

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Brake Pipe Fittings - Brake Pressure Modulator Valve Inlet	25 N·m	18 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
Vehicle Yaw Sensor and Lateral Accelerometer Nuts	9 N·m	80 lb in
Wheel Speed Sensor Bolt - Front	9 N·m	80 lb in
Wheel Speed Sensor Bolt - Rear	9 N·m	80 lb in

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: 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](#) 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 GM approved brake fluid from a clean, sealed brake fluid container. Refer to [Master Cylinder Reservoir Filling](#).
8. Bleed the hydraulic brake system. Refer to [Hydraulic Brake System Bleeding](#).
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.

Steering Angle Sensor Centering

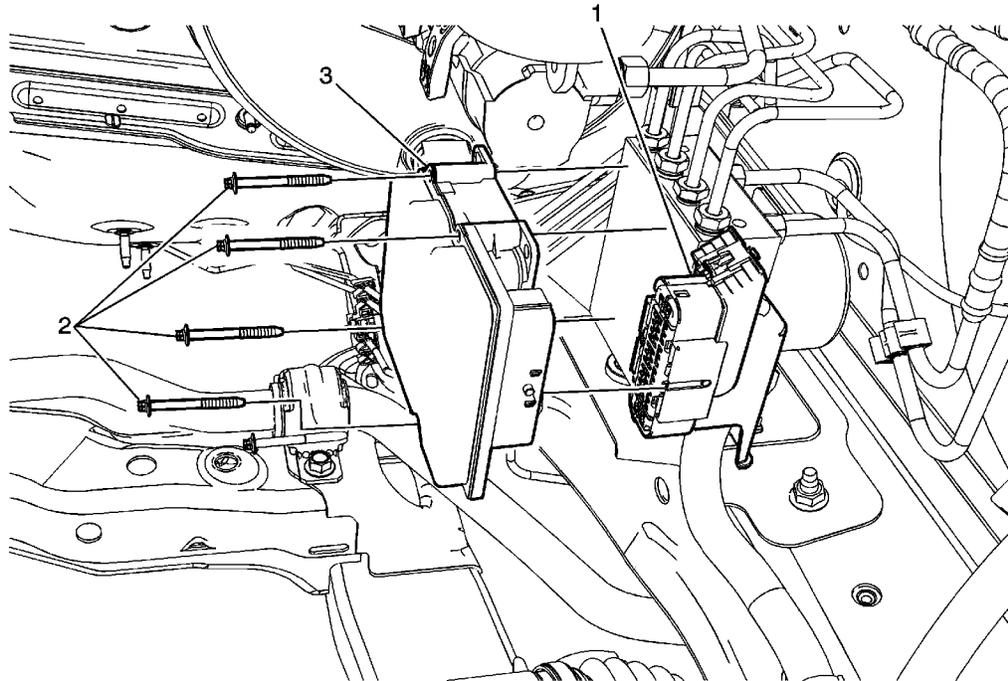
The steering angle sensor does not require centering often. Centering of the steering angle sensor might be required after certain service procedures are performed. Some of these procedures are as follows:

- 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



Callout	Component Name
<p>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.</p> <p>Preliminary Procedures</p> <ol style="list-style-type: none"> Turn the ignition switch to the OFF position. Remove the air cleaner assembly. Refer to Air Cleaner Assembly Replacement. Clean the electronic brake control module (EBCM) to brake pressure modulator valve (BPMV) area of any accumulated dirt and foreign material. 	
1	<p>Electronic Brake Control Module (EBCM) Electrical Connector</p> <p>Procedure</p> <p>Lift the EBCM electrical connector locking lever upward.</p>
2	<p>EBCM Bolt (Qty: 4)</p> <p>Caution: Refer to Fastener Caution in the Preface section.</p>

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	Tighten 3 N·m (27 lb in)
3	<p>EBCM</p> <p>Procedure</p> <ol style="list-style-type: none">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

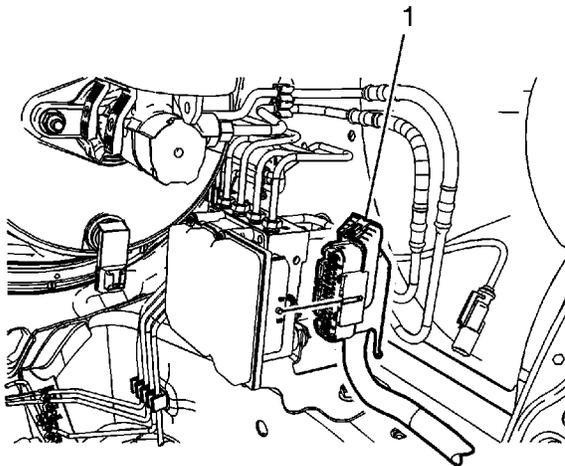
Removal Procedure

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

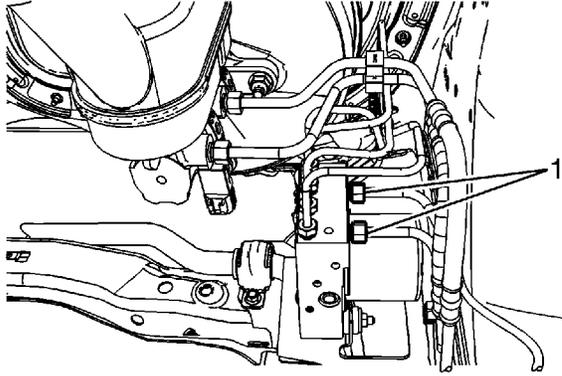
Caution: Refer to [Brake Fluid Effects on Paint and Electrical Components Caution](#) in the Preface section.

