

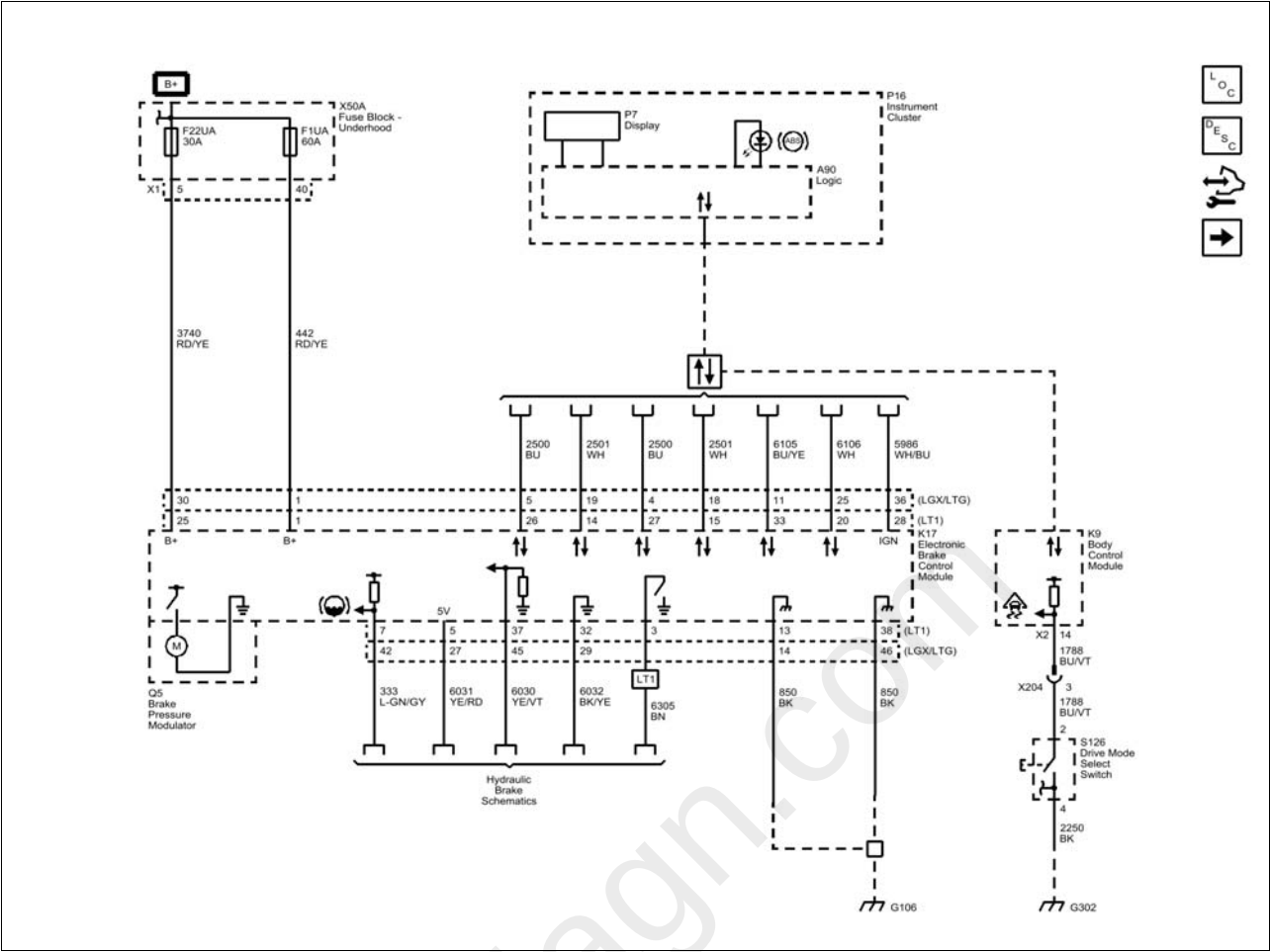
SPECIFICATIONS > FASTENER SPECIFICATIONS

Application	Specification	
	Metric	English
Brake Pipe Fitting - Brake Pressure Modulator Valve Inlet	32 N.m	24 lb ft
Brake Pipe Fitting - Brake Pressure Modulator Valve Outlet	18 N.m	13 lb ft
Brake Pressure Modulator Valve Bracket Nut	7 N.m	62 lb in
Brake Pressure Modulator Valve Nut	3 N.m	27 lb in
Electronic Brake Control Module Bolt	3 N.m	27 lb in
Wheel Speed Sensor Bolt	10 N.m	89 lb in

SCHEMATIC WIRING DIAGRAMS > ANTILOCK BRAKE SYSTEM WIRING

SCHEMATICS > MODULE POWER, GROUND, AND SUBSYSTEM REFERENCES

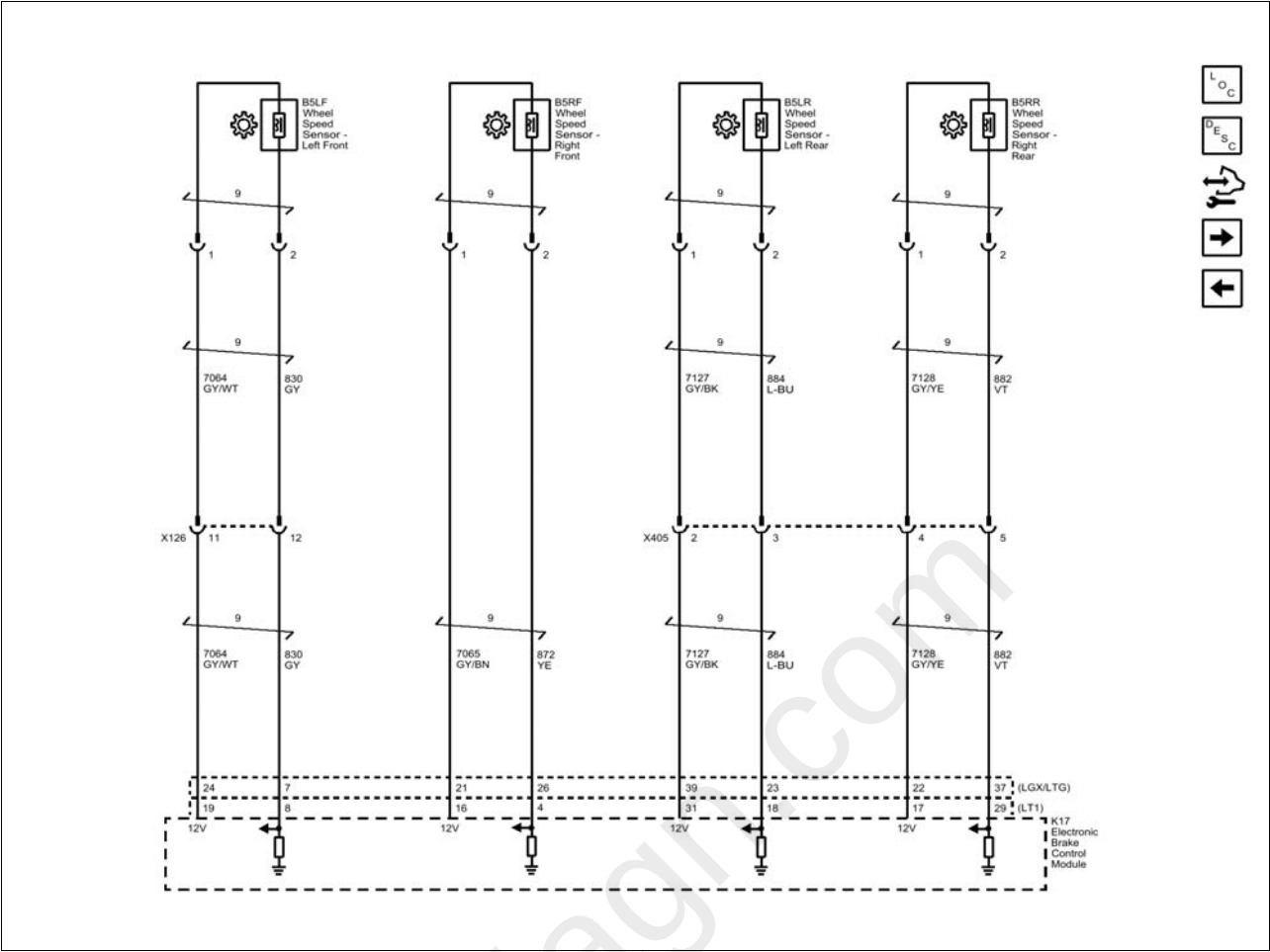
Fig 1: Module Power, Ground, and Subsystem References



Courtesy of GENERAL MOTORS COMPANY

**SCHEMATIC WIRING DIAGRAMS > ANTILOCK BRAKE SYSTEM WIRING
SCHEMATICS > WHEEL SPEED SENSORS**

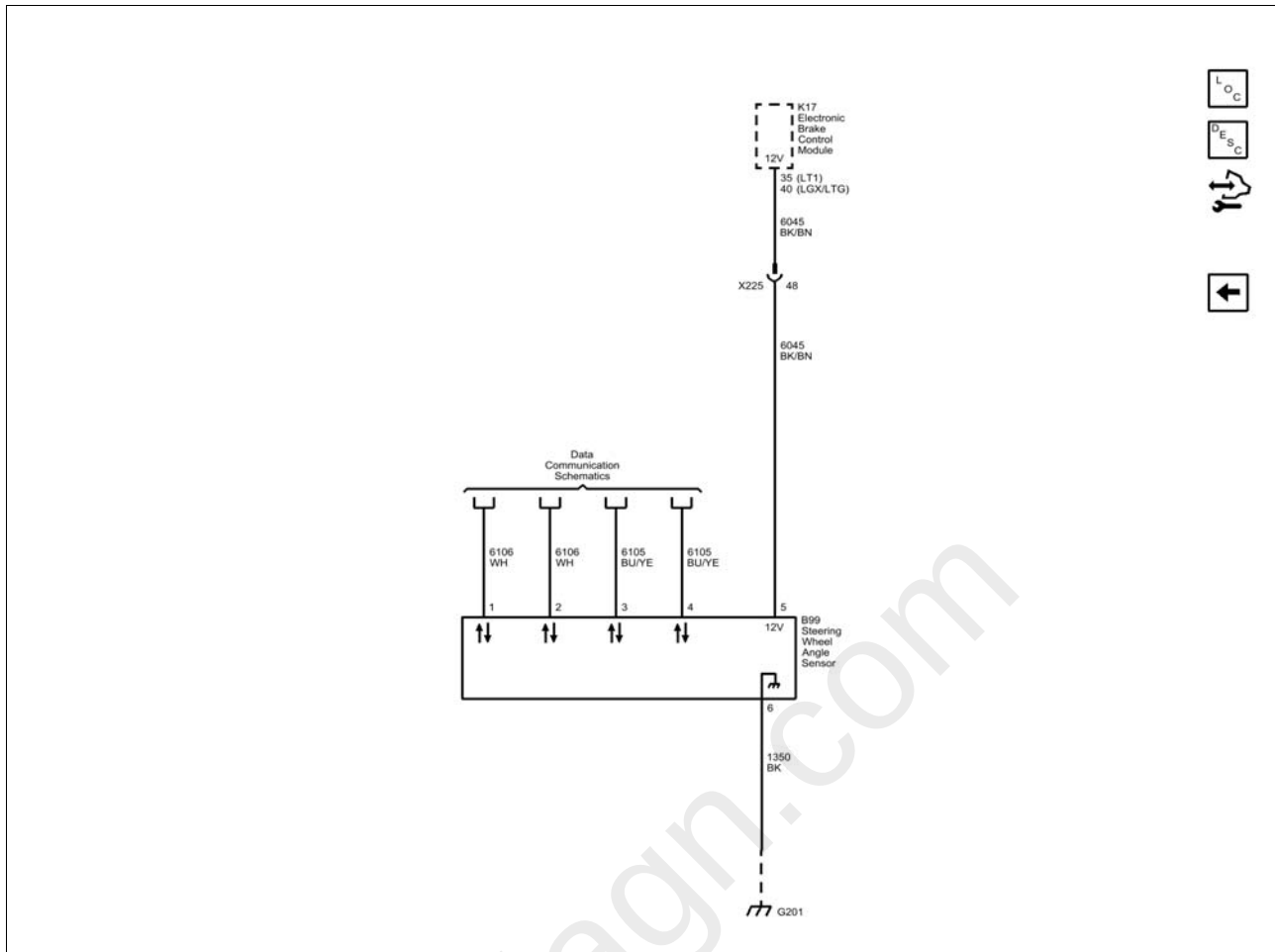
Fig 1: Wheel Speed Sensors



Courtesy of GENERAL MOTORS COMPANY

SCHEMATIC WIRING DIAGRAMS > ANTILOCK BRAKE SYSTEM WIRING
SCHEMATICS > STABILITY CONTROL

Fig 1: Stability Control



Courtesy of GENERAL MOTORS COMPANY

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B2745: TRACTION CONTROL SWITCH 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.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B2745: TRACTION CONTROL SWITCH CIRCUIT > DTC DESCRIPTOR

DTC B2745

Traction Control Switch Circuit

For symptom byte information refer to Symptom Byte List

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B2745: TRACTION CONTROL SWITCH CIRCUIT > DIAGNOSTIC FAULT INFORMATION

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Traction Control Switch Signal	B2745 02	1	1	-
Traction Control Switch Ground	-	1	-	-

1. Traction Control Switch Malfunction.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B2745: TRACTION CONTROL SWITCH CIRCUIT > CIRCUIT/SYSTEM DESCRIPTION

The body control module monitors the electronic stability control switch. When the electronic stability control switch is pressed once, the body control module will request the electronic brake control module via serial data to disable the traction control. When the electronic stability control switch is pressed and held for five seconds, the body control module will request the electronic brake control module to disable the stability control. The Electronic Brake Control Module will request the Instrument Cluster to turn the Traction Control Off and Stability Control Off indicator ON to notify the driver of the deactivation.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B2745: TRACTION CONTROL SWITCH CIRCUIT > CONDITIONS FOR RUNNING THE DTC

Ignition ON.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B2745: TRACTION CONTROL SWITCH CIRCUIT > CONDITIONS FOR SETTING THE DTC

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

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B2745: TRACTION CONTROL SWITCH CIRCUIT > ACTION TAKEN WHEN THE DTC SETS

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

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B2745: TRACTION CONTROL

SWITCH CIRCUIT > CONDITIONS FOR CLEARING THE DTC

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

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B2745: TRACTION CONTROL SWITCH CIRCUIT > REFERENCE INFORMATION

Schematic Reference

Antilock Brake System Schematics

Connector End View Reference

COMPONENT CONNECTOR END VIEWS - INDEX

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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

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B2745: TRACTION CONTROL SWITCH CIRCUIT > 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.
 1. Traction Control Off indicator
 2. Stability Control Off indicator
 3. Traction/stability Control indicator
1. **If any indicator does not turn ON and OFF**
 - Replace the P16 Instrument Cluster.

1. If all indicators turn 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 S48A Multifunction Switch-Instrument Panel.

1. If the parameter does not change

Refer to Circuit/System Testing.

1. If the parameter changes

4. All OK.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B2745: TRACTION CONTROL SWITCH CIRCUIT > CIRCUIT/SYSTEM TESTING



NOTE:

Circuit/System Verification must be performed before Circuit/System Testing.

1. Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the S48A Multifunction Switch-Instrument Panel. 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.

1. If 10 Ω or greater

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

1. If less than 10 Ω

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

1. If Active

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

1. If Inactive

5. Install a 3 A fused jumper wire between the signal circuit terminal 4 and ground.
6. Verify the scan tool Traction Control Switch parameter is Active.

1. If Inactive

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.
 1. If 1 V or greater, repair the short to voltage on the circuit.
 1. If less than 1 V.
3. Test for less than 2 Ω in the signal circuit end to end.
 1. If 2 Ω or greater, repair the open/high resistance in the circuit.
 2. If less than 2 Ω , replace the K9 Body Control Module.

1. If Active

7. Test or replace the S48A Multifunction Switch-Instrument Panel.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B2745: TRACTION CONTROL SWITCH CIRCUIT > COMPONENT TESTING

1. Ignition OFF, disconnect the harness connector at the S48A Multifunction Switch-Instrument Panel.
2. Test for infinite resistance between the signal terminal 4 and the ground terminal 1 with the switch in the open position.

1. If less than infinite resistance

Replace the S48A Multifunction Switch-Instrument Panel.

1. 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.

1. If 2 Ω or greater

Replace the S48A Multifunction Switch-Instrument Panel.

1. If less than 2 Ω

4. All OK.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC B2745: TRACTION CONTROL SWITCH CIRCUIT > REPAIR INSTRUCTIONS

Perform the Diagnostic Repair Verification after completing the repair.

- Front Floor Console Trim Plate Replacement (Automatic) Front Floor Console Trim Plate Replacement (Manual)
- Control Module References for Body Control Module or Instrument Cluster replacement, programming and setup.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0035-C0051 (RPO LT1): 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.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0035-C0051 (RPO LT1): WHEEL SPEED SENSOR > DTC DESCRIPTORS

DTC C0035

Left Front Wheel Speed Sensor Circuit

DTC C0036

Left Front Wheel Speed Sensor Range Performance

DTC C003A

Front Wheel Speed Sensor Circuit

DTC C0040

Right Front Wheel Speed Sensor Circuit

DTC C0041

Right Front Wheel Speed Sensor Range Performance

DTC C0045

Left Rear Wheel Speed Sensor Circuit

DTC C0046

Left Rear Wheel Speed Sensor Range Performance

DTC C0050

Right Rear Wheel Speed Sensor Circuit

DTC C0051

Right Rear Wheel Speed Sensor Range Performance

For symptom byte information refer to Symptom Byte List

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0035-C0051 (RPO LT1): WHEEL SPEED SENSOR > DIAGNOSTIC FAULT INFORMATION

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Signal High - Left Front	C0035 00	C0035 00, C0035 06	C0245 00	C0035 18, C0035 0F, C0035 27
Signal Low - Left Front	C0035 00	C0035 00	C0035 00	C0035 18, C0035 0F, C0035 27
Signal High - Right Front	C0040 00	C0040 00, C0040 06	C0245 00	C0040 18, C0040 0F, C0040 27
Signal Low - Right Front	C0040 00	C0040 00	C0040 00	C0040 18, C0040 0F, C0040 27
Signal High - Left Rear	C0045 00	C0045 00, C0045 06	C0245 00	C0045 18, C0045 0F, C0045 27, C0055 67
Signal Low - Left Rear	C0045 00	C0045 00	C0045 00	C0045 18, C0045 0F, C0045 27, C0055 67
Signal High - Right Rear	C0050 00	C0050 00, C0050 06	C0245 00	C0050 18, C0050 0F, C0050 27, C0055 67
Signal Low - Right Rear	C0050 00	C0050 00	C0050 00	C0050 18, C0050 0F, C0050 27, C0055 67

Component	Condition	DTC Symptom Byte
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	08, 0F, 27, 29, 66, or 67

	• Air gap between the wheel speed sensor and the encoder ring too large • Water intrusion in the wiring harness • Incorrect part wheel speed sensor installed • Wheel speed sensor installed on incorrect side of same axle	
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DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0035-C0051 (RPO LT1): WHEEL SPEED SENSOR > 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 speed.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0035-C0051 (RPO LT1): WHEEL SPEED SENSOR > CONDITIONS FOR RUNNING THE DTC

C0035 00 - C0050 00, C0035 18 - C0050 18, or C0035 27 - C0050 27

Ignition ON

C0035 0F - C0050 0F or C0035 5A - C0050 5A

Vehicle speed is greater than 60 km/h (37 MPH).

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0035-C0051 (RPO LT1): WHEEL SPEED SENSOR > CONDITIONS FOR SETTING THE DTC

C0035 00, C0040 00, C0045 00, or C0050 00

- A short to ground, or open/high resistance on the wheel speed sensor signal high circuit is detected for 0.2 sec.
- A short to voltage, short to ground, or open/high resistance on the wheel speed sensor signal low circuit is detected for 0.2 sec.

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

- An erratic wheel speed sensor signal is detected.

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

- Incorrectly mounted wheel speed sensor.
- Debris on the wheel speed sensor or the tone ring.
- Missing tooth or teeth on the wheel speed sensor tone ring.
- Air gap between the wheel speed sensor and the encoder ring.
- Electrical magnetic interference with the wheel speed sensor harness.

C0035 27, C0040 27, C0045 27, or C0050 27

- Debris on the wheel speed sensor tone ring.
- Missing tooth or teeth on the wheel speed sensor tone ring.
- Air gap between the wheel speed sensor and the encoder ring too large.

C0035 67, C0040 67, C0045 67, or C0050 67

- An incorrect part wheel speed sensor signal is detected.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0035-C0051 (RPO LT1): WHEEL SPEED SENSOR > ACTION TAKEN WHEN THE DTC SETS

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

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0035-C0051 (RPO LT1): WHEEL SPEED SENSOR > CONDITIONS FOR CLEARING THE DTC

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

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0035-C0051 (RPO LT1): WHEEL SPEED SENSOR > DIAGNOSTIC AIDS

- Do not use a magnet to clean the encoder ring.
- Inspect the wheel encoder ring for rust or corrosion.

- Inspect the wheel speed sensors and components for the correct parts.
- If two or more wheel speed sensors are inoperative, diagnose each wheel speed sensor individually.
- If symptom code 0F, 27, or 5A is 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.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0035-C0051 (RPO LT1): WHEEL SPEED SENSOR > REFERENCE INFORMATION

Schematic Reference

Antilock Brake System Schematics

Connector End View Reference

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- Testing for Intermittent Conditions and Poor Connections
- Wiring Repairs

Scan Tool Reference

Control Module References for scan tool information

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0035-C0051 (RPO LT1): WHEEL SPEED SENSOR > CIRCUIT/SYSTEM VERIFICATION

1. Drive the vehicle in a straight line at a speed greater than 40 km/h (25 MPH).
2. Verify all scan tool Wheel Speed Sensor parameters are within 1.6 km/h (1 MPH) of each other.

1. **If any parameter is not within 1.6 km/h (1 MPH) of each other.**

Refer to Circuit/System Testing.

1. **If each parameter is within 1.6 km/h (1 MPH) of each other.**

3. All OK.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0035-C0051 (RPO LT1): WHEEL SPEED SENSOR > CIRCUIT/SYSTEM TESTING

1. Inspect the appropriate B5 Wheel Speed Sensor and encoder ring for contamination, metallic particles, physical damage, incorrect installation and the correct component.

1. If contamination, physical damage, incorrect installation, or the wrong component is diagnosed

Repair or replace the applicable component.

1. If no contamination, physical damage, incorrect installation, or the wrong component is not diagnosed

2. 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.

3. Test for less than 1 V between the K17 Electronic Brake Control Module harness connector terminals listed below and ground:

1. B5LF Wheel Speed Sensor - Left Front - terminal 8 and terminal 19
2. B5LR Wheel Speed Sensor - Left Rear - terminal 18 and terminal 31
3. B5RF Wheel Speed Sensor - Right Front - terminal 4 and terminal 16
4. B5RR Wheel Speed Sensor - Right Rear - terminal 29 and terminal 17

1. If 1 V or greater

Repair the short to voltage on the circuit.

1. If less than 1 V

4. Ignition OFF.

5. Test for infinite resistance between the K17 Electronic Brake Control Module harness connector terminals listed below and ground:

1. B5LF Wheel Speed Sensor - Left Front - terminal 8 and terminal 19
2. B5LR Wheel Speed Sensor - Left Rear - terminal 18 and terminal 31
3. B5RF Wheel Speed Sensor - Right Front - terminal 4 and terminal 16
4. B5RR Wheel Speed Sensor - Right Rear - terminal 29 and terminal 17

1. If less than infinite resistance

Repair the short to ground on the circuit.

1. If infinite resistance

6. 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:

1. B5LF Wheel Speed Sensor - Left Front - terminal 19
2. B5LR Wheel Speed Sensor - Left Rear - terminal 31
3. B5RF Wheel Speed Sensor - Right Front - terminal 16
4. B5RR Wheel Speed Sensor - Right Rear - terminal 17

1. If 2 Ω or greater

Repair the open/high resistance in the circuit.

1. If less than 2 Ω

7. 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:

1. B5LF Wheel Speed Sensor - Left Front - terminal 8
2. B5LR Wheel Speed Sensor - Left Rear - terminal 18
3. B5RF Wheel Speed Sensor - Right Front - terminal 4
4. B5RR Wheel Speed Sensor - Right Rear - terminal 29

1. If 2 Ω or greater

Repair the open/high resistance in the circuit.

1. If less than 2 Ω

8. Replace the B5 Wheel Speed Sensor.

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

1. If the DTC sets

Replace the K17 Electronic Brake Control Module.

1. If the DTC does not set

10. All OK.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0035-C0051 (RPO LT1): WHEEL SPEED SENSOR > REPAIR INSTRUCTIONS

Perform the Diagnostic Repair Verification after completing the repair.

- Front Wheel Speed Sensor Replacement
- Rear Wheel Speed Sensor Replacement
- Control Module References for electronic brake control module replacement, programming and

setup

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0035-C0051 (RPO LGX/LTG): 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.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0035-C0051 (RPO LGX/LTG): WHEEL SPEED SENSOR > DTC DESCRIPTORS

DTC C0035

Left Front Wheel Speed Sensor Circuit

DTC C0036

Left Front Wheel Speed Sensor Range Performance

DTC C003A

Front Wheel Speed Sensor Circuit

DTC C0040

Right Front Wheel Speed Sensor Circuit

DTC C0041

Right Front Wheel Speed Sensor Range Performance

DTC C0045

Left Rear Wheel Speed Sensor Circuit

DTC C0046

Left Rear Wheel Speed Sensor Range Performance

DTC C0050

Right Rear Wheel Speed Sensor Circuit

DTC C0051

Right Rear Wheel Speed Sensor Range Performance

For symptom byte information refer to Symptom Byte List

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0035-C0051 (RPO LGX/LTG): WHEEL SPEED SENSOR > DIAGNOSTIC FAULT INFORMATION

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Signal High - Left Front	C0035 00	C0035 00	C0245 00	C0035 18, C0035 0F, C0035 27
Signal Low - Left Front	C0035 00	C0035 00	C0035 00	C0035 18, C0035 0F, C0035 27
Signal High - Right Front	C0040 00	C0040 00	C0245 00	C0040 18, C0040 0F, C0040 27
Signal Low - Right Front	C0040 00	C0040 00	C0040 00	C0040 18, C0040 0F, C0040 27
Signal High - Left Rear	C0045 00	C0045 00	C0245 00	C0045 18, C0045 0F, C0045 27, C0055 67
Signal Low - Left Rear	C0045 00	C0045 00	C0045 00	C0045 18, C0045 0F, C0045 27, C0055 67
Signal High - Right Rear	C0050 00	C0050 00	C0245 00	C0050 18, C0050 0F, C0050 27, C0055 67
Signal Low - Right Rear	C0050 00	C0050 00	C0050 00	C0050 18, C0050 0F, C0050 27, C0055 67

Component	Condition	DTC Symptom Byte
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 - Incorrect part wheel speed sensor installed	08, 0F, 27, 29, 66, or 67

- | | | |
|--|---|--|
| | <ul style="list-style-type: none"> • Wheel speed sensor installed on incorrect side of same axle | |
|--|---|--|

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0035-C0051 (RPO LGX/LTG): WHEEL SPEED SENSOR > 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 speed.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0035-C0051 (RPO LGX/LTG): WHEEL SPEED SENSOR > CONDITIONS FOR RUNNING THE DTC

C0035 00 - C0050 00, C0035 18 - C0050 18, or C0035 27 - C0050 27

Ignition ON

C0035 0F - C0050 0F or C0035 5A - C0050 5A

Vehicle speed is greater than 60 km/h (37 MPH).

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0035-C0051 (RPO LGX/LTG): WHEEL SPEED SENSOR > CONDITIONS FOR SETTING THE DTC

C0035 00, C0040 00, C0045 00, or C0050 00

- A short to ground, or open/high resistance on the wheel speed sensor signal high circuit is detected for 0.2 sec.
- A short to voltage, short to ground, or open/high resistance on the wheel speed sensor signal low circuit is detected for 0.2 sec.

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

- An erratic wheel speed sensor signal is detected.

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

- Incorrectly mounted wheel speed sensor.
- Debris on the wheel speed sensor or the tone ring.
- Missing tooth or teeth on the wheel speed sensor tone ring.

- Air gap between the wheel speed sensor and the encoder ring.
- Electrical magnetic interference with the wheel speed sensor harness.

C0035 27, C0040 27, C0045 27, or C0050 27

- Debris on the wheel speed sensor tone ring.
- Missing tooth or teeth on the wheel speed sensor tone ring.
- Air gap between the wheel speed sensor and the encoder ring too large.

C0035 67, C0040 67, C0045 67, or C0050 67

- An incorrect part wheel speed sensor signal is detected.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0035-C0051 (RPO LGX/LTG): WHEEL SPEED SENSOR > ACTION TAKEN WHEN THE DTC SETS

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

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0035-C0051 (RPO LGX/LTG): WHEEL SPEED SENSOR > CONDITIONS FOR CLEARING THE DTC

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

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0035-C0051 (RPO LGX/LTG): WHEEL SPEED SENSOR > DIAGNOSTIC AIDS

- Do not use a magnet to clean the encoder ring.
- Inspect the wheel encoder ring for rust or corrosion.
- Inspect the wheel speed sensors and components for the correct parts.
- If two or more wheel speed sensors are inoperative, diagnose each wheel speed sensor individually.
- If symptom code 0F, 27, or 5A is 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.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0035-C0051 (RPO LGX/LTG): WHEEL SPEED SENSOR > REFERENCE INFORMATION

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Antilock Brake System Schematics

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- Wiring Repairs

Scan Tool Reference

Control Module References for scan tool information

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0035-C0051 (RPO LGX/LTG): WHEEL SPEED SENSOR > CIRCUIT/SYSTEM VERIFICATION

1. Drive the vehicle in a straight line at a speed greater than 40 km/h (25 MPH).
2. Verify all scan tool Wheel Speed Sensor parameters are within 1.6 km/h (1 MPH) of each other.

1. **If any parameter is not within 1.6 km/h (1 MPH) of each other.**

Refer to Circuit/System Testing.

1. **If each parameter is within 1.6 km/h (1 MPH) of each other.**

3. All OK.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0035-C0051 (RPO LGX/LTG): WHEEL SPEED SENSOR > CIRCUIT/SYSTEM TESTING

1. Inspect the appropriate B5 Wheel Speed Sensor and encoder ring for contamination, metallic particles, physical damage, incorrect installation and the correct component.

1. **If contamination, physical damage, incorrect installation, or the wrong component is diagnosed**

- Repair or replace the applicable component.

1. **If no contamination, physical damage, incorrect installation, or the wrong component is not diagnosed**

2. 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.

3. Test for less than 1 V between the K17 Electronic Brake Control Module harness connector terminals listed below and ground:

1. B5LF Wheel Speed Sensor - Left Front - terminal 7 and terminal 24
 2. B5LR Wheel Speed Sensor - Left Rear - terminal 23 and terminal 39
 3. B5RF Wheel Speed Sensor - Right Front - terminal 26 and terminal 21
 4. B5RR Wheel Speed Sensor - Right Rear - terminal 37 and terminal 22

1. **If 1 V or greater**

- Repair the short to voltage on the circuit.

1. **If less than 1 V**

4. Ignition OFF.

5. Test for infinite resistance between the K17 Electronic Brake Control Module harness connector terminals listed below and ground:

1. B5LF Wheel Speed Sensor - Left Front - terminal 7 and terminal 24
 2. B5LR Wheel Speed Sensor - Left Rear - terminal 23 and terminal 39
 3. B5RF Wheel Speed Sensor - Right Front - terminal 26 and terminal 21
 4. B5RR Wheel Speed Sensor - Right Rear - terminal 37 and terminal 22

1. **If less than infinite resistance**

- Repair the short to ground on the circuit.

1. **If infinite resistance**

6. 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:

1. B5LF Wheel Speed Sensor - Left Front - terminal 24
 2. B5LR Wheel Speed Sensor - Left Rear - terminal 39

3. B5RF Wheel Speed Sensor - Right Front - terminal 21

4. B5RR Wheel Speed Sensor - Right Rear - terminal 22

1. If 2 Ω or greater

Repair the open/high resistance in the circuit.

1. If less than 2 Ω

7. 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:

1. B5LF Wheel Speed Sensor - Left Front - terminal 7

2. B5LR Wheel Speed Sensor - Left Rear - terminal 23

3. B5RF Wheel Speed Sensor - Right Front - terminal 26

4. B5RR Wheel Speed Sensor - Right Rear - terminal 37

1. If 2 Ω or greater

Repair the open/high resistance in the circuit.

1. If less than 2 Ω

8. Replace the B5 Wheel Speed Sensor.

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

1. If the DTC sets

Replace the K17 Electronic Brake Control Module.

1. If the DTC does not set

10. All OK.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0035-C0051 (RPO LGX/LTG): WHEEL SPEED SENSOR > REPAIR INSTRUCTIONS

Perform the Diagnostic Repair Verification after completing the repair.

- Front Wheel Speed Sensor Replacement
- Rear Wheel Speed Sensor Replacement
- Control Module References for electronic brake control module replacement, programming and setup

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0055: REAR WHEEL SPEED SENSOR CIRCUIT > DIAGNOSTIC INSTRUCTIONS

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

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0055: REAR WHEEL SPEED SENSOR CIRCUIT > DTC DESCRIPTOR

DTC C0055

Rear Wheel Speed Sensor Circuit

For symptom byte information refer to Symptom Byte List

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0055: REAR WHEEL SPEED SENSOR CIRCUIT > 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.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0055: REAR WHEEL SPEED SENSOR CIRCUIT > CONDITIONS FOR RUNNING THE DTC

Ignition ON

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0055: REAR WHEEL SPEED SENSOR CIRCUIT > CONDITIONS FOR SETTING THE DTC

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

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0055: REAR WHEEL SPEED SENSOR CIRCUIT > ACTION TAKEN WHEN THE DTC SETS

Specific subsystems will not function or operate in degraded mode.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0055: REAR WHEEL

SPEED SENSOR CIRCUIT > CONDITIONS FOR CLEARING THE DTC

A current DTC clears when the diagnostic runs and passes.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0055: REAR WHEEL SPEED SENSOR CIRCUIT > REFERENCE INFORMATION

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- Wiring Repairs

Scan Tool Reference

Control Module References for scan tool information

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0055: REAR WHEEL SPEED SENSOR CIRCUIT > DIAGNOSTIC AIDS

This DTC can be set due to an incorrect part wheel speed sensor installed.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0055: REAR WHEEL SPEED SENSOR CIRCUIT > 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).

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0055: REAR WHEEL SPEED SENSOR CIRCUIT > CIRCUIT/SYSTEM TESTING

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

1. If any listed DTC is set

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

1. 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.

1. If the DTC sets

Replace the module that set the DTC.

1. If the DTC does not set

5. All OK.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0055: REAR WHEEL SPEED SENSOR CIRCUIT > REPAIR INSTRUCTIONS

Perform the Diagnostic Repair Verification after completing the repair.

Control Module References for control module replacement, programming and setup

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C005A: SIMULTANEOUS MALFUNCTION OF BOTH WHEEL SPEED SENSORS ON ONE AXLE MALFUNCTION > DIAGNOSTIC INSTRUCTIONS

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

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C005A: SIMULTANEOUS MALFUNCTION OF BOTH WHEEL SPEED SENSORS ON ONE AXLE MALFUNCTION > DTC DESCRIPTOR

DTC C005A

Simultaneous Malfunction of Both Wheel Speed Sensors on One Axle Malfunction

For symptom byte information refer to Symptom Byte List

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C005A: SIMULTANEOUS MALFUNCTION OF BOTH WHEEL SPEED SENSORS ON ONE AXLE MALFUNCTION > 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 module uses the frequency of the square wave signal to calculate the wheel speed.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C005A: SIMULTANEOUS MALFUNCTION OF BOTH WHEEL SPEED SENSORS ON ONE AXLE MALFUNCTION > CONDITIONS FOR RUNNING THE DTC

- Vehicle in Service Mode or Vehicle ON
- Ignition voltage is greater than 10 V.
- Two wheel speeds are greater than 5 km/h (3 MPH).

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C005A: SIMULTANEOUS MALFUNCTION OF BOTH WHEEL SPEED SENSORS ON ONE AXLE MALFUNCTION > CONDITIONS FOR SETTING THE DTC

Simultaneous dropout of both wheel speed sensors on the same axle.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C005A: SIMULTANEOUS MALFUNCTION OF BOTH WHEEL SPEED SENSORS ON ONE AXLE MALFUNCTION > ACTIONS TAKEN WHEN THE DTC SETS

- The ABS indicator turns ON.
- The red brake indicator turns ON.
- The traction control/stability control indicator turns ON.
- The Service Brake Assist and Service StabiliTrak messages are displayed on the driver information center.
- The electronic brake control module disables the antilock brake system, the dynamic rear proportioning, the traction control system and the electronic stability program for the duration of the drive cycle.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C005A: SIMULTANEOUS MALFUNCTION OF BOTH WHEEL SPEED SENSORS ON ONE AXLE MALFUNCTION > 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.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C005A: SIMULTANEOUS MALFUNCTION OF BOTH WHEEL SPEED SENSORS ON ONE AXLE MALFUNCTION > REFERENCE INFORMATION

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Scan Tool Reference

Control Module References for scan tool information

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C005A: SIMULTANEOUS MALFUNCTION OF BOTH WHEEL SPEED SENSORS ON ONE AXLE MALFUNCTION > CIRCUIT/SYSTEM VERIFICATION

1. Ignition on.
2. Verify that DTC C005A is not set.

1. If the DTC is set

Refer to DTC C0035-C0051 (RPO LT1) DTC C0035-C0051 (RPO LGX/LTG) .

1. If the DTC is not set

3. All OK.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0110 (RPO LGX/LTG): PUMP MOTOR CIRCUIT MALFUNCTION > DIAGNOSTIC INSTRUCTIONS

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

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0110 (RPO LGX/LTG): PUMP MOTOR CIRCUIT MALFUNCTION > DTC DESCRIPTOR

DTC C0110

Pump Motor Circuit Malfunction

For symptom byte information refer to Symptom Byte List

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0110 (RPO LGX/LTG): PUMP MOTOR CIRCUIT MALFUNCTION > DIAGNOSTIC FAULT INFORMATION

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
B+	C0110 03	C0110 00	C0110 07	C0110 39, C0110 59
Ground	-	C0110 00	-	-

Component	Condition	DTC
Pump Motor	• Wear • Damage • Lock	C0110 61

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0110 (RPO LGX/LTG): PUMP MOTOR CIRCUIT MALFUNCTION > CIRCUIT/SYSTEM DESCRIPTION

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

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0110 (RPO LGX/LTG): PUMP MOTOR CIRCUIT MALFUNCTION > CONDITIONS FOR RUNNING THE DTC

C0110 00

- Ignition ON
- The pump motor is commanded ON.

