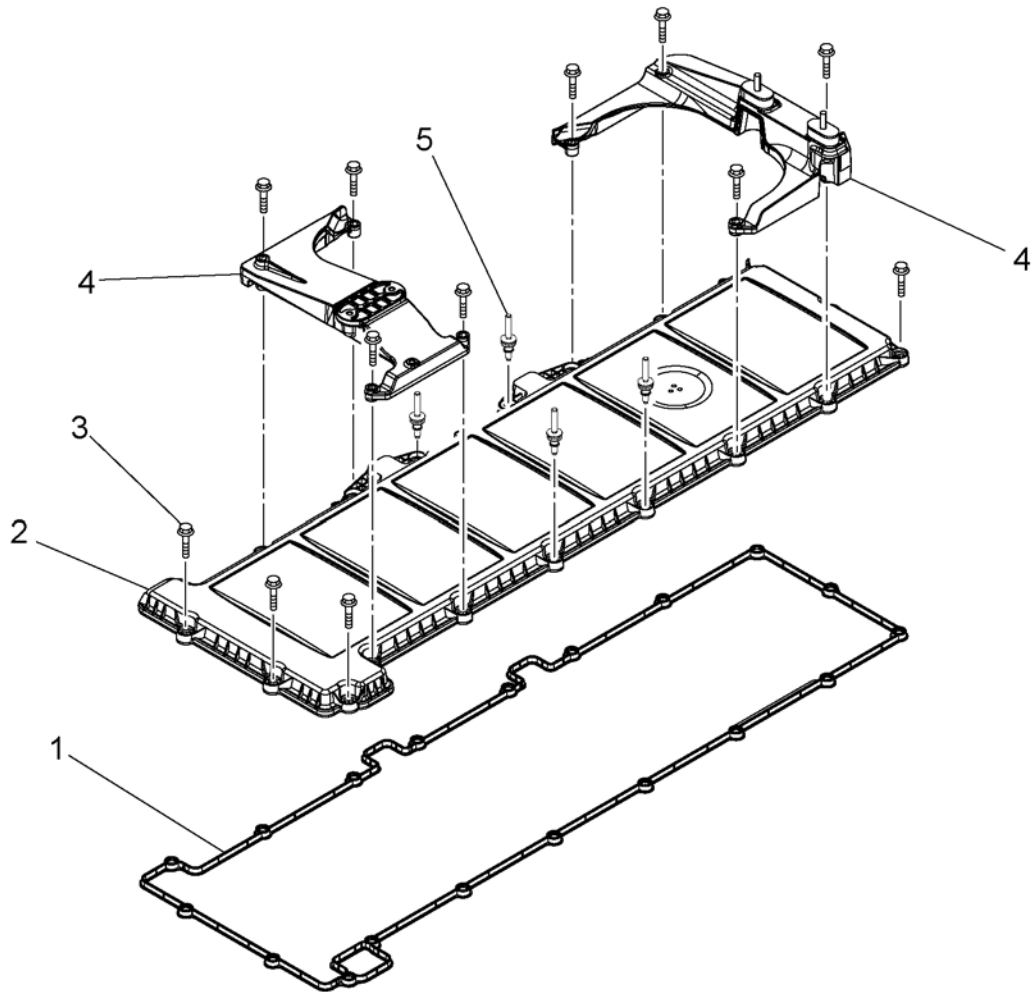


1.1 DESCRIPTION AND OPERATION OF ROCKER COVER AND RELATED PARTS

The rocker cover (2) is made of an aluminum or plastic material and uses an elastomer seal (1) which completely encloses the valve operating mechanism including the overhead camshafts, brake assemblies and the injector harness.



d010030a

- 1. Gasket
- 2. Rocker Cover
- 3. Bolt

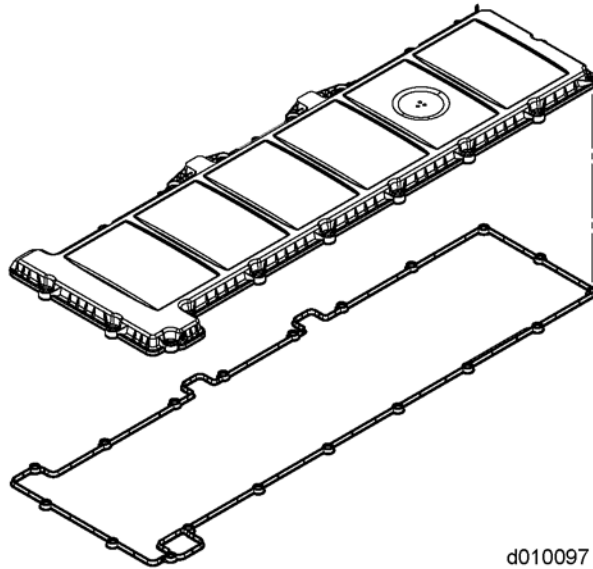
- 4. Air Cleaner Bracket
- 5. Stud (Bolt)

Figure 1-1 Rocker Cover

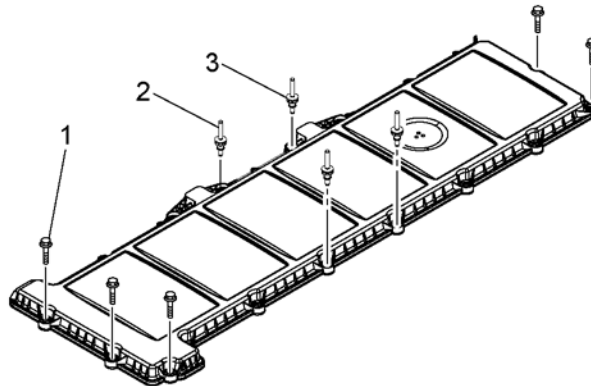
1.4 INSTALLATION OF THE ROCKER COVER

Install as follows:

1. Install rocker cover gasket into groove in rocker cover.



2. Install bolts (1) or stud bolts (2) (if removed) and isolators (3) into rocker cover.

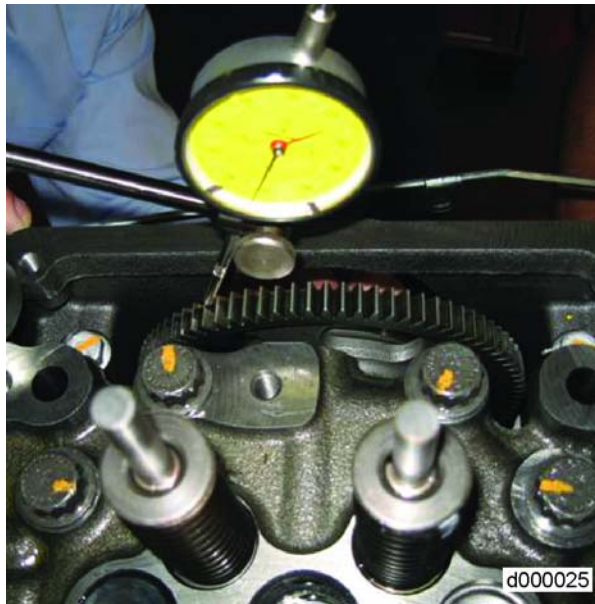


3. Install rocker cover onto camshaft housing.
4. Finger tighten all bolts (1) and stud bolts; then torque to 20 N·m (14 lb·ft).

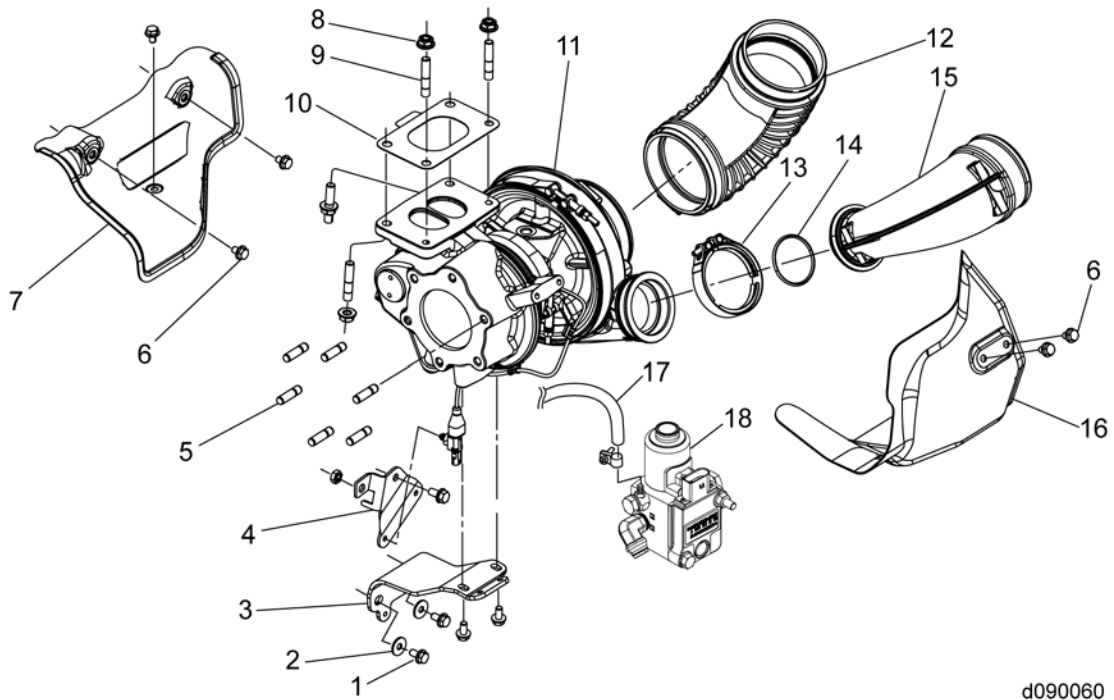
5.3 CHECKING AND ADJUSTING GEAR LASH WITH CAMSHAFT HOUSING REMOVED

This is performed with camshaft housing removed. Check and adjust as follows:

1. Remove the camshaft housing if not already removed. Refer to section 3.1.
2. Install a magnetic base-dial indicator gauge on engine block.
3. Set the dial indicator on the idler gear number five gear tooth.



4. Turn idler gear number five counterclockwise (viewed from front of engine) until “0” lash is present, then zero the gauge on the dial indicator.
5. Check the gear lash by turning the idler gear number five stop-to-stop, verify that the lash reading on the dial indicator is 0.043 - 0.165 mm (0.0016 - 0.0065 in.).
6. If gear lash is incorrect, continue with the following steps to adjust.
7. Remove access cover to the idler gear number three bolts.
8. Loosen the two number three idler gear bolts and then snug by hand.



d090060

- | | | |
|-------------------------|----------------------|------------------------------------|
| 1. Bolt | 7. Heat Shield | 13. Clamp |
| 2. Washer | 8. Nut | 14. Seal |
| 3. Turbocharger Bracket | 9. Stud | 15. Turbo Outlet Elbow Pipe |
| 4. Bracket | 10. Gasket | 16. Heat Shield |
| 5. Stud (6 qty.) | 11. Turbocharger | 17. Air Hose |
| 6. Bolt | 12. Turbo Inlet Pipe | 18. Electronic Proportioning Valve |

