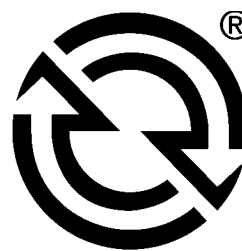


# **DETROIT DIESEL**



## **SERIES 60® 2007 Service Information**

**NUMBER:** 08 60-8   **S.M. REF.:** 13.2   **ENGINE:** EPA07 Series 60   **DATE:** November 2008

**SUBJECT: VALVE LASH ADJUSTMENTS**

**PUBLICATION: DDC-SVC-MAN-0005**

The valve lash adjustments section has been revised.

### **13.2 VALVE LASH ADJUSTMENTS**

Accurate adjustment of clearance between valve buttons, intake and exhaust valves is important if maximum performance and economy are to be obtained.

To ensure efficient engine performance and extended valve and injector service life, an initial valve lash measurement/adjustment requirement has been established.

The valve lash on all Series 60 engines must be measured and, if necessary, adjusted at the initial period listed in Table 1.

**NOTICE:**

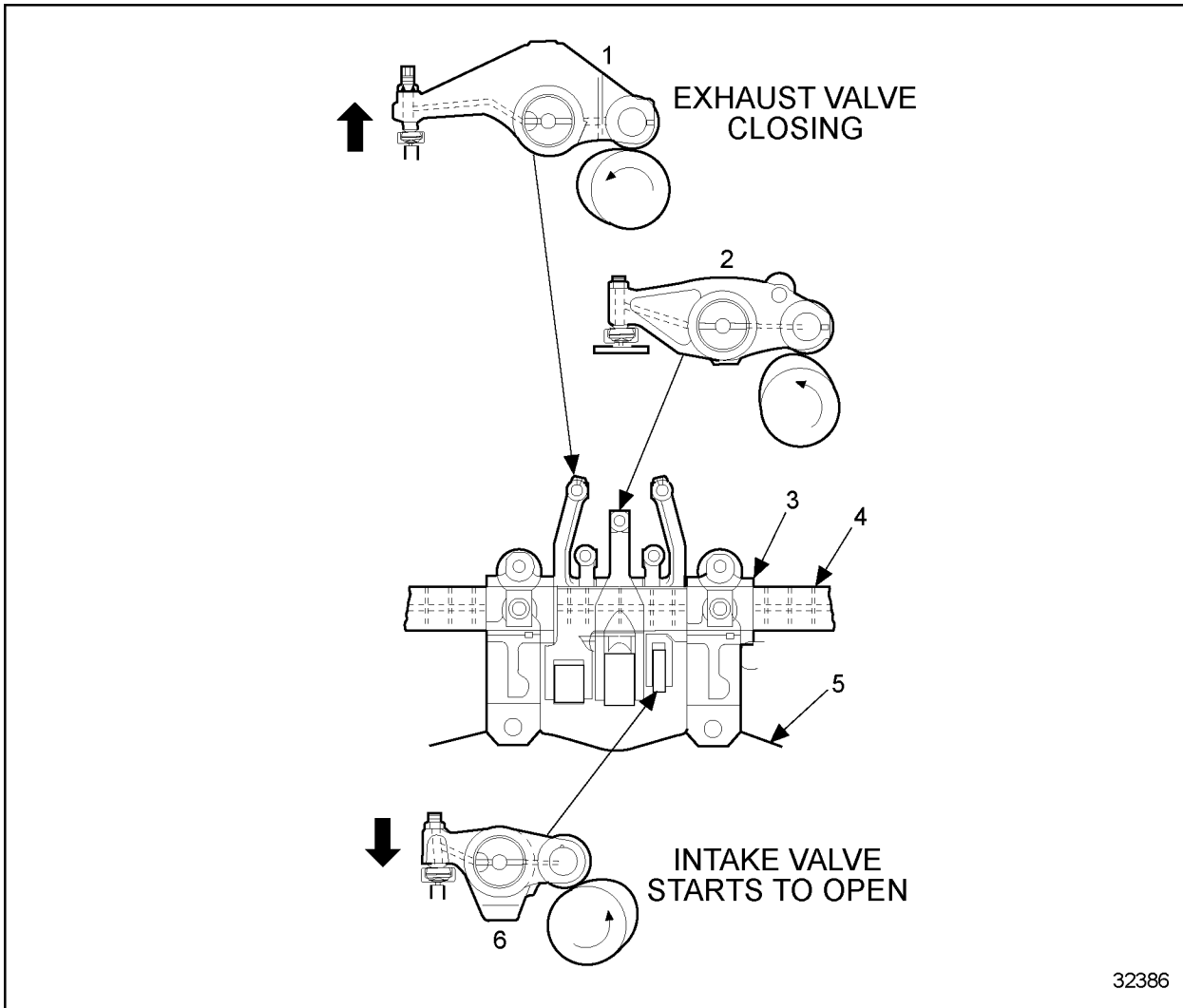
Failure to measure valve clearances at the required initial period and make necessary adjustments may result in gradual degrading of engine performance and reduced fuel combustion efficiency.

