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## Service Information Bulletin

SUBJECT	DATE
Removal and Installation of the Camshaft Housing Assembly	February 2014

### Additions, Revisions, or Updates

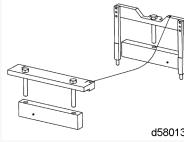
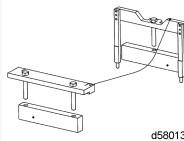
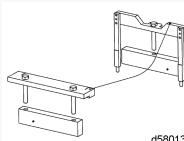
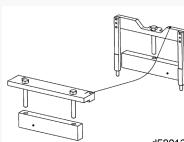
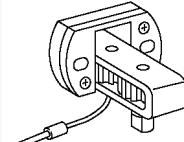
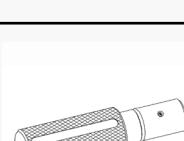
Publication Number / Title	Platform	Section Title	Change
DDC-SVC-MAN-0081	DD Platform	Removal of the Camshaft Housing Assembly	Numerous minor upgrades to the procedure. Inclusion of links for both fuel systems types.
		Installation of the Camshaft Housing Assembly	



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## 2 Removal of the Camshaft Housing Assembly

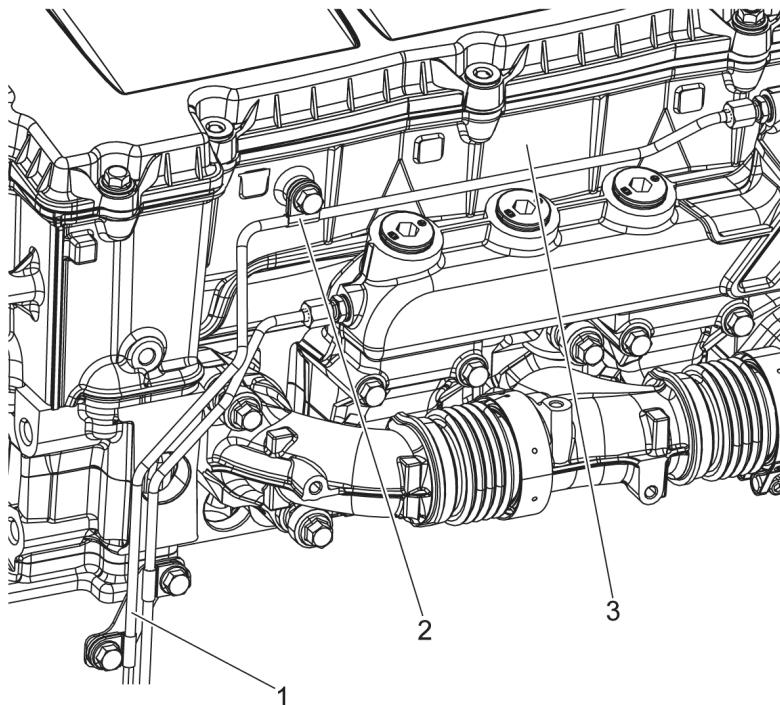
**Table 1.**

Service Tools Used in the Procedure		
Tool Number	Tool Name and Engine	Tool Graphic
W470589034000	Camshaft Timing Tool - EPA07 DD13*	 d580135
W470589114000	Camshaft Timing Tool - EPA07/EPA10 DD13	 d580135
W470589054000	Camshaft Timing Tool - EPA07	 d580135
W470589104000	DD15 Camshaft Timing Tool - EPA07/EPA10 DD15/16	 d580135
J-46392 or W904589046300	Engine Barring Tool - DD Platform	 d580077
W470589001500	Top Dead Center Locating Pin - DD Platform	 d580136

Remove as follows:

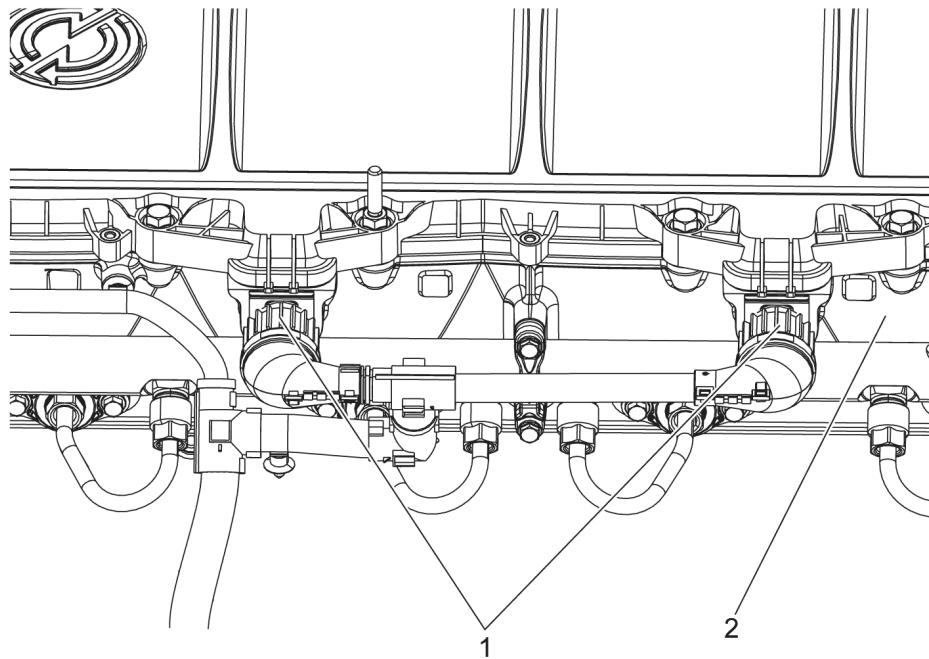
1. Turn engine OFF.
2. Disconnect the battery power to the engine. Refer to OEM procedures.
3. Open the hood.
4. Steam clean the engine.
5. If needed, remove the bumper. Refer to OEM procedures.
6. If needed, remove the fender. Refer to OEM procedures.
7. If needed, remove the wipers. Refer to OEM procedures.
8. If needed, remove the rain tray. Refer to OEM procedures.

