SEBE1006600

Shop Manual

Perkins 1000 Series Diesel Engine

It is our policy to improve our products whenever it is possible and practical to do so. We reserve the right to make changes or add improvements at any time without incurring any obligation to install such changes on products sold previously.

Due to this continuous program of research and development, periodic revisions may be made to this publication. It is recommended that customers contact their distributor for information on the latest revision.

Aug 1995

Recommended torque tensions

The torque tensions below apply to components lubricated lightly with clean engine oil before they are fitted.

Description	Thread size	Torque		
		Nm	lbf ft	kgf m
Cylinder head assembly				
Setscrews, cylinder head	1/2 UNF	See section 12		
Fasteners, rocker shaft brackets:				
- Aluminium bracket	M12	40	30	4,1
- Cast iron bracket	M12	75	55	7,6
Cap nuts, rocker cover	M12	20	15	2,1
Piston and connecting rod assemblies				
Nuts, connecting rods	1/2 UNF	125	92	12,7
Setscrews, connecting rods	1/2 UNF	155	114	15,8
Banjo bolts, piston cooling jets	3/8 UNF	27	20	2,8
Crankshaft assembly				
Setscrews, main bearings	5/8 UNF	265	196	27,0
Setscrews, crankshaft pulley	7/16 UNF	115	85	11,8
Cap screws, damper to crankshaft pulley	M8	35	26	3,6
Setscrews, rear oil seal housing to cylinder block	M8	22	16	2,2
Cap screws, rear oil seal housing to bridge piece	M8	18	13	1,9
Setscrew, idler gear hub of balancer unit	M12	93	68	9,5
Nut, drive gear of balance weight	1/2 UNF	82	60	8,4
Setscrews, rear cover of balancer frame	M10	54	40	5,5
Setscrews, oil transfer plate	M10	30	22	3,1
Setscrews, oil pump to balancer frame	M8	22	16	2,2
Setscrews, balancer to cylinder block	M10	54	40	5,5
Timing case and drive assembly				
Setscrews, timing case to cylinder block	M8	22	16	2,2
	M10	44	33	4,5
Setscrews, hub of idler gear	M10	44	33	4,5
Setscrew, camshaft gear	M12	78	58	8,0
Setscrews, timing case cover to timing case	M8	22	16	2,2
Nuts, timing case cover to timing case	M8	22	16	2,2
Aspiration system				
Nuts, turbocharger to manifold	M10	44	33	4,5
Lubrication system				
Plug, lubricating oil sump	3/4 UNF	34	25	3,5
Setscrews, oil pump to front bearing cap	M8	22	16	2,2
Setscrews, cover for oil pump	M8	28	21	2,9
Fasteners, lubricating oil sump	M8	22	16	2,2
Fuel system				
Nuts, high-pressure fuel pipes	M12	18	14	1,9
Setscrews, atomiser	M8	12	9	1,2
Setscrews, fuel lift pump	M8	22	16	2,2
Nut for gear of fuel injection pump	M14	80	59	8,2
Nuts for flange of fuel injection pump	M8	22	16	2,2
Cooling system				
Setscrews, fan drive housing to timing case	M10	44	33	4,5
Setscrews, fan drive pulley to hub	M8	22	16	2,2
Setscrews, fan	M8	22	16	2,2
	M10	44	33	4,5

With the crankshaft on mountings at the front and rear journals, the maximum run-out (total indicator reading) at the journals must not be more than shown below.

Journal	4 cylinder crankshafts	6 cylinder crankshafts engines
1	Mounting	Mounting
2	0,08 mm (0.003 in)	0,10 mm (0.004 in)
3	0,15 mm (0.006 in)	0,20 mm (0.008 in)
4	0,08 mm (0.003 in)	0,25 mm (0.010 in)
5	Mounting	0,20 mm (0.008 in)
6	-	0,10 mm (0.004 in)
7	-	Mounting

Run-out must not be opposite. The difference in run-out between one journal and the next must not be more than 0,10 mm (0.004 in). Run-out on the crankshaft pulley diameter, rear oil seal diameter and the rear flange diameter must not be more than 0,05 mm (0.002 in) total indicator reading.

Main bearings

Type:
- AA, AB, AC, AD:
All bearings ... Steel back, 20% tin-aluminium bearing material

- YA, YB, YC, YD:
Centre bearing ... Steel back, lead bronze bearing material with lead finish

All other bearings ... Steel back, 20% tin-aluminium bearing material

Bearing width:
- AA, AB, AC, AD:
Centre bearing ... 36,32/36,70 mm (1.430/1.445 in)

All other bearings ... 31,62/31,88 mm (1.245/1.255 in)

- YA, YB, YC, YD:
Centre bearing ... 36,32/36,70 mm (1.430/1.445 in)

All other bearings ... 30,86/31,12 mm (1.215/1.225 in)

Bearing thickness:
- AA,AB,AC,AD:
All bearings ... 2,083/2,089 mm (0.0820/0.0823 in)

- YA,YB,YC,YD:
Centre bearing ... 2,087/2,096 mm (0.0822/0.0825 in)

All other bearings ... 2,083/2,089 mm (0.0820/0.0823 in)

Inside diameter ... 76,23/76,27 mm (3.0010/3.0025 in)

Bearing clearance ... 0,046/0,107 mm (0.0018/0.0042 in)

Available undersize bearings ... -0,25 mm (-0.010 in); -0,51 mm (-0.020 in); -0,76 mm (-0.030 in).

