ENGINE

General

Type, up to chassis no. 131917	B 4 B			
„ from chassis no. 131918 onwards	B 16 A			
Type designation	B 4 B	B 4 B	B 4 B	B 16 A
Engine part no. (various productions)	495300	495301	495302	495383
Output, b.h.p. at r.p.m.	40/3800	44/4000	51/4500	60/4500
Max. torque, kgm (lb.ft.) at r.p.m.	9.5 (69) /2200	9.5 (69) /2200	10.0 (72½) /2500	11.3 (81 /2500
Compression pressure (warm engine) when turning over with starter motor, 200 r.p.m. kg/cm²	8.1—8.4	8.1—8.4	9.2—9.6	9.8—10.
p.s.i.	115—120	115—120	130—136	139—14
Compression ratio	6.5: 1	6.5: 1	7.3: 1	7.4: 1

Common data:	B 4 B	B 16 A
Number of cylinders	4	4
Bore	75 mm (2.953″)	79.37 mm (3.125″)
Stroke	80 mm (3.150″)	80 mm (3.150″)
Displacement	1.4 litres	1.6 litres
Weight	about 145 kg (319½ lb.)	about 150 kg (330 lb)

Cylinder block

	B 4 B	B 16 A
Material	Special-alloy cast-iron	
The cylinder bores are machined direct into the block		
Bore, standard	75 mm (2.953″)	79.37 mm (3.125″)
„ .010″ oversize	75.25 mm (2.963″)	79.62 mm (3.134″)
„ .020″ oversize	75.51 mm (2.973″)	79.88 mm (3.145″)
„ .030″ oversize	75.76 mm (2.983″)	80.13 mm (3.155″)
„ .040″ oversize	76.02 mm (2.993″)	80.39 mm (3.165″)
„ .050″ oversize	76.27 mm (3.003″)	80.64 mm (3.175″)

Concerning the letter stamped on the cylinder bore see Part 1, "Fitting of pistons".

Pistons

Material	Light-alloy	Light-alloy
Weight	355±3 grammes (12.67±.107 oz.)	407±3 grammes (14.35±.107 oz.)
Permissible weight difference for pistons in the same engine	6 grammes (.214 oz.)	6 grammes (.214 oz.)
Total height	86 mm (3.386″)	86 mm (3.386″)
Height from gudgeon pin centre to piston top	46 mm (1.81″)	46 mm (1.81″)
Piston clearance	0.04—0.06 mm (.016″—.024″)	0.03—0.05 mm (.012—.02″)
Diameter, standard, measured at right angles to gudgeon pin at bottom end of piston	74.95 mm (2.9508″)	79.33 mm (3.123″)
.010″ oversize	75.20 mm (2.9606″)	79.58 mm (3.133″)
.020″ oversize	75.46 mm (2.9709″)	79.84 mm (3.144″)
.030″ oversize	75.71 mm (2.9807″)	80.09 mm (3.153″)
.040″ oversize	75.97 mm (2.9909″)	80.35 mm (3.164″)
.050″ oversize	76.22 mm (3.0008″)	80.60 mm (3.173″)

Concerning the letter stamped on the cylinder bore see Part 1, "Fitting of pistons".

Piston rings

	B 4 B	B 16 A
Piston ring gap measured at ring opening	0.25—0.50 mm (.010″—.020″)	
Piston ring oversizes	.010″ .020″ .030″ .040″ .050″	

Compression rings

Chromed upper ring

Number of rings per piston	2	2
Height	2.5 mm (.098″)	1.97 mm (.078″)
Piston ring clearance in groove	0.051—0.088 mm (.0020—.0035″)	0.068—0.079 mm (.0027—.0031″)

B 4 B Ring No. 1 from piston top: chamfered inner edge, turned up
Ring No. 2 from piston top: chamfered outer edge, turned up

B 16 A Both rings have chamfered inner edges. These are turned upwards.

Oil rings

Number on each piston	1	1
Height	4.5 mm (.177″)	4.73 mm (.186″)
Piston ring clearance in groove	0.025—0.064 mm (.0010—.0025″)	0.045—0.073 (.0018—.0029″)

Gudgeon pins

Fully-floating. Circlips at both ends in piston.

