

Section 4 Power transmission

Group 41 Clutch

Pressure plate,

max. out-of-true mm 0.2

Clutch fork clearance,

hydraulic control not adjustable

with return spring at cylinder (play forwards) mm 1-3

with return spring at pedal (play rearwards) mm 1-3

Clutch pedal play (with return spring in pedal plate, play upwards)..... mm 10-15

Clutch pedal travel, 240, LHD mm 150

RHD..... mm 160

diesel mm 165

turbo..... mm 155-170

260, -1980 mm 160

1981- mm 170

Group 43 Transmission

Manual transmissions

Type	M 40, M 41	M 45 WR	M 45, M 46	M 47
Ratios:				
1st gear, early type	3.41 : 1	4.33 : 1	3.71 : 1	4.03 : 1
later type			4.03 : 1	
2nd gear	1.99 : 1	2.32 : 1	2.16 : 1	2.16 : 1
3rd gear	1.36 : 1	1.47 : 1	1.37 : 1	1.37 : 1
4th gear	1 : 1	1 : 1	1.00 : 1	1.00 : 1
5th gear	-	-	-	0.82 : 1
Reverse gear	3.25 : 1	3.96 : 1	3.68 : 1	3.68 : 1
Play				
between reverse gear and gear selector	mm 0.1 - 1.0	0.1 - 1.0	0.1 - 1.0	0.1 - 1.0
axial play				
input shaft	mm 0.01 - 0.20	0.01 - 2.0	0.01 - 0.20	0.01 - 0.20
countershaft	mm 0.025 - 0.10	0.025 - 0.10	0.025 - 0.10	0.01 - 0.10
	-	-	0.03 - 0.08*	-
primary shaft	mm 0.01 - 0.20	0.01 - 0.20	0.01 - 0.20	0.01 - 0.20
5th synchro. hub	mm -	-	-	0.01 - 0.20
* aluminium gearbox housing (pre-tensioning)				
Lubricating oil				
Type: ATF type F or G				
Oil capacity,	litres 0.75	0.75	0.75	1.6
with overdrive	litres 1.60		2.30	

Overdrive, Gearboxes M41, M 46	
Ratios, overdrive	0.797 : 1
Oil pressure, top gear	MPa 0.15
overdrive, type J, all without turbo	MPa 3.7 - 4.0
turbo	MPa 3.9 - 4.2
type J/P hybrid	MPa 2.7 - 2.9

Tightening torque, M 50 – M 51	Nm
Bearing cage screws	8 - 10
Front-rear gearbox housing screws, M 50	20 - 25
Front gearbox housing-intermediate section screws, M 51	20 - 25
Rear gearbox housing-intermediate section screws, M 51	20 - 25
Screws/nuts for gear lever carrier	20 - 25
Drive flange nuts	7 - 9
Long screws for front cover	90 - 110
Short screws for front cover	20 - 25
Fasteners for reverse gear selector fork, M 50	7 - 9
Bell housing screws	41 - 50

Automatic transmissions

B W 35

Ratios:

1st gear	2.39 : 1
2nd gear	1.45 : 1
3rd gear	1 : 1
Reverse gear	2.09 : 1

Torque converter

diameter	mm 241
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Lubricating oil

total oil capacity	approx., litres 6.4
quality, ATF oil, type G (or. F)	

Throttle cable adjustment

Distance between adjusting sleeve and cable stop

at engine idle speed	mm 0.25 - 1.0
at kick-down(KD)	mm 43.0 - 47.0

System pressure

Idle (500 rpm)	MPa 0.35 - 0.46
Increase of 500 rpm from idling gives pressure increase of	MPa 0.11 - 0.14
Stall speed	MPa 0.98 - 1.26
police version	MPa 1.30 - 1.60

