



Date	Group	No.	Release	Page
10.2009	230	256	01	1(13)

Air in the Fuel System, Check

MP7

MP8

MP10

Air in the Fuel System, Check

This information covers checking for air in the fuel system on the Mack MP7, MP8 and MP10 engines.

Note: This bulletin also applies to Mack Trucks Australia.

Contents

- "Air in the Fuel System, Check", page 2

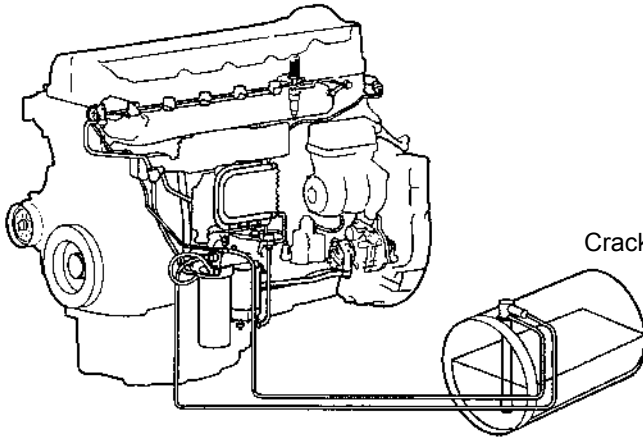
Note: Information is subject to change without notice.
Illustrations are used for reference only, and can differ slightly from the actual vehicle being serviced. However, key components addressed in this information are represented as accurately as possible.

2309-06-03-01 Air in the Fuel System, Check

You must read and understand the precautions and guidelines in Service Information, group 20, "General Safety Practices, Engine" before performing this procedure. If you are not properly trained and certified in this procedure, ask your supervisor for training before you perform it.

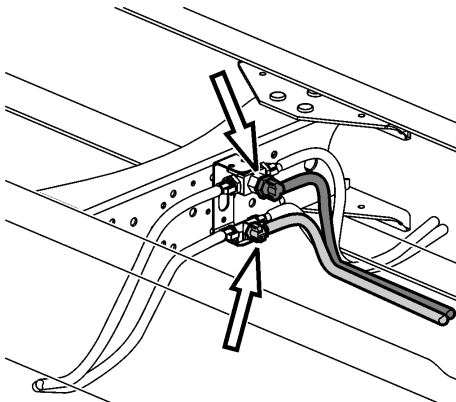
This is a mechanical check for air in the fuel system. For other fault tracing information, refer to the Guided Diagnostics under Symptom Based fault tracing.

Air in the fuel being supplied to the engine can cause a number of problems including hard starting and poor performance. Air can enter the fuel system at several points such as:



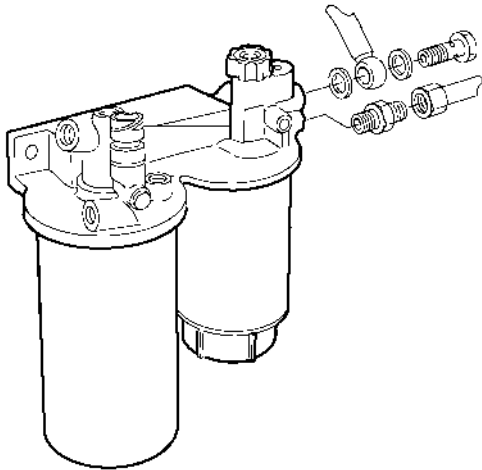
Cracked pickup tube in the fuel tank (low fuel)