Fit:	
In connecting rod	Close running fit
In piston	Slide fit
Diameter, standard	19 mm (.748″)
0.05 mm oversize	19.05 mm (.750″)
0.10 mm „	19.10 mm (.752″)
0.20 mm „	19.20 mm (.756″)

Cylinder head

Height, measured from cylinder head contact surface to cylinder head nut level	Part No. 495300: 100 mm (3.937″) Part No. 495301: 100 mm (3.937) Part No. 495302: 98 mm (3.858″)	99 mm (3.898″)

Crankshaft

(Replaceable bearing shells for main and big-end bearings)

Crankshaft axial clearance	0.01—0.10 mm (.0004—.004″)
Main bearings, radial clearance	0.014—0.064 mm (.0005—.0025″)

Main bearings

Main bearing journals

Diameter, standard	53.950—53.960 mm (2.1240—2.1244″)
undersize .010″	53.696—53.706 mm (2.1140—2.1144″)

	B 4 B	B 16 A
Diameter, undersize .020″		53.442—53.452 mm (2.1040—2.1044″)
„ .030″		53.188—53.198 mm (2.0940—2.0944″)
„ .040″		52.934—52.944 mm (2.0840—2.0844″)
Main bearing journal width (distance between webs):		
Standard		38.935—38.975 mm (1.5329—1.5344″)
Oversize 0.1 mm (undersize shell .010″)		39.035—39.075 mm (1.5369—1.5384″)
0.2 mm („ „ .020″)		39.135—39.175 mm (1.5407—1.5423″)
0.3 mm („ „ .030″)		39.235—39.275 mm (1.5447—1.5463″)
0.4 mm („ „ .040″)		39.335—39.375 mm (1.5486—1.5502″)

Main bearing shells

Thickness, standard		1.911—1.918 mm (.0752—.0755″)
undersize .010″		2.038—2.045 mm (.0802—.0805″)
„ .020″		2.165—2.172 mm (.0852—.0855″)
„ .030″		2.292—2.299 mm (.0902—.0905″)
„ .040″		2.419—2.426 mm (.0952—.0955″)

Big-end bearings

Big-end bearing journals

Big-end bearings, radial clearance	0.013—0.049 mm (.0005—.0019″)	0.051—0.091 mm (.0021—.0036″)
Bearing seat width		32.900—33.000 mm (1.2953—1.2992″)
Diameter, standard		47.589—47.600 mm (1.8736—1.8740″)
undersize .010″		47.335—47.347 mm (1.8636—1.8640″)
„ .020″		47.081—47.092 mm (1.8536—1.8540″)
„ .030″		46.827—46.838 mm (1.8436—1.8440″)
„ .040″		46.573—46.584 mm (1.8336—1.8340″)

Big-end bearing shells

Thickness, standard	1.581—1.587 mm (.0622—.0625″)	1.560—1.568 mm (.0611—.0614″)
undersize .010″	1.708—1.714 mm (.0672—.0675″)	1.687—1.695 mm (.0645—.0657″)
„ .020″	1.835—1.841 mm (.0722—.0725″)	1.814—1.822 mm (.0715—.0719″)
„ .030″	1.962—1.968 mm (.0772—.0775″)	1.941—1.949 mm (.0756—.0759″)
„ .040″	2.089—2.095 mm (.0822—.0825″)	2.068—2.076 mm (.0817—.0820″)

Connecting rods

Marked 1—4 from the camshaft. Classified A—D to show the weight classification. Only connecting rods with the same weight classification may be fitted in any one engine.

	B 4 B	B 16 A
Axial play at crankshaft	0.15—0.35 mm (.0059—.0138″)	
Length, centre-centre	150±0,1 mm (5.905±.0039″)	
Weight, classification A	528—558 grammes (18.62—19.6802 oz.)	578—608 grammes (20.35—21.48 oz.)
„ B	558—588 grammes (19.68—20.7402 oz.)	608—638 grammes (21.48—22.54 oz.)
„ C	588—618 grammes (20.74—21.8002 oz.)	638—668 grammes (22.54—23.60 oz.)
„ D	618—648 grammes (21.80—22.8502 oz.)	668—698 grammes (23.60—24.65 oz.)

