Service Manual

Repairs and maintenance

TP30868/2; reprint w/o changes

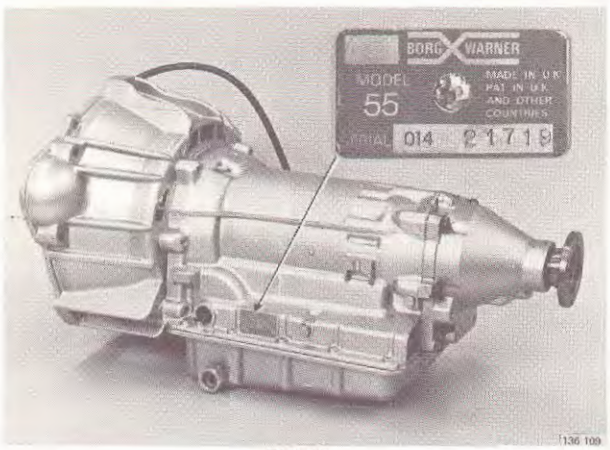
Section 4 (43)

BW55, AW55
AW70, AW71
Automatic transmissions
240, 260
1975–

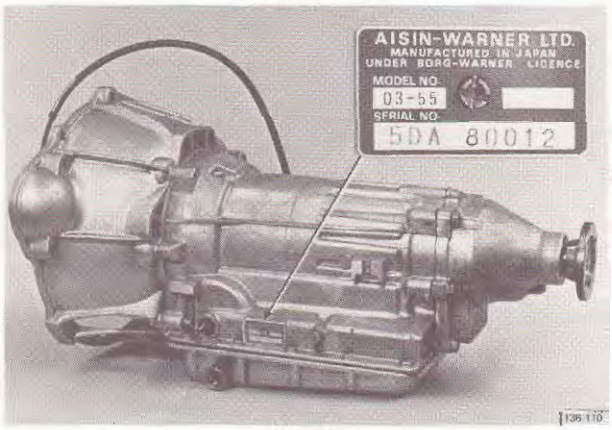
August 1989

VOLVO

Volvo Cars North America

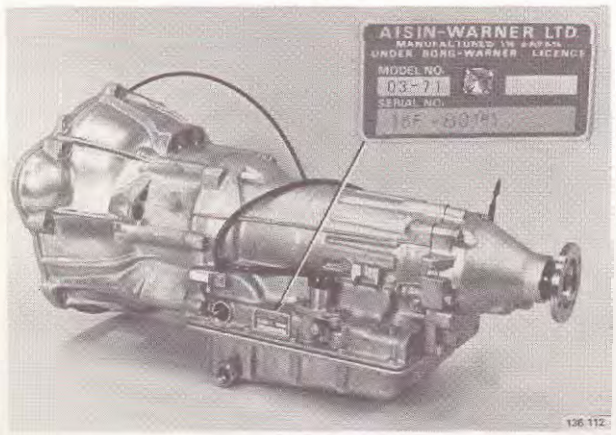


BW 55



AW 55

AW 70



AW 71

BW55, AW55, AW70, AW71

This manual deals with the repair and maintenance of Borg Warner (BW55) and Aisin Warner (AW55, 70 and 71) automatic transmissions.

AW55 and BW55 are three speed units whereas AW70 and AW71 are four speed transmissions where the fourth gear is effectively an overdrive.

The main difference between the AW55 and BW55 is that the front and rear clutches in the AW55 gear case have only one large return spring: the BW clutches have many small springs. Otherwise the two transmissions are the same.

Note that the capacity of the oil pan on a AW55/BW55 was increased in 1979. For distinguishing purposes, the later type has a plastic dipstick.

AW70 and 71 four speed transmissions are similar in many respects to the model 55 units. However the valve body assemblies on the transmissions are different and are adapted to the wide range of engine types found on Volvos. (See page 11 for details.)

An identification plate carrying the serial and model numbers as well as the Volvo part number is fixed to the side of the transmission gear case.

A 1983 plate is shown above.

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Volvos are sold in versions adapted for different markets. These adaptations depend on many factors including legal, taxation and market requirements.

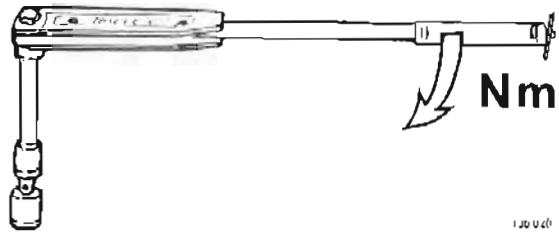
This manual may therefore show illustrations and text which do not apply to cars in your country.

▌ Indicates changes in text and/or specifications in this manual.

Order number: TP 30868/2

Reprint of 7.83 material with minor changes

Important information



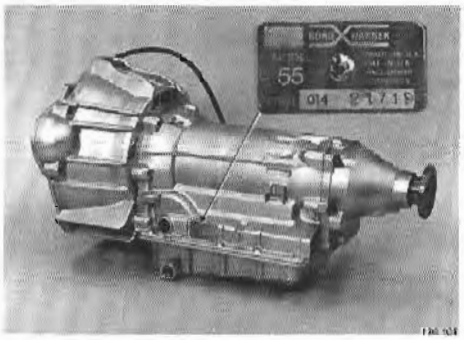
Tightening torques

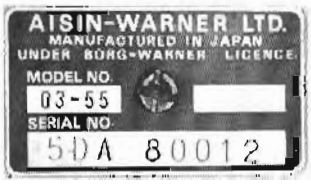
Two kinds of tightening torques will be found in this manual

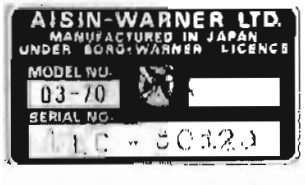
1. Tighten to **40 Nm** (30 ft lbs) indicates that a torque wrench must be used for tightening.
2. Tightening torque 40 Nm (30 ft lbs) indicates a guide value. Tightening need not be done with a torque wrench.

Specifications

Group 40 General







Model and serial numbers:

— Identification plate is attached to side of gear case.
— are used in service publications and parts catalogue.
— should be quoted in all correspondence (e.g. technical reports) with Volvo.

BW 55

Also stamped on identification plate is a code which gives details of serial number as follows:

Ex. 014-21719

014 = Volvo part number 1208165 (015 = 1208166 etc.)

21719 transmission serial number (1001 – production start).

AW55, 70,71

Serial number and model number are stamped on a plate Ex. 03-55 000100

03 = Aisin Warner's code
55 = type 55 (70 = type 70 etc.)
100 (in 00100) – code equivalent to Volvo P/N 1208165 (250 = P/N 1208195 etc.)

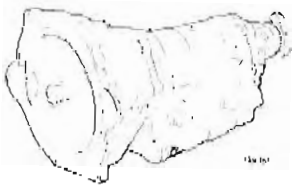
Ex. serial number 5 DA 80012

5 = year of manufacture (1975)
D – month (A = Jan., B = Feb etc.) (NOTE! "I" is not used.
A = type 55 (C – type 70, F = type 71)
8 = Volvo installed unit
0012 = manufacturing number, start = 0001 each month.

From 1983 M/Y, only the Volvo part number is stamped on transmission.

Group 43 Automatic transmission

BW55, AW55 AUTOMATIC TRANSMISSIONS



Manufacturer and type	Borg Warner type 55, Aisin Warner type 56	
Reduction ratios, 1st speed	2.46:1	x torque converter ratio
2nd speed	1.46:1	
3rd speed	1:1	
Reverse	2.21:1	
Torque converter, ratio	1:1 to approx. 2:1 (Varies)	
size	9.5 in	
Lubricant	ATF type G (or F)[1]	
Capacity, early types	6.5 liters (6.9 US qts) incl. approx. 2.5 litres (2.6 US qts) in torque converter	
late types (with deep oil pan, 1979–)	6.9 liters (7.2 US qts) incl. approx. 2.5 liters (2.6 US qts) in torque converter	

[1] ATF – automatic transmission fluid (specification must comply with Ford M2 C33-F or G)

BW55

Engine type	Normal stall speed* r/s (r/min)	Type designation	Plate color
B 21 A	36.7 (2200)	0466 . . 003	Light yellow
	36.7 (2200)	0466 . . . 014	Brown/yellow
B 21 F	41.7 (2500)	0466 . . . 005	Green
	41.7 (2500)	0455 . . . 006	Grey
	41.7 (2500)	0455 012	Grey
	41.7 (2500)	0456 . . . 019	Yellow/brown
	35.0 (2100)	0455 . . . 027	Green
B 23 E	40.0 (2400)	0466 . . . 030	Smoke grey
D 24	36.6 (2200)	0455 . . . 020	Smoke grey

AW55

Engine type	Normal stall speed* r/s (r/min)	Type designation	Plate color
B 21 F	41.7 (2500)	0355 . . . 100	Black
	41.7 (2500)	0355 . . . 250	Black
	41.7 (2500)	0355 . . . 320	Black
	35.0 (2100)	0355 . . . 376	Black (Red 1982-)

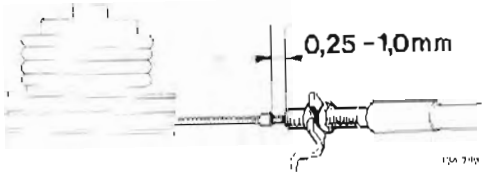
* Stall speed drops by 2 r/s (120 r/min) for each 1000 meter above sea level.

BW55

Engine type	Normal stall speed* r/s (r/min)	Type designation	Plate color
B 27 F	38.3 (2300)	0455 . . 007	Light blue
	36.7 (2200)	0455 . . . 011	Light orange
	36.7 (2200)	0455 . . . 018	Pink
	36.7 (2200)	0455 . . . 021	Brown
B 28 F	40.0 (2400)	0455 . . . 023	Light yellow

Throttle cable setting

Distance between adjusting sleeve and cable stop
at idle ..... 0.25–1.0 mm (0.01–0.04 in)
at kick-down ..... 50.4–52.6 mm (1.986–2.072 in)



Stall speed pressures

BW55

Position D ..... 1.12–1.37 MPa (159–195 psi)
Position R ..... 1.54–1.96 MPa (219–279 psi)

AW55

Position D ..... 0.95–1.20 MPa (135–171 psi)
Position R ..... 1.40–1.70 MPa (199–242 psi)

Line pressures

BW55

Idle, position D ..... 0.53–0.63 MPa (75–90 psi)
position R ..... 0.74–0.91 MPa (105- 129 psi)

AW55

Idle, position D ..... 0.40–0.45 MPa (57–64 psi)
position R ..... 0.58–0.68 MPa (82–97 psi)

Governor pressures

Final drive ratio	Governor pressure											
	MPa	psi	km/h	mph	MPa	psi	km/h	mph	MPa	psi	km/h	mph
BW55 3.31:1 Diesel	0.11–0.14	16–20	34	21	0.18–0.22	26–31	62	39	0.38–0.43	54–61	121	76
3.54:1	0.10–0.13	14–18	32	20	0.15–0.19	21–27	57	35	0.36–0.46	51–65	110	69
3.54:1 Diesel	0.12–0.14	17–20	32	20	0.19–0.23	27–33	57	35	0.43–0.48	61–68	110	69
3.73:1	0.10–0.13	14–18	30	19	0.16–0.20	23–28	55	34	0.37–0.44	53–63	108	67
3.73:1 Diesel	0.13–0.15	18–21	30	19	0.20–0.23	28–33	55	34	0.47–0.52	67–74	108	67
3.91:1	0.10–0.13	14–18	29	18	0.16–0.20	23–28	53	33	0.37–0.44	53–63	103	64
AW55 3.73:1	0.10–0.15	14–21	30	19	0.16–0.22	23–32	55	34	0.42–0.52	60–74	108	67
3.91:1	0.10–0.15	14–21	29	18	0.16–0.22	23–32	53	33	0.42–0.52	60–74	103	64

Shift speeds km/h (mph)

Limits for shift points

BW56

Engine type	B 21 A	B 21 A	B 21 F	B 21F	
final drive ratio	3.54:1	3.73:1	3.73:1	3.91:1	
1–2	67 (42)	64 (40)	63 (39)	63 (39)	
2–3	118 (74)	112 (70)	111 (69)	109 (68)	
3–2	109 (68)	104 (65)	102 (64)	99 (62)	
3–1 ca	50 (31)	50 (31)	50 (31)	50 (31)	
Final drive ratio	B 23 E	B 27 F	B 28 F	D 24	D 24
	3.54:1	3.54:1	3.54:1	3.31:1	3.54:1
1–2	69 (43)	70 (44)	70 (44)	58 (36)	55 (34)
2–3	123 (77)	125 (78)	125 (78)	106/66	100 (63)
3–2	114 (71)	115 (72)	115 (72)	98 (61)	92 (58)
3–1 ca	50 (31)	50 (31)	50 (31)	50 (31)	50 (31)

AW55

Final drive ratio	B 21 F	B 21 F
	3.73:1	3.91:1
1–2	63 (39)	63 (39)
2–3	111 (69)	109 (68)
3–2	101 (63)	99 (62)
3–1 ca	50 (31)	50 (31)

Clearances

	BW55	AW55
Oil pump: pump body – outer gear wheel	0.07–0.30 mm (0.0027–0.0118 in)	0.07–0.15 mm (0.0027–0.0059 in)
arc segment – large gear wheel	0.11–0.50 mm (0.0043–0.0197 in)	0.11–0.14 mm (0.0043–0.0055 in)
axial clearance	0.02–0.10 mm (0.0008–0.0040 in)	0.02–0.05 mm (0.0008–0.0020 in)
C2 clutch, B1 and B2 brakes: clearance between clutch assembly pressure plate and lock ring	0.3–1.2 mm (0.0118–0.0472 in)	0.3–1.2 mm (0.0118–0.0472 in)
Input shaft, C1 clutch, axial clearance	0.20–0.55 mm (0.0078–0.0216 in)	0.20–0.55 mm (0.0078–0.0216 in)
Output shaft, axial clearance	0.20–0.55 mm (0.0078–0.0216 in)	0.20–0.55 mm (0.0078–0.0216 in)

Brake and clutch discs

Minimum permissible thickness	2.1 mm (0.083 in)

BW55 spring identification chart

Spring	Free length mm (in)	Active coils	Wire dia mm (in)	Spring OD mm (in)	Remarks
Accumulator B2:					
B21A, B23A,	52.9 (2.083)	12	2.24 (0.088)	16.2 (0.638)	
B27, B28	67.0 (2.637)	12.5	2.3 (0.091)	17.8 (0.701)	
B21F, D24	58.6 (2.307)	12.6	2.337 (0.092)	17.8 (0.701)	
B23[1]	66.5 (2.618)	12.6	2.7 (0.106)	17.9 (0.705)	
Accumulator C2, late type	54.0 (2.136)	12.0	2.24 (0.088)	16.0 (0.591)	
early type	52.25 (2.067)	12.5	2.0 (0.079)	15.31 (0.603)	
Accumulator C1, late type	68.5 (2.697)	10.5	2.65 (0.104)	19.65 (0.774)	
early type	67.0 (2.638)	12.5	2.3 (0.091)	17.80 (0.701)	
Governor B23, B27, B28	20.63 (0.812)	7.5	0.9 (0.035)	9.05 (0.356)	
D24	19.52 (0.768)	7.6	0.9 (0.035)	9.06 (0.356)	
Throttle valve, secondary, type 2	20.0 (0.787)	7.0	0.81 (0.032)	8.68 (0.342)	
type 1	19.34 (0.761)	7.3	0.81 (0.032)	8.68 (0.342)	P/N 1239287
Throttle valve, primary	43.03 (1.694)	14.0	1.37 (0.054)	10.95 (0.431)	
Detent regulator valve	36–32 (1.430)	12.0	0.76 (0.030)	9.14 (0.360)	
Intermediate coast modulator valve,					
type 2	35.92 (1.414)	13.5	0.94 (0.037)	8.94 (0.352)	
type 1	35.92 (1.414)	13.5	0.94 (0.037)	9.88 (0.389)	
Reverse clutch sequence valve	37.21 (1.465)	15.5	1.4 (0.055)	9.0 (0.354)	
Governor modulator valve*	36.07 (1.420)	12.0	0.71 (0.028)	9.09 (0.368)	
*Line pressure relief valve, type 1	32.14 (1.265)	9.0	2.03 (0.080)	13.14 (0.517)	
type 2	36.8 (1.449)	9.0	1.9 (0.075)	13.4 (0.528)	260
Cut-back valve*	18.0 (0.709)	19.0	0.36 (0.014)	3.92 (0.154)	
Low coast modulator valve					
type 1	33.22 (1.308)	13.5	0.94 (0.037)	9.88 (0.389)	
type 2 – transmission code: 003, 005, 006, 008, 009, PP22, 010, 012, 020, 026	35.92 (1.414)	13.5	0.94 (0.037)	8.94 (0.352)	Black
type 3 = transmission code: 001, 002, 007, 011, 013, 014, 015, 016, 017, 018, 019, 021, 022, 023, 025, 027, 030, 031	33.22 (1.308)	13.5	0.94 (0.037)	8.94 (0.352)	Red
Shift valve 3–2, type 2	32.07 (1.308)	11.0	0.94 (0.037)	10.21 (0.402)	
type 1	36.17 (1.424)	11.0	0.94 (0.037)	10.20 (0.402)	
Secondary regulator valve,					
type 3	56.45 (2.183)	13.5	2.3 (0.091)	16.95 (0.667)	
type 2	69.11 (2.721)	13.5	1.75 (0.069)	16.99 (0.669)	
type 1 very early models	59.45 (1.947)	11.0	2.10 (0.083)	16.45 (0.648)	
Primary regulator valve	69.11 (2.271)	13.5	1.75 (0.069)	16.99 (0.669)	
By-pass valve, type 3	25.0 (0.984)	7.0	1.75 (0.069)	11.6 (0.457)	
type 2	28.89 (1.137)	7.9	1.42 (0.056)	11.4 (0.449)	
type 1 very early models	29.70 (1.169)	7.0	1.52 (0.060)	13.80 (0.543)	
Low coast shift valve, late type	30.33 (1.194)	12.6	0.65 (0.026)	7.2 (0.284)	
early type	29.61 (1.166)	13.0	0.64 (0.025)	5.40 (0.213)	

* Discontinued on later models. Only fitted on transmissions 002, 005, 006 and 007.

[1] B23E may have same spring as B21F, and D24.

NOTE! The above chart can be used to identify springs prior to installing. If the free length of a spring is not exactly according to specifications this does not necessarily mean that the spring is defective (special test equipment is necessary to ascertain this).

AW55 spring identification chart

Spring	Free length mm (in)	Active coils	Wire dia mm (in)	Spring OD mm (in)	Remarks
Accumulator B2	67.00 (2.638)	12.5	2.30 (0.091)	17.80 (0.701)	
Accumulator C2	38.42 (1.513)	10.0	2.03 (0.080)	14.03 (0.552)	
Accumulator C1	68.56 (2.699)	15.5	2.03 (0.080)	17.53 (0.691)	
Governor	20.63 (0.812)	7.5	0.90 (0.035)	9.05 (0.356)	
Throttle valve, secondary	21.44 (0.844)	8	0.71 (0.028)	8.58 (0.338)	
Throttle valve, primary	43.0 (1.693)	16.6	1.19 (0.047)	10.89 (0.429)	
Detent regulator valve, type 1	30.43 (1.198)	13	0.90 (0.035)	8.90 (0.351)	
type 2	31.39 (1.236)	13.5	0.90 (0.035)	8.85 (0.348)	
Intermediate coast modulator valve,					
type 1	35.43 (1.395)	14.4	0.90 (0.035)	8.80 (0.346)	
type 2	25.6 (1.008)	11.5	1.14 (0.045)	9.00 (0.354)	
Reverse clutch sequence valve,					
type 1	36.83 (1.450)	15	1.14 (0.045)	9.14 (0.360)	
type 2	37.55 (1.478)	14.5	1.17 (0.046)	9.17 (0.361)	
Governor modulator valve	36.07 (1.420)	12.0	0.71 (0.028)	9.09 (0.358)	
Low coast modulator valve	42.35 (1.667)	15.0	0.84 (0.033)	9.24 (0.364)	
Intermediate coast shift valve	35.10 (1.382)	12.5	0.76 (0.030)	8.96 (0.353)	White
Reverse clutch sequence valve	37.55 (1.478)	14.5	1.17 (0.046)	9.17 (0.361)	
Low coast shift valve	34.62 (1.363)	13.0	0.56 (0.022)	7.56 (0.298)	
Line pressure relief valve	32.14 (1.265)	9.0	2.03 (0.080)	13.14 (0.517)	
Pressure relief valve	30.65 (1.207)	7	1.32 (0.052)	13.82 (0.544)	
Primary regulator valve	73.3 (2.886)	15	1.588 (0.063)	16.118 (0.635)	Red
Secondary regulator valve	74.83 (2.946)	15	1.60 (0.063)	16.84 (0.663)	

NOTE! The above chart can be used to identify springs prior to installing. If the free length of a spring is not exactly according to specifications this does not necessarily mean that the spring is defective (special test equipment is necessary to ascertain this).

Tightening torques

BW55, AW55	Nm	ft-lbs
Converter housing to engine, M10	35–50	25–36
M12	55–90	40–65
Drive plate to torque converter, M10	41–50	30–36
M8 (diesel)	17–27	12–20
Cover plate to converter housing, 3 x M6	6–9	4–6
2 x M8	18–25	13–18
Center support to gear case		
Tighten alternately in steps of 7 Nm (5 ft-lbs)	24–28	17–20
Pump cover to pump	5–9	4–6
Pump assembly to gear case	22–28	16–20
Plate above parking pawl	6–9	4–6
Converter housing to gear case		
4 x M10	26–40	19–29
2 x M12	47–60	34–43
Rear extension housing to gear case	26–40	19–29
Valve body to gear case	8–12	6–9
Valve body, for cam, M6	6–9	4–6
other bolts, M5	5–6	3.5–4
Oil strainer to lower valve body	5–6	3.5–4
Oil pan to gear case (grey cork gasket) AW55	4–5	3–3.5
(yellow gasket)	6–10	4–7
(blue gasket)[1]	8–12	6–9
Coupling flange to output shaft[2]	40–50	30–36
Nut, oil cooler to gear case	20–30	14–22
Blind plug for pressure test	9–12	7–9
Cover plate to gear case (governor), M6	6–9	4–6
Speedometer drive	4–6	3–4
Nut, oil dipstick tube	80–100	58–72
Inhibitor switch to gear case (B27 early type)	5–7	3.5–5
Drain plug to oil pan, AW55	18–23	13–17
BW55	12–17	9–12

[1] Grease lightly before installing
[2] Apply locking fluid P/N 1161053-2 (1161054-0)

AW70, AW71 AUTOMATIC TRANSMISSIONS

Manufacturer and type	Aisin Warner types 70 and 71
Reduction ratios, 1st speed	2.45:1
2nd speed	1.45:1
3rd speed	1:1
Overdrive	0.69:1
Reverse	2.21:1
	(2nd speed, 3rd speed, Overdrive, Reverse: x torque converter ratio)
Torque converter, ratio	1:1 to approx. 2:1 (Varies)
size	248 mm
Lubricant	ATF type G (F)[1] DEXRON II D AW 70, AW 71 1984 —
Capacity	7.5 liters (7.8 US qts) incl. approx. 2.5 liters (2.6 US qts) in torque converter

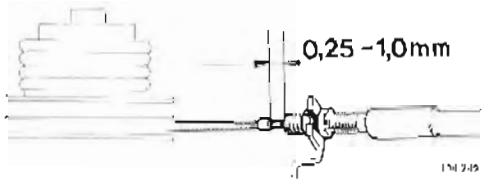
[1] ATF – automatic transmission fluid (specification must comply with Ford M2 C33-F or G)

Type	Normal stall speed*	Volvo P/N	Plate colour
AW70	r/s (r/min)		
B21F-MPG	30.8 (1800)	1208 220	Yellow
B21F-LH	33.0 (1980)	1208 284	Silver
B23F	37.0 (2220)	1208 320	Purple
B230F	33.3 (2000)	1208 485	Purple
AW71			
B21FT	34–41 (2050–2500)	1208 222	Pink
B21FT	34–41 (2050–2500)	1208 319	Dark brown

* Stall speed drops by 2 r/s (120 r/min) for each 1000 meters above sea level.

Throttle cable setting

Distance between adjusting sleeve and cable stop
at idle ..... 0.25–1.0 mm (0.01–0.040 in)
at kick-down ..... 50.4–52.6 mm (1.986–2.072 in)



Line pressure

	AW70	AW71
Position D	0.35–0.44 MPa (50–63 psi)	0.46–0.54 MPa (65–77 psi)
Position R	0.50–0.64 MPa (71–91 psi)	0.70–0.82 MPa (106–117 psi)

Stall speed pressure

Position D	0.96–1.10 MPa (137–156 psi)	1.00–1.20 MPa (142–205 psi)
Position R	1.37–1.70 MPa (195–242 psi)	1.50–1.90 MPa (213–270 psi)

Governor pressures

Final drive ratio	Governor pressure											
	MPa	km/h	psi	mph	MPa	km/h	psi	mph	MPa	km/h	psi	mph
3.73:1	0.09–0.15	30	13–21	19	0.16–0.22	55	23–31	35	0.41–0.53	108	58–75	67
3.91:1	0.09–0.15	29	13–21	18	0.16–0.22	53	23–31	33	0.41–0.53	108	58–75	67

Shift speeds km/h (mph)

Limits for shift points	AW 70	AW 70	AW 71	AW 71	Throttle opening %
Final drive ratio	3.73:1	3.91:1	3.73:1	3.91:1	
1–2	65 (41)	62 (39)	63 (40)	60 (38)	100*
2–3	108 (68)	103 (65)	105 (66)	100 (63)	100*
3–4	114 (72)	109 (69)	111 (70)	105 (66)	75
4–3	40 (25)	38 (24)	39 (25)	37 (23)	0
3–2	102 (64)	97 (61)	99 (62)	94 (59)	100*
2–1	51 (32)	49 (31)	50 (32)	48 (30)	100*

* Kick-down position

Clearances

Oil pump: pump body outer gear wheel	2.1 (0.083 in)
arc segment – large gear wheel	0.11–0.14 mm (0.0043–0.0055 in)
axial clearance	0.02–0.05 mm (0.0008–0.0019 in)
Brake BO: clearance between clutch pressure plate and lock ring	0.35–1.60 mm (0.0138–0.063 in)
Clutch C2, brakes B1 and B2. clearance between clutch assembly pressure plate and lock ring	0.3–1.2 mm (0.0118–0.0472 in)
Input shaft, clutch CO, axial clearance	0.3–0.9 mm (0.0118–0.0354 in)
Output shaft, axial clearance	0.3–0.9 mm (0.0118–0.0354 in)

Brake and clutch rings

Minimum permissible thickness	2.1 mm (0.083 in)

Solenoid valve

Resistance	13 ohms

AW70, AW71 spring identification chart

Spring	Free length mm (in)	Active coils	Wire dia mm (in)	Spring OD mm (in)	Remarks
Accumulator B2	66.68 (2.625)	14.00	2.80 (0.110)	17.34 (0.682)	AW70: 020, 033
	68.35 (2.691)	13.00	2.60 (0.102)	17.91 (0.705)	AW70: 055
	66.68 (2.625)	12.00	3.20 (0.126)	20.4 (0.803)	AW71
Accumulator C2	61.21 (2.410)	11.5	2.50 (0.098)	16.54 (0.651)	AW70
	55.18 (2.172)	8.5	2.00 (0.079)	15.87 (0.625)	AW71
Accumulator C1	68.56 (2.700)	15.5	2.03 (0.080)	17.53 (0.690)	AW70, AW71
	64.80 (2.551)	13.0	2.00 (0.079)	17.20 (0.677)	AW70: 053
Governor	20.63 (0.812)	1.5	0.90 (0.035)	9.05 (0.356)	
Throttle valve, secondary	21.94 (0.864)	8	0.71 (0.028)	8.58 (0.338)	
Throttle valve, primary	43.0 (1.693)	15.5	1.19 (0.047)	10.89 (0.429)	
Detent regulator valve	31.39 (1.236)	13.5	0.90 (0.035)	8.85 (0.348)	
Intermediate coast modulator valve					
type 1	25.6 (1.008)	11.5	1.14 (0.045)	9.00 (0.354)	AW70
type 2	27.26 (1.073)	9.5	1.10 (0.043)	9.04 (0.356)	AW71
Reverse clutch sequence valve	37.55 (1.478)	14.5	1.17 (0.046)	9.17 (0.361)	
Governor modulator valve	36.07 (1.420)	12.0	0.71 (0.028)	9.09 (0.358)	Yellow
Intermediate coast modulator valve	42.35 (1.667)	15.0	0.84 (0.033)	9.24 (0.364)	
Intermediate coast shift valve	35.10 (1.382)	12.5	0.76 (0.030)	8.96 (0.353)	
Low coast shift valve	34.62 (1.363)	13.0	0.56 (0.022)	7.56 (0.298)	
Line pressure relief valve	32.14 (1.265)	9.0	2.03 (0.080)	13.14 (0.517)	
Pressure relief valve	33.32 (1.312)	7.0	1.32 (0.052)	13.82 (0.544)	
Shift valve 3–4, type 1	37.88 (1.491)	14.5	1.10 (0.043)	10.60 (0.417)	AW70
type 2	33.65 (1.325)	14.5	1.10 (0.043)	10.60 (0.417)	AW71
Primary regulator valve, type 1	73.30 (2.886)	15	1.588 (0.063)	16.72 (0.658)	AW70
type 2	61.20 (2.409)	13	1.80 (0.071)	17.2 (0.677)	AW71 (AW70 055)
Secondary regulator valve	71.27 (2.806)	15	1.93 (0.076)	17.43 (0.686)	

Note! The above chart can be used to identify springs prior to installing.

If the free length of a spring is not exactly according to specifications this does not necessarily mean that the spring is defective (special test equipment is necessary to ascertain this).

Tightening torques

	Nm	ft-lbs
Converter casing – engine, M10	35–50	25–36
M12	55–90	40–65
Drive plate to torque converter	41–50	30–36
Centre support to gear case:		
tighten alternately in steps to		
7 Nm (5 ft lbs)	24–28	17–20
Pump cover to pump body	6–9	4–6
Pump assembly to gear case	18–26	13–18
Plate above parking pawl	6–9	4–6
Converter casing to gear case		
4 x M10	26–47	19–34
2 x M12	48–68	35–49
Rear extension housing to gear case	27–42	20–30
Valve bodies, for cam M6	6–9	4–6
other bolts, M5	5–6	3.5–4
Oil strainer to lower valve body	5–6	3.5–4
Cover plate to gear case, M6	6–9	4–6
Valve body to gear case	8–12	6–9
Oil pan to gear case	4–5	3–3.5

	Nm	ft-lbs
Coupling flange to output shaft*	40–50	30–36
Blind plug for pressure test	5–9	3.5–6
Nut, oil cooler to gear case	20–30	14–22
Speedometer drive	4–6	3–4
Nut, oil dipstick tube	80–100	58–72
Solenoid valve	10–16	7–12
Drain plug to oil pan	18–23	13–17

* Use locking fluid P/N 1161053-2 (1161054-0)

VALVE BODY ASSEMBLIES

A brief description of the many different types of valve body assemblies in use on Volvos is described in the following pages. Modifications have been made throughout the years, and can be identified by a code number or by the change in part and serial numbers as shown below

The valve body assemblies for the different transmissions are very similar but parts must not be interchanged otherwise there is risk of too high or too low shift speeds or no shift at all.

When replacing an old type valve body with a new one, it is very important that the governor is replaced as well even if it is in fully working order. This is because the valve body and governor are matched to ensure correct shift speeds.

Note that AW transmissions have only one governor.

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AW70 B23F, B230F	1239 947	(superseded by 1239 964)	13
AW71 B21FT	1239 790	(superseded by 1239 971)	13
BW 55	1233 148	(superseded by 1233 280)	
		(superseded by 1233 281)	14
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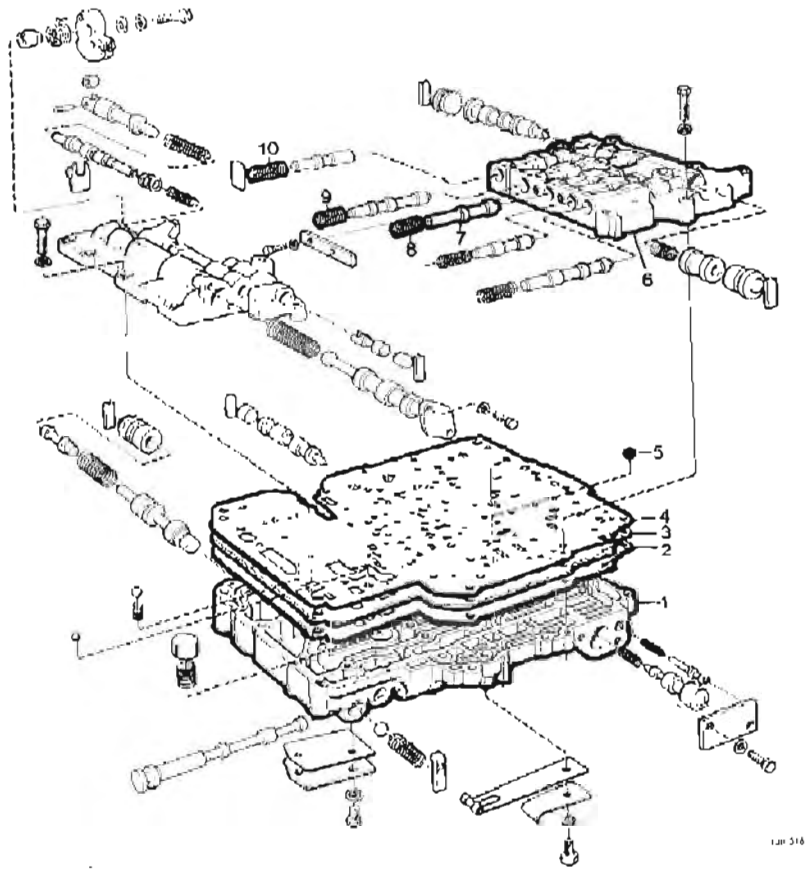
Governor transmission code	Governor P/N				
001	1233 274	012	1233 274	023	1233 275
002	1233 244 to serial no 11336	013	1233 274	025	1233 274
002	1233 275 from serial no 11337	014	1233 274	026	1233 344
003	1233 274	015	1233 276	027	1233 274
005	1233 274	016	1233 274	030	1233 276
006	1233 274	017	1233 276	031	1233 274
007	1233 244 to serial no 2819	018	1233 275	AW55	1239 611 to 2BA 80000
007	1233 275 from serial no 2820	019	1233 274	AW55	1239 785 from 2BA 80001
008	1233 276	020	1233 344	AW70	1239 867 to 1LC 86636
009	1233 274	021	1233 276	AW70	1239 785 from 1LC 86637
010	1233 276	022	1233 274	AW71	1239 785
011	1233 275				

AW55 1976–



1 Lower valve body
2 Gasket
3 Separator plate
4 Gasket
5 Valve ball (upper rear valve body)
6 Upper rear valve body
7 Reverse clutch sequence valve
8 Spring (reverse clutch sequence valve)
9 Spring (intermediate coast modulator valve)
10 Spring (detent regulator valve)

Valve body

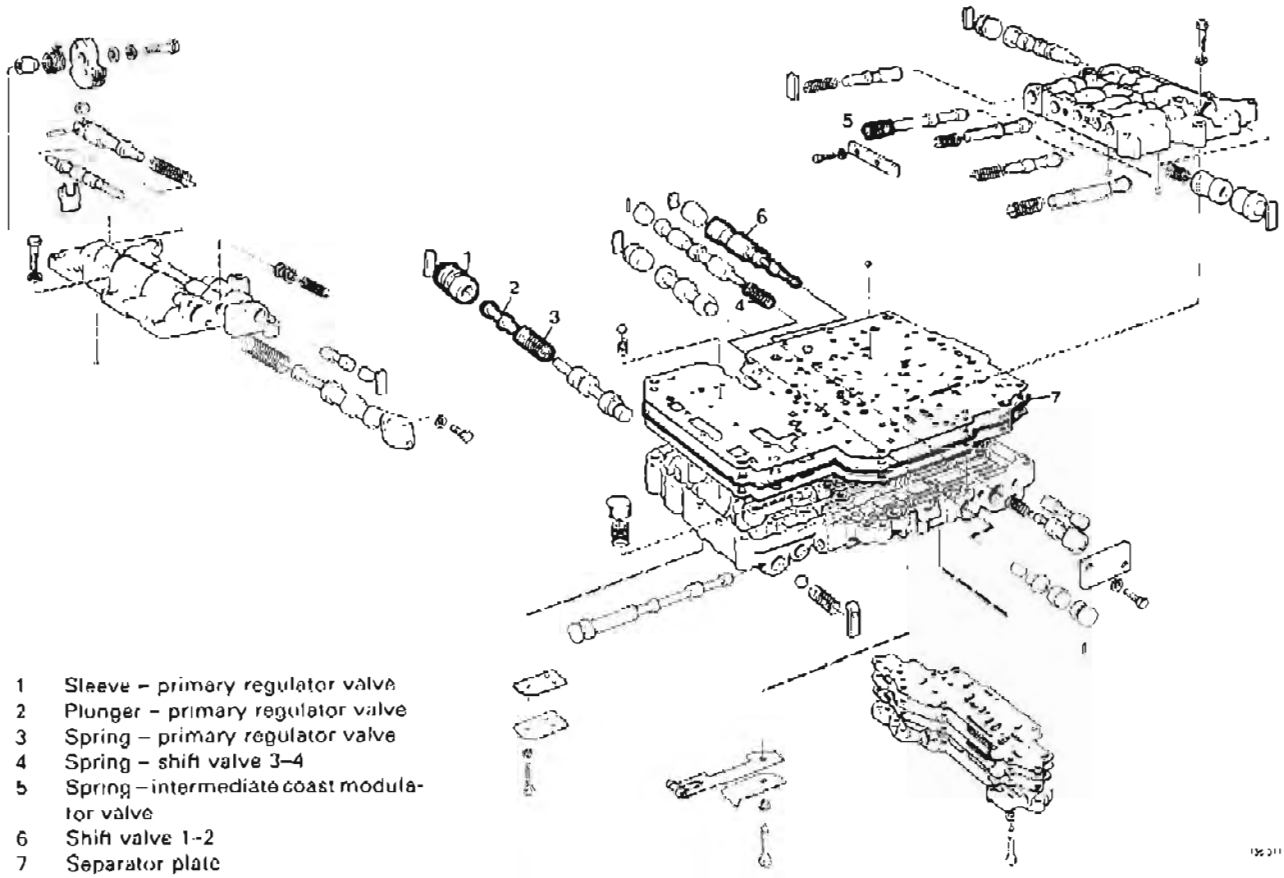
Early type (1976–1977)

Valve body P/N 1239 556 fitted only to transmissions 1208 063 (code 100) to serial no -80 492.

Late type (1978–)

Valve body P/N 1239 646. Difference between old and new types is shown above. The numbered components are only to be found on 1978- valve bodies. Note! Extra ball (5) P/N 1239 572.
Valve body system introduced from serial no 80 493 on:
P/N 1208 063 (1978)
from production start on transmissions:
1208 163 (code 250) (1979–1980)
1208 193 (code 320) (1980)
1208 253 (code 376) (1981–).

AW70/71 1982–



1 Sleeve – primary regulator valve
2 Plunger – primary regulator valve
3 Spring – primary regulator valve
4 Spring – shift valve 3–4
5 Spring – intermediate coast modulator valve
6 Shift valve 1-2
7 Separator plate

A brief description of the differences between the valve body assemblies on the AW70 and AW71 transmissions is given below.

AW70, Valve body P/N 1239 380[1] (1982–)

Components:

- sleeve P/N 1239 600 (1)
- plunger P/N 1239 599 (2)
- spring P/N 1239 558 (3)
- spring – shift valve 3–4 P/N 1239 869
- spring – intermediate coast modulator valve P/N 1239 649 (two part shift valve 1–2 introduced from serial no KC 86 659–).

AW71, Valve body P/N 1239 790[1] (1982–)

Components:

- sleeve P/N 1239 794 (1)
- plunger P/N 1239 793 (2)
- spring P/N 1239 792 (3)
- spring – shift valve 3–4 P/N 1239 797
- spring – intermediate coast modulator valve P/N 1239 812 (two part shift valve 1–2 introduced from serial no KF 80 439–).

