

11 SPECIFICATIONS

Basic engine data

Engine

Type	Vertical, 6-cylinder, in-line, liquid cooled, four stroke diesel, turbocharged and charge cooled (depending on application)
Combustion system	Direct injection
Nominal bore	130,17 mm (5.125 in)
Stroke	152,4 mm (6.00 in)
Cubic capacity	12,17 litres (742.64 in ³)
Compression ratio	
Tx2000 engines	17.8:1
Other engines	15.9:1
Firing order	1, 4, 2, 6, 3, 5
No.1 cylinder is at the front (fan end)	
Direction of rotation	Clockwise: view on front (fan end)
Tappet clearances (Hot or cold)	
Inlet	0,25 (0.010 in)
Exhaust	0,50 (0.020 in)
Injection timing	As stamped on engine data plate
Dry weight of engine (approximate)	1050 kg (2,315 lb)
Cooling system	
Capacity of coolant system (engine only)	
Tx2000 engines	18 litres (4 UK gallons)
Earlier engines	20,4 litres (4.5 UK gallons)
Coolant system pressure	Maximum 70 kN/m ² (10 lbf/in ²)
(at normal temperature of operation)	
Coolant pump	Centrifugal, gear driven unit
Temperature (normal)	
Tx2000 engines	82 to 103°C (180 to 217°F)
Earlier engines	78 to 95°C (172 to 203°F)
Thermostat	Triple element, wax capsule type with radiator by-pass

Recommended specific applied torques

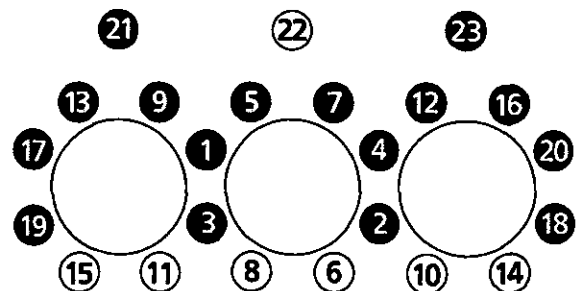
Caution: The torque loads listed below apply to threads in an oil wet condition, unless the use of thread locking compound is recommended.

Application of a torque load specification is NOT enough to ensure that the relevant components are retained securely as an assembly. It is important to conform also to the recommendations for assembly and, if given, the sequence in which the bolts or nuts must be tightened. This information is given in the relevant section of this publication.

If a bolt or nut is retained with a locking washer, locking plate or split pin, the specification for a torque load can be exceeded, if necessary, by the MINIMUM amount that is needed for correct assembly.

	Nm	lbf ft
Alternator pulley nut		
Prestolite	95	70
CAV 5	54	40
CAV 7	88	65
Camshafts		
Thrustplate setbolts/capscrews	54	40
Drive gear setbolts	61	45
Compressor - single cylinder model		
Drive gear nut	176	130
Cylinder head bolts (single cylinder model)	25 to 30	18 to 22
Compressor - twin cylinder model		
Drive gear nut	200 to 250	148 to 184
Connecting rods		
Big end bearing bolts and nuts	217	160
Coolant pump		
Pulley retaining screws (low-mounted pump)	24	18
Cylinder heads		
Initial tightening of all bolts and nuts	136	100
Intermediate tightening of all bolts and nuts	204	150
Final tightening at positions 1 to 23 in black circles ONLY		+40 degrees

Caution: The drilled bolt, which is identified by the word "OIL" stamped on its head for early engines and by a recess in its head for later engines, MUST be fitted at position 22. The old and new drilled bolts are interchangeable. Certain early engines are fitted with a stud at position 22 and require a nut and washer.



