SERVICE MANUAL

LOADALL (ROUGH TERRAIN
VARIABLE REACH TRUCK)
527-58 T4F

EN - 9813/7550 - ISSUE 1 - 04/2018

This manual contains original instructions, verified by the manufacturer (or their authorized representative).

Foreword

The Operator's Manual

⚠

You and others can be killed or seriously injured if you operate or maintain the machine without first studying the Operator's Manual. You must understand and follow the instructions in the Operator's Manual. If you do not understand anything, ask your employer or JCB dealer to explain it.

Do not operate the machine without an Operator's Manual, or if there is anything on the machine you do not understand.

Treat the Operator's Manual as part of the machine. Keep it clean and in good condition. Replace the Operator's Manual immediately if it is lost, damaged or becomes unreadable.

Contents

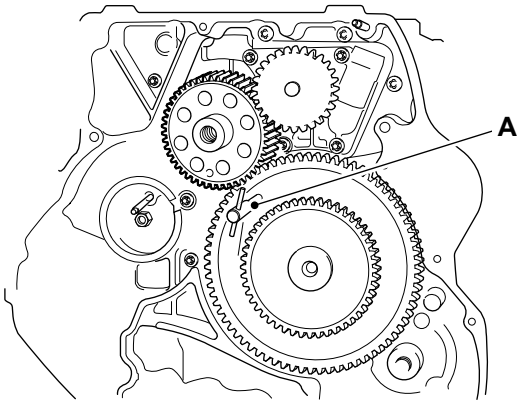
21 - Tappet

Remove and Install

Before Removal

1. Drain the oil from the engine.
2. Disconnect and remove the fuel pipes from the injectors. Refer to (PIL 18-96).
3. Remove the rocker cover. Refer to (PIL 15-42).
4. Remove the fuel injection pump. Refer to (PIL 18-18).
5. Remove the rocker assembly and push rods. Refer to (PIL 15-42).
6. Remove the starter motor. Refer to (PIL 15-75).
7. Remove the oil sump. Refer to (PIL 15-45).
8. Remove the flywheel. Refer to (PIL 15-54).
9. Remove the flywheel housing. Refer to (PIL 15-54).
10. Rotate the crankshaft until the camshaft timing pin can be inserted through the gear and into the aligning hole in the rear gear case.

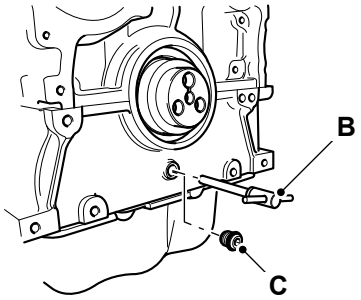
Figure 216.



A Timing pin - camshaft

11. Remove the taper blanking plug and insert the crankshaft locking pin. The camshaft and crankshaft locking pins must be in position to lock the crankshaft and camshaft before removing the camshaft assembly.

Figure 217.



B Timing pin - crankshaft
C Blanking plug

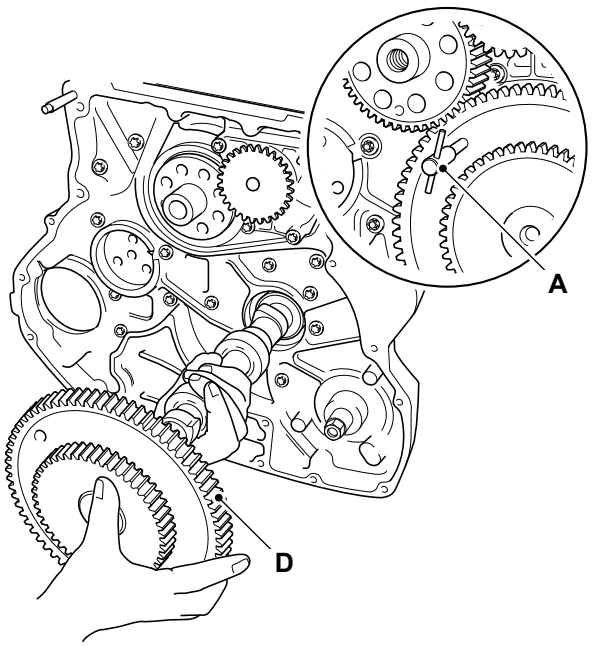
12. Remove the fuel injection pump drive gear. Refer to (PIL 15-51).

