

workshop manual for V8.640 & TV8.640 diesel engines

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Perkins Engines Limited
Peterborough England
1983

Publication No. 601 TPD 0983 1149

This publication supersedes the previous
edition numbered 601 SER 0880 1149
and incorporates Amendment Page Set No. 1,
issued July 1984.

This publication is written for world wide use. In territories where legal requirements govern engine smoke emission, noise, safety factors etc., then all instructions, data and dimensions given must be applied in such a way that, after servicing (preventive maintenance) or repairing the engine, it does not contravene the local regulations when in use.

Published by the Technical Publications Department of Perkins Engines Limited and printed in England

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TECHNICAL DATA—B.2

Engine Data

Type ...	...	...	...	...	...	Eight Cylinder, Four Stroke, Direct Injection. 90°V. V8.640 naturally aspirated, TV8.640 turbocharged.
Bore ...	...	...	...	...	...	4.63 in (118 mm) Nominal
Stroke ...	...	...	...	...	...	4.75 in (121 mm)
Cubic Capacity ...	...	...	...	...	...	640 in ³ (10,48 litres)
Compression Ratio —						
V8.640 ...	...	...	...	...	...	16.25 : 1
TV8.640 ...	...	...	...	...	...	14.95 : 1
Firing Order ...	...	...	...	...	...	1, 8, 7, 5, 4, 3, 6, 2.
Valve Tip Clearance ...	...	...	...	...	...	(Cold) 0.010 in (0,25 mm) Inlet 0.025 in (0,65 mm) Exhaust
Lubricating Oil Pressure ...	...	...	...	...	...	45 lbf/in ² (3,2 kgf/cm ²) or 310 kN/m ² minimum at maximum engine speed and normal operating tem- perature.
Sump Capacity ...	...	...	...	...	...	40 imp. pints (22,7 litres) 24 U.S. quarts (May vary with application — use indicated level on the dipstick with vehicle or machine on level ground).

Rating Details V8.640

Rated Output ...	...	...	...	...	...	215 bhp at 2600 rev/min
Maximum Torque ...	...	...	...	...	...	485 lbf ft (658 Nm) 67,1 kgf m at 1650 rev/min

TV8.640

Rated Output ...	...	...	...	...	...	250 bhp at 2600 rev/min
Maximum Torque ...	...	...	...	...	...	590 lbf ft (800 Nm) 81,6 kgf m at 1700 rev/min

Note: The above ratings are maximum ratings to BSAU141a : 1971 and can vary according to application. For details of individual ratings, apply to your nearest Perkins Distributor.

De-Rating for Altitude

If the engine is to operate continuously at altitudes higher than 5000 ft (1500 m), the fuel delivery should be reduced to minimise exhaust smoke and fuel consumption.

The reduced fuel delivery rate for operating at a particular altitude can be obtained through your Perkins Distributor providing that the information specified below is submitted.

Engine number, fuel injection pump type number and application into which engine is fitted.

Site barometric pressure, ambient temperature and humidity. If these are not available, specify altitude and location.

Whether or not the machine is working at a constant altitude or moving from one altitude to another.

Whether conventional gearbox or torque converter is fitted. If using a torque converter, give stall speed of transmission.

If possible, horsepower requirements of machine operating at site conditions.

Any alterations to fuel pump settings must be made by an authorised fuel pump specialist or Perkins Distributor.

Engine Weights (approximate)

Dry Bare Engine (includes alternator)

V8.640	1625 lb (737 kg)
TV8.640	1680 lb (762 kg)

Typical Installed Dry Engine (includes starter motor, flywheel and housing)

V8.640 Vehicle	1865 lb (846 kg)
V8.640 Ag. Tractor	2150 lb (975 kg)
TV8.640 Vehicle	1920 lb (871 kg)
TV8.640 Ag. Tractor	2200 lb (998 kg)

CYLINDER HEAD—E.2

Cylinder Head Removal

Drain coolant.

Remove or disconnect, where necessary:—

High pressure fuel pipes — mark for position.

Fuel leak-off pipes.

Atomisers — remove seating washers.

Water outlet pipe. Water by-pass pipe.

Cab heater return pipe. Compressor water pipe.

Water temperature gauge connection.

Starting aid connection.

Turbocharger heat shield.

Intake cross-over pipe. Inlet manifold.

Exhaust pipe and manifold.