W2004976

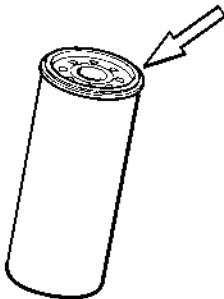


Loose suction side fuel supply lines

W2004691

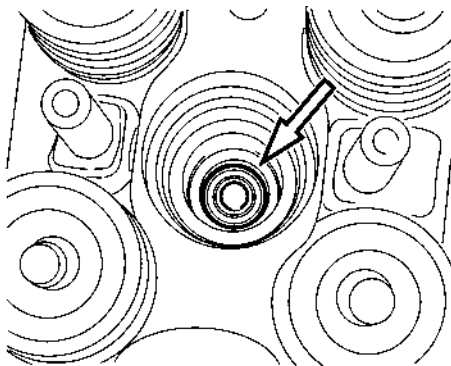


W2005860



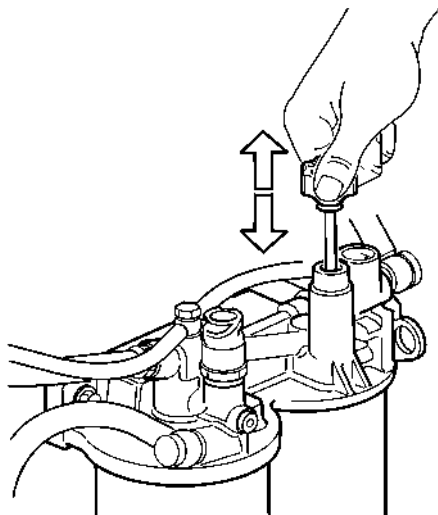
Damaged primary fuel filter seals

W2032840



Leaking copper sleeve to injector seat

W2004180



Loose fuel filter housing primer pump

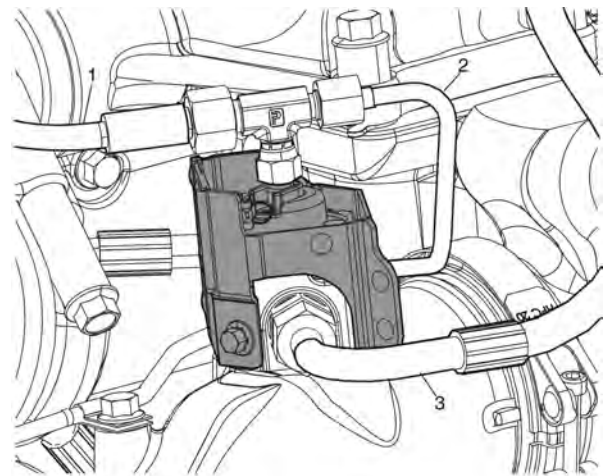
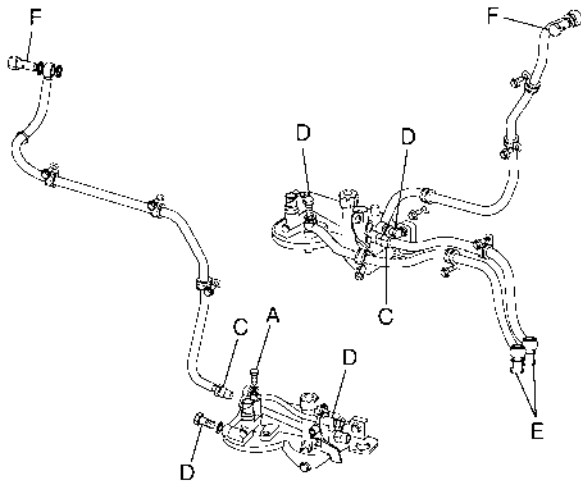
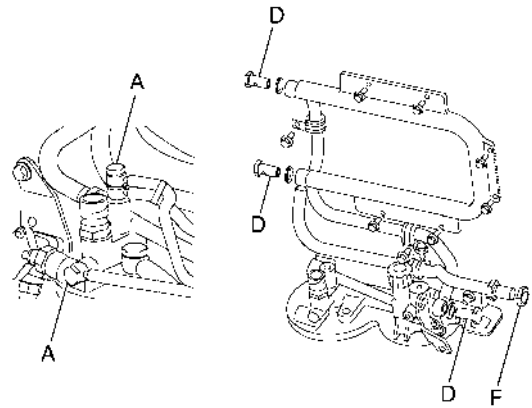
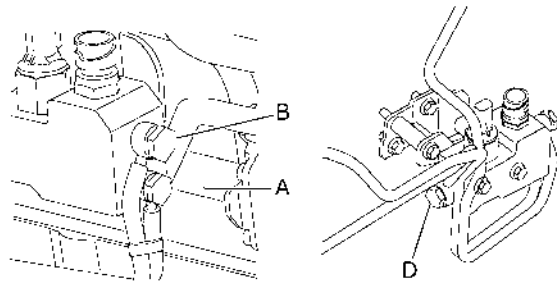
T2021565