9. If needed, remove the rain wiper motor assembly. Refer to OEM procedures.
10. Remove the turbocharger inlet pipe and hose. Refer to OEM procedures.
11. If needed, remove air filter housing. Refer to OEM procedures.
12. Unbolt the air compressor intake hose from the air filter mounting brackets and the chassis water manifold mounting bracket.
13. Remove the air filter housing mounting brackets from the top of the valve cover (if needed).
14. Remove the coolant distribution block bracket mounted above the rocker cover (if needed).
15. Unbolt the air compressor inlet pipe from the camshaft housing.
16. Unbolt the air compressor inlet pipe from the flywheel housing.
17. Remove the air compressor inlet hose.
18. Unbolt (2) the doser coolant supply line (1) from the cam shaft housing (3).



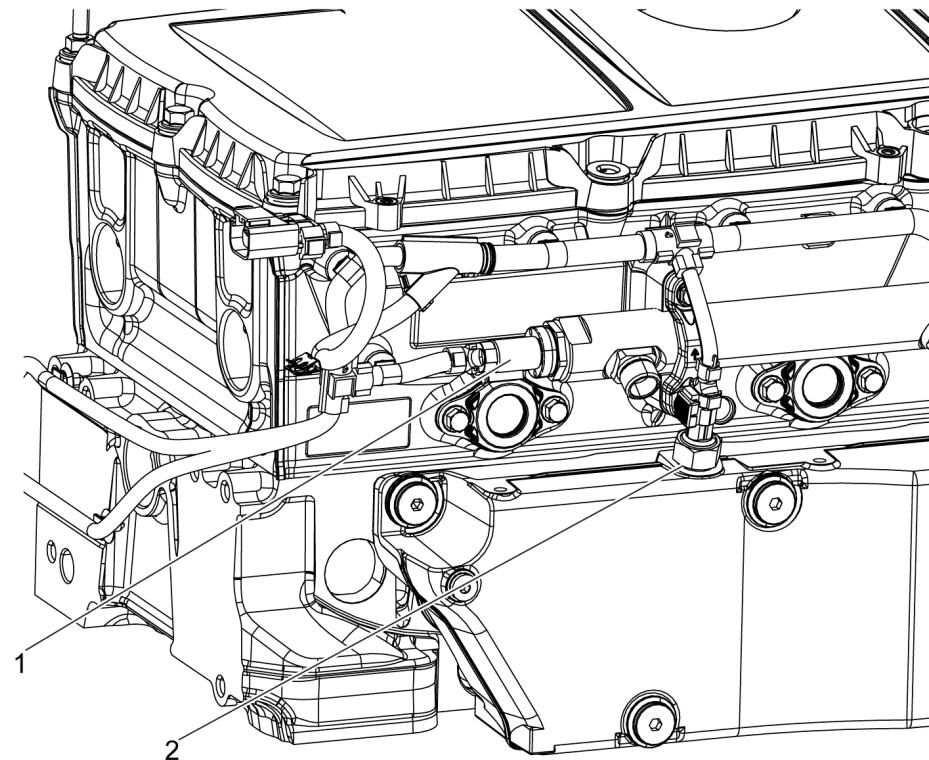
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19. Remove the high pressure fuel rail feed lines.
  - Refer to section "Removal of the High Pressure Fuel Rail Feed Lines - Two-Filter System".
  - Refer to section "Removal of the High Pressure Fuel Rail Feed Lines - Three-Filter System".
20. Remove the Pressure Limiting Valve (PLV) banjo bolt.
21. Remove the two 14-pin fuel injector harness connectors (1) from the camshaft housing (2).



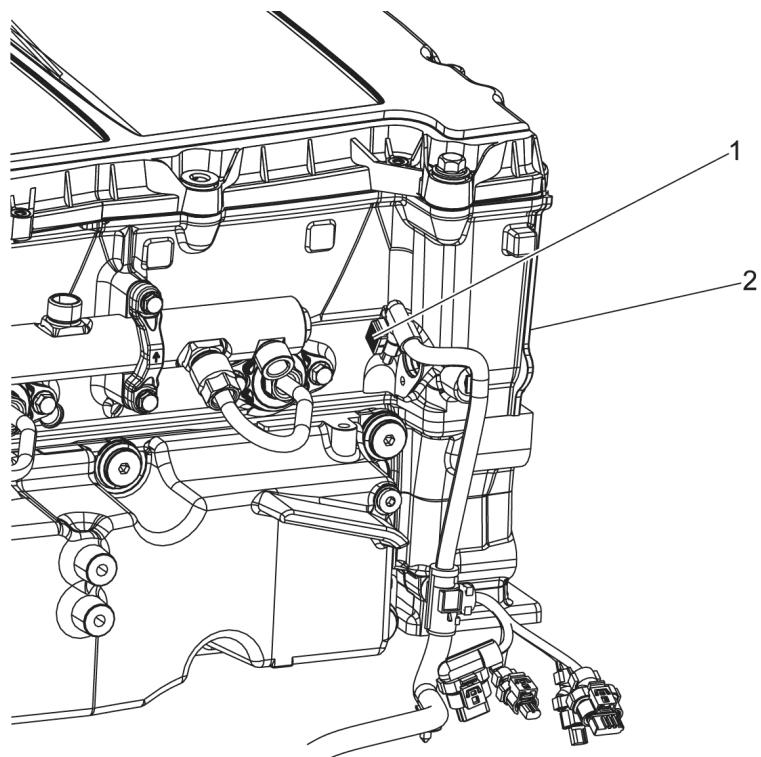
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22. Remove the high pressure fuel injector lines.  
Refer to section "Removal of the High Pressure Fuel Injector Lines - Two-Filter System".  
Refer to section "Removal of the High Pressure Fuel Injector Lines - Three-Filter System".
23. Disconnect the fuel rail pressure sensor (1) and intake manifold temperature sensor (2).



