VOLVO SERVICE

CARS

PART 0 (03)
SPECIFICATIONS
1800, 1800 S

SERVICE MANUAL

CONTENTS

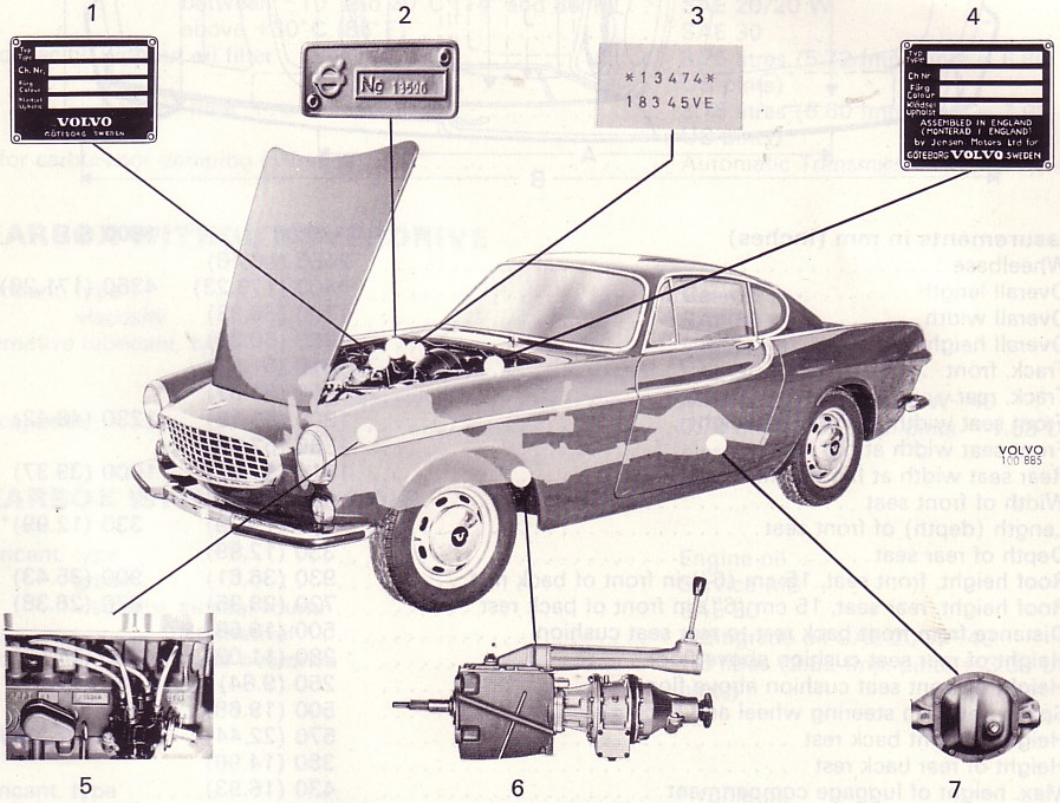
GENERAL

TYPE DESIGNATIONS

These specifications concern the Volvo 1800 and 1800 S with the type designations and main data shown below.

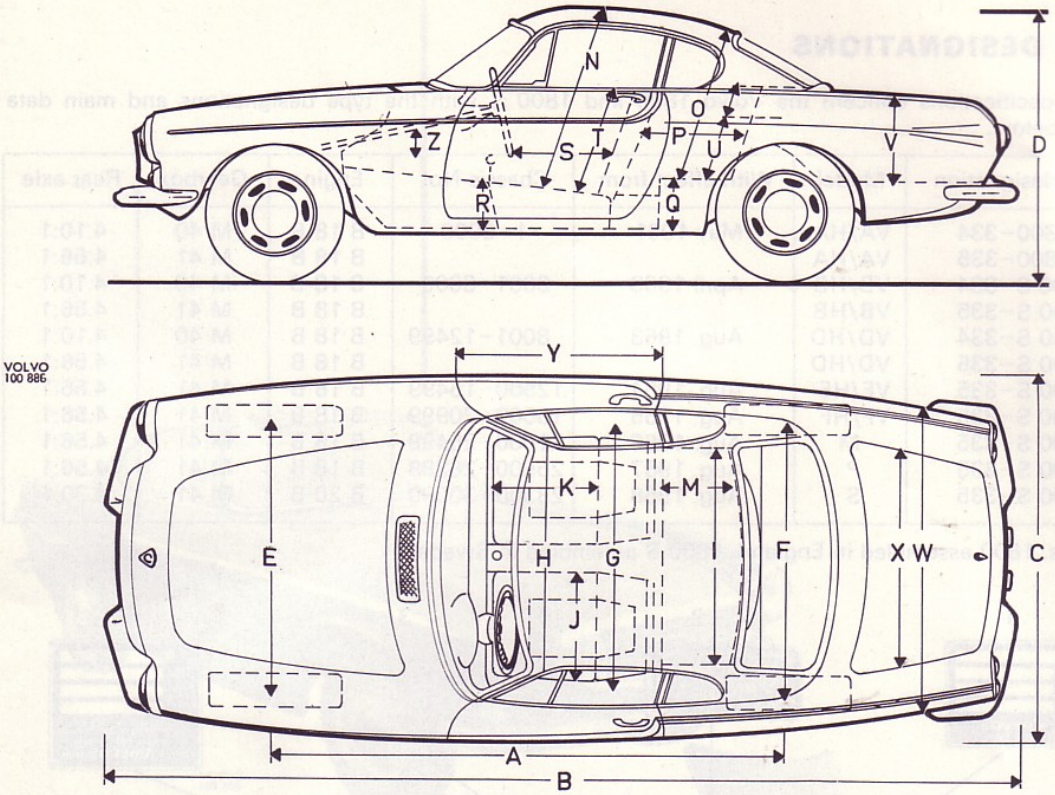
Type designation	Model	With effect from	Chassis No.	Engine	Gearbox	Rear axle
P 1800–334	VA/HA	May 1961	1–6000	B 18 B	M 40	4.10:1
P 1800–335	VA/HA			B 18 B	M 41	4.56:1
1800 S–334	VB/HB	April 1963	6001–8000	B 18 B	M 40	4.10:1
1800 S–335	VB/HB			B 18 B	M 41	4.56:1
1800 S–334	VD/HD	Aug. 1963	8001–12499	B 18 B	M 40	4.10:1
1800 S–335	VD/HD			B 18 B	M 41	4.56:1
1800 S–335	VE/HE	Aug. 1964	12500–16499	B 18 B	M 41	4.56:1
1800 S–335	VF/HF	Aug. 1965	16500–20999	B 18 B	M 41	4.56:1
1800 S–335	M	Aug. 1966	21000–25499	B 18 B	M 41	4.56:1
1800 S–335	P	Aug. 1967	25500–28299	B 18 B	M 41	4.56:1
1800 S–335	S	Aug. 1968	28300–30000	B 20 B	M 41	4.30:1

Remarks. 1800 assembled in England, 1800 S assembled in Sweden.



