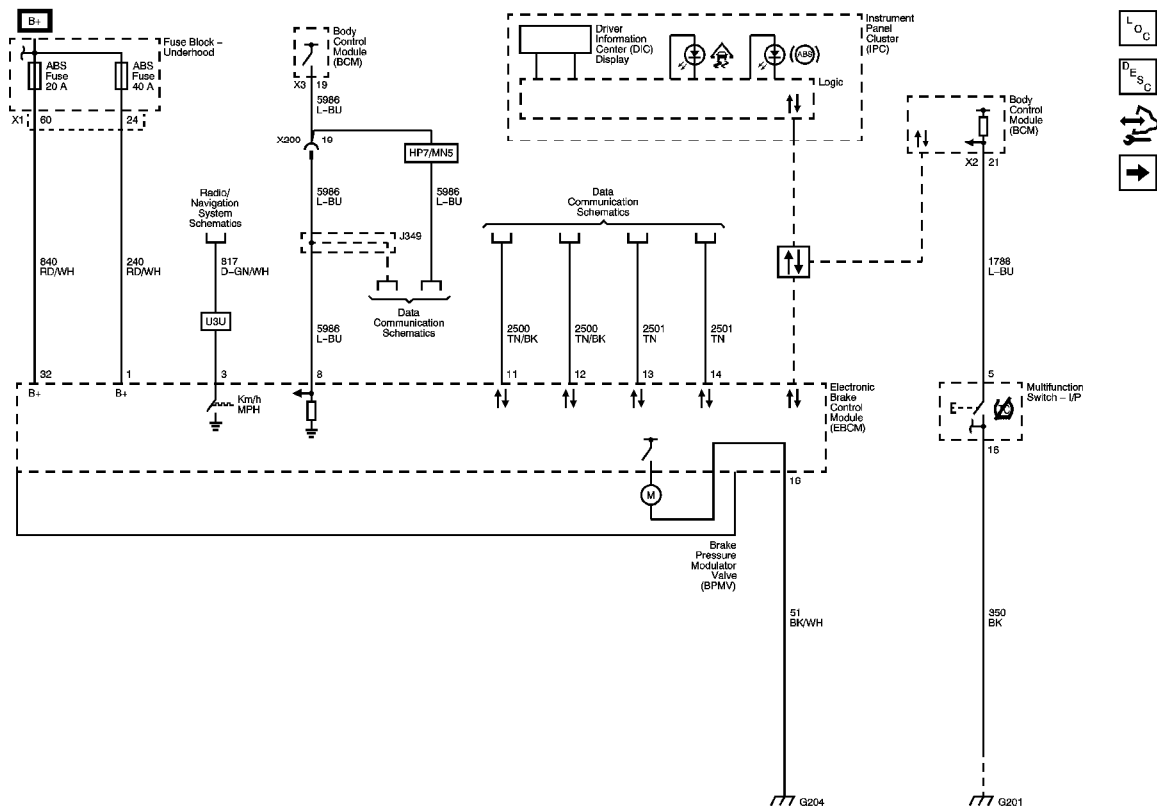


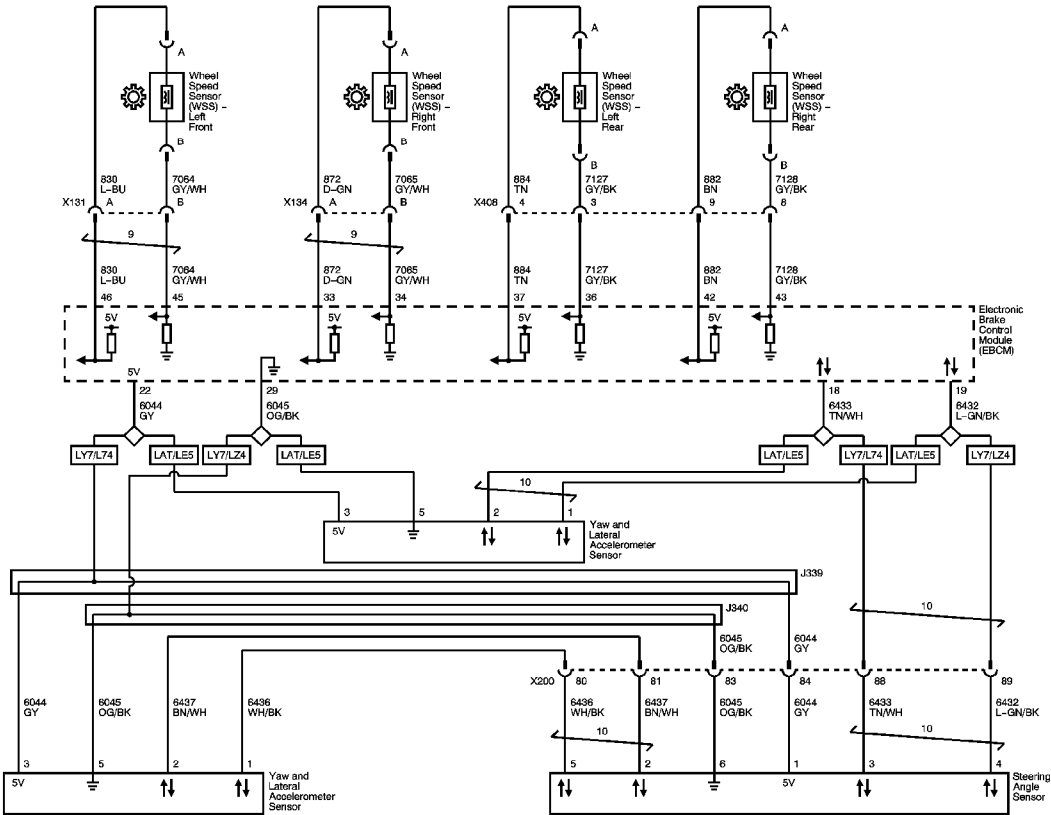
Fastener Tightening Specifications

Application	Specification	
	Metric	English
Brake Pressure Modulator Valve Bracket Bolts	10 N·m	89 lb in
Brake Pressure Modulator Valve Bracket Nut	10 N·m	89 lb in
Brake Pressure Modulator Valve Bolt	10 N·m	89 lb in
Brake Pipe Fittings	21 N·m	16 lb ft
Electronic Brake Control Module (EBCM) to Brake Pressure Modulator Valve Bolts	3 N·m	27 lb in
Wheel Speed Sensor Bolt	8 N·m	71 lb in
Yaw Rate Sensor Bolts	8 N·m	71 lb in

Control Module, Instrument Panel Display and Serial Data



Wheel Speed and YAW/Lateral Speed Sensors



Antilock Brake System Automated Bleed Procedure

Warning: Refer to [Brake Fluid Irritant Warning](#) in the Preface section.

Caution: Refer to [Brake Fluid Effects on Paint and Electrical Components Caution](#) in the Preface section.

Note: Before performing the antilock brake system (ABS) Automated Bleed Procedure, first perform a manual or pressure bleed of the base brake system. Refer to [Hydraulic Brake System Bleeding](#). The automated bleed procedure is recommended when one of the following conditions exist:

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

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

Automated Bleed Procedure

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

1. Raise and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#).
2. Remove all 4 tire and wheel assemblies. Refer to [Tire and Wheel Removal and Installation](#).
3. Inspect the brake system for leaks and visual damage. Refer to [Symptoms - Hydraulic Brakes](#). Repair or replace components as needed.
4. Lower the vehicle.
5. Inspect the battery state of charge. Refer to [Battery Inspection/Test](#).
6. Install a scan tool.
7. Turn the ignition ON, with the engine OFF.
8. With the scan tool, establish communications with the ABS system. Select Special Functions. Select Automated Bleed from the Special Functions menu.