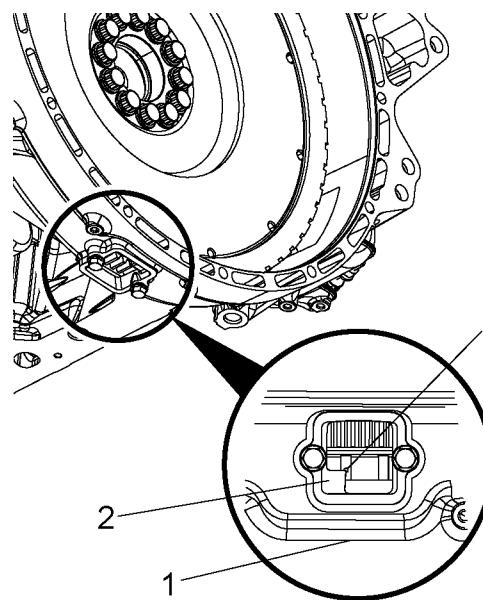
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24. Disconnect the camshaft position sensor (1) from the camshaft housing (2).



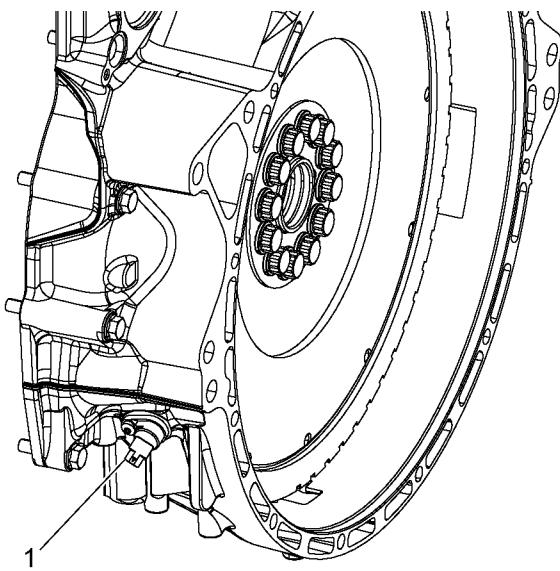
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25. Unclip all of the electrical wiring harness attaching points on to the camshaft housing.
26. Remove the rocker cover. Refer to section "Removal of the Rocker Cover".
27. Remove the fuel injector wiring harness.
  - Refer to section "Removal of the Two-Piece Fuel Injector Wiring Harness - Two-Filter System".
  - Refer to section "Removal of the Two-Piece Fuel Injector Wiring Harness - Three-Filter System".
28. Using the engine barring tool (J-46392 or W904589046300) rotate the crankshaft to Top Dead Center (TDC) on cylinder No. 1. The TDC dot (3) is between two teeth on the flywheel and aligns with the edge of pointer (2) on the flywheel housing (1).



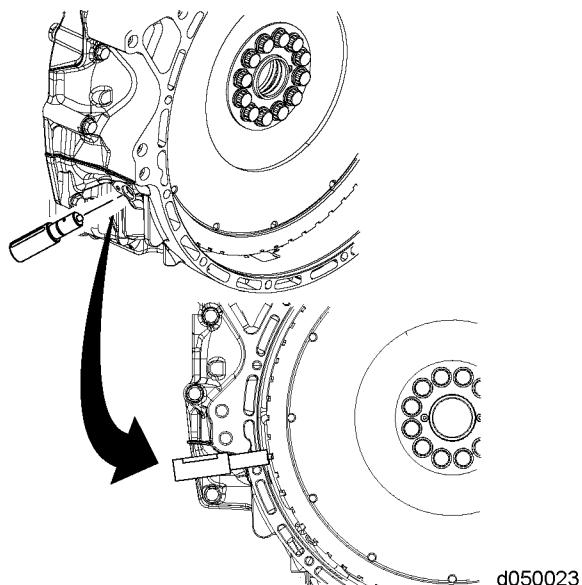
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29. Remove the Crankshaft Position (CKP) sensor (1) from the driver side of the flywheel housing. Refer to section "Removal of the Crankshaft Position Sensor".



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30. To accurately locate TDC, install the flywheel housing crankshaft TDC locating pin (W470589001500) into the CKP sensor hole located on the driver side of the flywheel housing.



