Safety precautions

General

For safe and reliable operation of the engine it is very important that these safety precautions, and those **Warnings** and **Cautions** given throughout this manual, are observed, and where necessary the special tools indicated are used.

All safety precautions should be read and understood before operating or servicing the engine.

Improper operation or maintenance procedures are dangerous and could result in accidents, injury or death.

The operator should check before beginning an operation that all the basic safety precautions have been carried out to prevent accidents occurring.

You must also refer to the local regulations in the country of use.

Note: Some items only apply to specific applications.

Guards

- Ensure that guards are fitted over exposed rotating parts, hot surfaces, air intakes, belts or live electrical terminals (high and low tension).

Protection equipment

- Ensure that correct protection equipment is worn at all times.
- Always wear protective gloves when using inhibitors or anti-freeze, removing the pressure cap from the radiator or heat exchanger filler, changing the lubricating oil/filter or changing the electrolyte in the battery.
- Always wear ear protection when working in an enclosed engine room.
- Always wear suitable eye protection when using an air pressure line.
- Always wear protective boots when working on the engine.
- Always wear protective headgear when working on or underneath the engine.

Naked flames

- Ensure that no smoking or naked flames are lit when checking battery electrolyte, working in the engine room or when operating or servicing the engine.

Fuel/oil pipes

- Ensure that all pipes are regularly checked for leaks.
- Ensure that all pipes and the surrounding area are regularly checked for spilt oil (and cleaned up where necessary).
- Always apply suitable barrier cream to hands before any work is carried out.

Gas pipes

- Always check for gas/air mixture leaks.
- Ensure that the gas line and valves meet local safety standards.
- Ensure that the gas line pressure is correct.

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

Specific torque settings

Warning! *It is essential that the correct length of screw or bolt is used. Insufficient thread may result in the thread being stripped. Excessive thread may result in bottoming in a blind hole or catching on adjacent components.*

Cylinder head group

Description	Thread size	Torque tension	
		lbf ft	Nm
Cylinder head bolt (1)	M24	530	723
Rocker shaft capscrew and nut	M16	90	120
Rocker adjuster nut inlet/exhaust	M12	35	50
Rocker box capscrews	M10	50	70
Inlet manifold bolt	M10	35	50
Exhaust manifold bolt	M10	50	70
Turbocharger V-band clamp nuts	M8	8	11

(1) Cylinder head bolts to be lubricated under the heads, under the washers and on the threads with PBC (Poly-Butyl-Cuprysil) grease. All other bolt threads only to be lubricated with clean engine oil.

Crankcase and crankshaft groups

Description	Thread size	Torque tension	
		lbf ft	Nm
Main bearing bolt (1)	M24	580	783
Bolts sump to crankcase	M10	40	57
Connecting rod bolts (1)	M16	82	110
		and angle 60°	
Torsional vibration damper bolts	M12	120	160
Flywheel bolt	M16	250	340
TV Damper retaining plate	M16	250	340
Balance weight bolt	M16	250	340
Fan drive pulley bolts	M16	250	340
Piston cooling jet bolt	M10	7	10
Flywheel housing bolt	M10	35	50
Crankcase side bolts	M16	200	270

(1) Bolt and threads must be lubricated with clean engine oil.

Lubricating oil pump

Description	Thread size	Torque tension	
		lbf ft	Nm
Bolts, pump housing to gearcase plate	M10	35	50
Thin nut gear to drive shaft	M24	175	237

Camshaft group

Description	Thread size	Torque tension	
		lbf ft	Nm
Camshaft gear bolt	M12	110	150
Camshaft thrust plate bolt	M10	35	50
Camshaft follower housing capscrew	M10	50	70
Cam follower housing bolt	M10	35	50
Idler gear hub bolts	M10	35	50

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

4

Piston and connecting rod assemblies

Pistons

To remove **Operation 4-1**

Special requirements

Special tools			
Description	**Part number**	**Description**	**Part number**
Engine cranking device	SE253	30° Indicator socket tool	SE671K
Piston lifting tool	T6253/295	Torque wrench	UA
Piston ring compressing tool	T6253/139	Ratchet wrench (340 Nm/250 lbf ft)	UA

Warning! *Disconnect batteries or any other means of starting.*

1 Remove the cylinder head in question, see Operation 3-13.

2 Fit the engine cranking device SE253 to the spare starter motor mounting in the flywheel housing, see page 48 in the Users Handbook.