Damaged engine-mounted fuel pump seals

Perform the following checks to eliminate obvious causes of air in the fuel system:

- 1 Make sure there is adequate fuel in the fuel tank (above the pickup port)
- 2 Check the fuel filters and seals for damage or looseness
- 3 Check that all fuel system connections are tight, sealed and that the lines are not kinked
- 4 Make sure the hand primer pump is screwed tight against the filter housing
- 5 Look and smell for leaks on the pressure side of the fuel system

If after checking all the items listed above there is still air in the fuel system, perform the Check for Air in the Fuel procedure.



Fuel line fittings:

A	18 ± 3 Nm (13 ± 2 ft-lb)
B	28 ± 4 Nm (20.5 ± 3 ft-lb)
C	30 ± 4 Nm (22 ± 3 ft-lb)
D	35 ± 5 Nm (26 ± 4 ft-lb)
E	40 ± 5 Nm (29.5 ± 4 ft-lb)
F	48 ± 5 Nm (35 ± 4 ft-lb)
1	Air Line
2	Fuel Line 15 Nm (235 in-lb)
3	Coolant Line

Check for Air in the Fuel

This procedure should only be used to check for air in fuel on vehicles having one or more of these fuel system related symptoms:

- Engine is difficult to start
- Engine misfire
- Low power
- Erratic fuel pressure (low fuel pressure should be dealt with as a separate problem)
- Fault code: MID128, PID 94, FMI 1 (low fuel pressure)
- Fault code: MID 128, SID 1/2/3/4/5/6, FMI 7 (injector)

If one or more of the fuel system related symptoms exist, use the Air In Fuel System Tester kit to help locate the point of entry. The kit (88800236) consists of:

- 20 ft. transparent hose assembly with 16 mm banjo and 3/8 NPTF
- 3 ft. transparent hose assembly with 14 mm banjo and 16 mm banjo
- 2 ft. transparent hose assembly with 14 mm banjo and 14 mm banjo
- 6 hex head capscrews
- 10 seal washers
- 5 hex nuts
- 1 plug

Note: Always follow the instructions in the kit for storage and use of the tool.

1



CAUTION

After using the fuel aeration test kit, thoroughly drain all remaining fuel from the test hoses, then install plugs, end caps and washers. This prevents accidental spillage that can result in fuel contamination.

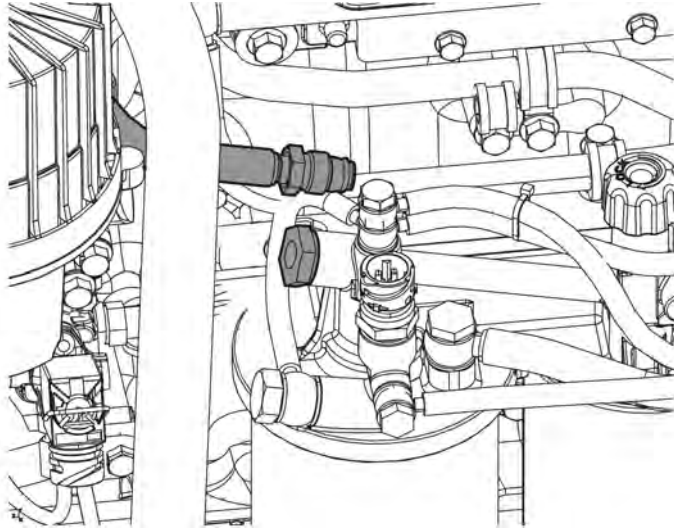
Remove left inner splash guard from left side of vehicle.

