

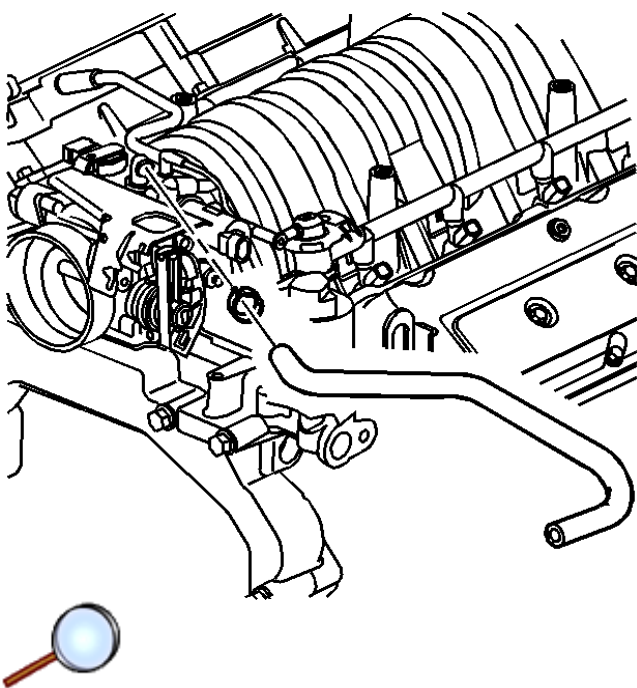
# Engine Replacement

## Tools Required

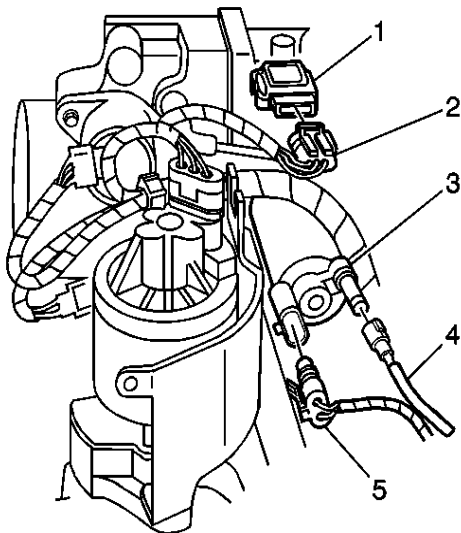
- [J 37097-A](#) Hose Clamp Remover/Installer
- [J 38185](#) Hose Clamp Pliers
- [J 39580](#) Universal Engine Support Table
- [J 41623-B](#) Cooler Quick Connect Tool
- [J 42504](#) Engine Lift Bracket
- [J 42640](#) Steering Column Lock Pin

## Removal Procedure

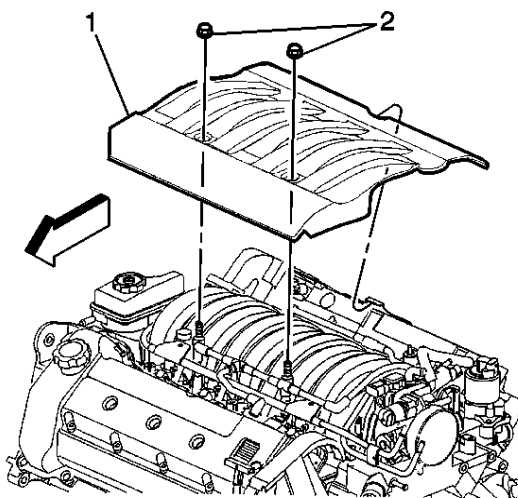
1. Disconnect the battery negative cable. Refer to [Battery Negative Cable Disconnection and Connection](#) in Engine Electrical.
2. Recover the A/C refrigerant system. Refer to [Refrigerant Recovery and Recharging](#) in Heating, Ventilation and Air Conditioning.



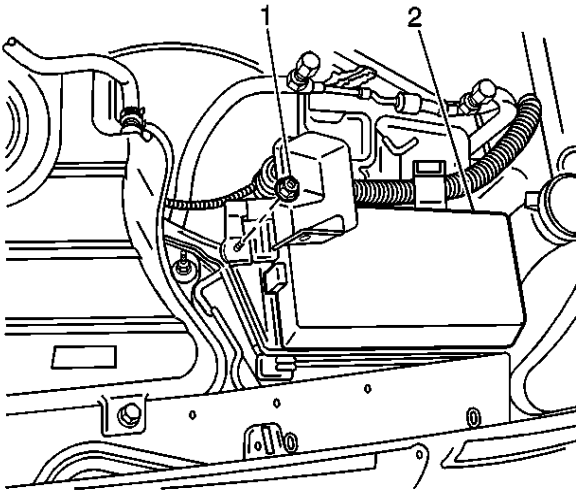
3. Disconnect the vacuum brake booster hose from the vacuum connection and position aside.
4. Disconnect the fuel inlet and return quick-connect fittings at the fuel rail and secure to the air inlet grille. Refer to [Metal Collar Quick Connect Fitting Service](#) or [Plastic Collar Quick Connect Fitting Service](#) in Engine Controls-4.6L.



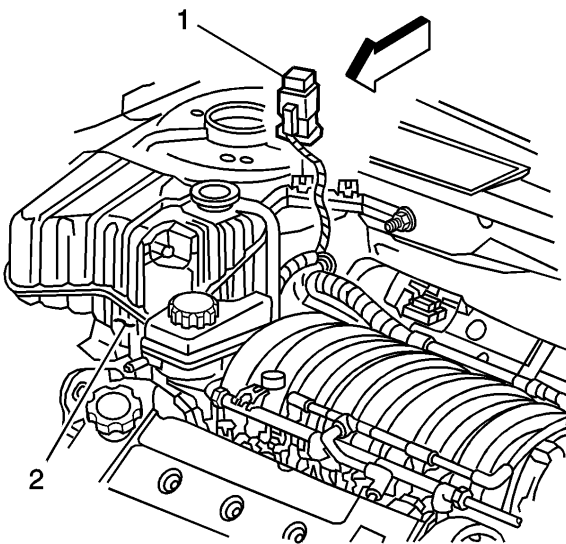
5. Disconnect the hose (4) from the evaporative emission canister purge valve (3) and secure to the air inlet grille.
6. Remove the upper filler panel. Refer to [Filler Panel Replacement - Upper](#) in Body Front End.
7. Remove the air cleaner assembly. Refer to [Air Cleaner Assembly Replacement](#) in Engine Controls-4.6L.



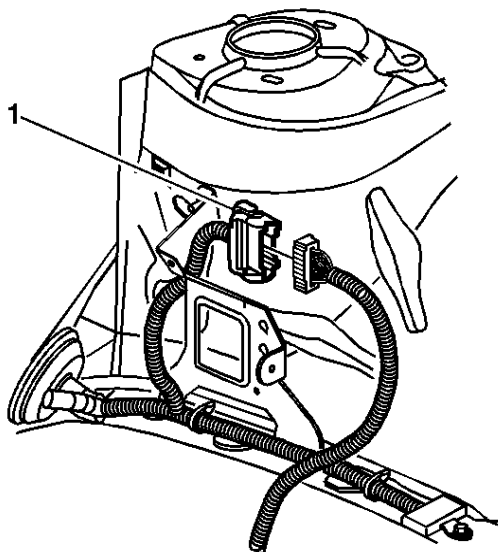
8. Remove the 2 nuts (2) from the intake manifold sight shield (1).
9. Remove the sight shield (1) from the engine.



10. Remove the nut (1) securing the battery positive cable to the remote positive terminal and secure to the top of the engine.

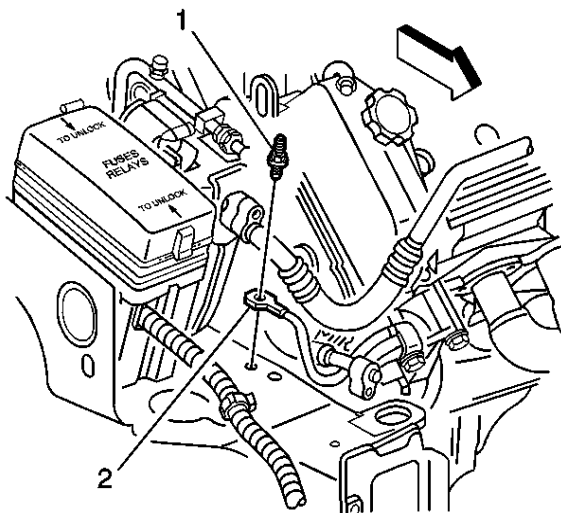


11. Disconnect the secondary AIR relay (1) from the relay bracket and secure to the top of the engine.

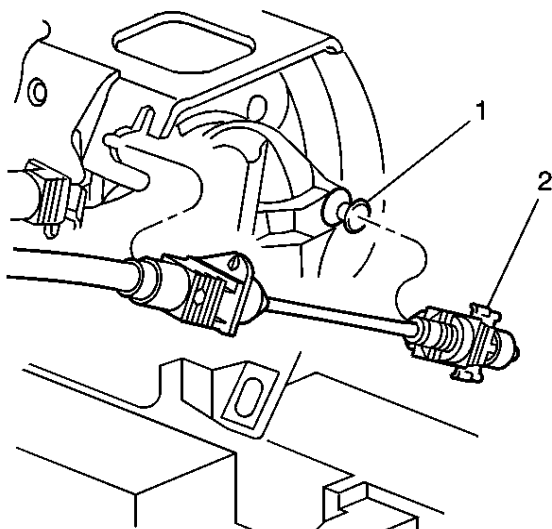


12. Disconnect and secure the following wiring harness electrical connectors to the top of the engine:

- The PCM. Refer to [Powertrain Control Module Replacement](#) in Engine Controls-4.6L.
- The C101 (1)
- The engine electrical harness. Refer to [Underhood Electrical Center or Junction Block Replacement](#) in Wiring Systems.

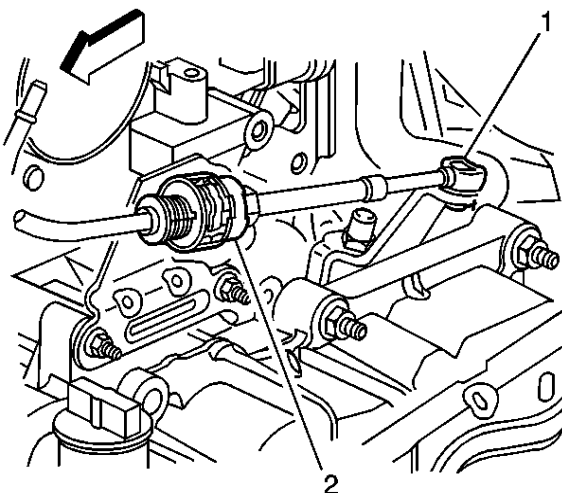


13. Remove the bolt (1) securing the engine ground cable (2) from the right side body frame rail.

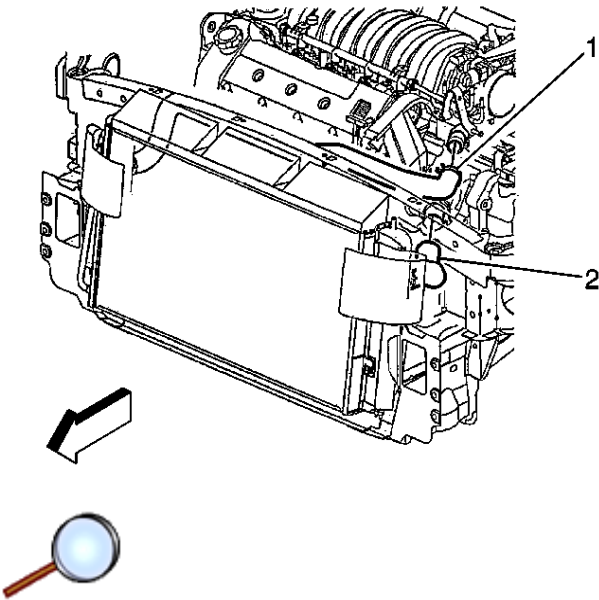


**Caution:** In order to avoid possible injury or vehicle damage, always replace the accelerator control cable with a NEW cable whenever you remove the engine from the vehicle. In order to avoid cruise control cable damage, position the cable out of the way while you remove or install the engine. Do not pry or lean against the cruise control cable and do not kink the cable. You must replace a damaged cable.