1. Type designation, chassis number and code number for colour and upholstery (vehicles assembled in Sweden).
2. Body number.
3. Chassis number, type and model designation (stamped in body plating).
4. Type designation, chassis number and code numbers for colour and upholstery (vehicles assembled in England).
5. Engine designation, serial and part numbers.
6. Gearbox designation, serial and part numbers.
7. Final drive. Number of teeth and ratio on plate fixed to lower part of inspection cover.

GENERAL DATA



Measurements in mm (inches)	1800	1800 S
A Wheelbase	2450 (86.46)	
B Overall length	4400 (173.23)	4350 (171.26)*
C Overall width	1700 (66.93)	
D Overall height	1280 (50.39)	
E Track, front	1310 (51.57)	
F Track, rear	1310 (51.57)	
G Front seat width at shoulder height	1300 (51.18)	1230 (48.42)
H Front seat width at hip height	1360 (53.54)	
I Rear seat width at hip height	1310 (51.57)	1000 (39.37)
J Width of front seat	500 (19.68)	
K Length (depth) of front seat	490 (19.29)	330 (12.99)*
M Depth of rear seat	330 (12.99)	
N Roof height, front seat, 15 cm (6") in front of back rest	930 (36.61)	900 (35.43)
O Roof height, rear seat, 15 cm (6") in front of back rest	720 (28.35)	670 (26.38)
P Distance from front back rest to rear seat cushion	500 (19.68)	
Q Height of rear seat cushion above floor	280 (11.02)	290 (11.41)
R Height of front seat cushion above floor	250 (9.84)	280 (11.02)*
S Space between steering wheel and back rest	500 (19.68)	390 (15.35)
T Height of front back rest	570 (22.44)	580 (22.83)
U Height of rear back rest	380 (14.96)	
V Max. height of luggage compartment	430 (16.93)	
W Max. width of luggage compartment	1250 (49.23)	1480 (59.20)
X Max. and min. width of luggage compartment lid	1070–860 (42.33–33.86)	
Y Width of door	1020 (40.16)	
Z Inclination of steering column	11.5°	
The front seats can be adjusted lengthways	± 10 cm (4")	± 20 cm (8")
Turning circles:		
Outside edge of vehicle	10000 (32 ft. 9 in.)	
Kerb to kerb	9100 (29 ft. 10 in.)	

* With effect from Chassis No. 12500.

Type designation	Kerb weight incl. driver	Dry weight	Axle pressure (at kerb weight)	
			Front	Rear
VA/HA	1210 (2668)	1095 (2414)	636 (1402)	574 (1265)
VB/HB	1210 (2668)	1095 (2414)	636 (1402)	574 (1265)
VD/HD	1190 (2623)	1075 (2370)	625 (1378)	565 (1245)
VE/HE-S	1170 (2579)	1055 (2326)	613 (1352)	557 (1227)

All values in the above table are in kg. (lb).

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° and 30°C (14° and 86°F)	SAE 20/20 W
above +30°C (86°F)	SAE 30
Oil capacity, without oil filter	3.25 litres (5.72 Imp. pints = 6.86 US pints)
with oil filter	3.75 litres (6.60 Imp. pints = 7.91 US pints)
Oil for carburettor damping cylinders	Automatic Transmission Fluid, Type A

GEARBOX WITHOUT OVERDRIVE

Lubricant, type	Gearoil
viscosity	SAE 80
Alternative lubricant, type	Engine oil
viscosity, all year round	SAE 30
alternatively	Multigrade oil SAE 20 W–40
Oil capacity	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)

FINAL DRIVE

Lubricant, type	Hypoid oil
viscosity, above −10°C (14°F)	SAE 90
below −10°C (14°F)	SAE 80
Oil capacity	1.3 litres (2.28 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)

ENGINE

B 18 ENGINE

GENERAL

Type designation, B 18 B	Type 1 (496800)*	Type 2 (496812-817)*	Type 3
Output h.p. at r.p.m. (SAE)	100/5500	108/5800	115/6000
(DIN)	90/5500	96/5600	103/5600
Max. torque, kgm (lb.ft.) at r.p.m. (SAE)	15.0 (108)/4000	15.2 (110)/4000	15.5 (112)/4000
(DIN)	14.1 (101)/3400	14.3 (103)/3800	15.0 (108)/3800
Compression pressure (warm engine) when turned over with starter motor, 250–300 r.p.m. kg/cm² (p.s.i.)	12-14 (170-200)	12-14 (170-200)	12-14 (170-200)
Compression ratio	9.5:1	10.0:1	10.0:1
Number of cylinders	4	4	4
Bore, mm. (in.)	84.14 (3.313)	84.14 (3.313)	84.14 (3.313)
Stroke, mm (in.)	80 (3.150)	80 (3.150)	80 (3.150)
Displacement, litres	1.78	1.78	1.78
Weight incl. elec. equipment and carburettors, kg (lb.), approx.	155 (340)	155 (340)	155 (340)

CYLINDER BLOCK

Material	Special-alloy cast iron
Bore, standard	84.14 mm (3.313″)
0.020″ oversize	84.65 mm (3.332″)
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
Permissible weight difference between pistons in same engine	10 g (0.35 oz.)
Height, overall, early prod.	83.5 mm (3.29″)
late prod.	71.0 mm (2.79″)
Height from centre of gudgeon pin 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	0.25–0.50 mm (0.010–0.020″)
Piston ring oversize	0.020″
	0.030″
	0.040″
	0.050″

* The figures in brackets refer to the engine type number and are stamped on the engine.