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 air cleaner assembly. Refer to [Air Cleaner Assembly Replacement](#).

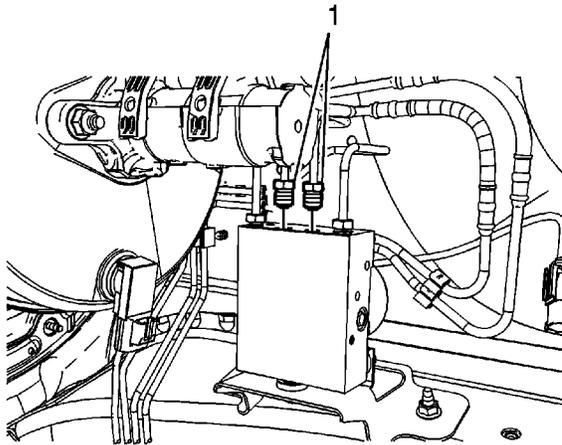


3. Disconnect the electronic brake control module (EBCM) electrical connector (1) by lifting the locking tabs.



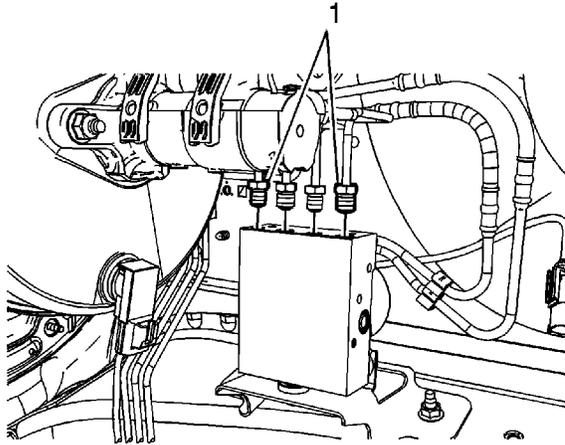
4. Disconnect the master cylinder inlet brake pipe fittings (1).

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



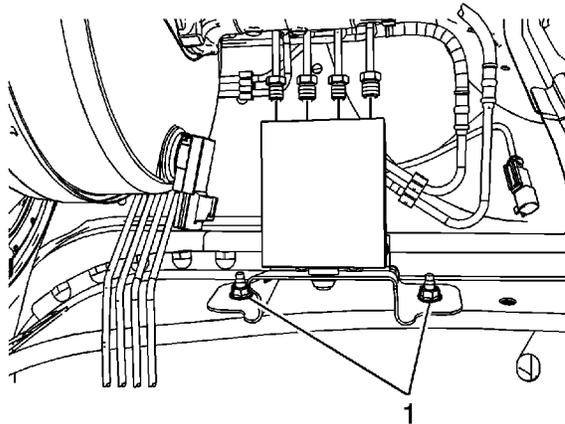
5. Disconnect the BPMV outlet port front brake pipe fittings (1).

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

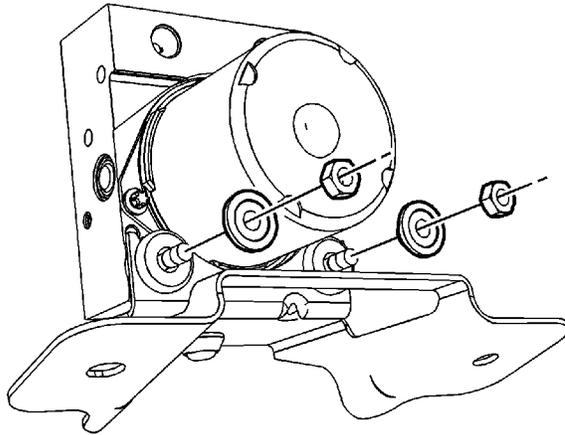


6. Disconnect the BPMV outlet port rear brake pipe fittings (1).

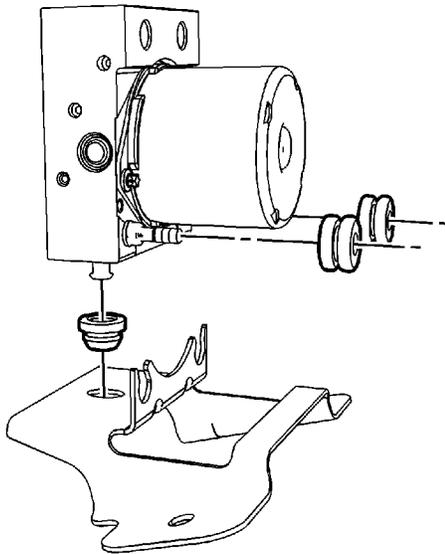
Cap the brake pipe fittings and plug the BPMV outlet ports to prevent brake fluid loss and contamination.