Removal

The engine must be inverted. DO NOT attempt to remove the camshaft and its drive gears with the engine upright. The tappets and push rods will fall into the engine and further dismantling will be required to retrieve them.

1. Remove the camshaft timing pin.
2. Carefully withdraw the camshaft and gear assembly from the crankcase. Make sure you fully support the camshaft to prevent the lobes contacting the bearing surfaces in the crankcase. The bearing surfaces can easily be damaged by the sharp hard edges on the cam lobes.

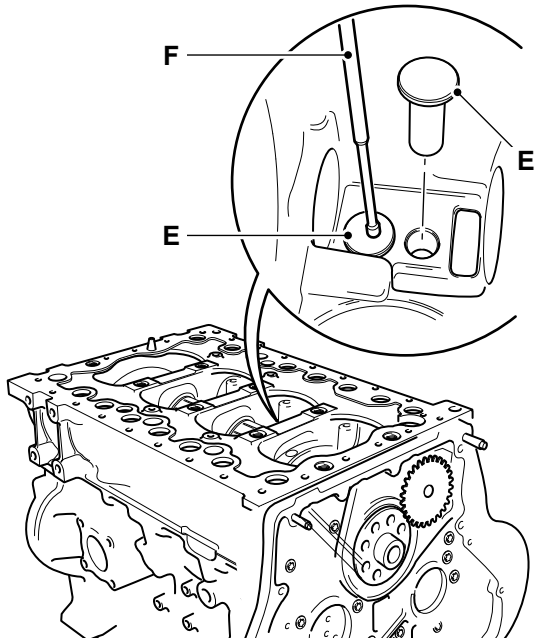
Figure 218.



A Timing pin - camshaft
D Camshaft and drive gear

3. Access the tappets through the apertures in the crankcase bedplate next to the crankshaft. Lift out the tappets from the crankcase using a suitable magnetic probe. Label the tappets to ensure replacement in their original positions.

Figure 219.



E Tappet (8 off)
F Magnetic probe

Inspection

1. Inspect the camshaft gear teeth for signs of damage or excessive wear.
2. Inspect the cam lobes for signs of excessive wear, scoring or pitting.
3. Inspect the cam bearing surfaces for signs of excessive wear, or scoring. Check that the dimensions are within service limits.
4. Inspect the cam bearing surfaces inside the crankcase for signs of excessive wear, or scoring. Check that the dimensions are within service limits.
5. Inspect the bearing surfaces of the tappets for signs of excessive wear or damage. Check that the dimensions are within service limits.
6. Inspect the tappet bores inside the crankcase for signs of excessive wear or damage. Check that the dimensions are within service limits.
7. If any of the camshaft bearings or lobes are worn or damaged then the relative oil feed galleries in the crankcase and camshaft may be blocked. Make sure all oil ways are clear and free from debris.

Installation

1. Lubricate the tappets and tappet bores inside the crankcase with clean engine oil.
2. Insert the tappets in their original positions in the crankcase using a suitable magnetic probe.
3. Lubricate the camshaft bearing journals inside the crankcase with clean engine oil.
4. Carefully insert the camshaft assembly into the crankcase as shown. Support the camshaft preventing the lobes contacting the bearing surfaces in the crankcase. Before meshing the camshaft gear with the crankshaft gear, rotate the camshaft until the timing hole in the gear aligns with the dowel hole in the gear casing. Insert the timing pin to lock the camshaft in this position.

After Installation

1. Note that the fuel injection pump drive gear fixing nut is torque tightened as part of the fuel injection pump replacement procedure. Refer to (PIL 18-18).
2. Do the procedures in Before Removal in reverse order.

