Fastener Tightening Specifications

Application	Specification	
	Metric	English
BPMV Bracket Bolt	25 N·m	18 lb ft
BPMV Shield Bolt	25 N·m	18 lb ft
BPMV Shield Nut	25 N·m	18 lb ft
Brake Pipe Fitting	25 N·m	18 lb ft
Brake Pressure Modulator Valve (BPMV) Bolt	11 N·m	97 lb in
Electronic Brake Control Module (EBCM) Bolt	3 N·m	27 lb in
Wheel Speed Sensor Bolt - Front	18 N·m	13 lb ft
Wheel Speed Sensor Bolt - Rear	14 N·m	124 lb in
Yaw Rate Sensor with Lateral Accelerometer Nut	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:

- Before performing the ABS Automated Bleed Procedure, first perform a manual or pressure bleed of the base hydraulic brake system. Refer to Hydraulic Brake System Bleeding.
- The automated bleed procedure must be performed when a new brake pressure modulator valve (BPMV) is installed, because the secondary circuits of the new BPMV are not prefilled with brake fluid.
- 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 away from the brake modulator assembly, which is then forced out at the brake corners by the pressure bleeder.

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 the 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. Prepare the brake bleeding equipment and the vehicle for a pressure bleed of the base hydraulic brake system. Refer to Hydraulic Brake System Bleeding.
6. Inspect the battery state of charge. Refer to Battery Inspection/Test.
7. Install a scan tool.
8. Turn the ignition ON, with the engine OFF.
9. With the scan tool, perform the following steps:
   - 9.1. Select Diagnostics
   - 9.2. Select the appropriate vehicle information
   - 9.3. Select Chassis

9.4. Select Electronic Brake Control Module (EBCM)
9.5. Select Special Functions
9.6. Select Automated Bleed

10. With an assistant ready, raise and support the vehicle. Refer to Lifting and Jacking the Vehicle.

Note:

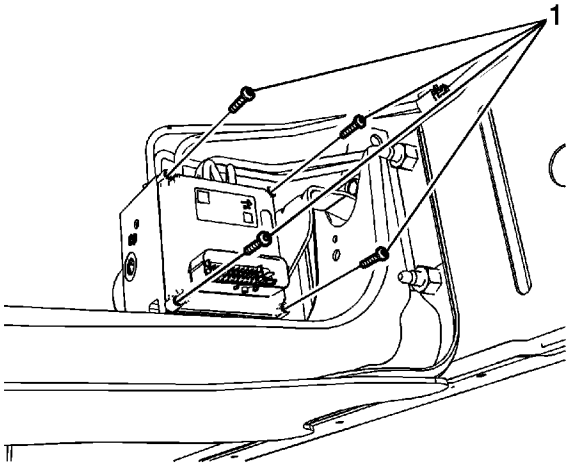
- Apply the brake pedal when instructed, using moderate effort.
- Ensure the pedal remains applied until instructed to release by the scan tool.
- Do not exceed the time period allowed by the scan tool for having the bleeder valves open.
- The bleed sequence for each corner is as follows:
  - Left front
  - Right front
  - Right rear
  - Left rear

11. Perform the automated bleed procedure as instructed by the scan tool.
12. If the automated bleed procedure is aborted, a malfunction exists. If a DTC is detected, refer to Diagnostic Trouble Code (DTC) List - Vehicle to diagnose the DTC.
13. After completion of the automated bleed procedure, press and hold the brake pedal to inspect for pedal firmness.
14. If the brake pedal feels spongy, repeat the bleed procedure completely.
15. Remove the scan tool.
16. Install the tire and wheel assemblies. Refer to Tire and Wheel Removal and Installation.
17. Lower the vehicle.
18. Adjust the brake fluid level. Refer to Master Cylinder Reservoir Filling.
19. Road test the vehicle while confirming the brake pedal remains high and firm.

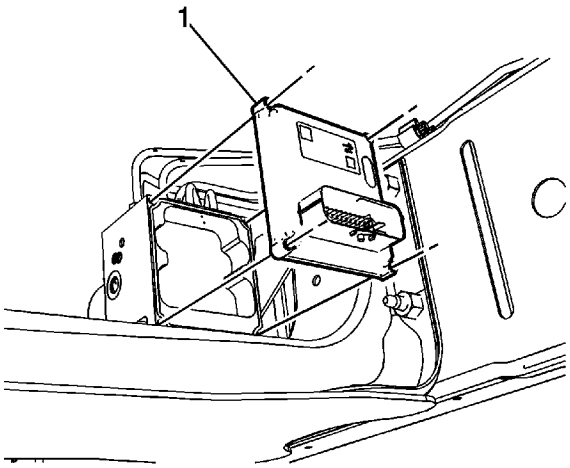
Electronic Brake Control Module Replacement

Removal Procedure

1. Disconnect the negative battery cable. Refer to Battery Negative Cable Disconnection and Connection.
2. Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle.
3. Remove the brake modulator shield mounting nuts, if equipped.
4. Remove the brake modulator shield mounting bolt and the brake modulator shield, if equipped.
5. Remove all dirt and debris from the electronic brake control module (EBCM) and the brake pressure modulator valve (BPMV) before loosening or removing any of the components.
6. Disconnect the electrical connector from the EBCM.

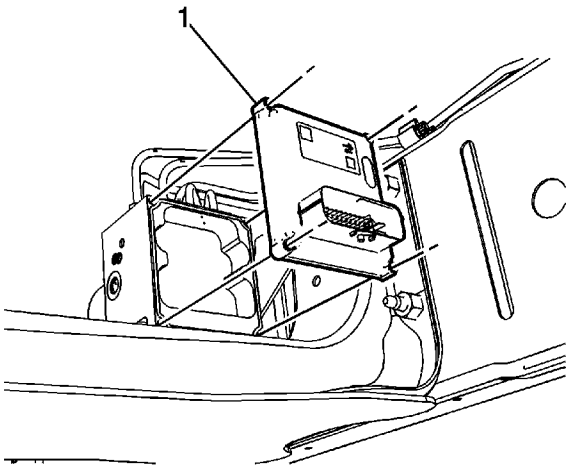


7. Remove and discard the EBCM bolts (1).



8. Carefully remove the EBCM (1) from the BPMV.
9. Clean the sealing surface of the BPMV using denatured alcohol and a clean shop cloth.

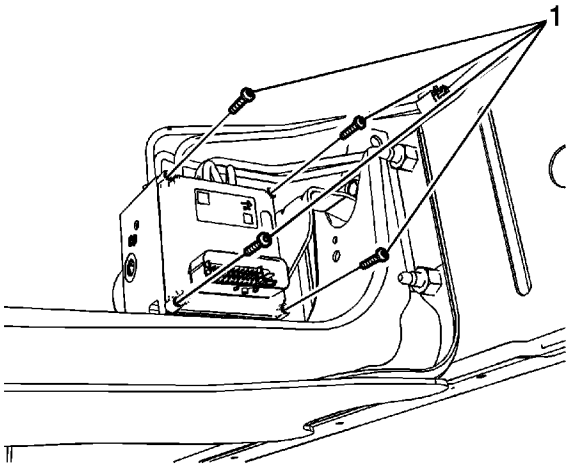
Installation Procedure



1. Carefully align and install the EBCM (1) to the BPMV.

   Do not force the components together.

   Caution: Refer to Fastener Caution in the Preface section.



2. Install new EBCM bolts (1).

   Tighten the bolts in a cross pattern to **3 N·m (27 lb in)**.

3. Connect the electrical connector to the EBCM.
4. Install the brake modulator shield and the mounting nuts, if equipped, and tighten to **25 N·m (18 lb ft)**.
5. Install the brake modulator shield mounting bolt and tighten to **25 N·m (18 lb ft)**.
6. Lower the vehicle.
7. Connect the negative battery cable. Refer to Battery Negative Cable Disconnection and Connection.
8. Refer to Control Module References for programming and setup information.

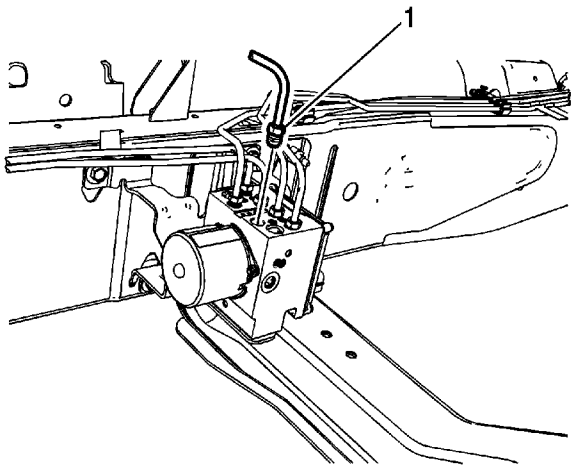
Brake Pressure Modulator Valve Replacement (With JL4)

Removal Procedure

Warning: Refer to Brake Fluid Irritant Warning in the Preface section.