AW70, Valve body P/N 1239 947[1] B23F, B230F (1983–)

Components:

- sleeve (1) same as AW71
- plunger (2) same as AW71
- spring (3) same as AW71
- spring – shift valve 3–4, same as AW70
- spring – intermediate coast modulator valve, same as AW70
- two part shift valve, same as AW70

NOTE:
[1] Separator plate modified several times in 1983 to improve lubrication of overdrive.
Valve body **1239 830** replaced by **1239 965**
1239 790 replaced by **1239 971**
1239 947 replaced by **1239 964**

BW55 1975–

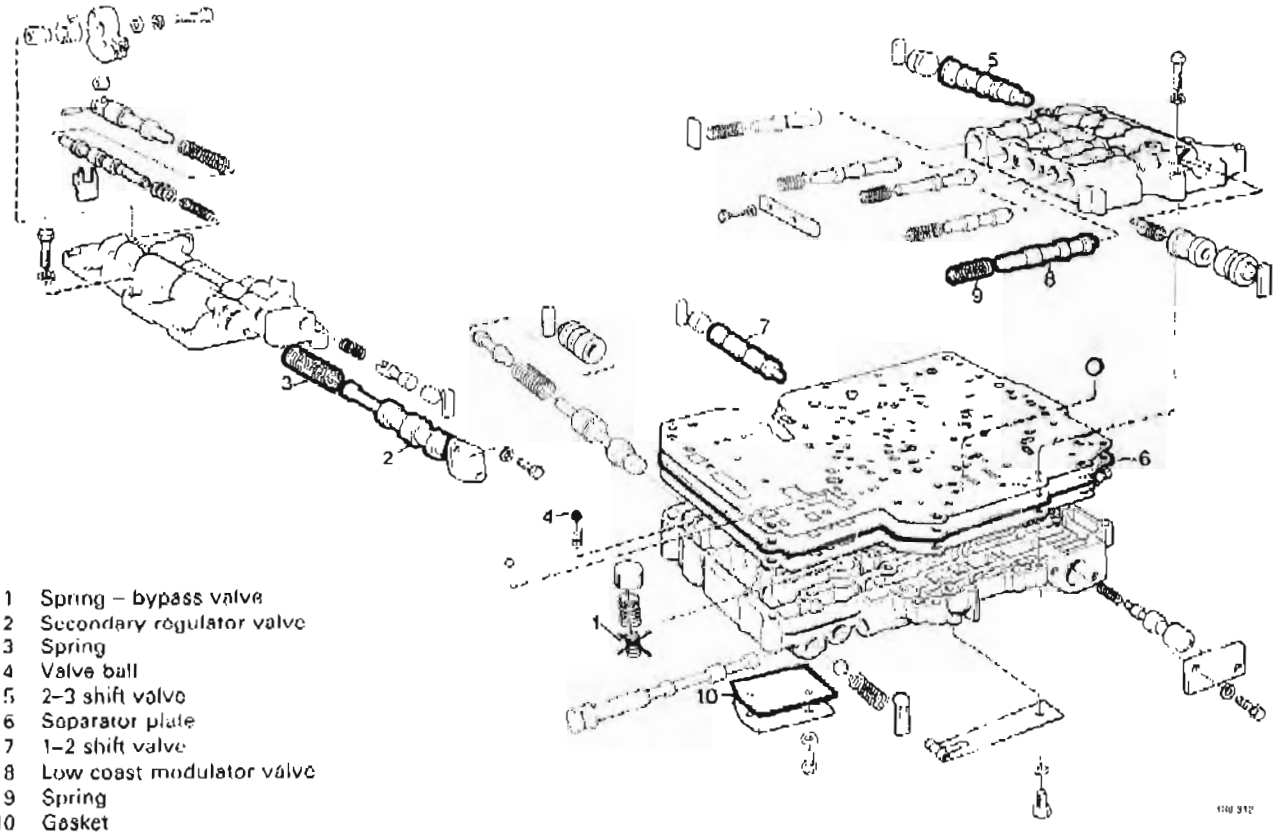
Valve body P/N 1233 148 (codes 5007, 5011, 5012, 5015)

	Position
Codes 5007, 5011 and 5012 valve bodies only on transmission P/N 254721-002.	
With effect from code 5011 one spring only used for bypass valve	1
With effect from code 5012 (serial no 1311-6722) following modifications were undertaken:	
– new secondary regulator valve and spring	2, 3
– ball diameter reduced from 6.3 mm (1/4") to 5.5 mm (7/32")	4
new quick action 2–3 shift valve introduced	5
– separator plate. Hole E12 reduced in size to 1.0 mm	6
– quick action 1–2 shift valve introduced	7
With effect from code 5015: – modified low coast modulator valve and spring	8, 9
– modified separator plate. Hole E12 increased in size to 1.5 mm	6
– gasket (10) introduced for cover plate	10

Valve body assemblies with code 5015 are mounted on following transmissions:

P/N 254 721-002 (serial no 9688-11336)
P/N 1208 056-006 (serial no 1011-3056)
P/N 1208 047-005 (serial no 1011-3414)
P/N 1208 004-007 (serial no 1011-2819).

(serial no "1001" = production start)



1 Spring – bypass valve
2 Secondary regulator valve
3 Spring
4 Valve ball
5 2–3 shift valve
6 Separator plate
7 1–2 shift valve
8 Low coast modulator valve
9 Spring
10 Gasket

Valve body P/N 1233 280, 1233 281, 1233 289

1233 280 (code 5014) superseded 1233 148 (code 5015) on transmissions:
P/N 254 721-002 (serial no 11337-18888)
P/N 1208 046-007 (serial no 12820-19717)

1233 281 (code 5013) superseded 1233 148 (code 5015) on transmissions:
P/N 1208 047-005 (serial no 3415-4893)
P/N 1208 056-006 (serial no 3057-10132)

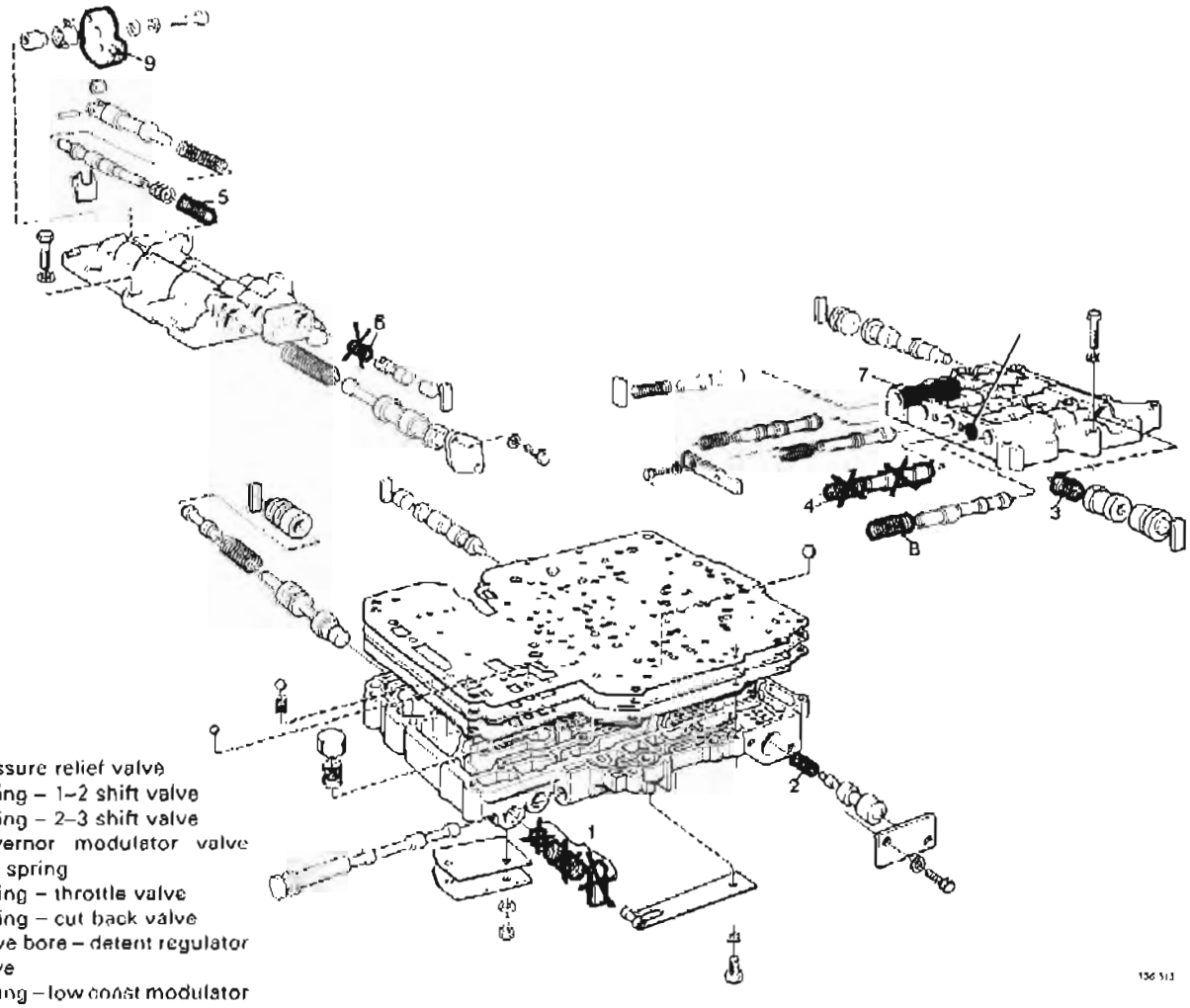
1233 289 (code 5019) introduced from production start on transmission:
P/N 254 720-001 (serial no 1001-3251)

Modifications undertaken from serial nos quoted above as compared with valve body P/N 1233 148 (code 5015) are as follows:

	Position
– pressure relief valve discontinued	1
– low coast shift valve spring modified	2
– intermediate coast shift valve spring modified	3
– governor modulator valve replaced by a plug	4
– throttle valve spring modified	5
– cut back valve spring discontinued	6
– detent regulator valve spring position adjusted	7

Special modifications (B27):

– new type low coast modulator valve spring introduced on B27A/E (on transmissions with codes 001, 002, 007)	8
– new type cam introduced on B27A with valve body code 5019	9



1 Pressure relief valve
2 Spring – 1–2 shift valve
3 Spring – 2–3 shift valve
4 Governor modulator valve and spring
5 Spring – throttle valve
6 Spring – cut back valve
7 Valve bore – detent regulator valve
8 Spring – low coast modulator valve
9 Throttle cam

Valve body P/N 1233 295, 1233 296, 1233 297

1233 295 (codes 5017, 5021)

superseded 1233 280 on transmissions:
P/N 254 721-002 (serial no 18889-20452)
P/N 1208 046-007 (serial no 19718-21946)

Introduced from production start on transmissions:
P/N 1208 128-011 (1011-)
P/N 1208 170-018 (1001-12401)
P/N 1208 164-021 (1001-)
P/N 1208 189-023 (1001-1038)

1233 296 (codes 5016, 5020)

superseded 1233 281 on transmission:
P/N 1208 047-005 (serial no 4894-7415)
P/N 1208 056-006 (serial no 10133-)[1]

Introduced from production start on transmissions from serial no:

P/N 254 718–003 (1024–12306)	P/N 1208 166-015 (1001–4763)
P/N 1208 066–008 (1001–4875)	P/N 1208 171-016 (1001–1246)
P/N 1208 111–009 (1001–1509)	P/N 1208 172-017 (1001–1134)
P/N 1208 112–010 (1001–1241)	P/N 1208 167–019 (1011–2702)
P/N 1208 162–012 (1001–)	P/N 1208 197–022 (1001–1354)
P/N 1208 165–014 (1001–10516)	P/N 1208 198–PP22 (1001–)

1233 297 (codes 5018, 5022) superseded 1233 289 on transmissions:
P/N 254 720-001 (serial no 3252–5782)
introduced from production start 1208 168–013 (serial no 1001–1537)

[1] Unchanged throughout production, discontinued 1977.
[2] Modified to prevent deposits on gear case. Transmissions with nos. lower than quoted above should be checked carefully. If valve body-gear case joint is uneven –parts must be levelled.
[3] **Throttle valve washer reintroduced on:**
– valve body code 5020 with effect from:

Serial no	Transmission code	Serial no	Transmission code
55775-	003	17901-	008
9929-	005	3299-	009
10012-	006	1742	010

– production start on transmissions code: 014, 015, 016, 017, 019

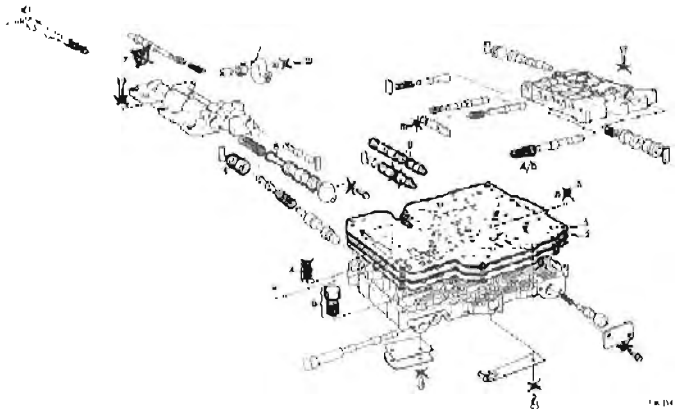
– valve body code 5021 with effect from:

Serial no	Transmission code	Serial no	Transmission code
29317-	002	2485-	012
22825-	007	3177-	018
17194-	011	2543-	021

– valve body code 5022 with effect from
serial no 7590- on transmission code 001.
– production start on transmissions code:013, 014, 015, 016, 017, 019, 020, 022

In comparison with valve bodies 1233-280; -281; -289 the following components have been modified with effect from the serial nos qoted above:

	Position
– primary regulator valve sleeve modified	1
– separator plate modified	2
– upper gasket modified	3
– damper valve (ball + spring) discontinued	4
– ball on intermediate coast modulator valve discontinued	5
– secondary regulator valve modified	6
thrust washer (all) discontinued	–
throttle valve washer discontinued[3]	7
– two part shift valve introduced	8
– valve body shape modified[1]	–
Bypass valve and spring modified	9



A = 1233 127 (black) transmission code
003, 009, 008, 010,
005, 006, 009PP22, 012, 020, 022,
014, 01b, 016, 017, 019, 026.

B 1233 285 (red) transmission code
001, 002, 007, 011, 013, 018,
021, 025, 023, 027, 030, 031

Valve body P/N 1233 349, 1233 370, 1233 371

1233 370 (code 5023) superseded 1233 297 on transmission:
P/N 1208 168–013 (serial no 1538–)
introduced from production start on transmission:
P/N 1208 218–025 (serial no 1001–2515)

1233 371 (code 5024) superseded 1233 296 on transmission:
P/N 1208 165–014 (serial no. 10517–49595)
P/N 1208 166–015 (serial no. 4764–14477)
P/N 1208 171–016 (serial no. 1247–)
P/N 1208 172 017 (serial no. 1135–1305)
P/N 1208 167–019 (serial no. 2703–)
P/N 1208 197–022 (serial no. 1356–1955)

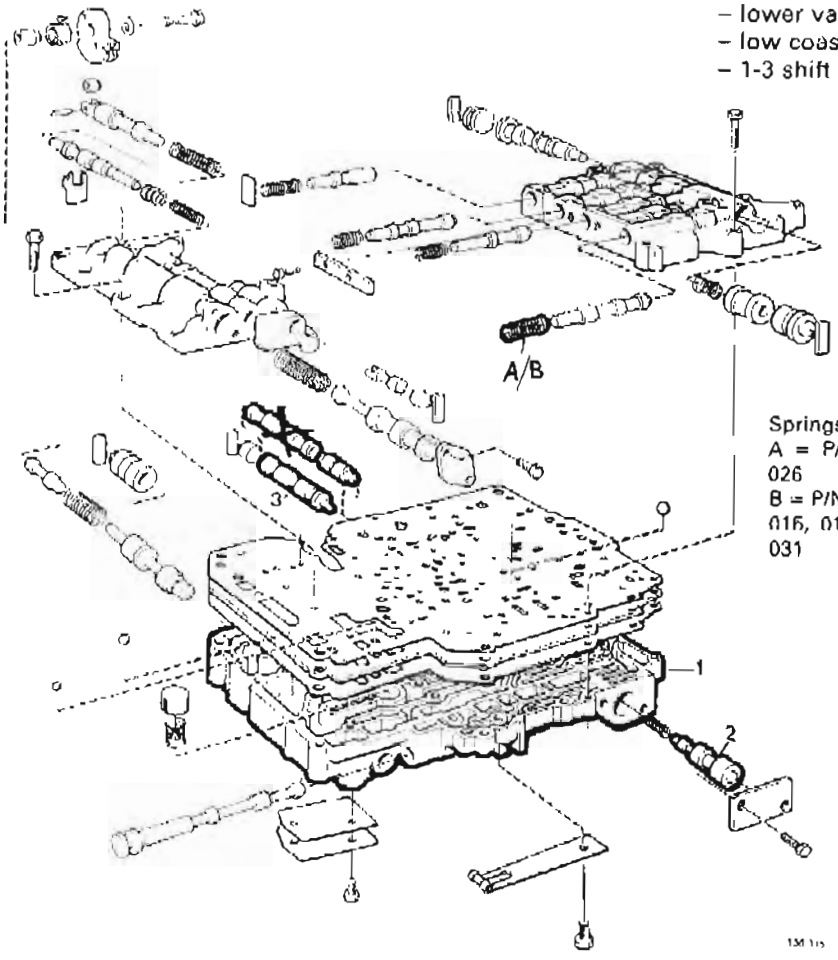
superseded 1233 295 on transmission:
1208 170–018 (serial no 12402–)
1208 189–023 (serial no 1039–28661)

introduced from production start on transmissions:
P/N 1208 254–027 (serial no 1001–9071)
P/N 1208 207–030 (serial no 1001–8601)
P/N 1208 262–031 (serial no 1001–6405)

1233 349 (code 5027) introduced from production start on transmissions:
P/N 1208 173–020 (serial no 1001–10810)
P/N 1208 227–026 (serial no 1001–1668)

In comparison with valve bodies 1233 295; -296; -297 the following components have been modified with effect from the serial numbers quoted above:

	Position
– lower valve body	1
– low coast shift valve	2
– 1-3 shift valve	3



Springs for low coast modulator valve
A = P/N 1233 172 on transmission (codes) 020, 026
B = P/N 1233 285 on transmission (codes) 013, 014, 015, 016, 017, 018, 019, 022, 023, 025, 027, 030, 031

Valve body P/N 1233 387, 1233 388, 1233 389

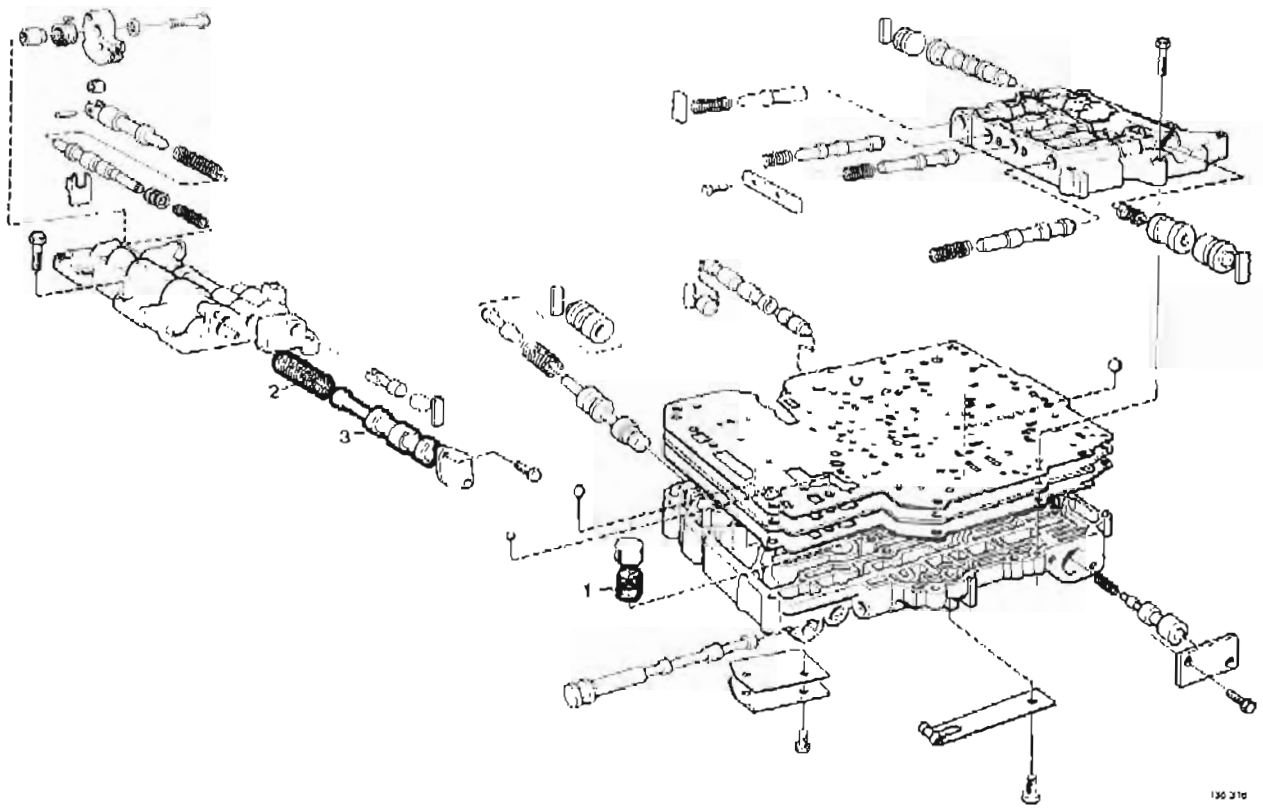
1233 387 (code 5029) superseded 1233 349 on transmission:
P/N 1208 173-020 (serial no 10811–)
P/N 1208 227–026 (serial no 1669–)

1233 388 (code 5030) superseded 1233 370 on transmission:
P/N 1208 218–025 (serial no 2b16–)

1233 389 (code 5031) superseded 1233 371 on transmissions:
P/N 1208 165–014 (serial no 1956–)
P/N 1208 166–015 (serial no 14478–)
P/N 1208 172–017 (serial no 1306–)
P/N 1208 192–022 (serial no 1956–)
P/N 1208 189–023 (serial no 28662–)
P/N 1208 254–027 (serial no 9072–)
P/N 1208 207–030 (serial no 8602–)
P/N 1208 262–031 (serial no 6406–)

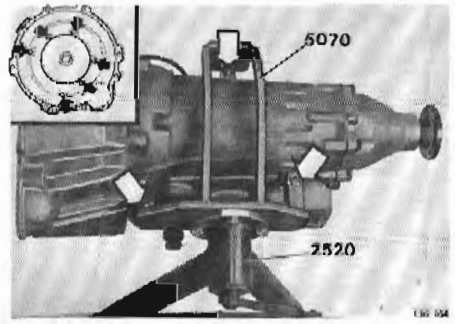
	Position
With effect from serial numbers quoted above the following modifications have been undertaken:	
– Bypass valve spring modified	1
– secondary regulator valve spring modified	2
New secondary regulator valve (P/N 1233 396) introduced with effect from:	3

Transmission code	Serial number	Transmission code	Serial number
013	1750-	022	1872–
014	29606–	023	22336–
015	1925–	025	2043–
016	1925–	026	1592–
017	1300–	027	4146–
019	7579–	030	3881–
020	9252–	031	3000–



Special tools

999	Description – use
2520-8	**Stand**
2531-5	**Pressure gauge** (0–25 kp/cm^2): checking line pressure
2779-0	**Socket** (11 mm): removing propeller shaft flange bolts
2846-7	**Spanner** (9/16 in): removing propeller shaft flange bolts
5069-3	**Puller**: removing oil pump seal
5070-1	**Fixture**: transmission overhaul
5071-9	**Puller**: oil pump
5072-7	**Spring compressor**: removing/installing return springs in clutches
5073-5	**Spring compressor**: removing return springs from B3 brake
5074-3	**Nipple**: connecting oil pressure test equipment, used with 2531 and 5114



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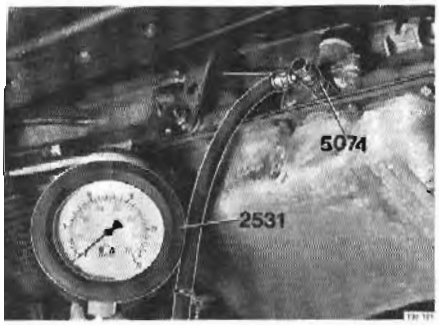

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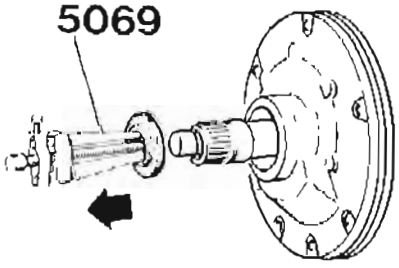
2779, 2846



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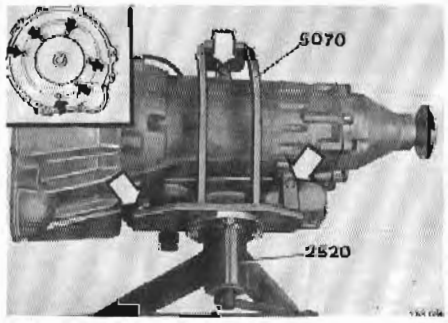

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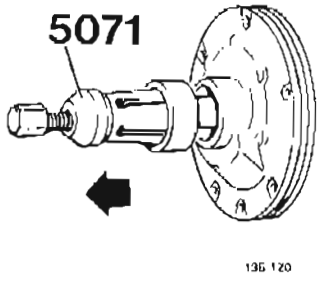

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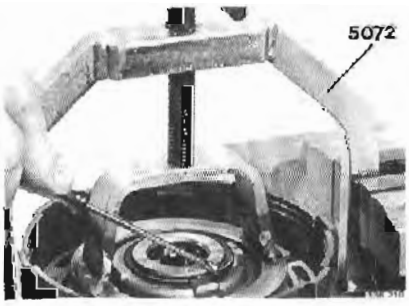

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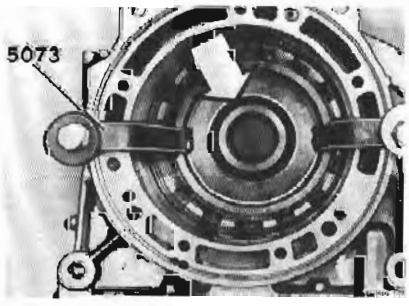

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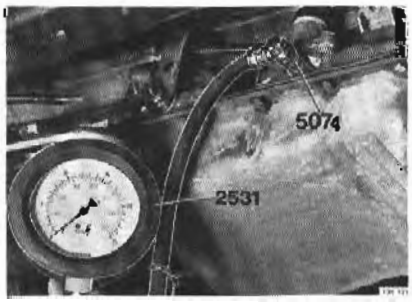

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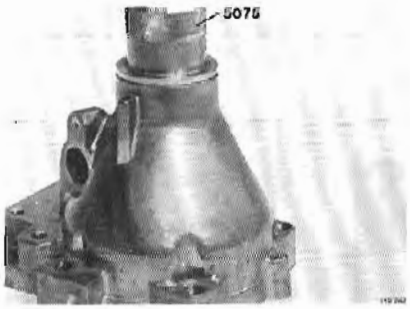
Special tools

999	Description – use
5075-0	**Drift**: installing oil seal in coupling flange at rear
5076-8	**Retainer**: accumulator pistons
5077-6	**Centering band**: assembling oil pump
5080-0	**Drift**: removing/installing bushing in extension housing
5114-7	**Pressure gauge** (0–10 kp/cm²): checking governor pressure
5117-0	**Drift**: installing oil pump seal
5118-8	**Drift**: installing selector shaft seal
5149-3	**Spanner**: flange nut
5225-1	**Drift**: removing/installing rubber bushing in transmission mount
5231-9	**Display tray**: for valves and springs
5241-8	**Guide pins**: installing overdrive section
5972-8	**Fixture**: removing/installing transmission



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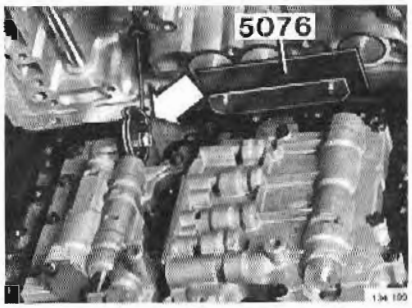

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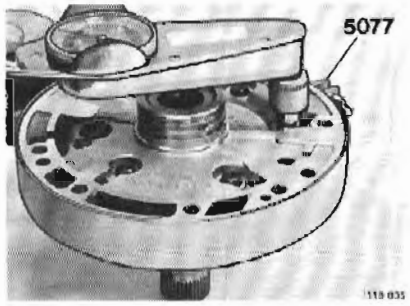

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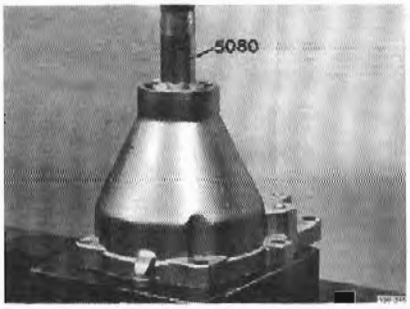

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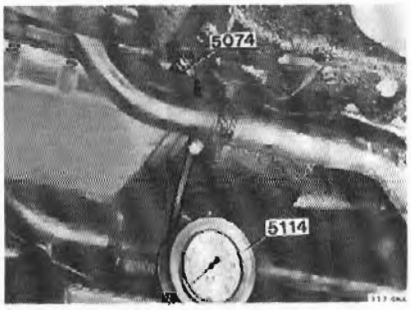

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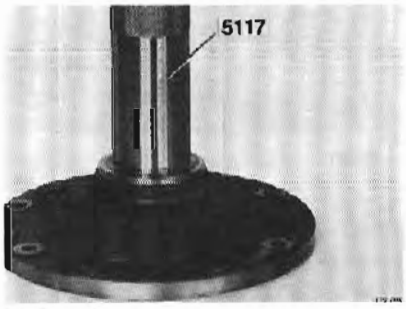

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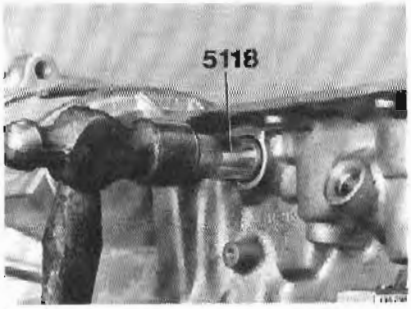

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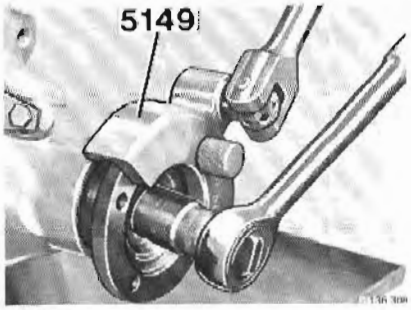

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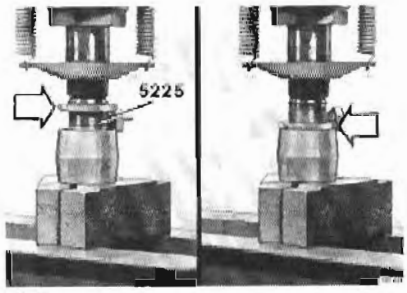

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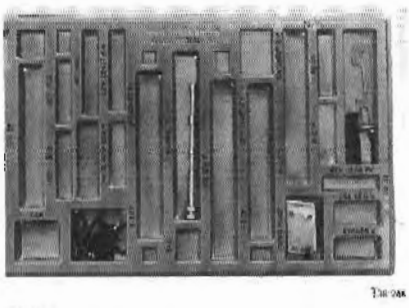

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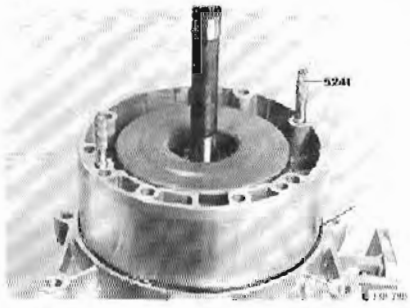

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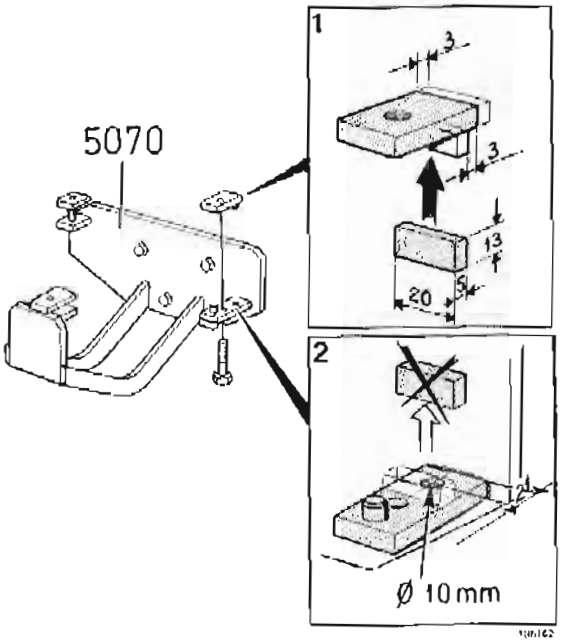


Modification of tools

Fixture 999 5070-1

Fixture 5070 for supporting AW55 and BW55 transmissions has been modified to fit new type BW55 units as well as AW70 and 71.

To modify old type fixtures

Detach support plate from back plate.

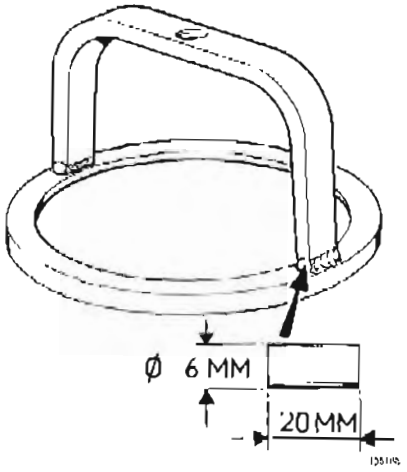
Cut off 3 mm (0.12 in) of support plate.

Weld on a new plate as illustrated.

Dimensions = 20 x 13 x 5 mm (0.79 x 0.51 x 0.1 in).

Grind off stud on support plate.

Drill a 10 mm (0.39 in) hole, 21 mm (0.83 in) from back plate, see fig.



Spring compressor 999 5072-7

Now modified to fit AW70 and AW71 transmissions as well as AW55 and BW55. Modification involves increasing height of arm by 5 mm.

To modify

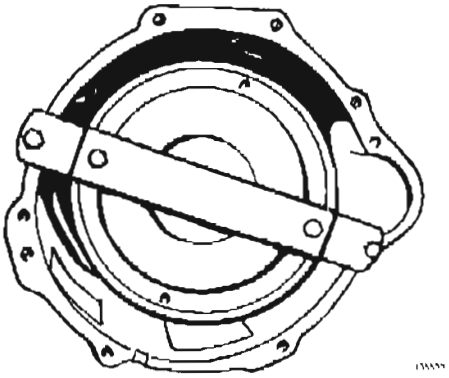
Remove weld from one side of arm and bend arm up free from ring.

Place a piece of 6 mm (0.2 in) rod (length 20 mm: 0.79 in) on ring, see arrow.

Weld on arm again.

Repeat procedure on opposite side of ring.

Exchange units, automatic transmissions



When should an exchange unit be installed?

The following are considered normal and should not be rectified:

- Slip on shift from P or N under harsh acceleration. Normally, clutches are fully applied within 2 seconds.
- 3–2 downchange under part load and low speed (25–40 km/h = 15–25 mph) occasionally accompanied by light jerk and clicking noise.
- If accelerator is released quickly during a stall test in position D a screeching noise can sometimes result (AW55 only).
- 1–2 upshift harsher with gear selector in 2 than D. (AW55 only.)

In-Car Service

It is not necessary to remove the automatic transmission from the vehicle to rectify faults associated with the following items. (Also unacceptable as reason for installing exchange unit.)

- Oil level
- Oil leakage, excluding leakage from torque converter and oil pump
- Kickdown cable
- Selector linkage
- Parking pawl
- Valve body assembly
- Governor
- Extension housing, coupling flange, speedometer drive and oil seal
- Hydraulics
- Accumulator pistons
- Solenoid valve (AW70/71)

Following faults can be repaired with transmission mounted on fixture 5972

- Oil leakage from torque converter or oil pump
- Torque converter
- Torque converter casing.

Installing exchange unit (see 09–20, page 64)

It is extremely important that the instructions on page 64 are followed carefully and carried out before testing the vehicle, otherwise damage may occur which may invalidate the warranty.

Fault tracing

An automatic transmission should not be exchanged or reconditioned before a thorough troubleshooting has been carried out.

Fault symptoms can sometimes be misleading, for instance if an oil passage is blocked by clutch particles as a result of the clutch slipping, the removal of the blockage will only postpone transmission breakdown and not stop it.

It is therefore important to check the condition of the oil, if the strainer is blocked, particles in the sump, etc.

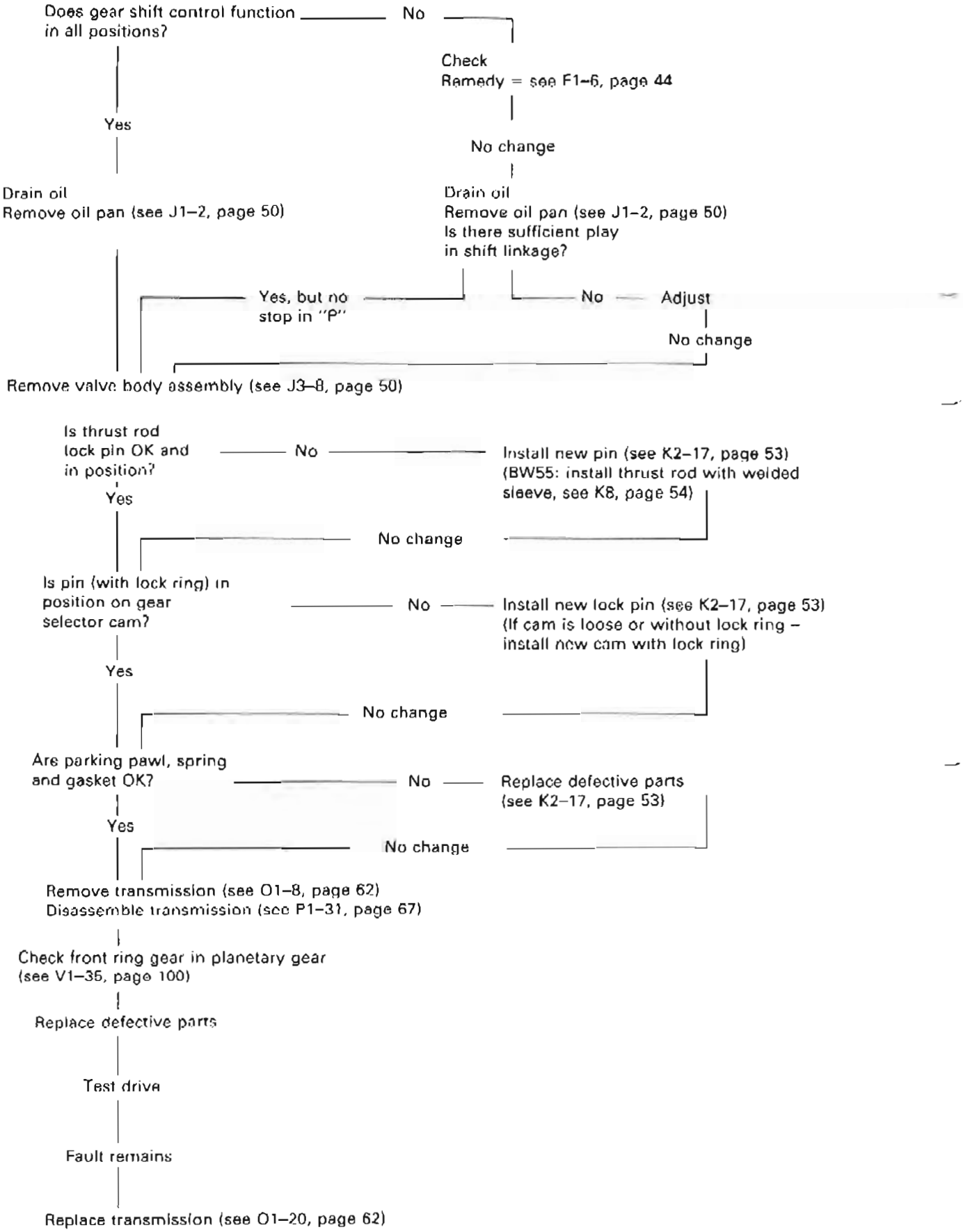
In this way it will be possible at an early stage to establish where the actual fault is.