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")

SCRAPER RINGS

Number on each piston	1
Height	4.74 mm (0.187 = $^3/_{16}$")
Oil scraper ring clearance in groove	0.044–0.072 mm (0.0017–0.0028")

GUDGEON 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")
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 face under bolt heads Type 1	87.0 mm (3.425")
Types 2 and 3	86.2 mm (3.394")
Distance from upper surface of cylinder head to upper end of overflow pipe (pipe located under thermostat)	35 mm (1.38")

CRANKSHAFT

Crankshaft end float	0.017–0.108 mm (0.0007–0.0042")
Big-end bearings, radial clearance	0.039–0.081 mm (0.0015–0.0032")
Main bearings, radial clearance	0.038–0.089 mm (0.0015–0.0035")

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

Thickness, standard	1.979–1.985 mm (0.0779–0.0781")
undersize 0.010"	2.106–2.112 mm (0.0829–0.0831")
0.020"	2.233–2.239 mm (0.0879–0.0881")
0.030"	2.360–2.366 mm (0.0929–0.0931")
0.040"	2.487–2.493 mm (0.0979–0.0981")
0.050"	2.614–2.620 mm (0.1029–0.1031")

BIG-END BEARINGS

Big-end 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")

Big-end 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 (0.0972–0.0975")

CONNECTING RODS

End float on 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 the same engine	6 g (0.21 oz.)

FLYWHEEL

Permissible axial throw, max.	0.05 mm/150 mm diam. (0.002"/6" diam.)
Ring gear (chamfer facing forwards)	142 teeth

FLYWHEEL HOUSING

Permissible axial throw, max.	0.05 mm/100 mm diam. (0.002"/4" diam.)
Max. radial throw for rear guide	0.15 mm (0.006")

CAMSHAFT

Marked Type 1	B
Types 2 and 3	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 check of camshaft setting (cold engine)	
Type 1	1.15 mm (0.045")
Types 2 and 3	1.45 mm (0.057")
Inlet valve should then open at	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
Tooth flank clearance	0.04–0.08 mm (0.0016–0.0032")
End float, camshaft	0.02–0.06 mm (0.0008–0.0023")

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")

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")

Valve clearances

Clearance, warm and cold engine, exhaust	0.50–0.55 mm (0.020–0.022")
Clearance, warm and cold engine, inlet	0.50–0.55 mm (0.020–0.022")

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 valves	0.025–0.055 mm (0.0010–0.0022")
exhaust valves	0.065–0.095 mm (0.0026–0.0037")

VALVE SPRINGS

Early prod.	
Length, unloaded, approx.	45 mm (1.77")
loaded with 25.5 ± 2.0 kg (56 ± 4 1/2 lb.)	39 mm (1.54")
66.0 ± 3.5 kg (145 ± 8 lb.)	30.5 mm (1.20")
Late prod.	
Length, unloaded, approx.	46 mm (1.81")
loaded with 29.5 ± 2.3 kg (65 ± 5 lb.)	40 mm (1.57")
82.5 ± 4.3 kg (182 ± 9 1/2 lb.)	30 mm (1.18")

LUBRICATING SYSTEM

Oil capacity, incl. oil filter	3.75 litres (6.60 Imp. pints = 7.91 US pints
excl. oil filter	3.25 litres (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/cm² (50–85 p.s.i.)
Lubricant	Engine oil "For 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

Lubricating oil filter

Type	Full-flow
Make	Wix or Mann

Lubricating oil pump

Oil pump, type	Gear pump
number of teeth on each gear	10
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, early prod.	approx. 31 mm (1.22")
late prod.	approx. 32.5 mm (1.28")
loaded with 4.0 ± 0.2 kg (9 ± $^1/_2$ lb.) early prod.	27.5 mm (1.08")
9.5 ± 0.3 kg (21 ± $^3/_4$ lb.)	22.5 mm (0.88")
8.0 ± 0.8 kg (18 ± $1^3/_4$ lb.), late prod.	22.5 mm (0.88")

FUEL SYSTEM

Fuel pump

Fuel pump, type I. Diaphragm pump	AC–UG
Fuel pump, type II. Diaphragm pump	Pierburg APG
Fuel pump, type III. Diaphragm pump	AC–YD
Fuel pressure, measured at same height as pump	min. 0.11 kg/cm² (1.5 p.s.i.) max. 0.25 kg/cm² (3.5 p.s.i.)

Carburettors

Type	Horizontal
Make and designation	SU-HS 6
Number of carburettors	2
Size (air intake diameter)	44.5 mm ($1^3/_4$")
Fuel needle, designation	early prod. ZH, late prod. KD
Idling speed	600–800 r.p.m.
Oil for damping cylinder	SAE 20 engine oil (not multigrade)

Carburettors (with exhaust emission control)

Type	Horizontal
Make and designation	SU–HS 6
Number	2
Fuel needle, designation	DX
Idling speed (warm engine): vehicle with automatic transmission	800–850 r.p.m.
Oil for damping cylinder	Automatic Transmission Fluid, Type A

COOLING SYSTEM

Type	Pressure
Radiator cap valve opens at	0.23–0.30 kg/cm² (3–4 p.s.i.)
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 kg (17.6–24.3 lb.) at a lever of 150 mm (6")

Anti-freeze

Amount of glycol required for frost protection

down to −10°C (14°F)	2 litres	(3.52 Imp. pints = 4.22 US pints)
−20°C (−4°F)	3 litres	(5.28 Imp. pints = 6.33 US pints)
−30°C (−22°F)	4 litres	(7.04 Imp. pints = 8.44 US pints)
−40°C (−40°F)	4.5 litres	(7.92 Imp. pints = 9.50 US pints)

The maximum depression of freezing point (−56°C = − 68°F) is obtained by the addition of 5.1 litres (8.98 Imp.pints = 10.76 US pints) of ethylene glycol.