<b>Engine Application</b>	<b>Initial Valve Lash and Measurement/Adjustment Period</b>
Vehicle Engines	96,000 km (60,000 miles) or 24 months (whichever comes first)

**Table 1 Measurement/Adjustment Period**

Once the initial measurements and adjustments have been made, any adjustments beyond this point should be made only as required to maintain satisfactory engine performance.

Intake and exhaust valve clearance are adjusted by means of an adjusting set screw and locknut located at the valve end of the rocker arm. See Figure 1.



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- |                                      |                               |
|--------------------------------------|-------------------------------|
| 1. Exhaust Valve Rocker Arm Assembly | 4. Rocker Arm Shaft           |
| 2. Fuel Injector Rocker Arm Assembly | 5. Cylinder Head              |
| 3. Rocker Arm                        | 6. Intake Rocker Arm Assembly |

**Figure 1 Valve Overlap Period**

**NOTE:**

When setting valve lash clearance always set them to the dimension listed in Table 2.

Adjust the valves and fuel injector settings as follows:

 <b>WARNING:</b> <b>ELECTRICAL SHOCK</b>
<b>To avoid injury from electrical shock, do not touch battery terminals, alternator terminals, or wiring cables while the engine is operating.</b>

1. Disconnect batteries.
2. Remove the engine valve rocker cover as outlined. Refer to section 1.6.2 "Removal of Two-Piece Rocker Covers" for two-piece rocker cover, and refer to section 1.6.3 "Removal of Three-Piece Rocker Covers" for three-piece rocker cover.
3. If equipped with Jake Brakes®, remove the electrical connections at both brake solenoids.