Type, part number and stall speed
SW 35

Engine	Type designation	Volvo P/N	Torque converter K-factor amplification		Normal stall speed r/s(rpm)
B 20 A	469	254 782	217	1.95	36.7 (2200)
B 20 A Taxi	475	12 08 023			36.7 (2200)
B 21 A	467	254 758	217	1.91	36.7 (2200)
B 21 A Taxi	483	12 08 062			36.7 (2200)
B 21 E	466	254 757	250	2.27	42.5 (2550)
B 21 E Police	474	12 08 024	250	2.27	42.5 (2550)
B 21 F	466	254 757	250	2.27	42.5 (2550)

Tightening torque	
Screw location	Nm
Flexible plate - converter.....	34 - 41
Transmission case - converter housing.....	11 - 18
Rear housing - transmission case.....	41 - 76
Oil sump - transmission case.....	11 - 18
Front control cylinder - transmission case.....	11 - 18
Rear control cylinder - transmission case.....	18 - 37
Front pump plate - pump body.....	24 - 30
Slotted screws.....	3 - 4
Pump -gearbox housing.....	11 - 26
Oil vane flange.....	6 - 10
Separator plate - transmission case.....	14 - 25
Lever - control shaft.....	10 - 12
Pressure gauge connection.....	6 - 7
Oil drain plug.....	12 - 17
Oil pipe plate - lower valve body.....	2.5 - 3.5
Channel plate - lower valve body.....	2.5 - 3.5
End plate - lower valve body.....	2.5 - 3.5
End plate - upper valve body.....	2.5 - 3.5
Upper valve body - lower valve body.....	2.5 - 3.5
Control system - transmission case.....	6 - 12
Strainer - lower valve body.....	2.5 - 3.5
Holder for cam - lower valve body.....	2.5 - 5.0
Governor	
Screw.....	21 - 25
Brake band adjustment	
Lock nut for rear adjustment.....	41 - 55
Various	
Park/neutral Position (PNP) switch.....	8 - 11
Throttle cable connection - transmission case.....	11 - 12
Drive flange - output shaft.....	48 - 68
Nipple for oil cooler connection.....	17 - 21
Nut for nipple.....	14 - 17
Locking screw for speedometer gear.....	6 - 10

Automatic transmissions

BW 55 / AW 55

Ratios, 1st gear	2.452:1
2nd gear	1.452:1
3rd gear	1:1
Reverse gear	2.212:1

Lubrication, ATF oil type G (or F)

Oil capacity, early type	litres 6.5
later type with deep oil sump	litres 6.9

Throttle cable adjustment			
Distance between adjuster sleeve and cable stop			
at engine idle	mm	0.25 - 1.0	
at kick-down (KD)	mm	50.4 - 52.6	
Clearances		BW 55	AW 55
Oil pump: pump body - outer gear wheel	mm	0.07 - 0.30	0.07 - 0.15
arc segment - large gear wheel	mm	0.11 - 0.50	0.11 - 0.14
axial clearance	mm	0.02 - 0.10	0.02 - 0.05
C2 clutch, B1 and B2 brakes:			
clearance between clutch ass. pressure plate and lock ring	mm	0.30 - 1.20	0.30 - 1.20
Input shaft, C1 clutch, axial clearance	mm	0.20 - 0.55	0.20 - 0.55
Output shaft, axial clearance	mm	0.20 - 0.55	0.20 - 0.55
Brake and clutch discs			
Minimum permissible thickness	mm	2.1	

AW 55				
Variant	Type designation	Torque converter K factor amplification	Volvo P/N	Normal stall speed
B 21 F	100		12 08 063	2500
	250		12 08 163	2500
	320		12 08 193	2500
	376		12 08 253	2100