9. Raise and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#).
10. Following the directions given on the scan tool, pressure bleed the base brake system. Refer to [Hydraulic Brake System Bleeding](#).
11. Follow the scan tool directions until the desired brake pedal height is achieved.
12. If the bleed procedure is aborted, a malfunction exists. Perform the following steps before resuming the bleed procedure:
 - If a DTC is detected, refer to [Diagnostic Trouble Code \(DTC\) List - Vehicle](#) and diagnose the appropriate DTC.
 - If the brake pedal feels spongy, perform the conventional brake bleed procedure again.

14. Lower the vehicle.
15. Remove the scan tool.
16. Install the tire and wheel assemblies. Refer to [Tire and Wheel Removal and Installation](#).
17. Inspect the brake fluid level. Refer to [Master Cylinder Reservoir Filling](#).
18. Road test the vehicle while inspecting that the pedal remains high and firm.

Steering Angle Sensor Centering

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

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

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

1. Using the steering wheel, align the front wheels forward.
2. Set the transmission in the PARK position.
3. Turn the ignition switch ON, with the engine OFF.
4. Clear any DTCs that may be set.
5. Select Steering Angle Sensor Centering in the EBCM Special Functions list.
6. Follow the scan tool directions to complete the centering procedure.

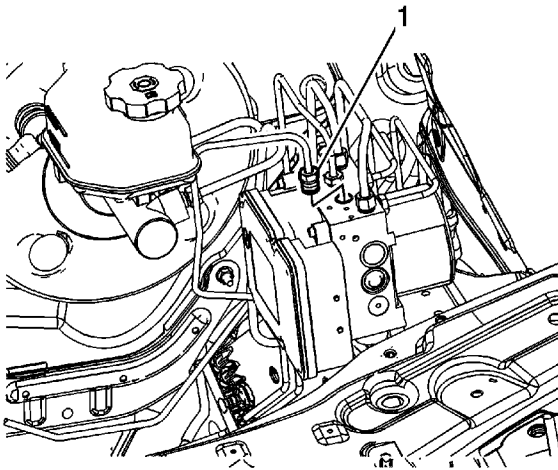
Electronic Brake Control Module Replacement (Except Hybrid)

Removal Procedure

Warning: Refer to [Brake Fluid Irritant Warning](#) in the Preface section.

Caution: Refer to [Brake Fluid Effects on Paint and Electrical Components Caution](#) in the Preface section.

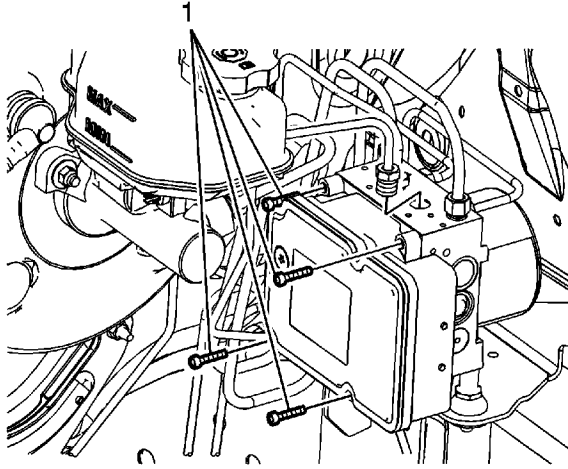
Caution: Always connect or disconnect the wiring harness connector from the EBCM/EBTCM with the ignition switch in the OFF position. Failure to observe this precaution could result in damage to the EBCM/EBTCM.