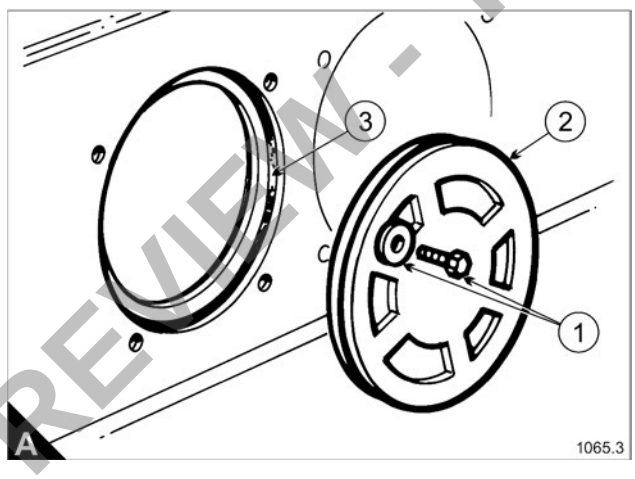
3 Remove the piston cooling jet, see Operation 10-1.

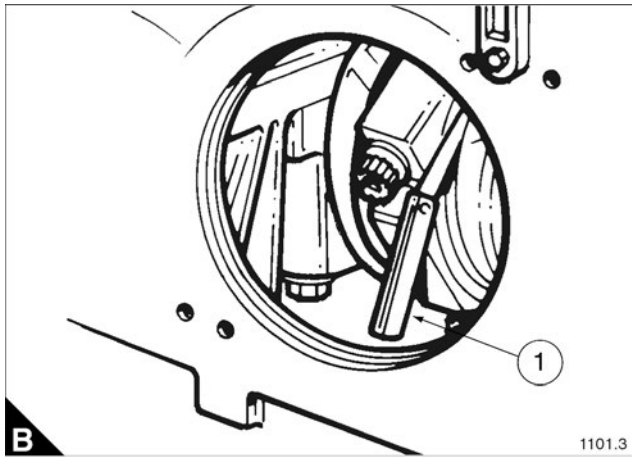
4 Take out the retaining bolts and washers (A1).

5 Remove the crankcase inspection cover (A2) and discard the 'O' ring seal (A3).

6 Rotate the crankshaft to a position where the con rod end float can be checked and the end cap and bolts can be removed.

7 Use feeler gauges (B1) set between the crankshaft and con rod. The maximum end float is 0,5 mm.





Continued

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

Valve gear oil feed pipework and ignition coil support assembly

To remove **Operation 3-2**

Note: This assembly is removed when cylinder heads are changed or at major overhaul.