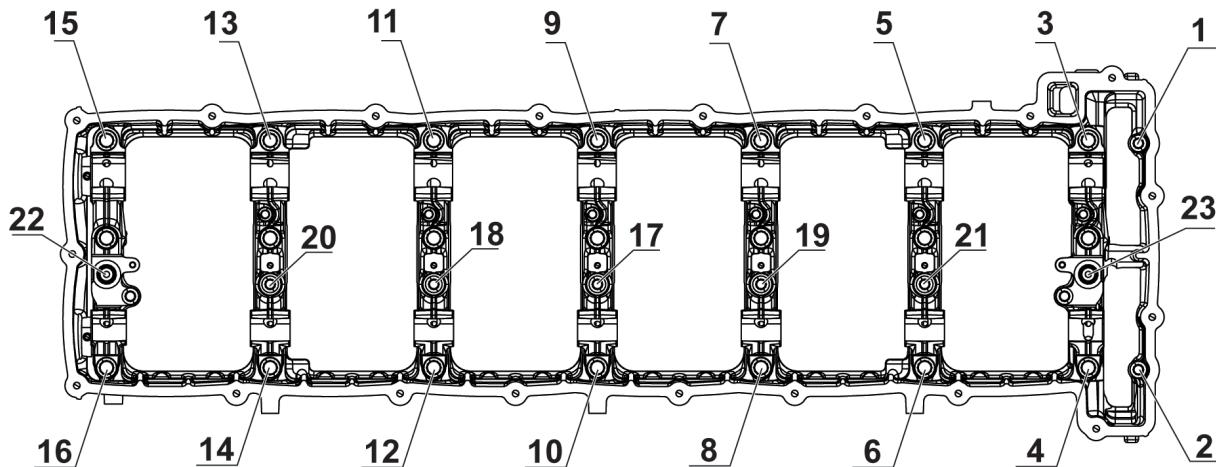
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31. Install the proper camshaft timing tool to verify TDC. See tool list below:
  - W470589034000 - EPA07 DD13
  - W470589114000 - EPA07/EPA10 DD13
  - W470589054000 - EPA07
  - W470589104000 - EPA07/EPA10 DD15 / DD16
32. Loosen the overhead lash on the intake, exhaust, and engine brake rockers.
33. Remove the timing tool on the rear of the camshaft housing only.
34. Loosen camshaft housing mounting bolts 1 and 2 (if applicable) completely, but do not remove them.
35. Install the timing tool on the rear of the camshaft housing.

**NOTICE:** Loosen the camshaft housing bolts in the correct sequence to prevent damage.

**NOTE:** Do not remove the camshaft mounting bolts completely from the assembly.

36. Loosen the remaining bolts by a single turn at a time following the sequence below. Repeat as necessary until the bolts are completely loose.



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37. Install four lifting eyes into the rocker cover mounting holes.

**NOTE:** Ensure that no debris fall into the return oil ports on the cylinder head or severe engine damage can occur.

38. Connect a suitable lifting device to the lifting eyes.  
 39. Remove camshaft housing assembly.

**NOTE:** Because of the pressure on cylinders 2 & 3 rockers, the housing may get stuck on the rear alignment dowel. If it gets stuck, it can be broken free by rocking down on the front of the housing; if not, a pry bar may be needed to help break it loose.

40. Remove and discard the camshaft housing seal.

**NOTE:** Do not rest the camshaft housing assembly on the camshaft gears or damage can occur.

41. Place the camshaft housing assembly on the bench on its side.

### 3 Installation of the Camshaft Housing Assembly

Install as follows:

**NOTE:** Do not remove the camshaft timing tool until instructed to do so.

1. Clean the groove on the camshaft housing where the camshaft housing seal is positioned.
2. Install a new camshaft housing seal into the camshaft housing.



#### **WARNING: PERSONAL INJURY**

To avoid injury when removing or installing a heavy engine component, ensure the component is properly supported and securely attached to an adequate lifting device to prevent the component from falling.

3. Clean the camshaft housing assembly sealing surface on the cylinder head.

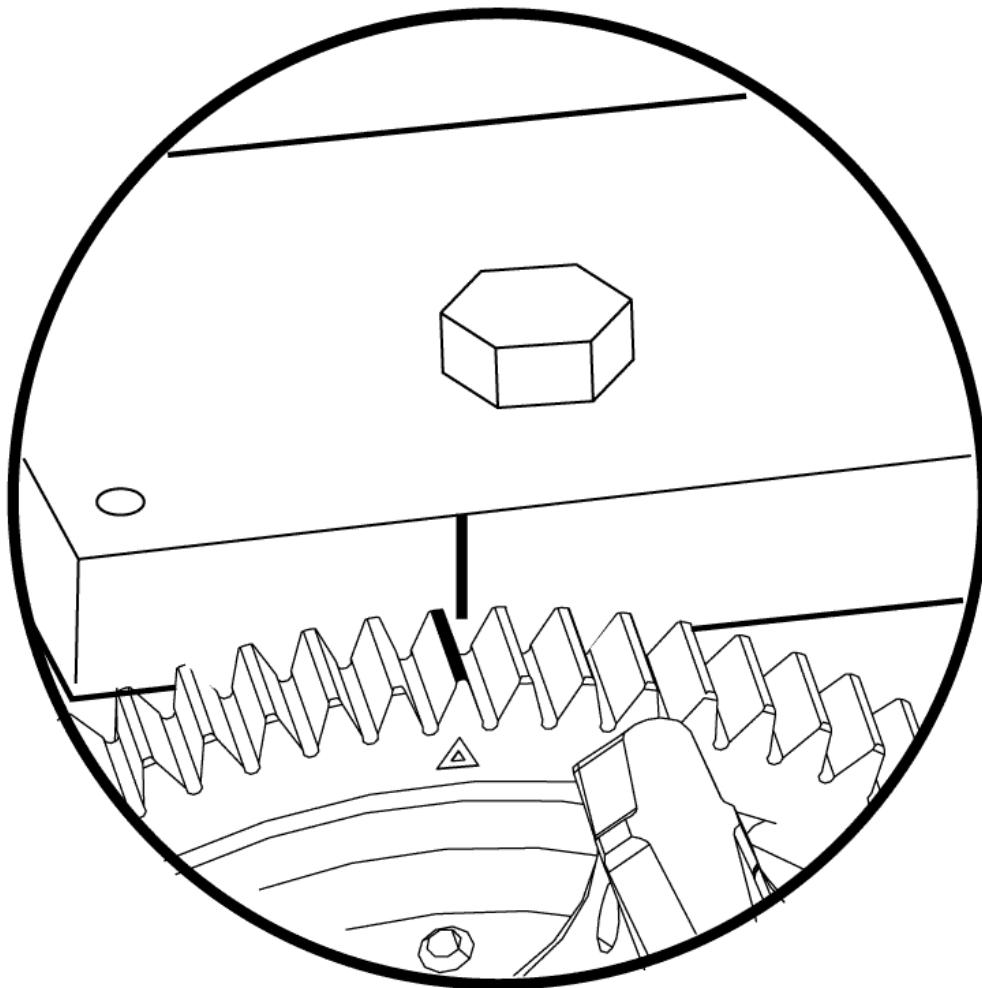
**NOTE:** Ensure the new camshaft housing seal remains positioned in the groove before the mounting bolts are tightened.

