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GENERAL

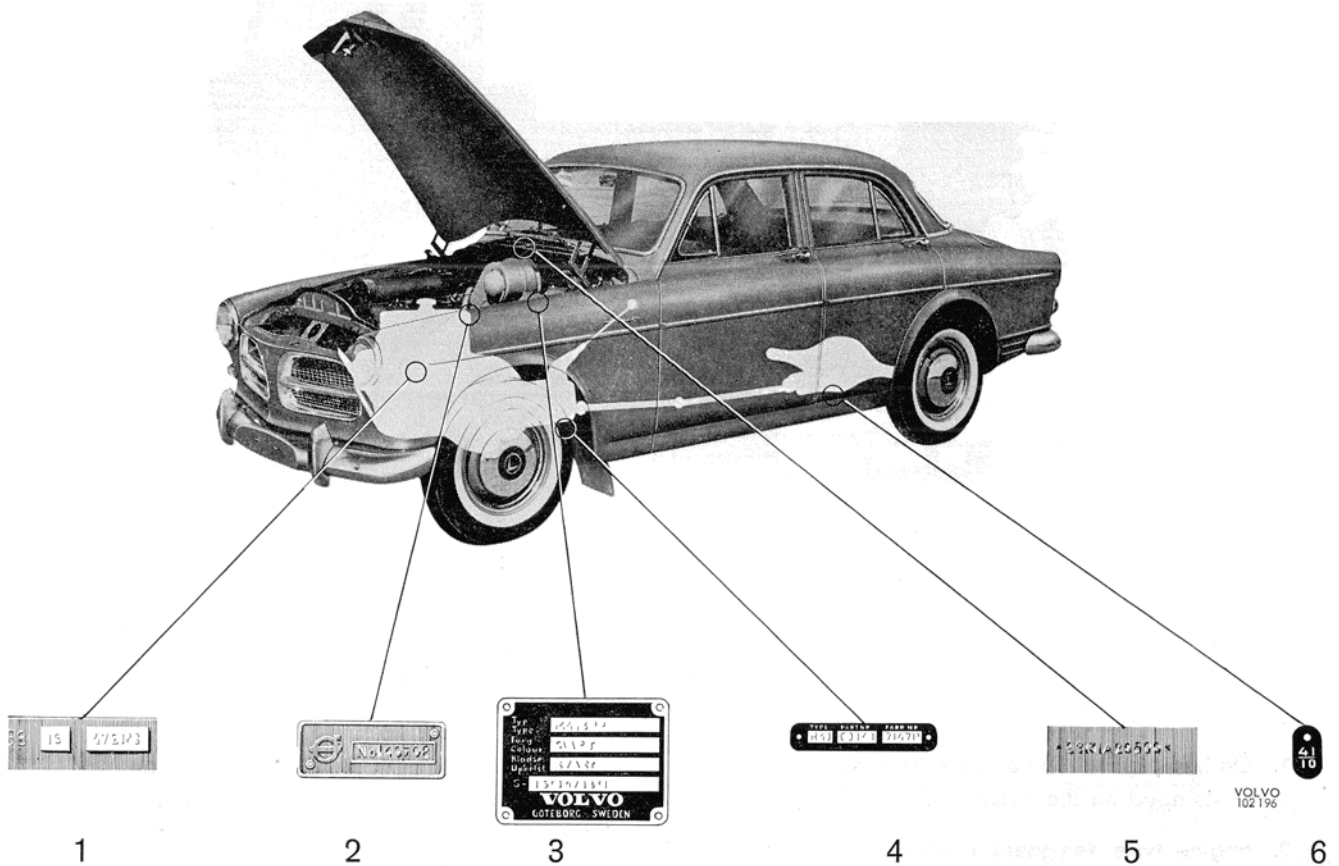
These specifications concern the Volvo 120 cars and Station Wagons with the type designations and main data shown below.

Type designation	Model	With effect from	Chassis number	Engine	Gearbox	Rear axle	Remarks	
P 1200	A	Oct. 1956	1—ca 5000	B 16 A	H 6	4.56:1		
P 1200	B	Febr. 1958	ca 5000—12082	B 16 A	M 4	4.56:1		
P 12104/06	B	Sept. 1958	12083—54399	B 16 A	M 4	4.56:1		
P 12204/06	B			B 16 B	M 4	4.56:1		
P 12132/33/34	D	Aug. 1960	54400—84299	B 16 A	M 30/31/40	4.56:1		
P 12234/35	D			B 16 B	M 40/41	4.56:1		
12132/34	E	Aug. 1961	84300—112799	B 18 A	M 30/40	4.10:1		
12234/35	E			B 18 D	M 40/41	4.10/4.56:1		
12134	F	Aug. 1962	112800—139999	B 18 A	M 40	4.10:1		
12234	F			B 18 D	M 41	4.56:1		
12134/36	G	Aug. 1953	140000—166399	B 18 A	M 40/AV	4.10:1	AV=Automatic transmission	
12134/36	K	Aug. 1964	166400—193799	B 18 A	M 40/AV	4.10:1		
12134/36	L	Aug. 1965	193800—225049	B 18 A	M 40/AV	4.10:1		
12235	L			B 18 D	M 41	4.56:1		
12—1341/61/2	M	Aug. 1966	225050—	B 18 A	M 40/AV	4.10:1		
12—2351/2	M			B 18 D	M 41	4.56:1		
13134	A	Oct. 1961	1—10499	B 18 A	M 40	4.10:1		
13132	B	Sept. 1962	10500—39999	B 18 A	M 30	4.10:1		
13234	B			B 18 D	M 40	4.10:1		
13134	D	Aug. 1963	40000—84599	B 18 A	M 40	4.10:1		
13235	D			B 18 D	M 41	4.56:1		
13134	E	Aug. 1964	84600—144399	B 18 A	M 40	4.10:1		
13235	E			B 18 D	M 41	4.56:1		
13134/36	F	Aug. 1965	144400—216949	B 18 A	M 40/AV	4.10:1		
13235	F			B 18 D	M 41	4.56:1		
13—1341/61/2	M	Aug. 1966	216950—279899	B 18 A	M 40/AV	4.10:1		
13—3351/2	M			B 18 B	M 41	4.56:1		
13—2351/2	M	Aug. 1967	279900—312499	B 18 D	M 41	4.56:1		
13—121	P			B 18 A	M 30	4.10:1		
13—134	P			B 18 A	M 40	4.10:1		
13—136	P			B 18 A	BW 35	4.10:1		
13—334	P			B 18 B	M 40	4.10:1		
13—335	P			B 18 B	M 41	4.56:1		
13—344	P			B 18 B	M 40	4.10:1		
13—346	P			B 18 B	BW 35	4.10:1		
13—134	S			Aug. 1968	312500—339999	B 20 A	M 40	4.10:1
13—334	S					B 20 B	M 40	4.10:1
13—194	S	B 20 A	M 40			4.10:1		
13—394	S	B 20 B	M 40			4.10:1		
13—134	T	Aug. 1969	340000—	B 20 A	M 40	4.10:1		
13—334	T			B 20 B	M 40	4.10:1		
13—344	T			B 20 B	M 40	4.10:1		
22134	A			Febr. 1962	1—1399	B 18 A	M 40	4.55:1
22134	B	Aug. 1962	1400—8274	B 18 A	M 40	4.55:1		
22134	D	Aug. 1963	8275—17949	B 18 A	M 40	4.55:1		
22134	E	Aug. 1964	17950—29399	B 18 A	M 40	4.55:1		
22134	F	Aug. 1965	29400—44599	B 18 A	M 40	4.55:1		
22234	F			B 18 D	M 40	4.55:1		
22—1341/2	M	Aug. 1966	44600—61799	B 18 A	M 40	4.55:1		
22—2341/2	M			B 18 D	M 40	4.55:1		
22—134	P	Aug. 1967	61800—70299	B 18 A	M 40	4.56:1		
22—334	P			B 18 B	M 40	4.56:1		
22—344	P			B 18 B	M 40	4.56:1		
22—346	P			B 18 B	BW 35	4.56:1		
22—134	S	Aug. 1968	70300—	B 20 A	M 40	4.30:1		

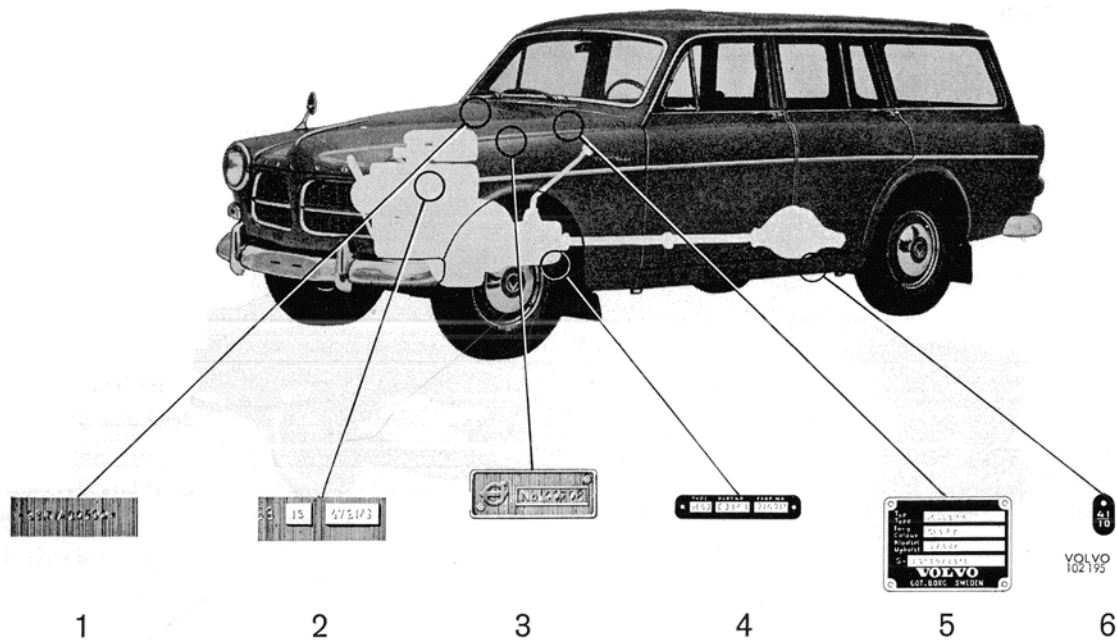
Weights

Type designation	Kerb weight	Dry weight	Axle pressure (with kerb weight)	
			Front	Rear
P 1200	1130 kg (2490 lb.)	1010 kg (2330 lb.)	590 kg (1300 lb.)	540 kg (1190 lb.)
P 1200 VB and HB	1140 kg (2515 lb.)	1020 kg (2250 lb.)	595 kg (1310 lb.)	545 kg (1200 lb.)
P 12104 VB and HB	1140 kg (2515 lb.)	1020 kg (2250 lb.)	595 kg (1310 lb.)	545 kg (1200 lb.)
P 12104 UVB and UHB	1160 kg (2560 lb.)	1040 kg (2295 lb.)	605 kg (1335 lb.)	555 kg (1225 lb.)
P 12106 UVB	1170 kg (2580 lb.)	1050 kg (2315 lb.)	610 kg (1345 lb.)	560 kg (1235 lb.)
P 12106 UHB	1160 kg (2560 lb.)	1040 kg (2295 lb.)	605 kg (1335 lb.)	555 kg (1225 lb.)
P 12204 VB and HB	1140 kg (2515 lb.)	1020 kg (2250 lb.)	595 kg (1310 lb.)	545 kg (1200 lb.)
P 12204 UVB and UHB	1160 kg (2560 lb.)	1040 kg (2295 lb.)	605 kg (1335 lb.)	555 kg (1225 lb.)
P 12206 V and HB	1140 kg (2515 lb.)	1020 kg (2250 lb.)	595 kg (1310 lb.)	545 kg (1200 lb.)
P 12206 UVB and UHB	1160 kg (2560 lb.)	1040 kg (2295 lb.)	605 kg (1335 lb.)	555 kg (1225 lb.)
12132	1160 kg (2560 lb.)	1040 kg (2295 lb.)	605 kg (1335 lb.)	555 kg (1225 lb.)
12134 12–1341/2 M	1160 kg (2560 lb.)	1040 kg (2295 lb.)	605 kg (1335 lb.)	555 kg (1225 lb.)
12136 12–1361/2 M	1170 kg (2580 lb.)	1050 kg (2315 lb.)	610 kg (1345 lb.)	560 kg (1235 lb.)
12234	1160 kg (2560 lb.)	1040 kg (2295 lb.)	605 kg (1335 lb.)	555 kg (1225 lb.)
12235 12–2351/2 M	1160 kg (2560 lb.)	1040 kg (2295 lb.)	605 kg (1335 lb.)	555 kg (1225 lb.)
13121	1150 kg (2530 lb.)	1030 kg (2265 lb.)	610 kg (1345 lb.)	540 kg (1190 lb.)
13134 13–1341/2 M	1140 kg (2515 lb.)	1020 kg (2250 lb.)	595 kg (1310 lb.)	545 kg (1200 lb.)
13136 13–1361/2 M	1180 kg (2600 lb.)	1060 kg (2330 lb.)	615 kg (1350 lb.)	565 kg (1245 lb.)
13234	1160 kg (2560 lb.)	1040 kg (2295 lb.)	605 kg (1335 lb.)	555 kg (1225 lb.)
13235 13–2351/2 M	1150 kg (2530 lb.)	1030 kg (2265 lb.)	610 kg (1345 lb.)	540 kg (1190 lb.)
13335 13–3351/2 M	1180 kg (2600 lb.)	1060 kg (2330 lb.)	615 kg (1350 lb.)	565 kg (1245 lb.)
13–121 P	1140 kg (2515 lb.)	1020 kg (2250 lb.)	595 kg (1310 lb.)	545 kg (1200 lb.)
13–134 P	1150 kg (2530 lb.)	1030 kg (2265 lb.)	610 kg (1345 lb.)	540 kg (1190 lb.)
13–136 P	1170 kg (2580 lb.)	1050 kg (2315 lb.)	610 kg (1345 lb.)	560 kg (1235 lb.)
13–334 P	1150 kg (2530 lb.)	1030 kg (2265 lb.)	610 kg (1345 lb.)	540 kg (1190 lb.)
13–335 P	1170 kg (2580 lb.)	1050 kg (2315 lb.)	610 kg (1345 lb.)	560 kg (1235 lb.)
13–134 S	1140 kg (2515 lb.)	1020 kg (2250 lb.)	595 kg (1310 lb.)	545 kg (1200 lb.)
13–334 S	1150 kg (2530 lb.)	1030 kg (2265 lb.)	610 kg (1345 lb.)	540 kg (1190 lb.)
13–134 T	1150 kg (2530 lb.)	1030 kg (2265 lb.)	610 kg (1345 lb.)	540 kg (1190 lb.)
13–334 T	1150 kg (2530 lb.)	1030 kg (2265 lb.)	610 kg (1345 lb.)	540 kg (1190 lb.)
22–134 A and B	1260 kg (2770 lb.)	1136 kg (2500 lb.)	590 kg (1300 lb.)	670 kg (1475 lb.)
22–134 D, 2, F 22–1341/2 M	1270 kg (2795 lb.)	1146 kg (2520 lb.)	595 kg (1310 lb.)	675 kg (1485 lb.)
22–234 F 22–2341/2 M	1270 kg (2795 lb.)	1146 kg (2520 lb.)	595 kg (1310 lb.)	675 kg (1485 lb.)
22–134 P	1270 kg (2795 lb.)	1146 kg (2520 lb.)	595 kg (1310 lb.)	675 kg (1485 lb.)
22–334 P	1260 kg (2770 lb.)	1136 kg (2500 lb.)	590 kg (1300 lb.)	670 kg (1475 lb.)
22–134 S	1250 kg (2750 lb.)	1126 kg (2475 lb.)	585 kg (1290 lb.)	665 kg (1465 lb.)

