DETROIT DIESEL

ATS Technician's Guide

NUMBER: 2–**ATS**–07 **S.M. REF.:** Listed in Table 1 **ENGINE:** ATS **DATE:** April 2007

SUBJECT: UPDATES TO AFTERTREATMENT SYSTEM TROUBLESHOOTING

PUBLICATION: 7SE63

The *Aftertreatment System Technician's Guide* has been revised.

MANUAL REFERENCE

Section	Change
6.1, Mechanical Troubleshooting	A section on Mechanical Troubleshooting was added with tables about Parked Regeneration requirements and symptoms.
9.1, SPN 3242/FMI 2	The directions in step 1.b of the troubleshooting procedure were changed for SPN 3242/FMI 2.
10.6, SPN 3246/FMI 14	The directions in step 2 of the troubleshooting procedure were changed for SPN 3246/FMI 14.
17.2, SPN3209/FMI 3	The directions in steps 3 and 4 of the troubleshooting procedure were changed for SPN 3609/FMI 3.
18.2, SPN 3610/FMI 3	The directions in steps 3 and 4 of the troubleshooting procedure were changed for SPN 3610/FMI 3.

Table 1 Manual Revisions

MECHANICAL TROUBLESHOOTING

To perform a parked regeneration, the required conditions listed in Table 2 must be met.

Connect DDDL 7.0 to monitor the inputs.

Symptom	Required Conditions
Unable to initiate Parked Regeneration via Regen Request Switch	☐ VSS must be 0 mph. ☐ Clutch switch must have been cycled ON/OFF/ON (manual transmission). ☐ Parking Brake must have been cycled ON/OFF/ON. ☐ J1939 Gear Selected must be neutral (automatic transmission). ☐ J1939 Gear Actual must be neutral (automatic transmission). ☐ Engine must be on idle governor, not in PTO mode. ☐ DPF Zone must not be 0. ☐ Regen request switch must be held for 5 seconds.

Table 2 Parked Regeneration Requirements

Listed in Table 3 are the common symptoms and possible causes to guide you through mechanical troubleshooting if regen is not functioning properly when initiated via the dash switch.

Symptom	Possible Causes	Suggestions
High idle regen initiates via the dash switch and runs indefinitely. (Intake throttle on Series 60 and MBE 4000 or Exhaust Flap on MBE-900 closes, and there is no HEST Lamp after 25 minutes.)	Low supply fuel pressure	Manual test fuel pressure. Check for plugged fuel filters or aerated fuel.
	Fuel Injection Valve partially plugged	Monitor HC Doser Injection Status and doser fuel line pressure. A high HC Doser Injection Status during regen, usually greater than 25% and doser fuel line pressure close to engine fuel pressure indicate plugging.
	Intake Manifold Pressure Sensor inaccurate	Compare reading to BARO (key ON, engine OFF).
	DOC Outlet Temperature Sensor non-responsive	Compare temperatures before and after engine startup. No temperature change indicates sensor problem.
	Electronic Dosing Valve inoperative	Monitor fuel line pressure. Pressure should change when valve commanded to open (PWM > 0).
	Fuel Cutoff Valve inoperative	Monitor fuel compensation pressure. Pressure should change when valve commanded to 100%.
	DOC not active	Monitor temperature rise across DOC during regen. Little or no temperature rise indicates DOC not active.
High idle regen initiates via the dash switch and runs indefinitely. (Intake Throttle on Series 60 and MBE 4000 or Exhaust Flap on MBE-900 does NOT close, and there is no HEST Lamp after 25 minutes.)	Low coolant temperature	Monitor coolant temperature. Temperature should be greater than 60°C (140°F).
	High DOC Outlet temperature	Monitor DOC outlet temperature. Temperature should NOT be greater than 100°C (212°F) prior to regen.
	Engine in smoke control mode	Monitor smoke control status during regen. Smoke control status should be 0.
High idle regen initiates via the dash switch but aborts. (Test ends after 10-15 minutes of activation of Intake Throttle on Series 60 and MBE 4000 or Exhaust Flap on MBE-900.)	DOC Inlet Temperature Sensor non-responsive	Monitor DOC inlet temperature. No temperature change after engine startup indicates sensor problem.
	Intake Throttle Valve not functioning properly	Listen for the ITV to sweep at key up.
	Turbo not functioning properly	Perform a turbo hysteresis test.
	Low output of Engine Fuel Injector	Check for plugged tip. Perform cylinder cut out test.
	Exhaust Flap not functioning properly (MBE 900)	Check solenoid supply voltage and air pressure.
	Aerated fuel	Check fuel for aeration.