C0110 03, or C0110 07

- Ignition ON
- Vehicle speed is greater than 30 km/h (18.6 MPH) for 7 s.

C0110 39, C0110 59, or C0110 61

- Ignition ON
- Vehicle speed is greater than 60 km/h (37.3 MPH) for 5 s.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0110 (RPO LGX/LTG): PUMP MOTOR CIRCUIT MALFUNCTION > CONDITIONS FOR SETTING THE DTC

C0110 00

An open/high resistance is detected on the pump motor switch circuit.

C0110 03

Worn out pump motor brushes are detected.

C0110 07

A short to voltage is detected on the pump motor ground circuit.

C0110 39

A shorted circuit is detected in the pump motor circuit.

C0110 59

The pump motor is overheating.

C0110 61

- The pump motor is mechanically blocked.

- The pump motor is actuated but no generated motor voltage is detected.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0110 (RPO LGX/LTG): PUMP MOTOR CIRCUIT MALFUNCTION > ACTION TAKEN WHEN THE DTC SETS

- The ABS indicator turns ON.
- The red brake indicator turns ON.
- The traction/stability control indicator turns ON.
- The driver information center may display a message.
- The electronic brake control module disables the ABS, the traction control and the stability control for the duration of the ignition cycle.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0110 (RPO LGX/LTG): PUMP MOTOR CIRCUIT MALFUNCTION > CONDITIONS FOR CLEARING THE DTC

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

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0110 (RPO LGX/LTG): PUMP MOTOR CIRCUIT MALFUNCTION > REFERENCE INFORMATION

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Scan Tool Reference

**DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0110 (RPO LGX/LTG):
PUMP MOTOR CIRCUIT MALFUNCTION > CIRCUIT/SYSTEM VERIFICATION**

1. Ignition ON.
2. Verify the ABS pump motor turns On and Off when commanding the ABS Motor On and Off with a scan tool.
 1. **If the pump motor does not turn On and Off**
Refer to Circuit/System Testing.
 1. **If the pump motor turns On and Off**
3. All OK.

**DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0110 (RPO LGX/LTG):
PUMP MOTOR CIRCUIT MALFUNCTION > 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 ground circuit terminal 14 and ground.
 1. **If 10 Ω or greater**
 1. Ignition OFF.
 2. Test for less than 2 Ω in the ground circuit end to end.
 1. If 2 Ω or greater, repair the open/high resistance in the circuit.
 2. If less than 2 Ω , repair the open/high resistance in the ground connection.
 1. **If less than 10 Ω**
3. Ignition ON.
4. Verify that a test lamp illuminates between the B+ circuit terminal 1 and ground.
 1. **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 B+ circuit end to end.
 1. If 2 Ω or greater, repair the open/high resistance the in the circuit.
 2. If less than 2 Ω , verify the fuse is not open and there is voltage at the fuse.

1. 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 B+ circuit and ground.
 1. If less than infinite resistance, repair the short to ground on the circuit.
 2. If infinite resistance, replace the Q5 Brake Pressure Modulator.

1. 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.

1. If the DTC sets

Replace the K17 Electronic Brake Control Module.

1. If the DTC does not set

7. All OK.

**DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0110 (RPO LGX/LTG):
PUMP MOTOR CIRCUIT MALFUNCTION > REPAIR INSTRUCTIONS**

Perform the Diagnostic Repair Verification after completing the repair.

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

**DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0110 (RPO LT1): PUMP
MOTOR CIRCUIT MALFUNCTION > DIAGNOSTIC INSTRUCTIONS**

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

**DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0110 (RPO LT1): PUMP
MOTOR CIRCUIT MALFUNCTION > DTC DESCRIPTOR**

DTC C0110

Pump Motor Circuit Malfunction

For symptom byte information refer to Symptom Byte List

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0110 (RPO LT1): PUMP MOTOR CIRCUIT MALFUNCTION > DIAGNOSTIC FAULT INFORMATION

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
B+	C0110 03	C0110 00	C0110 07	C0110 39, C0110 59
Ground	-	C0110 00	-	-

Component	Condition	DTC
Pump Motor	• Wear • Damage • Lock	C0110 61

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0110 (RPO LT1): PUMP MOTOR CIRCUIT MALFUNCTION > CIRCUIT/SYSTEM DESCRIPTION

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

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0110 (RPO LT1): PUMP MOTOR CIRCUIT MALFUNCTION > CONDITIONS FOR RUNNING THE DTC

C0110 00

- Ignition ON
- The pump motor is commanded ON.

C0110 03, or C0110 07

- Ignition ON
- Vehicle speed is greater than 30 km/h (18.6 MPH) for 7 s.

C0110 39, C0110 59, or C0110 61

- Ignition ON

- Vehicle speed is greater than 60 km/h (37.3 MPH) for 5 s.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0110 (RPO LT1): PUMP MOTOR CIRCUIT MALFUNCTION > CONDITIONS FOR SETTING THE DTC

C0110 00

An open/high resistance is detected on the pump motor switch circuit.

C0110 03

Worn out pump motor brushes are detected.

C0110 07

A short to voltage is detected on the pump motor ground circuit.

C0110 39

A shorted circuit is detected in the pump motor circuit.

C0110 59

The pump motor is overheating.

C0110 61

- The pump motor is mechanically blocked.
- The pump motor is actuated but no generated motor voltage is detected.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0110 (RPO LT1): PUMP MOTOR CIRCUIT MALFUNCTION > ACTION TAKEN WHEN THE DTC SETS

- The ABS indicator turns ON.
- The red brake indicator turns ON.
- The traction/stability control indicator turns ON.
- The driver information center may display a message.
- The electronic brake control module disables the ABS, the traction control and the stability control for the duration of the ignition cycle.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0110 (RPO LT1): PUMP MOTOR CIRCUIT MALFUNCTION > CONDITIONS FOR CLEARING THE DTC

- When the condition for setting the DTC is no longer present.

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

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0110 (RPO LT1): PUMP MOTOR CIRCUIT MALFUNCTION > REFERENCE INFORMATION

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Scan Tool Reference

Control Module References for scan tool information

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0110 (RPO LT1): PUMP MOTOR CIRCUIT MALFUNCTION > CIRCUIT/SYSTEM VERIFICATION

1. Ignition ON.
2. Verify the ABS pump motor turns On and Off when commanding the ABS Motor On and Off with a scan tool.
 1. **If the pump motor does not turn On and Off**
Refer to Circuit/System Testing.
 1. **If the pump motor turns On and Off**
3. All OK.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0110 (RPO LT1): PUMP MOTOR CIRCUIT MALFUNCTION > 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 ground circuit terminal 13 and ground.

1. **If 10 Ω or greater**

1. Ignition OFF.

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

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

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

1. **If less than 10 Ω**

3. Ignition ON.

4. Verify that a test lamp illuminates between the B+ circuit terminal 1 and ground.

1. **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 B+ circuit end to end.

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

2. If less than 2 Ω , verify the fuse is not open and there is voltage at the fuse.

1. **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 B+ circuit and ground.

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

2. If infinite resistance, replace the Q5 Brake Pressure Modulator.

1. **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.

1. **If the DTC sets**

- Replace the K17 Electronic Brake Control Module.

1. **If the DTC does not set**

7. All OK.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0110 (RPO LT1): PUMP MOTOR CIRCUIT MALFUNCTION > REPAIR INSTRUCTIONS

Perform the Diagnostic Repair Verification after completing the repair.

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

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0115: PUMP MOTOR STUCK > 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 INFORMATION AND PROCEDURES > DTC C0115: PUMP MOTOR STUCK > DTC DESCRIPTOR

DTC C0115 61

Pump Motor Stuck

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0115: PUMP MOTOR STUCK > DIAGNOSTIC FAULT INFORMATION

Component	Condition	DTCs
Pump Motor	• Wear • Damage • Lock	C0115 61

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0115: PUMP MOTOR STUCK > CIRCUIT/SYSTEM DESCRIPTION

The pump motor is an integral part of the brake pressure modulator valve, 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, the traction control or the stability control operation is required, the

electronic brake control module activates the pump motor relay and turns the pump motor ON.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0115: PUMP MOTOR STUCK > CONDITIONS FOR RUNNING THE DTC

- Ignition ON.
- Vehicle speed is greater than 60 km/h (37.3 MPH) for 5 s.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0115: PUMP MOTOR STUCK > CONDITIONS FOR SETTING THE DTC

- The pump motor is mechanically blocked.
- The pump motor is actuated but no generated motor voltage is detected.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0115: PUMP MOTOR STUCK > ACTION TAKEN WHEN THE DTC SETS

- The ABS indicator turns ON.
- The red brake indicator turns ON.
- The traction/stability control indicator turns ON.
- The driver information center may display a message.
- The electronic brake control module disables the ABS, the traction control and the stability control for the duration of the ignition cycle.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0115: PUMP MOTOR STUCK > 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 in the next ignition cycle.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0115: PUMP MOTOR STUCK > DIAGNOSTIC AIDS

DTC C0115 61 may set due to extended operation of the ABS, the traction control or the stability control, review with the customer the conditions under which the DTC set.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0115: PUMP MOTOR STUCK > REFERENCE INFORMATION

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Control Module References for scan tool information

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0115: PUMP MOTOR STUCK > CIRCUIT/SYSTEM VERIFICATION

1. Ignition ON.
2. Verify that DTC C0110 is not set.
 1. **If DTC C0110 is set**

Refer to DTC C0110 (RPO LGX/LTG) DTC C0110 (RPO LT1) .
 1. **If DTC C0110 is not set**
3. Verify that DTC C0115 does not set while driving the vehicle under normal braking conditions.
 1. **If DTC C0115 sets**

Replace the Q5 Brake Pressure Modulator.
 1. **If DTC C0115 does not set**
4. All OK.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0115: PUMP MOTOR STUCK > REPAIR INSTRUCTIONS

Perform the Diagnostic Repair Verification after completing the repair.

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

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0116: PUMP MOTOR RELAY 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.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0116: PUMP MOTOR RELAY CIRCUIT > DTC DESCRIPTORS

DTC C0116

Pump Motor Relay Circuit

For symptom byte information refer to Symptom Byte List .

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0116: PUMP MOTOR RELAY CIRCUIT > DIAGNOSTIC FAULT INFORMATION

Component	Condition	DTCs
Pump motor relay	• Wear • Damage • Lock	C0116

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0116: PUMP MOTOR RELAY CIRCUIT > CIRCUIT/SYSTEM DESCRIPTION

The pump motor is an integral part of the brake pressure modulator valve assembly, 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 control or stability control operation is required, the electronic brake control module activates the pump motor relay and turns the pump motor ON.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0116: PUMP MOTOR RELAY CIRCUIT > CONDITIONS FOR RUNNING THE DTC

Ignition ON.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0116: PUMP MOTOR RELAY CIRCUIT > CONDITIONS FOR SETTING THE DTC

- The pump motor relay has an internal failure
- The pump motor relay voltage is greater than threshold.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0116: PUMP MOTOR RELAY CIRCUIT > ACTION TAKEN WHEN THE DTC SETS

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

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0116: PUMP MOTOR RELAY CIRCUIT > 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 in the next ignition cycle.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0116: PUMP MOTOR RELAY CIRCUIT > REFERENCE INFORMATION

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Scan Tool Reference

Control Module References for scan tool information

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0116: PUMP MOTOR RELAY CIRCUIT > CIRCUIT/SYSTEM VERIFICATION

1. Ignition ON.
2. Verify that DTC C0110 is not set.

1. If DTC C0110 is set

Refer to DTC C0110 (RPO LGX/LTG) DTC C0110 (RPO LT1) to diagnose that DTC prior to this diagnostic.

1. If DTC C0110 is not set

3. Replace the K17 Electronic Brake Control Module.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0116: PUMP MOTOR RELAY CIRCUIT > REPAIR INSTRUCTIONS

Perform the Diagnostic Repair Verification after completing the repair.

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

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0121: VALVE RELAY CIRCUIT MALFUNCTION > DIAGNOSTIC INSTRUCTIONS

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

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0121: VALVE RELAY CIRCUIT MALFUNCTION > DTC DESCRIPTOR

DTC C0121

Valve Relay Circuit Malfunction

For symptom byte information refer to Symptom Byte List

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0121: VALVE RELAY CIRCUIT MALFUNCTION > DIAGNOSTIC FAULT INFORMATION

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
B+	C0121 00	C0121 00	-	-
Ground	-	C0121 00	-	-

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0121: VALVE RELAY CIRCUIT MALFUNCTION > CIRCUIT/SYSTEM DESCRIPTION

The valve relay is an integral part of the electronic brake control module (EBCM), while the solenoid valves are integral to the brake pressure modulator valve assembly. The valve relay is engaged during normal system operation and provides voltage to the solenoid valves. When the ABS control operation is required, the EBCM controls the solenoid valves by providing ground to the active solenoid valves.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0121: VALVE RELAY CIRCUIT MALFUNCTION > CONDITIONS FOR RUNNING THE DTC

- Vehicle speed is greater than 6 km/h (4 MPH) with the brake pedal not applied.
- OR
- Vehicle speed is greater than 15 km/h (9 MPH) and the brake pedal is not actuated.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0121: VALVE RELAY CIRCUIT MALFUNCTION > CONDITIONS FOR SETTING THE DTC

- The EBCM is requesting valve activation and the relay output voltage is low.
- The EBCM is not requesting valve activation and the relay output voltage is B+.
- The EBCM detects 3 or more solenoid valve circuits are open or shorted during the self-test.

- A malfunction exists within the EBCM.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0121: VALVE RELAY CIRCUIT MALFUNCTION > ACTION TAKEN WHEN THE DTC SETS

- The EBCM disables the ABS for the duration of the ignition cycle.
- The ABS indicator turns ON.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0121: VALVE RELAY CIRCUIT MALFUNCTION > CONDITIONS FOR CLEARING THE DTC

- A current DTC clears when the diagnostic runs and passes.
- The EBCM will turn OFF the indicator and enable the system functions in the next ignition cycle.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0121: VALVE RELAY CIRCUIT MALFUNCTION > REFERENCE INFORMATION

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Control Module References for scan tool information

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0121: VALVE RELAY CIRCUIT MALFUNCTION > CIRCUIT/SYSTEM VERIFICATION

Ignition ON, command the ABS Solenoid Valves On and Off with the scan tool. The solenoid valves should turn ON and OFF.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0121: VALVE RELAY CIRCUIT MALFUNCTION > CIRCUIT/SYSTEM TESTING

1. Ignition OFF, disconnect the harness connector at the K17 Electronic Brake Control Module (EBCM).
2. Test for less than 5 Ω between the ground circuit terminals listed below:
 1. Ground circuit terminal 13 and ground.
 2. Ground circuit terminal 38 and ground.
- 1. If greater than 5 Ω**
3. Test/repair the ground circuit for an open/high resistance.
 - 1. If less than 5 Ω**
4. Replace the K17 Electronic Brake Control Module

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0121: VALVE RELAY CIRCUIT MALFUNCTION > REPAIR INSTRUCTIONS

Perform the Diagnostic Repair Verification after completing the diagnostic procedure.

Control Module References for EBCM replacement, setup and programming

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0131: TRACTION CONTROL SYSTEM PRESSURE CIRCUIT > DIAGNOSTIC INSTRUCTIONS

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

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0131: TRACTION CONTROL SYSTEM PRESSURE CIRCUIT > DTC DESCRIPTORS

DTC C0131

Traction Control System Pressure Circuit

For symptom byte information refer to Symptom Byte List

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0131: TRACTION CONTROL SYSTEM PRESSURE CIRCUIT > CIRCUIT/SYSTEM DESCRIPTION

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

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0131: TRACTION CONTROL SYSTEM PRESSURE CIRCUIT > CONDITIONS FOR RUNNING THE DTC

- The engine is running.
- The brake pedal has been applied and released.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0131: TRACTION CONTROL SYSTEM PRESSURE CIRCUIT > CONDITIONS FOR SETTING THE DTC

C0131 00

The electronic brake control module detects an invalid or erratic brake pressure sensor signal.

C0131 1A

The offset value of the pressure sensor is out of the specified range.

C0131 3B

The brake pressure sensor is not calibrated.

C0131 5A

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

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0131: TRACTION CONTROL SYSTEM PRESSURE CIRCUIT > ACTION TAKEN WHEN THE DTC SETS

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

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0131: TRACTION CONTROL SYSTEM PRESSURE CIRCUIT > CONDITIONS FOR CLEARING THE DTC

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

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0131: TRACTION CONTROL SYSTEM PRESSURE CIRCUIT > REFERENCE INFORMATION

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Control Module References for scan tool information

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0131: TRACTION CONTROL SYSTEM PRESSURE CIRCUIT > CIRCUIT/SYSTEM VERIFICATION

1. Ignition ON.
2. Apply and release brake pedal. Verify the brake stop lamps operate properly.
 1. **If the brake stop lamps do not operate properly**
Refer to Symptoms - Lighting .
 1. **If the brake stop lamps operate properly**
3. Verify that DTC C0131 is not set.

1. If the DTC is set

1. Perform the Brake Pressure Modulator Valve Pressure Sensor Calibration .
2. Verify the DTC does not set.
 1. If the DTC sets, replace the K17 Electronic Brake Control Module with the Brake Pressure Modulator.
 1. If the DTC does not set
3. All OK.

1. If the DTC is not set

4. All OK.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0131: TRACTION CONTROL SYSTEM PRESSURE CIRCUIT > REPAIR INSTRUCTIONS

Perform the Diagnostic Repair Verification after completing the repair.

- Electronic Brake Control Module Replacement
- Control Module References for electronic brake control module replacement, programming and setup

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0161: ANTILOCK BRAKING SYSTEM BRAKE SWITCH CIRCUIT NOT PLAUSIBLE > DIAGNOSTIC INSTRUCTIONS

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

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0161: ANTILOCK BRAKING SYSTEM BRAKE SWITCH CIRCUIT NOT PLAUSIBLE > DTC DESCRIPTOR

DTC C0161 5A

Antilock Braking System Brake Switch Circuit Not Plausible

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0161: ANTILOCK BRAKING SYSTEM BRAKE SWITCH CIRCUIT NOT PLAUSIBLE > CIRCUIT/SYSTEM DESCRIPTION

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

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0161: ANTILOCK BRAKING SYSTEM BRAKE SWITCH CIRCUIT NOT PLAUSIBLE > CONDITIONS FOR RUNNING THE DTC

Ignition ON.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0161: ANTILOCK BRAKING SYSTEM BRAKE SWITCH CIRCUIT NOT PLAUSIBLE > CONDITIONS FOR SETTING THE DTC

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

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0161: ANTILOCK BRAKING SYSTEM BRAKE SWITCH CIRCUIT NOT PLAUSIBLE > CONDITIONS FOR CLEARING THE DTC

A current DTC clears when the diagnostic runs and passes.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0161: ANTILOCK BRAKING SYSTEM BRAKE SWITCH CIRCUIT NOT PLAUSIBLE > ACTION TAKEN WHEN THE DTC SETS

No actions are taken

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0161: ANTILOCK BRAKING SYSTEM BRAKE SWITCH CIRCUIT NOT PLAUSIBLE > DIAGNOSTIC AIDS

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

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0161: ANTILOCK BRAKING SYSTEM BRAKE SWITCH CIRCUIT NOT PLAUSIBLE > REFERENCE INFORMATION

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Control Module References for scan tool information

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0161: ANTILOCK BRAKING SYSTEM BRAKE SWITCH CIRCUIT NOT PLAUSIBLE > CIRCUIT/SYSTEM VERIFICATION

1. Ignition ON.

2. Verify DTC C0277 or C0890 is not set.

1. If either DTC is set

Refer to DTC C0277 or C0890 .

1. If either DTC is not set

3. Verify the brake pedal position sensor or the brake pedal is not binding causing residual brake pressure to be detected, while the brake lights operate properly.

1. If a condition is found

Repair or replace the applicable component.

1. If a condition is not found

4. Verify the scan tool Electronic Brake Control Module Brake Pedal Position Sensor parameter changes between Active and Inactive while applying and releasing the brake pedal.

1. If the parameter does not change between Active and Inactive

Refer to Symptoms - Lighting .

1. If the parameter changes between Active and Inactive

5. Refer to Diagnostic Aids, All OK.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0179: SYSTEM THERMAL HIGH MALFUNCTION > DIAGNOSTIC INSTRUCTIONS

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

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0179: SYSTEM THERMAL HIGH MALFUNCTION > DTC DESCRIPTOR

DTC C0179 59

System Thermal High Malfunction

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0179: SYSTEM THERMAL HIGH MALFUNCTION > 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.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0179: SYSTEM THERMAL HIGH MALFUNCTION > CONDITIONS FOR RUNNING THE DTC

Ignition ON.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0179: SYSTEM THERMAL HIGH MALFUNCTION > CONDITIONS FOR SETTING THE DTC

The electronic brake control module detects the calculated temperature of the brake components is

higher than 500°C (932°F).

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0179: SYSTEM THERMAL HIGH MALFUNCTION > ACTION TAKEN WHEN THE DTC SETS

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

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0179: SYSTEM THERMAL HIGH MALFUNCTION > 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 INFORMATION AND PROCEDURES > DTC C0179: SYSTEM THERMAL HIGH MALFUNCTION > DIAGNOSTIC AIDS

DTC C0179 does not indicate a malfunction has occurred. This DTC indicates there was excessive ABS, traction control or stability control activation that caused the high temperatures.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0179: SYSTEM THERMAL HIGH MALFUNCTION > REFERENCE INFORMATION

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DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0179: SYSTEM THERMAL HIGH MALFUNCTION > 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.
 1. **If any other DTCs are set**

Refer to Diagnostic Trouble Code (DTC) List - Vehicle .
 1. **If no other DTCs are set**
3. Verify DTC C0179 does not set while driving the vehicle under normal braking conditions.
 1. **If the DTC sets**

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

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0179: SYSTEM THERMAL HIGH MALFUNCTION > REPAIR INSTRUCTIONS

Perform the Diagnostic Repair Verification after completing the repair.

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

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0186, C018B, C0196, C019B, C027E, OR C0287: LATERAL ACCELERATION SENSOR, YAW RATE SIGNAL, LONGITUDINAL ACCELERATION SENSOR > DIAGNOSTIC INSTRUCTIONS

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

- Diagnostic Procedure Instructions provides an overview of each diagnostic category.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0186, C018B, C0196, C019B, C027E, OR C0287: LATERAL ACCELERATION SENSOR, YAW RATE SIGNAL, LONGITUDINAL ACCELERATION SENSOR > DTC DESCRIPTORS

DTC C0186 5A

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

DTC C0186 71

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

DTC C018B 5A

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

DTC C0196 00

Yaw Rate Signal Malfunction (Electronic Brake Control Module)

DTC C0196 5A

Yaw Rate Signal Not Plausible (Electronic Brake Control Module)

DTC C0196 71

Yaw Rate Signal Invalid Data (Electronic Brake Control Module)

DTC C019B 5A

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

DTC C027E 5A

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

DTC C0287 4B

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

DTC C0287 5A

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

DTC C0287 71

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

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0186, C018B, C0196, C019B, C027E, OR C0287: LATERAL ACCELERATION SENSOR, YAW RATE SIGNAL, LONGITUDINAL ACCELERATION SENSOR > DTC DESCRIPTORS

LONGITUDINAL ACCELERATION SENSOR > 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.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0186, C018B, C0196, C019B, C027E, OR C0287: LATERAL ACCELERATION SENSOR, YAW RATE SIGNAL, LONGITUDINAL ACCELERATION SENSOR > CONDITIONS FOR RUNNING THE DTC

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

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0186, C018B, C0196, C019B, C027E, OR C0287: LATERAL ACCELERATION SENSOR, YAW RATE SIGNAL, LONGITUDINAL ACCELERATION SENSOR > CONDITIONS FOR SETTING THE DTC

C0186 00 or C018B 5A

The lateral acceleration signal is out of the specified range.

C0186 5A

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

C0186 71

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

C0196 00 or C019B 5A

The yaw rate signal is out of the specified range.

C0196 5A

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

C0196 71

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

C027E 5A

The longitudinal acceleration signal is not plausible.

C0287 4B

The longitudinal acceleration sensor is not calibrated.

C0287 5A

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

C0287 71

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

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0186, C018B, C0196, C019B, C027E, OR C0287: LATERAL ACCELERATION SENSOR, YAW RATE SIGNAL, LONGITUDINAL ACCELERATION SENSOR > ACTION TAKEN WHEN THE DTC SETS

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

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0186, C018B, C0196, C019B, C027E, OR C0287: LATERAL ACCELERATION SENSOR, YAW RATE SIGNAL, LONGITUDINAL ACCELERATION SENSOR > CONDITIONS FOR CLEARING THE DTC

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

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0186, C018B, C0196, C019B, C027E, OR C0287: LATERAL ACCELERATION SENSOR, YAW RATE SIGNAL, LONGITUDINAL ACCELERATION SENSOR > REFERENCE INFORMATION

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DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0186, C018B, C0196, C019B, C027E, OR C0287: LATERAL ACCELERATION SENSOR, YAW RATE SIGNAL, LONGITUDINAL ACCELERATION SENSOR > CIRCUIT/SYSTEM TESTING

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

1. 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.

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

2. Verify DTC C0186, C0196, or C0287 is not set in the K36 Inflatable Restraint Sensing and Diagnostic Module.

1. If any of the DTCs are set

Perform the Vehicle Yaw Sensor Learn .

1. If none of the DTCs are set

3. Verify DTC C0187, C0196, or C0287 is not set in the K17 Electronic Brake Control Module.

1. 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.
 1. If the DTC sets, replace the K17 Electronic Brake Control Module.
 1. If the DTC does not set
3. All OK.

1. If none of the DTCs are set

4. All OK.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0186, C018B, C0196, C019B, C027E, OR C0287: LATERAL ACCELERATION SENSOR, YAW RATE SIGNAL, LONGITUDINAL ACCELERATION SENSOR > REPAIR INSTRUCTIONS

Perform the Diagnostic Repair Verification after completing the repair.

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

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C018A, C019A, OR C027F: LATERAL ACCELERATION, YAW RATE, LONGITUDINAL ACCELERATION > 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 INFORMATION AND PROCEDURES > DTC C018A, C019A, OR C027F: LATERAL ACCELERATION, YAW RATE, LONGITUDINAL ACCELERATION > DTC DESCRIPTORS

DTC C018A

Lateral Acceleration Sensor 2 Signal

DTC C019A

Yaw Rate 2 Signal

DTC C027F

Longitudinal Acceleration Signals 1-2 Not Plausible

For symptom byte information refer to Symptom Byte List

**DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C018A, C019A, OR C027F:
LATERAL ACCELERATION, YAW RATE, LONGITUDINAL ACCELERATION >
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.

**DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C018A, C019A, OR C027F:
LATERAL ACCELERATION, YAW RATE, LONGITUDINAL ACCELERATION >
CONDITIONS FOR RUNNING THE DTC**

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

**DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C018A, C019A, OR C027F:
LATERAL ACCELERATION, YAW RATE, LONGITUDINAL ACCELERATION >
CONDITIONS FOR SETTING THE DTC**

C018A

The lateral acceleration signal 2 is out of the specified range.

C019A

The yaw rate signal 2 is out of the specified range.

C027F

Correlation concern between longitudinal acceleration signals 1 and 2.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C018A, C019A, OR C027F:

LATERAL ACCELERATION, YAW RATE, LONGITUDINAL ACCELERATION > ACTION TAKEN WHEN THE DTC SETS

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

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C018A, C019A, OR C027F: LATERAL ACCELERATION, YAW RATE, LONGITUDINAL ACCELERATION > CONDITIONS FOR CLEARING THE DTC

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

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C018A, C019A, OR C027F: LATERAL ACCELERATION, YAW RATE, LONGITUDINAL ACCELERATION > REFERENCE INFORMATION

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**DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C018A, C019A, OR C027F:
LATERAL ACCELERATION, YAW RATE, LONGITUDINAL ACCELERATION >
CIRCUIT/SYSTEM TESTING**

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

1. 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.

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

2. Verify DTC C0186, C0196, or C0287 is not set in the K36 Inflatable Restraint Sensing and Diagnostic Module.

1. If any of the DTCs are set

Perform the Vehicle Yaw Sensor Learn .

1. If none of the DTCs are set

3. Verify DTC C0187, C0196, or C0287 is not set in the K17 Electronic Brake Control Module.

1. 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.

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

1. If the DTC does not set

3. All OK.

1. If none of the DTCs are set

4. All OK.

**DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C018A, C019A, OR C027F:
LATERAL ACCELERATION, YAW RATE, LONGITUDINAL ACCELERATION > REPAIR
INSTRUCTIONS**

Perform the Diagnostic Repair Verification after completing the repair.

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

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0242: ENGINE CONTROL MODULE INDICATED TRACTION CONTROL > 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 INFORMATION AND PROCEDURES > DTC C0242: ENGINE CONTROL MODULE INDICATED TRACTION CONTROL > DTC DESCRIPTOR

DTC C0242

Engine Control Module Indicated Traction Control

For symptom byte information refer to Symptom Byte List .

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0242: ENGINE CONTROL MODULE INDICATED TRACTION CONTROL > CIRCUIT/SYSTEM DESCRIPTION

The electronic brake control module and the engine control module simultaneously control the traction control. 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.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0242: ENGINE CONTROL MODULE INDICATED TRACTION CONTROL > CONDITIONS FOR RUNNING THE DTC

Engine running

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0242: ENGINE CONTROL MODULE INDICATED TRACTION CONTROL > 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.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0242: ENGINE CONTROL

MODULE INDICATED TRACTION CONTROL > ACTION TAKEN WHEN THE DTC SETS

The electronic brake control module sends a serial data message to illuminate the appropriate warning/indicator message.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0242: ENGINE CONTROL MODULE INDICATED TRACTION CONTROL > CONDITIONS FOR CLEARING THE DTC

- The condition for the DTC is no longer present.
- The electronic brake control module clears the history DTC when a current DTC is not detected in 100 consecutive drive cycles.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0242: ENGINE CONTROL MODULE INDICATED TRACTION CONTROL > DIAGNOSTIC AIDS

- Inspect for proper transmission operation.
- Inspect the exhaust system for a possible restriction.
- Inspect for lack of engine power, hesitation, stumble or rough idle.
- Some intermittent communication concerns may be caused by fretting corrosion on the serial data circuit terminals. Inspect all connectors at the control module that set the communication DTC, the control module that the communication DTC was set against, and any inline harness connectors between the two control modules. Do not replace a control module based only on fretting corrosion.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0242: ENGINE CONTROL MODULE INDICATED TRACTION CONTROL > REFERENCE INFORMATION

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DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0242: ENGINE CONTROL MODULE INDICATED TRACTION CONTROL > CIRCUIT/SYSTEM VERIFICATION

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

1. If any other DTCs are set

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

1. If no other DTCs are set

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

1. If DTC sets

Replace the K17 Electronic Brake Control Module.

1. If DTC does not set

5. All OK.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0242: ENGINE CONTROL MODULE INDICATED TRACTION CONTROL > 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

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0245: WHEEL SPEED SENSOR FREQUENCY MALFUNCTION > DIAGNOSTIC INSTRUCTIONS

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

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0245: WHEEL SPEED SENSOR FREQUENCY MALFUNCTION > DTC DESCRIPTOR

DTC C0245

Wheel Speed Sensor Frequency Malfunction

For symptom byte information refer to Symptom Byte List

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0245: WHEEL SPEED SENSOR FREQUENCY MALFUNCTION > DIAGNOSTIC FAULT INFORMATION

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Signal High - Left Front	C0035 00	C0035 00	C0245 00	-
Signal High - Right Front	C0040 00	C0040 00	C0245 00	-
Signal High - Left Rear	C0045 00	C0045 00	C0245 00	-
Signal High - Right Rear	C0050 00	C0050 00	C0245 00	-

Component	Condition	DTC Symptom Byte
Wheel Speed Sensor	Wheel speed sensor incorrectly mounted	66

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0245: WHEEL SPEED SENSOR FREQUENCY MALFUNCTION > 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 consist 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 speed.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0245: WHEEL SPEED SENSOR FREQUENCY MALFUNCTION > CONDITIONS FOR RUNNING THE DTC

- DTC C0035, C0040, C0045, or C0050 is not present.

- Vehicle speed is between 20 km/h (13 MPH) and 50 km/h (31 MPH).
- While driving a curve with a yaw-rate of 3° per second for greater than 9 s.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0245: WHEEL SPEED SENSOR FREQUENCY MALFUNCTION > CONDITIONS FOR SETTING THE DTC

- A short to voltage on any one of the wheel speed sensor ignition circuits.
- A electrical magnetic interference with the wheel speed sensor harness.
- Difference between the fastest and slowest wheel speed is greater than 6 km/h (4 MPH).
- If two or more wheel speed sensor faults are detected without the ABS warning lamp being turned ON.
- The electronic brake control module cannot determine a specific wheel speed sensor signal because of electrical interference.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0245: WHEEL SPEED SENSOR FREQUENCY MALFUNCTION > ACTION TAKEN WHEN THE DTC SETS

- The ABS indicator turns ON.
- The traction control Off indicator turns ON.
- The stability control Off indicator turns ON.
- The traction/stability control indicator turns ON.
- The driver information center displays the Service StabiliTrak message.
- The electronic brake control module disables the ABS, the traction control, and the stability control for the duration of the ignition cycle.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0245: WHEEL SPEED SENSOR FREQUENCY MALFUNCTION > CONDITIONS FOR CLEARING THE DTC

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

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0245: WHEEL SPEED SENSOR FREQUENCY MALFUNCTION > DIAGNOSTIC AIDS

- Do not use a magnet to clean the encoder ring.

- Check for electrical magnetic interference with the wheel speed sensor harness.
- If two or more wheel speed sensors are inoperative, diagnose each wheel speed sensor individually.
- 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.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0245: WHEEL SPEED SENSOR FREQUENCY MALFUNCTION > REFERENCE INFORMATION

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Control Module References for scan tool information

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0245: WHEEL SPEED SENSOR FREQUENCY MALFUNCTION > CIRCUIT/SYSTEM VERIFICATION

1. Verify that all tires have the proper air pressure.

1. If not the proper air pressure

Adjust all tire air pressures to the stated cold air pressure as identified on the tire placard or specification.

1. If the proper air pressure

2. Verify that all tires are of uniform size and matching brand.

1. If not of uniform size or matching brand

1. Replace the mis-sized or non-matching brand tire.
2. Ignition ON.
3. Verify the DTC does not set while operating the vehicle within the Conditions for Running the DTC.
 1. If the DTC set, replace the K17 Electronic Brake Control Module.
 1. If the DTC does not set
4. All OK.

1. If all tires are of uniform size and matching brand

3. Refer to Circuit/System Testing.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0245: WHEEL SPEED SENSOR FREQUENCY MALFUNCTION > CIRCUIT/SYSTEM TESTING

1. Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the K17 Electronic Brake Control Module, ignition ON.
2. Test for less than 1 V between the K17 Electronic Brake Control Module harness connector terminals listed below and ground:
 1. B5LF Left Front Wheel Speed Sensor - terminal 8
 2. B5RF Right Front Wheel Speed Sensor - terminal 4
 3. B5LR Left Rear Wheel Speed Sensor - terminal 18
 4. B5RR Right Rear Wheel Speed Sensor - terminal 29
 1. **If 1 V or greater**
Repair the short to voltage on the circuit.
 1. **If less than 1 V**
3. All OK.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0245: WHEEL SPEED SENSOR FREQUENCY MALFUNCTION > REPAIR INSTRUCTIONS

Perform the Diagnostic Repair Verification after completing the repair.

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

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0274: ISOLATION VALVE

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.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0274: ISOLATION VALVE HIGH TEMPERATURE > DTC DESCRIPTORS

DTC C0274 54

Isolation Valve High Temperature

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0274: ISOLATION VALVE HIGH TEMPERATURE > CIRCUIT/SYSTEM DESCRIPTION

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

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0274: ISOLATION VALVE HIGH TEMPERATURE > CONDITIONS FOR RUNNING THE DTC

Ignition ON

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0274: ISOLATION VALVE HIGH TEMPERATURE > CONDITIONS FOR SETTING THE DTC

The calculated solenoid valve temperature is greater than the threshold.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0274: ISOLATION VALVE HIGH TEMPERATURE > ACTION TAKEN WHEN THE DTC SETS

C0274 54

- The ABS indicator turns ON.
- The traction/stability control indicator turns ON.

- The electronic brake control module disables the ABS, the traction control, the stability control and the hill start assist for the duration of the ignition cycle.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0274: ISOLATION VALVE HIGH TEMPERATURE > CONDITIONS FOR CLEARING THE DTC

The condition for setting the DTC is no longer present.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0274: ISOLATION VALVE HIGH TEMPERATURE > DIAGNOSTIC AIDS

DTCs may set due to extended operation of the ABS, the traction control or the stability control.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0274: ISOLATION VALVE HIGH TEMPERATURE > REFERENCE INFORMATION

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Control Module References for scan tool information

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0274: ISOLATION VALVE HIGH TEMPERATURE > CIRCUIT/SYSTEM VERIFICATION

**NOTE:**

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

1. Ignition ON.

2. Verify that DTC C0186, C0187, C0196, C0287, or C0710 is not set.

1. If any of the DTCs are set

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

1. If none of the DTCs are set

3. Ignition OFF, allow the hydraulic brake pressure modulator to cool down to ambient temperature.

4. Ignition ON.

5. Verify that DTC C0274 54 is not set while driving the vehicle within normal braking conditions.

1. If any of the DTCs are set

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

1. If none of the DTCs are set

6. All OK.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0274: ISOLATION VALVE HIGH TEMPERATURE > REPAIR INSTRUCTIONS

Perform the Diagnostic Repair Verification after completing the repair.

