

SECTION B

Technical data

Engine Data

	4.108 and 4.107	4.99
Bore (nominal — See Page B.3)	3.125 in (79,37 mm)	3.00 in (76,2 mm)
Stroke	3.5 in (88,9 mm)	3.5 in (88,9 mm)
No. of Cylinders	Four	Four
Cubic Capacity	107.4 in ³ (1,760 litre)	99 in ³ (1,621 litre)
Compression Ratio	22 : 1	20 : 1
Firing Order	1, 3, 4, 2.	1, 3, 4, 2.
Cycle	Four-Stroke	Four-Stroke
Combustion System	Indirect Injection	Indirect Injection

Rating Details

	4.99	4.107	4.108
Maximum Gross Rated Output	48 bhp at 4000 rev/min	41 bhp at 3000 rev/min	55 bhp at 4000 rev/min
Maximum Gross Torque Output	73 lbf ft (10,1 kgf m) at 2250 rev/min	79 lbf ft (10,9 kgf m) at 1900 rev/min	83 lbf ft (11,5 kgf m) at 2200 rev/min

Engine Weights, Dry

Approx. dry weight, bare engine, i.e. complete with fuel injection equipment, pressed steel oil sump, dynamo, water pump, but not including starter motor, air cleaner, fan, flywheel or flywheel housing: 330 lb (150 kg).

Typical dry weight, engine with all accessories: 450 lb (204 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 feet (600 metre)	No change
2,000— 4,000 feet (1,200 metre)	6%
4,000— 6,000 feet (1,800 metre)	12%
6,000— 8,000 feet (2,400 metre)	18%
8,000—10,000 feet (3,000 metre)	24%
10,000—12,000 feet (3,600 metre)	30%

*Measured at setting speed given in pump setting code.

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

For any further information apply to Technical Service Department, Perkins Engines Limited, Peterborough, or to one of the Perkins Companies listed on Page 2.

TECHNICAL DATA—B.12

Static Timing Position

The static timing position varies according to application, but can be obtained by referring to the first group of letters and digits of the fuel pump setting code (stamped on the fuel pump identification plate), i.e.,

First Group of Fuel Pump Code	Static Timing B.T.D.C.	Piston Displacement B.T.D.C.	Remarks			
EH39 MH26 MH27 PH28 PH30	18°	0.108 in (2,75 mm)				
			CH35 PH34 LH23	4.107 engines rated up to and including 2,500 rev/min		
					LH29 LH31	4.107 engines rated above 2,500 rev/min
			19°	0.120 in (3,05 mm)		
20°	0.134 in (3,40 mm)					
20°	0.134 in (3,40 mm)					
22°	0.160 in 4,06 mm)					
26°	0.226 in (5,74 mm)					

Note: For 4.107 and 4.99 mechanically governed engines rated above 3,000 and 2,500 rev/min respectively, the static timing is altered to 22° B.T.D.C. - piston displacement 0.160 in (4,06 mm). For 4.108 engines prior to engine numbers 108U15973 and 108UD20214, the static timing was 19° B.T.D.C. - piston displacement 0.120 in (3,05 mm). When re-setting these pumps, it is advisable to set at the figures quoted in above table.

For 4.107 industrial engines having a fuel pump coding of PH30 and an idling speed of 1,000 rev/min, the static timing is 21° B.T.D.C. and a piston displacement of 0.147 in (3,73 mm).

Atomisers

4.108 Veh., M., Ind., Comb.

4.107 M., Ind., TA

Make	...	...	...	...	C.A.V.
Holder Type	...	...	...	...	BKB40SD5224
Nozzle Type	...	...	...	...	BDN12SD6236
Code Letter	...	...	...	...	BG
Min. Working Pressure	...	...	...	...	135 atm (2000 lbf/in ² or 140 kgf/cm ²)
Setting Pressure	...	...	...	...	150 atm (2200 lbf/in ² or 155 kgf/cm ²)

Note: Earlier atomisers bearing the identification code letter 'J' had a setting pressure of 140 atm. When servicing of these atomisers is carried out, they should be reset in accordance with the settings quoted above.

	4.99 Veh	4.99 Veh	4.99 Ind. & 4.107 Ind.
Make	...	C.A.V.	C.A.V.
Holder Type	...	BKB40S5223	BKB40S5224
Nozzle Type	...	BDN12SD6236	BDN4S6157
Code Letter	...	BK	BE
Min. Working Pressure	...	120	125
Setting Pressure	...	130	130

Starting Aid

Make	...	C.A.V.
Type	...	Thermostart
Voltage	...	12 Volt
Maximum Current Consumption	...	12.9 Amperes at 11.5 Volts
Fuel Flow Rate through Unit	...	4.3-4.9 cm ³ min at 70°F (21°C)
Height of Reservoir above Centre of Thermostart	...	4.5-10 in (11,4-25,4 cm)

MANUFACTURING DATA AND DIMENSIONS

The data regarding clearances and tolerances are given for personnel engaged upon major overhauls. Further information can be obtained on request from the Technical Service Department, Perkins Engines Ltd., Peterborough.

