

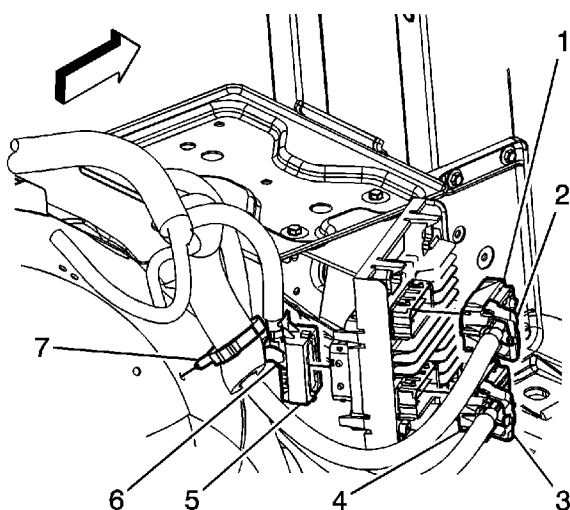
Engine Control Module Replacement

Caution:

- Turn the ignition OFF when installing or removing the control module connectors and disconnecting or reconnecting the power to the control module (battery cable, powertrain control module (PCM)/engine control module (ECM)/transaxle control module (TCM) pigtail, control module fuse, jumper cables, etc.) in order to prevent internal control module damage.
- Control module damage may result when the metal case contacts battery voltage. DO NOT contact the control module metal case with battery voltage when servicing a control module, using battery booster cables, or when charging the vehicle battery.
- In order to prevent any possible electrostatic discharge damage to the control module, do not touch the connector pins or the soldered components on the circuit board.
- Remove any debris from around the control module connector surfaces before servicing the control module. Inspect the control module connector gaskets when diagnosing or replacing the control module. Ensure that the gaskets are installed correctly. The gaskets prevent contaminant intrusion into the control module.
- The replacement control module must be programmed.

Important: It is necessary to record the remaining engine oil life. If the replacement module is not programmed with the remaining engine oil life, the engine oil life will default to 100 percent. If the replacement module is not programmed with the remaining engine oil life, the engine oil will need to be changed at 5 000 km (3,000 mi) from the last oil change.

Removal Procedure

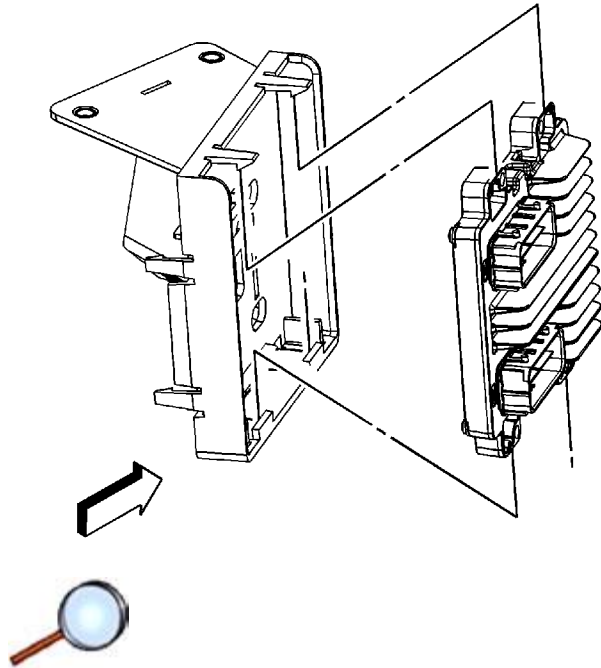


1. Using a scan tool, retrieve the percentage of remaining engine oil. Record the remaining engine oil life.
2. Disconnect the negat

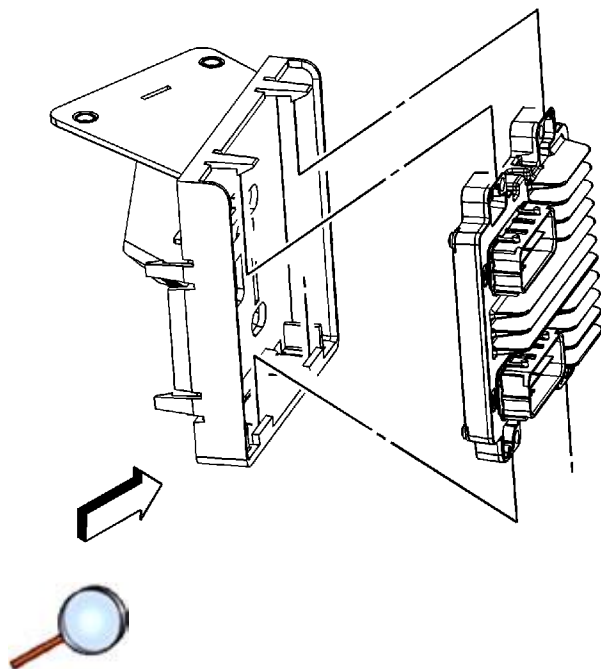
[able Disconnection and](#)

Connection.

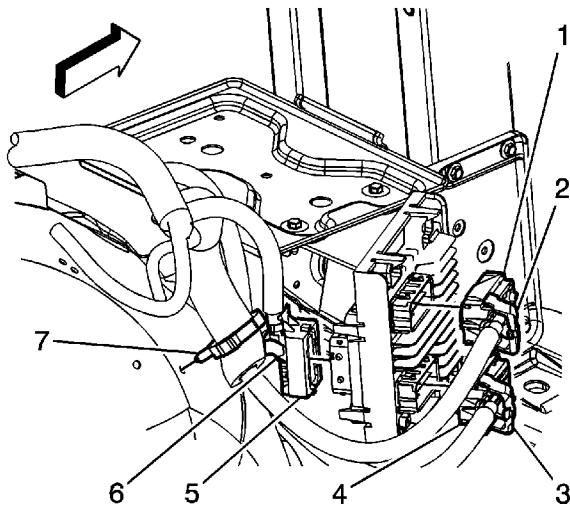
3. Disengage the engine wiring harness upper electrical connector retainer (2) and remove the connector (1) from the ECM.
4. Disengage the engine wiring harness lower electrical connector retainer (3) and remove the connector (4) from the ECM.



5. Disengage the retainer tabs securing the ECM to the bracket.
6. Remove the ECM.

Installation Procedure

1. Install the bottom ECM tabs into the bracket.
2. Push the ECM in securing the ECM to the bracket.



3. Position the engine wiring harness lower electrical connector and engage the retainer (3) securing the lower connector (4) to the ECM.
4. Position the engine wiring harness upper electrical connector and engage the retainer (2) securing the upper connector (1) to the ECM.
5. Connect the negative battery cable. Refer to [Battery Negative Cable Disconnection and Connection](#).
6. If a NEW ECM was installed, program the ECM. Refer to [Control Module References](#).

Crankshaft Position System Variation Learn

1. Install a scan tool.
2. Monitor the engine control module (ECM) for DTCs with a scan tool. If other DTCs are set, except DTC P0315, refer to [Diagnostic Trouble Code \(DTC\) List - Vehicle](#) for the applicable DTC that set.
3. Select the crankshaft position (CKP) variation learn procedure with a scan tool.
4. The scan tool instructs you to perform the following:
 - 4.1. Accelerate to wide open throttle (WOT).
 - 4.2. Release throttle when fuel cut-off occurs.
 - 4.3. Observe fuel cut-off for applicable engine.
 - 4.4. Engine should not accelerate beyond calibrated RPM value.
 - 4.5. Release throttle immediately if value is exceeded.
 - 4.6. Block drive wheels.
 - 4.7. Set parking brake.
 - 4.8. DO NOT apply brake pedal.
 - 4.9. Cycle ignition from OFF to ON.
 - 4.10. Apply and hold brake pedal.
 - 4.11. Start and idle engine.
 - 4.12. Turn A/C OFF.
 - 4.13. Vehicle must remain in Park or Neutral.
 - 4.14. The scan tool monitors certain component signals to determine if all the conditions are met to continue with the procedure. The scan tool only displays the condition that inhibits the procedure. The scan tool monitors the following components:
 - CKP sensors activity--If there is a CKP sensor condition, refer to the applicable DTC that set.
 - Camshaft position (CMP) sensor activity--If there is a CMP sensor condition, refer to the applicable DTC that set.
 - Engine coolant temperature (ECT)--If the ECT is not warm enough, idle the engine until the engine coolant temperature reaches the correct temperature.
5. Enable the CKP System Variation Learn Procedure with a scan tool.

Important: While the learn procedure is in progress, release the throttle immediately when the engine starts to decelerate. The engine control is returned to the operator and the engine responds to throttle position after the learn procedure is complete.

6. Accelerate to WOT.
7. Release when the fuel cut-off occurs.
8. Test in progress.
9. The scan tool displays Learn Status: Learned this ignition. If the scan tool indicates that DTC P0315 ran and passed, the CKP Variation Learn Procedure is complete. If the scan tool indicates DTC P0315 failed or did not run, refer to [DTC P0315](#). If any other DTCs set, refer to [Diagnostic Trouble Code \(DTC\) List - Vehicle](#) for the applicable DTC that set.
10. Turn OFF the ignition for 30 seconds after the learn procedure is completed successfully.
11. The CKP Variation Learn Procedure is also required when the following service procedures have been performed, regardless of whether DTC P0315 is set:

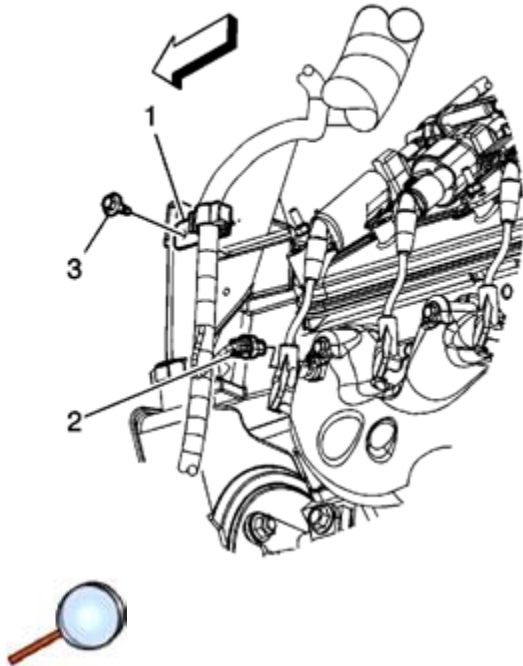
- A CKP sensor replacement
- An engine replacement
- A ECM replacement
- A harmonic balancer replacement
- A crankshaft replacement
- Any engine repairs which disturb the CKP sensor relationship

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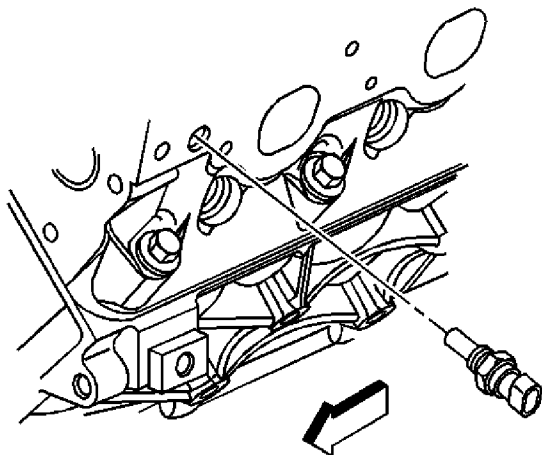
Engine Coolant Temperature Sensor Replacement

Removal Procedure

Caution: Use care when handling the coolant sensor. Damage to the coolant sensor will affect the operation of the fuel control system.



1. Drain the cooling system to a level below the engine cooling temperature (ECT) sensor. Refer to [Cooling System Draining and Filling](#).
2. Disconnect the engine wiring harness electrical connector (2) from the ECT sensor.



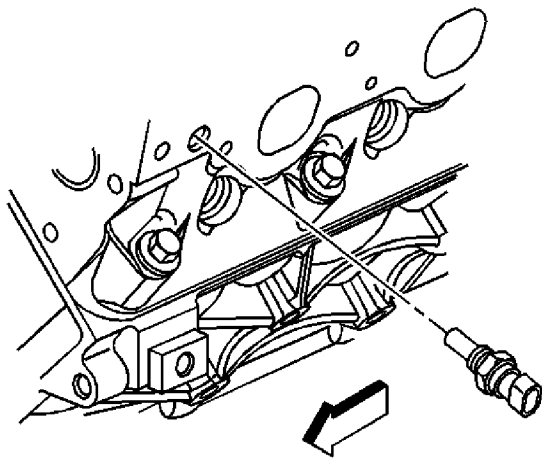


3. Remove the ECT sensor.

Installation Procedure

Caution: Do not insert any tools into the throttle body bore in order to avoid damage to the throttle valve plate.

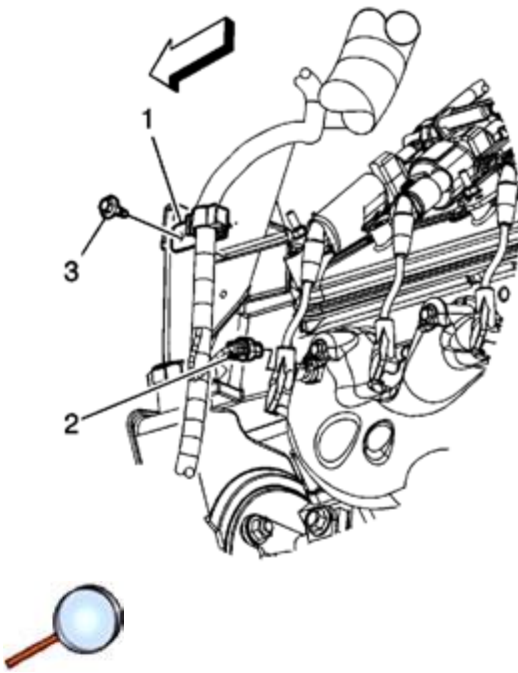
Caution: Use care when handling the coolant sensor. Damage to the coolant sensor will affect the operation of the fuel control system.



1. If installing the old sensor, coat the threads with sealant GM P/N 12346004 (Canadian P/N 10953480) or equivalent.

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

2. Install the ECT sensor and tighten to **20 N·m (15 lb ft)**.

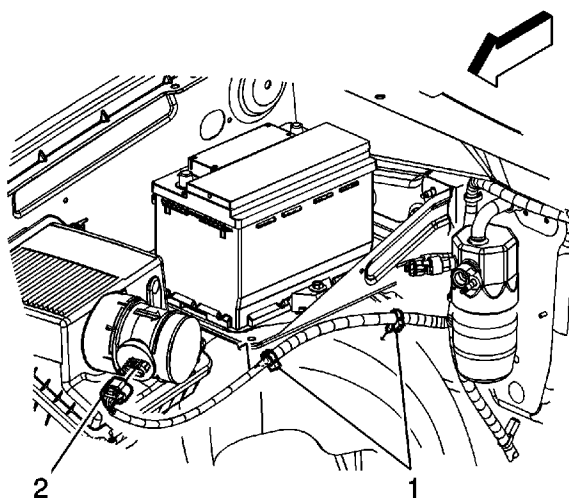


3. Connect the engine wiring harness electrical connector (2) to the ECT sensor.
4. Refill the cooling. Refer to [Cooling System Draining and Filling](#).

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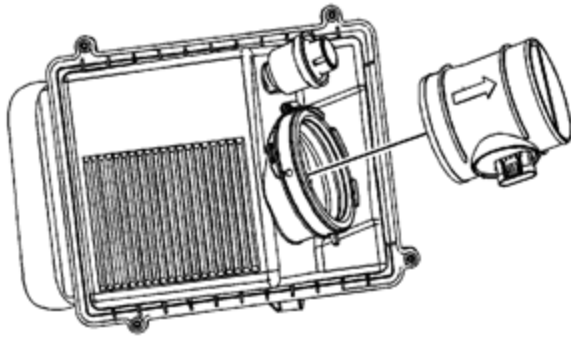
Mass Airflow Sensor with Intake Air Temperature Sensor Replacement

Removal Procedure



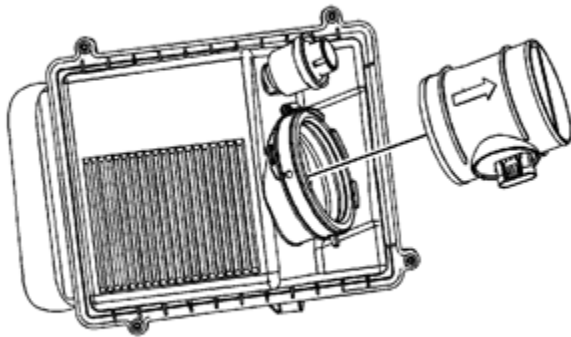
Note: Use care when handling the mass air flow (MAF)/intake air temperature (IAT) sensor. Do not dent, puncture, or otherwise damage the honeycomb located at the air inlet end of the MAF/IAT. Do not touch the sensing elements or allow anything including cleaning solvents and lubricants to come in contact with them. Use a small amount of a non-silicone based lubricant, on the air duct only, to aid in installation.

1. Remove the air cleaner outlet resonator. Refer to [Air Cleaner Resonator Outlet Duct Replacement](#).
2. Disconnect the engine wiring harness electrical connector (2) from the MAF/IAT sensor.



3. Loosen the MAF/IAT sensor adapter clamp.
4. Remove the MAF/IAT sensor from the air cleaner assembly.

Installation Procedure



Note: The embossed arrow on the MAF/IAT sensor indicates the proper air flow direction. The arrow must point toward the engine.

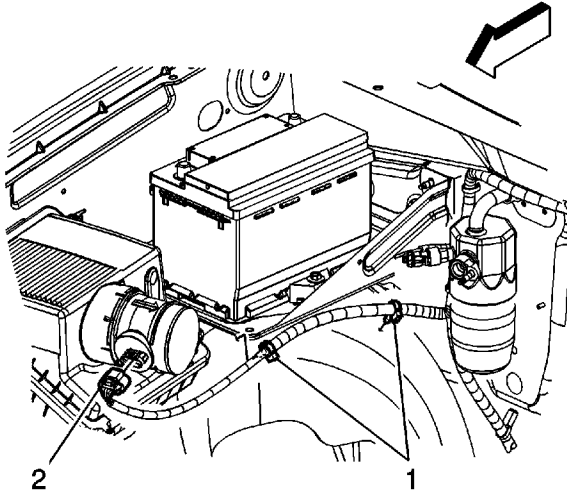
1. Install the MAF/IAT sensor to the air cleaner assembly.

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

2. Tighten the MAF/IAT sensor adapter clamp.

Tighten

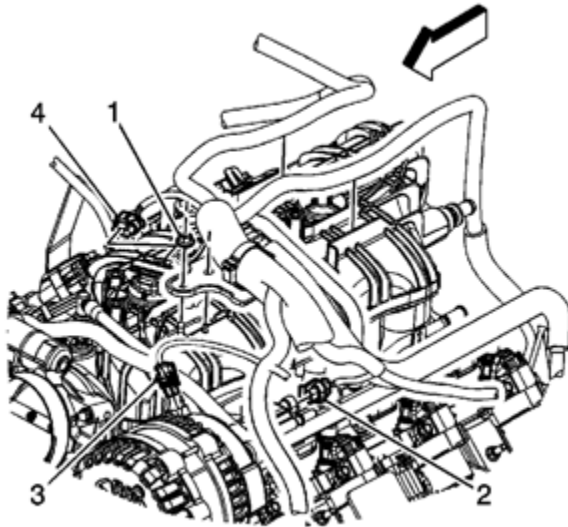
Tighten the clamp to 4 N·m (35 lb in).



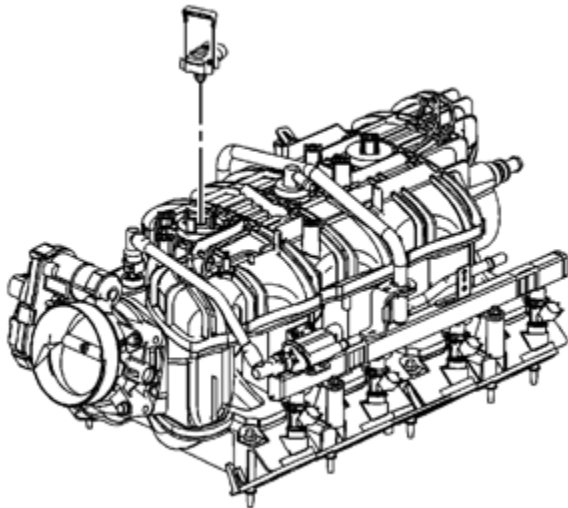
3. Connect the engine wiring harness electrical connector (2) to the MAF/IAT sensor.
4. Install the air cleaner outlet resonator. Refer to [Air Cleaner Resonator Outlet Duct Replacement](#).

Manifold Absolute Pressure Sensor Replacement

Removal Procedure



1. Remove the intake manifold sight shield. Refer to [Upper Intake Manifold Sight Shield Replacement](#).
2. Disconnect the engine wiring harness electrical connector (4) from the manifold absolute pressure (MAP) sensor.

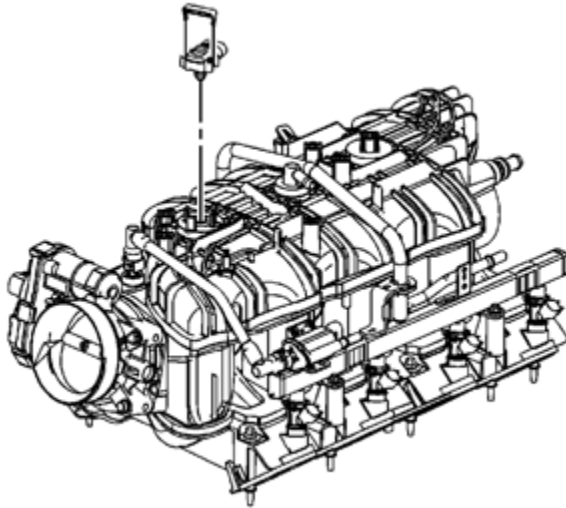


3. Remove the MAP sensor retainer.

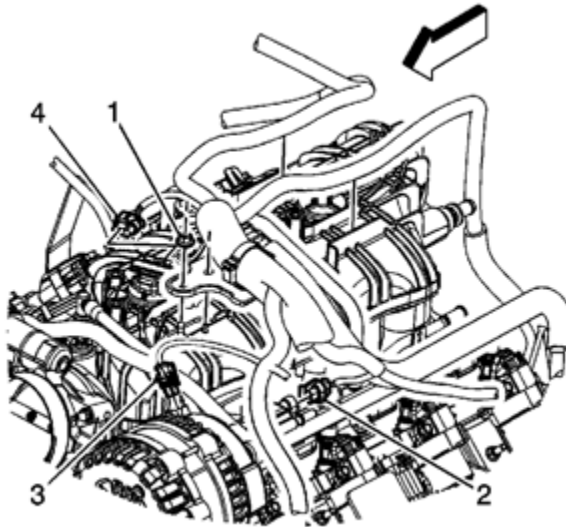
4. Remove the MAP sensor.

Installation Procedure

Important: Lightly coat the MAP sensor seal with clean engine oil before installing the sensor.



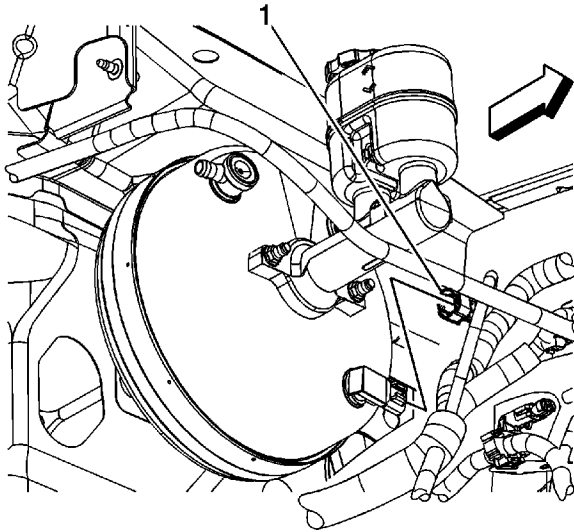
1. Install the MAP sensor.
2. Install the MAP sensor retainer.



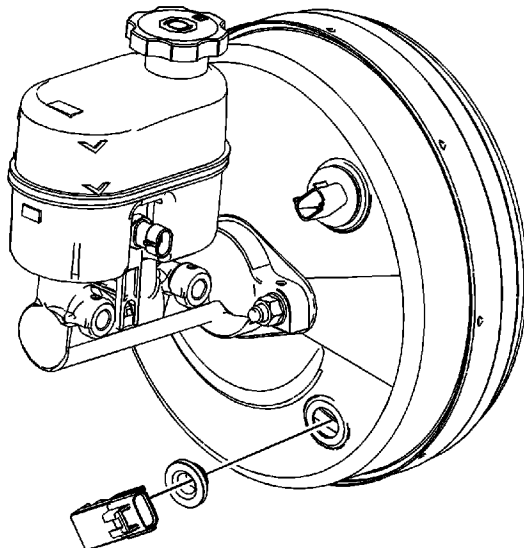
3. Connect the engine harness wiring electrical connector (4) to the MAP sensor.
4. Install the intake manifold sight shield. Refer to [Upper Intake Manifold Sight Shield Replacement](#) .

Power Brake Booster Vacuum Sensor Replacement

Removal Procedure



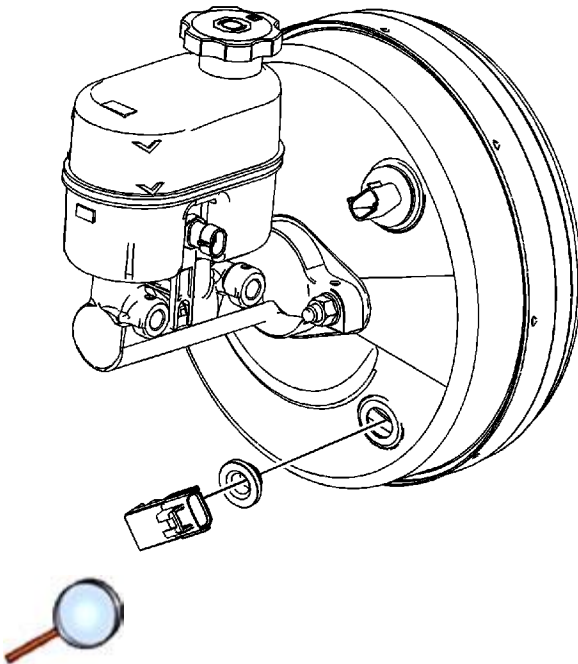
1. Disconnect the chassis wiring harness electrical connector (1) from the brake booster vacuum sensor.



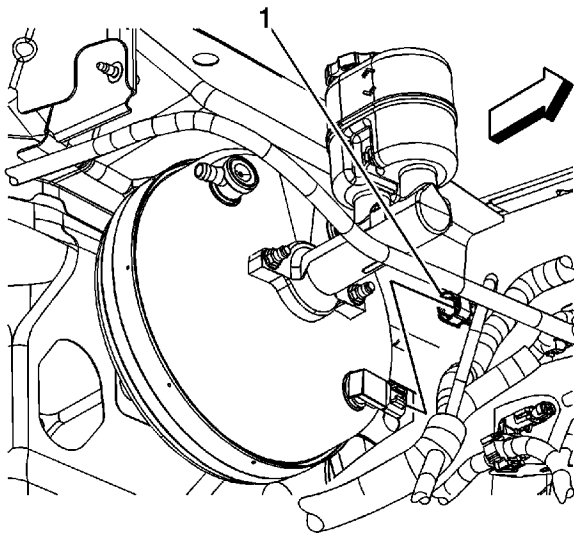
2. Remove the brake booster vacuum sensor from the brake booster.
3. Remove the brake booster vacuum sensor grommet from the brake booster.

Installation Procedure

Important: Lightly coat the brake booster vacuum sensor grommet with clean engine oil before installing the sensor.



1. Install the brake booster vacuum sensor grommet to the brake booster.
2. Install the brake booster vacuum sensor to the brake booster.

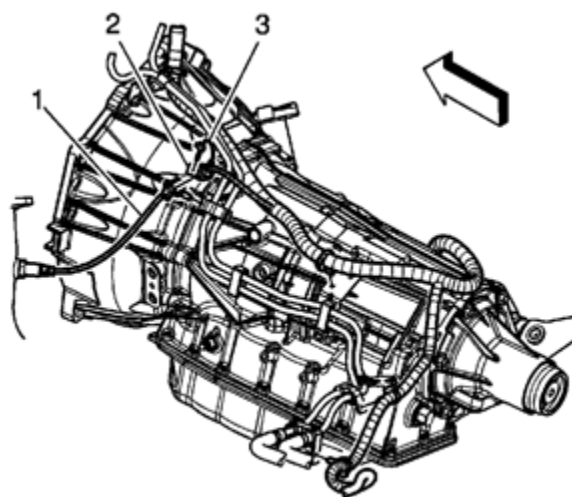


3. Connect the chassis wiring harness electrical connector (1) to the brake booster vacuum sensor.

Heated Oxygen Sensor Replacement - Bank 1 Sensor 1 (2500 Series - Cab/Chassis)

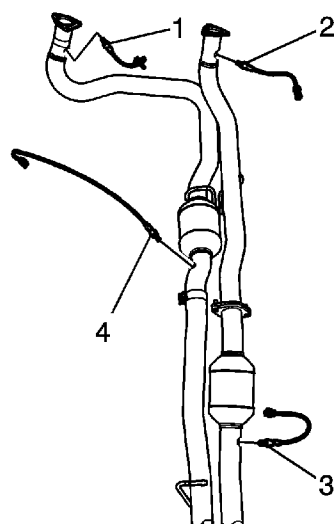
Removal Procedure

Caution: Refer to [Heated Oxygen and Oxygen Sensor Caution](#) in the Preface section.



1. Raise and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#).
2. Unbolt the front propeller shaft from the front differential, if equipped with four wheel drive (4WD). Refer to [Front Propeller Shaft Replacement](#).
3. Remove the connector position assurance (CPA) retainer (3).
4. Disconnect the HO2S (1) electrical connector from the engine wiring harness electrical connector (2).

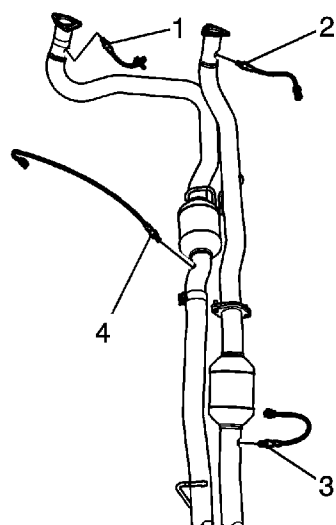
Caution: Refer to [Excessive Force and Oxygen Sensor Caution](#) in the Preface section.



5. Remove the HO2S (1).

Installation Procedure

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



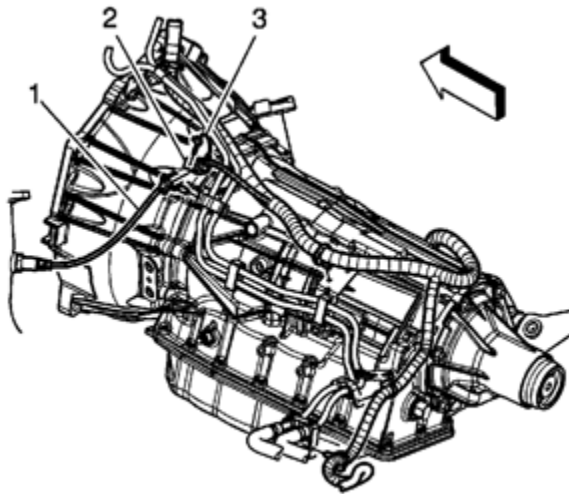
Note: A special anti-seize compound is used on the HO2S threads. The compound consists of liquid graphite and glass beads. The graphite tends to burn away, but the glass beads remain, making the sensor easier to remove. New, or service replacement sensors already have the compound applied to the threads. If the sensor is removed from an exhaust component and if for any reason the sensor is to be reinstalled, the threads must have anti-

seize compound applied before the reinstallation.

1. If reinstalling the old sensor, coat the threads with anti-seize compound GM P/N 12377953, or equivalent.
2. Install the HO2S (1).

Tighten

Tighten the sensor to 42 N·m (31 lb ft).

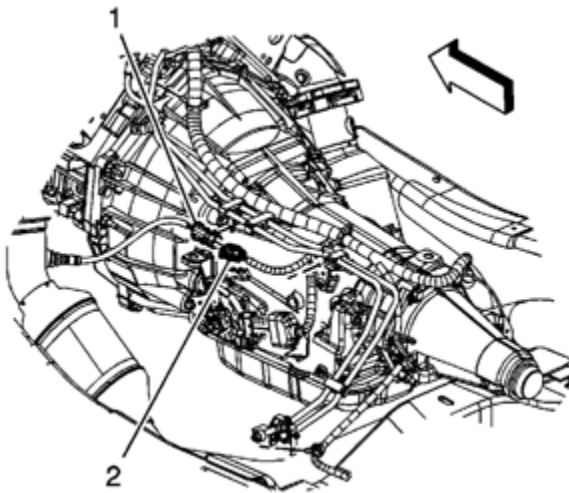


3. Connect the HO2S (1) electrical connector to the engine wiring harness electrical connector (2).
4. Install the CPA retainer (3).
5. Install the front propeller shaft to the front differential, if equipped with 4WD. Refer to [Front Propeller Shaft Replacement](#).
6. Lower the vehicle.

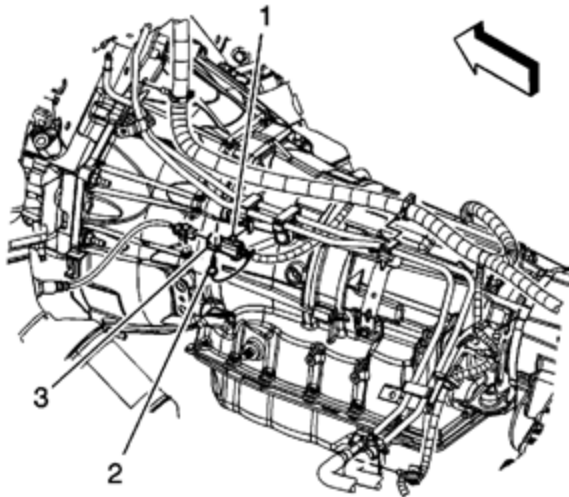
Heated Oxygen Sensor Replacement - Bank 1 Sensor 1 (2500 Series)

Removal Procedure

Caution: Refer to [Heated Oxygen and Oxygen Sensor Caution](#) in the Preface section.

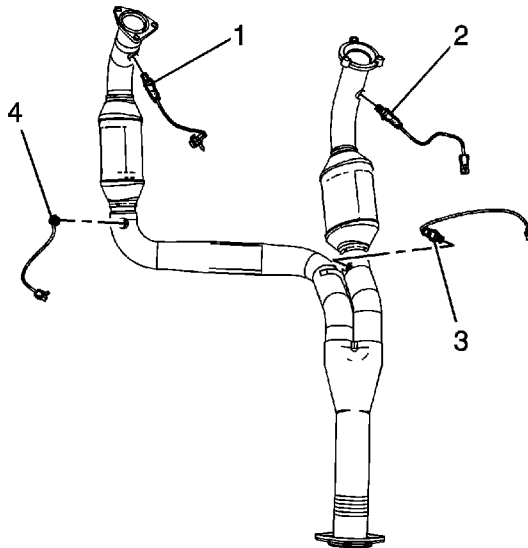


1. Raise and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#).
2. Unbolt the front propeller shaft from the front differential, if equipped with four wheel drive (4WD). Refer to [Front Propeller Shaft Replacement](#).
3. For vehicles equipped with a 4L60-E/4L70-E automatic transmission perform the following steps. For vehicles equipped with a 6L80-E automatic transmission proceed to step 7.
4. Remove the connector position assurance (CPA) retainer.
5. Disconnect the engine wiring harness electrical connector (2) from the HO2S.
6. Remove the HO2S electrical connector clip (1) from the fuel line clip.



7. Remove the CPA retainer (2).
8. Remove the engine wiring harness electrical connector clip (1) from the fuel line clip.
9. Disconnect the engine wiring harness electrical connector (3) from the HO2S.

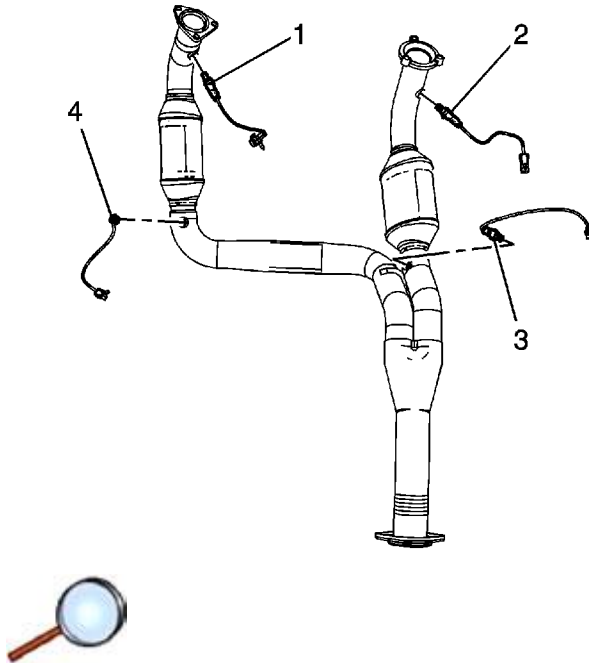
Caution: Refer to [Excessive Force and Oxygen Sensor Caution](#) in the Preface section.



10. Remove the HO2S (1).

Installation Procedure

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

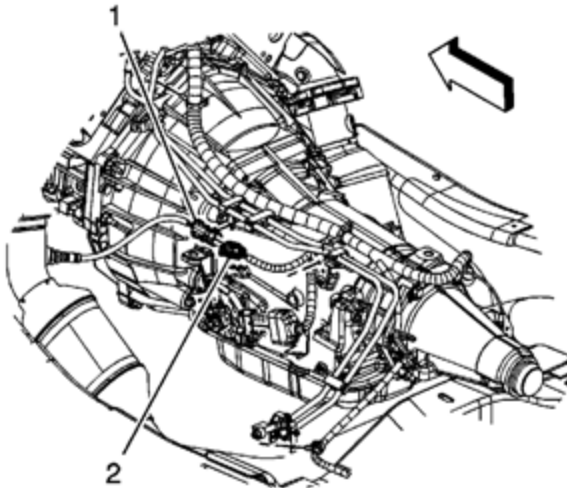


Note: A special anti-seize compound is used on the HO₂S threads. The compound consists of liquid graphite and glass beads. The graphite tends to burn away, but the glass beads remain, making the sensor easier to remove. New, or service replacement sensors already have the compound applied to the threads. If the sensor is removed from an exhaust component and if for any reason the sensor is to be reinstalled, the threads must have anti-seize compound applied before the reinstallation.

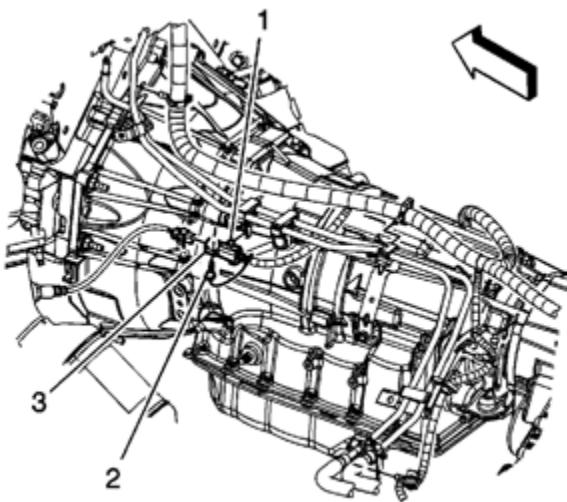
1. If reinstalling the old sensor, coat the threads with anti-seize compound GM P/N 12377953, or equivalent.
2. Install the HO₂S (1).

Tighten

Tighten the sensor to 42 N·m (31 lb ft).



3. For vehicles equipped with a 4L60-E/4L70-E automatic transmission perform the following steps, for vehicles equipped with a 6L80-E automatic transmission proceed to step 7.
4. Install the HO2S electrical connector clip (1) to the fuel line clip.
5. Connect the engine wiring harness electrical connector (2) to the HO2S.
6. Install the CPA retainer.

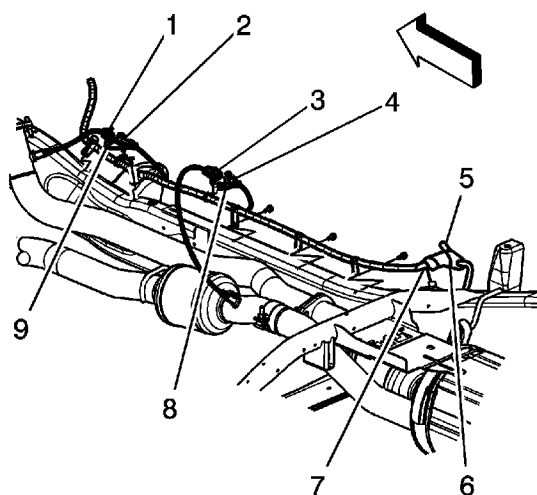


7. Connect the engine wiring harness electrical connector (3) to the HO2S.
8. Install the engine wiring harness electrical connector clip (1) to the fuel line clip.
9. Install the CPA retainer (2).
10. Install the front propeller shaft to the front differential, if equipped with 4WD. Refer to [Front Propeller Shaft Replacement](#).
11. Lower the vehicle.

Heated Oxygen Sensor Replacement - Bank 1 Sensor 2 (2500 Series - Cab/Chassis)

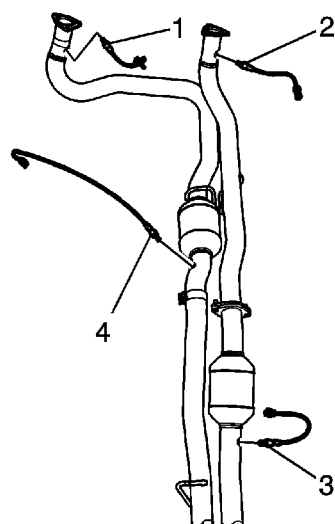
Removal Procedure

Caution: Refer to [Heated Oxygen and Oxygen Sensor Caution](#) in the Preface section.



1. Raise and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#).
2. Remove the HO2S electrical connector rosebud clip from the engine wiring harness clip.
3. Remove the connector position assurance (CPA) retainer (8).
4. Disconnect the HO2S electrical connector (3) from the engine wiring harness electrical connector (4).

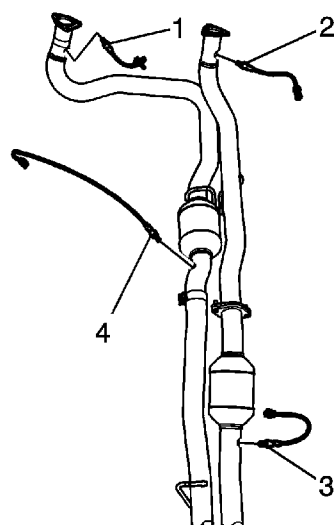
Caution: Refer to [Excessive Force and Oxygen Sensor Caution](#) in the Preface section.



5. Remove the HO₂S (4).

Installation Procedure

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



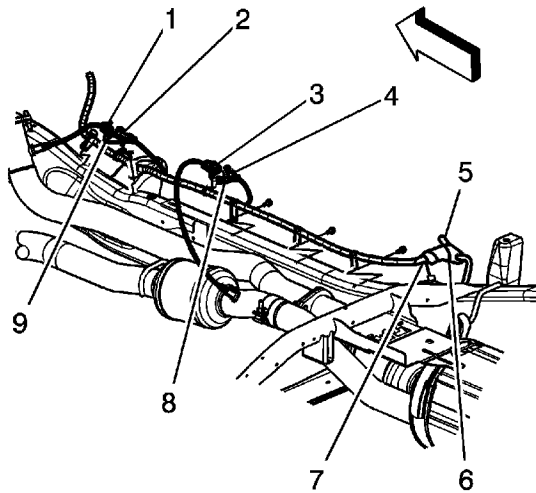
Note: A special anti-seize compound is used on the HO₂S threads. The compound consists of liquid graphite and glass beads. The graphite tends to burn away, but the glass beads remain, making the sensor easier to remove. New, or service replacement sensors already have the compound applied to the threads. If the sensor is removed from an exhaust component and if for any reason the sensor is to be reinstalled, the threads must have anti-

seize compound applied before the reinstallation.

1. If reinstalling the old sensor, coat the threads with anti-seize compound GM P/N 12377953, or equivalent.
2. Install the HO2S (4).

Tighten

Tighten the sensor to 42 N·m (31 lb ft).

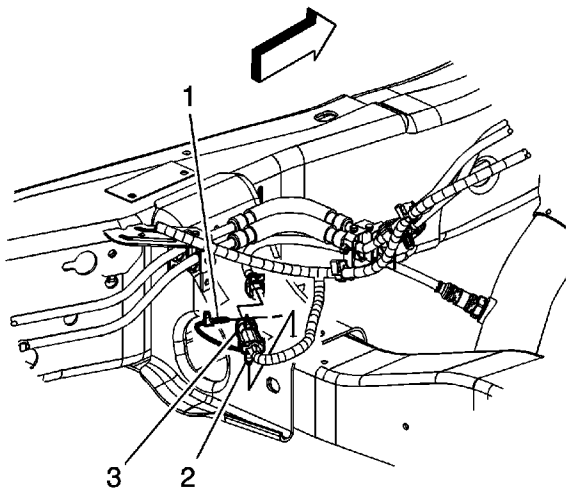


3. Connect the HO2S electrical connector (3) to the engine wiring harness electrical connector (4).
4. Install the CPA retainer (8).
5. Install the HO2S electrical connector rosebud clip to the engine wiring harness clip.
6. Lower the vehicle.

Heated Oxygen Sensor Replacement - Bank 1 Sensor 2 (2500 Series)

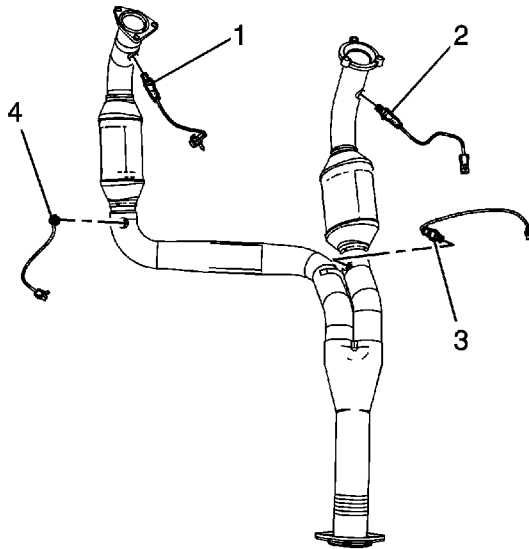
Removal Procedure

Caution: Refer to [Heated Oxygen and Oxygen Sensor Caution](#) in the Preface section.



1. Raise and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#).
2. Remove the connector position assurance (CPA) retainer (1).
3. Disconnect the HO2S electrical connector from the engine wiring harness electrical connector (3).

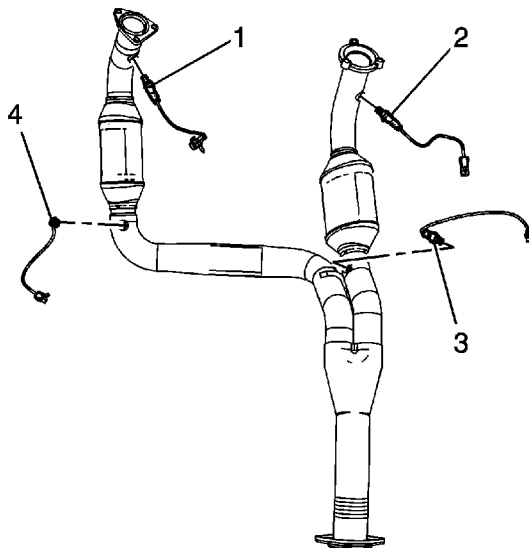
Caution: Refer to [Excessive Force and Oxygen Sensor Caution](#) in the Preface section.



4. Remove the HO2S (4).

Installation Procedure

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



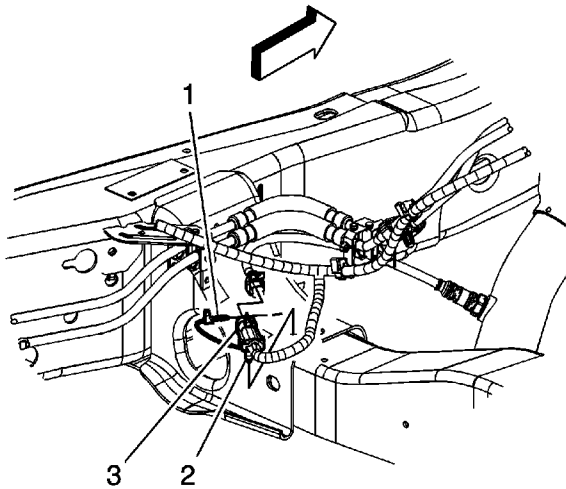
Note: A special anti-seize compound is used on the HO2S threads. The compound consists of liquid graphite and glass beads. The graphite tends to burn away, but the glass beads remain, making the sensor easier to remove. New, or service replacement sensors already have the compound applied to the threads. If the sensor is removed from an exhaust component and if for any reason the sensor is to be reinstalled, the threads must have anti-

seize compound applied before the reinstallation.

1. If reinstalling the old sensor, coat the threads with anti-seize compound GM P/N 12377953, or equivalent.
2. Install the HO2S (4).

Tighten

Tighten the sensor to 42 N·m (31 lb ft).

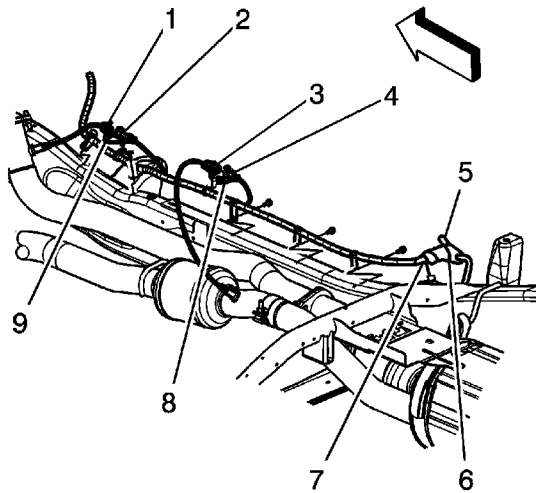


3. Connect the HO2S electrical connector to the engine wiring harness electrical connector (3).
4. Install the CPA retainer (1).
5. Lower the vehicle.

Heated Oxygen Sensor Replacement - Bank 2 Sensor 1 (2500 Series - Cab/Chassis)

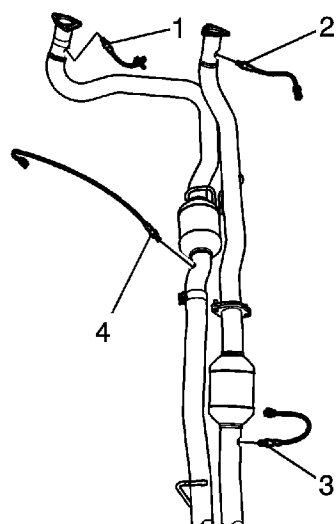
Removal Procedure

Caution: Refer to [Heated Oxygen and Oxygen Sensor Caution](#) in the Preface section.



1. Raise and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#).
2. Remove the connector position assurance (CPA) retainer (9).
3. Disconnect the HO2S electrical connector (1) from the engine wiring harness electrical connector (2).

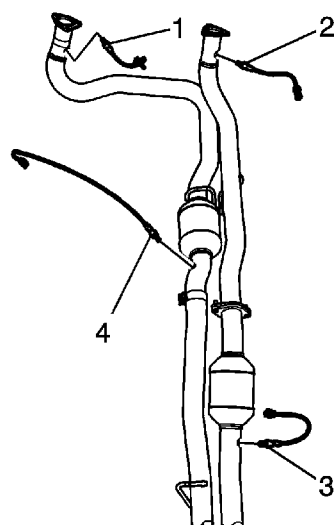
Caution: Refer to [Excessive Force and Oxygen Sensor Caution](#) in the Preface section.



4. Remove the HO₂S (2).

Installation Procedure

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



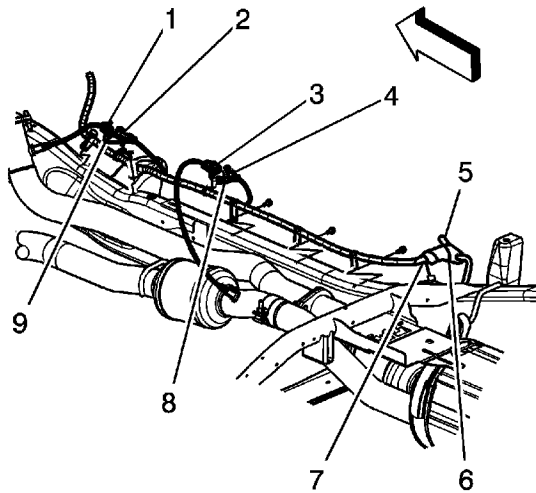
Note: A special anti-seize compound is used on the HO₂S threads. The compound consists of liquid graphite and glass beads. The graphite tends to burn away, but the glass beads remain, making the sensor easier to remove. New, or service replacement sensors already have the compound applied to the threads. If the sensor is removed from an exhaust component and if for any reason the sensor is to be reinstalled, the threads must have anti-

seize compound applied before the reinstallation.

1. If reinstalling the old sensor, coat the threads with anti-seize compound GM P/N 12377953, or equivalent.
2. Install the HO2S (2).

Tighten

Tighten the sensor to 42 N·m (31 lb ft).

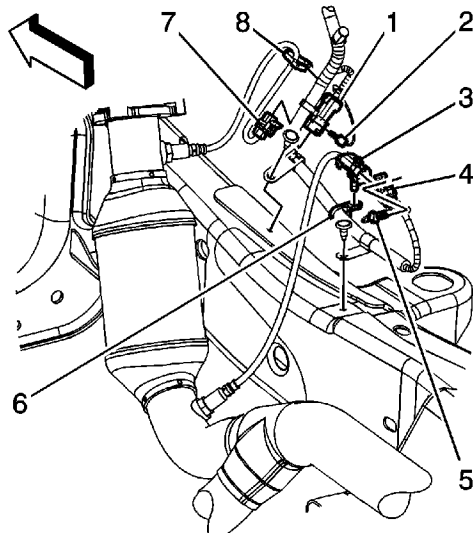


3. Connect the HO2S electrical connector (1) to the engine wiring harness electrical connector (2).
4. Install the CPA retainer (9).
5. Lower the vehicle.

Heated Oxygen Sensor Replacement - Bank 2 Sensor 1 (2500 Series)

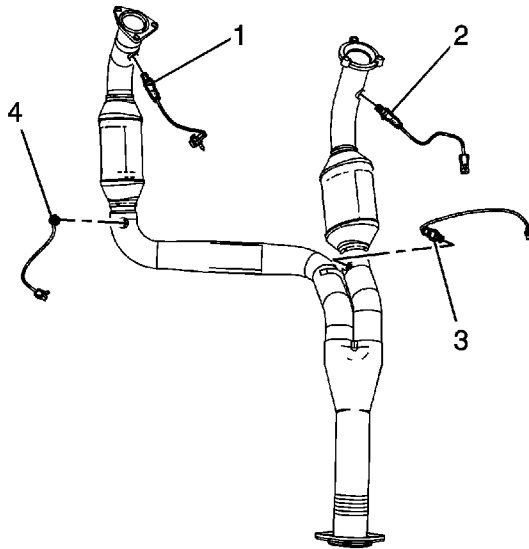
Removal Procedure

Caution: Refer to [Heated Oxygen and Oxygen Sensor Caution](#) in the Preface section.



1. Remove the right wheelhouse liner. Refer to [Front Wheelhouse Liner Replacement - Right Side](#).
2. Remove the connector position assurance (CPA) retainer (2).
3. Disconnect the HO2S electrical connector (7) from the engine wiring harness electrical connector (1).
4. Remove the HO2S clip (8) from the engine wiring harness.

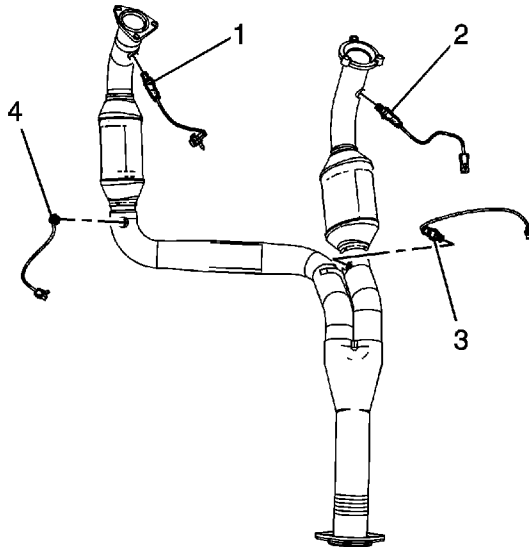
Caution: Refer to [Excessive Force and Oxygen Sensor Caution](#) in the Preface section.



5. Remove the HO₂S (2).

Installation Procedure

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



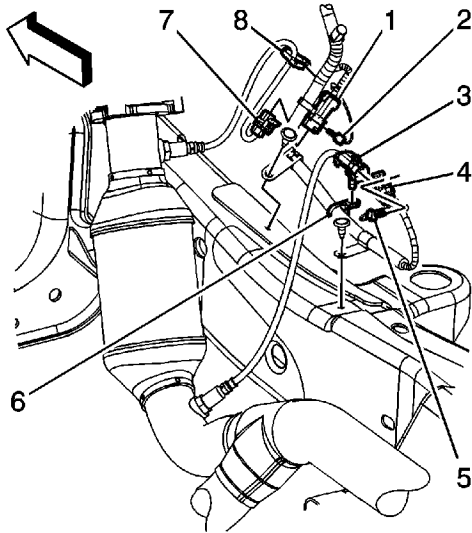
Note: A special anti-seize compound is used on the HO₂S threads. The compound consists of liquid graphite and glass beads. The graphite tends to burn away, but the glass beads remain, making the sensor easier to remove. New, or service replacement sensors already have the compound applied to the threads. If the sensor is removed from an exhaust component and if for any reason the sensor is to be reinstalled, the threads must have anti-

seize compound applied before the reinstallation.

1. If reinstalling the old sensor, coat the threads with anti-seize compound GM P/N 12377953, or equivalent.
2. Install the HO2S (2).

Tighten

Tighten the sensor to 42 N·m (31 lb ft).

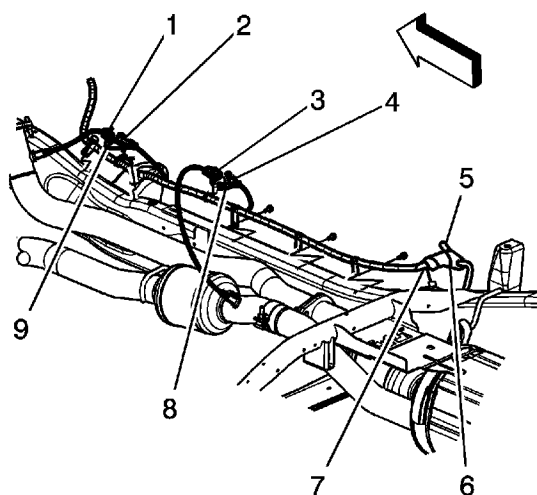


3. Connect the HO2S electrical connector (7) to the engine wiring harness electrical connector (1).
4. Install the CPA retainer (2).
5. Install the HO2S clip (8) to the engine wiring harness.
6. Install the right wheelhouse liner. Refer to [Front Wheelhouse Liner Replacement - Right Side](#).

Heated Oxygen Sensor Replacement - Bank 2 Sensor 2 (2500 Series - Cab/Chassis)

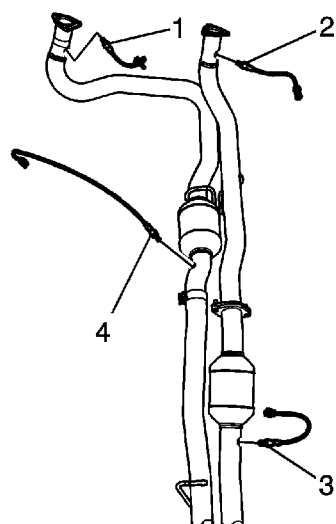
Removal Procedure

Caution: Refer to [Heated Oxygen and Oxygen Sensor Caution](#) in the Preface section.



1. Raise and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#).
2. Remove the connector position assurance (CPA) retainer (5).
3. Disconnect the HO2S electrical connector (6) from the engine wiring harness electrical connector (7).

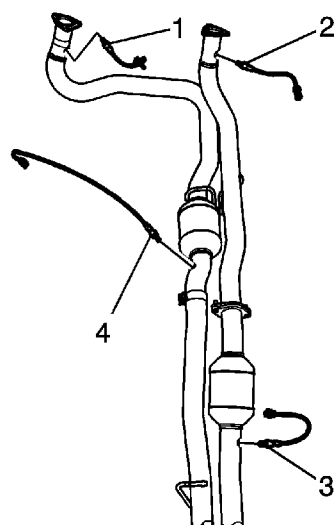
Caution: Refer to [Excessive Force and Oxygen Sensor Caution](#) in the Preface section.



4. Remove the HO2S (3).

Installation Procedure

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



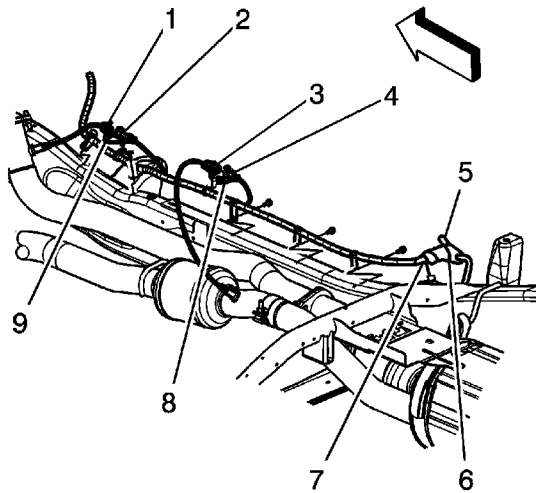
Note: A special anti-seize compound is used on the HO2S threads. The compound consists of liquid graphite and glass beads. The graphite tends to burn away, but the glass beads remain, making the sensor easier to remove. New, or service replacement sensors already have the compound applied to the threads. If the sensor is removed from an exhaust component and if for any reason the sensor is to be reinstalled, the threads must have anti-

seize compound applied before the reinstallation.

1. If reinstalling the old sensor, coat the threads with anti-seize compound GM P/N 12377953, or equivalent.
2. Install the HO2S (3).

Tighten

Tighten the sensor to 42 N·m (31 lb ft).

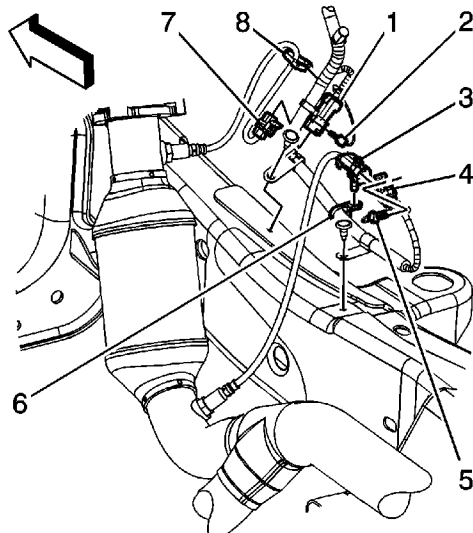


3. Connect the HO2S electrical connector (6) to the engine wiring harness electrical connector (7).
4. Install the CPA retainer (5).
5. Lower the vehicle.

Heated Oxygen Sensor Replacement - Bank 2 Sensor 2 (2500 Series)

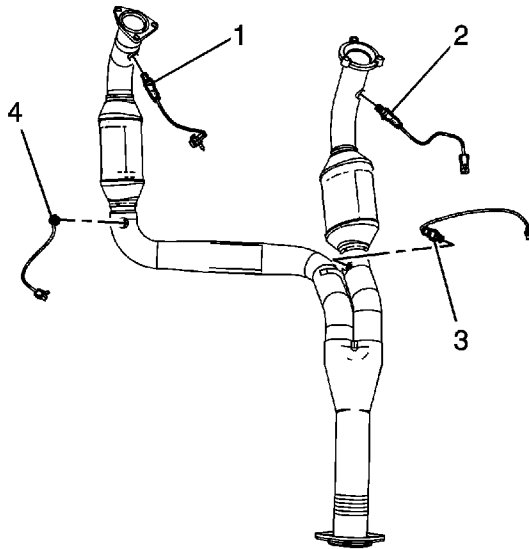
Removal Procedure

Caution: Refer to [Heated Oxygen and Oxygen Sensor Caution](#) in the Preface section.



1. Raise and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#).
2. Remove the connector position assurance (CPA) retainer (5).
3. Disconnect the engine wiring harness electrical connector (4) from the HO2S electrical connector (3).
4. Remove the HO2S electrical connector clip from the engine harness clip (6).

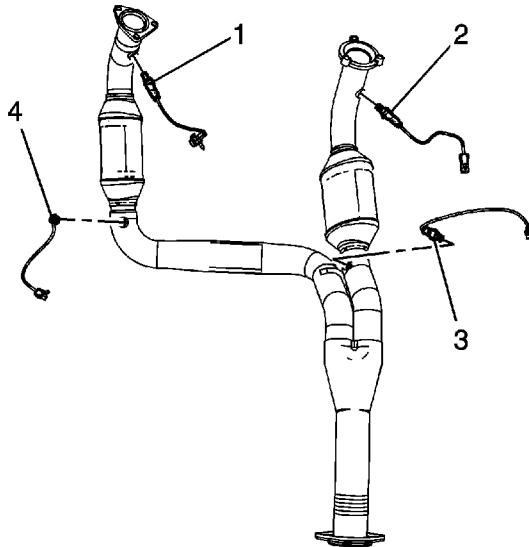
Caution: Refer to [Excessive Force and Oxygen Sensor Caution](#) in the Preface section.



5. Remove the HO2S (3).

Installation Procedure

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



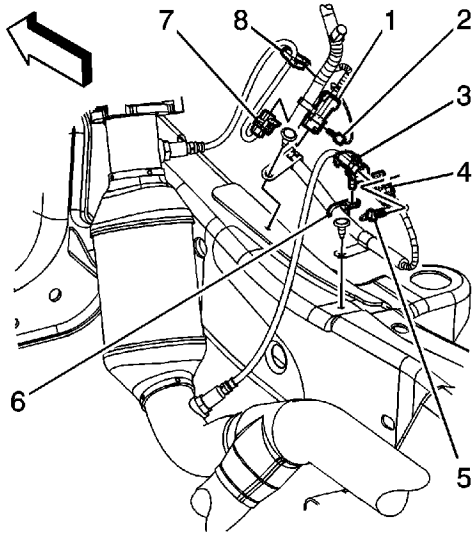
Note: A special anti-seize compound is used on the HO2S threads. The compound consists of liquid graphite and glass beads. The graphite tends to burn away, but the glass beads remain, making the sensor easier to remove. New, or service replacement sensors already have the compound applied to the threads. If the sensor is removed from an exhaust component and if for any reason the sensor is to be reinstalled, the threads must have anti-

seize compound applied before the reinstallation.

1. If reinstalling the old sensor, coat the threads with anti-seize compound GM P/N 12377953, or equivalent.
2. Install the HO2S (3).

Tighten

Tighten the sensor to 42 N·m (31 lb ft).

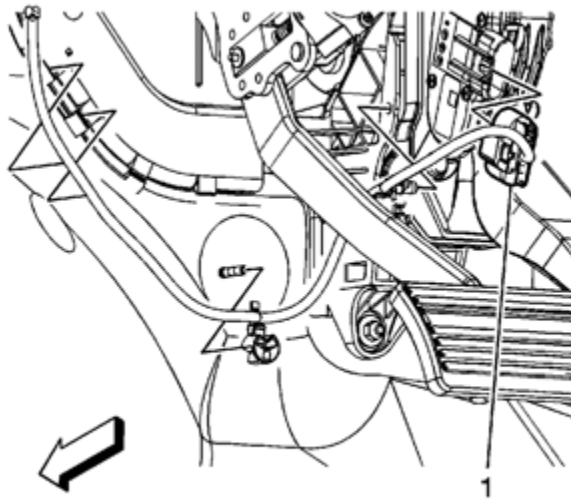


3. Install the HO2S electrical connector clip to the engine harness clip (6).
4. Connect the engine wiring harness electrical connector (4) to the HO2S electrical connector (3).
5. Install the CPA retainer (5).
6. Lower the vehicle.

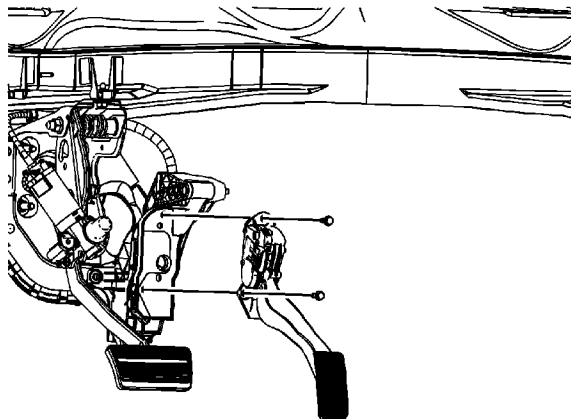
Accelerator Pedal Position Sensor Replacement

Removal Procedure

Caution: Handle the electronic throttle control components carefully. Use cleanliness in order to prevent damage. Do not drop the electronic throttle control components. Do not roughly handle the electronic throttle control components. Do not immerse the electronic throttle control components in cleaning solvents of any type.



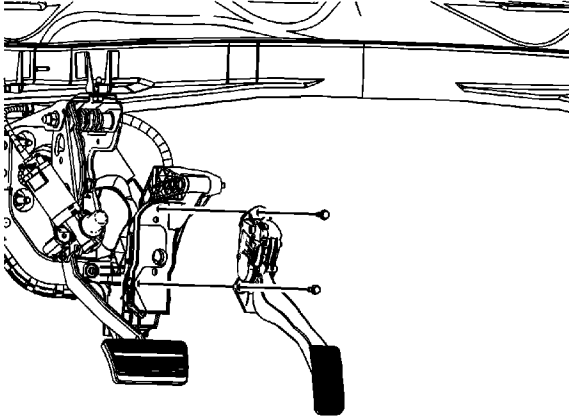
1. Remove the knee bolster. Refer to [Knee Bolster Replacement](#).
2. Push down the small tab and disconnect the accelerator pedal position (APP) sensor electrical connector (1).





3. Remove the accelerator pedal bolts.
4. Remove the accelerator pedal.

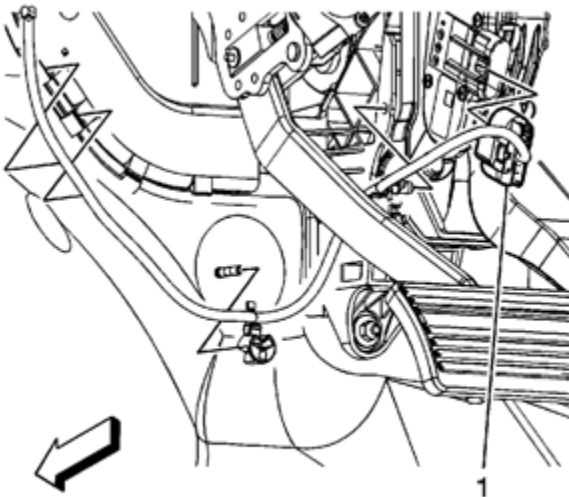
Installation Procedure



1. Position the accelerator pedal to the accelerator pedal bracket.

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

2. Install the accelerator pedal bolts and tighten to **9 N·m (80 lb in)**.





3. Connect the APP sensor electrical connector (1).
4. Connect a scan tool to the diagnostic port in order to test for proper throttle-opening and throttle-closing range.
5. Operate the accelerator pedal and monitor the throttle angles. The accelerator pedal should operate freely, without binding, between a closed throttle, and a wide open throttle (WOT).
6. Verify that the vehicle meets the following conditions:
 - The vehicle is not in a reduced engine power mode.
 - The ignition is ON.
 - The engine is OFF.
7. Install the knee bolster. Refer to [Knee Bolster Replacement](#).

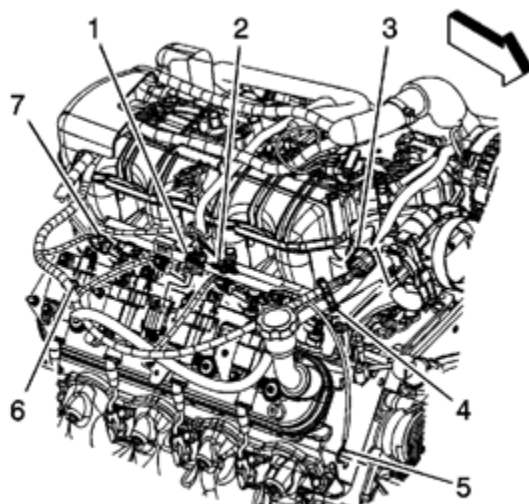
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Throttle Body Assembly Replacement

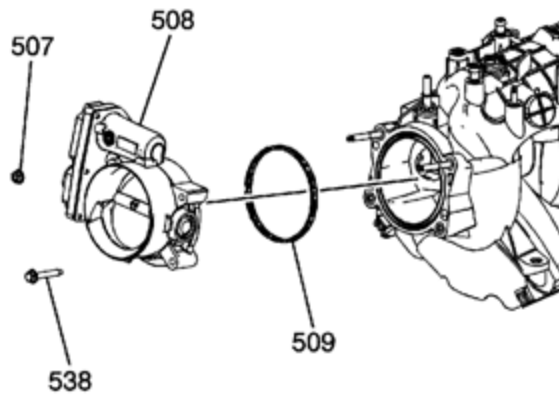
Removal Procedure

Caution: Handle the electronic throttle control components carefully. Use cleanliness in order to prevent damage. Do not drop the electronic throttle control components. Do not roughly handle the electronic throttle control components. Do not immerse the electronic throttle control components in cleaning solvents of any type.

Caution: DO NOT for any reason, insert a screwdriver or other small hand tools into the throttle body to hold open the throttle plate, as the wedge inside the throttle body could be damaged.

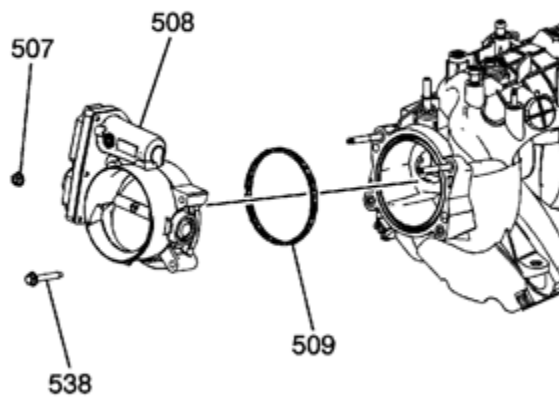


1. Remove the air cleaner outlet duct. Refer to [Air Cleaner Resonator Outlet Duct Replacement](#).
2. Disconnect the engine wiring harness electrical connector (3) from the electronic throttle control.



3. Remove the throttle body nuts (507) and bolts (538).
4. Remove the throttle body (508).
5. Remove and discard the throttle body gasket (509).

Installation Procedure

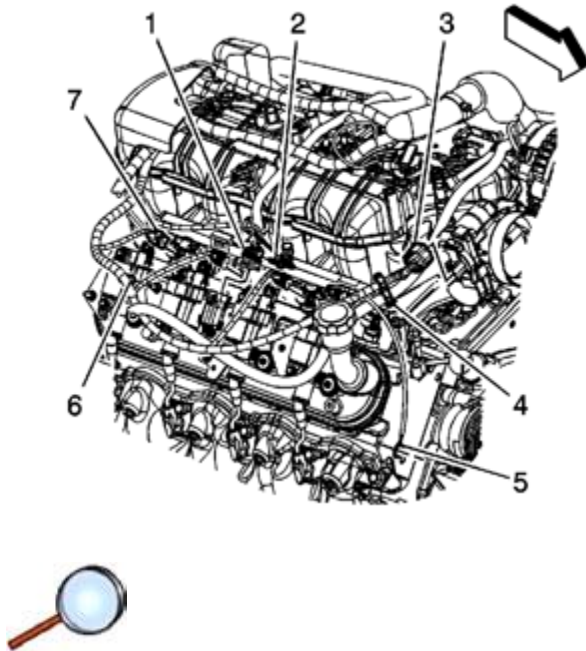


1. Install a NEW throttle body gasket to the intake manifold. Align the tab of the gasket with the notch in the manifold.

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

2. Install the throttle body (508), bolts (538), and nuts (507) and tighten to **10 N·m**

(89 lb in).



Note: Verify that the engine wiring harness electrical connector seal for the electronic throttle control is properly installed and not damaged.

3. Connect the engine wiring harness electrical connector (3) to the electronic throttle control.
4. Install the air cleaner outlet duct. Refer to [Air Cleaner Resonator Outlet Duct Replacement](#).
5. Connect a scan tool in order to test for proper throttle-opening and throttle-closing range.
6. Operate the accelerator pedal and monitor the throttle angles. The accelerator pedal should operate freely, without binding, between a closed throttle, and a wide open throttle (WOT).
7. Verify that the vehicle meets the following conditions:
 - The vehicle is not in a reduced engine power mode.
 - The ignition is ON.
 - The engine is OFF.
8. Perform the Throttle Learn Procedure. Refer to [Throttle Learn](#).
9. Inspect for coolant leaks.

Throttle Body Cleaning

1. Remove the air cleaner outlet duct. Refer to [Air Cleaner Resonator Outlet Duct Replacement](#).

Warning: Turn OFF the ignition before inserting fingers into the throttle bore. Unexpected movement of the throttle blade could cause personal injury.

Caution: Do not insert any tools into the throttle body bore in order to avoid damage to the throttle valve plate.

2. Inspect the throttle body bore and the throttle plate for deposits. You will need to open the throttle plate in order to inspect all surfaces.

Caution: Do not use any solvent that contains Methyl Ethyl Ketone (MEK). This solvent may damage fuel system components.

3. Clean the throttle body bore and the throttle plate using a clean shop towel with GM Top Engine Cleaner, P/N 1052626, or AC-Delco Carburetor Tune-Up Conditioner, P/N X66-P, or an equivalent product.
4. Install the air cleaner outlet duct. Refer to [Air Cleaner Resonator Outlet Duct Replacement](#).
5. Perform the Throttle Learn Procedure. Refer to [Throttle Learn](#).

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Fuel Pressure Gage Installation and Removal

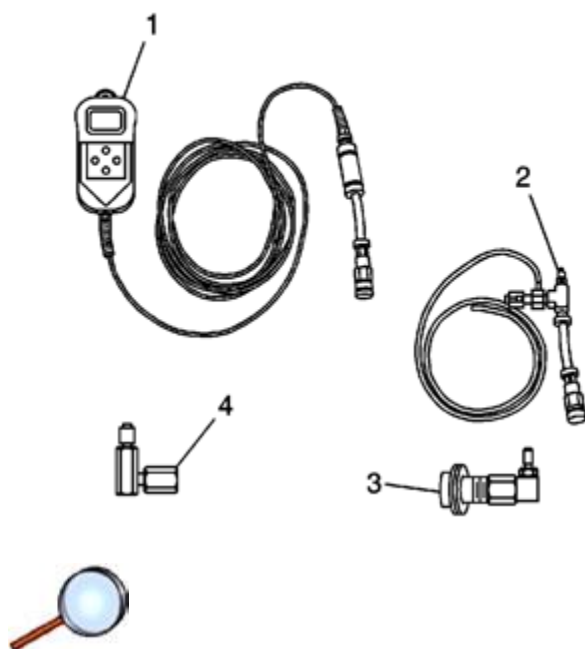
Special Tools

[CH-48027](#) Digital Pressure Gage

Installation Procedure

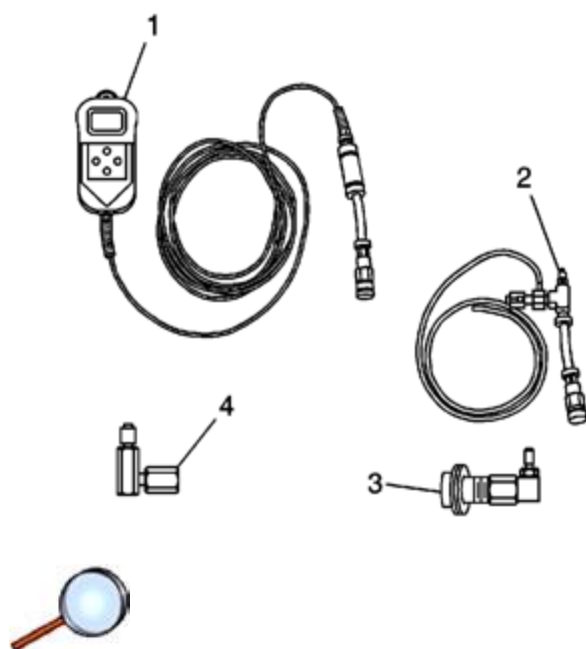
Warning: Refer to [Gasoline/Gasoline Vapors Warning](#) in the Preface section.

Warning: Remove the fuel tank cap and relieve the fuel system pressure before servicing the fuel system in order to reduce the risk of personal injury. After you relieve the fuel system pressure, a small amount of fuel may be released when servicing the fuel lines, the fuel injection pump, or the connections. In order to reduce the risk of personal injury, cover the fuel system components with a shop towel before disconnection. This will catch any fuel that may leak out. Place the towel in an approved container when the disconnection is complete.



1. Relieve the fuel system pressure. Refer to [Fuel Pressure Relief](#).
2. Connect the CH-48027-1 (1) to the CH-48027-2 (2).
3. Remove the shop towel from around the fuel rail service port, and place in an approved gasoline container.
4. Perform any tests and/or diagnostics as needed. For the proper usage of the [CH-48027](#), refer to the manufacture's directions.

Removal Procedure



1. Relieve the fuel system pressure, if required. Perform the following steps:

Warning: Wrap a shop towel around the fuel pressure connection in order to reduce the risk of fire and personal injury. The towel will absorb any fuel leakage that occurs during the connection of the fuel pressure gage. Place the towel in an approved container when the connection of the fuel pressure gage is complete.

- 1.1. Wrap a shop towel around the fuel rail service port.
- 1.2. Place the hose on the CH-48027-2 (2) into an approved gasoline container.
- 1.3. Open the valve on the CH-48027-2 (2) in order to bleed any fuel from the fuel rail.
- 1.4. Close the valve on the CH-48027-2 (2).
- 1.5. Remove the hose on the CH-48027-2 (2) from the approved gasoline container.
- 1.6. Remove the shop towel from around the fuel rail service port, and place in an approved gasoline container.

Caution: Clean all of the following areas before performing any disconnections in order to avoid possible contamination in the system:

- The fuel pipe connections
- The hose connections
- The areas surrounding the connections

2. Disconnect the CH-48027-1 (1) from the CH-48027-2 (2).
3. Disconnect the CH-48027-2 (2) from the CH-48027-3 (4).
4. Disconnect the CH-48027-3 (4) from the fuel rail service port.
5. Install the fuel rail service port cap.
6. Tighten the fuel fill cap.

Fuel Pressure Relief (With CH-48027)

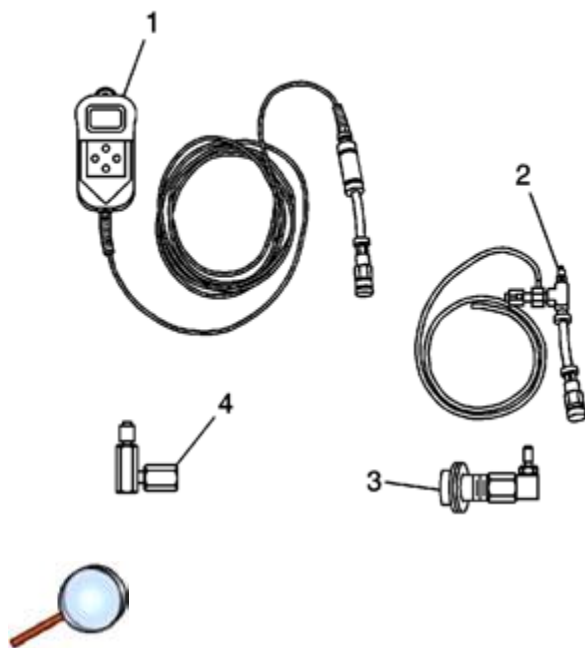
Special Tools

CH-48027 Digital Pressure Gage

Warning: Refer to [Gasoline/Gasoline Vapors Warning](#) in the Preface section.

Warning: Remove the fuel tank cap and relieve the fuel system pressure before servicing the fuel system in order to reduce the risk of personal injury. After you relieve the fuel system pressure, a small amount of fuel may be released when servicing the fuel lines, the fuel injection pump, or the connections. In order to reduce the risk of personal injury, cover the fuel system components with a shop towel before disconnection. This will catch any fuel that may leak out. Place the towel in an approved container when the disconnection is complete.

1. If the fuel system requires repair, prevent fuel spillage by removing the fuel pump fuse. Refer to [Electrical Center Identification Views](#).



2. Remove the engine cover, if required.
3. Loosen the fuel fill cap in order to relieve the fuel tank vapor pressure.
4. Remove the fuel rail service port cap.

Warning: Wrap a shop towel around the fuel pressure connection in order to reduce the risk of fire and personal injury. The towel will absorb any fuel leakage that occurs during the connection of the fuel pressure gage. Place the towel in an approved container when the connection of the fuel pressure gage is complete.

5. Wrap a shop towel around the fuel rail service port.
6. Connect the CH-48027-3 (4) to the fuel rail service port.
7. Connect the CH-48027-2 (2) to the CH-48027-3 (4).

