workshop manual for 4.2032 diesel engines

Publication No. 601TPD07911158

CONTENTS

FOREWORD

This Workshop Manual has been compiled for use in conjunction with normal workshop practice. Mention of certain accepted practices, therefore, has been purposely omitted in order to avoid repetition.

Reference to renewing joints and cleaning off joint faces, has not always been made as it is understood that this will be carried out where applicable.

Similarly, it is understood that in re-assembly and inspection, all parts are to be thoroughly cleaned, and burrs and scale are to be removed if necessary.

All open ports of high precision components, e.g. fuel injection equipment, exposed by dismantling, should be blanked off until re-assembled, to prevent the ingress of dust and dirt.

When fitting setscrews into "through" holes into the interior of the engine, a suitable sealant should be used.

Note: Some setscrews may already have sealant coated threads. These can be identified by the colour of the threads which will be red or blue etc. Ensure that where these setscrews are fitted, the holes do not have sharp edges as this could remove the sealant.

Throughout this manual, whenever "left" or "right" hand side of the engine is referred to, it is that side of the engine when viewed from the flywheel end.

Running in Procedure

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 coolant temperature of at least 140° F (60° C).**

SERVICE LITERATURE

Other service literature is available from your normal source of supply at a nominal charge.

Users Handbooks by engine family.

Fault Finding Guide — all engines.

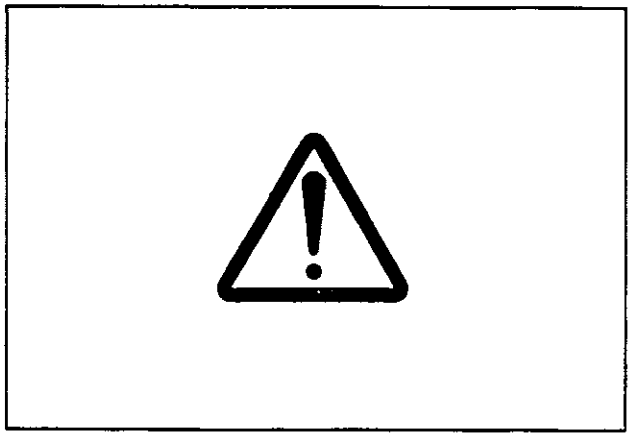
Engine Brake Testing Data.

Crankshaft Regrinding.

SAFETY PRECAUTIONS

These safety precautions are important. You must refer also to the local regulations in the country of use.

- Only use these engines in the type of application for which they have been designed.
- Do not change the specification of the engine.
- Do not smoke when you put fuel in the tank.
- Clean away fuel which has been spilt. Material which has been contaminated by fuel must be moved to a safe place.
- Do not put fuel in the tank while the engine runs (unless it is absolutely necessary).
- Do not clean, add lubricating oil, or adjust the engine while it runs (unless you have had the correct training; even then extreme caution must be used to prevent injury).
- Do not make adjustments that you do not understand.
- Ensure that the engine does not run in a location where it can cause a concentration of toxic emissions.
- Other persons must be kept at a safe distance while the engine or equipment is in operation.
- Do not permit loose clothing or long hair near moving parts.
- Keep away from moving parts during engine operation.
  Attention: The fan cannot be seen clearly while the engine runs.
- Do not operate the engine if a safety guard has been removed.
- Do not remove the filler cap of the cooling system while the engine is hot and while the coolant is under pressure, because dangerous hot coolant can be discharged.
- Do not use salt water or any other coolant which can cause corrosion in the closed circuit of the cooling system.
- Do not allow sparks or fire near the batteries (especially when the batteries are on charge) because the gases from the electrolyte are highly flammable. The battery fluid is dangerous to the skin and especially to the eyes.
- Disconnect the battery terminals before a repair is made to the electrical system.
- Only one person must control the engine.
- Ensure that the engine is operated only from the control panel or from the operator's position.
- If your skin comes into contact with high-pressure fuel, obtain medical assistance immediately.
- Diesel fuel can damage the skin of certain persons. Protect your hands with gloves or a special solution to protect the skin.
- Do not move mobile equipment if the brakes are not in good condition.
- Ensure that the control lever of the transmission drive is in the "out-of-drive" position before the engine is started.
- Read and use the instructions relevant to asbestos joints which are given on this page.
- Fit only genuine Perkins parts.



Asbestos joints

Some joints and gaskets contain compressed asbestos fibres in a rubber compound or in a metal outer cover. The "white" asbestos (Chrysotile) which is used is a safer type of asbestos and the risk of damage to health is extremely small.

The risk of asbestos from joints occurs at their edges or if a joint is damaged when a component is removed or if a joint is removed by abrasion.

To ensure that the risk is kept to a minimum, the procedures given below must be applied when an engine which has asbestos joints is dismantled or assembled.

- Work in an area with good ventilation.
- Do not smoke.
- Use a hand scraper to remove the joints - do not use a rotary wire brush.
- Ensure that the joint to be removed is wet with oil or water to contain loose particles.
- Spray all asbestos debris with water and put it in a closed container which can be sealed for safe disposal.

