4799 008 M1

WORKSHOP MANUAL

for
3.1522, 3.1524 &
T3.1524
diesel engines

KOMATSU

MANUFACTURING DATA & DIMENSIONS

The following data of clearances and tolerances are given as a guide for personnel engaged upon major overhauls and the figures are mainly those used in the factory for production purposes.

Cylinder Block

Height of Cylinder Block between Top and Bottom Faces	13.7405/13.7435 in (349,01/349,08 mm)
Parent Bore Dia. for Cylinder Liner	3.6875/3.6885 in (93,66/93,69 mm)
Depth of Recess for Liner Flange	0.148/0.152 in (3,76/3,86 mm)
Dia. of Recess for Liner Flange	3.820/3.825 in (97,03/97,16 mm)
Main Bearing Parent Bore Dia.	2.9165/2.9175 in (74,08/74,10 mm)
Parent Bore for No. 1 Camshaft Bearing Bush ...	2.0000/2.0012 in (50,80/50,83 mm)
Internal Dia. of No. 1 Camshaft Bearing Bush ...	1.872/1.874 in (47,55/47,60 mm)
Camshaft Bore Dia. — No. 2	1.864/1.876 in (47,35/47,42 mm)
Camshaft Bore Dia. — No. 3	1.844/1.847 in (46,84/46,91 mm)

Cylinder Liners

Type — Production Liner...	Dry — Interference Fit
— Service Liner	Dry — Pre-finished — Transition Fit
Outside Dia. of Production Liner	3.6895/3.6905 in (93,71/93,74 mm)
Outside Dia. of Service Liner	3.6875/3.6885 in (93,66/93,69 mm)
Interference Fit of Production Liner in Block ...	0.001/0.003 in (0,03/0,08 mm)
Transition Fit of Service Liner in Block	0.001/0.001 in (0,03/0,03 mm)
Inside Dia. of Finished Production Liner in Block ...	3.6015/3.6025 in (91,48/91,50 mm)
Inside Dia. of Service Liner in Block	3.6025/3.6035 in (91,50/91,53 mm)
Outside Dia. of Liner Flange	3.803/3.808 in (96,60/96,72 mm)
Flange Thickness	0.148/0.150 in (3,76/3,81 mm)
Relationship of Liner Flange Top Face to Top Face of Cylinder Block	0.004 in (0,10 mm) Above to 0.004 in (0,10 mm) Below
Maximum Bore Wear (new liner needed)	0.007 in (0,178 mm)

Pistons, 3.1522

Type	"Squish Lip" Re-entrant Chamber in Crown. Four Ringed Piston has Steel Rail in Top Groove, Three Ringed Piston has Armoured Top Ring Groove.

Pistons, 3.1524, T3.1524

Type	Cavity in Crown, Three Ringed Piston
All Engines. Piston Height in relation to Cylinder Block Top Face	0.0012 in (0,03 mm) **ABOVE** to 0.0065 in (0,17 mm) **BELOW.**
Centre-line of Gudgeon Pin to Piston Crown ...	Grade H — 2.4329/2.4349 in (61,80/61,85 mm) Grade L — 2.4274/2.4289 in (61,66/61,69mm)
Bore Diameter for Gudgeon Pin	1.2499/1.2501 in (31,747/31,753 mm)
Top Ring Groove Width (Four Ringed Piston Only) ...	0.0957/0.0977 in (2,43/2,48 mm)
All Other Compression Ring Groove Widths... ...	0.0957/0.0967 in (2,43/2,46 mm)
Oil Control Ring Groove Width	0.1895/0.1905 in (4,81/4,84 mm)
Maximum Permissible Top Ring Clearance (with new ring fitted)	0.007 in (0,18 mm)

Piston Rings, 3.1522

Top Compression	Chrome Inserted, Copper Plated
2nd or 2nd and 3rd Compression	Internally Stepped, Copper Plated
Oil Control	Chrome Faced, Coil Spring Loaded

Piston Rings, 3.1524, T3.1524

Top Compression	Tapered Semi Inlay, Chrome Faced Compression
Second Compression	Tapered Face Compression
Oil Control	Spring Loaded, Laminated Scraper

Protection of an engine not in service

The recommendations given below are to ensure that damage is prevented when an engine is removed from service for an extended period. Use these procedures immediately the engine is removed from service. The instructions for the use of POWERPART products are given on the outside of each container.

