

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Brake Pipe Nuts	22 N·m	16 lb ft
Brake Pressure Modulator Valve (BPMV) Nuts	15 N·m	11 lb ft
Front Wheel Speed Sensor Bolt	8 N·m	71 lb in
Rear Wheel Speed Sensor Bolt	8 N·m	71 lb in

ABS Component Specifications

Application	Specification	
	Metric	English
Antilock Brake System (ABS) Main Relay Operation Voltage	9-16 V	
Antilock Brake System (ABS) Type	4 Channel 4 Sensor	
Speed Ring		
• Inside Diameter - Front	69.6 mm	2.7401 in
• Inside Diameter - Rear	58 mm	2.2835 in
• Outside Diameter - Front	83.7 mm	3.2952 in
• Outside Diameter - Rear	69 mm	2.7165 in
• Tooth Volume of the Speed Ring (Front) • Tooth Volume of the Speed Ring (Rear)	47 EA 40 EA	
Wheel Speed Sensor - Resistance	1,215-1,485 Ω	

Antilock Brake System Automated Bleed Procedure

Bleeding the ABS System

Perform a manual or pressure bleeding procedure. Refer to [Hydraulic Brake System Bleeding](#). If the desired brake pedal height results are not achieved, perform the automated bleed procedure below.

The procedure cycles the system valves and runs the pump in order to purge the air from the secondary circuits normally closed off during normal base brake operation and bleeding. The automated bleed procedure is recommended when air ingestion is suspected in the secondary circuits, or when the BPMV has been replaced.

Automated Bleed Procedure

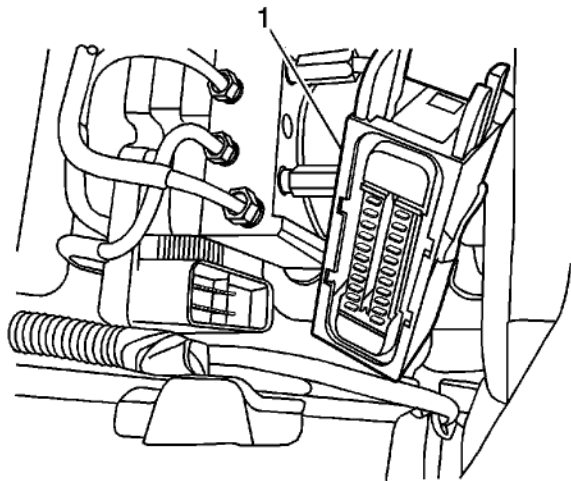
Caution: The Auto Bleed Procedure may be terminated at any time during the process by pressing the EXIT button. No further Scan Tool prompts pertaining to the Auto Bleed procedure will be given. After exiting the bleed procedure, relieve bleed pressure and disconnect bleed equipment per manufacturers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

1. Raise the vehicle on a suitable support. Refer to [Lifting and Jacking the Vehicle](#).
2. Remove all four tire and wheel assemblies. Refer to [Tire and Wheel Removal and Installation](#).
3. Inspect the brake system for leaks and visual damage. Refer to [Brake Pipe and Hose Inspection](#) or [Symptoms - Hydraulic Brakes](#). Repair or replace as needed.
4. Inspect the battery state of charge. Refer to [Battery Inspection/Test](#).
5. Install a scan tool.
6. Turn ON the ignition, with the engine OFF.
7. With the scan tool, establish communications with the EBCM. Select Special Functions. Select Automated Bleed from the Special Functions menu.
8. Bleed the base brake system. Refer to [Hydraulic Brake System Bleeding](#).
9. Follow the scan tool directions until the desired brake pedal height is achieved.
10. 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. Refer to [Hydraulic Brake System Bleeding](#).
11. When the desired pedal height is achieved, press the brake pedal in order to inspect for firmness.
12. Remove the scan tool.
13. Install the tire and wheel assemblies. Refer to [Tire and Wheel Removal and Installation](#).
14. Inspect the brake fluid level.
15. Road test the vehicle while inspecting that the pedal remains high and firm.