Type Plates

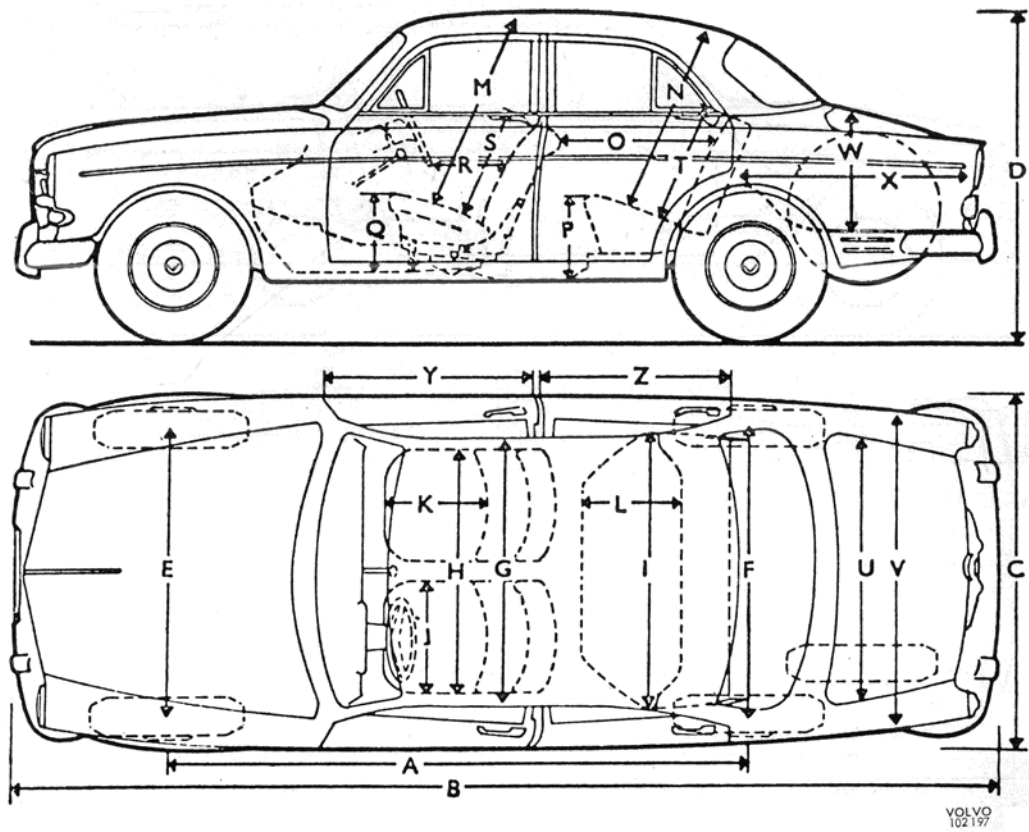


1. Type designation, serial and part number of the engine stamped on the right-hand side of the engine. On early prod. versions of the B 16-engine, the plate is on the right-hand side of the engine.
2. Body number.
3. Vehicle type designation — possibly S number for special equipment — and colour and upholstery codes. On early prod. models chassis number instead of S number.
4. Gearbox type designation, serial and part numbers.
5. On late production vehicles the chassis number is stamped on the bulkhead.
6. Rear axle. Number of teeth and reduction ratio on plate attached to lower part of inspection cover.



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GENERAL DATA

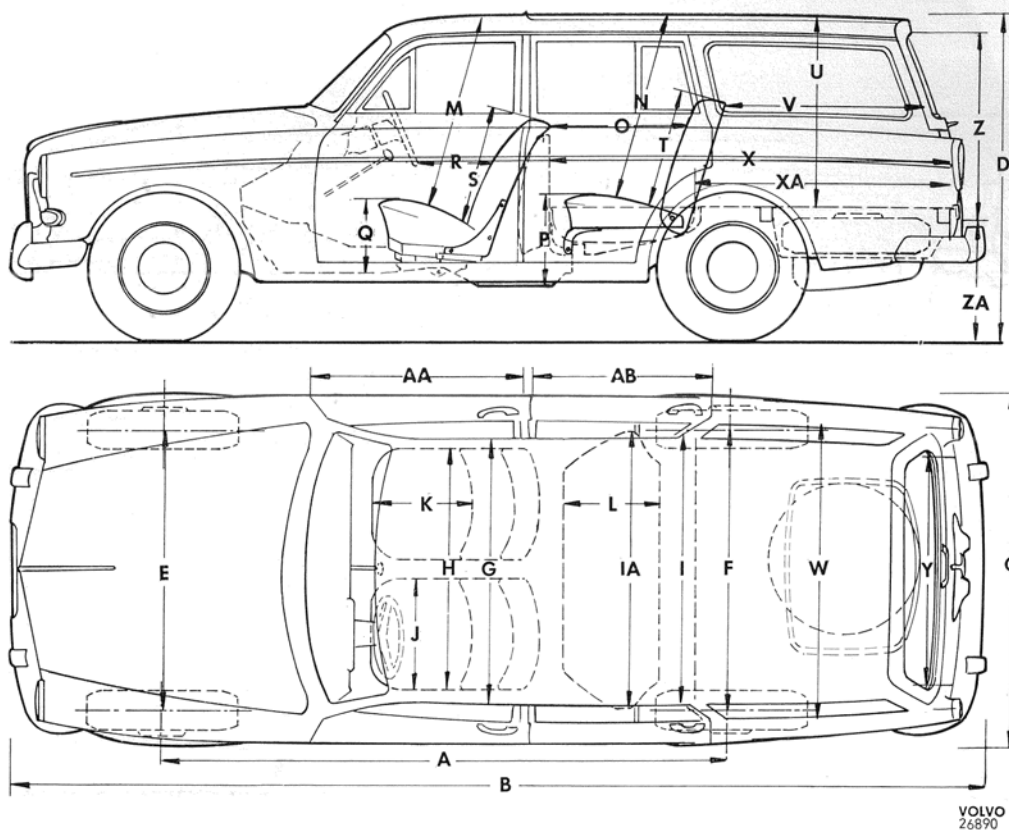


VOLVO
102197

Dimensions

A Wheelbase	2600 mm (102.36")	O Distance from front backrest to rear seat cushion	760 mm (29.92")
B Overall length	4450 mm (175.20")	P Height of rear seat cushion above floor	380 mm (14.96")
C Overall width	1620 mm (63.78")	Q Height of front seat cushion above floor	340 mm (13.39")
D Overall height	1505 mm (59.25")	R Space between steering wheel and backrest	390 mm (15.35")
E Track, front	1315 mm (51.78")	S Height of front backrest	540 mm (21.26")
F Track rear	1315 mm (51.78")	T Height of rear backrest	550 mm (21.65")
G Front seat width at shoulder height	1290 mm (50.79")	U Width of luggage compartment (max. and min.)	1210-950 mm (47.64-37.40")
Rear seat width at shoulder height	1240 mm (48.81")	V Max. width of luggage compartment	1430 mm (56.30")
H Width over front seats, hip height	1340 mm (52.75")	W Max. height of luggage compartment	550 mm (21.65")
I Rear seat width, hip height, Four-door	1330 mm (52.36")	X Max. length, luggage compartment	1070 mm (42.12")
Two-door	1520 mm (59.84")	Y Width, front door, four-door	935 mm (36.81")
J Width of front seat	530 mm (20.87")	Width, front door, two-door	1090 mm (42.91")
K Length (depth) of front seat	500 mm (19.69")	Z Width, rear door	840 mm (33.07")
L Depth of rear seat	420 mm (16.53")		
M Roof height, front seat, 15 cm (6") in front of backrest	950 mm (37.40")		
N Roof height, rear seat, 15 cm (6") in front of backrest	870 mm (34.25")		
		The front seats can be adjusted lengthwise, total	±22.5 cm (8.9")
		Turning circle, early production	9.9 m (32 ft. 6 in.)
		Turning circle, late production	9.6 m (31 ft. 6 in.)

GENERAL DATA



Dimensions	mm *	in. *	mm **	in. **		mm *	in. *	mm **	in. **
A Wheelbase	2600	102.36			O Distance between front seat squab and rear seat cushion	600	23.62	700	27.56
B Overall length	4490	176.77			P Height of rear seat cushion above floor	370	14.57	400	15.75
C Overall width	1620	63.78			Q Height of front seat cushion above floor	330	12.99	340	13.39
D Overall height	1530	60.24			R Space between steering wheel and squab	350	13.78	390	15.35
E Track, front	1315	51.78			S Height of front squab	540	21.26		
F Track, rear	1315	51.78			T Height of rear squab	550	21.65	580	22.83
G Front seat width at shoulder height	1280	50.39	1340	52.75	U Height, floor-roof of luggage space	865	34.06		
H Width over front seat, hip height	1340	52.75	1290	50.79	V Distance between rear squab and tailgate	970	38.19	900	35.43
I Rear seat width at shoulder height	1250	49.21	1330	52.36	W Width, luggage space	1260	49.61		
IA Rear seat width, hip height	1330	52.36	1240	48.81	X Length, luggage space (rear seat folded down)	1830	72.05		
J Width of front seat	530	20.87			XA Length, luggage space (rear seat in raised position)	1185	46.65		
K Length (depth), front seat	470	18.50	500	19.69	Y Width of rear door	1055	41.54		
L Length (depth), rear seat	460	18.11	480	18.90	Z Height of rear door	780	30.71		
M Roof height, front seat, 15 cm (6") in front of squab	980	38.58	950	37.40	ZA Loading height	620	24.41		
N Roof height, rear seat, 15 cm (6") in front of squab	910	35.83	950	37.40	AA Door, width, front	935	36.81		
					AB Door width, rear	840	33.07		
Turning circle:									
Outermost edge of vehicle	11320 mm	(37 ft. 2 in.)			The front seats can be fully adjusted lengthwise	150	5.91	225	8.86
Kerb to kerb	10560 mm	(34 ft. 7 in.)							

* Up to chassis number 17949.
 ** From chassis number 17950.

LUBRICATION

ENGINE

Lubricant, type	Engine oil
grade	Service MS
viscosity, all year round	Multigrade oil SAE 10 W-30
at continuous temperature below	
-20° C (-4° F)	Multigrade oil SAE 5 W-20
or	
viscosity, below -10° C (14° F)	SAE 10 W
between -10° C and +30° C	
(14° and 86° F)	SAE 20/20 W
above +30° C (86° F)	SAE 30
Oil capacity, B 16	
with oil cleaner	3.5 litres (6.16 Imp. pints=7.39 US pints)
without oil cleaner	2.75 litres (4.84 Imp. pints=5.80 US pints)
B 18, B 20	
with oil cleaner	3.75 litres (6.60 Imp. pints=7.91 US pints)
without oil cleaner	3.25 litres (5.72 Imp. pints=6.86 US pints)
Oil for damping cylinder of carburettors	Oil ATF, Type A

GEARBOX WITHOUT OVERDRIVE

Lubricant, type	Gear oil
viscosity	SAE 80
Alternative lubricant, type	Engine oil
viscosity, all year round	SAE 30
alternatively	Multigrade oil SAE 20 W-40
Oil capacity H 6	0.5 litre (0.88 Imp. pint=1.06 US pints)
M 4	0.9 litre (1.58 Imp. pints=1.90 US pints)
M 30, M 40	0.75 litre (1.32 Imp. pints=1.58 US pints)

GEARBOX WITH OVERDRIVE

Lubricant, type	Engine oil
grade	Service MS
viscosity, all year round	SAE 30
alternatively	Multigrade oil SAE 20 W-40
Oil capacity, gearbox and overdrive	1.6 litres (2.82 Imp. pints=3.38 US pints)

AUTOMATIC TRANSMISSION

Lubricant, type	Oil approved as "Automatic Transmission Fluid, Type F
Oil capacity	6.2 litres (10.91 Imp. pints=13.08 US pints)

REAR AXLE

Lubricant, type without differential brake	Hypoid oil
with differential brake	Oil acc. to ML-L-2105 B, provided with additive for differential brake
viscosity, above -10° C (14° F)	SAE 90
below -10° C (14° F)	SAE 80
Oil capacity	1.3 litres (2.29 Imp. pints=2.74 US pints)

STEERING BOX

Lubricant, type	Hypoid oil
viscosity, all year round	SAE 80
oil capacity	0.25 litre (0.44 Imp. pint=0.53 US pint)

B 16 ENGINE

GENERAL

	B 16 A	B 16 B
Type designation	60/4500 (DIN)	76/5500 (DIN)
Output, b.h.p./r.p.m.	66/4500 (SAE)	85/5500 (SAE)
Max. torque, kgm (lb. ft.) at r.p.m.	11.3 (81.7)/2500 (DIN)	11.5 (83.1)/3300 (DIN)
	11.8 (85.4)/2500 (SAE)	12 (86.8)/3500 (SAE)
Compression pressure (warm engine) when turning over by using starter motor, 200 r.p.m. kg/cm ²	9.5–10.5	10–11
	135–150	142–156
	p.s.i.	
Compression ratio	7.4: 1	8.2: 1
Number of cylinders	4	4
Bore	79.37 mm (3.125")	79.37 mm (3.125")
Stroke	80 mm (3.15")	80 mm (3.15")
Displacement	1.58 litres	1.58 litres
Weight, including clutch, carburettor, starter motor, dynamo and air cleaner	approx. 150 kg (330 lb.)	approx. 150 kg (330 lb.)

CYLINDER BLOCK

The cylinder bores are bored directly in the block.

Material	Special-alloy cast iron
Bore, standard	79.37 mm (3.125")
0.020" oversize	79.88 mm (3.145")
0.030" "	80.13 mm (3.155")
0.040" "	80.39 mm (3.165")
0.050" "	80.64 mm (3.175")

PISTONS

Material	Light-alloy
Weight	410 ± 5 gm (14.35 ± 0.18 oz.)
Permissible weight difference between pistons in the same engine	10 gm (0.35" oz.)
Total height	86 mm (3.390")
Height from piston pin centre to piston top	46 mm (1.81")
Piston clearance	0.03–0.05 mm (0.0012–0.0020")
Diameter, standard, at right-angles to piston crown at lower edge of piston	79.33 mm (3.1230")
0.020" oversize	79.84 mm (3.1431")
0.030" "	80.09 mm (3.1535")
0.040" "	80.35 mm (3.1638")
0.050" "	80.60 mm (3.1736")

PISTON RINGS

Piston ring gap measured in ring opening	0.25–0.50 mm (0.0100–0.0200")
Piston ring oversizes	0.020" 0.040"
	0.030" 0.050"

Compression rings

Both rings are bevelled on the inner edge and this bevel should be turned upwards.