Fault symptoms

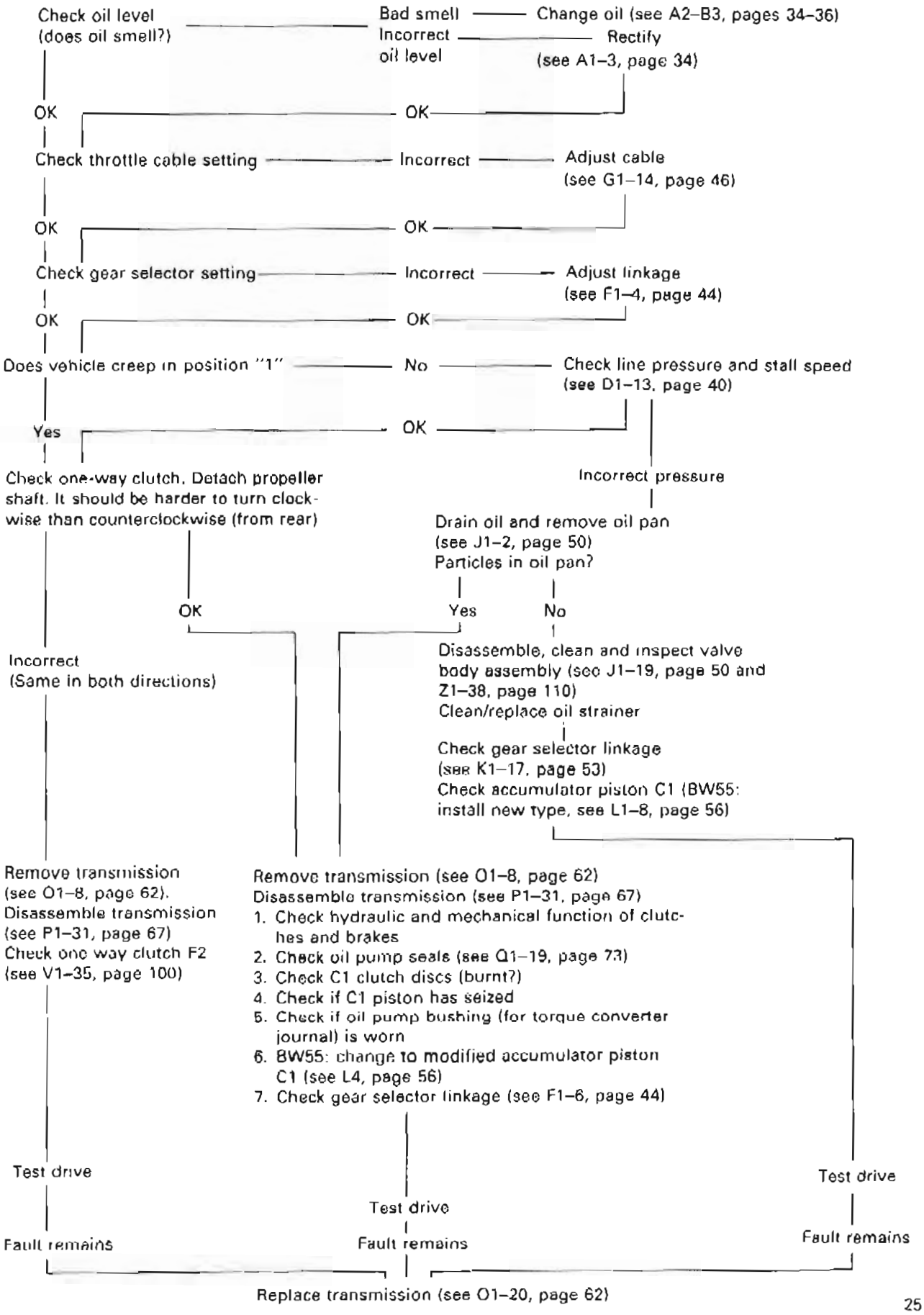
Poor operation	Page
No stop in position P	24
Vehicle does not move forward	25
Vehicle does not move forward in "2" and "D" (cold transmission)	26
Vehicle does not move in reverse	27
Upshift fails or delayed	28
Harsh engagement – noisy disengagement	29
Noise in "N" or "P" (Vehicle stationary and engine running)	
High pitch noise, increasing with engine speed	30
Whirring noise	30
Squawking noise	30
Noise in "D" or "R" (Engine running, brakes applied)	
Murmuring or steady low frequency noise, especially at full throttle	30
Noise during operation	
Loud noise e.g. knocking or metallic noise in any gear except direct drive	31
Rattling noise when starting	31
Oil leakage	
Vehicle stationary, engine off	31
Vehicle stationary, engine running	31
During operation	32

Poor operation

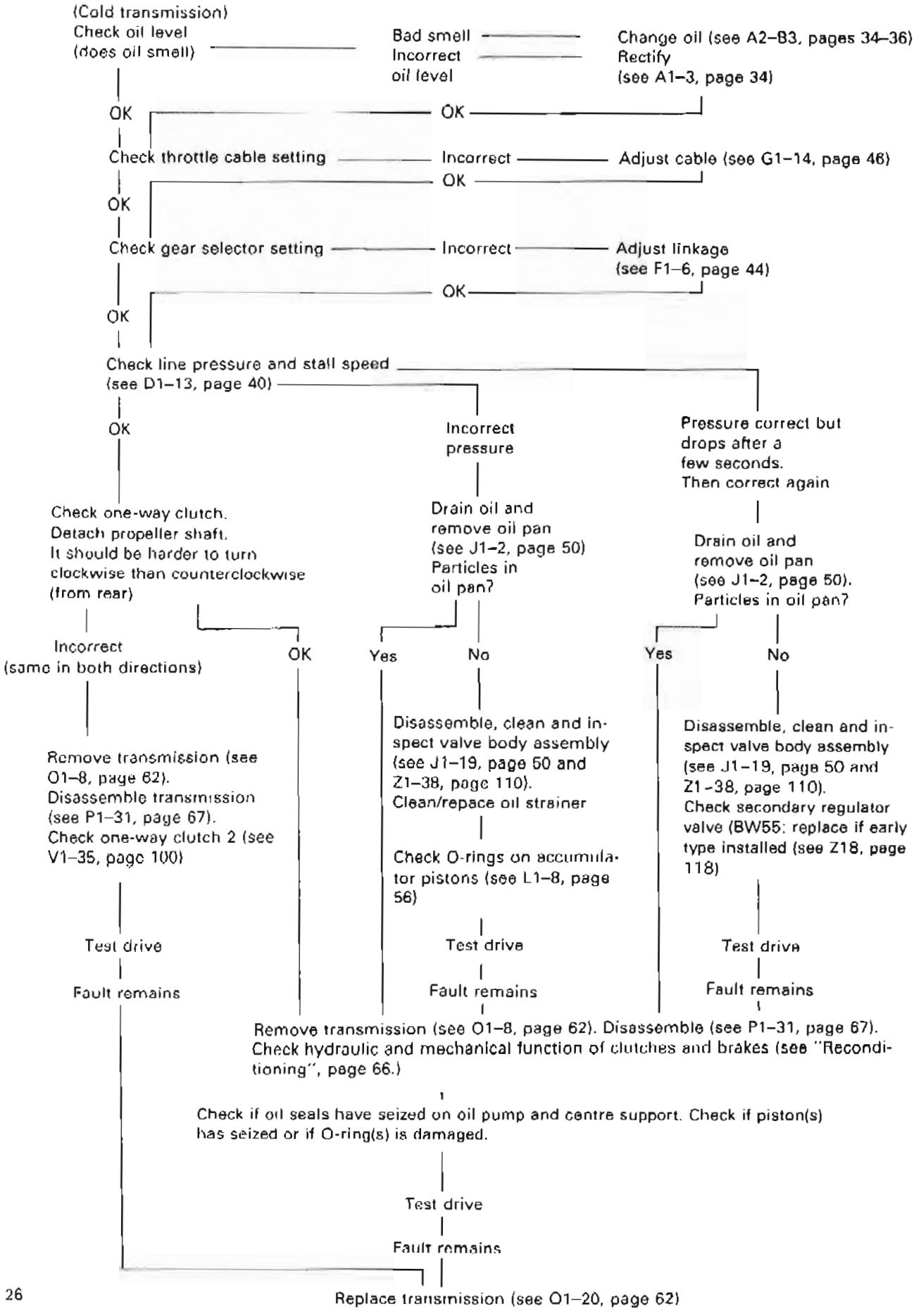
No stop in position P



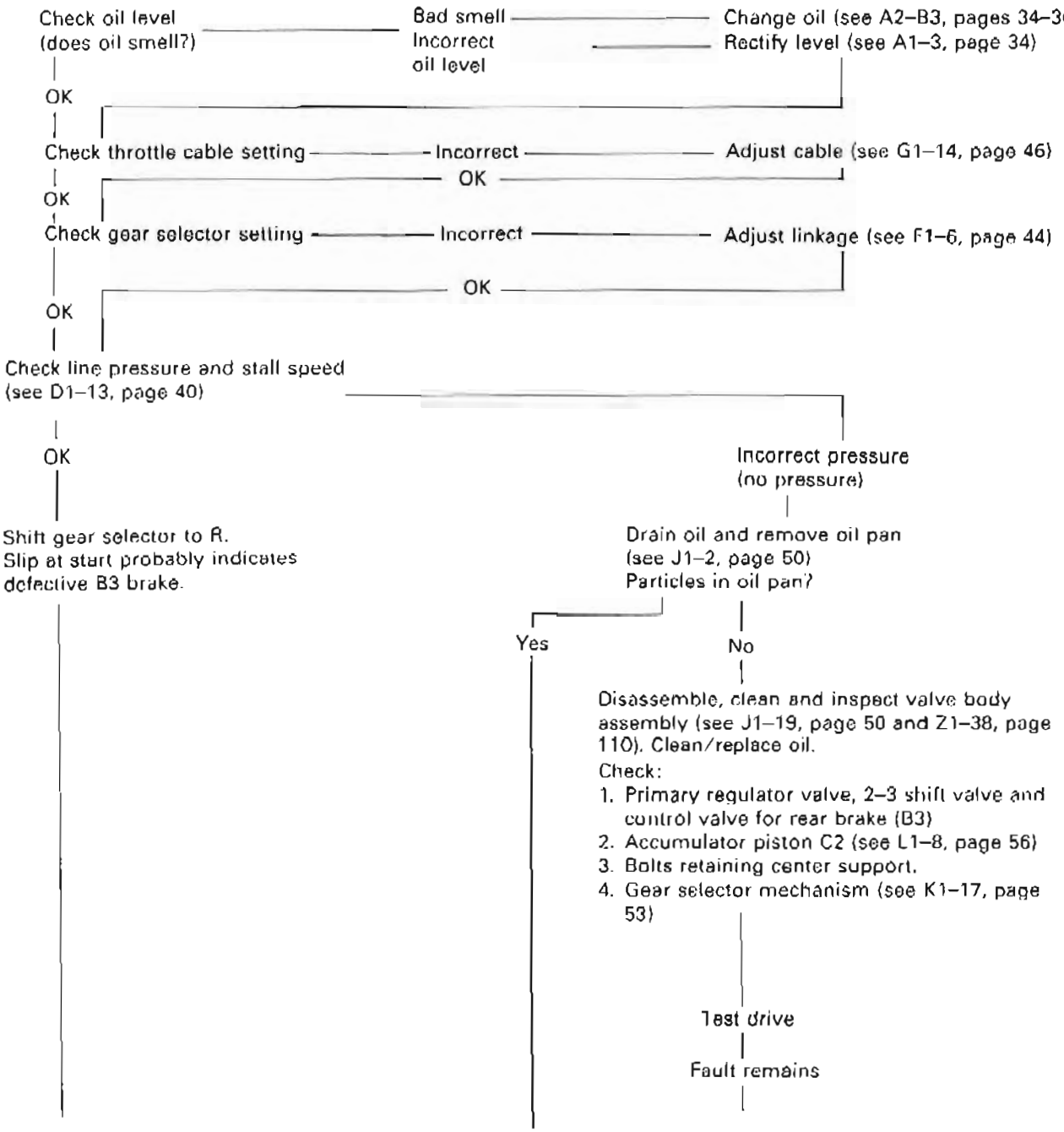
Vehicle does not move forward



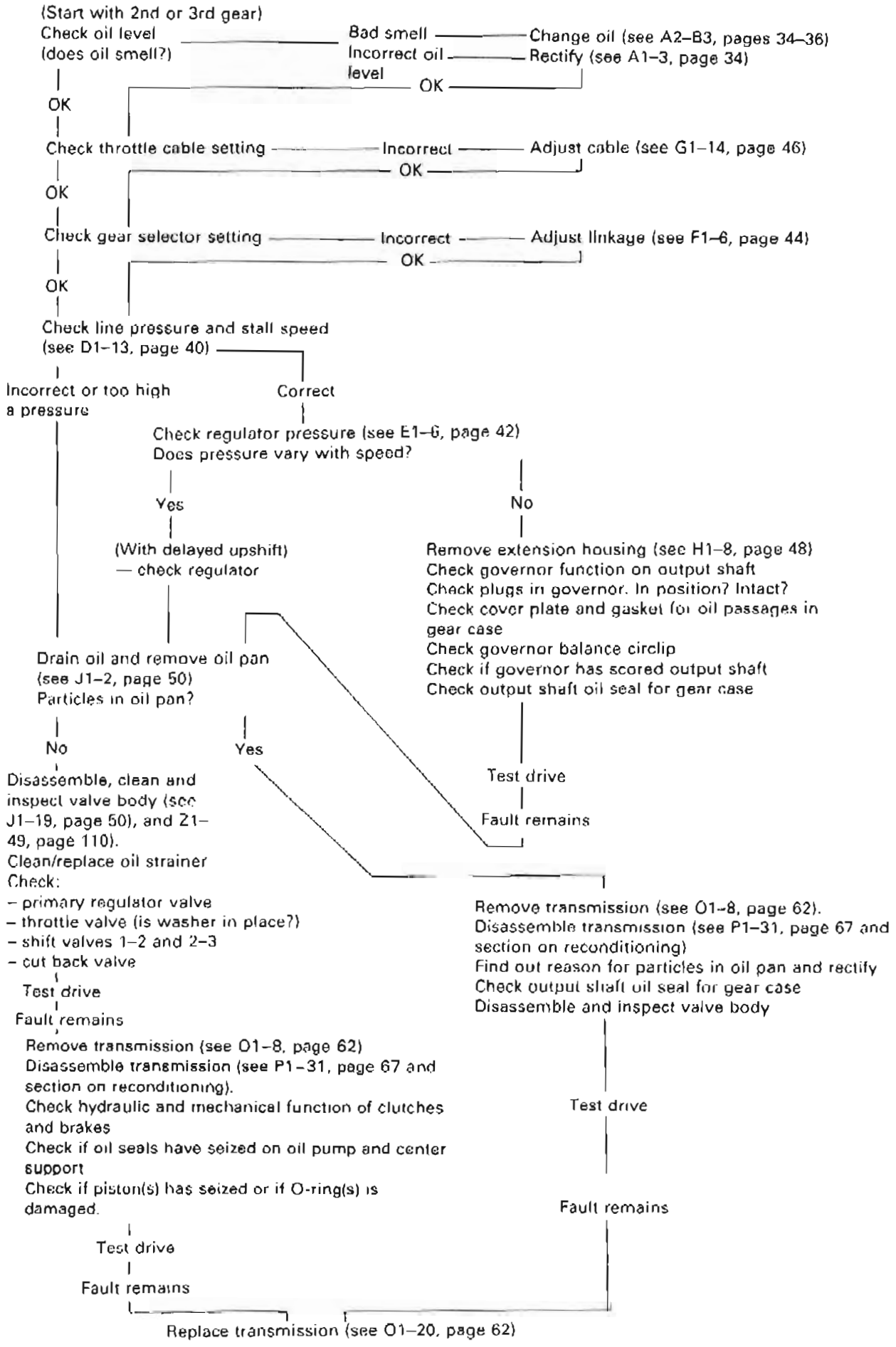
Vehicle does not move forward in "2" or "D"



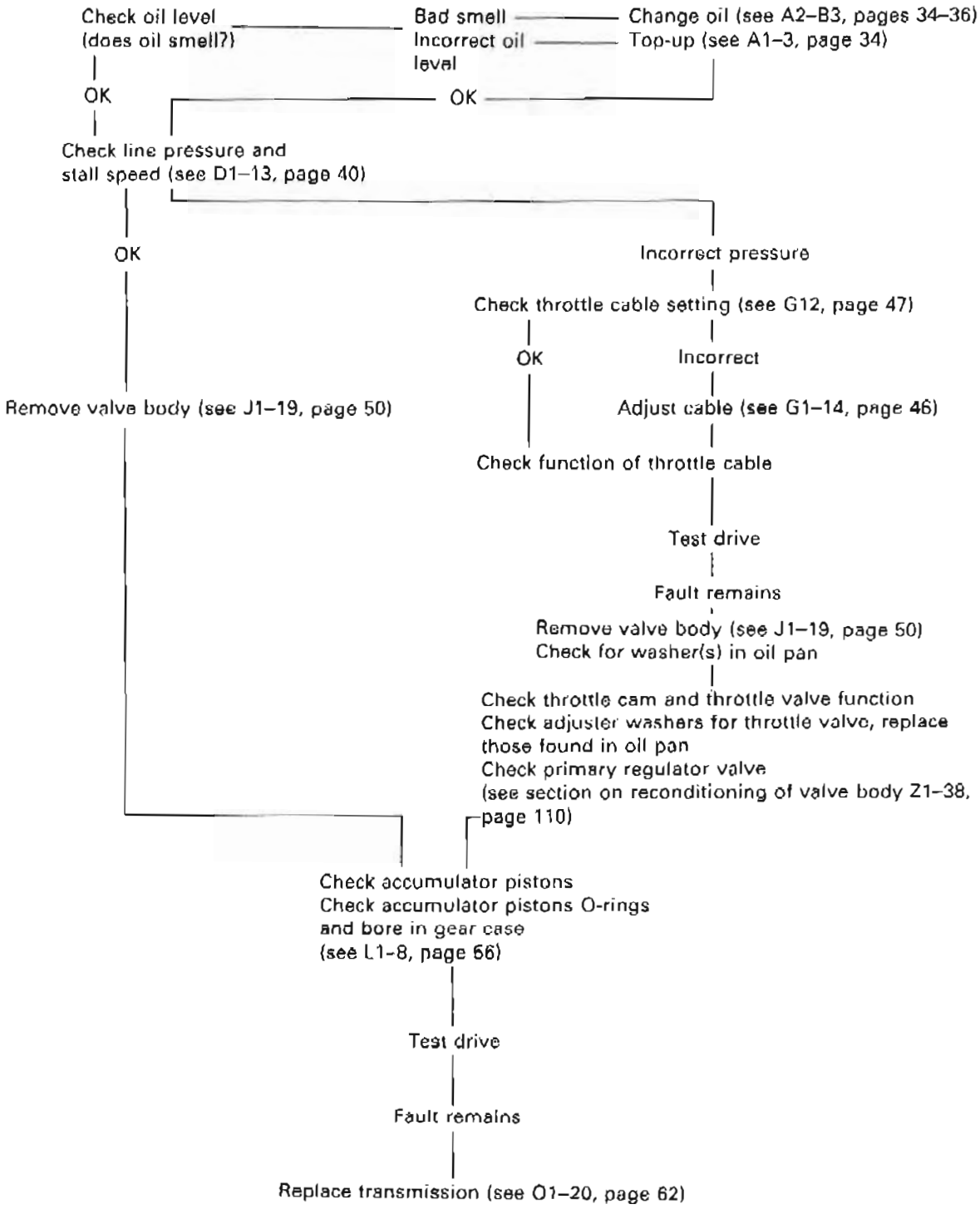
Vehicle does not move in reverse



No shift or delayed shift



Harsh engagement – noisy disengagement



Noise in position N or P. (Vehicle stationary, engine running)

High pitch noise, increasing with engine speed

Possible fault	Remedy	Operation	Page
Low oil level	Top up	A1–6	34
Oil filter clogged	Clean/replace	J1–18	50
Oil pump worn	Replace	O1–20; P18–21; Z56–83	62, 70, 135
Torque converter faulty	Replace	O1–20, P2; Z39; Z82–83	62, 67, 129, 142
Other transmission fault	Overhaul transmission	O1–20, P1–Z86	62, 67

Whirring noise

Possible fault	Remedy	Operation	Page
Flywheel drive flange broken	Replace	O1–20; service manuals – section 2	62
Torque converter touches cover	Replace converter	O1–20; P2; Z39; Z82–83	62, 67, 129, 142
Torque converter cover improperly attached to engine	Check cover attachment (Dowels, etc)	O9–14	64
Other fault (planetary gear, etc)	Overhaul transmission	O1–20; P1–Z86	62, 67

Squawking noise

Possible fault	Remedy	Operation	Page
Bushing for torque convorter in oil pump, worn	Replace oil pump and if necessary torque converter	O1–20; C5; P18–21; Z56–83	62, 39, 70 135
Dowels for torque converter cover loose/missing	Repair	O1–20	62

Noise in position D or R. (Brakes applied, engine running)

Noises similar to those above can also occur in positions D and R.

Murmuring or steady low frequency noise, especially at full throttle, usually in combination with low stall speed

Possible fault	Remedy	Operation	Page
Stator slips in torque converter	Replace torque converter and change oil	O1–20; P2, Z39, Z82–83	62, 67, 129 142
	Clean oil cooling system	A1–6; B1–3	34, 36

Noisy operation

Noises similar to those on the previous page can also occur when transmission is operating.

Loud knocking or metallic noise in any gear except direct drive

Possible fault	Remedy	Operation	Page
Inside transmission (Possible defective planetary gear tooth)	Overhaul transmission	O1–20; P1–Z86	62, 67

Rattling noise when starting

Possible fault	Remedy	Operation	Page
Parking pawl partly engaged	Check parking pawl and front ring of planetary gear	K1–17	53
	If ring gear damaged: – overhaul transmission	O1–20; P1–Z86	62, 67

Oil leaks

Vehicle stationary, engine off

Possible fault	Remedy	Operation	Page
Gasket or oil cooler connection	Clean, locate fault and repair	C1–6	37

Leakage, vehicle stationary, engine running

Possible fault	Remedy	Operation	Page
Leak from transmission front end:			
– high oil level	Top up	A1–6	34
– pump bushing damaged/loose	Replace oil pump	O1–20;P18–21; Z56–83	62, 70, 135
– oil pump seal worn or damaged (BW55: is twin-lip sealing ring installed?)	Replace oil seal	C5–6	39
– torque converter neck damaged	Replace torque converter	O1–20; P2; Z82–83	62, 67, 142
– torque converter cover loosely attached to engine	Tighten, adjust	O1–20	62
Leak from oil filler tube (after driving)	Wipe clean. Check	C4	38

Oil leaks during driving

Possible fault	Remedy	Operation	Page
Leak from rear extension housing gasket or oil seal	Replace gasket and oil seal	C2; H1–8; X8–12 C1–6	37, 48, 108, 37
Leak from oil seals	Check/replace oil seals	C1–6	37
Leak from transmission front end	See bottom of page 31		
Leak from oil pump oil seal during fast motor-way driving or towing	Check oil pump seal (BW55: is twin-lip seal installed?)	C5–6	39
Worn torque converter neck	Check	Z39	129
Overheated oil	Install auxiliary oil cooler	Accessory	

Power flow charts

BW55 AW55

Gear selector position	Gear	Clutch applied	Planetary gear used P1 or P2	Brake applied	One-way clutch applied	Engine braking
P	–	–	–	rear B3[1]	–	–
R	reverse	rear C2	front	rear B3	–	yes
N	–	–	–	–	–	no
D	first second third	front C1 front C1 C1+C2	both rear "direct"	– B1, B2 B2[2]	F2 F1 –	no yes yes
2	first second	front C1 front C1	both rear	– B1, B2	F2 F1	no yes
1	first	front C1	both	B3	F2	yes

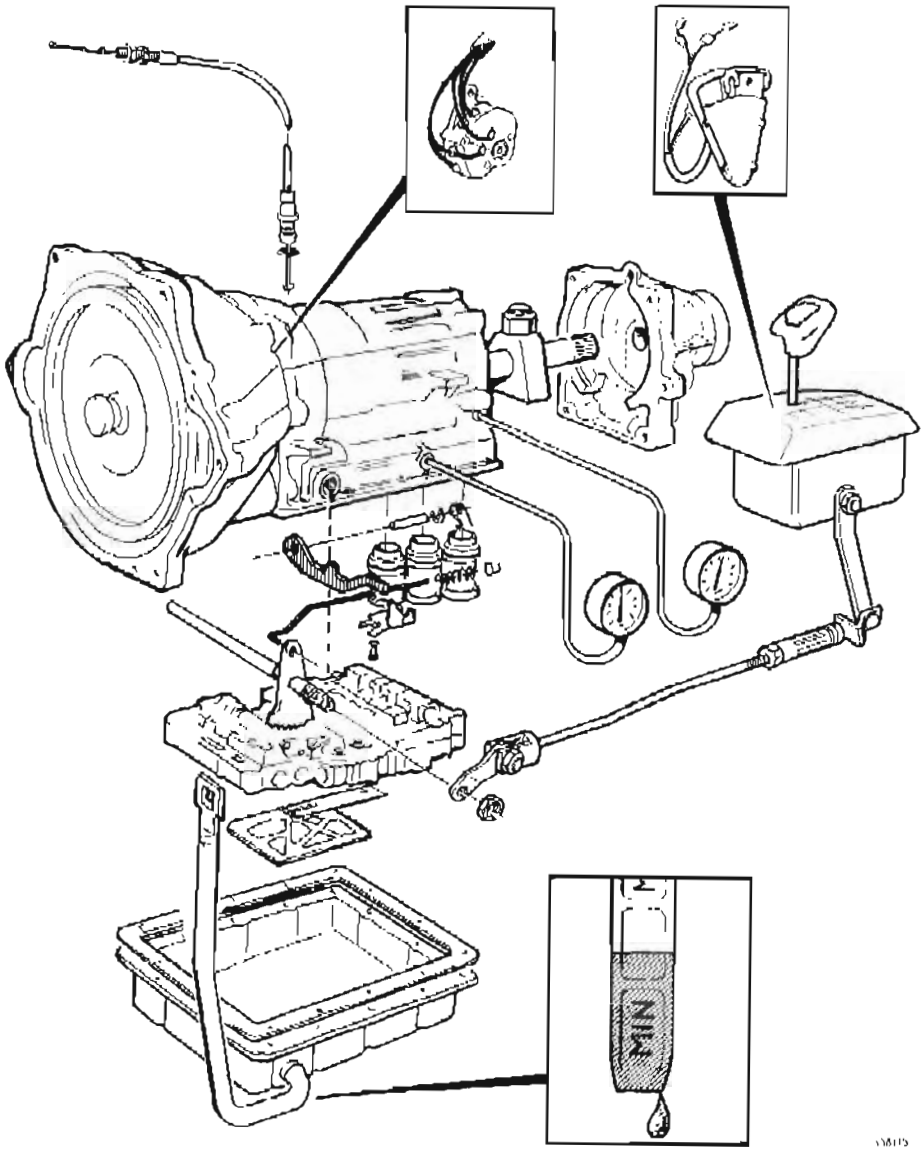
AW70, AW71

P	–	C0[1]	–	B3[1]	–	–
R	reverse	C0, C2	front	B3	F0	yes
N	–	C0	–	–	–	no
D	first second third fourth	C0, C1 C0, C1 C0, C1, C2 C1, C2	both rear "direct" overdrive + "direct"	– B2 B2[3] B0, B2[3]	F0, F2 F0, F1 F0 –	no no[2] yes yes
2	first second	C0, C1 C0, C1	both rear	– B1, B2	F0, F2 F0, F1	no yes
1	first	C0, C1	both	B3	F0, F2	yes

[1] With engine running.
[2] At speeds above 16 mph (25 km/h) third gear is engaged when throttle pedal is released.
[3] Applied to facilitate gear changing.

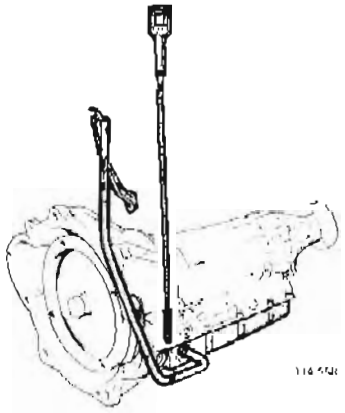
In-car repairs

	Operation	Page
Oil, check-change	A1–6	34
Oil cooling system, cleaning	B1–3	36
Oil seals, replacement	C1–6	37
Line pressure, check	D1–6	40
Stall test	D7–13	41
Governor pressure, check	E1–6	42
Gear selector, adjustment	F1–6	44
Kick-down cable, replacement – adjustment	G1–14	46
Governor, removing, installing	H1–8	48
Valve body, removing	J1–8	50
installing	J9–19	51
Selector linkage, replacement	K1–17	53
Accumulator pistons, replacement	L1–8	56
Solenoid valve (AW70/71), replacement	M1–7	58
Transmission mounts:	N1–4	60
replacement	N5–10	61
Transmission, removing	O1–8	62
installing	O9–20	64

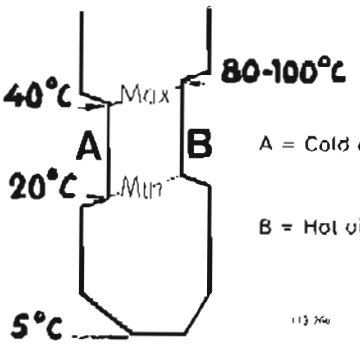


A. Oil, checking – changing

Never start engine without oil in transmission!



Late type
1979–



A = Cold oil range

B = Hot oil range

Old type
1975–78

Oil level is normally within cold range at 20°C (68°F). Idling for approx. 10 minutes in workshop will usually give an oil temperature of 40°C (104°F).

Hot range is used for normal operating conditioning i.e. temperatures reached after road driving for approx. 30 minutes.

119 008A

A1

Checking oil level: Check oil when warm (cold part of dipstick is only for reference)

Conditions: vehicle on level surface, engine idling and selector lever in position "P".

Move selector level through all gear positions, stopping in each position for 4–5 seconds. Return lever to position P and wait 2 minutes before checking oil level.

Wipe dipstick with a nylon rag or chamois i.e. fluff-free materials.

Note! Two types of dipsticks are in use:

1975–1978 = steel ended
1979– = plastic ended.

A2

High oil level

Drain excess oil

Unscrew filler tube from oil pan. (Drain plug fitted on 1983-models.) Re-torque tube fitting to 90 Nm (66 ft-lbs).

WARNING! The transmission oil may be extremely hot if vehicle has just been driven.

Check drained oil for water contamination. If water is present, transmission and torque converter must be removed and cleaned. Also oil cooler must be checked for leakage and repaired or replaced.

Heavy load on transmission can also cause too high an oil level because of extremely high oil temperature.

A3

Low oil level

Ensure low level is not due to leakage.

Checking oil level at low temperatures (below 5°C = 41°F) may result in false readings.

Driving with insufficient oil in transmission will cause oil to foam, also giving false oil level.

Filling oil

Use ATF type G (F). Types F and G are mixable.

Note! Use DEXRON II D for 1984 — AW 70, AW 71 transmissions.

Distance between max and min on dipstick represents 0.5 liter (0.5 US qts) on AW55/BW55.

AW70/71: max – min = 0.4 liter (0.4 US qts).

Oil change quantities, see A6 on page 36.

Note! Additives must not be added to transmission.

Tightening torque for oil pan, see J14 on page 52.

Be careful when adding oil

Overfilling can cause foaming and leakage.

Do not check level immediately after adding oil, as oil adhering to filler tube may wipe off on dipstick and give false reading

Note! Engine must be idling throughout addition of oil. If engine is revved with low transmission oil level, oil will foam considerably and give false reading.

A4

Discolored or burnt oil

Remove oil pan and check for abnormal quantities of solid particles of steel, aluminum or clutch facing materials.

If found = overhaul transmission

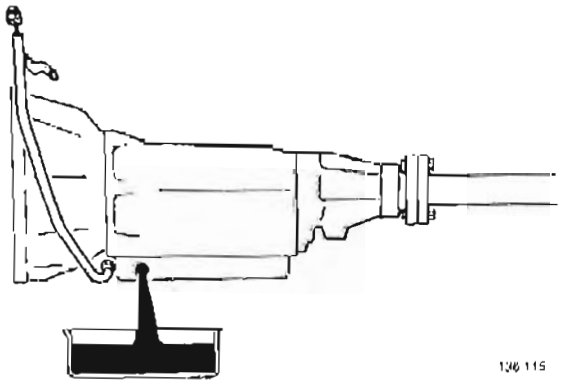
If no fault can be found with the transmission, it is possible that particles have accumulated in torque converter and suddenly moved with oil flow. Replace torque converter and clean oil cooler and pipes.

None = change oil and clean oil pan, filter, magnet and oil cooler

Alternatively overhaul transmission.

If oil discoloration or burnt smell was caused by harsh driving or towing (transmission operates correctly), oil should be filled according to method described on page 36 "Cleaning oil cooling system", i.e. fill oil until clean oil comes from return pipe.

A5



Changing oil

Drain oil by unscrewing oil filler tube. (Drain plug introduced in 1983).

> **Caution!** Transmission oil may by very **hot** if vehicle has just been driven.

Clean oil pan, filter, magnet

Should always be done after each oil change. (Tightening torque for oil pan, see J14 on page 52).

Note! Always clean oil cooler if oil is burnt and contains foreign particles.

Torque filler tube to 90 Nm (66 ft. lbs). Fill oil. Start engine and allow it to idle. Check oil level.

Oil fill quantities: Litres (US qts)

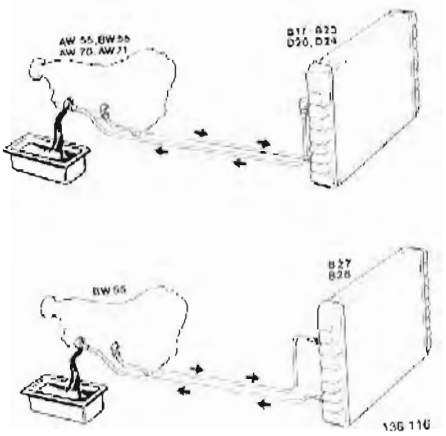
A6

	AW/BW55 1975–78	AW/BW55 1979	AW70/71
Removing oil pan	3.0 (3.15)	3.4 (3.57)	3.3 (3.47)
Add before starting engine	2.5 (2.63)	2.9 (3.05)	2.7 (2.84)
Reconditioning valve body assembly in-car	4.5 (4.73)	4.9 (5.15)	5.5 (5.78)
Add before starting engine	4.0 (4.20)	4.4 (4.62)	5.0 (5.25)
Reconditioning transmission incl. installing new torque converter	6.5 (6.83)	6.9 (7.25)	7.4–7.5 (7.77–7.88)
Add before starting engine	6.0 (6.30)	6.4 (6.72)	7.0 (7.35)
Reconditioning transmission incl installing old torque converter	5.5 (5.78)	5.9 (6.20)	6.5 (6.83)
Add before starting engine (not possible to drain converter fully)	5.1 (5.36)	5.5 (5.78)	6.1 (6.41)

Note! Add extra 3 dl (0.3 US qts) on vehicles with auxiliary oil cooler.

[1] Deeper sump introduced in 1979

B. Cleaning oil cooling system



B1

Always clean oil cooler when reconditioning/replacing transmission

B2

To clean

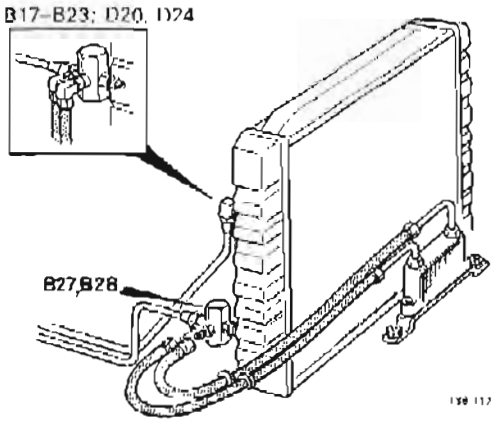
Disconnect oil return pipe at rear of transmission.

Overfill transmission by approx. 0.3 liter (0.3 US qt.).

Start engine and allow to idle. Collect contaminated oil and switch off engine when clean oil comes out of pipe.

Re-connect pipe.

Check/top up oil level (see A1, page 34).



B3

Clean auxiliary oil cooler separately

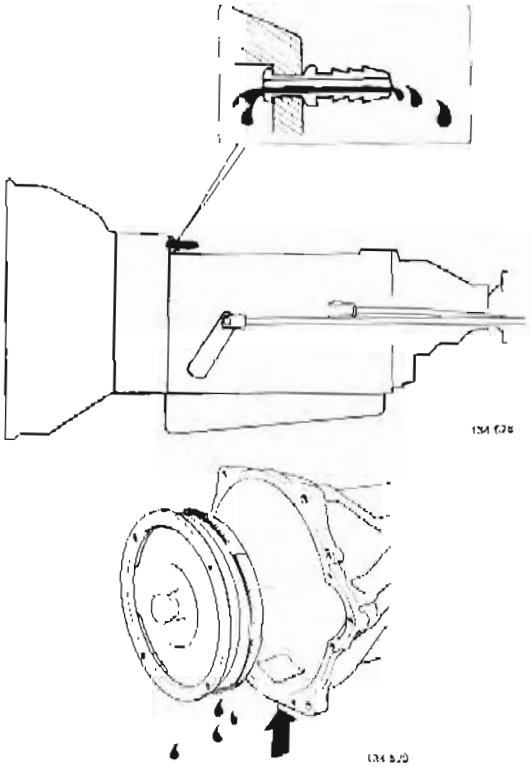
Disconnect pipes from standard oil cooler. Connect auxiliary oil cooler to an oil supply pump and pump clean oil through.

Re-connect pipes to standard oil cooler.

Start engine and let idle. Check oil level.

(Illustration shows location of hoses and thermostat valve for different engine types.)

C. Oil seals, replacement



C1

Oil leakage

High level

First check that leakage is not due to high oil level; oil may be thrown out through vent located on top side of torque converter. Also check for leaks at oil cooler pipes and the test outlet plugs.

With other leakages, clean the transmission and determine if leak can be remedied or if transmission must be removed.

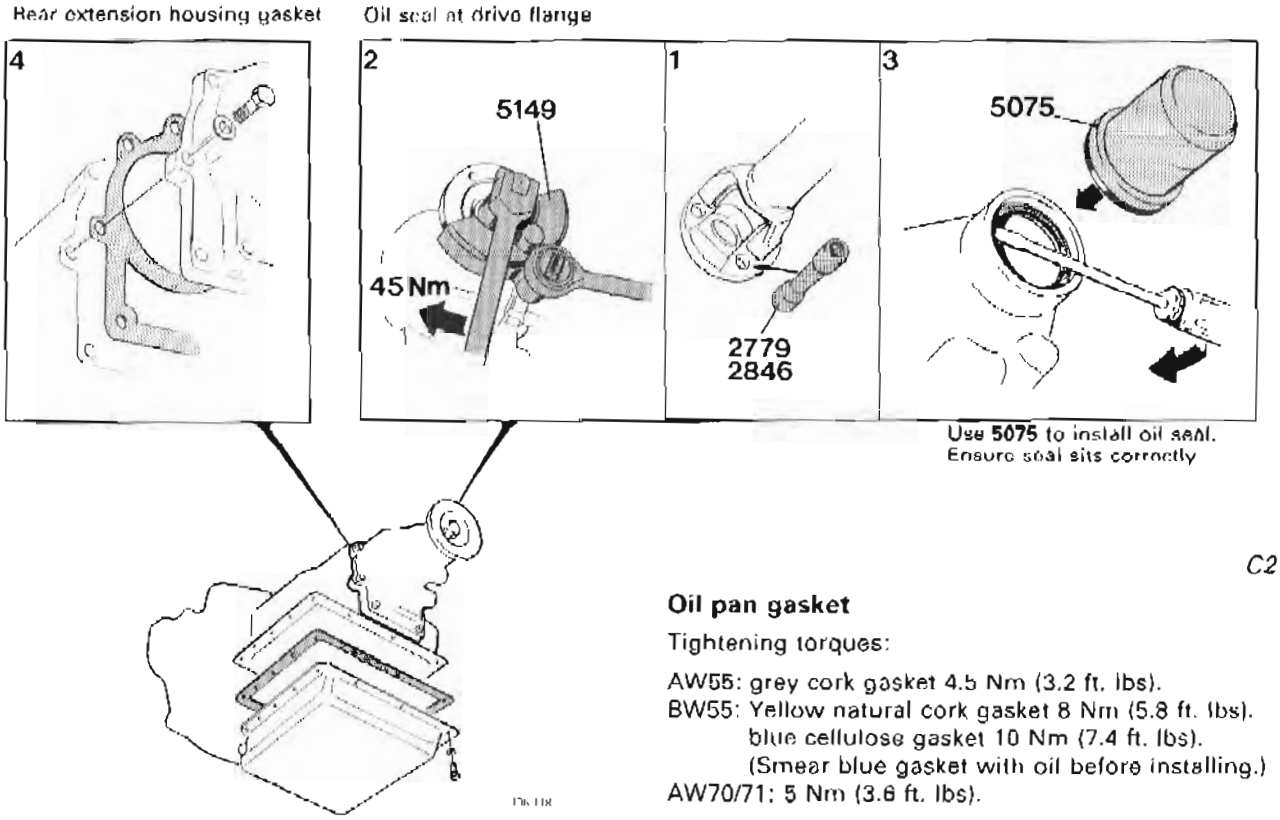
Leaks from torque converter welds

Insert a piece of paper through opening in bottom of torque converter housing. Run engine at idle for a few minutes.

Oil spill on paper indicates an oil leak. Replace torque converter.

Replace seals in vehicle (transmission rear and underside)

Special tools: 2779, 2846, 5075, 5149



C2

Oil pan gasket

Tightening torques:

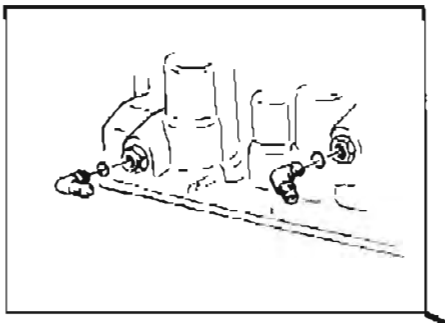
AW55: grey cork gasket 4.5 Nm (3.2 ft. lbs).
BW55: Yellow natural cork gasket 8 Nm (5.8 ft. lbs).
blue cellulose gasket 10 Nm (7.4 ft. lbs).
(Smear blue gasket with oil before installing.)
AW70/71: 5 Nm (3.6 ft. lbs).

Replacing oil seals in vehicle (transmission right side)

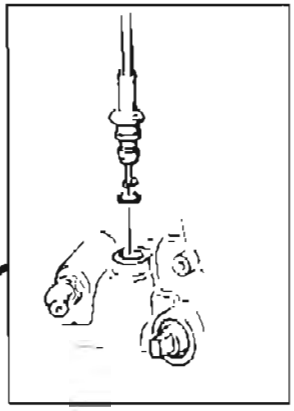
Special tool: 5118

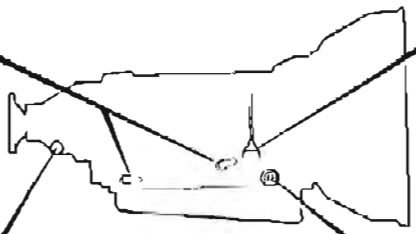
C3

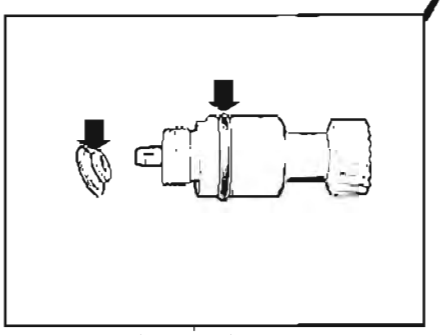
O-rings, oil cooler connections



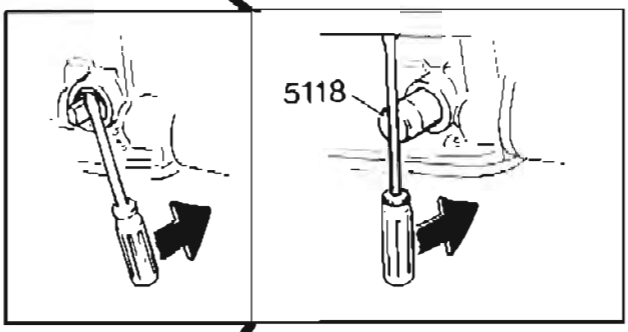
O-ring, kickdown cable







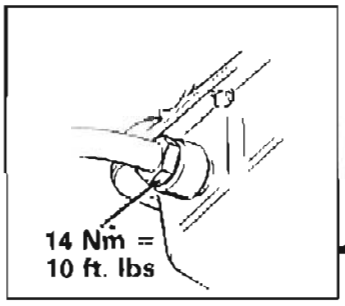
O-ring, speedometer drive



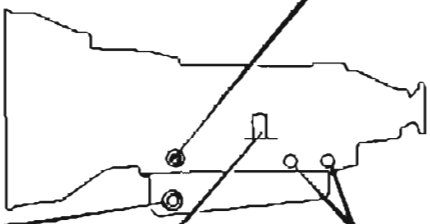
Oil seals, gear selector shaft

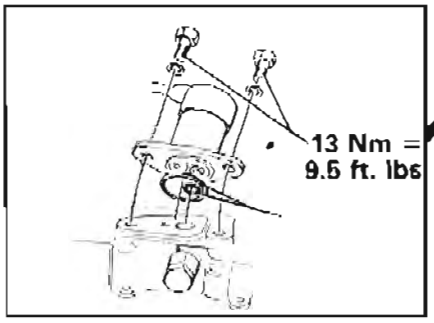
Replacing oil seals in vehicle (transmission left side)

C4

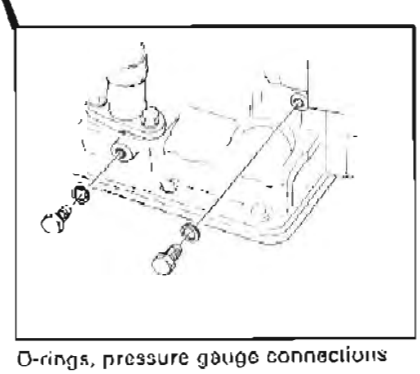


Oil filler tube





O-rings, solenoid valve, AW70/71



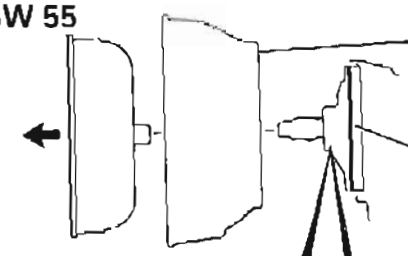
O-rings, pressure gauge connections

Replacing oil seals (transmission on fixture)

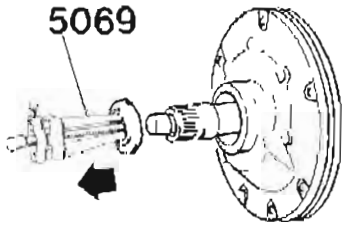
Special tools: 5069, 5071, 5117, 5241

C5

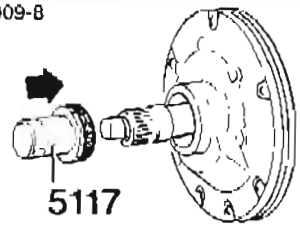
AW 55, BW 55



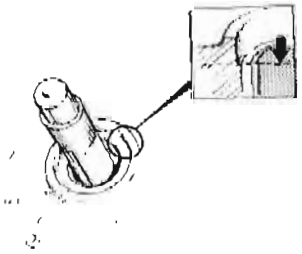
Oil pump seal



P/N 1233 009-8



Bushing – oil pump

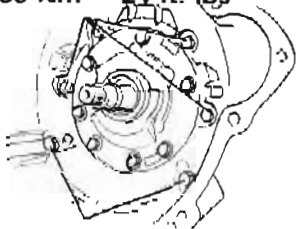


Replace oil pump if bushing is damaged or moved outward because it will block a drain channel and cause an oil leak.

