

SERVICE MANUAL

ENGINE
JCB T4F 444 Elec Engine (4 Cyl),
JCB T4F 448 Elec Engine (4 Cyl)

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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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00 - General

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Introduction

The rocker assembly is an indirect valve actuating system consisting of rocker arms and a shaft.

The rocker arm is an oscillating lever that conveys radial movement from the cam lobe into linear movement at the poppet valve to open it. One end is raised and lowered by a rotating lobe of the camshaft via a tappet and push rod while the other end acts on the bridge piece which is connected to the valve stem.

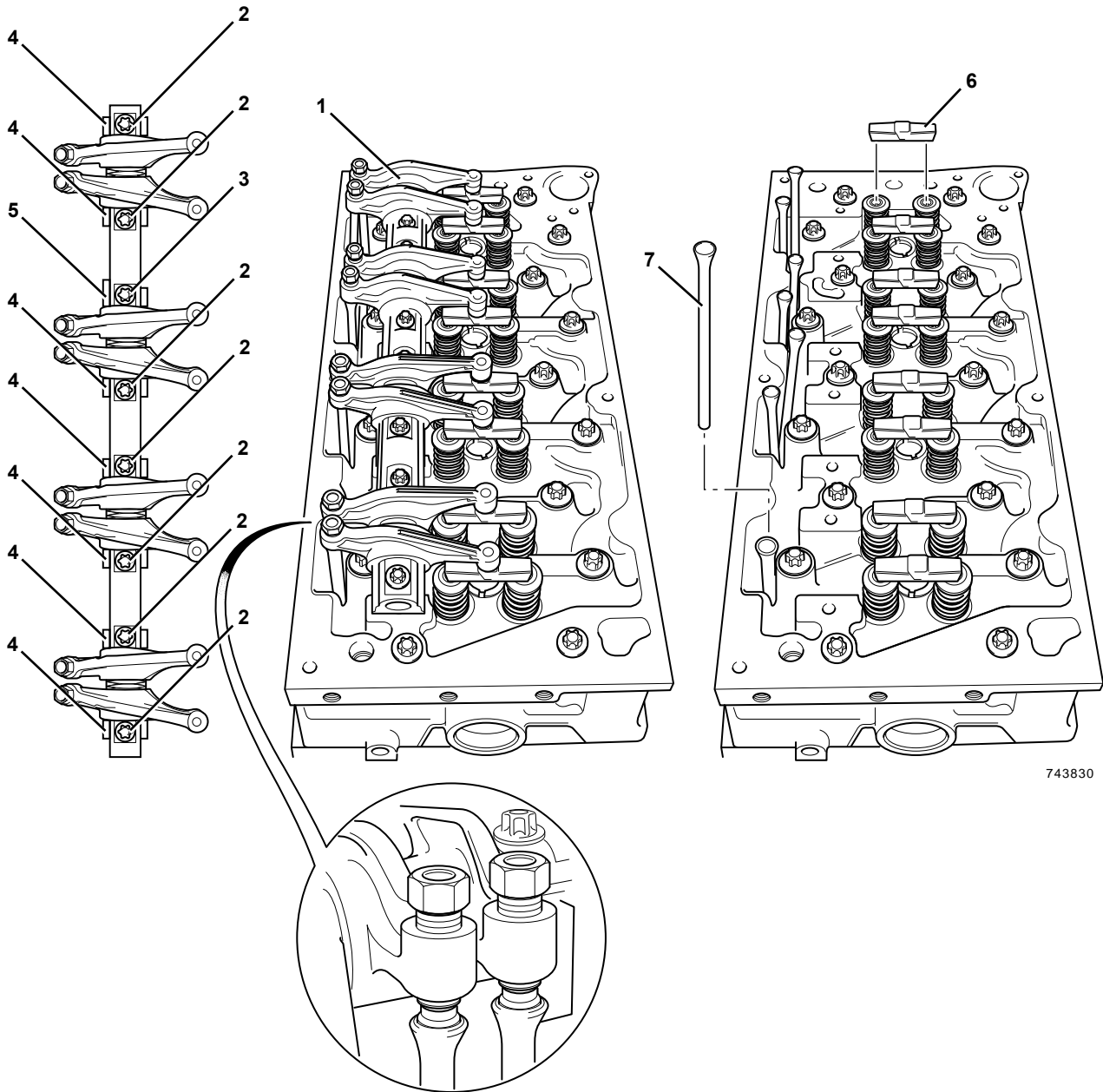
Technical Data

Table 43. Rocker Levers, Rocker Shafts and Tappets Data

| | |
|---|---------------|
| Valve clearances measured at the valve end of the rockers (measured cold): | |
| - Inlet | 0.19 –0.27 mm |
| - Exhaust | 0.56 –0.64 mm |
| Valve clearances measured at the tappet end of the rockers (measured cold): | |