The rings are also marked "TOP" on the upper surface.

The upper ring on each piston is chromed.

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

Oil rings

	B 16 A	B 16 B
Number on each piston	1	
Height	4.73 mm (0.1865")	
Oil ring clearance in groove	0.045–0.073 mm (0.0017–0.0029")	

PISTON PINS

Fully floating. Circlip at both ends in piston.

Fit:

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

CYLINDER HEAD

Height, measured from cylinder head contact surface to cylinder head nut face

99 mm (3.90")	97.5 mm (3.84")
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CRANKSHAFT

Replaceable bearing shells for main bearings and connecting rod bearings.

Crankshaft end play	0.01–0.10 mm (0.0004–0.0040")	0.01–0.10 mm (0.0004–0.0040")
Main bearings, radial play, pilot bearing	0.014–0.064 mm (0.0005–0.0025")	0.014–0.064 mm (0.0005–0.0025")
others	0.014–0.064 mm (0.0005–0.0025")	0.051–0.100 mm (0.0020–0.0034")
Connecting rod bearings, radial play	0.051–0.091 mm (0.0020–0.0036")	0.051–0.087 mm (0.0020–0.0034")

MAIN BEARINGS**Main bearing journals**

Diameter, standard	53.950–53.960 mm (2.1240–2.1244")
0.010" undersize	53.696–53.706 mm (2.1140–2.1144")
0.020" "	53.442–53.452 mm (2.1040–2.1044")
0.030" "	53.188–53.198 mm (2.0940–2.0944")
0.040" "	52.934–53.944 mm (2.0840–2.0844")
Width on crankshaft for flange bearing shell:	
Standard	38.935–38.975 mm (1.5329–1.5344")
Oversize 0.1 mm (undersize shell 0.010")	39.035–39.075 mm (1.5369–1.5384")
0.2 mm (" " 0.020")	39.135–39.175 mm (1.5407–1.5423")
0.3 mm (" " 0.030")	39.235–39.275 mm (1.5447–1.5463")
0.4 mm (" " 0.040")	39.335–39.375 mm (1.5486–1.5502")

Main bearing shells

Flange bearing shells:

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

Other bearing shells:

Thickness, standard	1.911–1.918 mm (0.0752–0.0755")	1.894–1.900 mm (0.0746–0.0748")
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	B 16 A	B 16 B
0.010" undersize	2.038—2.045 mm (0.0802—0.0805")	2.021—2.027 mm (0.0796—0.0798")
0.020" "	2.165—2.172 mm (0.0852—0.0855")	2.148—2.154 mm (0.0854—0.0856")
0.030" "	2.292—2.299 mm (0.0902—0.0905")	2.275—2.281 mm (0.0895—0.0898")
0.040" "	2.419—2.426 mm (0.0952—0.0955")	2.402—2.408 mm (0.0946—0.0948")

CONNECTING ROD BEARINGS

Connecting rod bearing journals

Bearing seat width	32.900—33.000 mm (1.2953—1.2992")
Diameter, standard	47.589—47.600 mm (1.8736—1.8740")
0.010" oversize	47.335—47.347 mm (1.8635—1.8640")
0.020" "	47.081—47.092 mm (1.8536—1.8540")
0.030" "	46.827—46.838 mm (1.8436—1.8440")
0.040" "	46.573—46.584 mm (1.8336—1.8340")

Connecting rod bearing shells

Thickness, standard	1.560—1.568 mm (0.0614—0.0617")	1.562—1.568 mm (0.0615—0.0617")
0.010" undersize	1.687—1.695 mm (0.0664—0.0667")	1.689—1.695 mm (0.0665—0.0667")
0.020" "	1.814—1.822 mm (0.0715—0.0717")	1.816—1.822 mm (0.0715—0.0717")
0.030" "	1.941—1.949 mm (0.0764—0.0767")	1.943—1.949 mm (0.0765—0.0767")
0.040" "	2.068—2.076 mm (0.0814—0.0817")	2.070—2.076 mm (0.0815—0.0817")

CONNECTING RODS

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

Weight class A	578—608 gm (20.39—21.44 oz.)
B	608—638 gm (21.44—22.50 oz.)
C	638—668 gm (22.50—22.56 oz.)
D	668—698 gm (23.56—24.62 oz.)
Side clearance at crankshaft	0.15—0.35 mm (0.0060—0.0140")
Length, centre—centre	150 ± 0.1 mm (5.905 ± 0.004")

FLYWHEEL

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

FLYWHEEL HOUSING

Maximum axial play for rear surface	0.08 mm (0.0032")
Maximum radial play for rear guide	0.15 mm (0.0060")

CAMSHAFT

Drive	Gear drive with fibre gear on camshaft
Number of bearings	3
Forward 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 (0.0010—0.0029")

	B 16 A	B 16 B
Valve clearance for check of camshaft setting (cold engine)	1.1 mm (0.043")	1.15 mm (0.045")
Inlet valve should then open at	10° after T.D.C.	0° (T.D.C.)

Camshaft bearings

Forward 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

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

VALVE SYSTEM

Valves

Inlet

Disc diameter	37 mm (1.46")
Stem diameter	7.859–7.874 mm (0.3094–0.3100")
Valve seat angle	44,5°
Cylinder head seat angle	45°
Seat width in cylinder head	1.5 mm (0.060")

Exhaust

Disc diameter	34 mm (1.34")
Stem diameter	7.830–7.845 mm (0.3082–0.3089")
Valve seat angle	44,5°
Cylinder head seat angle	45°
Seat width in cylinder head	1.5 mm (0.060")

Valve clearances

Clearance, inlet valves, warm engine	0.40 mm (0.016")	0.50 mm (0.020")
Clearance, exhaust valves, warm engine	0.45 mm (0.018")	0.50 mm (0.020")

Valve guides

Length	62 mm (2.44")
Inner diameter	7.905–7.920 mm (0.311–0.312")
Height above cylinder head upper surface	21 mm (0.83")
Clearance, valve stem–valve guide, inlet valves	0.031–0.061 mm (0.0012–0.0024")
Clearance, valve stem–valve guide, exhaust valves	0.060–0.090 mm (0.0024–0.0035")

Valve springs

Length, unloaded	45 mm (1.77")
Length with loading of 22.5 ± 2 kg (50 ± 4 1/2 lb.)	39 mm (1.53")
Length with loading of 66 ± 3.5 kg (145 ± 8 lb.)	30.5 mm (1.20")

LUBRICATING SYSTEM

Lubricant	Engine oil Service MS
viscosity, all year round	Multigrade oil SAE 10 W–30
at continuous temperature below	
–20° C (–4° F)	Multigrade oil SAE 5 W–20
or viscosity, below –10° C (14° F)	SAE 10 W
between –10 and +30° C (14 and	
86° F)	SAE 20/20 W
above +30° C (86° F)	SAE 30

Compression ratio	8.5: 1 late prod. 8.7: 1	8.7: 1
Number of cylinders	4	4
Bore	84.14 mm (3.312")	84.14 mm (3.312")
Stroke	80 mm (3.15")	80 mm (3.15")
Displacement	1.78 litres	1.78 litres
Weight, incl. electrical equipment and carburettors	approx. 155 kg (341 lb.)	

Type designation	B 18 B
Output, h.p. at r.p.m. (SAE)	115/6000
(DIN)	96/5600
Max. torque, kgm (lb.ft.) at r.p.m. (SAE)	15.5 (112)/4000
(DIN)	14.7 (106)/3500

Compression pressure (warm engine) when turned over with starter motor, 250—300 r.p.m. kg/cm ²	12—14
p.s.i.	170—200

Compression ratio	10.0: 1
Number of cylinders	4
Bore	84.14 mm (3.312")
Stroke	80 mm (3.15")
Displacement	1.78 litres
Weight, including electrical equipment and carburettors ..	approx. 155 kg (341 lb.)

	B 18 D Type 1	B 18 D Type 2	B 18 D Type 3
Output, h.p. at r.p.m. (SAE)	90/5000	95/5400	100/5700
(DIN)	80/5000	86/5000	90/5500
Max. torque, kgm (lb.ft.) at r.p.m. (SAE)	14.5 (105)/3500	14.2 (103)/3200	15 (108)/3500
(DIN)	14.0 (101)/3000	14.0 (101)/3000	14.5 (105)/3200

Compression pressure (warm engine) when turned over with starter motor, 250—300 r.p.m., kg/cm ²	11—13	11—13	11—13
p.s.i.	156—185	156—185	156—185

Compression ratio	8.5: 1	8.7: 1	8.7: 1
Number of cylinders	4	4	4
Bore	84.14 mm (3.312")	84.14 mm (3.312")	84.14 mm (3.312")
Stroke	80 mm (3.15")	80 mm (3.15")	80 mm (3.15")
Displacement	1.78 litres	1.78 litres	1.78 litres
Weight, including electrical equipment and carburettors	approx 155 kg (341 lb.)	approx 155 kg (341 lb.)	approx 155 kg (341 lb.)

CYLINDER BLOCK

Material	Special-alloy cast iron
Bore, standard	84.14 mm (3.313")
0.020" oversize	84.65 mm (3.363")
0.030" "	84.90 mm (3.342")
0.040" "	85.16 mm (3.353")
0.050" "	85.41 mm (3.362")

PISTONS

Material	Light-alloy
Weight	425 ± 5 gm (15 ± 0.18 oz.)
Permissible weight difference between pistons in same engine	10 gm (0.35 oz.)
Height total	83.5 mm (3.29")
Height from piston pin centre to piston top	46 mm (1.81")
	0.02—0.04 mm (0.0008—0.0016")

PISTON RINGS

Piston ring gap measured in ring opening	0.25—0.50 mm (0.010—0.020")
Piston ring oversizes	0.020" 0.040"
	0.030" 0.050"

Compression rings

Marked "TOP". Upper ring on each piston chromed.

Number of rings on each piston	2
Height	1.98 mm (0.078")
Compression ring clearance in groove	0.054—0.081 mm (0.0021—0.0032")

Oil scraper rings

Number on each piston	1
Height	4.74 mm (0.187 = 3/16")
Scraper ring clearance in groove	0.044—0.072 mm (0.0017—0.0028")

PISTON PINS

Floating fit. Circlip at both ends in piston.

Fit:

In connecting rod	Close running fit
In piston	Slide fit
Diameter, standard	22 mm (0.866")
0.05 mm (0.002") oversize	22.05 mm (0.868")
0.10 mm (0.004") "	22.10 mm (0.870")
0.20 mm (0.008") "	22.20 mm (0.874")

CYLINDER HEAD

Height, measured from cylinder head contact surface to bolt head level B 18 A and D

88 mm (3.46")

B 18 B

86.2 mm (3.40")

Distance from upper surface of cylinder head to upper end of relief pipe (pipe located under thermostat)

35 mm (1.38")

CRANKSHAFT

Crankshaft axial clearance	0.017—0.108 mm (0.0007—0.0042")
Connecting rod bearings, radial clearance	0.039—0.081 mm (0.0015—0.0032")
Main bearings, radial clearance B 18 A and D	0.026—0.077 mm (0.0010—0.0030")
B 18 B	0.038—0.089 mm (0.0014—0.0035")

MAIN BEARINGS

Main bearing journals

Diameter, standard	63.441—63.454 mm (2.4977—2.4982")
undersize 0.010"	63.187—63.200 mm (2.4877—2.4882")
0.020"	62.933—62.946 mm (2.4777—2.4782")
0.030"	62.679—62.692 mm (2.4677—2.4682")
0.040"	62.425—62.438 mm (2.4577—2.4582")
0.050"	62.171—62.184 mm (2.4477—2.4482")
Width on crankshaft for flange bearing shell	
Standard	38.930—38.970 mm (1.5327—1.5342")
Oversize 1 (undersize shell 0.010")	39.031—39.072 mm (1.5367—1.5383")
2 (" " 0.020")	39.133—39.173 mm (1.5407—1.5422")
3 (" " 0.030")	39.235—39.275 mm (1.5447—1.5463")
4 (" " 0.040")	39.336—39.376 mm (1.5487—1.5502")
5 (" " 0.050")	39.438—39.478 mm (1.5527—1.5543")

Main bearing shells

	B 18 A and D	B 18 A
Thickness, standard	1.985—1.991 mm (0.0781—0.0784")	1.979—1.985 mm (0.0780—0.0781")
undersize 0.010"	2.112—2.118 mm (0.0831—0.0834")	2.106—2.112 mm (0.0829—0.0831")

0.020"	2.239—2.245 mm (0.0881—0.0884")	2.233—2.239 mm (0.0879—0.0881")
0.030"	2.366—2.372 mm (0.0931—0.0934")	2.360—2.366 mm (0.0929—0.0931")
0.040"	2.493—2.499 mm (0.0981—0.0984")	2.487—2.493 mm (0.0979—0.0981")
0.050"	2.620—2.626 mm (0.1031—0.1034")	2.614—2.620 mm (0.1029—0.1031")

CONNECTING ROD BEARINGS

Connecting rod bearing journals

Bearing seat width	31.950—32.050 mm (1.2579—1.2618")
Diameter, standard	54.089—54.102 mm (2.1295—2.1300")
undersize 0.010"	53.835—53.848 mm (2.1195—2.1200")
0.020"	53.581—53.594 mm (2.1095—2.1100")
0.030"	53.327—53.340 mm (2.0995—2.1000")
0.040"	53.073—53.086 mm (2.0895—2.0900")
0.050"	52.819—52.832 mm (2.0795—2.0800")

Connecting rod bearing shells

Thickness, standard	1.833—1.841 mm (0.0722—0.0725")
undersize 0.010"	1.960—1.968 mm (0.0772—0.0775")
0.020"	2.087—2.095 mm (0.0822—0.0825")
0.030"	2.214—2.222 mm (0.0872—0.0875")
0.040"	2.341—2.349 mm (0.0922—0.0925")
0.050"	2.468—2.476 mm (0.0971—0.0975")

CONNECTING RODS

Axial clearance at crankshaft	0.15—0.35 mm (0.006—0.014")
Length, centre—centre	145 ± 0.1 mm (5.710 ± 0.004")
Maximum permissible difference in weight between connecting rods in same engine	6 gm (0.21 oz.)