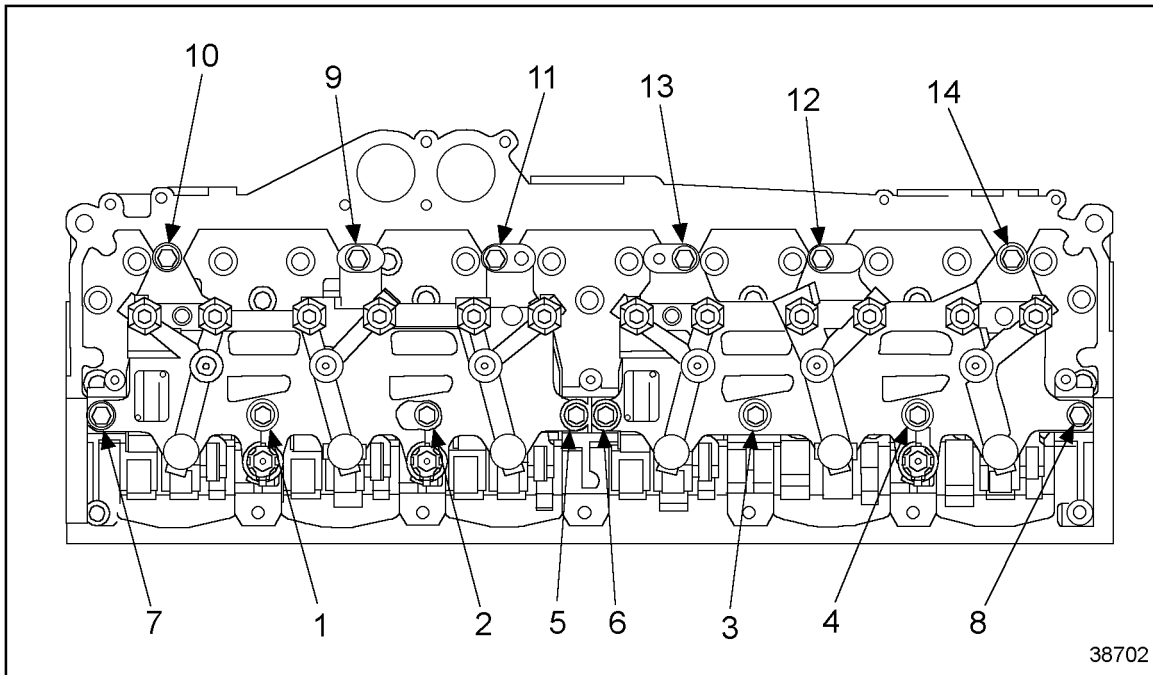
**NOTE:**

When removing retaining bolts (1-6) and retaining nuts (7 and 8), loosen them one turn at a time so as not to damage the rocker shaft or the cylinder head. See Figure 2.

**NOTE:**


Whenever nuts (1 or 8) are loosened or removed, the torque on the corresponding rocker shaft stud must be checked. Torque to 126–146 N·m (93–108 lb·ft). See Figure 2.

4. Remove the Jake Brake retaining bolts (1-6 and 9-14) and nuts (7 and 8) that retain the Jake Brake and rocker arm shaft assembly to the cylinder head. See Figure 2.



**Figure 2 Rocker Arm Shaft Bolts and Nut Identification Numbers**

5. Remove the Jake Brake and set aside, being careful not to damage the housing.

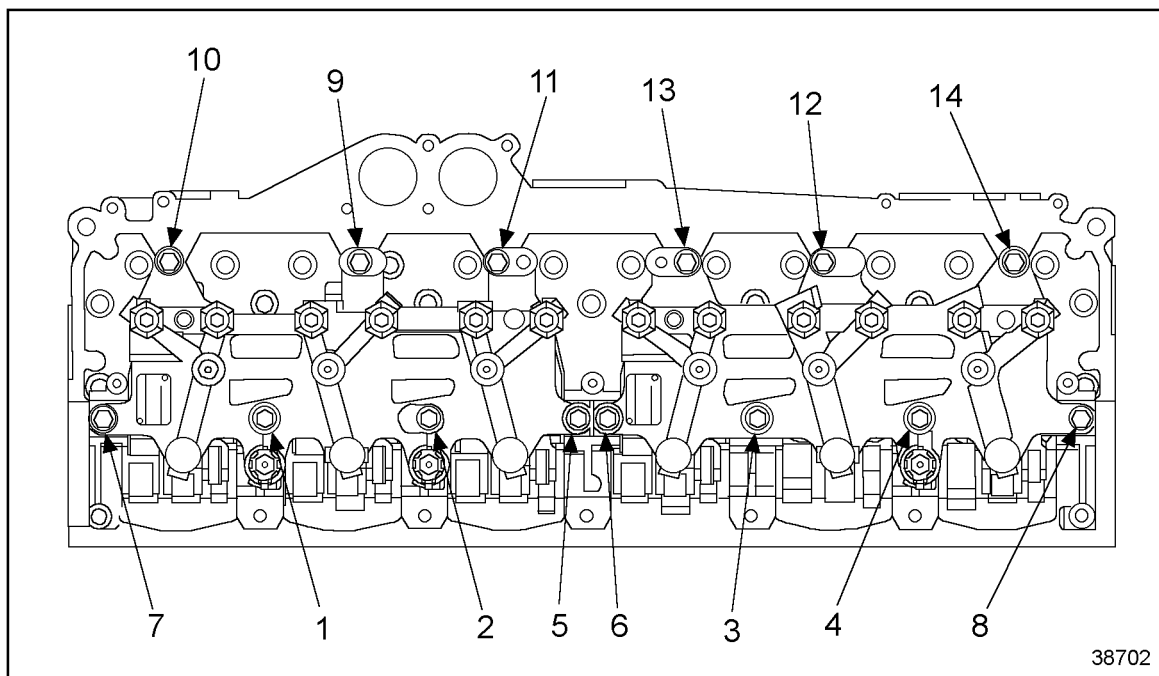
 <b>WARNING:</b> <b>EYE INJURY</b>
<b>To avoid injury from flying debris when using compressed air, wear adequate eye protection (face shield or safety goggles) and do not exceed 276 kPa (40 psi) air pressure.</b>

**NOTE:**

Cover the holes with hand towels to minimize oil spray.