BW 55

Variant	Type designation	Torque converter K factor amplification		Volvo P/N	Normal stall speed
B 17 A	022	250	2.27	12 08 197	2300
	041	250	2.27	12 08 408	2300
	PP22	250	2.27	12 08 198	2300
B 19 A	003	220	1.95	254 718	2100
	014	220	1.95	12 08 165	2100
B 19 E	008	250	2.27	12 08 066	2500
	015	250	2.27	12 08 166	2500
B 21 A	003	220	1.95	254 718	2200
	014	220	1.95	12 08 165	2200
B 21 A Taxi	009	220	1.95	12 08 111	2200
	016	220	1.95	12 08 171	2200
B 21 E	008	250	2.27	12 08 066	2550
	015	250	2.27	12 08 166	2550
B 21 E Police	010	250	2.27	12 08 112	2550
	017	250	2.27	12 08 172	2250
B 21 F	005	250	2.27	12 08 047	2500
	012				2500
B 21 F Taxi	019	250	2.27	12 08 162	2500
	027	217	1.91	12 08 254	2100
	006	250	2.27	12 08 056	2500
B 23 A	031	217	1.91	12 08 262	2400
B 23 E	030	217	1.91	12 08 207	2400
B 27 A	001	200	1.97	254 720	2200
	013	200	1.97	12 08 168	2200
B 27 E	002	200	1.97	254 721	2200
	018	200	1.97	12 08 170	2200
	023	200	1.97	12 08 189	2200
B 27 F	007	200	1.97	12 08 046	2300
	011	200	1.97	12 08 128	2300
	018	200	1.97	12 08 170	2200
	021	200	1.97	12 08 164	2300
B 28 A	025	200	1.97	12 08 218	2200
B 28 E	042	200	1.97	12 08 409	2200
B 28 F	023	200	1.97	12 08 189	2200
D 20	020	240	2.30	12 08 173	1950
D 20 Taxi	026	240	2.30	12 08 227	1950
D 24	020	240	2.30	12 08 173	2200
	026	240	2.30	12 08 227	2200
D 24 Taxi	043	248	2.30	12 08 410	2200

System and stall speed pressures

Transmission	System pressure, idling MPa		System pressure, stall speed MPa	
	Shift Pos. D	Shift Pos. R	Shift Pos. D	Shift Pos. R.
BW 55	0.53 - 0.63	0.74 - 0.91	1.12 - 1.37	1.54 - 1.96
AW 55	0.40 - 0.45	0.58 - 0.68	0.95 - 1.20	1.40 - 1.70

Governor pressure

Final drive ratio	Pressure at		
	1000 propshaft speed	1800 propshaft speed	3500 propshaft speed
	MPa	MPa	MPa
BW 55			
3.31:1 Diesel	0.11-0.14	0.18-0.22	0.38-0.43
3.54:1	0.10-0.13	0.15-0.19	0.36-0.46
3.54:1 Diesel	0.12-0.14	0.19-0.23	0.43-0.48
3.73:1	0.10-0.13	0.16-0.20	0.37-0.44
3.73:1 Diesel	0.13-0.15	0.20-0.23	0.47-0.52
3.91:1	0.10-0.13	0.16-0.20	0.37-0.44
AW 55			
3.73:1	0.10-0.15	0.16-0.22	0.42-0.52
3.91:1	0.10-0.15	0.16-0.22	0.42-0.52
4.10:1	0.10-0.15	0.16-0.22	0.42-0.52
	Speed in km/h (mph)		
3.31:1	34 (21)	62 (39)	121 (75)
3.54:1	32 (20)	57 (35)	110 (68)
3.73:1	30 (19)	55 (34)	108 (67)
3.91:1	29 (18)	53 (33)	103 (64)
4.10:1	28 (17)	51 (32)	98 (61)

Gear changing speeds, km/h

BW 55

Engine	Type	Final drive	Gear position / throttle opening (KD = kick-down)			
			1-2 (KD)	2-3 (KD)	3-2 (KD)	3-1 (KD)
B 17 A	BW 55	3.91:1	61	107	99	49
B 19 A	BW 55	3.91:1	61	107	99	49
B 19 E	BW 55	3.91:1	64	114	106	49
B 21 A	BW 55	3.73:1	64	112	104	49
B 21 E	BW 55	3.73:1	66	117	109	49
B 21 E	BW 55	3.91:1	64	114	106	49
B 21 F	BW 55	3.73:1	63	111	101	49
B 21 F	BW 55	3.91:1	63	109	99	50
B 23 A	BW 55	3.54:1	67	117	109	55
B 23 E	BW 55	3.94:1	69	123	114	55
B 27 A	BW 55	3.54:1	67	120	110	49
B 27 E	BW 55	3.54:1	70	125	115	49
B 27 F	BW 55	3.54:1	70	125	115	49
B 28 A	BW 55	3.54:1	67	120	110	49
B 28 E	BW 55	3.54:1	70	125	115	49
B 28 F	BW 55	3.54:1	70	125	115	49
D 20	BW 55	3.73:1	53	95	88	49
D 24	BW 55	3.31:1	58	106	98	50
D 24	BW 55	3.54:1	55	100	92	52