8. Place the hose on the CH-48027-2 (2) into an approved gasoline container.
9. Open the valve on the CH-48027-2 (2) in order to bleed any fuel from the fuel rail.
10. Close the valve on the CH-48027-2 (2).
11. Remove the hose on the CH-48027-2 (2) from the approved gasoline container.

Caution: Clean all of the following areas before performing any disconnections in order to avoid possible contamination in the system:

- The fuel pipe connections
- The hose connections
- The areas surrounding the connections

Note: If relieving the fuel pressure for the fuel pressure gage installation and removal, it is NOT necessary to proceed with the following steps.

12. Disconnect the CH-48027-2 (2) from the CH-48027-3 (4).
13. Disconnect the CH-48027-3 (4) from the fuel rail service port.
14. Remove the shop towel from around the fuel rail service port, and place in an approved gasoline container.
15. Install the fuel rail service port cap.
16. Install the engine cover, if required.
17. Tighten the fuel fill cap.

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Fuel Pressure Relief (Without CH-48027)

Warning: Refer to [Gasoline/Gasoline Vapors Warning](#) in the Preface section.

Warning: Remove the fuel tank cap and relieve the fuel system pressure before servicing the fuel system in order to reduce the risk of personal injury. After you relieve the fuel system pressure, a small amount of fuel may be released when servicing the fuel lines, the fuel injection pump, or the connections. In order to reduce the risk of personal injury, cover the fuel system components with a shop towel before disconnection. This will catch any fuel that may leak out. Place the towel in an approved container when the disconnection is complete.

1. If the fuel system requires repair, prevent fuel spillage by removing the fuel pump fuse. Refer to [Electrical Center Identification Views](#) .
2. Loosen the fuel fill cap in order to relieve the fuel tank vapor pressure.
3. Remove the engine cover, if required.
4. Remove the fuel rail service port cap.
5. Wrap a shop towel around the fuel rail service port and using a small flat-bladed tool, depress (open) the fuel rail test port valve.
6. Remove the shop towel from around the fuel rail service port, and place in an approved gasoline container.
7. Install the fuel rail service port cap.
8. Install the engine cover, if required.
9. Tighten the fuel fill cap.

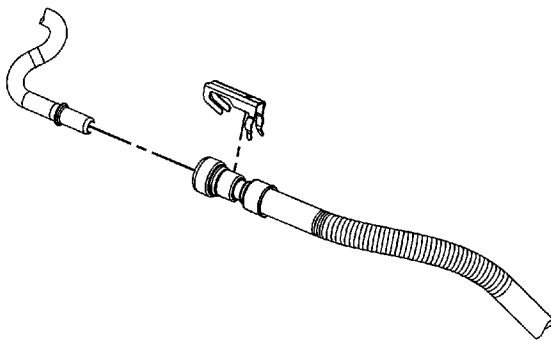
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Metal Collar Quick Connect Fitting Service

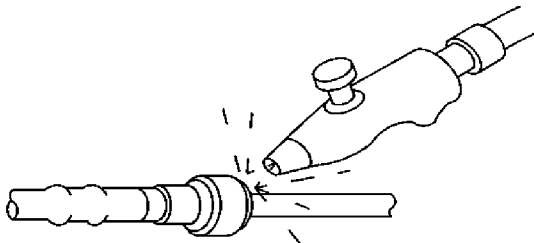
Special Tools

[J 41769](#) Fuel Line Quick Disconnect Tool

Disconnect Procedure



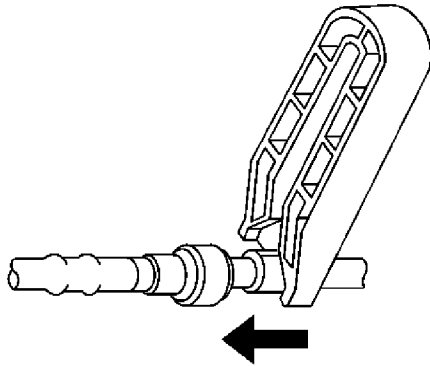
1. Relieve the fuel system pressure. Refer to [Fuel Pressure Relief](#).
2. Remove the fuel line retainer.



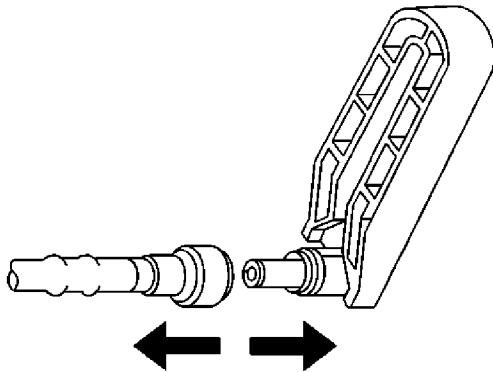


Warning: Wear safety glasses when using compressed air, as flying dirt particles may cause eye injury.

3. Using compressed air, blow any dirt or debris from around the connection.



4. Using the correct tool from the [J 41769](#) , insert the tool into the female connector end, then push inward in order to release the quick connect locking tabs.



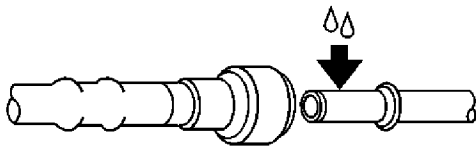
5. Pull the fuel line connection apart.

Caution: If necessary, remove rust or burrs from the fuel pipes with an emery cloth. Use a

radial motion with the fuel pipe end in order to prevent damage to the O-ring sealing surface. Use a clean shop towel in order to wipe off the male tube ends. Inspect all the connections for dirt and burrs. Clean or replace the components and assemblies as required.

6. Use a clean shop towel in order to wipe off the male connection end.
7. Inspect both ends of the fitting for dirt and burrs. Clean or replace the components as required.

Connect Procedure

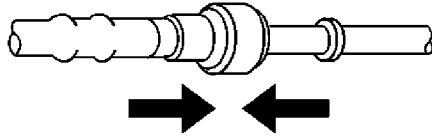


Warning: In order to reduce the risk of fire and personal injury, before connecting fuel pipe fittings, always apply a few drops of clean engine oil to the male pipe ends.

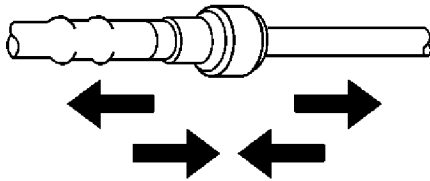
This will ensure proper reconnection and prevent a possible fuel leak.

During normal operation, the O-rings located in the female connector will swell and may prevent proper reconnection if not lubricated.

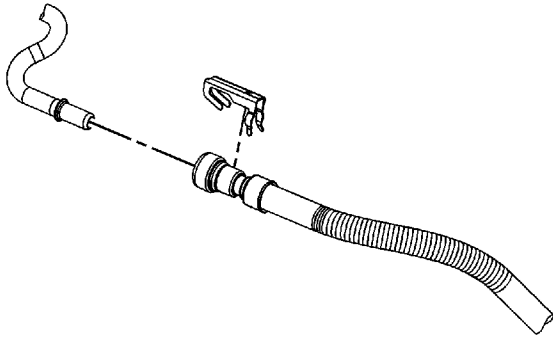
1. Apply a few drops of clean engine oil to the male connection end.



2. Push both sides of the fitting together in order to engage the retaining tabs.



3. Once installed, pull on both sides of the connection in order to ensure the connection is secure.



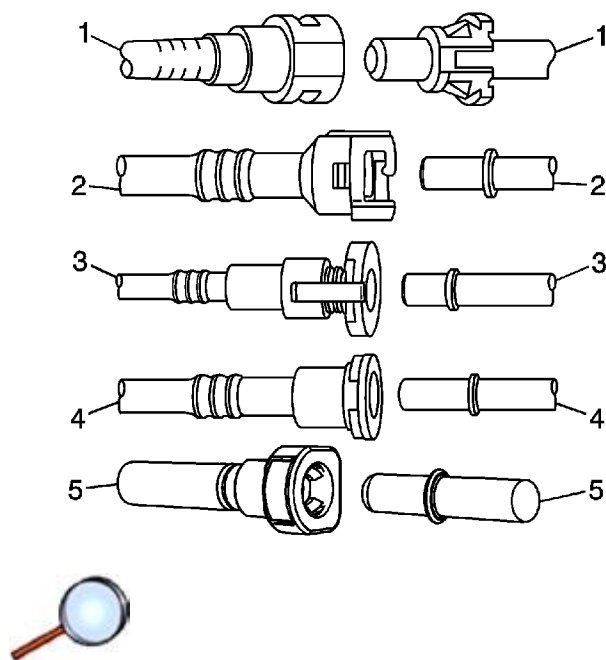
4. Install the fuel line retainer.

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Plastic Collar Quick Connect Fitting Service

Disconnect Procedure

Warning: Refer to [Gasoline/Gasoline Vapors Warning](#) in the Preface section.



Note: There are several types of Plastic Collar Fuel and Evaporative Emission Quick Connect Fittings used on this vehicle.

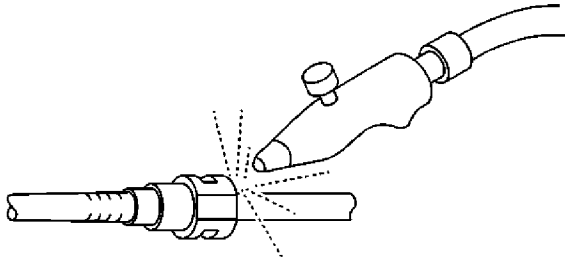
- Bartholomew (1)
- Q Release (2)
- Squeeze to Release (3)
- Sliding Retainer (4)
- Push Down TI (5)

The following instructions apply to all of these types of Plastic Collar Quick Connect Fittings except where indicated.

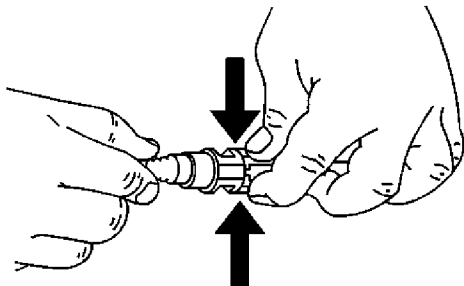
1. Relieve the fuel system pressure. Refer to [Fuel Pressure Relief](#).

Warning: Refer to [Safety Glasses Warning](#) in the Preface section.

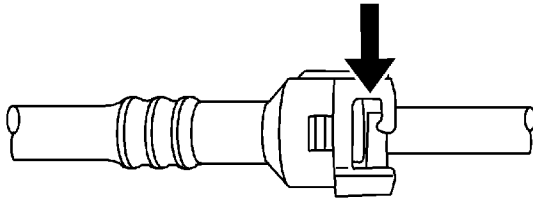
Caution: Refer to [Fuel and Evaporative Emission Hose/Pipe Connection Cleaning Caution](#) in the Preface section.



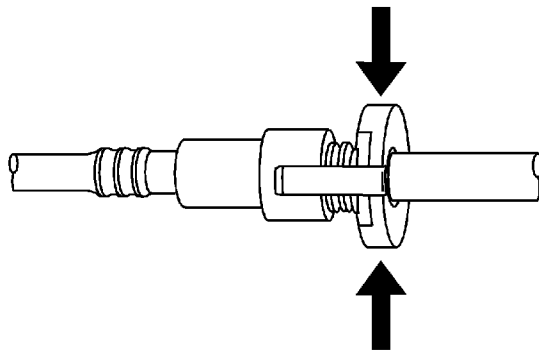
2. Using compressed air, blow any dirt or debris from around the connection.



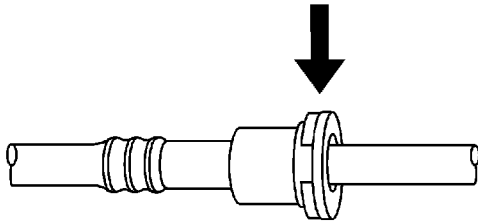
3. This step applies to Bartholomew style connector ONLY. Squeeze the plastic quick connect fitting release tabs.



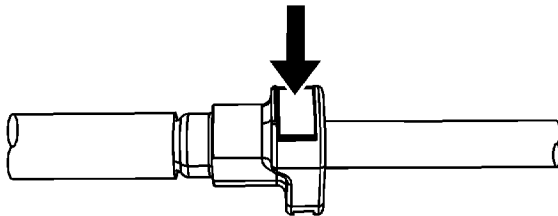
4. This step applies to Release Tab style connector ONLY. Release the fitting by pushing the tab toward the other side of the slot in the fitting.



5. This step applies to the Squeeze to Release style connector ONLY. Squeeze where indicated by the arrows shown above on both sides of the plastic ring surrounding the quick connect fitting.

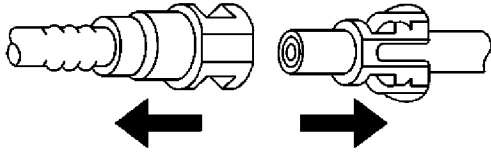


6. This step applies to the Sliding Retainer style connector ONLY. Release the fitting by pressing on one side of the release tab causing it to push in slightly. If the tab does not move try pressing the tab in from the opposite side. The tab will only move in one direction.



7. This step applies to the Push Down TI style connector ONLY. Release the fitting by pressing on the tab indicated by the arrow.

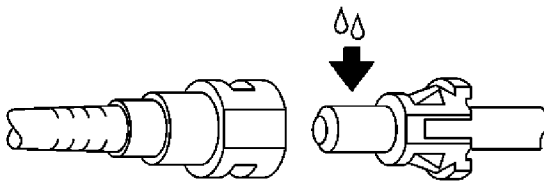
Warning: Refer to [Relieving Fuel Pressure Warning](#) in the Preface section.



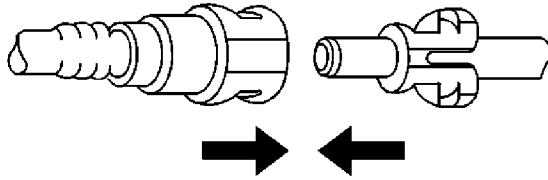
8. Pull the connection apart.

Connect Procedure

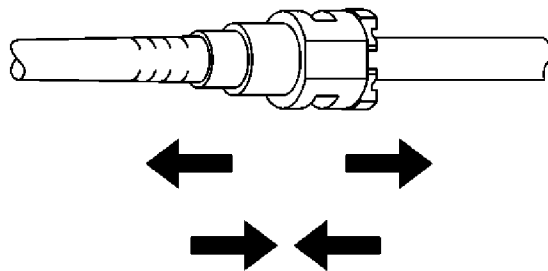
Warning: Refer to [Fuel Pipe Fitting Warning](#) in the Preface section.



1. Apply a few drops of clean engine oil to the male connection end.



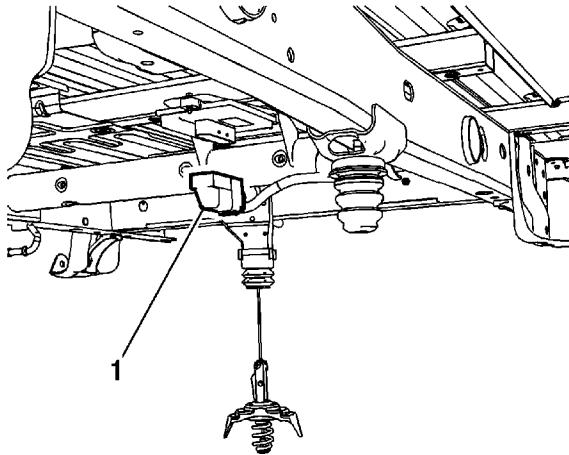
2. Push both sides of the quick-connect fitting together in order to cause the retaining feature to snap into place.



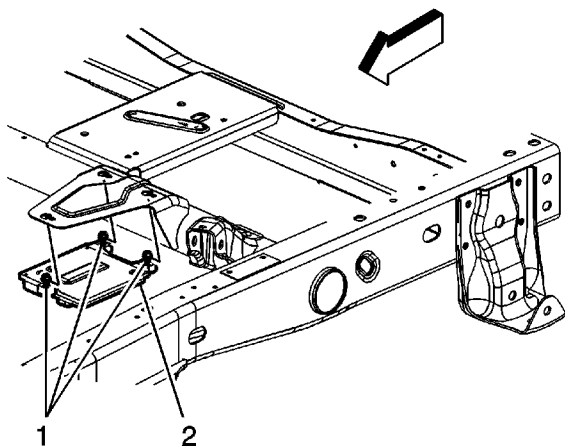
3. Once installed, pull on both sides of the connection in order to make sure the connection is secure.

Fuel Pump Flow Control Module Replacement

Removal Procedure



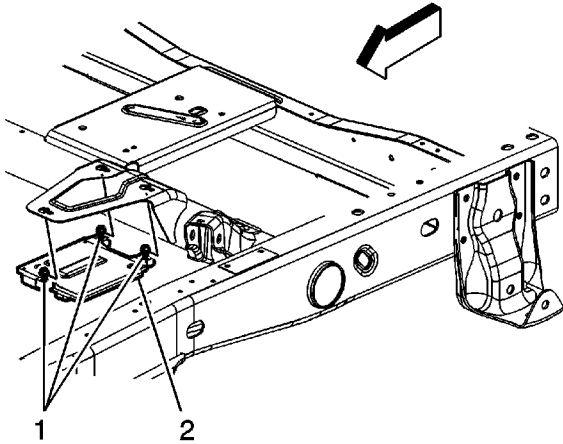
1. Remove the spare tire and wheel.
2. Disconnect the chassis wiring harness electrical connector (1) from the fuel pump flow control module.



3. Loosen the fuel pump flow control module bolts (1).
4. Slide the fuel pump flow control module (2) towards the passenger side of the vehicle.

5. Remove the fuel pump flow control module from the vehicle.

Installation Procedure



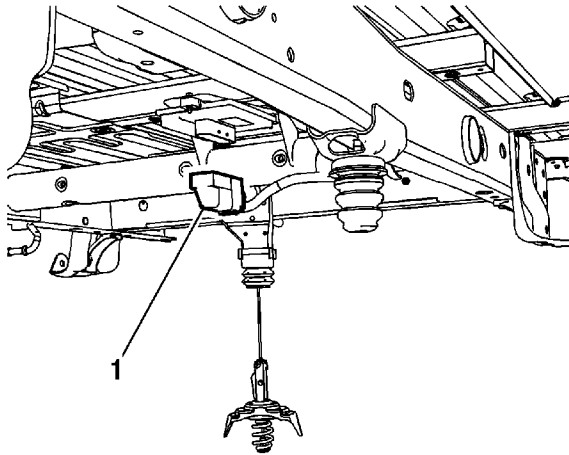
1. Position the fuel pump flow control module (2) to the vehicle.
2. Slide the fuel pump flow control module towards the driver side of the vehicle.

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

3. Tighten the fuel pump flow control module bolts (1).

Tighten

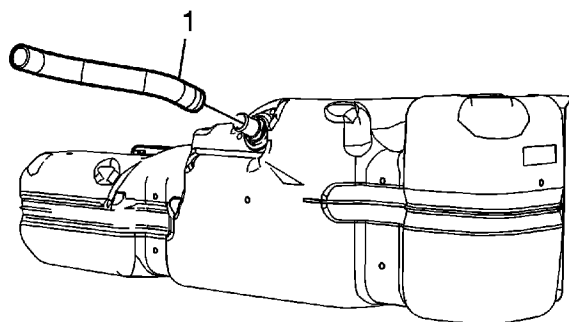
Tighten the bolts to 9 N·m (80 lb in).



4. Connect the chassis wiring harness electrical connector (1) to the fuel pump flow control module.
5. Install the spare tire and wheel.
6. Program the fuel pump flow control module. Refer to [Control Module References](#).

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Fuel Tank Draining

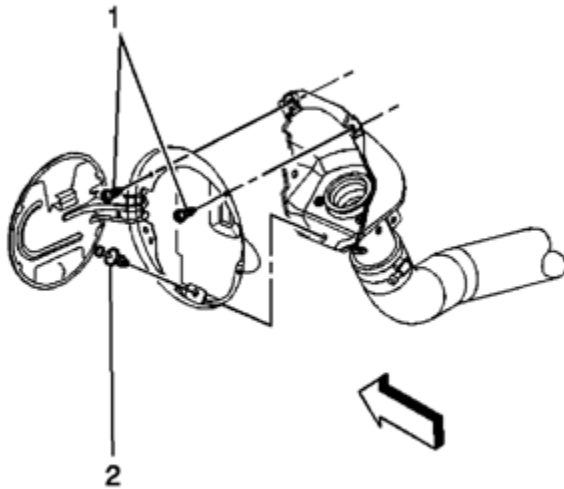


Warning: Gasoline or gasoline vapors are highly flammable. A fire could occur if an ignition source is present. Never drain or store gasoline or diesel fuel in an open container, due to the possibility of fire or explosion. Have a dry chemical (Class B) fire extinguisher nearby.

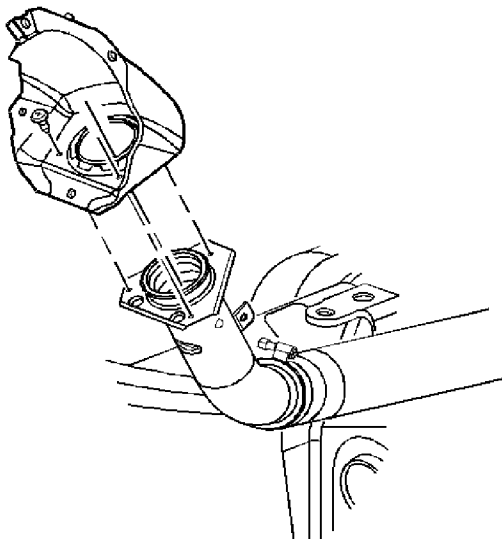
1. Loosen the fuel fill cap in order to relieve the fuel tank vapor pressure.
2. Raise and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#).
3. Loosen the fuel fill hose clamp (1).
4. Remove the fuel fill hose from the fuel tank.
5. Remove the flame arrester screen from the tank opening, if required.
6. Insert the hose from the pump device into the fuel tank.
7. Using a hand or air operated pump device, drain as much fuel from the tank as possible.

Fuel Tank Filler Pipe Replacement (25 Ext /Crew Cab w / 26 Gal Tank)

Removal Procedure

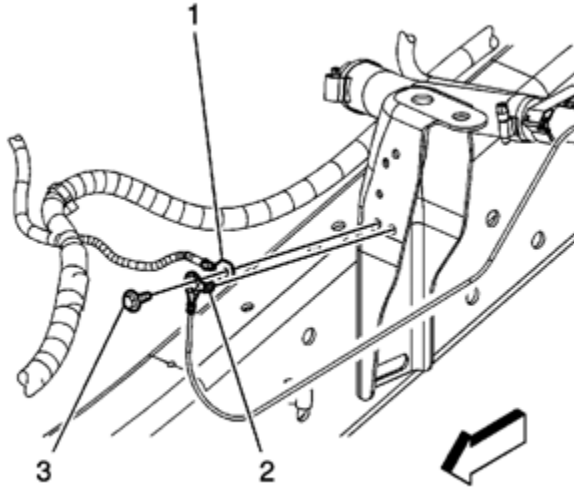


1. Remove the fuel tank filler housing to body TORX® screws (1) and pushpin retainer (2).

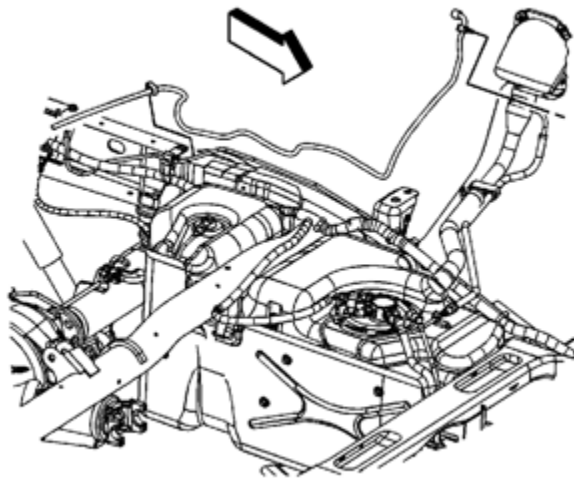


2. Remove the fuel tank filler housing to fuel tank fill pipe bolts.
3. Remove the fuel tank filler housing.

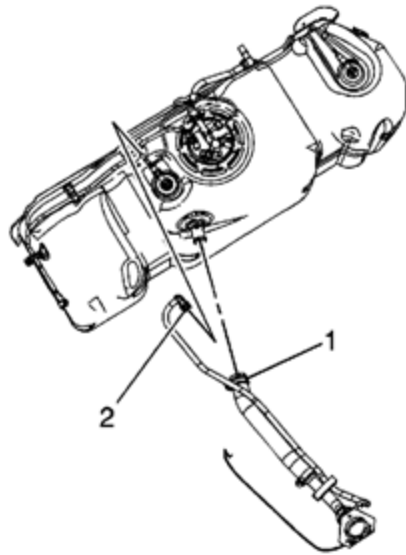
4. Raise and suitably support the vehicle half way. Refer to [Lifting and Jacking the Vehicle](#).



5. Remove the fuel tank fill pipe ground wire bolt (3).
6. Remove the fuel tank fill pipe ground wire (2) anti-rotation tab from the frame hole.
7. Reposition the fuel tank fill pipe ground wire and chassis harness ground wire (1).

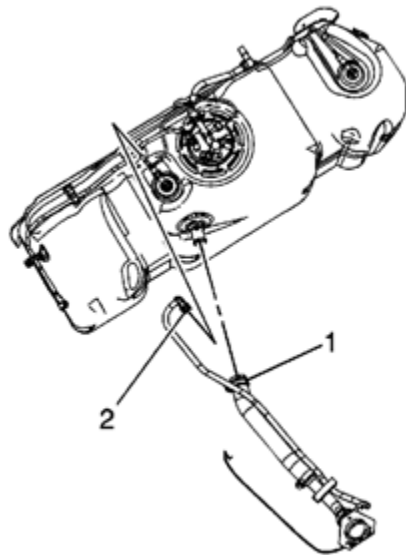


8. Open the axle vent hose clip on the fuel fill pipe bracket.
9. Remove the rear axle vent hose from the clip.



10. Disconnect the fuel fill pipe recirculation line quick connect fitting (2) from the evaporative emission (EVAP) rear hose. Refer to [Plastic Collar Quick Connect Fitting Service](#).
11. Loosen the fuel tank fill pipe clamp (1) at the fuel tank.
12. Remove the fuel tank fill pipe.
13. Cap the opening on the fuel tank in order to prevent possible system contamination.

Installation Procedure



1. Remove the cap from the opening on the fuel tank.
2. Position the fuel tank fill pipe.

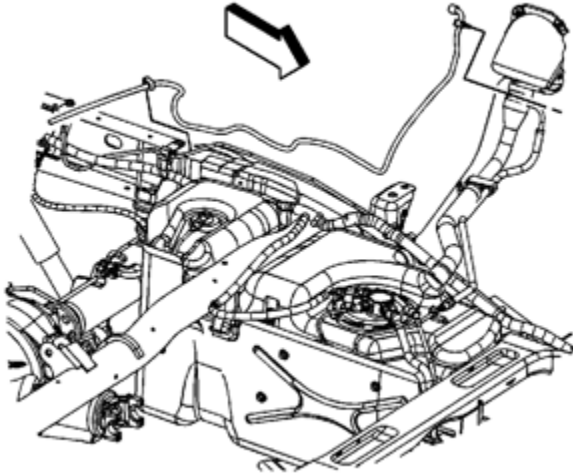
Caution: Refer to [Fastener Caution](#) in the Preface section.

3. Tighten the fuel tank fill pipe clamp (1) at the fuel tank.

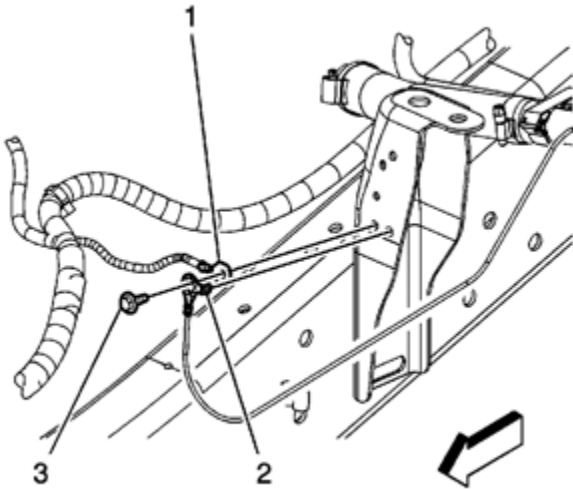
Tighten

Tighten the clamp to 2.5 N·m (22 lb in).

4. Connect the fuel fill pipe recirculation line quick connect fitting (2) to the EVAP rear hose. Refer to [Plastic Collar Quick Connect Fitting Service](#).



5. Install the rear axle vent hose to the clip on the fuel fill pipe bracket.
6. Close the axle vent hose clip.

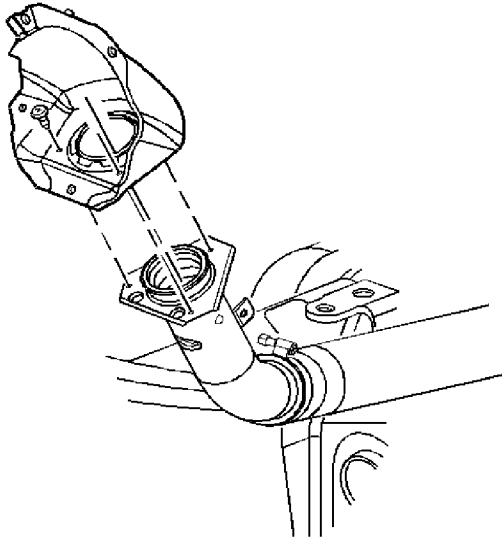


7. Position the chassis harness ground wire (1) and the fuel tank fill pipe ground wire (2) to the frame bracket.
8. Install the fuel tank fill pipe ground wire (2) anti-rotation tab into the frame hole.
9. Install the fuel tank fill pipe ground wire bolt (3).

Tighten

Tighten the bolt to 9 N·m (80 lb in).

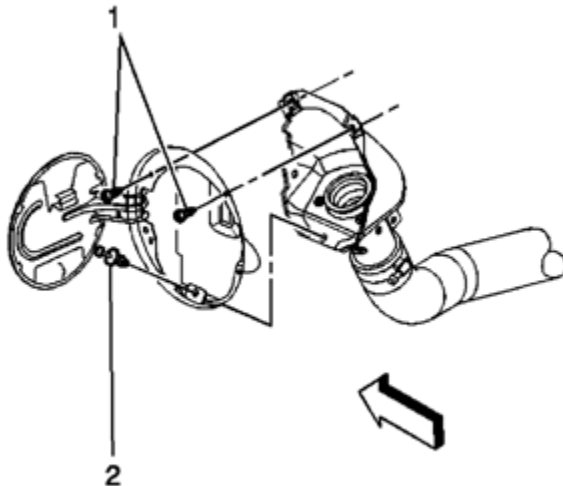
10. Lower the vehicle.



11. Install the fuel tank filler housing.
12. Install the fuel tank filler housing to fuel tank fill pipe bolts.

Tighten

Tighten the screws to 2.3 N·m (20 lb in).



13. Install the fuel tank filler housing to body TORX® screws (1) and pushpin retainer (2).

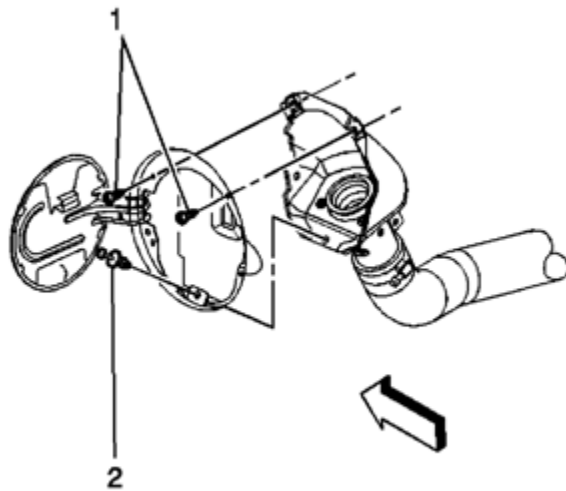
Tighten

Tighten the screws to 2.3 N·m (20 lb in).

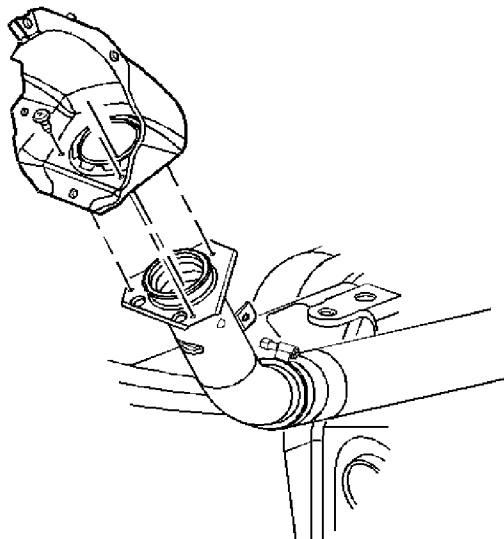
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Fuel Tank Filler Pipe Replacement (15 Reg Cab w / 26 Gal Tank)

Removal Procedure

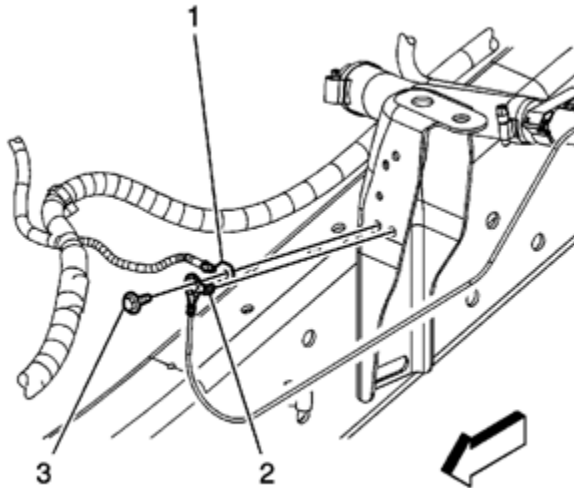


1. Remove the fuel tank filler housing to body TORX® screws (1) and pushpin retainer (2).

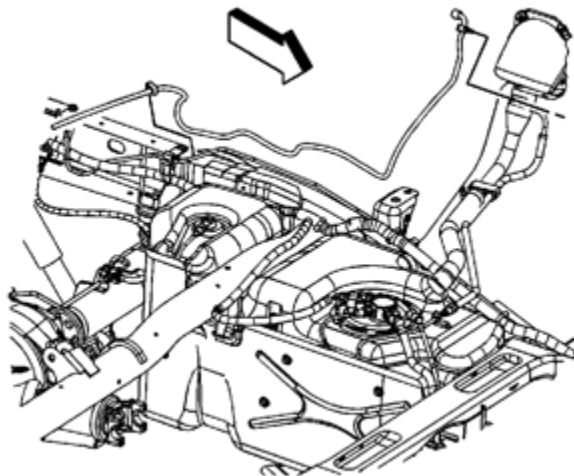


2. Remove the fuel tank filler housing to fuel tank fill pipe bolts.
3. Remove the fuel tank filler housing.

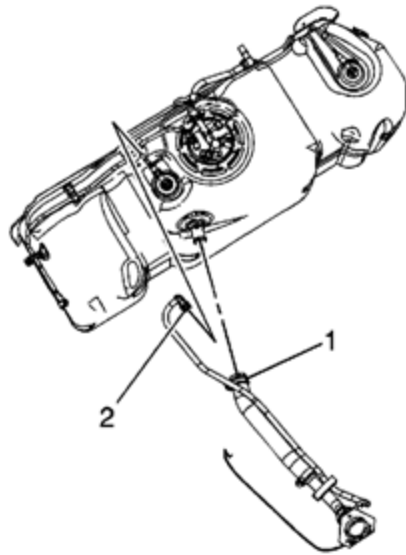
4. Raise and suitably support the vehicle half way. Refer to [Lifting and Jacking the Vehicle](#).



5. Remove the fuel tank fill pipe ground wire bolt (3).
6. Remove the fuel tank fill pipe ground wire (2) anti-rotation tab from the frame hole.
7. Reposition the fuel tank fill pipe ground wire and chassis harness ground wire (1).

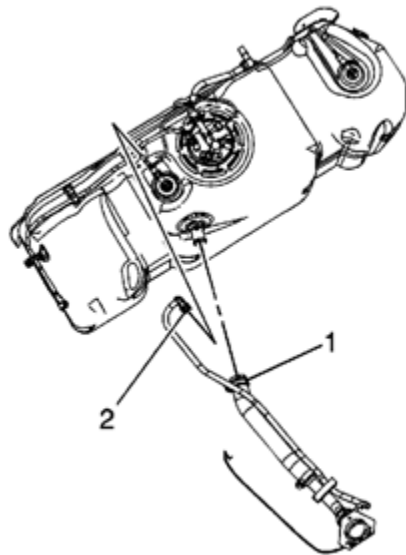


8. Open the axle vent hose clip on the fuel fill pipe bracket.
9. Remove the rear axle vent hose from the clip.



10. Disconnect the fuel fill pipe recirculation line quick connect fitting (2) from the evaporative emission (EVAP) rear hose. Refer to [Plastic Collar Quick Connect Fitting Service](#).
11. Loosen the fuel tank fill pipe clamp (1) at the fuel tank.
12. Remove the fuel tank fill pipe.
13. Cap the opening on the fuel tank in order to prevent possible system contamination.

Installation Procedure



1. Remove the cap from the opening on the fuel tank.
2. Position the fuel tank fill pipe.

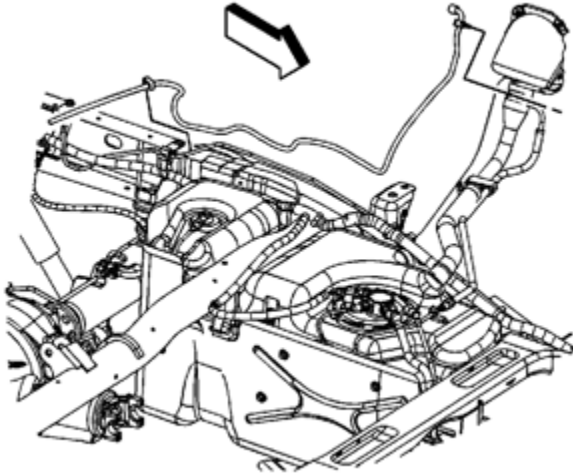
Caution: Refer to [Fastener Caution](#) in the Preface section.

3. Tighten the fuel tank fill pipe clamp (1) at the fuel tank.

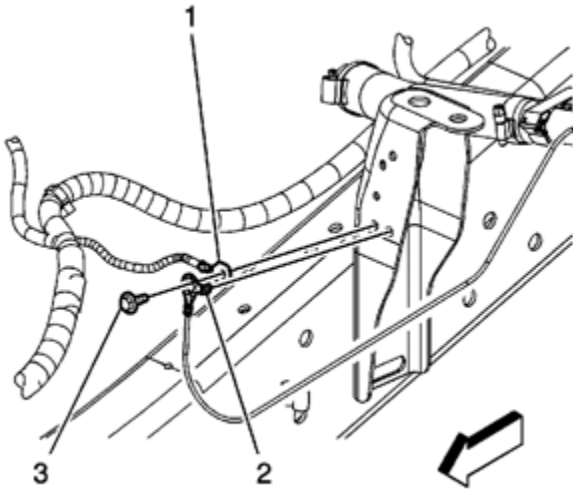
Tighten

Tighten the clamp to 2.5 N·m (22 lb in).

4. Connect the fuel fill pipe recirculation line quick connect fitting (2) to the EVAP rear hose. Refer to [Plastic Collar Quick Connect Fitting Service](#).



5. Install the rear axle vent hose to the clip on the fuel fill pipe bracket.
6. Close the axle vent hose clip.

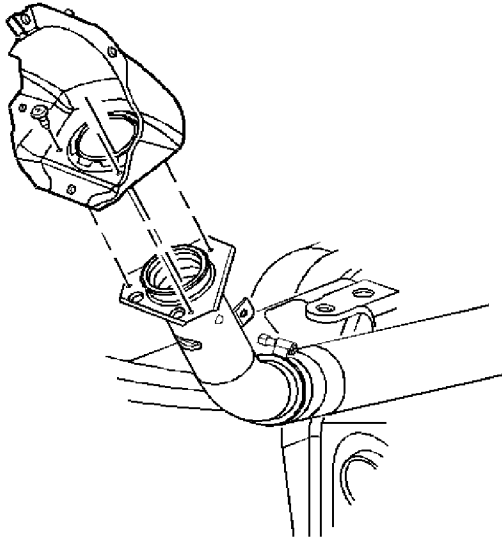


7. Position the chassis harness ground wire (1) and the fuel tank fill pipe ground wire (2) to the frame bracket.
8. Install the fuel tank fill pipe ground wire (2) anti-rotation tab into the frame hole.
9. Install the fuel tank fill pipe ground wire bolt (3).

Tighten

Tighten the bolt to 9 N·m (80 lb in).

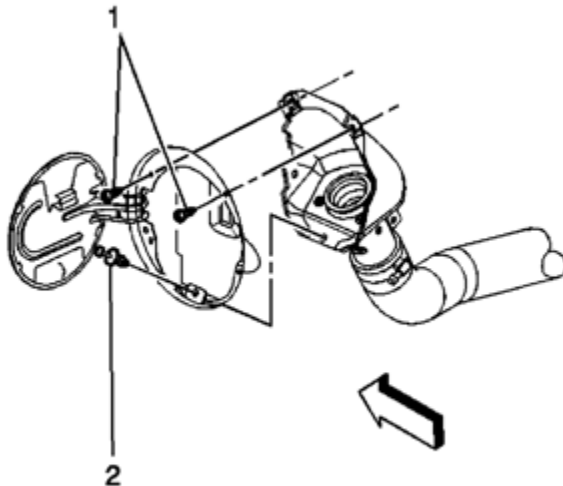
10. Lower the vehicle.



11. Install the fuel tank filler housing.
12. Install the fuel tank filler housing to fuel tank fill pipe bolts.

Tighten

Tighten the screws to 2.3 N·m (20 lb in).



13. Install the fuel tank filler housing to body TORX® screws (1) and pushpin retainer (2).

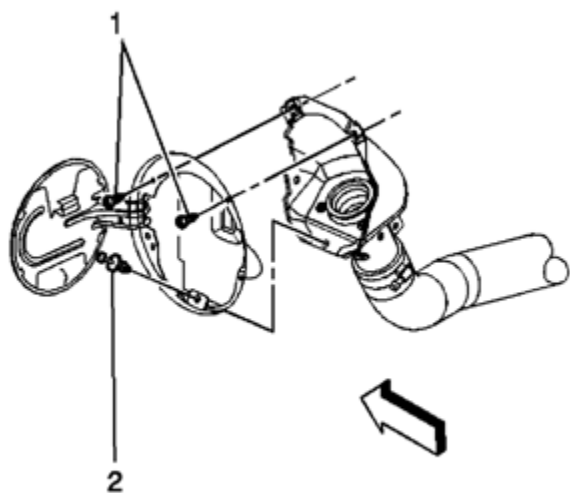
Tighten

Tighten the screws to 2.3 N·m (20 lb in).

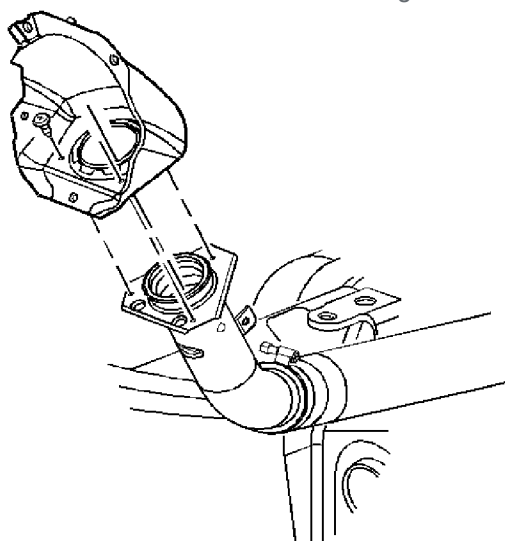
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Fuel Tank Filler Pipe Replacement (15 / 25 Reg / Ext / Crew cab w / 34 Gal Tank)

Removal Procedure

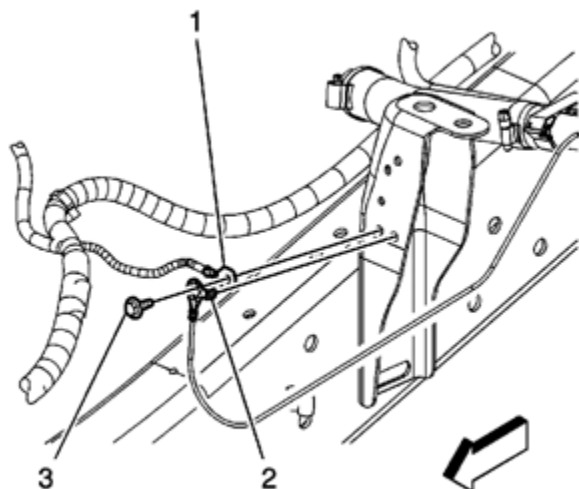


1. Remove the fuel tank filler housing to body TORX® screws (1) and retainer (2).

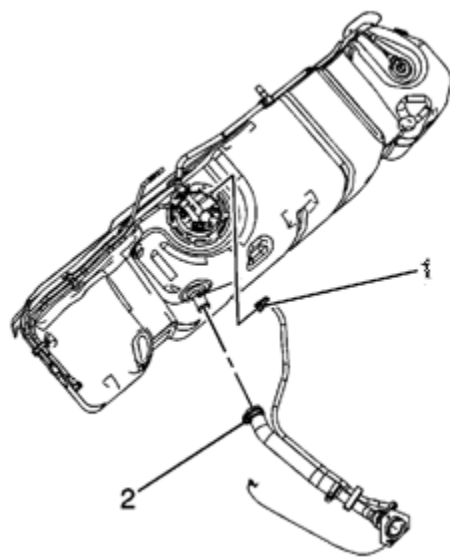


2. Remove the fuel tank filler housing to fuel tank fill pipe bolts.
3. Remove the fuel tank filler housing.

4. Partially raise and suitably support the vehicle. Refer to [Lifting and Jacking the Vehicle](#).

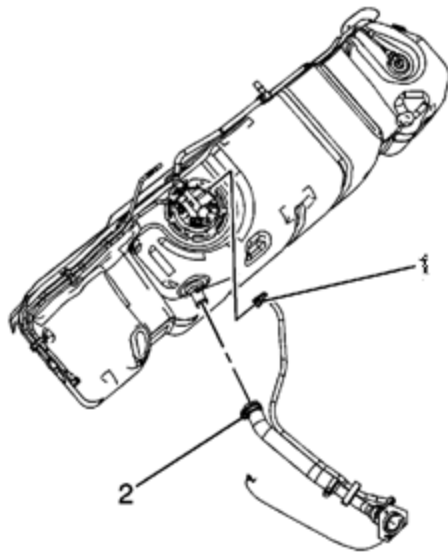


5. Remove the fuel tank fill pipe ground wire bolt (3).
6. Remove the fuel tank fill pipe ground wire (2) anti-rotation tab from the frame hole.
7. Reposition the fuel tank fill pipe ground wire and chassis harness ground wire (1).



8. Loosen the fuel tank fill pipe clamp (2) at the fuel tank.
9. Disconnect the fuel tank evaporative emission (EVAP) line quick connect fitting (1) from the fuel tank module. Refer to [Plastic Collar Quick Connect Fitting Service](#).
10. Remove the fuel tank fill pipe.
11. Cap the opening on the fuel tank in order to prevent possible system contamination.

Installation Procedure



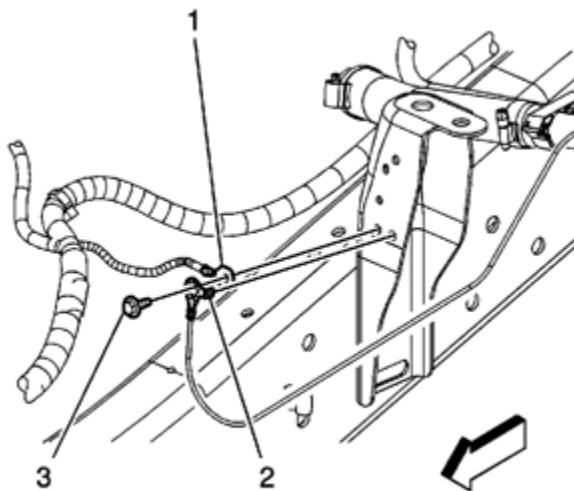
1. Remove the cap from the opening on the fuel tank.
2. Install the fuel tank fill pipe.

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

3. Connect the fuel tank EVAP line quick connect fitting (1) to the fuel tank module. Refer to [Plastic Collar Quick Connect Fitting Service](#).
4. Tighten the fuel tank fill pipe clamp (2) at the fuel tank.

Tighten

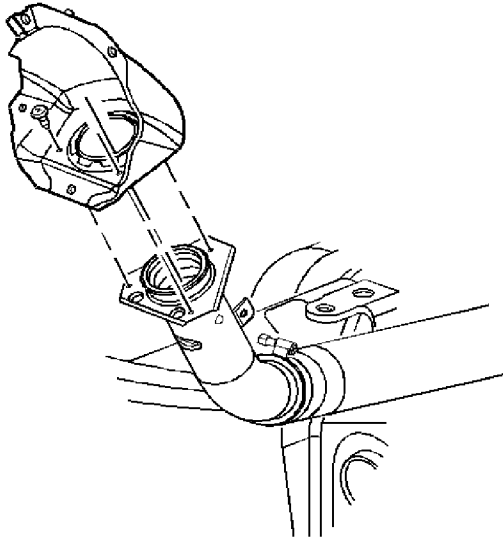
Tighten the clamp to 2.5 N·m (22 lb in).



5. Position the fuel tank fill pipe ground wire (1) and the fuel tank fill pipe ground wire (2) to the frame bracket.
6. Install the fuel tank fill pipe ground wire (2) anti-rotation tab into the frame hole.
7. Install the fuel tank fill pipe ground wire bolt (3).

Tighten

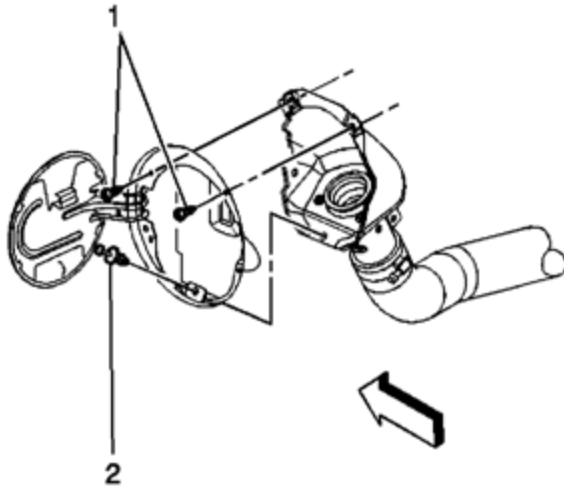
Tighten the bolt to 9 N·m (80 lb in).



8. Lower the vehicle.
9. Install the fuel tank filler housing.
10. Install the fuel tank filler housing to fuel tank fill pipe bolts.

Tighten

Tighten the bolts to 2.3 N·m (20 lb in).



11. Install the fuel tank filler housing to body TORX® screws (1) and retainer (2).

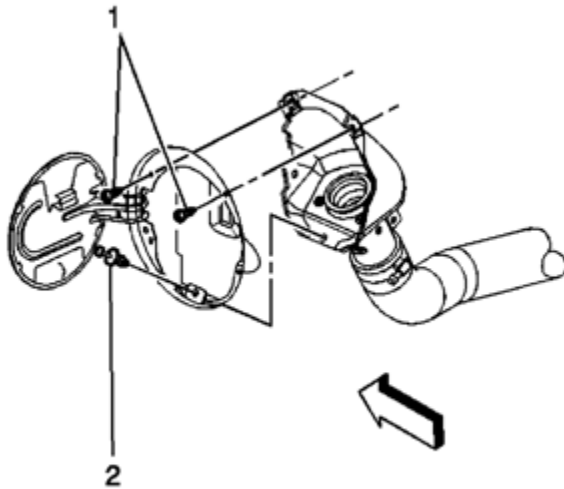
Tighten

Tighten the screws to 2.3 N·m (20 lb in).

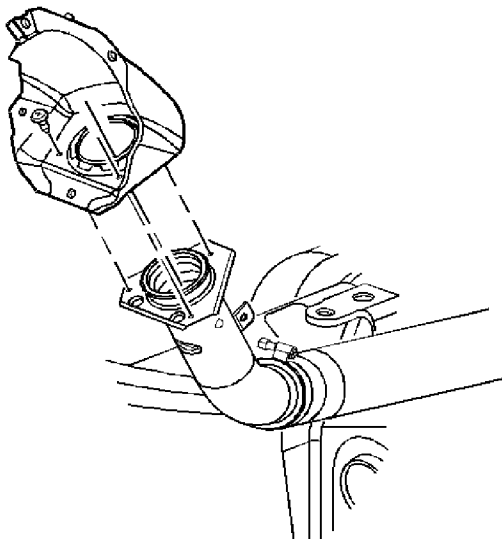
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Fuel Tank Filler Pipe Replacement (35 Reg/Ext/Crew Cab w / 34 Gal Tank)

Removal Procedure

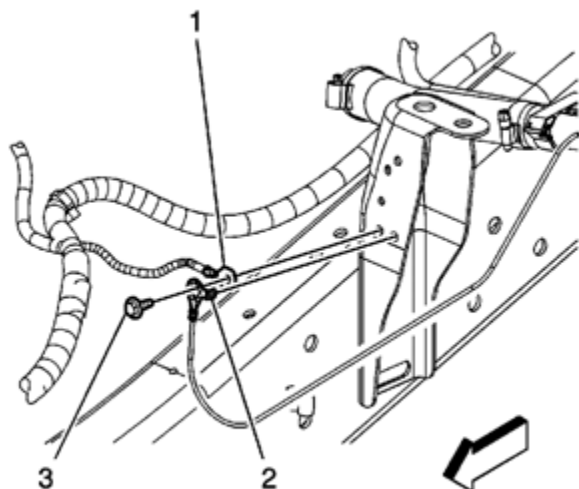


1. Remove the fuel tank filler housing to body TORX® screws (1) and retainer (2).

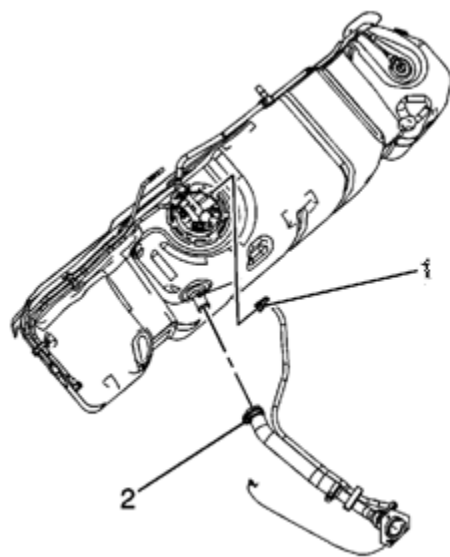


2. Remove the fuel tank filler housing to fuel tank fill pipe bolts.
3. Remove the fuel tank filler housing.

4. Partially raise and suitably support the vehicle. Refer to [Lifting and Jacking the Vehicle](#).

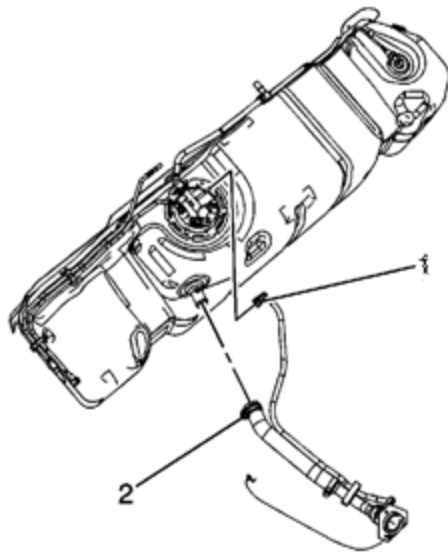


5. Remove the fuel tank fill pipe ground wire bolt (3).
6. Remove the fuel tank fill pipe ground wire (2) anti-rotation tab from the frame hole.
7. Reposition the fuel tank fill pipe ground wire and chassis harness ground wire (1).



8. Loosen the fuel tank fill pipe clamp (2) at the fuel tank.
9. Disconnect the fuel tank evaporative emission (EVAP) line quick connect fitting (1) from the fuel tank module. Refer to [Plastic Collar Quick Connect Fitting Service](#).
10. Remove the fuel tank fill pipe.
11. Cap the opening on the fuel tank in order to prevent possible system contamination.

Installation Procedure



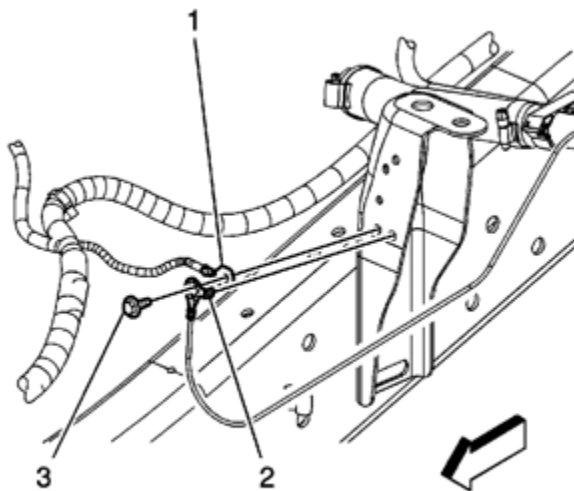
1. Remove the cap from the opening on the fuel tank.
2. Install the fuel tank fill pipe.

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

3. Connect the fuel tank EVAP line quick connect fitting (1) to the fuel tank module. Refer to [Plastic Collar Quick Connect Fitting Service](#).
4. Tighten the fuel tank fill pipe clamp (2) at the fuel tank.

Tighten

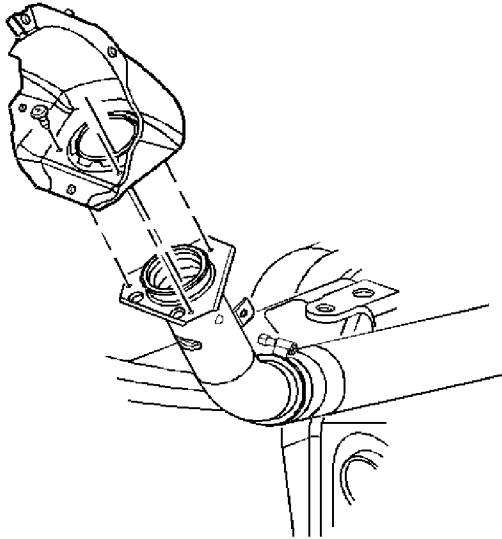
Tighten the clamp to 2.5 N·m (22 lb in).



5. Position the fuel tank fill pipe ground wire (1) and the fuel tank fill pipe ground wire (2) to the frame bracket.
6. Install the fuel tank fill pipe ground wire (2) anti-rotation tab into the frame hole.
7. Install the fuel tank fill pipe ground wire bolt (3).

Tighten

Tighten the bolt to 9 N·m (80 lb in).

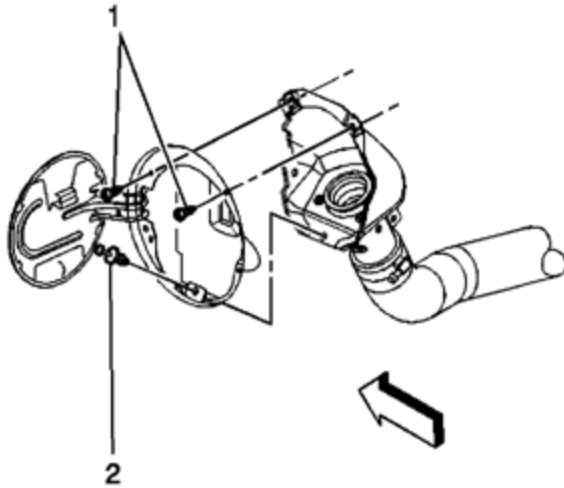


8. Lower the vehicle.
9. Install the fuel tank filler housing.
10. Install the fuel tank filler housing to fuel tank fill pipe bolts.

Tighten

Tighten the bolts to 2.3 N·m (20 lb in).

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11. Install the fuel tank filler housing to body TORX® screws (1) and retainer (2).

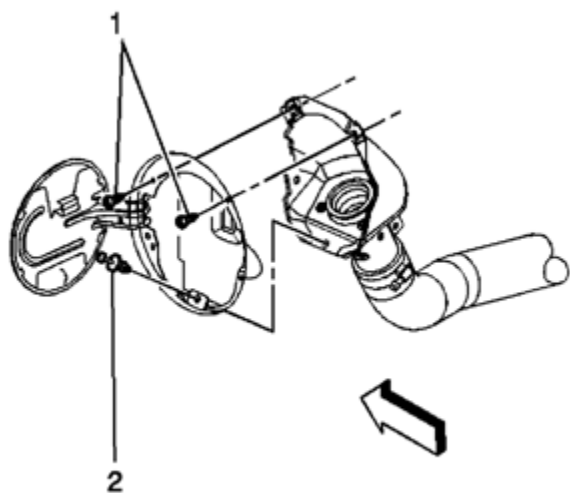
Tighten

Tighten the screws to 2.3 N·m (20 lb in).

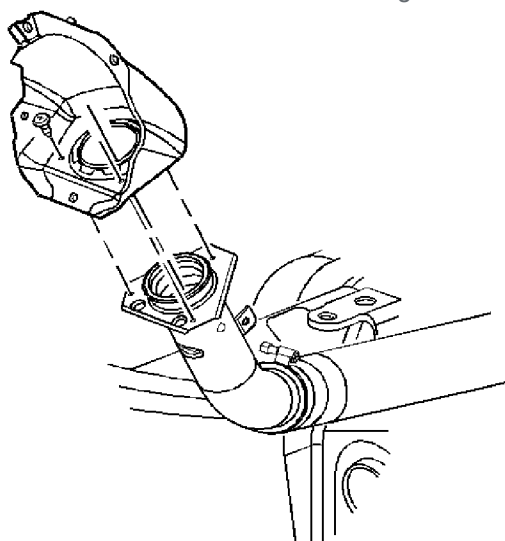
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Fuel Tank Filler Pipe Replacement (15 Ext /Crew Cab w / 26 Gal Tank)

Removal Procedure

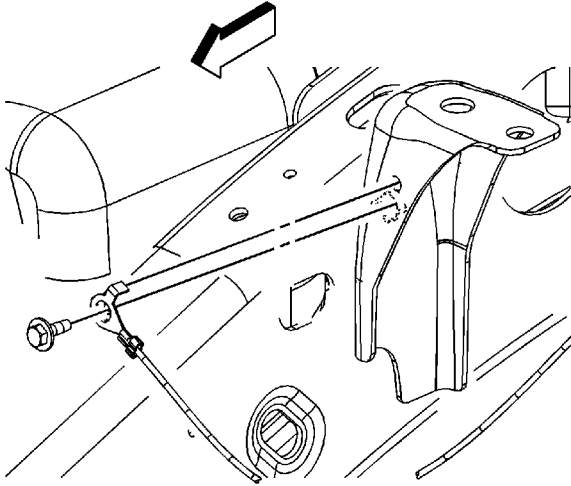


1. Remove the fuel tank filler housing to body TORX® screws (1) and pushpin retainer (2).

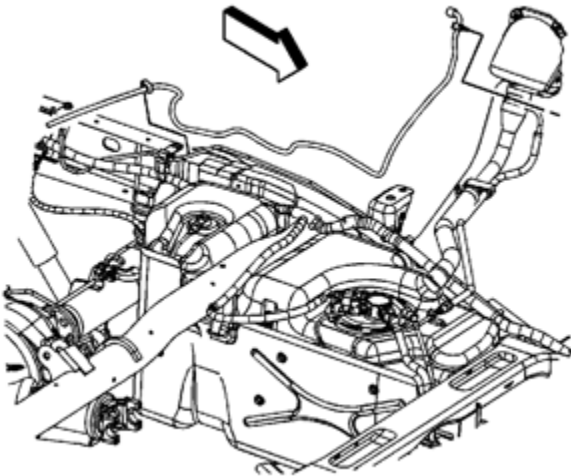


2. Remove the fuel tank filler housing to fuel tank fill pipe bolts.
3. Remove the fuel tank filler housing.

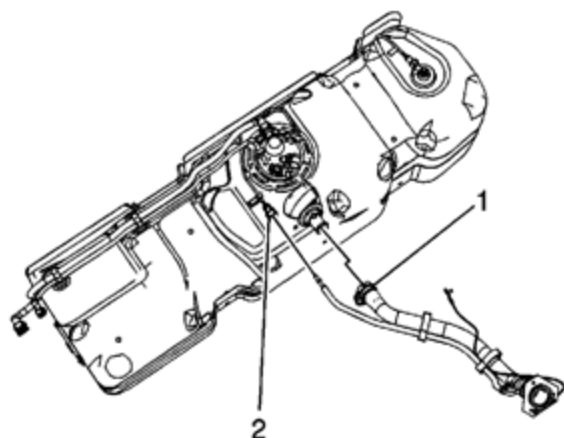
4. Raise and suitably support the vehicle half way. Refer to [Lifting and Jacking the Vehicle](#).



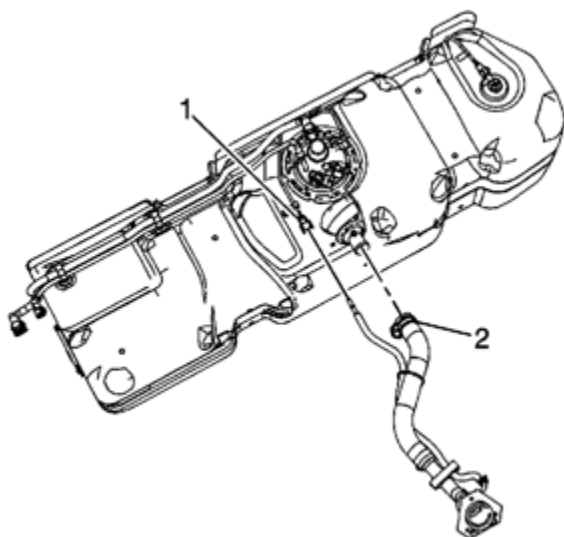
5. Remove the fuel tank fill pipe ground wire bolt.
6. Remove the fuel tank fill pipe ground wire anti-rotation tab from the frame hole.
7. Reposition the fuel tank fill pipe ground wire.



8. Open the axle vent hose clip on the fuel fill pipe bracket.
9. Remove the rear axle vent hose from the clip.

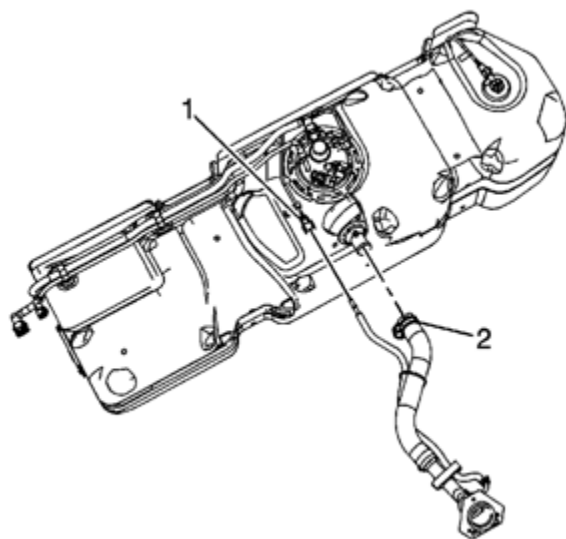


10. If equipped with 5 ft 8 in. bed, perform the following steps:
11. Disconnect the fuel tank evaporative emission (EVAP) line quick connect fitting (2) from the fuel fill pipe recirculation line. Refer to [Plastic Collar Quick Connect Fitting Service](#).
12. Loosen the fuel tank fill pipe clamp (1) at the fuel tank.
13. Remove the fuel tank fill pipe.
14. Cap the opening on the fuel tank in order to prevent possible system contamination.



15. If equipped with 6 ft 5 in. bed, perform the following steps:
16. Disconnect the fuel tank EVAP line quick connect fitting (1) from the fuel fill pipe recirculation line. Refer to [Plastic Collar Quick Connect Fitting Service](#).
17. Loosen the fuel tank fill pipe clamp (2) at the fuel tank.
18. Remove the fuel tank fill pipe.
19. Cap the opening on the fuel tank in order to prevent possible system contamination.

Installation Procedure



1. If equipped with 6 ft 5 in. bed, perform the following steps:
2. Remove the cap from the opening on the fuel tank.
3. Position the fuel tank fill pipe.

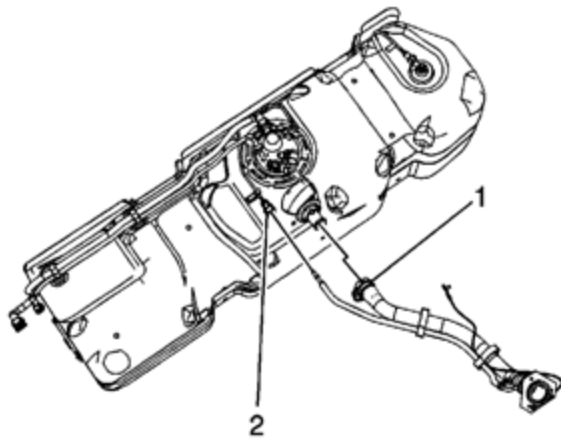
Caution: Refer to [Fastener Caution](#) in the Preface section.

4. Tighten the fuel tank fill pipe clamp (2) at the fuel tank.

Tighten

Tighten the clamp to 2.5 N·m (22 lb in).

5. Connect the fuel fill pipe recirculation line to the fuel tank EVAP line quick connect fitting (1). Refer to [Plastic Collar Quick Connect Fitting Service](#).

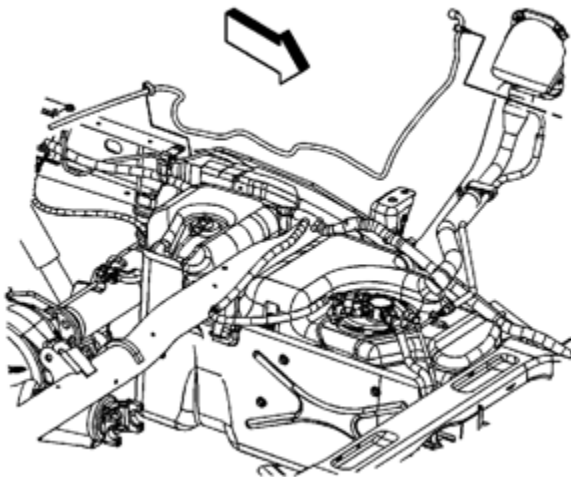


6. If equipped with 5 ft 8 in. bed, perform the following steps:
7. Remove the cap from the opening on the fuel tank.
8. Position the fuel tank fill pipe.
9. Tighten the fuel tank fill pipe clamp (1) at the fuel tank.

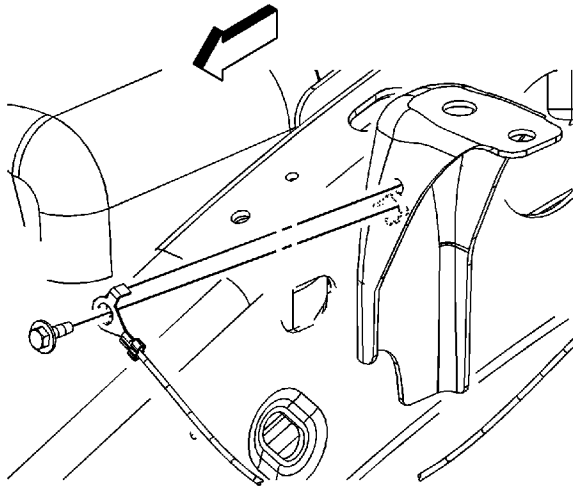
Tighten

Tighten the clamp to 2.5 N·m (22 lb in).

10. Connect the fuel fill pipe recirculation line to the fuel tank EVAP line quick connect fitting (2). Refer to [Plastic Collar Quick Connect Fitting Service](#).



11. Install the rear axle vent hose to the clip on the fuel fill pipe bracket.
12. Close the axle vent hose clip.

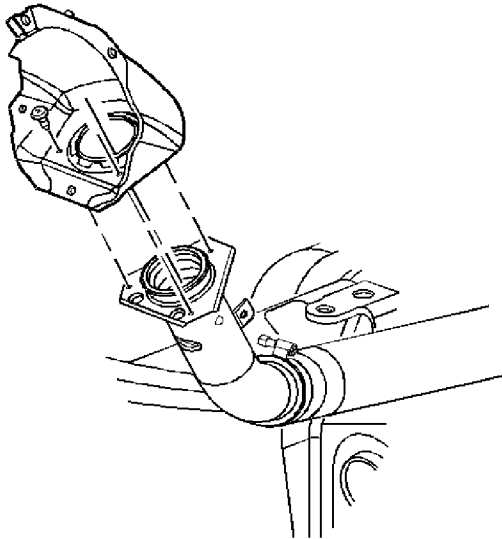


13. Position the fuel tank fill pipe ground wire to the frame bracket.
14. Install the fuel tank fill pipe ground wire anti-rotation tab into the frame hole.
15. Install the fuel tank fill pipe ground wire bolt.

Tighten

Tighten the bolt to 9 N·m (80 lb in).

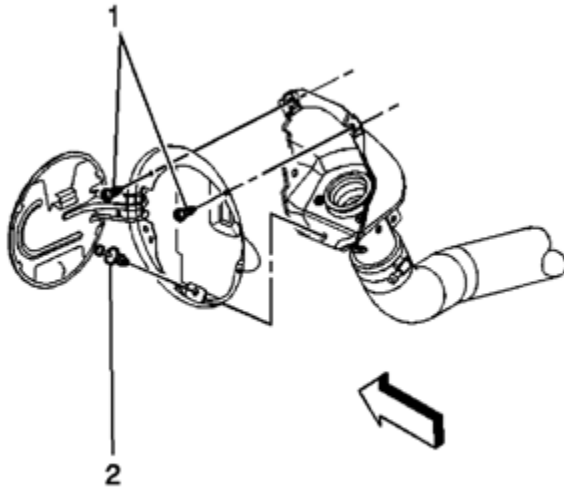
16. Lower the vehicle.



17. Install the fuel tank filler housing.
18. Install the fuel tank filler housing to fuel tank fill pipe bolts.

Tighten

Tighten the screws to 2.3 N·m (20 lb in).



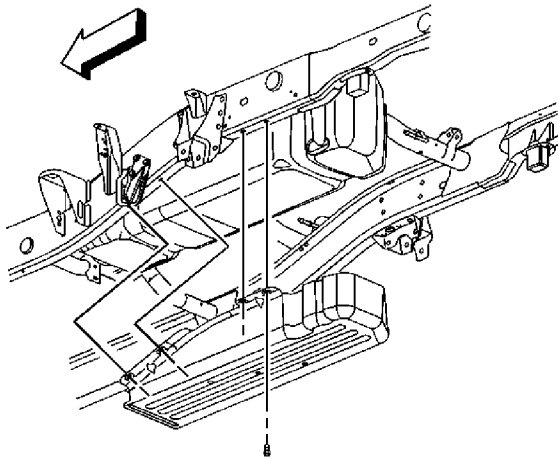
19. Install the fuel tank filler housing to body TORX® screws (1) and pushpin retainer (2).

Tighten

Tighten the screws to 2.3 N·m (20 lb in).

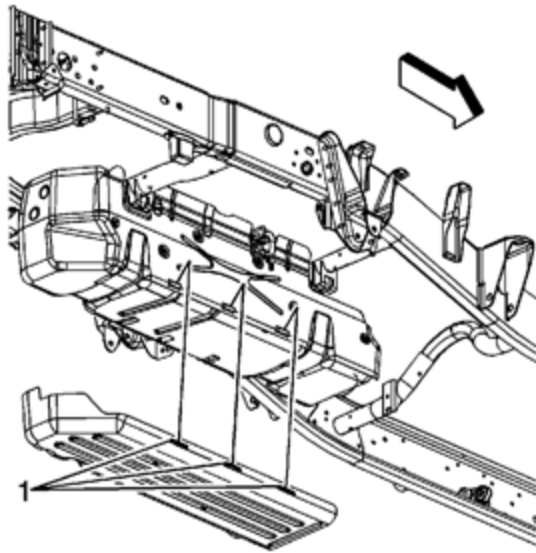
Fuel Tank Replacement (35 Reg/Ext/Crew Cab w/34 Gal Tank)

Removal Procedure

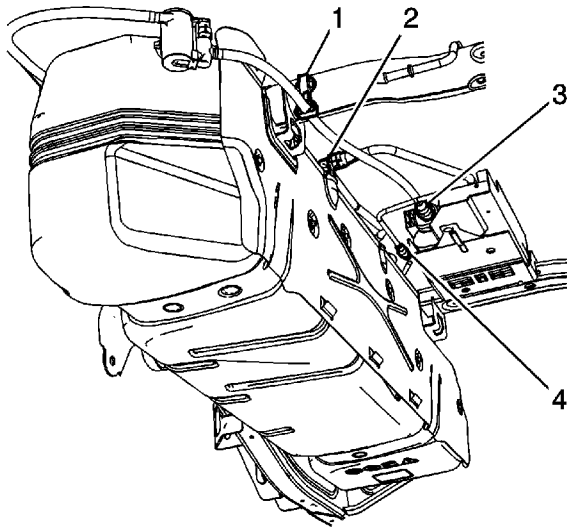


Note: Clean the fuel and evaporative emission (EVAP) connections and surrounding areas prior to disconnecting the lines in order to avoid possible system contamination.

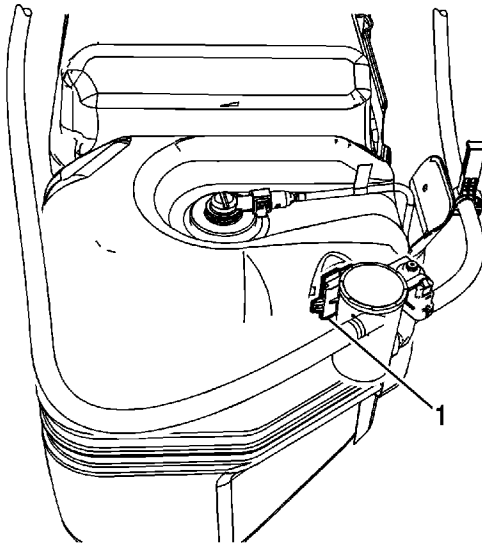
1. Relieve the fuel system pressure. Refer to [Fuel Pressure Relief](#).
2. Drain the fuel tank. Refer to [Fuel Tank Draining](#).
3. Remove the fuel tank fill pipe. Refer to [Fuel Tank Filler Pipe Replacement](#).
4. Remove the fuel tank bolts, if equipped.



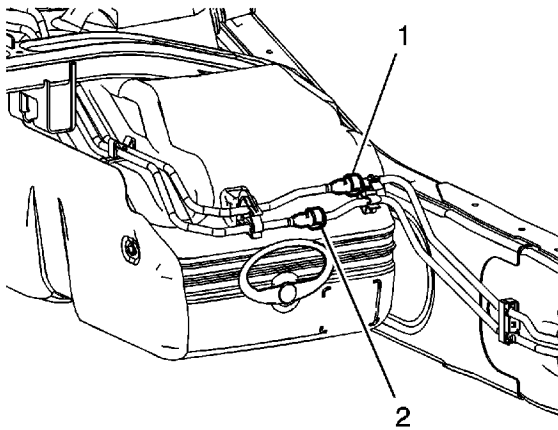
5. Remove the fuel tank shield from the fuel tank shield tabs (1), if equipped.



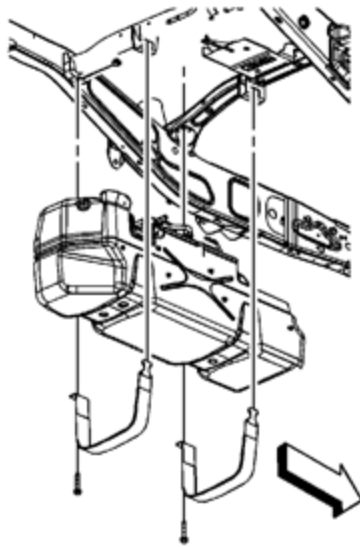
6. Remove the EVAP canister vent solenoid pipe clip (1) from the frame crossmember.
7. Disconnect the EVAP canister pipe quick connect fitting (2) from the fuel tank EVAP pipe. Refer to [Plastic Collar Quick Connect Fitting Service](#).
8. Disconnect the EVAP canister vent solenoid pipe quick connect fitting (3) from the EVAP canister. Refer to [Plastic Collar Quick Connect Fitting Service](#).
9. Disconnect the chassis wiring harness electrical connector from the EVAP canister vent solenoid.
10. Remove the chassis wiring harness clip from the fuel tank shield.



11. Disengage the retainer (1) securing the EVAP canister vent solenoid.
12. Slide the EVAP canister vent solenoid off the bracket towards the passenger side of the vehicle.



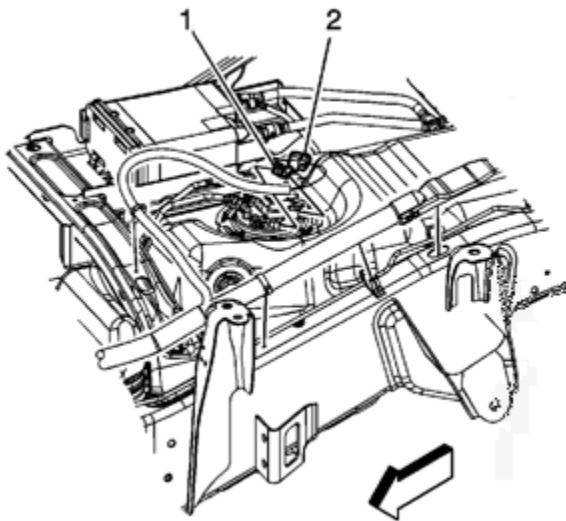
13. Disconnect the fuel tank fuel feed line quick connect fitting (1) from the chassis line. Refer to [Plastic Collar Quick Connect Fitting Service](#).
14. Disconnect the fuel tank EVAP line quick connect fitting (2) from the EVAP canister. Refer to [Plastic Collar Quick Connect Fitting Service](#).
15. Cap the fuel and EVAP lines in order to prevent possible system contamination.



16. Place a suitable adjustable jack under the fuel tank.
17. Remove the fuel tank strap bolts.
18. Remove the fuel tank straps.

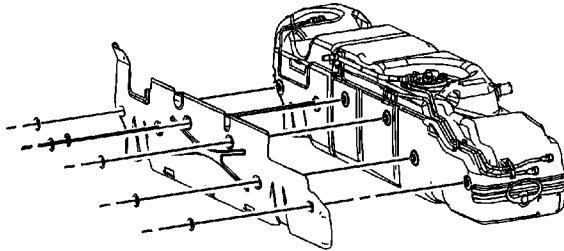
Note: When lowering the tank, ensure that the fill neck on the tank does not get hung up on the chassis wiring harness.

19. Lower the fuel tank half way.
20. Disconnect the chassis wiring harness clip at the frame crossmember.
21. Lower the fuel tank until the electrical connections are accessible.

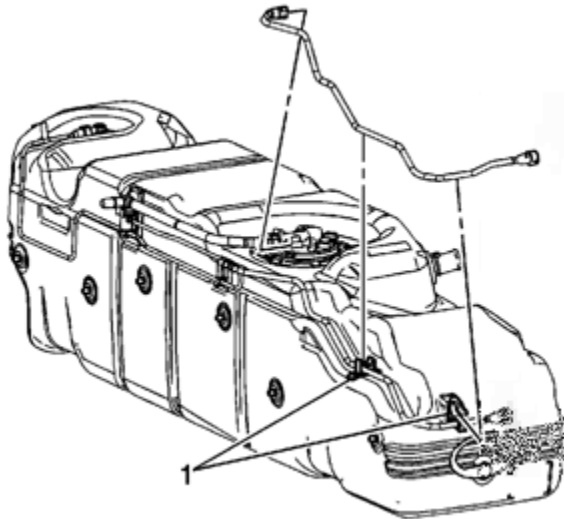


22. Disconnect the chassis wiring harness electrical connector (1) from the fuel tank pressure sensor.
23. Disconnect the chassis wiring harness electrical connector (2) from the fuel tank module.

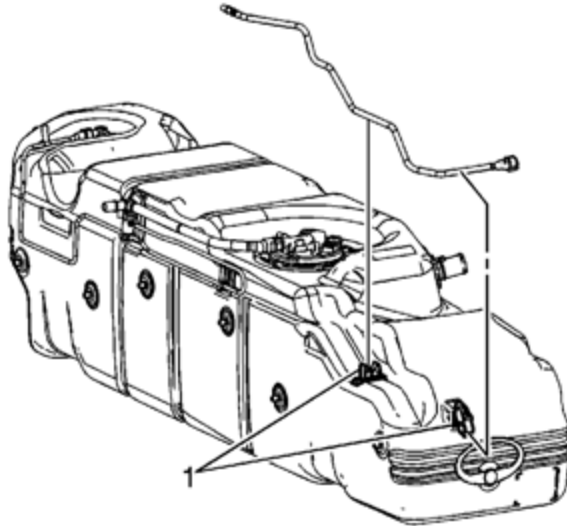
24. Completely lower the fuel tank.
25. With the aid of an assistant, place the fuel tank in a suitable work area.
26. If replacing the fuel tank proceed to the next step, otherwise proceed to step 9 in the installation procedure.



