

LUBRICATING OIL DILUTION IN LISTER ENGINES

Introduction

The range of Lister engines including LD, SL, LR, SR, HSR, ST, HA, HB, HR & their water-cooled variants all have the fuel equipment contained within the engine.

Any leakage on this equipment will result in the lubricating oil being contaminated by fuel oil causing increasing levels in the engine - possibly with serious consequences.

Although it was generally accepted that the engines would survive running with 65% dilution, the possible result of this could be that the crankshaft would dip into the increased level of oil causing excessive crankcase pressures, erratic running, stalling on tick-over and, in extreme cases, possibility of the engine running on its own lubricating oil and becoming uncontrollable.

There are three main areas where leakage can occur:

- 1 Low pressure feed sources
- 2 High pressure sources
- 3 Low pressure leak-off sources

Section 1 - Low pressure feed sources

- 1:1 Leak on fuel pump diaphragm
- 1:2 Damage to fuel feed rail
- 1:3 Leaking dowty washer between fuel feed rail and fuel injection pump
- 1:4 Leaking bleed valve on fuel injection pump
- 1:5 Loose element securing screw at rear of injection pump

Section 2 - High pressure sources

- 2:1 Worn fuel pump element - in bad cases manifested by fuel spraying from pump rack
- 2:2 Loose delivery valve holder
- 2:3 Damaged delivery valve holder seal
- 2:4 Loose or damaged injector pipe union to top of injector pump
- 2:5 Fractured injector feed pipe
- 2:6 Loose or damaged injector pipe union to injector
- 2:7 Loose or damaged union on injector
- 2:8 Cracked injector body
- 2:9 Leakage from injector nozzle cap nut

Section 3 - Low pressure leak-off sources

- 3:1 Injector cap nut
- 3:2 Loose or damaged leak-off union on injector
- 3:3 Loose or damaged cap nut or nipple on spill rail assembly - often caused by over-tightening
- 3:4 Fractured or damaged pipe on spill rail assembly - also includes automatic bleed pipe extension to fuel injection pump & associated union (if fitted)

Section 4 - Recommended Investigation Procedure to determine source of leakage

All the above can usually be diagnosed as follows, with the exception of the lift pump - this is covered under section 5.

- 4:1 Reduce level of oil to mark on dipstick
- 4:2 Remove air ducting, cylinder head covers and fuel pump housing door.
- 4:3 Check that fuel pumps are correctly tightened down - do not tighten fuel unions at this stage.
- 4:4 Observe whether any fuel pipes are being chaffed by pushrods etc - bend to provide adequate clearance if necessary.
- 4:5 Locate & disconnect oil feed pipe from crankcase to valve rocker pedestals. This is located within the fuel pump housing and comprises a single small pipe connecting to a tee-piece.
Place a piece of flexible tubing c. 1/8" ID over this pipe and redirect through convenient hole back into crankcase.
- 4:6 Thoroughly dry with tissue or cloth all potential sources of leakage as detailed above.
- 4:7 Operate fuel lift pump by hand & inspect all sources covered in Section 1.
- 4:8 Start engine & inspect all potential sources.

Section 5 - Fuel Lift Pump

- 5:1 Remove pump from engine
- 5:2 Plug outlet from pump (usually 1/2"unf)
- 5:3 Connect inlet to pipe & container providing fuel at pressure - c. 3ft head should be sufficient
- 5:4 Leave for sufficient period to determine whether leakage is apparent.

Section 6 - Rectification Procedures

In most cases the cure will be obvious, i.e. tightening, repair or replacement of part at point of leakage. However, the following comments should be noted:

- 6:1 Do not assume that leakage will only come from one source - check all points as above.
- 6:2 Looseness of parts or abrasion will often give guidance to possible sources.
- 6:3 If delivery valve holder is loose (2:2), do not just tighten as this can introduce a 'twist' to the injector pipe.
Disconnect injector pipe from Injector and loosen union to fuel pump.
Tighten delivery valve holder - 35 ft.lb
Align fuel pipe to injector & tighten to delivery valve holder - use two spanners to avoid applying torque to pump.
Check alignment again and reconnect fuel pipe to injector.
If this does not cure leakage between holder & pump, assume damage to sealing washer. This will require specialist attention - also applies to 2:1
- 6:4 When faults are located and rectified, reassemble engine using new joints etc if required, pump out contaminated oil & replenish with fresh oil of the correct grade & viscosity.

**BEWARE OF OVER TIGHTENING !
THIS CAN INTRODUCE FURTHER PROBLEMS**

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