



SERVICE MANUAL

6TFT, 6TST

EN - 9813/5300 - ISSUE 1 - 09/2015

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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.

Contents

01 - Machine

06 - Body and Framework

09 - Operator Station

15 - Engine

18 - Fuel and Exhaust System

21 - Cooling System

24 - Brakes

25 - Steering System

27 - Driveline

30 - Hydraulic System

33 - Electrical System

72 - Fasteners and Fixings

75 - Consumable Products

78 - After Sales

00 - General

Introduction	15-181
Component Identification	15-182
Remove and Install	15-183

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).

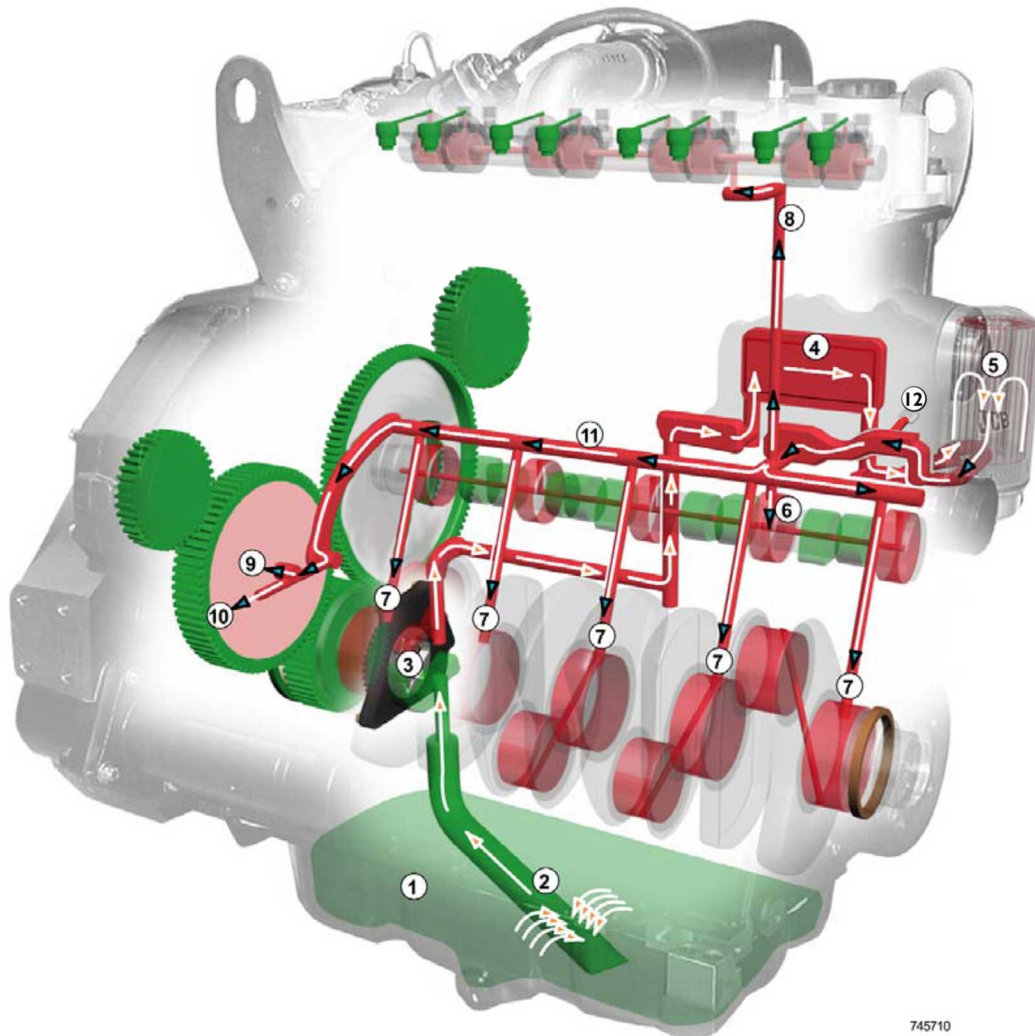
From the pump the oil passes through the oil cooler and filter, refer to (PIL 15-69 and PIL 15-21).

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 185.