Thermostat

Type	Fulton Sylphon 1-1700-D3
Marking	170
Starts to open at	75–78° C (167–172° F)
Fully open at	89° C (192° F)

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 (0.0020")
Permissible out-of-round on big-end bearing journals, max.	0.07 mm (0.0030")
Max. crankshaft end float	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

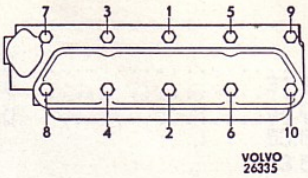
Permissible out-of-round (with new bearings) max.	0.07 mm (0.0030")
Bearings, permissible wear	0.02 mm (0.0008")

Timing gears

Permissible backlash, max.	0.12 mm (0.0050")

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	4.5–5.5	33–40
Spark plugs	3.8–4.5	27–33
Camshaft nut	13–15	94–108
Crankshaft pulley bolt	7–8	51–58
Bolt (3/8"–16)	3.5–4.0	25–29
Oil cooler nut	3.0–3.5	22–25
Nipple for oil cooler and oil filter	4.5–5.5	33–40
Sump bolts	0.8–1.1	6–8



Tightening sequence for cylinder head bolts.

B 20 ENGINE

GENERAL

Type designation	B 20 B
Output, h.p. at r.p.m. SAE	118/5800
DIN	105/5500
Max. torque, kgm (lb. ft.) at r.p.m. SAE	17 (123)/3500
DIN	16 (116)/3500
Compression pressure (warm engine) when turned over with starter motor, 250–300 r.p.m. kg/cm²	12–14
p.s.i.	170–200
Compression ratio	9.5:1
Number of cylinders	4
Bore	88.90 mm (3.499")
Stroke	80 mm (3.150")
Displacement	1.99 litres
Weight incl. elec. equipment and carburettors	approx. 155 kg (341 lb.)

CYLINDER BLOCK

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

Pistons

Material	Light alloy
Weight, early prod.	500 ± 5 g (17.5 ± 0.18 oz.)
late prod.	507 ± 5 g (17.9 ± 0.18 oz.)
Permissible weight difference between pistons in same engine	10 g (0.35 oz.)
Height, total	71 mm (2.79")
from gudgeon 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")
Piston ring oversize	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 (0.187")
Scraper ring clearance in groove	0.045–0.072 mm (0.0017–0.0028")

GUDGEON 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")
0.05 mm (0.002") oversize	22.05 mm (0.868")

CYLINDER HEAD

Height, measured from cylinder head contact surface to face under bolt heads	86.7 mm (3.41")
Distance from upper surface of cylinder head to upper end of overflow pipe (pipe located under thermostat)	35 mm (1.38")
Cylinder head gasket, thickness, unloaded	0.8 mm (0.031")
loaded	0.7 mm (0.028")

CRANKSHAFT

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

MAIN BEARINGS

Main bearing journals

Diameter, standard	63.451–63.464 mm (2.4981–2.4985")
0.010" undersize	63.197–63.210 mm (2.4881–2.4886")
0.020" undersize	62.943–62.956 mm (2.4781–2.4786")
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 (1.5367–1.5382")
2 (undersize shell 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")
0.010" undersize	2.112–2.118 mm (0.0831–0.0834")
0.020" undersize	2.239–2.245 mm (0.0881–0.0884")

BIG-END BEARINGS

Big-end bearing journals

Bearing seat width	31.950–32.050 mm (1.2579–1.2618")
Diameter, standard	54.099–54.112 mm (2.1299–2.1304")
0.010" undersize	53.845–53.858 mm (2.1199–2.1204")
0.020" undersize	53.591–53.604 mm (2.1099–2.1104")

Big-end bearing shells

Thickness, standard	1.833–1.841 mm (0.0722–0.0724")
0.010" undersize	1.960–1.968 mm (0.0772–0.0775)
0.020" undersize	2.087–2.095 mm (0.0822–0.0824")

CONNECTING RODS

End float on 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 g (0.21 oz.)

FLYWHEEL

Permissible axial throw, max.	0.05 mm/150 mm diam. (0.002"/6" diam.)
Ring gear (chamfer facing forwards)	142 teeth

FLYWHEEL HOUSING

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

CAMSHAFT

Marking	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 check of camshaft setting (cold engine)	1.45 mm (0.057")
Inlet valve should then open at	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
Tooth flank clearance	0.04–0.08 mm (0.0016–0.0032")
Endfloat, camshaft	0.02–0.06 mm (0.0008–0.0023")

VALVES

Inlet

Disc diameter	42 mm (1.654")
Stem diameter	7.955–7.970 mm (0.3132–0.3138")
Valve seat angle	44.5°
Cylinder head seat angle	45°
Seat width in cylinder head	2 mm (0.079")
Clearance, warm and cold engine	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°
Cylinder head seat angle	45°
Seat width in cylinder head	2 mm (0.080")
Clearance, warm and cold engine	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 (0.315–0.316")
Height above upper surface of head	17.5 mm (0.689")
Clearance, valve stem–guide, inlet valve	0.030–0.067 mm (0.0012–0.0026")
exhaust valve	0.060–0.097 mm (0.0024–0.0038")

VALVE SPRINGS

Length, unloaded, approx.	46 mm (1.81")
loaded with 29.5 ± 2.3 kg (65 ± 5 lb.)	40 mm (1.57")
loaded with 82.5 ± 4.3 kg (182 ± 9.5 lb.)	30 mm (1.18")

LUBRICATING SYSTEM

Oil capacity, incl. oil filter	3.75 litres (6.60 Imp. pints = 7.91 US pints)
excl. oil filter	3.25 litres (5.72 Imp. pints = 6.68 US pints)
Oil pressure at 2000 r.p.m. (with warm engine and new oil filter)	2.5–6.0 kg/cm² (36–85 p.s.i.)
Lubricant	Engine oil "For Service MS"
viscosity	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

Lubricating oil filter

Type	Full-flow

Lubricating oil pump

Oil pump, type	Gear pump
number of teeth on each gear	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	39.2 mm (1.543")
loaded with 5 ± 0.4 kg (11 ± 0.88 lb.)	26.25 mm (1.033")
7 ± 0.8 kg (15 ± 1.76 lb.)	21.0 mm (0.827")

FUEL SYSTEM

Fuel pump

Diaphragm pump	Pierburg APG
Fuel pressure, measured at same height as pump	min. 0.11 kg/cm² (1.5 p.s.i.) max. 0.25 kg/cm² (3.5 p.s.i.)

