

2

Specifications

Basic engine data

Number of cylinders.	6
Cylinder arrangement..	In line
Cycle	Four stroke
Induction system..	Air to air charged cooled
Combustion system.	Direct injection
Nominal bore	145 mm (5.708 in)
Nominal stroke.	183 mm (7.204 in)
Compression ratio	14.5:1
Cubic capacity	18,13 litres (1106.36 in ³)
Firing order	1, 5, 3, 6, 2, 4
Direction of rotation	Anti-clockwise viewed on flywheel
Lubricating oil capacity:	
Total system	55,5 litres (97.6 UK pints)
Sump maximum... ..	53,5 litres (94.14 UK pints)
Sump minimum	37,5 litres (65.99 UK pints)
Lubricating oil pressure:	
At rated speed	4,2 bar (60.9 PSI)
Typical coolant capacity of engine... ..	20,8 litres (4.6 UK gallons)
Typical coolant capacity of engine and radiator	61 litres (13.4 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

Thread size metric	Metric nuts and setscrews torque		
	Nm	lbf ft	kgf m
M6	12	9	0,9
M8	28	21	2,2
M10	55	41	4,5
M12	100	75	8,0
M14	124	120	13,0
M16	240	175	19,3
M20	460	340	46,9
M24	800	590	81,5
M30	1600	1180	163,1
M36	2700	2000	273,3

Thread size metric	Metric taperlock studs torque		
	Nm	lbf ft	kgf m
M6	8	6	0,81
M8	17	13	3,5
M10	35	26	4,5
M12	65	48	6,6
M16	110	80	11,2
M20	170	125	17,3
M24	400	300	40,7
M30	750	550	76,4
M36	1200	880	122,3

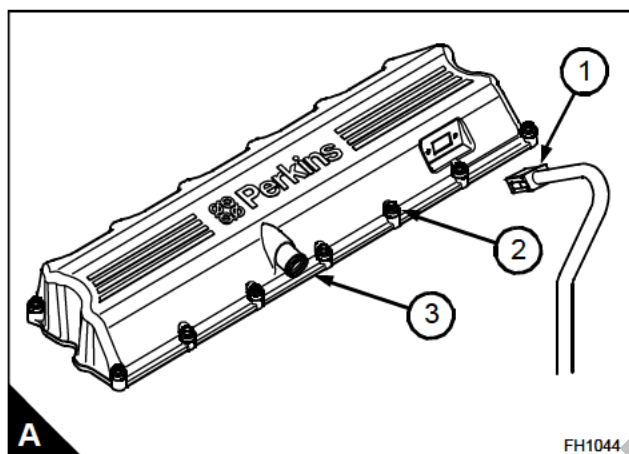
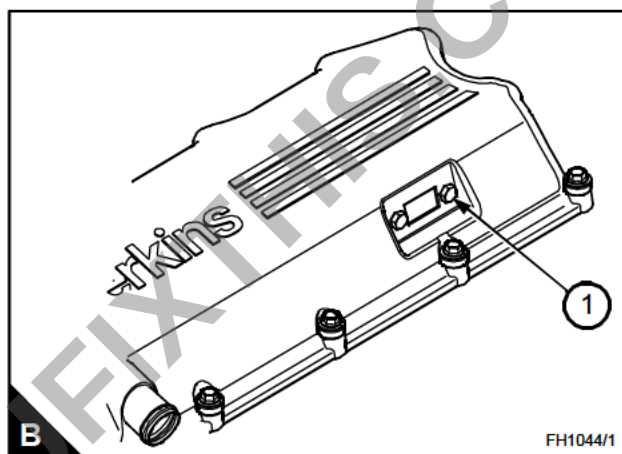
Rocker cover

To remove

Operation 3-1

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 Remove the engine breather pipe, see Operation 9-1.
- 2 Disconnect the outer wiring harness (A1) from the rocker cover.
- 3 Remove the two setscrews (B1).
- 4 Loosen the fasteners (A2) fully which retain the rocker cover (A3), but do not remove the setscrews from the assembly; allow them to be retained by the seal.