Figure 9-1 EPA10 DD13 Turbocharger and Related Parts

9.3 INSPECTION OF THE DD13 TURBOCHARGER

Check as follows:

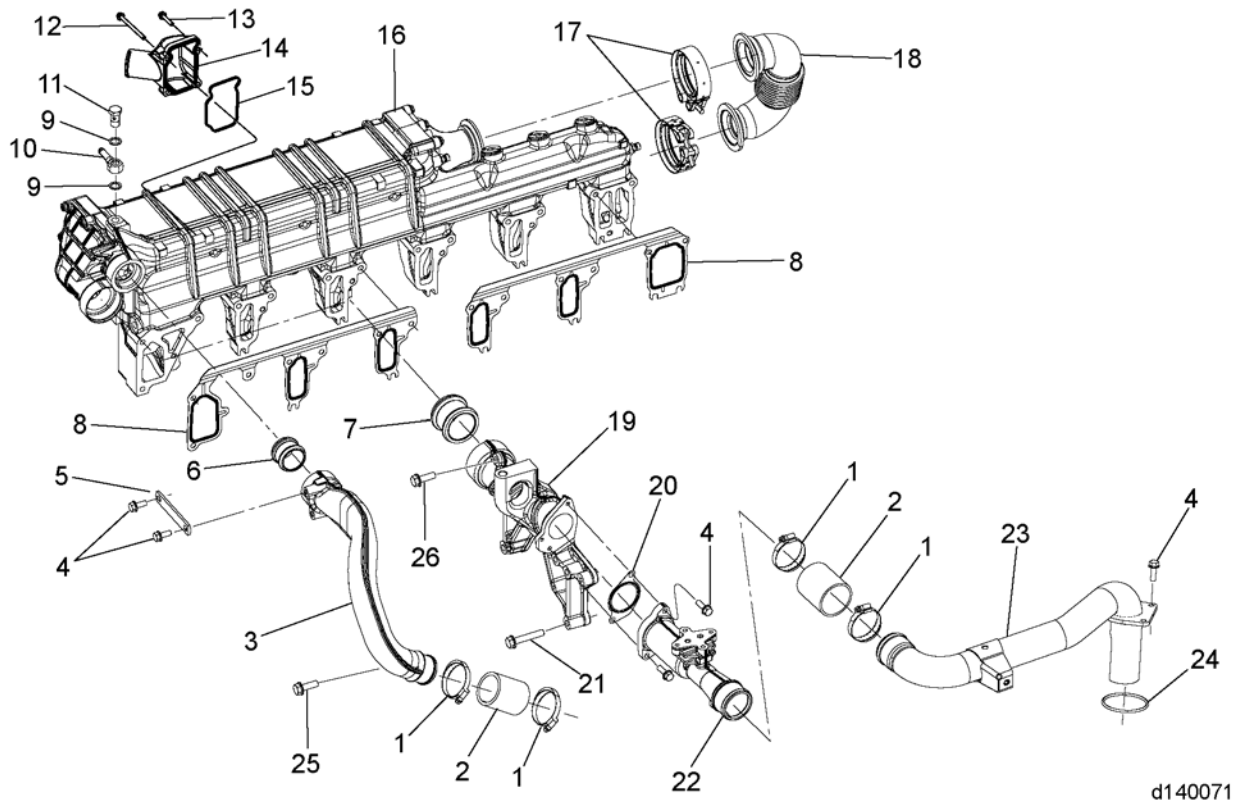
1. Remove the exhaust pipe from the turbine outlet and remove the air intake pipe from the compressor inlet.
2. Visually inspect the turbine and compressor wheels for missing blades or blade damage.
3. Inspect the turbine and compressor wheels for heavy deposits of dirt, coke or carbon.
4. Using a flashlight, check the wheels and housings for signs of rubbing.
5. Rotate the turbine wheel to check for freedom of movement.
6. Replace the turbocharger if there is any visible damage. **For DD13:** refer to section 9.2.
 - [a] Remove defective turbocharger from the engine.
 - [b] Tag removed turbocharger for remanufacture.
 - [c] Install a new turbocharger to the engine.



ENGINE EXHAUST

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

7. Start the engine.
8. Run the engine speed to full load.
9. Visually inspect the exhaust for excessive smoke.
 - [a] If the engine exhaust emission appears normal, no further troubleshooting is required. Shut down the engine.
 - [b] If the engine exhaust emission is excessive, shut down the engine. Call Detroit Diesel Customer Support Center (313-592-5800).