1. Thoroughly clean the outside of the engine.

2. Where a preservative fuel is to be used, drain the fuel system and fill with the preservative fuel. POWERPART Lay-Up 1 can be added to the normal fuel to change it to a preservative fuel. If preservative fuel is not used, the system can be kept charged with normal fuel but this will have to be drained and discarded at the end of the storage period together with the fuel filter.

3. Run the engine until it is warm. Correct any fuel, lubricating oil or air leakage. Stop the engine and drain the lubricating oil sump.

4. Renew the lubricating oil filter canister.

5. Fill the sump to the full mark on the dipstick with clean new lubricating oil or with a correct preservative fluid. POWERPART Lay-Up 2 can be added to the lubricating oil to give protection against corrosion during the period in storage. If a preservative fluid is used, this must be drained and normal lubricating oil used when the engine is returned to service.

6. Drain the cooling system, see page B.4. To give protection against corrosion, it is better to fill the cooling system with a coolant that has a corrosion inhibitor, see 'Engine Coolant' on page B.4. If frost protection is needed, use an antifreeze mixture. If no frost protection is needed, use water with an approved corrosion inhibitor mixture.

7. Run the engine for a short period to send the lubricating oil and coolant around the engine.

8. Clean out the engine breather pipe and seal the end of the pipe. (3.1522 engines, clean the breather vent valve, see page C.8).

9. Remove the atomisers and spray POWERPART Lay-Up 2 into each cylinder bore. If this is not available, clean engine lubricating oil will give a degree of protection. Spray into the cylinder bores 140 ml (1/4 pint) of lubricating oil divided evenly between the three cylinders.

10. Slowly turn the crankshaft one revolution and then install the atomisers complete with new seat washers and new dust seals.

11. Remove the air filter/cleaner and any pipe installed between it and the induction manifold or turbocharger. Spray POWERPART Lay-Up 2 into the induction manifold or turbocharger. It is recommended that the spray time for the turbocharger is 50% longer than the manifold spray time given on the container label. Seal the manifold or turbocharger with waterproof tape.

12. Remove the exhaust pipe. Spray POWERPART Lay-Up 2 into the exhaust manifold or turbocharger. It is recommended that the spray time for the turbocharger is 50% longer than the manifold spray time given on the container label. Seal the manifold or turbocharger with waterproof tape.

13. Remove the rocker cover. Spray POWERPART Lay-Up 2 around the rocker shaft assembly. Fit the filler cap.

14. Disconnect the battery and put it into safe storage in a fully charged condition. Before the battery is put into storage, give the battery terminals a protection against corrosion. POWERPART Lay-Up 3 can be used on the terminals.

15. Seal the vent pipe of the fuel tank or the fuel filler cap with waterproof tape.

16. Remove the drive belt and put it into storage.

17. To prevent corrosion, spray the engine with POWERPART Lay-Up 3. Do not spray inside the alternator cooling fan area.

Note: Before the engine is started after a period in storage, operate the starter motor with the engine stop control in the 'off' position until oil pressure shows on the oil pressure gauge or the oil warning light goes out. If a solenoid stop control is used, this will have to be disconnected for this operation.

If the engine protection is done correctly according to the above recommendations, no corrosion damage will normally occur. Perkins Engines Ltd. are not responsible for any damage that occurs in relation to a service storage period.

Engine Coolant

The quality of the coolant used can have a large effect on the efficiency and life of the cooling system. The recommendations given below can be of assistance in the maintenance of a good cooling system with frost and/or corrosion protection.

