2007 BRAKES

Antilock Brake System - Outlook

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Brake Pipe Fittings - Brake Pressure Modulator Valve Inlet	20 N.m	15 lb ft
Brake Pipe Fittings - Brake Pressure Modulator Valve Outlet	17 N.m	13 lb ft
Brake Pressure Modulator Valve Bracket Nuts	20 N.m	15 lb ft
Brake Pressure Modulator Valve Insulator Nuts	8 N.m	71 lb in
Electronic Brake Control Module (EBCM) Bolts	3 N.m	27 lb in
Wheel Speed Sensor Bolt - Front	9 N.m	80 lb in
Wheel Speed Sensor Bolt - Rear	6 N.m	53 lb in

SCHEMATIC AND ROUTING DIAGRAMS

ANTILOCK BRAKE SYSTEM SCHEMATICS

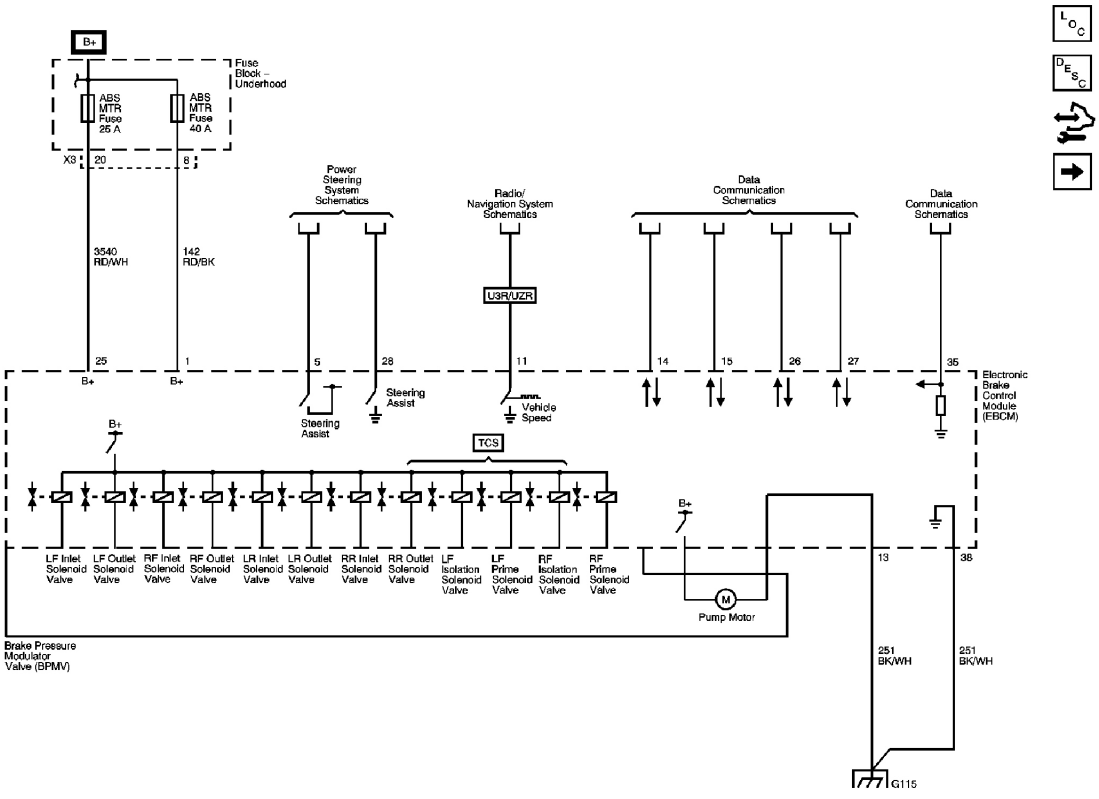

Fig. 1: Module Power & Ground, Subsystem References Schematic
Courtesy of GENERAL MOTORS CORP.

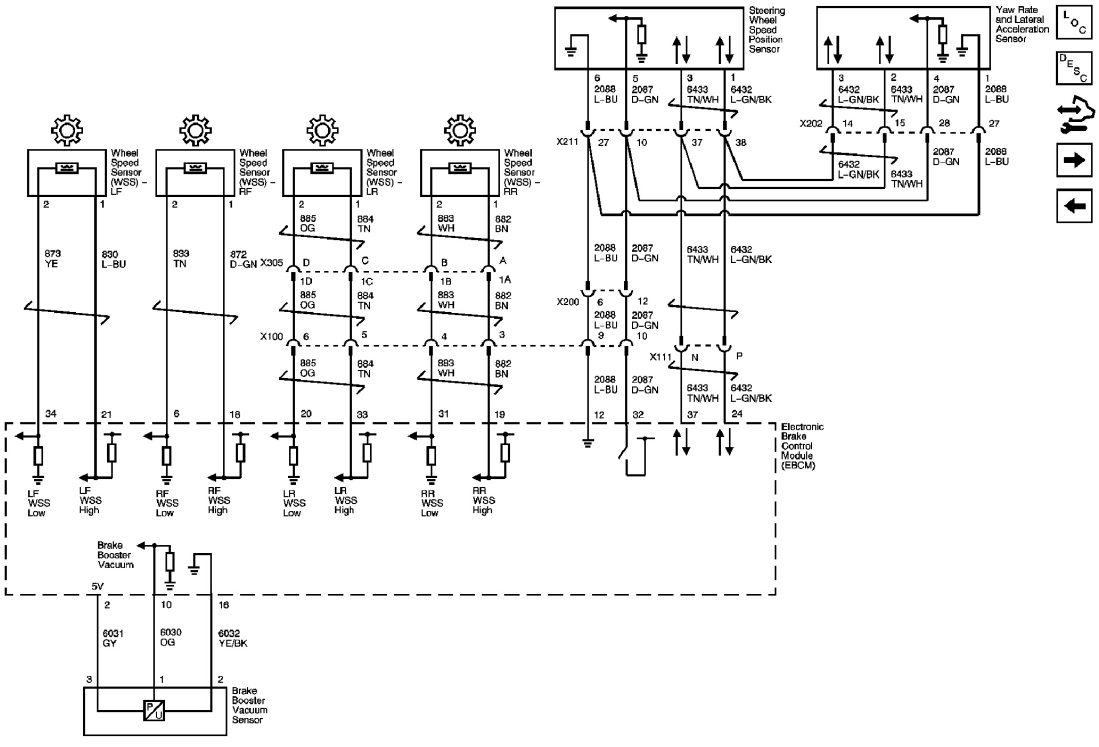

Fig. 2: Sensors Schematic
Courtesy of GENERAL MOTORS CORP.

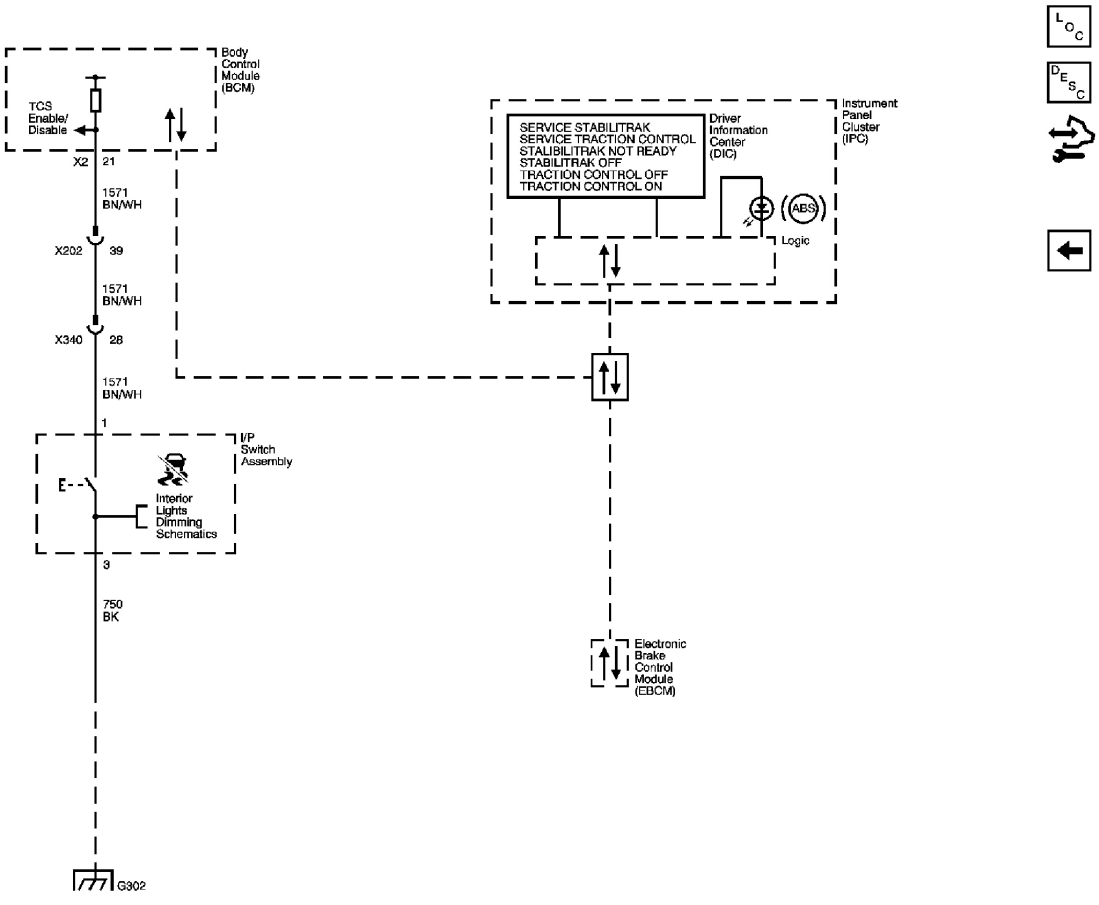

Fig. 3: TCS Control & Indicators Schematic
Courtesy of GENERAL MOTORS CORP.

COMPONENT LOCATOR

ANTILOCK BRAKE SYSTEM COMPONENT VIEWS

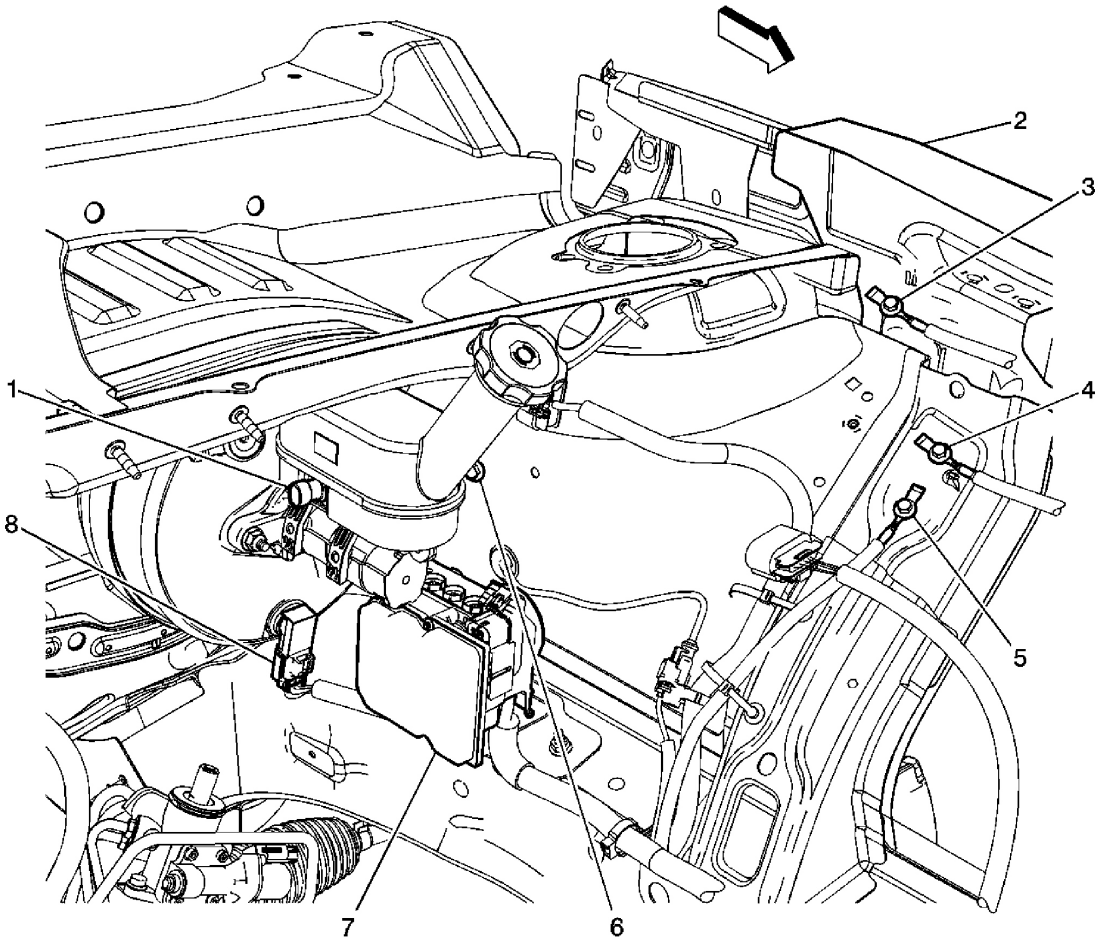

Fig. 4: View Near The Brake Booster
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 4

Callout	Component Name
1	Brake fluid Level Switch
2	LF Fender
3	G103
4	G115
5	Electronic Brake Control Module (EBCM)
6	Brake Booster Vacuum Sensor

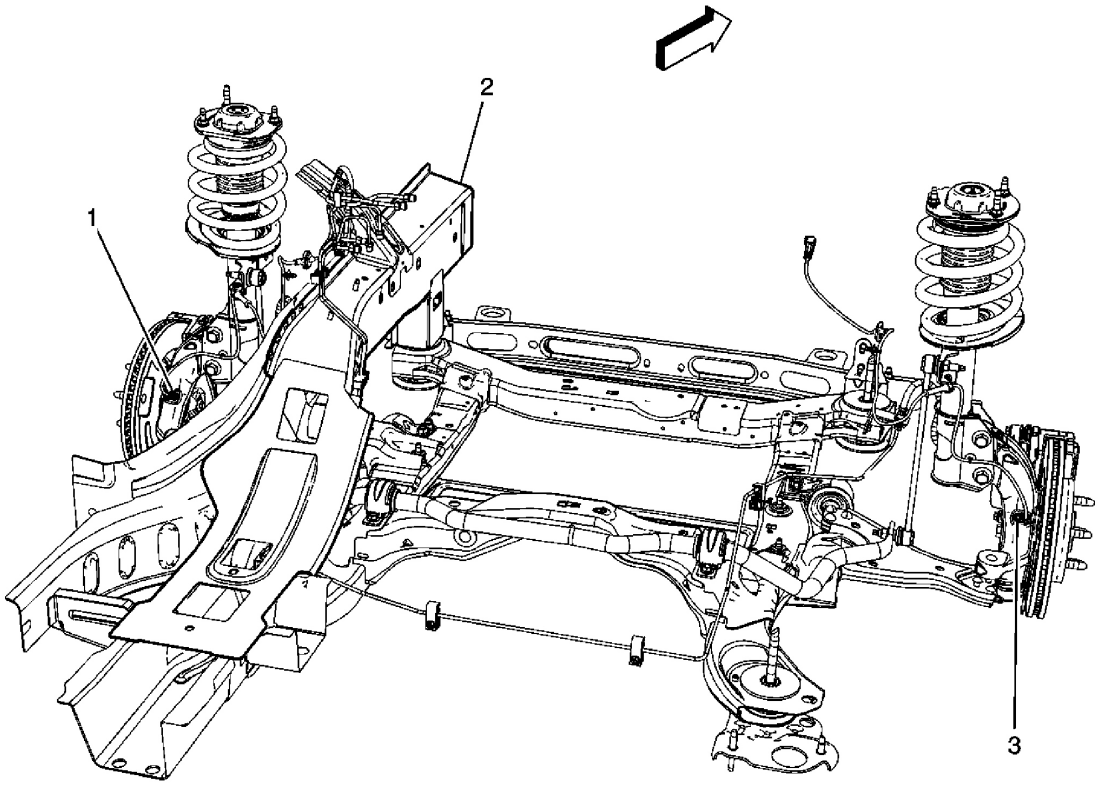

Fig. 5: Identifying Front Wheel Speed Sensors
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 5

Callout	Component Name
1	Wheel Speed Sensor (WSS) - LF
2	LF Frame Rail
3	Wheel Speed Sensor (WSS) - RF

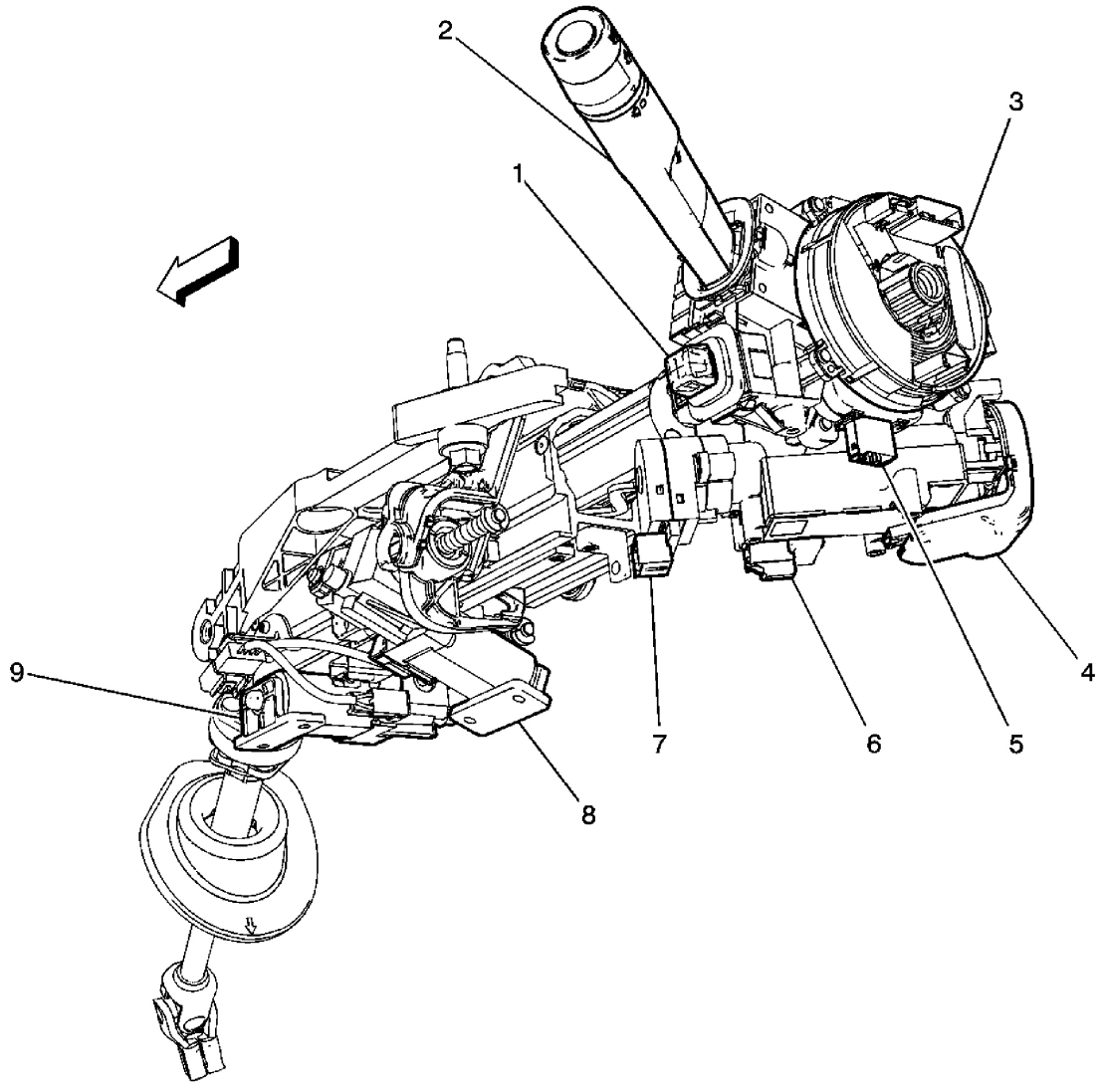

Fig. 6: Identifying Steering Column Components
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 6

Callout	Component Name
1	Tilt/Telescope Switch (N38)
2	Turn Signal/Multifunction Switch
3	Inflatable Restraint Steering Wheel Module Coil
4	Theft Deterrent Control Module
5	Steering Wheel Speed Position Sensor
6	Ignition Lock Cylinder Control Actuator

7	Ignition Switch
8	Tilt Motor
9	Telescope Actuator

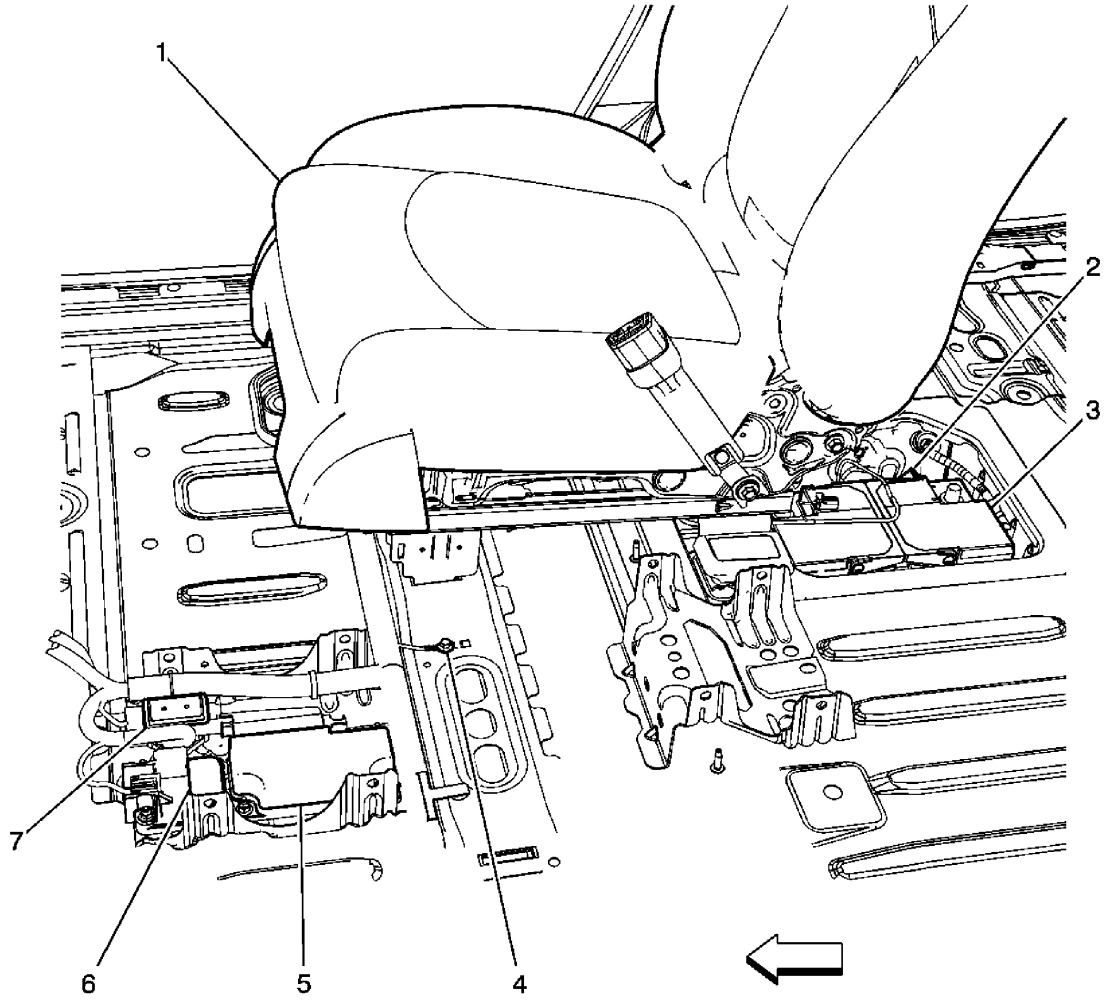

Fig. 7: Identifying Components Near Passenger Seat
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 7

Callout	Component Name
1	Passenger Seat
2	Battery Current Sensor
3	Battery
4	G304

5	Inflatable Restraint Sensing and Diagnostic Module (SDM)
6	Inflatable Restraint Vehicle Rollover Sensor
7	YAW Rate and Lateral Acceleration Sensor

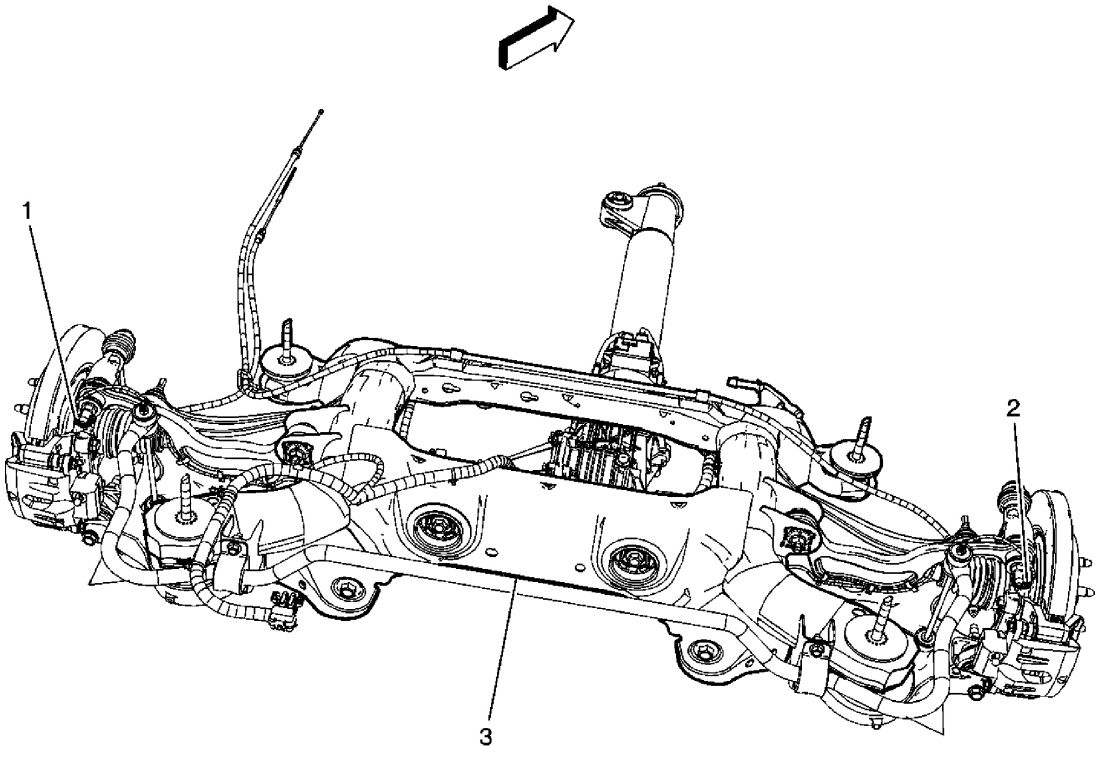

Fig. 8: Locating Rear Wheel Speed Sensors
Courtesy of GENERAL MOTORS CORP.

Callouts For Fig. 8

Callout	Component Name
1	Wheel Speed Sensor (WSS) - LR
2	Wheel Speed Sensor (WSS) - RR
3	Rear Suspension Frame

ANTILOCK BRAKE SYSTEM CONNECTOR END VIEWS

Brake Booster Vacuum Sensor

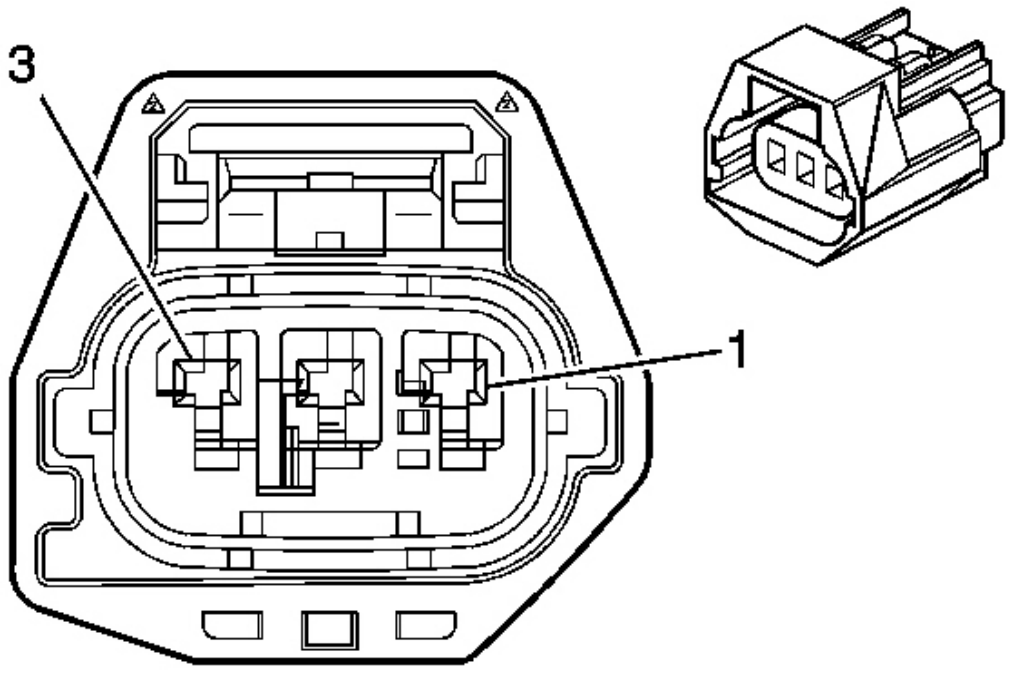

Fig. 9: Brake Booster Vacuum Sensor Connector End View
Courtesy of GENERAL MOTORS CORP.