This Publication is produced by the Service Publications Department of Perkins Engines Ltd., 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 make alterations without notice.

USE ONLY

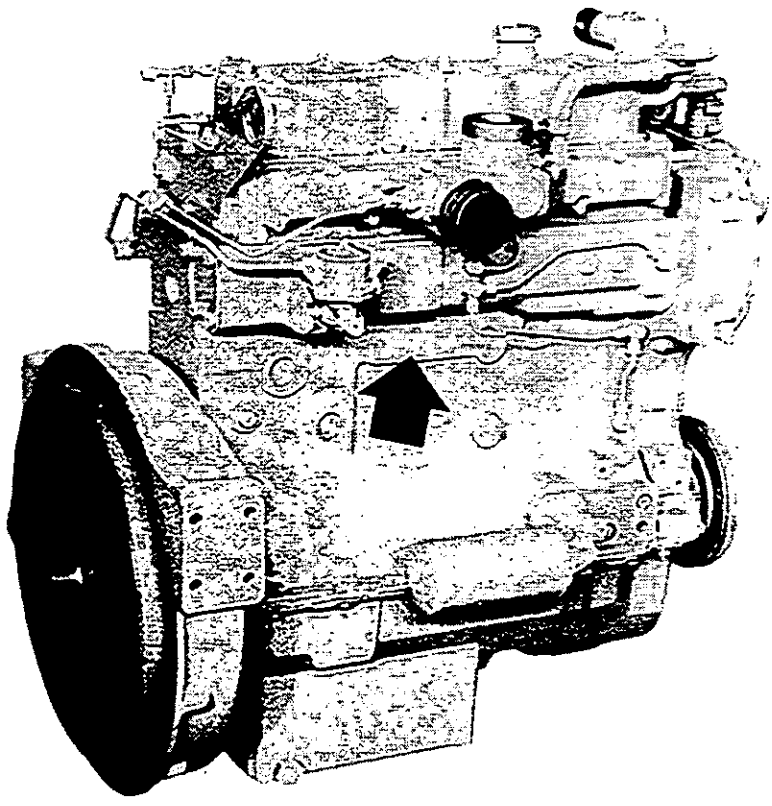
GENUINE

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.

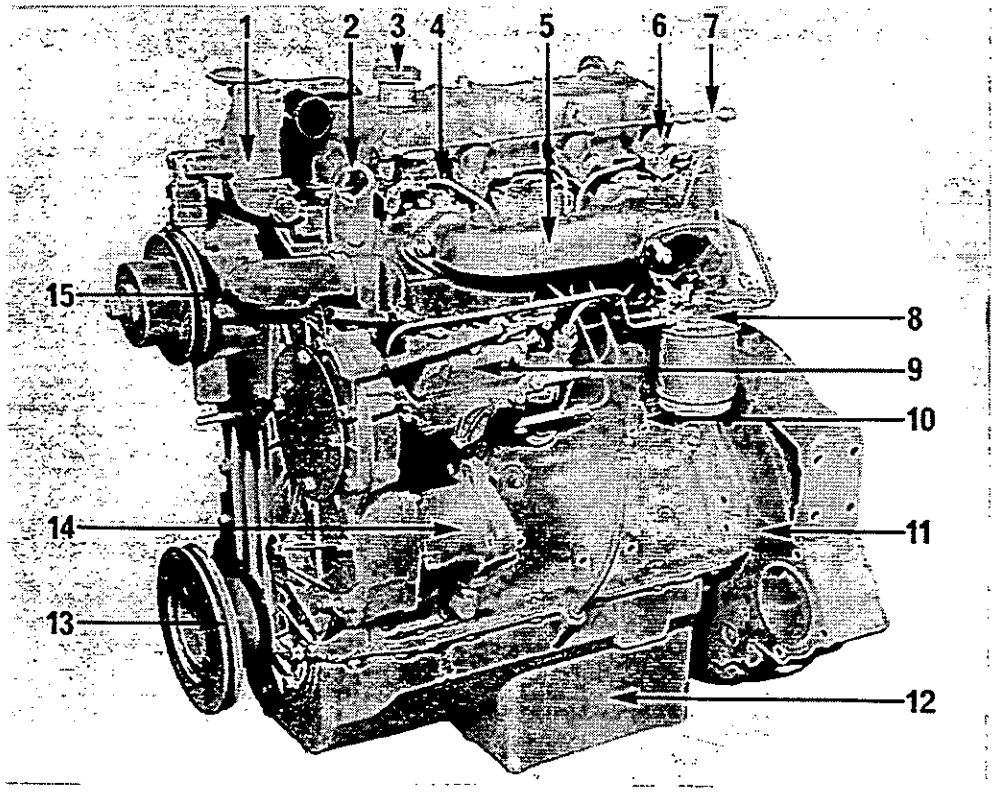
ENGINE NUMBER

When entering into any correspondence or discussions concerning this engine, always quote the full engine number which is to be found stamped on a machined face in the middle of the right hand side of the cylinder block just below the camshaft tunnel, see below. Current engines have the engine number stamped on the top rear face of the cylinder block.