Rocker pedestal bolts	41	30
Tappet screw lock nuts	41	30
Rocker cover stud (apply Loctite 270 to thread before fitting to pedestal)	16.3	12
Rocker cover nuts	10.8	8
Fuel injector sleeves	33	24

12 CYLINDER HEAD ASSEMBLIES

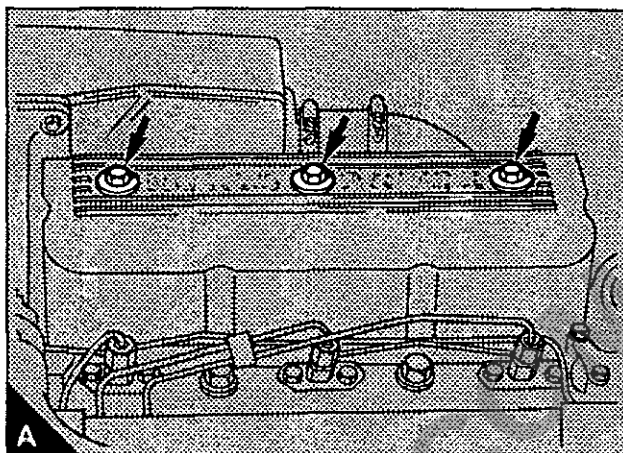
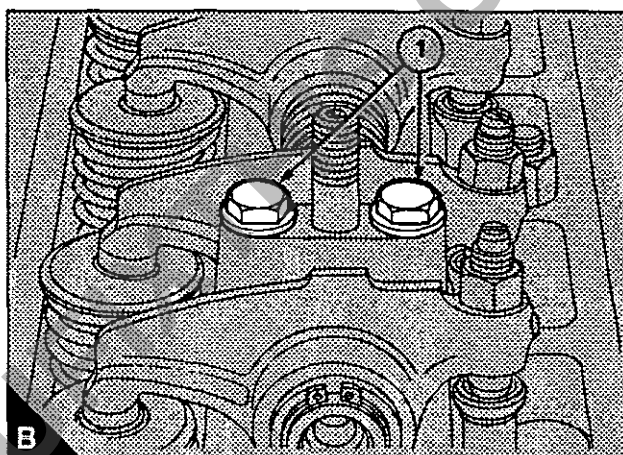
Rocker cover

To remove

- 1 Remove the three cap nuts (A) from the top of the cover.
- 2 The cover and joint can now be removed. For certain engines it may be necessary to first remove the air ducting between the turbocharger and the inlet manifold.

To fit

- 1 Remove the joint from the rocker cover and clean the two corresponding faces of the cover and cylinder head.
- 2 Fit a new joint to the rocker cover and, ensuring that it is correctly located within the slots in the cover, secure it to the cover with a suitable adhesive. Place the cover in position on the head.
- 3 Secure the cover with the three cap nuts and check that the joint has not moved. Tighten the cap nuts evenly to a torque of 11 Nm (8 lbf ft). Do NOT over tighten.