Flywheel

Permissible axial throw	0.20 mm (.79″)
Ring gear (chamfer facing front)	116 teeth

Flywheel housing

Permissible axial throw, max.	0.08 mm (.0031″)
radial throw, max.	0.15 mm (.0059″)

Camshaft

Drive	Gear, fibre gear on camshaft	
Number of bearings	3	
Front bearing journal, diameter	46.975—47.000 mm (1.8494—1.8504″)	
Centre bearing journal, diameter	42.975—43.000 mm (1.6919—1.6929″)	
Rear bearing journal, diameter	36.975—37.000 mm (1.4557—1.4567″)	
Radial clearance	0.025—0.075 mm (.0010—.0030″)	
Clearance for camshaft setting examination (cold engine):		
engine part No. 495300	0.31 mm (.0122″)	1.1 mm (.0429″)
495301	0.60 mm (.0236″)	
495302	1.1 mm (.0433″)	
Inlet valve should open at engine part No. 495300	5° B.T.D.C.	10° A.T.D.C.
495301	5° B.T.D.C.	
495302	10° A.T.D.C.	

Camshaft bearings

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

Timing gears

	B 4 B	B 16 A
Crankshaft gear	20 teeth	
Camshaft gear	40 teeth	
Tooth flank clearance	0.01—0.04 mm (.0004—.0016″)	

Valve system

Valves

Inlet

		B 4 B	B 16 A
Disc diameter		32 mm (1.26″)	37 mm (1.457″)
Stem diameter		7.850—7.875 mm (.3095—.3105″)	7.859—7.874 mm (.3098—.3104″)
Valve seat angle		44,5°	44,5°
Cylinder head seat angle		45°	45°
Seat width in cylinder head		1.5 mm (.059″)	1.5 mm (.059″)
Clearance, warm engine	(engine part No. 495300)	0.15 mm (.0059″)	0.40 mm (.0157″)
	(engine part No. 495301)	0.30 mm (.0118″)	
	(engine part No. 495302)	0.40 mm (.0157″)	

Exhaust

Disc, resistant to ethylized fuel.

		B 4 B	B 16 A
Disc diameter		32 mm (1.26″)	34 mm (1.34″)
Stem diameter		7.84—7.86 mm (.3091—.3099″)	7.830—7.845 mm (.3087—.3093″)
Valve seat angle		44,5°	44,5°
Cylinder head seat angle		45°	45°
Seat width in cylinder head		1.5 mm (.059″)	1.5 mm (.059″)
Clearance, warm engine	(engine part No. 495300)	0.20 mm (.0079″)	0.45 mm (.0177″)
	(engine part No. 495301)	0.35 mm (.0138″)	
	(engine part No. 495302)	0.45 mm (.0177″)	

Valve guides

	B 4 B	B 16 A
Length, early production	70 mm (2.75″)	62 mm (2.44″)
late production	62 mm (2.44″)	
Inner diameter	7.905—7.920 mm (3.112—3.1181″)	7.905—7.920 mm (.3112—.3122″)
Height above cylinder head upper surface (engine part No. 495300)	29 mm (1.14″)	21 mm (.827″)
(engine part Nos. 495301 and 495302)	21 mm (.83″)	
Clearance, valve stem-guide, inlet valve	0.030—0.070 mm (.0012—.0028″)	0.031—0.061 mm (.0012—.0024″)
exhaust valve	0.045—0.080 mm (.0018—.0031″)	0.060—0.090 mm (.0024—.0035″)

Valve springs

Tightly wound at one end (tightly-wound end faces downwards)

	B 4 B	B 16 A
Engine with part No. 495300:		
Length, unloaded	68 mm (2.677″)	
with 40±2 kg (88±4½ lb.) loading	49 mm (1.929″)	
with 60±3 kg (132±6½ lb.) loading	41.5 mm (1.634″)	
Engine with part No. 495301:		
Length, unloaded	50 mm (1.97″)	
with 30±2 kg (66±4½ lb.) loading	39 mm (1.535″)	
with 56±3 kg (123½±6½ lb.) loading	32 mm (1.260″)	

Engine with part No. 495302:	B 4 B	B 16 A
Spring coloured blue. Lower spring seat washer not used.		
Length, unloaded	45 mm (1.772″)	
with 25.5±2 kg (56±4½ lb.) loading	39 mm (1.535″)	
with 66±3.5 kg (145½±7¾ lb.) loading	30.5 mm (1.201″)	
Length, unloaded		45 mm (1.772″)
with 25.5±2 kg (56±4½ lb.) loading		39 mm (1.535″)
with 66±3.5 kg (145½±7¾ lb.) loading		30.5 mm (1.201″)

