Verification

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

Replace the P16 Instrument Cluster.
 - **If all indicators 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 S75 Traction Control Switch. 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 terminal 1 and ground.
 - **If 10 Ω or greater**
 1. Ignition OFF
 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 Traction Control Switch parameter is Inactive.
 - **If not Inactive**
 1. Ignition OFF, disconnect the X2 harness connector at the K9 Body Control Module.
 2. Test for infinite resistance between the signal circuit terminal 14 and ground.

- If less than infinite resistance, repair the short to ground on the circuit.
 - If infinite resistance, replace the K9 Body Control Module.
 - **If Inactive**
5. Install a 3 A fused jumper wire between the signal circuit terminal 4 and the ground circuit terminal 1.
 6. Verify the scan tool Traction Control Switch parameter is Active.
 - **If not Active**
 1. Ignition OFF, disconnect the X2 harness connector at the K9 Body Control Module, ignition ON.
 2. Test for less than 1 V between the signal circuit and ground.
 - If 1 V or greater, repair the short to voltage on the circuit.
 - If less than 1 V
 3. Test for less than 2 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 S75 Traction Control Switch.

Component Testing

1. Ignition OFF, disconnect the harness connector at the S75 Traction Control Switch.
2. Test for infinite resistance between the signal terminal 4 and the ground terminal 1 with the switch in the open position.
 - **If less than infinite resistance**
Replace the S75 Traction Control Switch.
 - **If infinite resistance**
3. Test for less than 2 Ω between the signal circuit terminal 4 and the ground terminal 1 with the switch in the closed position.
 - **If 2 Ω or greater**
Replace the S75 Traction Control Switch.
 - **If less than 2 Ω**
4. All OK.

Repair Instructions

Perform the [Diagnostic Repair Verification](#) after completing the repair.

- [Vehicle Stability Control System Switch Replacement \(Buick\)](#)[Vehicle Stability Control System Switch Replacement \(Chevrolet\)](#)
- [Control Module References](#) for Body Control Module, Electronic Brake Control Module or Instrument Cluster replacement, programming and setup

REPAIR INSTRUCTIONS

CONNECTOR RECONNECTION - WHEEL SPEED SENSOR

Special Tools

EL-35616 Terminal Test Probe Kit

For equivalent regional tools, refer to [Special Tools](#) .

When the condition is not currently present, but is indicated in DTC history, the cause may be intermittent. An intermittent may also be the cause when there is a customer complaint, but the symptom

cannot be duplicated. Refer to the Symptom Table of the system that is suspect of causing the condition before trying to locate an intermittent condition.

Most intermittent conditions are caused by faulty electrical connections or wiring. Inspect for the following items:

- Loose, corroded, or painted terminal stud/fastener
- Wiring broken inside the insulation
- Poor connection between the male and female terminal at a connector
- A terminal not seated all the way into the connector body
- Poor terminal to wire connection - Some conditions which fall under this description are poor crimps, poor solder joints, crimping over the wire insulation rather than the wire itself, and corrosion in the wire to terminal contact area, etc.
- Pierced or damaged insulation can allow moisture to enter the wiring causing corrosion. The conductor can corrode inside the insulation, with little visible evidence. Look for swollen and stiff sections of wire in the suspect circuits.
- Wiring which has been pinched, cut, or its insulation rubbed through may cause an intermittent open or short as the bare area touches other wiring or parts of the vehicle.
- Wiring that comes in contact with hot or exhaust components
- Refer to [**Inducing Intermittent Fault Conditions**](#) in order to duplicate the conditions required, in order to verify the customer concern.
- Refer to [**Testing for Electrical Intermittents**](#) for test procedures to detect intermittent open, high resistance, short to ground, and short to voltage conditions.
- Refer to [**Scan Tool Snapshot Procedure**](#) for advanced intermittent diagnosis and Vehicle Data Recorder operation.

Testing for Terminal Fretting

Some intermittent conditions can be caused by wire terminal fretting corrosion. Fretting corrosion is a build-up of insulating, oxidized wear debris that can form when there is a small motion between electrical contacts. The oxidized wear debris can pile up enough at the electrical contact spots that the electrical resistance across the connection increases. Movement between the contacting surfaces as small as 10 to 100 microns can cause fretting. To put this in perspective, a sheet of paper is about 100 microns thick, so fretting motion is small and hard to see. Vibration and thermal expansion/contraction are the main sources that create fretting motion. Since vehicles vibrate and can experience large temperature swings, they are a good source for fretting motion. Tin, copper, nickel, and iron surfaces are all susceptible to fretting corrosion. Fretting corrosion can be difficult to see but it looks like small, dark smudges on the terminals contact surface.

To correct a fretting condition disconnect the suspect connector and add dielectric grease / lubricant (Nyogel 760G or equivalent, meeting GM specification 9986087) to both sides of the connector terminals. Then reconnect the connector and wipe away any excess lubricant. This will correct the additional terminal contact resistance due to the terminal fretting corrosion.

Testing for Proper Terminal Contact

It is important to test terminal contact at the component and any inline connectors before replacing a suspect component. Mating terminals must be inspected to ensure good terminal contact. A poor connection between the male and female terminal at a connector may be the result of contamination or deformation.

Contamination may be caused by the connector halves being improperly connected. A missing or damaged connector seal, damage to the connector itself, or exposing the terminals to moisture and dirt can also cause contamination. Contamination, usually in the underhood or underbody connectors, leads to terminal corrosion, causing an open circuit or intermittently open circuit.

Deformation is caused by probing the mating side of a connector terminal without the proper adapter. Always use the **EL-35616** kit when probing connectors. Other causes of terminal deformation are improperly joining the connector halves, or repeatedly separating and joining the connector halves.

Deformation, usually to the female terminal contact tang, can result in poor terminal contact causing an open or intermittently open circuit.

Testing for Proper Terminal Contact in Bussed Electrical Centers

It is very important to use the correct test adapter when testing for proper terminal contact of fuses and relays in a bussed electrical center. Use the **EL-35616** kit to test for proper terminal contact. Failure to use the **EL-35616** kit can result in improper diagnosis of the bussed electrical center.

Follow the procedure below in order to test terminal contact:

1. Separate the connector halves.
2. Visually inspect the connector halves for contamination. Contamination may result in a white or green build-up within the connector body or between terminals. This causes high terminal resistance, intermittent contact, or an open circuit. An underhood or underbody connector that shows signs of contamination should be replaced in its entirety: terminals, seals, and connector body.
3. Using an equivalent male terminal/terminated lead, verify that the retention force is significantly different between a known good terminal and the suspect terminal. Replace the female terminal in question.

Flat Wire Connectors

There are no serviceable parts for flat wire connectors on the harness side or the component side.

Follow the procedure below in order to test terminal contact:

1. Remove the component in question.
2. Visually inspect each side of the connector for signs of contamination. Avoid touching either side of the connector as oil from your skin may be a source of contamination as well.
3. Visually inspect the terminal bearing surfaces of the flat wire circuits for splits, cracks, or other imperfections that could cause poor terminal contact. Visually inspect the component side connector to ensure that all of the terminals are uniform and free of damage or deformation.
4. Insert the appropriate adapter into the flat wire harness connector in order to test the circuit in question.

Control Module/Component Voltage and Grounds

Poor voltage or ground connections can cause widely varying symptoms.

- Test all control module voltage supply circuits. Many vehicles have multiple circuits supplying voltage to a control module. Other components in the system may have separate voltage supply circuits that may also need to be tested. Inspect connections at the module/component connectors, fuses, and any intermediate connections between the voltage source and the module/component. A test lamp or a DMM may indicate that voltage is present, but neither tests the ability of the circuit to carry sufficient current. Operate the component to test the ability of the circuit to carry sufficient current. Refer to [Circuit Testing](#) , and [Power Distribution Schematics \(Buick\)](#) [Power Distribution Schematics \(Chevrolet\)](#) .
- Test all control module ground and system ground circuits. The control module may have multiple ground circuits. Other components in the system may have separate grounds that may also need to be tested. Inspect grounds for clean and tight connections at the grounding point (screw or stud). Inspect the connections at the component and in splice packs, where applicable. Operate the component to test the ability of the circuit to carry sufficient current. Refer to [Circuit Testing](#) , and [Ground Distribution Schematics \(Buick\)](#) [Ground Distribution Schematics \(Chevrolet\)](#) .

Temperature Sensitivity

- An intermittent condition may occur when a component/connection reaches normal operating temperature. The condition may occur only when the component/connection is cold, or only when the component/connection is hot.
- Freeze Frame, Failure Records, Snapshot, or Vehicle Data Recorder data may help with this type of intermittent condition, where applicable.

- If the intermittent is related to heat, review the data for a relationship with the following:
 - High ambient temperatures
 - Underhood/engine generated heat
 - Circuit generated heat due to a poor connection, or high electrical load
 - Higher than normal load conditions, towing, etc.
- If the intermittent is related to cold, review the data for the following:
 - Low ambient temperatures - In extremely low temperatures, ice may form in a connection or component. Inspect for water intrusion.
 - The condition only occurs on a cold start.
 - The condition goes away when the vehicle warms up.
- Information from the customer may help to determine if the trouble follows a pattern that is temperature related.
- If temperature is suspected of causing an intermittent fault condition, attempt to duplicate the condition. Refer to [Inducing Intermittent Fault Conditions](#) in order to duplicate the conditions required.

Electromagnetic Interference and Electrical Noise

Some electrical components/circuits are sensitive to electromagnetic interference or other types of electrical noise. Inspect for the following conditions:

- A mis-routed harness that is too close to high voltage/high current devices such as secondary ignition components, motors, generator etc. - These components may induce electrical noise on a circuit that could interfere with normal circuit operation.
- Electrical system interference caused by a malfunctioning relay, or a control module driven solenoid or switch - These conditions can cause a sharp electrical surge. Normally, the condition will occur when the malfunctioning component is operating.
- Installation of non-factory or aftermarket add on accessories such as lights, 2-way radios, amplifiers, electric motors, remote starters, alarm systems, cell phones, etc. - These accessories may create interference in other circuits while operating and the interference would disappear when the accessory is not operating. Refer to [Checking Aftermarket Accessories](#).
- Test for an open diode across the A/C compressor clutch and for other open diodes. Some relays may contain a clamping diode.
- The generator may be allowing AC noise into the electrical system.

Incorrect Control Module

- There are only a few situations where reprogramming a control module is appropriate:
 - A new service control module is installed.
 - A control module from another vehicle is installed.
 - Revised software/calibration files have been released for this vehicle.

NOTE: **DO NOT re-program the control module with the SAME software/calibration files that are already present in the control module. This is not an effective repair for any type of concern.**

- Verify that the control module contains the correct software/calibration. If incorrect programming is found, reprogram the control module with the most current software/calibration. Refer to [Control Module References](#) for replacement, setup, and programming.

ANTILOCK BRAKE SYSTEM AUTOMATED BLEED

WARNING: Refer to [Brake Fluid Irritant Warning](#).

CAUTION: Refer to [Brake Fluid Effects on Paint and Electrical Components Caution](#).

NOTE: Before performing the Antilock Brake System (ABS) Automated Bleed

Procedure, first perform a pressure bleed of the base brake system. Refer to [Hydraulic Brake System Bleeding \(Manual\)](#) [Hydraulic Brake System Bleeding \(Pressure\)](#) . The automated bleed procedure is recommended when one of the following conditions 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](#) .
2. Remove all four tire and wheel assemblies. Refer to [Tire and Wheel Removal and Installation](#) .
3. Inspect the brake system for leaks and visual damage. Refer to [Symptoms - Hydraulic Brakes](#) , repair or replace components as needed.
4. Lower the vehicle.
5. Inspect the battery state of charge. Refer to [Battery Inspection/Test](#) .
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](#) .
10. Following the directions given on the scan tool, pressure bleed the base brake system. Refer to [Hydraulic Brake System Bleeding \(Manual\)](#) [Hydraulic Brake System Bleeding \(Pressure\)](#) .
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](#) , and diagnose the appropriate DTC.
 - If the brake pedal feels spongy, perform the conventional brake bleed procedure again. Refer to [Hydraulic Brake System Bleeding \(Manual\)](#) [Hydraulic Brake System Bleeding \(Pressure\)](#) .
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](#) .
17. Inspect the brake fluid level. Refer to [Master Cylinder Reservoir Filling](#) .
18. Road test the vehicle while inspecting that the pedal remains high and firm.

STEERING ANGLE SENSOR REPLACEMENT

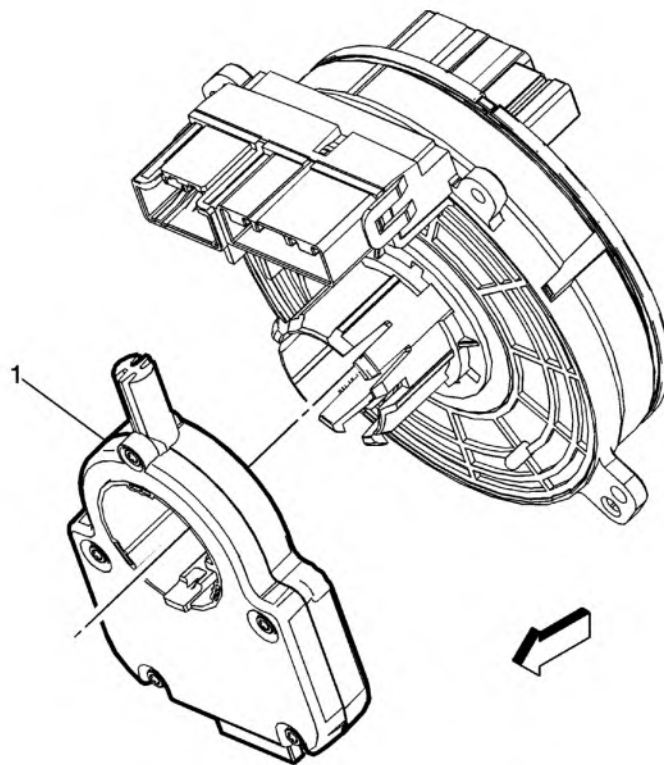


Fig. 7: View Of Steering Angle Sensor
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Steering Wheel Airbag Coil Replacement (Buick) , Steering Wheel Airbag Coil Replacement (Chevrolet, Without BTM) , Steering Wheel Airbag Coil Replacement (Chevrolet, With BTM)	
1	Steering Angle Sensor Procedure 1. Press in the retaining tabs on the steering wheel airbag coil and remove the steering angle sensor. 2. Center the steering angle sensor. Steering Wheel Angle Sensor Centering

STEERING WHEEL 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:

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

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.
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.
6. Follow the scan tool directions to complete the reset procedure.
7. Select Steering Wheel Angle Sensor Learn in the Steering Wheel Angle Sensor Module Functions 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](#) .

CAUTION: Refer to [Brake Fluid Effects on Paint and Electrical Components Caution](#) .

1. Remove the battery tray. [Battery Tray Replacement](#)
2. Without disconnecting the brake pipes, remove the electronic brake control module (EBCM) with the brake pressure modulator valve (BPMV) and bracket as an assembly. [Brake Pressure Modulator Valve Replacement](#)
3. Carefully position aside the assembly and secure with heavy mechanics wire.

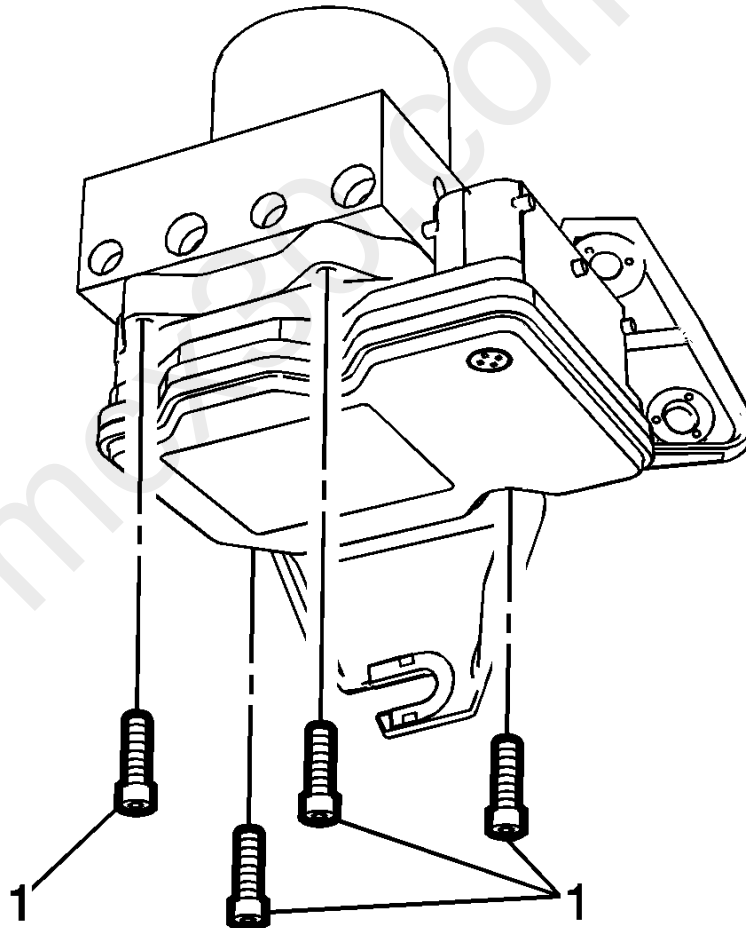


Fig. 8: EBCM Bolts

Courtesy of GENERAL MOTORS COMPANY

4. Remove the EBCM bolts (1),

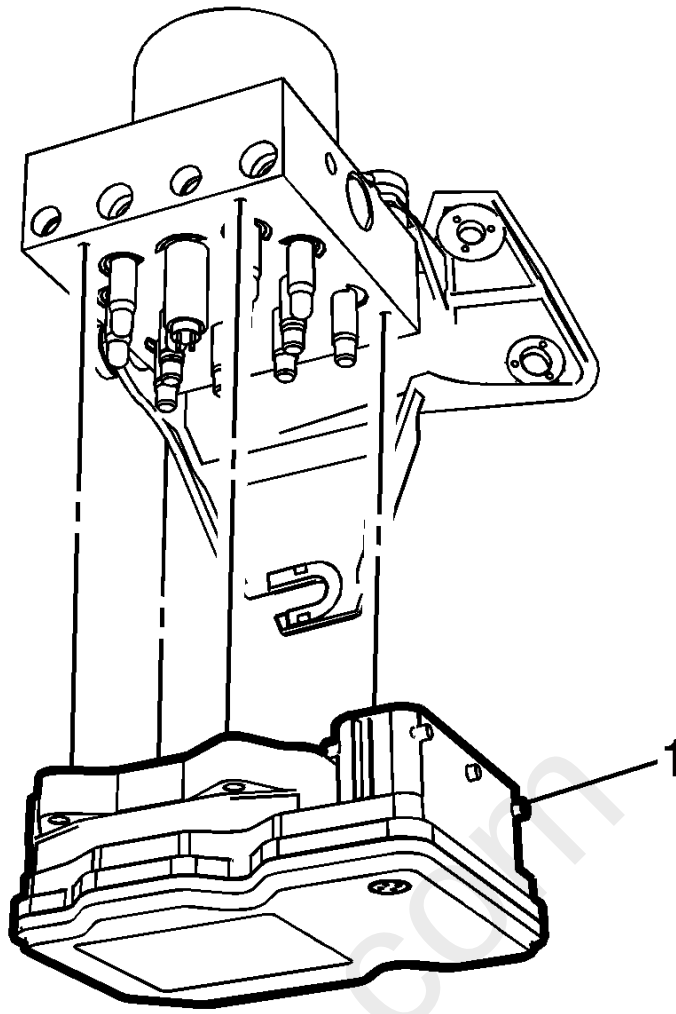


Fig. 9: Electronic Brake Control Module

Courtesy of GENERAL MOTORS COMPANY

NOTE: Do not pry the components apart.