- Electronic Brake Control Module Replacement
- Control Module References for electronic brake control module replacement, programming and setup

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0280: STABILITY SYSTEM ACTIVE TOO LONG MALFUNCTION > DIAGNOSTIC INSTRUCTIONS

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

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0280: STABILITY SYSTEM ACTIVE TOO LONG MALFUNCTION > DTC DESCRIPTORS

DTC C0280

Stability System Active Too Long Malfunction

For symptom byte information, refer to Symptom Byte List

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0280: STABILITY SYSTEM ACTIVE TOO LONG MALFUNCTION > CIRCUIT/SYSTEM DESCRIPTION

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

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0280: STABILITY SYSTEM ACTIVE TOO LONG MALFUNCTION > CONDITIONS FOR RUNNING THE DTC

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

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0280: STABILITY SYSTEM ACTIVE TOO LONG MALFUNCTION > CONDITIONS FOR SETTING THE DTC

Calculated solenoid valve temperature is greater than threshold.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0280: STABILITY SYSTEM ACTIVE TOO LONG MALFUNCTION > ACTION TAKEN WHEN THE DTC SETS

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

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0280: STABILITY SYSTEM ACTIVE TOO LONG MALFUNCTION > CONDITIONS FOR CLEARING THE DTC

The condition for setting the DTC is no longer present.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0280: STABILITY SYSTEM ACTIVE TOO LONG MALFUNCTION > DIAGNOSTIC AIDS

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

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0280: STABILITY SYSTEM ACTIVE TOO LONG MALFUNCTION > REFERENCE INFORMATION

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Control Module References for scan tool information

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0280: STABILITY SYSTEM ACTIVE TOO LONG MALFUNCTION > CIRCUIT/SYSTEM TESTING



NOTE:

Since most occurrences of this DTC are caused by excessive ABS, traction control, or

stability control usage, review with the customer the conditions under which the DTC set.

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

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

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0280: STABILITY SYSTEM ACTIVE TOO LONG MALFUNCTION > REPAIR INSTRUCTIONS

Perform the Diagnostic Repair Verification after completing the repair.

- Electronic Brake Control Module Replacement
- Control Module References for Electronic Brake Control Module replacement, programming and setup.

DIAGNOSTIC INFORMATION AND PROCEDURES > 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.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0561: SYSTEM DISABLED INFORMATION STORED > DTC DESCRIPTOR

DTC C0561 43

System Disabled Information Stored

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0561: SYSTEM DISABLED INFORMATION STORED > 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.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0561: SYSTEM DISABLED INFORMATION STORED > CONDITIONS FOR RUNNING THE DTC

Engine running.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0561: SYSTEM DISABLED INFORMATION STORED > CONDITIONS FOR SETTING THE DTC

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

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0561: SYSTEM DISABLED INFORMATION STORED > 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.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0561: SYSTEM DISABLED INFORMATION STORED > 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 INFORMATION AND PROCEDURES > DTC C0561: SYSTEM DISABLED INFORMATION STORED > 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.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0561: SYSTEM DISABLED INFORMATION STORED > REFERENCE INFORMATION

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Scan Tool Reference

Control Module References for scan tool information

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0561: SYSTEM DISABLED INFORMATION STORED > CIRCUIT/SYSTEM VERIFICATION

1. Ignition ON.
2. Verify that DTC C0561 43 is not set.

1. If the DTC is set

1. Reprogram the K17 Electronic Brake Control Module. Refer to Control Module References .
2. Verify DTC C0561 43 is not set.

1. If the DTC is set, replace the K17 Electronic Brake Control Module.

1. If the DTC is not set

3. All OK.

1. If the DTC is not set

3. All OK.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0561: SYSTEM DISABLED INFORMATION STORED > REPAIR INSTRUCTIONS

Perform the Diagnostic Repair Verification after completing the repair.

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

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0569: SYSTEM CONFIGURATION MALFUNCTION > DIAGNOSTIC INSTRUCTIONS

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

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0569: SYSTEM CONFIGURATION MALFUNCTION > DTC DESCRIPTOR

DTC C0569 49

System Configuration Malfunction

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0569: SYSTEM CONFIGURATION MALFUNCTION > CIRCUIT/SYSTEM DESCRIPTION

The electronic brake control module receives serial data messages from other modules. The electronic brake control module must be configured with the Vehicle Identification Number (VIN), configuration data and vehicle options. If not properly configured after installation, the electronic brake control module may set a DTC.

The internal fault detection is handled inside the control module. No external circuits are involved.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0569: SYSTEM

CONFIGURATION MALFUNCTION > CONDITIONS FOR RUNNING THE DTC

Ignition ON

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0569: SYSTEM CONFIGURATION MALFUNCTION > CONDITIONS FOR SETTING THE DTC

The electronic brake control module is not programmed.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0569: SYSTEM CONFIGURATION MALFUNCTION > ACTION TAKEN WHEN THE DTC SETS

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

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0569: SYSTEM CONFIGURATION MALFUNCTION > CONDITIONS FOR CLEARING THE DTC

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

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0569: SYSTEM CONFIGURATION MALFUNCTION > DIAGNOSTIC AIDS

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

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0569: SYSTEM CONFIGURATION MALFUNCTION > REFERENCE INFORMATION

Schematic Reference

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Scan Tool Reference

Control Module References for scan tool information

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0569: SYSTEM CONFIGURATION MALFUNCTION > CIRCUIT/SYSTEM VERIFICATION

1. Ignition ON.
2. Verify that DTC C0569 49 is not set.
 1. **If the DTC is set**
 1. Reprogram the K17 Electronic Brake Control Module. Refer to Control Module References .
 2. Verify DTC C0569 49 is not set.
 1. If the DTC is set, replace the K17 Electronic Brake Control Module.
 1. If the DTC is not set
 3. All OK.
 1. **If the DTC is not set**
3. All OK.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0569: SYSTEM CONFIGURATION MALFUNCTION > REPAIR INSTRUCTIONS

Perform the Diagnostic Repair Verification after completing the repair.

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

DIAGNOSTIC INFORMATION AND PROCEDURES > 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.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0710: STEERING POSITION SIGNAL > DTC DESCRIPTOR

DTC C0710 00

Steering Position Signal Malfunction

DTC C0710 09

Steering Position Signal Too Fast Transitions

DTC C0710 11

Steering Position Signal High Input

DTC C0710 4B

Steering Position Signal Calibration Not Programmed

DTC C0710 5A

Steering Position Signal Not Plausible

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0710: STEERING POSITION SIGNAL > DIAGNOSTIC FAULT INFORMATION

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
12 V Reference	U0125, U0126	U0125, U0126	-	-
High Serial Data	U0073, U0074, U0125, U0126	U0073, U0074, U0125, U0126	U0073, U0074, U0125, U0126	C0710 00, C0710 09, C0710 11, C0710 4B, C0710 5A
Low Serial Data	U0073, U0074, U0125, U0126	U0073, U0074, U0125, U0126	U0073, U0074, U0125, U0126	C0710 00, C0710 09, C0710 11, C0710 4B, C0710 5A
Ground	-	U0126	-	-

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0710: STEERING POSITION

SIGNAL > CIRCUIT/SYSTEM DESCRIPTION

The steering wheel angle sensor receives a 12 V reference voltage from the electronic brake control module. The electronic brake control module receives serial data 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.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0710: STEERING POSITION SIGNAL > CONDITIONS FOR RUNNING THE DTC

C0710 00, or C0710 4B

Ignition ON

C0710 09, or C0710 11

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

C0710 5A

- Ignition ON
- Vehicle stopped with engine running turn the steering wheel through its entire range of motion from right to left.
- Drive the vehicle straight ahead with constant velocity greater than 30 km/h (18.6 MPH), then turn right and then turn left.
- Drive the vehicle straight ahead while accelerating up to 70 km/h (43.5 MPH) and maintain this speed for at least 5 s.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0710: STEERING POSITION SIGNAL > CONDITIONS FOR SETTING THE DTC

C0710 00

The control module received an invalid steering angle sensor signal.

C0710 09

The steering wheel angle sensor signal rate of change is too fast greater than 30°.

C0710 11

The steering wheel angle sensor signal is above the maximum specification.

C0710 4B

The steering wheel angle sensor is not calibrated.

C0710 5A

The steering wheel angle sensor signal is not plausible with the yaw rate sensor signal.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0710: STEERING POSITION SIGNAL > ACTION TAKEN WHEN THE DTC SETS

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

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0710: STEERING POSITION SIGNAL > 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 INFORMATION AND PROCEDURES > DTC C0710: STEERING POSITION SIGNAL > DIAGNOSTIC AIDS

- Improperly mounted or loose steering wheel angle sensor.
- The car should not pull in either direction causing the steering wheel to be off center while driving in a straight line on a level surface.
- Confirm that all tires are of the proper size and that all are matching brands. Check and adjust all tires to the stated cold air pressure as identified on the tire placard. If a miss 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.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0710: STEERING POSITION SIGNAL > REFERENCE INFORMATION

Schematic Reference

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Scan Tool Reference

Control Module References for scan tool information

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0710: STEERING POSITION SIGNAL > CIRCUIT/SYSTEM VERIFICATION

1. Ignition ON.
2. Verify the scan tool Steering Column Position parameter corresponds to the actual steering position as the steering wheel is turned through its entire range of motion.
 1. **If the parameter does not correspond with the steering wheel position or the reading is erratic**
 Refer to Circuit/System Testing.
 1. **If the parameter reading corresponds with the steering wheel position**
3. All OK.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0710: STEERING POSITION SIGNAL > CIRCUIT/SYSTEM TESTING

1. Ignition ON.
2. Verify that DTC U0073, U0074, U0125 or U0126 is not set.
 1. **If DTC U0073, U0074, U0125 or U0126 is set**
 Refer to Diagnostic Trouble Code (DTC) List - Vehicle .
 1. **If DTC U0073, U0074, U0125 or U0126 is not set**
3. Verify that DTC C0710 4B or C0710 5A is not set.
 1. **If DTC C0710 4B or C0710 5A is set**
 Refer to Steering Angle Sensor Centering .
 1. **If DTC C0710 4B or C0710 5A is not set**
4. Verify the B99 Steering Wheel Angle Sensor is installed correctly.
 1. **If loose or incorrect installation**

Correct the installation or replace the component.

1. If correct installation

5. 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.

6. Test for less than 5 Ω between the ground circuit terminal 6 and ground.

1. If 5 Ω or greater

1. Ignition OFF.

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

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

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

1. If less than 5 Ω

7. Ignition ON.

8. Verify a test lamp illuminates between the 12 V reference circuit terminal 5 and ground.

1. 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 12 V reference circuit and ground.

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

1. If infinite resistance

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

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

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

1. If the test lamp illuminates

9. Replace the B99 Steering Wheel Angle Sensor.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C0710: STEERING POSITION SIGNAL > 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

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C1207, C1208, C1221, C1222, C1225, C1226, C1232, OR C1233: WHEEL SPEED SENSOR CIRCUIT > DIAGNOSTIC INSTRUCTIONS

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

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C1207, C1208, C1221, C1222, C1225, C1226, C1232, OR C1233: WHEEL SPEED SENSOR CIRCUIT > DTC DESCRIPTORS

DTC C1207 00

Left Front Wheel Speed Sensor Circuit High Input Malfunction

DTC C1208 00

Right Front Wheel Speed Sensor Circuit High Input Malfunction

DTC C1221 00

Left Front Wheel Speed Sensor Circuit Malfunction

DTC C1222 00

Right Front Wheel Speed Sensor Circuit Malfunction

DTC C1225 00

Left Front Wheel Speed Sensor Circuit Performance Malfunction

DTC C1226 00

Right Front Wheel Speed Sensor Circuit Performance Malfunction

DTC C1232 00

Left Front Wheel Speed Sensor Circuit Low Input Malfunction

DTC C1233 00

Right Front Wheel Speed Sensor Circuit Low Input Malfunction

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C1207, C1208, C1221, C1222, C1225, C1226, C1232, OR C1233: WHEEL SPEED SENSOR CIRCUIT > 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 12 V reference 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 control module uses the frequency of the square wave signal to calculate the wheel speed. The electronic brake control module sends the wheel speed information as a high speed controller area network (CAN) serial data message.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C1207, C1208, C1221, C1222, C1225, C1226, C1232, OR C1233: WHEEL SPEED SENSOR CIRCUIT > CONDITIONS FOR RUNNING THE DTC

Ignition ON.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C1207, C1208, C1221, C1222, C1225, C1226, C1232, OR C1233: WHEEL SPEED SENSOR CIRCUIT > CONDITIONS FOR SETTING THE DTC

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

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C1207, C1208, C1221, C1222, C1225, C1226, C1232, OR C1233: WHEEL SPEED SENSOR CIRCUIT > ACTION TAKEN WHEN THE DTC SETS

Specific subsystems will not function or operate in degraded mode.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C1207, C1208, C1221, C1222, C1225, C1226, C1232, OR C1233: WHEEL SPEED SENSOR CIRCUIT > 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.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C1207, C1208, C1221, C1222, C1225, C1226, C1232, OR C1233: WHEEL SPEED SENSOR CIRCUIT > REFERENCE INFORMATION

Schematic Reference

Antilock Brake System Schematics

Connector End View Reference

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- Wiring Repairs

Scan Tool Reference

Control Module References for scan tool information

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C1207, C1208, C1221, C1222, C1225, C1226, C1232, OR C1233: WHEEL SPEED SENSOR CIRCUIT > CIRCUIT/SYSTEM VERIFICATION

1. Ignition ON.
2. Verify that DTC C0035, C0040, C0045, or C0050 is not set.
 1. **If any listed DTC is set**

Refer to Diagnostic Trouble Code (DTC) List - Vehicle .
 1. **If none of the listed DTCs is 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.
 1. **If the DTC sets**

Replace the module that set the DTC.
 1. **If the DTC does not set**
5. All OK.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C1207, C1208, C1221, C1222, C1225, C1226, C1232, OR C1233: WHEEL SPEED SENSOR CIRCUIT > REPAIR INSTRUCTIONS

Perform the Diagnostic Repair Verification after completing the repair.

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

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C124F OR C1250-C1254: LATERAL ACCELERATION SENSOR, LONGITUDINAL ACCELERATION SENSOR > DIAGNOSTIC INSTRUCTIONS

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

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C124F OR C1250-C1254: LATERAL ACCELERATION SENSOR, LONGITUDINAL ACCELERATION SENSOR > 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 .

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C124F OR C1250-C1254: LATERAL ACCELERATION SENSOR, LONGITUDINAL ACCELERATION SENSOR > 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.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C124F OR C1250-C1254: LATERAL ACCELERATION SENSOR, LONGITUDINAL ACCELERATION SENSOR > CONDITIONS FOR RUNNING THE DTC

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

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C124F OR C1250-C1254: LATERAL ACCELERATION SENSOR, LONGITUDINAL ACCELERATION SENSOR > CONDITIONS FOR SETTING THE DTC

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

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C124F OR C1250-C1254: LATERAL ACCELERATION SENSOR, LONGITUDINAL ACCELERATION SENSOR > 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.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C124F OR C1250-C1254: LATERAL ACCELERATION SENSOR, LONGITUDINAL ACCELERATION SENSOR > CONDITIONS FOR CLEARING THE DTC

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

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C124F OR C1250-C1254: LATERAL ACCELERATION SENSOR, LONGITUDINAL ACCELERATION SENSOR >

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Scan Tool Reference

Control Module References for scan tool information

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C124F OR C1250-C1254: LATERAL ACCELERATION SENSOR, LONGITUDINAL ACCELERATION SENSOR > CIRCUIT/SYSTEM VERIFICATION

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

Refer to Diagnostic Trouble Code (DTC) List - Vehicle .
 1. **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.
 1. **If the DTC sets**

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

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC C124F OR C1250-C1254: LATERAL ACCELERATION SENSOR, LONGITUDINAL ACCELERATION SENSOR > 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

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC P0856: TRACTION CONTROL TORQUE REQUEST CIRCUIT > DIAGNOSTIC INSTRUCTIONS

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

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC P0856: TRACTION CONTROL TORQUE REQUEST CIRCUIT > DTC DESCRIPTOR

DTC P0856

Traction Control Torque Request Circuit

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC P0856: TRACTION CONTROL TORQUE REQUEST CIRCUIT > CIRCUIT/SYSTEM DESCRIPTION

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

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC P0856: TRACTION CONTROL TORQUE REQUEST CIRCUIT > CONDITIONS FOR RUNNING THE DTC

Engine running.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC P0856: TRACTION CONTROL

TORQUE REQUEST CIRCUIT > 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.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC P0856: TRACTION CONTROL TORQUE REQUEST CIRCUIT > 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.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC P0856: TRACTION CONTROL TORQUE REQUEST CIRCUIT > CONDITIONS FOR CLEARING THE DTC

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

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC P0856: TRACTION CONTROL TORQUE REQUEST CIRCUIT > REFERENCE INFORMATION

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Scan Tool Reference

Control Module References for scan tool information

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC P0856: TRACTION CONTROL TORQUE REQUEST CIRCUIT > CIRCUIT/SYSTEM TESTING

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

1. If any other DTCs are set

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

1. If only DTC P0856 is set

2. Replace the K20 Engine Control Module.

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

1. If DTC sets

Replace the K17 Electronic Brake Control Module.

1. If DTC does not set

4. All OK.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC P0856: TRACTION CONTROL TORQUE REQUEST CIRCUIT > REPAIR INSTRUCTIONS

Perform the Diagnostic Repair Verification after completing the repair.

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

DIAGNOSTIC INFORMATION AND PROCEDURES > 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.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC P15FD: WHEEL SPEED SENSOR MESSAGE SEQUENCE INCORRECT > DTC DESCRIPTOR

DTC P15FD

Wheel Speed Sensor Message Sequence Incorrect

DIAGNOSTIC INFORMATION AND PROCEDURES > 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.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC P15FD: WHEEL SPEED SENSOR MESSAGE SEQUENCE INCORRECT > CONDITIONS FOR RUNNING THE DTC

Ignition ON

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC P15FD: WHEEL SPEED SENSOR MESSAGE SEQUENCE INCORRECT > CONDITIONS FOR SETTING THE DTC

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

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC P15FD: WHEEL SPEED SENSOR MESSAGE SEQUENCE INCORRECT > ACTION TAKEN WHEN THE DTC SETS

Specific subsystems will not function or operate in degraded mode.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC P15FD: WHEEL SPEED SENSOR MESSAGE SEQUENCE INCORRECT > CONDITIONS FOR CLEARING THE DTC

A current DTC clears when the diagnostic runs and passes.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC P15FD: WHEEL SPEED SENSOR MESSAGE SEQUENCE INCORRECT > REFERENCE INFORMATION

Schematic Reference

Antilock Brake System Schematics

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Scan Tool Reference

Control Module References for scan tool information

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC P15FD: WHEEL SPEED SENSOR MESSAGE SEQUENCE INCORRECT > 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.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC P15FD: WHEEL SPEED SENSOR MESSAGE SEQUENCE INCORRECT > 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).

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC P15FD: WHEEL SPEED SENSOR MESSAGE SEQUENCE INCORRECT > CIRCUIT/SYSTEM TESTING

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

1. If any listed DTC is set

Refer to Diagnostic Trouble Code (DTC) List - Vehicle to diagnose that DTC prior to this

diagnostic.

1. 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.

1. If the DTC sets

Replace the module that set the DTC.

1. If the DTC does not set

5. All OK.

DIAGNOSTIC INFORMATION AND PROCEDURES > DTC P15FD: WHEEL SPEED SENSOR MESSAGE SEQUENCE INCORRECT > REPAIR INSTRUCTIONS

Perform the Diagnostic Repair Verification after completing the repair.

Control Module References for control module replacement, programming and setup

DIAGNOSTIC INFORMATION AND PROCEDURES > 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:

1. There are no DTCs set.
2. The control modules can communicate via the serial data link.

2. Review the system description and operation in order to familiarize yourself with the system functions. Refer to ABS Description and Operation .

DIAGNOSTIC INFORMATION AND PROCEDURES > SYMPTOMS - ANTILOCK BRAKE SYSTEM > VISUAL/PHYSICAL INSPECTION

- Inspect for aftermarket devices which could affect the operation of the ABS. Refer to Checking Aftermarket Accessories .

- Inspect the easily accessible or visible system components, for obvious damage or conditions, which could cause the symptom.

DIAGNOSTIC INFORMATION AND PROCEDURES > SYMPTOMS - ANTILOCK BRAKE SYSTEM > INTERMITTENT

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

DIAGNOSTIC INFORMATION AND PROCEDURES > SYMPTOMS - ANTILOCK BRAKE SYSTEM > SYMPTOM LIST

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

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

DIAGNOSTIC INFORMATION AND PROCEDURES > 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.

DIAGNOSTIC INFORMATION AND PROCEDURES > ABS INDICATOR MALFUNCTION > CIRCUIT/SYSTEM DESCRIPTION

The instrument cluster turns the ABS indicator ON for 5 s 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.

DIAGNOSTIC INFORMATION AND PROCEDURES > ABS INDICATOR MALFUNCTION > REFERENCE INFORMATION

Schematic Reference

Antilock Brake System Schematics

Connector End View Reference

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- Wiring Repairs

Scan Tool Reference

Control Module References for scan tool information

DIAGNOSTIC INFORMATION AND PROCEDURES > ABS INDICATOR MALFUNCTION > CIRCUIT/SYSTEM VERIFICATION

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

Refer to Diagnostic Trouble Code (DTC) List - Vehicle .
 1. **If no DTCs are set**
3. Verify the Instrument Cluster ABS indicator turns ON and OFF when commanding the All Indicators ON and OFF with a scan tool.
 1. **If ABS indicator does not turn ON and OFF**

Replace the P16 Instrument Cluster.
 1. **If the ABS indicator turns ON and OFF**
4. Verify the ABS indicator turns OFF 5 s after the ignition is turned ON.
 1. **If the ABS indicator does not turn OFF**

Replace the K17 Electronic Brake Control Module.
 1. **If the ABS indicator turns OFF**
5. All OK.

DIAGNOSTIC INFORMATION AND PROCEDURES > ABS INDICATOR MALFUNCTION > 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

DIAGNOSTIC INFORMATION AND PROCEDURES > TRACTION CONTROL/STABILITY CONTROL INDICATOR MALFUNCTION > DIAGNOSTIC INSTRUCTIONS

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

DIAGNOSTIC INFORMATION AND PROCEDURES > TRACTION CONTROL/STABILITY CONTROL INDICATOR MALFUNCTION > DIAGNOSTIC FAULT INFORMATION

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Traction Control Switch Signal	B2745 02	1	1	-
Traction Control Switch Ground	-	1	-	-
1. Traction Control Switch Malfunction.				

DIAGNOSTIC INFORMATION AND PROCEDURES > TRACTION CONTROL/STABILITY CONTROL INDICATOR MALFUNCTION > CIRCUIT/SYSTEM DESCRIPTION

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

The body control module monitors the electronic stability control switch. When the electronic stability control switch is pressed once, the body control module will request the electronic brake control module via serial data to disable the traction control. When the electronic stability control switch is pressed and held for five seconds, the body control module will request the electronic brake control module to disable the stability control. The Electronic Brake Control Module will request the Instrument Cluster to turn the Traction Control Off and Stability Control Off indicator ON to notify the driver of the deactivation.

DIAGNOSTIC INFORMATION AND PROCEDURES > TRACTION CONTROL/STABILITY CONTROL INDICATOR MALFUNCTION > REFERENCE INFORMATION

Schematic Reference

Antilock Brake System Schematics

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- Wiring Repairs

Scan Tool Reference

Control Module References for scan tool information

DIAGNOSTIC INFORMATION AND PROCEDURES > TRACTION CONTROL/STABILITY CONTROL INDICATOR MALFUNCTION > 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.
 1. Traction Control Off indicator
 2. Stability Control Off indicator
 3. Traction/stability Control indicator
 1. **If any indicator does not turn ON and OFF**

Replace the P16 Instrument Cluster.
 1. **If all indicators turn 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 S48A Multifunction Switch-Instrument Panel.
 1. **If the parameter does not change**

Refer to Circuit/System Testing.

1. If the parameter changes

4. All OK.

DIAGNOSTIC INFORMATION AND PROCEDURES > TRACTION CONTROL/STABILITY CONTROL INDICATOR MALFUNCTION > CIRCUIT/SYSTEM TESTING



NOTE:

Circuit/System Verification must be performed before Circuit/System Testing.

1. Ignition OFF and all vehicle systems OFF, disconnect the harness connector at the S48A Multifunction Switch-Instrument Panel. 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.

1. If 10 Ω or greater

1. Ignition OFF.

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

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

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

1. If less than 10 Ω

3. Ignition ON.

4. Verify the scan tool Body Control Module, Traction Control Switch parameter is Inactive.

1. If Active

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.

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

2. If infinite resistance, replace the K9 Body Control Module.

1. If Inactive

5. Install a 3 A fused jumper wire between the signal circuit terminal 4 and ground.

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

1. If Inactive

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.
 1. If 1 V or greater, repair the short to voltage on the circuit.
 1. If less than 1 V.
3. Test for less than 2 Ω in the signal circuit end to end.
 1. If 2 Ω or greater, repair the open/high resistance in the circuit.
 2. If less than 2 Ω , replace the K9 Body Control Module.

1. If Active

7. Test or replace the S48A Multifunction Switch-Instrument Panel.

DIAGNOSTIC INFORMATION AND PROCEDURES > TRACTION CONTROL/STABILITY CONTROL INDICATOR MALFUNCTION > COMPONENT TESTING

1. Ignition OFF, disconnect the harness connector at the S48A Multifunction Switch-Instrument Panel.
2. Test for infinite resistance between the signal terminal 4 and the ground terminal 1 with the switch in the open position.

1. If less than infinite resistance

Replace the S48A Multifunction Switch-Instrument Panel.

1. 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.

1. If 2 Ω or greater

Replace the S48A Multifunction Switch-Instrument Panel.

1. If less than 2 Ω

4. All OK.

DIAGNOSTIC INFORMATION AND PROCEDURES > TRACTION CONTROL/STABILITY CONTROL INDICATOR MALFUNCTION > REPAIR INSTRUCTIONS

Perform the Diagnostic Repair Verification after completing the repair.

- Front Floor Console Trim Plate Replacement (Automatic) Front Floor Console Trim Plate Replacement (Manual)

- Control Module References for Body 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:

- Wiring broken inside the insulation
- Poor connection between the male and female terminal at a connector
- 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.

REPAIR INSTRUCTIONS > CONNECTOR RECONNECTION - WHEEL SPEED SENSOR > 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.

REPAIR INSTRUCTIONS > CONNECTOR RECONNECTION - WHEEL SPEED SENSOR > 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.

REPAIR INSTRUCTIONS > CONNECTOR RECONNECTION - WHEEL SPEED SENSOR > 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 .
- 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. 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 .

REPAIR INSTRUCTIONS > CONNECTOR RECONNECTION - WHEEL SPEED SENSOR > 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.

REPAIR INSTRUCTIONS > CONNECTOR RECONNECTION - WHEEL SPEED SENSOR > 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.

REPAIR INSTRUCTIONS > CONNECTOR RECONNECTION - WHEEL SPEED SENSOR > 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.

REPAIR INSTRUCTIONS > ANTILOCK BRAKE SYSTEM AUTOMATED BLEED



WARNING:

Refer to Brake Fluid Irritant Warning .



CAUTION:

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



NOTE:

Before performing the ABS Automated Bleed Procedure, first perform a pressure bleed of the base brake system. Refer to Hydraulic Brake System Bleeding (Manual J55, J6G)Hydraulic Brake System Bleeding (Pressure J55, J6G)Hydraulic Brake System Bleeding (Manual JL9)Hydraulic Brake System Bleeding (Pressure JL9) . The automated bleed procedure is recommended when one of the following conditions exist:

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

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

Performing the Automated Bleed Procedure

 CAUTION:

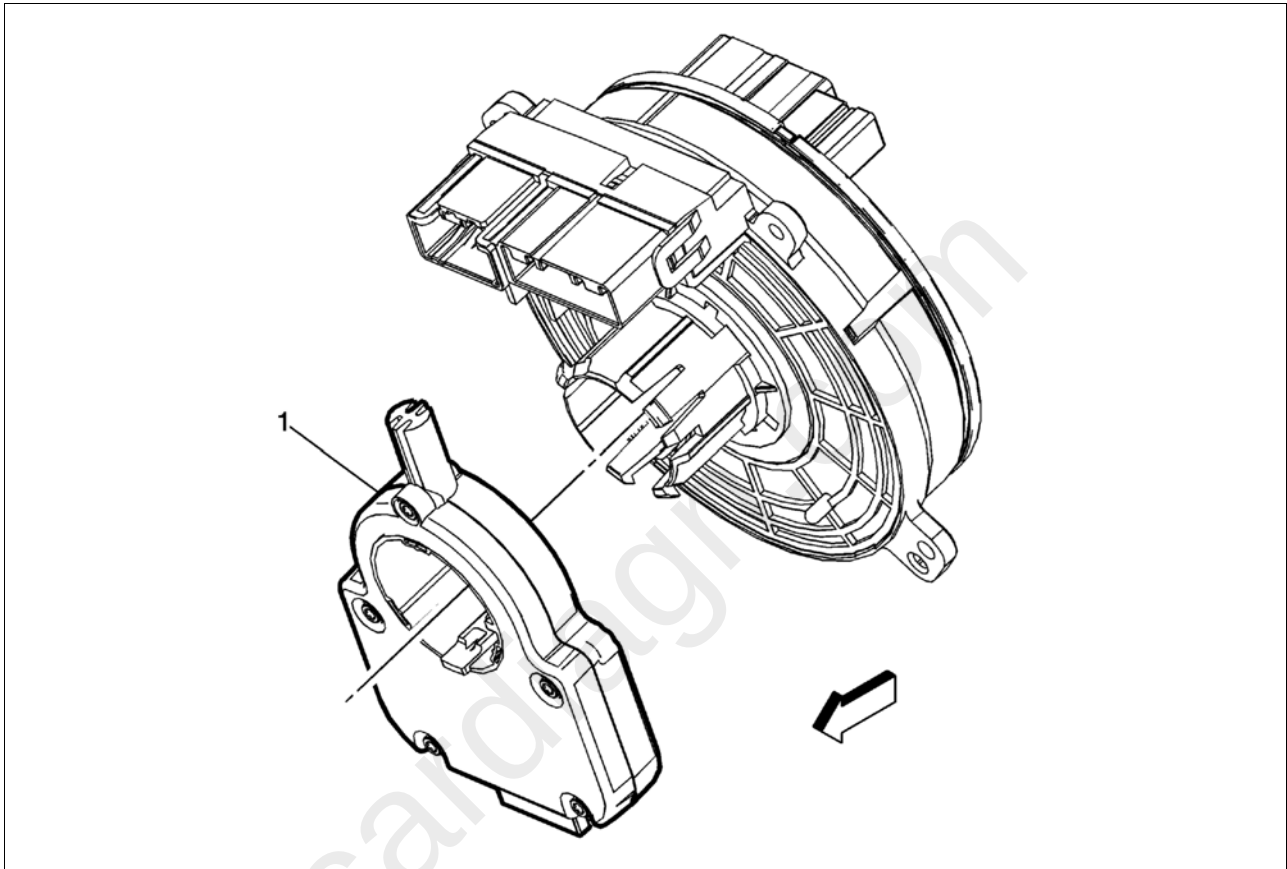
The Auto Bleed Procedure may be terminated at any time during the process by pressing the EXIT button. No further Scan Tool prompts pertaining to the Auto Bleed procedure will be given. After exiting the bleed procedure, relieve bleed pressure and disconnect bleed equipment per manufacturers instructions. Failure to properly relieve pressure may result in spilled brake fluid causing damage to components and painted surfaces.

1. Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle (Base)Lifting and Jacking the Vehicle (HP) .
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 Special Functions. Select Automated Bleed from the Special Functions menu.
9. Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle (Base)Lifting and Jacking the Vehicle (HP) .
10. Following the directions given on the scan tool, pressure bleed the base brake system. Refer to Hydraulic Brake System Bleeding (Manual J55, J6G)Hydraulic Brake System Bleeding (Pressure J55, J6G)Hydraulic Brake System Bleeding (Manual JL9)Hydraulic Brake System Bleeding (Pressure JL9) .
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:
 1. If a DTC is detected, refer to Diagnostic Trouble Code (DTC) List - Vehicle , and diagnose the appropriate DTC.
 2. If the brake pedal feels spongy, perform the conventional brake bleed procedure again. Refer to Hydraulic Brake System Bleeding (Manual J55, J6G)Hydraulic Brake System Bleeding (Pressure J55, J6G)Hydraulic Brake System Bleeding (Manual JL9)Hydraulic Brake System Bleeding (Pressure JL9) .
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.

REPAIR INSTRUCTIONS > STEERING ANGLE SENSOR REPLACEMENT

Fig 1: Steering Angle Sensor



Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Steering Wheel Airbag Coil Replacement	
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 Angle Sensor Centering

REPAIR INSTRUCTIONS > STEERING ANGLE SENSOR CENTERING

WARNING:

An inaccurate or not centered steering angle sensor could limit the operation of the electric power steering and may result in personal injury.

NOTE:

The GDS2 calibration software must be updated to the latest diagnostic package for the scan tool Reset and Learn functions to work correctly.

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

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

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

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

10. Follow the scan tool directions to complete the learn procedure.

11. Clear any DTCs that may be set.

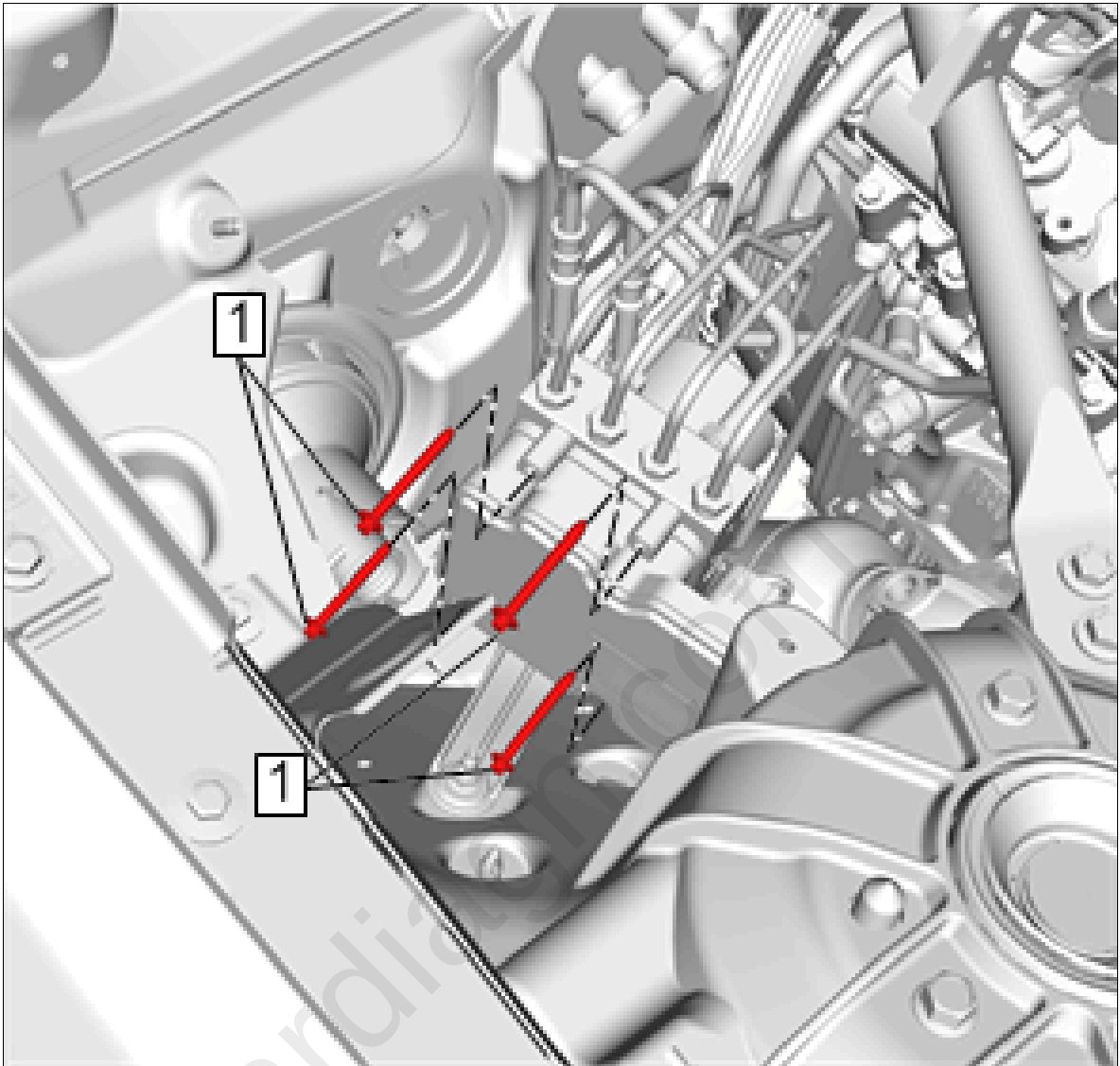
REPAIR INSTRUCTIONS > ELECTRONIC BRAKE CONTROL MODULE REPLACEMENT > REMOVAL PROCEDURE

 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. Thoroughly clean the electronic brake control module (EBCM) to brake pressure modulator valve (BPMV) area of any accumulated dirt and debris.
3. Remove Windshield Washer Solvent Container Filler Tube Replacement
4. Disconnect the EBCM electrical connector.