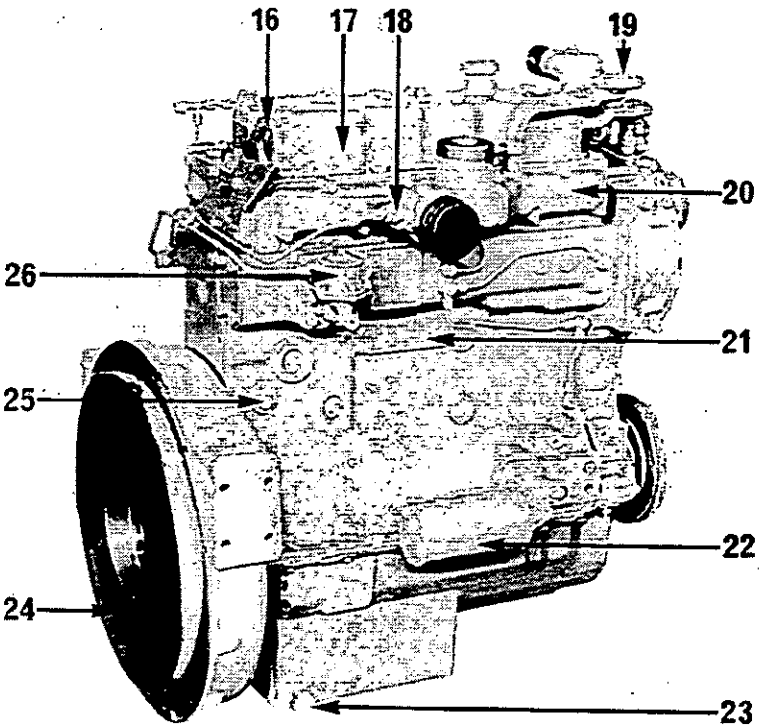
ENGINE VIEWS

Perkins Engines are built to individual requirements to suit the applications for which they are intended and the following engine views do not necessarily typify any particular specification.



Front Left Hand Side of Engine

1 Thermostat Housing.
2 Front Engine Lifting Bracket.
3 Lubricating Oil Filler.
4 High Pressure Pipe from Fuel Pump to Atomiser.
5 Exhaust Manifold.
6 Atomiser.
7 Atomiser Leak Off Pipe.
8 Fuel Oil Filter.
9 Fuel Injection Pump.
10 Dipstick.
11 Flywheel Housing.
12 Lubricating Oil Sump.
13 Crankshaft Pulley.
14 Hydraulic Pump Drive Housing.
15 Water Pump.



Rear Right Hand Side of Engine

16 Rear Engine Lifting Bracket.
17 Cylinder Head Cover.
18 Cold Start Aid.
19 Breather Vent Valve.
20 Induction Manifold
21 Engine Number Location.
22 Lubricating Oil Filter.
23 Sump Drain Plug.
24 Flywheel.
25 Engine Coolant Drain Plug.
26 Fuel Lift Pump.

SECTION A
Technical Data

Type	Four Cylinder, Four Stroke
Combustion System	Direct Injection
Bore	3.6 in (91,44 mm)*
Stroke	5 in (127 mm)
Cubic Capacity	203 in³ (3,33 Litres)
Compression Ratio	19:1
Firing Order	1, 3, 4, 2.
Tappet Clearance (cold)	
inlet	0.008 in (0,20 mm)
exhaust	0.012 in (0,30 mm)
Engine Rotation	Clockwise from front

*Nominal — for actual bore size, refer to inside diameter of finished liner. Page A.3.

Engine Ratings

Standard	60 bhp (44,7 kW) at 2,600 rev/min
Maximum Torque	156 lbf ft (21,5 kgf m or 210 Nm) at 1,500 rev/min
Alternative Rating	52 bhp (39 kW) at 2,600 rev/min
Maximum Torque	141 lbf ft (19,5 kgf m or 190 Nm) at 1,500 rev/min

Recommended Torque Tensions

	lbf ft	kgf m	Nm
Cylinder head setscrews with integral head washer	80	11,1	108
Cylinder Head Nuts and Setscrews	70	9,7	95
Connecting Rod Nuts (Cadmium plated)	45	6,2	60
Connecting Rod Nuts (Phosphated)	60	8,3	81
Main Bearing Setscrews	115	15,9	155
Camshaft Gear to Camshaft Setscrew	21	2,9	28
Idler Gear Hub Nuts	21	2,9	28
Flywheel Setscrews	80	11,1	108
Water Pump Pulley Retaining Nut	55	7,6	75
Crankshaft Pulley Retaining Setscrew with 3/16 in (4,8 mm) thick washer	110	15,2	150
Crankshaft Pulley Retaining Setscrew with 0.36 in (8,9 mm) thick washer	240	33,2	325
Atomiser Securing Nuts/Setscrews	12	1,6	15
High Pressure Fuel Pipe Nuts	15	2,1	20
Thermostart	10	1,4	13,6
Thermostart Adaptor (where fitted)	10	1,4	13,6
Flywheel Housing/Adaptor Plate Setscrew	36	5,0	4,9

Engine Weights, Dry

Engines with standard basic accessories, i.e. water pump, fuel pump and alternator	520 lb — 236 kg
Typical weight, dry, of standard basic engines plus flywheel, housing, starter motor, air cleaner, fan and filters	745 lb — 338 kg

De-Rating for Altitude

Where engines are called upon to operate in rarefied atmospheres occasioned by altitude, such engines should be de-rated.