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

Installation Procedure

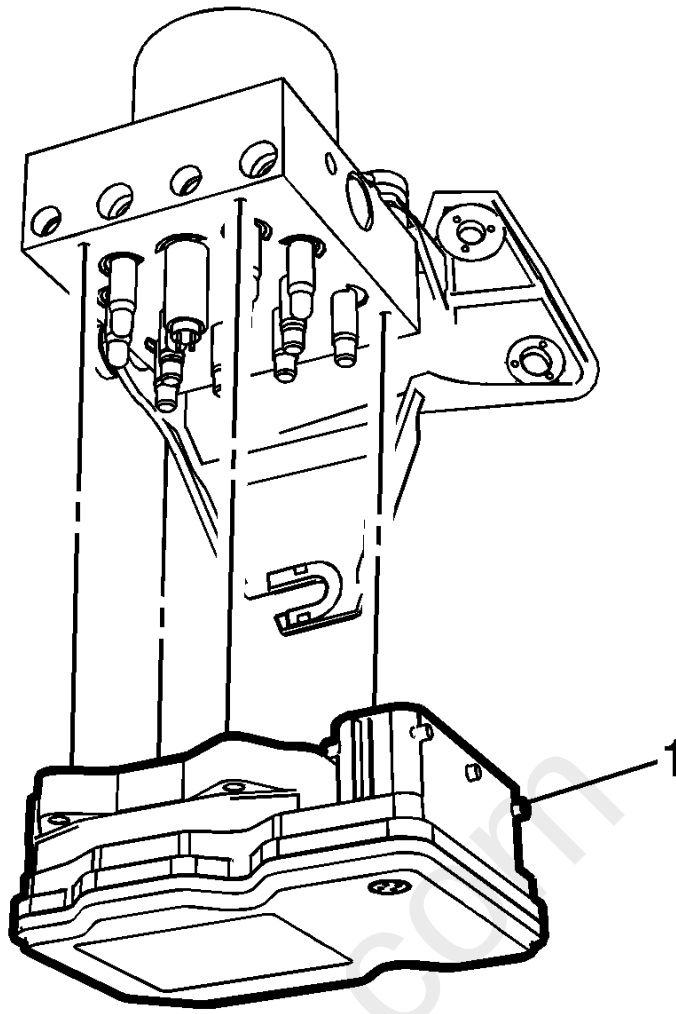


Fig. 10: Electronic Brake Control Module

Courtesy of GENERAL MOTORS COMPANY

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

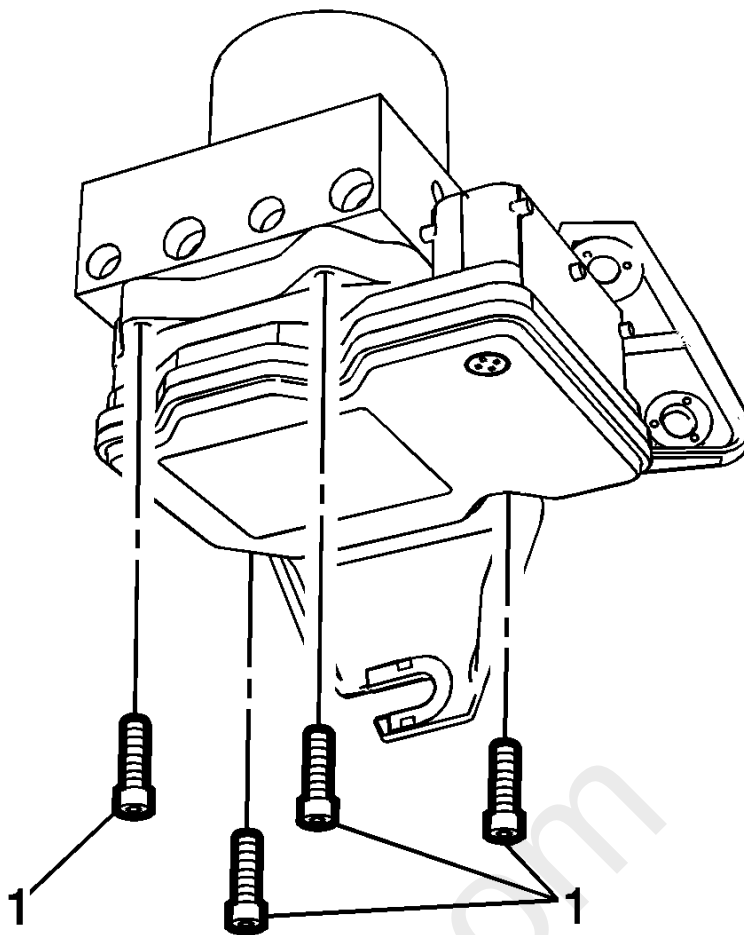


Fig. 11: EBCM Bolts

Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to [Fastener Caution](#) .

2. Install the EBCM bolts (1) and tighten to 3 N.m (26 lb in).
3. Install the BPMV with EBCM and bracket assembly. [Brake Pressure Modulator Valve Replacement](#)
4. Install the battery tray. [Battery Tray Replacement](#)
5. Program the EBCM. [Control Module References](#)

BRAKE PRESSURE MODULATOR VALVE REPLACEMENT

Removal Procedure

WARNING: Refer to [Brake Fluid Irritant Warning](#) .

CAUTION: Refer to [Brake Fluid Effects on Paint and Electrical Components Caution](#) .

CAUTION: 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](#) .

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 assembly of any accumulated dirt and debris.
4. Disconnect the EBCM electrical connector.

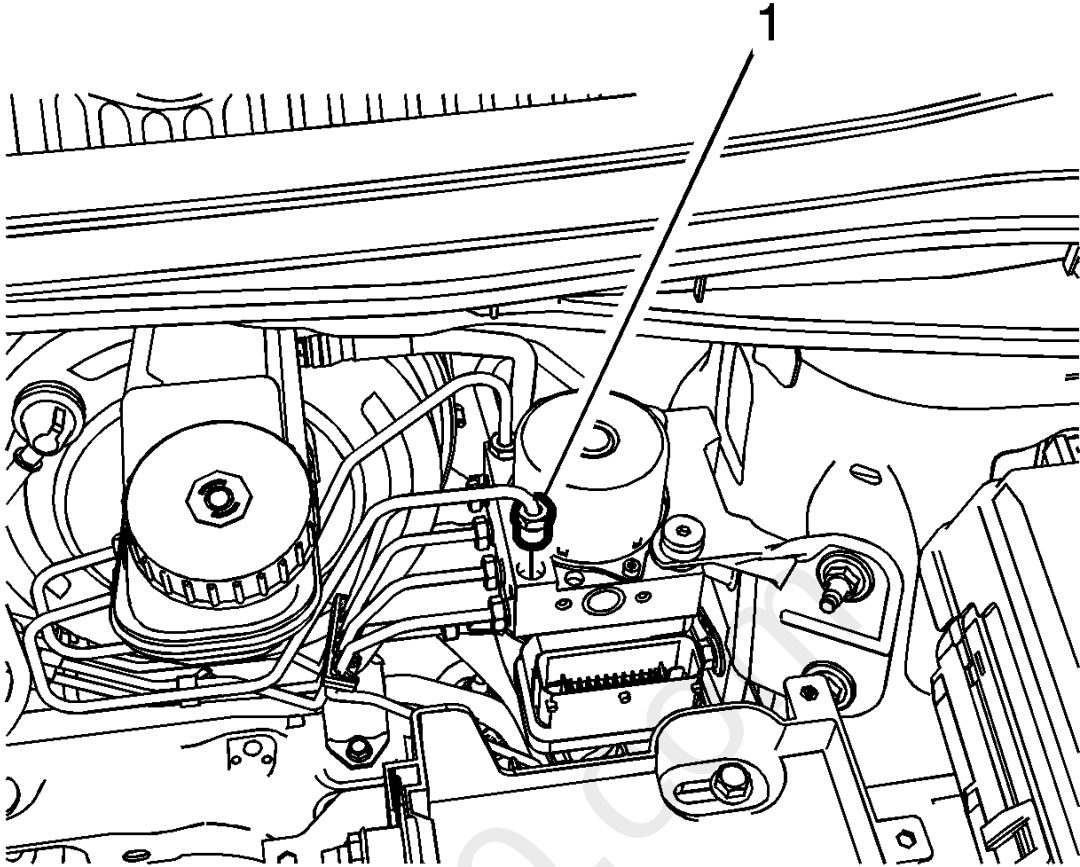


Fig. 12: Master Cylinder Secondary Brake Pipe Fitting
Courtesy of GENERAL MOTORS COMPANY

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.

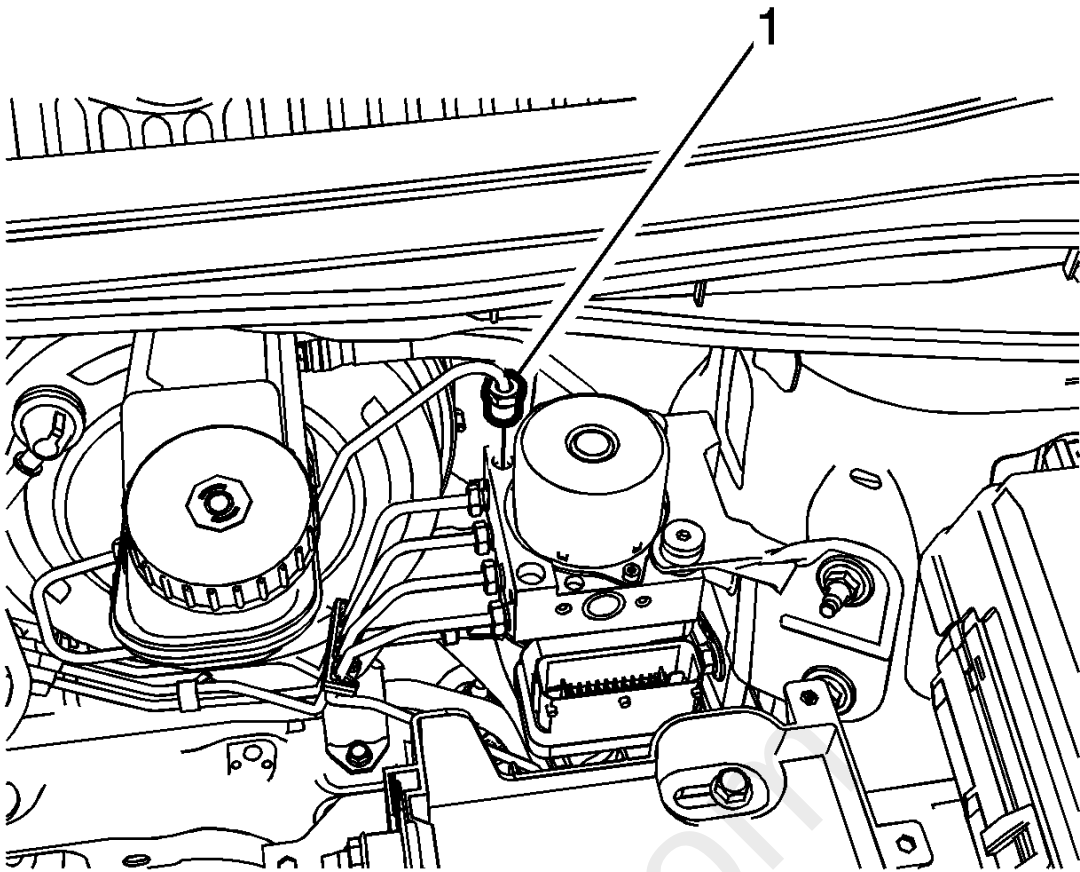


Fig. 13: Master Cylinder Primary Brake Pipe Fitting
Courtesy of GENERAL MOTORS COMPANY

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.

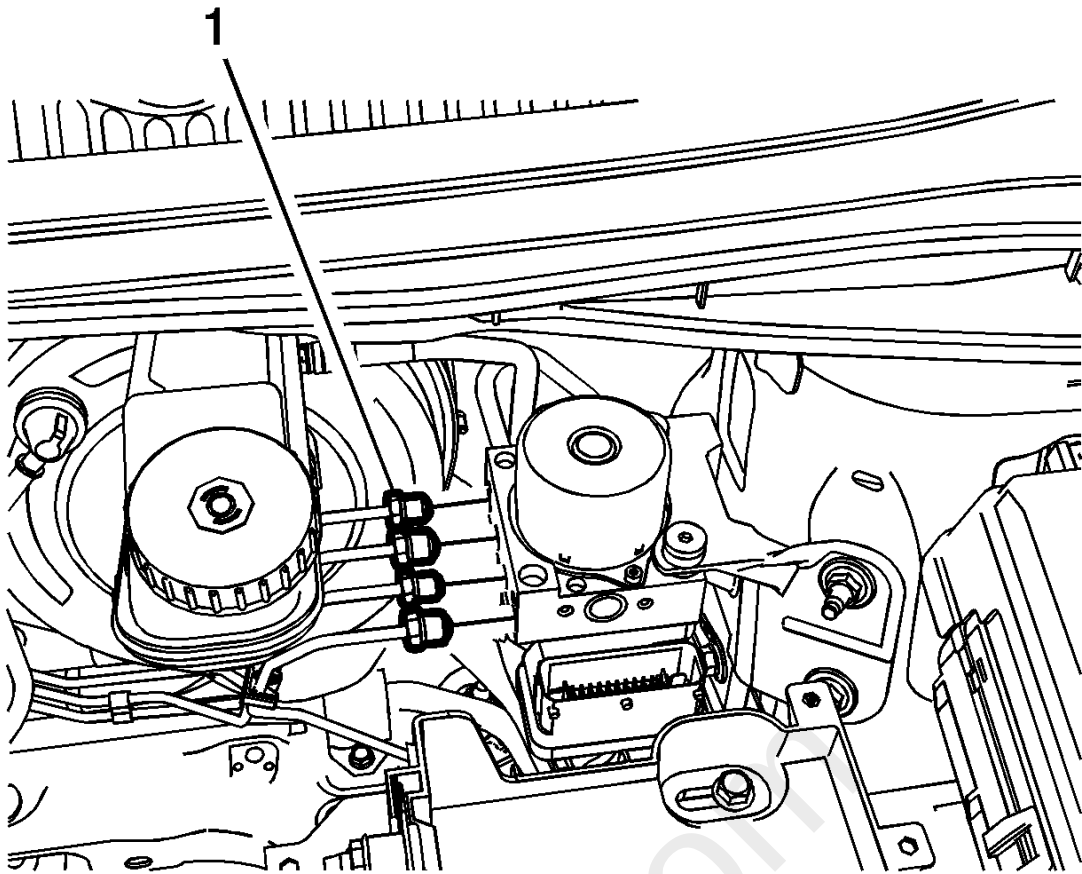


Fig. 14: Front & Rear Brake Pipe Fittings
Courtesy of GENERAL MOTORS COMPANY

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.

