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Service Information Bulletin

SUBJECT	DATE
Checking for Poor Engine Brake Performance	March 2014

Additions, Revisions, or Updates

Publication Number / Title	Platform	Section Title	Change
DDC-SVC-MAN-0084	DD Platform	Checking for Poor Engine Brake Performance	Symptom based diagnostics for poor engine brake performance.
DDC-SVC-MAN-S184	Euro IV	Checking for Poor Engine Brake Performance	Symptom based diagnostics for poor engine brake performance.



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2 Checking for Poor Engine Brake Performance

Use this procedure to determine the cause of poor engine brake performance when no codes are present. Verify the customer complaint before beginning any troubleshooting.

Check as follows:

NOTE:

On EPA10 engines, engine brakes do not enable until engine oil temperature reaches 50°C (122°F). The Front Engine Brake Solenoid controls cylinder 1, 2, and 3. The Rear Engine Brake Solenoid controls cylinders 4, 5, and 6.

EPA07 engines, engine brakes do not enable until engine oil temperature reaches 15°C (59°F). The Front Engine Brake Solenoid controls cylinder 1 and 2. The Rear Engine Brake Solenoid controls cylinders 3, 4, 5, and 6.

All DD Engines: Engine Brake Performance increases as engine speed increases. The Engine Brakes are most effective at higher engine speeds.

Engine Brake Solenoids typically do NOT cause Engine Brake Performance issues.

1. Using DiagnosticLink™, view all modules for active or inactive codes. Are faults present?
 - a. Yes; perform the troubleshooting for all fault codes first.
 - i. Check all modules for fault codes such as the Transmission Control Module (TCM), ABS Module, and chassis modules.
 - b. No; Go to step 2.
2. Using DiagnosticLink, view the clutch switch status. Is the clutch switch working correctly?
 - a. Yes; Go to step 3.
 - b. No; ensure the clutch switch is adjusted correctly and operating correctly. Refer to OEM procedures and guidelines.
3. Turn engine OFF for a minimum of five minutes; check the oil level.
 - a. If the oil level is above the maximum mark on the dipstick with no oil previously added, Go to step 4.
 - b. If the oil level is below the minimum mark on the dipstick, fill to the proper level and verify repair.
 - c. If the oil level is within the minimum and maximum mark, Go to step 5.
4. Visually inspect and/or test for contamination in the oil.
 - a. Coolant in Oil -- perform the coolant in oil troubleshooting. Change the engine oil and filter once the source of contamination is found.
 - b. Fuel in Oil -- locate and repair the source of fuel leak.
 - i. For the Three Filter Fuel System, Refer to section "FIS Low Pressure Leak Test - Three-Filter Fuel System".
 - ii. For the Two Filter Fuel System, Refer to section "FIS Low Pressure Leak Test-Two-Filter Fuel System".
 - c. No contamination is found -- drain the oil to the correct level and verify repairs.
5. Check the oil pressure using DiagnosticLink.

For DD13: Refer to section "DD13 Oil Pressure Specifications".

For DD15 and DD16: Refer to section "DD15 and DD16 Oil Pressure Specifications".

 - a. If the oil pressure is within specification, go to next step.
 - b. If the oil pressure is not within specifications, perform the Low Oil Pressure troubleshooting. Fault code SPN 100/FMI 1 low oil pressure.

NOTE: DD13 EPA10, DD15 GHG14 AT are equipped with waste-gated turbochargers.

6. Is the engine equipped with a waste-gated turbocharger?
 - a. Yes; Go to step 7.
 - b. No; Go to step 9.

7. Perform the function test of the Turbo wastegate; Refer to section "Functional Check of the DD13 and GHG14 DD15 Asymmetrical Turbocharger Wastegate Actuator".
 - a. If the Wastegate passed the functional check, Go to step 9.
 - b. If the Wastegate failed the functional check, repair as necessary.
8. Measure air inlet restriction and/or inspect the air filter. Is the air filter restrictive/plugged?
 - a. Yes; replace and verify repairs.
 - b. No; Go to step 9.
9. Pressurize the intake track, including the Charge Air Cooler and associated piping, inspecting for leaks. Was a leak found?
 - a. Yes; repair and/or replace as necessary and verify repairs.
 - b. No; Go to step 10.
10. Inspect the exhaust manifolds and turbo mounting flange for exhaust leaks. Are leaks present?
 - a. Yes; repair and/or replace as necessary and verify repairs.
 - b. No; Go to step 11.
11. Inspect the EGR pipes (Hot Pipe, Venturi and Delivery Pipe) for leaks. Are leaks present?
 - a. Yes; repair and/or replace as necessary and verify repairs.
 - b. No; Go to step 12.