Crankshaft thrust washers

Type ... Steel back, lead bronze bearing material

Position ... Each side of centre main bearing

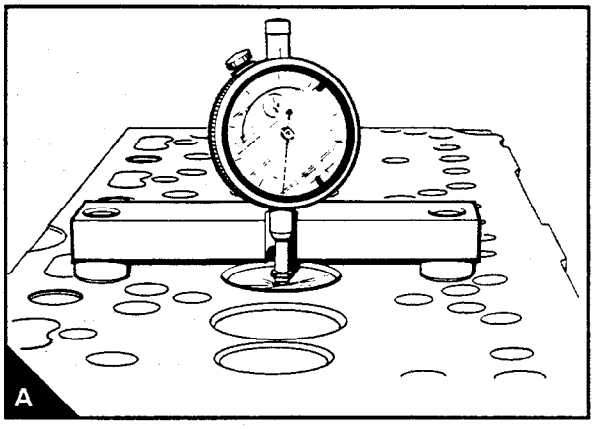
Thickness:
- Standard ... 2,26/2,31 mm (0.089/0.091 in)
- Oversize ... 2,45/2,50 mm (0.096/0.098 in)

Cylinder head assembly 12

To inspect and to correct 12A-09

Special tool:

Gauge, valve depth, PD.41D
Dial gauge for use with PD.41D, PD.208



1 Check the depth of the valves below the face of the cylinder head before the valve springs are removed. Ensure that the heads of the valves and the bottom face of the cylinder head are clean. Put the valve depth tool on the face of the cylinder head and zero the dial gauge. Carefully put the valve depth tool in position over the head of each valve (A) and make a note of the measurement. In service the maximum depth for the inlet valve is 1,85 mm (0.073 in) and for the exhaust valve it is 2,08 mm (0.082 in). If a valve is below the depth limit, check the valve depth with a new valve in position. If the valve depth is still below the limit and a valve seat insert is fitted, the insert must be renewed. Where a valve seat insert is not fitted, the bottom face of the cylinder head can be machined to reduce the valve depth, or an insert can be fitted, operation 12A-14.

2 Check the valves for cracks. Check the stems of the valves for wear and for correct fit in their valve guides.

3 Check that the seat faces of the valves are not badly burnt or damaged. Seat faces of valves which are damaged can be ground on a special machine. Valves which have only little damage can be lapped to their valve seats. When new valves are fitted, the valve depths must be checked, see paragraph 1.

4 Check that the load on the valve springs is correct at their fitted length, see section 11C.

Fit new valve springs at every complete engine overhaul.

Piston and connecting rods

To dismantle and to assemble **13A-05**

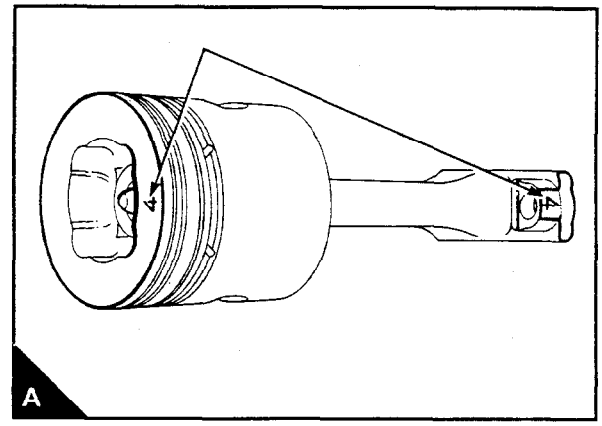
To dismantle

1 Remove the piston rings, operation 13A-04.

2 Remove the circlips which retain the gudgeon pin.

3 Put a mark on the piston to indicate the cylinder number as shown on the connecting rod. Put the mark on the piston on the same side as the mark on the big end to ensure that they are assembled correctly (A).

4 Push the gudgeon pin out by hand. If the gudgeon pin is tight, heat the piston to 40/50°C (100/120°F) for easy removal of the gudgeon pin.



To assemble

1 Clean the bore of the small end bush and lubricate it with clean engine lubricating oil.

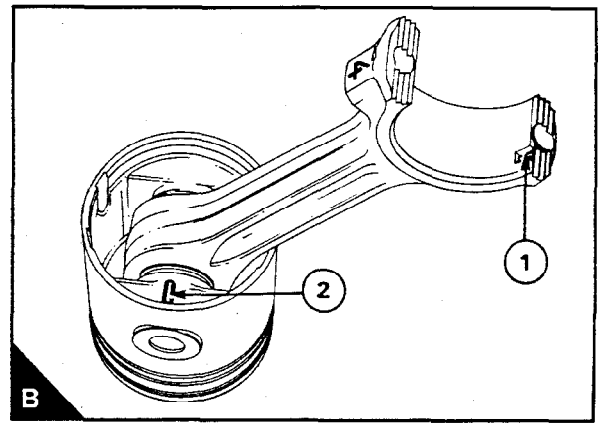
2 Fit a new circlip in the circlip groove of one of the gudgeon pin bosses. Ensure that it fits correctly in the groove.

3 With the piston upside down, put the connecting rod in position with the recess for the location of the big end bearing (B1) on the same side as the lug on the gudgeon pin boss (B2). If the original piston is used, ensure that it is assembled to the correct connecting rod and is used in the original cylinder.

4 Lubricate the gudgeon pin bosses with clean engine lubricating oil and push in the gudgeon pin towards the circlip. If the gudgeon pin is a tight fit in the piston, heat the piston to 40/50°C (100/120°F) before the gudgeon pin is fitted.