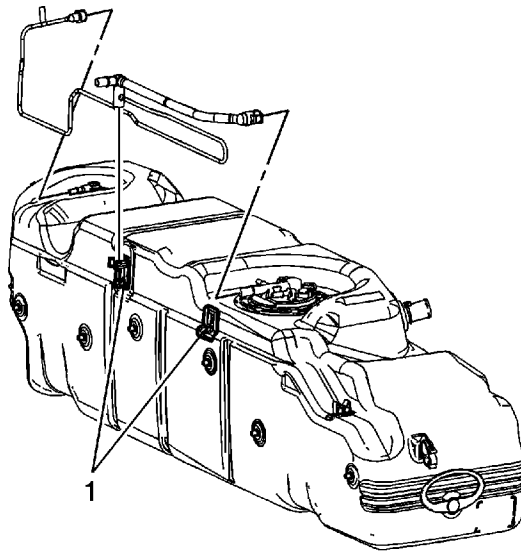
27. Remove the fuel tank shield push on retainers.
28. Remove the fuel tank shield.



29. Disconnect the fuel feed pipe quick connect fitting from the fuel tank module. Refer to [Plastic Collar Quick Connect Fitting Service](#).
30. Remove the fuel feed pipe from the fuel tank clips (1).

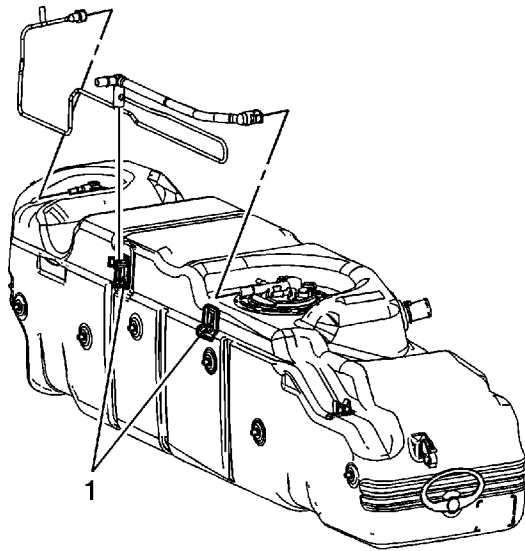


31. Remove the EVAP pipe from the fuel tank clips (1).

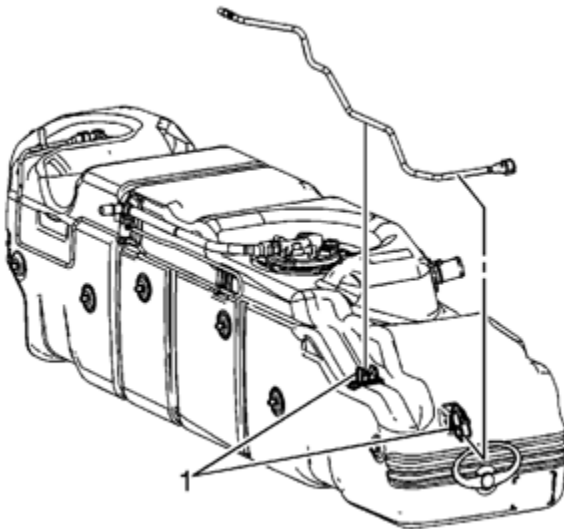


32. Disconnect the EVAP pipe quick connect fittings from the rollover valve and the fuel tank module. Refer to [Plastic Collar Quick Connect Fitting Service](#).
33. Remove the EVAP pipe from the fuel tank clips (1).
34. Remove the fuel tank module. Refer to [Fuel Tank Fuel Pump Module Replacement](#).

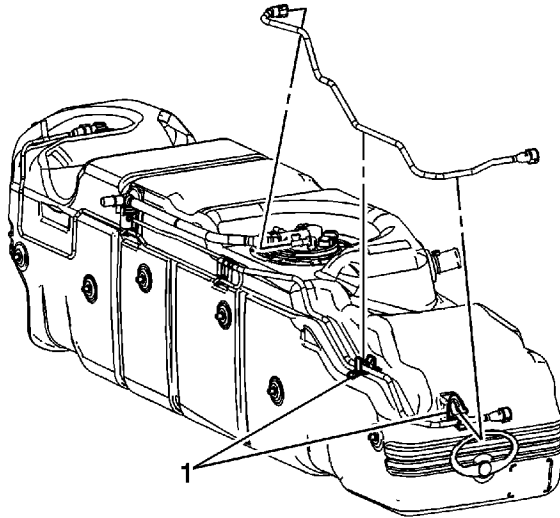
Installation Procedure



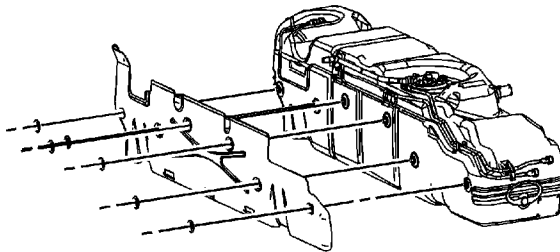
1. Install the fuel tank module. Refer to [Fuel Tank Fuel Pump Module Replacement](#).
2. Position and connect the EVAP pipe quick connect fittings to the rollover valve and the fuel tank module. Refer to [Plastic Collar Quick Connect Fitting Service](#).
3. Install the EVAP pipe to the fuel tank clips (1).



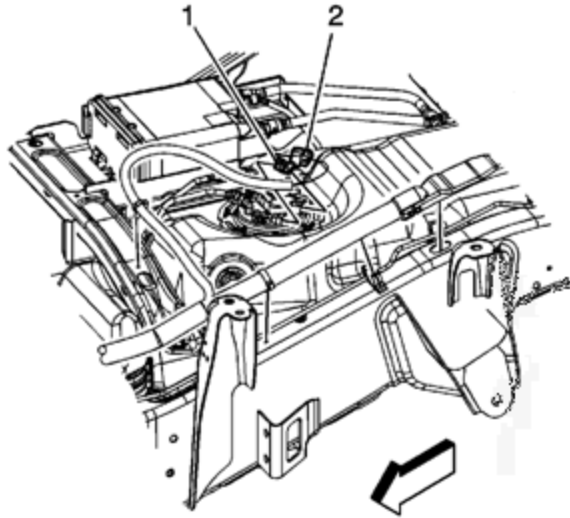
4. Install the EVAP pipe to the fuel tank clips (1).



5. Position and connect the fuel feed pipe quick connect fitting to the fuel tank module. Refer to [Plastic Collar Quick Connect Fitting Service](#).
6. Install the fuel feed pipe to the fuel tank clips (1).

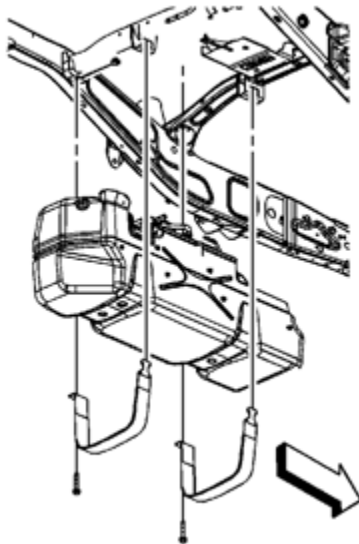


7. Position and install the fuel tank shield.
8. Install the fuel tank shield push on retainers.



9. With the aid of an assistant, place the fuel tank in a the adjustable jack.
10. Raise the fuel tank until the electrical connections can be made.
11. Connect the chassis wiring harness electrical connector (2) to the fuel tank module.
12. Connect the chassis wiring harness electrical connector (1) from the fuel pressure sensor.
13. Completely raise the fuel tank into position.

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

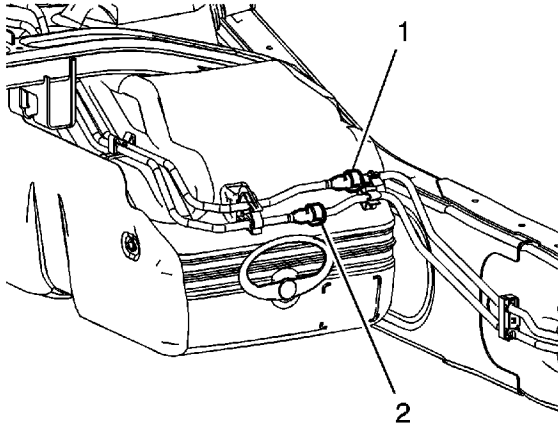


14. Install the fuel tank straps.
15. Install the fuel tank strap bolts.

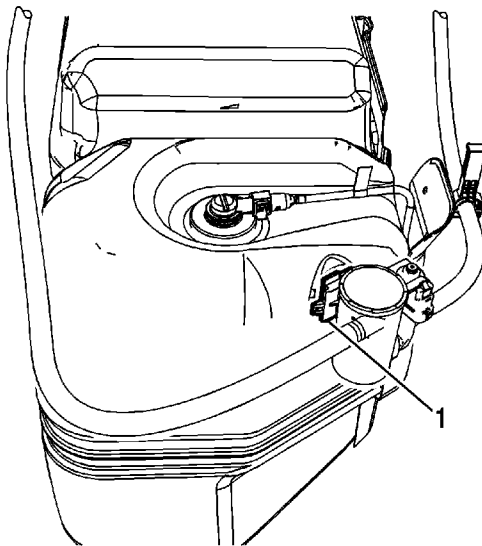
Tighten

Tighten the bolts to 40 N·m (30 lb ft).

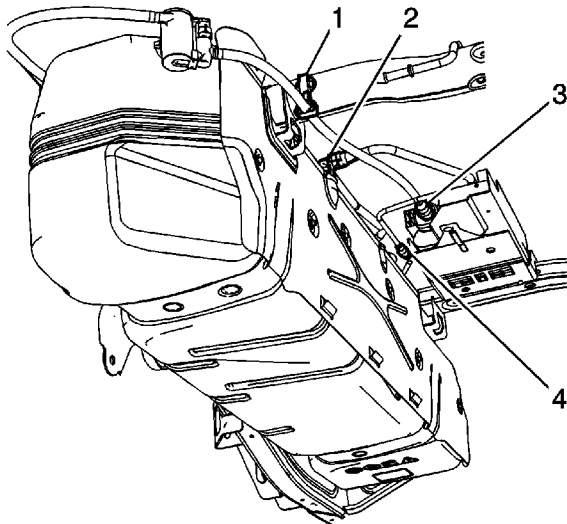
16. Remove the adjustable jack from under the fuel tank.



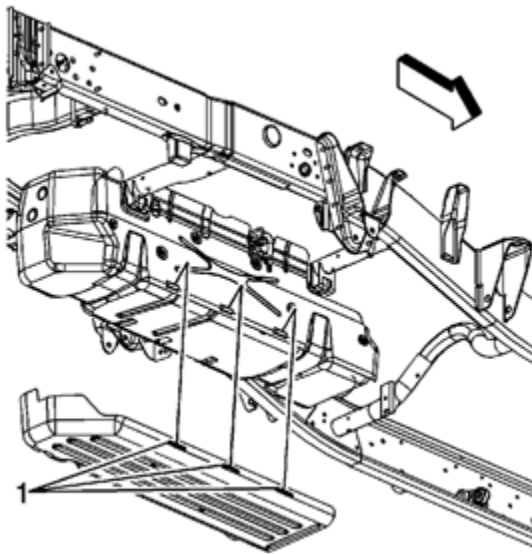
17. Remove the caps from the fuel and EVAP lines.
18. Connect the fuel tank EVAP line quick connect fitting (2) to the EVAP canister. Refer to [Plastic Collar Quick Connect Fitting Service](#).
19. Connect the fuel tank fuel feed line quick connect fitting (1) to the chassis line. Refer to [Plastic Collar Quick Connect Fitting Service](#).



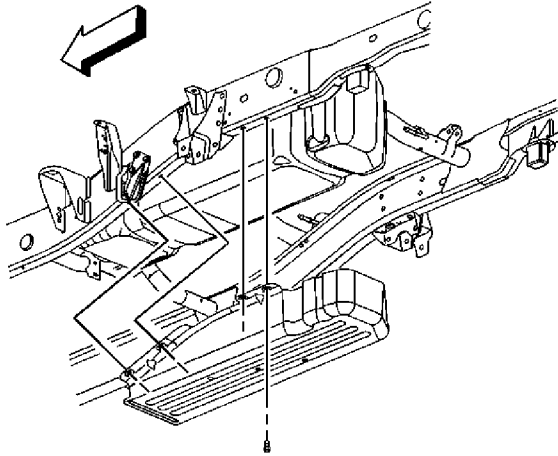
20. Slide the EVAP canister vent solenoid onto the bracket towards the driver side of the vehicle.
21. Ensure that the retainer (1) is engaged, securing the EVAP canister vent solenoid.



22. Connect the EVAP canister vent solenoid pipe quick connect fitting (3) to the EVAP canister. Refer to [Plastic Collar Quick Connect Fitting Service](#).
23. Connect the EVAP canister pipe quick connect fitting (2) to the fuel tank EVAP pipe. Refer to [Plastic Collar Quick Connect Fitting Service](#).
24. Install the EVAP canister vent solenoid pipe clip (1) to the frame crossmember.
25. Connect the chassis wiring harness electrical connector to the EVAP canister vent solenoid.
26. Install the chassis wiring harness clip to the fuel tank shield.



27. Position and install the fuel tank shield onto the fuel tank shield tabs (1), if equipped.



28. Install the fuel tank shield bolts, if equipped.

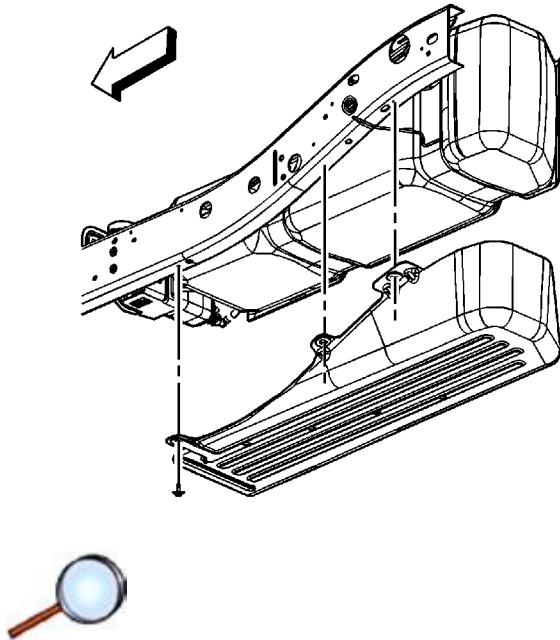
Tighten

Tighten the bolts to 18 N·m (13 lb ft).

29. Install the fuel tank fill pipe. Refer to [Fuel Tank Filler Pipe Replacement](#).
30. Refill the fuel tank.
31. Install the fuel cap.
32. Connect the negative battery cable. Refer to [Battery Negative Cable Disconnection and Connection](#).
33. Perform the following procedure in order to inspect for leaks:
- 33.1. Turn the ignition ON, with the engine OFF, for 2 seconds.
 - 33.2. Turn the ignition OFF for 10 seconds.
 - 33.3. Turn the ignition ON, with the engine OFF.
 - 33.4. Inspect for fuel leaks.

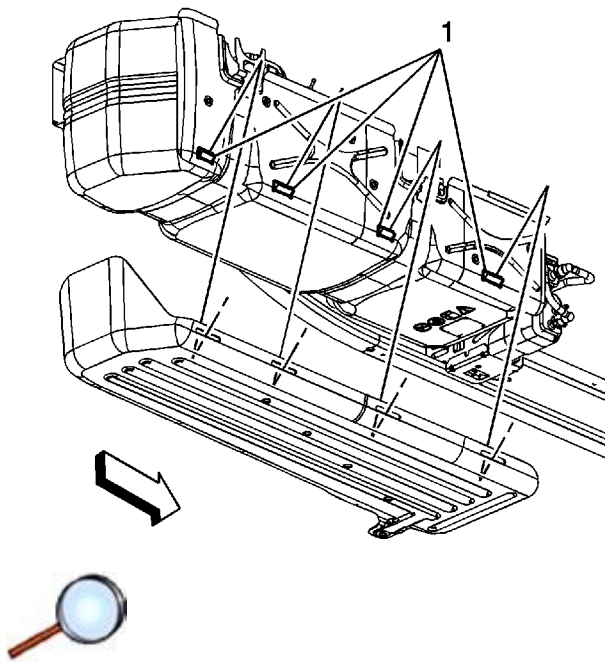
Fuel Tank Replacement (15 Ext /Crew Cab w / 26 Gal Tank)

Removal Procedure

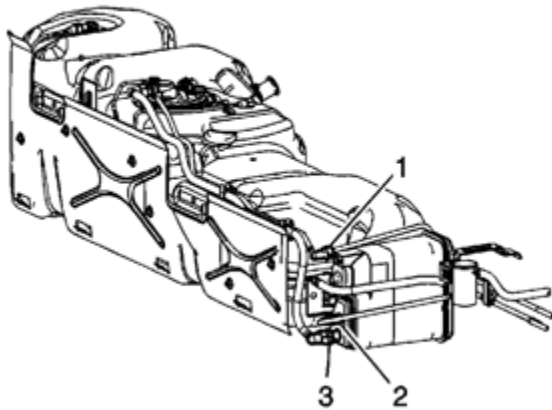


Note: Clean the fuel and evaporative emission (EVAP) connections and surrounding areas prior to disconnecting the lines in order to avoid possible system contamination.

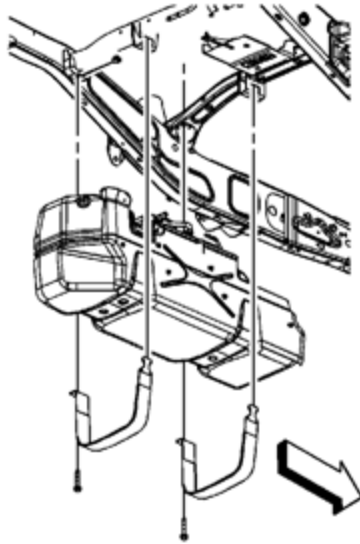
1. Relieve the fuel system pressure. Refer to [Fuel Pressure Relief](#).
2. Drain the fuel tank. Refer to [Fuel Tank Draining](#).
3. Remove the fuel tank shield bolts, if equipped.



4. Remove the fuel tank shield from the fuel tank shield tabs (1), if equipped.



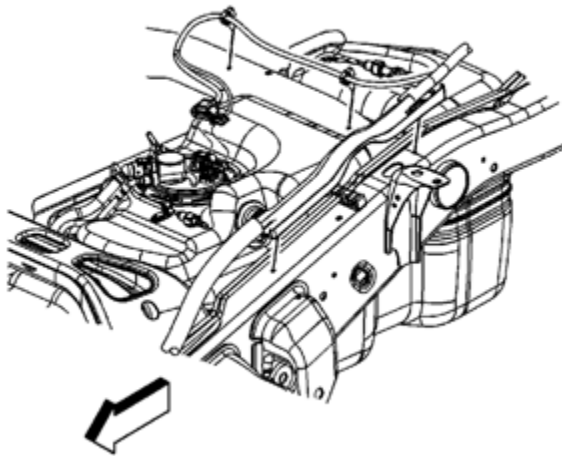
5. Disconnect the fuel tank fuel feed line quick connect fitting (1) from the chassis line. Refer to [Plastic Collar Quick Connect Fitting Service](#).
6. Disconnect the fuel tank EVAP line quick connect fitting (3) from the EVAP canister. Refer to [Plastic Collar Quick Connect Fitting Service](#).
7. Cap the fuel and EVAP lines in order to prevent possible system contamination.



8. Place a suitable adjustable jack under the fuel tank.
9. Remove the fuel tank strap bolts.
10. Remove the fuel tank straps.

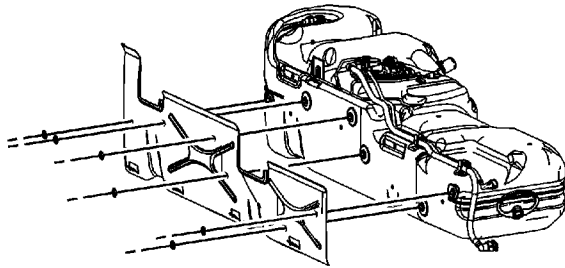
Note: When lowering the tank, ensure that the fill neck on the tank does not get hung up on the chassis wiring harness.

11. Lower the fuel tank half way.
 - 11.1. Loosen the fuel fill pipe clamp at the fuel tank.
 - 11.2. Separate the fuel fill pipe from the fuel tank.
12. Disconnect the chassis wiring harness clip at the frame crossmember.
13. Lower the fuel tank until the electrical connections are accessible.

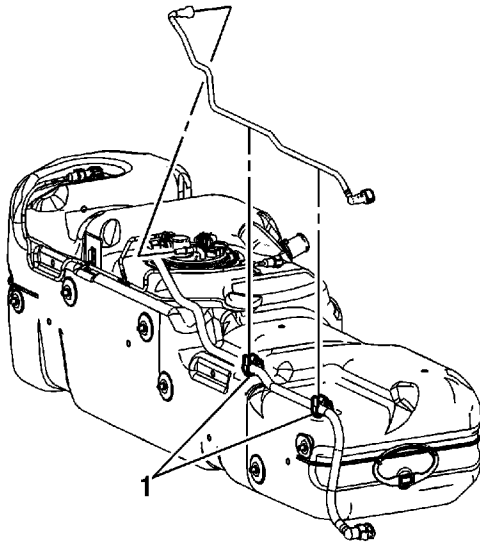


14. Disconnect the chassis wiring harness electrical connector from the fuel tank pressure sensor.

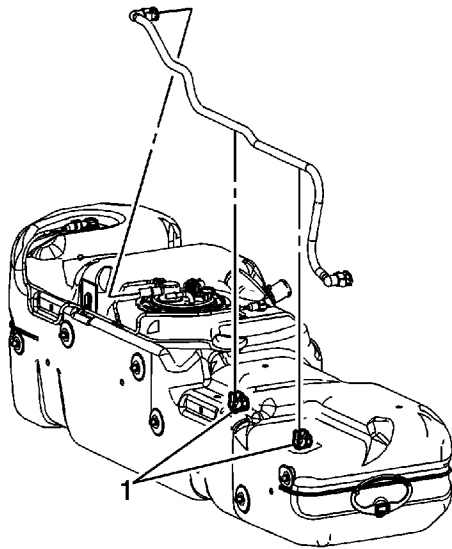
15. Disconnect the chassis wiring harness electrical connector from the fuel tank module.
16. Completely lower the fuel tank.
17. With the aid of an assistant, place the fuel tank in a suitable work area.
18. If replacing the fuel tank proceed to the next step, otherwise proceed to step 10 in the installation procedure.



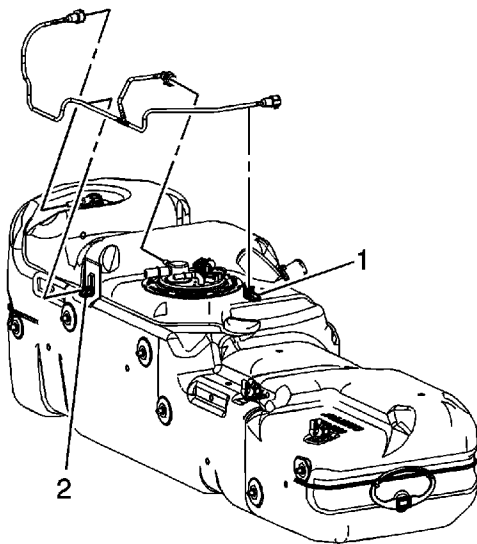
19. Remove the fuel tank shield push on retainers.
20. Remove the fuel tank shield.



21. Disconnect the fuel feed pipe quick connect fitting from the fuel tank module. Refer to [Plastic Collar Quick Connect Fitting Service](#).
22. Remove the fuel feed pipe from the fuel tank clips (1).

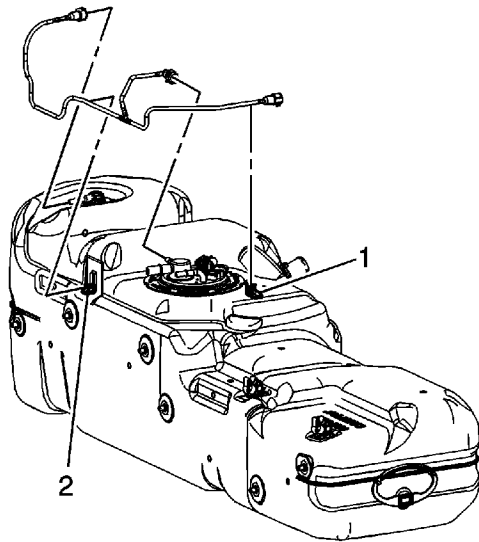


23. Disconnect the EVAP pipe quick connect fitting from the fuel tank module. Refer to [Plastic Collar Quick Connect Fitting Service](#).
24. Remove the EVAP pipe from the fuel tank clips (1).

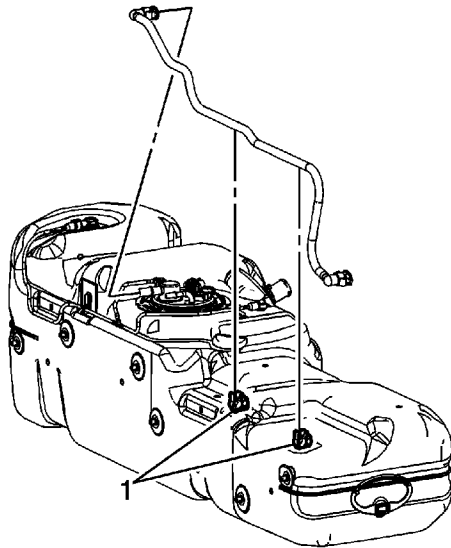


25. Disconnect the EVAP pipe quick connect fittings from the rollover valve and the fuel tank module. Refer to [Plastic Collar Quick Connect Fitting Service](#).
26. Remove the EVAP pipe from the fuel tank clips (1 and 2).
27. Remove the fuel tank module. Refer to [Fuel Tank Fuel Pump Module Replacement](#).

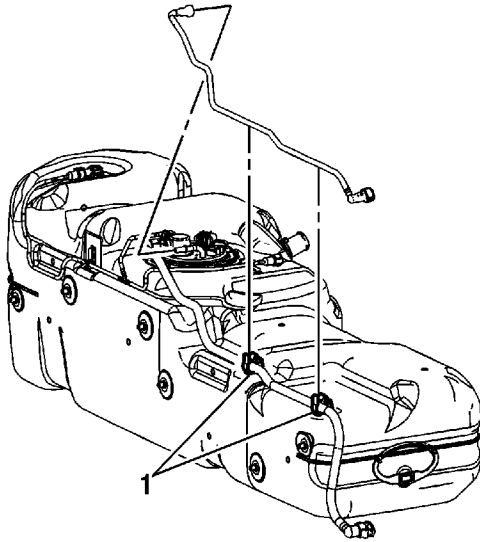
Installation Procedure



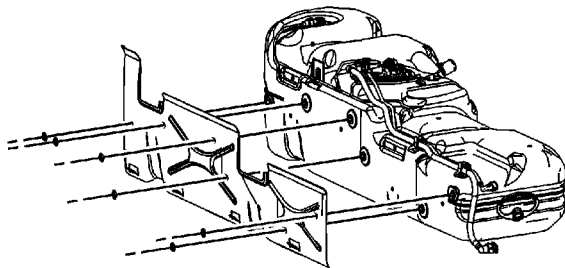
1. Install the fuel tank module. Refer to [Fuel Tank Fuel Pump Module Replacement](#).
2. Position and connect the EVAP pipe quick connect fittings to the rollover valve and the fuel tank module. Refer to [Plastic Collar Quick Connect Fitting Service](#).
3. Install the EVAP pipe to the fuel tank clips (1 and 2).



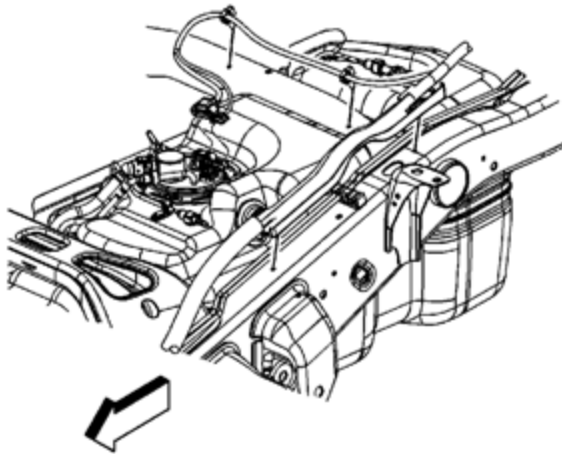
4. Position and connect the EVAP pipe quick connect fitting to the fuel tank module. Refer to [Plastic Collar Quick Connect Fitting Service](#).
5. Install the EVAP pipe to the fuel tank clips (1).



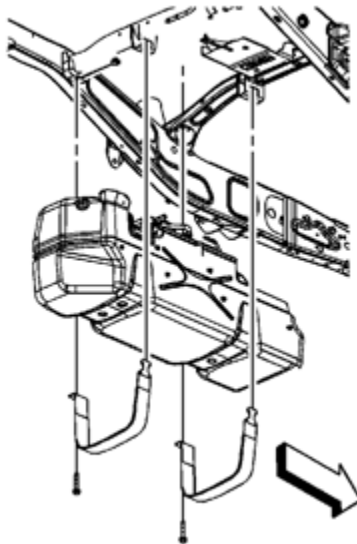
6. Position and connect the fuel feed pipe quick connect fitting to the fuel tank module. Refer to [Plastic Collar Quick Connect Fitting Service](#).
7. Install the fuel feed pipe to the fuel tank clips (1).



8. Position and install the fuel tank shield.
9. Install the fuel tank shield push on retainers.



10. With the aid of an assistant, place the fuel tank in a the adjustable jack.
11. Raise the fuel tank until the electrical connections can be made.
12. Connect the chassis wiring harness electrical connector to the fuel tank module.
13. Connect the chassis wiring harness electrical connector from the fuel pressure sensor.
14. Completely raise the fuel tank into position.



15. Install the fuel tank straps.

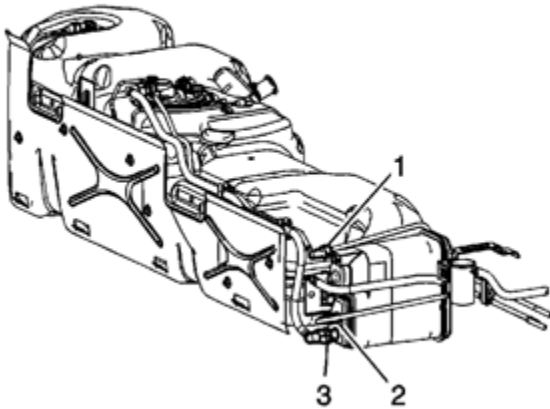
Caution: Refer to [Fastener Caution](#) in the Preface section.

16. Install the fuel tank strap bolts.

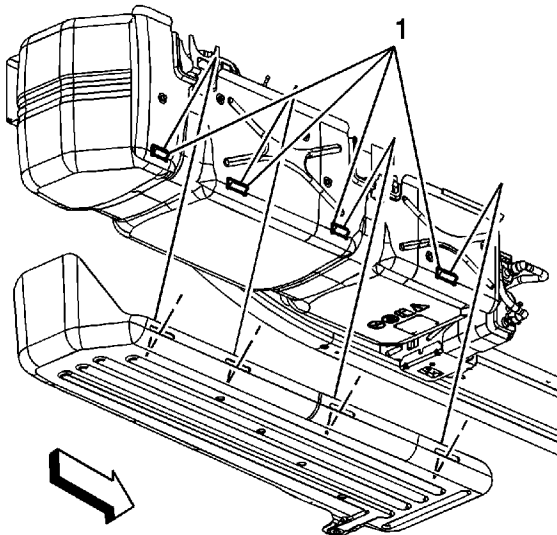
Tighten

Tighten the bolts to 40 N·m (30 lb ft).

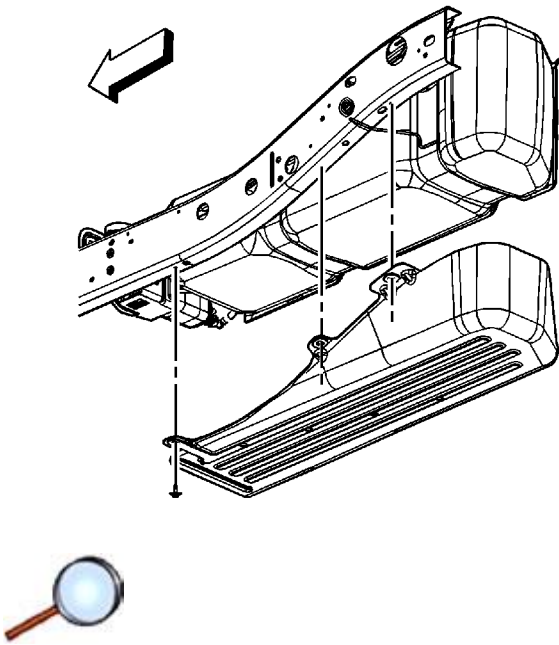
17. Remove the adjustable jack from under the fuel tank.



18. Remove the caps from the fuel and EVAP lines.
19. Connect the fuel tank EVAP line quick connect fitting (3) to the EVAP canister. Refer to [Plastic Collar Quick Connect Fitting Service](#).
20. Connect the fuel tank fuel feed line quick connect fitting (1) to the chassis line. Refer to [Plastic Collar Quick Connect Fitting Service](#).



21. Position and install the fuel tank shield onto the fuel tank shield tabs (1), if equipped.



22. Install the fuel tank shield bolts, if equipped.

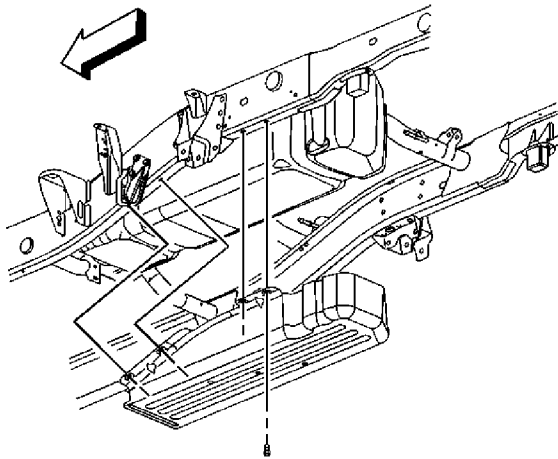
Tighten

Tighten the bolts to 18 N·m (13 lb ft).

23. Refill the fuel tank.
24. Install the fuel cap.
25. Connect the negative battery cable. Refer to [Battery Negative Cable Disconnection and Connection](#).
26. Perform the following procedure in order to inspect for leaks:
26.1. Turn the ignition ON, with the engine OFF, for 2 seconds.
26.2. Turn the ignition OFF for 10 seconds.
26.3. Turn the ignition ON, with the engine OFF.
26.4. Inspect for fuel leaks.

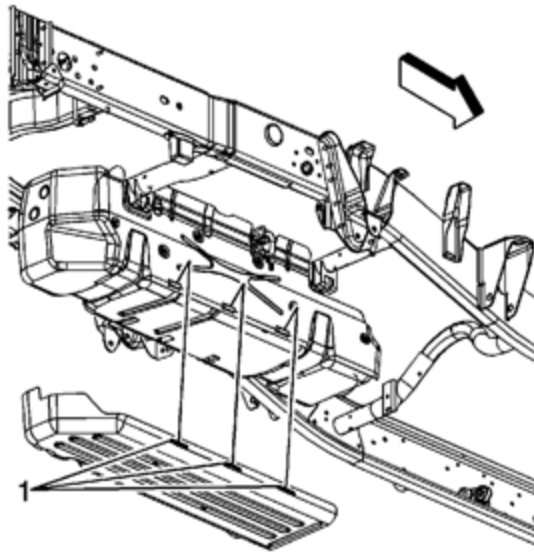
Fuel Tank Replacement (15 / 25 Reg / Ext / Crew Cab w / 34 Gal Tank)

Removal Procedure

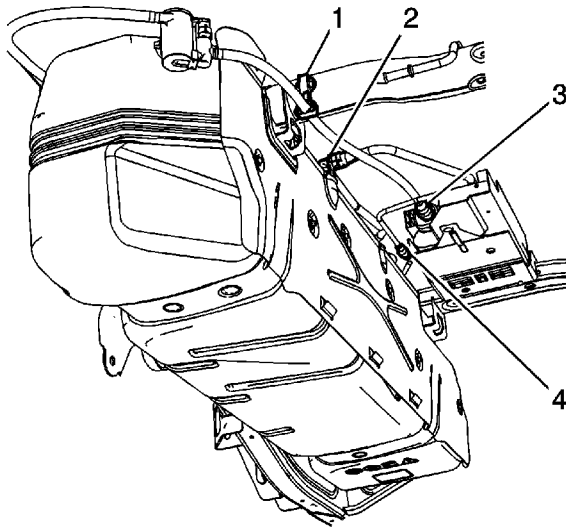


Note: Clean the fuel and evaporative emission (EVAP) connections and surrounding areas prior to disconnecting the lines in order to avoid possible system contamination.

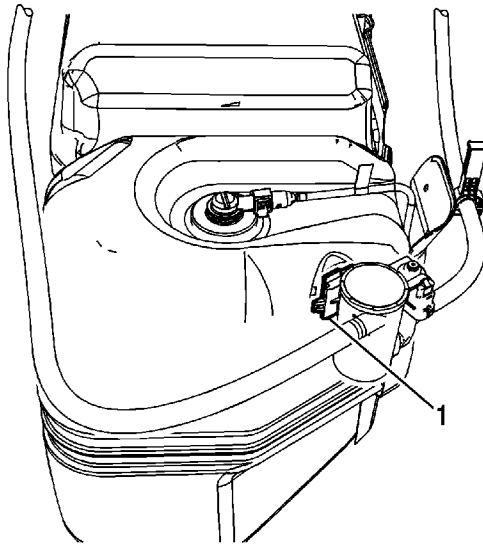
1. Relieve the fuel system pressure. Refer to [Fuel Pressure Relief](#).
2. Drain the fuel tank. Refer to [Fuel Tank Draining](#).
3. Remove the fuel tank fill pipe. Refer to [Fuel Tank Filler Pipe Replacement](#).
4. Remove the fuel tank shield bolts, if equipped.



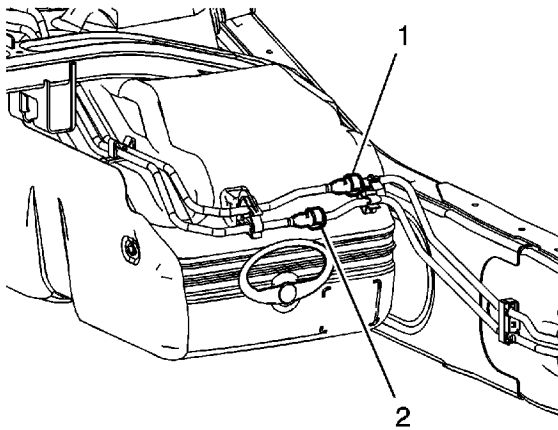
5. Remove the fuel tank shield from the fuel tank shield tabs (1), if equipped.



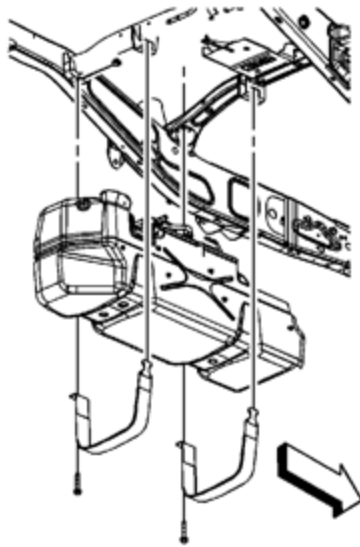
6. Remove the EVAP canister vent solenoid pipe clip (1) from the frame crossmember.
7. Disconnect the EVAP canister pipe quick connect fitting (2) from the fuel tank EVAP pipe. Refer to [Plastic Collar Quick Connect Fitting Service](#).
8. Disconnect the EVAP canister vent solenoid pipe quick connect fitting (3) from the EVAP canister. Refer to [Plastic Collar Quick Connect Fitting Service](#).
9. Disconnect the chassis wiring harness electrical connector from the EVAP canister vent solenoid.
10. Remove the chassis wiring harness clip from the fuel tank shield.



11. Disengage the retainer (1) securing the EVAP canister vent solenoid.
12. Slide the EVAP canister vent solenoid off the bracket towards the passenger side of the vehicle.



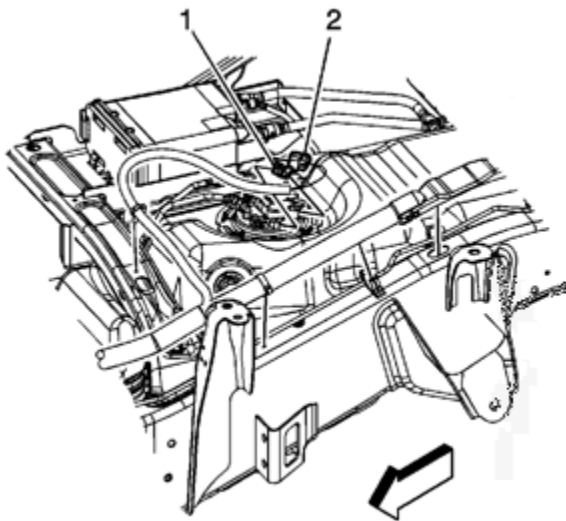
13. Disconnect the fuel tank fuel feed line quick connect fitting (1) from the chassis line. Refer to [Plastic Collar Quick Connect Fitting Service](#).
14. Disconnect the fuel tank EVAP line quick connect fitting (2) from the EVAP canister. Refer to [Plastic Collar Quick Connect Fitting Service](#).
15. Cap the fuel and EVAP lines in order to prevent possible system contamination.



16. Place a suitable adjustable jack under the fuel tank.
17. Remove the fuel tank strap bolts.
18. Remove the fuel tank straps.

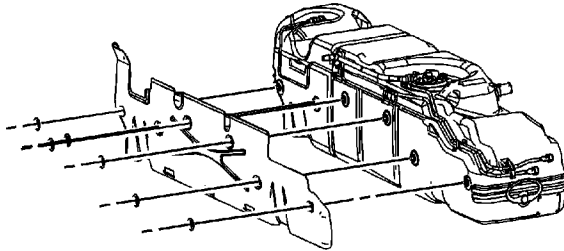
Note: When lowering the tank, ensure that the fill neck on the tank does not get hung up on the chassis wiring harness.

19. Lower the fuel tank half way.
20. Disconnect the chassis wiring harness clip at the frame crossmember.
21. Lower the fuel tank until the electrical connections are accessible.

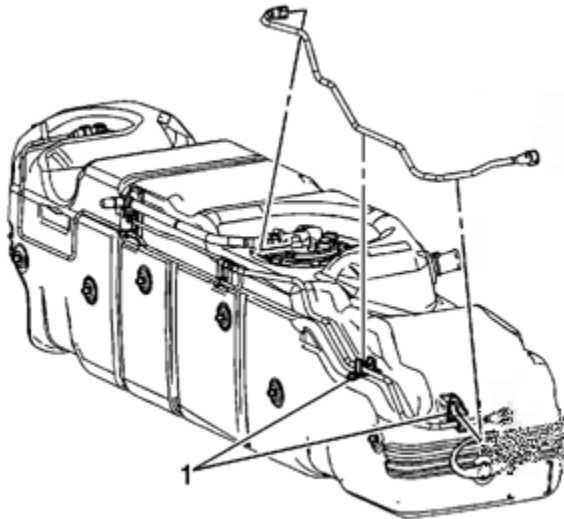


22. Disconnect the chassis wiring harness electrical connector (1) from the fuel tank pressure sensor.
23. Disconnect the chassis wiring harness electrical connector (2) from the fuel tank module.

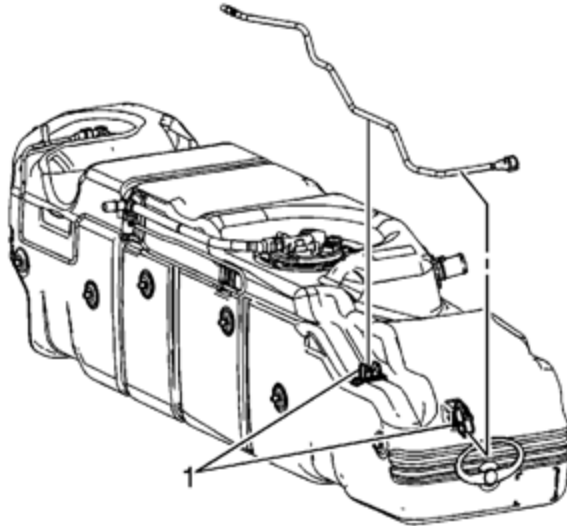
24. Completely lower the fuel tank.
25. With the aid of an assistant, place the fuel tank in a suitable work area.
26. If replacing the fuel tank proceed to the next step, otherwise proceed to step 9 in the installation procedure.



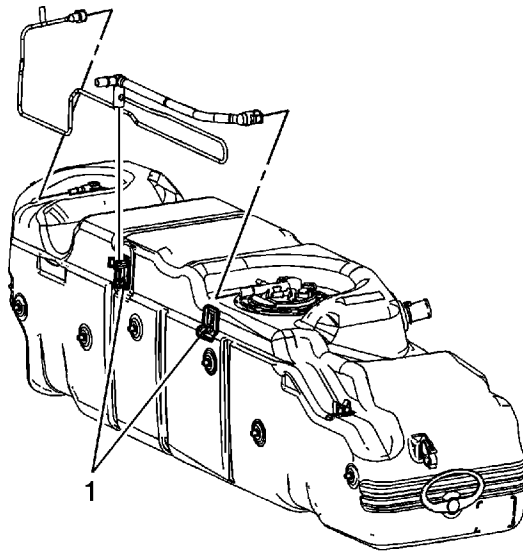
27. Remove the fuel tank shield push on retainers.
28. Remove the fuel tank shield.



29. Disconnect the fuel feed pipe quick connect fitting from the fuel tank module. Refer to [Plastic Collar Quick Connect Fitting Service](#).
30. Remove the fuel feed pipe from the fuel tank clips (1).

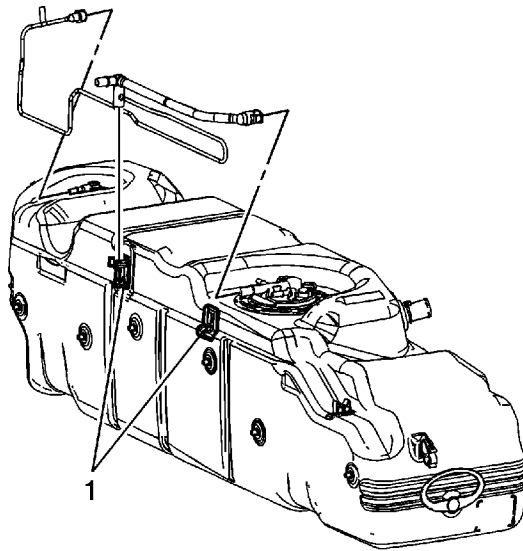


31. Remove the EVAP pipe from the fuel tank clips (1).

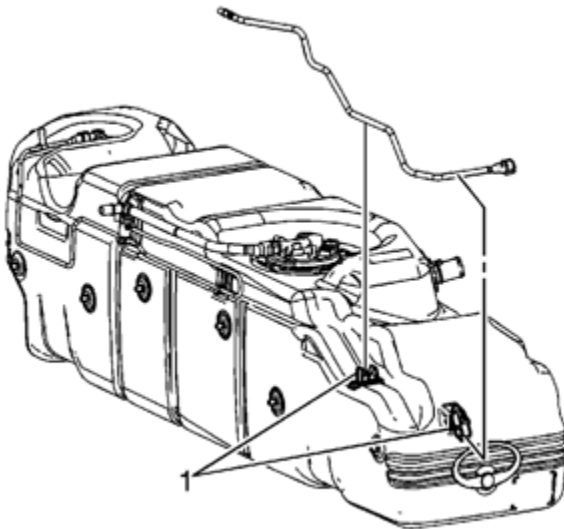


32. Disconnect the EVAP pipe quick connect fittings from the rollover valve and the fuel tank module. Refer to [Plastic Collar Quick Connect Fitting Service](#).
33. Remove the EVAP pipe from the fuel tank clips (1).
34. Remove the fuel tank module. Refer to [Fuel Tank Fuel Pump Module Replacement](#).

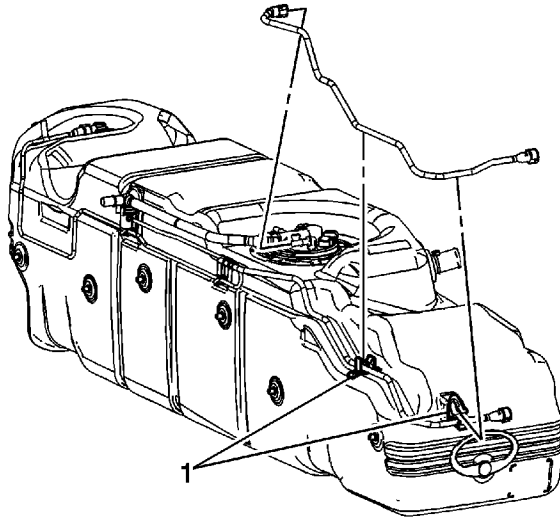
Installation Procedure



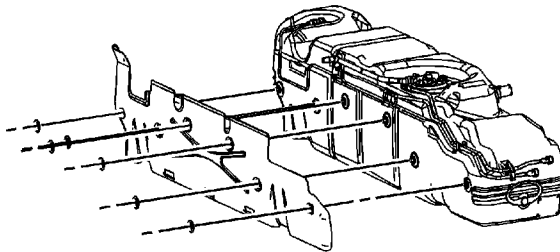
1. Install the fuel tank module. Refer to [Fuel Tank Fuel Pump Module Replacement](#).
2. Position and connect the EVAP pipe quick connect fittings to the rollover valve and the fuel tank module. Refer to [Plastic Collar Quick Connect Fitting Service](#).
3. Install the EVAP pipe to the fuel tank clips (1).



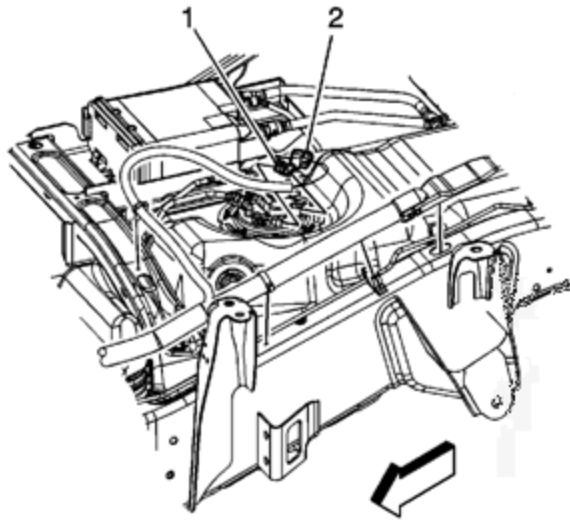
4. Install the EVAP pipe to the fuel tank clips (1).



5. Position and connect the fuel feed pipe quick connect fitting to the fuel tank module. Refer to [Plastic Collar Quick Connect Fitting Service](#).
6. Install the fuel feed pipe to the fuel tank clips (1).

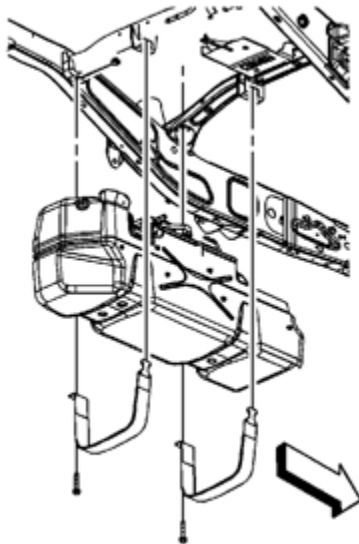


7. Position and install the fuel tank shield.
8. Install the fuel tank shield push on retainers.



9. With the aid of an assistant, place the fuel tank in a the adjustable jack.
10. Raise the fuel tank until the electrical connections can be made.
11. Connect the chassis wiring harness electrical connector (2) to the fuel tank module.
12. Connect the chassis wiring harness electrical connector (1) from the fuel pressure sensor.
13. Completely raise the fuel tank into position.

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

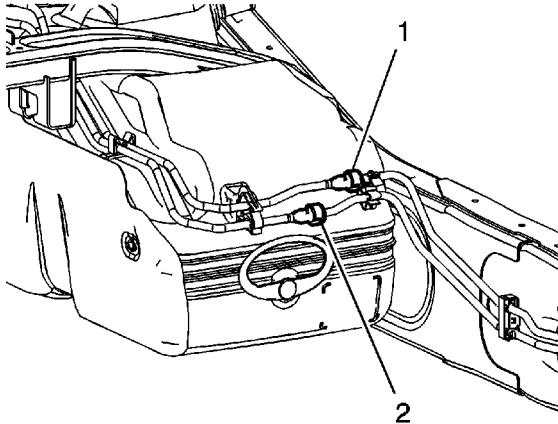


14. Install the fuel tank straps.
15. Install the fuel tank strap bolts.

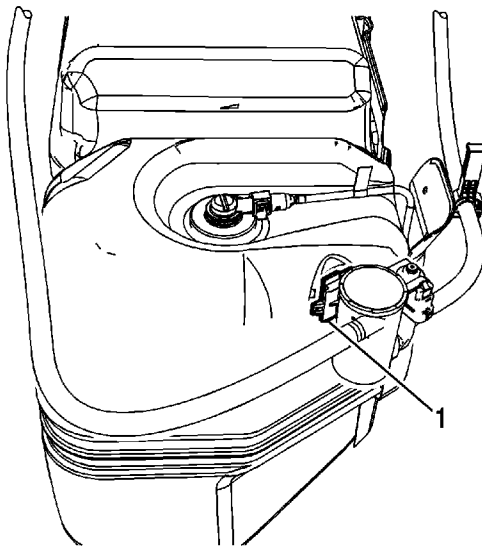
Tighten

Tighten the bolts to 40 N·m (30 lb ft).

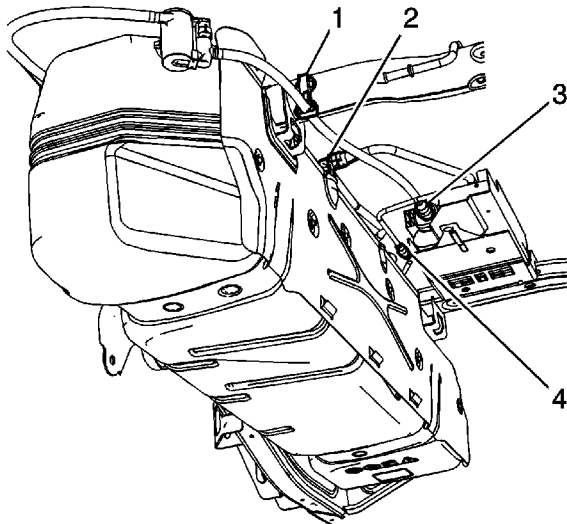
16. Remove the adjustable jack from under the fuel tank.



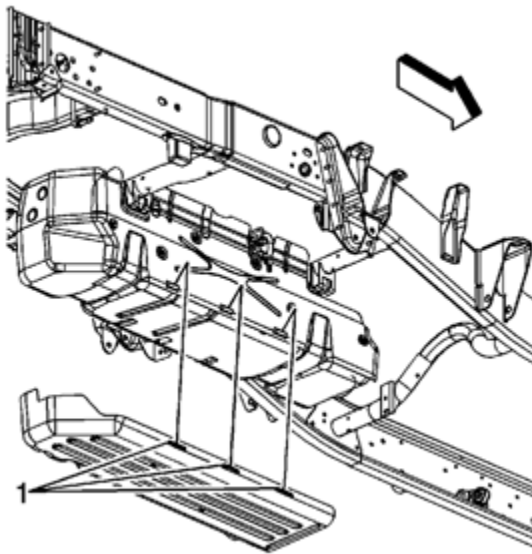
17. Remove the caps from the fuel and EVAP lines.
18. Connect the fuel tank EVAP line quick connect fitting (2) to the EVAP canister. Refer to [Plastic Collar Quick Connect Fitting Service](#).
19. Connect the fuel tank fuel feed line quick connect fitting (1) to the chassis line. Refer to [Plastic Collar Quick Connect Fitting Service](#).



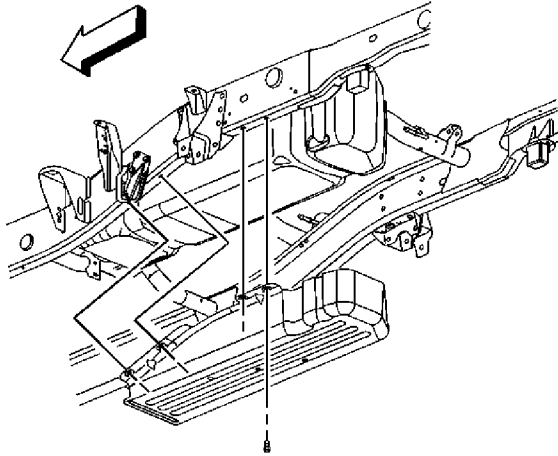
20. Slide the EVAP canister vent solenoid onto the bracket towards the driver side of the vehicle.
21. Ensure that the retainer (1) is engaged, securing the EVAP canister vent solenoid.



22. Connect the EVAP canister vent solenoid pipe quick connect fitting (3) to the EVAP canister. Refer to [Plastic Collar Quick Connect Fitting Service](#).
23. Connect the EVAP canister pipe quick connect fitting (2) to the fuel tank EVAP pipe. Refer to [Plastic Collar Quick Connect Fitting Service](#).
24. Install the EVAP canister vent solenoid pipe clip (1) to the frame crossmember.
25. Connect the chassis wiring harness electrical connector to the EVAP canister vent solenoid.
26. Install the chassis wiring harness clip to the fuel tank shield.



27. Position and install the fuel tank shield onto the fuel tank shield tabs (1), if equipped.



28. Install the fuel tank shield bolts, if equipped.

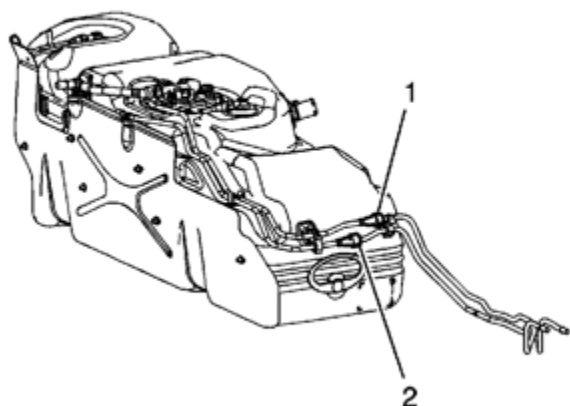
Tighten

Tighten the bolts to 18 N·m (13 lb ft).

29. Install the fuel tank fill pipe. Refer to [Fuel Tank Filler Pipe Replacement](#).
30. Refill the fuel tank.
31. Install the fuel cap.
32. Connect the negative battery cable. Refer to [Battery Negative Cable Disconnection and Connection](#).
33. Perform the following procedure in order to inspect for leaks:
- 33.1. Turn the ignition ON, with the engine OFF, for 2 seconds.
 - 33.2. Turn the ignition OFF for 10 seconds.
 - 33.3. Turn the ignition ON, with the engine OFF.
 - 33.4. Inspect for fuel leaks.

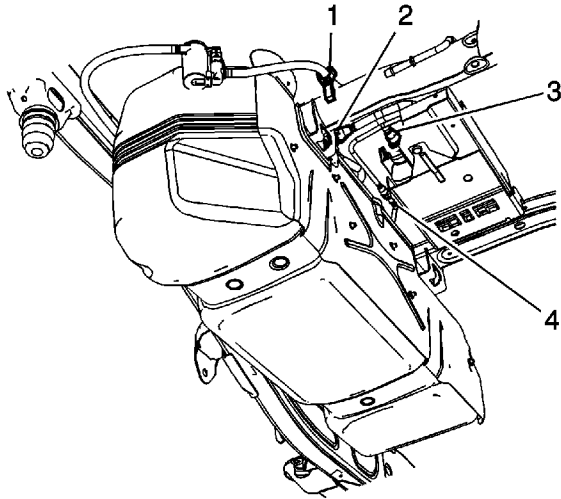
Fuel Tank Replacement (15 Rec Cab w / 26 Gal Tank)

Removal Procedure

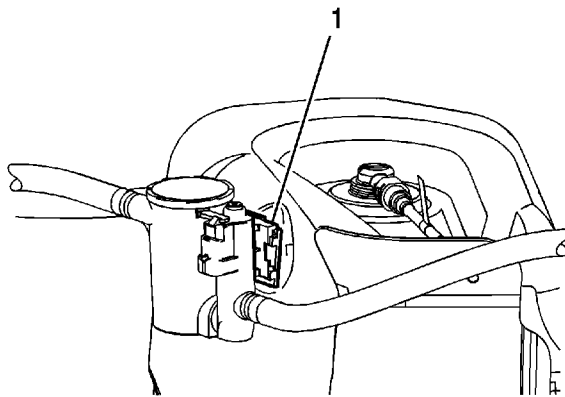


Note: Clean the fuel and evaporative emission (EVAP) connections and surrounding areas prior to disconnecting the lines in order to avoid possible system contamination.

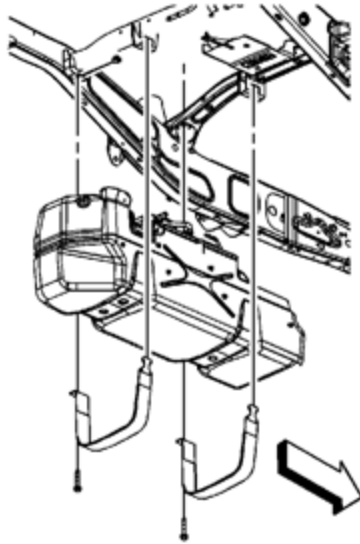
1. Relieve the fuel system pressure. Refer to [Fuel Pressure Relief](#).
2. Drain the fuel tank. Refer to [Fuel Tank Draining](#).
3. Remove the fuel tank fill pipe. Refer to [Fuel Tank Filler Pipe Replacement](#).
4. Disconnect the fuel tank fuel feed (1) and EVAP (2) line quick connect fittings from the chassis lines. Refer to [Plastic Collar Quick Connect Fitting Service](#).
5. Cap the fuel and EVAP lines in order to prevent possible system contamination.



6. Remove the EVAP canister vent solenoid pipe clip (1) from the frame crossmember.
7. Disconnect the EVAP canister pipe quick connect fitting (2) from the fuel tank EVAP pipe. Refer to [Plastic Collar Quick Connect Fitting Service](#).
8. Disconnect the EVAP canister vent solenoid pipe quick connect fitting (3) from the EVAP canister. Refer to [Plastic Collar Quick Connect Fitting Service](#).
9. Disconnect the chassis wiring harness electrical connector from the EVAP canister vent solenoid.
10. Remove the chassis wiring harness clip from the fuel tank shield.



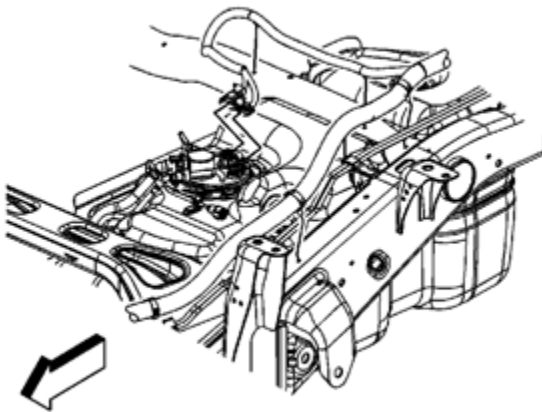
11. Insert a small flat bladed tool between the EVAP canister vent solenoid and the fuel tank bracket, disengaging the retainer (1).
12. Slide the EVAP canister vent solenoid off the bracket towards the passenger side of the vehicle.
13. Position and secure the EVAP canister vent solenoid out of the way.



14. Place a suitable adjustable jack under the fuel tank.
15. Remove the fuel tank strap bolts.
16. Remove the fuel tank straps.

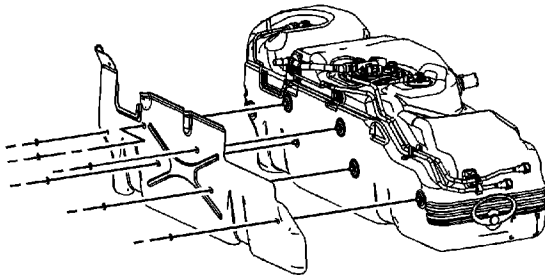
Note: When lowering the tank, ensure that the fill neck on the tank does not get hung up on the chassis wiring harness.

17. Lower the fuel tank half way.
18. Disconnect the chassis wiring harness clip at the frame crossmember.
19. Lower the fuel tank until the electrical connections are accessible.

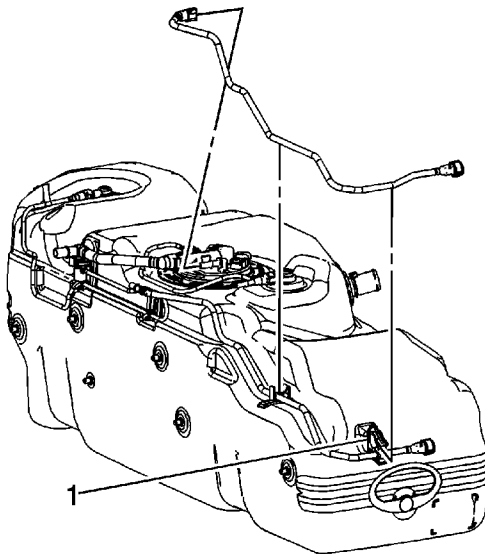


20. Disconnect the chassis wiring harness electrical connector from the fuel tank pressure sensor.
21. Disconnect the chassis wiring harness electrical connector from the fuel tank module.
22. Completely lower the fuel tank.

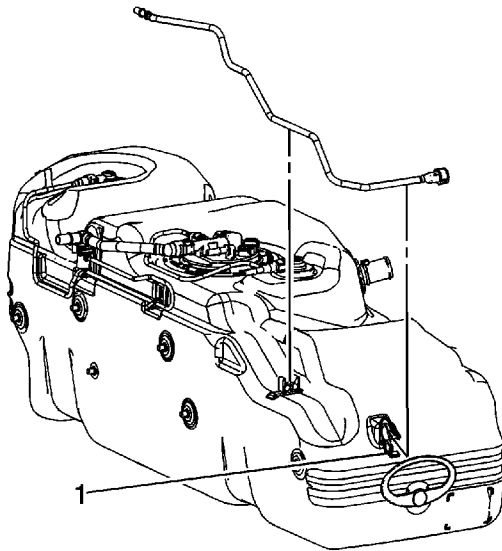
23. With the aid of an assistant, place the fuel tank in a suitable work area.
24. If replacing the fuel tank proceed to the next step, otherwise proceed to step 10 in the installation procedure.



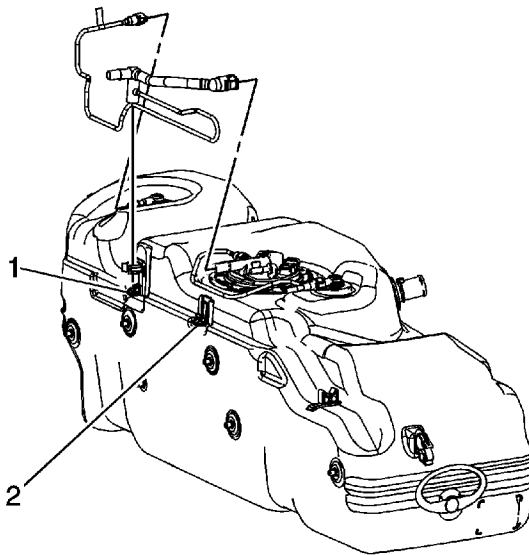
25. Remove the fuel tank shield push on retainers.
26. Remove the fuel tank shield.



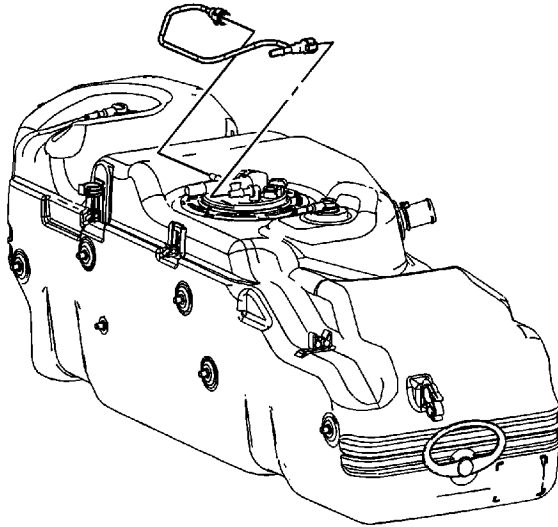
27. Disconnect the fuel feed pipe quick connect fitting from the fuel tank module. Refer to [Plastic Collar Quick Connect Fitting Service](#).
28. Remove the fuel feed pipe from the fuel tank clip (1).



29. Remove the EVAP canister purge pipe from the fuel tank clip (1).

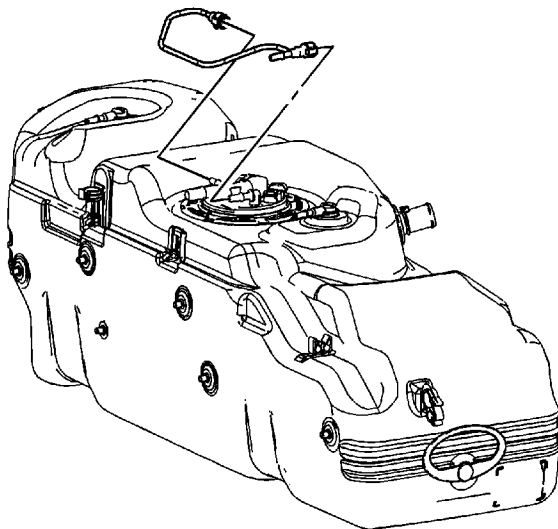


30. Disconnect the EVAP rear pipe quick connect fittings from the rollover valve and the fuel tank module. Refer to [Plastic Collar Quick Connect Fitting Service](#).
31. Remove the EVAP rear pipe from the fuel tank clips (1 and 2).

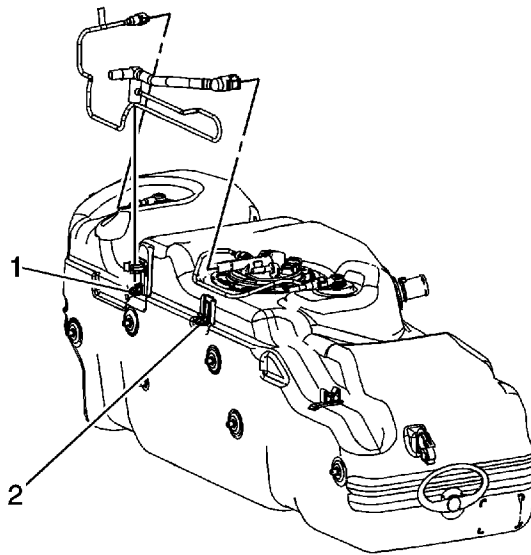


32. Disconnect the small EVAP rear pipe quick connect fittings from the rollover valve and the fuel tank module. Refer to [Plastic Collar Quick Connect Fitting Service](#).
33. Remove the fuel tank module. Refer to [Fuel Tank Fuel Pump Module Replacement](#).

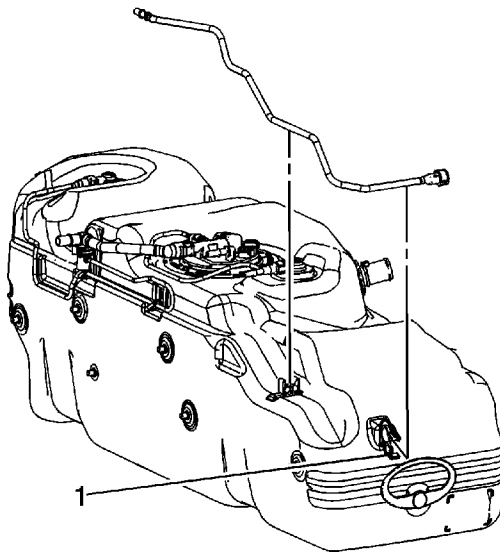
Installation Procedure



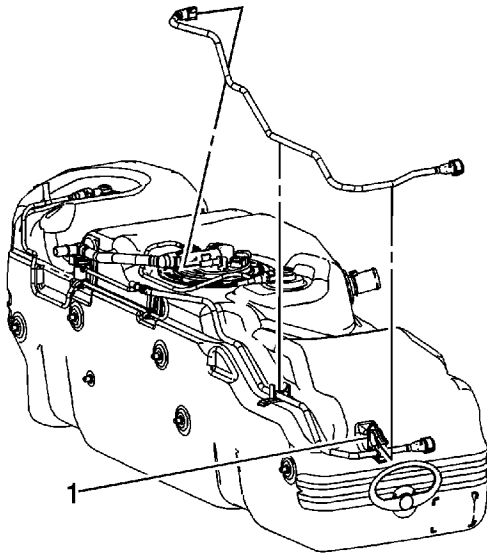
1. Install the fuel tank module. Refer to [Fuel Tank Fuel Pump Module Replacement](#).
2. Position and connect the small EVAP rear pipe quick connect fittings to the rollover valve and the fuel tank module. Refer to [Plastic Collar Quick Connect Fitting Service](#).



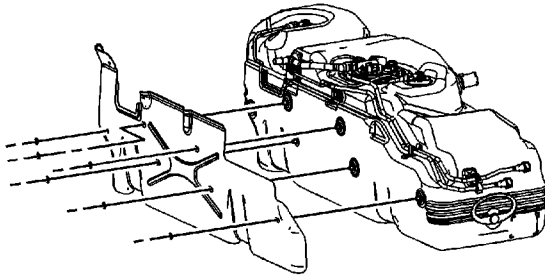
3. Position and connect the EVAP rear pipe quick connect fittings to the rollover valve and the fuel tank module. Refer to [Plastic Collar Quick Connect Fitting Service](#).
4. Install the EVAP rear pipe to the fuel tank clips (1 and 2).



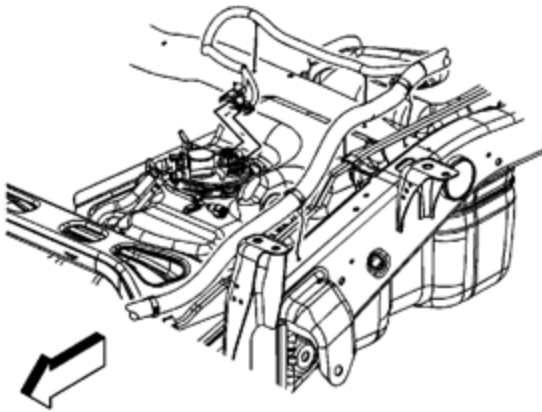
5. Install the EVAP canister purge pipe to the fuel tank clip (1).



6. Position and connect the fuel feed pipe quick connect fitting to the fuel tank module. Refer to [Plastic Collar Quick Connect Fitting Service](#).
7. Install the fuel feed pipe to the fuel tank clip (1).

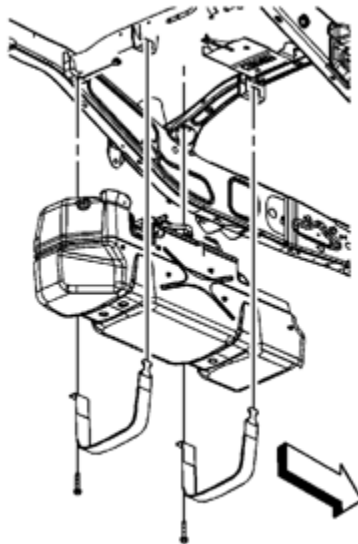


8. Position and install the fuel tank shield.
9. Install the fuel tank shield push on retainers.



10. With the aid of an assistant, place the fuel tank in a the adjustable jack.
11. Raise the fuel tank until the electrical connections can be made.
12. Connect the chassis wiring harness electrical connector to the fuel tank module.
13. Connect the chassis wiring harness electrical connector from the fuel pressure sensor.
14. Completely raise the fuel tank into position.

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

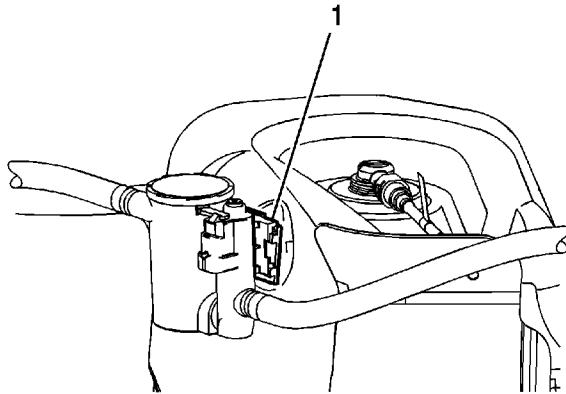


15. Install the fuel tank straps.
16. Install the fuel tank strap bolts.

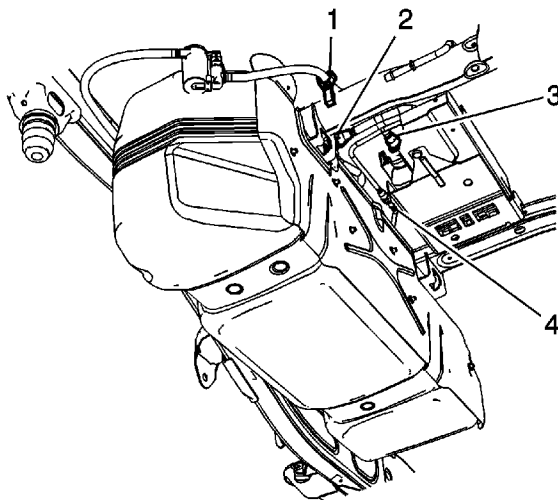
Tighten

Tighten the bolts to 40 N·m (30 lb ft).

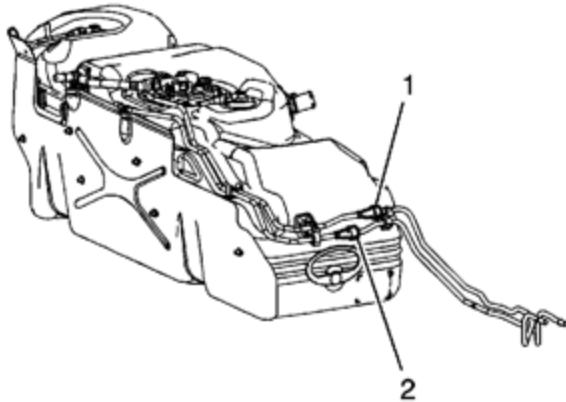
17. Remove the adjustable jack from under the fuel tank.



18. Unsecure and position the EVAP canister vent solenoid to the fuel tank.
19. Slide the EVAP canister vent solenoid onto the bracket towards the driver side of the vehicle.
20. Ensure that the EVAP canister vent solenoid engages the fuel tank bracket retainer (1).



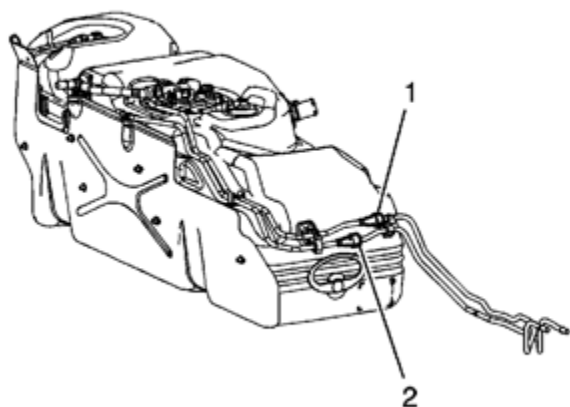
21. Connect the EVAP canister vent solenoid pipe quick connect fitting (3) to the EVAP canister. Refer to [Plastic Collar Quick Connect Fitting Service](#).
22. Connect the EVAP canister pipe quick connect fitting (2) to the fuel tank EVAP pipe. Refer to [Plastic Collar Quick Connect Fitting Service](#).
23. Install the EVAP canister vent solenoid pipe clip (1) to the frame crossmember.
24. Connect the chassis wiring harness electrical connector to the EVAP canister vent solenoid.
25. Install the chassis wiring harness clip to the fuel tank shield.



26. Remove the caps from the fuel and EVAP lines.
27. Connect the fuel tank fuel feed (1) and EVAP (2) line quick connect fittings to the chassis lines. Refer to [Plastic Collar Quick Connect Fitting Service](#).
28. Install the fuel tank fill pipe. Refer to [Fuel Tank Filler Pipe Replacement](#).
29. Refill the fuel tank.
30. Install the fuel cap.
31. Connect the negative battery cable. Refer to [Battery Negative Cable Disconnection and Connection](#).
32. Perform the following procedure in order to inspect for leaks:
 - 32.1. Turn the ignition ON, with the engine OFF, for 2 seconds.
 - 32.2. Turn the ignition OFF for 10 seconds.
 - 32.3. Turn the ignition ON, with the engine OFF.
 - 32.4. Inspect for fuel leaks.

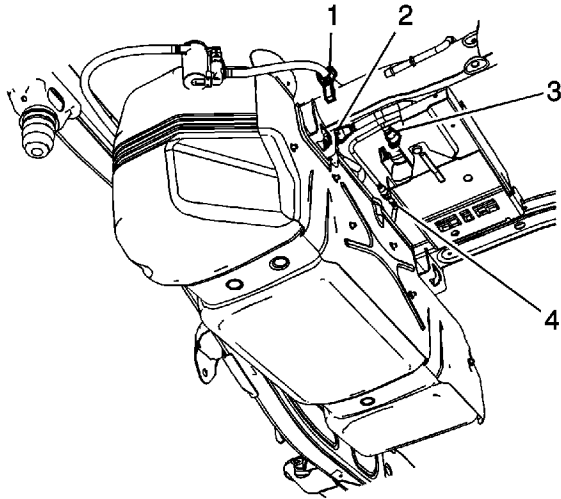
Fuel Tank Replacement (25 Ext /Crew Cab w / 26 Gal Tank)

Removal Procedure

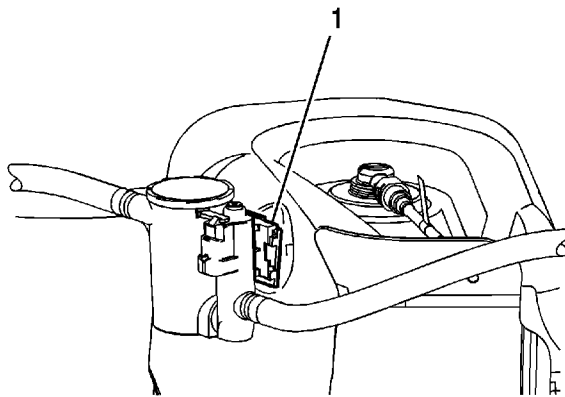


Note: Clean the fuel and evaporative emission (EVAP) connections and surrounding areas prior to disconnecting the lines in order to avoid possible system contamination.

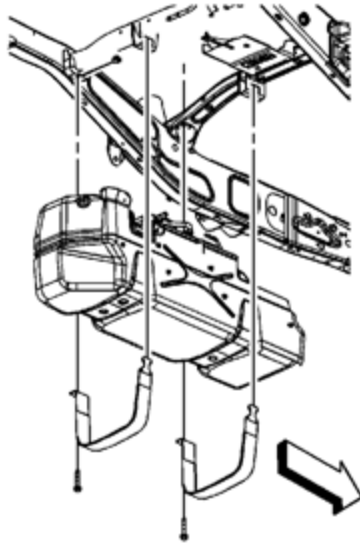
1. Relieve the fuel system pressure. Refer to [Fuel Pressure Relief](#).
2. Drain the fuel tank. Refer to [Fuel Tank Draining](#).
3. Remove the fuel tank fill pipe. Refer to [Fuel Tank Filler Pipe Replacement](#).
4. Disconnect the fuel tank fuel feed (1) and EVAP (2) line quick connect fittings from the chassis lines. Refer to [Plastic Collar Quick Connect Fitting Service](#).
5. Cap the fuel and EVAP lines in order to prevent possible system contamination.



6. Remove the EVAP canister vent solenoid pipe clip (1) from the frame crossmember.
7. Disconnect the EVAP canister pipe quick connect fitting (2) from the fuel tank EVAP pipe. Refer to [Plastic Collar Quick Connect Fitting Service](#).
8. Disconnect the EVAP canister vent solenoid pipe quick connect fitting (3) from the EVAP canister. Refer to [Plastic Collar Quick Connect Fitting Service](#).
9. Disconnect the chassis wiring harness electrical connector from the EVAP canister vent solenoid.
10. Remove the chassis wiring harness clip from the fuel tank shield.



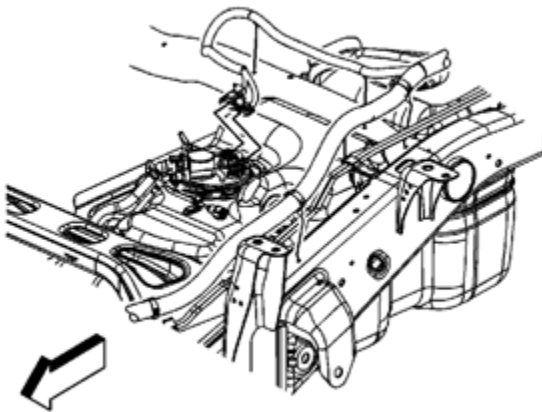
11. Insert a small flat bladed tool between the EVAP canister vent solenoid and the fuel tank bracket, disengaging the retainer (1).
12. Slide the EVAP canister vent solenoid off the bracket towards the passenger side of the vehicle.
13. Position and secure the EVAP canister vent solenoid out of the way.



