SERVICE MANUAL

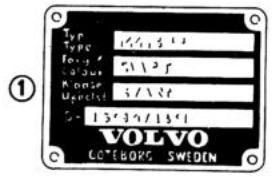
VOLVO 164 1971

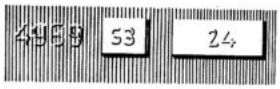
GROUP 01

TYPE DESIGNATIONS

This Manual deals with the Volvo 164 car of the following types:

Type designation	Engine	Gearbox	Rear axle
164—134	B 30 A	M 400	3.73:1
164—135	B 30 A	M 410	3.73:1
164—136	B 30 A	BW 35	3.31:1
164—155	B 30 A	M 410	3.73:1
164—156	B 30 A	BW 35	3.31:1





1. Vehicle type designation, chassis number and code number for colour and upholstery.
2. Body number.
3. Type designation and chassis number (stamped on the front right-hand door pillar).
4. Engine type designation, part number and manufacturing serial number.
5. Gearbox type designation, part number and manufacturing serial number.
6. Plate on lower part of inspection cover showing number of teeth and reduction ratio of final drive.

GROUP 03

DIMENSIONS AND WEIGHT

Length		4715 mm (186")
Width		1735 mm (68.3")
Height		1440 mm (56.7")
Wheelbase		2720 mm (107.0")
Ground clearance		180 mm (7.0")
Track, front		1350 mm (53.2")
rear		1350 mm (53.2")
Turning circle		9600 mm (31.6 ft.)
Curb weight	approx.	1360 mm (2992 lb.)

LUBRICATION

ENGINE

Lubricant, type	Engine oil
grade	Service MS
viscosity, all year round	Multigrade Oil SAE 10 W-30
below —10° C (14° F)	SAE 10 W
between —10° and +30° C (14 and 90° F)	SAE 20/20 W
above +30° C (90° F)	SAE 30
Oil capacity, excluding oil filter	5.2 litres (9.15 Imp.pints=10.97 US pints)
including oil filter	6.0 litres (10.56 Imp.pints=12.66 US pints)
Oil for carburettor damping cylinder	Automatic Transmission Fluid

GEARBOX (WITHOUT OVERDRIVE)

Lubricant, type	Gear oil
viscosity	SAE 90
at continuous air temperature below —10° C (14° F)	SAE 80
Alternative lubricant, type	Engine oil
viscosity, all year round	SAE 40
Oil capacity	0.6 litre (1.1 Imp.pints=1.3 US pints)

GEARBOX WITH OVERDRIVE

Lubricant, type	Engine oil
grade	Service MS
viscosity, all year round	SAE 30
alternative	Multigrade Oil SAE 20 W-40
Oil capacity, gearbox and overdrive	1.4 litres (2.46 Imp.pints=2.95 US pints)

AUTOMATIC TRANSMISSION

Lubricant, type	Automatic Transmission Fluid, Type F
Normal operating temp. of oil	100—115° C (212—239° F)
Oil capacity	8.2 litres (14.43 Imp.pints=17.30 US pints)

FINAL DRIVE

Lubricant, type, without differential lock	Oil according to MIL-L-2105 B
with differential lock	Oil according to MIL-L-2105 B, provided with additive for differential lock
viscosity, above —10° C (14° F)	SAE 90
below —10° C (14° F)	SAE 80
Oil capacity	1.6 litres (2.82 Imp.pints=3.38 US pints)

MECHANICAL STEERING GEAR

Lubricant, type	Hypoid oil
viscosity	SAE 80
oil capacity	0.6 litre (1.1 Imp.pints=1.3 US pints)

SERVO STEERING

Lubricant, type	Automatic Transmission Fluid, Type A
Oil capacity approx.	1.2 litres (2.11 Imp.pints=2.53 US pints)

ENGINE

GENERAL

Type designation	B 30 A
Output, h.p. at r.p.m. (SAE)	145/5500
(DIN)	130/5000
Max. torque, kpm (lb.ft.) at r.p.m. (SAE)	22.5 (163)/3000
(DIN)	21 (152)/2500

Compression pressure (warm engine) when turned over with starter motor, 250—300 r.p.m.	12—14 kp/cm² (170—200 p.s.i.)
Compression ratio	9.3:1
Number of cylinders	6
Bore	88.90 mm (3.50")
Stroke	80 mm (3.15")
Displacement	2.98 litres
Weight, including electrical equipment and gearbox	241 kg (530 lb.)
Weight excluding gearbox, starter motor, oil and water	192 kg (422 lb.)