5 Fit a new circlip in the groove in the other gudgeon pin boss. Ensure that it is fits correctly in the groove.

6 Fit the piston rings, operation 13A-04.



8 Fit the setscrews and washers to the main bearing caps and tighten them gradually and evenly to 265 Nm (196 lbf ft) 27,0 kgf m.

9 Clean the bridge piece and the location areas for the bridge piece in the cylinder block. Apply a narrow strip of POWERPART Hylosil sealant in the corners and around the thread holes of the bridge piece seat in the cylinder block. Fit the bridge piece and the two rubber seals (A). The rubber seals will be a little higher than the bridge piece when they are fitted correctly. Later engines may not have been fitted with rubber seals and the grooves in the bridge piece should be filled with POWERPART Hylosil sealant. Use a straight edge to ensure that the bridge piece is in line with the rear face of the cylinder block (B). Tighten the bridge piece capscrews.

10 Fit the connecting rod caps, operation 13A-01. Turn the crankshaft two complete revolutions to ensure free movement.

11 If necessary, fit the balancer unit, operation 14A-10. If a balancer unit is not used, fit the lubricating oil pump, the lubricating oil suction pipe and strainer, the delivery pipe and the relief valve (four cylinder engines) and if necessary, the lubricating oil crossover pipe, see section 19.

12 Fit the rear oil seal housing, operation 14A-02.

13 Fit the flywheel housing and the flywheel, see section 22.

14 Fit the timing case and the timing gears, see section 15.

15 Fit the fuel injection pump, see section 20.

16 Fit the timing case cover, operation 15A-01.

17 Fit the compressor and its drive assembly or fit the exhauster, see section 24.

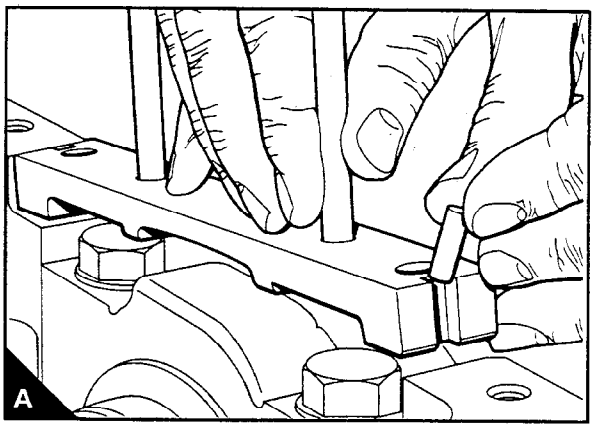
18 Fit the alternator and its mounting bracket, see section 23.

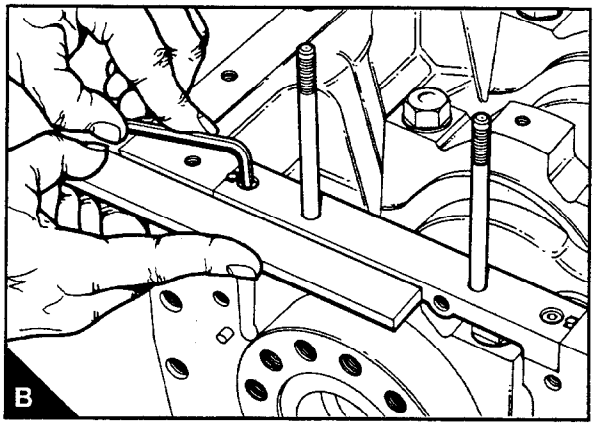
19 Fit the crankshaft pulley, operation 14A-01.

20 Fit the coolant pump, the fan drive pulley and housing, the drive belts and the fan , see section 21.

21 Fit the lubricating oil sump, operation 19A-03.

22 After the engine has been installed, fill the lubricating oil sump to the correct level with an approved oil. Fill the cooling system.





To inspect **14A-09**

Check the crankshaft for wear and other damage. The maximum permissible wear and ovality on the crankshaft journals and crank pins is 0,04 mm (0.0016 in).

The main journals and the crankpins of standard size crankshafts can be machined to 0,25mm (0.010 in), 0,50mm (0.020 in) or 0,75 mm (0.030 in) undersize on diameter, see section 11C. Special undersize bearings are available.

The seal location area of the rear flange can be machined to remove the wear marks, if the seal has been used in all positions, see section 11C.

Idler gear and hub

To remove and to fit **15A-03**

To remove

1 Remove the fan, operation 21A-04.

2 Remove the drive belts, operation 23A-03.

3 Remove the crankshaft pulley, operation 14A-01.

4 If necessary, remove the fan drive pulley, operation 21A-05.

5 Drain the coolant and remove the water pump, operation 21A-02.

6 Remove the timing case cover, operation 15A-01.

7 Turn the crankshaft until the marked teeth of the crankshaft gear, the camshaft gear and the fuel pump gear are all in mesh with the idler gear. The marked teeth of the idler gear will not necessarily be in mesh with the marked teeth of the other gears because of the different speed of rotation of the idler gear.

8 Release the three setscrews, remove the plate of the idler gear and remove the gear. The drive gear of the fuel injection pump may turn counter-clockwise when the idler gear is removed.

9 Remove the idler hub.

Attention: Do not turn the crankshaft with the idler gear removed.

10 Inspect the gear and the bushes for wear and other damage and renew as necessary. The gear and bushes are available as an assembly or separate bushes are available.