NOTE: Oil residue at the turbo compressor wheel is normal. Excessive oil can be caused by excessive idle time, high air inlet restriction, or high crankcase pressure. Do NOT Replace the turbocharger.

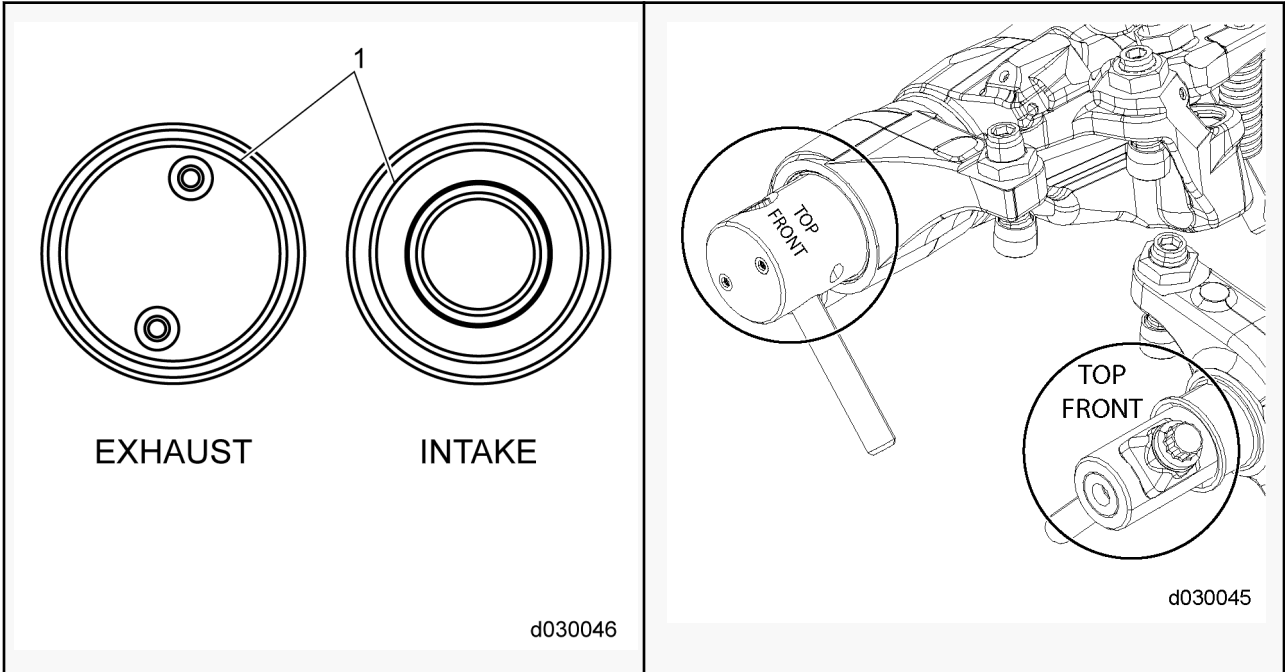
12. Remove the turbo inlet pipe/elbow and inspect the Turbo Compressor wheel for damage. Is the turbo compressor wheel damaged?
 - a. Yes; replace the turbocharger and verify repairs.
 - b. No; Go to step 13.
13. Perform a Relative Compression Test using DiagnosticLink . Refer to section "Relative Cylinder Compression Test". Was a faulty cylinder found?
 - a. Yes; Perform a Mechanical Cylinder Compression Test, Refer to section "Mechanical Cylinder Compression Test".
 - b. No; Go to step 14.
14. Remove the Rocker Cover, Refer to section "Removal of the Rocker Cover".

NOTICE: The cam journal area is lubricated by oil that has to travel through the rocker shaft. If the shaft is installed incorrectly, the oil passages do not line up. This will result in insufficient lubrication and damage to the cam journal and rocker arm bushings.

