14.4 MISFIRING CYLINDER

There are several causes for the engine cylinder to be misfiring. These probable causes are:

- ☐ Poor Vehicle Ground
- ☐ Aerated Fuel
- ☐ Improper Valve Clearance, Worn or Damaged Camshaft Lobes and Roller Followers
- ☐ Faulty Fuel Nozzle
- ☐ Faulty PLD-MR Control Unit
- ☐ Worn or Damaged Valve or Cylinder Kit

14.4.1 Troubleshooting Procedure for Poor Vehicle Ground

To determine if poor vehicle ground is causing the cylinder to misfire, perform the following steps:

1. Remove the alternator belt. Refer to section 9.2.1.

⚠ CAUTION:

To avoid injury before starting and running the engine, ensure the vehicle is parked on a level surface, parking brake is set, and the wheels are blocked.

⚠ CAUTION:

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

- ☐ **Always start and operate an engine in a well ventilated area.**
- ☐ **If operating an engine in an enclosed area, vent the exhaust to the outside.**
- ☐ **Do not modify or tamper with the exhaust system or emission control system.**

2. Start the engine.
3. Run the engine through operating range.
4. Listen for engine misfiring.
   [a] If the engine is not misfiring, refer to section 14.4.2. Shut down the engine.
   [b] If the engine is still misfiring, check for aerated fuel; refer to section 14.4.3.

14.4.2 Negative Lead Repair

Perform the following steps for negative lead repair:

1. Shut down the engine.
2. Remove negative lead(s) at frame ground stud near battery box.
3. Clean ground stud; refer to OEM guidelines.
4. Clean negative lead(s) terminal lugs with low grit sandpaper.
5. Repair any loose or damaged lead(s), using the splice method or rosin core solder.
6. Install negative lead(s) to frame ground stud; refer to OEM guidelines.
7. Install alternator belt. Refer to section 9.2.2.

NOTE:
Drive belts (Vee and poly-vee) should be replaced every 2,000 hours or 100,000 miles (160,000 km).

8. Verify negative lead repair; refer to section 14.4.2.1.

14.4.2.1 Verification of Repair for Negative Lead

Perform the following steps to determine if negative lead repair resolved the misfiring cylinder condition:

⚠ CAUTION:

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

- ☐ **Always start and operate an engine in a well ventilated area.**
- ☐ **If operating an engine in an enclosed area, vent the exhaust to the outside.**
- ☐ **Do not modify or tamper with the exhaust system or emission control system.**

1. Start the engine.
2. Run engine speed up to the occurrence of the misfiring.
3. Listen for misfiring cylinder.
   [a] If the engine is not misfiring, no further troubleshooting is required. Shut down the engine.
   [b] If the engine is misfiring, check for aerated fuel. Shut down the engine; refer to section 14.4.3.

14.4.3 Troubleshooting Procedure for Aerated Fuel

To determine if aerated fuel is causing the cylinder to misfire, perform the following steps:

1. Disconnect the fuel line return hose from the fitting located at the fuel tank.
2. Place the opened end of fuel line into a suitable container.

⚠ CAUTION:

To avoid injury before starting and running the engine, ensure the vehicle is parked on a level surface, parking brake is set, and the wheels are blocked.

⚠ CAUTION:

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

- ☐ **Always start and operate an engine in a well ventilated area.**
- ☐ **If operating an engine in an enclosed area, vent the exhaust to the outside.**
- ☐ **Do not modify or tamper with the exhaust system or emission control system.**

3. Start the engine.
4. Run the engine at 1000 rpm.
5. Visually check to see if air bubbles are rising to the surface of the fuel within the container.
   [a] If air bubbles are present, refer to section 14.4.4.
   [b] If air bubbles are not present, shut down the engine. Check for improper valve clearance, and worn or damaged camshaft lobes and roller followers; refer to section 14.4.5.