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- | | | | |
|----------|--|-----------|--|
| 1 | Oil sump | 10 | External high pressure oil feed connection (crankcase) - Turbocharger (if installed) |
| 2 | Suction strainer | 11 | Main high pressure oil feed gallery (crankcase) |
| 3 | Oil pump | 12 | Oil pressure switch |
| 4 | Oil cooler | | Green- Oil at sump pressure |
| 5 | Filter | | Red- Oil at high pressure |
| 6 | Camshaft - high pressure oil feed | | Pink- Oil at lower pressure but higher than sump pressure |
| 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 | | |

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	0.31L

Before Removal

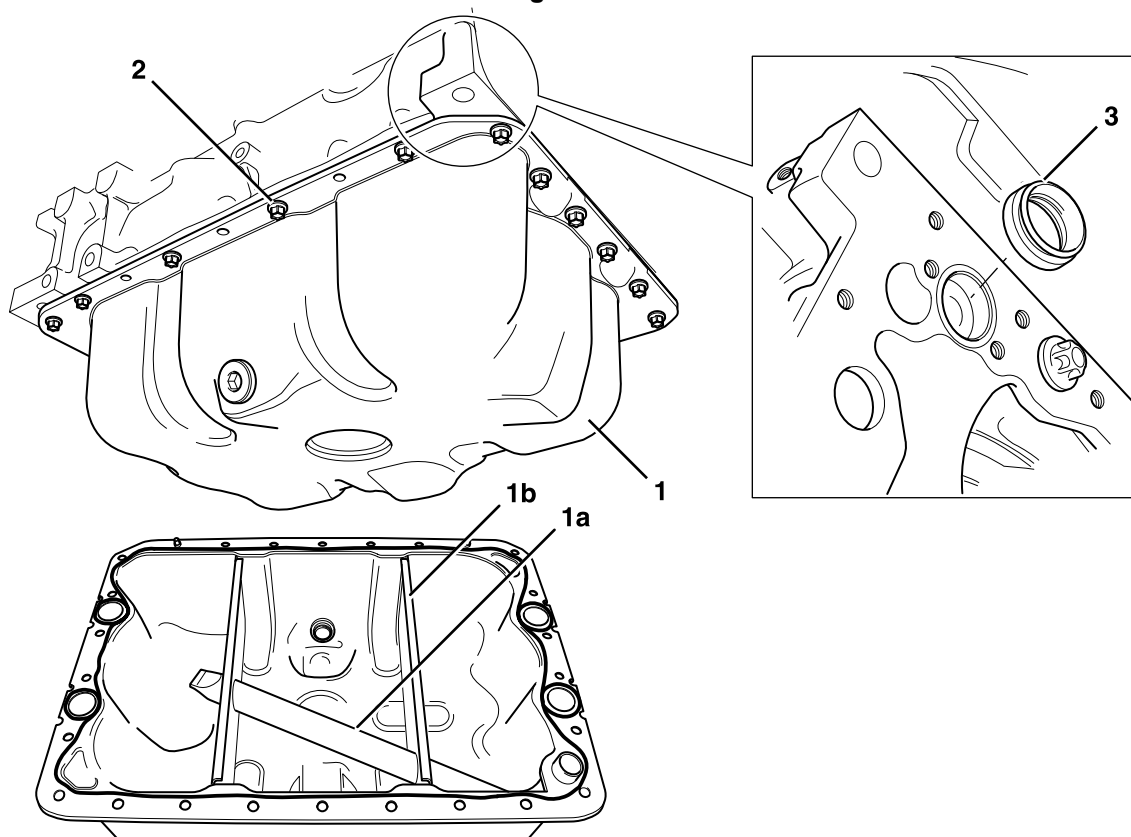
1. Make sure that the engine is safe to work on. If the engine has been running, make sure the engine has cooled sufficiently before you start.

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 186.



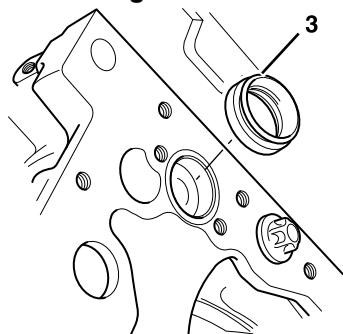
- 1** Oil sump
1a Integral suction tube
1b Integral baffle plates

- 2** Oil sump fixing bolts (x20)
3 Oil pick up seal

Installation

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

Figure 187.



