

Pocket data booklet
Cars

700, 850, 900
1991 - 1997

VOLVO

FOREWORD

This book is intended primarily for mechanics but it can naturally also be used by others who require technical data about the car. Make a habit of keeping the booklet near to hand.

Owing to the format you may not always find the illustrations and explanations you are looking for. **If you are in the slightest doubt** about what the data means, refer to the appropriate service manual for more details.

With compliments and best regards to old friends
Ove Österlund

Volvo Car Corporation

Volvos are sold in versions adapted for different markets.
This book may therefore show diagrams and text which do not apply to cars available in your country.

Order number: TP 0302035 (UK)
TP 0302205 (USA & CDN)
Supersedes TP 0302034 (UK)
TP 0302204 (USA & CDN)

We reserve the right to make alterations without prior notification.

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700/900

850

Diagnostic trouble codes (DTC)

Tables

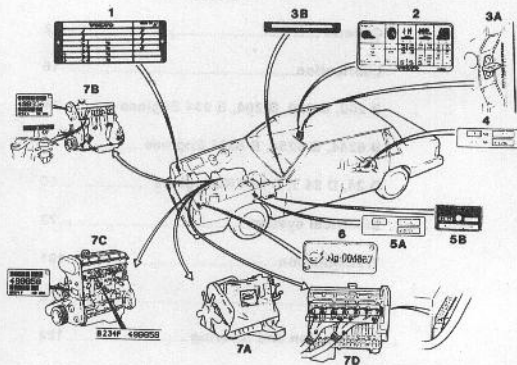
700/900

1991 - 1997

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Section 0 General Plates



740/940/960

0300005S

1. Product plate

Plate above right headlight. For info. on plate, see pg. 6

2. Tyre inflation

Rear edge front door, passenger side.

3. Type and model year designation and chassis number

A. All markets:

Stamped onto right middle door pillar.

B. USA, Canada, UK:

Plate placed to the left on instrument panel upper surface.

4. Final drive ratio, part and manufacturing number.

Live rear axle: Plate on axle housing.

Multilink MK I and MK II: Decal on lower rear axle beam's rear edge.

5. Transmission type designation, part and manufacturing number.

A. Manual transmission:

M 90: On left of transmission unit.

Others: Under the transmission.

B. Automatic transmission:

AW 70/71/72: On left of transmission unit.

AW 30-40: On right of transmission unit.

AW 30-43: On right of transmission unit.

6. Body number plate.

Above left headlight.

7. Engine type designation, manufacturing and part number.

A. D 24, D 24 T, D 24 TIC.

Stamped into cylinder block under vacuum pump.

B. B 200, B 230

Decal on timing gear cover. Also stamped onto cylinder block left side.

C. B 204, B 234

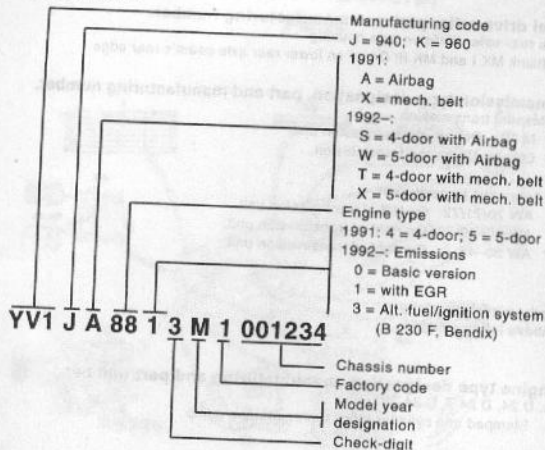
Decal on timing gear cover. Also stamped onto cylinder block left side.

D. B 6244, B 6254, B 6304

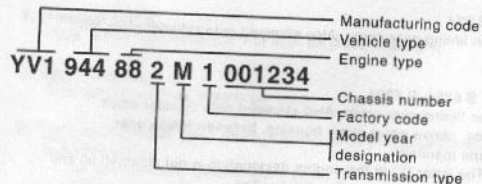
Decal on timing gear cover. Also stamped onto cylinder block right side, above water pump housing, between timing gear cover and manifold.

Note! The letter 'F' in the engine designation is not stamped on and does not appear on the decal either.

Identification number USA & CANADA



OTHER MARKETS



Factory code	Engine type		Mod. year designation	Transmission type
0 = Sweden (VKAV)	20 = B 200 G	82 = B 230 GT	M = 1991	1 = M 90
1 = Sweden (VTV/VTM)	21 = B 200 FT	83 = B 230 FD	N = 1992	2 = M 46
2 = Belgium (VEC)	22 = B 200 GT	84 = B 230 E	P = 1993	3 = M 47
3 = Canada (VCL)	24 = B 200 E	= B 230 GK	R = 1994	5 = ZF 4HP 22
4 = Thailand (TSA)	25 = B 204 FT	85 = B 230 FB	S = 1995	6 = AW 70 L
5 = Malaysia (SMA)	27 = B 200 F	86 = B 230 FT	T = 1996	AW 71 L
7 = Indonesia (ISMAL)	28 = B 204 GT	87 = B 230 FT	V = 1997	AW 72 L
A = Sweden (Uddevalla)	29 = B 204 E	88 = B 230 F		AW 30-40
	68 = B 280 E	89 = B 234 F		AW 30-43
	69 = B 280 F	92 = B 6244 F		7 = AW 70
	74 = D 24 TIC ¹⁾	93 = B 6254 F		AW 71
	75 = D 24 TIC ²⁾	95 = B 6304 F ³⁾		
	76 = D 24 T	96 = B 6304 F ⁴⁾		
	77 = D 24	98 = B 6304 G		
	80 = B 230 G	99 = B 6254 G		
	81 = B 234 G	= B 230 FK		

- 1) with EGR
- 2) without EGR
- 3) EU, OS
- 4) US/CDN

Product plate -1995

VOLVO		MADE IN SWEDEN
A		1 2 3 4 5 6 7
B		8 9 10 D D E
C1		F F F F F F F
C2		G G H J K L
1- C3		M M M - N P
2- C4		R R R R R S

A. Type approval

B. Identification number
(Type approval)

C1. Max. total weight

C2. Max. train weight (car + trailer)

C3. Max. front axle load

C4. Max. rear axle load

1 - 10

= Version (see tables)

1-2: main type,

3: doors,

4-5: engine type,

6-7: equipment level,

8: body version,

9: transmission,

10: steering wheel location

D = Marketing code
(see tables)

E = Brakes

2: Girling front, ATE rear

3: DBA front, ATE rear

4: Girling front and rear

5: DBA front, Girling rear

6: Girling front, Lucas rear (960)

F = Chassis code (see next page)

G = Emissions (see tables)

H-L = Interior trim code (see tables)

M-P = Colour code (see tables)

R = Special car number

S = Steering gear

1: Koyo

2: CAM GEAR

3: ZF

4: TRW

Product plate 1996-

VOLVO CAR CORP.		MADE IN SWEDEN
A		D D
B		H J K L
C1		M M M - N P
C2		R R R R R
1- C3		F F F F F F F
2- C4		G G

A. Type approval

B. Identification number
(Type approval)

C1. Max. total weight

C2. Max. train weight (car + trailer)

C3. Max. front axle load

C4. Max. rear axle load

D = Marketing code
(see tables)

F = Chassis code (see next page)

G = Emissions (see tables)

H-L = Interior trim code (see tables)

M-P = Colour code (see tables)

R = Special car number

The chassis code consists of seven digits as follows

- pos. 1-2 Front springs, shock absorbers, brake discs and brake calipers
 pos. 3 Front anti-roll bar
 pos. 4 Rear shock absorbers
 pos. 5 Rear springs
 pos. 6 Rear anti-roll bar
 pos. 7 -1994: Bump stop
 1995-: Auxiliary spring

How to interpret the chassis code

A	8	3	7	9	2	4
						-1994: Bump stop: 1995-: Auxiliary spring
						13 30 853
						Rear anti-roll bar: 35 16 572
						Rear springs: 13 87 836
						Rear shock absorbers: 13 29 507
						Front anti-roll bar: 13 30 221
						Front springs: 13 87 677
						Shock absorbers: 68 19 260
						-1994: Brake discs: 35 16 567
						-1994: Brake calipers, LH: 35 16 565,
						RH: 35 16 566

Pos 1, 2	Springs, front	Shock absorbers, front	Brake disc	Brake caliper	Pos 3	Anti-roll bar, front
01	91 27 409	68 19 403	-	-	1	91 27 427
02	91 27 257	68 19 403	-	-	3	13 30 221
03	91 40 559	68 19 403	-	-	4	13 30 219 -1991
37	91 40 532	91 40 535	35 16 567	35 16 565 35 16 566	4	13 59 808 1993-1995
40	91 40 533	91 40 535	35 16 567	35 16 565 35 16 566	4	68 19 683 1995-
42	13 29 822	13 29 648	13 59 908	13 29 642 13 29 643	7	35 30 276
44	13 29 824	35 30 274	13 59 908	13 29 642 13 29 643	8	35 30 277
45	13 29 824	68 19 260	13 59 908	13 29 642 13 29 643	9	68 19 504
5A	12 93 449	35 30 274	13 59 906	13 29 866 13 29 867		
5M	12 93 449	13 29 648	13 59 906	13 29 866 13 29 867		
61	91 40 532	91 40 535	35 16 567	35 16 565 35 16 566		
62	91 40 533	91 40 535	35 16 567	35 16 565 35 16 566		
97	13 29 822	91 40 535	35 16 567	35 16 565 35 16 566		
A1	13 87 678	68 19 260	35 16 567	35 16 565 35 16 566		
A2	13 29 822	13 29 648	35 16 567	35 16 565 35 16 566		
A3	13 29 823	35 30 274	35 16 567	35 16 565 35 16 566		
A4	13 29 824	35 30 274	35 16 567	35 16 565 35 16 566		

Pos 1, 2	Springs, front	Shock absorbers, front	Brake disc	Brake caliper
A5	13 87 678	35 30 274	35 16 567	35 16 565 35 16 566
A6	12 93 449	35 30 274	35 16 567	35 16 565 35 16 566
A7	12 93 992	35 42 675	35 16 567	35 16 565 35 16 566
A8	13 87 677	68 19 260	35 16 567	35 16 565 35 16 566
A9	13 87 677	35 30 274	35 16 567	35 16 565 35 16 566
AA	13 29 823	68 19 260	35 16 567	35 16 565 35 16 566
AC	13 29 824	68 19 260	35 16 567	35 16 565 35 16 566
D5	13 29 824	68 19 260	13 59 908	35 16 517 35 16 518
D8	13 29 824	35 30 274	13 59 908	35 16 517 35 16 518
DC	13 29 823	35 30 274	13 59 908	35 16 517 35 16 518
DE	13 29 823	68 19 260	13 59 908	35 16 517 35 16 518
E4	12 93 449	35 30 274	13 59 908	35 16 513 35 16 514
EJ	12 93 449	13 29 648	13 59 908	35 16 513 35 16 514
G1	13 29 822	13 29 648	35 16 567	35 16 565 35 16 566
G2	13 29 823	68 19 260	35 16 567	35 16 565 35 16 566
G3	13 29 824	68 19 260	35 16 567	35 16 565 35 16 566
G5	12 93 449	35 30 274	35 16 567	35 16 565 35 16 566

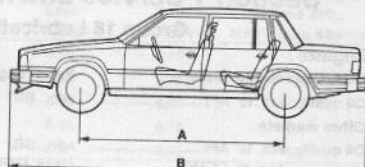
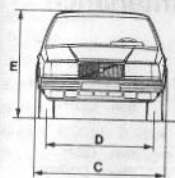
Pos 4	Shock absorbers, rear	Pos 5	Springs, rear	Pos 6	Anti-roll bar, rear	Pos 7	Bump stop/ Auxiliary spring
1	13 29 501	1	68 19 300	1	35 16 573 (Ø 16 mm)	4	13 30 853
5	35 30 697 (13 29 505)	2	68 19 301			5	13 59 653
6	91 57 408	3	91 40 471	2	35 16 572 (Ø 19 mm)	6	13 87 181
7	13 29 507	4	12 73 759				/
8	35 42 670	7	12 73 977	3	35 30 751 -1994	A	91 40 490
9	13 29 504	8	13 59 710				
A	91 63 224	9	13 87 836		(Ø 18 mm)		
C	13 29 500 (940) 91 63 225 (960)	A	12 73 977	3	91 40 599 1995- (Ø 21 mm)		
E	91 69 420	C	68 19 404				
F	91 40 552	E	35 30 199				
G	13 30 702	F	35 42 610	4	91 40 491 (Ø 18 mm)		
H	91 69 421	H	68 19 405				
J	35 30 200	J	91 40 534	5	91 57 415 (Ø 16 mm)		
K	91 73 202	K	91 40 681				
M	35 30 283						
N	35 30 697 (-9320) 91 40 553 (9320-)						
P	91 40 536						
R	13 30 332 (-9320) 91 40 562 (9320-)						
T	91 57 989						
U	91 40 592						
V	91 40 593						
Z	91 57 219						
X	91 40 594						
Y	91 40 472						
W	91 44 682						

General data

Mod. year	Mod. letter	Chassis number		Engine type	Transmission	Final drive ratio
		744	745			
1991	M	499200 — 530999	316300 — 342699	B 200 E, B 200 F, B 200 FT, B 230 E, B 230 F, B 230 FB, B 230 FT, D 24, D 24 T, D 24 TIC	M 46, M 47, AW 70, AW 71	3.31:1, 3.54:1, 3.73:1, 3.91:1, 4.10:1
1992	N	531000 —	342700 —	B 200 F, B 200 G, B 200 FT, B 230 G, B 230 F, B 230 FB, B 230 FT, D 24, D 24 TIC	M 46, M 47, AW 70, AW 71, ZF 4HP 22	3.31:1, 3.54:1, 3.73:1, 3.91:1, 4.10:1

Mod. year	Mod. letter	Chassis number		Engine type	Transmission	Final drive ratio
		944	945			
1991	M	1 — 52899	1 — 27999	B 200 E, B 200 F, B 200 FT, B 204 E, B 230 E, B 230 FB, B 230 FT, B 230 GT, B 234 F, B 234 G, D 24, D 24 T, D 24 TIC	M 46, M 47, AW 70, AW 71, ZF 4HP 22	3.54:1, 3.73:1, 3.91:1, 4.10:1
1992	N	52900 — 103399	28000 — 58049	B 200 F, B 200 G, B 200 FT, B 230 F, B 230 FB, B 230 G, B 230 FT, B 230 GT, B 234 F, B 234 G, D 24 T, D 24 TIC	M 46, M 47, AW 70, AW 71, AW 72, ZF 4HP 22	3.54:1, 3.73:1, 3.91:1, 4.10:1
1993	P	103400 — 145699	58050 — 93399	B 200 F, B 200 G, B 200 FT, B 230 F, B 230 FB, B 230 FD, B 230 G, B 230 FT, B 230 GT, D 24, D 24 TIC	M 46, M 47, AW 70, AW 71, ZF 4HP 22	3.54:1, 3.73:1, 3.91:1, 4.10:1
1994	R	145700 — 190299	93400 — 132399	B 200 F, B 200 G, B 200 FT, B 230 F, B 230 FB, B 230 FD, B 230 G, B 230 FT, B 230 GT, D 24 TIC	M 46, M 47, M 90, AW 70, AW 71, ZF 4HP 22	3.54:1, 3.73:1, 3.91:1, 4.10:1
1995	S	190300 — 218999	132400 — 162499	B 200 F, B 200 FT, B 200 GT, B 230 FB, B 230 FD, B 230 FT, B 230 G, B 230 FK, B 230 GK, D 24 TIC	M 47, M 90, AW 70, AW 71, ZF 4HP 22	3.54:1, 3.73:1, 3.91:1, 4.10:1
1996	T	219000 — 234999	162500 — 193999	B 200 FT, B 200 GT, B 230 FT, B 230 FK, B 230 GK, D 24 TIC	M 90, AW 71, ZF 4HP 22	3.31:1, 3.54:1, 3.73:1
1997	V	235000 —	194000 —	B 200 FT, B 200 GT, B 230 FK, B 230 GK	M 90, AW 71	3.31:1, 3.54:1, 3.73:1

Mod. year	Mod. letter	Chassis number		Engine type	Transmission	Final drive ratio
		964	965			
1991	M	1 - 14899	1 - 4699	B 230 GT, B 230 FT, B 280 E, B 280 F, B 204 FT, B 6304 F, D 24 TIC	M 46, AW 71, AW 30-43	3.54:1, 3.73:1, 3.91:1
1992	N	14900 - 27099	4700 - 9999	B 230 FT, B 230 GT, B 204 FT, B 6304 F, B 6304 G, D 24 TIC	M 46, AW 71, AW 30-40, AW 30-43, ZF 4HP 22	3.31:1, 3.54:1, 3.73:1
1993	P	27100 - 36599	10000 - 14699	B 230 GT, B 204 FT, B 6304 F, B 6304 G, D 24 TIC	M 46, AW 71, AW 30-40, AW 30-43, ZF 4HP 22	3.31:1, 3.54:1, 3.73:1, 4.10:1
1994	R	36600 - 48299	14700 - 18099	B 230 GT, B 204 FT, B 6304 F, B 6304 G, D 24 TIC	M 46, AW 71, AW 30-40, AW 30-43	3.31:1, 3.54:1, 3.73:1
1995	S	48300 - 76199	18100 - 28099	B 6244 F, B 6254 F, B 6254 G, B 6304 F, B 6304 G,	M 90, AW 30-40, AW 30-43	3.73:1, 3.91:1, 4.10:1
1996	T	76200 - 104504	28100 - 38899	B 6244 F, B 6254 F, B 6254 G, B 6304 F, B 6304 G,	M 90, AW 30-40, AW 30-43	3.73:1, 3.91:1, 4.10:1
1997	V	104505 -	39000 -	B 6244 F, B 6254 F, B 6254 G, B 6304 F, B 6304 G,	M 90, AW 30-40, AW 30-43	3.73:1, 3.91:1, 4.10:1



132410

Dimensions in mm		744	745	944	945	964	965
A.	Wheelbase.....	2770	2770	2770	2770	2770	2770
B.	Length.....	4812	4812	4871	4844	4871	4844
C.	Width.....	1750	1750	1750	1750	1750	1750
D.	Track, front, -1994.....	1471	1471	1471	1471	1471	1471
	1995.....	—	—	1471	1471	1502	1502
	rear, -1994.....	1460	1460	1460	1460	1520	1460
	1995.....	—	—	1460	1460	1520	1520
E.	Height, approx. (depending on type of tyres)	1410 - 1460					
Weight in kg							
	Approx. weight of empty car with full fuel tank.	1270 - 1460	1270 - 1460	1327 - 1463	1363 - 1496	1484 - 1576	1438 - 1527
Weight varies depending on variant and equipment.							
Capacities in litres							
-92	Fuel tank, standard.....	60	60	60	60	80	60
-92	with extra tank.....	82	—	—	—	—	—
93-94	Fuel tank.....	—	—	75	75	80	75
95-	—	—	75	75	80	80

Section 1 Service and maintenance

Group 16 Lubrication

Engine

USA, Canada and Japan

Oil quality, acc. to API

Petrol engines

min. SG*

Diesel engines

min. CD**

Other markets

Oil quality, acc. to API

min. SG*

min. CD**

acc. to CCMC

class G4/G5*

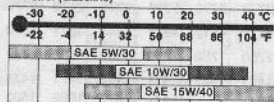
class D2/PD1*

* Oils with designation SG/CC and SG/CD meet this requirement.

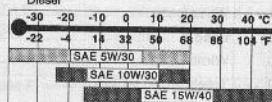
** Oils with designation SE/CD and SF/CD meet this requirement.

Viscosity (constant air temperature) USA, Canada and Japan

Petrol (Gasoline)

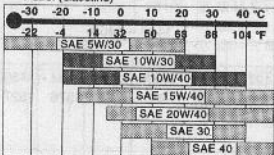


Diesel

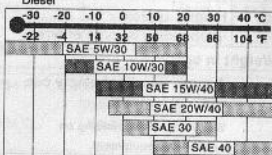


Viscosity (constant air temperature) Other markets

Petrol (Gasoline)



Diesel



Synthetic or semi-synthetic oils may be used if they meet the requirements above.

Volvo does not recommend the use of oil additives since they may impair the engine's service life.

Note! Under extreme driving conditions resulting in abnormally high oil consumption, such as mountainous roads with considerable engine braking and continuous driving at high speed, we recommend SAE 15W/40 or SAE 20W/40. However, note the lower temperature limit.

Oil capacity in litres	Excl. oil filter	Incl. oil filter	Volume diff., max - min, approx
B 200, B 230*	3.50	3.85	1.0
B 204, B 234*	3.50	3.85	1.0
B 280	5.65	6.00	1.0
B 6244, B 6254, B 6304	5.40	5.75	1.0
D 24, D 24 T, D 24 TIC**	5.00	6.00	1.0

* Turbo: When system is fully drained, there is an additional 0.6 litres for the oil cooler.

** On the D 24 TIC there is an additional 0.7 litres (air cooled oil cooler)

Transmission, manual

Lubricating oil, type:

M 46/M47:

.....ATF-oil F or G

or

.....Volvo Thermo oil, P/N

Note!

Do not mix different oil types.

Do not use ATF-oil type Dexron.

Dampers and overdrive may slip causing premature failures.

M 90:

Synthetic oil

.....Volvo P/N

Oil change volume:

M 46	litres	2.6
M 47	litres	1.6
M 90	litres	1.75

Tightening torque

for oil plugs	Nm	27-40
	ft lb	20-29

Transmission, automatic

Lubricating oil, type:

AW 70/AW 71/AW 72,

ZF 4 HP 22:

.....Dexron II D or E

AW 30-40, AW 30-43:

Must meet the requirements of both

.....Dexron II E and Ford Mercon

or

.....Dexron III and Ford Mercon

Oil change volume:

(draining only)

AW 70/AW 71/AW 72 litres, approx	3.9
AW 30-40	litres, approx 3.0
AW 30-43	litres, approx 3.0
ZF 4 HP 22	litres, approx 2.0

Final drive

Lubricating oil,

type.....	Final drive oil
quality, without diff. brake.....	API-GL-5(6) or MIL-L-2105 B(C)
or with automatic differential lock (Eaton)	Low-friction oil.
	Volvo P/N 11 61 329 (0.5 litres)
with diff. brake (Dana)	API-GL-5(6) or MIL-L-2105 B(C), equipped with additive for diff. brake.
	Volvo P/N 11 61 129 (0.5 litres)
viscosity, above - 10°C (14°F).....	SAE 90
below - 10°C (14°F).....	SAE 80

Oil change volume,

1030	litres	1.30
1031	litres	1.75
1035	litres	1.40
1041	litres	1.45
1045	litres	1.30
1055	litres	1.50
1065	litres	1.35

Steering gear

Lubricant:

type:	Grease, Volvo P/N	11 61 001
qty.:	approx, grams	100

Hydraulic oil, servo gear:

ATF-oil	type	F/G
or		Dexron II D/E
servo oil		11 61 317

qty., B 200, B 230	litres	0.8
B 280	litres	0.8
B 6244, B 6254, B 6304	litres	0.8
D 24, D 24 T, D 24 TIC	litres	0.5

Section 2 B200/230, B204/234 Engines

Group 20 General

Performance, compression, octane requirements

Engine variant	Comp. ratio	Rec. octane ratio	Power		Max. torque	
			kW at r/s	hp* (bhp) at rpm	Nm at r/s	kpm (ft.lbf) at rpm
B 200 E	10.0:1	95 ¹⁾	89/95	121/5700	158/80	16.1/4800
B 200 F	10.0:1	95 ²⁾	82/95	111/5700	158/47	16.1/2800
B 200 G	10.0:1	95 ¹⁾	82/95	111/5700	155/47	16.1/2800
B 200 FT	8.5:1	95 ²⁾	114/93	155/5600	230/60	23.4/3600
				(153/5600)		(170/3600)
B 200 GT	8.5:1	95 ²⁾	114/93	155/5600	230/60	23.4/3600
B 230 E	10.3:1	95 ¹⁾	96/92	131/5500	190/55	19.4/3300
B 230 F	9.8:1	95 ²⁾	85/90	116/5400	183/42	18.7/2500
				(114/5400)		(135/2500)
B 230 F (Bosch 2.4)	9.8:1	95 ²⁾	85/90	116/5400	182/42	18.6/2500
B 230 F (Bendix)	9.8:1	95 ²⁾	96/92	130/5500	185/49	18.9/2950
B 230 FB	9.8:1	95 ²⁾	85/82	116/4900	183/42	18.7/2500
B 230 FD	8.7:1	95 ²⁾	121/80	165/4800	264/57	26.9/3450
				(162/4800)		(195/3450)
B 230 FK	8.7:1	95 ²⁾	99/82	135/4900	230/38	23.4/2300
				(133/4900)		(170/2300)
B 230 G	9.3:1	95 ¹⁾	96/92	130/5500	185/49	18.9/2950
B 230 GT	8.7:1	95 ¹⁾	125/80	170/4800	265/57	27.0/3450
B 230 GK	8.7:1	95 ¹⁾	99/82	135/4900	230/38	23.4/2300
B 204 E	9.7:1	95 ¹⁾	102/100	139/6000	181/80	18.4/4800
B 204 FT	8.2:1	95 ²⁾	140/88	190/5300	280/49	28.5/2950
B 234 F	10.0:1	95 ²⁾	114/93	155/5600	204/80	20.8/4800
				(153/5600)		(150/4800)
B 234 G	10.0:1	95 ¹⁾	114/93	155/5600	204/80	20.8/4800
				(153/5600)		(150/4800)

* metric horsepower

1) Unleaded fuel can be used.

2) Unleaded fuel **must** be used. Can be run on 91 octane unleaded.