The following table is given as a general guide which may be applied on a percentage basis where specific figures for a particular engine rating are not available.

Altitude	Maximum fuel delivery de-rating*
0 — 2,000 ft (600 metre)	No change
2,000 — 4,000 ft (1,200 metre)	6%
4,000 — 6,000 ft (1,800 metre)	12%
6,000 — 8,000 ft (2,400 metre)	18%
8,000 — 10,000 ft (3,000 metre)	24%
10,000 — 12,000 ft (3600 metre)	30%

*Measured at the pump setting speed as given in the Fuel Pump Setting Code.

Any necessary adjustments in this respect to the fuel pump should be carried out by the C.A.V. dealer for the territory concerned.

For any further information, apply to Service Department, Perkins Engines Ltd., Peterborough, or to those Overseas Companies listed on page 2.

MANUFACTURING DATA & DIMENSIONS

The data regarding clearances and tolerances are given as a guide for personnel engaged upon major overhauls and the figures given are 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 Diameter for Cylinder Liner	3.6875/3.6885 in (93,66/93,69 mm)
Depth of Recess for Liner Flange	0.148/0.152 in (3,76/3,86mm)
Dia. of Recess for Liner Flange	3.820/3.825 in (97,03/97,16 mm)
Main Bearing Parent Bore	2.9165/2.9175 in (74,08/74,10 mm)
No. 1 Bore (bushed) for camshaft	1.872/1.874 in (47,55/47,60 mm)
No. 2 Bore for Camshaft	1.864/1.867 in (47,34/47,42 mm)
No. 3 Bore for Camshaft	1.844/1.847 in (46,84/46,91 mm)

Cylinder Liners — Service Cast Iron

Type	Dry — Transition Fit
Outside Diameter of Liner	3.6875/3.6885 in (93,66/93,69 mm)
Transition Fit in Cylinder Block	0.001/0.001 in (0,03/0,03 mm)
Flange Thickness	0.148/0.150 in (3,76/3,81 mm)
Outside Diameter of Flange	3.803/3.808 in (96,60/96,72 mm)
Depth of Liner Flange relative to Top Face of Cylinder Block	+0.004/−0.004 in (+0,10/−0,10 mm)
I Inside Diameter of Finished Liner in Cylinder Block	3.6025/3.6035in (91,50/91,53mm)

Cylinder Liners — Production Cast Iron

Type	Dry — Interference Fit
Outside Diameter of Liner	3.6895/3.6905 in (93,71/93,74 mm)
Interference Fit of Liner in Cylinder Block	0.001/0.003 in (0,03/0,08 mm)
Flange Thickness	0.148/0.150 in (3,76/3,81 mm)
Outside Diameter of Flange	3.803/3.808 in (96,60/96,72 mm)
Relationship of Liner Flange to Cylinder Block Face	+0.004/−0.004 in (+0,10/−0,10 mm)
Inside Diameter of Finished Liner in Cylinder Block	3.6015/3.6025in (91,48/91,50mm)

Pistons

Type	Re-Entrant Chamber in Crown (Squish Lip)
Overall Height — Skirt to Crown	
"H" Grade (see Page D.5)	4.308/4.310 in (109,42/109,47 mm)
"L" Grade (see Page D.5)	4.3032 in (109,30 mm)
Centre Line of Gudgeon Pin to Crown	
"H" Grade (see Page D.5)	2.4329/2.4349 in (61,80/61,85 mm)
"L" Grade (see Page D.5)	2.4274/2.4289 in (61,66/61,69 mm)
Skirt Diameter—across Thrust	3.5975 in (91,38 mm)
Height in relation to Cylinder Block Top Face	0.0065 in (0,17 mm) BELOW to 0.0012 in (0,03 mm) ABOVE
I Bore Diameter for Gudgeon Pin	1.25012/1.25035in (31,753/31,759mm)
I Compression Ring Groove Width—No. 1	0.0957/0.0977 in (2,43/2,48 mm)
Compression Ring Groove Width—Nos. 2 and 3	0.0957/0.0967 in (2,43/2,46 mm)
Scraper Ring Groove Width	0.1895/0.1905 in (4,81/4,84 mm)