Lubricating oil dipstick tube.

Breather pipe.

Remove rocker covers, rocker assemblies and push rods. The inlet valves of some later engines may be fitted with valve stem caps (Fig. E.21). Ensure, when removing rocker assemblies, that these caps do not stick to the rocker levers and then fall into the engine. Where necessary, remove valve stem caps.

Remove cylinder head securing setscrews and nuts progressively in the reverse order to that given in Fig. E.1.

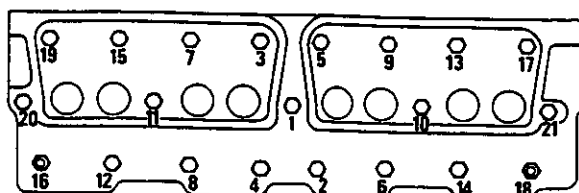
Remove head and place on wooden bench. The insert shown in Fig. E.3. may become separated from the head gasket during removal so ensure that it does not fall in a cylinder bore or water passage etc.

To Fit a Cylinder Head

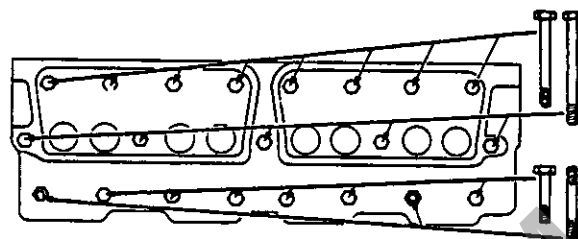
Ensure that cylinder head studs are fitted as shown in Fig. E.2. Some early engines had right hand stud fitted at end of row which could obstruct exhaust manifold.

Check that oil drillings of cylinder head are clear and that block and head faces and cylinder bores are clean.

Apply a very light and even coat of Perkins (Hylomar) Jointing Compound to both sides of head gasket and locate gasket on cylinder head studs. Position separate inserts as shown in Fig. E.3 ensuring that sealing faces are clear of jointing compound and inserts are correctly

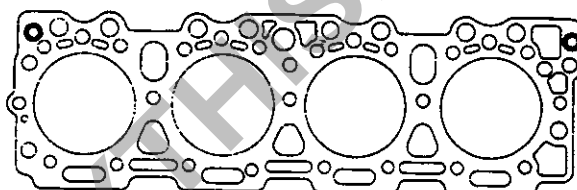


E1



E2

located in gasket. Place head into position, lightly oil threads of head securing setscrews and studs and fit setscrews and nuts as shown in Fig. E.2. Tighten in the order shown in Fig. E.1 firstly to 100 lbf ft (136 Nm) 13,8 kgf m and finally to 155 lbf ft (210 Nm) 21,4 kgf m.



E3

Replace push rods, inlet valve stem caps (where applicable) and rocker assemblies.

Set valve tip clearances, as detailed later.

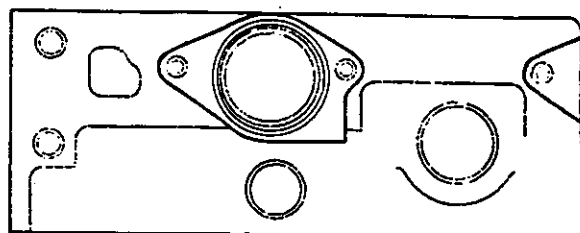
Reconnect and refit all necessary components noting the following:—

Fit inlet manifold joints with square corner to bottom right when viewing cylinder head (Fig. E.4). Where corrugated joints are used, these should be fitted without jointing compound.

Refit atomisers with new seating washers and serviceable dust seals, tightening clamp securing nuts to 35 lbf ft (47 Nm) 4,8 kgf m.

Refit high pressure pipes, as detailed later.

After filling cooling system, run engine until operating temperature is reached, at least 77°C (170°F) coolant temperature, shut down and retighten cylinder head securing setscrews and nuts to correct torque in the order given in Fig. E.1. If a setscrew or nut does not move when checked, it should be released by 1/12 to 1/6 of a turn and retightened. After retightening all the setscrews and nuts, the first 10 positions should be rechecked without further slackening off to ascertain that they are still tightened to the correct torque.



E4

Close the accelerator to give the lowest even running speed and allow the engine to warm up.