FLYWHEEL

Permissible axial throw, max.	0.05 mm (0.002")/150 mm (5.9") diam.
Ring gear (bevel facing forwards)	142 teeth

FLYWHEEL HOUSING

Max. axial throw for rear face	0.05 mm/100 diam. (0.002"/4" diam.)
	0.15 mm (0.006")

CAMSHAFT

Marking B 18 A	A
B 18 B	C
B 18 D type 1	A
types 2 and 3	B
Number of bearings	3
Front bearing journal, diameter	46.975—47.000 mm (1.8494—1.8504")
Centre bearing journal, diam.	42.975—43.000 mm (1.6919—1.6929")
Rear bearing journal, diam.	36.75—37.000 mm (1.4557—1.4567")
Radial clearance	0.020—0.075 mm (0.0008—0.0030")
Axial clearance	0.020—0.060 mm (0.0008—0.0024")
Valve clearance for check of camshaft setting (cold engine)	
B 18 A	1.1 mm (0.043")
B 18 B	1.45 mm (0.057")
B 18 D type 1	1.1 mm (0.043")
types 2 and 3	1.15 mm (0.045")

Inlet valve should then open at	
B 18 A and D	10° after T.D.C.
B 18 B	0° T.D.C.

Camshaft bearings

Front bearing, diameter	47.020—47.050 mm (1.8512—1.8524")
Centre bearing, diameter	43.025—43.050 mm (1.6939—1.6949")
Rear bearing, diameter	37.020—37.045 mm (1.4575—1.4585")

TIMING GEARS

Crankshaft gear, number of teeth	21
Camshaft gear (fibre), number of teeth	42
Backlash	0.04—0.08 mm (0.0016—0.0032")
Axial clearance, camshaft	0.02—0.06 mm (0.0008—0.0023")

VALVE SYSTEM

Valves

Inlet

Disc diameter	40 mm (1.58")
Stem diameter	8.685—8.700 mm (0.3419—0.3425")
Valve seat angle	44.5°
Cylinder head seat angle	45°
Seat width in cylinder head	1.4 mm (0.055")
Clearance, warm and cold engine B 18 A, B 18 D type 1 ..	0.40—0.45 mm (0.016—0.018")
B 18 B, B 18 D types	
2 and 3	0.50—0.55 mm (0.019—0.021")

Exhaust

Disc diameter	35 mm (1.38")
Stem diameter	8.645—8.660 mm (0.3403—0.3409")
Valve seat angle	44.5°
Cylinder head seat angle	45°
Seat width in cylinder head	1.4 mm (0.055")
Clearance, warm and cold engine B 18 A, B 18 D type 1 ..	0.40—0.45 mm (0.016—0.018")
B 18 B, B 18 D types	
2 and 3	0.50—0.55 mm (0.019—0.021")

Valve guides

Length	63 mm (2.48")
Inner diameter	8.725—8.740 mm (0.3435—0.3441")
Height above upper surface of head	21 mm (0.83")
Clearance, valve stem—guide, inlet valve	0.025—0.055 mm (0.0010—0.0022")
exhaust valve	0.065—0.095 mm (0.0026—0.0037")

Valve springs

	Early prod.	Late prod.
Length, unloaded, approx.	45 mm (1.77")	46 mm (1.81")
loaded with 25.5 ± 2 kg (56 ± 4 1/2 lb.)	39 mm (1.54")	
66 ± 3.5 kg (145 ± 8 lb.)	30.5 mm (1.20")	
29.5 ± 2.3 kg (65 ± 5 lb.)		40 mm (1.57")
82.5 ± 4.3 kg (181.5 ± 9.5 lb.)		30 mm (1.18")

LUBRICATING SYSTEM

Oil capacity, including oil cleaner	3.75 litres (6.60 Imp. pints=7.91 US pints)
excluding oil cleaner	3.25 litres (5.72 Imp. pints=6.86 US pints)
Oil pressure at 2.000 r.p.m. (with warm engine and new oil cleaner)	2.5—6.0 kg/cm ² (35—85 p.s.i.)

Lubricant	Engine oil, Service MS
viscosity, all year round	Multigrade oil SAE 10 W-30
viscosity, below -10°C (-14°F)	SAE 10 W
between -10°C (14°F) and $+30^{\circ}\text{C}$	SAE 20/20 W
(86°F) above $+30^{\circ}\text{C}$ (86°F)	SAE 30

Lubricating oil cleaner

Type	Fullflow
Make	Wix or Mann

Lubricating oil pump

Oil pump, type	Gear pump
number of teeth on each gear	10
axial clearance	0.02—0.10 mm (0.0008—0.0040")
radial clearance	0.08—0.14 mm (0.0032—0.0055")
backlash	0.15—0.35 mm (0.0060—0.0140")

Relief valve spring (in oil pump)

Length, unloaded	approx. 31 mm (1.22")
late prod.	27.5 mm (1.08")
loaded with 4.0 ± 0.2 kg (9 ± 0.5 lb.)	22.5 mm (0.88")
8.0 ± 0.8 kg (18 ± 1.8 lb.)	22.5 mm (0.88")
9.5 ± 0.3 kg (21 ± 0.6 lb.)	approx. 32.5 mm (1.28")

FUEL SYSTEM

Fuel pump

Fuel pump, type diaphragm pump 1	AC—UG
2	Pierburg—APG
3	AC—YD
Fuel pressure (measured at same height as pump)	min. 0.11 kg/cm ² (1.5 p.s.i.)
	max. 0.25 kg/cm ² (3.5 p.s.i.)

CARBURETTOR, B 18 A

Prod. 1

Type	Down-draught
Make and designation	Zenith 36 VN
Venturi	30
Main jet	117
Compensation jet	115
Idling jet	70
Idling air jet	70
Air jet for part acceleration	1.40
Acceleration jet	40
Acceleration pump stroke	Short
Float valve	1.75
Washer for float valve, thickness	1 mm (0.04")
Idling speed (warm engine)	500—700 r.p.m.

CARBURETTOR, B 18 A

Prod. 2

Type	Horizontal
Make	Zenth-Stromberg
Designation, early prod.	175 CD
late prod.	175 CD—2 S
Number of carburettors	1

Metering needle, designation, early prod.	4 E
late prod.	4 F
Idling speed	600—700 r.p.m.
Oil for damping cylinder	ATF, Type A

CARBURETTOR, B 18 B

Type	Horizontal
Make and designation	SU—HS 6
Number of carburettors	2
Size (air intake diam.)	44.5 (1 3/4")
Metering needle	K D
with cleaner and induction silencer	K F
Idling speed	600—800 r.p.m.
Oil for damping cylinder	ATF, Type A

CARBURETTOR, B 18 D

Type	Horizontal
Make and designation	SU—HS 6
Number of cylinders	2
Size (air intake diam.)	44.5 (1 3/4")
Metering needle, type 1	K A
type 2	Z H
type 3	S M
with cleaner and induction silencer:	
type 1	K B
type 2	K E
type 3	K G
Idling speed, type 1	500—700 r.p.m.
types 2 and 3	600—800 r.p.m.
Oil for damping cylinder	ATF, Type A

IGNITION SYSTEM

Voltage	12 V
Firing order	1—3—4—2
Ignition timing setting, at 1500 r.p.m. Accurate adjustment should not be carried out on stationary engine.	
B 18 A, octane rating 97 ROT (Research Method), vacuum governor disconnected	21—23° before T.D.C.
B 18 B, octane rating 100 ROT	17—19° before T.D.C.
B 18 D, type 1, octane rating 97—100 ROT, vacuum governor disconnected	22—24° before T.D.C.
B 18 D, types 2 and 3, octane rating 97—100 ROT, vacuum governor disconnected	17—19° before T.D.C.
Ignition timing setting with exhaust emission control 3—5° at 850 r.p.m.	
Spark plugs B 18 A and D	Bosch 175 T 35
B 18 B, normal driving	Bosch 200 T 35
hard driving	Bosch 225 T 35 or corresponding
Spark plug gap	0.7—0.8 mm (0.028—0.032")
tightening torque	3.5—4.0 kgm (25—29 lb. ft.)

COOLING SYSTEM

Type	Pressure
Radiator cap valve opens at	0.23—0.30 kg/cm ² (3—4 p.s.i. overpressure
Capacity	Approx. 8.5 litres (1.87 Imp. galls=2.24 US galls)
Fan belt, designation	HC 38×35"
tension: the pulley should start slipping when the force applied is	8.0—11.0 kg (17—24 lb.)/lever of 150 mm (6")

Anti-freeze

Amount of glycol required for frost protection down to
 -10° C (14° F)
 -20° C (- 4° F)
 -30° C (-22° F)
 -40° C (-40° F)

2 litres (3.52 Imp. pints=4.22 US pints)
 3 litres 5.28 Imp. pints=6.33 US pints)
 4 litres (7.04 Imp. pints=8.44 US pints)
 4.5 litres (7.92 Imp. pints=9.50 US pints)

Maximum depression of freezing point down to -56°
 (-69° F) is obtained by adding 5.1 litres (8.98 Imp.
 pints=10.76 US pints) of ethylene glycol.

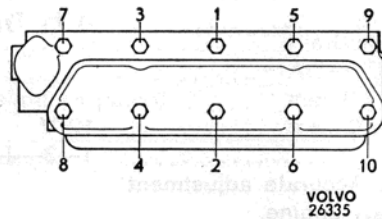
Thermostat

Type
 Marking
 Starts to open at
 Fully open at

Fulton Sylphon 1-1700-D 3
 170
 75—78° C (167—172° F)
 89° C (192° F)

TIGHTENING TORQUES

	Kgm	Lb. ft.
Cylinder head	8.5—9.5	61—68
Main bearings	12—13	87—94
Connecting rod bearings	5.2—5.8	38—42
Flywheel	4.5—5.5	33—40
Spark plugs	3.5—4.0	25—29
Camshaft nut	13—15	94—108
Crankshaft pulley bolt	7—8	50—58
Generator bolt (3/8"—16)	3.5—4.0	25—30
Oil cleaner nipple	4.5—5.5	32—39
Oil pump bolts	0.8—1.1	6—8



Tightening sequence, cylinder head bolts, B 18 engine.

WEAR TOLERANCES

Cylinders:

To be rebored when wear reaches (if engine shows abnormal oil consumption) 0.25 mm (0.010")

Crankshaft:

Permissible out-of-round on main bearing journals, max. 0.05 mm ((0.002")
 Permissible out-of-round on connecting rod bearing journals, max. 0.07 mm (0.003")
 Crankshaft end play, max. 0.15 mm (0.006")

Valves:

Permissible clearance between valve stems and valve guides, max. 0.15 mm (0.006")
 Valve stems, permissible wear, max. 0.02 mm (0.0008")

Camshaft:

Permissible out-of-round (with new bearings), max. 0.07 mm (0.003")
 Bearings, permissible wear, max. 0.02 mm (0.0008")

Timing gears:

Permissible backlash, max. 0.12 mm (0.005")

B 20 ENGINE

GENERAL

Type, designation	B 20 A	B 20 B
Output, h.p at r.p.m. (SAE)	90/4800	118/5800
(DIN)	82/4700	100/5500 (105/5500)
Max. torque, kgm (lb.ft.) at r.p.m. (SAE)	16.5 (119)/3000	17.0 (123)/3500
(DIN)	16.0 (116)/2300	15.5 (112)/3500
Compression pressure (warm engine when turned over with starter motor) 250—300 r.p.m.	11—13 kg/cm ² (156—185 p.s.i.)	12—14 kg/cm ² (170—200 p.s.i.)
Compression ratio	8.7: 1	9.5: 1
Number of cylinders	4	4
Bore	88.90 mm (3.500")	88.90 mm (3.500")
Stroke	80 mm (3.150")	80 mm (3.150")
Displacement	1.99 litres	1.99 litres
Weight, including electrical equipment and carburettor, approx.	155 kg (341 lb.)	155 kg (341 lb.)

CYLINDER BLOCK

Material	Special alloy cast iron
Bore, standard	88.90 mm (3.499")
oversize	89.66 mm (3.530")

PISTONS

Material	Light alloy
Weight, standard	500 ± 5 grammes (17.5 ± 0.18 oz.)
Permissible weight deviation between pistons in same engine	10 grammes (0.35 oz.)
Height, total	71 mm (2.79")
Height from piston pin centre to piston crown	46 mm (1.81")
Piston clearance	0.02—0.04 mm (0.0008—0.0016")

PISTON RINGS

Piston ring gap, measured in ring opening	0.40—0.55 mm (0.016—0.022")
Oversize on piston rings	0.76 mm (0.030")

Compression rings

Marked "TOP". Upper ring chromed.

Number on each piston	2
Height	1.98 mm (0.078")
Compression ring clearance in groove	0.045—0.072 mm (0.0017—0.0028")

Oil scraper rings

Number on each piston	1
Height	4.74 mm (0.186")
Scraper ring clearance in groove	0.045—0.072 mm (0.0017—0.0028")

CRANK PINS

Floating fit. Circlips at both ends in piston.

Fit:	
In connecting rod	Close running fit
In piston	Push fit
Diameter, standard	22.00 mm (0.866")

CYLINDER HEAD

Height, measured from cylinder contact face to face for bolt heads	86.7 mm (3.41")
Distance from top side of head to overflow pipe upper end (pipe placed under thermostat)	35 mm (1.38")
Cylinder head gasket, thickness (unloaded), B 20 A	2 mm ((0.08") (loaded 1.65 mm=0.065")
B 20 B	0.8 mm (0.031") (loaded 0.7 mm=0.028")

CRANKSHAFT

Crankshaft, end float	0.047—0.138 mm (0.0018—0.0054")
Main bearings, radial clearance	0.029—0.071 mm (0.0012—0.0028")
Big-end bearings, radial clearance	0.028—0.079 mm (0.0011—0.0031")

MAIN BEARINGS**Main bearing journals**

Diameter, standard	63.451—63.456 mm (2.4981—2.4986")
undersize 0.010"	63.197—63.210 mm (2.4881—2.4886")
0.020"	62.943—62.956 mm (2.5174—2.4786")
Width on crankshaft for pilot bearing shell	
Standard	38.930—38.970 mm (1.5327—1.5342")
Oversize 1 (undersize shell 0.010")	39.031—39.972 mm (1.5367—1.5382")
2 (" " 0.020")	39.133—39.173 mm (1.5407—1.5422")

Main bearing shells

Thickness, standard	1.985—1.991 mm (0.0781—0.0784")
undersize 0.010"	2.112—2.118 mm (0.0831—0.0834")
0.020"	2.239—2.245 mm (0.0881—0.0884")

BIG-END BEARINGS**Big-end bearing journals**

Width of bearing recess	31.950—32.050 mm (1.2579—1.2618")
Diameter, standard	54.099—54.112 mm (2.1299—2.1304")
undersize 0.010"	53.845—53.858 mm (2.1199—2.1204")
0.020"	53.591—53.604 mm (2.1099—2.1104")

Connecting rod bearing shells

Thickness, standard	1.833—1.841 mm (0.0722—0.0725")
undersize 0.010"	1.960—1.968 mm (0.0772—0.0775")
0.020"	2.087—2.095 mm (0.0822—0.0825")

CONNECTING RODS

End float on crankshaft	0.15—0.35 mm (0.006—0.014")
Max. permissible weight deviation between connecting rods in same engine	6 grammes (0.21 oz.)
Length, centre—centre	145 ± 0.1 mm (5.7 ± 0.04")

FLYWHEEL

Permissible axial throw, max.	0.05 mm (0.002") at a diameter of 150 mm (5.9")
Ring gear (bevel at front)	142 teeth

FLYWHEEL HOUSING

Max. axial throw for rear face	0.05 mm (0.002") at a diameter of 100 mm (3.9")
Max. radial throw for rear guide	0.15 mm (0.006")

CAMSHAFT

Marking, B 20 A	A
B 20 B	C
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	0.020—0.075 mm (0.0008—0.0030")
End float	0.020—0.060 mm (0.0008—0.0024")
Valve clearance for control of camshaft setting (cold engine), B 20 A	1.10 mm (0.043")
B 20 B	1.45 mm (0.057")
Inlet valve should then open at, B 20 A	10 (A.T.D.C.)
B 20 B	0 (T.D.C.)