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



9. Remove the 2 BPMV insulator nuts and washers.



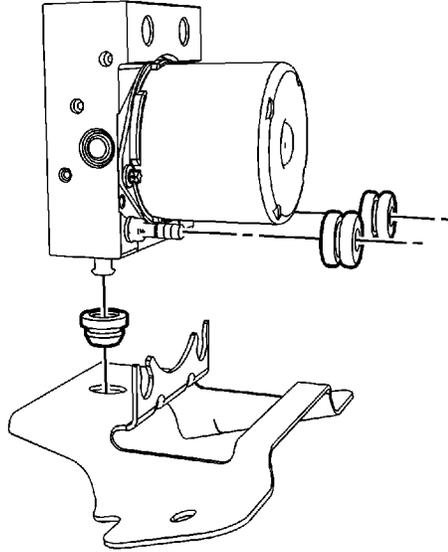
10. Carefully remove the BPMV from the bracket by pulling upward.
11. Remove the 2 BPMV insulators.

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



1. Install the 2 BPMV insulators to the BPMV.

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

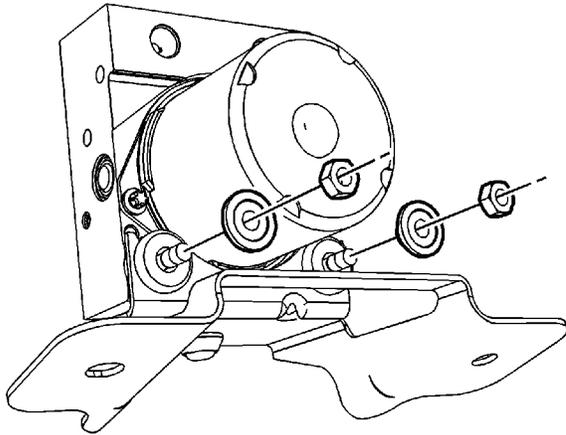
2. Install the lower BPMV insulator to the bracket.

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.

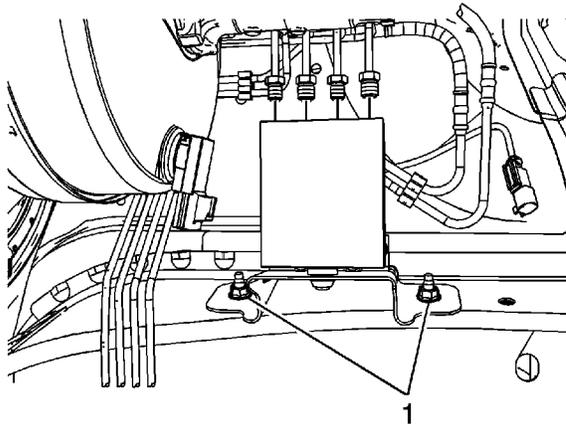
Caution: Refer to [Fastener Caution](#) in the Preface section.



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

Tighten

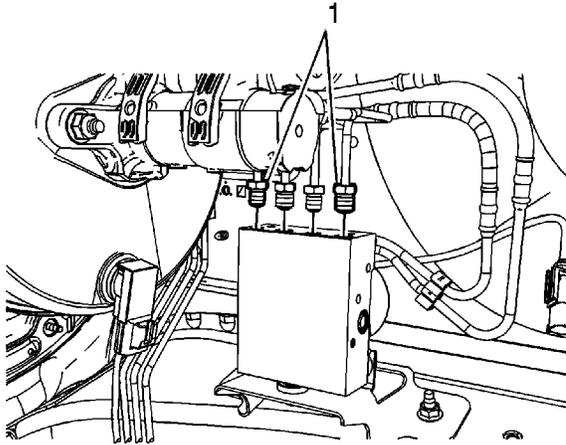
Tighten the nuts to 8 N·m (71 lb in).



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

Tighten

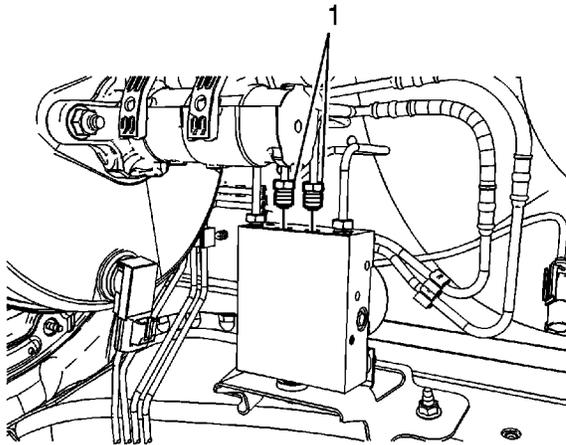
Tighten the nuts to 20 N·m (15 lb ft).