2

If equipped, remove chassis fairing under driver's door.

3

Place an approved container under the filter housing to catch fuel that will spill from lines.

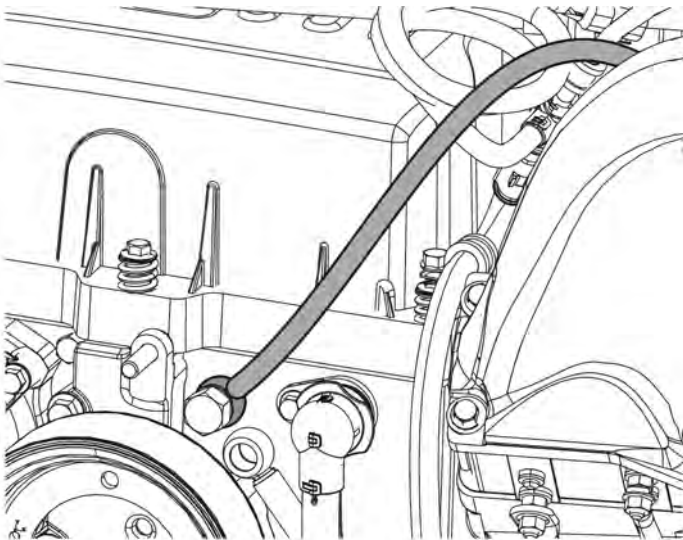


W2006866

4

Remove fuel return line hose connection at filter housing and install plug from kit.

Note: Plugging the fuel return port isolates all return fuel and directs it back to the tank through the clear hose.



W2006869

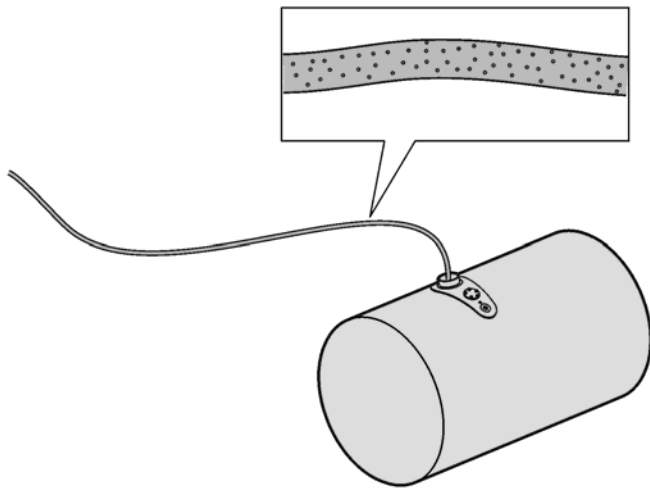
5

Remove the pressure regulator valve from fuel return port at front of cylinder head and move fuel line out of the way.

6

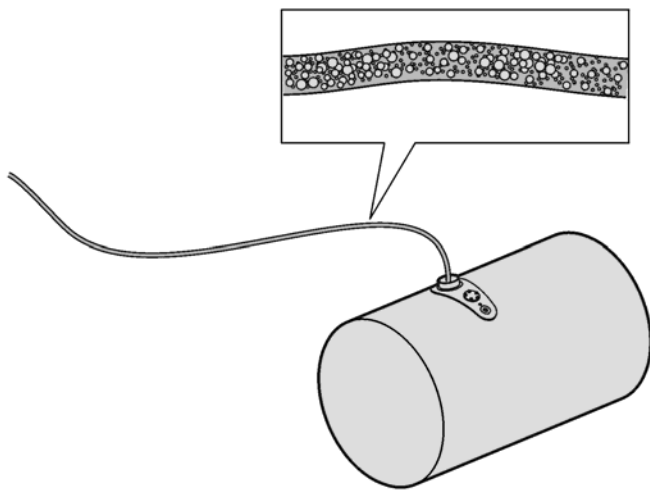
Note: Clean the connection points before installing the line.