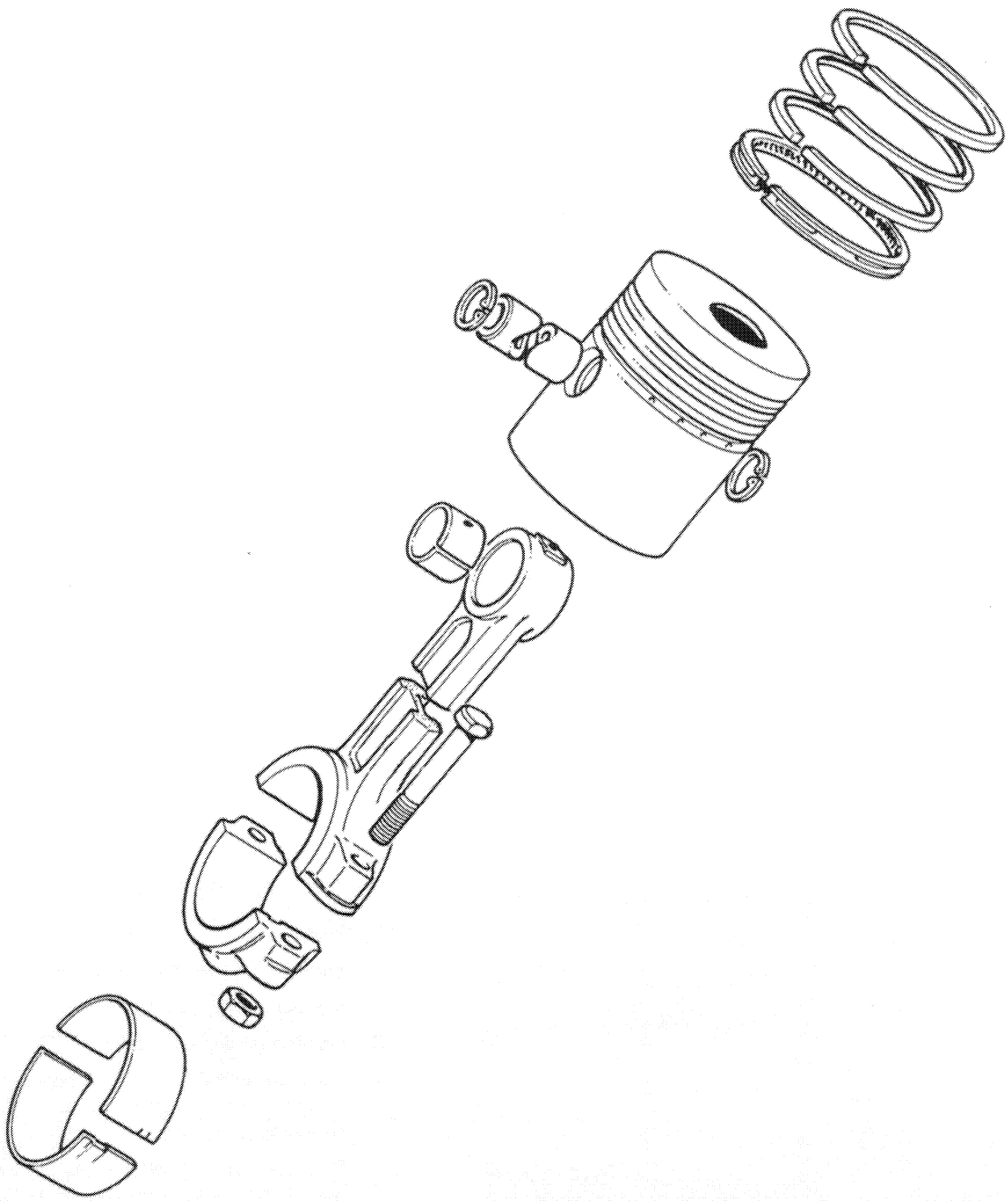
1. Where possible, use clean soft water.

2. If an antifreeze mixture is used to prevent frost damage, it must have an ethylene glycol (ethanediol) base. An antifreeze that is to one of the standards given below or to an equal standard is acceptable if the pH value is kept within the range of 7.0 - 8,5 when diluted.