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

Tighten

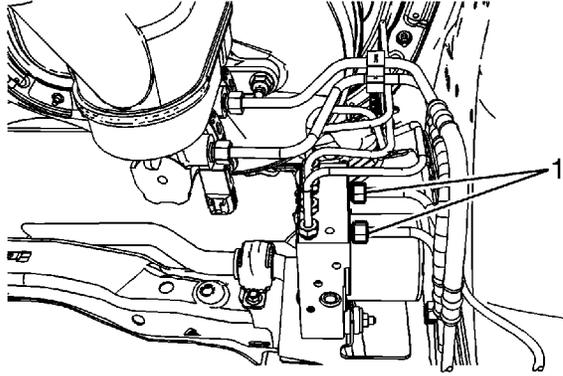
Tighten the fittings to 17 N·m (13 lb ft).



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

Tighten

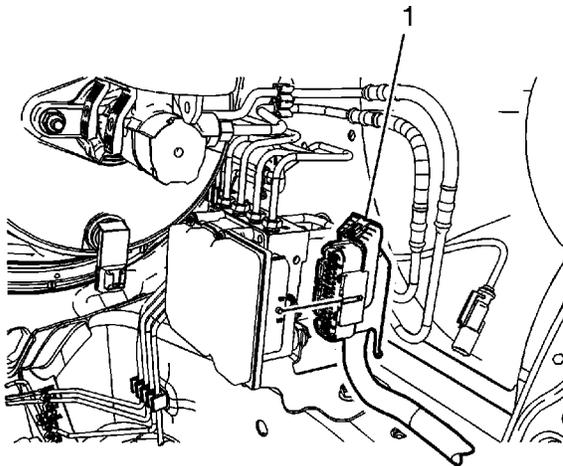
Tighten the fittings to 17 N·m (13 lb ft).



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

Tighten

Tighten the fittings to 25 N·m (18 lb ft).



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](#) .

12. Perform the [Diagnostic System Check - Vehicle](#).

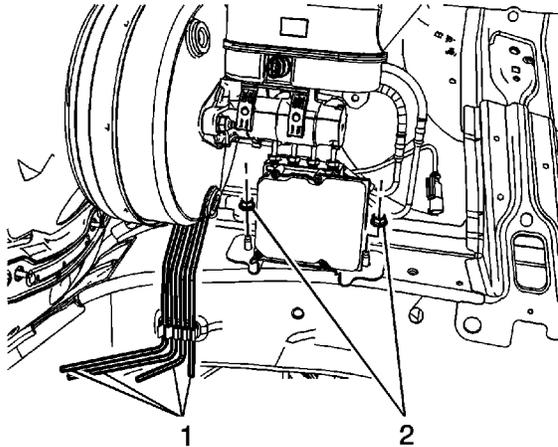
13. Observe the brake pedal feel after performing the diagnostic system check. If the pedal now feels spongy, air may have been in, or may have been introduced into the primary circuit.

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

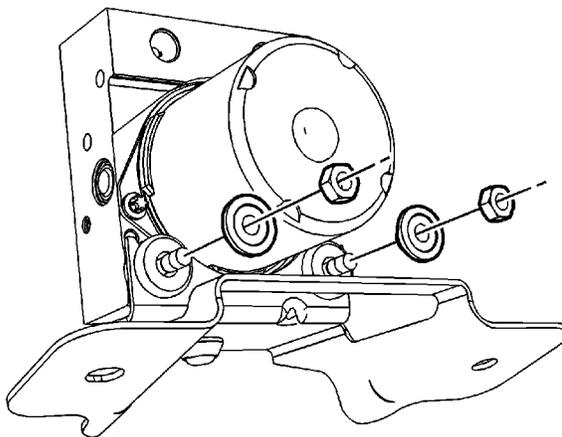
14. Install the air cleaner assembly. Refer to [Air Cleaner Assembly Replacement](#).

Brake Pressure Modulator Valve Bracket Replacement

Removal Procedure

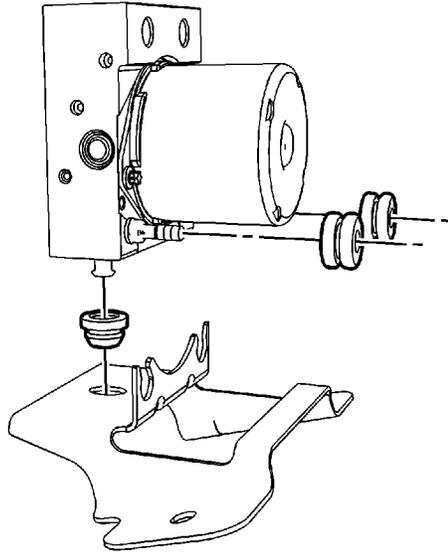


1. Remove the air cleaner assembly. Refer to [Air Cleaner Assembly Replacement](#).
2. Release the front and rear brake pipes (1) from the routing clip on the frame rail.
3. Remove the 2 brake pressure modulator valve (BPMV) bracket nuts (2).