TECHNICAL DATA — A.4

Piston Rings

Top Compression	Parallel Faced, Chrome Inserted, Copper Plated
2nd and 3rd Compression	Internally Stepped, Copper Plated
4th Oil Control	Conformable, Chrome Plated, Spring Loaded Slotted Scraper
Top—2nd and 3rd Width	0.0928/0.0938 in (2,36/2,38 mm)
Top Ring Clearance in Groove	0.0019/0.0049 in (0,05/0,13 mm)
2nd and 3rd Ring Clearance in Groove	0.0019/0.0039 in (0,05/0,10 mm)
4th Ring Width	0.1865/0.1875 in (4,74/4,76 mm)
4th Ring Clearance in Groove	0.002/0.004 in (0,05/0,10 mm)
Ring Gap—No. 1	0.012/0.029 in (0,30/0,73 mm) with Copper Plating
... ...	0.018/0.032 in (0,05/0,81 mm) without Copper Plating
Ring Gap—Nos. 2 and 3	0.008/0.025 in (0,20/0,64 mm) with Copper Plating
... ...	0.011/0.028 in (0,28/0,71 mm) without Copper Plating
Ring Gap—No. 4	0.010/0.030 in (0,25/0,76 mm)

Ring gaps given are for when checking in an unworn portion of the cylinder bore. Compression rings are copper plated for running-in purposes, (see D.6).

Gudgeon Pin

Type	Fully Floating
Outside Diameter	1.24975/1.250 in (31,74/31,75 mm)
Clearance fit in Piston Boss	0.00012/0.00060 in (0,003/0,015 mm)
Clearance in Small End Bush	0.0005/0.00175 in (0,01/0,04 mm)
Length	2.9606/2.9646 in (75,2/75,3 mm)

Small End Bush

Type	Steel Backed, Lead Bronze Lined
Outside Diameter	1.3785/1.380 in (35,01/35,05 mm)
Length	1.0475/1.0575 in (26,61/26,86 mm)
Inside Diameter after Reaming	1.2505/1.2515 in (31,76/31,79 mm)

Connecting Rod

Type	"H" Section
Big End Parent Bore Diameter	2.395/2.3955 in (60,83/60,85 mm)
Small End Parent Bore Diameter	1.37475/1.3762 in (34,92/34,95 mm)
Big End Width	1.5502/1.5525 in (39,37/39,43 mm)
Big End Side Clearance on Crankpin	0.0095/0.0148 in (0,24/0,38 mm)

Connecting rod nuts if removed should be replaced by new ones.

Connecting Rod Alignment

Large and small end connecting rod bores must be square and parallel with each other within the limit of +/-0.010 in (0,25 mm) measured 5 in (127 mm) each side of the axis of the rod on test mandrel as shown in Fig. A.1. With the small end bush fitted, the limit of +/-0.010 in (0,25 mm) is reduced to +/-0.0025 in (0,06 mm).

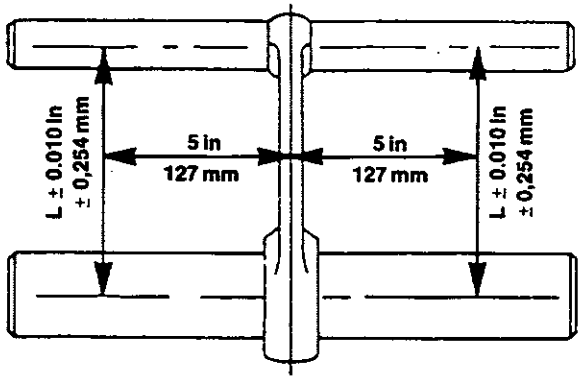


Fig. A.1.

Crankshaft

Main Journal Diameter	2.7485/2.7493 in (69,81/69,83 mm)
Main Journal Width—Rear	1.8427/1.8457 in (46,80/46,88 mm)
Fillet Radii, Main Journals, Nos. 1, 2 and 4 ...	0.125/0.140 in (3,17/3,56 mm)
Fillet Radii, Main Journals, Centre and Rear ...	0.1562/0.1662 in (3,97/4,22 mm)
Crankpin Diameter	2.2484/2.2492 in (57,11/57,12 mm)
Crankpin Width	1.562/1.565 in (39,67/39,75 mm)
Fillet Radii, Crankpins	0.1875/0.2031 in (4,76/5,16 mm)
Surface Finish, All Pins and Journals	8 to 16 micro inches (0,2 to 0,4 microns)
Crankshaft End Float	0.002/00.014 in (0,05/0,36 mm)
Regrind Undersizes, Mains and Pins	0.010 in (0,25 mm), 0.020 in (0,51 mm) 0.030 in (0,76 mm)

Crankshaft Thrust Washers

Type	Aluminium Tin, Steel Backed
Position in Engine	Cylinder block, Rear Main Bearing Housing
Thrust Washer Thickness (STD)	0.121/0.123 in (3,07/3,12 mm)
Thrust Washer Thickness (O/S)	0.1285/0.1305 in (3,26/3,31 mm)

Main Bearings

Type	Steel Backed, Aluminium Tin
Shell Width, Centre and Rear	1.532/1.542 in (38,91/39,17 mm)
Shell Width, No. 1	1.264/1.274 in (32,11/32,36 mm)
Shell Width, Nos. 2 and 4	0.927/0.937 in (23,55/23,80 mm)
Inside Diameter, Fitted	2.7510/2.7525 in (69,86/69,91 mm)
Main Bearing Running Clearance	0.0017/0.004 in (0,04/0,10 mm)

Inside diameters for main bearings quoted are for standard sizes. For undersizes, subtract 0.010 in (0,25 mm), 0.020 in (0,51 mm) or 0.030 in (0,76 mm).