- 5 Remove the inner wiring harness on the rocker cover, see Operation 14-7.
- 6 Remove the rocker cover (A3).
- 7 Inspect the seal of the rocker cover and renew if worn or damaged.

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3 Cylinder head assembly

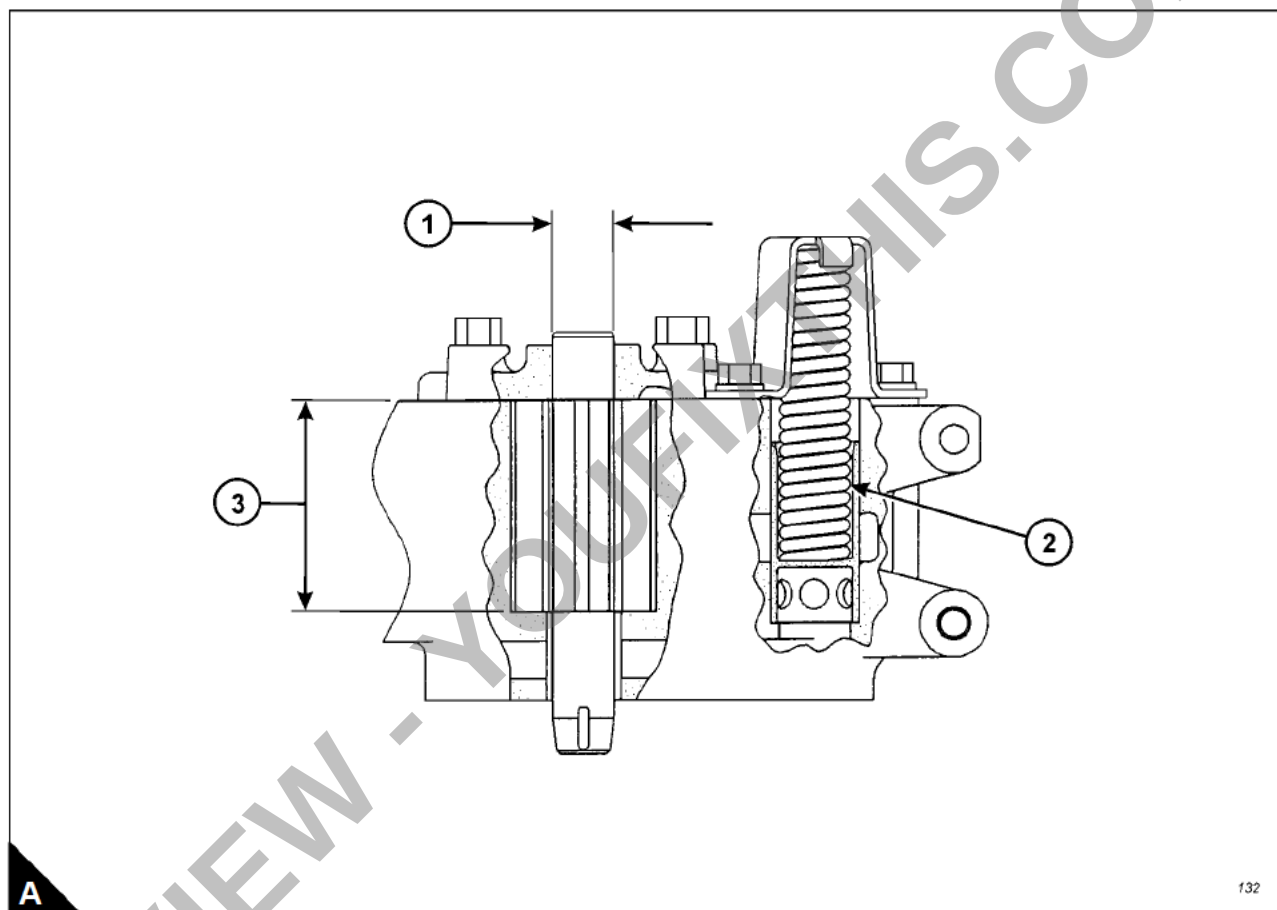
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Lubricating oil pump