| - Inlet | 0.15 –0.21 mm |
| - Exhaust | 0.43 –0.49 mm |
| Rocker lever bore diameter | |
| - min | 26.058 mm |
| - max | 26.092 mm |
| Rocker shaft diameter | |
| - min | 26.003 mm |
| - max | 26.021 mm |
| Tappets stem diameter | |
| - min | 19.975 mm |
| - max | 19.985 mm |
| Tappet bore diameter | |
| - min | 20 mm |
| - max | 20.021 mm |
| Tappet height (maximum) | 55.25 mm |

Component Identification

Figure 92.



743830

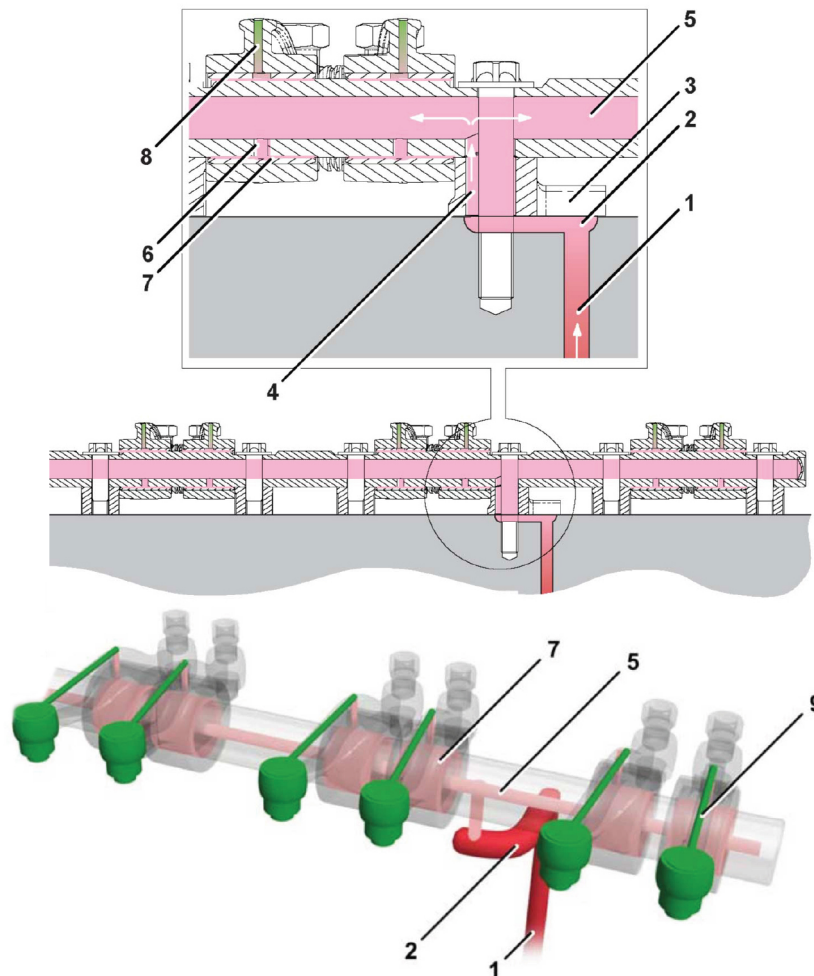
- | | | | |
|---|---|---|--------------------------------|
| 1 | Rocker shaft assembly | 2 | Rocker shaft fixing bolts (x7) |
| 3 | Rocker shaft - oil feed pedestal fixing bolt (x1) | 4 | Pedestals (x7) |
| 5 | Oil feed pedestal (x1) | 6 | Bridge pieces (x8) |
| 7 | Push rods (x8) | | |

Operation

When the camshaft lobe raises the outside of the rocker arm, the inside presses down on the valve stem to open the valve. When the outside of the

rocker arm is permitted to return due to the camshafts rotation, the inside rises to allow the valve spring to close the valve.

Figure 93.