CYLINDER BLOCK

Total Height of Cylinder Block			
between Top & Bottom Faces	4.108, 4.107, 4.99		9.936/9.939 in (252,374/252,451 mm)
Parent Bore Dia. for Cylinder Liner	4.108		3.249/3.250 in (82,525/82,550 mm)
Parent Bore Dia. for Cylinder Liner		4.107, 4.99	Wet Liners
Main Bearing Parent Bore	4.108, 4.107, 4.99		2.3950/2.3955 in (60,833/60,846 mm)
Camshaft Bore Dia. No. 1	4.108, 4.107, 4.99		1.794/1.7955 in (45,568/45,606 mm)
Camshaft Bore Dia. No. 2	4.108, 4.107, 4.99		1.784/1.787 in (45,314/45,390 mm)
Camshaft Bore Dia. No. 3	4.108, 4.107, 4.99		1.776/1.778 in (45,110/45,161 mm)
Tappet Bore Dia.	4.108, 4.107, 4.99		0.562/0.56325 in (14,275/14,307 mm)
Fuel Pump Drive Hub Bearing			
Bore Dia.	4.108, 4.107, 4.99		1.8125/1.8141 in (46,037/46,078 mm)

Cylinder Liner 4.108

Type	...	...	Cast Iron — Dry — Interference Fit
Interference Fit of Liners	...	...	0.003/0.005 in (0,076/0,127 mm)
Inside Dia. of Liner after Finish Boring and Honing	...	...	3.125/3.126 in (79,375/79,40 mm)
Height of Liner in relation to Cylinder Block Top Face	...	...	0.023/0.027 in (0,584/0,686 mm) above
Overall Length of Liner	...	...	6.495/6.505 in (164,973/165,227 mm)

Cylinder Liner 4.107 and 4.99

Type	...	...	Cast Iron — Wet — Push Fit
Inside Dia. of Liner Pre-Finished	...	4.99	3.00/3.001 in (76,20/76,225 mm)
Inside Dia. of Liner Pre-Finished	...	4.107	3.125/3.126 in (79,374/79,4 mm)
Thickness of Top Flange	...	4.99	0.3125/0.3145 in (7,937/7,988 mm)
Depth of Recess in Block for Liner Flange	...	4.99	0.3115/0.3135 in (7,912/7,963 mm)
Thickness of Top Flange	...	4.107	0.250/0.252 in (6,35/6,4 mm)
Depth of Recess in Block for Liner Flange	...	4.107	0.249/0.251 in (6,325/6,375 mm)
Height of Liner in relation to			
Cylinder Block Top Face	...	4.107 and 4.99	0.003 in (0,076 mm) Above, 0.001 in (0,025 mm) Below
Liner Flange Outside Dia.	...	4.99	3.618/3.621 in (91,898/91,973 mm)
Cylinder Block Top Bore for Liner Flange	...	4.99	3.625/3.627 in (92,075/91,125 mm)
Clearance Fit of Liner Flange			
to Block Bore	...	4.107 and 4.99	0.004/0.009 in (0,102/0,229 mm)

Pistons 4.108

Type	...	...	Flat Topped
Centre Line of Gudgeon Pin to Piston Skirt	...	...	1.157 in (29,388 mm)
Piston Height in relation to Cylinder Block Top Face	...	...	0.002/0.006 in (0,051/0,152 mm) Above
Bore Dia. for Gudgeon Pin	...	...	1.06255/1.06275 in (26,989/26,994 mm)
Compression Ring Groove Width—Top	...	...	0.0805/0.0815 in (2,045/2,070 mm)
Compression Ring Groove Width—2nd	...	...	0.0645/0.0655 in (1,638/1,664 mm)
Compression Ring Groove Width—3rd	...	...	0.0645/0.0655 in (1,638/1,664 mm)
Oil Control Ring Groove Width—4th	...	...	0.126/0.127 in (3,200/3,225 mm)
Oil Control Ring Groove Width—5th	...	...	0.190/0.191 in (4,826/4,851 mm)

Note: There is a Steel Insert fitted above the Top Groove.

Pistons 4.107 and 4.99

Type	...	...	Flat Topped
Centre Line of Gudgeon Pin to Piston Skirt	...	...	1.344 in (34,14 mm)
Piston Height in relation to Cylinder Block Top Face	...	...	0.0085/0.012 in (0,22/0,30 mm) Above
Bore Dia. for Gudgeon Pin			
later 4.99 and all 4.107 engines	...	...	0.93755/0.93775 in (23,81/23,82 mm)
Early 4.99 engines	...	...	0.87505/0.87525 in (22,22/22,23 mm)
Compression Ring Groove Width—Top	...	...	0.0801/0.0811 in (2,034/2,06 mm)
Compression Ring Grooves Width 2nd and 3rd	...	...	0.0645/0.0655 in (1,638/1,664 mm)
Oil Control Ring Grooves Width 4th and 5th	...	...	0.190/0.191 in (4,826/4,851 mm)

TECHNICAL DATA—B.10

Lubricating Oil Pump

Type	Rotor Type
Number of Lobes—Inner Rotor	Three or Four
Number of Lobes—Outer Rotor	Four or Five
Method of Drive	By Spiral Gears from the Camshaft

Pump Clearances

Inner Rotor to Outer Rotor	0.0005/0.0025 in (0,013/0,063 mm)
Outer Rotor to Pump Body	0.011/0.013 in (0,28/0,33 mm)
Inner Rotor End Clearance	0.0015/0.0003 in (0,0380,076 mm)
Outer Rotor End Clearance	0.0005/0.0025 in (0,013/0,063 mm)
Inside Dia. of Bore for Pump Shaft	0.500/0.501 in (12,700/12,725 mm)
Outside Dia. of Pump Shaft	0.4983/0.4986 in (12,655/12,664 mm)
Running Clearance, Shaft in Bore	0.0014/0.0027 in (0,036/0,069 mm)