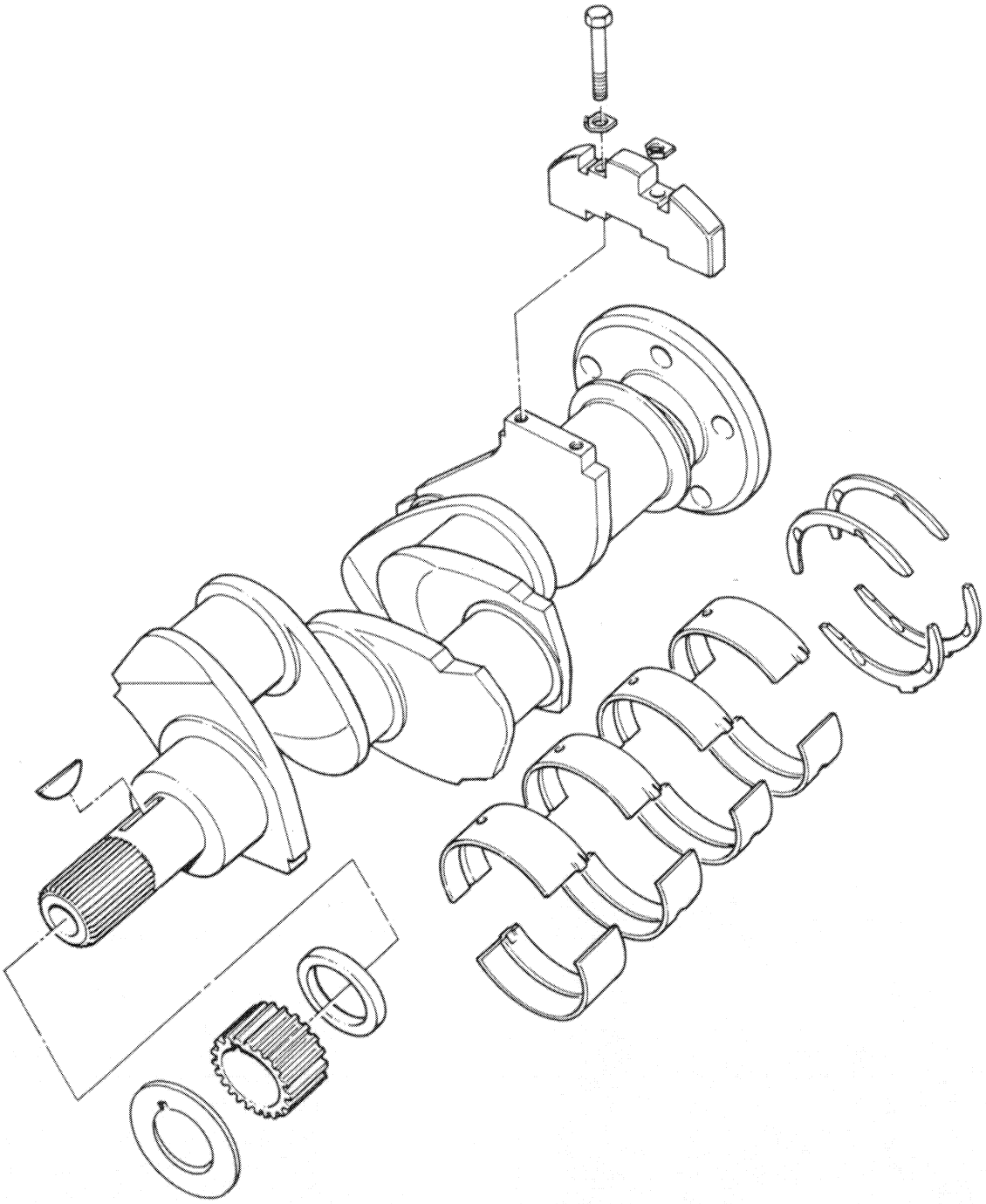
U.K.	BS 3151:1959	'Ethanediol Antifreeze Type B with Sodium Benzoate and Sodium Nitrite Inhibitors'.
U.S.A.	ASTM D3306-74	'Ethylene Glycol Base Engine Coolant'.
Australia	AS 2108-1977	'Antifreeze Compounds and Corrosion Inhibitors for Engine Cooling Systems'.

When Perkins POWERPART antifreeze is used, the correct mixtures of antifreeze and water are as given

SECTION D
Pistons and Connecting Rods



SECTION F
Crankshaft and Main Bearings



To Refit Timing Case Cover

1. Clean jointing faces of timing case and its cover using a new joint, refit cover and water pump taking care not to damage front crankshaft oil seal as cover is entered over crankshaft front end.
2. For purposes of centralising cover around crankshaft, fit pulley to crankshaft and fix position of cover to timing case by two or three setscrews. Remove pulley and refit all setscrews to timing case.
3. Replace crankshaft pulley, washer and setscrew, tightening setscrew to torque given on Page A.2.
4. Refit hoses to water pump and tighten clips.
5. Replace generator bracket, generator and fan belt and tighten generator retaining bolts.