CYLINDER BLOCK

Material	Special alloy cast iron
Bore, standard	88.92 mm (3.501")
oversize .030"	89.68 mm (3.531")

PISTONS

Material	Light alloy
Weight, standard	507±5 grammes (17.75±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	0.04—0.06 mm (0.0016—0.0024")

PISTON RINGS

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

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")
oversizes .05"	22.05 mm (0.868")

CYLINDER HEAD

Height, measured from cylinder head 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 standard (unloaded)	0.8 mm (0.031") (loaded 0.7 mm=0.028")

CRANKSHAFT

Crankshaft, end float	0.047—0.138 mm (0.0019—0.0054")
Main bearings, radial clearance	0.028—0.079 mm (0.0011—0.0031")
Big-end bearings, radial clearance	0.029—0.071 mm (0.0012—0.0028")

MAIN BEARINGS

Main bearing journals

Diameter, standard	63.451—63.464 mm (2.4981—2.4986")
undersize .010"	63.197—63.210 mm (2.4881—2.4886")
.020"	62.943—62.956 mm (2.4781—2.4786")
Width on crankshaft for pilot bearing shell	
Standard	38.960—39.000 mm (1.5338—1.5351")
Oversize 1 (undersize shell .010")	39.061—39.101 mm (1.5438—1.5451")
2 („ „ .020")	39.163—39.203 mm (1.5538—1.5551")

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 .010"	53.845—53.858 mm (2.1199—2.1204")
.020"	53.591—53.604 mm (2.1099—2.1104")

CONNECTING RODS

End float on crankshaft	0.15—0.35 mm (0.006—0.014")
Length, centre-centre	145±0.1 mm (5.71±0.004")
Max. permissible weight deviation between connectings rods in same engine	6 grammes (0.21 oz.)

FLYWHEEL

Permissible axial throw, max.	0.05 mm (0.002") at a diameter of 150 mm (5.9")
Ring gear (chamfer forwards)	153 teeth

CAMSHAFT

Marking	C
Number of bearings	4
Journal, diameter	46.975—47.000 mm (1.8494—1.8504")
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)	1.45 mm (0.057")
Inlet valve should then open at	0° (T.D.C.)

CAMSHAFT BEARING

Bearing diameter	47.020—47.050 mm (1.8512—1.8524")

TIMING GEARS

Crankshaft drive, number of teeth	21
Crankshaft gear (fibre), number of teeth	42
Backlash	0.04—0.08 mm (0.0016—0.0032")
End float, camshaft	0.02—0.06 mm (0.008—0.0024")

VALVE SYSTEM

VALVES

Inlet

Disc diameter	42 mm (1.654")
Stem diameter	7.955—7.970 mm (0.3132—0.3138")
Valve face angle	44.5°
Valve seat angle	45°
Seat width in cylinder head	2.0 mm (0.080")
Clearance, both 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 face angle	44.5°
Valve seat angle	45°
Seat width in cylinder head	2.0 mm (0.020—0.022″)
Clearance, both 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 (0.32—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—0.097 mm (0.0024—0.0038″)

VALVE SPRINGS

Length, unloaded, approx.	45 mm (1.77″)
with a loading of 25.5±2.0 kp (56±4.4 lb)	39 mm (1.54″)
with a loading of 66.0±3.5 kp (145±7.7 lb)	30.5 mm (1.20″)

LUBRICATING SYSTEM

Oil capacity, including oil filter	6.0 litres (10.56 Imp.pints=12.66 US pints)
excluding oil filter	5.2 litres (9.15 Imp.pints=10.97 US pints)
Oil pressure at 2000 r.p.m. (with warm engine and new oil filter)	2.5—6.0 kp/cm² (36—85 p.s.i.)

