

2009 ENGINE

Fuel System - Journey

FUEL DELIVERY

STANDARD PROCEDURE

FUEL SYSTEM PRESSURE RELEASE PROCEDURE

1. Remove fuel fill cap.
2. Remove fuel pump fuse from Totally Integrated Power Module (TIPM). For location of fuse, refer to label on underside of TIPM cover.
3. Start and run engine until it stalls.
4. Attempt restarting engine until it will no longer run.
5. Turn ignition key to OFF position.
6. Place a rag or towel below fuel line quick-connect fitting at fuel rail.
7. Disconnect quick-connect fitting at fuel rail. See Fuel System/Fuel Delivery/FITTING, Quick Connect - Standard Procedure.
8. When the repair is complete, reconnect fuel fittings and return fuel pump fuse to TIPM.
9. One or more Diagnostic Trouble Codes (DTC's) may have been stored in PCM memory due to fuel pump fuse removal. A diagnostic scan tool must be used to erase a DTC.

DRAINING FUEL TANK

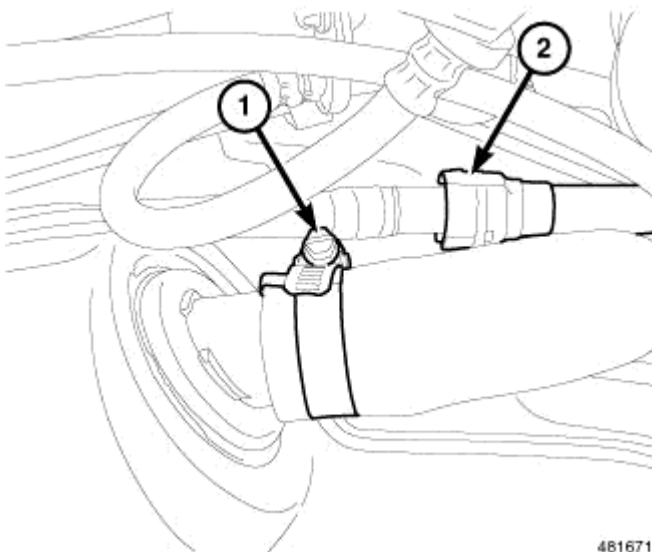


Fig. 1: Fuel Fill Hose Clamp
Courtesy of CHRYSLER LLC

1. Disconnect and isolate negative battery cable.

2009 Dodge Journey R/T

2009 ENGINE Fuel System - Journey

2. Remove fuel fill cap.
3. Raise and support vehicle.
4. Remove fuel fill hose clamp (1) at rear of tank.
5. Remove fuel fill hose from fuel tank fitting.
6. Position a drain hose into the fuel fill hose opening.
7. Drain fuel tank using an approved gasoline draining station.

SPECIFICATIONS**FUEL SYSTEM PRESSURE**

DESCRIPTION	SPECIFICATION	
	METRIC	STANDARD
-		
Fuel Pressure	400 kPa $\pm$ 34 kPa	58 psi $\pm$ 5 psi

TORQUE**TORQUE**

DESCRIPTION	N.m	Ft. Lbs.	In. Lbs.
Fuel Fill Tube Clamp	3	-	27
Fuel Rail to Intake Manifold 2.4L	11.9	-	105
Fuel Rail to Cylinder Head 2.4L	22	-	195
Fuel Rail to Cylinder Head 3.5L	28	20.5	-
Fuel Rail to Intake Manifold 2.7L	11.9	-	105
Fuel Tank Strap Bolts	48	35	-
Filler Tube Mounting Screw	11.5	-	101

SPECIAL TOOLS**FUEL**

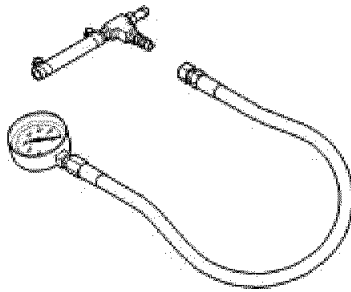


Fig. 2: Kit, Fuel Pressure C-4799-B
Courtesy of CHRYSLER LLC

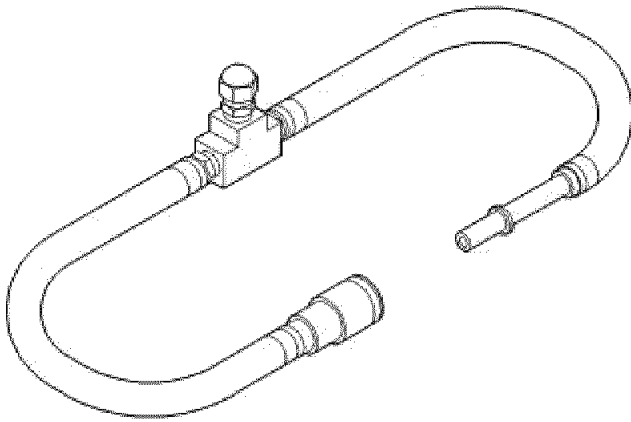


Fig. 3: Adapter, Fuel Pressure 6539
Courtesy of CHRYSLER LLC

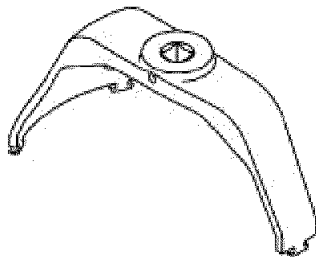


Fig. 4: SAE Fuel Pump Lock Ring Wrench 9340
Courtesy of CHRYSLER LLC

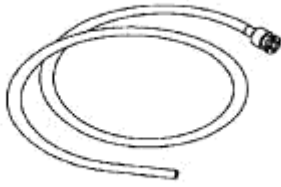


Fig. 5: Adapter, Fuel Pressure 6668
Courtesy of CHRYSLER LLC

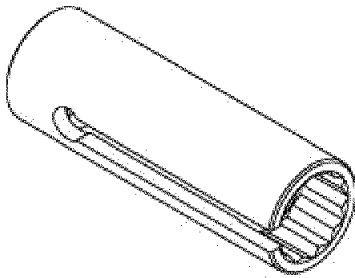


Fig. 6: Oxygen Sensor Socket C-4907
Courtesy of CHRYSLER LLC

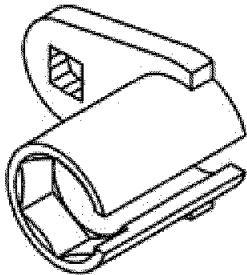


Fig. 7: O2 Sensor Wrench 8439
Courtesy of CHRYSLER LLC

FILTER, INLET

Description

DESCRIPTION

The fuel filter and fuel pressure regulator are combined within the fuel pump module assembly. They are not serviceable.

FITTING, QUICK CONNECT

Standard Procedure

QUICK-CONNECT FITTINGS

Different types of quick-connect fittings are used to attach the various fuel system components, lines and tubes. These are: a single-button type, a two-button type, a pinch type, a single-tab type, a two-tab type or a plastic retainer ring type. Some are equipped with safety latch clips. Some may require the use of a special tool for disconnection and removal.

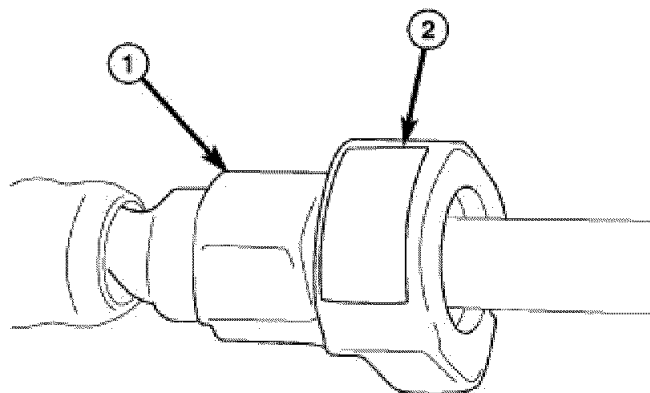
DISCONNECTING

WARNING: The fuel system is under a constant pressure (even with engine off). Before servicing any fuel system hose, fitting or line, fuel system pressure must be released. See Fuel System/Fuel Delivery - Standard Procedure

CAUTION: Before separating a quick-connect fitting, pay attention to what type of fitting is being used by referring to Quick-Connect Fitting Removal. This will prevent unnecessary fitting or fitting latch breakage.

CAUTION: The interior components (O-rings, clips) of quick-connect fittings are not serviced separately, but new plastic spacers and latches are available for some types. If service parts are not available, do not attempt to repair the damaged fitting or fuel line (tube). If repair is necessary, replace the complete fuel line (tube) assembly.

1. Perform fuel pressure release procedure. See Fuel System/Fuel Delivery - Standard Procedure.
2. Disconnect negative battery cable from battery.
3. Clean fitting of any foreign material before disassembly.

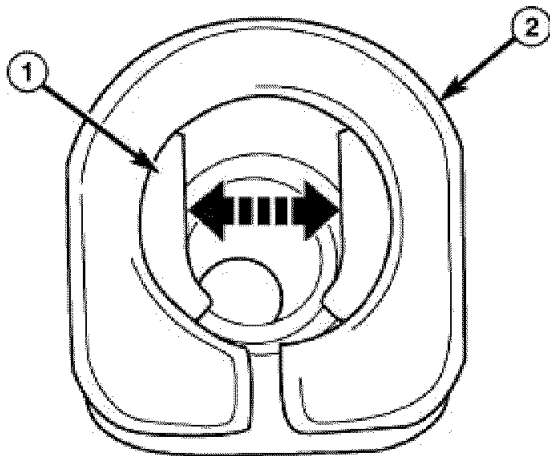


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Fig. 8: SINGLE BUTTON FITTING

Courtesy of CHRYSLER LLC

4. **Single-Button Type Fitting:** This type of fitting is equipped with a single push-button (2) located on the quick-connect fitting.



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Fig. 9: FITTING LATCHES

Courtesy of CHRYSLER LLC

5. The push-button is attached to two internal latches (1). To disconnect, press on push-button with your thumb and unlatch fitting from fuel line. Special tools are not required for disconnection. **DO NOT ATTEMPT TO PRY OR PULL UP ON PUSH-BUTTON. LATCHES WILL BE BROKEN.**

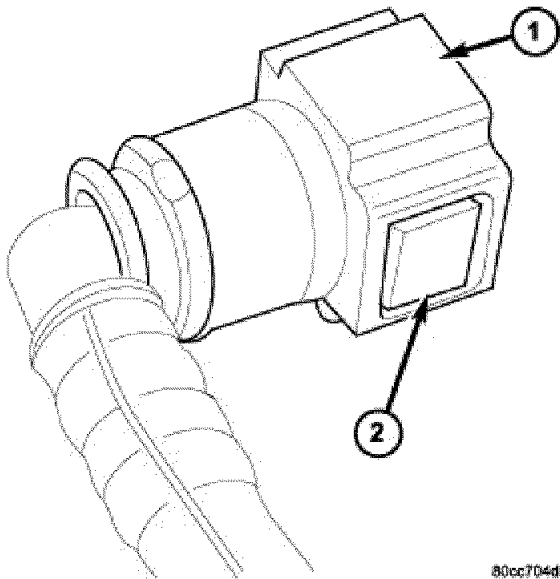


Fig. 10: 2-BUTTON TYPE FITTING

Courtesy of CHRYSLER LLC

6. Perform fuel pressure release procedure. Refer to **Fuel System/Fuel Delivery - Standard Procedure**.
7. Disconnect negative battery cable from battery.
8. Clean fitting of any foreign material before disassembly.
9. **2-Button Type Fitting:** This type of fitting (1) is equipped with a push-button located on each side of quick-connect fitting (2). Press on both buttons simultaneously for removal. Special tools are not required for disconnection.

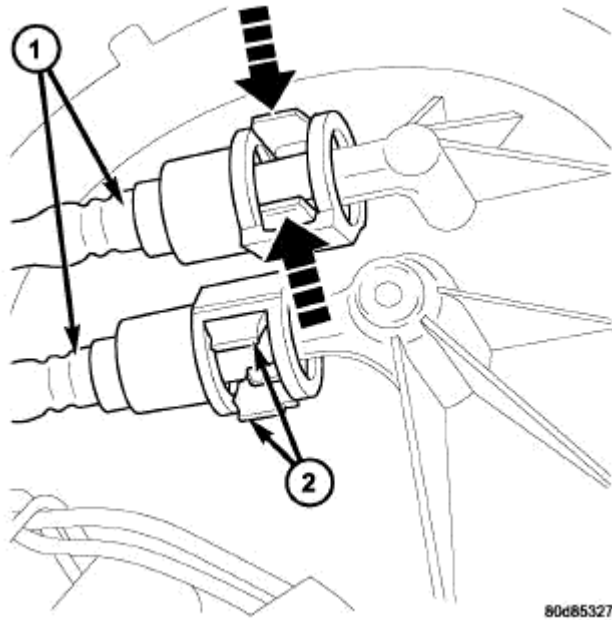


Fig. 11: PINCH TYPE QUICK-CONNECT FITTING

Courtesy of CHRYSLER LLC

10. **Pinch-Type Fitting:** This fitting (1) is equipped with two finger tabs (2). Pinch both tabs together while removing fitting. Special tools are not required for disconnection.

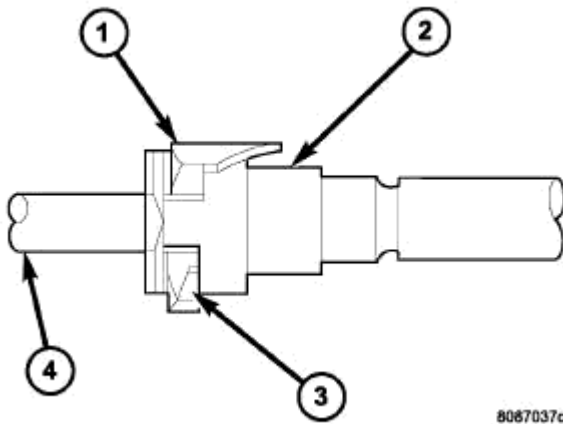


Fig. 12: Single-Tab Type Fitting

Courtesy of CHRYSLER LLC

11. **Single-Tab Type Fitting:** This type of fitting (3) is equipped with a single pull tab (1). The tab is removable. After tab is removed, quick-connect fitting can be separated from fuel system component. Special tools are not required for disconnection.

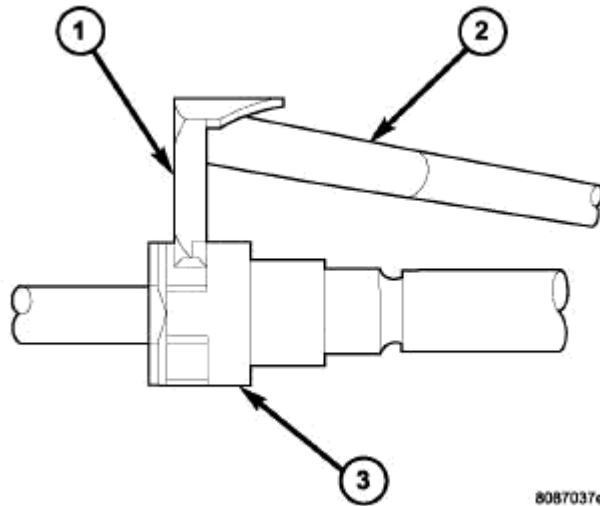


Fig. 13: Disconnecting Single-Tab Type Fitting
Courtesy of CHRYSLER LLC

12. Press release tab on side of fitting to release pull tab (1). **If release tab is not pressed prior to releasing pull tab, pull tab will be damaged.**
13. While pressing release tab on side of fitting, use screwdriver (2) to pry up pull tab.
14. Raise pull tab until it separates from quick-connect fitting.

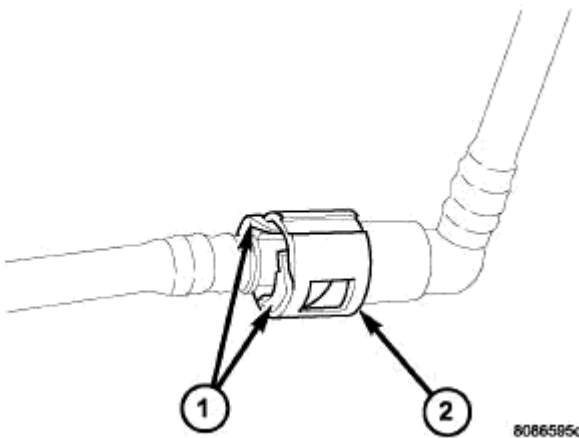


Fig. 14: Typical Two-Tab Type Quick-Connect Fitting
Courtesy of CHRYSLER LLC

15. **Two-Tab Type Fitting:** This type of fitting (2) is equipped with tabs located on both sides of fitting (1). The tabs are supplied for disconnecting quick-connect fitting from component being serviced.
 - a. To disconnect quick-connect fitting, squeeze plastic retainer tabs (1) against sides of quick-connect fitting with your fingers. Tool use is not required for removal and may damage plastic retainer.

- b. Pull fitting from fuel system component being serviced.
- c. The plastic retainer will remain on component being serviced after fitting is disconnected. The O-rings and spacer will remain in quick-connect fitting connector body.

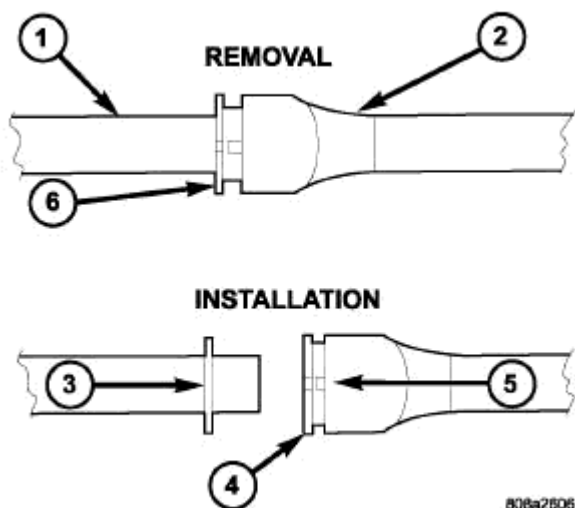


Fig. 15: Plastic Retainer Ring Type Fitting
Courtesy of CHRYSLER LLC

16. **Plastic Retainer Ring Type Fitting:** This type of fitting can be identified by the use of a full-round plastic retainer ring (4) usually black in color.
 - a. To release fuel system component from quick-connect fitting, firmly push fitting towards component being serviced while firmly pushing plastic retainer ring into fitting (6). With plastic ring depressed, pull fitting from component. **The plastic retainer ring must be pressed squarely into fitting body. If this retainer is cocked during removal, it may be difficult to disconnect fitting. Use an open-end wrench on shoulder of plastic retainer ring to aid in disconnection.**
 - b. After disconnection, plastic retainer ring will remain with quick-connect fitting connector body.
 - c. Inspect fitting connector body, plastic retainer ring and fuel system component for damage. Replace as necessary.

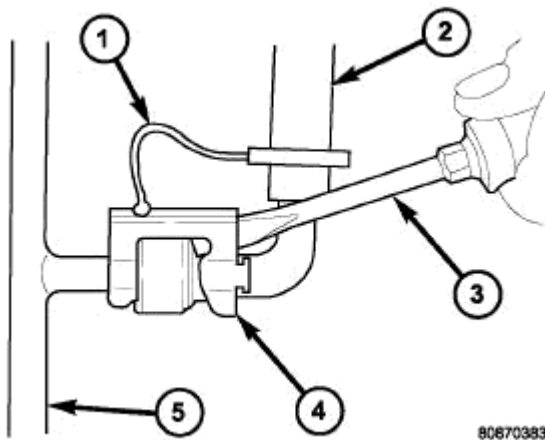


Fig. 16: Latch Clip Type 1
Courtesy of CHRYSLER LLC

17. **Latch Clips Type 1:** Depending on vehicle model and engine, 2 different types of safety latch clips are used. Type-1 (4) is tethered to fuel line and type-2 is not. A special tool will be necessary to disconnect fuel line after latch clip is removed. The latch clip may be used on certain fuel line/fuel rail connection, or to join fuel lines together.
18. Pry up on latch clip with a screwdriver (3).
19. Slide latch clip toward fuel rail while lifting with screwdriver.

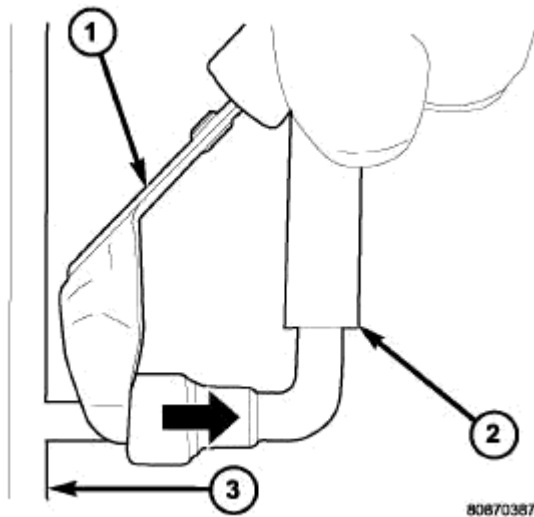


Fig. 17: Fuel Line Disconnection Using Special Tool
Courtesy of CHRYSLER LLC

20. Insert special fuel line removal tool (Snap-On® number FIH 9055-1 or equivalent) into fuel line (1). Use tool to release locking fingers in end of line.

21. With special tool still inserted, pull fuel line from fuel rail.
22. After disconnection, locking fingers will remain within quick-connect fitting at end of fuel line.
23. Disconnect quick-connect fitting from fuel system component being serviced.

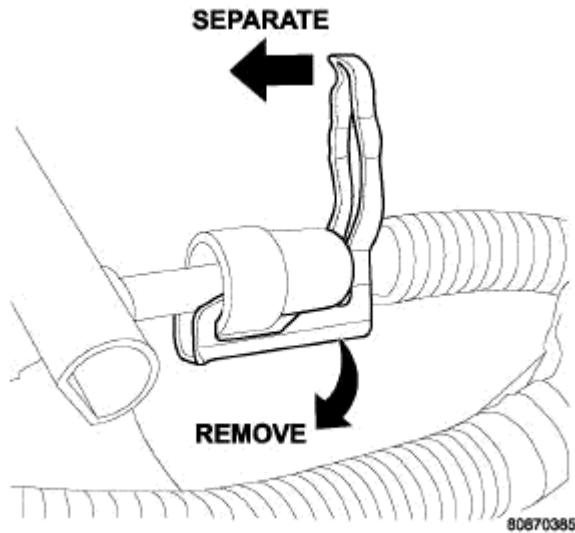


Fig. 18: Latch Clip Type 2
Courtesy of CHRYSLER LLC

24. **Latch Clips Type 2:** Depending on vehicle model and engine, 2 different types of safety latch clips are used. Type-1 is tethered to fuel line and type-2 is not. A special tool will be necessary to disconnect fuel line after latch clip is removed. The latch clip may be used on certain fuel line/fuel rail connection, or to join fuel lines together.
25. Type 2: Separate and unlatch small arms on end of clip and swing away from fuel line.
26. Slide latch clip toward fuel rail while lifting with screwdriver.

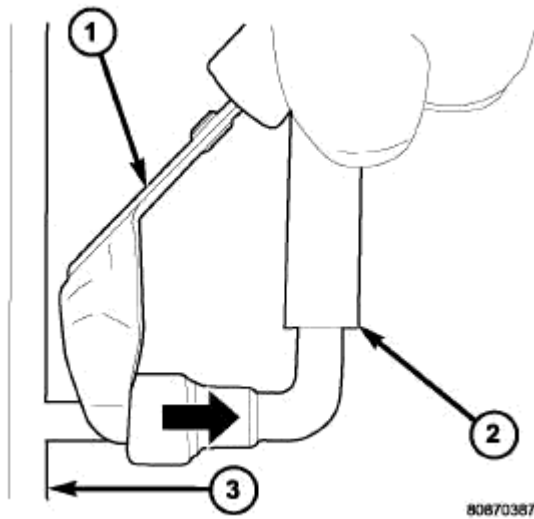


Fig. 19: Fuel Line Disconnection Using Special Tool
 Courtesy of CHRYSLER LLC

27. Insert special fuel line removal tool (Snap-On® number FIH 9055-1 or equivalent) into fuel line (1). Use tool to release locking fingers in end of line.
28. With special tool still inserted, pull fuel line from fuel rail.
29. After disconnection, locking fingers will remain within quick-connect fitting at end of fuel line.
30. Disconnect quick-connect fitting from fuel system component being serviced.

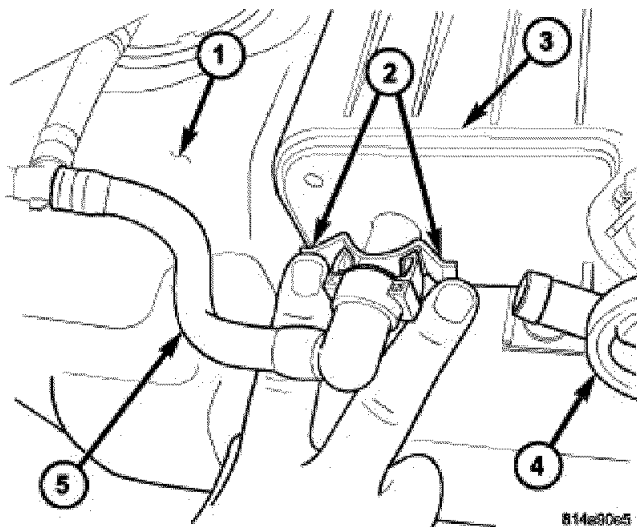


Fig. 20: EVAP Canister Vapor Hose
 Courtesy of CHRYSLER LLC

31. **Wing Type:** A special tool is not necessary to disconnect this type of fitting (2). This line is used on

different fuel and emission components. The graphic shows the fitting used on an EVAP canister.

32. Use two fingers to push on fitting wings (2)
33. Pull and disconnect fitting while holding wings.
34. After disconnection, locking fingers will remain within quick-connect fitting.

CONNECTING

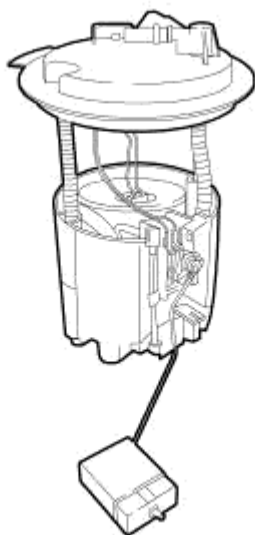
1. Inspect quick-connect fitting body and fuel system component for damage. Replace as necessary.
2. Prior to connecting quick-connect fitting to component being serviced, check condition of fitting and component. Clean parts with a lint-free cloth. Lubricate with clean engine oil.
3. Insert quick-connect fitting into fuel tube or fuel system component until built-on stop on fuel tube or component rests against back of fitting.
4. Continue pushing until a click is felt.
5. Single-tab type fitting: Push new tab down until it locks into place in quick-connect fitting.
6. Verify a locked condition by firmly pulling on fuel tube and fitting (15-30 lbs.).
7. Latch Clip Equipped: Install latch clip (snaps into position). **If latch clip will not fit, this indicates fuel line is not properly installed to fuel rail (or other fuel line). Recheck fuel line connection.**
8. Connect negative cable to battery.
9. Start engine and check for leaks.

MODULE, FUEL PUMP

Description

DESCRIPTION

FWD



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Fig. 21: PUMP MODULE REGULAR

Courtesy of CHRYSLER LLC

The front wheel drive (FWD) fuel pump module contains the electric fuel pump, fuel pump reservoir, fuel level sending unit, fuel pressure regulator, and fuel filter.

The fuel level sending unit is serviceable. See **Fuel System/Fuel Delivery/SENDING UNIT and SENSOR, Fuel Level - Removal.**

The fuel pump module, fuel pump reservoir, fuel pressure regulator, and fuel filter is serviced as an assembly. See **Fuel System/Fuel Delivery/MODULE, Fuel Pump - Removal.**

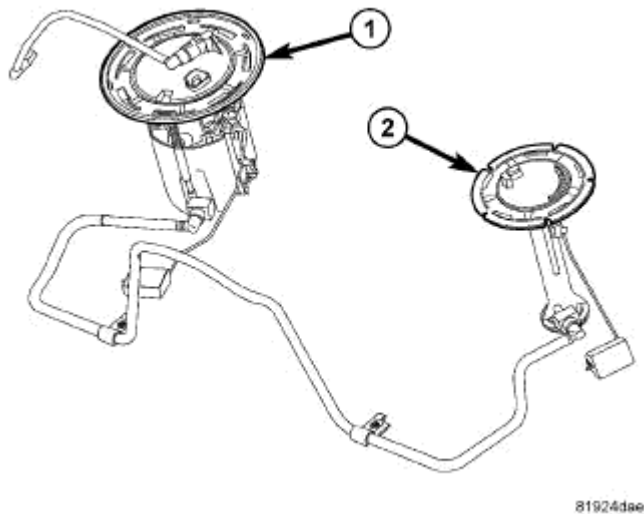
AWD

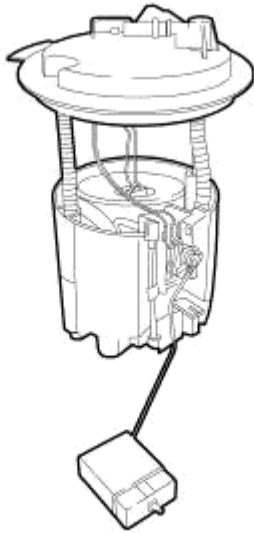
Fig. 22: Main Fuel Pump Module & Auxiliary Fuel Pump Module
Courtesy of CHRYSLER LLC

The all wheel drive (AWD) vehicles with the saddle fuel tank configurations have a main (1) and auxiliary (2) fuel pump modules.

The AWD fuel pump modules contains the main fuel pump module (1), auxiliary fuel pump module (2), main fuel level sending unit, auxiliary fuel level sending unit, fuel pump reservoir, fuel pressure regulator and fuel filter.

The main fuel level sending unit is located on the main fuel pump reservoir (1) is serviceable. See **Fuel System/Fuel Delivery/SENDING UNIT and SENSOR, Fuel Level - Removal.** The auxiliary fuel level sending unit (2) is integrated with the auxiliary fuel pump module and is serviced as an assembly. See **Fuel System/Fuel Delivery/MODULE, Fuel Pump - Removal.**

Operation**OPERATION**

FWD

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Fig. 23: PUMP MODULE REGULAR
Courtesy of CHRYSLER LLC

The front wheel drive (FWD) fuel pump module is located inside the fuel tank with a fuel level sending unit and pressure regulator. The fuel pump module is a positive displacement, gerotor, driven by a 12 volt DC permanent magnet electric motor.

The fuel pump module draws fuel through a internal filter and pushes it through the motor to an outlet pipe. The fuel pump module contains two check valves. One valve relieves internal fuel pump pressure and regulates maximum pump output. The second valve, in the pump outlet, maintains pump pressure during engine off conditions.

The fuel pump pressure regulator contains a calibrated spring which forces a diaphragm against the fuel filter return port. When pressure exceeds the calibrated amount, the diaphragm retracts, allowing excess fuel pressure in the fuel pump module to purge into the fuel tank.

The maximum deadhead pressure is approximately 880 kPa (130 psi). The fuel pump pressure regulator adjusts fuel system pressure to approximately 400 ± 34 kPa (58 ± 5 psi).

AWD

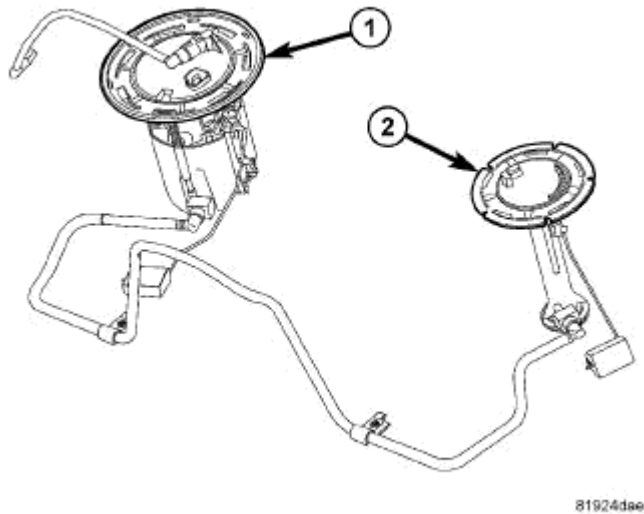


Fig. 24: Main Fuel Pump Module & Auxiliary Fuel Pump Module
Courtesy of CHRYSLER LLC

Operation of the all wheel drive (AWD) main fuel pump module is similar to the FWD with the addition of a auxiliary fuel pump module with a auxiliary fuel level sending unit and draws fuel from the base of the auxiliary fuel pump module (2) through an internal tube.

The auxiliary fuel pump module flow rate is greater than the vehicle fuel consumption rate so that the auxiliary side of the tank is emptied before fuel is depleted from the primary side.

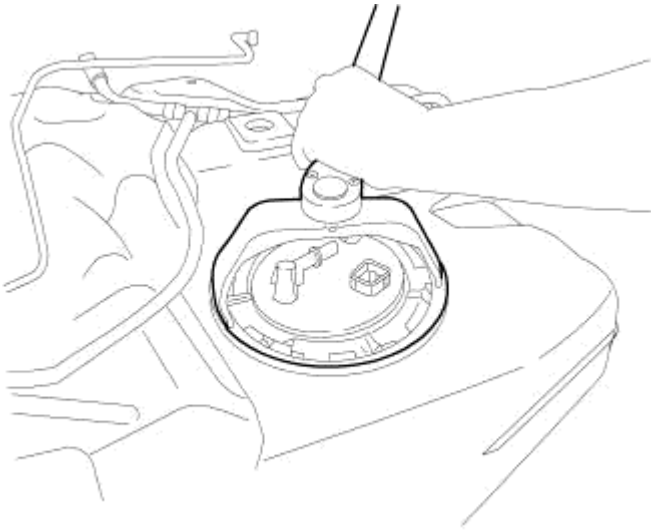
Removal

REMOVAL

MAIN FUEL PUMP MODULE

WARNING: Risk of injury to eyes and skin from contact with fuel, Wear protective clothing and eye protection. Risk of poisoning from inhaling and swallowing fuel. Pour fuel only into appropriately marked OSHA approved containers. Failure to comply may result in serious or fatal injury.

WARNING: The fuel system is under constant high pressure even with engine off. Until the fuel pressure has been properly released from the system, do not attempt to open the fuel system. Do not smoke or use open flames/sparks when servicing the fuel system. Make sure the area in which the vehicle is being serviced is in a well ventilated area. Failure to comply may result in serious or fatal injury.



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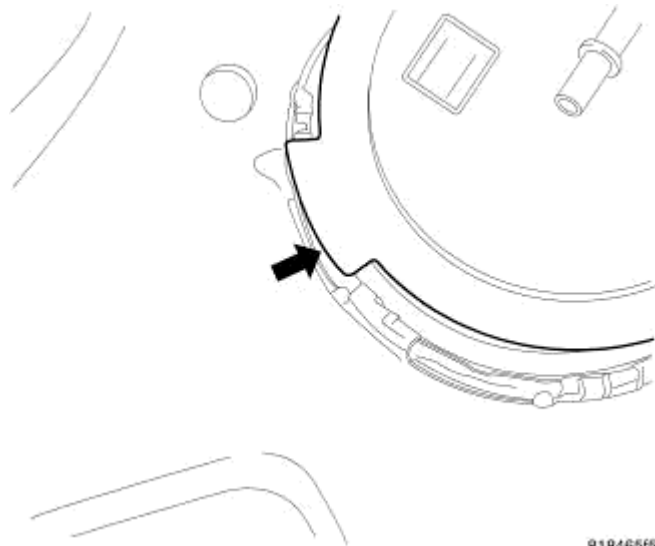
Fig. 25: LOCK RING TOOL

Courtesy of CHRYSLER LLC

1. Drain and remove the fuel tank. See **Fuel System/Fuel Delivery/TANK, Fuel - Removal**.

NOTE: Prior to removing the main fuel pump module, use compressed air to remove any accumulated dirt and debris from around fuel tank opening.

2. Position the lock-ring remover/installer 9340 into the notches on the outside edge of the lock-ring.
3. Install a 1/2 inch drive breaker bar into the lock-ring remover/installer 9340.
4. Rotate the breaker bar counterclockwise and remove the lock-ring.



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Fig. 26: LOCATION TAB

Courtesy of CHRYSLER LLC

NOTE: The main fuel pump module has to be properly located in the fuel tank for the fuel level gauge to work properly.

5. Mark the main fuel pump module orientation.

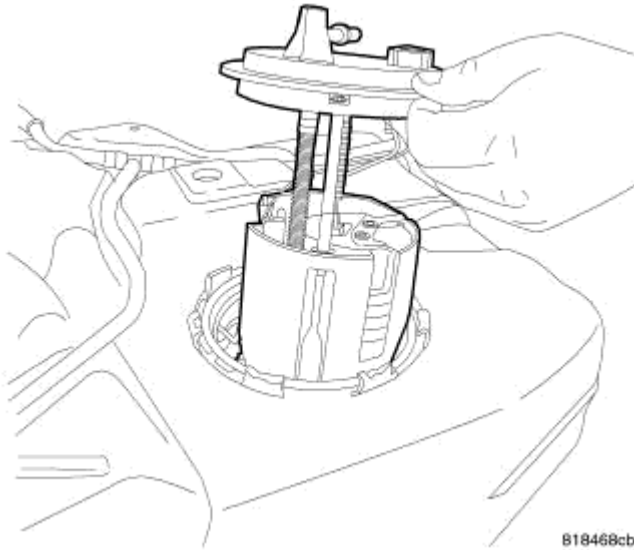


Fig. 27: Main Fuel Pump Module Into Fuel Tank
Courtesy of CHRYSLER LLC

WARNING: The fuel pump module reservoir does not empty out when the tank is drained. The fuel in the reservoir will spill out when the module is removed.

NOTE: Do not spill fuel into the interior of the vehicle.

6. Raise the main fuel pump module out of the fuel tank using caution not spill fuel inside the vehicle.

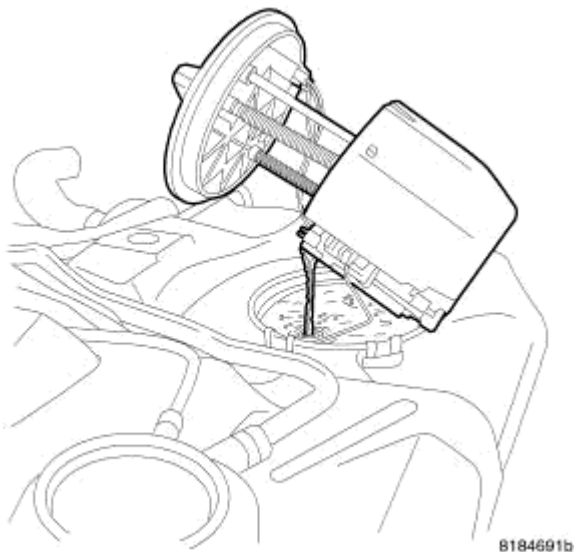


Fig. 28: DRAINING FUEL
Courtesy of CHRYSLER LLC

7. Tip the main fuel pump module and drain enough fuel from the main fuel pump module reservoir to gain access to the internal fuel line without spilling fuel into the interior of the vehicle.

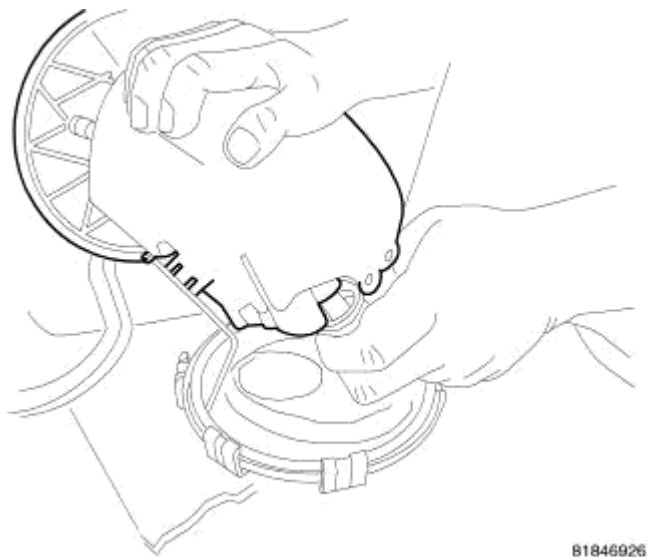


Fig. 29: SIPHON LINE FOR AWD
Courtesy of CHRYSLER LLC

8. If equipped with AWD, disconnect the internal fuel line from the main fuel pump module.

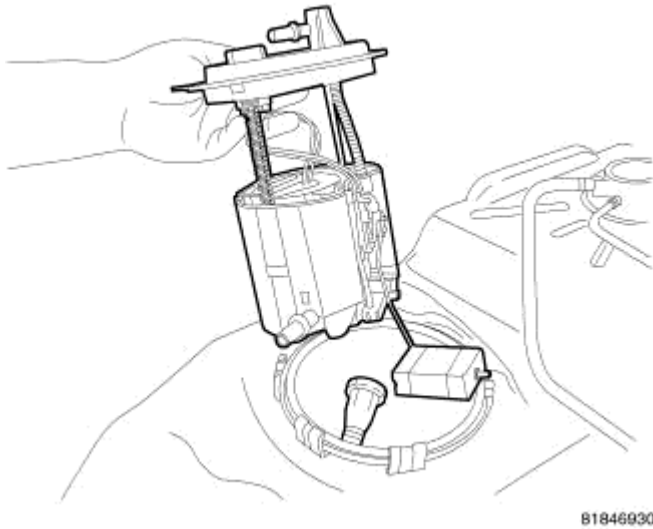


Fig. 30: Main Fuel Pump Module
Courtesy of CHRYSLER LLC

9. Remove the main fuel pump module from the fuel tank using caution not to bend the float arm.

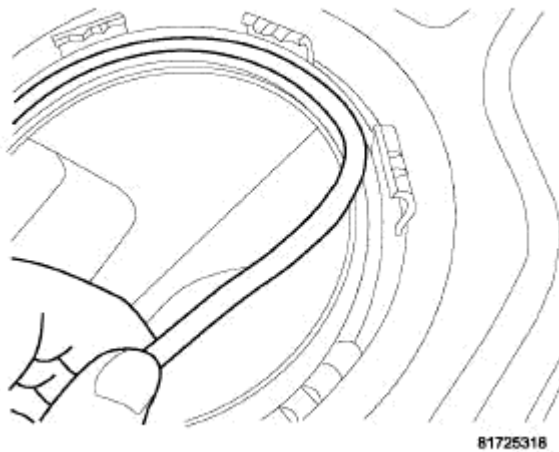


Fig. 31: FUEL PUMP MODULE O-RING
Courtesy of CHRYSLER LLC

10. Remove and discard the rubber O-ring seal.

AUXILIARY FUEL PUMP MODULE

WARNING: Risk of injury to eyes and skin from contact with fuel, Wear protective clothing and eye protection. Risk of poisoning from inhaling and

swallowing fuel. Pour fuel only into appropriately marked OSHA approved containers. Failure to comply may result in serious or fatal injury.

WARNING: The fuel system is under constant high pressure even with engine off. Until the fuel pressure has been properly released from the system, do not attempt to open the fuel system. Do not smoke or use open flames/sparks when servicing the fuel system. Make sure the area in which the vehicle is being serviced is in a well ventilated area. Failure to comply may result in serious or fatal injury.

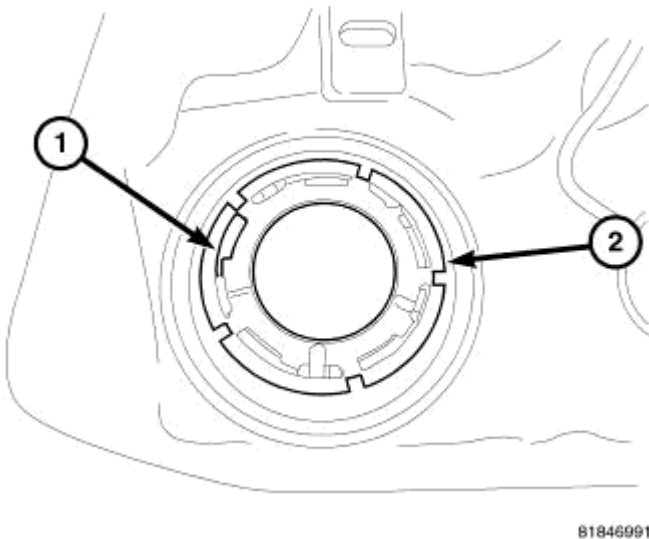


Fig. 32: SMALL MODULE LOCK RING
Courtesy of CHRYSLER LLC

1. Drain and remove the fuel tank. See Fuel System/Fuel Delivery/TANK, Fuel - Removal.

NOTE: The auxiliary fuel pump module has to be properly located in the fuel tank for the fuel level gauge to work properly.

2. Mark the auxiliary fuel pump module orientation (1).

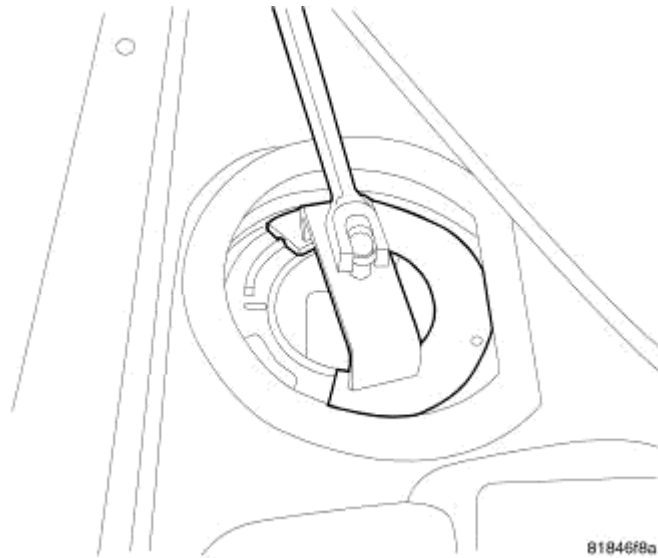


Fig. 33: SMALL LOCK RING TOOL
Courtesy of CHRYSLER LLC

NOTE: Prior to removing the auxiliary fuel pump module, use compressed air to remove any accumulated dirt and debris from around fuel tank opening.

3. Position the lock-ring remover/installer 9318 into the notches on the outside edge of the lock-ring.
4. Install a 1/2 inch drive breaker bar into the lock-ring remover/installer 9318.
5. Rotate the breaker bar counterclockwise and remove the lock-ring.

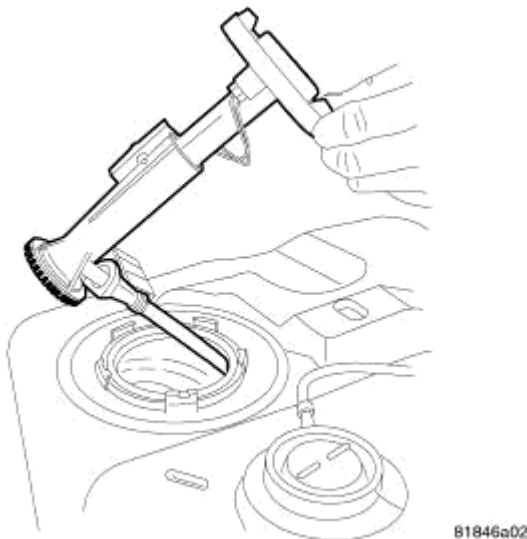


Fig. 34: SIPHON LINE ON SMALL MODULE
Courtesy of CHRYSLER LLC

6. Raise the auxiliary fuel pump module and disconnect the internal fuel line.
7. Remove the auxiliary fuel pump module from the fuel tank using caution not to bend the float arm.

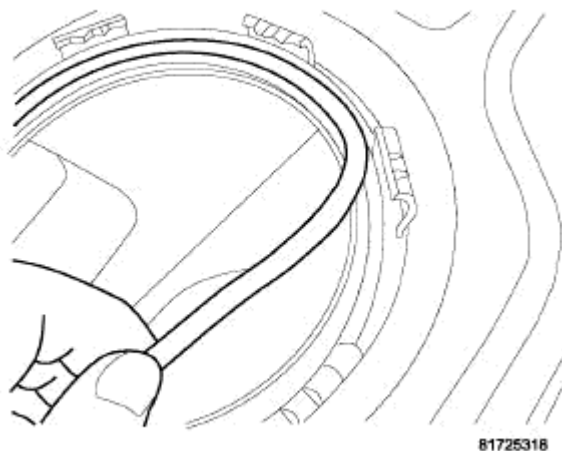


Fig. 35: Fuel Pump Module Seal
Courtesy of CHRYSLER LLC

8. Remove and discard the rubber O-ring seal.

Installation

INSTALLATION

MAIN FUEL PUMP MODULE

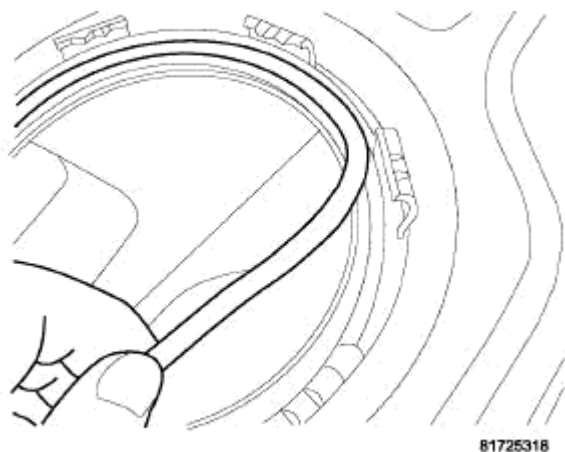


Fig. 36: FUEL PUMP MODULE O-RING
Courtesy of CHRYSLER LLC

CAUTION: Whenever the fuel pump module is serviced, the rubber O-ring seal must be replaced.

1. Clean the rubber O-ring seal area of the fuel tank and install a new rubber O-ring seal.

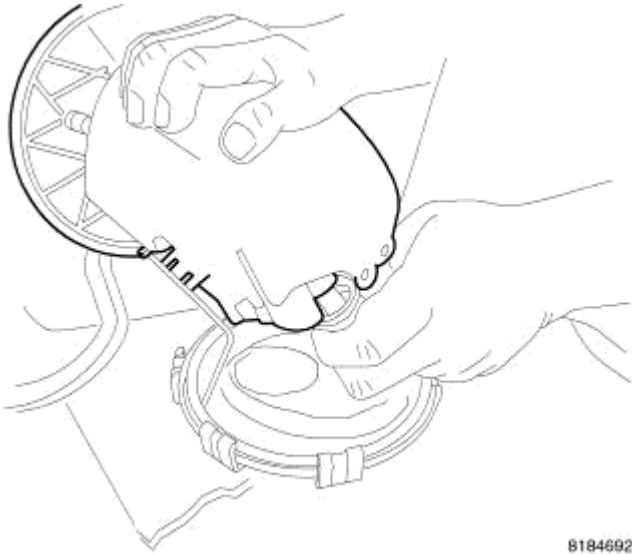


Fig. 37: SIPHON LINE FOR AWD
Courtesy of CHRYSLER LLC

2. If equipped with AWD, Connect the internal fuel line to the main fuel pump module.

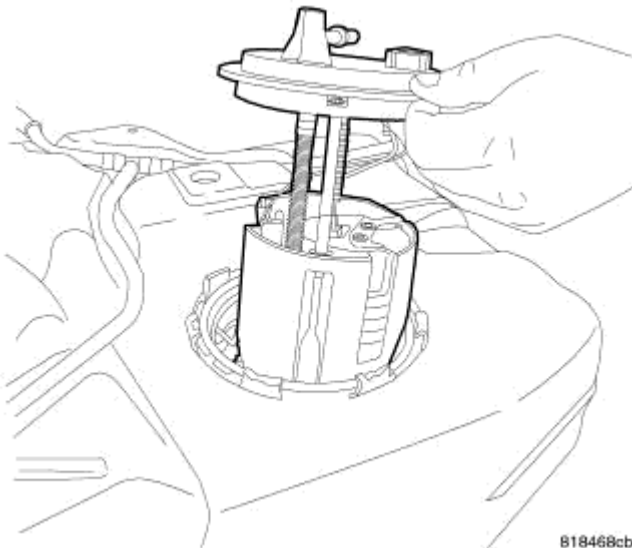
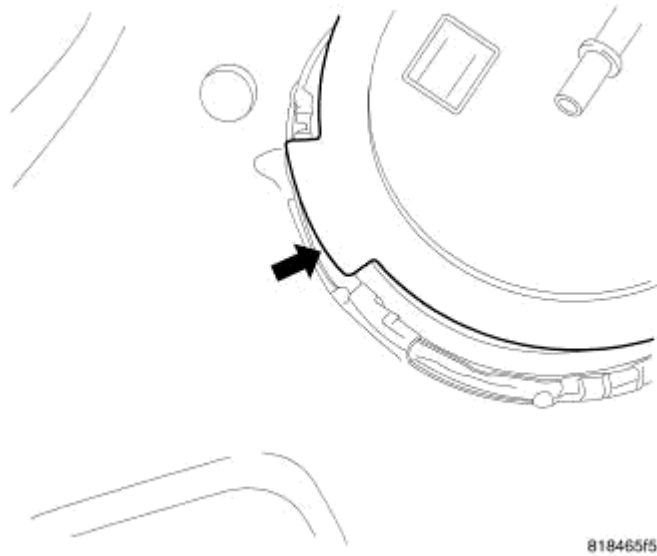


Fig. 38: Main Fuel Pump Module Into Fuel Tank
Courtesy of CHRYSLER LLC

3. Lower the main fuel pump module into the fuel tank using caution not to bend the float arm.

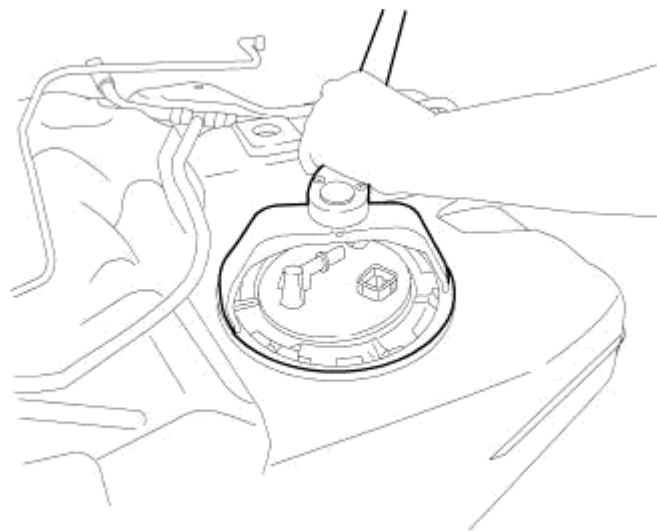


818465f5

Fig. 39: Location Tab
Courtesy of CHRYSLER LLC

NOTE: The main fuel pump module must be properly located in the fuel tank for the fuel level gauge to work properly.

4. Align the rubber O-ring seal and rotate the main fuel pump module to the orientation marks noted during removal. This step must be performed for the fuel level gauge to work properly.



81846497

Fig. 40: Lock Ring Tool
Courtesy of CHRYSLER LLC

5. Position the lock-ring over top of the main fuel pump module.
6. Position the lock-ring remover/installer 9340 into the notches on the outside edge of the lock-ring.
7. Install a 1/2 inch drive breaker bar into the lock-ring remover/installer 9340.

8. Rotate the breaker bar clockwise until all seven notches of the lock-ring have engaged.
9. Install the fuel tank. See **Fuel System/Fuel Delivery/TANK, Fuel - Installation**.

AUXILIARY FUEL PUMP MODULE

WARNING: Risk of injury to eyes and skin from contact with fuel, Wear protective clothing and eye protection. Risk of poisoning from inhaling and swallowing fuel. Pour fuel only into appropriately marked OSHA approved containers. Failure to comply may result in serious or fatal injury.

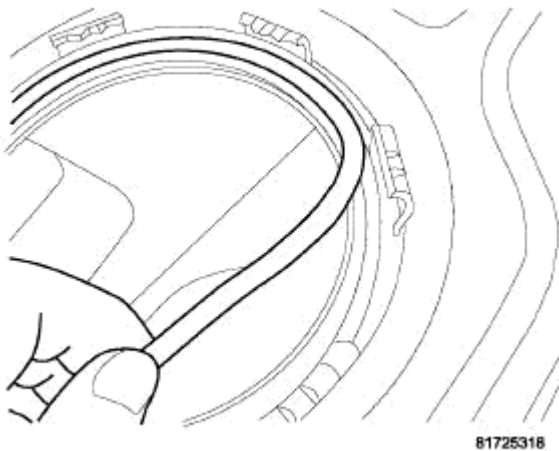


Fig. 41: Fuel Pump Module Seal
Courtesy of CHRYSLER LLC

CAUTION: Whenever the fuel pump module is serviced, the rubber O-ring seal must be replaced.

1. Clean the rubber O-ring seal area of the fuel tank and install a new rubber O-ring seal.

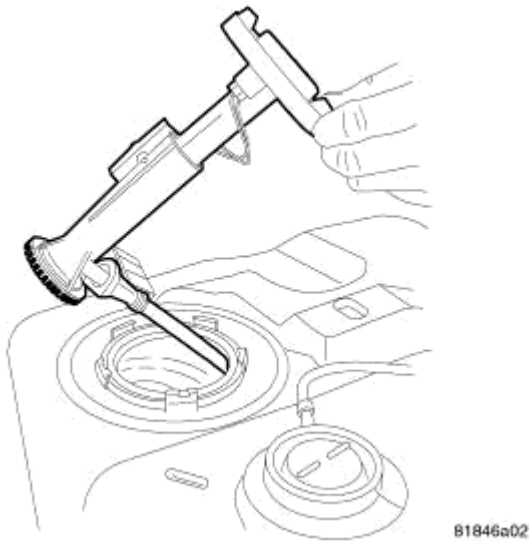


Fig. 42: SIPHON LINE ON SMALL MODULE
Courtesy of CHRYSLER LLC

2. Connect the internal fuel line to the auxiliary fuel pump module.
3. Lower the auxiliary fuel pump module into the fuel tank using caution not to bend the float arm.

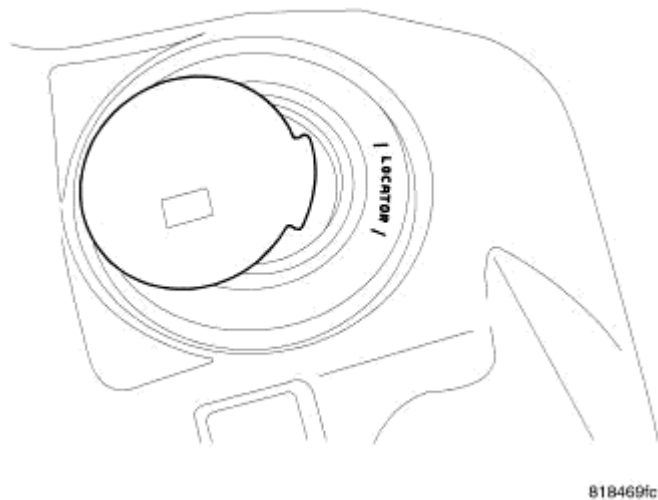


Fig. 43: TAB LOCATION SMALL MODULE
Courtesy of CHRYSLER LLC

NOTE: The auxiliary fuel pump module must be properly located in the fuel tank for the fuel level gauge to work properly.

4. Align the rubber O-ring seal and rotate the auxiliary fuel pump module to the orientation marks noted during removal. This step must be performed for the fuel gauge to work properly.

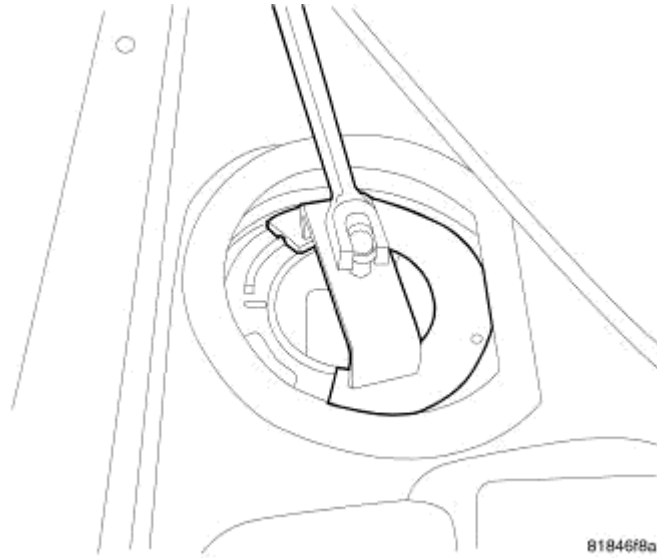


Fig. 44: SMALL LOCK RING TOOL
Courtesy of CHRYSLER LLC

5. Position the lock-ring over top of the auxiliary fuel pump module.
6. Position the lock-ring remover/installer 9318 into the notches on the outside edge of the lock-ring.
7. Install a 1/2 inch drive breaker bar into the lock-ring remover/installer 9318.
8. Rotate the breaker bar clockwise until all seven notches of the lock-ring have engaged.
9. Install the fuel tank. See **Fuel System/Fuel Delivery/TANK, Fuel - Installation.**

RAIL, FUEL

Removal

2.4L

WARNING: Risk of injury to eyes and skin from contact with fuel, Wear protective clothing and eye protection. Risk of poisoning from inhaling and swallowing fuel. Pour fuel only into appropriately marked OSHA approved containers. Failure to comply may result in serious or fatal injury.

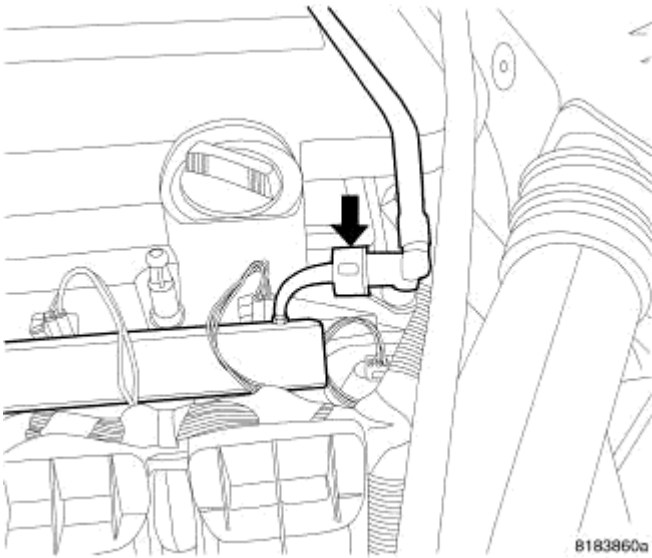


Fig. 45: FUEL LINE AT RAIL
Courtesy of CHRYSLER LLC

NOTE: **Wrap shop towels around hose to catch any gasoline spillage.**

1. Release the fuel system pressure. See **Fuel System/Fuel Delivery - Standard Procedure**.
2. Disconnect and isolate negative battery cable.
3. Remove engine cover.
4. Disconnect the fuel line from the fuel rail. See **Fuel System/Fuel Delivery/FITTING, Quick Connect - Standard Procedure**.