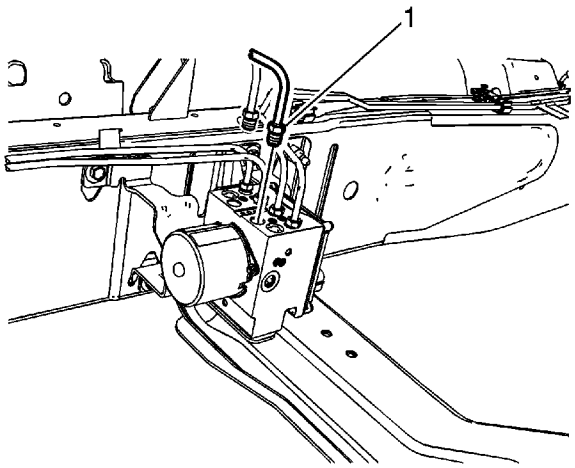
Caution: Refer to Brake Fluid Effects on Paint and Electrical Components Caution in the Preface section.

1. Disconnect the negative battery cable. Refer to Battery Negative Cable Disconnection and Connection.
2. Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle.
3. Remove the 2 brake modulator shield mounting nuts, if equipped.
4. Remove the brake modulator shield mounting bolt and the shield.
5. Remove all dirt and debris from the electronic brake control module (EBCM) and the brake pressure modulator valve (BPMV) before loosening or removing any of the components.
6. Disconnect the electrical connector from the EBCM.
7. If equipped with AWD, remove the LF suspension torsion bar. Refer to Torsion Bar and Support Assembly Replacement.



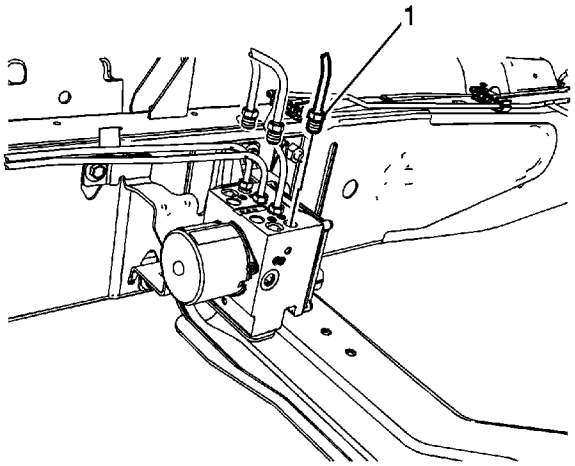
8. Disconnect the rear master cylinder brake pipe fitting (1).

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



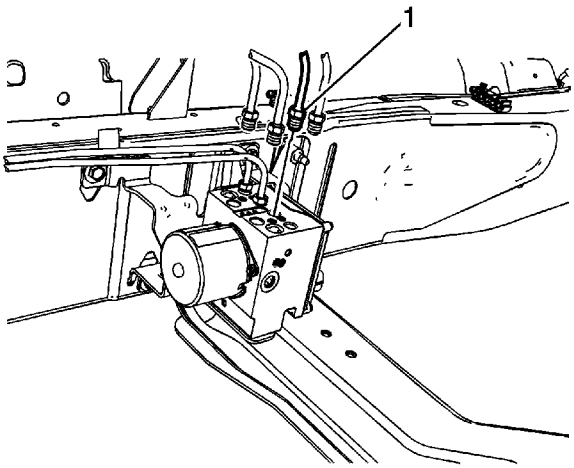
9. Disconnect the front master cylinder brake pipe fitting (1).

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



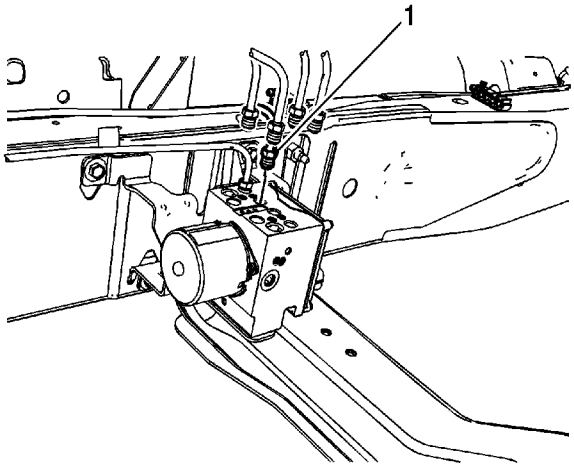
10. Disconnect the LF brake pipe fitting (1).

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



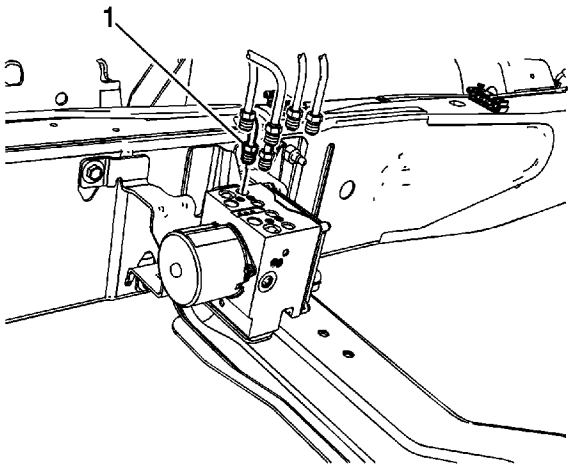
11. Disconnect the RF brake pipe fitting (1).

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



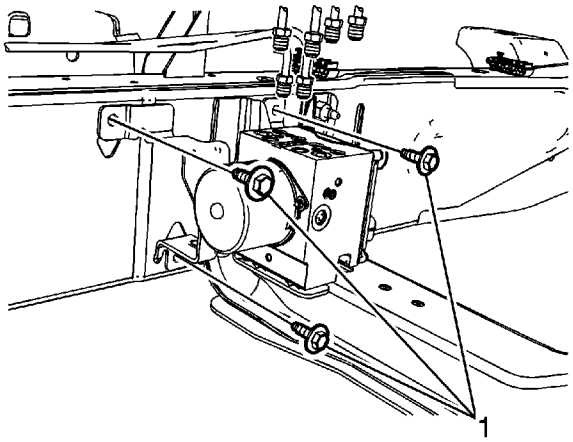
12. Disconnect the LR brake pipe fitting (1).

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

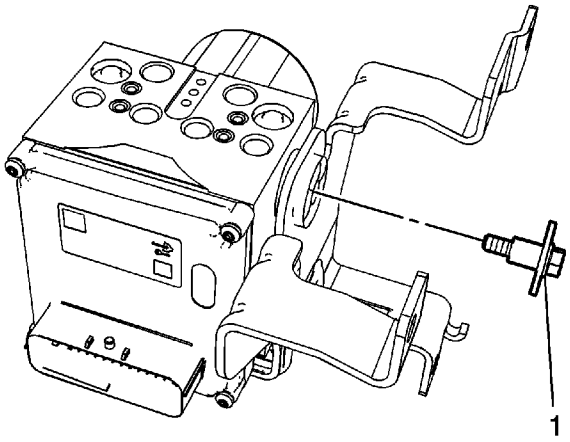


13. Disconnect the RR brake pipe fitting (1).

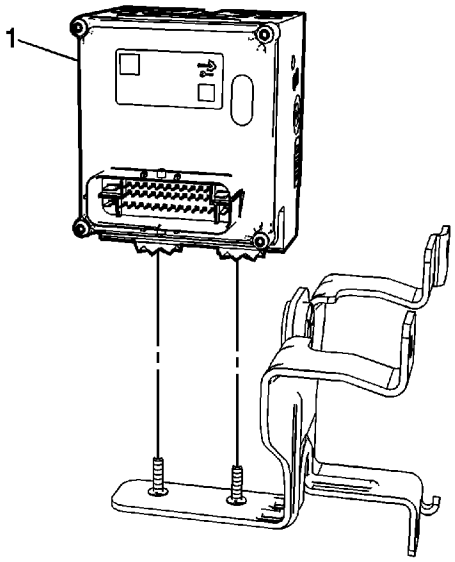
    Cap the brake pipe fitting and plug the BPMV outlet port to prevent brake fluid loss and contamination.