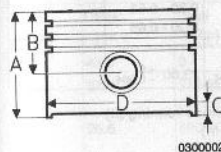
Other general data

	B 200/204	B 230/234
No. of cylinders	4	4
Cylinder bore	88.9	96.0
Stroke	80	80
Displacement	1.99	2.32
Firing order	1-3-4-2	1-3-4-2
Compression	0.9 (9)	0.9 (9)
max. deviation between cylinders	0.2 (2)	0.2 (2)
Weight, without turbocharger (TC)	140-150	140-150
with turbocharger (TC)	165	160-165

Group 21 Engine block

Cylinder head	B 200/230	B 204/234
Height, new	146.1	103.5 ± 0.5
Max. machining		0.3
min. after machining	145.6	102.7
Max. warp		
along	0.50	0.50
across	0.25	0.25

Cylinder block	B 200/204	B 230/234
Cylinder bore		
Standard (C-marked)	88.90 - 88.91	96.00 - 96.01
(D-marked)	88.91 - 88.92	96.01 - 96.02
(E-marked)	88.92 - 88.93	96.02 - 96.03
(G-marked)	88.94 - 88.95	96.04 - 96.05
Oversize 1	89.29 - 89.30	96.30 - 96.31
2	89.67 - 89.68	96.60 - 96.61



Engine type	Dimensions in mm		
	A	B	C
B 200 E/F	69.9	41.9	13.4
B 200 FT/GT	67.7	39.7	13.4
B 230	64.7	39.7	13.5
B 204 E	67.1	39.1	13.4
B 204 FT	67.7	39.7	14.6
B 234 F/G	68.7	39.9	13.4

Pistons	B 200/204	B 230/234
Piston diameter (D) (measured at right angles to gudgeon (piston) pin hole, dim. C from lower edge)		
• Standard (C-marked)mm	88.88 - 88.89	95.98 - 95.99
(D-marked)mm	88.89 - 88.90	95.99 - 96.00
(E-marked)mm	88.90 - 88.91	96.00 - 96.01
(G-marked)mm	88.92 - 88.93	96.02 - 96.03
• Oversize 1mm	89.27 - 89.28	96.28 - 96.29
2mm	89.65 - 89.66	96.58 - 96.59
Piston clearance, new pistonmm	0.010 - 0.030	0.010 - 0.030
used pistonmm	0.08	0.08
Piston weight	B 200/230	B 204/234
• Max. weight diff. between pistons in same engineg	16	14
Piston rings, axial clearance (measured with ring on piston)	B 200	B 204
• upper comp. ringmm	0.060 - 0.092	0.040 - 0.072
• lower comp. ringmm	0.030 - 0.062	0.030 - 0.062
• oil scraper ringmm	0.020 - 0.055	0.020 - 0.050
Piston rings, gap (measured in cylinder)	B 200/204	B 230/234
• upper comp. ringmm	0.30 - 0.50	0.30 - 0.55
• lower comp. ringmm	0.30 - 0.50	0.30 - 0.55
• oil ringmm	0.20 - 0.50	0.30 - 0.65
Gudgeon (piston) pin		
• Diametermm	23.00 ± 0.004	23.00 ± 0.004

- fit in connecting rod Light thumb pressure (close running fit)
 • fit in piston Thumb pressure (push fit)

Valve system	
Valve clearance, checking (adjustment)	B 200/230
• cold enginemm	0.30 - 0.40(0.40)
• warm enginemm	0.35 - 0.45(0.45)
Valve tappets	B 200/230
• diameter (A)mm	36.975 - 36.995
• height (B)mm	30 - 31
• dim. (C) unloadedmm	26.0 ± 0.5
• dim. (C) compressedmm	18.40
(Measurement points, see diagram in service manual)	16.15

Valve springs			B 200/230 F, FB, FD, FT, FK, G, GT, GK					
B 200 E, B 230 E			B 200/230 F, FB, FD, FT, FK, G, GT, GK					
			-1993			1993-		
Ø mm	Length mm	Load N(kp)	Ø mm	Length mm	Load N (kp)	Ø mm	Length mm	Load N (kp)
32.5	45.0	0	25.9	44.5	0	29.1	45.7	0
	38.0	280-320 (28-32)		38.0	264-304 (26-30)		38.0	280-320
	27.0	710-790 (71-79)		27.5	702-782 (70-78)		27.5	704-784

B 204 E, B 234 F, B 234 G			B 204 FT, B 234 GT		
Ø mm	Length mm	Load N (kp)	Ø mm	Length mm	Load N (kp)
26.2	43.0	0	26.5	46.6	0
	37.0	212-252 (21-25)		37.0	330-370 (33-37)
	26.5	600-680 (60-68)		29.5	665-735 (66-73)

Valve guide	Intake valve	Exhaust valve
Inner diameter.....mm	8.000 - 8.022	8.000 - 8.022
Height above face of cyl. head, 200/230.....mm	15.4 - 15.6	17.9 - 18.1
204/234.....mm	14.8 - 15.2	14.8 - 15.2
Play, valve spindle guide (measured with new valve)		
new, B 200/230.....mm	0.03 - 0.06	0.06 - 0.09
B 204/234.....mm	0.03 - 0.06	0.04 - 0.07
max.....mm	0.15	0.15

Valve guides available in 3 oversizes (B204/234 one oversize) and are marked with grooves.	Size	Marking	Reamer
	Standard	No groove	—
	O/s 1	1 groove	5161*
	O/s 2	2 grooves	5162
	O/s 3	3 grooves	5163

* B 204/234: Reamer 5373

Valve seat	B 200/230		B 204/234	
	Intake	Exhaust	Intake	Exhaust
• diameter, standard.....mm	46.00	38.00	34.14/ 36.14	31.14/ 33.14
oversize 1.....mm	46.25	38.25	34.64/ 36.64	31.64/ 33.64
oversize 2.....mm	46.50	38.50		
• matching surface width.....mm	1.3 - 1.9	1.7 - 2.3	1.3 - 1.9	1.7 - 2.3
• matching surface angle°	45	45	45	45
• reduction angle,				
upper.....°	15	15	15	15
lower.....°	70	70	70	70
• seat pos. in cyl. head				
diameter, standard.....mm	45.83	37.83	34.00/36.00	31.00/33.00
oversize 1.....mm	46.08	38.08	34.50/36.50	31.50/33.50
oversize 2.....mm	46.33	38.33		
interference.....mm	0.17	0.17	0.10 - 0.14	0.10 - 0.14
Valves				
(stellite-flashed may not be machine-ground)				
• diameter, disc.....mm	44.00	35.00	32.50 ± 0.15	29.50 ± 0.15
stem.....mm	7.935	7.925	6.95	6.94
• total length.....mm			122.45	122.25
• max. machining				
valve stem.....mm	0.4	0.4	0.4	0.4
• height, valve stem.....mm			49.0 - 49.8	49.0 - 49.8
• height, disc edge, new.....mm	1.5	1.5	1.5	1.5
• matching surface angle°	44.5	44.5	44.5	44.5

Timing gears

Engine type	Camshaft		Checking of camshaft adjustment (cold engine)			
	marking	max. lift height in mm		Valve clearance in mm, check	Valves to open at	
	intake	exhaust	intake	exhaust	intake	exhaust
B 200 E	V		11.37	0.7	11° *	
B 200 F/G	M	9.5	10.5	0.7	6° **	44° ***
B 200 FT	T		9.93	0.7	4° *	
B 200 GT	T		9.93	0.7	4° *	
B 230 E	V		11.37	0.7	11° *	
B 230 F	M	9.5	10.5	0.7	6° **	44° ***
B 230 FB/G	VX3	11.37	10.65	0.7	7.7° *	50.1° ***
B 230 FD	M	9.5	10.5	0.7	6° **	44° ***
B 230 FT	T		9.93	0.7	4° *	
B 230 FK	T		9.93	0.7	4° *	
B 230 GT	T		9.93	0.7	4° *	
B 230 GK	T		9.93	0.7	4° *	
B 204 E	UI	UA	9.38	0.7	5.1° *	37.1° ***
B 204 FT	FI	FA	6.81	7.45	0.7	12.9° **

* before top dead centre, ** after top dead centre, *** before bottom dead centre

Camshaft

Radial play, new,	mm	0.030 - 0.071
max,	mm	0.15
Axial play, B 200/230	mm	0.1 - 0.4
B 204/234	mm	0.05 - 0.40

Balance shaft, 204/234

Axial play	mm	0.06 - 0.19
------------------	----	-------------

Belt tension table, B 204/234

Balance shaft belt		
Coolant temperature	Used belt	New belt
20°C (68°F)	3.4 ± 0.2	3.8 ± 0.2
40°C (104°F)	4.0 ± 0.2	4.3 ± 0.2
87°C (188°F)	4.7 ± 0.2	4.9 ± 0.2

Crank mechanism

Crankshaft

Out-of-true, max.	mm	0.04
Crankshaft, axial play	mm	0.080 - 0.270
Main bearing, radial play	mm	0.024 - 0.064
Crankshaft bearing, radial play	mm	0.023 - 0.067

Main bearing journals

Diameter, standard	mm	63.00
undersize 1	mm	62.75
undersize 2	mm	62.50
Out-of-roundness, max.	mm	0.006
Taper, max.	mm	0.006
Axial bearing width	mm	35.40 +0.17

Crankshaft bearing journals

Diameter, standard	mm	49.00
undersize 1	mm	48.75
undersize 2	mm	48.50
Out-of-roundness, max.	mm	0.01
Taper, max.	mm	0.01

Connecting rod

Play at piston	mm	0.15 - 0.45
Max. weight diff. between connecting rods in same engine	g	20

Flywheel

Axial runout, max.	mm	0.02 / 100 mm Ø
Carrier plate (automatic)		
Axial plate, max.	mm	0.40

Tightening torque	Nm		ft. lb	
	B 200 B 230	B 204 B 234	B 200 B 230	B 204 B 234
Applies to oiled nuts and bolts.				
Cylinder head (stage 1)	20	20	15	15
(stage 2)	60	40	43	29
(stage 3) angle-tighten	90°	115°	90°	115°
Bolts should be tightened in sequence from the middle outwards.				
Cam-carrier (central fastener)		20		15
Main bearing cap	110	110	80	80
Connecting rod cap (stage 1)	20	20	15	15
(stage 2) angle-tighten	90°	90°	90°	90°
Camshaft cap	20	20	15	15
Camshaft pulley	50	50	37	37
Camshaft idler pulleys		25		18
Camshaft tensioner pulley		50		37
Cross stay		25		18
Balance shaft housing, separate unit		5		3.5
Balance axle housing, attachment, stage 1		20		15
stage 2 undo the bolts				
stage 3		10		7
stage 4 angle-tighten		90°		90°
Balance axle housing, fitted unit		8		5.9
Balance axle pulley		50		37
Balance axle belt-tension pulley		40		29
Crankshaft, centre bolt (vibration damper, pulley), stage 1	60	60	43	43
stage 2	60°	60°	60°	60°
Flywheel/carrier plate (use new bolts)	70	70	51	51
Two-mass flywheel (stage 1)	35		35	
(stage 2)	65°		65°	
Oil pump		11		8
Oil pump-suction pipe		11		8
Oil pump-gear, stage 1		20		15
stage 2 angle-tighten		50°		50°
Spark plugs	25	25	18	18

Group 22 Lubrication system

General	
Oil capacity and quality, see page 16	
Oil pressure with warm engine and new oil filter:	
engine speed r/s (rpm)	oil pressure MPa
15 (900)	min 0.10
33 (2000)	min 0.25
50 (3000)	min 0.30
max. oil pressure	0.80

Oil pump	B 200/230	B 204/234
	B 204 F	B 204 FT/GT
Axial play	0.02 - 0.12	0.05 - 0.10
Radial play (excl. bearing play)	0.02 - 0.09	
Gear flank play (excl. bearing play)	0.15 - 0.35	
Bearing play, drive spindle	0.032 - 0.070	
trailing spindle	0.014 - 0.043	
Length, reduction valve spring at different loads	47.6 / 0 32.0 / 40 - 48 26.0 / 56 - 87	37.8 / 0 30.3 / 61 - 67 26.0 / 96 - 108

Group 23 Fuel system

CO-content, idling speed

Engine type	Fuel system	CO-content %		Idling speed r/s (rpm)
		Adjustment	Check	
B 200 E	CI	1.0	0.5 - 2.0	15.0 (900)
B 200 F	LH 2.4	*	0.4 - 0.8 ¹⁾	12.9 (775)
B 200 G	LH 2.4	1.0	0.5 - 2.0	12.9 (775)
B 200 FT	LH 2.4	*	0.2 - 1.0 ¹⁾	12.9 (775)
B 200 GT	LH 2.4	1.0	0.5 - 2.0	12.5 (750)
B 230 E	CI	1.0	0.5 - 2.0	15.0 (900)
B 230 F	LH 2.4	*	0.4 - 0.8 ¹⁾	12.9 (775)
	Regina	*	0.4 - 0.8 ¹⁾	12.9 (775)
B 230 FB	LH 2.4	*	0.4 - 0.8 ¹⁾	12.9 (775)
B 230 FD	LH 2.4	*	0.4 - 0.8 ¹⁾	12.9 (775)
B 230 FT	LH 2.4	*	0.4 - 0.8 ¹⁾	12.5 (750)
B 230 FK	LH 2.4	*	0.4 - 0.8 ¹⁾	12.5 (750)
B 230 G	LH 2.4	1.0	0.5 - 2.0	12.5 (750)
B 230 GT	LH 2.4	1.0	0.5 - 2.0	13.3 (800)
B 230 GK	LH 2.4	0.8	0.6 - 1.0	15.0 (900)
B 204 E	LH 2.4	*	0.4 - 0.8 ¹⁾	13.3 (800)
B 204 FT	LH 2.4	*	0.4 - 0.8 ¹⁾	14.2 (850)
B 234 F	LH 2.4	*	0.4 - 0.8 ¹⁾	

* Cannot be adjusted

¹⁾ Heated oxygen sensor (HO2S) connected. Measured upstream of three-way catalytic converter (TWC).

Components LH 2.4 MFI system

CONTROL MODULES

Engine type	Volvo P/N	Bosch P/N	Engine type	Volvo P/N	Bosch P/N
B 200 F 91	35 31 831	0 280 000 594	B 230 FT4		
92-95	35 47 779	936	94-96	68 42 448	954
92-95	68 42 289	949	94-96	91 35 591	962
B 200 G			95	12 75 203	975
92-95	35 07 258	0 280 000 926	96	12 75 111	977
B 200 FT 91	35 31 721	0 280 000 596	96	12 75 112	976
92-96	35 47 772	932	96	12 75 184	975
96	12 75 113	980			
96	12 75 202	979	B 230 FK		
96	12 75 467	981	95-96	68 42 448	954
B 200 GT			95-96	91 35 591	962
95	35 47 782	0 280 000 938	96	12 75 111	977
B 230 F 91	35 17 407	0 280 000 561	96	12 75 112	976
91-92	35 01 687	0 280 000 556	96	12 75 184	975
92	35 47 773	933	97	12 70 539	977
B 230 FB 91	35 31 657	0 280 000 595	97	91 79 350	
92-95	35 47 777	935	97	91 79 343	
92-95	68 42 288	934	97	91 79 342	
95	12 71 788	968	97	12 70 516	962
B 230 FD 93	35 07 179	0 280 000 946	B 230 G		
94	91 46 221	946	92-95	35 07 259	0 280 000 900
94-95	91 46 847	946	B 230 GT 91	35 47 400	0 280 000 927
95	91 46 794	943	92-95	35 47 782	938
B 230 FT 91	35 17 368	0 280 000 560	B 230 GK 95	35 47 782	938
91-93	35 17 370	563	96	12 75 716	962
92	35 47 783	939	B 204 E 91	13 67 066	0 280 000 559
92-93	91 35 138	939	B 204 FT -92	35 31 519	0 280 000 597
92-95	35 47 781	937	93-94	35 47 059	0 280 000 950
94-95	91 46 220		B 234 F 91	35 07 605	0 280 000 562
96	12 70 539	977	91	35 07 604	571
			91	35 17 372	562
			91	35 17 608	571
			92	35 47 788	928
			B 234 G 91	35 47 262	0 280 000 911
			92	35 47 790	930

MASS AIR FLOW (MAF) SENSOR	B 200/230 F/FB/FD/FT/FK, B 234 F	B 200 G/GT, B 230 G/GT/GK, B 234 G
Bosch.....	0 280 212 016	0 280 212 021
Volvo.....	35 17 020	35 47 266
Resistance between connectors 2 and 3..... Ω	2.5 - 4.0	2.5 - 4.0
MASS AIR FLOW (MAF) SENSOR	B 204 E	B 204 FT
Bosch.....	0 280 212 007	0 280 213 012
Volvo.....	13 46 645	35 17 569
Resistance between connectors 2 and 3..... Ω	3.5 - 4.0	2.5 - 4.0

HEATED OXYGEN SENSOR (HO2S) (Lamdasond)

Engine type	Volvo P/N	Manuf. P/N	Resistance of preheating resistor		Tightening torque
			cold + 20°C (+ 68°F)	hot + 350°C (+ 662°F)	Nm (ft lb)
B 200 F.....-93	35 01 753	0 258 003 034	2 - 3	7 - 14	45 (33)
.....94-95	91 35 793	0 258 003 034	2 - 3	7 - 14	45 (33)
B 200 FT.....-93	35 31 400	0 258 003 090	2 - 3	7 - 14	45 (33)
.....94-96	91 35 794	0 258 003 381	2 - 3	7 - 14	45 (33)
.....97	91 35 621	0 258 003 034	2 - 3	7 - 14	45 (33)
B 230 F/FB.....-93	35 01 753	0 258 003 034	2 - 3	7 - 14	45 (33)
.....94-95	91 35 793	0 258 003 034	2 - 3	7 - 14	45 (33)
B 230 FD.....-93	68 42 910	0 258 003 308	2 - 3	7 - 14	45 (33)
.....94-95	91 35 795	0 258 003 378	2 - 3	7 - 14	45 (33)
B 230 FT/FK.....-93	35 31 400	0 258 003 090	2 - 3	7 - 14	45 (33)
.....94-96	91 35 794	0 258 003 381	2 - 3	7 - 14	45 (33)
(el. EGR).....94-	91 35 621	0 258 003 034	2 - 3	7 - 14	45 (33)
B 204 FT.....-93	35 31 400	0 258 003 090	2 - 3	7 - 14	45 (33)
.....94	91 35 794	0 258 003 381	2 - 3	7 - 14	45 (33)
B 204 GT.....-92	35 17 778	0 258 003 085	2 - 3	7 - 14	45 (33)
B 234 F.....-92	35 01 753	0 258 003 034	2 - 3	7 - 14	45 (33)

PRESSURE REGULATOR	B 200/230/234 B 204 E	B 204 FT	
Bosch.....	0 280 160 294	0 280 160 730	
Volvo.....	35 17 064	35 47 368	
System pressure*kPa	300	300	
Shut-off pressure.....kPa	200 - 300	200 - 300	
* fuel pressure above pressure in inlet manifold.			
INJECTORS	B 200/230 F/FB/FD/G B 204 E	B 200 FT/GT B 204 FT B 230 FT/GT B 230 FK/GK	B 234 F/G
Bosch.....	0 280 150 762	0 280 150 804	0 280 150 749
Volvo.....	35 17 572	35 17 283	35 01 986
Injection volumecm ³ /min	185	300	214
at system pressurekPa	300	300	300
SERIES RESISTANCE	B 204 FT		
Bosch.....	0 280 159 014		
Volvo.....	35 31 339		
Resistance.....Ω	5.5 - 6.6		
START INJECTOR	B 200	B 230	
Bosch.....	0 280 170 455	0 280 170 446	
Volvo.....	35 31 228	35 17 130	
Injection volumecm ³ /min	123	160	
IDLE AIR CONTROL (IAC) VALVE	B 200/230 B 204/234		
Bosch.....	0 280 140 516		
Volvo.....	13 89 618		

THROTTLE POSITION (TP) SWITCH	B 200/230 B 204/234	
Bosch.....	0 280 120 325	
Volvo.....	35 17 068	
THROTTLE POSITION (TP) SENSOR	B 204 FT	
Bosch.....	0 280 150 400	
Volvo.....	35 17 772	
Resistance between connector 1 and 3, idle..... Ω	2500 - 5000	
full load..... Ω	300 - 500	
ENGINE COOLANT TEMPERATURE (ETC) SENSOR	B 200/230 B 204/234	B 204 FT (EGTC)
Bosch (Luxor).....	0 280 130 032	220 4079-01L(Luxor)
Volvo.....	13 46 030	35 14 565
Resistance at:		
- 10°C (14°F)..... Ω	8 260 - 10 560	12 400
+ 20°C (68°F)..... Ω	2 280 - 2 720	2 800
+ 80°C (176°F)..... Ω	290 - 364	280
Tightening torque.....Nm(ft lb)		40 (30)
FUEL PUMP (FP) - 1994	B 200/230 F/FP/FG/G B 204 E, B 234 F	B 230 FT/GT B 200/204 FT
Bosch, -1993.....	0 580 464 039	0 580 464 025
1993-1994.....	0 580 464 068	0 580 464 025
Volvo, -1993.....	13 89 449	13 36 679
1993-1994.....	91 42 044	91 42 045
Pump capacity at system pressure 300 kPa and +20°C (68°F)		
12V.....l/h	130	130
11V.....l/h	108	108
10V.....l/h	85	85
Current consumption at system pressure 300 kPa, +20°C (68°F), 12V: maximum.....A	6.5	6.5

FUEL PUMP (FP) 1995-	B 200/230 F/FP/FG/G B 204 E, B 234 F	B 230 FT/GT/FG/GK B 200 FT/GT
Bosch.....	0 580 453 033	0 580 453 037
Volvo.....	91 35 418	91 35 605
Pump capacity at system pressure 300 kPa and +20°C (68°F)		
12V.....l/h	130	130
11V.....l/h	108	108
10V.....l/h	85	85
Current consumption at system pressure 300 kPa, +20°C (68°F), 12V: maximum.....A	6.5	6.5
PREPUMP -1994	B 200/230 F/FP/FG/G B 204 E, B 234 F	B 230 FT/GT B 200/204 FT
Volvo, 91.....	35 07 436	35 17 845 *
92-94 (excl. 960 93-94).....	13 89 721	35 17 845 *
93-94.....		91 42 049
Current consumption.....A	3 - 4	5.5
Volvo (only 740 with extra tank).....	35 01 928	
Current consumption.....A	1.4	
* for Thailand applies to P/N 35 07 436		
FUEL FILTER	-1991	1992-1994
Bosch.....	0 450 905 601	0 450 905 200
Volvo.....	13 89 450	68 42 033
Filters particles down to.....mm	0.002	0.002
Tightening torque.....Nm(ft lb)	20 - 35 (15 - 26)	20 - 35 (15 - 26)
FUEL FILTER	1995-	
Knecht.....	713 91 73 / FB 821/4	
Volvo.....	13 89 562	
Filters particles down to.....mm	0.002	
Tightening torque.....Nm(ft lb)	35 - 45 (26 - 33)	
RELAY, FUEL INJECTION	740/940	960
Volvo, E-engines.....	35 23 639	
Volvo, F-engines -93.....	35 23 608	13 62 914
Volvo, F-engines 94- (excl. Turbo).....	91 30 270	91 30 270
Turbo engines 94-.....	35 23 608	91 30 270

Regina, components (B 230 F)

CONTROL MODULE

	Volvo	Bendix
P/N - 1992	35 31 658	S 101 560 102 B
1992 - 1993, automatic	68 42 882	S 101 560 202 B
1994, automatic	91 46 261	S 101 590 202 C
1992 - 1994, manual	68 42 981	S 101 560 102 E

PRESSURE REGULATOR

	Volvo	Bendix
P/N - 1993	13 89 564	4088942-0001
1993 - 1994	68 42 410	7056689-0501
System pressure	kPa 300	
Shut-off pressure	kPa 200 - 300	

INJECTORS

	Volvo	Bendix
P/N	13 89 563	4088914-0001
Injection volume	cm ³ /min 170	
at system pressure	kPa 300	
Resistance	Ω 16 ± 1	

START INJECTOR

	Volvo	Bosch
P/N	35 17 130	0 280 170 446
Injection volume	cm ³ /min 165	
Resistance	Ω 10 ± 1	

IDLE AIR CONTROL (IAC) VALVE

	Volvo	VDO
P/N	13 89 557	Kx 220 75 777
Resistance of coil	Ω 4	

THROTTLE POSITION (TP) SWITCH

	Volvo	VDO
P/N - 1993	13 89 558	K 243.003001004
1993 - 1994	91 35 839	Kx19.120.602

PRESSURE SENSOR

	Volvo	Delco
P/N	13 78 162	16018622
Signal approx. 4.4 volts at	kPa 100	
3.2 volts at	kPa 80	
2.1 volts at	kPa 60	
1.1 volts at	kPa 40	
0.5 volts at	kPa 20	

ENGINE COOLANT TEMPERATURE SENSOR (ECT), (double)

	Volvo	Bosch
P/N	13 46 030	0 280 130 032
Resistance at:		
- 10°C (14°F)	Ω 8200 - 10600	
+ 20°C (68°F)	Ω 2200 - 2800	
+ 80°C (176°F)	Ω 250 - 400	

TEMPERATURE SENSOR FOR INTAKE AIR

	Volvo	Bendix
P/N	13 89 556	X 102 152
Approximate resistance at:		
- 40°C (-40°F)	Ω 45 000	
- 20°C (- 4°F)	Ω 15 000	
0°C (32°F)	Ω 5 800	
+ 20°C (68°F)	Ω 2 500	
+ 80°C (176°F)	Ω 330	

HEATED OXYGEN SENSOR (HO2S)

	-1993	1994
NGK, P/N	OTA4F-B	
Volvo, P/N	35 17 394	35 47 445
Resistance of preheating resistor:		
cold probe (20°C (68°F))	Ω 3	
hot probe (above 350°C (662°F))	Ω 13	
Tightening torque	Nm(ft lb) 45 (33)	

FUEL PUMP (TP)

	Volvo	Delco
P/N	35 07 736	644 3440

Pump capacity at system pressure

350 kPa and + 20°C (68°F):

12 V l/h 130

11 V l/h 108

10 V l/h 65

Current consumption at system pressure

350 kPa and + 20°C (68°F), 13.5 V:

maximum A 8.8

FUEL FILTER

	Volvo	Knecht
P/N	13 89 562	7139173/FB821/4

Tightening torque Nm(ft lb) 27 (20)

SYSTEM RELAY

	Volvo
Volvo, P/N	35 23 608

Group 25 Intake and exhaust systems**Turbo-engines**

Engine variant	B 230 FT/GT	B 230 FK/GK	B 204 FT	B 200 FT/GT
Charge pressure,				
at full load and rpm	3000	3000	3000	3000
control value kPa	48 - 54	27 - 34	73 - 83	53 - 59
adjustment value kPa	51	31	40 - 44	56
Pressure regulator,				
density check kPa	60 - 70	60 - 70	50 - 60	60 - 70
Overflow valve,				
fully open at under-pressure kPa	22	22	22	

Tightening torque

Turbocharger (TC) - manifold* Nm(ft lb) 30 (22)

Use special tool 999 5411

(90° angle to torque wrench)

Turbocharger (TC) - exhaust manifold* Nm(ft lb) 30 (22)

* Use lubricant (P/N 11 61 408)

Group 26 Cooling system

General

Use Genuine Volvo **green** coolant, **type C**, mixed 50/50 with **clean** water.

This mixture helps prevent **corrosion** and damage by **freezing**.

- Never top up with only water. Use Genuine Volvo coolant mixed 50/50 with clean water.
- The coolant does not normally need to be changed. In the case of major repairs requiring the draining of coolant, fresh coolant must be used since the drained coolant will have been subjected to oxidation and will contain dirt particles.
- Clean the cooling system when changing the coolant.

Engine type	Approx volume litres	Expansion tank. Pressure valve opens at		Thermostat			
		Pos. pressure, kPa	Neg. pressure, kPa	Type	Marking	Starts opening °C (°F)	Fully open °C (°F)
B 200/230	8.5	150	7	1	87	87 (189)	97 (207)
				2	92	92 (198)	102 (216)
B 204/234	9.5	150	7	1	87	87 (189)	97 (207)
				2	92	92 (198)	102 (216)

Group 28 Distributor ignition (DI) system

General

Engine type	Ignition system	Ignition setting		Spark plugs		
		btdc	Engine speed r/s (rpm)	Design.	P/N	Kit no.
B 200 E	EZ 118 K	12	15.0 ± 0.8 (900 ± 50)	WR6DC	13 67 529	270 747
B 200 F	EZ 116 K	12	12.9 ± 0.8 (775 ± 50)	WR7DC	13 67 528	270 746
B 200 G	EZ 116 K	12	12.9 ± 0.8 (775 ± 50)	WR7DC	13 67 528	270 746
B 200 FT	EZ 116 K	12	12.9 ± 0.8 (775 ± 50)	WR6DC	13 67 529	270 747
B 200 GT	EZ 116 K	12	12.9 ± 0.8 (775 ± 50)	WR6DC	13 67 529	270 747
B 230 E	EZ 118 K	12	15.0 ± 0.8 (900 ± 50)	WR6DC	13 67 529	270 747
B 230 F	EZ 116 K	12	12.9 ± 0.8 (775 ± 50)	WR7DC	13 67 528	270 746
B 230 F	Rex-I	10	12.9 ± 0.8 (775 ± 50)	WR7DC	13 67 528	270 746
B 230 G	EZ 116 K	12	12.9 ± 0.8 (775 ± 50)	WR7DC	13 67 528	270 746
B 230 FB	EZ 116 K	12	12.9 ± 0.8 (775 ± 50)	WR7DC	13 67 528	270 746
B 230 FD	EZ 116 K	12	12.9 ± 0.8 (775 ± 50)	WR7DC	13 67 528	270 746
B 230 FT	EZ 116 K	12	12.5 ± 0.8 (750 ± 50)	WR7DC	13 67 528	270 746
B 230 FK	EZ 116 K	12	12.5 ± 0.8 (750 ± 50)	WR7DC	13 67 528	270 746
B 230 GT	EZ 116 K	12	12.5 ± 0.8 (750 ± 50)	WR7DC	13 67 528	270 746
B 230 GK	EZ 116 K	12	12.5 ± 0.8 (750 ± 50)	WR7DC	13 67 528	270 746
B 204 E	EZ 116 K	15	15.0 ± 0.8 (900 ± 50)	WR6DC	13 67 529	270 747
B 204 FT	EZ 116 K	10	13.3 ± 0.8 (800 ± 50)	WR6DC	13 67 529	270 747
B 234 F	EZ 116 K	15	14.2 ± 0.8 (850 ± 50)	WR6DC	13 67 529	270 747
B 234 G	EZ 116 K	15	14.2 ± 0.8 (850 ± 50)	WR6DC	13 67 529	270 747

Spark plugs, electrode gap mm 0.7 - 0.8
tightening torque Nm (ft.lb) 25 (15)

Components

Control module

Engine type	Volvo P/N	Manuf. P/N
B 200 E	13 36 800	0 261 201 010
B 200 F/G	35 31 830	0 227 400 176
B 200 FT/GT	35 31 722	0 227 400 177
B 230 E	13 36 503	0 261 201 009
B 230 F, (S,N,DK) -1991	35 31 325	0 227 400 169
B 230 F, (REX-I) -1991	35 31 649	S 101 500 102 A
B 230 F, (REX-I) 1991-1994	35 07 696	S 101 500 102 D
B 230 F, (EGR,EL) Calif., 1991-1992	35 17 855	0 227 400 162
B 230 F, (EGR,EL) Calif., 1992	68 42 495	0 227 400 209
B 230 FB	35 31 648	0 227 400 175
B 230 FD, 1993-1994	35 07 348	0 227 400 196
B 230 FD, auto, 1995	35 07 348	0 227 400 196
B 230 FD, man., 1995	12 71 797	0 227 400 231
B 230 FT/GT, 1997	35 17 369	0 227 400 148
B 230 FT/GT, (EGR), -1992	35 17 360	0 227 400 149
B 230 FT/GT, (EGR,EL), 1992-1993	68 42 496	0 222 400 214
B 230 FT/GT, (EGR,EL), 1993	91 35 869	0 227 400 214
B 230 FT, (EGR,EL) man., 1994-1996	91 35 590	0 227 400 219
B 230 FT, (EGR,EL) auto, 1994-1996	68 42 449	0 227 400 207
B 230 G	35 31 648	0 227 400 175
B 230 FK/GK, man.	91 35 590	0 227 400 219
B 230 FK/GK, auto	68 42 449	0 227 400 207
B 204 E	13 67 178	0 227 400 143
B 204 FT, -1992	35 17 719	0 227 400 159
B 204 FT, 1993-1994	35 31 520	0 227 400 208
B 234 F/G, -1991	35 17 609	0 227 400 152
B 234 F/G, 1991-1992	35 07 646	0 227 400 152
B 234 F/G, (EGR,EL), -1991	35 07 213	0 227 400 147
B 234 F/G, (EGR,EL), 1991	35 07 645	0 227 400 147

Power stage

Engine type (model year)	Volvo P/N	Bosch P/N
1991-	35 01 921-5	0 227 100 124

Distributor

Engine type	Volvo P/N	Bosch P/N
B 200/230 E.....	13 36 087	0 237 502 001
B 200/230 F/FB/FD/G/FT/GT.*.....	13 36 132	0 237 502 002
B 230 F, Regina, 1993-1994.....	13 67 468	0 237 523 003
B 204 E/FT, B 234 F/G.....	13 67 197	0 237 502 003
* B 230 F, China 1992.....	13 67 468	0 237 523 003

Ignition coil

Ignition system	Volvo P/N	Manuf. P/N	Resistance of coils	
			primary (1 and 15)	secondary (1 and high)
EZ-K (Bosch)	13 46 071	0 221 601 005	0.6 - 0.9 Ω	7.0 - 8.5 k Ω
Rex I (Bendix)	13 67 438	S 102 020 004 A	0.5 - 0.6 Ω	5.0 - 7.0 k Ω

Knock sensor (KS)

Engine type (model year)	Volvo P/N	Bosch P/N	Tightening torque
1991-	13 67 644	0 261 231 046	20 Nm (15 ft lb)

RPM sensor

Engine type (model year)	Volvo P/N	Manuf. P/N	Resistance of coil(Ω)	Inductance of coil(mH)
-1991	13 89 399	14.64.039.0000	240 \pm 25	55 \pm 10 (10kHz)
1991-	35 47 847	14.64.042.0000	170 \pm 30	44 \pm 15 (10kHz)

Section 2 B 6244, B 6254, B 6304 Engine

Group 20 General

Engine type	Comp. ratio	Rec. octane RON	Output		Max. torque	
			kW at r/s	hp (bhp) at rpm	Nm at r/s	kpm (ft.lbf) at rpm
B 6244 F	10.3:1	95 ¹⁾	120/97	163/5800 161/5800	220/73	22.4/4400 162.3/4400
B 6254 F/G (-1995)	10.5:1	95 ²⁾	125/95	170/5700 (168/5700)	230/73	23.4/4400 (170/4400)
B 6254 F/G (1996-)	10.5:1	95 ²⁾	125/95	170/5700 (168/5700)	233/76	23.8/4550 (172/4550)
B 6304 F	10.7:1	95 ¹⁾	150/100	204/6000 (201/6000)	267/72	27.2/4300 (197/4300)
B 6304 F2 1995	10.7:1	95 ¹⁾	135/87	184/5200 (181/5200)	270/68	27.5/4100 (199/4100)
B 6304 F2 1996-	10.7:1	95 ¹⁾	135/87	184/5200 (181/5200)	274/73	28.2/4350 (202/4350)
B 6304 G	10.7:1	95 ²⁾	150/100	204/6000 201/6000	267/72	27.2/4300 197/4300

- 1) Unleaded fuel **must** be used. Can be run on 91 octane unleaded.
 2) B 6254 F: Unleaded fuel **must** be used. Can be run on 91 octane unleaded.
 B 6254 G: Intended for leaded fuel. Can also be run on unleaded fuel.