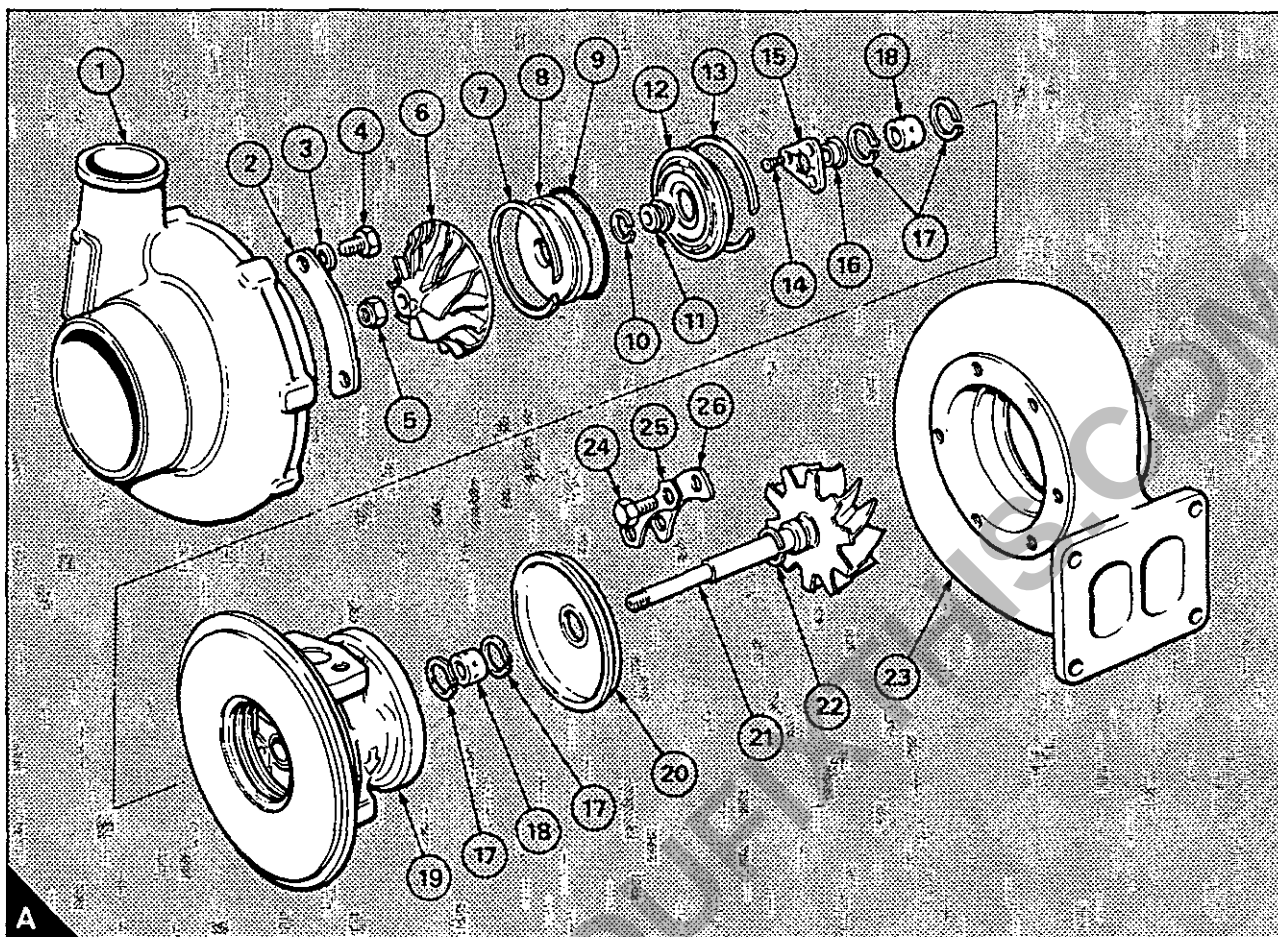
Rocker assembly

To remove

- 1 Remove the rocker cover as previously described.
- 2 Unscrew the bolts (B1) which secure the rocker pedestals to the cylinder head.
- 3 Remove the rocker assembly complete and carefully lift out the push rods. Ensure that the tappets remain in position in the crankcase.

To fit

- 1 Ensure that the tappets have remained correctly positioned in the crankcase and fit the push rods.
- 2 Check that the lower ends of the push rods are located inside the tappets.
- 3 Fit the rocker assembly with the tappet adjusting screws seating in the upper end of the push rods.
- 4 Screw in the pedestal securing bolts and tighten evenly, outwards from the centre, to a torque of 41 Nm (30 lbf ft).
- 5 Check and adjust the tappet clearances as given on page 12.06.
- 8 On completion of tappet clearance adjustment, refit the rocker covers.



Turbochargers: OE49342, OE51140 and OE51430

These turbochargers are very similar in both design and operation.

Whilst OE49342 is illustrated, OE51140 differs from OE49342 in only minor details. Turbocharger OE51430 is fitted with a waste-gate. The following operations apply to these three types of turbocharger.

Oil pressure with the engine on load must be between 2,0 kgf/cm² (30 lbf/in²) and 4,0 kgf/cm² (60 lbf/in²). Under idling conditions pressure should not fall below 0,7 kgf/cm² (10 lbf/in²).

To dismantle

Refer to the exploded view (A) for itemised parts.

1 Use a scribe to mark the relative positions of the turbine housing (23), the bearing housing (19) and the compressor housing (1). This will ensure correct alignment during reassembly.

2 Clamp the unit on the turbine inlet flange in a vice in an upright position.

3 Remove the bolts (4) and the clamping plates (2) and lift off the compressor housing.

Caution: Compressor wheel blades can be easily damaged with compressor housing removed.

4 Bend back the tabs on the locking plates (25) and remove the bolts (24) and clamping plates (26) from the turbine housing (23). Lift the core assembly away from the turbine housing.

Caution: Turbine blades can be easily damaged with turbine housing removed.

5 Use a scribe to mark the relative position of the compressor impeller (6) to the turbine shaft (21). Hold the turbine wheel in a suitable fixture and remove the compressor lock nut (5). **Note:** left hand thread. Do NOT bend the shaft.