NOTES ON HEAT START

If the fuel has been drained from the thermostart feed pipe, the pipe must be disconnected at the thermostart and the pipe primed with fuel before the thermostart is operated.

If any difficulty is experienced with the heat start, check that the fuel is reaching the starting aids. Electrical operation can be checked by disconnecting the units and removing them from the manifolds. Reconnect the electrical leads and ensure that the units are earthed by resting them on the manifolds. The units should glow when the 'Heat' position is selected.

The engine is fitted with efficient cold starting equipment and no responsibility can be accepted for any damage caused by the use of unauthorised starting aids.

STOPPING THE ENGINE

The fuel injection pump stop lever may be operated by either a spring loaded manual pull out control or by an electric solenoid connected to the start switch.

To stop the engine, either pull out the manual stop control, if fitted, or turn the starter key to the 'O' position. When using the manual control, wait until the engine has completely stopped before returning the control to the run position and then switch off.

Do not decelerate TV8.640 engines rapidly, allow engines to idle for a few moments before stopping.

RUNNING IN

It is not necessary to gradually run-in a new or factory rebuilt engine and any prolonged light load running during the early life of the engine can in fact prove harmful to the bedding in of piston rings and liners.

Full load can be applied on a new or factory rebuilt engine as soon as the engine is used, provided that the engine is first allowed to reach a temperature of at least 140°F (60°C).

RUNNING ADJUSTMENT

The driver or user of this engine must not interfere with the idling or maximum speed settings. Whilst the engine is under the manufacturer's guarantee, the breaking or interference of the fuel pump seals by an unauthorised person may possibly render the guarantee null and void, because interference with the speeds set by the manufacturer can cause considerable damage to the engine and/or transmission.

preventive maintenance

The following periods are based on 20.000 km intervals. It is good maintenance to check for leakage and loose fasteners at each service interval

DAILY OR EVERY 8 HOURS (WHICHEVER OCCURS FIRST)

Check coolant level.
Check sump oil level.
Check oil pressure (where gauge fitted).
In extreme dust conditions, empty dust bowl of dry type air cleaner.

EVERY 12,500 MILES (20.000 km), 500 HOURS OR 6 MONTHS (WHICHEVER OCCURS FIRST)

Drain and renew engine lubricating oil.
Renew lubricating oil filter elements.
Empty dust bowl of dry type air cleaner (more frequently under dusty conditions).

Clean fuel water trap (where fitted).
Clean compressor air inlet filter (where fitted).
Check alternator and water pump drive belt tension.

EVERY 25,000 MILES (40.000 km) OR 1,000 HOURS (WHICHEVER OCCURS FIRST)

Renew final fuel filter element(s).
Clean or renew element of dry type air cleaner (if not indicated earlier).
Clean breather gauzes.
Check and adjust valve tip clearances.

EVERY 50,000 MILES (80.000 km) OR 2,000 HOURS (WHICHEVER OCCURS FIRST)

Service atomisers.
Clean turbocharger impeller.
Arrange for examination and service of proprietary equipment, i.e. compressor, oil cooler, starter motor, etc.

EVERY 100,000 MILES (160.000 km) OR 4,000 HOURS (WHICHEVER OCCURS FIRST)

Renew alternator and water pump drive belts.
Service turbocharger.
Check and reset fuel injection pump.

Operators of engines are reminded that the above preventive maintenance periods are general in appli-

FAULT FINDING—D.2

fault finding chart

Fault	Possible Cause
Low cranking speed	1, 2, 3, 4.
Will not start	5, 6, 7, 8, 9, 10, 12, 13, 14, 15, 16, 17, 18, 19, 20, 22, 31, 32, 33.
Difficult starting	5, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 18, 19, 20, 21, 22, 24, 29, 31, 32, 33.
Lack of power	8, 9, 10, 11, 12, 13, 14, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 31, 33, 61, 63.
Misfiring	8, 9, 10, 12, 13, 14, 16, 18, 19, 20, 25, 26, 28, 29, 30, 32.
Excessive fuel consumption	11, 13, 14, 16, 18, 19, 20, 22, 23, 24, 25, 27, 28, 29, 31, 32, 33, 63.
Black exhaust	11, 13, 14, 16, 18, 19, 20, 22, 24, 25, 27, 28, 29, 31, 32, 33, 61, 63.
Blue/white exhaust	4, 16, 18, 19, 20, 25, 27, 31, 33, 34, 35, 45, 56, 62.
Low oil pressure	4, 36, 37, 38, 39, 40, 42, 43, 44, 58.
Knocking	9, 14, 16, 18, 19, 22, 26, 28, 29, 31, 33, 35, 36, 45, 46, 59.
Erratic running	7, 8, 9, 10, 11, 12, 13, 14, 16, 20, 21, 23, 26, 28, 29, 30, 33, 35, 45, 59.
Vibration	13, 14, 20, 23, 25, 26, 29, 30, 33, 45, 47, 48, 49.
High oil pressure	4, 38, 41.
Overheating	11, 13, 14, 16, 18, 19, 24, 25, 45, 50, 51, 52, 53, 54, 57.
Excessive crankcase pressure	25, 31, 33, 34, 45, 55, 60.
Poor compression	11, 19, 25, 28, 29, 31, 32, 33, 34, 46, 59.
Starts and stops	10, 11, 12.