Other general data	B 6244	B 6254	B 6304
No. of cylinders	6	6	6
Cylinder bore	81.0	81.0	83.00
Stroke	77.0	80.0	90.00
Displacement	2.381	2.473	2.922
Firing order	1 - 5 - 3 - 6 - 2 - 4		
Compression	1.3 - 1.5 (13 - 15)	1.3 - 1.5 (13 - 15)	1.3 - 1.5 (13 - 15)
max. deviation between cylinders	0.2 (2.0)	0.2 (2.0)	0.2 (2.0)
Weight	180	180	180

Group 21 Engine block

Cylinder head

Height, new mm 129.00 ± 0.05

Max. machining mm 0.30

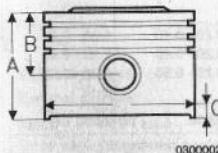
Max. warp

along mm 0.50

across mm 0.20

Cylinder block

Bore	B 6244/6254	B 6304
Standard (C-marked)	81.00 - 81.01	83.00 - 83.01
(D-marked)	81.01 - 81.02	83.01 - 83.02
(E-marked)	81.02 - 81.03	83.02 - 83.03
(G-marked)	81.04 - 81.05	83.04 - 83.05



Engine type	Dimensions in mm		
	A	B	C
B 6244	66.4	42.4	16.0
B 6254	68.8	40.9	16.0
B 6304	59.9	24.8	16.0

Pistons	B 6244/6254	B 6304
Piston diameter (D) (measured at right angles to gudgeon (piston) pin hole, distance C from lower edge)		
• Standard (C-marked)mm	80.98 - 80.99	82.98 - 82.99
(D-marked)mm	80.99 - 81.00	82.99 - 83.00
(E-marked)mm	81.00 - 81.01	83.00 - 83.01
(G-marked)mm	81.02 - 81.03	83.02 - 83.03
Piston clearancemm	0.010 - 0.030	0.010 - 0.030
Piston weightmm	375/380 ± 5	360 ± 5
• Max weight difference between pistons in same engineg	10	10
Piston rings, axial clearance (measured with ring on piston)		
• upper comp. ringmm	0.050 - 0.085	0.050 - 0.085
• lower comp. ringmm	0.030 - 0.065	0.030 - 0.065
• oil scraper ringmm	0.020 - 0.055	0.020 - 0.055
Piston rings, width		
• upper comp. ring, -1994mm	1.50	1.50
1994-mm	1.20	1.20
• lower comp. ringmm	1.75	1.75
• oil scraper ringmm	3.00	3.00
Piston rings, gap (measured in cylinder)		
• upper comp. ringmm	0.20 - 0.40	0.20 - 0.40
• lower comp. ringmm	0.20 - 0.40	0.20 - 0.40
• oil scraper ringmm	0.25 - 0.50	0.25 - 0.50
Gudgeon (piston) pin		
• diametermm	23.00 ± 0.004	23.00 ± 0.004
• fit in connecting rod Light thumb pressure (close running fit)		
• fit in piston Thumb pressure (push fit)		

Valve system	Intake	Exhaust
Valves		
Diameter, discmm	31.00 ± 0.15	27.00 ± 0.15
stemmm	6.97 ± 0.015	6.97 ± 0.015
Lengthmm	104.05 ± 0.18	103.30 ± 0.18
Matching surface angle°	44.5	44.5
Edge height, new valvemm	1.5	1.5
min. after machiningmm	1.2	
Max. machining valve stemmm	0.4	0.4
Valve seats		
Diameter, standardmm	32.61	28.61
oversizemm	33.11	29.11
Matching surface angle°	45.0	45.0
Reduction angle, upper°	15.0	15.0
lower°	60.0	60.0
Widthmm	1.4 - 1.8	1.8 - 2.2
Valve guides		
Diameter, standardmm	12.00	12.00
oversize 1mm	12.10	12.10
2mm	12.20	12.20
Clearance, valve stem-guide (measured with new valve)mm	0.03 - 0.06	0.04 - 0.07
maxmm	0.15	0.15
Height above face of cyl. headmm	13.0	13.0
Valve springs		
External diametermm	27.90 ± 0.20	27.90 ± 0.20
Internal diametermm	20.10 ± 0.20	20.10 ± 0.20
Valve spring lengthmm	43.0	43.0
under loadmm/N	34.0 / 270 ± 15	34.0 / 270 ± 15
"mm/N	24.5 / 670 ± 32	24.5 / 670 ± 32

Timing gears		B 6244/B 6254, B 6304 F2	B 6304 F/G
Camshaft			
Marking			
Intake	PM I	PC I	
Exhaust	PH E	PC E	
Lift height	mm 7.95	9.00	
Axial clearance	mm 0.05 - 0.20	0.05 - 0.20	
Camshaft belt			
Belt tension, measured with 998 8500			
Width 21 mm, -1993	units	3.5 - 4.6	
23 mm, 1993-1994	units	3.0 - 4.0	
28 mm, 1995	units	2.5 - 3.5	
Crankshaft mechanism			
Crankshaft			
Out-of-true, max.	mm 0.04	0.04	
Crankshaft, axial clearance	mm 0.08 - 0.19	0.08 - 0.19	
Main bearing, radial clearance	mm 0.019 - 0.043	0.019 - 0.043	
Main bearing journals			
Diameter	mm 65.00	65.00	
Out-of-round, max.	mm 0.004	0.004	
Taper, max.	mm 0.004	0.004	
Connecting rod bearing journals			
Diameter	mm 50.00	50.00	
Out-of-round, max.	mm 0.004	0.004	
Taper, max.	mm 0.004	0.004	
Connecting rods			
Diameter	mm 53.0	53.0	
Out-of-round, max.	mm 0.006	0.006	
Axial clearance at crankshaft	mm 0.15 - 0.45	0.15 - 0.45	

Tightening torque	Nm	ft. lb
Cylinder head (stage 1)	20	15
(stage 2)	60	44
(stage 3)	130°	130°
Bolts should be tightened in sequence from the centre outwards		
Middle section M10 (stage 1)	20	15
M10 (stage 2)	45	33
M 8 (stage 3)	24	18
M 7 (stage 4)	17	13
M10 (stage 5)	90°	90°
Bolts should be tightened in sequence from the centre outwards		
Connecting rod bearing caps (stage 1)	20	15
(stage 2)	90°	90°
Vibration damper (centre nut)	300	222
Flange bolt, vibration damper (stage 1)	35	26
(stage 2)	60°	60°
Flywheel (stage 1)	45	33
(stage 2)	65°	65°
Carrier plate (stage 1)	45	33
(stage 2)	50°	50°
Camshaft carrier cover	17	13
Camshaft gear	20	15
Tensioning pulley, camshaft belt, -1993	39	29
1994-	30	22
Damper unit, "	24	18
Idler pulley, "	24	18
Fuel distributor manifold (stage 1)	10	7
(stage 2)	75°	75°
Coolant pump	17	13
Stud, manifold (in cylinder head)	20	15
(on front pipe)	35	26
Exhaust manifold - cylinderhead	25	18
- heatshield	15	11
Intake manifold	20	15

	Nm	ft. lb
Oil sump	17	13
Plug, oil sump	38	28
Oil suction pipe	17	13
Oil cooler, connection to block	17	13
Oil trap	15	11
Nipple, oil filter	40	30
Oil pressure switch	25	18
Engine speed (RPM) sensor	8	6
Knock sensor (KS)	20	15
Temp. sensor, rear edge of cyl. head	20	15
Temp. sensor, thermostat	10	7
Plug, resetting tool	38	28
Spark plugs	25	18

Group 22 Lubrication system

General

Oil capacity and quality, see page 16.

Oil pressure with warm engine and new oil filter

Engine speed r/s (rpm)	Oil pressure MPa	
	-1993	1993-
12.5 (750)	0.10	0.10
50 (3000)	0.30	0.30
reduction valve opens at	0.50	0.60
max. pressure	0.70	0.70
Spring, reduction valve	-1993	1993-
number of turns	26	
outside diameter	9.5	
length, unloaded	82.13	76.22
loaded to a length of 56.1 mm	52 ± 4	59 ± 4
39.9 mm	85 ± 8	108 ± 8

Group 23 MFI Fuel system

Motronic 1.8 & 4.4

CO-content, idling speed

B 6244 F *, nominal value for CO-content	%	0.4 - 0.8
B 6254 F *, nominal value for CO-content	%	0.4 - 0.8
B 6254 G, nominal value for CO-content	%	0.5 - 2.0
adjustment value for CO-content	%	1.0
B 6304 F *, nominal value for CO-content	%	0.4 - 0.8
B 6304 G, nominal value for CO-content	%	0.5 - 2.0
adjustment value for CO-content	%	1.0
Idling speed	r/s (rpm)	12.5 (750)

* CO-content and idling speed cannot be adjusted, only checked.

Heated oxygen sensor (HO2S) connected, measured upstream of three-way catalytic converter (TWC).

Automatic: Gear lever must be in P during the check, and handbrake applied.

Components

Control modules (Motr. 1.8)	Volvo	Bosch
B 6244/6254 F, 1995, auto (with airpump)	91 35 686	0 261 203 452
B 6244/6254 F, 1995, auto (with airpump)	12 75 396	0 261 203 452
B 6254 F, early 1995, man (with air pump)	91 35 687	0 261 203 453
B 6254 F, late 1995, man (with air pump)	12 75 397	0 261 203 453
B 6254 G, early 1995	91 46 484	0 261 203 455
B 6254 G, late 1995	12 75 337	0 261 203 455
B 6304 F, -1991	35 17 623	0 261 200 362
B 6304 F, 1991 - early 1992	35 47 841	0 261 200 528
B 6304 F, 1992, (EGR, EL)	35 31 061	0 261 200 507
B 6304 F, 1992-1993, (EGR, EL)	68 42 498	0 261 200 996
B 6304 F, late 1992	91 35 010	0 261 200 528
B 6304 F, 1993-1994	68 42 234	0 261 200 517
B 6304 F, 1994	91 46 325	0 261 203 324
B 6304 F, 1994, (EGR, EL)	91 35 688	0 261 200 996
B 6304 F, early 1995, (with airpump)	91 35 171	0 261 203 450
B 6304 F, late 1995, (with air pump)	12 75 398	0 261 203 450
B 6304 F, 1995, (without air pump)	91 35 800	0 261 203 451
B 6304 G, 1992	35 47 443	0 261 200 516
B 6304 G, 1993-1994	68 42 235	0 261 200 997
B 6304 G, 1995	91 46 485	0 261 203 454

Control modules (Motr. 4.4)	Volvo	Bosch
B 6244 F, 1996, auto	91 46 468	0 261 203 657
B 6244 F, 1997, man	91 86 182	0 261 203 854
B 6254 F, 1996, man, OBD	12 75 356	0 261 204 001
B 6254 F, 1996, man, OBD, immobilizer	12 75 357	0 261 204 002
B 6254 F, 1996, auto, OBD	91 46 468	0 261 203 657
B 6254 F, 1996, auto, OBD, immobilizer	12 75 051	0 261 203 653
B 6254 F, 1996, auto, OBD2	91 46 469	0 261 203 656
B 6254 F, 1997, man, OBD, immobilizer	91 86 184	0 261 204 002
B 6254 F, 1997, auto, OBD, immobilizer	91 86 182	0 261 203 854
B 6254 G, 1996, man, OBD	91 46 471	0 261 203 659
B 6254 G, 1996, man, OBD, immobilizer	94 34 330	
B 6254 G, 1997, man, OBD, immobilizer	91 86 275	0 261 204 121
B 6304 F1, 1996, auto, OBD	91 46 467	0 261 203 655
B 6304 F1, 1996, auto, OBD, immobilizer	12 75 050	0 261 203 854
B 6304 F2, 1996, auto, OBD2	91 46 408	0 261 203 654
B 6304 F1, 1997, auto, OBD, immobilizer	91 86 181	0 261 203 854
B 6304 F2, 1997, auto, OBD2	12 70 422	0 261 203 451
B 6304 G, 1996, auto, OBD	91 46 470	0 261 203 658
B 6304 G, 1996, auto, OBD, immobilizer	94 34 329	0 261 204 329
B 6304 G, 1997, auto, OBD, immobilizer	91 86 273	0 261 204 120
Mass air flow (MAF) sensor	Volvo	Bosch
B 6304 F, -1994	35 17 569	0 280 213 012
B 6304 G, -1994	35 17 763	0 280 213 020
B 6244/6254/6304 F, 1995	12 71 861	0 280 213 025
B 6254 G, 1995	12 71 862	0 280 213 026
B 6244/6254/6304 F/G, 1995	91 46 483	0 280 217 503
Resistance between connectors 2 and 3	Ω 2.5 - 4.0	
Pressure regulator	Volvo	Bosch
B 6304 F/G, - early type 1991	35 17 064	0 280 160 294
B 6304 F/G, late type 1991-1994		
B 6244/6254/6304, 1995-	35 47 653	0 280 160 731
System pressure	kPa(kp/cm ²) 300 (3.0)	

Injectors	Volvo	Bosch
B 6304 F/G, -1992	35 17 572	0 280 150 762
B 6304 F, (EGR) 1993-1994	35 07 708	0 280 155 702
B 6304 F/G, (without EGR), 1993-1995	12 71 698	0 280 155 733
B 6244/6254 F/G, 1995	12 75 194	0 280 155 746
B 6244/6254/6304 F/G, 1996		
Injection quantity	g/min 150	
..... (approx. volume in cm ³ /min)	= 200	
at system pressure	kPa(kp/cm ²) 300 (3.0)	
Idle air control (IAC) valve	Volvo	Bosch
B 6304 F/G, -1994	35 17 886	0 280 140 527
B 6244/6254/6304, 1995-	35 31 803	0 280 140 542
Resistance between connectors 1 and 2	Ω 10 - 14	
2 and 3	Ω 10 - 14	
Throttle position (TP) sensor	Volvo	Bosch
B 6244/6254/6304 F/G	13 36 385	0 280 122 001
Resistance, shut throttle	kΩ 1.0	
open throttle	kΩ 2.6	
RPM sensor	Volvo	VDO/SIEMENS
B 6304 F/G, -1992	13 89 254	K 340.804/051/001
B 6304 F/G, 1992	35 07 941	K 340.804/051/002
B 6304 F/G, 1993-1994		
B 6244/6254/6304 F, 1995-	35 47 699	S 102 460 001
Resistance of coil	Ω 240 - 400	
Camshaft position (CMP) sensor	Volvo	Bosch
B 6304 F/G, -1994	13 83 966	0 232 101 009
B 6244/6254/6304 F/G, 1995-	91 46 108	0 232 101 023
Knock sensor (KS)	Volvo	Bosch
B 6244/6254/6304 F/G	13 67 644	0 261 231 046

Engine coolant temperature (ECT) sensor		Volvo	SWF
B 6304 F/G, -1993	13 62 643	601.605	
1993			
B 6244/6254/6304 F/G, 1995	68 49 350		
Resistance at 0°C (32°F)	Ω 7 300		
+ 20°C (68°F)	Ω 2 800		
+ 40°C (104°F)	Ω 1 200		
+ 80°C (176°F)	Ω 300		
+100°C (212°F)	Ω 150		
Heated oxygen sensor (HO2S)		Volvo	Bosch
B 6304 F/G -1994	35 31 251	0 258 003 119	
B 6244/6254/6304 F, front, 1995	12 71 955	0 258 003 592	
B 6244/6254/6304 F, rear, 1996	12 71 986	0 258 062 128	
B 6244/6254/6304 F, rear, 1996	91 79 101	0 258 003 603	
Resistance of preheating resistor:			
cold probe (+ 20°C (68°F))	Ω 3		
hot probe (above + 350°C (668°F))	Ω 13		
Tightening torque	Nm (ft lb) 45 (33)		
Lubricant, Volvo P/N 11 61 408, should be applied all along the probe's threaded section.			
Fuel pump (FP) -1994		Volvo	Bosch
B 6304 F/G, -1993	13 89 449	0 580 464 039	
1993-1994	91 42 044	0 580 464 068	
Pump capacity at system pressure			
300 kPa and + 20°C (68°F)			
- 12V	litres/hour 130		
- 11V	litres/hour 108		
- 10V	litres/hour 86		
Current consumption at system pressure			
300 kPa, + 20°C (68°F) and 12V:			
maximum	amp 6.5		
Resistance	Ω 1.0		

Fuel pump (FP) 1995-		Volvo	Bosch
B 6244/6254/6304 F/G, 1995-	91 35 418	0 580 453 033	
Pump capacity at system pressure			
300 kPa and + 20°C (68°F)			
- 12V	litres/hour 160		
- 11V	litres/hour 145		
- 10V	litres/hour 128		
Current consumption at system pressure			
300 kPa, + 20°C (68°F) and 12V:			
maximum	amp 8.5		
Resistance	Ω 1.0		
Prepump		Volvo	VDO/AC
B 6304 F/G, -1992	35 01 928	92151034	
B 6304 F/G, 1993-1994	35 17 845	644 3270	
Current consumption	amp 3 - 4		
Fuel filter		Volvo	Bosch/Knecht
B 6304 F/G, -1991	13 89 450	0 450 905 601	
B 6304 F/G, 1992-1994	68 42 033	0 450 905 200	
B 6244/6254/6304 F, 1995-	13 89 562	71339173/FB821/4	
Filters particles down to	mm 0.002		
Tightening torque	Nm(ft lb) 20 - 35 (15 - 26)		
Main relay		Volvo	
B 6304 F/G, -1994	35 44 322		
Resistance of coil	Ω 90		
B 6244/6254/6304 F/G, 1995-	91 28 164		
Resistance of coil	Ω 80		
Relay, fuel pump		Volvo	
B 6304 F/G -1993	13 62 914		
Resistance of coil	Ω 80		
B 6244/6254/6304 F/G, 1994	91 30 270		
1995-	91 30 269		
Resistance of coil	Ω 100		

Relay, engine cooling fan (FC)

B 6304 F/G

Resistance of coil Ω

Volvo

35 23 872

80

Group 26 Cooling system

General

Use Genuine Volvo **green** coolant mixed 50/50 with **clean** water. This mixture helps prevent **corrosion** and damage by **freezing**.

- Never top up with only water. Use Genuine Volvo coolant mixed 50/50 with clean water.
- The coolant does not normally need to be changed. In the case of major repairs requiring the draining of coolant, fresh coolant must be used since the drained coolant will have been subjected to oxidation and will contain dirt particles.
- Clean the cooling system when changing the coolant.

Engine type	Approx volume litres	Expansion tank. Pressure valve opens at		Thermostat °C (°F)		
		Pos. pressure kPa	Neg. pressure kPa	Marking	Starts opening	Fully open
B 6244 F	10.7	150	7	87	87 (189)	102 (216)
B 6254 F/G	10.7	150	7	87	87 (189)	102 (216)
B 6304 F/G	10.7	150	7	87	87 (189)	102 (216)

Group 28 Ignition system

Type	Motronic 1.8, Motronic 4.4
Firing order	1 - 5 - 3 - 6 - 2 - 4
Ignition setting at 12.5 r/s (750 r/min)	
-1994: all models	° 5
1995: B 6304 F/G (excl. US/CDN)	° 5
B 6244/6254 F, B 6304 (US/CDN)	° 10
1996-: B 6244/6254/6304 F	° 9
B 6254 G	° 10
B 6304 G	° 5

Components

Power amplifier	Volvo	Bosch
B 6244/6254/6304 F/G	13 67 776	0 227 100 203
Ignition coil	Volvo	NipponDenso
B 6304 F/G, - 1994	35 31 300	029 700-7260
B 6304 F/G, 1994,		
B 6244/6254/6304 F/G, 1995	91 35 689	029 700-7920
B 6244/6254/6304 F/G, early 1996	91 46 776	029 700-7990
B 6244/6254/6304 F/G, late 1996	12 75 971	029 700-8120
Resistance of primary coil (between terminals 1 and 15)	Ω 0.5	
Spark plugs	Volvo*	Volvo**
B 6244/6254/6304 F/G, normal driving	35 17 980	271 636-3
for high-speed driving (not USA,CDN) ..	35 17 629	271 427-7
Make / designation,	normal/high-speed	Bosch
Make / designation	normal/high-speed	Champion
Electrode gap	mm 0.7 - 0.8	RC 9 YC/RC 7 YC
Tightening torque, not oiled	Nm(ft lb)	25 (18)
* P/N ** kit no.		

Section 2 B 6244, B 6254, B 6304 Engine

Relay, ignition	Volvo	
B 6304 F/G, -1994.....	35 44 322	
B 6244/6254/6304 F/G, 1995-.....	91 30 269	
Knock sensor (KS)	Volvo	Bosch
B 6244/6254/6304 F/G	13 67 644	0 261 231 046

Section 2 D 24, D 24 T, D 24 TIC Engines

Group 20 General

Performance, compression ratio

Engine type	Comp. ratio	Output		Max. torque	
		kW at r/s	hp* (bhp) at rpm	Nm at r/s	kpm(ft.lb) at rpm
D 24	23:1	60/78	82/4700	145/33	14.8/2000
D 24 T	23:1	80/80	109/4800	205/42	20.9/2500
D 24 T (EGR)	23:1	79/80	108/4800	190/40	19.4/2400
D 24 TIC	23:1	90/80	122/4800	235/40	24.0/2400
D 24 TIC (EGR)	23:1	90/77	122/4600 (121/4600)	240/42	24.5/2500 (177/2500)

* Metric horsepower.

Other general data

No. of cylinders	6
Cylinder bore	mm 76.5
Stroke	mm 86.4
Displacement	dm ³ (litres) 2.383
Firing order	1 - 5 - 3 - 6 - 2 - 4
Compression, new	MPa 3.2
min	MPa 2.4
max. deviation between cylinders	MPa 0.8
Weight, without turbocharger (TC)	kg 200
with turbocharger (TC)	kg 210

Group 21 Engine block

Cylinder head

Max. warp, along	mm 0.5
across	mm 0.2

Note! Do not surface-grind cylinder head.
It should be replaced if there is excessive warp.

Gasket, cylinder head

Three alternative gaskets are used depending on the piston height above the cylinder block.

Piston height above cylinder block surface in mm.		Gasket, no. of holes (thickness in mm)	
D 24, D 24 T, D 24 TIC	D 24 TIC (EGR) 1993-	D 24, D 24 T, D 24 TIC	D 24 TIC (EGR) 1993-
0.67 - 0.80	0.662 - 0.870	1 (1.4)	1 (1.50)
0.81 - 0.90	0.871 - 0.900	2 (1.5)	2 (1.55)
0.91 - 1.02	0.901 - 1.019	3 (1.6)	3 (1.60)

Cylinder block			
Dimension	Marking (honing group)	Piston diameter (mm)	Cylinder diameter (mm)
Standard		76.48	76.51
Enlarge 1 (0.25 mm)	676	76.73	76.76
Enlarge 2 (0.50 mm)	701	76.98	77.01
Enlarge 3 (1.00 mm)	751	77.48	77.51
Max. wear (compared with nominal diameter)	mm 0.04		

Pistons**Piston diameter**

measured at right angle to gudgeon (piston) pin hole,
15 mm from lower edge.

See the table on previous page.

Piston clearance

new mm 0.03 - 0.05

max. mm 0.13

Max. wear

(compared with nominal diameter) mm 0.04

Piston weight

• Max. weight deviation between
pistons in same engine g 12

Piston rings, axial clearance

(measured with ring on piston)

• upper comp. ring, new mm 0.11 - 0.14

max. mm 0.20

• lower comp. ring, new mm 0.07 - 0.10

max. mm 0.20

• oil scraper ring, new mm 0.03 - 0.07

max. mm 0.15

Piston rings, gap

(measured in cylinder)

• upper comp. ring, new mm 0.30 - 0.50

max. mm 1.00

• lower comp. ring, new mm 0.30 - 0.50

max. mm 1.00

• oil scraper ring, new mm 0.25 - 0.50

max. mm 1.00

Gudgeon (piston) pin

• fit in connecting rod Light thumb pressure (close running fit)

• fit in piston Thumb pressure (push fit)

Valve system**Valve clearance (mm)***

Intake				Exhaust			
Check		Adjustment		Check		Adjustment	
hot	cold	hot	cold	hot	cold	hot	cold
0.20 - 0.30	0.15 - 0.25	0.25	0.20	0.40 - 0.50	0.35 - 0.45	0.45	0.40

Adjustment washers available in sizes from 3.00 to 4.25 in intervals of 0.05 mm.

* D 24 TIC with EGR has hydraulic tappets.