Diameter of shafts (A1)	22,217 +/- 0,005 mm (0.8747 +/- 0.0002 in)
Diameter of bores in cover for shafts.....	22,258 +/- 0,008 mm (0.8763 +/- 0.0003 in)
Length of gears (A3)	79,375 +/- 0,025 mm (3.1250 +/- 0.0010 in)
Depth of bores for gears (A3)	79,502 +/- 0,020 mm (3.1300 +/- 0.0008 in)

Spring (A2):

Test force.	150 +/- 8 Nm (110 +/- 6 lbf ft)
Length under test force	117,9 mm (4.64 in)
Free length after test	152,9 mm (6.02 in)
Outside diameter	27 mm (1.063 in)



To fit

Special requirements

Special tools	
Description	Part number
Lifting bracket	VP12712
Special socket	GE50020

1 If the oil transfer tube (A6) 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 POWERPART retaining compound, 21820638, 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 (A1) to the cylinder block. Fit a new spacer plate gasket over the dowels in the cylinder block.

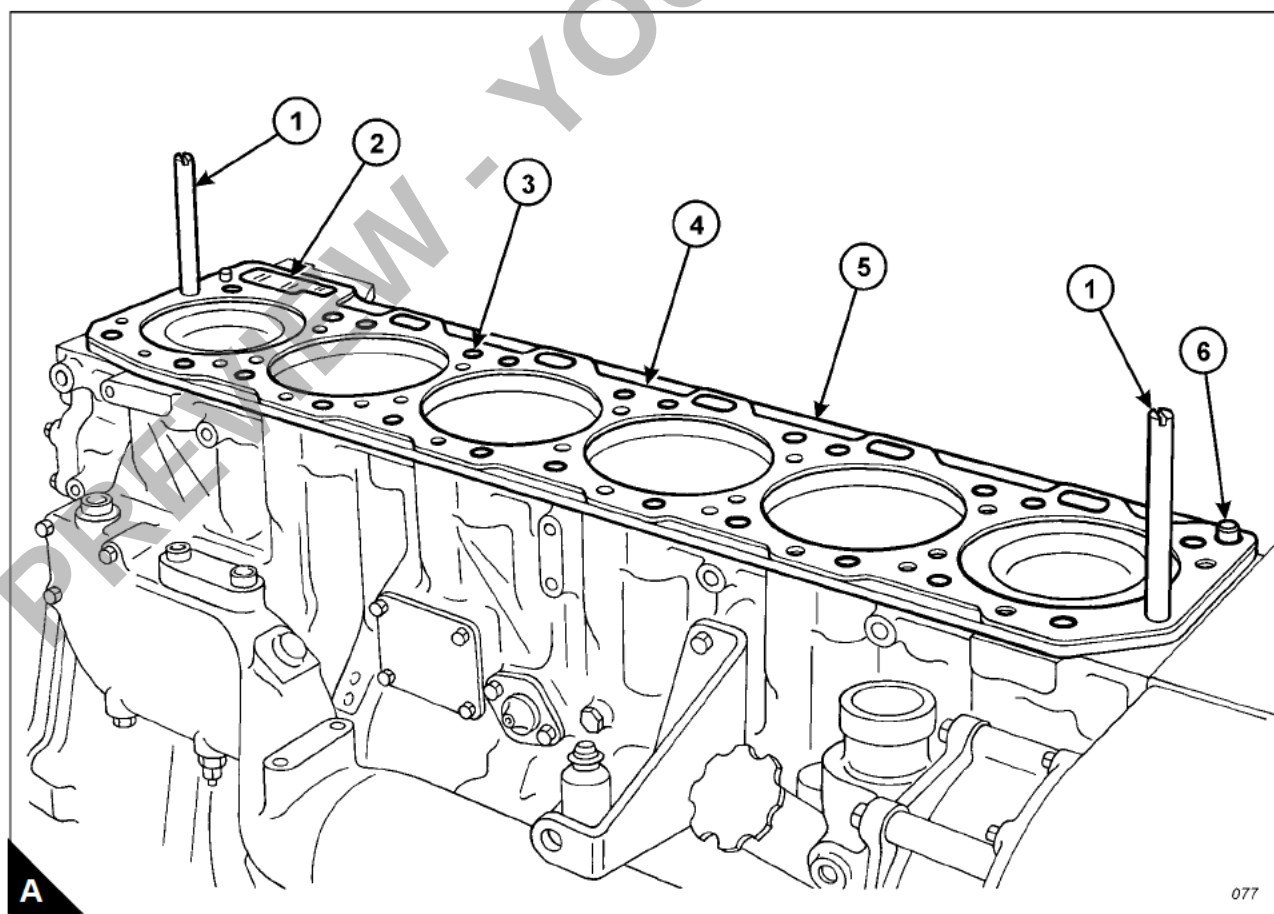
Note: Apply a small amount of clean engine lubricating oil to the seals and 'O' rings before installation.