KEY TO FAULT FINDING CHART

- | | |
|---|--|
| 1. Battery capacity low. | 32. Pitted valves and seats. |
| 2. Bad electrical connections. | 33. Broken, worn or sticking piston ring(s). |
| 3. Faulty starter motor. | 34. Worn valve stems and guides. |
| 4. Incorrect grade of lubricating oil. | 35. Overfull air cleaner or use of incorrect grade of oil. |
| 5. Low cranking speed. | 36. Insufficient oil in sump. |
| 6. Fuel tank empty. | 37. Worn or damaged bearings. |
| 7. Faulty stop control operation. | 38. Inaccurate gauge. |
| 8. Blocked fuel feed pipe. | 39. Oil pump worn. |
| 9. Faulty fuel lift pump. | 40. Pressure relief valve sticking open. |
| 10. Choked fuel filter. | 41. Pressure relief valve sticking closed. |
| 11. Restriction in air cleaner or induction system. | 42. Broken relief valve spring. |
| 12. Air in fuel system. | 43. Faulty suction pipe. |
| 13. Faulty fuel injection pump. | 44. Choked oil filter. |
| 14. Faulty atomisers or incorrect type. | 45. Piston seizure/pick up. |
| 15. Incorrect use of cold start equipment. | 46. Incorrect piston height. |
| 16. Faulty cold starting equipment. | 47. Damaged fan. |
| 17. Broken fuel injection pump drive. | 48. Faulty engine mounting (Housing). |
| 18. Incorrect fuel pump timing. | 49. Incorrectly aligned flywheel housing, or flywheel. |
| 19. Incorrect valve timing. | 50. Faulty thermostat. |
| 20. Blocked fuel tank vent. | 51. Restriction in water jacket. |
| 21. Poor compression | 52. Loose fan belt. |
| 22. Incorrect type or grade of fuel. | 53. Choked radiator. |
| 23. Sticking throttle or restricted movement. | 54. Faulty water pump. |
| 24. Exhaust pipe restriction. | 55. Choked breather pipe. |
| 25. Cylinder head gasket leaking. | 56. Damaged valve stem oil seals. |
| 26. Overheating. | 57. Coolant level too low. |
| 27. Cold running. | 58. Blocked sump strainer. |
| 28. Incorrect tappet adjustment. | 59. Broken valve spring. |
| 29. Sticking valves. | 60. Fault in exhaust or vacuum pipe leakage. |
| 30. Incorrect high pressure pipes. | 61. Damaged or dirty turbocharger impeller. |
| 31. Worn cylinder bores. | 62. Leaking turbocharger oil seals. |
| | 63. Air leaks between turbocharger and cylinder head. |

USE ONLY GENUINE PERKINS PARTS

TO ENSURE YOU OBTAIN THE BEST RESULTS FROM
YOUR ENGINE AND TO SAFEGUARD YOUR OWN
GUARANTEE, FIT ONLY GENUINE PERKINS PARTS.
THESE ARE READILY OBTAINABLE THROUGHOUT
THE WORLD.

FOREWORD

This manual is designed to be of assistance to all personnel involved with the maintenance and overhaul of Perkins V8.640 and TV8.640 engines, the information applying to both types of engine unless specified otherwise.

Engines built for Massey Ferguson applications are designated AV8.640 and ATV8.640 and where the information differs for these particular engines, it is specified.