Valves	Intake	Exhaust
• diameter, disc mm	36.00	31.00
stem mm	7.97	7.95
• Height, disc edge, min. after machining mm	0.5	*
• matching surface angle °	44.5	45.0
* The exhaust valves are stellite coated and must not be machine-ground.		
Valve seats		
Diameter, standard mm	37.090 - 37.105	33.090 - 33.105
oversize 1 mm	37.290 - 37.305	33.290 - 33.305
Matching surface angle °	45.0	45.0
Reduction angle, upper °	15	15
Width mm	2.0	2.4
Thread mm	0.074 - 0.105	0.074 - 0.105

Valve springs							
Inner valve spring				Outer valve spring			
Length in mm		Load in N		Length in mm		Load in N	
1	2	1	2	1	2	1	2
33.9	32.9	0	0	40.2	37.4	0	0
28.6	26.4	67 - 77	87 - 103	32.6	30.4	167 - 185	193 - 217
18.3	17.4	209 - 231	223 - 247	22.3	21.4	433 - 479	495 - 535

1: D 24, D 24 T, D 24 T (EGR), D 24 TIC
2: D 24 TIC (EGR)1993-

Valve guides	Intake valve	Exhaust valve
Interior diametermm	8.000 - 8.015	8.000 - 8.015
Height above upper face of cylinder headmm	40.1 - 40.5	40.1 - 40.5
Clearance, valve stem-guide (measured with new valve)		
newmm	0.3	0.3
max.mm	1.3	1.3

Timing gears	
Toothed belts	
Belt tension (measured with gauge 999 5197)	
nominal value	12 - 13
adjustment value	12.5
Camshaft	
Max. lift height, intake, D 24 TIC (EGR) 1993-.....mm	8.6
Others	8.5
exhaust	9.0
Radial clearance, new	0.05 - 0.10
Axial clearance, max.mm	0.15

Crankshaft assembly

Crankshaft

Out-of-true, max. deviation, two middle main bearings	mm	0.06
others	mm	0.04
Crankshaft, axial clearance, new	mm	0.07 - 0.18
max.mm		0.25
Main bearing, radial clearance, new	mm	0.016 - 0.075
max.mm		0.16
Crankshaft bearing, radial clearance, new	mm	0.015 - 0.062
max.mm		0.12
Crankshaft bearing, axial clearance, max.mm		0.40

Main bearing journals

Diameter, standard	mm	58.00
undersize 1	mm	57.75
undersize 2	mm	57.50
undersize 3	mm	57.25
Out-of-round, max.mm		0.03
Taper, max.mm		0.05

Connecting rod bearing journals

Diameter, standard	mm	47.80
undersize 1	mm	47.55
undersize 2	mm	47.30
Out-of-round, max.mm		0.03
Taper, max.mm		0.05

Connecting rods

Axial clearance at crankshaft, max.mm		0.40
Max. weight difference between connecting rods in the same engine	g	6

Flywheel

Axial runout, max per 150 mm diameter	mm	0.05
---	----	------

Glow plugs

Part number	12 57 889
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Tightening torques

Apply to oiled fasteners.

	Nm	ft. lb
Cylinder head (stage 1)	40	30
(stage 2)	60	44
(stage 3)	75	55
(stage 4)	180°	180°
Bolts should be tightened in sequence from the centre outwards.		
Main bearing cap	65	48
Connecting rod cap (stage 1)	30	22
(stage 2)	180°	180°
Camshaft cap	20	15
Camshaft pulley, front, D 24 TIC (EGR) 1993-	100	74
Others	45	33
rear	100	74
Pulley, crankshaft, (vibration damper)		
centre bolt (tighten with special tool)	350	258
socket head bolts	20	15
Flywheel/carrier plate		
(use new bolts)	75	55
Glow plugs	22	16

Group 22 Lubrication system**General**

Oil volume and quality, see page 16.

Oil pressure at + 60°C (176°F) oil temperature

engine speed r/s (rpm)	oil pressure, min. MPa (kp/cm ²)
33.3 (2000)	200 (2.0)

Oil pump

Reduction valve opens at	kPa	600 - 700
Reduction valve spring		
length at different loads	mm/N	53.5/ 0
.....	mm/N	36.0/ 152 - 162
.....	mm/N	28.0/ 229

Oil pressure sensor

Limit, warning lamp switches off at kPa 15 - 45

Group 25 Intake and exhaust systems

Turbocharger (TC)	
Charge pressure	
D 24 T, at 3000 rpm (full load)	kPa(kp/cm ²) 70 - 77 (0.70 - 0.77)
Safety valve (on intake manifold), opening pressure approx.	kPa(kp/cm ²) 80 - 85 (0.80 - 0.85)
D 24 TIC, at 2400 rpm (full load)	kPa(kp/cm ²) 85 - 95 (0.85 - 0.95)
Over-pressure protector, opening pressure approx.	kPa(kp/cm ²) 110 - 130 (1.10 - 1.30)
Tightening torques	
Use lubricant (P/N 11 61 408-8) on the fasteners below.	
Attachment bolts, front exhaust pipe - turbocharger (TC), D 24 T Nm(ft lb)	25 (18)
D 24 TIC Nm(ft lb)	20 (15)
Attachment bolts, turbine housing Nm(ft lb)	20 (15)
compressor housing Nm(ft lb)	18 (13)
rear housing (with bypass valve) D 24 T Nm(ft lb)	20 (15)
D 24 TIC Nm(ft lb)	25 (18)
Attachment nuts turbocharger (TC) compressor - manifold Nm(ft lb)	60 (45)
D 24 TIC: Lock-nut, pull-rod, wastegate Nm(ft lb)	6 (4)
D 24 TIC: Attachment nuts, wastegate Nm(ft lb)	6 (4)

Group 26 Cooling system

General

Use Genuine Volvo **green** coolant, mixed 50/50 with **clean** water. This mixture helps prevent **corrosion** and damage by **freezing**.

- Never top up with only water. Use Genuine Volvo coolant mixed 50/50 with clean water.
- The coolant does not normally need to be changed. In the case of major repairs requiring the draining of coolant, fresh coolant must be used since the drained coolant will have been subjected to oxidation and will contain dirt particles.
- Clean the cooling system when changing the coolant.

Engine type	Approx. volume litres	Expansion tank. Pressure valve opens at		Thermostat °C (°F)			
		Pos. pressure kPa	Neg. pressure kPa	Marking	Starts opening	Fully open	Opening dim., min.
D 24	9.5	150	10	87	87 (188)	102 (216)	8
D 24 T	11.0	150	10	87	87 (188)	102 (216)	8
D 24 TIC	11.0	150	10	87	87 (188)	102 (216)	8

Drive belts

Generator/radiator fan	HC 47 cog x 1150
Power steering pump	HC 38 cog x 1013
Compressor (A/C), -1992	HC 50 cog x 913
1993-	HC 50 cog x 900

Tightening torque

Radiator fan	Nm(ft lb) 9 (6.6)
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Section 3 Electrical system

Group 31 Battery

System voltage 12 V

Ground connection Negative terminal

Battery capacity

Volvo P/N	Cold start current* CCA SAE	Capacity (DIN)	Reserve capacity* RC SAE (DIN)	Recommended charge current
-1994				
35 15 893,				
35 15 230	440	50 Ah	85	4 A
35 15 895,				
35 15 231	520	60 Ah	100	5 A
35 15 897,				
35 15 232	600	70 Ah	125	6 A
1995-				
91 28 862	420	45 Ah	75	4 A
91 28 863	520	60 Ah	90	5 A
91 28 864	600	65 Ah	115	6 A

* **Cold start current (CCA, SAE)** is the discharge current which a battery can supply for 30 seconds at a temperature of -18°C (0°F) without falling below 7.2 V .

* **Reserve capacity (RC, SAE)** is the time it takes at a temperature of $+27^{\circ}\text{C}$ (81°F), with a discharge current of 25 A, to reduce the voltage of a fully-charged battery to 10.5 V .

Group 32 Generators

Generators

Type	Bosch K1 14V 55 A 20	Bosch K1 14V 65 A 20	Bosch N1 14V 31/80 A	Bosch N1 14V 34/90 A
Manuf. P/N.....	0 120 488 131 - 260	0 120 488 230 - 231 - 262	0 120 469 787 - 789 - 793 - 935 - 995 - 993 - 997	0 120 469 916
Nominal currentA	55	65	80	80
Nominal outputW	770	910	1120	1120
Max. speedr/s(rpm)	250(15000)	250(15000)	250(15000)	250(15000)
Diameter, slip rings,				
newmm	28.0	28.0	28.0	28.0
min.mm	26.8	26.8	26.8	26.8
Max. permitted radial runout				
slip ringsmm	0.03	0.03	0.03	0.03
rotor bodymm	0.05	0.05	0.05	0.05
Brushes,				
spring force N(kp)	3-4(0.3-0.4)	3-4(0.3-0.4)	3-4(0.3-0.4)	3-4(0.3-0.4)
min. lengthmm	5	5	5	5
Tightening torque				
attachment screws.Nm(ft lb)	4 (3)	4 (3)	4 (3)	4 (3)
pulley nutNm(ft lb)	40(30)	45-55(33-40)	45-55(33-40)	45-55(33-40)
Test values				
Resistance,				
rotor windingΩ	3.4-3.7	2.8 ± 10%	2.9	2.9
stator windingΩ	0.14-0.15*	0.1 ± 10%*	0.09*	0.09*
Amperage at 14V				
(min. value)A at r/s (rpm)	36/33.3(2000)	23/25(1500)	31/25(1500)	31/25(1500)
.....A at r/s (rpm)	47/50.0(3000)	44/35(2100)	80/100(6000)	90/100(6000)
.....A at r/s (rpm)	52/66.7(4000)	65/100(6000)		

* /phase. A low-range ohmmeter should be used.

Generators

Type	Bosch N1 14V 31/100 A	Bosch NC 14V 55/100 A	Bosch NC 14V 60/120 A
Manuf. P/N.....	0 120 468 010 -016	0 120 465 018 0 123 213 007 0 123 545 002	0 120 465 006 0 120 510 348 0 123 545 003
Nominal currentA	100	100	120
Nominal outputW	1400	1400	1680
Max. speedr/s(rpm)	250(15000)	300(18000)	300(18000)
Diameter, slip rings,			
newmm	28.0	15.0	15.0
min.mm	27.0	14.0	14.0
Max. permitted radial runout			
slip ringsmm	0.03	0.03	0.03
rotor bodymm	0.05	0.03	0.05
Brushes,			
spring force N(kp)	3-4(0.3-0.4)	3-5(0.3-0.5)	3-5(0.3-0.5)
min. lengthmm	5	5	5
Tightening torque			
attachment screws.Nm(ft lb)	4 (3)	4(3)	4 (3)
pulley nutNm(ft lb)	45-55(33-40)	45-55(33-40)	45-55(33-40)
Test values			
Resistance,			
rotor windingΩ	2.6	2.6	2.6
stator windingΩ	0.05*	0.03*	0.02*
Amperage at 14V			
(min. value)A at r/s (rpm)	31/25(1500)	55/30(1800)	60/30(1800)
.....A at r/s (rpm)	100/100(6000)	100/100(6000)	120/100(6000)

* /phase. A low-range ohmmeter should be used.

Generators

Type	NipponDenso 14V 80 A	NipponDenso 14V 100 A
Manuf. P/N.....	100 211-8370	100 211-8620 100 211-8630
Max. current.....A	80	100
Max. output.....W	1120	1400
Max. speed.....r/s(rpm)	300(18000)	300(18000)
Diameter, slip rings, new.....mm	14.4	14.4
min.....mm	12.8	12.8
Brushes, spring force, max/min.....N	3.23/1.37	3.23/1.37
min. length.....mm	5.5	5.5
Tightening torque attachment screws.....Nm(ft lb)	4.5(3.3)	4.5(3.3)
pulley nut.....Nm(ft lb)	115(85)	115(85)
Test values		
Resistance, rotor winding..... Ω	2.9	2.3
stator winding..... Ω	0.04*	0.03*
Amperage at 13.5V (min. value).....A at r/s (rpm)	52/33.3 (2000) 80/83 (5000) 86/100 (6000)	55/3.33 (2000) 100/83 (5000) 108/100 (6000)

* /phase. A low-range ohmmeter should be used.

Charge regulator

Make	Bosch	NipponDenso
Manuf. P/N.....	0 197 311 022, -213, -232, -234, -239	126 000-1130 126 000-1320
Conditions	* **	* **
Battery charge.....%	75 100	75 100
Air temperature.....°C	+ 25	+ 25
Temperature, warm regulator.....°C	+ 60 - 80	+ 60 - 80
Test values		
Generator speed.....r/s(rpm)	100(6000)	100(6000)
Engine speed.....r/s(rpm)	42(2500)	42(2500)
Generator load.....A	30-50***	30-50***
Regulating voltage, between B+ and D- on the generator.....V	13.8 - 14.6	14.1 - 14.9
Regulator tolerance		
Load the generator with rated output x 0.85		
Permitted voltage drop compared with previous reading.....V	0 - 0.3	0 - 0.3

* In car

** In bench test

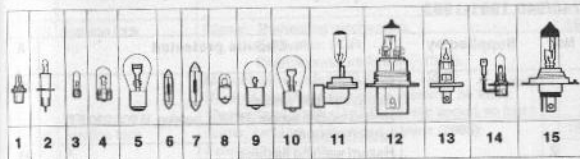
*** This load is achieved when the engine is running.

Group 33 Starter motor

Type	Bosch DW 12V 1.4 kW	Bosch DW 12V 1.7 kW
Manufacturer P/N	0 001 108 088 -089 -090	0 001 110 068 -068
Direction of rotation: clockwise		
Test values, mechanical		
Armature end clearance	mm 0.05 - 0.40	0.05 - 0.40
Frictional torque		
armature brake	Nm 0.9 - 1.4	0.9 - 1.5
..... (kpcm)	(9 - 14)	(9 - 15)
Distance from		
pinion to ring gear	mm 2.0 - 3.0	2.0 - 3.0
modulus	mm 2.11	2.11
clearance torque	Nm 0.12 - 0.18	0.12 - 0.18
..... (kpcm)	(1.2 - 1.8)	(1.2 - 1.8)
Backlash	mm 0.3 - 0.6	0.3 - 0.6
Min. commutator		
diameter	mm 31.2	31.2
Carbon brushes		
min. length	mm 4.5	6.0
Max. runout		
armature	mm 0.05	0.05
commutator	mm 0.05	0.01
Test values, electrical		
Unloaded starter motor	V 11.5	11.2
..... max. A	75	95
..... min. r/s(rpm)	48(2900)	46(2800)
Locked starter motor	V 4.5	3.8
..... A	625 - 800	650 - 840
Lowest cut-in voltage		
control solenoid	V 7.3	7.3

Type	Bosch DW 12V 1.7 kW	Bosch EW 12V 2.2 kW
Manufacturer P/N	0 001 115 002	0 001 218 017 -130
Direction of rotation: clockwise		
Test values, mechanical		
Armature end clearance	mm 0.20 - 0.70	0.05 - 0.30
Frictional torque		
armature brake	Nm 0.6 - 1.1	1.0 - 1.5
..... (kpcm)	(6 - 11)	(10 - 15)
Distance from		
pinion to ring gear	mm 0.7 - 4.5	2.0 - 3.0
modulus	mm 2.11	2.11
clearance torque	Nm 0.14 - 0.22	0.27 - 0.35
..... (kpcm)	(1.4 - 2.2)	(2.7 - 3.5)
Backlash	mm 0.3 - 0.5	0.3 - 0.6
Min. commutator		
diameter	mm 32.7	28.9
Carbon brushes		
min. length	mm 10.7	7.0
Max. runout		
armature	mm 0.05	0.05
commutator	mm 0.01	0.01
Test values, electrical		
Unloaded starter motor	V 11.6	10.5
..... max. A	100	160
..... min. r/s(rpm)	52 (3140)	70 (4200)
Locked starter motor	V 4.0	3.0
..... A	750 - 850	720 - 950
Lowest cut-in voltage		
control solenoid	V 7.4	7.8

Group 35 Lighting



3500290A

Bulbs	Rating	Socket type	USA/ CDN	No
Headlights, EU/OS, 940, 960 -1995....	60/55 W	15 P 43t-38 (H4)		2
960 1995-....	55 W	13 P 14s (H1)		4
USA/CDN, -1994max	70/50 W	13 Semi-sealed	9004/HB1	2
1995-, outer....max	55 W	11	HB4	2
inner....max	65 W	11	HB3	2
Parking light.....	5 W (4 cp)	5 BA 15s		2
Parking light/ Turn signal, front, USA/CAN	(24/2.2 cp)	4 BAY 15d	1157 NA	2
Turn signal, front	21 W	10 BA 15s		2
side	5 W	4 W 2.1x9.5d		2
rear	21 W (32 cp)	10 BA 15s	1156	2
Wide-beam/fog and spotlights	55 W	14 PK 22s(H3)		2
Foglights	27 W	11	GE 881	2
Tail lights.....	5 W (4 cp)	9 BA 15s	67	2
Brake lights	21 W (32 cp)	9 BA 15s	1156	2
Brake lights/tail lights	21/5 W (32/3 cp)	5 BAY 15d	1157	2
High-level brake light.....	21 W (32 cp)	10 BA 15s	1157	1
Rear foglight.....	21 W (32 cp)	10 BA 15s	1157	1
Backup light	21 W (32 cp)	10 BA 15s	1157	2
Number plate light, 4-door.....	5 W	4 W 2.1x9.5d		2
5-door	4 W	8 BA 9s		2

3500290A

Bulbs	Rating	Socket type	USA/ CAN	No.
Interior light	10 W	7 SV 8.5		1
Reading lamp, front	5 W	4 W 2.1x9.5d		2
rear	5 W	4 W 2.1x9.5d		2
Vanity mirror light	3 W	6 SV 7		2
Glove compartment light	2 W	8 BA 9s		1
Door-open warning lights	3 W	4 W 2.1x9.5d		4
Boot (trunk) light	10 W	7 SV 8.5		1
Door step courtesy lights	5 W	4 W 2.1x9.5d		2
Instrument lighting				
Indicator and warning lamps				
YAZAKI	1.2 W	3 W 2x4.6d		17
Lighting.....	3 W	4 W 2.1x9.5d		4
	1.2 W	W 2x4.6d		1
Control and panel lighting	1.2 W	20 W 2x4.6d		12

Group 37 Fuses

740/940 1991-1993

No.	Supplied by	Circuits protected	A
1	Battery +	Fuel pump; Relay, injection system; Heated oxygen sensor (HO2S), heating, B 200/230 FT; Ignition system;	25
2		Hazard warning flashers; Central locking; Alarm (1993); Headlight flasher (via fuses 17 and 18);	25
3		Power seats (supply); Trailer (1993);	30
4		Brake light switch; Brake light; P-shift lock, solenoid;	15
5		Clock; Radio; Power antenna; Interior lighting; Door open warning lights; Vanity mirror; CD-changer (1993); Alarm (1993); Glove compartment lighting; Boot (trunk) light;	15
6		ECC, climate system fan and control unit;	30
7	30-rail(bat+) X-relay, high beam	Foglight; Rear foglight (excl. USA/CDN);	15
8	Main relay, power windows / seat heaters	Power windows (supply);	30
9	Ignition lock 15 I	Seat belt reminder; Key reminder; Turn signal; Manual climate control (MCC); P-shift lock(supply); Trailer (1993); Relay, radiator fan (-1991); Relief relay power windows/seat heaters; (Transient protector ABS, no fuse)	15
10		Heated rear window; Heated door mirrors; Power sunroof;	30
11	Relay, injection system	Fuel prepump; Heated oxygen sensor (HO2S), (not B 200/230 FT);	15
12	Ignition lock 15	Backup lights; Overdrive relay, M 46; Bulb failure sensor; Alarm (1993); Exhaust temperature sensor (Japan); OD, AW71; Cruise control;	15

No.	Supplied by	Circuits protected	A
13	Ignition lock 15	Diesel: Preheating mechanism; Fuel valve; EGR; Charge pressure limiter (-1992); Magnet valve, pulsair (B 230 FD, 1993); (Control modules fuel-ignition systems, no fuse); (Power stage, Ignition and Diagnostic socket, no fuse);	15
14	Ignition lock X	Radio; Ambient temperature sensor (1993); Power door mirrors; Tailgate wash/wipe; Cigar lighter;	15
15		Horn; Windshield wash/wipe; Headlight wash/wipe; Power seats(control); (Airbag, no fuse);	25
16		Climate unit fan for standard heater and MCC; ECC, control module; ECC,solenoids;	30
17	X-relay, high beam	Left high beam; Indicator lamp, high beam;	15
18		Right high beam; Relay, front foglight (not USA/CDN);	15
19	Bulb failure sensor	Left low beam; Relay, front foglight; Beam width control;	15
20		Right low beam; Beam width control;	15
21	Relay, headlight	Left parking lights, front and rear; Number plate lighting; Instrument and control lighting; Ambient temperature sensor (1993);	15
22		Right parking lights, front and rear; Relay, front foglights; Seat belt lock(-91) and ashtray lighting, rear; Selector lighting automatic gearbox; Lighting, switches and storage compartment;	15
23	Main relay, power windows / seat heaters	Heated front seats (supply);	25
24		Spare (Test socket SRS - 1992);	
25	Ignition lock 15 I or Light switch	Rear foglight USA/CDN; Radio, USA/CDN/GB (lighting); Automatic low beam, EU/OS (can be disconnected); (Switch, foglight, 940 USA/CDN, no fuse);	15 / 25
26	Battery +	Radio, amplifier;	15

940 1994-1995

No.	Supplied by	Circuits protected	A
1	Battery +	Fuse 11; Fuel pump (1994); Relay, injection system; Heated oxygen sensor (HO2S), heating, B 200/230 FT; Ignition system;	25
2		Hazard warning flashers; Central locking; Alarm; Headlight flasher (via fuses 17 and 18);	25
3		Power seats (supply); Trailer;	30
4		Brake light; P-shift lock, solenoid (1994);	15
5		Clock; Radio (1994); Power antenna; CD-changer (1994); Interior lighting; Door open warning lights; Vanity mirror; Alarm (1995); Glove compartment lighting; Boot (trunk) light;	15
6		ECC, climate system fan and control unit;	30
7		Front foglight; Rear foglight (excl. USA/CDN);	15
8	Relief relay 15 I,	Power windows (supply);	30
9	Ignition lock 15 I	Seat belt reminder; Key reminder; Turn signal; Manual climate control (MCC); Relay, P-shift lock (1994); P-shift lock solenoid (1995); Trailer; Relief relay power (windows/seat heaters);	15
10		Heated rear window; Heated door mirrors; Power sunroof;	30
11	Relay, injection system	Fuel prepump (1994); Fuel pump (1995); Heated oxygen sensor (HO2S), (not B 200/230 FT);	15
12	Ignition lock 15	Backup lights; Overdrive relay, M 46; Bulb failure sensor; Alarm; Exhaust temperature sensor (Japan); OD, AW71; Cruise control; + 15 rail;	15

Section 3 Electrical system

No.	Supplied by	Circuits protected	A
13	Ignition lock 15	Diesel: Preheating mechanism; Fuel valve; EGR; Magnet valve, pulsair;	15
14	Ignition lock X	Radio; Ambient temperature sensor; Power door mirrors; Tailgate wash/wipe; Cigar lighter;	15
15		Horn; Windshield wash/wipe; Headlight wash/wipe; Power seats (control);	25
16		Climate unit fan for standard heater and MCC; Manual climate control unit, MCC; ECC, control module; ECC, solenoids;	30
17	Relief relay, high beam alt.	Left high beam; Indicator lamp, high beam;	15
18	Switch, turn signal/high-low beam	Right high beam; Relay, front foglight (variant dependent);	15
19	Bulb failure sensor	Left low beam; Relay, front foglight, 1994 (USA/CDN); Beam width control;	15
20		Right low beam; Beam width control;	15
21	Relay, headlight	Left parking lights, front and rear; Number plate lighting; Instrument and control lighting; Ambient temperature sensor;	15
22		Right parking lights, front and rear; Relay, front foglights; Ashtray lighting, rear; Selector lighting automatic gearbox; Lighting, switches and storage compartment;	15
23	Relief relay 15 I	Heated front seats (supply);	25
24	Ignition lock 15	ABS;	15
25	Ignition lock 15 I or Fog light switch	Rear foglight USA/CDN/J; Automatic low beam, EU/OS (can be disconnected);	25
26	Battery +	Radio, amplifier; 1995: Radio; CD-changer;	15

940 1996-1997

No.	Supplied by	Circuits protected	A
1	Battery +	Fuse 11; Fuel injection system; Ignition system; Heated oxygen sensor (HO2S), heating, B 200/230 FT; Relay, radio interference suppression;	25
2		Hazard warning flashers; Central locking; Alarm; Headlight flasher (via fuses 17 and 18);	25
3		Power seats (supply); Trailer;	30
4		Brake light; Electronic start inhibitor (Immobilizer);	15
5		Clock; Interior lighting; Power antenna; Door open warning lights; Vanity mirror; Alarm; Glove compartment lighting; Boot (trunk) light; Remote controle, central locking (1997);	15
6		ECC, climate system fan and control unit;	30
7		Front foglight; Rear foglight (excl. USA/CDN); Data Link Connector (DLC);	15
8	Ignition lock 15 I	Seat belt reminder; Key reminder; Turn signal; Solenoid, P-shift lock; Trailer; Relief relay power (windows/seat heaters);	15
9	Relief relay 15 I	Power windows (supply);	30
10		Heated rear window; Heated door mirrors; Power sunroof;	30
11	Relay, injection system	Fuel pump;	15
12	Ignition lock 15	Backup lights; Overdrive relay, M 46; Bulb failure sensor; Alarm; Down shift lock; Exhaust temperature sensor (Japan); OD, AW71; Cruise control; + 15 rail;	15
13	Ignition lock 15	Diesel: Preheating mechanism; Fuel valve; EGR; Electronic start inhibitor (Immobilizer);	15

No.	Supplied by	Circuits protected	A
14	Ignition lock X	Radio; Ambient temperature sensor; Power door mirrors; Tailgate wash/wipe; Cigar lighter; Accessories;	15
15		Horn; Windshield wash/wipe; Headlight wash/wipe; Power seats(control);	25
16		Climate unit fan for standard heater and MCC; Manual climate control unit, MCC; ECC, control module; ECC, solenoids;	30
17	Relief relay, high beam	Left high beam; Indicator lamp, high beam;	15
18		Right high beam; Relay, front foglight (variant dependent));	15
19	Bulb failure sensor	Left low beam; Beam width control;	15
20		Right low beam; Beam width control;	15
21	Relay, headlight	Parking light, left front; Parking lights, rear; Ashtray lighting, front; Number plate lighting; Instrument and control lighting; Ambient temperature sensor; ECC; Trailer;	15
22		Parking light, right front; Parking lights, rear; Relay, front foglights (excl. Japan); Ashtray lighting, rear; Selector lighting automatic gearbox; Lighting, switches and storage compartment; Trailer;	15
23	Relief relay 15 I	Heated front seats (supply);	25
24	Ignition lock 15	ABS;	15
25	Ignition lock 15 I or Light switch	Rear foglight (Japan); Automatic low beam, (Scandinavia, Netherlands, Belgium, can be disconnected);	25
26	Battery +	Radio, amplifier; Radio; CD-changer; Accessories;	15

960/940SE 1991

No.	Supplied by	Circuits protected	A
1	Light switch	Left parking light; Number plate light; Bulb failure sensor - outer tail lights;	10
2		Right parking light; Bulb failure sensor - inner tail light;	10
3		Left high beam; Left spot light;	15
4	Relay, headlight	Right high beam; Right spot light;	15
5		Test socket SRS	
6		Left low beam; Beam width control, left;	15
7	Bulb failure sensor, 9-pin	Right low beam; Beam width control, right;	10
8		Foglights	15
9		Rear foglight; Indicator lamp, rear foglight;	10
10	Light switch	Instrument panel; Instrument panel; Control panel; Mode selector; Beam width control; Sunroof; Controls, ECC; Radio; Clock; Cigar lighter; Ashtrays, front and rear; Gearshift gate; Seat heaters; Seat belt lock;	5
11		Backup light; Turn signal; Cruise control;	15
12		Reduced low beam(dim-dip); P-shift lock (control);	15
13	Ignition lock 15 1	Heated rear window; Heated door mirrors;	25
14		Exhaust temperature sensor(Japan); Seat belt reminder; Overdrive(M 46, AW 70/71); Power windows(control); Heated seats(control); Power sunroof(control); Bulb failure sensor, 14-pin;	10
15		Spare;	
16		Spare;	