OIL FILTER

Type	Full-flow type

OIL PUMP

Oil pump, type	Gear
number of teeth on each gear wheel	9
end float	0.02—0.10 mm (0.0008—0.0039″)
radial clearance	0.08—0.014 mm (0.0032—0.0055″)
backlash	0.15—0.35 mm (0.0060—0.0140″)

RELIEF VALVE SPRING (IN OIL PUMP)

Length, unloaded approx.	39.0 mm (1.54″)
loaded with 5.0±0.4 kp (11.0±88 lb.)	26.25 mm (1.03″)
7.0±0.8 kp (15.4±1.7 lb.)	21.0 mm (0.83″)

FUEL SYSTEM

FUEL PUMP

Diaphragm type pump	Pierburg PV 3025
Fuel pressure, measured at same level as pump at 1000 r.p.m.	min. 0.15 kp/cm² (2.1 p.s.i.) max. 0.25 kp/cm² (3.5 p.s.i.)

CARBURETTORS

Type	Horizontal carburettor
Make and designation	Zenith-Stromberg 175CD-2SE
Number	2
Air intake diameter	41.3 mm (1.63″)
Idling speed	800 r.p.m.
For cars with automatic transmission	700 r.p.m.
Metering needle designation	B1 BE
Oil for damping cylinder	Automatic Transmission Fluid

COOLING SYSTEM

Type	Sealed system
Radiator cap valve opens at	0.7 kp/cm² (10.0 p.s.i.)
Capacity	approx 12.4 litres = 2.73 Imp.galls/3.27 US galls (expansion tank of which 1.5 litres = 2.6 Imp. pints = 3.2 US pints)
Fan belt, designation	7MX875
Fan belt tension: for a force of 11.5—14.0 kp (25—30 lb.) on the belts between the pulleys obtained with a depression of	10 mm (0.39")

THERMOSTAT

Type	Wax
Marked	82°
Begins to open at	81—83" C (177—182° F)
Fully open at	90° C (194° F)

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—30
Camshaft nut	13—15	94—108
Bolt for crankshaft belt pulley	7—8	51—58
Nipple for oil filter	4.5—5.5	32—40
Sump bolts	0.8—1.1	6—8
Alternator bolt (½")	7.1—8.6	50—60

WEAR TOLERANCES

CYLINDERS

To be rebored when wear amounts to (if engine has 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-ound on big-end bearing journals, max.	0.07 mm (0.0028")
Crankshaft end float, max.	0.15 mm (0.0060")

VALVES

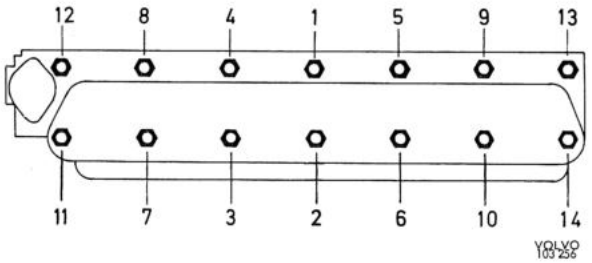
Permissible clearance between valve stems and valve guides, max.	0.15 mm (0.0060")
Valve stems, permissible wear, max.	0.02 mm (0.0008")

CAMSHAFT

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

TIMING GEARS

Permissible backlash, max.	0.12 mm (0.0048")



Tightening sequence for cylinder head bolts (tightened in 2 stages). 1st stage: 2.5—3.0 kgm (18—22 lb.ft.); 2nd stage: 8.5—9.5 kgm (61—69 lb.ft.)

ELECTRICAL SYSTEM

BATTERY

Type	Tudor 6 Ex 4 F op or equivalent
Grounded	Negative terminal
System voltage	12 V
Battery, capacity	60 Ah
Specific gravity of electrolyte:	
Fully charged battery	1.28
When recharging is necessary	1.21
Recommended charging current	5.5 A

ALTERNATOR

Type	S.E.V.Motorola 14 V-34833
Output	770 W
Max. amperage	55 A
Max. speed	15 000 r.p.m.
Direction of rotation	Optional
Ratio, engine-alternator	1—2
Brushes, minimum length	5 mm (0.20")
Tightening torques:	
Attaching screws	0.28—0.30 kpm (2.0—2.2 lb.ft.)
Pulley nut	4 kpm (29 lb.ft.)