1 Disconnect the spark plug leads (A1).

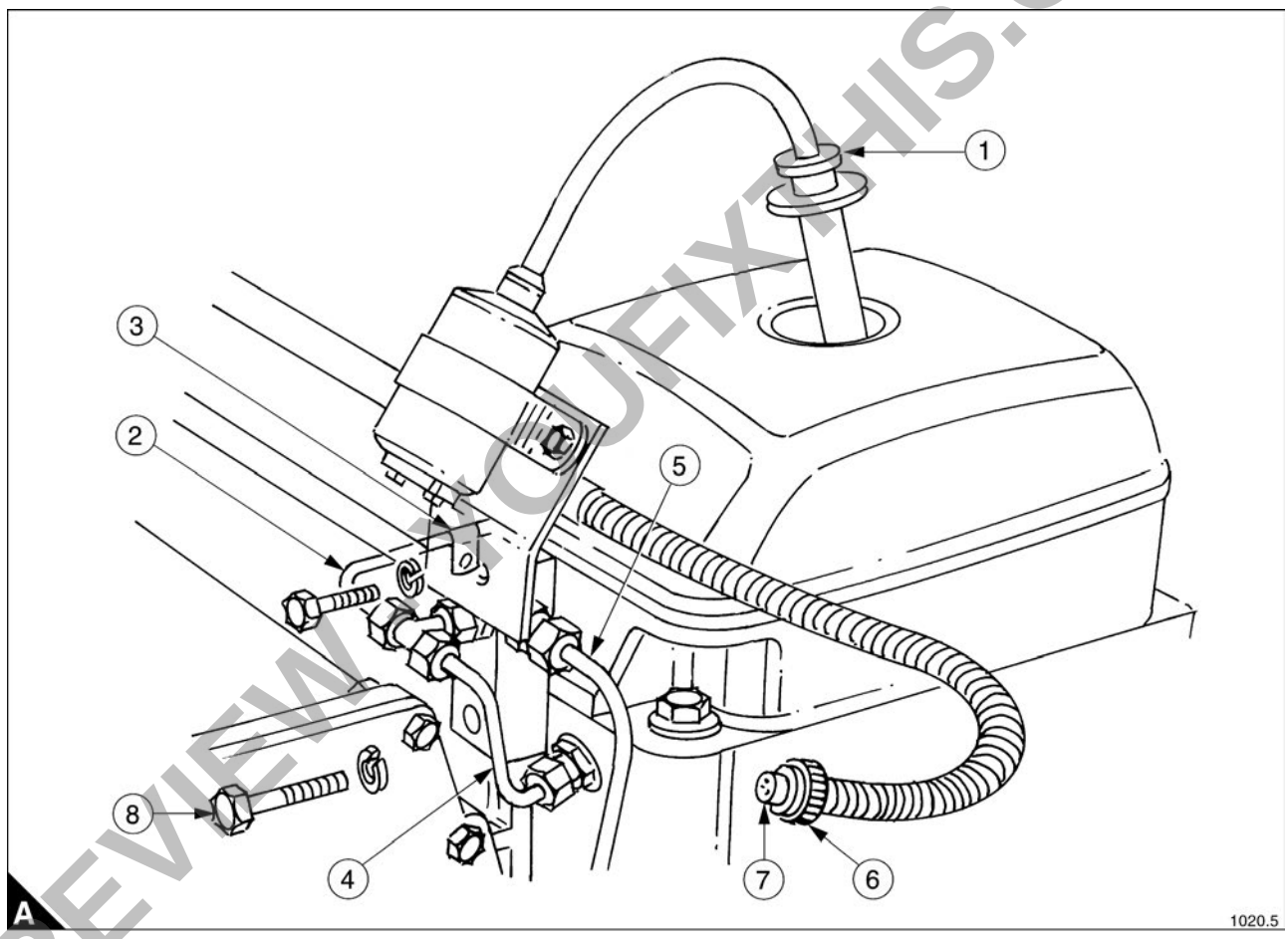
2 Remove the rocker box oil feed pipe (A2) and its steady clip (A3).

3 Remove the valve guide oil feed pipe (A4).

4 Disconnect the oil rail feed pipe (A5).

5 Unscrew the retaining collar (A6) and pull the multi-pin plug (A7) from the Altronic unit mounted on the inlet manifold at the gearcase end of the engine.

6 Remove the oil feed post retaining bolts (A8) and lift off the oil feed rail and ignition coils as an assembly.



PREVIEW YOUFIXTHIS.COM

Download full manual at youfixthis.com

To troubleshoot **Operation 14-3**

Check the three LED indicators located on the main panel of the unit. The green POWER indicator is ON when power is applied. The red PICK-UP and APPLICATION indicators are ON when there is a fault.

Indicator	Power applied engine stopped	Power applied engine rotating
Power	On	On
Pick-up	On (1)	Off
Application	Off	Off (2)

(1) No pick-up signal generated due to lack of rotation.
(2) This indicator will flash ON briefly when rotation commences and then turn OFF.