14. Place a suitable adjustable jack under the fuel tank.
15. Remove the fuel tank strap bolts.
16. Remove the fuel tank straps.

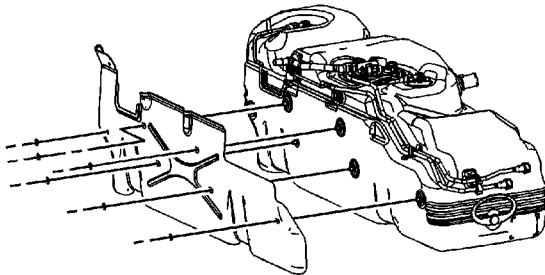
Note: When lowering the tank, ensure that the fill neck on the tank does not get hung up on the chassis wiring harness.

17. Lower the fuel tank half way.
18. Disconnect the chassis wiring harness clip at the frame crossmember.
19. Lower the fuel tank until the electrical connections are accessible.

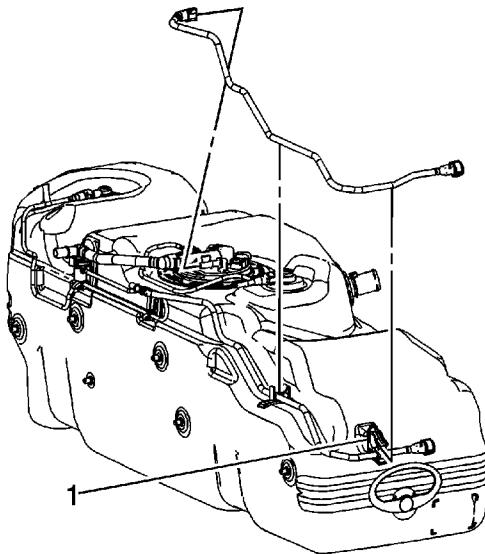


20. Disconnect the chassis wiring harness electrical connector from the fuel tank pressure sensor.
21. Disconnect the chassis wiring harness electrical connector from the fuel tank module.
22. Completely lower the fuel tank.

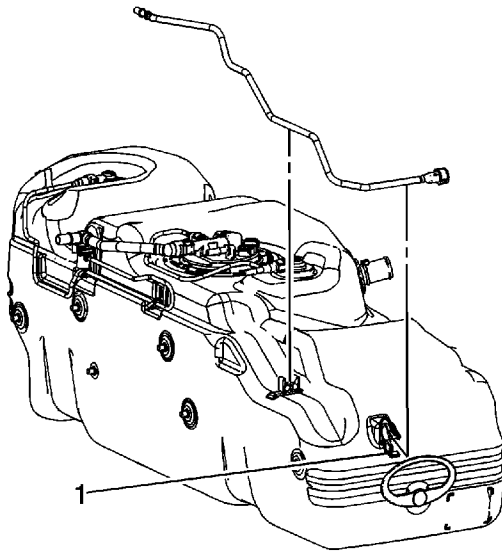
23. With the aid of an assistant, place the fuel tank in a suitable work area.
24. If replacing the fuel tank proceed to the next step, otherwise proceed to step 10 in the installation procedure.



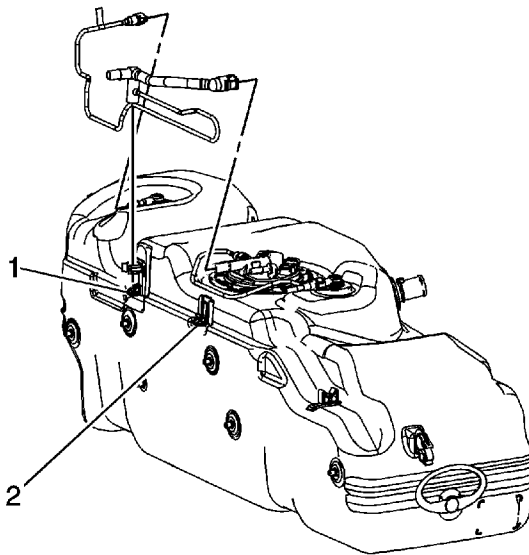
25. Remove the fuel tank shield push on retainers.
26. Remove the fuel tank shield.



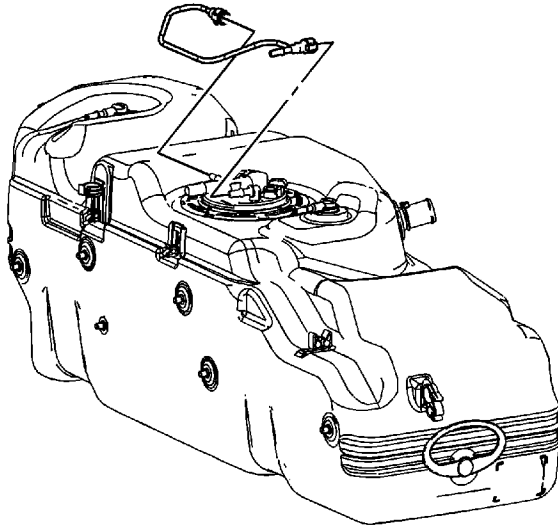
27. Disconnect the fuel feed pipe quick connect fitting from the fuel tank module. Refer to [Plastic Collar Quick Connect Fitting Service](#).
28. Remove the fuel feed pipe from the fuel tank clip (1).



29. Remove the EVAP canister purge pipe from the fuel tank clip (1).

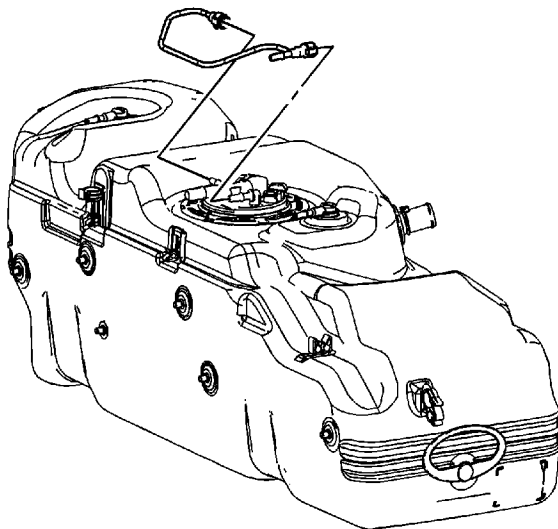


30. Disconnect the EVAP rear pipe quick connect fittings from the rollover valve and the fuel tank module. Refer to [Plastic Collar Quick Connect Fitting Service](#).
31. Remove the EVAP rear pipe from the fuel tank clips (1 and 2).

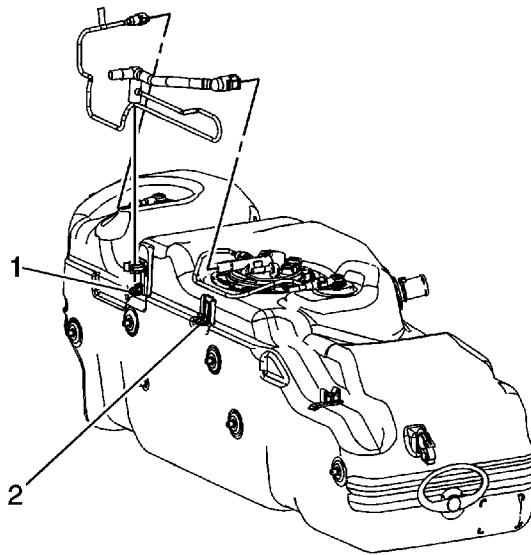


32. Disconnect the small EVAP rear pipe quick connect fittings from the rollover valve and the fuel tank module. Refer to [Plastic Collar Quick Connect Fitting Service](#).
33. Remove the fuel tank module. Refer to [Fuel Tank Fuel Pump Module Replacement](#).

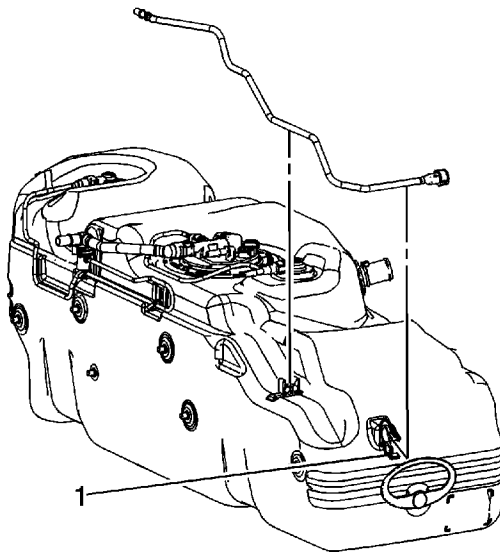
Installation Procedure



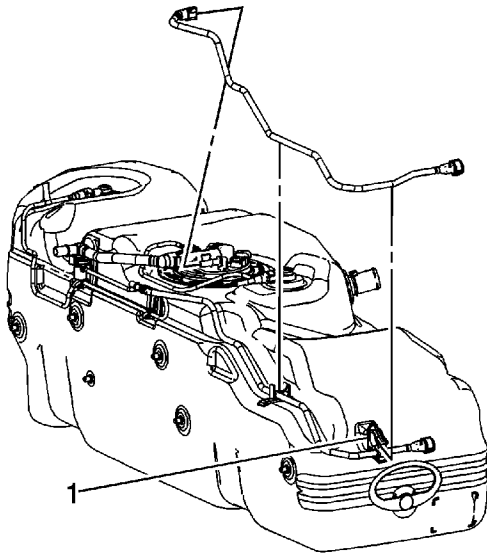
1. Install the fuel tank module. Refer to [Fuel Tank Fuel Pump Module Replacement](#).
2. Position and connect the small EVAP rear pipe quick connect fittings to the rollover valve and the fuel tank module. Refer to [Plastic Collar Quick Connect Fitting Service](#).



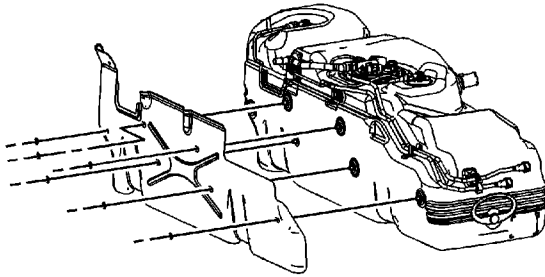
3. Position and connect the EVAP rear pipe quick connect fittings to the rollover valve and the fuel tank module. Refer to [Plastic Collar Quick Connect Fitting Service](#).
4. Install the EVAP rear pipe to the fuel tank clips (1 and 2).



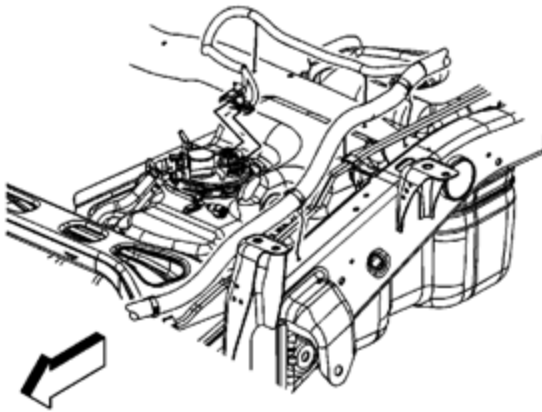
5. Install the EVAP canister purge pipe to the fuel tank clip (1).



6. Position and connect the fuel feed pipe quick connect fitting to the fuel tank module. Refer to [Plastic Collar Quick Connect Fitting Service](#).
7. Install the fuel feed pipe to the fuel tank clip (1).

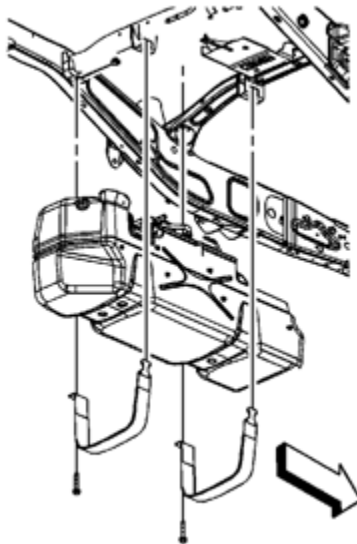


8. Position and install the fuel tank shield.
9. Install the fuel tank shield push on retainers.



10. With the aid of an assistant, place the fuel tank in a the adjustable jack.
11. Raise the fuel tank until the electrical connections can be made.
12. Connect the chassis wiring harness electrical connector to the fuel tank module.
13. Connect the chassis wiring harness electrical connector from the fuel pressure sensor.
14. Completely raise the fuel tank into position.

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

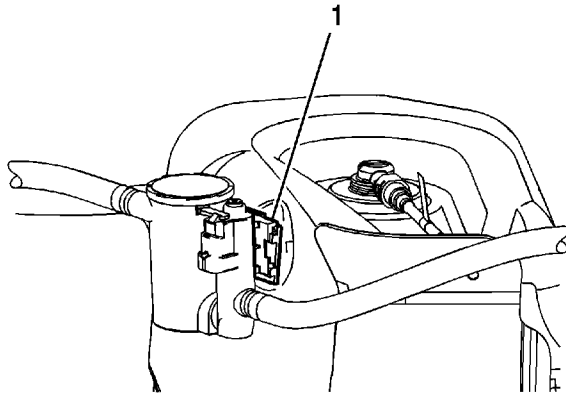


15. Install the fuel tank straps.
16. Install the fuel tank strap bolts.

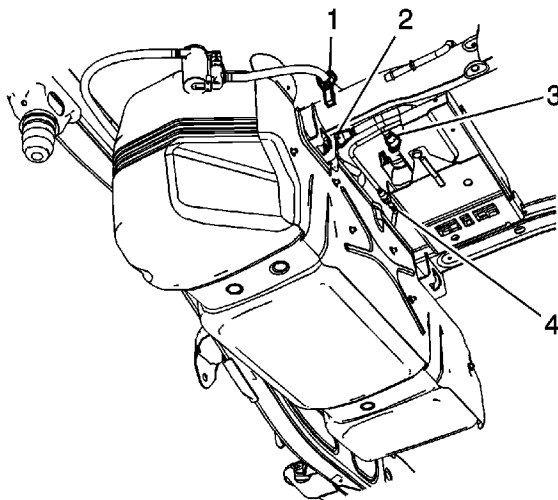
Tighten

Tighten the bolts to 40 N·m (30 lb ft).

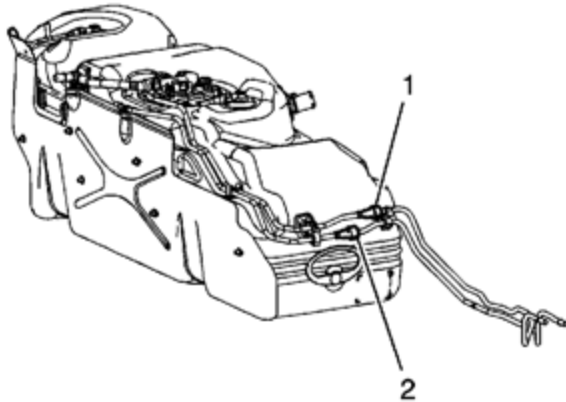
17. Remove the adjustable jack from under the fuel tank.



18. Unsecure and position the EVAP canister vent solenoid to the fuel tank.
19. Slide the EVAP canister vent solenoid onto the bracket towards the driver side of the vehicle.
20. Ensure that the EVAP canister vent solenoid engages the fuel tank bracket retainer (1).



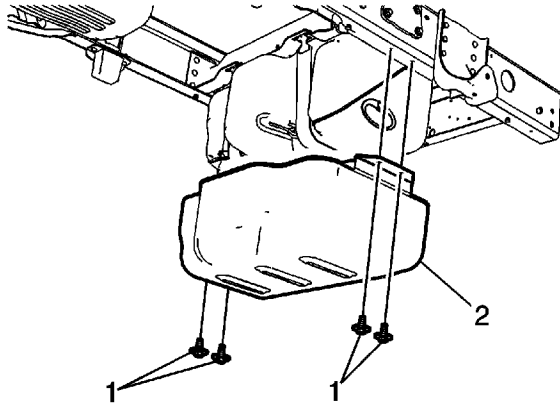
21. Connect the EVAP canister vent solenoid pipe quick connect fitting (3) to the EVAP canister. Refer to [Plastic Collar Quick Connect Fitting Service](#).
22. Connect the EVAP canister pipe quick connect fitting (2) to the fuel tank EVAP pipe. Refer to [Plastic Collar Quick Connect Fitting Service](#).
23. Install the EVAP canister vent solenoid pipe clip (1) to the frame crossmember.
24. Connect the chassis wiring harness electrical connector to the EVAP canister vent solenoid.
25. Install the chassis wiring harness clip to the fuel tank shield.



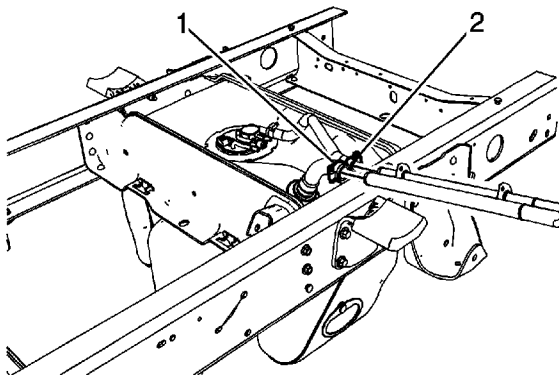
26. Remove the caps from the fuel and EVAP lines.
27. Connect the fuel tank fuel feed (1) and EVAP (2) line quick connect fittings to the chassis lines. Refer to [Plastic Collar Quick Connect Fitting Service](#).
28. Install the fuel tank fill pipe. Refer to [Fuel Tank Filler Pipe Replacement](#).
29. Refill the fuel tank.
30. Install the fuel cap.
31. Connect the negative battery cable. Refer to [Battery Negative Cable Disconnection and Connection](#).
32. Perform the following procedure in order to inspect for leaks:
 - 32.1. Turn the ignition ON, with the engine OFF, for 2 seconds.
 - 32.2. Turn the ignition OFF for 10 seconds.
 - 32.3. Turn the ignition ON, with the engine OFF.
 - 32.4. Inspect for fuel leaks.

Auxiliary Fuel Tank Replacement

Removal Procedure

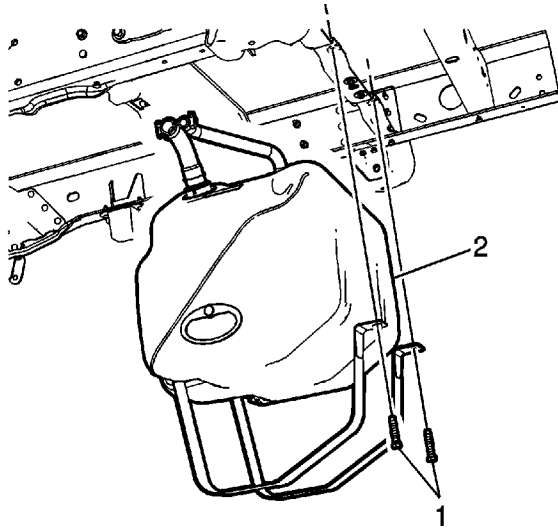


1. Relieve the fuel system pressure. Refer to the [Fuel Pressure Relief](#).
2. Raise the vehicle. Refer to [Lifting and Jacking the Vehicle](#).
3. Drain the fuel tank. Refer to [Fuel Tank Draining](#).
4. Remove the fuel tank shield bolts (1) and the fuel tank shield (2).



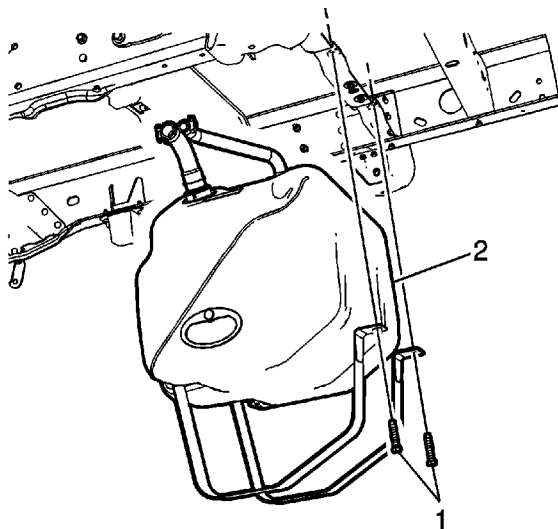
5. Loosen the fuel fill (1) and vent pipe (2) hose clamps.

6. Disconnect the hoses.



7. With the aid of an assistant, support the fuel tank.
8. Disconnect the evaporative emissions lines and the fuel lines. Refer to [Metal Collar Quick Connect Fitting Service](#) and [Plastic Collar Quick Connect Fitting Service](#)
9. Disconnect the electrical connectors.
10. Remove the fuel tank strap bolts (1) and the auxiliary fuel tank (2).
11. Remove the fuel pump module from the fuel tank. Refer to [Fuel Tank Fuel Pump Module Replacement](#).
12. Cap the fuel and EVAP pipes in order to prevent possible fuel system contamination.

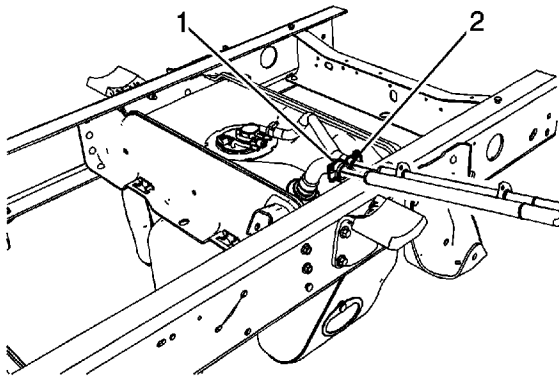
Installation Procedure



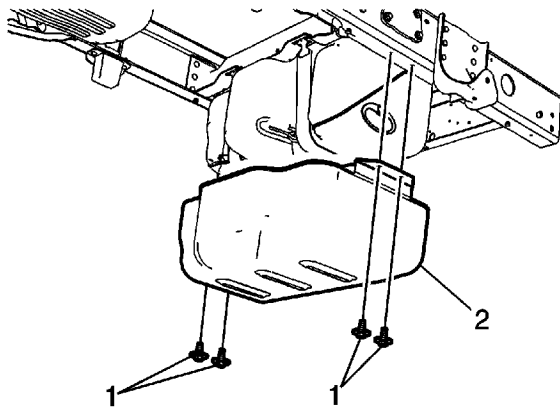
1. Install the fuel pump module to the fuel tank. Refer to [Fuel Tank Fuel Pump Module Replacement](#).
2. Remove the caps from the fuel and EVAP pipes.
3. With the aid of an assistant, support and partially raise the fuel tank.
4. Connect the electrical connectors.
5. Connect the evaporative emissions lines and the fuel lines. Refer to [Metal Collar Quick Connect Fitting Service](#) and [Plastic Collar Quick Connect Fitting Service](#).
6. With the aid of an assistant, support the auxiliary fuel tank.
7. Install the auxiliary fuel tank (1).

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

8. Install the fuel tank strap attaching bolts (2) and tighten to **40 N·m (30 lb ft)**.



9. Connect and tighten the fuel fill (1) and vent pipe (2) hose clamps to **4 N·m (35 lb in)**.



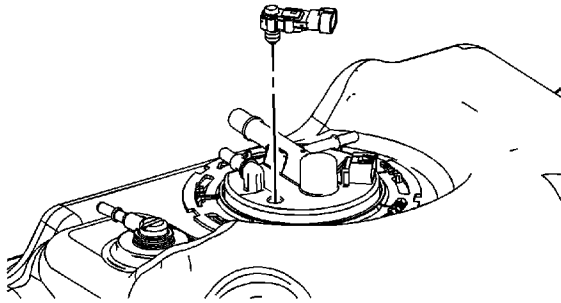


10. Install the fuel tank shield (2) and the fuel tank shield bolts (1) and tighten to **18 N·m (13 lb ft)**.
11. Refill the fuel tank.
12. Install the fuel filler cap.
13. Connect the negative battery cable. Refer to [Battery Negative Cable Disconnection and Connection](#) in Engine Electrical.
14. Use the following procedure in order to inspect for leaks:
 - 14.1. Turn ON the ignition, with the engine OFF, for 2 seconds.
 - 14.2. Turn OFF the ignition for 10 seconds.
 - 14.3. Turn ON the ignition, with the engine OFF.
 - 14.4. Inspect for fuel leaks.

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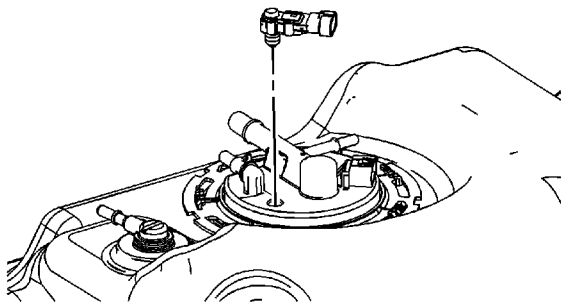
Fuel Tank Pressure Sensor Replacement (15 Reg Cab w/26 gal Tank)

Removal Procedure



1. Remove the fuel tank. Refer to [Fuel Tank Replacement](#) .
2. Remove the fuel tank pressure sensor by pulling straight up using a slight rocking motion.

Installation Procedure



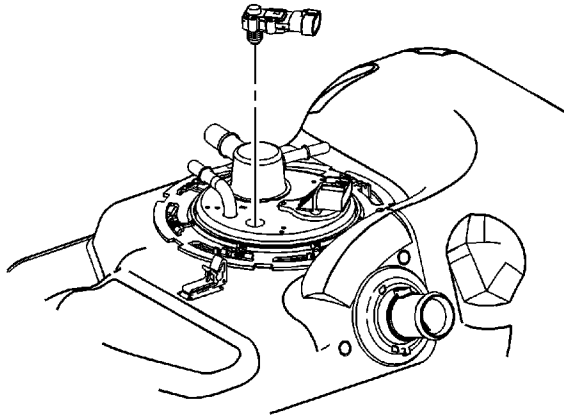


1. Install the fuel tank pressure sensor.
2. Install the fuel tank. Refer to [Fuel Tank Replacement](#) .

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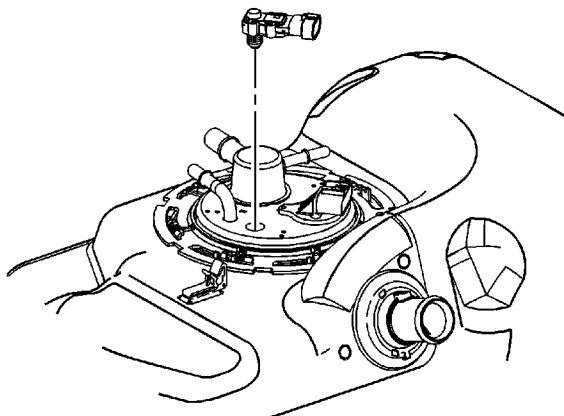
Fuel Tank Pressure Sensor Replacement (15 Ext/Crew Cab w / 26 gal Tank)

Removal Procedure



1. Remove the fuel tank. Refer to [Fuel Tank Replacement](#) .
2. Remove the fuel tank pressure sensor by pulling straight up using a slight rocking motion.

Installation Procedure



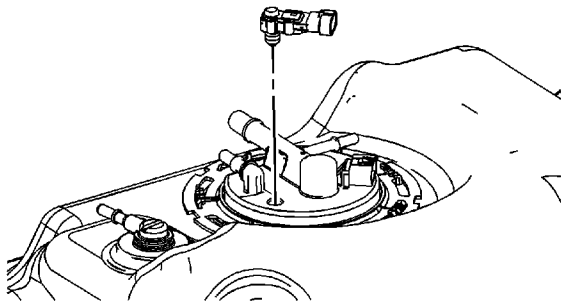


1. Install the fuel tank pressure sensor.
2. Install the fuel tank. Refer to [Fuel Tank Replacement](#) .

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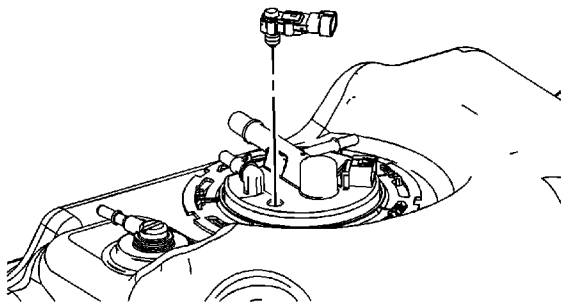
Fuel Tank Pressure Sensor Replacement (25 Ext/Crew Cab w / 26 gal Tank)

Removal Procedure



1. Remove the fuel tank. Refer to [Fuel Tank Replacement](#) .
2. Remove the fuel tank pressure sensor by pulling straight up using a slight rocking motion.

Installation Procedure



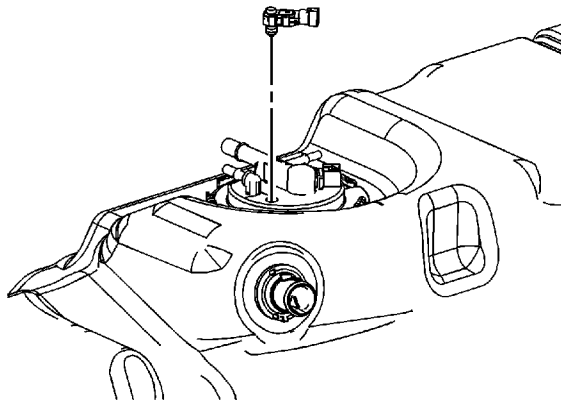


1. Install the fuel tank pressure sensor.
2. Install the fuel tank. Refer to [Fuel Tank Replacement](#) .

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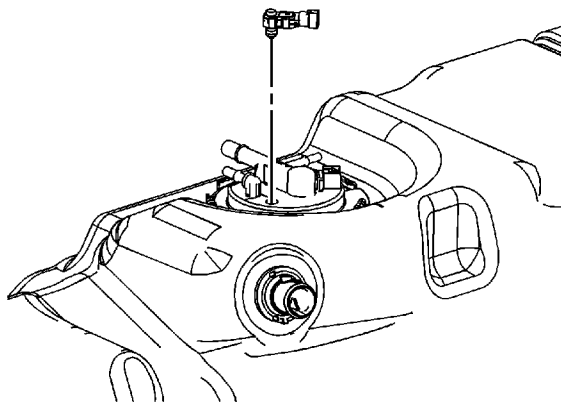
Fuel Tank Pressure Sensor Replacement (15 / 25 Reg / Ext / Crew Cab w / 34 gal Tank)

Removal Procedure



1. Remove the fuel tank. Refer to [Fuel Tank Replacement](#) .
2. Remove the fuel tank pressure sensor by pulling straight up using a slight rocking motion.

Installation Procedure



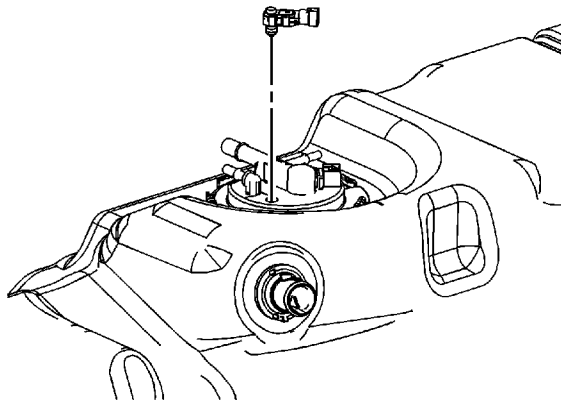


1. Install the fuel tank pressure sensor.
2. Install the fuel tank. Refer to [Fuel Tank Replacement](#) .

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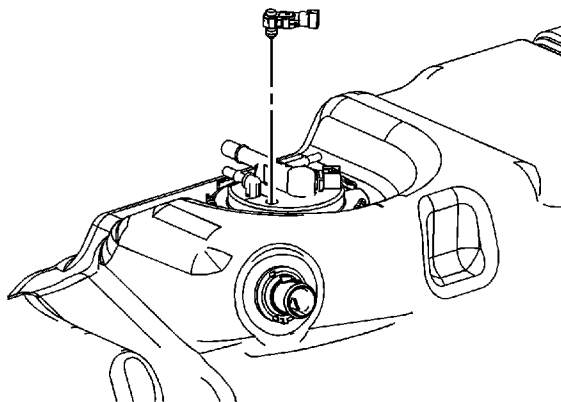
Fuel Tank Pressure Sensor Replacement (35 Reg/Ext/Crew Cab w/34 gal Tank)

Removal Procedure



1. Remove the fuel tank. Refer to [Fuel Tank Replacement](#) .
2. Remove the fuel tank pressure sensor by pulling straight up using a slight rocking motion.

Installation Procedure





1. Install the fuel tank pressure sensor.
2. Install the fuel tank. Refer to [Fuel Tank Replacement](#) .

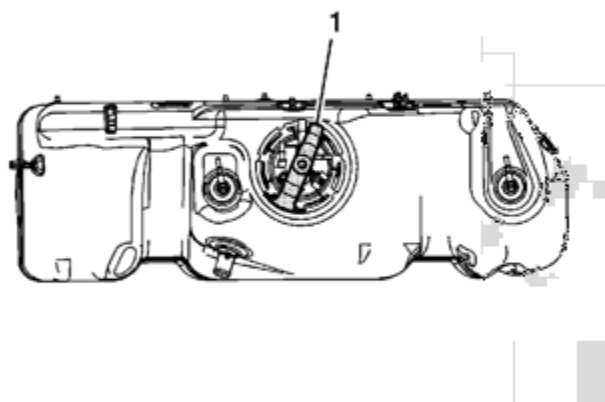
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Fuel Tank Fuel Pump Module Replacement (25 Ext/Crew Cab w/26 Gal Tank)

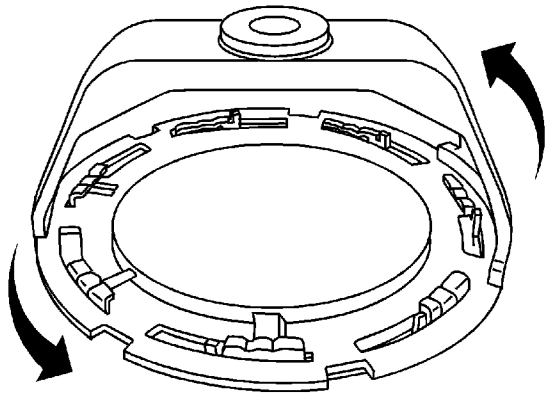
Special Tools

[J 45722](#) Fuel Sender Lock Ring Wrench

Removal Procedure



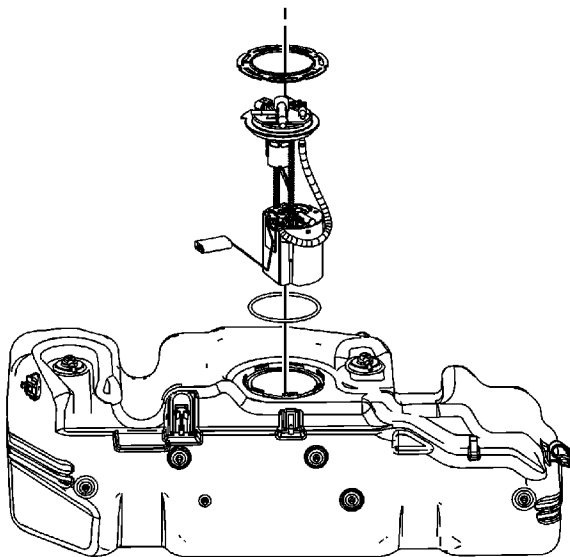
1. Remove the fuel tank. Refer to [Fuel Tank Replacement](#).
2. Disconnect the fuel tank fuel feed pipe quick connect fitting from the fuel tank module. Refer to [Plastic Collar Quick Connect Fitting Service](#).
3. Disconnect the fuel tank evaporative emission (EVAP) pipe quick connect fittings from the fuel tank module. Refer to [Plastic Collar Quick Connect Fitting Service](#).
4. Reposition the fuel and EVAP pipes out of the way.
5. Install the [J 45722](#) (1) to the fuel tank module lock ring.



Caution: Avoid damaging the lock ring. Use only J-45722 to prevent damage to the lock ring.

Note: Do NOT use impact tools. Significant force will be required to release the lock ring. The use of a hammer and screwdriver is not recommended. Secure the fuel tank in order to prevent fuel tank rotation.

6. Using the [J 45722](#) and a long breaker bar, rotate the lock ring clockwise unlocking the fuel tank module lock ring.
7. Remove the [J 45722](#).



8. Remove the fuel tank module lock ring.

Caution: Do Not handle the fuel sender assembly by the fuel pipes. The amount of leverage generated by handling the fuel pipes could damage the joints.

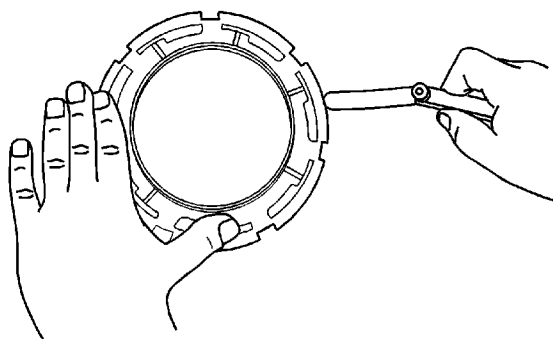
9. Slowly raise the module until the fuel level sensor float arm is just visible.

Note: When removing the module from the fuel tank, be aware that the module reservoir bucket is full of fuel. The module must be tipped slightly during removal to avoid bending the fuel level sensor float arm.

10. Tilt the module toward the rear of the fuel tank to allow the level sensor float arm to clear the tank opening. Remove the module from the tank.
11. Carefully discard the fuel in the module reservoir bucket into an approved fuel container.

Note: DO NOT reuse the old fuel tank module O-ring seal.

12. Remove and discard the fuel tank module O-ring seal.

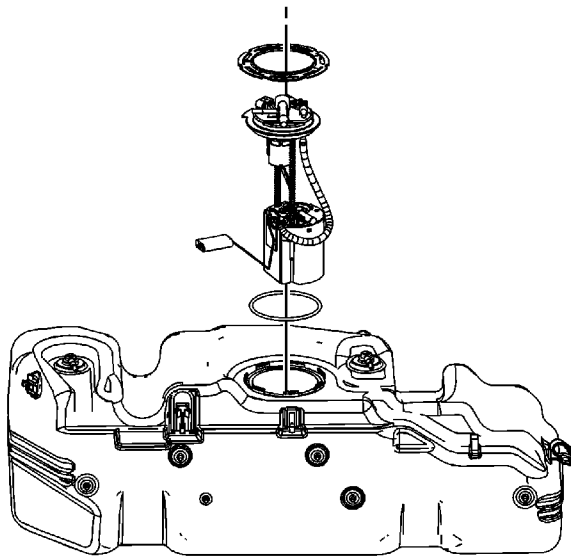


Note:

- Some lock rings were manufactured with "DO NOT REUSE" stamped into them. These lock rings may be reused if they are not damaged or warped.
- Inspect the lock ring for damage due to improper removal or installation procedures. If damage is found, install a NEW lock ring.
- Check the lock ring for flatness.

13. Place the lock ring on a flat surface. Measure the clearance between the lock ring and the flat surface using a feeler gage at 7 points.
14. If warpage is less than 0.41 mm (0.016 in), the lock ring does not require replacement.
15. If warpage is greater than 0.41 mm (0.016 in), the lock ring must be replaced.

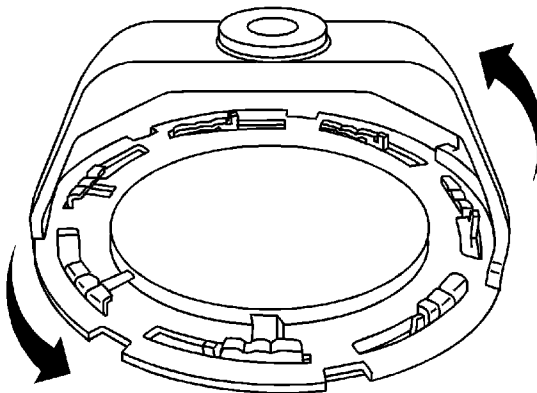
Installation Procedure



1. Install a NEW fuel tank module O-ring seal onto the fuel tank.

Note: The bucket must be tipped slightly during installation to avoid bending the fuel level sensor float arm.

2. Tilt the module toward the rear of the fuel tank to allow the fuel level sensor float arm to clear the tank opening. Install the module into the fuel tank.
3. Lower the module assembly into the tank.
4. Position and install the fuel tank module lock ring.
5. Ensure that the module sealing surface is clean and free of contamination.



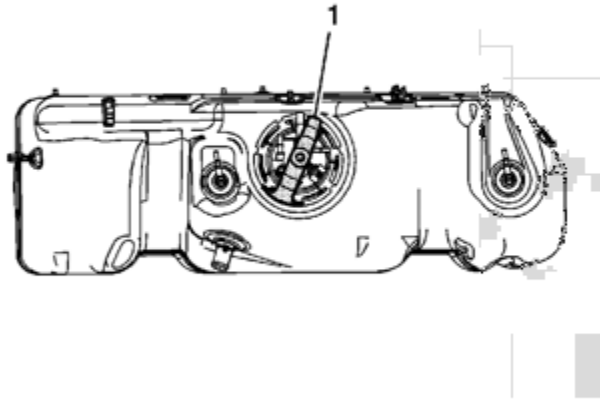
6. Install the [J 45722](#) to the fuel tank module lock ring.

Note: Always replace the fuel tank module seal when installing the fuel tank module. Replace

the lock ring if necessary. DO NOT apply any type of lubrication in the seal groove.

Ensure the lock ring is installed with the correct side facing upward. A correctly installed lock ring will only turn in a clockwise direction.

7. Using the [J 45722](#) and a long breaker bar, rotate the lock ring counterclockwise locking the fuel tank module lock ring.



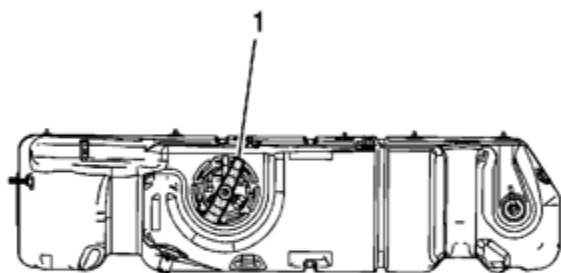
8. Remove the [J 45722](#) (1) from the fuel tank module lock ring.
9. Position the fuel and EVAP pipes to the module.
10. Connect the fuel tank EVAP pipe quick connect fittings to the fuel tank module. Refer to [Plastic Collar Quick Connect Fitting Service](#).
11. Connect the fuel tank fuel feed pipe quick connect fitting to the fuel tank module. Refer to [Plastic Collar Quick Connect Fitting Service](#).
12. Install the fuel tank. Refer to [Fuel Tank Replacement](#).

Fuel Tank Fuel Pump Module Replacement (15 / 25 Reg / Ext / Crew Cab w / 34 Gal Tank)

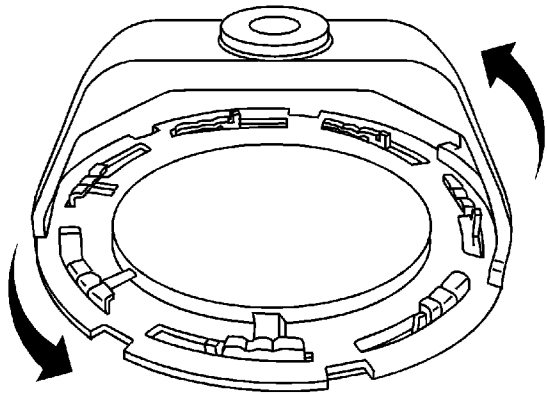
Special Tools

[J 45722](#) Fuel Sender Lock Ring Wrench

Removal Procedure



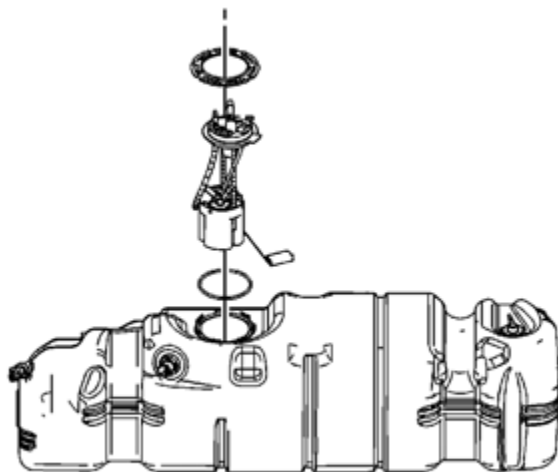
1. Remove the fuel tank. Refer to [Fuel Tank Replacement](#).
2. Disconnect the fuel tank fuel feed pipe quick connect fitting from the fuel tank module. Refer to [Plastic Collar Quick Connect Fitting Service](#).
3. Disconnect the fuel tank evaporative emission (EVAP) pipe quick connect fitting from the fuel tank module. Refer to [Plastic Collar Quick Connect Fitting Service](#).
4. Reposition the fuel and EVAP pipes out of the way.
5. Install the [J 45722](#) (1) to the fuel tank module lock ring.



Caution: Avoid damaging the lock ring. Use only J-45722 to prevent damage to the lock ring.

Note: Do NOT use impact tools. Significant force will be required to release the lock ring. The use of a hammer and screwdriver is not recommended. Secure the fuel tank in order to prevent fuel tank rotation.

6. Using the [J 45722](#) and a long breaker bar, rotate the lock ring clockwise unlocking the fuel tank module lock ring.
7. Remove the [J 45722](#).



8. Remove the fuel tank module lock ring.

Caution: Do Not handle the fuel sender assembly by the fuel pipes. The amount of leverage generated by handling the fuel pipes could damage the joints.

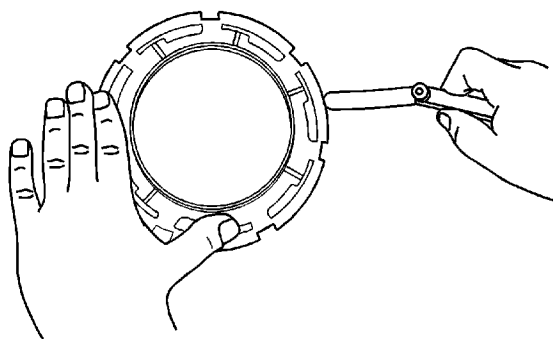
9. Slowly raise the module until the fuel level sensor float arm is just visible.

Note: When removing the module from the fuel tank, be aware that the module reservoir bucket is full of fuel. The module must be tipped slightly during removal to avoid bending the fuel level sensor float arm.

10. Tilt the module toward the rear of the fuel tank to allow the level sensor float arm to clear the tank opening. Remove the module from the tank.
11. Carefully discard the fuel in the module reservoir bucket into an approved fuel container.

Note: DO NOT reuse the old fuel tank module O-ring seal.

12. Remove and discard the fuel tank module O-ring seal.

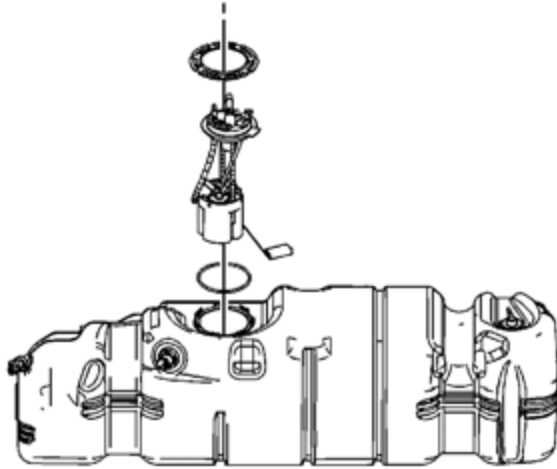


Note:

- Some lock rings were manufactured with "DO NOT REUSE" stamped into them. These lock rings may be reused if they are not damaged or warped.
- Inspect the lock ring for damage due to improper removal or installation procedures. If damage is found, install a NEW lock ring.
- Check the lock ring for flatness.

13. Place the lock ring on a flat surface. Measure the clearance between the lock ring and the flat surface using a feeler gage at 7 points.
14. If warpage is less than 0.41 mm (0.016 in), the lock ring does not require replacement.
15. If warpage is greater than 0.41 mm (0.016 in), the lock ring must be replaced.

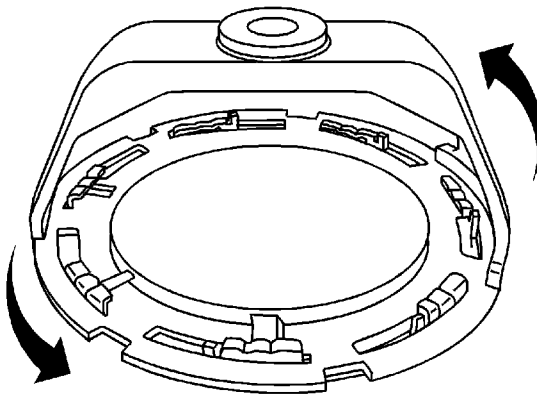
Installation Procedure



1. Install a NEW fuel tank module O-ring seal onto the fuel tank.

Note: The bucket must be tipped slightly during installation to avoid bending the fuel level sensor float arm.

2. Tilt the module toward the rear of the fuel tank to allow the fuel level sensor float arm to clear the tank opening. Install the module into the fuel tank.
3. Lower the module assembly into the tank.
4. Position and install the fuel tank module lock ring.
5. Ensure that the module sealing surface is clean and free of contamination.



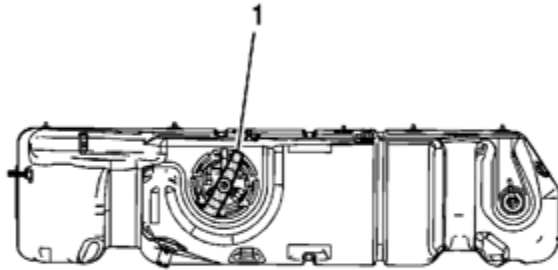
6. Install the [J 45722](#) to the fuel tank module lock ring.

Note: Always replace the fuel tank module seal when installing the fuel tank module. Replace

the lock ring if necessary. DO NOT apply any type of lubrication in the seal groove.

Ensure the lock ring is installed with the correct side facing upward. A correctly installed lock ring will only turn in a clockwise direction.

7. Using the [J 45722](#) and a long breaker bar, rotate the lock ring counterclockwise locking the fuel tank module lock ring.



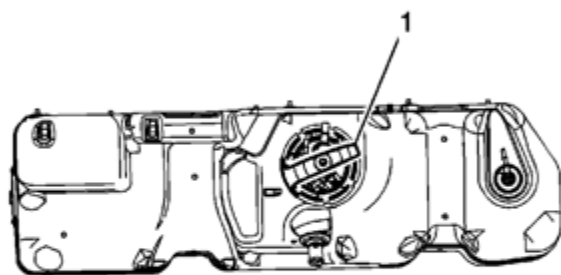
8. Remove the [J 45722](#) (1) from the fuel tank module lock ring.
9. Position the fuel and EVAP pipes to the module.
10. Connect the fuel tank EVAP pipe quick connect fitting to the fuel tank module. Refer to [Plastic Collar Quick Connect Fitting Service](#).
11. Connect the fuel tank fuel feed pipe quick connect fitting to the fuel tank module. Refer to [Plastic Collar Quick Connect Fitting Service](#).
12. Install the fuel tank. Refer to [Fuel Tank Replacement](#).

Fuel Tank Fuel Pump Module Replacement (15 Ext/Crew Cab w/26 Gal Tank)

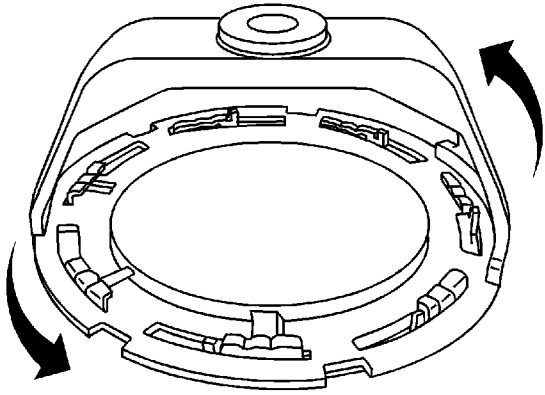
Special Tools

[J 45722](#) Fuel Sender Lock Ring Wrench

Removal Procedure



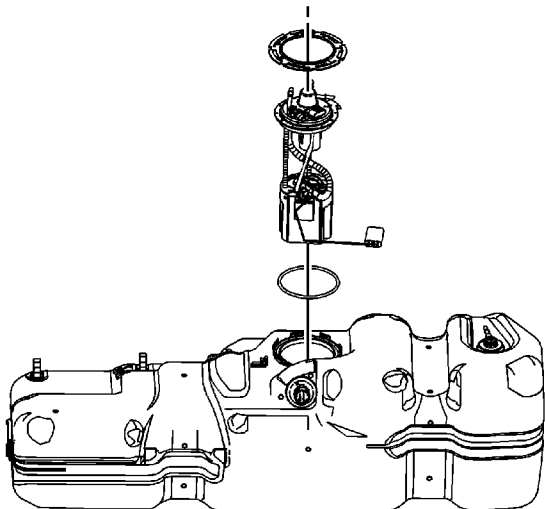
1. Remove the fuel tank. Refer to [Fuel Tank Replacement](#).
2. Disconnect the fuel tank fuel feed pipe quick connect fitting from the fuel tank module. Refer to [Plastic Collar Quick Connect Fitting Service](#).
3. Disconnect the fuel tank evaporative emission (EVAP) pipe quick connect fittings from the fuel tank module. Refer to [Plastic Collar Quick Connect Fitting Service](#).
4. Reposition the fuel and EVAP pipes out of the way.
5. Install the [J 45722](#) (1) to the fuel tank module lock ring.



Caution: Avoid damaging the lock ring. Use only J-45722 to prevent damage to the lock ring.

Note: Do NOT use impact tools. Significant force will be required to release the lock ring. The use of a hammer and screwdriver is not recommended. Secure the fuel tank in order to prevent fuel tank rotation.

6. Using the [J 45722](#) and a long breaker bar, rotate the lock ring clockwise unlocking the fuel tank module lock ring.
7. Remove the [J 45722](#).



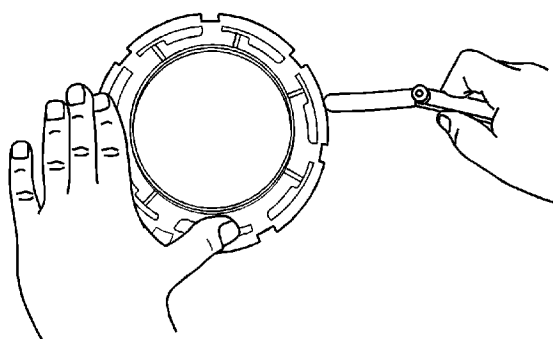
8. Remove the fuel tank module lock ring.

Caution: Do Not handle the fuel sender assembly by the fuel pipes. The amount of leverage generated by handling the fuel pipes could damage the joints.

9. Slowly raise the module until the fuel level sensor float arm is just visible.

Note: When removing the module from the fuel tank, be aware that the module reservoir bucket is full of fuel. The module must be tipped slightly during removal to avoid bending the fuel level sensor float arm.

10. Tilt the module toward the rear of the fuel tank to allow the level sensor float arm to clear the tank opening. Remove the module from the tank.
11. Carefully discard the fuel in the module reservoir bucket into an approved fuel container.
12. Remove and discard the fuel tank module O-ring seal.

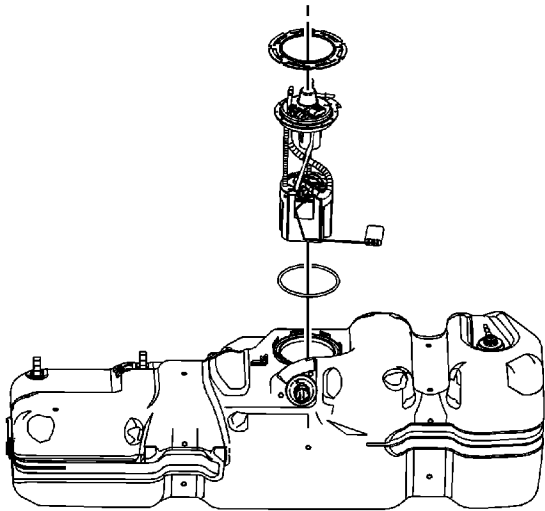


Note:

- Some lock rings were manufactured with "DO NOT REUSE" stamped into them. These lock rings may be reused if they are not damaged or warped.
- Inspect the lock ring for damage due to improper removal or installation procedures. If damage is found, install a NEW lock ring.
- Check the lock ring for flatness.

13. Place the lock ring on a flat surface. Measure the clearance between the lock ring and the flat surface using a feeler gage at 7 points.
14. If warpage is less than 0.41 mm (0.016 in), the lock ring does not require replacement.
15. If warpage is greater than 0.41 mm (0.016 in), the lock ring must be replaced.

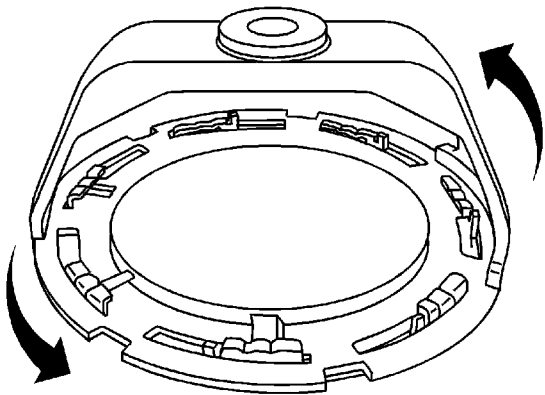
Installation Procedure



1. Install a NEW fuel tank module O-ring seal onto the fuel tank.

Note: The bucket must be tipped slightly during installation to avoid bending the fuel level sensor float arm.

2. Tilt the module toward the rear of the fuel tank to allow the fuel level sensor float arm to clear the tank opening. Install the module into the fuel tank.
3. Lower the module assembly into the tank.
4. Position and install the fuel tank module lock ring.
5. Ensure that the module sealing surface is clean and free of contamination.



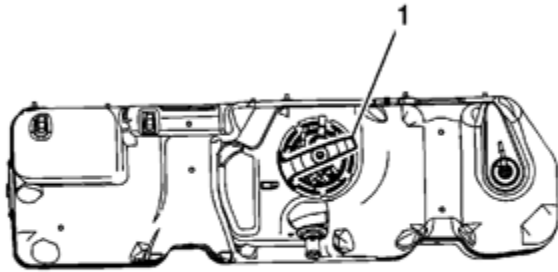
6. Install the [J 45722](#) to the fuel tank module lock ring.

Note: Always replace the fuel tank module seal when installing the fuel tank module. Replace

the lock ring if necessary. DO NOT apply any type of lubrication in the seal groove.

Ensure the lock ring is installed with the correct side facing upward. A correctly installed lock ring will only turn in a clockwise direction.

7. Using the [J 45722](#) and a long breaker bar, rotate the lock ring counterclockwise locking the fuel tank module lock ring.



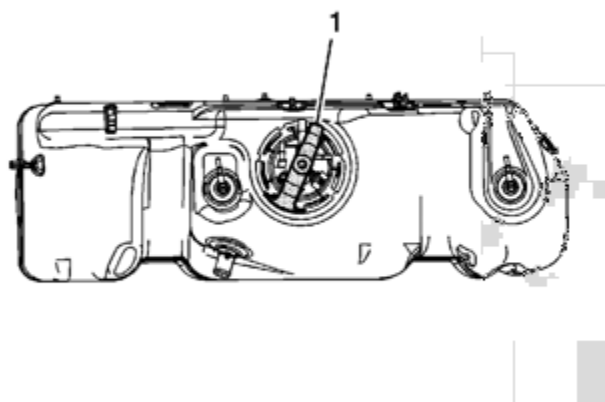
8. Remove the [J 45722](#) (1) from the fuel tank module lock ring.
9. Position the fuel and EVAP pipes to the module.
10. Connect the fuel tank EVAP pipe quick connect fittings to the fuel tank module. Refer to [Plastic Collar Quick Connect Fitting Service](#).
11. Connect the fuel tank fuel feed pipe quick connect fitting to the fuel tank module. Refer to [Plastic Collar Quick Connect Fitting Service](#).
12. Install the fuel tank. Refer to [Fuel Tank Replacement](#).

Fuel Tank Fuel Pump Module Replacement (15 Reg Cab w/ 26 Gal Tank)

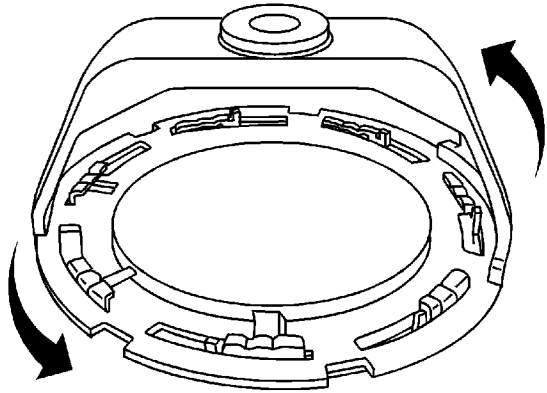
Special Tools

[J 45722](#) Fuel Sender Lock Ring Wrench

Removal Procedure



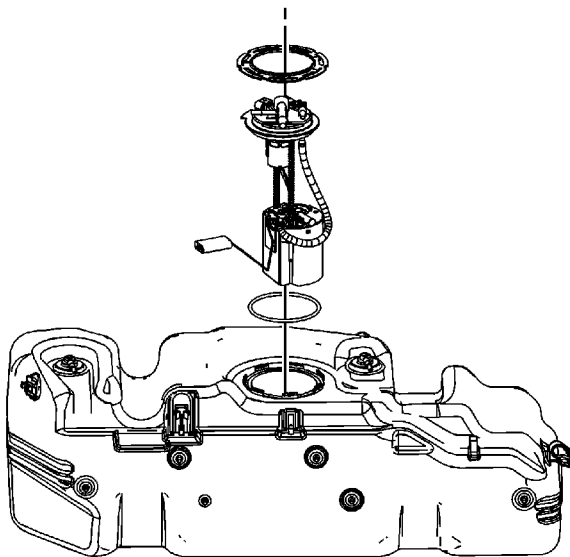
1. Remove the fuel tank. Refer to [Fuel Tank Replacement](#).
2. Disconnect the fuel tank fuel feed pipe quick connect fitting from the fuel tank module. Refer to [Plastic Collar Quick Connect Fitting Service](#).
3. Disconnect the fuel tank evaporative emission (EVAP) pipe quick connect fittings from the fuel tank module. Refer to [Plastic Collar Quick Connect Fitting Service](#).
4. Reposition the fuel and EVAP pipes out of the way.
5. Install the [J 45722](#) (1) to the fuel tank module lock ring.



Caution: Avoid damaging the lock ring. Use only J-45722 to prevent damage to the lock ring.

Note: Do NOT use impact tools. Significant force will be required to release the lock ring. The use of a hammer and screwdriver is not recommended. Secure the fuel tank in order to prevent fuel tank rotation.

6. Using the [J 45722](#) and a long breaker bar, rotate the lock ring clockwise unlocking the fuel tank module lock ring.
7. Remove the [J 45722](#).



8. Remove the fuel tank module lock ring.

Caution: Do Not handle the fuel sender assembly by the fuel pipes. The amount of leverage generated by handling the fuel pipes could damage the joints.

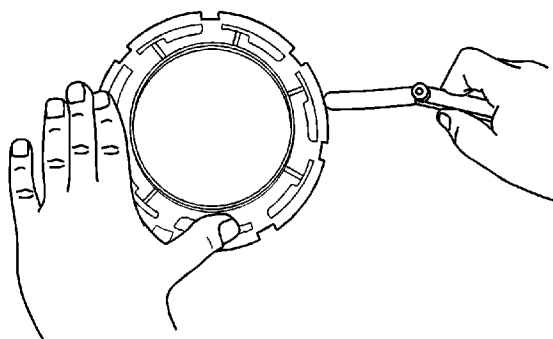
9. Slowly raise the module until the fuel level sensor float arm is just visible.

Note: When removing the module from the fuel tank, be aware that the module reservoir bucket is full of fuel. The module must be tipped slightly during removal to avoid bending the fuel level sensor float arm.

10. Tilt the module toward the rear of the fuel tank to allow the level sensor float arm to clear the tank opening. Remove the module from the tank.
11. Carefully discard the fuel in the module reservoir bucket into an approved fuel container.

Note: DO NOT reuse the old fuel tank module O-ring seal.

12. Remove and discard the fuel tank module O-ring seal.

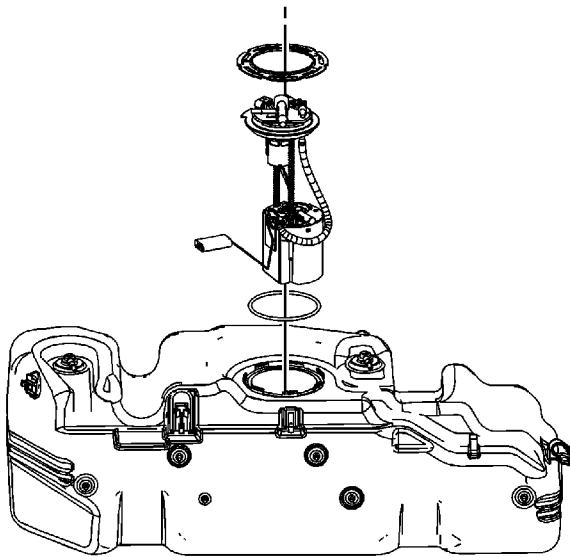


Note:

- Some lock rings were manufactured with "DO NOT REUSE" stamped into them. These lock rings may be reused if they are not damaged or warped.
- Inspect the lock ring for damage due to improper removal or installation procedures. If damage is found, install a NEW lock ring.
- Check the lock ring for flatness.

13. Place the lock ring on a flat surface. Measure the clearance between the lock ring and the flat surface using a feeler gage at 7 points.
14. If warpage is less than 0.41 mm (0.016 in), the lock ring does not require replacement.
15. If warpage is greater than 0.41 mm (0.016 in), the lock ring must be replaced.

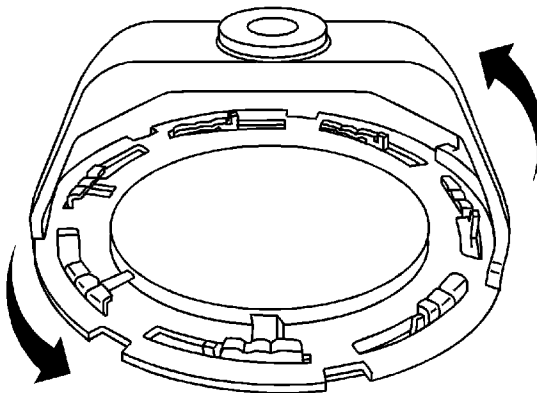
Installation Procedure



1. Install a NEW fuel tank module O-ring seal onto the fuel tank.

Note: The bucket must be tipped slightly during installation to avoid bending the fuel level sensor float arm.

2. Tilt the module toward the rear of the fuel tank to allow the fuel level sensor float arm to clear the tank opening. Install the module into the fuel tank.
3. Lower the module assembly into the tank.
4. Position and install the fuel tank module lock ring.
5. Ensure that the module sealing surface is clean and free of contamination.



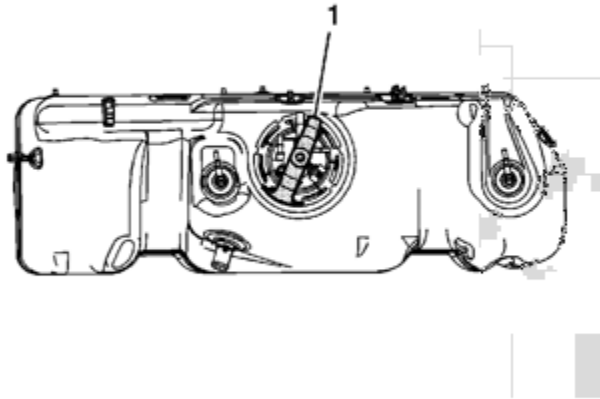
6. Install the [J 45722](#) to the fuel tank module lock ring.

Note: Always replace the fuel tank module seal when installing the fuel tank module. Replace

the lock ring if necessary. DO NOT apply any type of lubrication in the seal groove.

Ensure the lock ring is installed with the correct side facing upward. A correctly installed lock ring will only turn in a clockwise direction.

7. Using the [J 45722](#) and a long breaker bar, rotate the lock ring counterclockwise locking the fuel tank module lock ring.



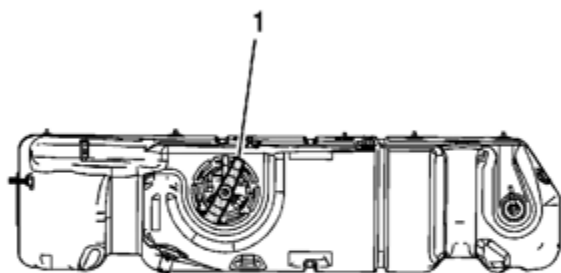
8. Remove the [J 45722](#) (1) from the fuel tank module lock ring.
9. Position the fuel and EVAP pipes to the module.
10. Connect the fuel tank EVAP pipe quick connect fittings to the fuel tank module. Refer to [Plastic Collar Quick Connect Fitting Service](#).
11. Connect the fuel tank fuel feed pipe quick connect fitting to the fuel tank module. Refer to [Plastic Collar Quick Connect Fitting Service](#).
12. Install the fuel tank. Refer to [Fuel Tank Replacement](#).

Fuel Tank Fuel Pump Module Replacement (35 Reg/Ext/Crew Cab w/34 Gal Tank)

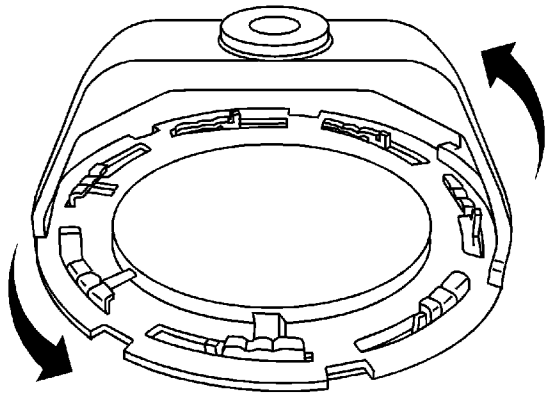
Special Tools

[J 45722](#) Fuel Sender Lock Ring Wrench

Removal Procedure



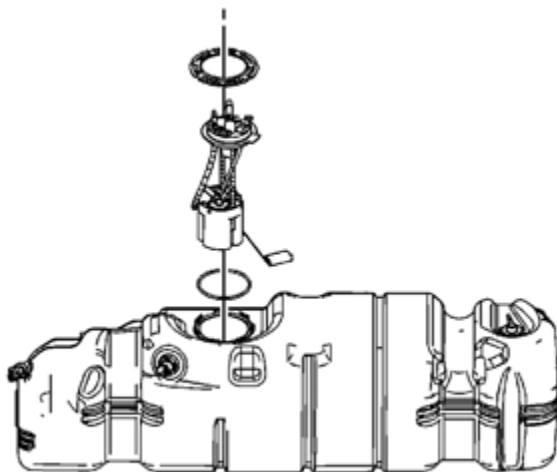
1. Remove the fuel tank. Refer to [Fuel Tank Replacement](#).
2. Disconnect the fuel tank fuel feed pipe quick connect fitting from the fuel tank module. Refer to [Plastic Collar Quick Connect Fitting Service](#).
3. Disconnect the fuel tank evaporative emission (EVAP) pipe quick connect fitting from the fuel tank module. Refer to [Plastic Collar Quick Connect Fitting Service](#).
4. Reposition the fuel and EVAP pipes out of the way.
5. Install the [J 45722](#) (1) to the fuel tank module lock ring.



Caution: Avoid damaging the lock ring. Use only J-45722 to prevent damage to the lock ring.

Note: Do NOT use impact tools. Significant force will be required to release the lock ring. The use of a hammer and screwdriver is not recommended. Secure the fuel tank in order to prevent fuel tank rotation.

6. Using the [J 45722](#) and a long breaker bar, rotate the lock ring clockwise unlocking the fuel tank module lock ring.
7. Remove the [J 45722](#).



8. Remove the fuel tank module lock ring.

Caution: Do Not handle the fuel sender assembly by the fuel pipes. The amount of leverage generated by handling the fuel pipes could damage the joints.

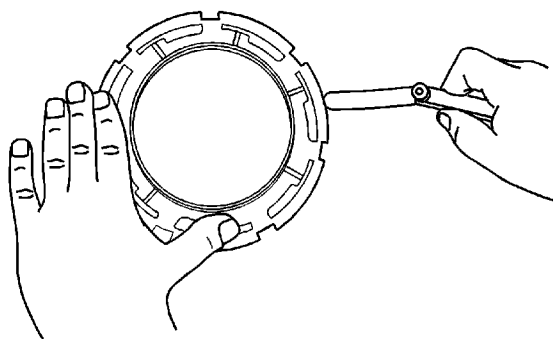
9. Slowly raise the module until the fuel level sensor float arm is just visible.

Note: When removing the module from the fuel tank, be aware that the module reservoir bucket is full of fuel. The module must be tipped slightly during removal to avoid bending the fuel level sensor float arm.

10. Tilt the module toward the rear of the fuel tank to allow the level sensor float arm to clear the tank opening. Remove the module from the tank.
11. Carefully discard the fuel in the module reservoir bucket into an approved fuel container.

Note: DO NOT reuse the old fuel tank module O-ring seal.

12. Remove and discard the fuel tank module O-ring seal.

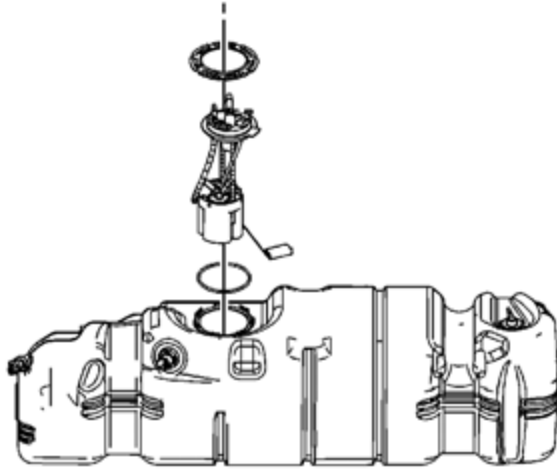


Note:

- Some lock rings were manufactured with "DO NOT REUSE" stamped into them. These lock rings may be reused if they are not damaged or warped.
- Inspect the lock ring for damage due to improper removal or installation procedures. If damage is found, install a NEW lock ring.
- Check the lock ring for flatness.

13. Place the lock ring on a flat surface. Measure the clearance between the lock ring and the flat surface using a feeler gage at 7 points.
14. If warpage is less than 0.41 mm (0.016 in), the lock ring does not require replacement.
15. If warpage is greater than 0.41 mm (0.016 in), the lock ring must be replaced.

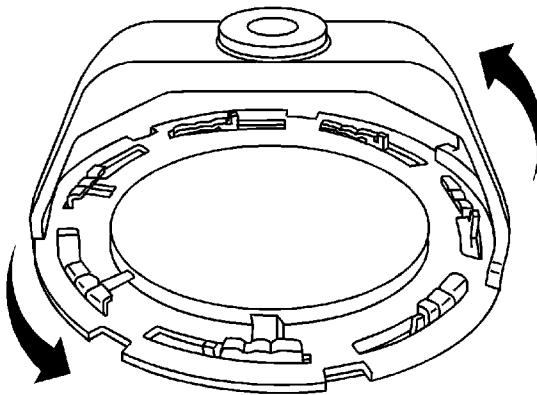
Installation Procedure



1. Install a NEW fuel tank module O-ring seal onto the fuel tank.

Note: The bucket must be tipped slightly during installation to avoid bending the fuel level sensor float arm.

2. Tilt the module toward the rear of the fuel tank to allow the fuel level sensor float arm to clear the tank opening. Install the module into the fuel tank.
3. Lower the module assembly into the tank.
4. Position and install the fuel tank module lock ring.
5. Ensure that the module sealing surface is clean and free of contamination.



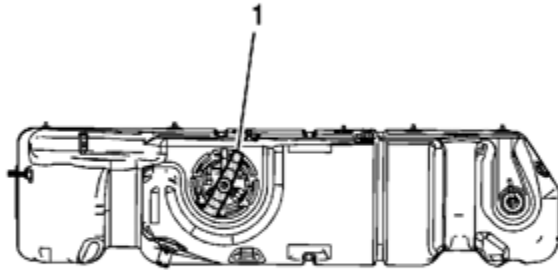
6. Install the [J 45722](#) to the fuel tank module lock ring.

Note: Always replace the fuel tank module seal when installing the fuel tank module. Replace

the lock ring if necessary. DO NOT apply any type of lubrication in the seal groove.

Ensure the lock ring is installed with the correct side facing upward. A correctly installed lock ring will only turn in a clockwise direction.

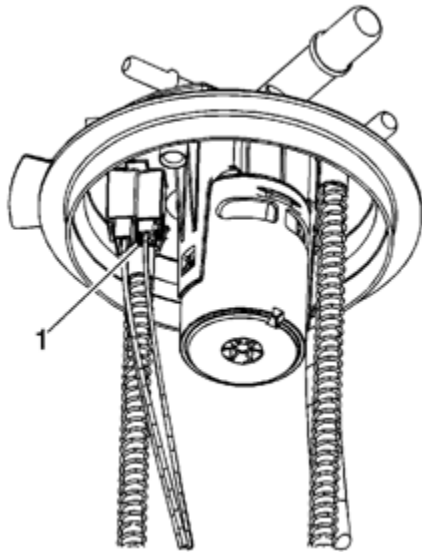
7. Using the [J 45722](#) and a long breaker bar, rotate the lock ring counterclockwise locking the fuel tank module lock ring.



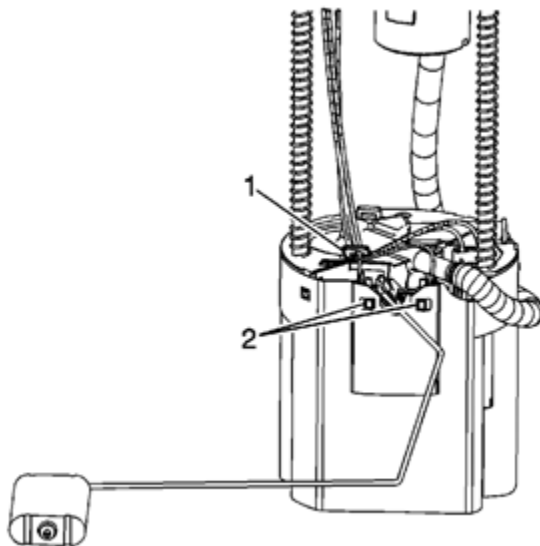
8. Remove the [J 45722](#) (1) from the fuel tank module lock ring.
9. Position the fuel and EVAP pipes to the module.
10. Connect the fuel tank EVAP pipe quick connect fitting to the fuel tank module. Refer to [Plastic Collar Quick Connect Fitting Service](#).
11. Connect the fuel tank fuel feed pipe quick connect fitting to the fuel tank module. Refer to [Plastic Collar Quick Connect Fitting Service](#).
12. Install the fuel tank. Refer to [Fuel Tank Replacement](#).

Fuel Level Sensor Replacement (15 Reg Cab w / 26 gal Tank)

Removal Procedure

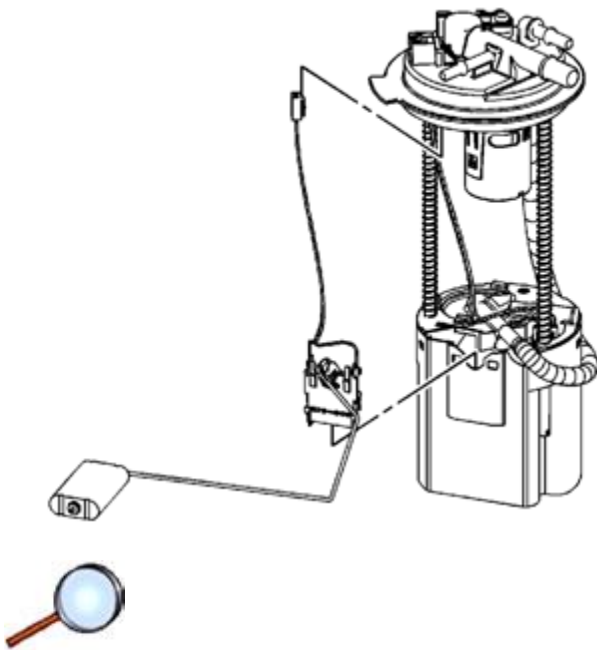


1. Remove the fuel tank module. Refer to [Fuel Tank Fuel Pump Module Replacement](#) .
2. Disconnect the fuel level sensor wiring pigtail electrical connector (1) from the module cover.



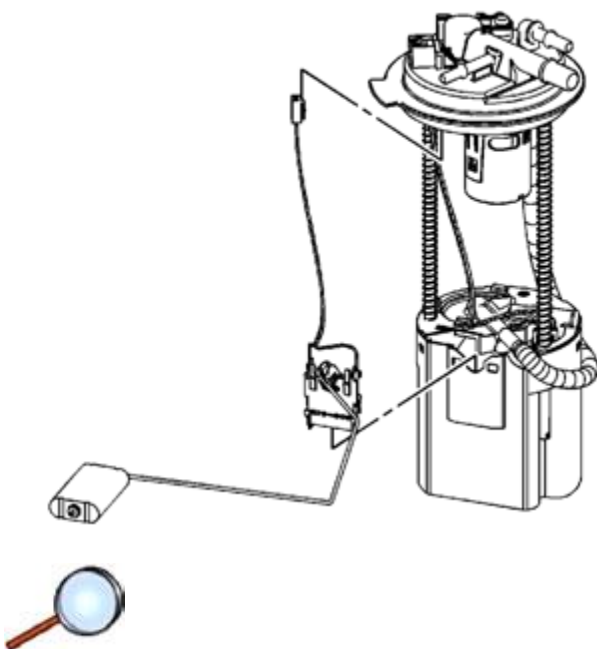
3. Remove the fuel level sensor wiring pigtail from under the module clip (1).

4. Gently push in the fuel level sensor retainers (2), disengaging them from the module reservoir.

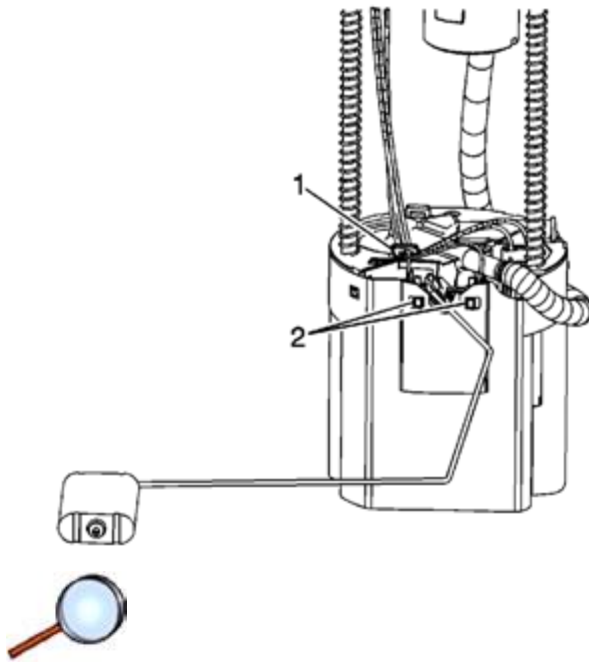


5. Slide the fuel level sensor up, in order to remove the sensor from the module slot.

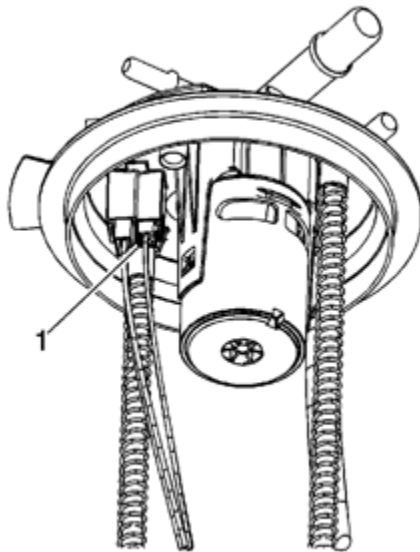
Installation Procedure



1. Position the fuel level sensor over the slot in the reservoir and slide the sensor down into the slot.



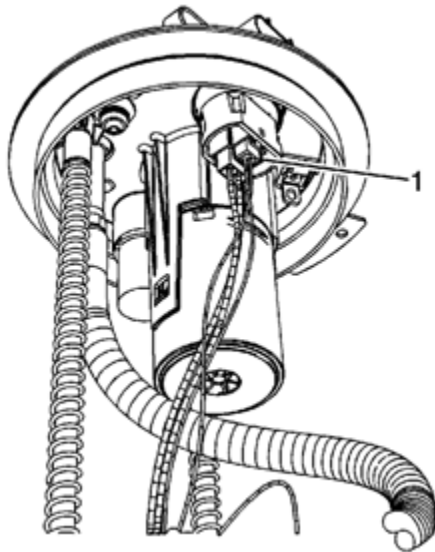
2. Ensure that the fuel level sensor retainers (2) engage the module reservoir.
3. Install the fuel level sensor wiring pigtail under the module clip (1) behind the fuel pump wires.