Brake Booster Vacuum Sensor Connector Parts Information

Connector Part Information

- OEM: 7283569110
- Service: See Catalog
- Description: 3-Way F 1.5 Sealed (D-GY)

Terminal Part Information

- Terminal/Tray: 7116-4102-08/9
- Core/Insulation Crimp: E/1
- Release Tool/Test Probe: 12094430/J-35616-2A (GY)

Brake Booster Vacuum Sensor Connector Terminal Identification

Pin	Wire	Circuit No.	Function

1	0.5 OG	6030	Brake Vacuum Sensor Signal
2	0.5 YE/BK	6032	Battery Positive Voltage
3	0.5 GY	6031	5-Volt Reference

Electronic Brake Control Module (EBCM)

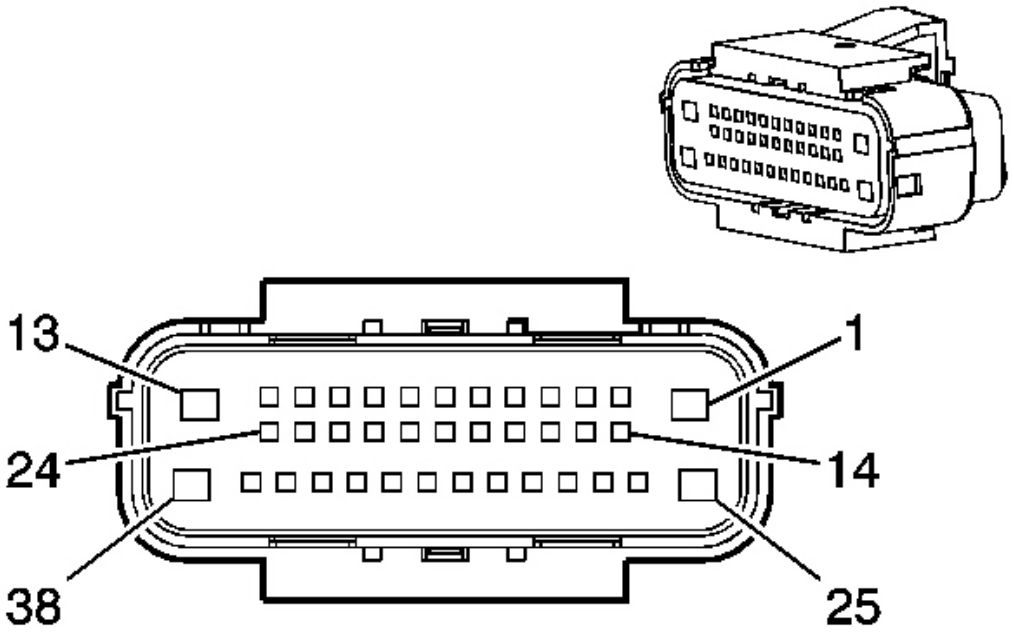

Fig. 10: Electronic Brake Control Module (EBCM) Connector End View
Courtesy of GENERAL MOTORS CORP.

Electronic Brake Control Module (EBCM) Connector Parts Information

Connector Part Information

- OEM: 31381-1005
- Service: See Catalog
- Description: 38-Way F 2.8 Series, Sealed

Terminal Part Information

- Pins: 1, 13, 25, 38

- Terminal/Tray: 15304720/19
- Core/Insulation Crimp: 4/5
- Release Tool/Test Probe: 15315247/J-35616-4A (PU)

- Pins: 2, 3, 5, 6, 10-12, 14-16, 18-20, 21, 24, 26-28, 31-35, 37
- Terminal/Tray: 7116-3703-02/14
- Core/Insulation Crimp: 9/9
- Release Tool/Test Probe: J-38125-215/J-35616-64B (L-BU)

Electronic Brake Control Module (EBCM) Connector Terminal Identification

Pin	Wire	Circuit No.	Function
1	3 RD/BK	142	Battery Positive Voltage
2	0.5 GY	6031	5-Volt Reference
3	0.5 WH	320	Engine Mount Solenoid Control (W49)
4	-	-	Not Used
5	0.5 WH	1294	Variable Effort Steering Actuator Supply Voltage (NV7)
6	0.5 TN	833	Right Front Wheel Speed Sensor Low Reference
7-9	-	-	Not Used
10	0.5 OG	6030	Brake Vacuum Sensor Signal
11	0.5 D-GN/WH	817	Vehicle Speed Signal (U3R/UZR)
12	0.5 L-BU	2088	Steering Wheel Position Sensor Low Reference
13	3 BK/WH	251	Ground
14	0.5 TN	2501	High Speed GMLAN Serial Data Bus-
15	0.5 TN	2501	High Speed GMLAN Serial Data Bus-
16	0.5 YE/BK	6032	Battery Positive Voltage
17	-	-	Not Used
18	0.5 D-GN	872	Right Front Wheel Speed Sensor Signal
19	0.5 BN	882	Right Rear Wheel Speed Sensor Signal
20	0.5 OG	885	Left Rear Wheel Speed Sensor Low Reference
21	0.5 L-BU	830	Left Front Wheel Speed Sensor Signal

22-23	-	-	Not Used
24	0.5 L-GN/BK	6432	CAN Bus Low Serial Data
25	2 RD/WH	3540	Battery Positive Voltage
26	0.5 TN/BK	2500	High Speed GMLAN Serial Data Bus+
27	0.5 TN/BK	2500	High Speed GMLAN Serial Data Bus+
28	0.5 BN	1295	Variable Effort Steering Actuator Control (NV7)
29-30	-	-	Not Used
31	0.5 WH	883	Right Rear Wheel Speed Sensor Low Reference
32	0.5 D-GN	2087	5-Volt Reference
33	0.5 TN	884	Left Rear Wheel Speed Sensor Signal
34	0.5 YE	873	Left Front Wheel Speed Sensor Low Reference
35	0.5 L-BU	5986	Communication Enable
36	-	-	Not Used
37	0.5 TN/WH	6433	CAN Bus High Serial Data
38	2 BK/WH	251	Ground

I/P Switch Assembly

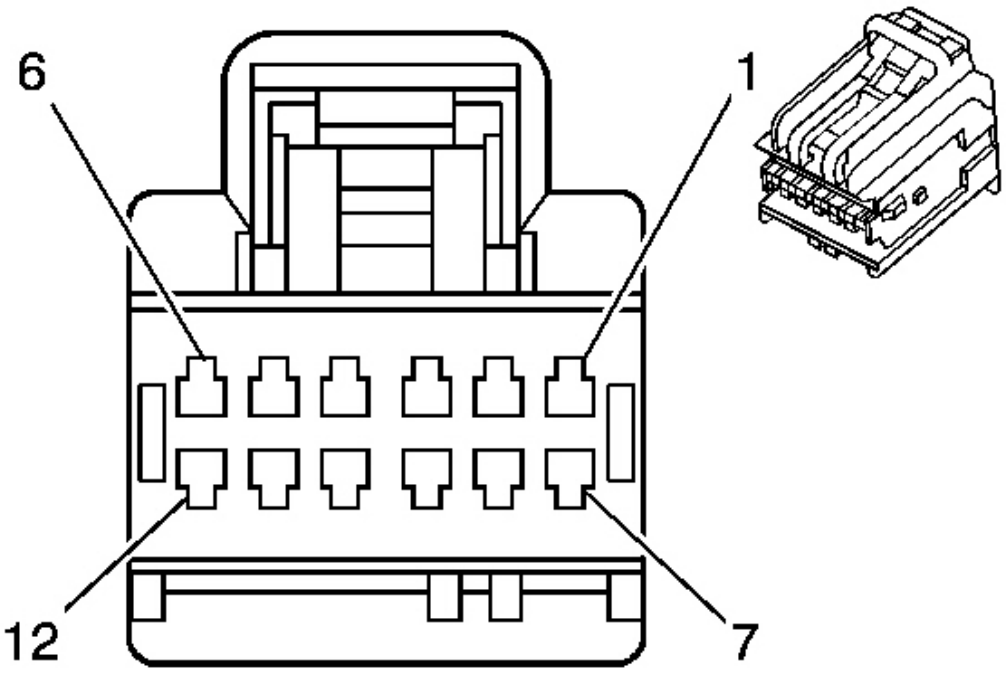

Fig. 11: I/P Switch Assembly Connector End View
Courtesy of GENERAL MOTORS CORP.

I/P Switch Assembly Connector Parts Information

Connector Part Information

- OEM: 31410-1120
- Service: See Catalog
- Description: 12-Way F 0.64 Series (BK)

Terminal Part Information

- Terminal/Tray: 7116-4618-02/14
- Core/Insulation Crimp: P/P
- Release Tool/Test Probe: J-38125-215/J-35616-64B (L-BU)

I/P Switch Assembly Connector Terminal Identification

Pin	Wire	Circuit No.	Function

1	0.35 BN/WH	1571	Traction Control Switch Signal
2	-	-	Not Used
3	0.35 BK	750	Ground
4	0.35 PU/WH	1382	LED Dimming Signal (NW9-KA1-UK6)
	0.35 PU/WH	1382	LED Dimming Signal (KA1/UK6)
5-6	-	-	Not Used
7	0.35 D-GN/WH	5800	Lift Gate Open/Close Switch Signal (E61)
8	0.35 D-GN	6112	Power Lift Gate On/Off Switch Signal (E61)
9	-	-	Not Used
10	-	-	Not Used
11	0.35 L-BU	553	Tow/Haul Switch Signal
12	-	-	Not Used

Steering Wheel Speed Position Sensor

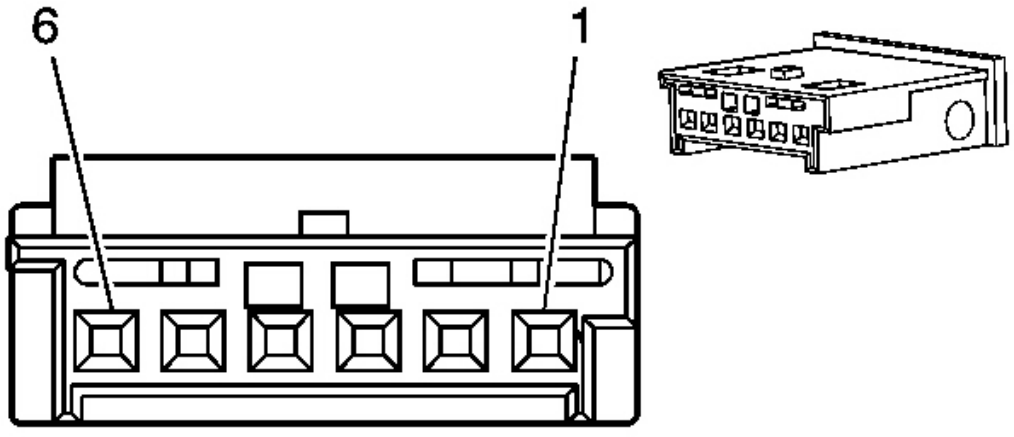

Fig. 12: Steering Wheel Speed Position Sensor Connector End View
Courtesy of GENERAL MOTORS CORP.

Steering Wheel Speed Position Sensor Connector Parts Information

Connector Part Information

- OEM: 112413703
- Service: See Catalog
- Description: 6-Way F MQS Series (BK)

Terminal Part Information

- Terminal/Tray: 928999-5/15
- Core/Insulation Crimp: J/J
- Release Tool/Test Probe: 12094429/J-35616-64B (L-BU)

Steering Wheel Speed Position Sensor Connector Terminal Identification

Pin	Wire	Circuit No.	Function
1	0.5 L-GN/BK	6432	CAN Bus Low Serial Data
2	-	-	Not Used
3	0.5 TN/WT	6433	CAN Bus High Serial Data
4	-	-	Not Used
5	0.5 D-GN	2087	5-Volt Reference
6	0.5 L-BU	2088	Steering Wheel Position Sensor Low Reference

Wheel Speed Sensor (WSS) - LF

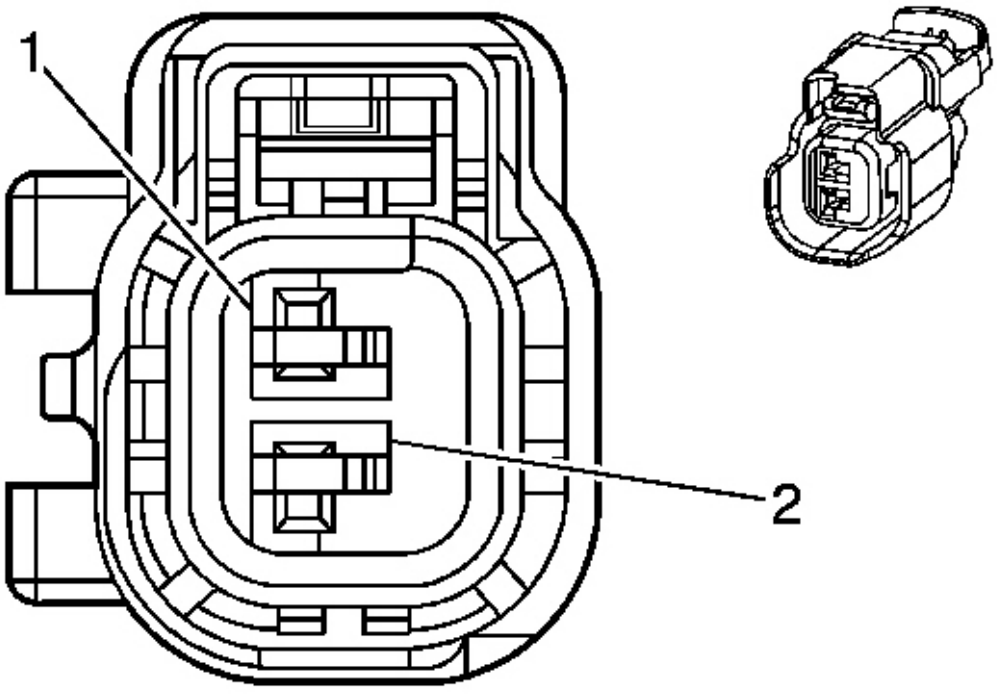

Fig. 13: Wheel Speed Sensor (WSS) - LF Connector End View
Courtesy of GENERAL MOTORS CORP.

Wheel Speed Sensor (WSS) - LF Connector Parts Information

Connector Part Information

- OEM: 34062-0011
- Service: See Catalog
- Description: 2-Way F 1.5 Series, Sealed (BK)

Terminal Part Information

- Terminal/Tray: 34083-1002/28
- Core/Insulation Crimp: C/E/1
- Release Tool/Test Probe: 12094429/J-35616-14 (GN)

Wheel Speed Sensor (WSS) - LF Connector Terminal Identification

Pin	Wire	Circuit No.	Function
1	0.5 L-BU	830	Left Front Wheel Speed Sensor Signal
2	0.5 YE	873	Left Front Wheel Speed Sensor Low Reference

Wheel Speed Sensor (WSS) - LR (Z88)

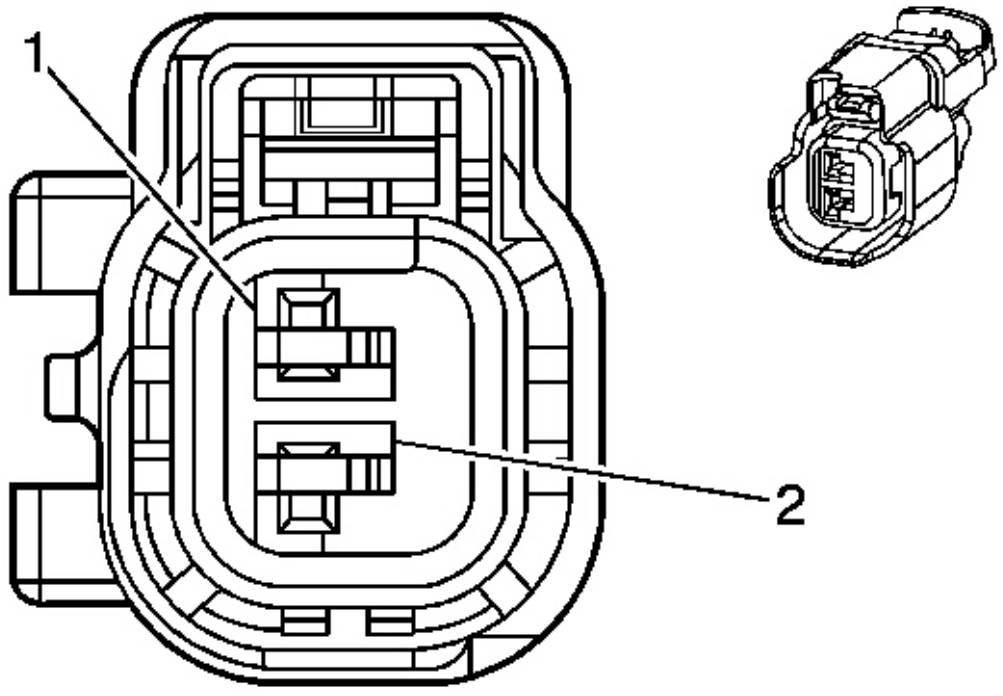

Fig. 14: Wheel Speed Sensor (WSS) - LR (Z88) Connector End View
Courtesy of GENERAL MOTORS CORP.

Wheel Speed Sensor (WSS) - LR (Z88) Connector Parts Information

Connector Part Information

- OEM: 34062-0011
- Service: See Catalog
- Description: 2-Way F 1.5 Series, Sealed (BK)

Terminal Part Information

- Terminal/Tray: 34083-1002/28
- Core/Insulation Crimp: C/E/1
- Release Tool/Test Probe: 12094429/J-35616-14 (GN)

Wheel Speed Sensor (WSS) - LR (Z88) Connector Terminal Identification

Pin	Wire	Circuit No.	Function
1	0.5 TN	884	Left Rear Wheel Speed Sensor Signal
2	0.5 OG	885	Left Rear Wheel Speed Sensor Low Reference

Wheel Speed Sensor (WSS) - RF

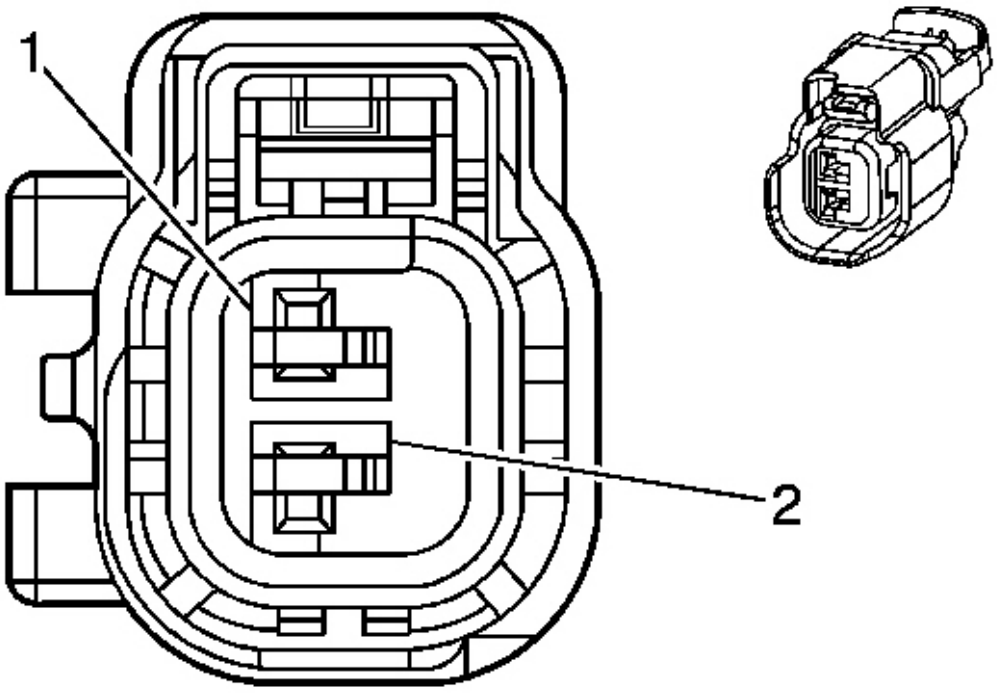

Fig. 15: Wheel Speed Sensor (WSS) - RF Connector End View
Courtesy of GENERAL MOTORS CORP.

Wheel Speed Sensor (WSS) - RF Connector Parts Information

Connector Part Information

- OEM: 34062-0011
- Service: See Catalog
- Description: 2-Way F 1.5 Series, Sealed (BK)

Terminal Part Information

- Terminal/Tray: 34083-1002/28
- Core/Insulation Crimp: C/E/1
- Release Tool/Test Probe: 12094429/J-35616-14 (GN)

Wheel Speed Sensor (WSS) - RF Connector Terminal Identification

Pin	Wire	Circuit No.	Function
1	0.5 D-GN	872	Right Front Wheel Speed Sensor Signal
2	0.5 TN	833	Right Front Wheel Speed Sensor Low Reference

Wheel Speed Sensor (WSS) - RR (Z88)

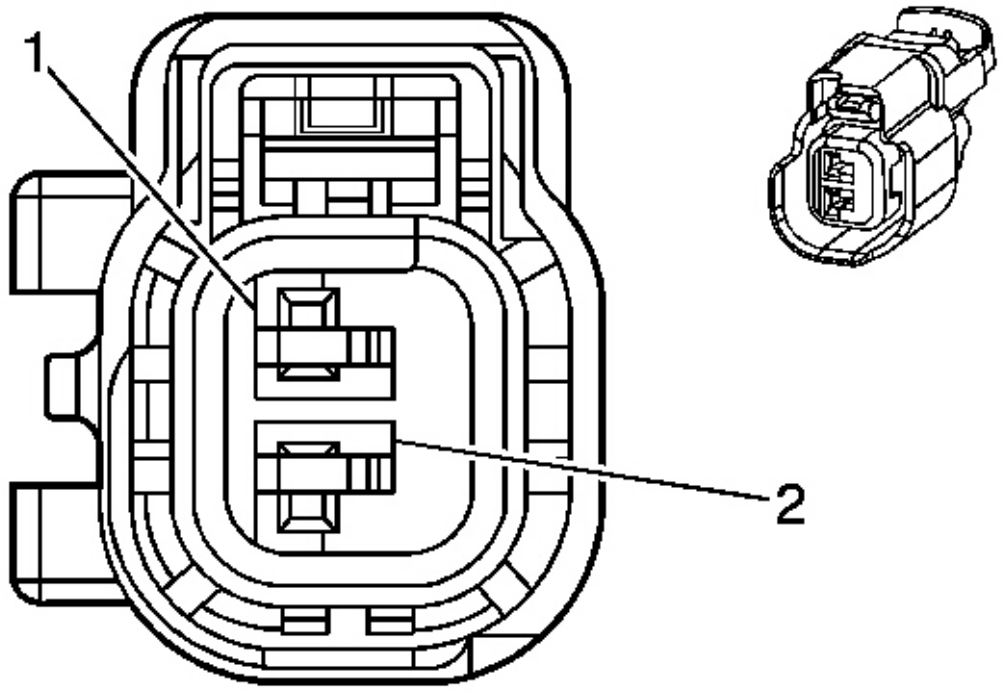

Fig. 16: Wheel Speed Sensor (WSS) - RR (Z88) Connector End View
Courtesy of GENERAL MOTORS CORP.

Wheel Speed Sensor (WSS) - RR (Z88) Connector Parts Information

Connector Part Information

- OEM: 34062-0011
- Service: See Catalog
- Description: 2-Way F 1.5 Series, Sealed (BK)

Terminal Part Information

- Terminal/Tray: 34083-1002/28
- Core/Insulation Crimp: C/E/1
- Release Tool/Test Probe: 12094429/J-35616-14 (GN)

Wheel Speed Sensor (WSS) - RR (Z88) Connector Terminal Identification

Pin	Wire	Circuit No.	Function
1	0.5 BN	882	Right Rear Wheel Speed Sensor Signal
2	0.5 WH	883	Right Rear Wheel Speed Sensor Low Reference

Yaw Rate and Lateral Acceleration Sensor (WDA)

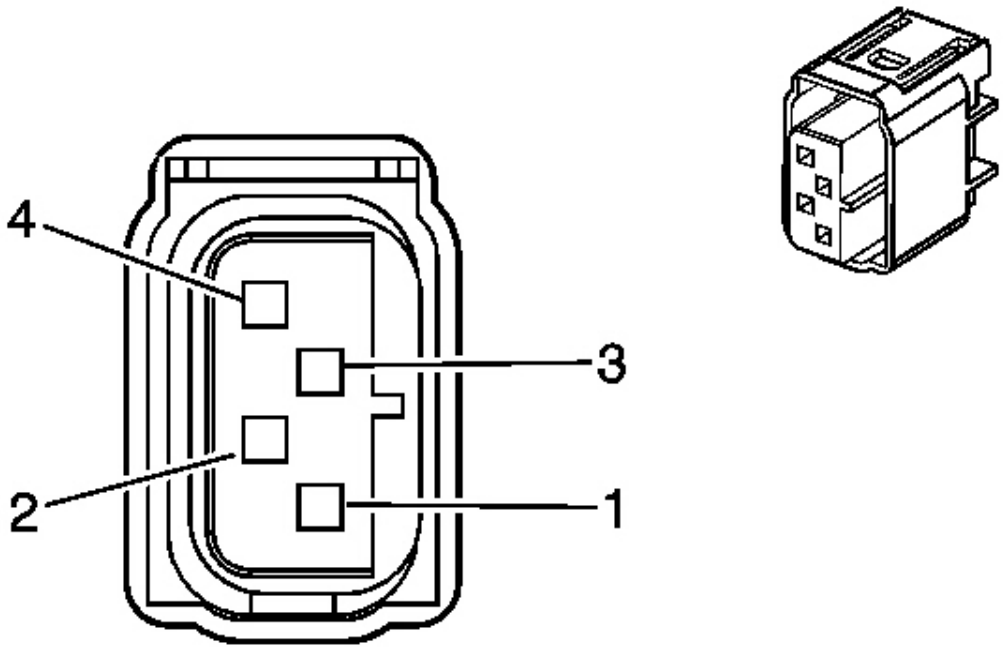

Fig. 17: Yaw Rate and Lateral Acceleration Sensor (WDA) Connector End View
Courtesy of GENERAL MOTORS CORP.

Yaw Rate and Lateral Acceleration Sensor (WDA) Connector Parts Information

Connector Part Information

- OEM: 1-967640-1
- Service: 88953370
- Description: 4-Way F MQS Socket Housing, Sealed (BK)

Terminal Part Information

- Terminal/Tray: 962885-5/15
- Core/Insulation Crimp: 6/6
- Release Tool/Test Probe: 12094429/J-35616-64B (L-BU)

Yaw Rate and Lateral Acceleration Sensor (WDA) Connector Terminal Identification

Pin	Wire	Circuit No.	Function
1	0.5 L-BU	2088	Steering Wheel Position Sensor Low Reference
2	0.5 L-GN/BK	6432	CAN Bus Low Serial Data
3	0.5 TN/WH	6433	CAN Bus High Serial Data
4	0.5 D-GN	2087	5-Volt Reference

Yaw Rate and Lateral Acceleration Sensor (Z88)

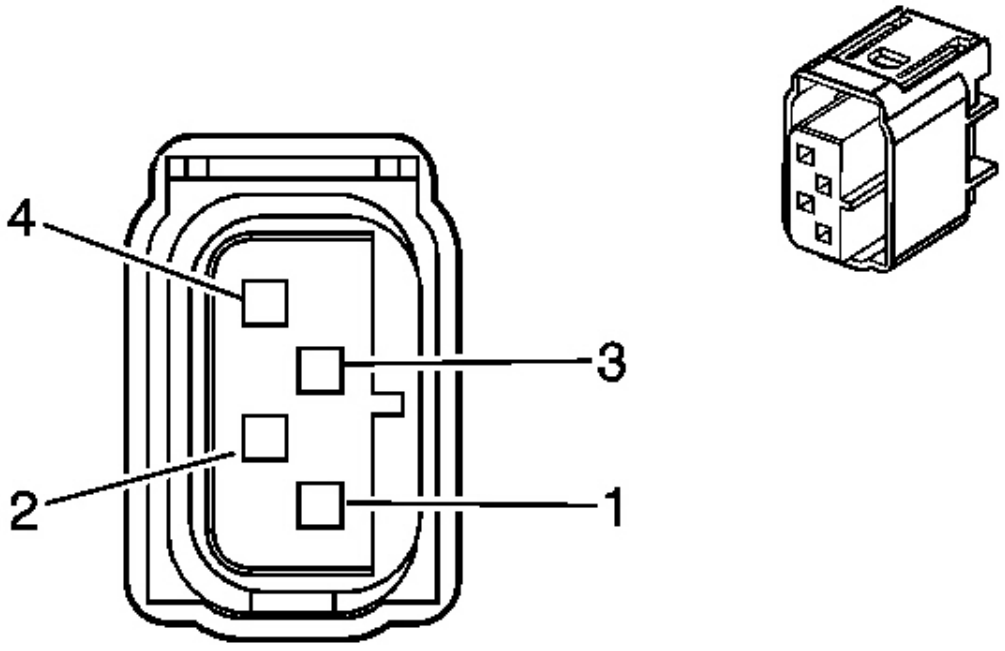

Fig. 18: Yaw Rate and Lateral Acceleration Sensor (Z88) Connector End View
Courtesy of GENERAL MOTORS CORP.

Yaw Rate and Lateral Acceleration Sensor (Z88) Connector Parts Information

Connector Part Information

- OEM: 1-967640-1
- Service: 88953370
- Description: 4-Way F MQS Socket Housing, Sealed (BK)

Terminal Part Information

- Terminal/Tray: 962885-5/15
- Core/Insulation Crimp: 6/6
- Release Tool/Test Probe: 12094429/J-35616-64B (L-BU)

Yaw Rate and Lateral Acceleration Sensor (Z88) Connector Terminal Identification

Pin	Wire	Circuit No.	Function
1	0.5 L-BU	2088	Steering Wheel Position Sensor Low Reference
2	0.5 L-GN/BK	6432	CAN Bus Low Serial Data
3	0.5 TN/WH	6433	CAN Bus High Serial Data
4	0.5 D-GN	2087	5-Volt Reference

DIAGNOSTIC INFORMATION AND PROCEDURES

DIAGNOSTIC CODE INDEX

DIAGNOSTIC CODE INDEX

DTC	Description
DTC C0035 or C0040	Right Or Left Front Wheel Speed Sensor Circuit
DTC C0045 or C0050	Right Or Left Rear Wheel Speed Sensor Circuit
DTC C0110	Pump Motor Circuit
DTC C0131	ABS Pressure Circuit
DTC C0161	Antilock Brake System (ABS) Brake Pedal Position Sensor Circuit Not Plausible
DTC C0186	Lateral Accelerometer Circuit
DTC C0196	Yaw Rate Circuit
DTC C0201	Antilock Brake System (ABS) Enable Relay Contact Circuit
DTC C0242 or P0856	Engine Control Module (ECM) Indicated TCS Malfunction
DTC C0245	Wheel Speed Sensor Frequency Error

DTC C0252	VSES Sensor Uncorrelated
DTC C0253	Centering Error
DTC C0299	Brake Booster Performance
DTC C0550	Electronic Control Unit (ECU) Performance
DTC C0561	System Disabled Information Stored Invalid Serial Data Received
DTC C0569	System Configuration Error
DTC C0710	Steering Position Signal
DTC C0774	Low Tire Pressure System Performance
DTC C1100	Brake Booster Vacuum Sensor Performance

DIAGNOSTIC STARTING POINT - ANTILOCK BRAKE SYSTEM

Begin the system diagnosis with **Diagnostic System Check - Vehicle** . The Diagnostic System Check will provide the following information:

- The identification of the control modules which command the system
- The ability of the control modules to communicate through the serial data circuit
- The identification of any stored diagnostic trouble codes (DTCs) and their status

The use of the Diagnostic System Check will identify the correct procedure for diagnosing the system and where the procedure is located.