CARBURETTORS

SU

Type	Horizontal
Make and designation	SU-HS 6
Number	2
Size (air intake diameter)	41.3 mm (1.626")
Fuel needle, designation	KN
Idling speed	800 r.p.m.
Oil for damping cylinders	Automatic Transmission Fluid, Type A

STROMBERG (in vehicles intended for USA and Canada)

Type	Horizontal
Make and designation	Zenith-Stromberg 175 CD-2 SE
Number	2
Size (air intake diameter)	41.3 mm (1.626")
Fuel needle, designation	B 1 S
Idling speed	800 r.p.m.
Oil for damping cylinders	Automatic Transmission Fluid, Type A

COOLING SYSTEM

Type	Sealed system
Radiator cap valve opens at	0.7 kg/cm² (10 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 vehicle	HC–38×988
Fan belt tension: for a force of 5.6–7.6 kg (12.3–16.7 lb.)	10 mm (0.4")

Thermostat

	Type 1	Type 2
Make	Wax	Wax
Marking	170	82°
Starts to open at	75–78° C (167–172° F)	81–83° C (178–182° F)
Fully open at	89° C (192° F)	90° C (194° F)

WEAR TOLERANCES

Cylinders

To be rebored when wear amounts to (if engine shows normal oil consumption)	0.25 mm (0.010")

Crankshaft

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

Valves

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

Camshaft

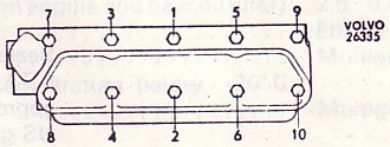
Permissible out-of-round (with new bearings), max.	0.07 mm (0.0028")
Bearings, permissible wear	0.02 mm (0.0008")

Timing gears

Tooth flank clearance, max.	0.12 mm (0.0048")

TIGHTENING TORQUES

	Kgm	Lb. ft.
Cylinder head	8.5–9.5	61–68
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
Crankshaft pulley bolt	7–8	50–58
Generator bolt (1/2")	7.1–8.6	50–60
Nipple for oil filter	4.5–5.5	32–40
Oil sump bolt	0.8–1.1	6–8



Tightening sequence for cylinder head bolts, B 20 engine.

ELECTRICAL SYSTEM AND INSTRUMENTS

BATTERY

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

IGNITION SYSTEM

Firing order	1–3–4–2
Ignition setting 100 octane ROT (Research Method),	
B 18 B 1500 r.p.m.	17–19° B.T.D.C.
B 20 B 600–800 r.p.m.	8–10° B.T.D.C.
(vacuum governor disconnected)	
with exhaust emission control B 18 B 850 r.p.m.	3–5° B.T.D.C.

DISTRIBUTOR

B 18, Bosch type 1	VJU 4 BL 33
type 2	VJ 4 BL 34
type 3	JC 4
type 4	JFR 4
type 5 with exhaust emission control	JFR 4
B 20, Type Bosch	JF UR 4

Test values (VJU 4BL 33, VJ 4BL 34)

Direction of rotation	Anti-clockwise			
Pre-ignition values, centrifugal regulator:				
Crankshaft degrees	0	10	20	26 ±3
Crankshaft r.p.m.	750–1050	1300–1850	2300–2900	2800–3300
Breaker contacts, gap	0.4–0.5 mm (0.016–0.020")			
Breaker contacts, contact pressure	0.4–0.5 kg (0.9–1.1 lb.)			
Closing angle	60°			

Test values (JC 4, JFR 4)

Direction of rotation	Anti-clockwise			
Pre-ignition values, centrifugal regulator:				
Crankshaft degrees	0	10	20	26 ±3
Crankshaft r.p.m.	510–1050	1450–1920	2350–3700	4600–4900
Breaker contacts, gap	0.4–0.5 mm (0.016–0.020")			
Breaker contacts, contact pressure	0.50–0.63 kg (1.1–1.3 lb.)			
Closing angle	59–65°			

Test values (JFR 4) with exhaust emission control

Direction of rotation	Anti-clockwise
Breaker contacts, gap	0.4–0.5 mm (0.016–0.020")
closing angle	60°–64°
contact pressure	500–630 g (17.5–22.0 oz.)
Centrifugal regulator:	
Pre-ignition, total	14.5 ±1 distr. degrees
Pre-ignition starts at	450–550 distr. r.p.m.
Values 5°	580–710 distr. r.p.m.
10°	870–1125 distr. r.p.m.
Pre-ignition finishes at	1550 distr. r.p.m.

Test values (JFUR 4)

Direction of rotation	Anti-clockwise
Breaker contacts, gap	0.4–0.5 mm (0.016–0.020")
closing angle (at 500 r.p.m.)	59–65°
contact pressure	500–630 g (17.5–22.0 oz.)
Centrifugal regulator:	
Pre-ignition, total	13.5 ±1 distr. degrees
Pre-ignition starts at	500–600 distr. r.p.m.
Values 5°	675–775 distr. r.p.m.
10°	1430–2100 distr. r.p.m.
Pre-ignition finishes at	2900 distr. r.p.m.
Vacuum governor (negative regulation):	
Drop, total	3 ±0.5 distr. degrees
Drop starts at	160–240 mm (6.3–9.5") Hg
Values 2°	230–305 mm (9.1–12.0") Hg
Drop finishes at	280–320 mm (11.0–12.5") Hg

GENERATOR, early prod.

Type	Bosch LJ/GG 240 12/2400 AR 7
Voltage	12 V
Rated output	240 W
Max. current (continuous)	30 A
Earthed	Negative terminal
Direction of rotation	Clockwise
Ratio, engine–generator	1.8:1
Brushes, designation	WSK 43 L 1
number	2
contact pressure	450–600 g (16–21 oz.)

Test values

Field winding resistance	4.8 ±0.5 ohms
Charging, cold generator	240 W at 2300 r.p.m.
Charging, warm generator	240 W at 2500 r.p.m.
Rated voltage speed, unloaded	1700 r.p.m.