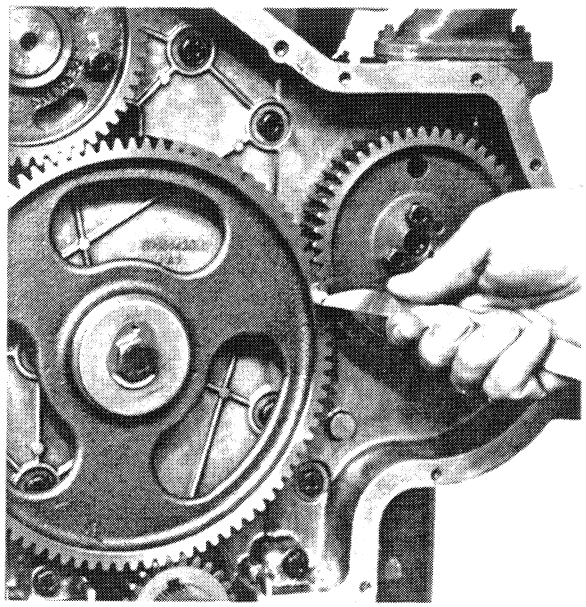


Fig. G.3
Checking Timing Gear Backlash.

Timing Gears

The camshaft and the fuel pump gears are driven by the crankshaft gear through an idler gear. All the gears are suitably marked during production to facilitate re-timing, the marks being made with No. 1 piston at top dead centre on its compression stroke. It will be appreciated that these timing marks will not align at every rotation of the crankshaft where No. 1 piston is at T.D.C. compression, due to the different rotational speeds of the gears.

If it is necessary to replace any of the timing gears, ensure that there is a minimum backlash of 0.003 in (0,08 mm) — see Fig. G.3.

To Remove Idler Gear and Hub

1. Turn crankshaft until marked teeth of crankshaft and camshaft gears are in mesh with idler gear.
2. Bend back locking washer on idler gear retaining setscrew, and remove setscrew, locking washer and idler gear retaining plate.
3. Remove idler gear from its hub (Fig. G.4).
4. Remove idler gear hub from its machined location in timing case.

To Refit Idler Gear and Hub

1. Ensure that crankshaft, camshaft and fuel pump gears are positioned as shown in Fig. H.1 with their marked teeth towards the idler gear position. If crankshaft or camshaft needs to be turned, rocker shaft may have to be removed to prevent a piston striking a valve.
2. Replace idler gear hub so that small locating peg is entered into through drilling in hub, ensuring