Lubricating Oil Pump Drive Gear

Number of Teeth	12
Inside Dia. of Gear Bore	0.4965/0.4970 in (12,611/12,624 mm)
Outside Dia. of Oil Pump Drive Shaft	0.4983/0.4986 in (12,655/12,664 mm)
Interference Fit of Gear on Shaft	0.0013/0.0021 in (0,033/0,053 mm)
Lubricating Oil Pump Drive Gear Backlash	0.0155/0.019 in (0,394/0,483 mm)

Relief Valve

Type	Spring Loaded Plunger
Pressure Setting	50/65 lbf/in ² (3,5/4,6 kgf/cm ²)
Length of Plunger	0.9375 in (23,813 mm)
Outside Dia. of Plunger	0.5585/0.5595 in (14,19/14,21 mm)
Inside Dia. of Valve Housing Bore	0.5605/0.5625 in (14,24/14,29 mm)
Clearance of Plunger in Bore	0.001/0.004 in (0,025/0,102 mm)
Outside Dia. of Spring	0.368/0.377 in (9,347/9,576 mm)
Spring—Free Length	1.5 in (38,10 mm)

Lubricating Oil Filter

Type	Full Flow
Element Type	Paper
By-Pass Valve Setting	Opens between 13-17 lbf/in ² (0,91-1,2 kgf/cm ²) pressure differential
Type of Valve	Spring Loaded Ball

COOLING SYSTEM 4.108, 4.107, 4.99

Type	Water Cooled
Cylinder Block and Head	Thermo-Syphon Impeller Assisted
Engine Water Capacity (Less Radiator)	6 Imp. pt (7.2 U.S. pt or 3.4 Litre)

Thermostat

Type	Wax Capsule
Opening Temperature	175-182°F (79,5-83,5°C)
Fully open at	200-205°F (93,5-96°C)
Minimum Travel at Fully Open Temp.	0.3125 in (7,94 mm)

Water Pump

Type	Centrifugal—Belt driven from Crankshaft
Outside Dia. of Shaft for Pulley (Separate Bearing Pump)	0.5905/0.5908 in (14,999/15,006 mm)
Inside Dia. of Pulley Bore (Separate Bearing Pump)	0.588/0.589 in (14,935/14,961 mm)
Outside Dia. of Shaft for Pulley (Combined Bearing and Shaft)	0.6262/0.6267 in (15,808/15,920 mm)
Inside Dia. of Pulley Bore (Combined Bearing and Shaft Pump)	0.6239/0.6247 in (15,849/15,869 mm)
Interference Fit of Pulley on Shaft	0.0015/0.0028 in (0,038/0,071 mm)
Outside Dia. of Shaft for Impeller	0.498/0.499 in (12,649/12,675 mm)
Inside Dia. of Impeller Bore	0.497/0.4975 in (12,624/12,636 mm)
Interference Fit of Impeller on Shaft	0.0005/0.002 in (0,013/0,051 mm)

Small End Bush 4.107 and 4.99

Type	...	Steel Backed, Lead Bronze Lined
Length of Small End Bush	...	0.865/0.885 in (22,00/22,48 mm)
Outside Dia. of Small End Bush		
on later 4.99 and all 4.107 engines	...	1.065/1.066 in (27,05/27,08 mm)
Early 4.99 engines	...	1.0025/1.0035 in (25,46/25,49 mm)
Inside Dia. after Reaming on later		
4.99 and all 4.107 engines	...	0.9382/0.93875 in (23,83/23,84 mm)
Early 4.99 engines	...	0.8757/0.87625 in (22,24/22,26 mm)
Clearance between Small End Bush and Gudgeon Pin		0.0005/0.00125 in (0,01/0,03 mm)

Note. Bushes to be reamed to suit respective Gudgeon Pins, and are provided with a reaming allowance.

Connecting Rod 4.108

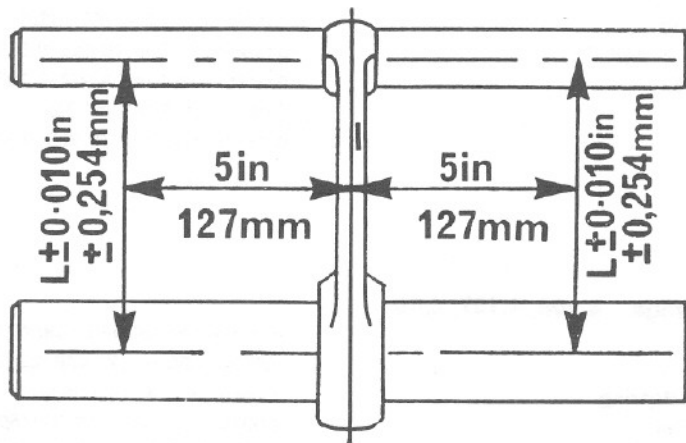
Type	...	'H' Section
Cap Location to Connecting Rod	...	Serrations, Offset 45° to the Horizontal
Big End Parent Bore Dia.	...	2.146/2.1465 in (54,508/54,521 mm)
Small End Parent Bore Dia.	...	1.21875/1.21975 in (30,956/30,981 mm)
Length from Centre Line of Big End		
to Centre Line of Small End	...	6.217/6.219 in (157,912/157,963 mm)
Big End Setscrew	...	0.375 in (3/8 in) U.N.F.
Connecting Rod End Float	...	0.0065/0.0105 in (0,165/0,267 mm)