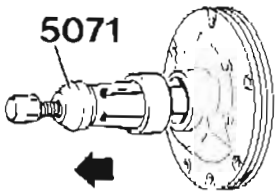
Replace torque converter if neck is damaged.

Installing

33 Nm = 24 ft. lbs

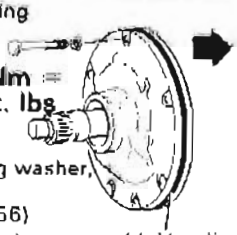


45 Nm = 32 ft. lbs



O-ring, oil pump

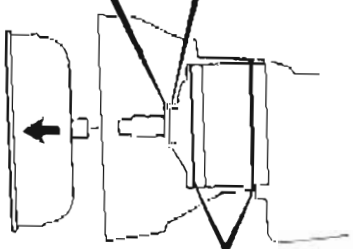
Installing



Bearing washer, rear
(see Z56)

Lightly smear with Vaseline

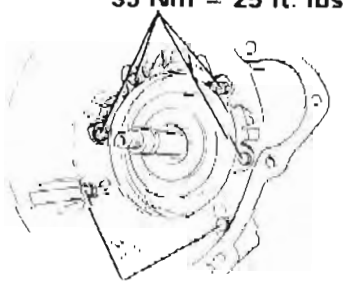
AW 70/71



O-ring, oil pump – torque converter casing

Installing

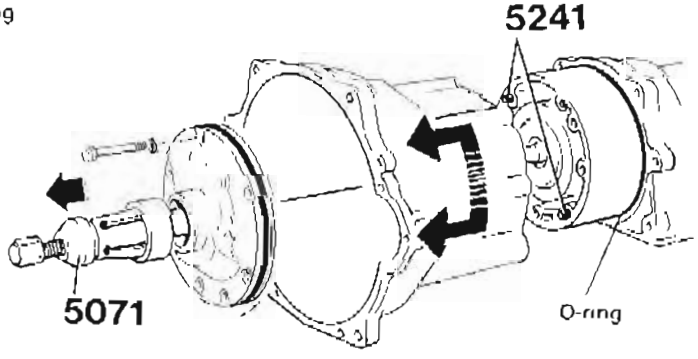
35 Nm = 25 ft. lbs



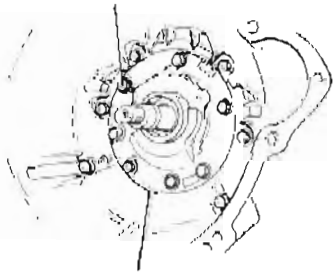
60 Nm = 43 ft. lbs

Torque converter casing

Removing



22 Nm = 16 ft. lbs



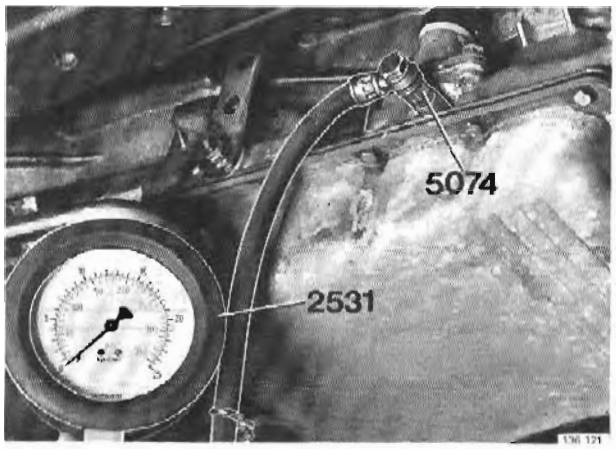
Vaseline

Oil pump

Use dowel pins **5241** to hold overdrive in place.

D. Checking line pressure

Special tools: 2531, 5074



D1

Check/top-up oil level

D2

Connect pressure gauge 2531 to transmission

Attach pressure gauge to door window.

Remove front plug on transmission and connect nipple 5074.

Connect pressure gauge hose to nipple.

D3

Start engine and allow to idle in position N

Check idle speed, see below.

D4

Depress brake pedal. Move gear selector to position D and record line pressure

Idle r/s (r/min)

Engine type	Idle speed r/s (r/min)
D24[1]	12,5 (750)
B21 MPG, LH	12,5 (750)
21A – 1977	14,2 (850)
Other markets	15,0 (900)
B23E – 1980	15,8 (950)
B27F – 1977 USA, CALIF, FEDERAL, CAN, JAPAN	
B28F 1980	

[1]Low idle

Idle, D

AW55	BW55	AW70[1]	AW71
0,40–0,45 MPa (57–64 psi)	0,53–0,63 MPa (75–90 psi)	0,35–0,44 MPa (50–63 psi)	0,46–0,54 MPa (66–77 psi)

[1] B23F LH AW70 has same pressure as AW71.

D5

Move gear selector to position R and record line pressure

Idle, R

AW55	BW55	AW70[1]	AW71
0,58–0,68 MPa (83–97 psi)	0,74–0,91 MPa (105–129 psi)	0,50–0,64 MPa (71–91 psi)	0,7–0,82 MPa (100–117 psi)

[1] B23F LH AW70 has same pressure as AW71.

D6

Incorrect pressures

Line pressure too high

Probable causes:

- throttle valve clip dropped off
- throttle valve incorrectly adjusted
- primary regulator valve seized. Check as follows: Rev up engine. If pressure increases proportionally to engine speed, valve has seized.
- throttle valve seized. Check as follows: Allow engine to idle in position N. Pull out throttle valve by hand (without moving throttle). If line pressure does not increase throttle valve has seized.
- shift valves seized
- cut back valve seized

Recondition valve body assembly if shift valves have seized. If no fault is found, recondition transmission.

No rearward drive (no line pressure)

Probable causes:

- primary regulator valve defective
- 2–3 shift valve defective
- reverse gear sequence valve defective
- C2 accumulator piston defective
- center support bolts loose.

Line pressure too low

Probable causes:

- seized primary or throttle valve. Check according to "Line pressure too high".

If test shows values are OK, low pressure may be caused by defective Bypass valve[1] or oil pump (noisy). Alternatively oil filter may be blocked or accumulator pistons may be defective.

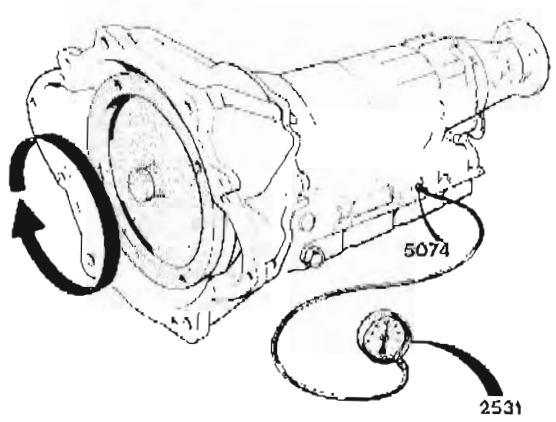
[1] Not fitted to late type BW55 transmissions.

Line pressure correct at first but drops after a few seconds

Probable cause:

Defective secondary regulator valve. If early type valve is fitted replace with new type (see "Reconditioning" Z1–49 on page 110).

Recondition valve body if valves are found to be defective.



118 928

D7

Testing stall speed

To be carried out in conjunction with check of line pressure (D1–6).

Never test stall speed if line pressure is too low.

Stall speed test gives an indication of condition of torque converter and transmission clutches.

Test conditions:

- engine must be properly tuned
- correct line pressure
- correct oil level and transmission at normal operating temperature.

D8

Connect tachometer to engine

Place tachometer on dashboard.

D9

Start engine. Apply parking brake and brake heavily with left foot

D10

Engage position D and depress accelerator to floor. Record highest engine speed and line pressure

CAUTION
Do not depress accelerator for more than 5 seconds.

Engine type	Stall speed r/s r(min)
B 21 A	36,7 (2200)
B 23 E	40,0 (2400)
B 21 F	41,7 (2500)[1]
B 21 F MPG	30,0 (1800) AW70
B 21 F LH	33,0 (1980) AW70
B 21 FT	37,0 (2220) AW71
B 21 FT	34-41 (2050-2600) AW71
B 23 F	37,0 (2200) AW70
B 27 A/E/F; B 28 A	36,7 (2200)[2]
B 28 E/F	40,0 (2400)
D 24	36,7 (2200)

[1] 35,0 (2100) for 1208 264-027 and 1208 253-376
[2] 38,3 (2300) for 1208 128-011 and 1208 164-021 for B27E and F and 1208 046-007 for B27F.

Position D

AW55	BW55	AW70[1]	AW71
0,95–1,20 MPa (135–171 psi)	1,13–1,37 MPa (159–195 psi)	0,96–1,10 MPa (137–156 psi)	1,00–1,20 MPa (142–171 psi)

[1] B23F LH AW70 has same pressure as AW71

D11

Allow engine to idle in position N for 30 sec

D12

Position R **Engage reverse and repeat test**

AW55	BW55	AW70[1]	AW71
1,40–1,70 MPa (199–242 psi)	1,54–1,96 MPa (219–279 psi)	1,37–1,76 MPa (195–250 psi)	1,50–1,90 MPa (213–270 psi)

[1] B23F LH AW70 has same pressure as AW71

Incorrect stall speeds

D13

High stall speed. Probable cause: incorrect oil level or blocked oil filter.

High stall speed with screech in position R. Probable cause: slipping C2 clutch and B3 brake.

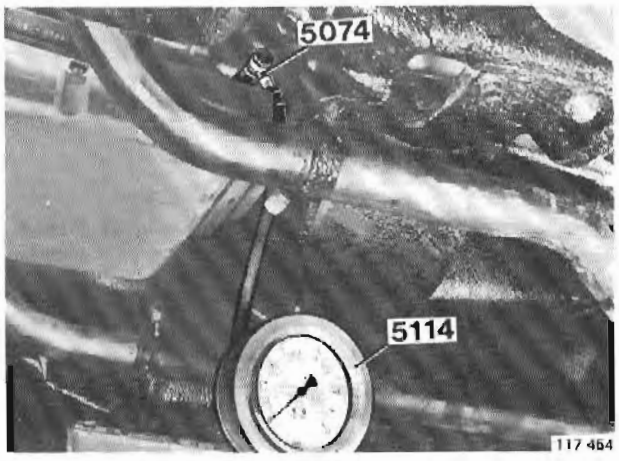
High stall speed with screech in positions D1 and D2. Probable cause: Slipping C1 clutch.

Low stall speed. Probable cause: insufficient power delivered by engine.

Low stall speed, poor acceleration at low speeds. (Normal after 70 km/h – 42 mph). Probable cause: defective torque converter.

E. Checking governor pressure

Special tools: 5074, 5114



E1

Check/top-up oil level

E2

Check line pressure

Governor pressure is a transformed line pressure. Therefore if line pressure is incorrect so is governor pressure

E3

Connect pressure gauge 5114

Attach pressure gauge to side window.

Remove plug from rear of transmission and attach nipple **5074**. Connect hose to nipple.

E4

Check that governor pressure is zero when engine is idling in D and R, vehicle stationary

E5

Test drive vehicle in D and record governor pressure

Final drive ratio	Governor pressure											
	MPa	psi	km/h	mph	MPa	psi	km/h	mph	MPa	psi	km/h	mph
BW55 3.31:1 Diesel	0.11–0.14	16–20	34	21	0.18–0.22	26–31	62	39	0.38–0.43	54–61	121	76
3.54:1	0.10–0.13	14–18	32	20	0.15–0.19	21–27	57	36	0.36–0.46	51–65	110	69
3.54:1 Diesel	0.12–0.14	17–20	32	20	0.19–0.23	27–33	57	34	0.43–0.48	61–68	110	69
3.73:1	0.10–0.13	14–18	20	19	0.16–0.20	23–28	55	34	0.37–0.44	53–63	108	67
3.73:1 Diesel	0.13–0.16	18–21	30	19	0.20–0.23	28–33	55	34	0.47–0.52	67–74	108	67
3.91:1	0.10–0.13	14–18	29	18	0.16–0.20	23–28	53	33	0.37–0.44	53–63	103	64
AW55 3.73:1	0.10–0.15	14–21	30	19	0.16–0.22	23–32	55	34	0.42–0.52	60–74	108	67
3.91:1	0.10–0.15	14–21	29	18	0.16–0.22	23–32	53	33	0.42–0.52	60–74	103	64
AW70/71 3.73:1	0.09–0.15	13–21	30	19	0.16–0.22	23–32	55	34	0.41–0.53	58–75	108	67
3.91:1	0.09–0.15	13–21	29	18	0.16–0.22	23–32	53	33	0.41–0.53	58–75	103	64

Incorrect governor pressure

E6

Too high

Probable cause:

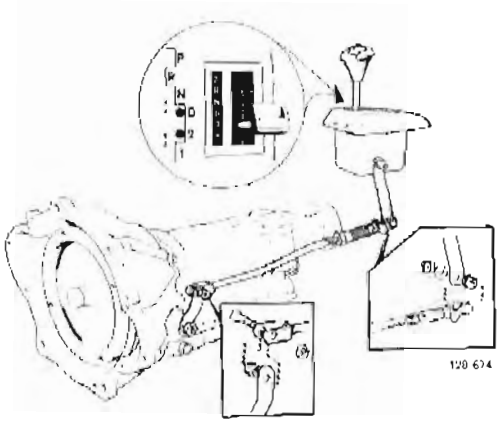
Governor seized. Remove, clean and check/replace.

Too low:

Probable causes:

- Governor seized or leaking. Remove, clean and check/replace.
- Oil leak at cover plate for oil channels to governor. Replace gasket.
- Governor oil seals on output shaft worn or broken. Replace seals.

F. Adjusting shift linkage



F1

Check that play in linkage is not too large

If too large, replace bushings.

F2

Check selector lever positions

Engage D and move lever against gate. Clearance should be same or greater than clearance in position 2 (see top left).

F3

Adjust rod length if necessary

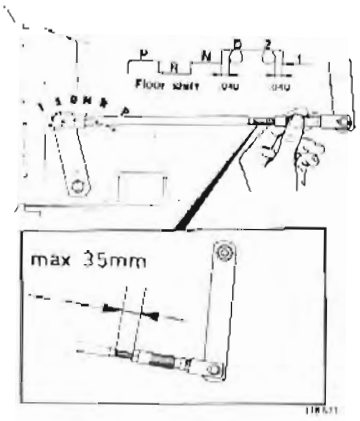
Rough adjustment: screw clevis in or out (clevis may be attached to front of rod on some models)

Fine adjustment: turn knurled sleeve as required.

Max. visible thread length = 35 mm (1.38 in).

Increasing rod length reduces clearance in position D and increases clearance in position 2.

After adjustment: engage position 1 and then P. Repeat test according to F2.

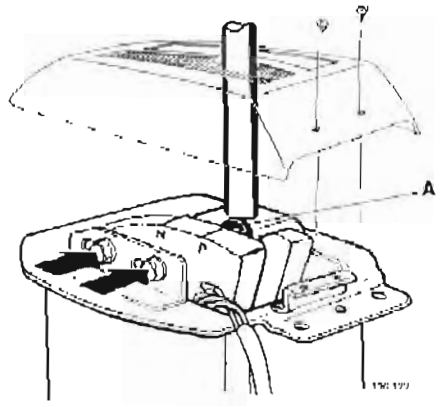


See K1–17 on page 53 if linkage mechanism inside transmission is defective.

F4

Checking start inhibitor switch

Remove gear selector cover. Check that N and P marks on inhibitor switch are opposite switch lever (A) in positions N and P respectively.



F5

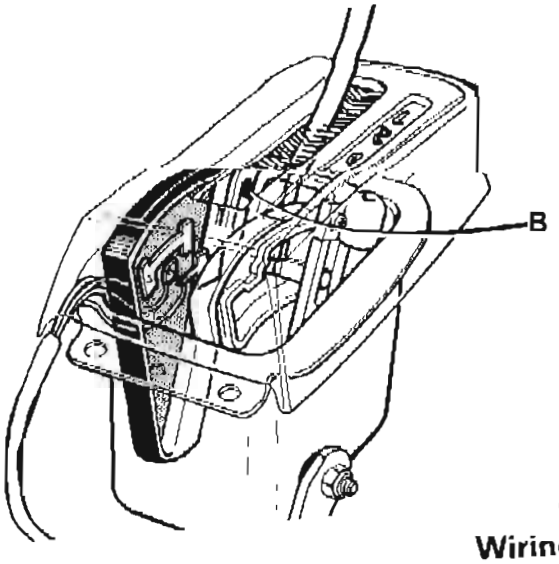
To adjust:

Engage position D.

Unscrew bolts (arrows)

Adjust switch so that P is opposite lever (A).

Engage position N and check that N mark is opposite (A).



Move selector lever forward and back, through gears (P to 1) and check that pin (B) does not slide out of lever (A).

Check that engine can only be started in positions P and N and that reversing (back-up) lights come on in position R.

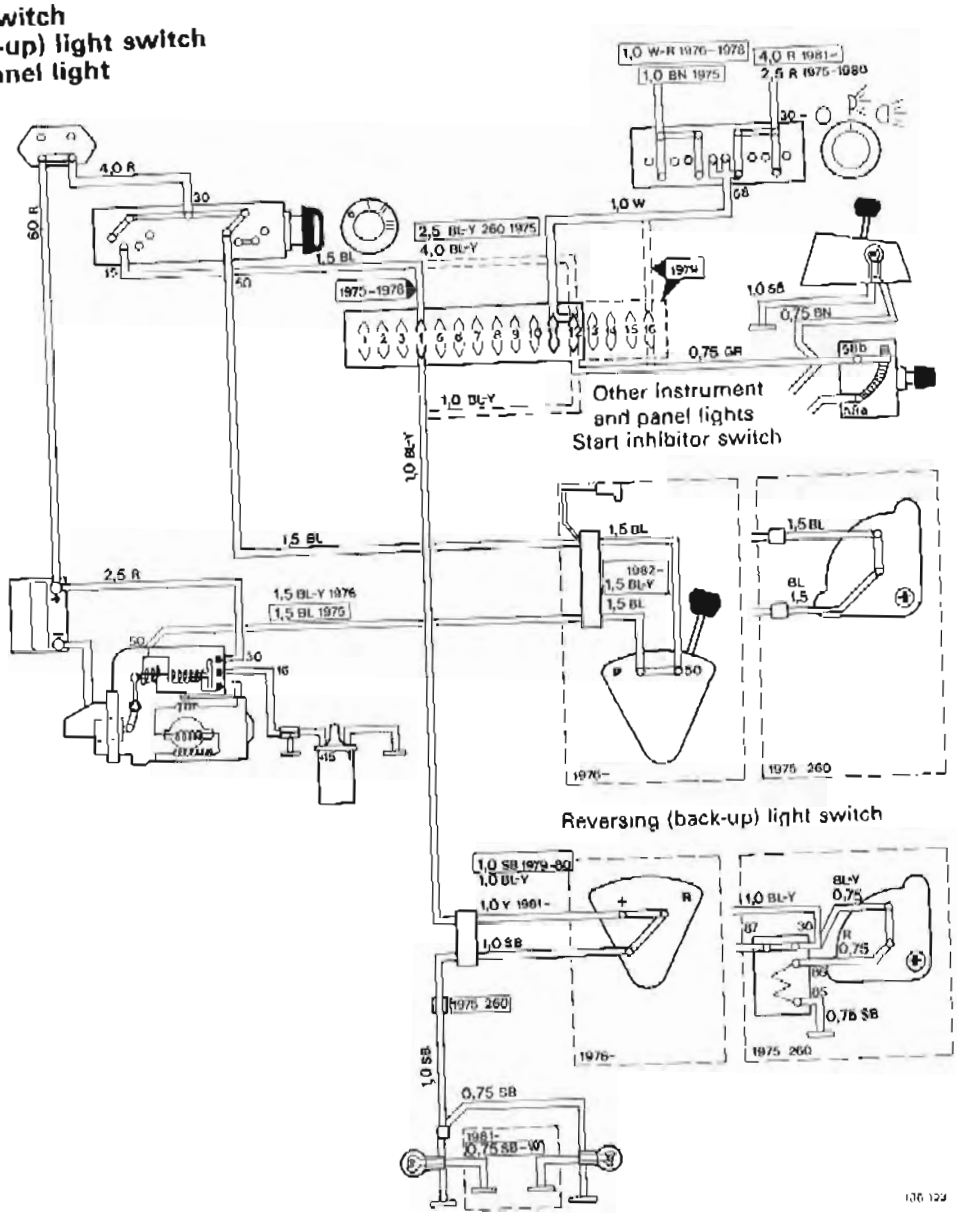
If reversing (back-up) light flashes when vehicle is reversed, move switch contact 1 mm (0.04 in) forward. After adjustment make sure that vehicle can only be started in "P" and "N".

Check that gear selector panel light works and is correctly installed. Install cover for selector linkage.

Wiring diagram 240, 260

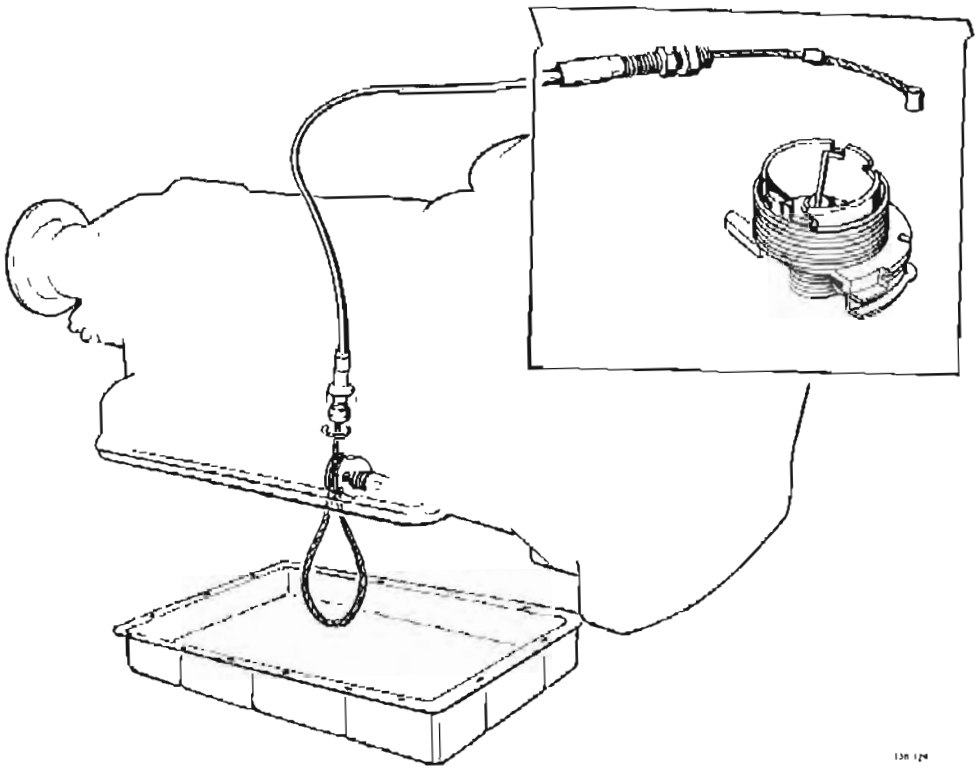
F6

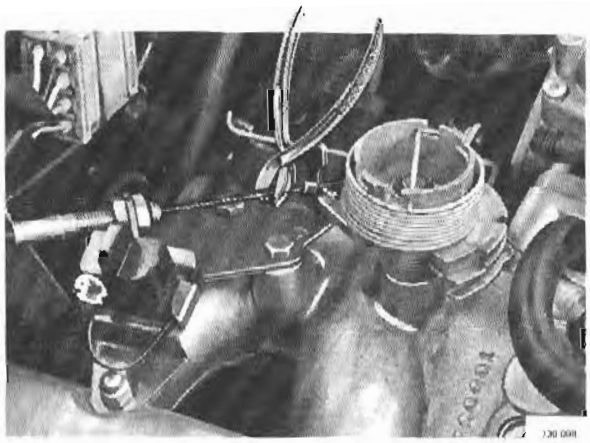
Start inhibitor switch
Reversing (back-up) light switch
Gear selector panel light

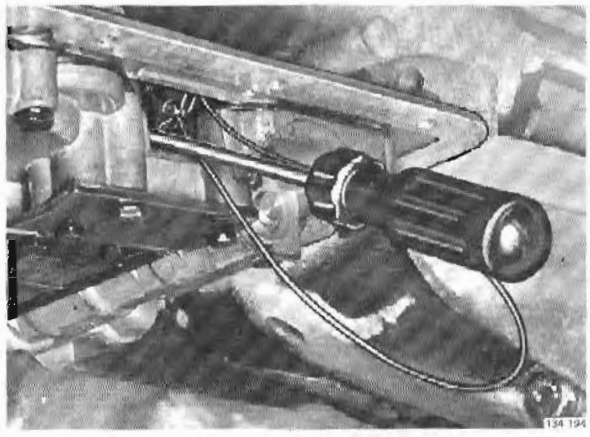


Colour code:
BL = Blue
BN = Brown
R = Red
SB = Black
W = White
Y = Yellow

G. Kick-down cable, replacing – adjusting







To remove

G1

Cut off cable at throttle pulley. Detach cable sheath from mounting bracket

B27, B28: Remove air filter first.

G2

Clean transmission around cable and remove cable sheath

G3

Drain transmission oil and remove oil pan

Disconnect oil filler tube from oil pan. (Drain plug introduced in 1983.)

Warning! Transmission oil may be very hot if vehicle has just been driven.

G4

Pull down cable with pair of long-nosed pliers, to form a loop

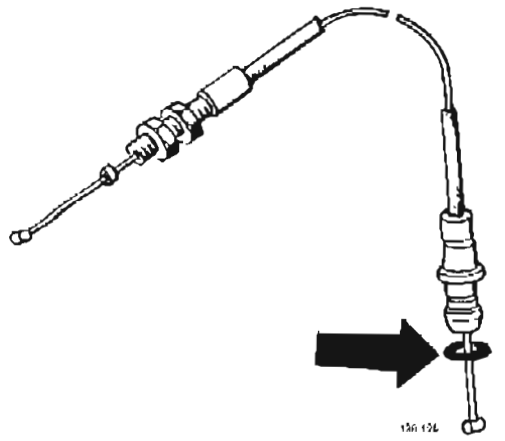
G5

Hook up pulley cam with a screwdriver

G6

Disconnect cable from throttle cam and withdraw from sheath

Lift up sheath with a screwdriver (see P15, page 69).



To install

G7

Install a new O-ring (arrow)

G8

Withdraw cable slightly, insert cable in transmission and press sheath into transmission gear case

G9

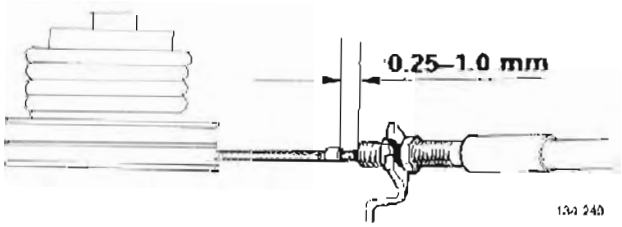
Attach cable to throttle cam

G10

Route cable with sheath assembly to engine compartment. Attach cable sheath loosely to throttle pulley bracket

G11

Install cable clip

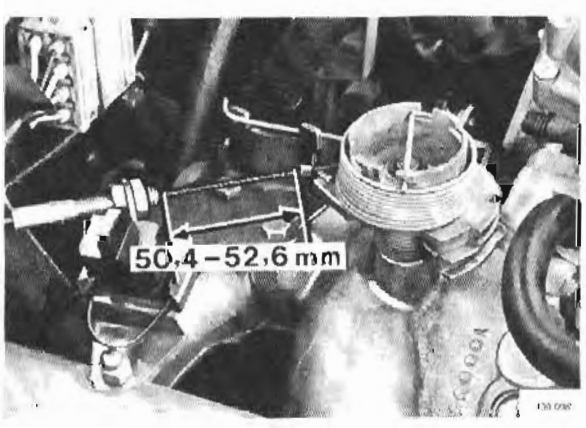


Pull out cable until light resistance is felt i.e. light preload. Hold cable in this position and attach clip 0.25–1.0 mm (0.01–0.04 in) from cable sheath end, see fig. This is idle position.

Ensure that throttle cable is not loose. Max. play = 0.5 mm (0.02 in).

G12

Connect cable to throttle pulley. Adjust clip position



4 cylinder A engine shown above – pulley arrangement similar on other engine types.

Depress accelerator to floor. **Note!** Do not move throttle pulley by hand otherwise adjustment may be false.

Adjust cable sheath position so that clip is pulled out 50.4–52.6 mm (1.98–2.07 in) when accelerator is depressed fully.

When correctly adjusted, cable should be tight in idle position and can be pulled out a further 2 mm (0.08 in) in full throttle position.

If extended length is less than 50.4 mm (1.98 in), check that throttle pulley turns fully between stops.

B27/28: Install air filter.

G13

Install oil pan and oil filler tube

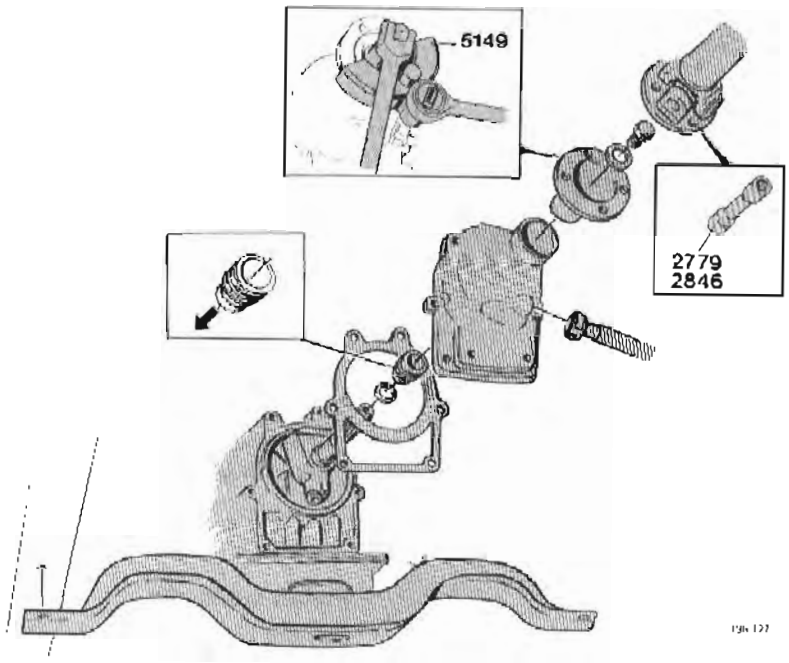
G14

Fill transmission with ATF and topup

Level check: See A1–4, page 34.

H. Governor, removing, installing

Special tools: 2779, 2846, 5149

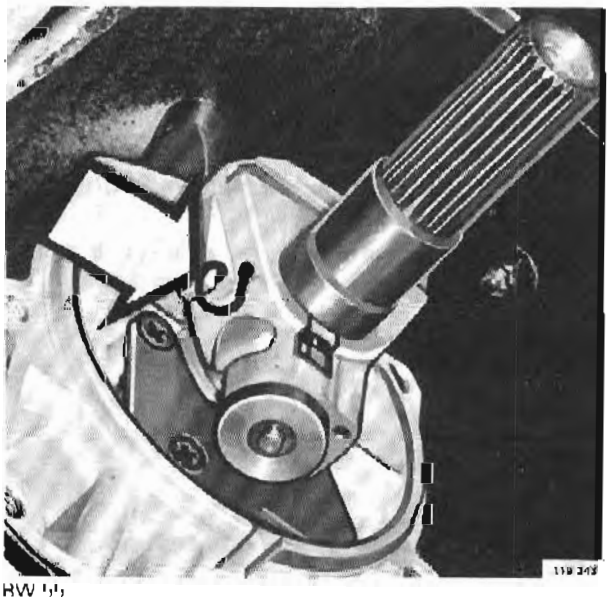


To remove:

H1

Remove:

- transmission crossmember (for different types, see N1–4, page 60)
- propeller shaft. Wrench **2779 (2846)**
- coupling flange
- speedometer cable
- rear extension housing and gasket
- large speedometer driven gear
- spacer.



RW 1[illegible]

H2

Remove governor

AW55, BW55, early type AW70: unsnap governor drive ring (clip) and withdraw governor. (AW55, BW65 have different drive rings.)

AW70 late type, AW71: unsnap drive ring and remove screw + lock plate. Then withdraw governor from shaft.

H3

Reconditioning governor

See X1–7, page 107

Note! Type of governor depends on transmission type (see table on page 11).

To install

AW55, early type AW70

H4

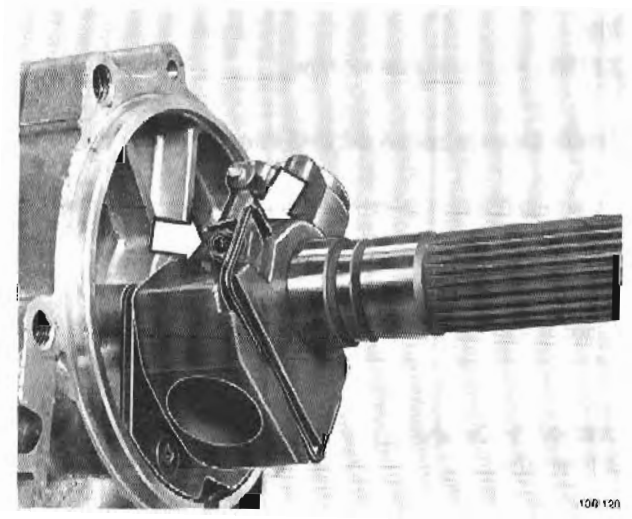
Replace gasket under channel plate

(AW: Clean oil filter, see P9, page 68.)

H5

Replace oil seal for flange and speedometer driven gear

Also check bushing in extension housing (see X1–12, page 107).



Late type AW70, AW71

H6

Reverse procedure to install governor

Turn drive ring on BW55 to secure.

AW70 late type/AW71: install bolt, lock plate and drive ring.

Tightening torque 4 Nm (3 ft. lbs).

H7

Tightening torques (all transmissions)

– rear extension housing	= 35 Nm (26 ft. lbs)
– coupling flange	= 45 Nm (33 ft. lbs)

H8

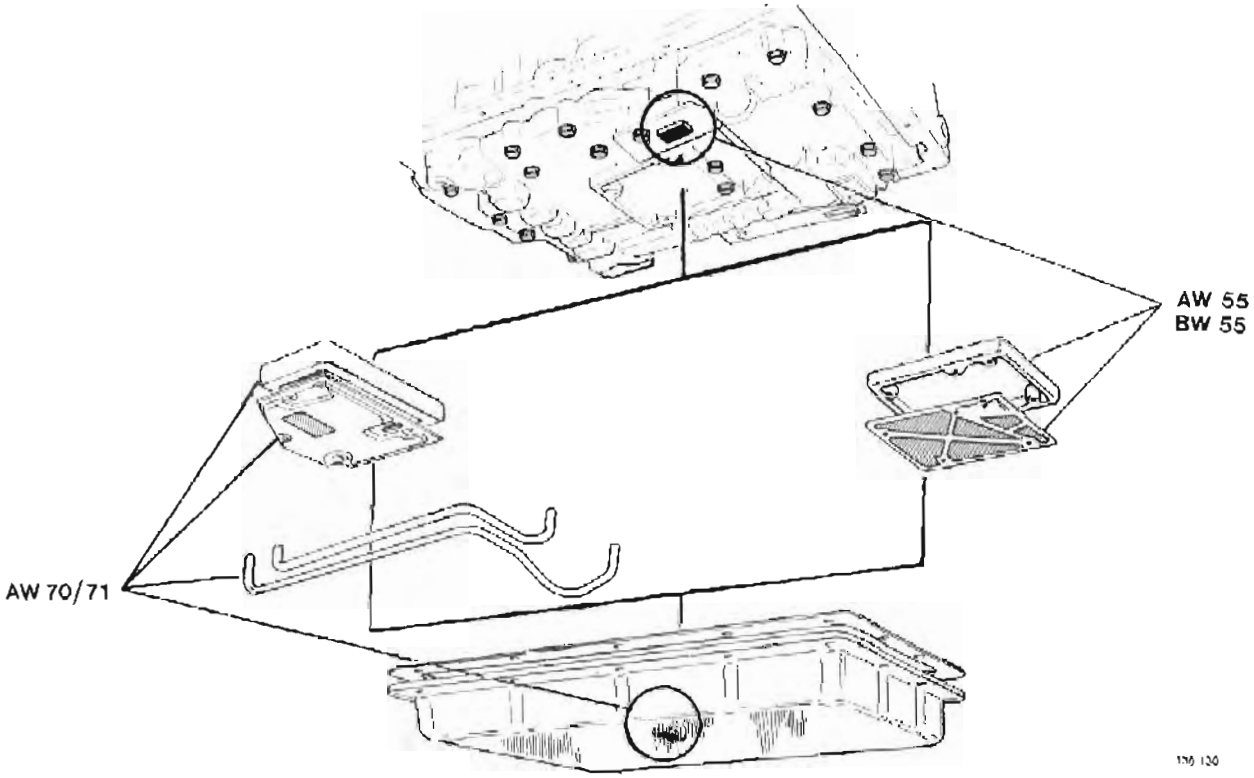
Fill oil and check level

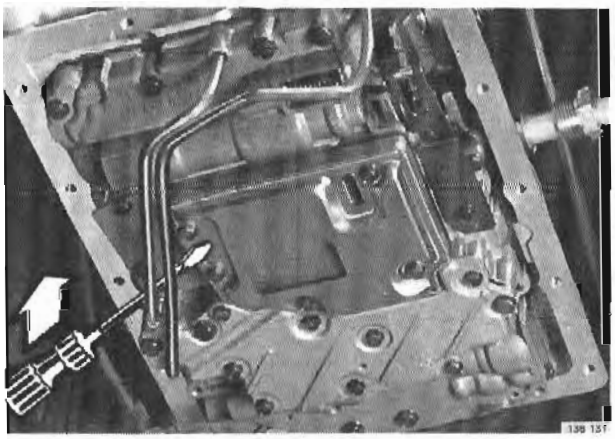
ATF

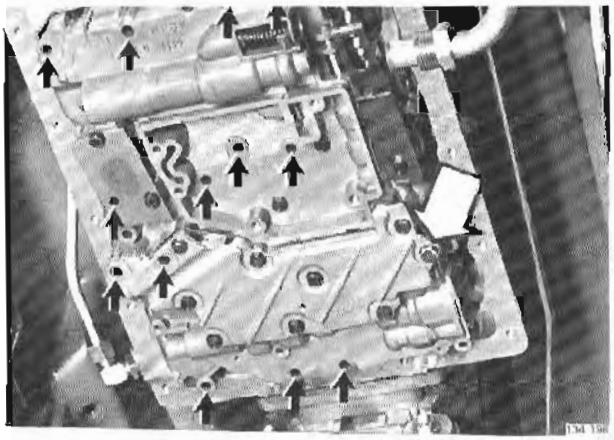
Level check: See A1–4, page 34.

J. Valve body, removing, installing

Special tool: 5076







To remove

J1

Disconnect kick-down cable from throttle pulley

B27/28: First remove air filter.

J2

Drain transmission oil and remove filter and gasket

Unscrew filler tube from oil pan. (Drain plug introduced in 1983.)

WARNING! The transmission oil may be extremely hot if vehicle has just been driven.

J3

AW70/71: Carefully pry out the two oil tubes with a screwdriver.

J4

Remove oil strainer and magnet

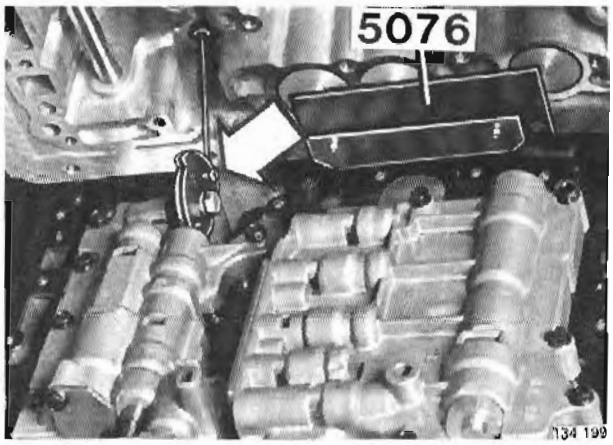
AW55, BW55: Magnet located in valve body assembly.