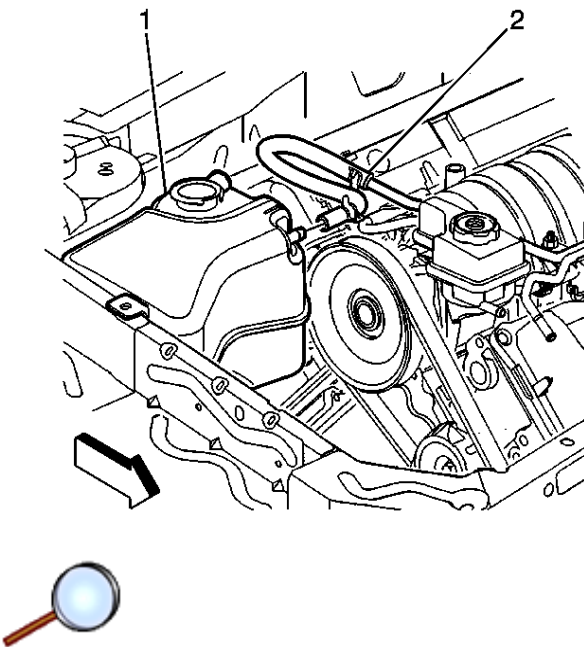
14. Push the lock release and remove the cruise control cable (2) from the throttle body bracket and lever (1).
15. Remove the accelerator control cable from the throttle body. Refer to [Accelerator Control Cable Replacement](#) in Engine Controls-4.6 L.



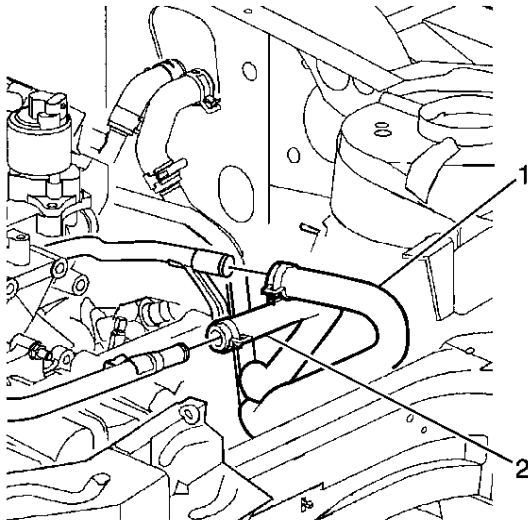
16. Remove the shift cable (2) from the bracket and manual shift lever (1) and position aside.
17. Drain the cooling system. Refer to [Cooling System Draining and Filling](#) in Engine Cooling.



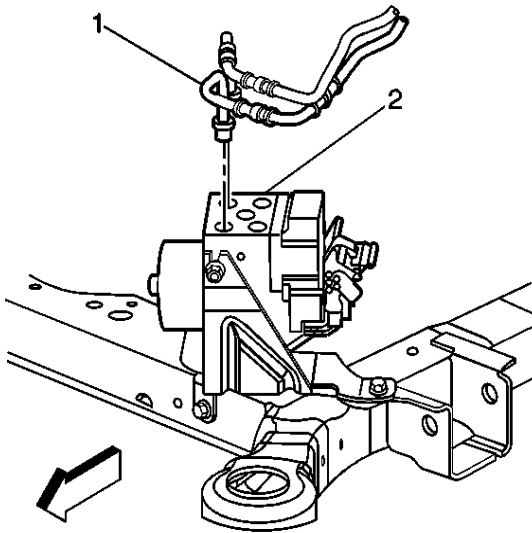
18. Position the [J 37097-A](#) to the clamp in order to remove the radiator inlet hose (1) from the water housing crossover and position aside.
19. Position the [J 38185](#) to the clamp in order to remove the radiator outlet hose (2) from the thermostat housing and position aside.



20. Disconnect the surge tank inlet hose (2) from the surge tank (1).



21. Disconnect the heater hoses (1, 2) from the heater pipes.



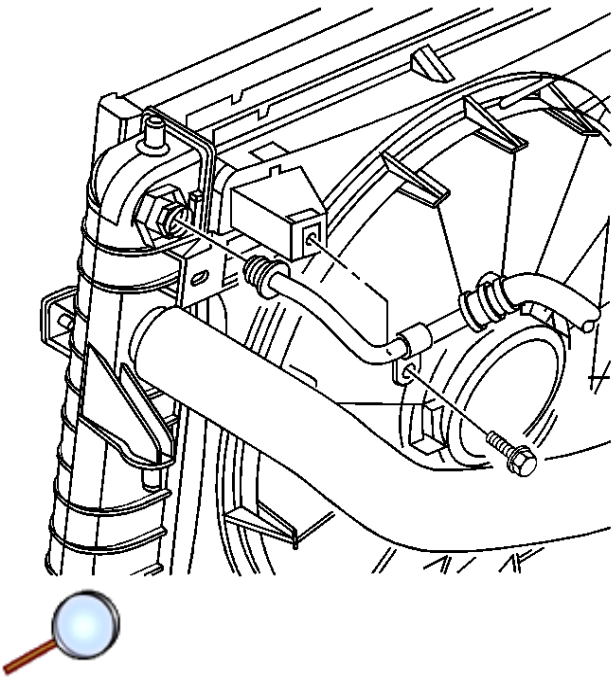
**Caution:** Brake fluid may irritate eyes and skin. In case of contact, take the following actions:

- Eye contact—rinse thoroughly with water.
- Skin contact—wash with soap and water.
- If ingested—consult a physician immediately.

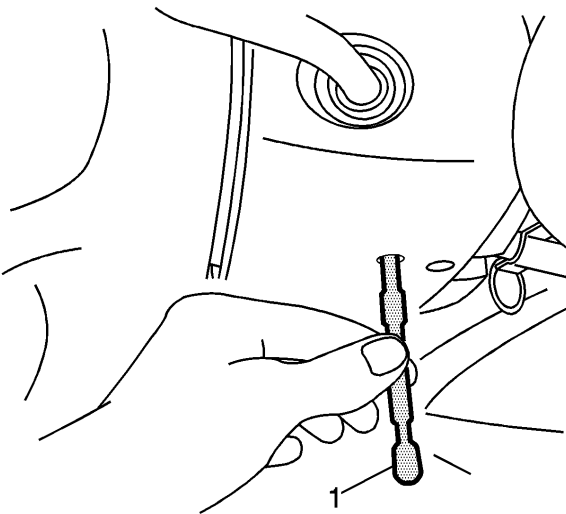
**Important:** Record the location of the brake pipes to the brake pressure modulator valve (BPMV) for use as an aid during installation.

22. Remove the 2 master cylinder brake pipes (1) from the BPMV (2).

Plug the open outlet ports to prevent fluid loss and contamination.



23. Remove the upper transaxle oil cooler pipe retaining bolt from the fan shroud.
24. Slide the plastic cap off the upper transaxle oil cooler pipe quick connect fitting.
25. Disconnect the upper transaxle oil cooler pipe from the radiator using the [J 41623-B](#).
26. Disconnect the lower transaxle oil cooler pipe fitting from the radiator.



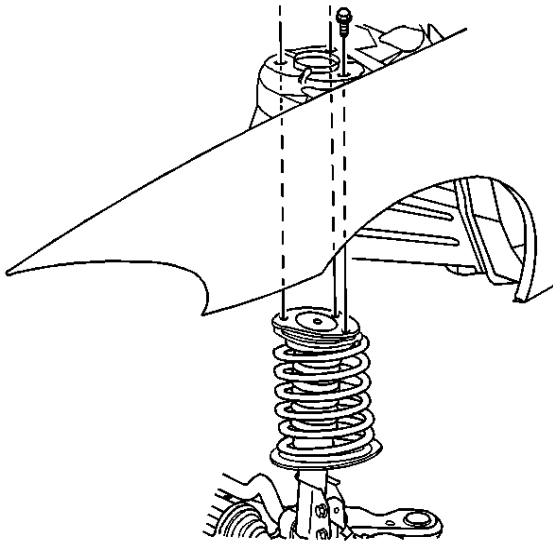
**Notice:** With wheels of the vehicle facing straight ahead, secure the steering wheel utilizing steering column anti-rotation pin, steering column lock, or a strap to prevent rotation. Locking of the steering column will prevent damage and a possible malfunction of the SIR system. The steering wheel must be secured in position before disconnecting the following components:

- The steering column
- The intermediate shaft(s)
- The steering gear

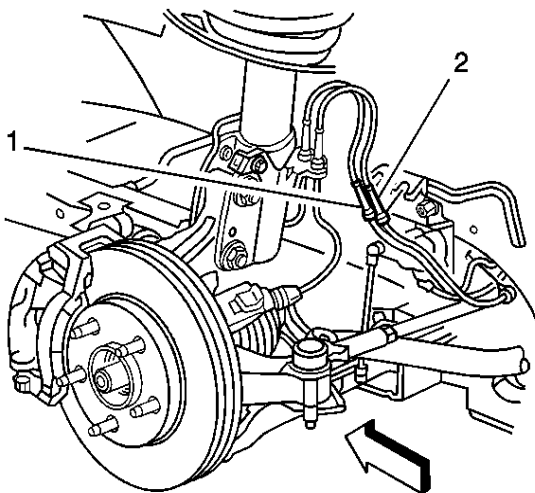


After disconnecting these components, do not rotate the steering wheel or move the front tires and wheels. Failure to follow this procedure may cause the SIR coil assembly to become un-centered and cause possible damage to the SIR coil. If you think the SIR coil has become un-centered, refer to your specific SIR coil's centering procedure to re-center SIR Coil.

27. Lock the steering column by installing the [J 42640](#) into the underside of the steering column.

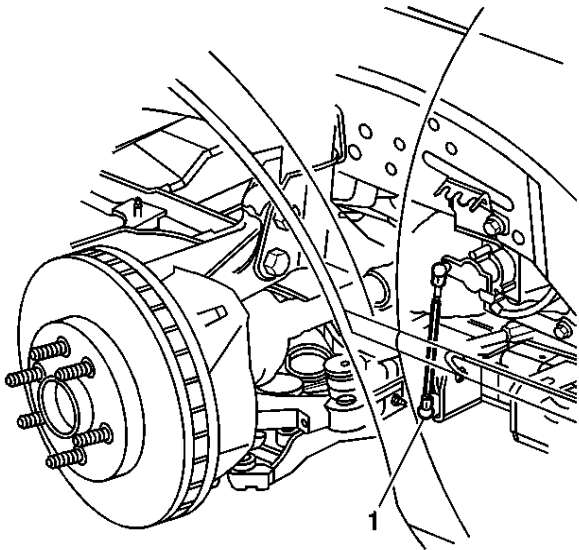


28. Remove the right and left side strut tower bolts.
29. Raise and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#) in General Information.
30. Remove the rear exhaust manifold pipe. Refer to [Exhaust Manifold Rear Pipe Replacement](#) in Engine Exhaust.
31. Remove the front wheels. Refer to [Tire and Wheel Removal and Installation](#) in Tires and Wheels.

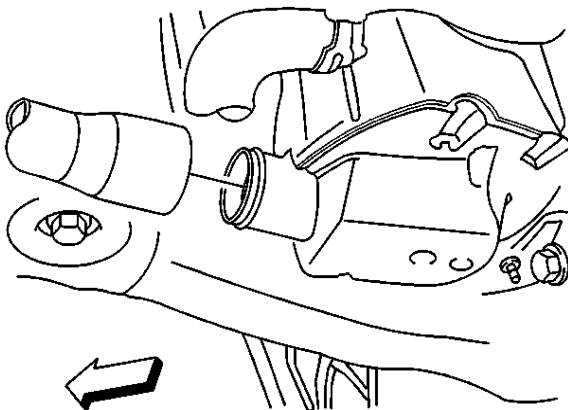


32. Disconnect the front wheel speed sensor electrical leads (2) from the body frame rail.

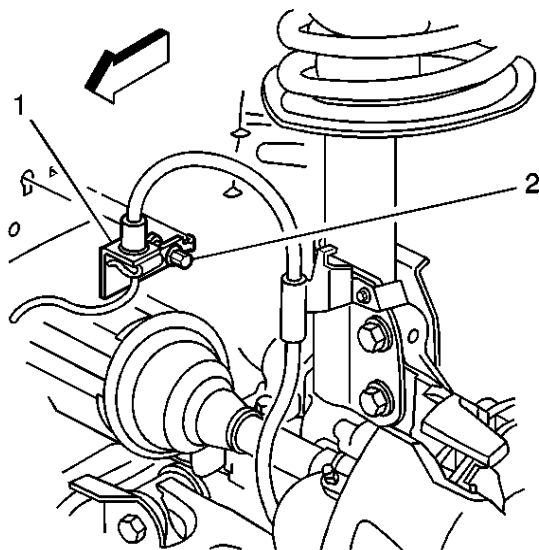
33. Disconnect the road sensing suspension electrical connector at the body frame rail (if equipped).
34. Disconnect the road sensing suspension electrical leads (1) from the body frame rail (if equipped).