24 - Tappet Cover

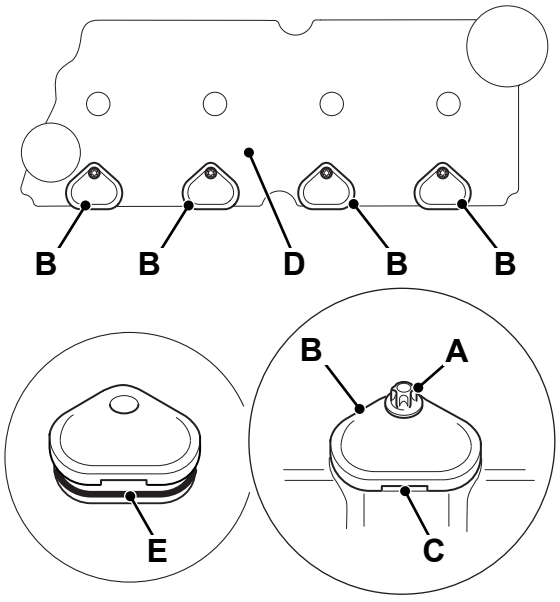
Remove and Install

It is not necessary to remove the tappet covers unless a new rocker cover is to be installed. It is necessary to remove the tappet covers to measure and adjust the valve clearances. Refer to Valve-Adjust, Valve Clearances (PIL 15-30).

Remove

1. Make sure that the engine is safe to work on. If the engine has been running, let it cool before you start the service work.
2. Get access to the engine.
3. Clean the tappet covers and the adjacent areas of the rocker cover. Refer to Engine - Clean. Important: Make sure that the screws do not fall into the engine.
4. Remove the tappet cover screws.
5. Keep the screws away from the engine.
6. Use a screwdriver in the slot to remove the tappet covers. Make sure that dirt or debris does not fall into the engine.

Figure 220.



A Screws
B Tappet covers
C Slot
D Rocker cover
E Tappet cover seals

Install

1. The installation procedure is the opposite of the removal procedure. Additionally do the following steps.
2. Inspect the tappet cover seals for signs of damage. Replace any damaged seals.
3. Install the tappet covers. Tighten the screws to the correct torque value.

Table 82. Torque Values

Item	Nm
A	9

00 - General

Introduction

The lubrication system distributes oil around the engine by a system of galleries and drillings in the crankcase and cylinder head. The oil lubricates and seals the moving parts of the engine, reducing friction and wear. In addition the oil plays an important role in cooling the engine by carrying heat from the engine to the cooler. A piston cooling jet sprays oil onto the underside of the pistons to keep them cool, refer to (PIL 15-36).

Oil is drawn from the oil sump by the integral oil pump via the suction strainer. The strainer prevents any large particles of debris passing through, which may damage the pump.

The oil passes from the outlet side of the pump through a relief valve which limits the maximum oil pressure by venting oil back to the inlet side of the pump, refer to (PIL 15-36).