4. Remove the 2 BPMV nuts and washers.

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



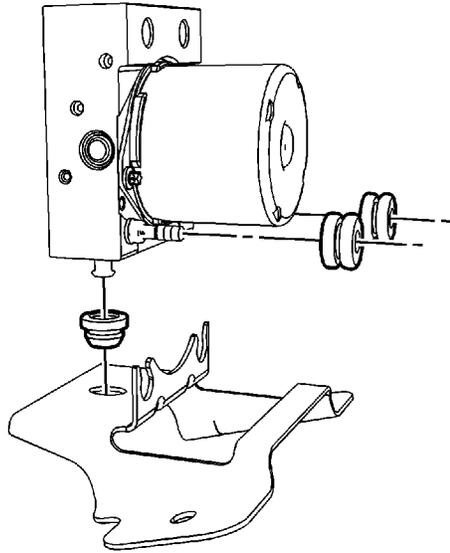
5. Carefully lift the BPMV assembly upward to release the BPMV from the bracket.
6. Remove the BPMV bracket.
7. Remove the 2 upper BPMV bracket insulators.

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



1. Install the lower BPMV bracket insulator.

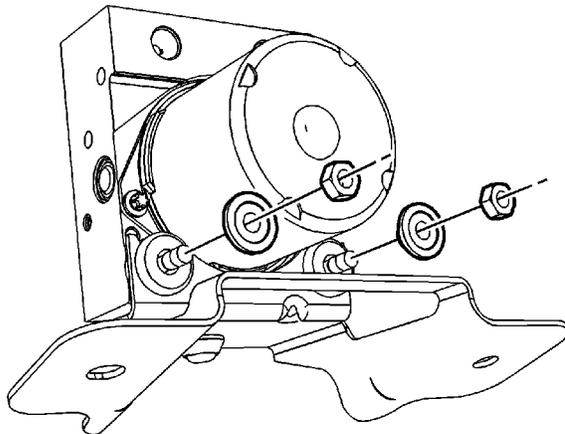
Use denatured alcohol on the BPMV bracket insulator as an installation aid, if necessary.

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.

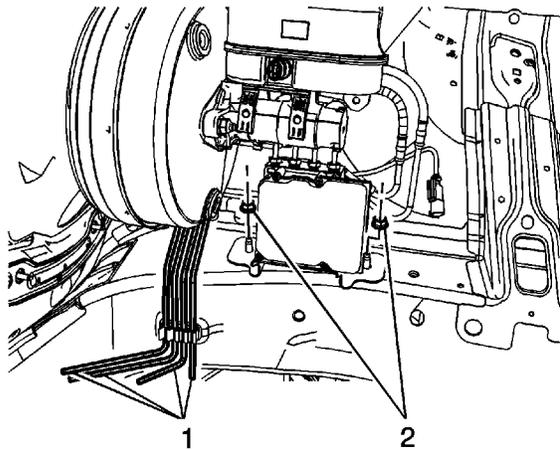
Caution: Refer to [Fastener Caution](#) in the Preface section.



4. Install the 2 BPMV washers and nuts.

Tighten

Tighten the nuts to 8 N·m (71 lb in).



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](#).

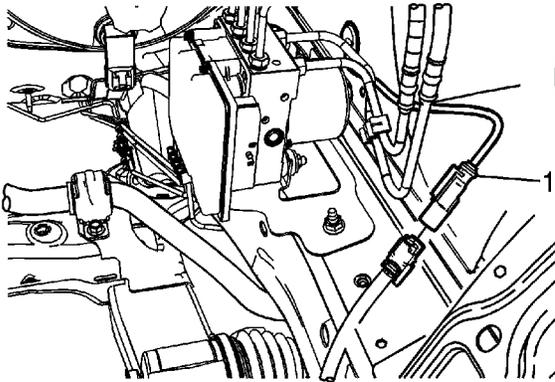
Front Wheel Speed Sensor Replacement

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

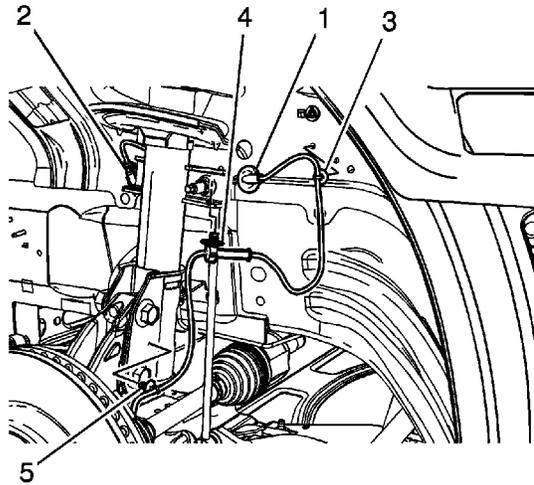
Note: If replacing the wheel speed sensor due to a DTC, inspect the back of the wheel bearing on the encoder surface for metallic chips or metal shavings. If metallic debris is found, clean the encoder surface to prevent interference with the wheel speed sensor signal and setting of a DTC. Refer to [Diagnostic System Check - Vehicle](#) to verify and clear the DTC.