Table 3 Mechanical Troubleshooting of High Idle Regen Initiated via the Dash Switch

Listed in Table 4 are the common symptoms and possible causes to guide you through mechanical troubleshooting if regen is not functioning properly when initiated via DDDL 7.0.

Symptom	Possible Causes	Suggestions
High idle regen initiates via DDDL 7.0 and runs indefinitely. (Intake throttle on Series 60 and MBE 4000 or Exhaust Flap on MBE-900 closes, and there is no HEST Lamp after 25 minutes.)	Low supply fuel pressure	Manual test fuel pressure. Check for plugged fuel filters or aerated fuel.
	Fuel Injection Valve partially plugged	Monitor HC Doser Injection Status and doser fuel line pressure. A high HC Doser Injection Status during regen, usually greater than 25% and doser fuel line pressure close to engine fuel pressure indicate plugging.
	Intake Manifold Pressure Sensor inaccurate	Compare reading to BARO (key ON, engine OFF).
	DOC Outlet Temperature Sensor non-responsive	Compare temperatures before and after engine startup. No temperature change indicates sensor problem.
	Electronic Dosing Valve inoperative	Monitor fuel line pressure. Pressure should change when valve commanded to open (PWM > 0).
	Fuel Cutoff Valve inoperative	Monitor fuel compensation pressure. Pressure should change when valve commanded to 100%.
	DOC not active	Monitor temperature rise across DOC during regen. Little or no temperature rise indicates DOC not active.
	DOC Inlet Temperature Sensor non-responsive	Monitor DOC inlet temperature. No temperature change after engine startup indicates sensor problem.
	Intake Throttle Valve not functioning properly	Listen for the ITV to sweep at key up.
	Turbo not functioning properly	Perform a turbo hysteresis test.
	Low output of Engine Fuel Injector	Check for plugged tip. Perform cylinder cut out test.
	Exhaust Flap not functioning properly (MBE 900)	Check solenoid supply voltage and air pressure.
	Aerated fuel	Check fuel for aeration.
High idle regen initiates via DDDL 7.0 and runs indefinitely. (Intake Throttle on Series 60 and MBE 4000 or Exhaust Flap on MBE-900 does NOT close, and there is no HEST Lamp after 25 minutes.)	Low coolant temperature	Monitor coolant temperature. Temperature should be greater than 60°C (140°F).
	High DOC Outlet temperature	Monitor DOC outlet temperature. Temperature should NOT be greater than 100°C (212°F) prior to regen.
	Engine in smoke control mode	Monitor smoke control status during regen. Smoke control status should be 0.

Table 4 Mechanical Troubleshooting of High Idle Regen Initiated via DDDL 7.0

SPN 3242/FMI 2

This diagnostic condition is typically DOC Inlet Temperature Sensor Plausibility Error.

CHECK FOR TEMPERATURE SENSOR PLAUSIBILITY ERROR

Check as follows:

1. Disconnect DOC Inlet Temperature Sensor and inspect connector for damaged, bent, spread, or corroded pins. If the temperature sensor connector is OK, the connections upstream to the MCM (ATD harness 10–pin connector pin 6, 31–pin VIH connector pin 18 and the 120–pin MCM connector pin 89) must also be checked. See Figure 1.