TEST VALUES

Field winding resistance	3.7 ohms
Voltage drop across insulation diode	0.8—0.9 V
Rated test	48 A (min. at 3000 r.p.m. and approx. 14 V)

VOLTAGE REGULATOR

Type	S.E.V. Motorola 14 V-33544
Control voltage, cold regulator	13.1—14.4 V
after running 45 minutes	13.85—14.25 V

STARTER MOTOR

Type	Bosch GF 12 V 1 PS
Voltage	12 V
Grounded	Negative terminal
Direction of rotation	Clockwise
Output	Approx. 1 h.p.
Brushes, number	4

TEST VALUES

Mechanical

Rotor end float	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 (0.047—0.173")
Frictional torque of rotor brake	2.5—4.0 kpcm (2.17—3.81 lb.in.)
Pinion idling torque	1.3—1.8 kpcm (1.13—1.56 lb.in.)
Backlash	0.35—0.45 mm (0.14—0.018")
Minimum diameter of commutaror	33 mm (1.3")
Minimum length of elec. brushes	14 mm (0.6")

Electrical

Unloaded starter motor:	
12.0 V and 40—50 A	6900—8100 r.p.m.
Loaded starter motor:	
9 V and 185—200 A	1050—1350 r.p.m.
Locked starter motor:	
6 V and 300—350 A	0 r.p.m.

CONTROL SOLENOID

Cut-in voltage	Min. 8 V

IGNITION SYSTEM

Firing order	1-5-3-6-2-4
Ignition timing	
(at 600—800 r.p.m. with vacuum governor disconnected)	10° before T.D.C.
Spark plugs, type	Bosch W 200 T 35 or equivalent
thread	14 mm
spark plug gap	0.7—0.8 mm (0.28—0.032")
tightening torque	3.5—4.0 kgm (25.3—29.0 lb.ft.)
Pre-engaging resistance to ignition coil	0.9±0.05 ohm

DISTRIBUTOR

Type	Bosch JFUR 6
Direction of rotation	Anti-clockwise
Breaker points, gap	Min. 0.25 mm (0.010")
contact pressure	500—630 grammes (1.10—1.40 lb.)
dwell angle	40±3°
Capacitor	0.2 μ F—25 %

Centrifugal governor:

Advance range, total	12±1° (distr. graduation)
Advance begins at	425—525 r.p.m. (distr.)
Values, 5°	625—725 r.p.m. (distr.)
10°	1150—1650 r.p.m. (distr.)
Advance finishes at	1850 r.p.m. (distr.)

Vacuum governor:

Positive control (not U.S.A.)

Advance range, total	5±1° (distr. graduation)
Advance begins at	6—10 cm Hg
Value, 2.5°	9.5—14 cm Hg
Advance finishes at	14.5—16 cm Hg

Negative control

Drop, total	3±0.5° (distr. graduation)
Drop begins at	16—24 cm Hg
Values 2°	23—31 cm Hg
Drop finishes at	28—32 cm Hg

LAMP BULBS

	Watts	Socket	Number
Headlights	45/40	P 45 t	2
Foglights	55	P 14,5 s	2
Parking lights, front	5 (4 cp)	Ba 15 s	2
rear	5 (4 cp)	Ba 15 s	2
Flashers	32 CP	Ba 15 s	4
Stop lights	25 (32 cp)	Ba 15 s	2
Reversing lights	15 (32 cp)	Ba 15 s	2
License plate light	5	SV 8.5	2
Side marker lamps	5	Ba 15 s	4
Interior lighting	10	SV 8.5	1
Glove compartment light	2	Ba 9 S	1
Engine and luggage compartments	18	SV 8.5	2
Instrument lighting, combined instrument	3	W 2.2 d	2
Lighting heater controls clock	2	Ba 7 s	1
Warning lamp, instrument panel	1.2	W 1.8 d	5
Warning lamp, overdrive	1.2	W 1.8 d	1
Warning lamp, elec. heated rear window	1.2	W 1.8 d	1
Emergency warning flashers	1.2	W 1.8 d	1

FUSES

	Number
Rated current 16 A	2
Rated current 8 A	1
Rated current 5 A	4
Rated current 8 A (foglights)	4

ELECTRICALLY HEATED REAR WINDOW

Output, at first position of switch	Approx. 40 W
Output, at second position of switch	Approx. 150 W

INSTRUMENTS

SPEEDOMETER GEARS

Tyre 165 SR 15

Gearbox	Final drive red. ratio	Small S-gear		Large S-gear		Ratio	Error %
		Part No.	Teeth	Part No.	Teeth		
M 400	3.73:1	380168	18	381033	6	3.0:1	+0.43
M 410	3.73:1	380754	18	380682	6	3.0:1	+0.43
BW 35	3.31:1	380164	16	381033	6	2.66:1	+0.38

The percentage error in the above table is calculated for a rolling radius of 308 mm (12.1"), which is 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 speedometer cable revolutions per km (mile) registered: 640 (1024).