Connecting Rod Bearings

Type	Pre-finished, Steel backed, Aluminium Tin Lined
Inside Diameter	2.251/2.252 in (57,17/57,20 mm)
Bearing Running Clearance	0.002/0.0035 in (0,05/0,09 mm)
For Undersizes, subtract	0.010 in (0,25 mm), 0.020 in (0,51 mm) or 0.030 in (0,76 mm)

TECHNICAL DATA — A.6

Camshaft

No. 1 Journal Diameter	1.869/1.870 in (47,47/47,50 mm)
Running Clearance	0.002/0.005 in (0,05/0,13 mm)
No. 2 Journal Diameter	1.859/1.860 in (47,22/47,24 mm)
Running Clearance	0.004/0.008 in (0,10/0,20 mm)
No. 3 Journal Diameter	1.839/1.840 in (46,71/46,74 mm)
Running Clearance	0.004/0.008 in (0,10/0,20 mm)
Cam Lift	0.308/0.322 in (7,82/8,18 mm)
Diameter of Camshaft Spigot	1.9985/1.9995 in (50,76/50,79 mm)

Cylinder Head

Skimming Allowance on Head Face*	A maximum of 0.012in (0,30mm) may be removed from the head face providing the atomiser nozzle protrusion does not exceed 0.249in (6,32mm)
Leak Test	30 lbf/in² (2,11 kgf/cm²) or 207 kN/m²
Valve Seat Angle	35°
Valve Depth below Cylinder Head Face	
Inlet	0.052/0.064 in (1,32/1,63 mm)
Exhaust	0.063/0.0755 in (1,60/1,92 mm)
Tappet Bore Diameter	0.6245/0.62575 in (15,86/15,89 mm)

Valve Guides (inlet)

Inside Diameter	0.314/0.315 in (7,98/8,00 mm)
Outside Diameter	0.5013/0.5018in (12,73/12,75mm)
Overall Length	2.219 in (56,36 mm)
Guide Protrusion above Cylinder Head Top Face	0.362/0.376 in (9,19/9,55 mm)

Valve Guides (exhaust)

Inside Diameter	0.314/0.3155in (7,98/8,01 mm)
Outside Diameter	0.5013/0.5018in (12,73/12,75mm)
Overall Length	2.440in (61,98mm)
Guide Protrusion above Cylinder Head Top Face	0.580/0.594in (14,73/15,09mm)

Inlet and Exhaust Valves

Valve Stem Diameter	0.311/0.312 in (7,90/7,92 mm)
Clearance Fit of Valve in Guide	0.002/0.004 in (0,05/0,10 mm)
Valve Face Angle	35°
Valve Head Depth below Cylinder Head Face (Inlet)	0.064/0.052in (1,63/1,32mm)
Valve Head Depth below Cylinder Head Face (Exhaust)	0.0755/0.063in (1,92/1,60mm)

Inner Valve Springs (inlet valves only)

Fitted Length	1.1875 in (30,16 mm)
Load at Fitted Length	8.0 lb +/- 1 lb (3,63 kg +/- 0,45 kg)
Free Length	1.365/1.405 in (34,67/35,68 mm)

Outer Valve Springs

Fitted Length	1.500 in (38,10 mm)
Load at Fitted Length	22.75 lb +/- 2 lb (10,34 kg +/- 0,90 kg)
Free Length	1.783/1.803 in (45,29/45,80 mm)

*From Engine No. JG . . . U561158G Nozzle Protrusion is 0.186in (4,72mm)

Note: Where a 0.082in (2.08mm) thick atomiser washer is fitted, nozzle protrusion must not be more than 0.163in (4.14mm).

Tappets

Tappet Shank Diameter	0.62225/0.62375 in (15,80/15,84 mm)
Running Clearance in Cylinder Head	0.00075/0.0035 in (0,02/0,09 mm)
Outside Diameter of Tappet Foot	1.125 in (28,57 mm)

Rocker Shaft

Outside Diameter	0.62225/0.62375 in (15,80/15,84 mm)
Overall Length of Shaft	16,875 in (428,62 mm)

Rocker Lever

Bush Bore Diameter	0.6245/0.62575 in (15,86/15,89 mm)
Running Clearance of Bush on Shaft	0.00075/0.0035 in (0,02/0,09 mm)

Valve Timing

Refer to Page H.4.

Camshaft Gear

Diameter of Gear Bore	2.000/2.0012 in (50,80/50,83 mm)
Clearance of Gear on Camshaft Spigot	0.0005/0.0027 in (0,01/0,07 mm)

Upper Idler Gear, Bushes and Hub

No. of Gear Teeth	43
Idler Gear Hub Diameter	1.996/1.997 in (50,70/50,72 mm)
Diameter of Gear Bush Bore	1.9998/2.0007 in (50,79/50,82 mm)
Running Clearance of Gear on Hub	0.0028/0.0047 in (0,07/0,12 mm)
Hub Width	1.1905/1.1935 in (30,24/30,31 mm)
Width of Gear with Bushes	1.1865/1.1875 in (30,14/30,16 mm)
Idler Gear End Float	0.001/0.007 in (0,02/0,18 mm)

Note: The bore and faces of bushes to be finished *in situ* to dimensions quoted.