Overhaul of the engine or components should only be carried out by skilled personnel. To assist in overhauling the engine, the manufacturing dimensions and in some instances the wear limits are given in Section B.

When left or right hand bank or side is referred to in this manual, this denotes the side looking towards the front of the engine from the rear or gearbox end, unless specified otherwise.

This publication is produced by the Service Publications Department of Perkins Engines Limited and every endeavour is made to ensure that the information contained in this manual is correct at the date of publication but due to continuous developments the manufacturers reserve the right to alter this specification without notice.

TECHNICAL DATA—B.14

Atomisers — TV8.640

Code Letters	Holder	Nozzle	Setting Pressure	Working Pressure
VR	2646561 (OKLL54S2965)	2646864 (OLL150S3385)	210 atm (217 kgf/cm ²) 3090 lbf/in ²	195 atm (201 kgf/cm ²) 2870 lbf/in ²
VX	2646561 (OKLL54S2965)	2646868 (OLL150S7777)	210 atm (217 kgf/cm ²) 3090 lbf/in ²	195 atm (201 kgf/cm ²) 2870 lbf/in ²
VY	2646566 (OKLL54S2924)	2646868 (OLL150S7777)	210 atm (217 kgf/cm ²) 3090 lbf/in ²	195 atm (201 kgf/cm ²) 2870 lbf/in ²
WA	2646566 (OKLL54S2924)	2646864 (OLL150S3385)	210 atm (217 kgf/cm ²) 3090 lbf/in ²	195 atm (201 kgf/cm ²) 2870 lbf/in ²
WK	2646551 (OKLL54S3014)	2646864 (OLL150S3385)	210 atm (217 kgf/cm ²) 3090 lbf/in ²	195 atm (201 kgf/cm ²) 2870 lbf/in ²
WL	2646551 (OKLL54S3014)	2646868 (OLL150S7777)	210 atm (217 kgf/cm ²) 3090 lbf/in ²	195 atm (201 kgf/cm ²) 2870 lbf/in ²
WP	2645C301 (OKLL54S3052)	2646864 (OLL150S3385)	210 atm (217 kgf/cm ²) 3090 lbf/in ²	195 atm (210 kgf/cm ²) 2870 lbf/in ²

Atomisers — V8.640

Code Letters	Holder	Nozzle	Setting Pressure	Working Pressure
VT	2646561 (OKLL54S2965)	2646867 (OLL150S7604)	210 atm (217 kgf/cm ²) 3090 lbf/in ²	195 atm (201 kgf/cm ²) 2870 lbf/in ²
VZ	2646566 (OKLL54S2924)	2646870 (OLL150S7788)	210 atm (217 kgf/cm ²) 3090 lbf/in ²	195 atm (201 kgf/cm ²) 2870 lbf/in ²
WD	2646569 (OKLL54S2996)	2646867 (OLL150S7604)	210 atm (217 kgf/cm ²) 3090 lbf/in ²	195 atm (201 kgf/cm ²) 2870 lbf/in ²
WJ	2646551 (OKLL54S3014)	2646870 (OLL150S7788)	210 atm (217 kgf/cm ²) 3090 lbf/in ²	195 atm (201 kgf/cm ²) 2870 lbf/in ²
WU	2646553 (OKLL54M3059)	2646874 (OLL150M8388)	250 atm (258 kgf/cm ²) 3670 lbf/in ²	235 atm (243 kgf/cm ²) 3450 lbf/in ²
WV	2645C301 (OKLL54S3052)	2646870 (OLL150S7788)	210 atm (217 kgf/cm ²) 3090 lbf/in ²	195 atm (201 kgf/cm ²) 2870 lbf/in ²

Turbocharger

Make and Type ...	...	Airesearch T-04B or Holset H2B
Boost Pressure ...	...	9/11 lbf/in ² (62/76 kN/m ²) 0,63/0,77 kgf/cm ² at 2500 rev/min Full load