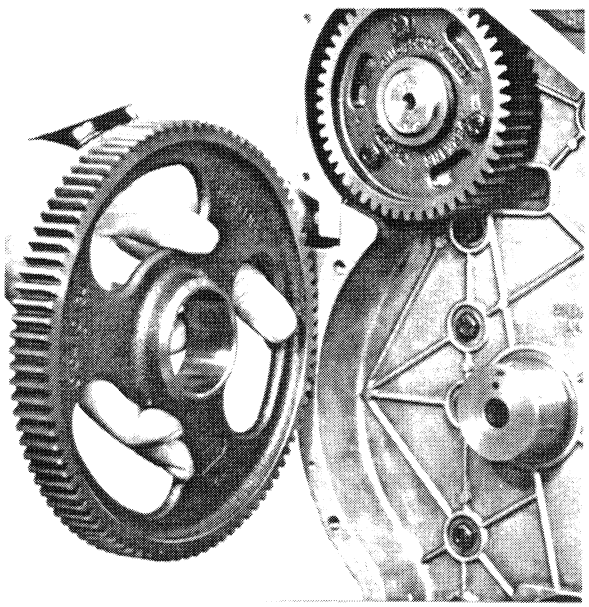
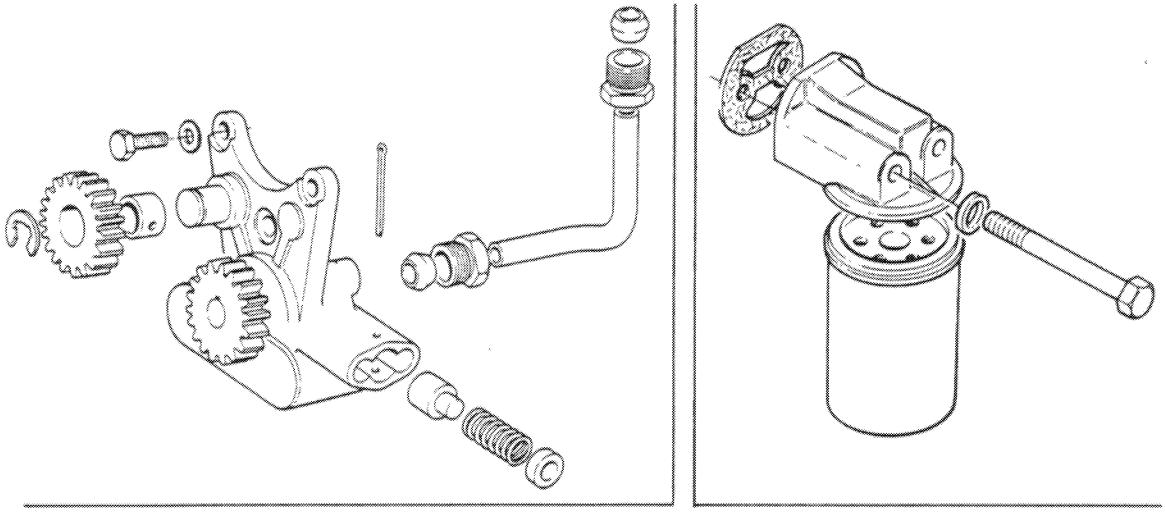
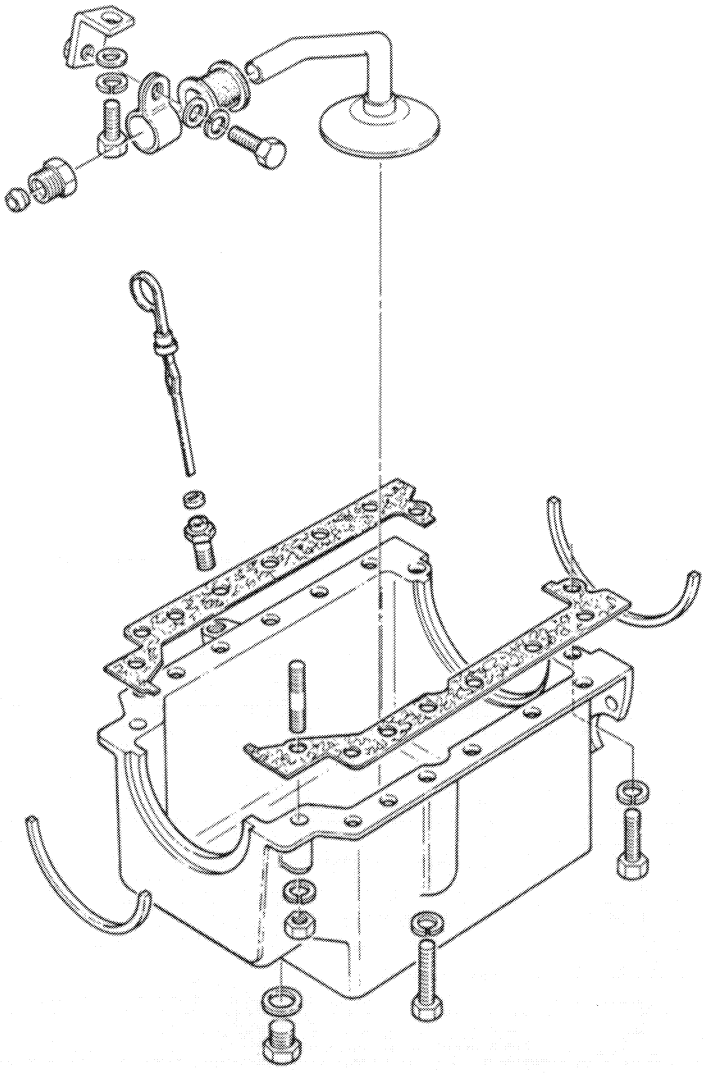


Fig. G.4
Removing Idler Gear.

SECTION J
Lubricating System





To Dismantle Water Pump (Fig. K.3)

Remove water pump pulley (3) using tool 21825006 (See Fig. K.4). The tapped holes in the pulley can be utilised for this purpose.

Press water pump shaft (2) complete with bearings and impeller (7) out through rear of pump body (1). Press shaft and bearing assembly out of impeller.