Check the three indicators located on the main panel of the unit. If the engine will not start or run correctly, crank engine with fuel turned off and check the chart below:

Indication and checks	Remedy
Power indicator OFF	
1 Check voltage to leads E(+) and F(-) of 6-pin pick-up cable.	**1** Must be in the range of 10-32 V dc.
2 If above check is OK:	**2** Replace DISN unit.
Pick-up indicator is ON with engine rotating:	
1 Check gap between pick-up and magnets.	**1** Correct gap.
2 Check cable between pick-up and DISN unit.	**2** Connect or replace cable.
3 Pick-up may be defective.	**3** Replace pick-up.
4 If above checks are OK:	**4** Replace DISN unit.

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

Shutdown equipment

- Always test that the protection system is working correctly.
- When stopping the engine in case of overspeed, high water temperature or low oil pressure should be provided.
- For heat sensors, methane and smoke protectors should be provided (if applicable).
- Always be in a position to stop the engine (even remotely).

Start-up

- When working on the engine always ensure that the battery has been disconnected, and that any other means of accidental start-up has been disabled.
- Never start the engine with the governor linkage disconnected.
- Do not hold the stop lever in the run position when starting the engine.
- Always hold the stop lever in the stop position when cranking only.

Electrical equipment

- Always check that electrics are earthed to local safety standards.
- Always disconnect the electrical supply to the jacket water heater (if fitted) before working on the engine.
- Take care to prevent any danger of electric shock.
- Never re-adjust the settings of electronic equipment without reference to the Workshop Manual.

Freezing or heating components

- Always use heat resistant gloves and use the correct handling equipment.

Exhaust system

- Check the system for leaks.
- Ensure that the engine room is correctly ventilated.
- Check that all the guards are fitted.
- Check that the pipework allows the exhaust gas to escape upwards.
- Check that the pipework is supported.

Stopping the engine

1 Disengage the engine load.

2 Run the engine on NO LOAD for 5 to 7 minutes before stopping.

Note: This will allow the circulating lubricating oil to dissipate heat from the bearings, pistons, etc. It will also allow the turbochargers, which run at a very high speed, to slow down while there is still oil flow through the bearings.

Ensure that the engine is stopped before performing any of the following operations:

- Changing the lubricating oil.
- Filling or topping up the cooling system.
- Beginning any repair work on the engine.
- Adjusting belts (where fitted).
- Adjusting bridge pieces / valve clearance.
- Changing spark plugs.
- Changing air or oil filters.
- Tightening any fixing bolts.

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

To fit **Operation 3-14**

Special requirements

Special tools			
Description	**Part number**	**Description**	**Part number**
Cylinder head lifting tool	T6253/154	Hoist	UA

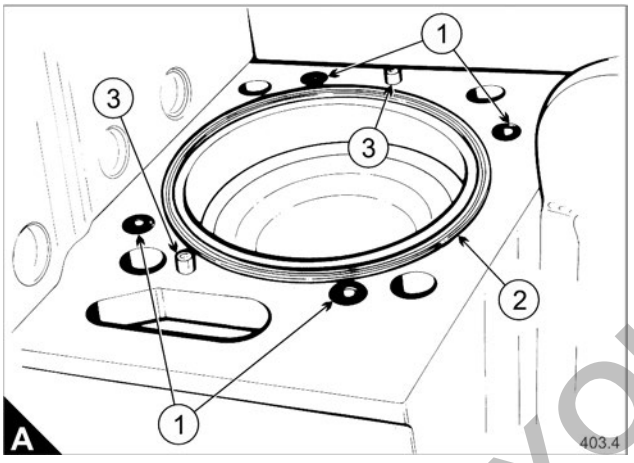
1 Place the four ‘O’ rings (A1) into the recesses in the crankcase face, holding them in position with grease.