**NOTE:** The camshaft housing assembly mounting bolts will act as guides to the cylinder head.

#### **NOTE:**

On some applications it is easier to lower the camshaft housing until the bolts just contact the head, then remove the front timing tool and position the intake gear approximately one tooth towards the center of the camshaft housing before lowering it down completely. This will allow the gear to rotate in to the idler gear.

4. Using an appropriate lifting device, lower the camshaft housing assembly onto the cylinder head ensuring the camshafts align properly with the camshaft timing tool.

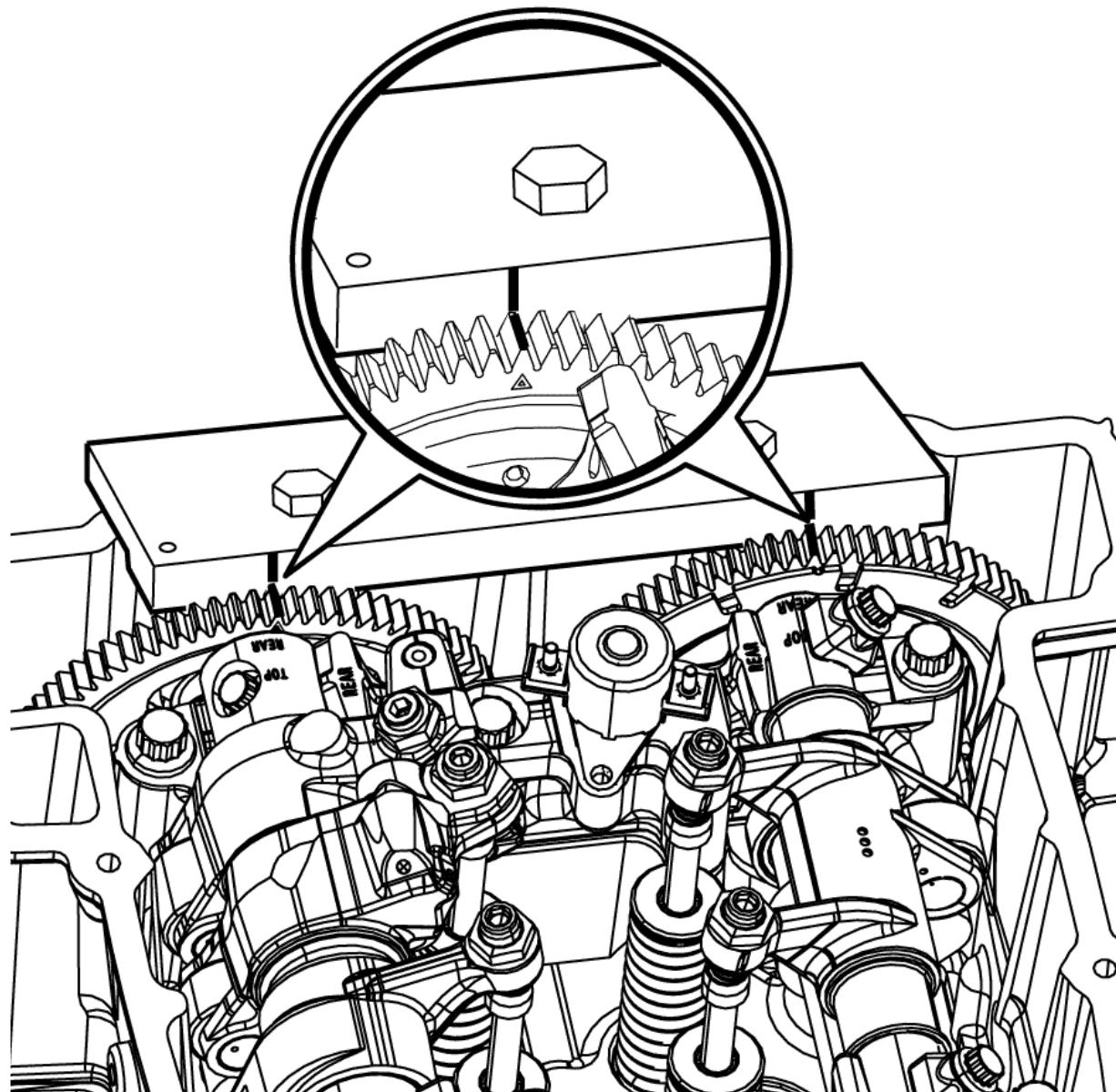


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5. Draw down the camshaft housing assembly by turning the mounting bolts gradually across the entire assembly.