5 Fit two new 'O' ring seals to the oil transfer tube (A6).

6 Fit the spacer plate (A5) and fit the second 'O' rings to the oil transfer tube (A6). Fit the 24 coolant seals (A3) and a new seal (A2) to the oil drain passage.

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

8 Fit a new cylinder head gasket (A4) onto the spacer plate.



Continued

Piston cooling jets

To remove and to fit

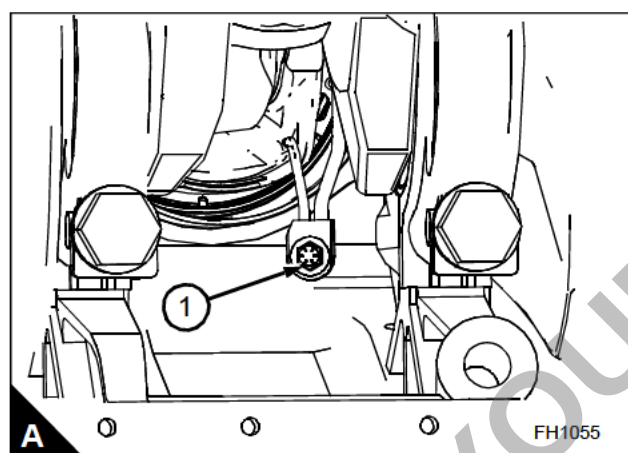
Operation 4-3

Special requirements

Special tools	
Description	Part number
Engine turning tool	CH11148

To remove

- 1 Remove lubricating oil pump, see Operation 10-6.
- 2 Use the engine turning tool CH11148 to turn the crankshaft in a clockwise direction (as seen from the front of the engine) to obtain access to the relevant piston cooling jet.
- 3 Remove the setscrew (A1) which retains the cooling jet and remove the cooling jet from the engine.



- 4 Repeat steps 2 and 3 for the cooling jets which remain.

To fit

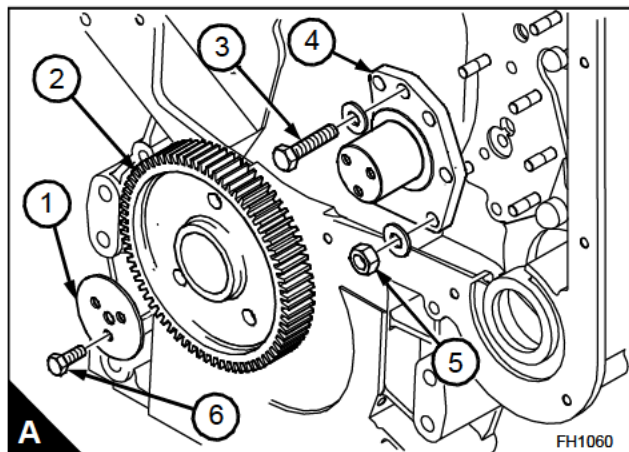
- 1 Carefully fit the piston cooling jets to the engine, ensure that the nozzles of the cooling jets are not damaged or distorted during the operation.
- 2 Tighten the setscrew (A1) to 40 Nm (30 lbf ft) 4 kgf m.
- 3 Turn the crankshaft clockwise (as seen from the front of the engine) as necessary to obtain access to the relevant positions.
- 4 Fit the lubricating oil pump, see Operation 10-6.

