

Exhaust Aftertreatment System Fault Tracing - Catalyzed DPF

M-254-002

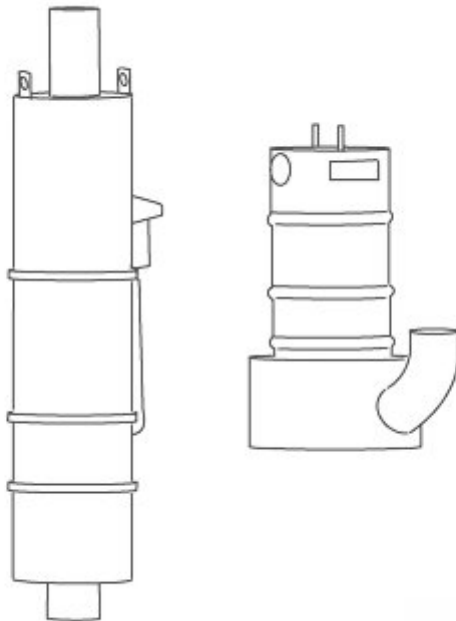
(March 2008)

Valid for

All US07 emission compliant MP7 and MP8 engines

Case description

Information and techniques for troubleshooting, the Exhaust Aftertreatment System (EATS) for the US 07 (MP7 and MP8)MACK engines with catalyzed Diesel Particulate Filters (DPF).



Catalyzed Diesel Particulate Filters — Back of Cab and Compact

Note: Not applicable to Mack Trucks Australia.

Troubleshooting

INTRODUCTION

It is important to use a systematic approach to diagnosis. Depending on the vehicle configuration, a problem may be caused, or influenced, by malfunctions in other vehicle components. Diagnostic help can be found in the Premium Tech Tool (PTT). PTT provides access to vehicle and parameter programming, service information and diagnostics. To obtain PTT, contact your local MACK dealer.

REGENERATION

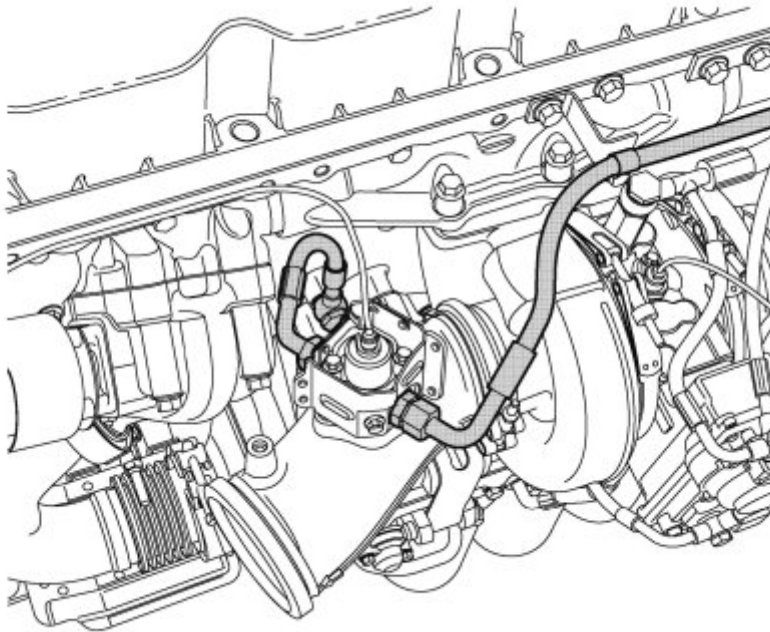
Vehicles equipped with a 2007 emission compliant engine have an exhaust aftertreatment system, which includes a Diesel Particulate Filter (DPF). During normal operation, the DPF collects soot and other particulate matter, which is eventually oxidized using a regeneration process. The filter insert in the exhaust aftertreatment system must be cleaned or replaced with a remanufactured filter insert if any of the following conditions exist:

- The filter insert has been in service for 400 000 km (250,000 miles) or 4,500 hours.
- There is a significant amount of black coating on the surfaces behind the DPF.
- The soot level is above 200%, the DPF inlet looks very dirty and the differential pressure is above 15 kPa (2.2 psi) when checked with VCADS.

Severe black coating on the surfaces behind the DPF indicates that the DPF is cracked or partially melted. The DPF failure is unrecoverable and it must be replaced.