11 If the bushes are to be changed, remove them with a suitable puller. If a puller is not available, machine off the face of one of the bushes and press them out. Press in new bushes, machine the bores to get the correct clearance on the hub and machine the faces to get the correct end clearance, see section 11C.

To fit

1 Use the three idler gear setscrews to ensure the correct position of the idler gear hub with the lubrication hole at the top. Push the hub into position and remove the setscrews.

2 Lubricate the idler gear bushes with clean engine lubricating oil. Align the timing marks on the idler gear with the marks on the crankshaft and camshaft gears. If necessary, turn the gear of the fuel injection pump clockwise to align the relevant timing mark with the marks on the idler gear and slide the idler gear into position. Check that all the timing marks are in correct mesh (A). Fit the plate and the setscrews to the idler gear hub and tighten the setscrews to 44 Nm (33 lbf ft) 4,5 kgf m.

3 Check the idler gear end-float (B) and the timing gear backlash (C).

4 Fit the timing case cover, operation 15A-01.

5 Fit the water pump, operation 21A-02.

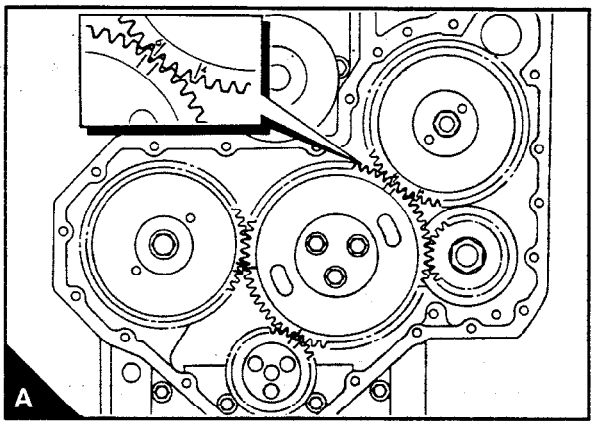
6 Fit the crankshaft pulley, operation 14A-01.

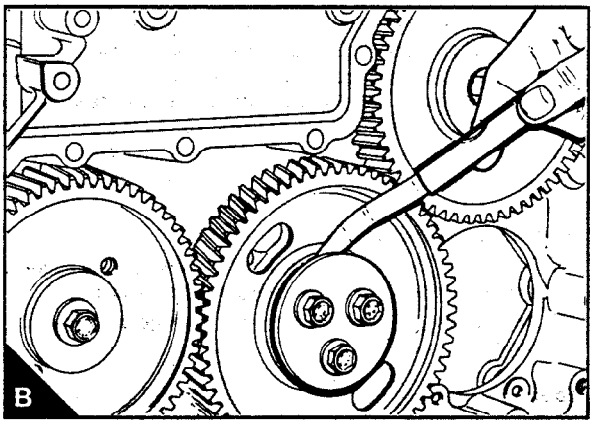
7 Where necessary, fit the fan drive pulley, operation 21A-05.

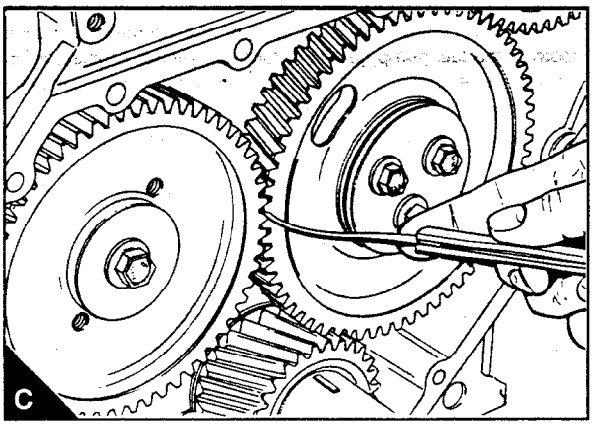
8 Fit the drive belts, operation 23A-03 and adjust the belt tension, operation 23A-02.

9 Fit the fan, operation 21A-04.

10 Fill the cooling system.





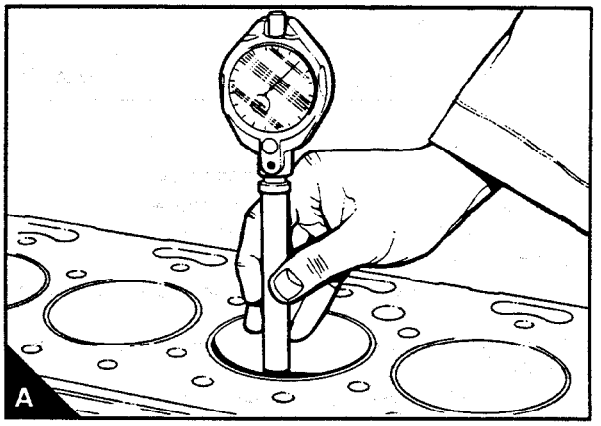


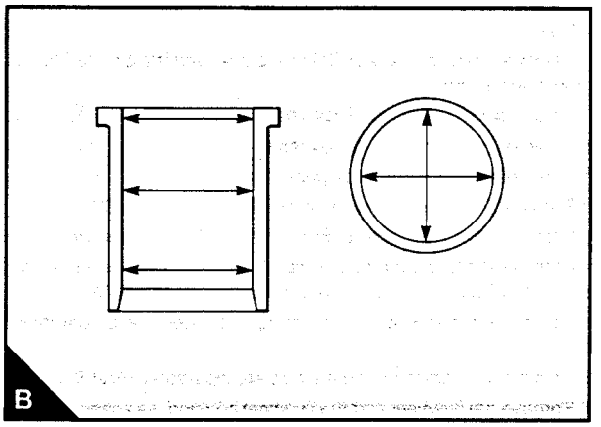
Cylinder liner

To inspect — 16A-03

Check the liners for damage and wear. To check the wear of the liner bore see A and B. The maximum permissible wear is 0,25 mm (0.010 in).