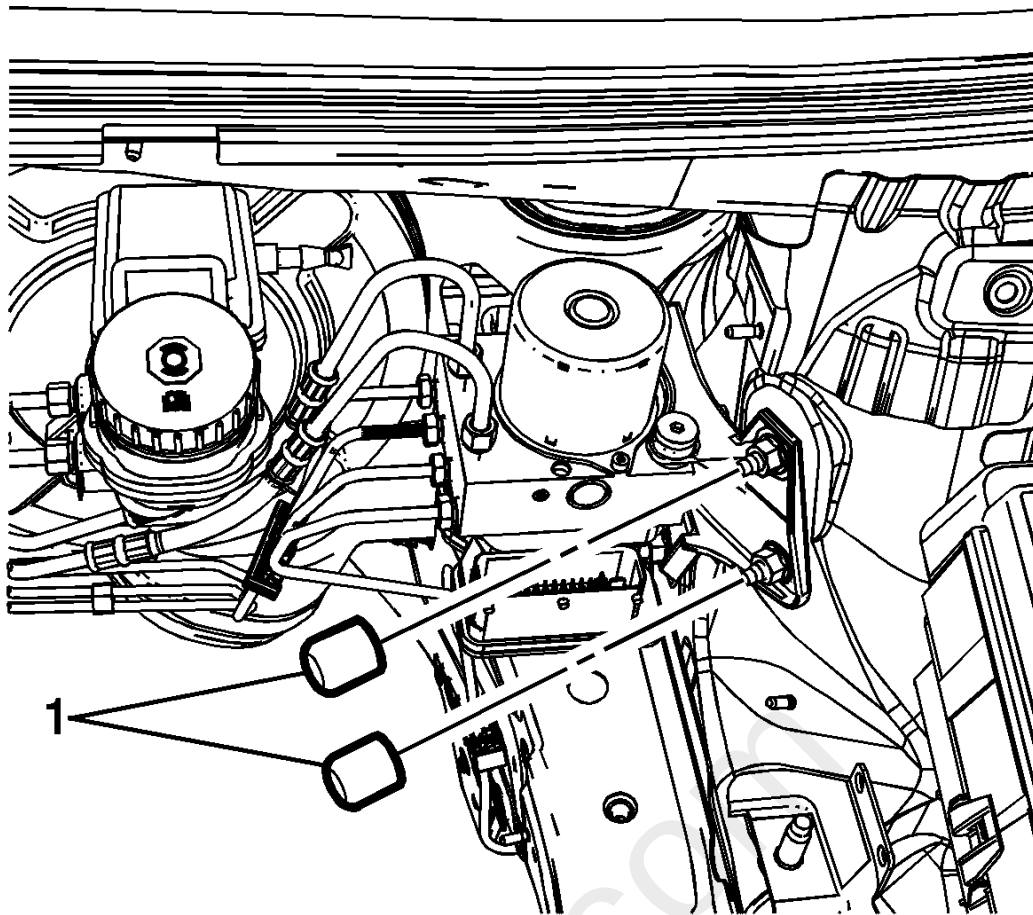


Fig. 15: BPMV Bracket Nut Protective Caps

Courtesy of GENERAL MOTORS COMPANY

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

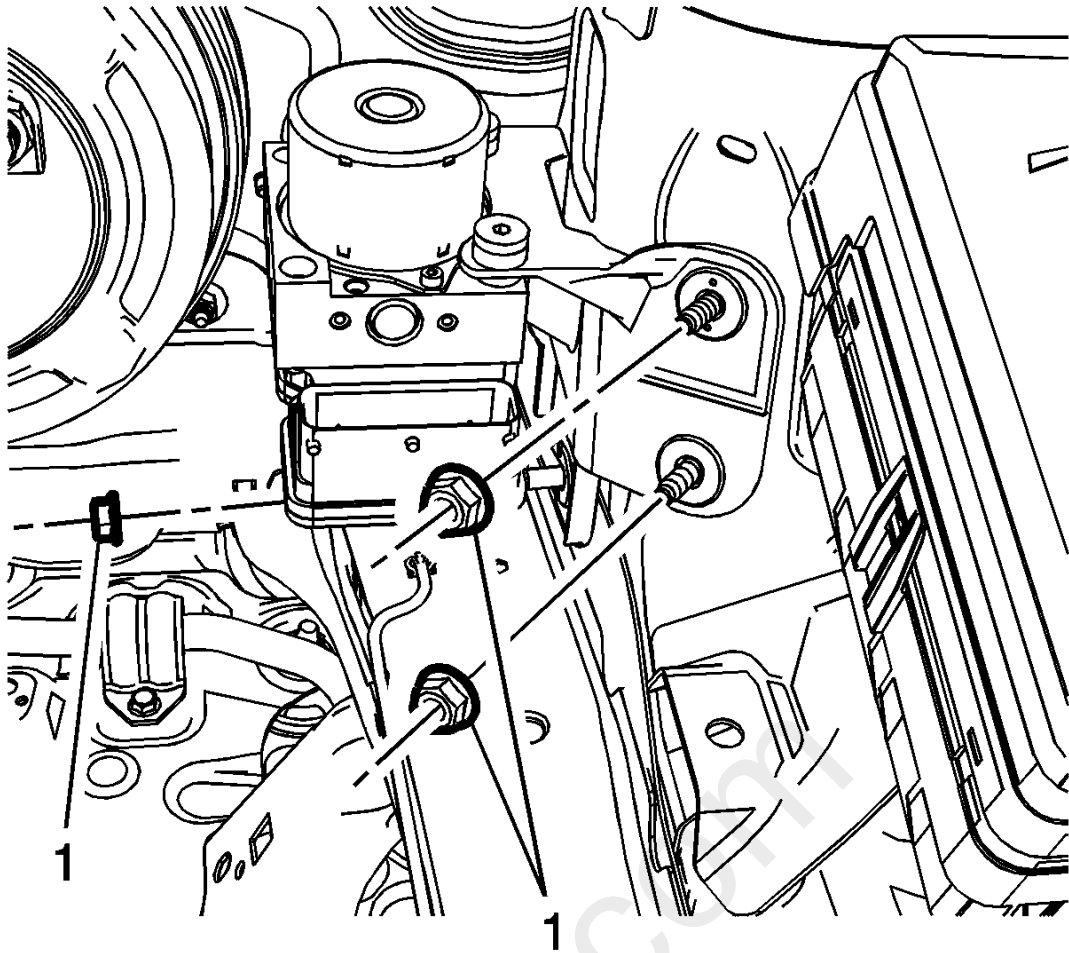


Fig. 16: Electronic Brake Control Module And Bracket Assembly Nuts
Courtesy of GENERAL MOTORS COMPANY

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

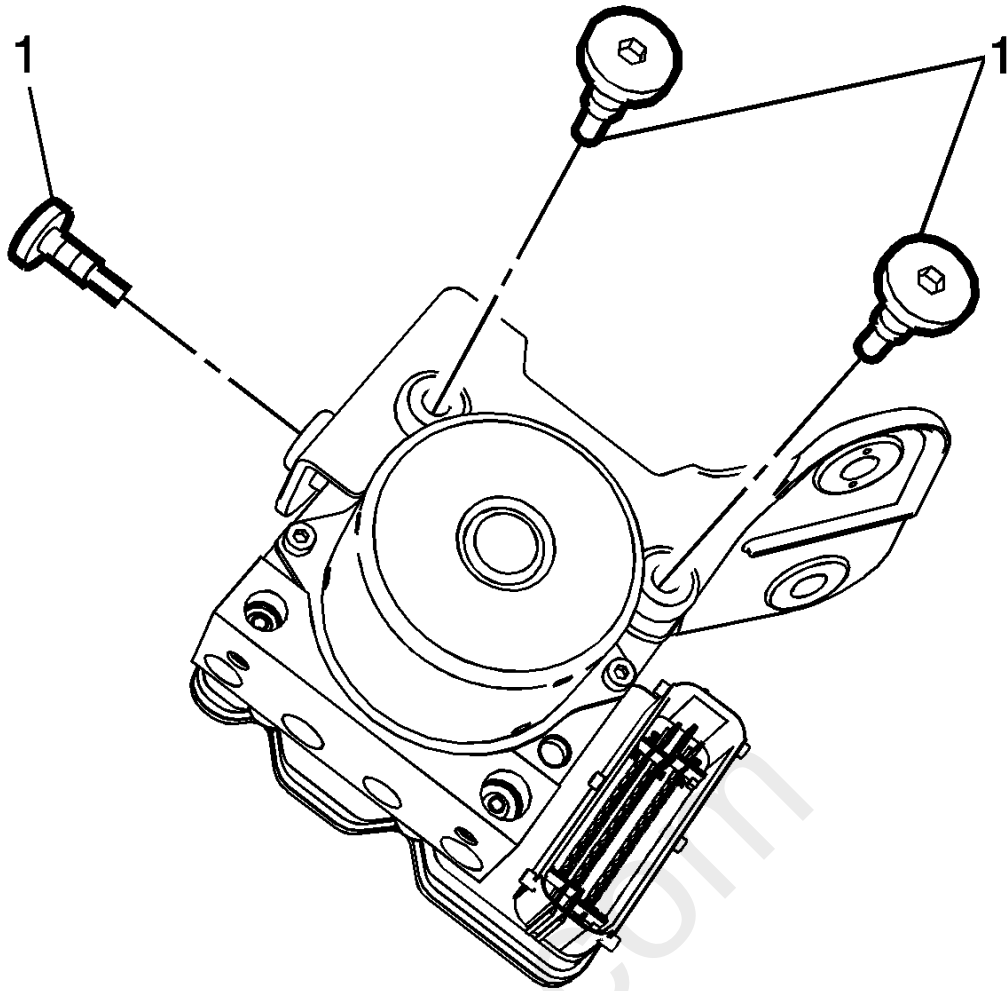


Fig. 17: Brake Pressure Modulator Valve Bolts
Courtesy of GENERAL MOTORS COMPANY

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](#).

Installation Procedure

1. If installing a new BPMV, install the EBCM. Refer to [Electronic Brake Control Module Replacement](#).
2. Install the BPMV bracket to the BPMV.

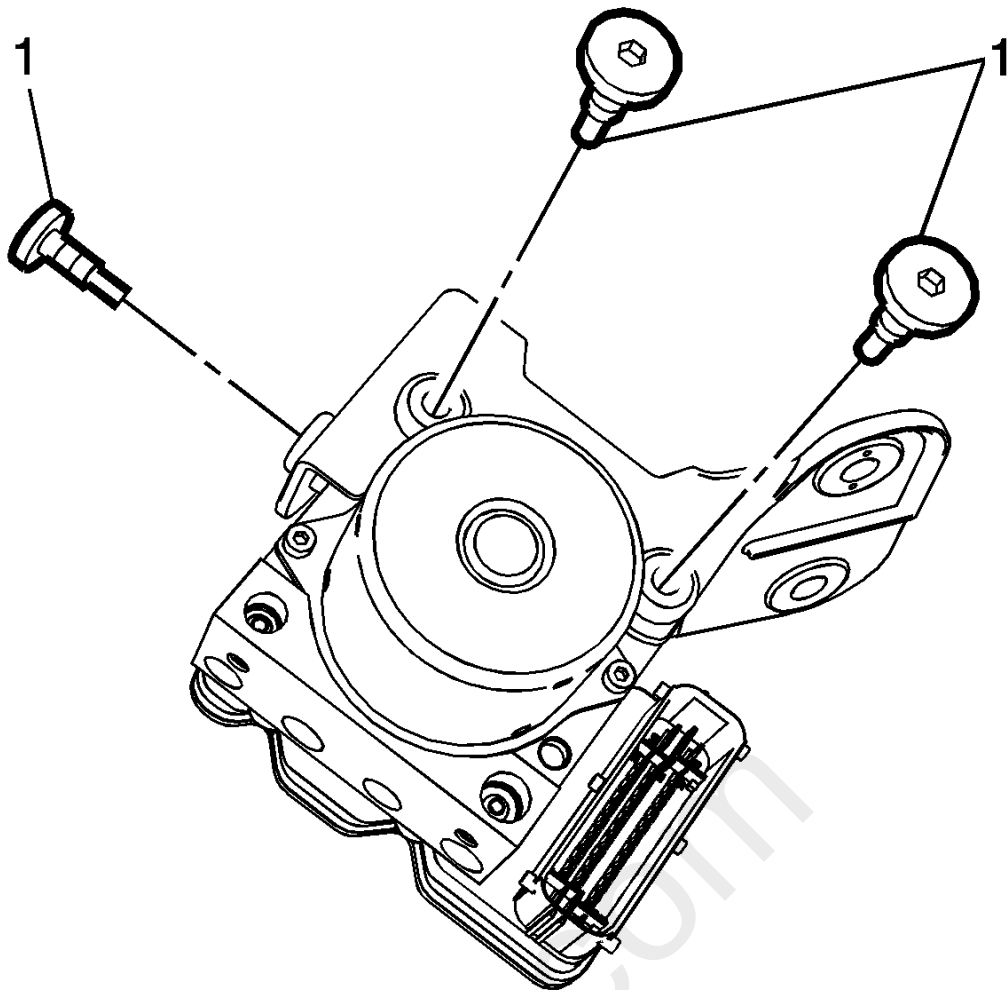


Fig. 18: Brake Pressure Modulator Valve Bolts
Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to [Fastener Caution](#) .

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

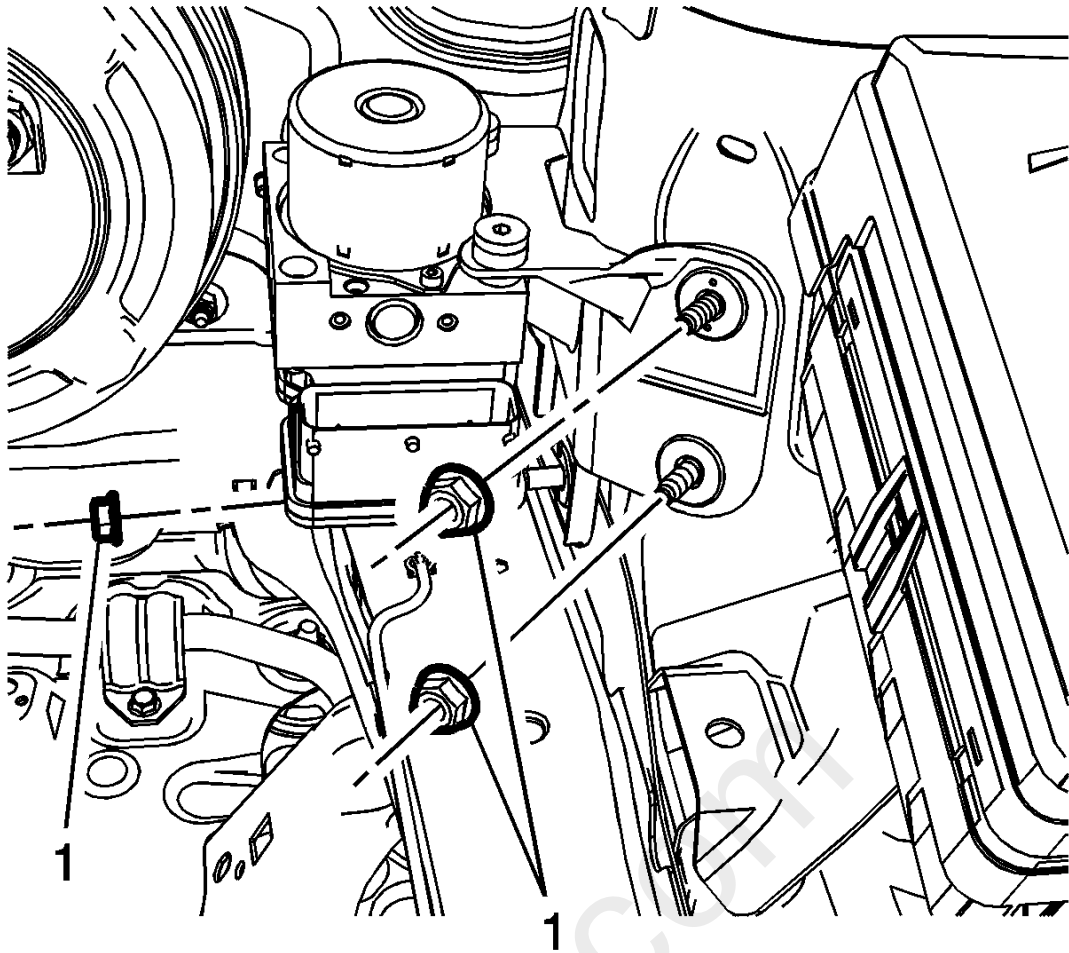


Fig. 19: Electronic Brake Control Module And Bracket Assembly Nuts
Courtesy of GENERAL MOTORS COMPANY