Main Idler gear

To remove

Operation 6-7

- 1 Remove the camshaft gear, see Operation 6-2.
- 2 Remove the adjustable idler gear, see Operation 6-4.
- 3 Remove the setscrews (A6) and remove the plate (A1).
- 4 Remove the gear (A2).



- 5 Remove the setscrew (A3) and the nuts (A5) and discard. Remove the axle (A4).

To fit

Operation 6-8

Special requirements

Consumable products	
Description	Part number
POWERPART Threadlock and nutlock	21820117

Caution: Some setscrews used on the axles of the gears are a special locking setscrew. These setscrews use a material similar to nylon in order to lock the setscrew. Perkins engine company limited recommend that these setscrews are discarded after use. If the setscrews are used again they must have POWERPART Threadlock and nutlock 21820117 applied to the threads.

- 1 Ensure that all components are clean and free from damage. Renew as necessary.
- 2 Align the axle (A4) to the gear case. If necessary apply POWERPART Threadlock and nutlock 21820117 to the setscrew and studs.
- 3 Fit the setscrew and nuts (A3) (A5) and tighten them to 50 Nm (37 lbf ft) 5 kgf m.
- 4 Lubricate the axle with clean engine lubricating oil.
- 5 Fit the gear (A2).
- 6 Align the plate (A1), apply POWERPART Threadlock and nutlock to the setscrews and tighten to 28 Nm (20 lbf ft) 2,8 kgf m.
- 7 Fit the adjustable idler gear, see Operation 6-5.
- 8 Fit the camshaft gear, see Operation 6-3

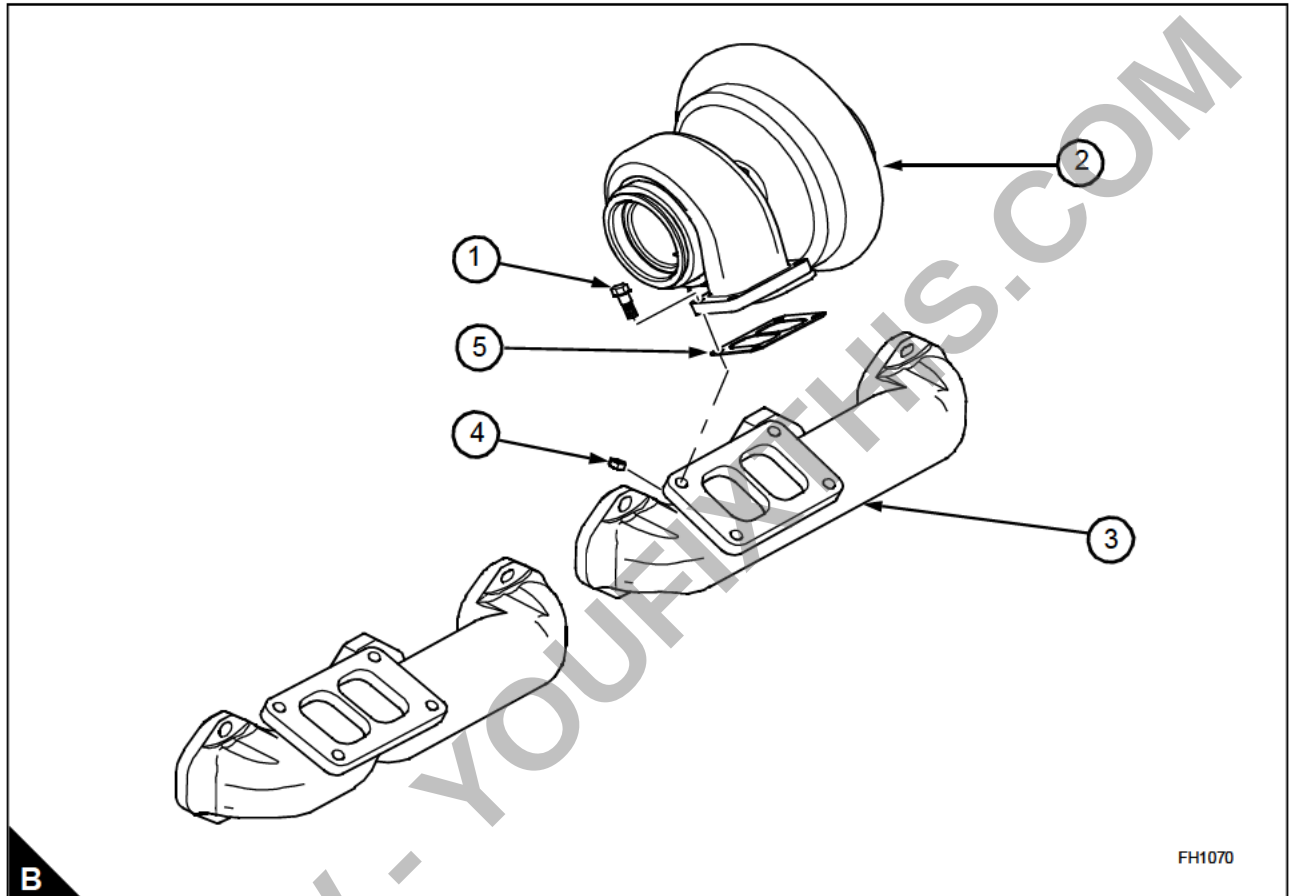
8 Remove the four nuts and bolts (B4) and (B1) from each of the turbochargers.