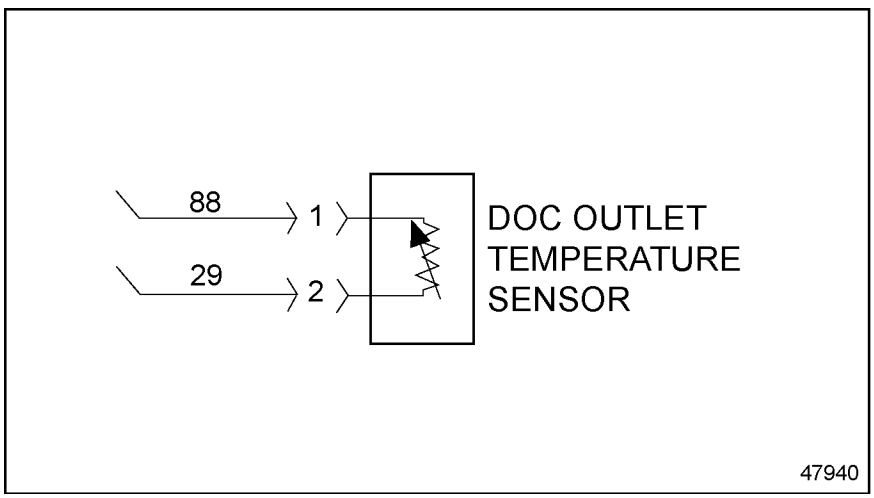

Figure 1 DOC Outlet Temperature Sensor

[a] If damage is found, repair connector(s) as necessary. Verify repairs.

[b] If OK, replace DOC Inlet Temperature Sensor. Verify repairs.

SPN 3246/FMI 14

This diagnostic condition is typically Abnormal DPF Temperature Rise.

CHECK FOR ABNORMAL DPF TEMPERATURE RISE

Check as follows:

1. Turn ignition ON (key ON, engine OFF).
2. Monitor DPF Inlet and DPF Outlet Temperature.
   [a] If the DPF Outlet Temperature 400°C (750°F) is greater than DOC Outlet Temperature, go to step 3.
   [b] If the DPF Outlet Temperature 400°C (750°F) is less than DOC Outlet Temperature, go to step 5.
3. Turn ignition OFF.
4. Disconnect DPF Outlet Temperature Sensor and inspect connector for damaged, bent, spread, or corroded pins. If the temperature sensor connector is OK, the connections upstream to the MCM (ATD harness 10–pin connector pin 7, 31–pin VIH connector pin 19, and the 120–pin MCM connector pin 115) must also be checked, see Figure 2.

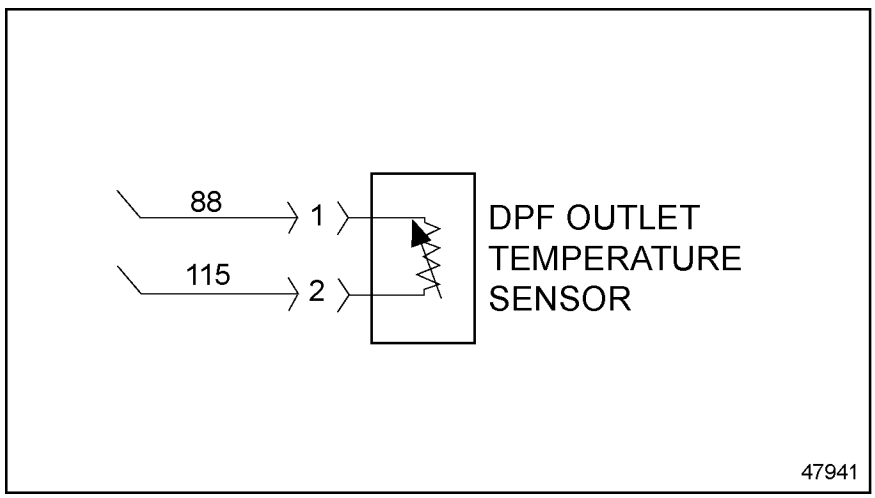

Figure 2 DPF Outlet Temperature Sensor

   [a] If found, repair connector as necessary. Verify repairs.
   [b] If OK, replace DPF Outlet Temperature Sensor. Verify repairs.
5. Remove Aftertreatment Device.