No.	Supplied by	Circuits protected	A
17	Ignition lock X	Spare;	
18		Radio; (airbag no fuse)	5
19	Ignition lock X	Control module, ECC; Power door mirrors; Cigar lighter; Power seats(control); Tailgate wash/wipe;	15
20		Horn; Windshield wash/wipe; Headlamp wash/wipe;	25
21		Glowplug mechanism, diesel; Mode selector, AW 30-40/43;	5
22	Ignition lock 15	ABS(control); (combined instrument, no fuse);	5
23		Control module, AW 30-40/43 (A/supply); Control module, fuel system; Diagnostic socket (B 6304); Relay, radiator fan(B 230/280); Relay, ignition coil Motronic (control);	10
24		Control module, AW 30-40/43 (B/memory); Control modules, fuel system and ignition system (MFI);	10
25	Battery +	Hazard warning flashers; Central locking; (light switch no fuse)	25
26		Clock; Interior lights; Reading light; Door open warning lamps; Boot light; Engine compartment light;	10
27		Brake light switch; P-shift lock (supply); Bulb failure sensor - brake light;	15
28		Heater fan (ECC); Electronic climate control (ECC);	30
29		Power antenna; Trailer; (turn signal switch, no fuse);	30
30		Fuel pump; Heated oxygen sensor (HO2S);	10
31	Relay, fuel injection	Relay, fuel injection - fuel pump;	25
32		Amplifier, radio;	15
33		Radio;	10
34	Relay, power windows	Power windows (supply); Power sunroof (supply);	30
35		Heated seats (supply); Power seats (supply)	30

960 1992-1993

No.	Supplied by	Circuits protected	A
1	Light switch	Left parking light; Number plate light; Bulb failure sensor - outer tail light;	10
2		Right parking light; Bulb failure sensor - inner tail light;	10
3	Relay, headlight	Left high beam; Left spot light;	15
4		Right high beam; Right spot light;	15
5		Test socket SRS (- 1992);	
6	1992: Bulb failure sensor, 9-pin	Left low beam; Beam width control, left;	15
7	1993: Relay, headlight	Right low beam; Beam width control, right;	10
8	Light switch	Foglight front;	15
9		Rear foglight; Indicator lamp, rear foglight;	10
10		Panel lighting: Instrument panel; Control panel; Mode selector; Beam width control; Sunroof; Controls, ECC; Radio; Clock; Cigar lighter; Ashtrays, front and rear; Gearshift gate; Heated seats; Ambient temperature sensor (1993)	5
11	Ignition lock 15 I	Backup lights; Turn signal; Cruise control;	15
12		Reduced low beam(dlm-dip); P-shift lock (control);	15
13		Heated rear window; Heated door mirrors;	25
14		Exhaust temperature sensor(Japan); Seat belt reminder; Key reminder (USA/CDN 1993); Overdrive(M 46, AW 70/71); Power windows(control); Heated seats(control); Power sunroof(control); Alarm (1993); Bulb failure sensor, 14-pin; Relief relay 15 I	10
15		Spare;	
16	Relief relay 15 I	Heated seats (supply)	30
17	Ignition lock X	Spare;	

No.	Supplied by	Circuits protected	A
18	Ignition lock X	Radio; (airbag no fuse)	5
19		Control module, ECC; Power door mirrors; Cigar lighter; Power seats(control); Tailgate wash/wipe; Ambient temperature sensor (1993)	15
20		Horn; Windshield wash/wipe; Headlamp wash/wipe;	25
21	Ignition lock 15	Diesel: Glowplug mechanism; Fuel valve; EGR; Turbo control valve (TCU); Mode selector ((AW 30-40/43);	5
22		ABS(control); (combined instrument, no fuse);	5
23		Control module, AW 30-40/43 (A/supply); Control module, fuel system; Data link connector (DLC) B 6304;	10
24	Battery +	Control module, AW 30-40/43 (B/memory); Control modules, fuel system and ignition system;	10
25		Hazard warning flashers; Alarm (1993); Central locking; (light switch no fuse)	25
26		Clock; Interior lights; Reading lights; Door open warning lamps; Vanity mirror light; Boot light; Alarm (1993);	10
27		Brake light; Brake light switch; P-shift lock (supply); Control module ABS, brake signal (1993);	15
28		Heater fan (ECC); Electronic climate control (ECC);	30
29		Power antenna; Trailer; (turn signal switch, no fuse);	30
30	Relay, fuel injection	Fuel pump; Lambda sensor (B 6304);	10
31	Battery +	Relay, fuel injection; Heated oxygen sensor (HO2S); Distributor ignition (DI) system, EZ 116 K;	25
32		Amplifier, radio 1992; Amplifier, radio 1993;	15 10
33		Radio;	10
34	Relief relay 15 I	Power windows (supply); Power sunroof (supply)	30
35		Power seats (supply)	30

960 1994

No.	Supplied by	Circuits protected	A
1	Light switch	Left parking light; Number plate light; Bulb failure sensor - outer tail light;	10
2		Right parking light; Bulb failure sensor - inner tail light;	10
3	Relay, headlight	Left high beam; Left spot light;	15
4		Right high beam; Right spot light;	15
5		Spare;	
6	Relay, headlight	Left low beam; Beam width control, left;	15
7		Right low beam; Beam width control, right;	10
8	Light switch	Foglight front;	15
9		Rear foglight; Indicator lamp, rear foglight;	10
10		Panel lighting: Instrument panel; Control panel; Mode selector; Beam width control; Sunroof; Controls, ECC; Radio; Clock; Cigar lighter; Ashtrays, front and rear; Gearshift gate; Heated seats; Ambient temperature sensor;	5
11	Ignition lock 15 I	Backup lights; Turn signal; Cruise control;	15
12		Reduced low beam (dim-dip); P-shift lock (control);	15
13		Heated rear window; Heated door mirrors;	25
14		Exhaust temperature sensor (Japan); Seat belt reminder; Key reminder (USA/CDN); Overdrive (M 46, AW 70/71); Power windows (control); Heated seats (control); Power sunroof (control); Alarm; Bulb failure sensor, 14-pin; Relief relay 15 I	10
15		Spare;	
16	Relief relay 15 I	Heated seats (supply)	30

No.	Supplied by	Circuits protected	A
17	Ignition lock X	Spare;	
18		Radio;	5
19		Control module, ECC; Power door mirrors; Cigar lighter; Power seats (control); Tailgate wash/wipe; Ambient temperature sensor;	15
20		Horn; Windshield wash/wipe; Headlamp wash/wipe;	25
21	Ignition lock 15	Diesel: Glowplug mechanism; Fuel valve; EGF; Turbo control valve (TCU); Mode selector ((AW 30-40/43);	5
22		ABS (control);	5
23		Control module, AW 30-40/43 (A/supply); Control module, fuel system; Diagnostic socket (B 6304); Relay, ignition coil, Motronic;	10
24	Battery +	Control module, AW 30-40/43 (B/memory); Control modules, fuel system and ignition system;	10
25		Hazard warning flashers; Alarm; Central locking;	25
26		Clock; Interior lights; Reading lights; Door open warning lamps; Vanity mirror light; Glove compartment light; Boot light; Alarm;	10
27		Brake light; Bulb failure sensor - brakelight; P-shift lock (supply); Control module ABS and AW 30-40/43, brake signal;	15
28		Heater fan (ECC); Electronic climate control (ECC);	30
29		Power antenna; Trailer;	30
30	Relay, fuel injection	Fuel pump; Lambdasond (B 6304);	10
31	Battery +	Relay, fuel injection - fuel pump; Heated oxygen sensor (HO2S), LH 2.4;	25
32		Spare;	10
33		Radio;	15
34	Relief relay 15 I	Power windows (supply); Power sunroof (supply)	30
35		Power seats (supply)	30

960 1995

Fuse box in car

No.	Supplied by	Circuits protected	A
1	Main fuse no. 1	Heated rear window; Heated door mirrors;	25
2		Central locking; Alarm;	20
3		Brake lights;	15
		Light switch;	
4	Relief relay X	Ignition switch; SRS;	10
5		Spare;	
6		Windshield wash/wipe;	25
		Headlight wash/wipe; Horn relay (control);	
7		Climate control unit;	20
8		Power seat;	15
		Power door mirrors;	
		Tailgate wash/wipe (965);	
		Rheostat; Ambient temperature sensor;	
9		Radio; Central locking/Alarm;	15
10		Beam width control;	15
		Cigar lighter;	
11	Ignition lock 15 A	Central locking;	5
12		Mode selector, AW 30-40/43;	
		ABS;	5
13	Main fuse no. 2	Clock; Interior lights; Vanity mirror light;	10
		Glow compartment light; Door open warning lights;	
		Boot (trunk) light;	
14		Horn, anti-theft alarm;	5
15		Power antenna; High beam flash;	20
		Trailer;	
16		(Parking heater)	20
17		Hazard warning flasher; Alarm;	20
18		Radio; CD-changer;	15
19		Backup (reversing) lights; Turn signal;	15
	Relief relay 15 I	Cruise control;	
20		Light switch;	15
21		Seat belt reminder; Temperature sensor (Japan);	5
		Heated rear window and door mirrors; P-shift lock;	
		Rear bulb failure sensor, connection 8;	
22		Heated driver seat + 15I;	15
23		Heated passenger seat + 15I;	15
24	Light switch	Rear fog lights;	5
CB1	Main fuse no. 2	Automatic fuse: Power seats	30
CB2	Relief relay 15 I	Automatic fuse: Power windows; Power sunroof;	30

In engine compartment

Fuses in relay-/fuse box

No.	Supplied by	Circuits protected	A
1	Main fuse no. 4	Control module (ECM), Motronic; Ignition lock;	5
		Control module (TCM), AW 30-40/43;	
2	Relay, air pump	Solenoid valve, air pump;	5
3	Main relay, fuel system	EGR converter; Relay air pump (control);	5
4		Fuel pump;	15
5		Fuel injection valves; Mass air flow (MAF) sensor;	15
		Idling valve (IAC); Control module, Motronic;	
6		Control module (TCM), AW 30-40/43;	15
7		Ignition coils;	25
		Heating, heated oxygen sensor (HO2S) (Lambdasond);	
8	Relay, foglight	Fog lights, front;	25
9	No supply	Spare;	
10	Relay, side indicator/parking light	Parking/side indicator, left;	15
11		Parking/side indicator, right;	15
12	Relay, main beam with bulb failure sensor	High beam, left;	15
13		High beam, right;	15
		Indicator lamp, high beam;	
14		Low beam, left;	15
15		Low beam, right;	15
16	Main fuse no. 6	A/C compressor;	15
17		Horn;	15
18		Accessories;	

Main fuses at battery

No.	Supplied by	Circuits protected	A
1	Battery	Fuses in car, no. 1-4; Relief relay X;	50
2		Fuses in car, no. 13-18;	50
		Automatic fuse 1; Relay, fog lights;	
3		Relief relay, 15 I;	50
4		Fuse in engine compartment, no. 1;	50
		Main relay, fuel system;	
5		ABS hydraulic unit, connections 6 and 10;	50
6		Fuses in engine compartment, no. 16-18;	50
		Starter motor, relay; Air pump, relay;	
7		Engine cooling fan relay;	50
8		Parking/side lights relay;	50
		Main headlight relay with bulb failure sensor;	

960 1996-1997

No.	Supplied by	Circuits protected	A
1	Main fuse no 1	Heated rear window; Heated door mirrors;	25
2		Central locking; Alarm;	20
3		Brake lights; Light switch;	15
4		Ignition switch;	10
5	Relief relay X	Electronic start inhibitor (Immobilizer);	
6		Spare;	
7		Windshield wash/wipe;	25
8		Headlight wash/wipe; Horn relay (control);	
9		Climate control unit;	20
10		Power seat;	15
11		Power door mirrors;	
12		Tailgate wash/wipe (965);	
13	Ignition lock 15 A	Rheostat; Ambient temperature sensor;	
14		Radio; Central locking/Alarm;	15
15		Beam width control; Cigar lighter; Telephone;	15
16		Relay, central locking; Mode selector, AW 30-40/43;	5
17	Main fuse no. 2	Electronic start inhibitor (Immobilizer);	
18		ABS;	5
19		Clock; Interior lights; Vanity mirror light;	10
20		Glow compartment light; Door open warning lights;	
21		Boot (trunk) light;	
22		Siren, anti-theft alarm; Data Link Connector (DLC);	5
23		Remote controle, central locking (1997);	
24		Power antenna; High beam flash;	20
25	Relief relay 15 I	Trailer;	
26		(Parking heater); Telephone;	20
27		Hazard warning flasher; Alarm;	20
28		Turn signal; Remote controle, central locking (1997);	
29		Radio; CD-changer;	15
30		Backup (reversing) lights; Turn signal;	15
31		Cruise control;	
32		Light switch;	15
33		Seat belt reminder; Temperature sensor (Japan);	5
34		Heated rear window and door mirrors; P-shift lock;	
35		Rear bulb failure sensor, connection 8;	
36		Heated driver seat + 15I;	15
37	Light switch	Heated passenger seat + 15I;	15
38		Rear fog lights;	5
39		Automatic fuse: Power seats	30
40		Automatic fuse: Power windows; Power sunroof;	30

In engine compartment

Fuses in relay-/fuse box

No.	Supplied by	Circuits protected	A
1	Main fuse no. 4	Control module (ECM), Motronic; Ignition lock 30 I;	5
2	Main relay, fuel system	Control module (TCM), AW 30-40/43;	
3		Relay, A/C;	5
4		Oxygen sensor (HO2S) (Lambdasond); EGR converter;	5
5		EVAP valve;	
6		Relay/Solenoid auxiliary air system;	
7		Fuel pump;	15
8		Fuel injection valves; Mass air flow (MAF) sensor;	15
9		Idling valve (IAC); Control module, Motronic;	
10	Relay, foglight	Control module (TCM), AW 30-40/43;	15
11		Ignition coils;	25
12		Fog lights, front;	25
13		Spare;	
14	No supply	Parking/side indicator, left;	15
15		Parking/side indicator, right;	15
16		High beam, left;	15
17		High beam, right;	15
18	Relay, side indicator/parking light	Indicator lamp, high beam;	15
19		Low beam, left;	15
20		Low beam, right;	15
21		A/C compressor;	15
22	Main fuse no. 6	Horn;	15
23		Accessories;	

Main fuses at battery

No.	Supplied by	Circuits protected	A
1	Battery	Fuses in car, no. 1-4; Relief relay X;	50
2		Fuses in car, no. 13-18;	50
3		Automatic fuse 1; Relay, fog lights;	
4		Relief relay, 15 I;	50
5		Fuse in engine compartment, no. 1;	50
6		Main relay, fuel system;	
7		ABS hydraulic unit, connections 6 and 10;	50
8		Fuses in engine compartment, no. 16-18;	50
9		Starter motor, relay; Air pump, relay;	
10		Engine cooling fan relay;	50
11		Parking/side lights relay;	50
12		Main headlight relay with bulb failure sensor;	

Relay location

1995-1997

Passenger compartment		Engine compartment	
Marked	Designation	Marked	Designation
Fuse box		Fuse box	
1	Relief relay X	A	Air pump relay
2	Fuel pump relay	B	Spare
3	Relief relay 15 I	C	Main relay, fuel system
Tunnel		D	Spare
A	Rear window/door mirror heating	E	Spare
B+E	Control module, cruise control	F	A/C relay
C+F	Alarm	G	Fog lights relay (excl. USA/CDN)
D+G	Central locking	H	Spare
H	Seat belt reminder/key reminder	J	Ignition coil relay
I	Exhaust temperature sensor (Japan)	K	Starter motor relay
L	Windshield wiper intermittent relay	L	USA: Fog lights relay
N	Relay, central locking, driver's door (USA/CDN)		UK 1996: Relay DIM-DIP
Console, driver side			Others: Spare
	Main beam relay	M	Side indicator/parking light relay
	with bulb failure sensor	N	Horn relay
Console, passenger side		Next to radiator	
	ECC/MCC output module	Engine cooling fan relay	
Door, driver side (behind panel)			
	Relay auto-down power windows		
Boot (trunk)			
(beneath cover behind left wheel housing)			
	Rear bulb failure sensor;		
	Tailgate wiper, intermittent relay		
	(5-door)		

Group 38 Instruments

Fuel level sensor	Volume litres	Resistance Ω
Main tank,		
tube sensor, -1992, 740/940, empty tank	0	0
full tank	60	280
960, empty tank	0	0
full tank	80	362
1993-, 940, empty tank	0	130 \pm 15
full tank	75	2 \pm 2
960, empty tank	0	130 \pm 15
full tank	80	2 \pm 2
lever sensor		
(with extra tank -1991)	20	27.5
Extra tank(-1991),		
lever sensor, empty tank	0	0
full tank	20	60

Engine coolant temperature (ECT) sensor		Temperature °C (°F)	Resistance Ω
1991-1993	Sensor resistance at different temperatures.	60 (140)	560
		90 (194)	206
		100 (212)	153
1994-	Sensor resistance at different temperatures.	20 (68)	780
		90 (194)	75

Section 4 Power transmission

Group 41 Clutch

Pressure plate,

diameter

max. out-of-true (only in one direction, see picture below) mm 0.2

Clutch disc

diameter, all engines excl. B 230 FT mm 228

B 230 FT (M90 transmission) mm 240

thickness, loaded, new (excl. B 230 FT 1994) mm 7.5 ± 0.3

B 230 FT 1994 (M90) mm 8.0 ± 0.3

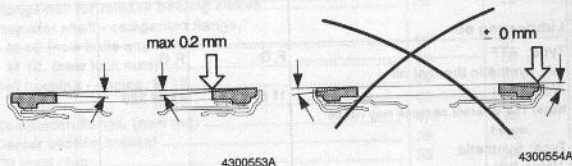
Clutch fork clearance,

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 stroke mm 160



Group 43 Transmission

Manual transmission

Type	M 46	M 47	M 90H	M 90L
Ratios:				
1st gear	4.03 : 1	4.03 : 1	3.54:1	3.91:1
2nd gear	2.16 : 1	2.16 : 1	2.05:1	2.20:1
3rd gear	1.37 : 1	1.37 : 1	1.38:1	1.38:1
4th gear	1.00 : 1	1.00 : 1	1.00:1	1.00:1
5th gear	0.79 : 1	0.82 : 1	0.81:1	0.81:1
Reverse gear	3.68 : 1	3.68 : 1	3.45:1	3.45:1
Play				
between reverse gear and gear selector	mm 0.1 - 1.0	0.1 - 1.0		
axial play				
input shaft	mm 0.01 - 0.20	0.01 - 0.20		
countershaft	mm 0.03 - + 0.05*	0.01 - 0.10		
primary shaft	mm 0.01 - 0.20	0.01 - 0.20		
5th synchro. hub	mm	0.01 - 0.20		
*pre-tensioning				
Lubricating oil				
Type: ATF	F, G	F, G		
alt. synthetic thermal oil				
Volvo P/N	11 61 323	11 61 323		
Note! The different oil types may not be mixed.				
Type: Synthetic				
Volvo P/N			11 61 423	
Oil volume, approx. litres	2.6	1.6	1.75	
Oil pressure - overdrive				
Type	J	J/P	P	
Top gear	MPa(kp/cm ²) 0.15 (1.5)	0.15 (1.5)	0.15 (1.5)	
Overdrive engaged	MPa(kp/cm ²) 2.8 - 3.1 (28 - 31)	2.7 - 2.9 (27 - 29)	2.8 - 3.1 (28 - 31)	

Manual transmission

Tightening torques M 45/47	Nm	ft. lb
Fasteners for bell housing	35 - 50	26 - 37
Screws for rear plate (gear lever carrier)	40	30
Fasteners for transmission cover	15 - 25	11 - 18
Fastener for countershaft, M 47	35 - 45	26 - 33
Nut, drive plate, M 47 (M16)	70 - 90	52 - 66
(M20)	90 - 110	66 - 81
M 46	165 - 180	122 - 133
Nut for rear housing, M 46	12 - 18	9 - 13
Nut for 5th gear synchromesh, M 47	120	89
Oil plugs	27 - 40	20 - 30

Tightening torques M 90	Nm	ft. lb
Backup lights contact	25	18
Flange bolt for release bearing sleeve	25	18
Propeller shaft - companion flange,		
M 10 (new bolts and nuts)	50	37
M 12, (new lock nuts)	80	59
Bell housing - engine, M 10	50	37
M 12	80	59
Companion flange, (new nut)	170	125
Center bearing bracket	25	18
Oil level plug	35	26
Cross stay, body/rear control arm (new bolts)	100	74
Pressure plate - flywheel	25	18
Gearbox member - body	50	37
Gearbox bracket - rear gearbox mounting (new nut)	50	37

Automatic transmission

	AW 70/71	AW 72	AW 30-40	AW 30-43
Ratio:				
1st gear.....	2.45 : 1	2.83 : 1	2.80 : 1	2.80 : 1
2nd gear.....	1.45 : 1	1.49 : 1	1.53 : 1	1.53 : 1
3rd gear.....	1 : 1	1 : 1	1 : 1	1 : 1
4th gear.....	0.69 : 1	0.73 : 1	0.71 : 1	0.75 : 1
Reverse gear.....	2.21 : 1	2.70 : 1	2.39 : 1	2.39 : 1
Torque converter				
K-factor.....	190, 206, 217	206	190	177, 206
diameter.....mm	248 ⁴⁾ , 254 ⁵⁾	254	254	254
torque amplification.....	1.72 - 2.40:1	2.4:1	2.1:1	2.1:1, 2.4:1
Lubricant				
oil volume, approx. litres	7.50	7.50	7.75	7.75
difference between MAX-MIN..... litres	0.5	0.5	0.5	0.5
quality, ATF-oil..... type				
	ZF4HP22 ¹⁾	ZF4HP22 ³⁾		
Ratio:				
1st gear.....	2.73 : 1	2.48 : 1		
2nd gear.....	1.56 : 1	1.48 : 1		
3rd gear.....	1 : 1	1 : 1		
4th gear.....	0.73 : 1	0.73 : 1		
Reverse gear.....	2.09 : 1	2.09 : 1		
Torque converter				
K-factor.....	218 ²⁾	195 ³⁾		
diameter.....mm	260	260		
torque amplification.....	2.3:1	2.3:1		
Lubricant				
oil volume..... litres	7.5	7.5		
difference between MAX-MIN..... litres	0.5	0.5		
quality, see page 17				

¹⁾ D 24, D 24 T/MC²⁾ D 24³⁾ Others⁴⁾ without lock-up⁵⁾ with lock-up

Type, part number and stall speed

Engine	Type	Volvo P/N	Normal stall speed r/s(rpm)
B 200 E	AW 70	12 08 415	35.0 (2100)
B 200 F/G	AW 70	12 08 659	37.0 (2200)
B 200 FT	AW 71	12 08 684, 12 08 739	31.7-40.0 (1900-2400)
B 230 E	ZF 4HP 22	12 08 662	36.0 (2150)
B 230 F/G	AW 70	12 08 604, 12 08 652	33.0 (2000)
B 230 FB	AW 71	12 08 682	33.0 (2000)
	ZF 4HP 22	12 08 686	33.0 (2000)
B 230 FD	AW 71	12 08 768	40.0 (2400)
B 230 FT	AW 71	12 08 642, 12 08 751	33.0 - 45.0 (2000 - 2700)
B 230 FK/GK	AW 71	12 08 829, 12 08 830, 12 08 831	33.0 - 45.0 (2000 - 2700)
B 230 GT	AW 71	12 08 643	33.0 - 45.0 (2000 - 2700)
B 234 F/G	AW 72	12 08 667, 12 08 666	40.8 (2450)
B 6244 F	AW 30-43	12 08 770	41.7 (2500)
B 6254 F	AW 30-43	12 08 770	41.7 (2500)
B 6304 F/G	AW 30-43	12 08 657, 12 08 744	35.0 (2100)
B 6304 F	AW 30-40	12 08 738, 12 08 745, 12 08 786	45.0 (2700)
D 24	ZF 4HP 22	12 08 594	36.0 (2150)
D 24 T	ZF 4HP 22	12 08 664	31.7-39.0 (1900-2350)
D 24 T, EGR	ZF 4HP 22	12 08 665	30.0-33.3 (1800-2000)
D 24 TIC	ZF 4HP 22	12 08 663	31.7-40.8 (1900-2450)

System and stall speed pressures

Engine (final drive)	Gearbox	System pressure, idling MPa		System pressure, stall speed, MPa	
		Gear position D	Gear position R	Gear position D	Gear position R
B 200 E/F/G B 200 FT	AW 70 AW 71	0.35 - 0.44 0.46 - 0.54	0.50 - 0.64 0.70 - 0.82	1.00 - 1.20 1.00 - 1.20	1.37 - 1.70 1.50 - 1.90
B 230 F/G B 230 FB/FD/ FT/GT/FK/GK B 230 E B 230 FB	AW 70 AW 71 ZF 4HP 22 ZF 4HP 22	0.46 - 0.54 0.46 - 0.54 0.60 - 0.76 0.60 - 0.76	0.70 - 0.82 0.70 - 0.82 1.10 - 1.40 1.10 - 1.40	1.00 - 1.20 1.00 - 1.20 0.83 - 1.03 0.83 - 1.03	1.50 - 1.90 1.50 - 1.90 1.51 - 1.72 1.51 - 1.72
B 234 F/G	AW 72	0.44 - 0.52	0.64 - 0.76	1.12 - 1.32	1.55 - 1.95
B 6244/6254 F	AW 30 - 43	0.40	0.64	1.21	1.59
B 6304 F/G	AW 30 - 43 AW 30 - 40	0.40 0.40	0.64 0.64	1.21 1.21	1.59 1.59
D 24 D 24 T (3.91:1) D 24 T (3.73:1) D 24 TIC	ZF 4HP 22 ZF 4HP 22 ZF 4HP 22 ZF 4HP 22	0.60 - 0.76 0.60 - 0.76 0.60 - 0.76 0.60 - 0.76	1.10 - 1.40 1.10 - 1.40 1.10 - 1.40 1.10 - 1.40	0.86 - 1.06 0.81 - 1.01 0.99 - 1.10 0.96 - 1.06	1.57 - 1.76 1.48 - 1.67 1.61 - 1.82 1.57 - 1.76

Governor pressure AW 70/71/72

Rear axle ratio					
3.73 : 1		3.91 : 1		4.10 : 1	
km/h	MPa	km/h	MPa	km/h	MPa
30	0.09 - 0.15	29	0.09 - 0.15	27 25*	0.09 - 0.15
55	0.16 - 0.22	53	0.16 - 0.22	50 45*	0.16 - 0.22
108	0.41 - 0.53	103	0.41 - 0.53	98 95*	0.41 - 0.53

* AW 72 L

106 - 700/900

Gear changing speeds, km/h

AW 70/71/72, ZF 22 HP

Engine	Type	Final drive	Gear lever / throttle opening (KD= kickdown)						Lock up	
			1 - 2 (KD)	2 - 3 (KD)	3 - 4 (75%)	4 - 3 (0%)	3 - 2 (KD)	2 - 1 (KD)	in	out
B 200 E	AW 70	3.91:1	67	113	114	40	107	55	—	—
B 200 F/G	AW 70	4.10:1	57	101	110	37	94	46	—	—
B 200 FT	AW 71	3.73:1	65	112	130	27	106	54	92	90
B 230 E	ZF 22	3.73:1	62	107	128	43	98	52	85	83
B 230 F/G	AW 70	4.10:1	57	99	110	36	93	45	86	84
B 230 FB	AW 71	4.10:1	60	103	119	25	94	45	90	88
B 230 FB	ZF 22	3.91:1	64	107	131	38	102	54	85	83
B 230 FD	AW 71	3.73:1	57	99	110	36	93	45	77	73
B 230 G	ZF 22	3.91:1	64	107	131	38	102	54	85	83
230 FT/GT	AW 71	3.73:1	64	116	135	29	108	48	98	96
230 FK/GK	AW 71	3.73:1	64	116	135	29	108	48	98	96
B 234 F/G	AW 72	4.10:1	56	102	116	33	93	41	86	84
D 24	ZF 22	3.91:1	46	83	98	34	79	39	76	74
D 24 T	ZF 22	3.91:1	46	83	98	34	79	39	73	71
		3.73:1	48	87	103	35	82	41	87	85
D 24 TIC	ZF 22	3.73:1	48	87	103	35	82	41	87	85

Gear changing speeds, km/h (gearlever in position D.)