AW 55

B 21 F	AW 55	3.73:1	63	111	101	50
	AW 55	3.91:1	63	109	99	50
	AW 55	4.10:1	60	104	94	50

Tightening torque	
Screw location	Nm
Torque converter - engine, M 10	35 - 50
M 12	55 - 90
Drive plate - torque converter M 10	41 - 50
M 8 (diesel)	17 - 27
Cover plate - torque converter, 3 x M 6	6 - 9
2 x M 8	18 - 25
Centre support - transmission case Tighten alternatively in steps of 7 Nm	24 - 28
Pump cover - pump body	6 - 9
Pump assembly - transmission case	22 - 28
Plate above parking pawl	6 - 9
Torque converter - transmission case, 4 x M 10	26 - 40
2 x M 12	47 - 60
Rear extension housing - transmission case	26 - 40
Valve body - transmission case	8 - 12
Valve body, for cam, M 6	6 - 9
Other screws, M 5	5 - 6
Strainer - lower valve body	5 - 6
Oil sump - transmission case (yellow gasket)	6 - 10
(blue gasket)	8 - 12
Coupling flange - output shaft	40 - 50
Nut, oil cooler connection - transmission case	20 - 30
Blind plug, pressure test	9 - 12
Drain plug	12 - 17
Cover plate - transmission case	6 - 9
Speedometer drive gear fastener	4 - 6
Nut, oil filler tube	65 - 70

Automatic transmission
AW 70/71

Ratios:	
1st gear.....	2.45 : 1
2nd gear.....	1.45 : 1
3rd gear.....	1 : 1
4th gear.....	0.69 : 1
Reverse gear.....	2.21 : 1
Torque converter	
diameter..... mm	248
Lubricating oil	
oil capacity, total..... approx., litres	7.4
oil change qty., when reconditioning, excl. converter..... approx., litres	6.5
when changing valve body ass. approx., litres	5.5
when changing sump gasket..... approx., litres	3.3
difference between MAX-MIN..... approx., litres	0.4
quality, ATF oil, type Dexron II D/E	
Clearance	
Oil pump: pump body - outer gear wheel..... mm	0.07 - 0.15
arc segment -large gear wheel..... mm	0.11 - 0.14
axial clearance..... mm	0.02 - 0.05
B0 brakes:	
clearance between clutch assembly pressure plate and lock ring..... mm	0.35 - 1.60
C1 clutch, B1 and B2 brakes:	
clearance between clutch assembly pressure plate and lock ring..... mm	0.30 - 1.20
Input shaft, C1 clutch, axial clearance..... mm	0.30 - 0.90
Output shaft, axial clearance..... mm	0.30 - 0.90
Brake and clutch rings	
Minimum permissible thickness..... mm	2.1

