DETROIT DIESEL

Service Information Bulletin

NUMBER: 4 **13**–09 **S.M. REF.:** Listed in Table **ENGINE:** DD Platform **DATE:** April 2009

SUBJECT: DD15 AXIAL POWER TURBINE

ADDITIONS, REVISIONS, OR UPDATES

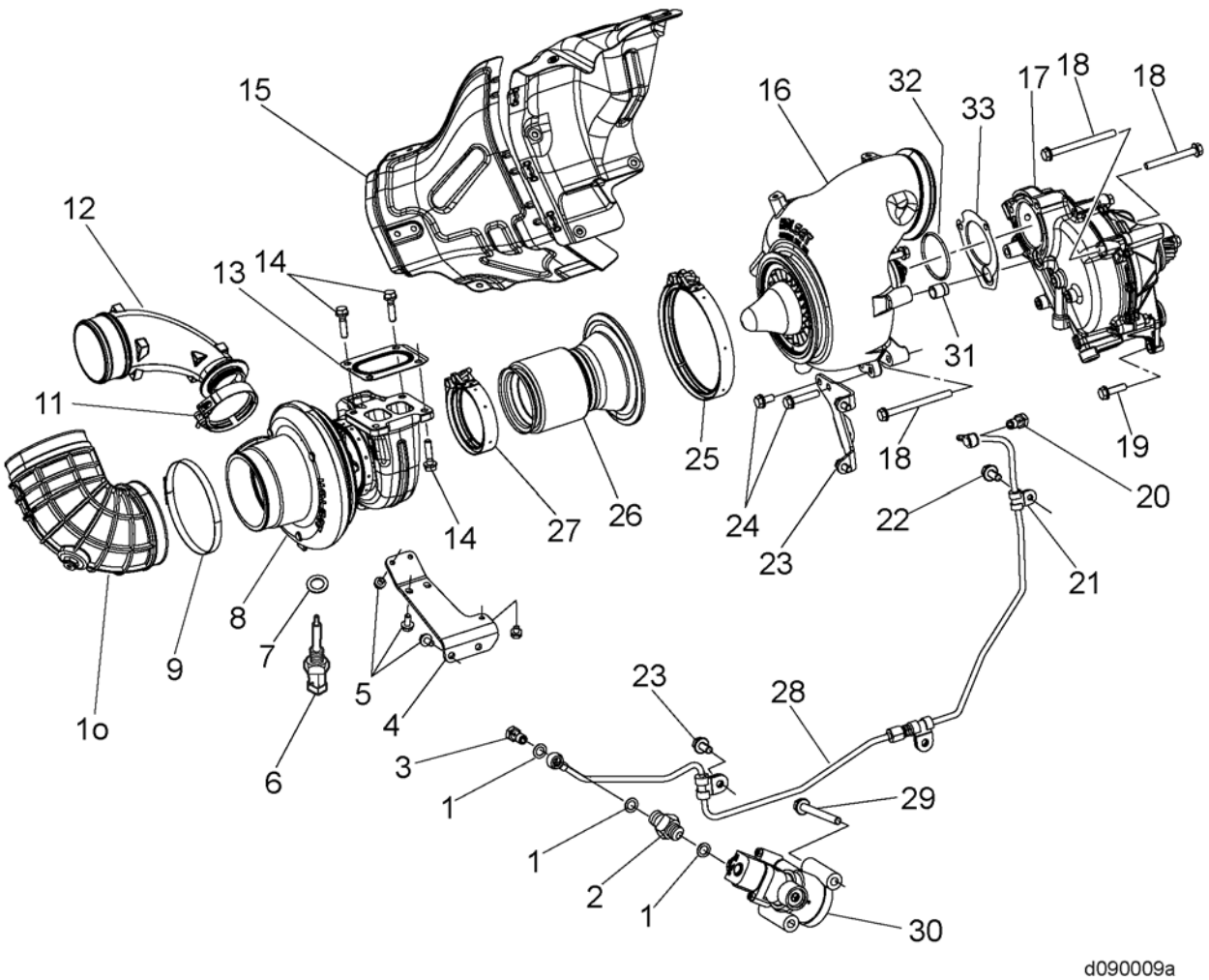
Publication Number	Platform	Section Title	Change	Page Number(s)
DDC-SVC-MAN-0002	DD15 Workshop Manual	4.3 DD15 Axial Power Turbine	The removal and installation procedures of the Axial Power Turbine have been modified to include a new seal and locating dowel.	4-20

NOTE: Page numbers are based on the most recent version of the individual publication and may be adjusted throughout the annual print cycle.