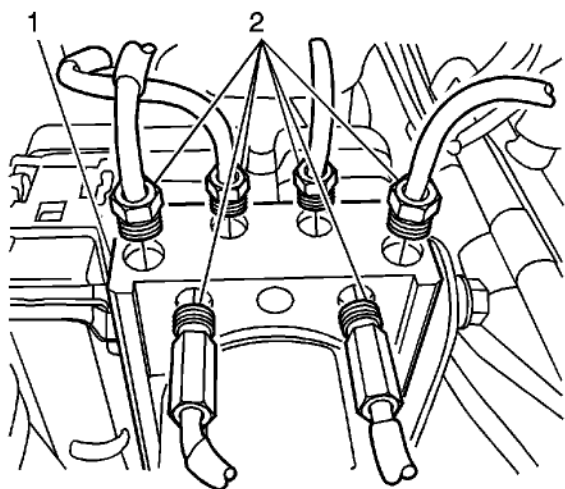
Brake Pressure Modulator Valve Assembly Replacement

Removal Procedure

Warning: Refer to [Battery Disconnect Warning](#) in the Preface section.



1. Disconnect the negative battery cable. Refer to [Battery Negative Cable Disconnection and Connection](#).
2. Disconnect the electronic brake control module (EBCM) connector (1).



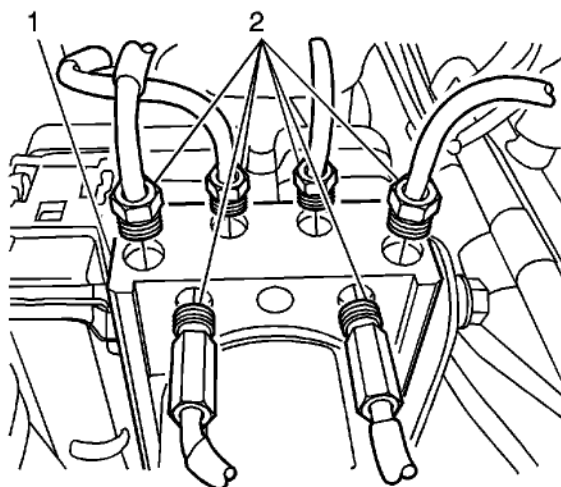
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Note: Take care not to allow air into the hydraulic unit or into the brake pipes from the master cylinder. If air gets into the hydraulic unit, it will require a bleeding procedure using a scan tool programmed for the ABS 5.3 system. As long as no air enters the hydraulic unit, a simple bleeding procedure is all the system will require.

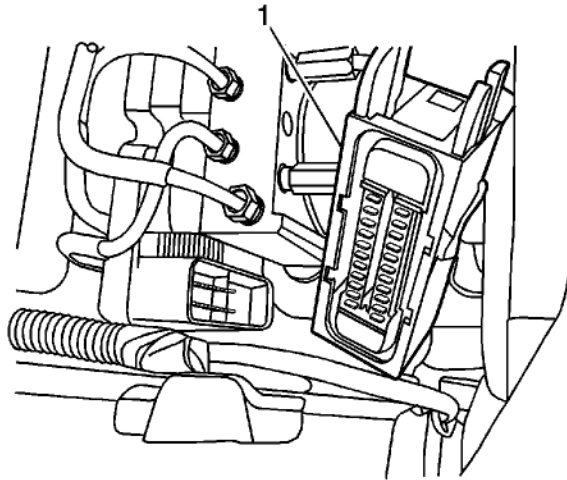
3. Remove the brake pipes from the brake pressure modulator valve (BPMV) assembly.
4. Plug the brake pipes.
5. Loosen the mounting nuts (2) on the BPMV assembly (1).
6. Position the brake pipes aside far enough to allow for lifting the BPMV assembly from the mounting bracket. It may be necessary to loosen the brake pipes on the master cylinder to allow for moving those pipes out of the way.
7. Remove the BPMV assembly from the mounting bracket.

Installation Procedure

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



1. Install the BPMV assembly (1) into the mounting bracket. Secure with two nuts (2) and tighten to **15 N·m (11 lb ft)**.
2. Remove the plugs from the brake pipes and connect the brake pipes to the BPMV assembly (1) and tighten to **22 N·m (16 lb ft)**.

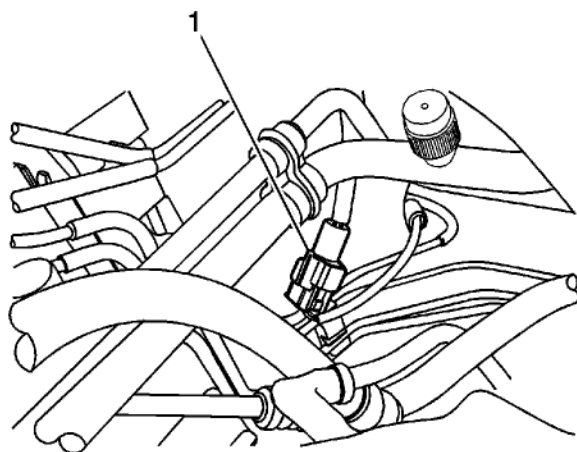


3. Connect the EBCM connector (1).
4. Connect the negative battery cable. Refer to [Battery Negative Cable Disconnection and Connection](#).
5. Bleed the brake system. Refer to [Hydraulic Brake System Bleeding](#).
6. Perform the [Diagnostic System Check - Vehicle](#).
7. Refer to [Control Module References](#) for programming and setup information.