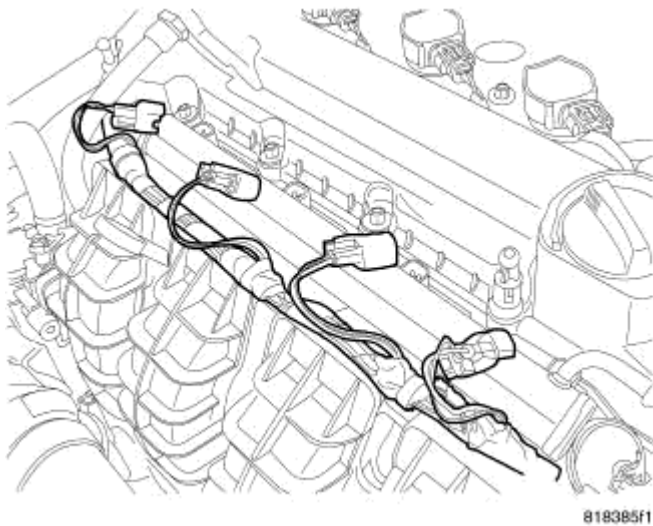


Fig. 46: Electrical Connectors From Fuel Injectors
Courtesy of CHRYSLER LLC

5. Unlock and disconnect the electrical connectors from the fuel injectors.

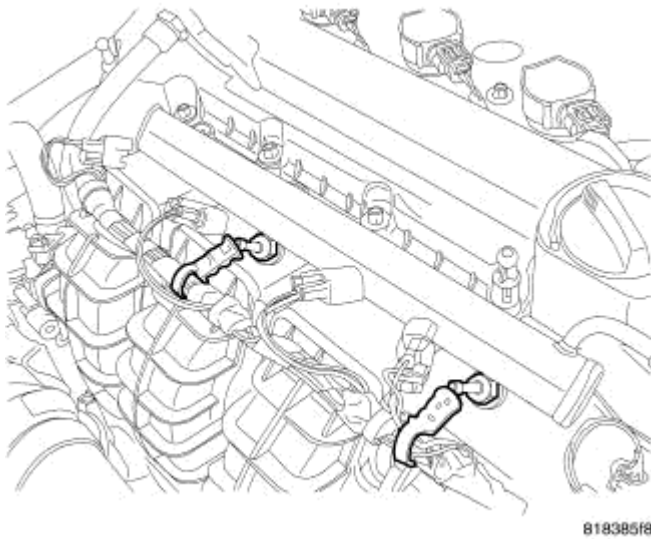


Fig. 47: Wire Harness From Fuel Rail Mounting Studs
Courtesy of CHRYSLER LLC

6. Remove the wiring harness from the fuel rail studs.

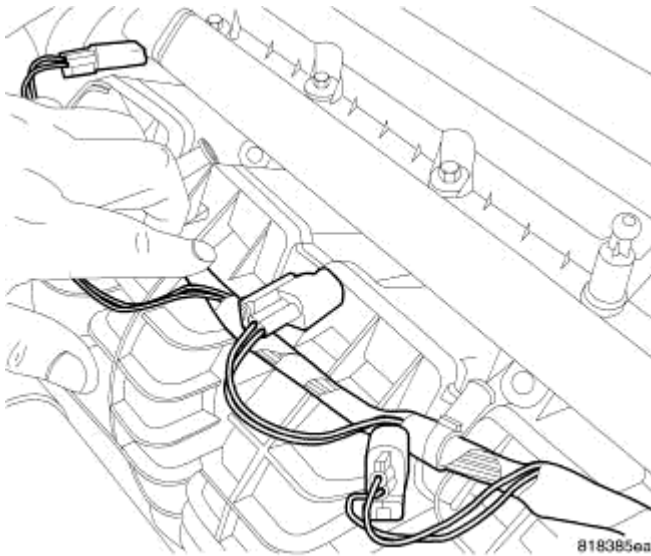


Fig. 48: Fuel Rail At Lower Manifold
Courtesy of CHRYSLER LLC

7. Remove the 2 bolts from the fuel rail at the lower manifold.

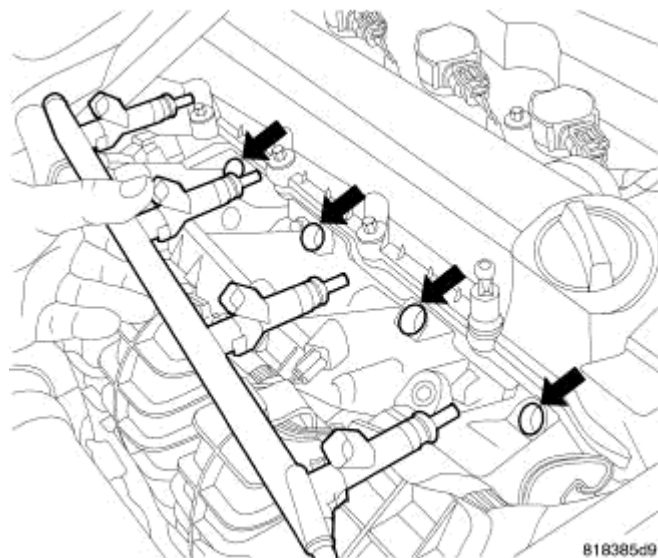


Fig. 49: RAIL REMOVAL/INSTALL
Courtesy of CHRYSLER LLC

8. Remove the fuel rail and injectors from the intake manifold.

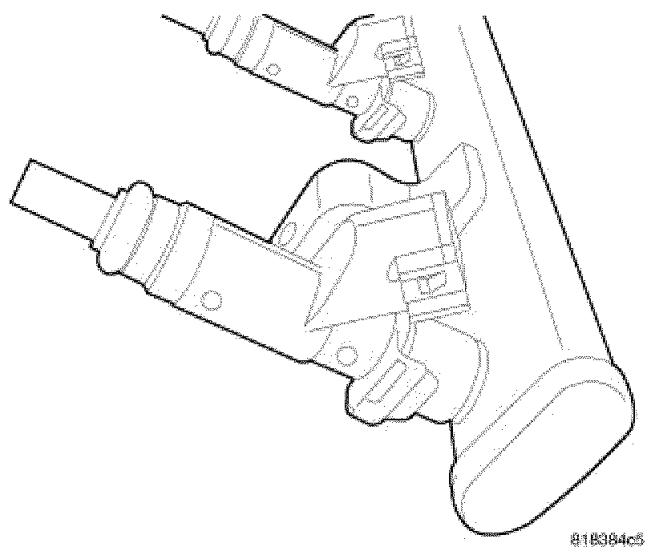
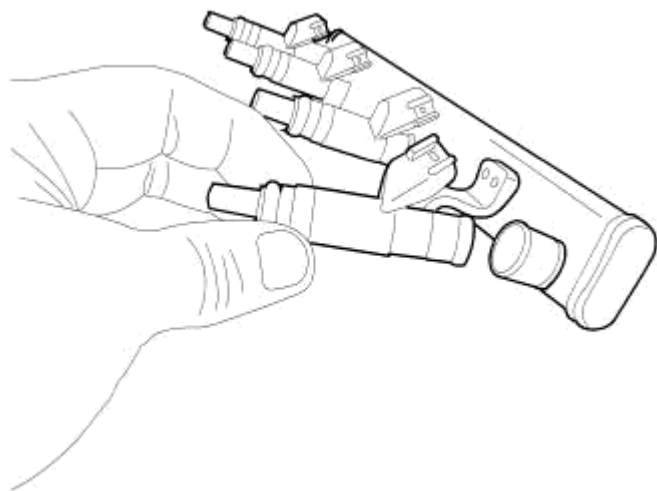


Fig. 50: FUEL RAIL ASSEMBLY
Courtesy of CHRYSLER LLC

9. Remove fuel injector clip holding fuel injector to fuel rail.

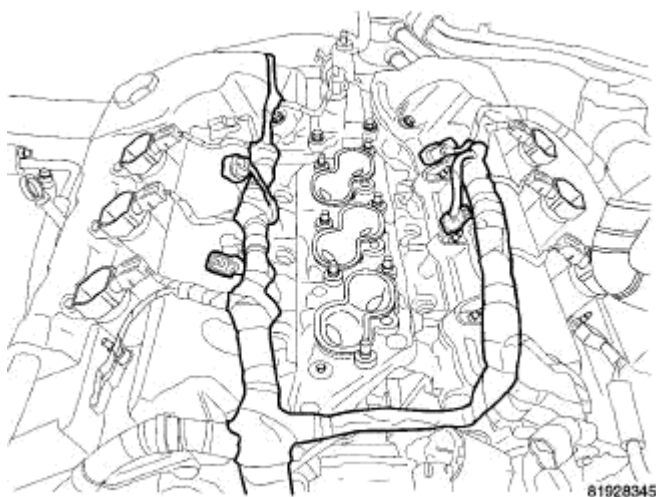


81837e38

Fig. 51: FUEL INJECTOR & RAIL
Courtesy of CHRYSLER LLC

10. Remove fuel injectors from fuel rail.

2.7L



81928345

Fig. 52: INTAKE REMOVED
Courtesy of CHRYSLER LLC

WARNING: Release fuel system pressure before servicing fuel rail. Service vehicles in well ventilated areas and avoid ignition sources. Never smoke while servicing the vehicle.

1. Release fuel system pressure. See **Fuel System/Fuel Delivery - Standard Procedure**.
2. Disconnect and isolate negative battery cable.

3. Remove intake manifold. Refer to **Engine/Manifolds/MANIFOLD, Intake - Removal** .
4. Cover intake manifold to prevent foreign material from entering engine.
5. Disconnect fuel supply tube quick connect fitting at the rear of the fuel rail. See **Fuel System/Fuel Delivery/FITTING, Quick Connect - Standard Procedure**.
6. If the injector connectors are not tagged with their cylinder number, tag them to identify the correct cylinder .
7. Remove electrical connectors from the fuel injectors.

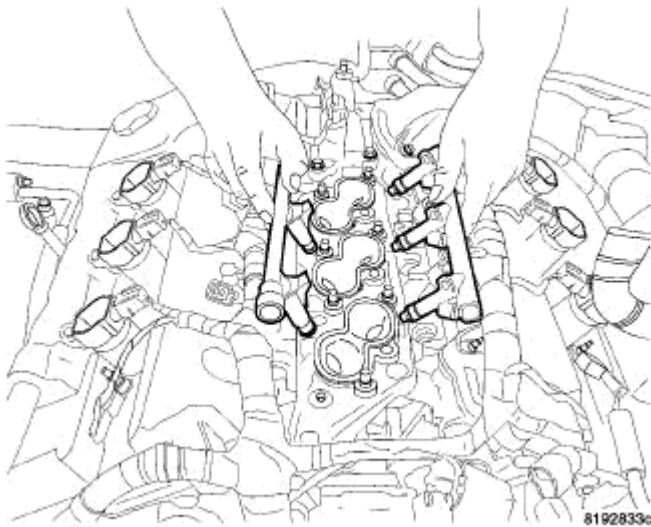
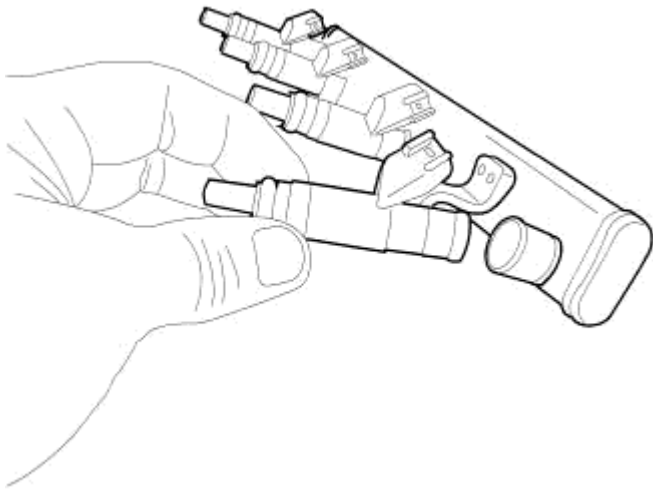


Fig. 53: FUEL RAIL REMOVAL/INSTALL
Courtesy of CHRYSLER LLC

8. Remove mounting bolts on both sides of fuel rail.
9. Lift fuel rail straight up off of cylinder head.

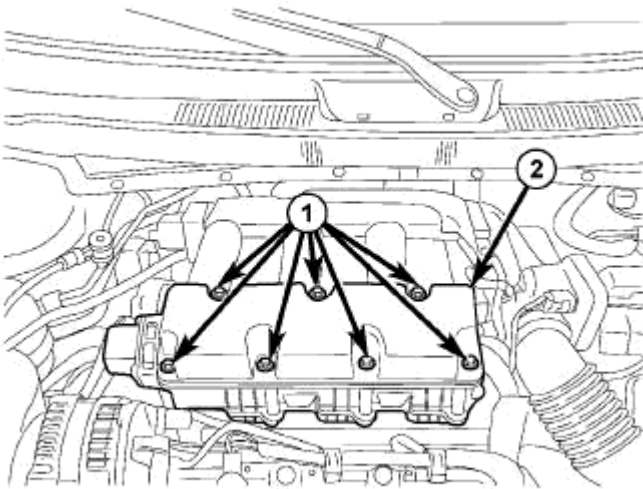


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Fig. 54: FUEL INJECTOR & RAIL
Courtesy of CHRYSLER LLC

10. Remove retaining clips from fuel injectors at fuel rail.
11. Remove fuel injector from fuel rail.

3.5L



81ae5f0d

Fig. 55: INTAKE RETAINER VIEW
Courtesy of CHRYSLER LLC

WARNING: The fuel system is under a constant pressure (even with the engine off). Before servicing any part on the fuel system, the fuel system pressure must be released.

1. Release fuel pressure. See **Fuel System/Fuel Delivery - Standard Procedure**.
2. Disconnect and isolate negative battery cable.
3. Remove the upper intake manifold. Refer to **Engine/Manifolds/MANIFOLD, Intake - Removal**.

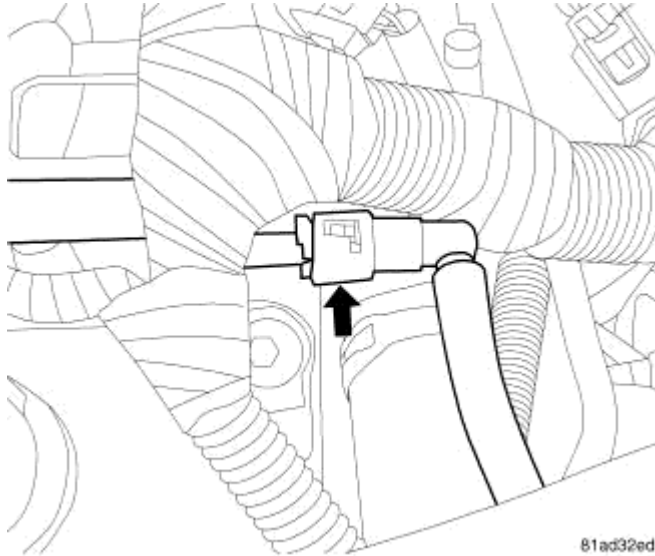


Fig. 56: RAIL CONNECTION
Courtesy of CHRYSLER LLC

4. Disconnect the quick connect fuel line from the fuel rail. See **Fuel System/Fuel Delivery/FITTING, Quick Connect - Standard Procedure**.

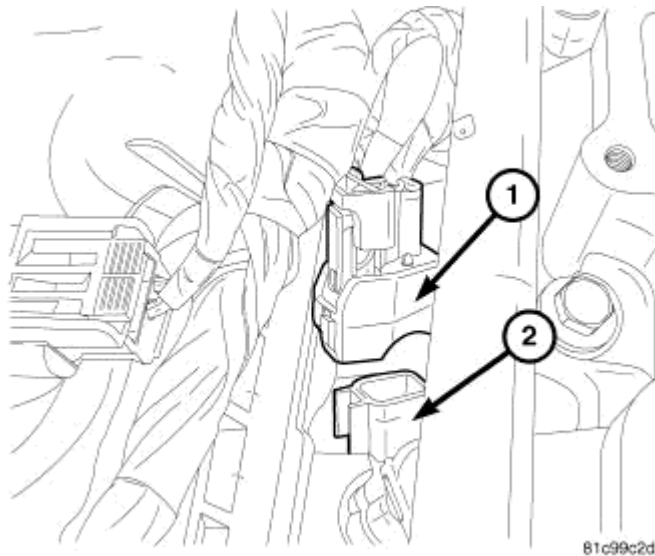
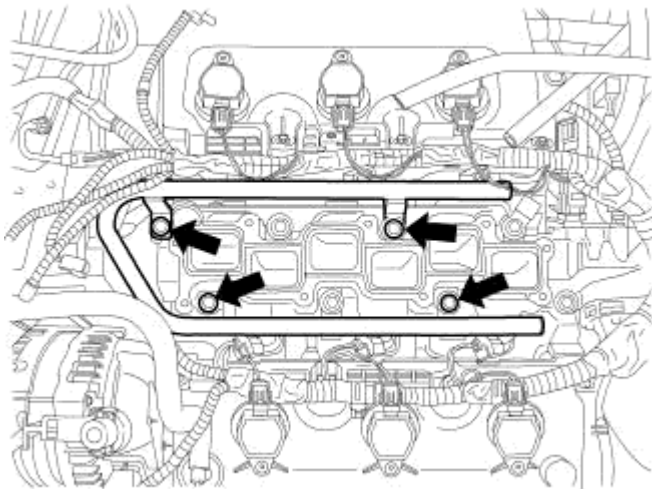


Fig. 57: Fuel Injector Electrical Connector
Courtesy of CHRYSLER LLC

NOTE: Mark fuel injector electrical harness connectors with correct corresponding cylinder numbers.

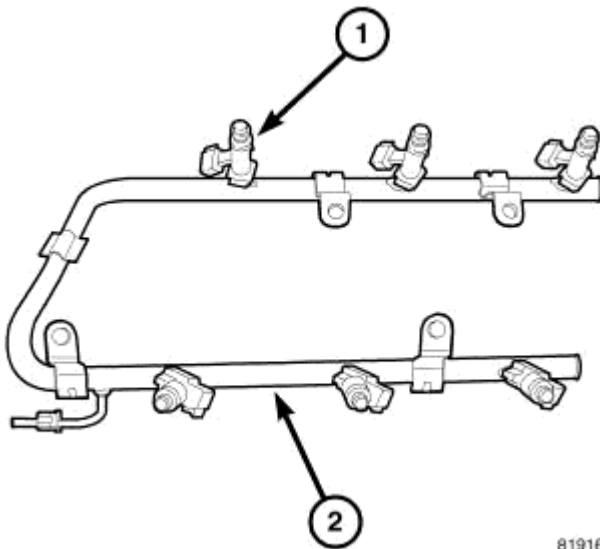
5. Disconnect all fuel injector electrical connectors (1) from fuel injectors (2).



81991ae6

Fig. 58: Fuel Rail Mounting Bolts
Courtesy of CHRYSLER LLC

6. Remove fuel rail mounting bolts from fuel rail and lower intake manifold.



819160f3

Fig. 59: FUEL RAIL
Courtesy of CHRYSLER LLC

NOTE: Gently rock the fuel rail and injectors back and forth to loosen the seals on the fuel injectors from the cylinder heads.

CAUTION: Do Not use excessive force or prying tools to remove fuel rail and injectors. Damage to the fuel rail and injectors may result.

7. Lift fuel rail straight up off of the cylinder heads.
8. Drain any excess fuel from the fuel rail into an approved fuel storage container.

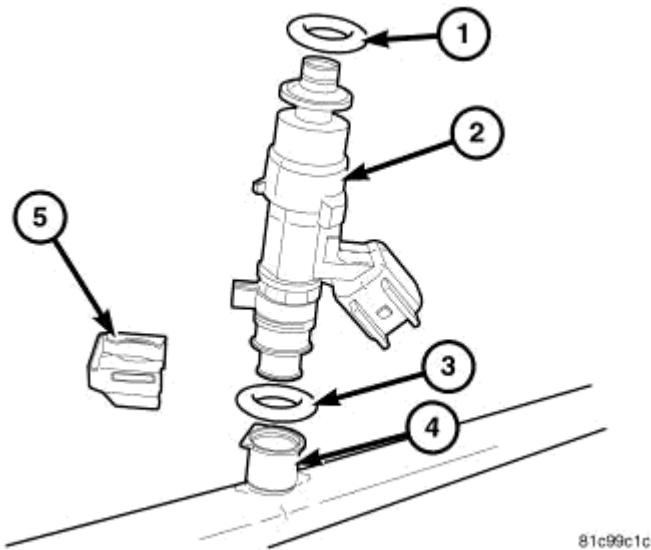


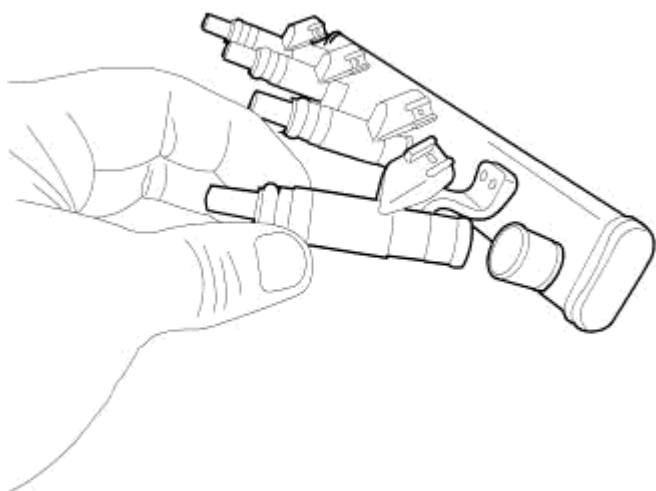
Fig. 60: FUEL INJECTOR REMOVAL/INSTALLATION
Courtesy of CHRYSLER LLC

NOTE: Mark or tag each fuel injector with correct corresponding cylinder numbers

9. Remove retaining clips (5) from fuel injectors (2) at fuel rail (4).

Installation

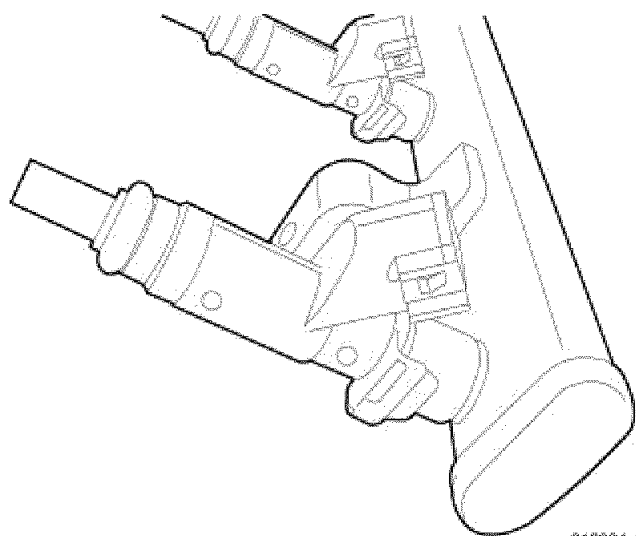
2.4L



81837e38

Fig. 61: FUEL INJECTOR & RAIL
Courtesy of CHRYSLER LLC

1. Apply a light coating of clean engine oil to the O-ring on the nozzle end of each injector.
2. Install injector into cup of fuel rail.



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Fig. 62: FUEL RAIL ASSEMBLY
Courtesy of CHRYSLER LLC

3. Install retaining clip and check to ensure injector is properly captured in the fuel rail assembly.

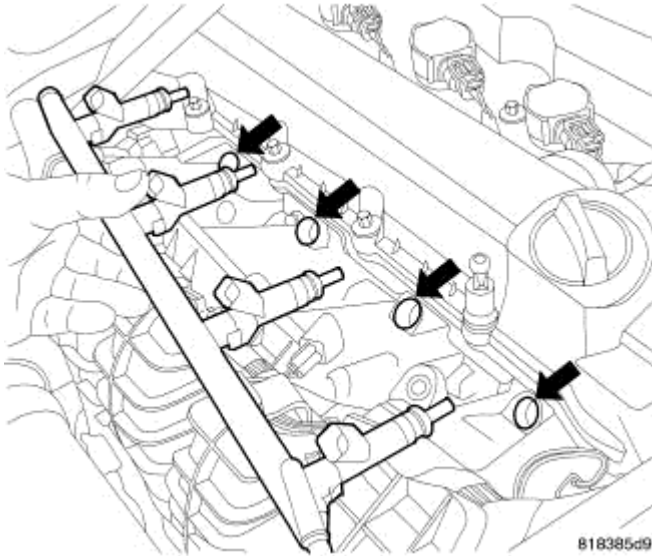


Fig. 63: RAIL REMOVAL/INSTALL
Courtesy of CHRYSLER LLC

4. Insert fuel injector nozzles into openings in intake manifold. Seat the injectors in place.

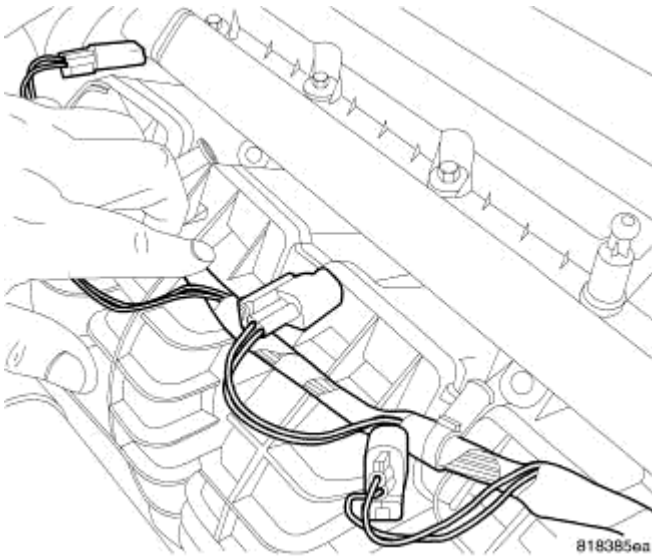


Fig. 64: Fuel Rail At Lower Manifold
Courtesy of CHRYSLER LLC

5. Install the 2 bolts to the fuel rail. Tighten fuel rail bolts to 27 N.m (20 ft. lbs.).

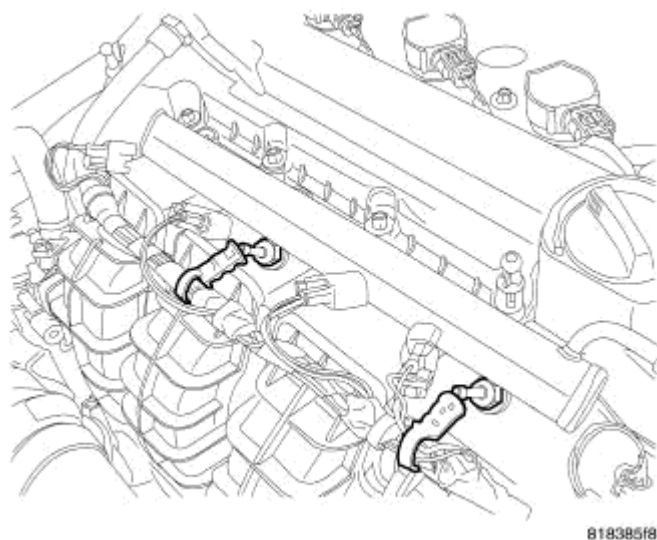


Fig. 65: Wire Harness From Fuel Rail Mounting Studs
Courtesy of CHRYSLER LLC

6. Install wiring harness clips to the fuel rail mounting studs.

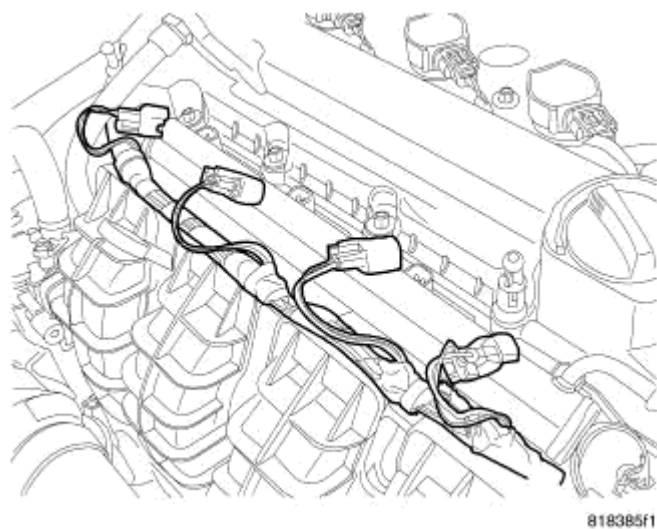


Fig. 66: Electrical Connectors From Fuel Injectors
Courtesy of CHRYSLER LLC

7. Connect and lock the electrical connectors to the fuel injectors.

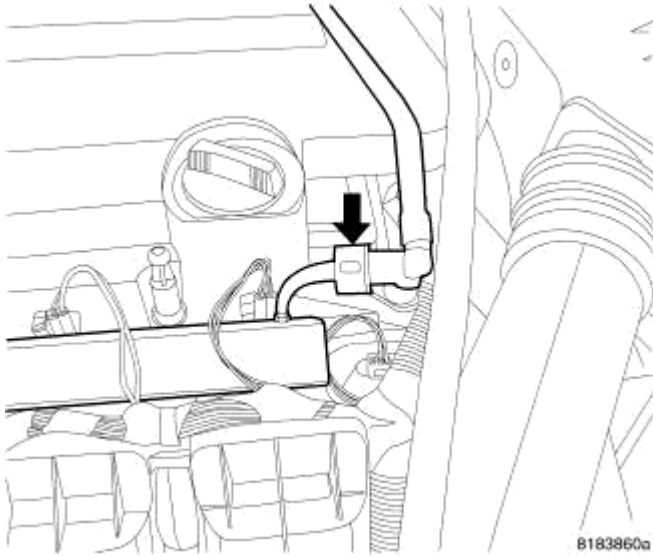


Fig. 67: FUEL LINE AT RAIL
Courtesy of CHRYSLER LLC

8. Connect the fuel line to the fuel rail. See **Fuel System/Fuel Delivery/FITTING, Quick Connect - Standard Procedure**.
9. Connect negative battery cable, tighten nut to 5 N.m (45 in. lbs.).
10. Use the scan tool ASD Fuel System Test to pressurize the fuel system. Check for leaks.
11. Install engine cover.

2.7L

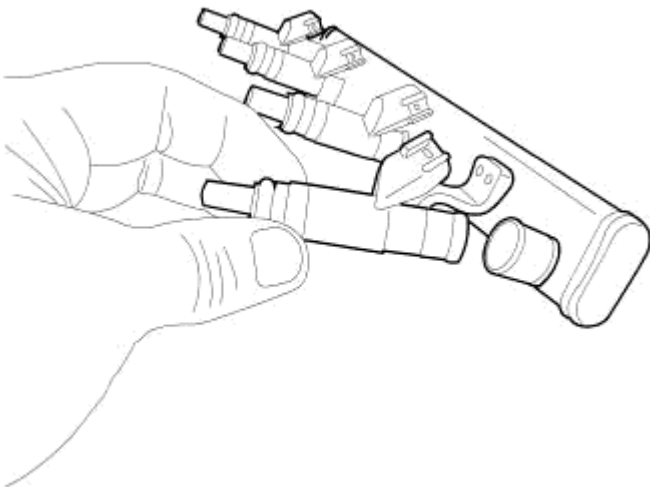


Fig. 68: FUEL INJECTOR & RAIL
Courtesy of CHRYSLER LLC

1. Lightly lubricate the fuel injector O-rings with a couple drops of clean engine oil.

2. Install retaining clips on fuel injectors.
3. Push injectors into fuel injector rail until clips are in the correct position.

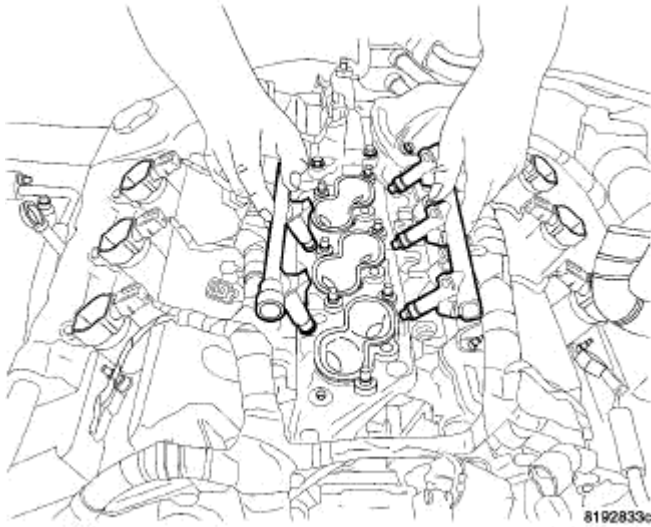


Fig. 69: FUEL RAIL REMOVAL/INSTALL
Courtesy of CHRYSLER LLC

4. Position fuel rail over cylinder heads, and push rail into place. Tighten fuel rail mounting bolts to 11.9 N.m (105 in. lbs.).
5. Connect the fuel supply tube quick connect fitting to the fuel rail. See **Fuel System/Fuel Delivery/FITTING, Quick Connect - Standard Procedure**.
6. Connect the electrical connectors to the fuel injectors.
7. Install intake manifold. Refer to **Engine/Manifolds/MANIFOLD, Intake - Installation**.
8. Connect the negative battery cable, tighten the nut to 5 N.m (45 in. lbs.).
9. Use the scan tool ASD Fuel System Test to pressurize the fuel system. Check for leaks.

3.5L

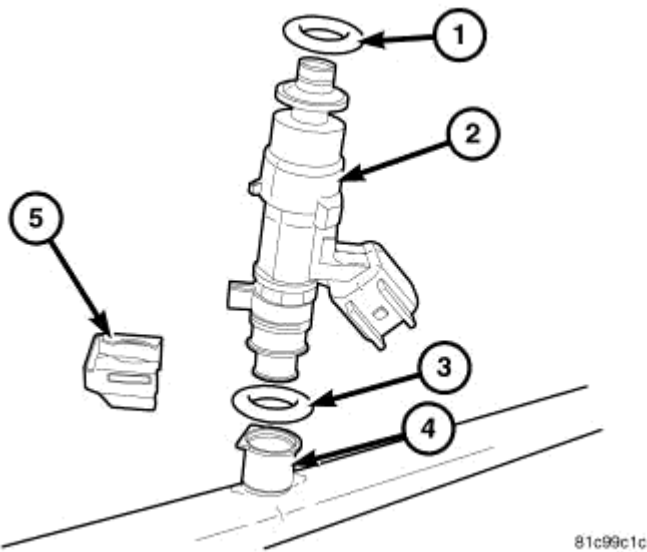


Fig. 70: FUEL INJECTOR REMOVAL/INSTALLATION

Courtesy of CHRYSLER LLC

NOTE: Inspect each O-ring seal on all the fuel injectors, replace O-ring seals if any damaged is noted. Note the fuel injector O-rings are color coded. The Blue colored O-ring is for the fuel rail side and the Green colored O-ring is cylinder head side.

1. Install and lubricate each fuel injector O-rings (1), (3) with a light drop of clean engine oil.
2. Install all of the fuel injectors (2) to the fuel rail (4), then install the retaining clips (5) to the fuel rail (4).

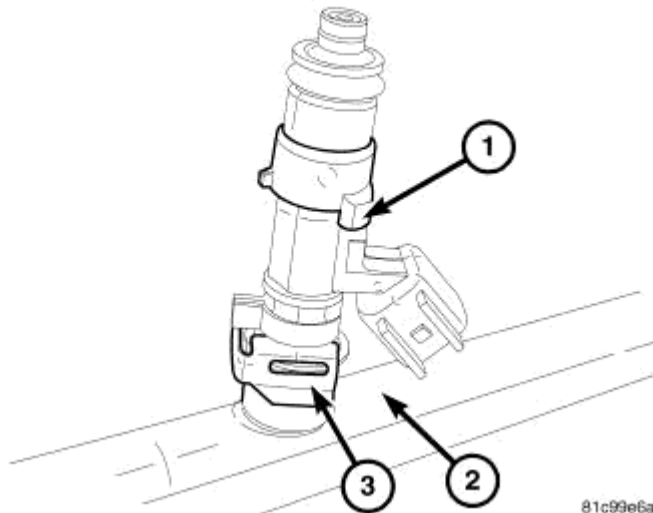


Fig. 71: PROPERLY SEATED FUEL INJECTOR

Courtesy of CHRYSLER LLC

3. Inspect each fuel injector for proper installation. Note how the retaining clip (3) secures the fuel injector

(1) to the fuel rail (2).

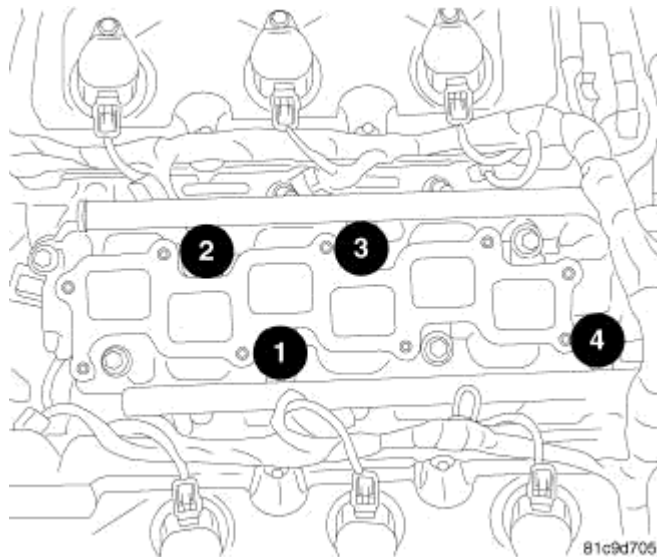


Fig. 72: Fuel Rail Bolts Tightening Sequence
Courtesy of CHRYSLER LLC

CAUTION: The fuel rail bolts are actually lower intake manifold bolts. These bolts must be torqued in a mandatory torque sequence.

4. Insert fuel injector nozzles into openings in the cylinder heads. Seat the injectors in place. Install the fuel rail bolts and tighten bolts in a mandatory torque sequence to 28 N.m (20.5 ft. lbs.).

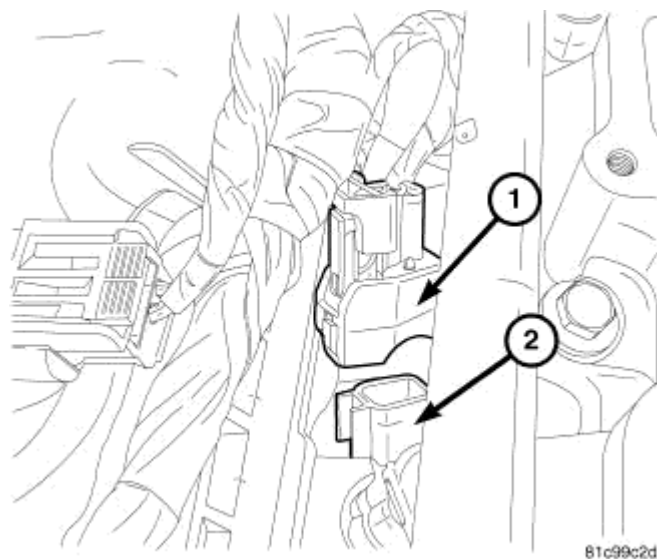


Fig. 73: Fuel Injector Electrical Connector
Courtesy of CHRYSLER LLC

5. Correctly position and connect all fuel injector electrical connectors (1) to fuel injectors (2).

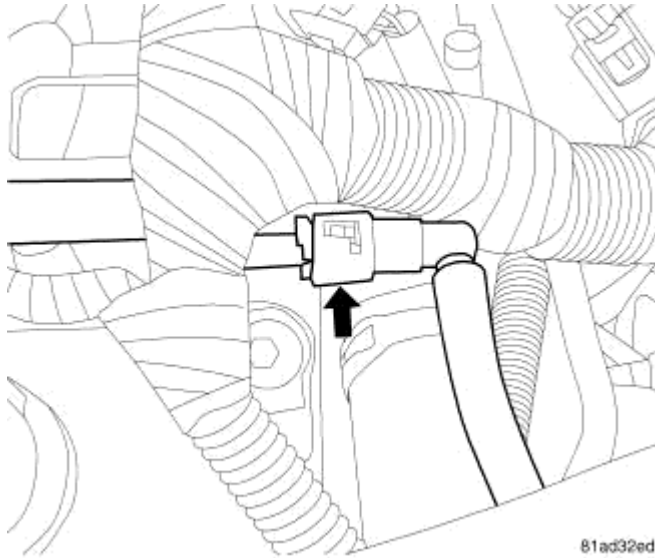


Fig. 74: RAIL CONNECTION
Courtesy of CHRYSLER LLC

CAUTION: Make sure the fuel line quick connector is connected properly. Failure to connect the fuel line correctly may result in a fuel leak at the rail assembly. Fuel leaked onto a hot engine may ignite resulting in damage to the vehicle.

6. Connect quick connect fuel line to fuel rail. See **Fuel System/Fuel Delivery/FITTING, Quick Connect - Standard Procedure.**

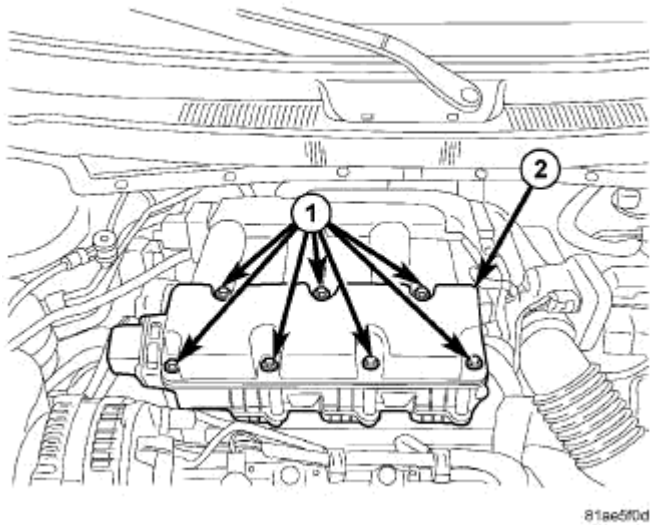
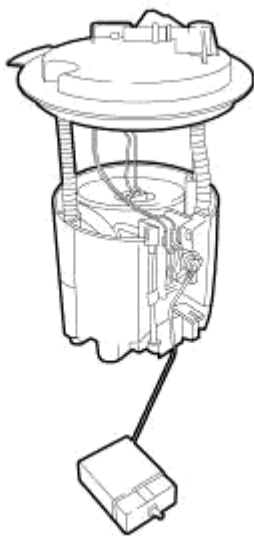


Fig. 75: INTAKE RETAINER VIEW
Courtesy of CHRYSLER LLC

7. Install upper intake manifold. Refer to **Engine/Manifolds/MANIFOLD, Intake - Installation** .
8. Connect the negative battery cable, tighten the nut to 5 N.m (45 in. lbs.).
9. Use the scan tool ASD Fuel System Test to pressurize the fuel system. Check for leaks.

SENDING UNIT AND SENSOR, FUEL LEVEL**Description****DESCRIPTION****FWD**

81924862

Fig. 76: PUMP MODULE REGULAR
Courtesy of CHRYSLER LLC

The front wheel drive (FWD) vehicles have a serviceable fuel level sending unit located on the fuel pump reservoir. See **Fuel System/Fuel Delivery/SENDING UNIT and SENSOR, Fuel Level - Removal**.

AWD

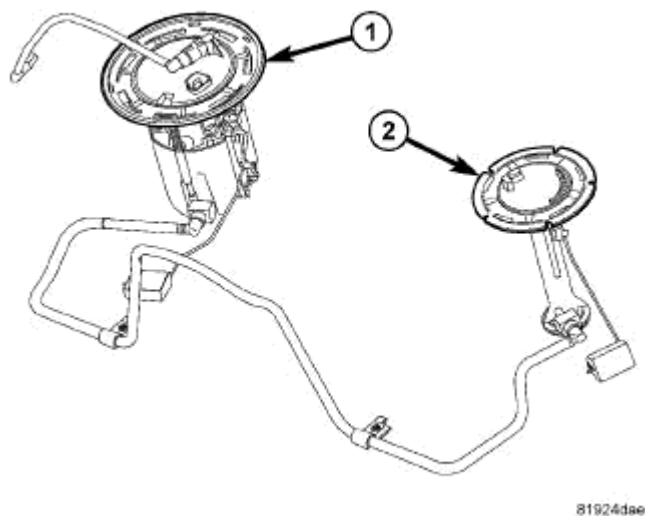


Fig. 77: Main Fuel Pump Module & Auxiliary Fuel Pump Module
Courtesy of CHRYSLER LLC

The all wheel drive (AWD) vehicles with the saddle fuel tank configurations have a main (1) and auxiliary (2) fuel level sending units.

The main fuel level sending unit located on the main fuel pump reservoir (1) is serviceable. See **Fuel System/Fuel Delivery/SENDING UNIT and SENSOR, Fuel Level - Removal**.

The auxiliary fuel level sending unit (2) is integrated with the auxiliary fuel pump module. The auxiliary fuel pump module and the fuel level sending unit is serviced as an assembly. See **Fuel System/Fuel Delivery/MODULE, Fuel Pump - Removal**.

Removal

REMOVAL

WARNING: Risk of injury to eyes and skin from contact with fuel. Wear protective clothing and eye protection. Risk of poisoning from inhaling and swallowing fuel. Pour fuel only into appropriately marked and approved containers. Failure to follow these instructions may result in possible serious or fatal injury.

WARNING: The fuel system is under constant high pressure even with engine off. Until the fuel pressure has been properly released from the system, do not attempt to open the fuel system. Do not smoke or use open flames/sparks when servicing the fuel system. Make sure the area in which the vehicle is being serviced is in a well ventilated area. Failure to comply may result in serious or fatal injury.

1. Remove the fuel pump module. See [Fuel System/Fuel Delivery/MODULE, Fuel Pump - Removal](#).

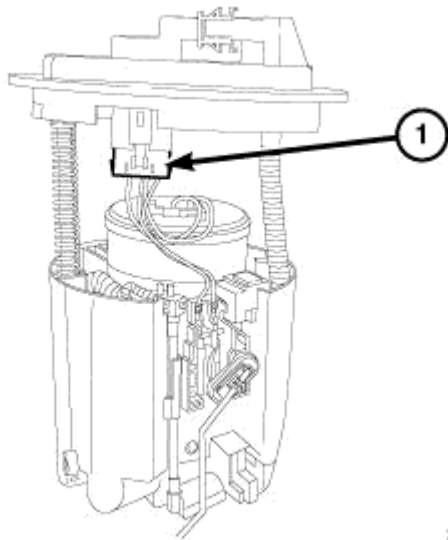


Fig. 78: Fuel Level Sending Unit Electrical Connector
Courtesy of CHRYSLER LLC

2. Disconnect the fuel level sending unit electrical connector (1).

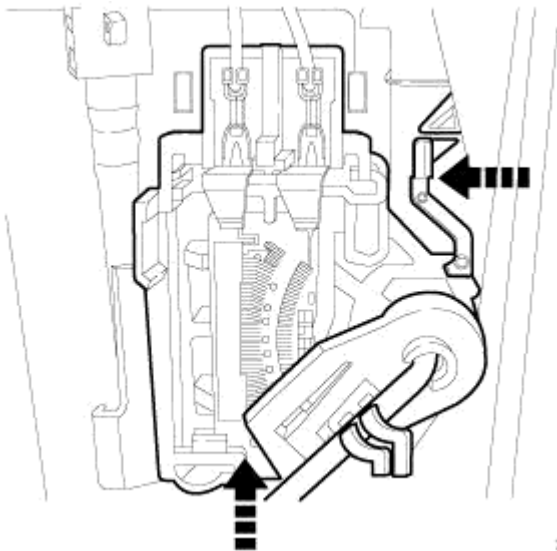


Fig. 79: Pressing Fuel Level Sending Unit Snap Tab To Left
Courtesy of CHRYSLER LLC

CAUTION: Do not touch the terminals or the resistor card.

CAUTION: Do not pull the fuel level sending unit by the wires or the float arm.

3. Using your finger, press the fuel level sending unit snap tab to the left while gently pushing up on the bottom of the fuel level sending unit and remove.

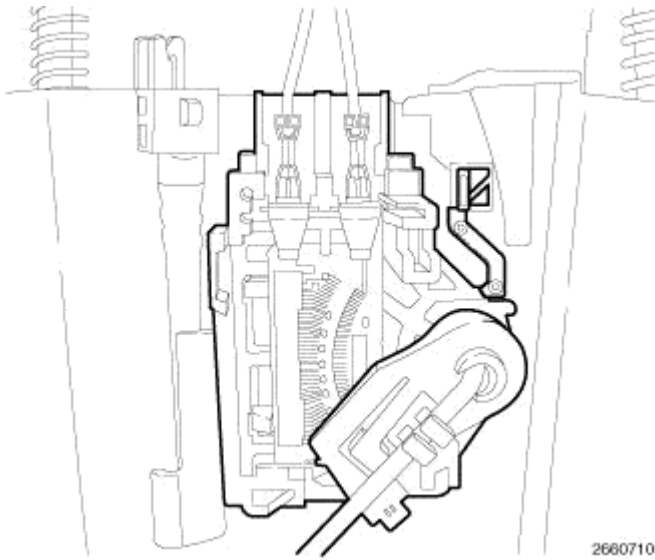
Installation**INSTALLATION**

Fig. 80: Fuel Level Sending Unit
Courtesy of CHRYSLER LLC

CAUTION: Do not touch the terminals or the resistor card.

CAUTION: Do not handle the new fuel level sending unit by the float arm.

1. Position the new fuel level sending unit to the fuel pump module reservoir.

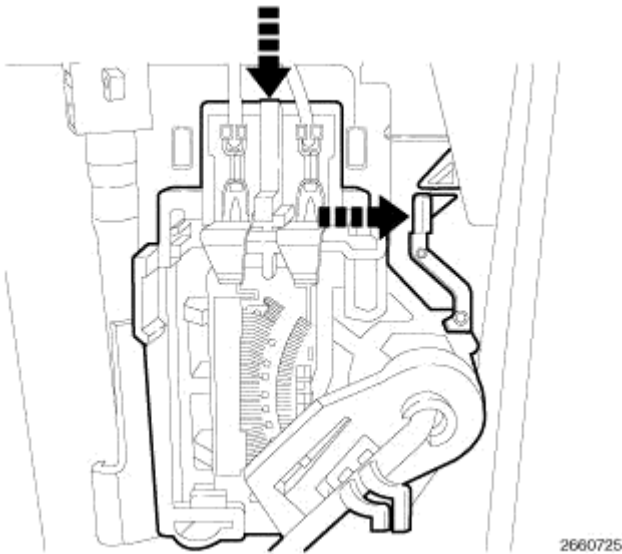


Fig. 81: Fuel Level Sending Unit Snap Tab
Courtesy of CHRYSLER LLC

2. Gently push the fuel level sending unit down until the snap tab (2) engages.

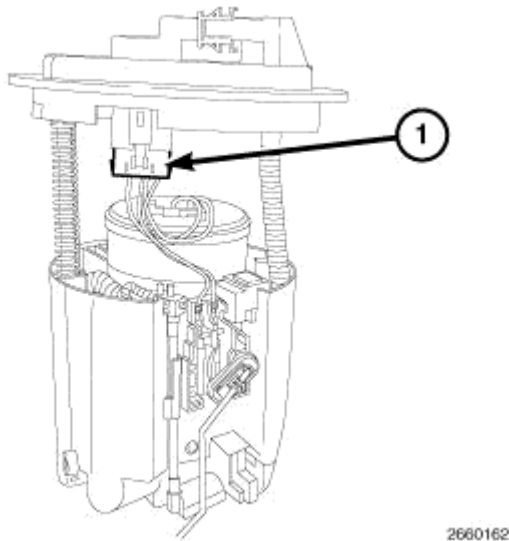
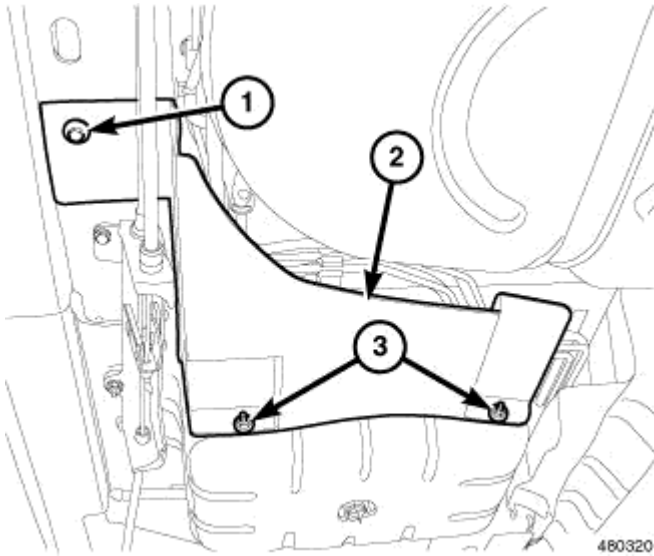


Fig. 82: Fuel Level Sending Unit Electrical Connector
Courtesy of CHRYSLER LLC

CAUTION: Ensure the fuel level sending unit wires are routed so they do not get pinched between the coils of the spring when the module is completely compressed.

3. Connect the fuel level sending unit electrical connector.
4. Install the fuel pump module. See **Fuel System/Fuel Delivery/MODULE, Fuel Pump - Installation.**

TANK, FUEL**Removal****AWD****Fig. 83: Splash Shield**

Courtesy of CHRYSLER LLC

WARNING: The fuel system is under constant pressure even with engine off. Until the fuel pressure has been properly relieved from the system, do not attempt to open the fuel system.

1. Release the fuel system pressure. See Fuel System/Fuel Delivery - Standard Procedure.
2. Drain fuel tank. See Fuel System/Fuel Delivery - Standard Procedure.
3. Remove exhaust system muffler. Refer to Exhaust System/MUFFLER, Exhaust - Removal.
4. Remove rear propshaft. Refer to Differential and Driveline/Propeller Shaft - Removal.
5. Remove one bolt (1), two nuts (3) and splash shield (2).

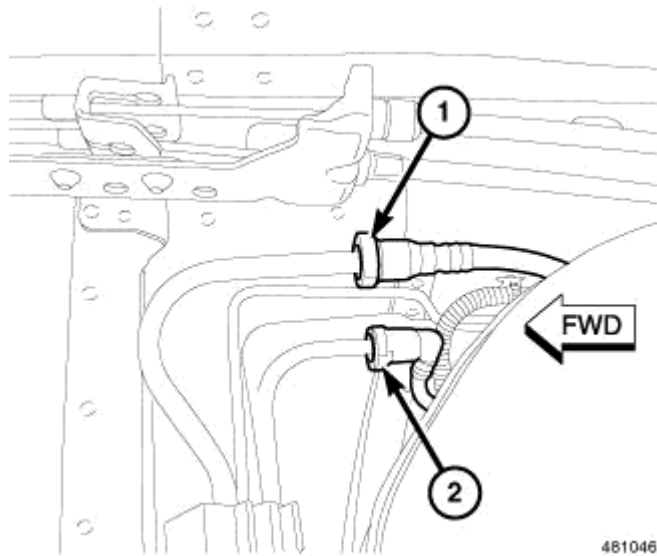


Fig. 84: Fuel Pump Module Quick Connect Fitting
Courtesy of CHRYSLER LLC

6. Disconnect the fuel pump module quick connect fitting (2) from the body mounted fuel line bundle. See **Fuel System/Fuel Delivery/FITTING, Quick Connect - Standard Procedure.**
7. Disconnect the purge line quick connect fitting (1) from the body mounted fuel line bundle. See **Fuel System/Fuel Delivery/FITTING, Quick Connect - Standard Procedure.**

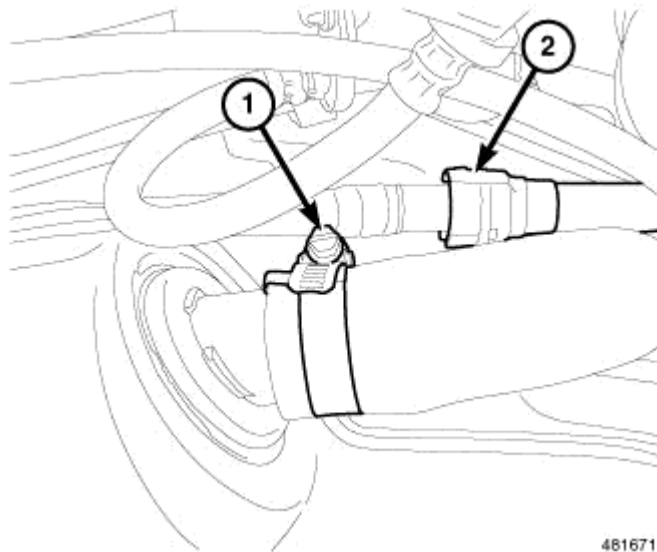


Fig. 85: Fuel Fill Hose Clamp
Courtesy of CHRYSLER LLC

8. Disconnect the purge line quick connect fitting (2) from the fuel tank connection. See **Fuel System/Fuel Delivery/FITTING, Quick Connect - Standard Procedure.**

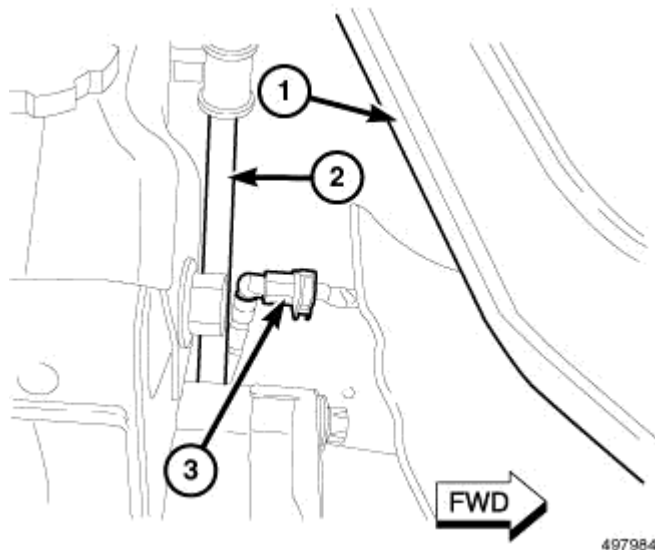


Fig. 86: Fuel Fill Tube Vent Line Quick Connect Fitting
Courtesy of CHRYSLER LLC

NOTE: The fuel fill tube vent line quick connect fitting (3) is located at the rear of the fuel tank (1) near the parking brake cable (2).

9. Disconnect the fuel fill tube vent line (3) and remove from the fuel tank quick connect fitting. See **Fuel System/Fuel Delivery/FITTING, Quick Connect - Standard Procedure**.

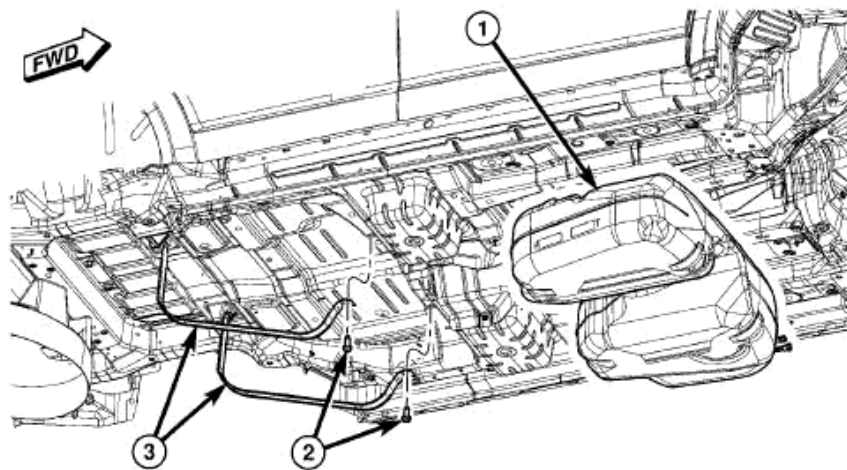


Fig. 87: Fuel Tank Install - AWD
Courtesy of CHRYSLER LLC

1 - Fuel Tank
2 - Strap Bolts
3 - Straps

WARNING: Support fuel tank with a transmission jack or equivalent. Use straps

to secure the fuel tank to the jack. Failure to properly support and secure the fuel tank during removal may cause fuel to spill or fuel tank to fall from jack assembly.

10. Use a transmission jack to support fuel tank (1), remove fuel tank strap bolts (2) and straps (3).
11. Partially lower tank to gain access to pump module and fuel level sensor electrical connectors.

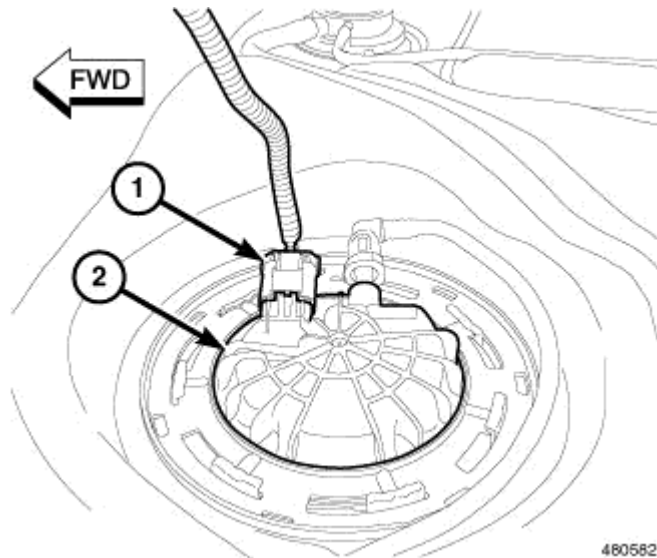


Fig. 88: Fuel Pump Module Electrical Connector
Courtesy of CHRYSLER LLC

12. Disconnect electrical connector (1) at fuel pump module (2).
13. Continue lowering tank for removal.
14. If fuel tank is to be replaced, remove fuel pump module from tank. See **Fuel System/Fuel Delivery/MODULE, Fuel Pump - Removal**.

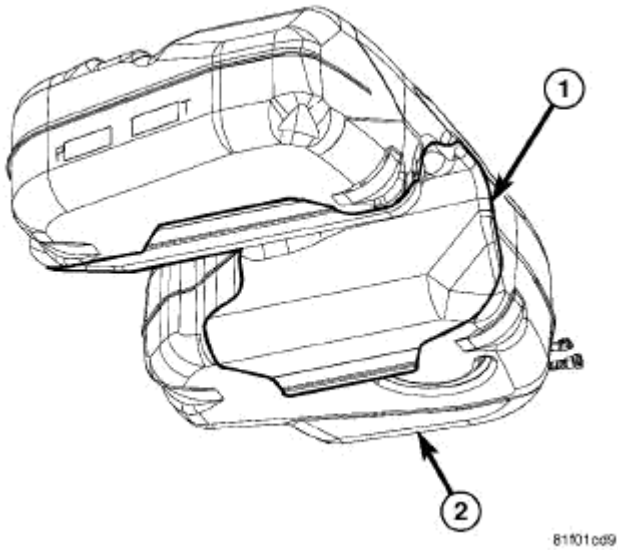


Fig. 89: FUEL TANK SHIELD - AWD
Courtesy of CHRYSLER LLC

1 - Fuel Tank Shield
2 - Fuel Tank

15. If fuel tank is to be replaced, remove three fasteners and fuel tank shield (1) from fuel tank (2).

FWD

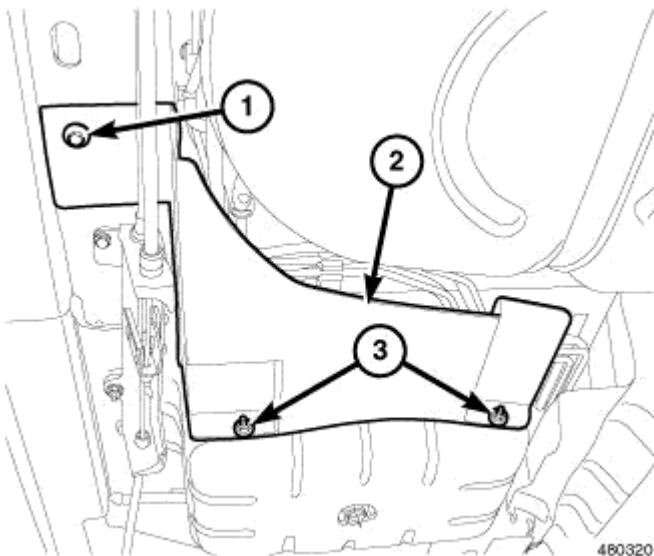


Fig. 90: Splash Shield
Courtesy of CHRYSLER LLC

WARNING: The fuel system is under constant pressure even with engine off. Until the

fuel pressure has been properly relieved from the system, do not attempt to open the fuel system.

1. Release the fuel system pressure. See **Fuel System/Fuel Delivery - Standard Procedure**
2. Drain the fuel tank. See **Fuel System/Fuel Delivery - Standard Procedure**
3. Remove exhaust muffler. Refer to **Exhaust System/MUFFLER, Exhaust - Removal**.
4. Remove one bolt (1), two nuts (3) and splash shield (2).

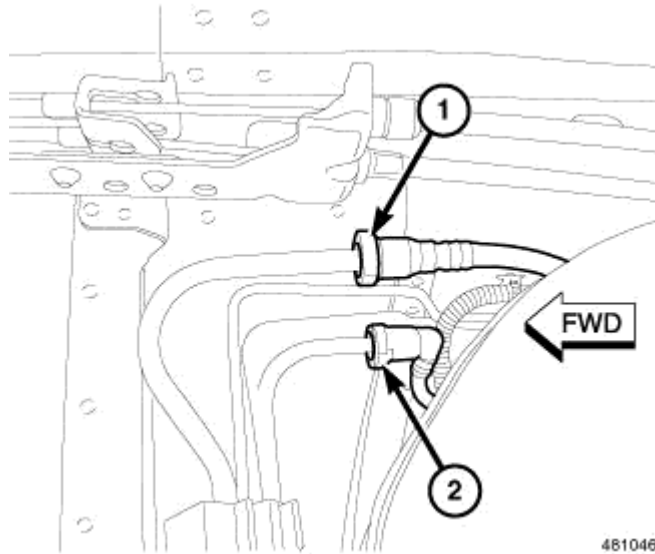
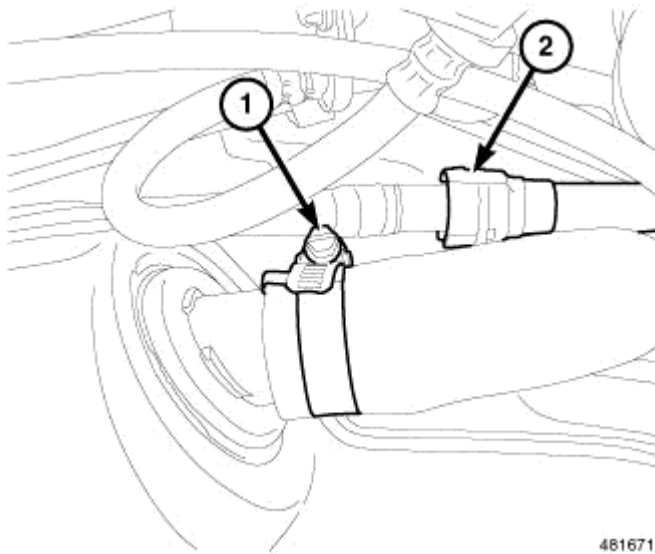


Fig. 91: Fuel Pump Module Quick Connect Fitting
Courtesy of CHRYSLER LLC

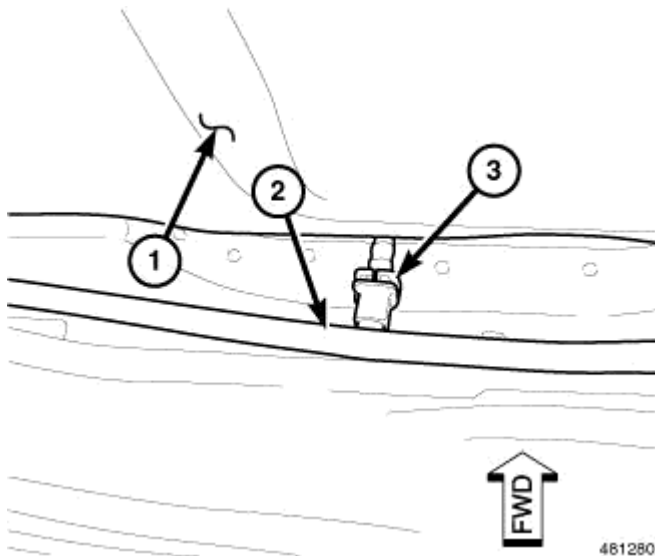
5. Disconnect the fuel pump module quick connect fitting (2) from the body mounted fuel line bundle. See **Fuel System/Fuel Delivery/FITTING, Quick Connect - Standard Procedure**
6. Disconnect the purge line quick connect fitting (1) from the body mounted fuel line bundle. See **Fuel System/Fuel Delivery/FITTING, Quick Connect - Standard Procedure**



481671

Fig. 92: Fuel Fill Hose Clamp
Courtesy of CHRYSLER LLC

7. Disconnect the fuel purge line quick connect fitting (2) from the fuel tank connection. See **Fuel System/Fuel Delivery/FITTING, Quick Connect - Standard Procedure**



481280

Fig. 93: Fuel Fill Tube Vent Line Quick Connect Fitting
Courtesy of CHRYSLER LLC

NOTE: The fuel fill tube vent line quick connect fitting (3) is located at the rear of the fuel tank (1) near the parking brake cable (2).