Camshaft bearings

Front bearing, diameter	47.020—47.050 mm (1.8512—1.8524")
Centre bearing, diameter	43.025—43.050 mm (1.6939—1.6949")
Rear bearing, diameter	37.020—37.045 mm (1.4575—1.4585")

TIMING GEARS

Crankshaft drive, number of teeth	21
Camshaft gear (fibre), number of teeth	42
Backlash	0.04—0.08 mm (0.0016—0.0032")
End float, camshaft	0.02—0.06 mm (0.0008—0.0024")

VALVES**Inlet**

Disc diameter	42 mm (1.654")
Stem diameter	7.955—7.970 mm (0.3132—0.3138")
Valve seat angle	44.5°
Seat angle in cylinder head	45°
Seat width in cylinder head	2.0 mm (0.080")
Clearance, both warm and cold engine, B 20 A	0.40—0.45 mm (0.016—0.018")
B 20 B	0.50—0.55 mm (0.020—0.022")

Exhaust

Disc diameter	35 mm (1.378")
Stem diameter	7.925—7.940 mm (0.3120—0.3126")
Valve seat angle	44.5°
Seat angle in cylinder head	45°
Seat width in cylinder head	2.0 mm (0.080")
Clearance, both warm and cold engine, B 20 A	0.40—0.45 mm (0.016—0.018")
B 20 B	0.50—0.55 mm (0.020—0.022")

Valve guides

Length, inlet valve	52 mm (2.047")
exhaust valve	59 mm (2.323")
Inner diameter	8.000—8.022 mm (0.32—0.321")
Height above upper face of cylinder head	17.5 mm (0.689")
Clearance, valve stem—valve guide, inlet valve	0.030—0.067 mm (0.0012—0.0026")
exhaust valve	0.060—0.088 mm (0.0024—0.0034")

Valve springs

Length, unloaded, approx.	46 mm (1.81")
with a loading of 29.5 ± 2.3 kg (65 ± 5 lb.)	40 mm (1.57")
with a loading of 82.5 ± 4.3 kg (181.5 ± 9.5 lb.)	30 mm (1.18")

LUBRICATING SYSTEM

Oil capacity, including oil filter	3.75 litres (6.60 Imp. pints=7.91 US pints)
excluding oil filter	3.25 liters (5.72 Imp. pints=6.86 US pints)
Oil pressure at 2000 r.p.m. (with warm engine and new oil filter)	2.5—6.0 kg/cm ² (35—85 p.s.i.)
Lubricant	Engine oil for Service MS
viscosity, all year round	Multigrade oil SAE 10 W—30
at constant temperature below -20° C (-4° F)	Multigrade oil SAE 5 W—20
or	
viscosity, below -10° C (14° F)	SAE 10 W
between -10° and $+30^{\circ}$ C (14 and 86° F)	SAE 20 W/20 W
above $+30^{\circ}$ C (86° F)	SAE 30

Lubricating oil filter

Type	Fullflow
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Oil pump

Oil pump, type	Gear
number of teeth on each gear wheel	9
end float	0.02—0.10 mm (0.0008—0.0040")
radial clearance	0.08—0.14 mm (0.0032—0.0055")
tooth flank clearance	0.15—0.35 mm (0.0060—0.0140")

Relief valve spring (in oil pump)

Length, unloaded	approx. 39.2 mm (1.54")
loaded with 5.0 ± 0.4 kg (11.0 ± 0.8 lb.)	26.25 mm (1.03")
7.0 ± 0.8 kg (15.4 ± 1.7 lb.)	21.0 mm (0.83")

FUEL SYSTEM**Fuel pump**

Diaphragm type pump B 20 A	AC—YD
Diaphragm type pump B 20 B and as alt. on B 20 A	Pierburg, APG
Fuel pressure, measured at same level as pump	min. 0.11 kg/cm ² (1.56 p.s.i.)
	max. 0.25 kg/cm ² (3.55 p.s.i.)

Carburettors**STROMBERG, B 20 A**

Type	Horizontal carburettor
Make and designation	Zenith-Stromberg 175 CD-2 SE
Number	1
Air intake diameter	41.3 mm (1.63")
Metering needle, designation	B 2 AF
Idling speed	700 r.p.m.
Oil for damping cylinder	Oil approved as "Automatic Transmission Fluid, Type A"

SU, B 20 B

Type	Horizontal carburettor
Make and designation	SU—HS 6
Number	2

Air intake diameter	41.3 mm (1.63")
Metering needle, designation	KN
Idling speed	800 r.p.m.
for cars with automatic transmission	700 r.p.m.
Oil for damping cylinder	"Automatic Transmission Fluid, Type A"

STROMBERG, B 20 B

(in cars for USA and Canada)

Type	Horizontal carburettor
Make and designation	Zenith-Stromberg 175 CD-2 SE
Number	2
Air intake diameter	41.3 mm (1.63")
Metering needle, designation	B 1 S
Idling speed	800 r.p.m.
for cars with automatic transmission	700 r.p.m.
Oil for damping cylinder	"Automatic Transmission Fluid, Type A"

IGNITION SYSTEM

Voltage	12 V
Firing order	1—3—4—2
Ignition timing (B 18 A) (B 20 A), 97 octane (Research Method) at 1500 engine r.p.m. (vacuum governor disconnected)	21—23° B.T.D.C.
(B 18 B), 100 octane at 1500 engine r.p.m.	17—19° B.T.D.C.
(B 18 B with exhaust emission control), 100 octane at 850 engine r.p.m.	
(B 20 B), 100 octane at 600—800 engine r.p.m.	3— 5° B.T.D.C.
Spark plugs (B 20 A)	10° B.T.D.C.
(B 20 B), normal driving	Bosch W 175 T 35 or corresponding
hard driving	Bosch W 200 T 35 or corresponding
Spark plug gap	Bosch W 225 T 35 or corresponding
tightening torque	0.7—0.8 mm (0.028—0.32")
	3.5—4.0 kgm (25.3—29.0 lb. ft.)

COOLING SYSTEM

Type	Sealed system
Radiator cap valve opens at	0.7 kg/cm ² (10.0 p.s.i.)
Capacity	Approx. 8.5 litres (1.87 Imp. galls=2.24 US galls)
Fan belt, designation	HC—38×888
right-hand steered car	HC—38×988
Fan belt tension: for a force of 5.6—7.6 kg (12.3—16.7 lb.), on the belts between the pulleys obtained with a depression of	10 mm (0.39")

Thermostat

	Type 1	Type 2
Type	Wax	Wax
Marking	170	82°
Begins opening at	75—80° C	81—83° C
	(168—172° F)	(177—181° F)
Fully open at	89° C (192° F)	90° C (195° F)

WEAR TOLERANCES**CYLINDERS:**

To be rebored when wear amounts to (if engine has abnormal oil consumption)	0.25 mm (0.010")
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CRANKSHAFT:

Permissible out-of-round on main bearing journals, max. . .	0.05 mm (0.0020")
Permissible out-of-round on big end bearing journals, max.	0.07 mm (0.0028")
Crankshaft end float. max.	0.15 mm (0.0060")

VALVES:

Permissible clearance between valve stems and valve guides, max.	0.15 mm (0.0060")
Valve stems, permissible wear, max.	0.02 mm (0.0008")

CAMSHAFT:

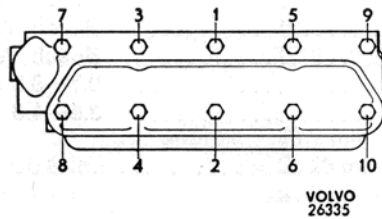
Permissible out-of-round on main bearing journals, max. . .	0.07 mm (0.0028")
Bearings permissible wear, max.	0.02 mm (0.0008")

TIMING GEARS:

Permissible backlash, max.	0.12 mm (0.0048")
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TIGHTENING TORQUES

	Kgm	Lb. ft.
Cylinder head	8.5—9.5	61—69
Main bearings	12—13	87—94
Big-end bearings	5.2—5.8	38—42
Flywheel	5.0—5.5	36—40
Spark plugs	3.5—4.0	25—29
Camshaft nut	13—15	94—108
Bolt for crankshaft pulley	7—8	50—58
Alternator bolt (1/2")	7.1—8.6	50—60
Nipple for oil filter	4.5—5.5	32—40
Sump bolts	0.8—1.1	6—8



Tightening sequence for cylinder head bolts, B 20 engine

ELECTRICAL SYSTEM AND INSTRUMENTS

EARLY PROD. FOR VEHICLES WITH B 16 ENGINE

BATTERY

Make and designation	Tudor 3 D f 6 or corresponding
Earthed	Negative terminal
Voltage	6 V
Battery capacity, standard	85 Ah (13 plates)
Electrolyte specific gravity, fully charged battery	1.275—1.285
Electrolyte specific gravity when battery needs recharging	1.230

IGNITION SYSTEM

	B 16 A	B 16 B
Firing order	1—3—4—2	
Ignition setting:		
basic setting		
octane rating (Research Method) 87	2—4° B.T.D.C.	—
93	—	4° B.T.D.C.
97	2—4° B.T.D.C.	4—6° B.T.D.C.
stroboscope setting, 1500 engine r.p.m. (vacuum disconnected)		
octane rating (Research Method) 87	19—21° B.T.D.C.	—
93	—	21° B.T.D.C.
97	19—21° B.T.D.C.	21—23° B.T.D.C.
Spark plugs, normal driving	Bosch W 175 T3 Champion J7 or corresponding	Bosch W 225 T3 Champion J6 or corresponding
hard driving	Bosch W 225 T3 Champion J6 or corresponding	Bosch W 240 T3 Champion J6 or corresponding
Spark plug gap	0.7—0.8 mm (0.028—0.032")	
Ignition coil	Bosch ZS/KZ 1/6/4	

DISTRIBUTOR

Make and designation	Bosch VJU 4 BR 20			
Test values				
Rotation	Clockwise			
Ignition setting curves:				
Centrifugal governor				
Crankshaft degress	0	10	20	27 ± 3
Crankshaft r.p.m.	400—800	700—1100	1600—2500	3100—3800
Vacuum regulator				
Crankshaft degress	0°		16 ± 2°	
Vacuum, cm (in.) Hg	7—14 (2.76—5.51")		50 (19.68")	
Contact breakers, gap	0.4—0.5 mm (0.016—0.020")			
contact pressure	0.4—0.5 kg (0.88—1.10 lb.)			
closing angle	50 ± 3°			

DYNAMO

	B 16 A	B 16 B
Make and designation, early production	Bosch LJ/GG 200/6-2300 R7	Bosch LJ/GG 200/6-2300 R7
late production	Bosch LJ/GG 200/6-2300 R7	Bosch LJ/GG 200/6-2300 R6
Voltage	6 V	
Earthed	Negative terminal	
Effect, continuous	Max. 49 A	
Direction of rotation	Clockwise	

Ratio, engine—dynamo	1: 1.8
Brushes, designation, 2	WSK 40 L6
Test values	
Brush spring tension	0.45—0.60 kg (1.0—1.3 lb.)
Field winding	4 A at 5 V
Dynamo as motor	8 A at 5 V
Charging, cold dynamo:	
6.4 V 0 A	1850—1900 r.p.m.
8 V 40 A	2575—2675 r.p.m.
Charging, warm dynamo:	
6.4 V 0 A	1875—1950 r.p.m.
8 V 40 A	2750—2850 r.p.m.

CHARGING REGULATOR

Make and designation	Bosch RS/UA 200/6/23
Equalizing resistance AR	5.5—6.0 Ohm
Control resistance W1	3.2—3.7 Ohm
Control resistance W2	5—6 Ohm

Test values

Reverse current relay:	
Adjusted for cutting-in at	5.5—6.3 V
Adjusted for cutting-out at, reverse current	4—9 A (closed circuit)
Voltage control:	
Control voltage adjusted to	7.0—7.5 V
Current control:	
Control current adjusted to	47—51 A
The test values apply for an ambient temperature of approx. 20° C (68° F)	

STARTER MOTOR

Make and designation	Bosch EGD 0.6/6 AR 19
Control solenoid, type designation	SSM 120/2
Voltage	6 V
Earthed	Negative terminal
Direction of rotation	Clockwise
Output	0.6 h.p. at —10° C (14° F) 0.75 h.p. at 20° C (68° F)
Number of teeth on the pinion	9
Brushes, designation	DSK 35/5
number	4

Test values

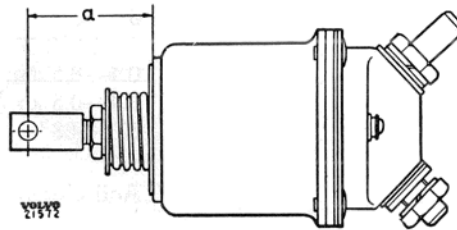
Mechanical:	
Axial clearance of rotor	0.15—0.30 mm (0.006—0.012")
Brush spring tension	0.8—0.9 kg (1.76—2.0 lb.)
Distance from pinion to ring gear	3 mm (0.12")
Friction torque of rotor brake	3—5 kgcm (2.6—4.3 lb. in.)
Pinion idling torque	0.4—0.8 kgcm (0.35—0.7 lb. in.)
Electrical:	
Starter motor unloaded:	
Test time	Max. 15 seconds
5.5 V and 65—75 A	3.500—4.000 r.p.m.
Starter motor loaded:	
4.5 V and 260—280 A	750—850 r.p.m.
Starter motor locked (r.p.m.=0):	
3.5 V and 450—460 A	Min. 1.33 kgm (9.4 lb. ft.)

Control solenoid

Test values

Current consumption of winding:

Between terminal 50 and earth	9—12 A at 5.0 V
Between terminal 50 and 30	31—35 A at 5.0 V
Control voltage, cutting-in	2.5—3.3 V
Control voltage, cutting-out	0.8—1.6 V
Distance "a" (see Fig.)	32.2 ± 0.1 mm (1.27 ± 0.004")



Adjusting the control solenoid (iron core withdrawn).