6 Slide the compressor impeller (6) off the shaft.

7 Ease out the retaining ring (7), using a small screwdriver, and remove the oil seal plate (8) from the bearing housing (19). Remove the 'O' ring seal (9) from the bearing housing and push out the oil slinger (11) from the oil seal plate.

8 Lift out the oil baffle (12).

9 Remove the three flat head cap screws (14) and withdraw the thrust bearing (15) and thrust collar (16).

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Introduction

This workshop manual has been designed to provide assistance in the service and the overhaul of Eagle 800 and Tx engines. Most of the general information, which is included in the User's Handbook (sections 1 to 9), has not been repeated in this Workshop Manual and the two publications should be used together.

Read the 'Safety precautions' and remember them. They are given for your protection and must be applied at all times.

Cylinder bore identification

The left and right sides of the engine are as seen from the rear (flywheel) end.

The numbers of the cylinders start from the front of the crankcase.

To ensure that you use the correct information for your specific engine type, refer to 'Engine identification' on this page.

Danger is indicated in the text by two methods:

Warning! This indicates that there is a possible danger to the person.

Caution: This indicates that there is a possible danger to the engine.

Note: Is used where the information is important, but there is not a danger.

Engine identification

The engine number is stamped on the data plate which is fastened to the left side of the crankcase.

For early engines, a typical engine number is: 8B27469U 66381T, which consists of these codes:

8B	Engine family
27469	Engine number
U	Country of manufacture
66381	Build line number
T	Year of manufacture

Engines made after August 1994, have a new engine number system. For these engines, a typical number is: SAK 06 0012 U 1854 A, which consists of these codes:

SA	Engine application
K	Engine type
06	Number of engine cylinders
0012	Engine specification number
U	The country of manufacture
1854	Build line number
A	Year of manufacture

Units such as the fuel injection pump and turbochargers have their own data plates.

If you need parts, service or information for your engine, you must give the complete engine number to your Perkins distributor.

12 CYLINDER HEAD ASSEMBLIES

9 Refit the rocker gear and push rods. Adjust the tappet clearances, see page 12.06, and fit the rocker covers.

10 Fit the inlet manifold/charge cooler assembly. Do not fit the ducting to the turbocharger(s) at this stage.

11 Fit the exhaust manifold and tighten the securing bolts to a torque of 45 Nm (33 lbf ft). Fit the turbocharger(s).

12 Renew the sealing rings (A) in the coolant rail/thermostat housing and refit the assembly.

13 Fit the fuel filter assembly.

14 Remove any blanking plugs or caps and refit the injectors. Tighten the clamping bolts to a torque of 10,8 Nm (8.0 lbf ft).

15 Refit the fuel spill pipes using new washers with the banjo bolts.

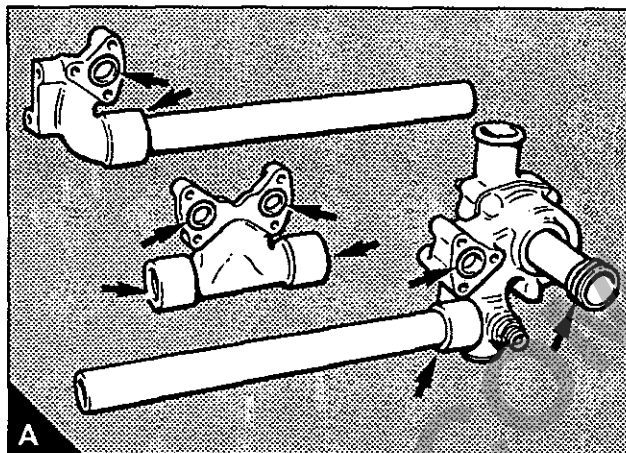
16 Remove the blanking covers from the fuel injection pump and fit the high pressure fuel pipes as a complete set. Do NOT allow the pipes to become bent. Tighten the nuts to a torque of 25 Nm (18.5 lbf ft).

Warning! If a high pressure fuel pipe becomes bent, its structure will be damaged and it may become split during use.

17 Fit the air ducting between the turbocharger and the induction manifold/charge cooler.

18 Refill the cooling system.

Caution: When a cylinder head had been removed and fitted, its bolts and nut must be retightened to the correct torque figures and the tappet clearances checked after the first 500 to 1 000 km. See page 12.05. This operation does NOT apply to Tx2000 engines.