8. Disconnect the fuel fill tube vent line (3) and remove from the fuel tank quick connect fitting. See **Fuel System/Fuel Delivery/FITTING, Quick Connect - Standard Procedure**

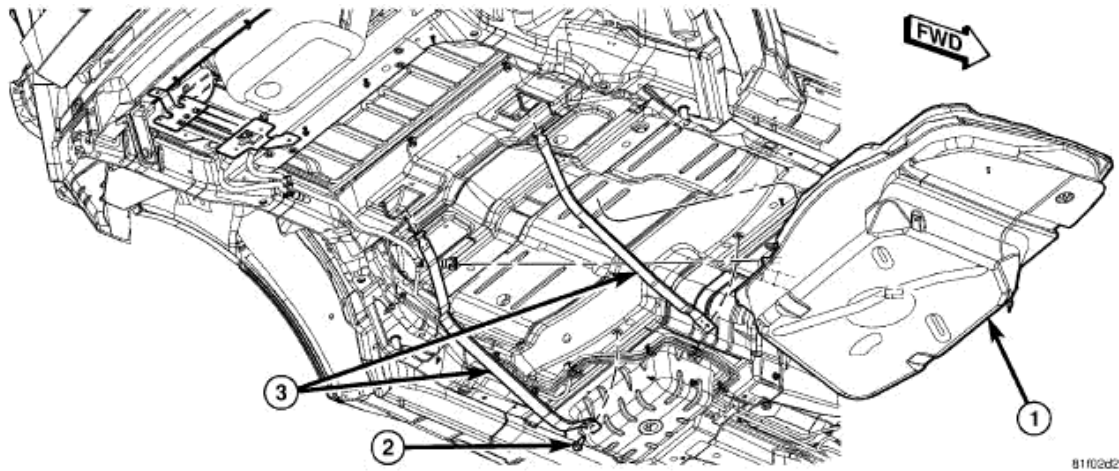


Fig. 94: FUEL TANK INSTALL - FWD

Courtesy of CHRYSLER LLC

1 - Fuel Tank
2 - Strap Bolt
3 - Fuel Tank Strap

WARNING: Support fuel tank with a transmission jack or equivalent. Use straps to secure the fuel tank to the jack. Failure to properly support and secure the fuel tank during removal may cause fuel to spill or fuel tank to fall from jack assembly.

9. Use a transmission jack to support fuel tank (1), remove fuel tank strap bolts (2) and straps (3).
10. Partially lower tank to gain access to pump module electrical connector.

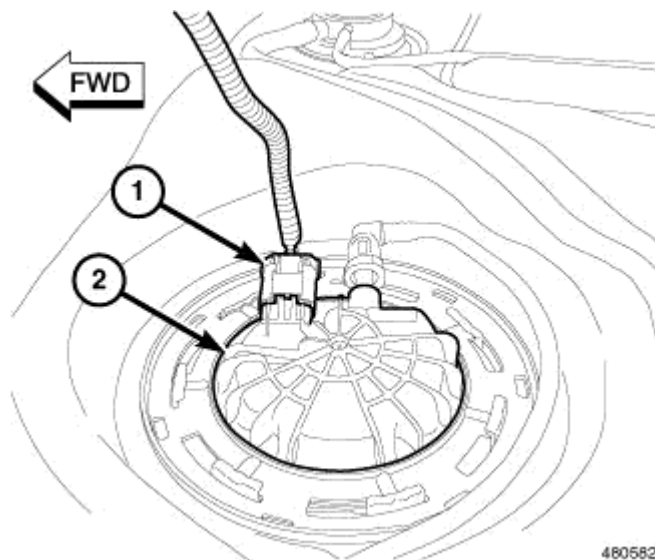
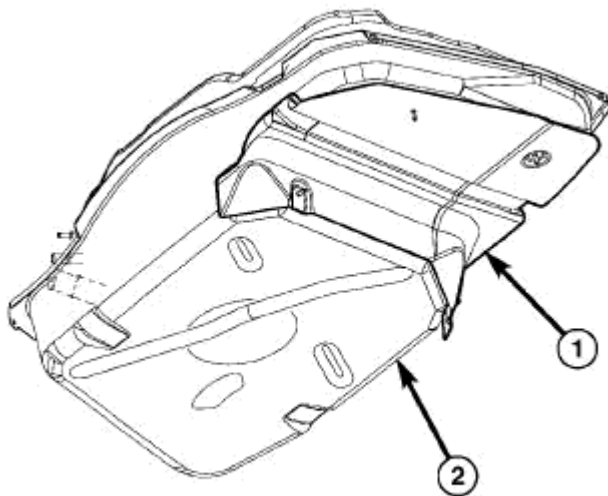


Fig. 95: Fuel Pump Module Electrical Connector

Courtesy of CHRYSLER LLC

11. Disconnect electrical connector (1) at fuel pump module (2).
12. Continue lowering tank for removal.
13. If fuel tank is to be replaced, remove fuel pump module from tank. See **Fuel System/Fuel Delivery/MODULE, Fuel Pump - Removal**



81102a39

Fig. 96: Fuel Tank Shield - FWD
Courtesy of CHRYSLER LLC

1 - Fuel Tank Shield
2 - Fuel Tank

14. If fuel tank is to be replaced, remove four fasteners and fuel tank shield (1) from fuel tank (2).

Installation

AWD

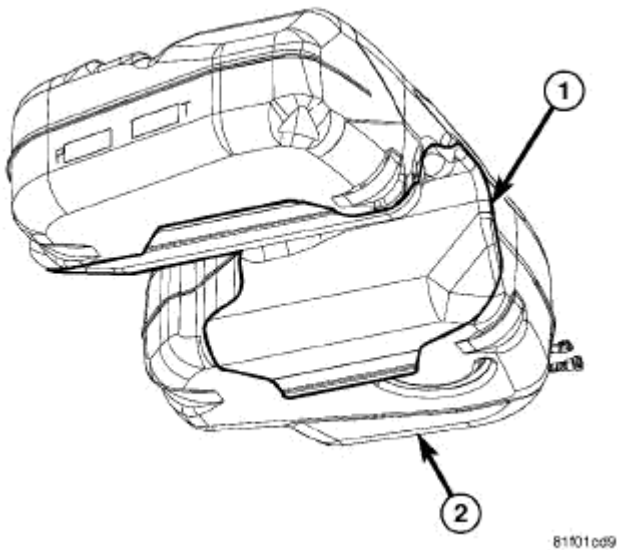


Fig. 97: FUEL TANK SHIELD - AWD
Courtesy of CHRYSLER LLC

- | |
|---------------------------------------|
| 1 - Fuel Tank Shield
2 - Fuel Tank |
|---------------------------------------|

1. Install fuel tank shield (1) to fuel tank (2).
2. Install fuel pump module to fuel tank. See **Fuel System/Fuel Delivery/MODULE, Fuel Pump - Installation.**

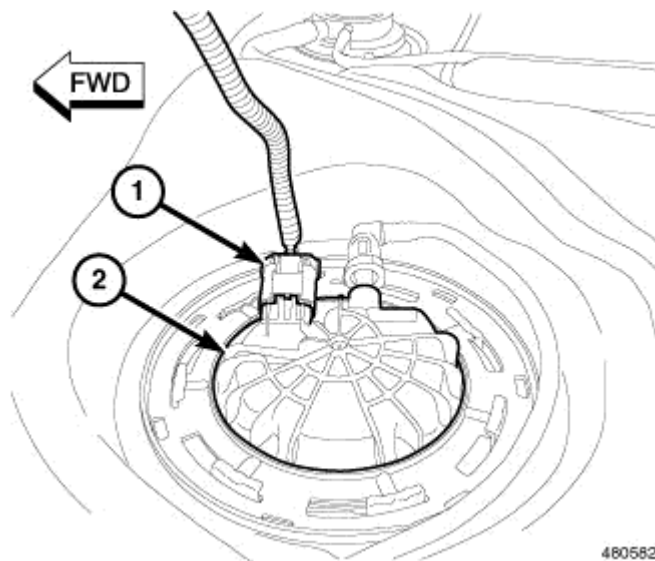
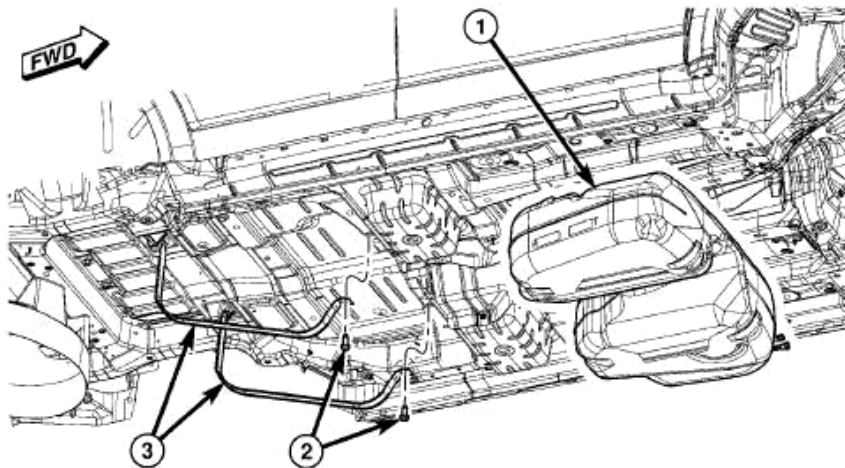


Fig. 98: Fuel Pump Module Electrical Connector
Courtesy of CHRYSLER LLC

WARNING: Support fuel tank with a transmission jack or equivalent. Use straps

to secure the fuel tank to the jack. Failure to properly support and secure the fuel tank during removal may cause fuel to spill or fuel tank to fall from jack assembly.

3. Position fuel tank onto a transmission jack or equivalent and raise the fuel tank into vehicle position.
4. Connect electrical connector (1) to fuel pump module (2) and fuel level sensor.

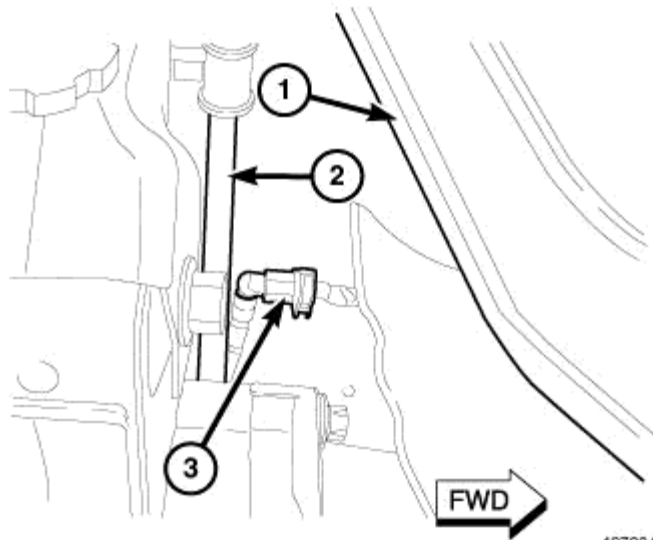


81101bae

Fig. 99: Fuel Tank Install - AWD
Courtesy of CHRYSLER LLC

1 - Fuel Tank
2 - Strap Bolts
3 - Straps

5. Install fuel tank straps (3) and bolts (2). Tighten to 48 N.m (35 ft. lbs.).



407984

Fig. 100: Fuel Fill Tube Vent Line Quick Connect Fitting

Courtesy of CHRYSLER LLC

6. Install fuel tube vent line to fuel tank quick connect fitting (3). See **Fuel System/Fuel Delivery/FITTING, Quick Connect - Standard Procedure**.

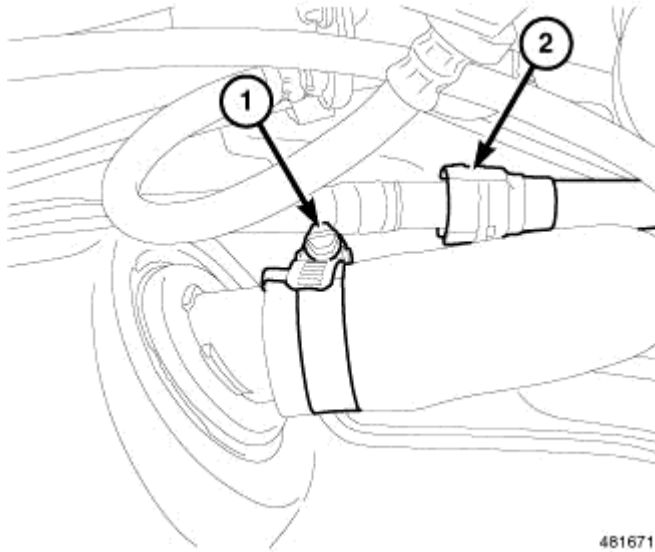


Fig. 101: Fuel Fill Hose Clamp
Courtesy of CHRYSLER LLC

7. Install purge line quick connect fitting (2) to fuel tank connection. See **Fuel System/Fuel Delivery/FITTING, Quick Connect - Standard Procedure**.
8. Install fuel filler tube to fuel tank. Tighten hose clamp (1) to 3 N.m (27 in. lbs.).

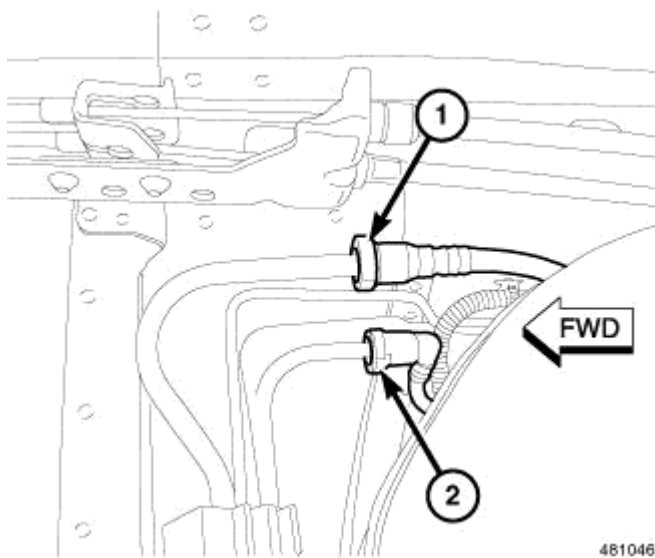
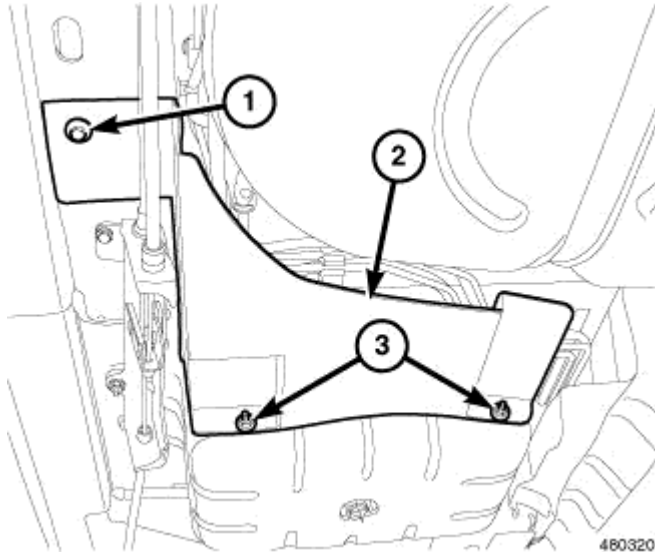


Fig. 102: Fuel Pump Module Quick Connect Fitting
Courtesy of CHRYSLER LLC

9. Connect the purge line quick connect fitting (1) to the body mounted fuel line bundle. See **Fuel**

System/Fuel Delivery/FITTING, Quick Connect - Standard Procedure.

10. Connect fuel pump module quick connect fitting (2) to the body mounted fuel line bundle. See **Fuel System/Fuel Delivery/FITTING, Quick Connect - Standard Procedure.**

**Fig. 103: Splash Shield****Courtesy of CHRYSLER LLC**

11. Install splash shield (2) with one bolt (1) and two nuts (3).
12. Install rear propshaft. Refer to **Differential and Driveline/Propeller Shaft - Installation** .
13. Install exhaust muffler. Refer to **Exhaust System/MUFFLER, Exhaust - Installation** .
14. Connect negative battery cable, tighten nut to 5 N.m (45 in. lbs.).
15. Fill fuel tank. Use the scan tool to pressurize the fuel system. Check for leaks.

FWD

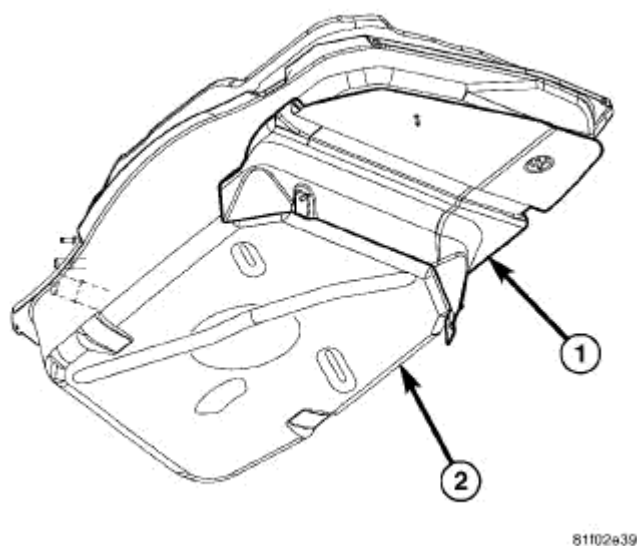


Fig. 104: Fuel Tank Shield - FWD
Courtesy of CHRYSLER LLC

- | |
|----------------------|
| 1 - Fuel Tank Shield |
| 2 - Fuel Tank |

1. Install fuel tank shield (1) to fuel tank (2).

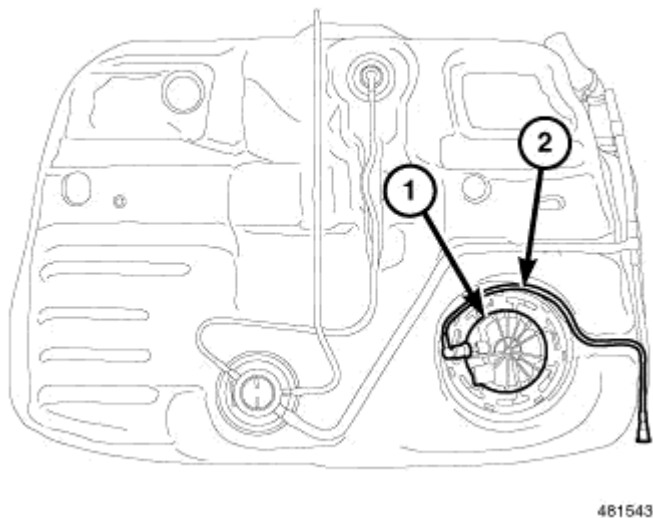


Fig. 105: Fuel Tank & Fuel Line
Courtesy of CHRYSLER LLC

2. Install fuel pump module (1) to fuel tank and connect fuel line (2). See **Fuel System/Fuel Delivery/MODULE, Fuel Pump - Installation**

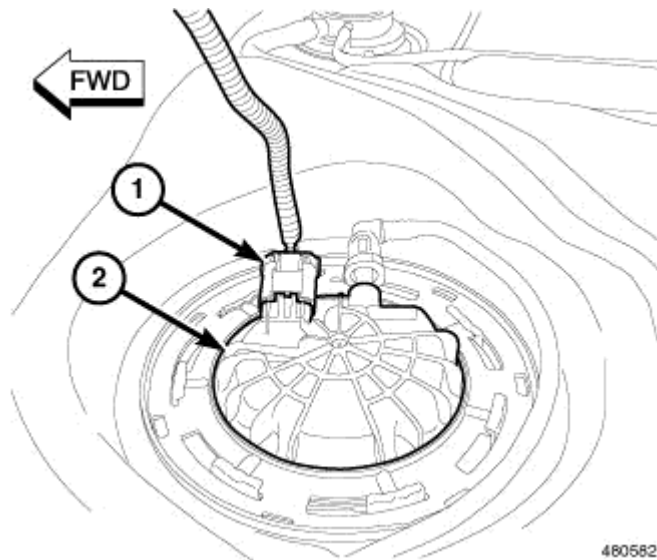


Fig. 106: Fuel Pump Module Electrical Connector

Courtesy of CHRYSLER LLC

WARNING: Support fuel tank with a transmission jack or equivalent. Use straps to secure the fuel tank to the jack. Failure to properly support and secure the fuel tank during removal may cause fuel to spill or fuel tank to fall from jack assembly.

3. Position fuel tank onto a transmission jack or equivalent and raise the fuel tank into vehicle position.
4. Connect electrical connector (1) to fuel pump module (2).

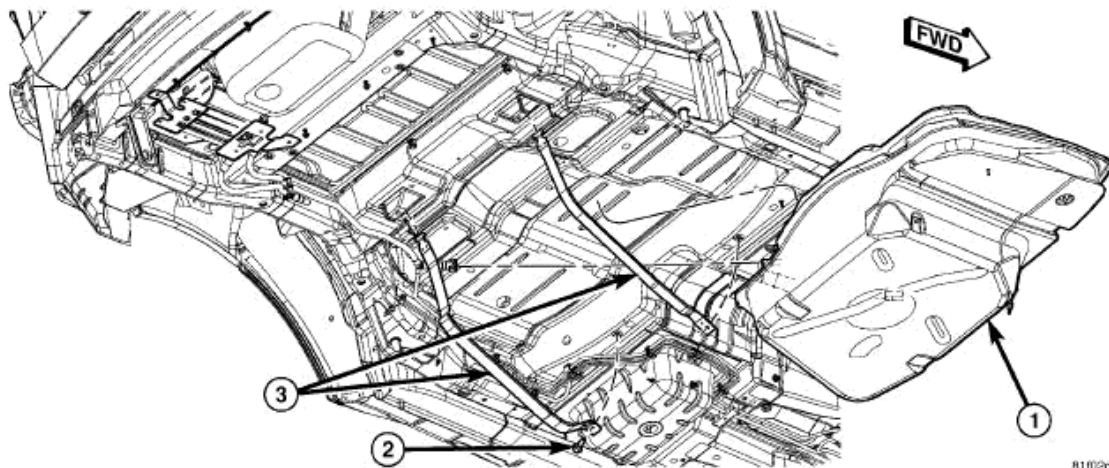


Fig. 107: FUEL TANK INSTALL - FWD

Courtesy of CHRYSLER LLC

1 - Fuel Tank
2 - Strap Bolt
3 - Fuel Tank Strap

5. Install fuel tank straps (3) and bolts (2). Tighten to 48 N.m (35 ft. lbs.).

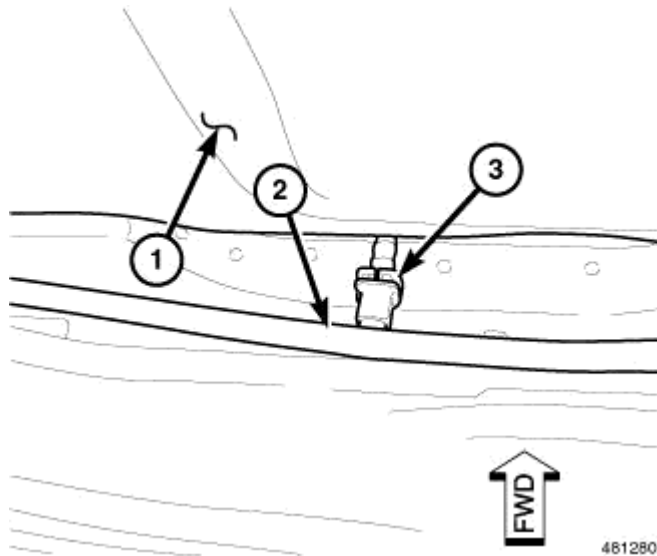


Fig. 108: Fuel Fill Tube Vent Line Quick Connect Fitting
Courtesy of CHRYSLER LLC

6. Install fuel fill tube vent line to fuel tank quick connect fitting (3). See **Fuel System/Fuel Delivery/FITTING, Quick Connect - Standard Procedure**

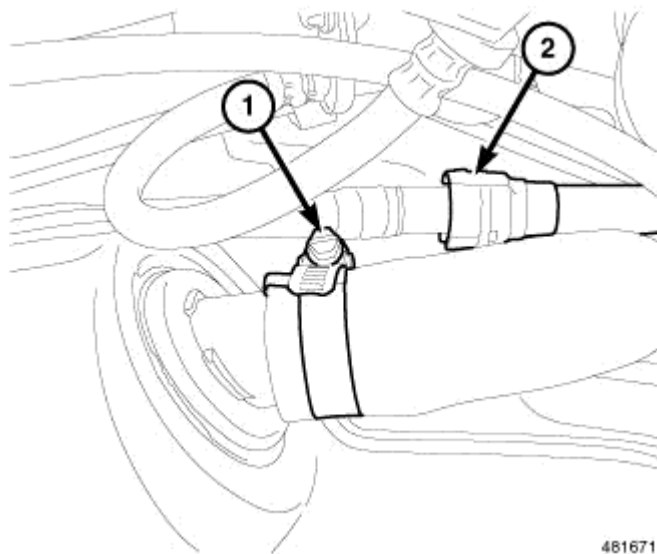


Fig. 109: Fuel Fill Hose Clamp
Courtesy of CHRYSLER LLC

7. Install purge line quick connect fitting (2) to fuel tank connection. See **Fuel System/Fuel Delivery/FITTING, Quick Connect - Standard Procedure**
8. Install fuel filler tube to fuel tank. Tighten hose clamp (1) to 3 N.m (27 in. lbs.).

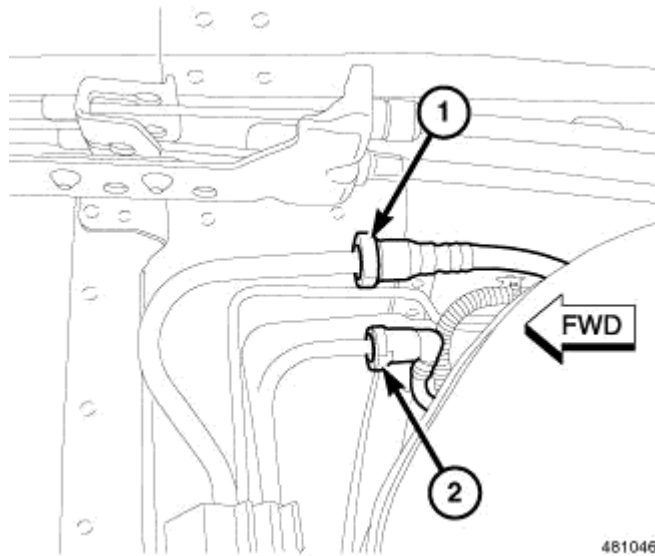


Fig. 110: Fuel Pump Module Quick Connect Fitting
Courtesy of CHRYSLER LLC

9. Connect the purge line quick connect fitting (1) to the body mounted fuel line bundle. See **Fuel System/Fuel Delivery/FITTING, Quick Connect - Standard Procedure**
10. Connect the fuel pump module quick connect fitting (2) to the body mounted fuel line bundle. See **Fuel System/Fuel Delivery/FITTING, Quick Connect - Standard Procedure**

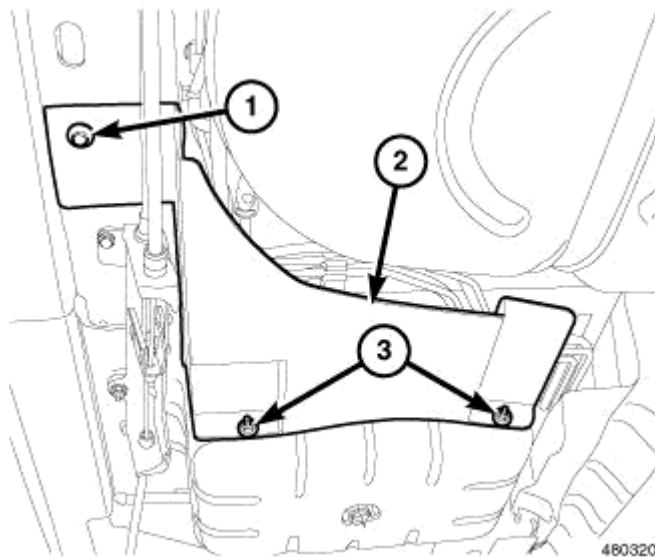
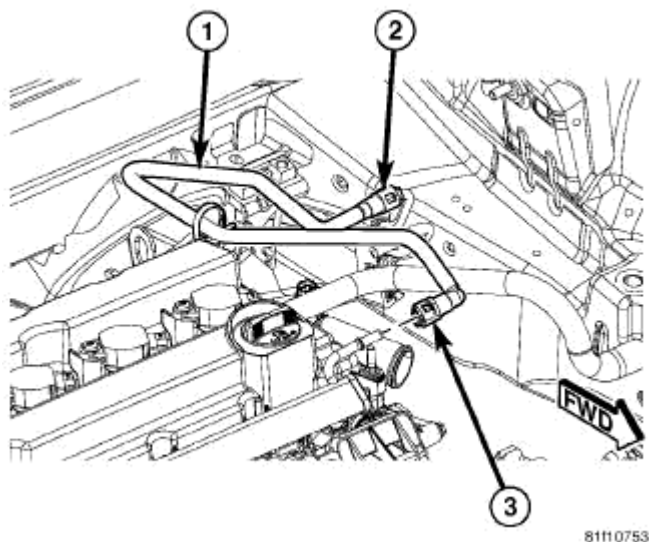


Fig. 111: Splash Shield
Courtesy of CHRYSLER LLC

11. Install splash shield (2) with one bolt (1) and two nuts (3).
12. Install exhaust muffler. Refer to **Exhaust System/MUFFLER, Exhaust - Installation**.
13. Connect negative battery cable, tighten nut to 5 N.m (45 in. lbs.).
14. Fill fuel tank. Use the scan tool to pressurize the fuel system. Check for leaks.

TUBE(S), FUEL**Removal****2.4L****Fig. 112: Fuel line 2.4L**

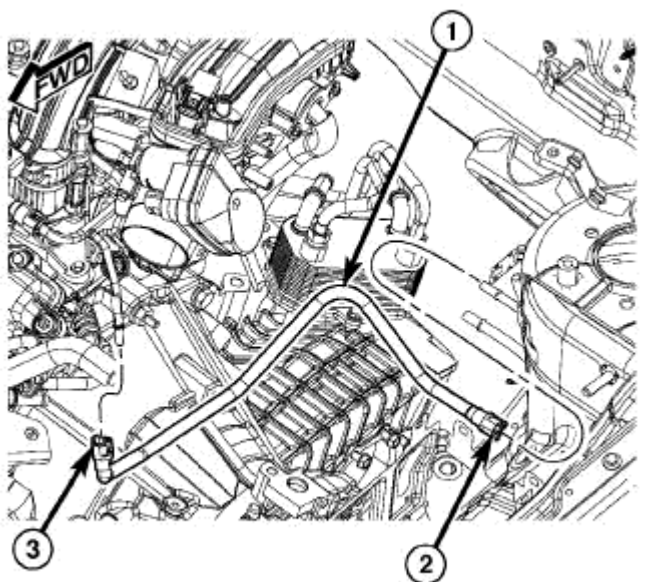
Courtesy of CHRYSLER LLC

- | |
|---|
| 1 - Fuel Line |
| 2 - Quick disconnect at body mounted fuel line bundle |
| 3 - Quick disconnect at fuel rail |

WARNING: The fuel system is under constant pressure even with engine off. Until the fuel pressure has been properly relieved from the system, do not attempt to open the fuel system.

1. Release the fuel system pressure. See **Fuel System/Fuel Delivery - Standard Procedure**.
2. Disconnect and isolate negative battery cable.
3. Remove engine cover.
4. Disconnect the fuel line quick connect fitting (2) from the body mounted fuel line bundle. See **Fuel System/Fuel Delivery/FITTING, Quick Connect - Standard Procedure**.
5. Disconnect the fuel line quick connect fitting (3) from the fuel rail. See **Fuel System/Fuel Delivery/FITTING, Quick Connect - Standard Procedure**.
6. Disengage fuel line retainer from valve cover mounting stud and remove fuel line (1) from vehicle.

2.7L



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Fig. 113: Fuel line 2.7L

Courtesy of CHRYSLER LLC

- | |
|---|
| 1 - Fuel Line |
| 2 - Quick disconnect at body mounted fuel line bundle |
| 3 - Quick disconnect at fuel rail |

WARNING: The fuel system is under constant pressure even with engine off. Until the fuel pressure has been properly relieved from the system, do not attempt to open the fuel system.

1. Release the fuel system pressure. See **Fuel System/Fuel Delivery - Standard Procedure**.
2. Disconnect and isolate negative battery cable.
3. Disconnect the fuel line quick connect fitting (2) from the body mounted fuel line bundle. See **Fuel System/Fuel Delivery/FITTING, Quick Connect - Standard Procedure**.
4. Disconnect the fuel line quick connect fitting (3) from the fuel rail. See **Fuel System/Fuel Delivery/FITTING, Quick Connect - Standard Procedure**.
5. Remove the fuel line (1).

3.5L

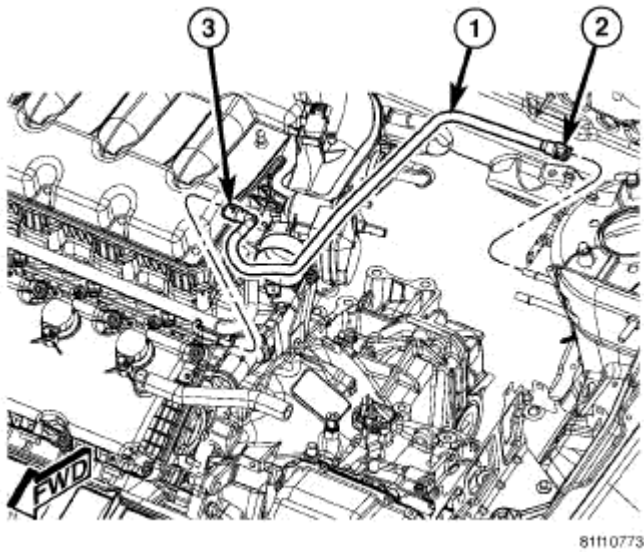


Fig. 114: Fuel line 3.5L

Courtesy of CHRYSLER LLC

- | |
|---|
| 1 - Fuel Line |
| 2 - Quick disconnect at body mounted fuel line bundle |
| 3 - Quick disconnect at fuel rail |

WARNING: The fuel system is under constant pressure even with engine off. Until the fuel pressure has been properly relieved from the system, do not attempt to open the fuel system.

1. Release the fuel system pressure. See **Fuel System/Fuel Delivery - Standard Procedure**.
2. Disconnect and isolate negative battery cable.
3. Disconnect the fuel line quick connect fitting (2) from the body mounted fuel line bundle. See **Fuel System/Fuel Delivery/FITTING, Quick Connect - Standard Procedure**.
4. Disconnect the fuel line quick connect fitting (3) from the fuel rail. See **Fuel System/Fuel Delivery/FITTING, Quick Connect - Standard Procedure**.
5. Remove the fuel line (1).

Installation

2.4L

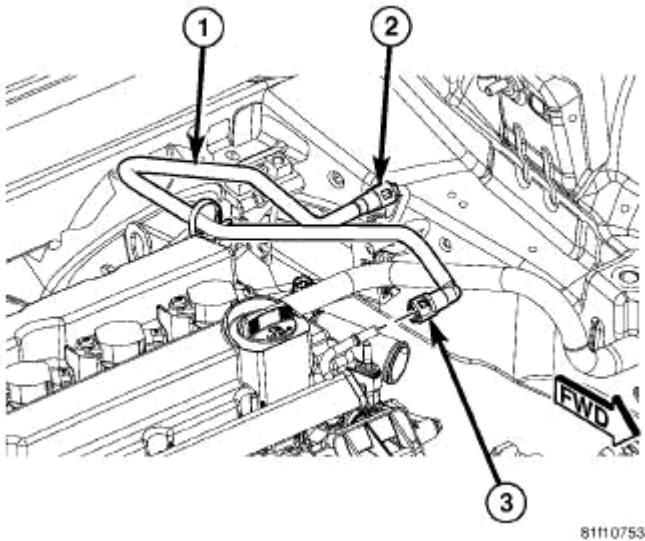


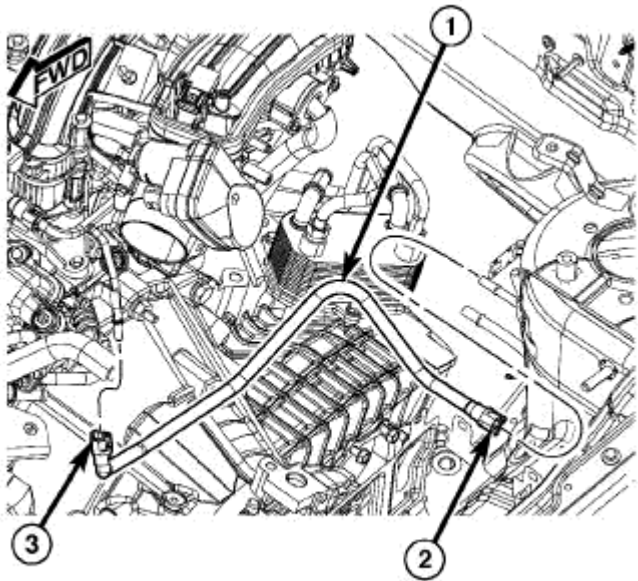
Fig. 115: Fuel line 2.4L

Courtesy of CHRYSLER LLC

- | |
|---|
| 1 - Fuel Line |
| 2 - Quick disconnect at body mounted fuel line bundle |
| 3 - Quick disconnect at fuel rail |

1. Install fuel line quick connect fitting (3) to fuel rail. See **Fuel System/Fuel Delivery/FITTING, Quick Connect - Standard Procedure.**
2. Install fuel line quick connect fitting (2) to body mounted fuel line bundle. See **Fuel System/Fuel Delivery/FITTING, Quick Connect - Standard Procedure.**
3. Engage fuel line retainer to valve cover mounting stud.
4. Connect the negative battery cable, tighten the nut to 5 N.m (45 in. lbs.).
5. Use the scan tool ASD Fuel System Test to pressurize the fuel system. Check for leaks.
6. Install engine cover.

2.7L



81110765

Fig. 116: Fuel line 2.7L

Courtesy of CHRYSLER LLC

- | |
|---|
| 1 - Fuel Line |
| 2 - Quick disconnect at body mounted fuel line bundle |
| 3 - Quick disconnect at fuel rail |

1. Install fuel line quick connect fitting (3) to fuel rail. See **Fuel System/Fuel Delivery/FITTING, Quick Connect - Standard Procedure.**
2. Install fuel line quick connect fitting (2) to body mounted fuel line bundle. See **Fuel System/Fuel Delivery/FITTING, Quick Connect - Standard Procedure.**
3. Connect the negative battery cable, tighten the nut to 5 N.m (45 in. lbs.).
4. Use the scan tool ASD Fuel System Test to pressurize the fuel system. Check for leaks.

3.5L

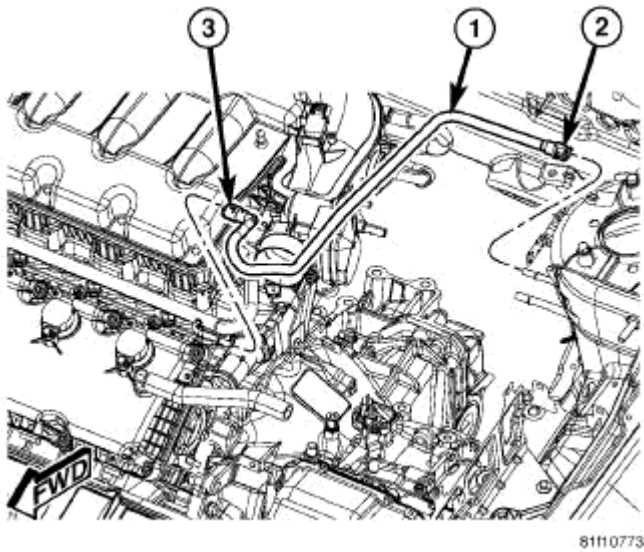


Fig. 117: Fuel line 3.5L

Courtesy of CHRYSLER LLC

- | |
|---|
| 1 - Fuel Line |
| 2 - Quick disconnect at body mounted fuel line bundle |
| 3 - Quick disconnect at fuel rail |

1. Install fuel line quick connect fitting (3) to fuel rail. See **Fuel System/Fuel Delivery/FITTING, Quick Connect - Standard Procedure.**
2. Install fuel line quick connect fitting (2) to body mounted fuel line bundle. See **Fuel System/Fuel Delivery/FITTING, Quick Connect - Standard Procedure.**
3. Connect the negative battery cable, tighten the nut to 5 N.m (45 in. lbs.).
4. Use the scan tool ASD Fuel System Test to pressurize the fuel system. Check for leaks.

TUBE, FUEL TANK FILLER

Removal

AWD

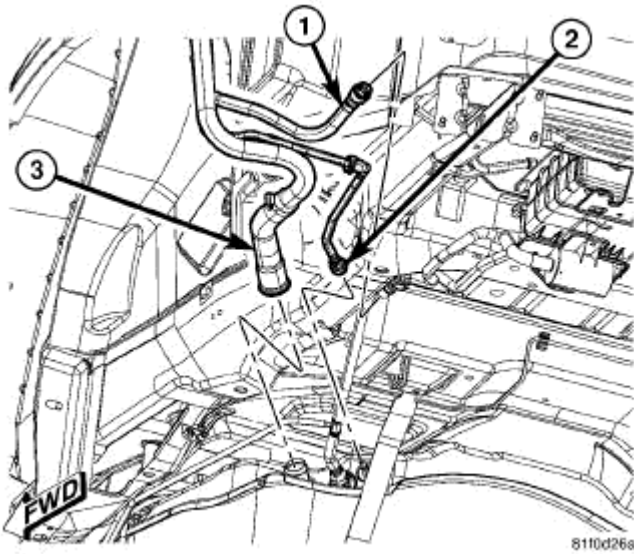


Fig. 118: Fuel Fill Tube AWD
Courtesy of CHRYSLER LLC

- | |
|--|
| 1 - canister filter line quick connect fitting |
| 2 - recirculation line quick connect fitting |
| 3 - fuel filler tube |

- | |
|--|
| 1 - canister filter line quick connect fitting |
| 2 - recirculation line quick connect fitting |
| 3 - fuel filler tube |

1. Disconnect and isolate negative battery cable at battery.
2. Remove fuel cap.
3. Remove the inner splash shield. Refer to **Body/Exterior/SHIELD, Splash - Removal** .
4. Disconnect the quick connect fitting (1) and remove the canister filter line. See **Fuel System/Fuel Delivery/FITTING, Quick Connect - Standard Procedure**.
5. Disconnect the quick connect fitting (2) and remove the recirculation line. See **Fuel System/Fuel Delivery/FITTING, Quick Connect - Standard Procedure**.
6. Loosen the hose clamp and remove the fuel filler tube (3) from the fuel tank.

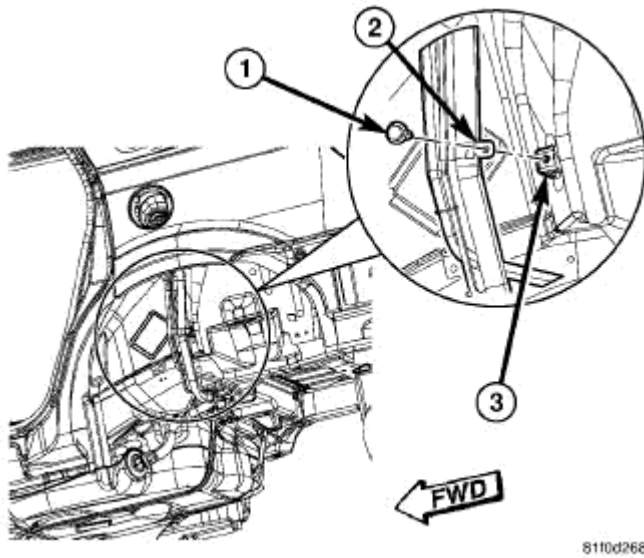


Fig. 119: Filler Tube Mounting Bracket Bolt
Courtesy of CHRYSLER LLC

1 - filler tube mounting bracket bolt
2 - filler tube mounting bracket
3 - filler tube mounting bracket body mount

1 - filler tube mounting bracket bolt
2 - filler tube mounting bracket
3 - filler tube mounting bracket body mount

7. Remove filler tube mounting bracket bolt (1) from bracket (2) and body mount (3).

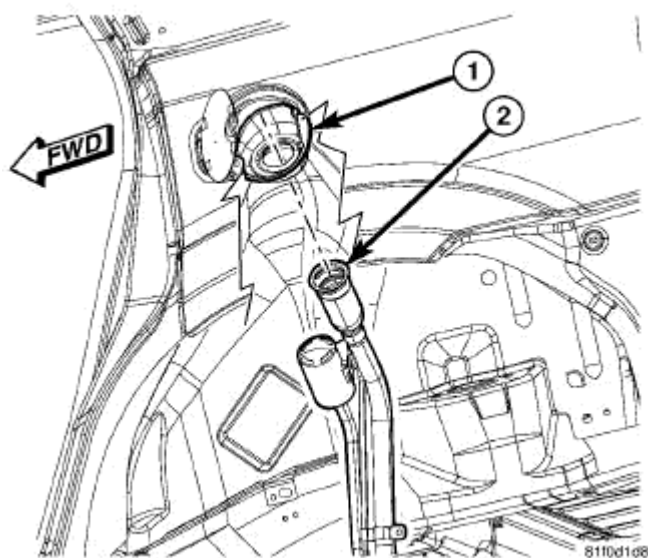


Fig. 120: Fuel Filler Tube
Courtesy of CHRYSLER LLC

1 - fuel door housing assembly
2 - fuel filler tube

1 - fuel door housing assembly
2 - fuel filler tube

8. Remove fuel filler tube (2) from the fuel door housing assembly (1).

FWD

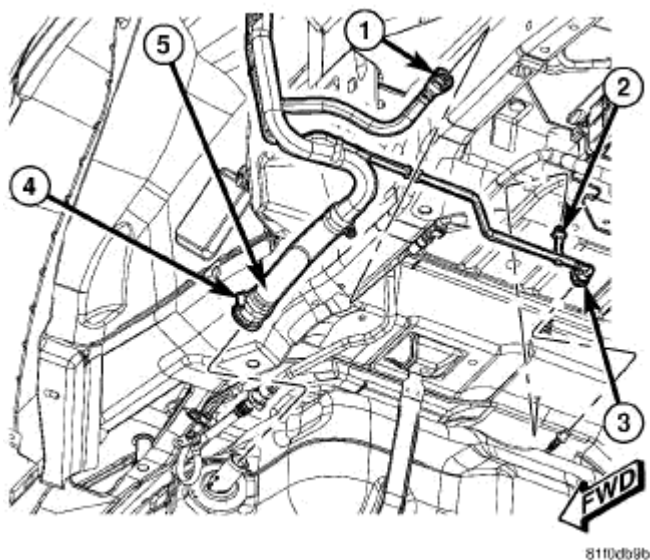


Fig. 121: Fuel Fill Tube FWD
Courtesy of CHRYSLER LLC

- | |
|--|
| 1 - canister filter line quick connect fitting |
| 2 - Christmas Tree Clip |
| 3 - recirculation line quick connect fitting |
| 4 - Fuel filler tube hose clamp |
| 5 - Fuel filler tube |

1. Disconnect and isolate negative battery cable.
2. Remove fuel cap.
3. Remove the left rear wheelhouse splash shield. Refer to **Body/Exterior/SHIELD, Splash - Removal**.
4. Disconnect the quick connect fitting (1) and remove the canister filter line. See **Fuel System/Fuel Delivery/FITTING, Quick Connect - Standard Procedure**.
5. Disengage the Christmas tree clip (2).
6. Disconnect the quick connect fitting (3) and remove the recirculation line. See **Fuel System/Fuel Delivery/FITTING, Quick Connect - Standard Procedure**.
7. Loosen the hose clamp (4) and remove the fuel filler tube (5) from the fuel tank.

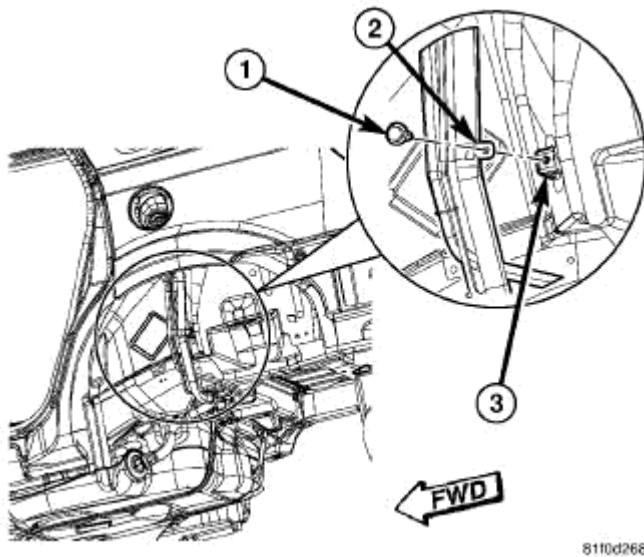


Fig. 122: Filler Tube Mounting Bracket Bolt
Courtesy of CHRYSLER LLC

- | |
|---|
| 1 - filler tube mounting bracket bolt |
| 2 - filler tube mounting bracket |
| 3 - filler tube mounting bracket body mount |

8. Remove filler tube mounting bracket bolt (1) from bracket (2) and body mount (3).

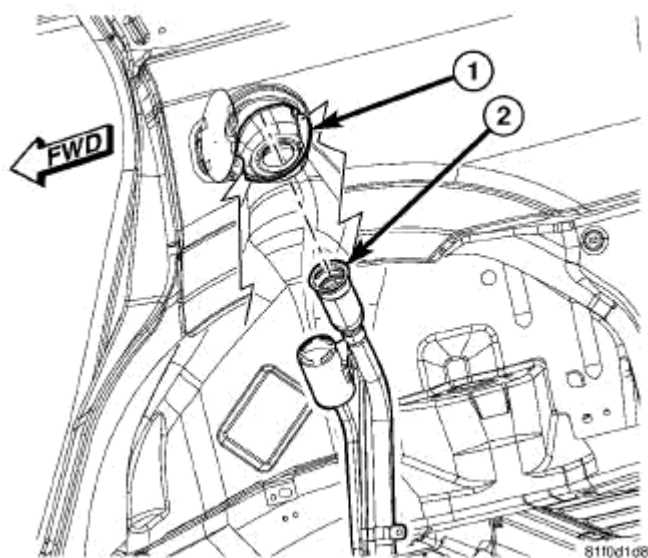


Fig. 123: Fuel Filler Tube
Courtesy of CHRYSLER LLC

- 1 - fuel door housing assembly
- 2 - fuel filler tube

9. Remove fuel filler tube (2) from the fuel door housing assembly (1).

Installation

AWD

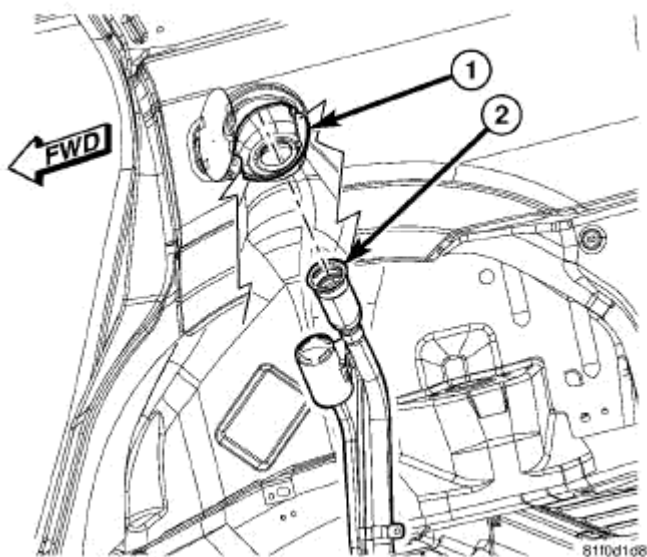


Fig. 124: Fuel Filler Tube

Courtesy of CHRYSLER LLC

- | |
|--|
| 1 - fuel door housing assembly
2 - fuel filler tube |
|--|

1. Install fuel filler tube (2) to the fuel door housing assembly (1).

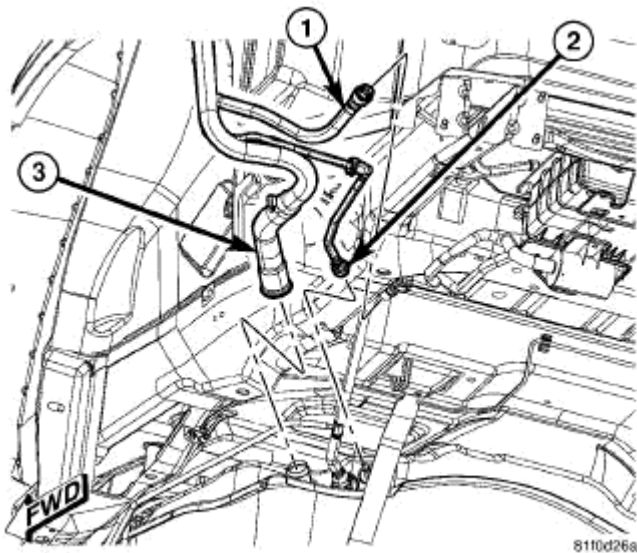


Fig. 125: Fuel Fill Tube AWD
Courtesy of CHRYSLER LLC

- | |
|--|
| 1 - canister filter line quick connect fitting
2 - recirculation line quick connect fitting
3 - fuel filler tube |
|--|

2. Install fuel filler tube (3) to the fuel tank. Tighten hose clamp to 3 N.m (27 in. lbs.).
3. Install the recirculation line quick connect fitting (2) to the fuel tank.
4. Install the canister filter line quick connect fitting (1).

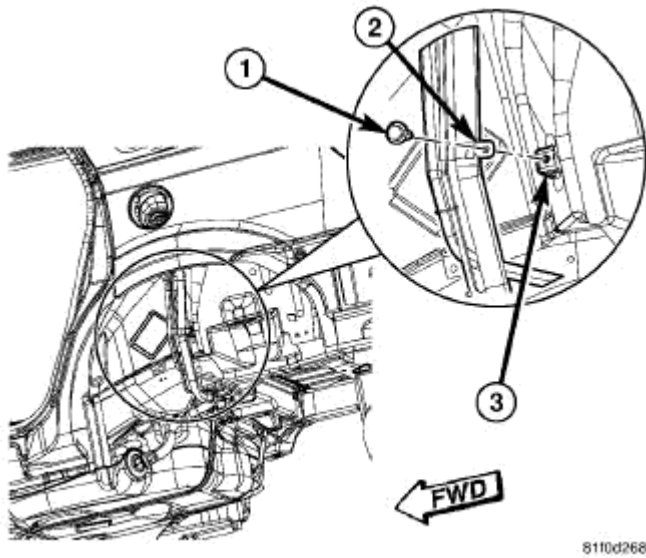


Fig. 126: Filler Tube Mounting Bracket Bolt
Courtesy of CHRYSLER LLC

1 - filler tube mounting bracket bolt
2 - filler tube mounting bracket
3 - filler tube mounting bracket body mount

5. Install filler tube mounting bracket (2) and bolt (1) to the body mount (3). Tighten to 11.5 N.m (101 in. lbs.).
6. Install the inner splash shield. Refer to **Body/Exterior/SHIELD, Splash - Installation** .
7. Install fuel cap.
8. Connect negative battery cable, tighten nut to 5 N.m (45 in. lbs.).

FWD

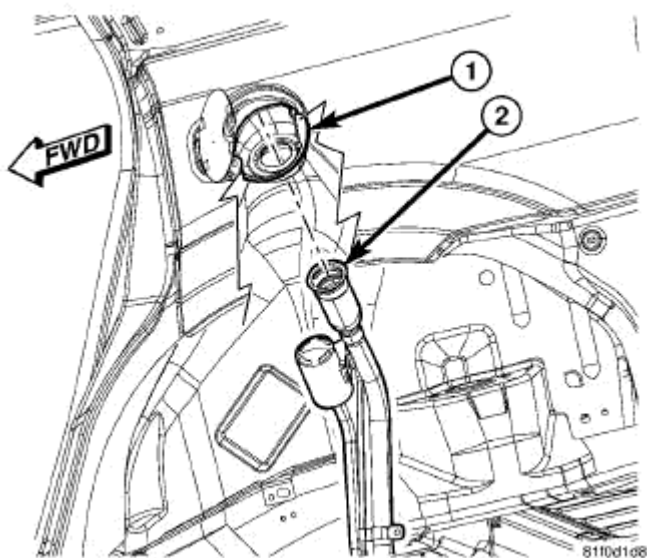


Fig. 127: Fuel Filler Tube

Courtesy of CHRYSLER LLC

- 1 - fuel door housing assembly
- 2 - fuel filler tube

1. Install fuel filler tube (2) to the fuel door housing assembly (1).

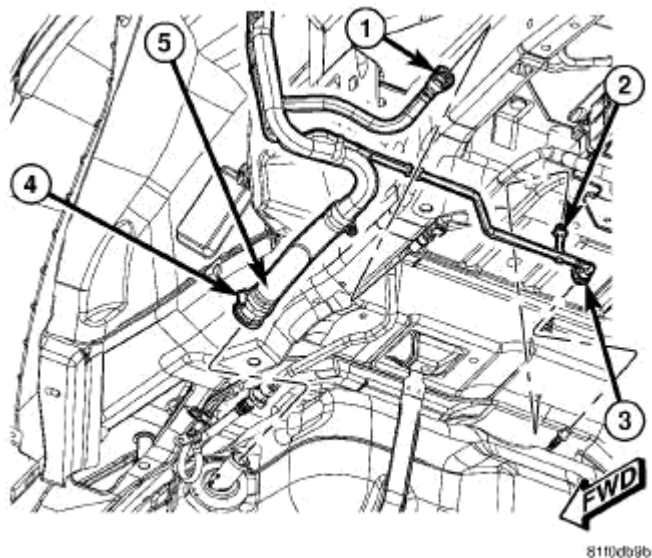


Fig. 128: Fuel Fill Tube FWD

Courtesy of CHRYSLER LLC

- 1 - canister filter line quick connect fitting

2 - Christmas Tree Clip
3 - recirculation line quick connect fitting
4 - Fuel filler tube hose clamp
5 - Fuel filler tube

2. Install fuel filler tube (5) to the fuel tank. Tighten hose clamp (4) to 3 N.m (27 in. lbs.).
3. Install the recirculation line quick connect fitting (3) to the fuel tank. See **Fuel System/Fuel Delivery/FITTING, Quick Connect - Standard Procedure.**
4. Align and insert the Christmas tree clip (2).
5. Install the canister filter line quick connect fitting (1). See **Fuel System/Fuel Delivery/FITTING, Quick Connect - Standard Procedure.**

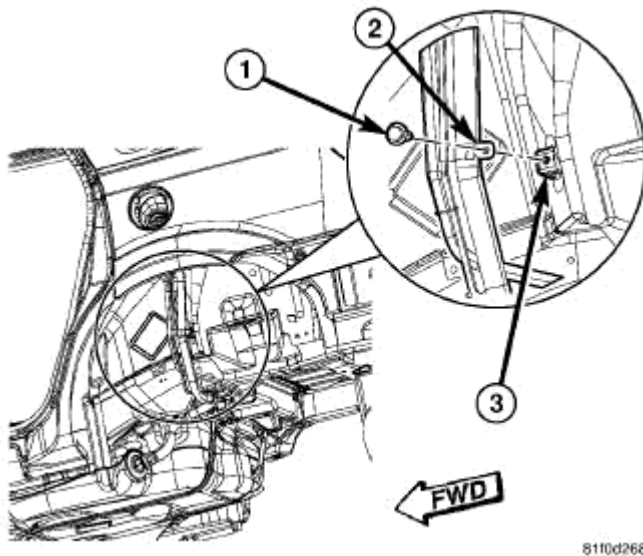


Fig. 129: Filler Tube Mounting Bracket Bolt
Courtesy of CHRYSLER LLC

1 - filler tube mounting bracket bolt
2 - filler tube mounting bracket
3 - filler tube mounting bracket body mount

6. Install filler tube mounting bracket (2) and bolt (1) to the body mount (3). Tighten to 11.5 N.m (101 in. lbs.).
7. Install the inner splash shield. Refer to **Body/Exterior/SHIELD, Splash - Installation**.
8. Install fuel cap.
9. Connect negative battery cable, tighten nut to 5 N.m (45 in. lbs.).

FUEL DELIVERY, DIESEL

WARNING**WARNING**

WARNING: Under no circumstances should gasoline be mixed with diesel fuel (not even during winter). The high pressure pump is lubricated by diesel fuel. Immediate fuel system damage may occur causing replacement and flushing of the complete diesel fuel system. High pressure pump seizure will cause metal particles to spread through out the fuel circuit. All cdi fuel system components connected to the fuel circuit will have to be exchanged and the lines flushed.

HIGH FUEL SYSTEM PRESSURE

WARNING: High pressure fuel lines deliver fuel under extreme pressure from the injection pump to the injectors. This maybe as high as 1600 bar (23,200 psi). Use extreme caution when inspecting for high pressure fuel leaks. Fuel under this amount of pressure can penetrate skin causing personal injury or death. Inspect high pressure fuel leaks with a sheet of cardboard. Wear safety goggles and adequate protective clothing when servicing fuel system.

DIAGNOSIS AND TESTING**FUEL DELIVERY SYSTEM**

WARNING: High-pressure fuel lines deliver fuel under extreme pressure from the injection pump to the injectors. This maybe as high as 1600 bar (23,200 psi). Use extreme caution when inspecting for high-pressure fuel leaks. Fuel under this amount of pressure can penetrate skin causing serious or fatal injury. Inspect high-pressure fuel leaks with a sheet of cardboard. Wear safety goggles and adequate protective clothing when servicing fuel system.

CONDITION	POSSIBLE CAUSES	CORRECTION
No Start/Hard Start/Start and Stall	1. Contaminated Fuel	1. Drain, Flush and Refill Fuel System
	2. Low Fuel Pressure supply to Fuel Filter	2. Perform the Low Pressure Fuel Pump Test to check the fuel pump pressure of the in-tank electric fuel pump. See <u>Fuel System/Fuel Delivery - Standard Procedure</u>
	3. High pressure (tandem) fuel pump	3. Perform the Tandem Pump Pressure Test Inspect / Replace necessary fuel line(s)

2009 Dodge Journey R/T

2009 ENGINE Fuel System - Journey

	4. Restricted Fuel Filter	4. Replace Fuel Filter
	5. Fuel Heater Inoperative	5. Test Fuel Heater and circuitry
	6. Restricted or Leaking Fuel Lines	6. Inspect / Replace necessary fuel line(s)
	7. Stored Diagnostic Trouble Codes	7. Refer to the appropriate Diagnostic Service Information.
Stalls Under Aggressive Maneuvers/Loss Of Fuel Pressure	1. Restricted or Damaged Fuel Pump Lower Filter	1. Test Fuel Pump Pressure
	2. Contaminated Fuel	2. Drain, Flush and Refill Fuel System
	3. Damaged Fuel Tank	3. Replace Fuel Tank
	4. Restricted Fuel Filter	4. Replace Fuel Filter
Cannot Refill Fuel Tank/Excessive Pressure in Fuel Tank When Cap Is Removed	1. Sticking or Damaged Fuel Tank Fill/Vent Valve	1. Replace Fuel Tank
	2. Restricted or Damaged Fuel Tank Fill/Vent Valve Filter or Hose	2. Replace Fuel Tank Vent Filter

AIR IN FUEL SYSTEM

Air will enter the fuel system whenever fuel supply lines, separator filters, injection pump, high-pressure lines or injectors are removed or disconnected. Air trapped in the fuel system can result in hard starting, a rough running engine, engine misfire, low power, excessive smoke and fuel knock.

Inspect the fuel system from the fuel tank to the injectors for loose connections. See **Fuel System/Fuel Delivery - Warning**. Leaking fuel is an indicator of loose connections or defective seals. Air can also enter the fuel system between the fuel tank and the fuel pump. Inspect the fuel tank module and fuel lines for damage that might allow air into the system.

With the scan tool connected to the vehicle, select Engine and the select Sensor Display. Scroll down to view Fuel Pressure Set Point and Actual Fuel Pressure. Start the engine and observe the Fuel Pressure Set Point and the Actual Fuel Pressure. If the Actual Fuel Pressure Oscillates above and below the Fuel Pressure Set Point in a regular cycle, inspect the fuel system for air intrusion.

If the Actual Fuel Pressure gradually drops below the Fuel Pressure Set Point then spikes well above the Fuel Pressure Set Point, replace the fuel pressure control valve and recheck.