Front Wheel Speed Sensor Replacement

Removal Procedure

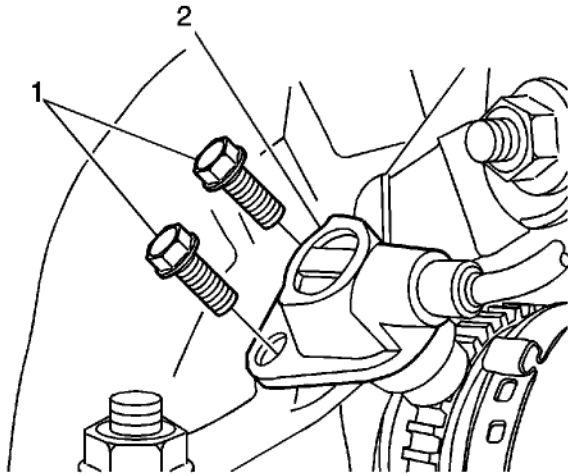
Warning: Refer to [Battery Disconnect Warning](#) in the Preface section.



1. Disconnect the negative battery cable. Refer to [Battery Negative Cable Disconnection and Connection](#).
2. Disconnect the front wheel speed sensor electrical connector (1).

Danger: To avoid any vehicle damage, serious personal injury or death when major components are removed from the vehicle and the vehicle is supported by a hoist, support the vehicle with jack stands at the opposite end from which the components are being removed and strap the vehicle to the hoist.

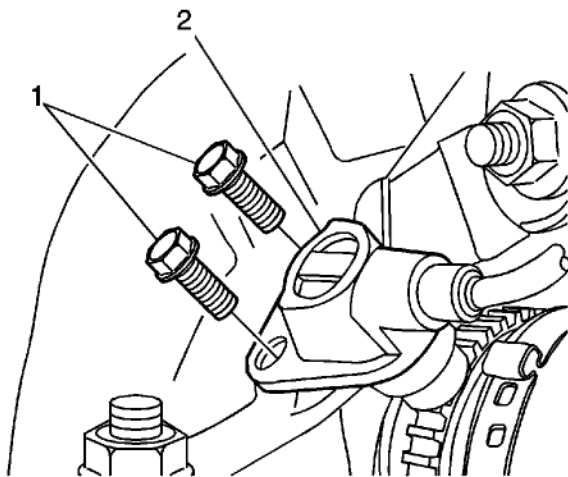
3. Raise and suitably support the vehicle. Refer to [Lifting and Jacking the Vehicle](#).
4. Remove the wheel. Refer to [Tire and Wheel Removal and Installation](#).



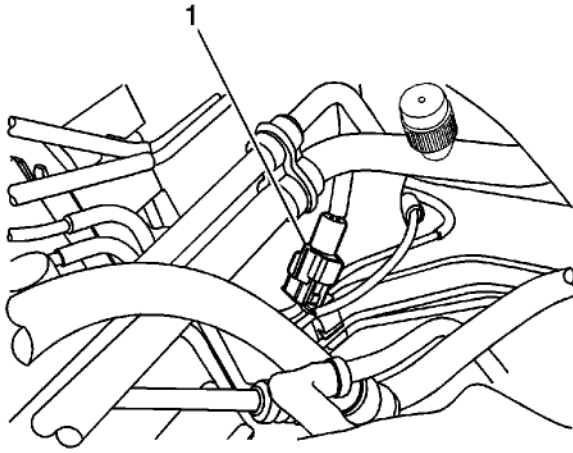
5. Remove the bolts (1) and the front wheel speed sensor (2) from the steering knuckle.

Installation Procedure

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



1. Install the front wheel speed sensor (2) to the steering knuckle. Secure it with the bolts (1) and tighten to **8 N·m (71 lb in)**.
2. Install the wheel. Refer to [Tire and Wheel Removal and Installation](#).
3. Lower the vehicle.