6. Inspect face of the removed DOC substrate for contamination.
   [a] If coolant contamination is found (white residue on inlet of ATD pipe or sweet smell from exhaust), go to step 7.
   [b] If oil contamination is found (oil residue on inlet of ATD pipe), go to step 10.
   [c] If fuel contamination is found (inlet pipe to ATD washed clean), go to step 12.
   [d] If soot contamination is found, go to step 14.
7. Question operator about coolant usage.
8. Visually inspect coolant reservoir for a low level. Possible causes for coolant contamination in Aftertreatment system are:
   - □ EGR Cooler
   - □ Failed/defective cylinder head gasket, improper head bolt torque, low liner height
   - □ Failed air compressor cylinder head
   - □ Failed fuel cooler (HDEP)
   - □ Fuel doser cracked body, missing or failed seals
9. Repair the cause of coolant entry as necessary, go to step 17.
10. Question operator about excessive oil consumption. Possible causes of excessive oil consumption are:
    - □ Excessive idle time
    - □ Defective turbine wheel seal
    - □ Turbo bearing failure
    - □ Worn exhaust valve seals
    - □ Defective crankcase breather system
    - □ Stuck rings
11. Repair the cause of oil contamination, go to step 17.
12. Inspect for source of fuel contamination. Possible cause of fuel contamination are:
    - □ Cylinder head not drained when performing injector replacement (if code sets right after injector replacement this is the most likely cause)
    - □ Injector tip failure (perform injector balance test)
    - □ Injector circuit failure
    - □ Fuel Doser Valve stuck open
    - □ Use of non-recommended fuels and/or additives

13. Repair cause of fuel contamination, go to step 17.
14. Inspect for source of soot loading. Possible causes are:
    - □ Charge Air Cooler and associated piping
    - □ EGR valve stuck open
    - □ Turbo actuator (Perform nozzle sweep test.)
    - □ Damaged turbo blades/vanes
15. Repair cause of soot contamination, go to step 17.
16. Replace DPF filter and re-install ATD, go to step 17.

NOTE:
If step 8 fails (No Temperature Rise), replace the DOC. If DOC is replaced, send in a fuel sample.

CAUTION:

EXHAUST FUMES

To avoid injury or injury to bystanders from fumes, engine or vehicle fuel system service operations should be performed in a well ventilated area.

17. Perform parked regeneration.

SPN 3609/FMI 3

This diagnostic condition is typically DPF Inlet Pressure Sensor circuit failed high.

CHECK FOR CIRCUIT FAILED HIGH

Check as follows:

1. Turn ignition ON (key ON, engine OFF)
2. Check for multiple codes.
   [a] If 3609/3 and 3610/3, are present, go to step 3.
   [b] If only 3609/3 is present, go to step 5.
3. Disconnect the DPF Inlet Pressure Sensor.
4. Measure the voltage between pin 1 of the DPF Inlet Pressure Sensor and ground (battery ground lug by starter).
   [a] If the voltage is present, repair the short to power between pin 114 of the 120–pin MCM connector and the DPF Inlet and DPF Outlet pressure sensors. Verify repairs.
   [b] If no voltage is present on pin 1 of the DPF Inlet Pressure Sensor, repair the open between pin 114 of the 120–pin MCM connector and DPF Inlet, pin 1 and DPF Outlet, pin 1 pressure sensors. Verify repairs.
5. Disconnect DPF Inlet Pressure Sensor connector. See Figure 3.