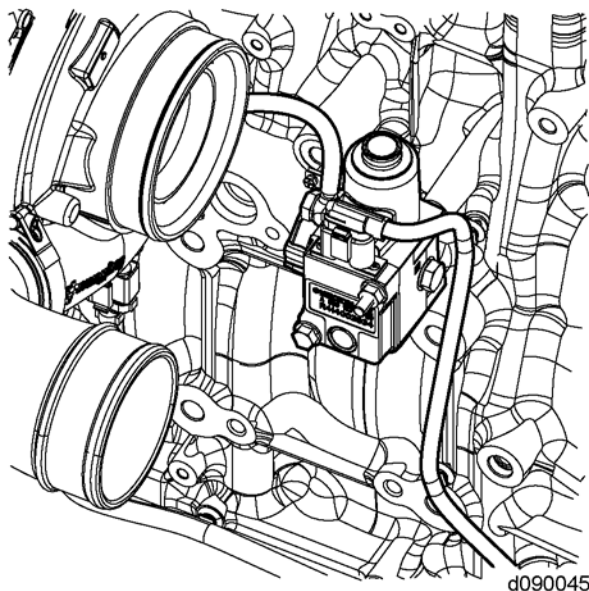
d140071

- | | | |
|--------------------------------|--|--|
| 1. Clamp | 10. Banjo Union | 19. Exhaust Gas Crossover Tube / Lifting Eye |
| 2. Hose | 11. Banjo Bolt | 20. Gasket |
| 3. Coolant Crossover Pipe | 12. Bolt | 21. Bolt |
| 4. Bolt | 13. Bolt | 22. Venturi |
| 5. Support | 14. Outlet Nipple | 23. Mixer Pipe |
| 6. Coolant Connecting Tube | 15. Seal | 24. Seal Ring |
| 7. Exhaust Gas Connecting Tube | 16. Exhaust Gas Recirculation Cooler Water Manifold Assembly | 25. Bolt |
| 8. Gasket | 17. Clamps | 26. Bolt |
| 9. Seal Ring | 18. Hot Pipe | |

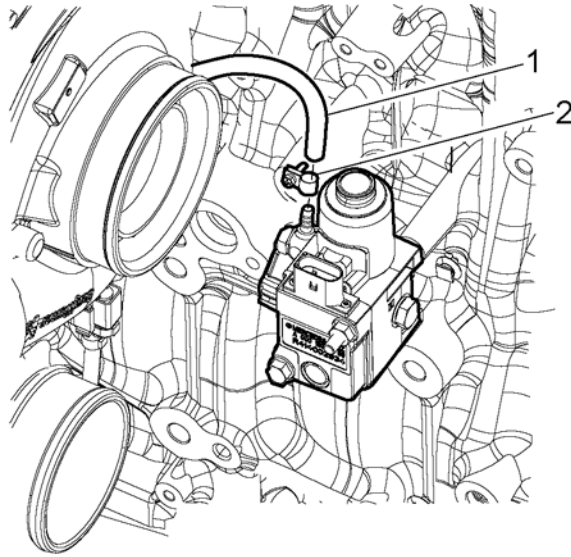
Figure 9-3 EPA07 DD13 EGR Cooler Water Manifold and Related Parts

10.1 DESCRIPTION AND OPERATION OF THE DD13 WASTEGATE SOLENOID

For EPA10, the DD13 uses an wastegate solenoid to control the turbocharger wastegate. The MCM uses a PWM signal to activate the wastegate solenoid to control the available air pressure to the wastegate on the turbocharger. There are many operating conditions that require use of the wastegate solenoid.