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

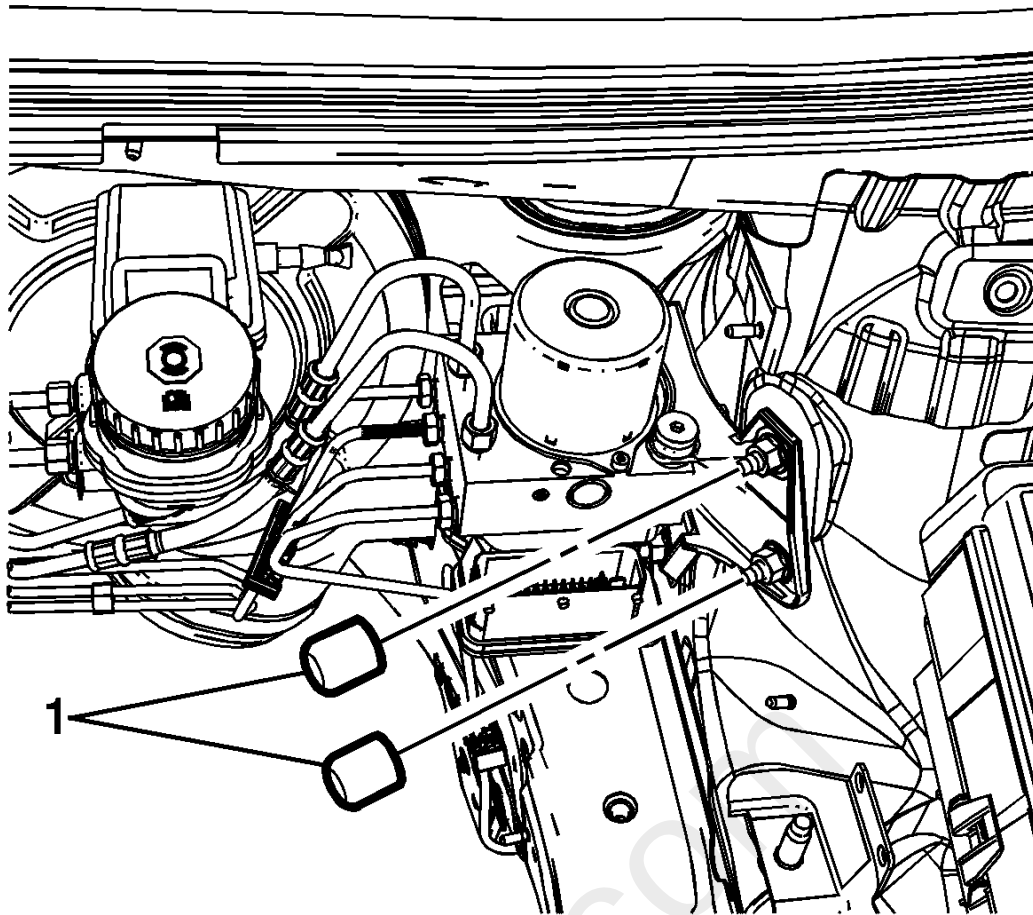


Fig. 20: BPMV Bracket Nut Protective Caps

Courtesy of GENERAL MOTORS COMPANY

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

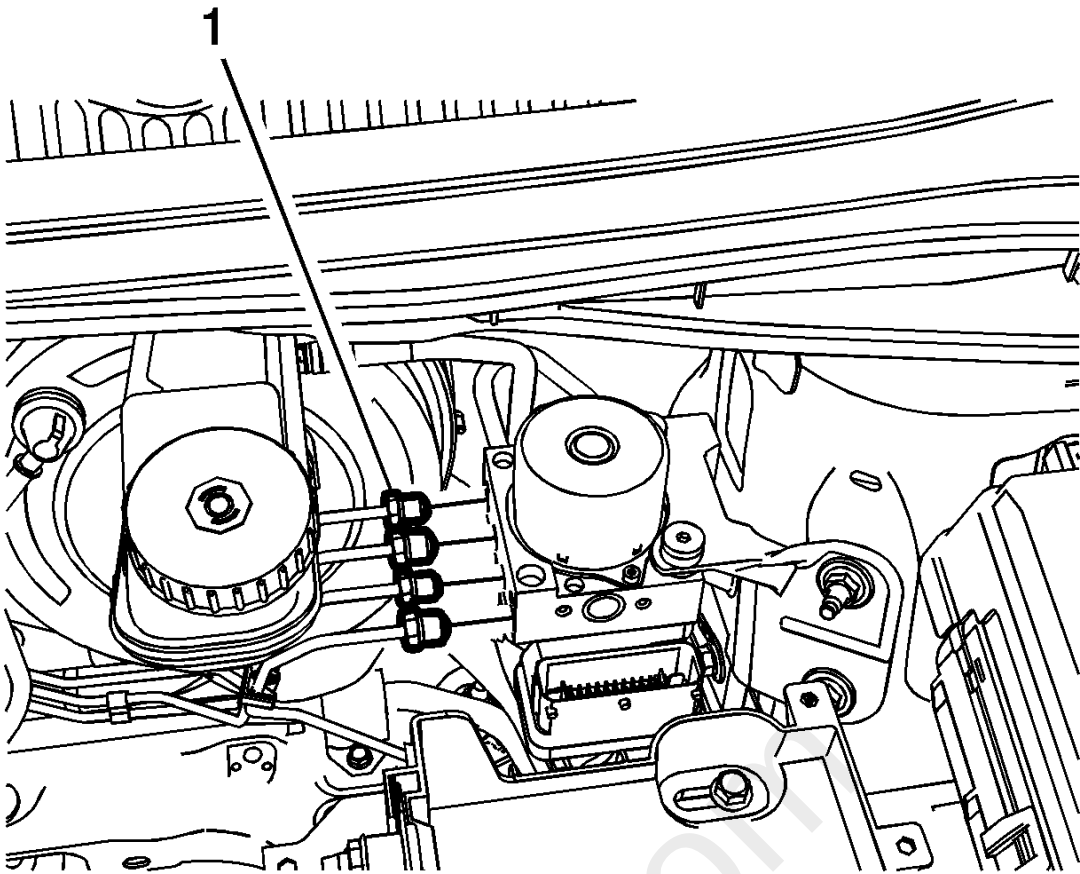


Fig. 21: Front & Rear Brake Pipe Fittings
Courtesy of GENERAL MOTORS COMPANY

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).

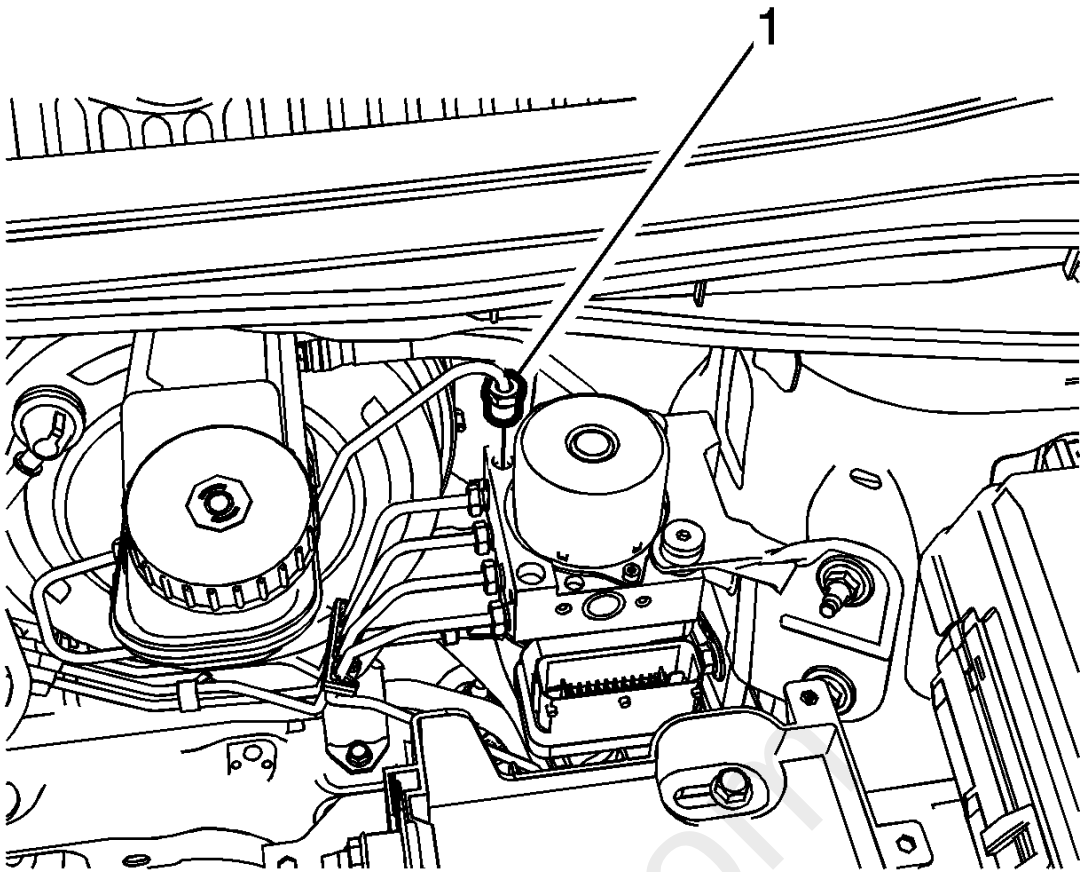


Fig. 22: Master Cylinder Primary Brake Pipe Fitting
Courtesy of GENERAL MOTORS COMPANY

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

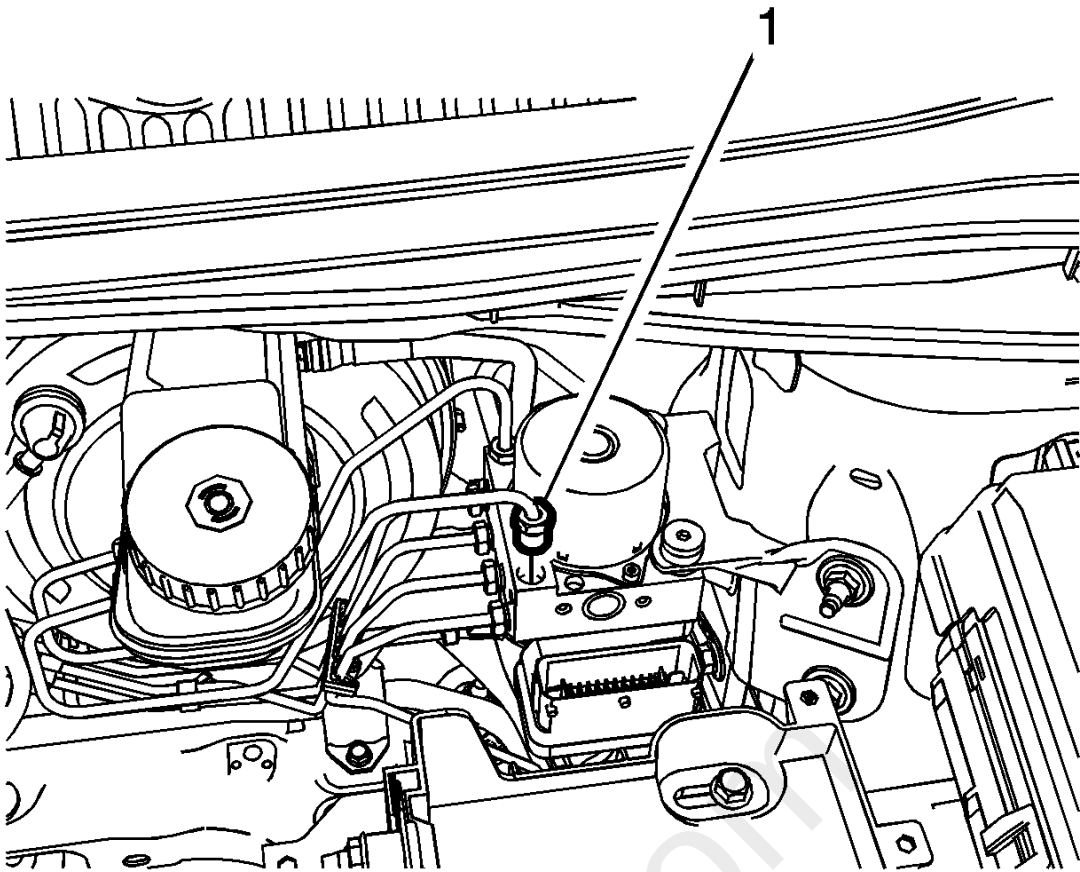


Fig. 23: Master Cylinder Secondary Brake Pipe Fitting
Courtesy of GENERAL MOTORS COMPANY

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](#) .
13. Bleed the hydraulic brake system. Refer to [Hydraulic Brake System Bleeding \(Manual\)](#) [Hydraulic Brake System Bleeding \(Pressure\)](#) .
14. Perform the [Diagnostic System Check - Vehicle](#) .
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](#).

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](#).

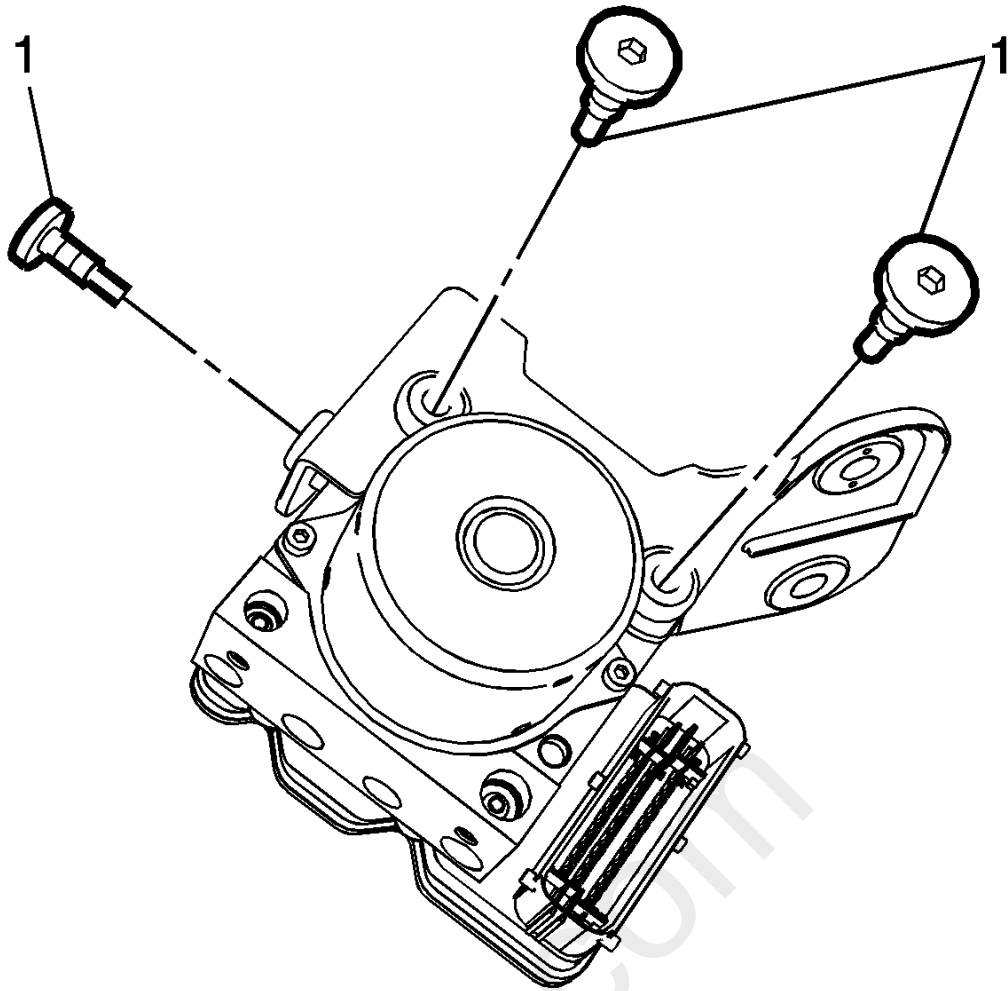


Fig. 24: Brake Pressure Modulator Valve Bolts
Courtesy of GENERAL MOTORS COMPANY

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

Installation Procedure

1. Install the BPMV bracket to the BPMV.

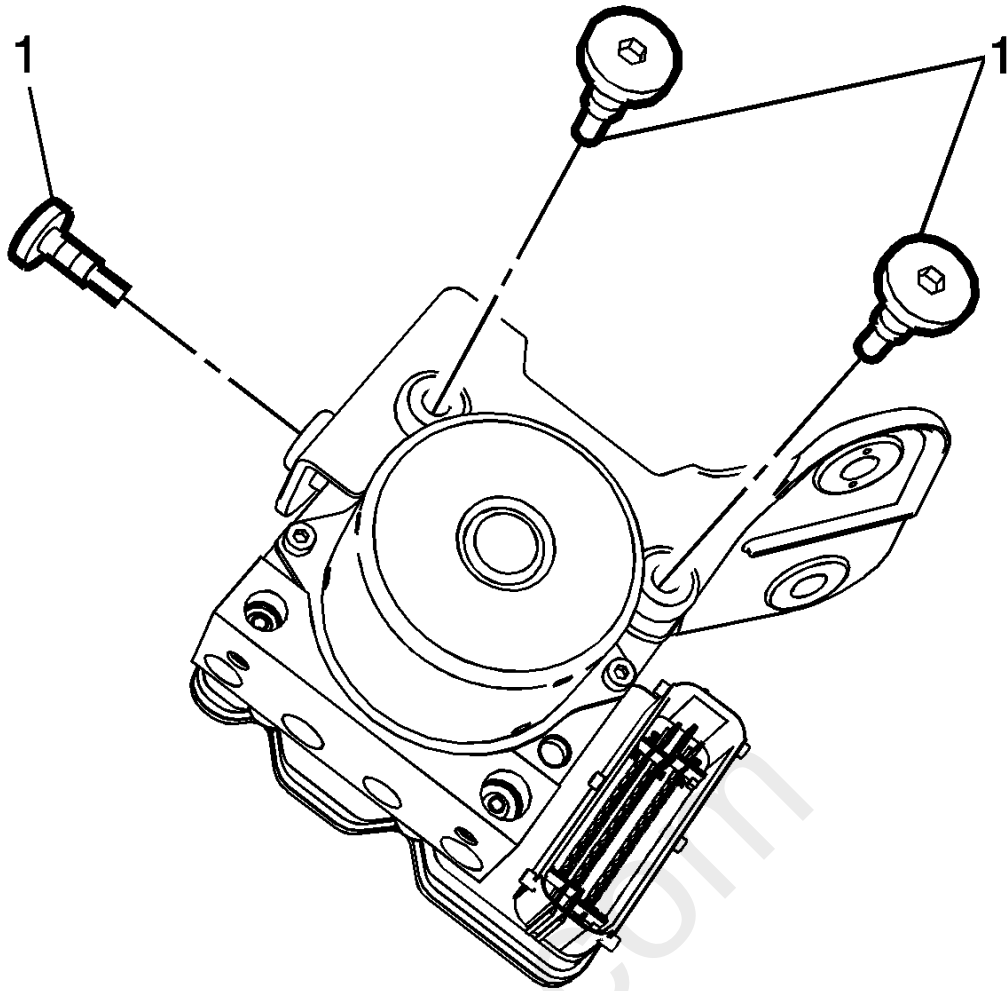


Fig. 25: Brake Pressure Modulator Valve Bolts
Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to [Fastener Caution](#) .