Removal Procedure

1. If replacing the left front wheel speed sensor, remove the air cleaner element. Refer to [Air Cleaner Element Replacement](#).
2. If replacing the right front wheel speed sensor, disconnect and position aside the battery positive junction block cables. Refer to [Battery Positive Junction Block Cable Replacement](#).

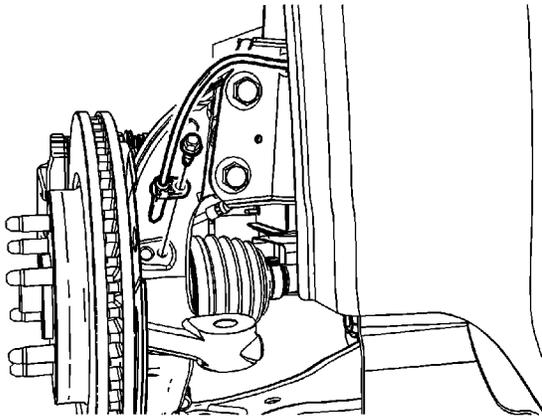


3. Disconnect the wheel speed sensor electrical connector (1).
4. Raise and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#).
5. Remove the tire and wheel assembly. Refer to [Tire and Wheel Removal and Installation](#).



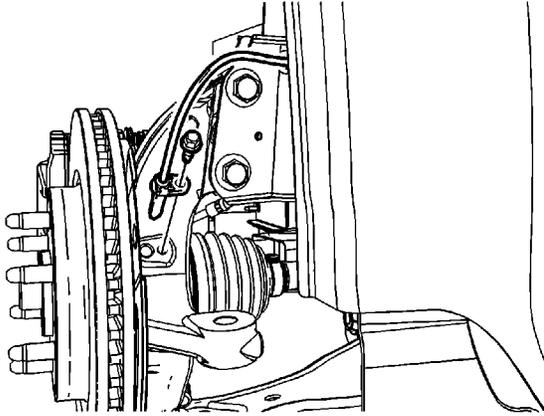
6. Release the wheel speed sensor wire grommet (1) from the wheelhouse.
7. Carefully pull the wheel speed sensor wire and connector (2) through the wheel house.
8. Release the wheel speed sensor wire harness routing clip (3) from the wheel house.
9. Release the wheel speed sensor wire harness routing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

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



10. Remove the wheel speed sensor bolt.
11. Pull the wheel speed sensor straight up and out of the steering knuckle.

Installation Procedure



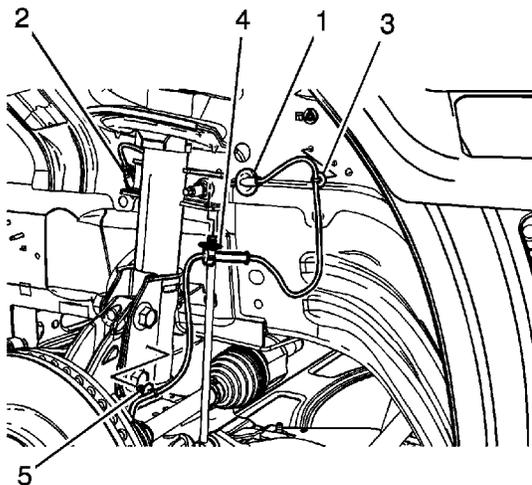
1. Install the wheel speed sensor to the steering knuckle.

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

2. Install the wheel speed sensor bolt.

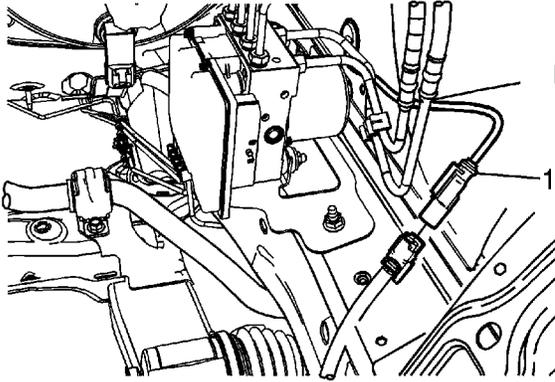
Tighten

Tighten the bolt to 9 N·m (80 lb in).





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.



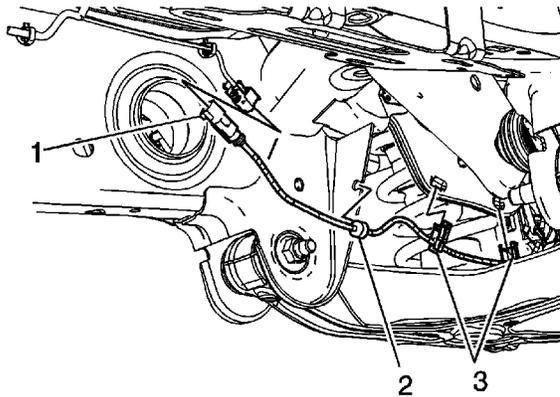
6. Connect the wheel speed sensor electrical connector (1).
7. Install the tire and wheel assembly. Refer to [Tire and Wheel Removal and Installation](#).
8. If replacing the right front wheel speed sensor, connect the battery positive junction block cables. Refer to [Battery Positive Junction Block Cable Replacement](#).
9. If replacing the left front wheel speed sensor, install the air cleaner element. Refer to [Air Cleaner Element Replacement](#).
10. Perform the [Diagnostic System Check - Vehicle](#).