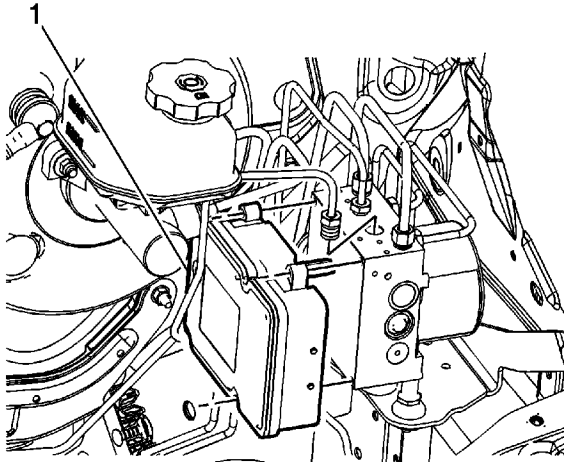
1. Place the ignition switch in the OFF position.
2. Remove the underhood electrical center. Refer to [Underhood Electrical Center or Junction Block Replacement](#).
3. Without draining the coolant or removing the hoses, remove and position aside the radiator surge tank. Refer to [Radiator Surge Tank Replacement](#).
4. Clean the electronic brake control module (EBCM) to brake pressure modulator valve (BPMV) area of any dirt or debris.
5. Disconnect the EBCM electrical connector by lifting the locking lever upward.
6. Disconnect the LF brake pipe fitting (1) from the BPMV.

Cap the brake pipe fitting and plug the BPMV outlet port to prevent brake fluid loss and contamination.

7. Carefully position aside and secure the brake pipe to provide clearance for removal of the



8. Remove the 4 EBCM bolts (1).

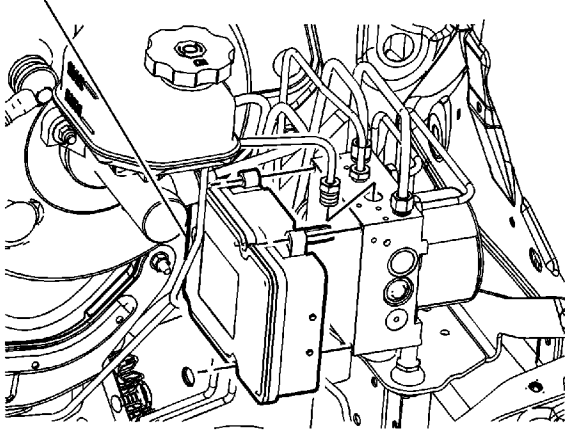


9. Carefully pull the EBCM (1) from the BPMV.

Do not pry the components apart.

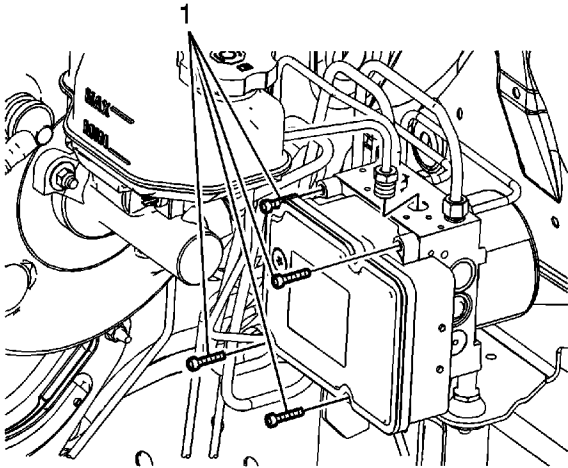
10. Remove the 12 EBCM seals, if necessary.

Installation Procedure

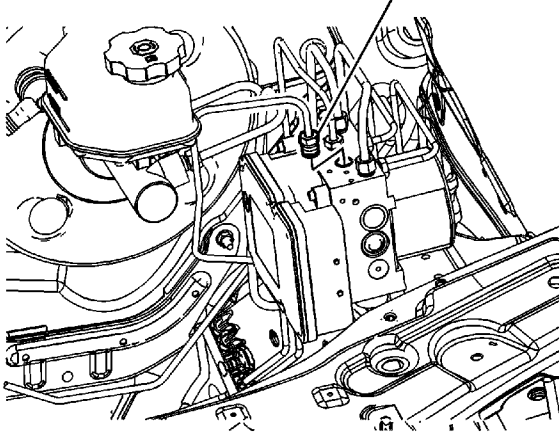


1. Install the EBCM seals, if removed.
2. Install the EBCM (1) to the BPMV.

Caution: Refer to [Fastener Caution](#) in the Preface section.



3. Install the 4 EBCM bolts (1) and tighten the bolts in a cross pattern to **3 N·m (27 lb in)**.



4. Position the LF brake pipe to the BPMV.
5. Connect the LF brake pipe fitting (1) to the BPMV and tighten to **21 N·m (16 lb ft)**.
6. Install the radiator surge tank. Refer to [Radiator Surge Tank Replacement](#).
7. Install the underhood electrical center. Refer to [Underhood Electrical Center or Junction Block Replacement](#).
8. If installing a new EBCM, program the EBCM. Refer to [Control Module References](#).
9. Without starting the engine, place the ignition switch in the ON position.
10. Perform the [Diagnostic System Check - Vehicle](#).
11. Observe the feel of the brake pedal after performing the diagnostic system check. If the pedal now feels spongy, air may have been in the secondary circuit of the brake modulator assembly, which may have been introduced into the primary circuit.