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](#).

FRONT WHEEL SPEED SENSOR REPLACEMENT

Removal Procedure

WARNING: Refer to [Brake Dust Warning](#) .

1. Raise and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#) .
2. Remove the tire and wheel assembly. Refer to [Tire and Wheel Removal and Installation](#) .
3. Clean the wheel speed sensor mounting area on the steering knuckle of any accumulated dirt and debris.

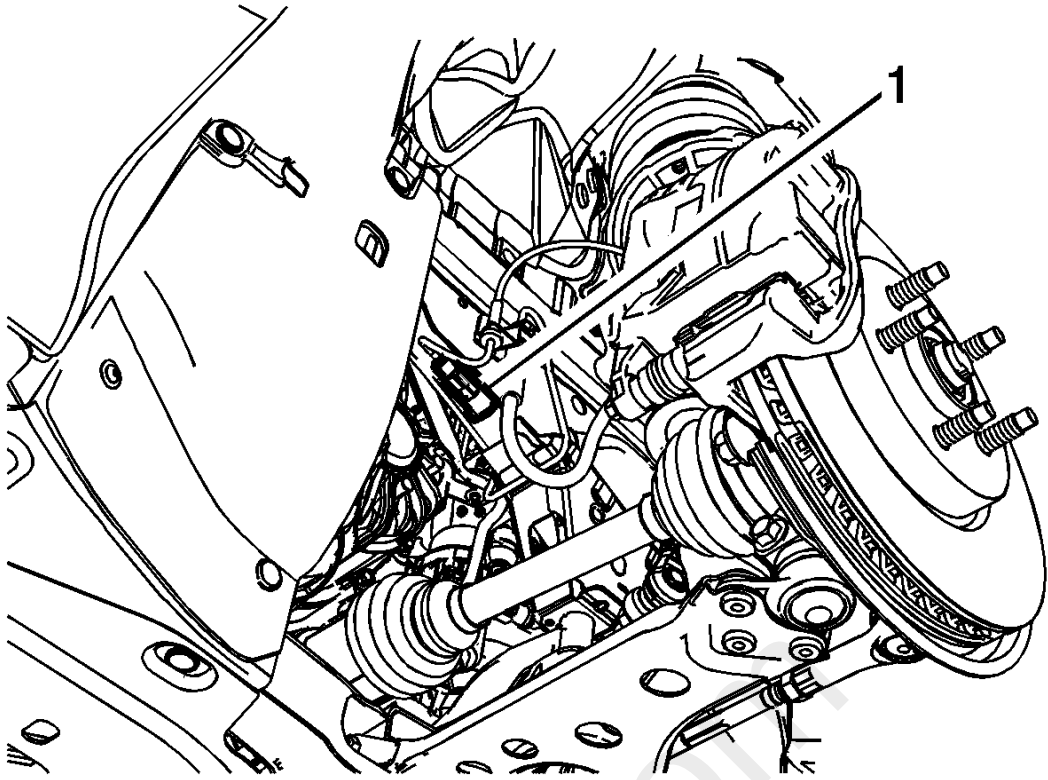


Fig. 26: Wheel Speed Sensor Electrical Connector

Courtesy of GENERAL MOTORS COMPANY

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

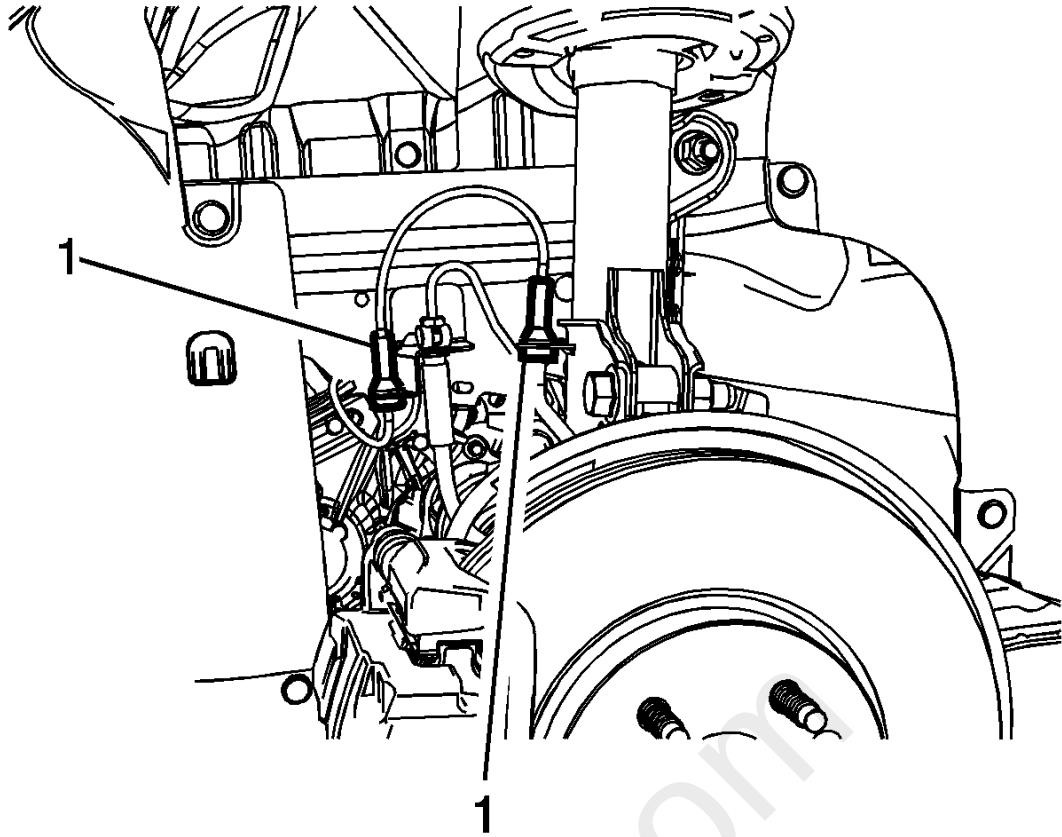


Fig. 27: Wheel Speed Sensor Harness Grommets
Courtesy of GENERAL MOTORS COMPANY

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

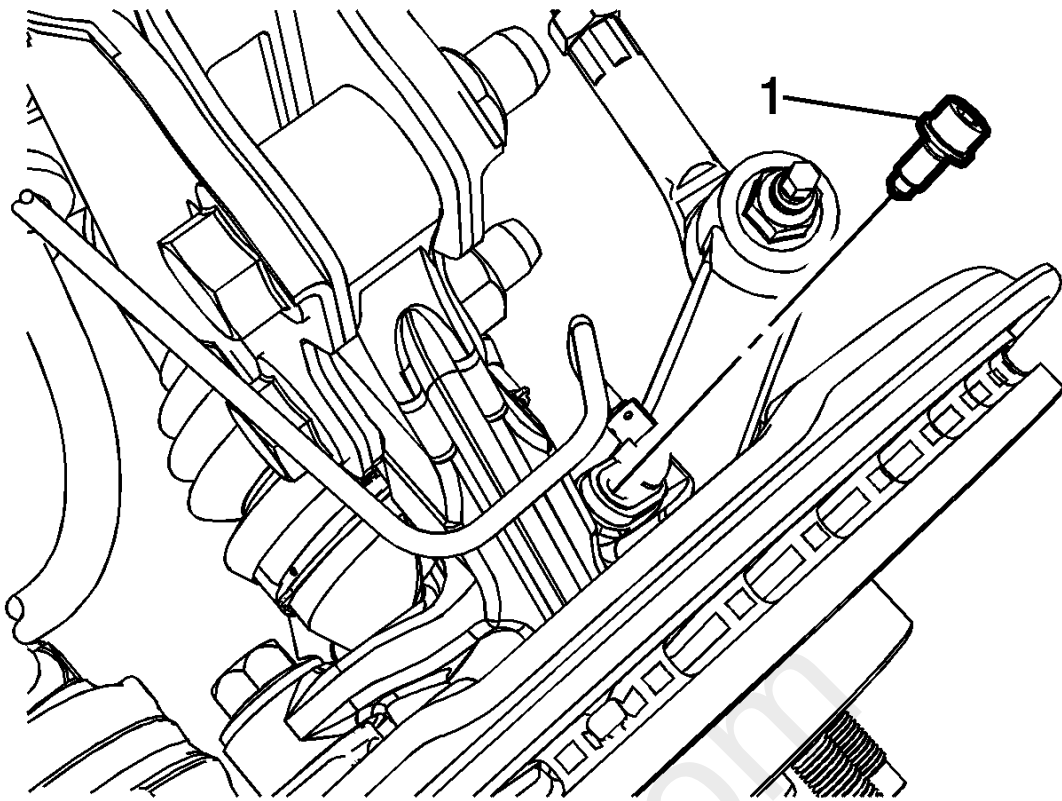


Fig. 28: Wheel Speed Sensor Bolt
Courtesy of GENERAL MOTORS COMPANY

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

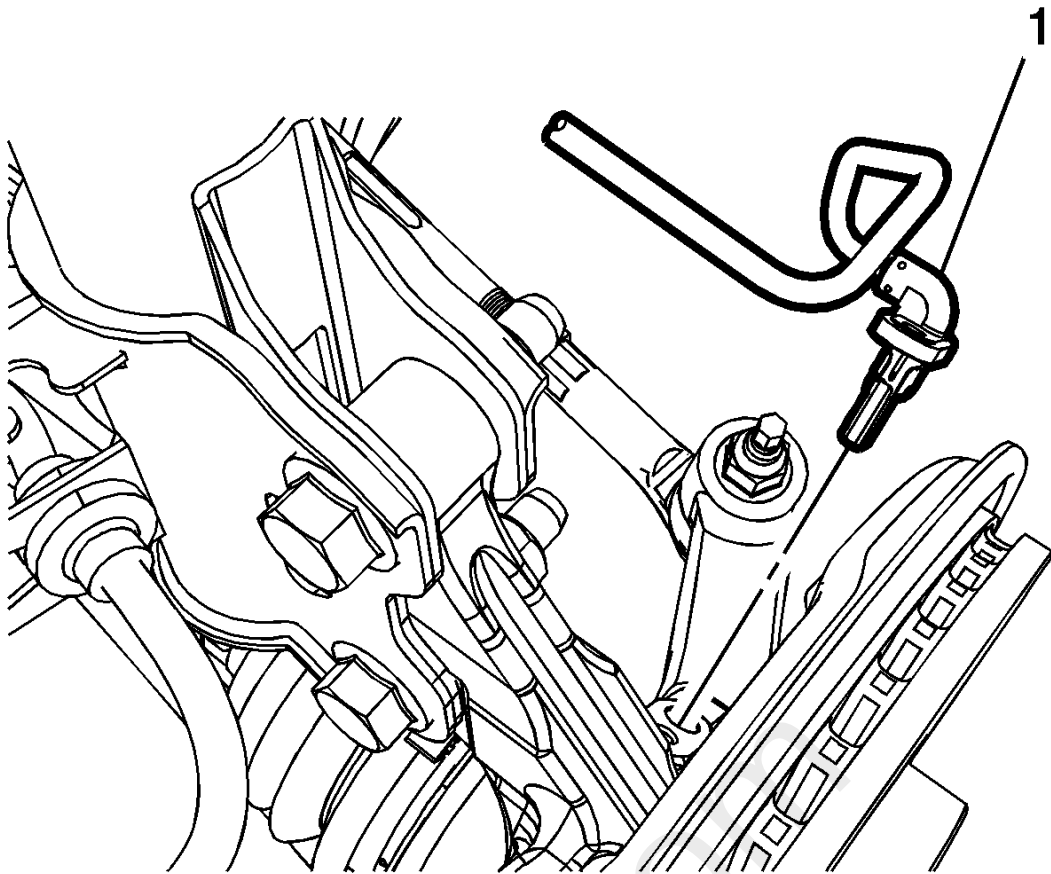


Fig. 29: Wheel Speed Sensor

Courtesy of GENERAL MOTORS COMPANY

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

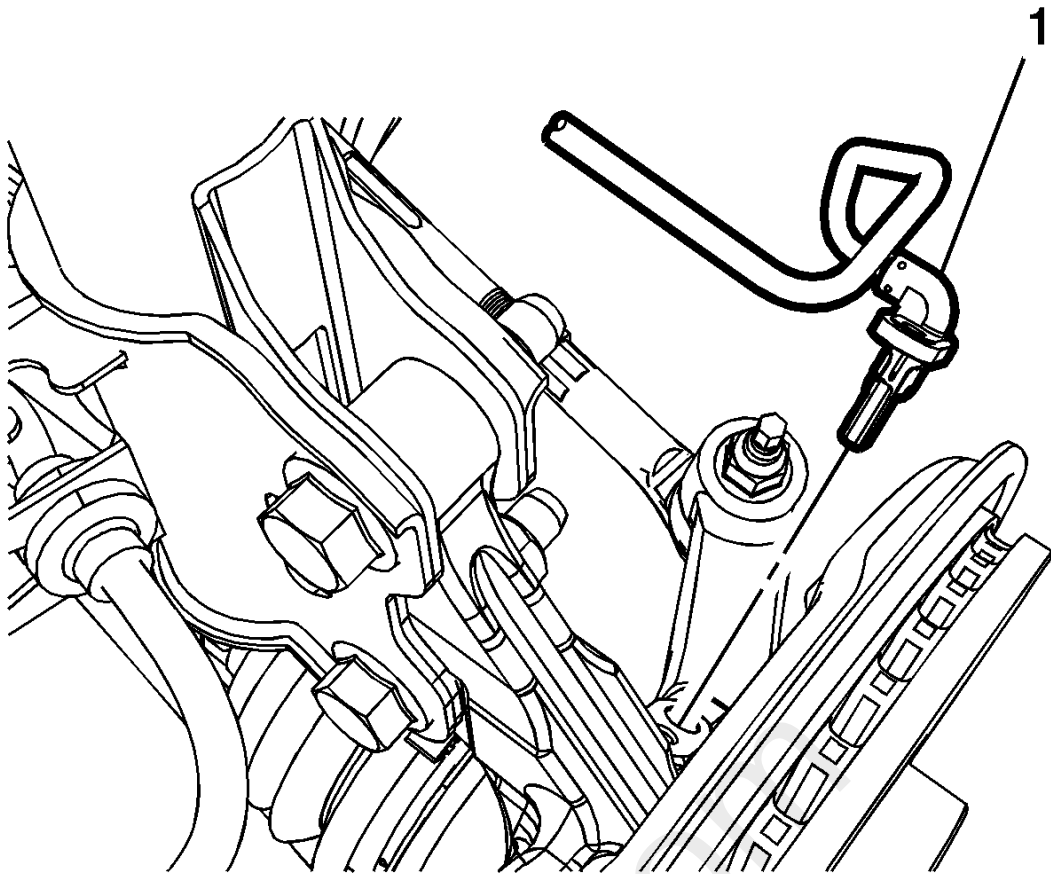


Fig. 30: Wheel Speed Sensor

Courtesy of GENERAL MOTORS COMPANY

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

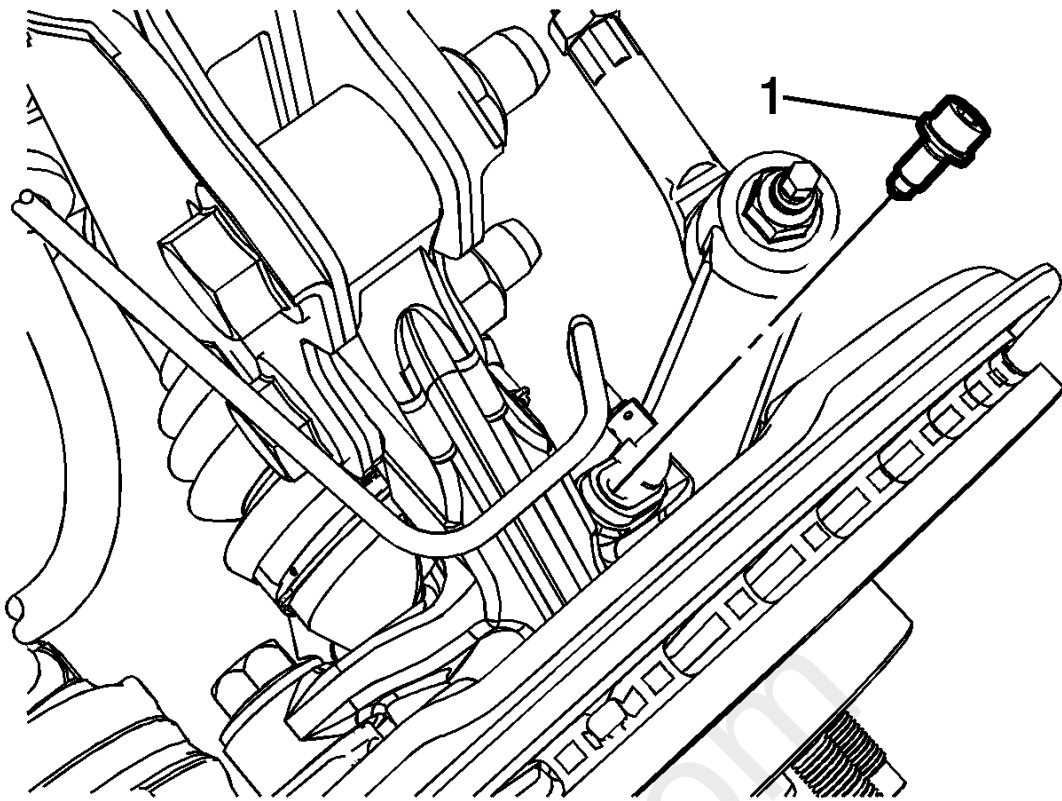


Fig.31: Wheel Speed Sensor Bolt

Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to **Fastener Caution** .