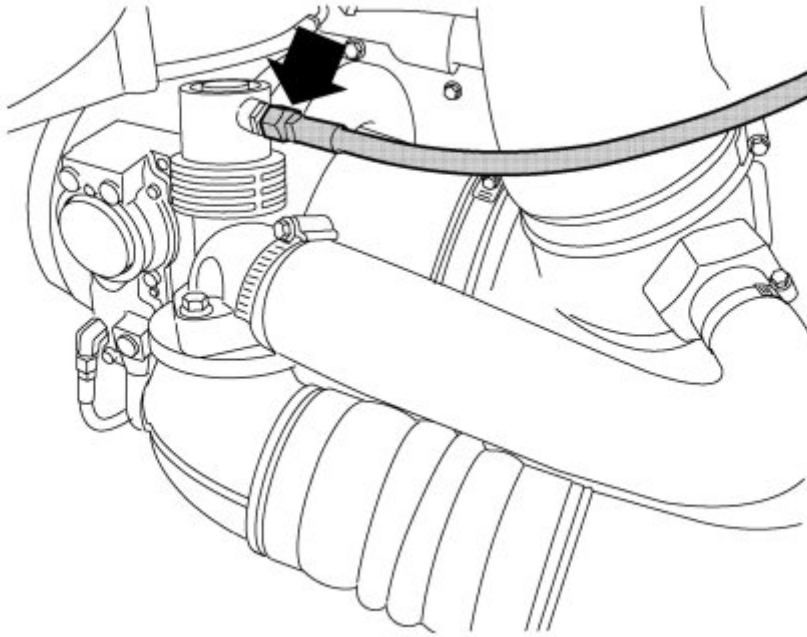
The exhaust aftertreatment system also includes two components designed to increase exhaust system temperature for DPF regeneration. The Aftertreatment Fuel Injector (AFI), mounted on the turbocharger diffuser, injects diesel fuel into the exhaust stream during a regeneration cycle. The fuel contacts the Diesel Oxidation Catalyst (DOC), a chemical reaction occurs, and the exhaust system temperature increases to a level that oxidizes the soot in the filter.

— Aftertreatment Fuel Injector (AFI)



The Discharge Recirculation Valve (DRV), mounted on the charge air cooler inlet pipe, increases exhaust system temperature by recirculating air back into the turbocharger.

— Discharge Recirculation Valve (DRV)



AUTOMATIC REGENERATION

When the soot level in the DPF reaches 100%, the system attempts to regenerate automatically, if the vehicle speed is above 40 km/h (25 mph) and load or throttle position is higher than 40%. An automatic regeneration attempt will fail if:

- The system has been disabled by the operator.
- There are active component fault codes.
- Exhaust system temperature is too low.
- Engine operates in low-load duty-cycle conditions (stop and go traffic or similar).

An automatic regeneration will start if the soot level exceeds 100% and the engine operating conditions are correct. Short interruptions are allowed, but the regeneration must be completed within 45 minutes. If the regeneration does not complete, it will start again after 30 minutes. The system will attempt to initiate an automatic regeneration a predetermined number of times (depending on the software version) before a regeneration fault code is set. The regeneration fault code is reset once a regeneration is completed. Also, the soot level is reduced every time the DPF is at a sufficiently high temperature for a period of time.

PARKED REGENERATION

Once the soot level reaches 110%, the operator can initiate a parked regeneration. A parked regeneration is allowed up to a 170% soot level. However, the engine will start to de-rate slightly at 140% and de-rate will increase as the soot level increases. During parked regeneration the engine will run at 1050–1200 rpm, depending on ambient conditions. A parked regeneration attempt will fail if:

- There are active component fault codes.
- The transmission is not in neutral.
- The parking brake is not on.
- The accelerator and clutch pedal are not released.
- The coolant temperature is not above 35°C (95°F).
- There is a heat mode-related problem.
- The battery voltage is not above 10 volts.

If a parked regeneration is completed successfully, the system is operational. However, automatic regenerations may still fail due to low exhaust temperatures, or due to degraded AFI or DOC performance. Low exhaust temperature can be caused by cold ambient temperature, periods of low load, periods of idle, periods of coasting/engine brake, stop

and go traffic or any combination of these conditions. Degraded AFI or DOC performance can be caused by full or partial AFI clogging, DOC face plugging, or DOC sulfur poisoning due to not using Ultra Low Sulfur Diesel (ULSD) fuel. Therefore, the AFI tip should be cleaned and the DOC inlet should be inspected before replacing the AFI. Follow the procedures in Guided Diagnostics to inspect and clean the DOC.

SERVICE REGENERATION

Once the soot level reaches 170%, the engine is in full de-rate. The DPF requires a service regeneration by a MACK dealer using the VCADS tool in PTT. VCADS can be used to perform a service regeneration up to a soot level of 200%.