Charging regulator

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

Test values

Reverse current relay:	
Adjusted for cutting-in at	12.1–12.8 V
reverse current at	2.0–7.5 A
Voltage control:	
Control voltage, idling, adjusted to	13.9–14.9 V
loaded	12.9–14.1 V
Load current:	
Cold generator and regulator	45 A
Warm generator and regulator	30 A

GENERATORS, late prod.

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

Bosch G 14 V 30 A 25 - 027
- 036

Wattage	420 W
Max. current, continuous	30 A
Earthed	Negative terminal
Direction of rotation	Clockwise
Ratio, engine–generator	1.8:1
Brushes, designation	WSK 43 L 1
number	2
contact pressure	450–600 g (16–21 oz.)

Test values

Minimum permissible diameter of commutator	35 mm (1.38")
Field winding resistance	4.8 ±0.5 ohms
Rated voltage speed, unloaded	1630 r.p.m.
Output test, cold generator, 20 A	2400 r.p.m.
warm generator, 20 A	2500 r.p.m.

S.E.V. Motorola 14 V - 26641

Wattage	490 W
Max. current	35 A
Max. speed	15000 r.p.m.
Direction of rotation	Optional
Ratio, engine–alternator	1.2:1
Min. length, brushes	5 mm (0.20")
Tightening torques: Attaching bolts	0.28–0.30 kgm (2–2.2 lb. ft.)
Nut for pulley	4 kgm (29 lb. ft.)

Test values

Field winding resistance	5.2 ±0.2 ohms
Voltage drop across protection diode	0.8–0.9 V
Output test	30 A (at min. 3000 r.p.m. and 13 V)

Bosch K 1 - 14 V 35 A 20

Wattage	490 W
Max. current	35 A
Max. speed	12000 r.p.m.
Direction of rotation	Clockwise
Ratio, engine–alternator	1:2
Min. diameter of slip rings	31.5 mm (1.24")
Max. permissible radial throw, slip rings	0.03 mm (0.0012")
rotor frame	0.05 mm (0.0020")
Min. length, brushes	8 mm (0.32")
Brush pressure	0.3–0.4 kg (0.66–0.88 lb.)
Tightening torque for pulley	3.5–4.0 kgm (25–29 lb. ft.)

Test values

Resistance in stator	0.26+0.03 ohm
rotor	4.0+0.4 ohms
Output test	35 A (min.) at 6000 r.p.m. and 14 V

CHARGING REGULATOR

Type B 18 with generator Bosch G 14 V 30 A 25	Bosch VA 14 V 30 A
B 18 with alternator S.E.V. Motorola 14 V – 26641, mechanically regulated	S.E.V. Motorola 14 V – 33525
transistor-regulated	S.E.V. Motorola 14 V – 33087
B 20 with alternator Bosch K 1 – 14 V 35 A 20	Bosch AD – 14 V

Bosch VA 14 V 30 A

Reverse current relay:	
Adjusted for cut-in at	12.4–13.1 V
reverse current at	2.5–9.5 A
Voltage control:	
Control voltage, broken charging circuit (measured at half field current)	13.5–14.5 V
loaded generator (measured at half field current)	12.8–13.8 V
Load current	45 A

S.E.V. Motorola 14 V - 33525 (mechanically regulated)

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-regulated)

Control voltage, fully charged battery, warm regulator	13.85–14.25 V

Bosch AD - 14 V

Control voltage at 4000 generator r.p.m., cold regulator read off 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)	0–0.3 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
Modulus	2.11
Brushes, designation	DSK 35/5
number	4

Test values

Mechanical:	
End float of rotor	0.1–0.3 mm (0.004–0.012")
Brush spring tension	800–900 g (1.76–1.98 lb.)
Distance from pinion to ring gear	2.5–3.0 mm (0.098–0.118")
Frictional torque of rotor brake	3–5 kgcm (2.6–4.34 lb. in.)

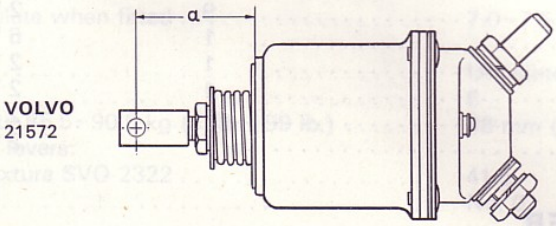
Pinion idling torque	1.3–1.8 kgcm (1.13–1.56 lb. in.)
Backlash	0.35–0.60 mm (0.014–0.023")

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)	400–450 A 8 V

Solenoid:

Cut-in voltage	Max. 7 V
Setting measurement "a" (see figure below)	32.2 ±0.1 mm (1.268 ±0.004")



Adjusting the control solenoid (iron core drawn in).

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
Carbon brushes, number	4

Test values

Mechanical:

End float of rotor	0.05–0.30 mm (0.0020–0.0120")
Brush spring tension	1.150–1.300 kg (2.5–2.9 lb.)
Distance from pinion to ring gear	1.2–4.4 mm (0.047–0.173")
Frictional torque of rotor brake	2.4–4.0 kgcm (2–3.5 lb. in.)
Idling torque of pinion	1.3–1.8 kgcm (1–1.5 lb. in.)
Backlash	0.35–0.45 mm (0.014–0.018")
Pinion modulus	2.11
Min. diameter of commutator	33 mm (1.29")
Min. length of brushes	14 mm (0.53")

Electrical:

Starter motor unloaded: 12.0 V and 40–50 A	6900–8100 r.p.m.
Starter motor loaded: 9 V and 185–200 A	1050–1350 r.p.m.
Starter motor locked: (r.p.m. = 0)	6 V, 300–350 A

Solenoid:

Cut-in voltage	Max. 8 V

FUSES

Fuseboxes under bonnet on left-hand wheel arch, three, rated 35 A.

