

# SPECIFICATIONS

## GENERAL

Type designation .....	B 16 B
Output, b.h.p./r.p.m. (SAE) .....	85/5500
(DIN) .....	76/5500
Max. torque, kgm (lb.ft)/r.p.m. (SAE) .....	12 (86.8)/3500
(DIN) .....	11.5 (83)/3300
Compression pressure (warm engine) when running on starter motor at 200 r.p.m., kg/cm <sup>2</sup> (lb/sq.in.) .....	10–11 (142–156)
Compression ratio .....	8.2:1
Number of cylinders .....	4
Bore .....	79.37 mm (3.125")
Stroke .....	80 mm (3.15")
Displacement .....	1.58 litres (96.4 cu.in.)
Weight, including starter motor, generator, clutch, carburetors and air cleaners .....	approx. 150 kg (330 lb.)

## CYLINDER BLOCK

Material .....	Special-alloy cast-iron
The cylinder bores are drilled directly in the block	
Bore, standard .....	3.125" (79.37 mm)
0.020" oversize .....	3.145" (79.88 mm)
0.030"    " .....	3.155" (80.13 mm)
0.040"    " .....	3.165" (80.39 mm)
0.050"    " .....	3.175" (80.64 mm)

## PISTONS

Material .....	Light-alloy
Weight .....	14.46 ± 0.18 oz. (410 ± 5 grams)
Permissible weight difference between pistons in same engine ..	0.35 oz. (10 grams)
Total height .....	3.390" (86 mm)
Height from piston pin centre to piston top .....	1.81" (46 mm)
Piston clearance .....	0.0012"–0.0020" (0.03–0.05 mm)
Diameter, measured at right angles to piston pin at lower edge of piston, standard .....	3.1230" (79.33 mm)
0.020" oversize .....	3.1431" (79.84 mm)
0.030"    " .....	3.1535" (80.09 mm)
0.040"    " .....	3.1638" (80.35 mm)
0.050"    " .....	3.1736" (80.60 mm)

## PISTON RINGS

Ring gap measured at gap opening .....	0.0017–0.0029" (0.25–0.50 mm)
Piston ring oversizes .....	0.020"
	0.030"
	0.040"
	0.050"

## Compression rings

Upper ring on each piston chromed.

Number of rings on each piston .....	2
Height .....	0.078" (1.97 mm)
Piston ring clearance in groove .....	0.0027"—0.0031" (0.068—0.079 mm)

Both rings are beveled on the inner edge which should face upwards.

## Oil rings

Number on each piston .....	1
Height .....	0.1865" (4.73 mm)
Piston ring clearance in groove .....	0.0017"—0.0029" (0.045—0.073 mm)

## PISTON PINS

Fully floating. Circlips at both ends in piston.

Fit in connecting rod .....	Close running fit
Fit in piston .....	Slide fit
Diameter, standard .....	0.748" (19)
0.05 mm oversize .....	0.750" (19.05 mm)
0.10 mm   " .....	0.752" (19.10 mm)
0.20 mm   " .....	0.754" (19.20 mm)

## CYLINDER HEAD

Height measured from cylinder head contact surface to cylinder head nut flats .....	3.84" (97.5 mm)
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## CRANKSHAFT

(Replaceable bearing shells for main and connecting rod bearings)

Crankshaft end play .....	0.0004"—0.0040" (0.01—0.10 mm)
Main bearings, radial play, flange bearing .....	0.0005"—0.0025" (0.014—0.064 mm)
Main bearings, radial play, others .....	0.0020"—0.0039" (0.051—0.100 mm)
Connecting rod bearings, radial play .....	0.0020"—0.0034" (0.051—0.087 mm)