HIGH PRESSURE FUEL LINES

WARNING: High-pressure fuel lines deliver fuel under extreme pressure from the injection pump to the injectors. This may be as high as 1600 bar (23,200 psi). Use extreme caution when inspecting for high-pressure fuel leaks. Fuel under this amount of pressure can penetrate skin causing personal injury or death. Inspect for high-pressure fuel leaks with a sheet of cardboard placed in the suspected area while the engine is not running.

Start the vehicle and allow the engine to run for a short period. Turn the engine off and inspect the piece of cardboard. Wear safety goggles and adequate protective clothing when servicing fuel system.

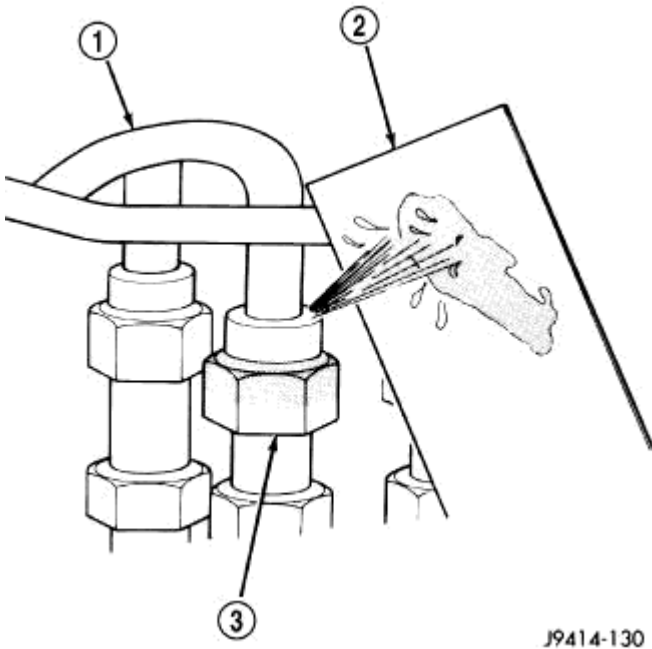


Fig. 130: High Pressure Fuel Lines
Courtesy of CHRYSLER LLC

- | |
|--|
| 1 - HIGH-PRESSURE LINE
2 - CARDBOARD
3 - FITTING |
|--|

High-pressure fuel line (1) leaks can cause starting problems and poor engine performance.

- Turn the engine off.
- Place a piece of cardboard (2) in the suspected area .
- Start the engine and allow to run for a short period.
- Turn the engine off.
- Inspect the cardboard.

If a high-pressure line connection is leaking, counter-hold and tighten the connection to specification then perform this procedure again. Replace any damaged, restricted or leaking high-pressure fuel lines with the correct replacement line.

CAUTION: The high-pressure fuel lines cannot contact each other or other components. Do not attempt to weld high-pressure fuel lines or to repair lines that are damaged. Only use the recommended lines when

replacement of high-pressure fuel line is necessary.

STANDARD PROCEDURE

LOW PRESSURE FUEL PUMP TEST

NOTE: Assure fuel tank quantity and proper fuel gauge operation. Assure that the fuel pump fuse or relay is not open. Capture any fuel spillage and store in appropriately marked containers.

NOTE: When the ignition switch is turned to the On position the fuel pump will begin to run for 20-30 seconds and then it stops.

The low pressure pump draws fuel out of the fuel tank module mixing bowl and pushes the fuel towards the fuel filter.

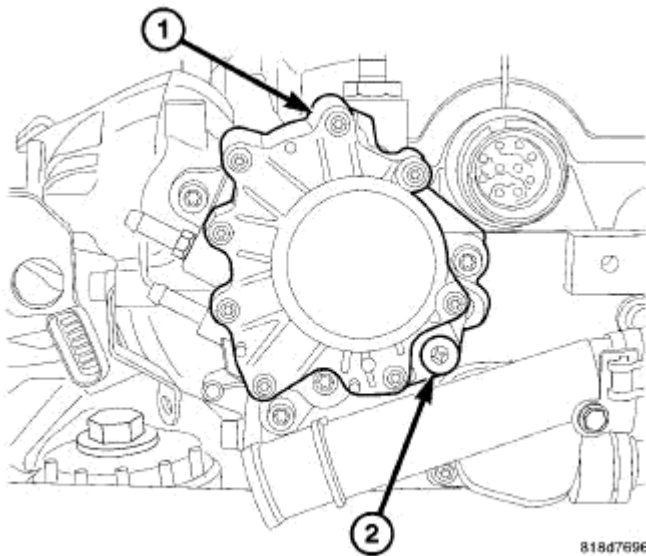


Fig. 131: Fuel Pump Pressure Tap Plug
Courtesy of CHRYSLER LLC

1. Remove fuel pump pressure tap plug (2) and connect a fuel pressure gauge to the test port.
2. Turn the ignition switch to the On position and observe the fuel gauge reading.
3. If the pressure reading is below specification, look for damaged or leaking fuel lines or a restricted fuel filter. If no problem is found with the fuel system replace the fuel pump.

FUEL PRESSURE SPECIFICATIONS	
SUCTION PRESSURE	7.25 PSI (0.5 bar)
DELIVERY PRESSURE	65 PSI (4.5 bar)
MAXIMUM FUEL DELIVERY	53 gallons/hour(200 liters/hour)

TANDEM PUMP PRESSURE TEST

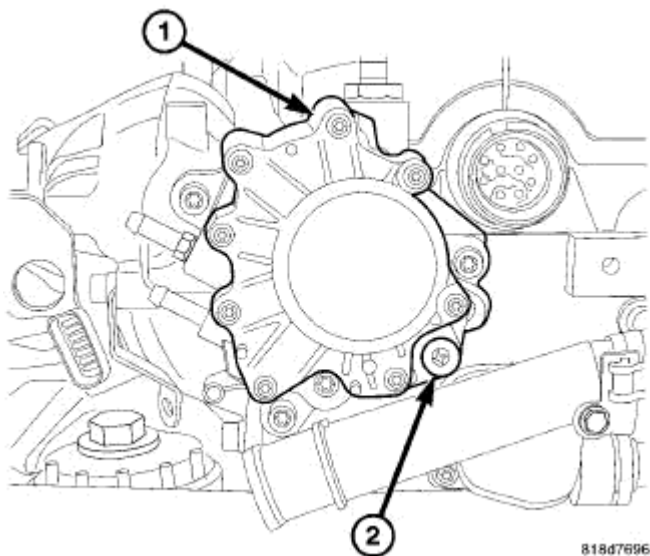


Fig. 132: Fuel Pressure Test Port Cap
Courtesy of CHRYSLER LLC

1. Remove fuel pressure test port cap (2).

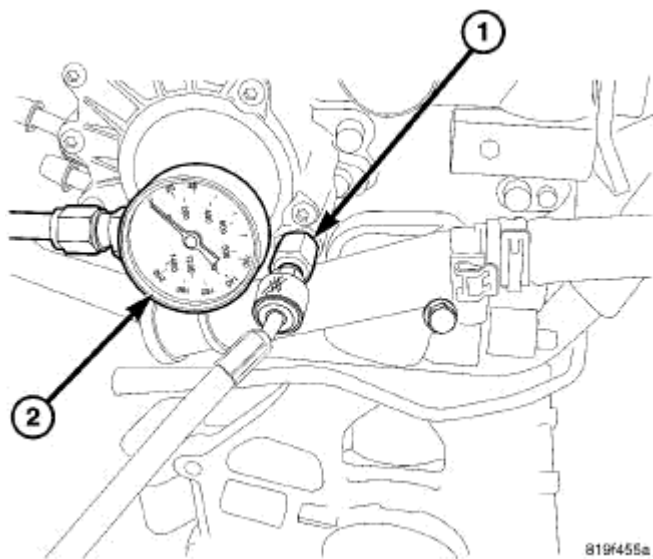


Fig. 133: FUEL PRESSURE GAUGE
Courtesy of CHRYSLER LLC

2. Install fuel pressure adapter 9938 (1).
3. Connect a 13.8 bar (200 psi) fuel pressure gauge (2).
4. Start engine and run at 4,000 RPM, monitor fuel pressure.

5. If the minimum specification of 10.5 bar (152 psi) is reached the tandem pump is ok.

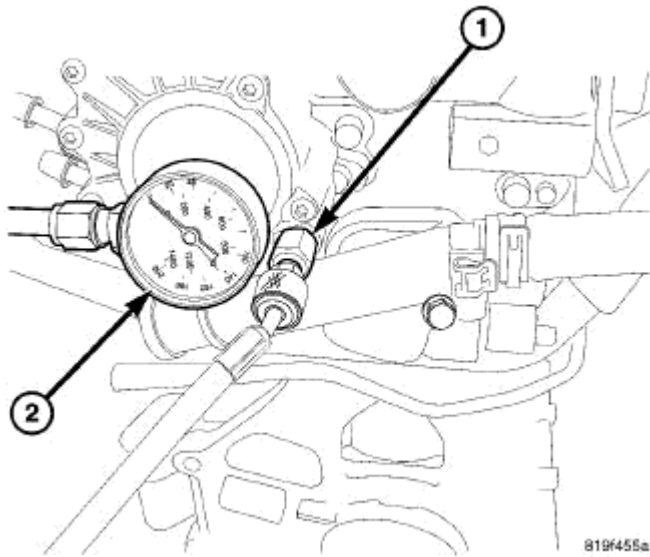


Fig. 134: FUEL PRESSURE GAUGE

Courtesy of CHRYSLER LLC

6. If the minimum specification was not obtained, clamp off the return line between the tandem pump and the fuel filter.
7. If the minimum specification is obtained, replace the unit injector O-rings.
8. Remove the fuel pressure gauge (2) and fuel pressure adapter 9938 (1).

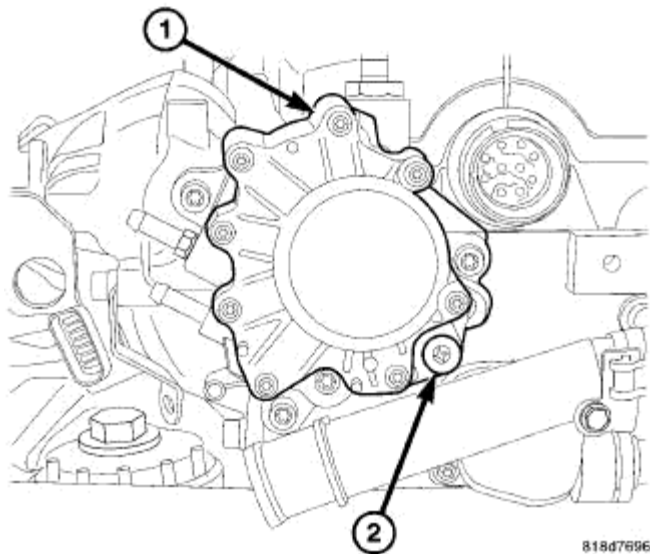


Fig. 135: Fuel Pressure Test Port Cap

Courtesy of CHRYSLER LLC

9. Install fuel pressure test port cap (2).

CLEANING FUEL SYSTEM COMPONENTS

CAUTION: Cleanliness cannot be overemphasized when handling or replacing diesel fuel system components. This especially includes the fuel injectors, high-pressure fuel lines, fuel rail, and fuel injection pump. Very tight tolerances are used with these parts. Dirt contamination could cause rapid part wear and possible plugging of fuel injector nozzle tip holes. This in turn could lead to possible engine misfire. Always wash/clean any fuel system component thoroughly before disassembly and then air dry. **DO NOT** wire brush injector nozzles when cleaning. Cap or cover any open part after disassembly. Before assembly, examine each part for dirt, grease or other contaminants and clean if necessary. When installing new parts, lubricate them with clean engine oil or clean diesel fuel only.

SPECIAL TOOLS

SPECIAL TOOLS

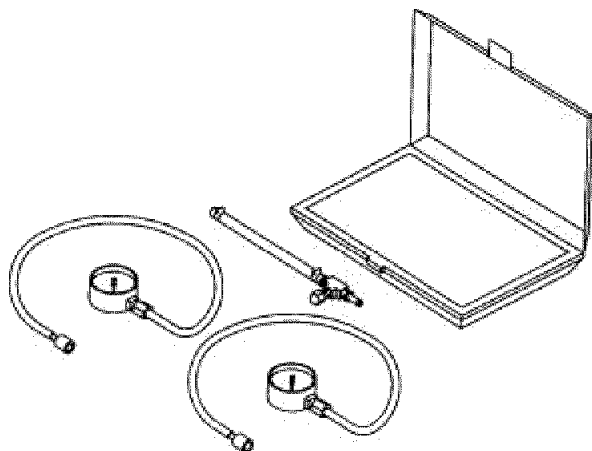


Fig. 136: TEST KIT, FUEL PRESSURE #5069

Courtesy of CHRYSLER LLC

COOLER, DIESEL FUEL

Description

DESCRIPTION

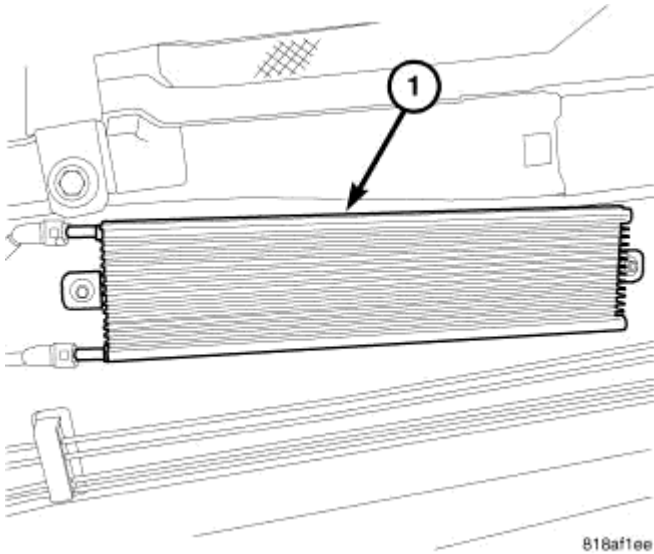


Fig. 137: FUEL COOLER
Courtesy of CHRYSLER LLC

The fuel cooler is located under the vehicle (1). The fuel cooler is a heat exchanger that allows heat in the fuel to be transferred to the air passing over the cooler fins.

The fuel cooler assembly is equipped with quick connect fitting for the fuel lines.

Removal

REMOVAL

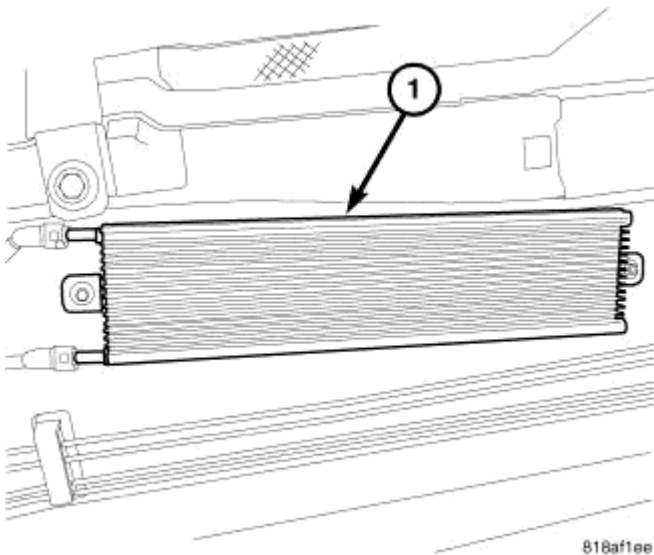


Fig. 138: FUEL COOLER
Courtesy of CHRYSLER LLC

1. Raise vehicle and support.

2. Remove shield.
3. Remove quick connect fuel fittings from fuel cooler (1).
4. Remove 2 mounting nuts.
5. Remove fuel cooler.

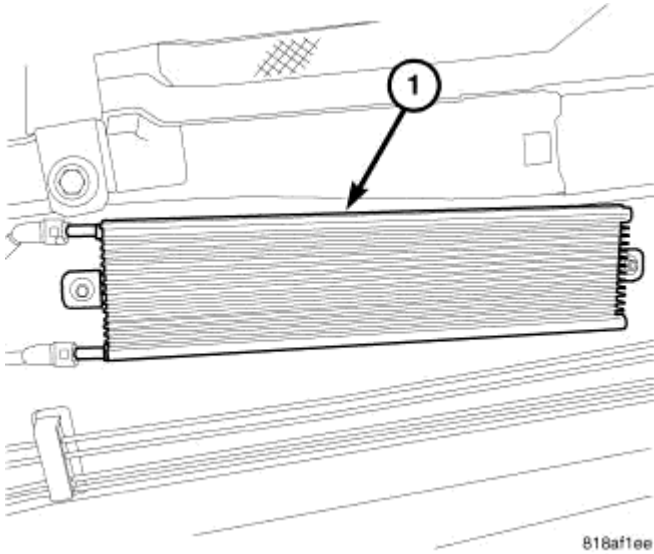
Installation**INSTALLATION**

Fig. 139: FUEL COOLER
Courtesy of CHRYSLER LLC

1. Install cooler (1) over mounting studs.
2. Install mounting nuts.
3. Install shield.
4. Install quick connect fuel line fittings.
5. Lower vehicle.

FILTER, FUEL**Description****DESCRIPTION**

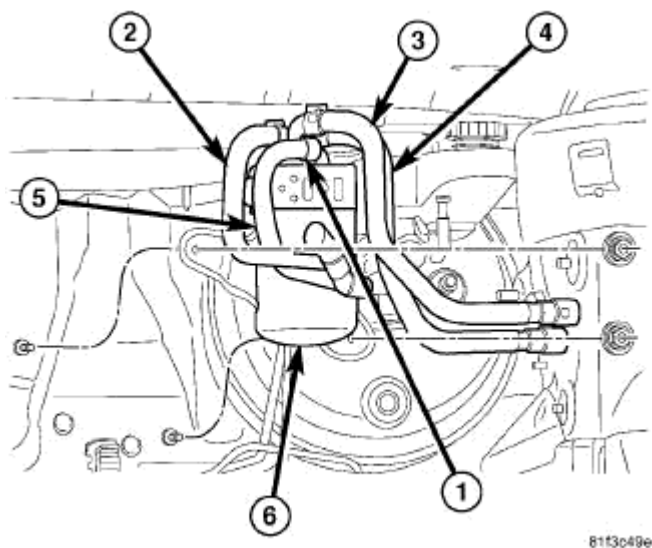


Fig. 140: DIESEL FUEL FILTER

Courtesy of CHRYSLER LLC

The fuel filter assembly is mounted to the cowl near the brake booster. The fuel filter is a disposable canister. The paper element of the fuel filter protects the fuel injection pump by removing contaminants from the fuel. The fuel filter should be replaced every 20,000 km.

Diagnosis and Testing

FUEL FILTER

WARNING: NO SPARKS, OPEN FLAMES OR SMOKING. RISK OF POISONING FROM INHALING AND SWALLOWING FUEL. RISK OF INJURY TO EYES AND SKIN FROM CONTACT WITH FUEL. POUR FUELS ONLY INTO SUITABLE AND APPROPRIATELY MARKED CONTAINERS. WEAR PROTECTIVE CLOTHING.

This diagnostic will test for a failing fuel pump or restricted fuel filter.

1. Disconnect the negative battery cable.
2. Disconnect the fuel supply line to the fuel filter/fuel heater assembly, at the filter assembly.

NOTE: Obtain the correct Fuel Line Pressure Test Adapter Tool Hose. Tool number 6539 is used for 5/16" fuel lines and tool number 6631 is used for 3/8" lines.

3. Connect correct Fuel Line Pressure Test Adaptor Tool Hose between the disconnected fuel line and filter/heater assembly.
4. Connect the 0-4.1bar (0-60 psi.) fuel pressure gauge (from Gauge Set 5069) to the test port on the

appropriate Adaptor Tool.

5. Connect negative battery cable.
6. Crank or run engine and record the fuel pressure reading.
7. Turn off the ignition (fuel pressure should begin to bleed down immediately).
8. Disconnect negative battery cable.

WARNING: THERE MAY BE FUEL IN THE PRESSURE TEST ADAPTOR TOOL HOSE, WRAP SHOP TOWELS AROUND HOSES TO CAPTURE ANY FUEL SPILLAGE.

9. Disconnect Fuel Line Pressure Adaptor Tool Hose.
10. Reconnect fuel tank supply line to fuel filter/fuel heater assembly.
11. Disconnect fuel supply line to injector pump, at the fuel filter/fuel heater assembly.
12. Connect Fuel Line Pressure Test Adaptor Tool Hose between the disconnected fuel line and filter/heater assembly.
13. Connect negative battery cable.
14. Crank or run engine and record the fuel pressure reading.
15. Turn off the ignition.
16. Disconnect negative battery cable.
17. Reconnect the fuel supply line to the fuel filter/fuel heater.

Inspect fuel lines and fuel tank for leaks and damage, replace the fuel pump module if the first pressure reading test did not obtain 1.5bar (22 psi.). Retest system after repair.

Replace the fuel filter if the pressure difference between test one and test two is more than 0.5bar (8 psi.).

Removal

REMOVAL

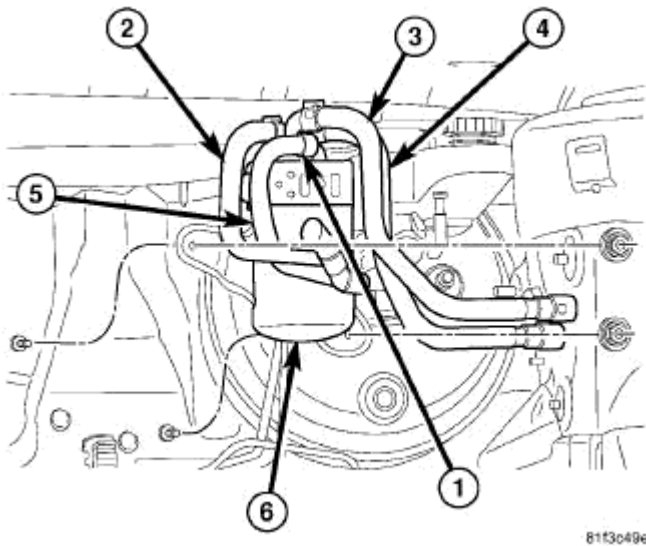


Fig. 141: DIESEL FUEL FILTER

Courtesy of CHRYSLER LLC

WARNING: THERE IS FUEL PRESENT IN THE FILTER HOUSING. REMOVE HOSES, AND HANDLE THE FILTER HOUSING CAREFULLY TO REDUCE SPLASH.

NOTE: Use a shop towel to capture any residual fuel spillage during this procedure.

1. Disconnect negative battery cable.
2. Remove air cleaner housing.
3. Disconnect fuel supply line (3) from fuel tank.
4. Disconnect fuel supply line to fuel pump (2).
5. Disconnect both fuel return lines (1,4) from the filter.
6. Remove filter retaining screw (5).
7. Remove filter from retaining bracket.

Installation

INSTALLATION

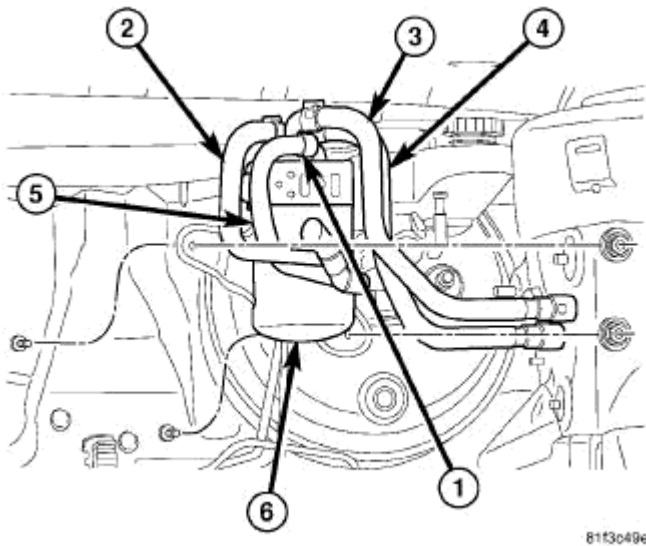


Fig. 142: DIESEL FUEL FILTER
 Courtesy of CHRYSLER LLC

1. Position filter (6) in retainer.
2. Install retaining screw (5) and tighten.
3. Connect fuel supply line (2) to injector pump.
4. Connect fuel supply line (3) from fuel tank.
5. Connect fuel return lines (1,4).
6. Position fuel filter shield in place (1).
7. Install air cleaner housing.
8. Connect negative battery cable.
9. Start engine and inspect for leaks.

MODULE, FUEL PUMP

Description

DESCRIPTION

The fuel pump module is located in the fuel tank and consists of a fuel pump, fuel contaminant filtering screen, fuel reservoir and fuel tank level monitoring device. The in tank fuel pump is low pressure and is to maintain an adequate supply of fuel to the high pressure injection pump.

Operation

OPERATION

When the ECM senses the ignition switch in the On, Crank or Run mode, battery positive voltage is supplied from the ASD relay and the PDC to the fuel pump relay. The ECM will also ground the fuel pump relay driver

at this time, closing the fuel pump relay contacts, completing the fuel pump circuit to chassis ground. If the ECM senses the ignition in the ON position, without a engine crank signal for more than 30 seconds, it will open the fuel pump driver circuit, turning off the fuel pump.

The regulated fuel pump, in On and Crank mode will produce 0.4 to 1.5 bar (6 psi. to 22 psi.). In Run mode the fuel pump will produce at least 2.5 bar (36 psi.) not to exceed 2.9 bar (42 psi.) to maintain constant fuel pressure to the injection pump.

PUMP, TANDEM FUEL

Description

DESCRIPTION

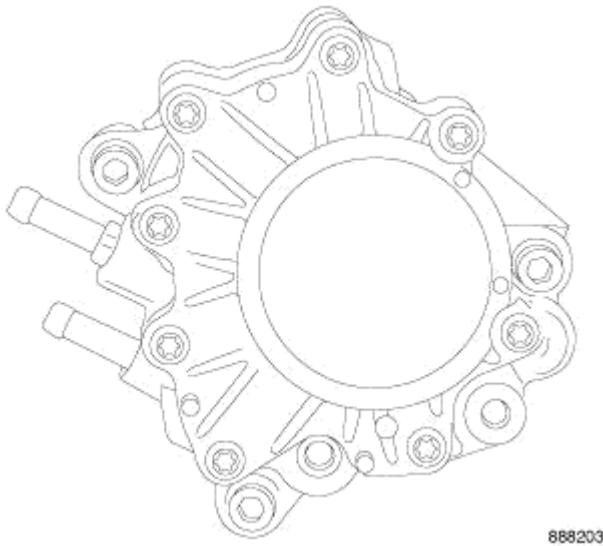


Fig. 143: Tandem Fuel Pump
Courtesy of CHRYSLER LLC

This pump is a tandem pump design. It contains a fuel pump and a vacuum pump in 1 housing. If either pump fails, the tandem pump assembly must be replaced.

Removal

REMOVAL

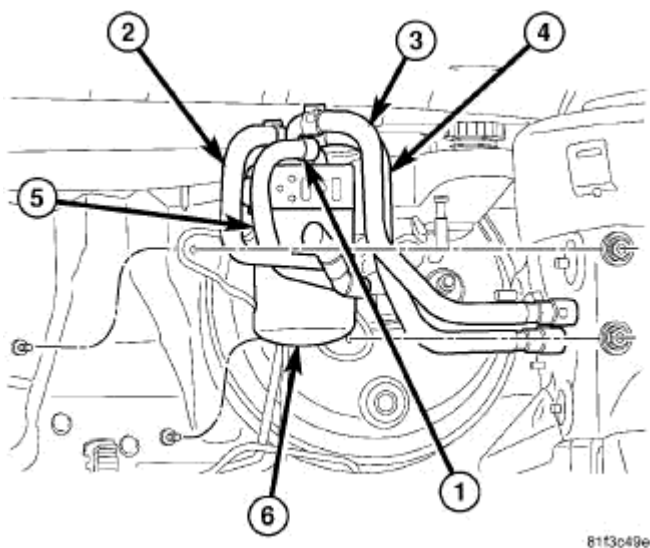


Fig. 144: DIESEL FUEL FILTER

Courtesy of CHRYSLER LLC

1. Remove Fuel feed line at filter (1).
2. Remove fuel return line at filter (2).
3. Connect vacuum pump to line and operate pump until no more fuel comes out.

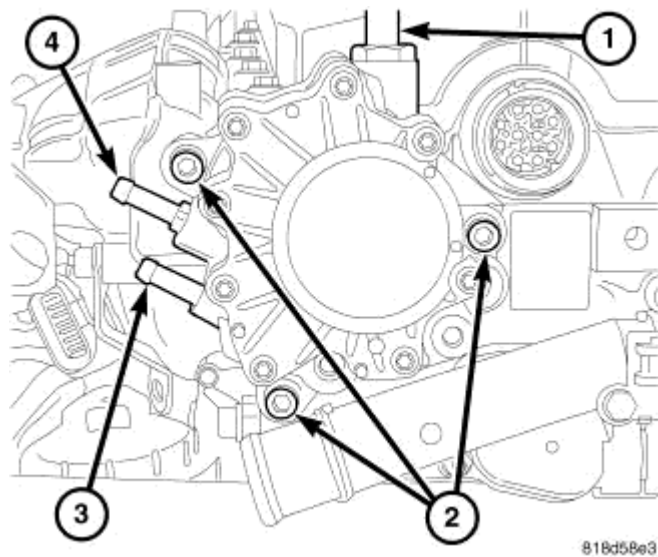


Fig. 145: FUEL PUMP

Courtesy of CHRYSLER LLC

4. Remove fuel feed line (4).
5. Remove fuel return line (3).
6. Remove retaining bolts (2) and remove pump.

Installation

INSTALLATION

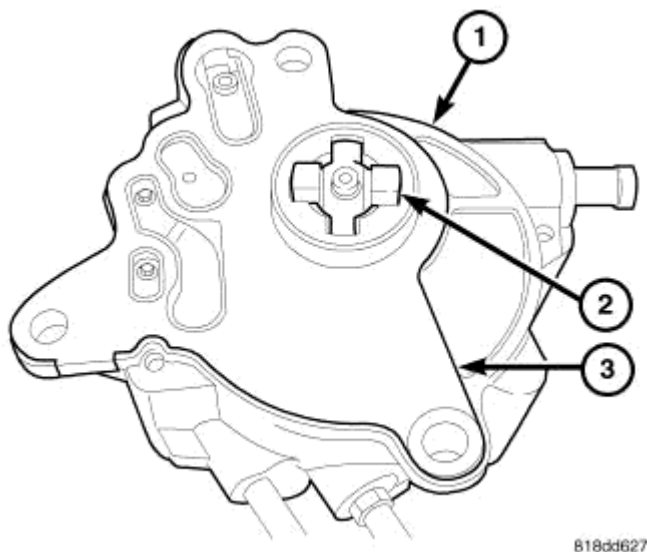


Fig. 146: PUMP & GASKET
Courtesy of CHRYSLER LLC

1. Place new gasket (3) on pump (1).
2. Align pump drive (2) on pump.

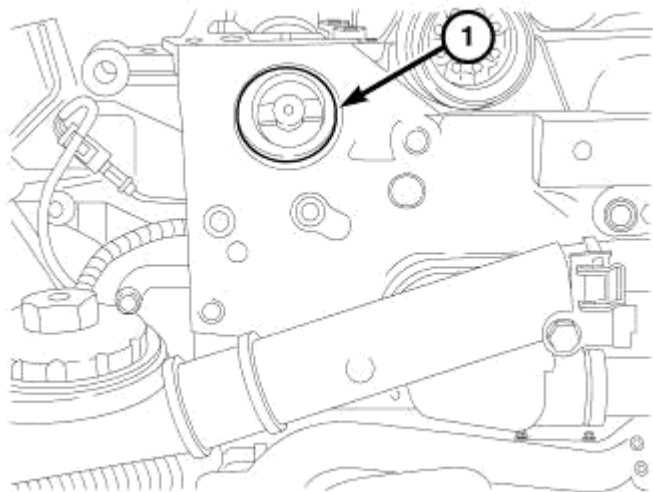


Fig. 147: FUEL PUMP DRIVE
Courtesy of CHRYSLER LLC

3. Insert pump drive into slot on camshaft (1).

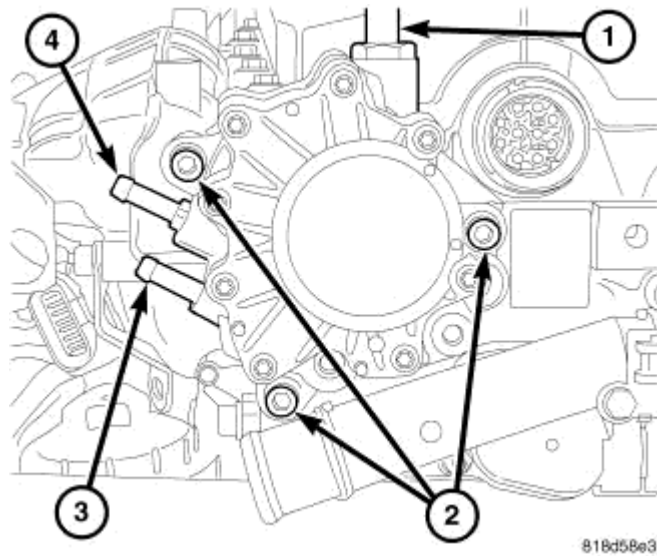


Fig. 148: FUEL PUMP

Courtesy of CHRYSLER LLC

4. install pump retaining bolts (2) and tighten.
5. Install fuel feed line (4).
6. Install fuel return line (3).
7. Reconnect fuel feed line and return lines to the fuel filter.

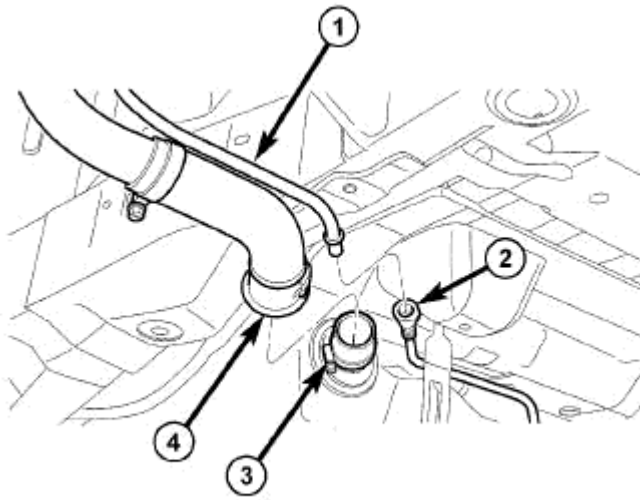
TANK, FUEL

Removal

FWD

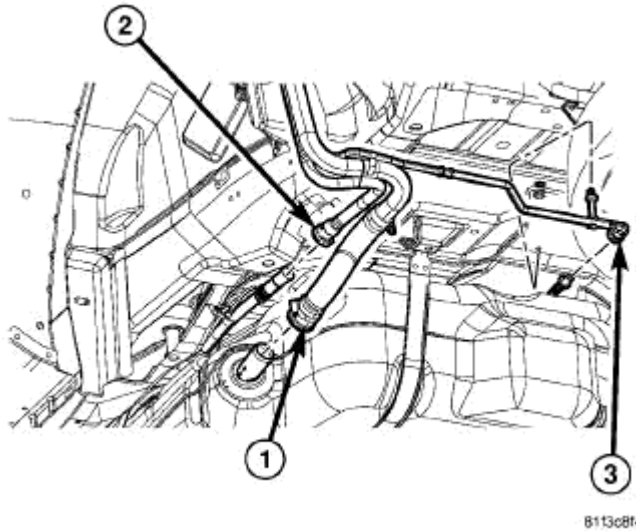
WARNING: The fuel system is under constant pressure even with engine off. Until the fuel pressure has been properly relieved from the system, do not attempt to open the fuel system.

1. Release the fuel system pressure. See Fuel System/Fuel Delivery - Standard Procedure.
2. Drain fuel tank. See Fuel System/Fuel Delivery - Standard Procedure.
3. Remove exhaust system. Refer to Exhaust System/PIPE, Exhaust - Removal.



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Fig. 149: FUEL FILL TUBE CONNECTION
Courtesy of CHRYSLER LLC



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Fig. 150: Fuel Tube Vent Line
Courtesy of CHRYSLER LLC

4. Disconnect the fuel tube vent line (2) and remove from the fuel tank quick connect fitting. See **Fuel System/Fuel Delivery/FITTING, Quick Connect - Standard Procedure**.
5. Disconnect the fuel fill tube (1).

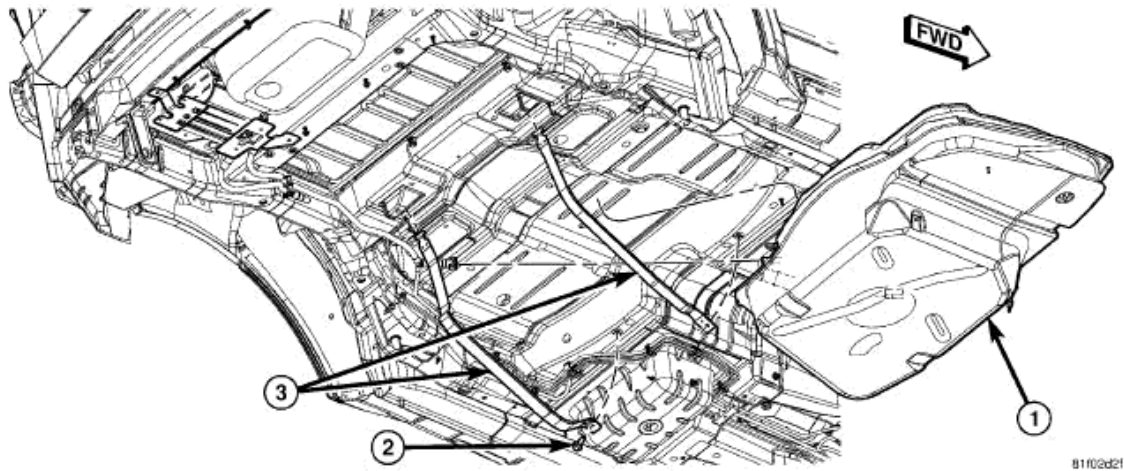


Fig. 151: FUEL TANK INSTALL - FWD
Courtesy of CHRYSLER LLC

1 - Fuel Tank
2 - Strap Bolt
3 - Fuel Tank Strap

WARNING: Support fuel tank with a transmission jack or equivalent. Use straps to secure the fuel tank to the jack. Failure to properly support and secure the fuel tank during removal may cause fuel to spill or fuel tank to fall from jack assembly.

6. Use a transmission jack to support fuel tank (1), remove fuel tank strap bolts (2) and straps (3).
7. Partially lower tank to gain access to pump module electrical connector.

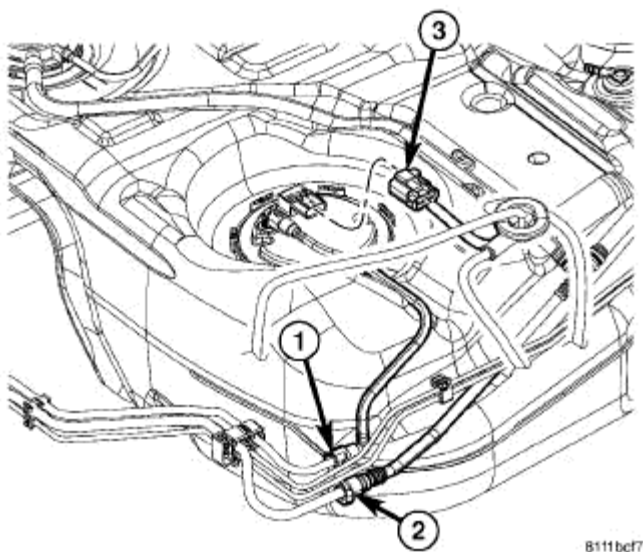
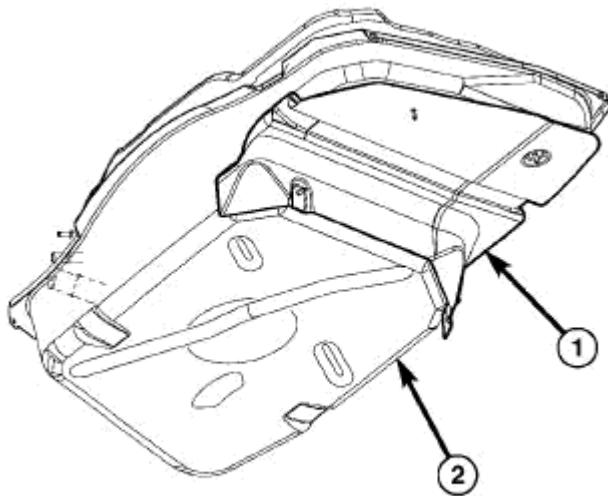


Fig. 152: Fuel Lines & Electrical Connector

Courtesy of CHRYSLER LLC

8. Disconnect electrical connector (3) and the fuel lines (1) and (2).
9. Continue lowering tank for removal.
10. If fuel tank is to be replaced, remove fuel pump module from tank. See **Fuel System/Fuel Delivery/MODULE, Fuel Pump - Removal**.



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Fig. 153: Fuel Tank Shield - FWD
Courtesy of CHRYSLER LLC

- | |
|----------------------|
| 1 - Fuel Tank Shield |
| 2 - Fuel Tank |

11. If fuel tank is to be replaced, remove fasteners and fuel tank shield (1) from fuel tank (2).

Installation

FWD

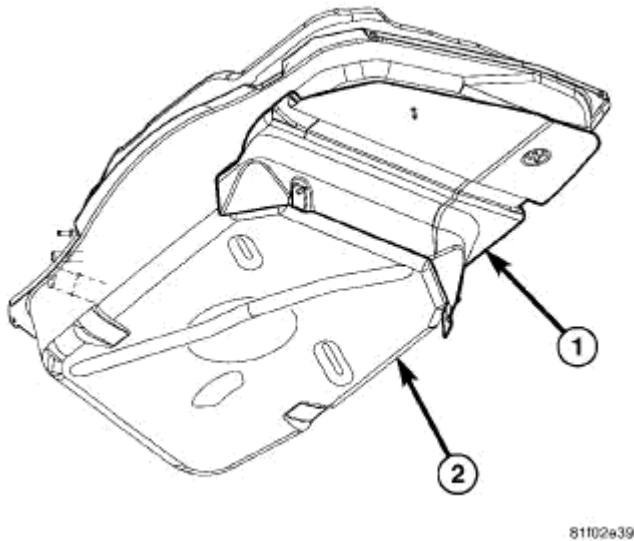


Fig. 154: Fuel Tank Shield - FWD
Courtesy of CHRYSLER LLC

- | |
|---------------------------------------|
| 1 - Fuel Tank Shield
2 - Fuel Tank |
|---------------------------------------|

1. Install fuel tank shield (1) to fuel tank (2).
2. Install fuel pump module to fuel tank. See **Fuel System/Fuel Delivery/MODULE, Fuel Pump - Installation**.

WARNING: Support fuel tank with a transmission jack or equivalent. Use straps to secure the fuel tank to the jack. Failure to properly support and secure the fuel tank during removal may cause fuel to spill or fuel tank to fall from jack assembly.

3. Position fuel tank onto a transmission jack or equivalent and raise the fuel tank into vehicle position.

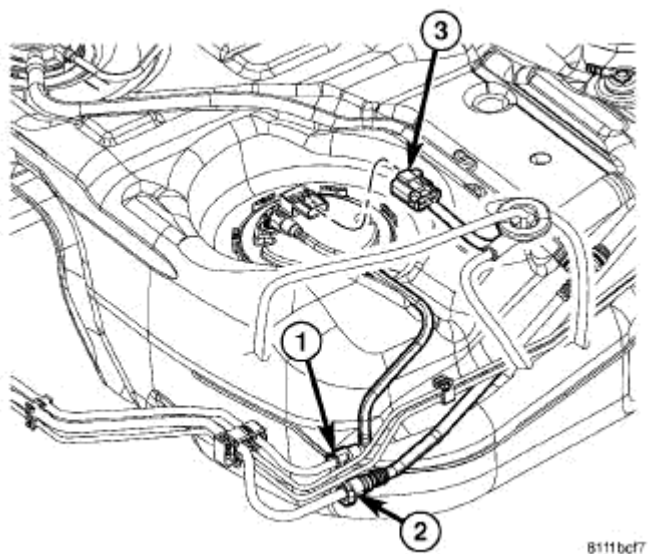


Fig. 155: Fuel Lines & Electrical Connector
Courtesy of CHRYSLER LLC

4. Connect electrical connector (3) and the fuel lines (1) and (2).

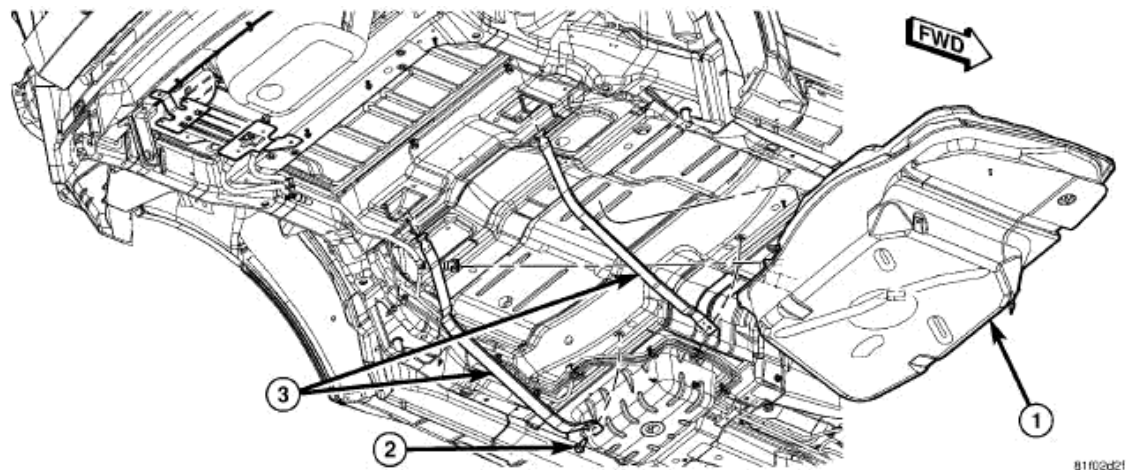


Fig. 156: FUEL TANK INSTALL - FWD
Courtesy of CHRYSLER LLC

1 - Fuel Tank
2 - Strap Bolt
3 - Fuel Tank Strap

5. Install fuel tank straps (3) and bolts (2). Tighten to 48 N.m (35 ft. lbs.).

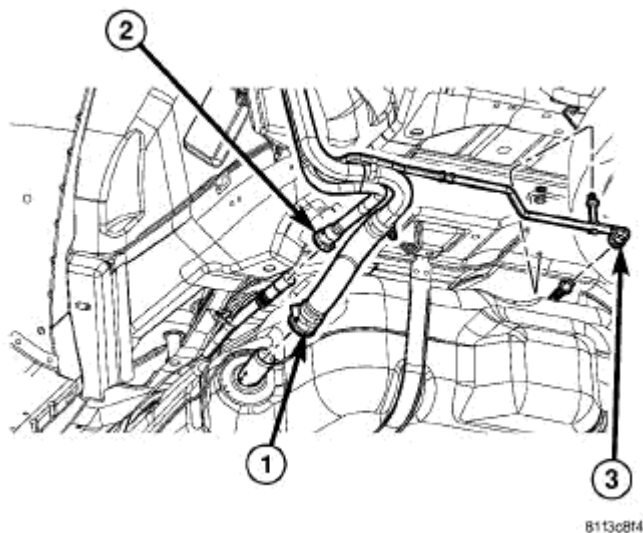


Fig. 157: Fuel Tube Vent Line
Courtesy of CHRYSLER LLC

6. Install fuel tube vent line (2) to fuel tank quick connect fitting. See **Fuel System/Fuel Delivery/FITTING, Quick Connect - Standard Procedure**.
7. Install fuel filler tube (4) to fuel tank. Tighten hose clamp (3) to 3 N.m (27 in. lbs.).
8. Install exhaust system. Refer to **Exhaust System/PIPE, Exhaust - Installation**.
9. Connect the battery cable.
10. Fill fuel tank. Use the scan tool to pressurize the fuel system. Check for leaks.

TUBE(S), FUEL

Removal

REMOVAL - HIGH PRESSURE LINES

WARNING: High-pressure fuel lines deliver fuel under extreme pressure from the injection pump to the injectors. This may be as high as 1600bar (23,200psi). Use extreme caution when inspecting for high-pressure fuel Leaks. Fuel under this amount of pressure can penetrate skin causing personal injury or death. Inspect high-pressure fuel leaks with a sheet of cardboard. Wear safety goggles and adequate protective clothing When servicing fuel system.

WARNING: No sparks, open flames or smoking. Risk of poisoning from inhaling and swallowing fuel. Risk of injury to eyes and skin from contact with fuel. Pour fuels only into suitable and appropriately marked containers. Wear protective clothing.

1. Disconnect negative battery cable.
2. Remove engine cover. Refer to **Engine - Removal** .

CAUTION: Counter-hold with wrench at threaded connections of injectors. **DO NOT EXCEED** the tightening torque in order to avoid also loosening the threaded connection.

CAUTION: DO NOT crimp or bend lines.

NOTE: After removing injection lines, seal connections and ensure cleanliness.

3. Unscrew union nuts of injection lines.
4. Remove injection lines.

Installation

INSTALLATION - HIGH PRESSURE LINES

WARNING: HIGH-PRESSURE FUEL LINES DELIVER FUEL UNDER EXTREME PRESSURE FROM THE INJECTION PUMP TO THE INJECTORS. THIS MAYBE AS HIGH AS 1600BAR (23,200PSI). USE EXTREME CAUTION WHEN INSPECTING FOR HIGH-PRESSURE FUEL LEAKS. FUEL UNDER THIS AMOUNT OF PRESSURE CAN PENETRATE SKIN CAUSING PERSONAL INJURY OR DEATH. INSPECT HIGH-PRESSURE FUEL LEAKS WITH A SHEET OF CARDBOARD. WEAR SAFETY GOGGLES AND ADEQUATE PROTECTIVE CLOTHING WHEN SERVICING FUEL SYSTEM.

WARNING: NO SPARKS, OPEN FLAMES OR SMOKING. RISK OF POISONING FROM INHALING AND SWALLOWING FUEL. RISK OF INJURY TO EYES AND SKIN FROM CONTACT WITH FUEL. POUR FUELS ONLY INTO SUITABLE AND APPROPRIATELY MARKED CONTAINERS. WEAR PROTECTIVE CLOTHING.

1. Loosen the fuel rail mounting bolts to install lines free of stress.

CAUTION: Inspect sealing cone at lines. Replace if compression points exist. Ensure lines are exactly located.

2. Position and install fuel lines. Tighten to 22N.m (195 lbs. in.) using a wrench to counter-hold at threaded connection.
3. Tighten fuel rail to 14N.m (124 lbs. in.).
4. Connect negative battery cable.

WARNING: HIGH-PRESSURE FUEL LINES DELIVER FUEL UNDER EXTREME PRESSURE FROM THE INJECTION PUMP TO THE INJECTORS. THIS MAYBE AS HIGH AS 1600BAR (23,200PSI). USE EXTREME CAUTION WHEN INSPECTING FOR HIGH-PRESSURE FUEL LEAKS. FUEL UNDER THIS AMOUNT OF PRESSURE CAN PENETRATE SKIN CAUSING PERSONAL INJURY OR DEATH. INSPECT HIGH-PRESSURE FUEL LEAKS WITH A SHEET OF CARDBOARD. WEAR SAFETY GOGGLES AND ADEQUATE PROTECTIVE CLOTHING WHEN SERVICING FUEL SYSTEM.

5. Start engine and inspect for leaks.
6. Install engine cover. Refer to **Engine - Installation** .

FUEL INJECTION

OPERATION

MODES OF OPERATION

As input signals to the PCM change, the PCM adjusts its response to output devices. For example, the PCM must calculate a different injector pulse width and ignition timing for idle than it does for Wide Open Throttle (WOT). There are several different modes of operation that determine how the PCM responds to the various input signals.

There are two different areas of operation, OPEN LOOP and CLOSED LOOP.

During OPEN LOOP modes the PCM receives input signals and responds according to preset PCM programming. Inputs from the upstream and downstream heated oxygen sensors are not monitored during OPEN LOOP modes, except for heated oxygen sensor diagnostics (they are checked for shorted conditions at all times).

During CLOSED LOOP modes the PCM monitors the inputs from the upstream and downstream heated oxygen sensors. The upstream heated oxygen sensor input tells the PCM if the calculated injector pulse width resulted in the ideal air-fuel ratio of 14.7 to one. By monitoring the exhaust oxygen content through the upstream heated oxygen sensor, the PCM can fine tune injector pulse width. Fine tuning injector pulse width allows the PCM to achieve optimum fuel economy combined with low emissions.

For the PCM to enter CLOSED LOOP operation, the following must occur:

1. Engine coolant temperature must be over 1.6°C (35°F).
 - If the coolant is over 1.6°C (35°F) the PCM will wait 38 seconds.
 - If the coolant is over 10°C (50°F) the PCM will wait 15 seconds.
 - If the coolant is over 75°C (167°F) the PCM will wait 3 seconds.
2. For other temperatures the PCM will interpolate the correct waiting time.
3. O2 sensor must read either greater than 0.745 volts or less than 0.29 volt.

4. The multi-port fuel injection system has the following modes of operation:
 - Ignition switch ON (Zero RPM)
 - Engine start-up
 - Engine warm-up
 - Cruise
 - Idle
 - Acceleration
 - Deceleration
 - Wide Open Throttle
 - Ignition switch OFF
5. The engine start-up (crank), engine warm-up, deceleration with fuel shutoff and wide open throttle modes are OPEN LOOP modes. Under most operating conditions, the acceleration, deceleration (with A/C on), idle and cruise modes, **with the engine at operating temperature** are CLOSED LOOP modes.

IGNITION SWITCH ON (ZERO RPM) MODE

When the ignition switch activates the fuel injection system, the following actions occur:

- The PCM monitors the engine coolant temperature sensor and throttle position sensor input. The PCM determines basic fuel injector pulse width from this input.
- The PCM determines atmospheric air pressure from the MAP sensor input to modify injector pulse width.

When the key is in the ON position and the engine is not running (zero RPM), the Auto Shutdown (ASD) and fuel pump relays de-energize after approximately 1 second. Therefore, battery voltage is not supplied to the fuel pump, ignition coil, fuel injectors and heated oxygen sensors.

ENGINE START-UP MODE

This is an OPEN LOOP mode. If the vehicle is in park or neutral (automatic transaxles) or the clutch pedal is depressed (manual transaxles) the ignition switch energizes the starter relay when the engine is not running. The following actions occur when the starter motor is engaged:

- If the PCM receives the camshaft position sensor and crankshaft position sensor signals, it energizes the fuel pump. If the PCM does not receive both signals within approximately one second, it will not energize the fuel pump. The PCM supplies voltage to the fuel pump, fuel injectors, ignition coil, (EGR solenoid and PCV heater if equipped) and heated oxygen sensors.
- The PCM energizes the injectors (on the 69 degree falling edge) for a calculated pulse width until it determines crankshaft position from the camshaft position sensor and crankshaft position sensor signals. The PCM determines crankshaft position within 1 engine revolution.
- After determining crankshaft position, the PCM begins energizing the injectors in sequence. It adjusts injector pulse width and controls injector synchronization by turning the individual ground paths to the injectors On and Off.
- When the engine idles within ± 64 RPM of its target RPM, the PCM compares current MAP sensor value

with the atmospheric pressure value received during the Ignition Switch On (zero RPM) mode.

Once the fuel pump relay has been energized, the PCM determines injector pulse width based on the following:

- MAP
- Engine RPM
- Battery voltage
- Engine coolant temperature
- Inlet/Intake air temperature (IAT)
- Throttle position
- The number of engine revolutions since cranking was initiated

During Start-up the PCM maintains ignition timing at 9 degrees BTDC.

ENGINE WARM-UP MODE

This is an OPEN LOOP mode. The following inputs are received by the PCM:

- Manifold Absolute Pressure (MAP)
- Crankshaft position (engine speed)
- Engine coolant temperature
- Inlet/Intake air temperature (IAT)
- Camshaft position
- Knock sensor
- Throttle position
- A/C switch status
- Battery voltage
- Vehicle speed
- Speed control
- O2 sensors

The PCM adjusts injector pulse width and controls injector synchronization by turning the individual ground paths to the injectors On and Off.

The PCM adjusts ignition timing and engine idle speed. Engine idle speed is adjusted through the idle air control motor.

CRUISE OR IDLE MODE

When the engine is at operating temperature this is a CLOSED LOOP mode. During cruising or idle the following inputs are received by the PCM:

- Manifold absolute pressure

- Crankshaft position (engine speed)
- Inlet/Intake air temperature
- Engine coolant temperature
- Camshaft position
- Knock sensor
- Throttle position
- Exhaust gas oxygen content (O2 sensors)
- A/C switch status
- Battery voltage
- Vehicle speed

The PCM adjusts injector pulse width and controls injector synchronization by turning the individual ground paths to the injectors On and Off.

The PCM adjusts engine idle speed and ignition timing. The PCM adjusts the air/fuel ratio according to the oxygen content in the exhaust gas (measured by the upstream and downstream heated oxygen sensor).

The PCM monitors for engine misfire. During active misfire and depending on the severity, the PCM either continuously illuminates or flashes the malfunction indicator lamp (Check Engine light on instrument panel). Also, the PCM stores an engine misfire DTC in memory, if 2nd trip with fault.

The PCM performs several diagnostic routines. They include:

- Oxygen sensor monitor
- Downstream heated oxygen sensor diagnostics during open loop operation (except for shorted)
- Fuel system monitor
- EGR monitor (if equipped)
- Purge system monitor
- Catalyst efficiency monitor
- All inputs monitored for proper voltage range, rationality.
- All monitored components (refer to **EMISSIONS CONTROL** for On-Board Diagnostics).

The PCM compares the upstream and downstream heated oxygen sensor inputs to measure catalytic converter efficiency. If the catalyst efficiency drops below the minimum acceptable percentage, the PCM stores a diagnostic trouble code in memory, after 2 trips.

During certain idle conditions, the PCM may enter a variable idle speed strategy. During variable idle speed strategy the PCM adjusts engine speed based on the following inputs.

- A/C status
- Battery voltage
- Battery temperature or Calculated Battery Temperature

- Engine coolant temperature
- Engine run time
- Inlet/Intake air temperature
- Vehicle mileage

ACCELERATION MODE

This is a CLOSED LOOP mode. The PCM recognizes an abrupt increase in Throttle Position sensor output voltage or MAP sensor output voltage as a demand for increased engine output and vehicle acceleration. The PCM increases injector pulse width in response to increased fuel demand.

- Wide Open Throttle-open loop

DECELERATION MODE

This is a CLOSED LOOP mode. During deceleration the following inputs are received by the PCM:

- A/C status
- Battery voltage
- Inlet/Intake air temperature
- Engine coolant temperature
- Crankshaft position (engine speed)
- Exhaust gas oxygen content (upstream heated oxygen sensor)
- Knock sensor
- Manifold absolute pressure
- Throttle position sensor

The PCM may receive a closed throttle input from the APPS when it senses an abrupt decrease in manifold pressure. This indicates a hard deceleration (Open Loop). In response, the PCM may momentarily turn off the injectors. This helps improve fuel economy, emissions and engine braking.

WIDE-OPEN-THROTTLE MODE

This is an OPEN LOOP mode. During wide-open-throttle operation, the following inputs are used by the PCM:

- Inlet/Intake air temperature
- Engine coolant temperature
- Engine speed
- Knock sensor
- Manifold absolute pressure
- Throttle position

When the PCM senses a wide-open-throttle condition through the APPS it de-energizes the A/C compressor

clutch relay. This disables the air conditioning system and disables EGR (if equipped).

The PCM adjusts injector pulse width to supply a predetermined amount of additional fuel, based on MAP and RPM.

IGNITION SWITCH OFF MODE

When the operator turns the ignition switch to the OFF position, the following occurs:

- All outputs are turned off, unless O2 Heater Monitor test is being run. Refer to **EMISSIONS CONTROL** for On-Board Diagnostics.
- No inputs are monitored except for the heated oxygen sensors. The PCM monitors the heating elements in the oxygen sensors and then shuts down.

FUEL CORRECTION or ADAPTIVE MEMORIES

DESCRIPTION

In Open Loop, the PCM changes pulse width without feedback from the O2 Sensors. Once the engine warms up to approximately -1.1° to 1.6°C (30° to 35° F), the PCM goes into closed loop **Short Term Correction** and utilizes feedback from the O2 Sensors. Closed loop **Long Term Adaptive Memory** is maintained above 77° to 88°C (170° to 190°F) unless the PCM senses wide open throttle. At that time the PCM returns to Open Loop operation.

OPERATION

Short Term

The first fuel correction program that begins functioning is the short term fuel correction. This system corrects fuel delivery in direct proportion to the readings from the Upstream O2 Sensor.

The PCM monitors the air/fuel ratio by using the input voltage from the O2 Sensor. When the voltage reaches its preset high or low limit, the PCM begins to add or remove fuel until the sensor reaches its switch point. The short term corrections then begin.

The PCM makes a series of quick changes in the injector pulse-width until the O2 Sensor reaches its opposite preset limit or switch point. The process then repeats itself in the opposite direction.

Short term fuel correction will keep increasing or decreasing injector pulse-width based upon the upstream O2 Sensor input. The maximum range of authority for short term memory is 25% (+/-) of base pulse-width. Short term is violated and is lost when ignition is turned OFF.

Long Term

The second fuel correction program is the long term adaptive memory. In order to maintain correct emission throughout all operating ranges of the engine, a cell structure based on engine RPM and load (MAP) is used.

The number of cells varies upon the driving conditions. Two cells are used only during idle, based upon TPS

and Park/Neutral switch inputs. There may be two other cells used for deceleration, based on TPS, engine RPM, and vehicle speed. The other twelve cells represent a manifold pressure and an RPM range. Six of the cells are high RPM and the other six are low RPM. Each of these cells has a specific MAP voltage range **Typical Adaptive Memory Fuel Cells**.

As the engine enters one of these cells the PCM looks at the amount of short term correction being used. Because the goal is to keep short term at 0 (O2 Sensor switching at 0.5 volt), long term will update in the same direction as short term correction is moving to bring the short term back to 0. Once short term is back at 0, this long term correction factor is stored in memory.

The values stored in long term adaptive memory are used for all operating conditions, including open loop and cold starting. However, the updating of the long term memory occurs after the engine has exceeded approximately 77° to 88°C (170° to 190°F), with fuel control in closed loop and two minutes of engine run time. This is done to prevent any transitional temperature or start-up compensations from corrupting long term fuel correction.

Long term adaptive memory can change the pulse-width by as much as 25%, which means it can correct for all of short term. It is possible to have a problem that would drive long term to 25% and short term to another 25% for a total change of 50% away from base pulse-width calculation.

Typical Adaptive Memory Fuel Cells

-	Open Throttle	Open Throttle	Open Throttle	Open Throttle	Open Throttle	Open Throttle	Idle	Decel
Vacuum	20	17	13	9	5	0	-	-
Above 1,984 RPM	1	3	5	7	9	11	13 Drive	15
Below 1,984 RPM	0	2	4	6	8	10	12 Neutral	14
MAP volt =	0	1.4	2.0	2.6	3.3	3.9	-	-

Fuel Correction Diagnostics

There are two fuel correction diagnostic routines:

- Fuel System Rich
- Fuel System Lean

A DTC is set and the MIL is illuminated if the PCM detects either of these conditions. This is determined based on total fuel correction, short term times long term.

FUEL ECONOMY AND MAINTENANCE

A vehicle that is not properly tuned and maintained cannot be expected to perform at its maximum efficiency and can have an adverse effect on fuel economy. The following recommendations will ensure that the vehicle is performing at its maximum efficiency:

- **Use the recommended motor oil grade.** Using the manufacturer's recommended grade of Mopar® motor oil can improve fuel mileage by 1-2%. Mopar® motor oil labeled "Energy Conserving" contains friction-reducing additives.
- **Check and replace air filters.** Replacing a clogged air filter with a new Mopar® air filter can improve fuel mileage by as much as 10%.
- **Keep the engine tuned.** Repairing a vehicle that is noticeably out of tune can improve fuel mileage by an average of 4%. Maintaining a vehicle and repairing problems, such as a faulty oxygen sensor, can improve mileage by as much as 40%.
- **Keep tires properly inflated.** Under inflated tires can lower fuel mileage by 0.4% for every 1 psi drop in pressure of all four tires.

SYSTEM DIAGNOSIS

OPERATION

The PCM can test many of its own input and output circuits. If the PCM senses a fault in a major system, the PCM stores a Diagnostic Trouble Code (DTC) in memory.

For DTC information see On-Board Diagnostics. Refer to **Electrical/Electronic Control Modules/MODULE, Powertrain Control - Description** .

INJECTION SYSTEM

All engines used in this vehicle have a sequential Multi-Port Electronic Fuel Injection (MPI) system. The MPI system is computer regulated and provides precise air/fuel ratios for all driving conditions. The Powertrain Control Module (PCM) operates the fuel injection system.

The PCM regulates:

- Air/Fuel Ratio
- Battery Charging
- Cooling Fans
- Emission Control Devices
- Electronic Throttle Control
- Idle Speed
- Ignition Timing

Various sensors provide the inputs necessary for the PCM to correctly operate these systems. In addition to the sensors, various switches also provide inputs to the PCM.

The PCM can adapt its programming to meet changing operating conditions.

Fuel is injected into the intake port above the intake valve in precise metered amounts through electrically operated injectors. The PCM fires the injectors in a specific sequence. Under most operating conditions, the PCM maintains an air fuel ratio of 14.7 parts air to 1 part fuel (by weight) through constant adjustment of

2009 Dodge Journey R/T

2009 ENGINE Fuel System - Journey

injector pulse width. Injector pulse width is the length of time the injector is open.

The PCM adjusts injector pulse width by opening and closing the ground path to the injector. Engine RPM (speed) and manifold absolute pressure (air density) are the **primary** inputs that determine injector pulse width.