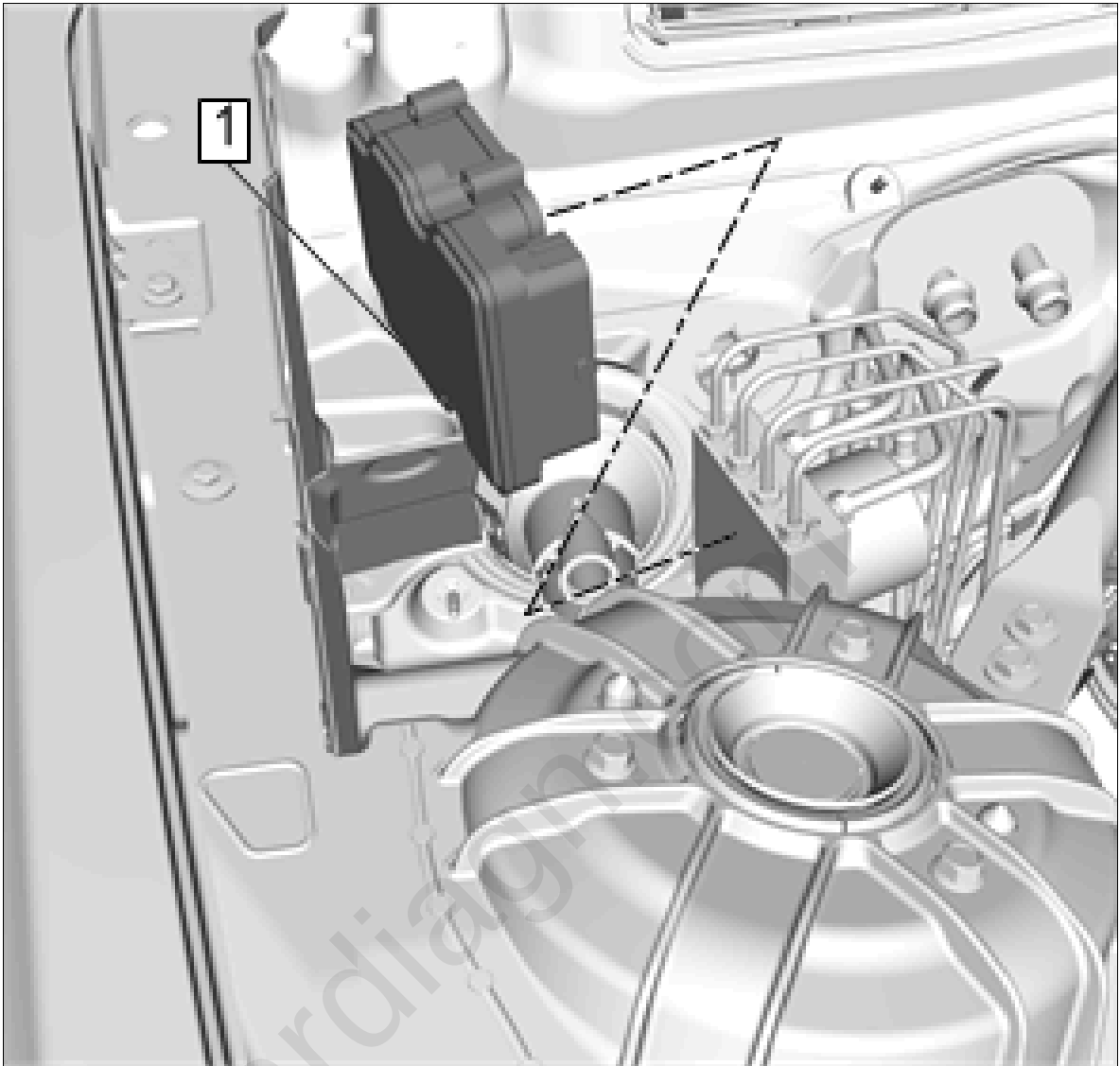
Fig 1: Electronic Brake Control Module Bolt



Courtesy of GENERAL MOTORS COMPANY

5. Remove Electronic Brake Control Module Bolt (1) (Qty: 4)

Fig 2: Electronic Brake Control Module



Courtesy of GENERAL MOTORS COMPANY

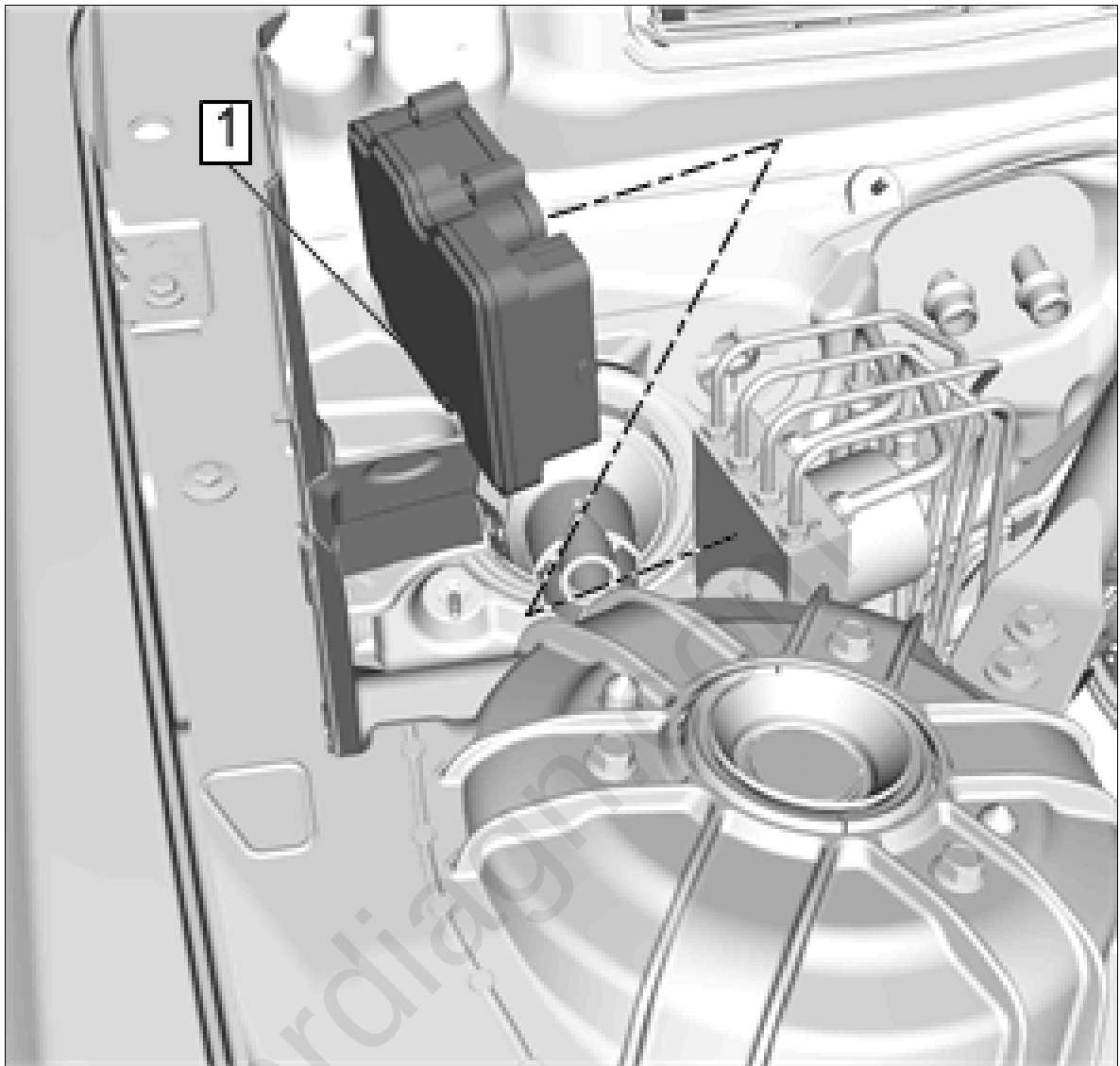
 **NOTE:**

Do NOT pry the components apart.

6. Remove Electronic Brake Control Module (1)

**REPAIR INSTRUCTIONS > ELECTRONIC BRAKE CONTROL MODULE
REPLACEMENT > INSTALLATION PROCEDURE**

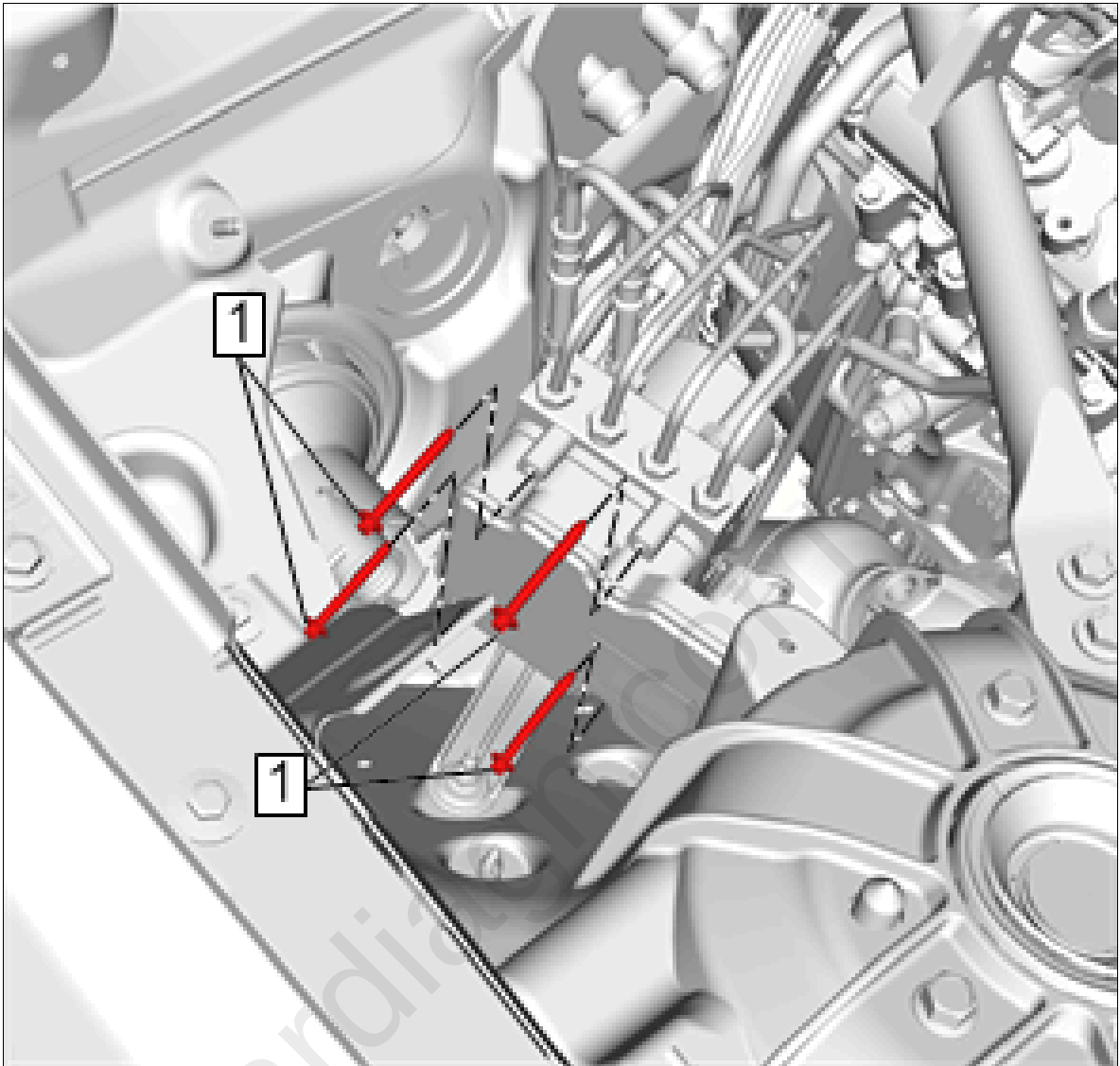
Fig 1: Electronic Brake Control Module



Courtesy of GENERAL MOTORS COMPANY

1. Install Electronic Brake Control Module (1)

Fig 2: Electronic Brake Control Module Bolt



Courtesy of GENERAL MOTORS COMPANY



CAUTION:

Fastener Caution

2. Install Electronic Brake Control Module Bolt (1) (Qty: 4) and tighten to 3 N.m (27 lb in)
3. Connect the EBCM electrical connector.
4. Install Windshield Washer Solvent Container Filler Tube Replacement
5. Program the EBCM. Electronic Brake Control Module Programming and Setup

PRESSURE MODULATOR VALVE REPLACEMENT > REMOVAL PROCEDURE



WARNING:

Brake Fluid Irritant Warning



CAUTION:

Brake Fluid Effects on Paint and Electrical Components Caution

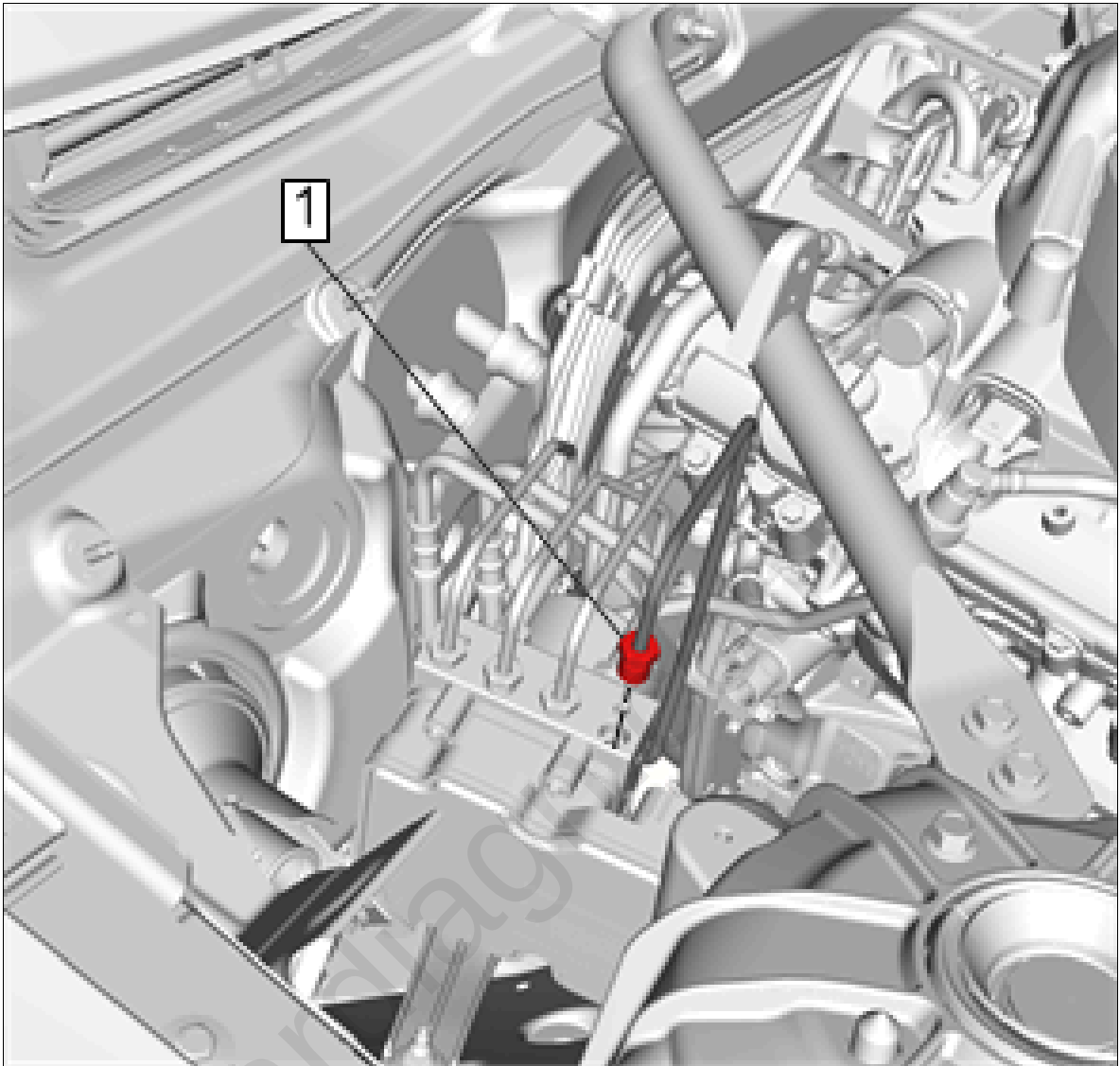


CAUTION:

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 Plenum Front Panel Replacement
3. Thoroughly clean the electronic brake control module (EBCM) to brake pressure modulator valve (BPMV) area of any accumulated dirt and debris.
4. Disconnect the EBCM electrical connector.

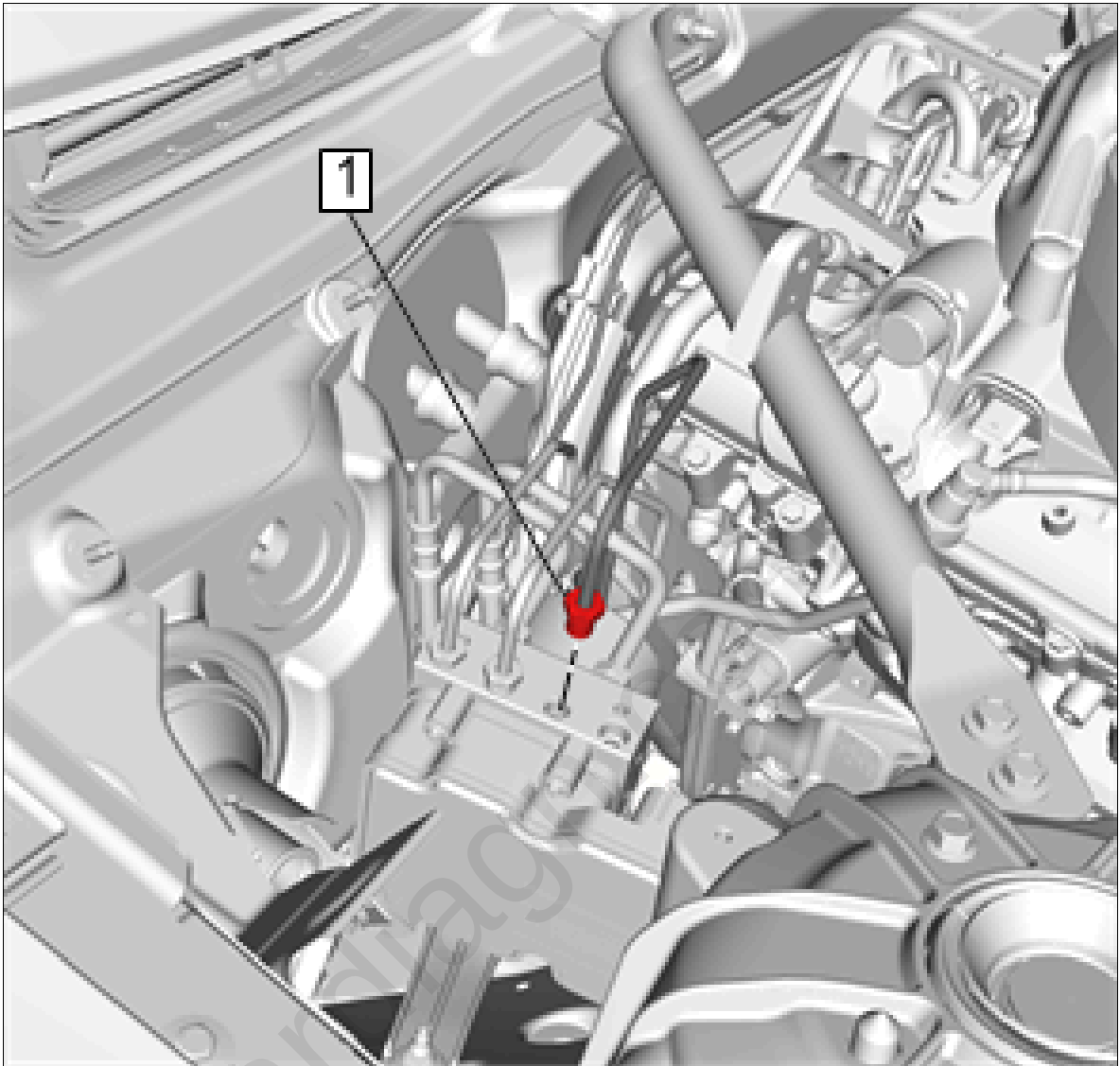
Fig 1: Right Rear Brake Pipe Fitting



Courtesy of GENERAL MOTORS COMPANY

5. Disconnect Right Rear Brake Pipe Fitting (1)
6. Cap the brake pipe fitting and plug the BPMV outlet port to prevent brake fluid loss and contamination.

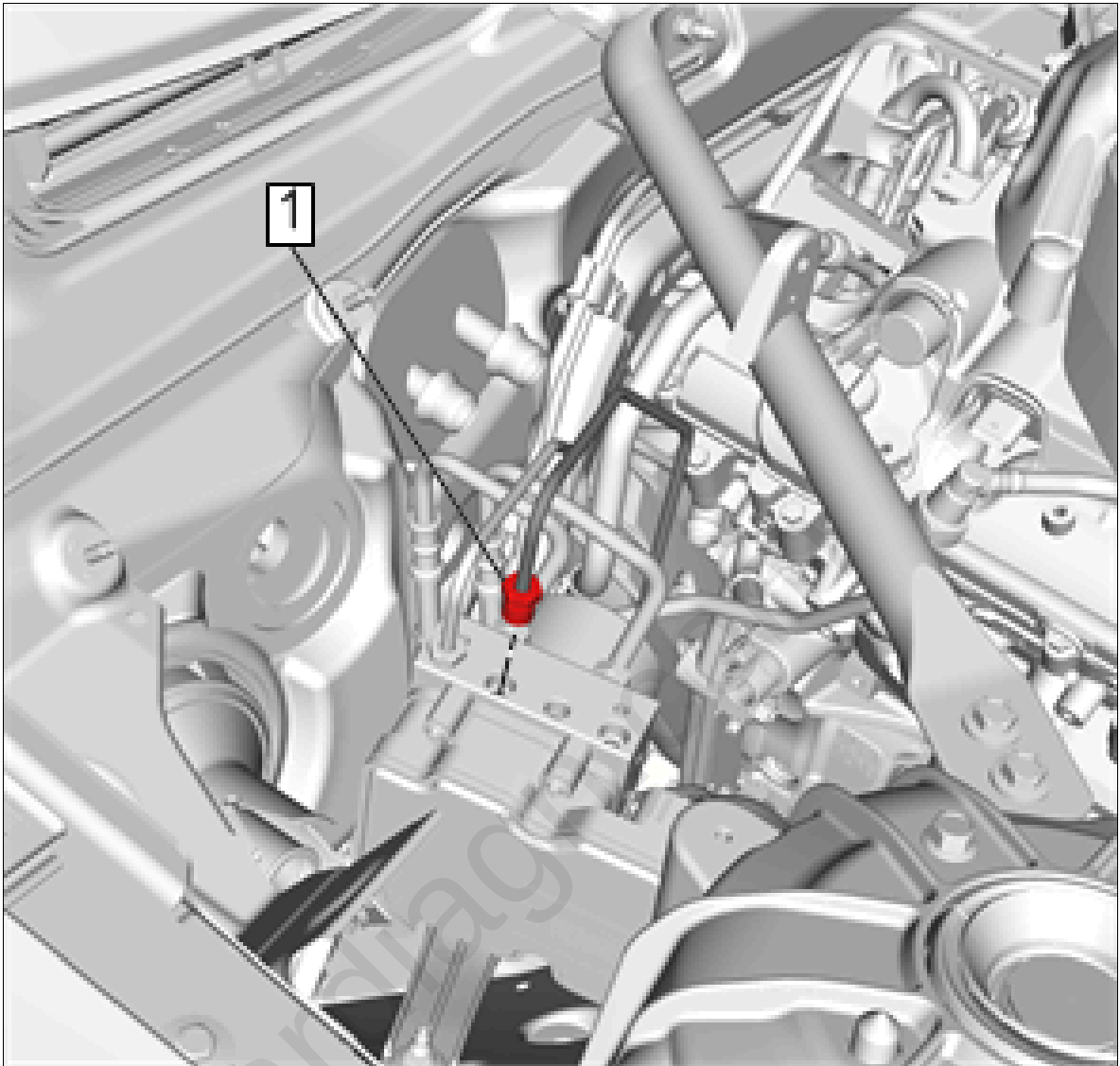
Fig 2: Left Front Brake Pipe Fitting



Courtesy of GENERAL MOTORS COMPANY

7. Disconnect Left Front Brake Pipe Fitting (1)
8. Cap the brake pipe fitting and plug the BPMV outlet port to prevent brake fluid loss and contamination.

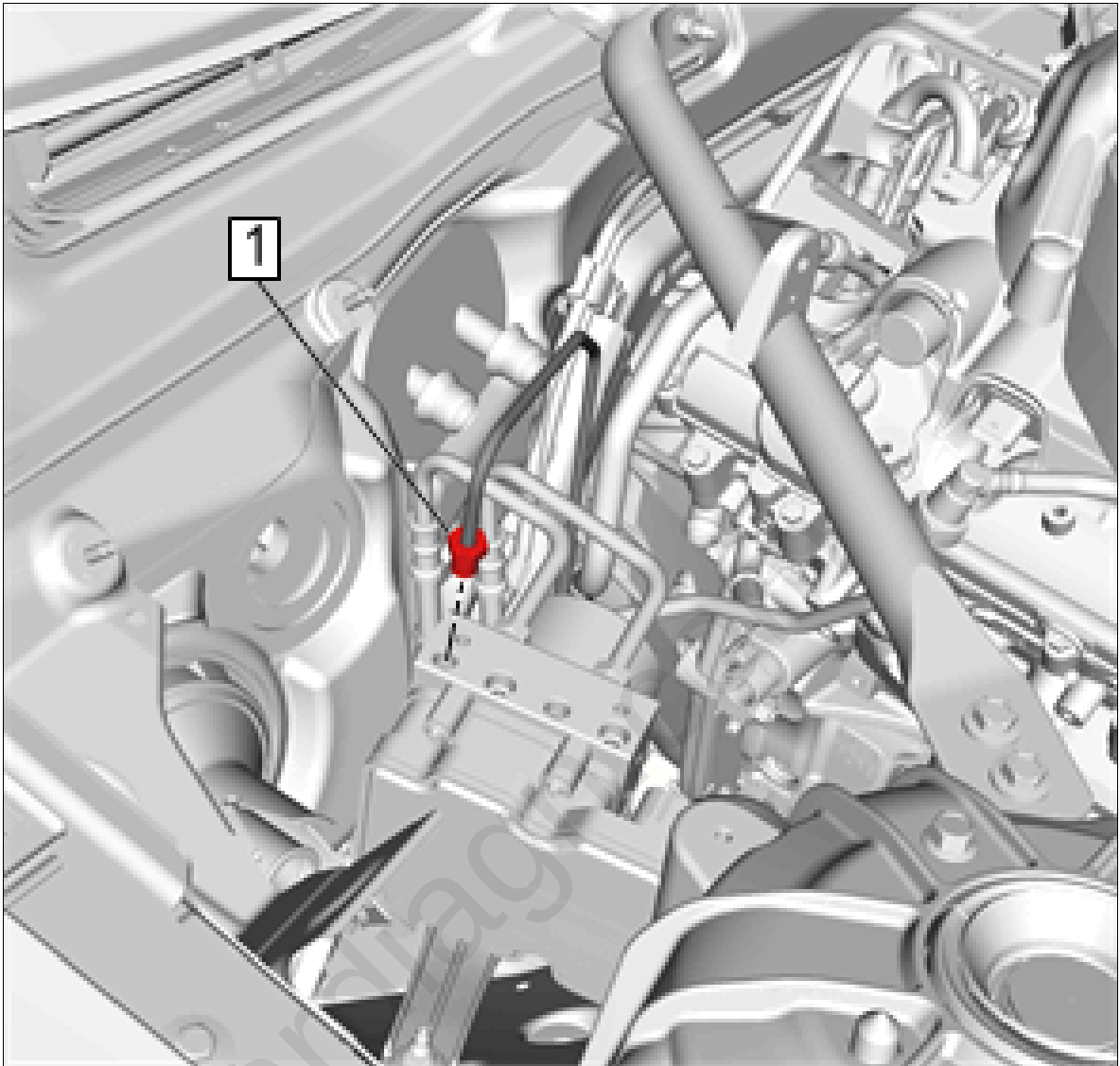
Fig 3: Right Front Brake Pipe Fitting



Courtesy of GENERAL MOTORS COMPANY

9. Disconnect Right Front Brake Pipe Fitting (1)
10. Cap the brake pipe fitting and plug the BPMV outlet port to prevent brake fluid loss and contamination.

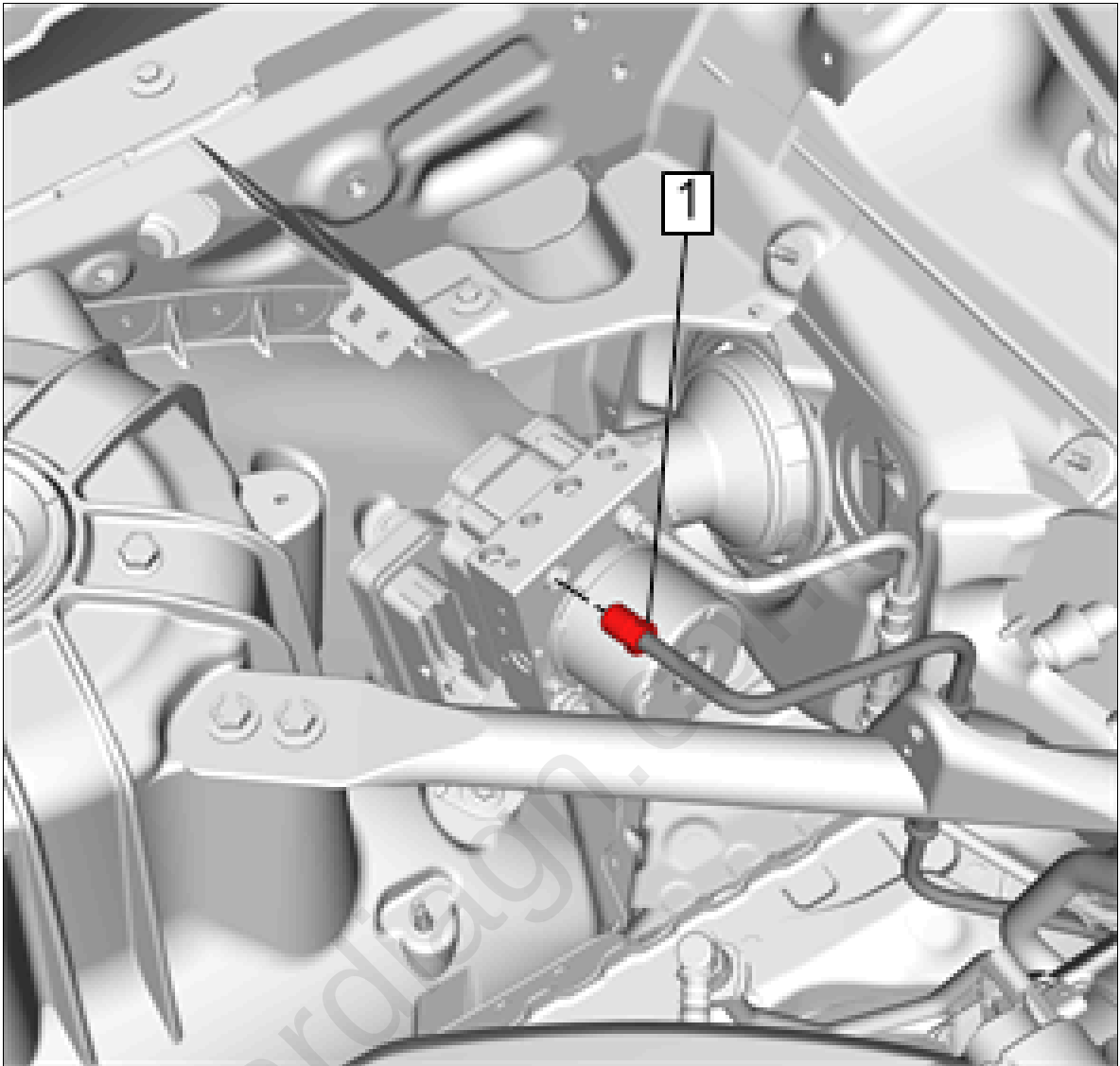
Fig 4: Left Rear Brake Pipe Fitting



Courtesy of GENERAL MOTORS COMPANY

11. Disconnect Left Rear Brake Pipe Fitting (1)
12. Cap the brake pipe fitting and plug the BPMV outlet port to prevent brake fluid loss and contamination.

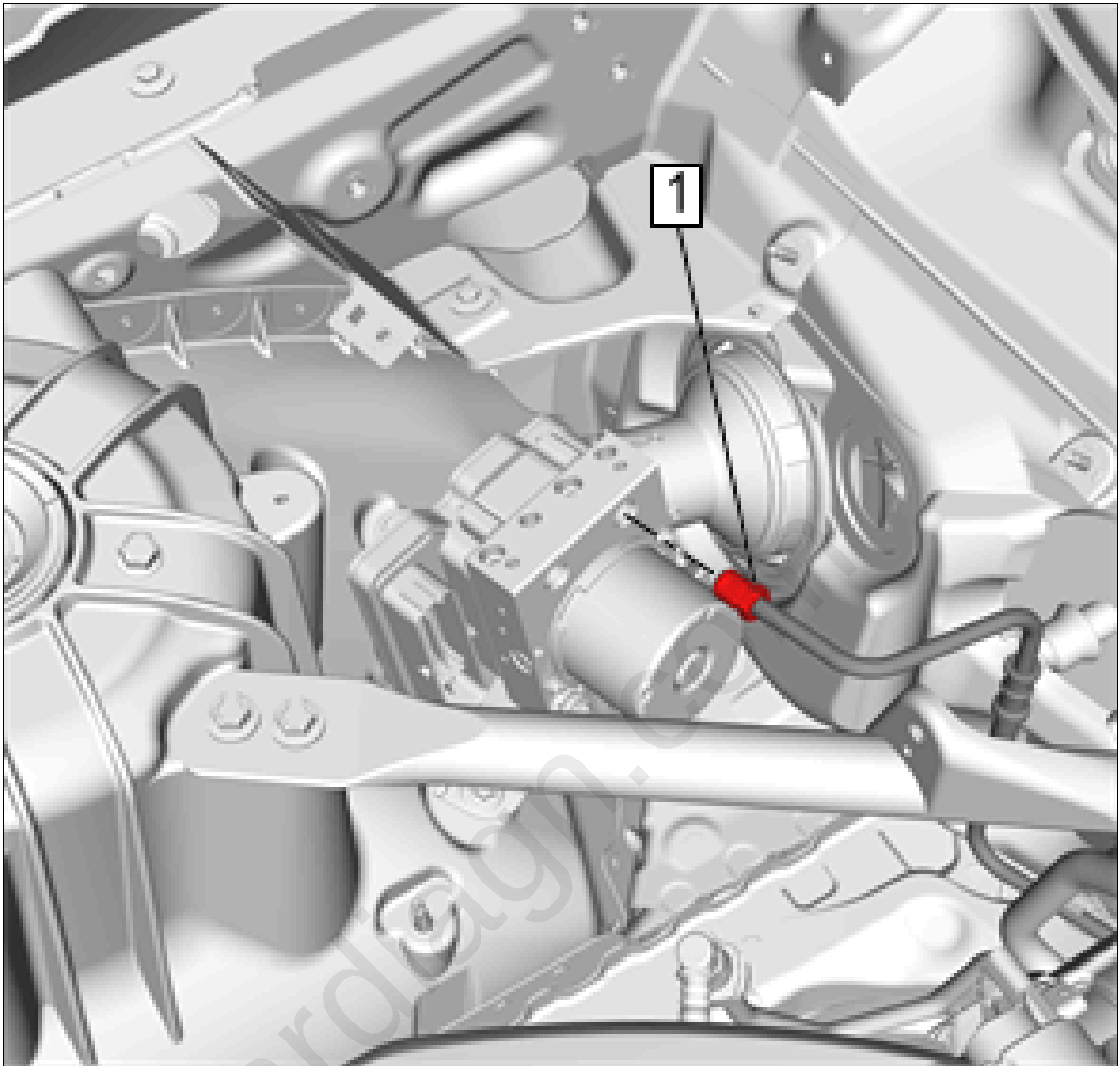
Fig 5: Brake Pressure Modulator Valve Secondary Pipe Fitting



Courtesy of GENERAL MOTORS COMPANY

13. Disconnect Brake Pressure Modulator Valve Secondary Pipe Fitting (1)
14. Cap the brake pipe fitting and plug the BPMV inlet port to prevent brake fluid loss and contamination.

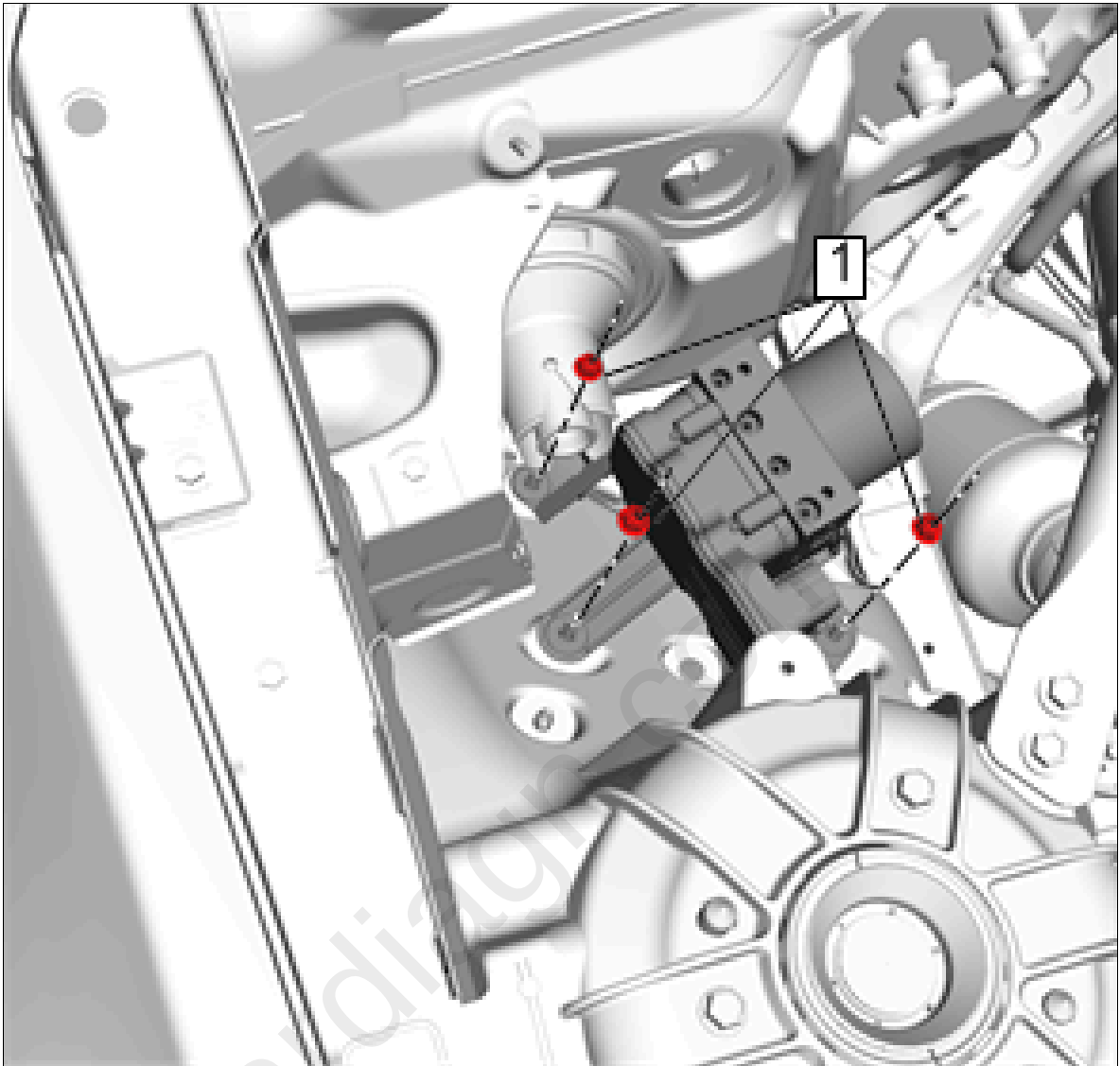
Fig 6: Brake Pressure Modulator Valve Primary Pipe Fitting



Courtesy of GENERAL MOTORS COMPANY

15. Disconnect Brake Pressure Modulator Valve Primary Pipe Fitting (1)
16. Cap the brake pipe fitting and plug the BPMV inlet port to prevent brake fluid loss and contamination.