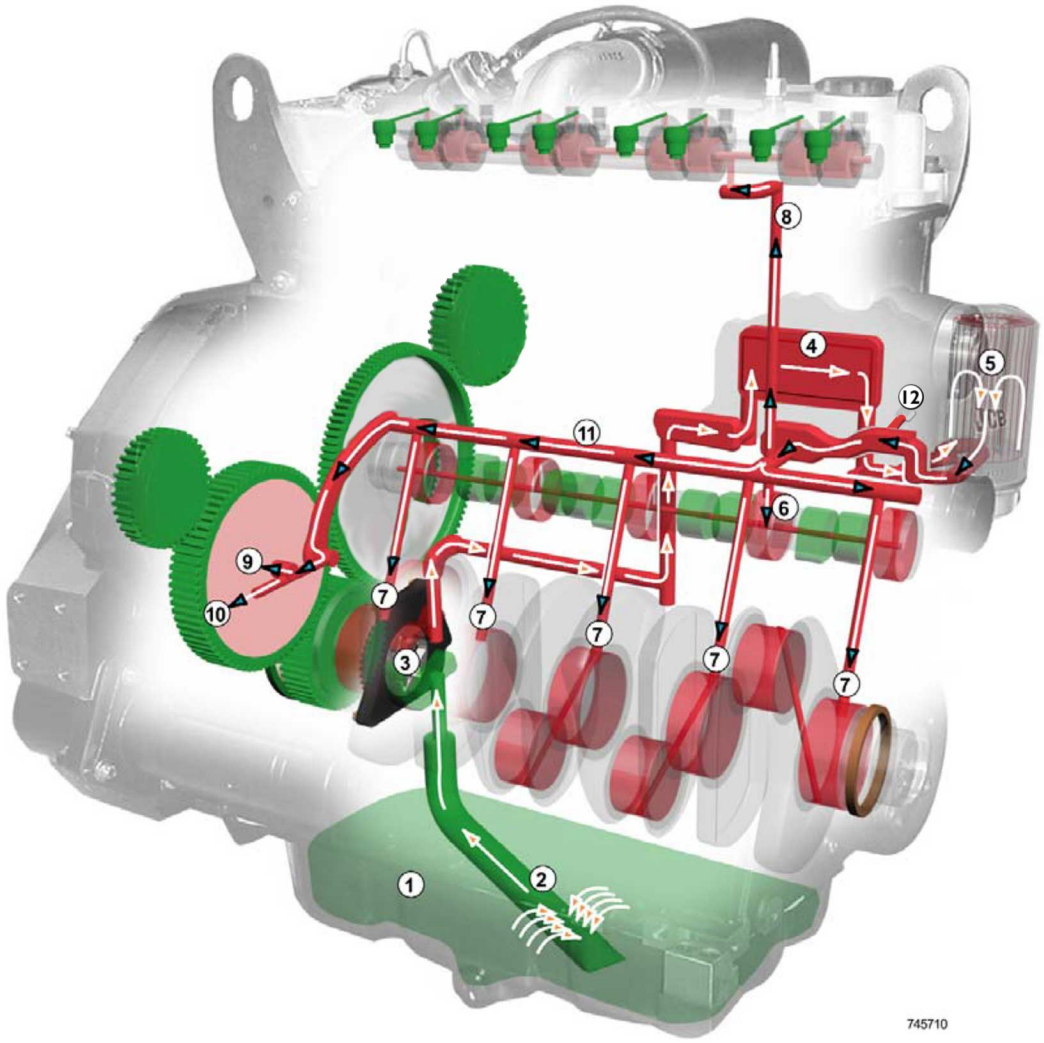
From the pump the oil passes through the oil cooler and filter, refer to (PIL 15-69 and PIL 15-21).

After cooling and filtering, the oil passes into the main oil gallery. An oil pressure switch senses the oil pressure. From the main gallery oil is delivered, via drillings, to the crankshaft main bearings, rocker assembly, camshaft and timing gears. Note that drillings are through the crankcase and cylinder head.

When the high pressure oil has passed through the bearings it reverts to sump pressure and splash lubricates the internal components such as rocker tips, cam lobes and timing gear teeth. Gravity drains the oil via drains into the cylinder head and crankcase, back into the oil sump. A drain slot allows the oil to drain from the timing case back to the oil sump.

Component Identification

Figure 221.



1 Oil sump
2 Suction strainer
3 Oil pump
4 Oil cooler
5 Filter
6 Camshaft - high pressure oil feed
7 Crankshaft main bearings - high pressure oil feed
8 Rocker assembly - high pressure oil feed
9 PTO (Power Take-Off) idler gear bearing/ timing case - high pressure oil feed
10 External high pressure oil feed connection (crankcase) - Turbocharger (if installed)
11 Main high pressure oil feed gallery (crankcase)
Green- Oil at sump pressure
Pink- Oil at lower pressure but higher than sump pressure
12 Oil pressure switch
Red- Oil at high pressure

Remove and Install

Special Tools

Description	Part No.	Qty.
Template for Sealant Oil Sump - Pressed	892/01149	1
Oil Sump Location Dowel	892/01150	2
Template for Sealant Oil Sump (Cast)	892/12354	1