Connect the 20 ft. test line from the kit to the fuel return port at the front of the cylinder head. Run the other end of the line into the fuel tank or a bucket.



W2032522

Acceptable Aeration



W2032523

Unacceptable Aeration

7

Start the engine and run at idle a minimum of 5 minutes to fill the lines with fuel and purge out all the air introduced when connecting the lines. Monitor the test line for aeration several feet away from the engine. Do not check at cylinder head outlet.

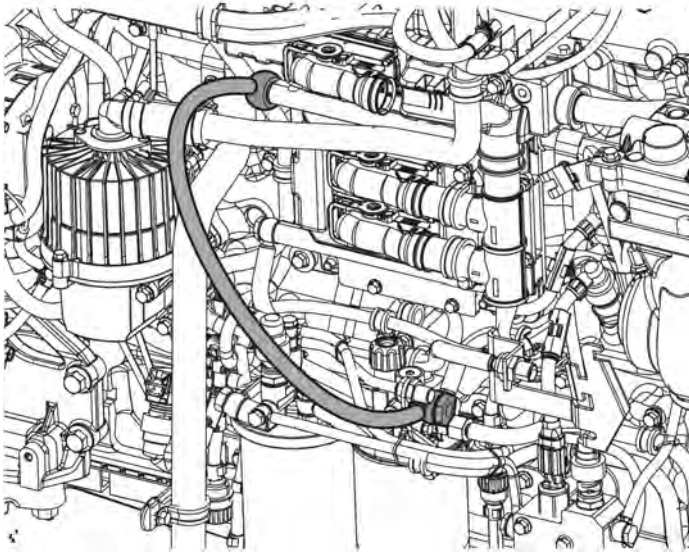
Note: Checking for aeration near the overflow valve can cause a misdiagnosis. Monitor the line as far away from the overflow valve as possible.

Note: Some very small air bubbles in the line are acceptable. This is normal aeration from the fuel tank.

- If large air pockets exist, air is getting into the fuel system. Continue to the next step.
- If there are no large air pockets, air in fuel system is not the cause of the symptom. Remove the test line and reconnect the fuel line to the cylinder head using a new sealing washer. Tighten the connection to specification.

8

Disconnect top fuel line from EECU cooler to filter housing inlet. Set the line aside in a clean area.



W2006867

9

Note: Clean the connection points before installing the line.

Install the 2 ft. test line from kit between filter housing inlet and EECU cooler.

10

Start the engine and run at idle a minimum of 5 minutes to fill the lines with fuel and purge out all the air introduced when connecting the lines. Monitor the test line for aeration.

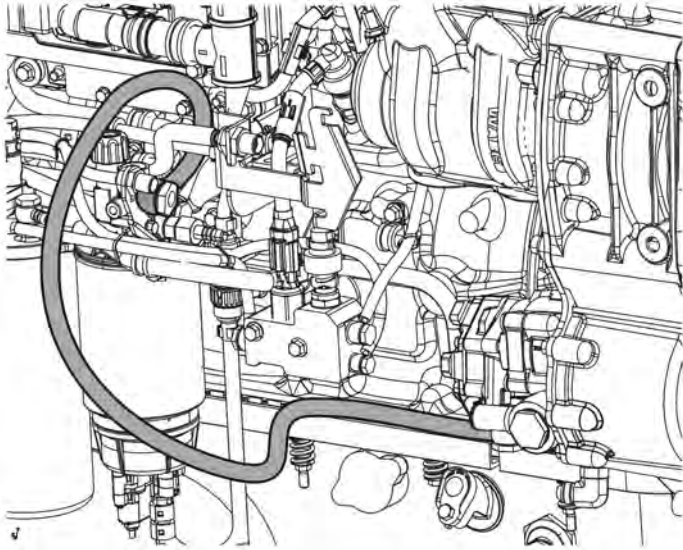
- If large air bubbles exist, there is a vacuum leak in the suction line. Check for leaks in the EECU cooler lines, splitter valves, supply line from fuel tank and missing O-rings.
- If there are no large air bubbles, remove the test line and reinstall the fuel line to the EECU cooler and filter housing inlet using new sealing washers. Tighten the connections to specification. Continue to the next step.