Rear Wheel Speed Sensor Replacement

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

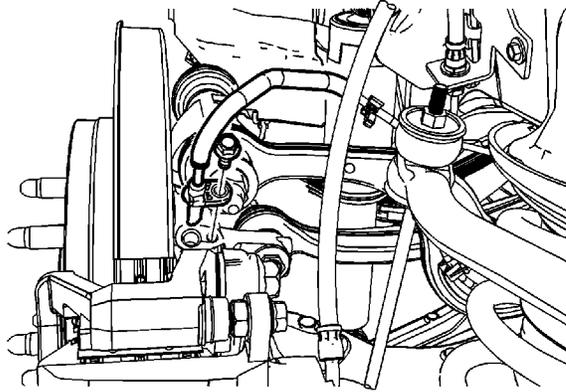
Note: If replacing the wheel speed sensor due to a DTC, inspect the back of the wheel bearing on the encoder surface for metallic chips or metal shavings. If metallic debris is found, clean the encoder surface to prevent interference with the wheel speed sensor signal and setting of a DTC. Refer to [Diagnostic System Check - Vehicle](#) to verify and clear the DTC.

Removal Procedure



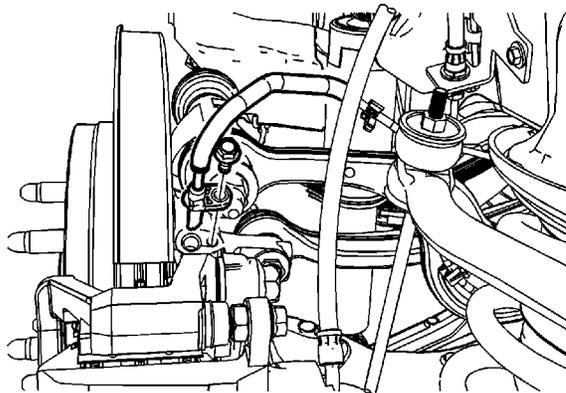
1. Raise and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#).
2. Remove the tire and wheel assembly. Refer to [Tire and Wheel Removal and Installation](#).
3. Disconnect the wheel speed sensor electrical connector (1).
4. Release the wheel speed sensor wire harness grommet (2) from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

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



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

Installation Procedure



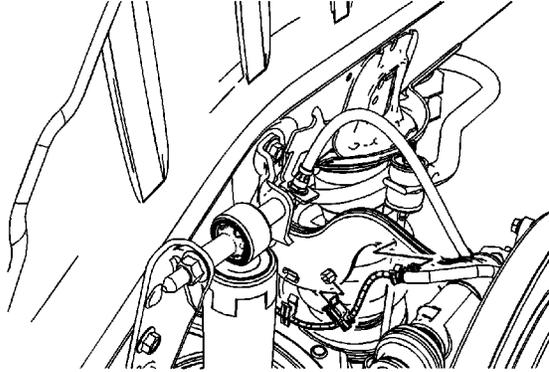
1. Install the wheel speed sensor to the wheel knuckle.

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

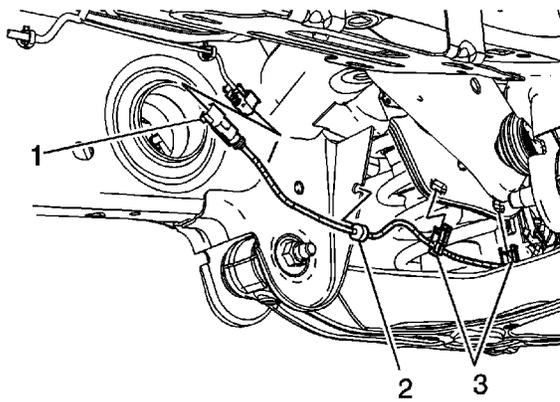
2. Install the wheel speed sensor bolt.

Tighten

Tighten the bolt to 9 N·m (80 lb in).