- 1 Oil feed from main gallery
- 3 Shaft pedestal
- 5 Centre rocker shaft drilling
- 7 Rocker pivot bushes
- 9 Groove

- 2 Small transfer gallery
- 4 Rocker shaft fixing bolt hole
- 6 Cross drillings
- 8 Cross drilling

Lubrication

Oil is fed from the main gallery via a drilling which passes up through the crankcase and the cylinder head to a small transfer gallery under the rocker shaft pedestal. The oversize rocker shaft fixing bolt hole allows oil to pass into a drilling in the centre of the rocker shaft. Further cross drillings transfer oil to each of the rocker pivot bushes. A cross drilling

in each rocker transfers oil to the top of the rocker where it flows by gravity along a groove to the rocker tip.

Check (Condition)

1. Check the rocker shaft and rocker bushings for signs of damage and excessive wear. Measure the rocker shaft diameter and rocker bearing bushes to confirm they are within service limits. Refer to Technical Data. Note: The rocker bearing bushes are not renewable. If a rocker bearing bush is damaged or worn the rocker must be renewed as a complete assembly.

[Refer to: PIL 15-42.](#)

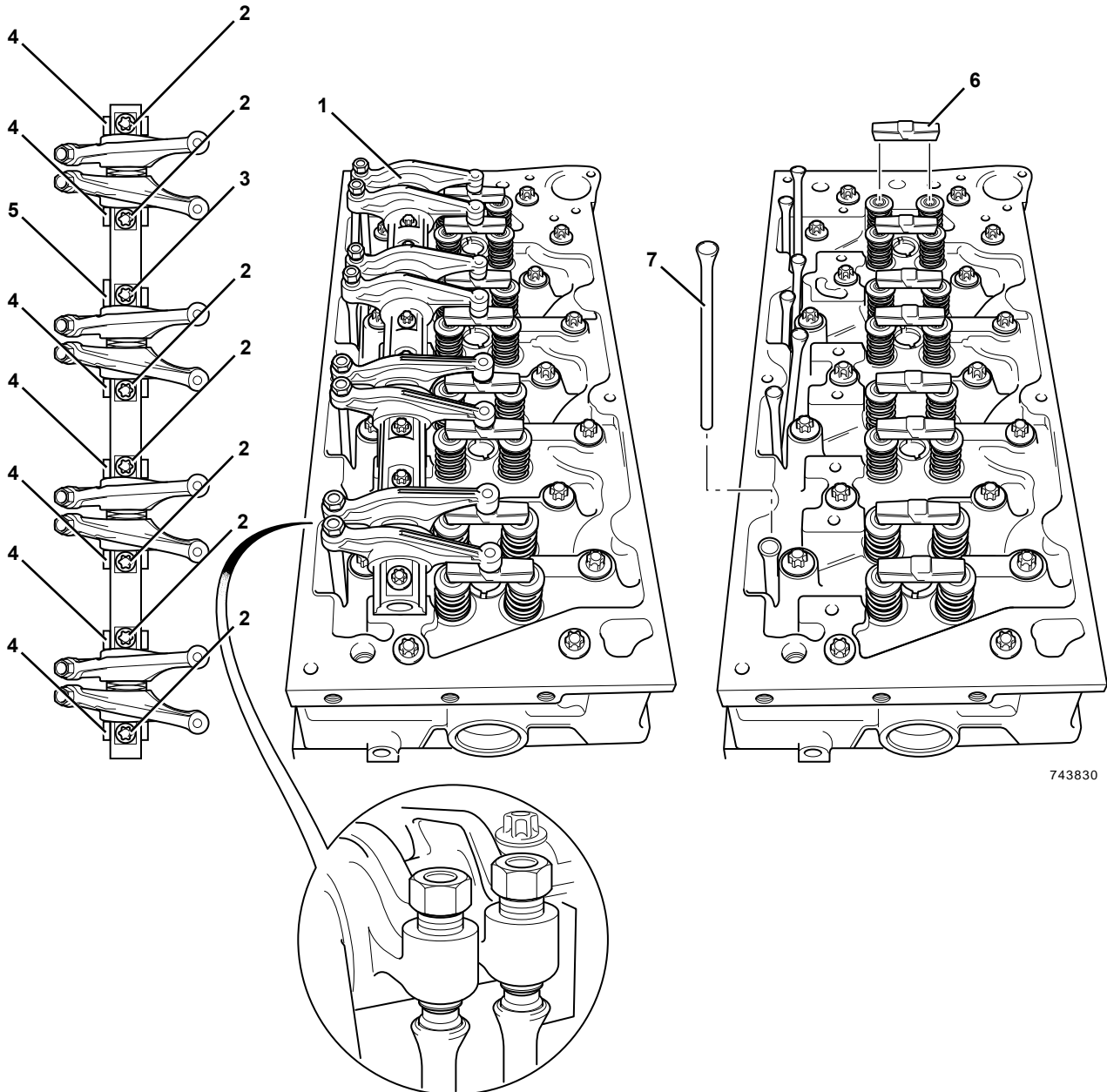
2. Make sure that all oil-ways and cross drillings in the rocker shaft, rocker arms and pedestals are clear and free from debris. Use an air line to blow through cross drillings.