Connecting Rod 4.107 and 4.99

Type	...	'H' Section
Cap Location to Connecting Rod	...	Serrations, Offset 45° to the horizontal
Big End Parent Bore Dia.	...	2.146/1.1465 in (54,508/54,521 mm)
Small End Parent Bore Dia.		
on later 4.99 and all 4.107 engines	...	1.0625/1.0635 in (26,99/27,01 mm)
Early 4.99 engines	...	1.00/1.001 in (25,4/25,43 mm)
Length from Centre Line of Big End to Centre Line of		
Small End	...	6.405/6.407 in (162,69/162,74 mm)
Big End Setscrew	...	0.375 in (3/8 in) U.N.F.
Connecting Rod End Float		
on later 4.99 and all 4.107 engines	...	0.0065/0.0105 in (0,16/0,27 mm)
Early 4.99 engines	...	0.0075/0.0105 in (0,19/0,27 mm)

Connecting Rod Alignment 4.108, 4.107, 4.99

Large and small end bores must be square and parallel with each other within the limits 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. B.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).



Valve Head Depth Below Cylinder Head Face	...	0.028/0.039 in (0,711/0,991 mm)
Overall Length of Valve	...	4.592/4.608 in (116,637/117,043 mm)
Sealing Arrangement	...	Rubber Oil Seal

Valves (Exhaust) 4.108, 4.107, 4.99

Valve Stem Dia.	...	0.3115/0.3125 in (7,912/7,937 mm)
Clearance Fit of Valve Stem in Guide	...	0.002/0.004 in (0,051/0,102 mm)
Valve Head Dia.	...	1.191/1.195 in (30,251/30,353 mm)
Valve Face Angle	...	45°
Valve Head Depth Below Cylinder Head Face	...	0.021/0.032 in (0,533/0,813 mm)
Overall Length of Valve	...	4.600/4.616 in (116,840/117,246 mm)
Sealing Arrangement	...	No Seal fitted to Exhaust Valve

Inner Valve Springs (where fitted)

Fitted Length	...	1.530 in (38,862 mm)
Load at Fitted Length	...	28.6 lbf ± 2 lbf (13,0 kgf ± 0,91 kgf)
Fitted Position	...	Damper Coil to Cylinder Head

Outer Valve Springs 4.108, 4.107, 4.99

Fitted Length	...	1.780 in (45,212 mm)
Load at Fitted Length	...	56.0 lbf ± 2.8 lbf (25,4 kgf ± 1,27 kgf)
Fitted Position	...	Damper Coil to Cylinder Head

Rocker Levers 4.108, 4.107, 4.99

Length between Centre Line of Adjusting Screw and Centre Line of Rocker Shaft	...	1.042/1.058 in (26,467/26,873 mm)
Length between Centre Line of Rocker Lever Pad and Centre Line of Rocker Shaft	...	1.567/1.583 in (39,802/40,208 mm)
Inside Dia. of Rocker Lever Bore	...	0.71825/0.71950 in (18,243/18,275 mm)
Outside Dia. of Rocker Lever Bush	...	0.7205/0.7215 in (18,301/18,326 mm)
Interference Fit of Bush in Rocker Lever	...	0.001/0.00325 in (0,025/0,082 mm)
Finished Inside Dia. of Rocker Lever Bush	...	0.6245/0.62575 in (15,862/15,894 mm)
Clearance of Rocker Lever Bush on Rocker Shaft	...	0.00075/0.0035 in (0,019/0,089 mm)

Valve Clearances 4.108, 4.107, 4.99

Clearance between Valve Stem Tip and Rocker Lever	0.012 in (0,30 mm) Cold
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Rocker Shaft 4.108, 4.107, 4.99

Overall Length of Shaft	...	14.5625 in (369,887 mm)
Outside Dia. of Shaft	...	0.62225/0.62375 in (15,805/15,843 mm)
Lubrication	...	Oil Feed from Cylinder Head through Central Passage to Individual Rocker Levers

Push Rods 4.108, 4.107, 4.99

Overall Length	...	8.527/8.560 in (216,58/217,42 mm)
Outside Dia.	...	0.250 in (6,350 mm)

Tappets 4.108, 4.107, 4.99

Overall Length	...	2.250 in (57,150 mm)
Outside Dia. of Tappet Shank	...	0.560/0.561 in (14,224/14,249 mm)
Cylinder Block Tappet Bore Dia.	...	0.562/0.56325 in (14,275/14,307 mm)
Tappet Running Clearance in Cylinder Block Bore	...	0.001/0.00325 in (0,025/0,082 mm)

Camshaft 4.108, 4.107, 4.99

No. 1 Journal Length	...	...	...	1.347/1.351 in (34,214/34,315 mm)
No. 1 Journal Dia.	...	...	...	1.791/1.792 in (45,491/45,517 mm)
No. 1 Cylinder Block Camshaft Bore Dia.	...	...	...	1.794/1.7955 in (45,568/45,606 mm)
No. 1 Journal Running Clearance	...	...	...	0.002/0.0045 in (0,051/0,114 mm)
No. 2 Journal Length	...	...	...	1.250 in (31,750 mm)
No. 2 Journal Dia.	...	...	...	1.781/1.782 in (45,237/45,263 mm)
No. 2 Cylinder Block Camshaft Bore Dia.	...	...	...	1.784/1.787 in (45,314/45,390 mm)
No. 2 Journal Running Clearance	...	...	...	0.002/0.006 in (0,051/0,152 mm)
No. 3 Journal Length	...	...	...	1.000 in (25,400 mm)
No. 3 Journal Dia.	...	...	...	1.773/1.774 in (45,034/45,060 mm)
No. 3 Cylinder Block Camshaft Bore Dia.	...	...	...	1.776/1.778 in (45,110/45,161 mm)
No. 3 Journal Running Clearance	...	...	...	0.002/0.005 in (0,051/0,127 mm)
Cam Lift	...	...	...	0.2592/0.2622 in (6,58/6,66 mm)
Oilways for Rocker Shaft Lubrication	...	...	...	No. 2 Journal