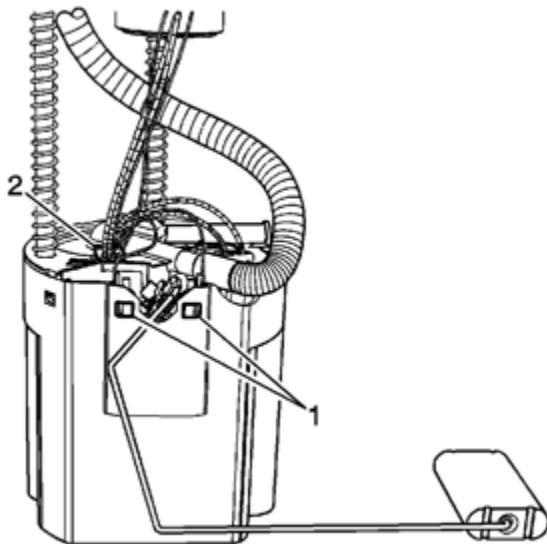
4. Connect the fuel level sensor wiring pigtail electrical connector (1) to the module cover.
5. Install the fuel tank module. Refer to [Fuel Tank Fuel Pump Module Replacement](#) .

Fuel Level Sensor Replacement (15 Ext/Crew Cab w/26 gal Tank)

Removal Procedure

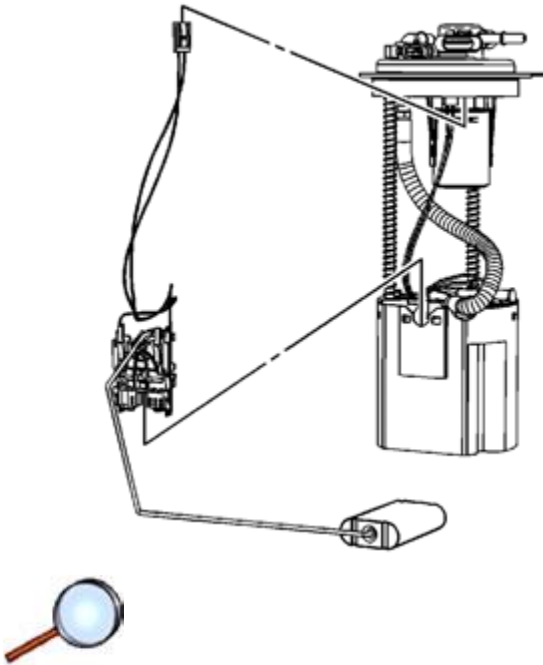


1. Remove the fuel tank module. Refer to [Fuel Tank Fuel Pump Module Replacement](#) .
2. Disconnect the fuel level sensor wiring pigtail electrical connector (1) from the module cover.



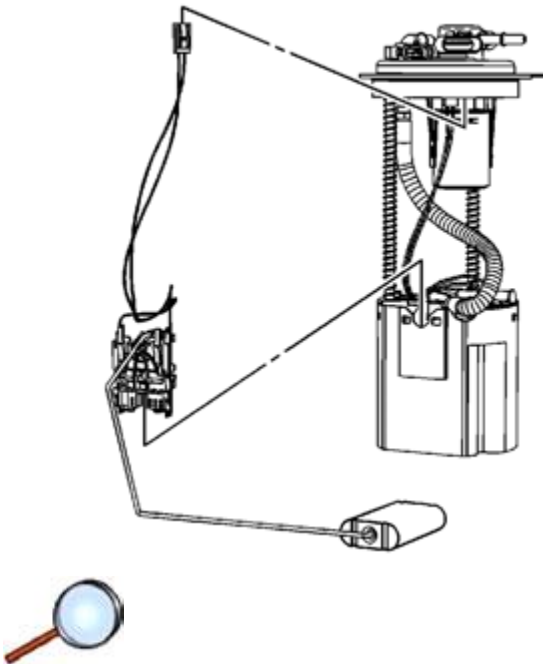
3. Remove the fuel level sensor wiring pigtail from under the module clip (2).

4. Gently push in the fuel level sensor retainers (1), disengaging them from the module reservoir.

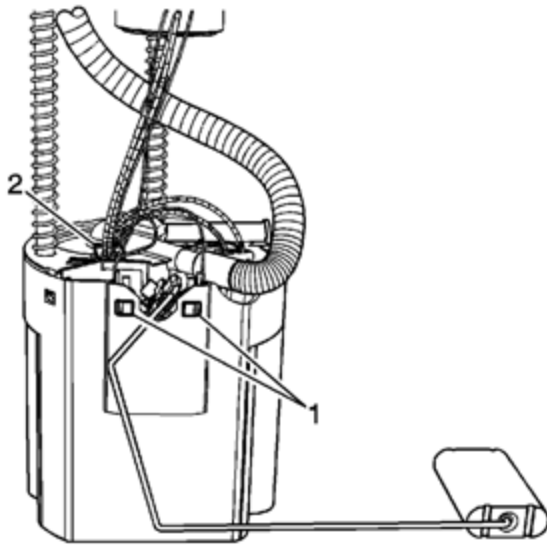


5. Slide the fuel level sensor up, in order to remove the sensor from the module slot.

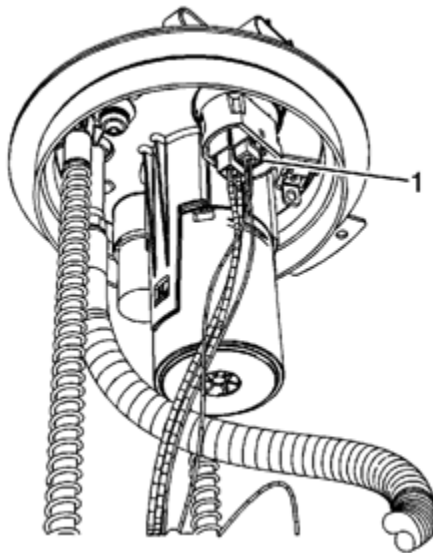
Installation Procedure



1. Position the fuel level sensor over the slot in the reservoir and slide the sensor down into the slot.



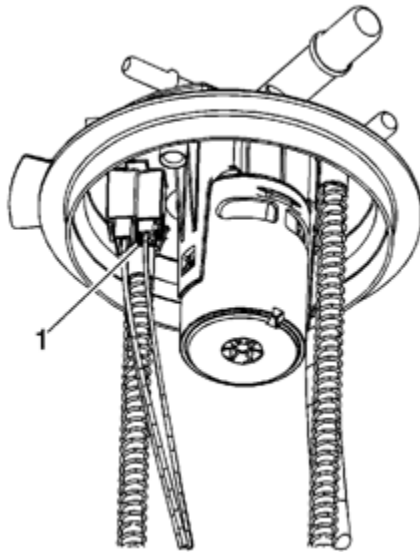
2. Ensure that the fuel level sensor retainers (1) engage the module reservoir.
3. Install the fuel level sensor wiring pigtail under the module clip (2) behind the fuel pump wires.



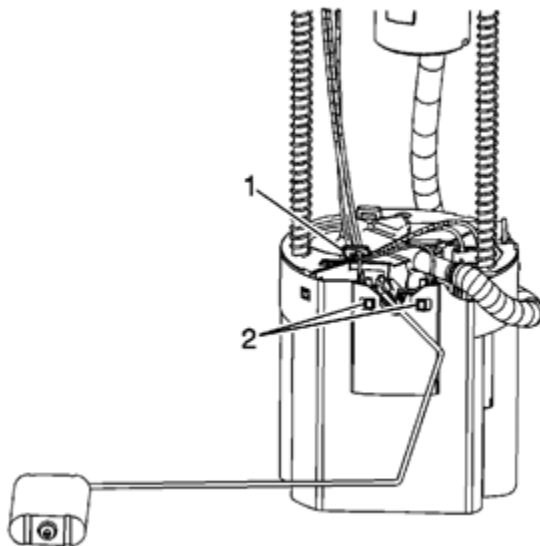
4. Connect the fuel level sensor wiring pigtail electrical connector (1) to the module cover.
5. Install the fuel tank module. Refer to [Fuel Tank Fuel Pump Module Replacement](#) .

Fuel Level Sensor Replacement (25 Ext/Crew Cab w/26 gal Tank)

Removal Procedure

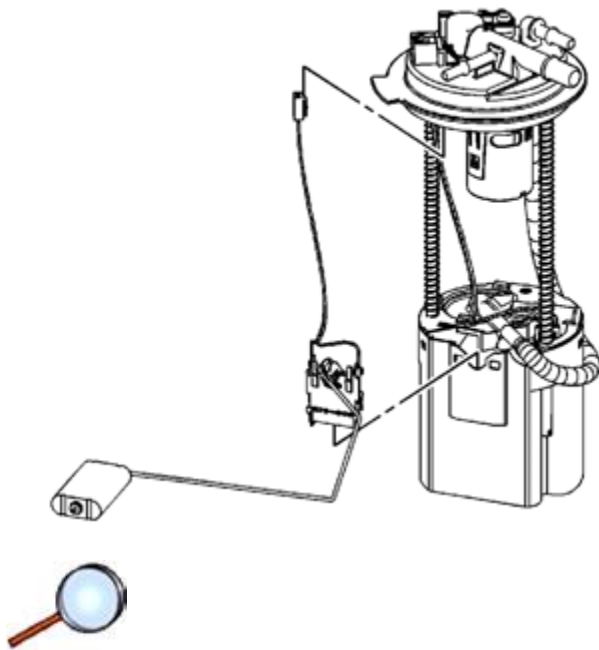


1. Remove the fuel tank module. Refer to [Fuel Tank Fuel Pump Module Replacement](#) .
2. Disconnect the fuel level sensor wiring pigtail electrical connector (1) from the module cover.



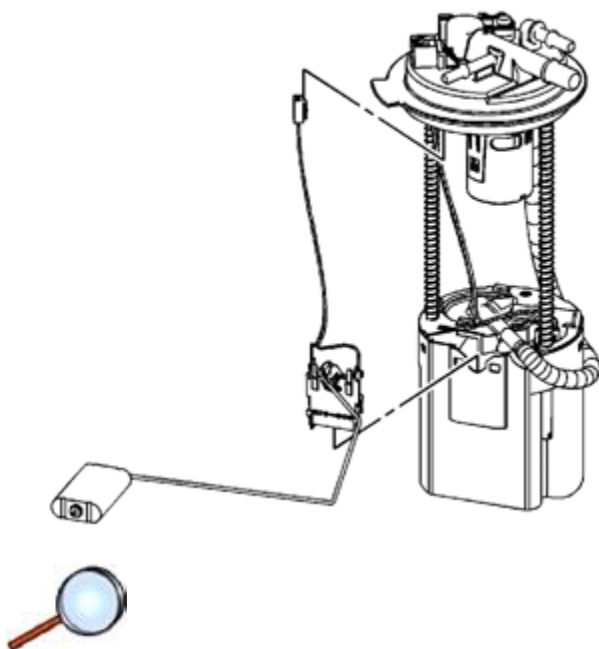
3. Remove the fuel level sensor wiring pigtail from under the module clip (1).

4. Gently push in the fuel level sensor retainers (2), disengaging them from the module reservoir.

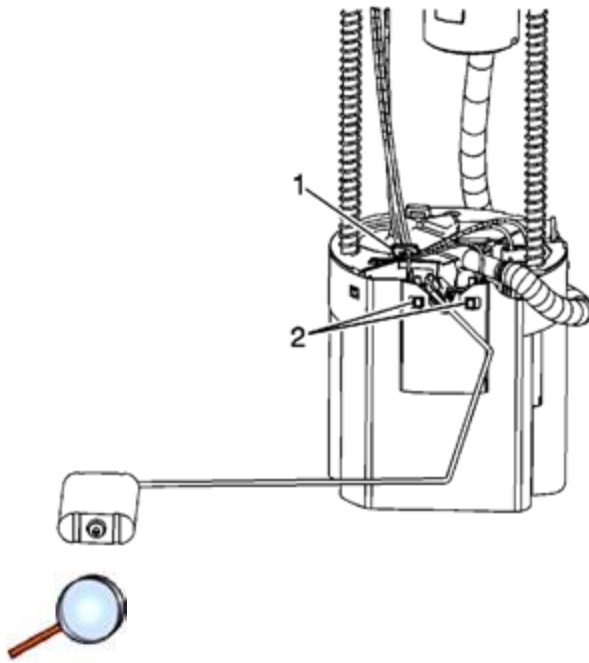


5. Slide the fuel level sensor up, in order to remove the sensor from the module slot.

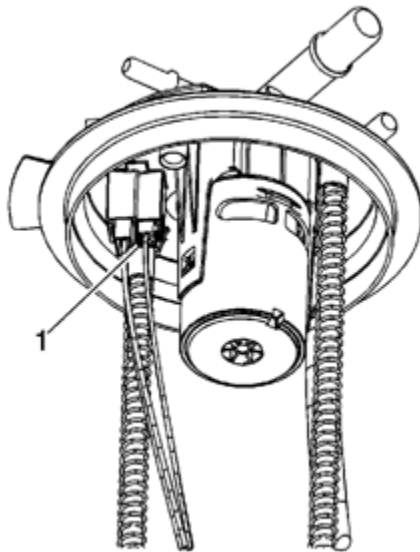
Installation Procedure



1. Position the fuel level sensor over the slot in the reservoir and slide the sensor down into the slot.



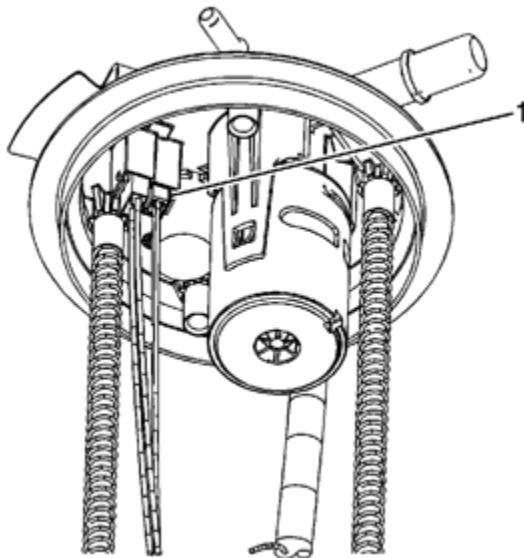
2. Ensure that the fuel level sensor retainers (2) engage the module reservoir.
3. Install the fuel level sensor wiring pigtail under the module clip (1) behind the fuel pump wires.



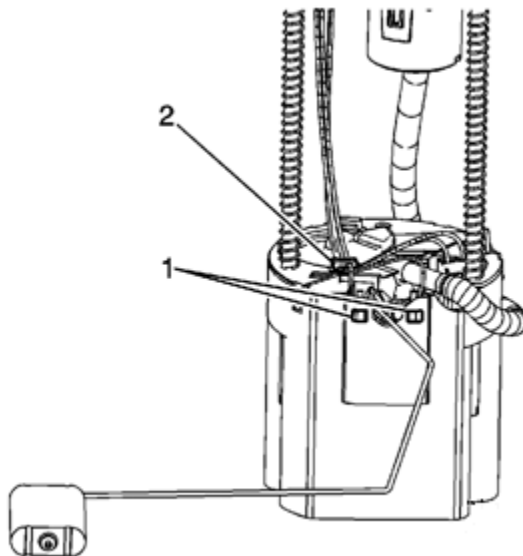
4. Connect the fuel level sensor wiring pigtail electrical connector (1) to the module cover.
5. Install the fuel tank module. Refer to [Fuel Tank Fuel Pump Module Replacement](#) .

Fuel Level Sensor Replacement (15 / 25 Reg / Ext / Crew Cab w / 34 gal Tank)

Removal Procedure

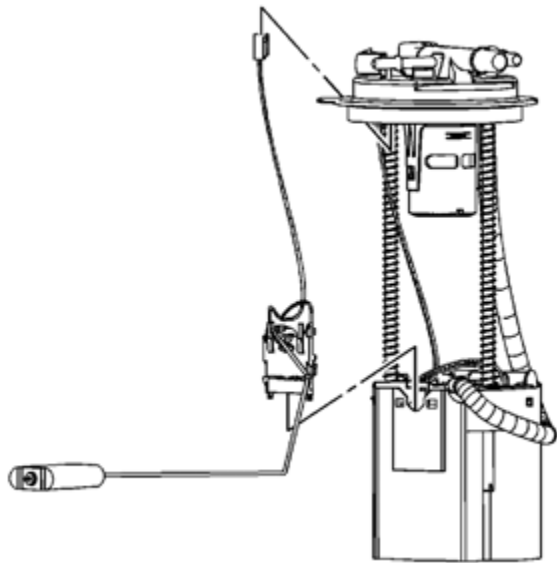


1. Remove the fuel tank module. Refer to [Fuel Tank Fuel Pump Module Replacement](#) .
2. Disconnect the fuel level sensor wiring pigtail electrical connector (1) from the module cover.



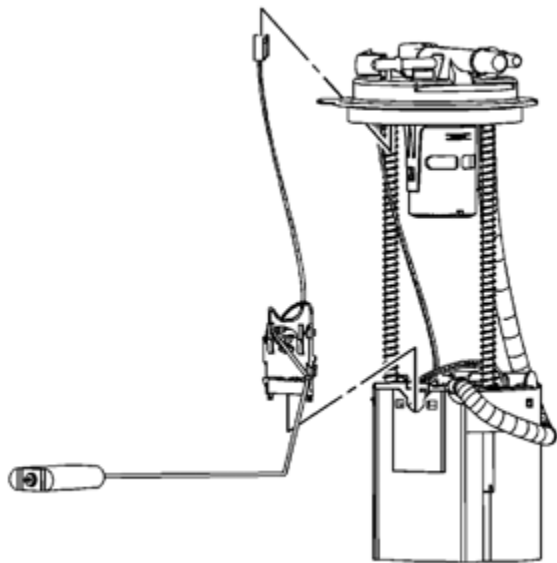
3. Remove the fuel level sensor wiring pigtail from under the module clip (2).

4. Gently push in the fuel level sensor retainers (1), disengaging them from the module reservoir.

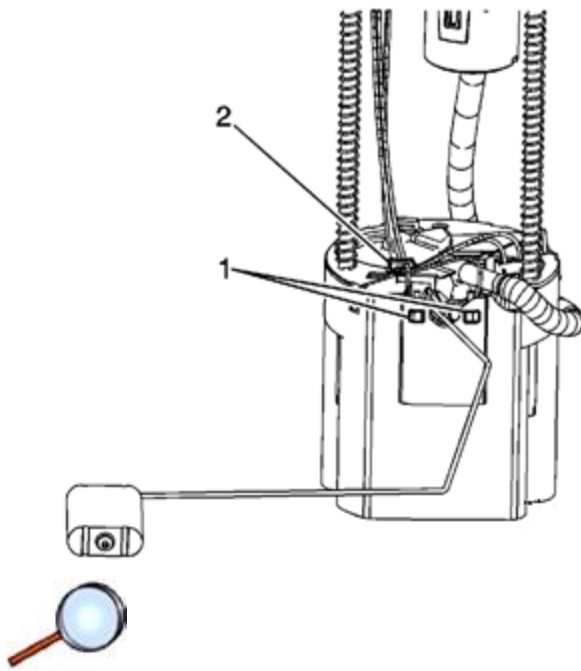


5. Slide the fuel level sensor up, in order to remove the sensor from the module slot.

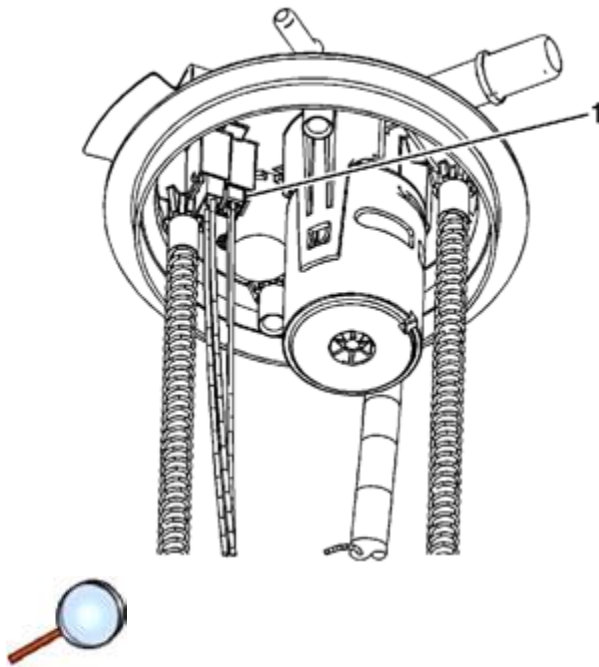
Installation Procedure



1. Position the fuel level sensor over the slot in the reservoir and slide the sensor down into the slot.



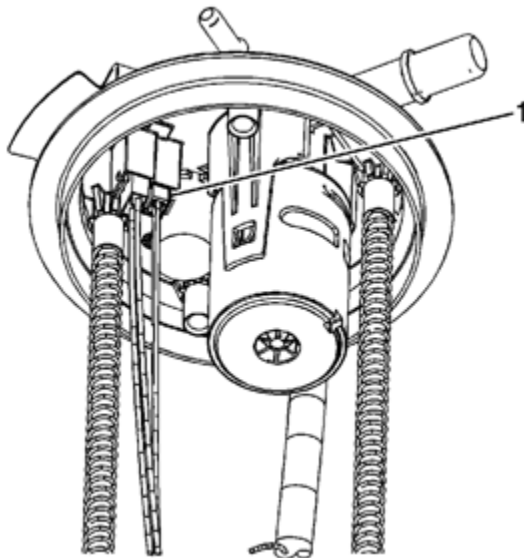
2. Ensure that the fuel level sensor retainers (1) engage the module reservoir.
3. Install the fuel level sensor wiring pigtail under the module clip (2) behind the fuel pump wires.



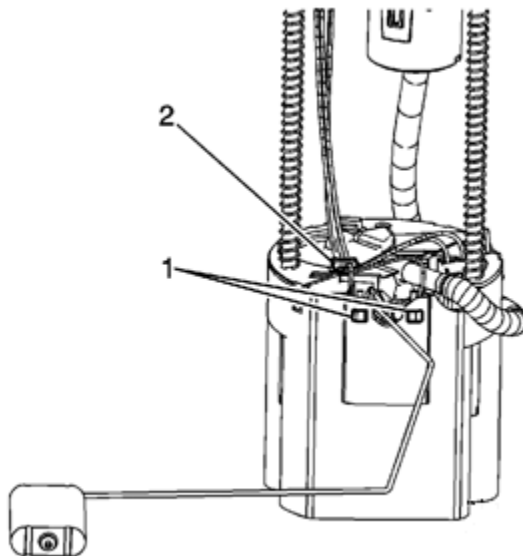
4. Connect the fuel level sensor wiring pigtail electrical connector (1) to the module cover.
5. Install the fuel tank module. Refer to [Fuel Tank Fuel Pump Module Replacement](#).

Fuel Level Sensor Replacement (35 Reg /Ext /Crew Cab w / 34 gal Tank)

Removal Procedure

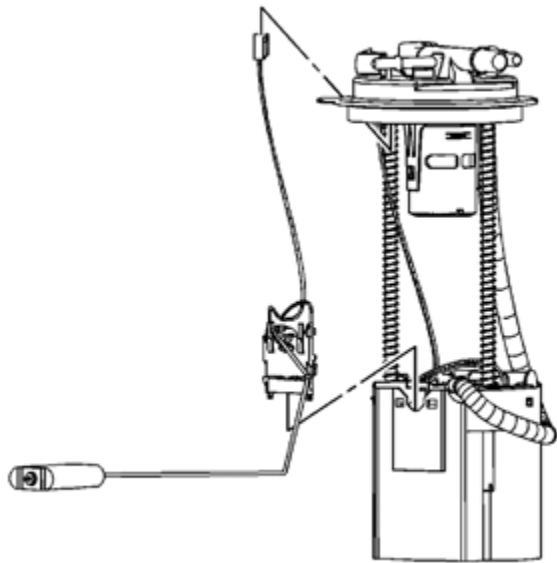


1. Remove the fuel tank module. Refer to [Fuel Tank Fuel Pump Module Replacement](#) .
2. Disconnect the fuel level sensor wiring pigtail electrical connector (1) from the module cover.



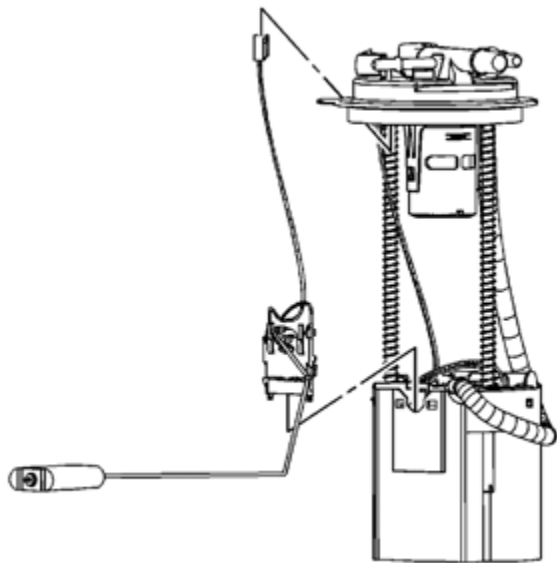
3. Remove the fuel level sensor wiring pigtail from under the module clip (2).

4. Gently push in the fuel level sensor retainers (1), disengaging them from the module reservoir.

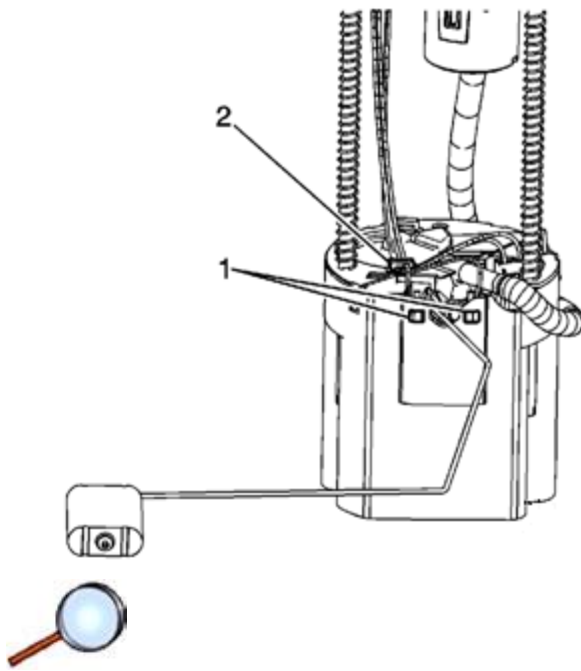


5. Slide the fuel level sensor up, in order to remove the sensor from the module slot.

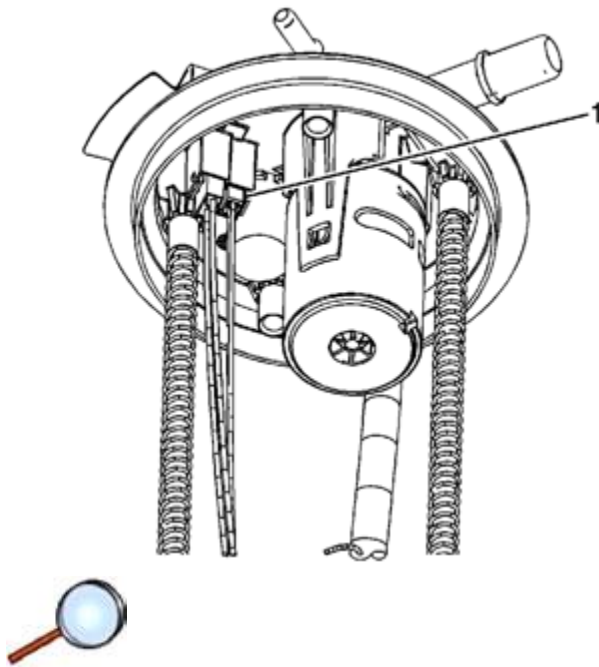
Installation Procedure



1. Position the fuel level sensor over the slot in the reservoir and slide the sensor down into the slot.



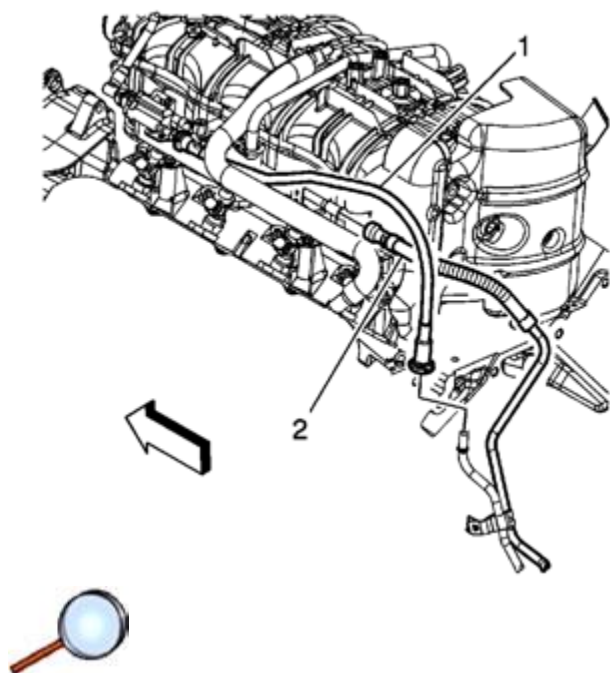
2. Ensure that the fuel level sensor retainers (1) engage the module reservoir.
3. Install the fuel level sensor wiring pigtail under the module clip (2) behind the fuel pump wires.



4. Connect the fuel level sensor wiring pigtail electrical connector (1) to the module cover.
5. Install the fuel tank module. Refer to [Fuel Tank Fuel Pump Module Replacement](#) .

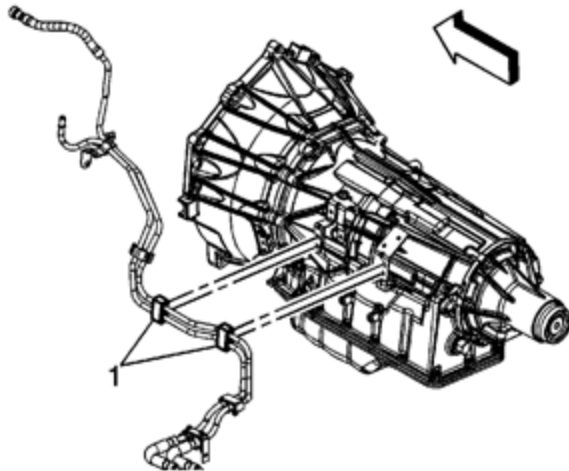
Fuel Hose / Pipes Replacement - Chassis (2500 / 3500 Regular Cab)

Removal Procedure

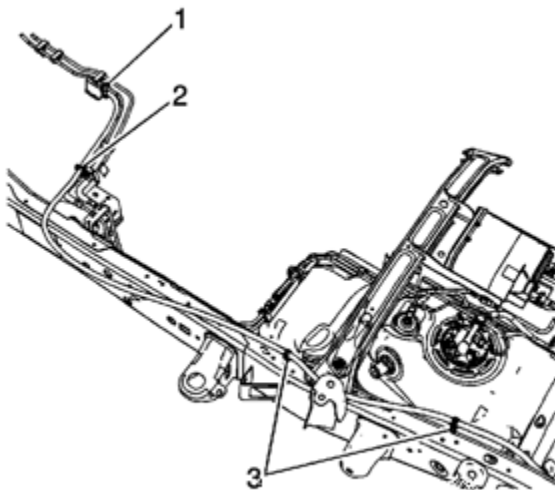


Note: Clean all fuel and evaporative emission (EVAP) lines connections and surrounding areas prior to disconnecting the lines in order to avoid possible fuel and/or EVAP system contamination.

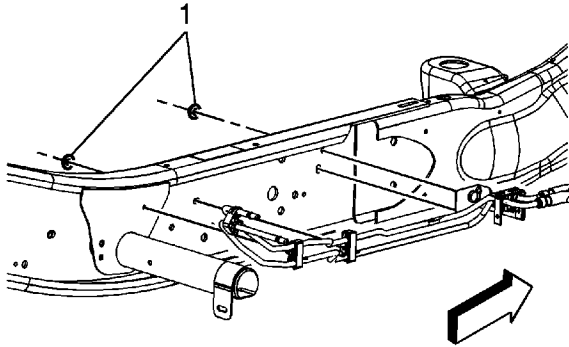
1. Relieve the fuel system pressure. Refer to the [Fuel Pressure Relief](#).
2. Disconnect the engine evaporative emission (EVAP) line (1) quick connect fitting from the chassis EVAP line. Refer to [Plastic Collar Quick Connect Fitting Service](#).
3. Disconnect the fuel feed line quick connect fitting (2) from the fuel rail. Refer to [Metal Collar Quick Connect Fitting Service](#).
4. Cap the fuel rail and EVAP pipes.
5. Raise and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#).
6. Unbolt and reposition the front propeller shaft, if required. Refer to [Front Propeller Shaft Replacement](#).
7. Unbolt and reposition the brake pressure modulator valve (BPMV). Refer to [Brake Pressure Modulator Valve Replacement](#).



8. Remove the fuel pipe bracket nut from the bellhousing stud.
9. Remove the fuel line clips (1) from the bracket on the automatic transmission.
10. If equipped with 4-wheel drive (4WD), remove the fuel hose/pipe clip from the bracket on the transfer case.

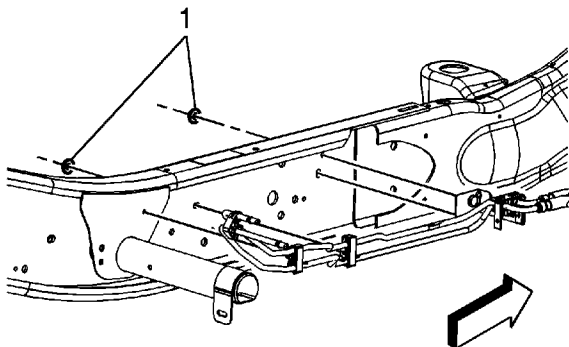


11. Remove the EVAP canister vent solenoid clip (1) from the chassis EVAP line and secure out of the way.
12. Remove the EVAP canister vent solenoid pipe clip (2) from the chassis EVAP line.



13. Disconnect the fuel tank fuel feed line quick connect fitting from the chassis line. Refer to [Plastic Collar Quick Connect Fitting Service](#).
14. Disconnect the fuel tank EVAP line quick connect fitting from the chassis line. Refer to [Plastic Collar Quick Connect Fitting Service](#).
15. Cap the fuel and EVAP lines in order to prevent possible fuel and/or EVAP system contamination.
16. Remove the fuel/EVAP line clip nuts (1).
17. Remove the fuel/EVAP line clips from the frame and crossmember.
18. Remove the fuel/EVAP line assembly from the vehicle.

Installation Procedure



1. Position and install the fuel/EVAP line assembly to the vehicle.
2. Install the fuel/EVAP line bracket locator tab to the frame.
3. Install the fuel/EVAP line clips to the frame and crossmember.

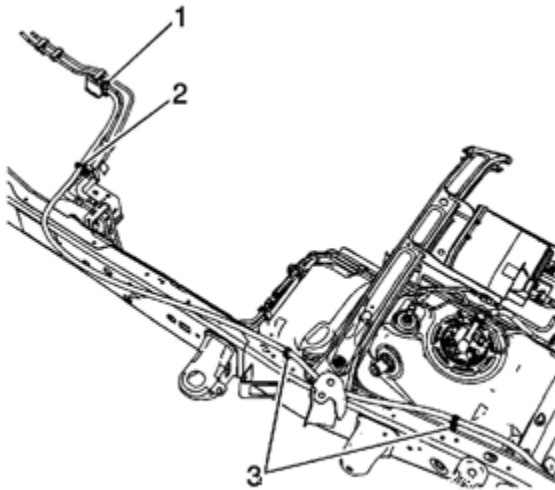
Caution: Refer to [Fastener Caution](#) in the Preface section.

4. Install the fuel/EVAP line clip nuts (2).

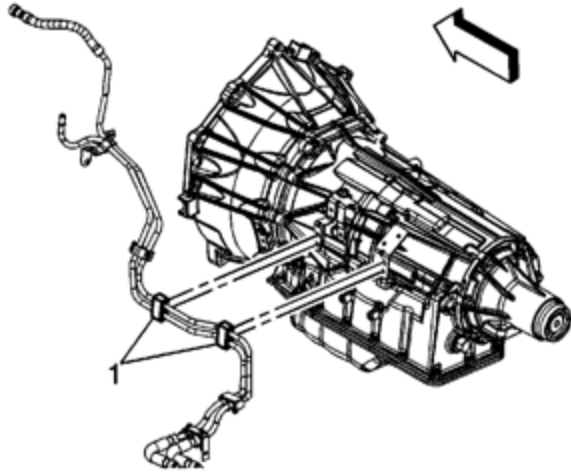
Tighten

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

5. Remove the caps from the fuel and EVAP lines.
6. Connect the fuel tank EVAP line quick connect fitting to the chassis line. Refer to [Plastic Collar Quick Connect Fitting Service](#).
7. Connect the fuel tank fuel feed line quick connect fitting to the chassis line. Refer to [Plastic Collar Quick Connect Fitting Service](#).



8. Unsecure and position the EVAP canister vent solenoid clip (1) to the chassis EVAP line.
9. Install the EVAP canister vent solenoid pipe clip (2) to the chassis EVAP line.

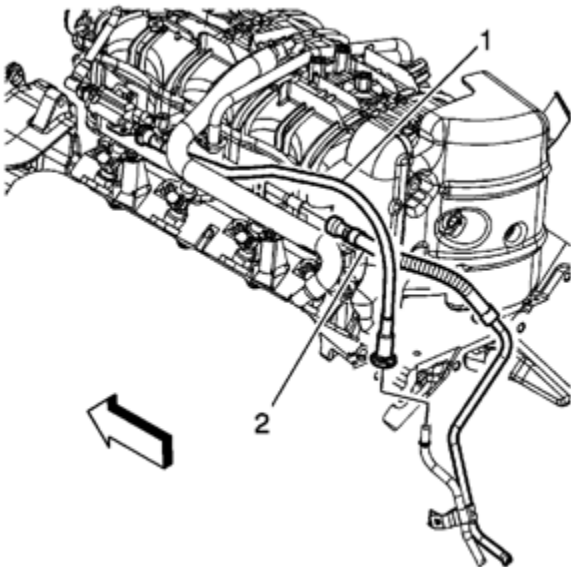


10. If equipped with 4WD, install the fuel hose/pipe clip to the bracket on the transfer case.
11. Install the fuel line clip to the bracket on the automatic transmission.
12. Install the fuel pipe bracket nut to the bellhousing stud.

Tighten

Tighten the nut to 25 N·m (18 lb ft).

13. Position and install the BPMV. Refer to [Brake Pressure Modulator Valve Replacement](#).
14. Position and install the front propeller shaft, if required. Refer to [Front Propeller Shaft Replacement](#).
15. Lower the vehicle.



16. Remove the caps from the fuel rail and EVAP line.
17. Connect the EVAP line (1) quick connect fitting to the chassis EVAP line. Refer to [Plastic](#)

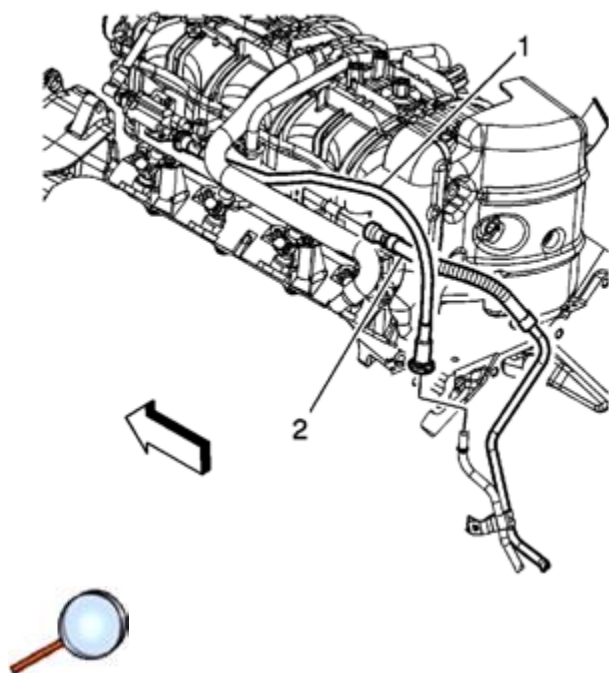
[Collar Quick Connect Fitting Service.](#)

18. Connect the fuel feed line (2) quick connect fitting to the fuel rail. Refer to [Metal Collar Quick Connect Fitting Service.](#)
19. Install the fuel fill cap.
20. Connect the negative battery cable. Refer to [Battery Negative Cable Disconnection and Connection.](#)
21. Use the following procedure in order to inspect for leaks:
 - 21.1. Turn the ignition ON, with the engine OFF, for 2 seconds.
 - 21.2. Turn the ignition OFF for 10 seconds.
 - 21.3. Turn the ignition ON, with the engine OFF.
 - 21.4. Inspect for fuel leaks.
22. Install the intake manifold sight shield. Refer to [Upper Intake Manifold Sight Shield Replacement.](#)

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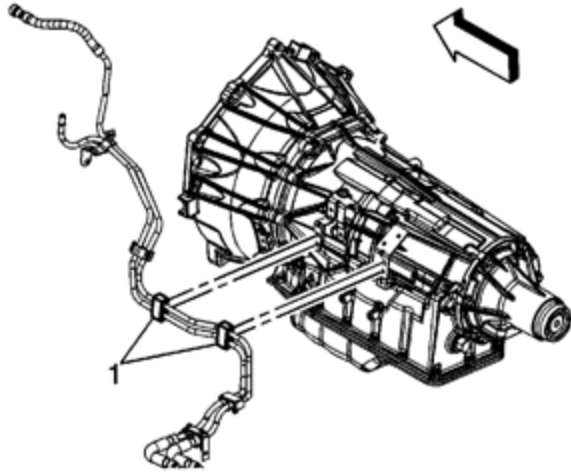
Fuel Hose / Pipes Replacement - Chassis (2500 / 3500 Crew Cab)

Removal Procedure

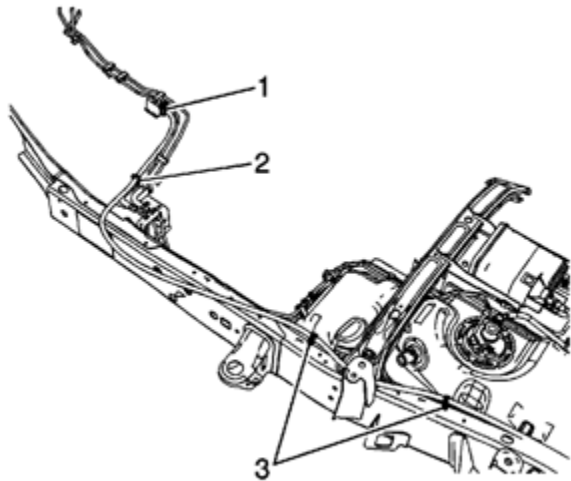


Note: Clean all fuel and evaporative emission (EVAP) lines connections and surrounding areas prior to disconnecting the lines in order to avoid possible fuel and/or EVAP system contamination.

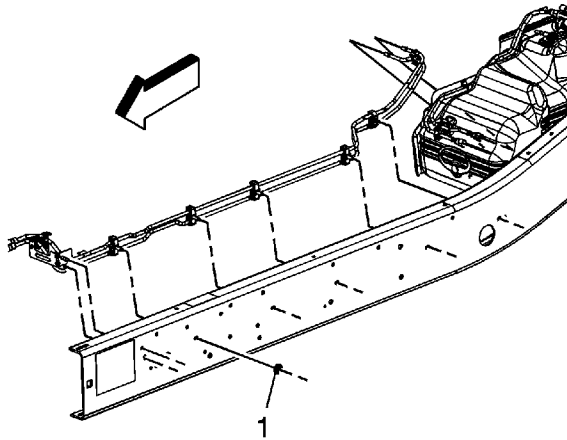
1. Relieve the fuel system pressure. Refer to the [Fuel Pressure Relief](#).
2. Disconnect the engine evaporative emission (EVAP) line (1) quick connect fitting from the chassis EVAP line. Refer to [Plastic Collar Quick Connect Fitting Service](#).
3. Disconnect the fuel feed line quick connect fitting (2) from the fuel rail. Refer to [Metal Collar Quick Connect Fitting Service](#).
4. Cap the fuel rail and EVAP pipes.
5. Raise and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#).
6. Unbolt and reposition the front propeller shaft, if required. Refer to [Front Propeller Shaft Replacement](#).
7. Unbolt and reposition the brake pressure modulator valve (BPMV). Refer to [Brake Pressure Modulator Valve Replacement](#).



8. Remove the fuel pipe bracket nut from the bellhousing stud.
9. Remove the fuel line clips (1) from the bracket on the automatic transmission.
10. If equipped with 4-wheel drive (4WD), remove the fuel hose/pipe clip from the bracket on the transfer case.

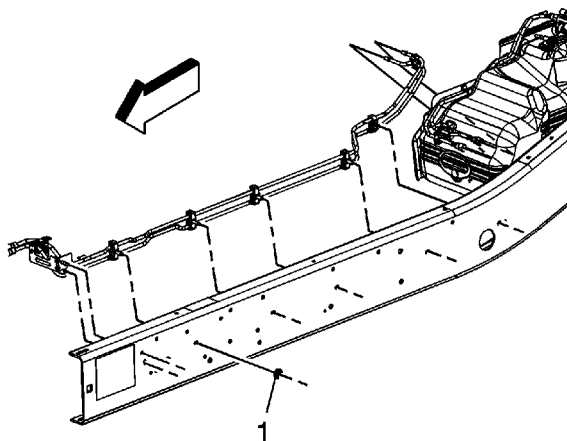


11. Remove the EVAP canister vent solenoid clip (1) from the chassis EVAP line and secure out of the way.
12. Remove the EVAP canister vent solenoid pipe clip (2) from the chassis EVAP line.



13. Disconnect the fuel tank fuel feed line quick connect fitting from the chassis line. Refer to [Plastic Collar Quick Connect Fitting Service](#).
14. Disconnect the fuel tank EVAP line quick connect fitting from the chassis line. Refer to [Plastic Collar Quick Connect Fitting Service](#).
15. Cap the fuel and EVAP lines in order to prevent possible fuel and/or EVAP system contamination.
16. Remove the fuel/EVAP line clip nuts (1).
17. Remove the fuel/EVAP line clips from the frame and crossmember.
18. Remove the fuel/EVAP line assembly from the vehicle.

Installation Procedure



1. Position and install the fuel/EVAP line assembly to the vehicle.
2. Install the fuel/EVAP line bracket locator tab to the frame.
3. Install the fuel/EVAP line clips to the frame and crossmember.

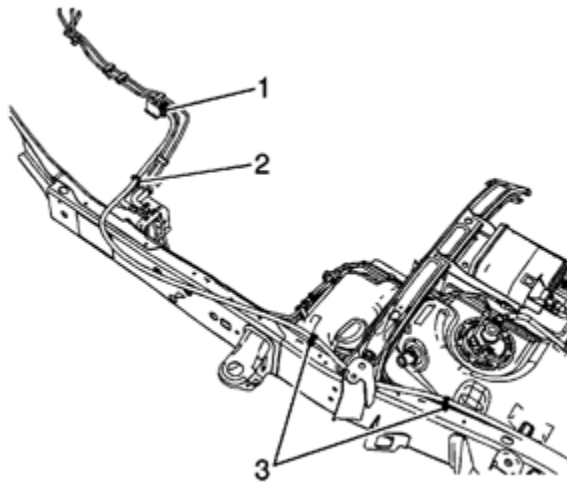
Caution: Refer to [Fastener Caution](#) in the Preface section.

4. Install the fuel/EVAP line clip nuts (2).

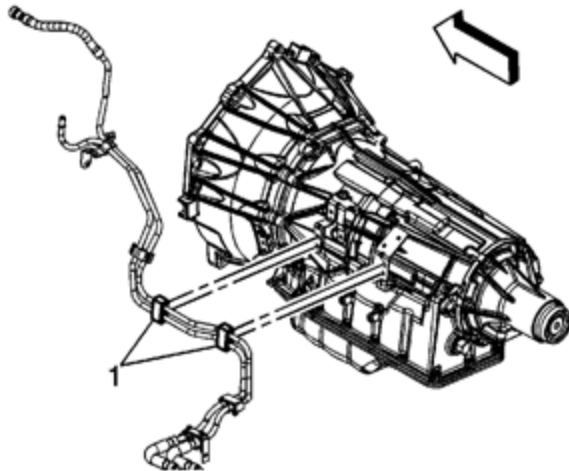
Tighten

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

5. Remove the caps from the fuel and EVAP lines.
6. Connect the fuel tank EVAP line quick connect fitting to the chassis line. Refer to [Plastic Collar Quick Connect Fitting Service](#).
7. Connect the fuel tank fuel feed line quick connect fitting to the chassis line. Refer to [Plastic Collar Quick Connect Fitting Service](#).



8. Unsecure and position the EVAP canister vent solenoid clip (1) to the chassis EVAP line.
9. Install the EVAP canister vent solenoid pipe clip (2) from the chassis EVAP line.

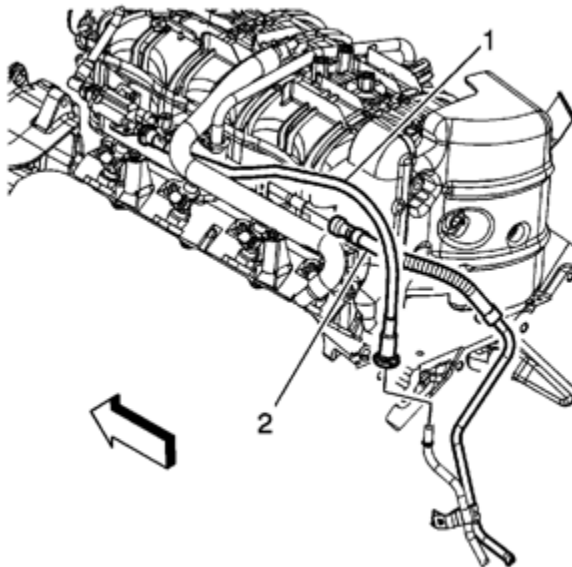


10. If equipped with 4WD, install the fuel hose/pipe clip to the bracket on the transfer case.
11. Install the fuel line clip to the bracket on the automatic transmission.
12. Install the fuel pipe bracket nut to the bellhousing stud.

Tighten

Tighten the nut to 25 N·m (18 lb ft).

13. Position and install the BPMV. Refer to [Brake Pressure Modulator Valve Replacement](#).
14. Position and install the front propeller shaft, if required. Refer to [Front Propeller Shaft Replacement](#).
15. Lower the vehicle.



16. Remove the caps from the fuel rail and EVAP line.
17. Connect the EVAP line (1) quick connect fitting to the chassis EVAP line. Refer to [Plastic](#)

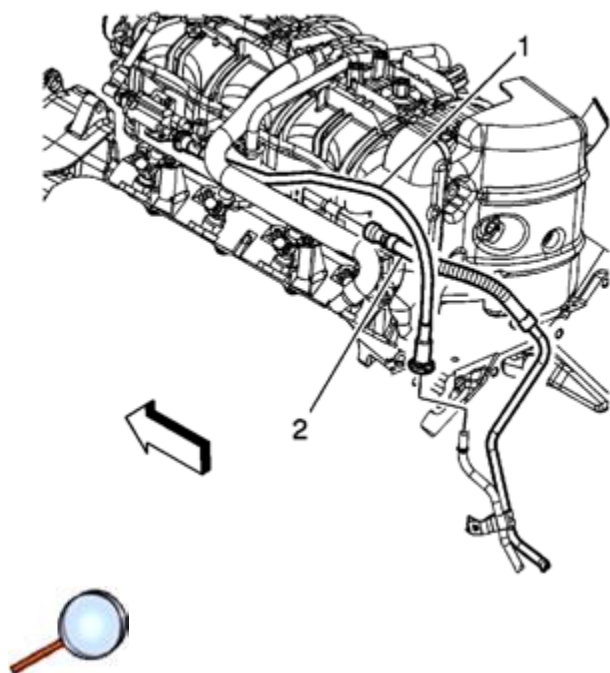
[Collar Quick Connect Fitting Service.](#)

18. Connect the fuel feed line (2) quick connect fitting to the fuel rail. Refer to [Metal Collar Quick Connect Fitting Service.](#)
19. Install the fuel fill cap.
20. Connect the negative battery cable. Refer to [Battery Negative Cable Disconnection and Connection.](#)
21. Use the following procedure in order to inspect for leaks:
 - 21.1. Turn the ignition ON, with the engine OFF, for 2 seconds.
 - 21.2. Turn the ignition OFF for 10 seconds.
 - 21.3. Turn the ignition ON, with the engine OFF.
 - 21.4. Inspect for fuel leaks.
22. Install the intake manifold sight shield. Refer to [Upper Intake Manifold Sight Shield Replacement.](#)

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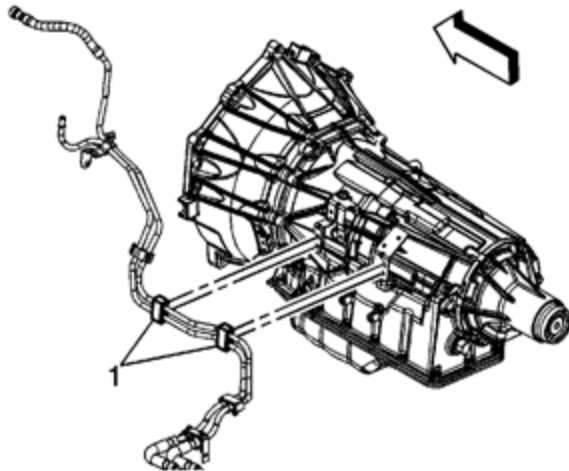
Fuel Hose / Pipes Replacement - Chassis (2500 / 3500 Extended Cab)

Removal Procedure

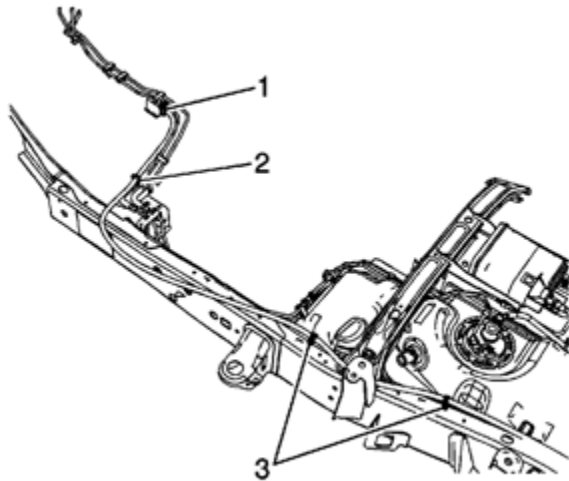


Note: Clean all fuel and evaporative emission (EVAP) lines connections and surrounding areas prior to disconnecting the lines in order to avoid possible fuel and/or EVAP system contamination.

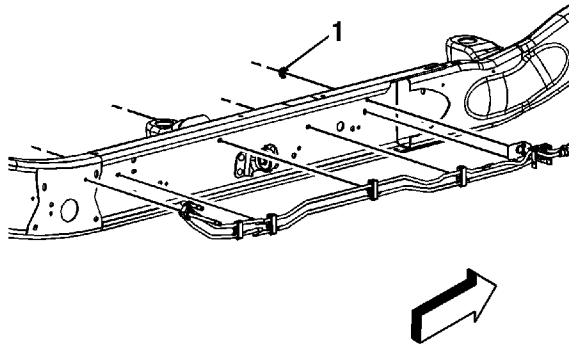
1. Relieve the fuel system pressure. Refer to the [Fuel Pressure Relief](#).
2. Disconnect the engine evaporative emission (EVAP) line (1) quick connect fitting from the chassis EVAP line. Refer to [Plastic Collar Quick Connect Fitting Service](#).
3. Disconnect the fuel feed line quick connect fitting (2) from the fuel rail. Refer to [Metal Collar Quick Connect Fitting Service](#).
4. Cap the fuel rail and EVAP pipes.
5. Raise and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#).
6. Unbolt and reposition the front propeller shaft, if required. Refer to [Front Propeller Shaft Replacement](#).



7. Remove the fuel pipe bracket nut from the bellhousing stud.
8. Remove the fuel line clips (1) from the bracket on the automatic transmission.
9. If equipped with 4-wheel drive (4WD), remove the fuel hose/pipe clip from the bracket on the transfer case.

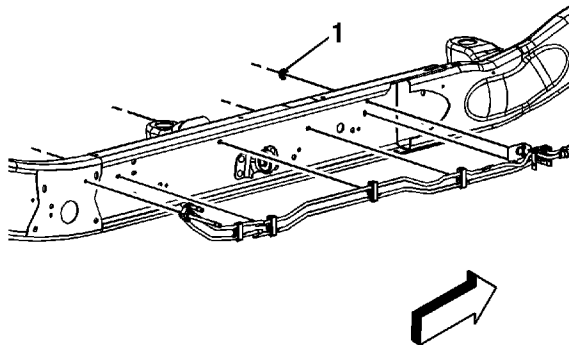


10. Remove the EVAP canister vent solenoid clip (1) from the chassis EVAP line and secure out of the way.
11. Remove the EVAP canister vent solenoid pipe clip (2) from the chassis EVAP line.



12. Disconnect the fuel tank fuel feed line quick connect fitting from the chassis line. Refer to [Plastic Collar Quick Connect Fitting Service](#).
13. Disconnect the fuel tank EVAP line quick connect fitting from the chassis line. Refer to [Plastic Collar Quick Connect Fitting Service](#).
14. Cap the fuel and EVAP lines in order to prevent possible fuel and/or EVAP system contamination.
15. Remove the fuel/EVAP line clip nuts (1).
16. Remove the fuel/EVAP line clips from the frame and crossmember.
17. Remove the fuel/EVAP line assembly from the vehicle.

Installation Procedure



1. Position and install the fuel/EVAP line assembly to the vehicle.
2. Install the fuel/EVAP line bracket locator tab to the frame.
3. Install the fuel/EVAP line clips to the frame and crossmember.

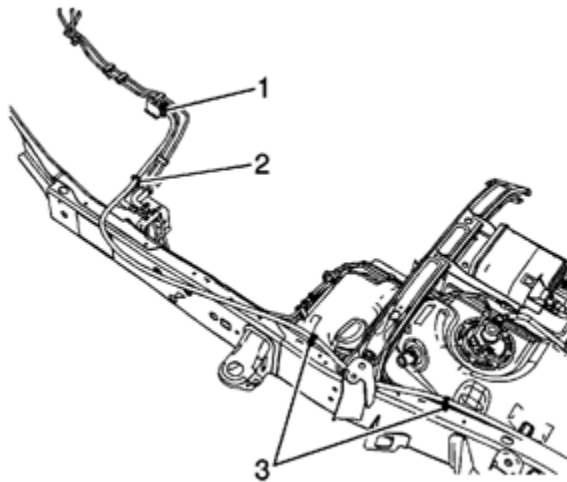
Caution: Refer to [Fastener Caution](#) in the Preface section.

4. Install the fuel/EVAP line clip nuts (2).

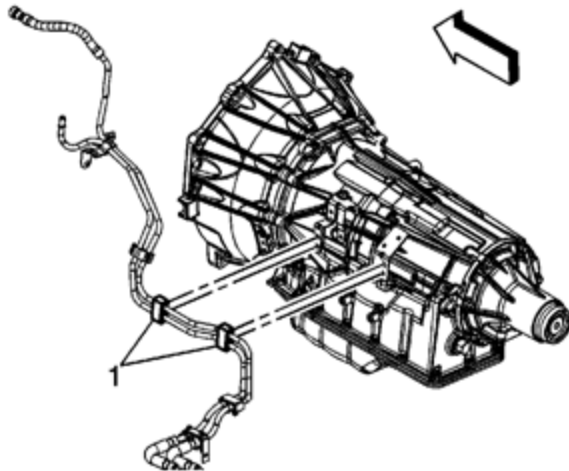
Tighten

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

5. Remove the caps from the fuel and EVAP lines.
6. Connect the fuel tank EVAP line quick connect fitting to the chassis line. Refer to [Plastic Collar Quick Connect Fitting Service](#).
7. Connect the fuel tank fuel feed line quick connect fitting to the chassis line. Refer to [Plastic Collar Quick Connect Fitting Service](#).



8. Unsecure and position the EVAP canister vent solenoid clip (1) to the chassis EVAP line.
9. Install the EVAP canister vent solenoid pipe clip (2) from the chassis EVAP line.

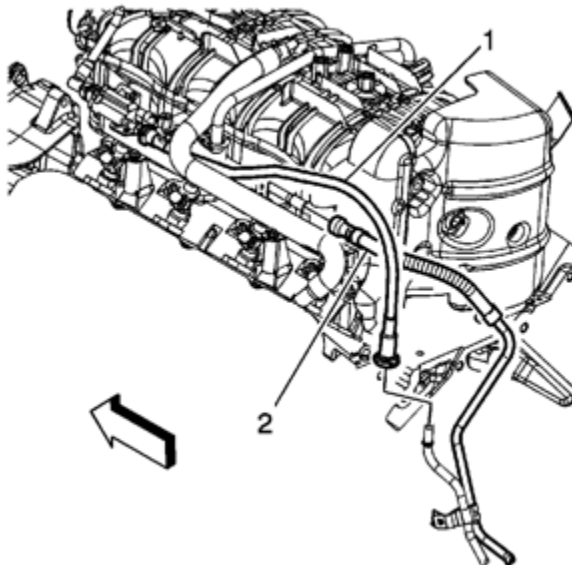


10. If equipped with 4WD, install the fuel hose/pipe clip to the bracket on the transfer case.
11. Install the fuel line clip to the bracket on the automatic transmission.
12. Install the fuel pipe bracket nut to the bellhousing stud.

Tighten

Tighten the nut to 25 N·m (18 lb ft).

13. Position and install the front propeller shaft, if required. Refer to [Front Propeller Shaft Replacement](#).
14. Lower the vehicle.



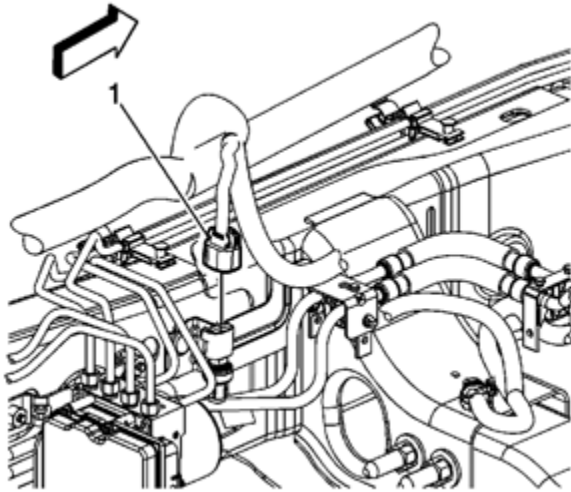
15. Remove the caps from the fuel rail and EVAP line.
16. Connect the EVAP line (1) quick connect fitting to the chassis EVAP line. Refer to [Plastic Collar Quick Connect Fitting Service](#).

17. Connect the fuel feed line (2) quick connect fitting to the fuel rail. Refer to [Metal Collar Quick Connect Fitting Service](#).
18. Install the fuel fill cap.
19. Connect the negative battery cable. Refer to [Battery Negative Cable Disconnection and Connection](#).
20. Use the following procedure in order to inspect for leaks:
 - 20.1. Turn the ignition ON, with the engine OFF, for 2 seconds.
 - 20.2. Turn the ignition OFF for 10 seconds.
 - 20.3. Turn the ignition ON, with the engine OFF.
 - 20.4. Inspect for fuel leaks.
21. Install the intake manifold sight shield. Refer to [Upper Intake Manifold Sight Shield Replacement](#).

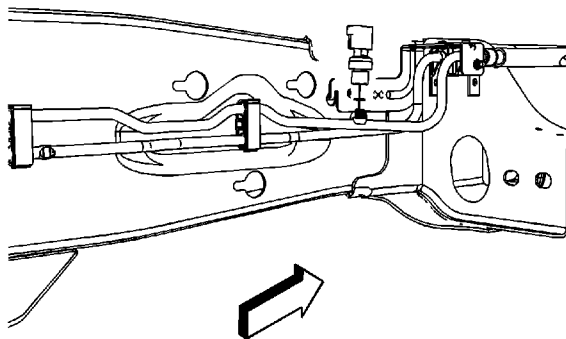
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Fuel Pressure Sensor Replacement

Removal Procedure



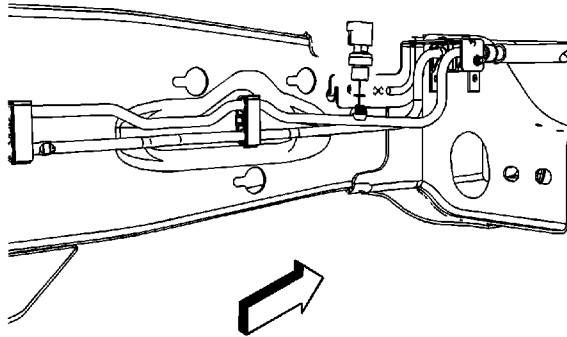
1. Raise and suitably support the vehicle. Refer to [Lifting and Jacking the Vehicle](#).
2. Disconnect the chassis wiring harness electrical connector (1) from the fuel pressure sensor.



3. Wrap a shop towel around the fuel pressure sensor fitting in order to absorb any fuel that may leak out.
4. Remove the fuel pressure sensor from the fuel line.

5. Remove and discard the fuel pressure sensor O-ring seal.

Installation Procedure



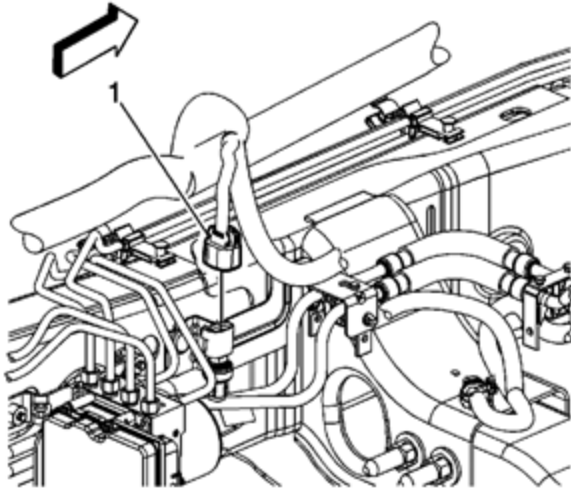
1. Lubricate a NEW fuel pressure sensor O-ring seal with clean engine oil.
2. Install the NEW fuel pressure sensor O-ring seal onto the fuel line fitting.
3. Wrap a shop towel around the fuel pressure sensor fitting in order to absorb any fuel that may leak out.

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

4. Install the fuel pressure sensor to the fuel line.

Tighten

Tighten the sensor to 15 N·m (11 lb ft).



5. Connect the chassis wiring harness electrical connector (1) to the fuel pressure sensor.
6. Lower the vehicle.
7. Use the following procedure in order to inspect for leaks:
 - 7.1. Turn the ignition ON, with the engine OFF, for 2 seconds.
 - 7.2. Turn the ignition OFF for 10 seconds.
 - 7.3. Turn the ignition ON, with the engine OFF.
 - 7.4. Inspect for fuel leaks.

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Fuel System Cleaning

Important: Only use oil free compressed air to blow out the fuel pipes.

1. Disconnect the negative battery cable. Refer to [Battery Negative Cable Disconnection and Connection](#).
2. Remove the fuel tank module. Refer to [Fuel Tank Fuel Pump Module Replacement](#).
3. Inspect the fuel tank module strainer, if equipped. If the strainer is contaminated replace the fuel tank module.
4. Inspect the fuel tank module inlet for dirt and debris. Replace the fuel tank module if you find dirt or debris in the fuel pump inlet.

Important: When flushing the fuel tank, handle the fuel and water mixture as a hazardous material. Handle the fuel and water mixture in accordance with all applicable local, state, and federal laws and regulations.

5. Flush the fuel tank with hot water.
6. Pour the water out of the fuel module opening. Rock the tank to be sure that removal of the water from the tank is complete.
7. Remove the fuel rail. Refer to [Fuel Injection Fuel Rail Assembly Replacement](#).
8. Drain the fuel from the fuel rail. It will be necessary to remove the fuel injectors from the fuel rail to properly clear all debris from the fuel rail and fuel injectors. Refer to [Fuel Injector Replacement](#).
9. Use light shop air to remove any debris from the fuel rail and injectors.
10. Use light shop air in the opposite direction of the fuel flow in order to remove any debris from the fuel lines. Catch any fuel from the fuel lines with an approved gasoline container.
11. Install the fuel injectors to the fuel rail. Refer to [Fuel Injector Replacement](#).
12. Install the fuel rail. Refer to [Fuel Injection Fuel Rail Assembly Replacement](#).
13. Install the fuel tank module. Refer to [Fuel Tank Fuel Pump Module Replacement](#).
14. Refill the fuel tank.
15. Install the fuel fill cap.
16. Connect the negative battery cable. Refer to [Battery Negative Cable Disconnection and Connection](#).

Important: If the fuel pump or sender assembly was not replaced, purge the fuel sender assembly.

17. Purge the fuel tank module.
 - 17.1. Disconnect the fuel feed line quick connect fitting from the fuel tank to the chassis line. Refer to [Plastic Collar Quick Connect Fitting Service](#).
 - 17.2. Connect a length of hose to the fuel feed pipe.
 - 17.3. Insert the other end of the hose into an empty 3.8 liter (1 gallon) approved gasoline container.
 - 17.4. Add 23 liters (6 gallons) of clean fuel into the fuel tank.
 - 17.5. Turn on the fuel pump using the scan tool until 2 liters (1/2 gallon) of fuel flows into the fuel container.
18. Inspect for leaks.
 - 18.1. Turn the ignition switch ON for 2 seconds.
 - 18.2. Turn the ignition switch OFF for 10 seconds.

18.3. Turn the ignition switch ON.

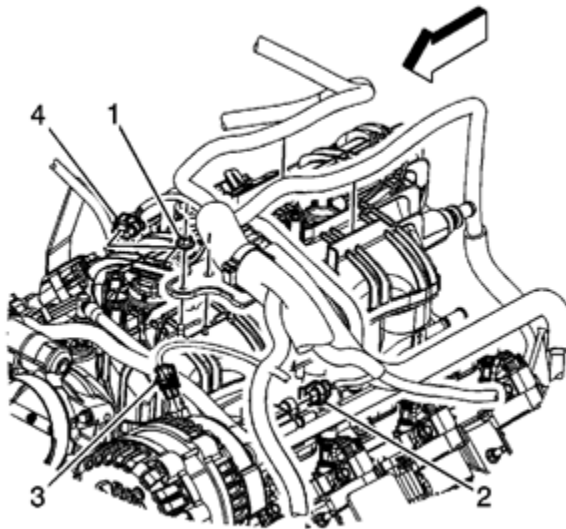
18.4. Inspect for fuel leaks.

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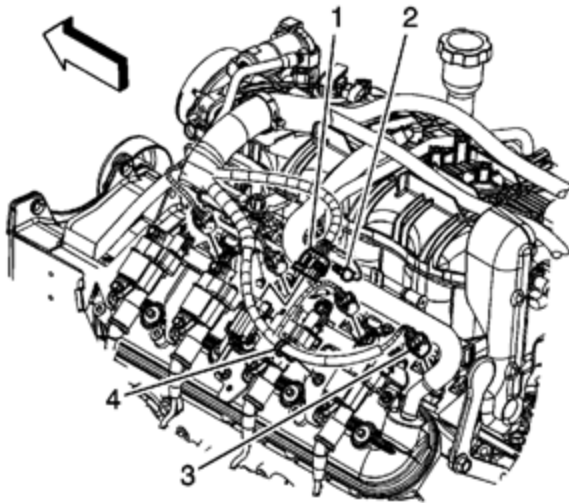
Fuel Injection Fuel Rail Assembly Replacement

Removal Procedure

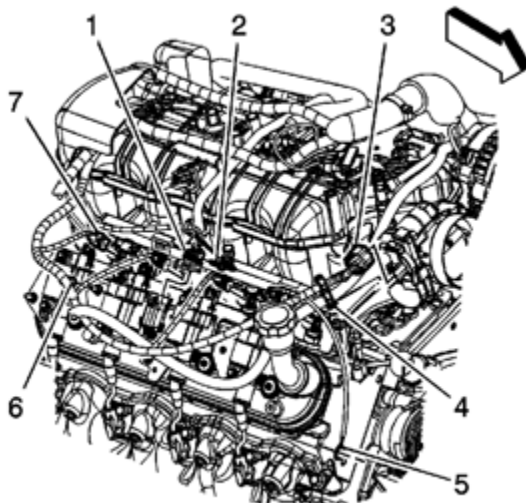
Note: An 8-digit identification number is located on the fuel rail. Refer to this identification number when servicing or when part replacement is required.



1. Remove the air cleaner outlet duct. Refer to [Air Cleaner Resonator Outlet Duct Replacement](#).
2. Relieve the fuel system pressure. Refer to [Fuel Pressure Relief](#).
3. Remove the engine wiring harness bracket nut (1).
4. Disconnect the engine wiring harness electrical connector (2) from the evaporative emission (EVAP) purge solenoid.
5. Disconnect the engine wiring harness electrical connector (3) from the generator.
6. Disconnect the engine wiring harness electrical connector (4) from the manifold absolute pressure (MAP) sensor.



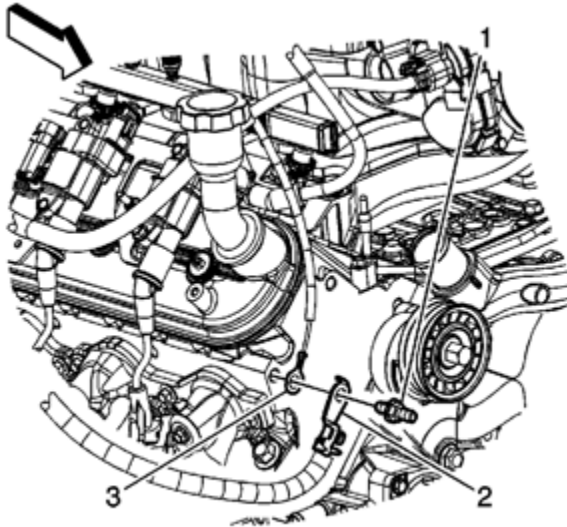
7. Remove the connector position assurance (CPA) retainer (2).
8. Disconnect the engine wiring harness electrical connector (1) from the ignition coil main electrical connector.
9. Disconnect the engine wiring harness electrical connectors (3) from the fuel injectors, perform the following:
 - 9.1. Mark the connectors to their corresponding injectors to ensure correct reassembly.
 - 9.2. Pull the CPA retainer on the connector up 1 click.
 - 9.3. Push the tab on the connector in.
 - 9.4. Disconnect the fuel injector electrical connector.



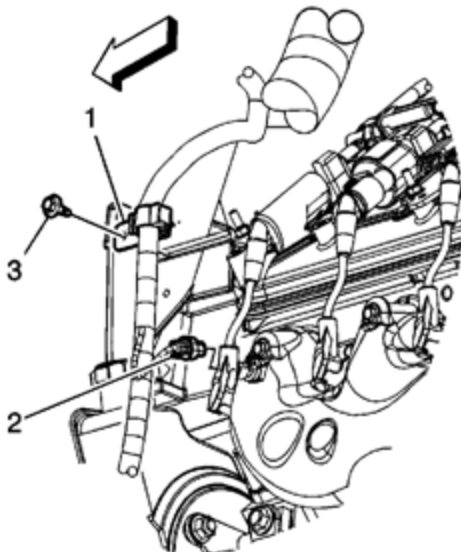
10. Remove the CPA retainer (2).
11. Disconnect the engine wiring harness electrical connector (1) from the ignition coil main

electrical connector.

12. Disconnect the engine wiring harness electrical connector (3) from the electronic throttle control.
13. Disconnect the engine wiring harness electrical connectors (7) from the fuel injectors, perform the following:
 - 13.1. Mark the connectors to their corresponding injectors to ensure correct reassembly.
 - 13.2. Pull the CPA retainer on the connector up 1 click.
 - 13.3. Push the tab on the connector in.
 - 13.4. Disconnect the fuel injector electrical connector.
14. Remove the engine wiring harness clip (4) from the generator battery jumper cable.
15. Remove the engine wiring harness clip (6) from the ignition coil bracket stud.

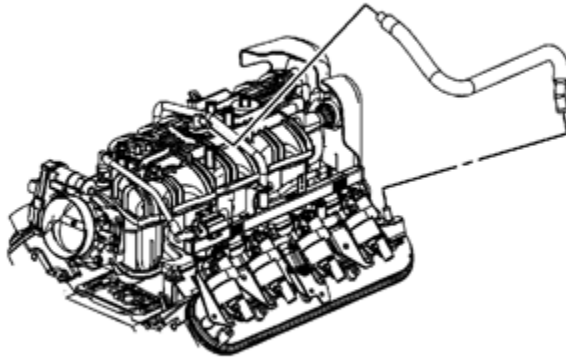


16. Remove the negative battery cable stud (1) from the right cylinder head.
17. Remove the negative battery cable terminal (2) and engine wiring harness ground terminal (3) from the cylinder head.

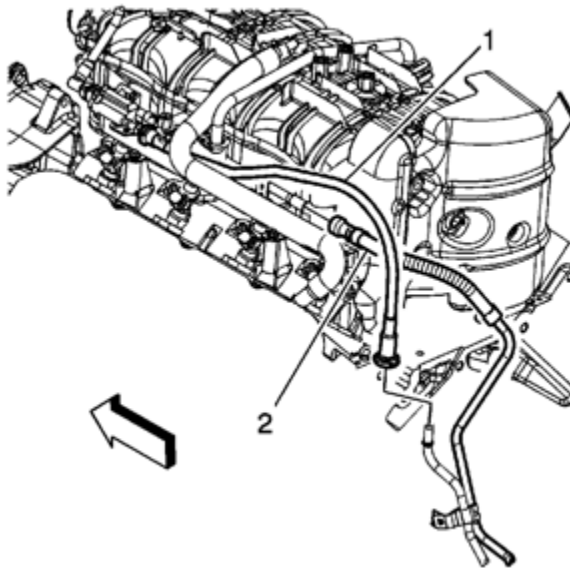




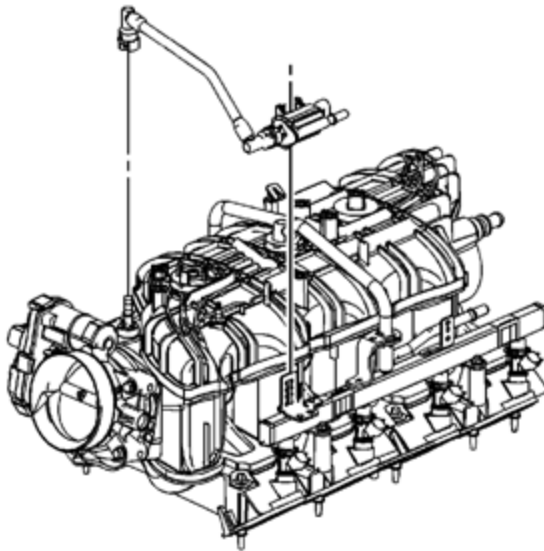
18. Remove the engine wiring harness clip bolt (3) from the generator bracket.
19. Gather the branches of the engine wiring harness and reposition the aside.



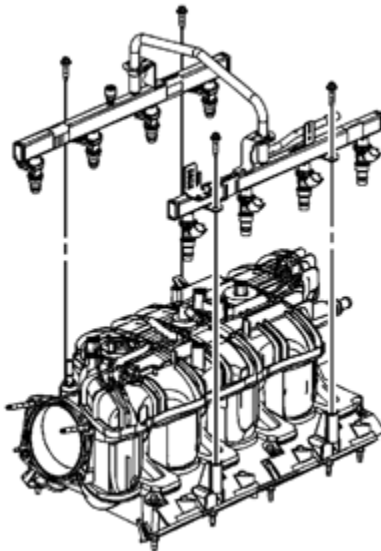
20. Remove the positive crankcase ventilation (PCV) hose.



21. Disconnect the chassis fuel feed pipe (2) quick connect fitting from the fuel rail. Refer to [Metal Collar Quick Connect Fitting Service](#).



22. Disconnect the EVAP tube quick connect fitting at the intake manifold. Refer to [Plastic Collar Quick Connect Fitting Service](#).
23. Disconnect the chassis EVAP tube quick connect fitting at the EVAP canister purge solenoid. Refer to [Plastic Collar Quick Connect Fitting Service](#).
24. Disengage the retainer securing the EVAP canister purge solenoid to the fuel rail.
25. Remove the EVAP tube and purge solenoid.



26. Remove the fuel rail bolts.

Caution:

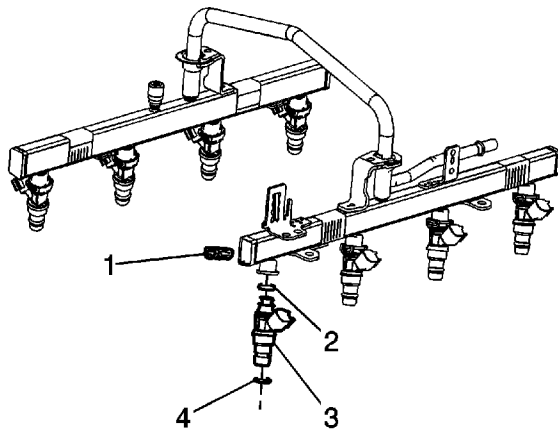
- Remove the fuel rail assembly carefully in order to prevent damage to the injector electrical connector terminals and the injector spray tips. Support the fuel rail after the fuel rail is removed in order to avoid damaging the fuel rail components.
- Cap the fittings and plug the holes when servicing the fuel system in order to prevent

dirt and other contaminants from entering open pipes and passages.

Note:

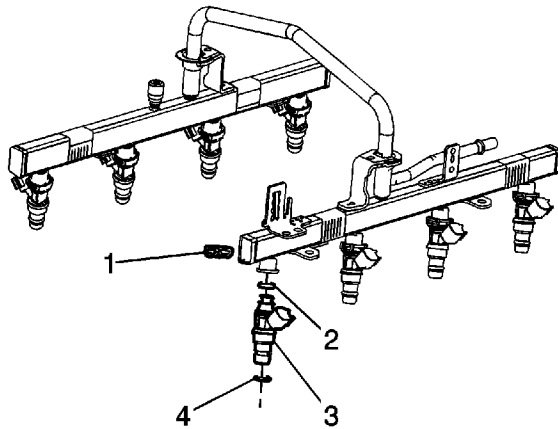
- Before removal, clean the fuel rail with a spray type engine cleaner, such as GM X-30A or equivalent, if necessary. Follow the package instructions. Do not soak the fuel rail in liquid cleaning solvent.
- Lift evenly on both sides of the fuel rail until all injectors are removed from their bores.

27. Remove the fuel rail assembly.

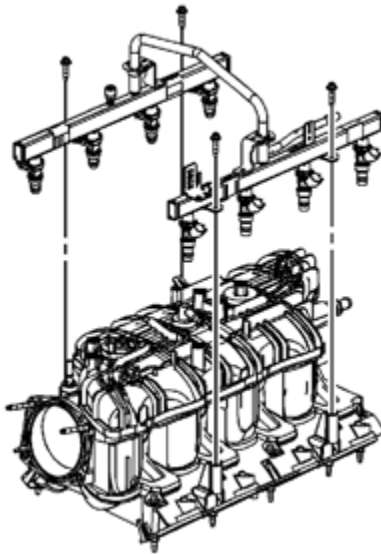


28. Remove the fuel injector retainers (1).
29. Remove the fuel injectors (3) from the fuel rail.
30. Remove and discard the fuel injector upper and lower O-ring seals (2 and 4).

Installation Procedure



1. Lubricate the NEW fuel injector O-ring seals with clean engine oil.
2. Install the NEW fuel injector upper and lower O-ring seals (2 and 4) onto the injectors.
3. Install the fuel injectors (3) into the fuel rails.
4. Install the fuel injector retainers (1).



5. Ensure the fuel injector lower O-ring seals are adequately lubricated, if not lubricate the fuel injector lower O-ring seals with clean engine oil.
6. Position the fuel rail onto the intake manifold.
7. Firmly push down on both the centers of the left and right fuel rails, until the rails are fully seated against the intake manifold.

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

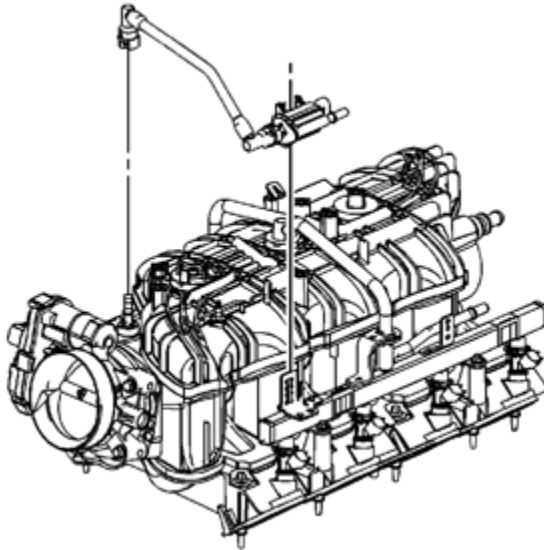
Note: Push down firmly on both sides of the rail until all injectors have been seated into their

bores.

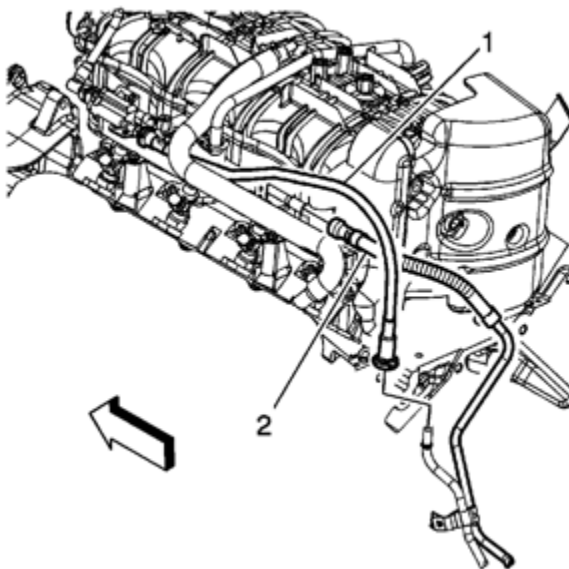
8. Install the fuel rail bolts.

Tighten

Tighten the bolts to 10 N·m (89 lb in).