## MAIN BEARINGS

### Main bearing journals

Journal diameter, standard .....	2.1240"—2.1244" (53.950—53.960 mm)
0.010" undersize .....	2.1140"—2.1144" (53.696—53.706 mm)
0.020"   " .....	2.1040"—2.1044" (53.442—53.452 mm)
0.030"   " .....	2.0940"—2.0944" (53.188—53.198 mm)
0.040"   " .....	2.0840"—2.0844" (52.934—52.944 mm)
Journal width, flange bearing, standard .....	1.5329"—1.5344" (38.935—38.975 mm)
0.1 mm oversize (for 0.010" undersize shell) .....	1.5369"—1.5384" (39.035—39.075 mm)
0.2 mm   " ( " 0.020"   "   " ) .....	1.5407"—1.5423" (39.135—39.175 mm)
0.3 mm   " ( " 0.030"   "   " ) .....	1.5447"—1.5463" (39.235—39.275 mm)
0.4 mm   " ( " 0.040"   "   " ) .....	1.5486"—1.5502" (39.335—39.375 mm)

## Main bearing shells

### Flange bearing shells

Thickness, standard .....	0.0752"—0.0755" (1.911—1.918 mm)
0.010" undersize .....	0.0802"—0.0805" (2.038—2.045 mm)
0.020"       " .....	0.0852"—0.0855" (2.165—2.172 mm)
0.030"       " .....	0.0902"—0.0905" (2.292—2.299 mm)
0.040"       " .....	0.0952"—0.0955" (2.419—2.426 mm)

### Other main bearing shells

Thickness, standard .....	0.0746"—0.0748" (1.894—1.900 mm)
0.010" undersize .....	0.0796"—0.0798" (2.021—2.027 mm)
0.020"       " .....	0.0845"—0.0848" (2.148—2.154 mm)
0.030"       " .....	0.0895"—0.0898" (2.275—2.281 mm)
0.040"       " .....	0.0946"—0.0948" (2.402—2.408 mm)

## Connecting rod bearings

### Connecting rod bearing journals.

Bearing seat width .....	1.2953"—1.2992" (32.900—33.000 mm)
Journal diameter, standard .....	1.8736"—1.8740" (47.589—47.600 mm)
0.010" undersize .....	1.8635"—1.8640" (47.335—47.347 mm)
0.020"       " .....	1.8536"—1.8540" (47.081—47.092 mm)
0.030"       " .....	1.8436"—1.8440" (46.827—46.838 mm)
0.040"       " .....	1.8336"—1.8520" (46.573—46.584 mm)

### Connecting rod bearing shells.

Thickness, standard .....	0.0615"—0.0617" (1.562—1.568 mm)
0.010" undersize .....	0.0665"—0.0667" (1.689—1.695 mm)
0.020"       " .....	0.0715"—0.0717" (1.816—1.822 mm)
0.030"       " .....	0.0765"—0.0767" (1.943—1.949 mm)
0.040"       " .....	0.0815"—0.0817" (2.070—2.076 mm)

## Connecting rods

Marked 1—4 on side away from camshaft. Classified A—D showing weight classification. Only connecting rods with same weight classification may be used in the same engine. Axial play at crankshaft .....

Length, centre—centre .....	0.0060"—0.0140" (0.15—0.35 mm)
Weight, Class A .....	5.905 ± 0.004" (150 ± 0.1 mm)
B .....	20.39—21.44 oz. (578—608 grams)
C .....	21.44—22.50 oz. (608—638 grams)
D .....	22.50—23.56 oz. (638—668 grams)
	23.56—24.62 oz. (668—698 grams)

## FLYWHEEL

Permissible axial play .....	0.008" (0.20 mm)
Ring gear (chamfer facing inwards) .....	116 teeth

## Flywheel housing

Permissible axial play for rear surface .....	0.0016" (0.08 mm)
Max. radial play for rear guide .....	0.0060" (0.15 mm)

## CAMSHAFT

Drive .....	Fiber gear on camshaft
Number of bearings .....	3
Forward bearing journal, diameter .....	1.8494"—1.8504" (46.975—47.000 mm)
Centre bearing journal, diameter .....	1.6919"—1.6929" (42.975—43.000 mm)
Rear bearing journal, diameter .....	1.4557"—1.4567" (36.975—37.000 mm)
Radial clearance .....	0.0010"—0.0029" (0.025—0.075 mm)
Valve clearance for check of camshaft setting (cold engine) ....	0.043" (1.15 mm)
Inlet valves should then open at .....	0° (T.D.C.)