FUSES

Fusebox under bonnet on left-hand side of cowl	4 8A, 2 25A
Fusebox under bonnet on left-hand wheel housing (from chassis number 2100)	4 8A

BULBS

	Watts	Socket	Number
Headlights	45/40	B 20 d	2
Long-time parking (up to chassis number 20999)	2	BA 9 s	4
Numberplate lighting	5	BA 15 s	2
Stop lights (up to chassis number 20999)	20	BA 15 s	2
Rear lights (up to chassis number 20999)	5	BA 15 s	2
Combination stop and rear lights (from chassis number 2100)	20/5	BA 15 d spec.	2
Instrument lighting	2	BA 9 s	2
Turn indicator and parking lights, front	20/5	BA 15 d spec.	2
Turn indicator lights, rear	20	BA 15 s	2
Glove compartment light	2	BA 9 s	1
Clock light	2	BA 9 s	1
Roof light	10	S 8	1
Control lamp for turn indicators	2	BA 9 s	1
headlights	2	BA 9 s	1
oil pressure	2	BA 9 s	1
charging	2	BA 9 s	1

**LATE PROD. FOR VEHICLES WITH
B 18, B 20 ENGINES**

BATTERY

Type	Tudor 6 E × 4 F or corresponding
Earthed	Negative terminal
Voltage	12 V
Battery capacity, standard	60 Ah
Electrolyte specific gravity:	
Fully charged battery	1.28
When recharging is necessary	1.21
Recommended charging current	5.5 A

Distributor, early prod.**Test values**

Type, VJ 4 BL 34, VJU 4 BL 33, VJUR 4 BL 33

Direction of rotation Anti-clockwise

Ignition setting curves:

Centrifugal governor:

Crankshaft degress	0	10	22	22 ± 3
Crankshaft r.p.m.	750—1050	1300—1850	2300—2900	2800—3300

Vacuum governor:

Crankshaft degress	6	15 ± 4
Vacuum, cm (in.) Hg	6—10 (2.36—3.94")	18 (7.09)

Contact breaker, gap	0.4—0.5 mm (0.016—0.020")
contact pressure	0.4—0.5 kg (0.88—1.10 lb)
closing angle	57°—63°

Type JFU(R) 4, JF(R) 4 JC 4

Direction of rotation Anti-clockwise

Ignition setting curves:

Centrifugal governor:

Crankshaft degress	0	10	22	22 ± 3
Crankshaft r.p.m.	510—1050	1450—1920	2350—3700	4600—4900

Curve jerk at about 3000 r.p.m.

Breaker points, gap 0.4—0.5 mm (0.016—0.020")

contact pressure 0.5—0.63 kg (1.1—1.39 lb.)

closing angle 59°—65°

Distributor, late prod.**(B 18 A)**

Type Bosch JFUR 4

Direction of rotation Anti-clockwise

Breaker points, gap 0.4—0.5 mm (0.016—0.020")

dwell angle 59—65°

contact force 500—630 g (1.10—1.40 lb.)

Centrifugal governor:

Advance, total 13 ± 1.5 degress (distributor)

Advance begins at 250—550 distr. r.p.m.

Values 5° 700—1000 distr. r.p.m.

10° 1150—1900 distr. r.p.m.

Advance finishes at 2400 distr. r.p.m.

Vacuum governor:

Advance, total 5 ± 1.5 degress (distributor)

Advance begins at 50—100 mm (1.97—3.94") Hg

Values 3° 75—125 mm (2.95—4.92") Hg

Advance finishes at 100—130 mm (3.94—5.12") Hg

(B 18 B)

Type Bosch JFR 4

Direction of rotation Anti-clockwise

Breaker points, gap 0.4—0.5 mm (0.016—0.020")

dwell angle 59—65°

contact force 500—630 g (1.10—1.40 lb. ft.)

Centrifugal governor:

Advance, total 13 ± 1.5 degrees (distributor)

Advance begins at 250—550 distr. r.p.m.

Values 5° 700—975 distr. r.p.m.

10° 1150—1900 distr. r.p.m.

Advance finishes at 2400 distr. r.p.m.

(B 18 B with exhaust emission control)

Type	Bosch JFR 4
Direction of rotation	Anti-clockwise
Breaker points, gap	0.4—0.5 mm (0.016—0.020")
dwell angle	60—64°
contact force	500—630 g (1.10—1.40 lb.)
Centrifugal governor:	
Advance, total	14.5 ± 1 degrees (distributor)
Advance begins at	450—550 distr. r.p.m.
Values 5°	580—710 distr. r.p.m.
10°	870—1125 distr. r.p.m.
Advance finishes at	1550 distr. r.p.m.

(B 20 A)

Type	Bosch JFUR 4
Direction of rotation	Anti-clockwise
Breaker points, gap	0.4—0.5 mm (0.016—0.020")
dwell angle (at 500 r.p.m.)	59—65°
contact force	500—630 g (1.10—1.40 lb.)
Centrifugal governor:	
Advance, total	13 ± 1 degrees (distributor)
Advance begins at	300—500 distr. r.p.m.
Values 5°	750—950 distr. r.p.m.
10°	1210—1750 distr. r.p.m.
Advance finishes at	2400 distr. r.p.m.
Vacuum governor:	
Advance, total	5 ± 1 degrees (distributor)
Advance begins at	60—100 mm (2.36—3.94") Hg
Values 3°	105—145 mm (4.13—5.71") Hg
Advance finishes at	150—160 mm (5.9—6.30") Hg

(B 20 B)

Type	Bosch JFUR 4
Direction of rotation	Anti-clockwise
Breaker points, gap	0.4—0.5 mm (0.016—0.020")
dwell angle (at 500 r.p.m.)	59—65°
contact force	500—630 g (1.10—1.40 lb.)
Centrifugal governor:	
Advance, total	13.5 ± 1 degrees (distributor)
Advance begins at	500—600 distr. r.p.m.
Values 5°	675—775 distr. r.p.m.
10°	1430—2100 distr. r.p.m.
Advance finishes at	2900 distr. r.p.m.
Vacuum governor (negative):	
Drop, total	3 ± 0.5 degrees (distributor)
Drop begins at	160—240 mm (5.91—9.45") Hg
Values 2°	230—305 mm (9.06—12.0") Hg
Drop finishes at	280—320 mm (11.0—12.6") Hg

DYNAMO, early prod.

B 18 A, type	Bosch LJ/GG 240/12/2400 AR6
B 18 D, type	Bosch LJ/GG 240/12/2400 AR7
Voltage	12 V
Rated effect	240 W
Max. continuous effect	30 A (cold dynamo)
Earthed	Negative terminal
Direction of rotation	Clockwise
Ratio, engine—dynamo	1:1.8

Brushes, designation	WSK 43 L1
number	2
contact pressure	450—600 g (1.0—1.3 lb)

Test values

Field winding resistance	4.8±0.5 ohm
Charging, cold dynamo, 240 W	2300 r.p.m.
warm dynamo, 240 W	2500 r.p.m.
Speed for rated voltage, unloaded	1700 r.p.m.

CHARGING REGULATOR

Type	Bosch RS/VA 240/12/2
Equalizing resistance aR	15.5—16.5 ohm
Control resistance wR	8—9 ohm

Test values

Reverse current relay:	
Adjusted for, cutting-in at	12.4—13.1 V
reverse current at	2.0—7.5 A
Voltage control:	
Control voltage, dynamo unloaded (idling)	14.1—14.8 V
loaded	13.0—14.0 V
Loading current	
Cold dynamo and control	45 A
Warm dynamo and control	30 A

ALTERNATOR, early prod.

B 18 B, type	Motorola 12 V (26642)
Direction of rotation	Clockwise
Max. effect	35 A
Magnetizing winding	5.2±0.2 ohm at 25° C (77° F)
Max. ambient temp.	85° C (185° F)
Cooling	Built-in fan

CHARGING REGULATOR

B 18 B, type	12 V (33028)
Control voltage at approx. 10 A loading	14.4±0.15 V at 25° C (77° F)

GENERATOR, late prod.

Type B 18 A, left-hand steering	Bosch G 14 V 30 A 25-036
B 18 B, left-hand steering	Bosch G 14 V 30 A 25-027
B 18 , right-hand steering	S.E.V. Motorola 14 V-26641
B 20 , left- and right-hand steering	Bosch K 1 - 14 V 35 A 20

**Bosch G 14 V 30 A25 - 027
- 036**

Output	420 W
Max. amperage, continuous	30 A
Earth connection	Negative pole
Direction of rotation	Clockwise
Ratio, engine—generator	1:1.8
Brushes, designation	WSK 43 L 1
number	2
contact pressure	450—600 g (1.0—1.3 lb.)

S.E.V. Motorola 14 V - 33525 (mech. gov.)

Control voltage, cold regulator	13.1—14.4 V
after 45 minutes' driving	13.85—14.25 V

S.E.V. Motorola 14 V - 33087 (transistor gov.)

Control voltage, fully charged battery, hot regulator	13.85—14.25 V
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Bosch AD - 14 V

Control voltage at 4 000 generator r.p.m., cold gov., read within 30 seconds (lower contact pair)	14.0—15.0 V
Load current, lower contact pair	28—30 A
Control range(between lower and upper contact pair) ..	— 0.1 to + 0.2 V
Load current, upper contact pair	3—8 A

STARTER MOTOR, early prod.

Type	Bosch EGD 1/12 AR 37
Voltage	12 V
Earthed	Negative terminal
Direction of rotation	Clockwise
Output	Approx. 0.9 h.p. at —10° C (14° F)
	Approx 1.2 h.p. at 20° C (68° F)
Number of teeth on pinion	9
Brushes, designation	DSK 35/5
number	4

Test values

Mechanical:	
Rotor axial clearance	0.1—0.3 mm (0.004—0.012")
Brush spring tension	0.8—0.9 kg (1.76—2.0 lb.)
Distance from pinion to ring gear	2.5—3.0 mm (0.10—0.12")
Friction torque of rotor brake	3—5 kg.cm (2.6—4.3 lb. in.)
Pinion idling torque	1.3—1.8 kg.cm (1.13—1.56 lb. in.)
Tooth flank clearance	0.35—0.6 mm (0.014—0.023")
Pinion modulus	2.11

Electrical:

Starter motor unloaded:	
11.5 V and 40—60 A	5500—7500 r.p.m.
Starter motor loaded:	
10 V and 200 A	1100—1300 r.p.m.
Starter motor locked:	
r.p.m.=0	8 V 400—450 A

Control solenoid

Cut-in voltage	Max. 7 V
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STARTER MOTOR, late prod.

Type	Bosch GF 12 V 1 PS
Voltage	12 V
Earthed	Negative terminal
Direction of rotation	Clockwise
Output	Approx. 1 h.p.
Number of teeth on pinion	9
Brushes, number	4

Test values

Mechanical:

Rotor axial clearance	0.05—0.3 mm (0.002—0.012")
Brush spring tension	1.150—1.300 kg (2.53—2.86 lb.)
Distance from pinion to ring gear	1.2—4.4 mm (0.05—0.17")
Friction torque of rotor brake	2.5—4.0 kgcm (2.16—3.46 lb. in.)
Pinion idling torque	1.3—1.8 kgcm (1.13—1.56 lb. in.)
Tooth flank clearance	0.35—0.60 mm (0.014—0.024")
Pinion modulus	2.11
Connection, min. diameter	33 mm (1.30")
Brushes, min. length	14 mm (0.56")

Electrical:

Starter motor unloaded:

12 V and 40—50 A	6900—8100 r.p.m.
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Starter motor loaded:

9 V and 185—200 A	1050—1350 r.p.m.
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Starter motor locked:

r.p.m.=0	6 V 300—350 A
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Control solenoid

Cut-in voltage	Min. 8 V
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BULBS

	Watts	Socket	Number
Headlights (asymmetrical)	45/40 W	P 45 t	2
Turn indicators/parking lights, front	20/5 W	BA 15 d spec.	2
Turn indicators, rear	20 W	BA 15 s	2
Brake lights, parking lights, rear	20/5 W	BA 15 d spec.	2
Numberplate lighting	5 W	S 8	2
Internal lighting	10 W	S 8	1
Instrument lighting	2 W	BA 9 s	2
Control lamp, turn indicators	2 W	BA 9 s	1
full headlights	2 W	BA 9 s	1
charging	2 W	BA 9 s	1
oil pressure	2 W	BA 9 s	1
overdrive	2 W	BA 9 s	1
Luggage compartment lighting	32 CP	BA 15 s	1
Engine compartment lighting	32 CP	BA 15 s	1
Revolution counter	2 W	BA 7 s	1
Fog light. Type, halogen lamp	55 W	Spec.	1
Spot light. Type, halogen lamp	55 W	Spec.	1

SPEEDOMETER GEARS

Tyre 5.90—15"

Rear axle ratio	Speedometer gears			Theoretical error percentage of mileometer
	Number of teeth		Ratio	
	Large	Small		
4.10:1 (10:41)	5	16	3.2	+1.56
4.56:1 (9:41)	5	18	3.6	+0.7

The error percentage in the above table is calculated for a rolling radius of 308 mm (12.1") which constitutes the value of the figure established by AB Volvo for tyres at a vehicle speed of about 80 km.p.h. (50 m.p.h.).

Tyre 6.00–15"

Rear axle ratio	Speedometer gears			Theoretical error percentage of mileometer
	Number of teeth		Ratio	
	Large	Small		
4.10: 1 (10: 41)	5	16	3.2	+2.5
4.56: 1 (9: 41)	5	18	3.6	+1.5

The error percentage in the above table is calculated for a rolling radius of 318 mm (12.5") which constitutes the value of the figure established by AB Volvo for tyres at a vehicle speed of about 80 km.p.h. (50 m.p.h.).

Tyre 165 S 15, 165 SR 15

Rear axle ratio	Speedometer gears			Theoretical error percentage of mileometer
	Number of teeth		Ratio	
	Large	Small		
4.10: 1	5	16	3.2	+4.8
4.30: 1	5	17	3.4	+4.0
4.56: 1	5	18	3.6	+3.7

The error percentage in the above table is calculated for a rolling radius of 315 mm (12.4") which constitutes the value of the figure established by AB Volvo for tyres at a vehicle speed of about 80 km.p.h. (50 m.p.h.).

Tyre 640–15"

Rear axle ratio	Speedometer gears			Theoretical error percentage of mileometer
	Number of teeth		Ratio	
	Large	Small		
4.55: 1 (11: 50)	5	17	3.4	+2.7

The error percentage in the above table is calculated for a rolling radius of 330 mm (13.0") which constitutes the value of the figure established by AB Volvo for tyres at a vehicle speed of about 80 km.p.h. (50 m.p.h.).

Tyre 640 S 15"

Rear axle ratio	Speedometer gears			Theoretical error percentage of mileometer
	Number of teeth		Ratio	
	Large	Small		
4.55: 1 (11: 50)	5	17	3.4	+2.5

The error percentage in the above table is calculated for a rolling radius of 330 mm (13.0") which constitutes the value of the figure established by AB Volvo for tyres at a vehicle speed of about 80 km.p.h. (50 m.p.h.).