SCAN TOOL OUTPUT CONTROLS

Scan Tool Output Controls

Scan Tool Output Control	Additional Menu Selection(s)	Description
ABS Motor Test	-	Used in order to command the ABS pump motor On or Off.
Automated Bleed Procedure	-	Used in order to bleed ABS hydraulics. Refer to **Antilock Brake System Automated Bleed Procedure**
LF Inlet Valve Solenoid	Solenoid Test	Commands the solenoid ON and OFF.
LF Outlet Valve Solenoid	Solenoid Test	Commands the solenoid ON and OFF.
LR Inlet Valve		

Solenoid	Solenoid Test	Commands the solenoid ON and OFF.
LR Outlet Valve Solenoid	Solenoid Test	Commands the solenoid ON and OFF.
RF Inlet Valve Solenoid	Solenoid Test	Commands the solenoid ON and OFF.
RF Outlet Valve Solenoid	Solenoid Test	Commands the solenoid ON and OFF.
RR Inlet Valve Solenoid	Solenoid Test	Commands the solenoid ON and OFF.

SCAN TOOL DATA LIST

EBCM Scan Tool Data List

Scan Tool Parameter	Data List	Units Displayed	Typical Data Value
Operating Conditions: Ignition is ON, engine OFF and vehicle is stationary			
ABS Active	ABS	Yes/No	No
ABS Failed	ABS/TCS	On/Off	Off
Battery Voltage Signal	ABS/TCS/VSES	Applied/Released	Released
Brake Fluid Level Status	ABS	OK/Low	OK
Brake Pressure Sensor Input	ABS	Volts	Varies
BPP Signal	ABS	Applied/Released	Released
Delivered Torque	TCS	%	Varies
DRP Active	ABS	Yes/No	No
DRP Disabled	ABS	Yes/No	No
Engine Drag Control Failed	ABS	Yes/No	No
HBB Calibration Status	ABS	Fail/Applied	Applied
Lateral Accelerometer Signal	VSES	Voltage	2.5 Volts
LF Wheel Speed Sensor	ABS/TCS	km/h or mph	0
LF Inlet Solenoid	ABS	Active/Inactive	Inactive

Command			
LF Outlet Solenoid Command	ABS	Active/Inactive	Inactive
LR Wheel Speed Sensor	ABS/TCS	km/h or mph	0
LR Inlet Solenoid Command	ABS	Active/Inactive	Inactive
LR Outlet Solenoid Command	ABS	Active/Inactive	Inactive
Panic Brake Assist Failed	ABS	Yes/No	No
Pump Motor Command Voltage	ABS	Voltage	Varies
Requested Torque	TCS	%	Varies
RF Inlet Solenoid	ABS	Active/Inactive	Inactive
RF Outlet Solenoid	ABS	Active/Inactive	Inactive
RF Wheel Speed Sensor	ABS/TCS	km/h or mph	0
RR Inlet Solenoid Command	ABS	Active/Inactive	Inactive
RR Outlet Solenoid Command	ABS	Active/Inactive	Inactive
RR Wheel Speed Sensor	ABS/TCS	km/h or mph	0
Steering Wheel Position	VSES	Degrees	Varies
TCS Failed	TCS	Yes/NO	No
VSES Active	VSES	Yes/No	No
VSES Failed	VSES	Yes/No	No
Yaw Rate Sensor	VSES	Volts	Varies

SCAN TOOL DATA DEFINITIONS

The ABS scan tool data definitions contain a brief description of all ABS related parameters available on the scan tool. The parameters available on the scan tool are listed below in alphanumeric order.

ABS Active

The scan tool displays Yes/No. The scan tool displays No when a when not active.

ABS Failed

The scan tool displays On/Off. The scan tool displays Off when a when not active.

Battery Voltage Signal

The scan tool displays 0-18 Volts. The scan tool displays approximately 12 Volts when the ignition is ON.

Brake Fluid Level Status

The scan tool displays 0-18 Volts. The scan tool displays approximately 12 Volts when the ignition is ON.

Brake Pressure Sensor Input

The scan tool displays 0-5 Volts. The scan tool displays approximately 1.5 Volts when the ignition is ON.

Brake Pedal Position Signal (BPP)

The scan tool displays Applied/Released. The scan tool indicates Released when the brake is not applied.

Delivered Torque

The scan tool displays 0-100 percent. The scan tool displays the duty cycle of the Delivered Torque PWM signal. The duty cycle of the signal is used to transmit how much engine torque the PCM is delivering. Normal values are between 10 and 90 percent duty cycle.

DRP Active

The scan tool will display Yes/No depending on the state of the DRP.

DRP Disabled

The scan tool will display Yes/No depending on the state of the DRP.

Engine Drag Control Failed

The scan tool will display Yes/No depending on the state of traction of the tires and engine RPM.

HBB Calibration Status

The scan tool will display Failed or Applied. The scan tool displays Applied when the calibration is complete.

Lateral Accelerometer Signal

The scan tool will display 0-5 Volts. The scan tool displays approximately 2.5 volts when the ignition is ON and the vehicle is stationary.

Ignition Voltage Signal

The scan tool displays 0-18 Volts. The scan tool displays approximately 12 Volts when the ignition is ON.

LF Wheel Speed Sensor

The scan tool displays 0-327 km/h (0-204 mph). The scan tool displays 0 km/h (0 mph) when the vehicle is not moving or is moving at speeds less than or equal to 0 km/h (0 mph).

LR Wheel Speed Sensor

The scan tool displays 0-327 km/h (0-204 mph). The scan tool displays 0 km/h (0 mph) when the vehicle is not moving or is moving at speeds less than or equal to 0 km/h (0 mph).

LF Outlet Valve Command

The scan tool displays Active/Inactive. The scan tool displays Active when the left front Outlet valve solenoid is commanded on.

LR Outlet Valve Command

The scan tool displays Active/Inactive. The scan tool displays Active when the left front Outlet valve solenoid is commanded on.

Panic Brake Assist Failed

The scan tool will display Yes/No depending on the state of traction of the tires and engine RPM.

Pump Motor Command Voltage

The scan tool will display Voltage when the pump motor is active.

Requested Torque

The scan tool displays 0-10 percent. The scan tool displays the duty cycle of the Requested Torque PWM signal. The duty cycle of the signal is used to transmit how much engine torque the EBCM is requested.

RF Outlet Valve Command

The scan tool displays Active/Inactive. The scan tool displays Active when the right front Outlet valve solenoid is commanded on.

RF Inlet Valve Command

The scan tool displays Active/Inactive. The scan tool displays Active when the right front Inlet valve solenoid is commanded on.

RF Wheel Speed Sensor

The scan tool displays 0-327 km/h (0-204 mph). The scan tool displays 0 km/h (0 mph) when the vehicle is not moving or is moving at speeds less than or equal to 0 km/h (0 mph).

RR Wheel Speed Sensor

The scan tool displays 0-327 km/h (0-204 mph). The scan tool displays 0 km/h (0 mph) when the vehicle is not moving or is moving at speeds less than or equal to 0 km/h (0 mph).

RR Outlet Valve Command

The scan tool displays Active/Inactive. The scan tool displays Active when the right front Inlet valve solenoid is commanded on.

RR Inlet Valve Command

The scan tool displays Active/Inactive. The scan tool displays Active when the right front Inlet valve solenoid is commanded on.

Steering Wheel Position

The scan tool will display Steering Angle Sensor. The scan tool will display the signal received from the Steering Angle Sensor.

TCS Active

The scan tool will display Yes or No depending on the state of the Traction Control.

TCS Failed

The scan tool will display Yes or No depending on the state of the Traction Control

VSES Active

The scan tool displays Yes or No. The scan tool displays Yes when VSES is active and No when VSES is inactive.

VSES Failed

The scan tool will display Yes or No depending on the state of the ABS indicator.

Yaw Rate Sensor

The scan tool will display Volts, depending on the angle of the vehicle.

HYDRAULIC BRAKE BOOSTER CALIBRATION

Hydraulic Brake Booster Calibration

Perform the Diagnostic System Check for DTCs prior to using this diagnostic procedure. Refer to **Diagnostic System Check - Vehicle** .

If the "Power Brake Booster" activates excessively or if excessive effort of the brake pedal is consistently required, HBB calibration may be needed. To perform the HBB calibration, perform the following steps:

IMPORTANT: Diagnose all vehicle DTCs before proceeding HBB calibration.

1. With the scan tool, observe the "HBB Calibration Status" parameter when performing calibration. It should display "complete when calibrated, " If not, repeat HBB Calibration.
2. Transmission in Park, engine running.
3. Apply throttle pedal to attain 3000 RPM

4. Release throttle pedal.
5. Apply and hold brake pedal firmly for approximately 1 second, release brake pedal. Perform this step 3 times. The entire sequence of steps 2 through 5 (consisting of one throttle apply and three brake pedal applies) should take place within 7 seconds.

DTC C0035 OR C0040

Diagnostic Instructions

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

DTC Descriptors

DTC C0035 00

Left Front Wheel Speed Sensor Circuit

DTC C0035 5A

Left Front Wheel Speed Sensor Circuit Erratic Signal

DTC C0040 00

Right Front Wheel Speed Sensor Circuit

DTC C0040 5A

Right Front Wheel Speed Sensor Circuit Erratic Signal

Diagnostic Fault Information

DTC C0035 or C0040

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Left Front Sensor Signal Circuit	C0035 00	C0035 00	-	C0035 5A
Left Front Sensor Low Reference Circuit	C0035 00	C0035 00	C0035 00	C0035 5A
Right Front Sensor				

Signal Circuit	C0040 00	C0040 00	-	C0040 5A
Right Front Sensor Low Reference Circuit	C0040 00	C0040 00	C0040 00	C0040 5A

Circuit/System Description

The wheel speed sensor receives ignition voltage from the electronic brake control module (EBCM) and provides a DC square wave signal back to the module. As the wheel spins, the EBCM uses the frequency of the square wave signal to calculate the wheel speed.

Conditions for Running the DTC

C0035 00 or C0040 00

- The ignition is ON.
- Ignition voltage is greater than 9.5 volts.

C0035 5A or C0040 5A

- The ignition is ON.
- Ignition voltage is greater than 9.5 volts.
- The brake pedal is not pressed.
- A DTC is not set for the other wheel speed circuit on the same axle.

Conditions for Setting the DTC

- An erratic signal output of the wheel speed sensor is detected.
- A short to ground, open/high resistance is detected on the wheel speed sensor signal circuit.
- A short to voltage, short to ground or an open/high resistance is detected on the low reference circuit.
- Wheel speed sensor power supply is less than 7.6 volts.
- A missing wheel speed sensor signal

Action Taken When the DTC Sets

- The EBCM disables the Antilock Brake System (ABS)/Traction Control System (TCS) and VSES for the duration of the ignition cycle.
- The electronic brake distribution (EBD) does not function optimally.
- The ABS indicator turns ON.
- The Traction Control indicator turns ON.

- The driver information center (DIC) displays the Service Stability System message.

Conditions for Clearing the DTC

- The condition for setting the DTC is no longer present.
- The EBCM automatically clears the history DTC when a current DTC is not detected in 100 consecutive drive cycles.

Diagnostic Aids

If 2 or more wheel speed sensors are inoperative diagnose each wheel speed sensor individually.

C0035 5A, 00 or C0040 5A, 00

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. If the DTC is not current, clear all DTCs and simulate the effects of water intrusion by using the following procedure:

1. Spray the suspected area with a 5 percent saltwater solution. To create a 5 percent saltwater solution, add 2 teaspoons of salt to 8 fl oz. of water (10 g of salt to 200 ml of water).
2. Test drive the vehicle over various road surfaces: bumps, turns, etc., above 40 km/h (25 mph) for at least 30 seconds.
3. Rinse the area thoroughly when completed.

Reference Information

Schematic Reference

Antilock Brake System Schematics

Connector End View Reference

Antilock Brake System Connector End Views

Description and Operation

ABS Description and Operation

Electrical Information Reference

- Circuit Testing
- Connector Repairs

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

Scan Tool Reference

Scan Tool Data List

Circuit/System Verification

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

Circuit/System Testing

IMPORTANT: It is recommended that Component Testing is performed before Circuit Testing when diagnosing wheel speed sensors because the module will default and does not supply voltage to the sensor when the DTC is set.
Performing Circuit Testing with EBCM connector disconnected and key on will cause U codes to set. Clear DTCs after performing the test.

1. Ignition OFF, disconnect the harness connector at the suspect wheel speed sensor.
2. Ignition ON, test for 0 volts between the low reference circuit terminal 2 and ground.
   - If not the specified value, test the low reference circuit for a short to voltage. If the circuit tests normal, replace the EBCM.
3. Disconnect the harness connector at the EBCM.
4. Test for infinite resistance between the low reference circuit terminal 2 and ground.
   - If not the specified value, test the low reference circuit for a short to ground.
5. Test for less than 1 ohm of resistance between the low reference circuit terminals of the appropriate sensor listed below.
   - LF sensor terminals 2 and 34
   - RF sensor terminals 2 and 6
   - If greater than the specified range, test the low reference circuit for an open/high resistance.
6. Test for infinite resistance between the signal circuit and ground.
   - If not the specified value, test the signal circuit for a short to ground.

7. Test for less than 1 ohm of resistance between the signal circuit terminals.
    - LF sensor terminals 1 and 21
    - RF sensor terminals 1 and 18
    - If not within the specified range, test the signal circuit for an open/high resistance.
8. If all circuits test normal, replace the EBCM.

Component Testing

1. Ignition OFF, disconnect the harness connector at the wheel speed sensor.
2. Connect a 12 volt test lamp between B+ and the wheel speed sensor signal circuit terminal 1.
3. Test for 4-8 mA on the low reading between the low reference terminal 2 and ground when spinning the wheel very slow.
    - If not within the specified range, replace the wheel speed sensor.
4. Test for 12-16 mA on the high reading between the low reference terminal 2 and ground when spinning the wheel very slow.
    - If not within the specified range, replace the wheel speed sensor.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

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

DTC C0045 OR C0050

Diagnostic Instructions

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

DTC Descriptors

DTC C0045 00

Left Rear Wheel Speed Sensor Circuit

DTC C0045 5A

Left Rear Wheel Speed Sensor Circuit Erratic Signal

DTC C0050 00

Right Rear Wheel Speed Sensor Circuit

DTC C0050 5A

Right Rear Wheel Speed Sensor Circuit Erratic Signal

Diagnostic Fault Information

DTC C0045 or C0050

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Left Rear Sensor Signal Circuit	C0045 00	C0045 00	C0045 00	C0045 5A
Left Rear Sensor Low Reference Circuit	-	C0045 00	-	C0045 5A
Right Rear Sensor Signal Circuit	C0050 00	C0050 00	C0050 00	C0050 5A
Right Rear Sensor Low Reference Circuit	-	C0050 00	-	C0050 5A

Circuit/System Description

The wheel speed sensor receives ignition voltage from the electronic brake control module (EBCM) and provides a DC square wave signal back to the module. As the wheel spins, the EBCM uses the frequency of the square wave signal to calculate the wheel speed.

Conditions for Running the DTC

C0045 00 or C0050 00

- The ignition is ON.
- Ignition voltage is greater than 9.5 volts.

C0045 5A or C0050 5A

- The ignition is ON.

- Ignition voltage is greater than 9.5 volts.
- The brake pedal is not pressed.
- A DTC is not set for the other wheel speed circuit on the same axle.

Conditions for Setting the DTC

- An erratic signal output of the wheel speed sensor is detected.
- A short to voltage, open or ground is detected on the wheel speed sensor signal circuit.
- A open or short to ground in the wheel speed sensor circuit supply voltage.
- Wheel speed sensor power supply is less than 7.6 volts.
- A missing wheel speed sensor signal

Action Taken When the DTC Sets

- The EBCM disables the Antilock Brake System (ABS)/Traction Control System (TCS)/Vehicle Stability Enhancement System (VSES) for the duration of the ignition cycle.
- The electronic brake distribution (EBD) does not function optimally.
- The ABS indicator turns ON.
- The Traction Control indicator turns ON.
- The driver information center (DIC) displays the Service Stability System message.

Conditions for Clearing the DTC

- The condition for setting the DTC is no longer present.
- The EBCM automatically clears the history DTC when a current DTC is not detected in 100 consecutive drive cycles.

Diagnostic Aids

If 2 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. If the DTC is not current, clear all DTCs and simulate the effects of water intrusion by using the following procedure:

1. Spray the suspected area with a 5 percent saltwater solution. To create a 5 percent saltwater solution, add 2 teaspoons of salt to 8 fl oz. of water (10 g of salt to 200 ml of water).
2. Test drive the vehicle over various road surfaces, bumps, turns, etc., above 50 km/h (31

mph) for at least 20 seconds.

3. If the DTC returns, replace the suspected wheel speed sensor or repair the wheel speed sensor wiring.
4. Rinse the area thoroughly when completed.

Reference Information

Schematic Reference

Antilock Brake System Schematics

Connector End View Reference

Antilock Brake System Connector End Views

Description and Operation

ABS Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Scan Tool Data List

Circuit/System Verification

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

Circuit/System Testing

IMPORTANT: It is recommended that Component Testing is performed before Circuit Testing when diagnosing wheel speed sensors because the module will default and does not supply voltage to the sensor when the DTC is set.

Performing Circuit Testing with EBCM connector disconnected and key on will cause U codes to set. Clear DTCs after performing the test.

1. Ignition OFF, disconnect the harness connector at the suspect wheel speed sensor.
2. Ignition ON, test for 0 volts between the low reference circuit terminal 2 and ground.
   - If not the specified value, test the low reference circuit for a short to voltage. If the circuit tests normal, replace the EBCM.
3. Disconnect the harness connector at the EBCM.
4. Test for infinite resistance between the low reference circuit terminal 2 and ground.
   - If not the specified value, test the low reference circuit for a short to ground.
5. Test for less than 1 ohm of resistance between the low reference circuit terminals of the appropriate sensor listed below.
   - LR sensor terminals 2 and 20
   - RR sensor terminals 2 and 31
   - If greater than the specified range, test the low reference circuit for an open/high resistance.
6. Test for infinite resistance between the signal circuit and ground.
   - If not the specified value, test the signal circuit for a short to ground.
7. Test for less than 1 ohm of resistance between the signal circuit terminals.
   - LR sensor terminals 1 and 33
   - RR sensor terminals 1 and 19
   - If not within the specified range, test the signal circuit for an open/high resistance.
8. If all circuits test normal, replace the EBCM.

Component Testing

1. Ignition OFF, disconnect the harness connector at the wheel speed sensor.
2. Connect a 12 volt test lamp between B+ and the wheel speed sensor signal circuit terminal 1.
3. Test for 4-8 mA on the low reading between the low reference terminal 2 and ground when spinning the wheel very slow.
   - If not within the specified range, replace the wheel speed sensor.
4. Test for 12-16 mA on the high reading between the low reference terminal and ground when spinning the wheel very slow.

- If not within the specified range, replace the wheel speed sensor.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

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

DTC C0110

Diagnostic Instructions

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

DTC Descriptor

DTC C0110 00

Pump Motor Circuit

Circuit/System Description

The pump motor is an integral part of the brake pressure modulator valve (BPMV), while the pump motor relay is integral to the electronic brake control module (EBCM). The pump motor relay is not engaged during normal system operation. When antilock brake system (ABS) or traction control system (TCS) operation is required the EBCM activates the pump motor relay and ground circuit is provided to the pump motor.

Conditions for Running the DTC

- The ignition switch is in the ON position.
- Initialization is complete.

Conditions for Setting the DTC

- The EBCM motor drive circuit detects a short to battery positive or open ground circuit and a continuously on or off motor.
- The pump motor continues to rotate briefly after activation creating a feedback voltage. The EBCM sets the code if the measured feedback voltage indicates a binding or stalled pump

motor.

Action Taken When the DTC Sets

- The EBCM disables the ABS/TCS/VSES for the duration of the ignition cycle.
- The ABS indicator turns ON.
- The Traction Control and VSES indicators turn ON.
- The Traction Control and Stabilitrack displayed on the DIC.

Conditions for Clearing the DTC

- The condition for the DTC is no longer present.
- The EBCM automatically clears the history DTC when a current DTC is not detected in 100 consecutive drive cycles.

Diagnostic Aids

The pump motor is integral to the BPMV. The pump motor is not serviceable. Inspect the power and ground circuits proper connections.

Reference Information

Schematic Reference

Antilock Brake System Schematics

Connector End View Reference

Antilock Brake System Connector End Views

Description and Operation

ABS Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Scan Tool Data List for EBCM

Circuit/System Testing

1. Ignition OFF, disconnect the harness connector at the EBCM.
2. Test for less than 1.0 ohm of resistance from ground circuit terminal 38 and ground.
   - If greater than the specified range, test the ground circuit for an open/high resistance.
3. Test for less than 1.0 ohm of resistance from ground circuit terminal 13 and ground.
   - If greater than the specified range, test the ground circuit for an open/high resistance.
4. Ignition ON, verify that a test lamp illuminates between the B+ circuit terminal 1 and ground.
   - If the test lamp does not illuminate, test the B+ circuit for a short to ground or an open/high resistance.
5. Verify that a test lamp illuminates between the B+ circuit terminal 25 and ground.
   - If the test lamp does not illuminate, test the B+ circuit for a short to ground or an open/high resistance.
6. If all circuits test normal, test or replace the BPMV and EBCM assembly.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

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

DTC C0131

Diagnostic Instructions

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

DTC Descriptors

DTC C0131 00

ABS Pressure Circuit

DTC C0131 5A

Pressure Circuit Calibration Not Learned

Diagnostic Fault Information

DTC C0131

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Brake Pressure Sensor Signal Circuit	C0131 00	C0131 00	C0131 00	C0131 5A

Circuit/System Description

The electronic brake control module (EBCM) uses input from the brake pressure sensor for more accurate control during a vehicle stability enhancement system (VSES) event.

Conditions for Running the DTC

- The ignition switch is in the ON position.
- Ignition voltage is greater than 9.5 volts.

Conditions for Setting the DTC

- Internal pressure sensor line fault.
- Pressure signal does not correlate to estimated Pressure over time.
- Brake Signal does not correlate to Pressure Signal.
- Signal is erratic and changes faster than physically allowed.

Action Taken When the DTC Sets

- The EBCM disables the antilock brake system (ABS)/traction control system/(TCS) and vehicle stability enhancement system/(VSES) for the duration of the ignition cycle.
- The ABS/TCS and stabilitrak indicator turns ON.
- The Service Traction Control and stabilitrak displayed on the DIC.

Conditions for Clearing the DTC

- The condition for the DTC is no longer present.
- The EBCM automatically clears the history DTC when a current DTC is not detected in 100 consecutive drive cycles.

Diagnostic Aids

The brake fluid pressure sensor is integral to the BPMV/EBCM. The brake fluid pressure sensor is not serviceable.

Reference Information

Schematic Reference

Antilock Brake System Schematics

Connector End View Reference

Antilock Brake System Connector End Views

Description and Operation

ABS Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Scan Tool Data List for EBCM

Circuit/System Testing

1. Apply and release brake pedal. Verify brake lamps operate properly.
    - If brake lamps do not operate properly, refer to **Symptoms - Lighting Systems** .
2. Replace EBCM/brake pressure modulator valve (BPMV) assembly.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

- **Brake Pressure Modulator Valve Replacement**
- **Electronic Brake Control Module Replacement**

- **Control Module References** for EBCM replacement, setup and programming

DTC C0161

Diagnostic Instructions

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

DTC Descriptor

DTC C0161

Antilock Brake System (ABS) Brake Pedal Position Sensor Circuit Not Plausible

Circuit/System Description

The EBCM receives a serial data message from BCM that the brake pedal is applied and to ensure that the states of their feedback circuits agree.

Conditions for Running the DTC

- The ignition is ON.
- The vehicle speed is greater than 16 km/h (10 mph).
- The ignition voltage is greater than 9.5 volts.

Conditions for Setting the DTC

- The brake pedal is sensed as applied for 6 minutes.
- The vehicle speed is greater than 21 km/h (13 mph).

Action Taken When the DTC Sets

The ABS/TCS/VSES if equipped, remains functional.

Conditions for Clearing the DTC

- The condition for the DTC is no longer present.
- The EBCM automatically clears the history DTC when a current DTC is not detected in 100 consecutive drive cycles.

Diagnostic Aids

The DTC C0161 00 can be set if the brake switch is applied while accelerating.

Reference Information

Schematic Reference

Antilock Brake System Schematics

Connector End View Reference

Antilock Brake System Connector End Views

Description and Operation

ABS Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Scan Tool Data List for EBCM

Circuit/System Verification

1. Verify that the following DTC is not set: B3445.
   - If the DTC is set, refer to **Diagnostic Trouble Code (DTC) List - Vehicle**
2. Ignition ON, observe the scan tool BCM Stoplamp relay command parameter. The reading should be ON when applied and OFF when unapplied.

Repair Verification

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

DTC C0186

Diagnostic Instructions

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

DTC Descriptors

DTC C0186 00

Lateral Accelerometer Circuit

DTC C0186 5A

Lateral Accelerometer Circuit Erratic

Diagnostic Fault Information

DTC C0186

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Lateral Accelerometer Supply Voltage Circuit	C0186 00	C0186 00	C0186 00	-
Lateral Accelerometer Communication Circuit	C0186 00	C0186 00	C0186 00	C0186 5A
Lateral Accelerometer Communication Circuit	C0186 00	C0186 00	C0186 00	C0186 5A
Lateral Accelerometer Communication Ground Circuit	-	C0186 00	-	-

Circuit/System Description

The lateral accelerometer and the yaw rate sensors are combined into one sensor external to the electronic brake control module (EBCM). The vehicle stability enhancement system (VSES) uses the lateral accelerometer input when calculating the desired yaw rate.

Conditions for Running the DTC

The ignition switch is in the ON position.

Conditions for Setting the DTC

- The yaw/lateral combination sensor fails an internal self test.
- Communication is lost between the EBCM and the yaw/lateral combination sensor.

Action Taken When the DTC Sets

One or more of the following actions may occur:

- The vehicle stability enhancement system (VSES) is disabled.
- Traction control system (TCS) is disabled.
- The TCS/VSES indicators turn ON.
- The driver information center (DIC) displays the Service Traction Control and or Service Stabilitrak message.

Conditions for Clearing the DTC

- The condition for the DTC is no longer present.
- The EBCM automatically clears the history DTC when a current DTC is not detected in 100 consecutive drive cycles.

Reference Information

Schematic Reference

Antilock Brake System Schematics

Connector End View Reference

Antilock Brake System Connector End Views

Description and Operation

ABS Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Scan Tool Data List for EBCM

Circuit/System Testing

1. Ignition OFF, disconnect the harness connector at the Yaw Rate/Lateral Accelerometer sensor.
2. Test for less than 1 ohm of resistance between the ground circuit terminal 1 and ground.
    - If greater than the specified range, test for an open/high resistance in the ground circuit. If the circuit tests normal, replace the EBCM.
3. Ignition ON, verify that a test lamp illuminates between the ignition circuit terminal 4 and ground.
    - If the test lamp does not illuminate, test the ignition circuit for a short to ground or an open/high resistance. If the circuit tests normal, replace the EBCM.
4. Ignition OFF, disconnect the harness connector at the EBCM.
5. Ignition ON, test for 0 volts between the communication circuit terminal 37 and ground.
    - If greater than the specified value, test the communication circuit for a short to voltage.
6. Test for 0 volts between the communication circuit terminal 24 and ground.
    - If greater than the specified value, test the communication circuit for a short to voltage.
7. Ignition OFF, test for infinite resistance between the communication circuit terminal 37 and ground.
    - If not the specified value, test the communication circuit for a short to ground.
8. Test for infinite resistance between the communication circuit terminal 24 and ground.
    - If not the specified value, test the communication circuit for a short to ground.
9. Test for less than 1 ohm of resistance between the communication circuit terminals 24 and terminal 3.
    - If greater than the specified range, test the communication circuit for an open/high resistance.
10. Test for less than 1 ohm of resistance between the communication circuit terminals 37 and terminal 2.
    - If greater than the specified range, test the communication circuit for an open/high resistance.
11. Test for infinite resistance between the communication circuit 37 and the communication circuit 24.
    - If not the specified value, test the communication circuits for a short together.
12. If all circuits test normal, replace the Yaw Rate/Lateral sensor.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

- **Vehicle Yaw Sensor with Vehicle Lateral Accelerometer Replacement**
- **Control Module References** for EBCM replacement, setup and programming

DTC C0196

Diagnostic Instructions

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

DTC Descriptors

DTC C0196 00

Yaw Rate Circuit

DTC C0196 5A

Yaw Rate Circuit Erratic

Diagnostic Fault Information

DTC C0196

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Yaw Rate Supply Voltage Circuit	C0196 00	C0196 00	C0196 00	-
Yaw Rate CAN Bus High Circuit	C0196 00	C0196 00	C0196 00	C0196 5A
Yaw Rate CAN Bus Low Circuit	C0196 00	C0196 00	C0196 00	C0196 5A
Yaw Rate Ground Circuit	-	C0196 00	-	-

Circuit/System Description

The lateral accelerometer and the yaw rate sensors are combined into one sensor external to the electronic brake control module (EBCM). The vehicle stability enhancement system (VSES) uses the lateral accelerometer input when calculating the desired yaw rate. The usable output signal is a serial data signal CAN high and CAN low serial data circuits.