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: 4mm

Consumable: Clear Silicone Sealant

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

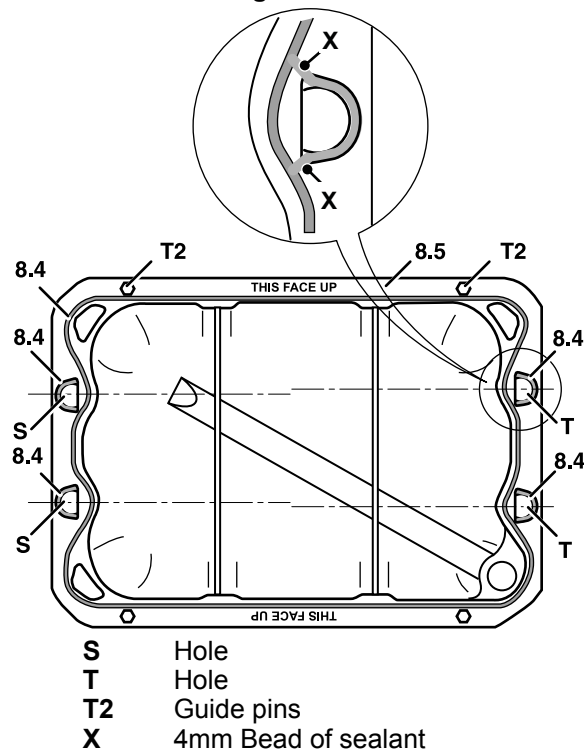
6. Apply a bead of sealant so as to join the sealant beads around holes with the bead around the oil sump flange.

Length/Dimension/Distance: 4mm

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

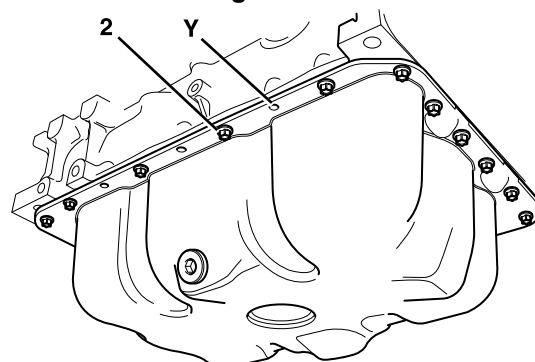
Duration: 5min

Figure 188.



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 189.



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

After Replacing

1. Allow the sealant to cure for
Duration: 20min
2. Refill the engine with the recommended engine oil. Refer to (PIL 75-00).
3. Start the engine and check for oil leaks.

Table 55. Torque Values

Item	Nm
2	24

Component Identification

Figure 190.



- A** Crankshaft gear
- B** Camshaft gear
- C** High pressure fuel pump gear
- D** Oil pump gear

- E** Heavy duty PTO device gear (if fitted)
- F** Heavy duty PTO device gear (if fitted)
- G** Low duty PTO device gear (if fitted)

Operation

All the gears are driven via the crankshaft gear as follows:

- Camshaft gear-The camshaft is driven at half crankshaft speed.
- High pressure fuel pump gear-The high pressure fuel pump is driven via the camshaft gear installed to the camshaft.
- Oil pump gear-The lubrication oil pump is driven directly by the crankshaft gear.
- Power Take-Off (PTO)-driven by the crankshaft gear via idler gear.
- Low Duty Power Take-Off (PTO) Gear (if installed)-driven by the camshaft gear.

Figure 191.



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)