* Mode selector position: E = Economy: S = Sport: W = Winter

AW 30-43, AW 30-40

Engine	Control unit	*	Throttle opening	Gear changing speeds					
				1-2	2-3	3-4	4-3	3-2	2-1
B 6244 F B 6254 F (AW 30-43)	91 28 408 (1995)	E	100% + KD	59	115	177	155	104	47
			25% / 60%	18/37	37/76	68/121	41/92	22/52	8/18
		S	100% + KD	59	115	177	155	104	47
			25% / 60%	18/45	37/88	68/142	48/118	28/70	12/29
		W	100% + KD	59	115	177	137	85	39
			25% / 60%	—	—	57/79	43/61	—	—
	91 44 366 (1996-)	E	100% + KD	59	115	177	155	104	47
			25% / 60%	18/37	37/76	68/121	41/92	22/52	8/18
		S	100% + KD	59	115	177	155	104	47
			25% / 60%	18/45	37/88	68/142	48/118	28/70	12/29
		W	100% + KD	59	115	177	137	85	39
			25% / 60%	—	—	57/79	43/61	—	—
B 6304 F (AW 30-43)	35 15 646 (1991-95)	E	100% + KD	58	114	180	175	105	45
			25% / 60%	25/35	52/80	80/148	58/85	40/50	10/19
		S	100% + KD	58	114	180	175	105	45
			25% / 60%	40/51	80/111	115/174	64/155	40/94	20/31
		W	100% + KD	50	90	170	160	70	20
			25% / 60%	—	—	70/83	60/74	—	—
	91 48 498 (1996-)	E	100% + KD	58	114	180	175	105	45
			25% / 60%	20/36	49/82	74/148	58/87	36/50	10/19
		S	100% + KD	58	114	180	175	105	45
			25% / 60%	40/52	64/112	103/164	72/143	40/95	20/32
		W	100% + KD	58	114	180	175	105	45
			25% / 60%	—	—	70/85	60/75	—	—
B 6304 F (AW 30-40)	35 15 784 (1992-93)	E	100% + KD	65	130	208	193	115	55
			25% / 60%	29/40	54/80	100/140	63/95	40/60	18/25
		S	100% + KD	66	130	208	193	120	55
			25% / 60%	40/58	54/123	130/205	63/180	40/80	22/37
		W	100% + KD	50	90	170	160	70	20
			25% / 60%	—	—	70/85	60/74	—	—

Engine	Control unit	*	Throttle opening	Gear changing speeds					
				1-2	2-3	3-4	4-3	3-2	2-1
B 6304 F (AW 30-40)	91 44 038 (1993-94)	E	100% + KD	65	130	208	193	115	55
			25% / 60%	29/40	54/100	130/167	65/87	32/45	18/25
		S	100% + KD	66	130	208	193	120	55
			25% / 60%	32/52	54/123	150/205	65/109	34/54	20/32
		W	100% + KD	50	90	170	160	70	20
			25% / 60%	—	—	70/85	60/74	—	—
	68 48 274 (1995)	E	100% + KD	60	115	178	142	90	49
			25% / 60%	17/33	41/73	74/133	46/99	23/46	9/20
		S	100% + KD	60	115	178	170	101	43
			25% / 60%	17/41	41/95	75/158	56/109	28/65	8/32
		W	100% + KD	59	115	177	137	85	39
			25% / 60%	—	—	63/95	50/63	—	—
	91 44 365 (1996-)	E	100% + KD	60	115	178	142	90	49
			25% / 60%	17/33	41/73	74/133	46/99	23/46	9/20
		S	100% + KD	60	115	178	170	101	43
			25% / 60%	17/41	41/95	75/158	56/109	28/65	8/32
		W	100% + KD	59	115	177	137	85	39
			25% / 60%	—	—	63/95	50/63	—	—

Mechanical locking (LOCK-UP), km/h. (Gear lever in position D. Tolerance $\pm 10\%$)

* Mode selector position: E = Economy: S = Sport: W = Winter

Engine	Control unit	* Throttle opening	Gear changing speeds					
			2 in	2 out	3 in	3 out	4 in	4 out
B 6244 F, B 6254 F (AW 30-43)	91 28 408 (1995)	E 100% + KD			131	110	181	163
		25%	—	—	45	40	87	59
		S 100% + KD			133	111	192	170
		25%	—	—	45	40	87	59
		W 100% + KD			125	120	192	157
		25%	—	—	45	40	70	49
	91 44 366 (1996-)	E 100% + KD			131	110	181	163
		25%	—	—	45	40	87	59
		S 100% + KD			133	111	192	170
		25%	—	—	53	40	87	59
		W 100% + KD			125	120	192	157
		25%	—	—	45	40	70	49
B 6304 F (AW 30-43)	35 15 646 (1991-95)	E 100% + KD	88	77	130	123	180	175
		25%	30	22	52	45	80	58
		S 100% + KD	88	77	130	123	180	175
		25%	40	30	80	50	115	80
		W 100% + KD	—	—	50	40	170	83
		25%	—	—	50	40	70	58
	91 48 498 (1996-)	E 100% + KD	—	—	130	123	185	175
		25%	—	—	63	45	100	58
		S 100% + KD	—	—	130	123	185	175
		25%	—	—	80	50	127	80
		W 100% + KD	—	—	130	90	170	83
		25%	—	—	40	38	70	58
B 6304 F (AW 30-40)	35 15 784 (1992-93)	E 100% + KD	85	60	140	120	170	160
		25%	33	30	50	40	100	63
		S 100% + KD	100	85	140	125	208	200
		25%	45	30	50	40	130	63
		W 100% + KD	—	—	130	105	170	83
		25%	—	—	50	40	70	58

Engine	Control unit	* Throttle opening	Gear changing speeds					
			2 in	2 out	3 in	3 out	4 in	4 out
B 6304 F (AW 30-40)	91 44 038 (1993-94)	E 100% + KD	85	60	140	120	170	160
		25%	33	30	88	45	130	64
		S 100% + KD	100	85	140	125	208	200
		25%	45	30	88	49	140	67
		W 100% + KD	—	—	130	105	170	83
		25%	—	—	50	40	70	58
	68 48 274 (1995)	E 100% + KD	—	—	133	96	195	152
		25%	—	—	41	36	102	60
		S 100% + KD	—	—	140	109	200	178
		25%	—	—	41	36	102	62
		W 100% + KD	—	—	133	96	192	157
		25%	—	—	47	40	72	57
	91 44 365 (1996-)	E 100% + KD	—	—	133	96	195	152
		25%	—	—	41	36	102	60
		S 100% + KD	—	—	140	109	200	178
		25%	—	—	41	36	102	62
		W 100% + KD	—	—	133	96	192	157
		25%	—	—	47	40	72	57

Components

AW 30-43, AW 30-40

Control module, AW 30-40	Volvo P/N	Manuf. P/N
B 6304, 1992-1993	35 15 784	30 40 301 013 30 40 301 013 W
1993-1994	91 44 038	
1995	68 48 274	
1996-	91 44 365	
Control module, AW 30-43	Volvo P/N	Manuf. P/N
B 6244/6254, 1995	91 28 408	30 40 301 004
1996-	91 44 366	
B 6304, 1991-1995	35 15 646	
1994-1995	91 28 859	
1996-	91 48 498	
Gear position sensor		
- Volvo P/N	35 15 639	99 03 740 153
- Aisin Warner P/N	99 03 740 153	
Mode selector		
- Volvo P/N	35 15 640	
Solenoids:		
Gearchange solenoid 1 (S1) and 2 (S2)		
- Volvo P/N	35 15 643	99 03 740 040
- Aisin Warner P/N	99 03 740 040	
Lock-Up solenoid (SL)		
- Volvo P/N	35 15 644	99 03 740 041
- Aisin Warner P/N	99 03 740 041	
System pressure solenoid (STH)		
- Volvo P/N	35 15 645	99 03 457 389
- Aisin Warner P/N	99 03 457 389	
Resistance at +25°C (77°F)	Ω	2 - 4

Engine speed (RPM) sensor	
- Volvo P/N	35 15 641
- Aisin Warner P/N	30 40 330 005 T
Oil temperature sensor	
- Volvo P/N	35 15 642
- Aisin Warner P/N	30 40 352 005 X
Resistance at	
+160°C (320°F)	Ω 20.7 ± 2.9
0°C (32°F)	Ω 2067 ± 396
< 0°C (32°F)	Ω > 2067

Tightening torques

Location	Dim	Nm	ft lb
AW 70/71/72, AW 30/43, AW 30/40			
Torque converter-engine	M 10	48	35
Drive plate-torque converter	M 8	30	22
Transmission - oil filler pipe	M 8	24	18
Lever for gear selector	M 8	16	12
Nipple for coolant pipe	M 14	30	22
ZF 22 HP			
Drive plate - torque converter	M 8	17 - 27	13 - 20
Drive plate - torque converter	M 10	41 - 50	30 - 37
Torque converter housing - engine	M 10	35 - 50	26 - 37
Torque converter housing - engine	M 12	55 - 90	41 - 66
Valve body ass. - transmission housing	M 6	7 - 9	5.2 - 6.6
Lock plate - parking lock	M 6	9 - 11	6.6 - 8.1
Rear housing - transmission housing	M 8	20 - 26	15 - 19
Strainer - valve body ass.	M 6	7 - 9	5.2 - 6.6
Governor - counterweight - ratchet wheel	M 6	9 - 11	6.6 - 8.1
Oil pump - connecting plate	M 6	9 - 11	6.6 - 8.1
Companion flange - output shaft	M 20	85 - 115	63 - 85
Cylinder B4 - transmission housing	M 6	9 - 11	6.6 - 8.1
Plug - connecting plate	M 14	34 - 46	25 - 34
Plug - connecting plate	M 20	43 - 57	32 - 42
Torque converter housing			
- connecting plate, transmission housing	M 10	40 - 52	30 - 38
Oil sump - transmission housing	M 6	5 - 7	4 - 5
Plug, oil sump	M 10	13 - 17	10 - 13
Oil filler pipe - oil sump	M 24x1.5	85 - 115	63 - 85

Group 45 Propeller shaft

Tightening torque, companion flange	Nm	ft. lb
Steel universal joint, M 8, stage 1, diagonally	30	22
stage 2, diagonally angle-tighten	60°	60°
M 10, diagonally	50	37
Rubber universal joint, M 12	80	59
CV universal joint, stage 1, diagonally	8	6
stage 2, diagonally	30	22
Flange bolt, centre bearing	25	18

Group 46 Rear axle

Final drive 740/940/965-1994 (1031/1041)		
Alternative ratios	3.31:1, 3.54:1, 3.73:1, 3.91:1, 4.10:1	
Axial runout, ring gear, max.	mm	0.08
Backlash	mm	0.10 - 0.16
Torque, pinion bearing, new bearing	Nm	2.5 - 3.5
used bearing	Nm	1.5 - 2.5
Pre-tensioning of differential bearing	mm	0.05 - 0.08
Clearance, speedometer sensor (VSS) - induction gear	mm	0.5 - 1.2
Radial runout outer diameter, induction gear, max.	mm	0.3
Lubricant, see page 18.		
Tightening torques	Nm	ft. lb
Companion flange, pinion with spacer washer	180 - 320	148 - 184
pinion with pre-tensioning sleeve*	180 - 280	133 - 207
Note! pinion with used pre-tensioning sleeve* .. max	180 - 200	133 - 148
Bearing cap	30 + 60°	22 + 60°
Ring gear**	35 + 60°	26 + 60°
Inspection hatch - final drive (screw)	25	18
Driveshaft (bolts for pressure plate)	50	30
Oil plug, drainage	25	18
Oil plug, filling	34	25
Wheel nuts	85	63
* Check that torque is not exceeded. (check during tightening)		
** The bolts may only be used once.		

Final drive Multi link MK I, 964 1988-1994 (1035/1045)		
Alternative ratios.....	3.54:1, 3.73:1, 3.91:1	
Axial runout, ring gear, max.....mm	0.08	
Backlash.....mm	0.10 - 0.16	
Turning torque, pinion bearing, new bearing.....Nm	1.2 - 2.8	
used bearing.....Nm	1.0 - 2.5	
Pre-tensioning of differential bearing, 1 + 1 "notches" on each side		
Clearance, speedometer sensor (VSS) - induction gear.....mm	0.35 - 0.75	
Radial runout diameter, induction gear, max.....mm	0.2	
Lubricant, see page 18.		
Note! Expanding final drive housing, maximum of 1 turn on tool 999 5566.....mm	0.25 - 0.35	
Tightening torques		
	Nm	ft. lb
Companion flange, pinion (nut)*.....	180 - 320	133 - 207
Note! pinion with used pre-tensioning sleeve*.....max	180 - 200	133 - 148
Ring gear - differential housing (bolt)**.....angle-tighten	35 + 60°	26 + 60°
Inductive sensor - rear hatch (bolt).....	10	6 - 9
Inspection hatch - final drive (bolt).....	25	15 - 22
Side bracket - final drive (bolt).....	50	30 - 41
Lock washer - adjustment nut (bolt).....	50	30 - 41
Weight - final drive (bolt).....	25	15 - 21
Oil drainage plug.....	34	20 - 30
Oil filler plug.....	34	20 - 30
Driveshaft (bolt).....angle-tighten	30 + 90°	22 + 90°
Wheel nut, driveshaft - driveshaft.....angle-tighten	140 + 60°	103 + 60°
Wheel nuts.....	85	63

* Check that turning torque is not exceeded.
(check during tightening)

** The bolts may only be used once.

Final drive Multi link MK II, 960 1995- (1055/1065)		
Alternative ratios.....	3.73:1, 3.91:1, 4.10:1	
Axial runout, ring gear, max.....mm	0.08	
pinion, max.....mm	0.05	
Backlash, new bearings.....mm	0.10 - 0.16	
used bearings.....mm	0.10 - 0.18	
Turning torque, pinion bearing, new bearings.....Nm	2.0 - 4.5	
used bearings.....Nm	1.5 - 2.5	
Pre-tensioning of differential bearing, each side.....	0.05 - 0.08	
Clearance, speedometer sensor (VSS) - induction gear.....mm	0.6 ± 0.3	
Radial runout diameter, induction gear, max.....mm	0.3	
Lubricant, see page 18.		
Note! Expanding final drive housing, maximum of 1 turn on tool 999 5566.....mm	0.25 - 0.35	
Tightening torques		
	Nm	ft. lb
Companion flange, pinion *.....	180 - 320	133 - 207
Note! pinion with used pre-tensioning sleeve*.....max	180 - 200	133 - 148
Bearing cap (bolt).....angle-tighten	30 + 60°	22 + 60°
Ring gear - differential housing **.....angle-tighten	35 + 60°	26 + 60°
Inductive sensor - rear hatch (bolt).....	10	7
Inspection hatch - final drive (bolt).....	56	41
Oil level plug.....	34	25
Driveshaft nut.....angle-tighten	140 + 60°	103 + 60°
Wheel nuts.....	85	63

* Check that turning torque is not exceeded.
(check during tightening)

** The bolts may only be used once.

Section 5 Brakes

Group 51 Wheel brakes

Brake fluid		
Quality	DOT 4+	
Front wheel brakes		
Brake disc (ventilated).....type	I	II
outer diameter.....mm	287	280
thickness, new.....mm	22.0	26.0
replace at min.....mm	20.0	23.0
max. runout.....mm	0.035	0.035
max. thickness variation.....mm	0.008	0.008
Brake linings		
thickness, new.....mm	11.0	12.0
min.....mm	3.0	3.0
Rear wheel brakes		
Brake disc (solid).....type	I *	II **
outer diameter.....mm	281	265
thickness, new.....mm	9.6	10.0
replace at min.....mm	8.4	8.0
max. runout.....mm	0.05	0.04
max. thickness variation.....mm	0.012	0.008
Brake linings		
thickness, new.....mm	10.0	8.0
min.....mm	2.0	2.0
* Live rear axle		
** Multi link rear axle		
Master cylinder		
	1991	1992-
Type, tandem, with ABS		
Primary cylinder, diameter.....mm	22.20	23.81
Secondary cylinder, diameter.....mm	19.05	20.64
Type, tandem, without ABS		
Primary cylinder, diameter.....mm	23.81	23.81
Secondary cylinder, diameter.....mm	16.84	20.64

Reduction valve.....type	2	3
Begins reducing at.....MPa	3.5	2.5
Type 2 : 5 - door with 4 cyl. engines		
Type 3 : Others		

Servo cylinder		
Type, DBA, B 6304, -1994		
16 valve engines without turbo, L/H drive		
size.....inches	1x10	
ratio.....	1 : 4.0	
Others, - early 1995,		
size.....inches	2x8	
ratio.....	1 : 4.0	
Type, Allied Signal (DBA), B 6244/6254/6304 1995-,		
Others, late 1995-		
size.....inches	2x8	
ratio.....	1 : 5.2	

Group 55 Parking brake

Parking brake

Brake drum, diameter.....mm	160
radial runout, max.....mm	0.15
out-of-round, max.....mm	0.20
Full braking effect	
after adjusting at.....notches	4 - 8
when checking, max.....notches	11

Tightening torques

	Nm	ft. lb
Fasteners, front brake calipers.....	105	78
rear brake calipers.....	60	44
tie bolt, parking brake.....	50	37
shield, front.....	25	18
shield, rear.....	25	18
brake caliper, slide pin.....	30	22
Wheel nuts.....	85	63
Attachment nuts, master cylinder.....	30	22
Bleeder nipples, front.....	10	7
rear.....	4.5	3.3
Brake pipe, unions.....	14	10
Brake hoses to nipple.....	18	13
Nipple to caliper.....	18	13

Group 59 Anti-lock brakes (ABS)

Hydraulic unit, -1991.....	Volvo P/N	35 30 316
1992-1996.....	Volvo P/N	35 30 871
1996-.....	Volvo P/N	91 69 162

Control module, -1993.....	Volvo P/N	35 23 142
1993.....	Volvo P/N	91 30 197
1993-.....	Volvo P/N	91 28 853

Transient protector, -1993.....	Volvo P/N	13 63 569
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Sensors

front, -1994.....	Volvo P/N	35 15 092
1995-.....	Volvo P/N	91 27 410
rear, Bosch.....	Volvo P/N	35 15 093
VDO.....	Volvo P/N	13 98 321
resistance, front..... Ω		900 - 2200
rear..... Ω		600 - 1600
tightening torque.....Nm/(ft lb)		8 - 12 (6 - 9)

Tooth wheel

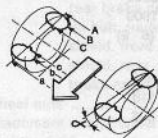
front.....	Volvo P/N	13 87 839
rear, 1041/1045/1065.....	Volvo P/N	68 14 113
1031/1055.....	Volvo P/N	68 14 806

Section 6 Suspension and steering

Group 60 Wheel alignment

General	940, 960-1994	960 1995-
Turning circle	9.9 metres	9.7
Steering wheel turns	3.5	3.5
Wheel alignment, front		
Caster 15" wheel	$5.0^\circ \pm 1^\circ$	$6^\circ \pm 0.5^\circ$
16" wheel	$4.5^\circ \pm 1^\circ$	$6^\circ \pm 0.5^\circ$
17" wheel		$6^\circ \pm 0.5^\circ$
Camber, * 960 1995- see diagram	$0.1^\circ \pm 1^\circ$	*
tolerance	$\pm 1^\circ$	$\pm 0.5^\circ$
symmetry error, difference between right and left sides	max. 0.7°	0.7°
Toe-in	mm 18' \pm 8'	18' \pm 8'

Conversion table for Toe-in, degrees (18' \pm 8') to mm (inches)



	A - a	B - b	C - c
15" wheel	3.2 ± 1.4 mm 0.13 ± 0.05 "	2.8 ± 1.3 mm 0.11 ± 0.05 "	2.2 ± 1.0 mm 0.09 ± 0.04 "
16" wheel	3.3 ± 1.5 mm 0.13 ± 0.05 "	2.8 ± 1.3 mm 0.11 ± 0.05 "	2.3 ± 1.0 mm 0.09 ± 0.04 "
17" wheel	3.4 ± 1.5 mm 0.13 ± 0.05 "	2.8 ± 1.3 mm 0.11 ± 0.05 "	2.5 ± 1.1 mm 0.10 ± 0.04 "

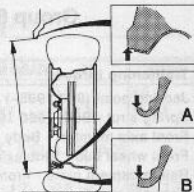
Wheel alignment, rear (960, Multi link MK I and MK II)

Toe-in	6' \pm 8'
max. deviation from symmetrical axis (thrust angle)	8'
Toe-in variation under load corresponding to 40 mm at panel edge	max./wheel 3'

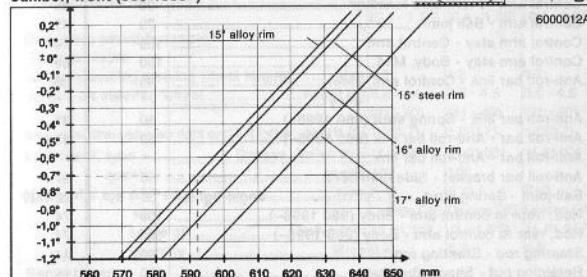
Camber see diagram

Panel edge dimensions

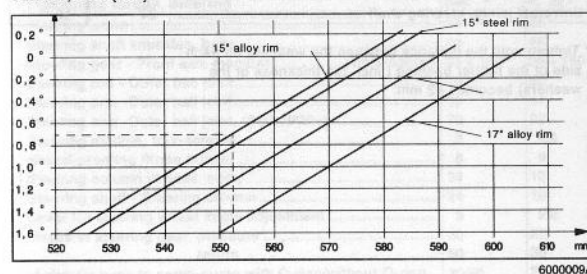
The panel edge dimension is used to read the camber as per the diagram.
The dimension is measured vertically above the wheel centre, between the panel edge and the edge of the wheel rim.



Camber, front (960 1995-)



Camber, rear (960)



Group 61 Front wheel suspension

Tightening torque	Nm	ft. lb
Jacking point (960 1995-)	25	18
Spring strut - Body (960 1995-)	65 + 90°	48 + 90°
Front axle member - Body	95	70
Front wheel hub - Stub axle	100 + 45°	74 + 45°
Reinforcement plate - Front axle member (960 1995-)	25	18
Control arm - Front axle member	90	66
Control arm - Ball joint	70	52
Control arm stay - Control arm	105	74
Control arm stay - Body, M14	120	89
Anti-roll bar link - Control arm, steel	90	66
alloy	*	*
Anti-roll bar link - Spring strut (960 1995-)	50	37
Anti-roll bar - Anti-roll bar link (960 1995-)	50	37
Anti-roll bar - Anti-roll bar link	*	*
Anti-roll bar bracket - Side member	50	37
Ball joint - Spring strut	30 + 90°	22 + 90°
Rod, front to control arm - Body (960 1996-)	100	74
Rod, rear to control arm - Body (960 1995-)	100	74
Steering rod - Steering arm	60	44
Retaining nut - Shock absorber	160	118
Upper bearing - Body	50	37
Upper bearing - Shock absorber	80	52
Universal joints, steering shaft	24	18

* Tighten until the distance between the washers on each side of the rubber bushing (incl. the thickness of the washers) becomes 42 mm.

Group 64 Steering

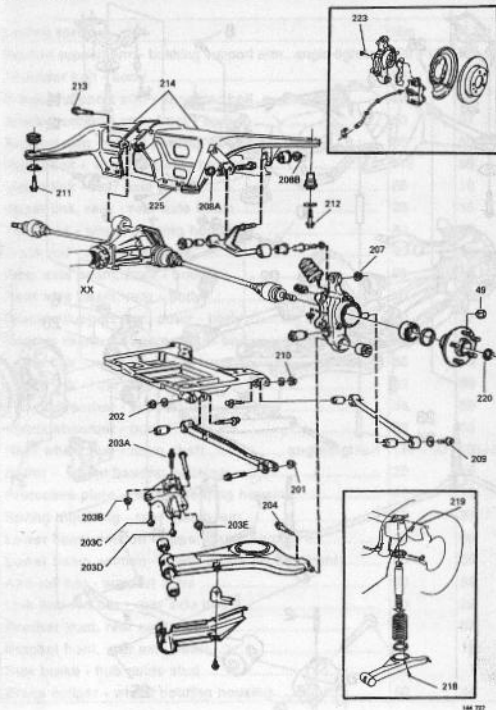
Steering gear			
Make	CAM GEAR	ZF	KOYO
Number of turns lock to lock	3.5	3.5	3.5
Ratio	16.9:1	16.9:1	16.9:1
Clearance between pre-tensioning piston and cover	mm 0.05 - 0.12	0.025 - 0.05	
Frictional torque, measured on input shaft	Nm 0.6 - 1.7 (0.4 - 1.25)	0.6 - 2.1 (0.4 - 1.55)	0.6 - 1.7 (0.4 - 1.25)
Checking servo balance: pump pressure			
when measuring steering wheel torque	Mpa 1.2	1.2	1.2
torque on steering wheel	Nm(ft lb) 3.5 - 4.5 (31 - 40)	3.5 - 4.5 (31 - 40)	3.5 - 4.5 (31 - 40)
max. deviation between right and left locks	Nm(ft lb) 1.0(0.7)	1.0(0.7)	1.0(0.7)
Lubricant, type	Grease, Volvo P/N 11 61 001	11 61 001	11 61 001
quantity	grams 100	100	
Hydraulic oil, ATF-oil	type F, G, alt. Dexron D/E	F, G, Dexron D/E	F, G, Dexron D/E
servo oil	Volvo P/N 11 61 317	11 61 317	11 61 317
quantity	litres 0.8	0.8	0.8
Servo pump			
Max. pressure	Mpa 9.3 - 10.0		
Tightening torque, steering			
	Nm	ft. lb	
Steering worm	34	25	
Steering shaft knuckles, bolts	24	18	
Steering gear - Front axle member	35 + 150°	26 + 150	
Steering rod - Outer ball joint	70	52	
Steering arm - Outer ball joint	60	44	
Steering arm - Outer ball joint, (960 1995-)	70	52	
Steering module, torx-screws	8	4.4	
Sound-proofing /Knee bolster	8	6	
Steering column in pass. comp.	24	18	
Steering shaft - Steering column	24	18	
Lever for steering wheel angle adjustment	3	2.2	
Hoses to steering gear, pressure	30	22	
return	50	30	
Hydraulic hose to servo-pump with O-ring/without O-ring	30/50	22/30	

Group 65 Rear wheel suspension

Multilink MK I

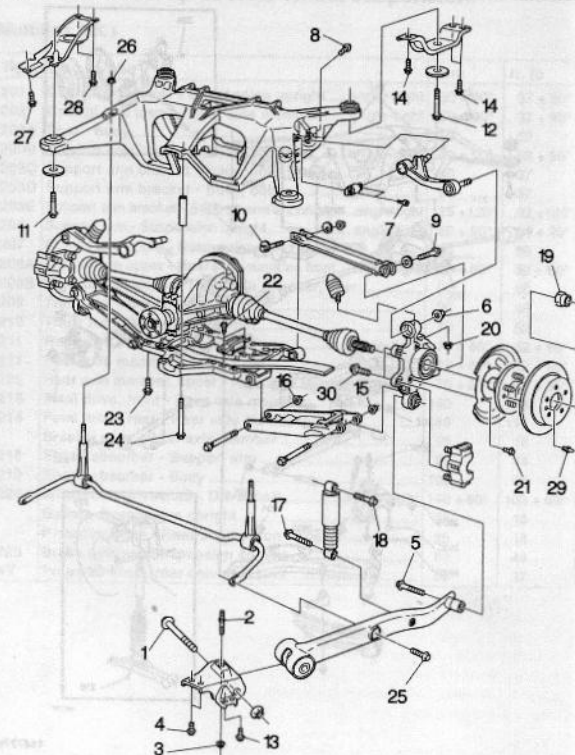
Tightening torque		Nm	ft. lb
201	Control arm lower - Suspension upright.....angle-tight	50 + 90°	37 + 90°
202	Control arm lower - Rear axle member.....angle-tight	50 + 90°	37 + 90°
203A	Stud - Body	70	52
203B	Support arm bracket - Body, nut	70 + 90°	52 + 90°
203C	Support arm bracket - Body, bolt	50	37
203D	Support arm bracket - Body, bolt	50	37
203E	Support arm bracket - Support arm anchorage.....angle-tight	125 + 120°	92 + 120°
204	Support arm - Suspension upright..... angle-tight	60 + 90°	44 + 90°
207	Control arm upper - Suspension upright	120	89
208A	Control arm upper - Rear axle member, front... angle-tight	70 + 60°	52 + 60°
208B	Control arm upper - Rear axle member, rear	90	66
209	Track rod - Suspension upright.....	90	66
210	Track rod - Rear axle member.....	70	52
211	Rear axle member, front - Body	70 + 60°	52 + 60°
211	Rear axle member, rear - Body	70 + 60°	52 + 60°
225	Rear axle member, upper - Rear axle member, lower	70 + 30°	52 + 30°
213	Final drive, front - Rear axle member	160	118
214	Final drive, rear - Rear axle member	160	118
	Bracket wire - Rear axle member	25	18
218	Shock absorber - Support arm	60	44
219	Shock absorber - Body	100	66
220	Wheel nut, driveshaft - Driveshaft	140 + 60°	103 + 60°
	Buffer - Suspension upright	25	18
	Protector plate - Rear suspension upright	25	18
223	Brake caliper - Suspension upright	60	44
XX	Propeller shaft, rear universal joint	50	37

Multilink MK I



144 727

Multilink MK II



Multilink MK II

Tightening torque		Nm	ft.lb	
1	Bracket support arm - bushing support arm.. angle-tighten	125 + 120°	92 + 120°	nut
2	Shoulder bolt - body	80	59	bolt
3	Bracket support arm - shoulder bolt	80	59	nut
4	Bracket support arm, front - body	50	37	bolt
5	Support arm - wheel bearing housing	80	59	bolt
6	Upper link - wheel bearing housing	115	85	nut
7	Upper link - rear axle beam	25	18	bolt
8	Upper link, rear - rear axle beam	25	18	bolt
9	Track rod - wheel bearing housing	80	59	bolt
10	Track rod - rear axle beam	90	66	nut
11	Rear axle beam, front - body	80	59	nut
12	Rear axle beam, rear - body	80	59	bolt
13	Bracket support arm, outer - body	50	37	bolt
14	Bracket rear axle beam, rear - body	60	44	bolt
15	Lower link - wheel bearing housing	80	59	nut
16	Lower link - rear axle beam	80	59	nut
17	Shock absorber - support arm	80	59	bolt
18	Shock absorber - body	80	59	bolt
19	Rear wheel hub - drive shaft..... angle-tighten	140 + 60°	103 + 60°	nut
20	Buffer - wheel bearing housing	25	18	nut
21	Protective plate - wheel bearing housing	25	18	bolt
22	Spring mounting - rear axle beam	50	37	bolt
23	Lower beam section - upper beam section	80	59	bolt
24	Lower beam section - upper beam section front	80	59	bolt
25	Anti-roll bar - support arms	80	59	bolt
26	Link anti-roll bar - rear axle beam	30	22	nut
27	Bracket front, rear axle beam	50	37	bolt
28	Bracket front, rear axle beam	25	18	bolt
29	Disc brake - hub guide stud	10	7	bolt
30	Brake caliper - wheel bearing housing	60	44	bolt

Section 7. Springs, shock absorbers, wheels

Group 77 Wheels, tyres, hubs

Wheels

Wheel rims

	Aluminum	Steel
Lateral runout.....max.	0.8	1.0
Radial runout.....max.	0.6	0.8

Tyre pressures, cold tyres, kPa(psi)

Tyre size	1 - 3 passengers (comfort)		Full load (economy)	
	Front	Rear	Front	Rear
740				
4-door	190 (28)	190 (28)	210 (30) 36*	260 (38) 36*
5-door	190 (28)	210 (30)	210 (30)	280 (41) 36*
940				
4-door	190 (28)	190 (28)	210 (30) 36*	260 (38) 36*
5-door	190 (28)	210 (30)	210 (30)	280 (41) 36*
960				
4-door, -1994	200 (29) 28*	190 (28)	210 (30) 36*	260 (38) 36*
1995-	200 (29) 28*	200 (29) 28*	210 (30) 36*	260 (38) 36*
5-door	190 (28)	210 (30) 28*	210 (30)	280 (41) 36*
Spare tyre				
'Temporary spare'				
155R15 R	350 (50) 40*	350 (50) 40*	350 (50) 40*	350 (50) 40*
T125/90 R15	400 (60)	400 (60)	400 (60)	400 (60)

* For certain markets (psi). Check with owners manual.