Conditions for Running the DTC

The ignition switch is in the ON position.

Conditions for Setting the DTC

- The yaw/lateral combination sensor fails an internal self test.
- Communication is lost between the EBCM and the yaw/lateral combination sensor.
- The correlation error between the yaw/lateral combination sensor and steering angle sensor.

Action Taken When the DTC Sets

One or more of the following actions may occur:

- The vehicle stability enhancement system (VSES) is disabled.
- Traction control system (TCS) is disabled.
- The TCS/VSES indicators turn ON.
- The driver information center (DIC) displays the Service Traction Control and or Service Stabilitrak message.

Conditions for Clearing the DTC

- The condition for the DTC is no longer present.
- The EBCM automatically clears the history DTC when a current DTC is not detected in 100 consecutive drive cycles.

Diagnostic Aids

Possible causes of this DTC are as follows:

- CAN HI and CAN LO circuits shorted together
- CAN HI or CAN LO circuit shorted to ground
- CAN HI or CAN LO circuit shorted to voltage

Reference Information

Schematic Reference

Antilock Brake System Schematics

Connector End View Reference

Antilock Brake System Connector End Views

Description and Operation

ABS Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Scan Tool Data List for EBCM

Circuit/System Verification

With scan tool installed, clear the DTCs then drive the vehicle in a straight line at a speed greater than 20 km/h (13 mph). If the DTC did not set as a current DTC see **Diagnostic Aids**.

Circuit/System Testing

1. Ignition OFF, disconnect the yaw rate/lateral accelerometer connector.
2. Test the yaw rate/lateral sensor reference voltage circuit for a short to voltage, short to ground, an open or high resistance.
    - If the reference voltage circuit did not test normal, repair the circuit.
3. Test the yaw/lateral sensor ground circuit for an open or high resistance.
    - If the reference ground circuit did not test normal, repair the circuit.
4. Test the yaw/lateral sensor CAN HI and LO circuit for a short to voltage, short to ground, an open or high resistance.
    - If the yaw/later CAN HI and LO circuits did not test normal repair the circuit.
5. Ignition ON, test the yaw/lateral sensor reference voltage circuit for 12 volts and the ground circuit for an open or high resistance.
    - If the yaw/later 12-volt reference and ground circuits test normal replace the

yaw/lateral sensor.

- If the yaw/later 12-volt reference and ground circuits did not test normal replace the EBCM.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

DTC C0201

Diagnostic Instructions

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

DTC Descriptor

DTC C0201 00

Antilock Brake System (ABS) Enable Relay Contact Circuit

Circuit/System Description

The solenoid relay, located within the electronic brake control module (EBCM), supplies battery voltage to all of the valve solenoids.

Conditions for Running the DTC

- Ignition voltage is greater than 9.5 volts.
- The solenoid relay is commanded ON.

Conditions for Setting the DTC

One or more of the following conditions exists:

- The EBCM detects an open in the battery positive voltage circuit to the solenoid valve relay.
- The EBCM detects a stuck open solenoid valve relay or an open circuit between the solenoid valve relay and solenoid valves.

Action Taken When the DTC Sets

- The EBCM disables the antilock brake system (ABS)/traction control system (TCS)/dynamic rear proportion (DRP) for the duration of the ignition cycle.
- The ABS indicator turns ON.
- The Traction Control indicator turns ON.
- The red brake warning indicator turns ON.
- The driver information center (DIC) displays the SERVICE BRAKE SYSTEM/TRACTION SYSTEM message.

Conditions for Clearing the DTC

- The condition for setting the DTC is no longer present.
- The EBCM automatically clears the history DTC when a current DTC is not detected in 100 consecutive drive cycles.

Reference Information

Schematic Reference

Antilock Brake System Schematics

Connector End View Reference

Antilock Brake System Connector End Views

Description and Operation

ABS Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Scan Tool Data List

Circuit/System Verification

Ignition ON, observe the scan tool EBCM Battery Voltage Signal parameter. The reading should

be battery voltage.

Circuit/System Testing

1. Ignition OFF, disconnect the harness connector at the EBCM.
2. Test for less than 1 ohm of resistance between the ground terminals 13 and 38 and ground.
   - If greater than the specified range, test the ground circuits for an open/high resistance.
3. Verify that a test lamp illuminates between the B+ terminals 25 and 1 and ground.
   - If the test lamp does not illuminate, test the B+ circuits for a short to ground or an open/high resistance.
4. If all circuits test normal, replace the EBCM.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

Control Module References for EBCM replacement, setup and programming

DTC C0242 OR P0856

Diagnostic Instructions

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

DTC Descriptor

DTC C0242

Engine Control Module (ECM) Indicated TCS Malfunction

DTC P0856

Engine Control Module (ECM) Indicated TCS Malfunction

Circuit/System Description

The electronic brake control module (EBCM) and the engine control module (ECM) simultaneously control the traction control. The EBCM sends a serial data message to the ECM requesting torque reduction. When certain ECM DTCs are set, the ECM will not be able to

perform the torque reduction for traction control. A serial data message is sent to the EBCM indicating that traction control is not allowed.

Conditions for Running the DTC

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

Conditions for Setting the DTC

The ECM diagnoses a condition preventing the engine control portion of the traction control function and sends a serial data message to the EBCM indicating that torque reduction is not allowed. The ECM will typically set a DTC and the EBCM will set this DTC.

Action Taken When the DTC Sets

- The EBCM disables the TCS for the duration of the ignition cycle.
- The Traction Off indicator turns ON.
- The DIC displays the Service Traction Control message.
- The ABS remains functional.

Conditions for Clearing the DTC

- The condition for the DTC is no longer present and the DTC is cleared with a scan tool.
- The electronic brake control module (EBCM) automatically clears the history DTC when a current DTC is not detected in 100 consecutive drive cycles.

Reference Information

Schematic Reference

Antilock Brake System Schematics

Connector End View Reference

Antilock Brake System Connector End Views

Description and Operation

ABS Description and Operation

Electrical Information Reference

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

Scan Tool Reference

- **Scan Tool Data Definitions**
- **Scan Tool Output Controls**

Circuit/System Verification

Verify that no DTCs are set in the ECM.

- If DTCs are set, refer to **Diagnostic Trouble Code (DTC) List - Vehicle** .

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

Control Module References

DTC C0245

Diagnostic Instructions

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

DTC Descriptor

DTC C0245 00

Wheel Speed Sensor Frequency Error

Diagnostic Fault Information

DTC C0245

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

Wheel Speed Sensor Frequency Error	-	-	-	C0245 00

Circuit/System Description

The wheel speed sensor receives a 12-volt power supply voltage from the electronic brake control module (EBCM) and provides an output signal to the EBCM. As the wheel spins, the wheel speed sensor sends the EBCM a DC square wave signal. The EBCM uses the frequency of the square wave signal to calculate the wheel speed.

Conditions for Running the DTC

- The ignition is ON.
- Ignition voltage is greater than 9.5 volts.
- No wheel speed sensor faults exist.
- Brake is not applied.
- Vehicle is not cornering.
- No wheel spinning is detected.

Conditions for Setting the DTC

Wheel speed differences between one wheel and the others is greater than 25 percent.

Action Taken When the DTC Sets

- Antilock Brake System (ABS), Traction Control System (TCS) and Vehicle Stability Enhancement System (VSES) are disabled for the remainder of the ignition cycle.
- The ABS and Stabilitrak indicator turns ON.
- The service Traction Control and Stabilitrak displays on the DIC.

Conditions for Clearing the DTC

- The DTC becomes history when the conditions for setting the DTC are no longer present.
- The history DTC clears after 100 malfunction-free ignition cycles.
- The EBCM receives a clear code command from the scan tool.

Diagnostic Aids

- Faulty wheel speed sensor will not set this DTC.
- A vehicle using a space saver spare will not set this code.

Reference Information

Schematic Reference

Antilock Brake System Schematics

Connector End View Reference

Antilock Brake System Connector End Views

Description and Operation

ABS Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Scan Tool Data List for EBCM

Circuit/System Verification

Inspect for one tire that has improper air pressure or improper size.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

DTC C0252

Diagnostic Instructions

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

DTC Descriptor

DTC C0252 00

VSES Sensor Uncorrelated

Circuit/System Description

The vehicle stability enhancement system (VSES) is activated by the electronic brake control module (EBCM) and monitors the yaw rate/lateral accelerometer sensor and steering wheel angle sensor inputs to ensure they correlate within their desired ranges.

Conditions for Running the DTC

- The steer angle has been centered.
- The VSES is active.
- The centered lateral acceleration value is less than 0.5 g.
- The yaw rate error is less than 6 degrees/second.

Conditions for Setting the DTC

One of the following conditions exists:

- The DTC sets when VSES is engaged for 10 seconds with the yaw rate error always in either understeer or oversteer.
- The yaw rate error is greater then 10 degrees/second for 5 seconds and the yaw has not changed and the lateral acceleration is less than 0.5 g.

Action Taken When the DTC Sets

One or more of the following actions may occur:

- The EBCM disables the ABS/TCS/VSES for the duration of the ignition cycle.
- The ABS and VSES indicators illuminate.
- The driver information center (DIC) displays the Service Traction Control and Stabilitrak message.

Conditions for Clearing the DTC

- The condition for the DTC is no longer present.
- The EBCM automatically clears the history DTC when a current DTC is not detected in 100 consecutive drive cycles.

Diagnostic Aids

The following conditions can cause this concern:

- Improper steering alignment
- An internal lateral accelerometer failure

Reference Information

Schematic Reference

Antilock Brake System Schematics

Connector End View Reference

Antilock Brake System Connector End Views

Description and Operation

ABS Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Scan Tool Data List for EBCM

Circuit/System Verification

Verify that the following DTCs are not set: C0186, C0196, C0253, C0710

- If any of the DTCs are set, refer to **Diagnostic Trouble Code (DTC) List - Vehicle** .

DTC C0253

Diagnostic Instructions

- Perform the **Diagnostic System Check - Vehicle** prior to using this diagnostic procedure.

- Review **Strategy Based Diagnosis** for an overview of the diagnostic approach.
- **Diagnostic Procedure Instructions** provides an overview of each diagnostic category.

DTC Descriptor

DTC C0253 00

Centering Error

Circuit/System Description

The electronic brake control module (EBCM) receives CAN message inputs from the steering wheel position sensor identifying the position and direction of the steering wheel rotation.

Conditions for Running the DTC

- The ignition is ON.
- Ignition voltage is greater than 9.5 Volts.

Conditions for Setting the DTC

- The calculated steering angle from the steering wheel position sensor does not correlate with the steering angle calculated from the yaw rate.
- The vehicle has been driven for 10 minutes without completing steer angle centering.

Action Taken When the DTC Sets

One or more of the following actions may occur:

- The antilock brake system (ABS) and vehicle stability enhancement system (VSES) are disabled.
- TCS is degraded.
- The driver information center (DIC) displays the Service Stability System message.
- The antilock brake system (ABS)/traction control system (TCS) remains functional.

Conditions for Clearing the DTC

- The condition for the DTC is no longer present.
- The EBCM automatically clears the history DTC when a current DTC is not detected in 100 consecutive drive cycles.

Reference Information

Schematic Reference

Antilock Brake System Schematics

Connector End View Reference

Antilock Brake System Connector End Views

Description and Operation

ABS Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Scan Tool Data List

Circuit/System Verification

1. Perform the Steering Angle Sensor Calibration with the scan tool special functions.
2. Operate the vehicle within the conditions for setting verify the DTC does not reset.
    - If the DTC resets, replace the Steering Angle Sensor.

Circuit/System Testing

1. Ignition OFF, disconnect the harness connector at the steering angle sensor.
2. Test for less than 1 ohm of resistance between the ground circuit terminal 6 and ground.
    - If greater than the specified range, test for an open/high resistance in the ground circuit. If the circuit tests normal, replace the EBCM.
3. Ignition ON, verify that a test lamp illuminates between the ignition circuit terminal 5 and ground.
    - If the test lamp does not illuminate, test the ignition circuit for a short to ground or an open/high resistance. If the circuit tests normal, replace the EBCM.
4. Ignition OFF, disconnect the harness connector at the EBCM.
5. Ignition ON, test for 0 volts between the communication circuit terminal 37 and ground.

- If greater than the specified value, test the communication circuit for a short to voltage.

6. Test for 0 volts between the communication circuit terminal 24 and ground.
   - If greater than the specified value, test the communication circuit for a short to voltage.
7. Ignition OFF, test for infinite resistance between the communication circuit terminal 37 and ground.
   - If not the specified value, test the communication circuit for a short to ground.
8. Test for infinite resistance between the communication circuit terminal 24 and ground.
   - If not the specified value, test the communication circuit for a short to ground.
9. Test for less than 1 ohm of resistance between the communication circuit terminals 37 and terminal 3.
   - If greater than the specified range, test the communication circuit for an open/high resistance.
10. Test for less than 1 ohm of resistance between the communication circuit terminals 24 and terminal 1.
    - If greater than the specified range, test the communication circuit for an open/high resistance.
11. Test for infinite resistance between the communication circuit 37 and the communication circuit 24.
    - If not the specified value, test the communication circuits for a short together.
12. If all circuits test normal, replace the steering angle sensor.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

- **Vehicle Yaw Sensor with Vehicle Lateral Accelerometer Replacement**
- **Control Module References** for EBCM replacement, setup and programming

DTC C0299

Diagnostic Instructions

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

DTC Descriptor

DTC C0299

Brake Booster Performance

Diagnostic Fault Information

DTC C0299

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Brake Booster Vacuum Sensor	-	-	-	C0299

Circuit/System Description

The EBCM monitors the vacuum level in the power brake booster and will set a DTC if the vacuum is too low.

Conditions for Running the DTC

- The ignition is ON.
- Ignition voltage is greater than 9 volts.
- The engine is running for the vacuum related fault to set.

Conditions for Setting the DTC

- A condition in which no vacuum is detected in the power brake booster for approximately 10 seconds after start-up.
- A condition in which low vacuum is detected in the power brake booster for approximately 60 seconds or longer after start-up or is detected while driving.

Conditions for Clearing the DTC

- The condition for the DTC is no longer present.
- The EBCM automatically clears the history DTC when a current DTC is not detected in 100 consecutive drive cycles.

Reference Information

Schematic Reference

Antilock Brake System Schematics

Connector End View Reference

Antilock Brake System Connector End Views

Description and Operation

ABS Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Scan Tool Data List

Circuit/System Verification

1. Verify that a vacuum leak is not present, refer to **Brake Assist System Diagnosis** .
2. Verify that the following DTC is not set: C1100.
    - If the DTC is set, refer to **Diagnostic Trouble Code (DTC) List - Vehicle** .

DTC C0550

Diagnostic Instructions

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

DTC Descriptor

DTC C0550 00

Electronic Control Unit (ECU) Performance

Circuit/System Description

The electronic brake control module (EBCM) detects an internal malfunction.

Conditions for Running the DTC

The ignition switch is in the ON position.

Conditions for Setting the DTC

An internal EBCM malfunction exists.

Action Taken When the DTC Sets

One or more of the following actions may occur:

- The antilock brake system (ABS) and vehicle stability enhancement system (VSES) are disabled.
- TCS is degraded.
- The ABS/TCS indicators turn ON.
- The red BRAKE Warning indicator turns ON.

Conditions for Clearing the DTC

- The condition for the DTC is no longer present.
- The EBCM automatically clears the history DTC when a current DTC is not detected in 100 consecutive drive cycles.

Reference Information

Schematic Reference

Antilock Brake System Schematics

Connector End View Reference

Antilock Brake System Connector End Views

Description and Operation

ABS Description and Operation

Electrical Information Reference

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

- **Wiring Repairs**

Scan Tool Reference

Scan Tool Data List

Circuit/System Verification

DTC C0550 will set as result of internal (EBCM) circuit failure.

- Replace the EBCM.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

Control Module References for EBCM replacement, setup and programming

DTC C0561

Diagnostic Instructions

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

DTC Descriptor

DTC C0561 71

System Disabled Information Stored Invalid Serial Data Received

Diagnostic Fault Information

DTC C0561

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
System Disabled Information Stored Invalid Serial Data Received	-	-	-	C0561 71

Circuit/System Description

The electronic brake control module (EBCM) receives messages from other modules over GMLAN which are needed to perform antilock brake system (ABS), vehicle stability enhancement system (VSES) or traction control system (TCS) functions.

Conditions for Running the DTC

- The ignition switch is in the ON position.
- Ignition voltage is greater than 9.5 volts.

Conditions for Setting the DTC

The EBCM receives an invalid message from another module over GMLAN which causes EBCM to deactivate ABS, VSES, TCS, etc.

Action Taken When the DTC Sets

One or more of the following actions may occur:

- The EBCM disables the ABS/TCS/VSES for the duration of the ignition cycle.
- The dynamic rear proportioning (DRP) may be disabled and the Brake Warning indicator may turn ON.
- The Stability Caution indicator turns ON.
- The driver information center (DIC) displays the SERVICE STAB SYS message.
- The DIC displays the TRACTION FAILED message.

Conditions for Clearing the DTC

- The condition for the DTC is no longer present.
- The EBCM automatically clears the history DTC when a current DTC is not detected in 100 consecutive drive cycles.

Reference Information

Schematic Reference

Antilock Brake System Schematics

Connector End View Reference

Antilock Brake System Connector End Views

Description and Operation

ABS Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Scan Tool Data List for EBCM

Circuit/System Verification

1. Perform Diagnostic System Check - Vehicle.
    - Diagnose any other Vehicle DTCs before attempting diagnosis of C0561.
2. With Tech 2, view "Signals" Data Display list under EBCM.
3. Refer to appropriate module for diagnosing any "invalid" signals.
4. If no invalid signals are present, view "Signal Fault" data in "Enhanced DTC Data".
5. Refer to appropriate module for diagnosing that invalid message data.
6. Do not replace the EBCM due to this DTC fault.

Repair Verification

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

DTC C0569

Diagnostic Instructions

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

DTC Descriptor

DTC C0569 00

System Configuration Error

Circuit/System Description

The electronic brake module (EBCM) receives a GMLAN message from each of the network modules. Each module contains its own unique identification (ID) code that must be learned into the EBCM memory. Once all the IDs have been learned and vehicle speed is 25 mph or greater, the EBCM continuously compares IDs in the GMLAN message to its learned IDs to determine if all the network modules are present.

Conditions for Running the DTC

The ignition is ON.

Conditions for Setting the DTC

The EBCM has not undergone the programming procedure.

Action Taken When the DTC Sets

The driver information center (DIC) displays the SERVICE ABS warning message.

Conditions for Clearing the DTC

A current DTC will clear when the EBCM has undergone the setup procedure.

Diagnostic Aids

A newly replaced EBCM will set DTC C0569 on its initial ignition ON cycle.

Reference Information

Scan Tool Reference

Scan Tool Data List

Circuit/System Verification

1. Verify that C0569 is not current.
    - If DTC is current, reprogram the EBCM. Refer to **Control Module References** for programming and setup.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

DTC C0710

Diagnostic Instructions

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

DTC Descriptor

DTC C0710 00

Steering Position Signal

Circuit/System Description

The electronic brake control module (EBCM) receives CAN message inputs from the steering wheel position sensor identifying the position and direction of the steering wheel rotation.

Conditions for Running the DTC

- The ignition is ON.
- Ignition voltage is greater than 9.5 volts.

Conditions for Setting the DTC

- Opens, short to ground or short to voltage
- The calculated steering angle from the steering angle sensor does not correlate with the steering angle calculated from the yaw rate.

Action Taken When the DTC Sets

- The EBCM disables the vehicle stability enhancement system (VSES) for the duration of the ignition cycle.
- The driver information center (DIC) displays the Service Stability System message.
- The antilock brake system (ABS) remains functional.
- The VSES Caution indicator turns ON.

Conditions for Clearing the DTC

- The condition for the DTC is no longer present.
- The EBCM automatically clears the history DTC when a current DTC is not detected in 100 consecutive drive cycles.

Diagnostic Aids

- During diagnosis, park the vehicle on a level surface.
- The car should not pull in either direction while driving straight on a level surface.
- The snapshot function on the scan tool can help find an intermittent DTC.

Reference Information

Schematic Reference

Antilock Brake System Schematics

Connector End View Reference

Antilock Brake System Connector End Views

Description and Operation

ABS Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Scan Tool Data List

Circuit/System Verification

1. With the scan tool perform the Steering Angle Sensor Calibration.
2. Verify the DTC does not reset.

Circuit/System Testing

1. Ignition OFF, disconnect the harness connector at the steering angle sensor.
2. Test for less than 1 ohm of resistance between the ground circuit terminal 6 and ground.
    - If greater than the specified range, test for an open/high resistance in the ground circuit. If the circuit tests normal, replace the EBCM.
3. Ignition ON, verify that a test lamp illuminates between the ignition circuit terminal 5 and ground.
    - If the test lamp does not illuminate, test the ignition circuit for a short to ground or an open/high resistance. If the circuit tests normal, replace the EBCM.
4. Ignition OFF, disconnect the harness connector at the EBCM.
5. Ignition ON, test for 0 volts between the communication circuit terminal 37 and ground.
    - If greater than the specified value, test the communication circuit for a short to voltage.
6. Test for 0 volts between the communication circuit terminal 24 and ground.
    - If greater than the specified value, test the communication circuit for a short to voltage.
7. Ignition OFF, test for infinite resistance between the communication circuit terminal 37 and ground.
    - If not the specified value, test the communication circuit for a short to ground.
8. Test for infinite resistance between the communication circuit terminal 24 and ground.
    - If not the specified value, test the communication circuit for a short to ground.
9. Test for less than 1 ohm of resistance between the communication circuit terminals 37 and terminal 3.
    - If greater than the specified range, test the communication circuit for an open/high resistance.
10. Test for less than 1 ohm of resistance between the communication circuit terminals 24 and terminal 1.
    - If greater than the specified range, test the communication circuit for an open/high resistance.
11. Test for infinite resistance between the communication circuit 37 and the communication circuit 24.
    - If not the specified value, test the communication circuits for a short together.
12. If all circuits test normal, replace the steering angle sensor.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

- **Vehicle Yaw Sensor with Vehicle Lateral Accelerometer Replacement**

- **Control Module References** for EBCM replacement, setup and programing

DTC C0774

Diagnostic Instructions

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

DTC Descriptor

DTC C0774

Low Tire Pressure System Performance

Diagnostic Fault Information

DTC C0774

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Low Tire Pressure System Performance	-	-	-	C0774

Circuit Description

The tire pressure monitor (TPM) system has 4 radio frequency (RF) transmitting pressure sensors inside each wheel/tire assembly. If a sensor detects a low tire pressure, the DIC will display the CHECK TIRE PRESSURE and the Electronic Brake Control Module (EBCM) will receive a serial data message that a DTC C0774 has set. The Vehicle Stability Enhancement System (VSES) will compensate for the low tire pressure with a calibration change to low tire present. Review the TPM for diagnostics for C0774.

Conditions for Running the DTC

Vehicle speed is 32 km/h (20 mph) or greater for 1 minute.

Conditions for Setting the DTC

- The TPM detects a tire pressure difference in 1 tire of 8.2 kPa (1.2 psi) higher or lower than the other 3.
- The EBCM will receive a serial data message that a DTC C0774 has set.

Actions Taken When the DTC Sets

- A DTC C0774 is stored in memory.
- The VSES system compensates for low tire pressure.

Conditions for Clearing the DTC

- A current DTC will clear when the TPM system is reset.
- A history DTC will clear after 100 consecutive malfunction-free ignition cycles from when the TPM system has been reset.

Diagnostic Aids

- A possible cause of this DTC could be a low tire pressure in one of the four tires.
- Review the tire pressure monitoring (TPM) system check for more information. Refer to **Diagnostic System Check - Tire Pressure Monitoring** .

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

DTC C1100

Diagnostic Instructions

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

DTC Descriptor

DTC C1100 00

Brake Booster Vacuum Sensor Performance

Diagnostic Fault Information

DTC C1100

Circuit	Short to Ground	Open/High Resistance	Short to Voltage	Signal Performance
Brake Booster Vacuum 5-Volt Reference Circuit	C1100 00	C1100 00	C1100 00	-

Signal Circuit	C1100 00	C1100 00	C1100 00	-
Low Reference Circuit	-	C1100 00	-	-

Circuit/System Description

The electronic brake control module (EBCM) provides a power 5-volt reference to the brake booster vacuum sensor. The brake booster vacuum sensor converts the change in vacuum levels in the brake booster into a voltage signal. This signal is sent to the EBCM. The voltage signal ranges, from 0.13-3.30 volts depending on vacuum levels. The low reference is the return side of the sensor to ground.

Conditions for Running the DTC

- The ignition is ON.
- Ignition voltage is greater than 9 volts.

Conditions for Setting the DTC

- Voltage at the brake booster sensor signal output to the EBCM falls outside the 0.13-3.30 volts range for more than 200 milliseconds.
- The power 5-volts reference is shorted to ground or battery positive.

Action Taken When the DTC Sets

One or more of the following actions may occur:

The red BRAKE Warning indicator turns ON.

Conditions for Clearing the DTC

- The condition for the DTC is no longer present.
- The EBCM automatically clears the history DTC when a current DTC is not detected in 100 consecutive drive cycles.

Reference Information

Schematic Reference

Antilock Brake System Schematics

Connector End View Reference

Antilock Brake System Connector End Views

Description and Operation

ABS Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Scan Tool Data List

Circuit/System Verification

DTC C1100 will set as result of power brake booster vacuum sensor or circuit failure, test for power and ground circuits to the EBCM.

- Repair the power or ground circuits.

Circuit/System Testing

1. Ignition OFF, disconnect the harness connector at the brake booster vacuum sensor.
2. Test for less than 1.0 ohm of resistance between the low reference circuit terminal and ground.
    - If greater than 1.0 ohm, test the low reference circuit for an open/high resistance. If the circuit tests normal, replace the EBCM.
3. Ignition ON, test for 4.8-5.2 volts between the 5-volt reference circuit terminal and ground.
    - If less than 4.8 volts, test the 5-volt reference circuit for a short to ground or an open/high resistance. If the circuit tests normal, replace the EBCM.
    - If greater than 5.2 volts, test the 5-volt reference circuit for a short to voltage. If the circuit tests normal, replace the EBCM.
4. Test for 4.5-5.3 volts between the 5-volt reference circuit terminal and the signal circuit terminal.
    - If less than the specified range, test the signal circuit for an open/high resistance. If the circuit tests normal, replace the EBCM.
    - If greater specified range, test the signal circuit for a short to voltage. If the circuit tests normal, replace the EBCM.

5. Install a 3A fused jumper wire at the signal circuit terminal. Toggle the jumper wire between the low reference circuit terminal and the 5-volt reference circuit terminal. Verify the scan tool Brake Pressure Sensor Input parameter toggles between 0.2-3.2 volts.
    - If the specified parameter, does not toggle between the minimum and maximum values test the signal circuit for a short to voltage, short to ground or an open/high resistance. If the circuit tests normal, replace the EBCM.
6. If all circuits test normal, test or replace the brake booster vacuum sensor.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

Control Module References for EBCM replacement, setup and programming

SYMPTOMS - ANTILOCK BRAKE SYSTEM

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

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

Visual/Physical Inspection

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

Intermittent

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

Symptom List

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

- **ABS Indicator Always On**
- **ABS Indicator Inoperative**
- **Stability System Caution Indicator Always On**
- **Stability System Caution Indicator Inoperative**

ABS INDICATOR ALWAYS ON

Diagnostic Instructions

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

Circuit/System Description

The instrument panel cluster (IPC) illuminates the Antilock Brake System (ABS) indicator by supplying ground to the lamp. The electronic brake control module (EBCM) sends a serial data messages to the IPC, in order to command the indicator ON or OFF.

Reference Information

Schematic Reference

Antilock Brake System Schematics

Connector End View Reference

- **Antilock Brake System Connector End Views**
- **Displays and Gages Connector End Views**

Electrical Information Reference

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

Scan Tool Reference

Scan Tool Data List

Circuit Verification

Ignition ON, observe the ABS indicator to turn ON then OFF during the IPC bulb test.

Circuit/System Testing

IMPORTANT: Diagnose all vehicle DTCs before using this diagnostic.

1. Ignition On, perform the display test with a scan tool, verify the ABS indicator turns On then OFF.
    - If the ABS warning lamp does not turn OFF, replace the IPC.
2. Replace the EBCM.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

Control Module References for EBCM or IPC replacement, setup and programming

ABS INDICATOR INOPERATIVE

Diagnostic Instructions

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

Circuit/System Description

The instrument panel cluster (IPC) illuminates the Antilock Brake System (ABS) indicator by supplying ground to the lamp. The electronic brake control module (EBCM) sends a serial data messages to the IPC, in order to command the indicator ON or OFF.

Reference Information

Schematic Reference

Antilock Brake System Schematics

Connector End View Reference

- **Antilock Brake System Connector End Views**
- **Displays and Gages Connector End Views**

Electrical Information Reference

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

Scan Tool Reference

Scan Tool Data List

Circuit Verification

Ignition ON, observe the ABS indicator to turn ON then OFF during the IPC bulb test.

Circuit/System Testing

IMPORTANT: Diagnose all vehicle DTCs before using this diagnostic.

1. Ignition On, perform the display test with a scan tool, verify the ABS indicator turns On then OFF.
   - If the ABS warning lamp does not turn ON, replace the IPC.
2. Replace the EBCM.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

Control Module References for EBCM or IPC replacement, setup and programming

STABILITY SYSTEM CAUTION INDICATOR ALWAYS ON

Diagnostic Instructions

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

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

Circuit Description

The instrument panel cluster (IPC) illuminates the stability system caution indicator during the IPC bulb check or when the electronic brake control module (EBCM) sends a serial data message to the IPC commanding the indicator ON.

Reference Information

Schematic Reference

Antilock Brake System Schematics

Connector End View Reference

- **Antilock Brake System Connector End Views**
- **Displays and Gages Connector End Views**

Description and Operation

ABS Description and Operation

Electrical Information Reference

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

Scan Tool Reference

Scan Tool Data List

Circuit/System Verification

Ignition ON, observe the stability system caution indicator to turn ON, then OFF during the IPC bulb test.

Circuit/System Testing

IMPORTANT: Diagnose all vehicle DTCs before using this diagnostic.