Consumables

Description	Part No.	Size
Clear Silicone Sealant	4102/0901	0.31 L

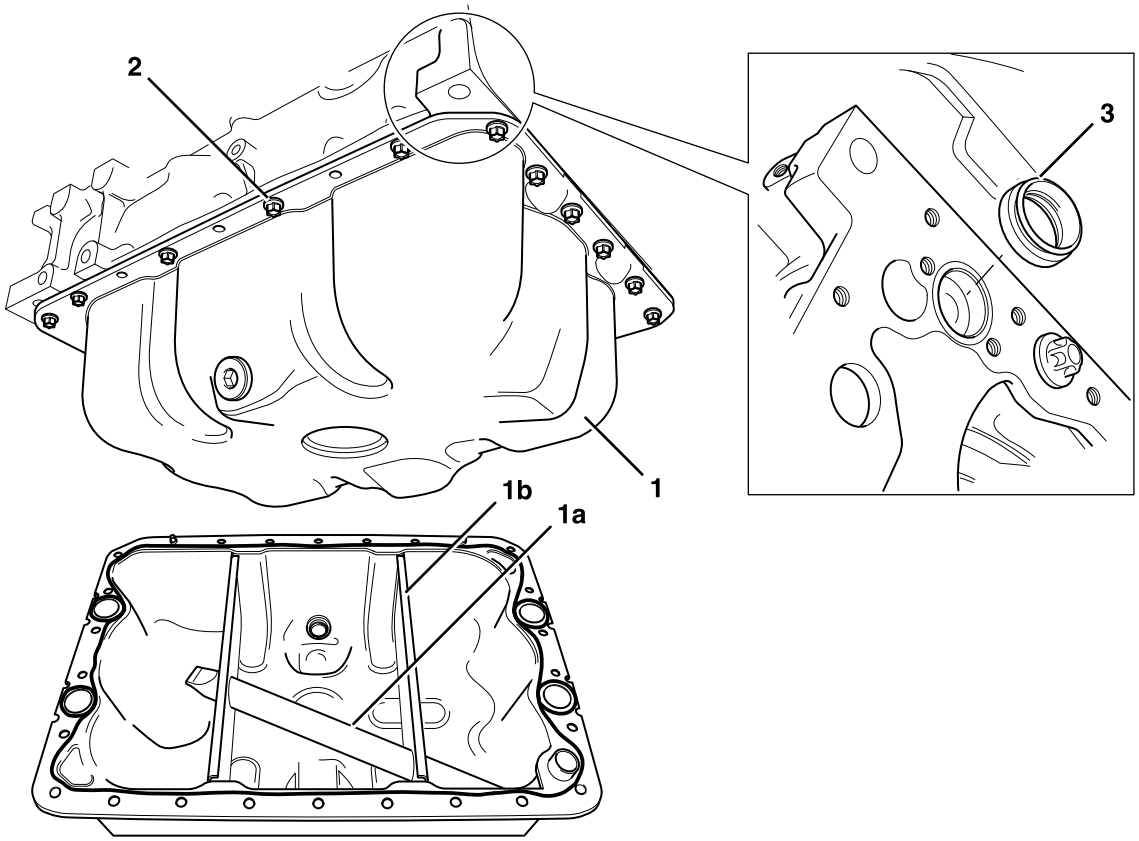
Before Removal

1. Make sure that the engine is safe to work on. If the engine has been running, make sure the engine has cooled sufficiently before you start.
2. Drain the engine oil.

Removal

1. Remove the fixing bolts and remove the oil sump from the engine. The oil sump may be difficult to remove due to adhesion of sealing compound. If necessary, carefully lever the mating flanges apart. Do not use excessive force, the oil sump could be damaged. Be sure to retrieve the oil pick up seal.
2. Use a gasket removal compound, carefully remove all traces of sealing compound from the oil sump and engine mating faces. Do not allow the sealing compound to enter the engine.
3. Use a suitable degreasing agent to thoroughly clean the oil sump.

Figure 222.

