

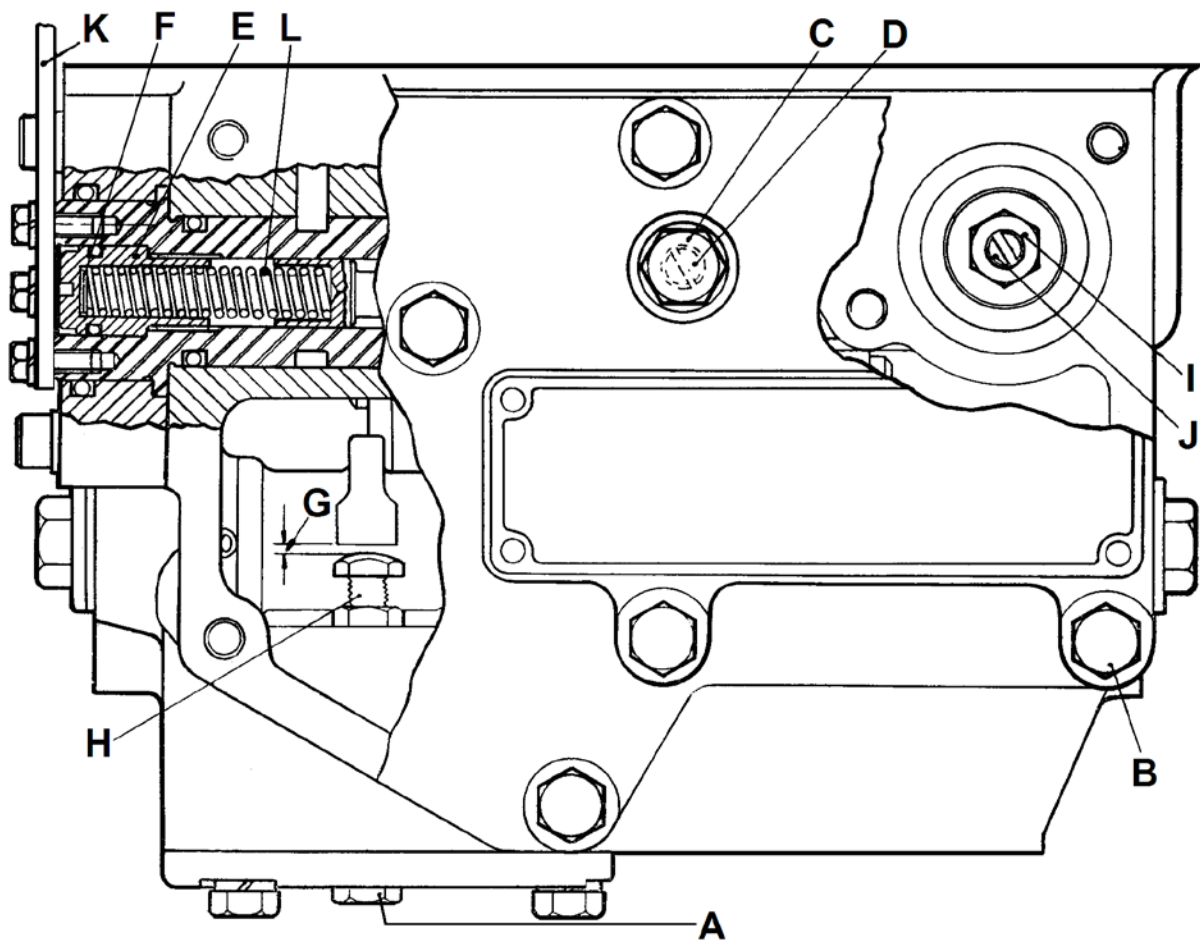
# LH150 Hydraulic Gearbox – Oil Pressure Setting

## Special Features

Hydraulic pressure is used only to obtain “neutral” and “astern” positions.

There is no high oil pressure in the ahead position and therefore the power loss in this position is small. If the hydraulic system fails the clutch remains engaged in the ahead position. The propeller shaft remains engaged with the crankshaft until the engine is started when it disengages instantly if the control is in neutral. If it is decided to free the ahead clutch with the engine stopped, as for example, for lining up the engine coupling during installation, the screw “A” is removed, replaced by screw “B” and screwed carefully until the clutch just disengages and no more.

The screws must be replaced before starting the engine.



## Oil Pressure

Remove screw “A” and connect, with copper pipe having a bore of 1/16” (1.5mm) a 400psi (28kg per sq.cm.) pressure gauge.

- 1 Place control lever in neutral and run engine at about 600/800 rpm. The oil pressure should be about 250psi (17.5kg per sq.cm.)
- 2 Remove plug “C”, remove screw “D” which is under plug “C” and replace plug. Set control lever in astern position and run engine at about 600/800 rpm (propeller will not turn). The oil pressure should be about 320psi (22.5kg per sq.cm.). Replace screw and plug in original position after testing.

If pressure (2) is not correct within 10psi (0.7kg per sq.cm.) it must be adjusted by removing the relief valve adjusting plug "E" (which is under a seal behind the control lever "K") and inserting or removing shims "F" from under the spring "L". Before making any final adjustments ensure that the correct oil is used and that it is up to working temperature.

