
Perkins 2300 Series

Models 2306A-E14 and 2306C-E14

WORKSHOP MANUAL

6 cylinder turbocharged diesel engines for industrial applications

Publication TSD3455E, Issue 2

© Proprietary information of Perkins Engines Company Limited, all rights reserved.

The information is correct at the time of print.

Published in December 2006 by Technical Publications,

Perkins Engines Company Limited, Peterborough PE1 5NA England.

Contents

1 General information

Introduction	1
Safety precautions	2
Viton seals	4
Welding	4
Environmental protection	4
Engine views	5
Engine identification	6
Engine lift equipment	6

2 Specifications

Basic engine data - 2306 engine	7
Basic engine data - 2806 engine	7
Rocker assemblies	8
Valves	9
Valve guides	10
Valve springs	10
Valve seat inserts	11

2

Specifications

Basic engine data - 2306 engine

Number of cylinders.	6
Cylinder arrangement..	In line
Cycle	Four stroke
Induction system..	Turbocharged
Combustion system.	Direct injection
Nominal bore	137 mm (5.394 in)
Nominal stroke.	165 mm (6.496 in)
Compression ratio	15.9:1
Cubic capacity	14,6 litres (893 in ³)
Firing order	1, 5, 3, 6, 2, 4
Direction of rotation	Anti-clockwise viewed on flywheel
Lubricating oil capacity:	
Total system	68 litres (120 UK pints)
Sump maximum... ..	60 litres (106 UK pints)
Sump minimum	45 litres (79 UK pints)
Lubricating oil pressure:	
At rated speed	4,5 bar
Typical coolant capacity of engine... ..	20,8 litres (4.6 UK gallons)
Typical coolant capacity of engine and radiator	47 litres (10.3 UK gallons)

Basic engine data - 2806 engine

Number of cylinders.	6
Cylinder arrangement..	In line
Cycle	Four stroke
Induction system..	Turbocharged
Combustion system.	Direct injection
Nominal bore	140 mm (5.512 in)
Nominal stroke.	171 mm (6.732 in)
Compression ratio	15.9:1
Cubic capacity	15,8 litres (964.18 in ³)
Firing order	1, 5, 3, 6, 2, 4
Direction of rotation	Anti-clockwise viewed on flywheel
Lubricating oil capacity:	
Total system	68 litres (120 UK pints)
Sump maximum... ..	60 litres (106 UK pints)
Sump minimum	45 litres (79 UK pints)
Lubricating oil pressure:	
At rated speed	4,5 bar
Typical coolant capacity of engine... ..	20,8 litres (4.6 UK gallons)
Typical coolant capacity of engine and radiator	50 litres (11 UK gallons)

Recommended torque figures

Exceptions to these torque figures are given in the Workshop Manual where necessary.

Before any components are fitted to the engine, ensure that they are in a new or close to new condition. Bolts or threads must not be worn or damaged. Components must be free from rust or other corrosion. Clean with a non-corrosive cleaner if necessary. Do not lubricate the threads of fasteners. Rust preventative which has been applied by the component supplier for shipping and storage is acceptable. Certain components may require an application of a particular lubricant, details are given in the Workshop Manual where relevant.

Standard torque figures for metric fasteners

Metric nuts and bolts	
Thread size metric	Standard torque
M6	12 +/- 3 Nm (9 +/- 2 lbf ft)
M8	28 +/- 7 Nm (21 +/- 5 lbf ft)
M10	55 +/- 10 Nm (41 +/- 7 lbf ft)
M12	100 +/- 20 Nm (75 +/- 15 lbf ft)
M14	160 +/- 30 Nm (120 +/- 22 lbf ft)
M16	240 +/- 40 Nm (175 +/- 30 lbf ft)
M20	460 +/- 60 Nm (340 +/- 44 lbf ft)
M24	800 +/- 100 Nm (590 +/- 75 lbf ft)
M30	1600 +/- 200 Nm (1180 +/- 150 lbf ft)
M36	2700 +/- 300 Nm (2000 +/- 220 lbf ft)