03 - Crankshaft Gear

Remove and Install

Special Tools

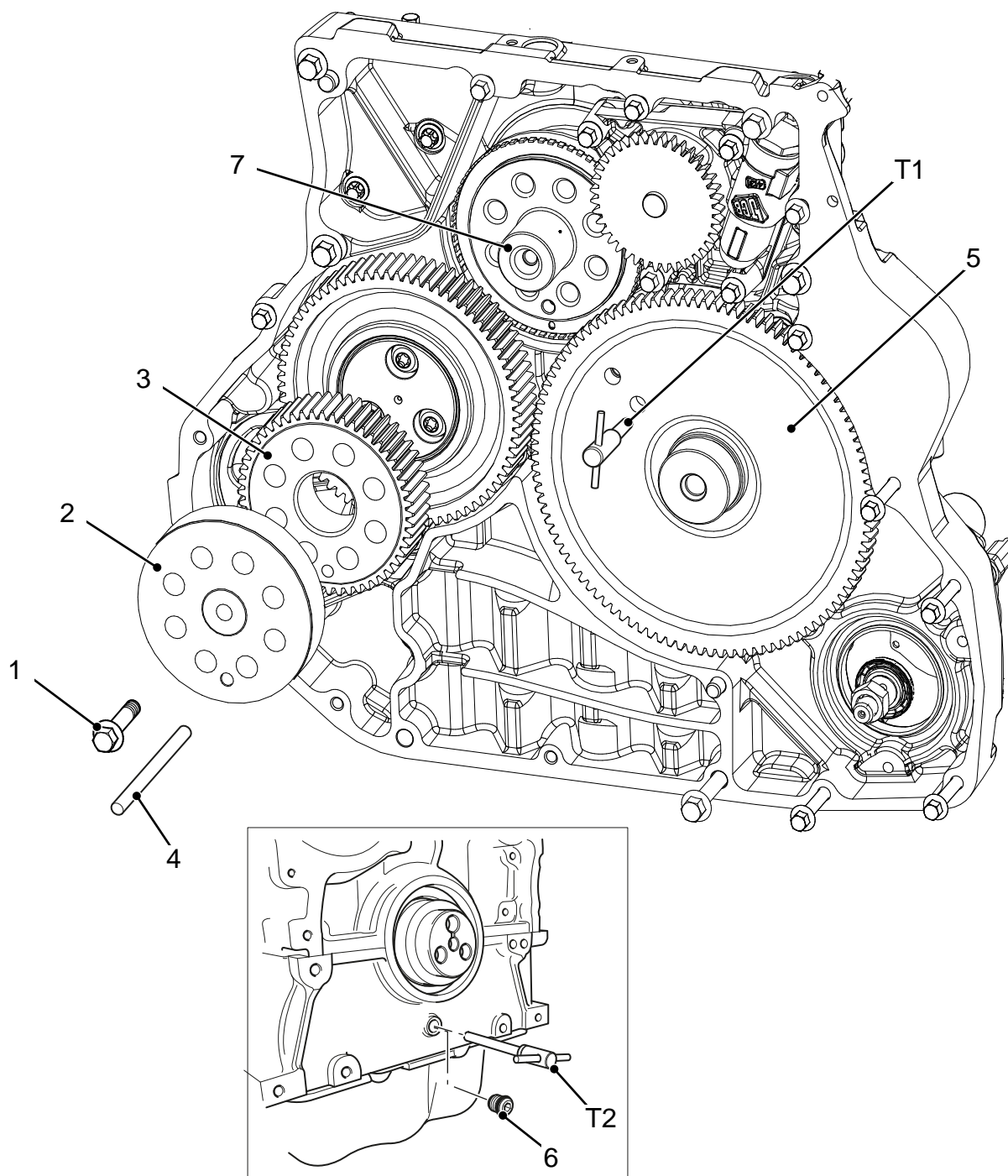
Description	Part No.	Qty.
Crankshaft / Camshaft Timing Pin	892/01148	2

Note: The illustrations show the engine inverted. If the drive gear components are being removed prior to crankshaft or camshaft removal the engine must be inverted. If the gear components only are being removed (for inspection/renewal) then the engine need not be inverted.

Before Removal

1. Remove the starter motor. Refer to (PIL 15-75).
2. Remove the flywheel. Refer to (PIL 15-54).
3. Remove the flywheel housing. Refer to (PIL 15-54).
4. Rotate the crankshaft until the camshaft locking pin can be inserted through the gear and into the aligning hole in the rear gear case. Note: The camshaft and crankshaft locking pins must be in position to lock the crankshaft and camshaft before removing the crankshaft gear.
[Special Tool: Crankshaft / Camshaft Timing Pin \(Qty.: 2\)](#)
5. Remove the taper blanking plug and insert the crankshaft locking pin.

Figure 192.



- 1** Drive gear and flywheel hub fixing bolt
- 2** Flywheel hub
- 3** Crankshaft gear
- 4** Location dowel
- 5** Camshaft drive gear

- 6** Blanking plug - crankcase
- 7** Crankshaft - gear location spigot
- T1** Timing pin - camshaft
- T2** Timing pin - crankshaft

Remove

1. Remove the flywheel hub fixing bolt and remove the flywheel hub.
2. Remove the crankshaft gear from the crankshaft. Make sure you retrieve the location dowel.

Inspect

1. Carefully inspect the outer diameter of the flywheel hub for signs of wear or damage. Wear or damage will cause the crankshaft rear oil seal to fail. If in doubt renew the hub.

Install

1. Apply some clean engine oil to the location spigot on the end of the crankshaft.
2. Make sure that the dowel is located in the crankshaft gear and locate the gear and dowel on to the crankshaft spigot.
3. Install the flywheel hub to the gear, locate on the dowel. Fix the hub with fixing bolt. Tighten the bolt to the correct torque value.