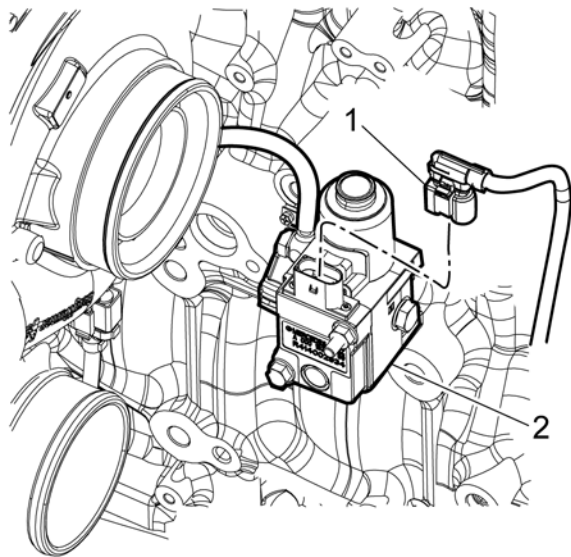


5. Install the air line to the wastegate solenoid and tighten hose clamp.

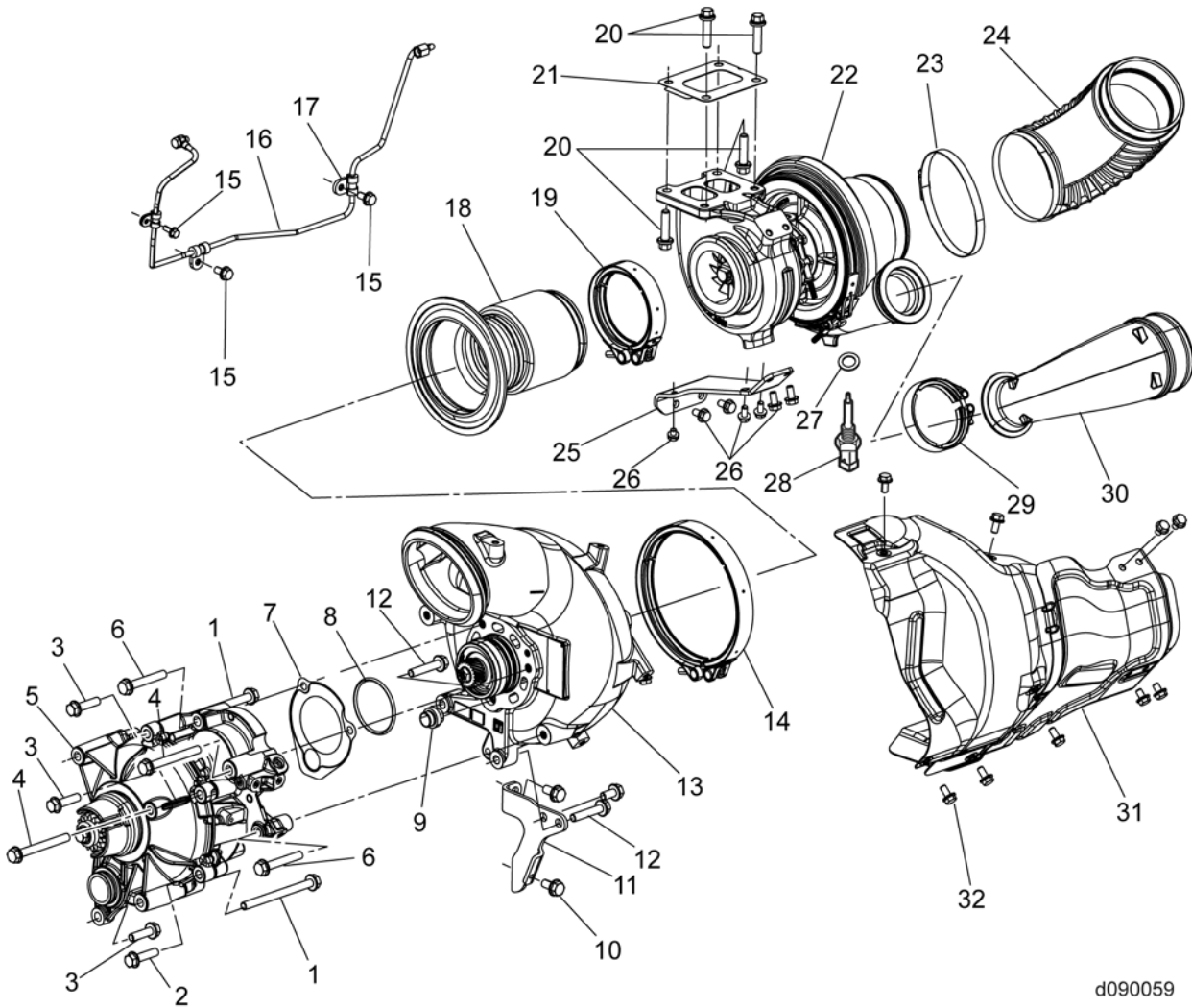


d090047

6. Connect the wastegate solenoid connector.



d090046



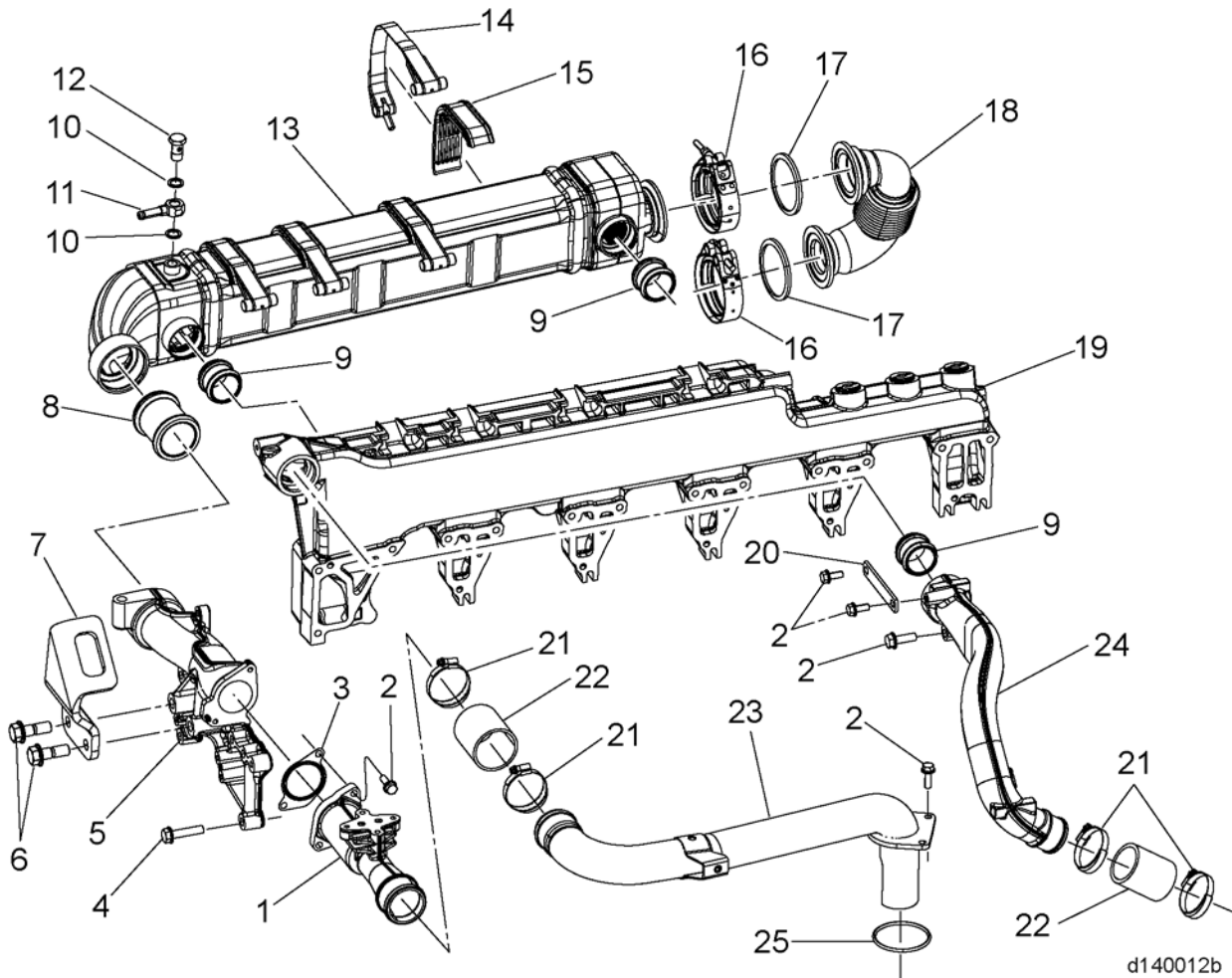
d090059

- | | | | |
|------------------------|-------------------------|-----------------------|-------------------------------|
| 1. Bolt (M10 x 120 mm) | 9. Locking Dowel | 17. P-clip | 25. Bracket |
| 2. Bolt (M10 x 35 mm) | 10. Bolt (M10 x 20 mm) | 18. Interstage Duct | 26. Bolts (6 qty.) |
| 3. Bolt | 11. Bracket | 19. Clamp | 27. O-ring |