An engine can have high oil consumption with very little wear of the liner bores, if the surfaces of the liners are glazed.





To remove glaze from the bore — 16A-04

A tool, known as a 'Flex-Hone', is available to correct the liner surface. This tool can be used with an electric hand drill at low speed. The pistons and connecting rods must be removed and the piston cooling jets, where fitted, must also be removed. Use covers to protect all engine components from the debris which is caused during the process.

1 Grade 80SC 'Flex-Hone' is to be used. A 4 in or 4 1/8 in size 'Flex-Hone' can be used according to how badly the bore is glazed.

2 New 'Flex-Hones' must be operated in an old liner before use on an engine to remove all loose material and sharp edges.

3 Lubricate lightly the liner and the 'Flex-Hone' with clean engine lubricating oil.

4 Put the tool in position on top of the liner, but do not press the tool into the liner until the tool is operated.

5 Operate the tool and move it up and down the liner bore once a second for 30-50 seconds. Remove the tool while it rotates.

6 Clean thoroughly the liner bore to remove all dirt from the operation, use a hard brush and kerosene.

7 Dry the liners and remove carefully all the covers used to protect the components. Clean thoroughly all the engine components which have been affected by debris.

8 Fit the piston cooling jets or the plugs. Ensure that new piston rings are fitted when the engine is assembled in accordance with the relevant sections of this workshop manual.

Attention: After a glazed bore has been corrected, these recommendations are advised for the first 240 km (150 miles) or 5 hours of operation:

- Do not operate the engine at full load.
- Do not operate the engine at high speed.
- Do not allow the engine to run at low idle speed for extended periods.

To check the engine timing mark 17A-05

Special tools:
Universal timing tool, MS.67B
Drive adaptor for use with MS.67B, PD.67-2
Pointer for use with MS.67B, PD.67-4
Distance piece for use with MS.67B, PD.67-5

1 Set the piston of number 1 cylinder to TDC on the compression stroke, operation 17A-01.

2 Remove the fuel injection pump and its joint, operation 20A-06A.

3 Fit the distance piece PD67-5 (A1) to the timing tool adaptor PD67-2. Align the key in the adaptor with the keyway in the gear of the fuel pump and fit the adaptor to the gear (A). Ensure that the distance piece is against the rear face of the timing case. Secure the adaptor to the gear with the nut supplied with the adaptor.

4 Loosen the screw (B1) on the timing tool MS.67B. Set the timing tool to the correct engine check angle, see section 11C, and tighten the screw. Loosen the screw (B2) and fit the splined shaft (B5) into the timing tool (B). Loosen the screw (B4). Fit the 90° pointer PD.67-4 (B3) and tighten the screw.

5 Fit the splined shaft of the timing tool to the adaptor. Slide the timing tool along the splined shaft until it is against the adaptor and tighten the screw (B2).

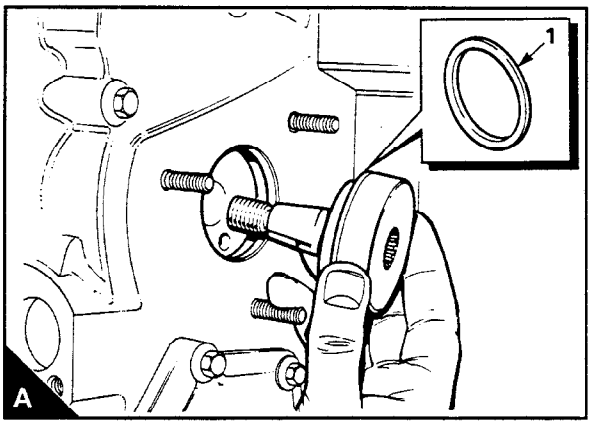
6 Loosen the screw (B4). Slide the pointer forward until the flat face is against the rear face of the timing case and tighten the screw. If the mark on the timing case is correct, the mark will align with the top edge of the pointer (B3). If the mark is not correct, remove the timing tool and eliminate the mark on the timing case. Fit the timing tool. Ensure that the pointer is against the timing case and make a new mark on the timing case along the top straight edge of the pointer.

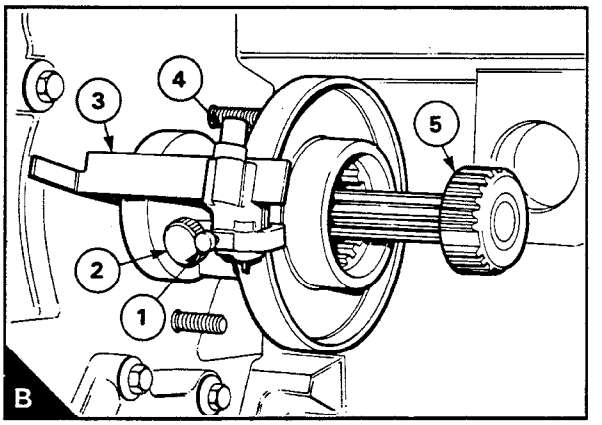
7 Remove the timing tool and the adaptor.

