

energized. The quantity of fuel is determined by the electronic control system.

Air entering the engine is monitored by speed, pressure and temperature sensors. The outputs of these sensors are processed by the Powertrain Control Module (PCM). The PCM computes the required fuel flow rate and determines the needed injector pulse width (injector "on" time) and sends a signal to the injector to meter the exact quantity of fuel. Each fuel injector is energized once every other crankshaft revolution, in sequence with the ignition firing order.

➔ For description and testing of electronic control system components, see Section 4.

FUEL SYSTEM SERVICE PRECAUTIONS

Safety is the most important factor when performing not only fuel system maintenance, but any type of maintenance. Failure to conduct maintenance and repairs in a safe manner may result in serious personal injury or death. Work on a vehicle's fuel system components can be accomplished safely and effectively by adhering to the following rules and guidelines.

- To avoid the possibility of fire and personal injury, always disconnect the negative battery cable unless the repair or test procedure requires that battery voltage be applied.

- Always relieve the fuel system pressure prior to detaching any fuel system component (injector, fuel rail, pressure regulator, etc.) fitting or fuel line connection. Exercise extreme caution whenever relieving fuel system pressure to avoid exposing skin, face and eyes to fuel spray. Please be advised that fuel under pressure may penetrate the skin or any part of the body that it contacts.

- Always place a shop towel or cloth around the fitting or connection prior to loosening to absorb any excess fuel due to spillage. Ensure that all fuel spillage is quickly removed from engine surfaces. Ensure that all fuel-soaked cloths or towels are deposited into a flame-proof waste container with a lid.

- Always keep a dry chemical (Class B) fire extinguisher near the work area.

- Do not allow fuel spray or fuel vapors to come into contact with a spark or open flame.

- Always use a second wrench when loosening or tightening fuel line connections fittings. This will prevent unnecessary stress and torsion to fuel piping. Always follow the proper torque specifications.

- Always replace worn fuel fitting O-rings with new ones. Do not substitute fuel hose where rigid pipe is installed.

Relieving Fuel System Pressure

** CAUTION

Fuel supply lines on fuel injected vehicles will remain pressurized for some time after the engine is shut off. Fuel pressure must be relieved before servicing the fuel system.

1. Disconnect the negative battery cable.
2. Remove the fuel tank cap to relieve the pressure in the fuel tank.

3. Remove the cap from the Schrader valve located on the fuel supply manifold.

4. Attach fuel pressure gauge T80L-9974-A or equivalent, to the Schrader valve and drain the fuel through the drain tube into a suitable container.

5. After the fuel system pressure is relieved, remove the fuel pressure gauge and install the cap on the Schrader valve.

Fuel Pump

TESTING

➔ See Figure 19

** CAUTION

Observe all applicable safety precautions when working around fuel. Whenever servicing the fuel system, always work in a well ventilated area. Do not allow fuel spray or vapors to come in contact with a spark or open flame. Keep a dry chemical fire extinguisher near the work area. Always keep fuel in a container specifically designed for fuel storage; also, always properly seal fuel containers to avoid the possibility of fire or explosion.

1. Check all hoses and lines for kinks and leaking. Repair as necessary.
2. Check all electrical connections for looseness and corrosion. Repair as necessary.
3. Turn the ignition key from the OFF position to the RUN position several times (do not start the engine) and verify that the pump runs briefly each time. (you will here a low humming sound from the fuel tank).

➔ Check that the inertia switch is reset before diagnosing power supply problems to the fuel pump.

The use of a scan tool is required to perform these tests.

4. Turn the ignition key OFF.
5. Connect a suitable fuel pressure gauge to the fuel test port (Schrader valve) on the fuel rail.
6. Connect the scan tool and turn the ignition key ON but do not start the engine.
7. Following the scan tool manufacturer's instructions, enter the output test mode and run the fuel pump to obtain the maximum fuel pressure.

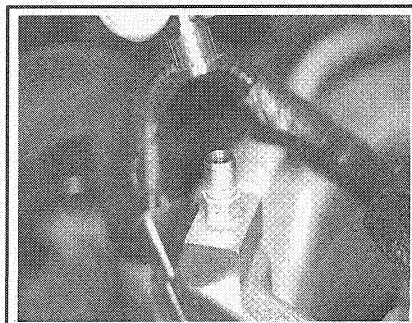


Fig. 19 The fuel pressure test port is located on the fuel rail, under the protective cap

8. The fuel pressure should be between 30–45 psi (210–310 kPa).

9. If the fuel pressure is within specification the pump is working properly. If not, continue with the test.

10. Check the pump ground connection and service as necessary.

11. Turn the ignition key ON.

12. Using the scan tool, enter output test mode and turn on the fuel pump circuit.

13. Using a Digital Volt Ohmmeter (DVOM), check for voltage (approximately 10.5 volts) at the fuel pump electrical connector.

14. If the pump is getting a good voltage supply, the ground connection is good and the fuel pressure is not within specification, then replace the pump.

REMOVAL & INSTALLATION

See fuel pump under fuel tank in this section.

Throttle Body

REMOVAL & INSTALLATION

3.8L Engine

UPPER INTAKE MANIFOLD AND THROTTLE BODY

➔ See Figure 20

1. Disconnect the negative battery cable.
2. Disengage the electrical connectors at the idle air bypass valve, throttle position sensor and the EGR position sensor.
3. Disconnect the throttle linkage at the throttle ball and transmission linkage from the throttle body. Remove the two retaining bolts securing the bracket to the intake manifold, then position the bracket with the cables out of the way.
4. Disengage the upper intake manifold vacuum fitting connections by disconnecting all of the vacuum lines to the vacuum tree, EGR valve and fuel pressure regulator.

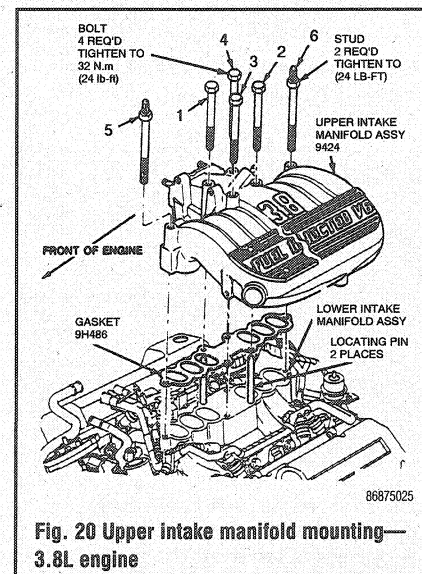


Fig. 20 Upper intake manifold mounting—3.8L engine