If the pedal feels spongy, perform the [Antilock Brake System Automated Bleed Procedure](#).

Brake Pressure Modulator Valve Replacement (Except Hybrid)

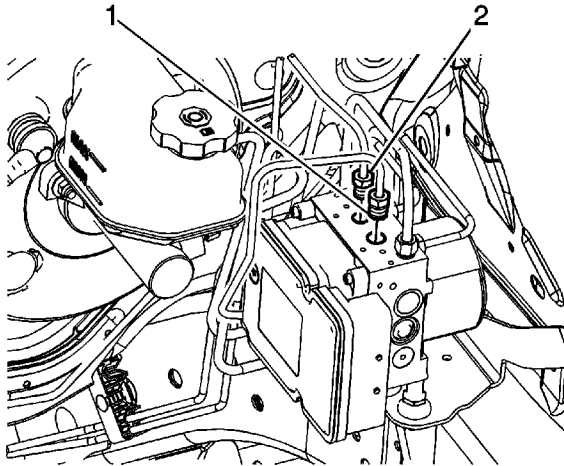
Removal Procedure

Warning: Refer to [Brake Fluid Irritant Warning](#) in the Preface section.

Caution: Refer to [Brake Fluid Effects on Paint and Electrical Components Caution](#) in the Preface section.

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

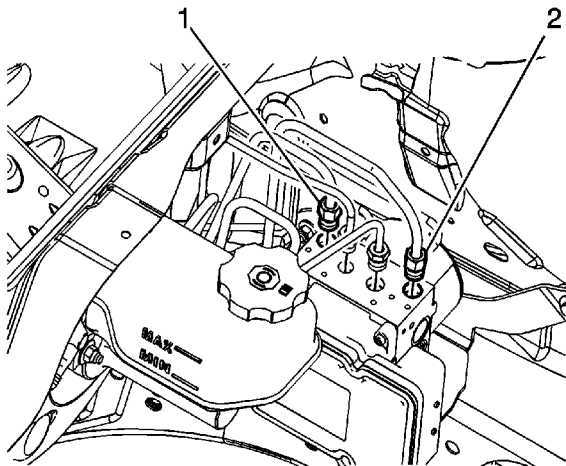
1. Turn the ignition switch to the OFF position.
2. Remove the underhood electrical center. Refer to [Underhood Electrical Center or Junction Block Replacement](#).
3. Without draining the coolant or removing the hoses, remove and position aside the radiator surge tank. Refer to [Radiator Surge Tank Replacement](#).



4. Disconnect the electronic brake control module (EBCM) electrical connector by lifting the locking tabs.
5. Disconnect the LF brake pipe fitting (1) at the brake pressure modulator valve (BPMV).

Cap the brake pipe fitting and plug the BPMV outlet port to prevent brake fluid loss and contamination.

6. Disconnect the RF brake pipe fitting (2) from the BPMV.

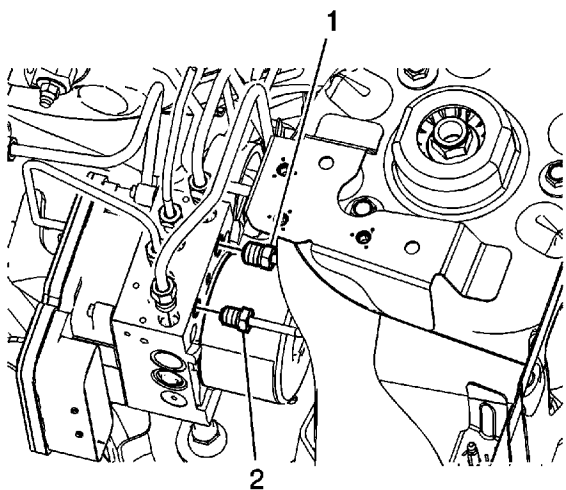


7. Disconnect the master cylinder primary brake pipe fitting (1) from the BPMV.

Cap the brake pipe fitting and plug the BPMV inlet port to prevent brake fluid loss and contamination.

8. Disconnect the master cylinder secondary brake pipe fitting (2) from the BPMV.

Cap the brake pipe fitting and plug the BPMV inlet port to prevent brake fluid loss and contamination.