For sustained driving at high speed (above 160 km/h) tyre pressure in cold tyres should be raised by 30 kPa (4PSI).

Tightening torques

	Nm	ft. lb
Wheel	85	63

Section 8 Body and interior

Group 84 Glass and mirrors

Component	Power (W)	Resistance(Ω)
Heated rear window, 745/945/965.....	150	
744	185	
944/964	200	0.72 ± 0.07
Heated door mirrors	21	

Group 87 Air conditioning (A/C)

Refrigerant

type R 12, -1992; R 134 a, 1993-
quantity,

1991, B 204 FT.....g 1000

B 6304 F.....g 1250

others.....g 1100

1992, Diesel, B 204/234 ...g 1050

others.....g 950

1993-, 4 cylinders.....g 950

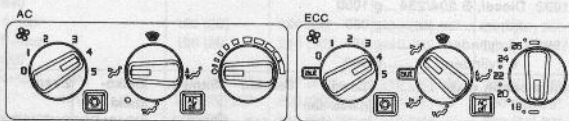
6 cylinders.....g 900

Compressor, make.....	Zexel (Diesel-Kiki)	Sanden	Sanden	Seiko- Seiki	Zexel
designation	DKS 15BH	SD 510	SD 709, SD 7H15	SS 121 DS5	DKS 15CH
no. of cylinders.....	6	5	7	-	6
cylinder volume.....cm ³	152.6	161.0	154.9	130 (7800)	147.0
max. speed.....r/s (rpm)	115 (7000)	100 (6000)	100 (6000)		140 (8400)
safety valve actuated at					
type R 12.....bar	32 ± 3	32 ± 3	32 ± 3	37 ± 3.7	40.2 ± 2.9
type R 134 a.....bar			38 ± 3		
Lubricating oil,					
R 12.....Volvo P/N	11 60 048	11 60 048	11 60 048		
R 134 a.....Volvo P/N			11 61 425	11 61 426	11 61 407
lubricant volume.....ml	200	240	240	220	200

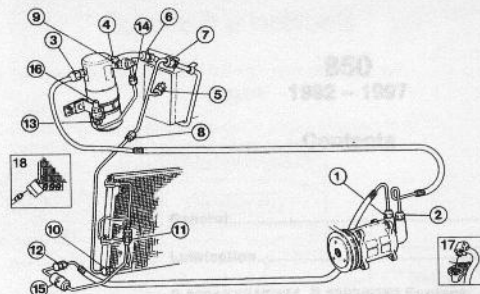
	Cut-In		Cut-out	
	R 12	Rr 134 a	R 12	R 134 a
Low-pressure switch (Pressostat).....bar	3.2 ± 0.15	3.1 ± 0.15	1.8 ± 0.1	1.6 ± 0.1
Pressure monitors				
high-pressure switch-offbar	20 ± 3	20 ± 3	28 ± 1.5	30 ± 1.5
Radiator fan,				
low speed.....bar	15 ± 1	18 ± 1	11 ± 1	14 ± 1
high speed.....bar	20 ± 1.5	23 ± 1	16 ± 1	19 ± 1

Performance test**Conditions**

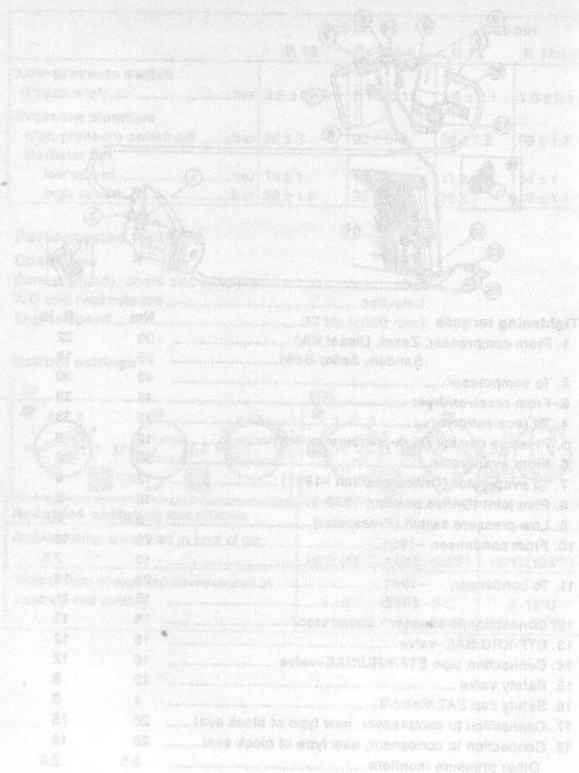
Bonnet (hood), doors and windows.....shut
 A/C and recirculation activated
 Engine speed33 r/s (2000 rpm)

Control settings

Recorded operating conditions			
Ambient temp. measured in front of car	20°C (68°F)	30°C (86°F)	40°C (104°F)
Temperature of expelled air measured at centre panel vents.	5 - 8°C (41 - 46°F)	5 - 8°C (41 - 46°F)	8 - 12°C (46 - 54°F)

**Tightening torques**

	Nm	ft. lb
1. From compressor, Zexel, Diesel Kiki.....	30	22
Sanden, Seiko-Seiki.....	25	18
2. To compressor.....	40	30
3. From receiver/dryer.....	45	33
4. To receiver/dryer.....	45	33
5. Pressure monitor (high-pressure switch).....	12	9
6. From evaporator.....	30	22
7. To evaporator (Orifice position -1991).....	12	9
8. Pipe joint (Orifice position 1992-).....	12	9
9. Low-pressure switch (Pressostat).....	3.5	2.5
10. From condenser, -1991.....	20	15
1992-.....	10	7.5
11. To condenser, -1991.....	25	18
1992-.....	15	11
12. Connection to silencer - compressor.....	18	13
13. ETF/KRU/SAE-valve.....	16	12
14. Connection pipe ETF/KRU/SAE-valve.....	16	12
15. Safety valve.....	12	9
16. Safety cap SAE/Retrofit.....	4	3
17. Connection to compressor, new type of block seal.....	20	15
18. Connection to condenser, new type of block seal.....	20	15
Other pressure monitors.....	3.5	2.5



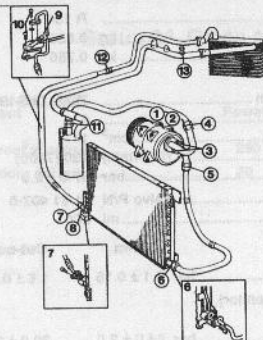
Section 0 General

850
1992 - 1997

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Tightening torque



87016555

	Nm	ft.lb
1. Screws, brackets/engine anchorage	20	15
2. Screws, compressor brackets	40	30
3. Screws, compressor pipe flange	24	18
4. Connection to compressor	60	44
5. Connection from compressor	45	33
6. Connection to condenser	20	15
7. Connection from condenser	20	15
8. Connection, pressure monitor	10	7
9. Connection, pressure monitor	8	6
10. Junction	20	15
11. Connection from receiver/drier	30	22
12. Expansion valve	30	22
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steel seat	8	6

Diagnostic trouble codes

Contents

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Note!

For model year 1996 and later, the diagnostic socket in the engine compartment has been replaced with a coupling tab inside the car, for connection to the Volvo System Tester.
Error codes with explanatory text are shown directly on the instrument's display window, so the new codes will not be listed in the pocket data booklet in the future.

TRANSMISSION (A1)**SYSTEM:**

AW 30-43 / AW 50-42

MODE: 1

- 111 - No faults found by diagnostic system.
- 112 - Solenoid S1 short-circuit to supply.
- 113 - Transmission control module (TCM) fault.
- 114 - Program selector open-circuit or short-circuit to supply.
- 121 - Solenoid S1 short-circuit to ground or control module fault.
- 122 - Solenoid S1 open-circuit.
- 123 - Solenoid STH short-circuit to supply.
- 124 - Program selector faulty or short-circuit to ground.
- 131 - Solenoid STH open-circuit, short-circuit to ground or control module fault.
- 132 - Transmission control module (TCM) fault.
- 134 - Faulty load signal from fuel system.
- 141 - Oil temp. sensor short-circuit to ground.
- 142 - Oil temp. sensor open-circuit.
- 143 - Kick-down switch faulty or short-circuit to ground.
- 211 - Transmission control module (TCM) fault.
- 212 - Solenoid S2 short-circuit to supply.
- 213 - Throttle position (TP) signal too high.
- 221 - Solenoid S2 short-circuit to ground or control module fault.
- 222 - Solenoid S2 open-circuit.
- 223 - Throttle position (TP) signal too low.
- 231 - Throttle position (TP) signal irregular.
- 232 - Speedometer signal absent.
- 233 - Speedometer signal faulty.
- 235 - Oil temperature too high.
- 245 - Torque limiting signal short-circuit or open-circuit.
- 311 - Engine speed signal from gearbox absent.
- 312 - Engine speed signal from gearbox faulty.
- 313 - Gear position sensor signal faulty.
- 321 - Gear changing too slow.
- 322 - Incorrect gear change ratio.
- 323 - Lock-up slipping or not engaged.
- 331 - Solenoid SL short-circuit to supply.
- 332 - Solenoid SL open-circuit or control module fault.
- 333 - Solenoid SL short-circuit to ground or control module fault.

MODE: 2

- 144 - Gear selector in position R OK.
- 214 - Gear selector in position D OK.
- 224 - Gear selector in position 3 OK.
- 234 - Gear selector in position L OK.
- 241 - Gear selector in position N OK.
- 242 - Gear selector in position P OK.
- 243 - Undefined signal from program selector.
- 244 - Economy position OK.
- 314 - Sport position OK.
- 324 - Winter position OK.
- 334 - Brake light switch OK.
- 341 - Kick-down switch OK.

MODE: 3

- Solenoid S1 operating.
- Solenoid S2 operating.
- Solenoid SL operating.
- Solenoid STH operating.
- Indicating LED in combination instr. flashes.
- Malfunction Indicator Lamp (MIL) flashes.
- Drive compensation and torque control signals are tested with engine idling.
- Engine speed changes.

MODE: 4

- 311 - Normal speed
- 312 - x2 speed
- 313 - x10 speed
- 342 - Solenoid S1
- 343 - Solenoid S2
- 344 - Solenoid SL
- 411 - Solenoid STH
- 412 - Indicating lamp
- 414 - Drive compensation (P&N)
- 422 - Torque control (TC2)
- 423 - Torque control (TC1)
- 431 - Malfunc.Indic.Lamp (MIL)
- 432 - Torque control (TCT)

MODE: 5

- 115 - Oil temp.
- 125 - Throttle signal status
- 135 - Engagement time status
- 424 - Speed
- 434 - Gearbox rpm
- 444 - Throttle opening

MODE: 6

- 125 - Reset throttle signal
- 135 - Reset engagement time

FUEL SYSTEM (A2)

SYSTEM:

- LH 2.4 MFI system
- LH 3.2 MFI system
- REGINA MFI system
- MOTRONIC 1.8 MFI system
- MOTRONIC 4.3 SFI system
- FENIX 5.2 MFI system

MODE: 1

- 111 - No faults found by diagnostic system.
- 112 - Engine control module (ECM) fault.
- 113 - FENIX 5.2,
 - LH 3.2: Short term fuel trim upper limit.
 - LH 2.4,
 - REGINA: Short term fuel trim upper or lower limit.
 - MOTR. 1.8: Injectors, group 1 faulty signal.
- 115 - MOTR. 1.8: Injectors, group 2 faulty signal.
- FENIX 5.2,
 - MOTR. 4.3: Injector, cylinder 1, faulty signal.
- 121 - LH 3.2,
 - LH 2.4,
 - MOTR. 1.8,
 - MOTR. 4.3: Mass air flow (MAF) sensor signal absent or faulty.
 - FENIX 5.2,
 - REGINA:
 - Manifold absolute pressure (MAP) sensor signal absent or faulty.
 - Intake air temp. (IAT) sensor signal absent or faulty.
 - 122 - Engine coolant temp. (ECT) sensor signal absent or faulty.
 - 123 - Injector, cylinder 2, faulty signal.
 - 125 -
 - 131 - LH 3.2,
 - LH 2.4:
 - MOTR. 1.8,
 - MOTR. 4.3: RPM sensor signal absent.
 - 132 - Battery voltage too low or too high.
 - 133 - Throttle position (TP) switch faulty at idling.
 - 135 - Injector, cylinder 3, faulty signal.
 - 143 - Front knock sensor (KS) signal, absent or faulty.
 - 144 - Load signal absent or faulty.
 - 145 - Injector, cylinder 4, faulty signal.
 - 152 - Air pump valve signal absent or faulty.
 - 153 - Rear oxygen sensor (HO2S) signal, absent or faulty.

- 154 - Leak in EGR-system.
 155 - Injector, cylinder 5, faulty signal.
 211 - CO potentiometer signal absent or faulty.
- 212 - LH 3.2,
 LH 2.4,
 MOTR. 1.8,
 FENIX 5.2,
 REGINA: Oxygen sensor (HO2S) signal absent or faulty.
 MOTR. 4.3: Front oxygen sensor (HO2S) signal, absent or faulty.
- 213 - Throttle position (TP) switch signal faulty at full load.
- 214 - FENIX 5.2: RPM sensor signal.
 MOTR. 1.8,
 MOTR. 4.3: RPM sensor signal absent intermittently.
- 221 - REGINA: Long term fuel trim upper or lower limit.
 FENIX 5.2,
 LH 3.2,
 LH 2.4,
 MOTR. 1.8: Long term fuel trim upper limit at part load.
- 222 - REGINA: System relay signal absent or faulty.
 FENIX 5.2: Main relay signal absent or faulty.
- 223 - REGINA,
 FENIX 5.2,
 LH 3.2,
 LH 2.4,
 MOTR. 1.8: Idle air control (IAC) valve signal absent or faulty.
 MOTR. 4.3: Idle air control (IAC) valve signal opening absent or faulty.
- 225 - FENIX 5.2,
 MOTR. 4.3: A/C pressure sensor signal absent or faulty.
- 231 - FENIX 5.2,
 LH 3.2,
 MOTR. 1.8: Long term fuel trim lower limit at part load.
 LH 2.4,
 MOTR. 4.3,
 REGINA: Long term fuel trim upper or lower limit at part load.
- 232 - FENIX 5.2,
 LH 3.2,
 MOTR. 1.8: Long term fuel trim upper limit at idling.
 LH 2.4,
 MOTR. 4.3,
 REGINA: Long term fuel trim upper or lower limit at idling.
- 233 - Long term idle air trim outside control range.

- 235 - EGR-controller signal absent or faulty.
 241 - EGR-system flow fault.
 243 - Throttle position (TP) sensor signal outside voltage range.
 245 - Idle air control (IAC) valve signal closing absent or faulty.
 311 - Speedometer signal absent.
 312 - No knock enrichment signal from ignition control module (ICM).
 313 - EVAP valve signal absent or faulty.
 314 - Camshaft position (CMP) sensor signal absent or faulty.
 315 - EVAP system.
 321 - Cold-start valve signal short-circuit to ground or absent.
 322 - Mass Air Flow (MAF) sensor burnoff signal too low.
 323 - Malfunction Indicator Lamp (MIL) signal faulty.
 325 - Loss of memory.
 335 - Request for Malfunction Indicator Lamp (MIL) from AW 50-42.
 342 - A/C relay control signal faulty.
 343 - Fuel pump relay control signal faulty.
 344 - Exhaust gas temp. sensor signal absent or faulty.
 411 - Throttle position (TP) sensor signal outside voltage range.
 412 - Short-circuit in full-throttle switch.
 413 - EGR temperature sensor signal absent or faulty.
 414 - Boost pressure control, boost pressure too high.
 416 - Boost pressure reduced from AW 50-42.
 425 - Rear oxygen sensor (Ho2S), trim
 432 - Temp. warning in control module box level 1.
 433 - Rear knock sensor (KS) signal absent or faulty.
 435 - Front oxygen sensor (HO2S) slow.
 436 - Rear oxygen sensor (HO2S) max. compensation.
 442 - Air pump relay signal absent or faulty.
 443 - Catalytic converter (TWC) efficiency, low.
 444 - Acceleration sensor.
 451 - Misfire, excessive emission cyl. 1.
 452 - Misfire, excessive emission cyl. 2.
 453 - Misfire, excessive emission cyl. 3.
 454 - Misfire, excessive emission cyl. 4.
 455 - Misfire, excessive emission cyl. 5.
 511 - Long term fuel trim lower limit at idling.
 512 - Short term fuel trim lower limit.
 513 - Temperature warning control module box level 2.
 514 - Engine cooling fan faulty at half speed.
 515 - Engine cooling fan faulty at full speed.

- 521 - FENIX 5.2, MOTR. 4.3 Oxygen sensor (HO2S) heating faulty.
Heating front oxygen sensor (HO2S) faulty.
Heating rear oxygen sensor (HO2S) faulty.
- 522 - Signal to engine cooling fan in control module box short-circuit to supply.
- 523 - Torque control signal to gearbox faulty.
- 524 - Final stage, group A.
- 531 - Final stage, group B.
- 532 - Final stage, group C.
- 533 - Final stage, group D.
- 534 - Turbocharger (TC) control valve.
- 535 - EVAP valve.
- 541 - Misfire emission level more than one cyl.
- 542 - Misfire emission level at least one cyl.
- 543 - Misfire catalytic converter (TWC) damage more than one cyl.
- 544 - Misfire catalytic converter (TWC) damage at least one cyl.
- 545 - Misfire resulting in catalytic converter (TWC) damage cyl. 1.
- 551 - Misfire resulting in catalytic converter (TWC) damage cyl. 2.
- 552 - Misfire resulting in catalytic converter (TWC) damage cyl. 3.
- 553 - Misfire resulting in catalytic converter (TWC) damage cyl. 4.
- 554 - Misfire resulting in catalytic converter (TWC) damage cyl. 5.
- 555 -

MODE: 2

- 114 - A/C control OK.
- 124 - Gear control on/off P/N position OK.
- 134 - A/C compressor engagement OK.
- 141 - RPM sensor signal OK.
- 331 - Engine speed (RPM) signal from ignition control module OK.
- 332 - FENIX 5.2,
LH 3.2: Throttle position (TP) sensor at idling OK.
MOTR. 1.8,
MOTR. 4.3:
LH 2.4,
REGINA: Throttle (TP) switch at idling OK.
- 333 - FENIX 5.2,
LH 3.2,
MOTR. 1.8,
MOTR. 4.3: Throttle position (TP) sensor at wide open throttle (WOT) OK.
LH 2.4,
REGINA: Throttle (TP) switch at wide open throttle (WOT) OK.
- 342 - Camshaft position sensor (CMP) OK.
- 343 - Vehicle speed sensor (VSS) signal OK.

MODE: 3

LH 2.4

Warning: Engine cooling fan about to run (A/C only, not 240).
 Engine cooling fan runs at half speed for 3 secs.
 (A/C only, not 240).
 Engine cooling fan runs at full speed for 3 secs.
 (A/C only, not 240).

Injectors operate at 13 Hz.
 Idle air control (IAC) valve operates at 1 Hz.
 EVAP canister solenoid operates at 2 Hz.
 (16-valve engines only)
 Cold-start injector operates at 13 Hz.
 (2-valve engines only)

LH 3.2

Air pump relay operates.
 Air pump valve operates.
 Injectors operate at 13 Hz.

MOTR. 1.8

Idle air control (IAC) valve operates at 1 Hz.
Warning: Engine cooling fan about to run.
 EGR controller operates at 2.5 Hz.
 Air pump operates.

Engine cooling fan operates at half speed for 3 secs.
 Engine cooling fan operates at full speed for 3 secs.
 Injectors operate at 13 Hz.
 Idle air control (IAC) valve operates at 1 Hz.
 A/C relay operates at 1 Hz.
 EGR controller operates at 2.5 Hz.
 RPM signal simulates.

REGINA

Injectors operate at 13 Hz.
 Idle air control (IAC) valve operates at 1 Hz.
 Cold-start valve operates at 13 Hz.
 Auxiliary relay operates at 1 Hz.
 Fuel pump runs.

MOTR. 4.3

Warning: Engine cooling fan about to run.
 EGR controller.
 Turbocharger (TC) control valve.
 EVAP valve.
 Engine cooling fan at half speed.
 Engine cooling fan at full speed.
 Injectors.
 Idle air control (IAC) valve.
 A/C relay.
 RPM signal simulated.

MODE: 4

311 - FENIX 5.2 Normal speed
 312 - FENIX 5.2 x2 speed
 313 - FENIX 5.2 x10 speed

115 - FENIX 5.2 Injector, cyl. 1
 125 - FENIX 5.2 Injector, cyl. 2
 135 - FENIX 5.2 Injector, cyl. 3
 145 - FENIX 5.2 Injector, cyl. 4
 152 - FENIX 5.2 Air pump valve
 155 - FENIX 5.2 Injector, cyl. 5
 222 - FENIX 5.2 Main relay
 223 - FENIX 5.2 Idle air control (IAC) valve
 235 - FENIX 5.2 EGR controller
 342 - FENIX 5.2 A/C relay
 343 - FENIX 5.2 Fuel pump relay
 442 - FENIX 5.2 Air pump relay
 514 - FENIX 5.2 Engine cooling fan half speed
 515 - FENIX 5.2 Engine cooling fan full speed
 523 - FENIX 5.2 Fan control module box

ABS (A3)

SYSTEM:

ABS 850
ABS 700/900

MODE: 1

- 111 - No faults found by diagnostic system.
- 121 - Left front wheel sensor, circuit fault below 40 km/h (25 mph).
- 122 - Right front wheel sensor, circuit fault below 40 km/h (25 mph).
- 123 - Left rear wheel sensor, circuit fault below 40 km/h (25 mph).
- 124 - Right rear wheel sensor, circuit fault below 40 km/h (25 mph).
- 125 - Faulty signal from at least one wheel sensor for prolonged period.
- 135 - Control module fault.
- 141 - Faulty pedal sensor, short-circuit to ground or supply.
- 142 - ABS 850: Faulty brake light switch, open-circuit or short-circuit.
ABS 700/900: Faulty brake light switch, open-circuit.
- 143 - Control module fault.
- 144 - Brake discs have been overheated.
- 151 - Left front wheel sensor, open-circuit or short-circuit to supply.
- 152 - Right front wheel sensor, open-circuit or short-circuit to supply.
- 155 - Rear axle sensor, open-circuit or short-circuit to supply.
- 211 - Left front wheel sensor, signal absent when moving off.
- 212 - Right front wheel sensor, signal absent when moving off.
- 213 - Left rear wheel sensor, signal absent when moving off.
- 214 - Right rear wheel sensor, signal absent when moving off.
- 215 - Valve relay, open-circuit or short-circuit.
- 221 - Left front wheel sensor, signal absent in ABS function.
- 222 - Right front wheel sensor, signal absent in ABS function.
- 223 - Left rear wheel sensor, signal absent in ABS function.
- 224 - Right rear wheel sensor, signal absent in ABS function.
- 231 - Left front wheel sensor, signal absent.
- 232 - Right front wheel sensor, signal absent.
- 235 - Rear axle sensor, signal absent.
- 311 - Left front wheel sensor, open-circuit or short-circuit.
- 312 - Right front wheel sensor, open-circuit or short-circuit.
- 313 - Left rear wheel sensor, open-circuit or short-circuit.
- 314 - Right rear wheel sensor, open-circuit or short-circuit.

- 321 - Left front wheel sensor, intermittent disturbance at speeds of more than 40 km/h (25mph).
- 322 - Right front wheel sensor, intermittent disturbance at speeds of more than 40 km/h (25mph).
- 323 - Left rear wheel sensor, intermittent disturbance at speeds of more than 40 km/h (25mph).
- 324 - Right rear wheel sensor, intermittent disturbance at speeds of more than 40 km/h (25mph).
- 411 - ABS 850: Left front wheel inlet valve, open-circuit or short-circuit.
ABS 700/900: Left front wheel valve, open-circuit or short-circuit.
- 412 - ABS 850: Left front wheel return valve, open-circuit or short-circuit.
- 413 - ABS 850: Right front wheel inlet valve, open-circuit or short-circuit.
ABS 700/900: Right front wheel valve, open-circuit or short-circuit.
- 414 - Right front wheel return valve, open-circuit or short-circuit.
- 415 - Rear valve, open-circuit or short-circuit.
- 421 - Rear inlet valve, open-circuit or short-circuit.
- 422 - Rear return valve, open-circuit or short-circuit.
- 423 - TRACS valve, open-circuit or short-circuit.
- 424 - TRACS pressure switch, faulty or short-circuit.
- 441 - Control module fault.
- 442 - Pump pressure too low.
- 443 - ABS 850: Pump motor, electrical or mechanical fault.
ABS 700/900: Pump motor/relay, electrical or mechanical fault.
- 444 - No supply to hydraulic unit valves.

MODE: 4

- 311 - Normal speed
- 312 - x2 speed
- 313 - x10 speed

TCU (A5)

SYSTEM:

TCU

MODE: 1

- 111 - No faults found by diagnostic system.
- 242 - Turbocharger (TC) control valve signal absent or faulty.
- 312 - No knock signal from ignition control module.
- 342 - A/C blocking relay signal absent or faulty.
- 421 - Boost pressure signal in control module faulty.
- 423 - Throttle position (TP) sensor signal outside voltage range.
- 424 - Fuel control module load signal absent or faulty.
- 431 - Radiator temp. sensor signal absent or faulty.

MODE: 3

Warning: Engine cooling fan about to run.

Engine cooling fan half speed for 3 secs. LED displays steady beam.

Engine cooling fan full speed for 3 secs. LED displays steady beam.

Turbocharger (TC) control valve operates at 2 Hz.

A/C blocking relay operates at 1 Hz.

IGNITION (DI) SYSTEM (A6)

SYSTEM:

EZ 129K
EZ 116K
REX

MODE: 1

- 111 - No faults found by diagnostic system.
- 112 - Ignition control module (ICM) fault.
- 123 - Engine coolant temperature signal from engine control module (ECM) absent or faulty.
- 131 - RPM sensor signal absent.
- 142 - Ignition control module (ICM) fault.
- 143 - EZ 129K: Front knock sensor (KS) signal absent or faulty.
- EZ 116K:
REX: Knock sensor (KS) signal absent or faulty.
- 144 - Engine control module (ECM) load signal absent or faulty.
- 154 - Leak in EGR-system.
- 214 - RPM sensor signal absent intermittently.
- 224 - Engine coolant temperature (ECT) signal absent or faulty.
- 234 - No throttle position (TP) switch signal at idling.
- 241 - EGR system flow faulty.
- 243 - Throttle position (TP) sensor signal absent or faulty.
- 311 - Vehicle speed sensor (VSS) signal absent or faulty.
- 314 - Camshaft position sensor (CMP) signal absent or faulty.
- 324 - Camshaft position sensor (CMP) signal absent intermittently.
- 411 - Engine control module (ECM) throttle position (TP) sensor signal absent or faulty.
- 413 - EGR temp. sensor signal faulty.
- 432 - High temperature in control module box level 1.
- 433 - Rear knock sensor (KS) signal absent or faulty.
- 513 - High temperature in control module box level 2.