11

Disconnect water in fuel sensor harness. Remove harness from bracket and move out of the way.

12

Disconnect fuel line from filter housing to transfer pump. Set the line aside in a clean area.



W2006868

13

Note: Clean the connection points before installing the line.

Remove the adapter fitting from the fuel filter housing and install the 3 ft. test line from kit between filter housing and transfer pump.

14

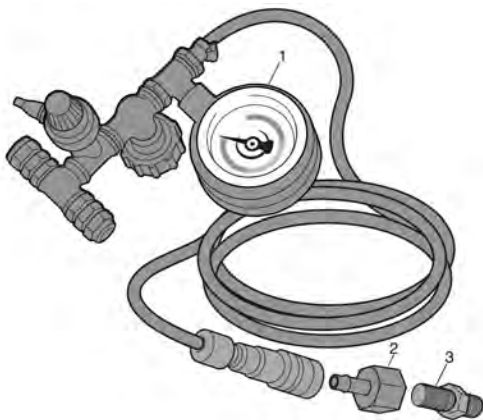
Start the engine and run at idle a minimum of 5 minutes to fill the lines with fuel and purge out all the air introduced when connecting the lines. Monitor the test line for aeration.

- If large air bubbles exist, there is a problem in the filter housing. Check for leaks in the filter housing and primary filter. Remove the test line and reinstall the fuel line to the filter housing and transfer pump using new sealing washers. Reconnect harness for fuel drain. Remove plug from filter housing and connect fuel line using a new sealing washer. Connect fuel line to return port at front of cylinder head using a new sealing washer.
- If there are no large air bubbles and air was noted in the return fuel line, the problem is most likely within the cylinder head, a leak between the copper sleeve and injector seat. Remove the test line and reinstall the fuel line to the filter housing and transfer pump using new sealing washers. Reconnect water in fuel sensor harness. Remove plug from filter housing and connect fuel line using a new sealing washer. Perform the Cylinder Head Pressure Test.

Cylinder Head Pressure Test

The cylinder head pressure test is a leak decay test used on the fuel gallery in the cylinder head. This test is used to check for leakage between the injector and the copper sleeve seal. The following equipment is needed to perform this test:

- Special Tool 9996662 Pressure Gauge (≈100 psi capacity) which includes pressure regulator, gate valve, pressurized air supply connection and hose
- Special Tool 9992976, Connection Adapter
- Reducing Nipple, part number 949088
- M16 Hexagon Plug, part number 960631



W2006901

- 1 Special Tool 999662, Pressure Gauge
- 2 Special Tool 9992976, Connection Adapter
- 3 Reducing Nipple, part number 949088

1

Assemble the test equipment as shown in the illustration.