## CAMSHAFT BEARINGS

Forward bearing, diameter .....	1.8514"—1.8524" (47.025—47.050 mm)
Centre bearing, diameter .....	1.6939"—1.6949" (43.025—43.050 mm)
Rear bearing, diameter .....	1.4577"—1.4587" (37.025—37.050 mm)

## TIMING GEARS

Crankshaft gear .....	20 teeth
Camshaft gear .....	40 teeth
Backlash .....	0.0004"—0.0016" (0.01—0.04 mm)

## VALVE SYSTEM

### Valves

Inlet	
Disc diameter .....	1.46" (37 mm)
Stem diameter .....	0.3094"—0.3100" (7.859—7.874 mm)
Valve seat angle .....	44.5°
Cylinder head seat angle .....	45°
Seat width in cylinder head .....	0.060" (1.5 mm)
Clearance, warm engine .....	0.020" 0.50 mm)
Exhaust	
Disc resistant to ethyl fuel	
Disc diameter .....	1.34" (34 mm)
Stem diameter .....	0.3082"—0.3089" (7.830—7.845 mm)
Valve seat angle .....	44.5°
Cylinder head seat angle .....	45°
Seat width in cylinder head .....	0.060" (1.5 mm)
Clearance, warm engine .....	0.020" 0.50 mm)

## VALVE GUIDES

Length .....	2.44" (62 mm)
Inner diameter .....	0.311"—0.312" (7.905—7.920 mm)
Length above cylinder head upper surface .....	0.83" (21 mm)
Clearance valve stem-valve guide, inlet valves .....	0.0012"—0.0024" (0.031—0.061 mm)
Clearance valve stem-valve guide, exhaust valves .....	0.0024"—0.0035" (0.061—0.090 mm)

## VALVE SPRINGS

Springs close-wound at one end. This end should be turned downwards.

Length, unloaded .....	1.77" (45 mm)
in./loading, lb. ....	1.54/56 ± 4 <sup>1</sup> / <sub>2</sub>
mm/loading, kg. ....	39/25.5 ± 2
in./loading, lb. ....	1.20/145 ± 8
mm/loading, kg. ....	30.5/66 ± 3.5

## LUBRICATING SYSTEM

Oil capacity of crankcase .....	4 <sup>7</sup> / <sub>8</sub> Imp. pints = 5 <sup>3</sup> / <sub>4</sub> US pints (2.75 litres)
Oil capacity, incl. oil cleaner .....	6 <sup>1</sup> / <sub>4</sub> Imp. pints = 7 <sup>1</sup> / <sub>2</sub> US pints (3.5 litres)
Oil pressure, warm engine (2000 r.p.m. = 30 m.p.h. 50 km.p.h. in top gear) .....	36–50 lb./sq.in. (2.5–3.5 kg/cm <sup>2</sup> )
Lubricant .....	Engine oil (For Service MM, MS)
viscosity, throughout the year .....	Multigrade oil 10 W–30
below 32° F (0° C) .....	SAE 10 W
from 32° F (0° C) to 90° F (30° C) .....	SAE 20
above 90° F (30° C) .....	SAE 30

## Oil pump

Type .....	Gear pump
Number of teeth .....	10
Axial clearance .....	0.0008"–0.004" (0.020–0.10 mm)
Radial clearance .....	0"–0.004" (0.00–0.10 mm)
Backlash .....	0.006"–0.014" (0.15–0.35 mm)

## Oil cleaner

Type .....	Full-flow
Make and designation .....	AC Mann or Fram
Element, designation including gasket .....	AC 1531572 Mann H 10.18 + Di 105–02 Fram CH847 PL