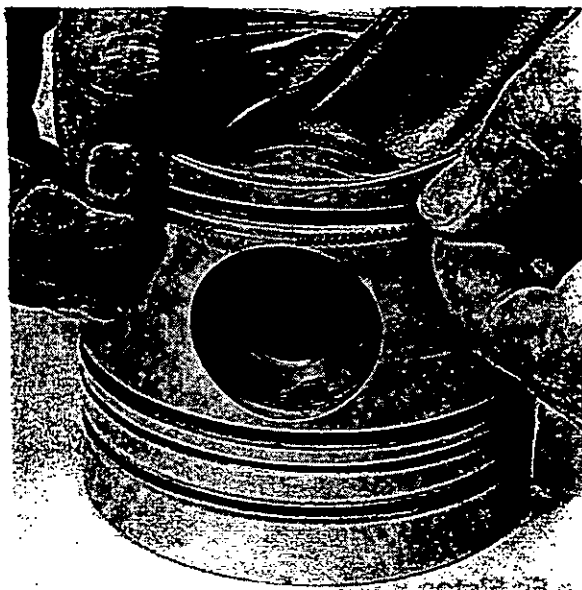
WB 15 Compressor

Make ...	...	Bendix Westinghouse
Rating ...	...	31,1 ft ³ /min (0,88 m ³ /min) at 2000 rev/min
Cylinder Bore Dia. ...	...	2.9527/2.9537 in (75,00/75,02 mm)
Max. Permissible Worn Bore Dia. ...	...	2.961 in (75,21 mm)
Clearance of Piston Skirt in Bore ...	...	0.003/0.0045 in (0,08/0,11 mm)
Clearance of Piston Rings in Grooves ...	...	0.0005/0.0025 in (0,01/0,06 mm)
Ring Gap in Unworn Cylinder — Top ...	...	0.004/0.013 in (0,10/0,33 mm)
Ring Gap in Unworn Cylinder — Second ...	...	0.003/0.010 in (0,08/0,11 mm)
Ring Gap in Unworn Cylinder — Scraper ...	...	0.005/0.013 in (0,13/0,33 mm)
Crankpin Dia. ...	...	1.1872/1.1875 in (30,15/30,16 mm)
Big End Running Clearance ...	...	0.0015/0.0037 in (0,04/0,09 mm)
Max. Permissible Worn Big End Running Clearance ...	...	0.0045 in (0,11 mm)
Main Bearing Running Clearance ...	...	0.0009/0.0028 in (0,02/0,07 mm)
Max. Permissible Worn Main Bearing Running Clearance ...	...	0.0035 in (0,09 mm)
Gudgeon Pin Dia. ...	...	0.6248/0.6250 in (15,870/15,875 mm)
Small End Running Clearance ...	...	0.0001/0.0007 in (0,003/0,018 mm)
Max. Permissible Worn Small End Clearance ...	...	0.0015 in (0,04 mm)

Tu-Flo 600 Compressor

Make ...	...	Bendix Westinghouse
Swept Volume ...	...	23 ft ³ /min (0,65 m ³ /min) at 2000 rev/min
Clearance of Piston Rings in Groove ...	...	0.0015/0.003 in (0,04/0,08 mm)
Ring Gap in Unworn Cylinder ...	...	0.005/0.015 in (0,13/0,38 mm)

PISTONS AND CONNECTING RODS—F.4



F7

Top ring can be fitted either way round.

Space ring gaps equally round piston.

To Fit Piston and Connecting Rod

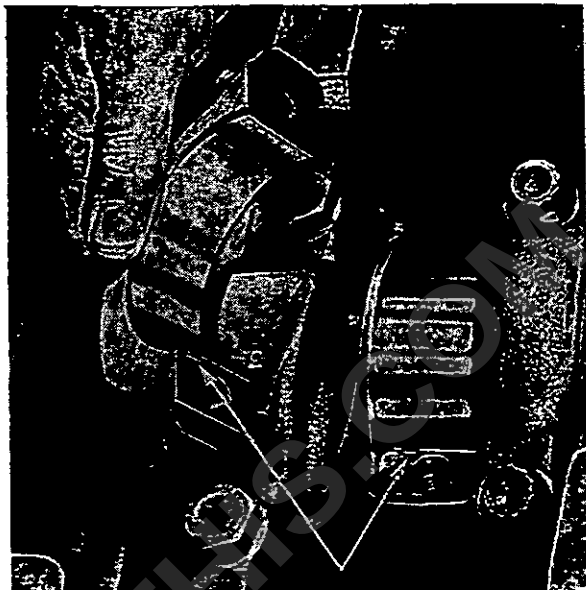
Clean cylinder bore, piston and bearing surfaces and liberally oil with clean engine oil.

Turn crankshaft until relevant crankpin is towards sump face.