14.4.4 Aerated Fuel Repair

Perform the following steps to repair the air in the fuel:

1. Shut down the engine.
2. Tighten all fuel line connections between fuel tank and fuel pump; refer to OEM guidelines.
3. Visually inspect all fuel lines between fuel tank and fuel pump for leaks.
4. Replace any damaged components.
5. Verify repair of fuel lines:
   [a] If no air in the fuel return, refer to section 14.4.4.1.
   [b] If air in the fuel return, locate and repair. Then refer to section 14.4.4.1.

14.4.4.1 Test the Engine with Repair for Aerated Fuel

Perform the following steps to determine if the aerated fuel repair resolved the misfiring cylinder condition:

⚠ CAUTION:

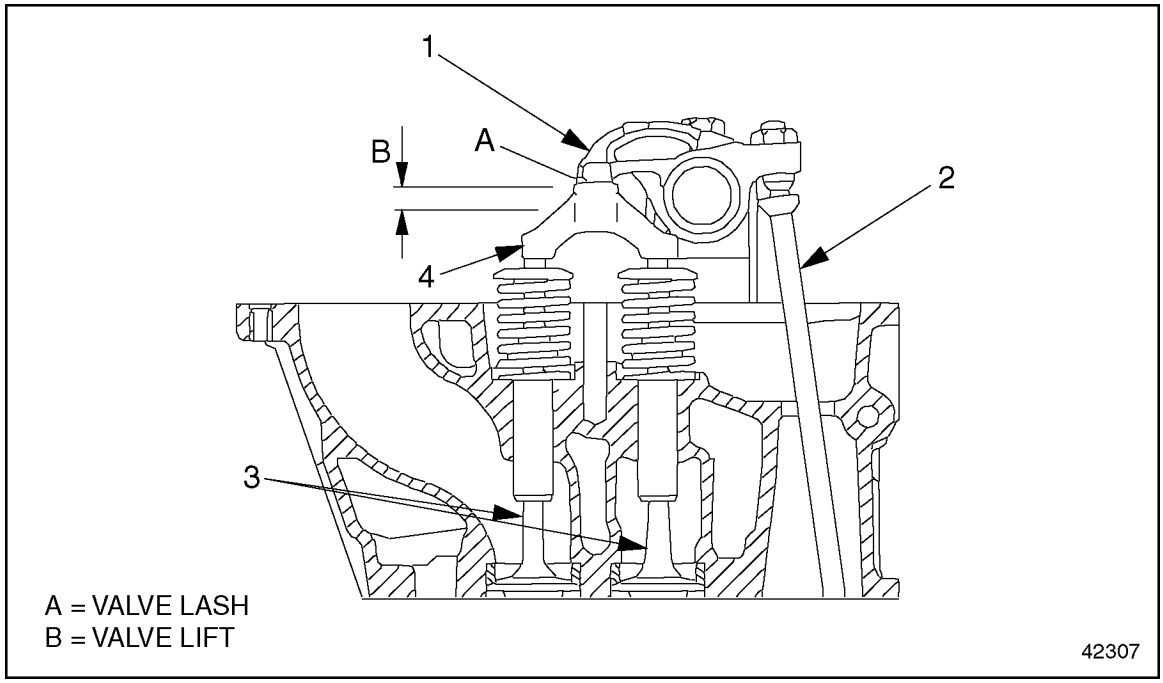
Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

- **Always start and operate an engine in a well ventilated area.**
- **If operating an engine in an enclosed area, vent the exhaust to the outside.**
- **Do not modify or tamper with the exhaust system or emission control system.**

1. Start engine.
2. Run the engine at 1000 rpm.
3. Listen for misfiring cylinder.
   [a] If the engine is not misfiring, no further troubleshooting is required. Shut down the engine.
   [b] If the engine is misfiring, check for improper valve clearance, or worn or damaged camshaft lobes or rollers. Shut down the engine; refer to section 14.4.5.