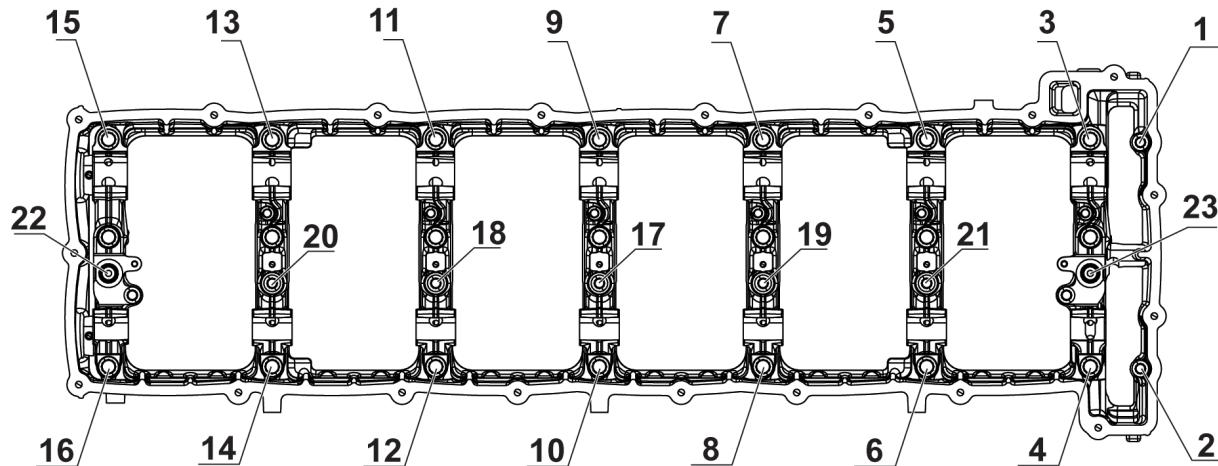
**NOTE:** The front timing tool should slip in and out of the cams easily if they are timed correctly.

6. Verify timing of camshafts.



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7. Remove the four camshaft housing assembly lifting eyes.
8. Remove the timing tool on the rear of the camshaft only.
9. Using the torque sequence shown below, torque the twenty one M10 (3-23) camshaft cap bolts to the following:



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- a. Torque all bolts to 20 N·m (15 lb·ft).  
b. Then torque bolts to 50 to 55 N·m (37 to 40 lb·ft).
10. Torque the M8 bolts (1 and 2) to 30 N·m (22 lb·ft).
11. Remove the camshaft timing tool.
12. Remove the flywheel housing crankshaft TDC locating pin (W470589001500) from the CKP sensor hole.
13. Install the crankshaft position sensor. Refer to section "Installation of the Crankshaft Position Sensor".
14. Adjust the valve lash on the intake, exhaust, and engine brakes.
  - a. Refer to section "Valve Lash Adjustments".
  - b. Refer to section "Setting the Engine Brake Lash".
15. Install the high pressure fuel injector lines.
 

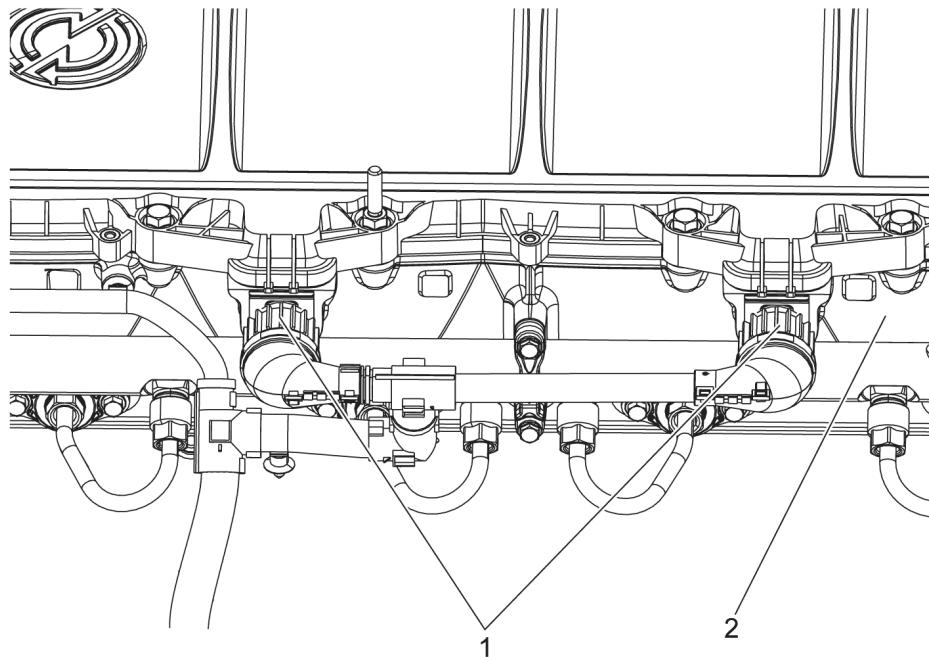
For the three-filter fuel system, Refer to section "Installation of the High Pressure Fuel Injector Lines - Three-Filter System".

For the two-filter fuel system, Refer to section "Installation of the High Pressure Fuel Injector Lines - Two-Filter System".
16. Install the fuel injector wiring harness.
 