Compress piston rings with tool No. 8 (Fig. F8) and push assembly into bore with longer side of big end towards centre of engine.



F8



F9

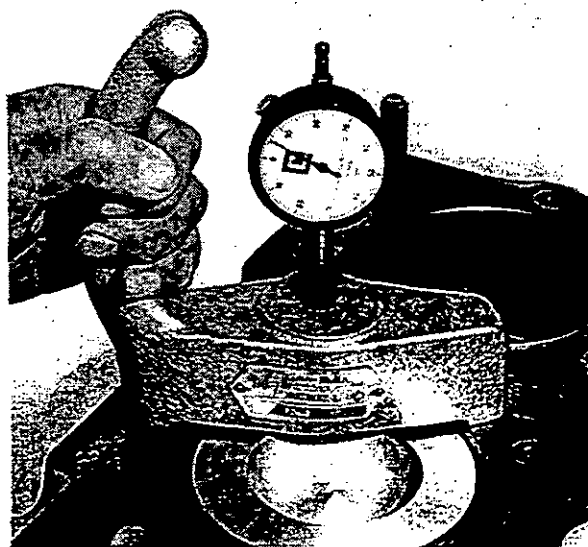
Press piston assembly into bore ensuring that connecting rod does not touch piston cooling jet.

Fit bearings to rod and cap with locating tabs fitting in recesses (Fig. F.9), position cap with numbers of rod and cap coinciding (Fig. F.2) and tighten cap set-screws to a torque of 105 lbf ft (142 Nm) 14,5 kgf m.

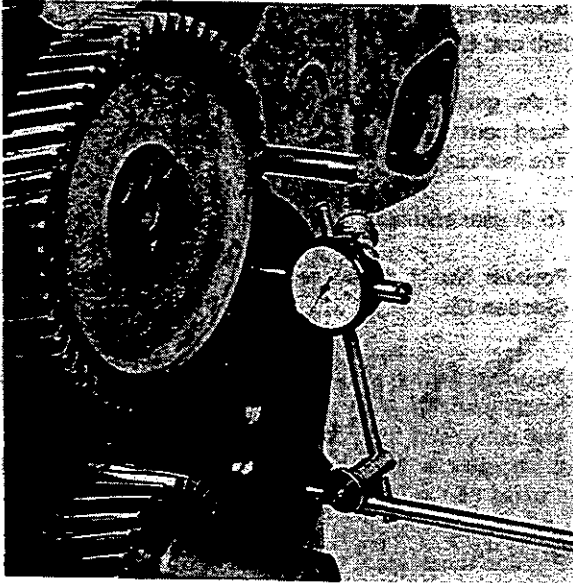
With piston at T.D.C., check that piston crown is 0.0015/0.010 in (0,04/0,25 mm) above top face of cylinder block. This can be checked using tool PD41B (Fig. F.10). The top of the piston should not be machined, but two grades of piston with differing crown heights are available, see Page B.6.

Refit cylinder head (Section E).

Refit lubricating oil sump (Section L).



F10



J9

To Fit Camshaft

Lightly oil camshaft and carefully enter into cylinder block.

Fit camshaft thrust plate and tighten securing set-screws to 12 lbf ft (16 Nm) 1,7 kgf m.

Fit camshaft gear, as detailed previously.

Check camshaft end float with a dial test indicator (Fig. J.9) to the limits given in Section B. If necessary, fit new thrust plate.

Where necessary, release tappets.

Where necessary refit tappet cover and breather, breather pipe, auxiliary drive housing (as detailed later), fuel injection pump (Section N), compressor (Section R) and turbocharger assembly.

Refit push rods and rocker assemblies and reset valve tip clearances (Section E).

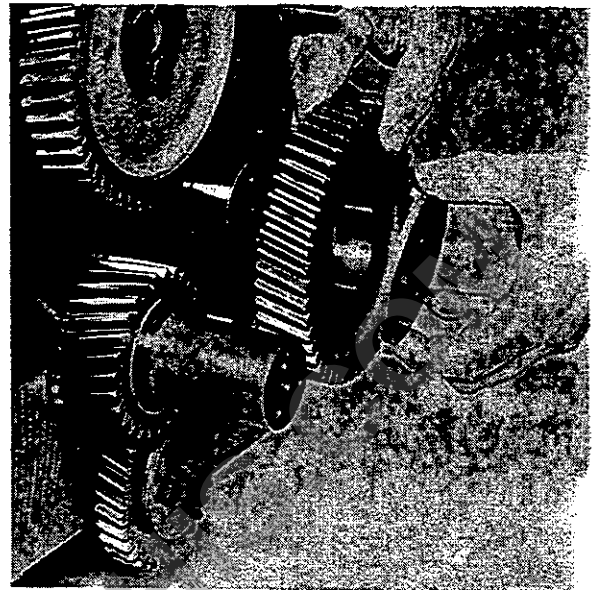
Check valve and static fuel injection timing (Section K).