14.4.5 Troubleshooting Procedure for Improper Valve Clearance, Worn or Damaged Camshaft Lobes and Rollers

Intake and exhaust valve clearance are adjusted by means of an adjusting set screw and locknut located at the push rod end of the rocker arm; See Figure 14-1 for intake valves. Exhaust valve is similar.



1. Rocker Arm
2. Pushrod
3. Intake Valves
4. Valve Bridge

Figure 14-1 Intake Valves

To determine if improper valve clearance is causing the cylinder to misfire, determine if a worn or damaged cam lobe or followers is causing the misfire.

1. Bar the engine over and inspect the camshaft and roller followers for wear or damage.
   [a] If damage is found on the camshaft lobes or roller followers, replace damaged components as necessary.
   [b] If no damage was found to camshaft or roller followers, continue with task. Verify the proper lash setting following the procedure in the “Valve Lash Checking and Adjustment” section; refer to section 1.17.2.

14.4.5.1 Verification of Repair for Improper Valve Clearance or Injector Height Setting

Perform the following steps to determine if valve clearance adjustment resolved the misfiring cylinder condition:

⚠ CAUTION:

To avoid injury before starting and running the engine, ensure the vehicle is parked on a level surface, parking brake is set, and the wheels are blocked.

⚠ CAUTION:

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

- **☐ Always start and operate an engine in a well ventilated area.**
- **☐ If operating an engine in an enclosed area, vent the exhaust to the outside.**
- **☐ Do not modify or tamper with the exhaust system or emission control system.**

1. Start the engine.
2. Run the engine at 1000 rpm.
3. Listen for misfiring cylinder.
   [a] If engine is not misfiring, shut down the engine. No further troubleshooting is required.
   [b] If engine is misfiring, shut down the engine and check for faulty fuel nozzle; refer to section 14.4.6.

14.4.6 Troubleshooting Procedure for Faulty Fuel Nozzle/Unit Pump

To determine if a faulty fuel nozzle or unit pump is causing the cylinder to misfire, check for the following items:

1. Use the Service Link to detect any fault codes.
2. Make sure that the transfer tube is installed at the proper torque. Refer to section 2.3.2. A leaking transfer tube may be identified by cylinder cut out evaluation.

14.4.7 Faulty Fuel Nozzle/Unit Pump Repair

Refer to the “Injector Unit Pump”section for unit pump and nozzle replacement.
Refer to section 2.1.

14.4.7.1 Verification of Repair for Faulty Fuel Nozzle/Unit Pump

Perform the following steps to determine if the replaced fuel nozzle/unit pump resolved the misfiring cylinder conditions:

⚠ CAUTION:

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

- ☐ **Always start and operate an engine in a well ventilated area.**
- ☐ **If operating an engine in an enclosed area, vent the exhaust to the outside.**
- ☐ **Do not modify or tamper with the exhaust system or emission control system.**

1. Start the engine.
2. Run the engine speed up to the occurrence of the misfiring.
3. Listen for misfiring cylinder.
   [a] If the engine is not misfiring, shut down the engine. No further troubleshooting is required.
   [b] If the engine is misfiring, shut down the engine and check for a faulty PLD-MR control unit; refer to section 14.4.8.

14.4.8 Troubleshooting Procedure for a Faulty PLD-MR Control Unit

To determine if a faulty PLD-MR control unit is causing the cylinder to misfire, install a test PLD-MR control unit.

NOTE:
Carefully disengage the lock tab on the vehicle wiring harness and engine wiring harness connectors when removing. Follow instructions in the “PLD-MR Control Unit” section; refer to section 2.5.1.

14.4.9 Faulty PLD-MR Control Unit Repair

There is no authorized repair for the PLD-MR control unit.

14.4.9.1 Verification of Repair for Faulty PLD-MR Control Unit

Perform the following steps to determine if the test PLD-MR Control Unit has resolved the misfiring cylinder condition:

⚠ CAUTION:

To avoid injury before starting and running the engine, ensure the vehicle is parked on a level surface, parking brake is set, and the wheels are blocked.