DD15 AXIAL POWER TURBINE

The Axial Power Turbine (APT) increases the efficiency and the economy of the engine by converting thermal energy, in the exhaust flow from the turbocharger, into mechanical energy and delivers the resulting torque to the crankshaft. The rated speed of the turbine wheel of the APT device is about 50,000 rpm. The turbine wheel generates a torque in this range of about 10 N·m (7 lb·ft), which is increased through various gear ratios up to 260 N·m (192 lb·ft). The exhaust gas flows to the turbine wheel of the APT and drives the wheel. The rotational movement created is transmitted to the shaft of the small output gear, and from there, to the large output gear of the hydrodynamic clutch. The rotational speed is reduced because of the gear ratio between the output gear and drive gear; this gear ratio also multiplies torque output. The hydrodynamic clutch impeller is a part of the hydrodynamic clutch housing. The vanes on the impeller generate an oil flow in the hydrodynamic clutch which sets the turbine wheel of the hydrodynamic clutch into rotation and the output gear is driven over a shaft. The generated torque is transferred through the intermediate gear to the crankshaft gear. It is also possible to ensure, via the hydrodynamic clutch, that matching rotational speed takes place between the crankshaft and the axial power turbine-drive.

The APT is connected to the engine oil circuit. The gears and the bearing are lubricated and cooled by the engine oil. The hydrodynamic clutch is supplied with engine oil by the hollow bearing shaft. One special aspect is the seal between the shaft and the exhaust turbine housing. The seal between these two components is formed by using two metal sealing rings which are pressed into their seat by compressed air. The pressure for pressing these sealing rings is reduced over the axial power turbine air seal pressure regulator valve to 0.5 bar which is actuated by the Motor Control Module (MCM) as soon as the engine starts.



1. Washer	8. Turbocharger	15. Heat Shield	22. Bolt	29. Bolt
2. Connector	9. Clamp	16. Axial Power Turbine	23. Bracket	30. Air Seal Pressure Regulator
3. Banjo Bolt	10. Exhaust Pipe	17. Gear Box	24. Bolt	31. Locating Dowel
4. Bracket	11. Clamp	18. Bolt	25. Clamp	32. O-ring
5. Bolts	12. Turbo Outlet Elbow	19. Bolt	26. Interstage Duct	33. Gasket Seal
6. Turbo Speed Sensor	13. Gasket	20. Banjo Bolt	27. Clamp	
7. O-ring	14. Bolts	21. Clip	28. Air Line	

Figure 1 Axial Power Turbine and Related Parts

REMOVAL OF DD15 AXIAL POWER TURBINE

Remove as follows:

NOTICE:
Ensure turbocharger and axial power turbine are supported prior to removal.

1. Shut off the engine, apply the parking brake, chock the wheels, and perform any other applicable safety steps.
2. Drain coolant.
3. Remove the turbocharger and APT heat shields.
4. Disconnect the doser injector housing lines and remove the exhaust S-pipe from APT outlet.
5. Remove the Exhaust Gas Recirculation (EGR) valve.
6. Remove the turbocharger and interstage duct.
7. Remove the clamp from turbocharger outlet.
8. Remove the air line from the air seal pressure regulator valve or from the compressor housing of the turbocharger.
9. Remove four bolts securing the gear box and axial power turbine to the engine block.
10. Remove four bolts retaining the bracket to the axial power turbine and cylinder block and remove the bracket.
11. Remove the remaining bolts attaching turbine housing to the gear box.
12. Separate the turbine housing from the gear box.
13. Remove the old gasket, graphite seal and O-ring.

INSPECTION OF THE DD15 AXIAL POWER TURBINE

Inspect as follows:

1. Shut off the engine, apply the parking brake, chock the wheels, and perform any other applicable safety steps.
2. Inspect axial power turbine for damage to the turbine and housing; replace if necessary.
3. Inspect the gear box for damage; replace if necessary.

INSTALLATION OF THE DD15 AXIAL POWER TURBINE

Install as follows:

1. Shut off the engine, apply the parking brake, chock the wheels, and perform any other applicable safety steps.
2. If removed, install the gear box to cylinder block with four bolts. Torque bolts to 55–60 N·m (41–45 lb·ft).
3. Install axial power turbine metal gasket, O-ring and graphite seal.
4. Lubricate collar and O-ring with clean engine oil (the guide tube must be pressed into the turbine housing with the taper facing toward the gear box).
5. Install axial power turbine to gear box and bracket (the APT must be installed as straight to the gearbox as possible; uneven installation could cause an oil leak).

NOTICE:
When installing axial power turbine to gear box ensure gears are aligned by viewing through exhaust port and rotating impeller. Damage to gear box and axial power turbine will occur if not installed correctly.

6. Install the front bolt through the APT into the gear box, and hand-tighten the bolt.
7. Install two bolts through the bracket into the axial power turbine; then install two bolts through the bracket into the cylinder block. Install the remaining three bolts into axial power turbine; hand-tighten.
8. Torque the bolts to 55-60 N·m (41-45 lb·ft).
9. Install airline to axial power turbine from air seal pressure regulator valve or from the turbocharger compressor housing. Torque the banjo bolt to 10 N·m (7 lb·ft).
10. Install the oil feed line from the block to the APT and torque to 20 N·m (15 lb·ft).
11. Install the turbocharger and interstage duct.
12. Install the EGR valve.
13. Install the doser housing onto the S-pipe.
14. Install the turbocharger and APT heat shields.
15. Fill the engine with coolant.

ADDITIONAL SERVICE INFORMATION

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

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