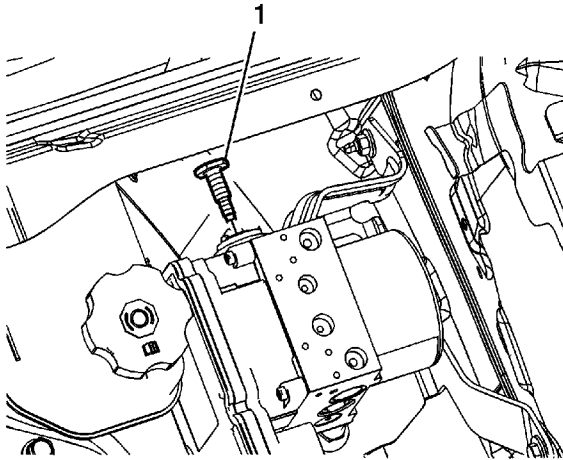


9. Disconnect the LR brake pipe fitting (1) from the BPMV.

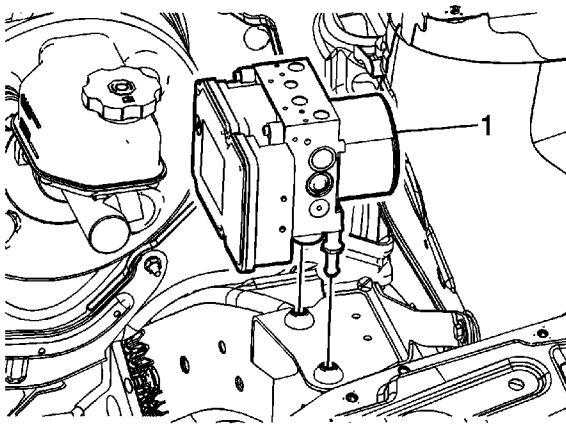
Cap the brake pipe fitting and plug the BPMV outlet port to prevent brake fluid loss and contamination.

10. Disconnect the RR brake pipe fitting (2) from the BPMV.

Cap the brake pipe fitting and plug the BPMV outlet port to prevent brake fluid loss and contamination.



11. Remove the BPMV bolt (1).

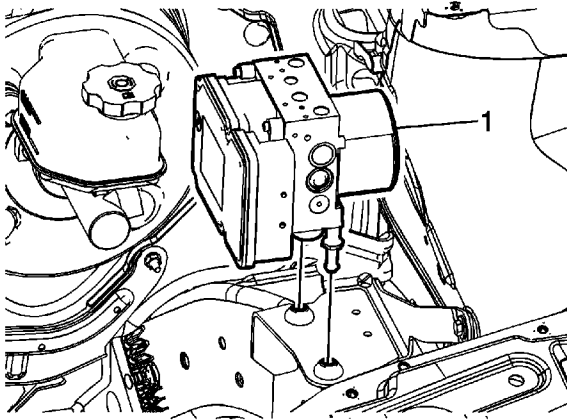


12. Carefully remove the BPMV assembly (1) by pulling straight upward.

Do not pry on the accumulator caps on the underside of the BPMV.

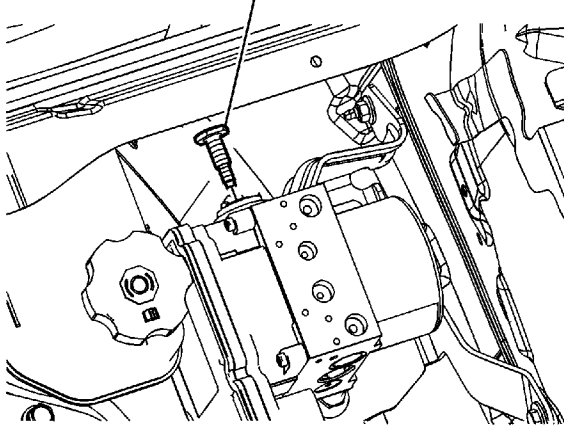
13. Inspect the insulators for damage and replace, if necessary.

Installation Procedure

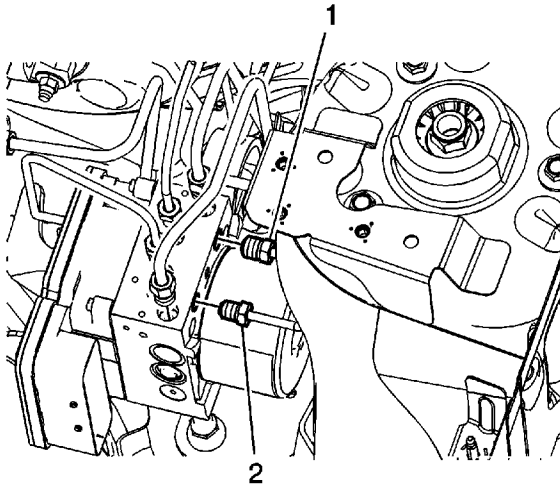


1. Install the BPMV assembly (1) to the bracket.

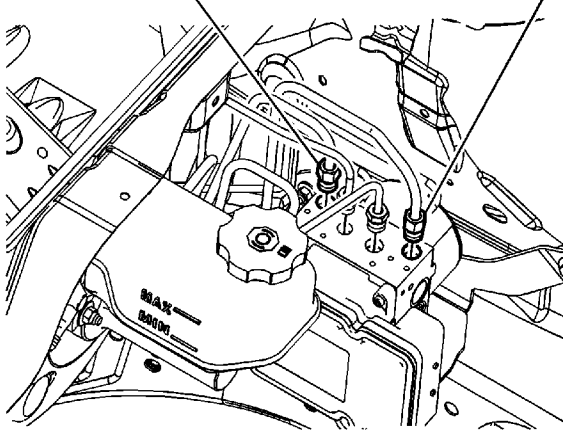
Caution: Refer to [Fastener Caution](#) in the Preface section.