Camshaft Thrust Plates 4.108, 4.107, 4.99

Type	...	...	...	180° Oil Impregnated Sintered Iron
Thrust Plate Outside Dia.	...	...	...	2.555/2.557 in (64,897/64,948 mm)
Cylinder Block Recess Dia. for Thrust Plate	...	...	...	2.5585/2.5685 in (64,986/65,240 mm)
Clearance Fit of Thrust Plate in Recess	...	...	...	0.0015/0.013 in (0,038/0,330 mm)
Thrust Plate Inside Dia.	...	...	...	1.500 in (38,100 mm)
Thrust Plate Thickness	...	...	...	0.160/0.162 in (4,060/4,115 mm)
Cylinder Block Recess Depth for Thrust Plate	...	...	...	0.158/0.164 in (4,009/4,166 mm)
Thrust Plate Height in relation to Cylinder Block Face	...	...	...	0.004 in (0,102 mm) above or below
Camshaft End Float	...	...	...	0.003/0.013 in (0,076/0,330 mm)

Valve and Fuel Pump Timing

Refer to later section on timing (page L.1).

CYLINDER HEAD 4.108, 4.107, 4.99

Overall Length of Cylinder Head	...	...	...	20.000 in (508,000 mm)
Overall Depth of Cylinder Head	...	...	...	2.617/2.633 in (66,472/66,878 mm)
Skimming Allowance on Cylinder Head Face	...	...	...	NIL—On no account can the cylinder head face be skimmed
Pressure for Water Leakage Test	...	...	...	20 lbf/in ² (1,4 kgf/cm ²)
Valve Seat Angle	...	...	...	45°
Bore in Cylinder Head for Guide	...	...	...	0.4995/0.5005 in (12,687/12,713 mm)
Bore in Cylinder Head for Combustion Chamber Inserts	...	...	...	1.250/1.252 in (31,750/31,801 mm)
Depth of Bore in Cylinder Head for Combustion Chamber Inserts	...	...	...	0.373/0.376 in (9,474/9,550 mm)

Combustion Chamber Inserts 4.108, 4.107, 4.99

Outside Dia. of Insert	...	...	...	1.248/1.249 in (31,699/31,724 mm)
Depth of Insert	...	...	...	0.374/0.375 in (9,499/9,525 mm)
Height of Insert in relation to Cylinder Head Face	...	...	...	0.002 in (0,051 mm) above or below
Clearance Fit of Insert in Cylinder Head Bore	...	...	...	0.001/0.004 in (0,025/0,102 mm)
Method of Location in Cylinder Head	...	...	...	By Cylinder Block Face and Expansion Washer

Valve Guides (Inlet) 4.108, 4.107, 4.99

Inside Dia.	...	...	...	0.3145/0.3155 in (7,988/8,014 mm)
Outside Dia.	...	...	...	0.50125/0.50175 in (12,744/12,757 mm)
Interference fit of Guide in Cylinder Head Bore	...	...	...	0.00075/0.00225 in (0,019/0,057 mm)
Overall length of Guide	...	...	...	2.130 in (54,102 mm)
Guide Protrusion Above Top Face of Cylinder Head	...	...	...	0.800/0.815 in (20,320/20,701 mm)

Valve Guides (Exhaust) 4.108, 4.107, 4.99

Inside Dia.	...	...	...	0.3145/0.3155 in (7,988/8,014 mm)
Outside Dia.	...	...	...	0.50125/0.50175 in (12,744/12,757 mm)
Interference fit of Guide in Cylinder Head Bore	...	...	...	0.00075/0.00225 in (0,019/0,057 mm)
Depth of Counterbore	...	...	...	0.380 in (9,650 mm)
Overall Length of Guide	...	...	...	2.440 in (61,980 mm)
Guide Protrusion above Top Face of Cylinder Head	...	...	...	0.800/0.815 in (20,320/20,701 mm)

Main Journal Length No. 1	...	...	...	1.40625 in (35,719 mm)
Main Journal Length No. 2	...	...	...	1.496/1.504 in (37,998/38,202 mm)
Main Journal Length No. 3	...	...	...	1.499/1.502 in (38,075/38,151 mm)
Main Journal Fillet Radii	...	...	...	0.125/0.141 in (3,175/3,581 mm)
Crankpin Dia.	...	...	...	1.9995/2.000 in (50,787/50,800 mm)
Crankpin Length	...	...	...	1.1875/1.1895 in (30,162/30,213 mm)
Crankpin Fillet Radii	...	...	...	0.15625/0.17187 in (5/32/11/64 in) (3,969/4,366 mm)
Surface Finish—All Journals	...	...	...	8-16 micro-in (0.2 - 0.4 micron)
Main Journal and Crankpin Re grind Undersizes	...	...	...	0.010, 0.020, 0.030 in (0.25, 0.51, 0.76 mm)
Oil Seal Helix Dia.	...	...	...	2.21075/2.21175 in (56,153/56,178 mm)
Oil Seal Helix Width	...	...	...	0.050/0.080 in (1,270/2,032 mm)
Oil Seal Helix Depth	...	...	...	0.004/0.008 in (0,102/0,203 mm)
Flange Dia.	...	...	...	3.9985/3.9995 in (101,562/101,587 mm)
Flange Width	...	...	...	0.500 in (12,700 mm)
Spigot Bearing Recess Depth	...	...	...	0.875 in (22,225 mm)
Spigot Bearing Recess Bore	...	...	...	1.250 in (31,750 mm)
Crankshaft End Float	...	...	...	0.002/0.015 in (0.0508/0,381 mm)