Note: Use suitable lift equipment in order to lift the turbochargers. Each turbocharger weighs approximately 26.5 kg (58 lb).

9 Remove the turbochargers (B2).

10 Remove the gasket (B5) from both exhaust manifolds (B3).

11 Discard all used joints and seals.



Fuel filter header

To remove and to fit

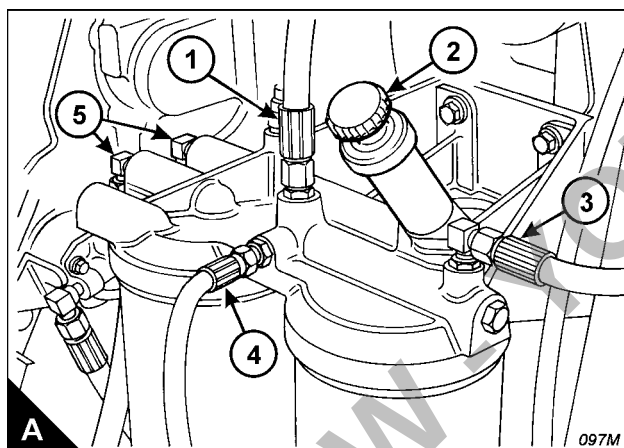
Operation 11-6

To remove

- 1 Remove the fuel priming pump (A2), see Operation 11-3.
 - 2 Disconnect the fuel pipes (A1, A3, A4 and A5). Fit plugs or caps to all openings to prevent contamination of the fuel system.
 - 3 Remove the filter housings and elements from the fuel filter header.
- Warning!** Discard the used filter elements and 'O' ring in a safe place and in accordance with local regulations.
- 4 Remove the setscrews which retain the filter header on the crankcase.

To fit

- 1 Fit the filter header to the crankcase.
- 2 Remove any plugs or caps and connect the fuel pipes (A1, A3, A4 and A5).
- 3 Renew the fuel filter elements in the primary and secondary fuel filter canisters. Refer to the User's Handbook TPD 1516.
- 4 Fit the fuel priming pump, see Operation 11-3.
- 5 Eliminate air from the fuel system, see Operation 11-7.



13

Flywheel and housing

General information

Warning! Always use lift equipment of the approved type and of the correct capacity to lift heavy engine components. Never work alone when you operate lift equipment.

The steel flywheel is fitted with a hardened starter ring. The flywheel is fastened securely to the rear face of the crankshaft by a clamp ring and 12 setscrews.

A dowel ensures that, when the flywheel is fitted, the timing marks on the flywheel are in the correct relationship to the crankshaft.

The flywheel housing is fitted on the crankcase by two dowels and 24 setscrews and washers. The electric starter motor is mounted on the left side of the flywheel housing and a facility is provided on the right side to set the engine to TDC on number one or number six piston.

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