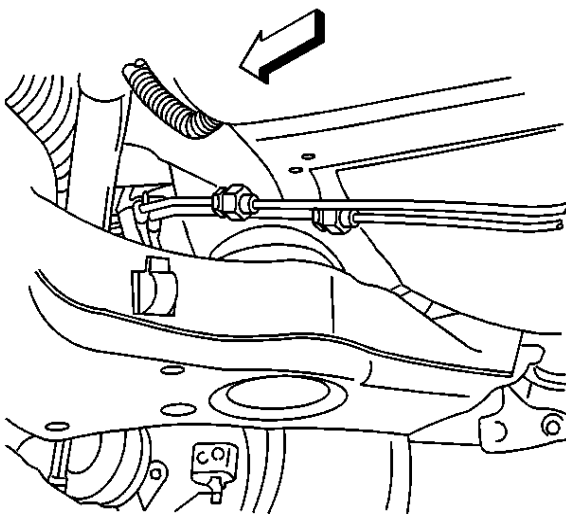
35. Disconnect the electronic suspension position sensor links (1) from the lower control arms (if equipped).
36. Remove the front air deflector. Refer to [Front Air Deflector Replacement](#) in Body Front End.
37. Remove the front fascia extensions. Refer to [Front Bumper Fascia Extension Replacement](#) in Body Front End.



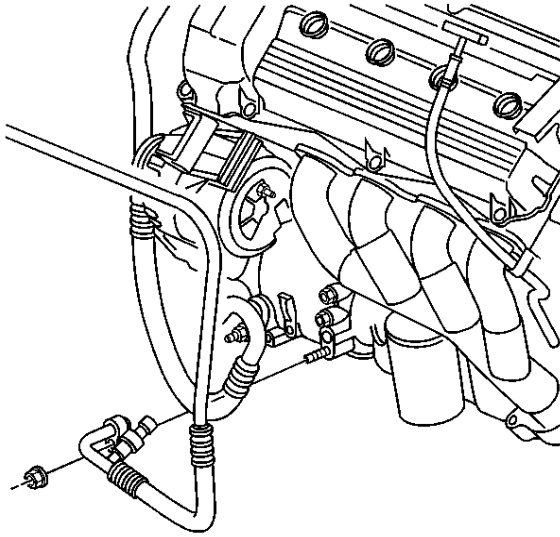
38. Disconnect the secondary AIR inlet hose from the secondary AIR pump.



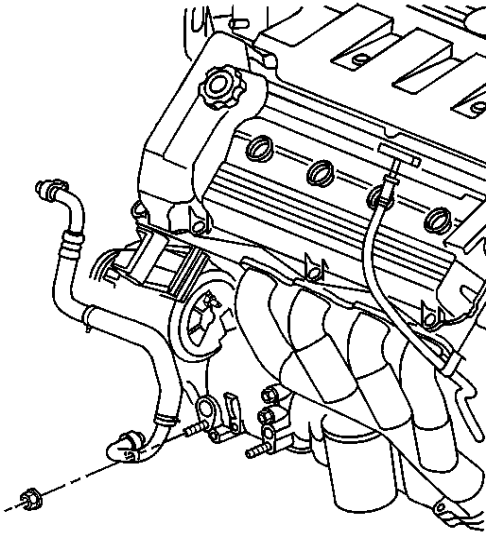
39. Loosen the nuts (2) securing the front brake pipe frame brackets (1) to the body frame rails.
40. Disconnect the front brake pipes from the retainers at the body frame rails.
41. Carefully pull the front brake pipes away from the body frame rails.



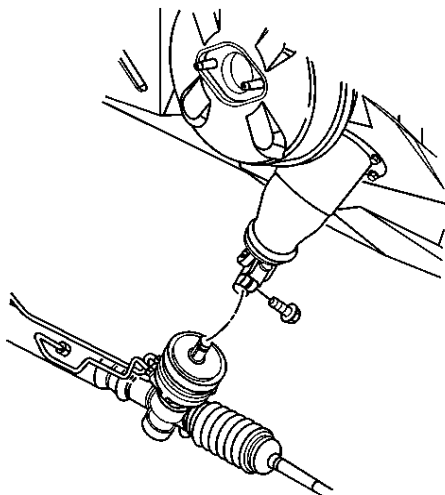
42. Disconnect the 2 rear brake pipes at the rear of the engine frame.  
Plug the open outlet ports to prevent fluid loss and contamination.
43. Disconnect the A/C pressure sensor.



44. Disconnect the A/C discharge hose from the compressor and secure to the cooling fan assembly.

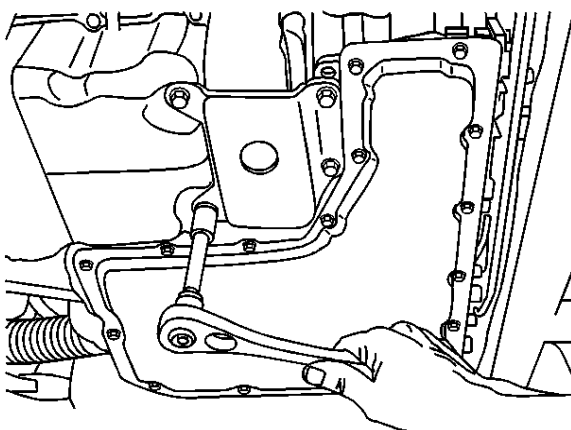


45. Disconnect the A/C suction hose from the compressor and secure to the cooling fan assembly.



**Caution:** Failure to disconnect the intermediate shaft from the rack and pinion stub shaft can result in damage to the steering gear and/or damage to the intermediate shaft. This damage may cause loss of steering control which could result in personal injury.

46. Remove the intermediate shaft pinch bolt.
47. Remove the steering gear from the intermediate shaft.
48. Disconnect the post HO2S at the sensor pigtail. Refer to [Oxygen Sensor Wiring Harness Heat Shield Replacement](#) in Engine Exhaust.
49. Remove the engine oil cooler quick connect fittings from the engine oil filter adapter, with the oil pipes still attached, and position aside (if equipped) [Engine Oil Cooler Hose/Pipe Replacement](#) in Engine Cooling

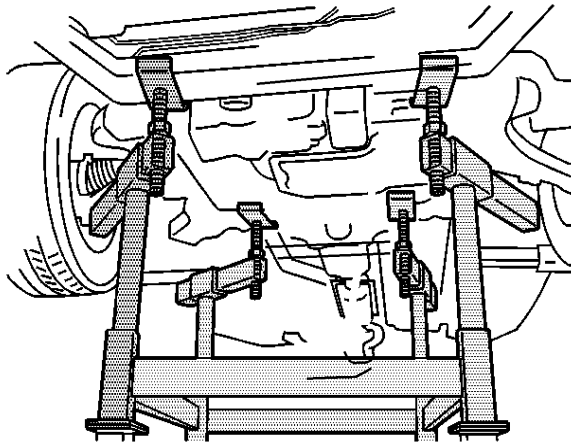


50. Remove the brace between the engine oil pan and the transaxle case.

51. Remove the torque converter cover. Refer to [Torque Converter Cover Replacement](#) in Automatic Transaxle-4T80-E.

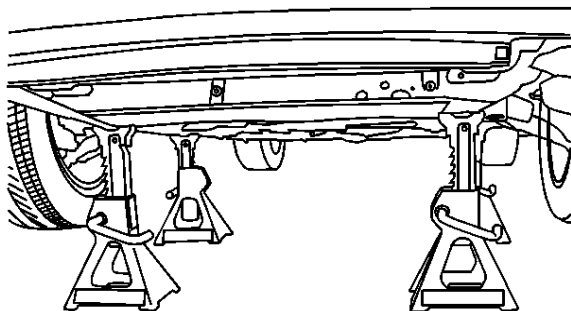
**Important:** Mark the flywheel to torque converter relationship prior to removal of the bolts.

52. Remove the torque converter to the flywheel bolts.



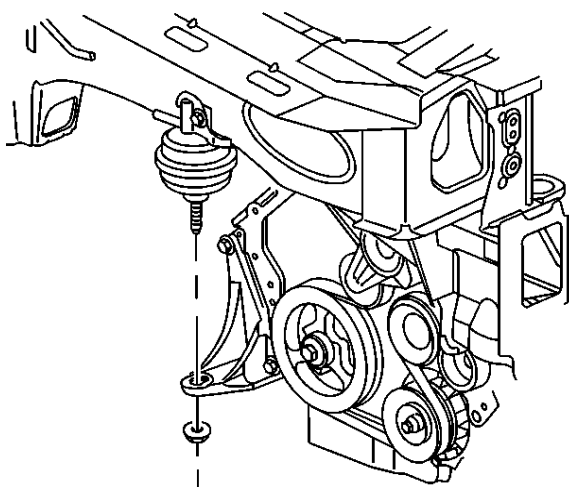
53. Position the [J 39580](#) powertrain support dolly under the engine frame.

54. Lower the vehicle on to the [J 39580](#).

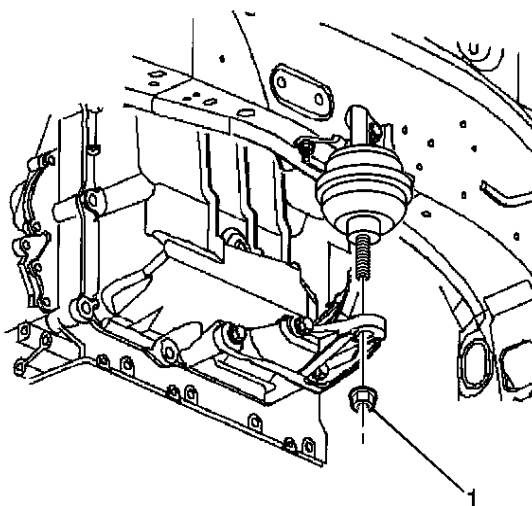


55. If the powertrain support dolly is unavailable. Support the powertrain with four suitable jackstands.

56. Place a 2 in x 4 in block of wood between the front of the engine oil pan and the engine frame.



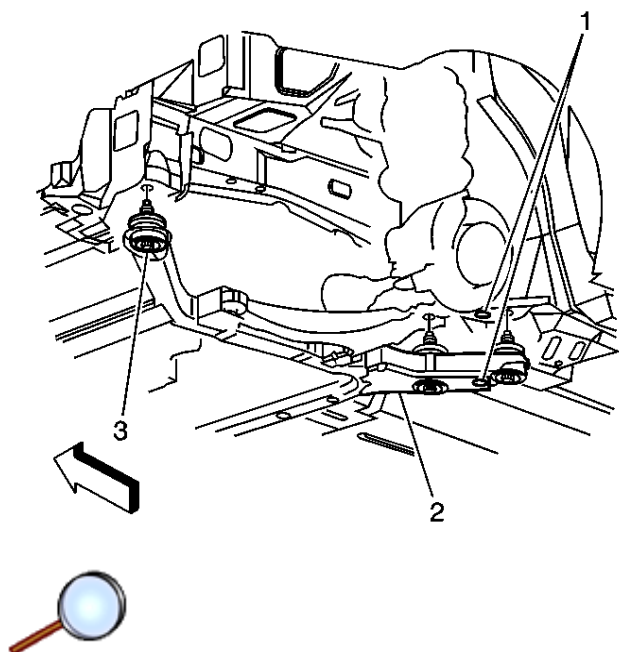
57. Remove the nut securing the right engine mount to the right engine mount bracket.



58. Remove the nut (1) securing the left transaxle mount to the left transaxle mount bracket.

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

59. Secure the front hoist pads to the vehicle.



60. Remove the 6 frame to body mounting bolts (3).

**Important:** Ensure clearance is maintained between the engine/transaxle assembly and the following:

- The A/C accumulator hose
- The A/C compressor hose
- The brake pipes
- The heater hoses
- The radiator hoses
- The wheel speed sensor leads
- The wiring harnesses

61. Carefully raise the vehicle in order to clear the supported engine/transaxle assembly.

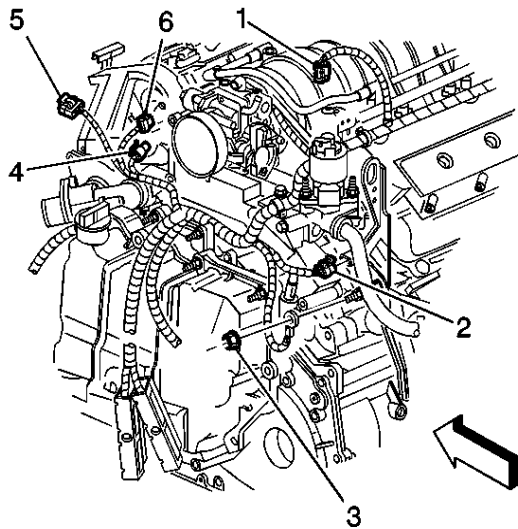
62. Drain the engine oil. Refer to [Engine Oil and Oil Filter Replacement](#) .