SPECIFICATIONS

TORQUE

TORQUE

DESCRIPTION	N.m	Ft. Lbs.	In. Lbs.
Accelerator Pedal Nuts	16	12	-
Crankshaft Position Sensor Bolt	9	-	79.5
Battery Cable Nut	5	-	45
Lower Throttle Body Support Bracket Nut 2.7L	28	20.5	-
MAP Sensor Bolt	4.5	-	40
Oxygen Sensor (All)	41	30	-
Power Steering Reservoir Plastic Manifold	5.7	-	50
Power Steering Reservoir Aluminum Manifold	11.9	-	105
Throttle Body Bolts 4-Cylinder	7.5	-	65
Throttle Body Bracket Bolt 4-Cylinder	25	18	-
Throttle Body Bolts 2.7, 3.5L Engines	5.5	-	50
Throttle Body Stud 2.7L Engine	5.5	-	50
Upper Throttle Body Support Bracket Nut 2.7L	12	-	105
The composite manifold uses special plastic screws. The factory installed plastic screws can be removed and installed up to 5 times. Do not exceed the specified torque. These screws must be installed slowly (less than 600 RPM) to avoid melting the parent material. There are service repair screws available for repair. They require a higher torque than the original screws.			

SPECIAL TOOLS

FUEL

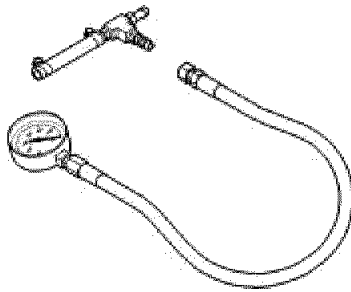


Fig. 158: Kit, Fuel Pressure C-4799-B
Courtesy of CHRYSLER LLC

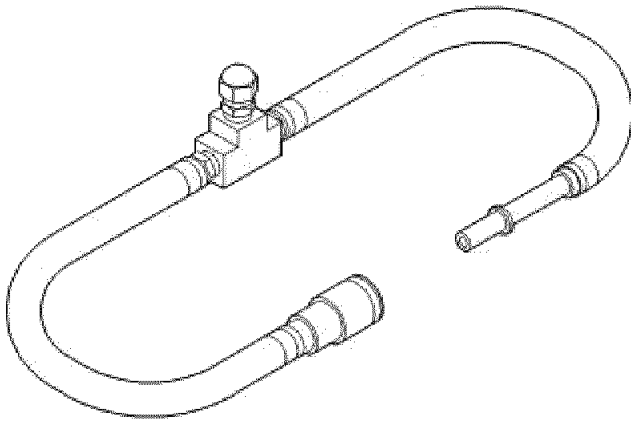


Fig. 159: Adapter, Fuel Pressure 6539
Courtesy of CHRYSLER LLC

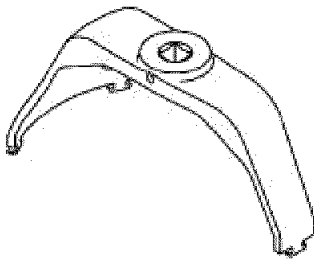


Fig. 160: SAE Fuel Pump Lock Ring Wrench 9340
Courtesy of CHRYSLER LLC

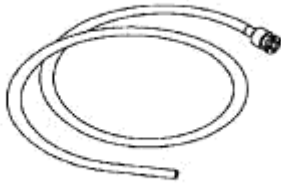


Fig. 161: Adapter, Fuel Pressure 6668
Courtesy of CHRYSLER LLC

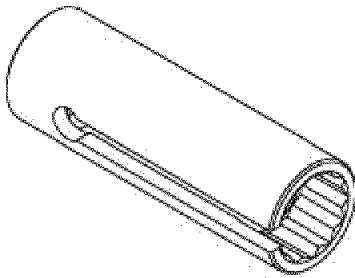


Fig. 162: Oxygen Sensor Socket C-4907
Courtesy of CHRYSLER LLC

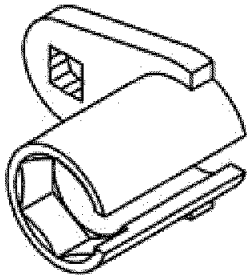


Fig. 163: O2 Sensor Wrench 8439
Courtesy of CHRYSLER LLC

INJECTOR(S), FUEL

Removal

2.4L

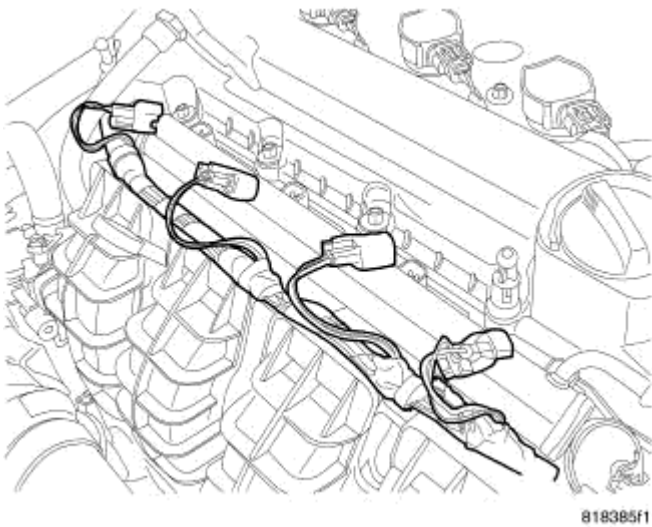


Fig. 164: Electrical Connectors From Fuel Injectors
Courtesy of CHRYSLER LLC

WARNING: Release fuel system pressure before servicing fuel system components. Service vehicles in well ventilated areas and avoid ignition sources. Never smoke while servicing the vehicle. This may result in personal injury or death.

1. Release the fuel pressure. See **Fuel System/Fuel Delivery - Standard Procedure**.
2. Disconnect and isolate negative battery cable.
3. Remove engine cover.
4. Unlock and disconnect the electrical connectors from the fuel injectors.

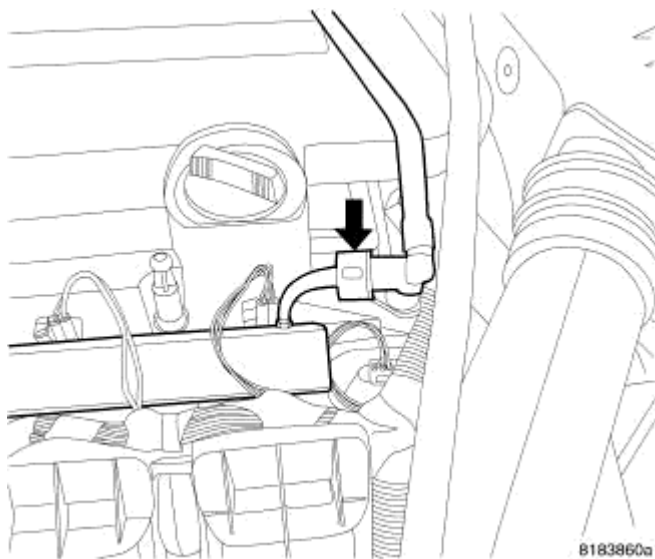


Fig. 165: FUEL LINE AT RAIL
Courtesy of CHRYSLER LLC

5. Disconnect the fuel line from the fuel rail. See **Fuel System/Fuel Delivery/FITTING, Quick Connect - Standard Procedure**.

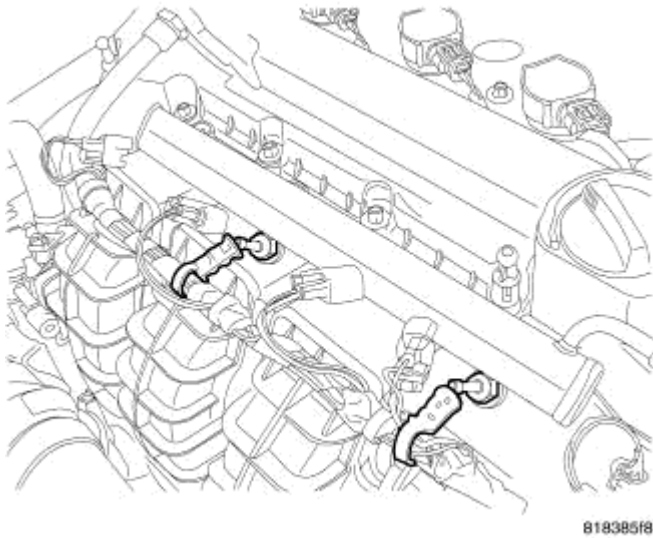


Fig. 166: Wire Harness From Fuel Rail Mounting Studs
Courtesy of CHRYSLER LLC

6. Remove wire harness from fuel rail mounting studs.

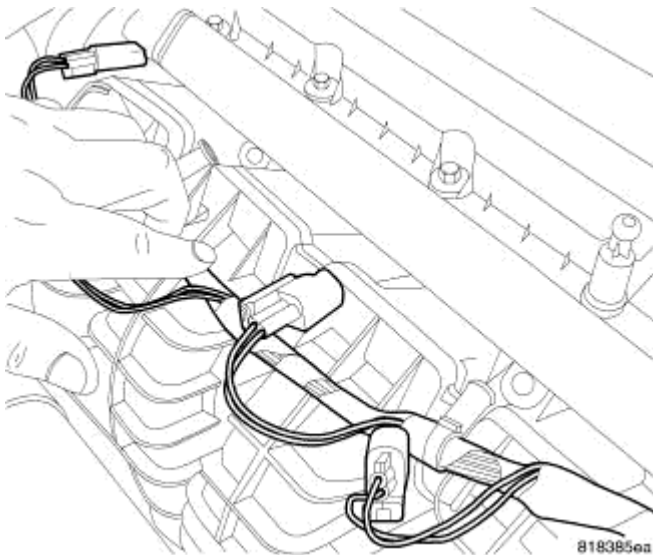


Fig. 167: Fuel Rail At Lower Manifold
Courtesy of CHRYSLER LLC

7. Remove the 2 bolts from the fuel rail at the lower manifold.

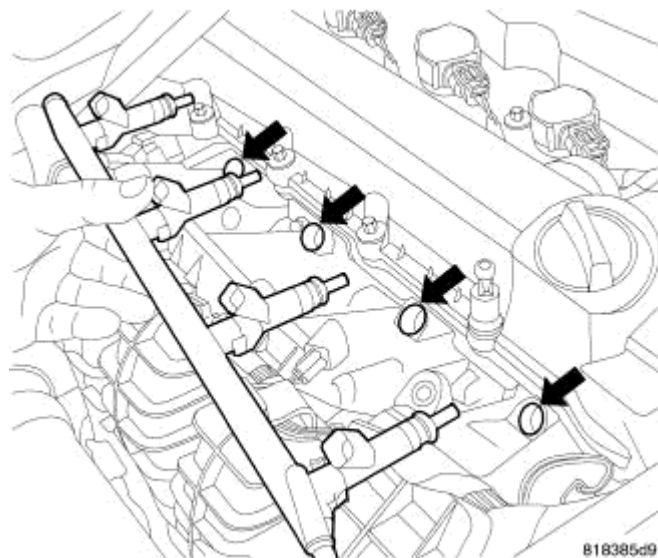


Fig. 168: RAIL REMOVAL/INSTALL
Courtesy of CHRYSLER LLC

8. Remove the fuel rail and injectors from the intake manifold.

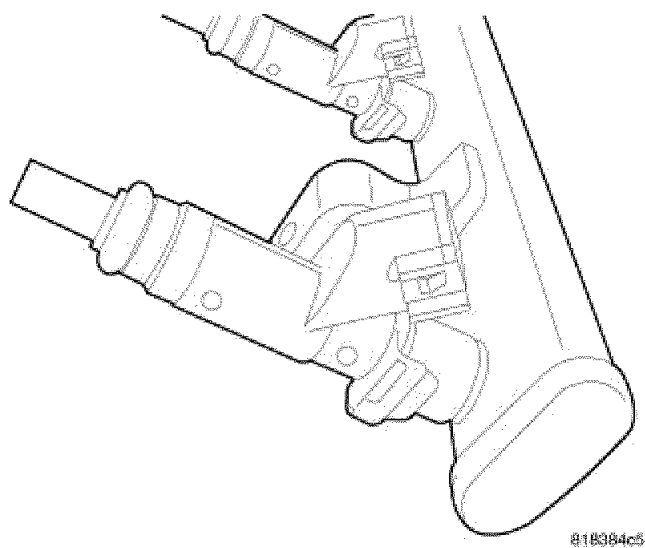
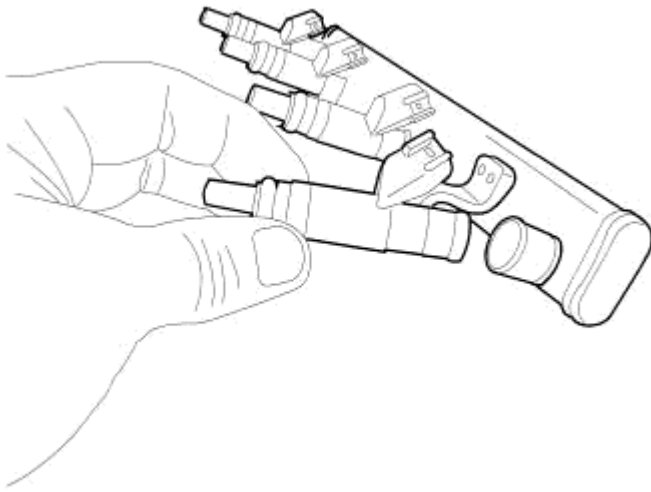


Fig. 169: FUEL RAIL ASSEMBLY
Courtesy of CHRYSLER LLC

9. Remove fuel injector clip holding fuel injector to fuel rail.

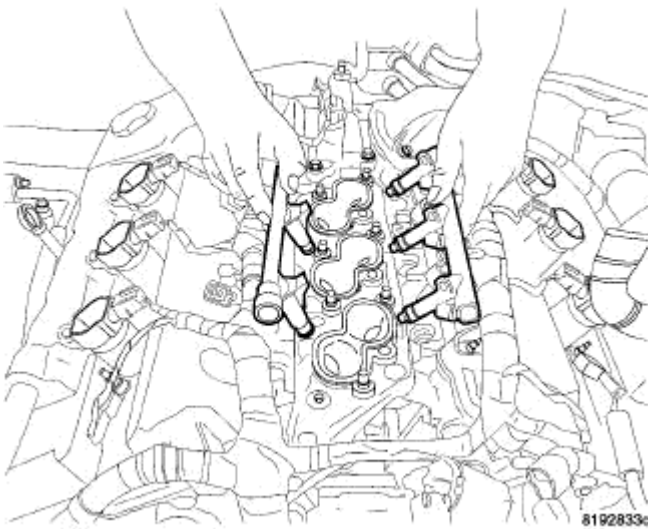


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Fig. 170: FUEL INJECTOR & RAIL
Courtesy of CHRYSLER LLC

10. Remove fuel injector from fuel rail.

2.7L

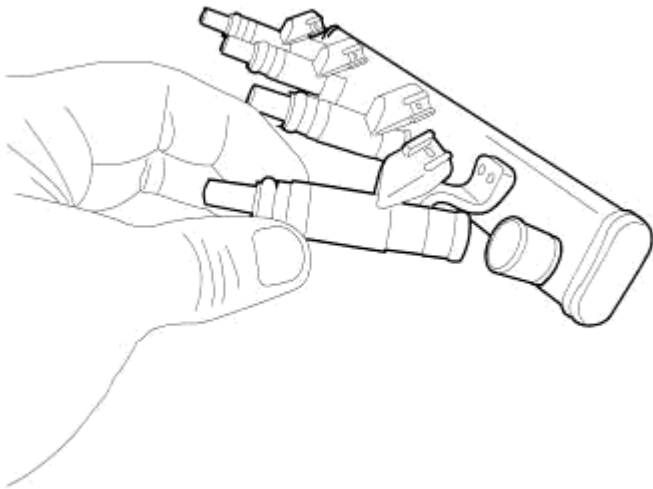


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Fig. 171: FUEL RAIL REMOVAL/INSTALL
Courtesy of CHRYSLER LLC

1. Release fuel system pressure. Refer to **Fuel System/Fuel Delivery - Standard Procedure**.
2. Disconnect negative cable to battery.
3. Remove intake manifold. Refer to **Engine/Manifolds/MANIFOLD, Intake - Removal**.
4. Cover intake manifold to prevent foreign material from entering engine.

5. Disconnect fuel supply tube quick connect fittings at the rear of intake manifold. Refer to **FITTING, Quick Connect**.
6. If the injector connectors are not tagged with their cylinder number, tag them to identify the correct cylinder
7. Remove electrical connectors from the fuel injectors.
8. Remove fuel rail mounting bolts.
9. Lift fuel rail straight up off of the cylinder head.



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Fig. 172: FUEL INJECTOR & RAIL
Courtesy of CHRYSLER LLC

10. Remove retaining clips from fuel injectors at fuel rail.
11. Remove fuel injectors.
12. Repeat for remaining injectors.
13. Check injector O-ring for damage. If O-ring is damaged, it must be replaced. Replace the injector clip if it is damaged.

3.5L

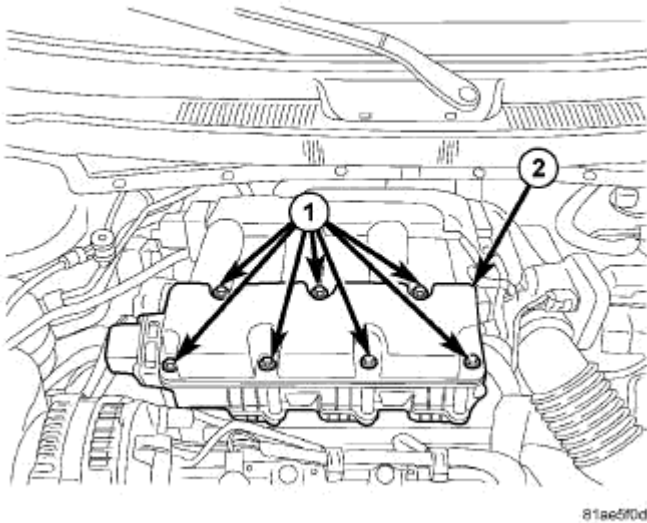


Fig. 173: INTAKE RETAINER VIEW
Courtesy of CHRYSLER LLC

WARNING: The fuel system is under a constant pressure (even with the engine off). Before servicing any part on the fuel system, the fuel system pressure must be released.

1. Release fuel pressure. See **Fuel System/Fuel Delivery - Standard Procedure**.
2. Disconnect and isolate negative battery cable at battery.
3. Remove the upper intake manifold. Refer to **Engine/Manifolds/MANIFOLD, Intake - Removal**.

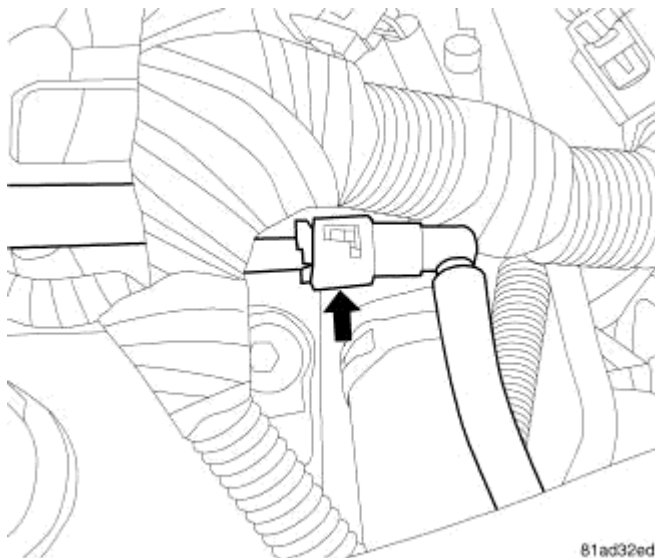


Fig. 174: RAIL CONNECTION
Courtesy of CHRYSLER LLC

4. Disconnect the quick connect fuel line from the fuel rail.

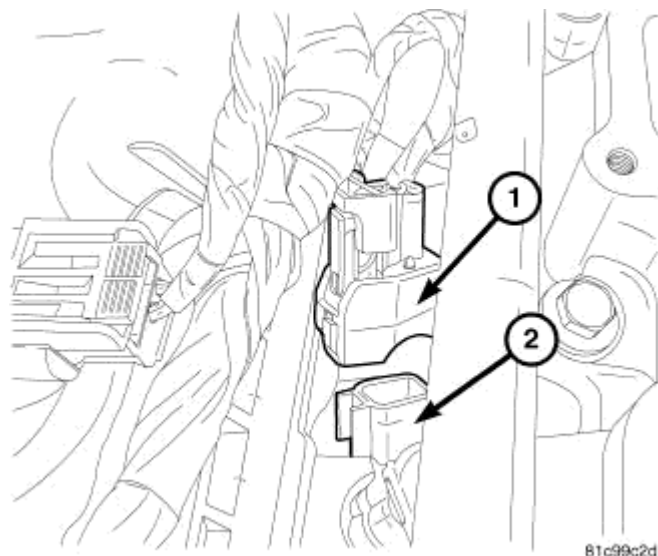


Fig. 175: Fuel Injector Electrical Connector
Courtesy of CHRYSLER LLC

NOTE: Mark fuel injector electrical harness connectors with correct corresponding cylinder numbers.

5. Disconnect all fuel injector electrical connectors (1) from fuel injectors (2).

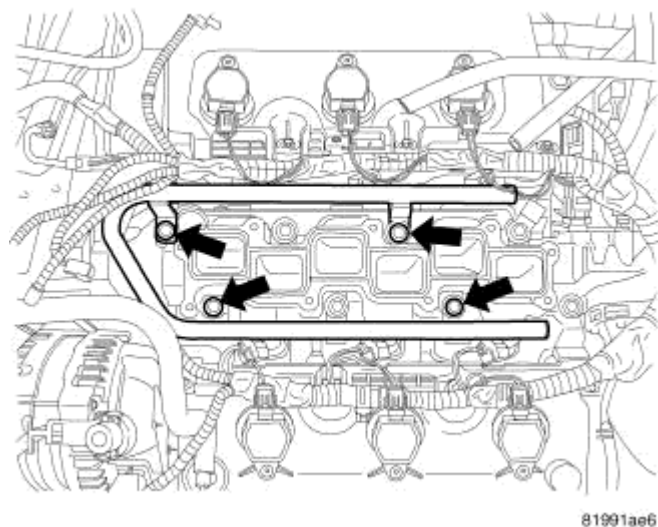


Fig. 176: Fuel Rail Mounting Bolts
Courtesy of CHRYSLER LLC

6. Remove fuel rail mounting bolts from fuel rail and lower intake manifold.

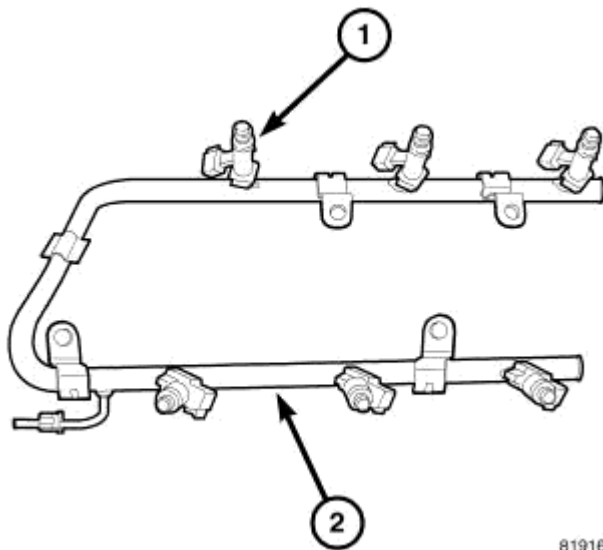


Fig. 177: FUEL RAIL

Courtesy of CHRYSLER LLC

NOTE: Gently rock the fuel rail and injectors back and forth to loosen the seals on the fuel injectors from the cylinder heads.

CAUTION: Do Not use excessive force or prying tools to remove fuel rail and injectors. Damage to the fuel rail and injectors may result.

7. Lift fuel rail straight up off of the cylinder heads.
8. Drain any excess fuel from the fuel rail into an approved fuel storage container.

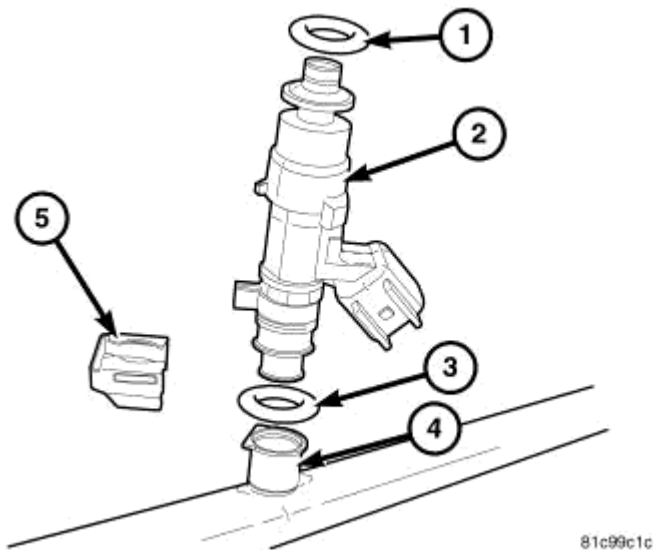


Fig. 178: FUEL INJECTOR REMOVAL/INSTALLATION

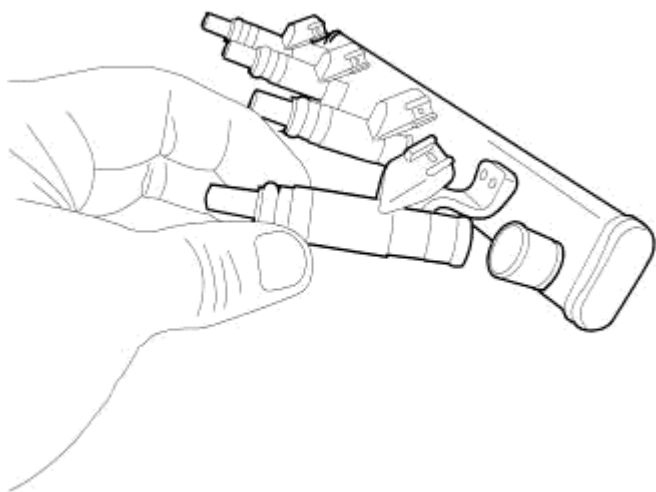
Courtesy of CHRYSLER LLC

NOTE: When replacing individual fuel injectors, each fuel injector must be installed to its original position. Mark or tag each fuel injector to identify the correct cylinder.

9. Remove retaining clips (5) from fuel injectors (2) at fuel rail (4).

Installation

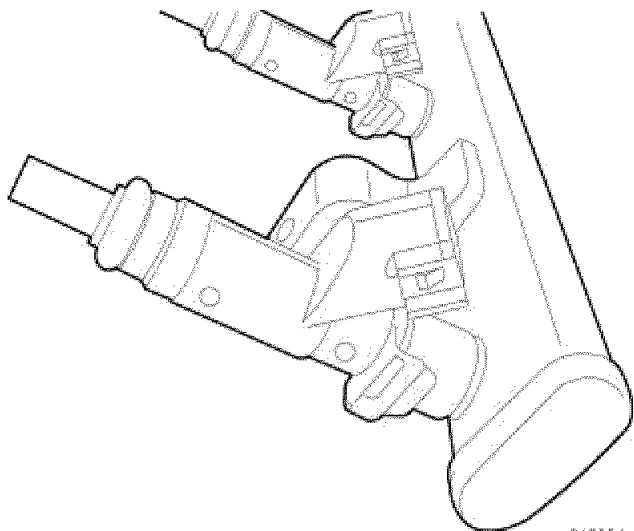
2.4L



81837e38

Fig. 179: FUEL INJECTOR & RAIL
Courtesy of CHRYSLER LLC

1. Apply a light coating of clean engine oil to the upper O-ring.
2. Install injector in cup on fuel rail.



818384c5

Fig. 180: FUEL RAIL ASSEMBLY

Courtesy of CHRYSLER LLC

3. Install retaining clip.

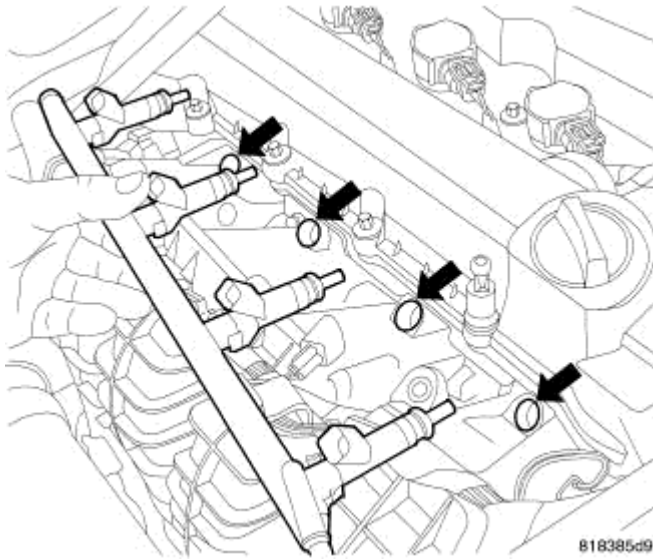


Fig. 181: RAIL REMOVAL/INSTALL

Courtesy of CHRYSLER LLC

4. Apply a light coating of clean engine oil to the O-ring on the nozzle end of each injector.
5. Insert fuel injector nozzles into openings in lower intake manifold. Seat the injectors in place.

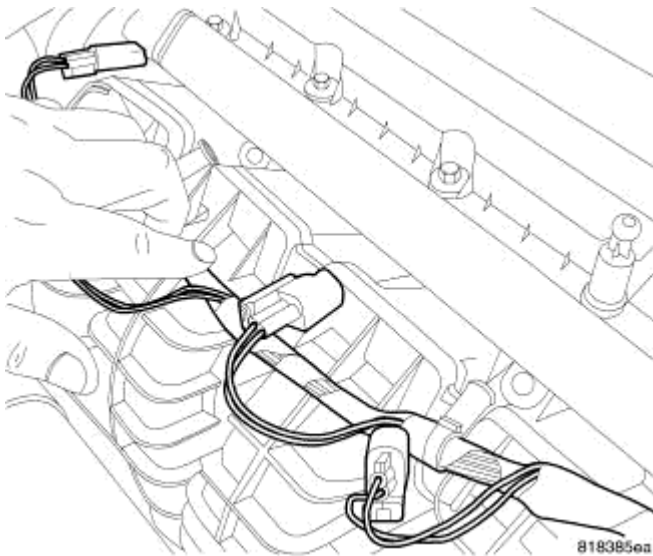


Fig. 182: Fuel Rail At Lower Manifold

Courtesy of CHRYSLER LLC

6. Install fuel rail mounting screws, tighten to 27 N.m (20 ft. lbs.).

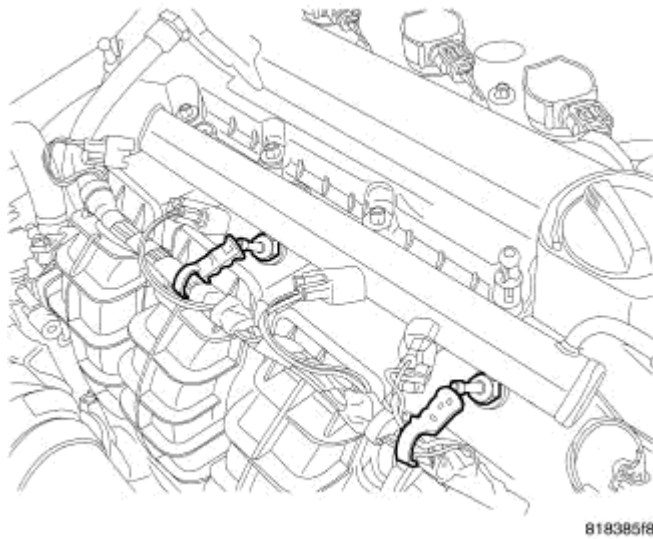


Fig. 183: Wire Harness From Fuel Rail Mounting Studs
Courtesy of CHRYSLER LLC

7. Install wiring harness clips to the fuel rail mounting studs.

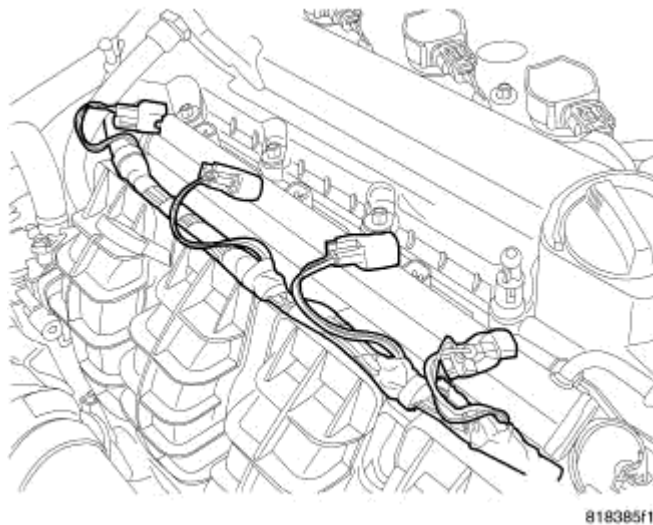


Fig. 184: Electrical Connectors From Fuel Injectors
Courtesy of CHRYSLER LLC

8. Connect and lock the electrical connectors to the fuel injectors.

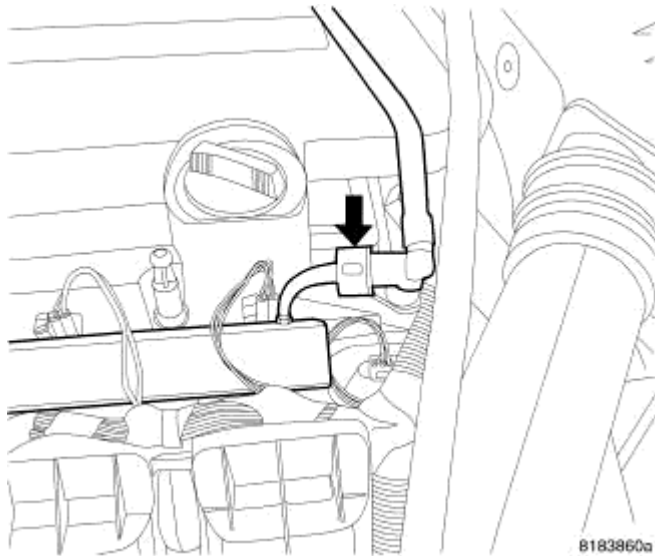


Fig. 185: FUEL LINE AT RAIL
Courtesy of CHRYSLER LLC

9. Connect fuel supply tube to fuel rail. See **Fuel System/Fuel Delivery/FITTING, Quick Connect - Standard Procedure.**
10. Connect negative battery cable, tighten nut to 5 N.m (45 in. lbs.).
11. Use the scan tool to pressurize the fuel system. Check for leaks.
12. Install engine cover.

2.7L

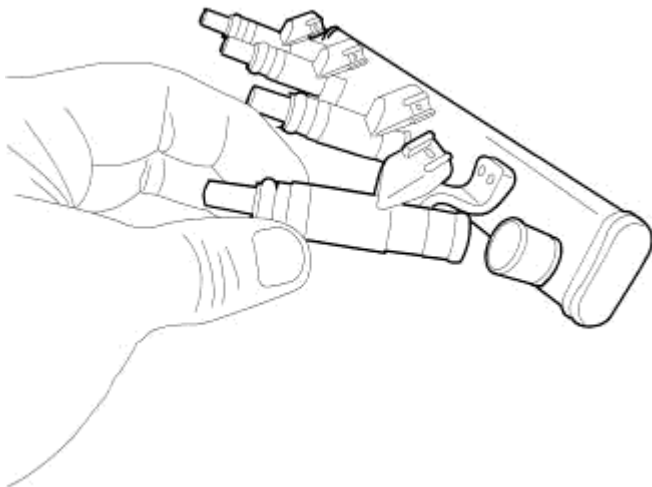


Fig. 186: FUEL INJECTOR & RAIL
Courtesy of CHRYSLER LLC

1. Lightly lubricate the fuel injector O-rings with a couple drops of clean engine oil.

2. Install fuel injectors.
3. Install retaining clips on fuel injectors.
4. Push injectors into fuel injector rail until clips are in the correct position.

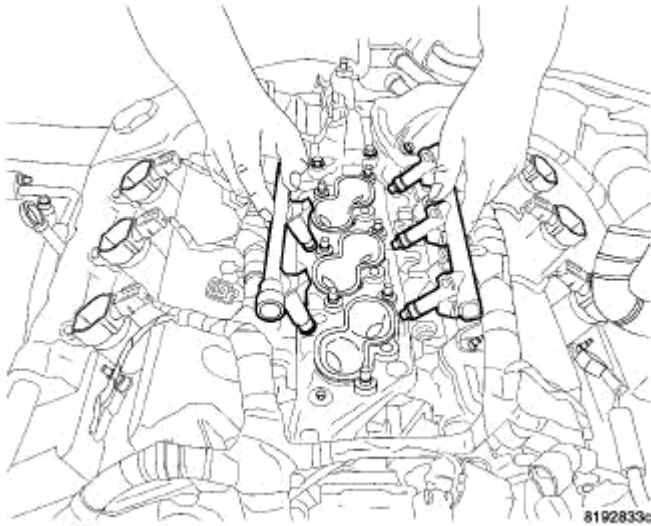


Fig. 187: FUEL RAIL REMOVAL/INSTALL
Courtesy of CHRYSLER LLC

5. Position fuel rail over cylinder head, and push rail into place. Tighten fuel rail mounting bolts to 11 N.m (100 in. lbs.).
6. Connect fuel supply tube quick connect fittings at the rear of intake manifold. Refer to **FITTING, Quick Connect**.
7. Connect electrical connectors to fuel injectors.
8. Install intake manifold. Refer to **Engine/Manifolds/MANIFOLD, Intake - Installation** .
9. Connect negative cable to battery.

3.5L

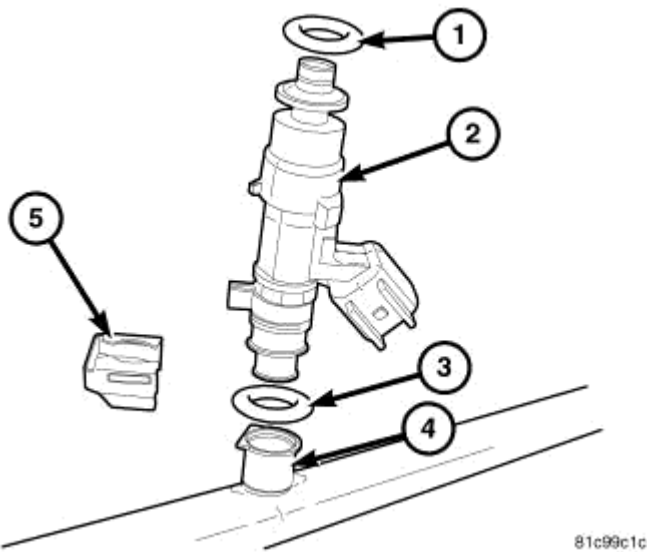


Fig. 188: FUEL INJECTOR REMOVAL/INSTALLATION

Courtesy of CHRYSLER LLC

NOTE: Inspect each O-ring seal on all the fuel injectors, replace O-ring seals if any damaged is noted. Note the fuel injector O-rings are color coded. The Blue colored O-ring is for the fuel rail side and the Green colored O-ring is cylinder head side.

NOTE: If individual fuel injectors are being replaced, return the remaining fuel injectors to the original positions noted during removal.

1. Install and lubricate each fuel injector O-rings (1), (3) with a light drop of clean engine oil.
2. Install all of the fuel injectors (2) to the fuel rail (4), then install the retaining clip (5) to the fuel rail (4).

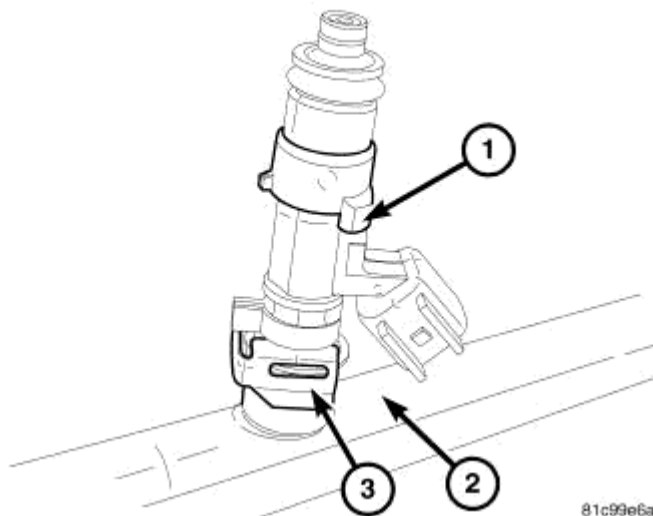


Fig. 189: PROPERLY SEATED FUEL INJECTOR

Courtesy of CHRYSLER LLC

3. Inspect each fuel injector for proper installation. Note how the retaining clip (3) secures the fuel injector (1) to the fuel rail (2).

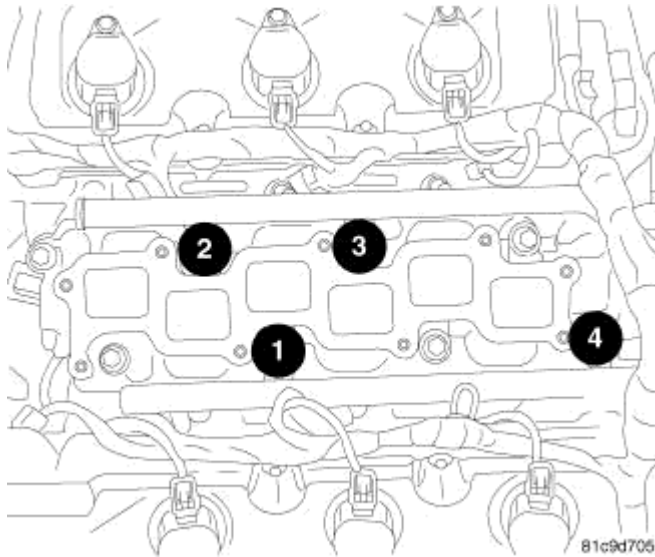


Fig. 190: Fuel Rail Bolts Tightening Sequence

Courtesy of CHRYSLER LLC

CAUTION: The fuel rail bolts are actually lower intake manifold bolts. These bolts must be torqued in a mandatory torque sequence.

4. Insert fuel injector nozzles into openings in the cylinder heads. Seat the injectors in place. Install the fuel rail bolts and tighten bolts in a mandatory torque sequence to 28 N.m (20.5 ft. lbs.).
5. Correctly position and connect the fuel injector electrical harness connectors to the fuel injectors.

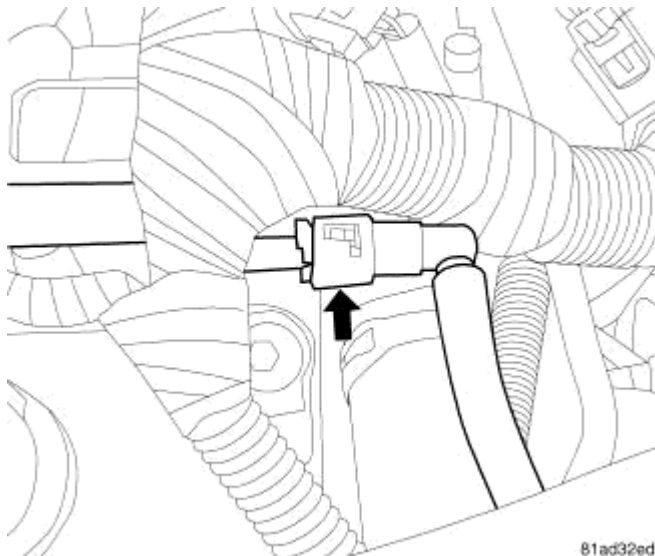


Fig. 191: RAIL CONNECTION

Courtesy of CHRYSLER LLC

CAUTION: Make sure the fuel line quick connector is connected properly. Failure to connect the fuel line correctly may result in a fuel leak at the rail assembly. Fuel leaked onto a hot engine may ignite resulting in damage to the vehicle.

6. Connect quick connect fuel line to fuel rail.

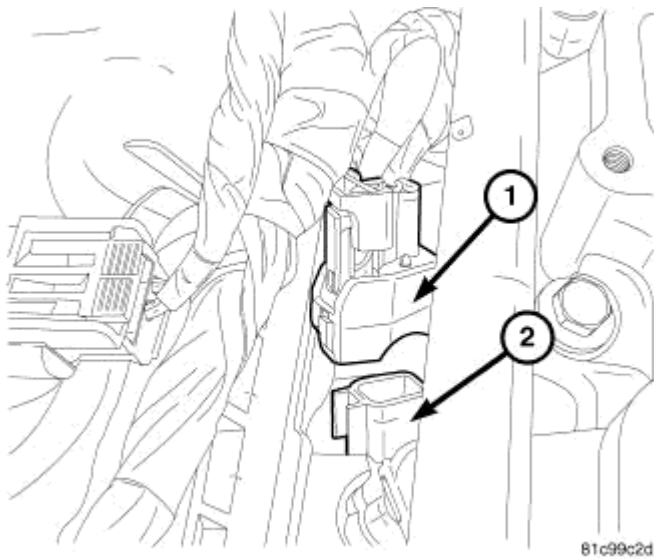


Fig. 192: Fuel Injector Electrical Connector

Courtesy of CHRYSLER LLC

7. Connect all fuel injector electrical connectors (1) to fuel injectors (2).

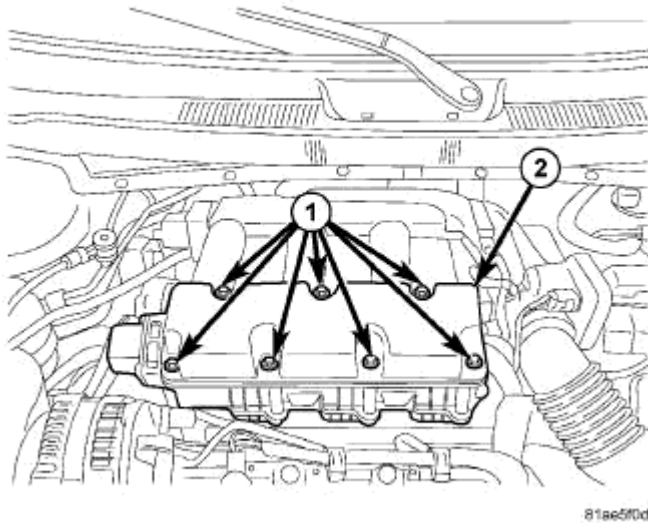


Fig. 193: INTAKE RETAINER VIEW
Courtesy of CHRYSLER LLC

8. Install upper intake manifold. Refer to **Engine/Manifolds/MANIFOLD, Intake - Installation**.
9. Connect the negative battery cable, tighten the nut to 5 N.m (45 in. lbs.).
10. Use the scan tool ASD Fuel System Test to pressurize the fuel system. Check for leaks.

PEDAL, ACCELERATOR

Removal

REMOVAL

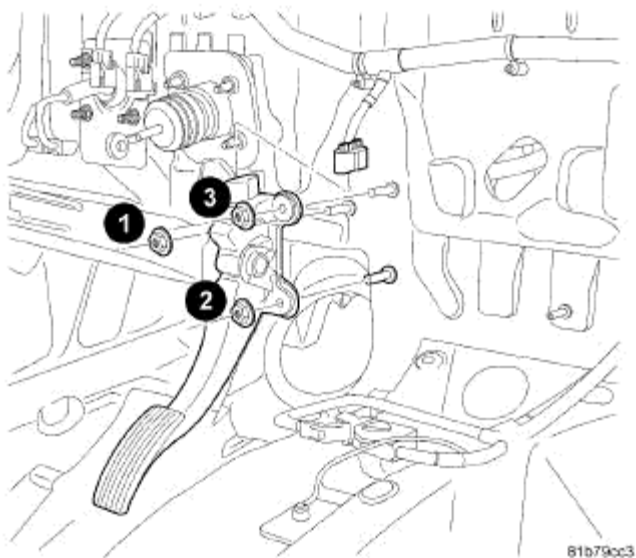
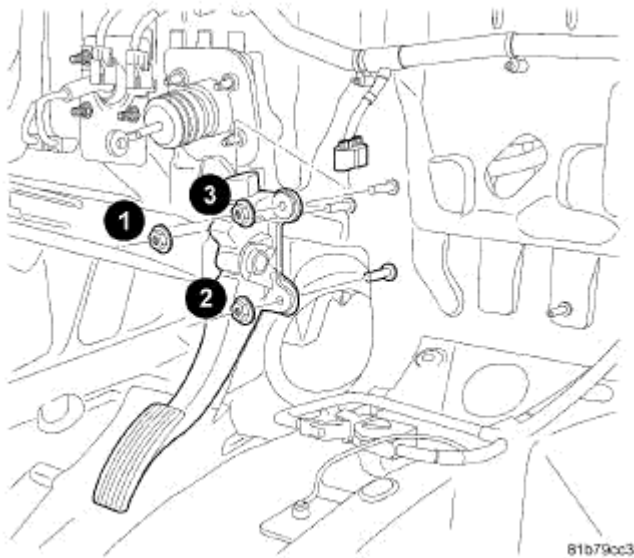


Fig. 194: ACCELERATOR PEDAL

Courtesy of CHRYSLER LLC

1. Disconnect and isolate negative battery cable at battery.
2. Disconnect the electrical connector from accelerator pedal.
3. Remove mounting nuts and remove accelerator pedal from the mounting studs.

Installation**INSTALLATION****Fig. 195: ACCELERATOR PEDAL**

Courtesy of CHRYSLER LLC

CAUTION: The accelerator pedal and mounting nuts need to be torque in a mandatory torque sequence or damage could result to the pedal assembly.

1. Install the accelerator pedal and mounting nuts to the mounting studs. Tighten the nuts in a mandatory torque sequence to 16 N.m (12 ft. lbs.).
2. Connect the electrical connector from accelerator pedal.
3. Connect negative battery cable, tighten nut to 5 N.m (45 in. lbs.).
4. Use a scan tool and perform the APPS RELEARN function.

SENSOR, AIR TEMPERATURE, INLET**Removal****REMOVAL**

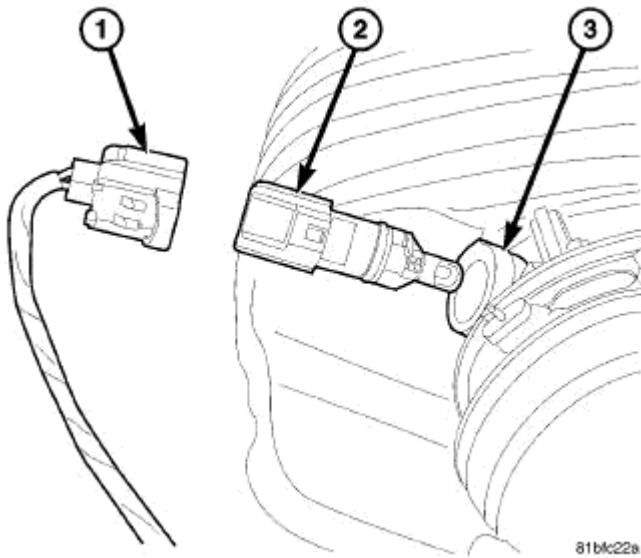


Fig. 196: AIR TEMPERATURE SENSOR
Courtesy of CHRYSLER LLC

1. Disconnect and isolate negative battery cable.

NOTE: **Clean dirt from sensor area prior to removal from air box.**

2. Disconnect the inlet air temperature sensor electrical connector (1).
3. Remove the inlet air temperature sensor (2) from the air box (3) by turning the sensor 1/4 turn in the counter - clockwise direction.

Installation

INSTALLATION

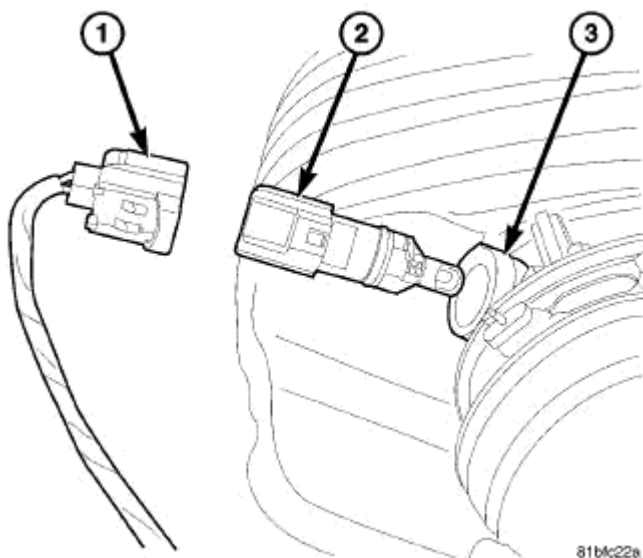


Fig. 197: AIR TEMPERATURE SENSOR

Courtesy of CHRYSLER LLC

1. Install the inlet air temperature sensor (2) to the air box (3) by turning the sensor 1/4 turn in the clockwise direction.
2. Connect the inlet air temperature sensor electrical connector (1).
3. Connect negative battery cable, tighten nut to 5 N.m (45 in. lbs.).

SENSOR, CRANKSHAFT POSITION

Operation

OPERATION

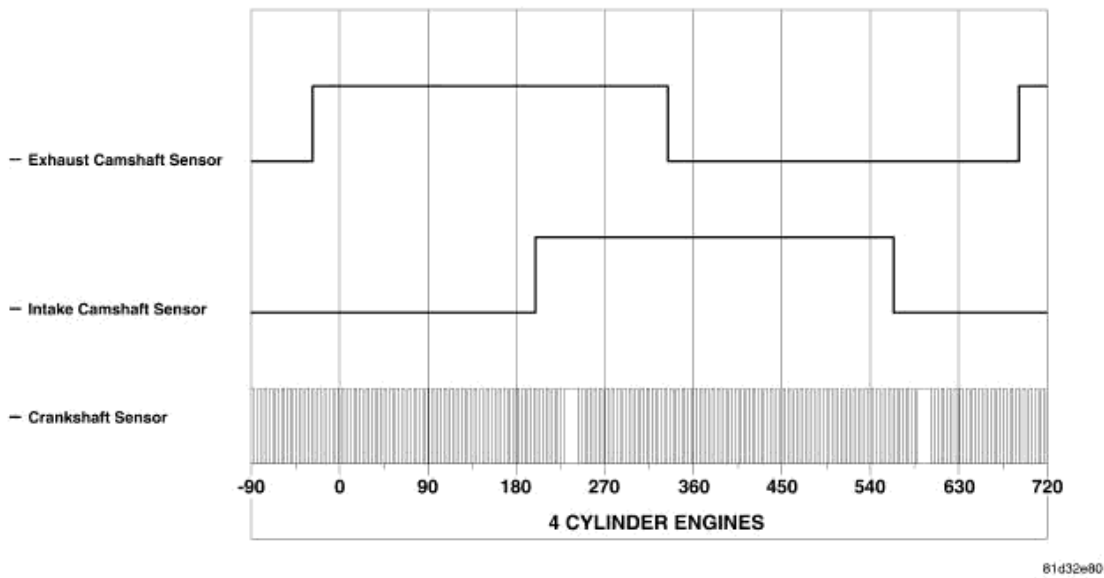


Fig. 198: 4 Cylinder Camshaft & Crankshaft Signals
Courtesy of CHRYSLER LLC

NOTE: The graphic represents the relationship between camshaft and crankshaft sensors edges with camshafts in "lock pin" position (cam shafts are not "phasing"). This is normally seen during idle.

Depiction of good camshaft and crankshaft square wave signals for 4 cylinder engines.

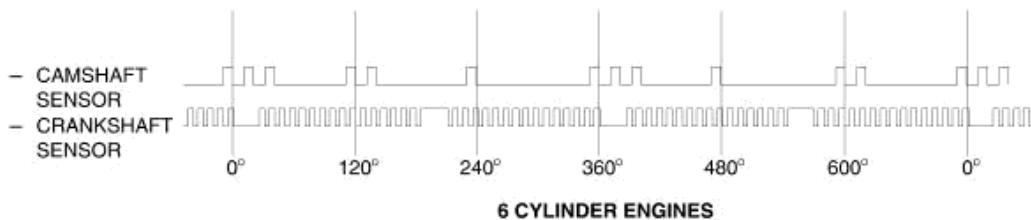


Fig. 199: 6 Cylinder Camshaft & Crankshaft Signals
Courtesy of CHRYSLER LLC

Depiction of good camshaft and crankshaft square wave signals for 6 cylinder engines.

Removal

2.4L

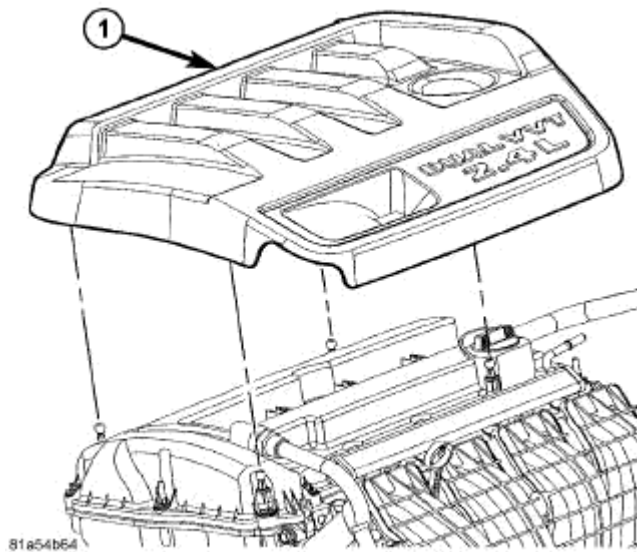


Fig. 200: ENGINE COVER
Courtesy of CHRYSLER LLC

The Crankshaft Position Sensor is in the rear of the engine block near the transmission.

1. Remove the engine cover (1).

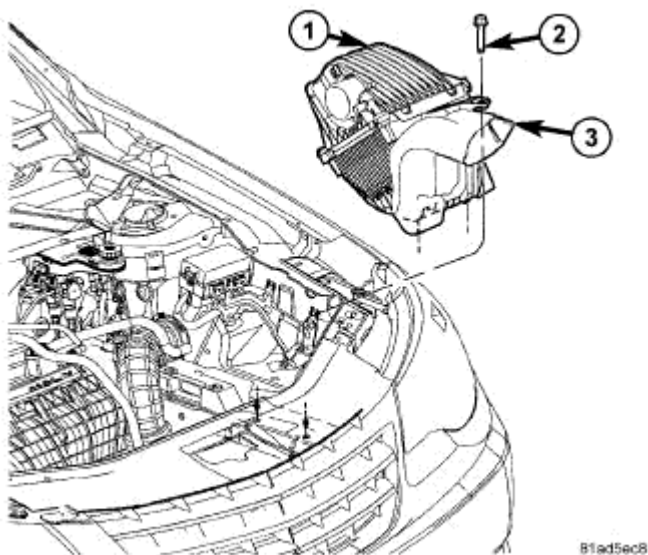


Fig. 201: Air Cleaner Body

Courtesy of CHRYSLER LLC

2. Disconnect and isolate the negative battery cable.
3. Remove the air cleaner body (1). Refer to Engine/Air Intake System/BODY, Air Cleaner - Removal.

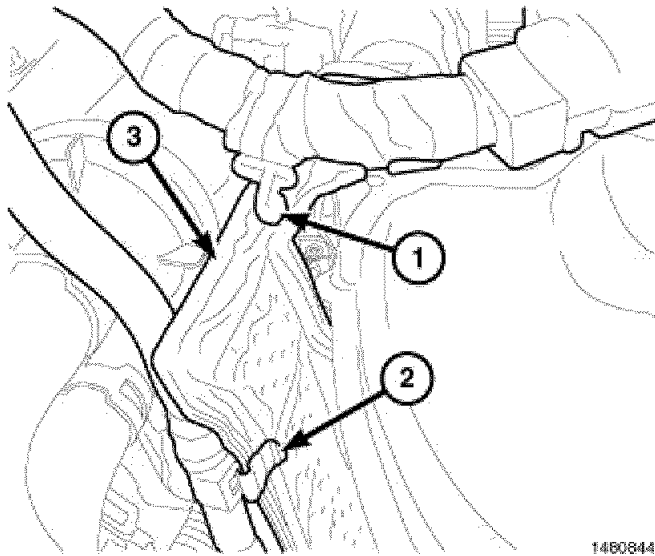


Fig. 202: Upstream O2 Sensor Wire Harness Retainer
Courtesy of CHRYSLER LLC

4. Disengage the upstream O2 sensor wire harness retainer (1) and crankshaft position sensor wire harness retainer (2) from the heat shield (3).

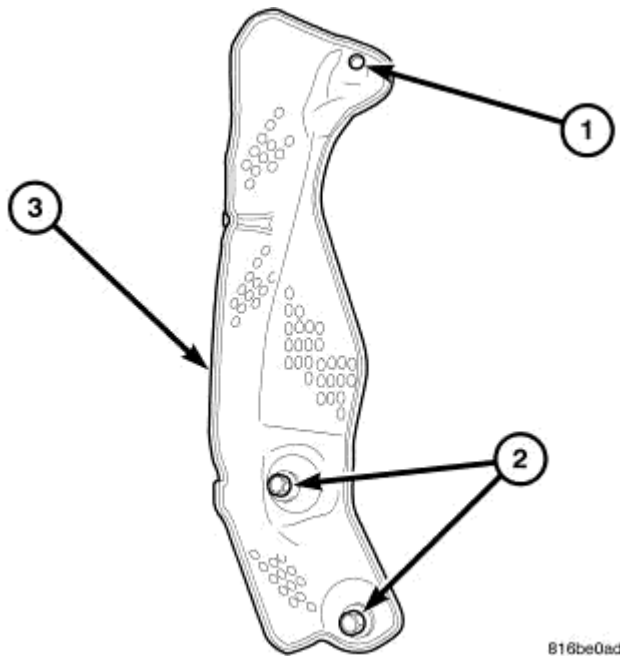


Fig. 203: Heat Shield Retaining Bolts
Courtesy of CHRYSLER LLC

5. Remove one nut (1) and two heat shield retaining bolts (2).
6. Remove heat shield (3).

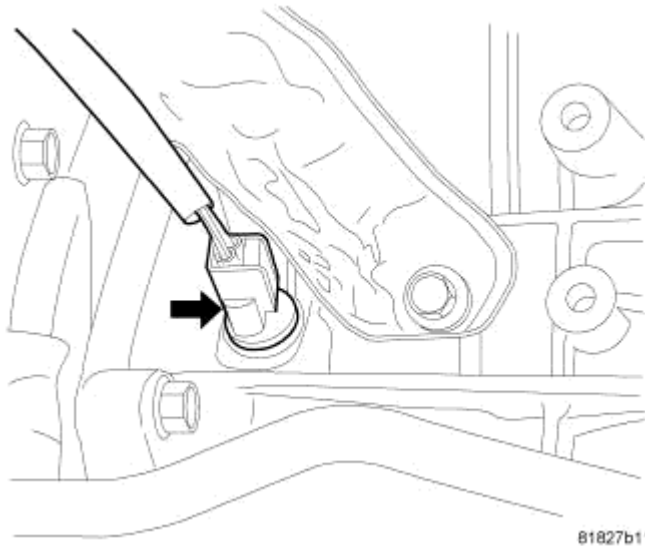


Fig. 204: Electrical Connector To Crankshaft Position Sensor
Courtesy of CHRYSLER LLC

7. Remove the crankshaft position sensor mounting bolt.
8. Remove sensor with the wire harness attached.
9. Unlock and disconnect the electrical connector from the crankshaft position sensor.

2.7L

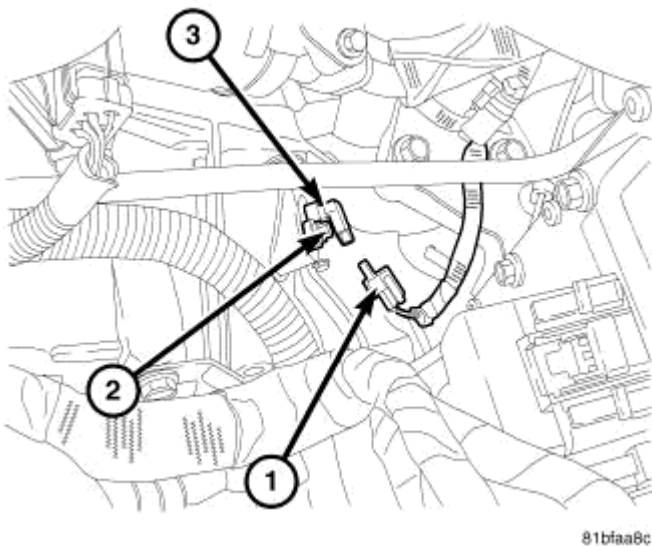


Fig. 205: CRANKSHAFT POSITION SENSOR - 2.7L
Courtesy of CHRYSLER LLC

NOTE: If the CKP sensor (3) is difficult to remove twist side to side during removal.

1. Disconnect and isolate negative battery cable.
2. Disconnect electrical connector (1) from crankshaft position (CKP) sensor (3).
3. Remove bolt (2) and remove CKP sensor (3) from transmission housing.

3.5L

NOTE: The crankshaft position sensor is located on the driver side of the vehicle, above the differential housing. The bottom of the sensor sits above the drive plate.