Type, part number and stall speed AW 70/71

Engine	Type	Torque converter K-factor amplification		Volvo P/N	Normal stall speed r/s (rpm)
B 19 E	AW 70	217	2.0:1	12 08 356	35.0 (2100)
B 21 F - MPG	AW 70	190	1.8:1	12 08 220	30.0 (1800)
B 21 F - LH	AW 70	190	1.8:1	12 08 284	
B 21 FT	AW 71	190	1.8:1	12 08 222	37.0 (2220)
B 21 FT	AW 71	217	2.0:1	12 08 319	34-41 (2050-2500)
B 21 FT	AW 71	217	1.97:1	12 08 378	37-48 (2220-2880)
B 21 FT	AW 71	217	1.97:1	12 08 414	37-48 (2220-2880)
B 23 A	AW 71	217	2.0:1	12 08 357	42.0 (2500)
B 23 E	AW 71	190	1.8:1	12 08 358	35.0 (2100)
B 23 F	AW 70	190	1.8:1	12 08 320	37.0 (2220)
B 200 E	AW 70	217	1.97:1	12 08 411	35.0 (2100)
B 200 E	AW 70	217	1.97:1	12 08 482	37.0 (2220)
B 200 F	AW 70	217	1.97:1	12 08 660	37.0 (2220)
B 200 K	AW 70	217	2.0:1	12 08 359	37.0 (2220)
B 200 K	AW 70	217	1.97:1	12 08 481	37.0 (2220)
B 230 A	AW 71	217	1.97:1	12 08 412	42.0 (2520)
B 230 A	AW 71	217	1.97:1	12 08 483	42.0 (2520)
B 230 E	AW 71	190	1.81:1	12 08 413	35.0 (2100)
B 230 E	AW 71	190	1.81:1	12 08 484	35.0 (2100)
B 230 F	AW 70	190	1.81:1	12 08 418	33.0 (2000)
B 230 F	AW 70	190	1.81:1	12 08 485	33.0 (2000)
B 230 F/FD	AW 70	190	1.81:1	12 08 602	33.0 (2000)
B 230 F	AW 71	190	1.81:1	12 08 499	33.0 (2000)
B 230 F/FD	AW 71	190	1.81:1	12 08 603	33.0 (2000)
B 230 FX	AW 71	190	2.15:1	12 08 683	33.0 (2000)
B 230 K	AW 71	217	1.97:1	12 08 449	40.0 (2400)
B 28 E	AW 71	177	1.78:1	12 08 223	35.0 (2100)
B 28 E	AW 71	177	1.78:1	12 08 486	35.0 (2100)

System and stall speed pressure AW 70/71

Engine	Transmission	System pressure, idling MPa		System pressure, stall speed MPa	
		Gear pos. D	Gear pos. R	Gear pos. D	Gear pos. R
B 19 E	AW 70	0.35 - 0.44	0.50 - 0.64	0.96 - 1.10	1.37 - 1.70
B 21 F	AW 70	0.35 - 0.44	0.50 - 0.64	0.96 - 1.10	1.37 - 1.70
B 21 F	AW 71	0.46 - 0.54	0.70 - 0.82	1.00 - 1.20	1.50 - 1.90
B 200 E/F	AW 70	0.35 - 0.44	0.50 - 0.64	0.96 - 1.10	1.37 - 1.70
B 230 E	AW 71	0.46 - 0.54	0.70 - 0.82	1.00 - 1.20	1.50 - 1.90
B 230 F/FD	AW 70	0.35 - 0.44	0.50 - 0.64	0.96 - 1.10	1.37 - 1.70
B 230 F/FD	AW 71	0.46 - 0.54	0.70 - 0.82	1.00 - 1.20	1.50 - 1.90
B 230 FX	AW 71	0.60 - 0.76	1.10 - 1.40	0.83 - 1.03	1.51 - 1.72

Governor pressure AW 70/71

Final drive ratio			
3.73 : 1		3.91 : 1	
km/h	MPa	km/h	MPa
30	0.09 - 0.15	29	0.09 - 0.15
55	0.16 - 0.22	53	0.16 - 0.22
108	0.41 - 0.53	103	0.41 - 0.53