## Relief valve spring

Length unloaded .....	1.575" ± 0.002" (40 ± 0.5 mm)
loaded with 5 <sup>1</sup> / <sub>2</sub> ± 1 <sup>1</sup> / <sub>2</sub> lb. (2.5 ± 0.2 kg) .....	1.340" (34 mm)
7 <sup>3</sup> / <sub>4</sub> ± 1 <sup>1</sup> / <sub>2</sub> lb. (3.5 ± 0.2 kg) .....	1.240" (31.5 mm)

## FUEL SYSTEM

Fuel pump, make and type .....	AC diaphragm pump
Fuel pressure .....	Min. 2 lb./sq.in. (0.14 kg/cm <sup>2</sup> ) Max. 3.5 lb./sq.in. (0.25 kg/cm <sup>2</sup> )
Capacity at idling speed .....	7 <sup>7</sup> / <sub>8</sub> Imp. pint/min. = 1 US pint/min. (0.5 litres/min.)
Fuel gauge, type .....	Electric

## Carburetors

Type .....	Horizontal
Make and designation .....	SU H4
Number of carburetors .....	2
Size (air intake diameter) .....	1½" (38.1 mm)
Fuel control jet, designation .....	AUC 2112
Fuel needle, designation .....	GT
Rapid idling, setting of rod in cam-shaped lever .....	Position 2
Idling speed .....	500–700 r.p.m.
Oil for damping cylinders .....	SAE 20

## Ignition system

Voltage .....	6 V
Order of firing .....	1–3–4–2
Ignition setting basic, (97 octane Research Method) .....	6–8° before T.D.C.
Ignition setting, stroboscope setting 1500 engine r.p.m. with vacuum regulator disconnected (97 octane Research Method) ..	23–25° before T.D.C.
Spark plugs, normal driving .....	Champion J 6 Bosch W 175–225 T3
hard driving .....	Champion J 6 Bosch W 225–240 T3
Spark plug gap .....	0.028" (0.7 mm)
tightening torque (copper washer) .....	25 lb.ft. (3.5 kgm)
(steel washer) .....	29 lb.ft. (4 kgm)

## Distributor

Make and designation .....	Bosch VJU 4 BR 20
Contact breaker gap .....	0.016"–0.020" (0.4–0.5 mm)
Breaker arm tension .....	14–18 oz. (0.4–0.5 kg)
Dwell angle .....	50±3°

## COOLING SYSTEM

Type .....	Pressure
Filler cap valve opens at .....	3.2–4.2 lb./sq.in. (0.23–0.30 kg/cm <sup>2</sup> )
Capacity .....	approx. 2 Imp. gallons = 2¼ US gallons (8.5 litres)

## Thermostat

Balanced thermostat. Does not open under influence of water pump pressure	
Thermostat marked .....	170
Starts to open at .....	167°–172° F (75°–78° C)
Fully open at .....	194° F (90° C)
Fan belt, designation .....	HC .380"×33"

## WEAR TOLERANCES

### Cylinders

Rebore when worn (if oil consumption abnormal) .....	0.010" (0.25 mm)
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## Crankshaft

Maximum main bearing journal out-of-round .....	0.0020" (0.05 mm)
Maximum connecting rod journal out-of-round .....	0.0028" (0.07 mm)
Maximum crankshaft end play .....	0.0060" (0.15 mm)

## Valves

Maximum valve stem to valve guide clearance .....	0.0060" (0.15 mm)
Maximum valve stem wear .....	0.0008" (0.02 mm)

## Camshaft

Maximum out-of-round (with new bearings) .....	0.0030" (0.075 mm)
Maximum bearing wear .....	0.0008" (0.02 mm)

## Timing gears

Largest permissible backlash .....	0.0050" (0.12 mm)
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## TIGHTENING TORQUES

	Lb.ft.	Kgm.
Cylinder head .....	50-60	7-8
Main bearings .....	60-70	8-10
Connecting rod bearings .....	30-35	4-5
Flywheel .....	17-20	2.3-2.7
Generator bolts ( $3/8$ "-16) .....	27	4
Oil cleaner center bolt .....	36	5
Spark plugs, copper washer .....	25	3.5
steel washer .....	29	4