

DIAGNOSIS AND TESTING (Continued)

Incorrect injection pump timing (mechanical or electrical) can cause poor performance, excessive smoke and emissions and poor fuel economy.

A defective fuel injection pump, defective fuel timing solenoid or misadjusted mechanical pump timing can cause starting problems or prevent the engine from revving up. It can also cause:

- Engine surge at idle
- Rough idle (warm engine)
- Low power
- Excessive fuel consumption
- Poor performance
- Low power
- Black smoke from the exhaust
- Blue or white fog like exhaust
- Incorrect idle or maximum speed

The electronically controlled fuel pump has no mechanical governor like older mechanically controlled fuel pumps. Do not remove the top cover of the fuel pump, or the screws fastening the wiring pigtail to the side of the pump. **The warranty of the injection pump and the engine may be void if those seals have been removed or tampered with.**

FUEL SUPPLY RESTRICTIONS

LOW-PRESSURE LINES

Restricted or Plugged supply lines or fuel filter can cause a timing fault that will cause the PCM to operate the engine in a "Limp Home" mode. See the introduction of the Fuel Injection System in this group for more information on the Limp Home mode. Fuel supply line restrictions can cause starting problems and prevent the engine from revving up. The starting problems include; low power and blue or white fog like exhaust. Test all fuel supply lines for restrictions or blockage. Flush or replace as necessary. Bleed the fuel system of air once a fuel supply line has been replaced. Refer to the Air Bleed Procedure section of this group for procedures.

HIGH-PRESSURE LINES

Restricted (kinked or bent) high-pressure lines can cause starting problems, poor engine performance and black smoke from exhaust.

Examine all high-pressure lines for any damage. Each radius on each high-pressure line must be smooth and free of bends or kinks.

Replace damaged, restricted or leaking high-pressure fuel lines with the correct replacement line.

CAUTION: The high-pressure fuel lines must be clamped securely in place in the holders. The 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 recom-

mended lines when replacement of high-pressure fuel line is necessary.

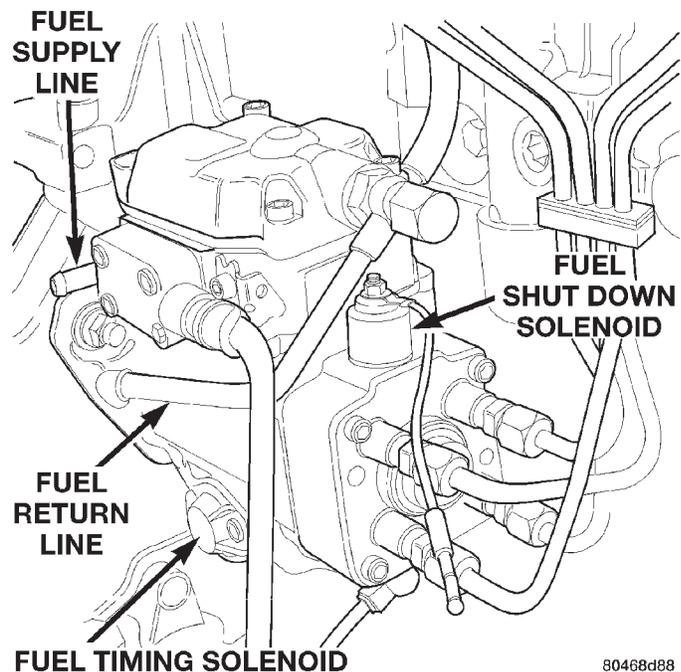
FUEL SHUTDOWN SOLENOID TEST

Since diesel fuel injection does not use spark plugs to start combustion, the only way to stop the engine is to cut off the fuel supply. This is done with the Fuel Shutdown Solenoid. If the engine cranks, but refuses to start, it may be caused by a defective fuel shutdown solenoid.

The fuel shutdown solenoid is not controlled or operated by the PCM. Voltage to operate the solenoid is supplied from the ignition (key) switch.

NOTE: Although the fuel shutdown solenoid is not operated by the PCM, if the Fuel Shutdown Solenoid has been disconnected, and the key turned on, the PCM will sense that the solenoid is not in the circuit, and will switch to a "Limp Home" mode. After reconnecting the solenoid, the PCM will have to be reset by clearing the codes with the DRBIII scan tool, or disconnecting the vehicle's battery for several minutes. The DRBIII scan tool is the preferred method for resetting the PCM. Refer to the 1997 GS 2.5L Diesel Powertrain Diagnostic Procedures Manual for procedure.

The fuel shutdown (shut-off) solenoid is used to electrically shut off the diesel fuel supply to the high-pressure fuel injection pump. The solenoid is mounted to the rear of the injection pump (Fig. 23).