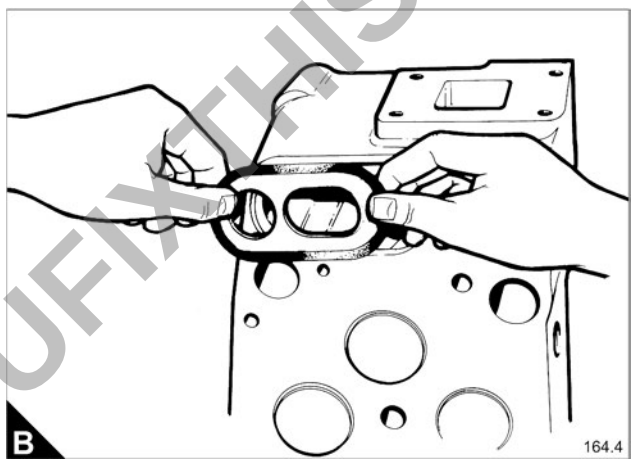
2 Fit the flame ring (A2) onto the cylinder liner flange.

3 Fit the push rod tunnel, ‘O’ ring and its retainer into the recess in the combustion face of the cylinder head, holding it in position with grease (B).

4 Fit the cylinder head lifting tool and hoist the cylinder head into position.

5 Lower the cylinder head, ensuring it locates on the two dowels (A3) in the crankcase face. Remove the cylinder head lifting tool.





Continued

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

Crankshaft damper 8 cylinder engines and (when fitted) fan drive pulley

To remove **Operation 5-5**

Special requirements

Special tools			
Description	**Part number**	**Description**	**Part number**
Damper lifting tool	T6253/214	Guide studs	T6253/157
Damper hub extractor	T6253/20	Hoist	UA

Note: The removal of the crankshaft damper etc is normally undertaken at major overhaul. The following procedure is based on the assumption that if fitted, the radiator fan, belts and guards must first be removed.

Warning! *The damper is filled with a silicone fluid contained in a closely fitting sealed casing. Great care must be used in its removal as any damage to the outer casing will render it ineffective.*

1 If fitted remove the belt drive pulley (A2).

Note: The retaining bolts (A1) hold the pulley and damper to the damper/adaptor (A5).

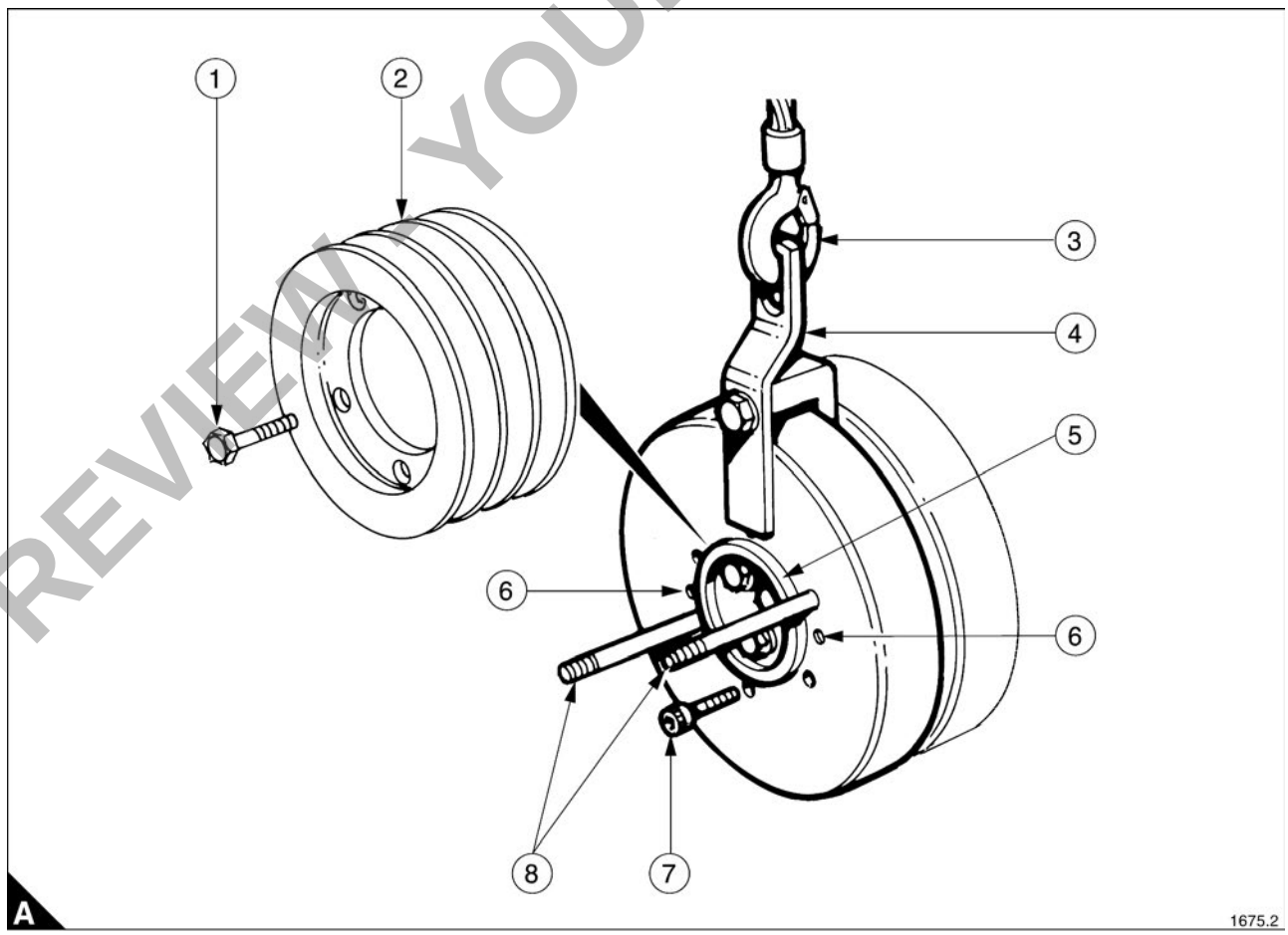
2 Fit the lifting tool (A4) to the front damper. Set the hoist to give light tension on the sling (A3).