Metric taperlock studs	
Thread size metric	Standard torque
M6	8 +/- 3 Nm (6 +/- 2 lbf ft)
M8	17 +/- 5 Nm (13 +/- 4 lbf ft)
M10	35 +/- 5 Nm (26 +/- 4 lbf ft)
M12	65 +/- 10 Nm (48 +/- 7 lbf ft)
M16	110 +/- 20 Nm (80 +/- 15 lbf ft)
M20	170 +/- 30 Nm (125 +/- 22 lbf ft)
M24	400 +/- 60 Nm (300 +/- 44 lbf ft)
M30	750 +/- 80 Nm (550 +/- 60 lbf ft)
M36	1200 +/- 150 Nm (880 +/- 110 lbf ft)

Rocker cover

To remove and to fit

Operation 3-1

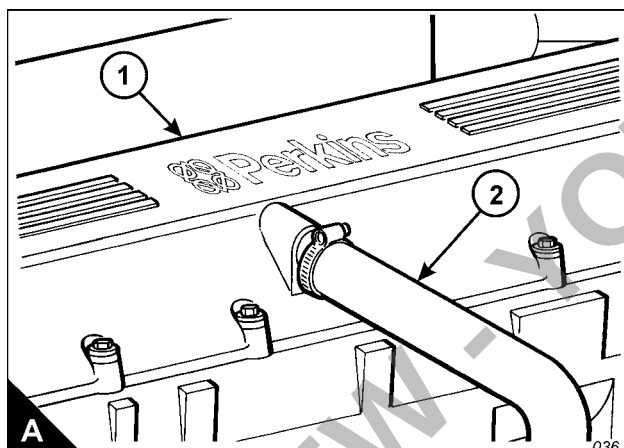
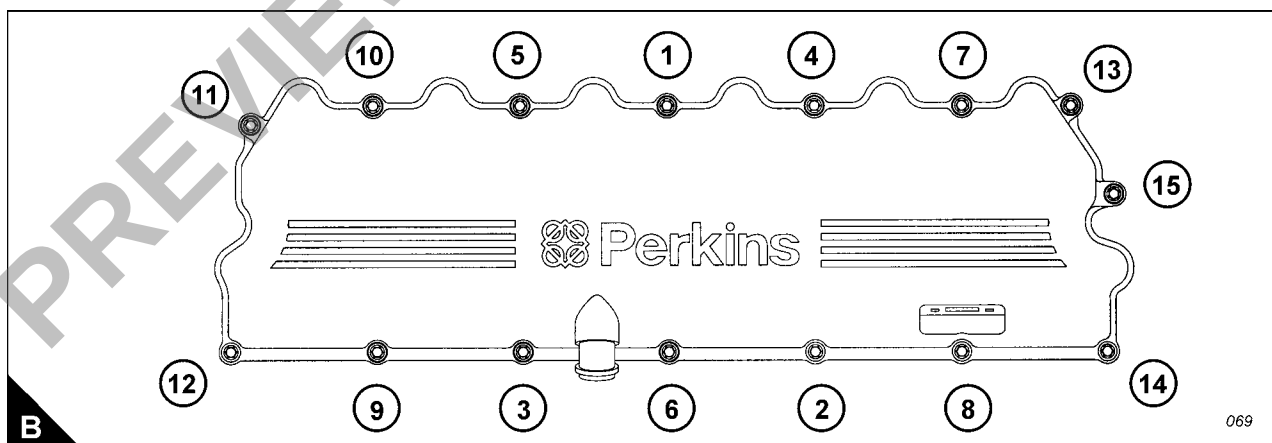
To remove

Warning! The electrical circuit for the fuel injector units operates on 110 volts. Do NOT work on the fuel injector units unless the power supply to the ECM has been disconnected.

- 1 Disconnect the wiring harness at the socket on the rocker cover (A1).
- 2 Disconnect and remove the engine breather pipe (A2).
- 3 Loosen fully the bolts which retain the rocker cover, but do not remove the bolts from the assembly; allow them to be retained by the seal.
- 4 Remove the rocker cover.

To fit

- 1 Inspect the seal of the rocker cover and renew if worn or damaged.
- 2 Fit the rocker cover, complete with seal and bolts. Tighten the bolts to a torque of 20 Nm (15 lbf ft); use the sequence shown (B).
- 3 Fit the engine breather pipe (A2).
- 4 Connect the wiring harness. Ensure that the wiring harness is fully engaged with the connector.