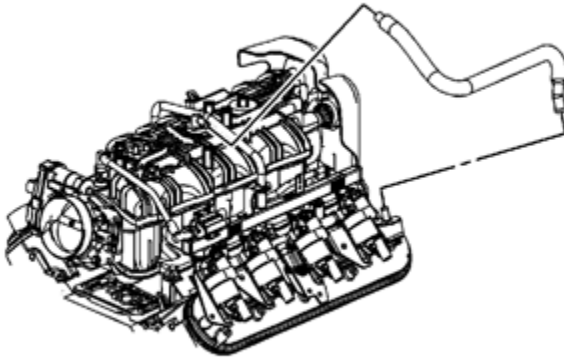


9. Install the EVAP tube and purge solenoid.
10. Install the EVAP canister purge solenoid to the fuel rail bracket and engage the retainer.
11. Connect the chassis EVAP tube quick connect fitting at the EVAP canister purge solenoid. Refer to [Plastic Collar Quick Connect Fitting Service](#).
12. Connect the EVAP tube quick connect fitting at the intake manifold. Refer to [Plastic Collar Quick Connect Fitting Service](#).

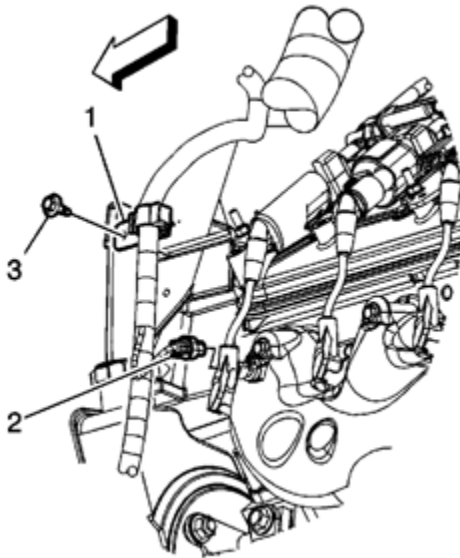




13. Connect the chassis fuel feed pipe (2) quick connect fitting to the fuel rail. Refer to [Metal Collar Quick Connect Fitting Service](#).



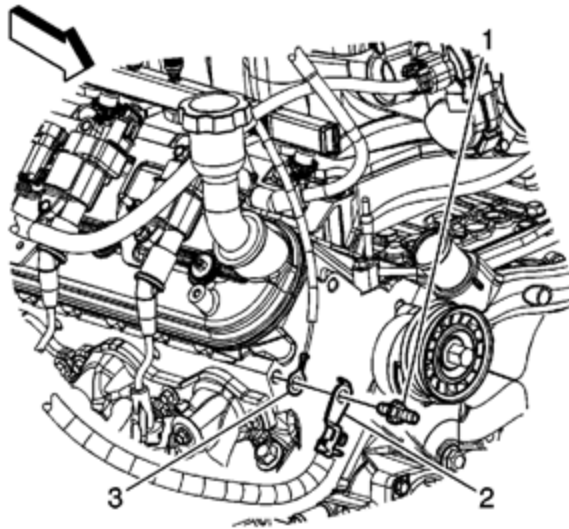
14. Install the PCV hose.
15. Gather the branches of the engine wiring harness and position over the top of the engine.



16. Position the engine wiring harness clip to the generator bracket and install the clip bolt (3).

Tighten

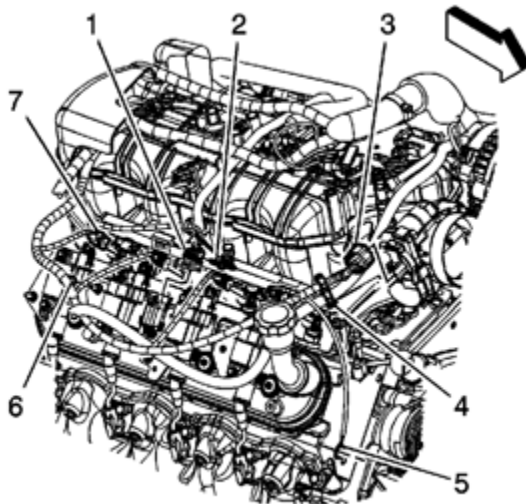
Tighten the bolt to 9 N·m (80 lb in).



17. Position the negative battery cable terminal (2) and engine wiring harness ground terminal (3) to the right cylinder head.
18. Install the negative battery cable stud (1) to the cylinder head.

Tighten

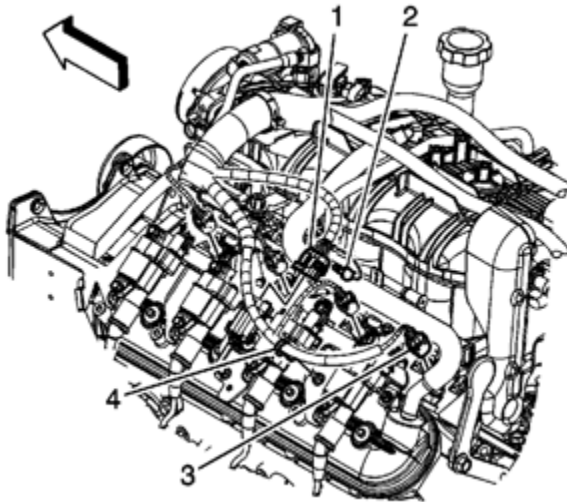
Tighten the stud to 25 N·m (18 lb ft).



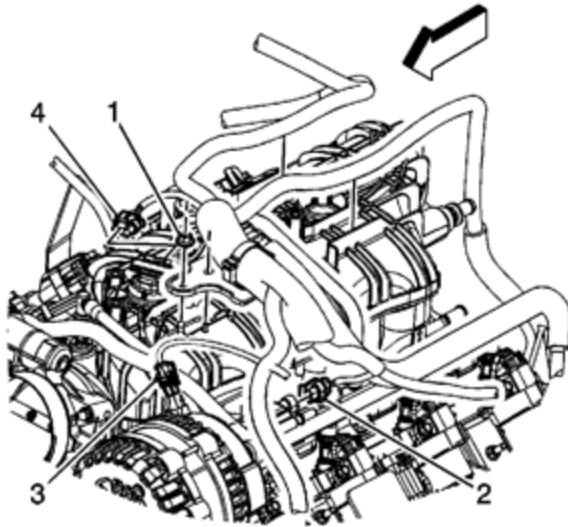
19. Connect the engine wiring harness electrical connector (1) to the ignition coil main electrical connector.
20. Install the CPA retainer (2).
21. Connect the engine wiring harness electrical connector (3) to the electronic throttle control.
22. Connect the engine wiring harness electrical connectors (7) to the fuel injectors, perform the

following:

- 22.1. Ensure that the CPA retainer is pulled out 1 click.
- 22.2. Connect the electrical connectors to their corresponding injectors.
- 22.3. Push the CPA retainer in 1 click.
- 22.4. Ensure that the connector is secured.
23. Install the engine wiring harness clip (4) to the generator battery jumper cable.
24. Install the engine wiring harness clip (6) to the ignition coil bracket stud.



25. Connect the engine wiring harness electrical connector (1) to the ignition coil main electrical connector.
26. Install the CPA retainer (2).
27. Connect the engine wiring harness electrical connectors (3) to the fuel injectors, perform the following:
 - 27.1. Ensure that the CPA retainer is pulled out 1 click.
 - 27.2. Connect the electrical connectors to their corresponding injectors.
 - 27.3. Push the CPA retainer in 1 click.
 - 27.4. Ensure that the connector is secured.



28. Connect the engine wiring harness electrical connector (4) to the MAP sensor.
29. Connect the engine wiring harness electrical connector (3) to the generator.
30. Connect the engine wiring harness electrical connector (2) to the EVAP purge solenoid.
31. Install the engine wiring harness bracket nut (1).

Tighten

Tighten the nut to 5 N·m (44 lb in).

32. Connect the negative battery cable. Refer to [Battery Negative Cable Disconnection and Connection](#).
33. Use the following procedure in order to inspect for leaks:
 - 33.1. Turn the ignition ON, with the engine OFF for 2 seconds.
 - 33.2. Turn the ignition OFF for 10 seconds.
 - 33.3. Turn the ignition ON, with the engine OFF.
 - 33.4. Inspect for leaks.
34. Install the air cleaner outlet duct. Refer to [Air Cleaner Resonator Outlet Duct Replacement](#).

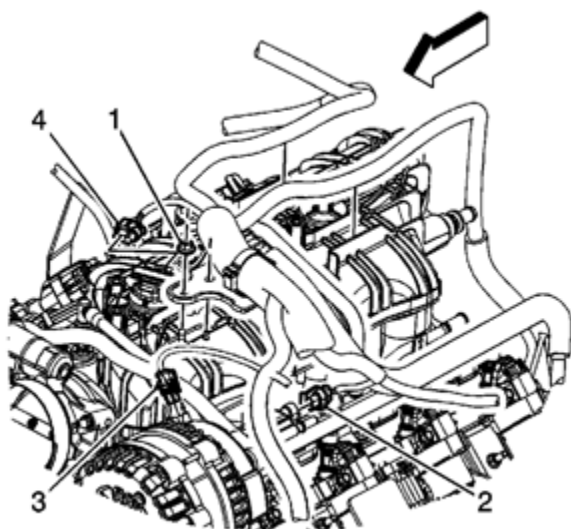
Fuel Injector Replacement

Removal Procedure

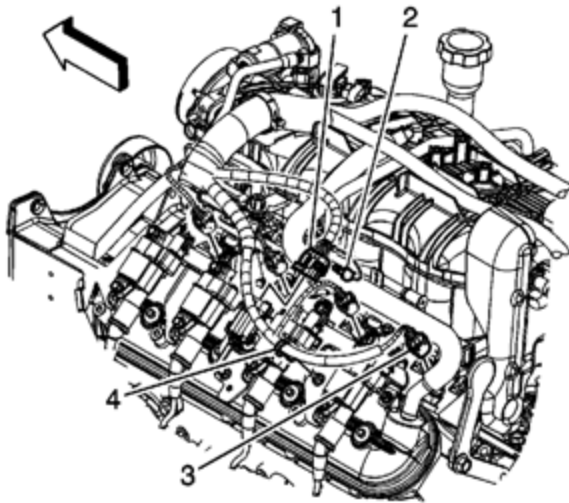
Caution: Use care in removing the fuel injectors in order to prevent damage to the fuel injector electrical connector pins or the fuel injector nozzles. Do not immerse the fuel injector in any type of cleaner. The fuel injector is an electrical component and may be damaged by this cleaning method.

Note:

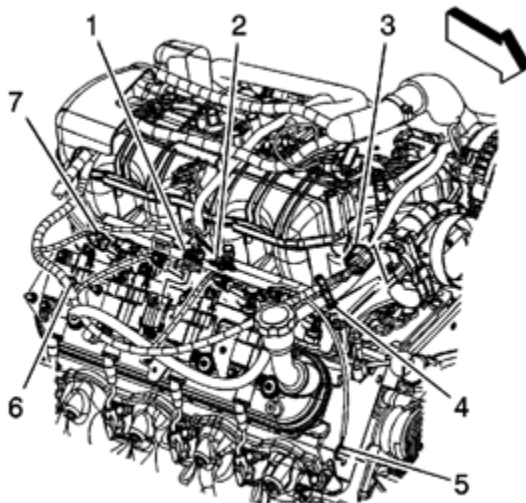
- An 8-digit identification number is located on the fuel rail. Refer to this identification number when servicing or when part replacement is required.
- The engine oil may be contaminated with fuel if the fuel injectors are leaking.



1. Remove the air cleaner outlet duct. Refer to [Air Cleaner Resonator Outlet Duct Replacement](#).
2. Relieve the fuel system pressure. Refer to [Fuel Pressure Relief](#).
3. Remove the engine wiring harness bracket nut (1).
4. Disconnect the engine wiring harness electrical connector (2) from the evaporative emission (EVAP) purge solenoid.
5. Disconnect the engine wiring harness electrical connector (3) from the generator.
6. Disconnect the engine wiring harness electrical connector (4) from the manifold absolute pressure (MAP) sensor.



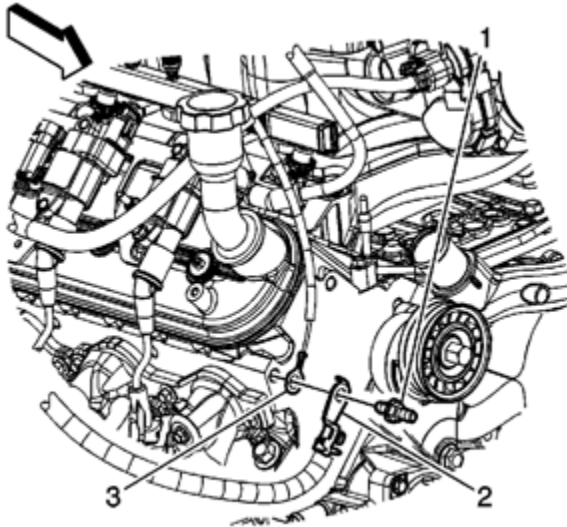
7. Remove the connector position assurance (CPA) retainer (2).
8. Disconnect the engine wiring harness electrical connector (1) from the ignition coil main electrical connector.
9. Disconnect the engine wiring harness electrical connectors (3) from the fuel injectors, perform the following:
 - 9.1. Mark the connectors to their corresponding injectors to ensure correct reassembly.
 - 9.2. Pull the CPA retainer on the connector up 1 click.
 - 9.3. Push the tab on the connector in.
 - 9.4. Disconnect the fuel injector electrical connector.



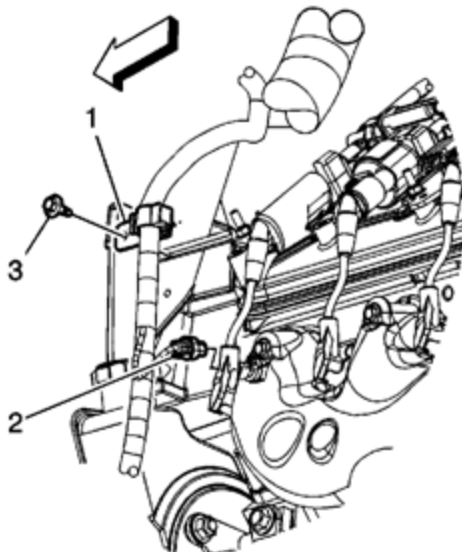
10. Remove the CPA retainer (2).
11. Disconnect the engine wiring harness electrical connector (1) from the ignition coil main

electrical connector.

12. Disconnect the engine wiring harness electrical connector (3) from the electronic throttle control.
13. Disconnect the engine wiring harness electrical connectors (7) from the fuel injectors, perform the following:
 - 13.1. Mark the connectors to their corresponding injectors to ensure correct reassembly.
 - 13.2. Pull the CPA retainer on the connector up 1 click.
 - 13.3. Push the tab on the connector in.
 - 13.4. Disconnect the fuel injector electrical connector.
14. Remove the engine wiring harness clip (4) from the generator battery jumper cable.
15. Remove the engine wiring harness clip (6) from the ignition coil bracket stud.

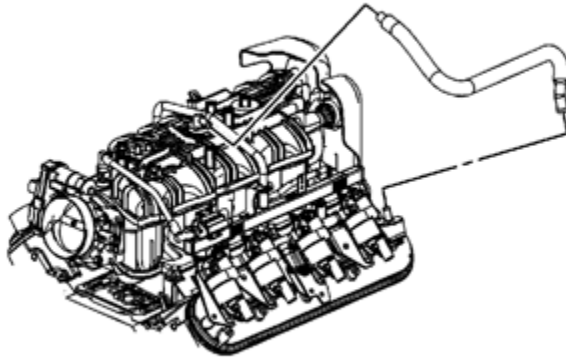


16. Remove the negative battery cable stud (1) from the right cylinder head.
17. Remove the negative battery cable terminal (2) and engine wiring harness ground terminal (3) from the cylinder head.

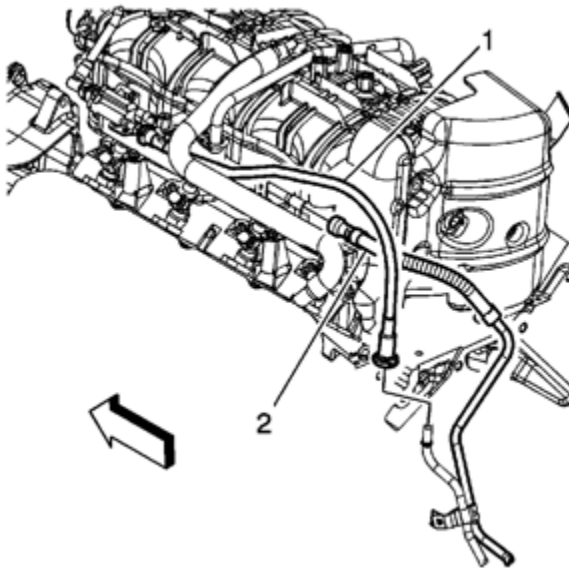




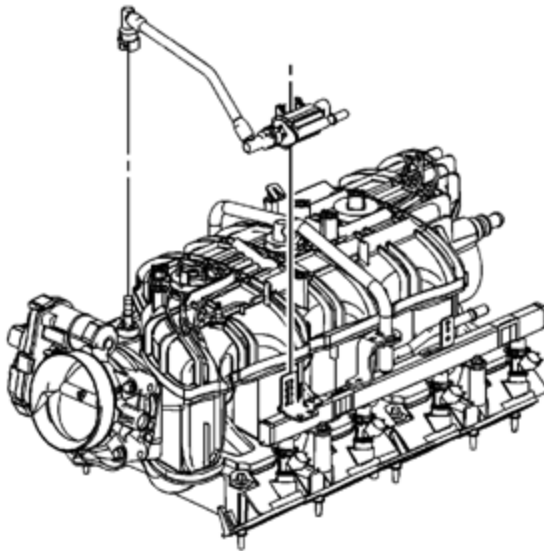
18. Remove the engine wiring harness clip bolt (3) from the generator bracket.
19. Gather the branches of the engine wiring harness and reposition the aside.



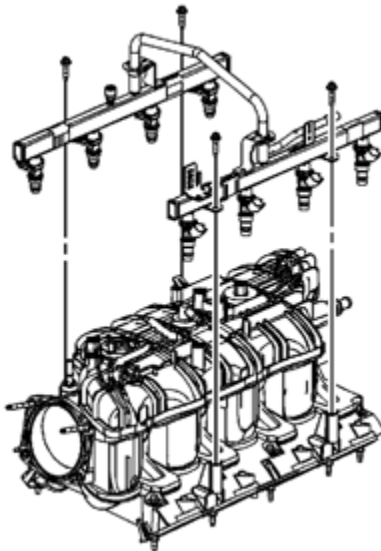
20. Remove the positive crankcase ventilation (PCV) hose.



21. Disconnect the chassis fuel feed pipe (2) quick connect fitting from the fuel rail. Refer to [Metal Collar Quick Connect Fitting Service](#).



22. Disconnect the EVAP tube quick connect fitting at the intake manifold. Refer to [Plastic Collar Quick Connect Fitting Service](#).
23. Disconnect the chassis EVAP tube quick connect fitting at the EVAP canister purge solenoid. Refer to [Plastic Collar Quick Connect Fitting Service](#).
24. Disengage the retainer securing the EVAP canister purge solenoid to the fuel rail.
25. Remove the EVAP tube and purge solenoid.



26. Remove the fuel rail bolts.

Caution:

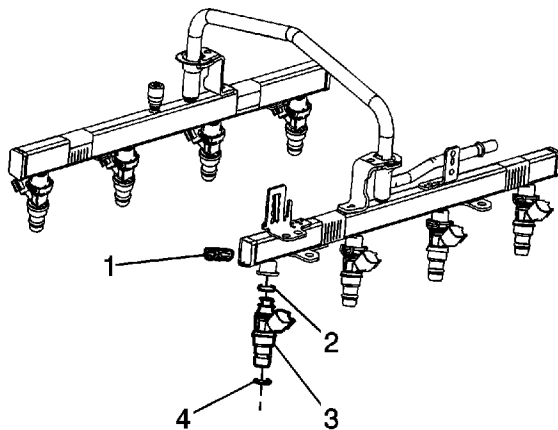
- Remove the fuel rail assembly carefully in order to prevent damage to the injector electrical connector terminals and the injector spray tips. Support the fuel rail after the fuel rail is removed in order to avoid damaging the fuel rail components.
- Cap the fittings and plug the holes when servicing the fuel system in order to prevent

dirt and other contaminants from entering open pipes and passages.

Note: Before removal, clean the fuel rail with a spray type engine cleaner, such as GM X-30A or equivalent, if necessary. Follow the package instructions. Do not soak the fuel rail in liquid cleaning solvent.

Note: Lift evenly on both sides of the fuel rail until all injectors are removed from their bores.

27. Remove the fuel rail assembly.

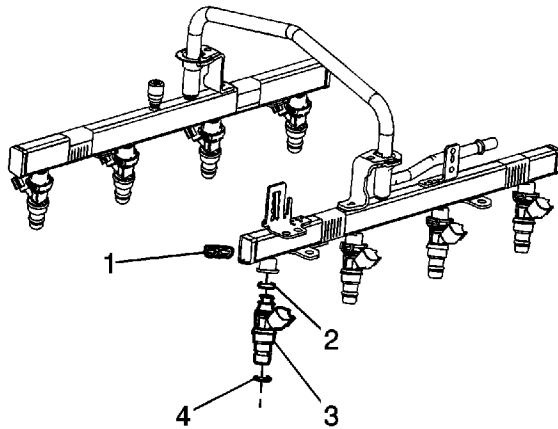


28. Remove the fuel injector retainers (1).

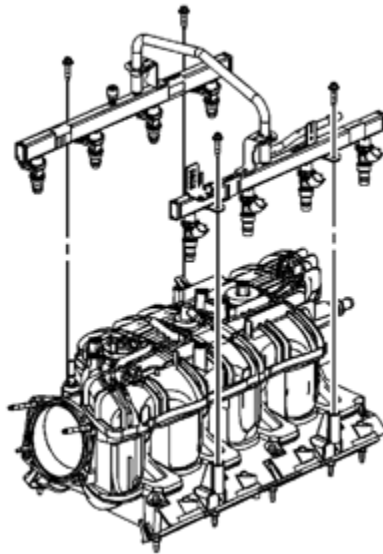
29. Remove the fuel injectors (3) from the fuel rail.

30. Remove and discard the fuel injector upper and lower O-ring seals (2 and 4).

Installation Procedure



1. Lubricate the NEW fuel injector O-ring seals with clean engine oil.
2. Install the NEW fuel injector upper and lower O-ring seals (2 and 4) onto the injectors.
3. Install the fuel injectors (3) into the fuel rails.
4. Install the fuel injector retainers (1).



5. Ensure the fuel injector lower O-ring seals are adequately lubricated, if not lubricate the fuel injector lower O-ring seals with clean engine oil.
6. Position the fuel rail onto the intake manifold.
7. Firmly push down on both the centers of the left and right fuel rails, until the rails are fully seated against the intake manifold.

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

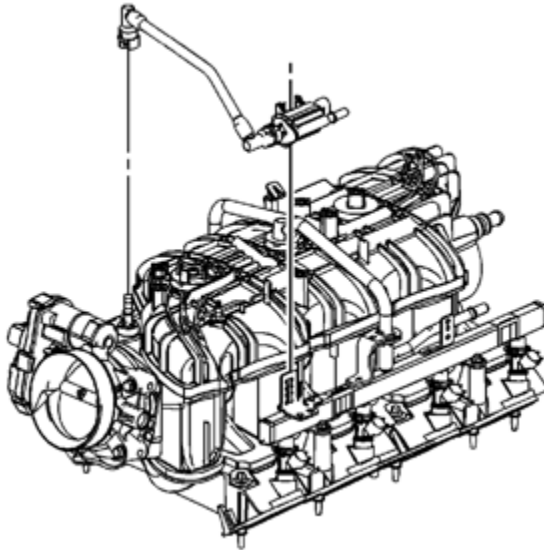
Note: Push down firmly on both sides of the rail until all injectors have been seated into their

bores.

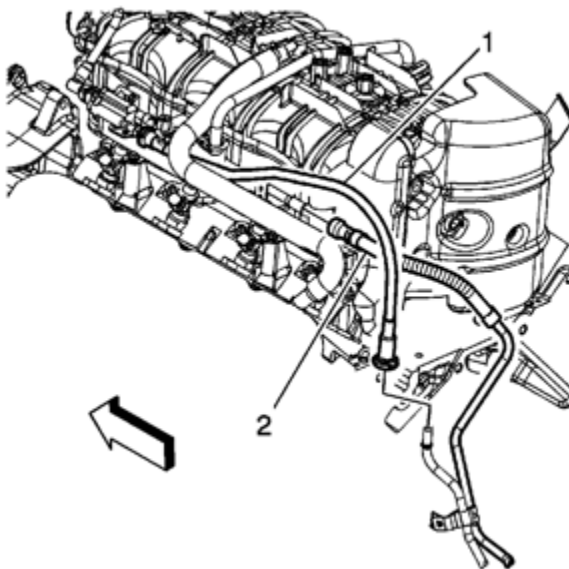
8. Install the fuel rail bolts.

Tighten

Tighten the bolts to 10 N·m (89 lb in).

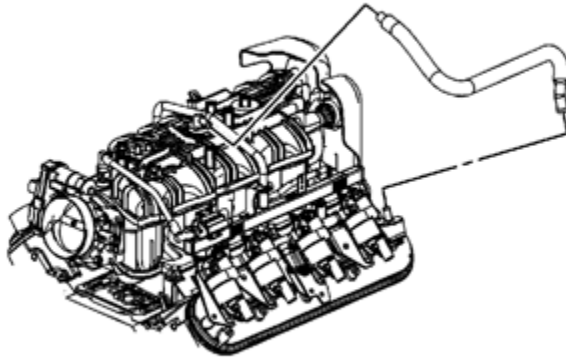


9. Install the EVAP tube and purge solenoid.
10. Install the EVAP canister purge solenoid to the fuel rail bracket and engage the retainer.
11. Connect the chassis EVAP tube quick connect fitting at the EVAP canister purge solenoid. Refer to [Plastic Collar Quick Connect Fitting Service](#).
12. Connect the EVAP tube quick connect fitting at the intake manifold. Refer to [Plastic Collar Quick Connect Fitting Service](#).

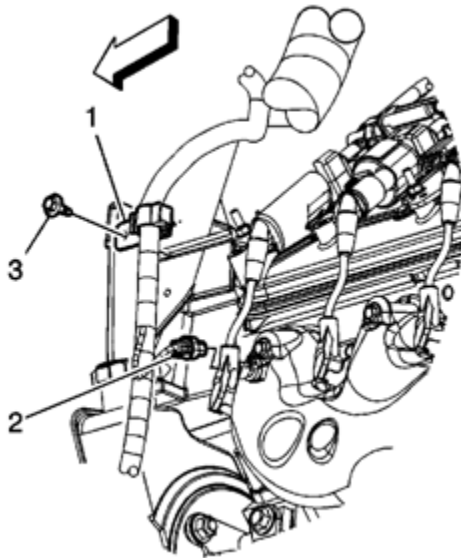




13. Connect the chassis fuel feed pipe (2) quick connect fitting to the fuel rail. Refer to [Metal Collar Quick Connect Fitting Service](#).



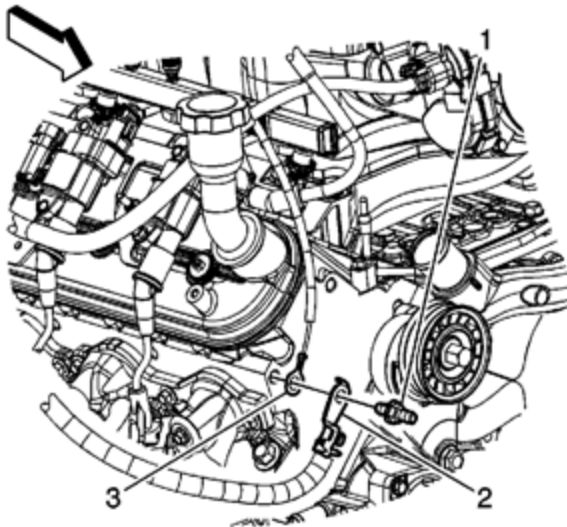
14. Install the PCV hose.
15. Gather the branches of the engine wiring harness and position over the top of the engine.



16. Position the engine wiring harness clip to the generator bracket and install the clip bolt (3).

Tighten

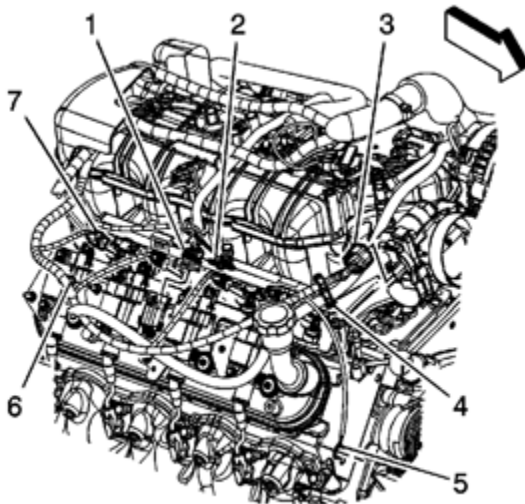
Tighten the bolts to 9 N·m (80 lb in).



17. Position the negative battery cable terminal (2) and engine wiring harness ground terminal (3) to the right cylinder head.
18. Install the negative battery cable stud (1) to the cylinder head.

Tighten

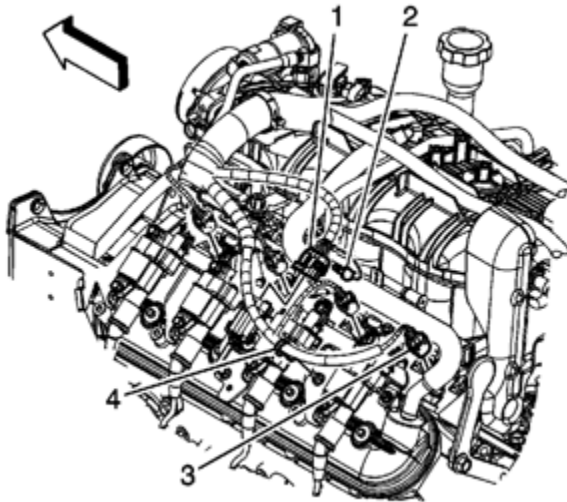
Tighten the stud to 25 N·m (18 lb ft).



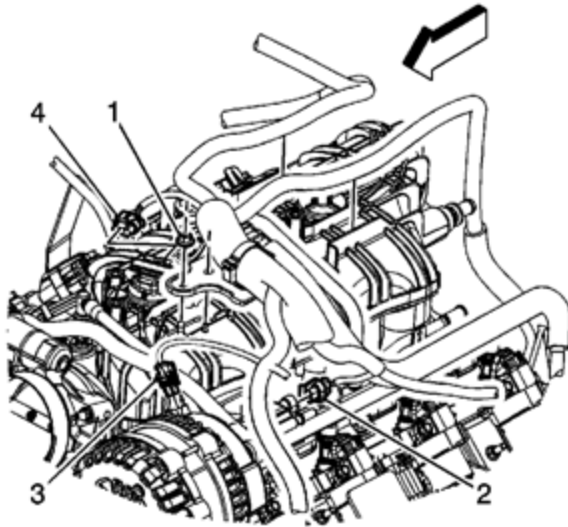
19. Connect the engine wiring harness electrical connector (1) to the ignition coil main electrical connector.
20. Install the CPA retainer (2).
21. Connect the engine wiring harness electrical connector (3) to the electronic throttle control.
22. Connect the engine wiring harness electrical connectors (7) to the fuel injectors, perform the

following:

- 22.1. Ensure that the CPA retainer is pulled out 1 click.
- 22.2. Connect the electrical connectors to their corresponding injectors.
- 22.3. Push the CPA retainer in 1 click.
- 22.4. Ensure that the connector is secured.
23. Install the engine wiring harness clip (4) to the generator battery jumper cable.
24. Install the engine wiring harness clip (6) to the ignition coil bracket stud.



25. Connect the engine wiring harness electrical connector (1) to the ignition coil main electrical connector.
26. Install the CPA retainer (2).
27. Connect the engine wiring harness electrical connectors (3) to the fuel injectors, perform the following:
 - 27.1. Ensure that the CPA retainer is pulled out 1 click.
 - 27.2. Connect the electrical connectors to their corresponding injectors.
 - 27.3. Push the CPA retainer in 1 click.
 - 27.4. Ensure that the connector is secured.



28. Connect the engine wiring harness electrical connector (4) to the MAP sensor.
29. Connect the engine wiring harness electrical connector (3) to the generator.
30. Connect the engine wiring harness electrical connector (2) to the EVAP purge solenoid.
31. Install the engine wiring harness bracket nut (1).

Tighten

Tighten the nut to 5 N·m (44 lb in).

32. Connect the negative battery cable. Refer to [Battery Negative Cable Disconnection and Connection](#).
33. Use the following procedure in order to inspect for leaks:
 - 33.1. Turn the ignition ON, with the engine OFF for 2 seconds.
 - 33.2. Turn the ignition OFF for 10 seconds.
 - 33.3. Turn the ignition ON, with the engine OFF.
 - 33.4. Inspect for leaks.
34. Install the air cleaner outlet duct. Refer to [Air Cleaner Resonator Outlet Duct Replacement](#).

Fuel Injector Cleaning

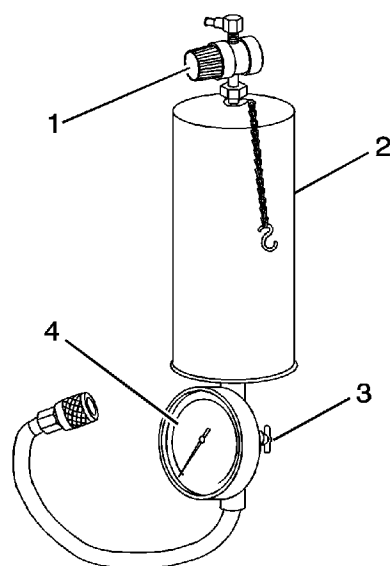
Special Tools

- [J 37287](#) Fuel Line Shut-Off Adapters
- [J 35800-A](#) Fuel Injector Cleaner
- [J 42873-1](#) 3/8 Fuel Line Shut-Off Valve
- [J 42873-2](#) 5/16 Return Pipe Shut-Off Valve
- [J 42964-1](#) 3/8 Fuel Pipe Shut-Off Valve
- [J 42964-2](#) 5/16 Fuel Pipe Shut-Off Valve

Caution:

- GM Upper Engine and Fuel Injector Cleaner is the only injector cleaning agent recommended. DO NOT USE OTHER CLEANING AGENTS AS THEY MAY CONTAIN METHANOL, WHICH CAN DAMAGE FUEL SYSTEM COMPONENTS.
- Under NO circumstances should the GM Upper Engine and Fuel Injector Cleaner be added to the vehicle fuel tank, as it may damage the fuel pump and other system components.
- Do not exceed the recommended cleaning solution concentration. Higher concentrations may damage fuel system components. Testing has demonstrated that exceeding the recommended cleaning solution concentration does not improve the effectiveness of this procedure.

Note: Vehicles with less than 160 km (100 mi) on the odometer should not have the injectors cleaned. These vehicles should have the injectors replaced.



1. Obtain [J 35800-A](#) (2).

Note: Make sure the valve at the bottom of the canister (3) is closed.

2. For 4, 5, and 6 cylinder engines, empty two of the 30 ml (1 oz) reservoirs of the GM Upper Engine and Fuel Injector Cleaner twin reservoir container into the [J 35800-A](#) , injector cleaning tank, then add 420 ml (14 oz) of regular unleaded gasoline. If you are using any other brand of cleaning tank, you will need a total of 60 ml (2 oz) of GM Upper Engine and Fuel Injector Cleaner mixed with 420 ml (14 oz) of regular unleaded gasoline.
3. For 8 cylinder engines, empty two of the 30 ml (1 oz) reservoirs of the GM Upper Engine and Fuel Injector Cleaner twin reservoir container into the [J 35800-A](#) , injector cleaning tank, then add 420 ml (14 oz) of regular unleaded gasoline. If you are using any other brand of cleaning tank, you will need a total of 60 ml (2 oz) of GM Upper Engine and Fuel Injector Cleaner mixed with 420 ml (14 oz) of regular unleaded gasoline.

This procedure will need to be repeated for an 8 cylinder engine. The 8 cylinder engines receive 960 ml total fluid--120 ml (4 oz) of GM Upper Engine and Fuel Injector Cleaner and 840 ml (28 oz) of gasoline.

4. Fill the injector cleaning tank with regular unleaded gasoline. Be sure to follow all additional instructions provided with the tool.
5. Electrically disable the vehicle fuel pump by removing the fuel pump relay and disconnecting the oil pressure switch connector, if equipped.
6. Disconnect the fuel feed and return line, if equipped, at the fuel rail. Plug the fuel feed and return line, if equipped, coming off the fuel rail with [J 37287](#) , or [J 42964-1](#) , and [J 42964-2](#) or [J 42873-1](#) , and [J 42873-2](#) as appropriate for the fuel system.
7. Connect the [J 35800-A](#) to the vehicle fuel rail.
8. Pressurize the [J 35800-A](#) to 510 kPa (75 psi).
9. Start and idle the engine until it stalls due to lack of fuel. This should take approximately 15-20 minutes.
10. Turn the ignition to the OFF position.
11. Injectors should be flow-tested at this point. If further cleaning is needed, a repeat of the above procedure should be done.

When the injector restriction returns to zero, proceed to step 12.

12. Disconnect the [J 35800-A](#) from the fuel rail.
13. Reconnect the vehicle fuel pump relay and oil pressure switch connector, if equipped.
14. Remove the [J 37287](#) , or [J 42964-1](#) and [J 42964-2](#) , or [J 42873-1](#) and [J 42873-2](#) and reconnect the vehicle fuel feed and return lines.
15. Start and idle the vehicle for an additional two minutes to ensure residual injector cleaner is flushed from the fuel rail and fuel lines.
16. Pour the entire contents of GM Fuel System Treatment Plus, GM P/N 88861011 (Canadian P/N 88861012) into a nearly empty tank and advise the customer to refuel with up to 76 L (20 gal) of fuel.
17. Advise the customer to use only a Top Tier Detergent gasoline and to add a bottle of GM Fuel System Treatment Plus to the fuel tank at every oil change.

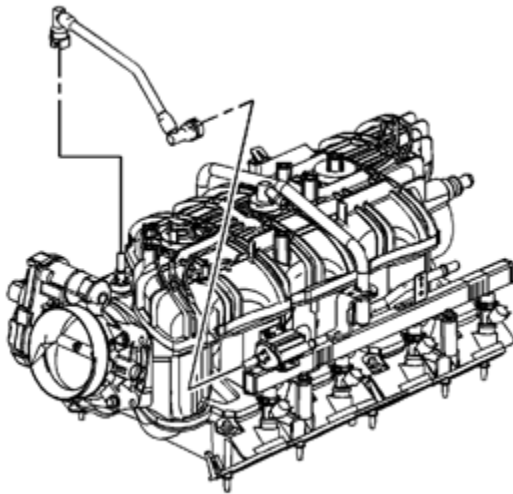
Regular use of GM Fuel System Treatment Plus should keep the customer from having to repeat the injector cleaning procedure.

18. Road test the vehicle to verify that the customer concern has been corrected.

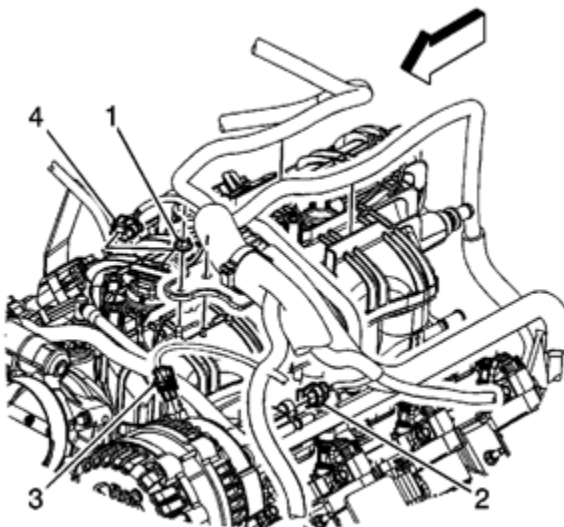
Evaporative Emission Canister Purge Solenoid Valve Replacement

Removal Procedure

Important: Clean all evaporative emission (EVAP) line connections and surrounding areas prior to disconnecting, in order to avoid possible EVAP system contamination.

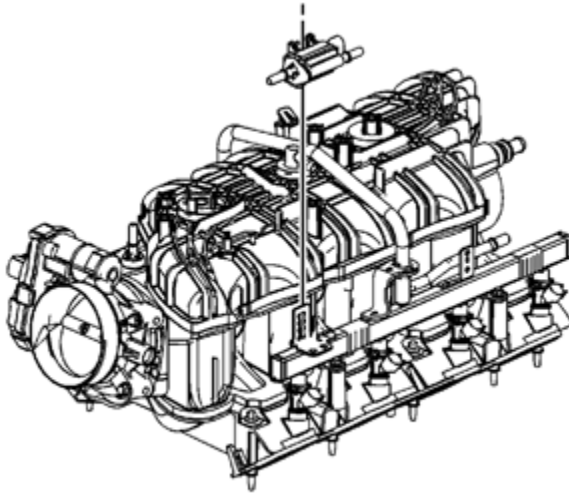


1. Remove the air cleaner outlet duct. Refer to [Air Cleaner Resonator Outlet Duct Replacement](#) .
2. Disconnect the EVAP line quick connect fitting from the EVAP canister purge solenoid. Refer to [Plastic Collar Quick Connect Fitting Service](#) .



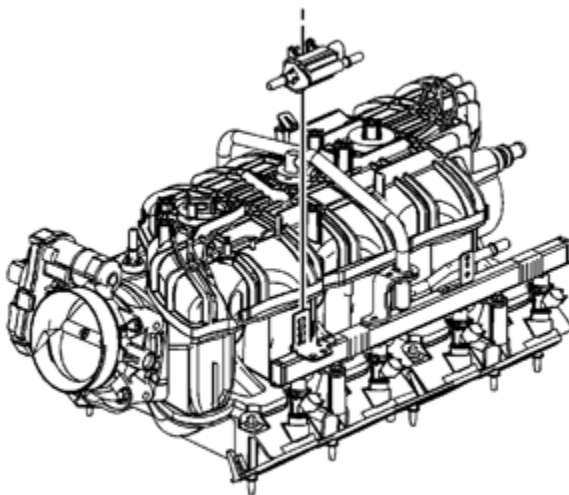


3. Disconnect the engine wiring harness electrical connector (2) from the EVAP canister purge solenoid.
4. Disconnect the chassis EVAP line quick connect fitting from the EVAP canister purge solenoid. Refer to [Plastic Collar Quick Connect Fitting Service](#).

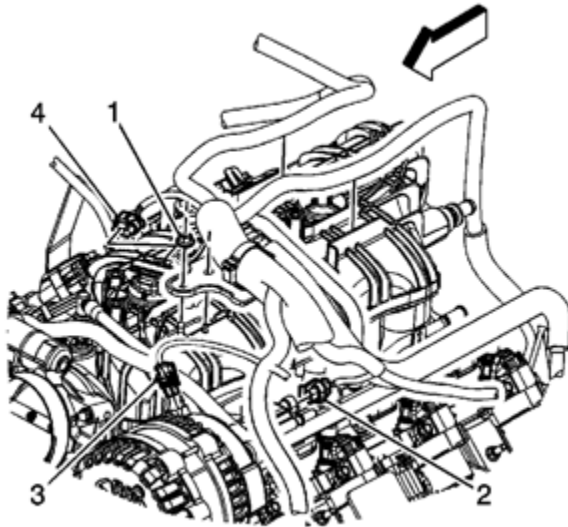


5. Disengage the retainer securing the EVAP canister purge solenoid to the fuel rail.
6. Remove the EVAP canister purge solenoid.

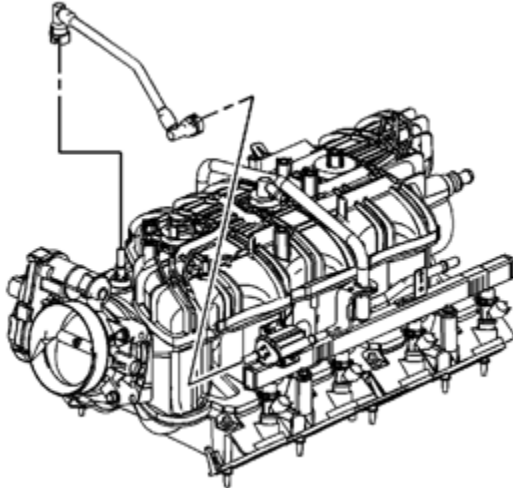
Installation Procedure



1. Install the EVAP canister purge solenoid.
2. Install the EVAP canister purge solenoid to the fuel rail and engage the retainer.



3. Connect the engine wiring harness electrical connector (2) to the EVAP canister purge solenoid.
4. Connect the chassis EVAP line quick connect fitting to the EVAP canister purge solenoid. Refer to [Plastic Collar Quick Connect Fitting Service](#).

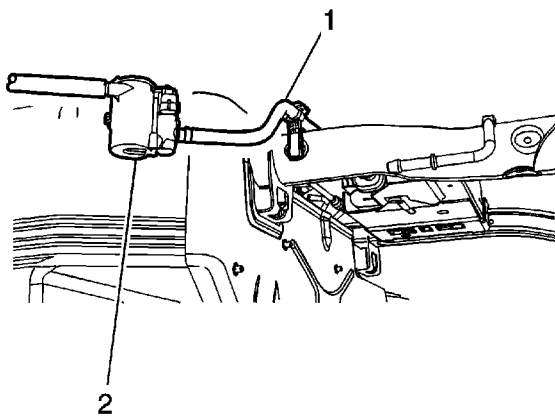


5. Connect the EVAP line quick connect fitting to the EVAP canister purge solenoid. Refer to [Plastic Collar Quick Connect Fitting Service](#).
6. Install the air cleaner outlet duct. Refer to [Air Cleaner Resonator Outlet Duct Replacement](#).

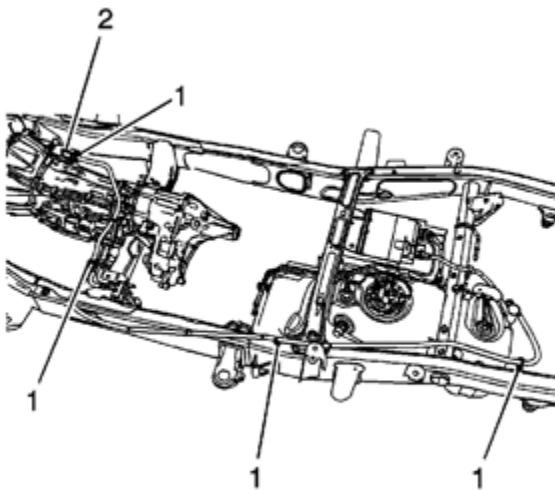
Evaporative Emission Canister Vent Solenoid Valve Replacement (Rear of Tank)

Removal Procedure

Note: Clean the evaporative emission (EVAP) connections and surrounding areas prior to disconnecting the fittings in order to avoid possible system contamination.



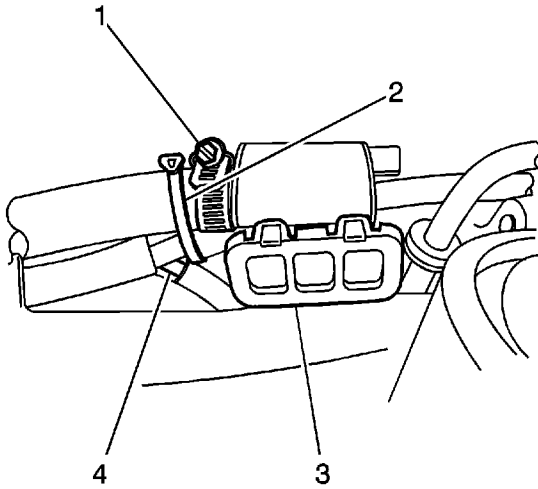
1. Lift and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#).
2. Cut the canister vent solenoid hose (1) approximately 76 mm (3 in) from the evaporative emission canister vent solenoid (2).



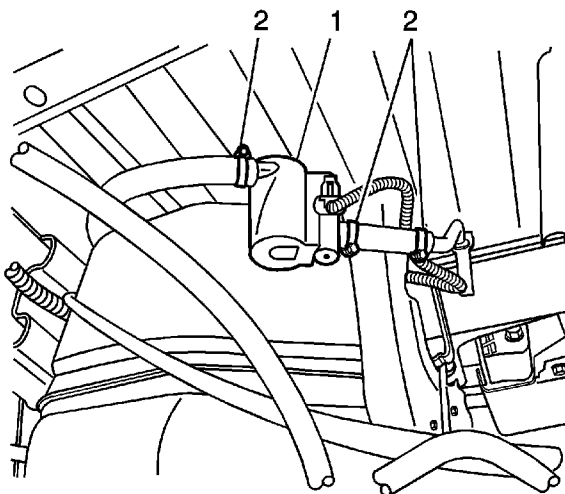


3. Disconnect the vent solenoid hose retainers (1).
4. Remove the vent solenoid hose and filter (2).
5. Replace the vent hose with bulk 5/8 in heater hose.

Installation Procedure



1. Use a hose clamp (1) at the end of the vent hose.
2. Ensure the filter (3) points down.
3. Secure the vent hose with a tie strap (2) to the vent hose tee connector (4).
4. Secure the remaining portion of the vent hose along the frame with tie straps as needed.





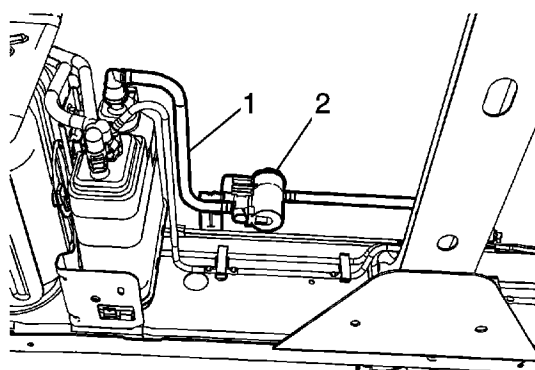
5. Position and install the evaporative canister vent solenoid (1) to the vehicle.
6. Secure both ends with hose clamps (2).

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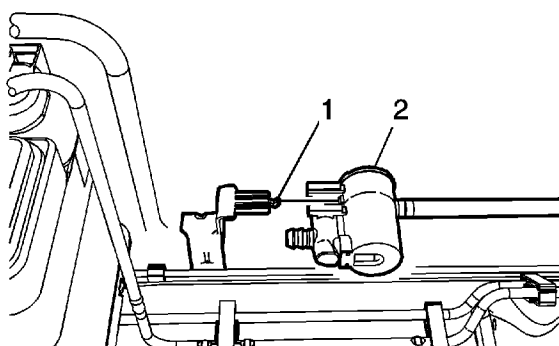
Evaporative Emission Canister Vent Solenoid Valve Replacement (Front of Tank)

Removal Procedure

Note: Clean the evaporative emission (EVAP) connections and surrounding areas prior to disconnecting the fittings in order to avoid possible system contamination.

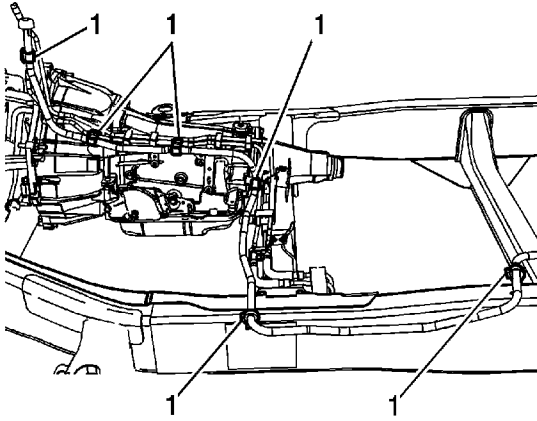


1. Lift and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#).
2. Cut the canister vent solenoid hose (1) approximately 76 mm (3 in) from the evaporative emission canister vent solenoid (2).



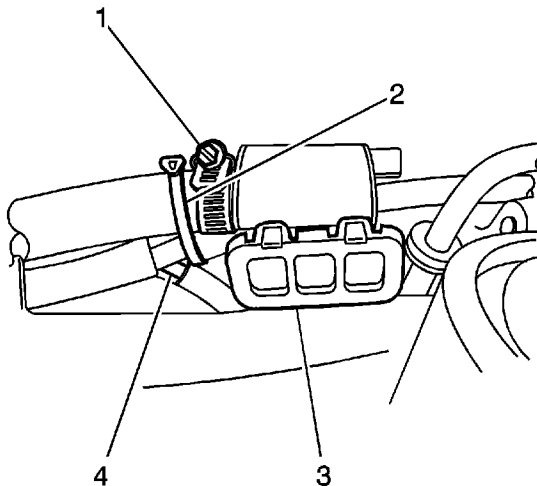


3. Pull back on the retaining tab (1) and release the vent solenoid valve (2).



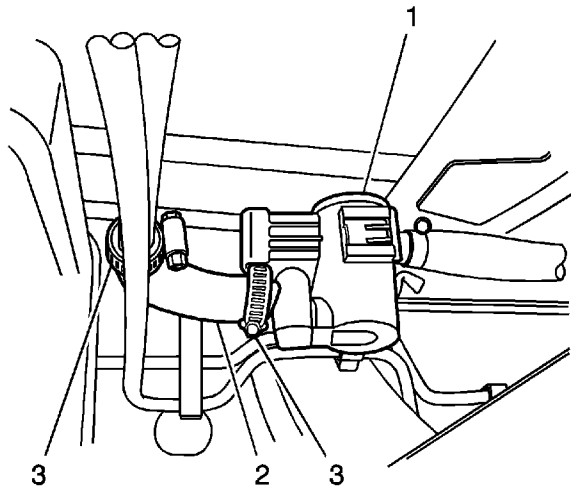
4. Disconnect the vent solenoid hose from the plastic retainers (1).
5. Remove the vent solenoid hose.
6. Replace the vent hose with bulk 5/8 in heater hose.

Installation Procedure



1. Use a hose clamp (1) at the end of the vent hose.
2. Ensure the filter (3) points down.

3. Secure the vent hose with a tie strap (2) to the vent hose tee connector (4).
4. Use 5/8 in heater hose and secure it along the frame with tie straps as needed.



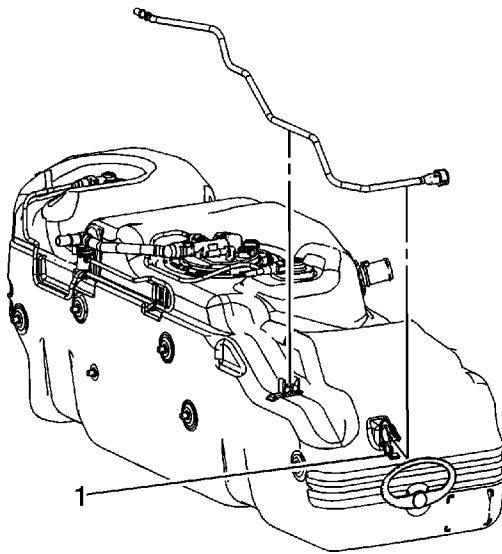
5. Position and install the evaporative canister vent solenoid (1) to the vehicle.
6. Use 5/8 in heater hose (2) to secure both ends with hose clamps (3).

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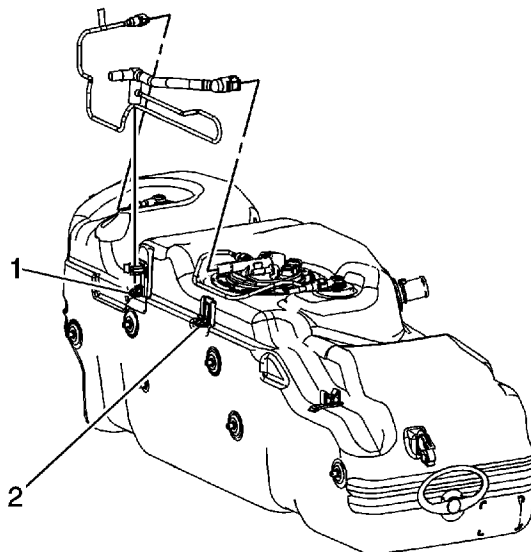
Evaporative Emission System Hoses/Pipes Replacement (15 Reg Cab w/ 26 gal Tank)

Removal Procedure

Important: Clean all fuel and evaporative emission (EVAP) line connections and surrounding areas prior to disconnecting the lines in order to avoid possible fuel and/or EVAP system contamination.

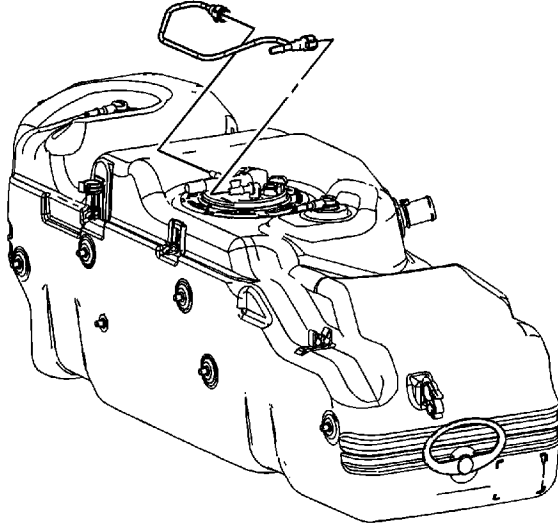


1. Remove the fuel tank. Refer to [Fuel Tank Replacement](#).
2. Remove the EVAP canister purge pipe from the fuel tank clip (1).



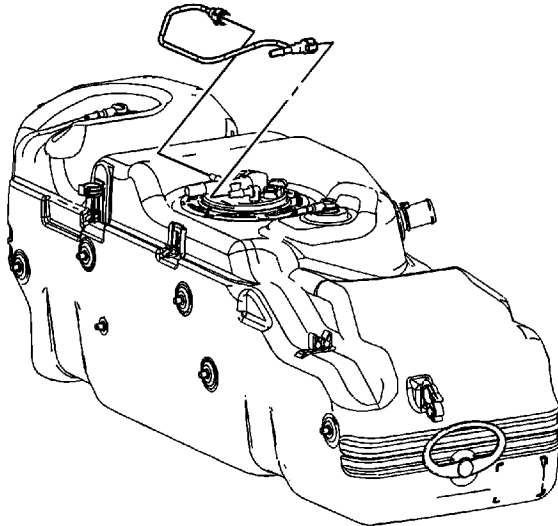


3. Disconnect the EVAP rear pipe quick connect fittings from the rollover valve and the fuel tank module. Refer to [Plastic Collar Quick Connect Fitting Service](#).
4. Remove the EVAP rear pipe from the fuel tank clips (1 and 2).



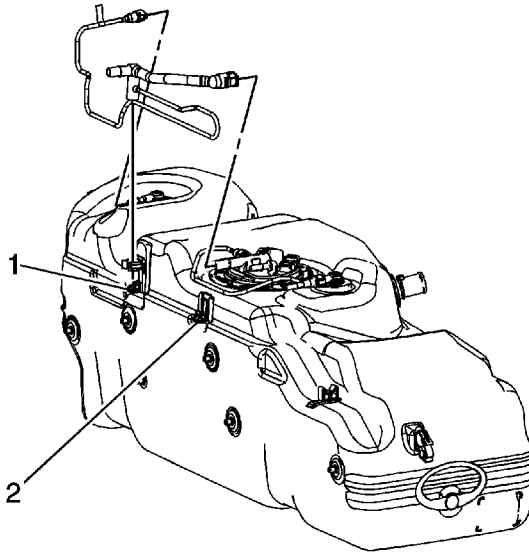
5. Disconnect the small EVAP rear pipe quick connect fittings from the rollover valve and the fuel tank module. Refer to [Plastic Collar Quick Connect Fitting Service](#).

Installation Procedure

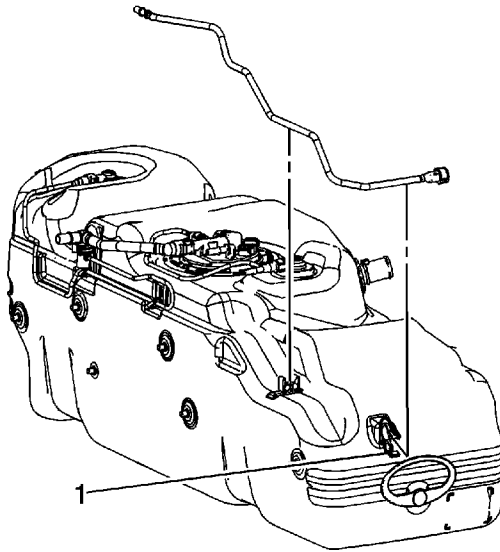


1. Position and connect the small EVAP rear pipe quick connect fittings to the rollover valve and

the fuel tank module. Refer to [Plastic Collar Quick Connect Fitting Service](#).



2. Position and connect the EVAP rear pipe quick connect fittings to the rollover valve and the fuel tank module. Refer to [Plastic Collar Quick Connect Fitting Service](#).
3. Install the EVAP rear pipe to the fuel tank clips (1 and 2).

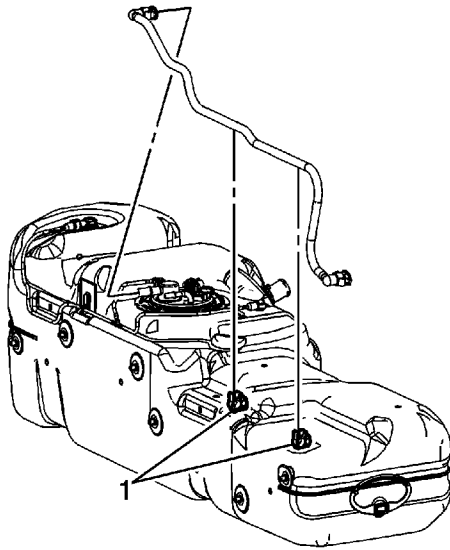


4. Install the EVAP canister purge pipe to the fuel tank clip (1).
5. Install the fuel tank. Refer to [Fuel Tank Replacement](#).

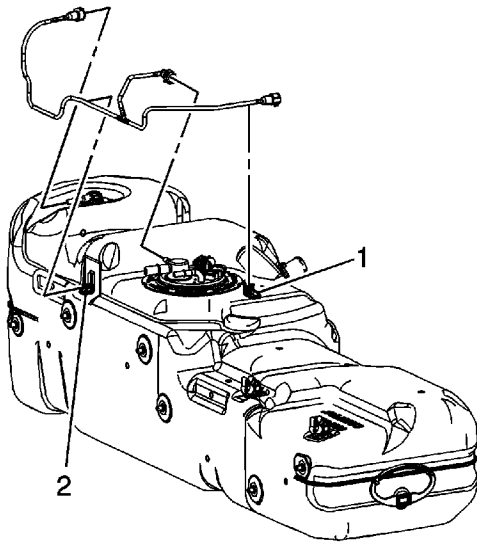
Evaporative Emission System Hoses/Pipes Replacement (15 Ext/Crew Cab w/26 gal Tank)

Removal Procedure

Important: Clean all fuel and evaporative emission (EVAP) line connections and surrounding areas prior to disconnecting the lines in order to avoid possible fuel and/or EVAP system contamination.

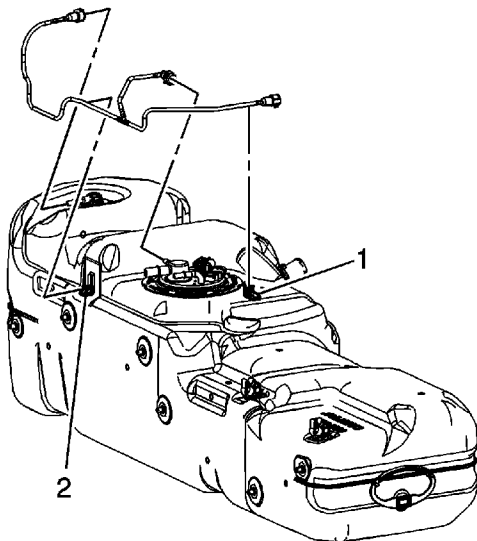


1. Remove the fuel tank. Refer to [Fuel Tank Replacement](#).
2. Disconnect the EVAP pipe quick connect fittings from the fuel tank module. Refer to [Plastic Collar Quick Connect Fitting Service](#).
3. Remove the EVAP pipe from the fuel tank clips (1).

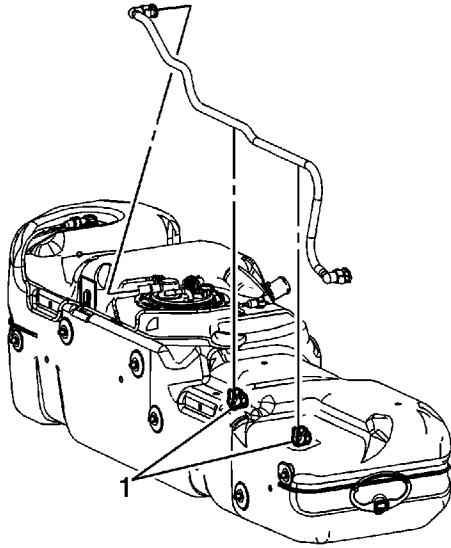


4. Disconnect the EVAP pipe quick connect fittings from the rollover valve and the fuel tank module. Refer to [Plastic Collar Quick Connect Fitting Service](#).
5. Remove the EVAP pipe from the fuel tank clips (1 and 2).

Installation Procedure



1. Position and connect the EVAP pipe quick connect fittings to the rollover valve and the fuel tank module. Refer to [Plastic Collar Quick Connect Fitting Service](#).
2. Install the EVAP pipe to the fuel tank clips (1 and 2).



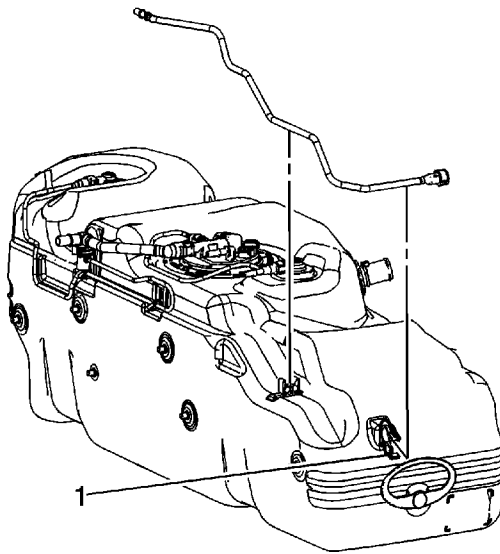
3. Position and connect the EVAP pipe quick connect fittings to the fuel tank module. Refer to [Plastic Collar Quick Connect Fitting Service](#).
4. Install the EVAP pipe to the fuel tank clips (1).
5. Remove the fuel tank. Refer to [Fuel Tank Replacement](#).

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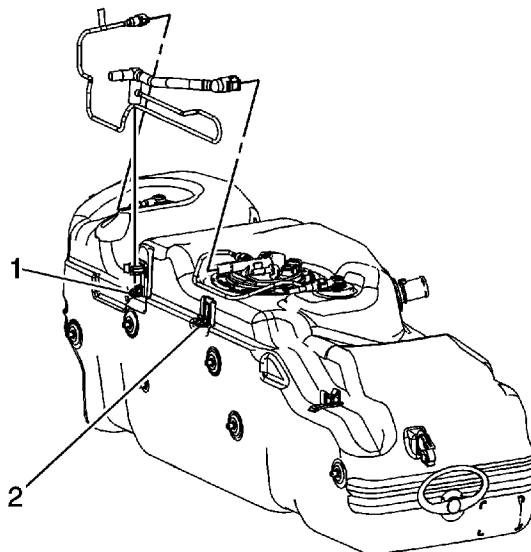
Evaporative Emission System Hoses/Pipes Replacement (25 Ext/Crew Cab w/26 gal Tank)

Removal Procedure

Important: Clean all fuel and evaporative emission (EVAP) line connections and surrounding areas prior to disconnecting the lines in order to avoid possible fuel and/or EVAP system contamination.

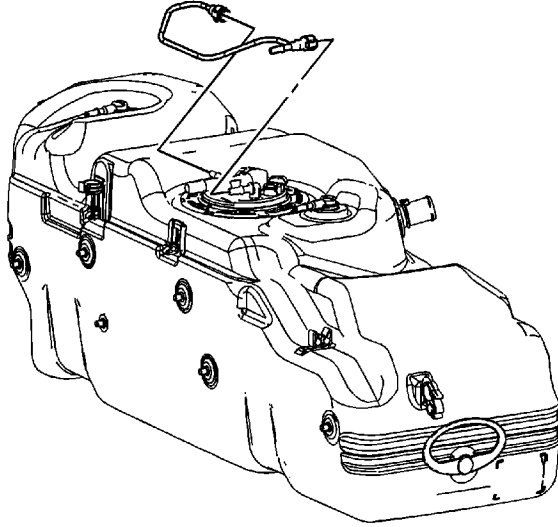


1. Remove the fuel tank. Refer to [Fuel Tank Replacement](#).
2. Remove the EVAP canister purge pipe from the fuel tank clip (1).



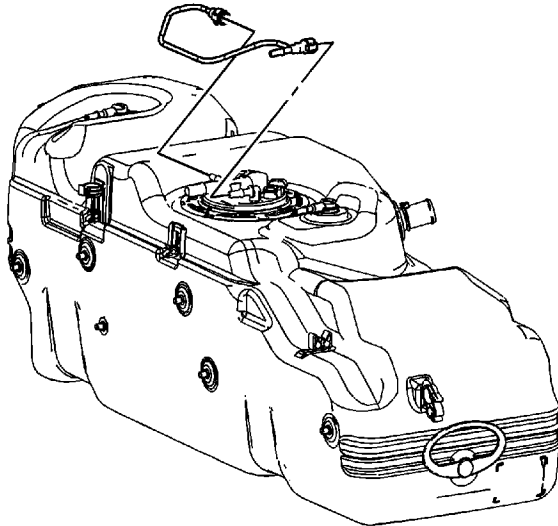


3. Disconnect the EVAP rear pipe quick connect fittings from the rollover valve and the fuel tank module. Refer to [Plastic Collar Quick Connect Fitting Service](#).
4. Remove the EVAP rear pipe from the fuel tank clips (1 and 2).



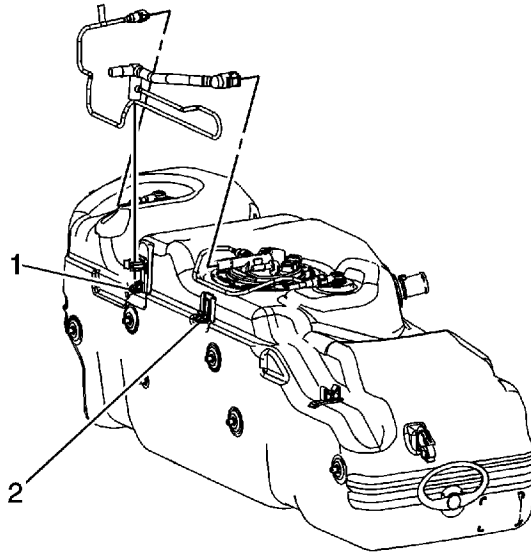
5. Disconnect the small EVAP rear pipe quick connect fittings from the rollover valve and the fuel tank module. Refer to [Plastic Collar Quick Connect Fitting Service](#).

Installation Procedure

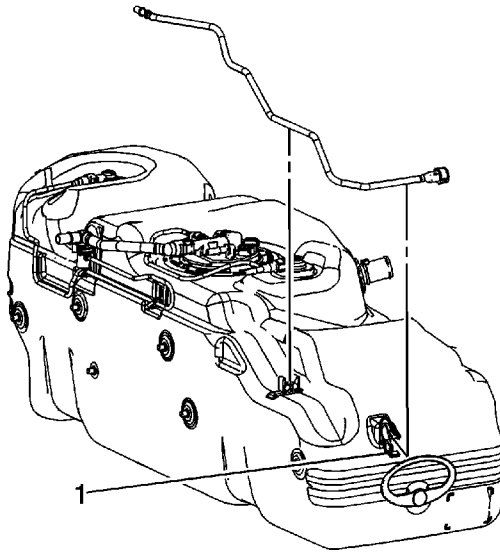


1. Position and connect the small EVAP rear pipe quick connect fittings to the rollover valve and

the fuel tank module. Refer to [Plastic Collar Quick Connect Fitting Service](#) .



2. Position and connect the EVAP rear pipe quick connect fittings to the rollover valve and the fuel tank module. Refer to [Plastic Collar Quick Connect Fitting Service](#) .
3. Install the EVAP rear pipe to the fuel tank clips (1 and 2).

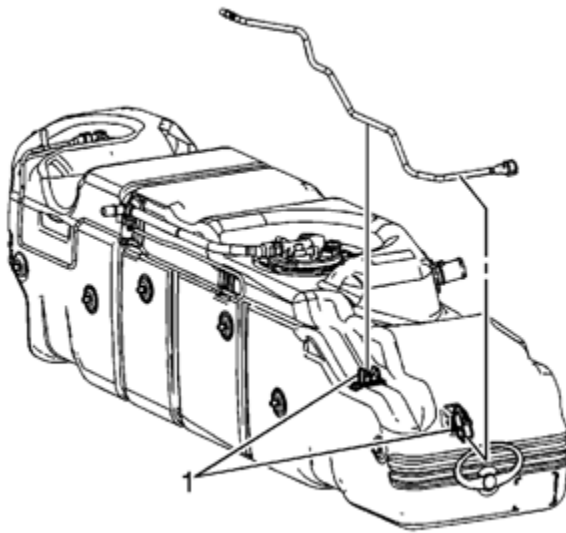


4. Install the EVAP canister purge pipe to the fuel tank clip (1).
5. Install the fuel tank. Refer to [Fuel Tank Replacement](#) .

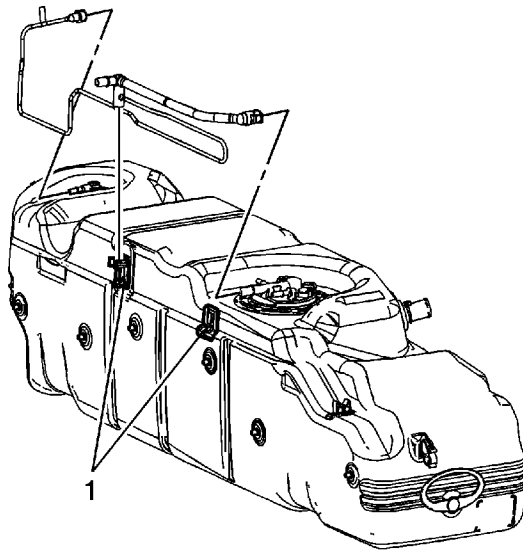
Evaporative Emission System Hoses/Pipes Replacement (15/25 Reg/Ext/Crew Cab w/34 gal Tank)

Removal Procedure

Important: Clean all fuel and evaporative emission (EVAP) line connections and surrounding areas prior to disconnecting the lines in order to avoid possible fuel and/or EVAP system contamination.

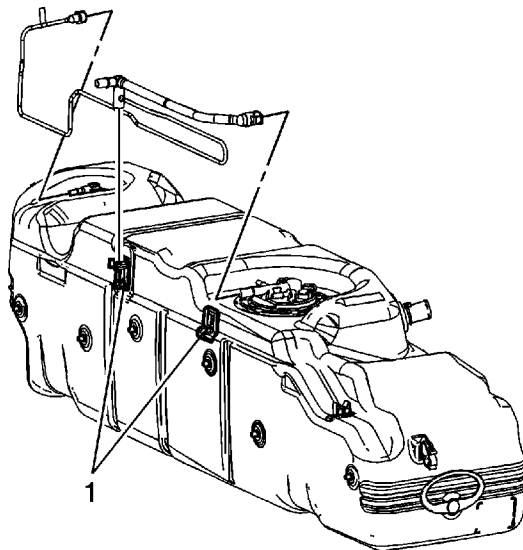


1. Remove the fuel tank. Refer to [Fuel Tank Replacement](#).
2. Remove the EVAP pipe from the fuel tank clips (1).

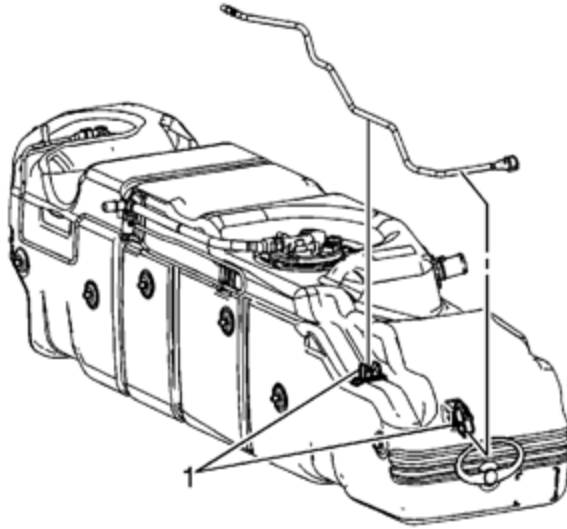


3. Disconnect the EVAP pipe quick connect fittings from the rollover valve and the fuel tank module. Refer to [Plastic Collar Quick Connect Fitting Service](#).
4. Remove the EVAP pipe from the fuel tank clips (1).

Installation Procedure



1. Position and connect the EVAP pipe quick connect fittings to the rollover valve and the fuel tank module. Refer to [Plastic Collar Quick Connect Fitting Service](#).
2. Install the EVAP pipe to the fuel tank clips (1).



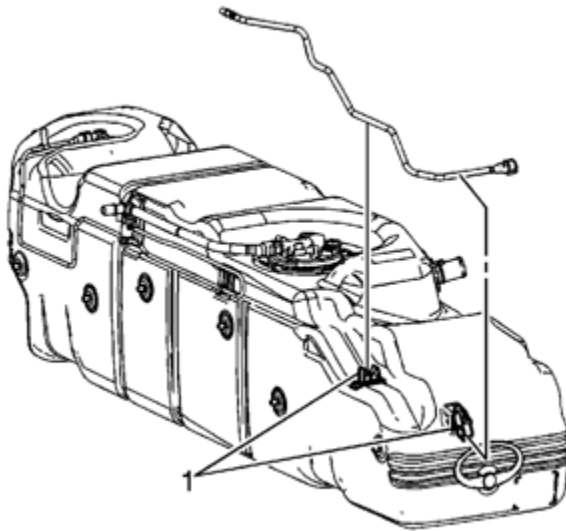
3. Install the EVAP pipe to the fuel tank clips (1).
4. Install the fuel tank. Refer to [Fuel Tank Replacement](#).

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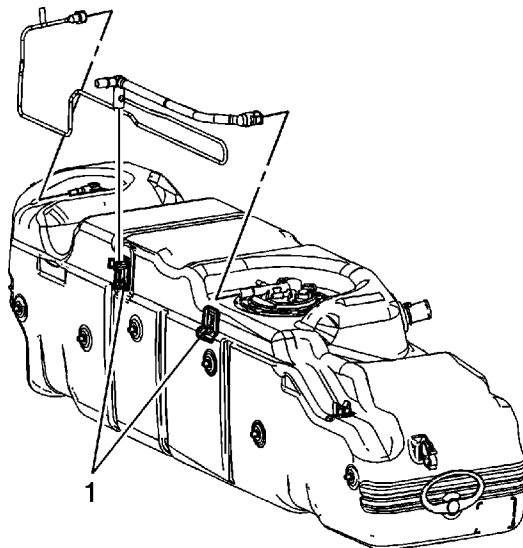
Evaporative Emission System Hoses/Pipes Replacement (35 Reg/Ext/Crew Cab w/35 gal Tank)

Removal Procedure

Important: Clean all fuel and evaporative emission (EVAP) line connections and surrounding areas prior to disconnecting the lines in order to avoid possible fuel and/or EVAP system contamination.



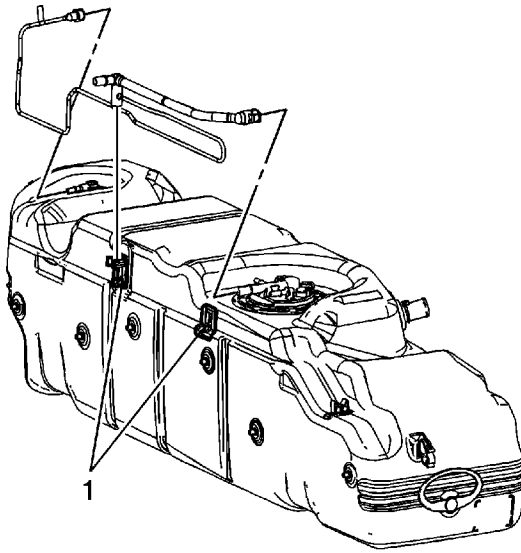
1. Remove the fuel tank. Refer to [Fuel Tank Replacement](#) .
2. Remove the EVAP pipe from the fuel tank clips (1).



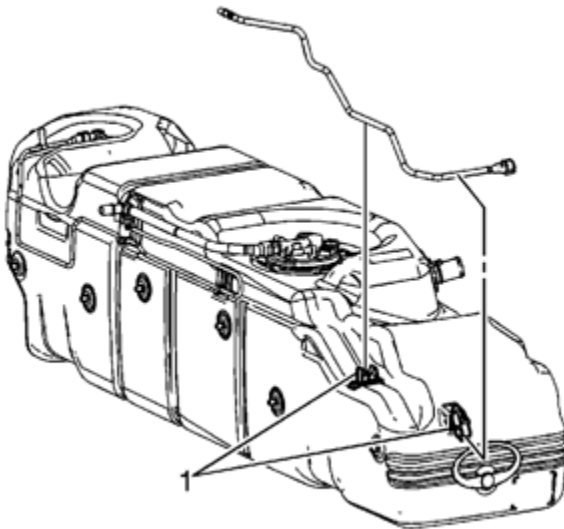


3. Disconnect the EVAP pipe quick connect fittings from the rollover valve and the fuel tank module. Refer to [Plastic Collar Quick Connect Fitting Service](#) .
4. Remove the EVAP pipe from the fuel tank clips (1).

Installation Procedure



1. Position and connect the EVAP pipe quick connect fittings to the rollover valve and the fuel tank module. Refer to [Plastic Collar Quick Connect Fitting Service](#) .
2. Install the EVAP pipe to the fuel tank clips (1).



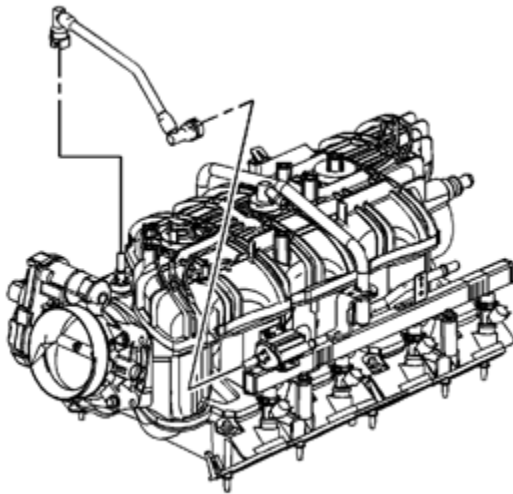
3. Install the EVAP pipe to the fuel tank clips (1).
4. Install the fuel tank. Refer to [Fuel Tank Replacement](#) .

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Evaporative Emission Hoses/Pipes Replacement - Engine

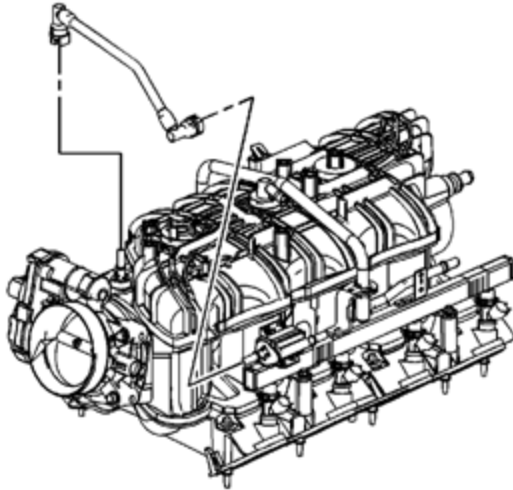
Removal Procedure

Important: Clean all evaporative emission (EVAP) line connections and surrounding areas prior to disconnecting the fittings in order to avoid possible system contamination.



1. Remove the upper intake manifold sight shield. Refer to [Upper Intake Manifold Sight Shield Replacement](#) .
2. Disconnect the EVAP line quick connect fitting at the intake manifold. Refer to [Plastic Collar Quick Connect Fitting Service](#) .
3. Disconnect the EVAP line quick connect fitting at the EVAP canister purge solenoid. Refer to [Plastic Collar Quick Connect Fitting Service](#) .

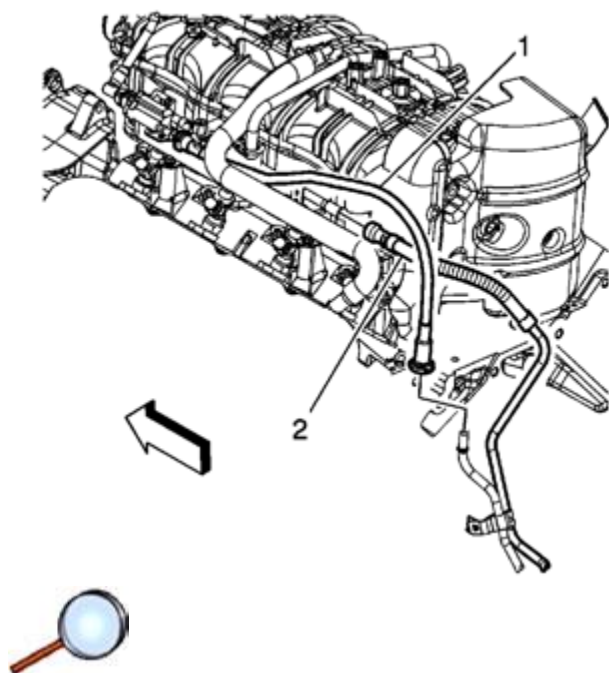
Installation Procedure



1. Connect the EVAP line quick connect fitting at the EVAP canister purge solenoid. Refer to [Plastic Collar Quick Connect Fitting Service](#) .
2. Connect the EVAP line quick connect fitting at the intake manifold. Refer to [Plastic Collar Quick Connect Fitting Service](#) .
3. Install the upper intake manifold sight shield. Refer to [Upper Intake Manifold Sight Shield Replacement](#) .