1. Ignition On, perform the display test with a scan tool, the stability system caution indicator should turn ON then OFF.
    - If the stability system caution indicator does not turn OFF, replace the IPC.
2. Replace the EBCM.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

Control Module References for EBCM or IPC replacement, setup and programming

STABILITY SYSTEM CAUTION INDICATOR INOPERATIVE

Diagnostic Instructions

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

Circuit Description

The instrument panel cluster (IPC) illuminates the stability system caution indicator during the IPC bulb check or when the electronic brake control module (EBCM) sends a serial data message to the IPC commanding the indicator ON.

Reference Information

Schematic Reference

Antilock Brake System Schematics

Connector End View Reference

- **Antilock Brake System Connector End Views**
- **Displays and Gages Connector End Views**

Electrical Information Reference

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

- **Wiring Repairs**

Scan Tool Reference

Scan Tool Data List

Circuit/System Verification

Ignition ON, observe the stability system caution indicator to turn ON, then OFF during the IPC bulb test.

Circuit/System Testing

IMPORTANT: Diagnose all vehicle DTCs before using this diagnostic.

1. Ignition On, perform the display test with a scan tool, the stability system caution indicator should turn ON then OFF.
    - If the stability system caution indicator does not turn OFF, replace the IPC.
2. Replace the EBCM.

Repair Procedures

Perform the **Diagnostic Repair Verification** after completing the diagnostic procedure.

Control Module References for EBCM or IPC replacement, setup and programming

REPAIR INSTRUCTIONS

ANTILOCK BRAKE SYSTEM AUTOMATED BLEED PROCEDURE

NOTE: When adding fluid to the brake master cylinder reservoir, use only Delco Supreme 11®, GM P/N 12377967 (Canadian P/N 992667) or equivalent DOT-3 brake fluid from a clean, sealed brake fluid container. The use of any type of fluid other than the recommended type of brake fluid, may cause contamination which could result in damage to the internal rubber seals and/or rubber linings of hydraulic brake system components.

NOTE: Refer to BRAKE FLUID EFFECTS ON PAINT AND ELECTRICAL COMPONENTS NOTICE .

IMPORTANT: The base hydraulic brake system must be bled before performing this automated bleeding procedure. If you have not yet performed the base hydraulic brake system bleeding procedure, refer to Hydraulic Brake System Bleeding (Manual) or Hydraulic Brake System Bleeding (Pressure) before proceeding.

1. Install a scan tool to the vehicle.
2. Start the engine and allow the engine to idle.
3. Using the scan tool, begin the automated bleed procedure.
4. Follow the instructions on the scan tool to complete the automated bleed procedure. Apply the brake pedal when instructed by the scan tool.
5. Turn the ignition OFF.
6. Remove the scan tool from the vehicle.
7. Fill the brake master cylinder reservoir to the maximum-fill level with Delco Supreme 11®, GM P/N 12377967 (Canadian P/N 992667) or equivalent DOT-3 brake fluid from a clean, sealed brake fluid container.
8. Bleed the hydraulic brake system. Refer to **Hydraulic Brake System Bleeding (Manual)** or **Hydraulic Brake System Bleeding (Pressure)** .
9. With the ignition OFF, apply the brakes 3-5 times or until the brake pedal becomes firm, in order to deplete the brake booster power reserve.
10. Slowly depress and release the brake pedal. Observe the feel of the brake pedal.
11. If the brake pedal feels spongy, repeat the automated bleeding procedure. If the brake pedal still feels spongy after repeating the automated bleeding procedure inspect the brake system for external leaks. Refer to **Brake System External Leak Inspection** .
12. Turn the ignition key ON, with the engine OFF. Check to see if the brake system warning lamp remains illuminated.
13. If the brake system warning lamp remains illuminated, DO NOT allow the vehicle to be driven until it is diagnosed and repaired. Refer to **Symptoms - Hydraulic Brakes** .
14. Drive the vehicle to exceed 13 km/h (8 mph) to allow ABS initialization to occur. Observe brake pedal feel.
15. If the brake pedal feels spongy, repeat the automated bleeding procedure until a firm brake pedal is obtained.

ELECTRONIC BRAKE CONTROL MODULE REPLACEMENT

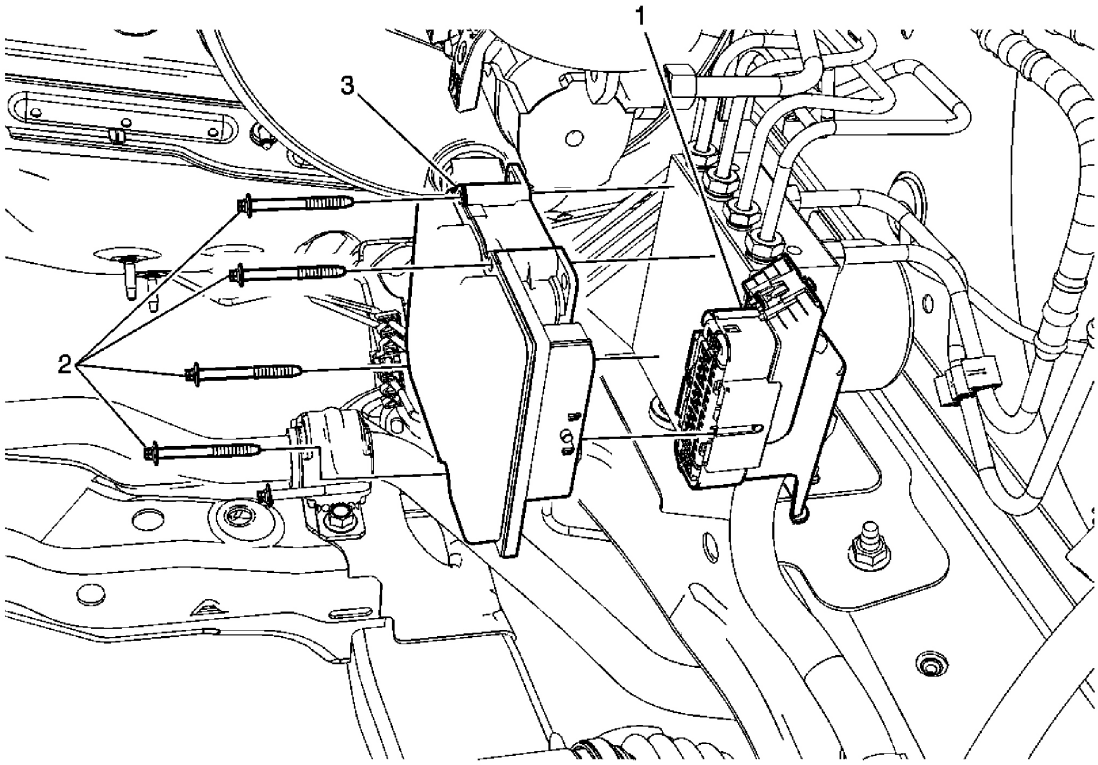

Fig. 19: Identifying Electronic Brake Control Module
Courtesy of GENERAL MOTORS CORP.

Electronic Brake Control Module Replacement

Callout	Component Name
NOTE: **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.** **Preliminary Procedures** 1. Turn the ignition switch to the OFF position. 2. Remove the air cleaner assembly. Refer to **Air Cleaner Assembly Replacement** . 3. Clean the electronic brake control module (EBCM) to brake pressure modulator valve (BPMV) area of any accumulated dirt and foreign material.	
1	Electronic Brake Control Module (EBCM) Electrical Connector **Procedure:** Lift the EBCM electrical connector locking lever upward.

2	EBCM Bolt (Qty: 4) **NOTE:** **Refer to Fastener Notice .** **Tighten:** 3 N.m (27 lb in)
3	EBCM **Procedure** 1. Separate the EBCM from the brake pressure modulator valve (BPMV) by carefully pulling apart. Do not pry apart. 2. Clean the sealing surface of the BPMV with denatured alcohol and a clean shop cloth. 3. If installing a new EBCM, program the EBCM. Refer to **Control Module References** .

BRAKE PRESSURE MODULATOR VALVE REPLACEMENT

Removal Procedure

CAUTION: Refer to Brake Fluid Irritant Caution .

NOTE: Refer to Brake Fluid Effects on Paint and Electrical Components Notice .

NOTE: 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. Turn the ignition switch to the OFF position.
2. Remove the air cleaner assembly. Refer to **Air Cleaner Assembly Replacement** .

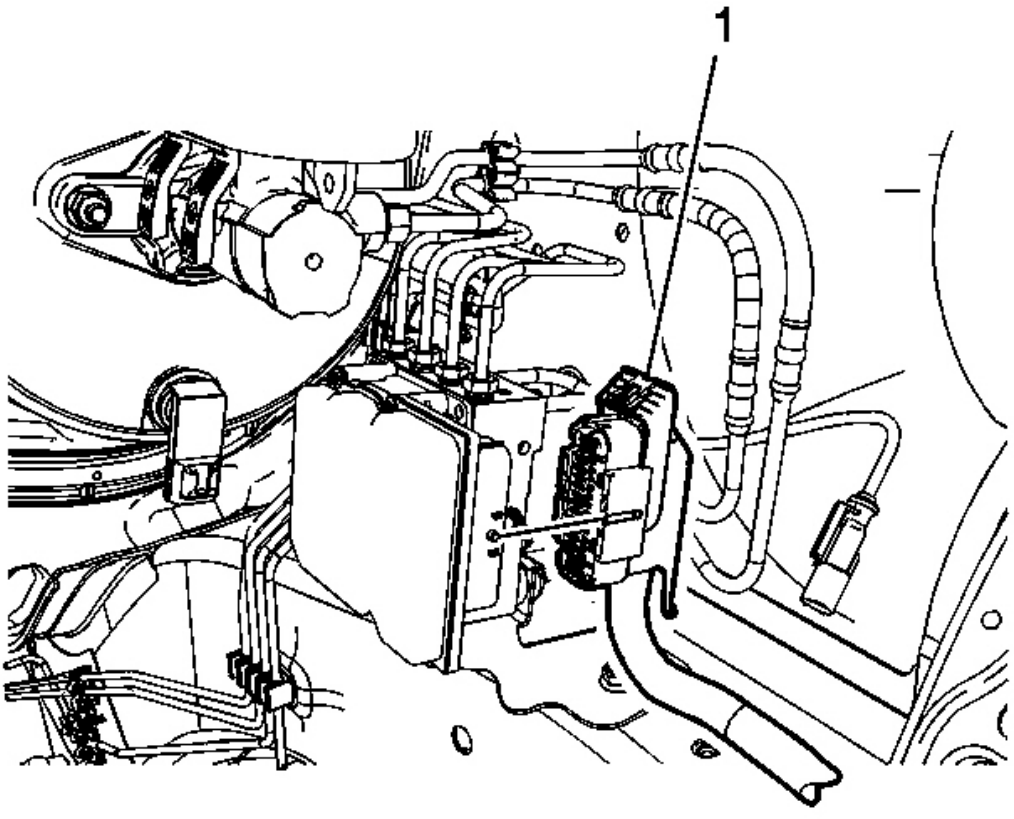

Fig. 20: Locating Electronic Brake Control Module Electrical Connector
Courtesy of GENERAL MOTORS CORP.

3. Disconnect the electronic brake control module (EBCM) electrical connector (1) by lifting the locking tabs.

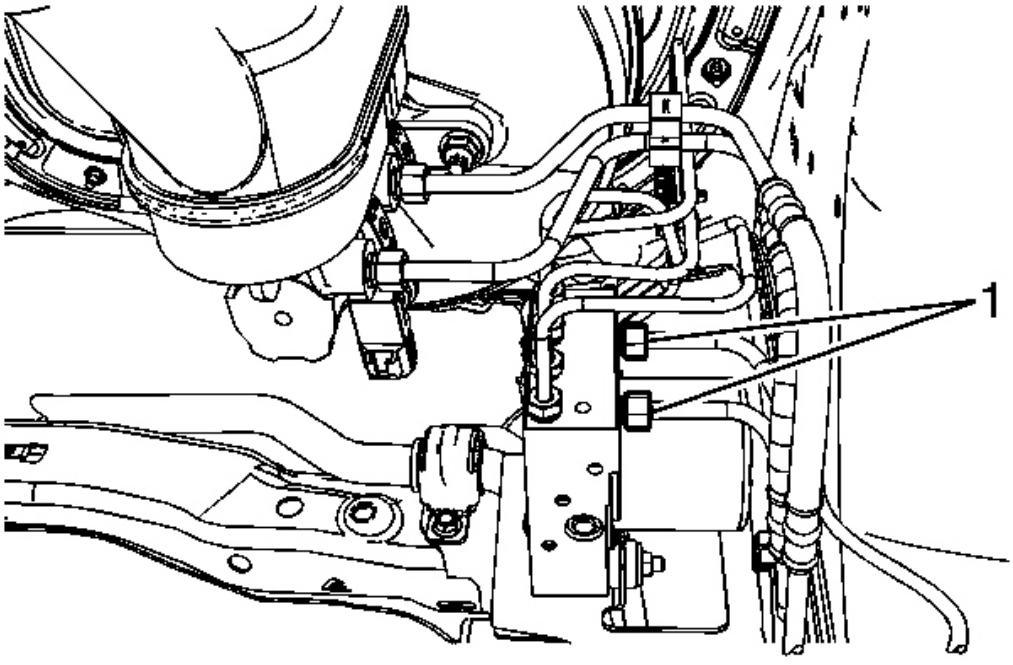

Fig. 21: View Of Master Cylinder Inlet Brake Pipe Fittings
Courtesy of GENERAL MOTORS CORP.

4. Disconnect the master cylinder inlet brake pipe fittings (1).

   Cap the brake pipe fittings and plug the brake pressure modulator valve (BPMV) inlet ports to prevent brake fluid loss and contamination.

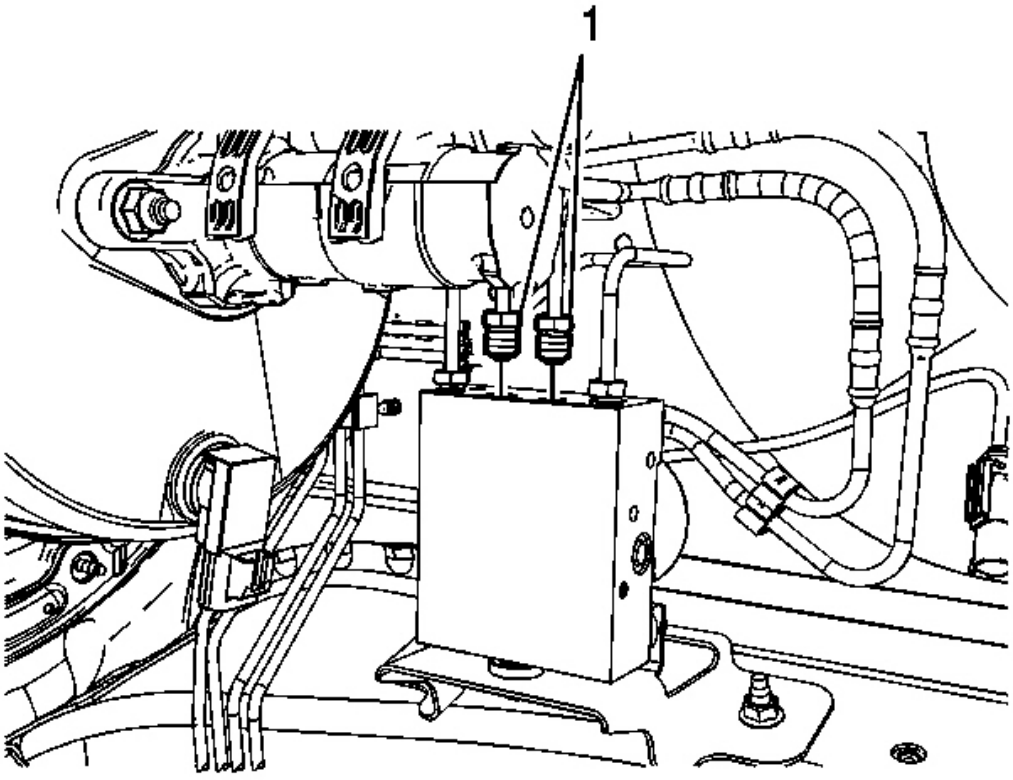

Fig. 22: Identifying BPMV Outlet Port Front Brake Pipe Fittings
Courtesy of GENERAL MOTORS CORP.

5. Disconnect the BPMV outlet port front brake pipe fittings (1).

   Cap the brake pipe fittings and plug the BPMV outlet ports to prevent brake fluid loss and contamination.

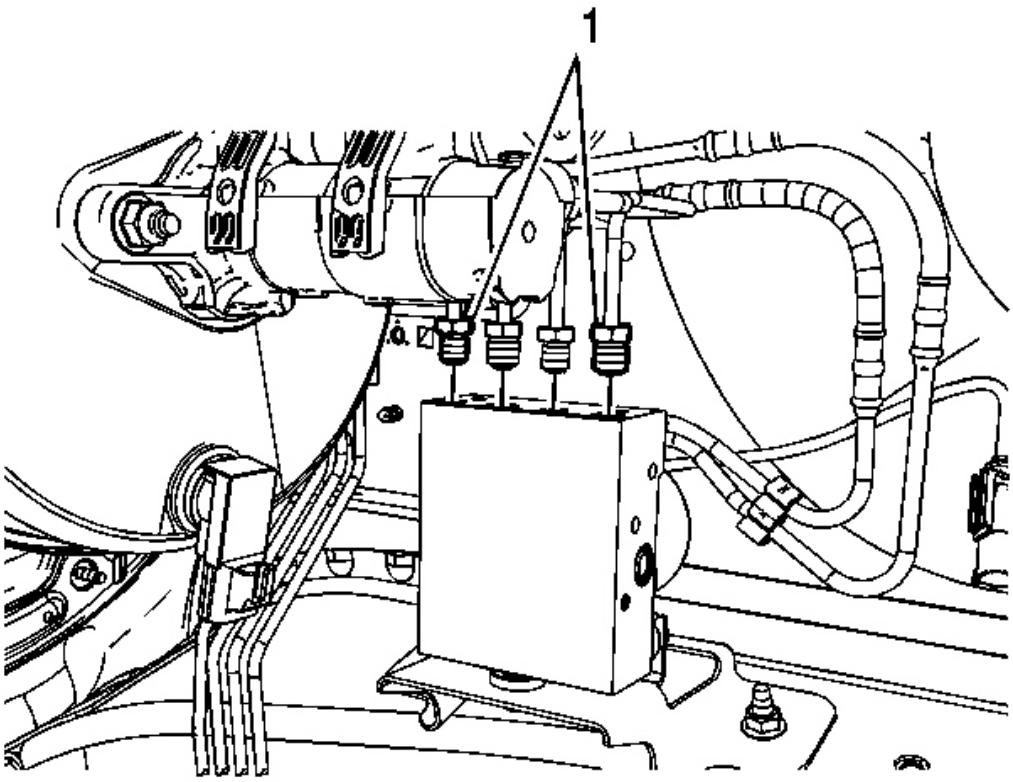

Fig. 23: View Of BPMV Outlet Port Rear Brake Pipe Fittings
Courtesy of GENERAL MOTORS CORP.

6. Disconnect the BPMV outlet port rear brake pipe fittings (1).

   Cap the brake pipe fittings and plug the BPMV outlet ports to prevent brake fluid loss and contamination.

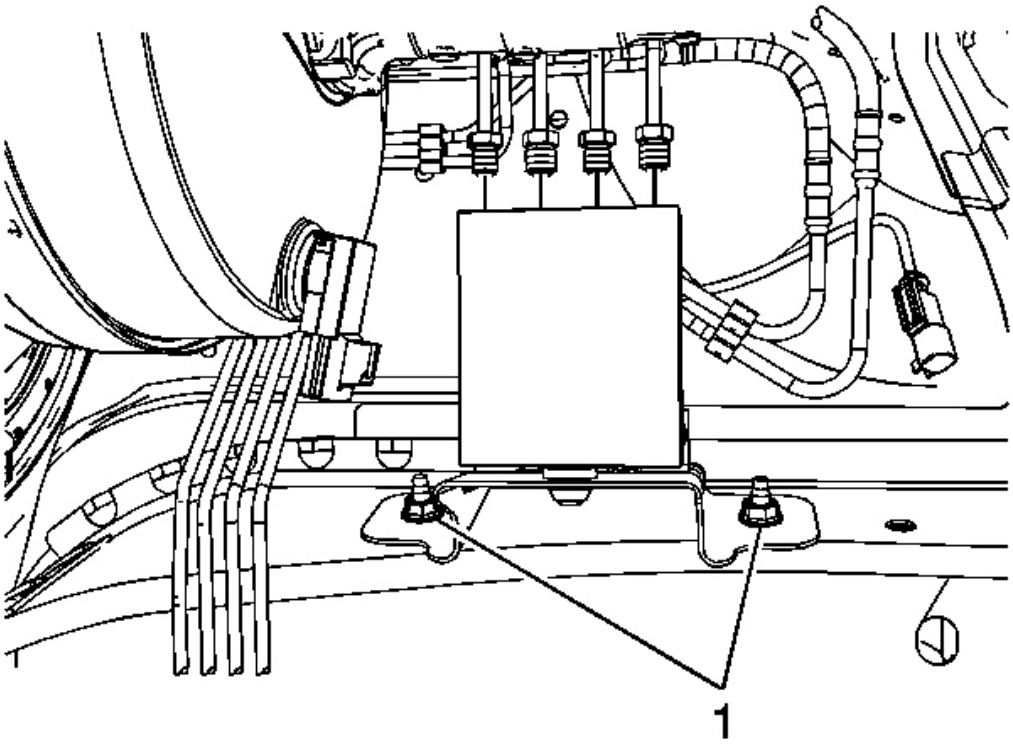

Fig. 24: Identifying BPMV Bracket Nuts
Courtesy of GENERAL MOTORS CORP.

7. Remove the 2 BPMV bracket nuts (1).
8. Remove the BPMV from the vehicle.

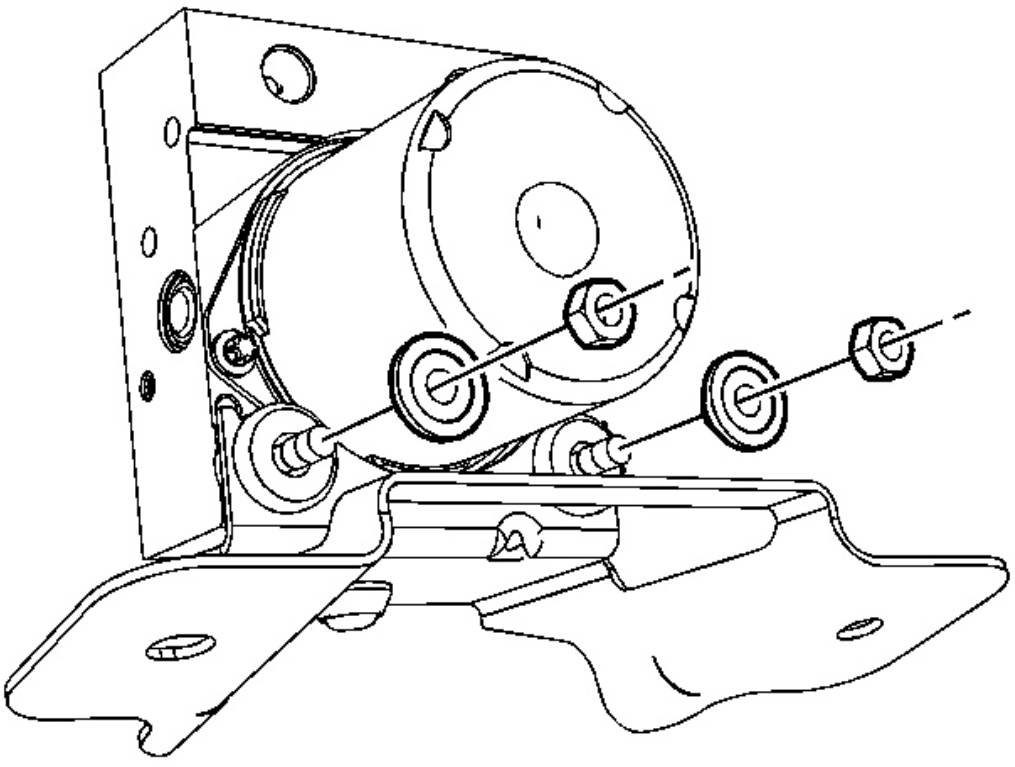

Fig. 25: View Of BPMV Insulator Nuts & Washers
Courtesy of GENERAL MOTORS CORP.

9. Remove the 2 BPMV insulator nuts and washers.

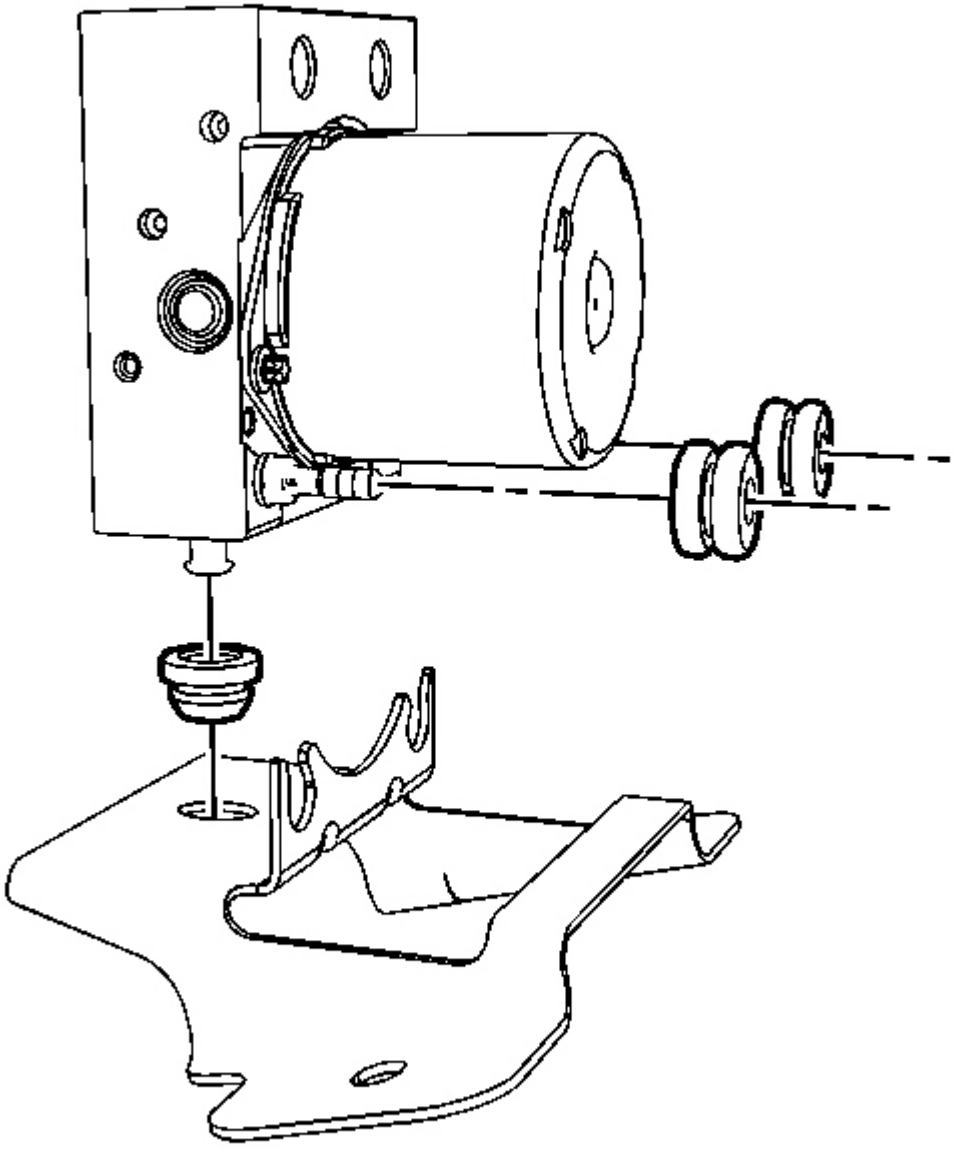

Fig. 26: Identifying BPMV Insulators
Courtesy of GENERAL MOTORS CORP.

10. Carefully remove the BPMV from the bracket by pulling upward.
11. Remove the 2 BPMV insulators.

Inspect the insulators for damage and replace, if necessary.

12. Remove the lower BPMV insulator.

    Inspect the insulator for damage and replace, if necessary.

Installation Procedure

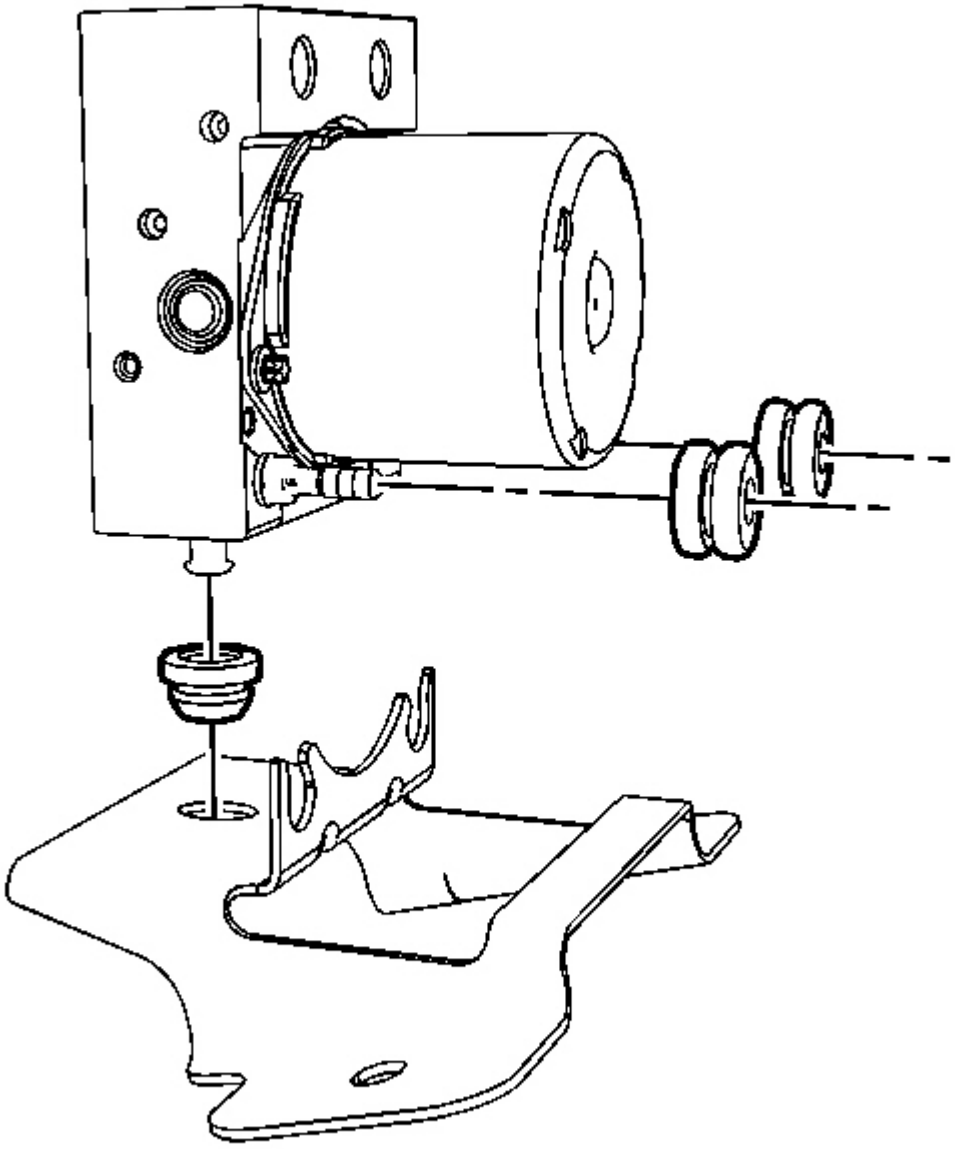

Fig. 27: Identifying BPMV Insulators
Courtesy of GENERAL MOTORS CORP.