14. Remove the BPMV bracket bolts (1).
15. Remove the BPMV and bracket assembly from the vehicle.

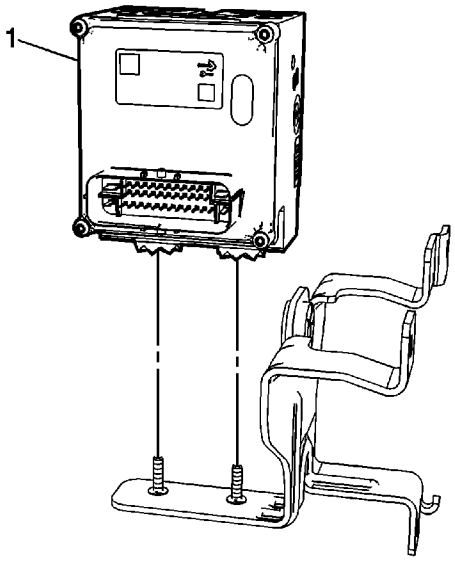


16. Remove the BPMV bolt (1).



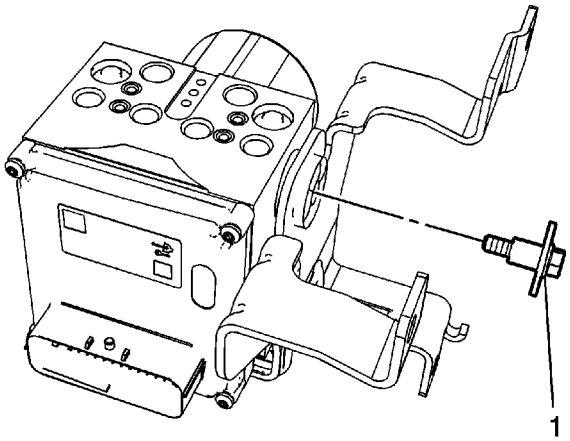
17. Remove the BPMV assembly (1) from the bracket.
18. If installing a new BPMV, remove the EBCM. Refer to Electronic Brake Control Module Replacement.

Installation Procedure

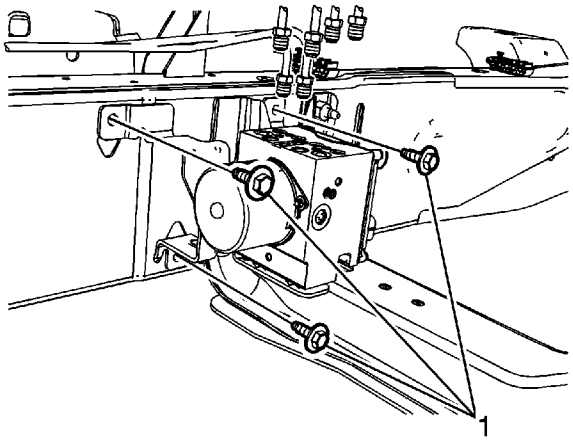


1. Install the EBCM, if removed. Refer to Electronic Brake Control Module Replacement.
2. Install the BPMV assembly (1) to the bracket.

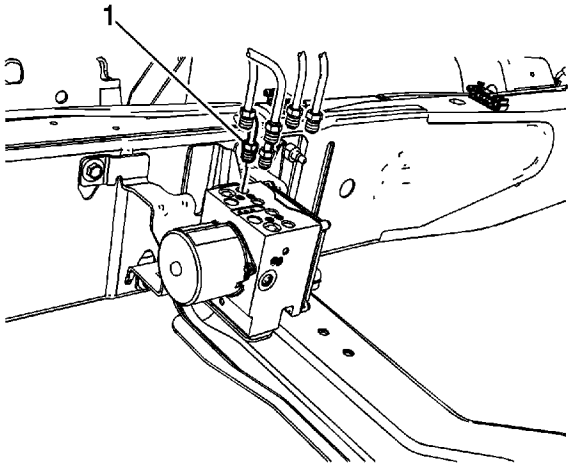
Caution: Refer to Fastener Caution in the Preface section.



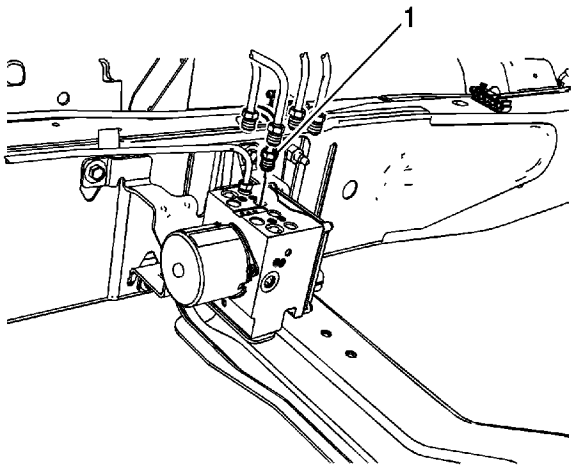
3. Install the BPMV bolt (1) and tighten to **11 N·m (97 lb in)**.



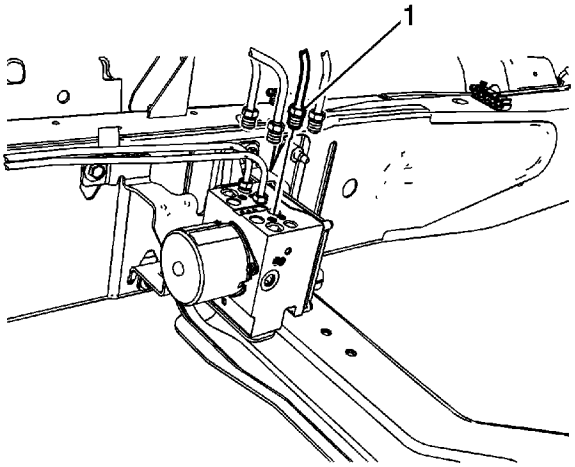
4. Install the BPMV and bracket assembly to the vehicle.
5. Install the BPMV bracket bolts (1) and tighten to **25 N·m (18 lb ft)**.



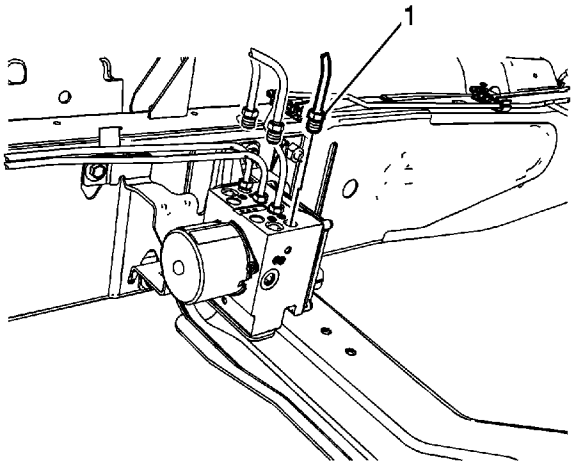
6. Connect the RR brake pipe fitting (1) and tighten to **25 N·m (18 lb ft)**.



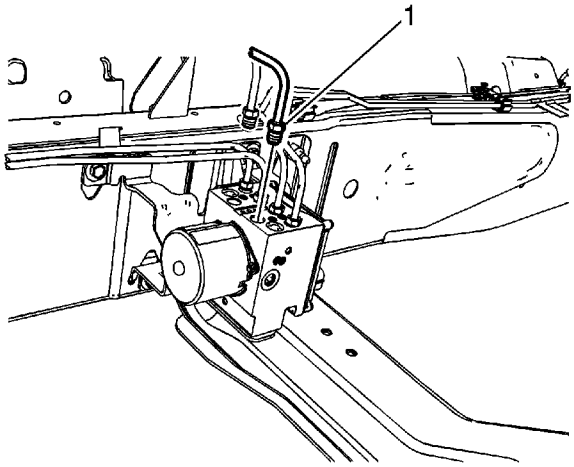
7. Connect the LR brake pipe fitting (1) and tighten to **25 N·m (18 lb ft)**.



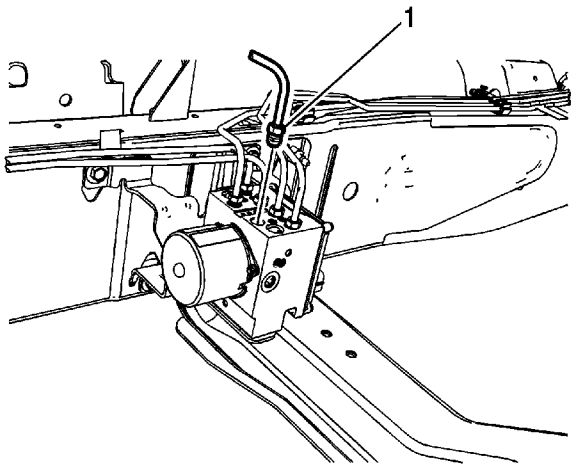
8. Connect the RF brake pipe fitting (1) and tighten to **25 N·m (18 lb ft)**.