Table 56. Torque Values

Item	Nm
1	47
6	11

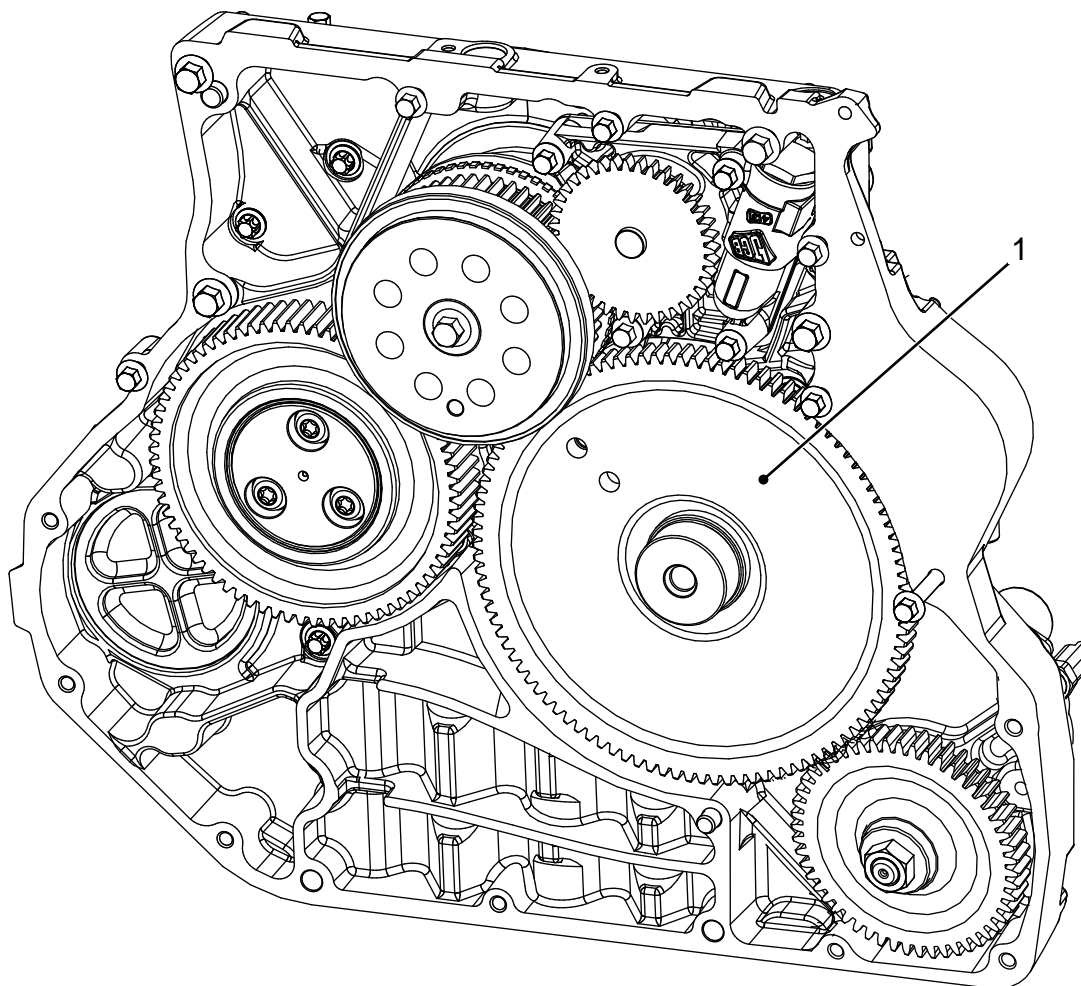
06 - Camshaft Gear

Remove and Install

The camshaft drive gears are an interference fit on the end of the camshaft and cannot be removed individually. If the gears are damaged or worn the

complete camshaft and gear assembly must be renewed. Refer to Camshaft- Remove and Install. Refer to (PIL 15-15).

Figure 193.



1 Camshaft gear

09 - Fuel Injection Pump Gear

Remove and Install

Note: The illustrations show the engine inverted. If the drive gear components are being removed prior to crankshaft or camshaft removal the engine must be inverted. If the gear components only are being removed (for inspection/renewal) then the engine need not be inverted.

Before Removal

1. Remove the high pressure fuel injection pump. Refer to (PIL 18-18).
2. Loosely install the high pressure fuel pump and fixing nut, retain the gear.
3. Remove the starter motor. Refer to (PIL 15-75).
4. Remove the flywheel. Refer to (PIL 15-54).
5. Remove the flywheel housing. Refer to (PIL 15-54).



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