1. Install the 2 BPMV insulators to the BPMV.

   Denatured alcohol may be used as an assembly aid to install the insulators.

2. Install the lower BPMV insulator to the bracket.

   Denatured alcohol may be used as an assembly aid to install the insulator.

3. Carefully install the BPMV to the bracket.

   Denatured alcohol may be used as an assembly aid on the insulators to install the BPMV.

   NOTE: Refer to Fastener Notice .

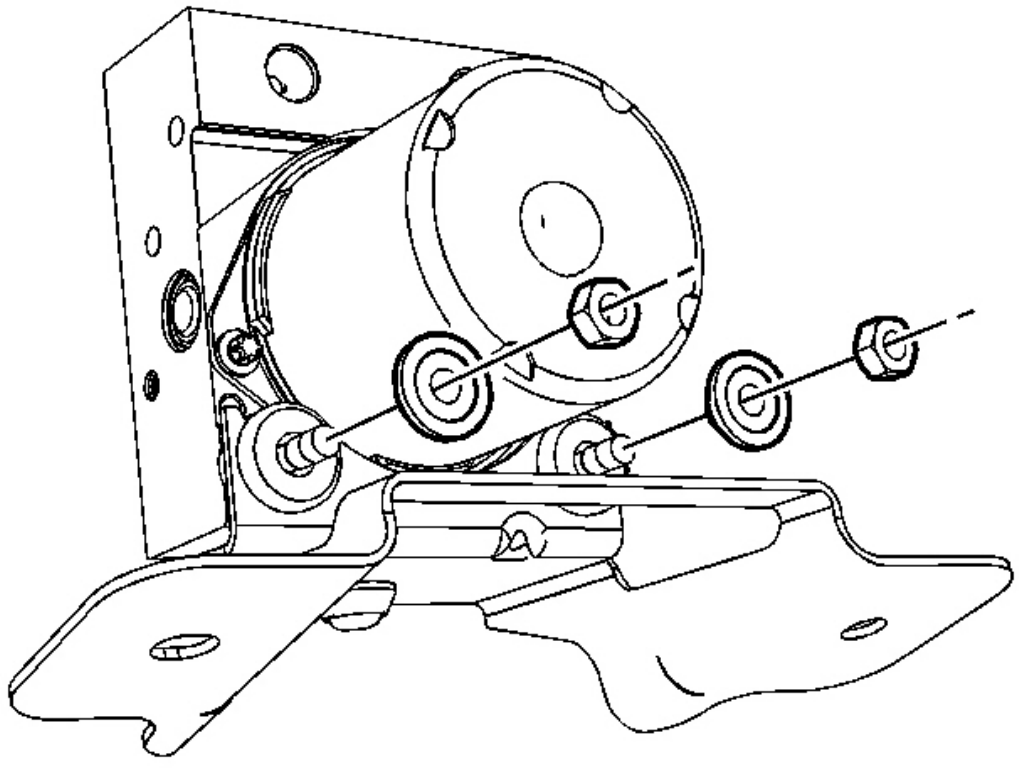

Fig. 28: View Of BPMV Insulator Nuts & Washers
Courtesy of GENERAL MOTORS CORP.

4. Install the 2 BPMV insulator washers and the 2 nuts.

   Tighten: Tighten the nuts to 8 N.m (71 lb in).

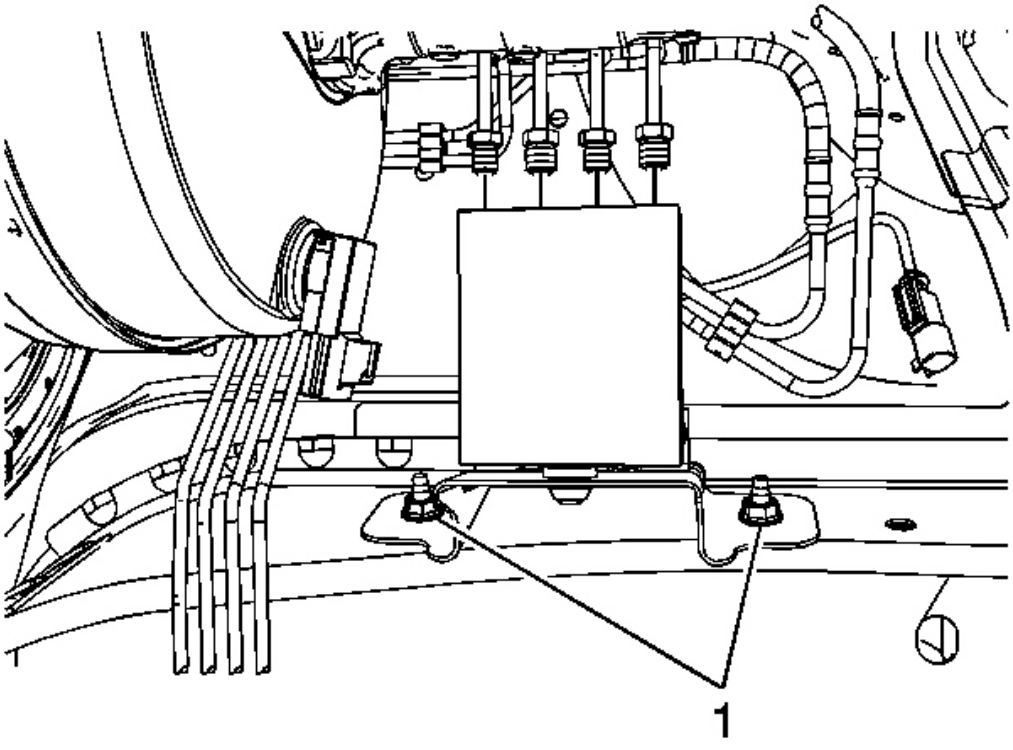

Fig. 29: Identifying BPMV Bracket Nuts
Courtesy of GENERAL MOTORS CORP.

5. Install the BPMV and bracket assembly to the frame rail.
6. Install the 2 BPMV bracket nuts (1).

Tighten: Tighten the nuts to 20 N.m (15 lb ft).

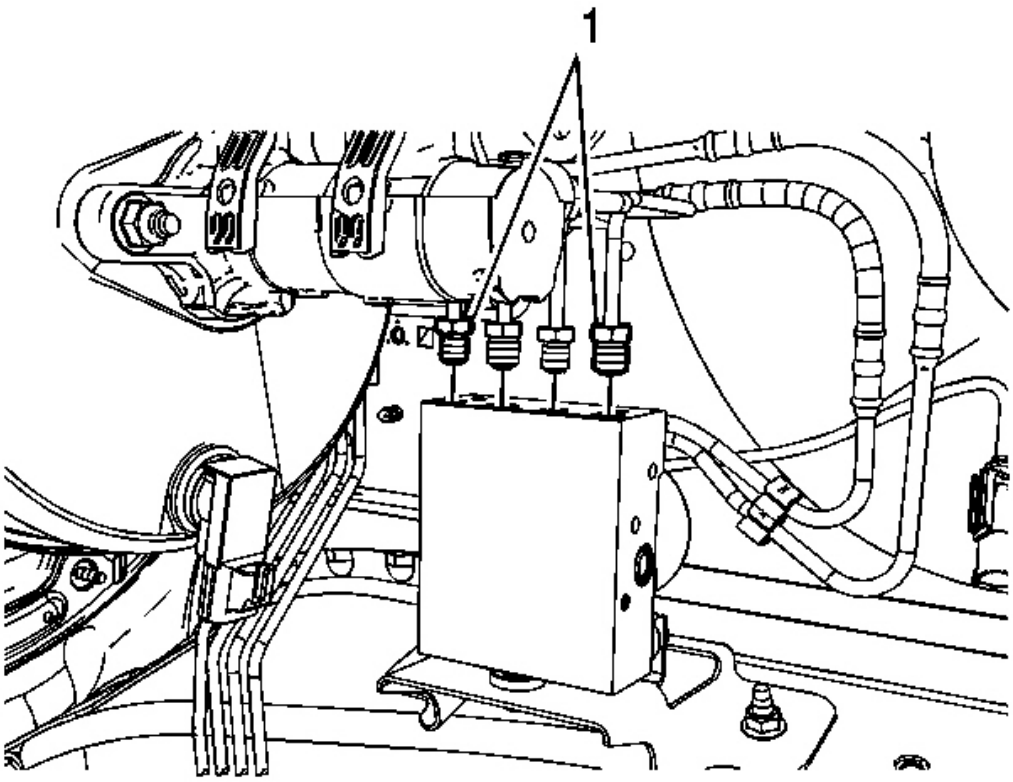

Fig. 30: View Of BPMV Outlet Port Rear Brake Pipe Fittings
Courtesy of GENERAL MOTORS CORP.

7. Connect the BPMV outlet port rear brake pipe fittings (1).

   Tighten: Tighten the fittings to 17 N.m (13 lb ft).

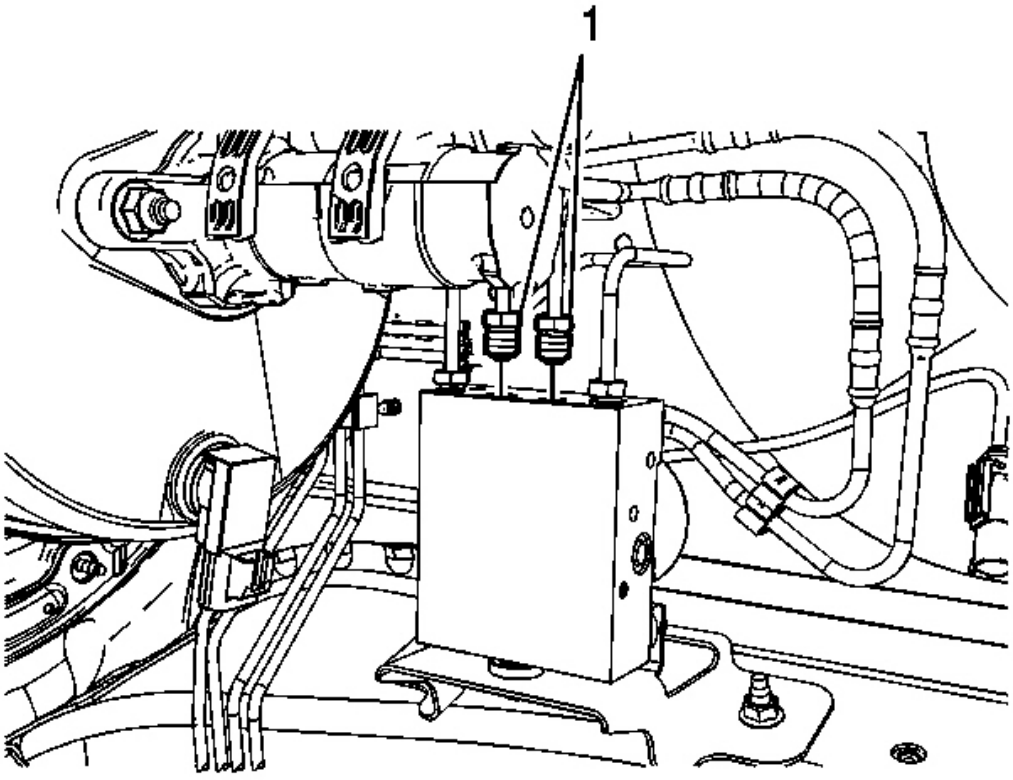

Fig. 31: Identifying BPMV Outlet Port Front Brake Pipe Fittings
Courtesy of GENERAL MOTORS CORP.

8. Connect the BPMV outlet port front brake pipe fittings (1).

   Tighten: Tighten the fittings to 17 N.m (13 lb ft).

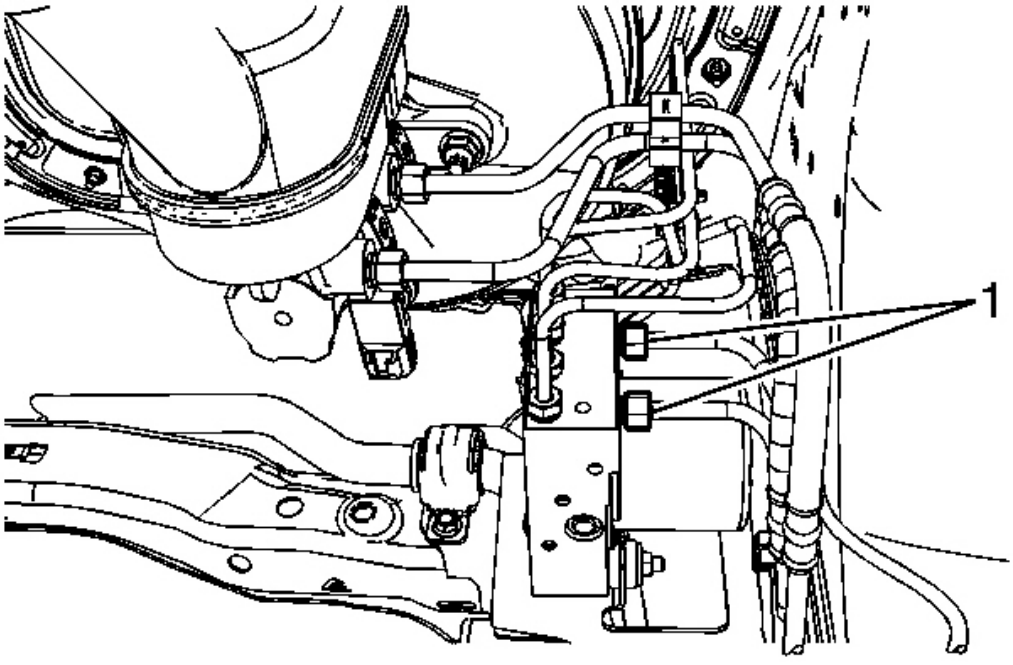

Fig. 32: View Of Master Cylinder Inlet Brake Pipe Fittings
Courtesy of GENERAL MOTORS CORP.

9. Connect the master cylinder inlet brake pipe fittings (1).

   Tighten: Tighten the fittings to 20 N.m (15 lb ft).

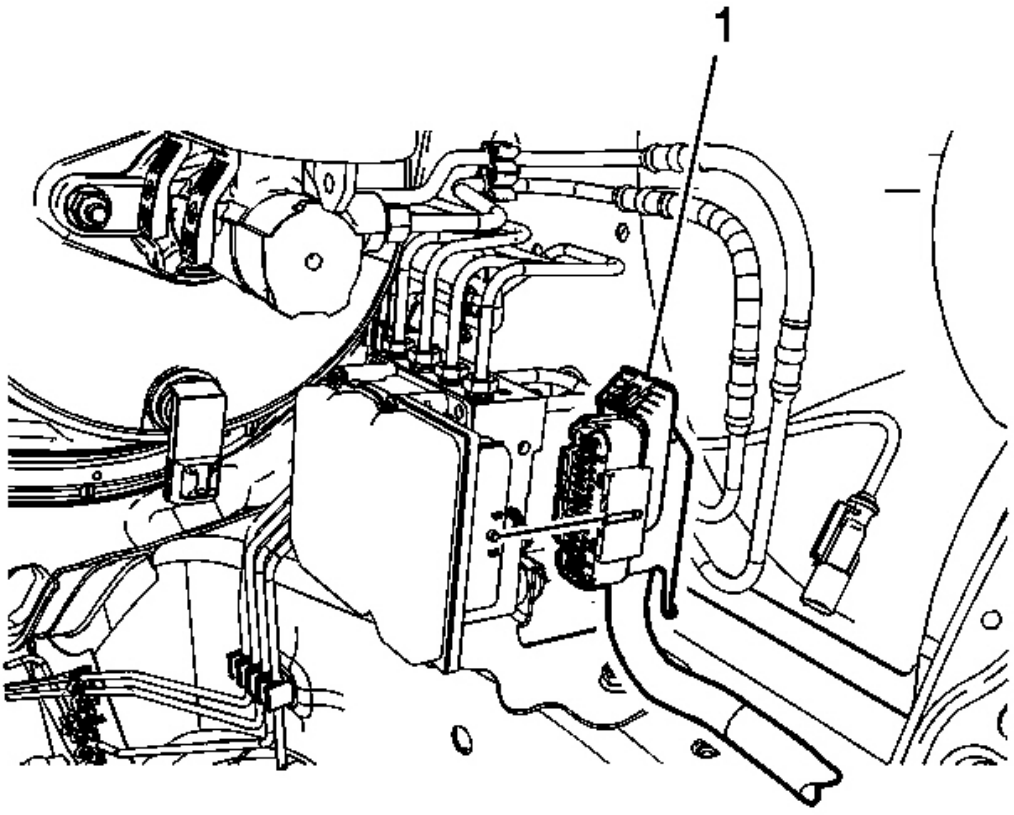

Fig. 33: Locating Electronic Brake Control Module Electrical Connector
Courtesy of GENERAL MOTORS CORP.

10. Connect the EBCM electrical connector (1).
11. A new BPMV comes with both the primary and secondary circuits pre-filled with brake fluid. As long as the ignition key has not been cycled, only a base brake bleed is necessary.

    Bleed the hydraulic brake system. Refer to **Hydraulic Brake System Bleeding (Manual)** or **Hydraulic Brake System Bleeding (Pressure)** .

12. Perform the **Diagnostic System Check - Vehicle** .
13. Observe the brake pedal feel after performing the diagnostic system check. If the pedal now feels spongy, air may have been in or may have been introduced into the primary circuit.

    If the pedal feels spongy, perform the **Antilock Brake System Automated Bleed**

Procedure.

14. Install the air cleaner assembly. Refer to **Air Cleaner Assembly Replacement** .

BRAKE PRESSURE MODULATOR VALVE BRACKET REPLACEMENT

Removal Procedure

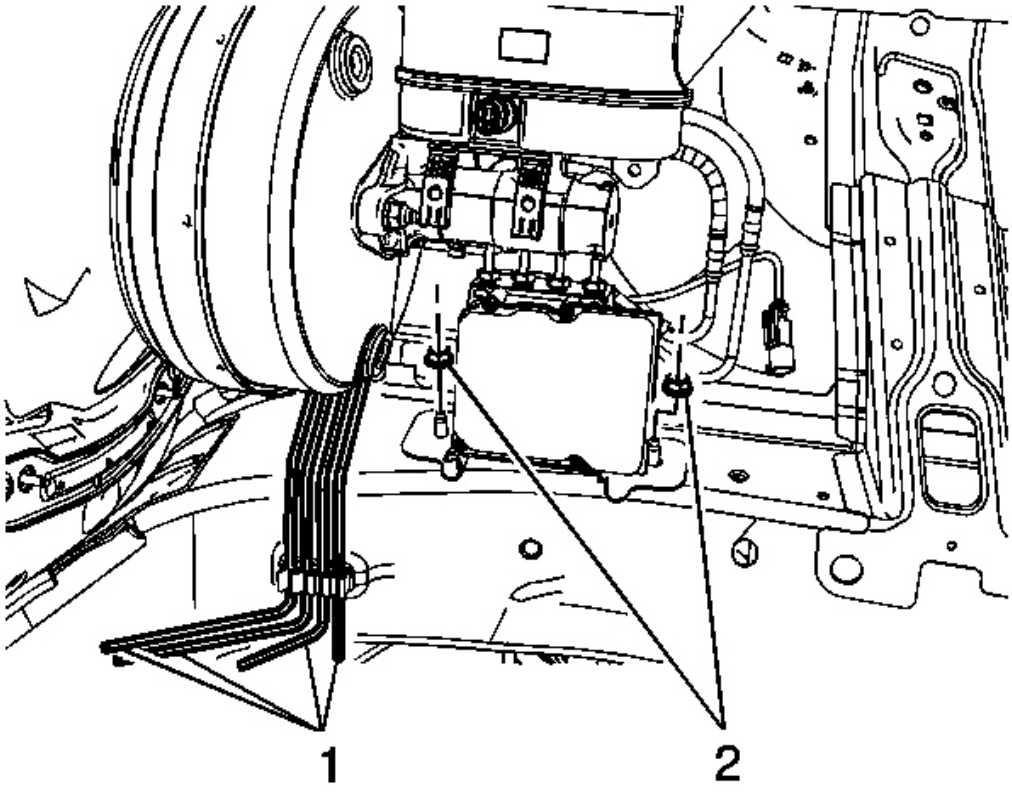

Fig. 34: View Of Front & Rear Brake Pipes
Courtesy of GENERAL MOTORS CORP.

1. Remove the air cleaner assembly. Refer to **Air Cleaner Assembly Replacement** .
2. Release the front and rear brake pipes (1) from the routing clip on the frame rail.
3. Remove the 2 brake pressure modulator valve (BPMV) bracket nuts (2).

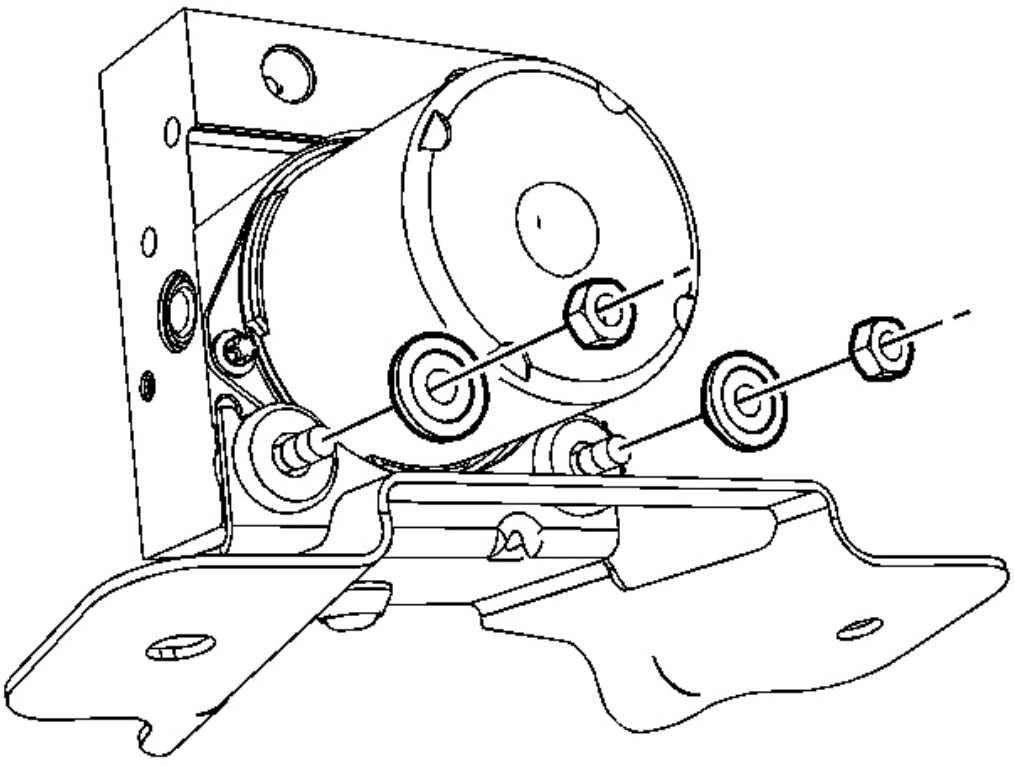

Fig. 35: View Of BPMV Insulator Nuts & Washers
Courtesy of GENERAL MOTORS CORP.

4. Remove the 2 BPMV nuts and washers.

IMPORTANT: Carefully separate the BPMV from the bracket. Do not pry on the accumulator covers on the underside of the BPMV.

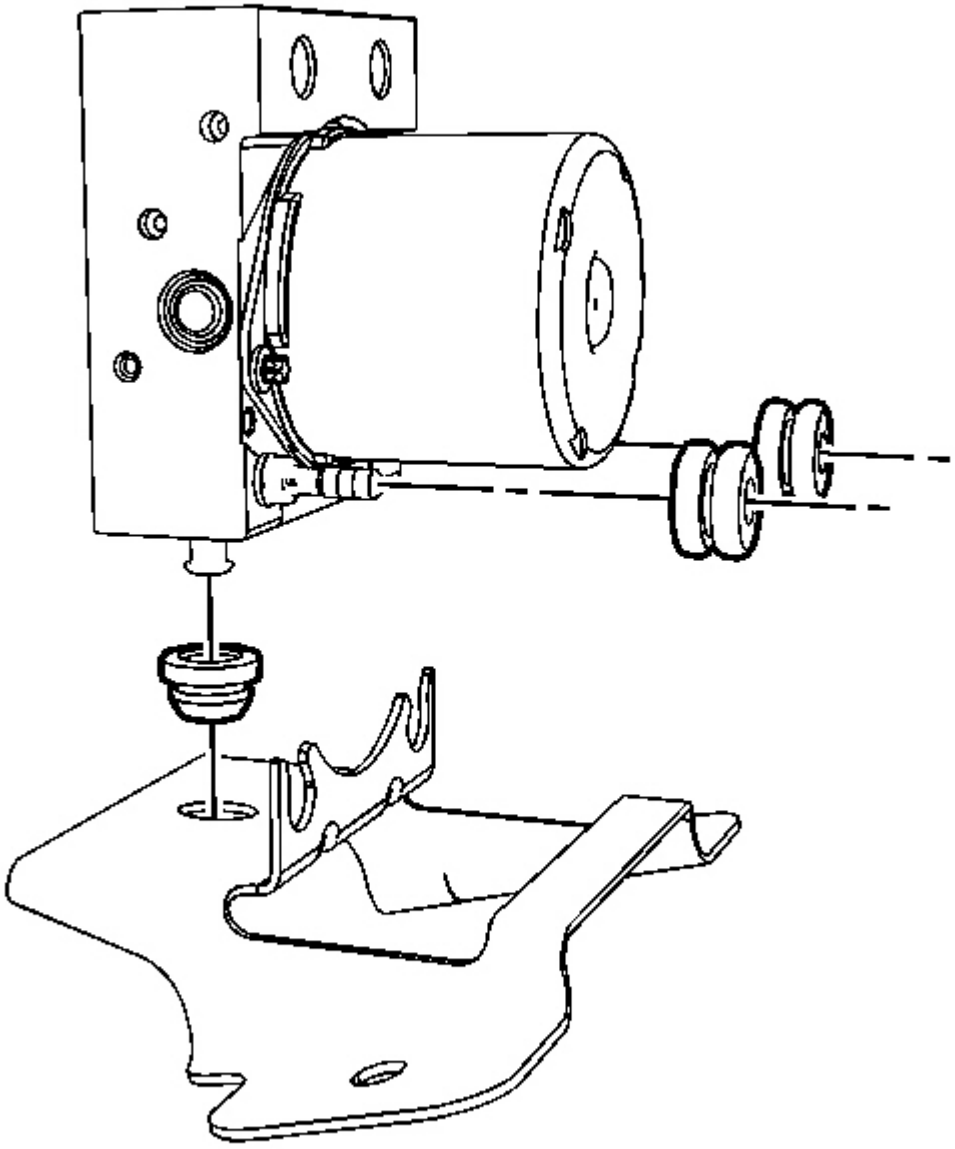

Fig. 36: Identifying BPMV Insulators
Courtesy of GENERAL MOTORS CORP.

5. Carefully lift the BPMV assembly upward to release the BPMV from the bracket.
6. Remove the BPMV bracket.

7. Remove the 2 upper BPMV bracket insulators.

   Inspect the bracket insulators for damage and replace, if necessary.

8. Remove the lower BPMV bracket insulator.

   Inspect the bracket insulator for damage and replace, if necessary.