Remove ceramic counterface (6), seal (5) and thrower (4) from shaft.

The shaft and bearings are manufactured as one component and cannot be dismantled.

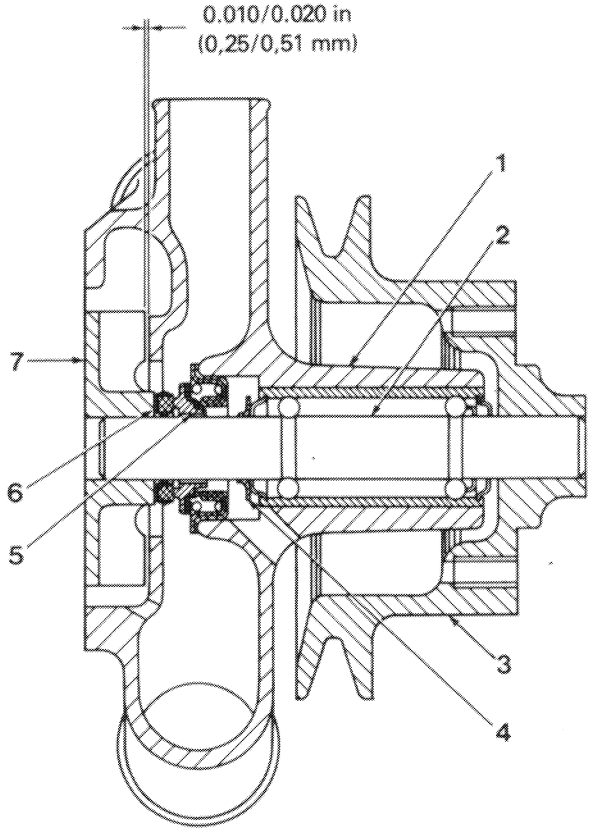


Fig. K.3
Water Pump Assembly.

1. Pump Body
2. Shaft and Bearing Assembly
3. Pulley
4. Thrower
5. Seal
6. Ceramic Counterface
7. Impeller

To Re-assemble Water Pump (Fig. K.3)

With shorter end foremost, press shaft and bearing assembly (2) into rear of water pump body (1) until bearing housing end is flush with front of water pump body.

Replace water thrower (4).

Fit seal (5) with carbon face to rear of pump and flange against machined face of body.

Fit ceramic counter face (6) to shaft with ceramic insert towards seal.

Supporting shaft at front end, press impeller (7) with blades inwards onto rear of shaft until a dimension of 0.010 in (0,25 mm) to 0.020 in (0,51 mm) is obtained between blades of impeller and pump body (See Fig. K.5).

Spin assembly to ensure freedom of rotation.

Position any pump securing setscrews that cannot be fitted with the pulley in position. These setscrews are fitted with aluminium sealing washers.

Supporting shaft at impeller end, press on water pump pulley until front end of pulley is flush with front end of shaft.

Recheck the clearance between impeller blades and pump body, and spin assembly to ensure freedom of movement.

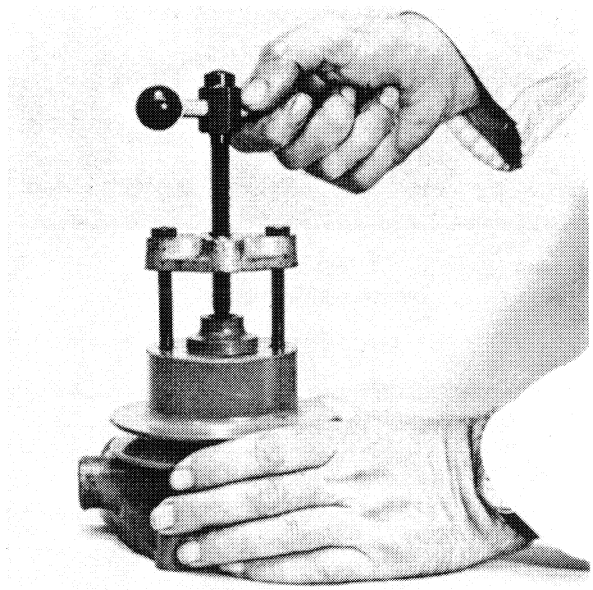


Fig. K.4
Removing Water Pump Pulley.

SECTION M
Flywheel and Flywheel Housing