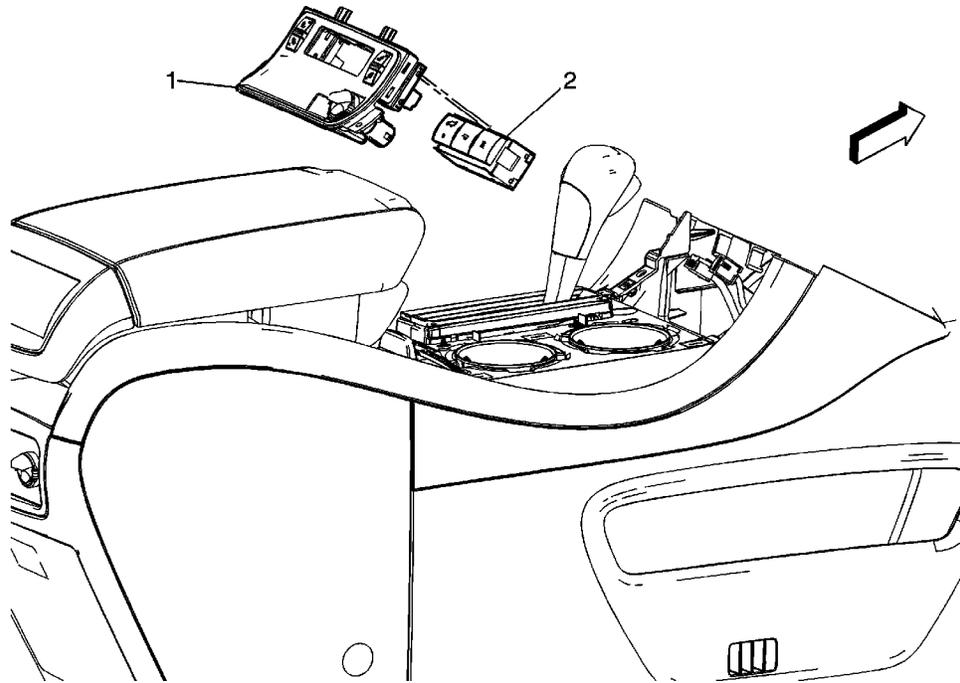


3. Install the wheel speed sensor wire harness routing clips to the upper suspension link.



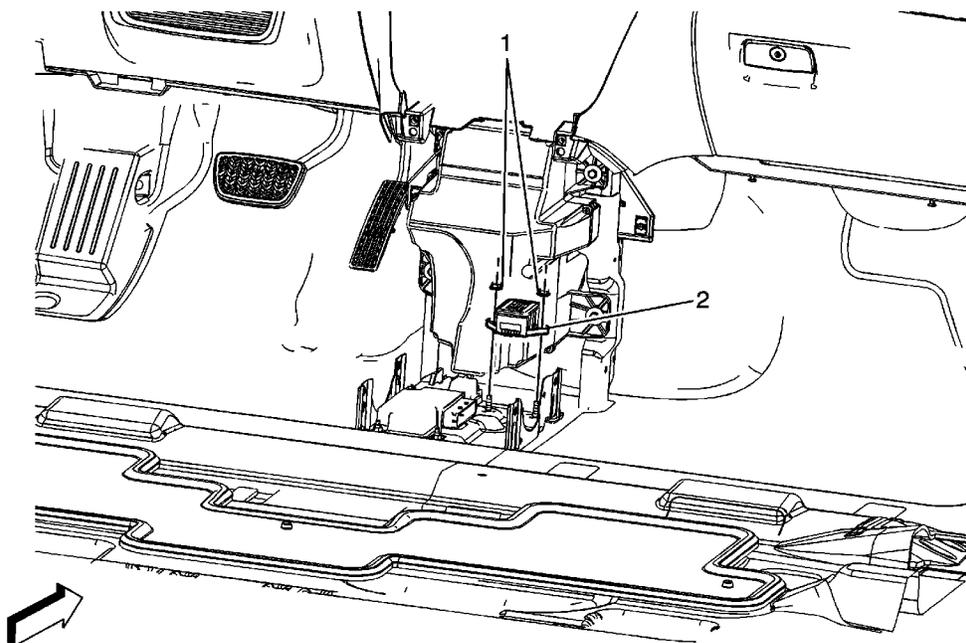
4. Install the wheel speed sensor wire harness routing clips (3) to the upper suspension link.
5. Install the wheel speed sensor wire harness grommet (2) to the lower control arm bracket.
6. Connect the wheel speed sensor electrical connector (1).
7. Install the tire and wheel assembly. Refer to [Tire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

Electronic Traction Control Switch Replacement



Callout	Component Name
1	Front Floor Console Accessory Housing Refer to Front Floor Console Accessory Housing Replacement .
2	Accessory Switch Assembly Procedure Disconnect the electrical connector.

Vehicle Yaw Sensor with Vehicle Lateral Accelerometer Replacement



Callout	Component Name
<p>Warning: Refer to SIR Warning in the Preface section.</p>	
<p>Preliminary Procedures</p>	
<p>1. Disable the SIR system. Refer to SIR Disabling and Enabling. 2. Remove front floor console. Refer to Front Floor Console Replacement.</p>	
<p>1</p>	<p>Vehicle Yaw Sensor and Lateral Accelerometer Nut (Qty: 2)</p> <p>Caution: Refer to Fastener Caution in the Preface section.</p> <p>Tighten 9 N·m (80 lb ft)</p>
<p>2</p>	<p>Vehicle Yaw with Vehicle Lateral Accelerometer Sensor Assembly</p> <p>Procedure</p> <p>Disconnect the electrical connector.</p>