TYRE 6.85-15

Gearbox	Final drive red. ratio	Small S-gear		Large S-gear		Ratio	Error %
		Part No.	Teeth	Part No.	Teeth		
M 400	3.73:1	380168	18	381033	6	3.0:1	—1
M 410	3.73:1	380754	18	380682	6	3.0:1	—1
BW 35	3.31:1	380164	16	381033	6	2.66:1	—0.75

The percentage error in the above table is calculated for a rolling radius of 312 mm (12.3"), which is 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 speedometer cable revolutions per km (mile) registered: 640 (1024).

POWER TRANSMISSION, REAR AXLE

CLUTCH

Clutch, type	Single, dry-plate, diaphragm spring
Size	9″
Clutch friction area, total	468 cm² (72.5 sq.in.)
Release lever play, vehicle with left-hand steering	4—5 mm (0.16—0.20″)
vehicle with right-hand steering	2—3 mm (0.08—0.12″)

GEARBOX

M 400

Reduction ratios:	
1st speed	3.14:1
2nd speed	1.97:1
3rd speed	1.34:1
4th speed	1:1
Reverse	3.54:1
Flange nut tightening torque	11.0—14.0 kpm (80—101 lb.ft.)
Lubricant	Gear oil
viscosity	SAE 90
at continuous air temperature below —10° C (14° F)	SAE 80
Alternative lubricant	Engine oil
viscosity, all year round	SAE 40
Oil capacity	approx. 0.6 litre (1.1 Imp.pints=1.3 US pints)

M 410 (GEARBOX M 400 WITH OVERDRIVE)

Reduction ratio, overdrive	0.797:1
Oil pressure, direct drive	Approx. 1.5 kg/cm² (21 p.s.i.)
overdrive	36—39 kg/cm² (510—550 p.s.i.)
Nut for driving flange	11.0—14.0 kpm (80—101 lb.ft.)
Lubricant,	Engine oil
viscosity	SAE 30 or SAE 20 W-40
quality	Service ML or higher
Oil capacity, gearbox and overdrive	approx. 1.4 litres (2.46 Imp.pints=2.95 US pints)

AUTOMATIC TRANSMISSION

Make and type	Borg-Warner, type 35	
Type designation, left-hand drive	As 15—35 EN	
right-hand drive	210	
Colour of type plate, left-hand drive	Light blue	
right-hand drive	Dark blue	
Reduction ratios:		
1st gear	2.39:1	X Converter ratios
2nd gear	1.45:1	X Converter ratios
3rd gear	1:1	X Converter ratios
Reverse	2.09:1	X Converter ratios
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	11″ (28 cm)	
Torque ratio in converter	2:1—1:1	
Normal stall speed	2100 r.p.m.	
Weights:	lb.	kp
Gearbox	82	37.2
Converter case	7	3.2
Converter	30	13.6
Total, without fluid	119	54.0
Weight of fluid	17	7.7
Total, with fluid	136	61.7
Fluid, type	Automatic Transmission Fluid, Type F	
Fluid capacity	14 pints (8.2 litres)	
Normal operating temperature of fluid	approx. 212—240° F (110—115° C)	

Approximative shift speeds, kick down

	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.
Left-hand drive	65	—	117	—	104	—	53	—
Right-hand drive	63	39	112	70	100	62	51	32

SPRINGS FOR CONTROL SYSTEM

Spring	Approximate length		Effective number of turns	Wire diameter	
1—2 shift valve	1.094"	27.8 mm	13 1/2	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
Primary regulator valve	2.941"	74.7 mm	14	0.056"	1.42 mm
Servo orifice control valve	1.005"	25.5 mm	17	0.024"	0.61 mm
Modulator valve	1.069"	27.2 mm	19	0.028"	0.71 mm
Secondary regulator valve	2.593"	65.9 mm	18	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)	1.174—1.185"	29.8—30.1 mm	19 1/2	0.032"	0.81 mm

