The cylinder compression test and the repair/verification section has changed. The sections listed in Table 1 have the changed test and repair/verification section.

<table>
<thead>
<tr>
<th>Name of Chapter</th>
<th>Section Number and Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>3. Misfiring Cylinder</td>
<td>Refer to section 3.5.1.2 &quot;Cylinder Compression Test&quot; and refer to section 3.5.1.1 &quot;Verify Repairs.&quot;</td>
</tr>
<tr>
<td>4. Starting Difficulty (Engine Rotates)</td>
<td>Refer to section 4.13.1.1 &quot;Cylinder Compression Test&quot; and section 4.13.1 &quot;Verify Repairs.&quot;</td>
</tr>
<tr>
<td>6. Excessive Oil Consumption</td>
<td>Refer to section 6.6.1.1 &quot;Cylinder Compression Test&quot; and section 6.6.1 &quot;Verify Repairs.&quot;</td>
</tr>
<tr>
<td>7. Excessive Crankcase Pressure</td>
<td>Refer to section 7.4.1 &quot;Cylinder Compression Test&quot; and section 7.4.2 &quot;Verify Repairs.&quot;</td>
</tr>
<tr>
<td>9. Excessive Blue Smoke</td>
<td>Refer to section 9.2.1.1 &quot;Cylinder Compression Test&quot; and refer to section 9.2.1 &quot;Verify Repairs.&quot;</td>
</tr>
<tr>
<td>11. Rough Running or Stalling</td>
<td>Refer to section 11.6.1 &quot;Cylinder Compression Test&quot; and refer to section 11.6.2 &quot;Verify Repairs.&quot;</td>
</tr>
</tbody>
</table>

Table 1  Changed Sections
CYLINDER COMPRESSION TEST

Perform the following steps for a compression test on a Series 60 Engine:

**WARNING:**

**ENGINE EXHAUST**

To avoid injury from inhaling engine exhaust, always operate the engine in a well-ventilated area. Engine exhaust is toxic.

1. Start and run the engine until normal operating temperature is reached. Stop the engine.
2. Disconnect the batteries.
3. Disconnect the fuel pump feed line from the fuel tank. Place a suitable container under the line to catch the spilling fuel.
4. Turn the quarter turn valve off on the outlet fitting of the secondary fuel filter.
5. Disconnect the fuel supply line to the cylinder head. Place a suitable container under the line to catch the spilled fuel. Disconnect the fuel return line from the rear of the cylinder head and place a suitable container under the fitting to catch the spilled fuel.

**WARNING:**

**EYE INJURY**

To avoid injury from flying debris when using compressed air, wear adequate eye protection (face shield or safety goggles) and do not exceed 276 kPa (40 psi) air pressure.

**NOTICE:**

All the fuel must be removed from the cylinder head before removing injectors. This prevents the fuel from entering the cylinder and causing cylinder wall lube oil wash down or a hydrostatic lock at startup.

6. Blow low pressure regulated air no more than 207 kPa (30 psi) into the inlet fitting for 20 to 30 seconds or until all fuel is purged from the head.
7. Clean and remove the rocker cover. If equipped with Jake Brakes, remove the Jake Brake assembly, front or rear depending on the suspect cylinder.
8. Remove all rocker shaft mounting bolts and nuts from the front or rear rocker shaft assembly. Using removal tool (J–35996–A), see Figure 1, lift the assembly straight up and off of the head and place in a clean area on the bench.

![Figure 1 Rocker Arm/Shaft Assembly Removal/Installation](image)

9. Use tool J-47383 to remove the electrical connector from all three injectors by disengaging the locking tang on the harness plug connection and gently pulling it from the socket.

10. Remove the injector hold-down bolts and washers (3).

<table>
<thead>
<tr>
<th>NOTICE:</th>
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<tr>
<td>Use extreme care when handling injectors to avoid costly damage by dropping or mishandling. Always install new O-rings when replacing injectors.</td>
</tr>
</tbody>
</table>
11. Remove three injectors from the cylinder head using tool J-47372, see Figure 2.

![Figure 2 J-47372](image)

12. Place the compression test adaptors (J-47908) into the injector holes. It is recommended to have three test adaptors (J-47908) when performing this routine.