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

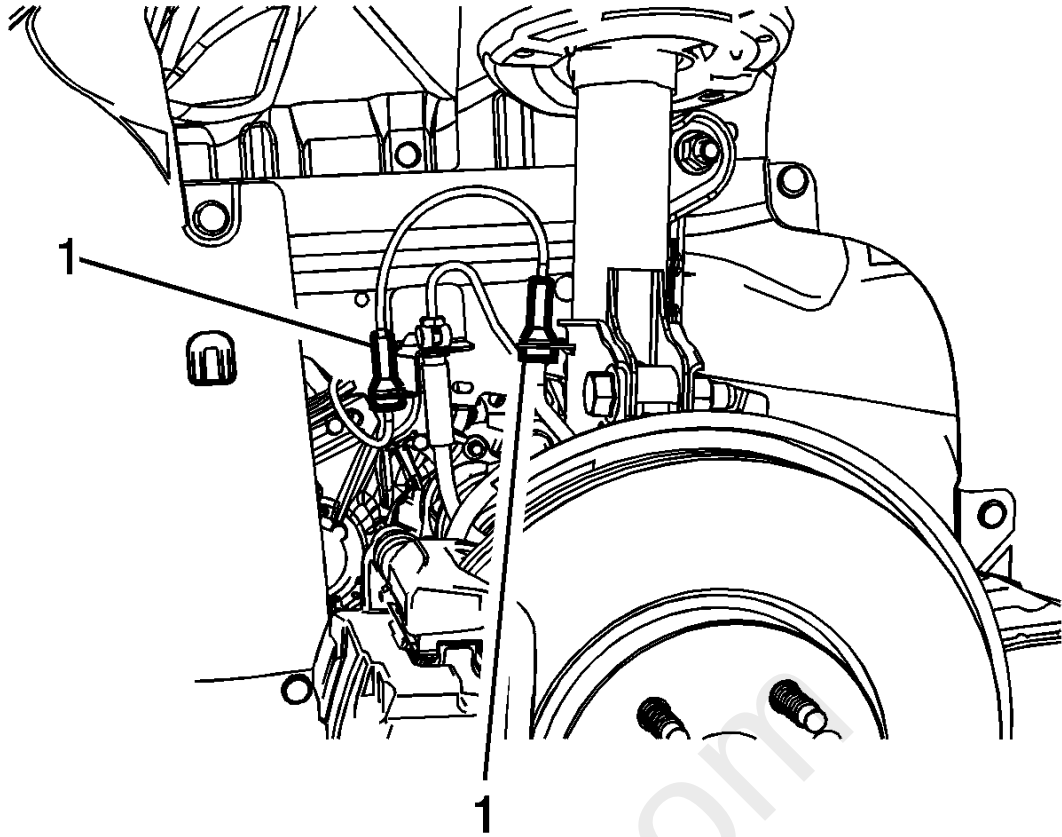


Fig. 32: Wheel Speed Sensor Harness Grommets

Courtesy of GENERAL MOTORS COMPANY

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

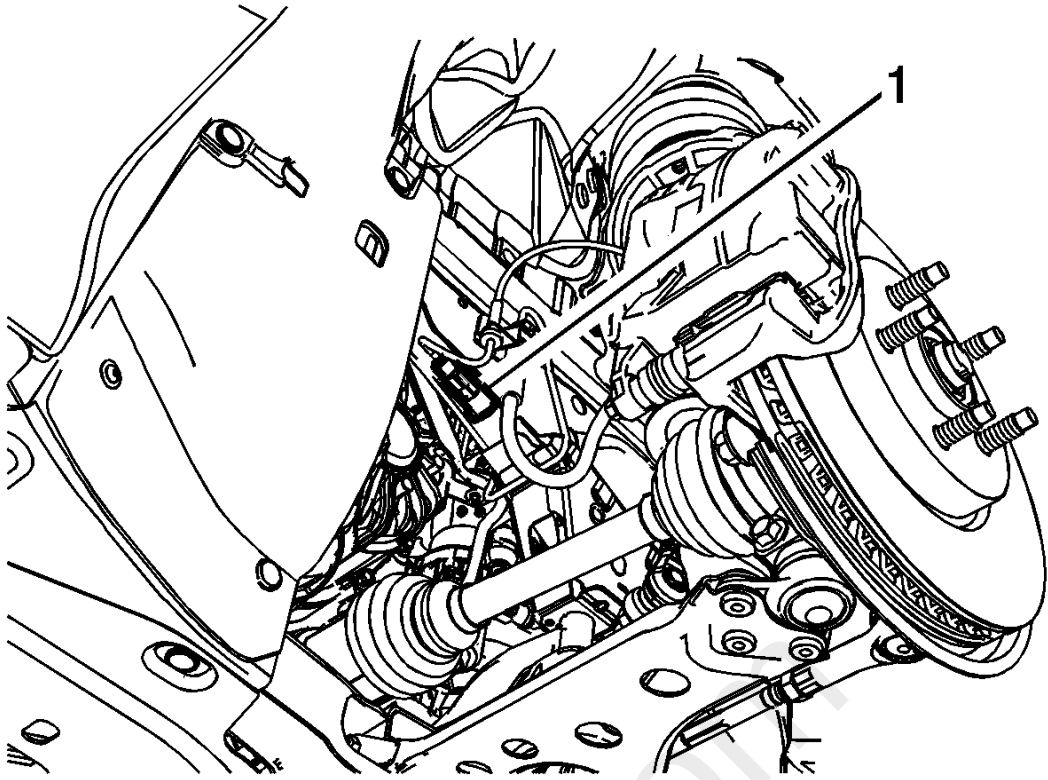


Fig. 33: Wheel Speed Sensor Electrical Connector

Courtesy of GENERAL MOTORS COMPANY

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](#) .
6. Perform the diagnostic system check. Refer to [Diagnostic System Check - Vehicle](#) .

REAR WHEEL SPEED SENSOR REPLACEMENT

Removal Procedure

WARNING: Refer to [Brake Dust Warning](#) .

1. Raise and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#) .
2. Remove the tire and wheel assembly. Refer to [Tire and Wheel Removal and Installation](#) .
3. Remove the rear wheelhouse panel liner. Refer to [Rear Wheelhouse Liner Replacement](#) .

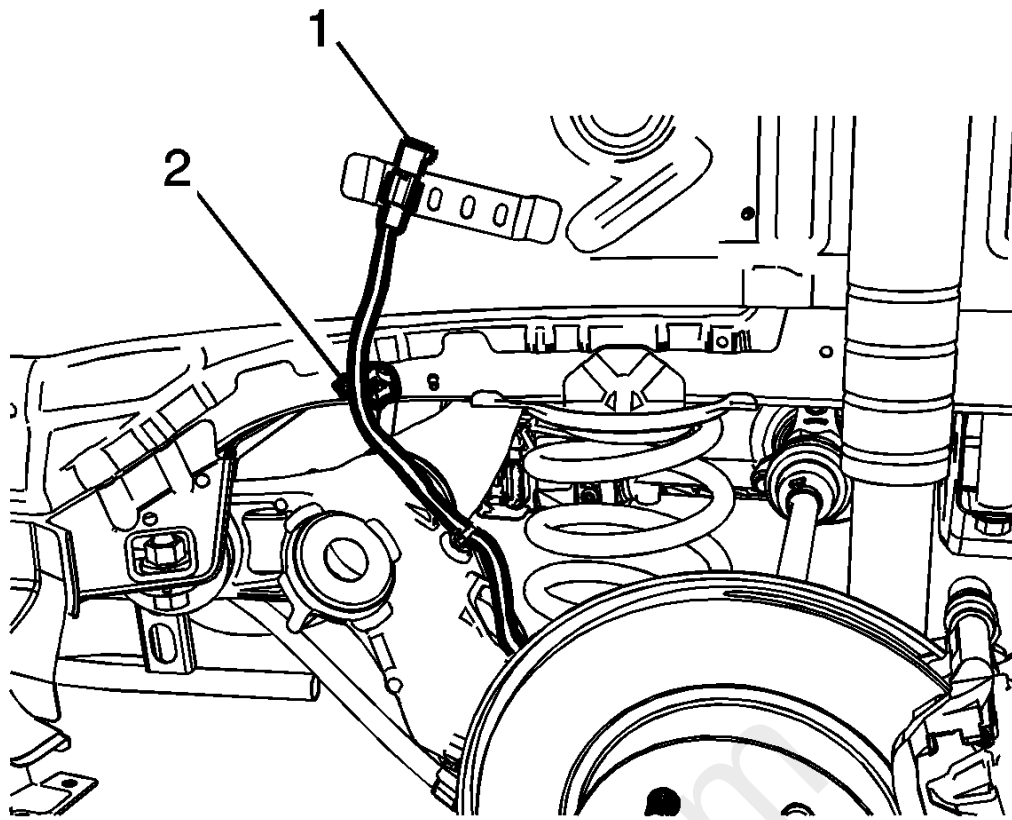


Fig. 34: Wheel Speed Sensor Electrical Connector

Courtesy of GENERAL MOTORS COMPANY

4. Disconnect the wheel speed sensor electrical connector (1) and release the connector clip from the wheelhouse bracket.
5. Release the wheel speed sensor harness clip (2) from the wheelhouse panel.