⚠ CAUTION:

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

- **☐ Always start and operate an engine in a well ventilated area.**
- **☐ If operating an engine in an enclosed area, vent the exhaust to the outside.**
- **☐ Do not modify or tamper with the exhaust system or emission control system.**

1. Start the engine.
2. Increase the engine speed up to the occurrence of the misfiring.
3. Listen for misfiring cylinder.

   [a] If the engine is not misfiring, shut down the engine. No further troubleshooting is required. Replace the PLD-MR Control Unit with a new unit.

   [b] If the engine is misfiring, shut down the engine, install original PLD-MR unit, and check for worn or damaged valves and cylinder kits; refer to section 14.4.10.

14.4.10 Troubleshooting Procedure for Worn or Damaged Valve or Cylinder Kit

Loss of compression in MBE 900 engines may result from a variety of sources, including worn or broken fire or compression rings, holes in pistons, leaky valves, scored or worn cylinder walls, leaky or broken gaskets and cracked cylinder heads or cylinder liners. The detection and elimination of the cause or causes of cylinder pressure losses is vital to engine life and efficient operation. To assist the mechanic in effectively measuring the loss of cylinder pressure, and locating the source of abnormal leaks in individual cylinders, the following test procedure has been developed.

1. Move the vehicle requiring test to the chassis dynamometer; refer to OEM guidelines.
2. Disconnect and remove the air compressor; refer to section 3.1.1.

⚠ CAUTION:

To avoid injury before starting and running the engine, ensure the vehicle is parked on a level surface, parking brake is set, and the wheels are blocked.

⚠ CAUTION:

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

- ☐ **Always start and operate an engine in a well ventilated area.**
- ☐ **If operating an engine in an enclosed area, vent the exhaust to the outside.**
- ☐ **Do not modify or tamper with the exhaust system or emission control system.**

3. Start the engine.
4. Run the engine and bring the engine coolant temperature to normal operating range, approximately 88-96°C (190-205°F).
5. Run vehicle to full load and rated speed.
6. Attach a manometer calibrated to read in. H_2O, to the oil dipstick opening.
7. Measure and record crankcase pressure.
8. Shut down the engine.
9. Remove the vehicle from the chassis dynamometer.
10. Review the crankcase pressure test results.
    [a] If the crankcase pressure was greater than 1.50 kPa (6 in. H_2O); refer to section 14.4.11.
    [b] If the crankcase pressure was less than 1.50 kPa (6 in. H_2O); perform a cylinder compression test. Refer to section 1.2.2.2.
11. Compare the cylinder compression test results to specifications; refer to section 1.2.2.2.
    [a] If cylinder pressure is below specifications, refer to section 14.4.11.
    [b] If cylinder pressure is within specifications, call Detroit Diesel Technical Service Group.

14.4.11 Worn or Damaged Valve or Cylinder Kit Repair

Perform the following steps to determine a worn or damaged valve or cylinder kit:

1. Remove cylinder head; refer to section 1.2.1.
2. Inspect the cylinder head for worn or damaged valves; refer to section 1.17.
3. Inspect the cylinder head components for worn or damaged liners examine the pistons or piston rings.
4. Verification of repairs made to cylinder valve(s) or cylinder kit components is required; refer to section 14.4.11.1.

14.4.11.1 Verification of Repair for Worn or Damaged Valve or Cylinder Kit

Perform the following steps to determine if the repaired valve or cylinder kit resolved the misfiring cylinder condition:

⚠ CAUTION:

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

- **☐ Always start and operate an engine in a well ventilated area.**
- **☐ If operating an engine in an enclosed area, vent the exhaust to the outside.**
- **☐ Do not modify or tamper with the exhaust system or emission control system.**

1. Start the engine.
2. Run the engine speed up to the occurrence of the misfiring.
3. Listen for misfiring cylinder.
   [a] If the engine is not misfiring, no further troubleshooting is required.
   [b] If the engine is misfiring, call Detroit Diesel Technical Service Group.