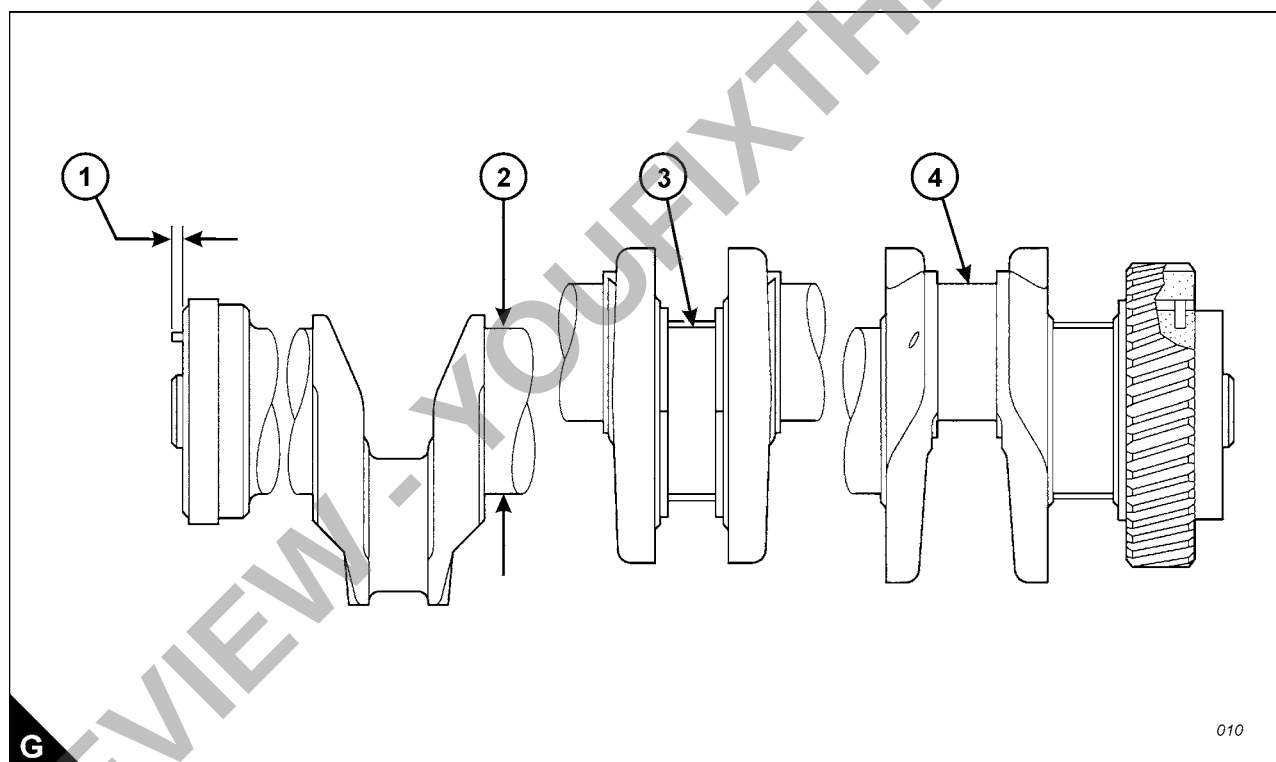
Cylinder head	12
Camshaft and bearings	12
Pistons and connecting rods - 2306 engine	13
Pistons and connecting rods - 2806 engine	14
Crankshaft, main bearings and flywheel	15
Crankshaft damper	15
Crankcase and cylinder liners	16
Lubricating oil pump	18
Coolant pump	19
Recommended torque figures	20

3 Cylinder head assembly

General information	27
Rocker cover	
Operation 3-1 To remove and to fit	28
Rocker lever and rocker shaft assemblies	
Operation 3-2 To remove and to fit	29
Operation 3-3 To dismantle and to assemble	30
Operation 3-4 How to check/adjust the tappet clearances	32
Cylinder head assembly	
Operation 3-5 To remove and to fit	35
Valve springs	
Operation 3-6 To remove and to fit	39
Valves	
Operation 3-7 To remove and to fit	41
Valve seals	
Operation 3-8 To renew	42
Valve guides	
Operation 3-9 To remove and to fit	43
Camshaft	