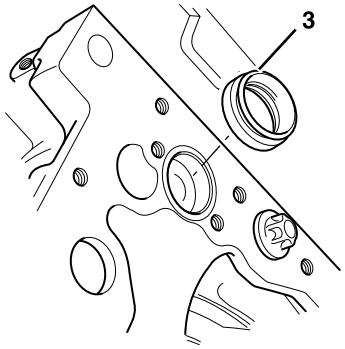


1 Oil sump
1b Integral baffle plates
3 Oil pick up seal
1a Integral suction tube
2 Oil sump fixing bolts (x20)

Installation

1. Lightly smear the new oil pick up seal with oil and install into the bedplate as shown.

Figure 223.



3 Oil pick up seal

2. Install the two guide pins at the oil sump screw holes in the engine.

   Special Tool: Oil Sump Location Dowel (Qty.: 2)

3. Use the fixing bolts to locate the template to the oil sump mating face. Make sure that the template is the correct way round (note that holes are on different centres).

   Special Tool: Template for Sealant Oil Sump (Cast) (Qty.: 1)
   Special Tool: Template for Sealant Oil Sump - Pressed (Qty.: 1)

4. Apply a bead of sealing compound around the oil sump flange using the inside edge of the template as a guide as shown. Note the beads around holes.

   Length/Dimension/Distance: 4 mm
   Consumable: Clear Silicone Sealant

5. Carefully remove the template without smudging the sealant beads.

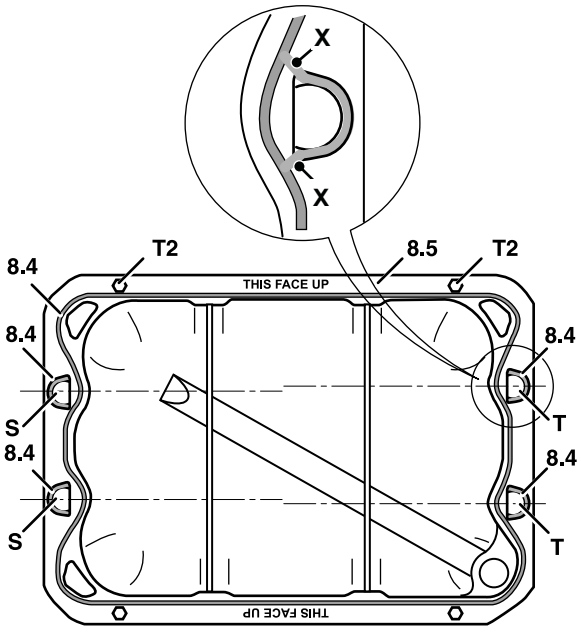
6. Apply a bead of sealant so as to join the sealant beads around holes with the bead around the oil sump flange.

   Length/Dimension/Distance: 4 mm

7. After applying the sealing compound, the oil sump must be installed and the bolts torque tightened within

   Duration: 5 min

Figure 224.



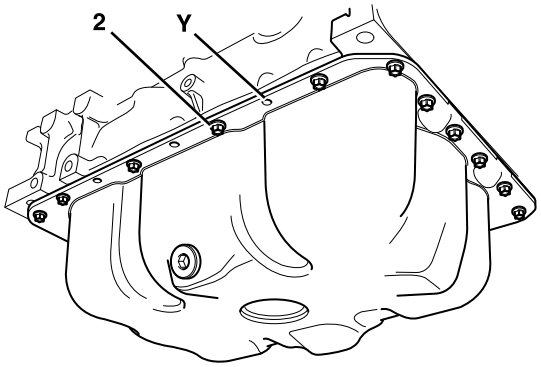
S Hole
T Hole
T2 Guide pins
X 4mm Bead of sealant

8. Position the oil sump with the suction tube outlet aligned with the oil pump inlet port on the engine. Take care not to damage the oil pick up seal when you install the oil sump. Damage to the seal could cause a drop in oil pressure and subsequently damage to the engine.

9. Locate the oil sump on the guide pins on the engine. Avoid smudging the sealant beads. DO NOT remove the guide pins until sufficient bolts have been installed to secure the oil sump.