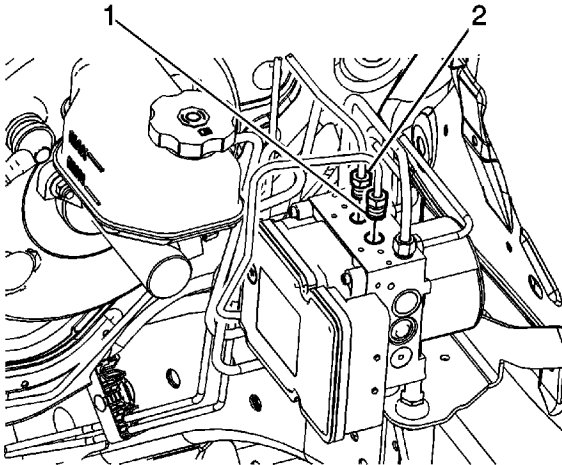
2. Install the BPMV bolt (1) and tighten to **10 N·m (89 lb in)**.



3. Connect the LR brake pipe fitting (1) to the BPMV and tighten to **21 N·m (16 lb ft)**.
4. Connect the RR brake pipe fitting (2) to the BPMV and tighten to **21 N·m (16 lb ft)**.



5. Connect the master cylinder primary brake pipe fitting (1) to the BPMV and tighten to **21 N·m (16 lb ft)**.
6. Connect the master cylinder secondary brake pipe fitting (2) to the BPMV and tighten to **21 N·m (16 lb ft)**.



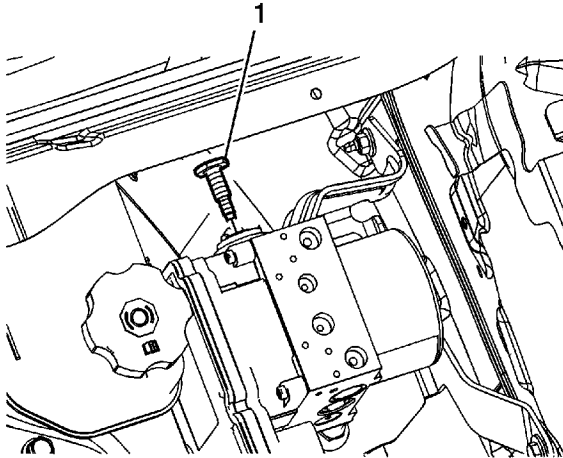
7. Connect the LF brake pipe fitting (1) to the BPMV and tighten to **21 N·m (16 lb ft)**.
8. Connect the RF brake pipe fitting (2) to the BPMV and tighten to **21 N·m (16 lb ft)**.
9. Connect the EBCM electrical connector.
10. Install the radiator surge tank. Refer to [Radiator Surge Tank Replacement](#).
11. Install the underhood electrical center. Refer to [Underhood Electrical Center or Junction Block Replacement](#).
12. Bleed the hydraulic brake system. Refer to [Hydraulic Brake System Bleeding](#).
13. Turn the ignition switch to the ON position.
14. Perform the [Diagnostic System Check - Vehicle](#).
15. Observe the brake pedal feel after performing the diagnostic system check. If the pedal now

If the pedal feels spongy, perform the [Antilock Brake System Automated Bleed Procedure](#).

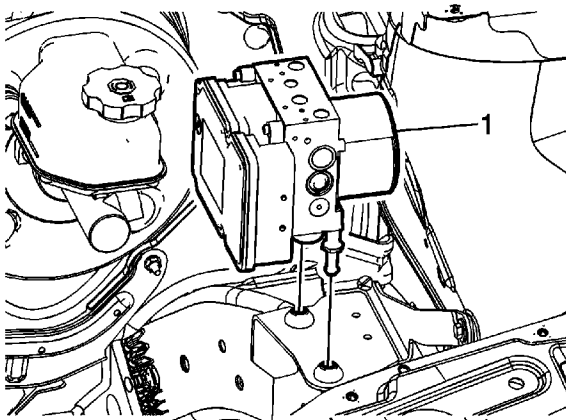
Brake Pressure Modulator Valve Bracket Replacement (Except Hybrid)

Removal Procedure

1. Place the ignition switch in the OFF position.
2. Remove the underhood electrical center. Refer to [Underhood Electrical Center or Junction Block Replacement](#).
3. Without draining the coolant or removing the hoses, remove and position aside the radiator surge tank. Refer to [Radiator Surge Tank Replacement](#).



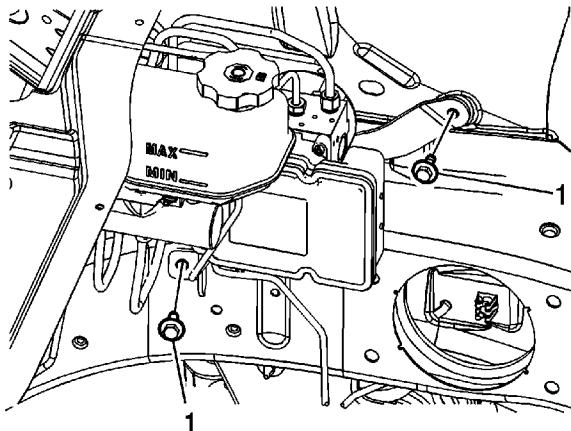
4. Remove the brake pressure modulator valve (BPMV) bolt (1).