MODE: 2

- 141 - RPM sensor signal OK.
- 334 - Throttle position (TP) switch at idling OK.
- 342 - Camshaft position sensor (CMP) OK.
- 343 - Vehicle speed signal OK.
- 344 - Throttle position (TP) sensor OK.

MODE: 3

EZ 129 K

Warning: Engine cooling fan about to run.

Variable-flow inlet manifold solenoid valve operates at 2 Hz (1993 models).

Engine cooling fan operates at half speed for 3 secs. (15 secs. -1992 models).

Engine cooling fan operates at full speed for 3 secs. (15 secs. -1992 models).

EGR controller operates at 2.5 Hz.

Variable-flow inlet manifold solenoid valve operates at 2 Hz (1992 models).

Engine speed signal simulated at 50 Hz.

EZ 116 K

EGR controller operates at 2 Hz.

COMBINED INSTRUMENT (A7)

SYSTEM:

COMBI

MODE: 1

111 - No faults found by diagnostic system.

112 - Fuel gauge sensor short-circuit.

113 - Fuel gauge sensor open-circuit.

121 - Temperature signal interval too short.

122 - Temperature signal interval too long.

123 - Digital output 48 pulse short-circuit to supply.

131 - Digital output 12 pulse short-circuit to supply.

132 - No rpm sensor signal.

133 - Tank signal to trip computer short-circuit to supply.

MODE: 3

Fuel gauge indicates half tank.

Engine coolant temperature gauge on edge of red sector.

Speedometer needle in vertical position.

Odometer augmented to 500 m.

Tachometer needle in vertical position.

MODE: 4

151 - Set counters to zero

311 - Normal speed

312 - x2 speed

313 - x10 speed

MODE: 5

112 - Odometer

114 - Odometer manip. time

121 - Mileage since service

122 - Months since service

123 - Eng. hours since service

124 - Speedometer type

131 - Service cond. mileage

132 - Service condition months

133 - Serv. cond. eng. hours

MODE: 6

112 - Odometer

124 - Speedometer type

131 - Serv. cond. mileage

132 - Service condition time

133 - Serv. cond. eng. hours

CLIMATE CONTROL, ECC 850 (B1)

SYSTEM:

ECC (850)

MODE: 1

- 111 - No faults found by diagnostic system.
- 121 - Outside temperature sensor, short-circuit to ground.
- 122 - Outside temperature sensor, open-circuit or short-circuit to supply.
- 123 - Interior temperature sensor, driver's side, short-circuit to ground.
- 124 - Interior temperature sensor, driver's side, open-circuit or short-circuit to supply.
- 125 - Interior temperature sensor, passenger side, short-circuit to ground.
- 126 - Interior temperature sensor, passenger side, open-circuit or short-circuit to supply.
- 131 - Duct temperature sensor, driver's side, short-circuit to ground.
- 132 - Duct temperature sensor, driver's side, open-circuit or short-circuit to supply.
- 133 - Duct temperature sensor, passenger side, short-circuit to ground.
- 134 - Duct temperature sensor, passenger side, open-circuit or short-circuit to supply.
- 135 - Engine coolant temp. no frequency signal.
- 141 - Temperature selector, driver's side, faulty control signal.
- 143 - Temperature selector, passenger side, faulty control signal.
- 145 - Air distribution selector, faulty control signal.
- 151 - Blower speed selector, control signal absent or too high.
- 152 - Blower speed selector control signal, short-circuit to ground.
- 211 - Shutter motor position sensor, driver's side, open-circuit or short-circuit to supply.
- 212 - Shutter motor position sensor, driver's side, short-circuit to ground.
- 221 - Shutter motor position sensor, passenger side, open-circuit or short-circuit to supply.
- 222 - Shutter motor position sensor, passenger side, short-circuit to ground.
- 231 - Ventilation shutter motor position sensor, open-circuit or short-circuit to supply.
- 232 - Ventilation shutter motor position sensor, short-circuit to ground.
- 233 - Floor defrost shutter motor position sensor, open-circuit or short-circuit to supply.
- 234 - Floor defrost shutter motor position sensor, short-circuit to ground.
- 235 - Recirculation shutter motor position sensor, open-circuit or short-circuit to supply.
- 236 - Recirculation shutter motor position sensor, short-circuit to ground.

- 311 - Shutter motor driver's side, short-circuit to ground or supply.
- 312 - Shutter motor passenger side, short-circuit to ground or supply.
- 313 - Ventilation shutter motor, short-circuit to ground or supply.
- 314 - Floor defrost shutter motor, short-circuit to ground or supply.
- 315 - Recirculation shutter motor, short-circuit to ground or supply.
- 321 - Shutter motor driver's side, active too long.
- 322 - Shutter motor passenger side, active too long.
- 323 - Ventilation shutter motor, active too long.
- 324 - Floor defrost shutter motor, active too long.
- 325 - Recirculation shutter motor, active too long.
- 411 - Heater blower, overcurrent or inhibit.
- 412 - Interior temp. sensor fan, driver's side, short-circuit to ground.
- 413 - Interior temp. sensor fan, driver's side, no control voltage.
- 414 - Interior temp. sensor fan, driver's side, operation inhibited.
- 415 - Interior temp. sensor fan, passenger side, short-circuit to ground.
- 416 - Interior temp. sensor fan, passenger side, no control voltage.
- 417 - Interior temp. sensor fan, passenger side, operation inhibited.
- 418 - Power stage, no control signal.
- 419 - Incorrect diagnostic signal from power stage.
- 420 - Control module program memory fault.
- 511 - Self-adjustment of shutter motor limit positions not performed.

MODE: 2

- 112 - Solar sensor signal OK.
- 113 - Speedometer signal OK.

MODE: 4

- 311 - Normal speed
- 312 - x2 speed
- 313 - x10 speed

111 - A/C relay control

999 - Adjust shutter motors

CRUISE CONTROL (B2)**SYSTEM:**

CRUISE 700/900/800

MODE: 1

- 111 - No faults found by diagnostic system. Speed has exceeded 35 km/h.
- 112 - Vehicle speed signal incorrect.
- 122 - Speed has not exceeded 35 km/h or no vehicle speed signal.
- 211 - Power supply or control module fault.
- 212 - Vacuum pump or regulator circuit fault.

MODE: 2

- 113 - ON/OFF switch, brake and clutch valve OK.
- 123 - RESUME switch OK.
- 131 - SET+ switch OK.
- 132 - Brake light switch OK.
- 213 - SET- switch OK.
- 223 - Start inhibitor switch OK.
- 311 - Several simultaneous signals.

MODE: 4

- 311 - Normal speed
- 312 - x2 speed
- 313 - x10 speed

MODE: 5

- 111 - Cause of disengagement

SRS (B5)**SYSTEM:**

SRS

MODE: 1

- 111 - No faults found by diagnostic system.
- 112 - Sensor module fault.
- 127 - SRS lamp, open-circuit or short-circuit.
- 211 - Steering wheel module, short-circuit in wiring circuit.
- 212 - Steering wheel module, open-circuit in wiring circuit.
- 213 - Steering wheel module, short-circuit to supply.
- 214 - Driver's air bag, short-circuit to ground.
- 221 - Passenger air bag, short-circuit in wiring circuit.
- 222 - Passenger air bag, open-circuit in wiring circuit.
- 223 - Passenger air bag, short-circuit to supply.
- 224 - Passenger air bag, short-circuit to ground.
- 231 - Left belt tensioner, short-circuit in wiring circuit.
- 232 - Left belt tensioner, open-circuit in wiring circuit.
- 233 - Left belt tensioner, short-circuit to supply.
- 234 - Left belt tensioner, short-circuit to ground.
- 241 - Right belt tensioner, short-circuit in wiring circuit.
- 242 - Right belt tensioner, open-circuit in wiring circuit.
- 243 - Right belt tensioner, short-circuit to supply.
- 244 - Right belt tensioner, short-circuit to ground.

MODE: 4

- 311 - Normal speed
- 312 - x2 speed
- 313 - x10 speed

POWER SEAT (B6)**SYSTEM:**

POWER SEAT

MODE: 1

111 - No faults found by diagnostic system.

112 - Position sensor, motor 1, signal absent or faulty.

114 - Motor 4, faulty lead.

121 - Position sensor, motor 2, signal absent or faulty.

122 - Position sensor, motor 3, signal absent or faulty.

123 - Motor 1 runs although button not operated.

131 - Motor 2 runs although button not operated.

132 - Motor 3 runs although button not operated.

133 - Motor 4 runs although button not operated.

143 - Motor 1 runs in wrong direction.

144 - Motor 2 runs in wrong direction.

211 - Position sensor, motor 4, signal absent or faulty.

214 - Motor 3 runs in wrong direction.

224 - Motor 4 runs in wrong direction.

321 - Fault in stored memory position 3.

322 - Fault in stored memory position 2.

323 - Fault in stored memory position 1.

331 - Motor 1, faulty lead.

332 - Motor 2, faulty lead.

333 - Motor 3, faulty lead.

414 - Faulty limit position calibration.

MODE: 4

T12 - Calibration, 800 seat

T13 - Calibration, 900 seat

311 - Normal speed

312 - x2 speed

313 - x10 speed

421 - Calibr. M1 and M4 front

422 - Calibr. M2 and M3 front

423 - Enable limit pos. calibr.

431 - Calibr. M1 and M4 rear

432 - Calibr. M2 and M3 rear

441 - Set seat type to 800

442 - Set seat type to 900

444 - Store limit positions

CLIMATE CONTROL, ECC 900 (Control Panel)**SYSTEM:**

ECC (900)

MODE: 1

111 - No faults discovered by diagnostic system.

Ambient temperature sensor (on fan housing)

121 - Short circuit to ground.

122 - Break or short circuit to battery supply.

Interior temperature sensor (in roof light unit)

131 - Short circuit to ground.

132 - Break or short circuit to battery supply.

Coolant temperature sensor (at heat exchanger).

141 - Short circuit to ground.

142 - Break or short circuit to battery supply.

Generator

151 - D+ signal fault in generator.

Solar sensor (in loudspeaker grille).

161 - Note! use a lamp to light up the sensor.

If this is not done, an error code is shown even if the sensor is OK.

Servo motor/Potentiometer

211 - Break or short circuit to ground.

212 - Short circuit to battery supply.

Servo motor drive

213 - Tab 17 or 18 incorrectly connected to battery supply.

Servo motor

214 - Motor incorrectly active too long (blocked motor or cut in electric power supply to motor) (> 10 sek)

ECC Control

231 - Error in temperature setting switch.

Fan motor

233 - Excessively high current during fan motor startup (turns slow or is stuck)

Power stage

24x - Coupling tab wrongly connected to battery supply.

Relevant outputs:

- 241 - Water valve
- 242 - B/L
- 243 - Vent
- 244 - Rec
- 245 - Defr
- 246 - Floor
- 247 - Fan max. relay
- 248 - Compressor
- 249 - Engine cooling fan relay

Tables

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Tables Formulae

Speed	Speed (m/s)	Distance (m) Time (s)
	Speed (km/h)	$\frac{\text{Engine speed (r/s)} \times \text{tyre circumference (m)} \times 36}{\text{Gearbox ratio} \times \text{final drive ratio}}$
	Km/h	m/s $\times 3.6$
	m/s	km/h 3.6
Power	Power (kW)	$\frac{\text{Tractive force (N)} \times \text{road speed (km/h)}}{3600}$
	Engine output (kW)	$\frac{\text{Torque (Nm)} \times \text{engine speed (r/s)}}{159.24}$
	Engine output (hk)	$\frac{\text{Tractive force (kp)} \times \text{road speed (km/h)}}{270}$
	Horsepower (hk)	$\frac{\text{Nm/sek}}{7.65} = \frac{\text{kpm/sec}}{75} = \frac{\text{kilowatt (kW)}}{0.736}$
Torque	Torque (Nm)	$\frac{159.24 \times \text{engine power (kW)}}{\text{Engine speed (r/s)}}$
Petrol consumption	Litres/10 km	$\frac{23.52}{\text{Miles/US gallon}}$
	Miles/US gallon	$\frac{23.52}{\text{litres/10 km}}$
Temperature	Degrees Celsius (°C)	$\frac{(\text{Degrees Fahrenheit (°F)} - 32) \times 5}{9}$
	Degrees Fahrenheit (°F)	$\frac{\text{Degrees Celsius (°C)} \times 9}{5} + 32$
Engine speed	Revs/minute (rpm)	$\text{Revs/second (r/s)} \times 60$
	Revs/second (r/s)	$\frac{\text{Revs/minute (rpm)}}{60}$
Frequency	Hertz (Hz)	Oscillations/second

Specific gravity	Specific gravity	$\frac{\text{Absolute weight (kg)}}{\text{Volume (m}^3\text{)}}$	
Pressure	Pressure (N/m ² = pascal)	Force (N)	Surface (m ²)
	Pressure (kp/cm ²)	Force (N)	Surface (m ²)
Circle	Circle area (m ²)	0.785 x diam (m) x diam (m)	
	Circle circumference (m)	3.14 x diam (m)	
Electricity	Amperage (A)	Power (W)	Voltage (V)
	Amperage (A)	Voltage (V)	Resistance (Ω = Ohm)
	Power (W)	Voltage (V) x Amperage (A)	
	Voltage (V)	Power (W)	Amperage (A)
	Resistance (Ω)	Voltage (V)	Amperage (A)
	External resistance (Ω)	$\frac{\text{Spec. resistance (Ω m)} \times \text{Length (m)}}{\text{Wire cross-sectional area (m}^2\text{)}}$	
	To	From	
	Length	Metres (m)	Inch (") x 0.0254
			Foot (ft) x 0.3048
			Yard (yd) x 0.9144
		Kilometre (km)	Miles (mile) x 1.609344
		Inch (")	Metre (m) x 39.3701
		Foot (ft)	Metre (m) x 3.28084
		Yard (yd)	Metre (m) x 1.09361
		Mile	Kilometre (km) x 0.621371
Area	Square centimetre (cm ²)	Square inch (in ²)	x 0.64516
	Square inch (in ²)	Square centimetre (cm ²)	x 1.550
Volume	Litre	US gallon	x 3.78541
	US gallon	Litre	x 0.26417
Mass	Kilogram (kg)	Pound	x 0.454
	Pound (lb)	Kilogram (kg)	x 2.205

Conversion tables

Conversion table, millimetres to inches

mm	0	1	2	3	4	5	6	7	8	9
	inch (")									
0		0.0394	0.0787	0.1181	0.1575	0.1969	0.2362	0.2756	0.3150	0.3543
10	0.3937	0.4331	0.4724	0.5118	0.5512	0.5906	0.6299	0.6693	0.7087	0.7480
20	0.7874	0.8268	0.8661	0.9055	0.9449	0.9843	1.0236	1.0630	1.1024	1.1417
30	1.1811	1.2205	1.2598	1.2992	1.3386	1.3780	1.4173	1.4567	1.4961	1.5354
40	1.5748	1.6142	1.6535	1.6929	1.7323	1.7717	1.8110	1.8504	1.8898	1.9291
50	1.9685	2.0079	2.0472	2.0866	2.1260	2.1654	2.2047	2.2441	2.2835	2.3228
60	2.3622	2.4016	2.4409	2.4803	2.5197	2.5591	2.5984	2.6378	2.6772	2.7165
70	2.7559	2.7953	2.8346	2.8740	2.9134	2.9528	2.9921	3.0315	3.0709	3.1102
80	3.1496	3.1890	3.2283	3.2677	3.3071	3.3465	3.3858	3.4252	3.4646	3.5039
90	3.5433	3.5827	3.6220	3.6614	3.7008	3.7402	3.7795	3.8189	3.8583	3.8976

Conversion table, inches to millimetres

"	"	mm	"	"	mm	"	"	mm
1/64	0.01562	0.397	17/64	0.265625	6.747	33/64	0.515625	13.097
1/32	0.03125	0.794	9/32	0.28125	7.144	17/32	0.53125	13.494
3/64	0.04687	1.191	19/64	0.296875	7.541	35/64	0.546875	13.891
1/16	0.0625	1.588	5/16	0.3125	7.938	9/16	0.5625	14.288
5/64	0.07812	1.984	21/64	0.328125	8.334	37/64	0.578125	14.684
3/32	0.09375	2.381	11/32	0.34375	8.731	19/32	0.59375	15.081
7/64	0.10937	2.778	23/64	0.359375	9.128	39/64	0.609375	15.478
1/8	0.125	3.175	3/8	0.375	9.525	5/8	0.625	15.875
9/64	0.14062	3.572	25/64	0.390625	9.922	41/64	0.640625	16.272
5/32	0.15625	3.969	13/32	0.40625	10.319	21/32	0.65625	16.669
11/64	0.17187	4.366	27/64	0.421875	10.716	43/64	0.671875	17.066
3/16	0.1875	4.762	7/16	0.4375	11.112	11/16	0.6875	17.462
13/64	0.203125	5.159	29/64	0.453125	11.509	45/64	0.703125	17.859
7/32	0.21875	5.556	15/32	0.46875	11.906	23/32	0.71875	18.256
15/64	0.234375	5.953	31/64	0.484375	12.303	47/64	0.734375	18.653
1/4	0.25	6.350	1/2	0.5	12.700	3/4	0.75	19.050

Conversion table, revs/second to revs/minute

r/s	0	1	2	3	4	5	6	7	8	9
	(rpm)									
0		60	120	180	240	300	360	420	480	540
10	600	660	720	780	840	900	960	1040	1100	1140
20	1200	1260	1320	1380	1440	1500	1560	1620	1680	1740
30	1800	1860	1920	1980	2040	2100	2160	2220	2280	2340
40	2400	2460	2520	2580	2640	2700	2760	2820	2880	2940
50	3000	3060	3120	3180	3240	3300	3360	3420	3480	3540
60	3600	3660	3720	3780	3840	3900	3960	4020	4080	4140
70	4200	4260	4320	4380	4440	4500	4560	4620	4680	4740
80	4800	4860	4920	4980	5040	5100	5160	5220	5280	5340
90	5400	5460	5520	5580	5640	5700	5760	5820	5880	5940

Conversion scales

Output		Length		Volume		Temperature	
kW	hk	Km	Miles	Litre	Gallons(US)	°C	°F
200				100	26	120	240
	260	260	160				
180	240	240	150	90	24	110	220
						100	200
160	220	220	140	80	22	90	200
	200		130		20	80	180
140	180	200	120	70	18	70	160
		180	110			60	140
120	160	160	100	60	16	50	120
	140	140	90		14	40	100
100	120	120	70	50	12	30	80
	100	100	60		10	20	60
80	80	80	50	40	8	10	40
	60	60	40		6	0	20
40	40	40	30	20	4	-10	0
	20	20	20		2	-20	-20
0	0	0	10	10	2	-30	-20
						-40	-40

6 - Tables

Torque		Mass		Pressure		Pressure	
Nm	ft.lbf	kg	lb	mPa	PSI	kPa	PSI
200		20	44	5		500	70
	140				700		
180	130	18	40	4,5	650	450	65
					600		60
160	120	16	36	4		400	55
	110				550		
140	100	14	32	3,5	500	350	50
			28		450		45
120	90	12		3	400	300	40
	80		24		350		35
100	70	10	20	2,5	300	250	30
					250		25
80	60	8	16	2	200	150	20
	50		12		150		15
60	40	6	8	1,5	100	100	10
	30				50		5
40	20	4	4	0,5		0	0
	10						
20		2					
0	0	0	0	0	0	0	0

Tables - 7

Product plate codes

Main type	Engine	Equip. level	Body	Transmission
74 = 740	69 = B 280 F	740/940/960	1 = without sunroof	740/940/960
85 = 850	74 = D 24 TIC with EGR	22 = 740 GL	2 = with sunroof	1 = M 90
94 = 940		31 = 960		2 = M 46
96 = 960	75 = D 24 TIC without EGR	32 = 960		3 = M 47
Doors		33 = 960		5 = ZF 4HP 22
4 = 4 door	76 = D 24 T	34 = 960		6 = AW 70/71/72 L
5 = 5 door	77 = D 24	37 = 960 Exec.		AW 30-40
Engine		38 = 960		AW 30-43
20 = B 200 G	80 = B 230 G	42 = 740 SE		7 = AW 70/71
21 = B 200 FT	81 = B 234 G	52 = 940 SE		
24 = B 200 E	82 = B 230 GT	53 = 940 GLT		850
25 = B 204 FT	83 = B 230 FD	55 = 940 Turbo		2 = M 56 L/H
27 = B 200 F	84 = B 230 E	71 = 940		3 = M 58
28 = B 204 GT	85 = B 230 GK	72 = 940 GL		6 = AW 50-42
29 = B 204 E	86 = B 230 FB	73 = 940 GLE		
41 = B 5202 S	87 = B 230 FT	76 = 940		
43 = B 5204 T3	88 = B 230 F	77 = 940		
45 = B 5204 S	89 = B 234 F	78 = 940 (Polar)		
46 = B 5204 T2	92 = B 6244 F			
47 = B 5204 T	93 = B 6254 F	850		
50 = B 5234 T4	95 = B 6304 F	41 = AWD Bas.		
51 = B 5252 S	96 = B 6304 F2	42 = AWD Leisure		
53 = B 5234 T3	98 = B 6304 G	52 = SE		
54 = B 5234 S	99 = B 6254 G	53 = GLT		
55 = B 5254 S		54 = GLT, Sv		
56 = B 5254 T		55 = Turbo T5		
57 = B 5234 T		56 = Turbo, Sv		
58 = B 5234 T5		61 = Bas., EU		
59 = B 5234 T2		72 = GL		
68 = B 280 E		73 = GLE/SE		
		90 = T-5 Yellow		
		91 = 850 R		
		92 = Activity, US		

Marketing codes

10 = Sweden	25 = Spain	45 = Asia(-1992)
11 = Norway	27 = Portugal	Taiwan(1993-)
12 = Denmark	28 = Israel	46 = Australia
13 = Finland	30 = USA excl. Calif.	47 = South Africa
15 = Gt. Britain	31 = California	49 = Turkey
16 = Switzerland	39 = Canada	50 = Japan
17 = Austria	40 = Overseas (-1994)	84 = Thailand
18 = Germany	Singapore (1995-)	85 = Malaysia
20 = Belgium	41 = Korea	87 = Indonesia
21 = Holland	42 = Latin America	88 = Philippines
22 = France	43 = Saudi Arabia	
23 = East Europe	44 = Hong Kong(1995)	
24 = Italy		

Emission-related equipment															
Emission code	EGR, stepless	EGR, On/Off	EGR, Electronic	EGR, Backpressure	EGR, Vac	Pulsed secondary air injection (PAIR)	Three-way catalytic converter (TWC)	Air pump	EVAP, Vac	EVAP, EL regulated	EVAP, EL reg. On-board	EVAP, Rulo	Heated oxygen sensor (HO2S)	On-Board Diagnostic system (OBD)	VVT
1	x					x	x		x						
2		x							x						
3	x						x		x						
4							x		x						
5						x									
6		x				x									
7									x						
8		x					x		x				x	OBD	
9							x	x	x				x		
10						x			x						
11	x					x									
12	x					x									
13		x				x									
15				x		x			x						
16				x		x									
17	x					x			x						
18		x					x								
19	x														
20		x				x			x						
21	x					x			x						
22						x									
23	x					x									
24							x								
25			x						x						
26			x												
27						x							x		
28						x							x		
29			x			x									
30															
31									x						
32										x					
33										x					
34			x				x		x						
35			x			x				x					
36			x						x						
37			x												
38		x													
39															
40			x												
42			x												

Emission-related equipment															
Emission code	EGR, stepless	EGR, On/Off	EGR, Electronic	EGR, Backpressure	EGR, Vac	Pulsed secondary air injection (PAIR)	Three-way catalytic converter (TWC)	Air pump	EVAP, Vac	EVAP, EL regulated	EVAP, EL reg. On-board	EVAP, Rulo	Heated oxygen sensor (HO2S)	On-Board Diagnostic system (OBD)	VVT
44			x				x	x					x	OBD2	
45							x	x		x			x	OBD2	
46			x				x	x		x			x	OBD	
47							x	x		x			x		
48							x			x			x	OBD	
49							x			x			x	OBD2	
50							x						x	OBD2	
51							x			x			x	OBD2	
A									x					OBD	
A1							x		x				x	OBD	
B			x						x					OBD	
C										x				OBD	
C1							x			x			x	OBD	
C2							x			x			x	OBD	
C3							x			x			x	OBD2	
C4							x					x	x	OBD2	
C5							x			x			x	OBD2	
D			x						x					OBD	
D1			x				x					x	x	OBD2	
D2			x				x			x			x	OBD	
D3			x				x			x			x	OBD2	
E			x					x	x					OBD	
F			x					x		x				OBD	
F1			x				x	x		x			x	OBD	
F2			x				x	x		x			x	OBD2	
G							x	x		x				OBD	
G1							x	x				x	x	OBD2	
G3							x	x		x				OBD	
G4							x	x		x			x	OBD2	
G5							x	x		x			x	OBD2	
G6							x	x		x			x	OBD	
H	x														
H1	x						x								
I								x		x			x		
I1							x	x		x					
J														OBD	
J1							x						x	OBD2	
J2							x						x	OBD2	x
K										x				OBD2	
K1							x			x			x	OBD2	

Interior trim codes 1992 - 1997 (model year 1991, see TMA blad)

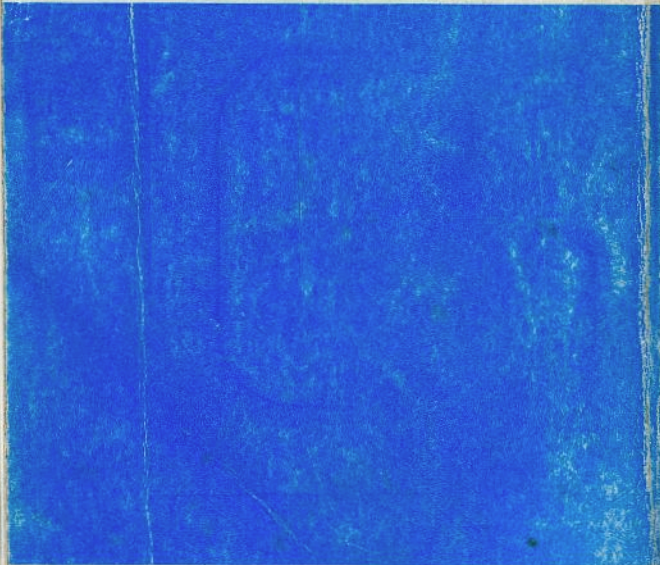
Model	Material 900	Material 850	Colour	Serial number
3 850	1 Tricot cloth	1 Vinyl	1 Black	
6 700/900	2 Tricot plush (woven fabric)	2 Woven fabric	3 Blue	
	3 Vinyl, Tricot cloth (police)	3 Tricot cloth	4 Red	
		4 Plush (Madison)	5 Beige	
		5 Plush (Ginza)	6 Light beige	
	6 Plush/Leather	6 Plush (Mistra)	7 Grey	
		7 Plush/Leather	8 Light grey	
	8 Plush	8 Plush		
	9 Leather	9 Leather		

Paint codes

Colour solid	Colour metallic	Colour pearl	Supplier	Type
019 Black	130 Silver	417 Dark blue	1 BASF	1 Solvent-borne, solid or metallic
112 Ivory	177 Silver-grey	418 Regent red	2 Herberts	
162 Canary yellow	214 Dark grey	420 Aubergine	3 Beckers	2 Water-borne, metallic
189 White	400 Beige	421 Dark Olive	4 IDAC	3 Water-borne, base solid + clear lacquer
601 Red	406 Mid-blue	422 Turquoise	5 Sikkens	
602 Burgundy	409 Burgundy	423 Brick orange	8 IVI	
604 Dark blue	410 Light blue	424 Polar white	9 Local suppliers (Thailand, Malaysia, Indonesia, Philippines)	4 Solvent-based solid paint + clear lacquer
605 Atlantic blue (mid-blue)	411 Beige	425 Beige		5 Solvent-based pearl
606 Green	412 Aquamarine	427 Dark grey		
607 Yellow	414 Burgundy	429 Black		
609 Red	415 Light blue	430 White		
696 Blue/White (police)	416 Green	433 Burgundy		
	419 Silver Sand			
	426 Silver			
	428 Red			
	434 Mint green			

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VOLVO

Volvo Car Corporation

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