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Fig. 23 Fuel Shutdown Solenoid Location

DIAGNOSIS AND TESTING (Continued)

The solenoid controls starting and stopping of the engine regardless of the position of the accelerator pedal. When the ignition (key) switch is OFF, the solenoid is shut off and fuel flow is not allowed to the fuel injection pump. When the key is placed in the ON or START positions, fuel supply is allowed at the injection pump.

(1) Disconnect the electrical pigtail connector (test connector) (Fig. 23) from the main engine wiring harness. Do not disconnect wiring directly at solenoid.

(2) Connect the leads of a voltmeter between a good ground and the disconnected engine wiring harness.

(3) Turn the key to the ON position. Do not attempt to start engine.

(4) 12V+ should be observed at wiring harness. If not, refer to Group 8 Wiring for wiring schematics and repair as necessary.

(5) Turn the key to the START position. 12V+ should be observed at wiring harness. If not, refer to Group 8 Wiring for wiring schematics and repair as necessary. The fault may be in the ignition (key) switch.

12V+ must be observed in both the ON and START positions. If 12V+ was observed, proceed to the next step.

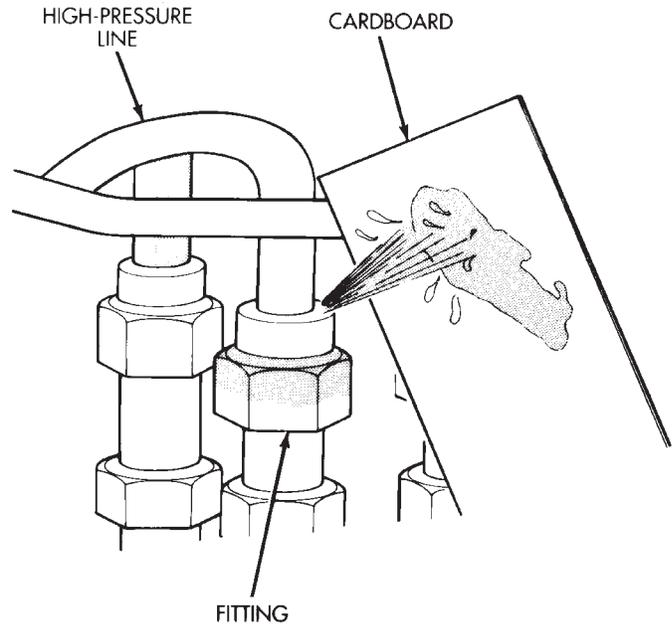
(6) With key still in the ON position, connect and disconnect the wiring harness to the solenoid. As this is done, a clicking noise should be heard coming from the solenoid. If not, replace solenoid. Refer to Fuel Shutdown Solenoid in the Removal/Installation section of this group for procedures.

HIGH-PRESSURE FUEL LINE LEAK TEST

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

WARNING: DUE TO EXTREME FUEL PRESSURES OF UP TO 45,000 KPA (6526 PSI), USE EXTREME CAUTION WHEN INSPECTING FOR HIGH-PRESSURE FUEL LEAKS. DO NOT GET YOUR HAND, OR ANY PART OF YOUR BODY NEAR A SUSPECTED LEAK. INSPECT FOR HIGH-PRESSURE FUEL LEAKS WITH A SHEET OF CARDBOARD. HIGH FUEL INJECTION PRESSURE CAN CAUSE PERSONAL INJURY IF CONTACT IS MADE WITH THE SKIN.

Start the engine. Move the cardboard over the high-pressure fuel lines and check for fuel spray onto the cardboard (Fig. 24). If a high-pressure line connection is leaking, bleed the system and tighten the connection. Refer to the Air Bleed Procedure in this group for procedures. Replace damaged, restricted or leaking high-pressure fuel lines with the correct replacement line.



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Fig. 24 Typical Test for Leaks with Cardboard

CAUTION: The high-pressure fuel lines must be clamped securely in place in the holders. The 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.

WASTEGATE (TURBOCHARGER)

Refer to Group 11, Exhaust System and Intake Manifold for information.

SERVICE PROCEDURES

AIR BLEED PROCEDURES

AIR BLEEDING AT FUEL FILTER

A certain amount of air may become trapped in the fuel system when fuel system components are serviced or replaced. Bleed the system as needed after fuel system service according to the following procedures.

WARNING: DO NOT BLEED AIR FROM THE FUEL SYSTEM OF A HOT ENGINE. DO NOT ALLOW FUEL TO SPRAY ONTO THE EXHAUST MANIFOLD WHEN BLEEDING AIR FROM THE FUEL SYSTEM.

Some air enters the fuel system when the fuel filter or injection pump supply line is changed. This small amount of air is vented automatically from the injection pump through the fuel drain manifold tubes