Number of revolutions of speedometer cable
per km (mile) registered, early prod. 630 (1008)
late prod. 640 (1024)

POWER TRANSMISSION, REAR AXLE

CLUTCH

For B 16

Type	Single dry disc
Size	8" (203.2 mm)
Friction area, total	340 cm ² (52.7 sq. in.)
Thickness of clutch plate when fitted	7.0—7.5 mm (0.276—0.295")
Rivets for clutch facings:	
Number	16
Size	9/64" × 1/4" (3.5 × 6.5 mm)
Distance between the flywheel and clutch release contact surface at the release bearing	46 mm (1.81")
Clutch springs:	
B 16 A, early production and B 16 B:	
Colour: Neutral	
Length, loaded with 85.5—90.5 kg (188—199 lb.)	38 mm (1.496")
B 16 A, late production:	
Colour: Light yellow and light green	
Length, loaded with 82—86 kg (180—190 lb.)	40 mm (1.575")
Number	6

Adjusting the clutch release levers:

Alternative I, 7.5 mm (0.295") lower than the hub in adjusting jig SVO 2065 within a limit of ± 1.5 mm (0.06") and within 0.25 mm (0.010") of each other.

Alternative II, adjustment 40.5 in clutch fixture SVO 2322, packing blocks number 0.

Clutch fork free travel	3—4 mm (0.118—0.157")
Clutch pedal stroke	140 mm (5 1/2")
Tightening torque for master cylinder push rod adjuster nuts	1.1—1.2 kgm (8—9 lb. ft.)

For B 18, B 20

Type	Single dry disc
Size	8 1/2" (215.9 mm)
Friction area, total	440 cm ² (68.2 sq. in.)
Clutch fork free travel	3—4 mm (0.118—0.157")
Clutch pedal stroke	140 mm (5 1/2")
Rivets for clutch facings, number	16
Size	9/64" × 7/32" (3.5 × 5.5 mm)
Distance between the flywheel and clutch release lever contact surface against the release bearing	46 mm (1.81")
Clutch plate thickness when fitted	7.0—7.5 mm (0.276—0.295")
Clutch springs:	
B 18 A type 1	
B 18 D types 1 and 2	
Marking	Neutral
Number	6
Length, loaded with 85.5—90.5 kg (188—199 lb.)	38 mm (1.496")

Adjustment of clutch release levers:

Adjustment in clutch fixture SVO 2322, packing blocks number 0	41.5
Clutch springs	
B 18 A type 2, B 20 A	
B 18 B B 20 B	
B 18 D type 3	

Clutch spring, type Disc
 There is no adjustment of clutch lever.

GEARBOX

H 6

Type designation, serial number and part number stamped on plate fixed to left-hand side of gearbox.

2nd and 3rd speeds synchronized.

Type designation H 6

Ratios:

1st speed	3.13: 1
2nd speed	1.62: 1
3rd speed	1: 1
Reverse	2.66: 1

Number of teeth on the different gears:

Input shaft	17
Countershaft, drive gear	24
gear for 1st speed	14
gear for 2nd speed	20
Mainshaft, gear for 1st speed	31
gear for 2nd speed	23

Reverse gears 17 and 20

Lubricant Gear oil

 Viscosity SAE 80

Oil capacity 0.5 litre (0.58 Imp. pints=US pints)

M 4

Type designation, serial number and part number stamped on plate fixed to lower side of gearbox.

4-speed, fully synchronized.

Type designation M 4

Ratios:

1st speed	3.45: 1
2nd speed	2.18: 1
3rd speed	1.31: 1
4th speed	1: 1
Reverse	3.55: 1

Number of teeth on the different gears:

Input shaft	18
Countershaft, drive gear	28
gear for 1st speed	14
gear for 2nd speed	20
gear for 3rd speed	25
gear for reverse	14
Mainshaft, gear for 1st speed	31
gear for 2nd speed	28
gear for 3rd speed	21
gear for reverse	32

Reverse gears 19

Lubricant Gear oil

 Viscosity SAE 80

Oil capacity Approx. 0.9 litre (1.58 Imp. pints=1.90 US pints)

M 30, M 40

Type designation M 30 M 40

Reduction ratios:

1st speed	3.13: 1	3.13: 1
2nd speed	1.55: 1	1.99: 1

3rd speed	1:1	1.36:1
4th speed	—	1:1
Reverse	3.25:1	3.25:1
Number of teeth on the different gears:		
Input shaft	19	19
Countershaft, drive gear	27	27
gear for 1st speed	15	15
gear for 2nd speed	22	20
gear for 3rd speed	—	23
gear for reverse	14	14
Mainshaft, gear for 1st speed	33	33
gear for 2nd speed	24	28
gear for 3rd speed	—	22
gear for reverse	32	32
Reverse gear	19	19
Lubricant	Gear oil	
viscosity	SAE 80	
Oil capacity	0.75 litre (1.32 Imp. pints=1.58 US pints)	

M 41 (Gearbox M 40 with overdrive)

Type designation, gearbox with overdrive	M 41
Reduction ratio, overdrive	0.756:1
Oil pump stroke	4 mm (0.16") early prod. 3.2 mm (0.13")
Oil pressure	35—40 kg/cm ² (498—569 p.s.i.)
Clutch pressure springs, length:	
Loaded with 18.0—21.5 kg (40—47 lb.)	33.5 mm (1.32")
Lubricant	Engine oil
viscosity (all year round)	SAE 30 or SAE 20 W—40
grade	For Service ML or higher
Oil capacity, gearbox and overdrive	1.6 litres (2.82 Imp. pints=3.38 US pints), early prod. 1.8 litres (3.17 Imp. pints= 3.80 US pints)
Tightening torque, nut for flange	9.0—10.5 kgm (65—76 lb. ft.)

Automatic transmission

Make and type	Borg-Warner, type 35	
Type designation	AS 1 — 35 EN	
Colour of type plate	Yellow	
Reduction ratios:		
1st gear	2.39:1	} × Converter ratios
2nd gear	1.45:1	
3rd gear	1:1	
Reverse	2.09:1	
Number of teeth, front sun gear	32	
rear sun gear	28	
planet gear, short	16	
planet gear, long	17	
ring gear	67	
Size of converter	9 1/2" (240 cm)	
Torque ratio in converter	2:1—1:1	
Normal stall speed, (drops 120 r.p.m. per 1000 m=660 ft. above se-level).		
B 18 A	2100 r.p.m.	
B 18 B	1950 r.p.m.	
B 18 D	2250 r.p.m.	
Weights:	lb.	kg
Gearbox	82	37.2
Converter case	8.2	3.7
Converter	24	10.9
Total, without fluid	114.2	51.8

Weight of fluid	13.25	6.0
Total, with fluid	127.45	57.8
Fluid, type	Type F Automatic Transmission Fluid	
Fluid capacity	6.2 litres (11 Imp. pints=13.09 US pints)	
Normal operating temperature of fluid	approx. 212—240° F (100—115° C)	
Bulb for selector control lighting	12 V 2 W BA 7s Socket	

Approximate shift speeds

	1—2 shift		2—3 shift		3—2 shift		3—1 shift	
	km.p.h.	m.p.h.	km.p.h.	m.p.h.	km.p.h.	m.p.h.	km.p.h.	m.p.h.
Full throttle	43	27	72	45	22	14	—	—
Kick-down	60	37	102	63	90	56	48	30

SPRINGS FOR CONTROL SYSTEM

Spring

	Approximate length		Effective number of turns	Wire diameter
1—2 shift valve	1.094"	27.8 mm	13.5	0.024" 0.61 mm
Converter exhausting valve	0.70"	17.8 mm	12	0.018" 0.46 mm
Rear pump check valve	0.617"	15.7 mm	3	0.019" 0.49 mm
*Rear pump check valve	0.617"	15.7 mm	5	0.024" 0.61 mm
Primary regulator valve	2.850"	72.4 mm	14 1/4	0.054" 1.37 mm
*Primary regulator valve	2.850"	72.4 mm	15	0.056" 1.42 mm
Servo orifice control valve	1.086"	27.6 mm	24	0.025" 0.64 mm
*Servo orifice control valve	1.213"	30.8 mm	25	0.024" 0.61 mm
Modulator valve	1.069"	27.2 mm	19	0.028" 0.71 mm
*Modulator valve	1.069"	27.2 mm	19	0.028" 0.71 mm
Secondary regulator valve	2.593"	65.9 mm	16 1/2	0.056" 1.42 mm
2—3 shift valve (inner spring)	1.59"	40.4 mm	19 1/2	0.036" 0.91 mm
Throttle valve (inner spring)	0.807"	20.5 mm	28	0.018" 0.46 mm
*Throttle valve (inner spring)	0.898"	22.8 mm	28	0.018" 0.46 mm
Throttle valve (outer spring)	1.174—1.185"		19 1/2	0.032" 0.81 mm
	29.8—30.1 mm			0.032" 0.81 mm
*Throttle valve (outer spring)	1.174—1.185"		18	
	29.8—30.1 mm			

*Alternative springs.

TIGHTENING TORQUES

Bolt location

	Lb. ft.	Kgm
Torque converter — drive plate	25—30	3.5—4.1
Transmission case — converter housing	8—13	1.1—1.8
Extension housing — transmission case	8—13	1.1—1.8
Oil pan — transmission case	8—13	1.1—1.8
Front servo — transmission case	8—13	1.1—1.8
Rear servo — transmission case	13—27	1.8—3.7
Pump adaptor — front pump body	17—22	2.4—3.0
Slotted screws	2—3	0.3—0.4
Pump adaptor — transmission case	8—18.5	1.1—2.6
Rear pump — transmission case	4—7	0.6—1.0
Slotted screws	1.7—3.0	0.25—0.41
Centre support — transmission case	10—18	1.4—2.5
Outer lever — manual valve shaft	7—9	1.0—1.2
Pressure point	4—5	0.6—0.7

	Lb. ft.	Kgm
Oil pan drain plug	8—10	1.1—1.4
Oil tube collector — lower body	1.7—2.5	0.25—0.35
Governor line plate — lower body	1.7—2.5	0.25—0.35
Lower body end plate — lower body	1.7—2.5	0.25—0.35
Upper body end plate front or rear — upper body	1.7—2.5	0.25—0.35
Upper body — lower body	1.7—2.5	0.25—0.35
Valve bodies assembly — transmission case	4—9	0.6—1.2
Front pump strainer — lower body	1.7—2.5	0.25—0.35
Downshift valve cam bracket — valve body	1.7—2.5	0.25—0.35

Governor

Inspection cover — extension housing	4.0—5.0	0.6—0.7
Cover plate — inspection cover	1.7—4.0	0.25—0.55

Brake band adjustment

Adjusting screw nut — front servo lever	15—20	2.1—2.8
Adjusting screw locking nut, rear servo — case	25—30	3.5—4.1

Special threaded parts

Starter inhibitor switch locknut	4—6	0.6—0.8
Downshift valve cable adaptor — transmission case	8—9	1.1—1.2
Filler tube connector adaptor — transmission case	20—30	2.8—4.1
Filler tube — connector sleeve nut	17—18	2.4—2.5
Stone guards — converter	1.4—1.6	0.19—0.22
Coupling flange — driven shaft	35—50	4.8—6.9

**GEARBOX (VEHICLES WITH B 20 ENGINE)
M 40**

Reduction ratios:

1st speed	3.13: 1
2nd speed	1.99: 1
3rd speed	1.36: 1
4th speed	1: 1
Reverse	3.25: 1

Teeth number for different gears:

Input shaft	19 teeth
Intermediate shaft, drive gear	27 "
gear for 1st speed	15 "
gear for 2nd speed	20 "
gear for 3rd speed	24 "
gear for reverse	14 "
Mainshaft, gear for 1st speed	33 "
gear for 2nd speed	28 "
gear for 3rd speed	23 "
gear for reverse	32 "
Reverse gear	19 "

Lubricant	Gear oil
viscosity	SAE 80

Oil capacity

0.75 litre (1.32 Imp. pints=1.58 US pints)

M 41 (M 40 Gearbox with overdrive)

Reduction ratio, overdrive	0.797: 1
Oil pressure, direct drive	approx. 1.5 kg/cm ² (21 p.s.i.)
overdrive	32—35 kg/cm ² (450—490 p.s.i.)

Lubricant	Engine oil
viscosity	SAE 30 or SAE 20 W-40
grade	Service ML or higher
Oil capacity, gearbox and overdrive	1.6 litres (2.81 Imp. pints=3.38 US pints)
Tightening torque, flange nut	11.0—14.0 kgm (80—100 lb. ft.)

Automatic transmission

Make and type	Borg-Warner type 35	
Type designation	AS 7 - 35 EN	
Data plate colour	Light buff	
Reduction ratios:		
1st speed	2.39: 1	} × Converter ratios
2nd speed	1.45: 1	
3rd speed	1: 1	
Reverse	2.09: 1	
Number of teeth, front sunwheel	32	
rear sunwheel	28	
planet gear, short	16	
long	17	
ring gear	67	
Converter size	24 cm (9 1/2")	
Torque ratio in converter	2: 1 - 1: 1	
Normal stall speed (at sea level, it reduces 120 r.p.m. per 3300 ft. above sea level):		
B 20 A engine	2100 r.p.m.	
B 20 A engine	1800 r.p.m.	
Weights:	Kg	lb.
Gearbox	37.2	82
Converter casing	3.0	6
Converter	10.9	24
Total, without oil	51.1	112
Weight of oil	6.0	13
Total, with oil	57.1	125
Oil, type	Oil for Automatic Transmission Fluid, Type A	
Oil capacity	6.2 litres (10.91 Imp. pints=13.08 Us pints)	
Normal operating temperature of oil	approx. 100—115° C (212—239° F)	
Bulb for selector control quadrant lighting	12 V	
	1.2 W	
	Socket W 1.8 d	

Approximate shift speeds

	1—2 shift		2—3 shift		3—2 shift		2—1 shift	
	km.p.h.	m.p.h.	km.p.h.	m.p.h.	km.p.h.	m.p.h.	km.p.h.	m.p.h.
Full throttle	43	27	69	43	58	36	13	8
Kick-down	60	37	95	59	86	53	52	32

SPRINGS FOR CONTROL SYSTEM

Spring	Approximate length		Effective number of turns	Wire diameter	
1—2 shift valve	1.094"	27.8 mm	13.5	0.024"	0.61 mm
Converter exhausting valve	0.70"	17.8 mm	12	0.018"	0.46 mm
Rear pump check valve	0.617"	15.7 mm	3	0.020"	0.51 mm
Primary regulator valve	2.850"	72.4 mm	14 1/4	0.054"	1.37 mm
Servo orifice control valve	1.086"	27.6 mm	24	0.025"	0.64 mm
Modulator valve	1.069"	27.2 mm	19	0.028"	0.71 mm

	Approximate length		Effective number of turns	Wire diameter	
Secondary regulator valve	2.593"	65.9 mm	16 1/2	0.056"	1.42 mm
2—3 shift valve (inner spring)	1.59"	40.4 mm	22 1/2	0.036"	0.91 mm
Throttle valve (inner spring)	0.807"	20.5 mm	28	0.018"	0.46 mm
Throttle valve (outer spring)	1.175—1.185"	29.8—30.1 mm	19 1/2	0.032"	0.81 mm