63. Remove the heater pipes. Refer to [Heater Inlet Pipe Replacement](#) and [Heater Outlet Pipe Replacement](#) in Heating, Ventilation and Air Conditioning.

64. Disconnect the intermediate hose from the secondary AIR valve at bank 2.

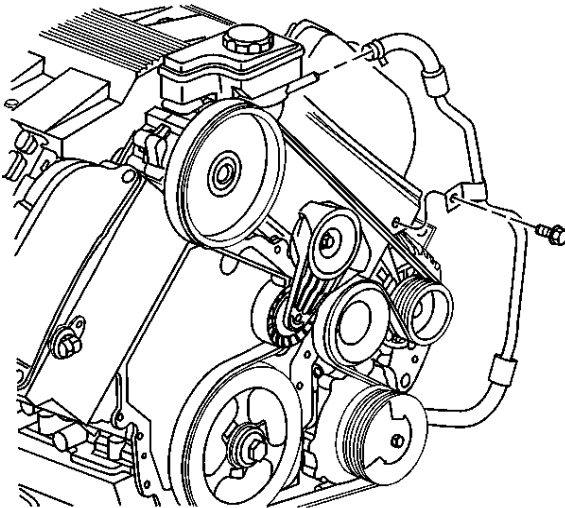
65. Remove the nut securing the intermediate hose to the secondary AIR valve at bank 1.





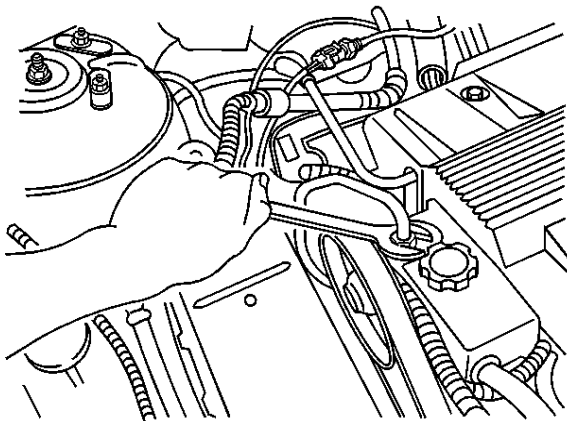
66. Remove the nut (3) securing the coil cassette ground wire to the right cylinder head.

67. Disconnect the engine wiring harness from the engine. Refer to [Engine Controls Component Views](#) in Engine Controls-4.6L.

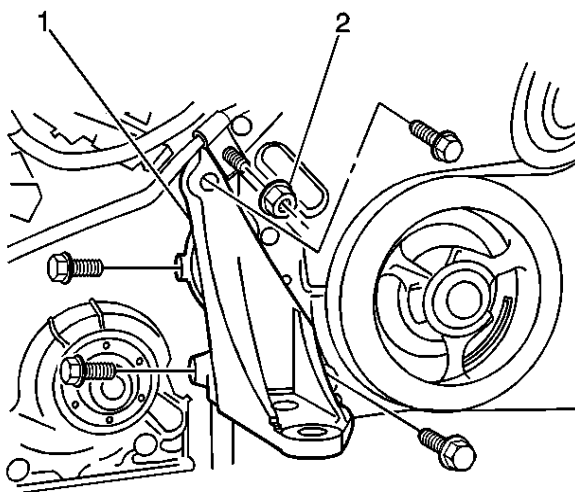


68. Disconnect the power steering hose from the power steering pump reservoir.

69. Remove the power steering return hose retaining bolt from the cylinder head.



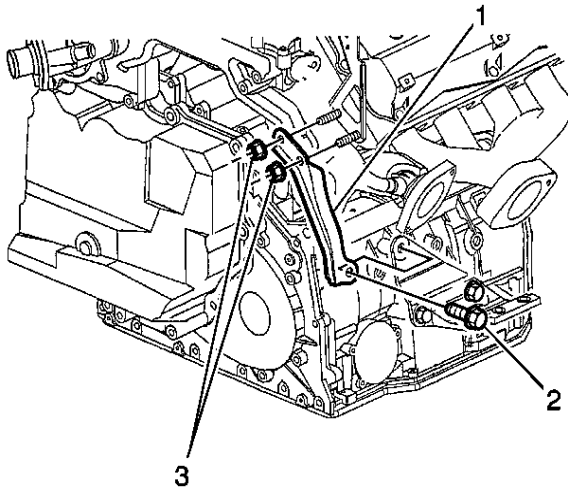
70. Remove the power steering pressure hose from the power steering pump.



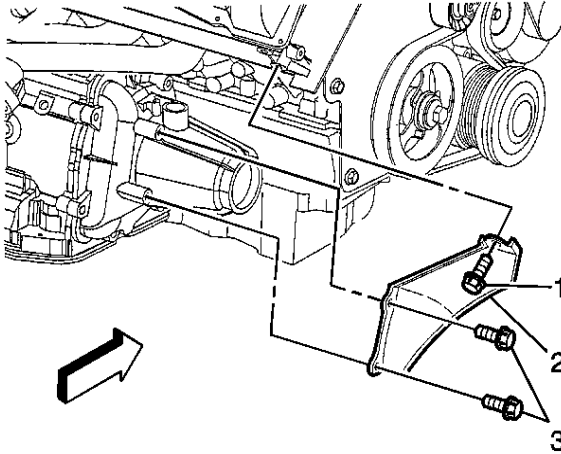
71. Remove the nut (2) securing the power steering pressure hose to the right engine mount bracket (1).

72. Remove the 4 bolts securing the right engine mount bracket (1) to the engine.

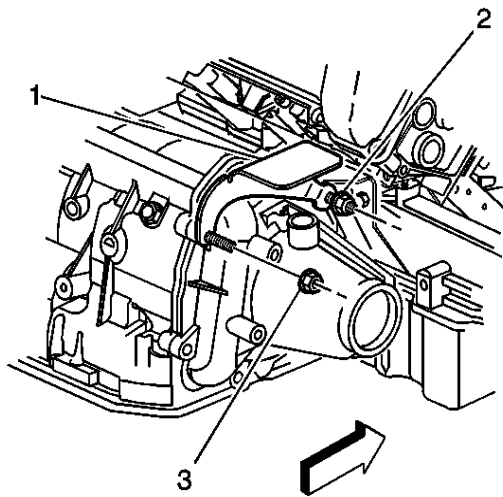
73. Remove the right engine mount bracket (1).



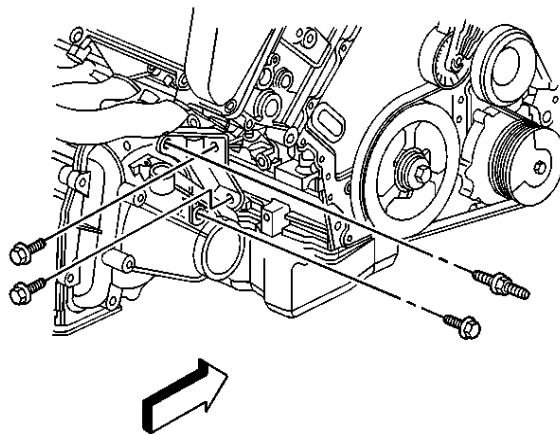
74. Remove the bolt (2) securing the rear transaxle brace (1) to the transaxle.
75. Remove the nuts (3) securing the rear transaxle brace (1) to the stud located on the right cylinder head.
76. Remove the rear transaxle brace (1).



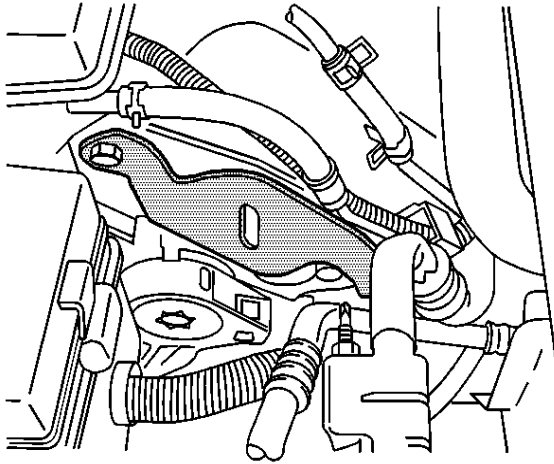
77. Remove the bolts (1, 3) securing the front transaxle brace (2) to the transaxle and right cylinder head.



78. Remove the nuts (2, 3) securing the vehicle speed sensor heat shield (1) to the transaxle.

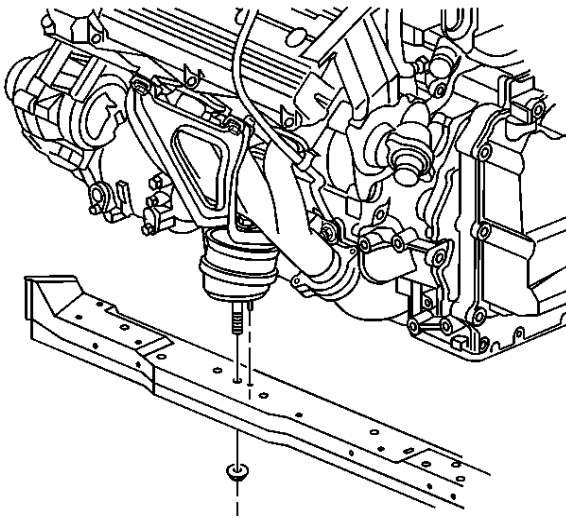


79. Remove the bolts securing the transaxle brace to the engine and transaxle.

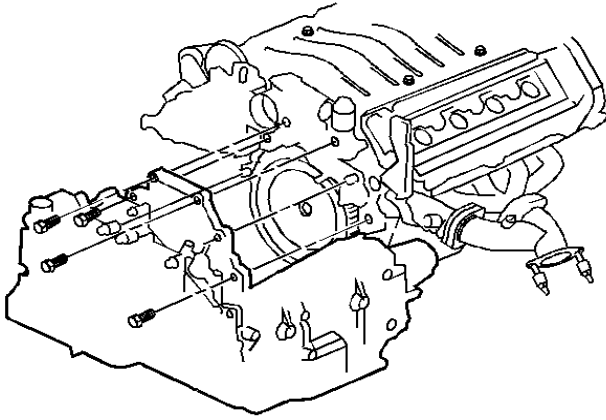


80. Install the [J 42504](#) to the cylinder head.

81. Install a engine lift chain to the engine lift brackets and attach to an engine lift devise.



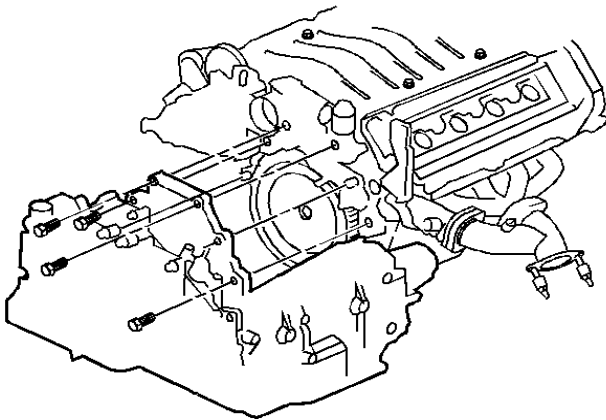
82. Remove the nut securing the front engine mount to the engine frame.



83. Remove the bolts attaching the engine to the transaxle.
84. Raise the engine from the supported frame and transaxle assembly.
85. Remove the front engine mount bracket. Refer to [Engine Front Mount Bracket Replacement](#) .

### **Installation Procedure**

1. Install the front engine mount bracket. Refer to [Engine Front Mount Bracket Replacement](#) .



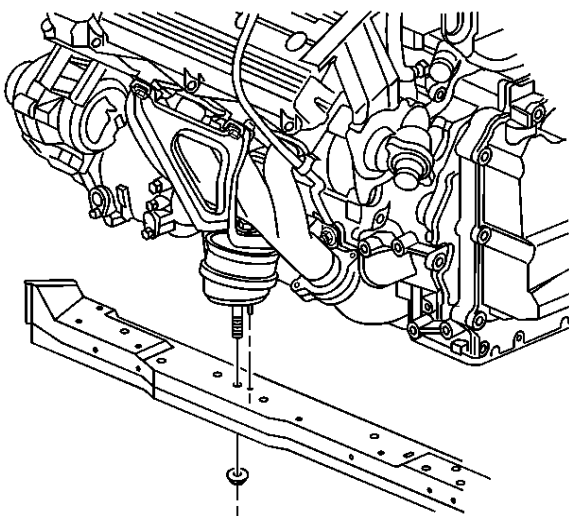
2. Carefully position the engine to the supported frame and transaxle assembly, aligning the engine dowels to the transaxle cover.