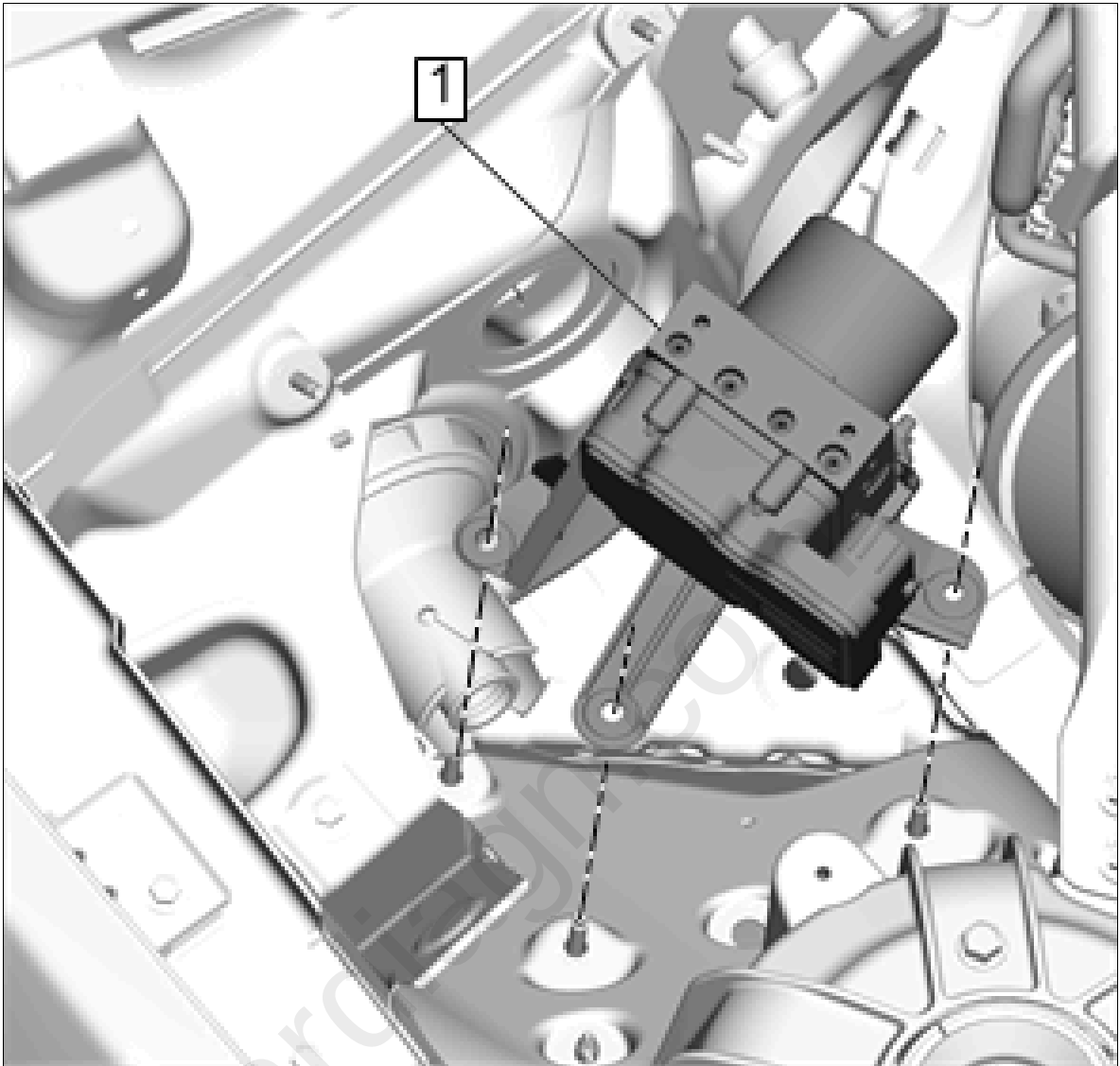
Fig 7: Brake Pressure Modulator Valve Bracket Nut



Courtesy of GENERAL MOTORS COMPANY

17. Remove Brake Pressure Modulator Valve Bracket Nut (1) (Qty: 3)

Fig 8: Brake Pressure Modulator Valve Assembly

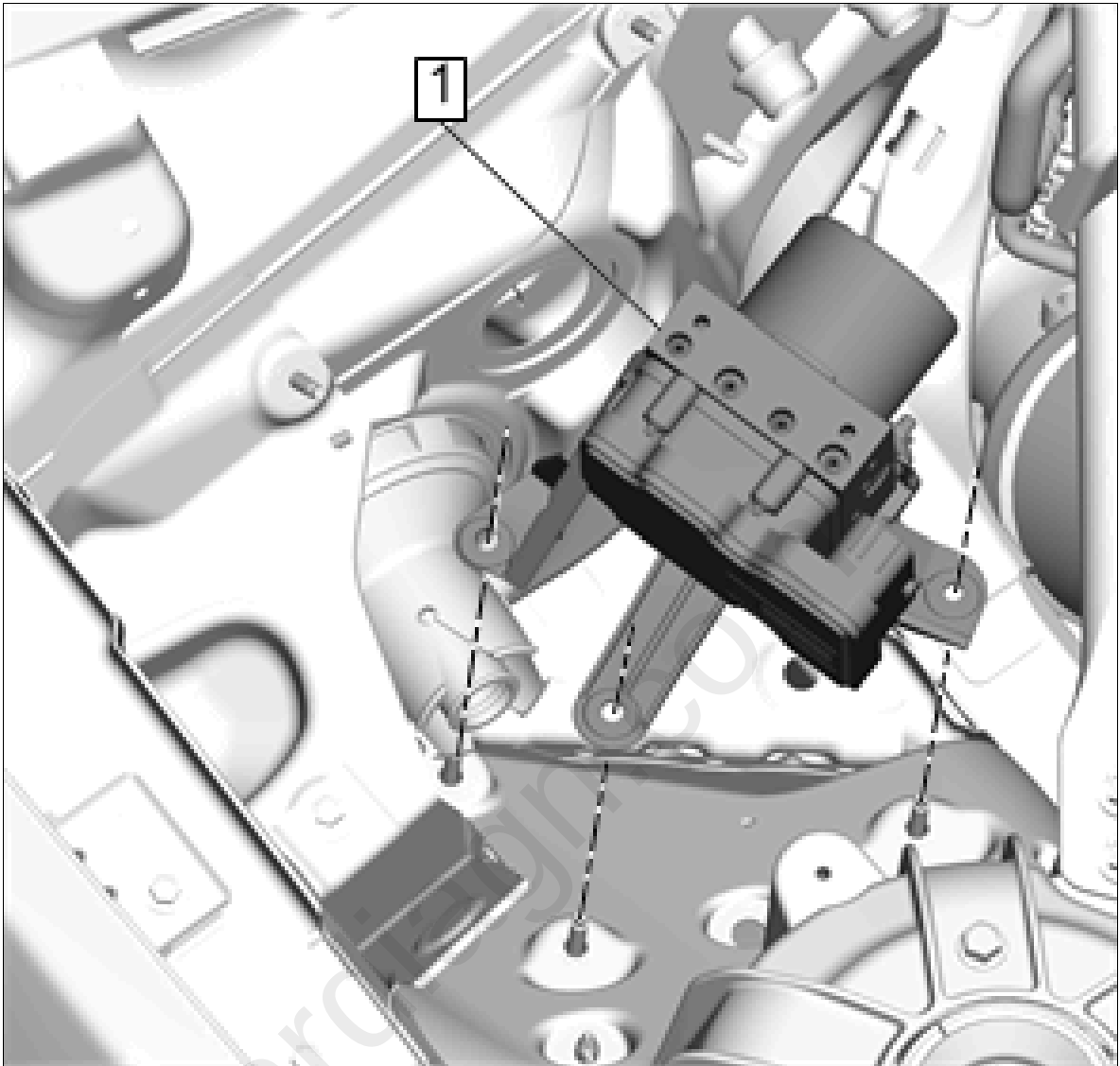


Courtesy of GENERAL MOTORS COMPANY

18. Remove Brake Pressure Modulator Valve Assembly (1)

**REPAIR INSTRUCTIONS > ELECTRONIC BRAKE CONTROL MODULE WITH BRAKE
PRESSURE MODULATOR VALVE REPLACEMENT > INSTALLATION PROCEDURE**

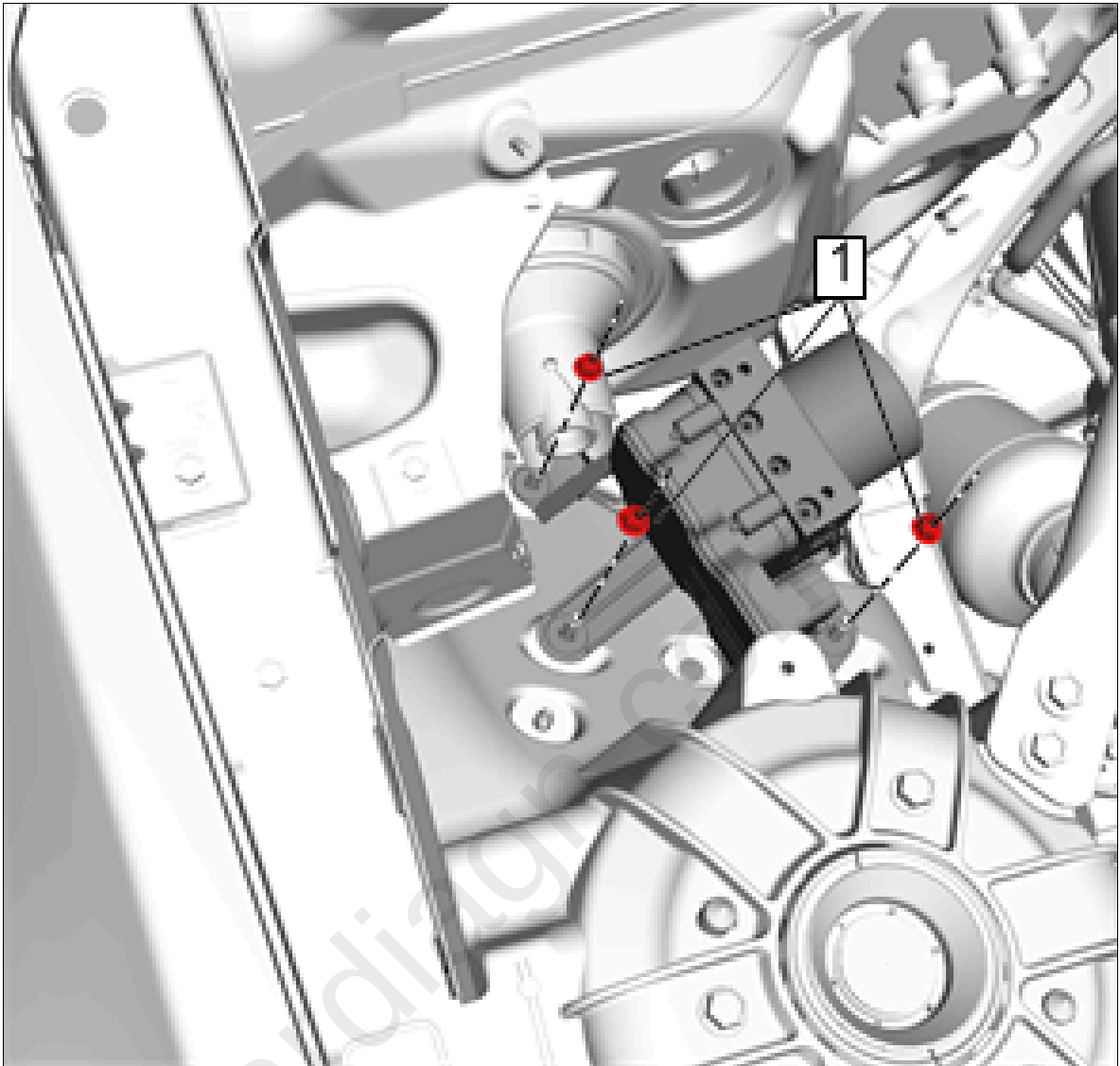
Fig 1: Brake Pressure Modulator Valve Assembly



Courtesy of GENERAL MOTORS COMPANY

1. Install Brake Pressure Modulator Valve Assembly (1)

Fig 2: Brake Pressure Modulator Valve Bracket Nut



Courtesy of GENERAL MOTORS COMPANY

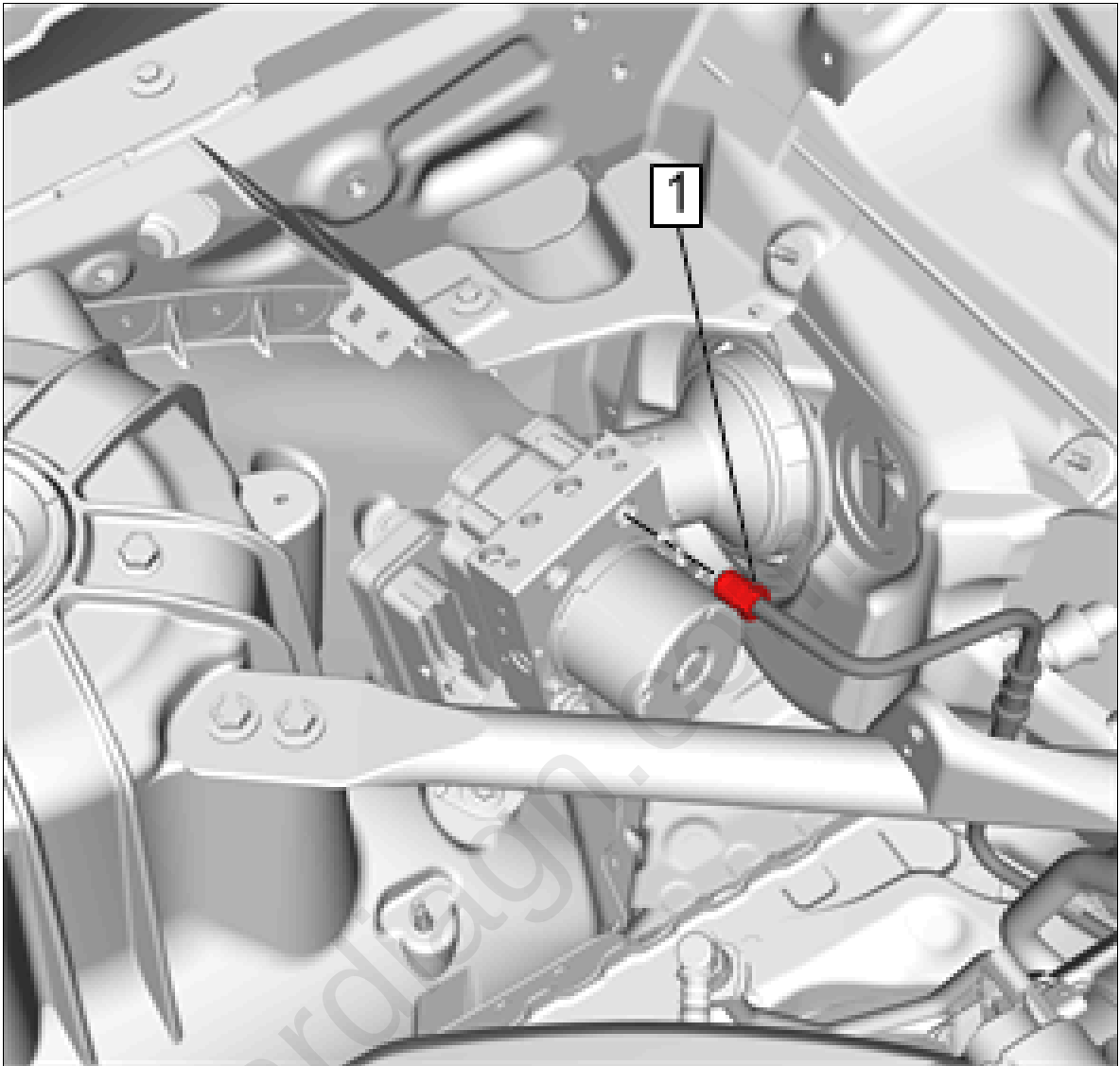


CAUTION:

Fastener Caution

2. Install Brake Pressure Modulator Valve Bracket Nut (1) (Qty: 3) and tighten to 7 N.m (62 lb in)

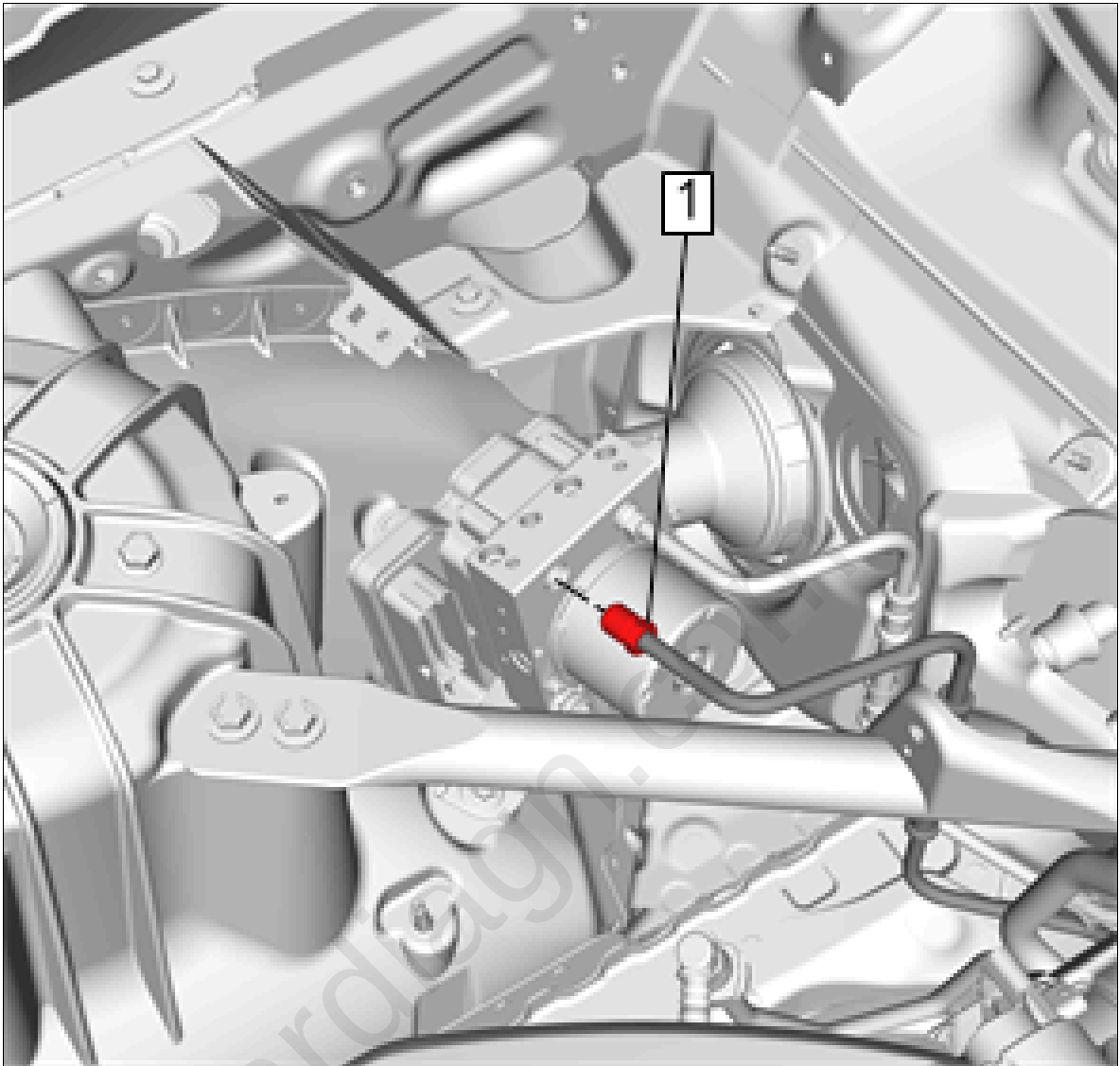
Fig 3: Brake Pressure Modulator Valve Primary Pipe Fitting



Courtesy of GENERAL MOTORS COMPANY

3. Install Brake Pressure Modulator Valve Primary Pipe Fitting (1) and tighten to 32 N.m (24 lb ft)

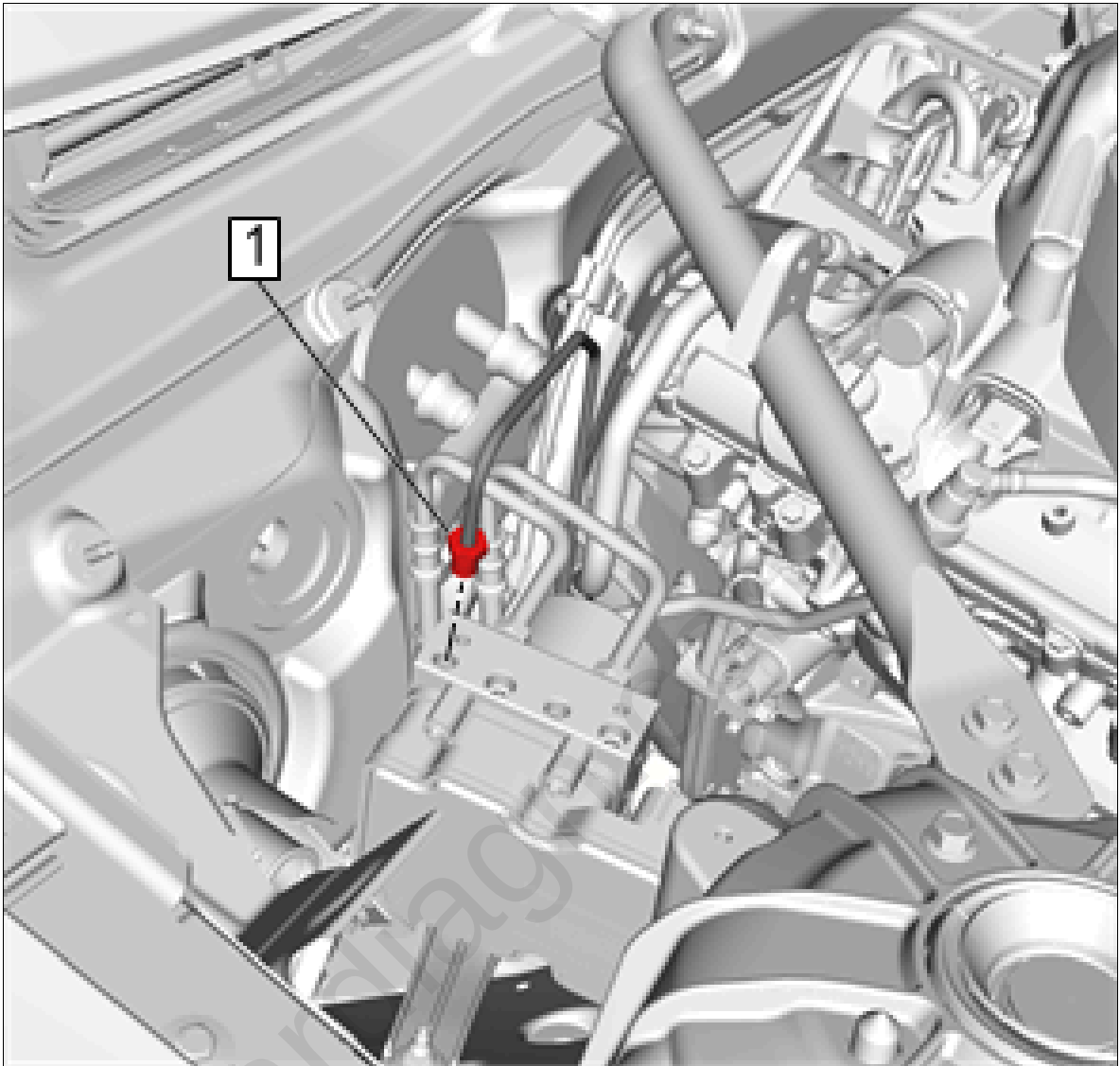
Fig 4: Brake Pressure Modulator Valve Secondary Pipe Fitting



Courtesy of GENERAL MOTORS COMPANY

4. Install Brake Pressure Modulator Valve Secondary Pipe Fitting (1) and tighten to 32 N.m (24 lb ft)

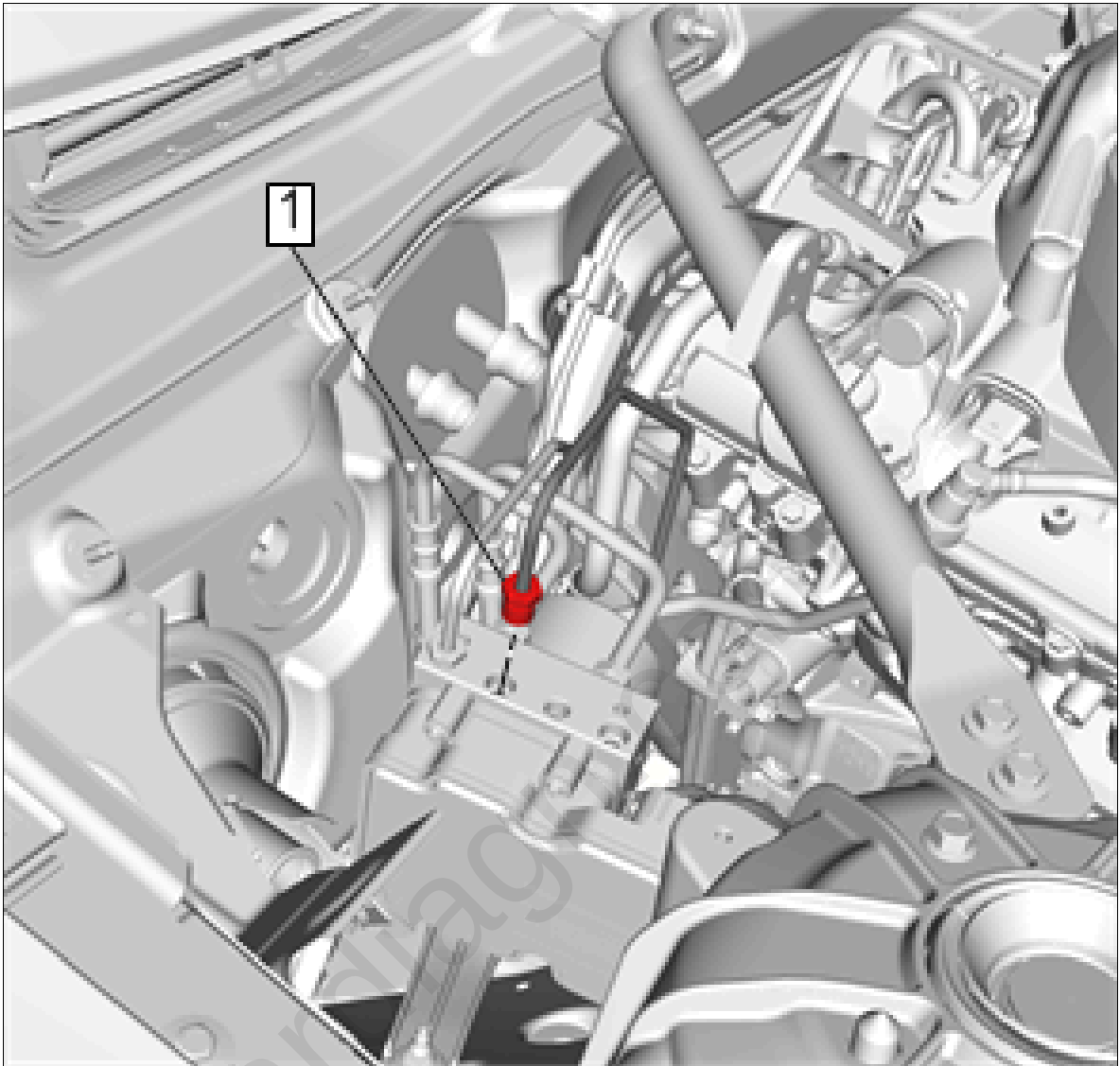
Fig 5: Left Rear Brake Pipe Fitting



Courtesy of GENERAL MOTORS COMPANY

5. Install Left Rear Brake Pipe Fitting (1) and tighten to 18 N.m (13 lb ft)

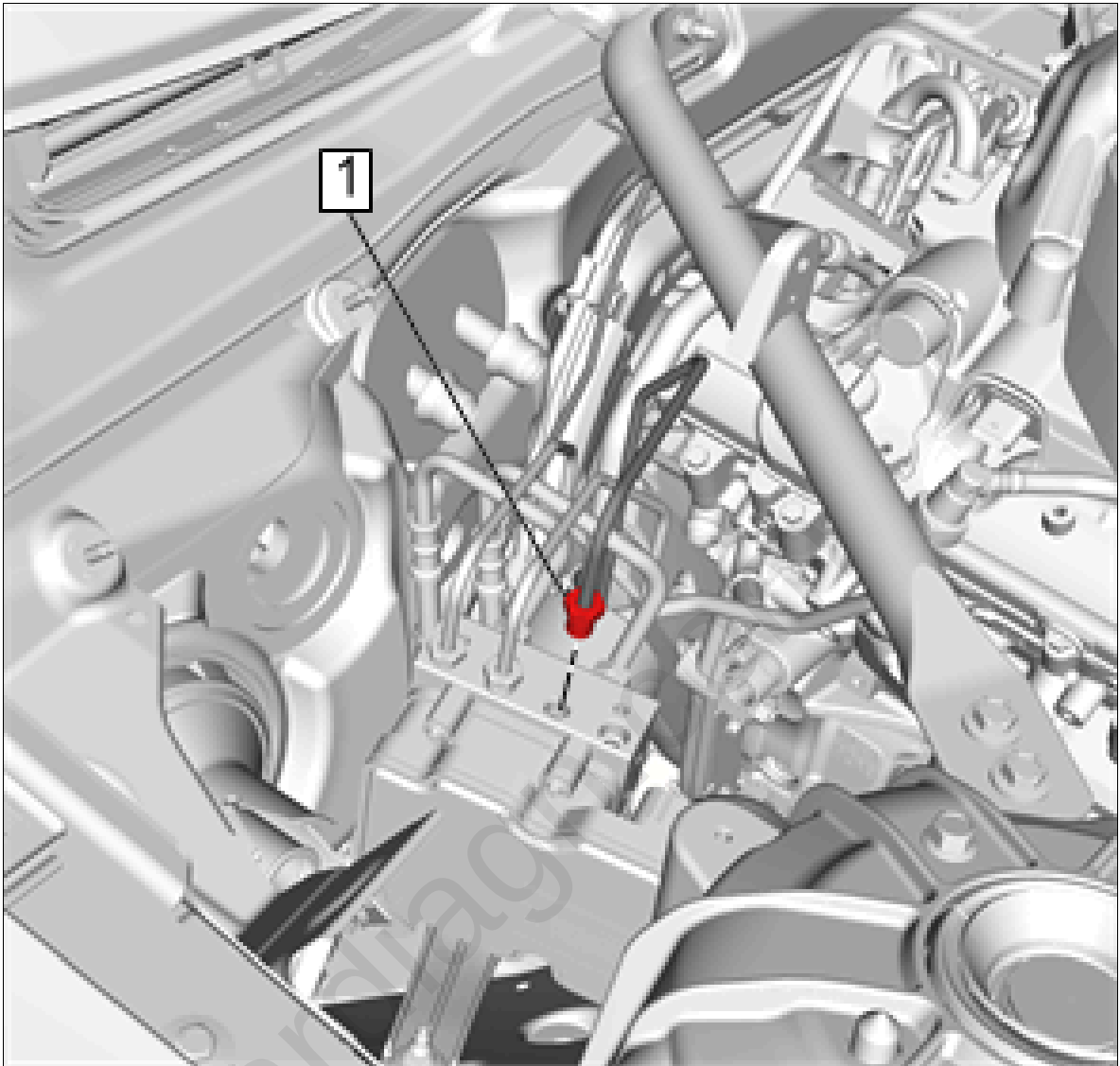
Fig 6: Right Front Brake Pipe Fitting



Courtesy of GENERAL MOTORS COMPANY

6. Install Right Front Brake Pipe Fitting (1) and tighten to 18 N.m (13 lb ft)

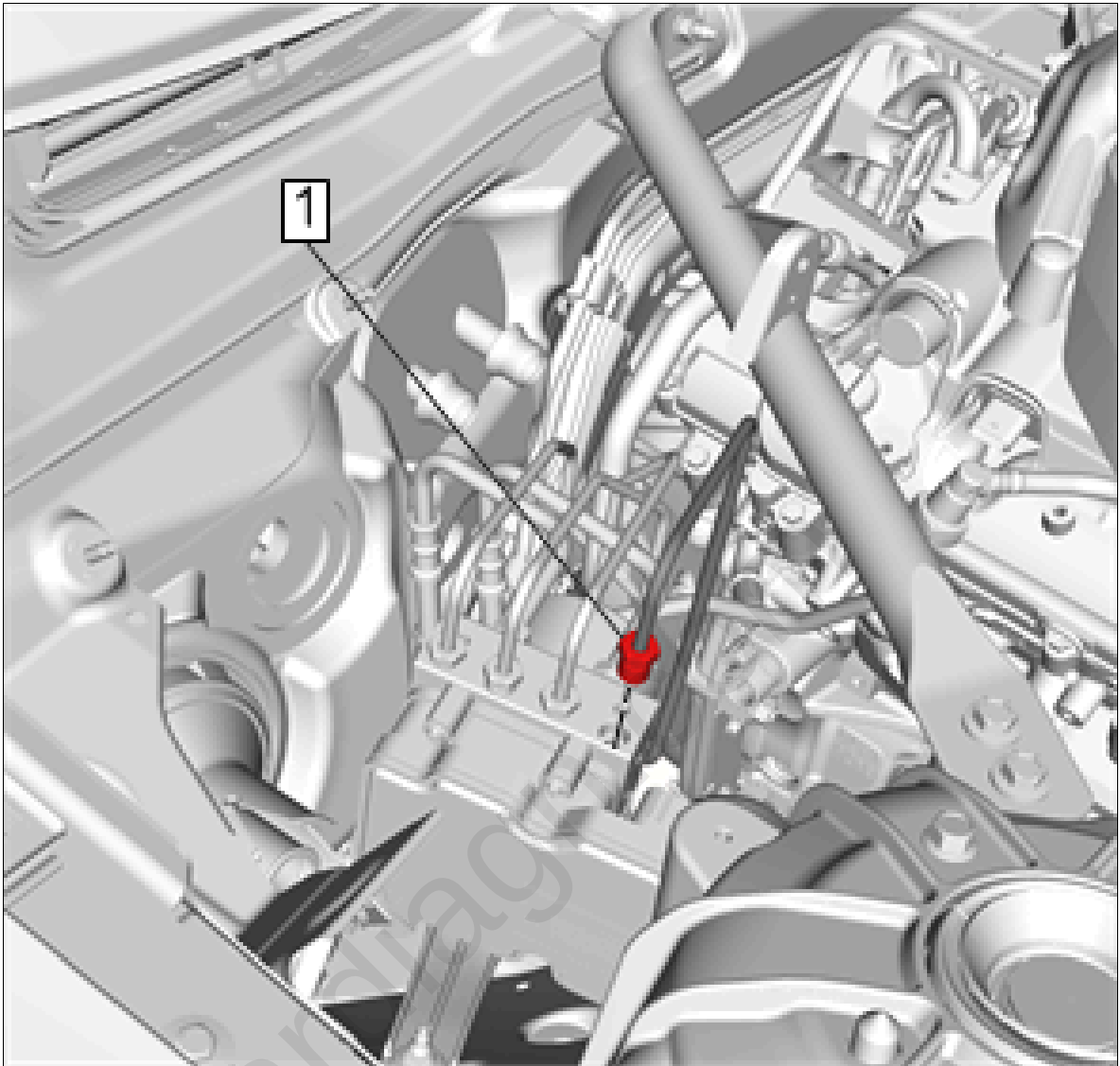
Fig 7: Left Front Brake Pipe Fitting



Courtesy of GENERAL MOTORS COMPANY

7. Install Left Front Brake Pipe Fitting (1) and tighten to 18 N.m (13 lb ft)

Fig 8: Right Rear Brake Pipe Fitting



Courtesy of GENERAL MOTORS COMPANY

8. Install Right Rear Brake Pipe Fitting (1) and tighten to 18 N.m (13 lb ft)
9. Connect the EBCM electrical connector.
10. Bleed the brake system. Antilock Brake System Automated Bleed
11. Install Plenum Front Panel Replacement
12. Program the EBCM. Electronic Brake Control Module Programming and Setup
13. Calibrate the BPMV pressure sensor. Brake Pressure Modulator Valve Pressure Sensor Calibration
14. Center the steering angle sensor. Steering Angle Sensor Centering

