



## Mack Low Oil Pressure Diagnostic Process For 11 Liter Engines



> Internal Content

### If diagnosis is initiated due to a customer report of low oil pressure:

If the unit is not actively coding for low oil pressure, nor any inactive codes in the history: release the unit and no further diagnostics should take place.

### If the codes described above or others related to low oil pressure are present:

Please follow the diagnostic process for further fault tracing [here](#).

- While completing the steps on the spreadsheet, please note: Part numbers listed must be at the level listed or newer.

#### Tags

[p25ae00](#)

[spn 100 fmi 15](#)

[spn 100 fmi 17](#)

[mid 128 pid 100 fmi 1](#)

[low oil pressure](#)

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## 11 Liter Low Oil Pressure Diagnostic Process

**This checklist / process supersedes all previous documents / FSBs / CBRs for D11/MP7 Low oil pressure issues**

- 1) For all chassis with a build date of September 19, 2013 or prior, verify that the wiring harness is free from oil wicking (check connector at the oil level/temperature sensor). Ensure oil level/temp sensor connector is newer solid pin style. Refer to FSB 284-047 for further detail.
- 2) Follow Guided Diagnostic and/or verify continuity of the wiring harness between the oil pressure sensor and the Engine ECU, look for connector pins that may have corrosion or a pin pushed out and correct as needed.
- 3) Verify that the main oil pressure sensor is reading correctly, this requires taking oil pressure readings with a manual gauge at idle, 1100, 1200, 1300 and 1450 rpm, the following table shows the **minimum** readings and are with oil at operating temperature (at least 200 F). If possible, use a T-fitting so that you can also read the dashboard pressure and verify these correspond. If all the readings fall at/near the minimum pressures, consider the oil system to be performing below expected ranges and perform the steps in the following sections.

RPM	Oil pressure <i>minimum</i> (psi)
650 (idle)	15
1100	34
1200	37
1300	40
1450 (and above)	45

**Chronic low oil pressure (Main gallery and PCJ) can be caused by the following:**

- High oil temperature
- Fuel dilution of the engine oil
- CCV spinner oil jet missing (brass orifice) - figure 2
- Brake control valve O-rings leaking (mounted on the tube between the control valve and rocker shaft)
- Brake control valve with leaking or missing sealing plug - figure 3
- Plugs at ends of rocker shaft missing or leaking
- Rocker arm shaft not torqued to spec
- Broken/Loose Rocker Arm shaft bolts
- Missing camshaft bearings
- Oil jet(s) in the injector rocker arm(s) missing (these are staked in, and if loose, are OK)
- Oil pickup and delivery O-rings missing or mis-installed
- O-rings for the valve housing passages missing - figure 4
- Oil pressure reduction valve weak spring and/or missing seal (located in the valve housing in oil pan)
- Oil pump wear / damage
- Oil reduction valve (under 2 bolt cover in the oil filter housing)
- Faulty oil level / temperature sensor

## 11 Liter Low Oil Pressure Diagnostic Process

### Screening Checklist (must be completed before a visit by CSE)

	Miles on engine:
	Faults logged (active/inactive)
Unplug front pressure sensor on oil filter housing, note what code logged:	
Unplug rear pressure sensor on oil filter housing, note what code logged:	

**See Figure 1 for sensor identification**

Procedure / Step	Comments
<b>Emissions level &amp; Software verification</b>	
Verify engine SW is current, if not, update EMS SW, clear codes and verify	This step is critical for US14 and older emissions levels
<b>Engine mechanical checks</b>	
At startup (cold engine) - read oil pan temp w/ infrared heat gun	Aim heat gun at lower sump, should be within ~10 C (18F) of cluster reading
Warm engine (prefer reading after full-load pull, but after reaching operating temp acceptable) - read oil pan temp w/infrared heat gun	Aim heat gun at lower sump, should be within ~10 C (18F) of cluster reading
Main gallery pressure sensor check with manual gauge	Manual gauge should correspond w/ PTT reading of main oil pressure (within 2-3 psi acceptable)
PCJ pressure sensor check with manual gauge (M16 x 1.5 threaded plug, to right and above the CCV) – applicable for low PCJ oil pressure issues	Manual gauge can be up to 15 psi lower than main oil pressure (can wait for CSE to be present)
PCJ & Main gallery oil pressure sensor PN check	If the current oil pressure sensors are brass colored, not stainless steel, install <b>kit # 85144398</b> (includes 2 sensors & 2 pigtails)
Verify that no aftermarket oil filtration systems installed	If an aftermarket system is installed, temporarily remove/disconnect and verify oil pressure
Does the CCV rotor spin?	see figure 2: Prior to check, inspect draft tube, no need for inspection if there are no signs of excess oil discharge from the tube
<b>Top end mechanical checks (valve cover removed)</b>	
Rocker shaft torqued to spec?	
All cam bearings in place?	
Plugs at rocker shaft end in place and tight (no evidence of leakage)	
Oil jets in injector rockers in place? (staked in, OK if loose)	
Engine brake control valve seal in place (base of control valve)	
Engine brake control valve to rocker arm shaft seals (2 seals)	
Engine Brake control valve oil plug in place	see figure 3
<b>Bottom end checks (oil pan removed)</b>	
Suction pipe O-ring in place (at pump inlet)	see figure 4
Pressure pipe O-rings in place (at pump outlet & inlet to valve hsg)	see figure 4