**Notice:** Refer to [Fastener Notice](#) in Cautions and Notices.

3. Install the bolts attaching the engine to the transaxle.

**Tighten**

Tighten the engine to transaxle mounting bolts to 75 N·m (55 lb ft).

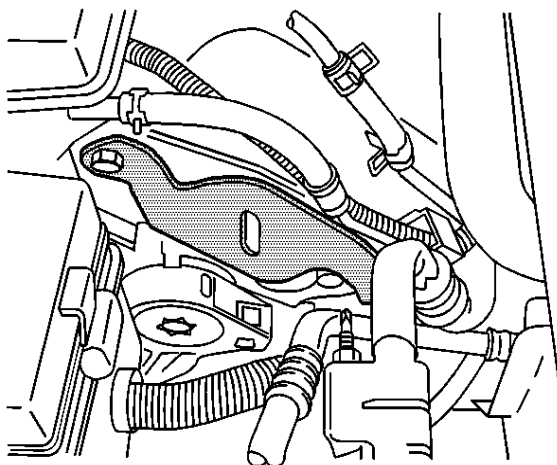


4. Install the nut securing the front engine mount to the front engine frame.

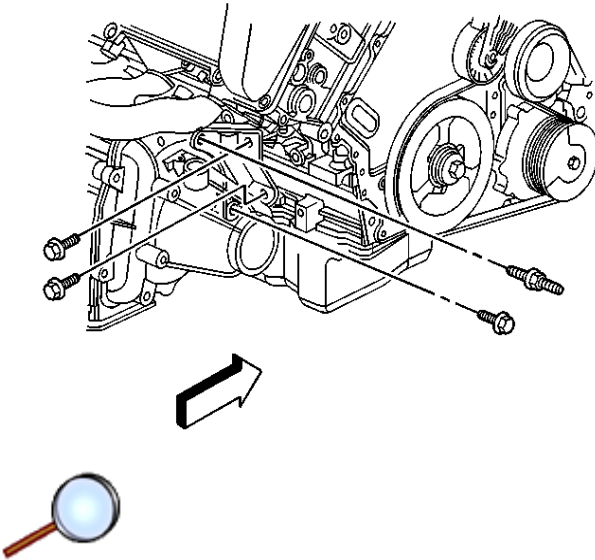
**Tighten**

Tighten the front engine mount nut to 70 N·m (52 lb ft).

5. Place a block of wood between the front of the engine oil pan and the engine frame.
6. Remove the engine lift chain from the engine lift brackets.



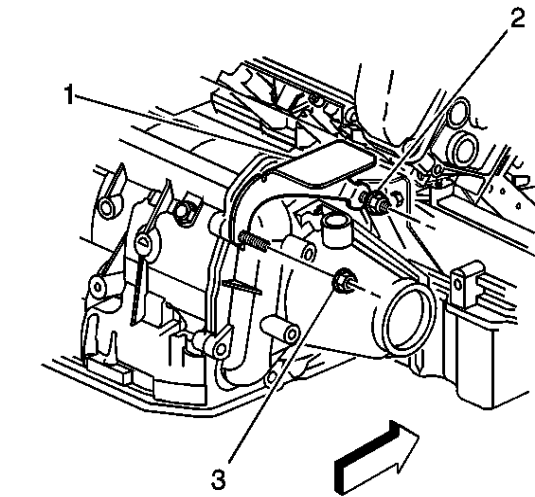
7. Remove the [J 42504](#) from the cylinder head.



8. Install the 4 bolts securing the center transaxle brace to the engine and transaxle.

**Tighten**

Tighten the center transaxle brace bolts to 50 N·m (37 lb ft).

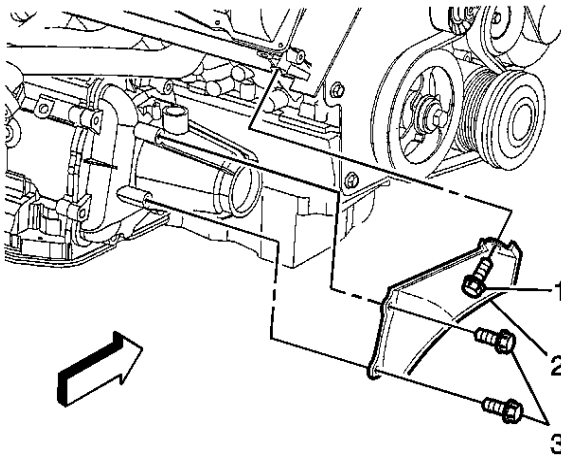


9. Install the retaining nuts (2, 3) securing the vehicle speed sensor heat shield (1) to the transaxle.

**Tighten**

Tighten the vehicle speed sensor heat shield nuts to 50 N·m (37 lb ft).

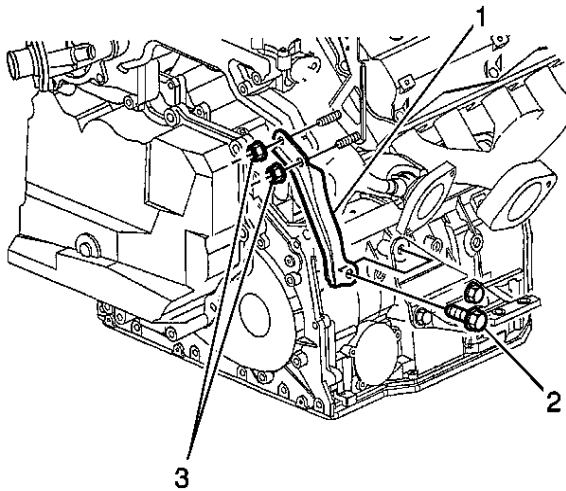




10. Install the bolts (1, 3) securing the front transaxle brace (2) to the transaxle and right cylinder head.

### **Tighten**

Tighten the front transaxle brace bolts (1, 3) to 50 N·m (37 lb ft).



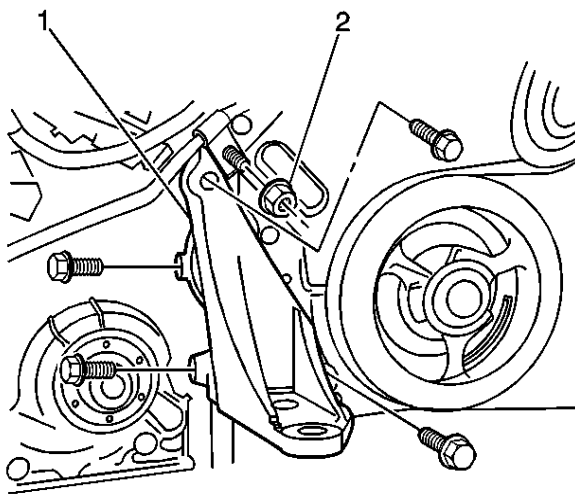
11. Position the rear transaxle brace over the studs located at the rear of the right cylinder head.

12. Loosely install the nuts (3) securing the rear transaxle brace (1) to the cylinder head.

13. Install the bolt (2) securing the rear transaxle brace (1) to the transaxle.

### **Tighten**

- Tighten the rear transaxle brace bolt (2) to 50 N·m (37 lb ft).
- Tighten the rear transaxle brace nuts (3) to 50 N·m (37 lb ft).



14. Position the right engine mount bracket (1) to the engine.
15. Install the 4 bolts securing the right engine mount bracket (1) to the engine.

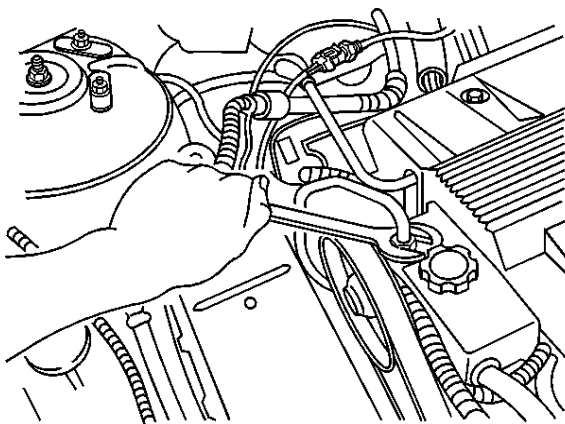
**Tighten**

Tighten the right engine mount bracket bolts to 50 N·m (37 lb ft).

16. Install the nut (2) securing the power steering pressure hose to the right engine mount bracket (1).

**Tighten**

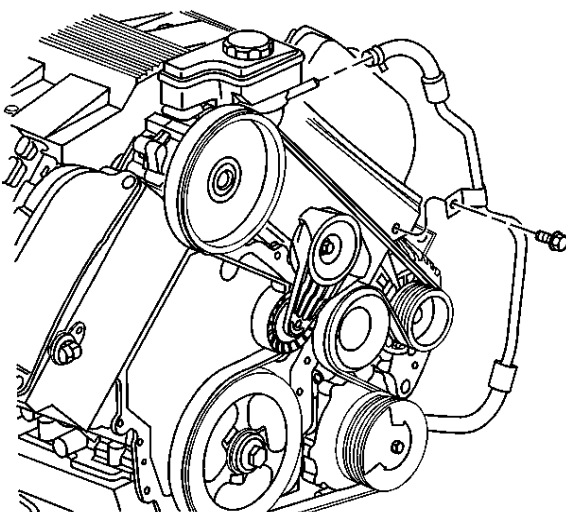
Tighten the power steering pressure hose retaining nut to 9 N·m (80 lb in).



17. Install the power steering pressure hose to the power steering pump.

**Tighten**

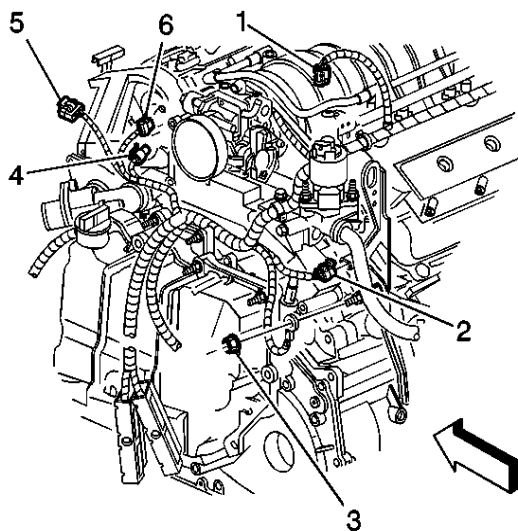
Tighten the power steering hose to power steering pump to 27 N·m (20 lb ft).



18. Connect the power steering hose to the power steering pump reservoir.
19. Install the power steering return hose retaining bolt to the cylinder head.

**Tighten**

Tighten the power steering return hose retaining bolt to 50 N·m (37 lb ft).



20. Connect the engine wiring harness to the engine. Refer to [Engine Controls Component Views](#) in Engine Controls-4.6L.
21. Install the nut (3) securing the coil cassette ground wire to the cylinder head.

**Tighten**

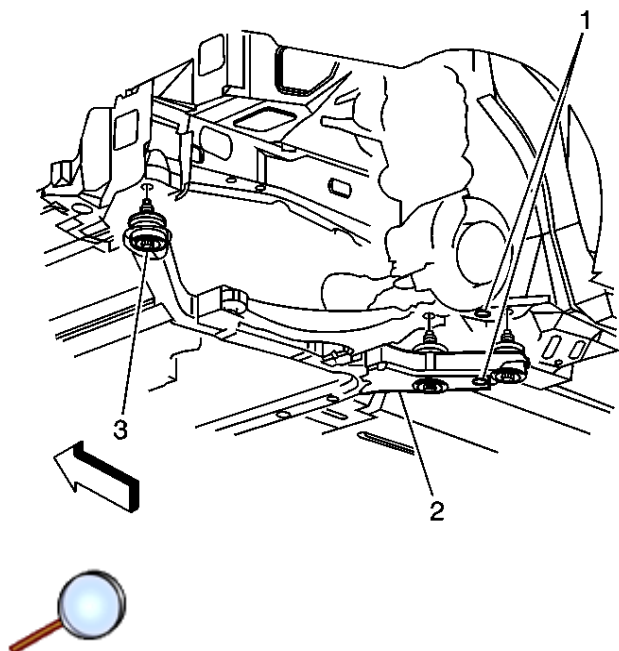
Tighten the coil cassette ground wire nut to 17 N·m (13 lb ft).