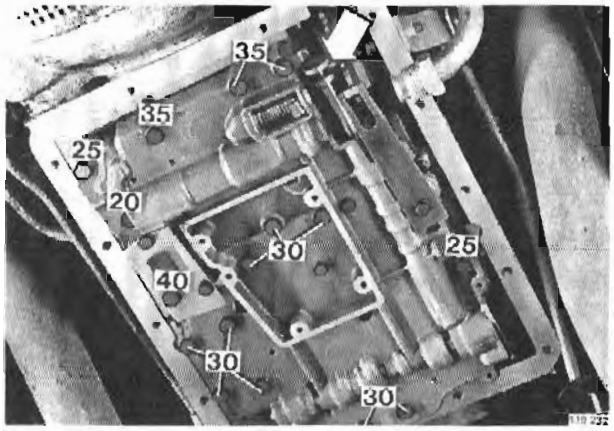
AW70/71: Magnet located in oil pan.

J5

Detach valve body

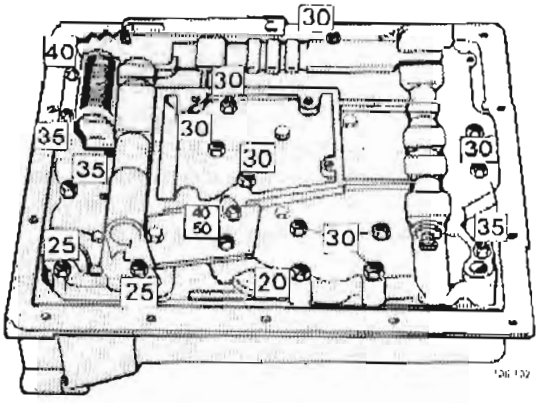
Do not remove screw behind cam spring at this stage.



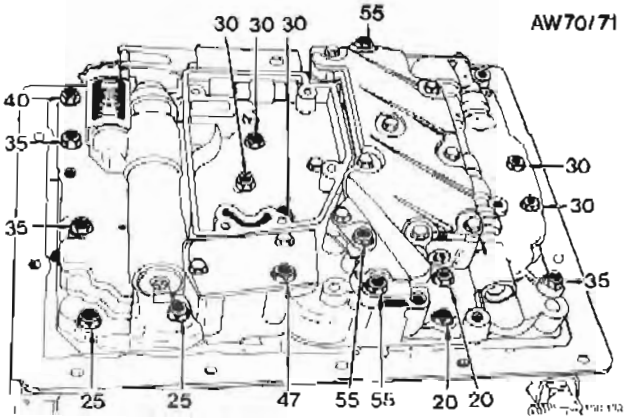


BW55, screw lengths in mm

AW55



AW70/71



J6

Install retainer 5076

Loosen cam screw sufficiently to be able to slide in accumulator piston retainer **5076**.

J7

Remove valve body assembly

Remove cam screw. Disconnect kick-down cable from throttle cam and lift away valve body assembly.

J8

Valve body repair work, see Z1–38, page 110

Replacement of accumulator pistons, L1–8, page 56.

Replacement of gear selector mechanism, K1–17, page 53.

To install

J9

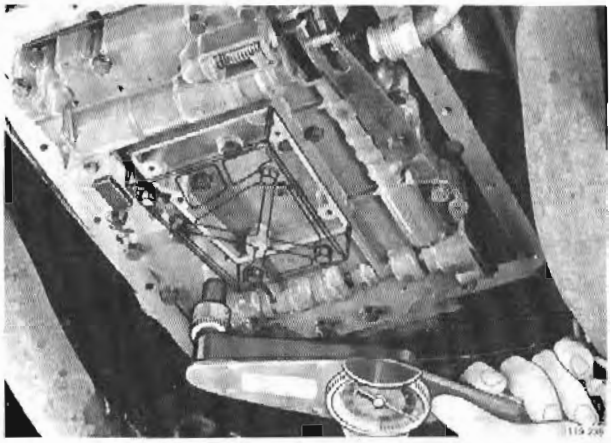
Connect kick-down cable to cam. Position valve body and install screws (loosely)

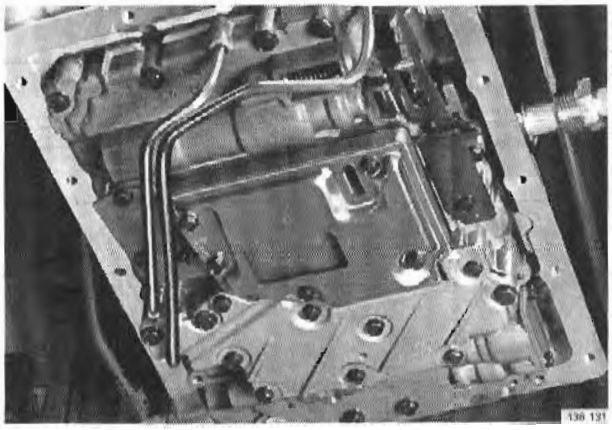
Align gear selector cam pin with valve groove.

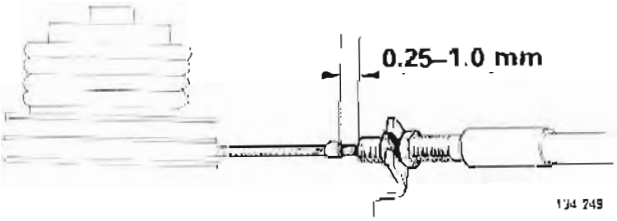
Note! Screw lengths are different for AW55, RW55, AW70, AW71 transmissions. Location of screws is shown on left.

Screw lengths (mm) AW55

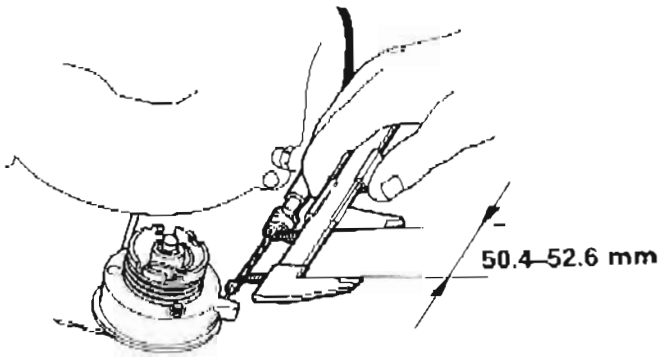
Screw lengths (mm) AW70/71







134 749



134 240

J10

Remove retainer 5076 and torque screws to 10 Nm (7 ft. lbs)

J11

Install gasket, spacer and oil strainer. Torque to 5 Nm (3.6 ft. lbs)

Spacer not fitted to early type AW55 and BW55 with "shallow" oil pan.

J12

AW70/71: Install two oil tubes

Carefully tap tubes into position with a plastic mallet.

J13

Clean and install magnet

AW55/BW55: Install magnet in valve body assembly.

AW70/71: Place magnet beneath oil strainer in oil pan.

J14

Install oil pan with new gasket

Gasket tightening torques:

AW55, grey	4.5 Nm (3.3 ft. lbs)
BW55, yellow	8 Nm (6 ft. lbs)
blue	10 Nm (7 ft. lbs)
AW70/71	5 Nm (4 ft. lbs)

Blue type gaskets should be smeared prior to assembly.

J15

Connect oil filler tube

Tightening torque 90 Nm (66 ft. lbs).

J16

Re-connect kick-down cable to throttle pulley. Adjust cable sheath to obtain a 0.25–1.0 mm (0.01–0.04 in) gap between clip and sheath

Make sure that throttle rod play does not exceed 0.5 mm (0.02 in).

J17

Depress accelerator pedal fully. Check that distance to clip is 50.4–52.6 mm (1.98–2.07 in)

If extended length is less than 50.4 mm, check that throttle pulley turns fully between stops. When correctly adjusted, cable should be taut in idle position and can be pulled out a further 2 mm (0.08 in) in full throttle position.

J18

Fill transmission with ATF

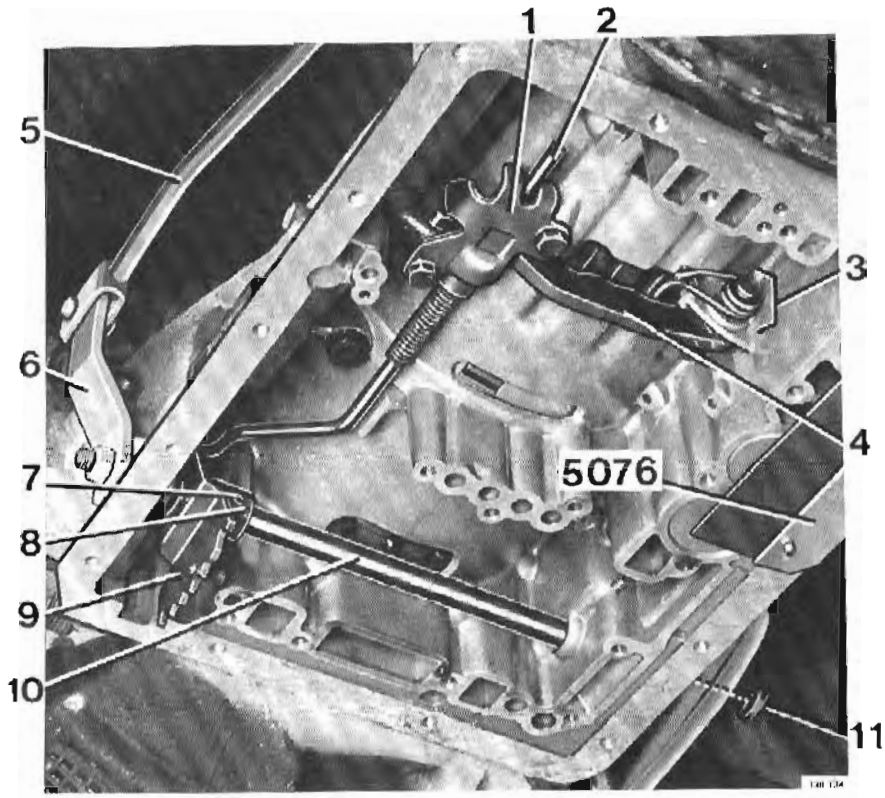
Oil fill quantities, see A6, page 36.

J19

B27/28: Re-install air filter

K. Gear selector mechanism, replacement

Special tools: 5076, 5118



1 Lock plate
2 Thrust rod
3 Spring, lock ring, pivot pin
4 Parking pawl (catch)
5 Control rod
6 Lever
7 Pin
8 Lock ring (not early type AW55 and BW55)
9 Gear selector cam
10 Gear selector shaft
11 Oil seal

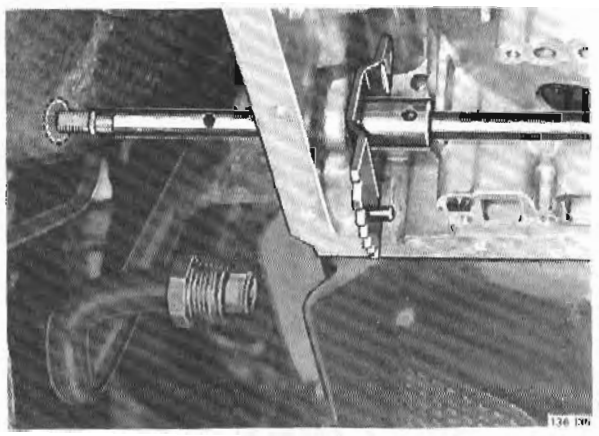
To remove

K1

Remove valve body assembly

See J1–8, page 50.

Do not forget to use retainer **5076**.



K2

Check for excessive play between gear selector shaft and cam

K3

Remove selector mechanism in numerical order shown above

Use a 3 or 5 mm punch to tap out cam pin, depending on size of pin.

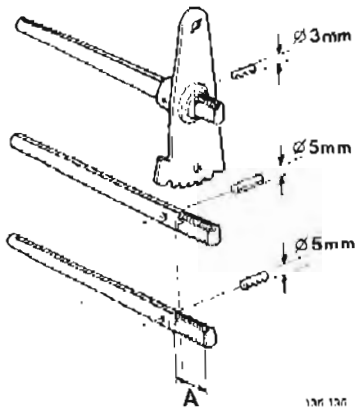
Note! It is necessary to drill a 19 mm (3/4 in) hole in left floor to be able to remove gear selector shaft.

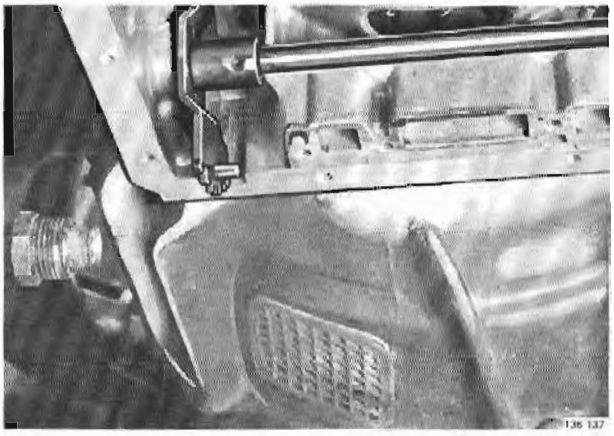
Move carpet to one side to prevent damage and drill hole with a 19 mm hole saw.

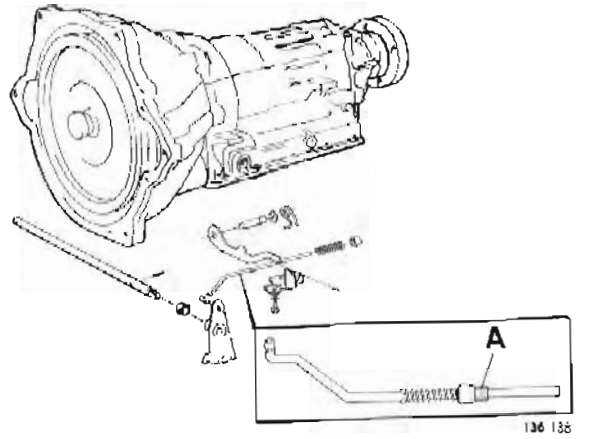
K4

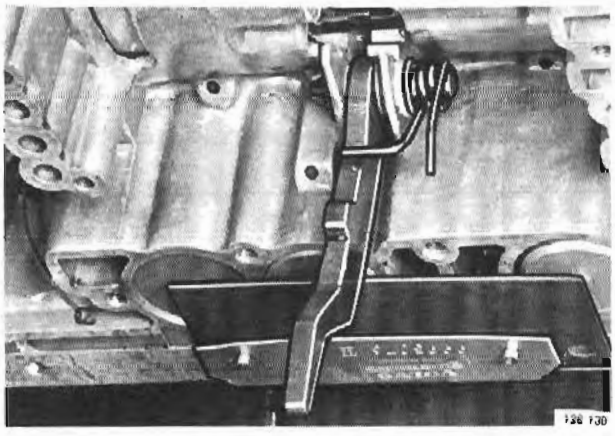
Clean and check all parts

Replace if worn or defective.









To install

K5

Gear selector shaft and AW55, BW55 cam

Type of shaft and cam fitted to transmission varies as follows:

1. Shaft and cam with 3 mm (0.118 in) pin hole.
2. Shaft and cam with 5 mm (0.197 in) pin hole.
3. Shaft and cam with 5 mm (0.197 in) pin hole. Shaft longer than types 1 and 2 to improve attachment of cam.

When reconditioning gear selector mechanism, always replace shaft and cam with type 3 assembly (P/N 1233 321-7).

Late type AW transmissions have a 4 mm (0.157 in) pin.

K6

Install shaft and cam

Always use new lock pins.

Late types: Place lock ring around pin and secure ring with a punch mark.

K7

Install rubber plug in hole in floor

Plug P/N 680036-1.

K8

Parking pawl (catch) AW55, BW55

Type of parking pawl and thrust rod fitted on transmission varies, see below.

Always replace old type assemblies with new ones as follows:

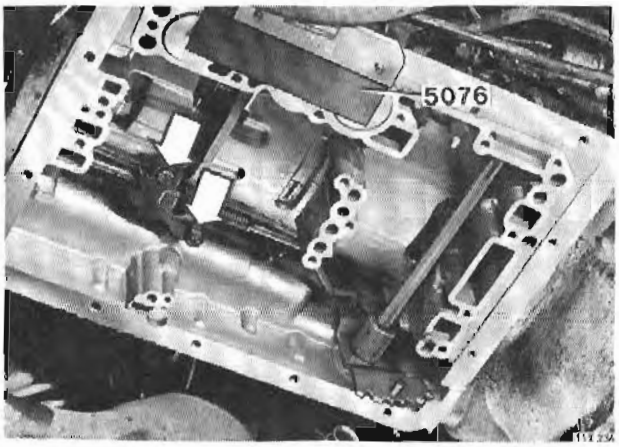
Parking pawl, early type	1233 243-3
late type	1233 294-6
Thrust rod, early type 1	1233 119-6
early type 2	1233 292-6
late type	1233 356-3

Late type thrust rods have a welded collar (A), see fig.

K9

Install parking pawl, spring and pivot pin

Install spring as illustrated.



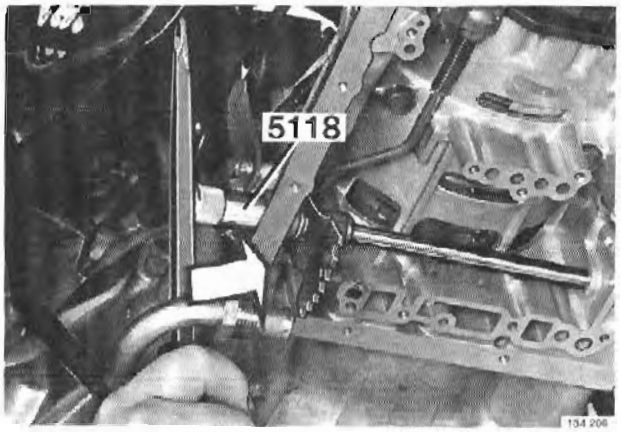
K10

Fit parking pawl rod in cam

K11

Use rod to lift parking pawl and install plate

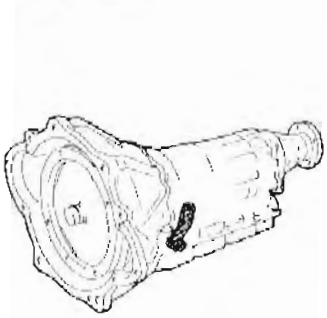
Tightening torque 7 Nm (5 ft. lbs)



K12

Install new oil seals for gear selector shaft

Use drift **5118** and a long screwdriver to ease in seal.



Late type Early type

K13

Gear selector shaft lever AW55, BW55

Note! Type of lever fitted to transmission varies with engine type.

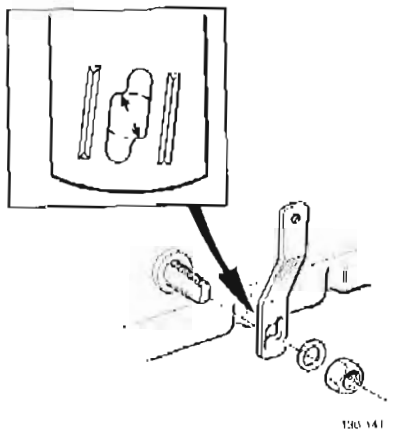
1978: new type lever introduced in production to eliminate play. Only fits on the type 3 (extended length) gear selector shaft, see K5.

Early type levers fit both early and late type shafts.

K14

Install lever on shaft

Tightening torque 14 Nm (10 ft. lbs).



K15

Connect control rod to lever

K16

Install valve body

See J9–19, page 51.

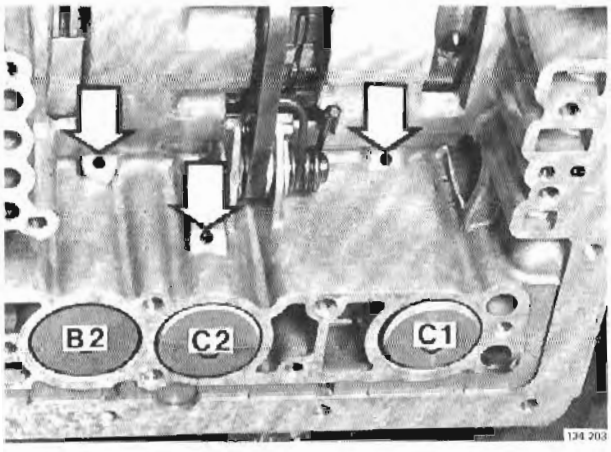
K17

Check shift linkage

See F1–6, page 44.

L. Accumulator pistons, replacement

Special tool: 5076



To remove

L1

Remove valve body assembly

See J1–8, page 50.

Do not forget to use retainer **5076.**

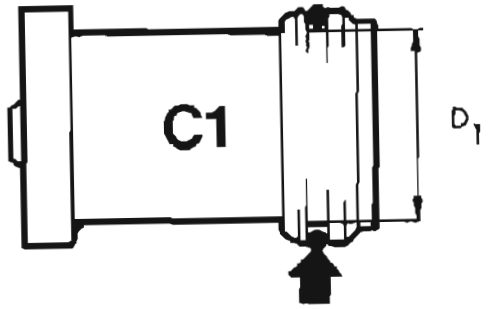
L2

Lift out accumulator pistons

Remove retainer **5076** first.

If pistons are difficult to remove, they can be dislodged by applying compressed air (max 14 psi) to feed hole (arrows).

Note! Location of springs.
BW55: C2 piston does not have spring on some transmissions.

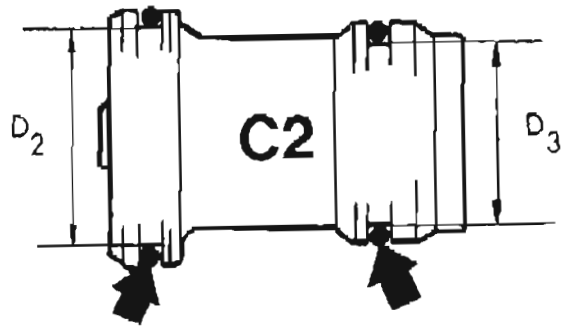


Early type (1233 147) D_1 = 23.70
Late type (1233 315) D_1 24.41

L3

Clean and check pistons

Replace if worn or damaged.



Early type (1233 145) D_2 26.87, D_3 22.10
Late type (1233 314) D_2 27.58, D_3 22.81

To install

L4

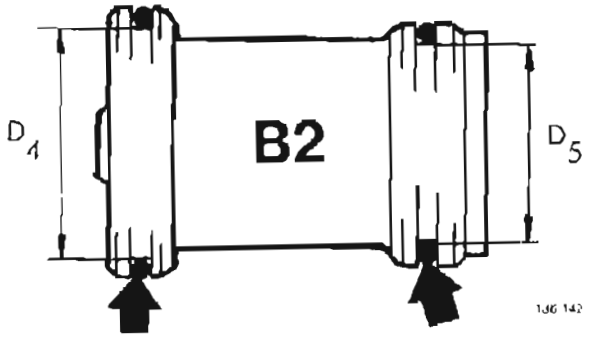
BW55 accumulator pistons

Pistons have been modified on several occasions.

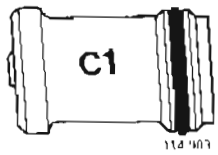
Type 1 – to reduce scoring:

- outer bore reduced
- larger grooves for O-rings
- new type O-rings
- increased bevel on pistons.

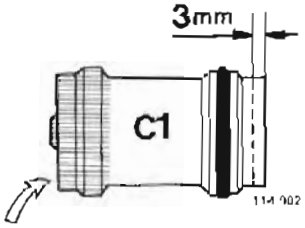
Pistons can be fitted to all type BW55 transmissions.



Early type (1233 221) D_4 – 28.45, D_5 = 25.77
Late type (1233 313) D_4 – 29.16, D_5 – 25.98



Late type (1233 315-9)



Late type (1233 380-3)

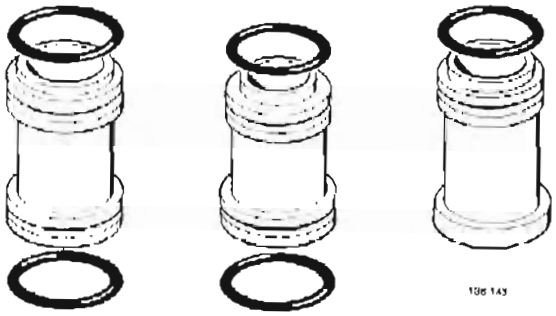
Type 2: – to improve oil flow

Accumulator piston C1 modified to improve oil flow to front clutch C1.

Length increased by 3 mm (0.12 in) and piston top modified slightly.

Pistons can be fitted to all type BW55 transmissions.

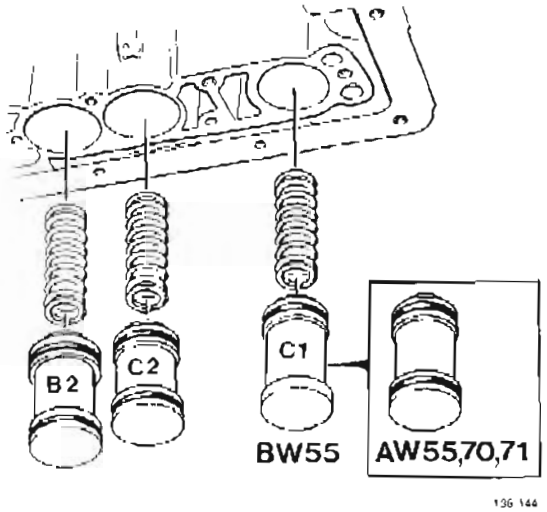
L5



Install new O-rings on pistons

Note! Type of O-ring depends on piston type and transmission type.

L6



Install accumulator pistons and springs

Short spring and smallest piston in center (C2).

The other pistons are different and cannot be installed incorrectly. Install springs as found.

Valve spring charts, see specifications on pages 6, 7 and 10.

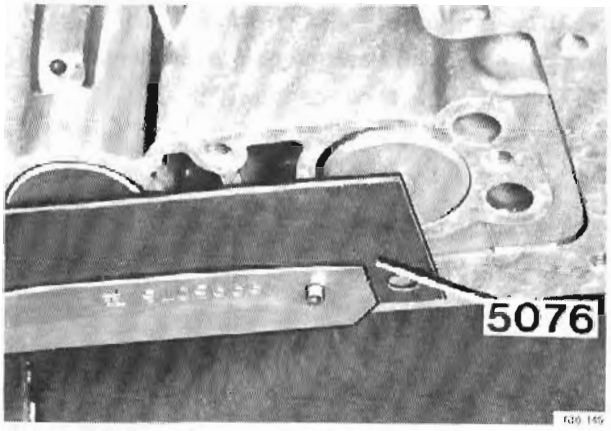
BW55: Following transmissions do not have center spring on accumulator piston C2:

Engine type	Transmission code
B 21 A	014, 003
B 21 F	019, 027
B 23 E	030
D 24	020, 026

Identification of springs

BW55: C1 spring larger than B2 spring.

AW55, 70, 71: B2 spring larger than C1 spring.



L7

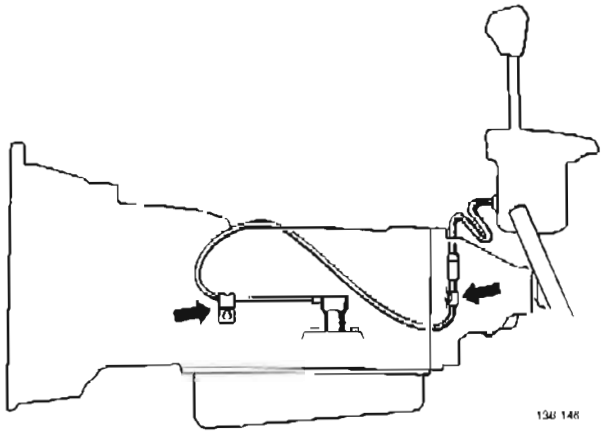
Install retainer 5076

L8

Install valve body assembly

See J9–19, page 51.

M. Solenoid valve, replacement (AW70/71 only)

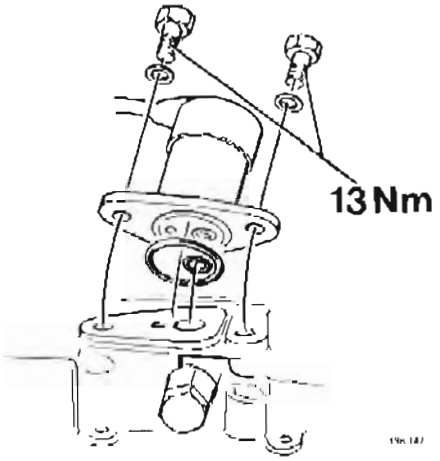


M1

Unplug connector (arrow) and unclip wire

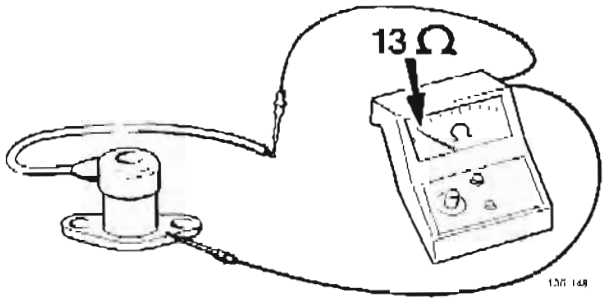
M2

Clean area around solenoid



M3

Remove solenoid and O-rings



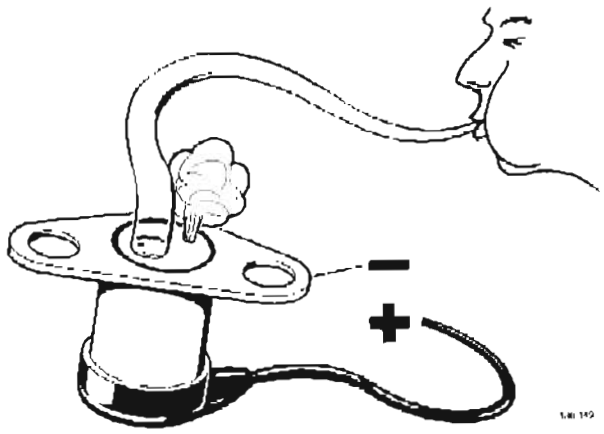
M4

Check solenoid

Resistance = 13 ohms.

Check that solenoid actuates when supplied with current. In this position air should pass through. When current is disconnected air passage should be blocked.

(Easiest way to check this is by connecting a hose as shown.)



M5

Install new solenoid and O-rings

Smear O-rings with Vaseline before installing.

Tightening torque 13 Nm (9 ft lbs).

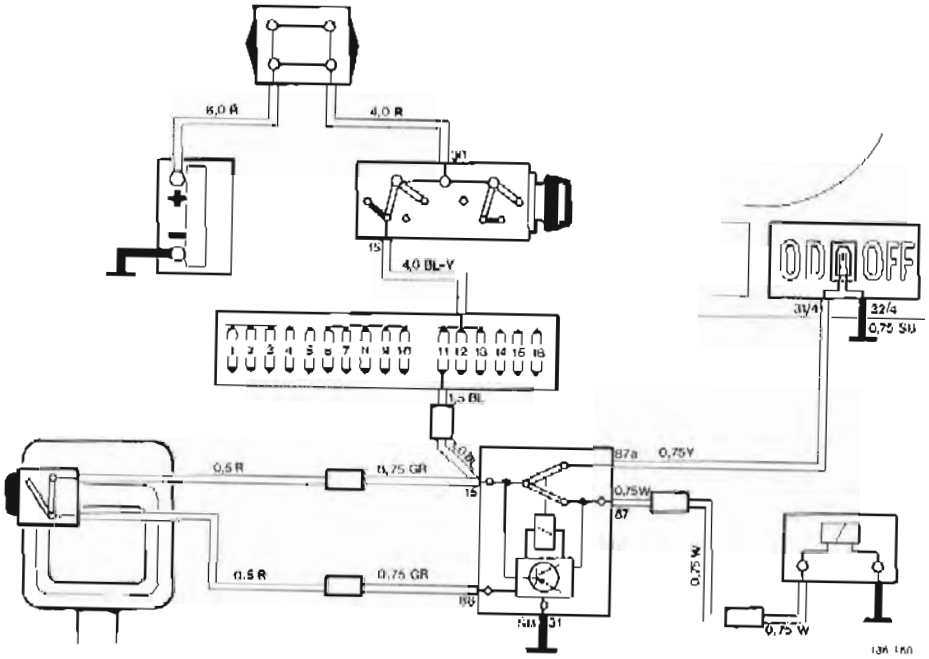
M6

Re-connect wire

M7

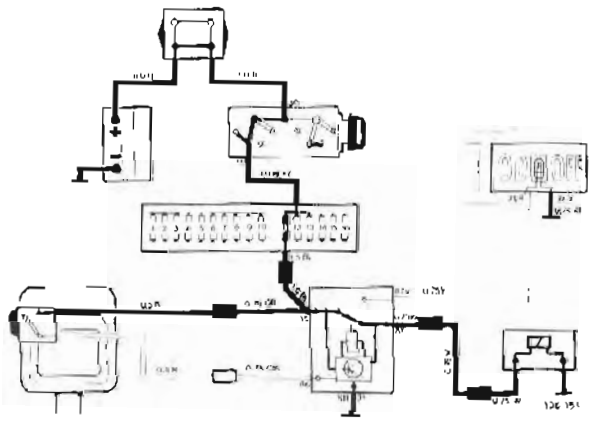
Check function

Wiring diagram



Color Code:
Bl = Blue
Bl–Y = Blue/yellow
GR = Gray
R = Red
SB = Black
W = White
Y = Yellow
31/4 = Instrument connection 31
32/4 = Instrument connection 32

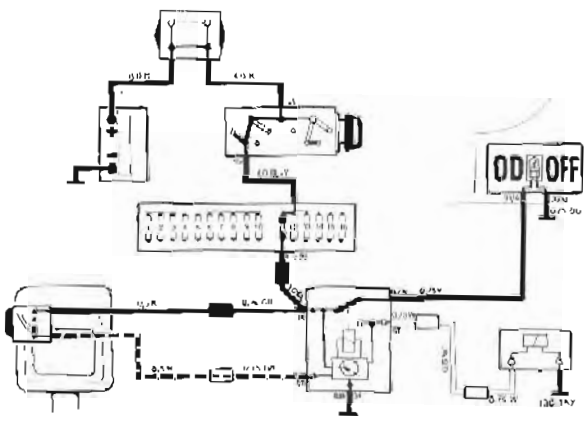
Overdrive engaged. 4th gear engaged



Push button OD OFF actuates solenoid which causes line pressure acting on high coast shift valve to drop.

Solenoid valve not actuated. Line pressure acting on high coast shift valve maintained.

Overdrive disengaged. 3rd gear engaged

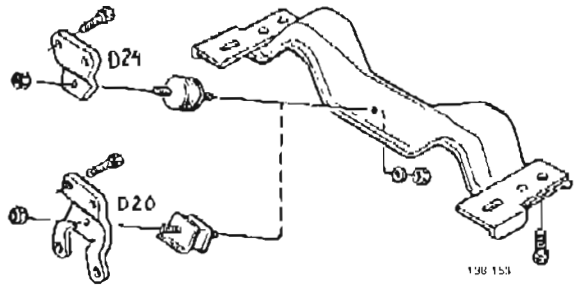


Valve acts directly on shift valve 3–4 and keeps transmission in 3rd gear.

(Line pressure is greater than all other pressures acting in transmission.)

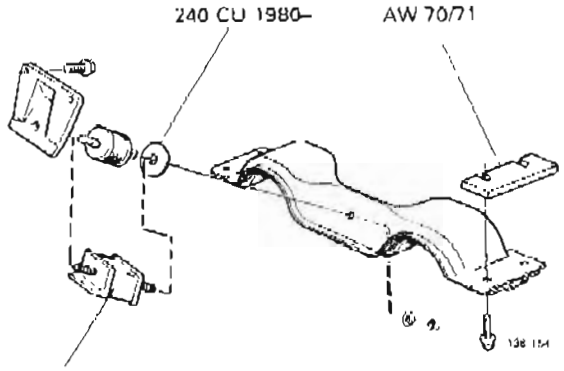
N. Transmission crossmember

N1



BW55, Diesel

N2



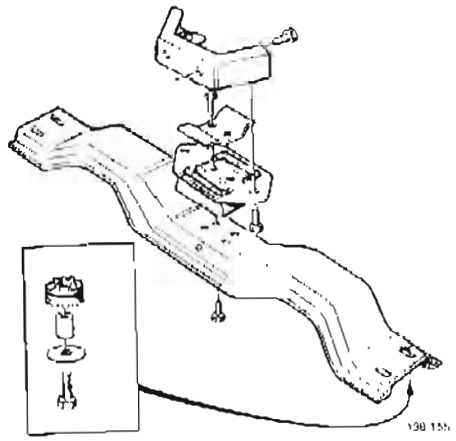
AW 55, BW 55 1975–1978

AW70/71

AW55, BW55

- 240 without CU heater, 1975–1980 (modified to N3 during 1980).
- 240 with CU heater, 1975–1977, 1980– (modified to N3 during 1977).

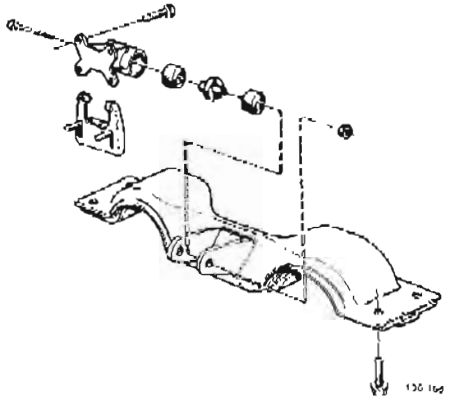
N3



AW55, BW55;

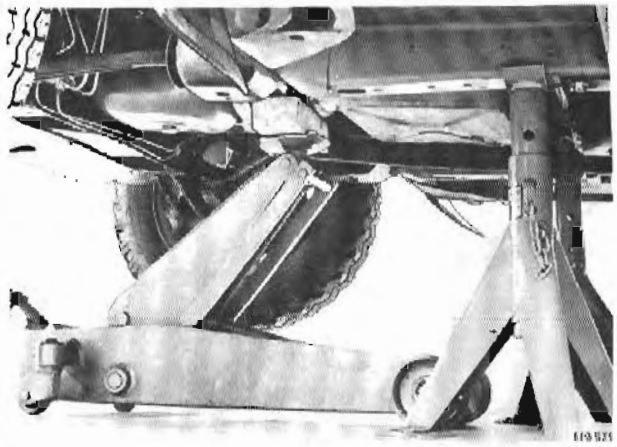
- 240 without CU heater, 1980–.
- 240 with CU heater, 1977–1980 (Modified to N2 during 1980).
- B27 (B27F USA modified to N4 during 1979).

N4



BW55;

- B27F USA, 1979–.
- B28F.

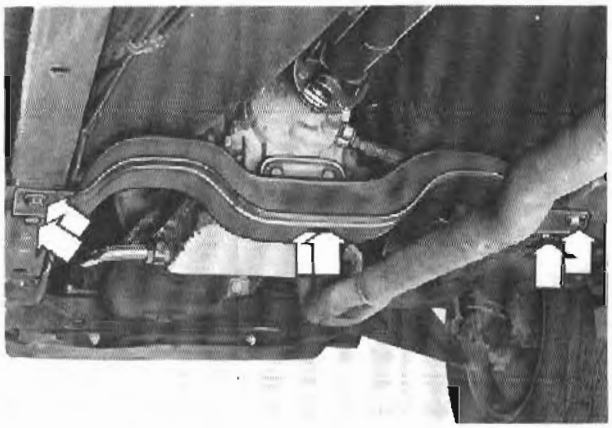


Replacement of transmission crossmember

Special tool: 5225

N5

Rest transmission on a jack to off-load crossmember



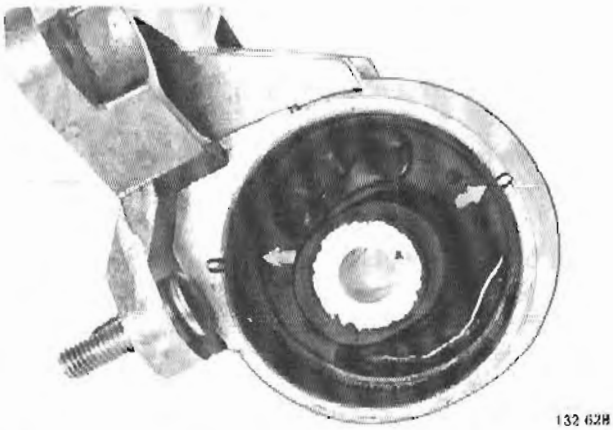
N6

Unscrew bolts (arrows)

N7

Remove:

- transmission crossmember from rubber pads and bracket
- bracket from transmission.



132 628

N8

Replace defective parts

N9

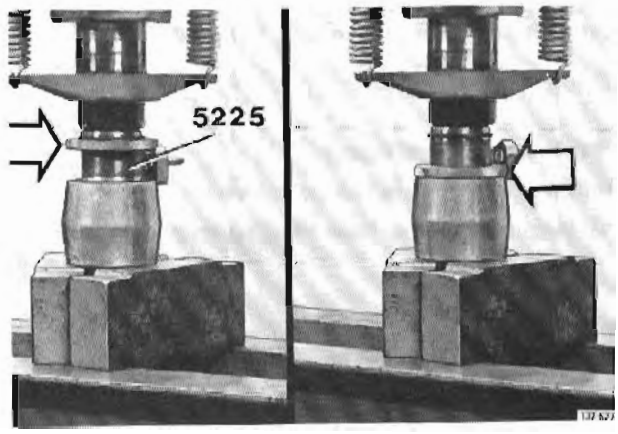
B28F, B27F USA (type N4 assembly)

Replacement of bushing

Special tool: **5225.**

To remove = nut on 5226 in upper position
To install = nut on 5225 in lower position

Note! Arrows on bushing must point towards marks on mounting bracket.