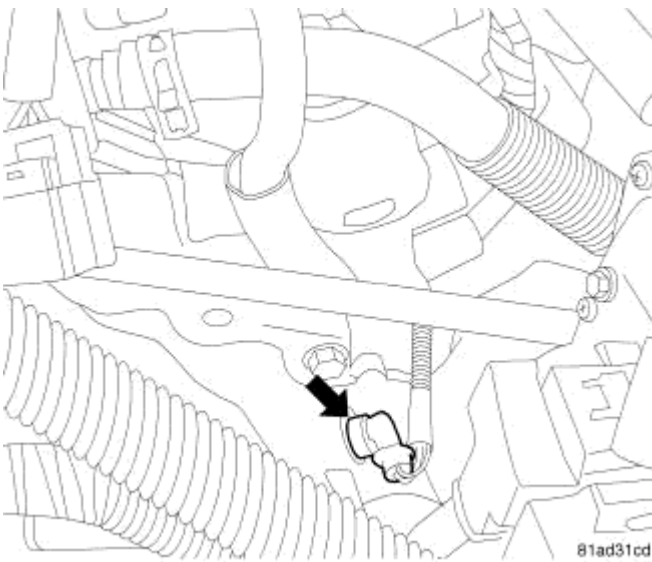


Fig. 206: CRANKSHAFT POSITION SENSOR - 3.5L
Courtesy of CHRYSLER LLC

1. Disconnect and isolate the negative battery cable.
2. Unlock and disconnect the electrical connector from the crankshaft position sensor.
3. Remove the sensor mounting screw and the sensor.

Installation

2.4L

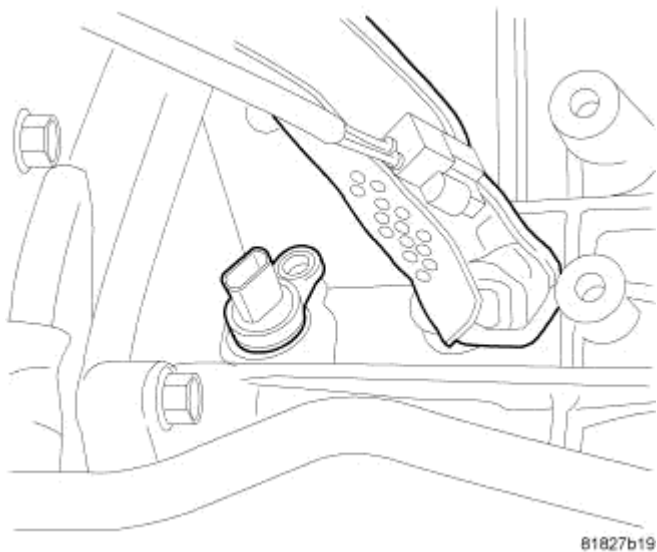


Fig. 207: HEAT SHIELD REMOVED

Courtesy of CHRYSLER LLC

1. Check O-ring for damage and lubricate the O-ring with engine oil before installing sensor.
2. Using a twisting motion, install the crankshaft position sensor.
3. Install the crankshaft position sensor bolt. Tighten the bolt to 9 N.m (80 in. lbs.).

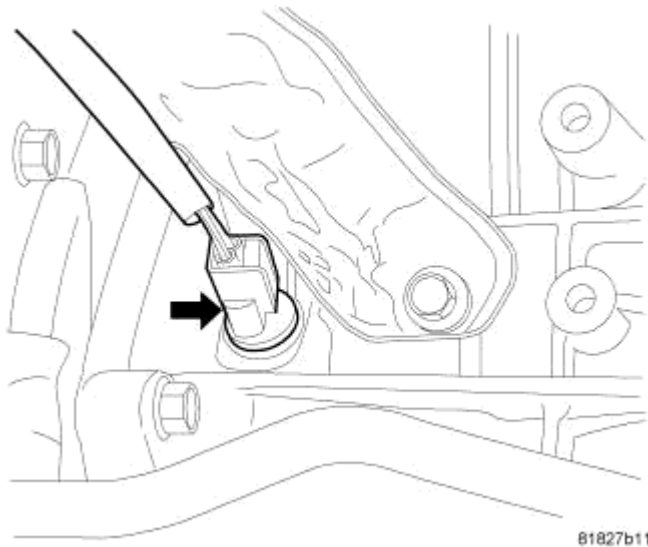


Fig. 208: Electrical Connector To Crankshaft Position Sensor

Courtesy of CHRYSLER LLC

4. Connect and lock the electrical connector to the crankshaft position sensor.

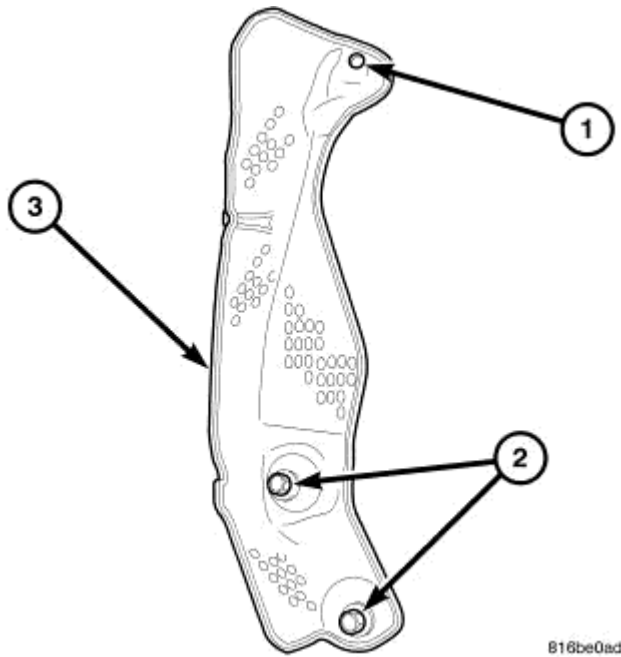


Fig. 209: Heat Shield Retaining Bolts
Courtesy of CHRYSLER LLC

5. Install the heat shield (3) with one nut (1) and two heat shield retaining bolts (2).

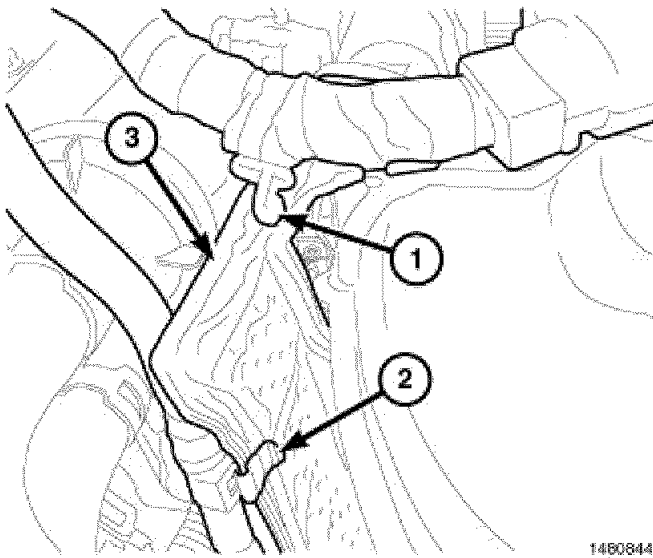


Fig. 210: Upstream O2 Sensor Wire Harness Retainer
Courtesy of CHRYSLER LLC

6. Install the upstream O2 sensor wire harness retainer (1) and crankshaft position sensor wire harness retainer (2) to the heat shield (3).

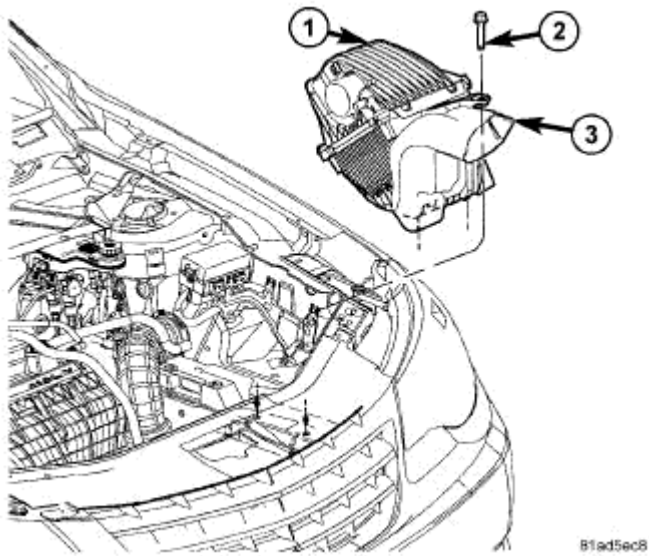


Fig. 211: Air Cleaner Body
Courtesy of CHRYSLER LLC

7. Install the air cleaner body (1). Refer to **Engine/Air Intake System/BODY, Air Cleaner - Installation**

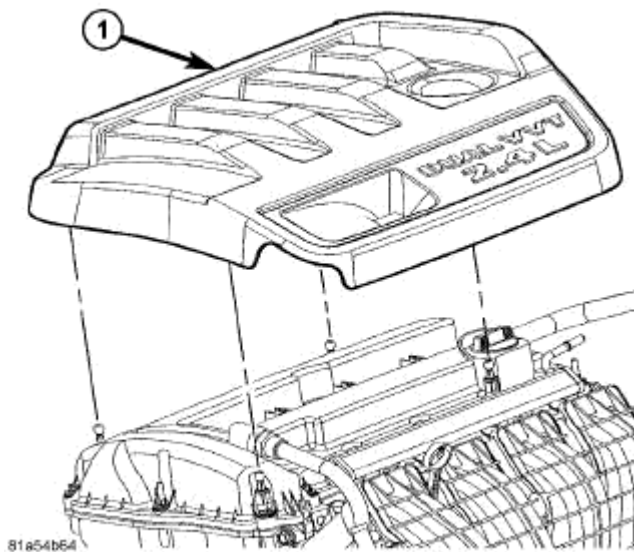


Fig. 212: ENGINE COVER
Courtesy of CHRYSLER LLC

8. Connect the negative battery cable.
9. Install the engine cover (1).

2.7L

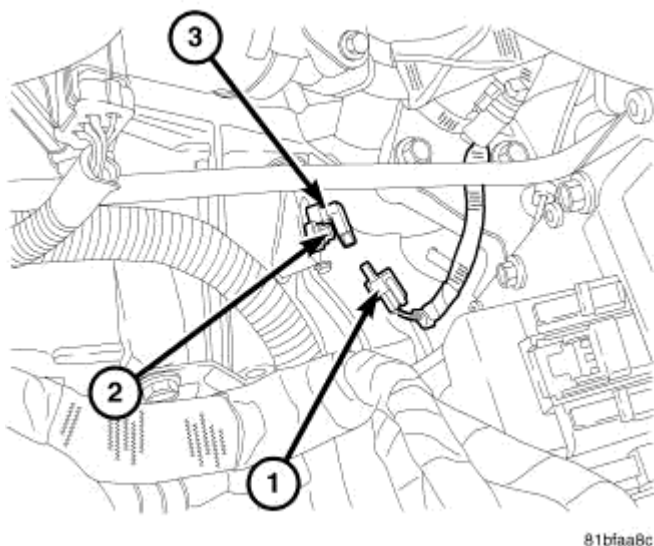


Fig. 213: CRANKSHAFT POSITION SENSOR - 2.7L

Courtesy of CHRYSLER LLC

NOTE: If reinstalling the sensor, check the sensor O-ring for damage and replace if necessary. Lubricate the O-ring with clean engine oil before installing the sensor.

1. Push the crankshaft position (CKP) sensor (3) into the transmission case with a twisting motion until fully seated.

CAUTION: Before tightening the sensor mounting bolt, be sure the sensor is completely flush to the mounting surface. If the sensor is not flush, damage to the sensor mounting tang may result.

2. While holding the sensor in this position, install and tighten the retaining bolt (2) to 9 N.m (79.5 in. lbs.).
3. Connect and lock the electrical connector (1) to the CKP sensor (3).
4. Connect the negative battery cable and tighten nut to 5 N.m (45 in. lbs.).

NOTE: The Cam/Crank Variation Relearn procedure must be performed anytime there has been a repair/replacement made to a powertrain system, for example: flywheel, valvetrain, camshaft and/or crankshaft sensors or components. Refer to DTC-Based Diagnostics/MODULE, Powertrain Control (PCM) - Standard Procedure

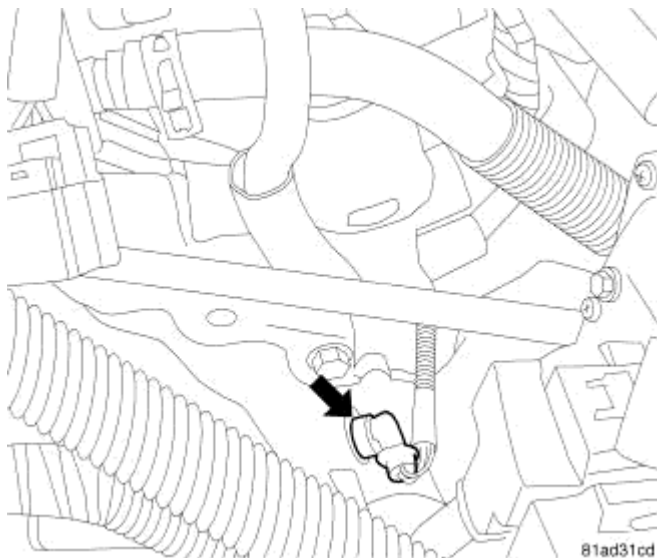


Fig. 214: CRANKSHAFT POSITION SENSOR - 3.5L

Courtesy of CHRYSLER LLC

NOTE: If reinstalling the sensor, check the sensor O-ring for damage and replace if necessary. Lubricate the O-ring with clean engine oil before installing the sensor.

1. Push the crankshaft position (CKP) sensor into the transmission case with a twisting motion until fully seated.

CAUTION: Before tightening the sensor mounting bolt, be sure the sensor is completely flush to the mounting surface. If the sensor is not flush, damage to the sensor mounting tang may result.

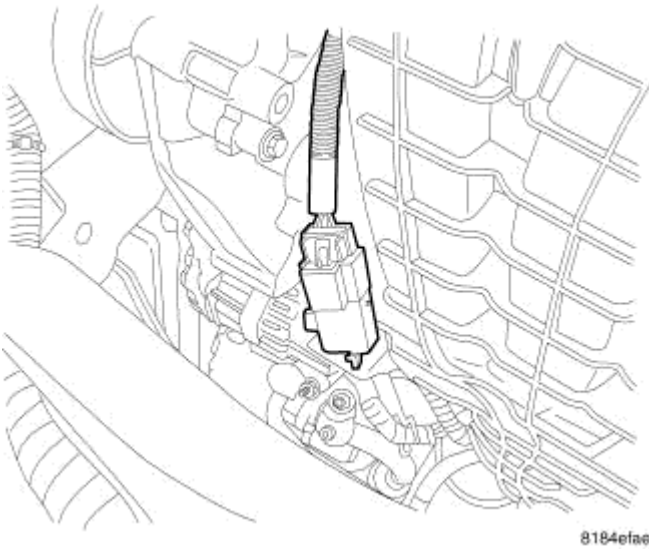
2. While holding the sensor in this position, install and tighten the retaining bolt to 12 N.m (105 in. lbs.).
3. Connect and lock the electrical connector to the CKP sensor.
4. Connect the negative battery cable and tighten nut to 5 N.m (45 in. lbs.).

NOTE: The Cam/Crank Variation Relearn procedure must be performed anytime there has been a repair/replacement made to a powertrain system, for example: flywheel, valvetrain, camshaft and/or crankshaft sensors or components. Refer to DTC-Based Diagnostics/MODULE, Powertrain Control (PCM) - Standard Procedure

SENSOR, MANIFOLD AIR PRESSURE (MAP)

Removal

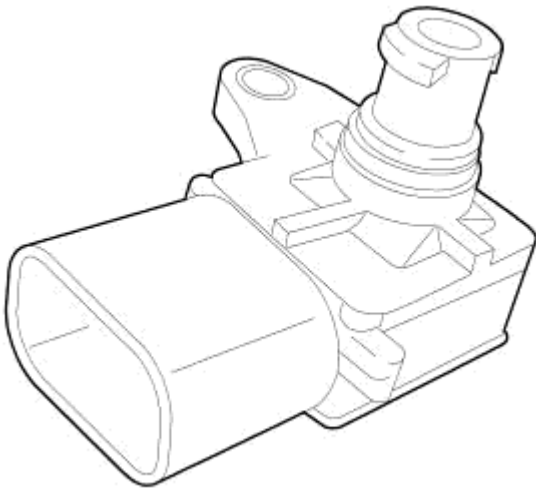
2.4L



8184efa6

Fig. 215: Manifold Air Pressure Sensor Electrical Connector
Courtesy of CHRYSLER LLC

1. Disconnect and isolate negative battery cable.
2. Disconnect electrical connector from manifold absolute pressure (MAP) sensor.
3. Remove screw from MAP sensor.



8184efa2

Fig. 216: Manifold Air Pressure Sensor
Courtesy of CHRYSLER LLC

4. Remove MAP sensor.

2.7L

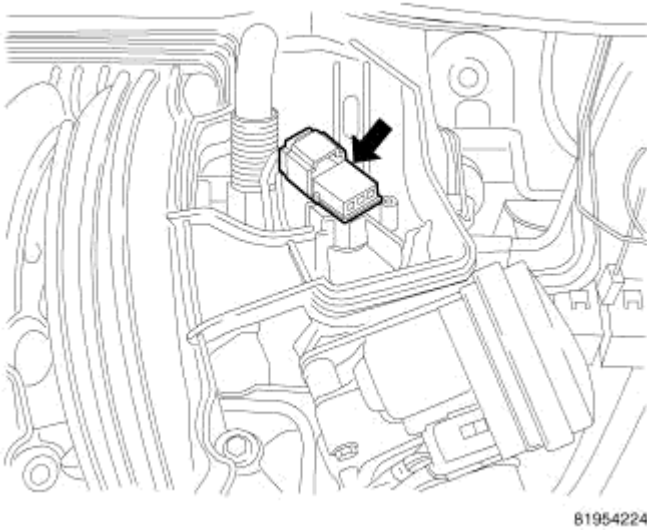


Fig. 217: Manifold Air Pressure Sensor Location
Courtesy of CHRYSLER LLC

1. Disconnect and isolate the negative battery cable.

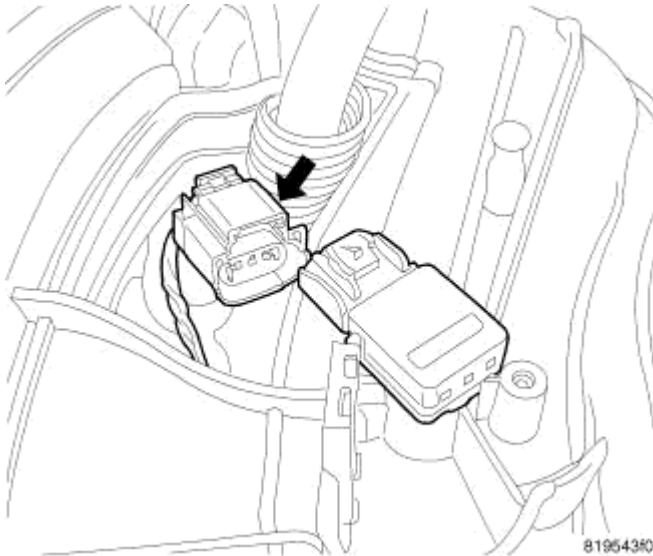


Fig. 218: Electrical Connector From Manifold Air Pressure Sensor
Courtesy of CHRYSLER LLC

2. Disconnect the electrical connector from the MAP sensor.

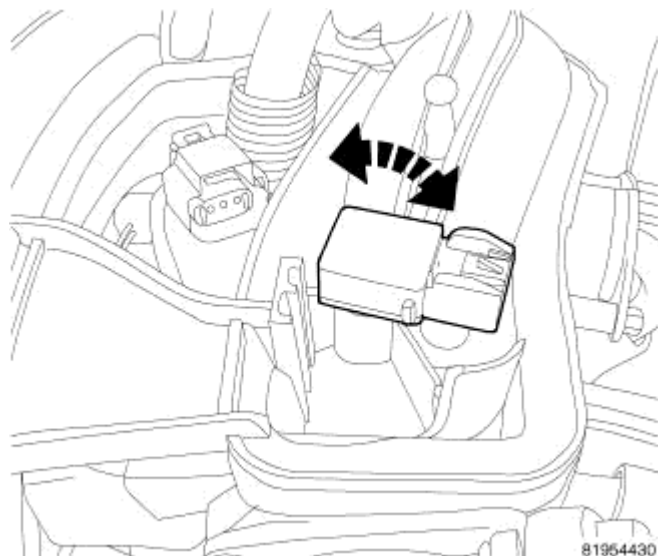


Fig. 219: Turn To Remove Manifold Air Pressure Sensor
Courtesy of CHRYSLER LLC

3. Turn sensor counterclockwise.

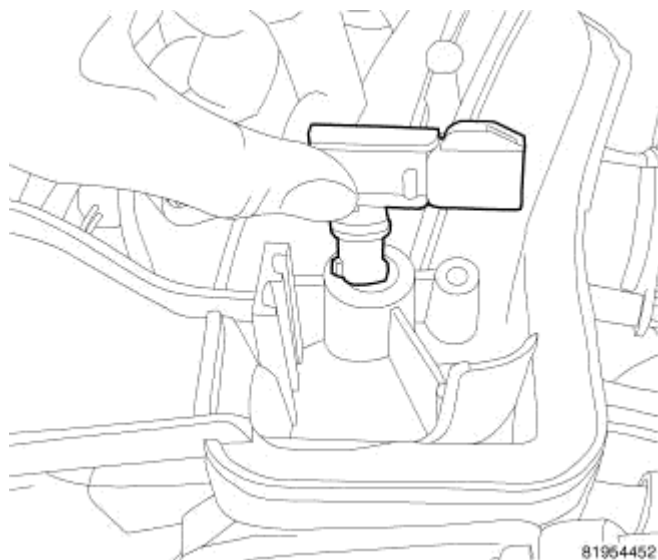


Fig. 220: Lift To Remove Manifold Air Pressure Sensor
Courtesy of CHRYSLER LLC

4. Lift sensor to remove.

3.5L

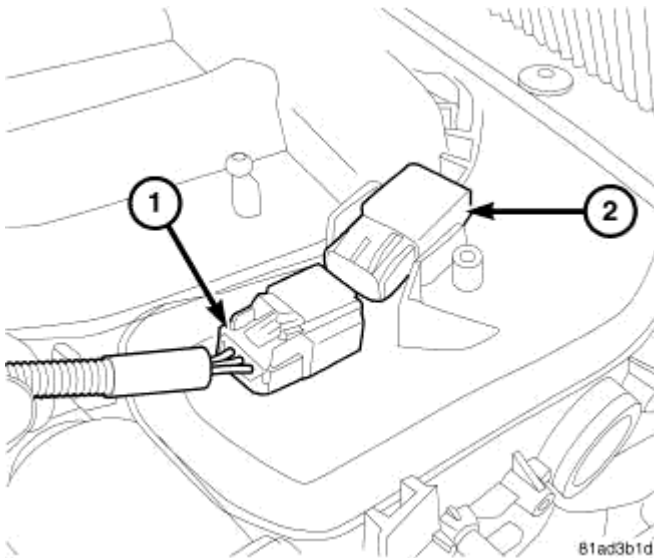


Fig. 221: Electrical Connector From Manifold Air Pressure Sensor
Courtesy of CHRYSLER LLC

1. Disconnect and isolate negative battery cable.
2. Disconnect the electrical connector from the MAP sensor.

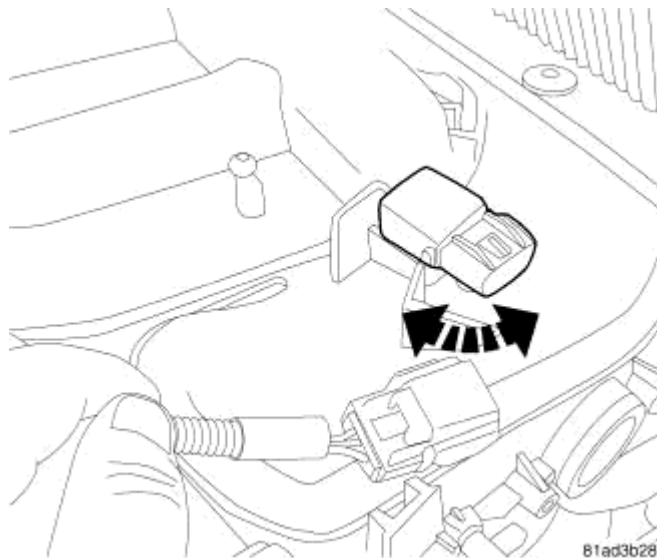


Fig. 222: Rotate Manifold Air Pressure Sensor
Courtesy of CHRYSLER LLC

3. Rotate sensor.

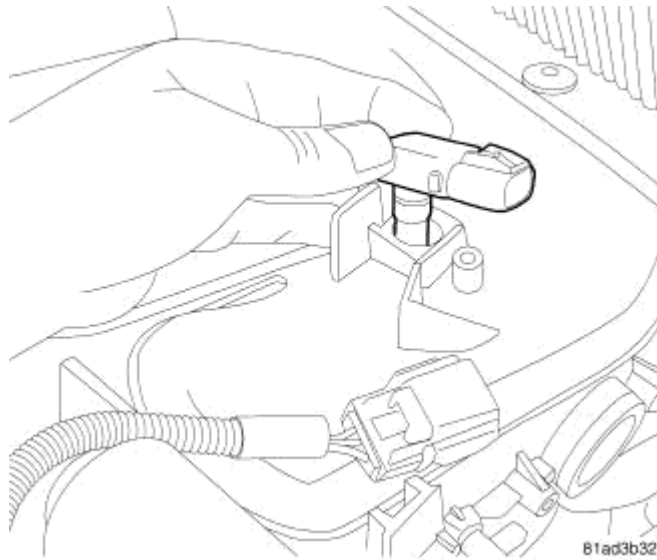


Fig. 223: Manifold Air Pressure Sensor Remove/Install
Courtesy of CHRYSLER LLC

4. Lift to remove.

Installation

2.4L

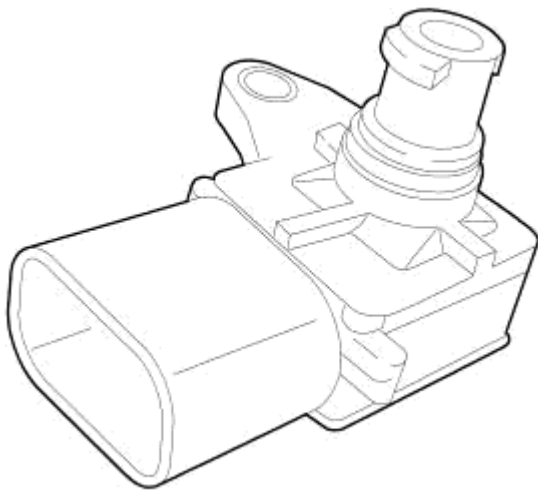


Fig. 224: Manifold Air Pressure Sensor
Courtesy of CHRYSLER LLC

1. Install manifold absolute pressure (MAP) sensor to intake manifold.

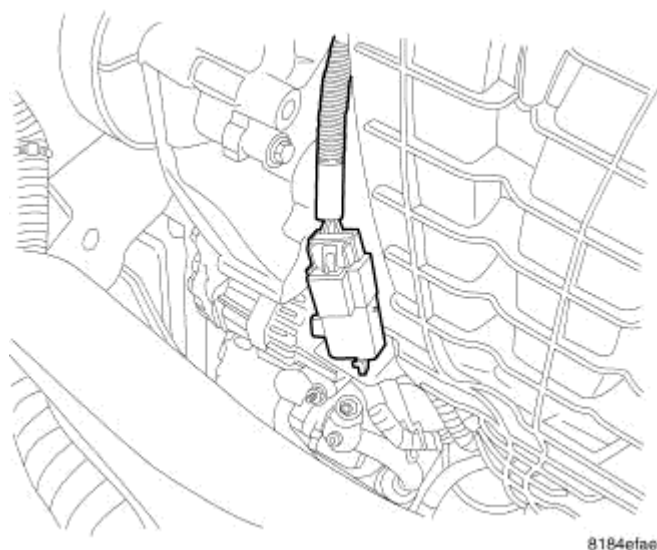


Fig. 225: Manifold Air Pressure Sensor Electrical Connector
Courtesy of CHRYSLER LLC

2. Tighten screw to 4.5 N.m (40 in. lbs.).
3. Connect electrical connector to sensor.
4. Connect negative battery cable, tighten nut to 5 N.m (45 in. lbs.).

2.7L

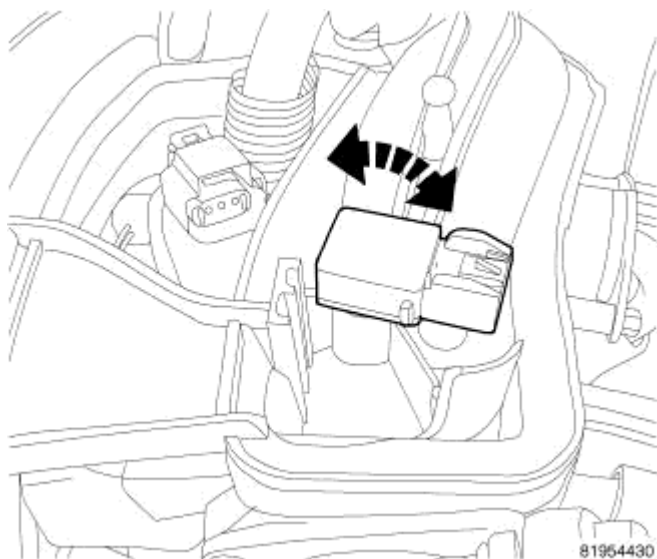


Fig. 226: Turn To Remove Manifold Air Pressure Sensor
Courtesy of CHRYSLER LLC

1. Install sensor to intake manifold plenum and turn clockwise to tighten.

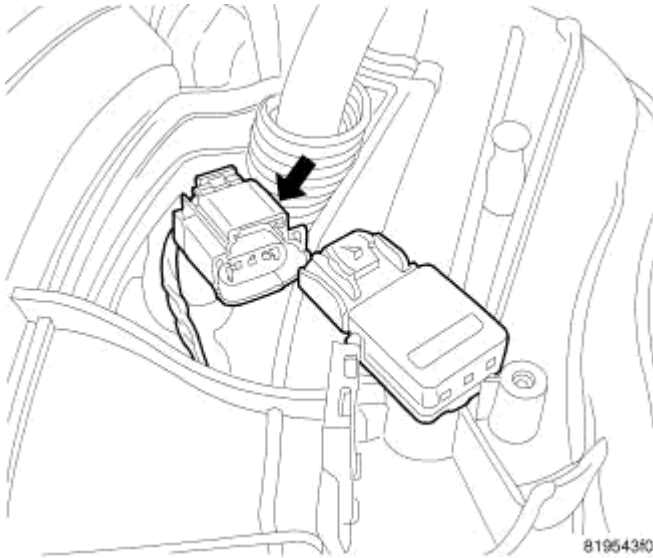


Fig. 227: Electrical Connector From Manifold Air Pressure Sensor
Courtesy of CHRYSLER LLC

2. Attach electrical connector to sensor.
3. Connect negative battery cable, tighten nut to 5 N.m (45 in. lbs.).

3.5L

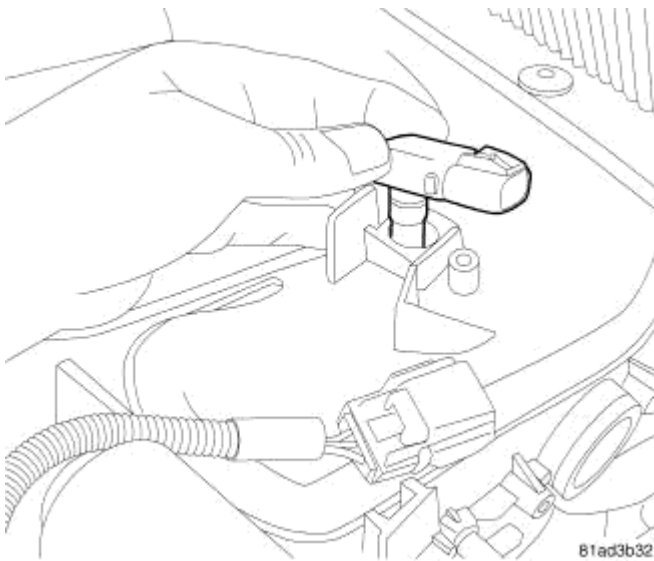


Fig. 228: Manifold Air Pressure Sensor Remove/Install
Courtesy of CHRYSLER LLC

1. Install sensor.

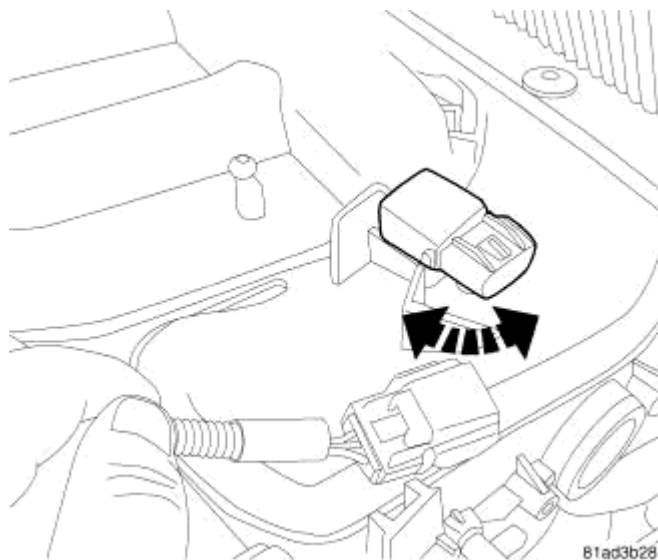


Fig. 229: Rotate Manifold Air Pressure Sensor
Courtesy of CHRYSLER LLC

2. Rotate sensor into position.

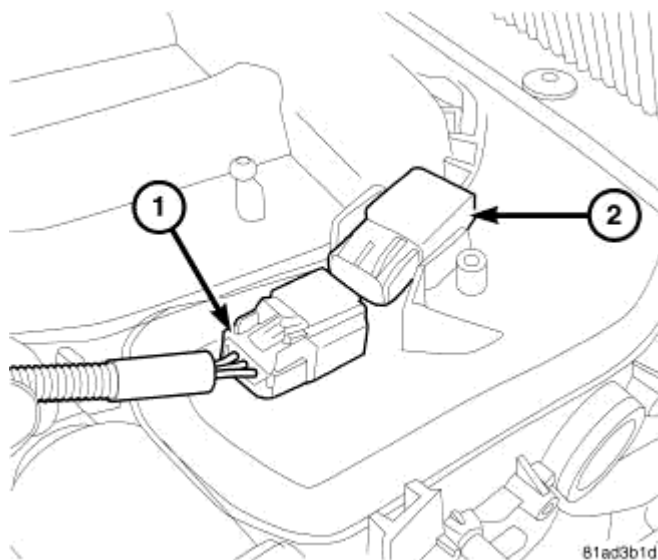


Fig. 230: Electrical Connector From Manifold Air Pressure Sensor
Courtesy of CHRYSLER LLC

3. Attach electrical connector (1) to sensor (2).
4. Connect negative battery cable, tighten nut to 5 N.m (45 in. lbs.).

SENSOR, OXYGEN

Removal

2.4L

UPSTREAM OXYGEN SENSOR (1/1)

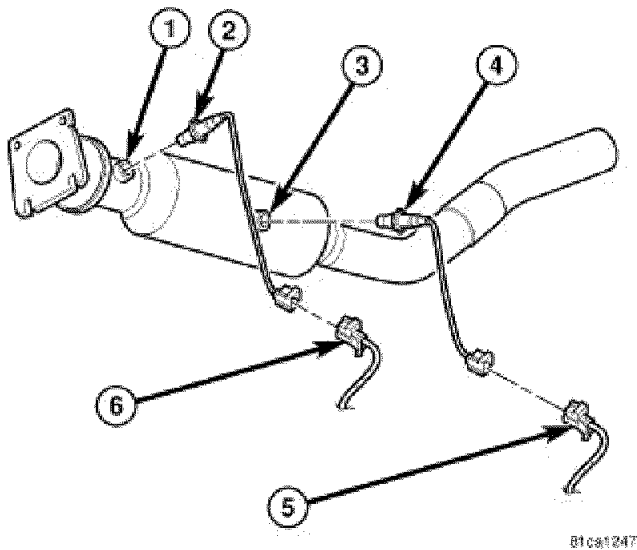


Fig. 231: Upstream Oxygen Sensor
Courtesy of CHRYSLER LLC

WARNING: THE EXHAUST MANIFOLD, EXHAUST PIPES AND CATALYTIC CONVERTER(S) BECOME VERY HOT DURING ENGINE OPERATION. ALLOW ENGINE TO COOL BEFORE REMOVING OXYGEN SENSOR. FAILURE TO ALLOW ENGINE TO COOL BEFORE REMOVAL MAY RESULT IN PERSONAL INJURY CAUSED BY BURNS.

CAUTION: When disconnecting sensor electrical connector, do not pull directly on wires going into oxygen sensor (O2S). Damage to the oxygen sensor may occur.

NOTE: Use an O2S removal tool for this procedure.

1. Raise and support vehicle.
2. Disconnect O2S wire harness mounting clips from engine or body, if equipped.
3. Disconnect O2S pigtail harness from engine wiring harness (6).
4. Remove O2S (2) from exhaust pipe (1).

DOWNSTREAM OXYGEN SENSOR (1/2)

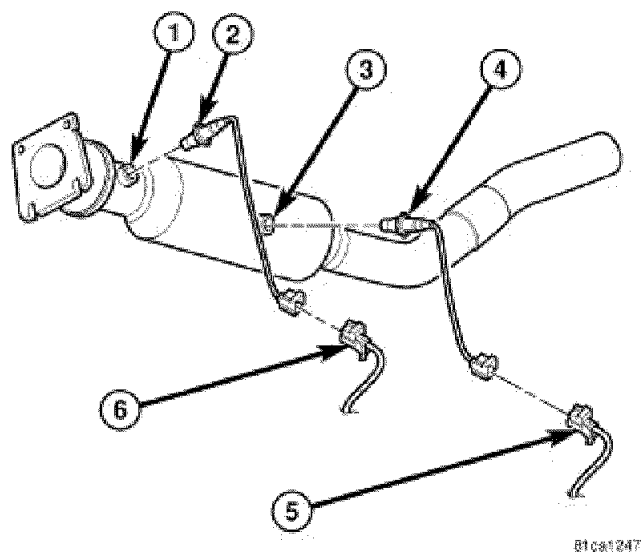


Fig. 232: Upstream Oxygen Sensor
Courtesy of CHRYSLER LLC

WARNING: THE EXHAUST MANIFOLD, EXHAUST PIPES AND CATALYTIC CONVERTER(S) BECOME VERY HOT DURING ENGINE OPERATION. ALLOW ENGINE TO COOL BEFORE REMOVING OXYGEN SENSOR. FAILURE TO ALLOW ENGINE TO COOL BEFORE REMOVAL MAY RESULT IN PERSONAL INJURY CAUSED BY BURNS.

CAUTION: When disconnecting sensor electrical connector, do not pull directly on wires going into oxygen sensor (O2S). Damage to the oxygen sensor may occur.

NOTE: Use an O2S removal tool for this procedure.

1. Raise and support vehicle.
2. Disconnect O2S wire harness mounting clips from engine or body, if equipped.
3. Disconnect O2S pigtail harness from engine wiring harness (5).
4. Remove O2S (4) from catalytic converter (3).

2.7, 3.5L

DOWNSTREAM OXYGEN SENSOR (1/2) AND UPSTREAM OXYGEN SENSOR (1/1)

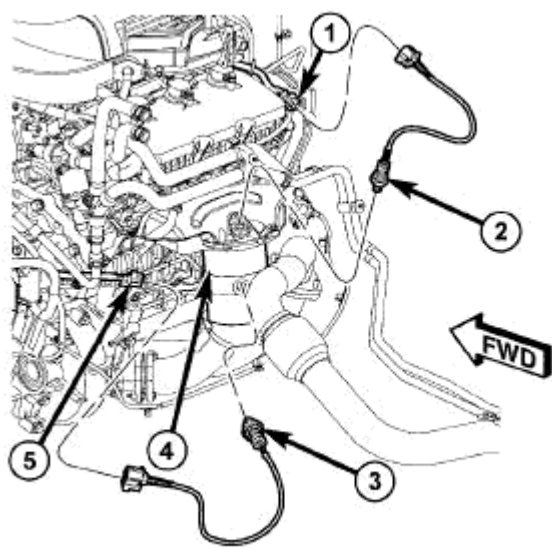


Fig. 233: Downstream Oxygen Sensor & Upstream Oxygen Sensor
Courtesy of CHRYSLER LLC

- | |
|---|
| <ul style="list-style-type: none">1 - ENGINE HARNESS CONNECTOR FOR O2 SENSOR 2/12 - UPPER REAR UPSTREAM O2 SENSOR 2/13 - LOWER REAR DOWNSTREAM O2 SENSOR 2/24 - RIGHT ENGINE SIDE CATALYTIC CONVERTER5 - ENGINE HARNESS CONNECTOR FOR O2 SENSOR 2/2 |
|---|

WARNING: THE EXHAUST MANIFOLD, EXHAUST PIPES AND CATALYTIC CONVERTER(S) BECOME VERY HOT DURING ENGINE OPERATION. ALLOW ENGINE TO COOL BEFORE REMOVING OXYGEN SENSOR. FAILURE TO ALLOW ENGINE TO COOL BEFORE REMOVAL MAY RESULT IN PERSONAL INJURY CAUSED BY BURNS.

CAUTION: When disconnecting sensor electrical connector, do not pull directly on wires going into oxygen sensor (O2S). Damage to the oxygen sensor may occur.

NOTE: Use an O2S removal tool for this procedure.

1. Raise and support vehicle.
2. Disconnect O2S wire harness mounting clips from engine or body, if equipped.
3. Disconnect O2S pigtail harness from engine wiring harness (1).
4. Remove O2S (2) from catalytic converter (4).
5. Disconnect O2S pigtail harness from engine wiring harness (5).
6. Remove O2S (3) from catalytic converter (4).

DOWNSTREAM OXYGEN SENSOR (2/2) AND UPSTREAM OXYGEN SENSOR (2/1)

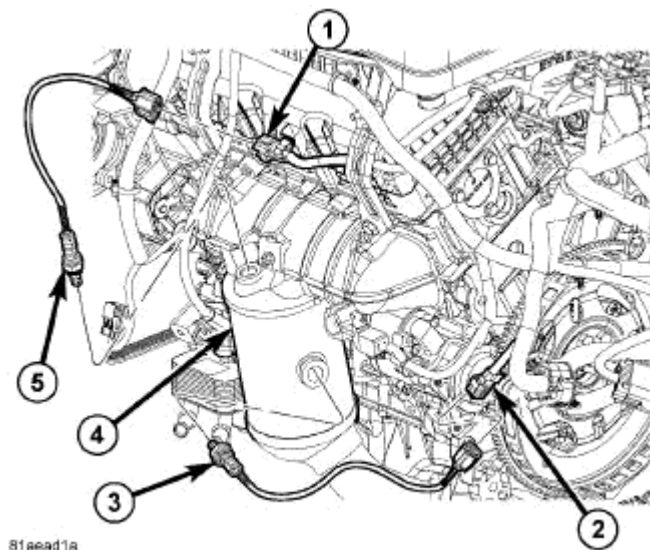


Fig. 234: Downstream Oxygen Sensor & Upstream Oxygen Sensor
Courtesy of CHRYSLER LLC

- | |
|---|
| <p>1 - ENGINE HARNESS CONNECTOR FOR O2 SENSOR 1/1
2 - ENGINE HARNESS CONNECTOR FOR O2 SENSOR 1/2
3 - LOWER FRONT DOWNSTREAM O2 SENSOR 1/2
4 - LEFT ENGINE SIDE CATALYTIC CONVERTER
5 - UPPER FRONT UPSTREAM O2 SENSOR 1/1</p> |
|---|

WARNING: THE EXHAUST MANIFOLD, EXHAUST PIPES AND CATALYTIC CONVERTER(S) BECOME VERY HOT DURING ENGINE OPERATION. ALLOW ENGINE TO COOL BEFORE REMOVING OXYGEN SENSOR. FAILURE TO ALLOW ENGINE TO COOL BEFORE REMOVAL MAY RESULT IN PERSONAL INJURY CAUSED BY BURNS.

CAUTION: When disconnecting sensor electrical connector, do not pull directly on wires going into oxygen sensor (O2S). Damage to the oxygen sensor may occur.

NOTE: Use an O2S removal tool for this procedure.

1. Raise and support vehicle.
2. Disconnect O2S wire harness mounting clips from engine or body, if equipped.
3. Disconnect O2S pigtail harness from engine wiring harness (1).
4. Remove the O2S (5) from catalytic converter (4).

5. Disconnect O2S pigtail harness from engine wiring harness (2).
6. Remove O2S (3) from catalytic converter (4).

Installation

2.4L

DOWNSTREAM OXYGEN SENSOR (1/2)

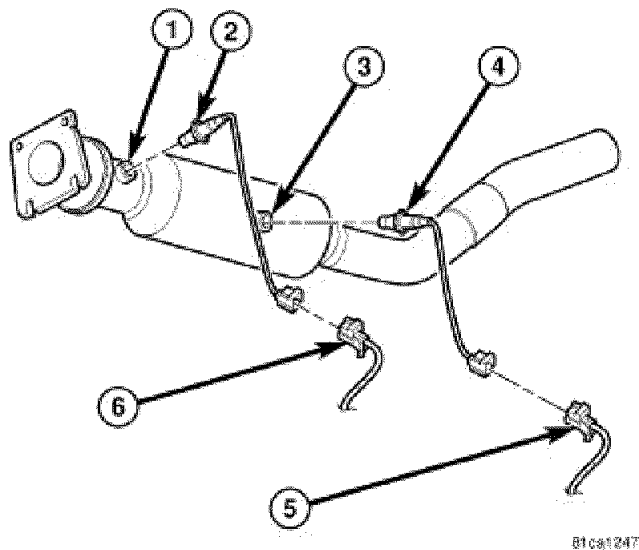


Fig. 235: Upstream Oxygen Sensor
Courtesy of CHRYSLER LLC

WARNING: THE EXHAUST MANIFOLD, EXHAUST PIPES AND CATALYTIC CONVERTER(S) BECOME VERY HOT DURING ENGINE OPERATION. ALLOW ENGINE TO COOL BEFORE REMOVING OXYGEN SENSOR. FAILURE TO ALLOW ENGINE TO COOL BEFORE REMOVAL MAY RESULT IN PERSONAL INJURY CAUSED BY BURNS.

CAUTION: When Equipped: The oxygen sensor (O2S) pigtail harness must be clipped and/or bolted back to their original positions on engine or body to prevent mechanical damage to wiring.

NOTE: Use an O2S removal tool for this procedure.

Threads of new oxygen sensors are factory coated with anti-seize compound to aid in removal. **DO NOT** add any additional anti-seize compound to threads of a new O2S.

1. Install the O2S (4) to catalytic converter (3). Tighten to 41 N.m (30 ft. lbs.).
2. Connect O2S pigtail harness to engine wiring harness (5).

3. Connect O2S wire harness mounting clips to engine or body, if equipped.

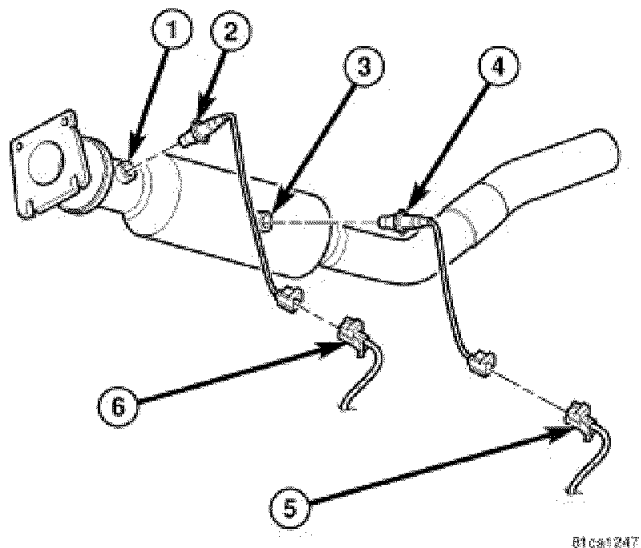
UPSTREAM OXYGEN SENSOR (1/1)

Fig. 236: Upstream Oxygen Sensor
Courtesy of CHRYSLER LLC

WARNING: THE EXHAUST MANIFOLD, EXHAUST PIPES AND CATALYTIC CONVERTER(S) BECOME VERY HOT DURING ENGINE OPERATION. ALLOW ENGINE TO COOL BEFORE REMOVING OXYGEN SENSOR. FAILURE TO ALLOW ENGINE TO COOL BEFORE REMOVAL MAY RESULT IN PERSONAL INJURY CAUSED BY BURNS.

CAUTION: When Equipped: The oxygen sensor (O2S) pigtail harness must be clipped and/or bolted back to their original positions on engine or body to prevent mechanical damage to wiring.

NOTE: Use an O2S removal tool for this procedure.

Threads of new oxygen sensors are factory coated with anti-seize compound to aid in removal. **DO NOT** add any additional anti-seize compound to threads of a new O2S.

1. Install the O2S (2) to exhaust pipe (1). Tighten to 41 N.m (30 ft. lbs.).
2. Connect O2S pigtail harness to engine wiring harness (6).
3. Connect O2S wire harness mounting clips to engine or body, if equipped.

2.7, 3.5L

DOWNSTREAM OXYGEN SENSOR (2/2) AND UPSTREAM OXYGEN SENSOR (2/1)

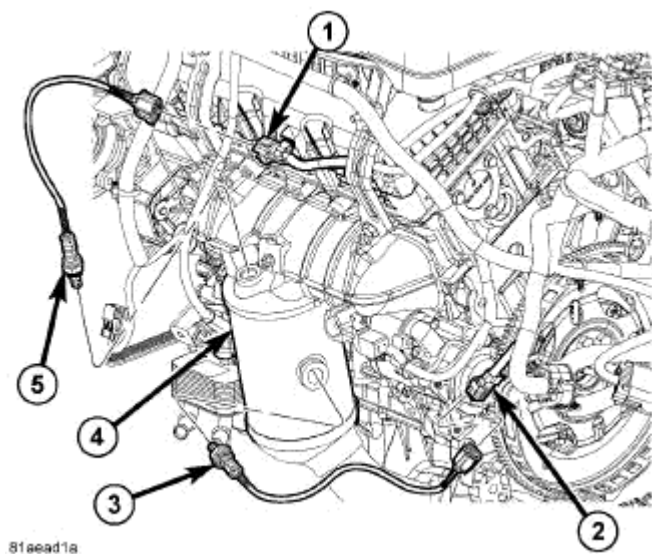


Fig. 237: Downstream Oxygen Sensor & Upstream Oxygen Sensor
Courtesy of CHRYSLER LLC

- | |
|--|
| <ul style="list-style-type: none">1 - ENGINE HARNESS CONNECTOR FOR O2 SENSOR 1/12 - ENGINE HARNESS CONNECTOR FOR O2 SENSOR 1/23 - LOWER FRONT DOWNSTREAM O2 SENSOR 1/24 - LEFT ENGINE SIDE CATALYTIC CONVERTER5 - UPPER FRONT UPSTREAM O2 SENSOR 1/1 |
|--|

WARNING: THE EXHAUST MANIFOLD, EXHAUST PIPES AND CATALYTIC CONVERTER(S) BECOME VERY HOT DURING ENGINE OPERATION. ALLOW ENGINE TO COOL BEFORE REMOVING OXYGEN SENSOR. FAILURE TO ALLOW ENGINE TO COOL BEFORE REMOVAL MAY RESULT IN PERSONAL INJURY CAUSED BY BURNS.

CAUTION: When Equipped: The oxygen sensor (O2S) pigtail harness must be clipped and/or bolted back to their original positions on engine or body to prevent mechanical damage to wiring.

NOTE: Use an O2S removal tool for this procedure.

Threads of new oxygen sensors are factory coated with anti-seize compound to aid in removal. **DO NOT** add any additional anti-seize compound to threads of a new O2S.

1. Install O2S (3) to catalytic converter (4).
2. Connect O2S pigtail harness to engine wiring harness (2).
3. Install the O2S (2) to catalytic converter (4). Tighten to 41 N.m (30 ft. lbs.).
4. Connect O2S pigtail harness to engine wiring harness (1).

5. Connect O2S wire harness mounting clips to engine or body, if equipped.

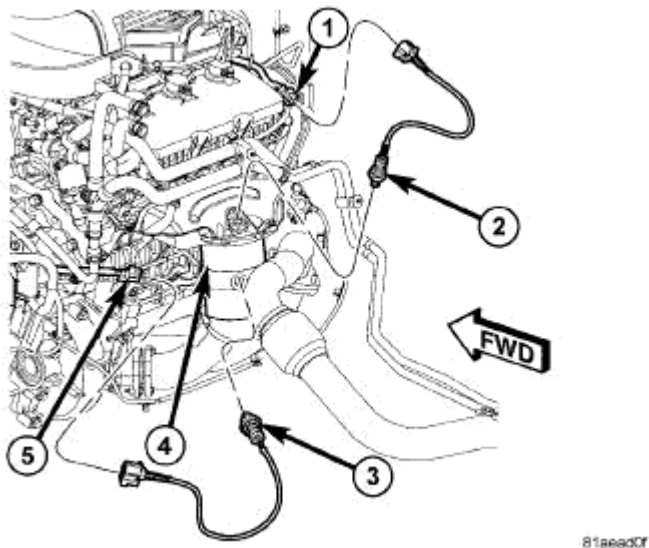
DOWNSTREAM OXYGEN SENSOR (1/2) AND UPSTREAM OXYGEN SENSOR (1/1)

Fig. 238: Downstream Oxygen Sensor & Upstream Oxygen Sensor
Courtesy of CHRYSLER LLC

- | |
|--|
| 1 - ENGINE HARNESS CONNECTOR FOR O2 SENSOR 2/1 |
| 2 - UPPER REAR UPSTREAM O2 SENSOR 2/1 |
| 3 - LOWER REAR DOWNSTREAM O2 SENSOR 2/2 |
| 4 - RIGHT ENGINE SIDE CATALYTIC CONVERTER |
| 5 - ENGINE HARNESS CONNECTOR FOR O2 SENSOR 2/2 |

WARNING: THE EXHAUST MANIFOLD, EXHAUST PIPES AND CATALYTIC CONVERTER(S) BECOME VERY HOT DURING ENGINE OPERATION. ALLOW ENGINE TO COOL BEFORE REMOVING OXYGEN SENSOR. FAILURE TO ALLOW ENGINE TO COOL BEFORE REMOVAL MAY RESULT IN PERSONAL INJURY CAUSED BY BURNS.

CAUTION: When Equipped: The oxygen sensor (O2S) pigtail harness must be clipped and/or bolted back to their original positions on engine or body to prevent mechanical damage to wiring.

NOTE: Use an O2S removal tool for this procedure.

Threads of new oxygen sensors are factory coated with anti-seize compound to aid in removal. **DO NOT** add any additional anti-seize compound to threads of a new O2S.

1. Install O2S (3) to catalytic converter (4).
2. Connect O2S pigtail harness to engine wiring harness (5).
3. Install O2S (2) to catalytic converter (4). Tighten to 41 N.m (30 ft. lbs.).
4. Connect O2S pigtail harness to engine wiring harness (1).
5. Connect O2S wire harness mounting clips to engine or body, if equipped.

THROTTLE BODY

Removal

2.4L

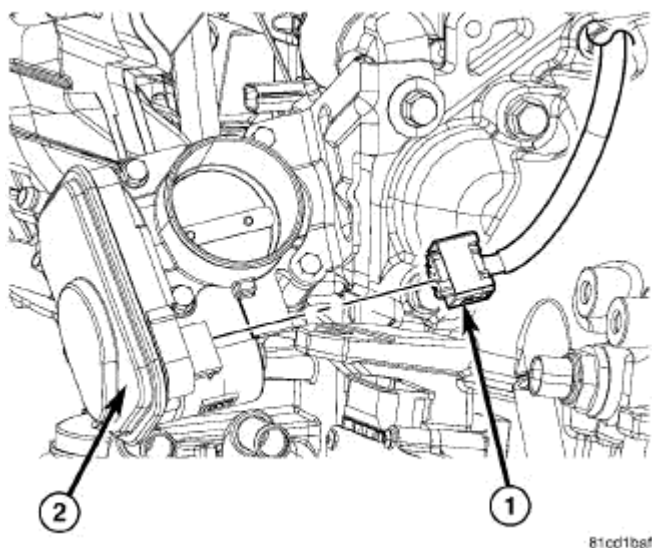


Fig. 239: Throttle Body Electrical Connector
Courtesy of CHRYSLER LLC

WARNING: DO NOT place fingers in or around the throttle body plate. If the throttle body is energized, the throttle plate could move causing personal injury. Always disconnect the negative battery cable prior to servicing the throttle body.

CAUTION: DO NOT move the throttle plate while power is connected to the throttle body. This may cause fault codes to set.

1. Disconnect and isolate negative battery cable.
2. Remove throttle body air intake hose.
3. Disconnect throttle body electrical connector (1) from throttle body (2).

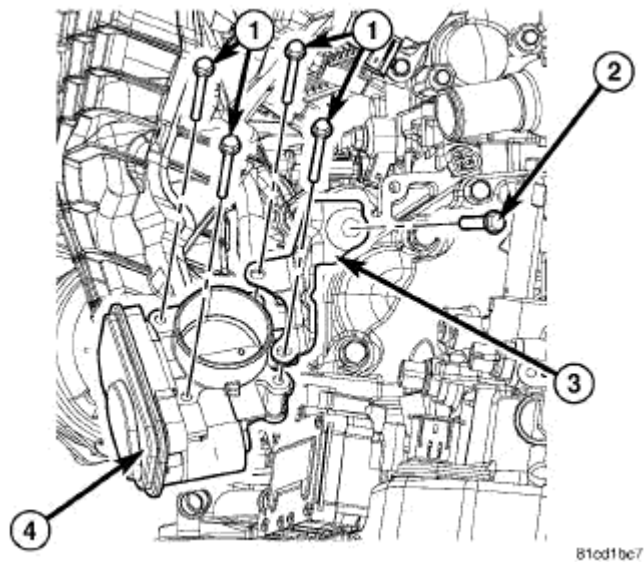


Fig. 240: Throttle Body Support Bracket Bolt
Courtesy of CHRYSLER LLC

4. Remove throttle body support bracket bolt (2).
5. Remove four bolts (1), throttle body bracket (3) and throttle body (4) from the intake manifold.

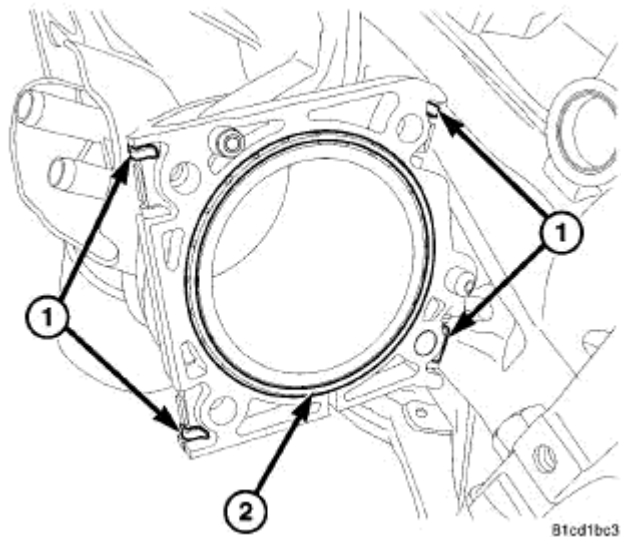


Fig. 241: Intake Manifold To Throttle Body Gasket
Courtesy of CHRYSLER LLC

NOTE: Inspect intake manifold to throttle body gasket (2) for damage. Inspect the j-nuts for damage or excessive wear. Replace as necessary.

6. Inspect the four i-nuts (1) for damage or excessive wear. remove if necessary.

7. Inspect intake manifold to throttle body gasket (2) for damage, remove if necessary.

2.7L

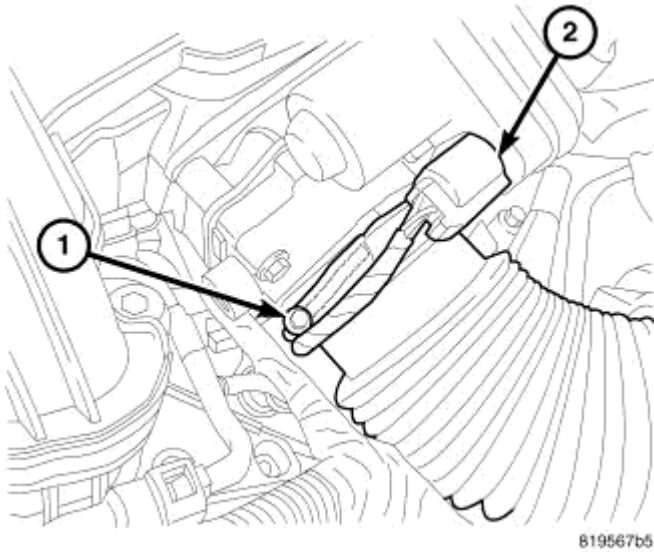


Fig. 242: Inlet Hose & Electrical Connection
Courtesy of CHRYSLER LLC

1. Disconnect and isolate negative battery cable at battery.
2. Loosen clamp (1) and remove throttle body air intake hose from throttle body.
3. Disconnect electrical connector (2) from throttle body.

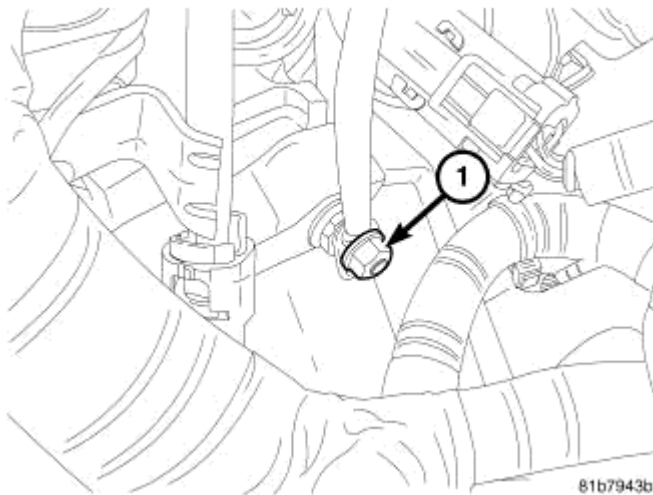
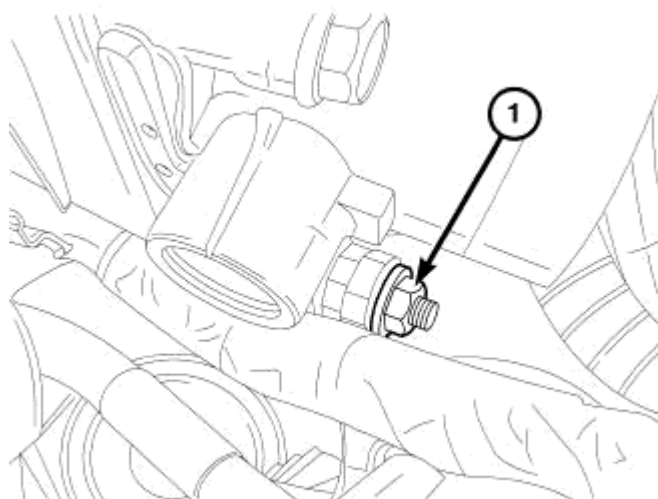


Fig. 243: LOWER THROTTLE BODY BRACKET NUT
Courtesy of CHRYSLER LLC

4. Remove lower throttle body bracket nut (1).



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Fig. 244: UPPER THROTTLE BODY BRACKET NUT
Courtesy of CHRYSLER LLC

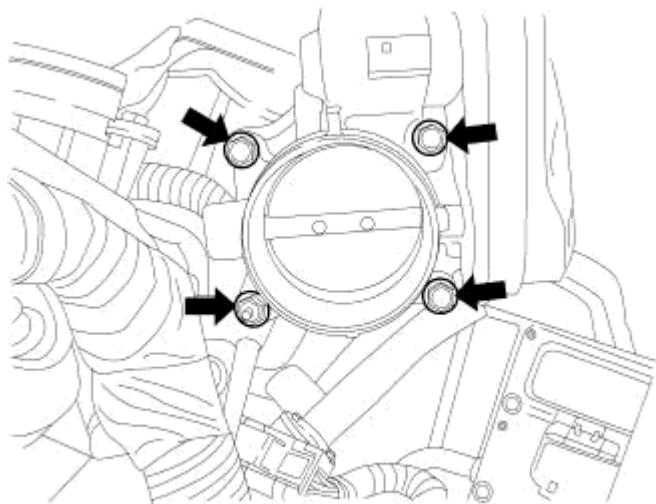
5. Remove upper throttle body bracket nut (1).



81956546

Fig. 245: BRACE FOR THROTTLE BODY
Courtesy of CHRYSLER LLC

6. Remove the throttle body support bracket from throttle body.



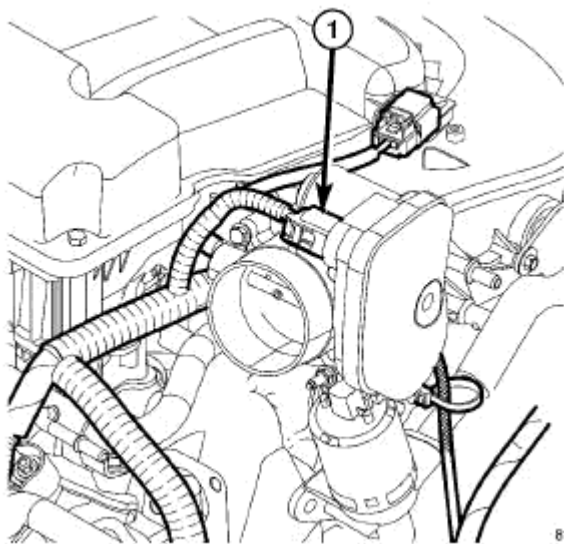
819565f8

Fig. 246: THROTTLE BODY BOLTS

Courtesy of CHRYSLER LLC

7. Remove three throttle body bolts and one stud.
8. Remove throttle body from intake manifold.

3.5L



81cb1bfe

Fig. 247: 3.5L THROTTLE BODY CONNECTOR

Courtesy of CHRYSLER LLC

1. Disconnect and isolate negative battery cable at battery.
2. Remove engine cover.
3. Remove clean air hose from throttle body.