8 Fit the fuel pump together with a new joint, operation 20A-06A.

9 Remove the dial test indicator from the cylinder head and fit the valve springs and the rocker lever. Set the valve tip clearance of number 1 cylinder inlet valve to 0,20 mm (0.008 in). Fit the rocker cover, operation 12A-01.

10 Eliminate air from the fuel system, operation 20A-08A.





To clean the impeller and the compressor casing

Generally, it is not necessary to remove the turbocharger to remove the compressor casing, except for engine types AB and AD used in vehicle applications. On these engines, the compressor casing is held by a circlip and access to the circlip is not always possible.

1 Release the clip and remove the hose from the compressor inlet. Release the clips and push the hose on the compressor outlet up the elbow of the induction manifold.

2 Make a reference mark on the compressor casing (A1) and the bearing housing to ensure correct location later. Release the setscrews and lock plates. For engine types AB and AD used in vehicle applications: Remove the turbocharger, make reference marks as above and release the circlip.
Remove carefully the compressor casing from the turbocharger (A). If the casing is tight, lightly hit it with a soft faced hammer. Be careful not to damage the impeller blades. If the impeller is damaged, the turbocharger must be renewed.

3 Put the compressor casing in a suitable container that contains a non-caustic solution. Allow the dirt to become soft and then clean the casing with a hard brush and/or a soft scraper. Dry the casing with clean, compressed air at low pressure.

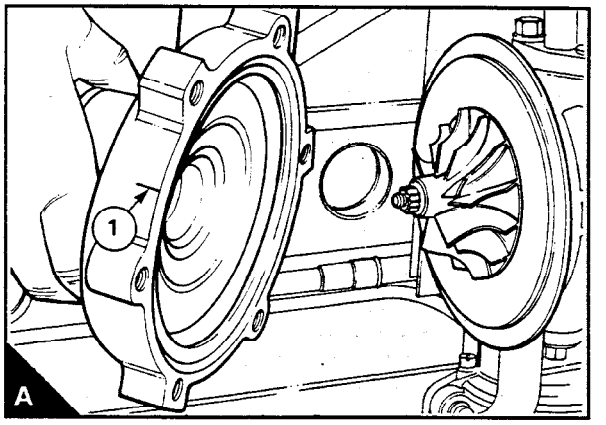
4 Clean the impeller with a soft brush.

5 Push carefully the compressor impeller towards the bearing housing and turn the impeller by hand. Check that there is no restriction of movement and that there is no noise which can indicate a fault. If there is a fault, remove the turbocharger for inspection by a specialist.

6 Fit the casing to the turbocharger and align the mark on the casing with the mark on the bearing housing. Fit the lock plates and the setscrews and tighten the setscrews.
For engine types AB and AD used in vehicle applications: If the circlip has been removed, fit it loosely on the bearing housing. Ensure that the chamfered face of the circlip is towards the exhaust end of the turbocharger. Carefully fit the turbocharger assembly into the compressor casing. Align the two location marks and fit the circlip in the groove.

7 Fit the hoses to the compressor inlet and outlet and tighten the clips.

8 If necessary, fit the turbocharger to the engine, operation 18A-01.



Fuel filter

To remove and to fit — 20A-01

The filter can have one or two elements. When twin elements are fitted, both of the elements must be renewed at the same time.

1 Clean the outside surfaces of the fuel filter assembly. If a drain tap is fitted to the filter bowl, drain the fuel from the filter (A).

2 Hold the bottom cover of the filter element and release the setscrew which is fitted through the filter head above the centre of each element.

3 Lower the bottom cover of the filter (B).

4 Remove the element and discard it.

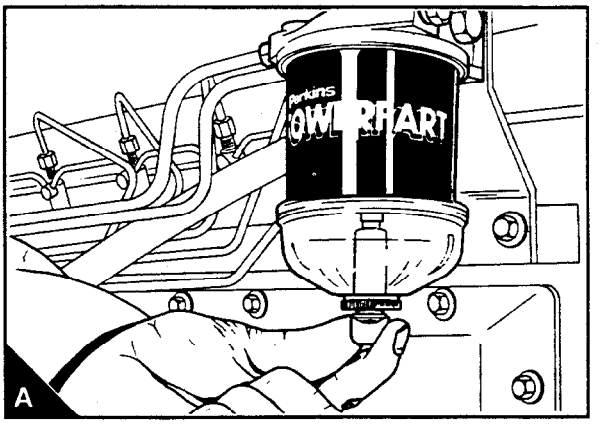
5 Clean the inside surfaces of the top and bottom filter covers.

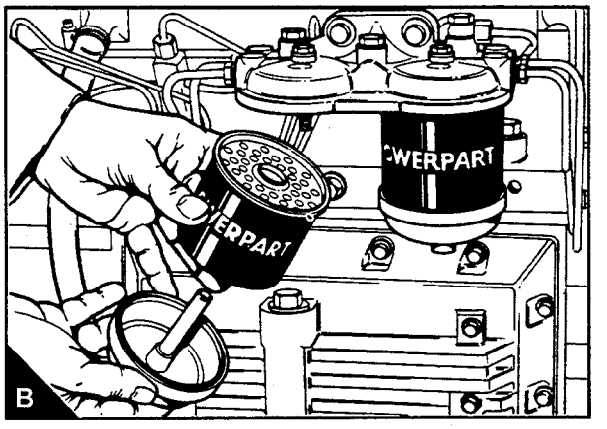
6 Fit the new sealing rings.