| 4. Bolt (M10 x 90 mm) | 12. Bolt (M10 x 20 mm) | 20. Bolt | 28. Turbo Speed Sensor |
| 5. Gear Box | 13. Axial Power Turbine | 21. Gasket | 29. Clamp |
| 6. Bolt (M10 x 65 mm) | 14. Clamp | 22. Turbocharger | 30. Turbo Outlet Elbow |
| 7. Gasket Seal | 15. Bolts | 23. Clamp | 31. Heat Shield |
| 8. O-ring | 16. Air Line | 24. Turbo Inlet Elbow | 32. Heat Shield Mounting Bolt |

Figure 11-1 EPA07 and EPA10 DD15 Turbocharger and Related Parts

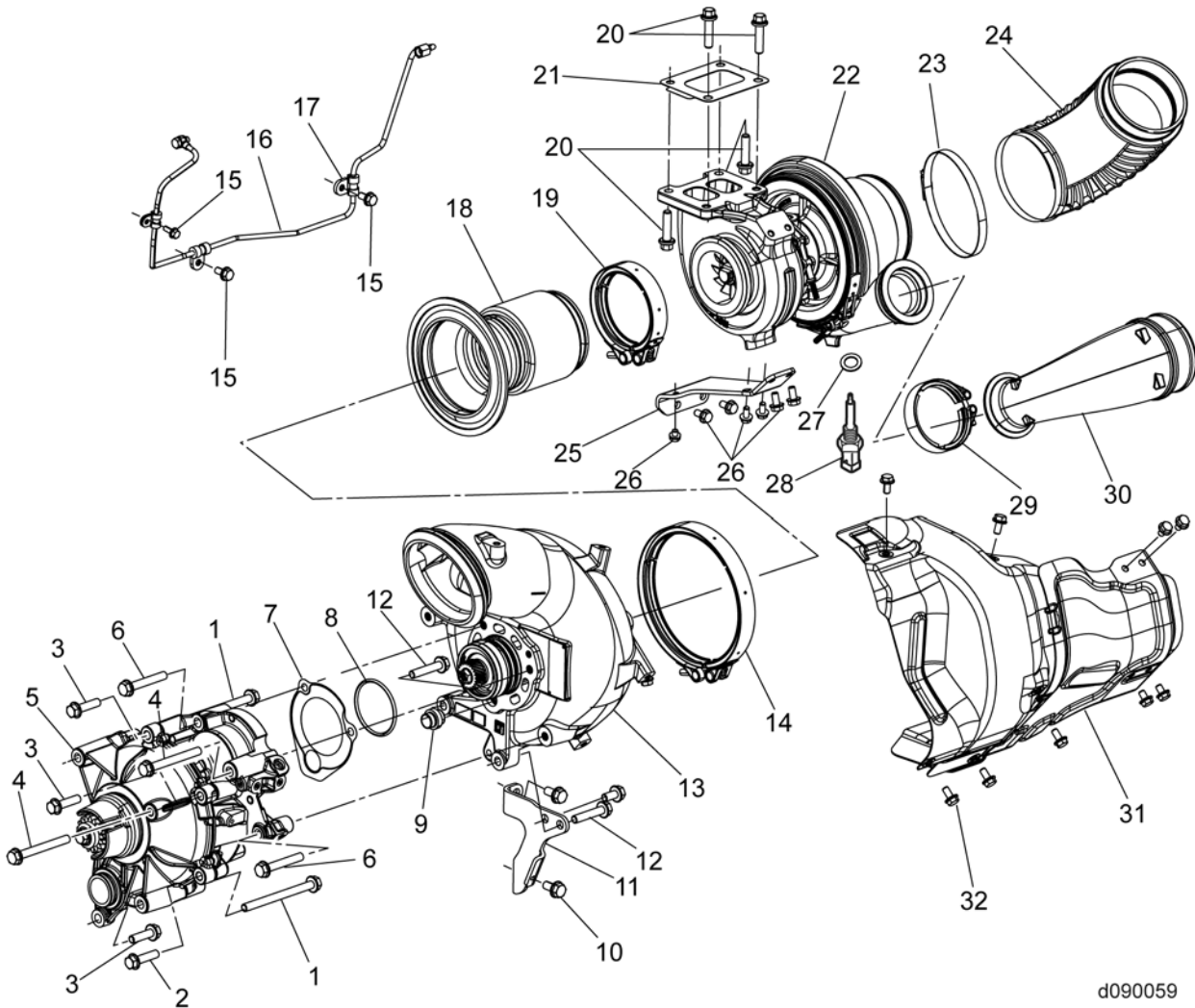
11.5 EGR COOLER CLEANING PROCEDURE TO REMOVE EXCESS OIL FROM EGR COOLER AFTER DD15 TURBOCHARGER FAILURE