TIGHTENING TORQUES

Application

	Lb. ft.	Kgm
Torque converter — drive plate	25—30	3.5—4.1
Transmission case — converter housing	8—13	1.1—1.8
Extension housing — transmission case	8—13	1.1—1.8
Oil pan — transmission case	8—13	1.1—1.8
Front servo — transmission case	8—13	1.1—1.8
Rear servo — transmission case	13—27	1.8—3.7
Pump adaptor — front pump body	17—22	2.4—3.0
Slotted screws	2—3	0.3—0.4
Pump adaptor — transmission case	8—18.5	1.1—2.6
Rear pump — transmission case	4—7	0.6—1.0
Slotted screws	1.7—3.0	0.25—0.41
Centre support — transmission case	10—18	1.4—2.5
Outer lever — manual valve shaft	7—9	1.0—1.2
Pressure point	4—5	0.6—0.7
Oil pan drain plug	8—10	1.1—1.4
Oil tube collector — lower body	1.7—2.5	0.25—0.35
Governor line plate — lower body	1.7—2.5	0.25—0.35
Lower body end plate — lower body	1.7—2.5	0.25—0.35
Upper body end plate front or rear — upper body	1.7—2.5	0.25—0.35
Upper body — lower body	1.7—2.5	0.25—0.35
Valve bodies assembly — transmission case	4.0—9	0.6—1.2
Front pump strainer — lower body	1.7—2.5	0.25—0.35
Downshift valve cam bracket — valve body	1.7—2.5	0.25—0.35

Governor

Inspection cover — extension housing	4—5	0.6—0.7
Cover plate — inspection cover	1.7—4.0	0.25—0.55

Brake band adjustment

Adjusting screw nut — front servo lever	15—20	2.1—2.8
Adjusting screw locking nut, rear servo — case	25—30	3.5—4.1

Special threaded parts

Starter inhibitor switch locknut	4—6	0.6—0.8
Downshift valve cable adaptor — transmission case	8—9	1.1—1.2
Filler tube connector adaptor — transmission case	20—30	2.8—4.1
Filler tube — connector sleeve nut	17—18	2.4—2.5
Stone guards — converter	1.4—1.6	0.19—0.22
Coupling flange — driven shaft	35—50	4.8—6.9

PROPELLER SHAFT

Type	Tubular divided, three universal joints, intermediate bearing
Universal joints, make and type	Hardy-Spicer with needle bearings
Lubricant, universal joints	Special chassis lubricant

REAR AXLE

ENV: Number of teeth and serial number stamped on the front part of casing.

Spicer Salisbury: Number of teeth and reduction ratio stamped on plate on lower part of inspection cover.

Type	Semi-floating
Track width	1315 mm (51 3/4")
Axial clearance for drive shafts, ENV	0.02—0.12 mm (0.0008—0.0047")
Spicer, Salisbury	0.07—0.20 mm (0.0027—0.0079")

REAR AXLE

Type	Hypoid
Reduction ratio	4.56:1 (9/41) or 4.30:1 (10/43) or 4.10:1 (10/41 or 4.55:1 (11/50)
Axial throw, crown wheel	max. 0.08 mm (0.0031")
Tooth flank clearance (pinion—crown wheel)	
ENV, Spicer model 23, Salisbury	0.10—0.20 mm (0.0039—0.0079")
Spicer model 27	0.08—0.15" (0.0032—0.0059")
Tension for pinion bearings,	
ENV, new bearings	4—8 kg.cm (3.48—6.95 lb. in.)
Spicer, Salisbury, new bearings	11.5—23 kg.cm (10.0—20 lb. in.)
Lubricant	Hypoid oil
viscosity, above —10° C (140° F)	SAE 80
below —10° C (140° F)	SAE 90
Oil capacity	1.3 litres (2.29 Imp. pints=2.74 US pints)

TIGHTENING TORQUES

	Kgm	Lb. ft.
ENV		
Flange	max. 14	max. 100
Cap	" 8.5—10	" 60—70
Crown wheel	" 5.0—5.5	" 36—40
Spicer, Salisbury		
Flange	" 28—30	" 200—220
Cap, Spicer model 23, Salisbury	" 10—11	" 70—85
Spicer model 27	" 5.5—7	" 40—50
Crown wheel	" 5.5—7	" 40—50

BRAKES

WHEEL BRAKE UNITS

Cars with drum brakes

Brake drum:	
Diameter, front wheel early production	228.6 mm (9")
late production	254 mm (10")
rear wheel	228.6 mm (9")
Radial throw, max.	0.15 mm (0.006")
Brake linings, production I	
Width	2"
Thickness	3/16"
Length, front wheels	260 mm (10 1/4")
rear wheels, front shoe	260 mm (10 1/4")
rear shoe	200 mm (7 7/8")

Effective brake lining area, front	520 cm ² (81 sq. in.)
rear	465 cm ² (72 sq. in.)
total	985 cm ² (153 sq. in.)
Brake linings, production II	
Width	2"
Thickness, rear lining, front wheel	1/4—3/16" (ground)
others	3/16"
Length, front wheel	275 mm (10 3/4")
rear wheel	250 mm (9 27/32")
Effective brake lining area, front	560 cm ² (87 sq. in.)
rear	508 cm ² (79 sq. in.)
total	1068 cm ² (166 sq. in.)
Brake linings, production III	
Width	2"
Thickness, rear lining, front wheel	1/4—3/16" (ground)
others	3/16"
Length, front wheel, front shoe	192 mm (7 3/8")
rear shoe	250 mm (9 27/32")
rear wheel, front shoe	212 mm (8 11/32")
rear shoe	250 mm (9 27/32")
Effective brake lining area, front	497 cm ² (77 sq. in.)
rear	451 cm ² (70 sq. in.)
total	948 cm ² (147 sq. in.)
Return spring for brake shoes, early production:	
Pulling force for a total length of	
154 mm (6 1/16") front	13.5—20.5 kg (30—45 lb.)
rear	15.5—20.5 kg (34—45 lb.)
Clearance between brake shoe and drum, early production	0.1 mm (0.004")
Rivets for brake linings, size	9/64" × 5/16" (3.5 × 8 mm)
Brake linings, bonded type:	
Width	2"
Thickness, rear lining, front wheel	1/4—3/16" (ground)
others	3/16"
Length, front wheel, front shoe	190 mm (7 1/2")
rear shoe	245 mm (9 1/2")
rear wheel, front shoe	165 mm (6 1/2")
rear shoe	220 mm (8 11/16")
Effective area, front wheel	441 cm ² (68 sq. in.)
rear wheel	398 cm ² (62 sq. in.)
total	839 cm ² (130 sq. in.)

Hydraulic system

Master cylinder:

Internal diameter	22.23 mm (7/8")
Clearance between plunger and cylinder, early production	max. 0.15 mm (0.006")
late production	max. 0.20 mm (0.008")

Wheel unit cylinders:

Internal diameter, front wheel, early production	22.23 mm (7/8")
late production	25.4 mm (1")
rear wheel, production I	22.23 mm (7/8")
production II	20.64 mm (13/16")
production III	22.23 mm (7/8")
Clearance between plunger and cylinder	max. 0.25 mm (0.010")

Brake lines:

External diameter	3/16"
Tightening torque for master cylinder push rod adjuster nuts	1.1—1.2 kgm (8—9 lb. ft.)

Cars with disc brakes

Front wheel brakes

Type	Disc brakes
Brake disc:	
External diameter	276.5 mm (10.88")
Thickness, new	12.7—12.8 mm (0.500—0.504")
reconditioned	min. 12.2 mm (0.480")
Lateral throw	max. 0.1 mm (0.004")
Brake linings:	
Number on each wheel	2
Thickness	10.7 mm (0.421")
Effective brake friction area per wheel	92.5 cm ² (14.3 sq. in.)
Wheel unit cylinders:	
Number on each wheel	3
Diameter, inner cylinder	53.98 mm (2 1/8")
outer cylinders	38.1 mm (1 1/2")
Tightening torque, internal bolts	6.2—7.0 kgm (45—50 lb. ft.)
outer bolts	3.5—4.2 kgm (25—30 lb. ft.)

Rear wheel brakes

Type	Drum brakes
Brake drum:	
Diameter	228.6 mm (9")
Radial throw	max. 0.15 mm (0.006")
Brake linings:	
Width	50.8 mm (2")
Thickness	4.76 mm (3/16")
Length	210 mm (8.27")
Effective brake lining area per wheel	210 cm ² (32 sq. in.)
Rivets for brake linings, size	6.7—4.4 mm (11/64 × 17/64")
number per shoe	10
Wheel unit cylinders:	
Internal diameter	25.4 mm (1")
Clearance between plunger and cylinder	max. 0.25 mm (0.010")
Return spring for brake shoe:	
Pulling force for a total external length of:	
for upper spring 95 mm (3.74")	7.0—9.5 kg (15.4—21 lb.)
for lower spring 132 mm (5.20")	5.5—8 kg (12—17.6 lb.)

MASTER CYLINDER

Internal diameter	22.2 mm (7/8")
Clearance between plunger and cylinder, early production	max. 0.15 mm (0.006")
late production	max. 0.20 mm (0.008")

Servo brake cylinder

Make and designation, early production	Girling AHV 550 MK 2
late production	Girling AHV 550 MK 2 A
Diameter of vacuum cylinder	139.7 mm (5 1/2")
Test values at 0.7 kg/cm ² (10 p.s.i.) vacuum:	
Outgoing hydr. pressure at input pressure of	
2.5 kg/cm ² (36 p.s.i.)	min. 3.5 kg/cm ² (50 p.s.i.)
Outgoing hydr. pressure at input pressure of	
35 kg/cm ² (500 p.s.i.)	min. 67 kg/cm ² (950 p.s.i.)
Tightening torques, screws in valve housing	0.3—0.4 kgm (2—3 lb. ft.)
screws for vacuum cylinder	1.4—1.8 kgm (10—12 lb. ft.)
screws for vacuum cylinder cover	0.3—0.4 kgm (2—3 lb. ft.)
screws for air cleaner casing	0.3—0.4 kgm (2—3 lb. ft.)

FRONT AXLE AND STEERING GEAR

WHEEL ALIGNMENT (unloaded vehicle)

Caster up to chassis number 2610	-1/2° to +1/2°
Caster with effect from chassis number 2611 and Station Wagon	0 to +1°
Camber	0 to +1/2°
'King pin' inclination with 0° camber	8°
Toe-in	0 to 4 mm (0.16")
Steering geometry:	
When the outer wheel is turned 20°, the inner wheel should be turned	21.5 to 23.5°
Max. turning angle outwards	40°

FRONT AXLE

Shims at front axle cross-member, thickness alt.	2 and 3 mm
Shims at upper control arm, thickness alt.	0.15, 0.5, 1.0, 3.0 and 6.0 mm (0.006, 0.002, 0.04, 0.12 and 0.24")

STEERING GEAR

Steering wheel diameter	430 mm (17")
Number of turns (from lock to lock)	3 1/4"
Steering box, type	Gemmer, cam and roller
ratio	15.5:1
Shims for steering worm bearing, thickness alt.	0.12, 0.15 and 0.30 mm (0.0048, 0.006 and 0.12")
Washer between adjusting screw and pitman arm shaft (0.05 mm—0.002" steps)	Thickness=2.20—2.45 mm (0.09—0.10")
Lubricant for steering box	SAE 80 Hypoid oil
Oil capacity	0.25 litre (0.44 Imp. pint=0.53 US pint)
Idler arm types 2 and 3	
Tightening torque required	10—20 kg.cm (8.7—17.3 lb. in.)
Shims, tickness, alt.	0.1 and 0.35 mm (0.004—0.014")

TIGHTENING TORQUES

	Kgm	Lb. ft.
Nyloc nut on idler arm shaft	7.0—8.5	50—60
Steering wheel nut	3.5—5	25—35
Pitman arm nut	14—17	100—120
Castle nut for steering rod and tie rod. Thread size		
M 10×1	3.2—3.7	23—27
M 14×1.5	7.5—9	55—65
5/8—18		
UNF		
Wishbone bolt nut	2—2.5	14—18
Bolt for upper wishbone shaft up to ch. No. 5215	4.8—5.5	35—40
from ch. No. 5216	5.5—7.0	40—50

FRAME, SUSPENSION AND WHEELS

SPRINGS

Front springs

Type	Coil springs
Material thickness	14.1—14.3 mm (0.555—0.563")

External diameter	121—122.5 mm (4.763—4.823")
Total number of coils	8.7
Test values:	
Loading for compression of 1 cm (25/64") (measured within a spring length range of 175—215 mm=6.89"—8.46")	47.8—51.8 (105—114 lb.)
Length when fully compressed	max. 120 mm (4.72")
Loading for a spring length of 195 mm (7.68")	
Yellow marked springs	481—491 kg (1060—1083 lb.)
Blue marked springs	491—501 kg (1083—1104 lb.)
Red marked springs	501—511 kg (1104—1127 lb.)

Rear springs, standard

Type	Coil springs
Material thickness	11.7—11.9 mm (0.461—0.468")
External diameter	114.5—116.0 mm (4.507—4.567")
Total number of coils	10.7
Test values:	
Loading for compression of 1 cm (25/64") (measured within a spring length range of 225—265 mm=8.65—10.43")	19.4—21.4 kg (43—47 lb.)
Length, fully compressed	max. 123 mm (4.8")
Loading for a spring length of 245 mm (9.64")	
Yellow marked springs	276—282 kg (608—622 lb.)
Blue marked springs	282—288 kg (622—635 lb.)
Red marked springs	288—294 kg (635—648 lb.)

Rear springs, extra equipment

Type	Coil springs
Material thickness	12.0—12.3 mm (0.47—0.48")
External diameter	115—116.5 mm (4.528—4.587")
Total number of coils	10.7
Test values:	
Loading for compression of 1 cm (25/64") (measured within a spring length range of 225—265 mm=8.85—10.43")	23.4—25.4 kg (52—56 lb.)
Length, fully compressed	max. 129 mm (5.08")
Loading for a spring length of 245 mm (9.64")	342 kg (752 lb.)

Rear springs, station wagon, standard

Type	Coil springs
Material thickness	12.28—12.48 mm (0.483—0.491")
External diameter	127.5—129.0 mm (5—5.1")
Total number of coils	9.2
Test values:	
Loading for compression of 1 cm (25/64") (measured within a spring length range of 227—267 mm=8.93—10.5")	18.5—20.5 kg (40—45 lb.)
Length, fully compressed	max. 110 mm (4.33")
Loading for a spring length of 247 mm (9.72")	276—294 kg (607—647 lb.)

Rear springs, station wagon, extra equipment

Type	Coil springs
Material thickness	12.77—12.97 mm (0.5—0.51")
External diameter	127.5—129.0 mm (5—5.1")
Total number of coils	9.5