Crankshaft Thrust Washers 4.108, 4.107, 4.99

Type	...	...	...	Steel Backed—Lead Bronze Faced
Position in Engine	...	...	...	Rear Main Bearing
Thrust Washer Thickness (STD)	...	...	...	0.089/0.091 in (2,261/2,311 mm)
Thrust Washer Thickness (O/S)	...	...	...	0.0965/0.1005 in (2,451/2,553 mm)
Thrust Washer Outside Dia.	...	...	...	3.245/3.255 in (82,423/82,677 mm)
Thrust Washer Inside Dia.	...	...	...	2.590/2.600 in (65.786/66,040 mm)

Main Bearings 4.108, 4.107, 4.99

Type	...	...	...	Pre-finished, Steel Backed, Aluminium Tin Lined
Shell Width	...	...	...	1.245/1.255 in (31,623/31,877 mm)
Outside Dia. of Main Bearing	...	...	...	2.3955 in (60,846 mm)
Inside Dia. of Main Bearing	...	...	...	2.2505/2.2515 in (57,163/57,188 mm)
Running Clearance—Nos. 1 and 2	...	...	...	0.002/0.0035 in (0,051/0,089 mm)
Running Clearance—No. 3	...	...	...	0.0025/0.004 in (0,063/0,102 mm)
Steel Thickness	...	...	...	0.060 in (1,524 mm) Max.
Aluminium Thickness	...	...	...	0.012/0.01225 in (0,305/0.311 mm)

Connecting Rod Bearings 4.108, 4.107, 4.99

Type	...	...	...	Pre-finished, Steel Backed, Aluminium Tin Lined
Shell Width	...	...	...	0.870/0.880 in (22,098/22,325 mm)
Outside Dia. of Con. Rod Bearing	...	...	...	2.1465 in (54,521 mm)
Inside Dia. of Con. Rod Bearing	...	...	...	2.0015/2.0025 in (50,838/50,863 mm)
Running Clearance	...	...	...	0.0015/0.003 in (0,038/0,076 mm)
Steel Thickness	...	...	...	0.060 in (1,524 mm) Max.

TIMING GEARS 4.108, 4.107, 4.99

Camshaft Gear

Number of Teeth	...	...	...	...	48
Inside Dia. of Gear Boss	...	...	...	...	1.750/1.7514 in (44,450/44,486 mm)
Outside Dia. of Camshaft Hub	...	...	...	...	1.7496/1.7509 in (44,430/44,473 mm)
Transition Fit of Gear and Hub	...	...	...	...	0.0009/0.0018 in (0,023/0,046 mm)

Fuel Pump Gear

Number of Teeth	...	...	...	...	48
Inside Dia. of Cylinder Block Bore for Fuel Pump Drive Hub Bearing	...	...	...	...	1.8125/1.8141 in (46,037/46,078 mm)
Outside Dia. of Fuel Pump Drive Hub Bearing	...	...	...	...	1.8145/1.8152 in (46,088/46,106 mm)
Interference Fit of Drive Hub Bearing in Cylinder Block Bore	...	...	...	...	0.0004/0.0027 in (0,010/0,069 mm)
Inside Dia. of Fuel Pump Drive Hub Bearing	...	...	...	...	1.3125/1.3135 in (33,34/33,78 mm)
Outside Dia. of Fuel Pump Gear Drive Hub	...	...	...	...	1.3105/1.3115 in (33,287/33,312 mm)
Running Clearance of Drive Hub in Bearing	...	...	...	...	0.0031/0.0051 in (0,079/0,129 mm)
Drive Hub End Float	...	...	...	...	0.002/0.010 in (0,051/0,254 mm)

Idler Gear and Hub

Number of Teeth	...	...	...	...	57
Inside Dia. of Gear Boss	...	...	...	...	1.7187/1.7197 in (43,655/43,680 mm)
Inside Dia. of Gear Boss with Bush Fitted	...	...	...	...	1.5625/1.5641 in (39,687/39,728 mm)
Outside Dia. of Gear Hub	...	...	...	...	1.5612/1.5619 in (39,654/39,668 mm)
Running Clearance of Gear on Hub	...	...	...	...	0.0003/0.0016 in (0,008/0,041 mm)
Idler Gear Width	...	...	...	...	1.3105/1.3135 in (33,287/33,363 mm)
Hub Width	...	...	...	...	1.3165/1.3185 in (33,439/33,490 mm)
Idler Gear End Float	...	...	...	...	0.003/0.008 in (0,076/0,208 mm)

Crankshaft Gear

Number of Teeth	...	...	...	...	24
Inside Dia. of Gear	...	...	...	...	1.250/1.2512 in (31,750/31,780 mm)
Crankshaft Dia. for Gear	...	...	...	...	1.250/1.2506 in (31,750/31,756 mm)
Transition Fit of Gear on Crankshaft	...	...	...	...	0.0006/0.0012 in (0,015/0,030 mm)

Timing Gear Backlash

Clearance between Crankshaft/Idler and Camshaft/Idler Gear	0.0015/0.0025 in (0,038/0,064 mm)
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LUBRICATING SYSTEM 4.108, 4.107, 4.99

Lubricating Oil Pressure	30/60 lbf/in ² (2,1/4,2 kgf/cm ²) at maximum engine speed and normal working temperature.
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Sump

Dipstick Position	Camshaft side of engine opposite No. 2 cylinder
Strainer Location	End of suction pipe to lubricating oil pump.