Installation Procedure

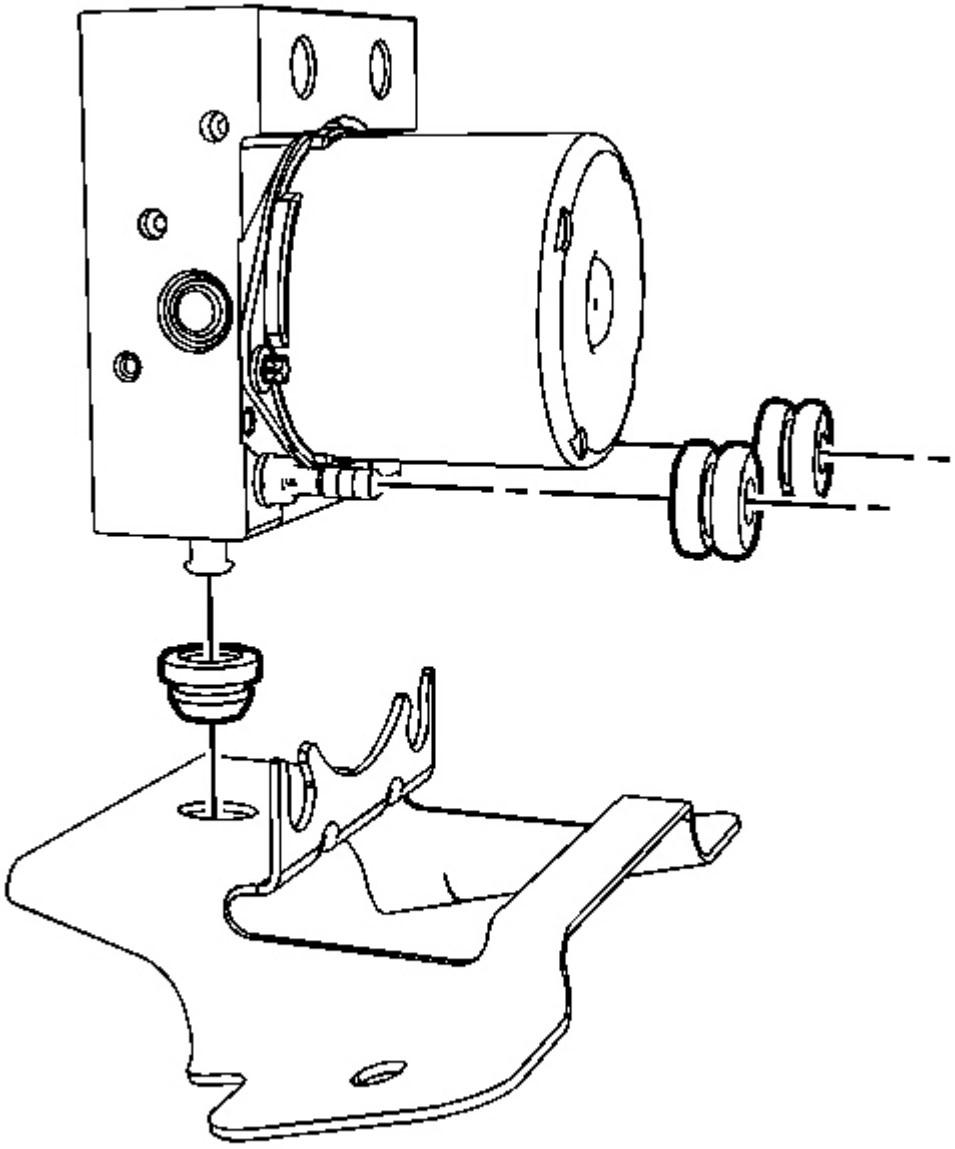

Fig. 37: Identifying BPMV Insulators
Courtesy of GENERAL MOTORS CORP.

1. Install the lower BPMV bracket insulator.

   Use denatured alcohol on the BPMV bracket insulator as an installation aid, if necessary.

2. Install the 2 upper BPMV bracket insulators.

   Use denatured alcohol on the BPMV bracket insulators as an installation aid, if necessary.

3. Install the BPMV bracket to the BPMV.

   NOTE: Refer to Fastener Notice .

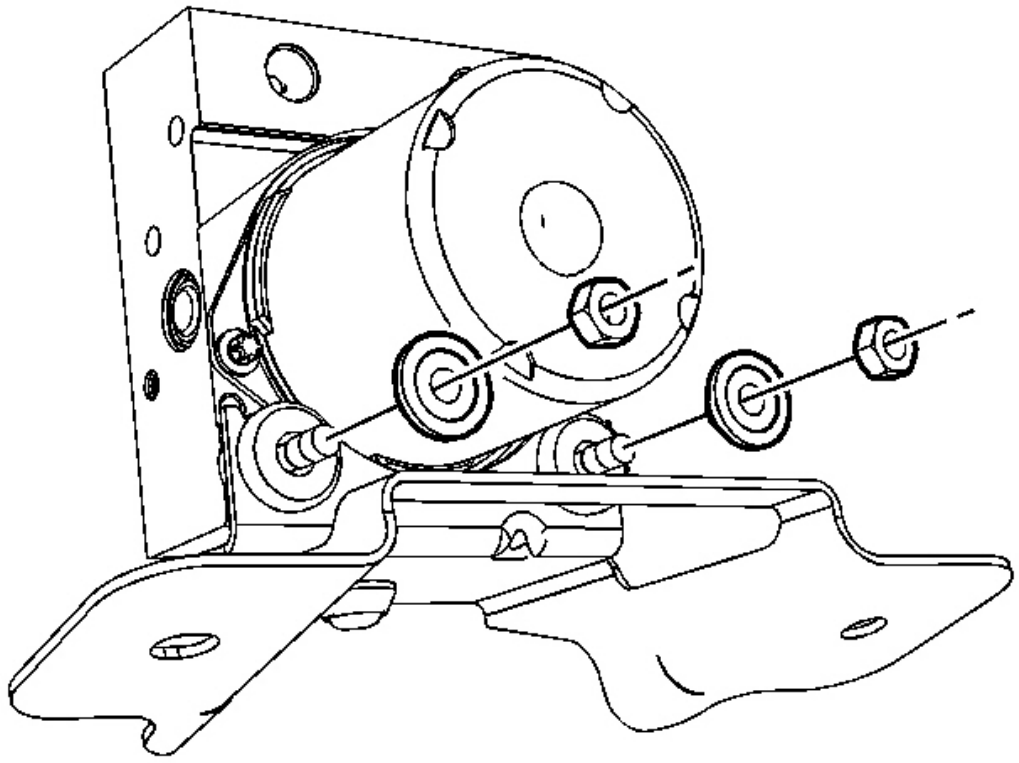

Fig. 38: View Of BPMV Insulator Nuts & Washers
Courtesy of GENERAL MOTORS CORP.

4. Install the 2 BPMV washers and nuts.

   Tighten: Tighten the nuts to 8 N.m (71 lb in).

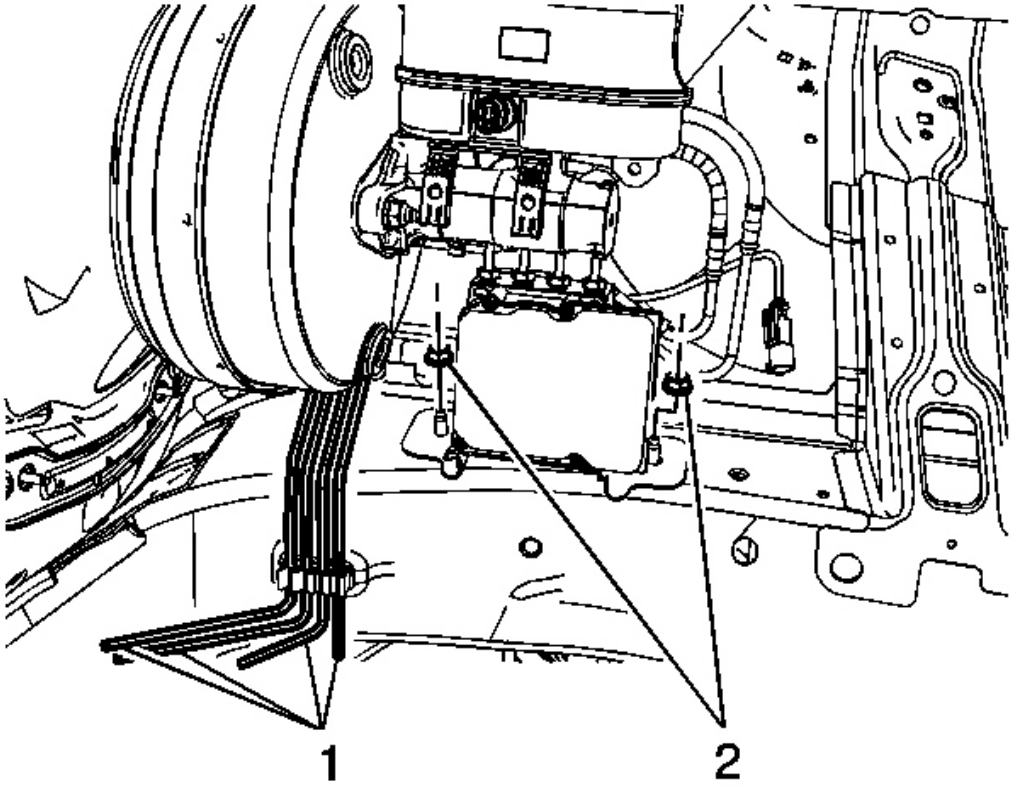

Fig. 39: View Of Front & Rear Brake Pipes
Courtesy of GENERAL MOTORS CORP.

5. Install the 2 BPMV bracket nuts (2).

   Tighten: Tighten the nuts to 20 N.m (15 lb ft).

6. Install the front and rear brake pipes (1) to the routing clip on the frame rail.
7. Install the air cleaner assembly. Refer to **Air Cleaner Assembly Replacement** .

FRONT WHEEL SPEED SENSOR REPLACEMENT

Removal Procedure

CAUTION: Refer to Brake Dust Caution .

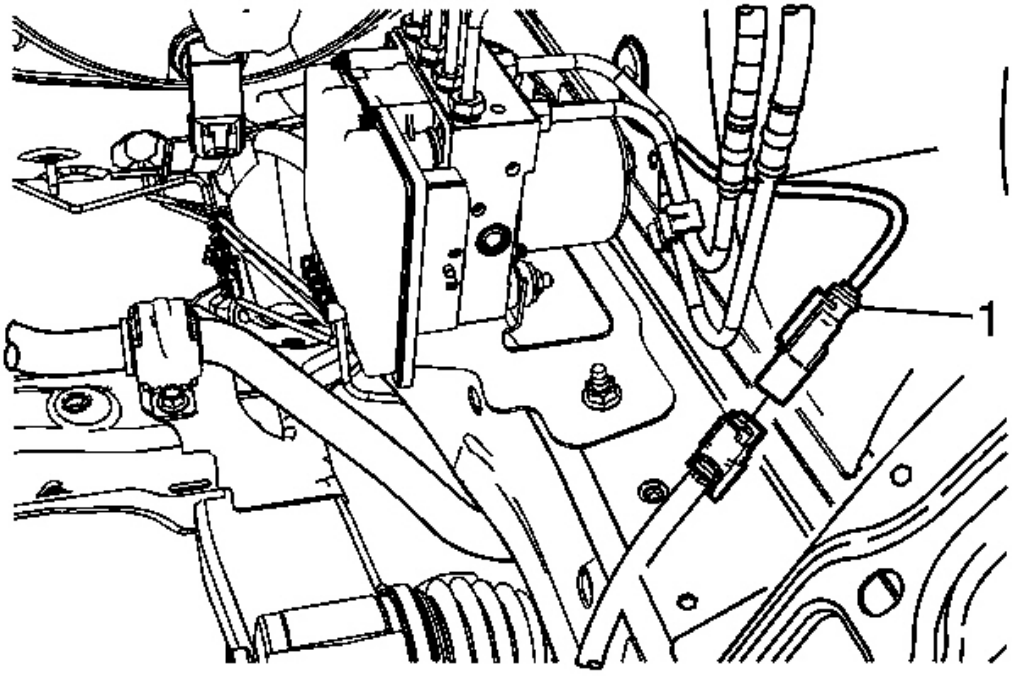

Fig. 40: Identifying Wheel Speed Sensor Electrical Connector
Courtesy of GENERAL MOTORS CORP.

1. Disconnect the wheel speed sensor electrical connector (1).
2. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
3. Remove the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** .

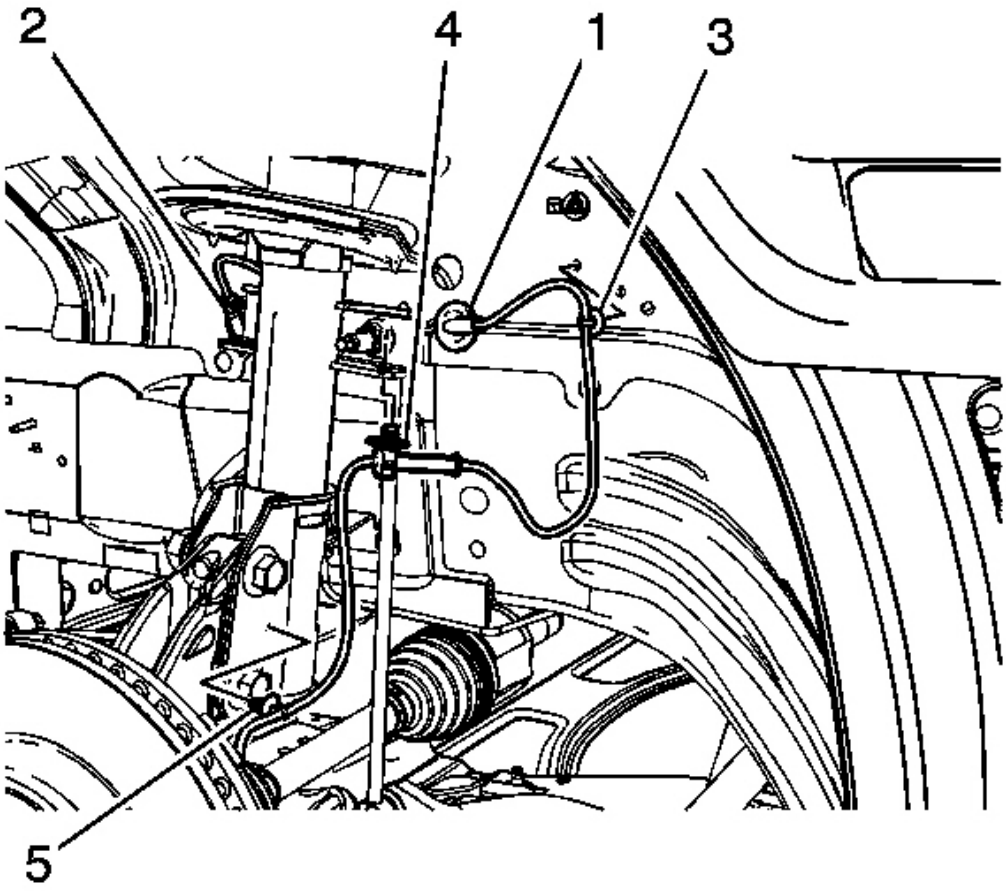

Fig. 41: View Of Wheel Speed Sensor Wire, Wire Grommet, Connector & Harness Routing Clips
Courtesy of GENERAL MOTORS CORP.

4. Release the wheel speed sensor wire grommet (1) from the wheelhouse.
5. Carefully pull the wheel speed sensor wire and connector (2) through the wheel house.
6. Release the wheel speed sensor wire harness routing clip (3) from the wheel house.
7. Release the wheel speed sensor wire harness routing clips (4) and (5) from the suspension strut.

IMPORTANT: Clean the wheel speed sensor mounting area on the steering knuckle of any accumulated dirt and debris.

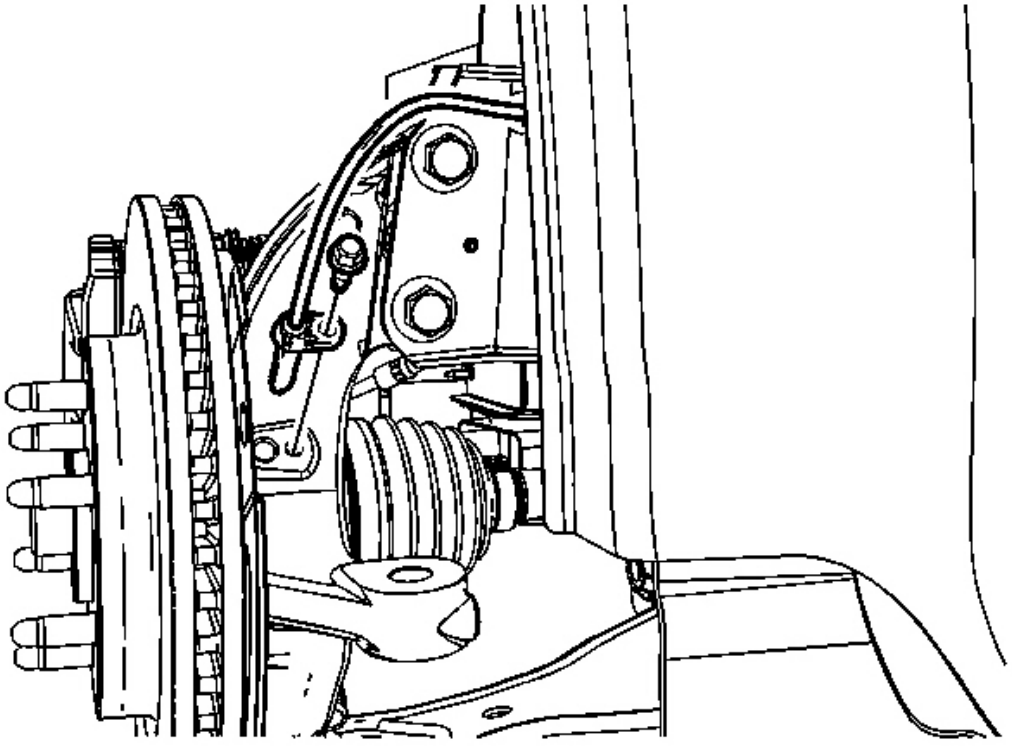

Fig. 42: Identifying Wheel Speed Sensor Bolt
Courtesy of GENERAL MOTORS CORP.

8. Remove the wheel speed sensor bolt.
9. Pull the wheel speed sensor straight up and out of the steering knuckle.

Installation Procedure

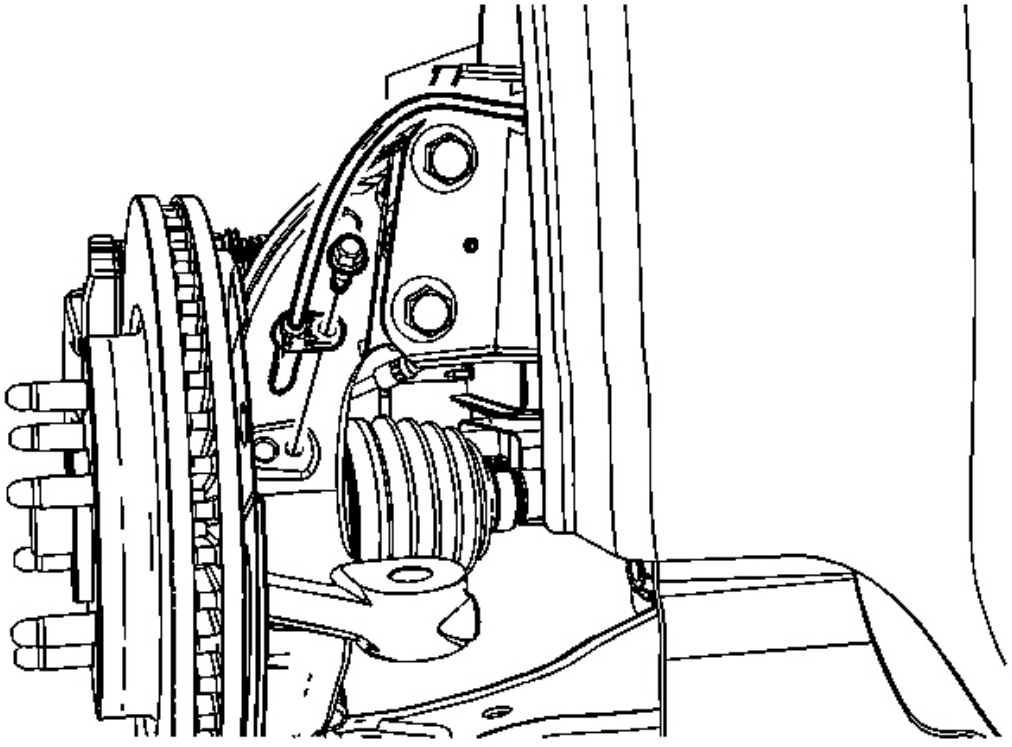

Fig. 43: Identifying Wheel Speed Sensor Bolt
Courtesy of GENERAL MOTORS CORP.

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

NOTE: Refer to Fastener Notice .

2. Install the wheel speed sensor bolt.

Tighten: Tighten the bolt to 9 N.m (80 lb in).

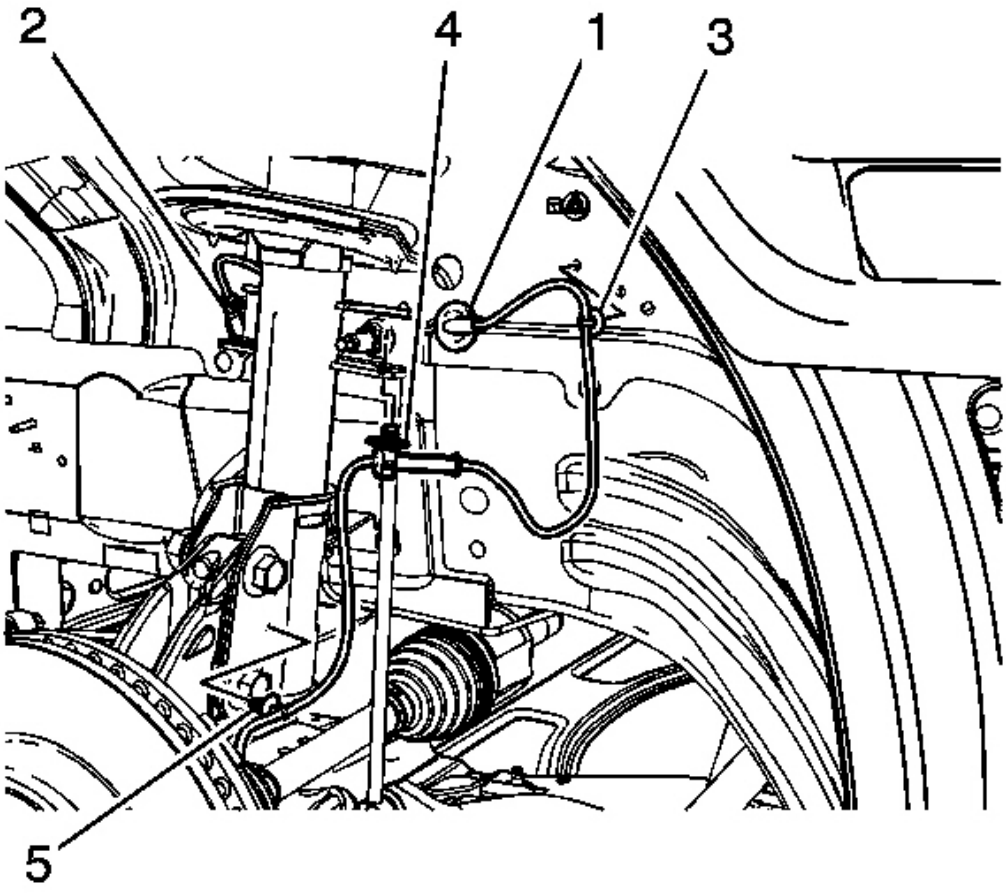

Fig. 44: View Of Wheel Speed Sensor Wire, Wire Grommet, Connector & Harness Routing Clips
Courtesy of GENERAL MOTORS CORP.

3. Install the wheel speed sensor wire harness routing clips (4) and (5) to the suspension strut.
4. Insert the wheel speed sensor wire electrical connector (2) through the wheel house hole.
5. Seat the wheel speed sensor wire harness grommet (1) to the wheel house.

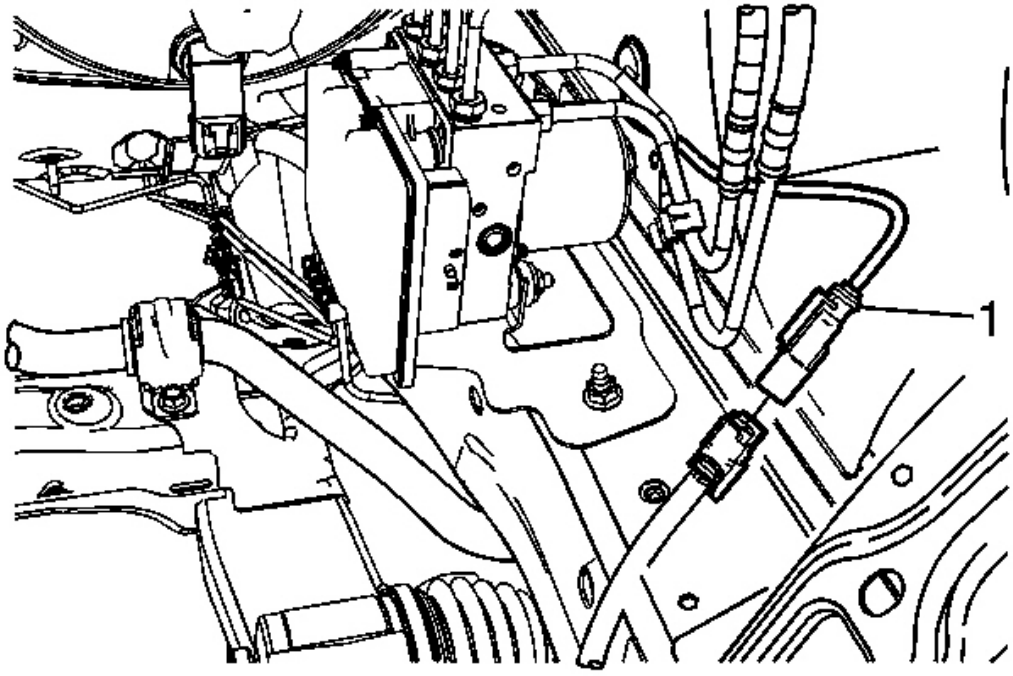

Fig. 45: Identifying Wheel Speed Sensor Electrical Connector
Courtesy of GENERAL MOTORS CORP.

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

REAR WHEEL SPEED SENSOR REPLACEMENT

Removal Procedure

CAUTION: Refer to Brake Dust Caution .

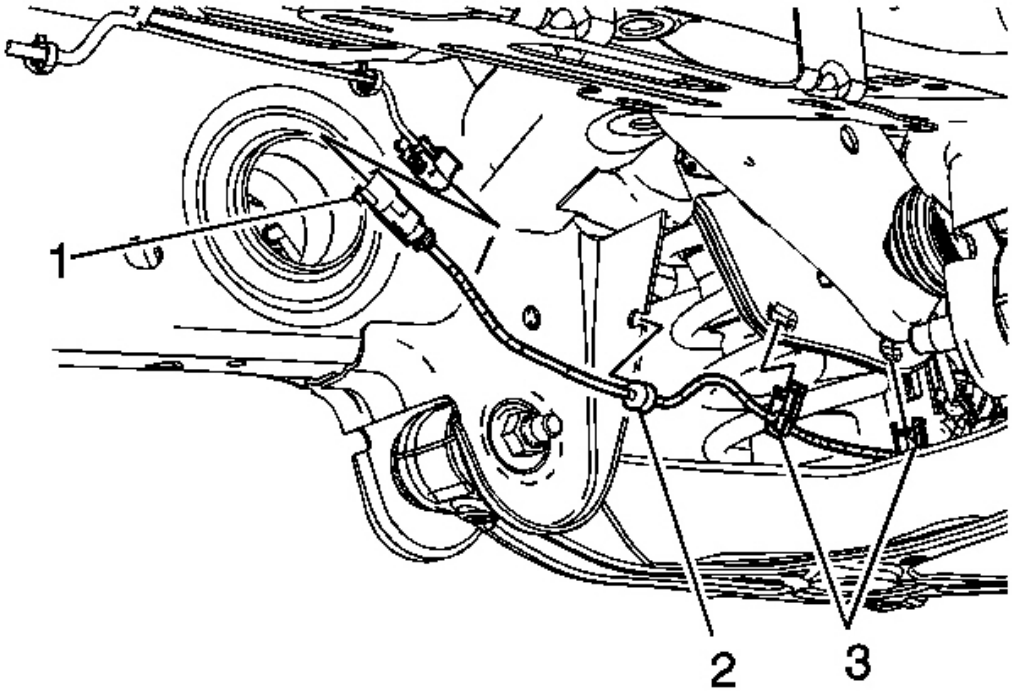

Fig. 46: Identifying Wheel Speed Sensor Electrical Connector
Courtesy of GENERAL MOTORS CORP.

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** .
3. Disconnect the wheel speed sensor electrical connector (1).
4. Release the wheel speed sensor wire harness grommet (2) from the lower control arm bracket.
5. Release the wheel speed sensor wire harness routing clips (3) from the upper suspension link.

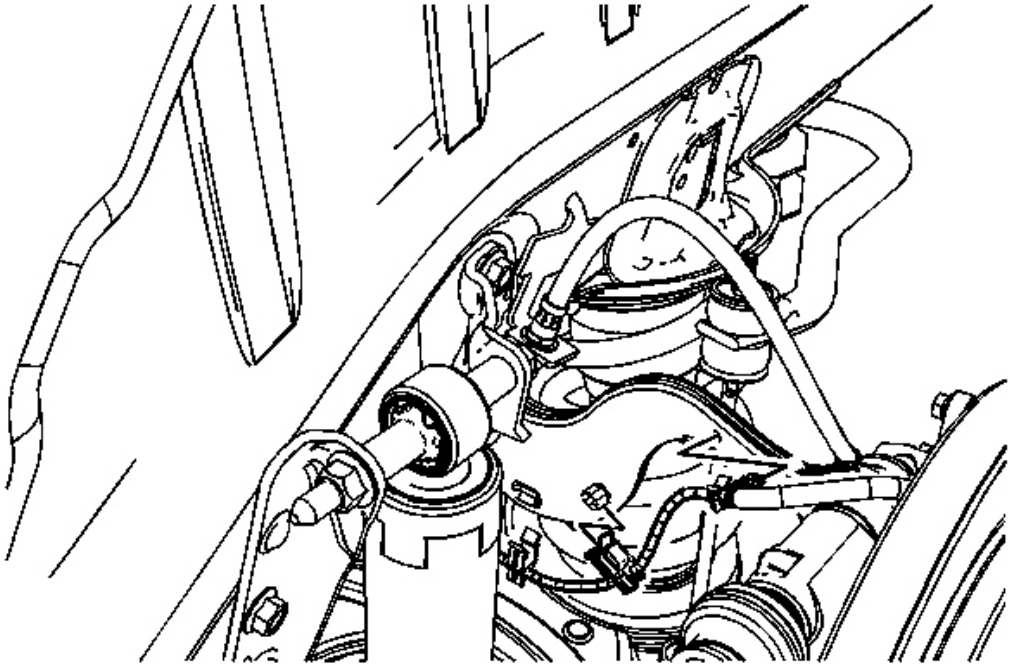

Fig. 47: View Of Wheel Speed Sensor Wire Harness Routing Clip
Courtesy of GENERAL MOTORS CORP.

6. Release the wheel speed sensor wire harness routing clips from the upper suspension link.

IMPORTANT: Clean the wheel speed sensor mounting area on the wheel knuckle of any accumulated dirt and debris.