7 Put the bottom cover on the bottom of the new element and assemble it squarely to the filter head to ensure that the element is fitted in the centre against the joint in the filter head.

8 Hold the assembly in this position and engage and tighten the setscrew.

9 Eliminate all air from the fuel system, operation 20A-08A or 20A-08B.





Atomisers

Atomiser fault

An atomiser fault can be shown by an engine misfire. In order to find which atomiser is defective, operate the engine at a fast idle speed. Loosen and tighten the union nut of the high pressure fuel pipe at each atomiser. When the union nut of the defective atomiser is loosened, it will have little or no effect on the engine speed.

Do not let the fuel spray on to your skin!

To remove and to fit — 20A-02

1 Remove the fuel leak-off pipe.

2 Release the union nuts of the high-pressure pipes from the atomisers and from the fuel injection pump. Hold the pump outlet with a spanner to prevent movement while the union nut of the high-pressure pipe is released at the pump. Do not bend the pipe. If necessary, remove the pipe clamps.

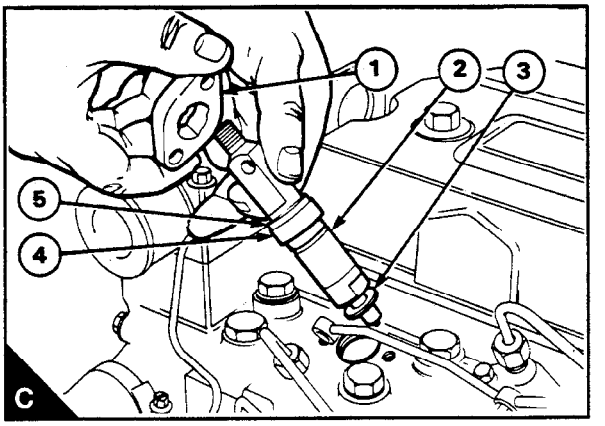
3 Release the setscrews of the atomiser flange and remove the flange (C1), the atomiser (C2) and its seat washer (C3). Remove the dust seal (C4) and the spacer (C5) and fit the spacer and a new dust seal to the new atomiser.

4 Put the new atomiser in position with its spacer, new dust seal and a new seat washer. Fit the flange and engage the flange setscrews. Ensure that the atomiser is not tilted and tighten the setscrews gradually and evenly to 12 Nm (9 lbf ft) 1,2 kgf m.

5 Fit the high-pressure pipes and tighten the union nuts to 18 Nm (13 lbf ft) 1,9 kgf m. Hold the pump outlet with a spanner to prevent movement while the pipe nut is tightened at the pump. If necessary, fit the pipe clamps.

6 Renew the seal washers and fit the leak-off pipe.

7 Operate the engine and check for fuel leakage.



Water pump

To remove and to fit — 21A-02

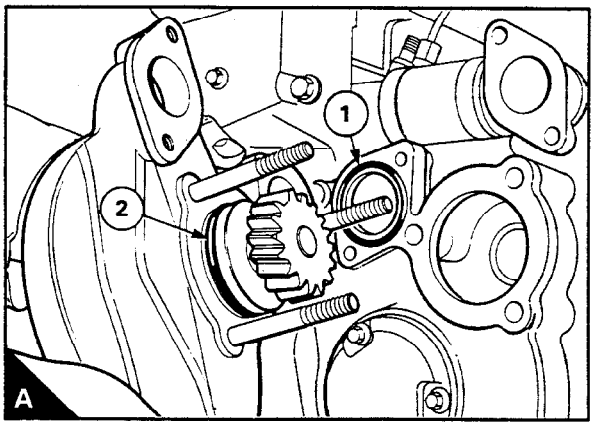
To remove

1 Drain the cooling system and disconnect the hose at the inlet connection of the water pump.

2 Release the setscrews from the flange of the coolant by-pass.

3 Release the three setscrews which retain the water pump to the cover of the timing case - two from the front and one from the rear.

4 Release the nuts from the rear face of the timing case, which fasten the pump to the timing case, and remove the water pump (A). Ensure that the "O" ring (A1) on the cover of the timing case is not lost.



To fit

1 Check the "O" rings on the pump body (A2) and on the cover of the timing case (A1) for damage. If either of the "O" rings are damaged, they must be renewed. Ensure that all joint faces are clean.

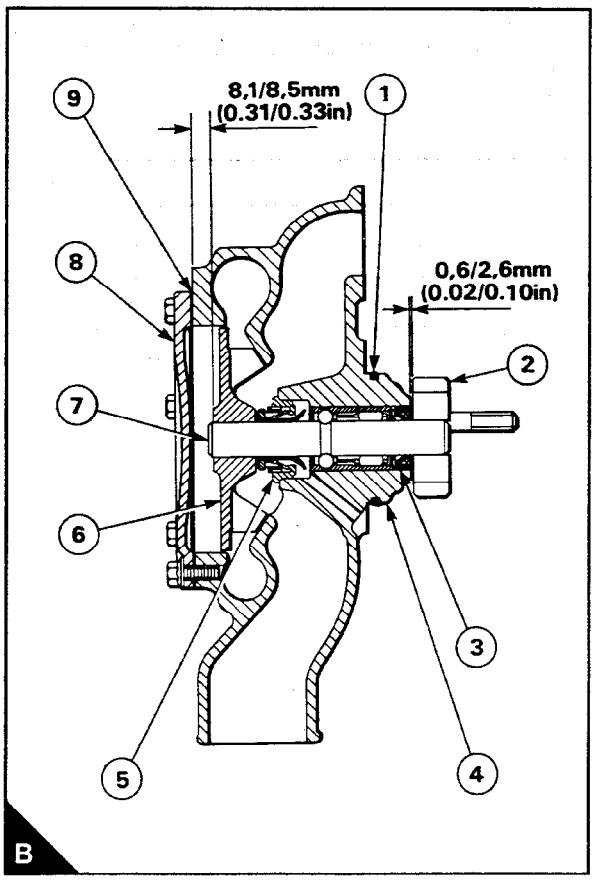
2 Check the drive gear of the water pump for wear or other damage. If the gear is damaged, it must be renewed.