Wheelcase and drive assembly 15

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Wheelcase	
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To fit	15.03
Backplate	
To remove	15.03
To fit	15.04
Camshaft gear	
To remove	15.04
To fit	15.04
Idler gear	
To remove	15.04
To fit	15.04
Gear backlash adjustment	15.05

Cam followers

To remove

- 1 Drain the coolant system to below the level of the coolant inlet pipe for the compressor.
- 2 Remove the rocker covers, the rocker gear assemblies and the push rods. Store the push rods in the correct sequence to ensure that they can be refitted to their original positions.
- 3 Disconnect and remove the oil feed and coolant pipes from the compressor, and remove the compressor air supply pipe.
- 4 Slacken the hose clip and remove the breather pipe from the cam follower cover.
- 5 Remove the cam follower cover and withdraw the baffle. Discard the gaskets.
- 6 Lift out the cam followers. Keep the cam followers in the correct sequence to ensure that they can be refitted to their original positions.

Inspection

Inspect the followers for wear and scuffing, and check each one in its respective bore. If the cam follower is otherwise serviceable, slight damage may be removed by the use of a stone.

To fit

- 1 Ensure that the joint faces on the cover plate and crankcase are clean.
- 2 Lightly smear the cam followers with clean engine oil and fit them to their correct positions in the crankcase.
- 3 Fit the baffle and cover plate, complete with a new gasket.
- 4 Fit the breather pipe to the cover and tighten the clip.
- 5 Fit the oil feed pipe, the coolant pipes and the air supply pipe to the compressor.
- 6 Fit the push rods to the relevant cam followers. Fit rocker gear and adjust the tappets as given on page 12.06.
- 7 Fit the rocker covers and fill the coolant system to the correct level with the approved coolant mixture.

The filtered oil is then directed into the transfer pipe which returns the oil to the main oil gallery which is machined in the crankcase.

Drillings in the crankcase provide lubrication for the camshaft and crankshaft bearings. The crankshaft shown (A) is of the early type which included an oil reservoir within each crankpin. The crankshafts of engines built after July 1995 have a new arrangement of oil passageways which removes the need for oil reservoirs.