3 Remove the six retaining bolts (A7) and fit the guide studs (A8) in two horizontally opposed bolt holes.

4 Fit two of the retaining bolts into the threaded holes in the damper (A6). Tighten them evenly to pull the damper from the adaptor and onto the guide studs.

5 Take the weight of the damper with the hoist, then slide the damper along the guide studs.

Caution: *Check the hoist is set to support the damper when it leaves the guide studs.*



Continued

PREVIEW YOUFIXTHIS.COM
Download full manual at youfixthis.com

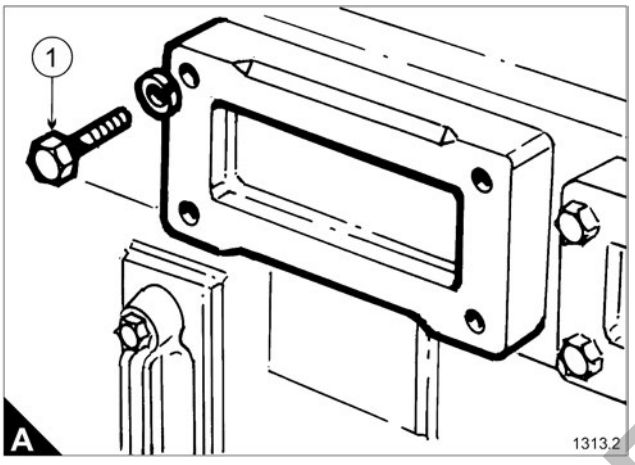
Cam followers and housing

To remove the cam follower housing — Operation 8-2

1 Mark each cam follower housing and its location on the cylinder block to ensure that it is refitted in its original position.

2 Take out the four retaining bolts (A1) and pull the housing from the crankcase.

Note: A light tap with a soft faced hammer may be necessary to free the housing from its sealing joint and locating dowel.



PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

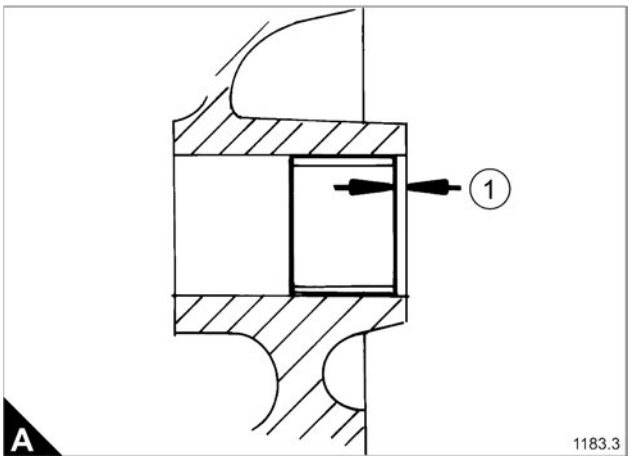
To replace pump shaft bearings **Operation 10-11**

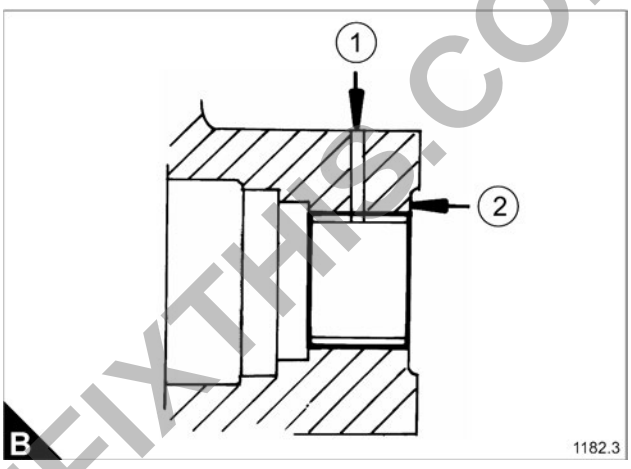
1 Using a soft drift knock the split bush bearings from the pump body and cover.

2 Press the new bush into the oil pump body seating it 0,5 mm (A1) below the face of the pump on the drive gear side.

3 Press the new bush into the oil pump cover lining up the oil hole (B1) and setting the face of the bush level with the cover body (B2).

Caution: *The split bush bearings used in the oil pump are pre-finished to size and do not require reaming after fitting.*





PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

7 Lubricate the rubber casing of the ceramic counterface (C1) with a 4% cyclam lubricant solution in demineralised water.

8 Use special tool T85038/14 to insert the counterface into its recess.

9 Wait 10 minutes to allow the cyclam lubricant to evaporate, allowing the rubber casing to grip and seal to the housing.

10 Lubricate the rubber face of the carbon seal assembly (C2) with the cyclam solution.

11 Fit the seal into the impeller using tool T85038/14.

12 Wait 10 minutes with tool in place to allow the cyclam lubricant to evaporate and the rubber face to grip the impeller.

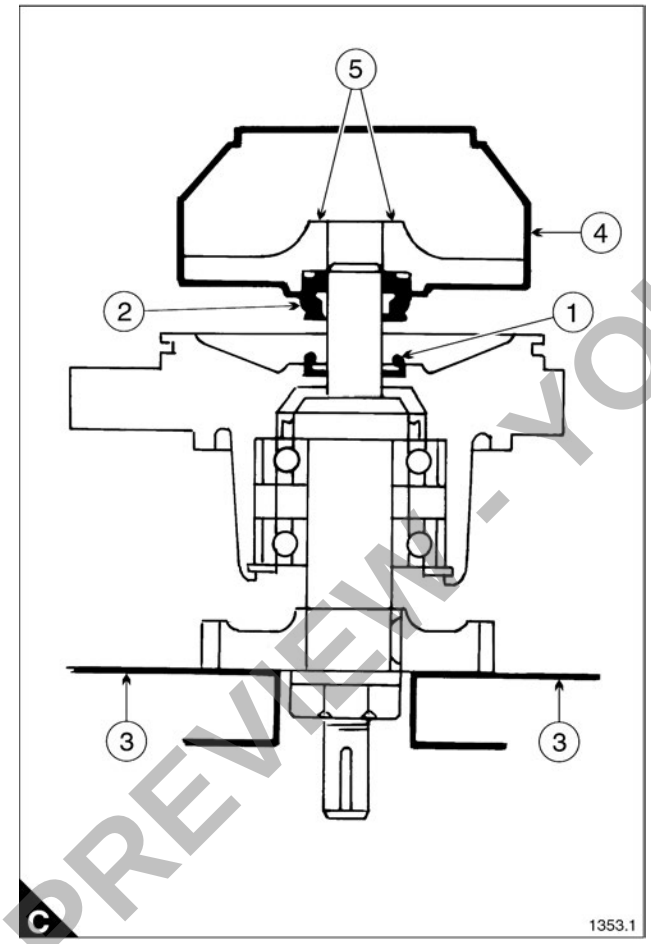
13 Mount the bearing housing assembly on the press bed so the gear face (C3) will take the pressure of assembly.