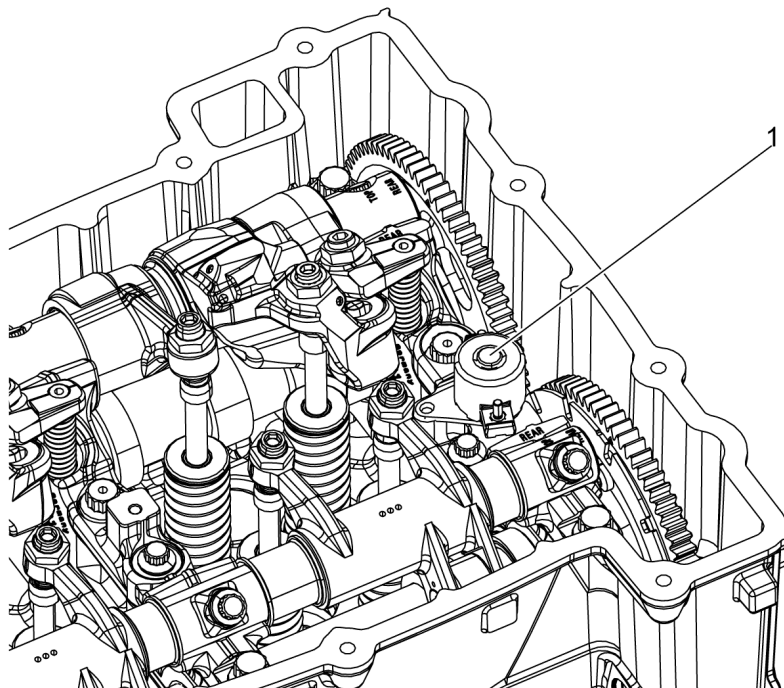
NOTE: On EPA10 Engines, the intake and exhaust rocker shafts are marked "TOP FRONT" and "TOP REAR." Top Front must face towards the front of the engine.

15. Inspect the exhaust rocker shaft to ensure it is installed with the groove towards the front of the engine as shown in figures below.

Table 1.



- a. If the exhaust rocker shaft is correctly installed, Go to step 16.
 - b. If the exhaust rocker shaft is incorrectly installed, check the camshafts and valve train for damage, and repair as necessary.
16. Check the Camshaft timing. Refer to section "Camshaft Timing Verification"
- a. If camshaft timing marks line up per procedures, Go to step 17.
 - b. If camshaft timing marks do not line up, repair as necessary.
17. Check Valve Lash and engine brake adjustments. Refer to section "Valve Lash Adjustments"
- a. If adjustment was required, assemble the engine and verify repairs.
 - b. If the valve lash and the engine brake adjustment were within range and did not require adjustment, Go to step 18.
18. Remove the engine brake solenoids from the cam frame housing. Refer to section "Removal of the Engine Brake Solenoid" Go to step 19.



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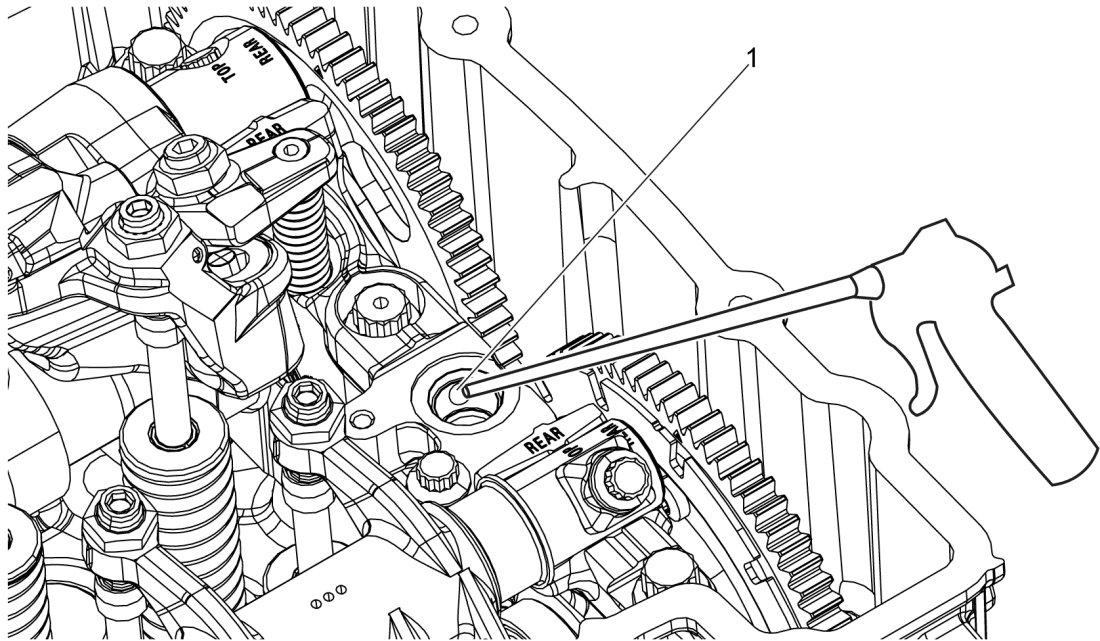
19. Inspect the engine brake solenoids for damage, including the screen and O-rings.
 - a. If damage is found, replace the parts on the engine brake solenoid and verify repairs.
 - b. If no damage is found, Go to step 20.