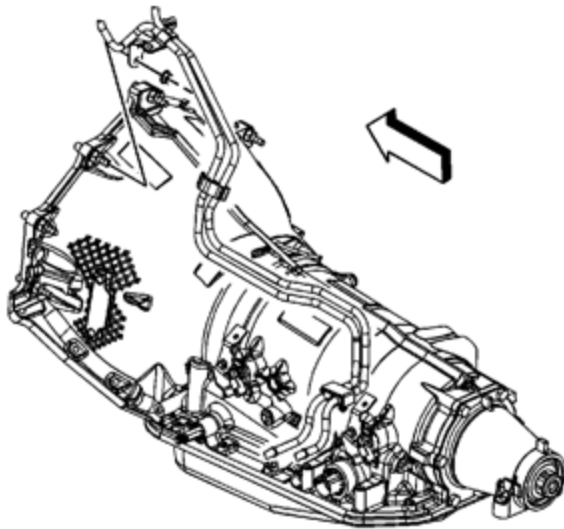
Evaporative Emission Hose / Pipe Replacement - Chassis (1500 Regular Cab)

Removal Procedure

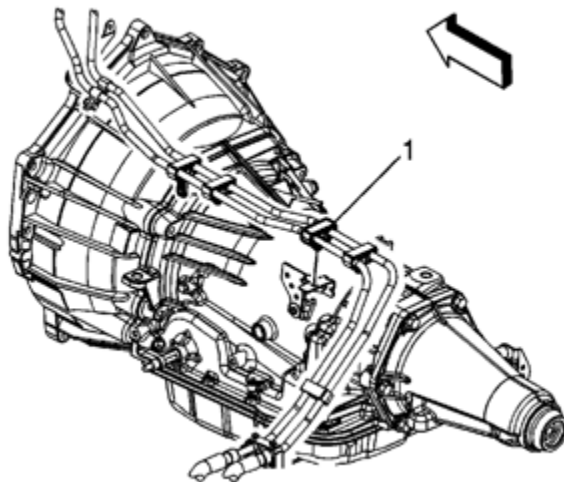


Note: Clean all fuel and evaporative emission (EVAP) lines connections and surrounding areas prior to disconnecting the lines in order to avoid possible fuel and/or EVAP system contamination.

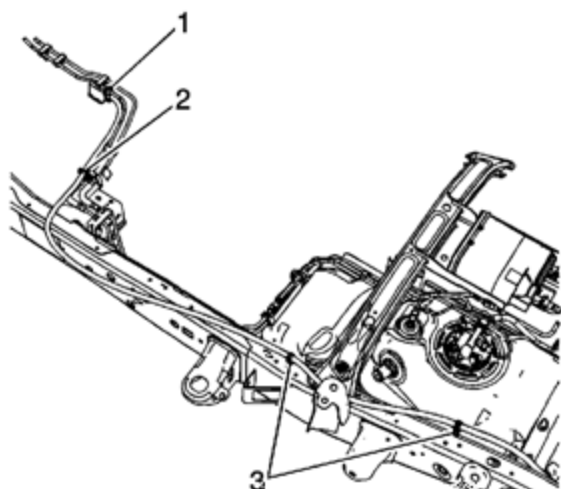
1. Relieve the fuel system pressure. Refer to the [Fuel Pressure Relief](#).
2. Disconnect the engine evaporative emission (EVAP) line (1) quick connect fitting from the chassis EVAP line. Refer to [Plastic Collar Quick Connect Fitting Service](#).
3. Disconnect the fuel feed line quick connect fitting (2) from the fuel rail. Refer to [Metal Collar Quick Connect Fitting Service](#).
4. Cap the fuel rail and EVAP pipes.
5. Raise and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#).
6. Unbolt and reposition the front propeller shaft, if required. Refer to [Front Propeller Shaft Replacement](#).



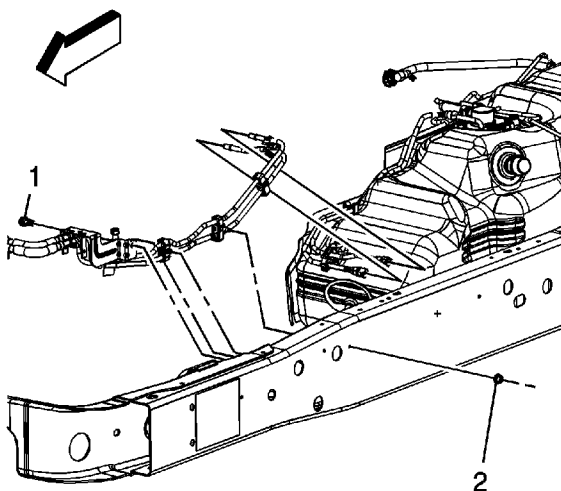
7. Remove the fuel pipe bracket nut from the bellhousing stud.



8. Remove the fuel line clip from the bracket on the automatic transmission.
9. If equipped with 4-wheel drive (4WD), remove the fuel hose/pipe clip from the bracket on the transfer case.

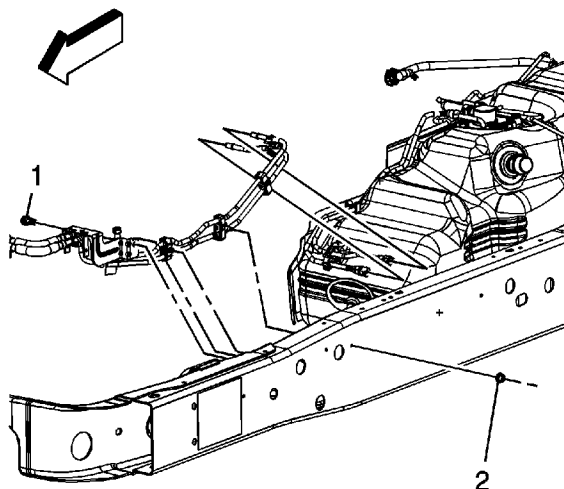


10. Remove the EVAP canister vent solenoid clip (1) from the chassis EVAP line and secure out of the way.
11. Remove the EVAP canister vent solenoid pipe clip (2) from the chassis EVAP line.



12. Disconnect the fuel tank EVAP line quick connect fitting from the chassis line. Refer to [Plastic Collar Quick Connect Fitting Service](#).
13. Disconnect the fuel tank fuel feed line quick connect fitting from the chassis line. Refer to [Plastic Collar Quick Connect Fitting Service](#).
14. Cap the fuel and EVAP lines in order to prevent possible fuel and/or EVAP system contamination.
15. Remove the fuel line bracket bolt (1).
16. Remove the fuel/EVAP line clip nut (2).
17. Remove the fuel/EVAP line clips from the frame and crossmember.
18. Remove the fuel/EVAP line assembly from the vehicle.

Installation Procedure



1. Position and install the fuel/EVAP line assembly to the vehicle.
2. Install the fuel/EVAP line bracket locator tab to the frame.
3. Install the fuel/EVAP line clips to the frame and crossmember.

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

4. Install the fuel/EVAP line bracket bolt (1).

Tighten

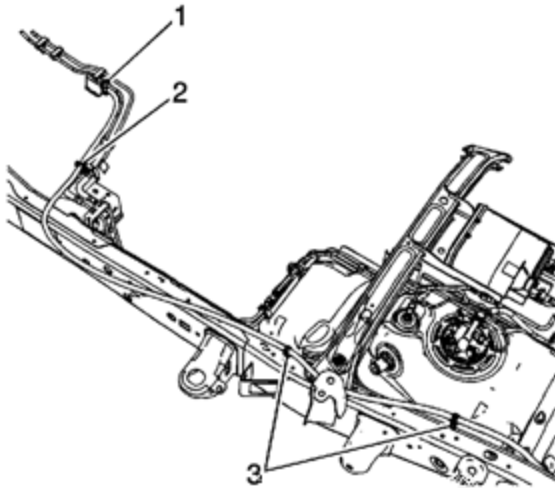
Tighten the bolt to 9 N·m (80 lb in).

5. Install the fuel/EVAP line clip nut (2).

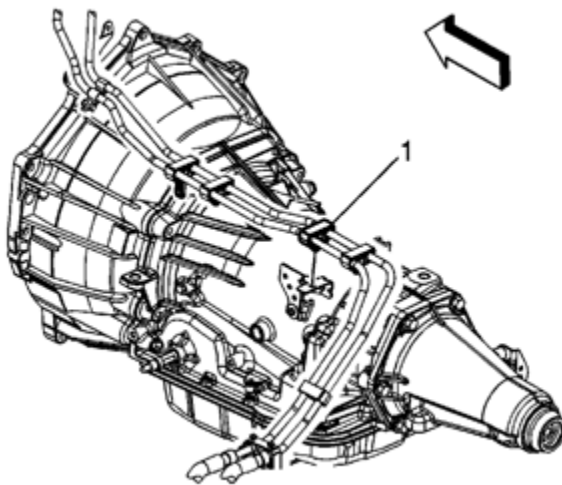
Tighten

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

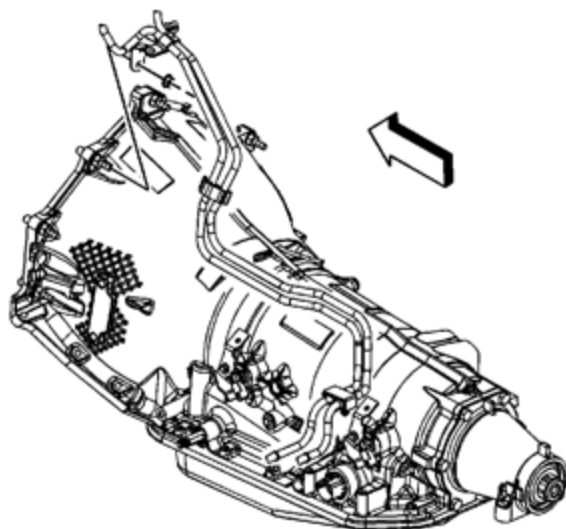
6. Remove the caps from the fuel and EVAP lines.
7. Connect the fuel tank EVAP line quick connect fitting to the chassis line. Refer to [Plastic Collar Quick Connect Fitting Service](#).
8. Connect the fuel tank fuel feed line quick connect fitting to the chassis line. Refer to [Plastic Collar Quick Connect Fitting Service](#).



9. Unscure and position the EVAP canister vent solenoid clip (1) to the chassis EVAP line.
10. Install the EVAP canister vent solenoid pipe clip (2) to the chassis EVAP line.



11. If equipped with 4WD, install the fuel hose/pipe clip to the bracket on the transfer case.
12. Install the fuel line clip to the bracket on the automatic transmission.

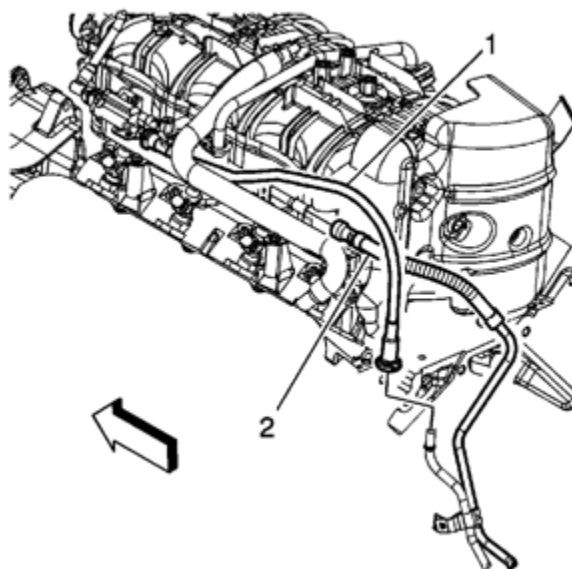


13. Install the fuel pipe bracket nut to the bellhousing stud.

Tighten

Tighten the nut to 25 N·m (18 lb ft).

14. Position and install the front propeller shaft, if required. Refer to [Front Propeller Shaft Replacement](#).
15. Lower the vehicle.



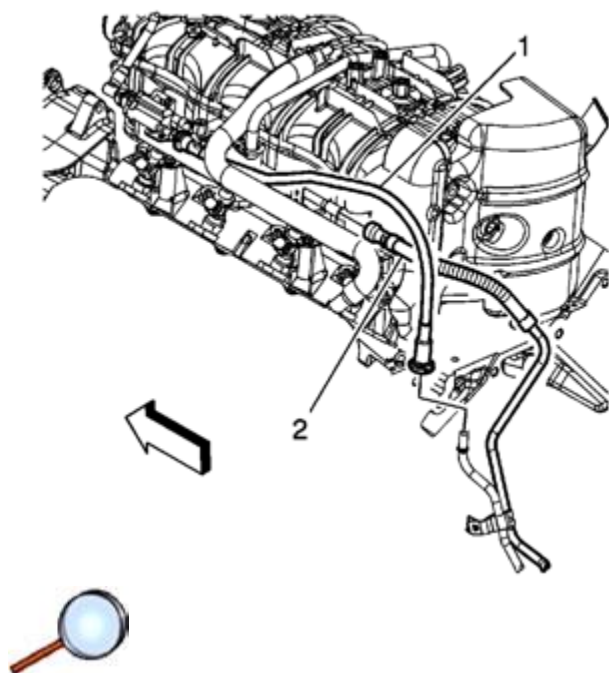
16. Remove the caps from the fuel rail and EVAP line.
17. Connect the EVAP line (1) quick connect fitting to the chassis EVAP line. Refer to [Plastic Collar Quick Connect Fitting Service](#).
18. Connect the fuel feed line (2) quick connect fitting to the fuel rail. Refer to [Metal Collar Quick Connect Fitting Service](#).

19. Install the fuel fill cap.
20. Connect the negative battery cable. Refer to [Battery Negative Cable Disconnection and Connection](#).
21. Use the following procedure in order to inspect for leaks:
 - 21.1. Turn the ignition ON, with the engine OFF, for 2 seconds.
 - 21.2. Turn the ignition OFF for 10 seconds.
 - 21.3. Turn the ignition ON, with the engine OFF.
 - 21.4. Inspect for fuel leaks.
22. Install the intake manifold sight shield. Refer to [Upper Intake Manifold Sight Shield Replacement](#).

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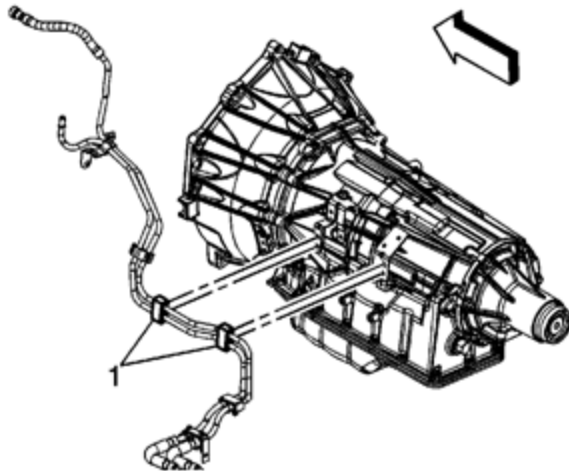
Evaporative Emission Hose / Pipe Replacement - Chassis (2500 / 3500 Extended Cab)

Removal Procedure

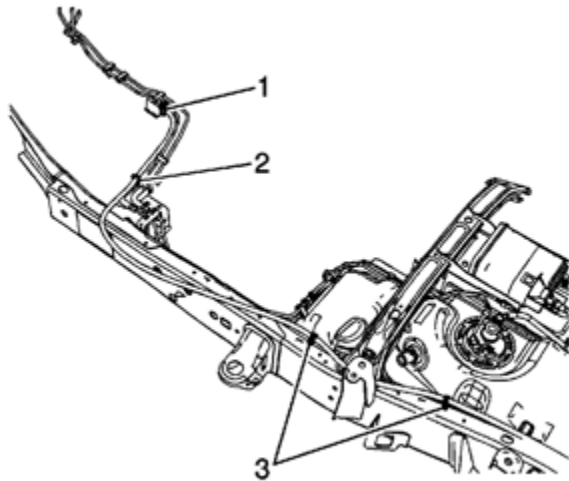


Note: Clean all fuel and evaporative emission (EVAP) lines connections and surrounding areas prior to disconnecting the lines in order to avoid possible fuel and/or EVAP system contamination.

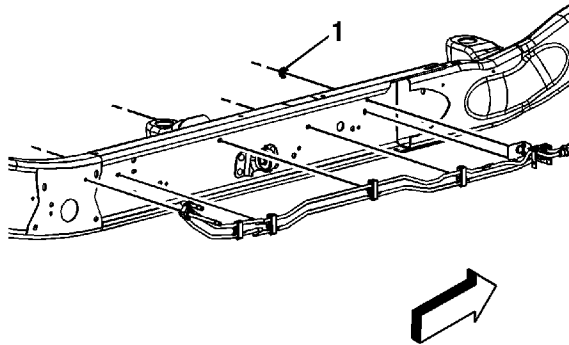
1. Relieve the fuel system pressure. Refer to the [Fuel Pressure Relief](#).
2. Disconnect the engine evaporative emission (EVAP) line (1) quick connect fitting from the chassis EVAP line. Refer to [Plastic Collar Quick Connect Fitting Service](#).
3. Disconnect the fuel feed line quick connect fitting (2) from the fuel rail. Refer to [Metal Collar Quick Connect Fitting Service](#).
4. Cap the fuel rail and EVAP pipes.
5. Raise and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#).
6. Unbolt and reposition the front propeller shaft, if required. Refer to [Front Propeller Shaft Replacement](#).



7. Remove the fuel pipe bracket nut from the bellhousing stud.
8. Remove the fuel line clips (1) from the bracket on the automatic transmission.
9. If equipped with 4-wheel drive (4WD), remove the fuel hose/pipe clip from the bracket on the transfer case.

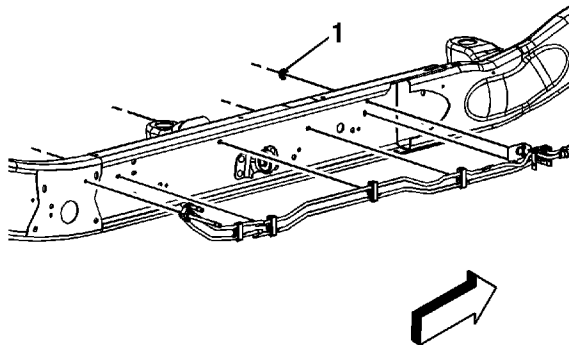


10. Remove the EVAP canister vent solenoid clip (1) from the chassis EVAP line and secure out of the way.
11. Remove the EVAP canister vent solenoid pipe clip (2) from the chassis EVAP line.



12. Disconnect the fuel tank fuel feed line quick connect fitting from the chassis line. Refer to [Plastic Collar Quick Connect Fitting Service](#).
13. Disconnect the fuel tank EVAP line quick connect fitting from the chassis line. Refer to [Plastic Collar Quick Connect Fitting Service](#).
14. Cap the fuel and EVAP lines in order to prevent possible fuel and/or EVAP system contamination.
15. Remove the fuel/EVAP line clip nuts (1).
16. Remove the fuel/EVAP line clips from the frame and crossmember.
17. Remove the fuel/EVAP line assembly from the vehicle.

Installation Procedure



1. Position and install the fuel/EVAP line assembly to the vehicle.
2. Install the fuel/EVAP line bracket locator tab to the frame.
3. Install the fuel/EVAP line clips to the frame and crossmember.

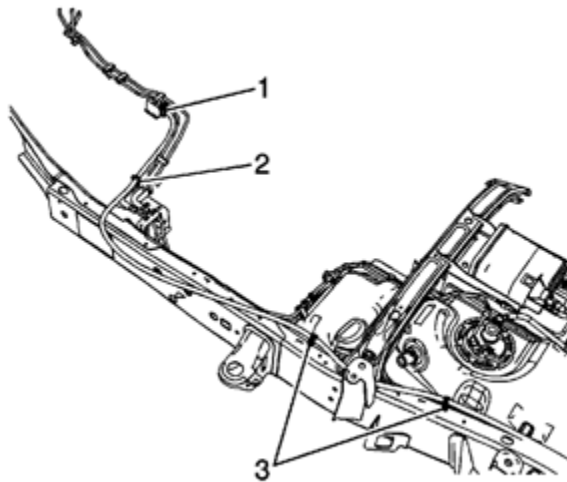
Caution: Refer to [Fastener Caution](#) in the Preface section.

4. Install the fuel/EVAP line clip nuts (2).

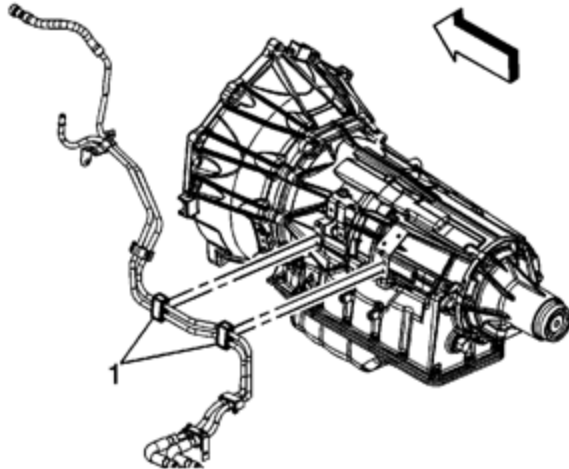
Tighten

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

5. Remove the caps from the fuel and EVAP lines.
6. Connect the fuel tank EVAP line quick connect fitting to the chassis line. Refer to [Plastic Collar Quick Connect Fitting Service](#).
7. Connect the fuel tank fuel feed line quick connect fitting to the chassis line. Refer to [Plastic Collar Quick Connect Fitting Service](#).



8. Unsecure and position the EVAP canister vent solenoid clip (1) to the chassis EVAP line.
9. Install the EVAP canister vent solenoid pipe clip (2) from the chassis EVAP line.

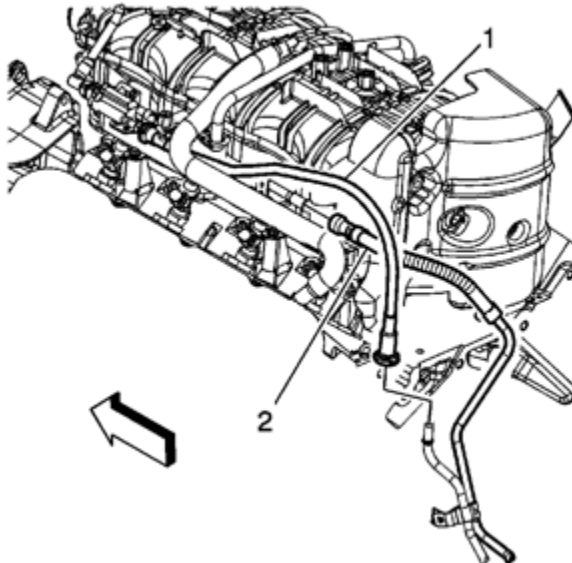


10. If equipped with 4WD, install the fuel hose/pipe clip to the bracket on the transfer case.
11. Install the fuel line clip to the bracket on the automatic transmission.
12. Install the fuel pipe bracket nut to the bellhousing stud.

Tighten

Tighten the nut to 25 N·m (18 lb ft).

13. Position and install the front propeller shaft, if required. Refer to [Front Propeller Shaft Replacement](#).
14. Lower the vehicle.



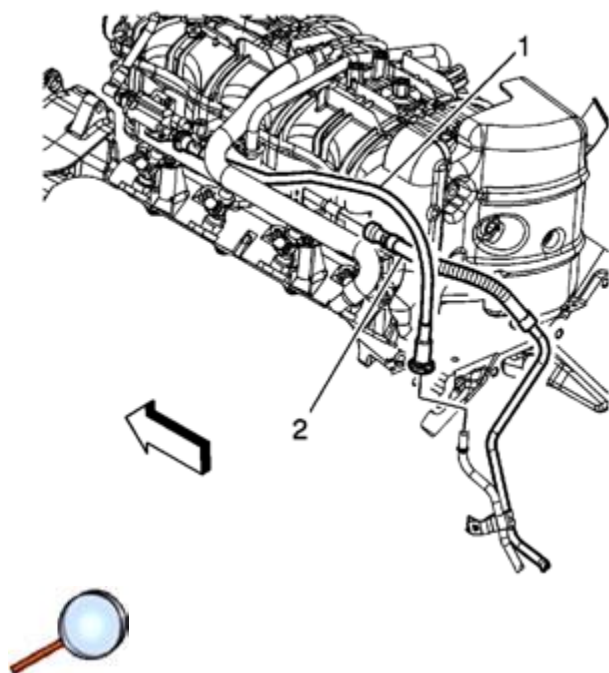
15. Remove the caps from the fuel rail and EVAP line.
16. Connect the EVAP line (1) quick connect fitting to the chassis EVAP line. Refer to [Plastic Collar Quick Connect Fitting Service](#).

17. Connect the fuel feed line (2) quick connect fitting to the fuel rail. Refer to [Metal Collar Quick Connect Fitting Service](#).
18. Install the fuel fill cap.
19. Connect the negative battery cable. Refer to [Battery Negative Cable Disconnection and Connection](#).
20. Use the following procedure in order to inspect for leaks:
 - 20.1. Turn the ignition ON, with the engine OFF, for 2 seconds.
 - 20.2. Turn the ignition OFF for 10 seconds.
 - 20.3. Turn the ignition ON, with the engine OFF.
 - 20.4. Inspect for fuel leaks.
21. Install the intake manifold sight shield. Refer to [Upper Intake Manifold Sight Shield Replacement](#).

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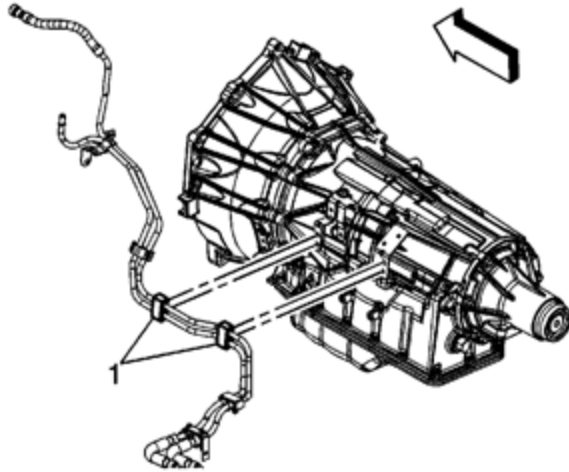
Evaporative Emission Hose / Pipe Replacement - Chassis (2500 / 3500 Crew Cab)

Removal Procedure

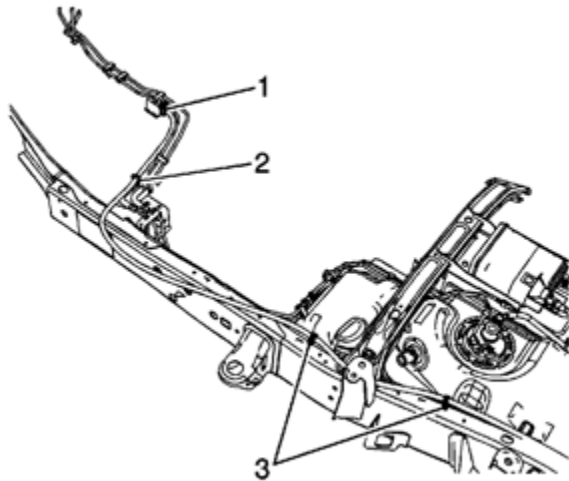


Note: Clean all fuel and evaporative emission (EVAP) lines connections and surrounding areas prior to disconnecting the lines in order to avoid possible fuel and/or EVAP system contamination.

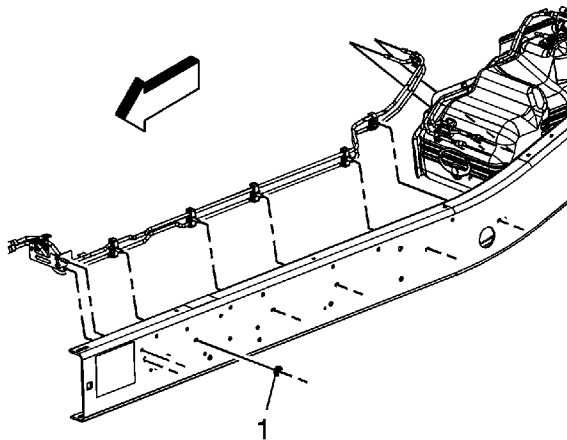
1. Relieve the fuel system pressure. Refer to the [Fuel Pressure Relief](#).
2. Disconnect the engine evaporative emission (EVAP) line (1) quick connect fitting from the chassis EVAP line. Refer to [Plastic Collar Quick Connect Fitting Service](#).
3. Disconnect the fuel feed line quick connect fitting (2) from the fuel rail. Refer to [Metal Collar Quick Connect Fitting Service](#).
4. Cap the fuel rail and EVAP pipes.
5. Raise and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#).
6. Unbolt and reposition the front propeller shaft, if required. Refer to [Front Propeller Shaft Replacement](#).
7. Unbolt and reposition the brake pressure modulator valve (BPMV). Refer to [Brake Pressure Modulator Valve Replacement](#).



8. Remove the fuel pipe bracket nut from the bellhousing stud.
9. Remove the fuel line clips (1) from the bracket on the automatic transmission.
10. If equipped with 4-wheel drive (4WD), remove the fuel hose/pipe clip from the bracket on the transfer case.

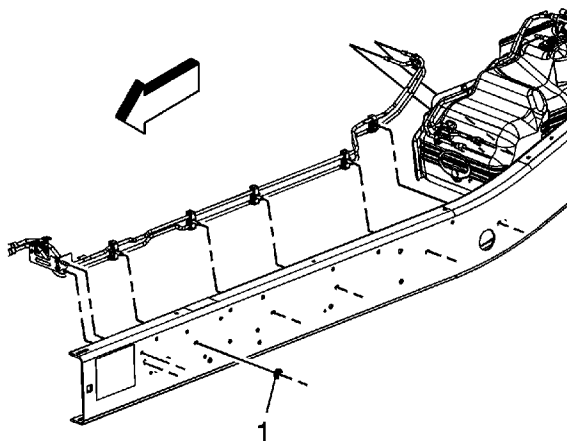


11. Remove the EVAP canister vent solenoid clip (1) from the chassis EVAP line and secure out of the way.
12. Remove the EVAP canister vent solenoid pipe clip (2) from the chassis EVAP line.



13. Disconnect the fuel tank fuel feed line quick connect fitting from the chassis line. Refer to [Plastic Collar Quick Connect Fitting Service](#).
14. Disconnect the fuel tank EVAP line quick connect fitting from the chassis line. Refer to [Plastic Collar Quick Connect Fitting Service](#).
15. Cap the fuel and EVAP lines in order to prevent possible fuel and/or EVAP system contamination.
16. Remove the fuel/EVAP line clip nuts (1).
17. Remove the fuel/EVAP line clips from the frame and crossmember.
18. Remove the fuel/EVAP line assembly from the vehicle.

Installation Procedure



1. Position and install the fuel/EVAP line assembly to the vehicle.
2. Install the fuel/EVAP line bracket locator tab to the frame.
3. Install the fuel/EVAP line clips to the frame and crossmember.

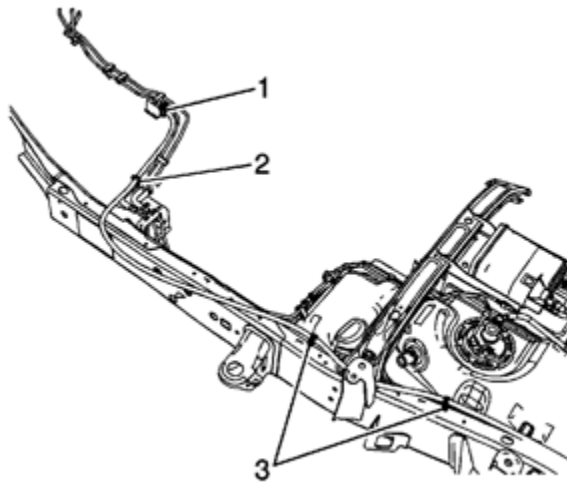
Caution: Refer to [Fastener Caution](#) in the Preface section.

4. Install the fuel/EVAP line clip nuts (2).

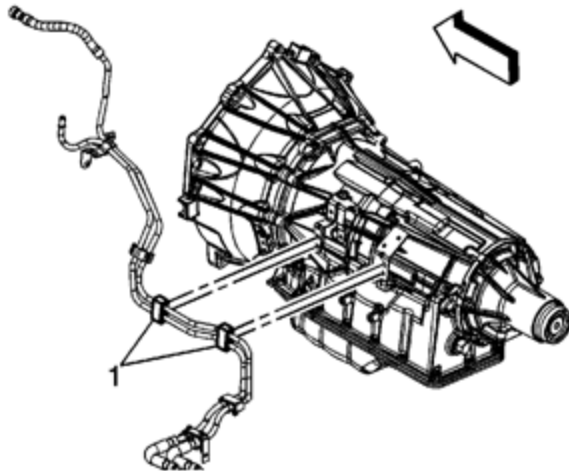
Tighten

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

5. Remove the caps from the fuel and EVAP lines.
6. Connect the fuel tank EVAP line quick connect fitting to the chassis line. Refer to [Plastic Collar Quick Connect Fitting Service](#).
7. Connect the fuel tank fuel feed line quick connect fitting to the chassis line. Refer to [Plastic Collar Quick Connect Fitting Service](#).



8. Unsecure and position the EVAP canister vent solenoid clip (1) to the chassis EVAP line.
9. Install the EVAP canister vent solenoid pipe clip (2) from the chassis EVAP line.

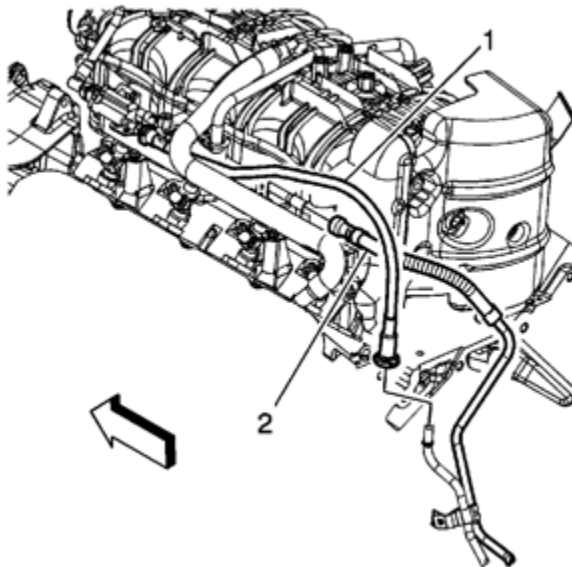


10. If equipped with 4WD, install the fuel hose/pipe clip to the bracket on the transfer case.
11. Install the fuel line clip to the bracket on the automatic transmission.
12. Install the fuel pipe bracket nut to the bellhousing stud.

Tighten

Tighten the nut to 25 N·m (18 lb ft).

13. Position and install the BPMV. Refer to [Brake Pressure Modulator Valve Replacement](#).
14. Position and install the front propeller shaft, if required. Refer to [Front Propeller Shaft Replacement](#).
15. Lower the vehicle.



16. Remove the caps from the fuel rail and EVAP line.
17. Connect the EVAP line (1) quick connect fitting to the chassis EVAP line. Refer to [Plastic](#)

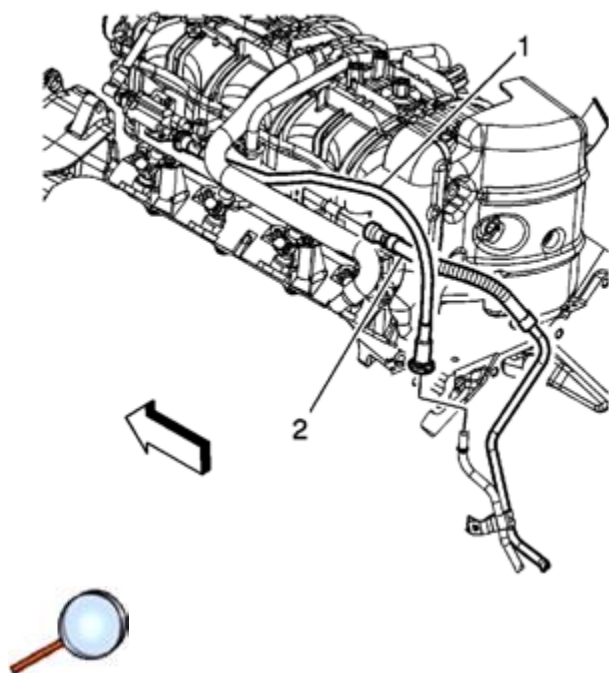
[Collar Quick Connect Fitting Service.](#)

18. Connect the fuel feed line (2) quick connect fitting to the fuel rail. Refer to [Metal Collar Quick Connect Fitting Service.](#)
19. Install the fuel fill cap.
20. Connect the negative battery cable. Refer to [Battery Negative Cable Disconnection and Connection.](#)
21. Use the following procedure in order to inspect for leaks:
 - 21.1. Turn the ignition ON, with the engine OFF, for 2 seconds.
 - 21.2. Turn the ignition OFF for 10 seconds.
 - 21.3. Turn the ignition ON, with the engine OFF.
 - 21.4. Inspect for fuel leaks.
22. Install the intake manifold sight shield. Refer to [Upper Intake Manifold Sight Shield Replacement.](#)

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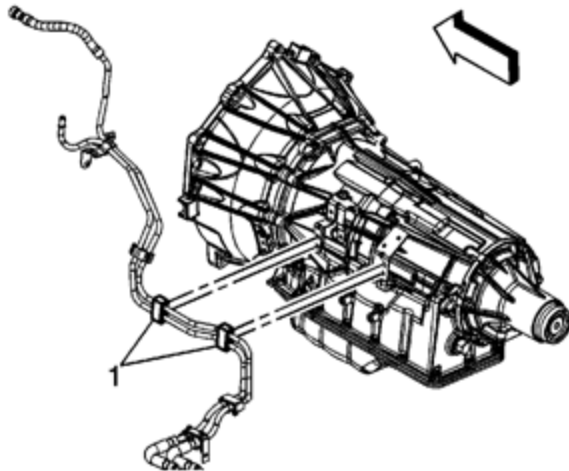
Evaporative Emission Hose / Pipe Replacement - Chassis (2500 / 3500 Regular Cab)

Removal Procedure

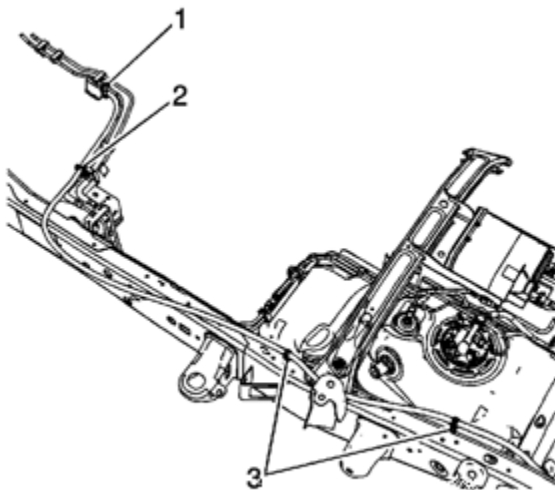


Note: Clean all fuel and evaporative emission (EVAP) lines connections and surrounding areas prior to disconnecting the lines in order to avoid possible fuel and/or EVAP system contamination.

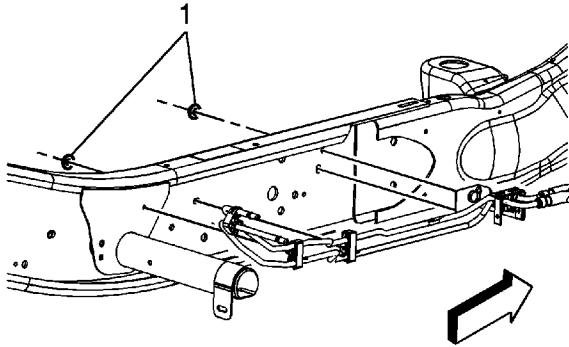
1. Relieve the fuel system pressure. Refer to the [Fuel Pressure Relief](#).
2. Disconnect the engine evaporative emission (EVAP) line (1) quick connect fitting from the chassis EVAP line. Refer to [Plastic Collar Quick Connect Fitting Service](#).
3. Disconnect the fuel feed line quick connect fitting (2) from the fuel rail. Refer to [Metal Collar Quick Connect Fitting Service](#).
4. Cap the fuel rail and EVAP pipes.
5. Raise and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#).
6. Unbolt and reposition the front propeller shaft, if required. Refer to [Front Propeller Shaft Replacement](#).
7. Unbolt and reposition the brake pressure modulator valve (BPMV). Refer to [Brake Pressure Modulator Valve Replacement](#).



8. Remove the fuel pipe bracket nut from the bellhousing stud.
9. Remove the fuel line clips (1) from the bracket on the automatic transmission.
10. If equipped with 4-wheel drive (4WD), remove the fuel hose/pipe clip from the bracket on the transfer case.

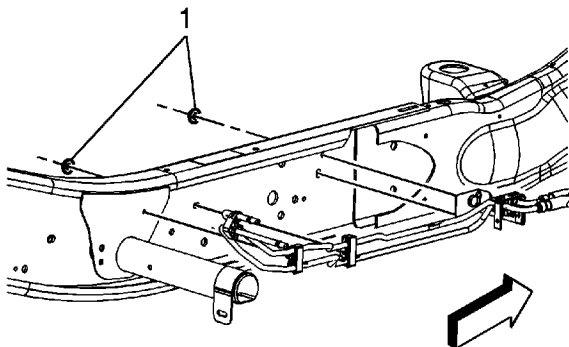


11. Remove the EVAP canister vent solenoid clip (1) from the chassis EVAP line and secure out of the way.
12. Remove the EVAP canister vent solenoid pipe clip (2) from the chassis EVAP line.



13. Disconnect the fuel tank fuel feed line quick connect fitting from the chassis line. Refer to [Plastic Collar Quick Connect Fitting Service](#).
14. Disconnect the fuel tank EVAP line quick connect fitting from the chassis line. Refer to [Plastic Collar Quick Connect Fitting Service](#).
15. Cap the fuel and EVAP lines in order to prevent possible fuel and/or EVAP system contamination.
16. Remove the fuel/EVAP line clip nuts (1).
17. Remove the fuel/EVAP line clips from the frame and crossmember.
18. Remove the fuel/EVAP line assembly from the vehicle.

Installation Procedure



1. Position and install the fuel/EVAP line assembly to the vehicle.
2. Install the fuel/EVAP line bracket locator tab to the frame.
3. Install the fuel/EVAP line clips to the frame and crossmember.

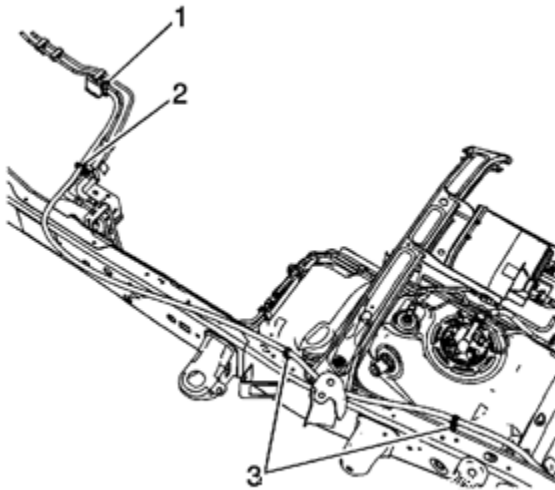
Caution: Refer to [Fastener Caution](#) in the Preface section.

4. Install the fuel/EVAP line clip nuts (2).

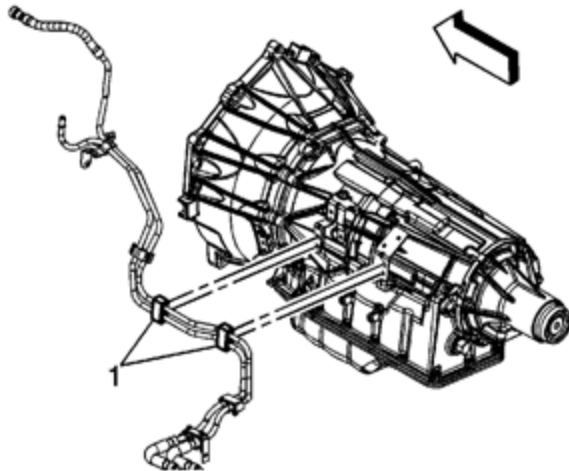
Tighten

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

5. Remove the caps from the fuel and EVAP lines.
6. Connect the fuel tank EVAP line quick connect fitting to the chassis line. Refer to [Plastic Collar Quick Connect Fitting Service](#).
7. Connect the fuel tank fuel feed line quick connect fitting to the chassis line. Refer to [Plastic Collar Quick Connect Fitting Service](#).



8. Unsecure and position the EVAP canister vent solenoid clip (1) to the chassis EVAP line.
9. Install the EVAP canister vent solenoid pipe clip (2) to the chassis EVAP line.

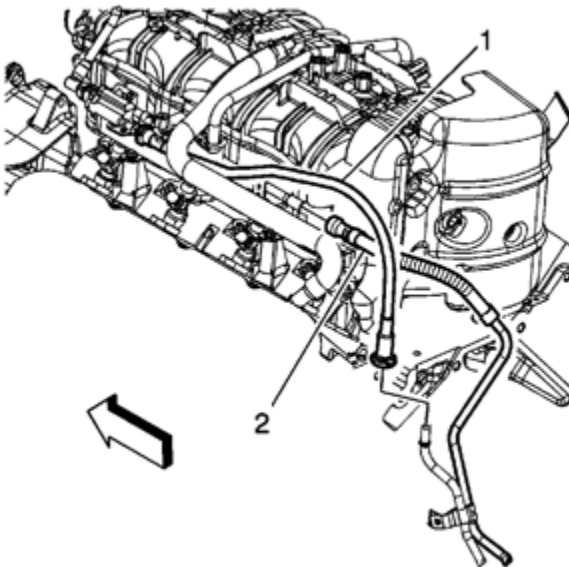


10. If equipped with 4WD, install the fuel hose/pipe clip to the bracket on the transfer case.
11. Install the fuel line clip to the bracket on the automatic transmission.
12. Install the fuel pipe bracket nut to the bellhousing stud.

Tighten

Tighten the nut to 25 N·m (18 lb ft).

13. Position and install the BPMV. Refer to [Brake Pressure Modulator Valve Replacement](#).
14. Position and install the front propeller shaft, if required. Refer to [Front Propeller Shaft Replacement](#).
15. Lower the vehicle.



16. Remove the caps from the fuel rail and EVAP line.
17. Connect the EVAP line (1) quick connect fitting to the chassis EVAP line. Refer to [Plastic](#)

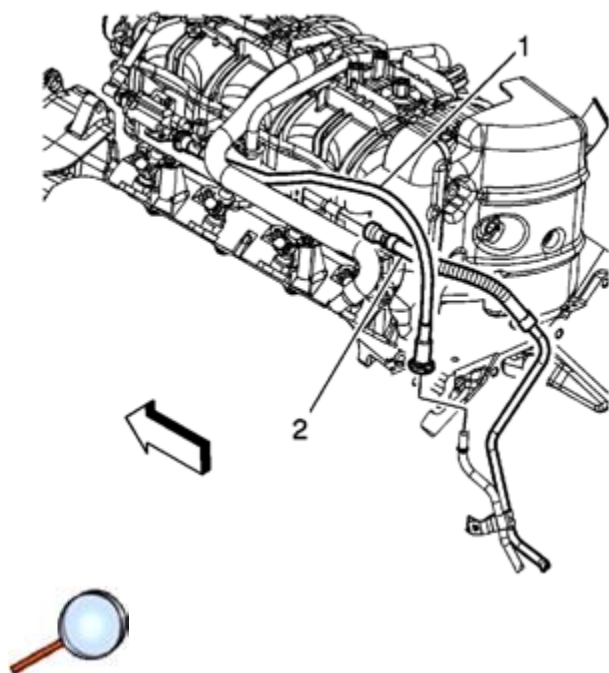
[Collar Quick Connect Fitting Service.](#)

18. Connect the fuel feed line (2) quick connect fitting to the fuel rail. Refer to [Metal Collar Quick Connect Fitting Service.](#)
19. Install the fuel fill cap.
20. Connect the negative battery cable. Refer to [Battery Negative Cable Disconnection and Connection.](#)
21. Use the following procedure in order to inspect for leaks:
 - 21.1. Turn the ignition ON, with the engine OFF, for 2 seconds.
 - 21.2. Turn the ignition OFF for 10 seconds.
 - 21.3. Turn the ignition ON, with the engine OFF.
 - 21.4. Inspect for fuel leaks.
22. Install the intake manifold sight shield. Refer to [Upper Intake Manifold Sight Shield Replacement.](#)

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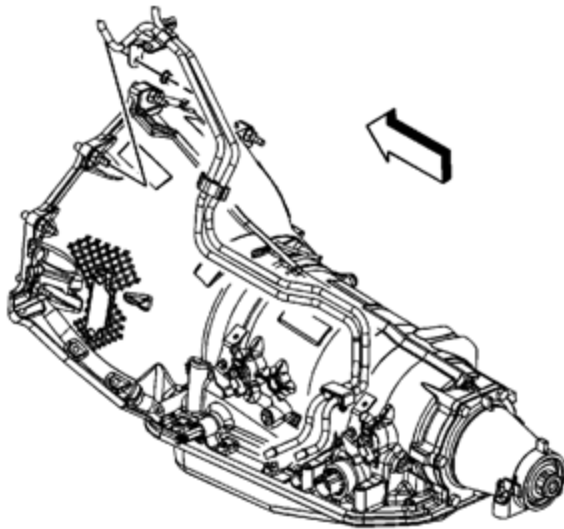
Evaporative Emission Hose / Pipe Replacement - Chassis (1500 Extended / Crew Cab)

Removal Procedure

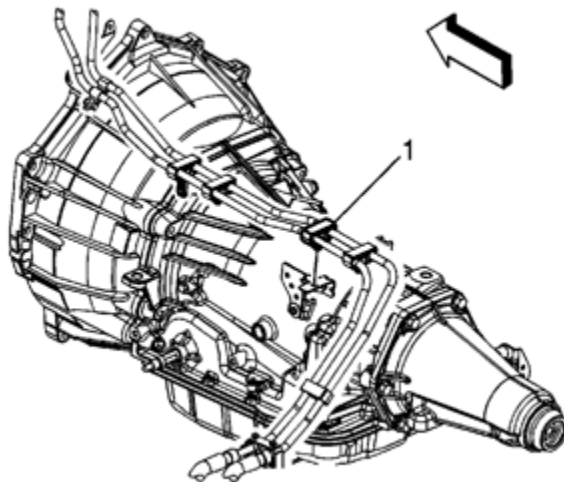


Note: Clean all fuel and evaporative emission (EVAP) lines connections and surrounding areas prior to disconnecting the lines in order to avoid possible fuel and/or EVAP system contamination.

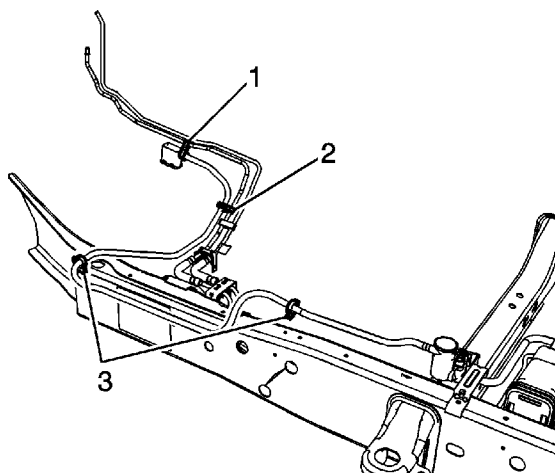
1. Relieve the fuel system pressure. Refer to the [Fuel Pressure Relief](#).
2. Disconnect the engine evaporative emission (EVAP) line (1) quick connect fitting from the chassis EVAP line. Refer to [Plastic Collar Quick Connect Fitting Service](#).
3. Disconnect the fuel feed line quick connect fitting (2) from the fuel rail. Refer to [Metal Collar Quick Connect Fitting Service](#).
4. Cap the fuel rail and EVAP pipes.
5. Raise and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#).
6. Unbolt and reposition the front propeller shaft, if required. Refer to [Front Propeller Shaft Replacement](#).
7. Unbolt and reposition the brake pressure modulator valve (BPMV). Refer to [Brake Pressure Modulator Valve Replacement](#).



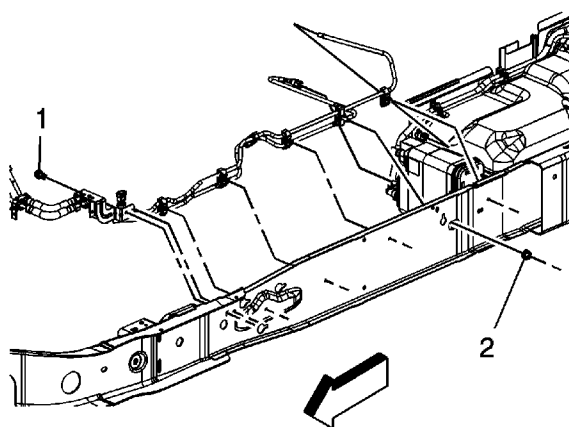
8. Remove the fuel pipe bracket nut from the bellhousing stud.



9. Remove the fuel line clip from the bracket on the automatic transmission.
10. If equipped with 4-wheel drive (4WD), remove the fuel hose/pipe clip from the bracket on the transfer case.

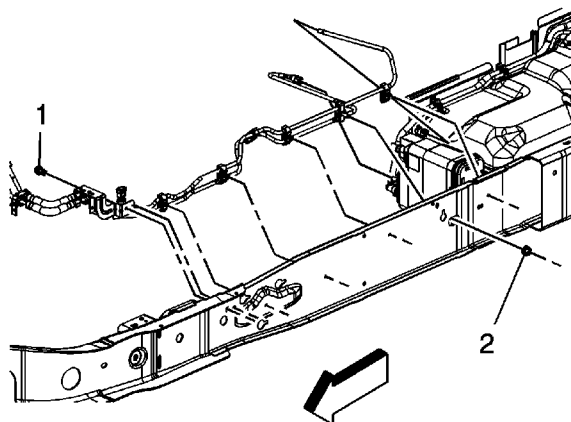


11. Remove the EVAP canister vent solenoid clip (1) from the chassis EVAP line and secure out of the way.
12. Remove the EVAP canister vent solenoid pipe clip (2) from the chassis line.



13. Disconnect the fuel tank fuel feed line quick connect fitting from the chassis line. Refer to [Plastic Collar Quick Connect Fitting Service](#).
14. Disconnect the chassis EVAP line quick connect fitting from the EVAP canister. Refer to [Plastic Collar Quick Connect Fitting Service](#).
15. Cap the fuel and EVAP lines in order to prevent possible fuel and/or EVAP system contamination.
16. Remove the fuel line bracket bolt (1).
17. Remove the fuel/EVAP line clip nut (2).
18. Remove the fuel/EVAP line clips from the frame and crossmember.
19. Remove the fuel/EVAP line assembly from the vehicle.

Installation Procedure



1. Position and install the fuel/EVAP line assembly to the vehicle.
2. Install the fuel/EVAP line bracket locator tab to the frame.
3. Install the fuel/EVAP line clips to the frame and crossmember.

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

4. Install the fuel/EVAP line bracket bolt (1).

Tighten

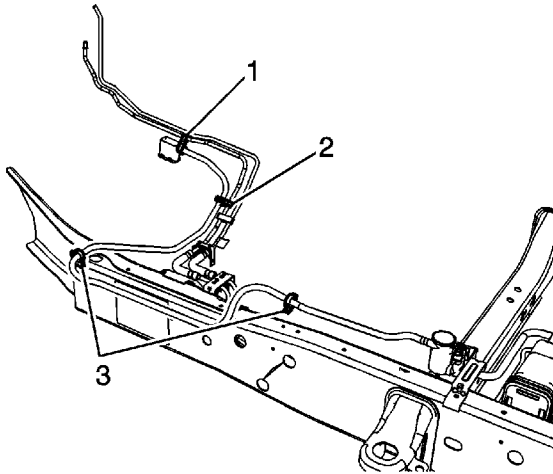
Tighten the bolt to 9 N·m (80 lb in).

5. Install the fuel/EVAP line clip nut (2).

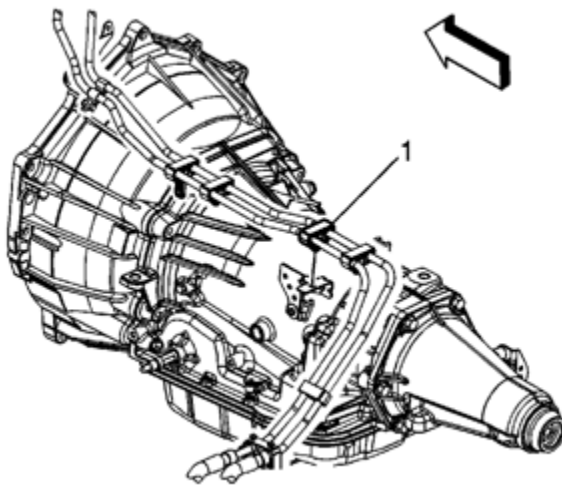
Tighten

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

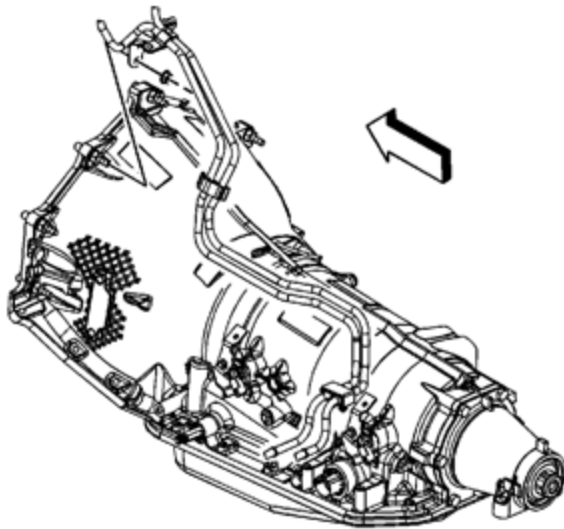
6. Remove the caps from the fuel and EVAP lines.
7. Connect the chassis EVAP line quick connect fitting to the EVAP canister. Refer to [Plastic Collar Quick Connect Fitting Service](#).
8. Connect the fuel tank fuel feed line quick connect fitting to the chassis line. Refer to [Plastic Collar Quick Connect Fitting Service](#).



9. Unsecure and position the EVAP canister vent solenoid clip (1) to the chassis EVAP line.
10. Install the EVAP canister vent solenoid pipe clip (2) to the chassis line.



11. If equipped with 4WD, install the fuel hose/pipe clip to the bracket on the transfer case.
12. Install the fuel line clip to the bracket on the automatic transmission.

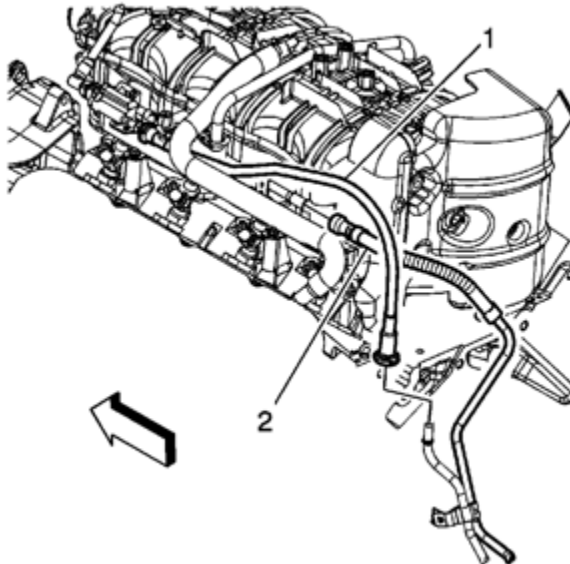


13. Install the fuel pipe bracket nut to the bellhousing stud.

Tighten

Tighten the nut to 25 N·m (18 lb ft).

14. Position and install the BPMV. Refer to [Brake Pressure Modulator Valve Replacement](#).
15. Position and install the front propeller shaft, if required. Refer to [Front Propeller Shaft Replacement](#).
16. Lower the vehicle.



17. Remove the caps from the fuel rail and EVAP line.
18. Connect the EVAP line (1) quick connect fitting to the chassis EVAP line. Refer to [Plastic Collar Quick Connect Fitting Service](#).
19. Connect the fuel feed line (2) quick connect fitting to the fuel rail. Refer to [Metal Collar Quick](#)

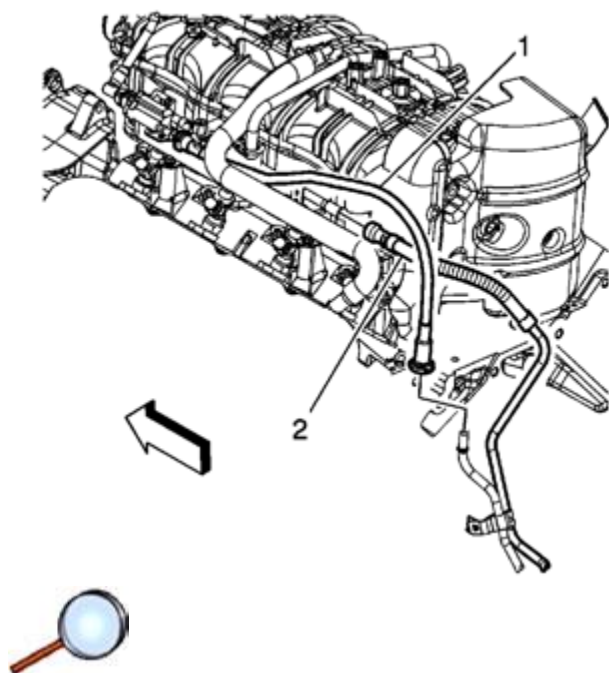
[Connect Fitting Service.](#)

20. Install the fuel fill cap.
21. Connect the negative battery cable. Refer to [Battery Negative Cable Disconnection and Connection](#).
22. Use the following procedure in order to inspect for leaks:
 - 22.1. Turn the ignition ON, with the engine OFF, for 2 seconds.
 - 22.2. Turn the ignition OFF for 10 seconds.
 - 22.3. Turn the ignition ON, with the engine OFF.
 - 22.4. Inspect for fuel leaks.
23. Install the intake manifold sight shield. Refer to [Upper Intake Manifold Sight Shield Replacement](#).

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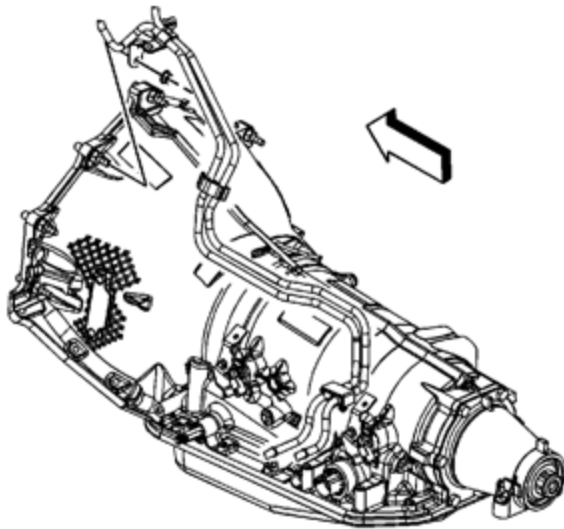
Evaporative Emission Hose/Pipe Replacement - Chassis (1500 Extended/Crew Cab w/ 8 Ft Bed)

Removal Procedure

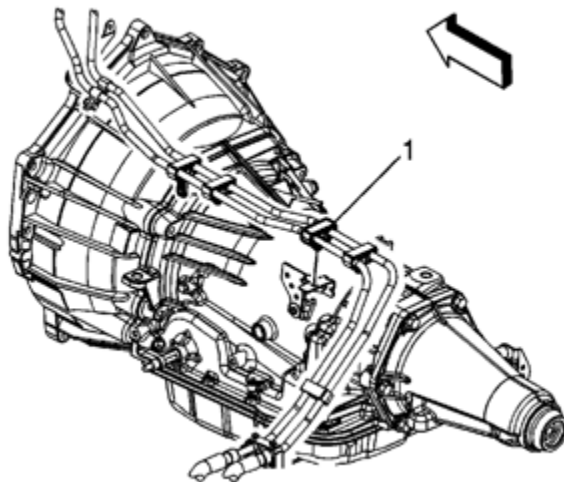


Note: Clean all fuel and evaporative emission (EVAP) lines connections and surrounding areas prior to disconnecting the lines in order to avoid possible fuel and/or EVAP system contamination.

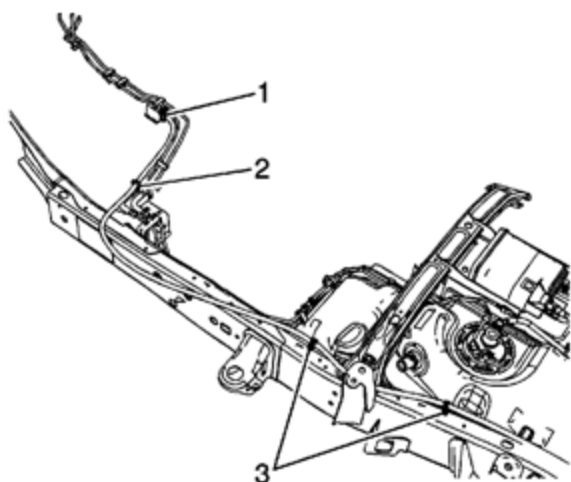
1. Relieve the fuel system pressure. Refer to the [Fuel Pressure Relief](#).
2. Disconnect the engine evaporative emission (EVAP) line (1) quick connect fitting from the chassis EVAP line. Refer to [Plastic Collar Quick Connect Fitting Service](#).
3. Disconnect the fuel feed line quick connect fitting (2) from the fuel rail. Refer to [Metal Collar Quick Connect Fitting Service](#).
4. Cap the fuel rail and EVAP pipes.
5. Raise and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#).
6. Unbolt and reposition the front propeller shaft, if required. Refer to [Front Propeller Shaft Replacement](#).



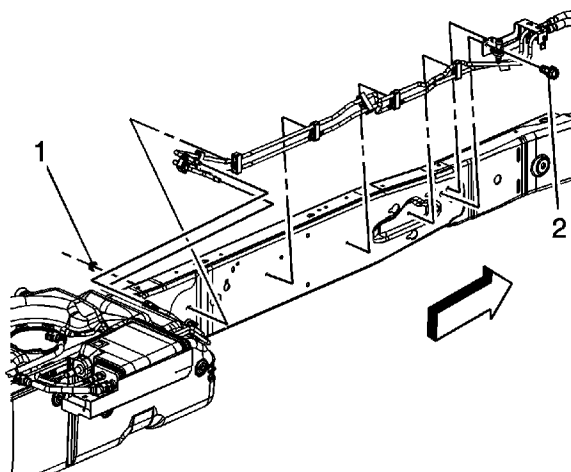
7. Remove the fuel pipe bracket nut from the bellhousing stud.



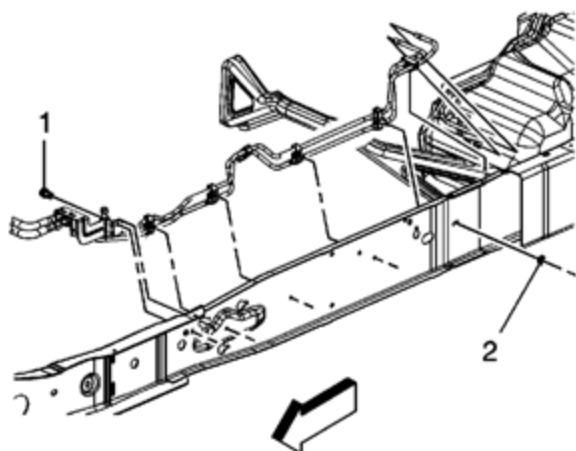
8. Remove the fuel line clip from the bracket on the automatic transmission.
9. If equipped with 4-wheel drive (4WD), remove the fuel hose/pipe clip from the bracket on the transfer case.



10. Remove the EVAP canister vent solenoid clip (1) from the chassis EVAP line and secure out of the way.
11. Remove the EVAP canister vent solenoid pipe clip (2) from the chassis EVAP line.

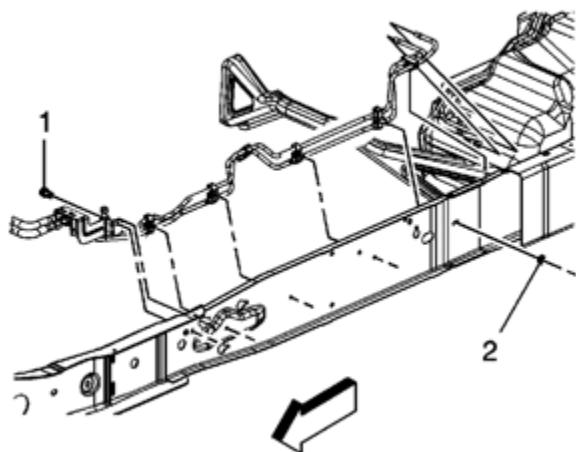


12. If equipped with 2-wheel drive (2WD) perform the following steps, disconnect the fuel tank fuel feed line quick connect fitting from the chassis line. Refer to [Plastic Collar Quick Connect Fitting Service](#).
13. Disconnect the fuel tank EVAP line quick connect fitting from the chassis line. Refer to [Plastic Collar Quick Connect Fitting Service](#).
14. Cap the fuel and EVAP lines in order to prevent possible fuel and/or EVAP system contamination.
15. Remove the fuel line bracket bolt (2).
16. Remove the fuel/EVAP line clip nut (1).
17. Remove the fuel/EVAP line clips from the frame and crossmember.
18. Remove the fuel/EVAP line assembly from the vehicle.



19. If equipped with 4WD perform the following steps, disconnect the fuel tank fuel feed line quick connect fitting from the chassis line. Refer to [Plastic Collar Quick Connect Fitting Service](#).
20. Disconnect the fuel tank EVAP line quick connect fitting from the chassis line. Refer to [Plastic Collar Quick Connect Fitting Service](#).
21. Cap the fuel and EVAP lines in order to prevent possible fuel and/or EVAP system contamination.
22. Remove the fuel line bracket bolt (1).
23. Remove the fuel/EVAP line clip nut (2).
24. Remove the fuel/EVAP line clips from the frame and crossmember.
25. Remove the fuel/EVAP line assembly from the vehicle.

Installation Procedure





1. If equipped with 4WD perform the following steps, position and install the fuel/EVAP line assembly to the vehicle.
2. Install the fuel/EVAP line bracket locator tab to the frame.
3. Install the fuel/EVAP line clips to the frame and crossmember.

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

4. Install the fuel/EVAP line bracket bolt (1).

Tighten

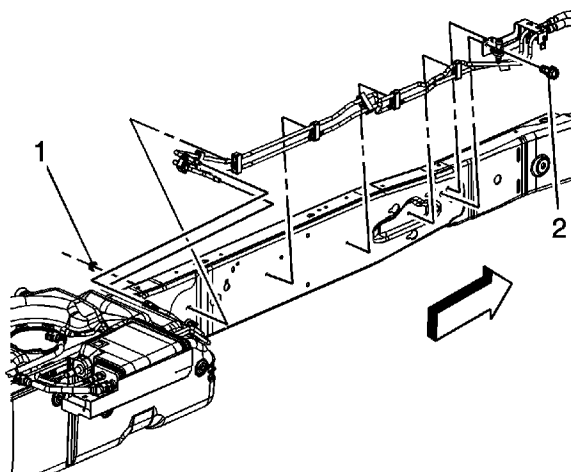
Tighten the bolt to 9 N·m (80 lb in).

5. Install the fuel/EVAP line clip nut (2).

Tighten

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

6. Remove the caps from the fuel and EVAP lines.
7. Connect the fuel tank EVAP line quick connect fitting to the chassis line. Refer to [Plastic Collar Quick Connect Fitting Service](#).
8. Connect the fuel tank fuel feed line quick connect fitting to the chassis line. Refer to [Plastic Collar Quick Connect Fitting Service](#).



9. If equipped with 2WD perform the following steps, position and install the fuel/EVAP line assembly to the vehicle.
10. Install the fuel/EVAP line bracket locator tab to the frame.
11. Install the fuel/EVAP line clips to the frame and crossmember.
12. Install the fuel/EVAP line bracket bolt (2).

Tighten

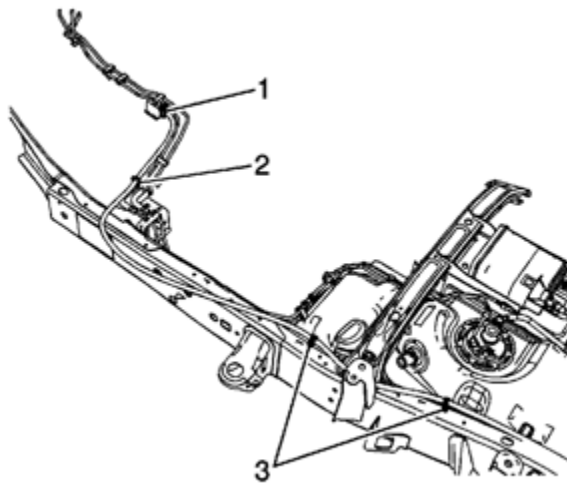
Tighten the bolt to 9 N·m (80 lb in).

13. Install the fuel/EVAP line clip nut (1).

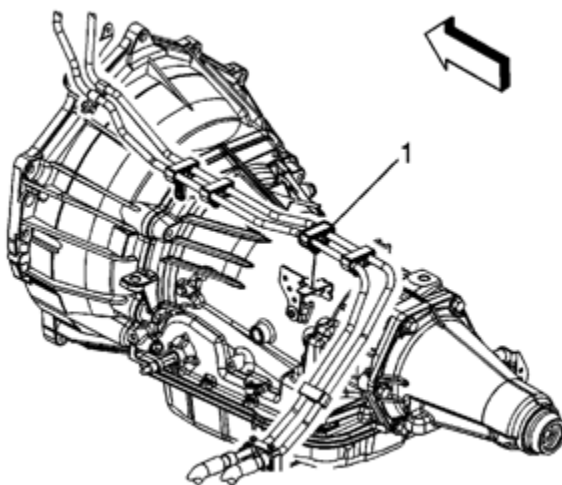
Tighten

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

14. Remove the caps from the fuel and EVAP lines.
15. Connect the fuel tank EVAP line quick connect fitting to the chassis line. Refer to [Plastic Collar Quick Connect Fitting Service](#).
16. Connect the fuel tank fuel feed line quick connect fitting to the chassis line. Refer to [Plastic Collar Quick Connect Fitting Service](#).

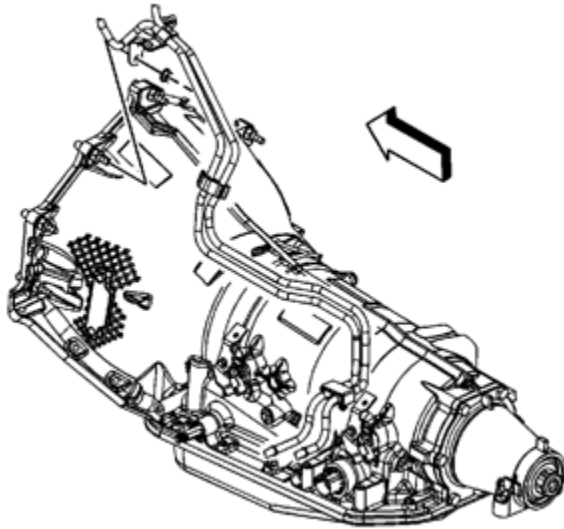


17. Unsecure and position the EVAP canister vent solenoid clip (1) to the chassis EVAP line.
18. Install the EVAP canister vent solenoid pipe clip (2) from the chassis EVAP line.



19. If equipped with 4WD, install the fuel hose/pipe clip to the bracket on the transfer case.

20. Install the fuel line clip to the bracket on the automatic transmission.

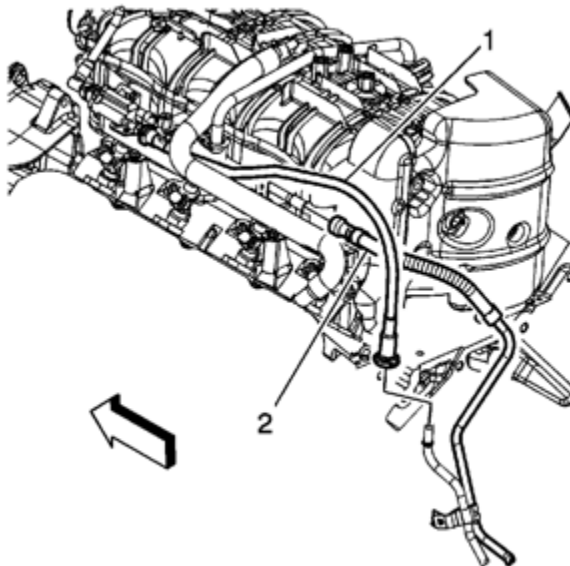


21. Install the fuel pipe bracket nut to the bellhousing stud.

Tighten

Tighten the nut to 25 N·m (18 lb ft).

22. Position and install the front propeller shaft, if required. Refer to [Front Propeller Shaft Replacement](#).
23. Lower the vehicle.



24. Remove the caps from the fuel rail and EVAP line.
25. Connect the EVAP line (1) quick connect fitting to the chassis EVAP line. Refer to [Plastic Collar Quick Connect Fitting Service](#).
26. Connect the fuel feed line (2) quick connect fitting to the fuel rail. Refer to [Metal Collar Quick](#)

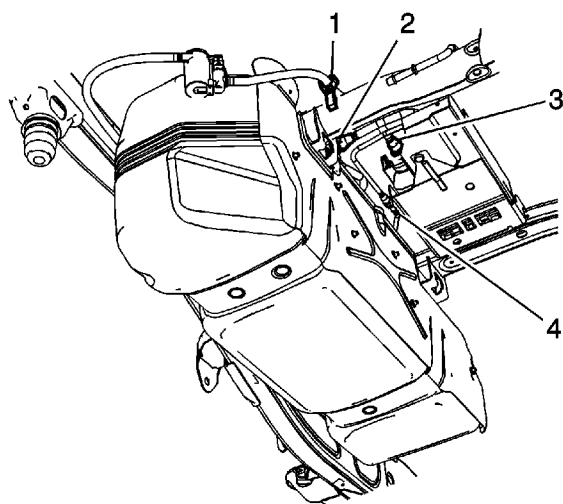
[Connect Fitting Service.](#)

27. Install the fuel fill cap.
28. Connect the negative battery cable. Refer to [Battery Negative Cable Disconnection and Connection](#).
29. Use the following procedure in order to inspect for leaks:
 - 29.1. Turn the ignition ON, with the engine OFF, for 2 seconds.
 - 29.2. Turn the ignition OFF for 10 seconds.
 - 29.3. Turn the ignition ON, with the engine OFF.
 - 29.4. Inspect for fuel leaks.
30. Install the intake manifold sight shield. Refer to [Upper Intake Manifold Sight Shield Replacement](#).

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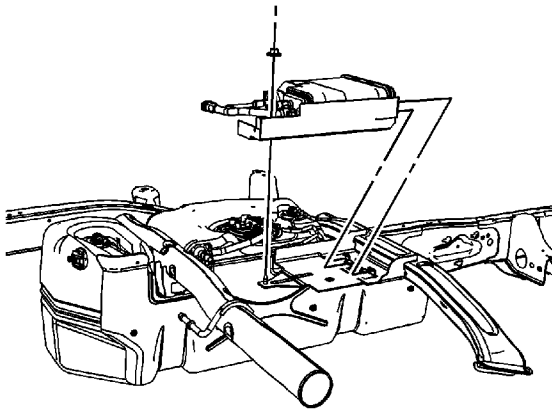
Evaporative Emission Canister Replacement (25 Ext/Crew Cab w/26 Gal Tank)

Removal Procedure

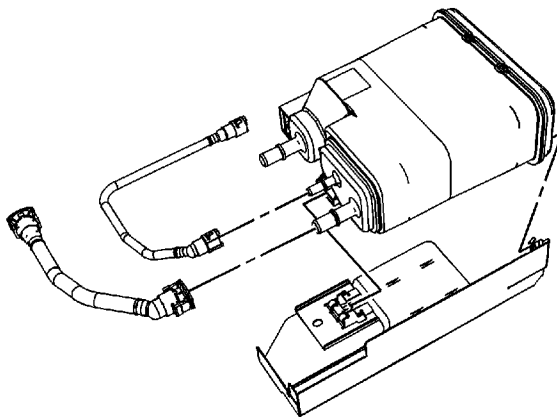


Note: Clean all evaporative emission (EVAP) connections and surrounding areas prior to disconnecting the lines in order to avoid possible system contamination.

1. Raise and suitably support the vehicle. Refer to [Lifting and Jacking the Vehicle](#).
2. Disconnect the EVAP canister pipe quick connect fitting (2) from the fuel tank EVAP pipe. Refer to [Plastic Collar Quick Connect Fitting Service](#).
3. Disconnect the EVAP canister vent solenoid pipe quick connect fitting (3) from the EVAP canister. Refer to [Plastic Collar Quick Connect Fitting Service](#).
4. Disconnect the EVAP canister pipe quick connect fitting (4) from the fuel tank EVAP pipe. Refer to [Plastic Collar Quick Connect Fitting Service](#).

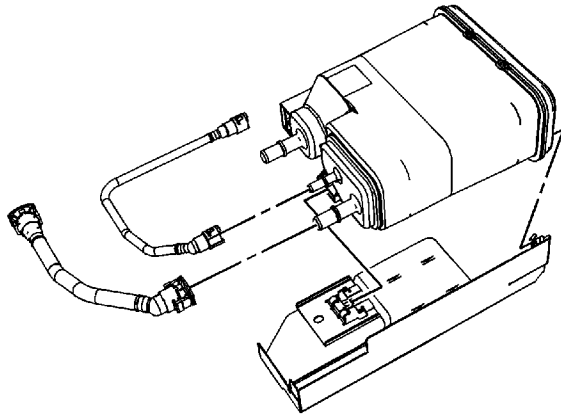


5. Remove the EVAP canister nut. (body shown removed, for clarity).
6. Remove the EVAP canister assembly.
7. If replacing the EVAP canister perform the following steps, otherwise proceed to step 4 in the installation procedure.

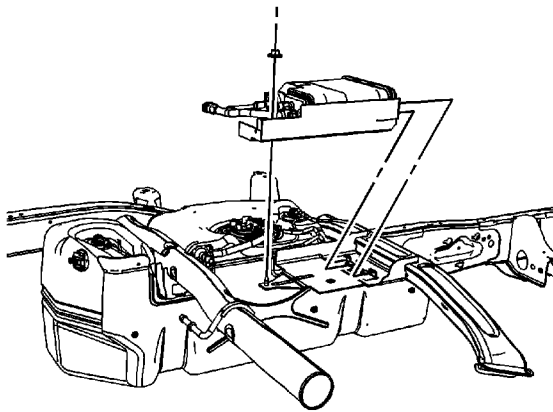


8. Remove the EVAP canister from the shield.
9. Disconnect the EVAP canister pipes from the canister. Refer to [Plastic Collar Quick Connect Fitting Service](#).

Installation Procedure



1. If replacing the EVAP canister perform the following steps, otherwise proceed to step 4.
2. Connect the EVAP canister pipes to the canister. Refer to [Plastic Collar Quick Connect Fitting Service](#).
3. Install the EVAP canister to the shield.



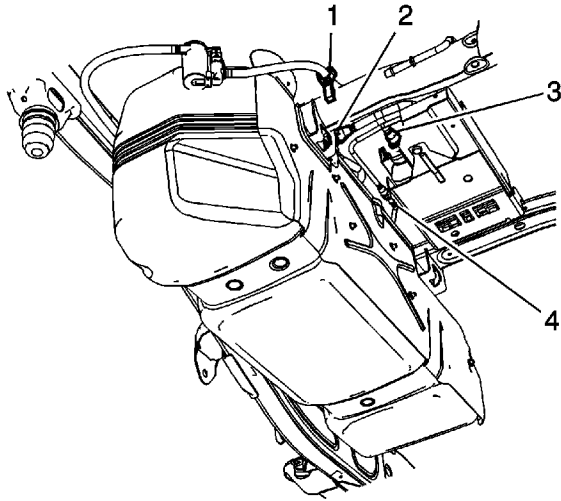
4. Install the EVAP canister assembly.

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

5. Install the EVAP canister nut.

Tighten

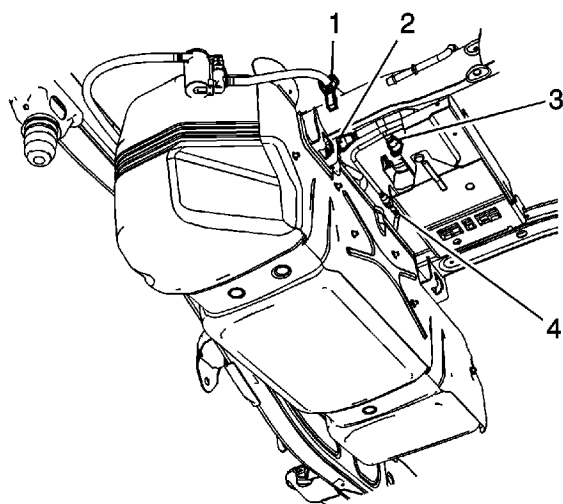
Tighten the nut to 25 N·m (18 lb ft).