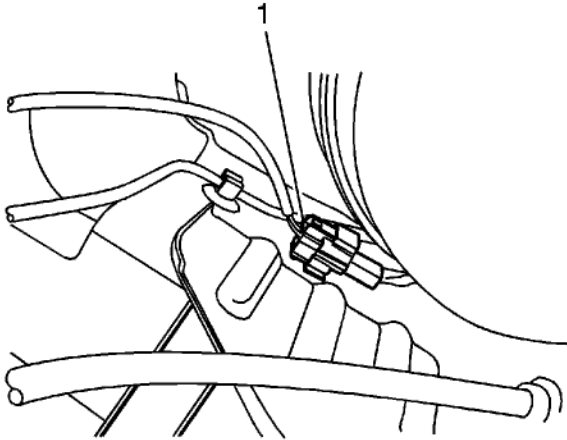


4. Connect the front wheel speed sensor electrical connector (1).
5. Connect the negative battery cable. Refer to [Battery Negative Cable Disconnection and Connection](#).

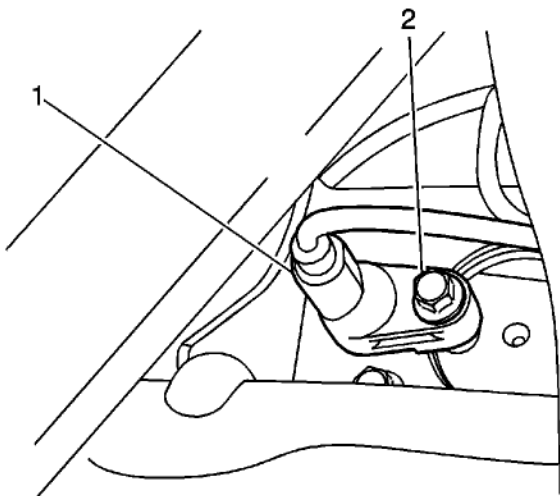
Rear Wheel Speed Sensor Replacement

Removal Procedure

Warning: Refer to [Battery Disconnect Warning](#) in the Preface section.



1. Disconnect the negative battery cable. Refer to [Battery Negative Cable Disconnection and Connection](#).
2. Disconnect the rear wheel speed sensor electrical connector (1).

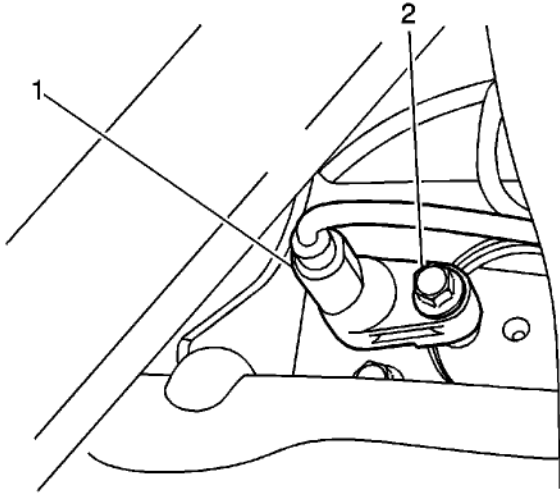


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3. Remove the rear wheel speed sensor bolt (2).
4. Remove the rear wheel speed sensor (1) from the backing plate.

Installation Procedure

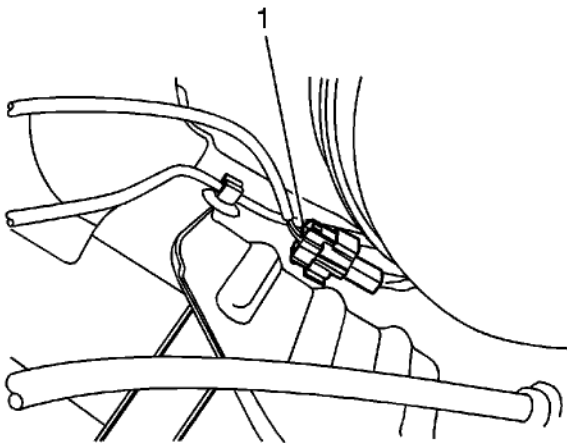
Caution: Refer to [Fastener Caution](#) in the Preface section.



1. Install the rear wheel speed sensor (1) to the backing plate. Secure it with the bolt (2).

Tighten

Tighten the rear wheel speed sensor bolt to 8 N·m (71 lb in).





2. Connect the rear wheel speed sensor electrical connector (1).
3. Connect the negative battery cable. Refer to [Battery Negative Cable Disconnection and Connection](#).