Remove and Install

Before Removal

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. Disconnect and remove the fuel pipes from the fuel injectors, refer to Fuel pipes (PIL 18-96).
4. Remove the rocker cover, refer to (PIL 15-42).

Figure 94.



743830

- | | |
|---|----------------------------------|
| 1 Rocker shaft assembly | 2 Rocker shaft fixing bolts (x7) |
| 3 Rocker shaft - oil feed pedestal fixing bolt (x1) | 4 Pedestals (x7) |
| 5 Oil feed pedestal (x1) | 6 Bridge pieces (x8) |
| 7 Push rods (x8) | |

Remove

1. Remove the rocker shaft fixing bolts. DO NOT withdraw the bolts. Lift the rocker shaft assembly from the cylinder head complete with pedestals still attached. Important: Keep all pedestals and fixing bolts in their original positions.
2. Lift off the bridge pieces from the pairs of inlet and exhaust valves.
3. Withdraw the push rods from the cylinder block.

Before Installation

1. Make sure that all items are clean and free from damage and corrosion. Refer to Check Condition (PIL 15-42).
2. Make sure that all oil-ways and cross drillings in the cylinder head, rocker shaft and pedestals are clear and free from debris. Use an air line to blow through the cross drillings.

Install

1. The installation procedure is the opposite of the removal procedure. Additionally do the following steps.
2. Use a suitable degreasing agent to clean the top of the cylinder head.
3. Install the bridge pieces on to the pairs of inlet and exhaust valves in the cylinder head.
4. Insert the push rods into the cylinder block. Make sure that they engage with the camshaft tappets.
5. Install the rocker shaft assembly into the cylinder head. Make sure that the pedestals are located in their original positions. Note the position of the oil feed pedestal and the longer bolt. Make sure that the push rods engage with the tappet adjusters and that the rockers are located over the bridge pieces.
6. Tighten the bolts to the correct torque value.