22. Install the nut securing the intermediate hose to the secondary AIR valve at bank 1.

**Tighten**

Tighten the intermediate hose to secondary AIR valve nut to 9 N·m (80 lb in).

23. Connect the intermediate hose to the secondary AIR valve at bank 2.
24. Install the heater pipes. Refer to [Heater Inlet Pipe Replacement](#) and [Heater Outlet Pipe Replacement](#) in Heating, Ventilation and Air Conditioning.



25. Position the engine/transaxle assembly under the vehicle.

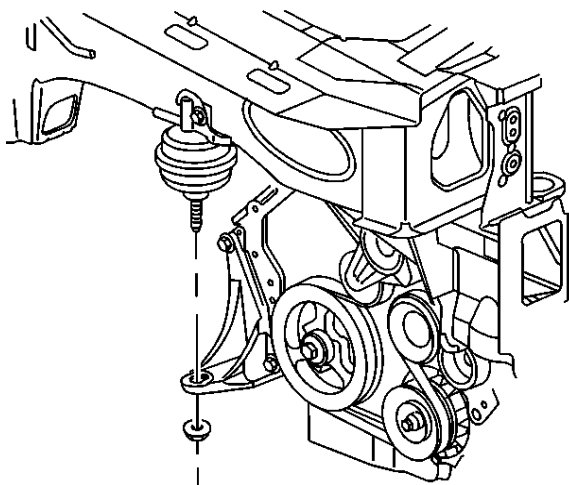
**Important:** Ensure clearance is maintained between the engine/transaxle assembly and the following:

- The A/C accumulator hose
- The A/C compressor hose
- The brake pipes
- The heater hoses
- The radiator hoses
- The wheel speed sensor leads
- The wiring harnesses

26. Carefully lower the vehicle over the engine/transaxle assembly, aligning the struts to the strut towers.
27. Install the six frame mounting bolts (3) retaining the frame (2) to the vehicle.
- Using dowel pins in the alignment holes (1), align the engine frame (2) with the vehicle.

**Tighten**

Tighten the frame mounting bolts to 191 N·m (141 lb ft).

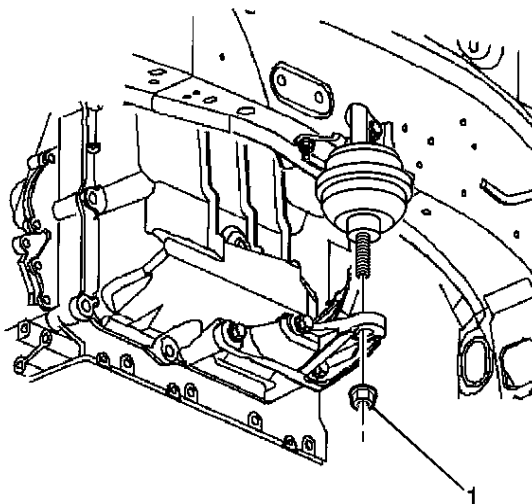


28. Install the nut securing the right engine mount to the right engine mount bracket.

**Tighten**

Tighten the right engine mount nut to 80 N·m (59 lb ft).

29. Remove the block of wood between the front of the engine oil pan and the engine frame.

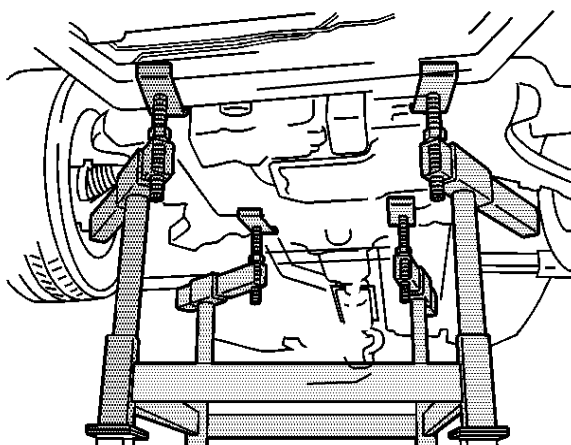


30. Install the nut (1) securing the left transaxle mount to the left transaxle mount bracket.

**Tighten**

Tighten the left transaxle mount nut to 80 N·m (59 lb ft).

31. Raise and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#) in General Information.



32. Remove the [J 39580](#) powertrain support dolly from under the engine frame.

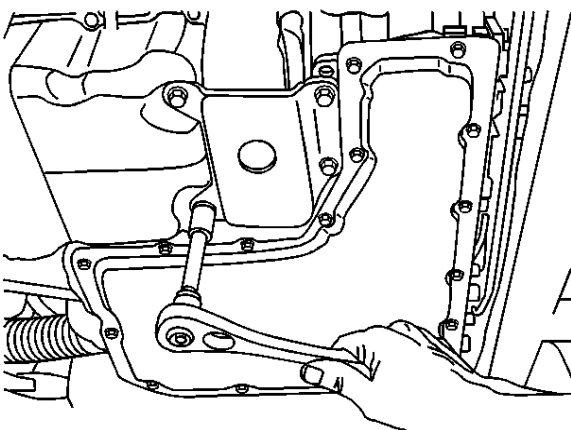
**Important:** Line up the flywheel and converter, using the alignment marks made during disassembly.

33. Install the bolts securing the flywheel to the torque converter.

#### **Tighten**

Tighten the flywheel to torque converter bolts to 60 N·m (44 lb ft).

34. Install the torque converter cover. Refer to [Torque Converter Cover Replacement](#) in Automatic Transaxle-4T80-E.

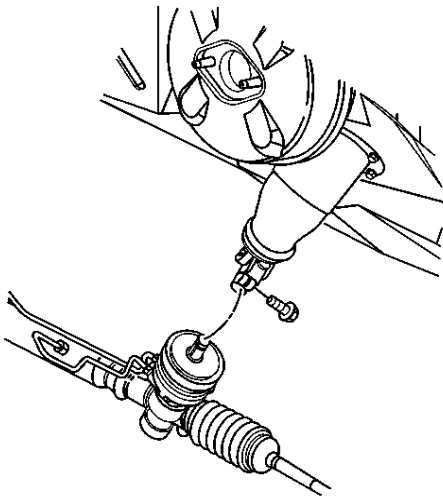


35. Install the oil pan to transaxle brace.

#### **Tighten**

Tighten the oil pan to transaxle brace bolts to 50 N·m (37 lb ft).

36. Install the engine oil cooler quick connect fittings to the engine oil filter adapter. (if equipped) [Engine Oil Cooler Hose/Pipe Replacement](#) in Engine Cooling.
37. Connect the post HO2S at the sensor pigtail. Refer to [Oxygen Sensor Wiring Harness Heat Shield Replacement](#) in Engine Exhaust.

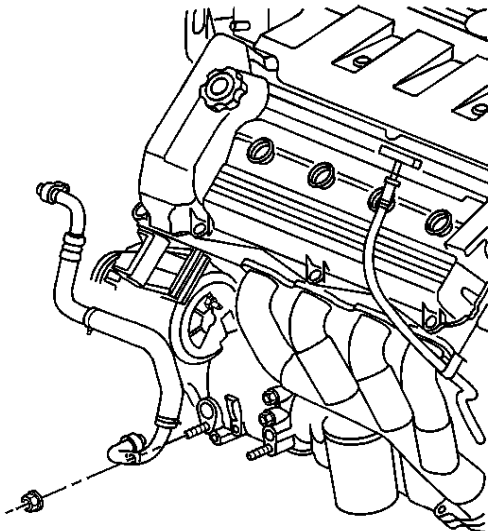


**Caution:** When installing the intermediate shaft make sure that the shaft is seated prior to pinch bolt installation. If the pinch bolt is inserted into the coupling before shaft installation, the two mating shafts may disengage. Disengagement of the two mating shafts will cause loss of steering control which could result in personal injury.

38. Connect the intermediate shaft to the steering gear.
39. Install the pinch bolt.

### **Tighten**

Tighten the intermediate shaft to steering gear pinch bolt to 45 N·m (33 lb ft).

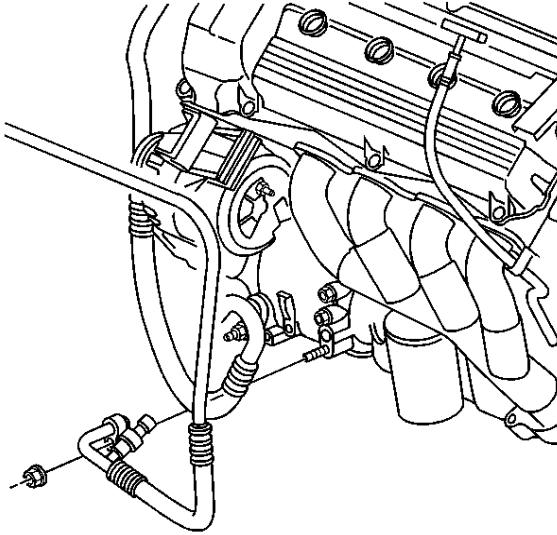




40. Connect the A/C suction hose to the compressor.

**Tighten**

Tighten the A/C suction hose nut to 20 N·m (15 lb ft).

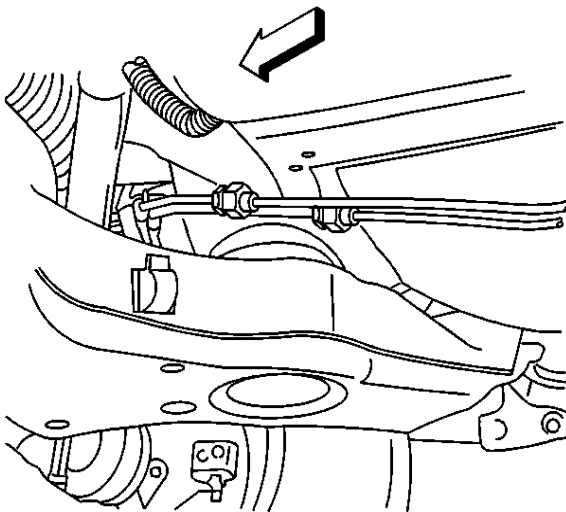


41. Connect the A/C discharge hose to the compressor.

**Tighten**

Tighten the A/C discharge hose nut to 20 N·m (15 lb ft).

42. Connect the A/C pressure sensor.

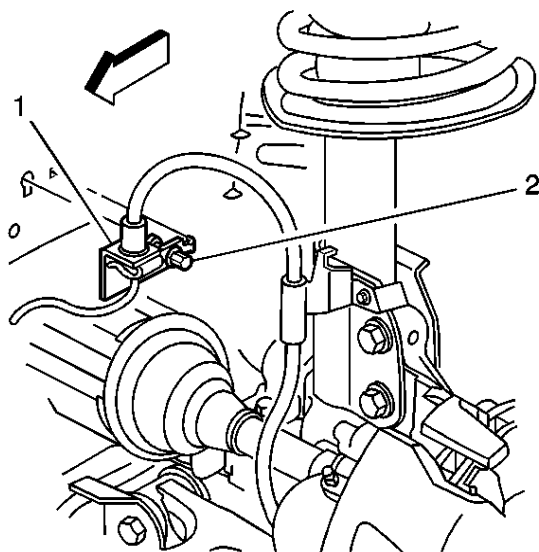




43. Connect the 2 rear brake pipes at the rear of the engine frame.

**Tighten**

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

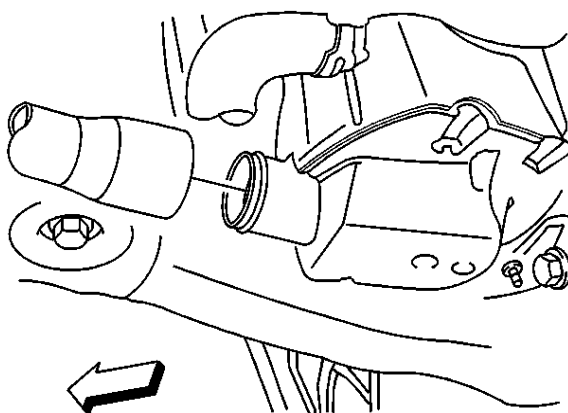


44. Connect the front brake pipes to the retainers at the body frame rails.

45. Install the nuts (2) securing the front brake pipe frame brackets (1) to the body frame rails.

**Tighten**

Tighten the brake pipe frame bracket nuts to 15 N·m (11 lb ft).