Lower Idler Gear, Bushes and Hub

No. of Gear Teeth	48
Idler Gear Hub Diameter	1.996/1.997 in (50,70/50,72 mm)
Diameter of Gear Bush Bore	1.9998/2.0007 in (50,79/50,82 mm)
Running Clearance of Gear on Hub	0.0028/0.0047 in (0,07/0,12 mm)
Hub Width	1.1905/1.1935 in (30,24/30,31 mm)
Width of Gear with Bushes	1.1865/1.1875 in (30,14/30,16 mm)
Idler Gear End Float	0.001/0.007 in (0,03/0,18 mm)

Note: The bore and faces of bushes to be finished *in situ* to dimensions quoted.

Fuel Pump Gear

Diameter of Gear Bore	1.750/1.751 in (44,45/44,47 mm)
Outside Diameter of Fuel Pump Shaft	1.748/1.7488 in (44,40/44,42 mm)
Clearance Fit of Gear on Shaft	0.0012/0.003 in (0,03/0,08 mm)

TECHNICAL DATA — A.8

Crankshaft Gear

Diameter of Gear Bore	1.4995/1.501 in (38,09/38,13 mm)
Diameter of Crankshaft for Gear	1.500/1.5005 in (38,10/38,11 mm)
Transition Fit of Gear on Shaft	0.001/0.001 in (0,03/0,03 mm)

Timing Gear Backlash

All Gears	0.003 in (0,08 mm) minimum

Lubrication System

Lubricating Oil Pressure	30/60 lbf/in² (2,1/4,2 kgf/cm²) or 207/414 kN/m² at max. engine speed and normal working temperature.

Sump Capacity

The lubricating oil level should be maintained in accordance with the marks on the dipstick. Only approved oils as listed in Section J should be used.

Actual sump capacities vary according to application and for further details, apply to Service Department, Perkins Engines Ltd., Peterborough.

Lubricating Oil Pump Idler Gear, Bush and Shaft

Diameter of Gear Bore	0.750/0.751 in (19,05/19,07 mm)
Outside Diameter of Bush	0.7522/0.7532 in (19,10/19,13 mm)
Interference Fit of Bush in Gear	0.0012/0.0032 in (0,03/0,08 mm)
Outside Diameter of Idler Gear Shaft	0.6547/0.6553 in (16,63/16,64 mm)
Inside Diameter of Bush	0.6562/0.6572 in (16,67/16,69 mm)
Running Fit of Bush on Shaft	0.0009/0.0025 in (0,02/0,06 mm)

Lubricating Oil Pump Assembly

Type	Rotor
No. of Lobes—Drive Rotor	Five
No. of Lobes—Driven Rotor	Six

Oil Pump Clearances

Between Inner and Outer Rotor	0.0025/0.0045 in (0,06/0,11 mm)
Inner Rotor End Clearance	0.0015/0.0035 in (0,04/0,09 mm)
Outer Rotor End Clearance	0.001/0.003 in (0,03/0,08 mm)

Lubricating Oil Pump Relief Valve

Type	Plunger
Pressure Setting	50/65 lbf/in² (3,52/4,57 kgf/cm²) or 345/448 kN/m²

Lubricating Oil Filter

Type	Full Flow
Element	Replaceable canister

Cooling System

Type	
Cylinder Head	Water Pump Circulation
Cylinder Block	Thermo-syphon
Cooling System Capacity, engine only	10.5 U.K. pt. (6,0 litres)

Thermostat

Type	Wax Capsule
Opening Temperature	82° C (180° F)
Fully Open	98° C (208° F)

Note: If the thermostat does not function properly, replace with a new unit.

Water Pump

Type	Centrifugal
Outside Diameter of Shaft for Pulley	0.5906/0.5909 in (15,00/15,01 mm)
Inside Diameter of Pulley Bore	0.588/0.589 in (14,93/14,96 mm)
Interference Fit of Pulley on Shaft	0.0018/0.0029 in (0,05/0,07 mm)
Outside Diameter of Shaft for Impeller	0.6262/0.6267 in (15,90/15,92 mm)
Inside Diameter of Impeller Bore	0.625/0.6257 in (15,87/15,89 mm)
Interference Fit of Impeller on Shaft	0.0005/0.0017 in (0,01/0,05 mm)
Impeller to Body Clearance	0.005/0.035 in (0,13/0,89 mm)

Fuel Lift Pump

Type	AC Delco
Method of Drive	Eccentric on Camshaft
Delivery Pressure	5/8 lbf/in² (0,35/0,56 kgf/cm²) or 34/54 kN/m²
Diaphragm Spring Colour	Blue

Fuel Filter

Element Type	Paper
Valve Type	Orifice Controlled Vent Valve

Fuel System

To get the correct power and performance from your engine, use good quality fuel. The recommended fuel specification for Perkins engines is indicated below:

Cetane number	45 minimum
Viscosity	2.5/4.5 centistokes at 40°C
Density	0,835/0,855 kg/litre
Sulphur	0.5% of mass, maximum
Distillation	85% at 350°C

Cetane number indicates ignition performance. Fuel with a low cetane number can cause cold start problems and affect combustion.