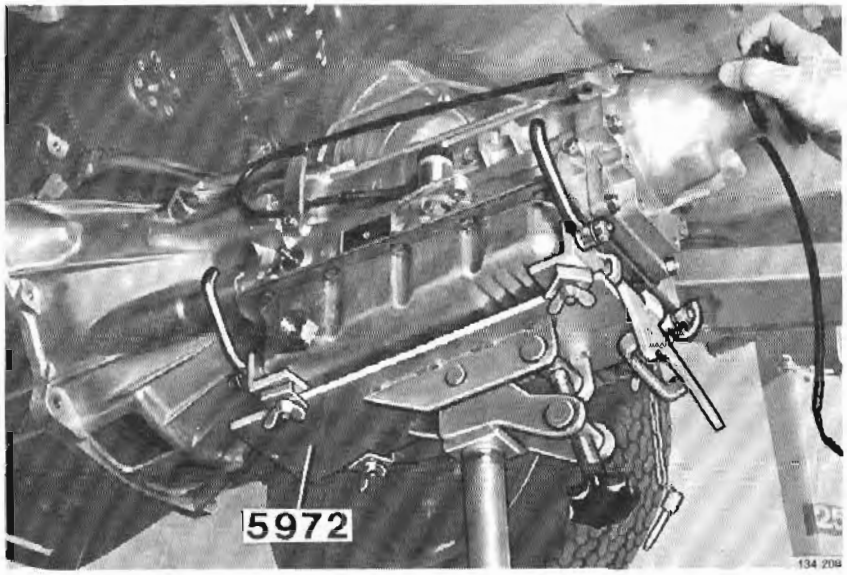
N10

Install:

- bracket and rubber pads on transmission
- transmission crossmember on rubber pads
- member to body.

O. Transmission, removing, installing

Special tools: 2779, 2846, 5972



Use fixture **5972** when removing/installing transmission.

Wrench **2779** = 11 mm flange bolts.

Wrench **2846** = 9/16" flange bolts.

To remove

O1

Move selector lever to position 2

O2

Remove:

- air filter (B27/28 only)
- kick-down cable from throttle pulley
- ground cable from battery.

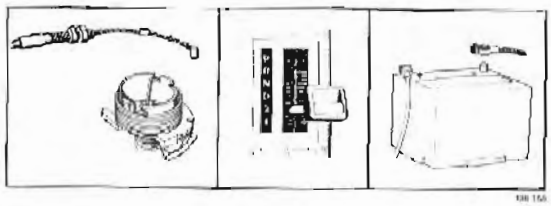
O3

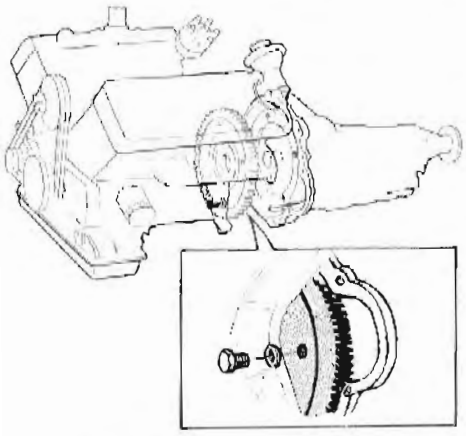
Drain transmission oil

Disconnect oil filler tube from oil pan.

Drain plug introduced in 1983.

WARNING! The transmission oil may be extremely hot if vehicle has just been driven.





O4

Disconnect parts from transmission according to O8, page 63

Leave one bolt in torque converter casing.

O5

Align fixture 5972 beneath transmission

Ensure heaviest part of transmission rests on center of fixture. Secure transmission with lock nuts

O6

Remove bolts from coupling flange

Turn engine with a screwdriver. (Remove bolts through starter motor aperture on B27, B28 and diesel.)

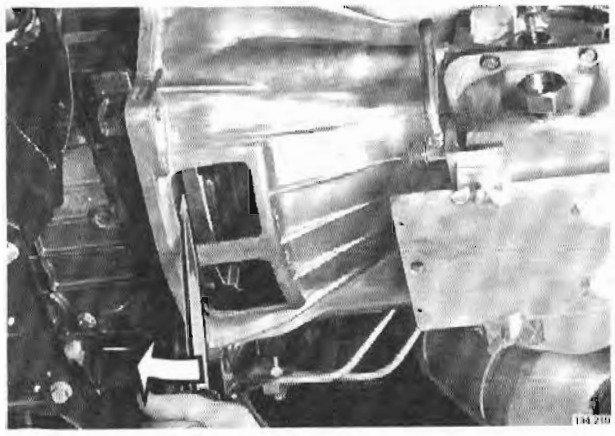
O7

Lift down transmission

Remove screw left in torque converter casing.

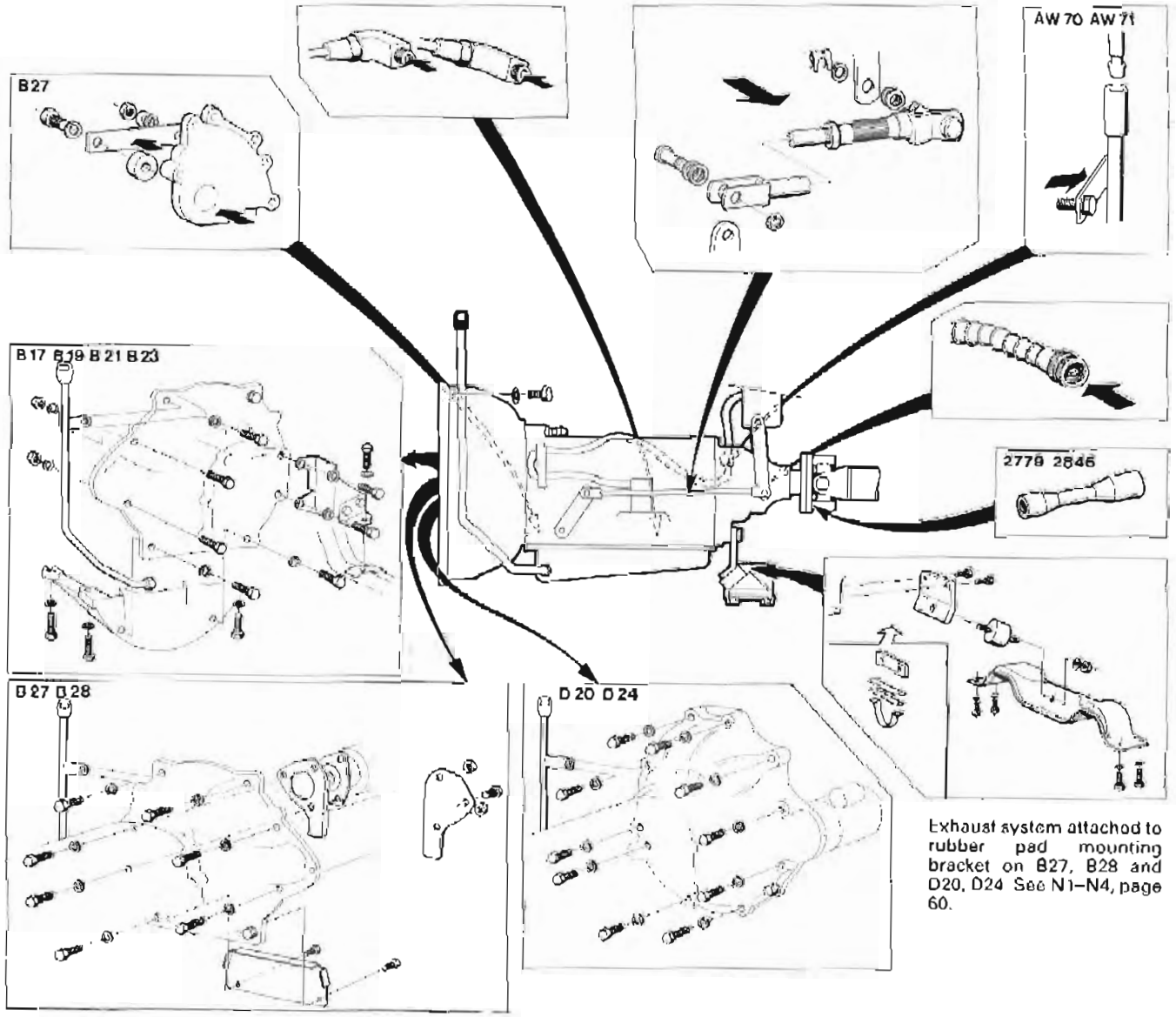
Pry torque converter back from coupling flange.

Important!
Do not tilt transmission forward otherwise torque converter may slide off shaft.



Disconnecting transmission

O8



Exhaust system attached to rubber pad mounting bracket on B27, B28 and D20, D24 See N1–N4, page 60.

B21, B23

Remove:

- transmission crossmember
- rubber pad
- support bracket
- propeller shaft. Use wrench **2779** or **2846**
- speedometer cable
- control rod
- oil cooler connections
- solenoid valve plug (AW70/71 only)
- support bracket
- starter motor bolts
- oil filler tube
- exhaust pipe bracket
- torque converter casing bolts

B27, B28

Remove:

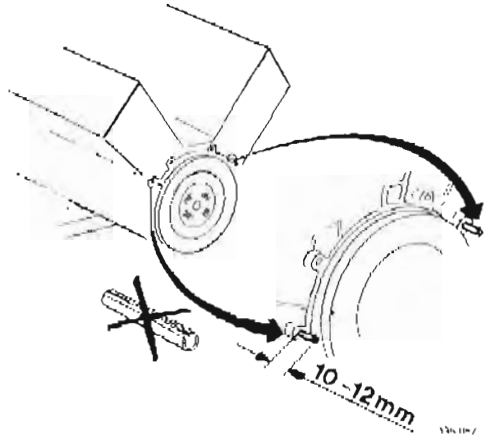
- exhaust pipe mount
- transmission crossmember
- rubber pad
- mounting bracket
- propeller shaft. Use wrench **2779** or **2846**
- speedometer cable
- control rod
- oil cooler connections
- cover plates
- starter motor bolts
- start inhibitor switch, early type B27 only
- oil filler tube
- torque converter casing bolts.

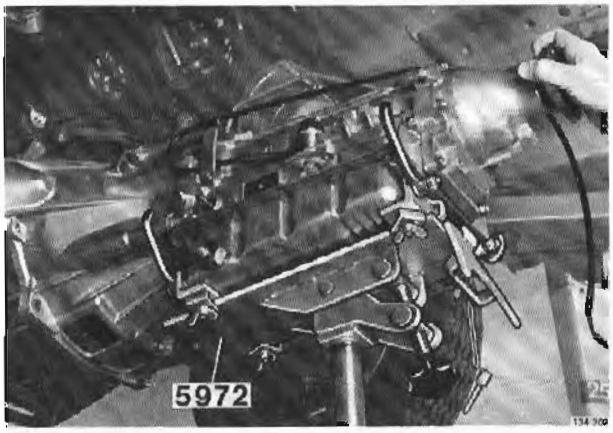
D24

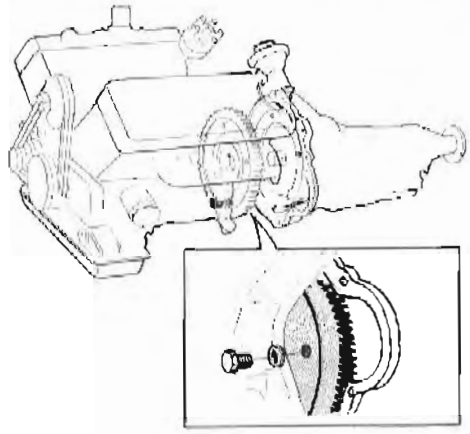
Remove:

- exhaust pipe mount
- transmission crossmember
- rubber pad
- mounting bracket
- propeller shaft. Use wrench **2779** or **2846**
- speedometer cable
- control rod
- oil cooler connections
- starter motor
- oil filler tube
- torque converter casing bolts.

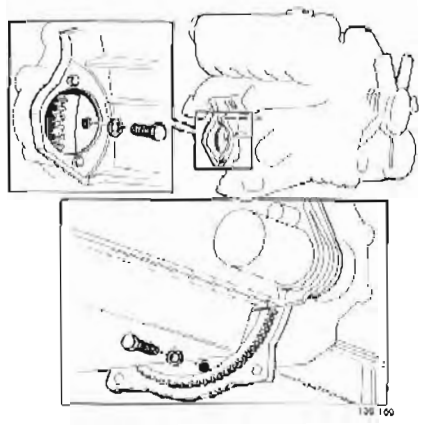
Leave one bolt in torque converter casing to hold it in position.







134 209



To install transmission

09

Prior to installing check that:

— mating surfaces between coupling flange and torque converter are clean and undamaged
dowel pins (D24 = guide sleeves) are in place in engine block (early type B27 = replace existing tubular pins with solid pins P/N 123 2544-5 and apply locking fluid)
— coupling flange is free from cracks and screw holes are not oval (for replacement see service manuals, Section 2)
— coupling flange is not rusty or damaged.

O10

Mount transmission on fixture 5972

O11

Connect transmission to engine

Lightly grease torque converter guide and equivalent hole in crankshaft.

O12

Install starter motor bolts (not diesel)

B27/B28: adjust panel between starter motor and torque converter casing.

O13

Install oil filler tube

Note! Type of tube and dipstick depends on transmission type. If incorrect type is fitted oil level reading will be false.

O14

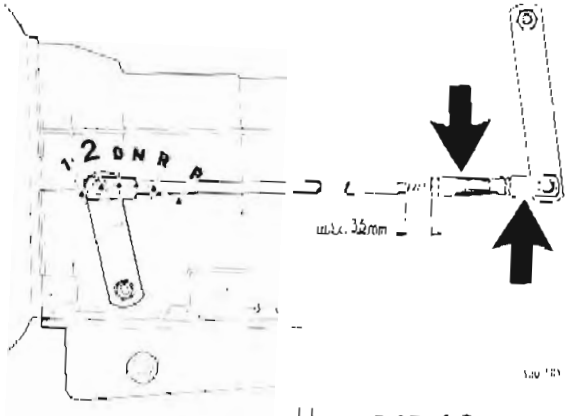
Install torque converter retaining bolts[1] hand tight

Important!

Tighten bolts crosswise to torque:

B21–B23, B27, B28:	**45 Nm** (33 ft-lbs)
D24:	**22 Nm** (16 ft-lbs)

[1] Late type length = 14 mm (0.55 in)
Early type length = 16 mm (0.63 in)
Replace 16 mm bolts with 14 mm ones to reduce risk of bolts shearing in torque converter.

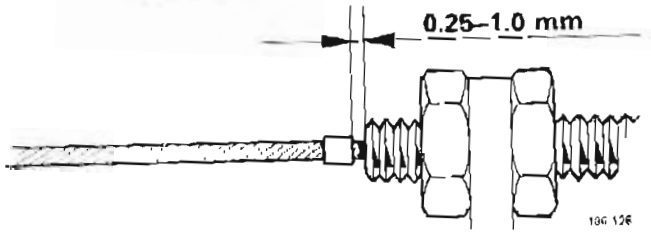


O15

Attach remaining parts

See O8, page 63.

Adjust gear shift linkage to position 2 (2nd notch from front) before connecting control rod.

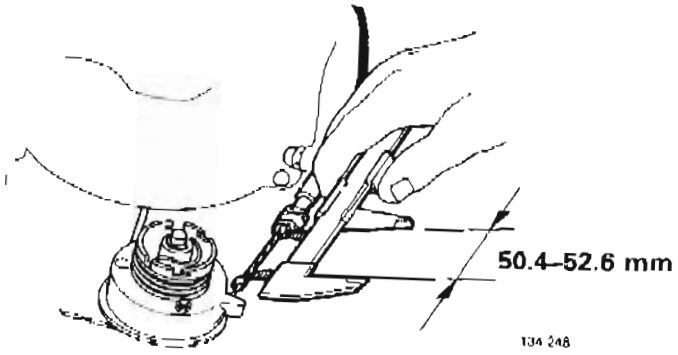


O16

Adjust linkage

See F1–6, page 44.

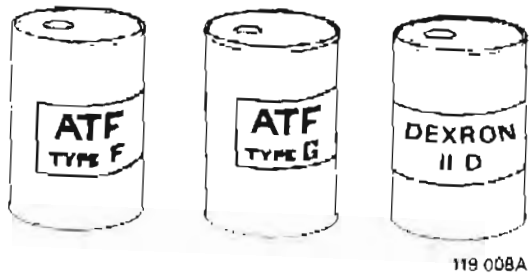
0.25–1.0 mm = 0.01–0.04 in



O17

Connect and adjust kick-down cable to throttle pulley

See G12, page 47.



O18

Fill transmission with ATF type G (F)

Note! Fill 1984 — AW 70, AW 71 transmissions with DEXRON II D.

For oil fill quantities, see A6 on page 36.

O19

Clean oil cooler

See B1–3, page 36.

O20

Check transmission function

Contents

Reconditioning automatic transmission

	Operation	Page
Disassembly	P1–31	67
Reconditioning:		
– oil pump	Q1–19	73
– overdrive (AW70/71)	R1–51	76
– front clutch	S1–20	85
– rear clutch	T1–18	89
– center support assembly	U1–27	93
– planetary gear assembly	V1–35	100
– governor and extension housing	X1–12	107
– brake pistons B3	Y1–6	109
– valve body	Z1–38	110
Miscellaneous	Z39	135
Assembly	Z40–86	136

Reconditioning

Disassembling

Try to find source of any oil leaks prior to dismantling unit.

Try to establish which parts are defective before disassembling other parts unnecessarily.

Parts which have stuck together should be separated by carefully tapping with a plastic mallet and not by prying apart.

Cleaning and drying

Carefully clean all oil passages and blow dry with compressed air. Do not use rags which leave behind lint. Wadding must not be used. High standards of cleanliness are essential.

Assembling

Smear all parts with ATF prior to installing.

Soak new friction discs thoroughly in ATF.

Ensure thrust washers and needle bearings are correctly fitted (smear lightly with Vaseline to hold in position. Too much Vaseline can block valve body passages.)

Always install new gaskets, O-rings and oil seals.

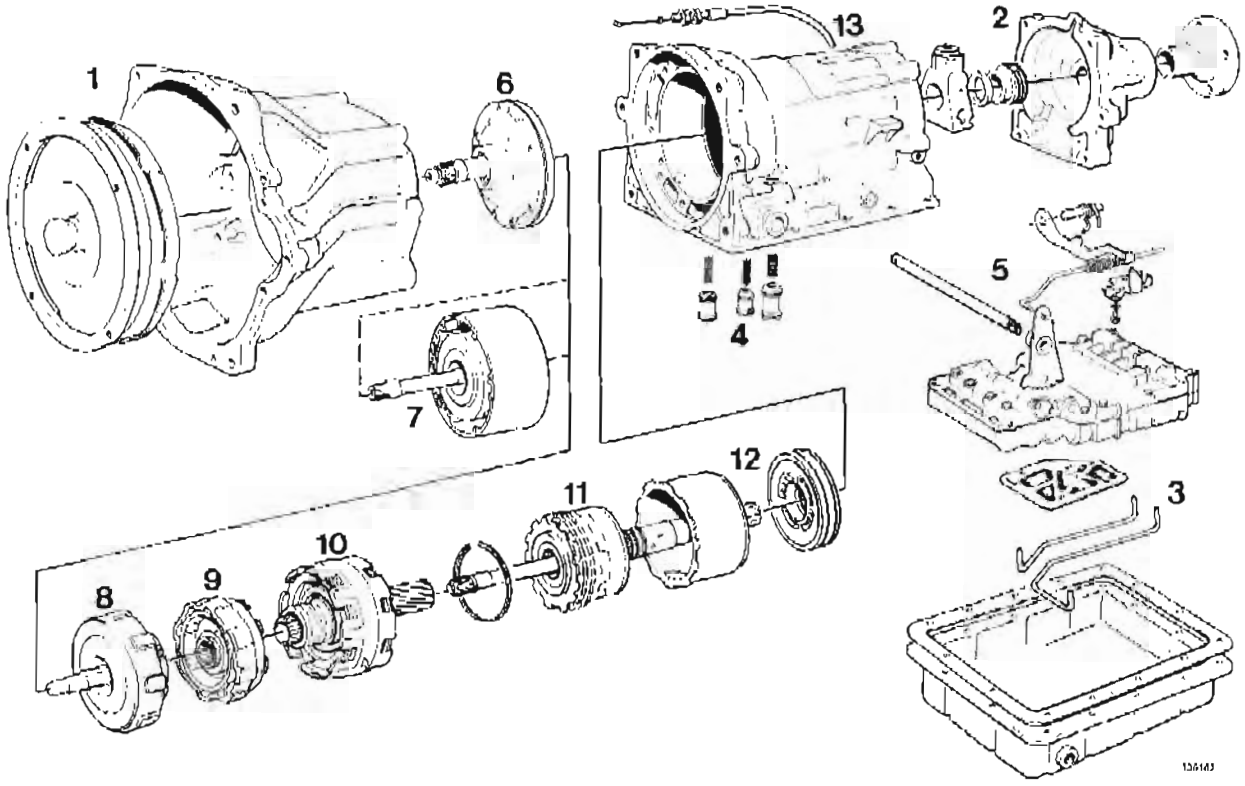
O-rings and pistons should be smeared lightly with Vaseline prior to installing.

Vaseline Volvo P/N 116 1151-4.

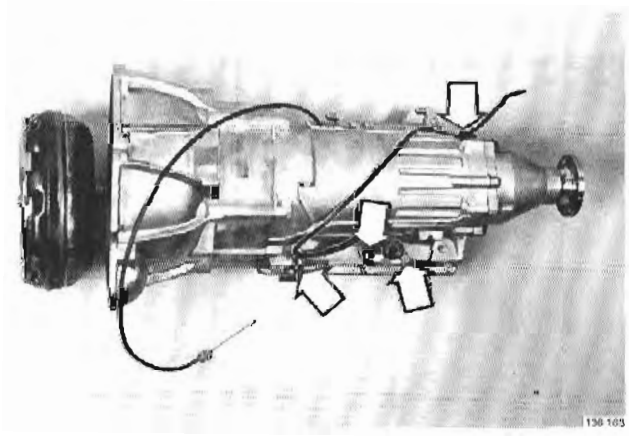
P. Disassembly of transmission

Special tools: 2520, 5070, 5071, 5073, 5149, 5241

Disassemble transmission in sequence shown below.



1 Torque converter and casing (AW70/71)
2 Extension housing and governor
3 Oil pan, oil tubes (AW70/71) and valve body assembly
4 Accumulator pistons
5 Gear selector linkage
6 Oil pump and torque converter casing
7 Overdrive unit (AW70/71)
8 Front clutch
9 Rear clutch
10 Center support assembly
11 Planetary gear assembly
12 Countershaft and piston – 83 brake
13 Gear case



P1

Clean gear case

Locate oil leaks as applicable.

P2

Detach torque converter

Use both hands to withdraw converter from shaft.

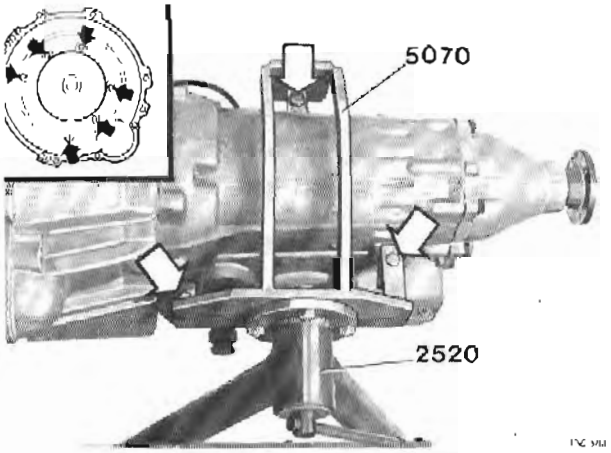
P3

Remove selector lever

P4

AW70/71: Remove solenoid

Remove O-rings and wire clamps.



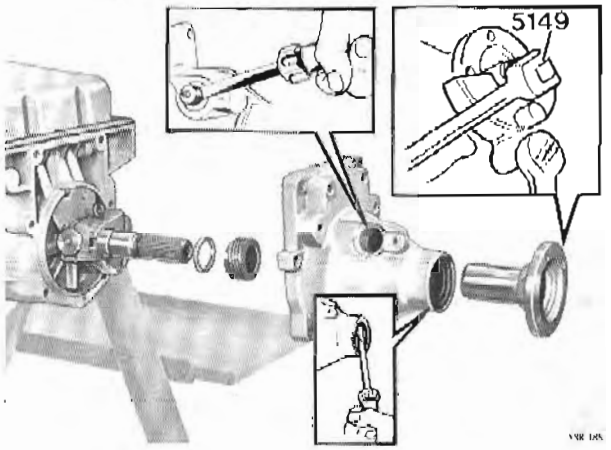
P5

Mount gear case on fixture 5070. Mount fixture on stand 2520

Fixture may need modifying to fit different transmission types, see page 21.

P6

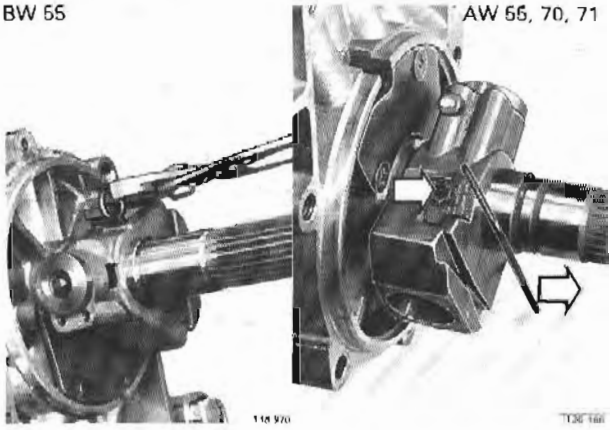
AW55, BW55: Remove torque converter casing



P7

Remove:

- speedometer driven gear
- speedometer driven gear O-rings
- coupling flange. Use **5149**
- extension housing and gasket. Pry sealing ring from housing with a screwdriver.
- speedometer drive gear and spacer.

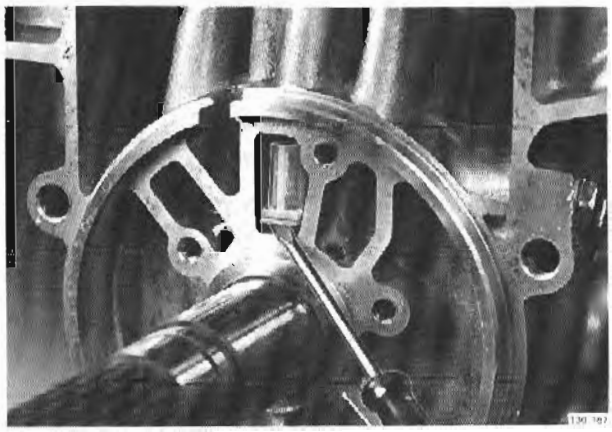


P8

Remove governor

AW55/BW55: Unclip drive ring and withdraw governor from shaft (also applies to early type AW70).

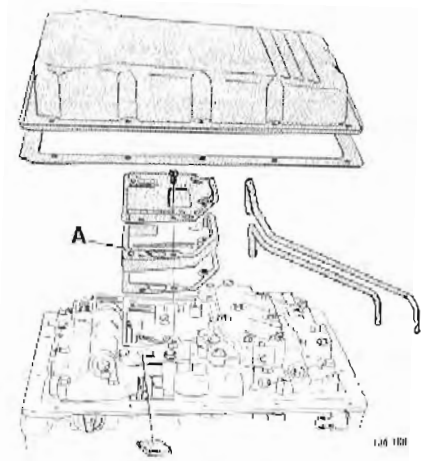
AW70 late type/71: Remove bolt and lock plate. Unclip drive ring and withdraw governor from shaft.



P9

Remove channel plate and gasket

AW70/71: Remove oil filter from oil channel.



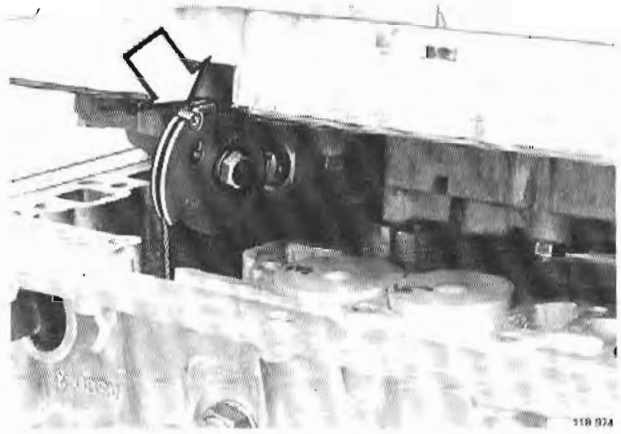
P10

Turn transmission in stand so that oil pan faces up

P11

Remove:

- oil pan and gasket
- **AW70/71**: oil tubes to valve body (carefully ease out with a screwdriver)
- oil strainer
- spacer plate (A). (Not AW55 and late type BW55 with "shallow" oil pan)
- gasket
- magnet (AW70/71 = located in oil pan).



P12

Check valve body (17 screws)

(For screw location, see section on assembly.)

Disconnect kick-down cable from pulley and lift away valve body assembly.

> Reconditioning valve body
> Operations Z1–49, page 110

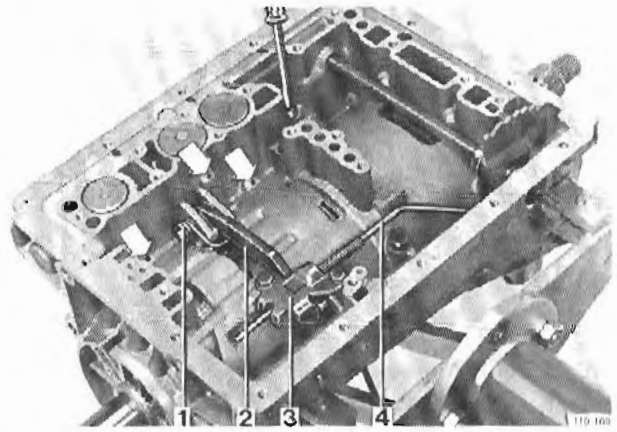
P13

Remove accumulator pistons and springs

Use compressed air (max. 14 psi) to dislodge pistons.

> Mark position of springs.
> Note! Center C2 piston does not have spring on some BW55 transmissions.

Note! Type of accumulator piston in transmission does vary, see section on in-car repairs (L4, page 56).



P14

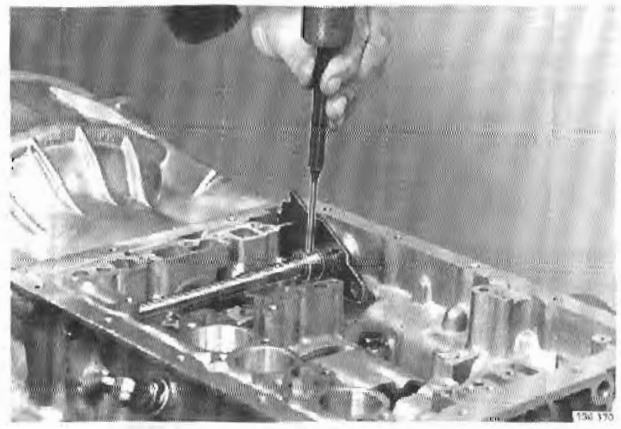
Remove kick-down cable

Press off cable sheath with a 10 mm socket.

P15

Remove:

- lock plate (3) and thrust rod (4)
- parking pawl (2)



P16

Remove selector shaft and cam

Remove lock ring securing cam and tap out pivot pin (3 mm = 0.12 in or 5 mm = 0.20 in) with a punch. (Lock ring not fitted on early type AWbb and BW55.)

> **Note!** For different types of gear selector mechanism, see In-car repairs, K1–17, page 53.

Late type AW transmissions have a 4 mm (0.16 in) pin.

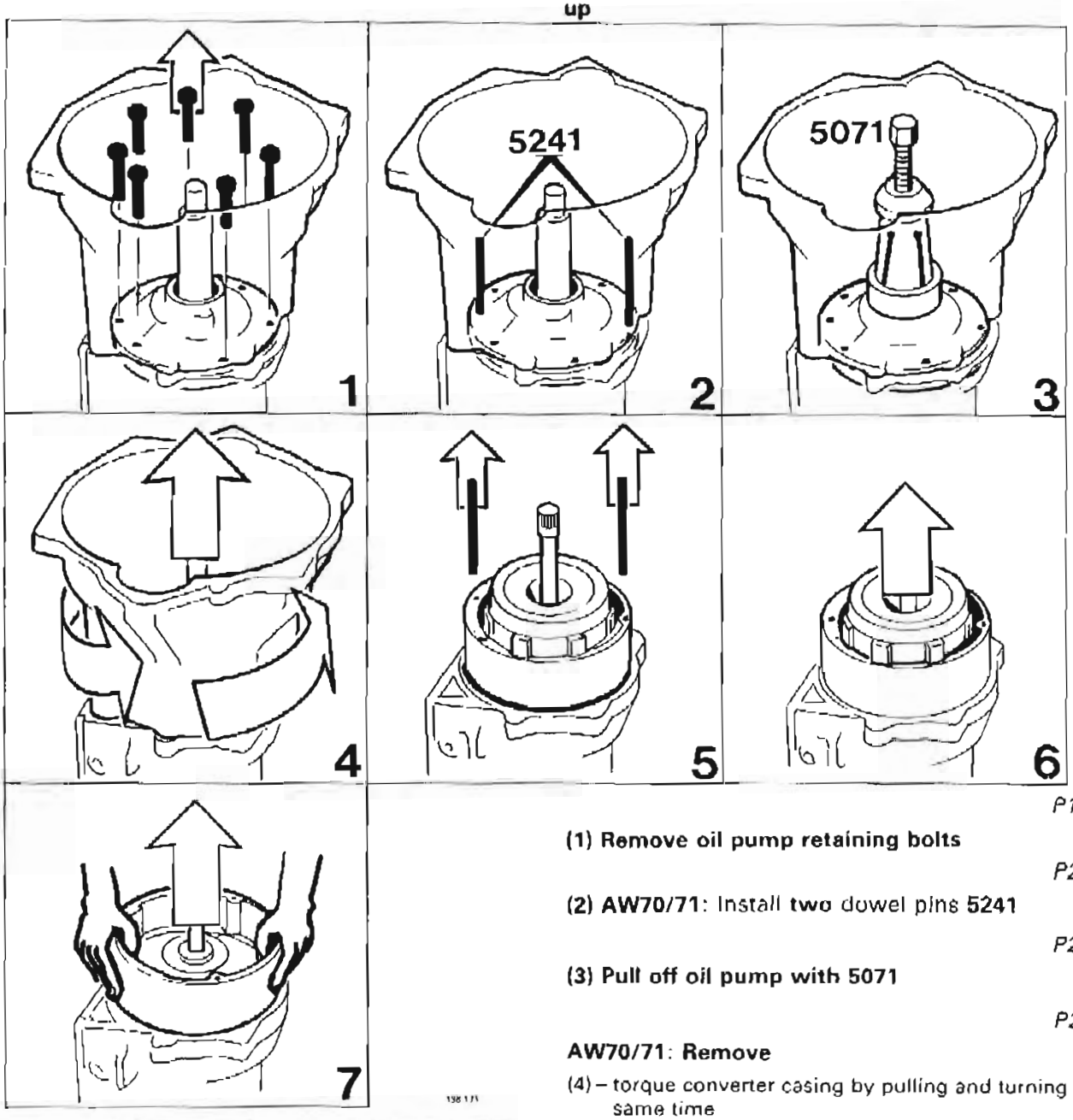
P17

Remove shaft oil seals

Ease out seals with a screwdriver.

P18

Turn transmission on stand so that oil pump faces up



P19

(1) Remove oil pump retaining bolts

P20

(2) AW70/71: Install two dowel pins **5241**

P21

(3) Pull off oil pump with 5071

P22

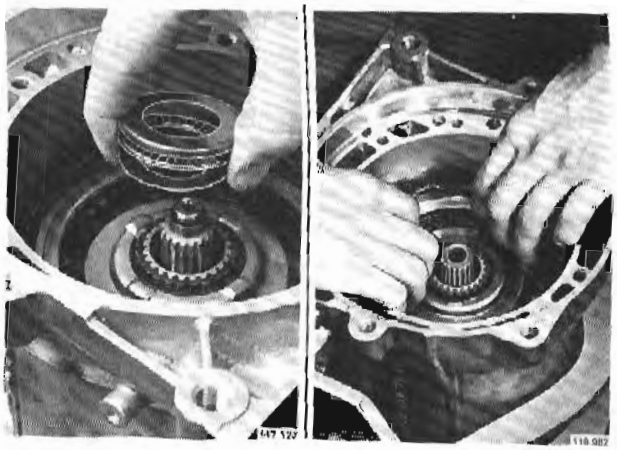
AW70/71: **Remove**

(4) – torque converter casing by pulling and turning at same time
(5) – dowel pins 5241
(5) – O-ring
(6) – overdrive clutch
(7) – overdrive housing. Lift housing straight off with both hands.

P23

Remove front clutch + bearing race and needle bearing

Withdraw clutch body as illustrated.



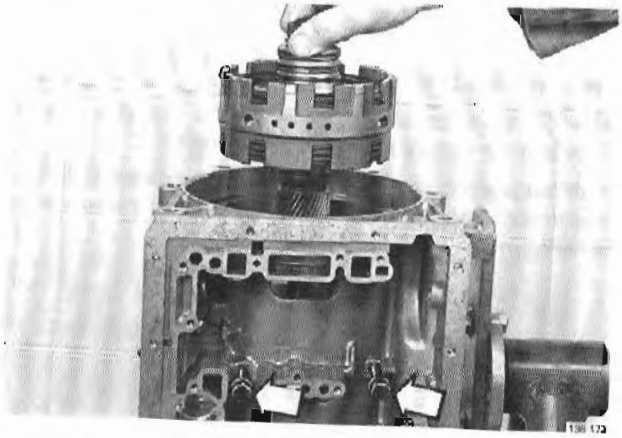
P24

Remove rear clutch bearing races and needle bearing

P25

Remove rear clutch

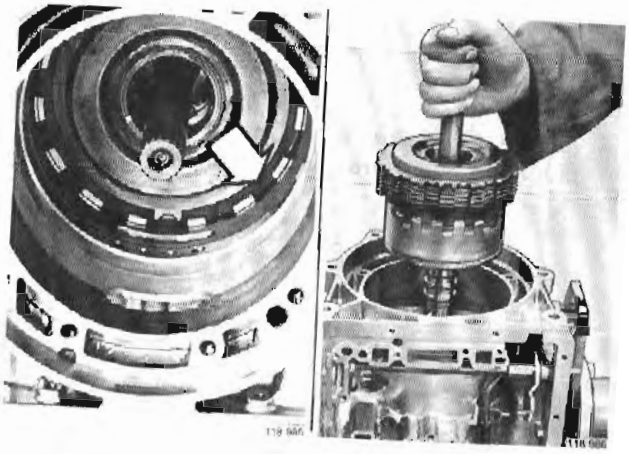
Place hand as illustrated and lift out clutch.



P26

Lift out center support assembly

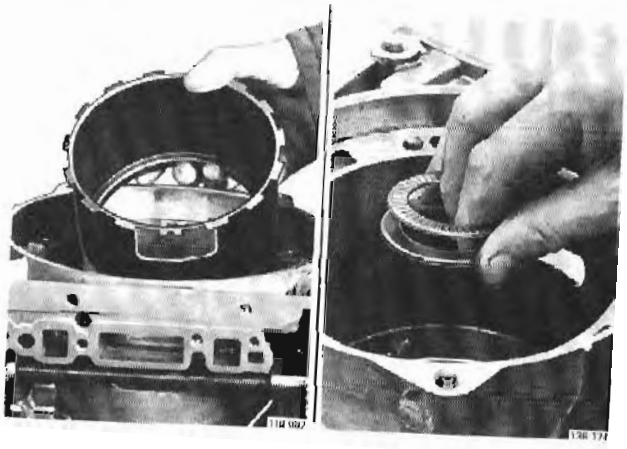
Remove screws and lift out assembly as shown.



P27

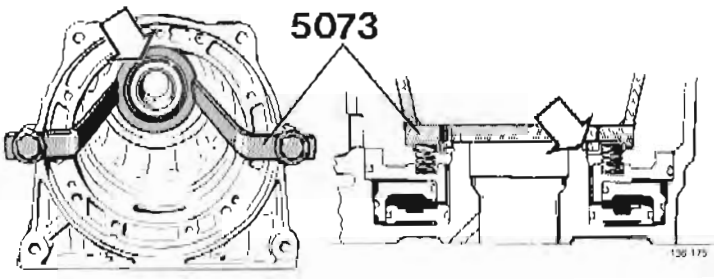
Remove:

- thrust disc retaining ring with a long screwdriver
- planetary gear unit and clutch pack to B3 brake.



Remove:

- countershaft for B3 brake
- needle bearing and bearing race.



P28

Remove lock ring securing B3 brake return springs

Attach press tool **5073** as illustrated. Tighten bolts crosswise to release load on lock ring. Remove lock ring with a screwdriver.

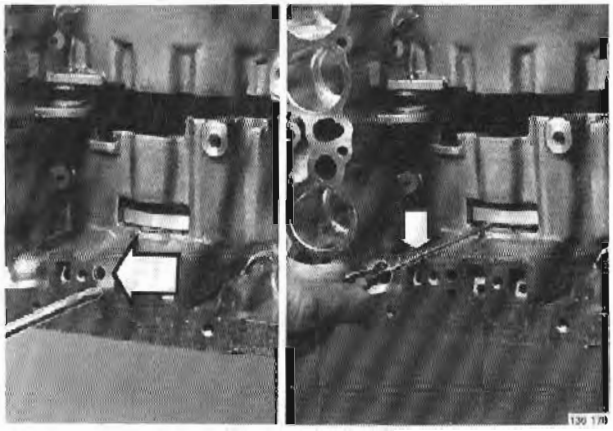
Loosen tool in similar manner.

P29

Remove:

- press tool **5073**
- thrust plate for springs
- return springs (16)

Springs fixed to retainer on most BW65 transmissions.

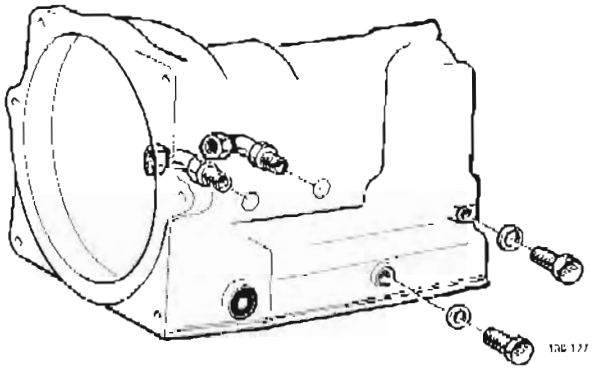


P30

Remove B3 brake pistons

Use compressed air (max. 14 psi) to dislodge pistons. Connect air supply to feed hole (arrow).