After Installation

1. Measure and adjust the valve clearances, refer to (PIL 15-30).

Table 44. Torque Values

| Item | Nm |
|------|----|
| 2 | 24 |
| 3 | 24 |

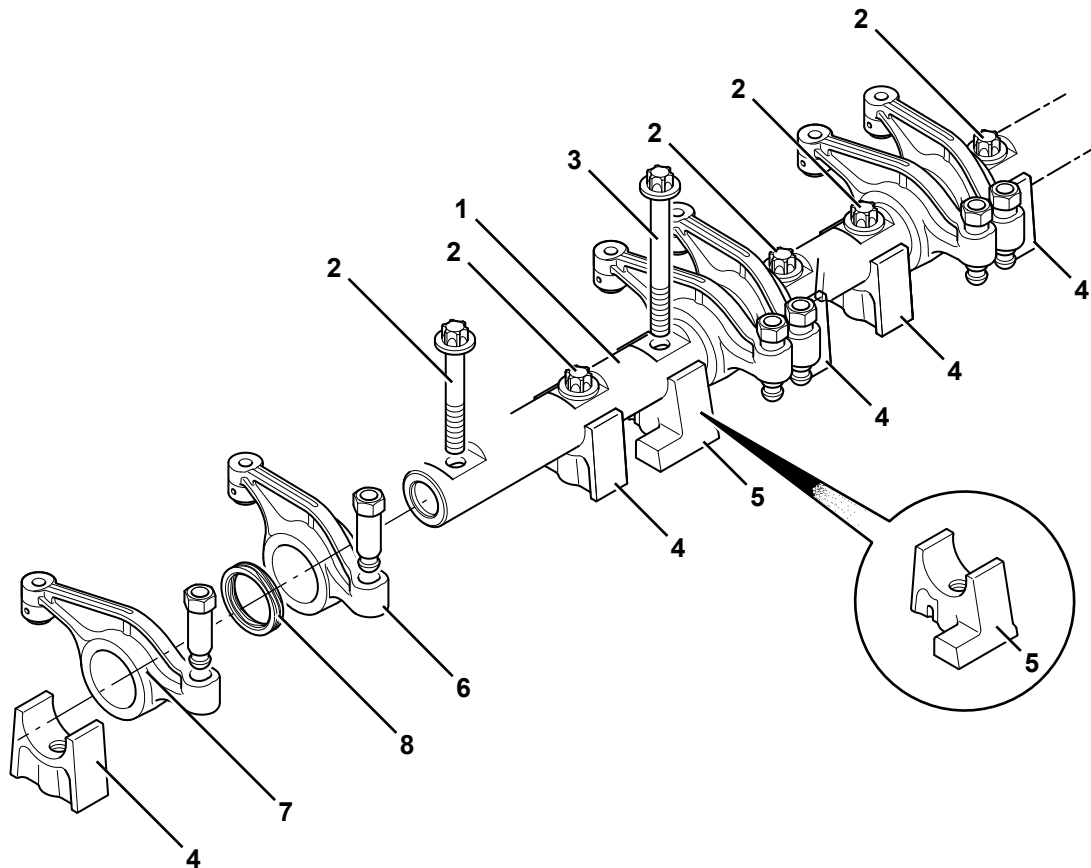
Disassemble and Assemble

Before Disassembly

1. Remove the rocker cover. Refer to (PIL 15-42).

2. Remove the rocker assembly. Refer to (PIL 15-42).

Figure 95.



- 1 Rocker shaft
- 3 Rocker shaft - Oil feed pedestal fixing bolt (x1)
- 5 Oil feed pedestal (x1)
- 7 Rockers - exhaust (x4)

- 2 Rocker shaft fixing bolts (x7)
- 4 Pedestals (x7)
- 6 Rockers - inlet (x4)
- 8 Wave washers (x8)

Disassemble

1. Lift out the rocker shaft fixing bolts, then slide the pedestals, rockers and wave washers off the rocker shaft as shown. Label the pedestals and rockers to make sure that they are installed in the correct positions on assembly.
2. Check the rocker shaft and rocker bushings for signs of damage and excessive wear. Refer to Check (Condition) (PIL 15-42).

Assemble

1. The assembly procedure is the opposite of the disassemble procedure. Additionally do the following steps.
2. Lubricate the rocker shaft and rocker bearing bushes with clean engine oil.
3. Make sure that the rockers and pedestals are installed in their original positions along the rocker shaft. Note the position of the oil feed pedestal.
4. Insert the rocker shaft fixing bolts to hold the rockers and pedestals loosely in position before fitting the assembly into the cylinder head. Note the position of the longer bolt.