Typical Sump Capacities

Refill Capacities—Engine Level	...	...	...	...	Imp. pt	U.S. pt	Litre
Standard Sump	...	...	...	...	7.0	8.4	4.0
Vauxhall Motors	...	...	...	...	9.0	10.8	5.1
Chrysler Cars	...	...	...	...	8.6	10.3	4.9
Ford Motor Co.	...	...	...	...	8.75	10.5	5.0

Note: The above sump capacities are intended to be used as a guide and actual capacities should be governed by the level indicated on the dipstick.

When refilling the engine after an overhaul has been carried out a further 2 imp. pints, 2½ U.S. pints or 1 litre approximately should be added to the capacities quoted, to allow for filling the pipes, oilways, filter assembly, etc.

TECHNICAL DATA—B.4

Piston Rings 4.108

Top—Compression	...	...	...	Parallel Faced
Second and Third Compression	...	...	...	Internally Stepped
Fourth—Oil Control	...	...	...	Laminated Segment
Fifth—Oil Control	...	...	...	Slotted Scraper
Top Compression Ring Width	...	...	...	0.0771/0.0781 in (1,958/1,984 mm)
Ring Clearance in Groove	...	...	...	0.0024/0.0044 in (0,061/0,112 mm)
Second and Third Compression Ring Width	...	...	...	0.0615/0.0625 in (1,562/1,587 mm)
Ring Clearance in Groove	...	...	...	0.002/0.004 in (0,051/0,102 mm)
Fifth Scraper Ring Width	...	...	...	0.1865/0.1875 in (4,737/4,762 mm)
Ring Clearance in Groove	...	...	...	0.0025/0.0045 in (0,063/0,114 mm)
Ring Gap—Top Compression	...	...	...	0.009/0.014 in (0,229/0,356 mm)
Ring Gap—Second and Third Compression	...	...	...	0.009/0.014 in (0,229/0,356 mm)
Ring Gap—Fifth Scraper	...	...	...	0.009/0.014 in (0,229/0,356 mm)

Piston Ring Gaps quoted are measured in a ring gauge of 3.125 in (79,38 mm) bore. In practice for every 0.001 in (0,254 mm) difference in cylinder bore diameter from gauge size, 0.003 in (0,762 mm) should be allowed.

Piston Rings

4.99 Vehicle Engines

Top Compression	...	...	...	Parallel Faced Chrome Plated
Second and Third Compression	...	...	...	Internally Stepped
Fourth and Fifth Oil Control	...	...	...	Slotted Scraper

Piston Rings 4.107 and 4.99

Agricultural and Industrial Engines

Top Compression	...	...	...	Parallel Cast Iron
*Second and Third Compression	...	...	...	Internally Stepped
Fourth—Oil Control	...	...	...	Chrome Plated Spring Loaded Scraper
Fifth—Oil Control	...	...	...	Slotted Scraper

*4.99 Agricultural engines have taper faced cast iron compression rings fitted in the second and third ring grooves.

Top Compression Ring Width	...	...	...	0.0771/0.0781 in (1,96/1,984 mm)
Ring Clearance in Groove	...	...	...	0.002/0.004 in (0,051/0,102 mm)
Second and Third Compression Ring Width	...	...	...	0.0615/0.0625 in (1,562/1,587 mm)
Ring Clearance in Groove	...	...	...	0.002/0.004 in (0,051/0,102 mm)
Fourth and Fifth Scraper Ring Width	...	...	...	0.1865/0.1875 in (4,737/4,762 mm)
Ring Clearance in Groove	...	...	...	0.0025/0.0045 in (0,064/0,114 mm)
Ring Gap—Compression Rings Chrome Vehicle	...	...	...	0.012/0.017 in (0,30/0,43 mm)
Ring Gap—Oil Control Rings Cast Iron Vehicle	...	...	...	0.009/0.014 in (0,229/0,356 mm)
Ring Gap—Compression Rings Cast Iron Agricultural and Industrial	...	...	...	0.009/0.014 in (0,229/0,356 mm)

Piston Ring Gaps quoted are measured in a ring gauge of 3.000 in (76,20 mm) bore for 4.99 engines and 3.125 in (79,38 mm) bore for 4.107 engines. In practice, for every 0.001 in (0,254 mm) difference in cylinder bore diameter from gauge size, 0.003 in (0,762 mm) should be allowed.