SENSOR CALIBRATION

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

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

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

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

REPAIR INSTRUCTIONS > BRAKE PRESSURE MODULATOR VALVE PUMP MOUNTING BRACKET REPLACEMENT > REMOVAL PROCEDURE

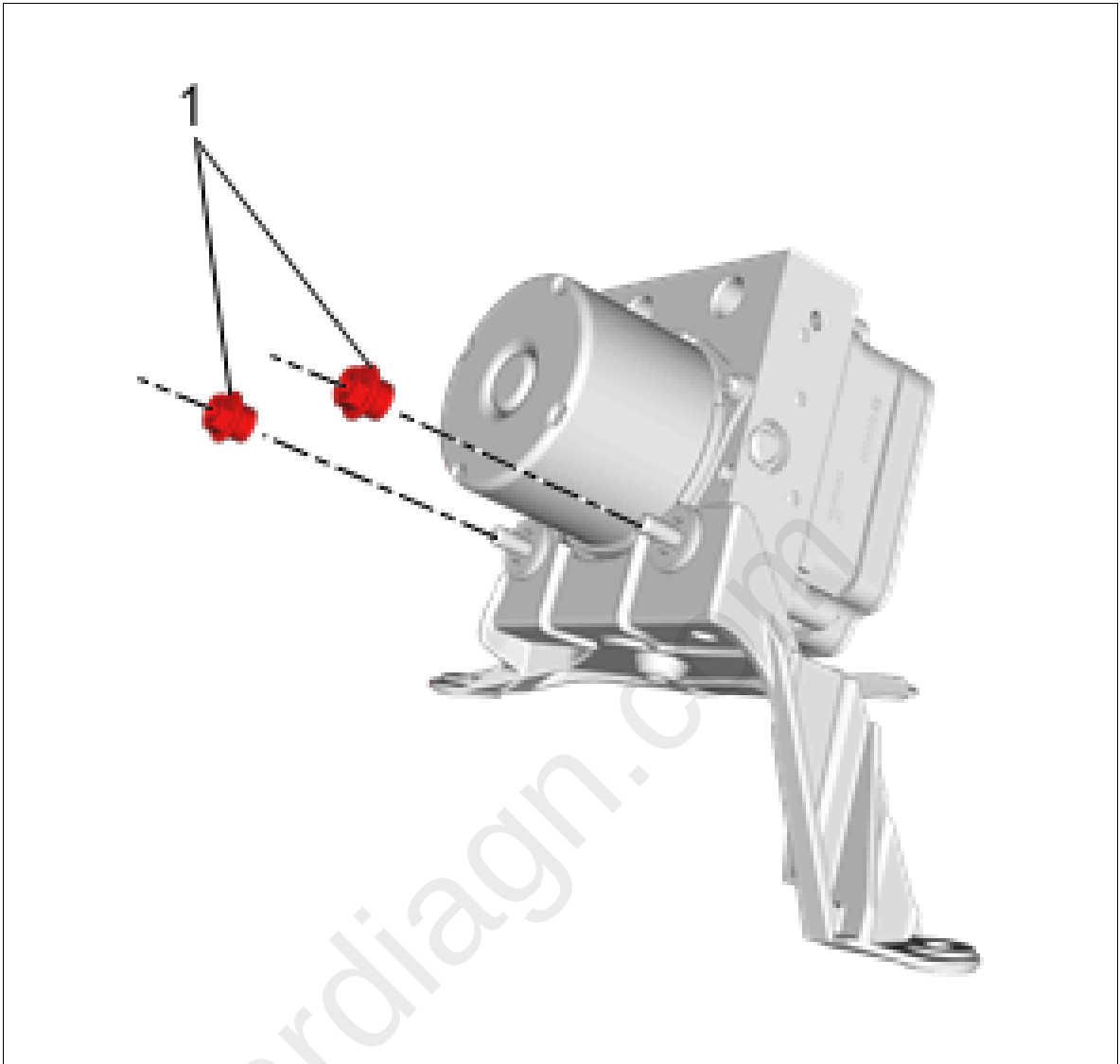


CAUTION:

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. Disconnect the electronic brake control module (EBCM) electrical connector.
3. Remove Electronic Brake Control Module with Brake Pressure Modulator Valve Replacement

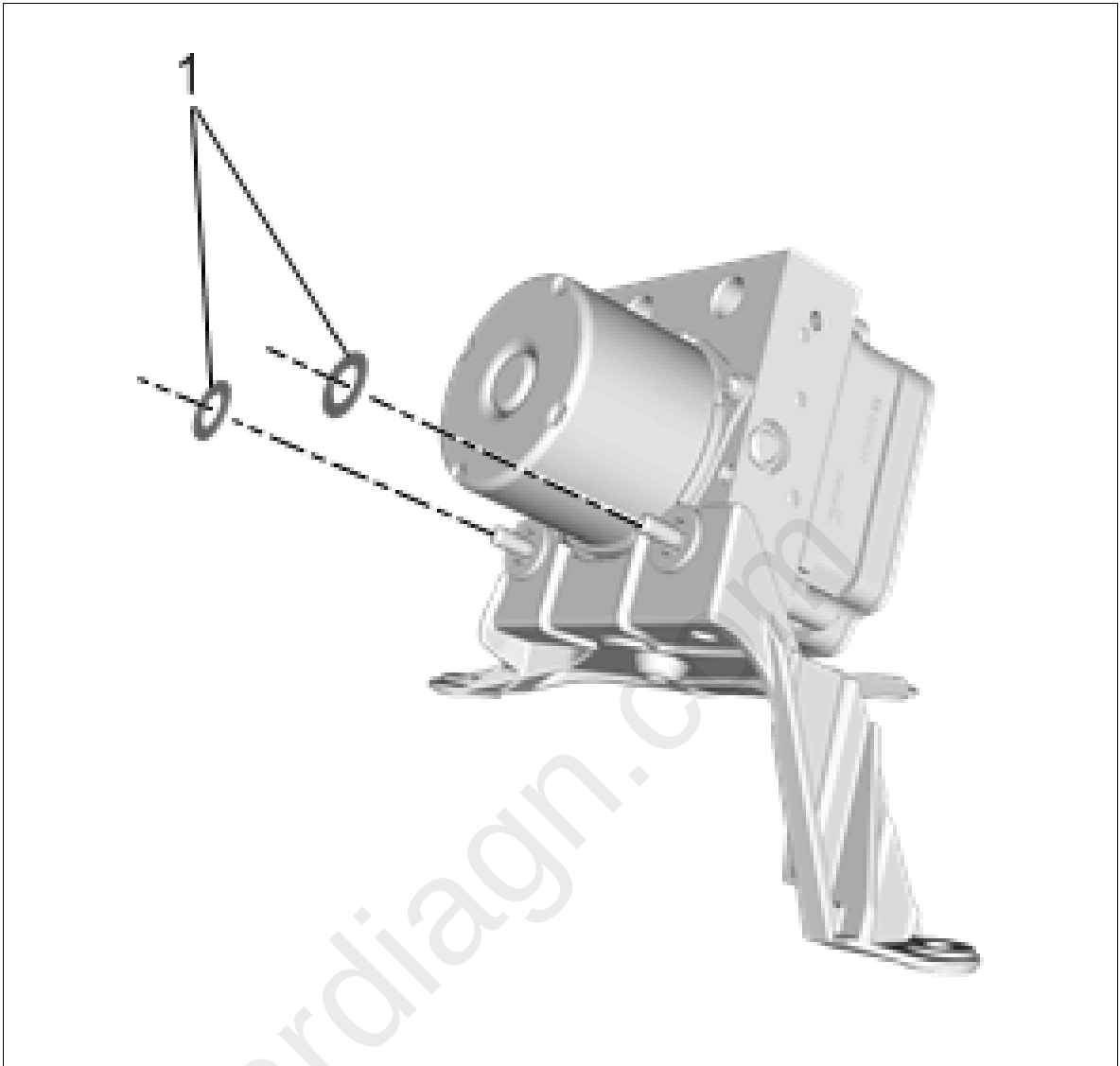
Fig 1: Brake Pressure Modulator Valve Nut



Courtesy of GENERAL MOTORS COMPANY

4. Remove Brake Pressure Modulator Valve Nut (1) (Qty: 2)

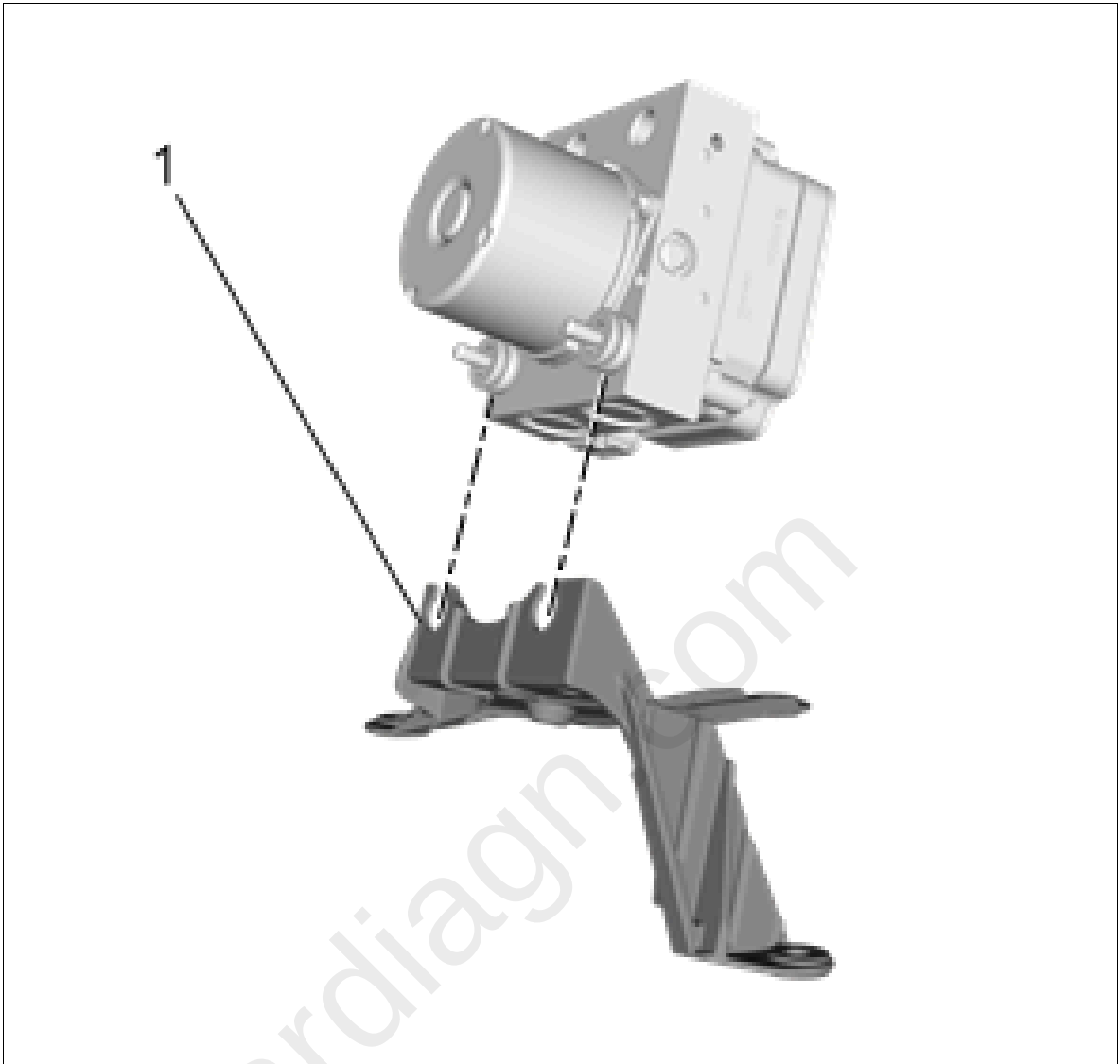
Fig 2: Brake Pressure Modulator Valve Bracket Washer



Courtesy of GENERAL MOTORS COMPANY

5. Remove Brake Pressure Modulator Valve Bracket Washer (1) (Qty: 2)

Fig 3: Brake Pressure Modulator Valve Bracket

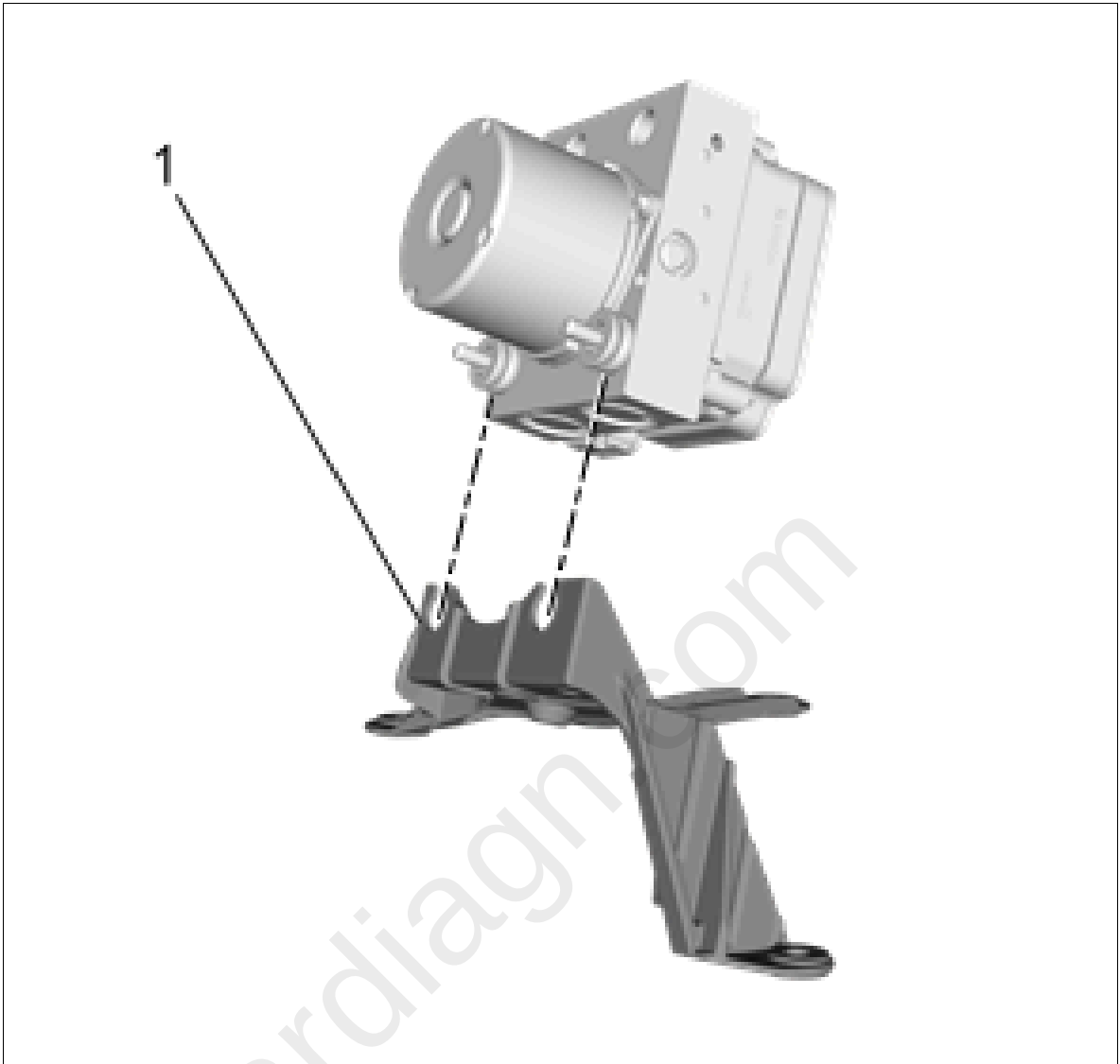


Courtesy of GENERAL MOTORS COMPANY

6. Remove Brake Pressure Modulator Valve Bracket (1)

**REPAIR INSTRUCTIONS > BRAKE PRESSURE MODULATOR VALVE PUMP
MOUNTING BRACKET REPLACEMENT > INSTALLATION PROCEDURE**

Fig 1: Brake Pressure Modulator Valve Bracket



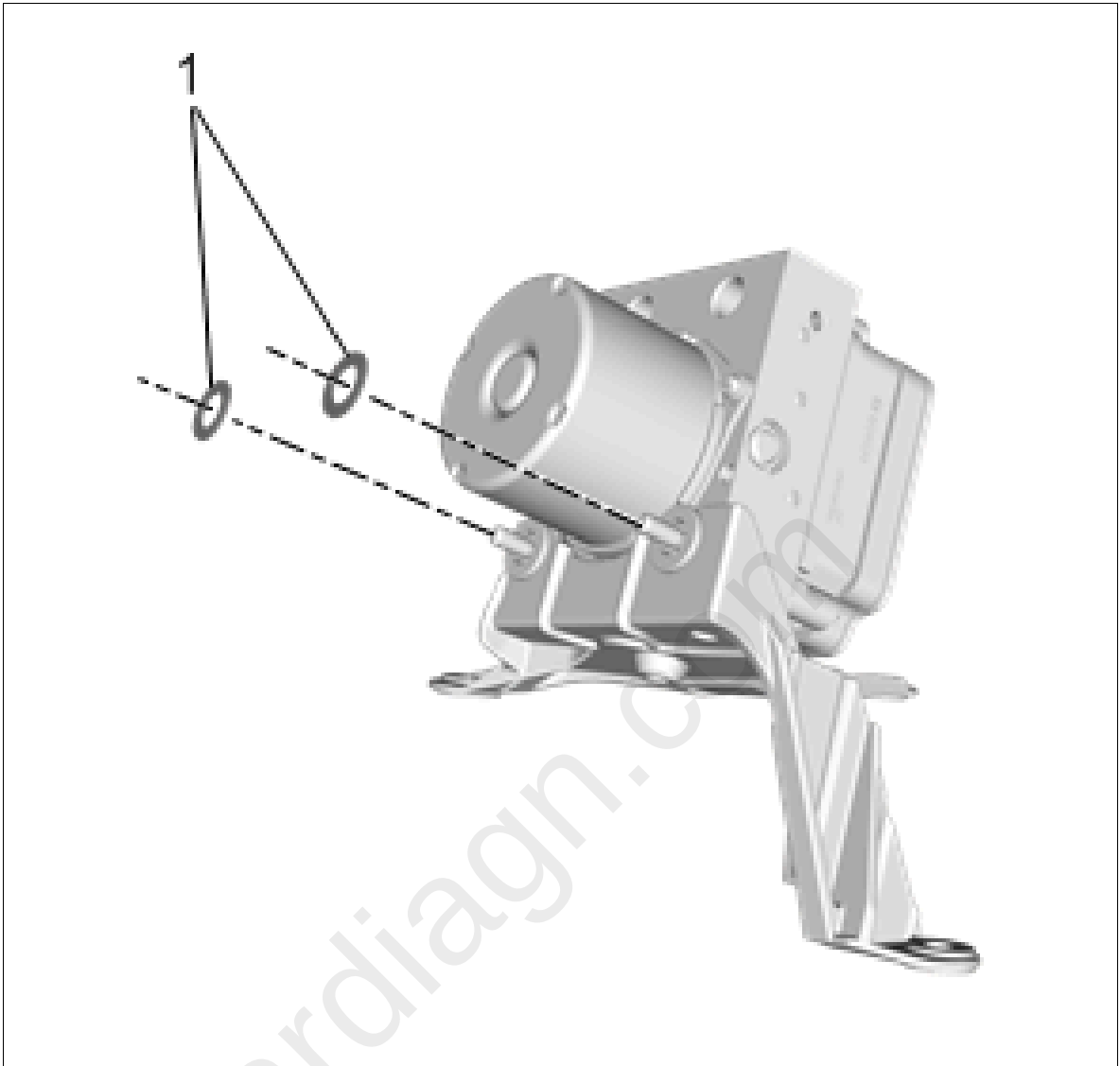
Courtesy of GENERAL MOTORS COMPANY

 NOTE:

A small amount of denatured alcohol may be used on the insulators to ease assembly.

1. Install Brake Pressure Modulator Valve Bracket (1)

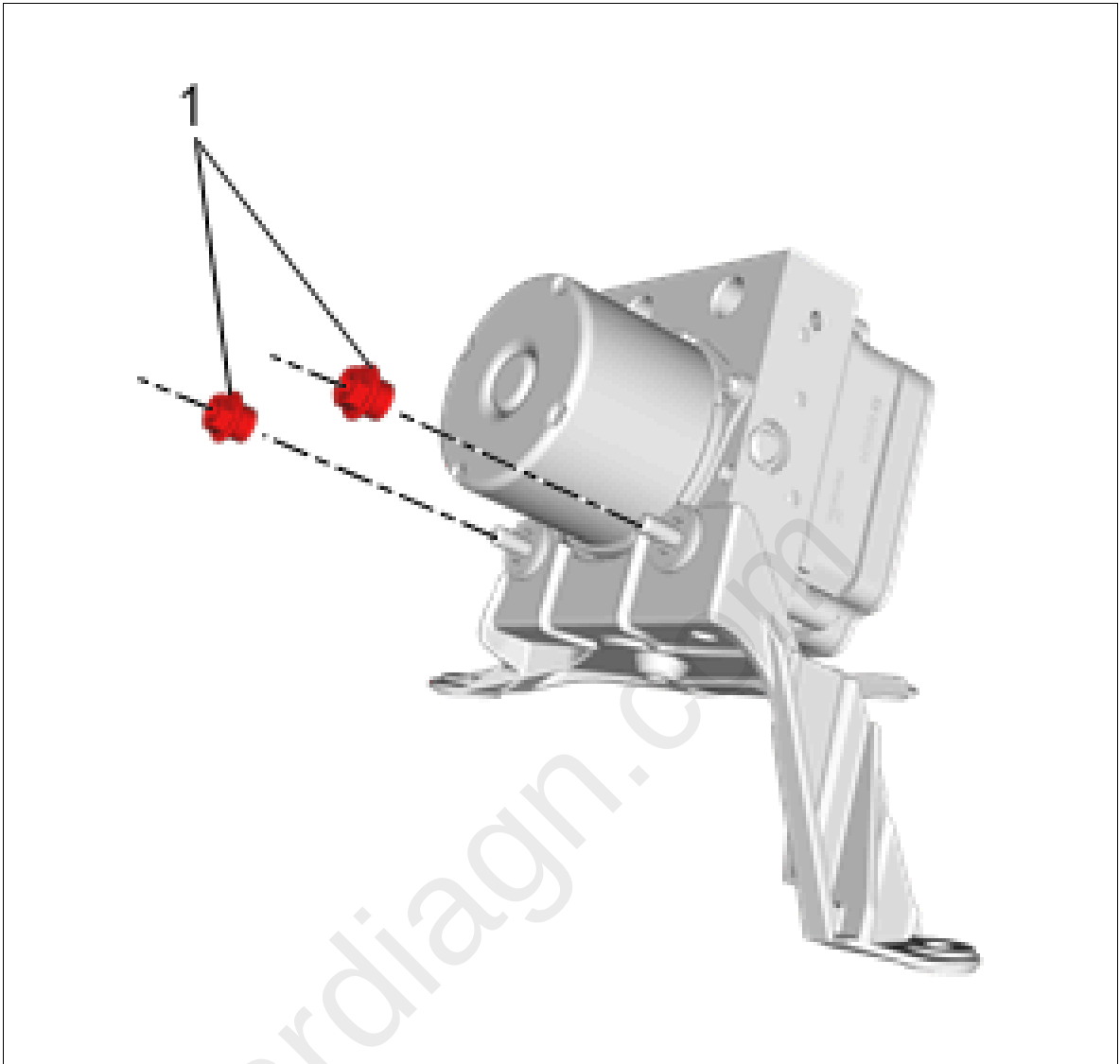
Fig 2: Brake Pressure Modulator Valve Bracket Washer



Courtesy of GENERAL MOTORS COMPANY

2. Install Brake Pressure Modulator Valve Bracket Washer (1) (Qty: 2)

Fig 3: Brake Pressure Modulator Valve Nut



Courtesy of GENERAL MOTORS COMPANY



CAUTION:

Fastener Caution

3. Install Brake Pressure Modulator Valve Nut (1) (Qty: 2) and tighten to 3 N.m (27 lb in)
4. Install Electronic Brake Control Module with Brake Pressure Modulator Valve Replacement

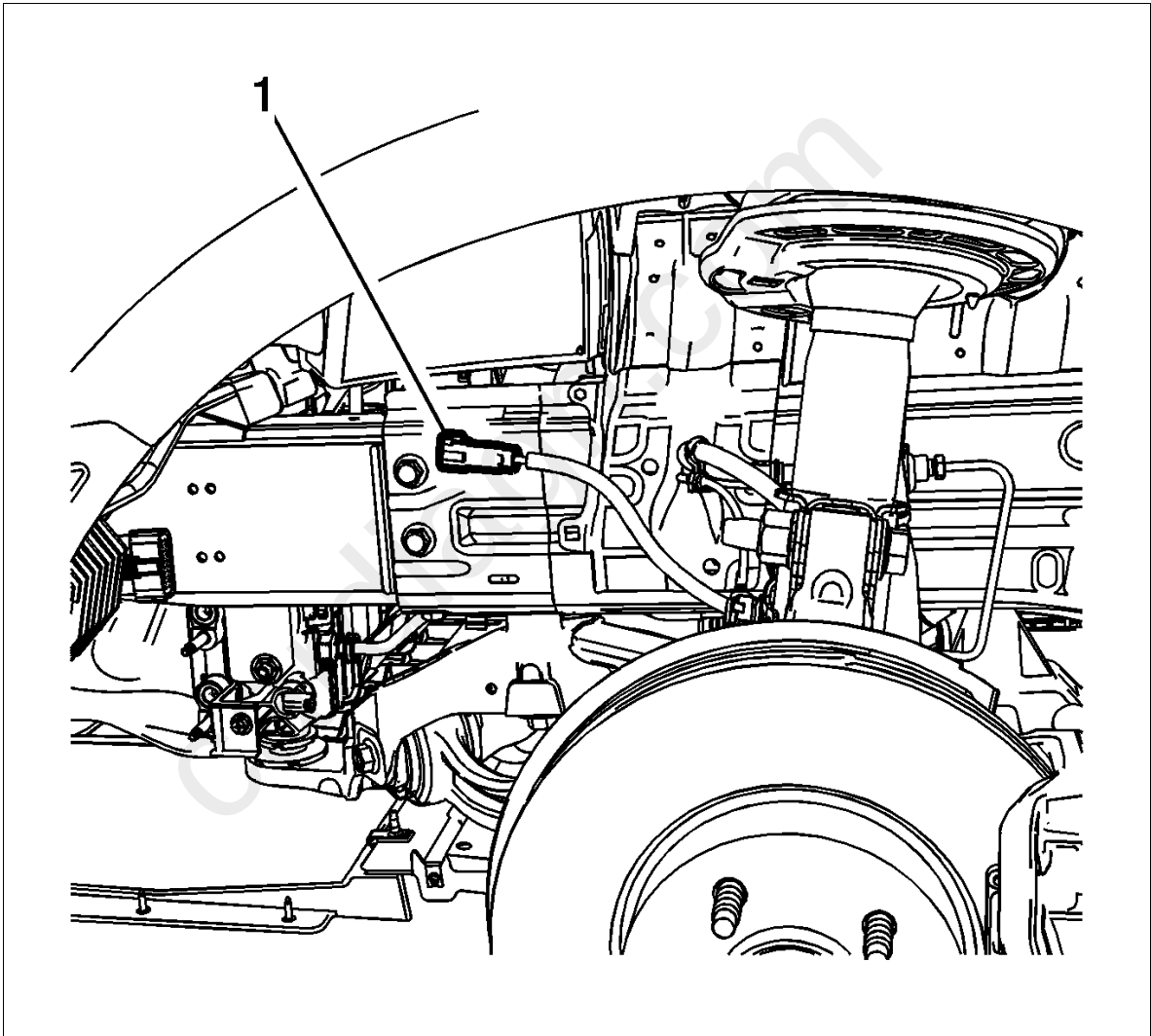
**REPAIR INSTRUCTIONS > FRONT WHEEL SPEED SENSOR REPLACEMENT >
REMOVAL PROCEDURE**

⚠ WARNING:

Refer to Brake Dust Warning .

1. Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle (Base)Lifting and Jacking the Vehicle (HP) .
2. Remove the tire and wheel assembly. Refer to Tire and Wheel Removal and Installation .
3. Remove the front wheelhouse liner. Refer to Front Wheelhouse Liner Replacement .

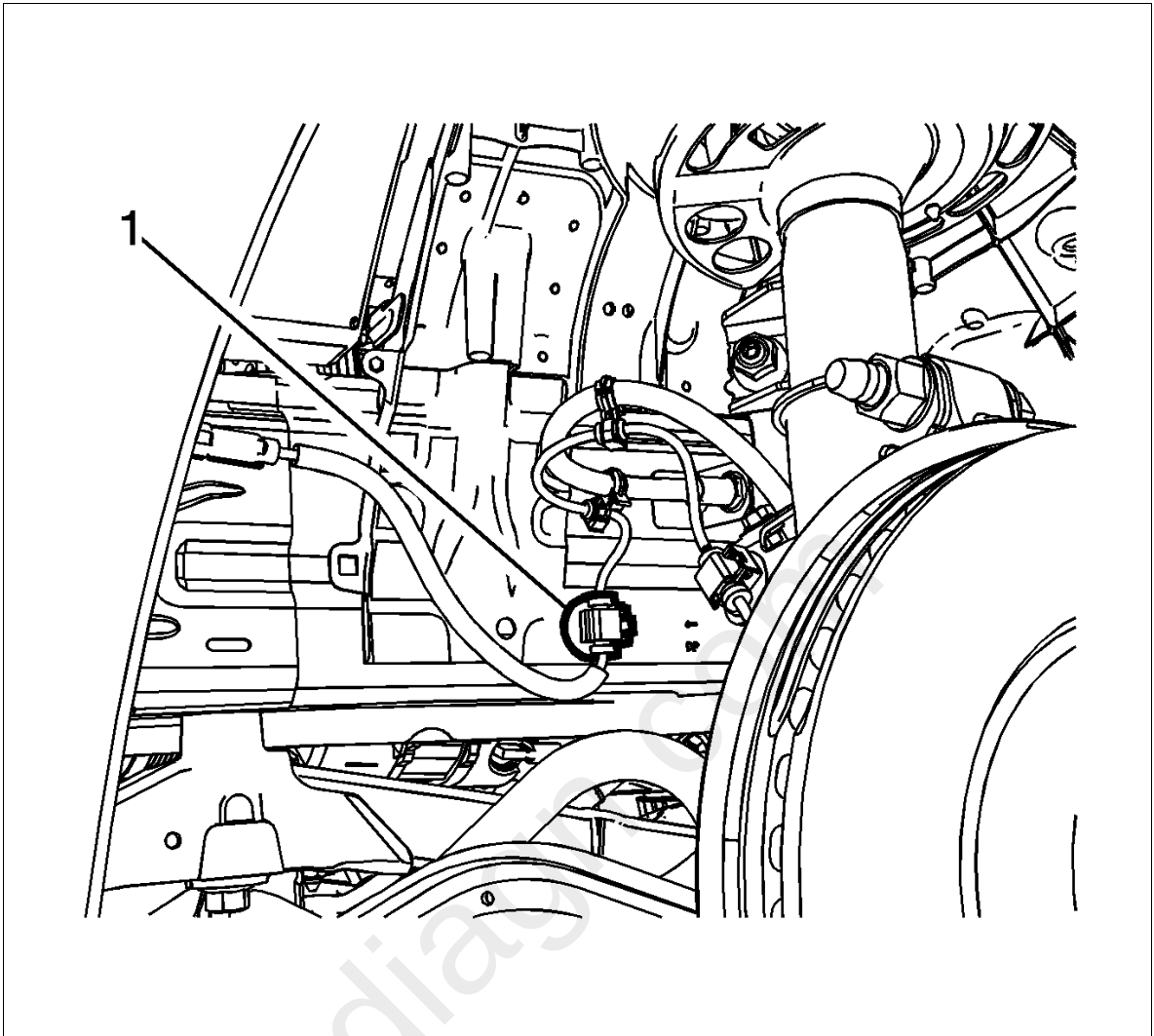
Fig 1: Wheel Speed Sensor Electrical Connector Clip



Courtesy of GENERAL MOTORS COMPANY

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

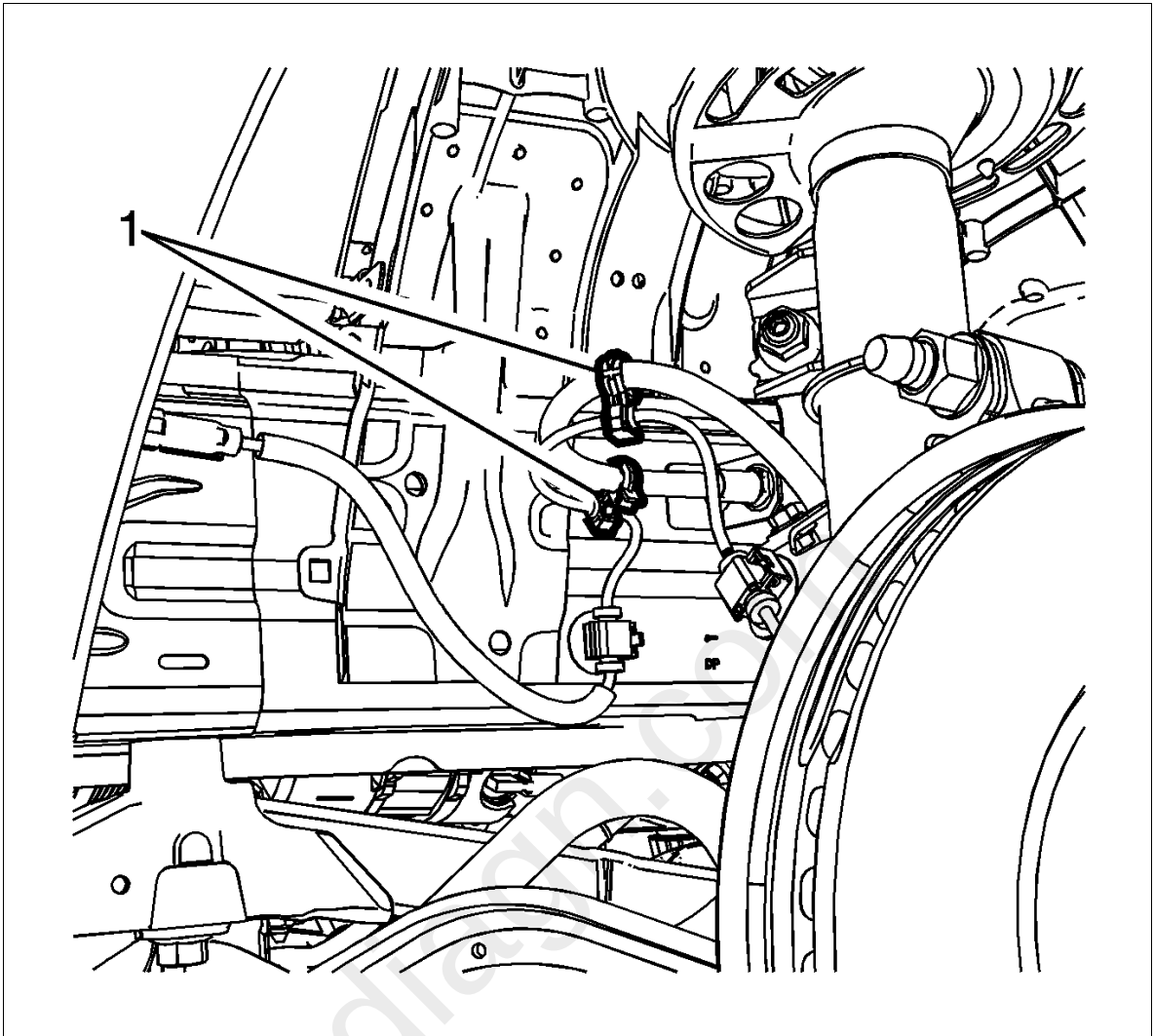
Fig 2: Wheel Speed Sensor Harness Clip



Courtesy of GENERAL MOTORS COMPANY

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

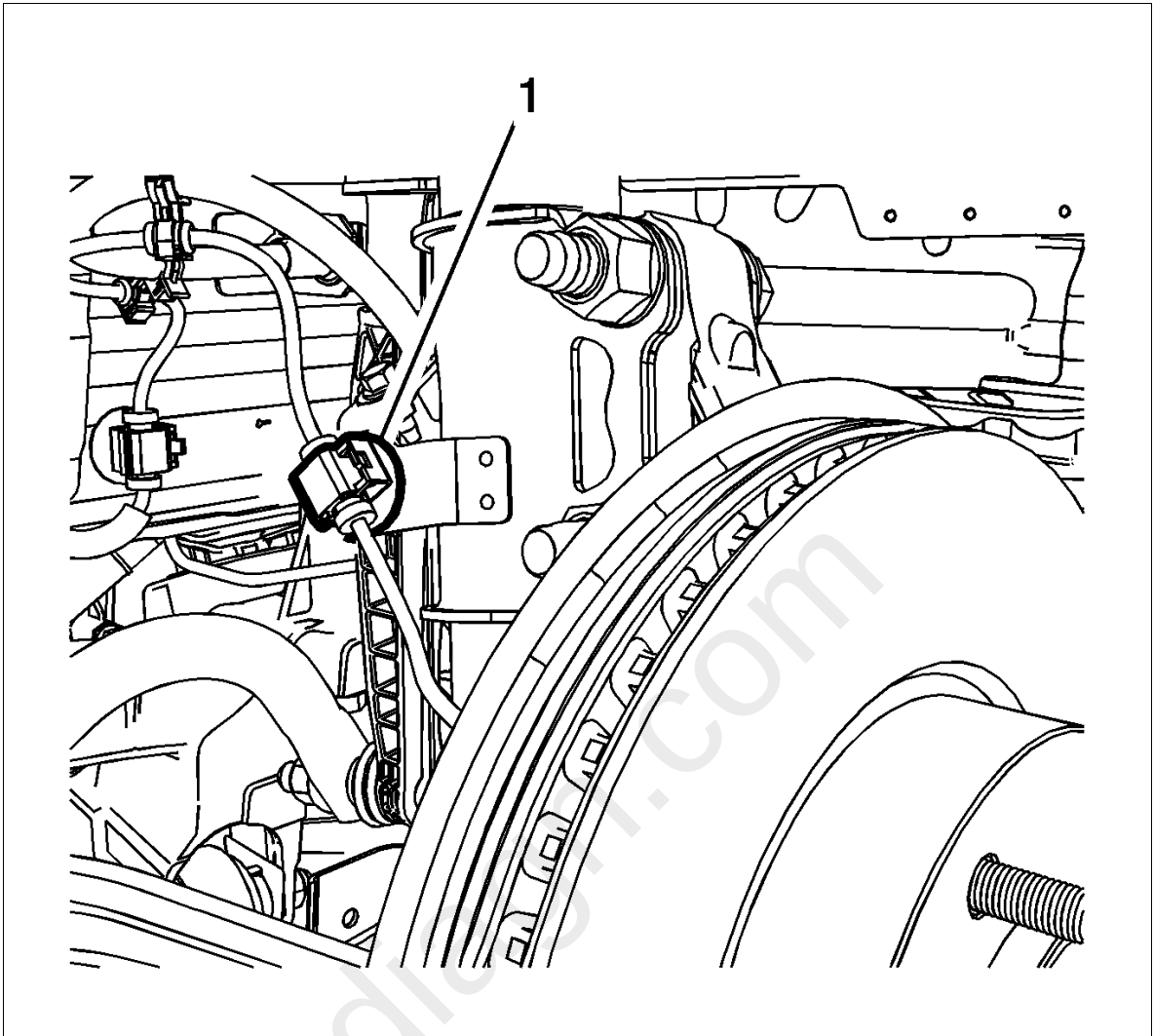
Fig 3: Wheel Speed Sensor Harness Clips



Courtesy of GENERAL MOTORS COMPANY

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

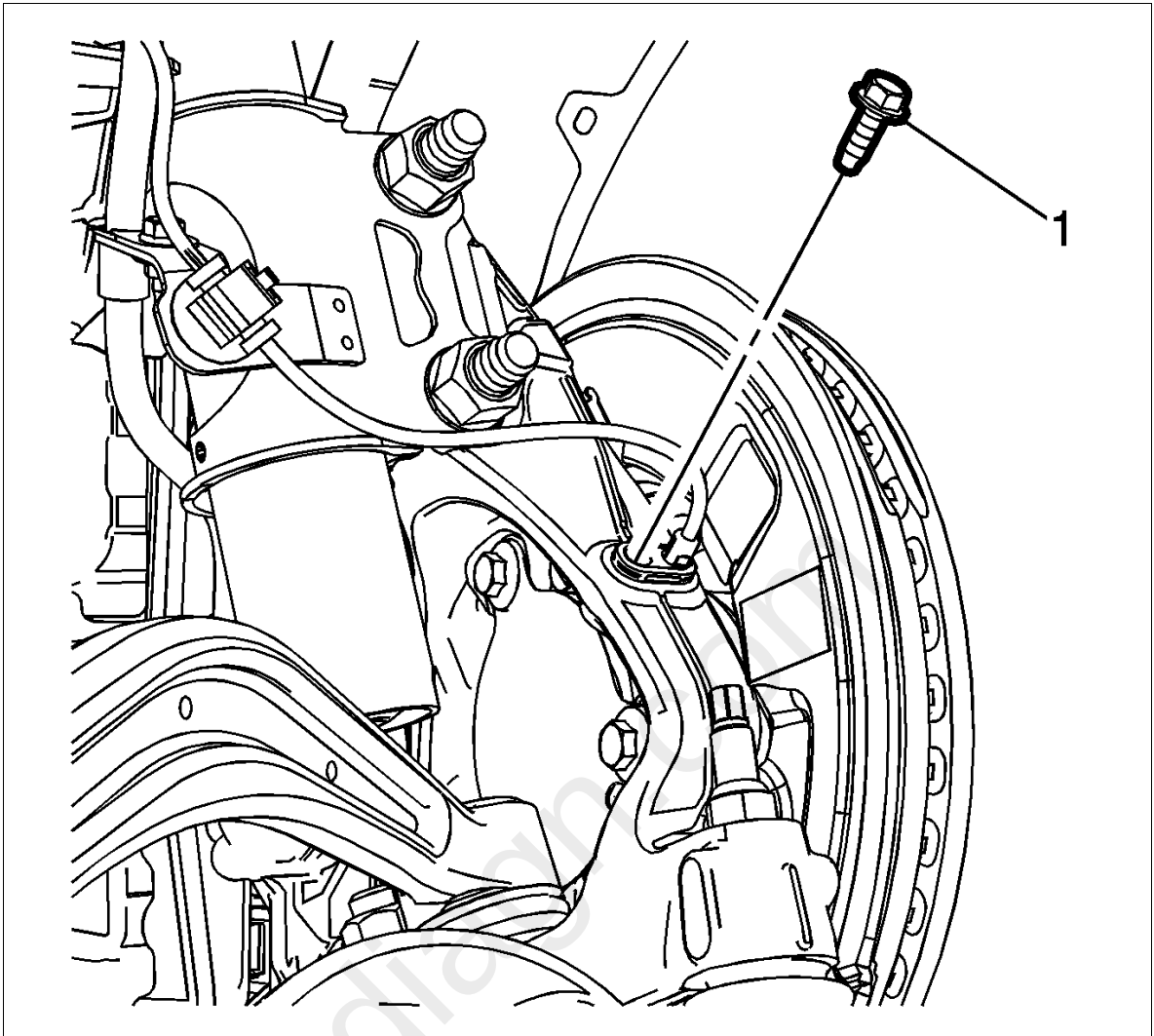
Fig 4: Wheel Speed Sensor Harness Retainer