Refit timing case, as detailed previously.

Refit rocker covers.

To Remove and Fit Crankshaft/Camshaft Idler Gear and Hub

It is advisable, where possible, to position No. 1 piston at T.D.C. compression stroke (Section K), before commencing dismantling in order to facilitate later re-assembly.



J10

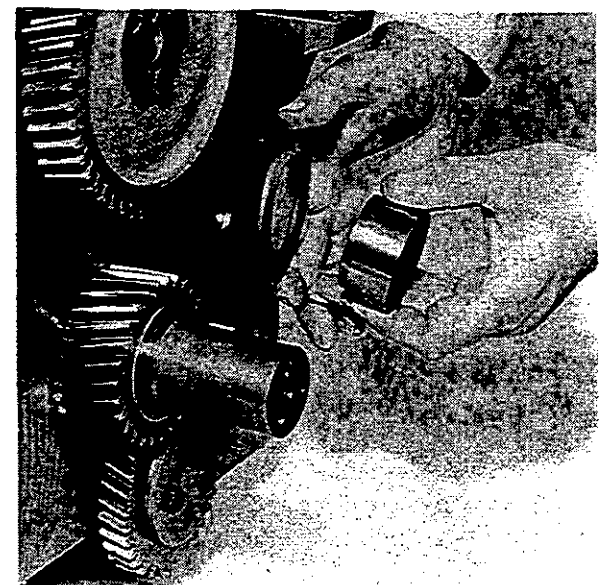
Remove timing case, as detailed previously.

Remove idler gear hub setscrews, gear retaining plate and gear (Fig. J.10).

Remove hub and thrust washer (Fig. J.11).

Gear bush is pre-finished. If renewing, ensure that bush does not protrude beyond gear.

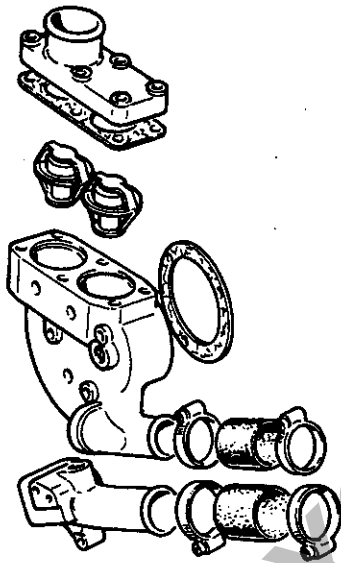
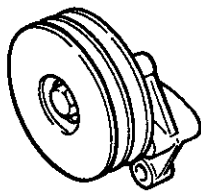
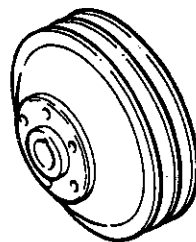
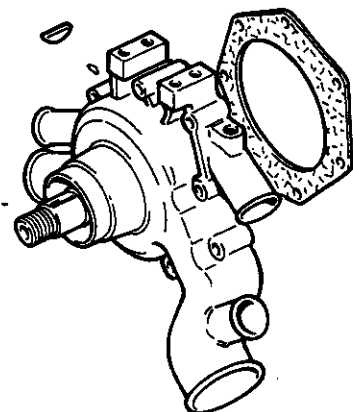
Refit thrust washer, hub, gear and retaining plate with marked teeth of idler gear meshing with marked teeth of crankshaft and camshaft gears. If the crankshaft or camshaft have to be turned, the rocker assemblies may have to be released to prevent a piston striking a valve. The holes in the hub for the securing studs are slightly off-centre and when fitting hub, ensure that oil drilling in hub is towards crankshaft.



J11

SECTION M

Cooling System



SECTION P

Flywheel and Flywheel Housing

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