Refer to section "Installation of the Two-Piece Fuel Injector Wiring Harness - Two-Filter System".

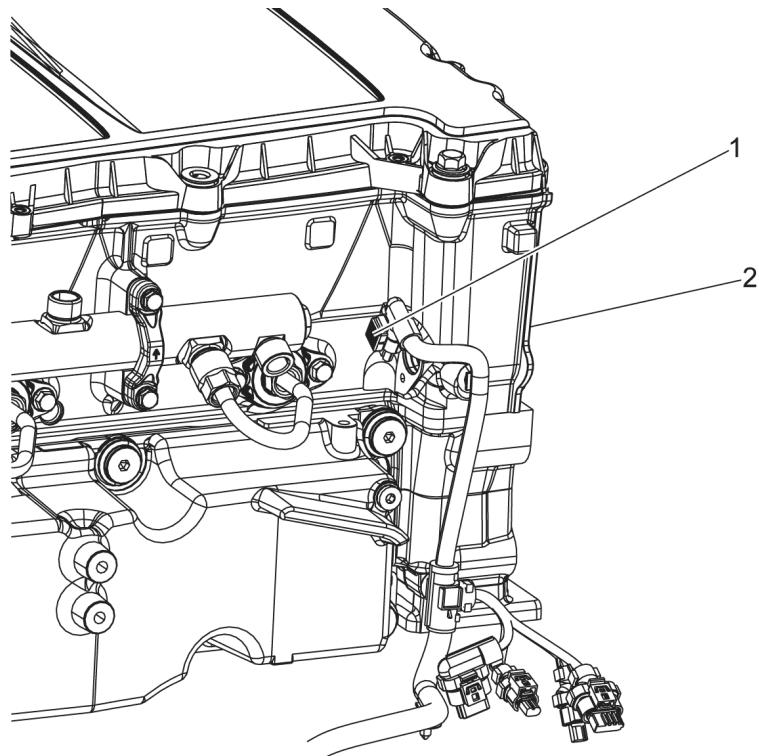
Refer to section "Installation of the One-Piece Fuel Injector Wiring Harness - Three-Filter System".

Refer to section "Installation of the Two-Piece Fuel Injector Wiring Harness - Three-Filter System".
17. Connect the two 14-pin fuel injector harness connectors (1) to the camshaft housing (2).



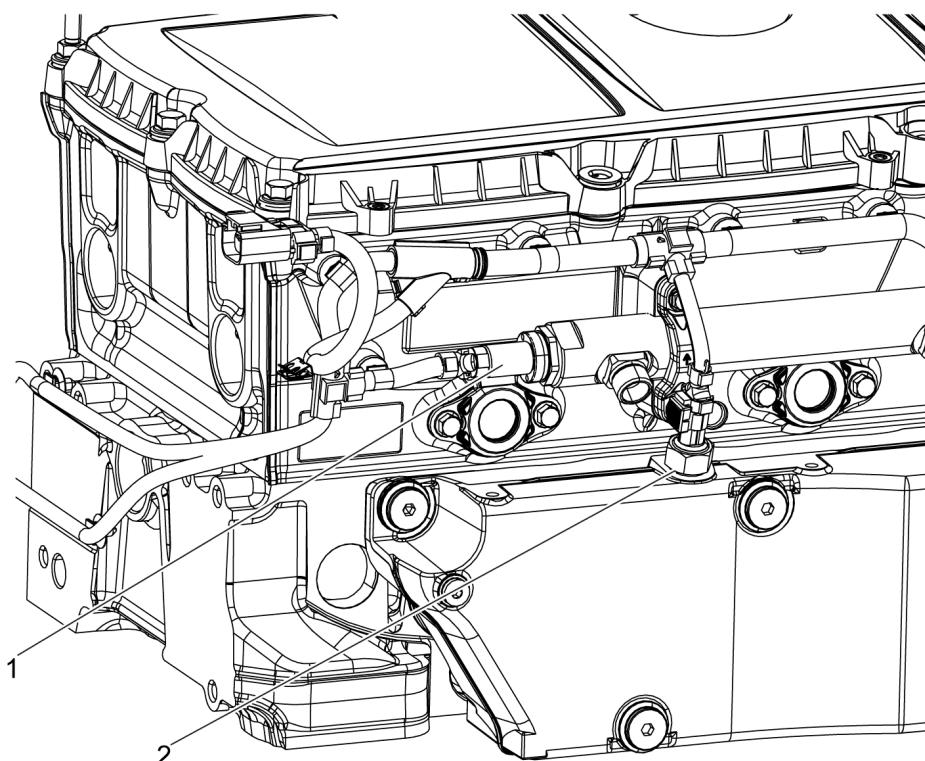
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18. Clean the rocker cover sealing gasket.
19. Install the rocker cover. Refer to section "Installation of the Rocker Cover".
20. Connect the camshaft position sensor (1) on to the camshaft housing (2).



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21. Connect the fuel rail pressure sensor (1) and intake manifold temperature sensor (2).



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22. Clip all of the electrical wiring harness attaching points on to the camshaft housing.
23. Install the PLV banjo bolt with new sealing washers. Torque to 30 to 32 N·m (22 to 24 lb·ft).