Observe the following:



- | | | |
|-------------------------------|------------------------|----------------------------|
| 1. Venturi | 10. Seal Ring | 19. Water Manifold |
| 2. Bolt | 11. Banjo Union | 20. Support |
| 3. Gasket | 12. Banjo Bolt | 21. Clamp |
| 4. Bolt | 13. Exhaust Gas Cooler | 22. Hose |
| 5. Exhaust Gas Crossover Tube | 14. Strap | 23. Mixer Pipe |
| 6. Bolt | 15. Shim | 24. Coolant Crossover Pipe |
| 7. Lifting Eye | 16. Clamp | 25. Seal Ring |
| 8. Coolant Connecting Tube | 17. Seal Washer | |
| 9. Connecting Tube | 18. EGR Hot Pipe | |

Figure 11-2 EPA10 DD15 EGR Cooler and Related Parts



d090059

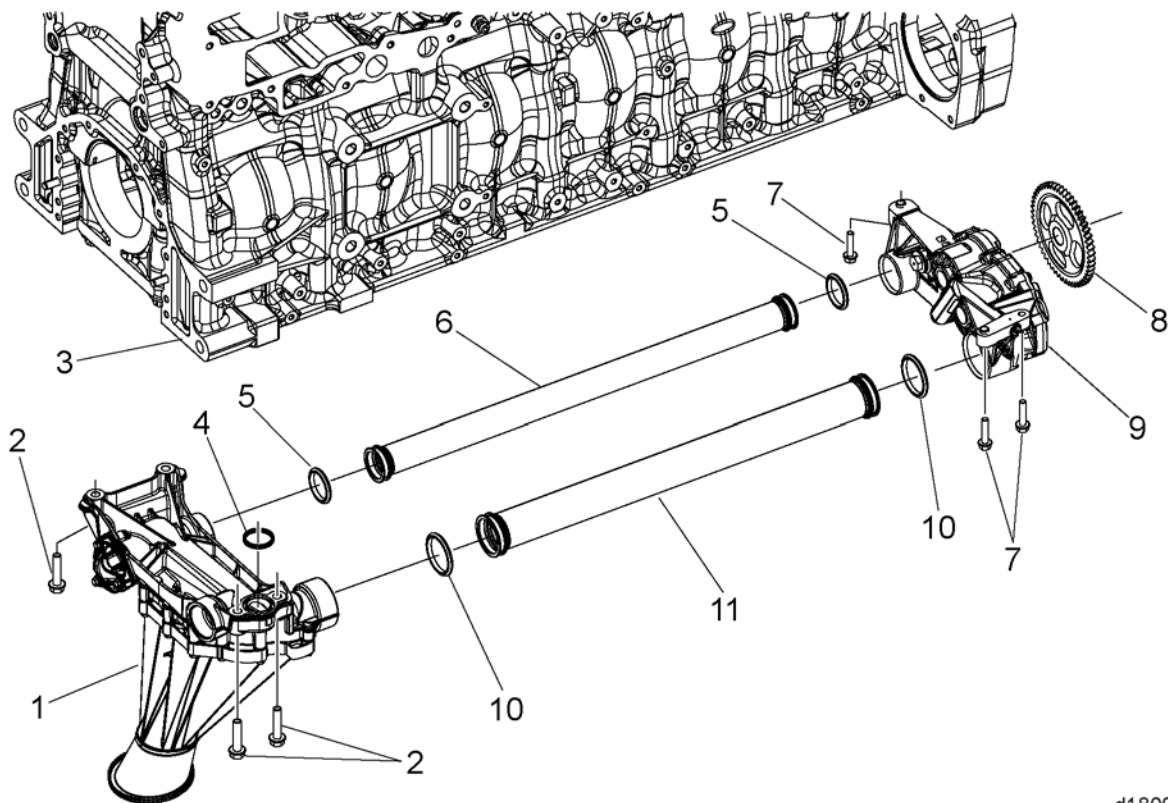
- | | | | |
|------------------------|-------------------------|-----------------------|-------------------------------|
| 1. Bolt (M10 x 120 mm) | 9. Locking Dowel | 17. P-clip | 25. Bracket |
| 2. Bolt (M10 x 35 mm) | 10. Bolt (M10 x 20 mm) | 18. Interstage Duct | 26. Bolts (6 qty.) |
| 3. Bolt | 11. Bracket | 19. Clamp | 27. O-ring |
| 4. Bolt (M10 x 90 mm) | 12. Bolt (M10 x 20 mm) | 20. Bolt | 28. Turbo Speed Sensor |
| 5. Gear Box | 13. Axial Power Turbine | 21. Gasket | 29. Clamp |
| 6. Bolt (M10 x 65 mm) | 14. Clamp | 22. Turbocharger | 30. Turbo Outlet Elbow |
| 7. Gasket Seal | 15. Bolts | 23. Clamp | 31. Heat Shield |
| 8. O-ring | 16. Air Line | 24. Turbo Inlet Elbow | 32. Heat Shield Mounting Bolt |

Figure 12-1 Axial Power Turbine and Related Parts

21.2 REMOVAL OF THE OIL PUMP, OIL SUCTION MANIFOLD, AND OIL LINES

Remove as follows:

1. Remove oil drain plug from the oil pan and drain the oil.
2. Remove the oil pan. Refer to section 19.2.
3. Remove the four bolts (2) securing the oil suction manifold (1) to the engine block (3).
4. Remove the oil suction manifold (1), oil lines (6 and 11) and O-rings (5 and 10). Discard the O-rings.
5. Remove the three bolts (7) securing the oil pump (9) to the engine block (3) and remove the oil pump assembly (8 and 9) from the engine block.



d180008

22.4 INSTALLATION OF THE CRANKCASE BREATHER

Install as follows:

1. Install the crankcase breather to the engine block with a new gasket and four bolts. Torque the bolts to 60 N·m (44 lb·ft).