6. Attach a length of tubing to an air gun nozzle and blow out the oil from the rocker shaft bolt holes.
7. Lubricate each hold-down cap screw with clean engine oil prior to installation.

8. Install three 170 mm (6.693 in.) long cap-screws on the rocker shaft using the Jake Brake® spacers from the exhaust side of the engine.
9. Tighten cap screws and spacers down equally until rocker shaft is against the cylinder head. Then torque the cap screws in the following sequence:
  - [a] Starting with the middle cap screw, on the camshaft, following the sequence for tightening bolts (1-6) and nuts (7 and 8), torque to 55 N·m (40 lb·ft). See Figure 3.
  - [b] Final torque all to 102-126 N·m (75-93 lb·ft).



**Figure 3 Housing Hold-Down Bolt Locations and Torque Sequence**

10. Insert a 3/4 in. drive breaker bar or ratchet into the square hole in the center of the crankshaft pulley.
11. Bar the engine in the direction of rotation and observe a cylinder where the injector rocker arm is just beginning to depress the injector plunger; both the intake and exhaust valves should be closed.
  - [a] Stop turning the engine and mount a magnetic base dial indicator so you can monitor the upward lift of travel of that injector lobe.
  - [b] Set the pedestal of the dial indicator on the top of the injector cam roller. Adjust the pedestal so it can travel the entire upward movement of the lobe.

- [c] Continue to slowly bar the engine over in the direction of rotation until the dial indicator shows no more upward lift. The needle of the dial indicator will stop moving indicating maximum lift.
- [d] This is the point of maximum injector roller lift that the injector can now be set.
- [e] If you rotate the engine beyond maximum injector lift you will have to bar the engine over in the opposite direction at least 1/4 turn and then bar the engine over in the direction of rotation until maximum injector roller lift is obtained.

12. Stop engine rotation and note which cylinder this is, and follow the sequence listed in Table 2 to correctly set injector and valves.

Max. injector lobe travel on Cylinder No.	Adjust Injector on Cylinder No.	Adjust Valves on Cylinder No.
6	6	2
2	2	4
4	4	1
1	1	5
5	5	3
3	3	6

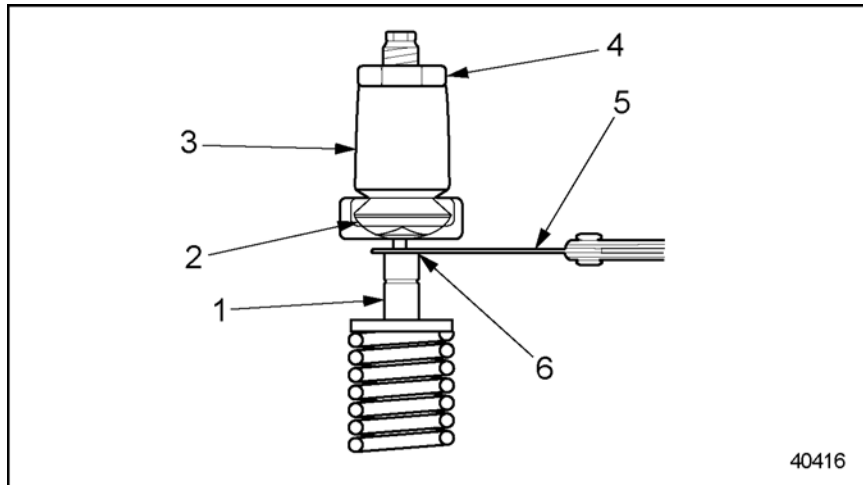
**Table 2 Valve Lash and Injector Setting Adjustment Sequence**

13. This injector can now be set using this procedure:
- [a] Loosen the locknut on the adjusting screw at least two full turns.
  - [b] Tighten the adjusting screw until the injector plunger bottoms out. Torque value should be 4.51 N·m (40 in·lbs).
  - [c] Back the adjusting screw off 3/4 of a turn 0.75 mm ± 0.25 mm (0.03 in.± 0.01in.) and tighten the locknut to 41-47 N·m (30-35 lb·ft).
  - [d] The injector is now adjusted.
14. Adjust the valves on the corresponding cylinders listed in Table 2.