10. Install the bolts and tighten the bolts to the correct torque value. Note that the bolts are not installed at 6 positions.

Figure 225.



2 Bolts
Y No bolts to be installed at this position (x6)

After Replacing

1. Allow the sealant to cure for

   Duration: 20 min

2. Refill the engine with the recommended engine oil. Refer to (PIL 75-00).

3. Start the engine and check for oil leaks.

Table 83. Torque Values

Item	Nm
2	24

00 - General

Operation

The system aids engine starting by heating the air in the induction manifold through an electrical grid heater. Operation of the system is fully automatic and is controlled by the engine ECU (Electronic Control Unit).

The power to the grid heater is supplied by a primary fuse through the link harness to relay. The relay when energised supplies power to the heater through the power lead.

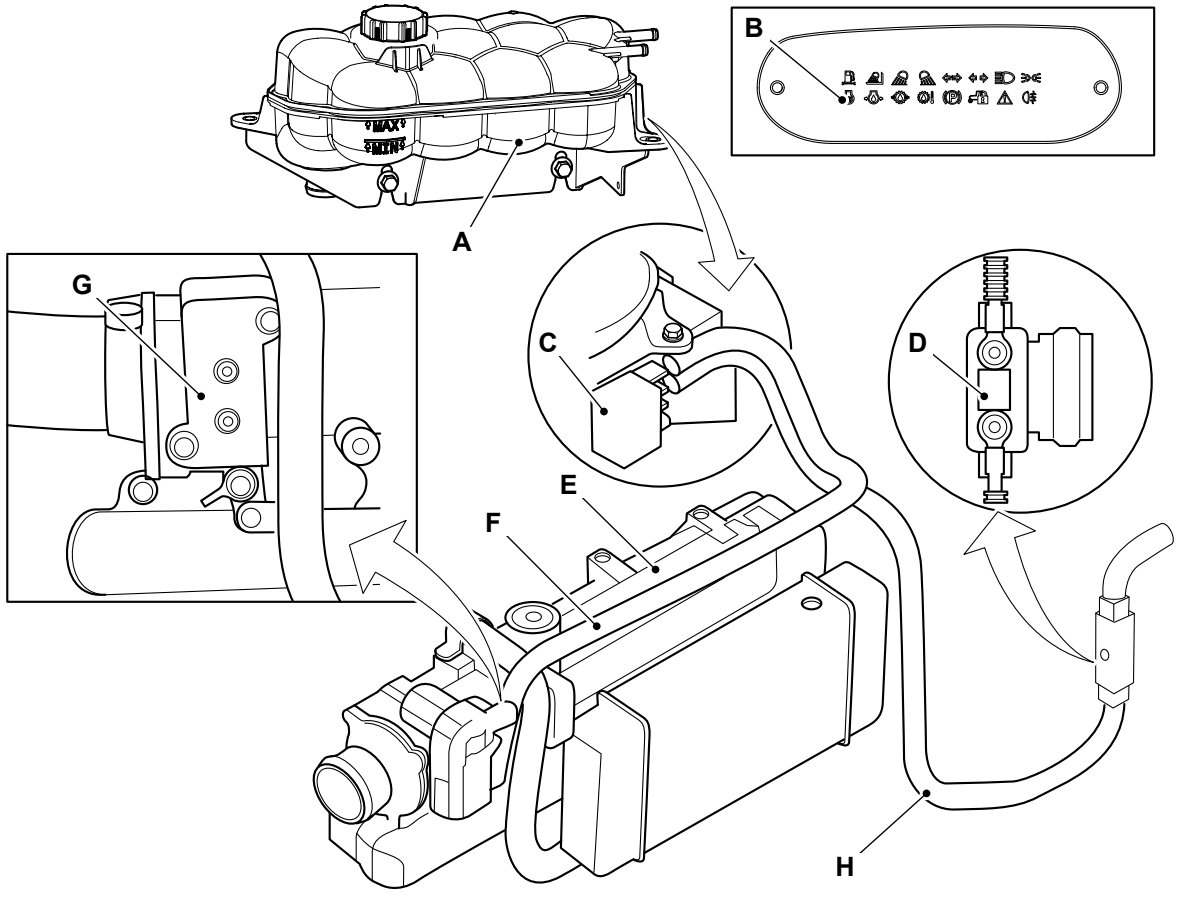
The relay is located at the side of the coolant expansion tank.