9. Connect the LF brake pipe fitting (1) and tighten to **25 N·m (18 lb ft)**.



10. Connect the front master cylinder brake pipe fitting (1) and tighten to **25 N·m (18 lb ft)**.



11. Connect the rear master cylinder brake pipe fitting (1) and tighten to **25 N·m (18 lb ft)**.
12. Install the brake modulator shield, if equipped.
13. Install the brake modulator shield bolt and tighten to **25 N·m (18 lb ft)**.
14. Install the 2 brake modulator shield nuts and tighten to **25 N·m (18 lb ft)**.
15. If equipped with AWD, install the LF suspension torsion bar. Refer to Torsion Bar and Support Assembly Replacement.
16. Connect the negative battery cable. Refer to Battery Negative Cable Disconnection and Connection.
17. Bleed the antilock brake system. Refer to Antilock Brake System Automated Bleed Procedure.

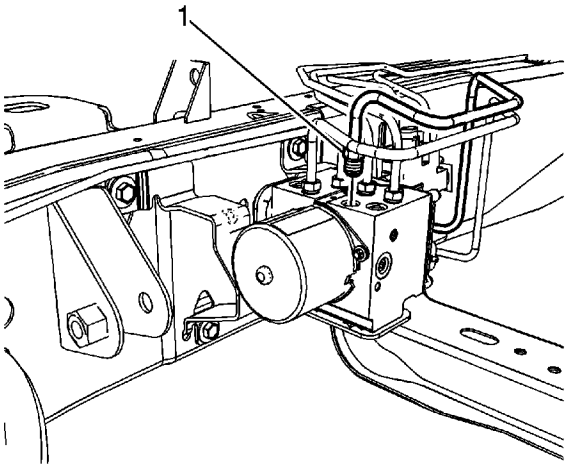
Brake Pressure Modulator Valve Replacement (Without JL4)

Removal Procedure

Warning: Refer to Brake Fluid Irritant Warning in the Preface section.

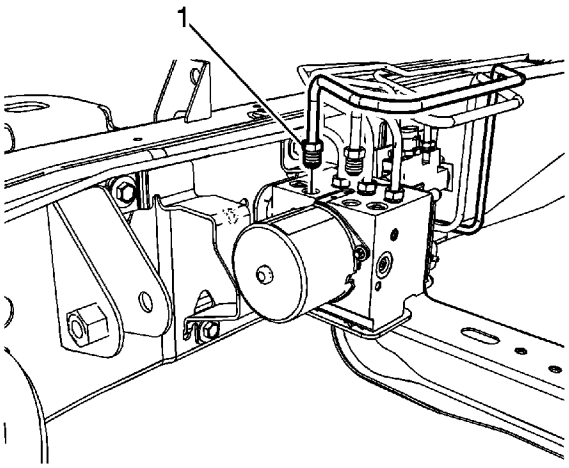
Caution: Refer to Brake Fluid Effects on Paint and Electrical Components Caution in the Preface section.

1. Disconnect the negative battery cable. Refer to Battery Negative Cable Disconnection and Connection.
2. Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle.
3. Remove the 2 brake modulator shield mounting nuts, if equipped.
4. Remove the brake modulator shield bolt and the brake modulator shield.
5. Remove all dirt and debris from the electronic brake control module (EBCM) and the brake pressure modulator valve (BPMV) before loosening or removing any of the components.
6. Disconnect the electrical connector from the EBCM.
7. If equipped with AWD, remove the LF suspension torsion bar. Refer to Torsion Bar and Support Assembly Replacement.



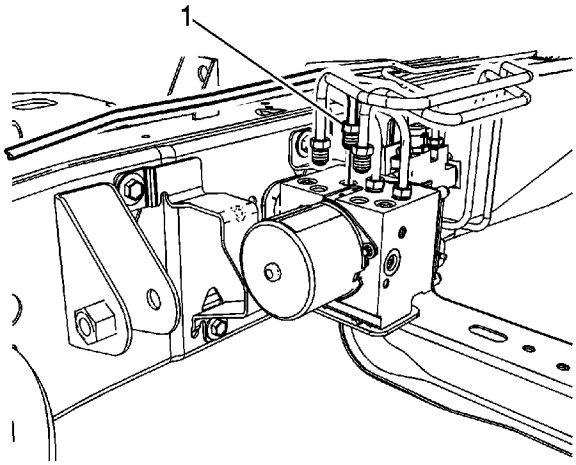
8. Disconnect the front master cylinder brake pipe fitting (1).

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



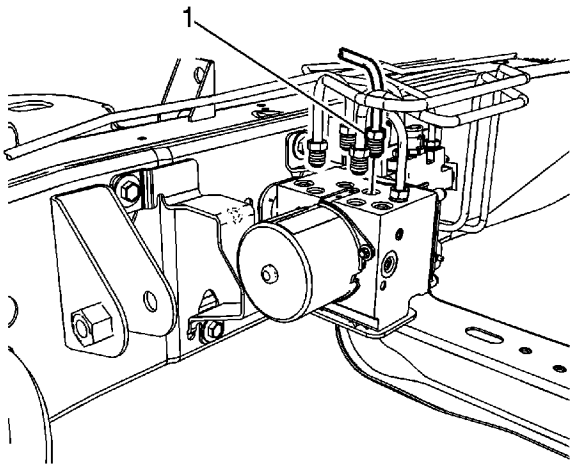
9. Disconnect the rear master cylinder brake pipe fitting (1).

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



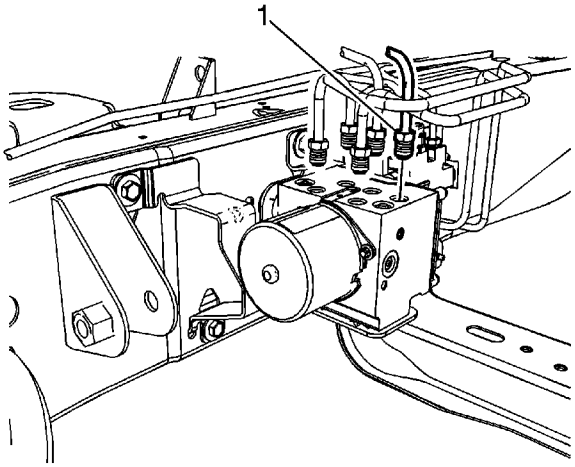
10. Disconnect the rear brake pipe fitting (1).

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



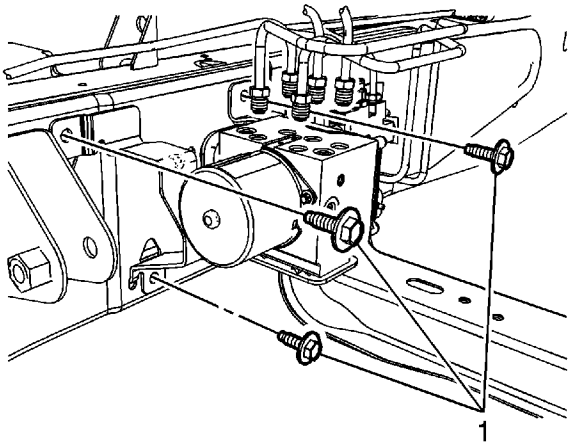
11. Disconnect the RF brake pipe fitting (1).

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

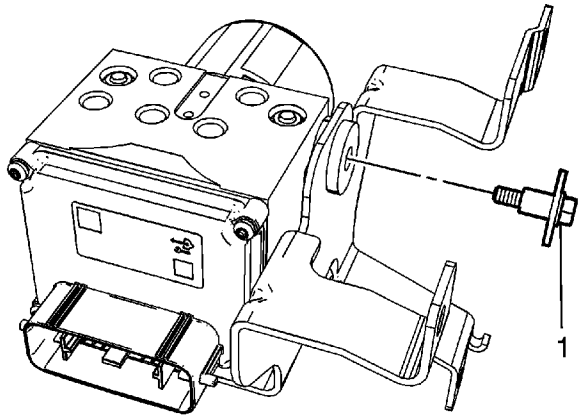


12. Disconnect the LF brake pipe fitting (1).

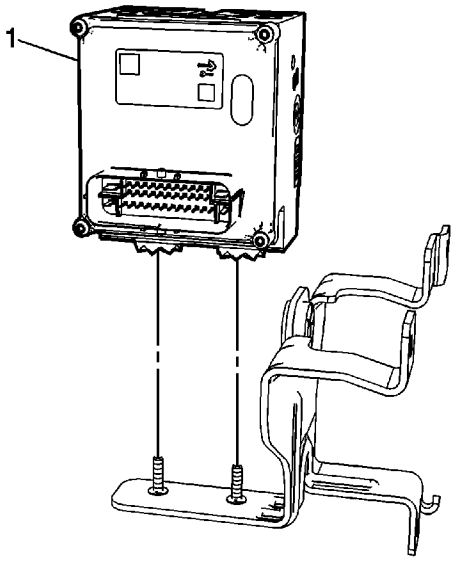
    Cap the brake pipe fitting and plug the BPMV outlet port to prevent brake fluid loss and contamination.