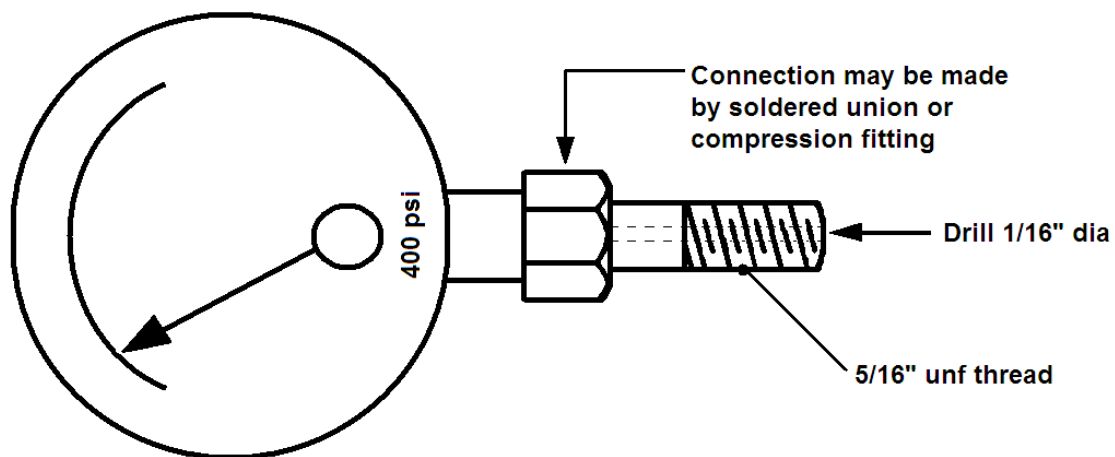
In the absence of any pressure reading please see comments below regarding possible causes.

### Comments

The foregoing are the instructions for setting the oil pressure on the gearbox as detailed in the Lister manual for SR/HSR engines.

However, a pressure gauge is not always available for the operation and even if it is, as the gearboxes age and pumps wear, it is sometimes necessary to make adjustments "by feel" rather than "by the book".

A suitable gauge fitted to a 5/16" diameter stub, drilled 1/16" & threaded 5/16"unf is most suitable for checking pressure as this can be screwed directly into the tapped hole following removal of screw "A".



### Common Faults and remedies

One of the problems associated with these boxes is that the forward cone tends to "stick" either because of wear, mechanical problems or insufficient oil pressure to extract.

#### Mechanical problems – including wear of the clutch lining.

Generally these can only be dealt with by replacement of parts or tightening up the assembly. Problems can be identified by attempting to disengage the clutch using the method shown involving screws "A" & "B" above although it is important that screw "B" is not overtightened since damage to the cover or the piston itself can result. During this operation any longitudinal movement of the clutch body & mainshaft should be noted because this could be caused by the nut holding the reduction box top pinion (or coupling in direct drive boxes) being insufficiently tightened. This will result in there being insufficient movement from the extraction piston to complete the operation.

## **Insufficient oil pressure**

This can be caused by any of the following

- 1 Oil pump drive gear slipping on the drive member – in the case of air-cooled engines the drive spigot can be observed by viewing through the ventilated flywheel housing adaptor. The spigot must be securely located in the slot in the oil pump drive gear.
- 2 Wear in the oil pump or other internal mechanical deterioration.
- 3 Leakage at the top of transfer pipe from pump to casing – damaged s/u plug or washers. The original plug fitted was made of brass and tends to distort if over-tightened. More recently the material was changed to steel which is preferable (pt.no 201-15400).
- 4 Leakage in the control valve due to wear or damaged oil seals (O rings)
- 5 Leakage at the pressure relief valve facing – damage or wear.
- 6 Insufficient spring pressure on pressure relief valve.
- 7 Leakage at the extraction piston due to broken or damaged rings.
- 8 Leakage across the top cover gasket.

Of the above, items 3 and 6 are the most common although there are instances of item 1 which can generally be cured by machining up a spacer washer to ensure that the spigot on the drive member remains securely located in the slot of the pump driving gear. In extreme cases it is possible to fit a new drive spigot and cut a second drive slot in the driving gear at 180deg to the existing one.

With regard to item 2, oil pump wear/leakage, there was an alternative pump fitted to some gearboxes which is more akin to a vehicle engine “lobe type” and these tend to suffer more from wear than the conventional gear type. If this is the case and the pump is faulty, replacement of the complete unit with the conventional type will be necessary.

**No oil pressure** – indicated by complete absence of all gearbox functions. In the event of the pump shaft being broken, usually caused by incorrect refitting of the gearbox, there will be a total absence of oil pressure and rebuild or replacement will be required. However, this can also be caused by slipping of drive gear as detailed in item 1 or failure of s/u plug (item 3).

All of these faults will require removal of the gearbox from the engine for remedial action.

If the engine stalls when reverse is engaged, this is an indication that the oil pressure is sufficient to engage the reverse band but insufficient for extraction of the forward cone resulting in both “ahead” & “astern” being engaged at the same time. Assuming that all settings have been checked and adjusted and all mechanical defects dealt with, an attempt can be made to overcome this by increasing the extraction pressure.

This may be done by introducing extra shims “F” under spring “L”, about .010” (0.25mm) at a time & running the engine to determine whether the cone extracts. Ideally, if available, a pressure gauge should be connected as detailed above since this pressure should not be increased beyond c.300/315psi (21/22kg per sq.cm.). If the cone still remains engaged then replacement of parts involving gearbox dismantling should be contemplated.

**NB Important** - increasing the pressure at which the relief valve opens beyond a certain point will restrict flow to the reverse band cylinder and hinder or stop its operation.

**Peter Thompson**

**Marine Engine Services Ltd, Unit 3 / 549 Eskdale Road, Uxbridge, Middlesex UB8 2RT  
Tel : 01895-236246. Fax : 01895-813322. e-mail : Peter@marineengine.co.uk**