NOTE:

EPA10/GHG14 Engines: The Front Engine Brake Solenoid controls cylinder 1, 2, and 3. The Rear Engine Solenoid controls cylinders 4, 5, and 6.

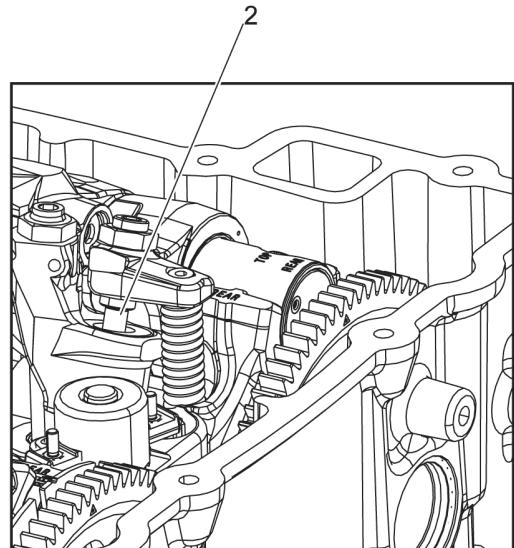
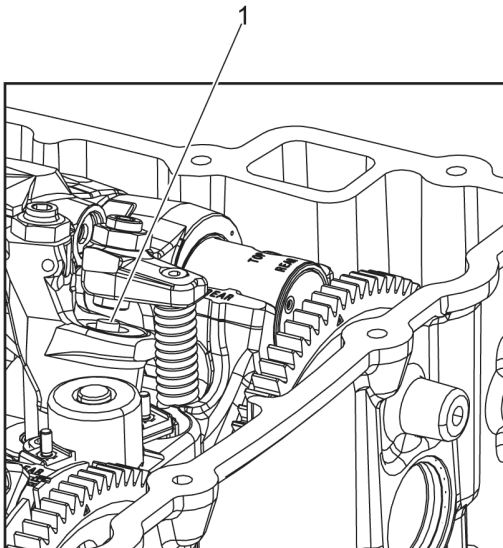
EPA07 Engines: The Front Engine Brake Solenoid controls cylinder 1 and 2. The Rear Engine Brake Solenoid controls cylinders 3, 4, 5, and 6.

20. With the **Front** engine brake solenoid removed from the cam frame housing, use a rubber tip blow gun regulated at 345 kPa (50 psi). Apply 345 kPa (50 psi) into the solenoid outlet port/engine activation port (1) of the cam frame housing. Go to step 21.



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21. Do all the actuator pistons (1) in the engine brake rocker arms extend upwards (2) for the appropriate cylinders?
- a. Yes; Go to step 22.
 - b. No; replace the Engine Brake Rocker(s) with stuck actuator pistons. Refer to section "Removal of the Rocker Shaft Assembly".



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22. Remove the air pressure; do the actuator pistons retract?
- a. Yes; Go to step 23.

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- b. No; replace the Engine Brake Rocker(s) with the stuck actuator pistons. Refer to section "Removal of the Rocker Shaft Assembly".
23. With the **Rear** engine brake solenoid removed from the cam frame housing, use a rubber tip blow gun regulated at 345 kPa (50 psi). Apply 345 kPa (50 psi) into the Solenoid Outlet Port/Engine Activation port of the cam frame housing.
24. Do the Actuator pistons in the Engine Brake Rocker Arms extend outwards for the appropriate cylinders?
- a. Yes; Go to step 25.
 - b. No; replace the Engine Brake Rocker(s) with the stuck actuator pistons. Refer to section "Removal of the Rocker Shaft Assembly".
25. Remove the air pressure; do the actuator pistons retract?
- a. Yes; Go to step 26.
 - b. No; replace the Engine Brake Rocker(s) with the stuck actuator pistons. Refer to section "Removal of the Rocker Shaft Assembly".
26. Replace both engine brake solenoids. Refer to section "Installation of the Engine Brake Solenoid". Verify repairs.
27. Does the engine still have Poor Engine Brake Performance?
- a. Yes; replace all six exhaust rockers arms that have actuator pistons. Refer to section "Removal of the Rocker Shaft Assembly".
 - b. No; trouble shooting is complete.