Gear changing speeds, km/h

AW 70/71

Engine	Type	Final drive	Gear position/throttle opening (KD= kick-down)					
			1-2 (KD)	2-3 (KD)	3-4 (75%)	4-3 (0%)	3-2 (KD)	2-1 (KD)
B 19 E	AW 70	3.91:1	62	103	109	38	97	49
B 21 F	AW 70	3.91:1	62	103	109	38	97	49
B 21 FT	AW 71	3.73:1	63	105	111	39	99	50
B 21 FT	AW 71	3.91:1	60	100	105	37	94	48
B 21 FT	AW 71	3.91:1	64	107	119	25	100	52
B 23 A	AW 71	3.73:1	64	106	113	40	100	50
B 23 E	AW 71	3.73:1	64	106	113	40	100	50
B 23 F	AW 70	3.73:1	65	108	114	40	102	51
B 200 E	AW 70	3.91:1	67	113	114	40	107	55
B 200 F	AW 70	3.91:1	60	106	115	39	99	48
B 200 K	AW 70	3.91:1	67	113	114	40	107	55
B 230 A	AW 71	3.73:1	69	117	117	26	109	55
B 230 E	AW 71	3.73:1	69	116	117	26	109	55
B 230 F *	AW 70	3.73:1	71	118	118	42	112	58
B 230 F **	AW 70	3.73:1	63	110	122	41	104	50
B 230 F ***	AW 71	3.73:1	63	110	122	28	103	47
B 230 FX	AW 71	3.73:1	66	113	131	27	103	50
B 230 K	AW 71	3.73:1	69	117	117	26	109	55
B 28 E	AW 71	3.54:1	72	121	122	31	113	58

* -1988

** USA, Canada, Japan, Australia 1989-

*** Other 1989-

Tightening torque

Screw location	Dim.	Nm
Torque converter – engine.....	M 10	35 - 50
	M 12	55 - 90
Torque converter – transmission case	M 10	27 - 42
	M 12	48 - 68
Centre support - transmission case: tighten alternately in steps of 7 Nm		24 - 28
Drive plate – torque converter.....	M 10	41 - 50
Rear extension housing -transmission case	M 10	27 - 47
Pump - transmission case	M 8	22 - 28
Pump cover -pump body.....		6 - 9
Control system - transmission case.....		8 - 12
Control system, for cam.....	M 6	6 - 9
Other fasteners	M 5	5 - 6
Strainer - lower valve housing.....		5 - 6
Oil sump -transmission case.....	M 6	4 - 5
Companion flange - output shaft.....		40 - 50
Blind plug, for pressure test.....		5 - 9
Nut, oil filler pipe.....	R 5/8	65 - 70
Nut, oil cooler connection, transmission housing.....		20 - 30
Solenoid valve.....	M 8	10 - 16
Cover plate - transmission case.....		6 - 9
Locking plate over parking pawl.....		6 - 9
Drain plug, oil sump		18 - 23
Speedometer drive gear		4 - 6

Group 45 Propeller shaft

Tightening torque, companion flange fasteners	Nm
Steel universal joint.....	50
Rubber universal joint.....	80

Group 46 Rear axle

Final drive (1030/1031/1041)	
Alternative ratios, 1030.....	3.54:1, 3.73:1, 3.91:1, 4.10:1, 4.30:1
1031/1041.....	3.15:1, 3.31:1, 3.54:1, 3.73:1, 3.91:1
Axial runout, ring gear, max..... mm	0.08
Backlash clearance..... mm	0.12 - 0.18
Torsional moment, pinion bearing, new bearing..... Nm	2.5 - 3.5
used bearing..... Nm	1.8 - 3.4
Pre-tensioning of differential bearing..... mm	0.05 - 0.08
Clearance, VSS sensor - induction gear..... mm	0.5 - 1.2
Radial runout, outer diameter, induction gear, max.....	0.3
Lubrication, see page 18.	
Tightening torque	Nm
Companion flange, pinion with spacer washer.....	200 - 250
pinion with pre-tensioning sleeve*.....	180 - 280
Bearing cap, stage 1.....	35
stage 2..... angle-tighten	60°
Ring gear**, stage 1.....	35
stage 2..... angle-tighten	60°
Inspection hatch, final drive (screw).....	25
Driveshaft (bolt on pressure plate).....	50
Wheel nuts.....	115

* Check that the torsional moment is not exceeded.

** The bolts may only be used once.