Crankshaft, main bearings and flywheel

Diameter of main bearing journal (G2)	120,650 +/- 0,020 mm (4.7500 +/- 0.0008 in)
Journal undersize by 0,63 mm (0.025 in)	120,015 +/- 0,020 (4.7250 +/- 0.0008 in)
Journal undersize by 1,27 mm (0.050 in)	119,380 +/- 0,020 mm (4.7000 +/- 0.0008 in)
Clearance between a new bearing and the journal (G3)	0,091 to 0,186 mm (0.0036 to 0.0073 in)
Maximum permissible clearance between the bearing and journal	0,25 mm (0.010 in)
Diameter of main bearing bore	129,891 +/- 0,013 mm (5.1138 +/- 0.0005 in)
Diameter of main bearing bore, oversize by 0,63 mm (0.025 in)	130,526 +/- 0,013 mm (5.1388 +/- 0.0005 in)
Diameter of connecting rod journal (G4)	90,000 +/- 0,020 mm (3.5433 +/- 0.0008 in)
Journal undersize by 0,63 mm (0.025 in)	89,370 +/- 0,020 (3.5185 +/- 0.0008 in)
Journal undersize by 1,27 mm (0.050 in)	88,730 +/- 0,020 mm (3.4933 +/- 0.0008 in)
Clearance between a new bearing and the journal	0,062 to 0,160 mm (0.0024 to 0.0063 in)
Maximum permissible clearance between the bearing and journal	0,20 mm (0.008 in)
End-float of crankshaft	0,15 to 0,55 mm (0.006 to 0.022 in)
Maximum permissible end-float (with used bearings)	0,89 mm (0.035 in)
Maximum protrusion of dowel (G1)	6,4 mm (0.25 in)



Crankshaft damper

Maximum permissible run-out of face of damper	2,03 mm (0.080 in)
---	--------------------

To fit

1 If the oil transfer tube (B6) has been removed, apply retaining compound, 21820 638, and insert it in the crankcase. It must protrude from the top face of the crankcase by 20,0 +/- 0,5 mm (0.79 +/- 0.02 in). Remove any excess compound and ensure that the bore of the oil transfer tube is clean.

2 If the rear dowel has been removed, apply retaining compound, 21820 638, and insert it in the crankcase. It must protrude from the top face of the crankcase by 18,5 +/- 0,5 mm (0.73 +/- 0.02 in).

3 If the front dowel, close to the oil transfer tube, has been removed, it must be fitted in a dry condition. It must protrude from the top face of the crankcase by 16,0 +/- 0,5 mm (0.63 +/- 0.02 in).

Note: Ensure that the spacer plate and the machined surface of the cylinder block are clean and free from dirt and gasket material. Both surfaces of the spacer plate gasket and the top of the cylinder block must be clean. Do NOT use a gasket adhesive on the surfaces.

4 Fit suitable guide studs (B1) to the cylinder block. Fit a new spacer plate gasket over the dowels in the cylinder block.