After Assembly

1. Install the rocker assembly. Refer to (PIL 15-42).
2. Install the rocker cover. Refer to (PIL 15-42).

06 - Rocker Cover

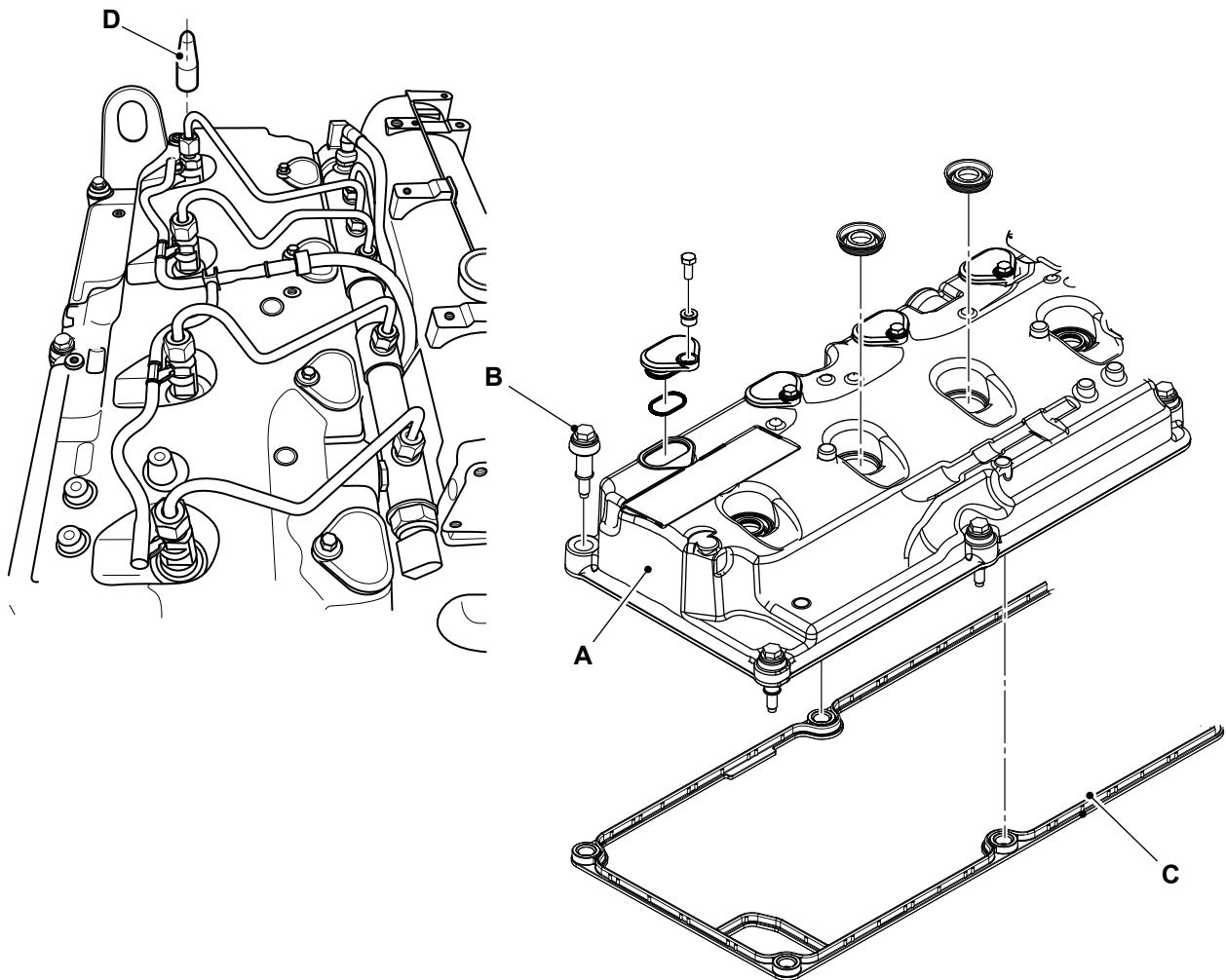
Remove and Install

Before Removal

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. Clean the engine. Refer to Engine - Clean (PIL 15-00).

Figure 96.



A Rocker cover
C Gasket

B Bolts
D Injector seals

Remove

1. Get access to the engine.
2. Remove the high pressure fuel pipes. Refer to Fuel Pipes (PIL 18-96).
3. Remove the fuel bleed off fuel pipes. Refer to Fuel Pipes (PIL 18-96).
4. Disconnect the electrical connectors at the fuel injectors. Refer to Fuel Injection (PIL 18-18).
5. Disconnect the electrical connector at the coolant temperature sensor. Refer to Engine Sensors (PIL 15-84).
6. Move the electrical harness away from the rocker cover.
7. Remove the bolts and lift the rocker cover from the cylinder head.
8. Discard the gasket.
9. The rocker cover injector seals must be replaced. Refer to Injector seals (PIL 18-18).

Install

1. The installation procedure is the opposite of the removal procedure. Additionally do the following steps.
2. Remove all oil and sludge contamination from inside the rocker chamber.
3. Renew the injector seals. Refer to Injector seals (PIL 18-18).
4. Renew the rocker cover gasket.
5. Prevent damage to the seals. Put sleeves/covers on the four injectors. Apply a rubber lubricant to the seals and then install the rocker cover.
6. Tighten the bolts to the correct torque value.
7. Remove the sleeves/covers.

After Installation

1. The high pressure fuel pipes must be replaced with new parts. Refer to Fuel Pipes (PIL 18-96).
2. Start the engine and check for oil and fuel leaks.

Table 45. Torque Values

| Item | Nm |
|------|----|
| B | 24 |



09 - Push Rod

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Introduction

Push rods are used in a reciprocating engine to open and close the valves. They are moved by the cams on the camshaft. One end is pushed up by the cam and the other end makes contact with the rocker arms which rotates and pushes the valve open.



Remove and Install

Refer to: [PIL 15-42-00](#).

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