4. Disconnect electrical connector (1) from throttle body.

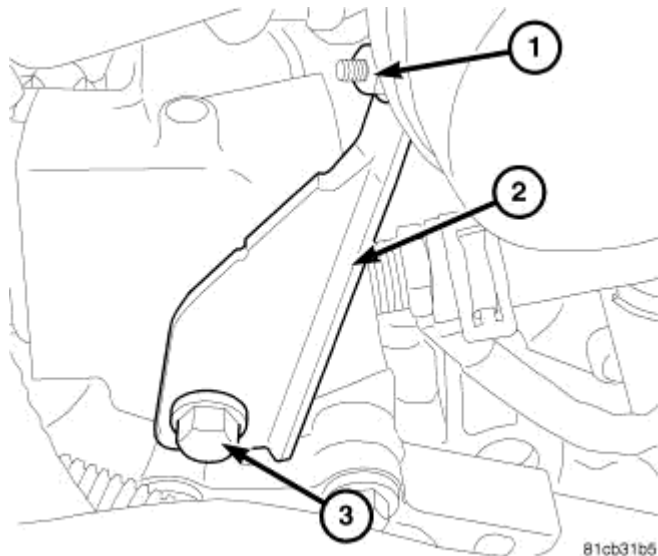


Fig. 248: 3.5L THROTTLE BODY BRACKET
Courtesy of CHRYSLER LLC

5. Remove nut (1) form throttle body bracket (2).
6. Remove bolt (3) and throttle body bracket (2).

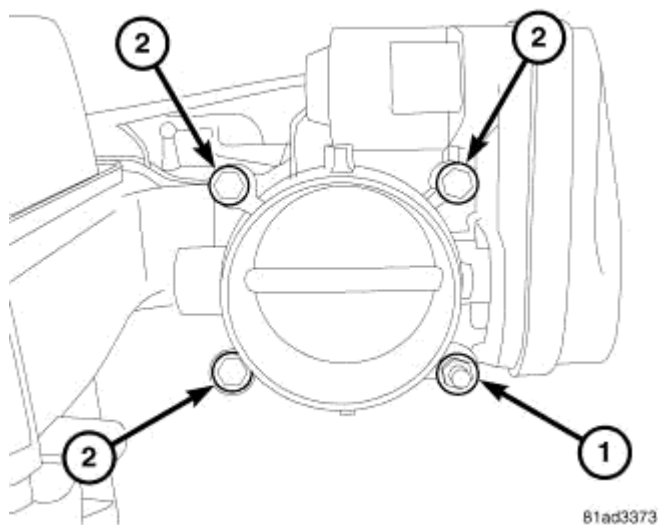


Fig. 249: THROTTLE BODY BOLTS
Courtesy of CHRYSLER LLC

1 - Stud
2 - Bolts

7. Remove bolts (2), stud (1) and remove throttle body from intake manifold.

Installation

2.4L

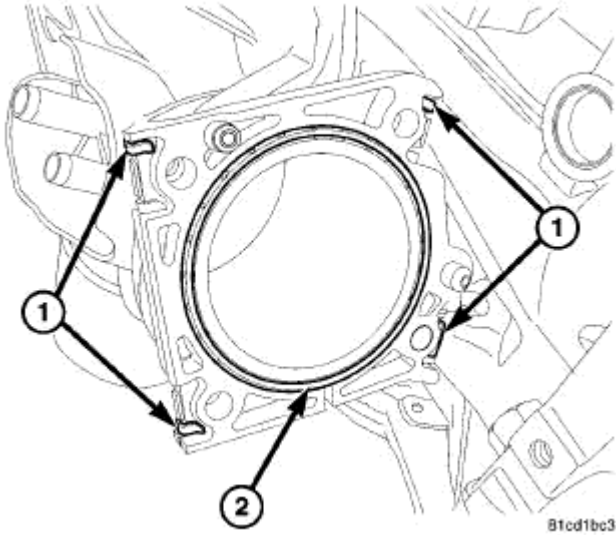


Fig. 250: Intake Manifold To Throttle Body Gasket
Courtesy of CHRYSLER LLC

1. Install a new intake manifold to throttle body gasket (2), if replacement was necessary.
2. Install four new four j-nuts (1), if replacement was necessary.

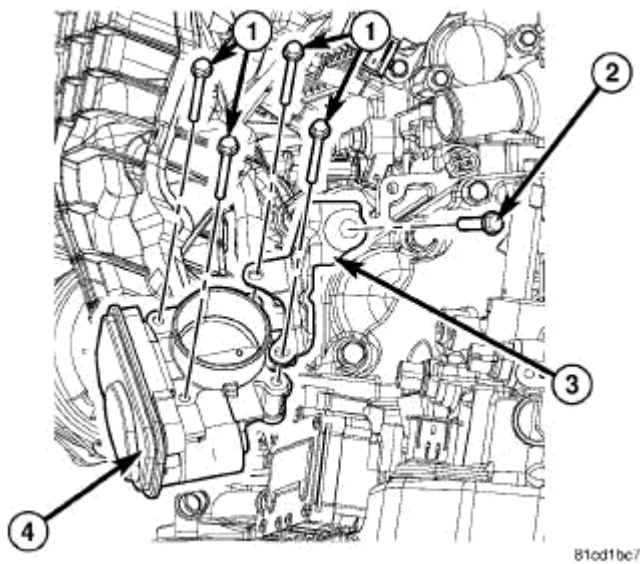
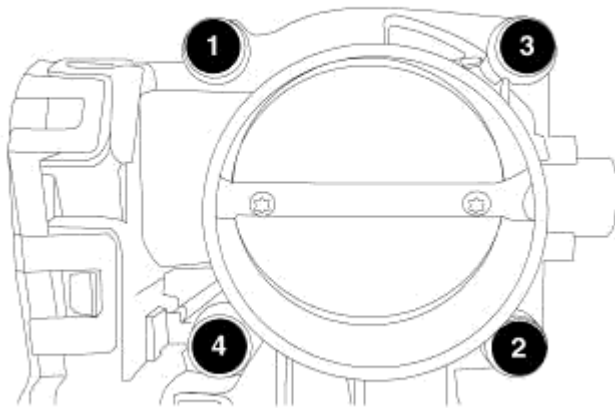


Fig. 251: Throttle Body Support Bracket Bolt
Courtesy of CHRYSLER LLC

CAUTION: DO NOT OVER TORQUE. Over tightening can cause damage to the throttle body, gaskets, bolts and/or the intake manifold.

3. Install throttle body (4) to intake manifold.
4. Install throttle body support bracket (3), bolt (2) and hand tighten.
5. Install four bolts (1) and hand tighten.



81b59a38

Fig. 252: THROTTLE BODY MANDATORY TORQUE
Courtesy of CHRYSLER LLC

CAUTION: The throttle body must be torqued in a mandatory torque sequence. Tighten in a criss - cross pattern to specification.

6. Tighten the bolts in a mandatory torque criss - cross pattern sequence to 7.5 N.m (65 in. lbs.).
7. Tighten the bracket bolt to 25 N.m (18 ft. lbs.).

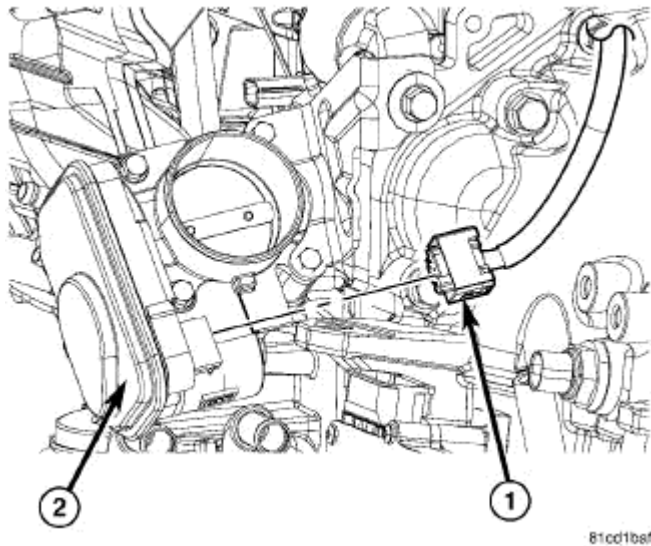


Fig. 253: Throttle Body Electrical Connector
Courtesy of CHRYSLER LLC

8. Connect electrical connector (1) to throttle body (2).
9. Install clean air hose and tighten clamps to 4 N.m (35 in. lbs.).
10. Connect negative battery cable, tighten nut to 5 N.m (45 in. lbs.).
11. Use a scan tool and clear all fault codes then perform the ETC RELEARN function.

2.7L

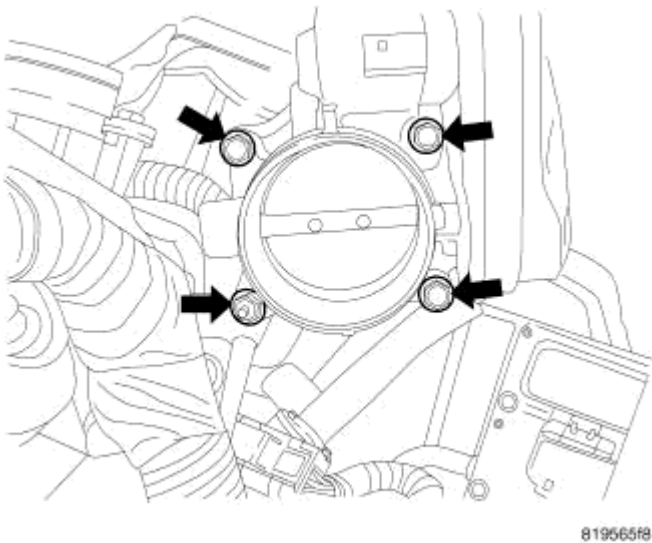


Fig. 254: THROTTLE BODY BOLTS
Courtesy of CHRYSLER LLC

NOTE: Make sure the intake gasket is clean and free of debris. Inspect the intake

gasket for damage. Replace as necessary.

CAUTION: DO NOT OVER TORQUE. Over tightening can cause damage to the throttle body, gaskets, bolts and/or the intake manifold.

1. Install throttle body, gasket and bolts to intake manifold.

CAUTION: The throttle body must be torqued in a mandatory torque sequence. Tighten in a criss - cross pattern to specification.

2. Tighten the three bolts and one stud in a mandatory torque criss - cross pattern sequence to 5.5 N.m (50 in. lbs.).

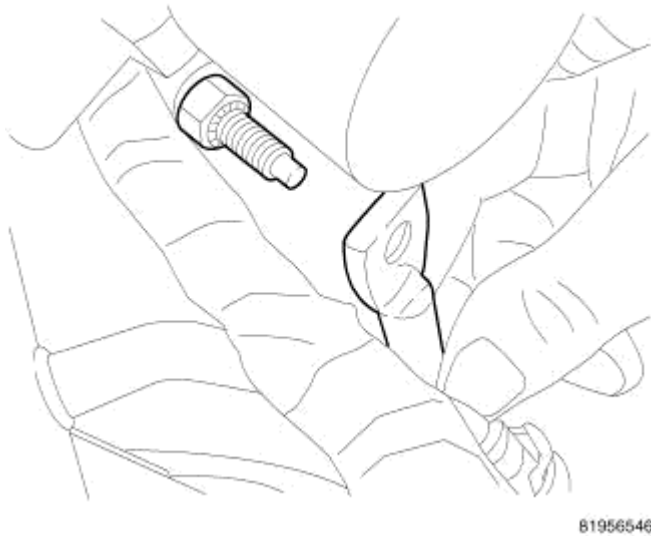
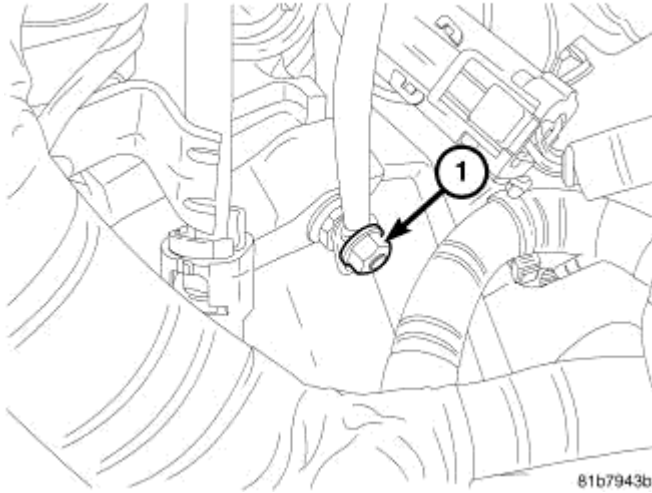


Fig. 255: BRACE FOR THROTTLE BODY
Courtesy of CHRYSLER LLC

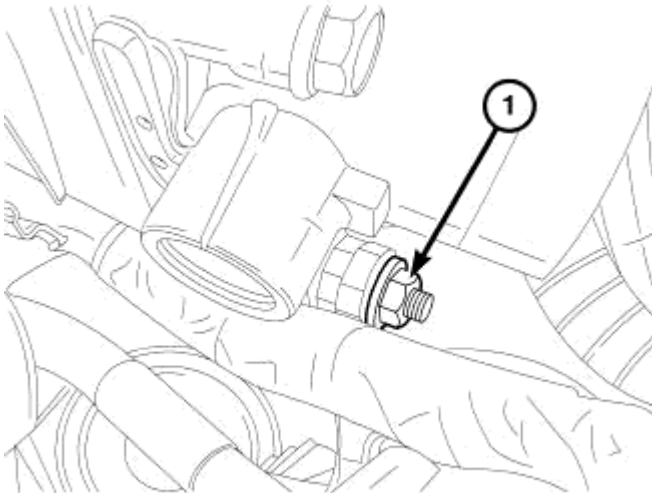
3. Install throttle body support bracket to the throttle body stud and the stud located on the transmission.



81b7943b

Fig. 256: LOWER THROTTLE BODY BRACKET NUT
Courtesy of CHRYSLER LLC

4. Install lower throttle body bracket nut (1). Tighten to 28 N.m (20.5 ft. lbs.).



81b79468

Fig. 257: UPPER THROTTLE BODY BRACKET NUT
Courtesy of CHRYSLER LLC

5. Install upper throttle body bracket nut (1). Tighten to 12 N.m (106 in. lbs.).

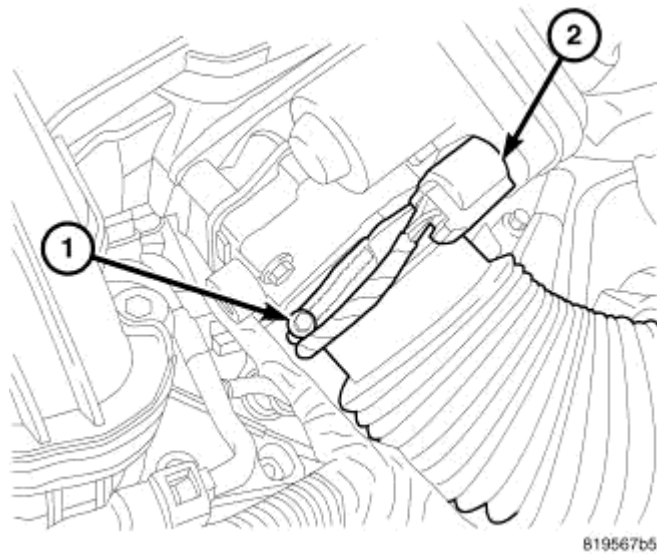


Fig. 258: Inlet Hose & Electrical Connection

Courtesy of CHRYSLER LLC

6. Connect electrical connector (2) to throttle body.
7. Install throttle body air intake hose and tighten clamp (1).
8. Connect negative battery cable, tighten nut to 5 N.m (45 in. lbs.).
9. Use a scan tool and perform the ETC RELEARN function.

3.5L

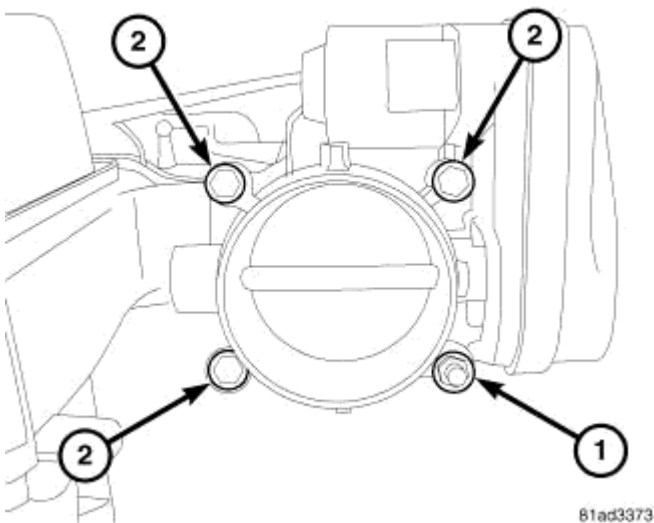


Fig. 259: THROTTLE BODY BOLTS

Courtesy of CHRYSLER LLC

- | |
|-----------|
| 1 - Stud |
| 2 - Bolts |

NOTE: Make sure the intake gasket is clean and free of debris. Inspect the intake gasket for damage. Replace as necessary.

CAUTION: DO NOT OVER TORQUE. Over tightening can cause damage to the throttle body, gaskets, bolts and/or the intake manifold.

1. Install throttle body, gasket and bolts to intake manifold.
2. Install throttle body and three throttle body bolts (2), and stud (1). Hand tighten the three bolts and one stud.

CAUTION: The throttle body must be torqued in a mandatory torque sequence. Tighten in a criss - cross pattern to specification.

3. Tighten the three bolts and one stud in a mandatory torque criss - cross pattern sequence to 5.5 N.m (50 in. lbs.).

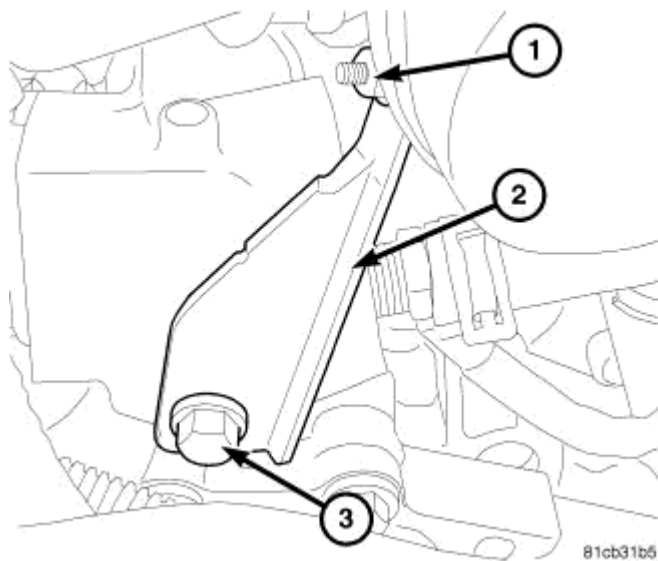


Fig. 260: 3.5L THROTTLE BODY BRACKET
Courtesy of CHRYSLER LLC

4. Install throttle body bracket (2), nut (1) and bolt (3). Tighten nut (1) to 12 N.m (106 in. lbs.). Tighten bolt (3) to 28 N.m (20.5 ft. lbs.).

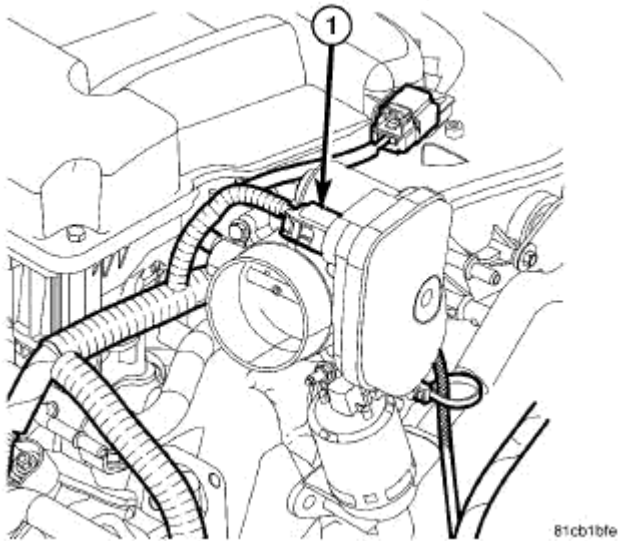


Fig. 261: 3.5L THROTTLE BODY CONNECTOR
Courtesy of CHRYSLER LLC

5. Connect electrical connector (1) to throttle body.
6. Install clean air hose to throttle body.
7. Install engine cover.
8. Connect negative battery cable, tighten nut to 5 N.m (45 in. lbs.).
9. Use a scan tool and perform the ETC RELEARN function.

VALVE, MANIFOLD TUNING

Removal

3.5L

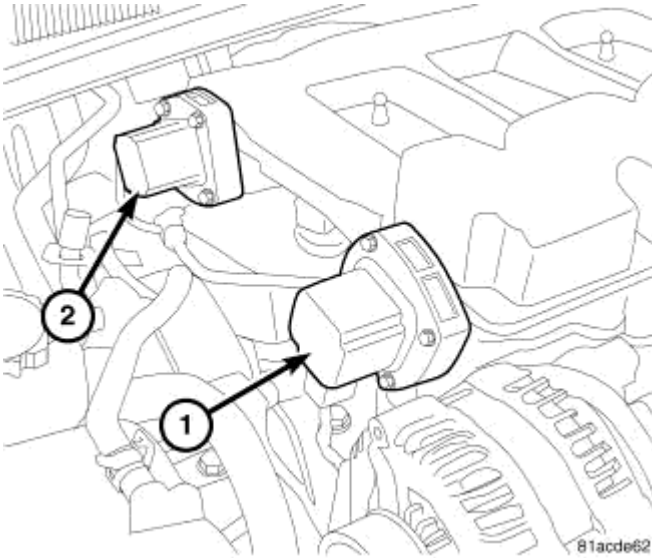
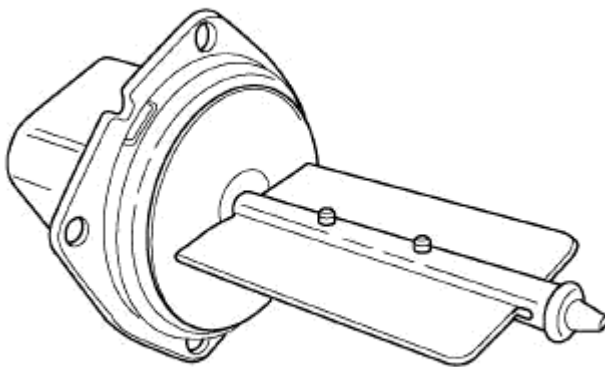


Fig. 262: MANIFOLD TUNING VALVE
Courtesy of CHRYSLER LLC

- | |
|---|
| 1 - Short Runner Valve
2 - MTV VALVE |
|---|

1. Disconnect the negative battery cable.
2. Remove the engine cover.
3. Disconnect the electrical connector.
4. Remove the 4 mounting bolts.

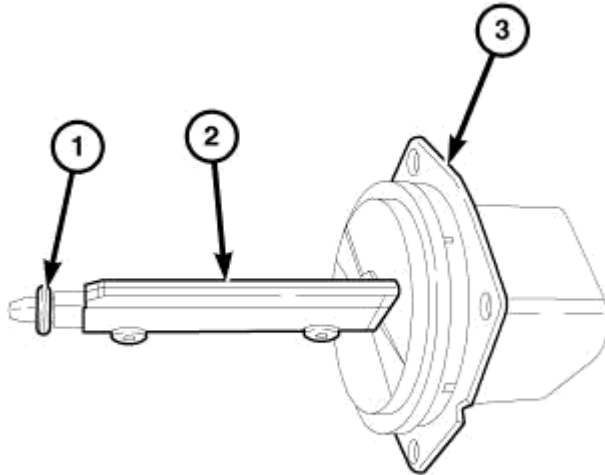


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Fig. 263: Manifold Tune Valve Removed
Courtesy of CHRYSLER LLC

1 -
MTV
VALVE

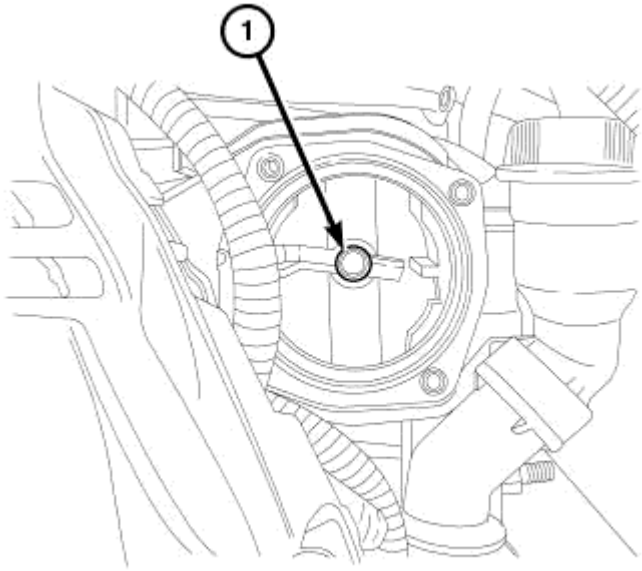
5. Pull manifold tune valve (MTV) straight out of manifold.



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Fig. 264: Manifold Tune Valve Assembly
Courtesy of CHRYSLER LLC

6. Be sure the O-ring (1) is still in place on the MTV shaft. If not, refer to the following step.



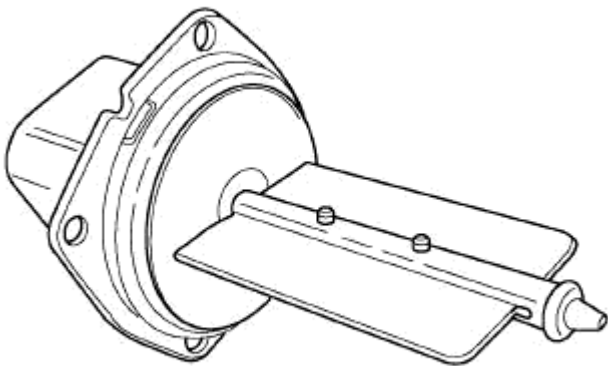
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Fig. 265: Manifold Tune Valve O-Ring
Courtesy of CHRYSLER LLC

7. If O-ring is not on MTV shaft (from previous step), gently pry it (1) from intake manifold.

Installation

3.5L



8110dbe6

Fig. 266: Manifold Tune Valve Removed
Courtesy of CHRYSLER LLC

1 - MTV VALVE

NOTE: Inspect the O-ring and gasket for the manifold tune valve replace if damaged.

1. Install a new O-ring and gasket to the manifold tune valve, if necessary.
2. Install the manifold tuning valve.
3. Make sure that the alignment pin and notch line up.

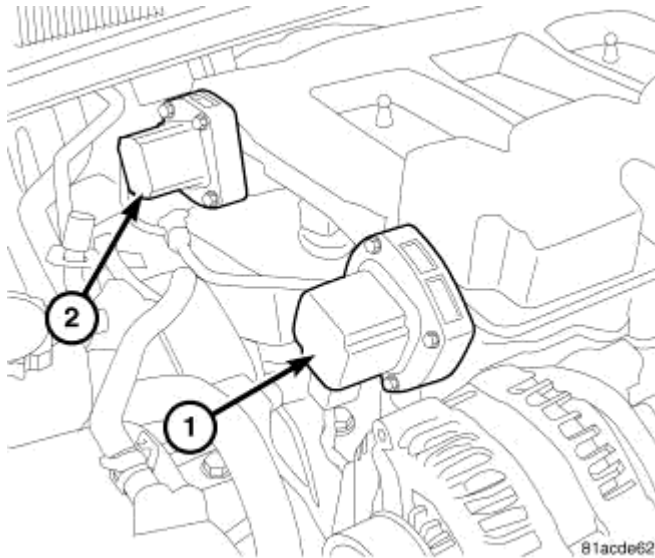


Fig. 267: MANIFOLD TUNING VALVE
Courtesy of CHRYSLER LLC

1 -
Short
Runner
Valve
2 -
MTV
VALVE

4. Install bolts and tighten.
5. Connect the electrical connector.
6. Install the engine cover.
7. Connect negative battery cable and tighten to 16.5 N.m (145 in. lbs.).

VALVE, SHORT RUNNER**Removal****REMOVAL**

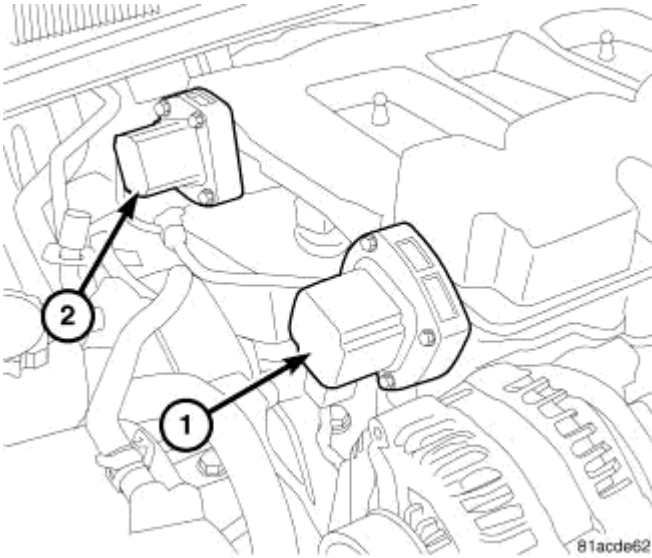


Fig. 268: MANIFOLD TUNING VALVE
Courtesy of CHRYSLER LLC

- 1 - Short Runner Valve
- 2 - MTV VALVE

1. Disconnect negative battery cable.
2. Remove engine cover.
3. Unlock and disconnect electrical connector.
4. Remove four mounting screws.
5. Remove Short Runner Valve.

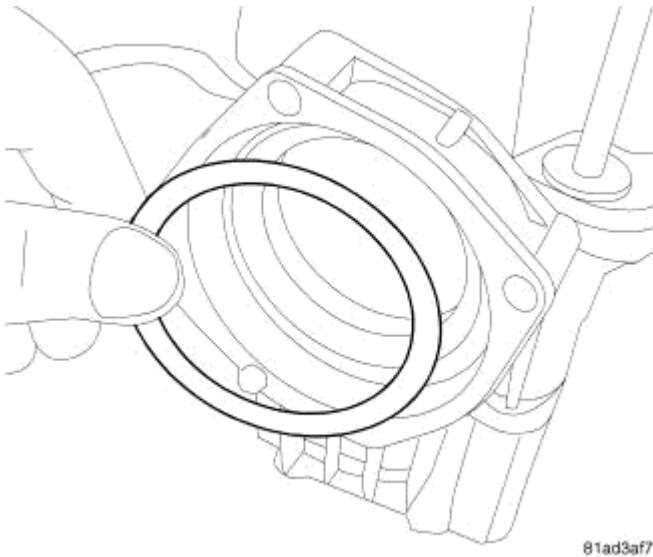
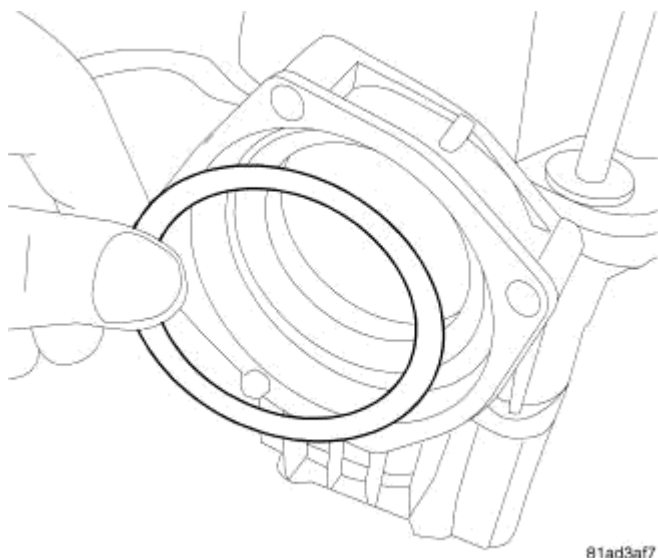


Fig. 269: Short Runner Valve O-Ring
Courtesy of CHRYSLER LLC

6. Remove and inspect o-ring.

Installation

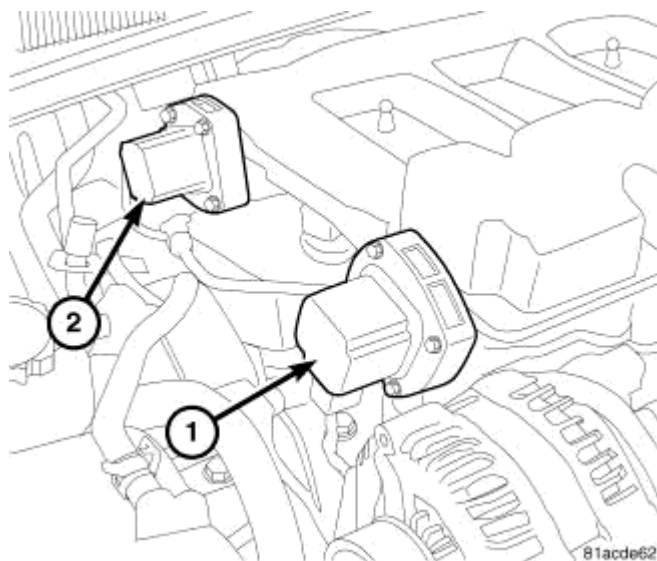
INSTALLATION



81ad3af7

Fig. 270: Short Runner Valve O-Ring
Courtesy of CHRYSLER LLC

1. Install o-ring.



81acde62

Fig. 271: MANIFOLD TUNING VALVE
Courtesy of CHRYSLER LLC

Short Runner Valve 2 - MTV VALVE

2. Align tab on valve to slot in manifold and install.
3. Install mounting screws.
4. Tighten bolts to 2.8 N.m (25 in. lbs.).
5. Connect electrical connector and lock.
6. Install engine cover.
7. Connect negative battery cable.

FUEL INJECTION, DIESEL

OPERATION

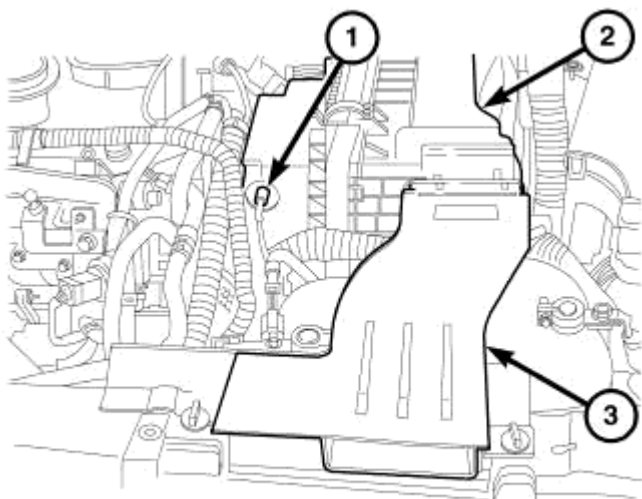
FUEL ECONOMY AND MAINTENANCE

A vehicle that is not properly tuned and maintained cannot be expected to perform at its maximum efficiency and can have an adverse effect on fuel economy. The following recommendations will ensure that the vehicle is performing at its maximum efficiency:

- **Use the recommended motor oil grade.** Using the manufacturer's recommended grade of Mopar® motor oil can improve fuel mileage by 1-2%. Mopar® motor oil labeled "Energy Conserving" contains friction-reducing additives.
- **Check and replace air filters.** Replacing a clogged air filter with a new Mopar® air filter can improve fuel mileage by as much as 10%.
- **Keep the engine tuned.** Repairing a vehicle that is noticeably out of tune can improve fuel mileage by an average of 4%. Maintaining a vehicle and repairing problems, such as a faulty oxygen sensor, can improve mileage by as much as 40%.
- **Keep tires properly inflated.** Under inflated tires can lower fuel mileage by 0.4% for every 1 psi drop in pressure of all four tires.

STANDARD PROCEDURE

STANDARD PROCEDURE - Common Rail Draining

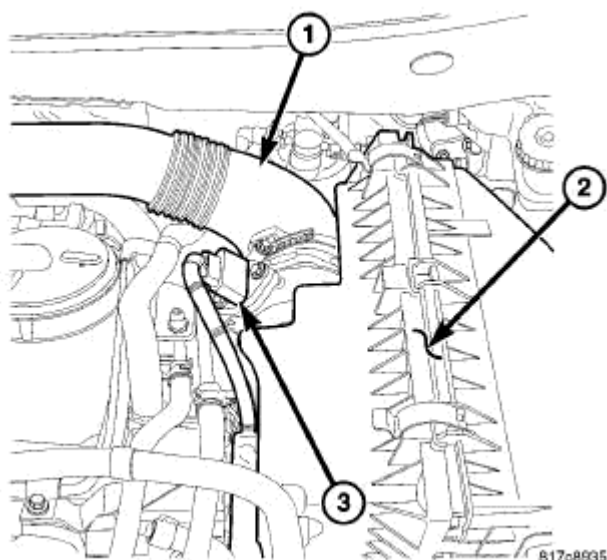


818ddc47

Fig. 272: AIR CLEANER REMOVAL

Courtesy of CHRYSLER LLC

1. Remove the vacuum line (1).
2. Remove the air cleaner inlet (3).



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Fig. 273: AIR FILTER HOUSING

Courtesy of CHRYSLER LLC

3. Disconnect MAF (3) electrical connector.
4. Remove clean air hose (1).
5. Remove air cleaner assembly (2).

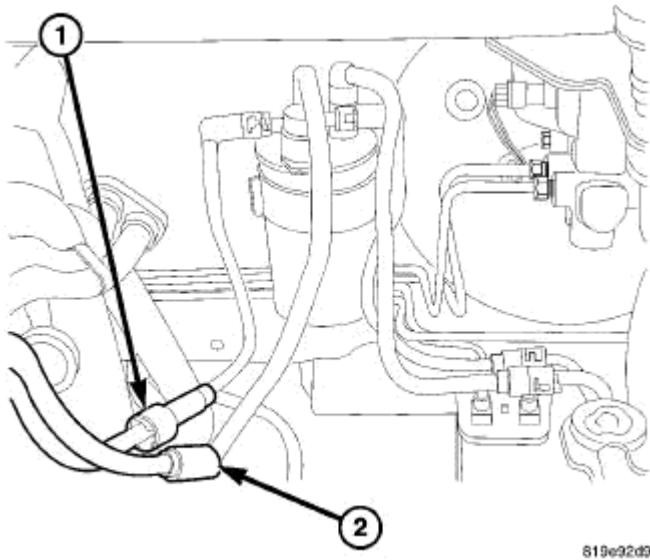


Fig. 274: FUEL LINES

Courtesy of CHRYSLER LLC

6. Disconnect fuel feed (1) and return lines (2).

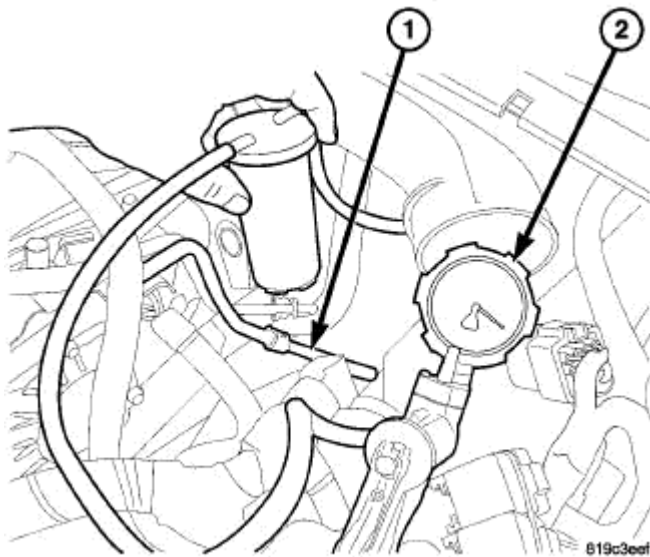
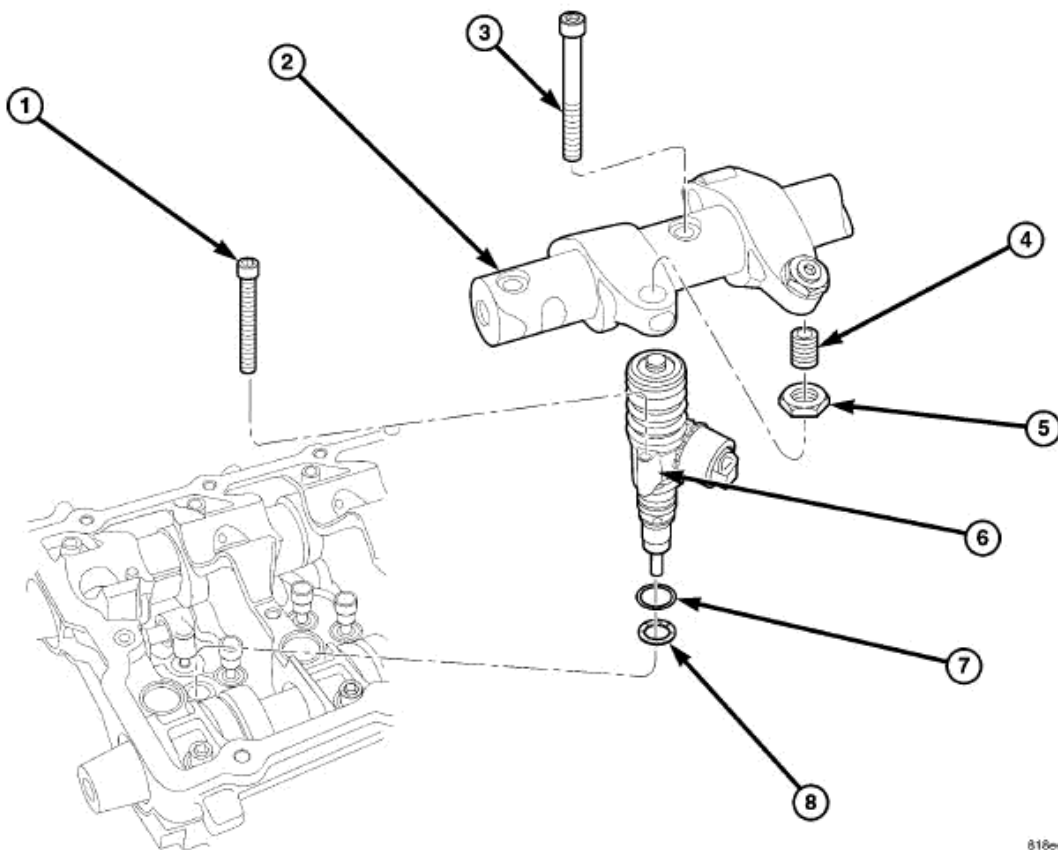


Fig. 275: FUEL REMOVAL

Courtesy of CHRYSLER LLC

7. Connect a vacuum pump (2) to the return fuel line (1).
8. Operate vacuum pump (2) until no more fuel comes out of the return line (1).

INJECTOR(S), FUEL

Description**DESCRIPTION**

818ee719

Fig. 276: Fuel Injectors**Courtesy of CHRYSLER LLC**

There are individual unit injectors (6) for all four cylinders. These unit injectors are used to deliver atomized fuel into the combustion chamber. They also pressurize the fuel and meter the fuel.

Operation**OPERATION**

The injector operation can be subdivided into five operating states with the engine running:

- Filling of the high-pressure chamber
- Commencement of pre-injection cycle
- End of pre-injection cycle
- Commencement of main injection cycle
- End of main injection cycle

Filling of the high-pressure chamber

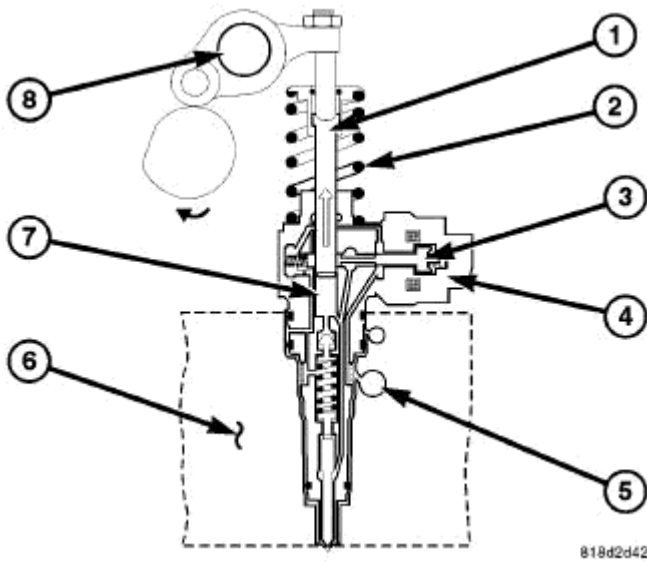


Fig. 277: Filling Of High-Pressure Chamber
Courtesy of CHRYSLER LLC

During the filling cycle, the pump piston rises under force of the piston spring and thus enlarges the volume of the high-pressure chamber. The injector solenoid valve is not activated. The solenoid valve stem is in the resting position and opens up the path from the fuel supply to the high-pressure chamber. The fuel pressure in the supply line causes the fuel to flow into the high-pressure chamber.

Commencement of pre-injection cycle

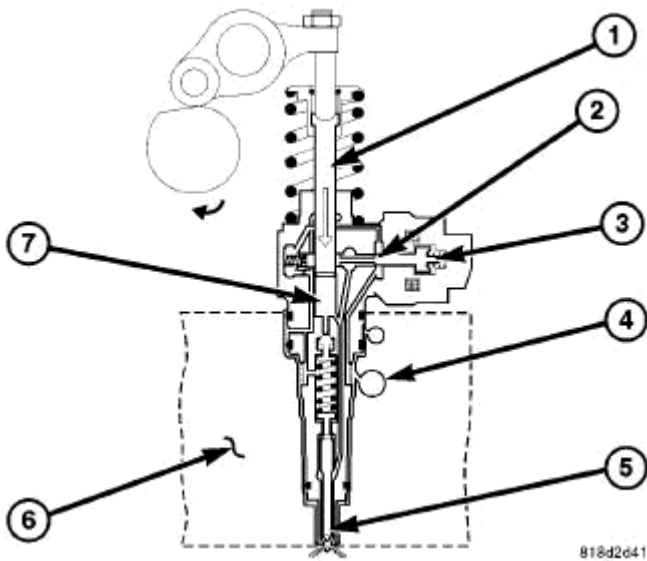


Fig. 278: Commencement Of Pre-Injection Cycle
Courtesy of CHRYSLER LLC

The pump piston is pressed down by the injection cam via the roller-type rocker arm, and thus displaces the fuel from the high-pressure chamber into the fuel supply line. The PCM initiates the injection cycle. For this purpose, the PCM activates the injector solenoid valve. The solenoid valve stem is pressed into the seat and closes off the path from the high-pressure chamber to the fuel supply line. As a result, pressure begins to build up inside the high-pressure chamber. At 180 bar, the pressure is greater than the force of the injector spring. The injector needle is lifted and the pre-injection cycle commences.

End of pre-injection cycle

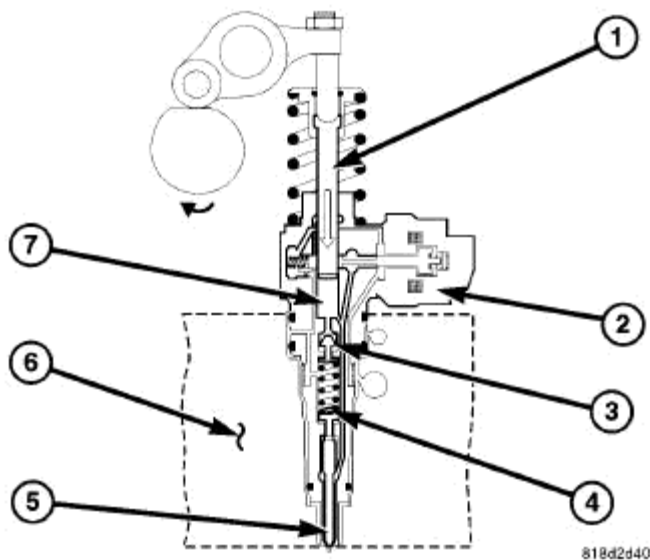


Fig. 279: End Of Pre-Injection Cycle

Courtesy of CHRYSLER LLC

The pre-injection cycle ends directly after the injection needle opens. The rising pressure causes the bypass piston to move down, thereby increasing the volume of the high-pressure chamber. The pressure drops briefly as a result and the injector needle closes. The pre-injection cycle is completed. The downwards movement of the bypass piston increases the preload on the injector spring. The fuel pressure required to reopen the injection needle during the subsequent main injection cycle, therefore, is higher than during the pre-injection cycle.

Commencement of main injection cycle

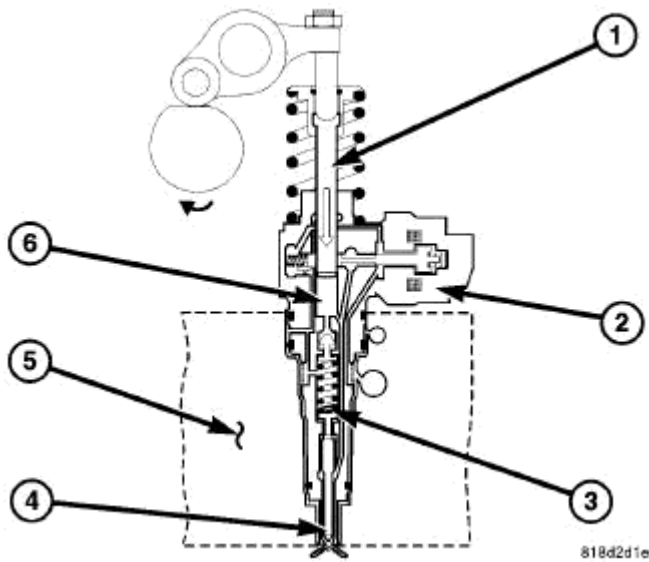


Fig. 280: Commencement Of Main Injection Cycle
Courtesy of CHRYSLER LLC

Shortly after the injection needle closes, the pressure again rises inside the high-pressure chamber. The injector solenoid valve remains closed and the pump piston moves downwards. At approximately 300 bar, the fuel pressure is greater than the force of the preloaded injector spring. The injector needle is again raised and the main injection quantity is injected. The pressure rises up to 2050 bar, because more fuel is displaced inside the high-pressure chamber than can escape through the nozzle holes. Peak pressure is at maximum engine speed and large injection quantity.

End of main injection cycle

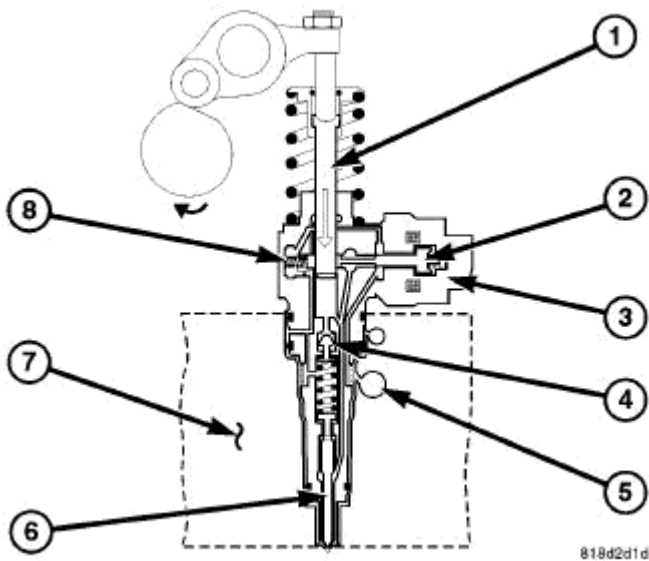


Fig. 281: End Of Main Injection Cycle
Courtesy of CHRYSLER LLC

The injection cycle is terminated when the PCM no longer actuates the injector solenoid valve. The solenoid valve stem is opened by the solenoid valve spring and the fuel displaced by the pump piston can escape into the fuel supply line. The pressure drops. The injector needle closes and the bypass is pressed into its initial position by the injector spring. The main cycle is now completed.

Standard Procedure**STANDARD PROCEDURE - CLEANING FUEL INJECTORS**

NOTE: Before cleaning the injector recesses, seal the injector holes in the injector recesses with the appropriate pin to prevent debris from falling into the recesses and entering the motor.

1. Seal the injector holes inside the cylinder head recesses.
2. Wipe out injector recesses with a non-woven cloth, then clean with a cylinder brush.
3. Clean the bottom of the cylinder recess with a round brush.
4. Blow out the recess and clean again with a non-woven cloth and cover over.
5. Perform these steps for each injector recess.

NOTE: DO NOT clean the tip of the injector with a wire brush. Use a non - woven cloth.

6. Clean injector body with a wire brush.
7. Clean injector tips with a non-woven cloth.

NOTE: Do Not apply anti-seize lubricant to the injector nozzle area.

8. Grease injector body with anti seize lubricant.

NOTE: Always replace the seals that seal off the injectors at the cylinder head to the combustion chamber and replace the retaining screws.

INJECTOR CLEARANCE

NOTE: The injector clearance adjustment procedure must be performed any time an injector has been removed from the cylinder head.

NOTE: The injector clearance adjustment procedure sets the minimum clearance between the tip of the injector pump piston and the bottom of the injector bore. The injector clearance adjustment procedure prevents the injector pump piston from contacting the bottom of the injector bore due to normal heat expansion of injector parts that will occur during engine operation.

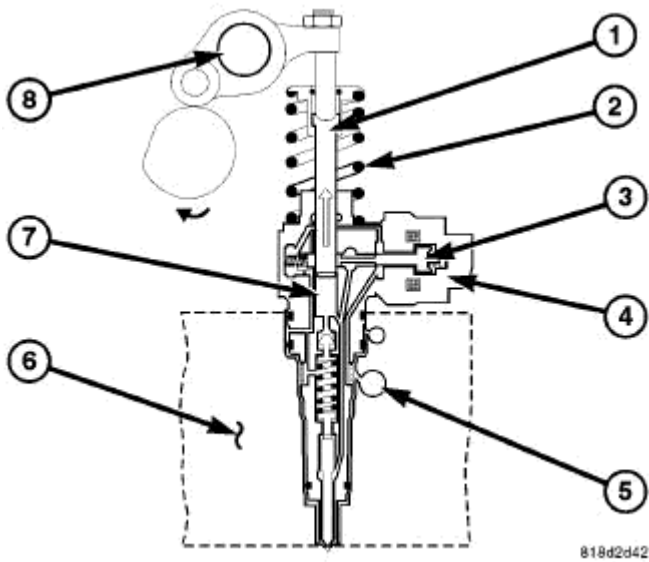


Fig. 282: Filling of the High-Pressure Chamber
Courtesy of CHRYSLER LLC

1. Using a suitable tool, rotate the crankshaft in the direction of engine rotation until the roller of the rocker arm (8) is positioned on the base of the drive cam.
2. Mount a dial indicator gauge on the cylinder head cover mounting surface.

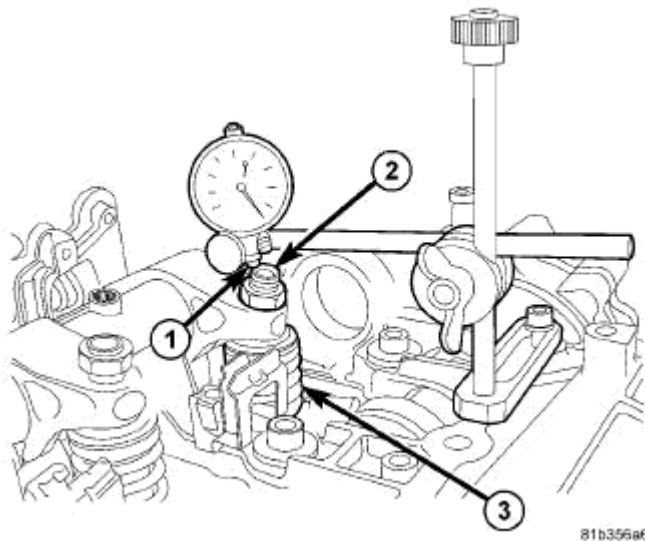


Fig. 283: Measurement Tip Of Dial Indicator Gauge On Top Edge Of Adjustment Screw Of Unit Injector
Courtesy of CHRYSLER LLC

3. Position the measurement tip (1) of the dial indicator gauge on the top edge of the adjustment screw (2) of the unit injector (3).

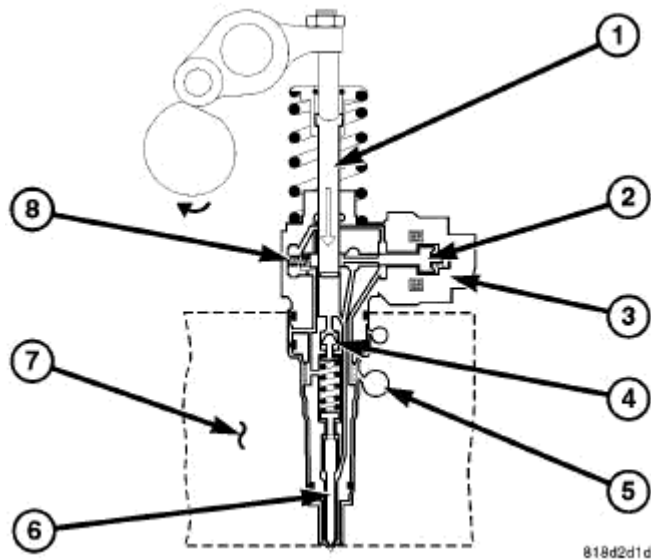
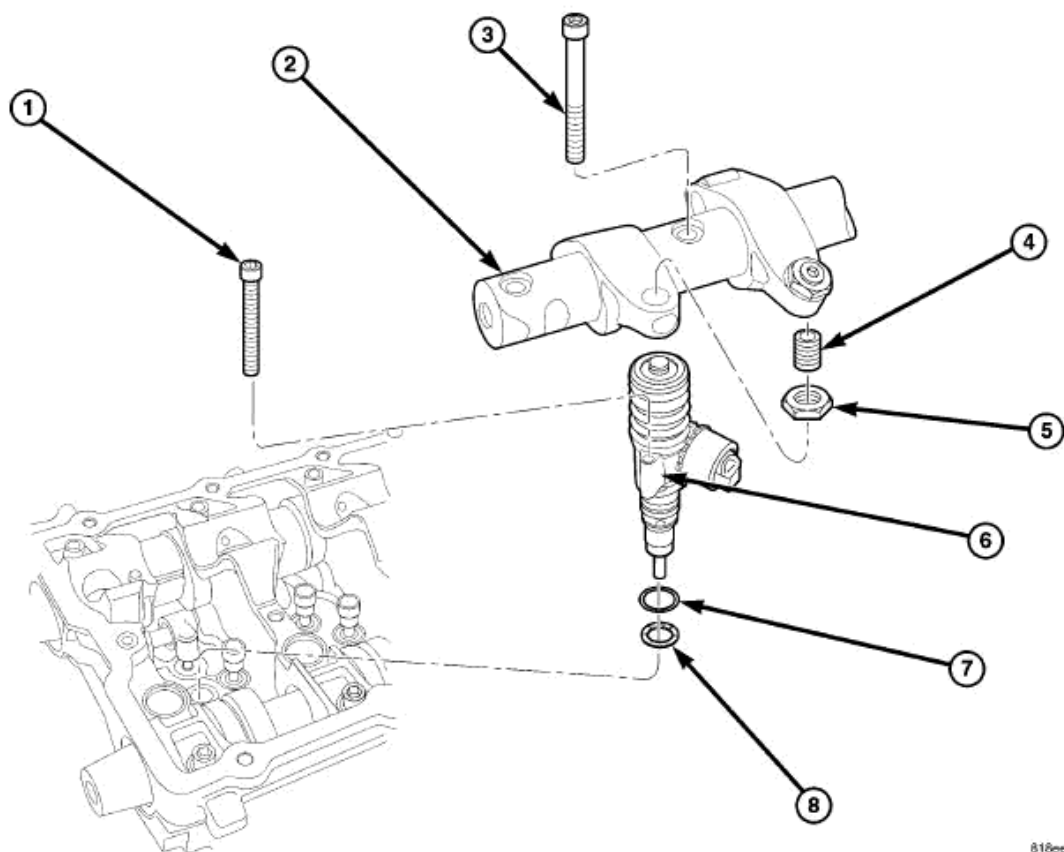


Fig. 284: Rotating Crankshaft In Direction Of Engine Rotation
 Courtesy of CHRYSLER LLC

4. Zero the dial indicator.
5. Using a suitable tool, rotate the crankshaft in the direction of engine rotation until the roller of the rocker arm for the injector being adjusted is positioned on the peak of the drive cam.
6. While observing the readings on the dial indicator, slowly rotate the crankshaft approximately 2° in the opposite direction of engine rotation and in the direction of engine rotation to determine the extreme bottom point of injector pump piston (1) travel inside the injector bore. The extreme bottom point of injector travel will be the point of crankshaft rotation where the readings on the dial indicator stop rising, but before the readings begin to decrease.
7. Remove the dial indicator.



81800719

Fig. 285: Adjustment Screw Lock Nut
Courtesy of CHRYSLER LLC

8. If necessary, loosen the adjustment screw lock nut (5). Using an Allen wrench, tighten the adjustment screw (4) into rocker arm until a firm resistance is felt. At this point, the injector pump piston is bottomed out at the base of the injector bore.

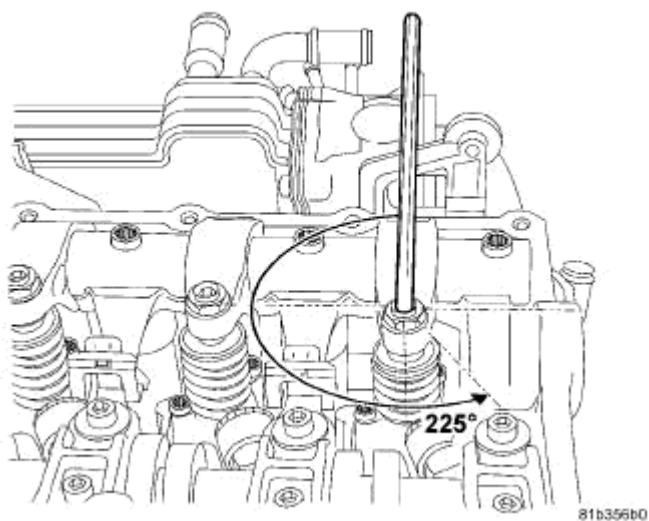


Fig. 286: Loosening Adjustment Screw 225°
Courtesy of CHRYSLER LLC

9. Loosen the adjustment screw 225° to allow the injector pump piston to back off the base of the injector bore.
10. Hold adjustment screw in this position and tighten the adjustment screw lock nut to 30 Nm/22 lb-ft.

Removal

REMOVAL

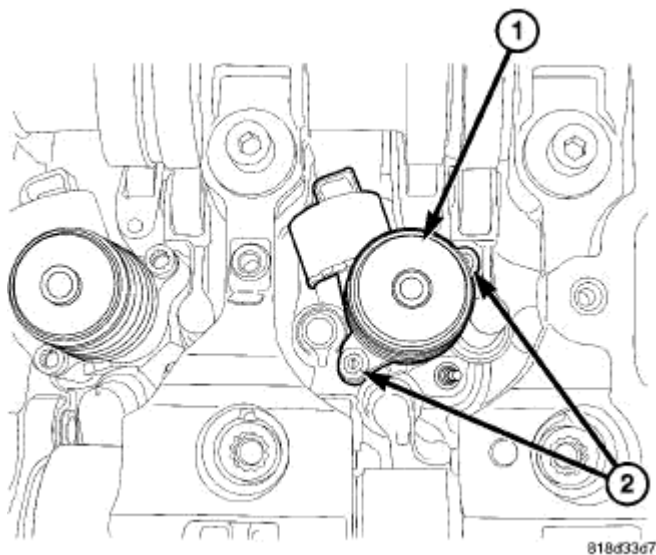


Fig. 287: Fuel Injector Retaining Bolts
Courtesy of CHRYSLER LLC

CAUTION: PAY CLOSE ATTENTION TO THE FOLLOWING POINTS WHEN REMOVING FUEL INJECTORS:

- Injectors **MUST** be removed only using the special tools provided for this purpose.
- Injectors **MUST NOT** be disassembled.
- Before cleaning injector recesses, seal all injector holes in the injector recesses with a pin.
- Clean all injector recesses in the cylinder head with a non-woven cloth and then a cylinder brush.
- Carefully clean sealing surfaces of injector recesses with the round brush. **DO NOT** use a power brush.

1. Disconnect negative battery cable.
2. Remove engine cover. Refer to **Engine - Removal** .
3. Remove cylinder head cover.