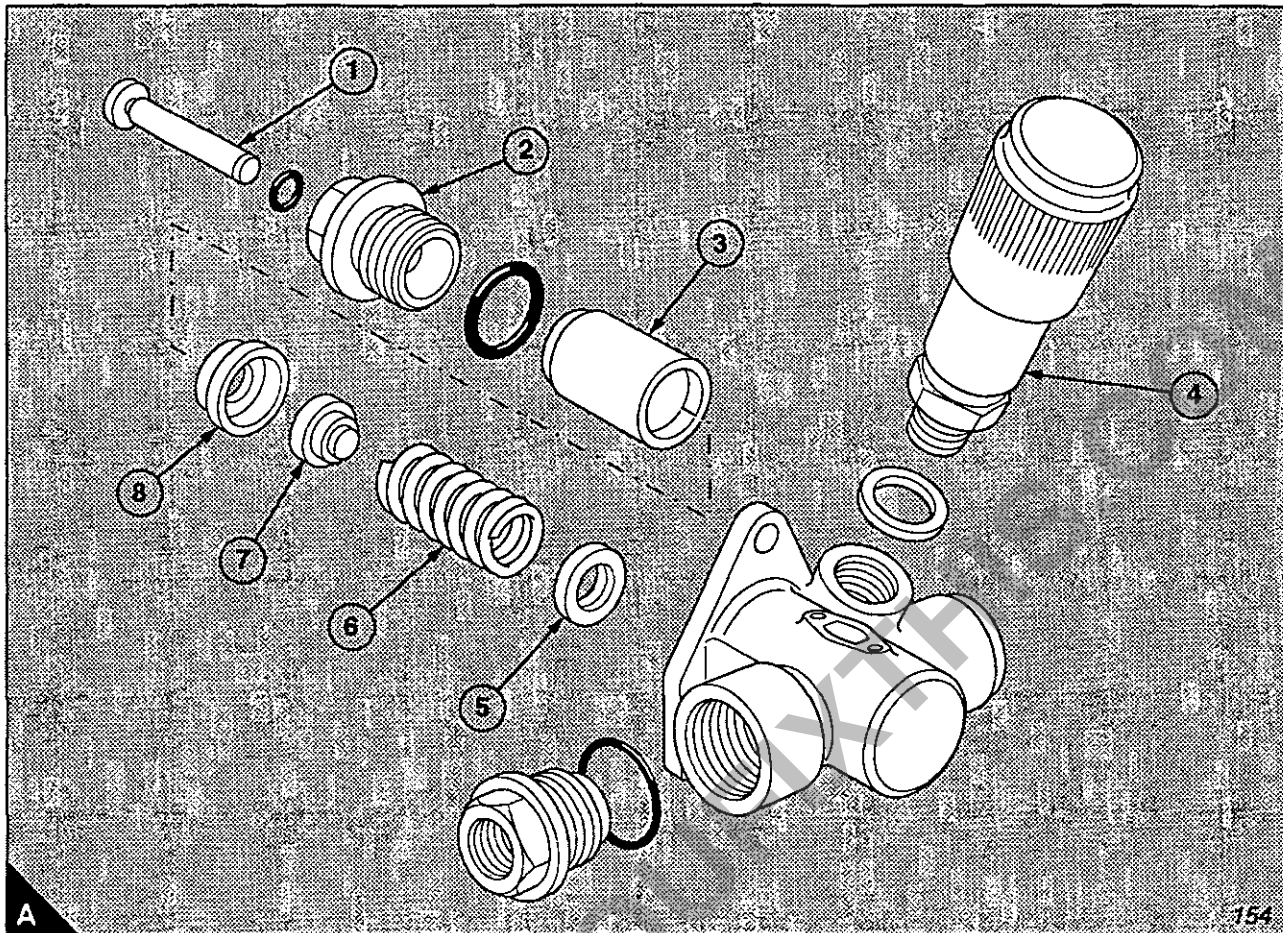
Two oilway studs in the top face of the crankcase allow the passage of oil for lubrication of the rocker gear, push rods and tappets.

Individual drillings from the main gallery supply oil, under pressure, to the piston cooling jets. The jets, fitted with an 'O' ring type seal, are fitted to the underside of the main oil gallery. Oil flow from the jets is continuous when the engine is running and is directed at the inside of the piston.

The idler gear axle and bearing are supplied with oil under pressure from the main gallery, with the gear train being splash lubricated.

Oil to the fuel injection pump passes through drillings in the mounting plate and gear plate and returns to the sump through a drain hole at the front of the pump. For recent engines, lubricating oil is supplied to the fuel injection pump by an external flexible pipe connected to the main oil gallery of the crankcase.

Oil is delivered to the turbocharger bearings through a steel pipe from the engine system and returns to the sump through a flexible drain pipe.



Fuel feed pumps

One of two types of feed pump is used on the Eagle range of engines, either single acting or double acting types. Tx engines are fitted with the single acting type.

Single acting type

To remove

- 1 Clean the area immediately surrounding the feed pump.
- 2 Disconnect the fuel pipes and remove the securing nuts and washers.
- 3 Lift the feed pump away from its mounting.

Dismantling and inspection

- 1 Withdraw the sliding tappet (A1).
- 2 Unscrew and remove the hand primer (A4).
- 3 Carefully unscrew the roller-tappet shell (A2) and extract the plunger (A3), non-return valve (A6), spring (A7), spacer ring (A5) and spring seat (A8), noting the sequence of withdrawal. The priming plunger of early models differs slightly from that shown (A).

- 4 Clean all parts and carefully inspect for wear or damage.

- 5 Sealing rings and any parts which are worn or damaged must be renewed.

To assemble

- 1 Apply a light coat of clean engine oil to all parts.
- 2 Assemble the pump in the sequence as shown (A).
- 3 Firmly secure the roller-tappet shell and the hand primer.

To test

- 1 Perform a leakage test by blanking off the delivery connection and applying air pressure at 193 kN/m² (28 lbf in²) to the suction connection, with the pump immersed in fuel oil. Check for air bubbles and at the same time, operate the pump plunger to ensure that there is no leakage from the plunger bore.

To fit

- 1 Refitting is a reversal of the removal procedure; use a new gasket.

Electrical equipment 23

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