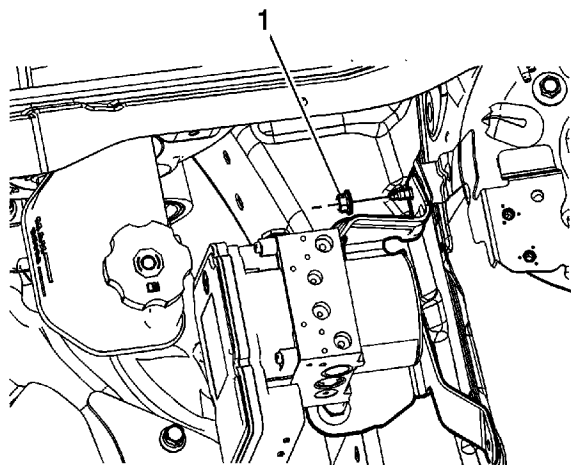
5. Without disconnecting the brake pipe fittings, carefully lift the BPMV assembly (1) upward to release the mounting pins from the BPMV bracket insulators.

Do not pry on the accumulator caps on the underside of the BPMV.

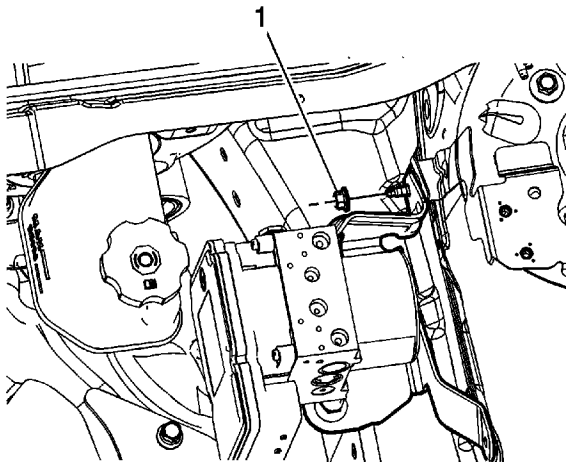
6. Position the BPMV assembly aside and secure with heavy mechanics wire or equivalent.



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

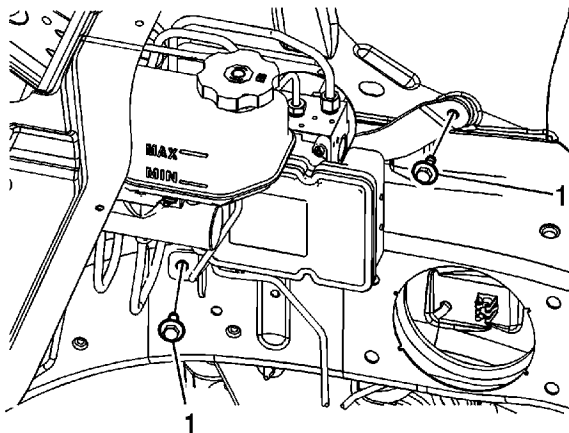


8. Remove the BPMV bracket nut (1) and the BPMV bracket.
9. Inspect the insulators for damage and replace, if necessary.

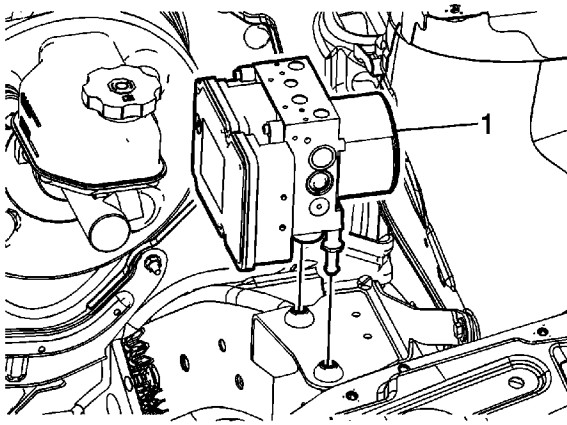


1. Install the BPMV bracket.
2. Loosely install the BPMV bracket nut (1).

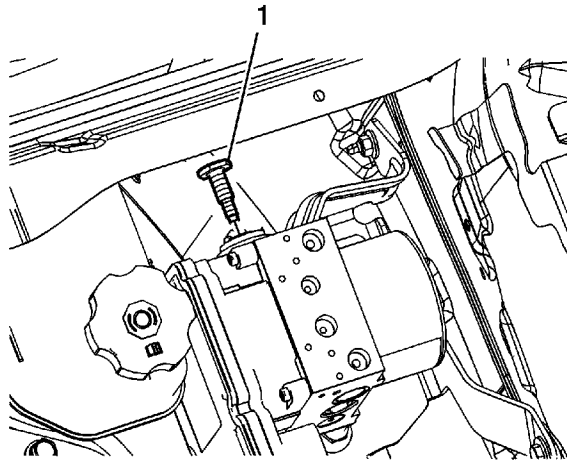
Caution: Refer to [Fastener Caution](#) in the Preface section.



3. Install the 2 BPMV bracket bolts (1) and tighten to **10 N·m (89 lb in)**.
4. Tighten the BPMV bracket nut to **10 N·m (89 lb in)**.

