

SPECIFICATIONS

GENERAL

Type designation	B 16 A
Output, B.H.P./r.p.m. (SAE)	66/4500
Max. torque: lb.ft/r.p.m. (SAE)	87/2500
kgm/r.p.m.	11.8/2500
Number of cylinders	4
Bore: in.	3.125
mm.	79.37
Stroke: in.	3.15
mm.	80
Displacement: cu.in.	96.4
liters	1.58
Compression ratio	7.4:1
Compression pressure at 200 r.p.m.,	
lb./sq.in.	135—150
kg/cm ²	9.5—10.5
Weight, including clutch, carburetor, starter motor and generator: lb ..	330
kg ..	150

CYLINDER BLOCK

Material	Special-alloy cast-iron
The cylinder bores are machined 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 center 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,	
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	0.001"—0.002" (0.25—0.50 mm)
Piston ring oversizes	0.02" 0.03" 0.04" 0.05"

Compression rings

Beveled on upper inner edge.

Number on each piston	2
Height upper ring (chromed)	0.078" (1.97 mm)
lower ring	0.078" (1.97 mm)
Ring clearance in groove	0.0027"—0.0031" (0.068—0.079 mm)

Oil rings

Number on each piston	1
Height	0.186" (4.73 mm)
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 mm)
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	3.90" (99 mm)
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CRANKSHAFT

Replaceable bearing shells for main and big-end bearings.

Crankshaft end play	0.0004"—0.0040" (0.01—0.10 mm)
Main bearings, radial play	0.0005"—0.0025" (0.014—0.064 mm)
Connecting rod bearings, radial play	0.0020"—0.0036" (0.051—0.091 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

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)

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	0.0614"—0.0617" (1.560—1.568 mm)
0.010" undersize	0.0664"—0.0667" (1.687—1.695 mm)
0.020" "	0.0714"—0.0717" (1.814—1.822 mm)
0.030" "	0.0764"—0.0767" (1.941—1.949 mm)
0.040" "	0.0814"—0.0817" (2.068—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, center—center	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

Ring gear (chamfer facing forwards)	0.008" (0.20 mm)
Ring gear (chamfer facing forwards)	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)
Center 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" (1.1 mm)
Inlet valves should then open at	10° after T.D.C.

Camshaft bearings

Forward bearing, diameter	1.8514"—1.8524" (47.025—47.050 mm)
Center 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)
Exhaust	
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)

Valve clearances

Clearance, inlet, warm engine	0.016" (0.40 mm)
Clearance, exhaust, warm engine	0.018" (0.45 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" (0.060—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 ¹ / ₂
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 ⁷ / ₈ Imp. pints=5 ³ / ₄ US pints (2.75 liters)
Oil capacity, incl. oil cleaner	6 ¹ / ₄ Imp. pints=7 ¹ / ₂ US pints (3.5 liters)
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 ²)
Lubricant	Engine oil (For Service MM, MS)
viscosity, below 32° F (0° C)	SAE 10W
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

Relief valve spring

Length unloaded	1.575" ± 0.002" (40 ± 0.5 mm)
loaded with 5 ¹ / ₂ ± 1 ¹ / ₂ lb. (2.5 ± 0.2 kg)	1.340" (34 mm)
8 ± 1 ¹ / ₂ lb. (3.5 ± 0.2 kg)	1.230" (31.5 mm)

FUEL SYSTEM

Fuel pump, make and type	AC diaphragm pump
Fuel pressure	Min. 2 lb./sq.in. (0.14 kg/cm ²) Max. 3.5 lb./sq.in. (0.25 kg/cm ²)
Capacity at idling speed	$\frac{7}{8}$ Imp. pint/min.=1 US pint/min. (0.5 liters/min.)
Fuel gauge, type	Electric
Fuel tank capacity PV 444, 445, P 544	$7\frac{3}{4}$ Imp. gallons= $9\frac{1}{4}$ US gallons
121/122 S	10 Imp. gallons=12 US gallons

Carburetor (B 16 A)

Model designation	Zenith 34 VN
	Designation Dimensions
Venturi	27
Main jet, standard	97 0.97 mm
ethyl fuel	102 1.02 mm
Compensation jet	97 0.97 mm
Idling jet	50 0.50 mm
Idling air jet	50 0.50 mm
Acceleration jet	40 0.40
Float valve	1.75
Float valve washer, thickness	1.0 mm (0.040")
Fuel level during operation	18 mm (0.70") below float bowl surface approx. 400–600 r.p.m.
Idling speed (warm engine)	

IGNITION SYSTEM

Voltage	6 V
Order of firing	1–3–4–2
Ignition setting when assembled, (83 octane Research Method)	2° after T.D.C.
(87–97 octane Research Method) ..	2°–4° before T.D.C.
Ignition setting, stroboscope setting 1500 engine r.p.m. with vacuum regulator disconnected (83 octane Research Method)	15° before T.D.C.
(87–97 octane Research Method)	19°–21° before T.D.C.
Spark plugs	Bosch W 175 T 3 AC 44 com Auto Lite A7 Champion J7 or corresponding
Spark plug gap	0.028"–0.032" (0.7–0.8 mm)

Distributor

Make and designation	Bosch V JU 4 BR 20
Direction of rotation	Clockwise
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 ²)
Capacity	approx. 2 Imp. gallons= 2 ¹ / ₄ US gallons (8.5 liters)

	Early prod.	Late prod.
Thermostat marked	165	170
Starts to open at	161°–163° F (72°–76° C)	167°–172° F (75°–78° C)
Fully open at	180°–188° F (83°–87° C)	194° F (90° C)
Fan belt, designation		HC. 380" × 33"
Table for anti-freeze:	Ethylene glycol	Water
Frost proof down to 14° F (–10° C)	2 qts. (2.0 lit.)	1 ¹ / ₂ galls. (6.5 lit.)
5° F (–15° C)	2 ¹ / ₄ qts. (2.5 lit.)	1 ¹ / ₄ galls. (6.0 lit.)
–4° F (–20° C)	3 qts. (3.0 lit.)	1 ¹ / ₈ galls. (5.5 lit.)
–22° F (–30° C)	3 ³ / ₄ qts. (4.5 lit.)	1 gall. (4.0 lit.)
–40° F (–40° C)	4 qts. (4.5 lit.)	⁷ / ₈ gall. (4.0 lit.)

WEAR TOLERANCES

Cylinders

Rebore when worn (if 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

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
Big-end bearings	30-35	4-5
Flywheel	17-20	2.3-2.7
Oil cleaner center bolt	36	5
Spark plugs, 14 mm	25	3.5
Generator bolts ($3/8''-16$)	18	2.5
Camshaft nut	105	15

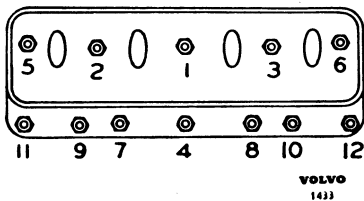


Fig. 88. Tightening sequence for cylinder head nuts.