The relay is energised by a feed from the engine compartment fusebox, with the engine ECU proving an earth for the relay.

The heating sequence is as follows:

1. Ignition key set to the on position.
2. Warning light illuminated (grid heater on)- engine not ready to start.

Figure 226.



A Coolant expansion tank

B Warning light- grid heater on

C Relay
D Primary fuse
E Induction manifold
F Grid heater
G Heater
H Harness

3. After a preset pre-heat time the warning light will off- engine ready to start.

    3.1. The pre-heat stage can not be repeated unless the ignition key is first set to the off position.

4. Turn the ignition key to engage the starter motor and start the engine- grid heater on.

5. Engine started and starter motor disengaged- grid heater off.

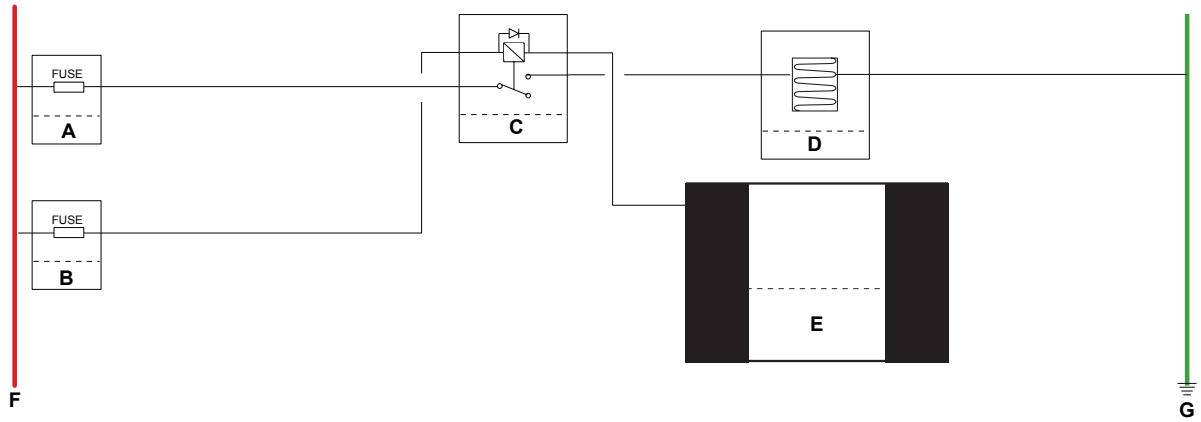
    5.1. If the engine stalls and is restarted without turning the ignition key to off, the grid heater will come on while the starter motor is engaged.

The 'pre-heat' stage can not be repeated unless the ignition key is first set to the off position.

If the engine stalls and is restarted without turning the ignition key to off position, the grid heater will come on while the starter motor is engaged.

Diagram

Figure 227.



A Primary fuse link
B Engine compartment fuse
C Cold start relay
D Grid heater element
E Engine ECU (Electronic Control Unit)
F +VE
G -VE

00 - General

Introduction

The timing gears are located inside a case at the flywheel end of the engine.

The engine must be timed so that the camshaft operates the valves at the correct times relative to the crankshaft position.

Valve timing is achieved by ensuring that the camshaft drive gear is meshed to the crankshaft gear at their correct angular positions, refer to Engine-General, Operation, The Four Stroke Cycle (PIL 15-00) for more information about valve timing.

Component Identification

Figure 228.

A Crankshaft gear
B Camshaft gear
C High pressure fuel pump gear
D Oil pump gear
E Heavy duty PTO device gear (if installed)
F Heavy duty PTO device gear (if installed)
G Low duty PTO device gear (if installed)

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