BULBS

	Number	Strength
Headlights	2	45/40 W
Flashers/parking lights, front	2	21/6 W
Flashers/tail lights	2	21/6 W
Stop lights	2	21 W
License plate lighting	2	4 W
Reversing light	1	21 W
Interior light	2	6 W
Instrument lighting	9	2 W
Map-reading, light	1	6 W
Warning lamps, turn indicators	1	2 W
charging	1	2 W
overdrive	1	2 W
headlights	1	2 W

REVOLUTION COUNTER

Range	0–7000 r.p.m.
Equivalent current in gauge	0–25.0 mA
Inner resistance of gauge	Max. 75 ohms
Maximum permissible sender temperature	+70° C (160° F)

SPEEDOMETER GEARS

Tyres 165 - 15″

Rear axle ratio	Speedometer gears			Theoretical error percentage of speedometer
	Number of teeth		Ratio	
	Driving	Driven		
4.10:1	5	17	3.4	− 0.23
4.30:1	5	18	3.6	− 1.1
4.56:1	5	19	3.8	+ 0.26

The error percentage in the above table is calculated for a rolling radius of 309 mm (12.2″) 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	620 (998)

TRANSMISSION SYSTEM, REAR AXLE

CLUTCH

Clutch, type	Single dry plate
Size	$8^1/_2$″ (215.9 mm)
Clutch friction area, total	440 cm² (68.2 sq. in.)
Clutch release fork travel	3–4 mm (0.12–0.16″)
Clutch pedal stroke	140 mm ($5^1/_2$″)
Clutch lining rivets:	
Number	16
Size	3.5×5.5 mm ($^9/_{64}$″×$^7/_{32}$″)
Distance between the contact surface of the clutch levers for the release bearing and flywheel	46 mm (1.8″)

Model I

Thickness of clutch plate when fitted	7.5–8.0 mm (0.295–0.315")
Clutch springs:	
Marking	Unpainted
Number	3
Length, loaded with 85.5–90.5 kg (188–199 lb.)	38 mm (1 1/2")
Marking	Black
Number	3
Length, loaded with 102–107 kg (224–235 lb.)	38 mm (1 1/2")
Adjustment of clutch levers:	
Setting in clutch fixture SVO 2322	44
Packing block	No. 0

Model II

Thickness of clutch plate when fitted	7.0–7.5 mm (0.276–0.295")
Clutch springs:	
Marking	Unpainted
Number	6
Length, loaded with 85.5–90.5 kg (188–199 lb.)	38 mm (1 1/2")
Adjustment of clutch levers:	
Setting in clutch fixture SVO 2322	41.5
Packing block	No. 0

Model III

Clutch springs, type	Diaphragm springs

There are no settings for the clutch levers.

GEARBOX

Type designation	M40
Ratios:	
1st speed	3.13:1
2nd speed	1.99:1
3rd speed	1.36:1
4th speed	1:1
Reverse	3.25:1
Number of teeth on the different gears:	
Input shaft	19 teeth
Countershaft. drive gear	27 "
gear for 1st speed	15 "
gear for 2nd speed	20 "
gear for 3rd speed	23 "
gear for reverse	14 "
Mainshaft, gear for 1 st speed	33 "
gear for 2nd speed	28 "
gear for 3rd speed	22 "
gear for reverse	32 "
Reverse gear	19 "
Lubricant, type	Gear oil
Viscosity, all year round	SAE 80
Oil capacity	0.75 litre (1.32 Imp. pints = 1.58 US pints)

M 41 (M 40 gearbox with overdrive) for B 18 engine

Type designation, gearbox with overdrive	M 41
Ratio, overdrive	0.756:1
Oil pump stroke, early prod.	3.2 mm (0.125")
late prod.	4 mm (0.157")

Clearance, plunger–cylinder in pump	0.005–0.040 mm (0.0002–0.0016")
Oil pressure	33–38 kg/cm² (470–540 p.s.i.)
Lubricant, type	Engine oil
viscosity, all the year round	SAE 30
quality	Service ML, or higher
Oil capacity, gearbox and overdrive	1.8 litres (3.17 Imp. pints = 3.80 US pints)

M 41 (Gearbox M 40 with overdrive) for B 20 engine

Ratio, overdrive	0.797:1
Oil pressure, direct drive	approx. 1.5 kg/cm² (21 p.s.i.)
overdrive	32–35 kg/cm² (455–498 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, nut for flange	11.0–14.0 kgm (80–100 lb. ft.)

PROPELLER SHAFT

Type	Tubular, divided, three universal joints, centre bearing
Universal joints, make and type	Hardy-Spicer with needle bearings
Lubricant	Chassis grease
Tightening torque:	
U-clamp nut, early prod.	1.40–1.65 kgm (10–12 lb. ft.)

REAR AXLE

Make and model	Spicer 27
Rear axle type	Semi-floating
Track width	1315 mm (51 3/4")
End play for drive shafts	0.07–0.20 mm (0.0028–0.0079")

Final drive

Type	Spiral bevel (hypoid)
Ratio	4.56:1 (9/41) or 4.3:1 (10/43)
Run-out, ring gear	max. 0.08 mm (0.003")
Backlash	0.08–0.15 mm (0.0032–0.0059")
Pinion bearing tension	11.5–23.0 kgcm (10–20 lb. in.)
Lubricant, type	Hypoid oil
viscosity, all year round	SAE 80
Oil capacity	1.3 litres (2.28 Imp. pints = 2.74 US pints)

Tightening torques

	kgm	lb. ft.
Flange	28–30	200–220
Caps	5.5–7.0	40–50
Ring gear	5.5–7.0	40–50
Wheel nuts	10–14	70–100

BRAKES

FRONT WHEEL BRAKES

Type	Disc brakes
Brake disc:	
External diameter, early prod.	276.5 mm (10.86")
late prod.	268.5 mm (10.43")
Thickness, new	12.7–12.8 mm (0.500–0.504")
reconditioned	Min. 12.2 (0.480")
Thickness variation	Max. 0.03 mm (0.001")
Run-out	Max. 0.1 mm (0.004")
Brake linings:	
Number per wheel	2
Thickness	10.7 mm (0.421")
Effective area per wheel	92.5 mm² (14.3 sq. in.)
Wheel unit cylinders:	
Number per wheel	3
Diameter, inner cylinders	53.98 mm ($2^1/_8$")
outer cylinders	38.1 mm ($1^1/_2$")
Tightening torque, inner bolts	6.2–7.0 kgm (45–50 lb. ft.)
outer bolts	3.5–4.2 kgm (25–30 lb. ft.)