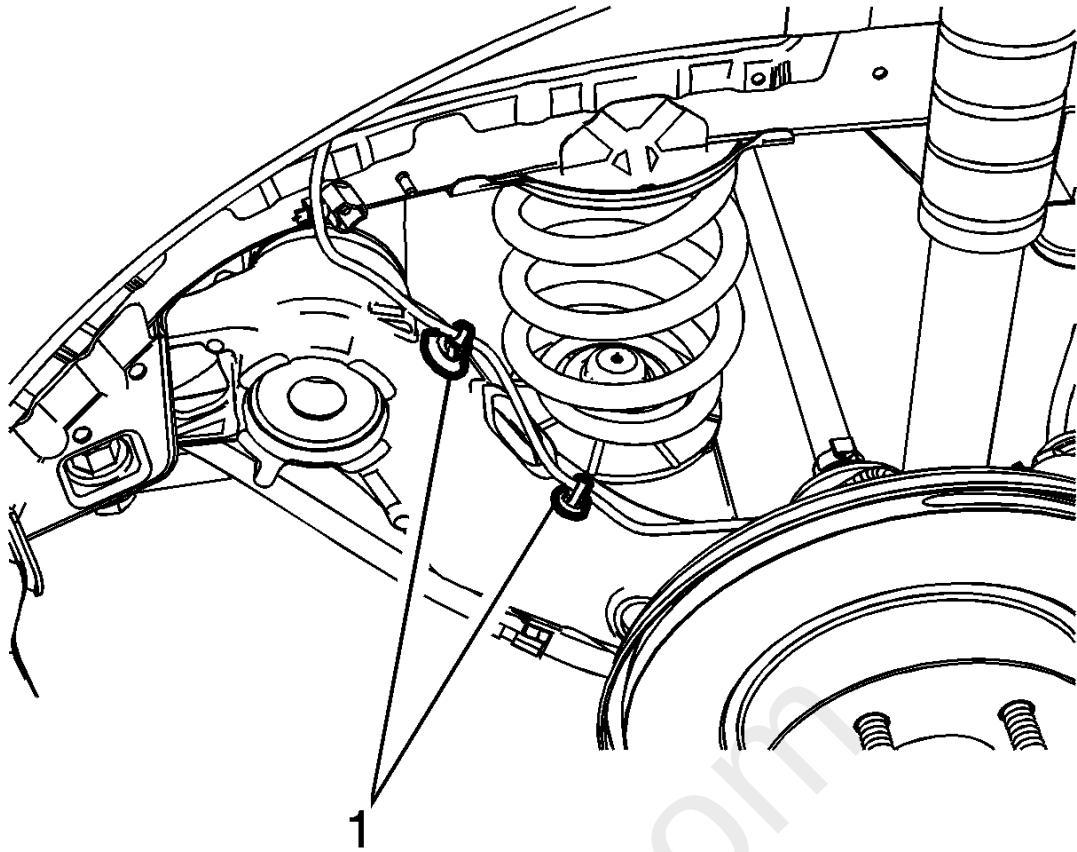


Fig. 35: Wheel Speed Sensor Harness Clips

Courtesy of GENERAL MOTORS COMPANY

6. Release the wheel speed sensor harness clips (1) from the rear axle.

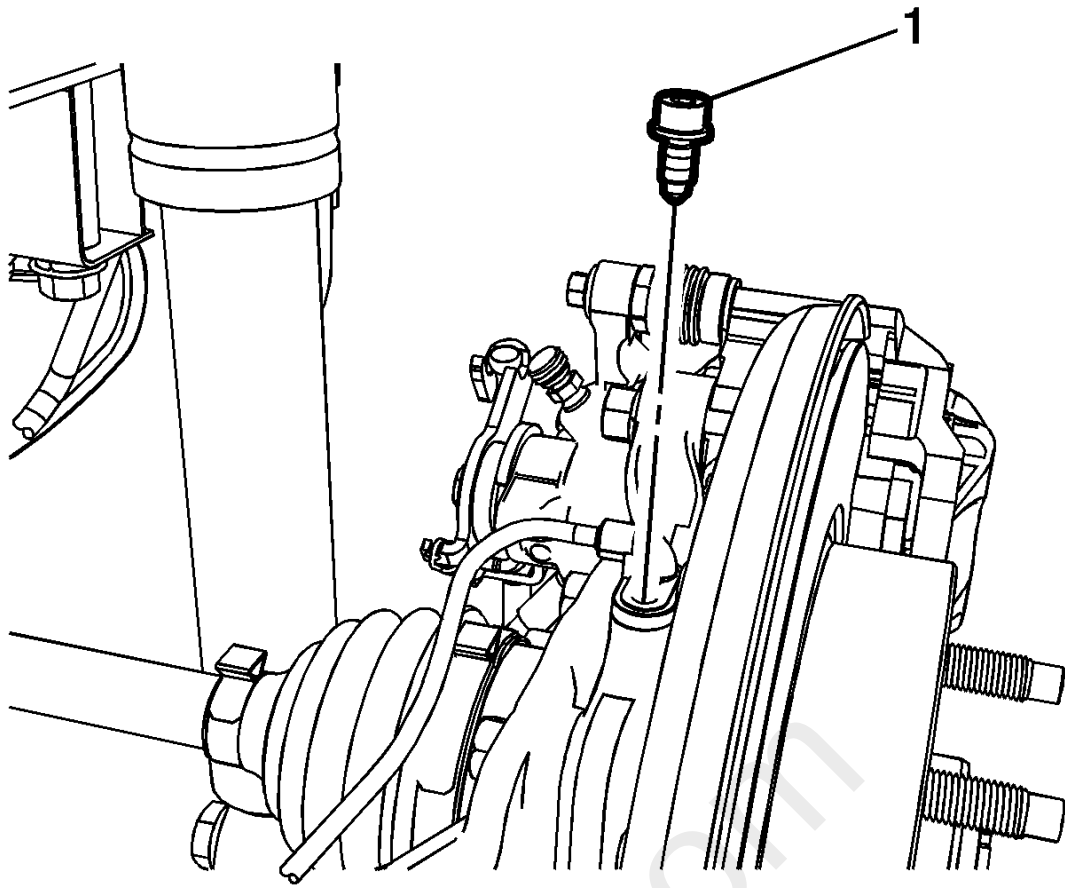


Fig. 36: Wheel Speed Sensor Bolt
Courtesy of GENERAL MOTORS COMPANY

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

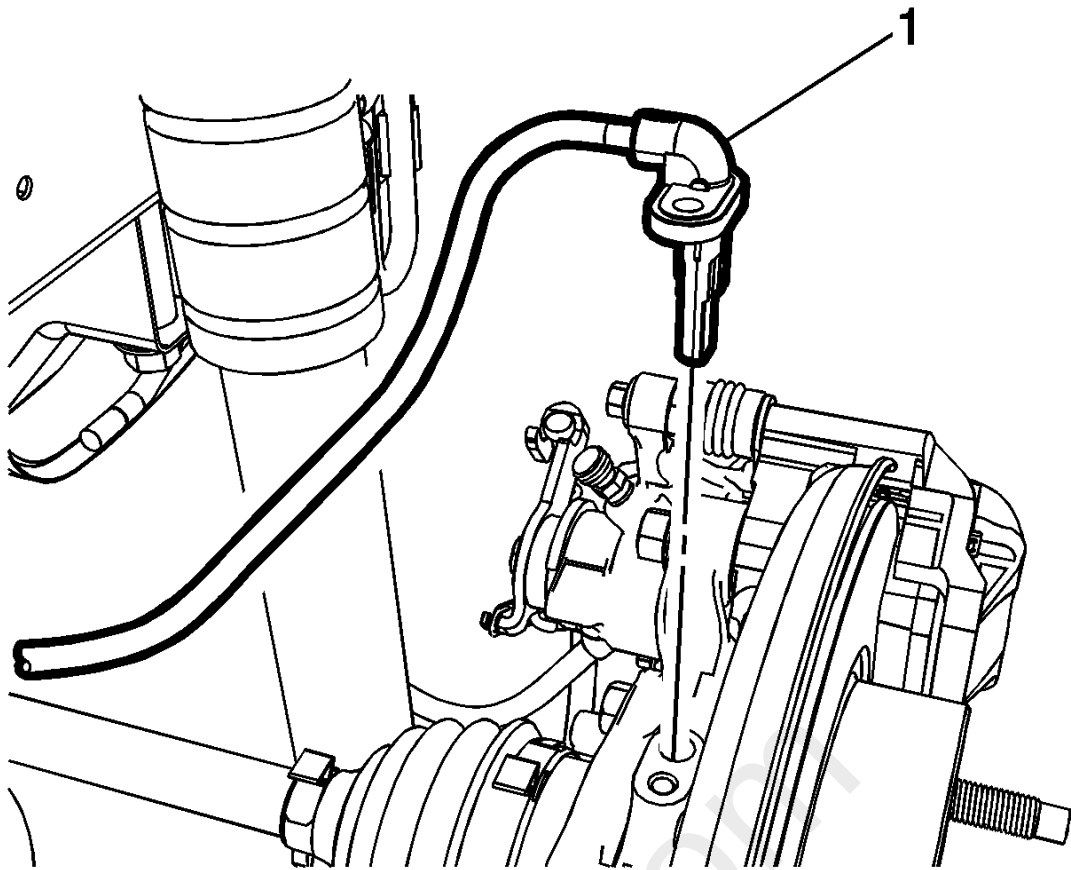


Fig.37: Wheel Speed Sensor

Courtesy of GENERAL MOTORS COMPANY

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

Installation Procedure

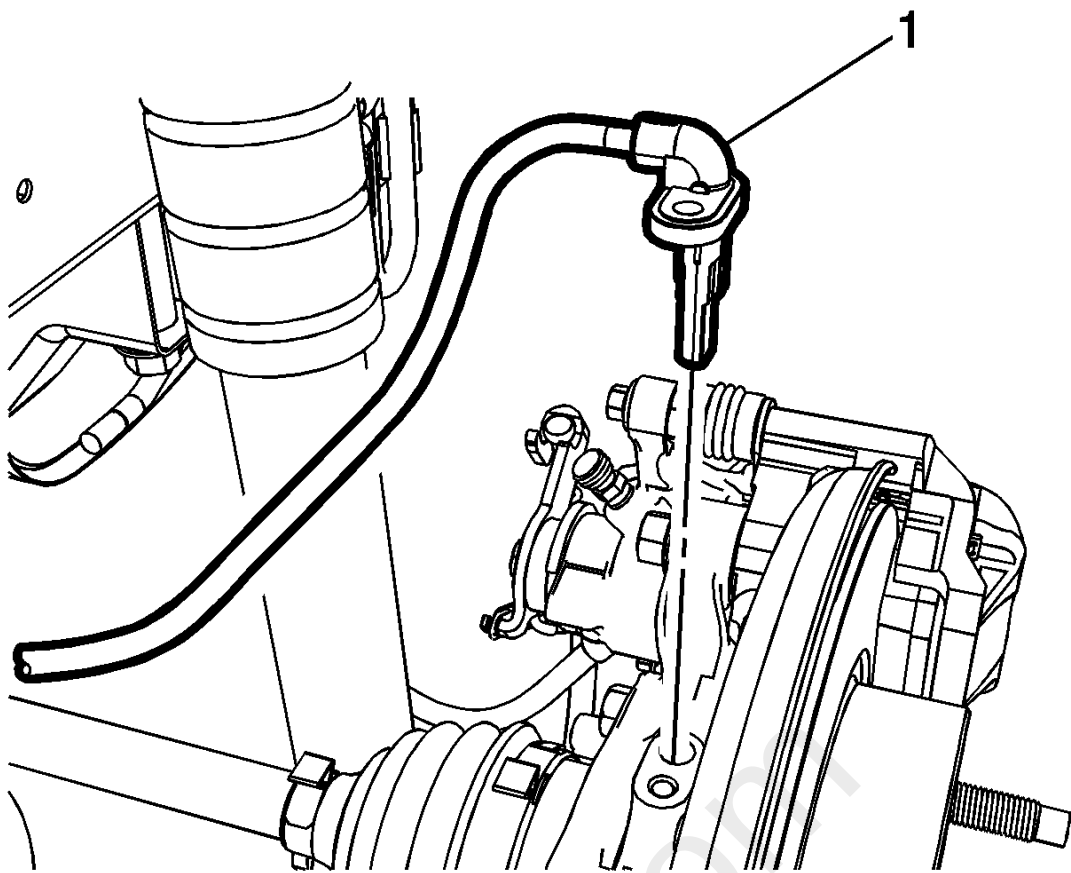


Fig. 38: Wheel Speed Sensor

Courtesy of GENERAL MOTORS COMPANY

1. Install the wheel speed sensor (1) to the rear suspension knuckle.

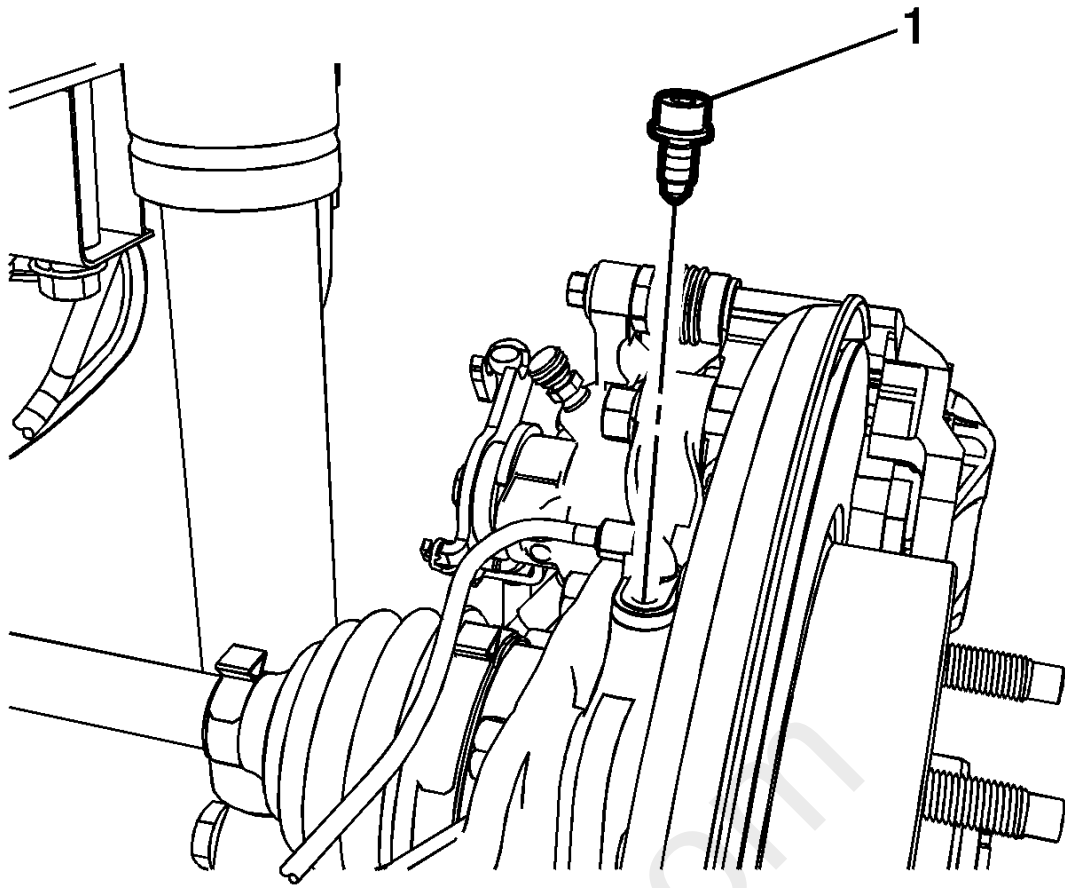


Fig. 39: Wheel Speed Sensor Bolt

Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to [Fastener Caution](#) .

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

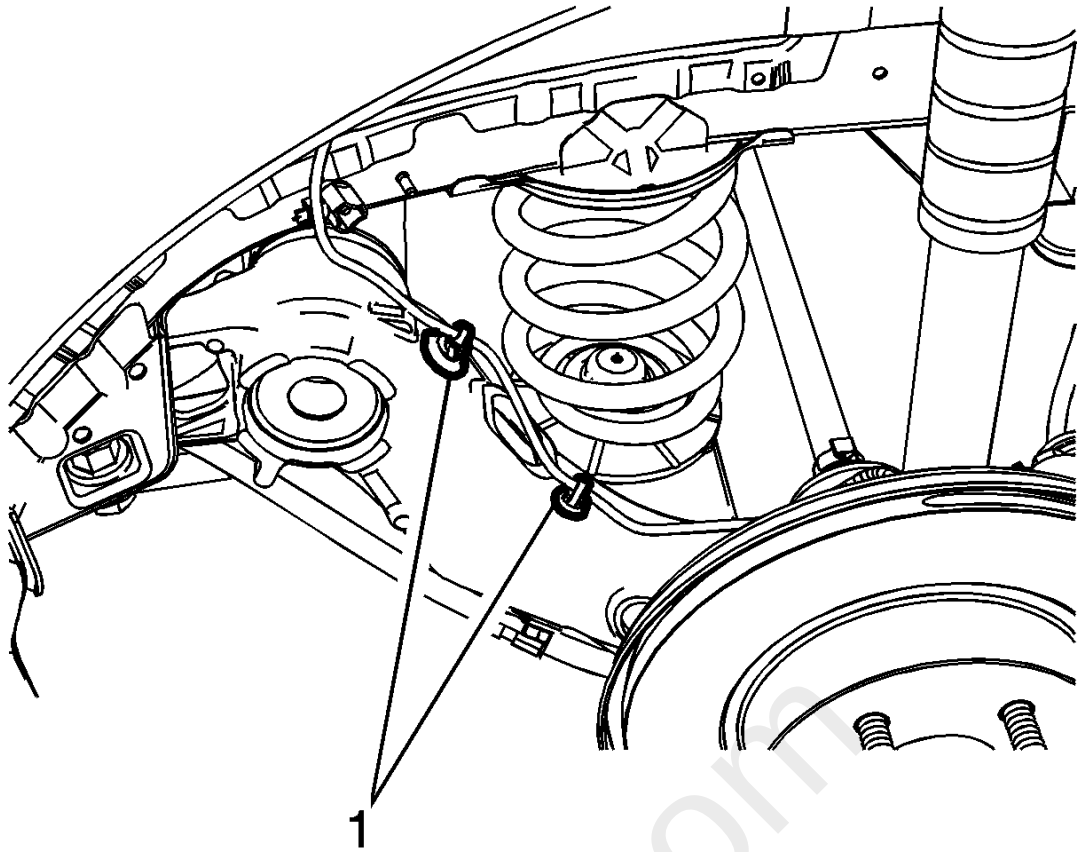


Fig. 40: Wheel Speed Sensor Harness Clips

Courtesy of GENERAL MOTORS COMPANY

3. Install the wheel speed sensor harness clips (1) to the rear axle.

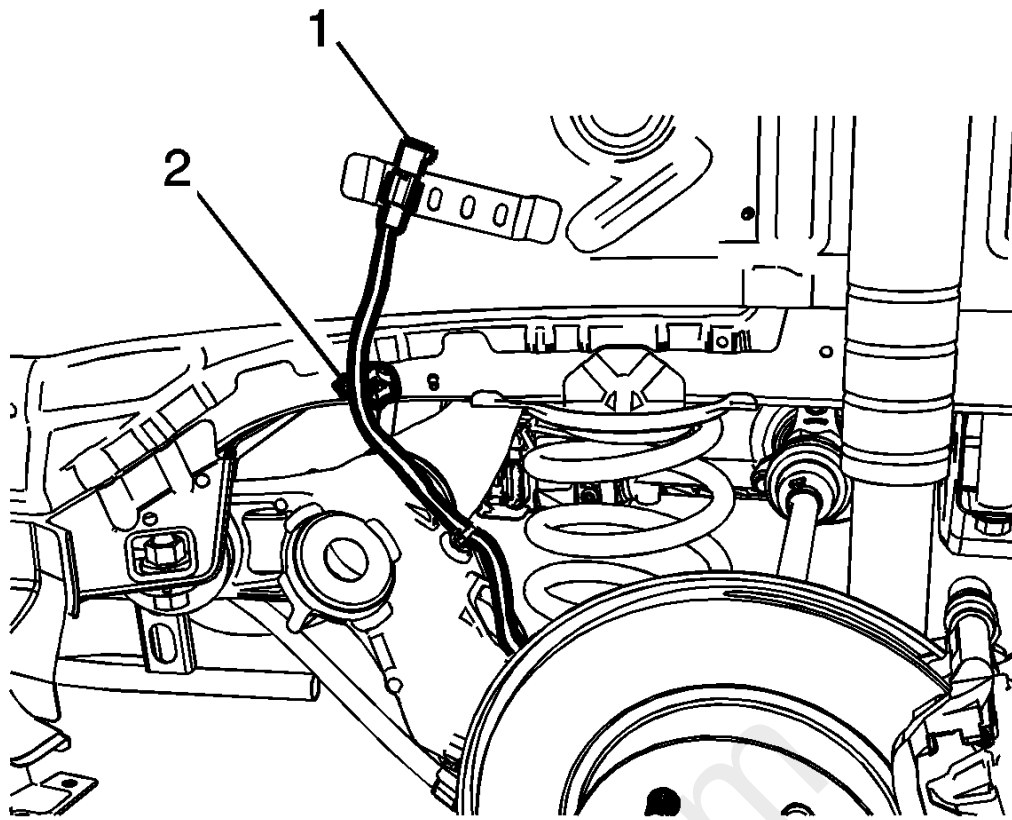


Fig. 41: Wheel Speed Sensor Electrical Connector

Courtesy of GENERAL MOTORS COMPANY

4. Connect the wheel speed sensor electrical connector (1) and install the connector clip to the wheelhouse bracket.
5. Install the wheel speed sensor harness clip (2) to the wheelhouse panel.
6. Install the rear wheelhouse panel liner. Refer to [Rear Wheelhouse Liner Replacement](#) .
7. Install the tire and wheel assembly. Refer to [Tire and Wheel Removal and Installation](#) .
8. Perform the diagnostic system check. Refer to [Diagnostic System Check - Vehicle](#) .

VEHICLE STABILITY CONTROL SYSTEM SWITCH REPLACEMENT (BUICK)

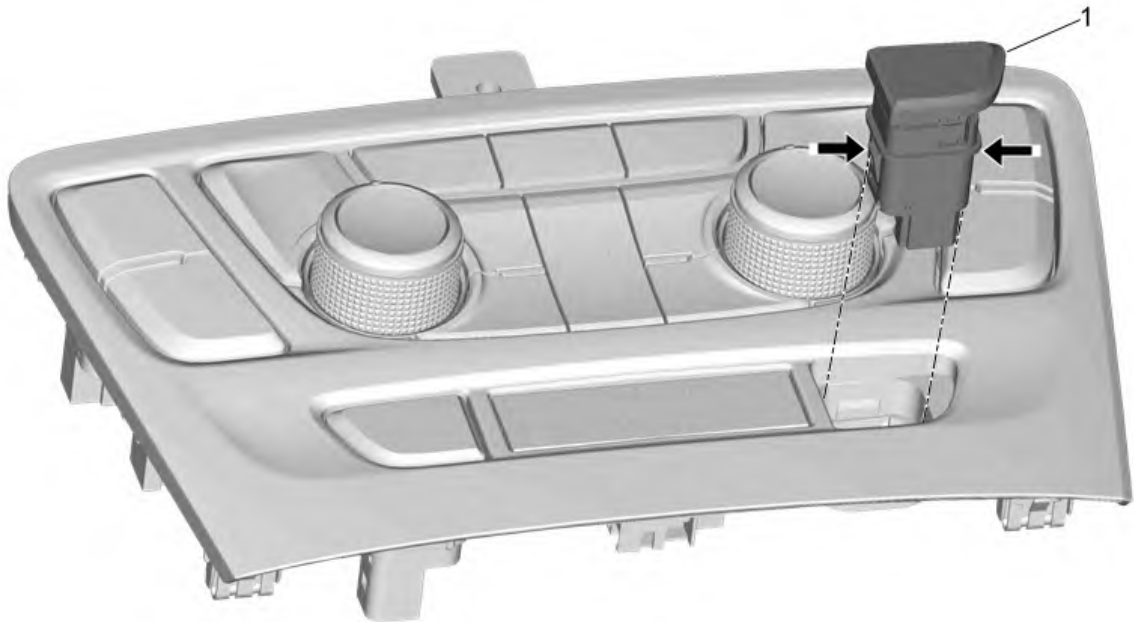


Fig. 42: Vehicle Stability Control System Switch (Buick).
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure <u>Instrument Panel Accessory Bezel Replacement (Buick).</u>	
1	Vehicle Stability Control System Switch Procedure Release the retaining tabs.

