**SERVICE INFORMATION BULLETIN**

**NUMBER:** 9–09–10  **S.M. REF.:** Listed in Table  **ENGINE:** EPA07/10 DD Platform  **DATE:** September 2010

**SUBJECT:** INSTALLATION OF THE CAMSHAFT AND ROCKER SHAFT/ENGINE BRAKE ASSEMBLY

**ADDITIONS, REVISIONS, OR UPDATES**

<table>
<thead>
<tr>
<th>Publication Number</th>
<th>Platform</th>
<th>Section Title</th>
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<tbody>
<tr>
<td>DDC-SVC-MAN-0081</td>
<td>EPA07/10 DD Platform</td>
<td>Section 2.4 Installation of the Camshaft and Rocker Shaft/Engine Brake Assembly</td>
<td>Notice is added to clarify the need to fully seat the brake solenoids by hand prior to torquing fasteners.</td>
<td>Insert as stated.</td>
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**NOTE:** Page numbers are based on the most recent version of the individual publication and may be adjusted throughout the annual print cycle.
INSTALLATION OF THE CAMSHAFT AND ROCKER SHAFT/ENGINE BRAKE ASSEMBLY

Table 1 Service Tools Used in Procedures

<table>
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<tr>
<th>Tool Number</th>
<th>Tool Name</th>
<th>Engine</th>
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<tbody>
<tr>
<td>W470589001500</td>
<td>TDC Locating Pin</td>
<td>DD Platform</td>
</tr>
<tr>
<td>W470589034000</td>
<td>Cam Timing Tool</td>
<td>EPA07 DD13*</td>
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<tr>
<td>W470589114000</td>
<td>Cam Timing Tool</td>
<td>EPA07/EPA10 DD13</td>
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<tr>
<td>W470589054000</td>
<td>Cam Timing Tool</td>
<td>EPA07 DD15</td>
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<tr>
<td>W470589104000</td>
<td>DD15 Cam Timing Tool</td>
<td>EPA07/EPA10 DD15/16</td>
</tr>
<tr>
<td>W470589044000</td>
<td>Intake Rocker Arm Lifter/Spacer Tool</td>
<td>DD13</td>
</tr>
<tr>
<td>W470589074000</td>
<td>Exhaust Rocker Arm Lifter/Spacer Tool</td>
<td>DD13</td>
</tr>
<tr>
<td>W470589004000</td>
<td>Rocker Arm Lifter/Spacer Tool</td>
<td>DD15/DD16</td>
</tr>
</tbody>
</table>

* Can be used on EPA10 DD13 with modification (refer to tool letter 10 TL-9)

Install as follows:

1. Verify that the crankshaft is at top dead center (TDC) on cylinder number one by installing TDC Locating Pin in the crankshaft position sensor (CKP) hole located in flywheel housing.
2. Install Camshaft Timing Tool to the rear of the camshaft housing. Tighten the two bolts.

3. Locate the etched triangle on the camshaft gear teeth and mark the teeth with a paint pen.

4. Lubricate the lower camshaft bearing surfaces and camshaft journals before installing the camshafts. Install the exhaust and intake camshaft gear assemblies into the camshaft housing.

5. Align the marked gear teeth with the marks on the timing tool.
6. Install Camshaft Timing Tool listed in Table 1 to the front of the camshaft housing and into the grooves cut into the camshafts. Secure timing tool to the camshaft housing with a bolt.

[a] At this point the front timing tool should slide into the camshaft grooves easily with no drag.

[b] If there is excessive drag when installing the tool, the camshafts are out of time. If so, repeat this procedure at Step 3.

7. Verify that the marks on the gear teeth match the marks on the timing tool.

<table>
<thead>
<tr>
<th>NOTICE</th>
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<tr>
<td>The camshaft caps are numbered and need to be installed correctly.</td>
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</table>

8. Install the seven camshaft caps onto intake and exhaust camshafts.

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<tr>
<td>When installing the engine brake solenoids do not use the bolt to pull the solenoid into the camshaft cap. Damage will occur to the O-rings on the solenoid.</td>
</tr>
</tbody>
</table>

9. The first and seventh camshaft caps hold the engine brake solenoids to camshaft cap. Replace the O-rings on the solenoids prior to reinstallation and lubricate with engine oil. Seat the engine brake solenoids into the camshaft caps by hand.
10. Install the 30 bolts to camshaft caps; finger tighten the bolts.

NOTE:
EPA07 DD15 uses 28 bolts to hold the camshaft cap and housing to the cylinder head.

11. Using the torque sequence shown below, torque the twenty one M10 camshaft cap bolts to the following:
□ Torque all bolts to 20 N·m (15 lb·ft)
□ Then torque to 50-55 N·m (37-40 lb·ft).
12. Using the torque sequence shown below, torque the nine 63 mm M8 bolts to 30 N·m (22 lb·ft).

13. Remove TDC Locating Pin from CKP sensor hole in the flywheel housing.


15. Install a dial indicator onto gear case and zero out the dial indicator.

16. Position the stem of dial indicator to rest between the teeth on the camshaft gear.

17. Hold the number five idler gear with a screwdriver. Check the lash between the camshaft gear and idler gear number five.
18. The dial indicator should read 0.051 - 0.257 mm (0.002 - 0.010 in.). If the gear lash is excessive between the exhaust or intake camshaft gear and the number five idler gear, inspect the number five idler gear spindle, camshaft gear and camshaft housing. Repair as necessary.

| NOTICE: |
| The camshaft journal area is lubricated by oil that has to travel through the rocker shaft. If the rocker shaft is installed incorrectly, oil passages will not line up. This results in insufficient lubrication and will damage the camshaft journals. Incorrect shaft installation can also result in the engine brakes not functioning which will cause damage to the rocker arm bushings. |

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**EXHAUST**

**INTAKE**

| NOTICE: |
| The markings on the front of the rockers shafts **must** face the front of the engine for proper rocker arm lubrication and engine brake operation. |
NOTE:
On EPA10 engines the intake and exhaust rocker shafts are each marked "TOP FRONT." Top Front must face towards the front of the engine.

NOTICE:
When tightening the rocker shaft bolts, ensure that the bolts are drawn down from the inside bolts outward, in 1/2 turn increments, before final torque. The rocker shaft can break if the rocker shaft bolt is fully torqued without using the increment procedure.

19. Remove timing tools.
20. Using the Intake Rocker Arm Lifter / Spacer tool, install the intake rocker shaft assembly to the camshaft cap and secure with seven clamping blocks and bolts.
21. Using the torque sequence shown below, torque the bolts to 50-55 N·m (36-41 lb·ft) +90°.

22. Using the Exhaust Rocker Arm Lifter / Spacer tool, install the exhaust rocker shaft assembly to the camshaft cap and secure with seven clamping blocks and bolts.

NOTE:
After initial torquing of each bolt, apply a paint mark to the head of the bolts to ensure that the proper 90° turn has been achieved.
23. Using the torque sequence shown below, torque the bolts to 50-55 N·m (36-41 lb·ft) +90°.

24. Remove timing tools.
25. Install the fuel injectors, if removed. Refer to section.
26. Lash the valves and engine brakes. Refer to section.
27. Install the fuel injector wiring harness. Refer to section.
28. Install the rocker cover. Refer to section.
29. Reconnect the battery power to the engine. Refer to OEM procedures.
30. Install air cleaner housing. Refer to OEM procedures.
31. Install the turbocharger inlet pipe and hose, and air cleaner. Refer to OEM procedures.
32. Prime lubrication system. Refer to section.
ADDITIONAL SERVICE INFORMATION

Additional service information is available in *Power Service Literature.*