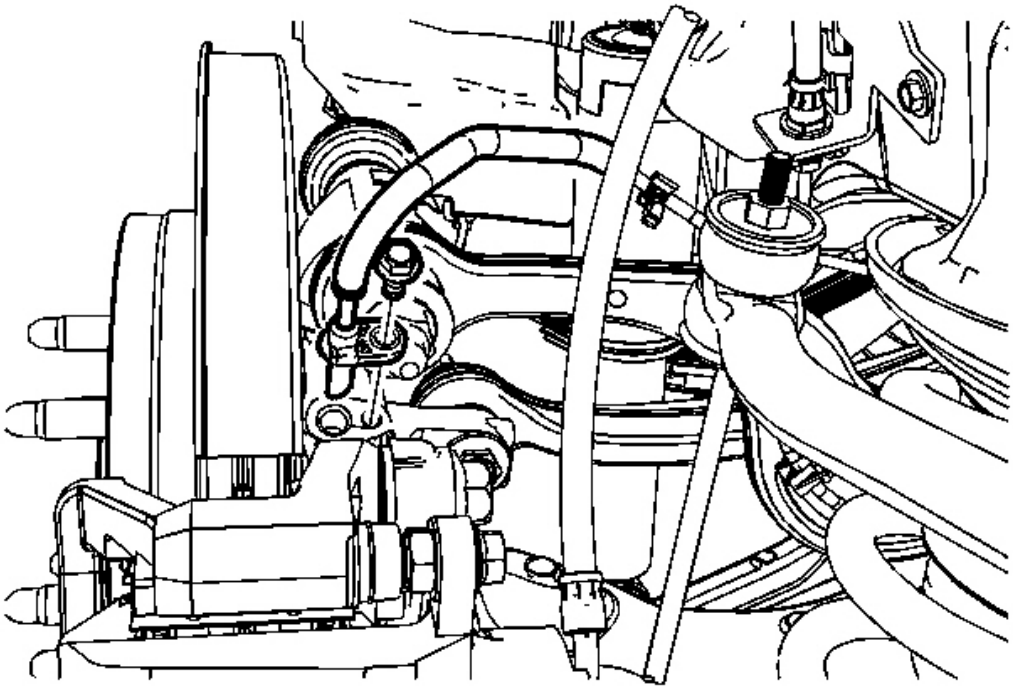

Fig. 48: Identifying Wheel Speed Sensor Bolt
Courtesy of GENERAL MOTORS CORP.

7. Remove the wheel speed sensor bolt.
8. Pull the wheel speed sensor straight up and out of the wheel knuckle.

Installation Procedure

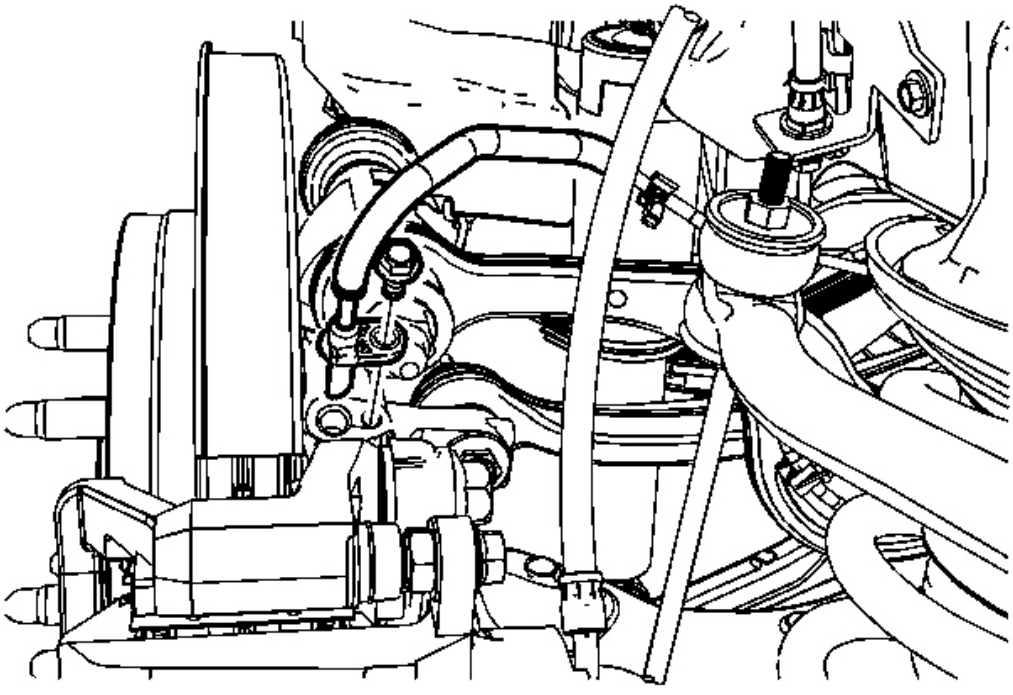

Fig. 49: Identifying Wheel Speed Sensor Bolt
Courtesy of GENERAL MOTORS CORP.

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

NOTE: Refer to Fastener Notice .

2. Install the wheel speed sensor bolt.

Tighten: Tighten the bolt to 6 N.m (53 lb in).

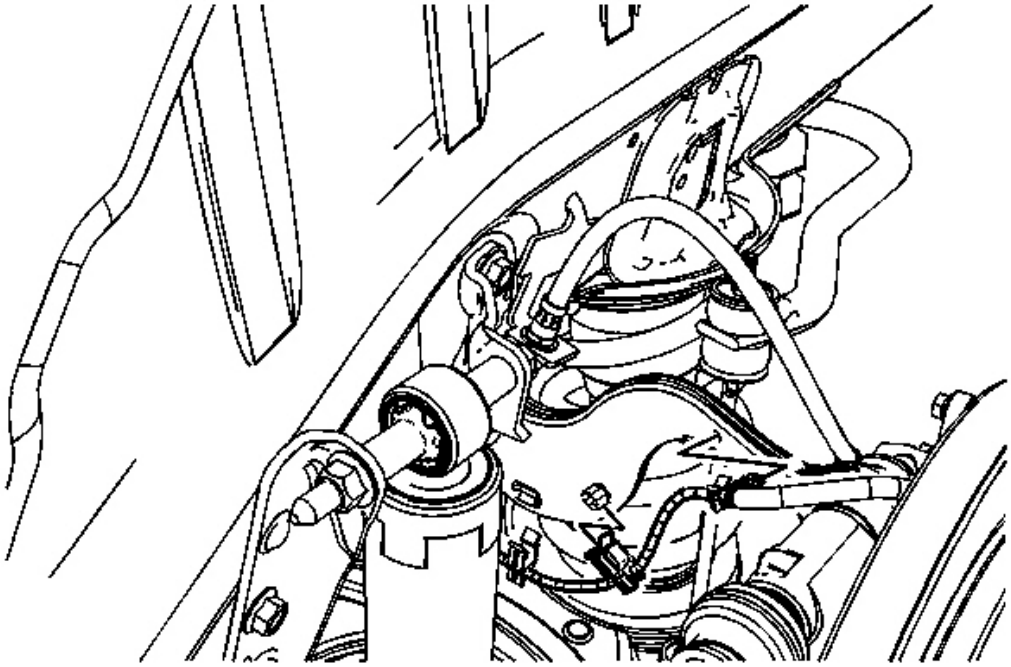

Fig. 50: View Of Wheel Speed Sensor Wire Harness Routing Clip
Courtesy of GENERAL MOTORS CORP.

3. Install the wheel speed sensor wire harness routing clips to the upper suspension link.

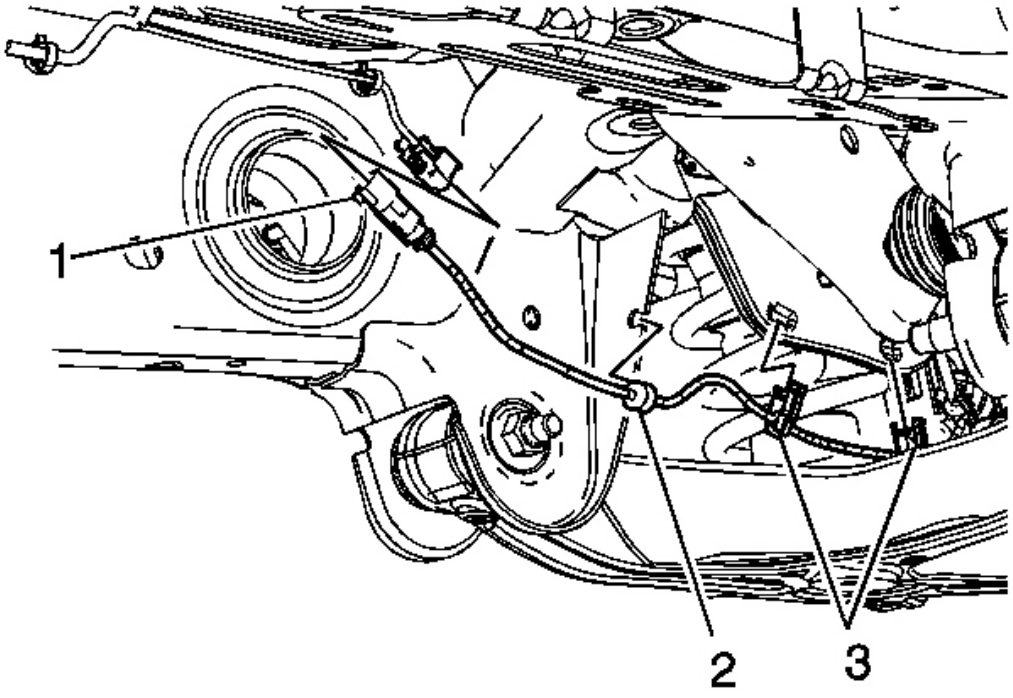

Fig. 51: Identifying Wheel Speed Sensor Electrical Connector
Courtesy of GENERAL MOTORS CORP.

4. Install the wheel speed sensor wire harness routing clips (3) to the upper suspension link.
5. Install the wheel speed sensor wire harness grommet (2) to the lower control arm bracket.
6. Connect the wheel speed sensor electrical connector (1).
7. Install the tire and wheel assembly. Refer to **Tire and Wheel Removal and Installation** .
8. Perform the **Diagnostic System Check - Vehicle** .

ELECTRONIC TRACTION CONTROL SWITCH REPLACEMENT

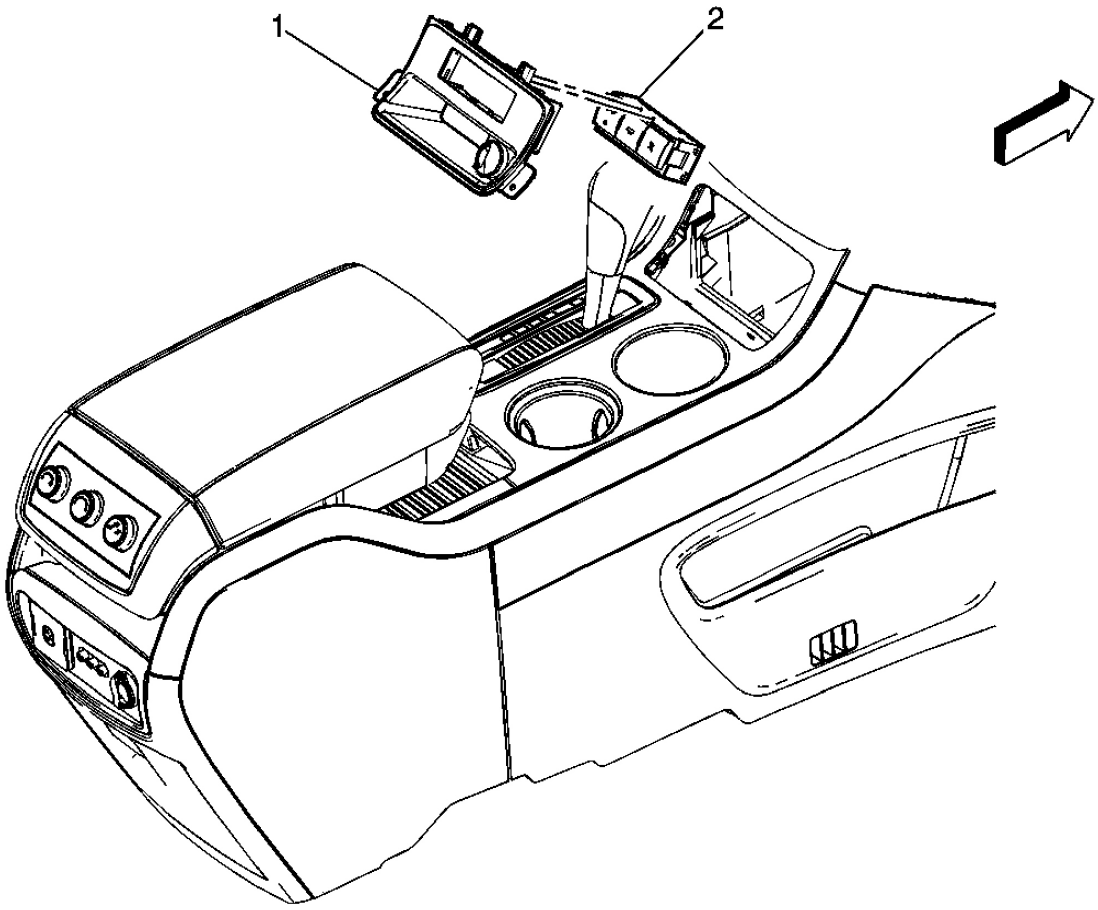

Fig. 52: Identifying Electronic Traction Control Switch
Courtesy of GENERAL MOTORS CORP.

Electronic Traction Control Switch Replacement

Callout	Component Name
1	Front Floor Console Accessory Switch Mounting Plate Refer to **Front Floor Console Accessory Switch Mount Plate Replacement** .
2	Accessory Switch Assembly **Procedure:** Disconnect the electrical connector.

VEHICLE YAW SENSOR WITH VEHICLE LATERAL ACCELEROMETER REPLACEMENT

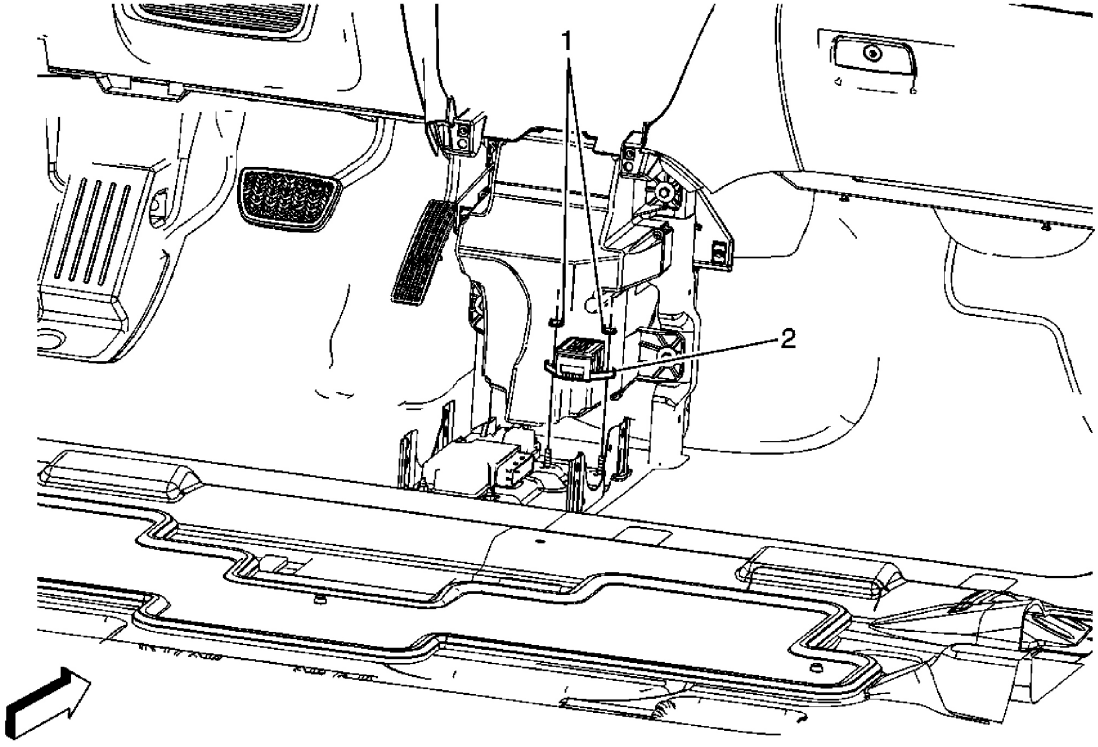

Fig. 53: View Of Vehicle Yaw Sensor With Vehicle Lateral Accelerometer
Courtesy of GENERAL MOTORS CORP.

Vehicle Yaw Sensor with Vehicle Lateral Accelerometer Replacement

Callout	Component Name
CAUTION: **Refer to SIR Caution .** **Preliminary Procedures** 1. Disable the SIR system. Refer to **SIR Disabling and Enabling** . 2. Remove front floor console. Refer to **Front Floor Console Replacement** .	
1	Vehicle Yaw Sensor and Lateral Accelerometer Nut (Qty: 2) **NOTE:** **Refer to Fastener Notice .** **Tighten:** 9 N.m (80 lb ft)
2	Vehicle Yaw with Vehicle Lateral Accelerometer Sensor Assembly **Procedure:**

	Disconnect the electrical connector.

DESCRIPTION AND OPERATION

ABS DESCRIPTION AND OPERATION

This vehicle is equipped with a Bosch ABS/EBD/TCS/VSES brake system. The electronic brake control module (EBCM) and the brake pressure modulator valve (BPMV) is serviced separately. The BPMV uses a 4 circuit configuration to control hydraulic pressure to each wheel independently.

The following vehicle performance enhancement systems are provided.

- Antilock Brake System (ABS)
- Electronic Brake Distribution (EBD)
- Power Brake Booster Solenoid Vacuum Supply
- Traction Control System (TCS)
- Vehicle Stability Enhancement System (VSES)

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

- ABS pump motor-The ABS pump motor is part of the brake pressure modulator valve. The ABS pump motor is active during ABS, VSES and base brake power assist functions.
    - System relays-There are two system relays internal to the EBCM. The solenoid relay is energized when the ignition is ON. The ABS pump motor relay supplies a ground path to the ABS pump motor when the EBCM commands the ABS pump motor on. The system relays are non serviceable.
    - Solenoids-The solenoids are commanded ON and OFF by the EBCM to operate the appropriate valves in the brake pressure modulator valve (BPMV).
- Brake booster solenoid-The Power Brake Booster is solenoid operated and applies a mechanical force to brake master cylinder push rod to aid in brake pedal effort.
- Brake booster vacuum sensor-The Brake Booster Vacuum Sensor is a input to EBCM and operates the ABS pump motor to precharge the brake system.
- Brake pressure modulator valve (BPMV)-The BPMV uses a 4-circuit configuration to control hydraulic pressure to each wheel independently.

  The BPMV contains the following components:

    - ABS pump motor and pump

  - Four inlet valves
  - Four outlet valves
  - Two TC isolation valves
  - Two TC supply valves
  - A master cylinder pressure sensor
  - A front low-pressure accumulator
  - A rear low-pressure accumulator
- Lateral accelerometer-The EBCM uses the lateral accelerometer to determine the sideways acceleration of the vehicle. The lateral accelerometer is packaged with the yaw rate sensor as a single component.
- Master cylinder pressure sensor-The master cylinder pressure sensor is located within the BPMV. The master cylinder pressure sensor uses a 5-volt reference and generates an output signal proportionate to the hydraulic fluid pressure which is present in the front brake circuit at the master cylinder.
- Power brake booster solenoid-Assist unit creates vacuum for the brake booster in case of a vacuum loss or low vacuum to the brake booster. The power brake booster Solenoid is active during increased brake booster assist and base brake power assist functions.
- Steering wheel position sensor-The EBCM receives several inputs from the steering wheel position sensor. Three digital square wave signal inputs and one analog signal input are wired directly to the EBCM harness connector. The EBCM uses the signals A and B for determining position movement and uses the analog and index signals to determine absolute center. All signals are monitored for plausibility to each other. The sensor is provided ground and 5-volt power directly from the EBCM.
- Traction control switch-VSES and the engine torque reduction function of TCS are manually disabled or enabled by pressing the traction control switch.
- Wheel speed sensors (WSS)-EBCM sends a 12-volt reference voltage signal to each wheel speed sensor. As the wheel spins, the wheel speed sensor produces a square wave DC signal voltage. The wheel speed sensor increases the signal frequency as the wheel speed increases, but does not increase the signal amplitude.
- Yaw rate sensor-The EBCM uses the yaw rate sensor to determine the rate of rotation along the vehicle's vertical axis. The yaw rate sensor is packaged with the lateral accelerometer as a single component.

Antilock Brake System (ABS)

When wheel slip is detected during a brake application, an ABS event occurs. During antilock braking, hydraulic pressure in the individual wheel circuits is controlled to prevent any wheel

from slipping. A separate hydraulic line and specific solenoid valves are provided for each wheel. The ABS can decrease, hold or increase hydraulic pressure to each wheel. The ABS does not, however, increase hydraulic pressure above the amount which is transmitted by the master cylinder during braking.

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

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

Pressure Hold

The EBCM closes the isolation valve and keeps the dump valve closed in order to isolate the slipping wheel when wheel slip occurs. This holds the pressure steady on the brake so that the hydraulic pressure does not increase or decrease.

Pressure Decrease

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

Pressure Increase

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

Electronic Brake Distribution (EBD)

The electronic brake distribution (EBD) is a control system that enhances the hydraulic

proportioning function of the mechanical proportioning valve in the base brake system. The EBD control system is part of the operation software in the electronic brake control module (EBCM). The EBD uses active control with existing ABS in order to regulate the vehicle's rear brake pressure.

Brake Pressure Application

The EBCM uses brake pressure application to control traction by transferring torque through the driveline to wheels which are not slipping. The ABS pump motor and appropriate valve solenoids are commanded ON and OFF to apply brake pressure to the slipping wheels. Brake pressure application is used in an attempt to maintain equal wheel speed sensor (WSS) signals at the driven wheels.

The EBCM does not allow excessive brake pressure application due to the fact that the solenoid coils or the brakes may become overheated, damaging the EBCM or reducing the drivers ability to stop the vehicle. Estimated coil and brake temperatures are determined by a calculation in the EBCM software. Overheated solenoid coils cause all brake pressure application to become disabled and the stability system disabled message to be displayed. Overheated brakes cause brake pressure application during TCS events to disable, yet the VSES remains functional and as long as the engine torque reduction is enabled, there is no indication to the driver when this occurs and no DTC sets.

Vehicle Stability Enhancement System (VSES)

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

The desired yaw rate is calculated by the EBCM using, primarily, the following inputs.

- The position of the steering wheel
- The speed of the vehicle
- The lateral or sideways 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 oversteer or understeer. When a yaw rate error is detected, the EBCM attempts to correct the vehicle's yaw motion by applying brake pressure to one or more of the wheels. The amount of brake pressure which is applied varies, depending on the correction required. The engine torque may be reduced also, if it is necessary to slow the vehicle while maintaining stability.

VSES activations generally occur in turns during aggressive driving. When braking during VSES activation, the pedal may pulsate. The brake pedal pulsates at a higher frequency during VSES activation than during ABS activation.

Power-Up Self-Test

The electronic brake control module (EBCM) 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 EBCM. Therefore, a power-up self-test is required at the beginning of each ignition cycle to verify correct operation of components before the various control systems can be enabled. The EBCM performs the first phase of the power-up self-test when the ignition is first turned ON. The system relay, solenoids and the ABS pump motor are commanded ON and OFF to verify proper operation and the EBCM verifies the ability to return the system to base braking in the event of a failure. The master cylinder pressure sensor performs a self-test by sending a series of specific voltage signals to the EBCM, each for a predetermined amount of time. This phase of the power-up self-test may be heard by the driver, depending on how soon the engine is cranked and started after turning ON the ignition. The second phase of the power-up self-test begins when the vehicle is driven at a speed greater than 12 km/h (7.5 mph) and the EBCM has not detected any traction control module (TCS)/vehicle stability enhancement system (VSES) related malfunctions thus far. When the brake switch indicates that the brake is not applied and the master cylinder pressure is detected as being low, the EBCM proceeds with the test. The EBCM isolates all of the wheels by closing the 4 isolation valves. Due to the fact that all of the wheels are isolated during the second phase of the test, the test must be aborted if the brake is applied while the test is being performed. Occasionally, the driver may detect this by experiencing a momentary hard pedal.

VSES Sensors Initialization

The vehicle stability enhancement system (VSES) sensors values may vary slightly due to differences in temperature, sensor mounting, connector resistances, manufacturing, etc. Since VSES is a very sensitive and precise control system, it is imperative that the electronic brake control module (EBCM) be able to accurately equate a given sensor voltage with an actual unit of measurement. For example, the yaw rate signal of one vehicle may be 2.64 volts at +18.0 deg/sec yaw rate while the yaw rate signal of another vehicle may be 2.64 volts at +17.5 deg/sec yaw rate. Therefore, at the beginning of each ignition cycle, the EBCM must perform an initialization procedure to observe how the VSES sensors are correlated with each other and also to determine what each sensor value is when the applicable unit of measurement equals 0. This voltage is referred to as the sensor bias voltage. Although some activation of the VSES system may occur if required to prior to full initialization, the system does not give optimum performance until the sensors are fully initialized.

The following VSES sensors require initialization:

- The yaw rate sensor
- The lateral accelerometer
- The master cylinder pressure sensor
- The steering wheel position sensor

When the vehicle speed is greater than 25 km/h (15 mph), full sensor initialization must occur during 3 km (1.8 mi) of driving or 1 km (0.6 mi) of straight and stable driving, whichever occurs first. Although an attempt at initialization may fail due to driving conditions, such as driving on a very winding road, failed initialization is usually caused by a sensor bias voltage which is not within an acceptable range. Often, a DTC sets soon after a failed initialization attempt. The message center displays the stability system disabled message when sensor initialization fails.

ECE 13 Response

The electronic brake control module (EBCM) illuminates the ABS indicator when a malfunction which disables ABS is detected. Usually, the ABS indicator is turned OFF during the following ignition cycle unless the fault is detected during that ignition cycle. However, the setting of a wheel speed sensor related DTC causes the ABS indicator to remain illuminated during the following ignition cycle until the vehicle is operated at a speed greater than 13 km/h (8 mph). This allows the EBCM to verify that no malfunction exists, before turning OFF the ABS indicator. This reaction occurs even if the ABS indicator turns OFF when the scan tool is used to clear the DTCs. When repairing these vehicles, it is important to ensure that the ECE 13 response has occurred and that the ABS indicator does not illuminate after returning the vehicle to the customer. It is also important to verify that ECE 13 is not the cause of an ABS indicator which is illuminated when no DTCs are set, before attempting to diagnose other possible causes.

Active Vacuum Booster

The power brake booster assist unit creates mechanical force for the brake booster in case of a vacuum loss or low vacuum to the brake booster. The power brake booster system consists of:

- The sensor circuits and pressure sensor
- The check valve manifold
- The vacuum solenoid valve

The Power Brake Booster is solenoid operated and applies a mechanical force to brake master cylinder push rod to aid in brake pedal effort.

The Brake Booster Vacuum Sensor is a input to EBCM and operates the ABS pump motor to precharge the brake system.

Driver Information Indicators and Messages

The following indicators are used to inform the driver of several different factors.

Brake Warning Indicator

The instrument panel cluster (IPC) illuminates the brake warning indicator when the following occurs.

- The body control module (BCM) detects that the park brake is engaged. The IPC receives a serial data message from the BCM requesting illumination. The brake warning indicator flashes at a rate of approximately twice per second when the park brake is engaged.
- The electronic brake control module (EBCM) detects a low brake fluid condition or a base brake pressure differential and sends a serial data message to the IPC requesting illumination.
- The IPC performs the bulb check.
- The EBCM detects an ABS-disabling malfunction which also disables electronic brake distribution (EBD) and sends a serial data message to the IPC requesting illumination.

ABS Indicator

The IPC illuminates the ABS indicator when the following occurs.

- The EBCM detects an ABS-disabling malfunction and sends a serial data message to the IPC requesting illumination.
- The IPC performs the bulb check.
- The IPC detects a loss of serial data communication with the EBCM.
- A DTC is set during the previous ignition cycle which requires an ECE 13 response at the beginning of the current ignition cycle. The EBCM sends a serial data message to the IPC requesting illumination.

Traction Control Off Indicator

The IPC illuminates the traction off indicator when the following occurs.

- The EBCM disables engine torque reduction due to a malfunction and sends a serial data message to the IPC requesting illumination.
- The driver manually disables VSES and engine torque reduction by pressing the traction

control switch. The EBCM sends a serial data message to the IPC requesting illumination.

Service Brake Booster Message

The service brake system message is displayed whenever the red brake warning indicator is illuminated.

Stabilitrak Off Message

The message center displays the stabilitrak off message when one or more of the following conditions exists.

- The transfer case is shifted into 4 LO. The EBCM sends a serial data message to the IPC requesting illumination.
- The driver manually disables the VSES and engine torque reduction by pressing the traction control switch. The EBCM sends a serial data message to the IPC requesting illumination.
- The estimated temperature of any solenoid coil exceeds an acceptable limit. The EBCM sends a serial data message to the IPC requesting this display.
- The EBCM detects a failed brake switch. The EBCM sends a serial data message to the IPC requesting this display. A DTC sets when this condition exists.
- VSES sensor initialization time is excessive. The EBCM sends a serial data message to the IPC requesting this display.
- Serial data communication between the EBCM and any of several other control modules is interrupted. The EBCM sends a serial data message to the IPC requesting this display or the IPC displays the message when communication with the EBCM is interrupted.
- The PCM is not able to perform engine torque reduction. The EBCM sends a GMLAN message to the IPC requesting this display. DTCs set when this condition exists.
- The EBCM detects an excessively low or excessively high ignition voltage. The EBCM sends a GMLAN message to the IPC requesting this display.

Service Stabilitrak Message

The message center displays the service stability system message when any one of many VSES-disabling DTCs is set. The EBCM sends a serial data message to the IPC requesting this display.

Service Traction Control Message

The message center displays the service traction control system message when any one of many traction control - disabling DTCs is set. The EBCM sends a serial data message to the IPC requesting this display.