Courtesy of GENERAL MOTORS COMPANY

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

Fig 5: Wheel Speed Sensor Bolt



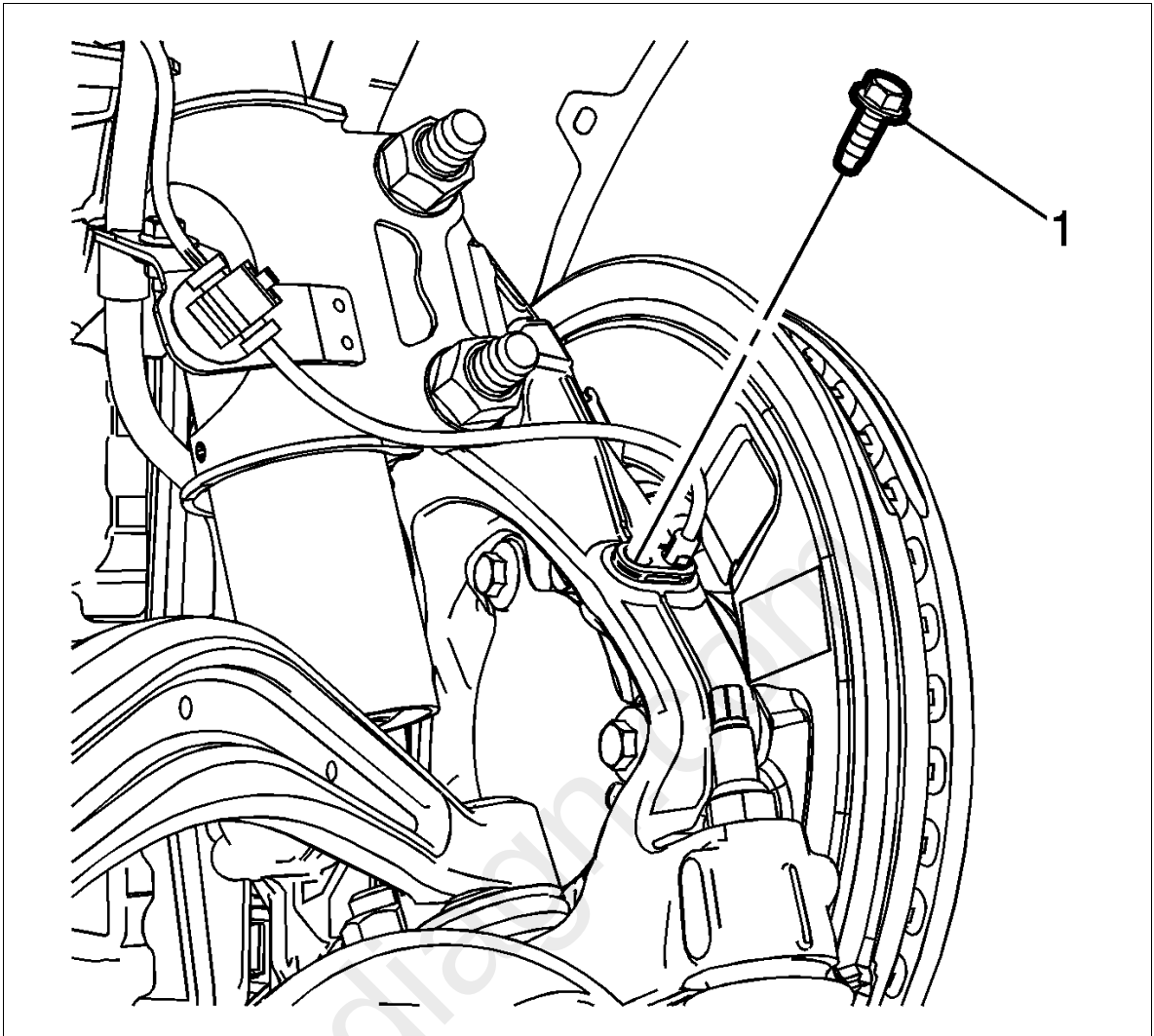
Courtesy of GENERAL MOTORS COMPANY

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

REPAIR INSTRUCTIONS > FRONT WHEEL SPEED SENSOR REPLACEMENT > INSTALLATION PROCEDURE

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

Fig 1: Wheel Speed Sensor Bolt



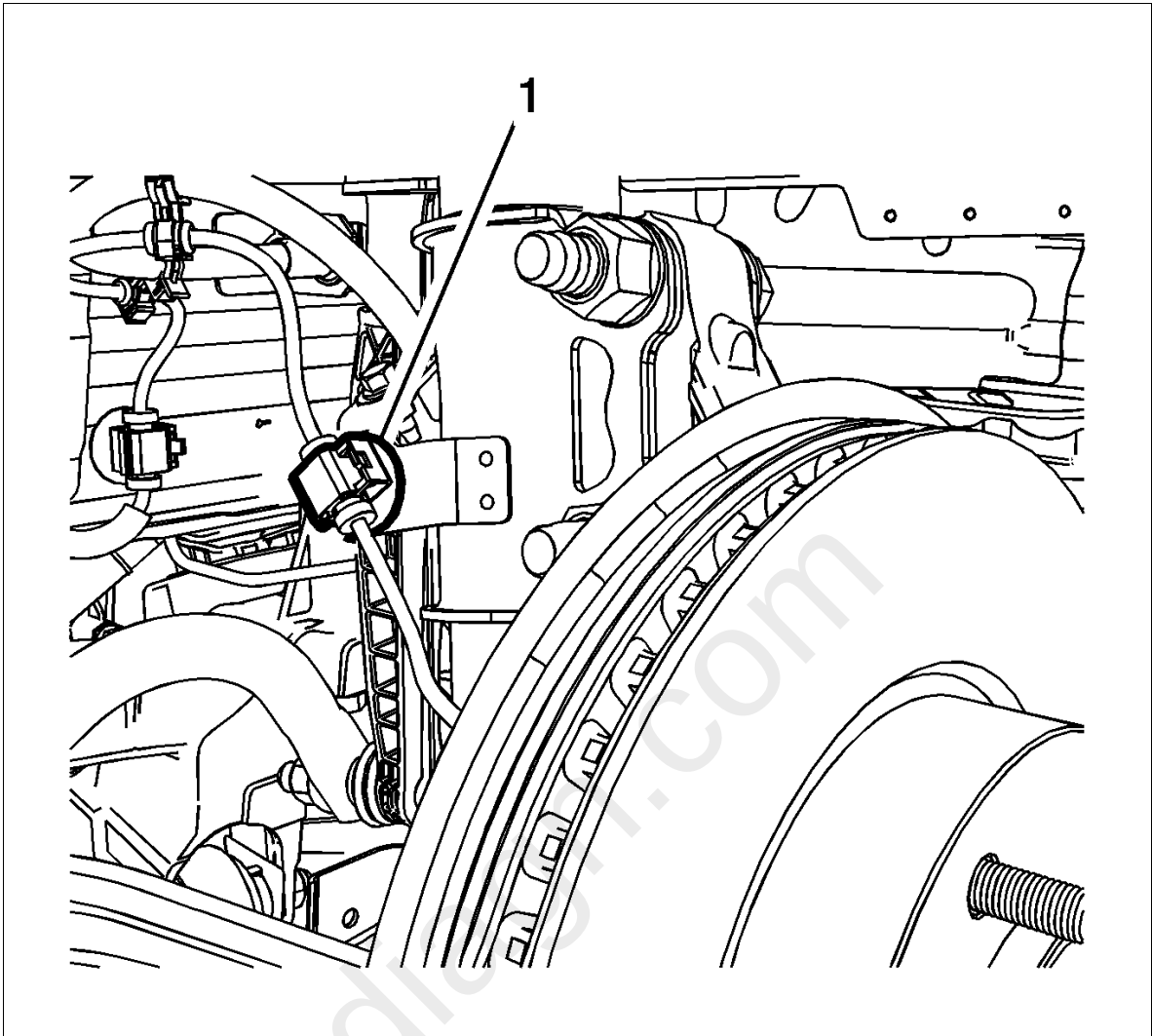
Courtesy of GENERAL MOTORS COMPANY

 **CAUTION:**

Refer to Fastener Caution .

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

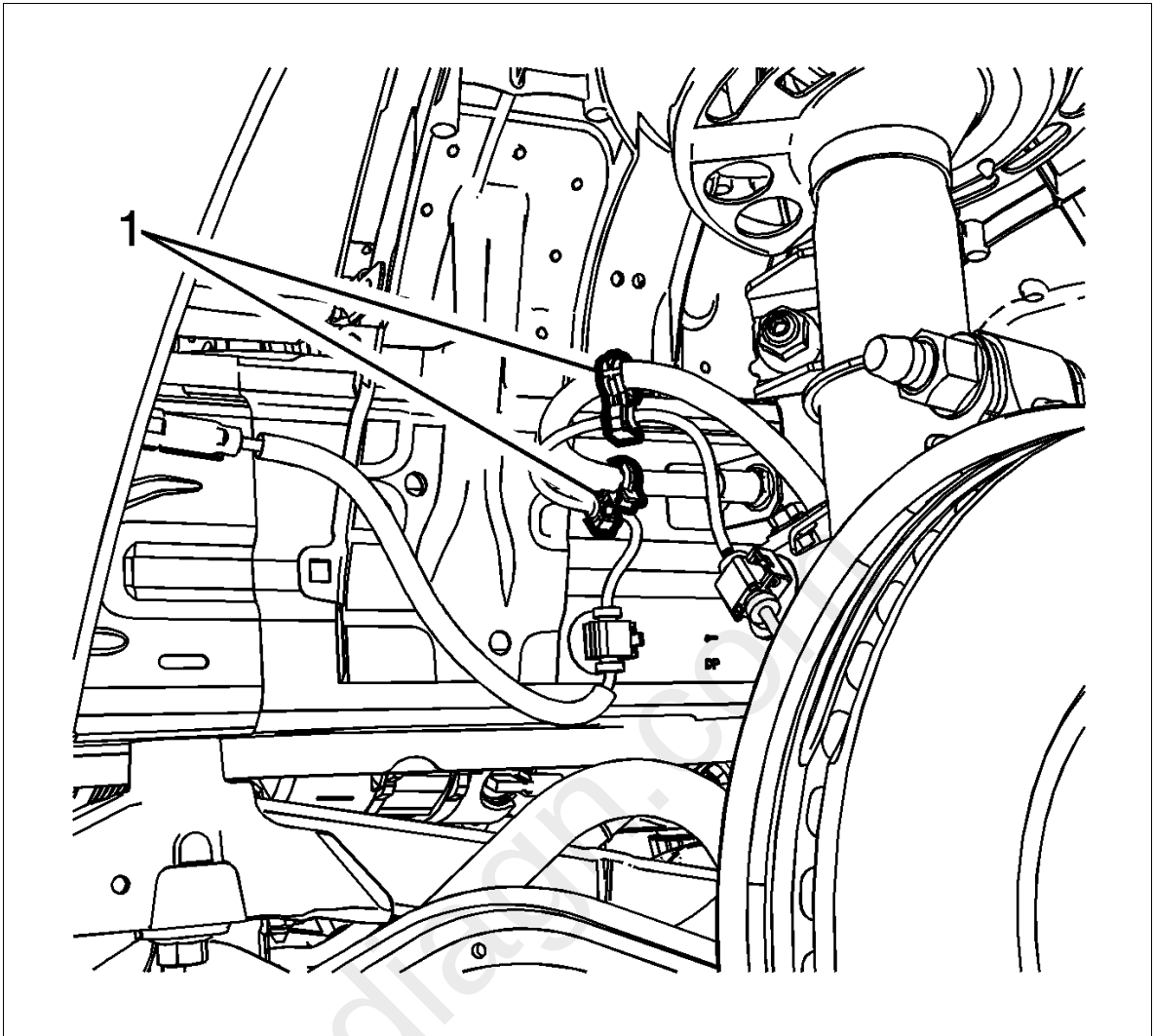
Fig 2: Wheel Speed Sensor Harness Retainer



Courtesy of GENERAL MOTORS COMPANY

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

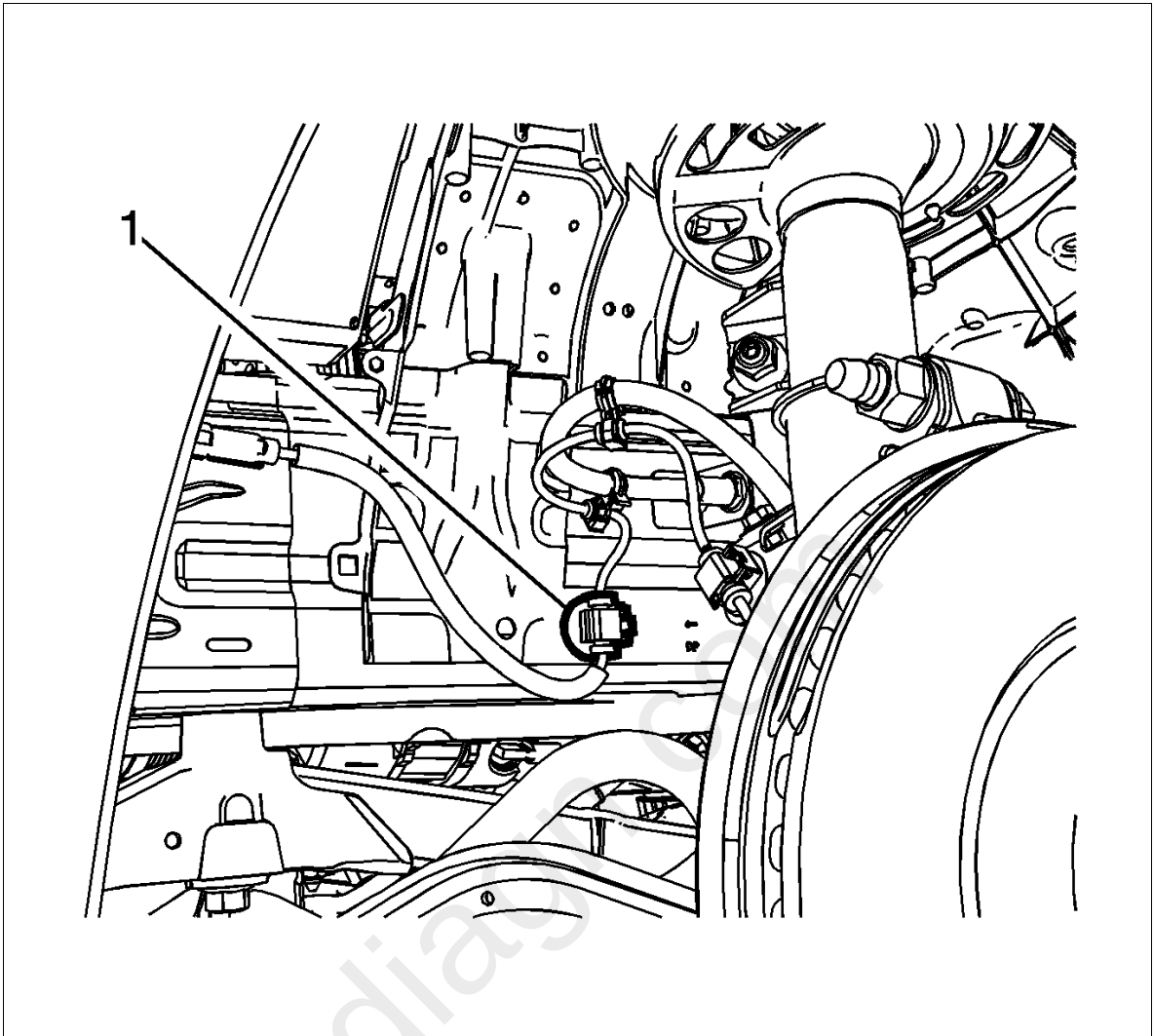
Fig 3: Wheel Speed Sensor Harness Clips



Courtesy of GENERAL MOTORS COMPANY

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

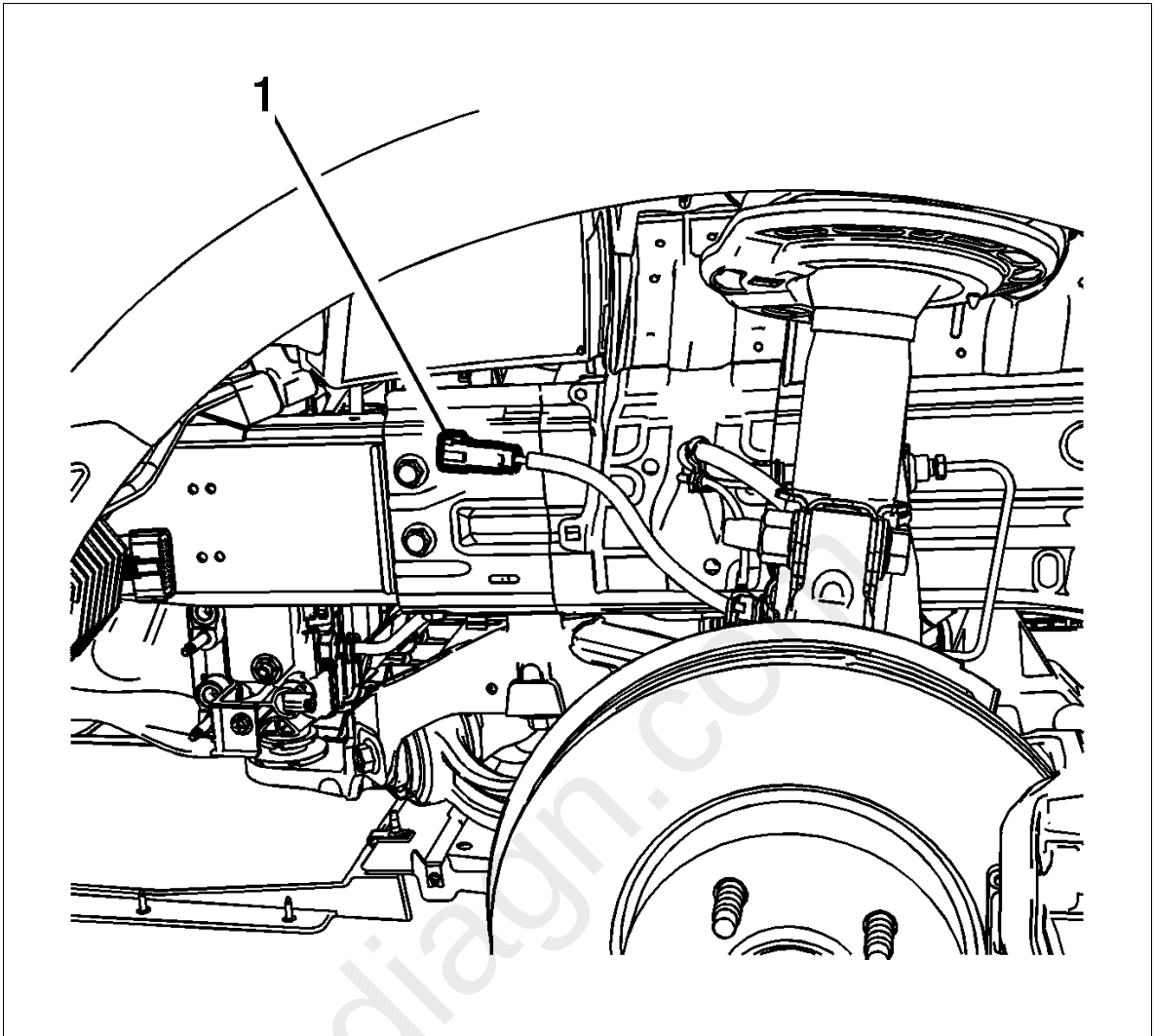
Fig 4: Wheel Speed Sensor Harness Clip



Courtesy of GENERAL MOTORS COMPANY

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

Fig 5: Wheel Speed Sensor Electrical Connector Clip



Courtesy of GENERAL MOTORS COMPANY

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

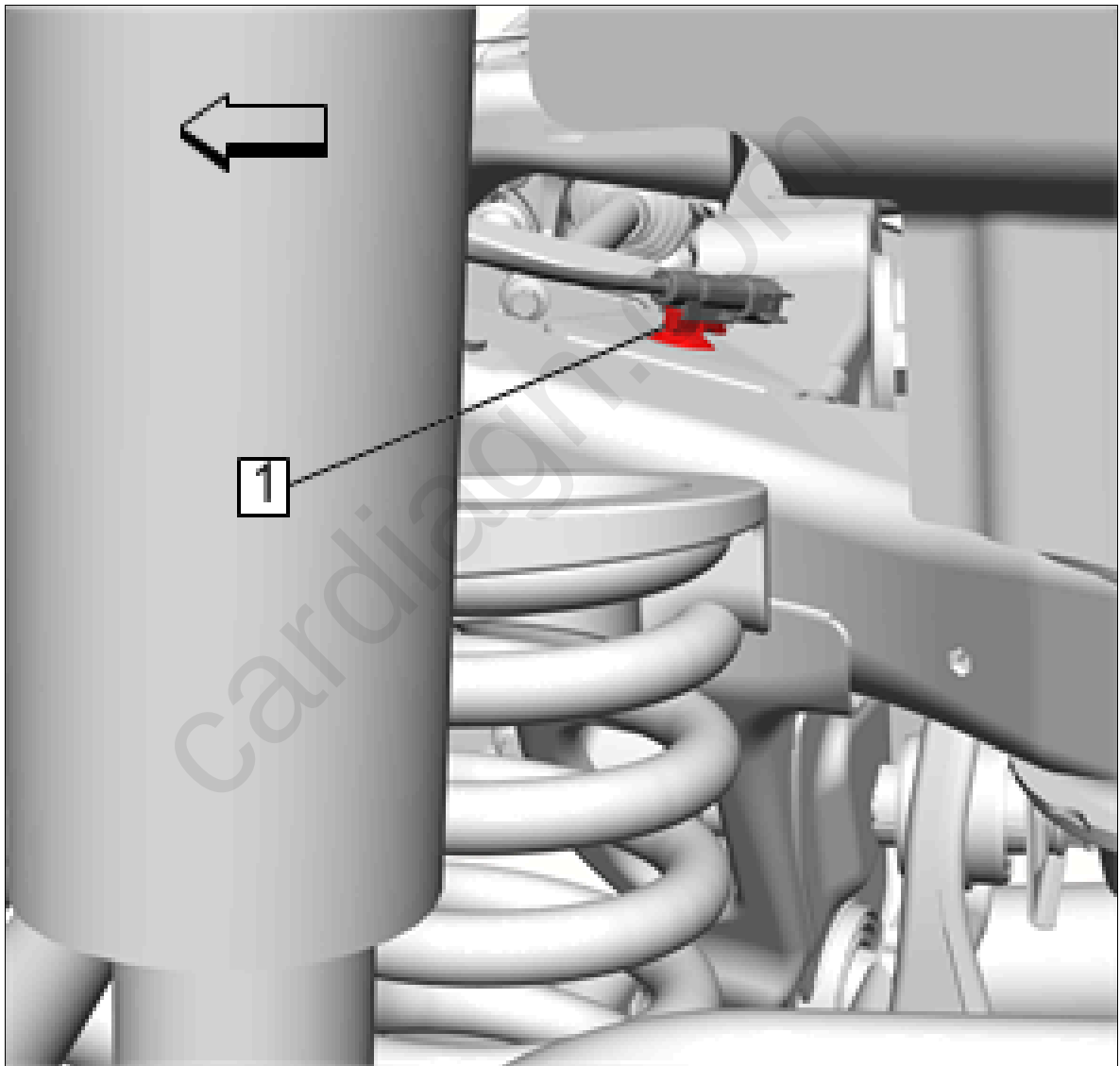
**REPAIR INSTRUCTIONS > REAR WHEEL SPEED SENSOR REPLACEMENT >
REMOVAL PROCEDURE**

 WARNING:

Brake Dust Warning

1. Raise and support the vehicle. Lifting and Jacking the Vehicle (Base)Lifting and Jacking the Vehicle (HP)
2. Remove the tire and wheel assembly. Tire and Wheel Removal and Installation
3. Disconnect Rear Wheel Speed Sensor Electrical Connector

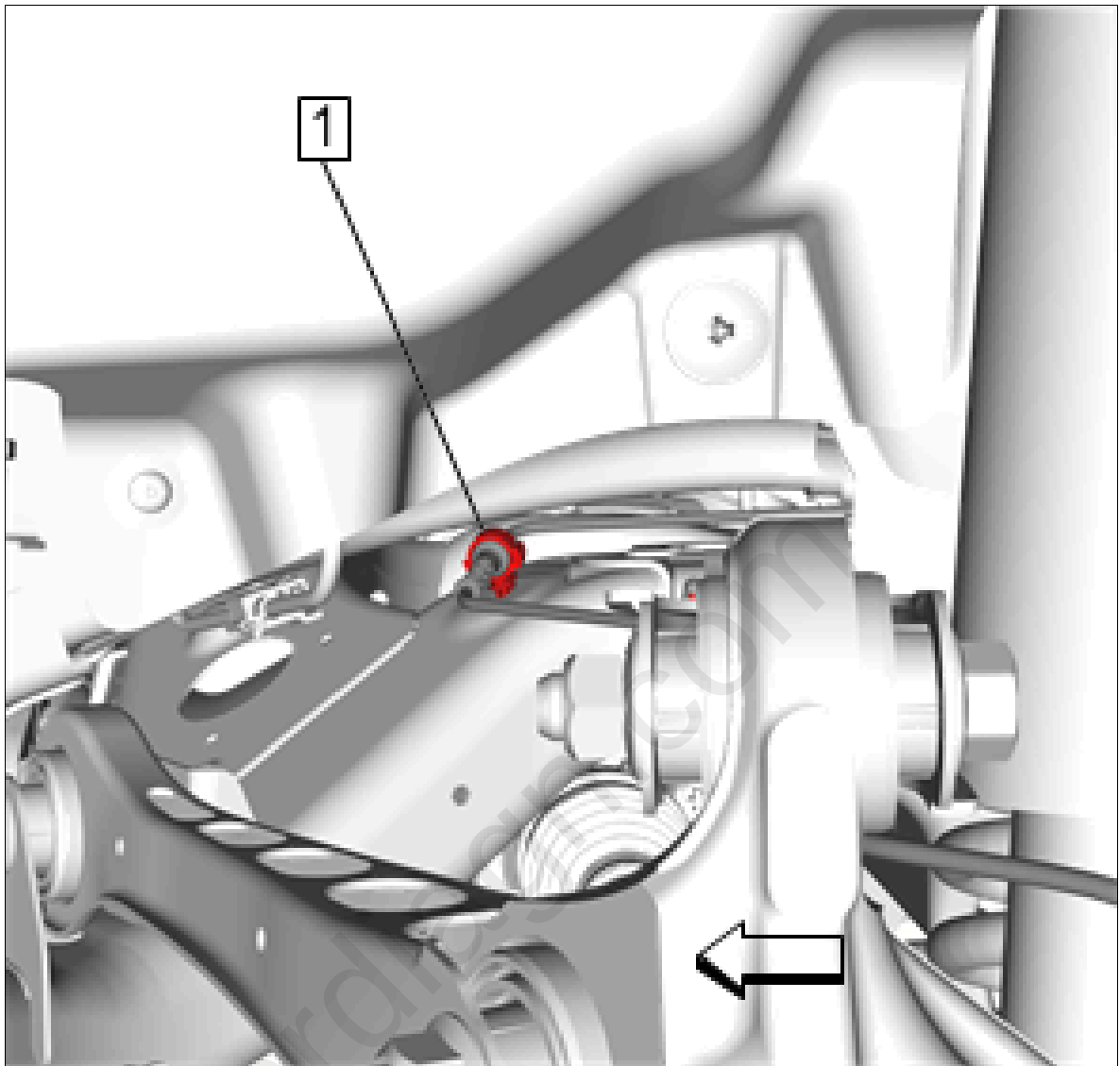
Fig 1: Rear Wheel Speed Sensor Electrical Connector Retainer