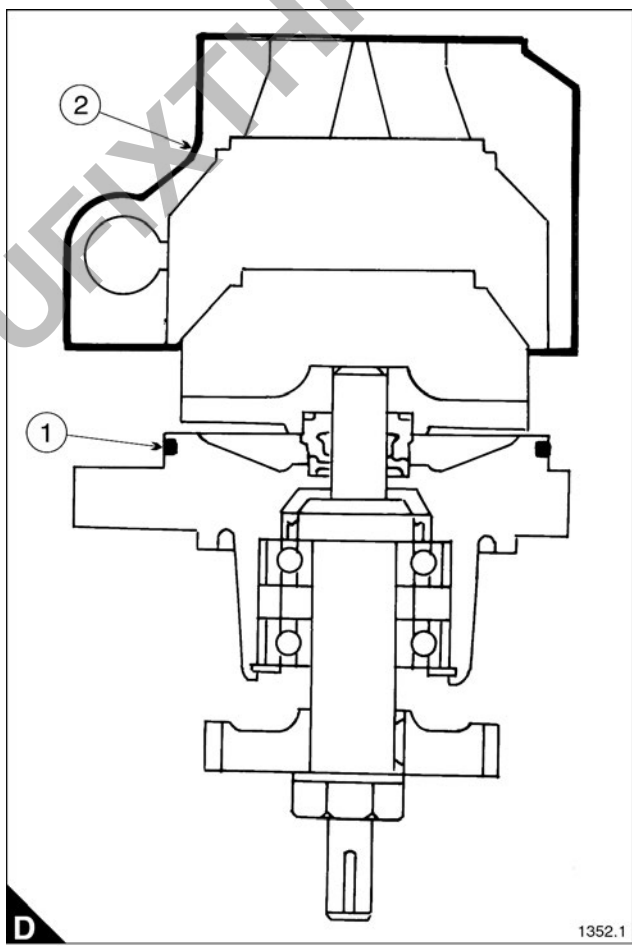
14 Set the impeller (C4) squarely on the end of the shaft. Apply load to the impeller at point (C5) and push the impeller evenly until it is flush with the end of the shaft.

15 Check the assembly is free to rotate.

16 Lubricate a new 'O' ring (D1) with cyclam solution and fit to the bearing housing.

17 Fit the pump body (D2). Rotate the shaft to check the impeller clears the pump body.





PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

PREVIEW ONLY

You're viewing 11 of 166 pages

The full manual includes:

- All 166 pages, complete
- Searchable PDF (find any keyword)
- No watermarks
- Instant download
- Print-ready quality

GET FULL MANUAL NOW

Perkins 4006/8 In-line Gas, 4006 Gas Engine, 4008 Gas Engine, 4000 Series, 4006TESI 200 LC, 4006TESI 140 LC, 4006TESI 140 HC, 4006TESI 90 HC, 4008TESI 200 LC, 4008TESI 140 LC, 4008TESI 140 HC, 4008TESI 90 HC Workshop Manual



Scan or click anywhere
youfixthis.com

Click anywhere on this page to get the full manual