13. Remove the BPMV bracket bolts (1).
14. Remove the BPMV and bracket assembly from the vehicle.

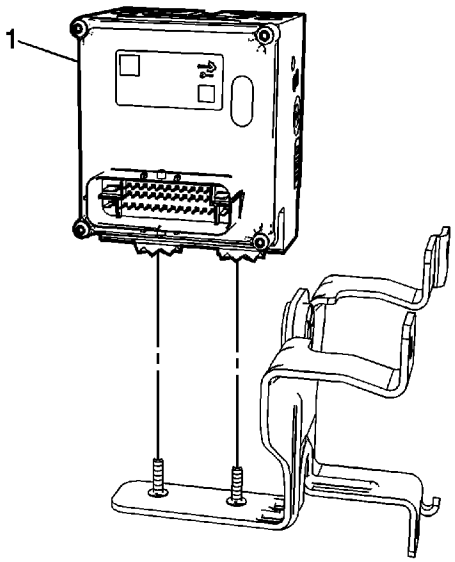


15. Remove the BPMV bolt (1).



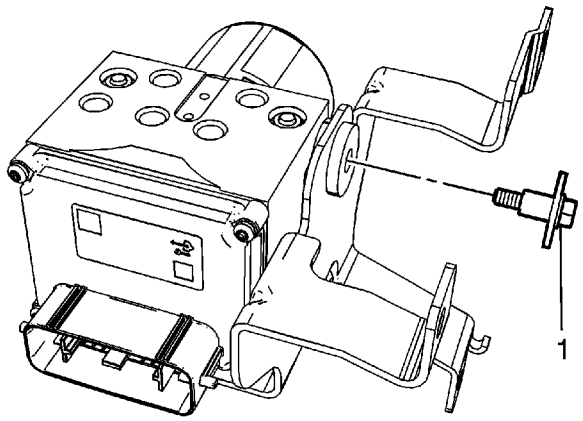
16. Remove the BPMV assembly (1) from the bracket.
17. If installing a new BPMV, remove the EBCM. Refer to Electronic Brake Control Module Replacement.

Installation Procedure

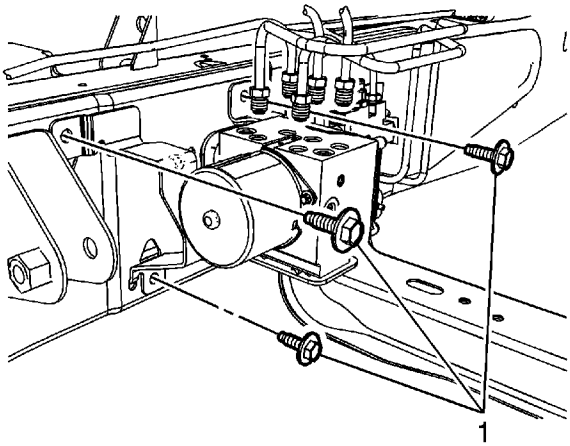


1. Install the EBCM to the BPMV, if removed. Refer to Electronic Brake Control Module Replacement.
2. Install the BPMV assembly (1) to the bracket.

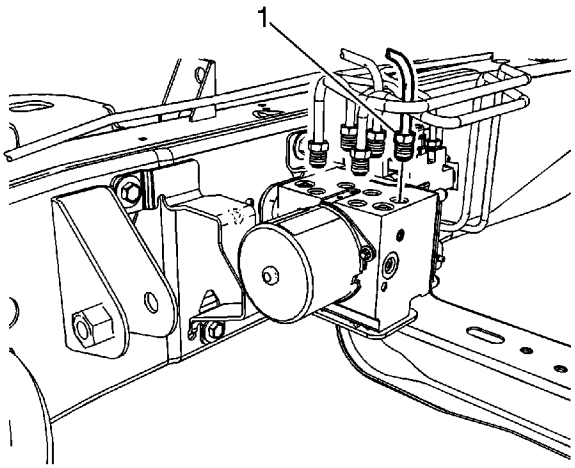
Caution: Refer to Fastener Caution in the Preface section.



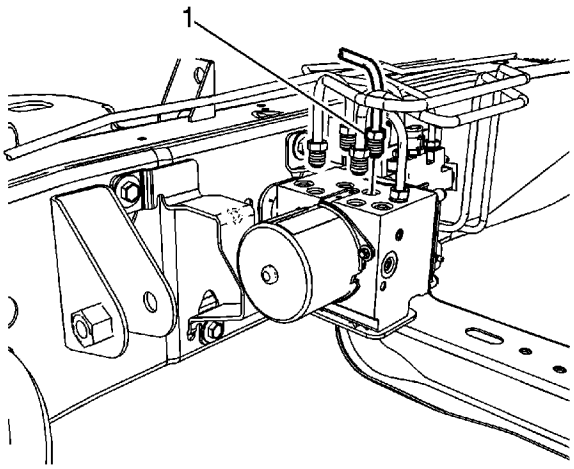
3. Install the BPMV bolt (1) and tighten to **11 N·m (97 lb in)**.



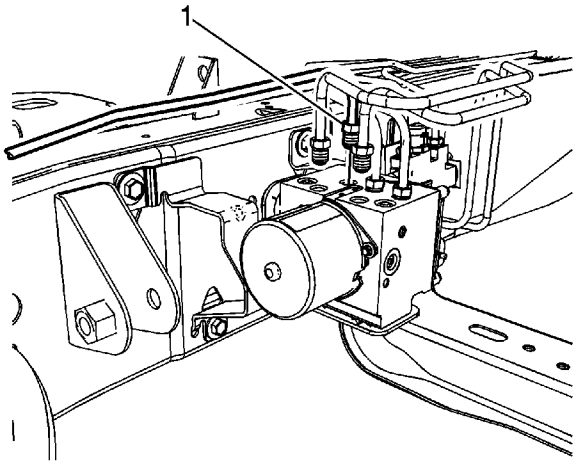
4. Install the BPMV and bracket assembly to the vehicle.
5. Install the BPMV bracket bolts (1) and tighten to **25 N·m (18 lb ft)**.



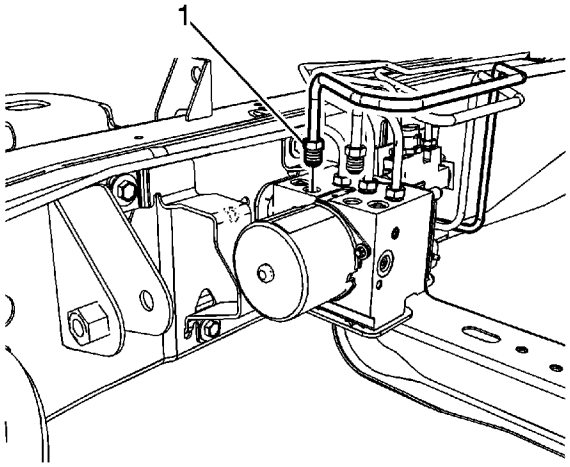
6. Connect the LF brake pipe fitting (1) and tighten to **25 N·m (18 lb ft)**.



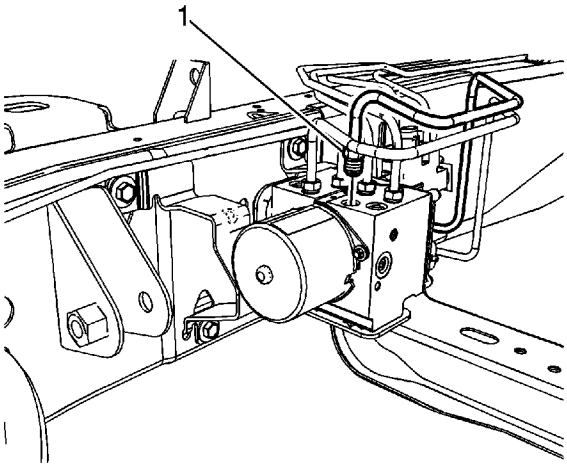
7. Connect the RF brake pipe fitting (1) and tighten to **25 N·m (18 lb ft)**.



8. Connect the rear brake pipe fitting (1) and tighten to **25 N·m (18 lb ft)**.



9. Connect the rear master cylinder brake pipe fitting (1) and tighten to **25 N·m (18 lb ft)**.

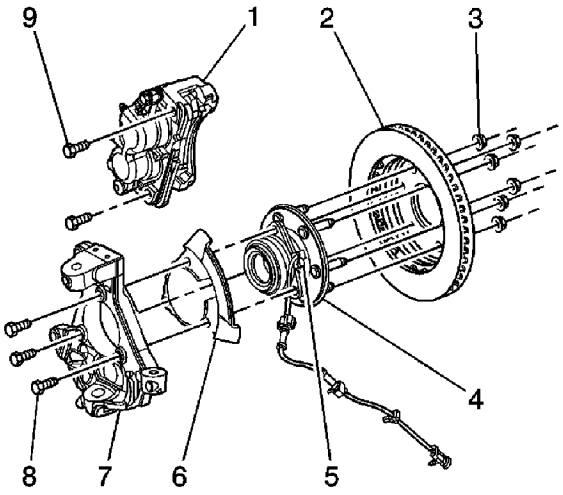


10. Connect the front master cylinder brake pipe fitting (1) and tighten to **25 N·m (18 lb ft)**.
11. Install the brake modulator shield, if equipped.
12. Install the brake modulator shield nuts and tighten to **25 N·m (18 lb ft)**.
13. Install the brake modulator shield bolt and tighten to **25 N·m (18 lb ft)**.
14. If equipped with AWD, install the LF suspension torsion bar. Refer to Torsion Bar and Support Assembly Replacement.
15. Connect the negative battery cable. Refer to Battery Negative Cable Disconnection and Connection.
16. Bleed the antilock brake system. Refer to Antilock Brake System Automated Bleed Procedure.