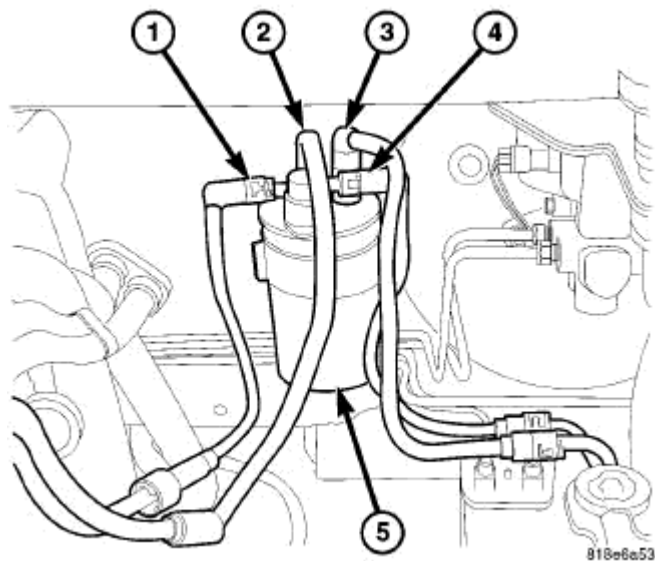


Fig. 288: FUEL FILTER
Courtesy of CHRYSLER LLC

4. Disconnect fuel feed (2) and return lines (1) from fuel filter (5).
5. Connect a vacuum pump to the return line and suck all of the fuel from the cylinder head.

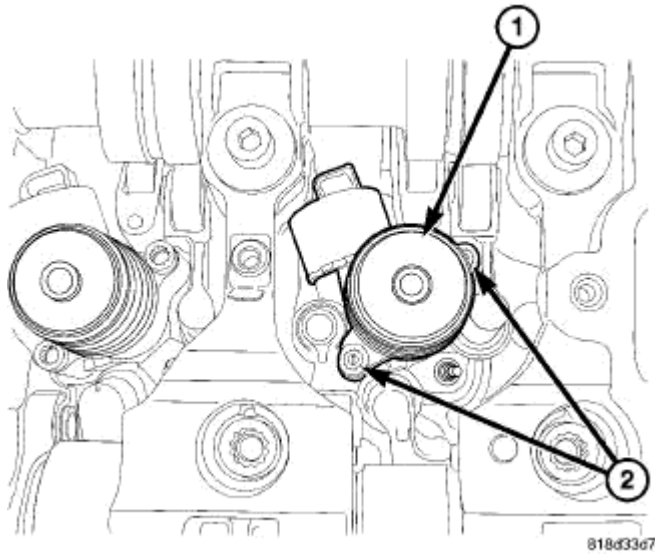


Fig. 289: Fuel Injector Retaining Bolts
Courtesy of CHRYSLER LLC

NOTE: If injectors (1) are tight and cannot be removed by hand, remove with special tools slide hammer 8937 and injector remover 9887.

6. Remove injector rocker shaft.
7. Remove fuel injector retaining bolts (2) and discard.

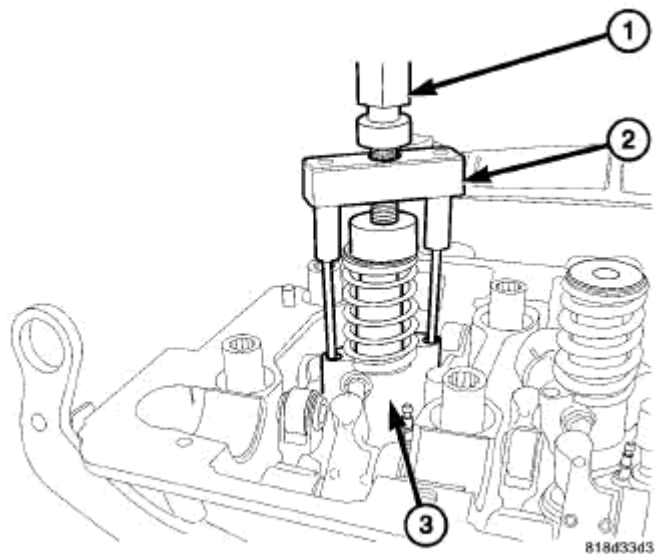


Fig. 290: INJECTOR REMOVAL
Courtesy of CHRYSLER LLC

NOTE: **Injectors can be removed with out removing the camshafts.**

8. Connect slide hammer 8937 to injector remover 9887 (2).
9. Twist remover clockwise and hold while tightening locking screw (1).
10. Hold pressure on injector remover while removing injector with slide hammer 8937.

Installation

INSTALLATION

CAUTION: Pay close attention to the following points when installing fuel injectors.

- Blow out injector recesses, clean again with non-woven cloth and then cover over. Fiber residues from non-woven cloth ARE NOT permissible.
- Carefully carry out a visual inspection of the sealing surfaces of the injector recesses.
- The length of the round brush can be adjusted and should be approximately 3mm for cleaning the seal seat. Optimal cleaning is achieved only if a brush with a flat surface is used. If necessary the surface of the brush can be ground flat on a grinding stone.
- ALWAYS replace the seals which seal off the injectors at the cylinder head to the combustion chamber. It is important that no grease gets onto the seal. Any impurities on the seal, on the sealing surfaces at the injector and cylinder head as a result of combustion residue or similar are absolutely impermissible.
- The screws attaching the injectors must always be replaced. The screws must screw in easily, if not, clean the threaded whole with an appropriate thread tap.
- The tip of the injector nozzle MUST NOT be cleaned with a wire brush. Use a non-woven cloth.
- Clean entire injector with a non-woven cloth.
- Fiber residues from a non-woven cloth are not permissible.

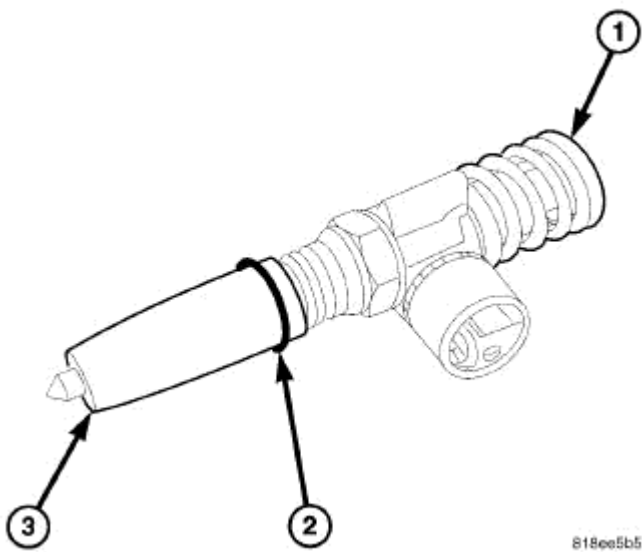


Fig. 291: UPPER INJECTOR O-RING
Courtesy of CHRYSLER LLC

1. Clean injectors and recesses. See **Fuel System/Fuel Injection/INJECTOR(S), Fuel - Standard Procedure.**
2. Coat injector (1) body with clean diesel fuel and install new upper o-ring (2) using injector o-ring protector/guide 9886 (3).

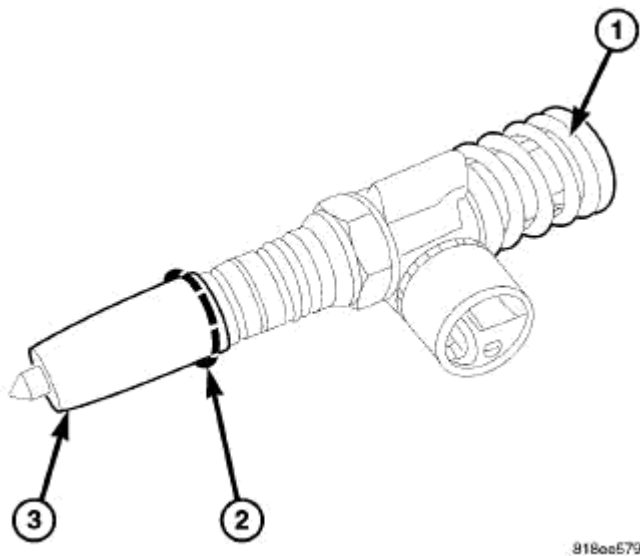
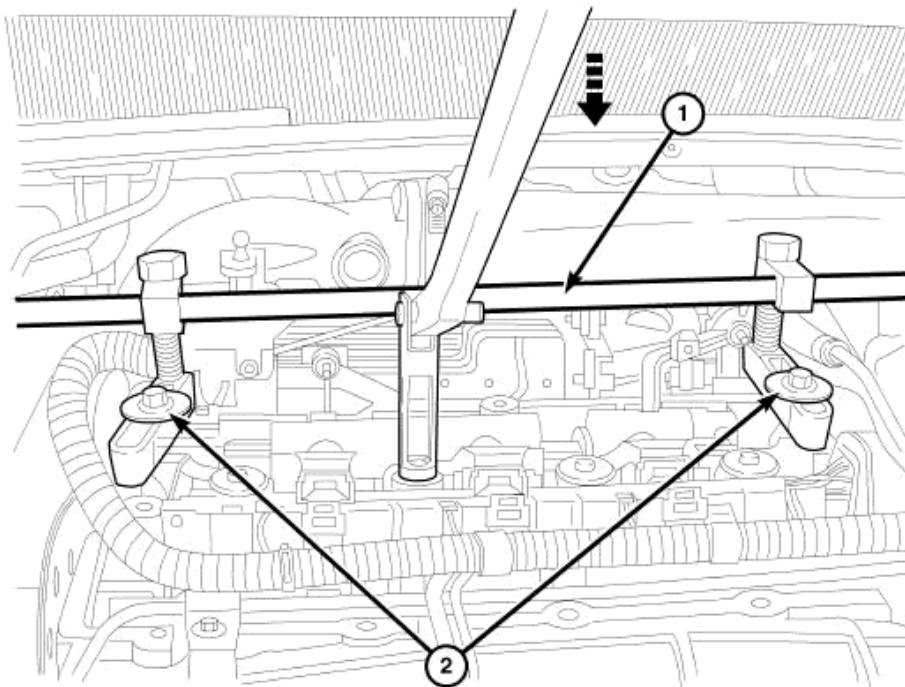


Fig. 292: LOWER INJECTOR O-RING
Courtesy of CHRYSLER LLC

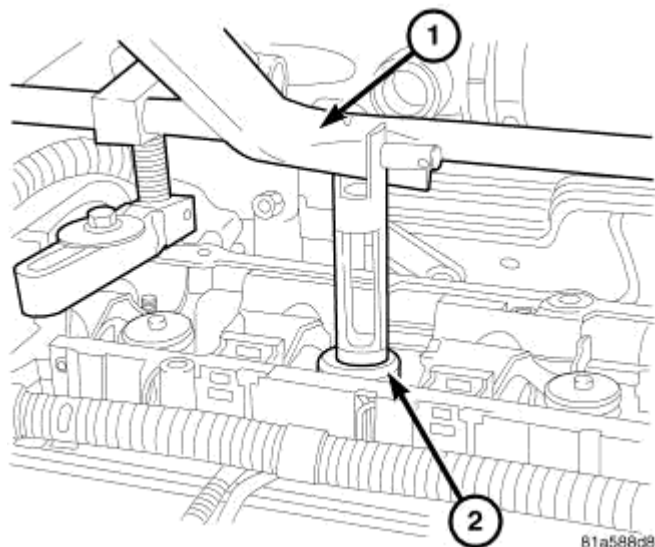
3. Install new lower injector o-ring (2) using injector o-ring protector/guide 9886 (3).



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Fig. 293: SEATING INJECTORS
Courtesy of CHRYSLER LLC

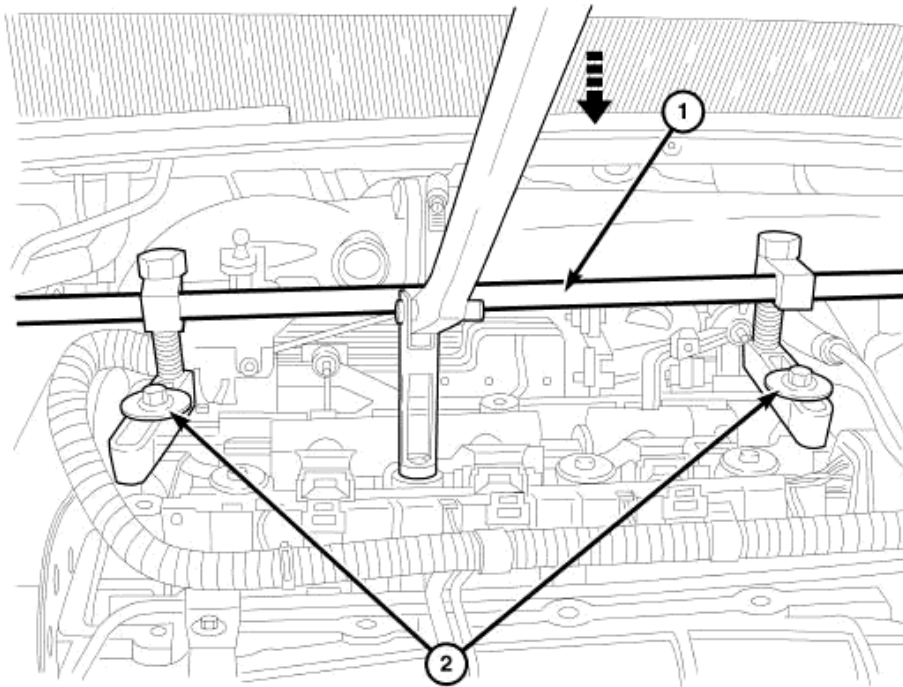
4. Install valve spring tool 9916 (1) on cylinder head using M-8 x 70 mm bolts (2).



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Fig. 294: INJECTOR SEATING TOOL
Courtesy of CHRYSLER LLC

5. Position valve spring tool 9916 over injector (2).

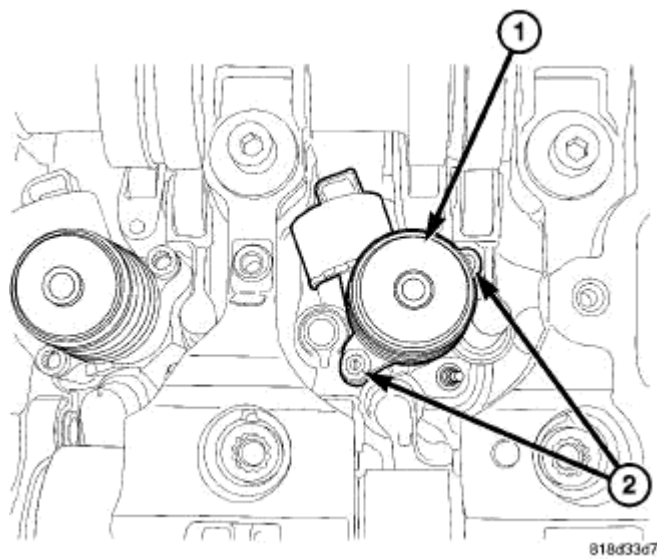


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Fig. 295: SEATING INJECTORS

Courtesy of CHRYSLER LLC

6. Seat injector by applying downward pressure on the handle of valve spring tool 9916.



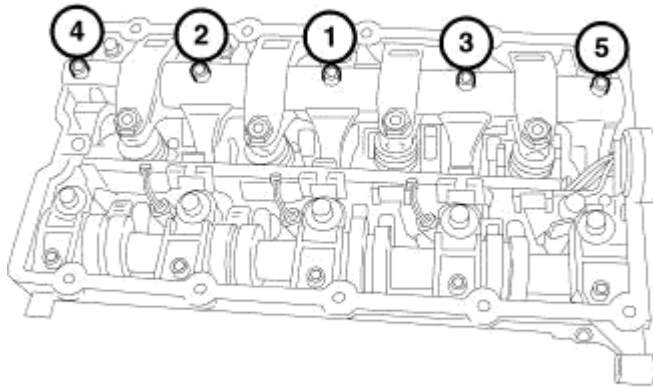
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Fig. 296: INJECTOR

Courtesy of CHRYSLER LLC

CAUTION: Install injector (1) using new retaining bolts.

7. Install new injector bolts (2).
8. Tighten bolts (2) to 3 N.m (27 lbs.in.).
9. Tighten injector retaining bolts an additional 90°.
10. Tighten injector retaining bolts an additional 180°.
11. Connect injector electrical connectors.



817a64d0

Fig. 297: Torque Injector Shaft Bolts In Sequence
Courtesy of CHRYSLER LLC

CAUTION: When replacing injectors, the rocker arm adjustment screws and the injector ball studs must be replaced or engine damage could result.

12. Install injector rocker shaft.
13. Install new rocker arm adjustment screws and the injector ball studs.
14. Torque injector shaft bolts to 20 N.m (15 in. lbs.) in the sequence shown in **Fig. 297**.
15. Tighten rocker arm shaft bolts an additional 90° as shown in **Fig. 297**.
16. Perform the injector clearance procedure. See **Fuel System/Fuel Injection/INJECTOR(S), Fuel - Standard Procedure**.
17. Install cylinder head cover. Refer to **Engine/Cylinder Head/COVER(S), Cylinder Head - Installation**.

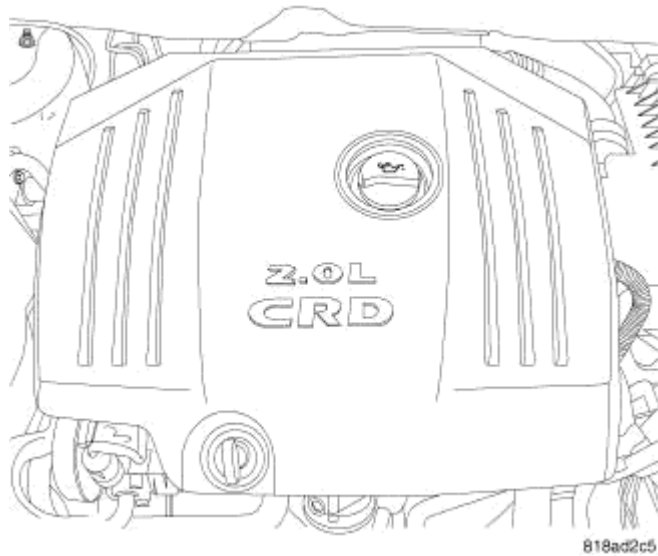


Fig. 298: ENGINE COVER-REMOVAL
Courtesy of CHRYSLER LLC

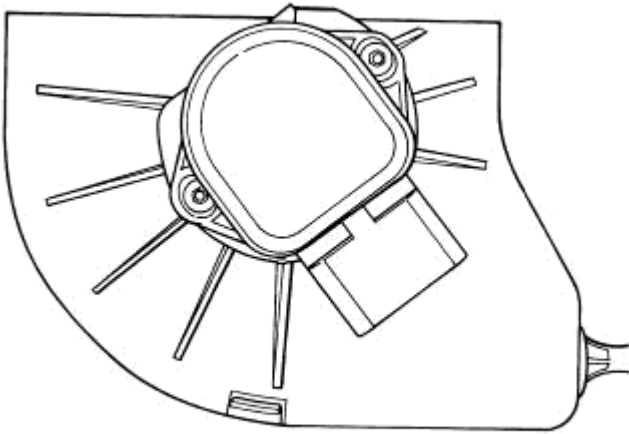
18. Connect negative battery cable.
19. Start engine and check for leaks.
20. Install engine cover. Refer to **Engine - Installation** .

SENSOR, ACCELERATOR PEDAL POSITION

Description

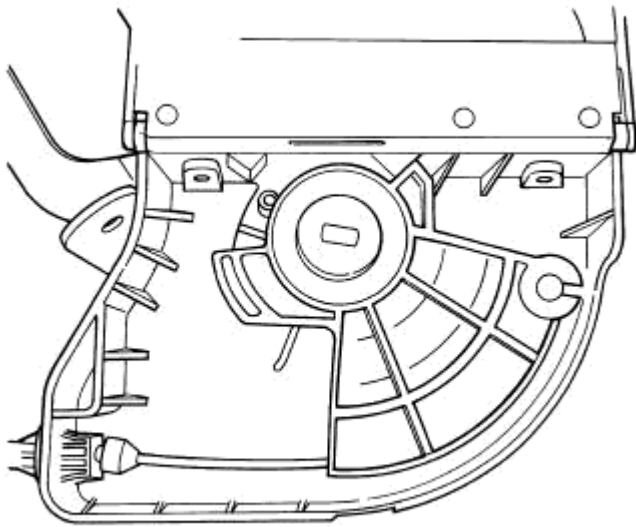
DESCRIPTION

The Accelerator Pedal Position Sensor (APPS) is a variable resistor that provides the PCM with an input signal (voltage) . The signal represents throttle blade position. As the position of the accelerator pedal changes, the resistance of the APPS changes . For service procedures, refer to the accelerator pedal removal and installation procedures. See **Fuel System/Fuel Injection/PEDAL, Accelerator - Removal**.



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Fig. 299: Accelerator Pedal Position Sensor Module
Courtesy of CHRYSLER LLC



80c1d106

Fig. 300: Accelerator Pedal Position Sensor Module Open
Courtesy of CHRYSLER LLC

SENSOR, AIR TEMPERATURE, INTAKE

Description

DESCRIPTION

The intake air temperature (IAT) sensor is integrated with the boost pressure sensor, which is located in the

charge air tube. The IAT is used to monitor the intake air temperature. Refer to **Fuel System/Fuel Injection/SENSOR, Boost Pressure - Removal** and **Fuel System/Fuel Injection/SENSOR, Boost Pressure - Installation** for removal and installation procedures.

Operation

OPERATION

The intake air temperature sensor is a negative temperature coefficient (NTC) thermistor (resistance varies with temperature). This means at cold air temperature its resistance is high, so the voltage signal will be high. As intake air temperature increases, sensor resistance decreases and the signal voltage will be low. This allows the sensor to provide an analog voltage signal (0.2-4.8 volts) to the ECM.

SENSOR, BOOST PRESSURE

Description

DESCRIPTION

The boost pressure sensor (1) is integrated with the intake air temperature sensor, and mounted in the charge air hose below the intake manifold. The sensor allows the ECM to monitor air pressure within the intake manifold.

Operation

OPERATION

When the intake manifold pressure is low (high vacuum) sensor voltage output is 0.25-1.8 volts at the ECM. When the intake manifold pressure is high due to turbo boost, sensor voltage output is 2.0-4.7 volts. The sensor receives a 5-volts reference from the ECM. Sensor ground is also provided by the ECM. The ECM uses boost pressure combined with intake air temperature to determine the volume of air entering the engine.

Diagnosis and Testing

DIAGNOSIS AND TESTING - BOOST PRESSURE SENSOR

If the boost pressure sensor fails, the ECM records a DTC into memory and continues to operate the engine in one of the three limp-in modes. When the ECM is operating in this mode, a loss of power will be present, as if the turbocharger was not operating. The best method for diagnosing faults with the boost pressure sensor is with a scan tool. Refer to **POWERTRAIN CONTROL MODULE (PCM) - ELECTRICAL DIAGNOSTICS - 545RE** for more information.

Refer to On-Board Diagnostics in **EMISSIONS CONTROL** for a list of Diagnostic Trouble Codes (DTC's) for certain fuel system components.

Removal

REMOVAL

1. Disconnect negative battery cable.
2. Remove the belly pan.

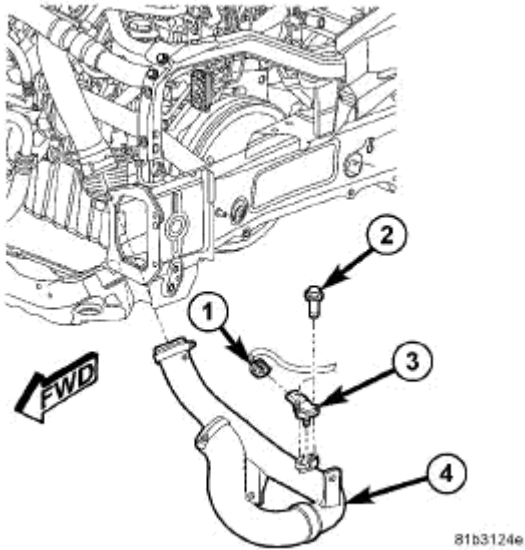


Fig. 301: Boost Pressure Sensor Electrical Connector
Courtesy of CHRYSLER LLC

3. Disconnect the electrical connector (1) from the boost pressure sensor (3).
4. Remove the 2 mounting bolts (2).
5. Remove the boost pressure sensor (3) from the charge air tube (4).

Installation

INSTALLATION

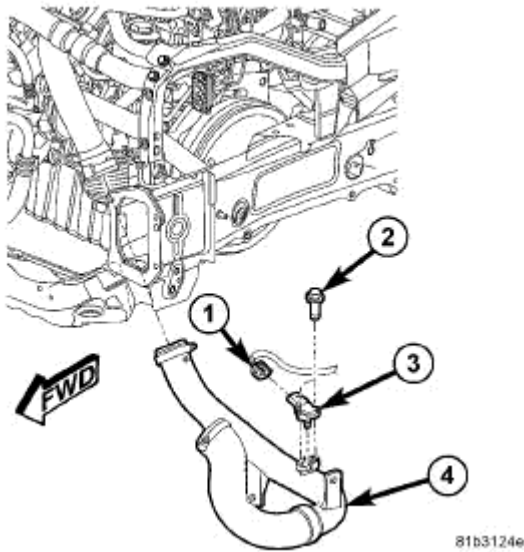


Fig. 302: Boost Pressure Sensor In Charge Air Tube
Courtesy of CHRYSLER LLC

1. Install the boost pressure sensor (3) in the charge air tube (4).
2. Install the 2 mounting bolts (2). Tighten to 8 Nm/6 lb-ft.
3. Reconnect the electrical connector (1).
4. Install the belly pan.
5. Reconnect negative battery cable.

SENSOR, CAMSHAFT POSITION

Description

DESCRIPTION

The camshaft position sensor is mounted inside the timing belt cover. The hall effect sensor generates a signal that corresponds to the camshaft position of rotation. The electronic control module (ECM) uses the camshaft position sensor signal to detect the TDC position of cylinder 1. The ECM controls Injection timing and the duration of time each injector delivers fuel during an injection cycle based on the camshaft signal and the crankshaft signals.

Operation

OPERATION

The signal circuit of the camshaft sensor has a voltage of approximately 5V. If the segment machined into the exhaust camshaft sprocket is positioned opposite the camshaft sensor, the camshaft signal is approximately 0V. This 0V to 5V signal is used by the engine control module (ECM) for detecting ignition TDC of cylinder 1 as the engine rotates. If no signal is supplied by the camshaft position sensor, the vehicle will not start.

Removal**REMOVAL**

1. Disconnect negative battery cable.
2. Remove engine cover. Refer to **Engine - Removal** .
3. Remove the throttle body.
4. Disconnect camshaft position sensor electrical connector.
5. Remove the upper and lower timing belt covers. Refer to **Engine/Valve Timing/COVER(S), Engine Timing - Removal** .
6. Remove cylinder head cover.

NOTE: When rotating engine to TDC, verify that the cylinder #1 is on the compression stroke. The camshaft lobes for cylinder #1 should be pointing upward.

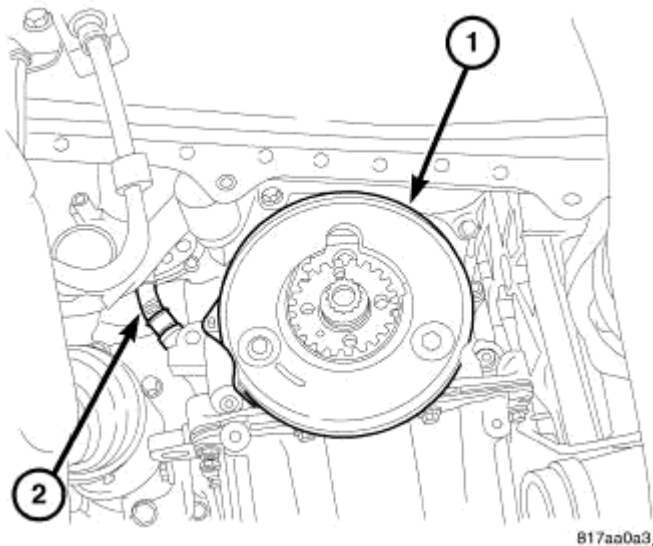


Fig. 303: LOWER TIMING BELT COVER

Courtesy of CHRYSLER LLC

7. Remove lower timing belt cover (1).

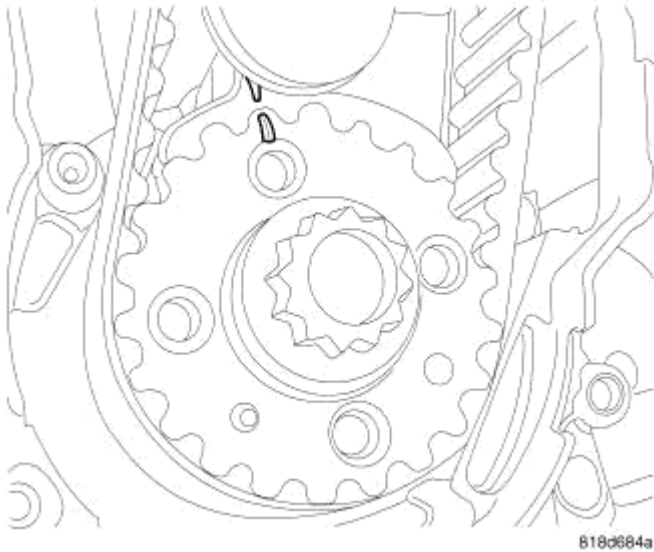


Fig. 304: CRANKSHAFT TIMING MARKS

Courtesy of CHRYSLER LLC

8. Rotate engine to TDC and insert crankshaft lock 9883.
9. Insert camshaft locking pins 9882.
10. Loosen timing belt tensioner retaining nut.
11. Rotate timing belt tensioner counter clockwise to release tension from the timing belt.

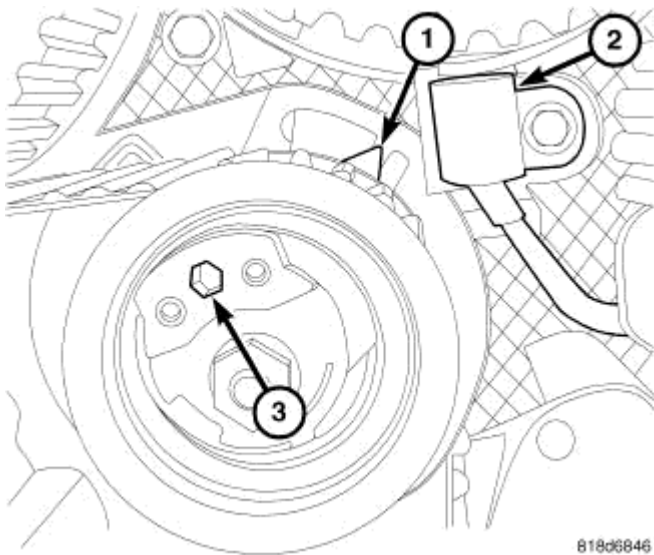


Fig. 305: TENSIONER ADJUSTMENT

Courtesy of CHRYSLER LLC

12. Remove the access plug from the cam position sensor harness opening in the back (engine block side) of the timing belt cover.
13. Remove retaining bolt and remove the cam position sensor.

Installation**INSTALLATION**

1. Route the cam position sensor harness connector through the opening in the back of the timing belt cover (engine block side) and install the access hole plug.
2. Reconnect the cam position sensor harness connector.
3. Install the cam position sensor (2) and the retaining bolt. Tighten the bolt to 10 Nm/ 7 lb-ft.

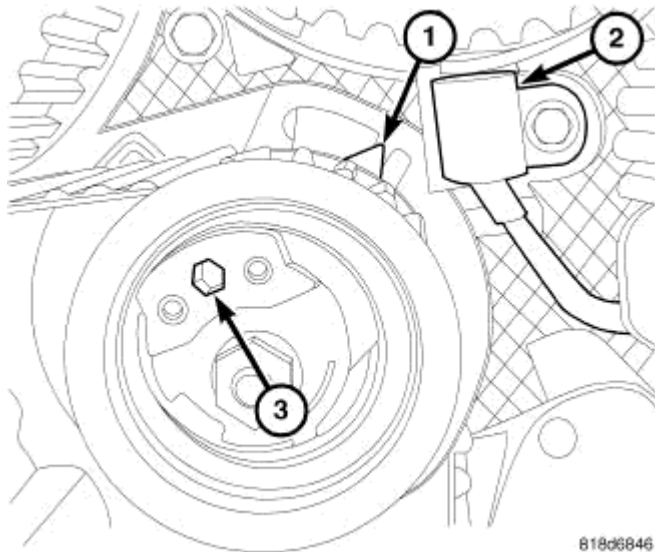


Fig. 306: TENSIONER ADJUSTMENT
Courtesy of CHRYSLER LLC

4. Insert Allen wrench into timing belt tensioner (3) and rotate timing belt tensioner until indicator (1) is in the middle of the slot.

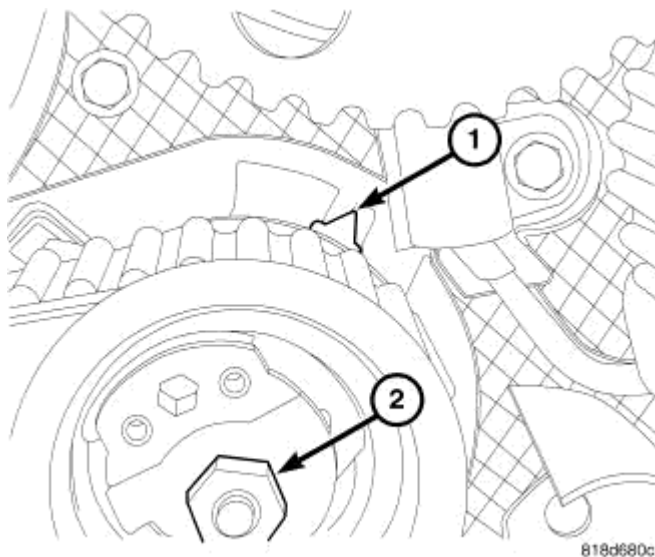
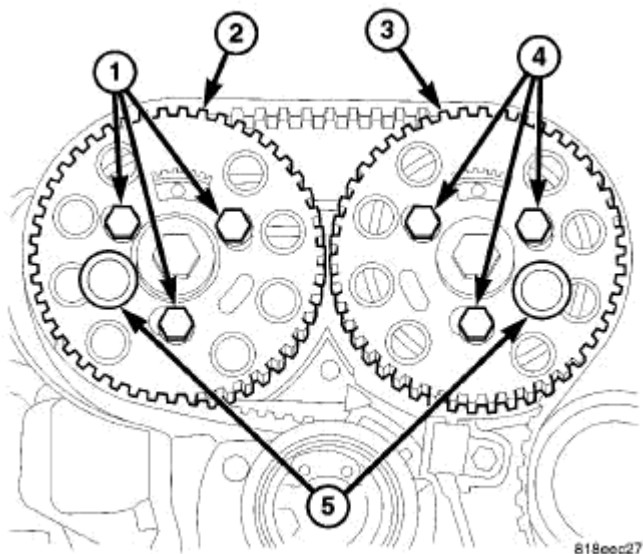


Fig. 307: TIGHTEN TENSIONER

Courtesy of CHRYSLER LLC

5. Torque nut (2) to 20 N.m + 45° (177 in. lbs. +45°).

NOTE: Tensioner indicator (1) will move out of the slot when nut (2) is torqued. This is normal, do not reposition the tensioner.

**Fig. 308: Camshaft Timing**

Courtesy of CHRYSLER LLC

6. Remove camshaft locking pins 9882 (5).
7. Remove crankshaft lock 9883.
8. Install the upper and lower timing belt covers. Refer to **Engine/Valve Timing/COVER(S), Engine Timing - Installation**.
9. Install the cylinder head cover.
10. Install the throttle body.
11. Install engine cover.
12. Connect negative battery cable.

SENSOR, CRANKSHAFT POSITION

Description

DESCRIPTION

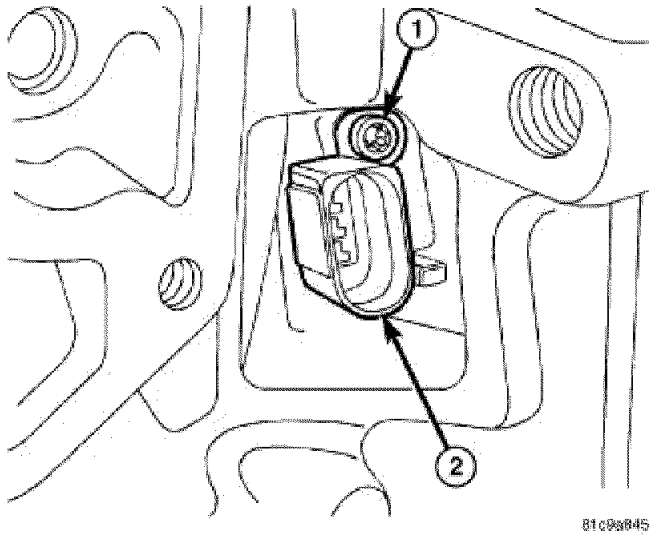


Fig. 309: Crankshaft Position Sensor Is Located Near Rear Main Oil Seal Assembly
Courtesy of CHRYSLER LLC

The crankshaft position sensor (2) is located near the rear main oil seal assembly. This sensor is used to generate a signal that corresponds to engine RPM. The ECM also uses the crankshaft position sensor to detect when the engine is at TDC. The crankshaft position sensor can be accessed by removing the engine oil cooler

Operation

OPERATION

The crankshaft position and engine speed are sensed with a contact-less hall effect signal generated by the crankshaft position sensor. The distance between the crankshaft position sensor and the tone wheel inside the rear main seal assembly is fixed by the installation position.

When the crankshaft rotates, a pulse width modulated (ON/OFF) voltage signal is generated in the crankshaft position sensor by the tone wheel inside the rear main seal assembly.

Removal

REMOVAL

1. Remove the belly pan.

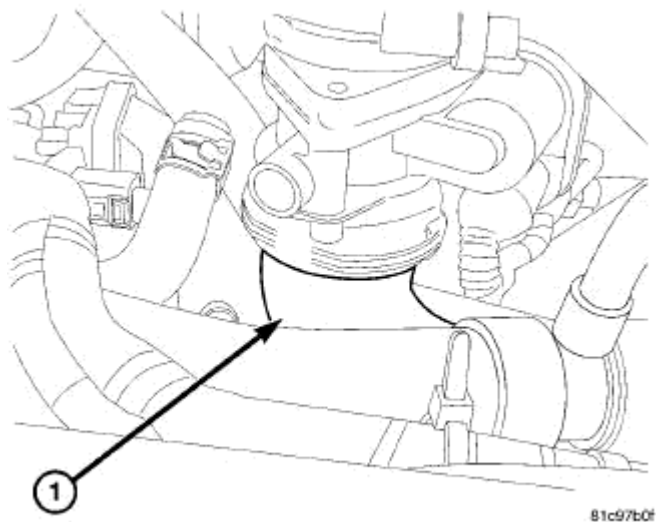


Fig. 310: Air Inlet Hose
Courtesy of CHRYSLER LLC

2. Disconnect the air inlet hose (1) from the throttle body.

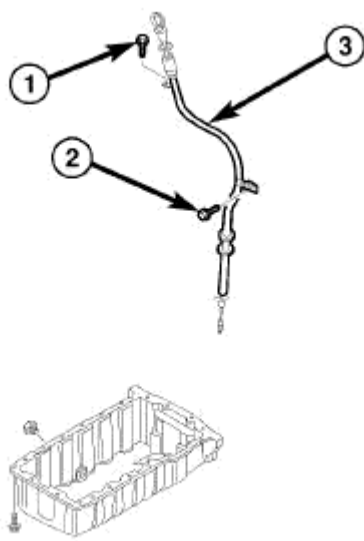


Fig. 311: Upper Dipstick Tube Support Bracket Bolt
Courtesy of CHRYSLER LLC

3. Remove the upper dipstick tube support bracket bolt (1).

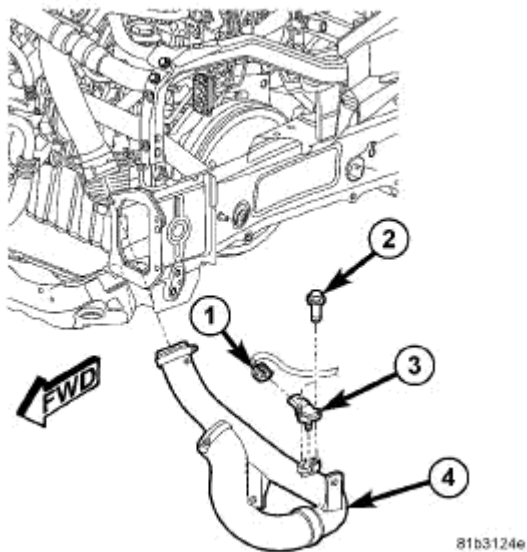


Fig. 312: Boost Pressure Sensor Harness Connector
Courtesy of CHRYSLER LLC

4. Disconnect the boost pressure sensor harness connector (1).

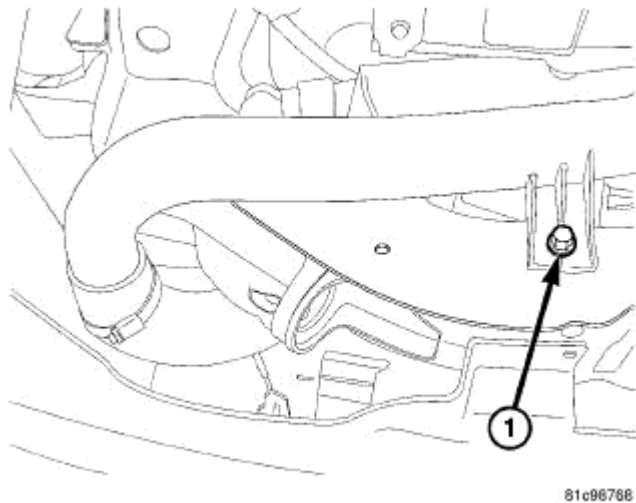


Fig. 313: Intercooler Outlet Tube Bolt
Courtesy of CHRYSLER LLC

5. Remove the bolt (1) from the intercooler outlet tube, the clamp at the intercooler, and remove the intercooler outlet tube.
6. Remove the lower dipstick tube support bracket bolt, and the wiring harness bracket bolt from the oil cooler assembly.
7. Position the dipstick tube aside.

8. Drain the engine coolant.

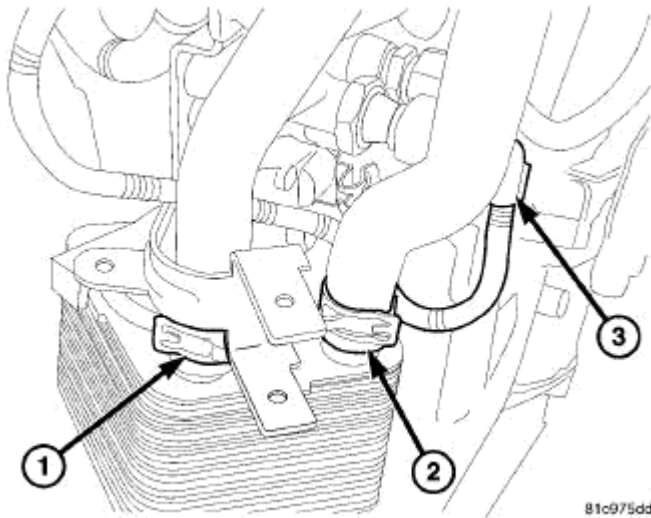


Fig. 314: Coolant Supply & Return Lines
Courtesy of CHRYSLER LLC

9. Disconnect the coolant supply (1) and return (2) lines from the oil cooler assembly.

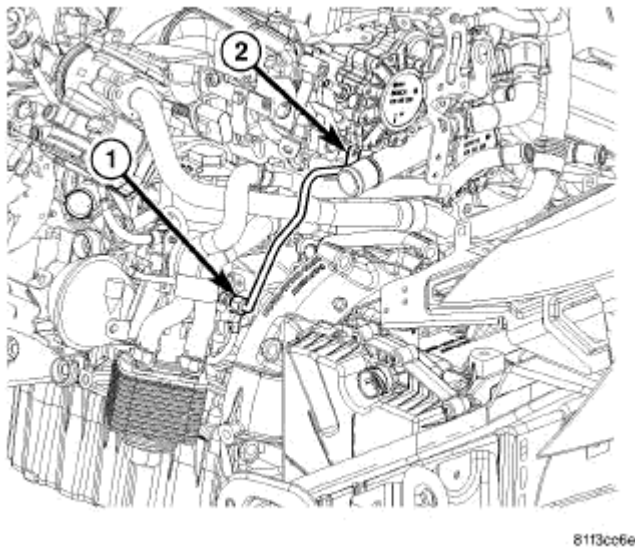


Fig. 315: Turbocharger Oil Supply Line
Courtesy of CHRYSLER LLC

10. Disconnect the turbocharger oil supply line (1) from the oil cooler assembly.

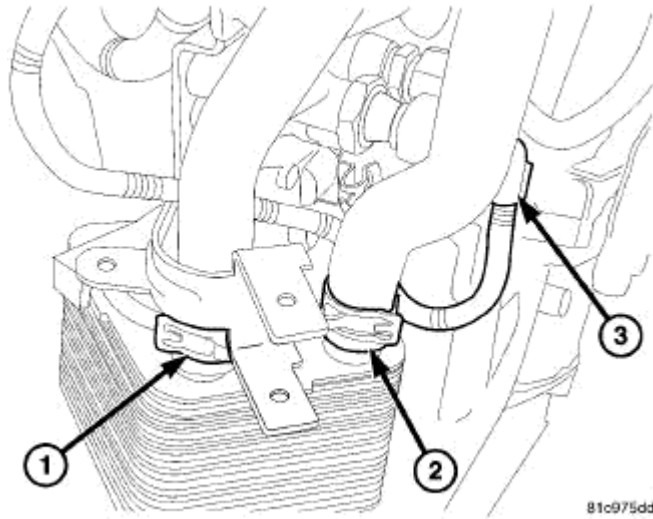


Fig. 316: Coolant Supply & Return Lines
Courtesy of CHRYSLER LLC

11. Disconnect the oil pressure sensor harness connector (3).

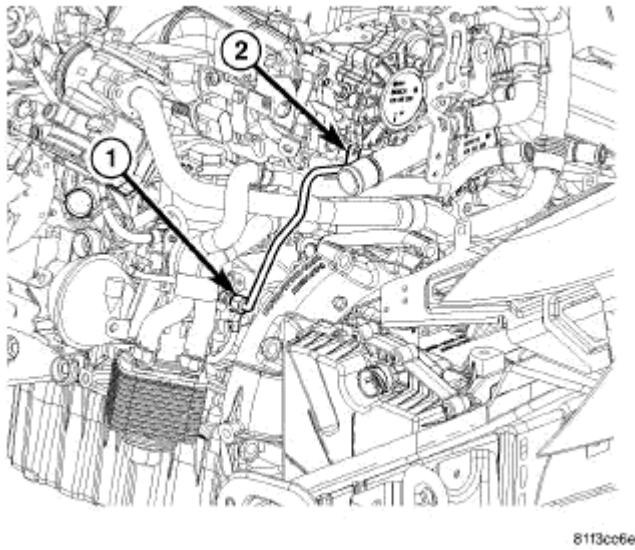


Fig. 317: Turbocharger Oil Supply Line
Courtesy of CHRYSLER LLC

12. Remove the turbocharger oil supply line support bracket bolt (2).

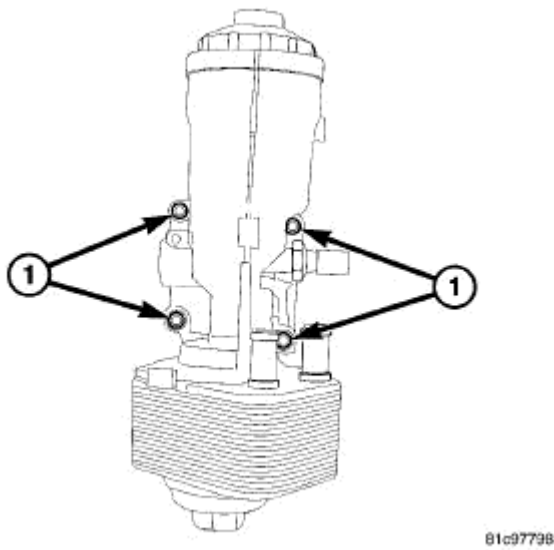


Fig. 318: Oil Cooler/Filter Adapter Assembly
Courtesy of CHRYSLER LLC

13. Remove the 4 bolts from the oil cooler/filter adapter assembly (1).
14. Remove the oil cooler/filter assembly.

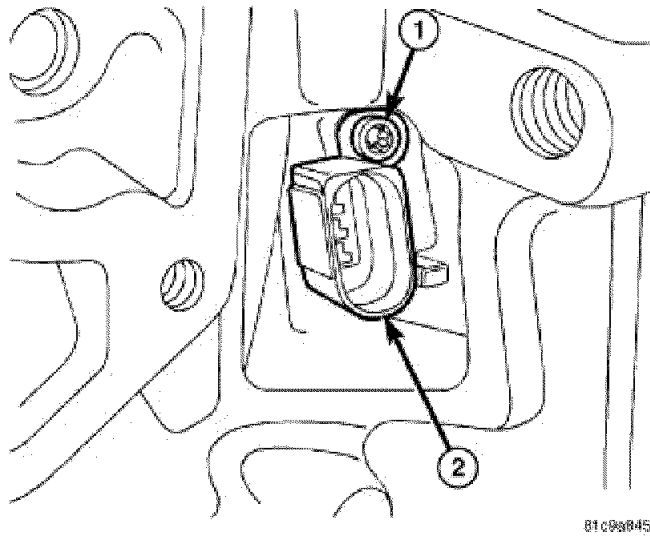


Fig. 319: Crankshaft Position Sensor Is Located Near Rear Main Oil Seal Assembly
Courtesy of CHRYSLER LLC

15. Disconnect the crankshaft position sensor harness connector.
16. Remove the crankshaft position sensor bolt (1).
17. Remove the crankshaft position sensor (2).

Installation

INSTALLATION

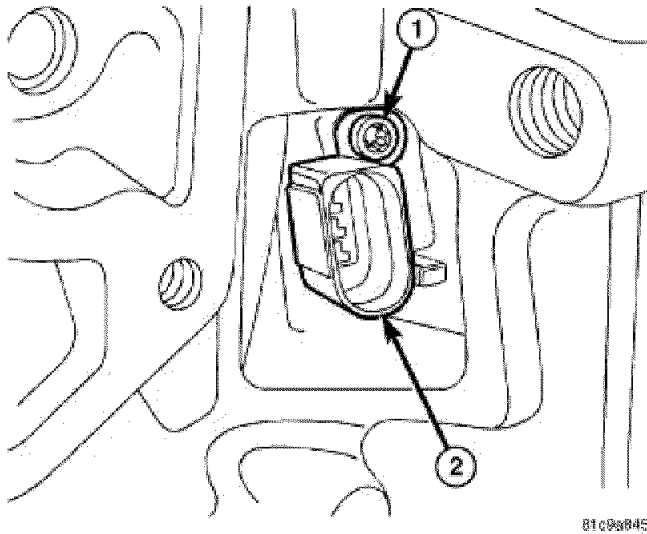


Fig. 320: Crankshaft Position Sensor Bolt
Courtesy of CHRYSLER LLC

1. Install the crankshaft position sensor (2).
2. Install the crankshaft position sensor bolt (1), and tighten to 5 Nm (44 in. lbs).
3. Reconnect the crankshaft position sensor harness connector.

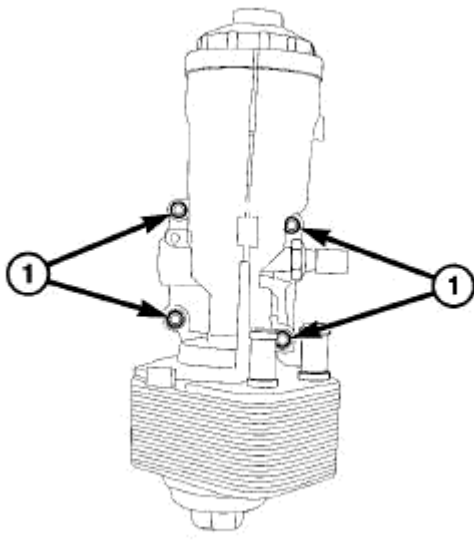


Fig. 321: Oil Cooler/Filter Adapter Assembly Bolts
Courtesy of CHRYSLER LLC

4. Install the oil cooler/filter assembly, and install the 4 oil cooler/filter adapter assembly bolts (1). Tighten the bolts in two stages, first to 15 Nm (11 ft.lbs), then an additional 90°.

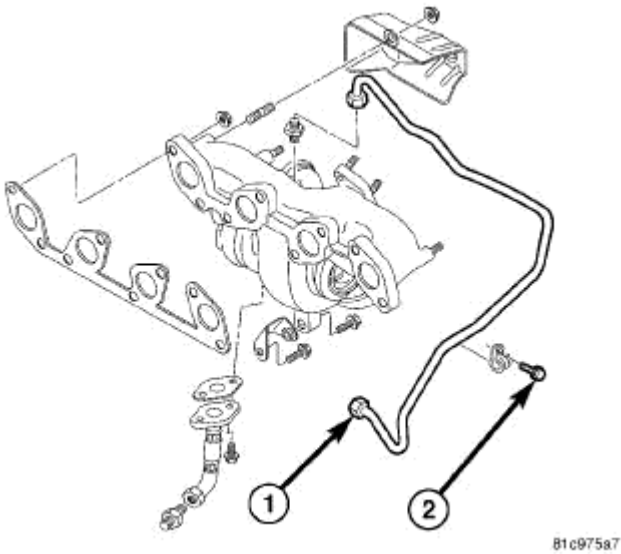


Fig. 322: Turbocharger Oil Supply Line Support Bracket Bolt
Courtesy of CHRYSLER LLC

5. Install the turbocharger oil supply line support bracket bolt (2), and tighten to 10 Nm (88 in. lb).

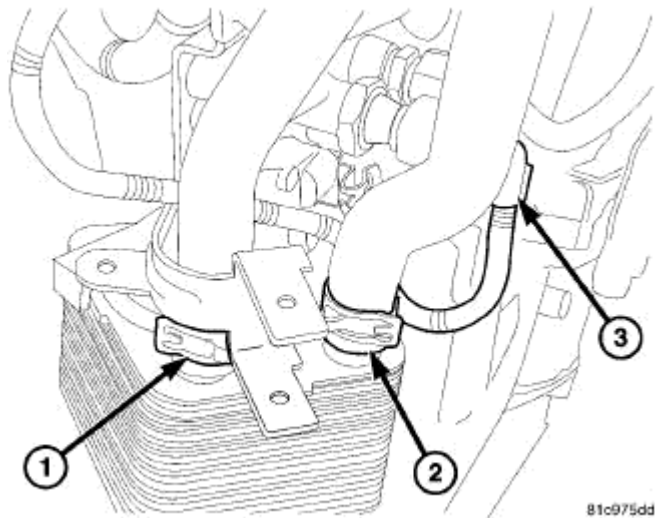


Fig. 323: Oil Pressure Sensor Harness Connector
Courtesy of CHRYSLER LLC

6. Reconnect the oil pressure sensor harness connector (3).

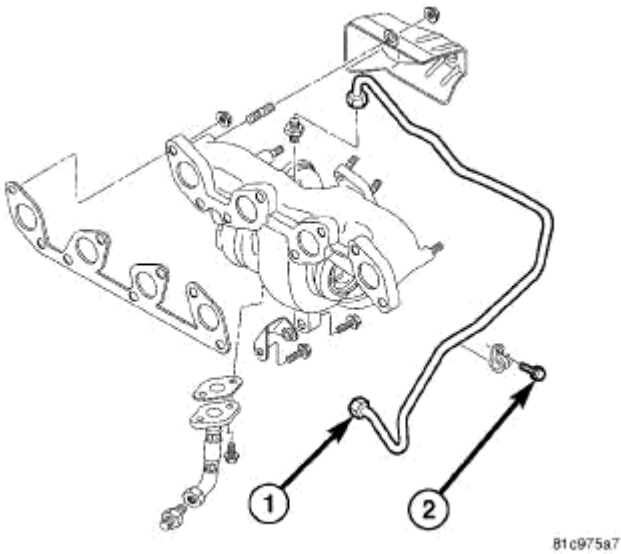


Fig. 324: Turbocharger Oil Supply Line Support Bracket Bolt
Courtesy of CHRYSLER LLC

7. Reconnect the turbocharger oil supply line (1) to the oil cooler assembly. Tighten oil supply line union nut at the oil cooler connection to 22 Nm (16 ft. lb).

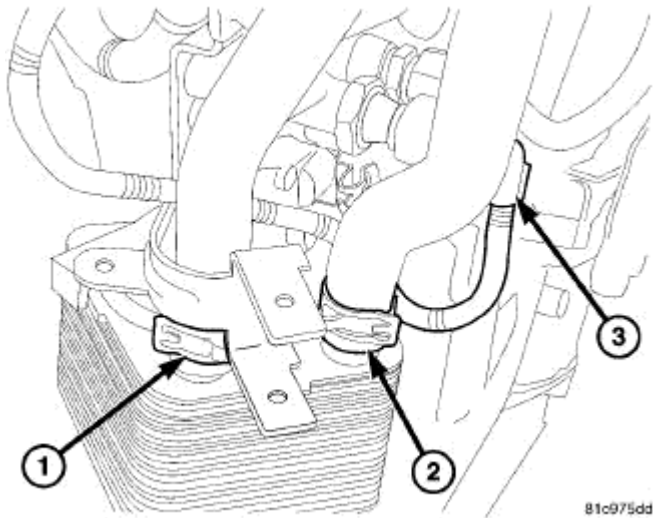


Fig. 325: Oil Pressure Sensor Harness Connector
Courtesy of CHRYSLER LLC

8. Reconnect the coolant supply (1) and return (2) lines to the oil cooler assembly.
9. Install the dipstick tube.
10. Install the lower dipstick tube support bracket bolt, and the wiring harness bracket bolt to the oil cooler assembly.

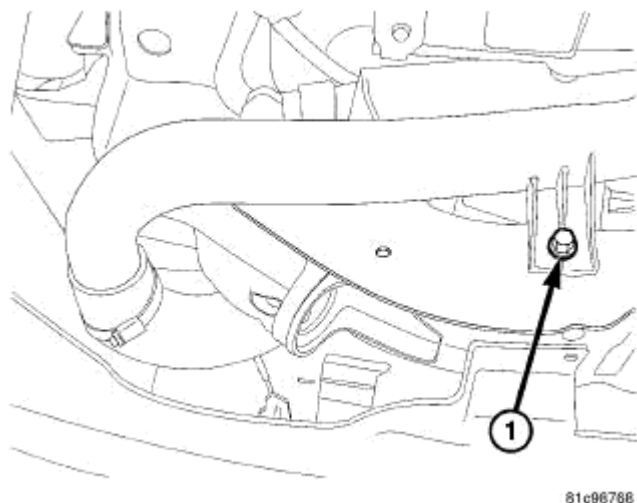


Fig. 326: Intercooler Outlet Tube Bolt
Courtesy of CHRYSLER LLC

11. Install the intercooler outlet tube, and install the bolt (1) to the intercooler outlet tube. Tighten bolt to 25 Nm (18 ft. lbs).

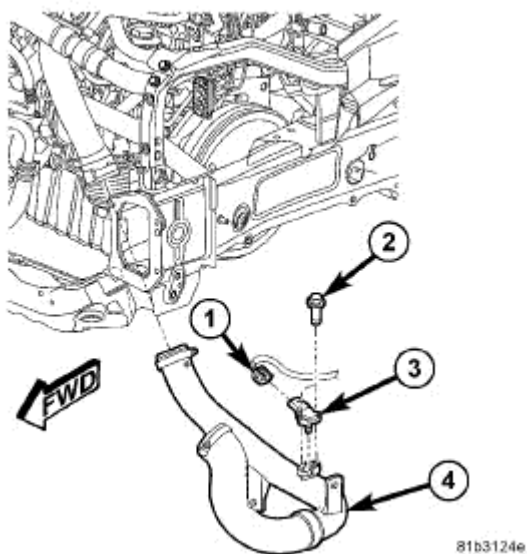
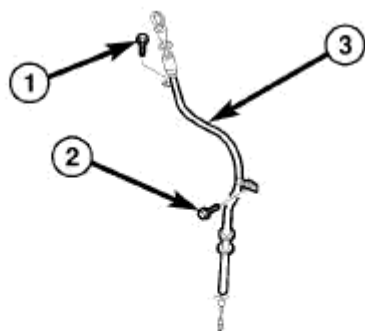


Fig. 327: Boost Pressure Sensor Harness Connector
Courtesy of CHRYSLER LLC

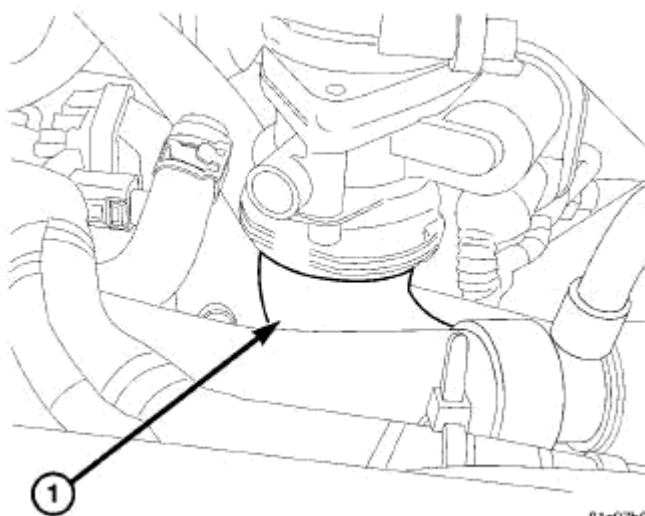
12. Reconnect the boost pressure sensor harness connector (1).



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Fig. 328: Upper Dipstick Tube Support Bracket Bolt
Courtesy of CHRYSLER LLC

13. Install the upper dipstick tube support bracket bolt (1).



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Fig. 329: Air Inlet Hose To Throttle Body
Courtesy of CHRYSLER LLC

14. Reconnect the air inlet hose (1) to the throttle body.
15. Install the belly pan.
16. Refill the cooling system. Refer to **Cooling - Standard Procedure** .

SENSOR, MASS AIRFLOW (MAF)

Description**DESCRIPTION**

The miromechanical Mass Air Flow (MAF) sensor is a hot film thermal flow meter with an integrated temperature sensor which detects the intake air temperature. The sensor is designed for recording load on combustion engines with diesel fuel injection and has a cylinder size in accordance with the required air flow rate. The MAF Sensor is mounted inline in the air intake between the air filter and the turbocharger.

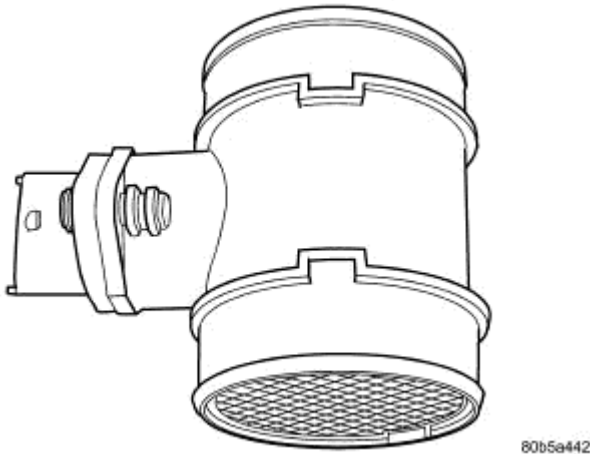


Fig. 330: MASS AIR FLOW (MAF) SENSOR
Courtesy of CHRYSLER LLC

Operation**OPERATION**

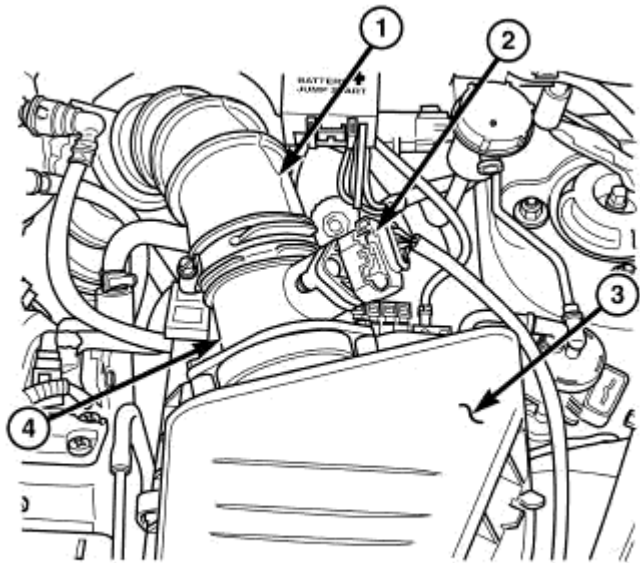
The MAF sensing element consists of two temperature sensors symmetrical to a heating area sitting on a thin membrane. Up and down stream sensors see the same temperature when there is no air flowing through the sensor. With incoming flow, the upstream heating area is cooled down due to heat transfer, while the downstream area retains its temperature because the air has been heated up after it flows through the heating area. The characteristic of temperature change in relation to airflow at the upstream area is utilized to determine the mass airflow passing through the sensor. This signal voltage variation is used by the ECM along with internal calibrations to coordinate the total mass air flow.

To reduce contamination during sensing, a partial air flow is directed at an angle with respect to the main flow in the measuring channel for the fact that moisture and other particles tend not to react in the same manner that air does after they hit the channel wall. The Diesel Power Relay supplies battery power to the MAF sensor, ground is provided by the ECM. The MAF sensor signal is provided by the ECM.

Removal**REMOVAL**

1. Disconnect negative battery cable.

2. Disconnect mass air flow (MAF) sensor electrical connector.
3. Disconnect air cleaner to turbocharger hose.
4. Remove MAF to air cleaner housing retaining bolts and remove sensor.



80ea15#1

Fig. 331: Mass Air Flow Sensor Location
Courtesy of CHRYSLER LLC

Installation

INSTALLATION

1. Position mass air flow (MAF) sensor to air cleaner housing and tighten bolts .
2. Connect air cleaner to turbocharger hose at MAF sensor .
3. Connect MAF sensor electrical connector .
4. Connect negative battery cable.