**NOTICE:**

Never set the valves and injector of the same cylinder at the same time. Doing this will result in engine damage.

15. To adjust the intake valves, insert a 0.203 mm (0.008 in.) feeler gage between the tip of the valve stem and the valve button at the end of the rocker arm.

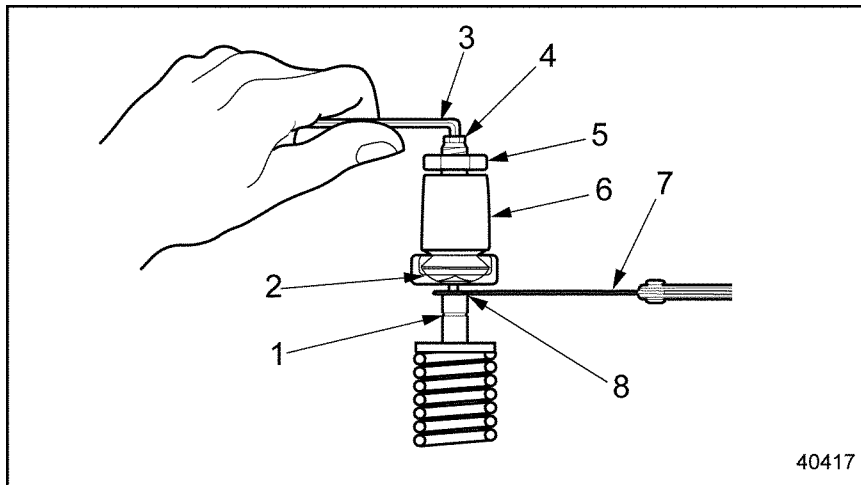


- |                               |                        |
|-------------------------------|------------------------|
| 1. Intake Valve               | 4. Locknut             |
| 2. Valve Button               | 5. Feeler Gage         |
| 3. Intake Rocker Arm Assembly | 6. Tip of Intake Valve |

#### Figure 4 Intake Valve Adjustment

16. Loosen the locknut, and turn the adjusting set screw until the feeler gage produces an even smooth pull between the valve stem and valve button.
17. Torque the locknut to 41 - 47 N·m (30 - 35 lb·ft) and remove the feeler gage. Reinsert the feeler gage to ensure that the adjustment did not change when the locknut was tightened. Readjust as necessary.

18. The exhaust valves are adjusted the same way as the intake valves, using a 0.508 mm (0.020 in.) feeler gage. See Figure 5.



- |                                      |                                |
|--------------------------------------|--------------------------------|
| 1. Location of Identification Groove | 5. Locknut                     |
| 2. Valve Button                      | 6. Exhaust Rocker Arm Assembly |
| 3. Allen Wrench                      | 7. Feeler Gage                 |
| 4. Adjusting Screw                   | 8. Tip of Exhaust Valve        |

**Figure 5 Exhaust Valve Adjustment**

19. Repeat steps 11 through 18 until all injectors and valves have been set.
20. After all the injectors and valves have been adjusted to specification, remove the cap screw and spacers holding down the rocker shaft.