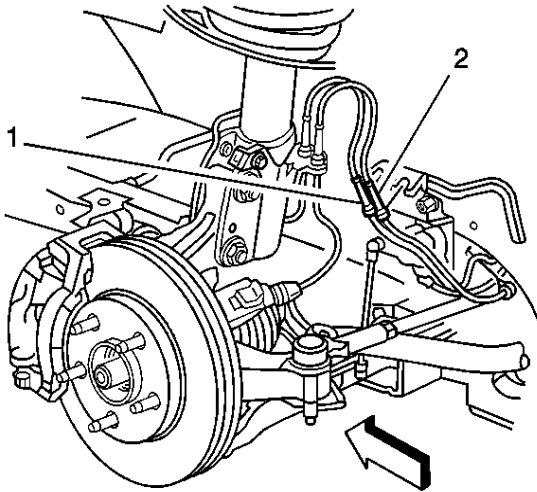


46. Connect the secondary AIR inlet hose to the secondary AIR pump.

47. Install the front fascia extensions. Refer to [Front Bumper Fascia Extension Replacement](#) in

### Body Front End.

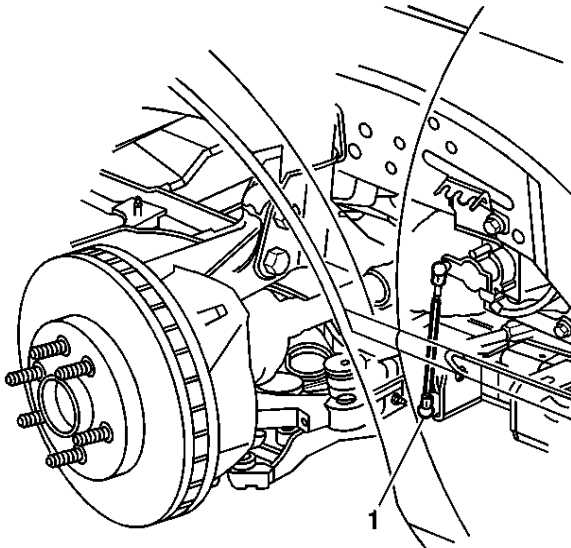
48. Install the front air deflector. Refer to [Front Air Deflector Replacement](#) in Body Front End.



49. Attach the front wheel speed sensor electrical leads (2) to the body frame rail.

50. Connect the road sensing suspension electrical connector at the body frame rail (if equipped).

51. Connect the road sensing suspension electrical leads (1) to the body frame rail (if equipped).

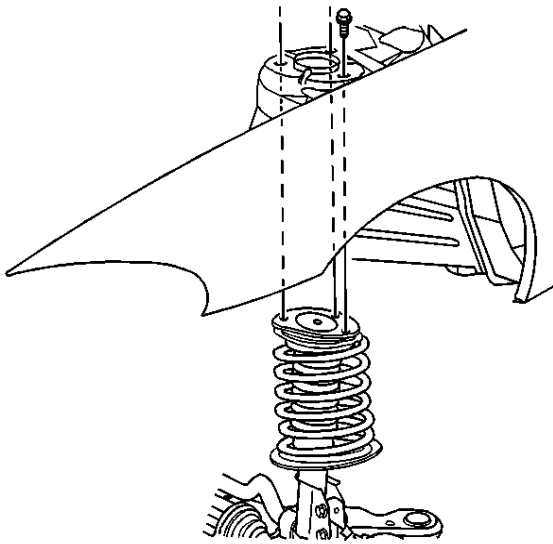


52. Connect the electronic suspension position sensor links (1) to the lower control arms (if equipped).

53. Install the rear exhaust manifold pipe. Refer to [Exhaust Manifold Rear Pipe Replacement](#) in Engine Exhaust.

54. Install the front wheels. Refer to [Tire and Wheel Removal and Installation](#) in Tires and Wheels.

55. Lower the vehicle ONLY enough to allow the threaded holes in the strut to align with the holes in the strut towers.

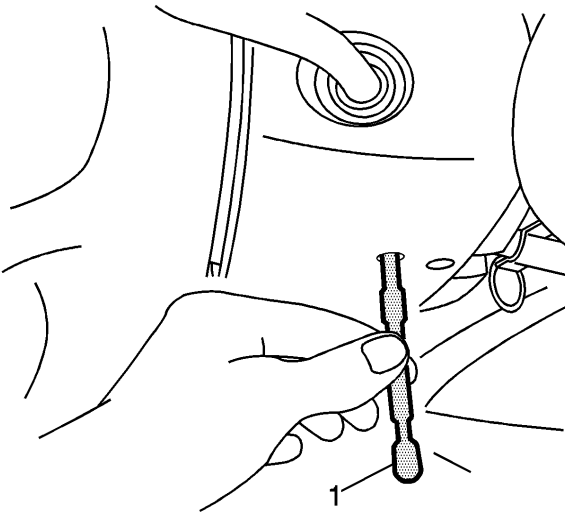


56. Install the right and left side strut tower bolts.

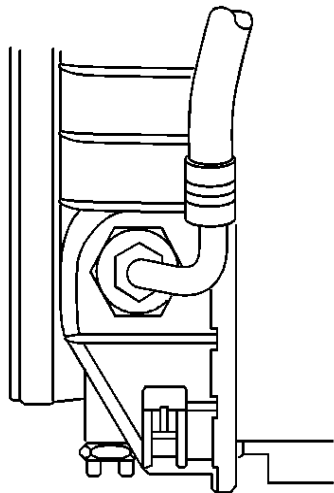
**Tighten**

Tighten the strut tower bolts to 60 N·m (44 lb ft).

57. Lower the vehicle.



58. Remove the [J 42640](#) from the steering column.

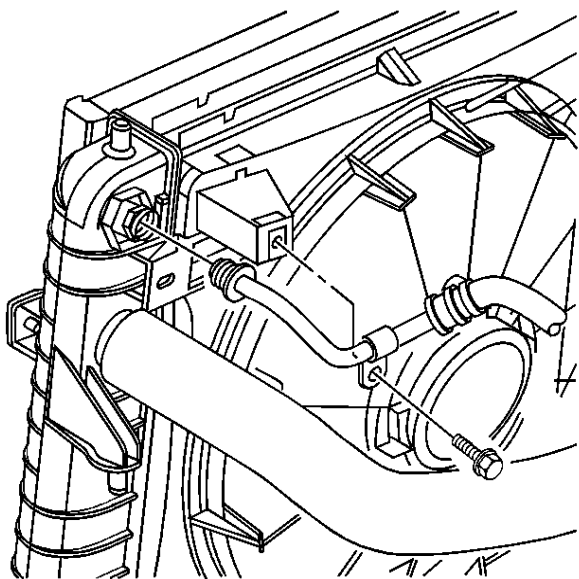


59. Connect the lower transaxle oil cooler pipe fitting to the radiator.

**Important:** Ensure the transaxle oil cooler pipe is positioned upwards while tightening.

**Tighten**

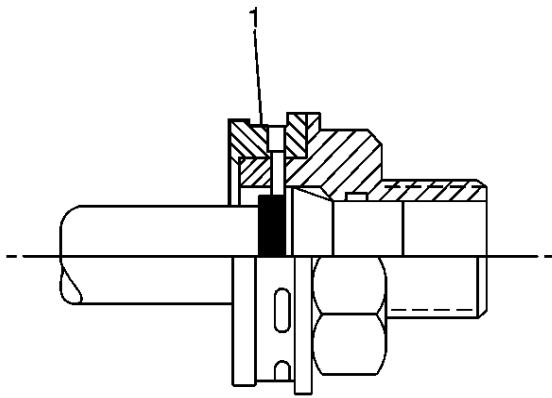
Tighten the transaxle oil cooler pipe fitting to 35 N·m (26 lb ft).



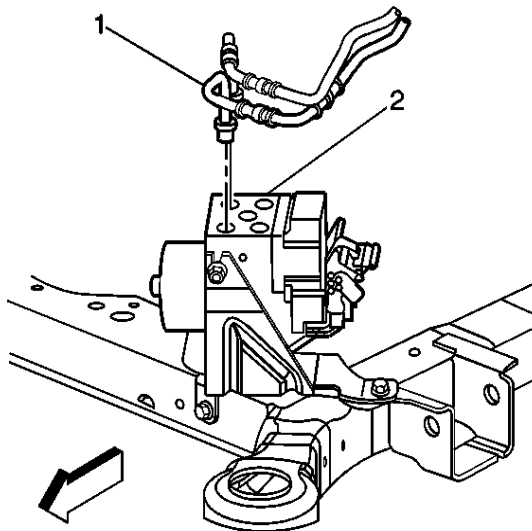
60. Install the upper transaxle oil cooler pipe retaining bolt to the fan shroud.

**Tighten**

Tighten the transaxle oil cooler pipe retaining bolt to 6 N·m (53 lb in).



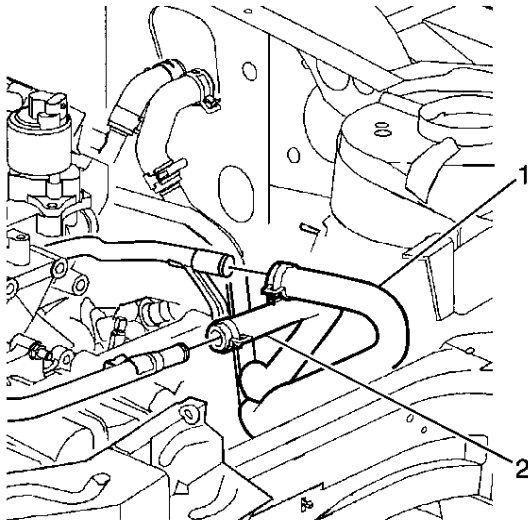
61. Push the upper transaxle oil cooler pipe into the radiator quick connect fitting, until a “click” is heard.
62. Tug gently on the cooler pipe to ensure proper retention.
63. Slide the plastic cap (1) over the quick connect fitting.



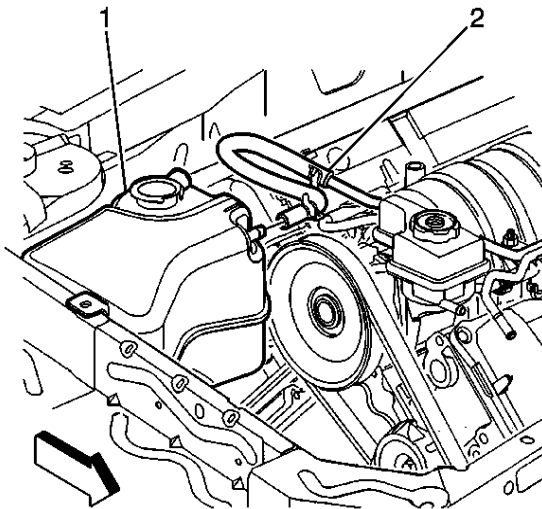
64. Install the 2 master cylinder brake pipes (1) to the BPMV (2) using the location recorded during the removal procedure.

**Tighten**

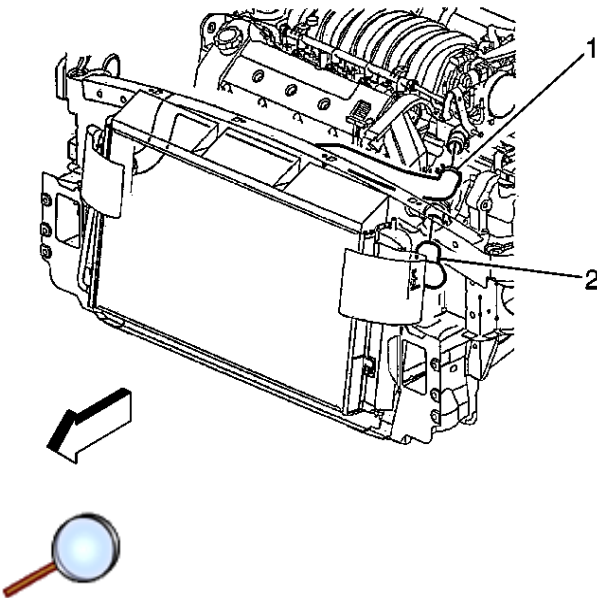
Tighten the brake pipes to 15 N·m (11 lb ft).