Lubricating system

Oil capacity in crankcase	3.25 litre (6 Imp. pints)	2.75 litre (4¾ Imp. pints)
Oil capacity incl. oil filter	3.75 litre (6½ Imp. pints)	3.5 litre (6¼ Imp. pints)
Oil pressure, hot engine, 2000 rpm (about 50 kph (30 mph) in 3rd gear)	1.5—2.5 kg/cm² (21½—35½ p.s.i.)	2.5—3.5 kg/cm² (35.6—49.8 p.s.i.)
Lubricant, type	Engine oil	
quality	Service MM, MS	
viscosity, summer	SAE 20	
winter	SAE 10 W	
Lubricating oil pump, type	Gear	
number of teeth	10	
axial clearance	0.02—0.10 mm (.0008—.004″)	
radial clearance	0.00—0.10 mm (0—.004″)	
tooth flank clearance	0.15—0.35 mm (.0059—.0138″)	
Relief valve spring:		
Length, unloaded	36±0.5 mm (1.417±.0197″)	40±0.5 mm (1.575±.0197″)
loaded with kg/lb	32 mm/2±0.2 kg (1.26″/4½±.44 lb.)	34 mm/2.5—0.2 kg (1.34″/5.51±.44 lb.)

Fuel system

Fuel pump, type	AC diaphragm pump
Fuel pressure	Min. 0.14 kg/cm² (2 p.s.i.) Max. 0.25 kg/cm² (3.5 p.s.i.)
Pumping capacity when idling (min. 300 r.p.m.)	0.5 litre/min. (⅞ Imp. pint/min.)
Fuel tank, capacity	35 litres (7¾ Imp. galls.)
Fuel gauge, type	Electric

Carburetter, B4B Engine

Carter

Model designation, early production	W-O 618 S	
late production	W-O 618 SA	
	Designation	Data
Venturi, diameter		23 mm (.91″)
Metering rod jet	120—151 S	dim. 0.070″
Needle, fuel	75—590	dim. 0.0590″—0.0532″ (two-stage)
Needle for light Bentyl	75—697	
Needle for lean mixture	75—676	
Main jet, WO 618 S	12—255	dim. 0.096″
WO 618 SA	12—323	dim. 0.096″
Acceleration jet	48—141	dim. 0.024″

	Designation	Data
Idling jet	11—186 S	dim. 0.029″
Needle valve	25—93 S	
Setting tool for fuel needle	T 109—26	length 2.718″
Wire gauge (for richer fuel mixture)	T 109—44	diam. 0.015″
Float level (measurement between cover and upper side of float. Turn the cover upside down with the gasket removed)		9.5 mm (.474″)
Acceleration pump stroke		9/64″ (3.5 mm)
Idling speed (warm engine)		400—600 r.p.m.

Zenith

Model designation, early production		Zenith 30 VIG-9/C 1412
late production		Zenith 30 VIG-9/C 1412 B
	Designation	Data
Venturi	25	
Main jet, standard, early production	102	1.02 mm (.040″)
late production	107	1.07 mm (.042″)
lean mixture, early production	95	0.95 mm (.037″)
late production	100	1.00 mm (.030″)
Compensating jet, standard	70	0.70 mm (.028″)
rich mixture (Bentyl)	75	0.75 mm (.030″)
Idling jet	50	0.50 mm (0.20″)
Acceleration jet	50	0.50 mm (0.20″)
Air jet for partial acceleration, early production	2.0	
late production	2.8	
Bentyl	2.4	
Air jet for full acceleration	1.8	
Float valve	1.5	
Float valve gasket, thickness		2 mm (.075″)
Idling speed		400—600 r.p.m.

Carburetter, B16A Engine

Model designation		Zenith 34 VN
	Designation	Data
Venturi	27	
Main jet, standard	97	0.97 mm (.0382″)
Bentyl	102	1.02 mm (.0469″)
Compensating jet	97	0.97 mm (.0382″)
Idling jet	50	0.50 mm (.0197″)
Air jet for idling	50	0.50 mm (.0197″)
Acceleration jet	40	0.40 mm (.0157″)
Float valve	1.75	
Float valve gasket, thickness		1.0 mm (.039″)
Fuel level, when running		18 mm (.709″) below top of float chamber
Idling speed		400—600 r.p.m.

Cooling system

Type	Pressure
Capacity	about 8 litres (1 3/4 Imp. galls.)
Radiator cap valve opens at	0.23—0.30 kg/cm² pressure (3 1/4—4 1/4 p.s.i.)
Thermostat:	
Rated	165
Type	Balanced = is not influenced by water pump pressure