Diagnostics

Find out how the vehicle is driven. What is the typical duty-cycle? Determine how the aftertreatment system operated before it failed. Ask about the maintenance schedule and the fuel, coolant and lubricant used. Begin by attempting to determine whether anything has happened recently that could point to the electrical system, but which is not related to the electronic control system.

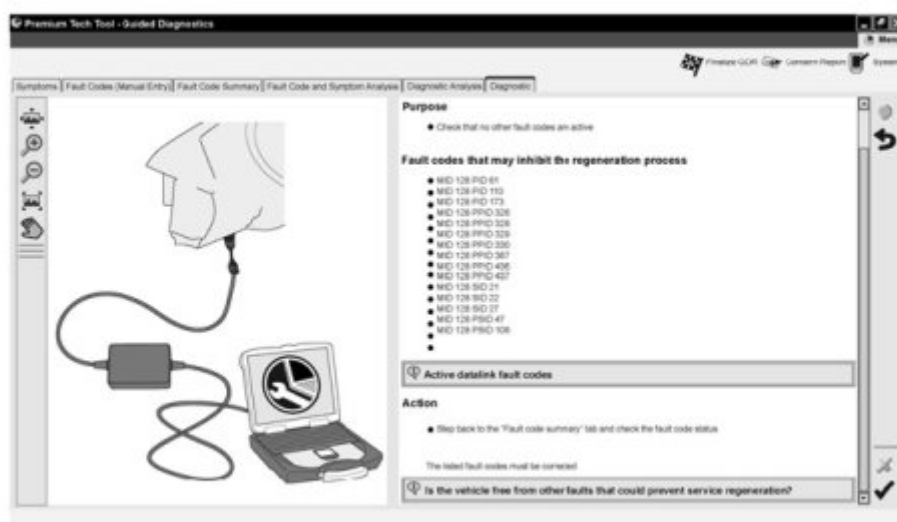
If possible, recreate the problem in an environment similar to that described by the vehicle operator. Run the engine at the temperature at which the symptom occurred. Check if there is soot in the exhaust pipes behind the DPF.

GUIDED DIAGNOSTICS

Guided Diagnostics is an application in PTT that presents step-by-step instructions for fault code and symptom fault tracing that pinpoints the cause of the fault. Guided Diagnostics is organized into a series of tabs outlining a diagnostic process.

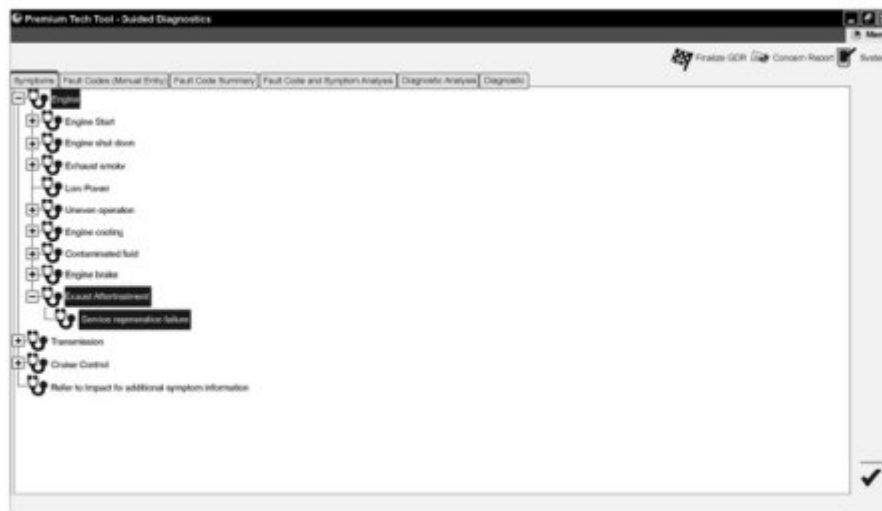
Connect PTT to the vehicle and use Guided Diagnostics to check for active fault codes. Active fault codes must be corrected.

—Premium Tech Tool Diagnostics Tab — Fault Codes



If there are no active fault codes, proceed to the "Symptoms" tab in Guided Diagnostics. Click on "Engine", "Exhaust Aftertreatment" and "Service regeneration failure". Open the Diagnostic folder and follow the instructions.

Premium Tech Tool Symptoms Tab



If the results are inconclusive, the message “No fault found” is displayed. Rerun the diagnostic procedure.

Premium Tech Tool Diagnostics Tab — No Fault Found



Issued by

Technical Service