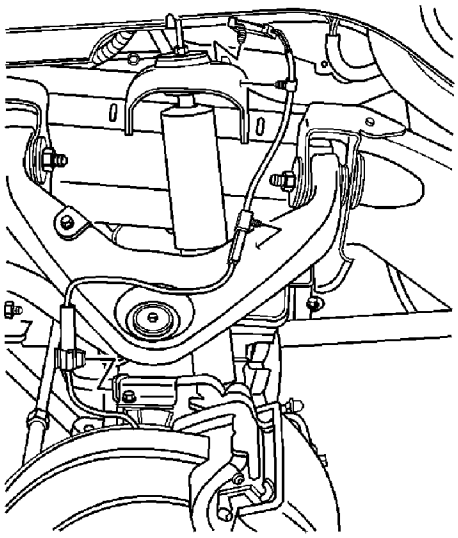
Wheel Speed Sensor Replacement (AWD)

Removal Procedure

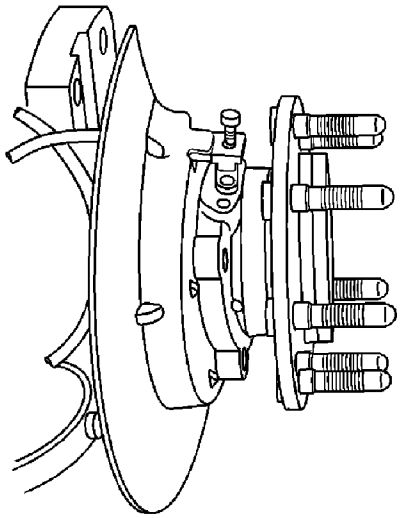
Warning: Refer to Brake Dust Warning in the Preface section.



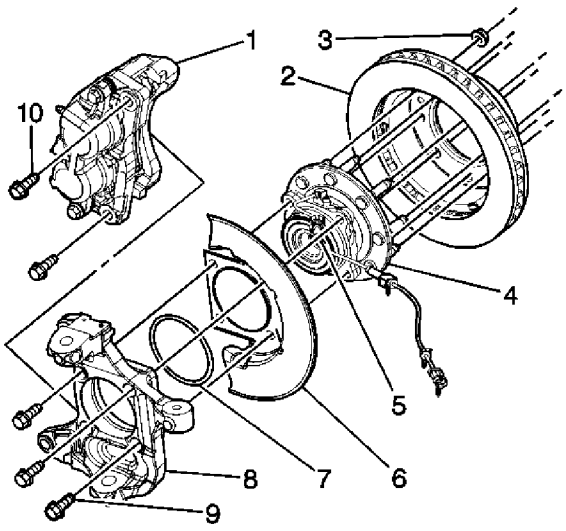
1. Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle.
2. Remove the tire and wheel. Refer to Tire and Wheel Removal and Installation.
3. Remove the brake rotor (2) shown on the 1500 Series. Refer to Front Brake Rotor Replacement.



4. Remove the wheel speed sensor (WSS) cable mounting clip from the knuckle.
5. Remove the WSS cable mounting clip from the upper control arm.
6. Remove the WSS cable mounting clip from the frame attachment point.
7. Remove the WSS cable electrical connector.



8. Remove the WSS mounting bolt.



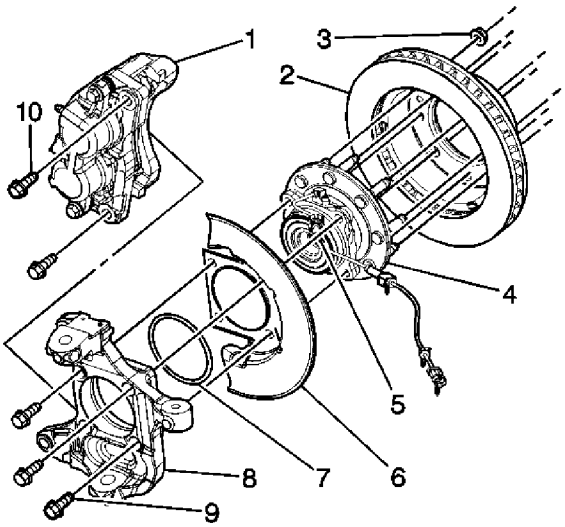
Caution: Carefully remove the sensor by pulling it straight out of the bore. DO NOT use a screwdriver, or other device to pry the sensor out of the bore. Prying will cause the sensor body to break off in the bore.

9. Remove the wheel speed sensor (5) from the hub/bearing assembly (4) shown on the

2500/3500 Series.

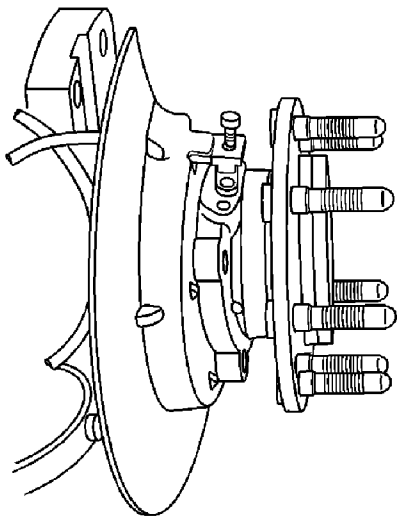
Installation Procedure

1. Plug the WSS bore to prevent debris from falling into the hub.
2. Using a wire brush or equivalent, clean the WSS mounting surface on the hub to remove any rust or corrosion.
3. Apply a thin layer of wheel bearing lubricant, GM P/N 01051344 to the hub surface and the sensor O-ring prior to sensor installation.

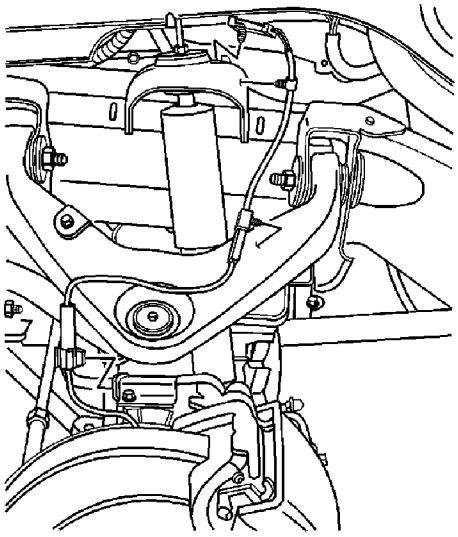


4. Install the WSS (5) into the hub/bearing assembly (4) shown on the 2500/3500 Series. Ensure that the sensor is seated flat against the hub.

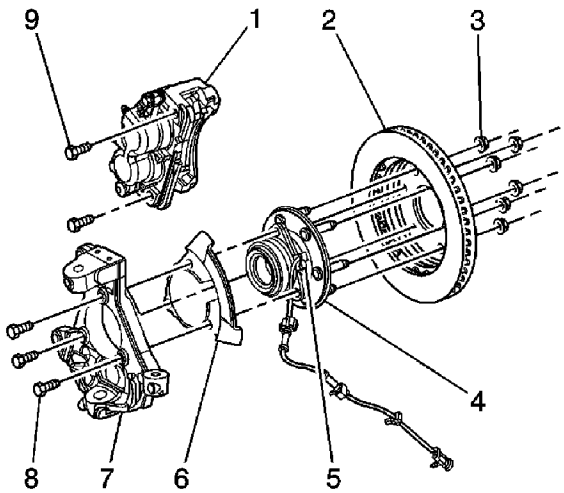
Caution: Refer to Fastener Caution in the Preface section.



5. Install the WSS mounting bolt and tighten to **18 N·m (13 lb ft)**.



6. Install the WSS cable mounting clip to the knuckle.
7. Install the WSS cable mounting clip to the upper control arm.
8. Install the WSS cable mounting clip to the frame attachment point.
9. Connect the WSS cable electrical connector.