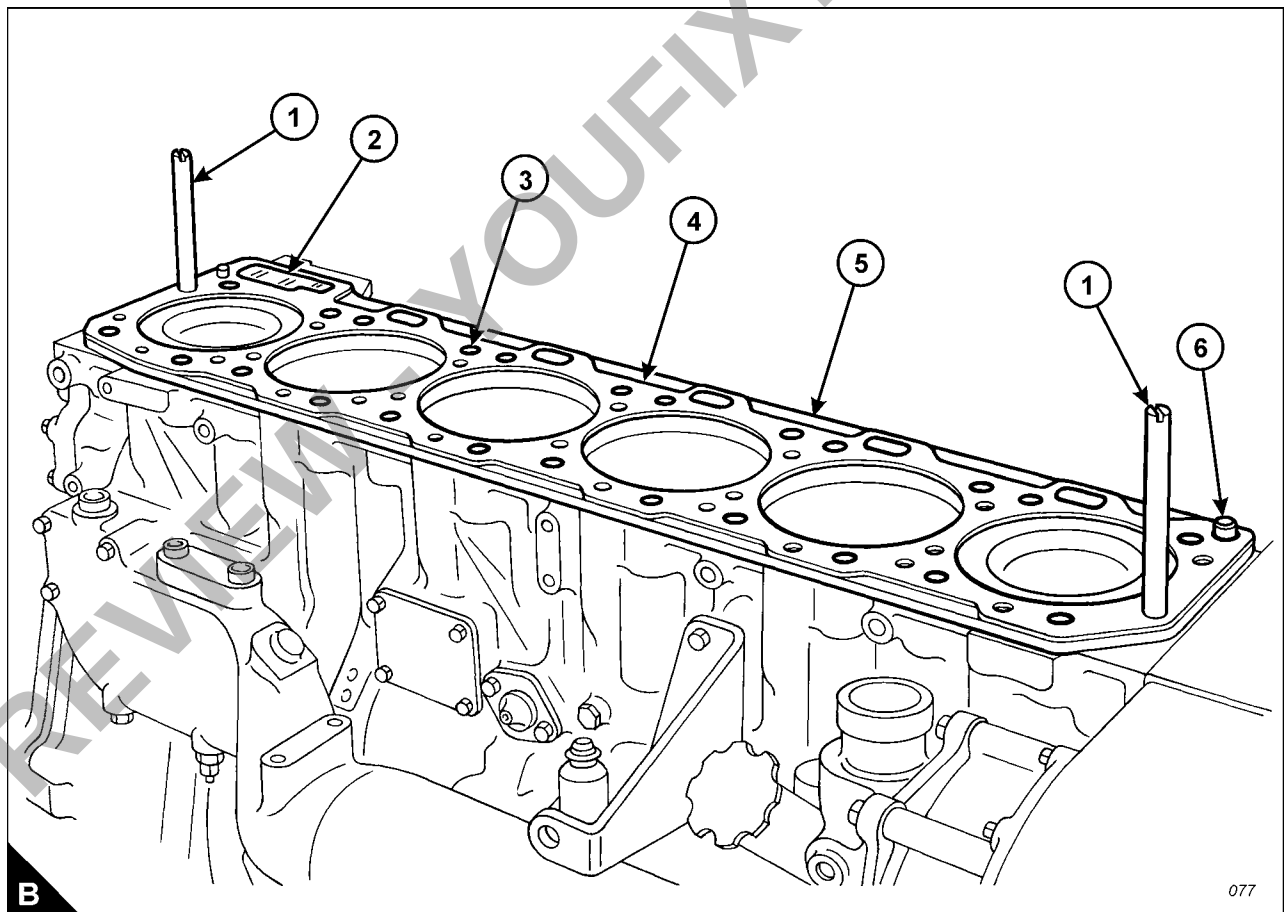
Note: Apply a small amount of clean engine oil to the seals and 'O' ring seals before installation.

5 Fit a new 'O' ring seal to the oil transfer tube (B6).

6 Fit the spacer plate (B5) and fit the second 'O' ring seal to the oil transfer tube (B6). Fit the 24 coolant seals (B3) and a new seal (B2) to the oil drain passage.

7 Check, and if necessary adjust, the protrusion of the cylinder liners, Operation 7-3.

8 Fit a new cylinder head gasket (B4) to the spacer plate.



Continued

Pistons and connecting rod assemblies

To remove and to fit

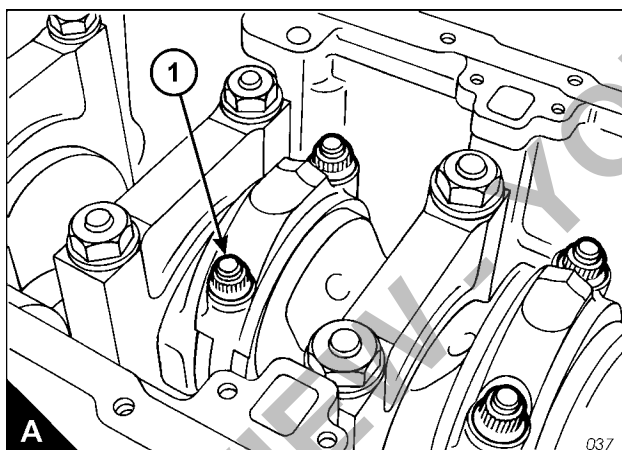
Operation 4-1

Special requirements

Special tools		Consumable products	
Description	Part number	Description	Part number
Installer, piston (2806 engine)	GE50003	Anti-seize compound	CV60890
Installer, piston (2306 engine)	GE50045		

To remove

- 1 Remove the cylinder head assembly, Operation 3-5.
- 2 Remove the oil pump, Operation 10-4.
- 3 Remove the stiffener plate from the base of the crankcase.
- 4 Remove the carbon ridge from the top inside surface of the cylinder liners.
- 5 Turn the crankshaft until two pistons are at bottom centre.
- 6 Remove the bolts (A1) and the bearing caps. Push the connecting rods and pistons up until the rings are free from the cylinder liners.
- 7 Withdraw carefully the pistons and connecting rods from the cylinder liners. Store the bearing caps with their relevant connecting rods.
- 8 Repeat steps 3 to 6 for the remainder of the pistons and connecting rods.