Pull out pistons with a pair of flat nosed pliers. If difficult to remove, **carefully** ease pistons out with a screwdriver as shown.



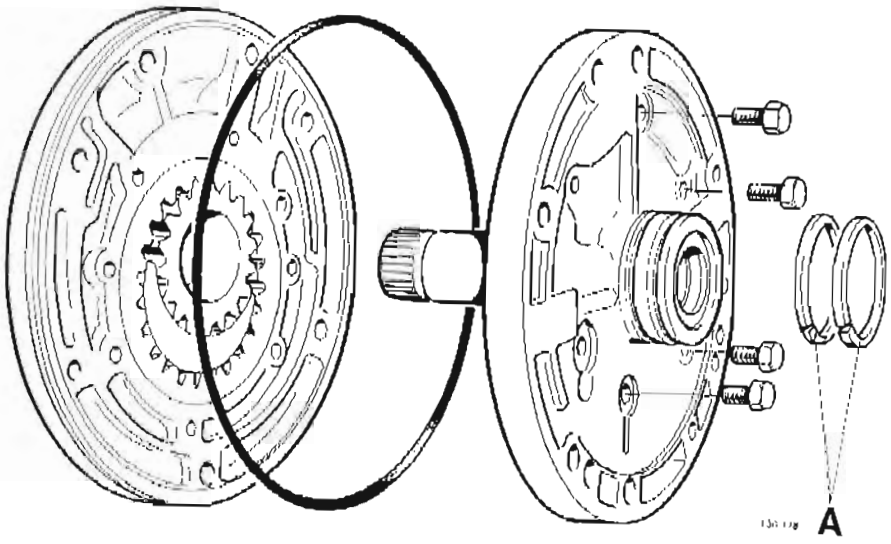
P31

Remove:

- nipples for tubes to oil cooler
- plugs from pressure gauge connections.

Q. Oil pump

Special tools: 5077, 5117



To disassemble

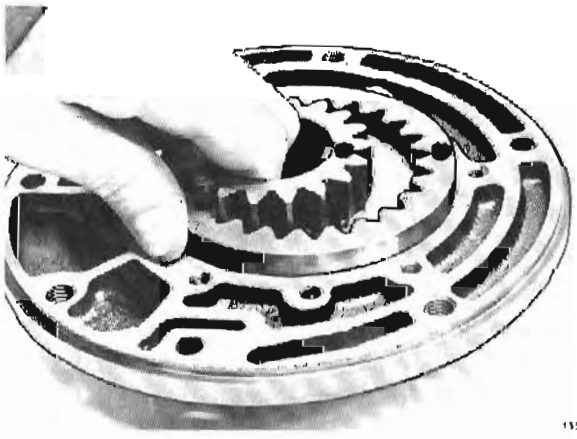
Q1

Remove two oil seals (A)

Unclip rings one at a time with thumbs.

Q2

Separate pump and remove O-ring



Q3

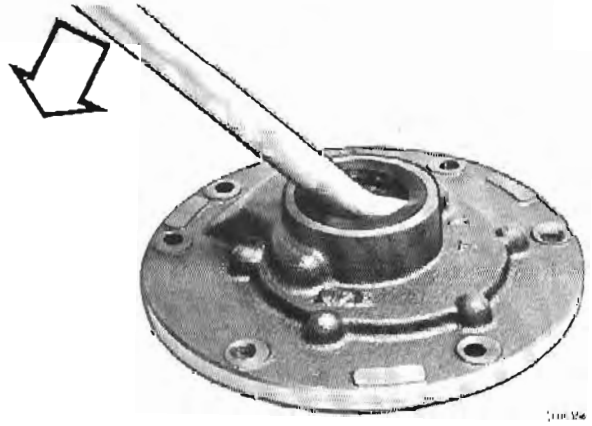
Mark position of gear top on top side

Use a felt-tipped pen.

Do not use a punch!

Q4

Lift off pump gears



Q5

Remove oil seal for converter shaft

Ease off with a screwdriver.

Cleaning and checking

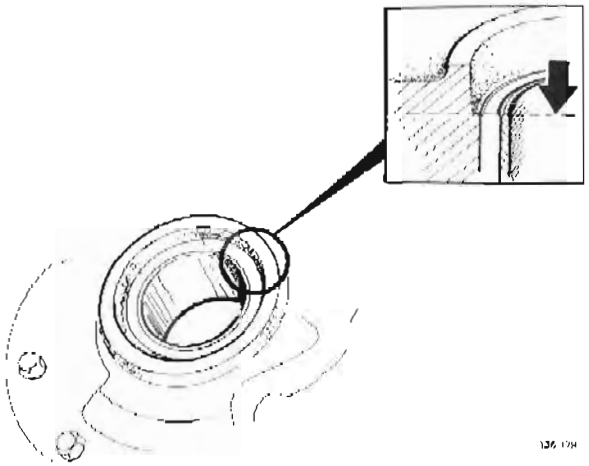
Q6

Carefully clean all parts without scoring

Dry with compressed air.

Check for cracks, scoring and signs of wear.

Note! Pump drive and housing are very accurately matched. Complete assembly must be replaced even if only one part is defective.



Q7

Check bushing for torque converter shaft

If bushing has moved outward it will block a drain channel and cause leakage.

Replace oil pump if bushing has moved outward or is damaged.

To assemble

Q8

Place pump gears in housing according to previously made marks

Q9

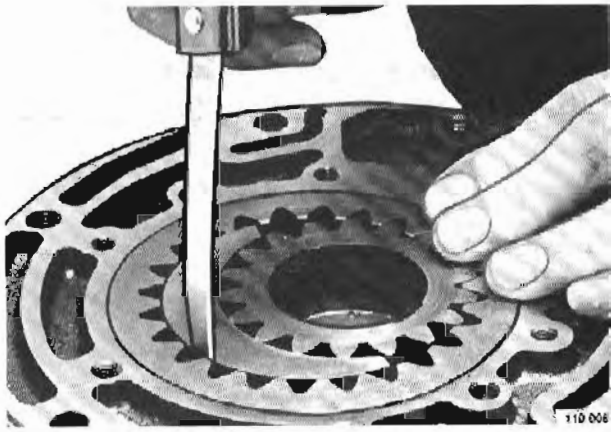
Check clearance between pump housing and outer gear

Pull both gears in direction indicated.

Measure clearance with a feeler gauge.

Max clearance:

BW55	0.03–0.07 mm (0.0012–0.0028 in)
AW55, 70, 71	0.07–0.15 mm (0.0028–0.0060 in)



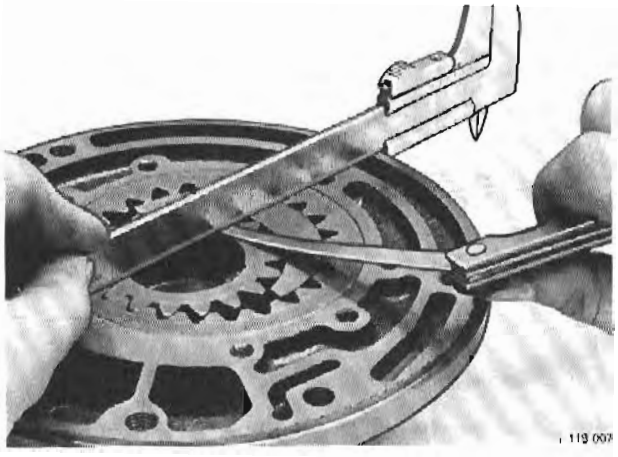
Q10

Check clearance between top of teeth on large gear and "U" section of housing

Check clearance as illustrated.

Max clearance:

BW55	0.03–0.07 mm (0.0012–0.0028 in)
AW55, 70, 71	0.15–0.07 mm (0.0060–0.0028 in)



Q11

Check axial clearance for both gears

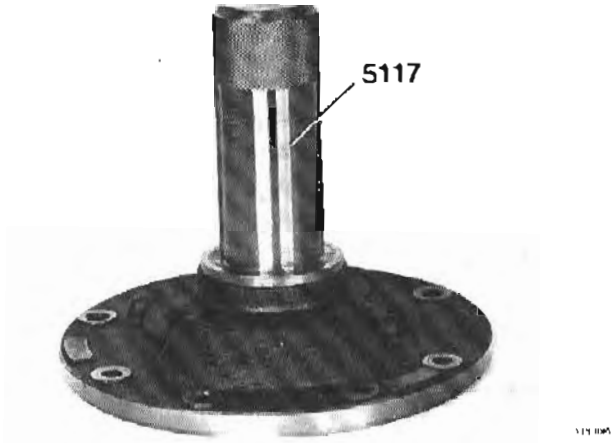
Place a caliper gauge or straight edge across pump as illustrated and measure axial clearance with a feeler gauge.

Max clearance:

BW55	0.02–0.10 mm (0.0008–0.0040 in)
AW55, 70, 71	0.02–0.05 mm (0.0008–0.0019 in)

Q12

Smear friction surfaces with ATF



Q13

Install oil seal for torque converter shaft

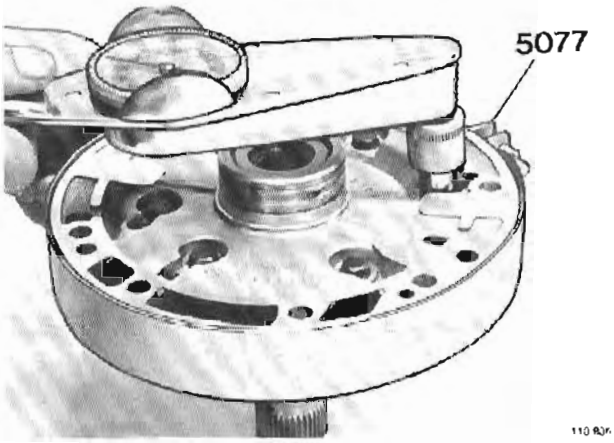
Use drift **5117.**

Note! Two types of seals are in use.

Single-lip CR 530039 with green front and twin lip KOYO P/N 1233 009-8. Late type transmissions are fitted with KOYO seals.

Single-lip seal is easily damaged during assembly because top of seal protrudes too far above body.

Therefore to prevent oil leak install twin lip oil seal.



Q14

Assemble pump loosely

Note! Bolts finger tight at this stage.

Q15

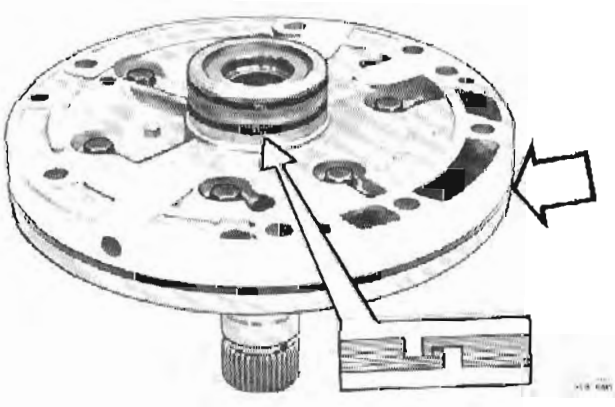
Install centering tool 5077

Q16

Torque bolts to 8 Nm (6 ft lbs)

Q17

Remove centering tool



Q18

Install O-ring on pump housing

Smear O-ring slightly with Vaseline.

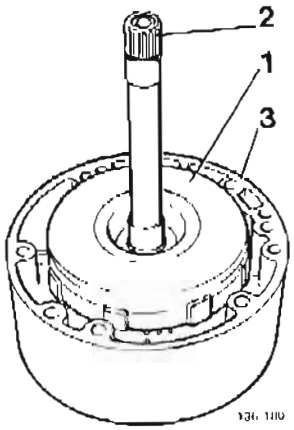
Q19

Install oil seals on hub

Smear seals with Vaseline.

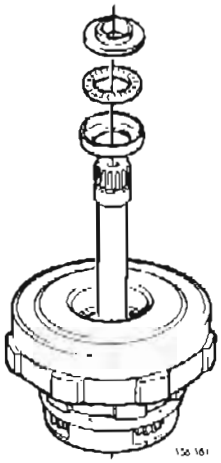
R. Overdrive, AW70, 71

Special tool: 5072



Reconditioning work on overdrive can be taken in three parts:

1. Clutch CO
2. Input shaft with planetary gear carrier and one-way clutch FO
3. Overdrive housing with ring gear and brake BO



R1

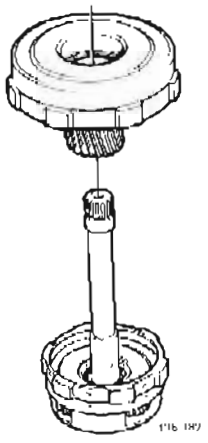
Place overdrive unit on a clean surface

R2

Detach input shaft + clutch from overdrive

R3

Remove bearing races and needle bearing from input shaft

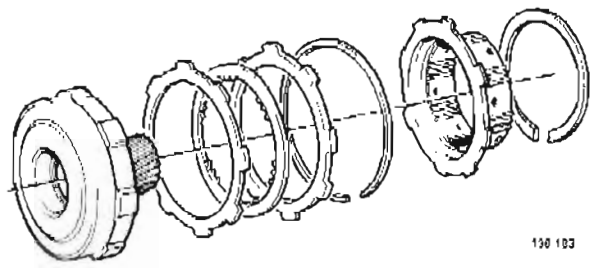


R4

Separate clutch from input shaft

CO-clutch disassembly

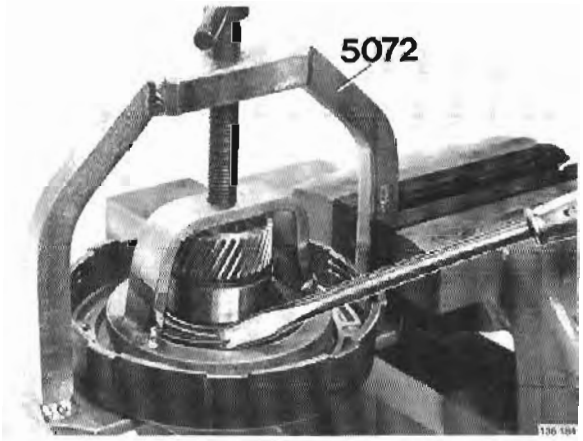
R5



Remove:

- lock ring
- brake hub to 80 brake
- lock ring for clutch pack
- clutches.

R6



Unclip retaining rings

Remove return springs

Compress springs with press tool **5072**.[1]

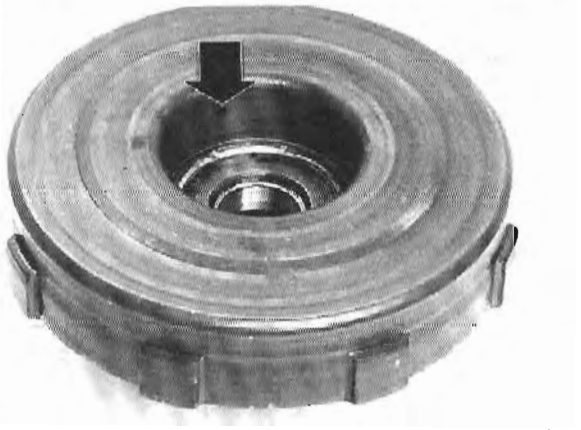
Remove:

- lock ring
- 5072
- ring cage
- retaining rings.

Springs fixed to retainer on most BW55 transmission.

[1] Press tool 5072 must be modified to fit AW70/71. See page 21.

R7



Remove clutch piston from housing

Blow out piston with compressed air at max 14 psi through feed hole indicated. Place finger over opposite hole if piston is difficult to remove. If this doesn't work, press piston back into cylinder and repeat.

R8

Remove O-rings from piston

Cleaning and checking

R9

Wash all parts excluding clutches with solvent

Blow clean and dry with compressed air.

Do not use rags or wadding.

R10

Check all parts for cracks, signs of wear, etc.

R11

Check piston

Shake piston and check that ball valve moves freely. Also check sliding surface of piston and O-ring grooves.

R12

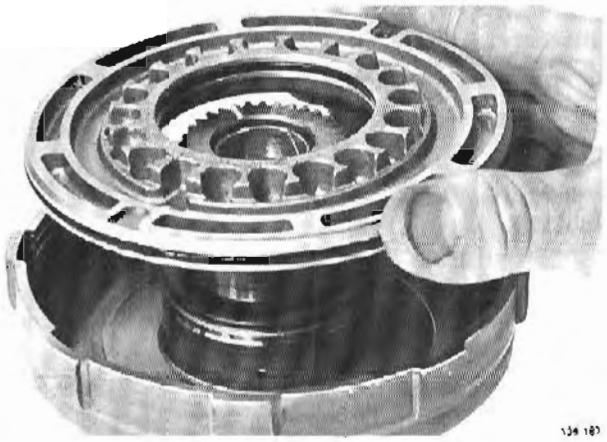
Check clutch discs

Check that discs are flat and not warped or damaged.

Min thickness, friction disc = 2.1 mm (0.083 in)

New thickness = 2.3 mm = (0.091 in)

CO Clutch – assembly



R13

Install new O-rings on piston

Do not turn O-rings in grooves.

R14

Smear all parts with ATF

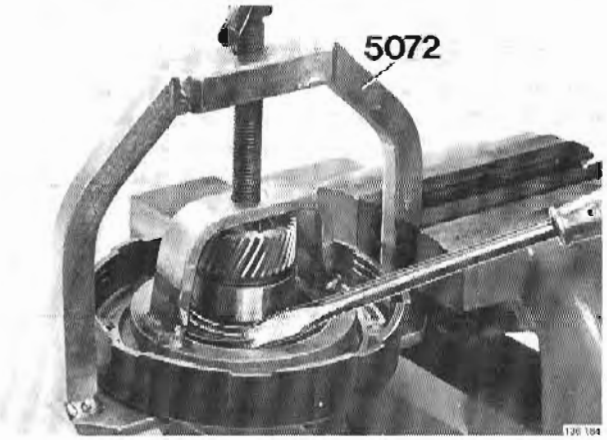
New clutch rings should be soaked in ATF before assembling.

R15

Install piston in housing

Smear O-ring with Vaseline.

Push in piston carefully to avoid damage to O-rings.



R16

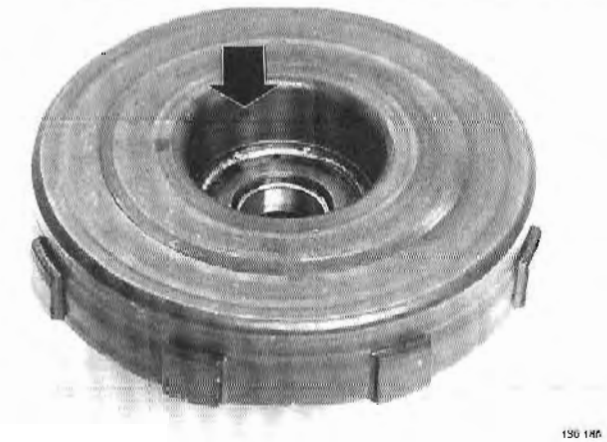
Install return springs and retainer

Make sure rings are vertical.

R17

Install lock ring

Use press tool 5072 to off load springs.

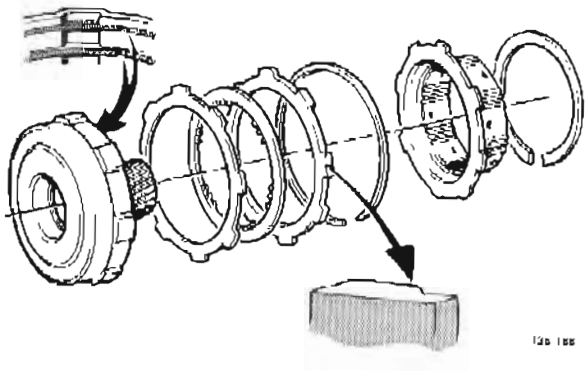


R18

Check piston function

Blow compressed air (max 14 psi) through feed hole on inside of clutch drum. Place finger over opposite hole. A click should be heard when air passes through.

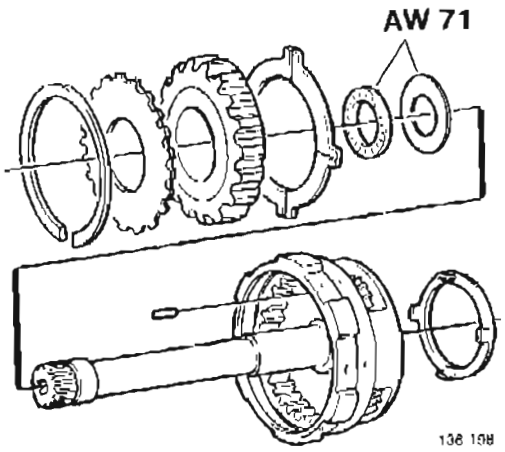
Note!
Do not exceed 14 psi. If too much pressure is used, piston may be dislodged.
Check that piston is correctly positioned.



R19

Install:

- clutch discs. Thin unlined disc at bottom, next friction lining and outermost the thick bevelled steel disc.
- lock ring for clutch pack. Ring opening should not be in one of recesses, see fig.
- brake hub
- lock ring. Ring opening should not be in one of recesses. Ensure that ring sits directly in groove.

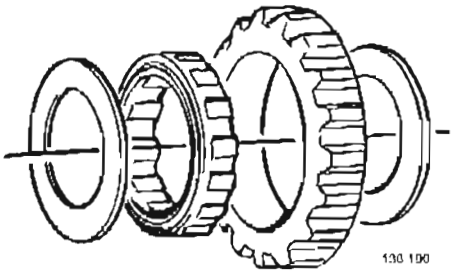


Input shaft, planetary gear carrier and one-way clutch FO – disassembly

R20

Remove:

- lock ring
- pressure plate, one-way clutch FO + outer race
- thrust washer
- AW71: needle bearing and bearing race
- plugs for oil passages in planetary gear shafts. Keep parts in correct order
- thrust washer from planetary gear carrier.



R21

Remove one-way clutch and bearing cages from outer race

Cleaning and checking

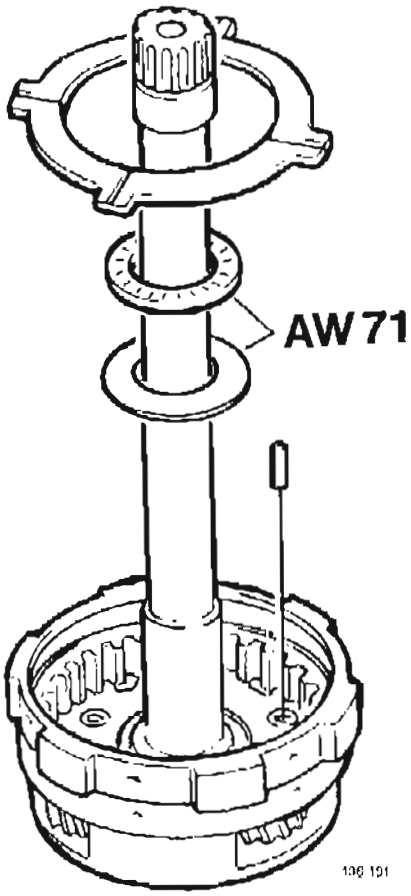
R22

Wash all parts in solvent

Dry with compressed air. Do **not** use rags or wadding.

R23

Check all parts for cracks, signs of wear etc



Input shaft, planetary gear carrier and one-way clutch FO – assembly

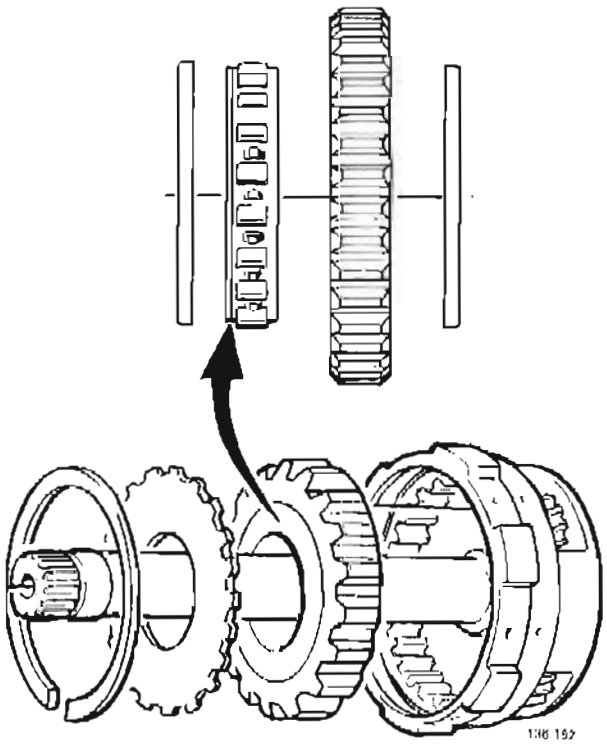
R24

Smear all parts with ATF

R25

Install:

- plugs for oil passages in planetary gear shafts. Use a magnetic screwdriver
- AW71: bearing race and needle bearing
- thrust washer. Grooves facing up, see fig.



R26

Assemble one-way clutch + outer race

Place bearing cage on one-way clutch.

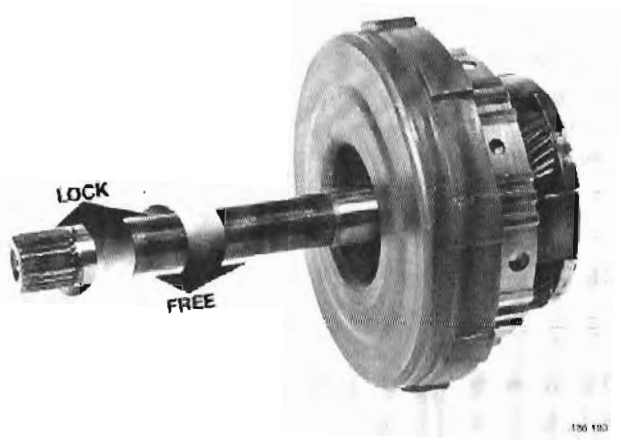
R27

Install one-way clutch + outer race in planetary gear carrier

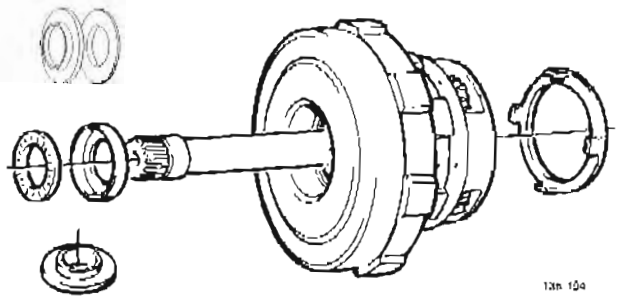
Note! Collar part of one-way clutch (see fig.) must face outward away from planetary gear carrier.

R28

Install pressure plate and lock ring



Late type AW71



AW70, early type AW71

R29

Assemble CO clutch + input shaft to planetary gear carrier

Make sure that planetary gear carrier fits correctly into clutch pack.

R30

Check one-way clutch

Hold carrier and turn input shaft. It should be possible to turn shaft clockwise but not counterclockwise.

R31

Install thrust washer in rear of planetary gear carrier

Smear washer with Vaseline to keep it in position.

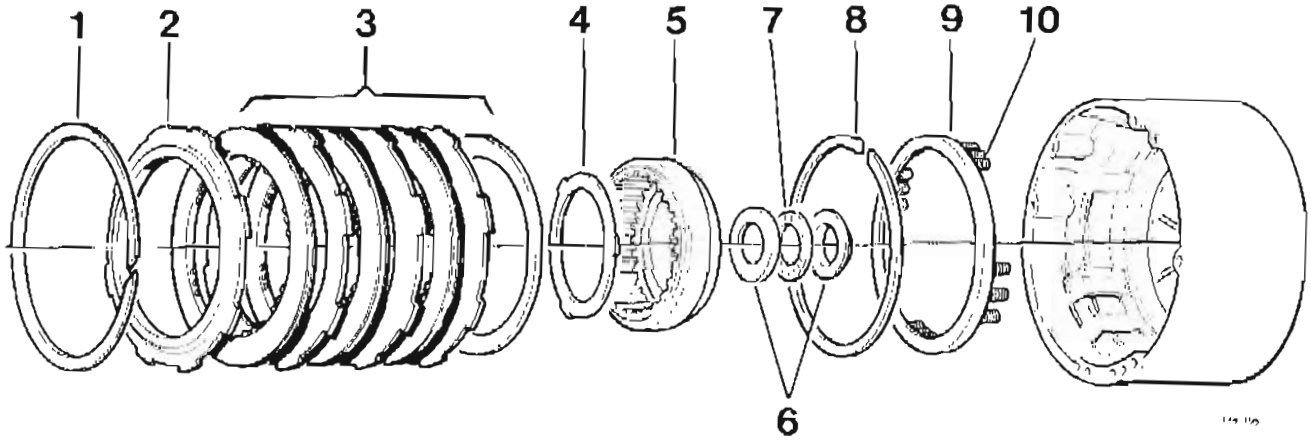
R32

Install bearing race and needle bearing on input shaft

Outer shoulder on bearing race must face out, away from carrier. The other (front) bearing race with inner collar is installed at rear of oil pump in connection with reassembling transmission, see Z56.

Note! Two types of bearing washer are in use for AW70/71.

Overdrive – disassembly



R33

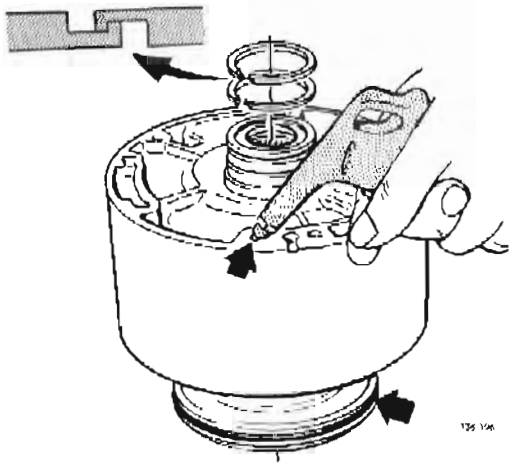
Remove:

- lock ring (1) for brake pack (use a screwdriver)
- thrust plate (2) for brake pack
- brake pack (3) and thrust ring
- bearing race (4) from ring gear
- ring gear (5)
- bearing races (6) and needle bearing (7).

R34

Remove:

- lock ring (8) for brake piston
- spring retainer (9)
- return springs (10).



R35

Remove brake piston

Dislodge piston by blowing compressed air (max 14 psi) through feed hole, see fig. If difficult to remove, pull out piston with a pair of flat nosed pliers.

R36

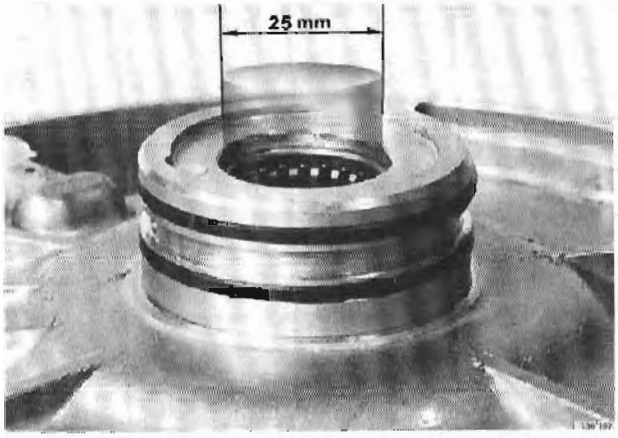
Remove O-rings from piston

R37

Remove sealing rings from overdrive housing

Unclip rings by hand.

Normally not necessary to replace.



R38

Remove needle bearing from overdrive housing

Tap bearing out with a 25 mm socket.

Cleaning and checking

R39

Wash all parts excluding brake pack in solvent

Blow clean and dry with compressed air.

Do **not** use rags or wadding.

R40

Check all parts for cracks, signs of wear, etc.

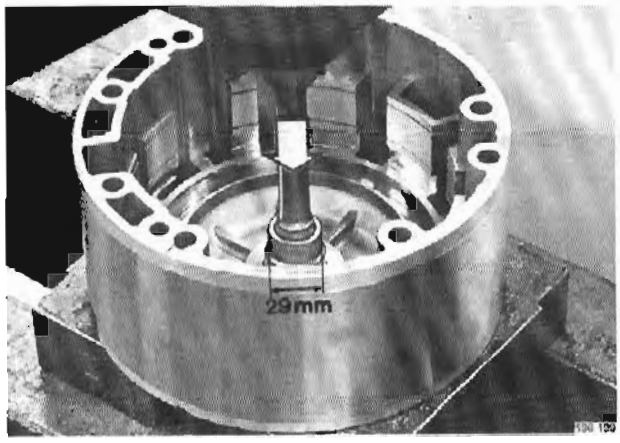
Check return springs and piston ring groove.

Check that discs are flat and not warped or defective.

Min thickness, friction disc: 2.1 mm (0.083 in)

(New disc = 2.3 mm (0.091 in)

Check that plugs are correctly mounted in overdrive housing.



Overdrive housing – assembly

R41

Install new sealing rings in overdrive housing

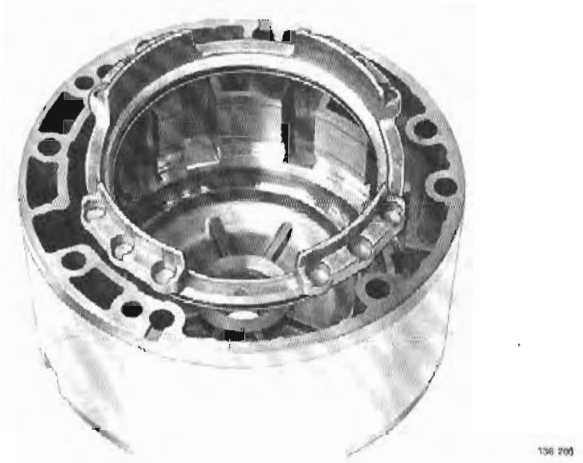
Rings should slide smoothly in groove.

R42

Install needle bearing in overdrive housing, as applicable

Mount housing in a vice protected by soft jaws.

Tap bearing into position with a 29 mm socket (external diam.).



R43

Install new O-rings on piston

Do **not** turn O-rings in groove.

R44

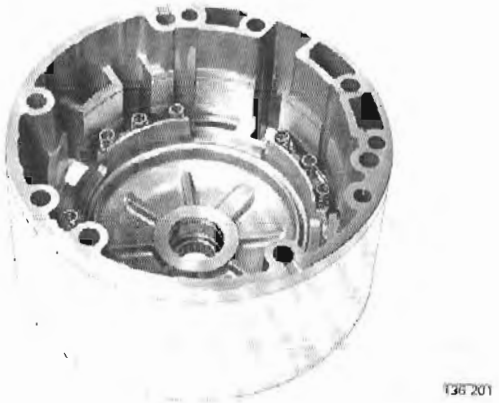
Smear all parts with ATF

New discs should be soaked in ATF prior to installing.

R45

Install piston in overdrive housing

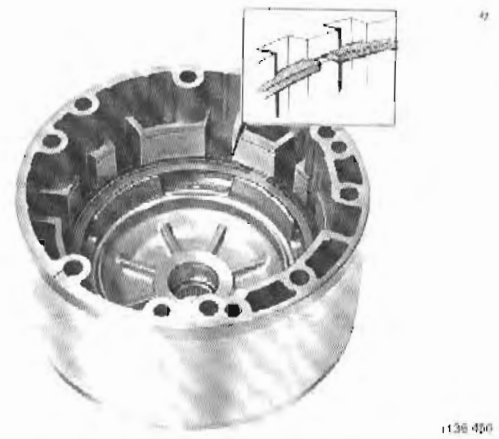
Smear O-rings with ATF and push in piston carefully to avoid damage to O-rings.



R46

Install:

- return springs
- retainer
- lock ring

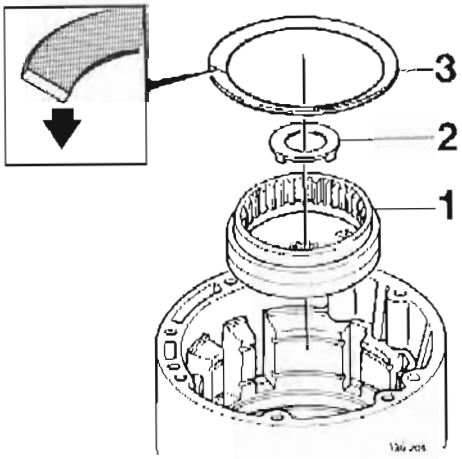


Press lock ring into position with a screwdriver. Make sure that gap is **not** in one of recesses in body.

R47

Install bearing races and needle bearing on ring gear

Races must be installed as illustrated. Smear parts with Vaseline.



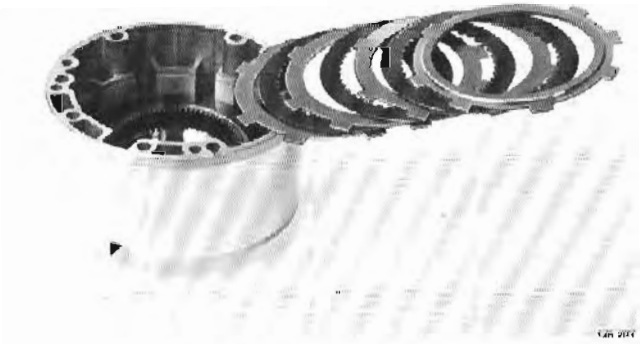
R48

Install bearing race (2) in ring gear

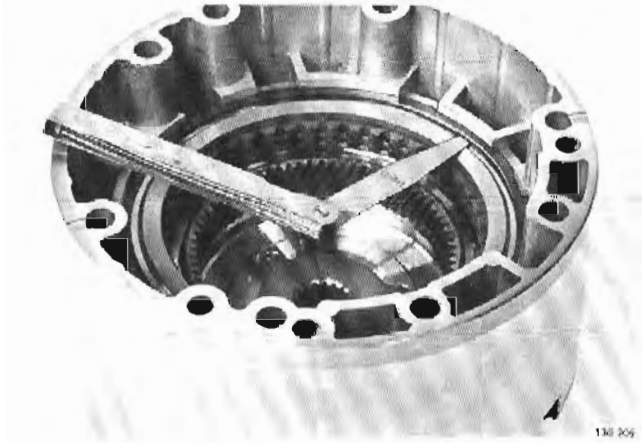
R49

Install in overdrive housing:

- ring gear (1)
- thrust ring (3), bevel facing out, see fig.



- brake pack. Correct order = unlined, lined, unlined, lined, unlined, lined
- thrust disc. Raised section up (out)
- lock ring. Make sure that gap is not in one of recesses in housing.



R50

Check clearance between pressure plate and lock ring

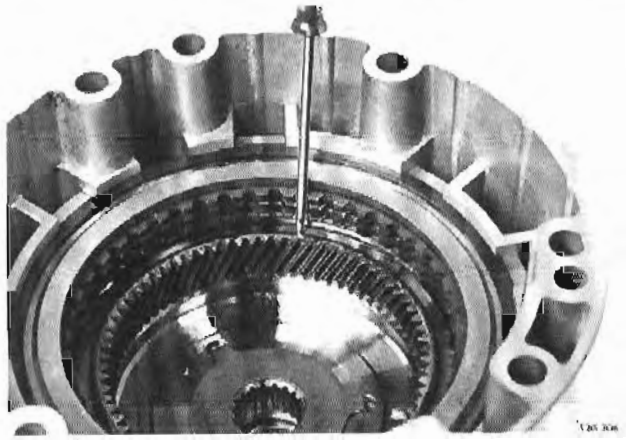
Normal clearance = 0.35–1.60 mm (0.014–0.063 in).

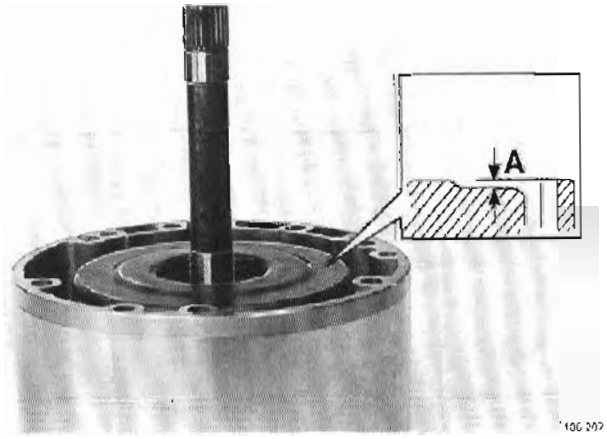
R51

Center clutch discs. Install input shaft — planetary gear carrier in overdrive housing

Make sure that input shaft fits correctly in clutch discs and ring gear.

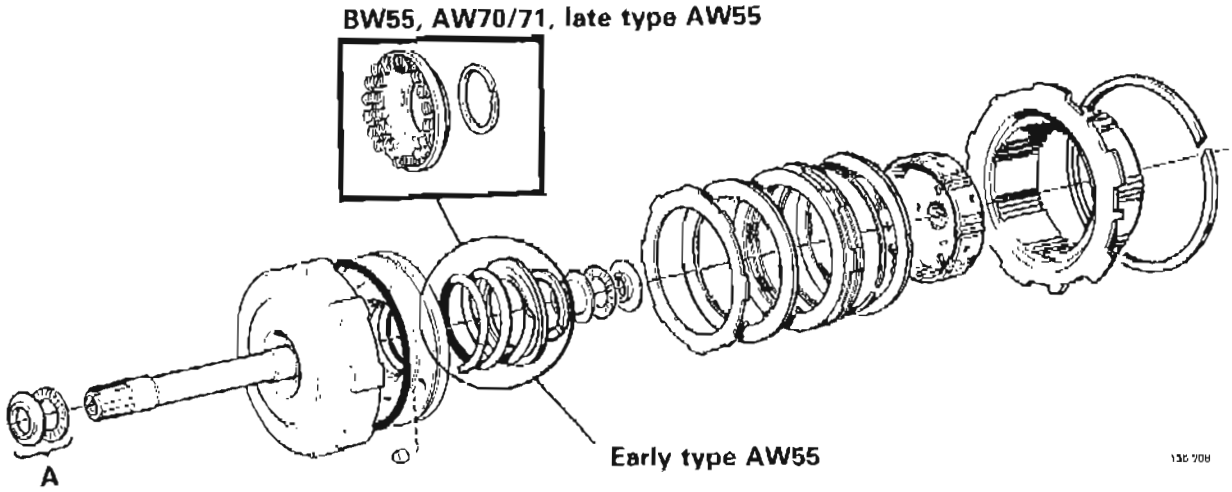
When correctly installed, clutch drum should be approx. 3.5 mm/(0.14 in) below edge of overdrive housing ("A" approximately 3.5 mm).