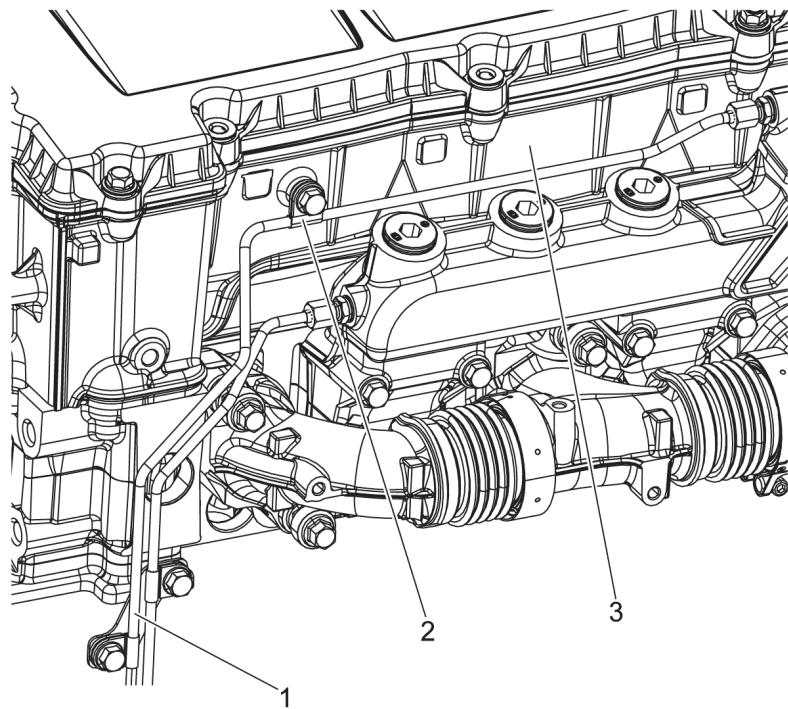
#### **WARNING: PERSONAL INJURY**

All hardware/components must be installed in the proper locations, and MUST be fastened to the specified torque. Failure to properly torque hardware/components will result in failure of a high pressure fuel feed line, resulting in possible fire and/or personal injury.

**NOTE:** The high pressure fuel rail feed lines, P-clips, vibration dampers, mounting bracket and hardware are one-time use components and MUST be replaced any time they are loosened or removed

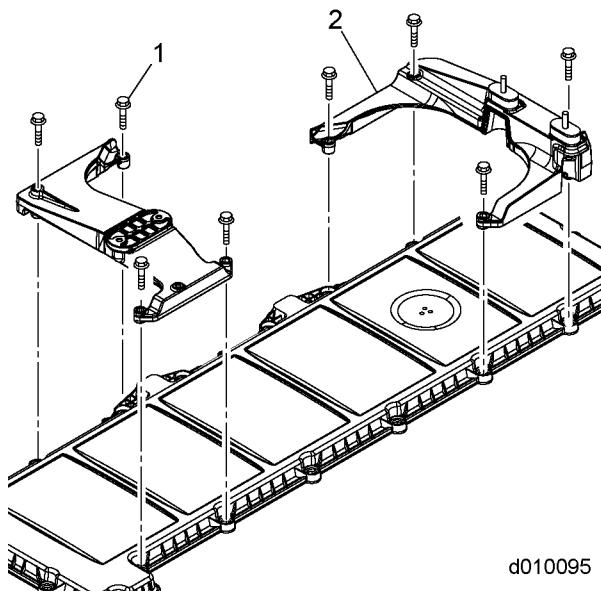
**NOTE:** Engine size/model year specific service kits, containing all of the necessary parts to replace the high pressure fuel rail feed lines have been released. Refer to TS letter 12 TS-9 for the high pressure fuel line kit numbers to repair these engines.

24. Install the high pressure fuel rail feed lines.  
For the DD13 three-filter fuel system, Refer to section "Installation of the DD13 High Pressure Fuel Rail Feed Lines - Three-Filter System".  
For the DD13 two-filter fuel system, Refer to section "Installation of the High Pressure Fuel Rail Feed Lines - Two-Filter System".  
For the DD15/16 three-filter fuel system, Refer to section "Installation of the DD15 and DD16 High Pressure Fuel Rail Feed Lines - Three-Filter System".  
For the DD15/16 two-filter fuel system, Refer to section "Installation of the High Pressure Fuel Rail Feed Lines - Two-Filter System".
25. Install the bolt (2) and the P-clip securing the doser coolant line (1) to the camshaft housing (3). Torque 30 N·m (22 lb·ft).



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26. Install the air compressor inlet air line pipe P-clips to the flywheel housing. Torque 30 N·m (22 lb·ft).
27. Install the air compressor inlet air line pipe P-clips to the camshaft housing. Torque 30 N·m (22 lb·ft).
28. Install the two air filter housing brackets (2) (if equipped), onto the rocker cover and torque the eight nuts to 20 N·m (14 lb·ft).



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29. If removed, install the coolant distribution block bracket. Refer to OEM procedures.
30. If removed, install air cleaner housing. Refer to OEM procedures.
31. Install the turbocharger inlet pipe and hose. Refer to OEM procedures.
32. Install the air compressor inlet air hose to the turbocharger inlet pipe.
33. Prime the fuel system.  
For the three-filter fuel system, Refer to section "Priming the Fuel System Using ESOC 350 Fuel Priming Pump - Three-Filter System".

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For the two-filter fuel system, Refer to section "Priming the Fuel System Using ESOC 350 Fuel Priming Pump - Two-Filter System".

34. Reconnect the battery power to the engine. Refer to OEM procedures.
35. Start the engine and inspect for leaks.
36. If removed, install the rain wiper assembly. Refer to OEM procedures.
37. If removed, install the rain tray. Refer to OEM procedures.
38. If removed, install the wipers. Refer to OEM procedures.
39. If removed, install the fenders. Refer to OEM procedures.
40. If removed, install the bumper. Refer to OEM procedures.
41. Close the hood.