To fit

- 1 Clean thoroughly the contact surfaces of the crankcase and gear case.
- 2 Fit the two dowels, if they have been removed, and ensure that they protrude from the crankcase by 19,1 +/- 0,5 mm (0.75 +/- 0.02 in).
- 3 Ensure that the front surface of the crankcase is clean and fit a new joint to the crankcase.
- 4 Ensure that the rear face of the gear case is clean and fit the gear case onto the crankcase. Fit the retaining bolts and tighten to a torque of 50 +/- 10 Nm (37 +/- 7 lbf ft).
- 5 Check the condition of the shaft for the adjustable idler. If the bearing diameter of the shaft is worn or damaged, renew the assembly. Apply thread lock compound, 21820 117, to the bolt and five studs, fit the bolt and nuts and tighten to a torque of 50 +/- 10 Nm (37 +/- 7 lbf ft).
- 6 Check the condition of the shaft for the main idler. If the bearing diameter of the shaft is worn or damaged, renew the assembly. Apply thread lock compound, 21820 117, to the bolt and five studs, fit the bolt and nuts and tighten to a torque of 50 +/- 10 Nm (37 +/- 7 lbf ft).
- 7 Check the condition of the shaft for the compound idler. Renew the shaft if the bearing diameter is worn or damaged. Renew the five bolts which retain the shaft. Apply thread lock compound, 21820 117, to the bolts and tighten to a torque of 50 +/- 10 Nm (37 +/- 7 lbf ft).
- 8 Fit new 'O' ring seals to the camshaft front seal plate. Apply a small amount of engine lubricating oil to the 'O' ring seal on the outside of the plate. Fit the seal plate with the face seal against the cylinder head. Insert the adapter plate and fit the thrust plate. Apply thread lock compound, 21820 117, to the three bolts, fit the bolts and tighten.
- 9 Fit the timing gears, Operation 6-2.
- 10 Fit the sump, Operation 10-3.
- 11 Fit a new crankshaft front seal and wear sleeve, Operation 5-2.
- 12 Fit the front engine support, Operation 7-1.
- 13 Fit the crankshaft vibration damper, Operation 5-4.
- 14 Fit the coolant pump, Operation 12-13.
- 15 Fit the camshaft timing sensor to its location behind the top of the gear case and connect the lead.
- 16 Fit the crankshaft timing sensor to its location behind the bottom of the gear case and connect the lead.
- 17 Fit the gear case cover, Operation 6-1.