Viscosity is the resistance to flow and, if this is outside the limits, engine performance can be affected.

Density Lower density will reduce engine power, higher density will increase engine power and exhaust smoke.

Sulphur High sulphur content (not normally found in Europe, North America or Australasia) can cause engine wear. Where only high sulphur fuels are available, it will be necessary to use a highly alkaline lubricating oil in the engine or to reduce the lubricating oil change interval.

Distillation This is an indication of the mixture of different hydrocarbons in the fuel. A high ratio of light weight hydrocarbons can affect the combustion characteristics.

Low temperature fuels

Special winter fuels may be available for engine operation at temperatures below 0°C. These fuels have a lower viscosity and also limit the wax formation in the fuel at low temperatures. If wax formation occurs, this could stop the fuel flow through the filter.

Aviation kerosene fuels

These fuels can be used but they can affect engine performance. It is recommended that you consult the Perkins Technical Service Department at Peterborough. especially if JP4 fuel is to be used. Aviation fuels are more flammable than diesel fuel and need careful storage and management.

If you need advice on any adjustment to the engine or to the lubricating oil change periods which may be necessary because. of the standard of available fuel, consult your nearest Perkins distributor or the Technical Service Department at one of the addresses on page 2.

Fuel Injection Pump

Make	C.A.V.
Type	D.P.A.
Pump Rotation	Anti-Clockwise
Governor	Mechanical
Plunger Diameter	8.5 mm
Timing Letter	"C"
No. 1 Cylinder Outlet	"W"

Engine Checking and Fuel Pump Marking Angles, Static Timing

The correct marking angles and static timing can be found by reference to the prefix letters and figures of the setting code adjacent to the word "Set" on the fuel pump identification plate. Engine checking and fuel pump marking angles are for use with timing tool MS67B and adaptor PD67B-1.

Prefix Letters	Engine Checking Angle (Degrees) (with engine at TDC compression	Fuel Pump Marking Angle (Degrees)	Static Timing (BTDC—Degrees)	Piston Displacement
PP48E	289½	281	17	0.145in.(3,68mm)
PP53E	289½	281	17	0.145in (3,68mm)
PP46E	289½	281	17	0.145in (3,68mm)
PP50E	289½	281	17	0.145in (3,68mm)
RP50E	290	281	18	0.156in (3,96mm)
SP50E	289½	281	17	0.145in (3,68mm)
TP	290	281	18	0.156in (3,96mm)

Atomisers

Make ... ... CAV

			Setting Pressure			Working Pressure		
Code	Holder	Nozzle	atm	lbf/in²	kgf/cm²	atm	lbf/in²	kgf/cm²
GR	BKBL67S5440	BDLL150S6745	210	3090	217	195	2870	201
GS	BKBL67S5446	BDLL150S6771	250	3670	258	235	3450	243
HM	LRB67015	JB6801029	250	3670	258	250	3670	258
HX	LRB67015	JB6801029	210	3090	217	210	3090	217
HW	BKBL67S5446	BDLL150S6771	210	3090	217	210	3090	217
YA	OKLL60M12150	OLL180M9977	210	3090	217	210	3090	217

When servicing a GR atomiser, nozzle BDLL150S6771 can be fitted in which case the pressures given for the GS atomiser must be used.

Electrical System

Voltage ... ... 12 volt

Alternator

Type	15ACR	17ACR	18ACR	1115/45	A127/55A	23ACR
Maximum Output	28A	36A	45A	45A	55A	
Type	LR135	LR150				
Maximum Output	35A	50A				

Starter Motor

Type	Lucas M45, M50, M127/2,8, CAV CA45, Perkins S12-84 S12-85
Maximum Current	855 amps

Cold Starting Aid

Type	CAV Thermostart
Voltage	12 volt

Note: The Electrical System Data is general and can vary with individual applications.

Service Wear Limits

The following "wear limits" indicate the condition when it is recommended that the respective items should be serviced or replaced.

Cylinder Head Bow	
Transverse	0.003 in (0,08 mm)
Longitudinal	0.006 in (0,15 mm)
Maximum Bore Wear	
(when new liners are necessary)	0.007 in (0,18 mm)
Maximum Top Piston Ring Clearance in Groove ...	0.007 in (0,18 mm)
Crankshaft, Main and Big End Journals Ovality	
and Wear	0.0015 in (0,04 mm)
Maximum Crankshaft End Float	0.020 in (0,51 mm)
Valve Stem to Guide Bore Clearance	
Inlet	0.006 in (0,15 mm)
Exhaust	0.0055 in (0,14 mm)
Valve Head Depth below Cylinder Head Face	PRODUCTION LIMITS MUST BE MAINTAINED
Rocker Clearance on Shaft	0.005 in (0,13 mm)
Camshaft Journals, Ovality and Wear	0.002 in (0,05 mm)
Idler Gear End Float	0.010 in (0,25 mm)

SECTION B
Maintenance