13. Install the injector hold-down clamps and torque hold-down bolts to 58-66 N·m (43-49 lb·ft).

14. Carefully remove the shaft from the rocker arm assembly by slowly pulling it out of the assembly. Place the shaft on the bench. Do not disturb the stack-up of the rocker arm sets.

15. Remove the three injector rocker arms and replace with spacers (J–38768–5).

16. Lubricate the shaft with clean engine oil. With spacers in place, carefully reinstall the shaft through each rocker arm shaft. Make sure cup plug end faces inboard.

**NOTICE:**
Verify that the bolt holes for the rocker shafts are clean as not to hydro lock the bolts causing damage to the cylinder head.

17. Install the modified rocker arm shaft assembly on the head. If the engine is equipped with a Jake Brake®, use non-Jake Brake rocker arm shaft bolts (P/N:8929129). Torque the three bolts and the nut to 102-126 N·m (75-93 lb·ft).

**NOTE:**
Verify that the bolt holes for the rocker shafts are clean as not to hydro lock the bolts causing damage to the cylinder head.
18. Disconnect the electrical connection at the rear of the cylinder head for the injectors.

![Warning: Personal Injury]

To avoid injury when working on or near an operating engine, wear protective clothing, eye protection, and hearing protection.

![Warning: Personal Injury]

To avoid injury from hot surfaces, wear protective gloves, or allow engine to cool before removing any component.

![Warning: Engine Exhaust]

To avoid injury from inhaling engine exhaust, always operate the engine in a well-ventilated area. Engine exhaust is toxic.

19. Attach cylinder compression gauge (J–6692–B) to the first adaptor. See Figure 3.

![Figure 3 Attach Cylinder Compression Gauge J 6692–B]

20. Reconnect the batteries.

21. Crank the engine over using the starter motor five compression strokes. Record the compression reading on the gauge.
### NOTE:
Verify that the batteries voltage does not go low enough to affect engine cranking speed. If the cranking speed is affected then the results will be inaccurate. If needed, connect a battery charger to maintain battery voltage.

22. The compression reading should show no two cylinders differing by more than 276 kPa (40 psi). If compression readings are greater than 40 psi deference between cylinders, repeat step 20 to be certain of the reading.

23. After testing all three cylinders, remove bolts from the modified rocker arm shaft assembly and, using rocker arm lifter (J–35996), lift the assembly straight up and off the cylinder head. Place in a clean area on the bench.

24. Carefully remove the shaft from the rocker arm assembly, remove the three rocker arm sleeves. Replace the three injector rocker arms. Lubricate the shaft with clean engine oil and carefully reinstall through each rocker arm.

25. Remove the injector hold-down clamps, discard the hold-down bolt and remove the compression test adaptors from the cylinder head.

26. Using new sealing rings and injector hold-down bolt, install the injectors back into the cylinder head and torque to specifications:
   - [a] Torque bolt to 50 N·m (37 lb·ft).
   - [b] Loosen the bolt 60 degrees (1/6 of a turn or one bolt flat). Do not fully loosen the bolt.
   - [c] Torque the bolt to 35 N·m (26 lb·ft).
   - [d] Tighten the bolt an additional 90 degrees.

27. Replace the completed rocker arm shaft assembly on the engine and torque nut and bolts to specifications. Torque to 102-108 N·m (75-80 lb·ft).

28. Using J-47335, reinstall the electrical connectors back on the injectors.

29. Repeat steps 8 through 28 for the three remaining cylinders.

30. Install valve cover, insuring that the bolt holes are clear of dirt and oil.

31. Compare cylinder readings and repair as needed.

32. To verify repairs, refer to the following section.
VERIFY REPAIRS

Perform the following steps to verify repairs:

1. Start and run the engine.

2. Run the engine through its operating range with no-load for approximately five minutes, allowing the engine coolant to reach normal operating range, 88-96°C (190-210°F).

   [a] If the engine is operating properly, no further troubleshooting is required. Shut down the engine.

   [b] If there is any indication that the engine is not running properly, shut down the engine. Call Detroit Diesel Customer Support Center (313-592-5800).
ADDITIONAL SERVICE INFORMATION

Additional service information is available in the Detroit Diesel Series 60 DDEC V Troubleshooting Guide, 6SE570. The next revision to this guide will include the revised information.