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Valve housing O-rings in place (3) - MUST REMOVE VALVE HOUSING TO VERIFY THIS	see figure 4
Verify all fasteners present in oil pump housing and no evidence of damage	
Oil level/temperature sensor PN	Should be <b>PN 22807993</b> or higher
Lilac valve PN and mileage at install	Should be <b>PN 22416685</b> or higher

If requested - Take oil sample (4 oz. minimum) and send to Volvo GTT, Hagerstown MD. Reference e-service case #, VIN, mileage of the oil sample and odometer mileage. Shipping instructions will be given at the time of the request.

Figure 1: Sensor locations and "blue" reduction valve location

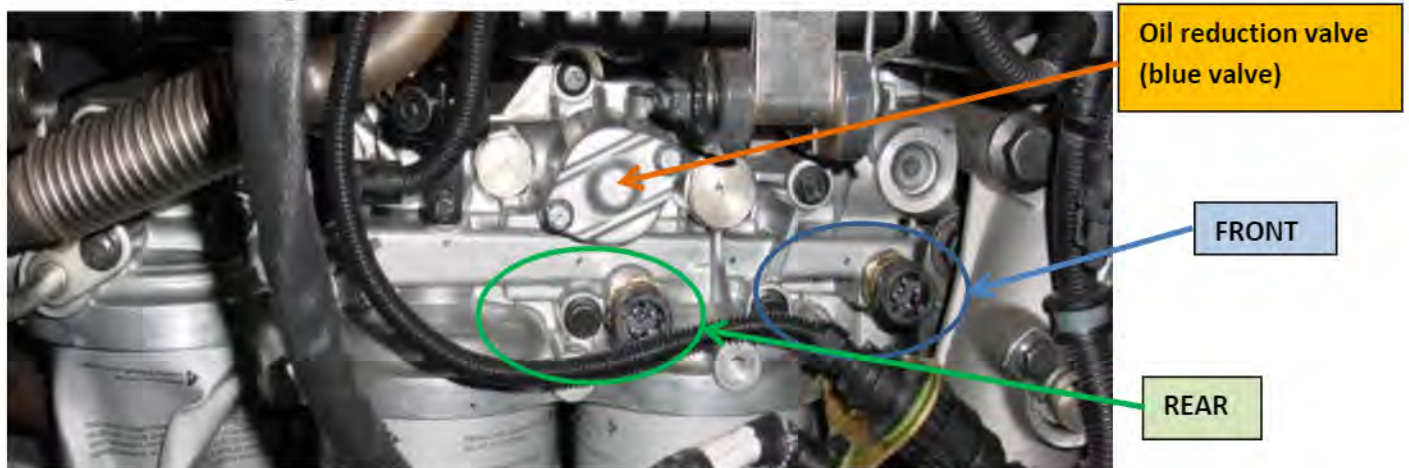


Figure 2: Procedure for checking for rotation of the CCV

**Test instruction**

**Purpose**

Check the separator

**Action**

- 1 Remove the crankcase ventilation pipes
- 2 Start the engine
- 3 Put the sensor in the indentation on the separator
- 4 Set the multimeter to measure Hz
- 5 Connect measurement tools according to illustration

**Evaluation**

- The sensor should register if the turbine that drives the separator membranes rotates
- When measuring the rotations multiply the value in Hz by 60 to get rpm
- Normal separator speed at idle is at least 5000 rpm

Are the conditions fulfilled?

No

Yes

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Figure 3: VCB oil plug and seal locations



Figure 4: Bottom end checks / o-ring locations / "Lilac" reduction valve location

