

# SERVICE MANUAL

LOADALL (ROUGH TERRAIN  
VARIABLE REACH TRUCK)  
**506-23, 509-23, 512-26**

EN - 9813/9400 - ISSUE 1 - 11/2017

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

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## 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.

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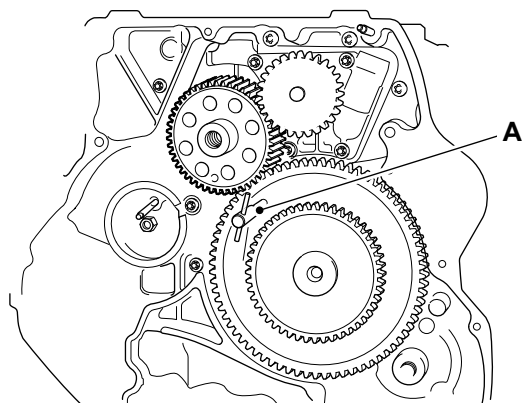
## 21 - Tappet

### 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.

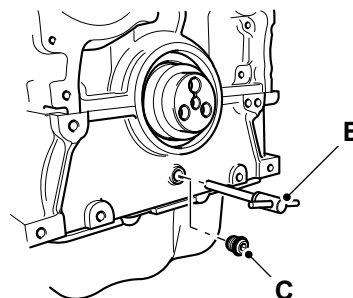
**Figure 219.**



**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 220.**



**B** Timing pin - crankshaft  
**C** Blanking plug

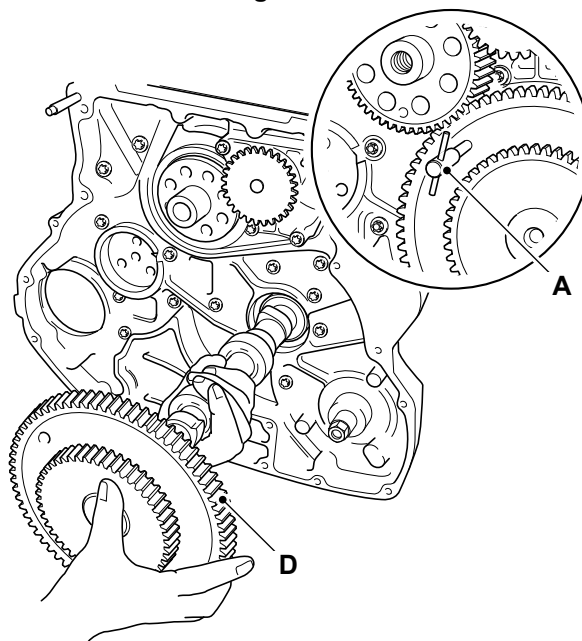
12. Remove the fuel injection pump drive gear. Refer to (PIL 15-51).

#### 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.

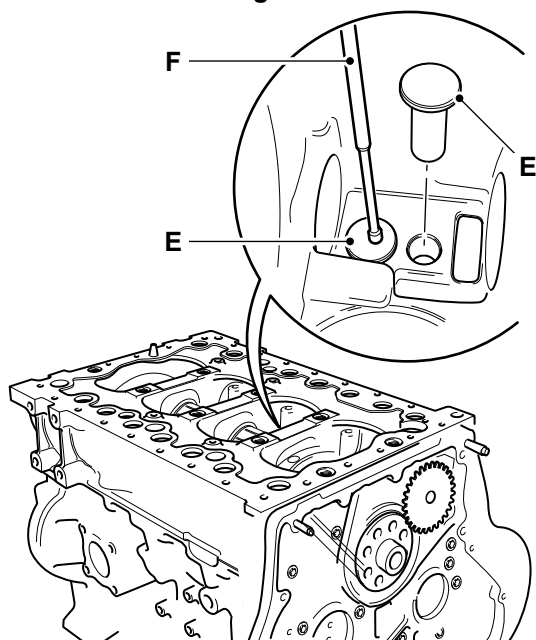
**Figure 221.**



**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 222.**



**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.

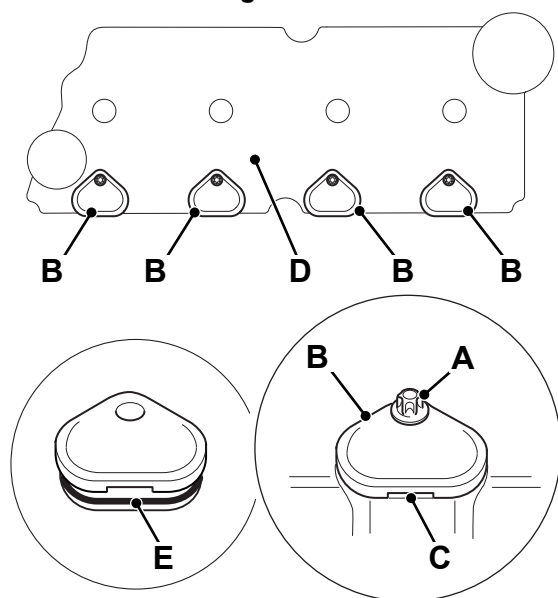
#### Install

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 84. Torque Values**

Item	Nm
A	9

**Figure 223.**



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

## 00 - General

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## 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.

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