Oil pump

To remove and to fit

Operation 10-4

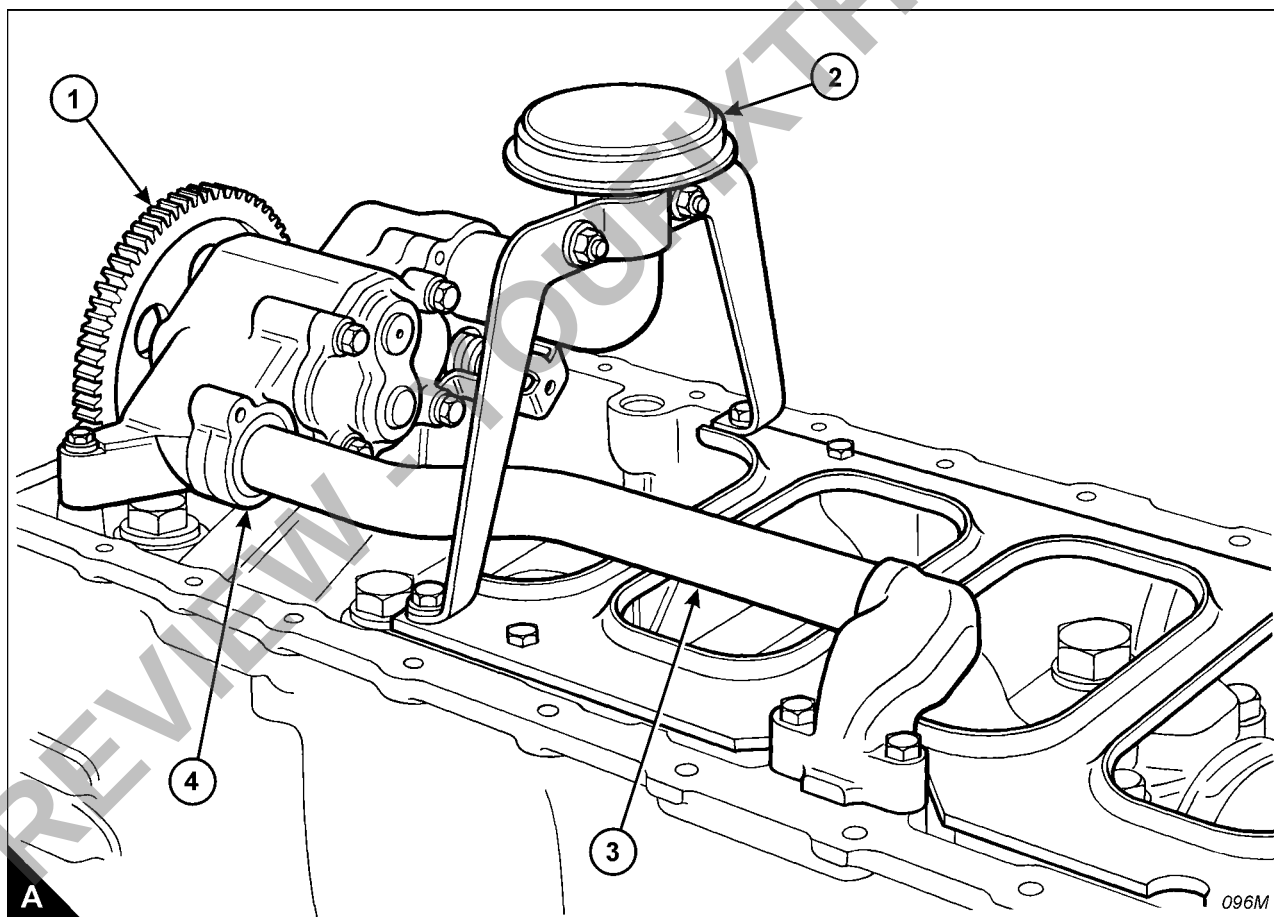
To remove

- 1 Remove the sump, Operation 10-3.
- 2 Remove the oil supply tube (A3) and the strainer and tube (A2).
- 3 Remove the bolts and remove the oil pump (A4).

Note: If the oil pump is to be dismantled, slacken the bolt which retains the drive gear (A1) before the pump is removed from the engine.

To fit

- 1 Fit the oil pump to the crankcase.
- 2 Apply clean engine oil to the 'O' ring seals of the tubes.
- 3 Install oil supply tube (A3) and strainer and tube (A2).
- 4 Fit the sump, Operation 10-3.



To test the thermostats

Operation 12-11

1 Remove the thermostats from the engine.

Warning! Use care during this operation to avoid serious injury from the hot water.

2 Heat water in a suitable container until the temperature is 98 °C (208 °F). Stir the water to ensure that the temperature is consistent within the container.

3 Suspend the thermostat in the container of water. The thermostat must be below the surface of the water and it must be away from the sides and the bottom of the container.

4 Ensure that the water is maintained at the correct temperature for ten minutes.

5 After ten minutes, remove the thermostat. Immediately check the distance that the thermostat has opened. It must be a minimum of 10,4 mm (0.41 in). If the distance is less, renew the thermostat.

PREVIEW ONLY

You're viewing 12 of 158 pages

The full manual includes:

- All 158 pages, complete
- Searchable PDF (find any keyword)
- No watermarks
- Instant download
- Print-ready quality

GET FULL MANUAL NOW

Perkins 2300, 2306A-E14, 2306C-E14 Shop Manual



Scan or click anywhere
youfixthis.com

Click anywhere on this page to get the full manual