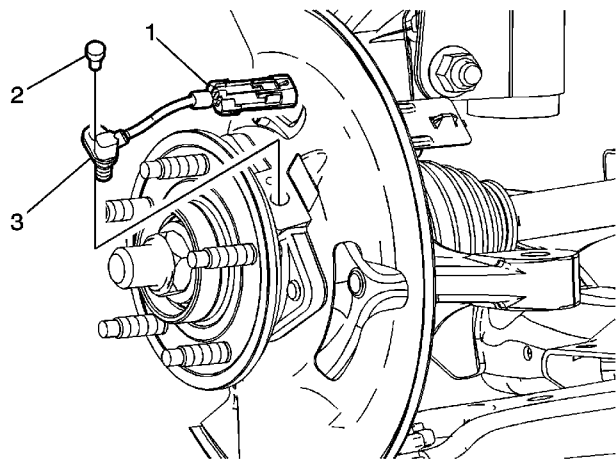


5. Carefully position the BPMV assembly (1) to the BPMV bracket insulators.



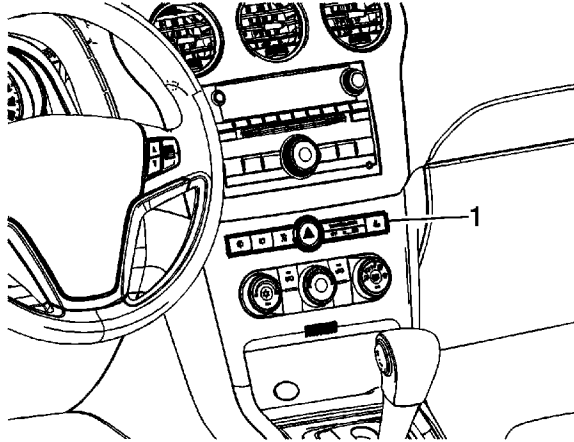
6. Install the BPMV bolt (1) and tighten to **10 N·m (89 lb in)**.
7. Install the radiator surge tank. Refer to [Radiator Surge Tank Replacement](#).
8. Install the underhood electrical center. Refer to [Underhood Electrical Center or Junction Block Replacement](#).

Front Wheel Speed Sensor Replacement



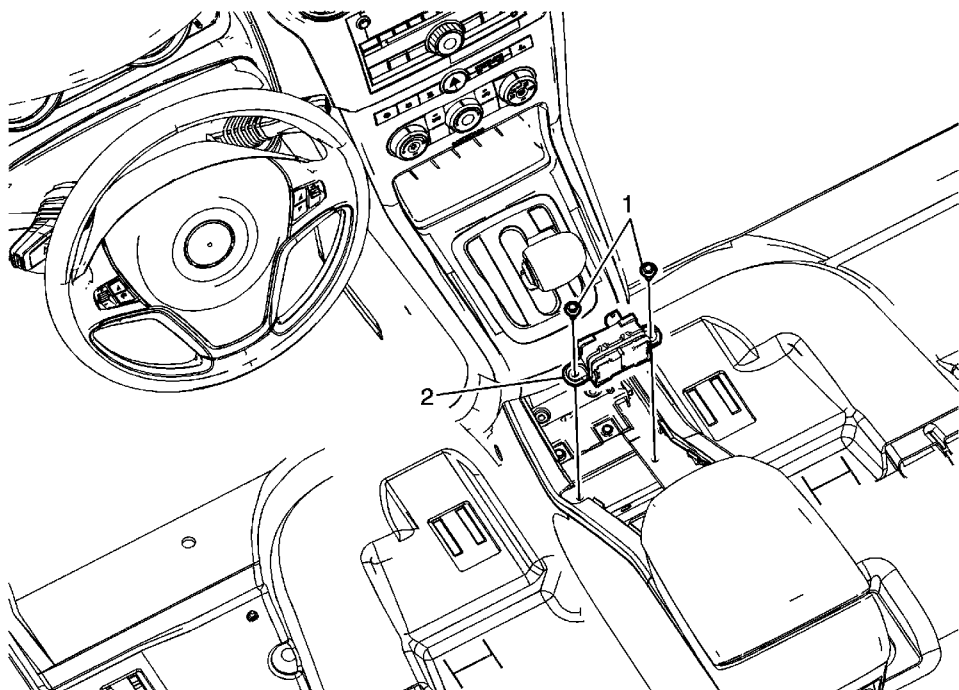
Callout	Component Name
Warning: Refer to Brake Dust Warning in the Preface section.	
Preliminary Procedures 1. Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle . 2. Remove the tire and wheel. Refer to Tire and Wheel Removal and Installation . 3. Remove the brake rotor. Refer to Front Brake Rotor Replacement .	
1	Wheel Speed Sensor Electrical Connector Procedure Release the electrical connector from the bracket.
2	Wheel Speed Sensor Bolt Caution: Refer to Fastener Caution in the Preface section. Tighten 8 N·m (71 lb in)
3	Wheel Speed Sensor Procedure Route the wheel speed sensor electrical harness through the splash shield.

Electronic Traction Control Switch Replacement



The electronic traction control switch (1) located in the driver information display assembly can not be serviced separately. Should the switch assembly need to be replaced, the entire driver information display assembly will need to be replaced. Refer to [Driver Information Display Switch Replacement](#) .

Vehicle Yaw Sensor Replacement



Callout	Component Name
Warning: Refer to SIR Warning in the Preface section.	
Preliminary Procedures	
<ol style="list-style-type: none">1. Disable the SIR system. Refer to SIR Disabling and Enabling.2. Remove front floor rear console. Refer to Front Floor Console Replacement.	
1	<p>Electronic Brake Control Vehicle Yaw Sensor Bolt (Qty: 2)</p> <p>Caution: Refer to Fastener Caution in the Preface section.</p> <p>Tighten 8 N·m (71 lb ft)</p>
2	<p>Electronic Brake Control Vehicle Yaw Sensor Assembly</p> <p>Procedure</p> <ol style="list-style-type: none">1. Remove the console bracket and bolts.2. Position the wire harness assembly out of the way.3. Disconnect any electrical connectors.