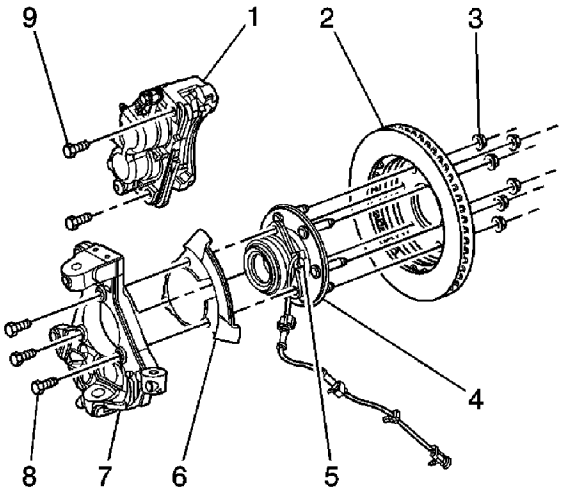


10. Install the brake rotor (2) shown on the 1500 Series. Refer to Front Brake Rotor Replacement.
11. Install the tire and wheel. Refer to Tire and Wheel Removal and Installation.
12. Perform the vehicle diagnostic system check. Refer to Diagnostic System Check - Vehicle.

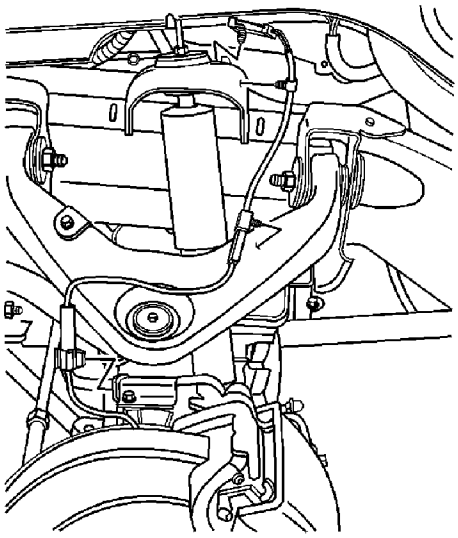
Wheel Speed Sensor Replacement (RWD)

Removal Procedure

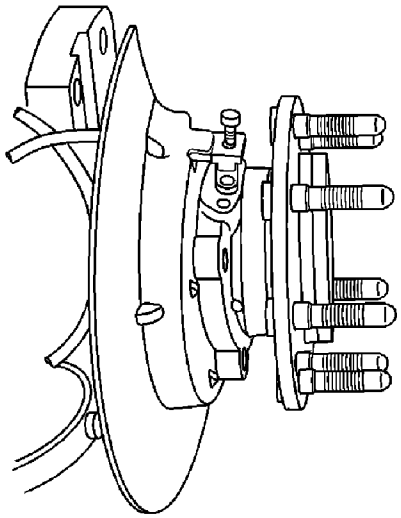
Warning: Refer to Brake Dust Warning in the Preface section.



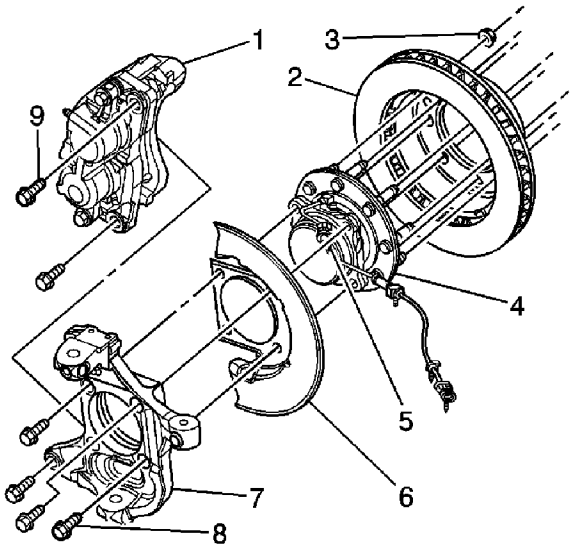
1. Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle.
2. Remove the tire and wheel. Refer to Tire and Wheel Removal and Installation.
3. Remove the brake rotor (2) shown on the 1500 Series. Refer to Front Brake Rotor Replacement.



4. Remove the wheel speed sensor (WSS) cable mounting clip from the knuckle.
5. Remove the WSS cable mounting clip from the upper control arm.
6. Remove the WSS cable mounting clip from the frame attachment point.
7. Remove the WSS cable electrical connector.



8. Remove the WSS mounting bolt.



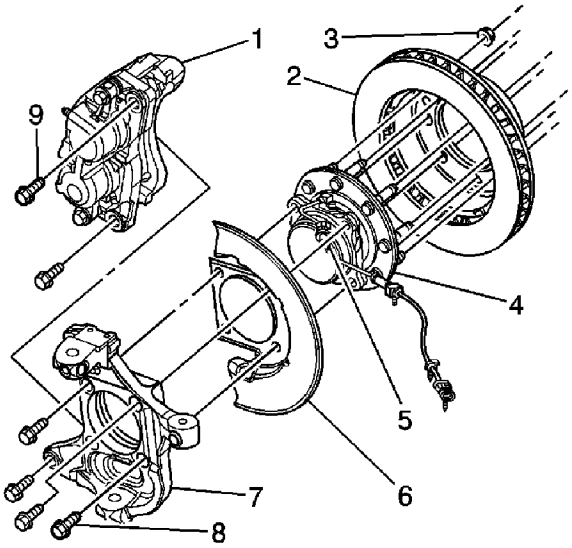
Caution: Carefully remove the sensor by pulling it straight out of the bore. DO NOT use a screwdriver, or other device to pry the sensor out of the bore. Prying will cause the sensor body to break off in the bore.

9. Remove the wheel speed sensor (5) from the hub/bearing assembly (4) shown on the

2500/3500 Series.

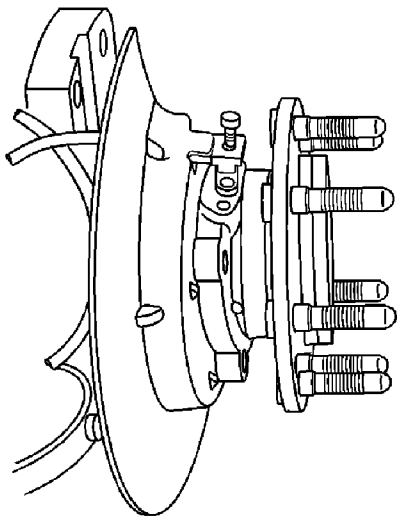
Installation Procedure

1. Plug the WSS bore to prevent debris from falling into the hub.
2. Using a wire brush or equivalent, clean the WSS mounting surface on the hub to remove any rust or corrosion.
3. Apply a thin layer of wheel bearing lubricant, GM P/N 01051344 to the hub surface and the sensor O-ring prior to sensor installation.

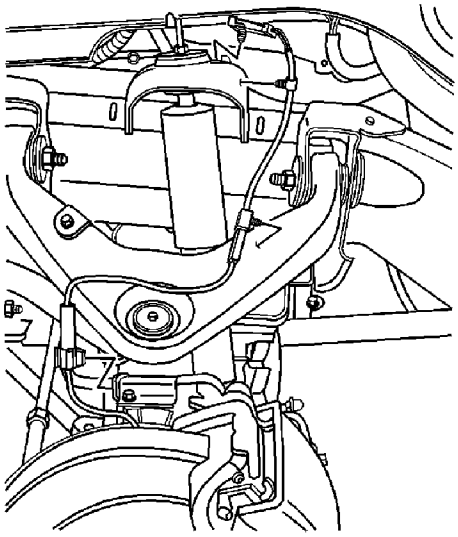


4. Install the WSS (5) into the hub/bearing assembly (4) shown on the 2500/3500 Series. Ensure that the sensor is seated flat against the hub.

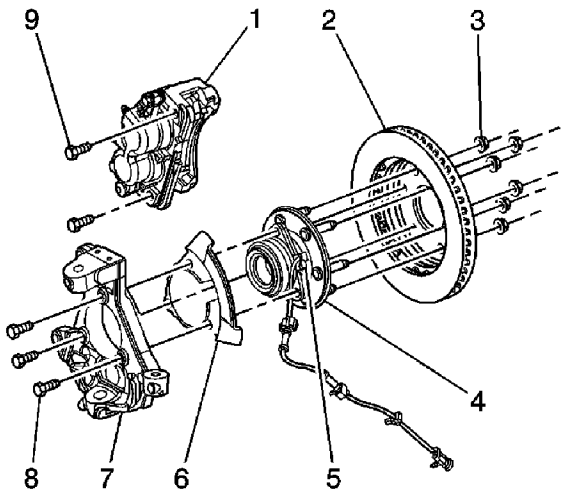
Caution: Refer to Fastener Caution in the Preface section.



5. Install the WSS mounting bolt and tighten to **18 N·m (13 lb ft)**.



6. Install the WSS cable mounting clip to the knuckle.
7. Install the WSS cable mounting clip to the upper control arm.
8. Install the WSS cable mounting clip to the frame attachment point.
9. Connect the WSS cable electrical connector.