65. Connect the heater hoses (1, 2) to the heater pipes.

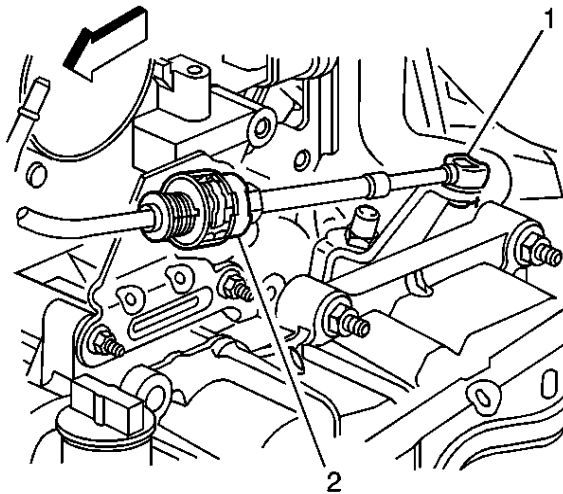


66. Connect the surge tank inlet hose (2) to the surge tank (1).

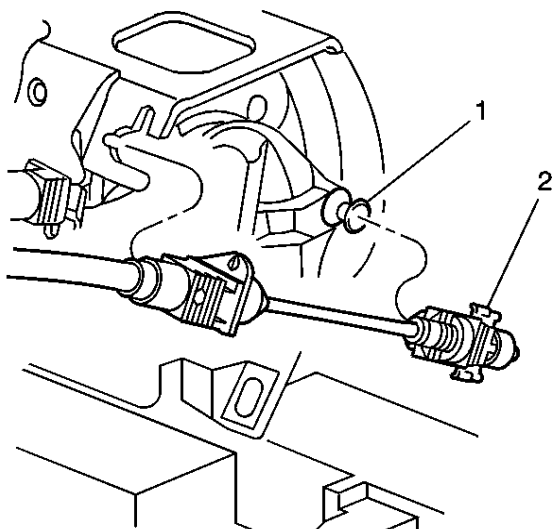


67. Position the [J 38185](#) to the clamp in order to connect the radiator outlet hose (2) to the thermostat housing.

68. Position the [J 37097-A](#) to the clamp in order to connect the radiator inlet hose (1) to the engine.

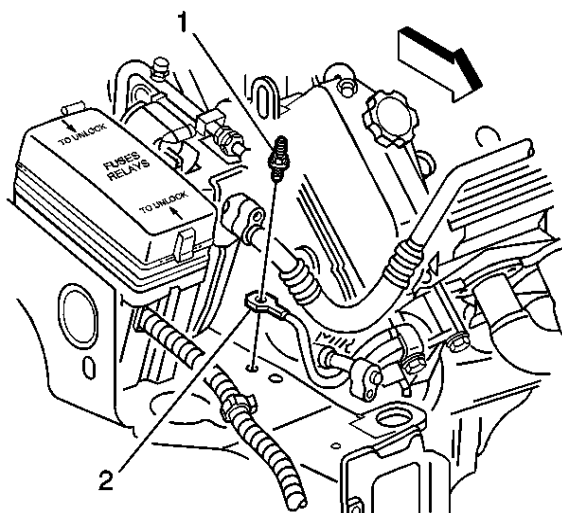


69. Install the shift cable (1) to the manual shift lever (2) and the bracket.



**Caution:** In order to avoid possible injury or vehicle damage, always replace the accelerator control cable with a NEW cable whenever you remove the engine from the vehicle. In order to avoid cruise control cable damage, position the cable out of the way while you remove or install the engine. Do not pry or lean against the cruise control cable and do not kink the cable. You must replace a damaged cable.

- 70. Install a NEW accelerator control cable to the throttle body. Refer to [Accelerator Control Cable Replacement](#) in Engine Controls-4.6L.
- 71. Install the cruise control cable (2) to the throttle body lever (1).
- 72. Slide the cruise control fully into the throttle body bracket until it snaps into place.

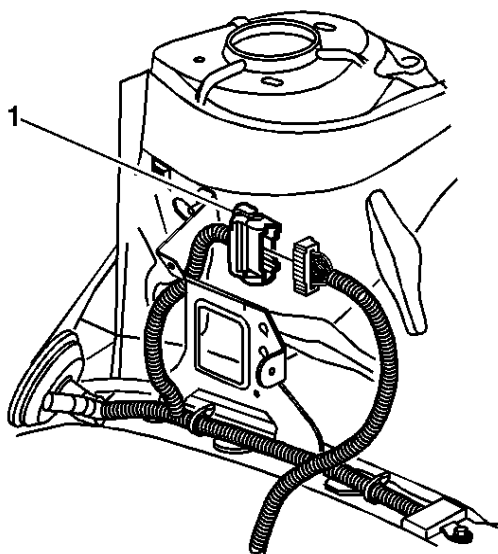


- 73. Install the bolt (1) securing the engine ground cable (2) to the right side body frame rail.

**Tighten**

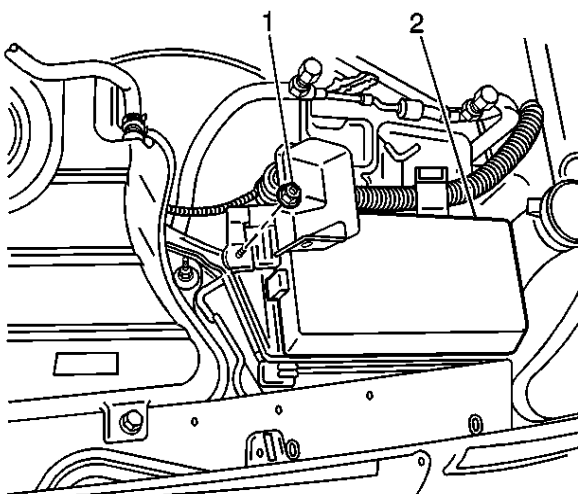


Tighten the engine ground cable bolt to 50 N·m (37 lb ft).



74. Connect the wiring harness electrical connectors to the following components:

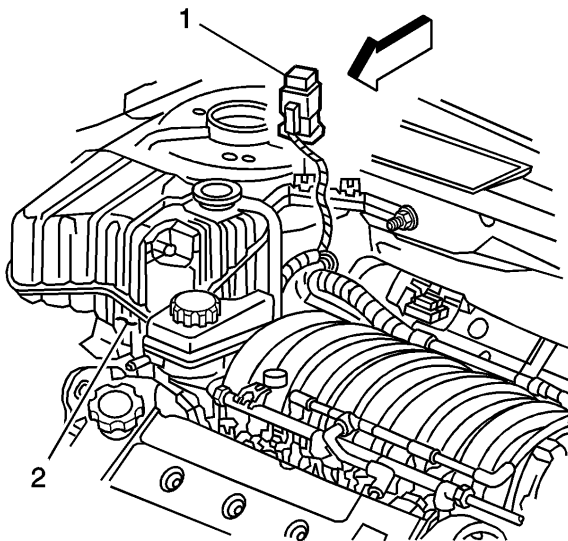
- The PCM. Refer to [Powertrain Control Module Replacement](#) in Engine Controls-4.6L.
- The C101 (1)
- The engine electrical harness. Refer to [Underhood Electrical Center or Junction Block Replacement](#) in Wiring Systems.



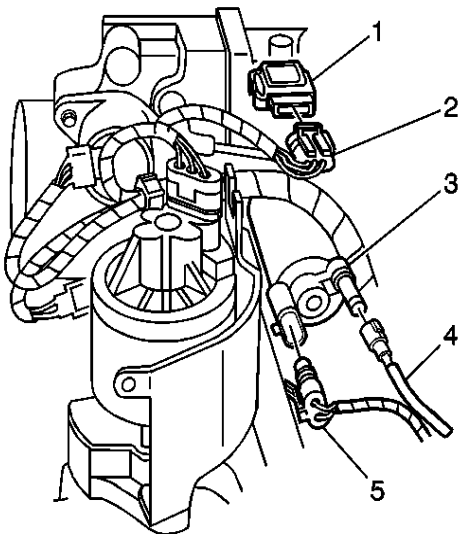
75. Install the nut (1) securing the battery positive cable to the remote positive terminal.

**Tighten**

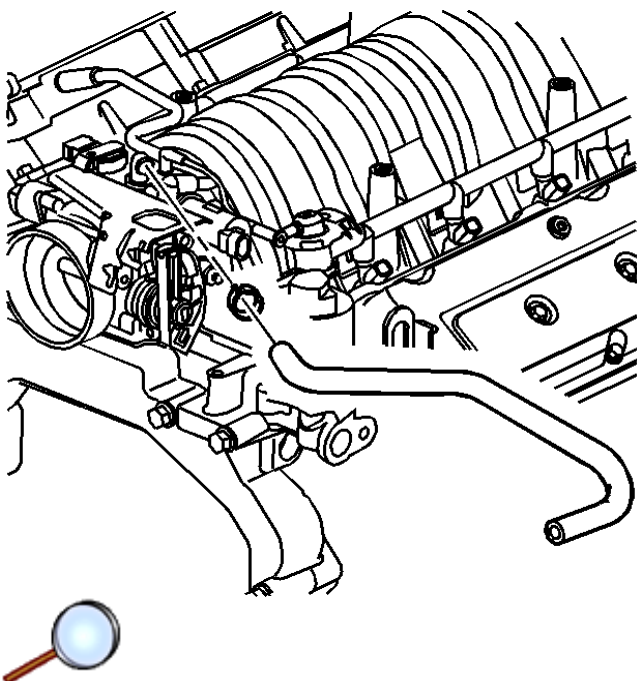
Tighten the battery positive cable to remote positive terminal nut to 12 N·m (106 lb in).



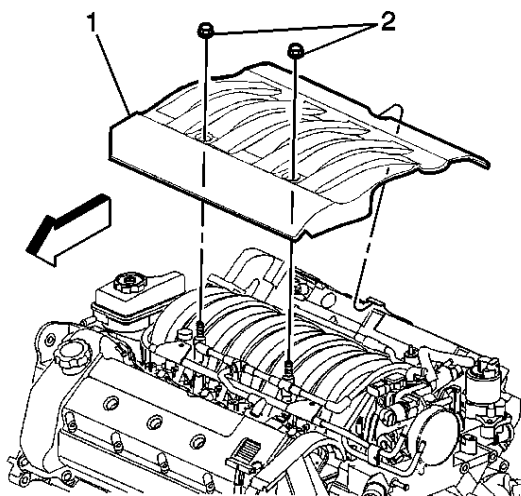
- 76. Attach the secondary AIR relay (1) to the relay bracket.
- 77. Install the air cleaner assembly. Refer to [Air Cleaner Assembly Replacement](#) in Engine Controls-4.6L.
- 78. Install the upper filler panel. Refer to [Filler Panel Replacement - Upper](#) in Body Front End.



- 79. Connect the hose (4) to the evaporative emission canister purge valve (3).
- 80. Connect the fuel inlet and return quick-connect fittings at the fuel rail. Refer to [Metal Collar Quick Connect Fitting Service](#) or [Plastic Collar Quick Connect Fitting Service](#) in Engine Controls-4.6L.



81. Connect the vacuum brake booster hose to the vacuum connection.



82. Position the intake manifold sight shield (1) to the engine.

83. Install the 2 intake manifold sight shield nuts (2).

### **Tighten**

Tighten the intake manifold sight shield nuts to 3 N·m (27 lb in).

84. Connect the battery negative cable. Refer to [Battery Negative Cable Disconnection and Connection](#) in Engine Electrical.

85. Fill the engine with oil. Refer to [Engine Oil and Oil Filter Replacement](#) .

86. Fill the cooling system. Refer to [Cooling System Draining and Filling](#) in Engine Cooling.

87. Bleed the hydraulic brake system. Refer to [Hydraulic Brake System Bleeding](#) in Hydraulic Brakes.

88. Recharge the A/C refrigerant system. Refer to [Refrigerant Recovery and Recharging](#) in Heating, Ventilation and Air Conditioning.
89. Bleed the power steering system. Refer to [Power Steering System Bleeding](#) in Power Steering System.
90. Measure the wheel alignment. Refer to [Wheel Alignment Measurement](#) in Wheel Alignment.

### **Engine Final Test and Inspection**

Complete the following procedure after the engine is installed in the vehicle:

1. With the ignition OFF or disconnected, crank the engine several times. Listen for any unusual noises or evidence that any parts are binding.
2. Start the engine and listen for abnormal conditions.
3. Check the vehicle oil pressure gauge or light and confirm that the engine has acceptable oil pressure.
4. Run the engine at approximately 1000 RPM until the engine reaches normal operating temperature.
5. While the engine continues to idle raise and support the vehicle. Refer to [Lifting and Jacking the Vehicle](#) in General Information.
6. Inspect for oil, coolant and exhaust leaks while the engine is idling.
7. Lower the vehicle.
8. Perform the CKP system variation learn procedure. Refer to [Crankshaft Position System Variation Learn](#) in Engine Controls-4.6L.
9. Perform a final inspection for the proper engine oil and coolant levels.
10. Road test the vehicle.