TIGHTENING TORQUES

Application	Lb.ft.	Kpm
Torque converter — drive plate	25—30	3.5—4.1
Transmission case — converter housing	8—13	1.1—1.8
Extension housing — transmission case	30—55	4.1—7.6
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	4.5—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 — governor body	1.7—4.0	0.25—0.55
Brake band adjustment		
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
Coupling flange — driven shaft	35—50	4.8—6.9

PROPELLER SHAFT

Type	Tubular, divided, three universal joints, support bearings
Universal joints	Fitted with needle bearings
Lubricant, sliding joint (when assembling)	Molybdenum disulphide chassis grease
universal joint	Further addition not required

REAR AXLE

Rear axle, type	Semi-floating
Track	1350 mm (53.15")

FINAL DRIVE

Type	Spiral bevel (hypoid)
Reduction ratio	3.31:1 (13:43) or 3.73:1 (11:41)
Backlash	0.13—0.20 mm (0.005—0.008")
Pre-loading on pinion bearings, new bearings	11—23 kpcm (9.55—20 lb.in.)
run-in bearings	6—11 kpcm (5.21—9.55 lb.in.)
Pre-loading on differential bearings	0.13—0.20 mm (0.005—0.008")
Lubricant, type, without differential brake	Oil according to MIL-L-2105 B
with differential brake	Oil according to MIL-L-2105 B, provided with additive for differential lock
viscosity, above —10° C (14° F)	SAE 90
below —10° C (14° F)	SAE 80
Oil capacity	1.6 litres (2.82 Imp.pints=3.38 US pints)

TIGHTENING TORQUES	Kpm	Lb.ft.
Flange	28—30	200—220
Caps	5.0—7.0	35—50
Crown wheel	6.5—9.0	45—65

BRAKES

FRONT WHEEL BRAKES

Type	Disc brakes
Brake discs:	
Outside diameter	272.2 mm (10.7")
Thickness, new	14.34 mm (0.565")
reconditioned	Min. 13.14 mm (0.517")
Warp	Max. 0.10 mm (0.004")
Brake linings:	
Number per wheel	2
Thickness, new	10 mm (0.394")
Effective area	172 cm² (26.7 sq.in.)
Wheel unit cylinders:	
Number per wheel	4
Diameter	36.12 mm (1.422")

REAR WHEEL BRAKES

Type	Disc brakes
Brake discs:	
Outside diameter	295.5 mm (11.6")
Thickness, new	9.6 mm (0.378")
reconditioned	8.4 mm (0.331")
Warp	max. 0.15 mm (0.006")
Brake linings:	
Number per wheel	2
Thickness, new	10 mm (0.394")
Effective area	100 cm² (15.5 sq.in.)
Wheel unit cylinders:	
Number per wheel	2
Diameter	38.15 mm (1.5")

MASTER CYLINDER

Nominal diameter	23.81 mm (0.94")
Bore	Max. 23.92 mm (0.95")
Piston diameter	Min. 23.66 mm (0.93")

BRAKE LINE

Outer diameter	3/16"

BRAKE VALVE

Make	Ate
Operating pressure	34±2 kg/cm² (484±28.4 p.s.i.)

SERVO CYLINDER

Make	Ate
Designation	Bromsgerät T 51

TIGHTENING TORQUES

	Kpm	Lb.ft.
Attaching bolts, front brake caliper	9—10	65—70
Attaching bolts, rear brake caliper	6—7	45—50
Wheel nuts	10—14	70—100
Stop screw, master cylinder	0.5—0.8	3.6—5.8
Attaching nuts, master cylinder	1.2—1.5	8.7—10.8
Bleeder nipples	0.4—0.6	3.0—4.0
Brake hoses	1.6—2.0	12—15
Warning valve, switch	1.4—2.0	10—15
Brake pipes	1.1—1.5	8—11
Plug, brake valve	10—12	70—85
Lock nut, brake valve	2.5—3.5	18—25

FRONT END AND STEERING GEAR

WHEEL ALIGNMENT (UNLOADED VEHICLE)