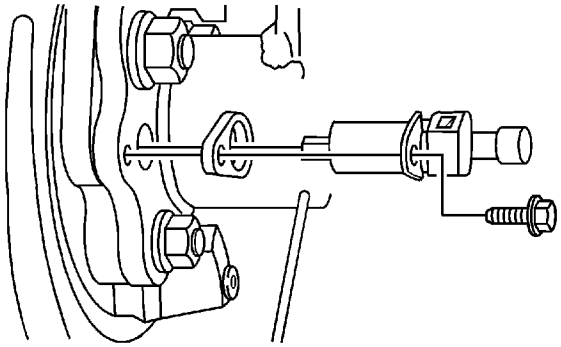


10. Install the brake rotor (2) shown on the 1500 Series. Refer to Front Brake Rotor Replacement.
11. Install the tire and wheel. Refer to Tire and Wheel Removal and Installation.
12. Perform the vehicle diagnostic system check. Refer to Diagnostic System Check - Vehicle.

Rear Wheel Speed Sensor Replacement (10.5 Axle)

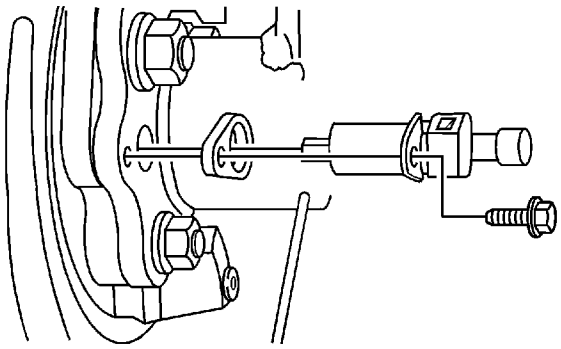
Removal Procedure

Warning: Refer to Brake Dust Warning in the Preface section.



1. Raise the vehicle. Refer to Lifting and Jacking the Vehicle.
2. For the left rear sensor, remove the leaf spring anchor plate. Refer to Leaf Spring Replacement.
3. Disconnect the electrical connector.
4. Remove the wheel speed sensor retaining bolt.
5. Remove the wheel speed sensor and spacer block.

Installation Procedure

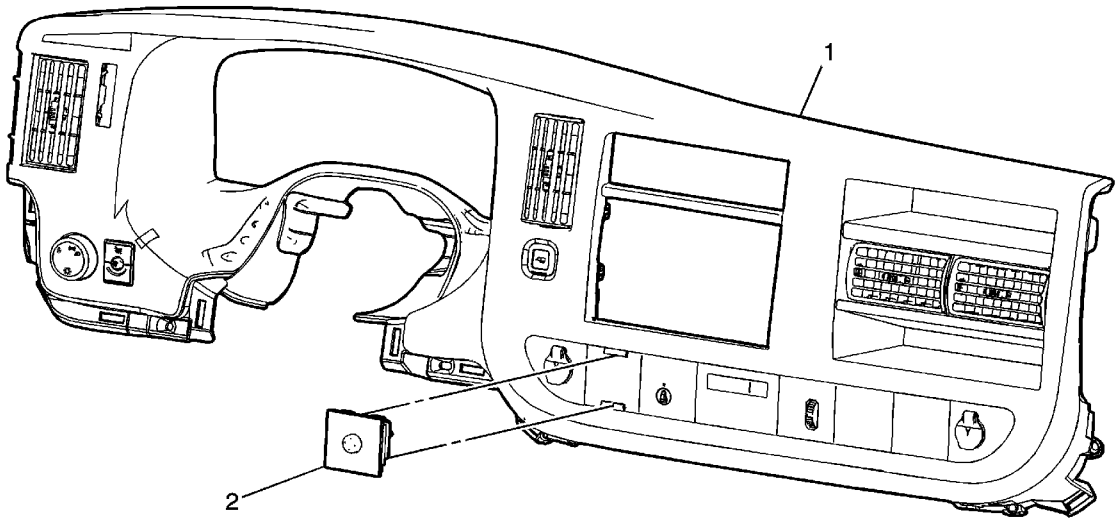


1. Install the spacer block and the wheel speed sensor.

   Caution: Refer to Fastener Caution in the Preface section.

2. Install the wheel speed sensor retaining bolt and tighten to **14 N·m (124 lb in)**.
3. Connect the electrical connector.
4. For the left rear sensor, install the leaf spring anchor plate. Refer to Leaf Spring Replacement.
5. Lower the vehicle.
6. Perform a low speed test to ensure the wheel speed sensor is functioning properly:
   - 6.1. Start the engine and allow it to idle.
   - 6.2. Check to see if the ABS indicator or the traction assist indicator remains illuminated.
   - 6.3. If the ABS indicator or the traction assist indicator remains illuminated, DO NOT proceed to drive the vehicle until it is diagnosed and repaired. Check the wheel speed sensor electrical connector to ensure it is not damaged and is installed properly. If the lamp remains illuminated, refer to Symptoms - Antilock Brake System.
   - 6.4. Select a smooth, dry, clean, and level road or large lot that is as free of traffic and obstacles as possible.
   - 6.5. Drive the vehicle and maintain a speed of at least 16 km/h (10 mph) for at least 5 seconds.
   - 6.6. Stop the vehicle and check to see if the ABS indicator or the traction assist indicator is illuminated.
   - 6.7. If an indicator is illuminated, refer to Diagnostic Starting Point - Antilock Brake System.

Electronic Traction Control Switch Replacement

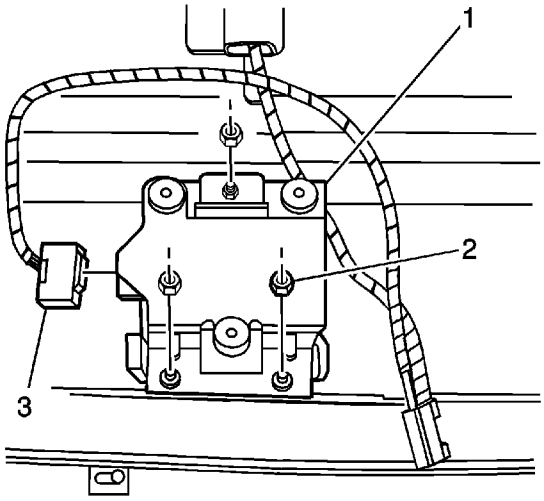


Callout	Component Name
1	Instrument Panel Cluster Trim Plate Bezel Assembly Refer to Instrument Panel Cluster Trim Plate Bezel Replacement.
2	Traction Control Switch Assembly **Procedure** Squeeze the retaining tabs on the back of the switch and push the switch out of the cluster trim bezel assembly.

Vehicle Yaw Sensor with Vehicle Lateral Accelerometer Replacement

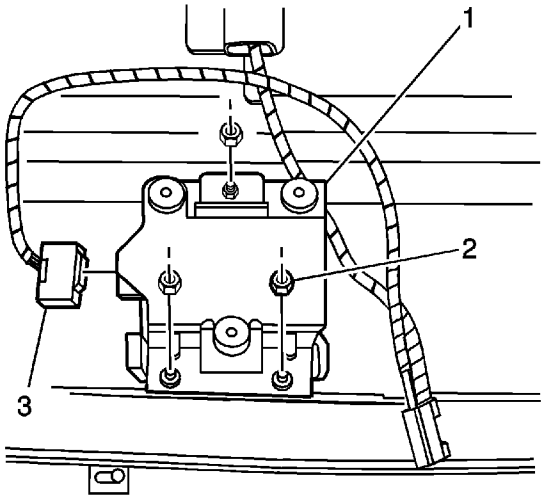
Removal Procedure

1. Remove the passenger seat from the vehicle. Refer to Driver or Passenger Seat Replacement.
2. Pull the carpet back to gain access to the sensor.



3. Remove the nuts (2) from the yaw rate sensor and lateral accelerometer.
4. Disconnect the electrical connector (3) from the yaw rate sensor/lateral accelerometer.
5. Remove the yaw rate sensor and lateral accelerometer (1) from the vehicle.

Installation Procedure



1. Install the yaw rate sensor and lateral accelerometer (1) to the vehicle.

   Caution: Refer to Fastener Caution in the Preface section.

2. Install the yaw rate sensor and lateral accelerometer nuts (2) and tighten to **9 N·m (80 lb in)**.
3. Install a scan tool.
4. Using the special functions menu on the scan tool, reset the yaw rate sensor.
5. Perform the Diagnostic System Check. Refer to Diagnostic System Check - Vehicle.
6. Connect the electrical connector (3) to the yaw rate sensor and lateral accelerometer.
7. Install the carpet.
8. Install the passenger seat to the vehicle. Refer to Driver or Passenger Seat Replacement.