VEHICLE STABILITY CONTROL SYSTEM SWITCH REPLACEMENT (CHEVROLET)

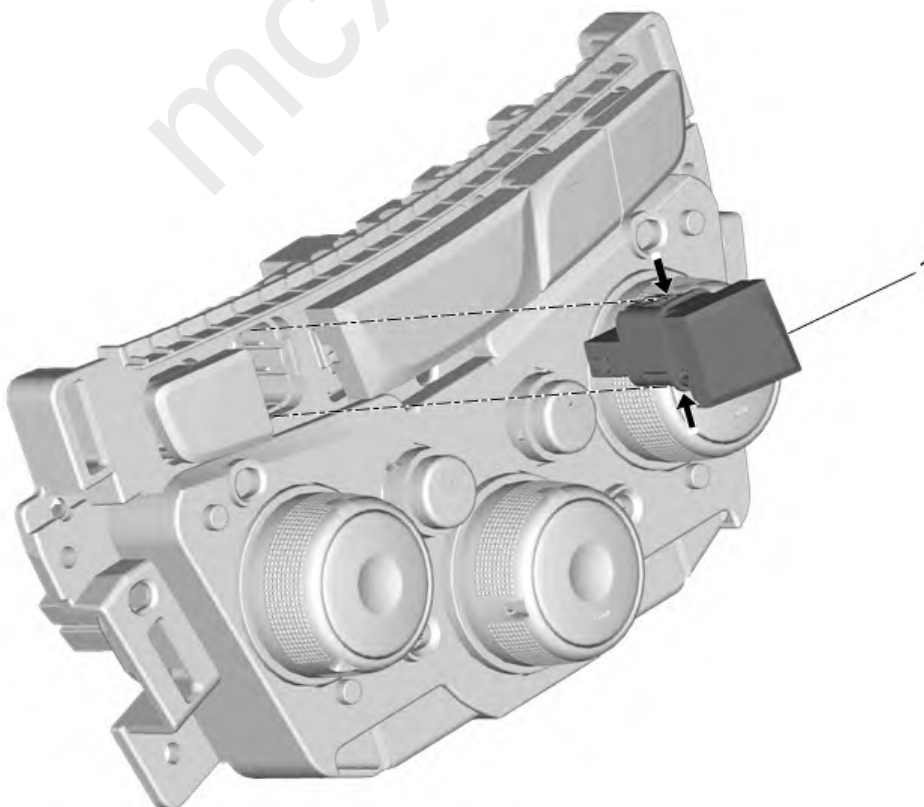


Fig. 43: Vehicle Stability Control System Switch (Chevrolet).
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure <u>Heater and Air Conditioning Control with Cable Control Replacement (C60).</u>	
1	Vehicle Stability Control System Switch Procedure Release the retaining tabs.

AUTOMATIC TRANSMISSION SHIFT PROGRAM SWITCH REPLACEMENT (BLANK COVER - BUICK)

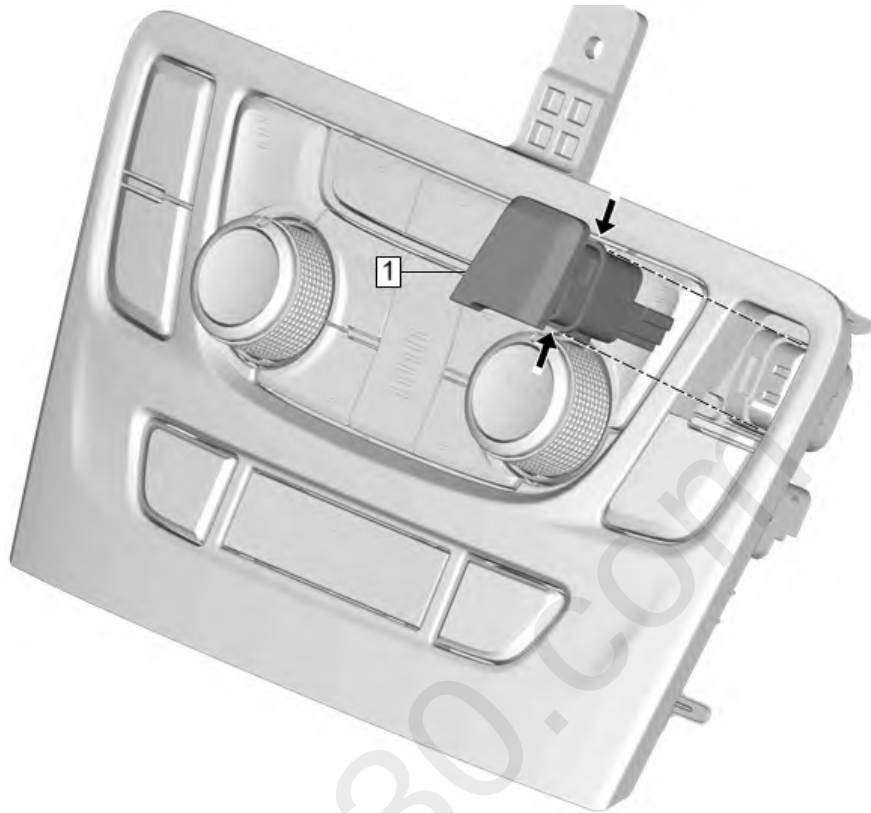


Fig. 44: Automatic Transmission Shift Program Switch (Blank Cover - Buick)
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure <u>Instrument Panel Accessory Bezel Replacement (Buick).</u>	
1	Automatic Transmission Shift Program Switch Procedure Release the retaining tabs.

AUTOMATIC TRANSMISSION SHIFT PROGRAM SWITCH REPLACEMENT (BLANK COVER - CHEVROLET)



Fig. 45: Automatic Transmission Shift Program Switch (Blank Cover - Chevrolet).
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure <u>Heater and Air Conditioning Control with Cable Control Replacement (C60).</u>	
1	Automatic Transmission Shift Program Switch Procedure Release the retaining tabs.

VEHICLE YAW SENSOR LEARN

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

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

VEHICLE YAW SENSOR WITH VEHICLE LATERAL ACCELEROMETER REPLACEMENT (BUICK)

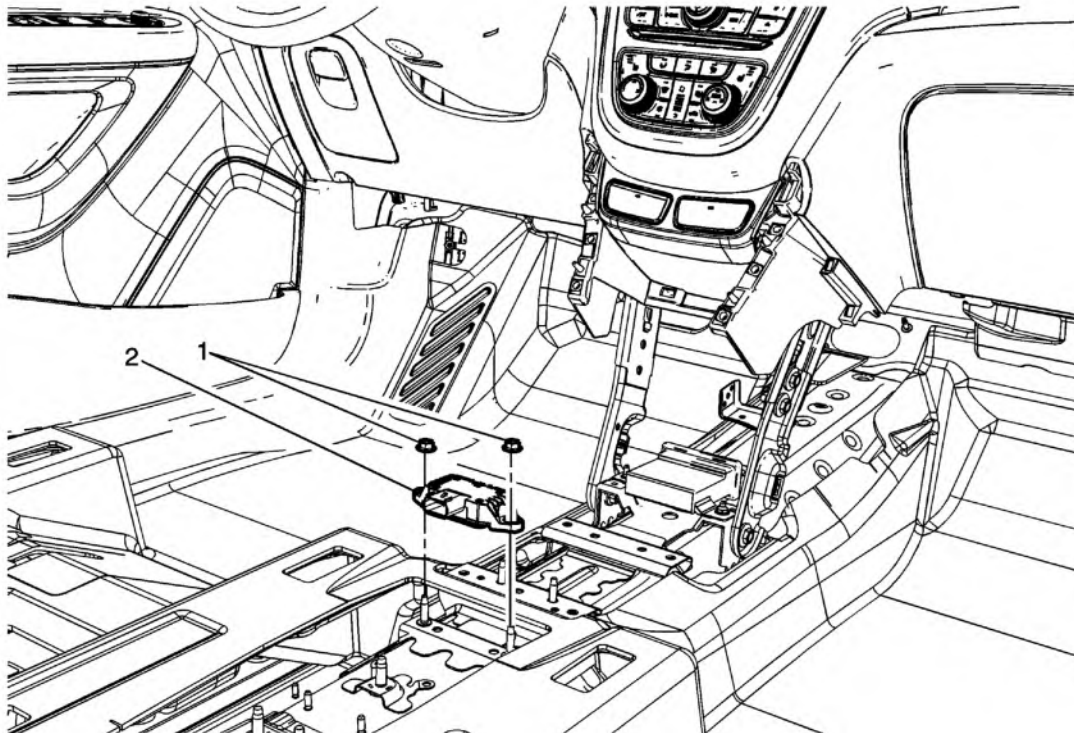


Fig. 46: Vehicle Yaw Sensor with Vehicle Lateral Accelerometer (Encore).

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Remove the front floor console. Refer to Front Floor Console Replacement (Buick) .	
1	Vehicle Yaw Sensor Nut (Qty: 2) CAUTION: Refer to Fastener Caution . Tighten 9 N.m (80 lb in)
2	Vehicle Yaw Sensor with Vehicle Lateral Accelerometer Procedure 1. Disconnect the electrical connector. 2. After the installation is complete, configure the yaw sensor. Refer to Service Programming System (SPS) . 3. After the installation is complete, perform the Vehicle Yaw Sensor Learn.

VEHICLE YAW SENSOR WITH VEHICLE LATERAL ACCELEROMETER REPLACEMENT (CHEVROLET)

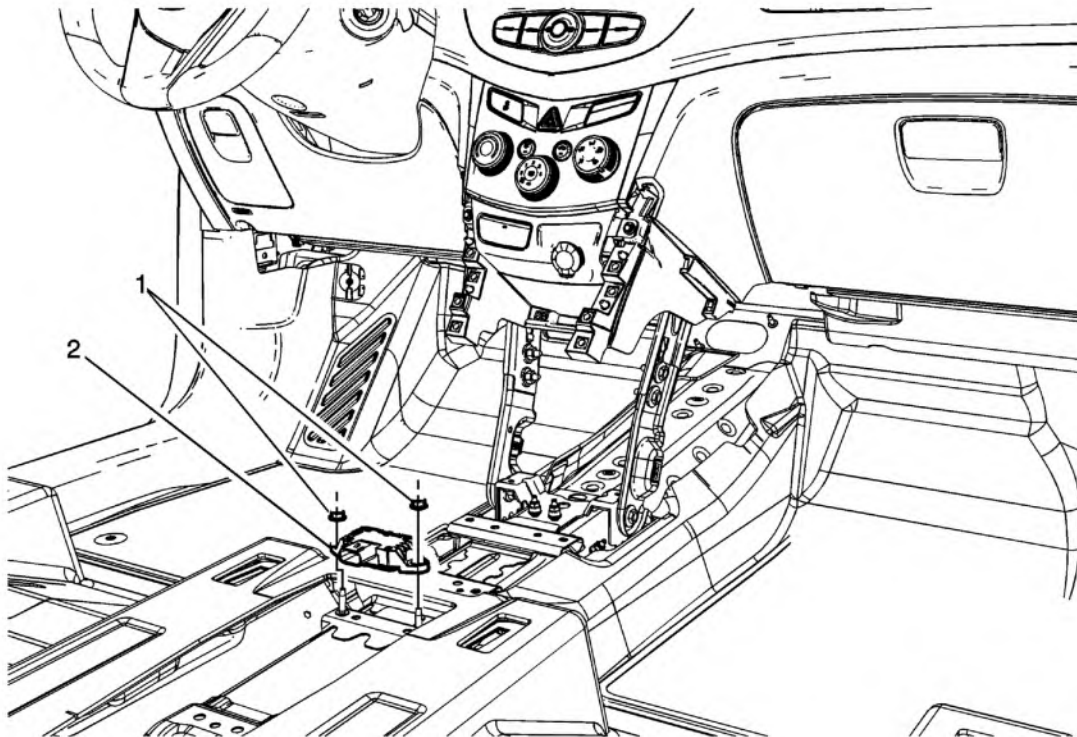


Fig. 47: Vehicle Yaw Sensor with Vehicle Lateral Accelerometer (Trax).

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Remove the front floor console. Refer to Front Floor Console Replacement (Chevrolet) .	
1	Vehicle Yaw Sensor Nut (Qty: 2) CAUTION: Refer to Fastener Caution . Tighten 9 N.m (80 lb in)
2	Vehicle Yaw Sensor with Vehicle Lateral Accelerometer Procedure 1. Disconnect the electrical connector. 2. After the installation is complete, configure the yaw sensor. Refer to Service Programming System (SPS) . 3. After the installation is complete, perform the Vehicle Yaw Sensor Learn.

DESCRIPTION AND OPERATION

ABS DESCRIPTION AND OPERATION

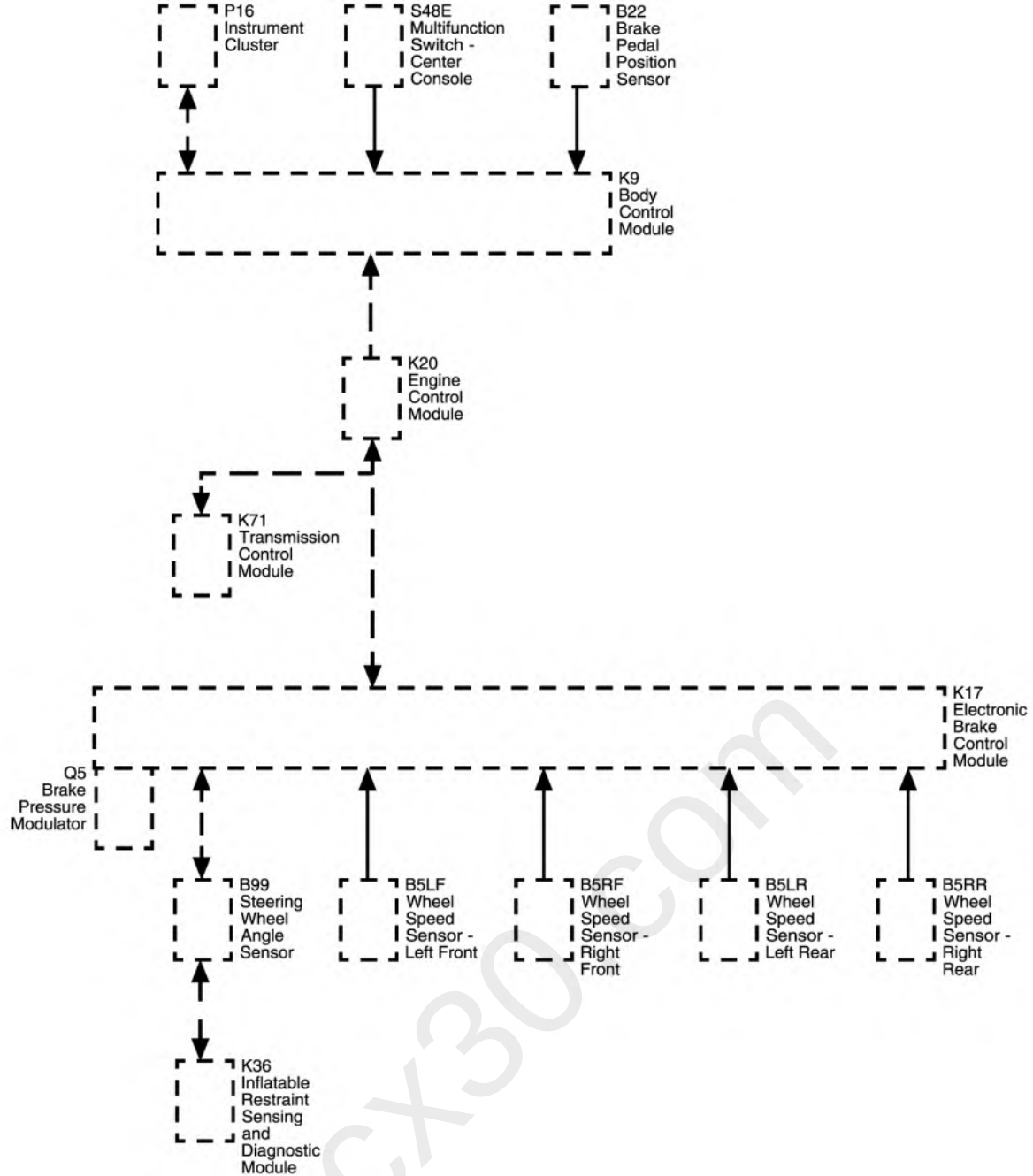


Fig. 48: Antilock Brake System Block Diagram
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
P16	P16 Instrument Cluster
S48E	S48E Multifunction Switch - Center Console
B22	B22 Brake Pedal Position Sensor
K9	K9 Body Control Module
K20	K20 Engine Control Module
K71	K71 Transmission Control Module
K17	K17 Electronic Brake Control Module
Q5	Q5 Brake Pressure Modulator
B99	B99 Steering Wheel Angle Sensor
K36	K36 Inflatable Restraint Sensing and Diagnostic Module
B5LF	B5LF Wheel Speed Sensor - Left Front
B5RF	B5RF Wheel Speed Sensor - Right Front
B5LR	B5LR Wheel Speed Sensor - Left Rear
B5RR	B5RR Wheel Speed Sensor - Right Rear

This vehicle is equipped with the MGH 60 Mando electronic stability control 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.

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

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

The following components listed below are involved in the operation of the brake system:

- Electronic brake control module - The electronic brake control module controls the system functions and detects failures. It supplies voltage to the solenoid valves and pump motor.
- Brake pressure modulator-The brake pressure modulator contains the 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 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, lateral acceleration and longitudinal acceleration sensors are combined into one multi-axis acceleration sensor, internal to the inflatable restraint sensing and diagnostic module. The electronic brake control module receives serial data message inputs from the yaw rate, lateral acceleration and longitudinal acceleration sensor and activates stability control and hill hold start assist function 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 Descent Control System

The hill descent control system allows a smooth and controlled hill descent in rough terrain without the driver needing to touch the brake pedal. The vehicle will automatically decelerate to a low speed and remain at that speed while activated. Some noise or vibration from the brake system may be apparent when the system is active. The descent control system may be activated, if equipped, by pressing the

button on the console. To activate, press the button when traveling at speeds less than 50 km/h (30 MPH). To deactivate, press the button on the console, the brake pedal, or the accelerator. Descent control enables the vehicle to descend using the ABS to control each wheel's speed. If the vehicle accelerates without driver input, the system automatically applies the brakes to slow the vehicle down to the desired speed.

Hill Start Hold (with JL4 or JL6)

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 vehicle's 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 vehicle's 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

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.

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.

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 and 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.

Traction/Stability Control System Warning Indicator

The instrument cluster turns the traction/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.
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