Caster	0 to +1°
Camber	0 to +0.5°
King pin inclination at a camber of 0°	7.5°
Toe-in	0 to 4 mm (0 to 0.16")
Turning angles: at a 20° turn of the outer wheel the inner wheel should be turned 21.5° to 23.5°.	
Shims, thickness	0.15 mm (0.006") 0.50 mm (0.020") 1.0 mm (0.039") 3.0 mm (0.118") 6.0 mm (0.236")

MECHANICAL STEERING GEAR

Steering wheel diameter	423 mm (16.6")
Number of turns from stop to stop in vehicle	4.8
Steering gear:	
Make	Burman
Type	Cam and ball nut
Reduction ratio, centre position	18.3:1
Clearance, steering shaft-bush, new part	0.025—0.063 mm (0.0010—0.0025")
wear limit	0.18 mm (0.007")
Ball diameter, bearings	7.14 mm (0.28")
ball nut	7.93 mm (0.31")

Shims	th=0.05 mm (0.002") th=0.127 mm (0.005") th=0.254 mm (0.010")
Lubricant	Typoid oil
Oil capacity	0.6 litre (1.1 Imp.pints=1.3 US pints)

SERVO STEERING

Steering wheel diameter	423 mm (16.6")
Number of turns from stop to stop in vehicle	3.7
Steering gear:	
Make and type	ZF, ball and nut
Reduction ratio	15.7:1
Servo pump:	
Make and type	ZF, vane pump
Max. pressure	75±5 kg/cm² (1066±71 p.s.i.)
Theoretical capacity at 500 r.p.m.	6.65 l/m (12 Imp.pints=14 US pints/minute)
Min. capacity, 500 r.p.m., 50 kg/cm² (711 p.s.i.), 80° C (176° F) (176° F)	4.5 l/m (8 Imp.pints=9.5 US pints/minute)
Regulated capacity	5—8 l/m (9 Imp.pints=10.5 US pints — 14 Imp. pints=17 US pints/minute)
Drive	With belt
Ratio, engine—pump	1:1
Oil type	Oil approved as "Automatic Transmission Fluid, Type A"
Oil changing quantity	Approx. 1.2 litres (2.11 Imp.pints=2.53 US pints)

TIGHTENING TORQUES

	Kpm	Lb.ft.
Attaching bolt for upper wishbone shaft	5.5—7.0	40—50
Nut for steering wheel	3—4	20—30
Nut for pitman arm	17.5—20	125—145
Locknut for tie rod	7.5—9	55—65
Mechanical steering gear:		
Screw for steering box screw cover	1.7—2.1	12—15
Screw for stop plate	1.7—2.1	12—15

SUSPENSION, WHEELS

SPRINGS

FRONT SPRINGS

Type	Helical spring
Wire diameter	15.3 mm (0.60")
External diameter	125.3 mm (4.93")
No. of effective turns	6½
Test values:	
Loading for a compression of 1 cm (25/64") (measured within a spring length of 185—205 mm = $7^{9}/_{22}$—$8^{1}/_{16}$)	61.9—65.9 kg (136—145 lb.)
Length, fully compressed	max. 126 mm (5.0")
Length, when loaded with 600—630 kg (1320—1386 lb.)	195.5 mm (7.7")

REAR SPRINGS

Type	Helical spring
Wire diameter	12.1 mm (0.48")
External diameter	127.1 mm (5.0")
No. of effective turns	8.9
Test values:	
Loading (for a compression of 1 cm=25/64")	15.88—16.88 kg (35—37 lb.)
Length, fully compressed	max. 114.9 mm (4.52")
Load/spring length	211—225 kp/297 mm (464—495 lb./11.7")

SHOCK ABSORBERS

Type	Double-acting, hydraulic, telescopic
Total length:	
front shock absorbers, compressed	approx. 223 mm (8.78")
unloaded	approx. 340 mm (13.39")
front shock absorbers, compressed	approx. 279 mm (10.98")
unloaded	approx. 443 mm (17.44")

WHEELS

WHEEL RIMS.

Designation	5.5 J×15 L
Type	Disc
Radial throw	max. 1.6 mm (0.063")
Warp	max. 1.6 mm (0.063")
Imbalance, complete wheel	900 gcm (7.8 lb.in.)
Tightening torque for wheel nuts	10—14 kpm (72—101 lb.ft.)

TYRES

Type	Tubeless
Size	165 SR 15