3 Lightly lubricate the "O" ring on the pump body with clean engine lubricating oil. Fit the pump to the timing case cover with its gear in mesh with the gear of the fuel injection pump. The pump is a tight fit in the cover, but can be pulled into position if the nuts for the pump studs are gradually and evenly tightened. Ensure that the "O" ring in the cover remains in position while the pump is fitted.

4 Fit and tighten the three setscrews which retain the pump to cover of the timing case - two from the front and one from the rear.

5 Fit a new joint to the flange of the coolant by-pass. Fit the by-pass and tighten the setscrews.

6 Connect the hose to the inlet connection of the water pump and fill the cooling system. Operate the engine and check for leakage.



To dismantle and to assemble — 21A-03

To dismantle

Special tool:
Gear puller, MS.99

1 Remove the three long studs and the "O" ring (B1) from the pump body (B4).

2 Remove the front cover (B8) and the joint (B9).

3 Remove the gear (B2) with puller.

4 Use a suitable lever to remove the oil seal (B3) and discard the seal.

5 If necessary, remove the studs from the pump body. With a suitable support under the impeller end of the body, use a suitable adaptor to press out the shaft and bearing assembly (B7), together with the impeller (B6) and the water seal (B5).

6 With a suitable support under the impeller, press the shaft out of the impeller. Remove the water seal and discard it.

Electrical equipment 23

General description

The fuelled starting aid is a device which is operated electrically and ignites a controlled amount of diesel fuel in the induction manifold to heat the induction air. A heater coil in the body expands a valve holder to allow fuel to flow into the device where it is ignited by an ignition coil when the engine is turned and air is drawn into the manifold.

Starting aid

To remove and to fit **23C-01**

1 Disconnect the fuel and the electrical connections.

2 Remove the starting aid.

3 Ensure that the contact faces of the manifold and the starting aid are clean and fit the starting aid. Tighten the starting aid to 31 Nm (23 lbf ft) 3,2 kgf m.

4 Check the fuel pipe and, if it is still full of fuel, connect it to the starting aid. If the fuel has drained from the pipe, eliminate the air from the pipe as shown in paragraph 5 of operation 20A-08A or 20A-08B.

5 Connect the electrical connection.

List of special tools 25

ENGINE IS DIFFICULT TO START

Assuming that the problems
LOW CRANKING SPEED
and
COLD ENGINE WILL NOT START
have been resolved, proceed as follows:

AIR IN THE FUEL SYSTEM	Bleed the system of air as in the relevant service literature.
RESTRICTED FUEL FEED PIPE OR BLOCKED VENT IN THE FUEL TANK	Trace and rectify restriction or blockage.
CHOKED FUEL FILTERS	Renew fuel filter element(s).
DEFECTIVE FUEL LIFT PUMP	Check lift pump operation, if insufficient fuel is flowing, repair or replace fuel lift pump.
POOR COMPRESSIONS	Check, as in the "POOR Compression" section.
STICKING VALVES OR INCORRECT VALVE TIP CLEARANCE	Adjust valve tip clearance according to the relevant manual. Inspect valves, guides, springs and rocker assembly for wear.
INCORRECT FUEL PUMP TIMING OR INCORRECT VALVE TIMIMG	Check all aspects of valve and fuel pump timing according to the relevant manual.
EXHAUST PIPE RESTRICTION	Examine the complete exhaust system, checking for dents or kinks in the pipes, check for broken mufflers.
DEFECTIVE OR INCORRECT ATOMISERS	Check that the correct part number is fitted. Replace or service all the atomisers.
DEFECTIVE FUEL INJECTION PUMP	Remove pump for attention by specialised workshop or fit replacement pump.

ENGINE STARTS AND STOPS

INSUFFICIENT FUEL IN TANK	Ensure that the fuel level in the tank is sufficient, if too low it may allow air to be drawn into the system at intervals, consequently stopping the engine.
AIR IN FUEL SYSTEM	Bleed the fuel system as instructed in the relevant Service literature.
CHECK LOW PRESSURE FUEL PIPES ON SUCTION SIDE, FOR HAIRLINE CRACKS OR LOOSE CONNECTIONS ALLOWING AIR INTO THE SYSTEM.	Rectify as necessary.
BLOCKED FUEL TANK VENT	Check and rectify as necessary.
CHOKED FUEL FILTER/S	Check and re-new as necessary.
RESTRICTION IN FUEL RETURN PIPE	Ensure that the fuel return pipe from the injection pump is not restricting fuel return in any way. i.e. Blocked, kinked, etc., as this will cause the engine to stop as the rev/min is raised.
RESTRICTION IN THE INDUCTION SYSTEM	Check air cleaner/element, re-new if dirty. Ensure that no restriction is present in induction piping.
STICKING ATOMISER/S	Remove for attention of specialised workshop.
EXHAUST PIPE RESTRICTION	Check and clear restriction.