6. Connect the EVAP canister pipe quick connect fitting (4) to the fuel tank EVAP pipe. Refer to [Plastic Collar Quick Connect Fitting Service](#).
7. Connect the EVAP canister vent solenoid pipe quick connect fitting (3) to the EVAP canister. Refer to [Plastic Collar Quick Connect Fitting Service](#).
8. Connect the EVAP canister pipe quick connect fitting (2) to the fuel tank EVAP pipe. Refer to [Plastic Collar Quick Connect Fitting Service](#).
9. Lower the vehicle.

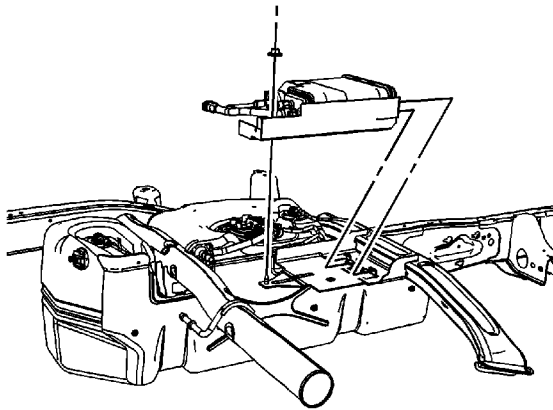
Evaporative Emission Canister Replacement (15 Regular Cab)

Removal Procedure

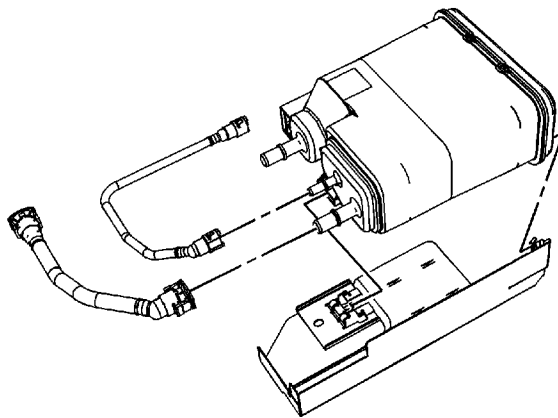


Note: Clean all evaporative emission (EVAP) connections and surrounding areas prior to disconnecting the lines in order to avoid possible system contamination.

1. Raise and suitably support the vehicle. Refer to [Lifting and Jacking the Vehicle](#).
2. Disconnect the EVAP canister pipe quick connect fitting (2) from the fuel tank EVAP pipe. Refer to [Plastic Collar Quick Connect Fitting Service](#).
3. Disconnect the EVAP canister vent solenoid pipe quick connect fitting (3) from the EVAP canister. Refer to [Plastic Collar Quick Connect Fitting Service](#).
4. Disconnect the EVAP canister pipe quick connect fitting (4) from the fuel tank EVAP pipe. Refer to [Plastic Collar Quick Connect Fitting Service](#).

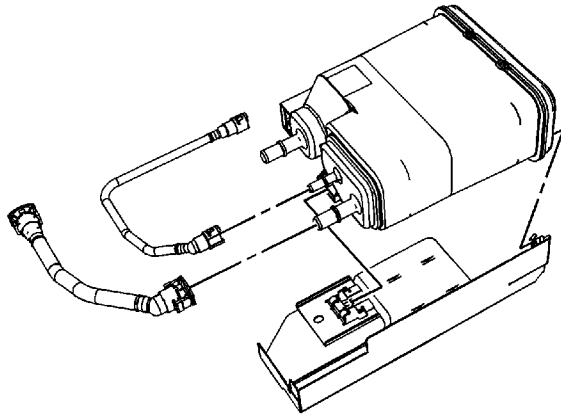


5. Remove the EVAP canister nut. (body shown removed, for clarity).
6. Remove the EVAP canister assembly.
7. If replacing the EVAP canister perform the following steps, otherwise proceed to step 4 in the installation procedure.

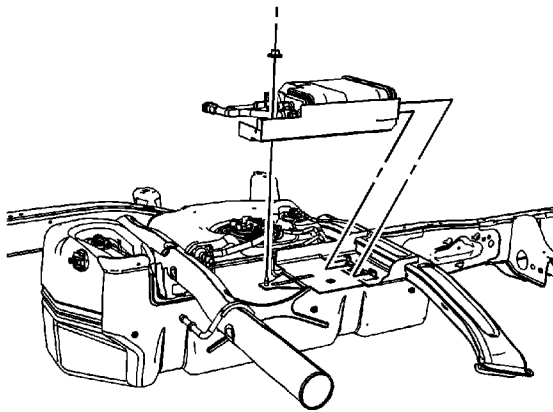


8. Remove the EVAP canister from the shield.
9. Disconnect the EVAP canister pipes from the canister. Refer to [Plastic Collar Quick Connect Fitting Service](#).

Installation Procedure



1. If replacing the EVAP canister perform the following steps, otherwise proceed to step 4.
2. Connect the EVAP canister pipes to the canister. Refer to [Plastic Collar Quick Connect Fitting Service](#).
3. Install the EVAP canister to the shield.



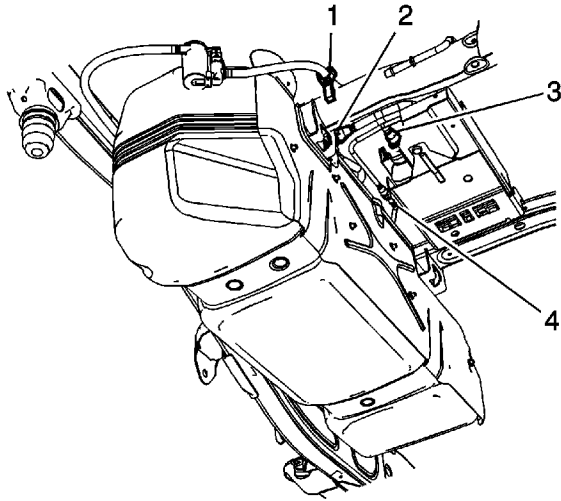
4. Install the EVAP canister assembly.

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

5. Install the EVAP canister nut.

Tighten

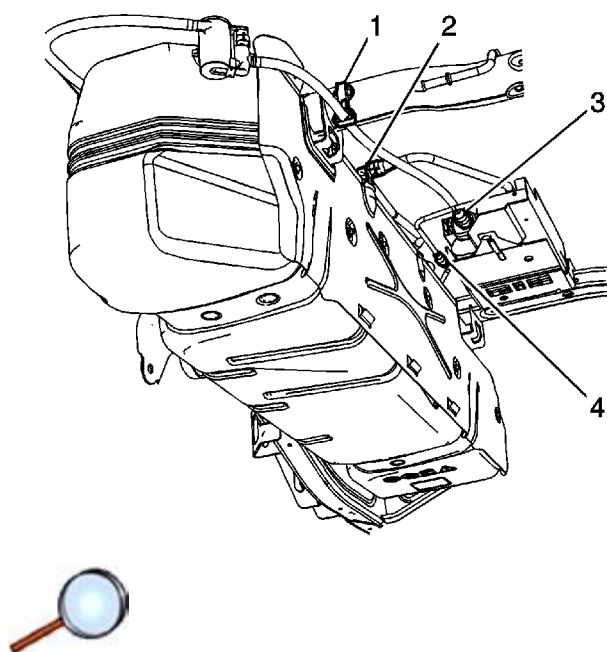
Tighten the nut to 25 N·m (18 lb ft).



6. Connect the EVAP canister pipe quick connect fitting (4) to the fuel tank EVAP pipe. Refer to [Plastic Collar Quick Connect Fitting Service](#).
7. Connect the EVAP canister vent solenoid pipe quick connect fitting (3) to the EVAP canister. Refer to [Plastic Collar Quick Connect Fitting Service](#).
8. Connect the EVAP canister pipe quick connect fitting (2) to the fuel tank EVAP pipe. Refer to [Plastic Collar Quick Connect Fitting Service](#).
9. Lower the vehicle.

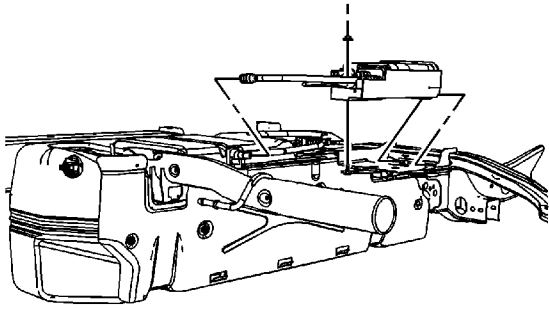
Evaporative Emission Canister Replacement (35 Reg/Ext/Crew Cab w/34 Gal Tank)

Removal Procedure

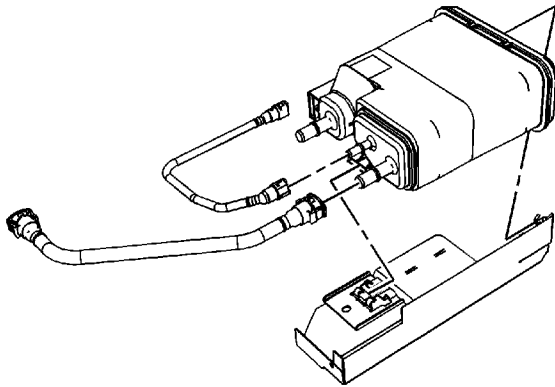


Note: Clean all evaporative emission (EVAP) connections and surrounding areas prior to disconnecting the lines in order to avoid possible system contamination.

1. Raise and suitably support the vehicle. Refer to [Lifting and Jacking the Vehicle](#).
2. Disconnect the EVAP canister pipe quick connect fitting (2) from the fuel tank EVAP pipe. Refer to [Plastic Collar Quick Connect Fitting Service](#).
3. Disconnect the EVAP canister vent solenoid pipe quick connect fitting (3) from the EVAP canister. Refer to [Plastic Collar Quick Connect Fitting Service](#).
4. Disconnect the EVAP canister pipe quick connect fitting (4) from the fuel tank EVAP pipe. Refer to [Plastic Collar Quick Connect Fitting Service](#).

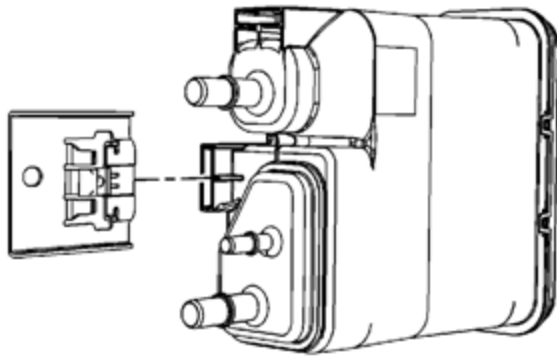


5. Remove the EVAP canister nut. (body shown removed, for clarity).
6. Remove the EVAP canister assembly.
7. If replacing the EVAP canister perform the following steps, otherwise proceed to step 4 in the installation procedure.

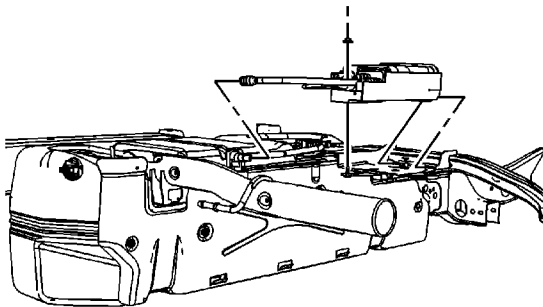


8. Remove the EVAP canister bracket from the canister.
9. Disconnect the EVAP canister pipe quick connect fittings from the EVAP canister. Refer to [Plastic Collar Quick Connect Fitting Service](#).

Installation Procedure



1. If replacing the EVAP canister perform the following steps, otherwise proceed to step 4.
2. Install the EVAP canister bracket to the canister.
3. Connect the EVAP canister pipe quick connect fittings to the EVAP canister. Refer to [Plastic Collar Quick Connect Fitting Service](#).



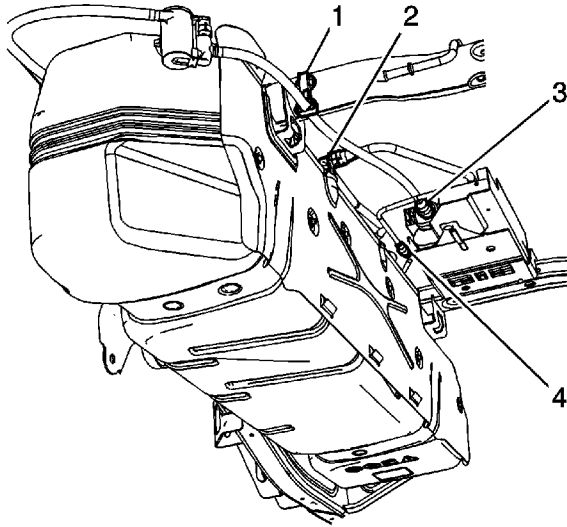
4. Install the EVAP canister assembly.

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

5. Install the EVAP canister nut.

Tighten

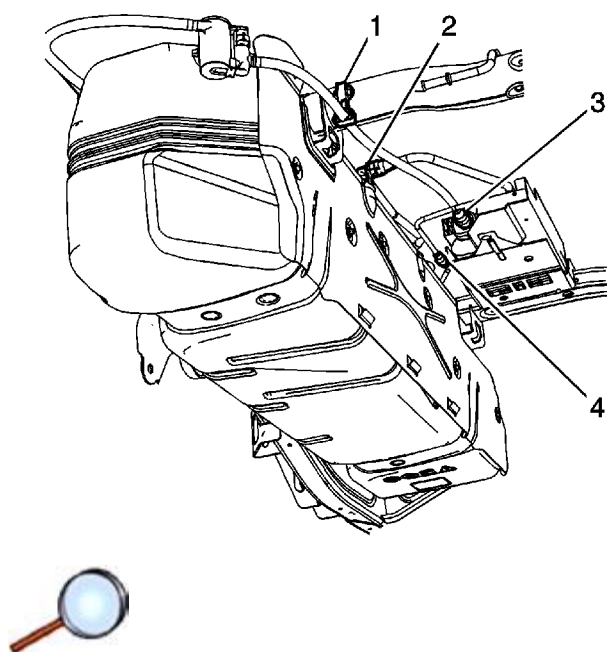
Tighten the nut to 25 N·m (18 lb ft).



6. Connect the EVAP canister pipe quick connect fitting (4) to the fuel tank EVAP pipe. Refer to [Plastic Collar Quick Connect Fitting Service](#).
7. Connect the EVAP canister vent solenoid pipe quick connect fitting (3) to the EVAP canister. Refer to [Plastic Collar Quick Connect Fitting Service](#).
8. Connect the EVAP canister pipe quick connect fitting (2) to the fuel tank EVAP pipe. Refer to [Plastic Collar Quick Connect Fitting Service](#).
9. Lower the vehicle.

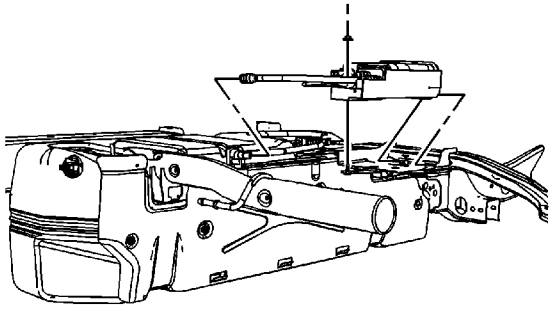
Evaporative Emission Canister Replacement (15/25 Reg/Ext/Crew Cab w/34 Gal Tank)

Removal Procedure

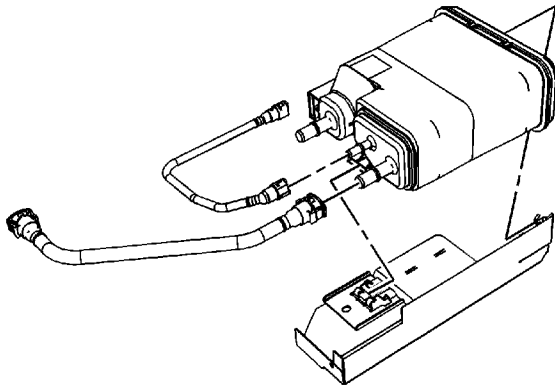


Note: Clean all evaporative emission (EVAP) connections and surrounding areas prior to disconnecting the lines in order to avoid possible system contamination.

1. Raise and suitably support the vehicle. Refer to [Lifting and Jacking the Vehicle](#).
2. Disconnect the EVAP canister pipe quick connect fitting (2) from the fuel tank EVAP pipe. Refer to [Plastic Collar Quick Connect Fitting Service](#).
3. Disconnect the EVAP canister vent solenoid pipe quick connect fitting (3) from the EVAP canister. Refer to [Plastic Collar Quick Connect Fitting Service](#).
4. Disconnect the EVAP canister pipe quick connect fitting (4) from the fuel tank EVAP pipe. Refer to [Plastic Collar Quick Connect Fitting Service](#).

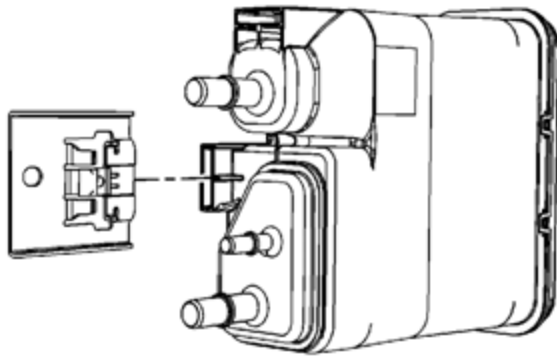


5. Remove the EVAP canister nut. (body shown removed, for clarity).
6. Remove the EVAP canister assembly.
7. If replacing the EVAP canister perform the following steps, otherwise proceed to step 4 in the installation procedure.

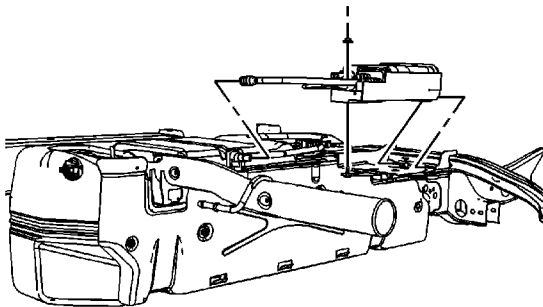


8. Remove the EVAP canister bracket from the canister.
9. Disconnect the EVAP canister pipe quick connect fittings from the EVAP canister. Refer to [Plastic Collar Quick Connect Fitting Service](#).

Installation Procedure



1. If replacing the EVAP canister perform the following steps, otherwise proceed to step 4.
2. Install the EVAP canister bracket to the canister.
3. Connect the EVAP canister pipe quick connect fittings to the EVAP canister. Refer to [Plastic Collar Quick Connect Fitting Service](#).



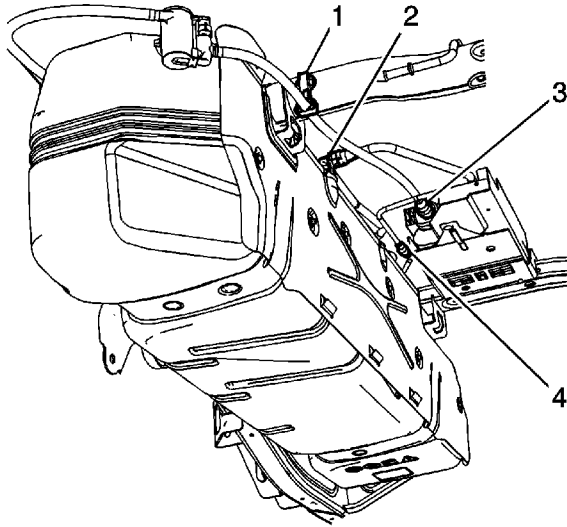
4. Install the EVAP canister assembly.

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

5. Install the EVAP canister nut.

Tighten

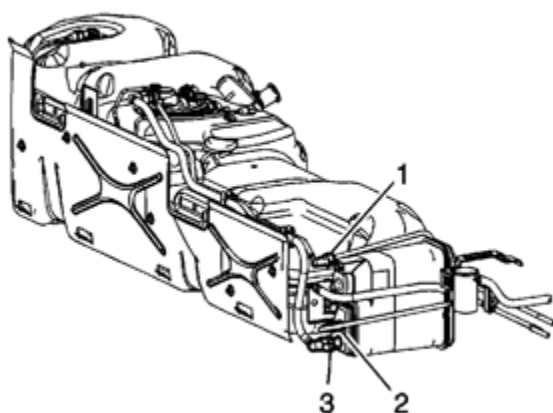
Tighten the nut to 25 N·m (18 lb ft).



6. Connect the EVAP canister pipe quick connect fitting (4) to the fuel tank EVAP pipe. Refer to [Plastic Collar Quick Connect Fitting Service](#).
7. Connect the EVAP canister vent solenoid pipe quick connect fitting (3) to the EVAP canister. Refer to [Plastic Collar Quick Connect Fitting Service](#).
8. Connect the EVAP canister pipe quick connect fitting (2) to the fuel tank EVAP pipe. Refer to [Plastic Collar Quick Connect Fitting Service](#).
9. Lower the vehicle.

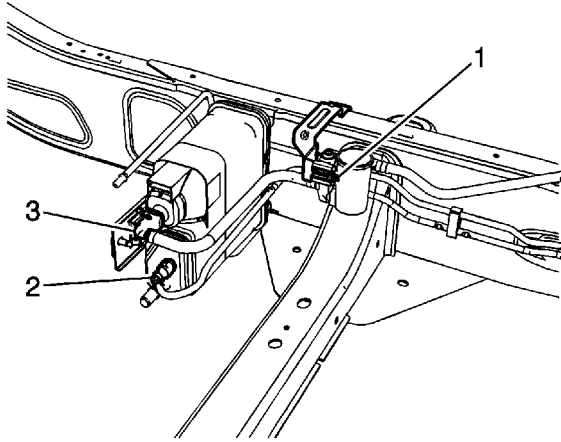
Evaporative Emission Canister Replacement (15 Ext/Crew Cab)

Removal Procedure

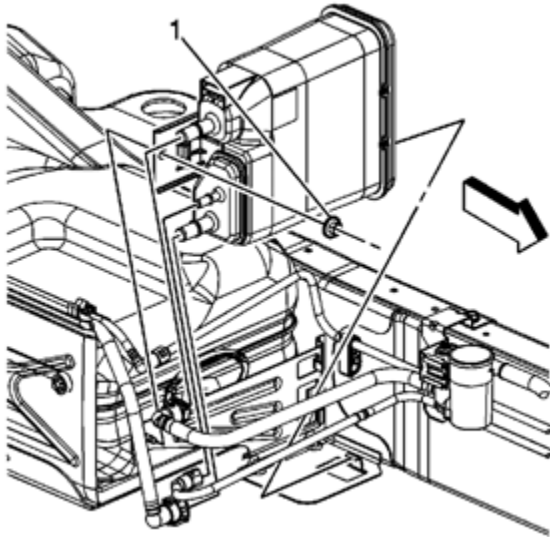


Note: Clean all evaporative emission (EVAP) connections and surrounding areas prior to disconnecting the lines in order to avoid possible system contamination.

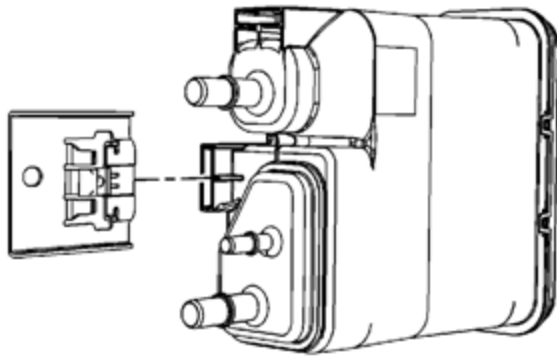
1. Raise and suitably support the vehicle. Refer to [Lifting and Jacking the Vehicle](#).
2. Disconnect the fuel tank EVAP pipe quick connect fitting (3) from the EVAP canister. Refer to [Plastic Collar Quick Connect Fitting Service](#).
3. Disconnect the chassis EVAP pipe quick connect fitting (2) from the EVAP canister. Refer to [Plastic Collar Quick Connect Fitting Service](#).



4. Disconnect the EVAP canister vent solenoid pipe quick connect fitting (3) from the EVAP canister. Refer to [Plastic Collar Quick Connect Fitting Service](#).

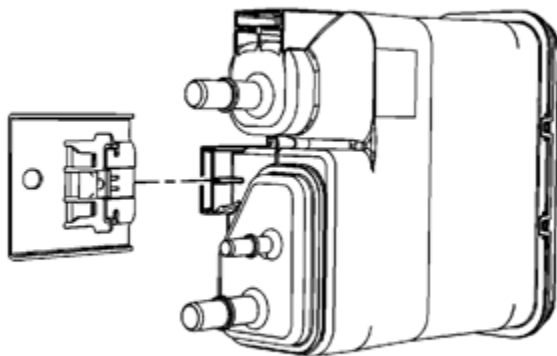


5. Remove the EVAP canister nut (1). (body shown removed, for clarity).
6. Remove the EVAP canister assembly.
7. If replacing the EVAP canister perform the following steps, otherwise proceed to step 3 in the installation procedure.

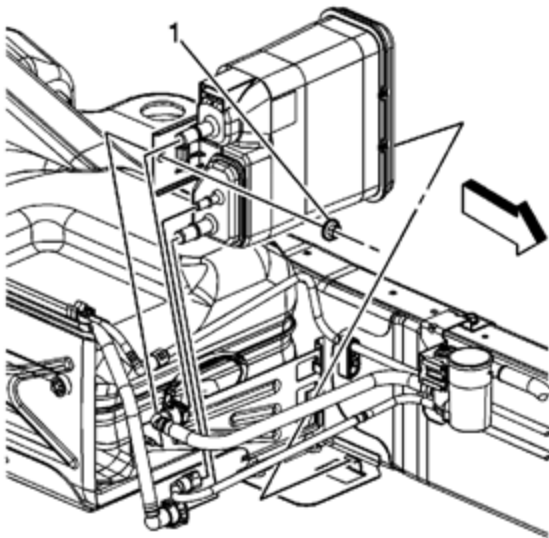


8. Remove the EVAP canister bracket from the canister.

Installation Procedure



1. If replacing the EVAP canister perform the following steps, otherwise proceed to step 3.
2. Install the EVAP canister bracket to the canister.



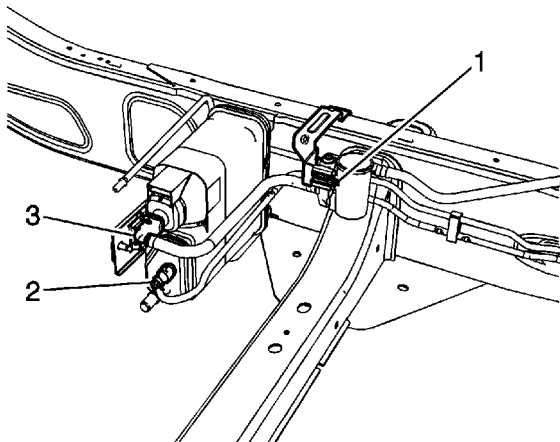
3. Install the EVAP canister assembly.

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

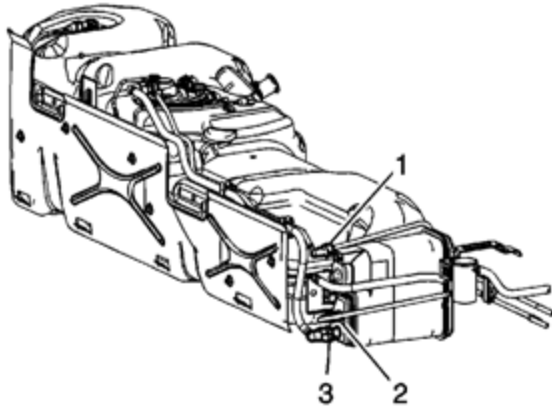
4. Install the EVAP canister nut (1).

Tighten

Tighten the nut to 25 N·m (18 lb ft).



5. Connect the EVAP canister vent solenoid pipe quick connect fitting (3) to the EVAP canister. Refer to [Plastic Collar Quick Connect Fitting Service](#).



6. Connect the chassis EVAP pipe quick connect fitting (2) to the EVAP canister. Refer to [Plastic Collar Quick Connect Fitting Service](#).
7. Connect the fuel tank EVAP pipe quick connect fitting (3) to the EVAP canister. Refer to [Plastic Collar Quick Connect Fitting Service](#).
8. Lower the vehicle.

Evaporative Emission System Cleaning

Tools Required

[J 41413-200](#) Evaporative Emissions System Tester (EEST)

Inspection Procedure

Important: Do not perform this procedure unless instructed by an evaporative emission (EVAP) diagnostic.

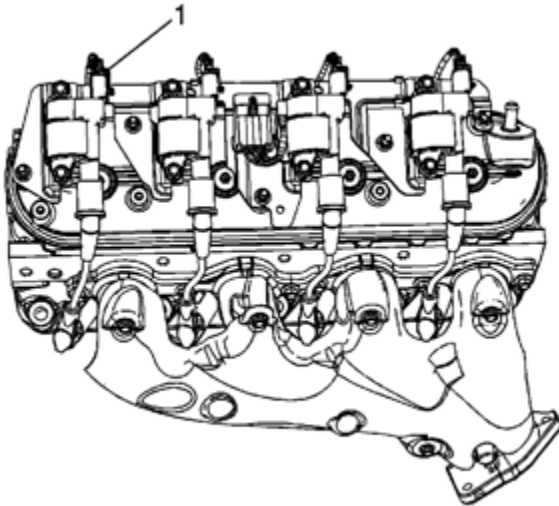
1. Turn OFF the ignition.
2. Remove the EVAP canister purge solenoid valve. Refer to [Evaporative Emission Canister Purge Solenoid Valve Replacement](#) .
3. Lightly tap the EVAP canister purge solenoid valve on a clean hard surface.
4. Inspect for carbon particles exiting either of the vacuum ports.
 - If no carbon particles are found reinstall the EVAP canister purge solenoid valve and continue with the EVAP cleaning procedure. Refer to [Evaporative Emission Canister Purge Solenoid Valve Replacement](#) .
 - If carbon particles are found during the inspection procedure, replace the EVAP canister purge solenoid valve and continue with the EVAP cleaning procedure. Refer to [Evaporative Emission Canister Purge Solenoid Valve Replacement](#) .
 - If you were instructed to replace the EVAP canister purge solenoid valve, and no carbon particles are found, return to the EVAP diagnostic procedure. Do not perform the EVAP cleaning procedure.

EVAP Cleaning Procedure

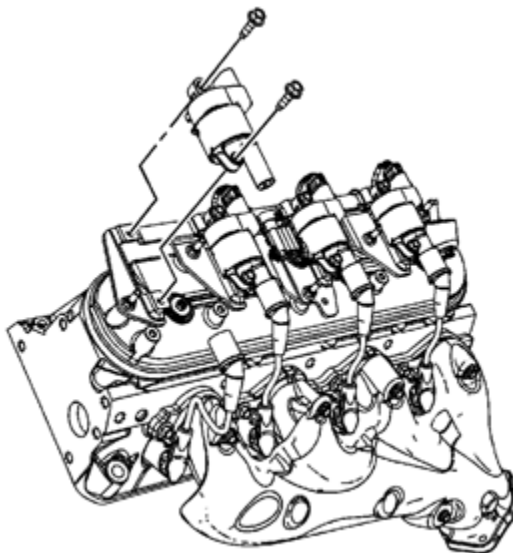
1. Remove the EVAP canister. Refer to [Evaporative Emission Canister Replacement](#) .
2. Turn OFF the main valve on the [J 41413-200](#) .
3. Disconnect the hose from the diagnostic station pressure regulator.
4. Using a section of vacuum hose, connect one end to the diagnostic station pressure regulator.
5. Connect the other end of the vacuum hose to the canister side of the purge pipe.
6. Turn ON the main nitrogen cylinder valve and continue to discharge nitrogen for 15 seconds.
7. If the nitrogen does not dislodge the carbon particles, replace the purge pipe.
8. Return the EVAP pressure/purge diagnostic station to the stations original condition.
9. Install a new EVAP canister. Refer to [Evaporative Emission Canister Replacement](#) .
10. Connect all previously disconnected EVAP pipe connectors.
11. Lower the vehicle.
12. Continue with the published service manual diagnostic DTC procedure.

Ignition Coil Replacement

Removal Procedure

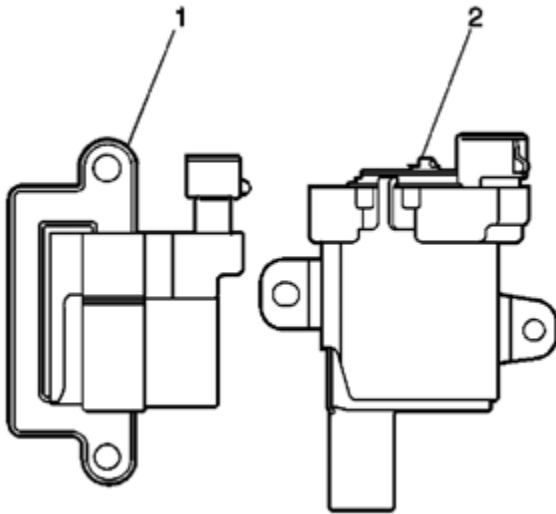


1. Remove the intake manifold sight shield. Refer to [Upper Intake Manifold Sight Shield Replacement](#).
2. Disconnect the ignition coil wiring harness electrical connector (1) from the ignition coil.

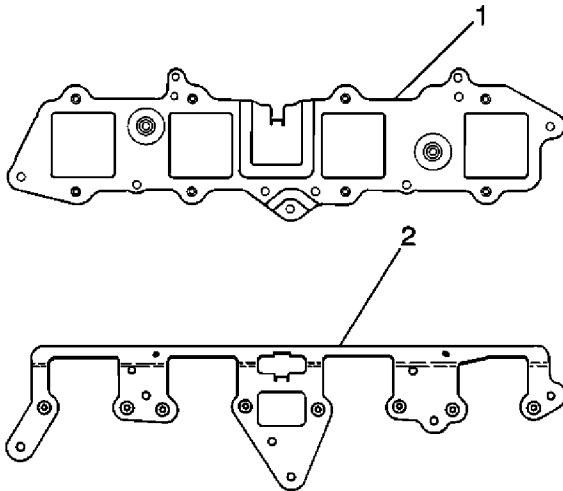


3. Remove the spark plug wire from the ignition coil.
 - Twist the spark plu

- Pull only on the boot in order to remove the wire from the ignition coil.
4. Remove the ignition coil bolts.
 5. Remove the ignition coil from the bracket. (left side shown, right side similar).
 6. There are 2 different manufacturers for the ignition coils and coil brackets. They are as follows:

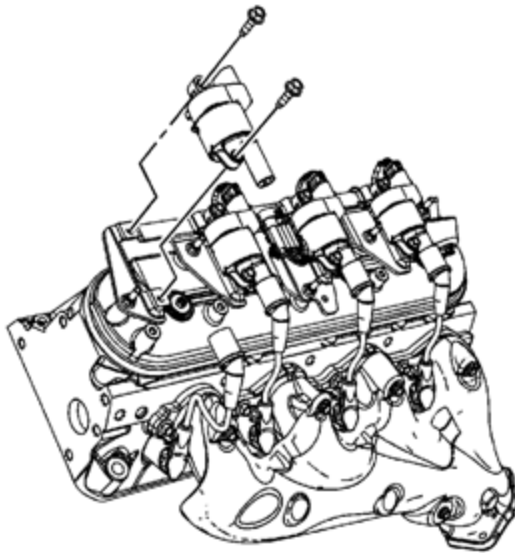


7. The Melco® (1) ignition coil is a square design.
8. The Delphi® (2) ignition coil is a round design.



9. The Melco® ignition coil bracket (1) is a square design.
10. The Delphi® ignition coil bracket (2) is a round design.

Installation Procedure



1. Position the ignition coil to the ignition coil bracket. (left side shown, right side similar).

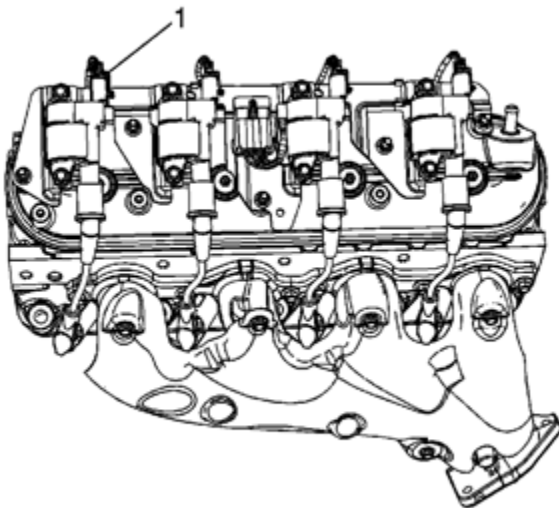
Caution: Refer to [Fastener Caution](#) in the Preface section.

2. Install the ignition coil bolts.

Tighten

Tighten the bolts to 10 N·m (89 lb in).

3. Install the spark plug wire to the ignition coil.
4. Inspect the spark plug wire for proper installation:
 - Push sideways on each boot in order to inspect the seating.
 - Reinstall any loose boot.





5. Connect the ignition coil wiring harness electrical connector (1) to the ignition coil.
6. Install the intake manifold sight shield. Refer to [Upper Intake Manifold Sight Shield Replacement](#).

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Spark Plug Wire Inspection

Spark plug wire integrity is vital for proper engine operation. A thorough inspection is necessary to accurately identify conditions that may affect engine operation. Inspect for the following conditions:

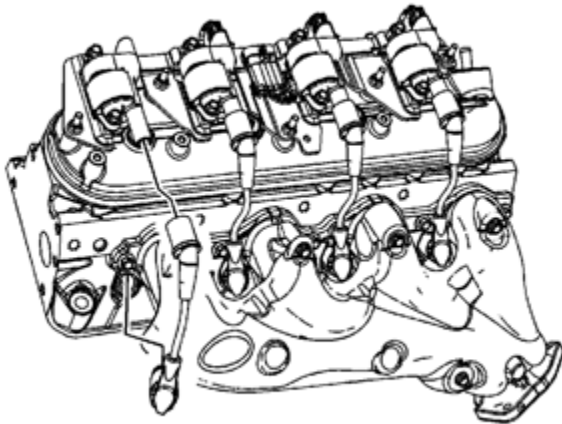
1. Correct routing of the spark plug wires, Incorrect routing may cause cross firing.
2. Any signs of cracks or splits in the wires.
3. Inspect each boot for any of the following conditions:
 - Tearing
 - Piercing
 - Arcing
 - Carbon tracking
 - Corroded terminal

If corrosion, carbon tracking or arcing are indicated on a spark plug wire boot or terminal, replace the wire and the component connected to the wire.

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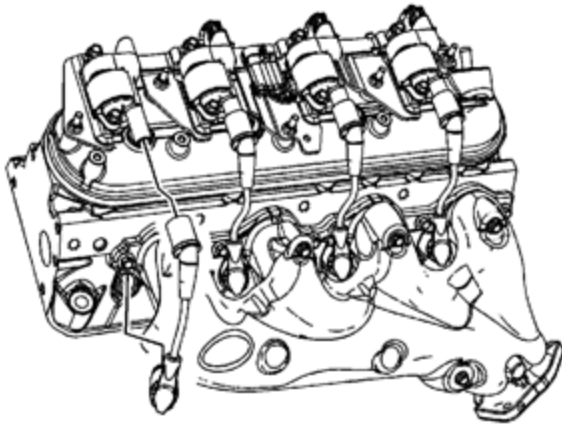
Spark Plug Wire Replacement

Removal Procedure



1. Remove the spark plug wire from the spark plug.
 - 1.1. Twist the spark plug wire boot a 1/2 turn.
 - 1.2. Pull only on the boot in order to remove the wire from the spark plug.
2. Remove the spark plug wire from the ignition coil.
 - 2.1. Twist the spark plug wire boot a 1/2 turn.
 - 2.2. Pull only on the boot in order to remove the wire from the ignition coil.

Installation Procedure

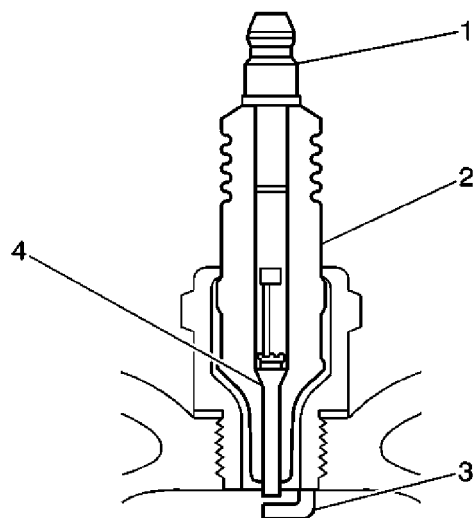


1. Install the spark plug wire to the ignition coil.
2. Install the spark plug wire to the spark plug.
3. Inspect the spark plug wire for proper installation:
 - 3.1. Push sideways on each boot in order to inspect the seating.
 - 3.2. Reinstall any loose boot.

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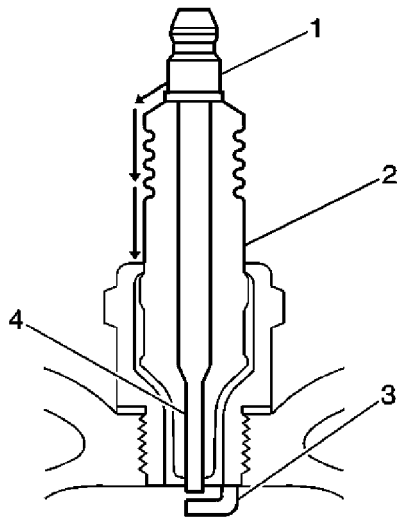
Spark Plug Inspection

•



- ┆ Verify that the correct spark plug is installed. An incorrect spark plug causes driveability conditions. Refer to [Ignition System Specifications](#) for the correct spark plug.
- ┆ Ensure that the spark plug has the correct heat range. An incorrect heat range causes the following conditions:
 - Spark plug fouling, replace with a colder plug
 - Pre-ignition causing spark plug and/or engine damage , replace with a hotter plug
- ┆ Inspect the terminal post (1) for damage.
- Inspect for a bent or broken terminal post (1).
- Test for a loose terminal post (1) by twisting and pulling the post. The terminal post (1) should not move.

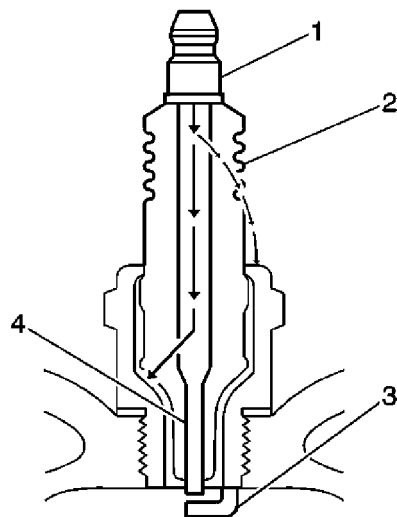
•



Inspect the insulator (2) for flashover or carbon tracking, or soot. This is caused by the electrical charge traveling across the insulator (2) between the terminal post (1) and ground. Inspect for the following conditions:

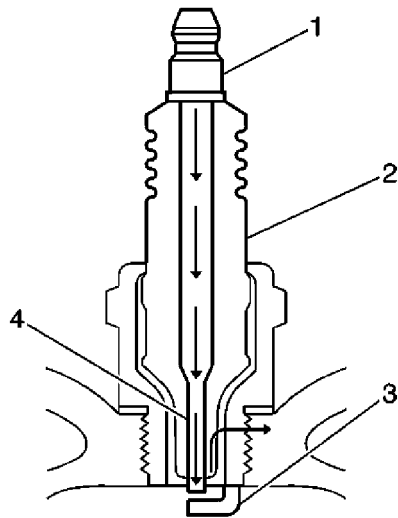
- Inspect the spark plug boot for damage.
- Inspect the spark plug recess area of the cylinder head for moisture, such as oil, coolant, or water. A spark plug boot that is saturated will cause arcing to ground.

•



Inspect the insulator (2) for cracks. All or part of the electrical charge may arc through the crack instead of the electrodes (3, 4).

•



- ▮ Inspect for evidence of improper arcing.
- Measure the gap between the center electrode (4) and the side electrode (3). Refer to [Ignition System Specifications](#). An excessively wide electrode gap can prevent correct spark plug operation.
- Inspect for the correct spark plug torque. Refer to [Ignition System Specifications](#). Insufficient torque can prevent correct spark plug operation. An over torqued spark plug, causes the insulator (2) to crack.
- Inspect for signs of tracking that occurred near the insulator tip instead of the center electrode (4).
- Inspect for a broken or worn side electrode (3).
- Inspect for a broken, worn, or loose center electrode (4) by shaking the spark plug.
 - A rattling sound indicates internal damage.
 - A loose center electrode (4) reduces the spark intensity.
- Inspect for bridged electrodes (3, 4). Deposits on the electrodes (3, 4) reduce or eliminates the gap.
- Inspect for worn or missing platinum pads on the electrodes (3, 4), if equipped.
- Inspect for excessive fouling.
- ▮ Inspect the spark plug recess area of the cylinder head for debris. Dirty or damaged threads can cause the spark plug not to seat correctly during installation.

Visual Inspection

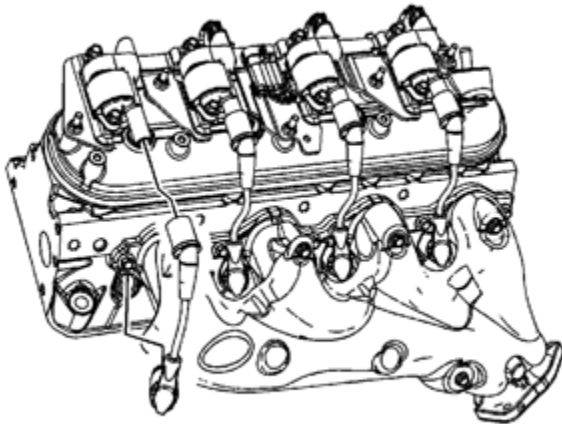
- Normal operation - Brown to grayish-tan with small amounts of white powdery deposits are normal combustion by-products from fuels with additives.
- Carbon fouled - Dry, fluffy black carbon, or soot caused by the following conditions:
 - Rich fuel mixtures
- Leaking fuel injectors

- Excessive fuel pressure
- Restricted air filter element
- Incorrect combustion
 - Reduced ignition system voltage output
- Weak ignition coils
- Worn ignition wires
- Incorrect spark plug gap
 - Excessive idling or slow speeds under light loads can keep spark plug temperatures so low that normal combustion deposits may not burn off.
- Deposit fouling - Oil, coolant, or additives that include substances such as silicone, very white coating, reduces the spark plug intensity. Most powdery deposits will not affect spark plug intensity unless they form into a glazing over the electrode.

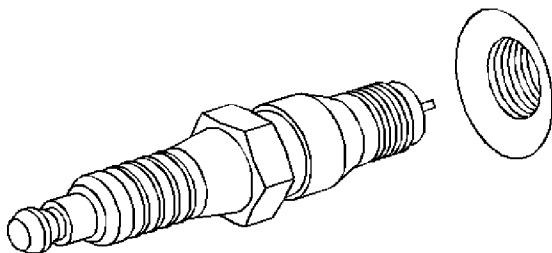
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Spark Plug Replacement

Removal Procedure



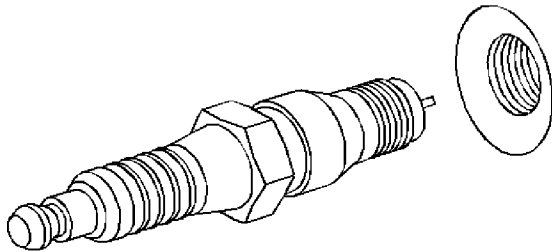
1. Remove the spark plug wire from the spark plug.
 - 1.1. Twist the spark plug wire boot a 1/2 turn.
 - 1.2. Pull only on the boot in order to remove the wire from the spark plug.



2. Brush or using compressed air, blow away any dirt from around the spark plug.
3. Remove the spark plug.

If removing more than one plug, place each plug in a tray marked with the corresponding cylinder number.

Installation Procedure



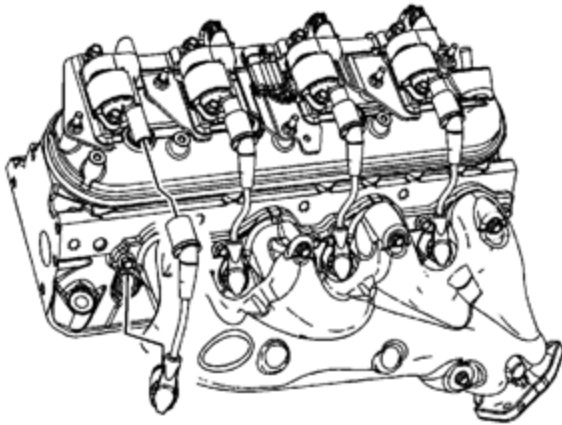
1. Correctly position the spark plug washer.
2. Inspect the spark plug gap. Adjust the gap as needed. Refer to [Ignition System Specifications](#)
3. Hand start the spark plug in the corresponding cylinder.

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

4. Tighten the spark plug.

Tighten

Tighten the plug to 15 N·m (11 lb ft).



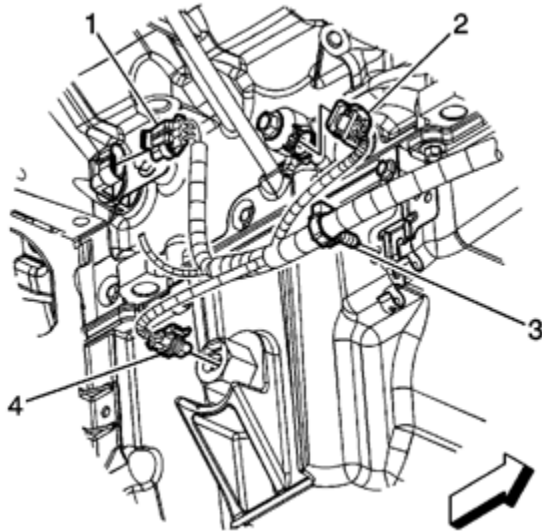
5. Install the spark plug wire to the spark plug.
6. Inspect the spark plug wire for proper installation:
 - 6.1. Push sideways on each boot in order to inspect the seating.
 - 6.2. Reinstall any loose boot.

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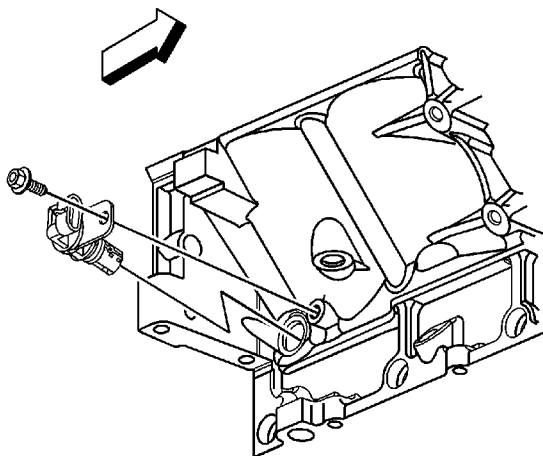
Crankshaft Position Sensor Replacement

Removal Procedure

Note: Perform the [Crankshaft Position System Variation Learn](#) whenever the crankshaft position sensor is removed or replaced.



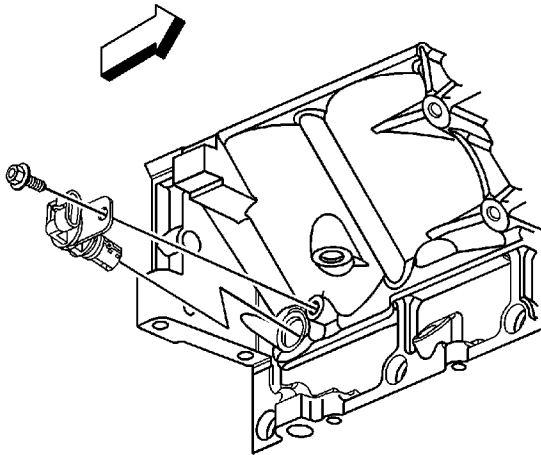
1. Remove the starter. Refer to [Starter Motor Replacement](#).
2. Working through the wheel well opening, disconnect the engine wiring harness electrical connector (1) from the crankshaft position (CKP) sensor.





3. Clean the area around the CKP sensor before removal in order to avoid debris from entering the engine.
4. Remove the CKP sensor bolt.
5. Remove the CKP sensor.

Installation Procedure



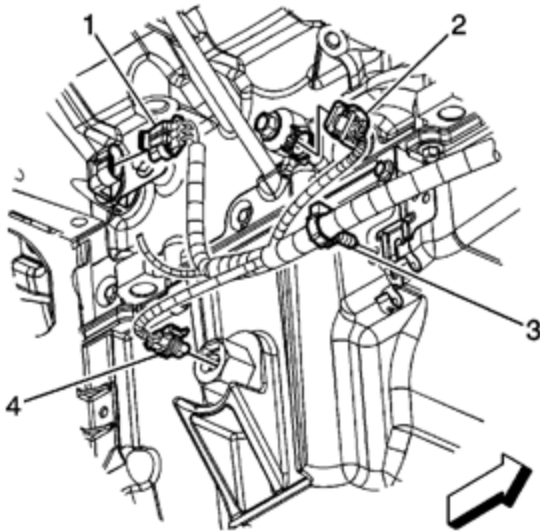
1. Install the CKP sensor.

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

2. Install the CKP sensor bolt.

Tighten

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

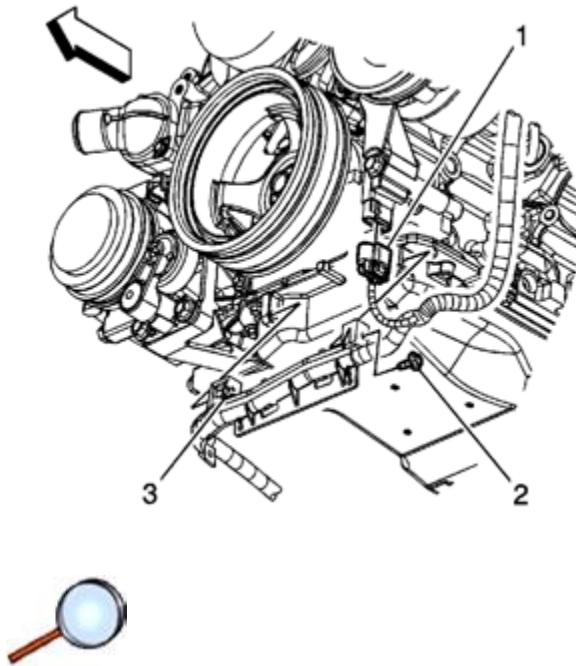


3. Connect the engine wiring harness electrical connector (1) to the CKP sensor.
4. Install the starter. Refer to [Starter Motor Replacement](#).
5. Perform the CKP system variation learn procedure. Refer to [Crankshaft Position System Variation Learn](#).

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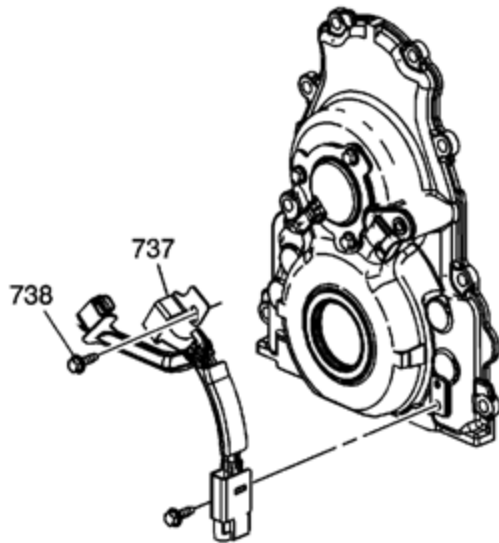
Camshaft Position Sensor Replacement (Except RPOs LY2, LY5, LH6 and LMG)

Removal Procedure

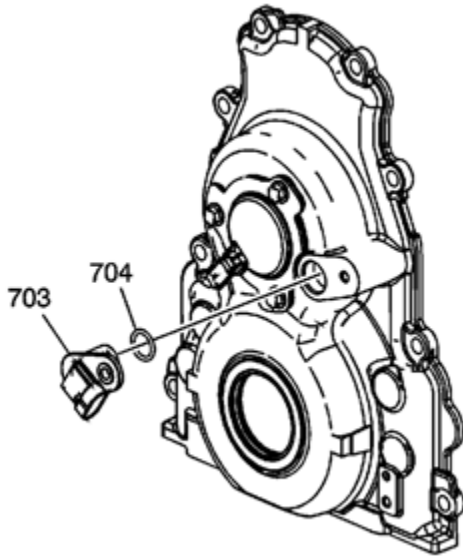


Note: Clean the area around the camshaft position (CMP) sensor before removal in order to prevent debris from entering the engine.

1. Raise and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#).
2. Disconnect the engine wiring harness electrical connector (1) from the CMP sensor wire harness.

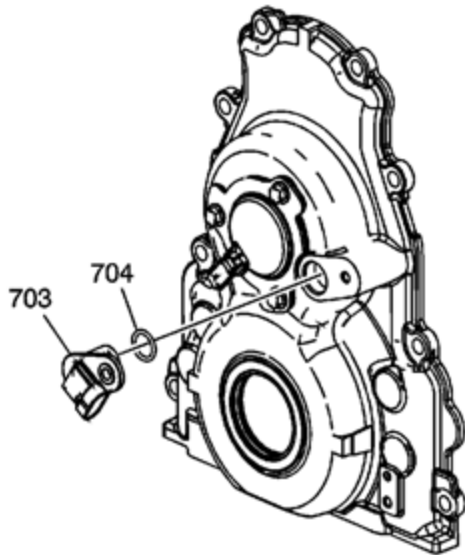


3. Remove the 3 CMP sensor wire harness bolts (738).
4. Disconnect the CMP sensor wire harness electrical connectors from the CMP sensor and the CMP actuator magnet.
5. Remove the CMP sensor wire harness (737).

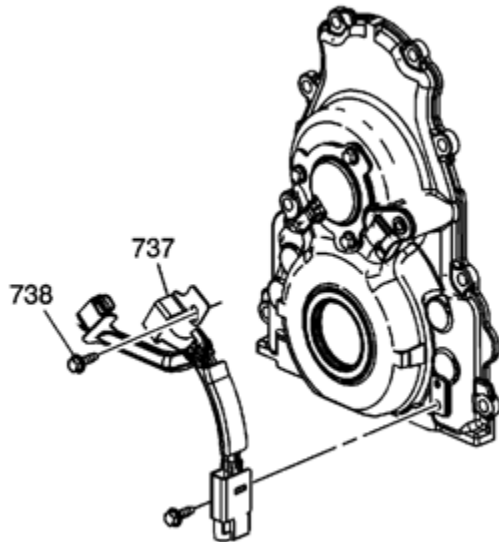


6. Remove the CMP sensor (703) and O-ring seal (704).

Installation Procedure



1. Inspect the CMP O-ring seal for cuts or damage. If the seal is not cut or damaged, it may be used again.
2. Lubricate the O-ring seal with clean engine oil.
3. Install the O-ring seal (704) onto the sensor.
4. Install the CMP sensor (703) to the front cover.



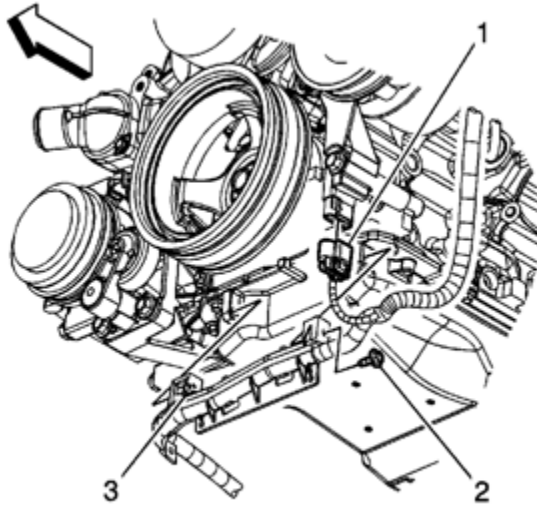
5. Install the CMP sensor wire harness (737).
6. Connect the CMP sensor wire harness electrical connectors to the CMP sensor and the CMP actuator magnet.

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

7. Install the 3 CMP sensor wire harness bolts (738).

Tighten

Tighten the bolts to 12 N·m (106 lb in).

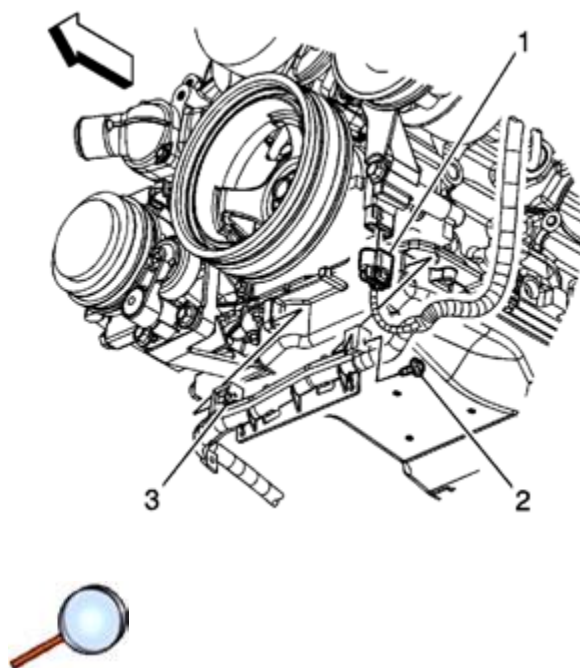


8. Connect the engine wiring harness electrical connector (1) to the CMP sensor wire harness.
9. Lower the vehicle.

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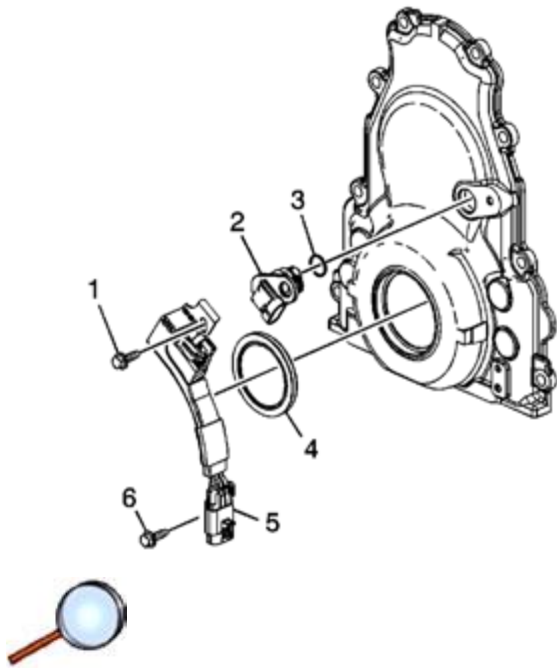
Camshaft Position Sensor Replacement (RPOs LY2 / LY5 / LH6 / LMG)

Removal Procedure



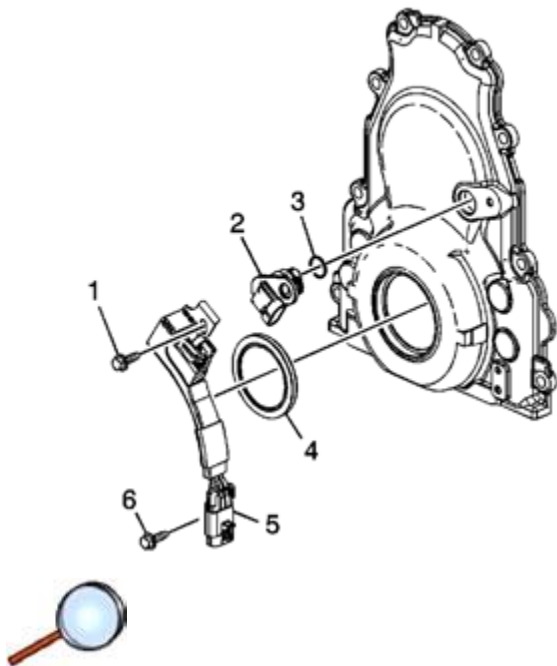
Note: Clean the area around the camshaft position (CMP) sensor before removal in order to prevent debris from entering the engine.

1. Raise and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#).
2. Disconnect the engine wiring harness electrical connector (1) from the CMP sensor wire harness.



3. Remove the CMP sensor wire harness bolts (1, and 6).
4. Remove the CMP sensor wire harness (5).
5. Remove the CMP sensor (2) and O-ring seal (3).

Installation Procedure



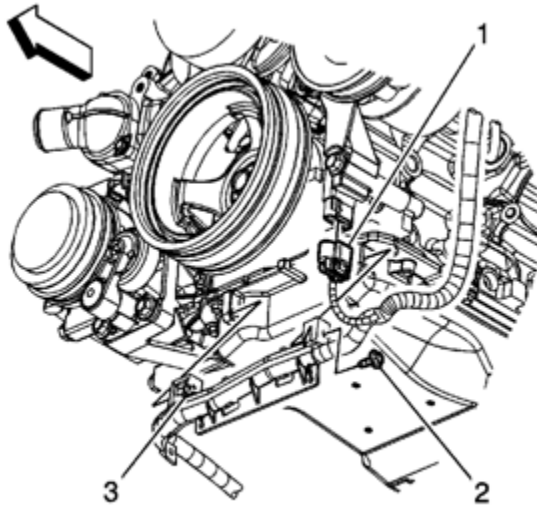
1. Inspect the CMP sensor O-ring seal for cuts or damage. If the seal is not cut or damaged, it may be used again.
2. Lubricate the O-ring seal with clean engine oil.
3. Install the O-ring seal (3) onto the sensor.
4. Install the CMP sensor (2) to the front cover.
5. Install the CMP sensor wire harness (5).

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

6. Install the CMP sensor wire harness bolts (1, and 6).

Tighten

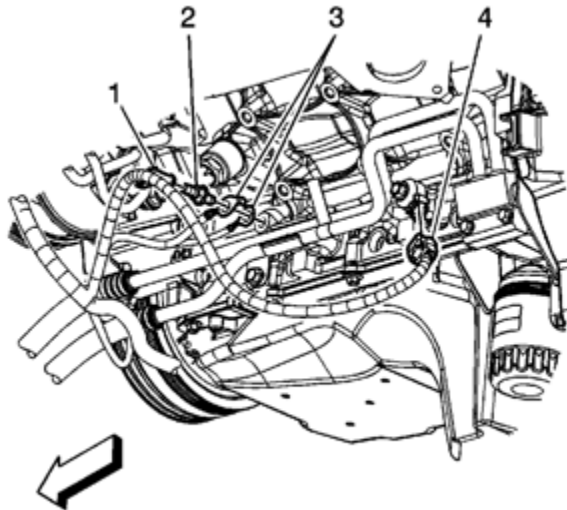
Tighten the bolts to 12 N·m (106 lb in).



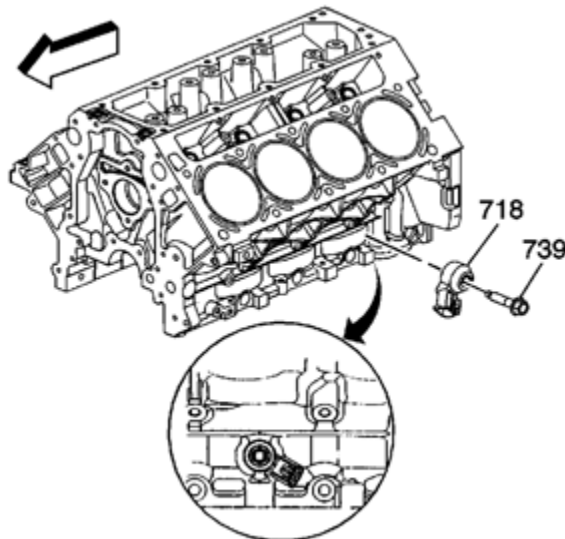
7. Connect the engine wiring harness electrical connector (1) to the CMP sensor wire harness.
8. Lower the vehicle.

Knock Sensor 1 Replacement

Removal Procedure



1. Lift and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#).
2. Disconnect the engine wiring harness electrical connector (4) from knock sensor.

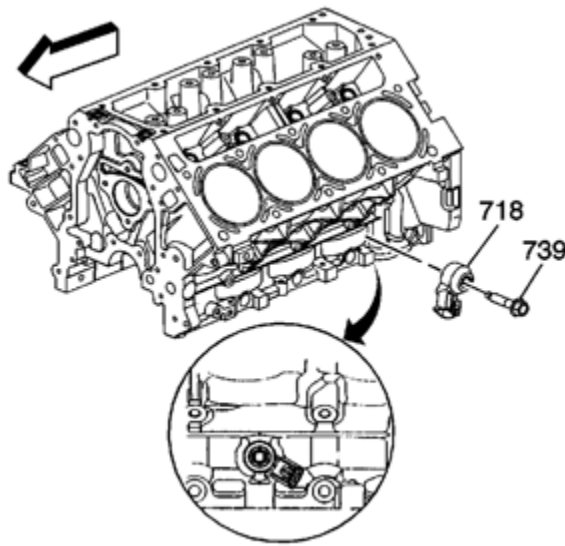


3. Remove the knock sensor bolt (739) and knock sensor (718).

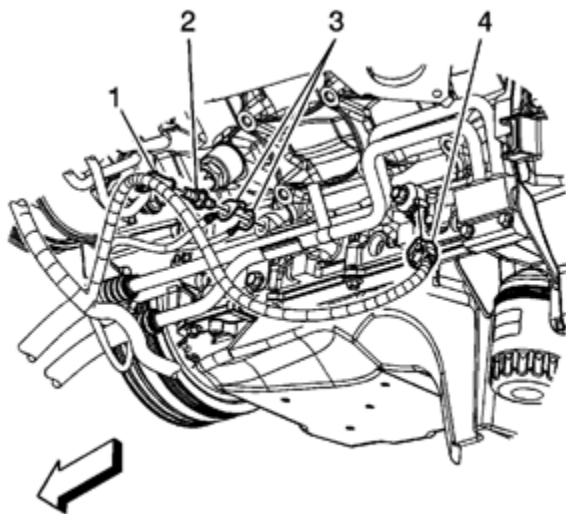
Installation Procedure

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



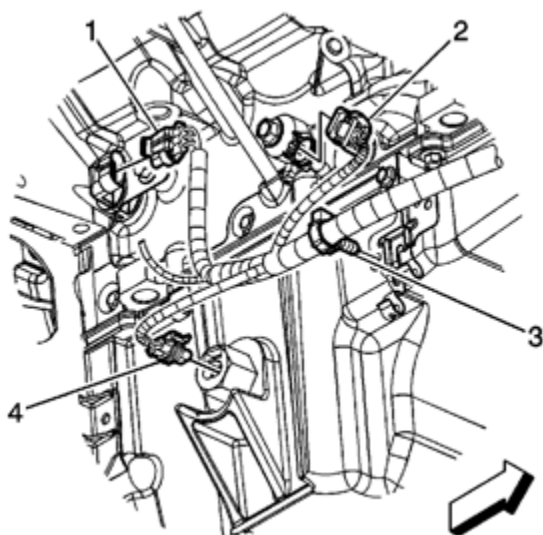
1. Position the knock sensor (718) to the engine block and install the knock sensor bolt (739). Tighten the bolt to **25 N·m (18 lb ft)**



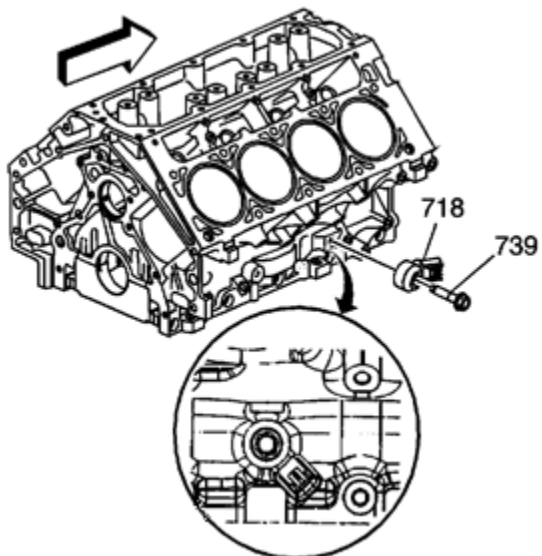
2. Connect the engine wiring harness electrical connector (4) to knock sensor.

Knock Sensor 2 Replacement

Removal Procedure



1. Lift and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#).
2. Disconnect the engine wiring harness electrical connector (2) from knock sensor.

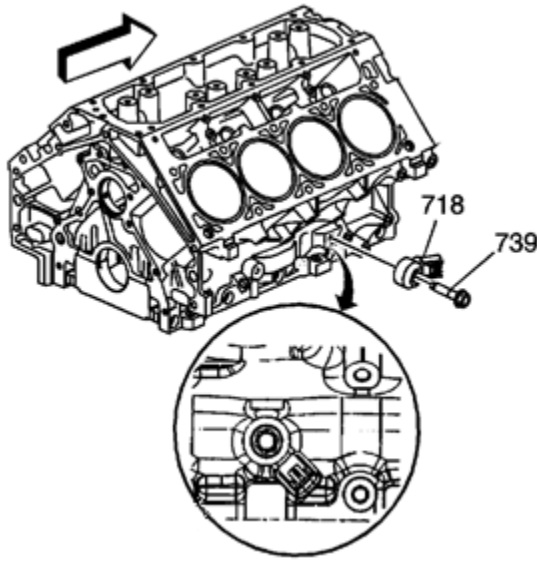


3. Remove the knock sensor bolt (739) and knock sensor (718).

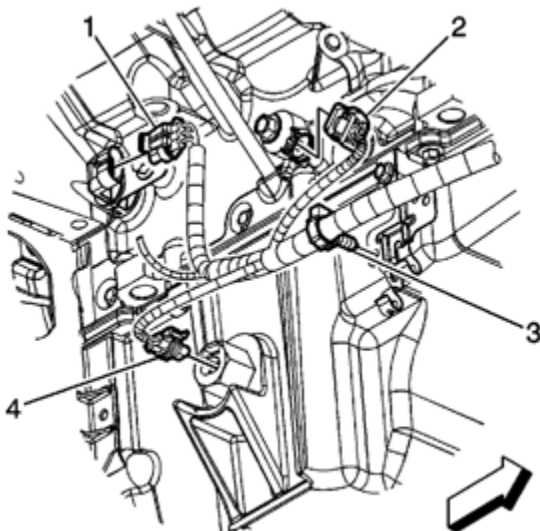
Installation Procedure

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

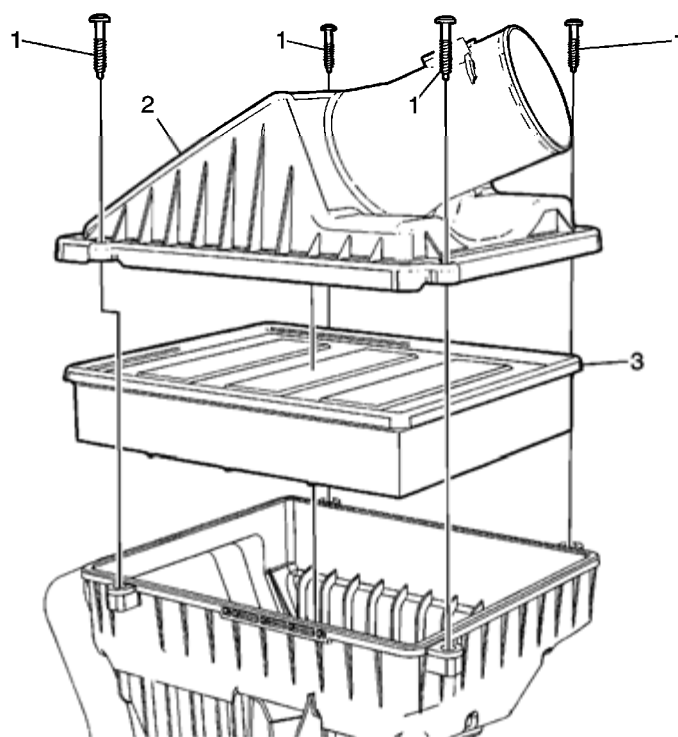


1. Position the knock sensor (718) to the engine block and install the knock sensor bolt (739). Tighten the bolt to **25 N·m (18 lb ft)**



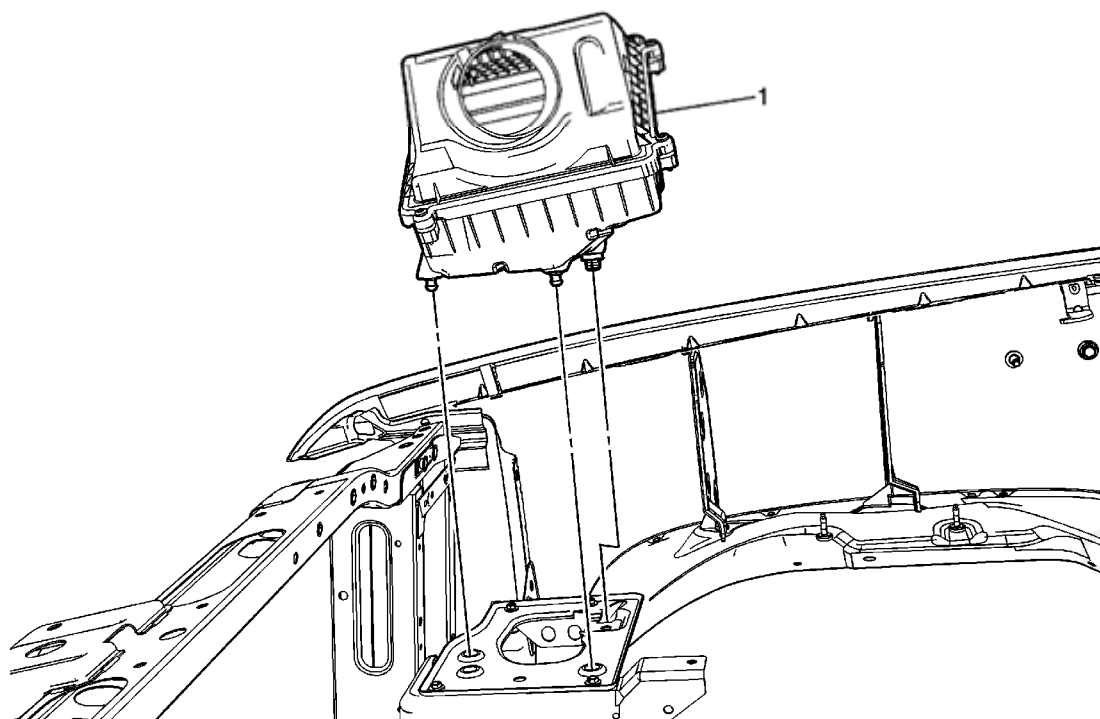
2. Connect the engine wiring harness electrical connector (2) to knock sensor.

Air Cleaner Element Replacement



Callout	Component Name
Preliminary Procedure	
Disconnect the air cleaner outlet duct from the air cleaner assembly. Refer to Air Cleaner Resonator Outlet Duct Replacement	
1	Air Cleaner Housing Cover Screw (Qty: 4) Caution: Refer to Fastener Caution in the Preface section. Tighten 3 N·m (27 lb in).
2	Air Cleaner Housing
3	Air Cleaner Element

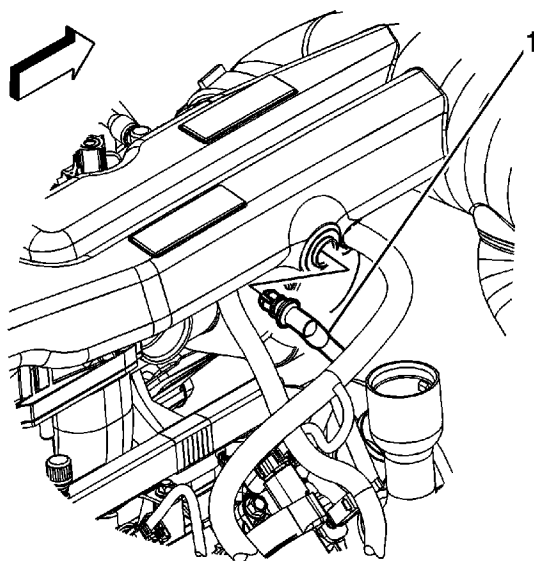
Air Cleaner Assembly Replacement



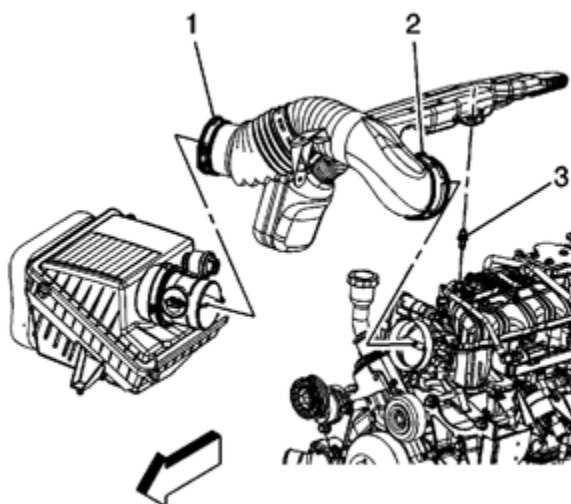
Callout	Component Name
Preliminary Procedure	
1. Remove the Mass Airflow Sensor. Refer to Mass Airflow Sensor / Intake Air Temperature Sensor Replacement	
2. Disconnect the air cleaner outlet duct from the air cleaner assembly. Refer to Air Cleaner Resonator Outlet Duct Replacement	
1	Air Cleaner Assembly Tip Pull upward in a jerking manner in order to disengage the air cleaner housing from the insulators.

Air Cleaner Resonator Outlet Duct Replacement

Removal Procedure



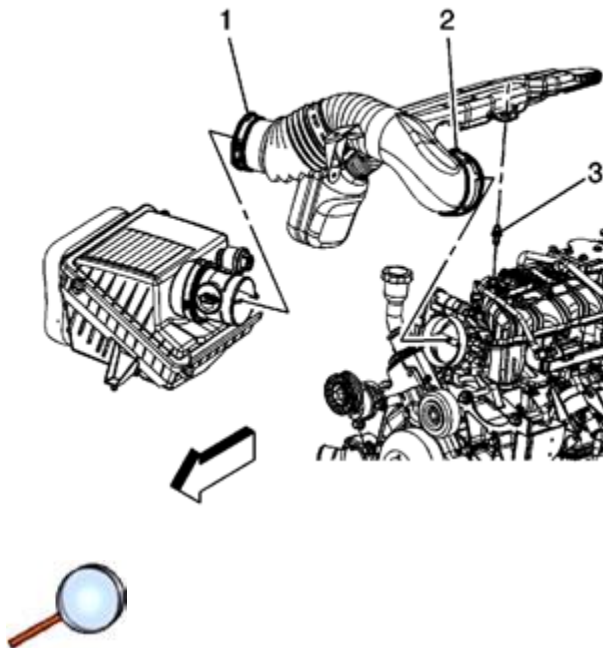
1. Remove the intake manifold sight shield. Refer to [Upper Intake Manifold Sight Shield Replacement](#).
2. Remove the positive crankcase ventilation (PCV) line (1) from the air cleaner outlet duct.



3. Remove the radiator inlet hose clamp retainer from the outlet duct.
4. Remove the radiator vent inlet hose retainer from the outlet duct.

5. Loosen the air cleaner outlet duct clamp (1) at the mass air flow (MAF)/intake air temperature (IAT) sensor.
6. Loosen the air cleaner outlet duct clamp (2) at the throttle body.
7. Lift up the air cleaner outlet duct at the resonator tab in order to separate the resonator from the stud on the intake manifold.
8. Remove the air cleaner outlet duct from the throttle body and MAF/IAT sensor.

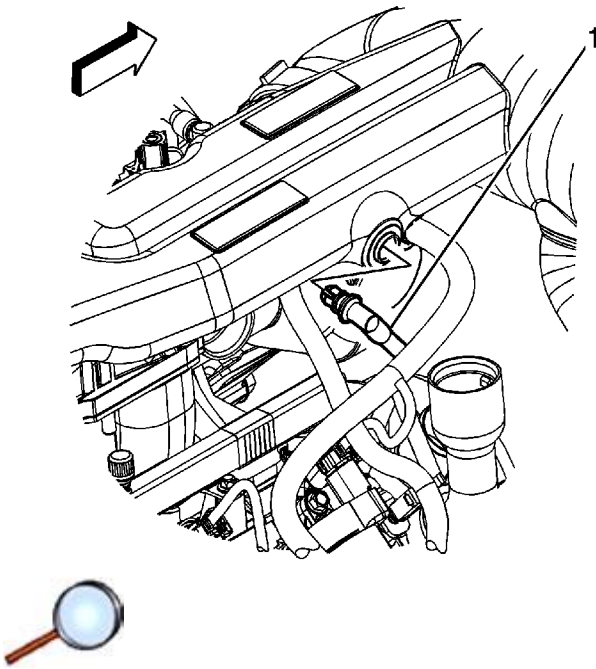
Installation Procedure



1. Install the air cleaner outlet duct to the throttle body and MAF/IAT sensor. Ensure that the resonator tab aligns with the stud on the intake manifold.
2. Push down on the air cleaner outlet duct resonator directly over the resonator tab in order to secure the resonator to the stud on the intake manifold.
3. Tighten the air cleaner outlet duct clamp (2) at the throttle body.

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

4. Tighten the air cleaner outlet duct clamp (1) and tighten to **4 N·m (35 lb in)** at the MAF/IAT sensor.
5. Install the radiator vent inlet hose retainer to the outlet duct.
6. Install the radiator inlet hose clamp retainer to the outlet duct.



7. Install the PCV line (1) to the air cleaner outlet duct.
8. Install the intake manifold sight shield. Refer to [Upper Intake Manifold Sight Shield Replacement](#).

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