NOTE:

Bracket is installed on top bolt.

2. *On EPA07 engines*, install the breather pipe and new gasket to the engine block. Torque the two bolts to 30 N·m (22 lb·ft).
3. *On EPA10 engines*, snap the breather pipe to the fitting on the cylinder block.



WARNING:

ENGINE EXHAUST

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



WARNING:

PERSONAL INJURY

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.

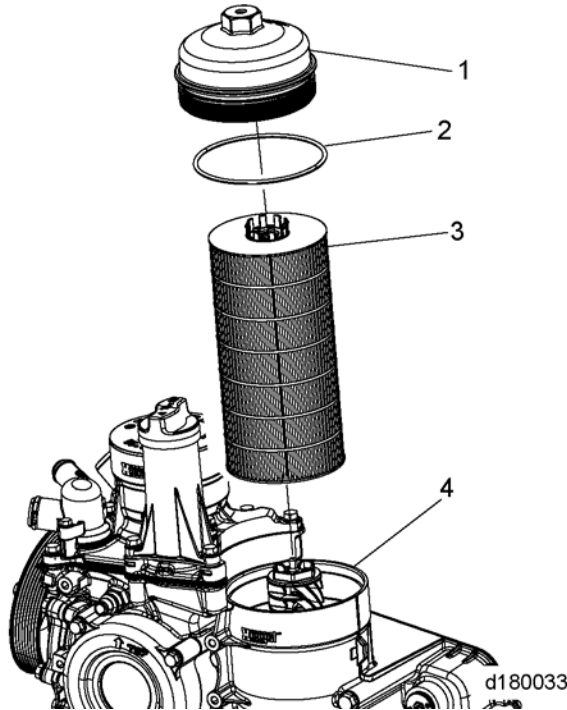
4. Connect electrical harness, if equipped.
5. Start the engine and check for leaks.

23.1 REPLACEMENT OF THE OIL FILTER

“Oil Filter Removal Video”

Remove as follows:

1. Using a 36-mm socket, unscrew the oil filter cap (1) and filter (3), and allow the oil to drain into the housing. After draining is complete, remove the assembly from the housing (4).



NOTE:

For EVO Bus, when removing the filter, separate the cap from the filter before pulling out of the module. Remove as two separate components.

NOTE:

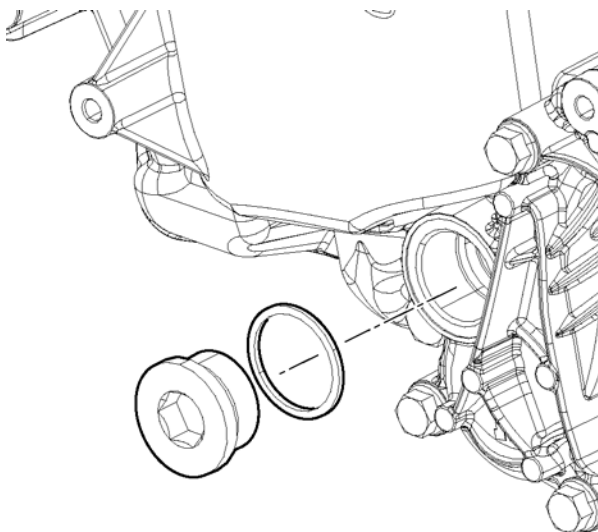
Use care to prevent foreign objects from entering the filter housing.

2. Remove the filter element by pressing and twisting the side and detaching it from the cap. Discard the filter element.
3. Remove the oil filter O-ring and discard. Lightly coat a new O-ring with clean engine oil and install it on the filter cap.
4. Check the filter housing for any debris and remove if necessary.
5. Insert a new filter element into the oil filter cap.
6. Insert the filter element and cap assembly into the housing. Torque the cap to 40-50 N·m (30-37 lb·ft).

24.1 REPLACING OIL PLUG WITH OIL SAMPLE VALVE

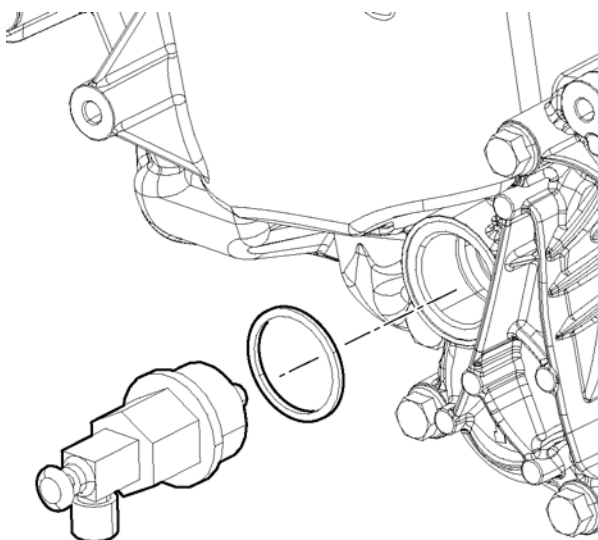
Replace oil plug with oil sample valve as follows:

1. Using a 17 mm Allen tool remove the Allen head plug from the oil priming port on the oil coolant module.



d180025

2. Install the oil sample valve onto the oil coolant module. Torque to 80 N·m (59 lb·ft).



d180026