Gudgeon Pin 4.108

Type	...	...	...	Fully Floating
Outside Dia. of Gudgeon Pin	...	...	...	1.0625/1.0627 in (26,987/26,993 mm)
Length of Gudgeon Pin	...	...	...	2.673/2.687 in (67,894/68,250 mm)
Fit in Piston Boss	...	...	...	Transition

Gudgeon Pin 4.107 and 4.99

Type	...	...	...	Fully Floating
Outside Dia. of Gudgeon Pin (Later Engines)	...	...	...	0.9375 in/0.9377 in (23,812/23,817 mm)
Outside Dia. of Gudgeon Pin (Earlier Engines)	...	...	...	0.875/0.8752 in (22,225/22,23 mm)
Fit in Piston Boss	...	...	...	Transition

Small End Bush 4.108

Type	...	...	...	Steel Backed, Lead Bronze Lined
Length of Small End Bush	...	...	...	0.935/0.955 in (23,749/24,257 mm)
Outside Dia. of Small End Bush	...	...	...	1.221/1.222 in (31,013/31,039 mm)
Inside Dia. before Reaming	...	...	...	1.0495/1.0545 in (26,657/26,784 mm)
Inside Dia. after Reaming	...	...	...	1.06315/1.0632 in (27,004/27,005 mm)
Clearance between Small End Bush and Gudgeon Pin	...	...	...	0.00045/0.0007 in (0,0114/0,0178 mm)

TECHNICAL DATA—B.11

Outside Dia. of Impeller	3.094/3.125 in (78,588/79,375 mm)
Water Pump Seal Type	Synthetic Rubber—Carbon Faced

FUEL SYSTEM 4.108, 4.107, 4.99

Approved Fuel Oil Specification

United Kingdom	BS.2869:1967	Class A.1 or A.2
United States	VV-F-800a	Grades DF-A, or DF-2.
	A.S.T.M./D975-66T	Nos. 1-D or 2-D.
France	(J.O. 14/9/57)	Gas Oil or Fuel Domestique
India	IS: 1460/1968	Grade Special or Grade A
Germany	DIN-51601 (1967)	—
Italy	CUNA-Gas Oil NC-630-01 (1957)	—
Sweden	SIS. 15 54 32 (1969)	—
Switzerland	Federal Military Spec.	—
	9140-335-1404 (1965)	

Fuel oils available in territories other than those listed above which are to an equivalent specification may be used.

Fuel Lift Pump

Type	AC Delco Diaphragm 'YJ' Series
Spring Colour Code	Green
Method of Drive	From Eccentric on Camshaft via Push rod
Total Stroke of Operating Lever	0.192 in (4,877 mm)
Static Pressure—No Delivery	4-7 lbf/in ² (0,28-0,49 kgf/cm ²)
Pump to Distance Piece Gasket Thickness	0.018/0.022 in (0,457/0,559 mm)
Distance Piece—Lift Pump to Tappet Inspection Cover	0.256 in (6,502 mm)

Final Fuel Filter

Element Type	Paper
Overflow Valve Type	Gravity Ball Check Valve
Valve in Fuel Pump Drain Connection	Spring Loaded Non-Return Valve set at 0.71-1.25 lbf/in ² (0,0522—0,0875 kgf/cm ²)

Fuel Injection Pump

Make	C.A.V.
Type	D.P.A.
Rotation	Clockwise (Viewed from Drive End)
Plunger Dia.	6 mm

Hydraulically Governed

	4.108	4.107	4.99
Timing Letter	A		A
No. 1 Cylinder Outlet	W		W

Mechanically Governed

	C	C	C
Timing Letter	W	W	W
No. 1 Cylinder Outlet			

TECHNICAL DATA—B.2

Recommended Torque Tensions

The following torque figures will apply with the components lightly oiled before assembly:—

	4.107 and 4.99	4.108
Cylinder Head Nuts	42 lbf ft (5,81 kgf m)	60 lbf ft (8,3 kgf m)
Connecting Rod Setscrews	42 lbf ft (5,81 kgf m)	42 lbf ft (5,81 kgf m)
*Main Bearing Setscrews	85 lbf ft (11,5 kgf m)	85 lbf ft (11,5 kgf m)
Flywheel Setscrews	60 lbf ft (8,3 kgf m)	60 lbf ft (8,3 kgf m)
Idler Gear Hub Setscrews	36 lbf ft (4,98 kgf m)	32 lbf ft (4,4 kgf m)
Crankshaft Pulley Setscrews	150 lbf ft (20,5 kgf m)	150 lbf ft (20,5 kgf m)
Atomiser Securing Nuts	12 lbf ft (1,7 kgf m)	12 lbf ft (1,7 kgf m)
Dynamo Pulley Retaining Nut	20 lbf ft (2,8 kgf m)	20 lbf ft (2,8 kgf m)

*The tab and shim washers may be discarded where used on earlier engines, but the setscrews must be tightened to the torque loading indicated.

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	Longitudinal	0.006 in (0,15 mm)
Cylinder Head Bow	Transverse	0.003 in (0,08 mm) concave 0.005 in (0,13 mm) convex
Maximum Bore Wear (when new liners are necessary)		0.006 in (0,15 mm)
Crankshaft Main and Big End Journal	Wear	0.001 in (0,03 mm)
Crankshaft Main and Big End Journal	Ovality	0.0005 in (0,01 mm)
Maximum Crankshaft End Float		0.020 in (0,51 mm)
Valve Stem to Guide Clearance	inlet	0.005 in (0,13 mm)
Valve Stem to Guide Clearance	exhaust	0.006 in (0,15 mm)
Valve Head Thickness at outer edge		0.025 in (0,64 mm)
Rocker Clearance on Shaft		0.005 in (0,13 mm)
Camshaft Journals — Ovality and Wear		0.002 in (0,05 mm)
Camshaft End Float		0.020 in (0,51 mm)
Idler Gear End Float		0.010 in (0,25 mm)
*Valve Head Depth below Head Face—inlet and exhaust		0.048 in (1,22 mm)

*Where vehicle engines have to conform with the smoke density regulation B.S.AU 141a : 1971, then the valve depths must not exceed production limits as given on page B.8.