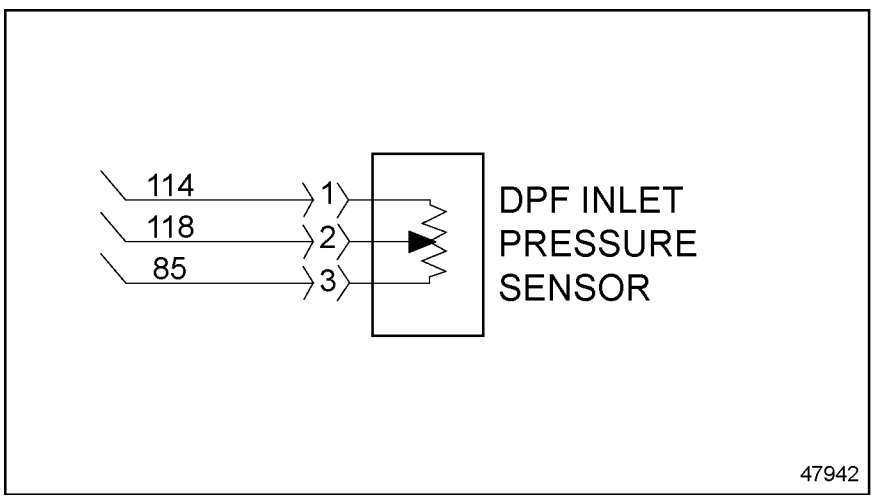

Figure 3 DPF Inlet Pressure Sensor

6. Turn the ignition switch to the OFF position.
7. Disconnect the 120-pin MCM connector.
8. Measure the resistance across pins 2 and 3 of the DPF Inlet Pressure Sensor connector.
   [a] If the resistance is less than 5 Ω, repair the short between the 120–pin MCM connector wires 85 and 118. Verify repairs.
   [b] If the resistance is greater than 5 Ω, repair short to power on circuit between the 120–pin MCM connector pin 118 and the DPF Inlet Pressure Sensor connector pin 2. Verify repairs.

SPN 3610/FMI 3

This diagnostic condition is typically DPF Outlet Pressure Sensor circuit failed high.

CHECK FOR CIRCUIT FAILED HIGH

Check as follows:

1. Turn ignition ON (key ON, engine OFF).
2. Check for multiple codes.
   [a] If 3610/3 and 3609/3 are present, go to step 3.
   [b] If only 3610/3 is present, go to step 5.
3. Disconnect the DPF Outlet Pressure Sensor.
4. Measure the voltage between pin 1 of the DPF Outlet Pressure Sensor and ground (battery ground lug by starter).
   [a] If the voltage is greater than 2.75 volts, repair the short to power between pin 114 of the 120–pin MCM connector and the DPF Inlet and DPF Outlet pressure sensors. Verify repairs.
   [b] If no voltage is present on pin 1 of the DPF Outlet Pressure Sensor, repair the open between pin 114 of the 120–pin MCM connector and DPF Inlet and DPF Outlet pressure sensors. Verify repairs.
5. Disconnect DPF Outlet Pressure Sensor connector. See Figure 4.

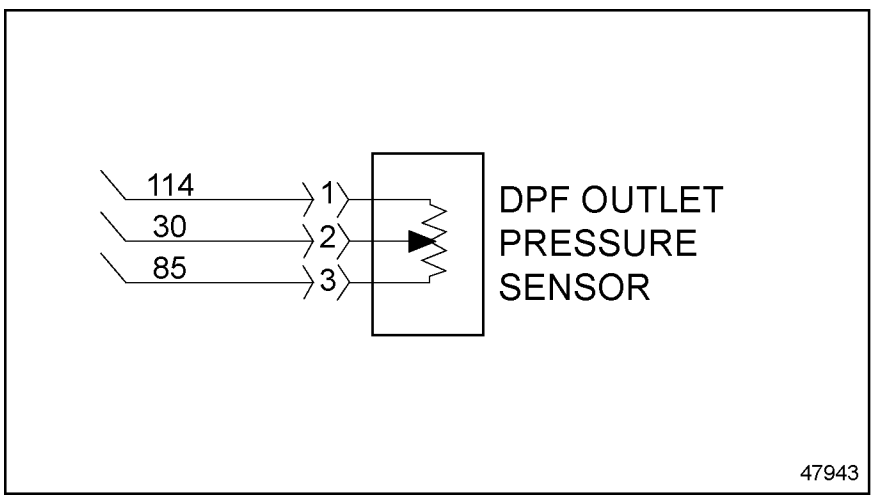

Figure 4 DPF Outlet Pressure Sensor

6. Turn the ignition switch to the OFF position.
7. Disconnect the 120–pin MCM connector.
8. Measure the resistance across pins 2 and 3 of the DPF Outlet Pressure Sensor connector.
   [a] If the resistance is less than 5 Ω, repair the short between the 120–pin MCM connector wires 30 and 85. Verify repairs.
   [b] If the resistance is greater than 5 Ω, repair short to power on circuit between the 120–pin MCM connector pin 30 and the DPF Outlet Pressure Sensor connector pin 2. Verify repairs.

ADDITIONAL SERVICE INFORMATION

Additional service information is available in the Detroit Diesel *ATS Technician's Guide,* 7SE63. The next revision to this manual will be in July 2007.

DETROIT DIESEL
CORPORATION

13400 Outer Drive, West / Detroit, Michigan 48239-4001
Telephone: 313-592-5000
www.detroitdiesel.com