**! 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:**

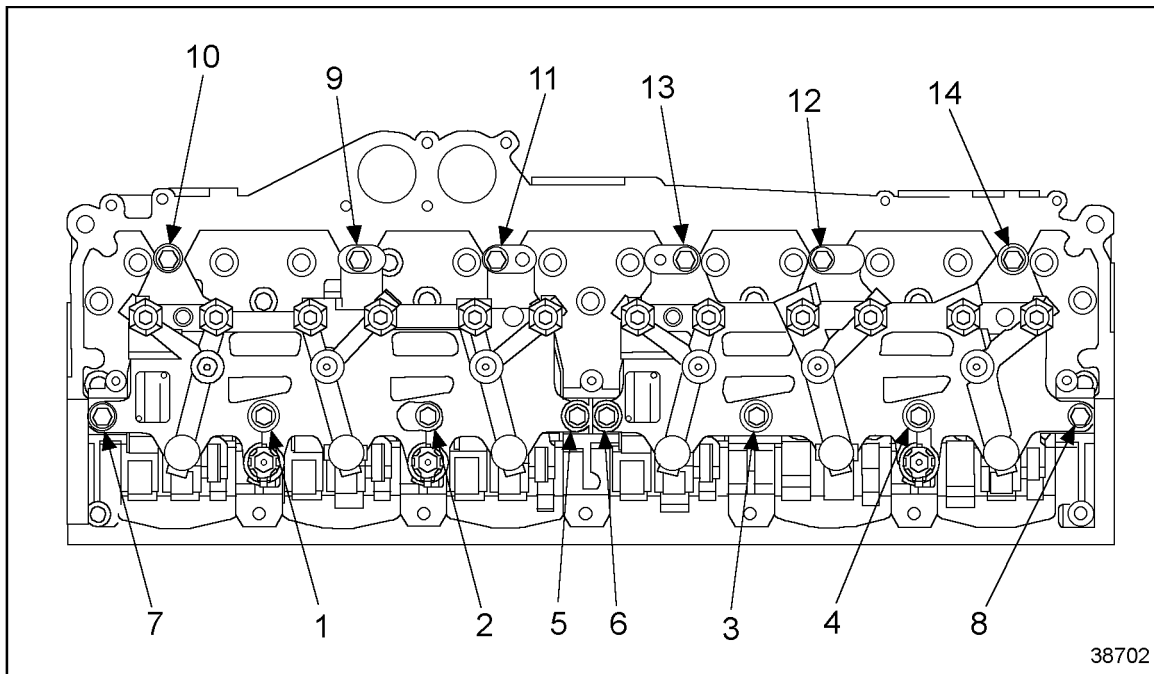
To prevent cylinder head from cracking when bolts are torqued, remove the oil from the bolt holes.



**NOTE:**

Cover the holes with hand towels to minimize oil spray.

21. Attach a length of tubing to an air gun nozzle and blow out the oil from the housing-hold down bolt holes.
22. Place the engine brake housings on the rocker shafts and spacer tubes. The solenoids should be on the camshaft side of the engine and the slave pistons over the exhaust valves.
23. Lubricate each hold-down cap screw with clean engine oil prior to installation.
24. Install three (per Jake Brake) 170 mm (6.693 in.) long cap screws on the camshaft side of the Jake Brake.



**Figure 6 Housing Hold-Down Bolt Locations and Torque Sequence**

**NOTICE:**

Installing 170 mm cap screws on the exhaust side of the engine can result in serious engine damage.

25. Install three (per Jake Brake) 140 mm (5.152 in.) long cap screws and spacers on the exhaust side of the engine.
26. Before tightening the cap screws, move the brake housing from side to side. Position housing in the center of the range of motion.

27. Tighten the cap screws and nuts down one turn at a time until the rocker shaft is snug against the cylinder head.
28. Tighten the cap screws and nuts in the following sequence for one engine brake assembly: see Figure 6.
  - [a] Starting with the middle cap screw on the camshaft side and following the sequence shown, torque to 55 N·m (40 lb·ft).
  - [b] Repeat the tightening sequence for the exhaust side.
  - [c] Final torque all to 102-126 N·m (75-93 lb·ft).
29. Connect the lead wires to the solenoid valves passing the wires through the wire clips.
30. Torque solenoid screw to 1 N·m (9 in·lb.).
31. Install the engine rocker cover ensuring that the electrical harness will not be pinched between the rocker cover and the cylinder head rocker cover base. Refer to section 1.6 "Installation of Two-Piece and Three-Piece Rocker Covers."



**CAUTION:**

**Electrical Shock**

**To avoid injury from electrical shock, use care when connecting battery cables. The magnetic switch studs are at battery voltage.**

32. Reconnect batteries.



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## **ADDITIONAL SERVICE INFORMATION**

Additional service information is available in the Detroit Diesel *Series 60 Service Manual* (DDC-SVC-MAN-0005). The next revision to this manual will include the revised information.

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CORPORATION



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