REAR WHEELS BRAKES

Type	Drum brakes
Brake drums:	
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	220 mm (8.66")
Effective area per wheel	223 cm² (34.56 sq. in.)
Rivets for brake linings, size	6.7×4.4 mm ($^{11}/_{64}$×$^7/_{64}$")
number per shoe	10
Wheel unit cylinder:	
Internal diameter, early prod.	22.23 mm ($^7/_8$")
late prod.	19.04 mm ($^3/_4$")
Clearance between piston and cylinder	Max. 0.25 mm (0.010")

MASTER CYLINDER

Internal diameter	22.2 mm ($^7/_8$")
Clearance between plunger and cylinder	Max. 0.20 mm (0.008")

BRAKE LINES

External diameter	$^3/_{16}$"

SERVO-BRAKE CYLINDER

Make and designation, early prod.	Girling AHV 550 MK 2
late prod.	Girling AHV 550 MK 2 A
Diameter of vacuum cylinder	139.7 mm ($5^1/_2$")
Test values at a vacuum of 0.7 kg/cm² (10 p.s.i.)	
Outgoing hydraulic pressure at an ingoing pressure of 2.5 kg/cm² (35.6 p.s.i.)	Min. 3.5 kg/cm² (50 p.s.i.)
Outgoing hydraulic pressure at an ingoing pressure of 33 kg/cm² (500 p.s.i.)	Min. 67 kg/cm² (950 p.s.i.)
Tightening torque, bolts for valve housing	0.3–0.4 kgm (2–3 lb. ft.)
bolts for vacuum cylinder	1.4–1.8 kgm (10–12 lb. ft.)
bolts for vacuum cylinder cover	0.3–0.4 kgm (2–3 lb. ft.)
bolts for air cleaner cover	0.3–0.4 kgm (2–3 lb. ft.)

FRONT AXLE WITH STEERING GEAR

WHEEL ALIGNMENT (unloaded vehicle)

Caster	0 to +1°
Camber	0 to +1/2°
"King pin" inclination at 0° camber	8°
Toe-in	0 to 4 mm (0 to 5/32")
Toe-out:	
When the outer wheel is turned 20°, the inner wheel should be turned	21.5 to 23.5°

FRONT AXLE

Shims for front axle member	Thickness = 2 mm (0.079")
	Thickness = 3 mm (0.118")
Shims for upper wishbones	Thickness = 0.15 mm (0.006")
	Thickness = 0.5 mm (0.020")
	Thickness = 1 mm (0.039")
	Thickness = 3 mm (0.118")
	Thickness = 6 mm (0.236")

STEERING GEAR

Steering wheel diameter	406.4 mm (16")
Number of turns (from lock to lock)	3 1/4
Steering mechanism, make and type	Gemmer, "cam and roller"
ratio	15.5:1
Shims for steering worm bearings	Thickness = 0.10 mm (0.0040")
	Thickness = 0.12 mm (0.0048")
	Thickness = 0.15 mm (0.0060")
	Thickness = 0.30 mm (0.0120")
Washers between adjusting screw and pitman arm shaft (in stages of 0.05 mm)	Thickness = 2.20–2.45 mm
Lubricant for steering box, type	Hypoid oil SAE 80
Oil capacity	0.25 litre (0.44 US pint = 0.53 Imp. pint)
Relay arm:	
Necessary turning torque	10–20 kgcm (8.7–17.4 lb. in.)
Shims	Thickness = 0.10 mm (0.0040")
	Thickness = 0.15 mm (0.0060")
	Thickness = 0.35 mm (0.0140")

Tightening torques

	kgm	lb. ft.
Nut for relay arm, early prod.	7	50
late prod. with Nyloc nut	8.5	60
Steering wheel nut	3.5–5	25–35
Nut for pitman arm shaft	14–17	100–120
Castle nut for steering rod and tie rod. Thread size M10×1	3.2–3.7	23–27
M14×1.5	7.5–9	55–65
5/8–18 UNF		
Nut for wishbone U-bolt	2.0–2.5	14–28
Bolt for upper wishbone shaft, early prod.	4.8–5.5	35–40
late prod.	5.5–7.0	40–50

SPRINGS, SHOCK ABSORBERS, WHEELS

SPRINGS

Front springs

Type	Coil springs
Material thickness	14.1–14.3 mm (0.550–0.563")
Outer diameter of spring	121.0–122.5 mm (4.76–4.82")

Total number of coils	8.7
Test values:	
Loading required to compress the spring 1 cm ($^{25}/_{64}$") (measured within a spring length range of 175–215 mm = 6.89–8.46")	47.8–51.8 kg (105.5–114.5 lb.)
Length, coil to coil	Max. 120 mm (4.76")
Loading for a spring length of 195 mm (7.68")	481–511 kg (1062 – 1126 lb.)

Rear springs

Type	Coil springs
Material thickness	11.2–11.4 mm (0.441–0.449")
Outer diameter of spring	116.0–117.5 mm (4.57–4.63")
Total number of coils	10.7
Test values:	
Loading required to compress the spring 1 cm ($^{25}/_{64}$") (measured within a spring length range of 225–265 mm = 8.85–10.43")	16.1–17.7 kg (35.5–38.9 lb.)
Length, coil to coil	Max. 118 mm (4.65")
Loading for a spring length of 245 mm ($9^{41}/_{64}$")	229–234 kg (504–515 lb.)

SHOCK ABSORBERS

Type	Double-acting hydraulic telescopic shock absorbers
Overall length:	
Front shock absorbers, compressed	approx. 305 mm (12")
extended	approx. 425 mm (16.75")
Rear shock absorbers, compressed	approx. 356 mm (14")
extended	approx. 526 mm (20.7")

WHEELS

Rims

Type	Disc wheels
Designation	$4^1/_2$×15 L
Number of wheel nuts	5
Radial throw	Max. 1.8 mm (0.07")
Run-out	Max. 2.5 mm (0.1")
Out-of-balance (complete wheel)	Max. 900 gcm (0.87 lb. in.)
Wheel nut tightening torque	10–14 kgm (70–100 lb. ft.)

Tyres

Type	Braced tread with inner tube
Size	165 mm (6.6")×15"
Air pressure (cold tyres), front	1.8 kg/cm² (26 p.s.i.)
rear	2.0 kg/cm² (28 p.s.i.)

REFERENCES TO WORKSHOP BULLETINS

NOTES

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