Courtesy of GENERAL MOTORS COMPANY

4. Release Rear Wheel Speed Sensor Electrical Connector Retainer (1)

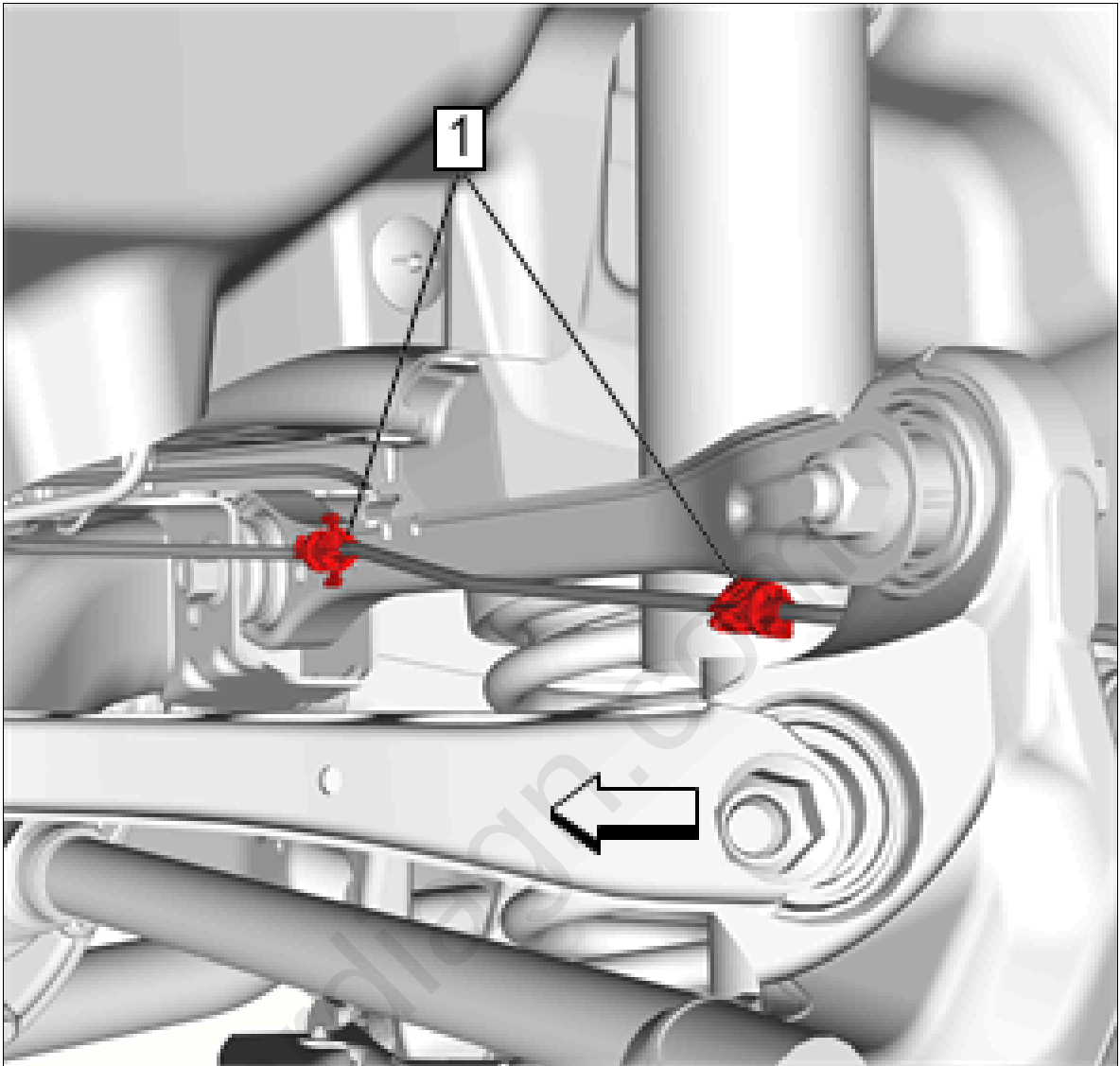
Fig 2: Retainer



Courtesy of GENERAL MOTORS COMPANY

5. Release Retainer (1)

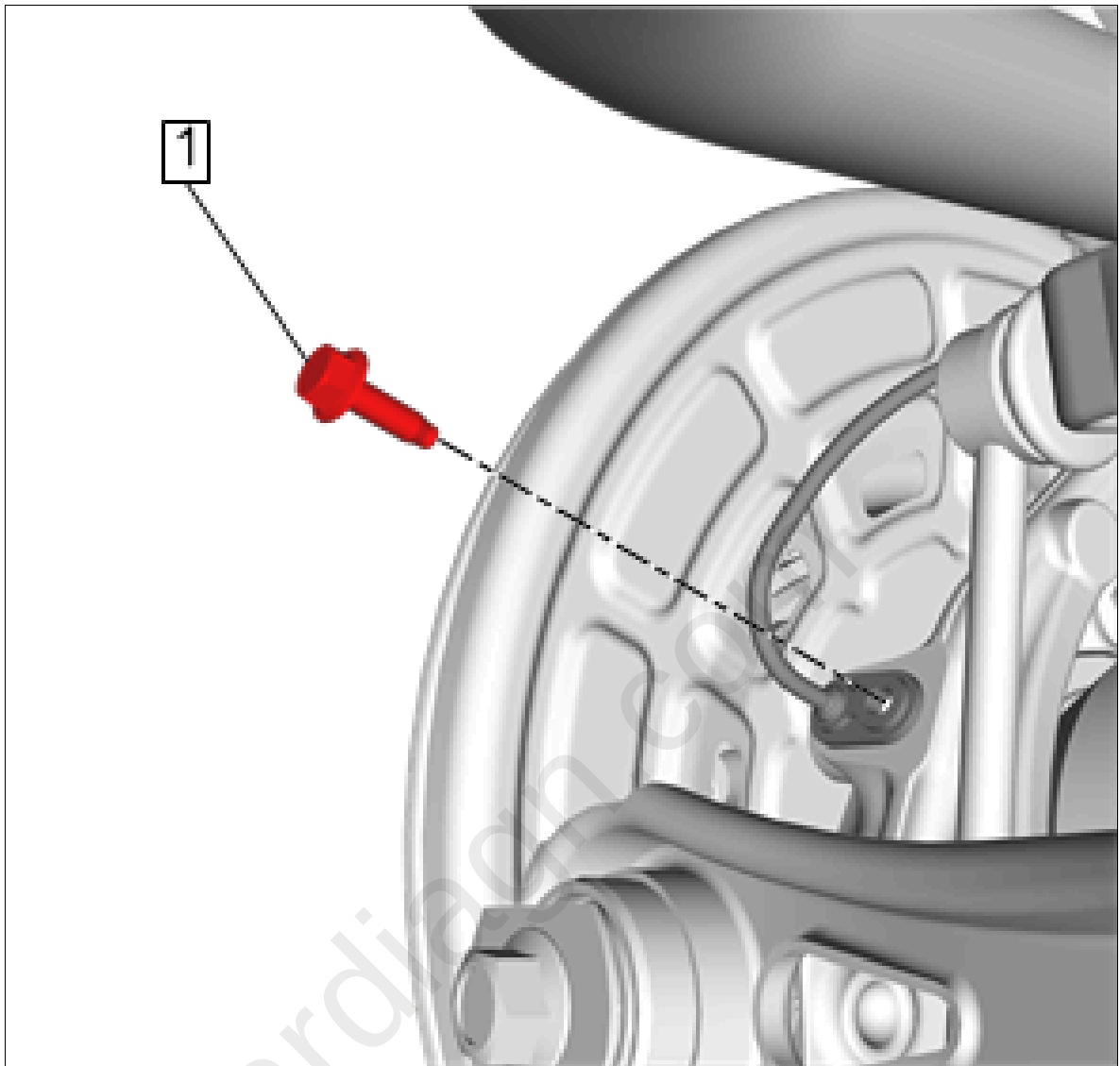
Fig 3: Retainer



Courtesy of GENERAL MOTORS COMPANY

6. Release Retainer (1) (Qty: 2)

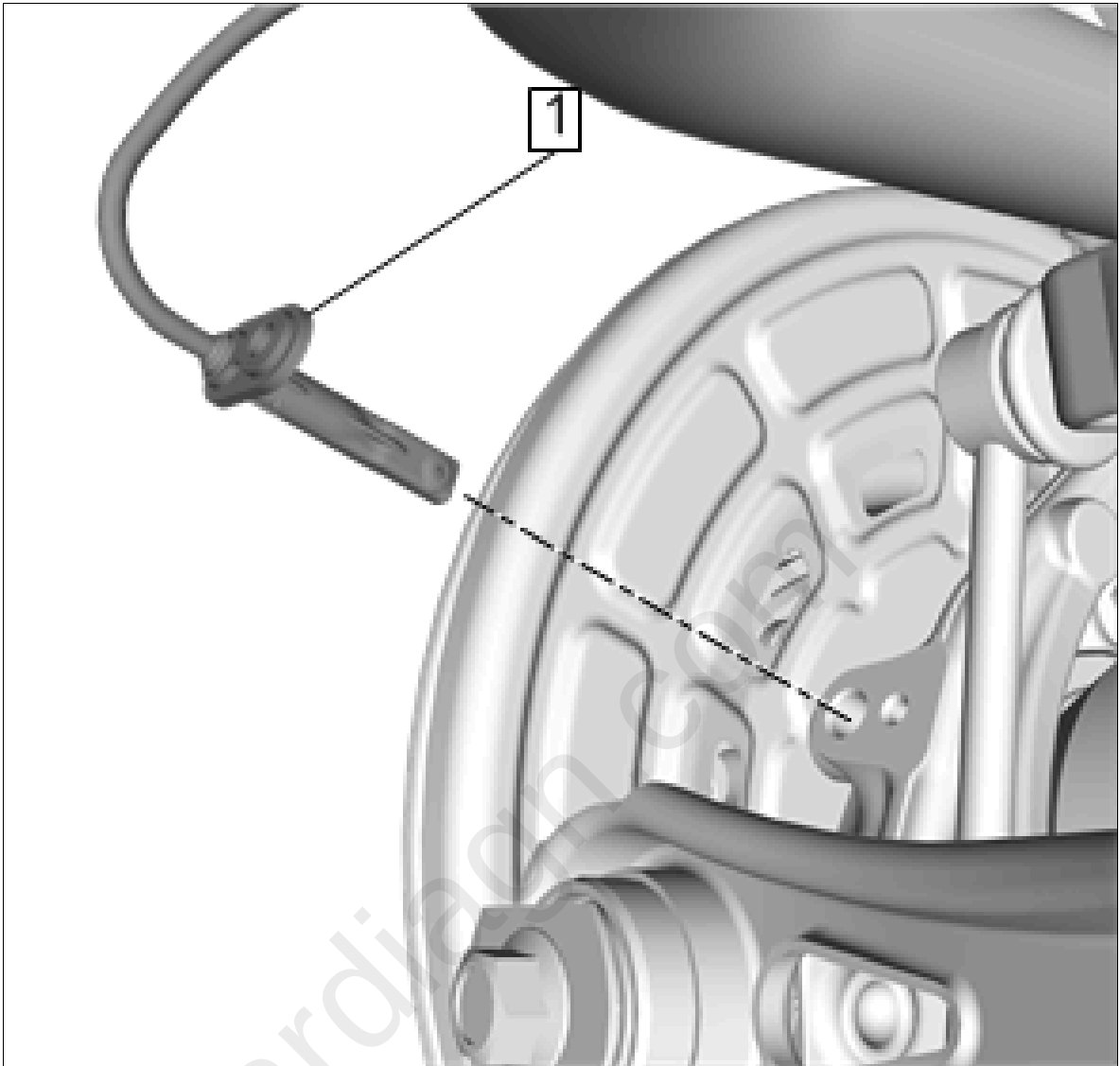
Fig 4: Rear Wheel Speed Sensor Bolt



Courtesy of GENERAL MOTORS COMPANY

7. Remove Rear Wheel Speed Sensor Bolt (1)

Fig 5: Rear Wheel Speed Sensor

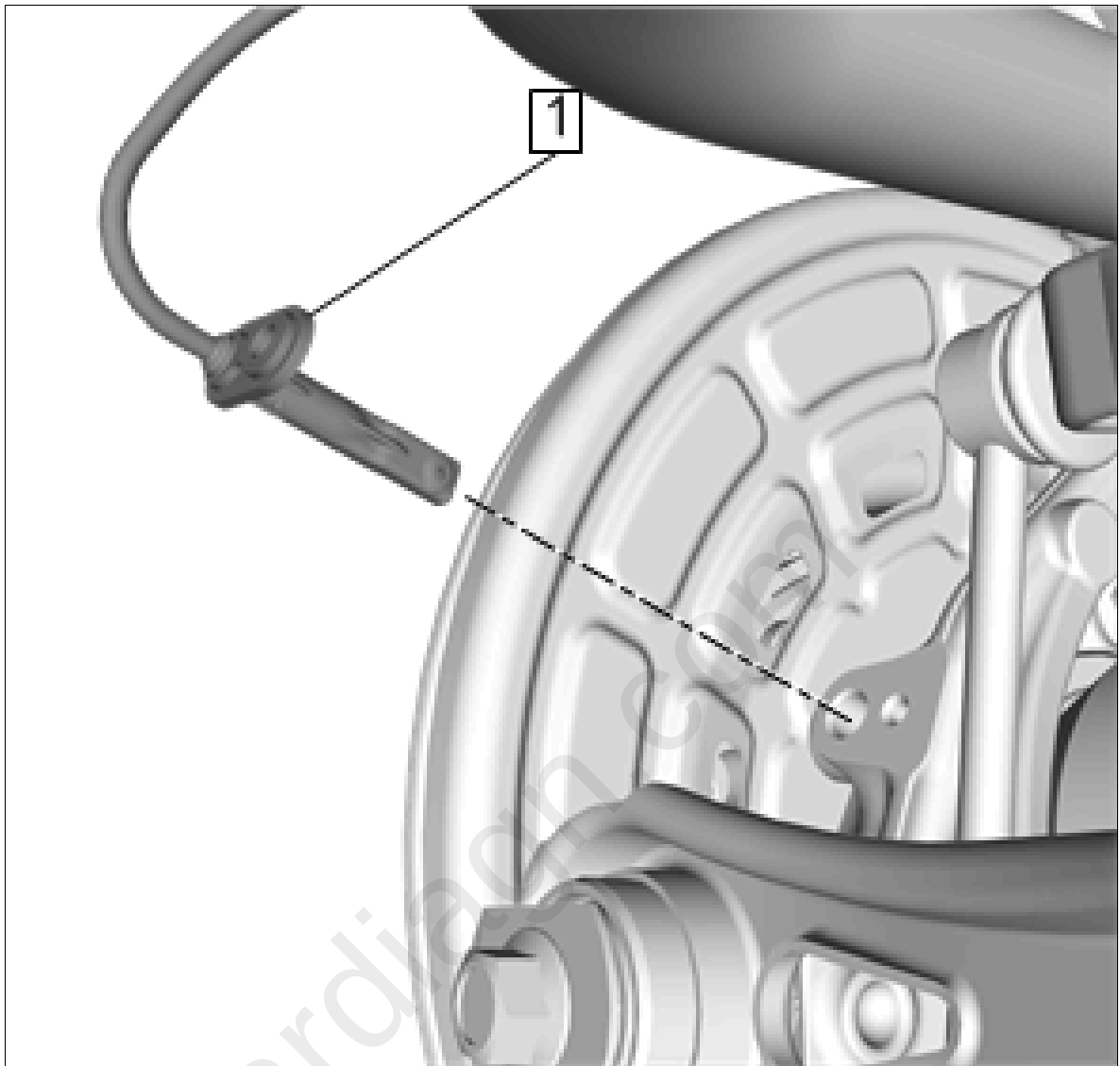


Courtesy of GENERAL MOTORS COMPANY

8. Remove Rear Wheel Speed Sensor (1)

**REPAIR INSTRUCTIONS > REAR WHEEL SPEED SENSOR REPLACEMENT >
INSTALLATION PROCEDURE**

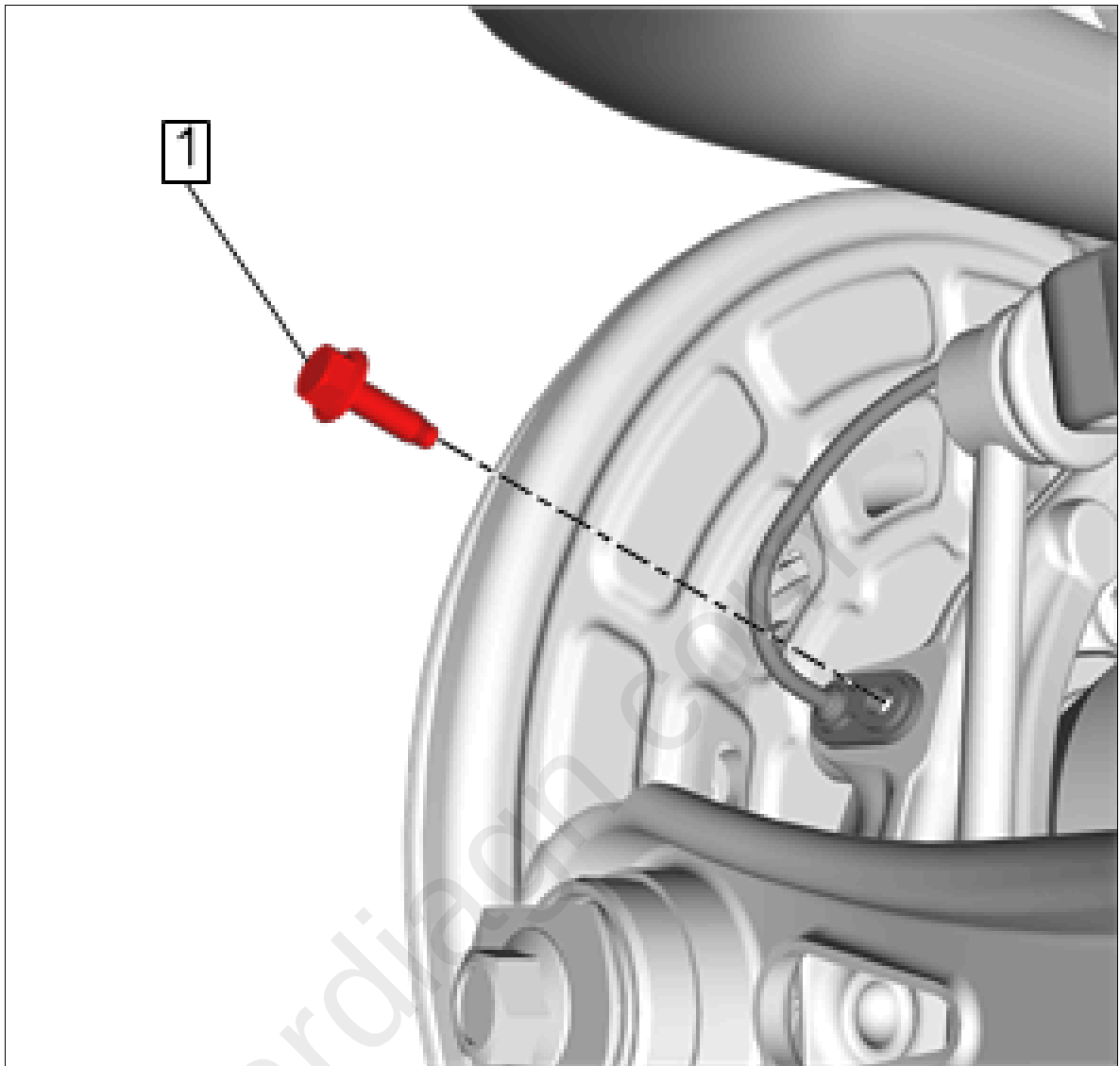
Fig 1: Rear Wheel Speed Sensor



Courtesy of GENERAL MOTORS COMPANY

1. Install Rear Wheel Speed Sensor (1)

Fig 2: Rear Wheel Speed Sensor Bolt



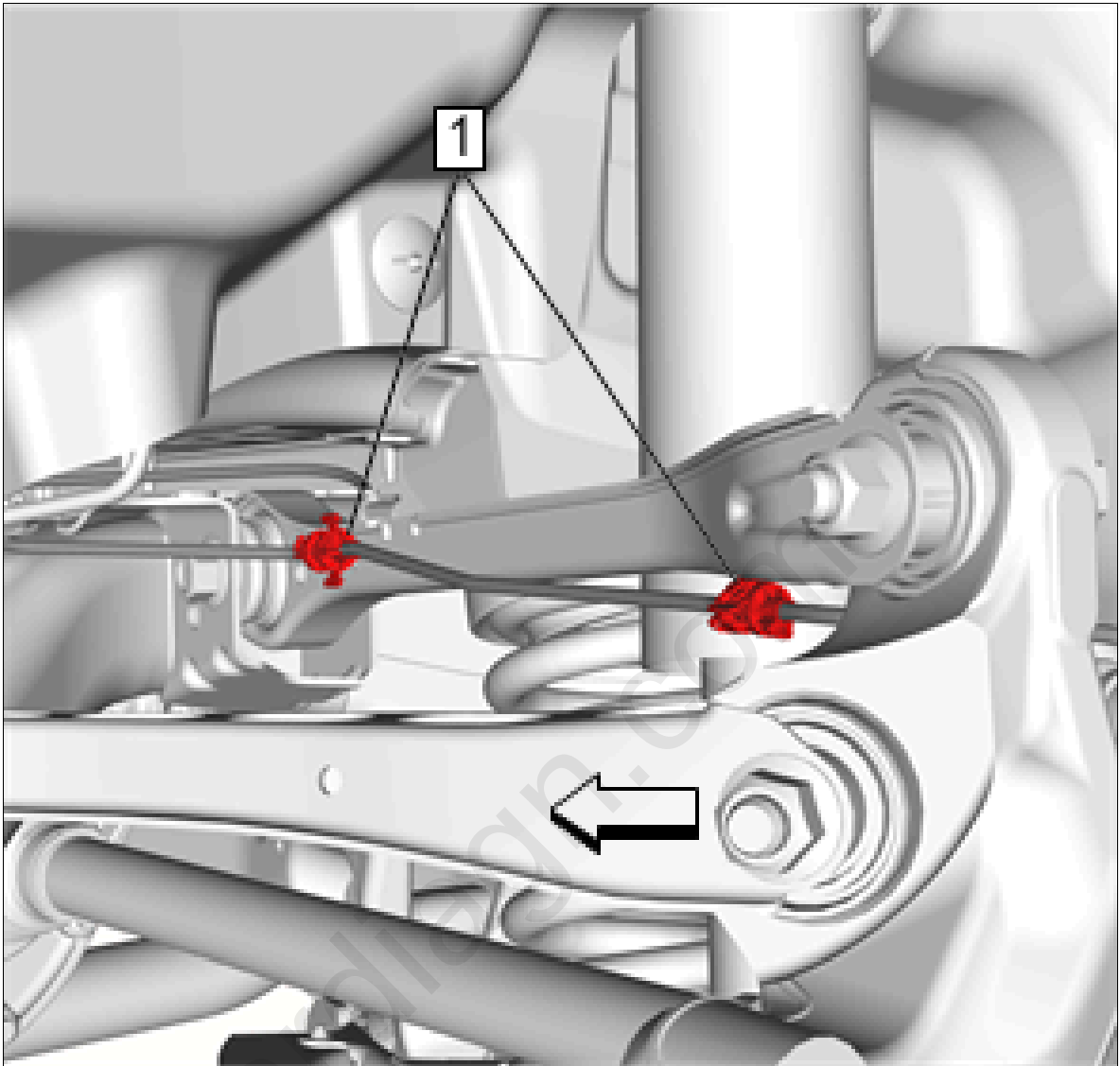
Courtesy of GENERAL MOTORS COMPANY

 **CAUTION:**

Fastener Caution

2. Install Rear Wheel Speed Sensor Bolt (1) and tighten to 10 N.m (89 lb in)

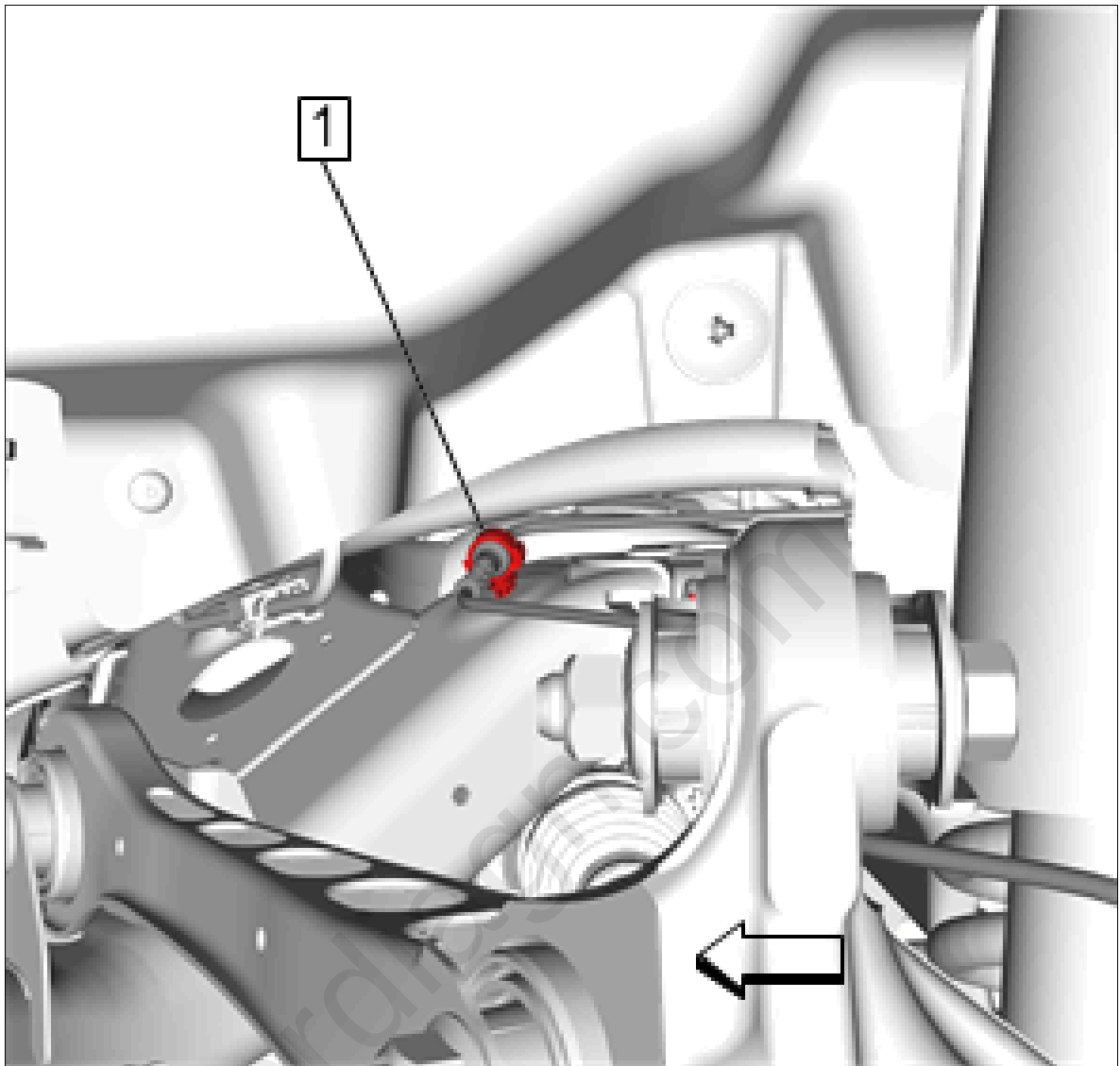
Fig 3: Retainer



Courtesy of GENERAL MOTORS COMPANY

3. Secure Retainer (1) (Qty: 2)

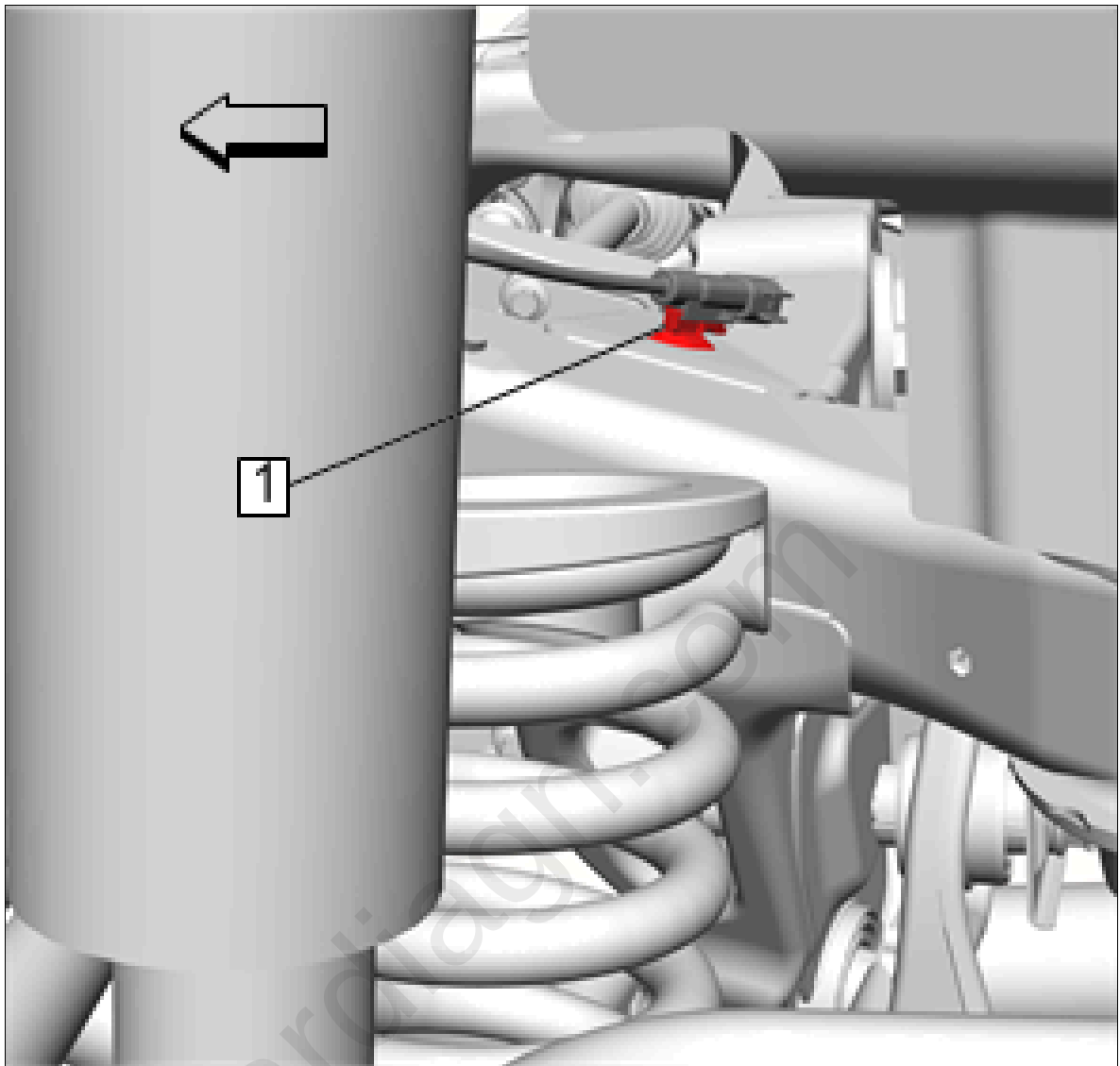
Fig 4: Retainer



Courtesy of GENERAL MOTORS COMPANY

4. Secure Retainer (1)

Fig 5: Rear Wheel Speed Sensor Electrical Connector Retainer

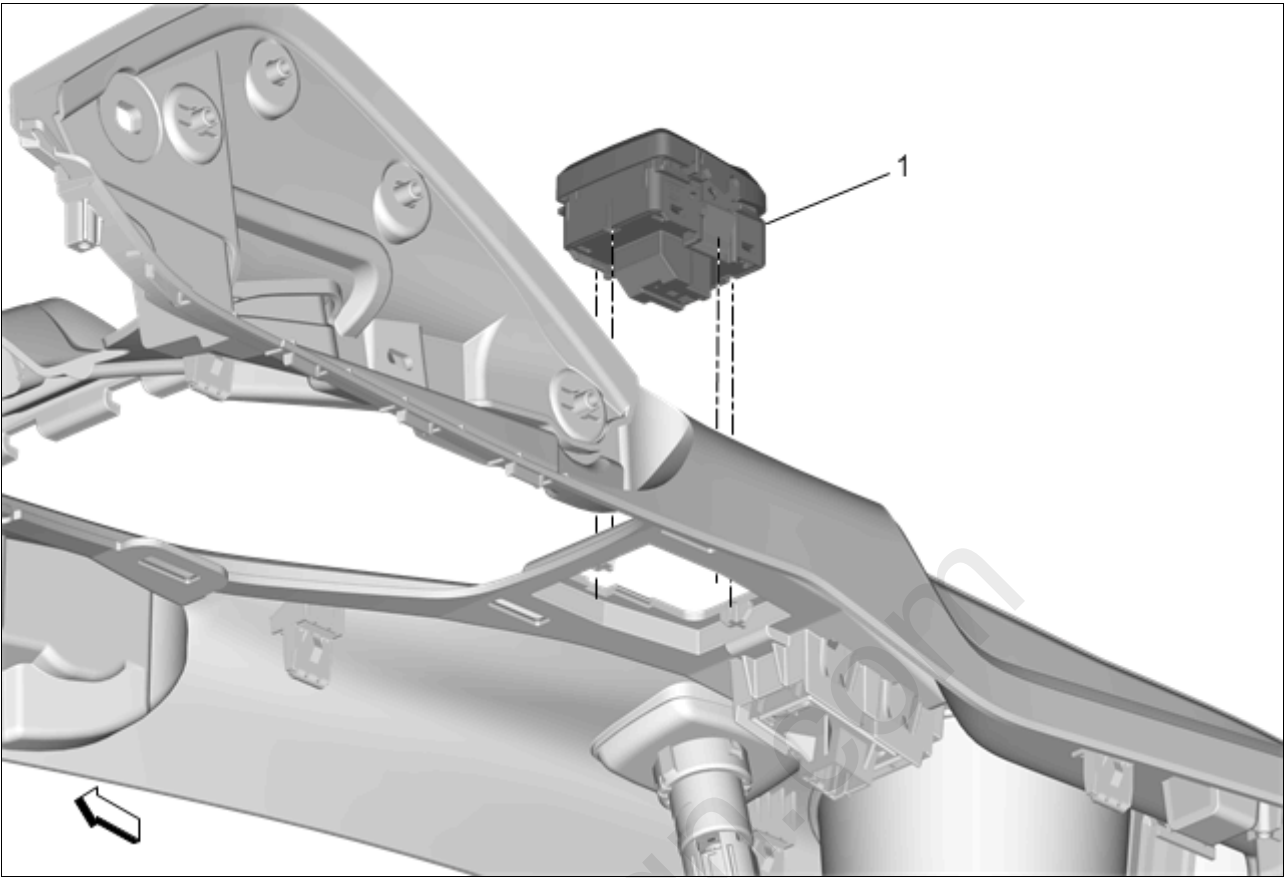


Courtesy of GENERAL MOTORS COMPANY

5. Secure Rear Wheel Speed Sensor Electrical Connector Retainer (1)
6. Connect Rear Wheel Speed Sensor Electrical Connector
7. Install the tire and wheel assembly. Tire and Wheel Removal and Installation
8. Perform the diagnostic system check. Diagnostic System Check - Vehicle

REPAIR INSTRUCTIONS > VEHICLE STABILITY CONTROL SYSTEM SWITCH REPLACEMENT

Fig 1: Vehicle Stability Control System Switch



Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Front Floor Console Upper Panel Replacement	
1	Vehicle Stability Control System Switch Procedure Release the tabs and remove the switch.

REPAIR INSTRUCTIONS > VEHICLE YAW SENSOR LEARN

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

- Yaw Rate Sensor replacement
- Electronic Brake Control Module replacement
- Inflatable Restraint Sensing and Diagnostic Module replacement

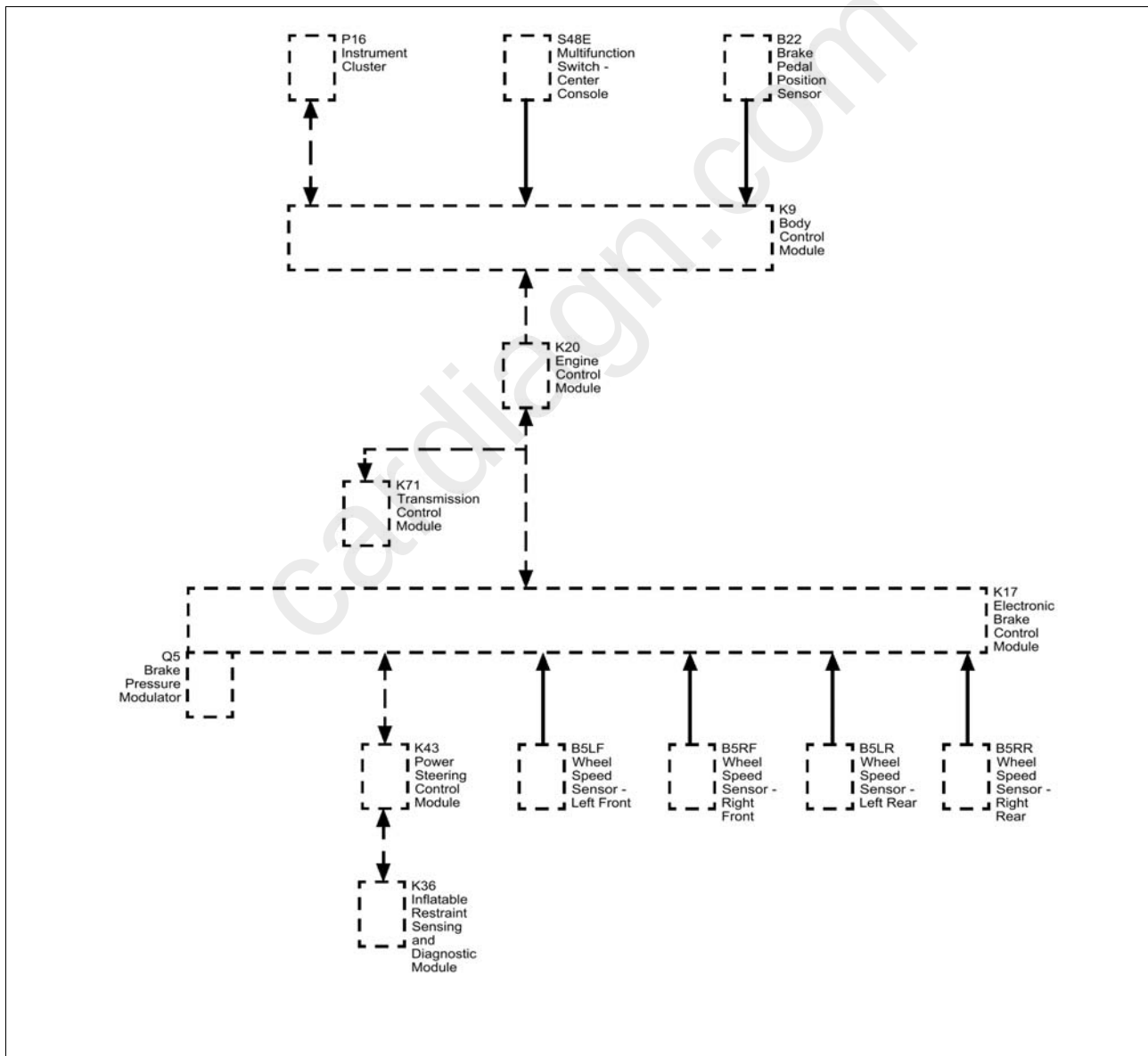
The yaw rate sensor learn procedure can be completed with a scan tool using the following steps:

1. Place vehicle on a level surface

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

DESCRIPTION AND OPERATION > ABS DESCRIPTION AND OPERATION

Fig 1: ABS Description and Operation



Callout	Component Name
B22	B22 Brake Pedal Position Sensor
S48E	S48E Multifunction Switch - Center Console
P16	P16 Instrument Cluster
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
K43	K43 Power Steering Control 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
K36	K36 Inflatable Restraint Sensing and Diagnostic Module



NOTE:

EBCM terminal pin locations may differ between different RPO option brake systems.

This vehicle is equipped with a Bosch ABS 9.0 brake system. The electronic brake control module and the brake pressure modulator valve are serviced separately. The brake pressure modulator valve uses a four circuit configuration to control hydraulic pressure to each wheel independently. Vehicles built with option RPO FX3 will feature stability enhancement.

The following vehicle performance enhancement systems are provided.

- ABS
- Brake Assist
- Electronic Brake Distribution
- Electronic stability control
- Hill start assist
- Traction control system

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

- Electronic Brake Control Module - The electronic brake control module controls the system functions and detects failures. It supplies voltage to the solenoid valves and pump motor.

- Brake pressure modulator valve - The brake pressure modulator valve 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:

- Brake pressure sensor
 - Four inlet valves (one per wheel)
 - Four outlet valves (one per wheel)
 - Pump motor
 - Two traction/stability control supply valves
 - Two traction/stability control isolation valves
- Body control module monitors the brake pedal position sensor signal when the brake pedal is applied and sends a high speed serial data message to the electronic brake control module indicating the brake pedal position.
 - Brake pressure sensor is used to sense the action of the driver application of the brake pedal. The sensor provides an voltage signal that will increase as the brake pedal is applied. The electronic brake control module monitors the brake pressure sensor which is integral to the brake pressure modulator.
 - Instrument cluster - The instrument cluster displays the vehicle speed based on the information from the engine control module. The engine control module sends the vehicle speed information via a high speed serial data to the body control module. The body control module then sends the vehicle speed information via a low speed serial data to the instrument cluster in order to display the vehicle speed, either in kilometers or miles, based on the vehicle requirements.
 - 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.
 - Multifunction switch - The traction control switch is a multifunction momentary switch. The body control module monitors the signal circuit from the traction control switch and sends a high speed serial data message to the electronic brake control module indicating the switch position. The traction control and stability control are manually disabled or enabled by pressing the traction control switch.
 - Steering angle sensor - The electronic brake control module receives serial data message inputs from the steering angle sensor. The steering angle sensor is integrated in the power steering control module. The steering angle sensor signal is used to calculate the desired yaw rate.
 - Transmission control module - The electronic brake control module receives high speed serial data message inputs from the transmission control module indicating the gear position of the transmission for hill start assist functions.

- **Wheel speed sensors** - This vehicle is equipped with unique directional wheel speed sensors that can detect wheel direction as well as zero wheel speed. The wheel speed sensors are Active sensors that receive a 12 V 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.

DESCRIPTION AND OPERATION > ABS DESCRIPTION AND OPERATION > POWER-UP-SELF TEST

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

DESCRIPTION AND OPERATION > ABS DESCRIPTION AND OPERATION > INITIALIZATION SEQUENCE

The initialization sequence cycles each solenoid valve and the pump motor, as well as the necessary relays, for approximately forty milliseconds to check component operation. The active test is initiated by the electronic brake control module at the start of the ignition cycle and the speed of the fastest wheel exceeds 16 km/h (10 MPH). If a fault condition is detected the electronic brake control module sets a DTC.

DESCRIPTION AND OPERATION > ABS DESCRIPTION AND OPERATION > ABS

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

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

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

stability. The typical ABS activation sequence is as follows.

DESCRIPTION AND OPERATION > ABS DESCRIPTION AND OPERATION > 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.

DESCRIPTION AND OPERATION > ABS DESCRIPTION AND OPERATION > 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.

DESCRIPTION AND OPERATION > ABS DESCRIPTION AND OPERATION > 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.

DESCRIPTION AND OPERATION > ABS DESCRIPTION AND OPERATION > BRAKE ASSIST

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

The electronic brake control module receives inputs from the brake pressure sensor. When the electronic brake control module senses an emergency braking situation, the electronic brake control module will actively increase the brake pressure to a specific maximum.

DESCRIPTION AND OPERATION > ABS DESCRIPTION AND OPERATION > ELECTRONIC BRAKE DISTRIBUTION

The electronic brake distribution function is designed to support the driver in emergency braking situations.

The electronic brake distribution is a control system that enhances 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.

DESCRIPTION AND OPERATION > ABS DESCRIPTION AND OPERATION > ELECTRONIC STABILITY CONTROL (RPO FX3)

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

Yaw rate is the rate of rotation about the vehicles vertical axis. The electronic stability control is activated when the electronic brake control module determines that the desired yaw rate does not match the actual yaw rate as measured by the yaw rate sensor.

The desired yaw rate is calculated from the following parameters:

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

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

The electronic stability control activations generally occur during aggressive driving, in turns or on bumpy roads without much use of the accelerator pedal. When braking during electronic stability control 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.

DESCRIPTION AND OPERATION > ABS DESCRIPTION AND OPERATION > HILL START ASSIST

When stopped on a hill, the hill start assist 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 start assist operation even though the brake pedal is released, this is considered normal operation.

The hill start assist feature is determined by the electronic brake control module using the following inputs:

- Accelerator pedal position
- Brake pedal position sensor
- Brake pressure
- Clutch switch, if equipped

- Engine torque
- Longitudinal acceleration
- Multi-axis acceleration sensor
- Transmission gear information
- Vehicle speed

DESCRIPTION AND OPERATION > ABS DESCRIPTION AND OPERATION > 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

DESCRIPTION AND OPERATION > ABS DESCRIPTION AND OPERATION > 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 the brake warning indicator ON when the following occurs:

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

Traction/Stability Active Control Indicator

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

- The instrument cluster performs the bulb check.
- The ABS system is in traction control or stability control mode.
- The electronic brake control module detects a traction control/stability control occurring and sends a serial data message to the instrument cluster requesting illumination.

Traction Control Off Indicator

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

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

Stability Control Off Indicator

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

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

Traction/Stability Control Indicator

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

SPECIAL TOOLS AND EQUIPMENT > SPECIAL TOOLS

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

cardiagn.com