2

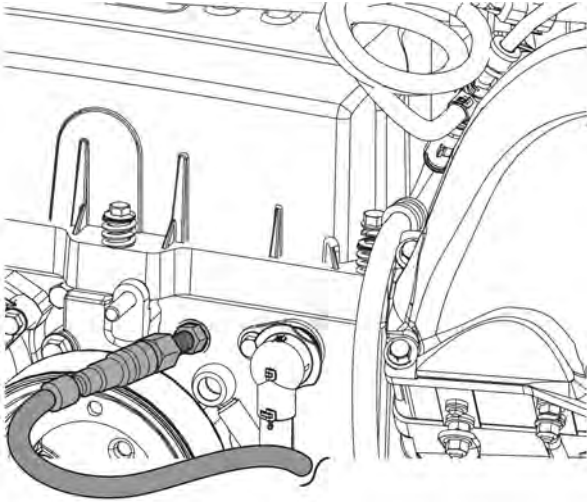
Remove the pressure regulator valve on the front of the cylinder head.

3

Disconnect the fuel supply line on the cold side of the engine.

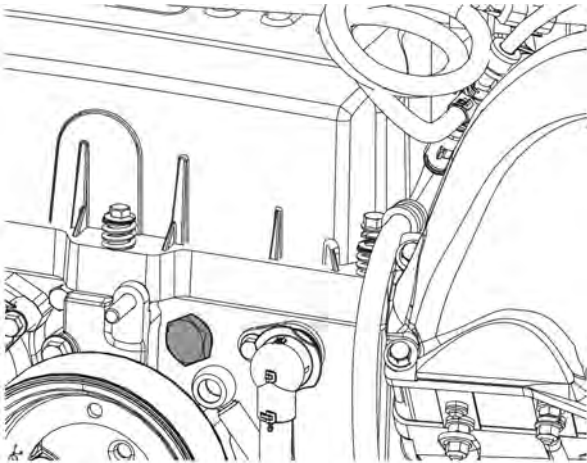
4

Purge all fuel from the cylinder head.



W2006900

Test equipment shown attached to the pressure regulator valve port on the front of the cylinder head.



W2006902

Plug shown in the pressure regulator valve port on the front of the cylinder head.

5

Note: The M16 hexagon plug and test equipment can be installed at either the pressure regulator valve port or the fuel supply line port.

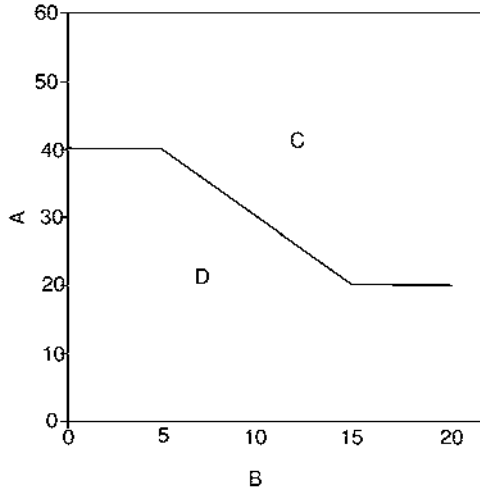
Attach the test equipment to the pressure regulator valve port on the front of the cylinder head or to the fuel supply line port on the cold side of the engine.

6

Insert the M16 hexagon plug in the pressure regulator valve port on the front of the cylinder head or the fuel supply line port on the cold side of the engine.

7

Apply air pressure to the cylinder head until the gauge reads 70 psi. Close the gate valve and disconnect air supply from test equipment.



W2033216

- A. Air Pressure (psi)
- B. Time (minutes)
- C. OK above line
- D. Not OK below line

8

After 5 minutes, the pressure should be 40 PSI or greater. After 20 minutes, the pressure should be 20 PSI or greater. Generally, when injector seals are leaking, pressure will decay within 5 minutes.

9

Remove the test equipment. Install the fuel lines using new sealing washers.

10

Prime the fuel system by pumping the hand priming the pump on the fuel filter housing until resistance is felt. Resistance indicates that the fuel system is full.

11

Start the engine and run at low idle for about 5 minutes. Check for any fuel leaks and correct if leaks are found.

Note: The engine speed should not be increased above idle. Any air pockets can be forced into the cylinder head and result in the engine stopping.