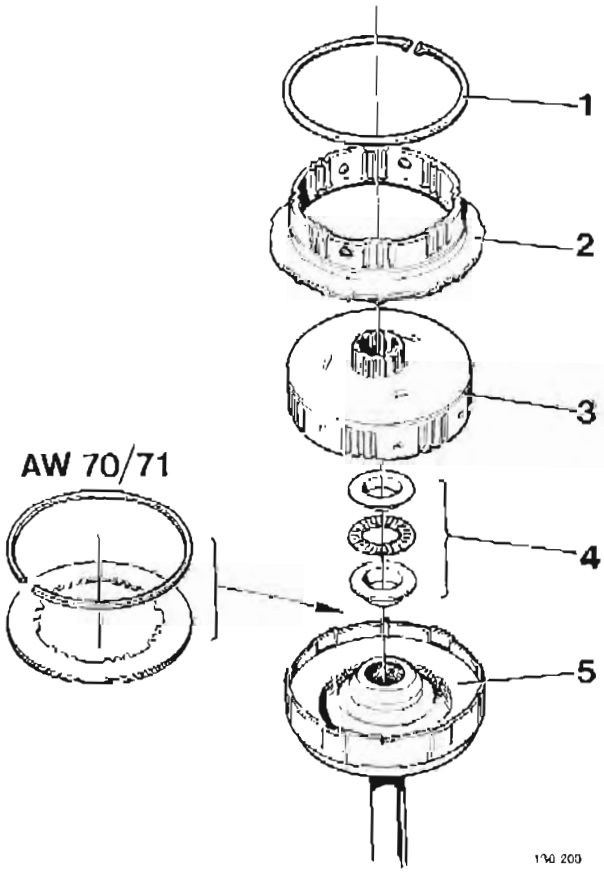




S. C1 front clutch

Special tool: 5072





To disassemble

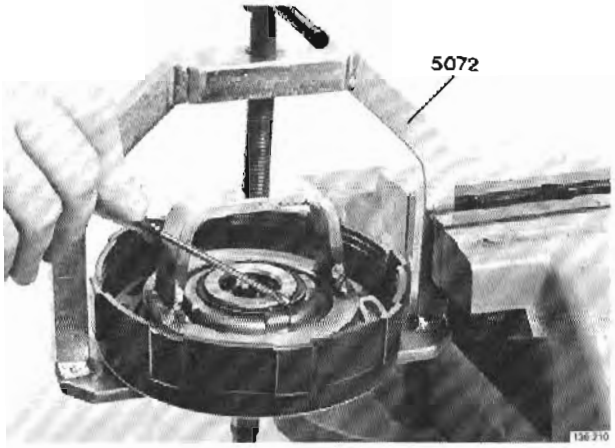
S1

Remove bearing race and needle bearing (A) from input shaft

S2

Remove:

- lock ring (1) (use a screwdriver)
- rear clutch input hub (2)
- front clutch hub (3)
- bearing races and needle bearing (4)
- friction discs (AW70/71)
- lock ring (AW70/71)
- clutch discs (5).



S3

Remove return spring(s)

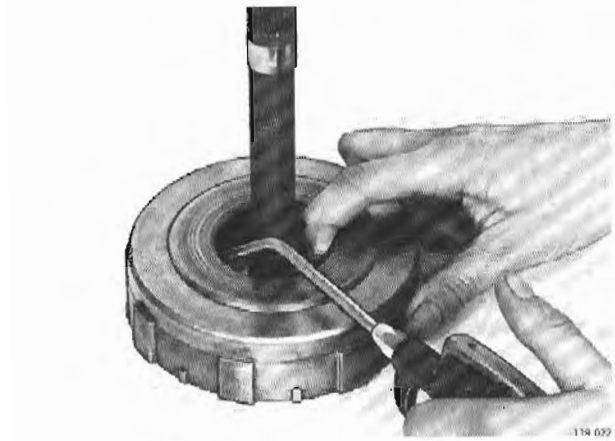
BW55, AW70/71, late type AW55 have 18 small return springs. Early type AW55: has one large return spring.

Compress spring(s) with tool **5072**.

Remove:

- lock ring
- press tool
- spring retainer and spring(s).

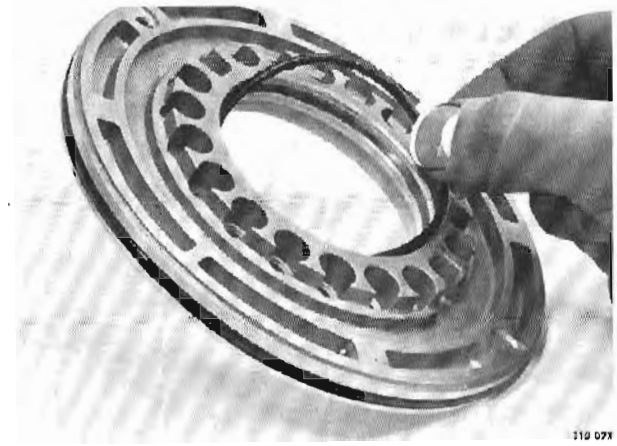
Note! Springs remain attached to retainer on most BW55 transmission.



S4

Remove clutch piston from housing

Blow out piston with compressed air at max 14 psi through feed hole indicated. Place finger over opposite hole if piston is difficult to remove. If this doesn't work, press piston back into bore and repeat.



S5

Remove O-rings from piston

Cleaning and checking

S6

Wash all parts excluding clutch discs, with solvent

Blow clean and dry with compressed air.

Do not use rags or wadding.

S7

Check clutch discs

Check that discs are flat and not warped or damaged

Min thickness, friction disc = 2.1 mm (0.083 in)

New thickness = 2.3 mm = (0.091 in)

S8

Check hub, clutch drum, input shaft and return springs

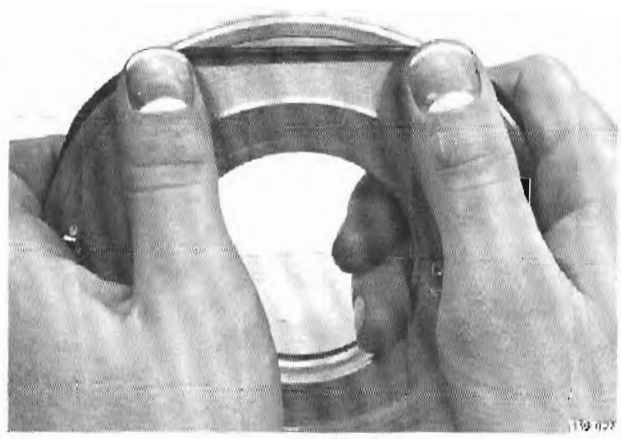
Carefully inspect all parts for cracks and signs of wear, etc.

S9

Check piston

Shake piston and check that ball valve moves freely. Also check sliding surface of piston and O-ring grooves.

To assemble



S10

Install new O-rings on piston

Do **not** turn O-rings in grooves.

S11

Smear all parts with ATF

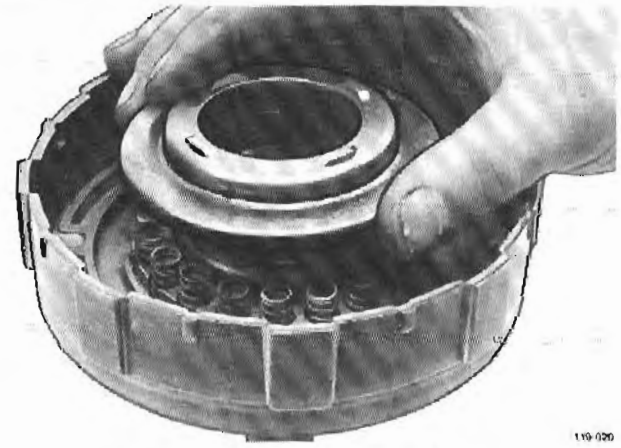
New clutch rings should be soaked in ATF before assembling.

S12

Install piston in housing

Smear O-ring with Vaseline.

Push in piston carefully to avoid damage to O rings.



S13

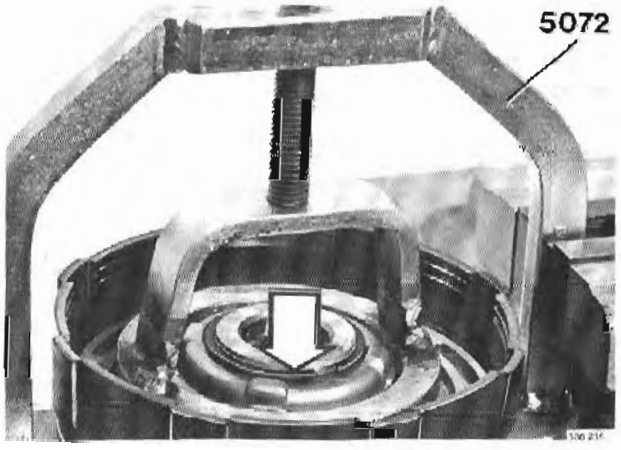
BW55, late type AW55, AW70/71: Install return spring (18x) and spring retainer

Make sure that springs are properly seated in retainer.

S14

Early type AW55:

Install return spring and spring retainer.



S15

Install lock ring

Compress return spring(s) with 5072.

Install lock ring, making sure that it fits correctly in groove.

Remove tool **5072.**

S16

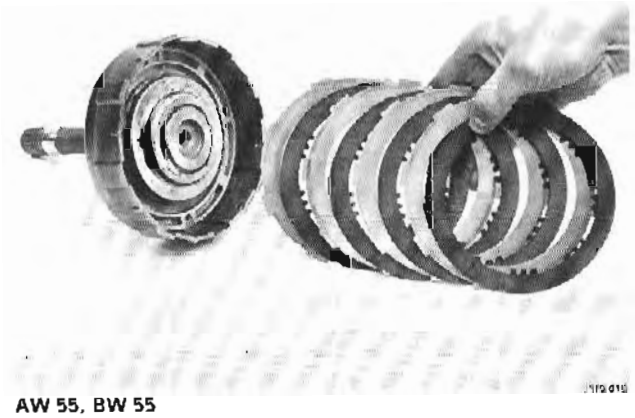
Check piston function

Blow compressed air (max 14 psi) through feed hole on inside of clutch body.

Place finger over opposite hole. A click should be heard when air passes through.

Note!
Do not exceed 14 psi. If too much pressure is used, piston may be dislodged.
Check that piston is correctly positioned.

S17



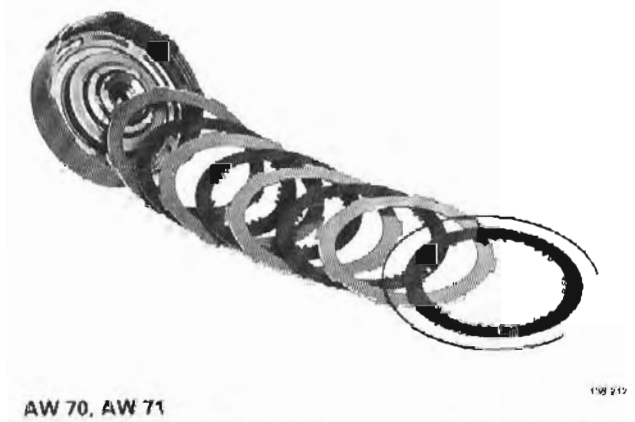
AW 55, BW 55

Install clutch discs

Assemble discs as illustrated (unlined disc innermost).

BW55: two clutch packs available, one with 6 discs and one with 8 discs.

AW70/71: install lock ring and last friction disc.



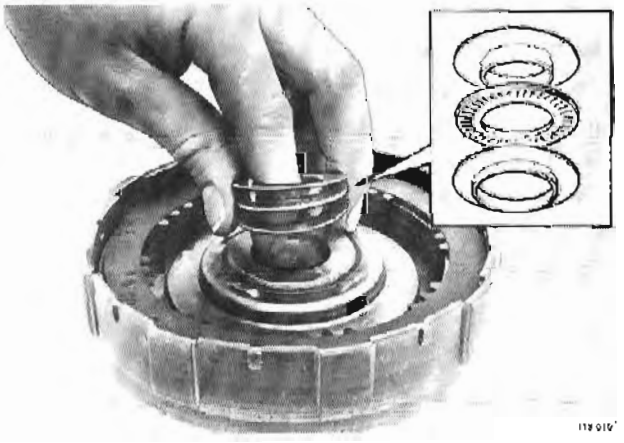
AW 70, AW 71

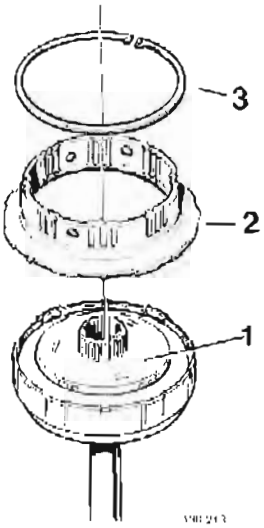
S18

Install bearing races and needle bearing

Needle bearing must be sandwiched between bearing races.

(Place races as illustrated.)

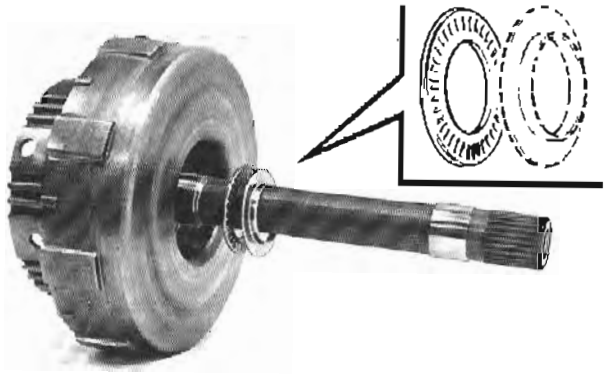




S19

Install:

- front clutch hub (1), making sure that discs seat correctly
- rear clutch hub (2)
- lock ring (3) for rear clutch hub. Make sure that ring fits correctly in groove.



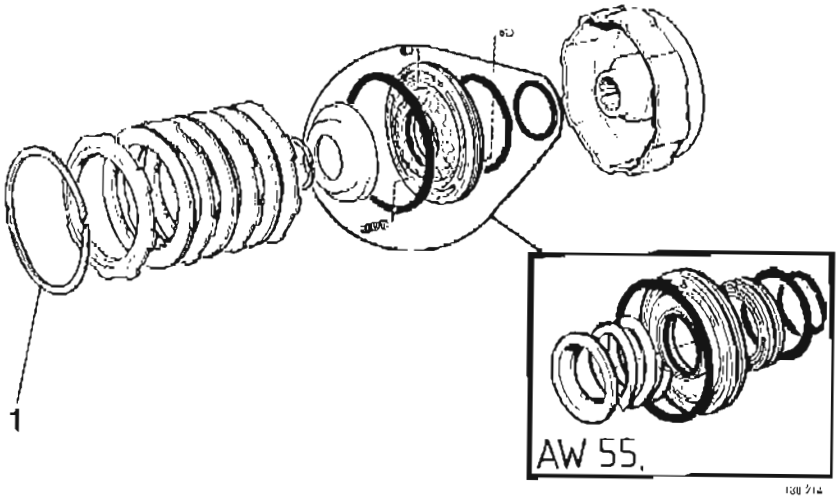
S20

Install needle bearing on shaft

See Z53, page 134 and Z56, page 135.

T. C2 rear clutch

Special tool:5072



AW70: two part piston, similar to AW55

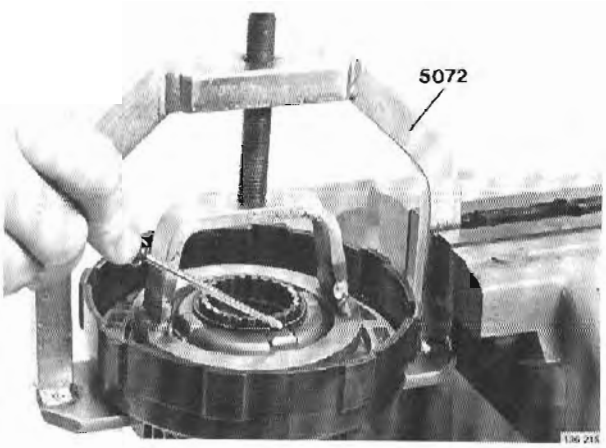
Early type

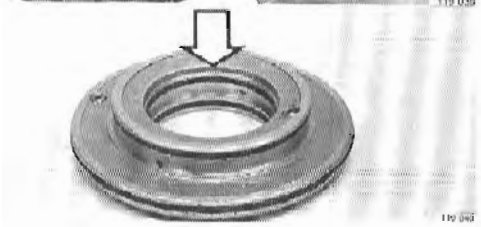
To disassemble

T1

Remove clutch pack

Unclip lock ring (1)





T2

Remove return spring(s)

BW55, AW70/71, late type AW55 have 18 small return springs. Early type AW55: has one large return spring.

Compress spring(s) with tool **5072**.

Remove:

- lock ring
- press tool
- spring retainer and spring(s).

Note! Springs remain attached to retainer on most BW55 transmission.

T3

Remove clutch piston from housing

Blow out piston with compressed air at max 14 psi through feed hole indicated. Place finger over opposite hole if piston is difficult to remove. If this doesn't work, press piston back into bore and repeat.

Note! Two part piston on AW55 and 70.

T4

Remove O-rings

Cleaning and checking

T5

Wash all parts excluding clutches with solvent

Blow clean and dry with compressed air. Do not use rags or wadding.

T6

Check clutch discs

Check that discs are flat and not warped or damaged.

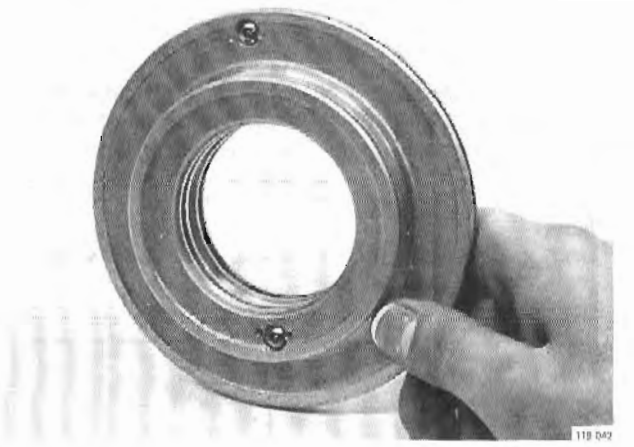
Min thickness, friction disc = 2.1 mm (0.083 in)

New thickness = 2.3 mm = (0.091 in)

T7

Check clutch drum and return springs

Carefully inspect parts for cracks and signs of wear etc.

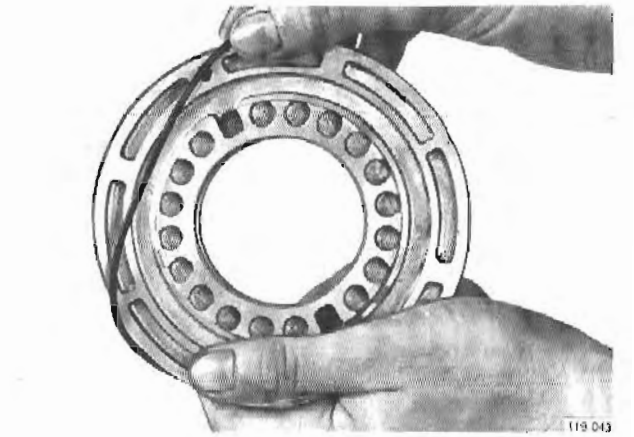


T8

Check piston

Shake piston and check that ball valve moves freely. Also check sliding surface of piston and O-rings grooves.

To assemble



T9

Install new O-rings on piston

Do **not** turn O-rings in grooves.

T10

Smear all parts with ATF

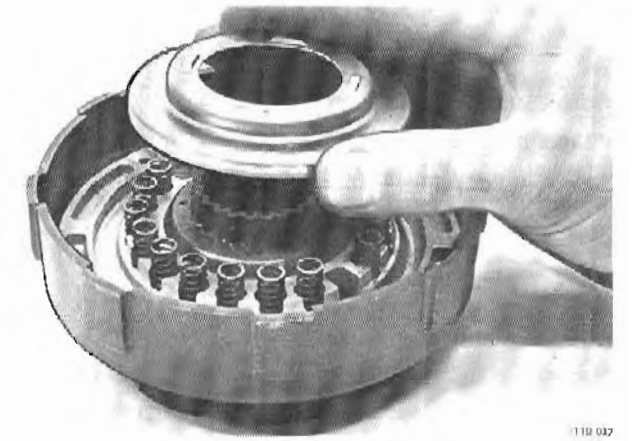
New clutch rings should be soaked in ATF before assembling.

T11

Press piston(s) into clutch drum, taking care not to damage O-rings

Lightly smear O-rings with Vaseline.

AW55/70, install inner piston first then outer on top of it.



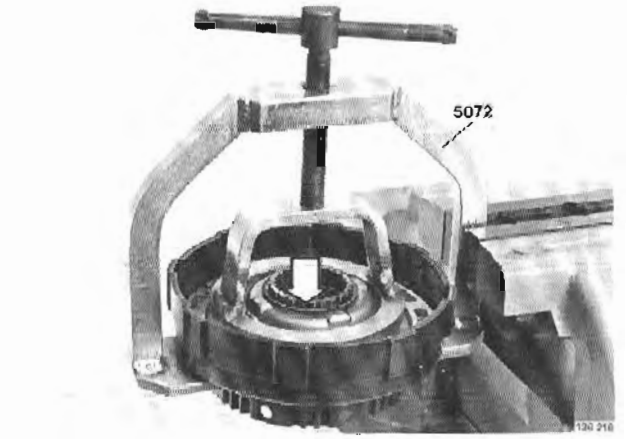
T12

BW55, late type AW55, AW70/71:
Install return spring (18x) and spring retainer

Make sure that springs are properly seated in retainer.

T13

Early type AW55:
Install return spring and spring retainer.



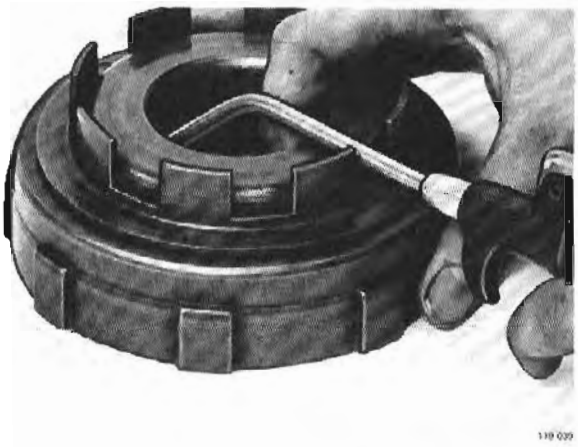
T14

Install lock ring

Compress return spring(s) with 5072.

Install lock ring, making sure that it fits correctly in groove.

Remove tool **5072**.

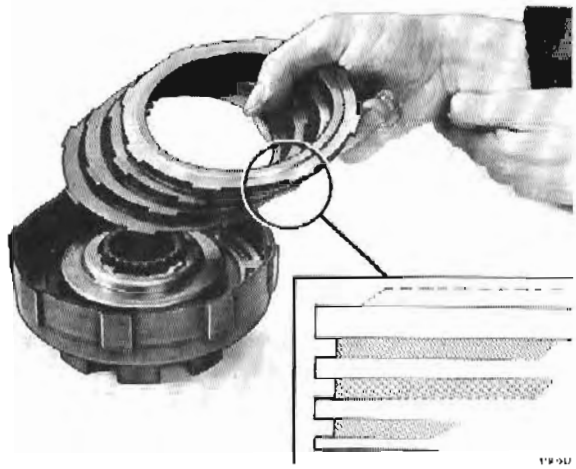


T15

Check piston function

Blow compressed air (max 14 psi) through feed hole on inside of clutch drum. Place finger over opposite hole. A click should be heard when air passes through.

Note!
Do not exceed 14 psi. If too much pressure is used, piston may be dislodged.
Check that piston is correctly positioned.

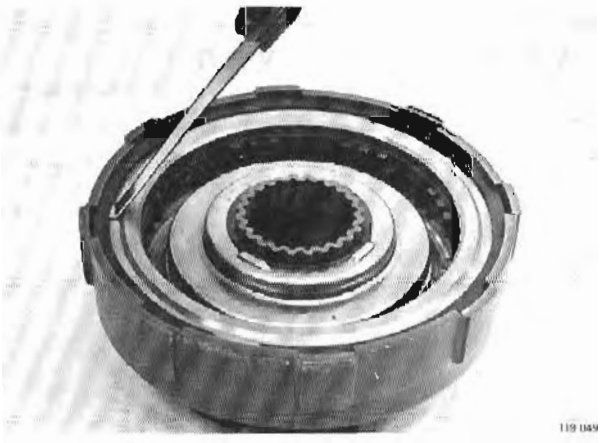


T16

Install clutch discs

1. Thin unlined disc first
2. Alternate with lined and unlined discs
3. Bevelled side of outer thrust disc must face lock ring.

(Not fitted to late type transmissions)



T17

Install lock ring

Make sure that lock ring fits correctly in groove.

Note! Ring gap must not be in one of recesses in clutch drum.

T18

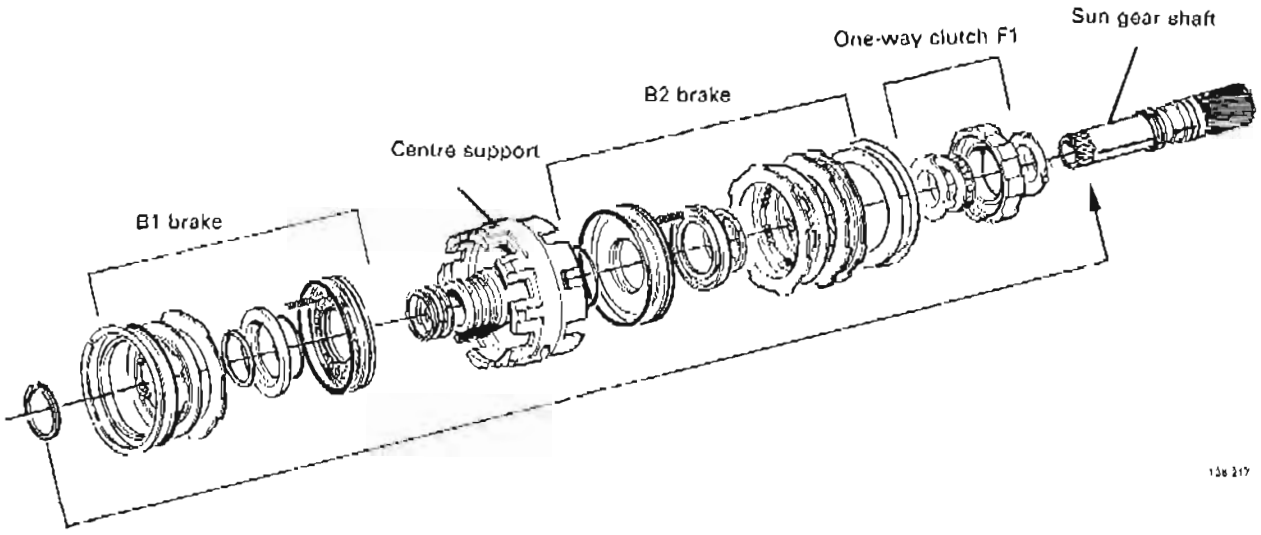
Measure clutch clearance

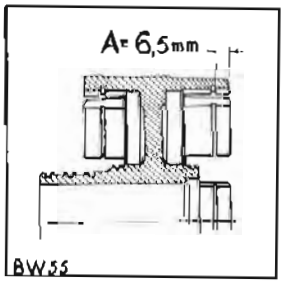
Measure clearance between lock ring and discs.

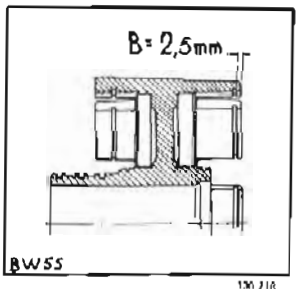
Permitted clearance = 0.3–1.2 mm = 0.012–0.48 in

U. Center support assembly

Special tool: 5072







Two types of center support assemblies are in use on BW55 transmissions.

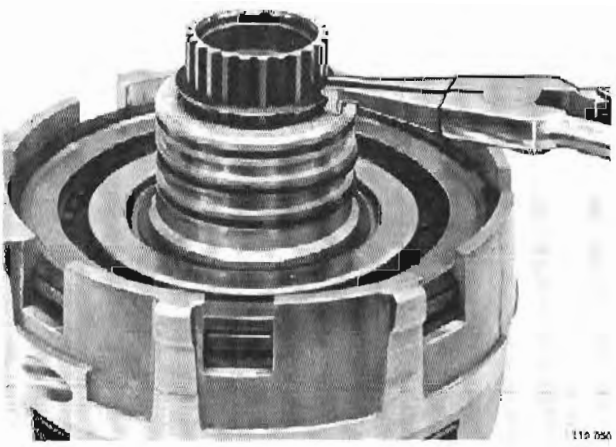
One type has two discs in B2 brake, the other three.

Identification

Distance between lock ring groove for B2 brake pack and rear of center support varies as follows:

A = 6.5 mm = 0.26 in (two discs);

B = 2.5 mm = 0.10 in (three discs).



To disassemble

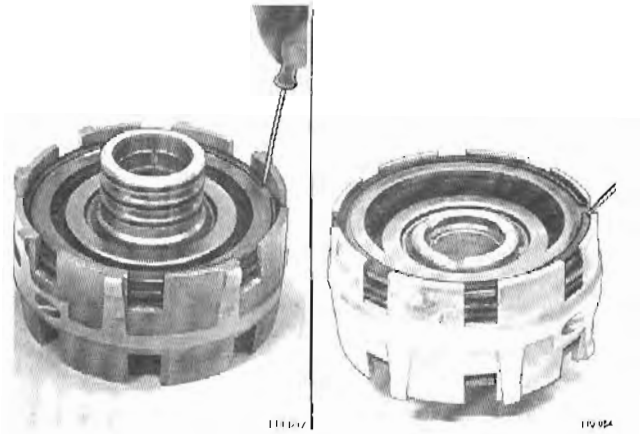
U1

Unclip lock ring from sun gear shaft

U2

Lift off center support assembly from shaft

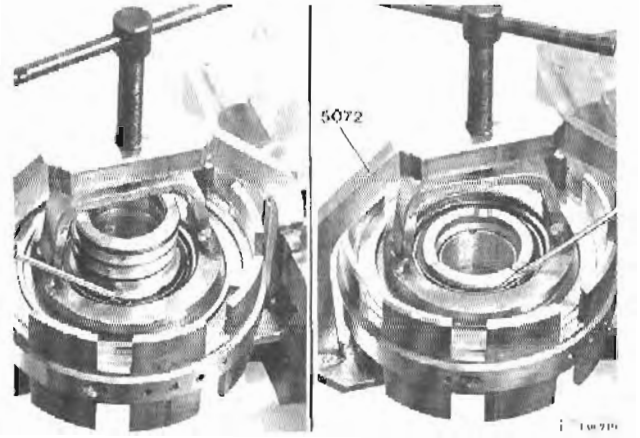
Center support assembly



U3

Remove:

- lock ring securing B1 brake pack
- B1 brake pack by hand
- lock ring securing B2 brake pack
- B2 brake pack by hand.



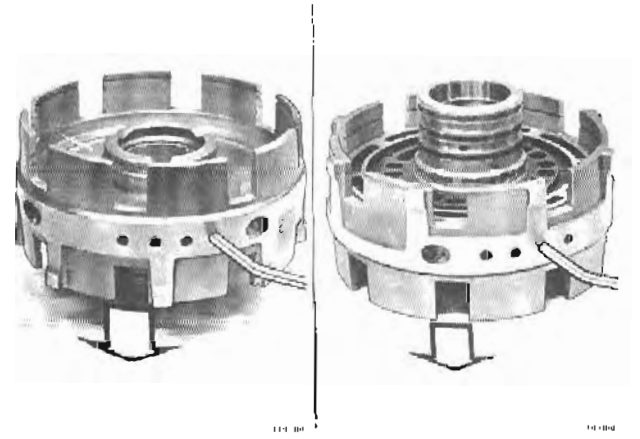
U4

Remove return springs (12x) in B1 and B2 brakes

Compress springs with tool **5072**.

Remove:

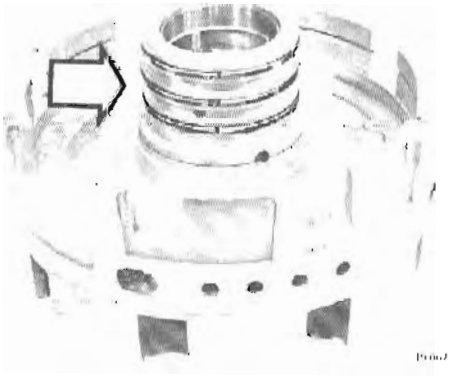
- lock ring
- tool 5072
- spring retainer and return spring.



U5

Remove B1 and B2 pistons

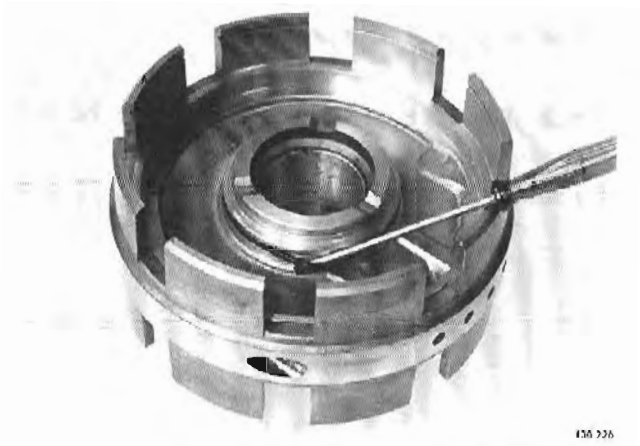
Blow compressed air (max 14 psi) through feed hole to dislodge pistons.



U6

Remove oil sealing rings (3x) from center support

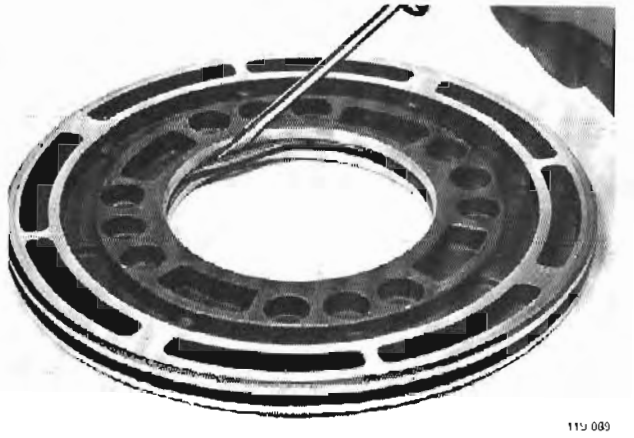
Unclip rings and lift off hub.



AW70/71: Remove O-ring from center support.

U7

Carefully remove O-rings from clutch pistons

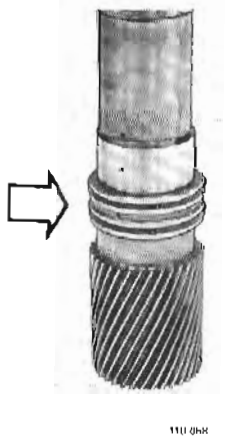


U8

Lift off brake hub (F1) from sun gear shaft

U9

Remove oil sealing rings (2x) from shaft
Unclip rings and lift off hub.



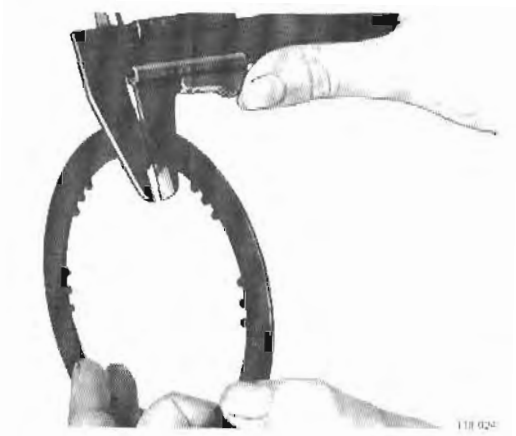
Cleaning and checking

U10

Wash all parts excluding brake discs in solvent

Use compressed air to clean/dry channels.

Do not use rags or wadding.



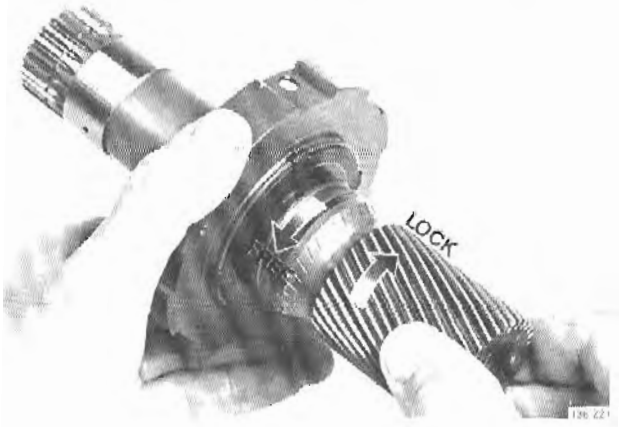
U11

Check clutch discs

Check that discs are flat and not warped or damaged.

Min thickness, friction disc = 2.1 mm (0.083 in)

New thickness = 2.3 mm = (0.091 in)



U12

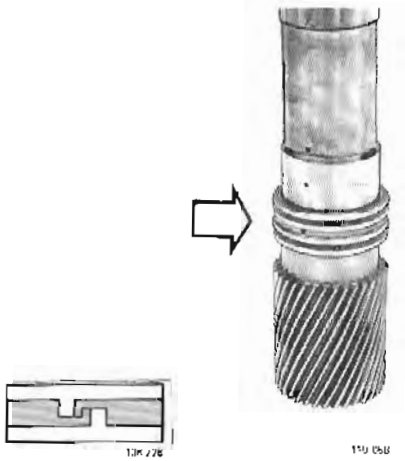
Check one-way clutch F1

Place one-way clutch on sun gear shaft as illustrated. Hold brake hub and turn shaft. It should be possible to turn shaft counterclockwise but not clockwise. Make sure that one-way clutch does not grind and is not loose. Replace if defective.

U13

Check parts

Carefully inspect all parts for signs of wear, cracks etc.

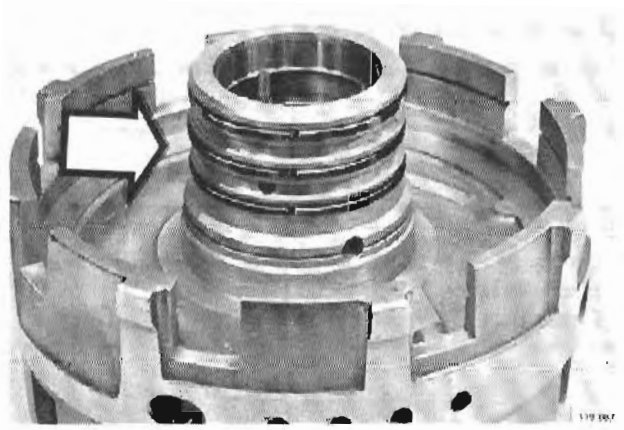


To assemble

U14

Install new oil sealing rings:

- 2x on sun gear shaft



- 3x on center support hub.

U15

Install new O-rings on brake pistons

Do not turn O-rings in groove.

U16

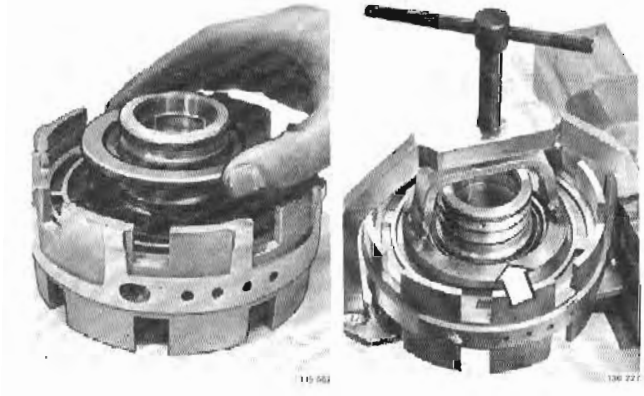
Smear all moving parts in ATF

New discs should be soaked in ATF prior to installing.

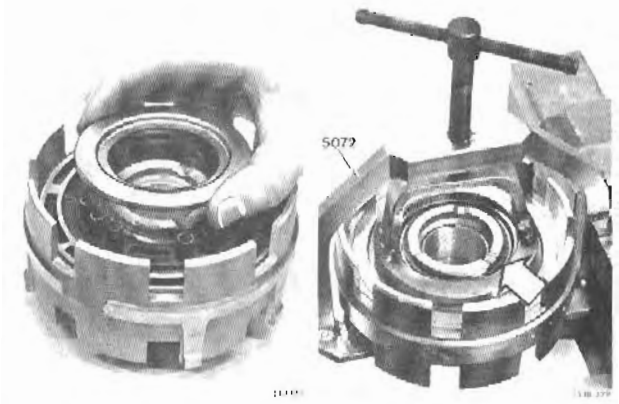
U17

Install brake B1 piston, return springs, retainer and lock ring

a. Smear piston O-rings with Vaseline and carefully press into position avoiding damage to O-ring
b. Install return springs (12x) and spring retainer. Make sure that springs seat correctly in retainer.
c. Compress springs with tool **5072** and install lock ring.
d. Remove tool 5072.



Center support assembly

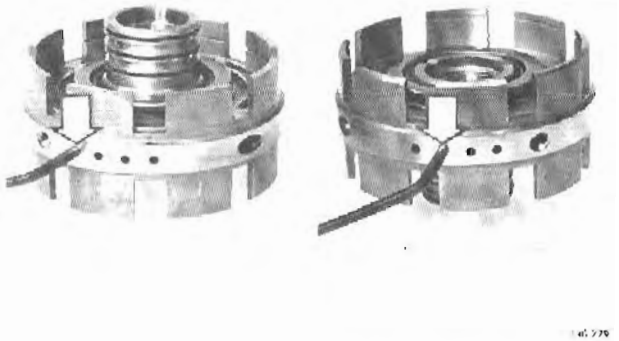


U18

Install brake B2 piston, return springs, retainer and lock ring

(Same method as above)

AW70/71 place springs in groups of three, see fig.



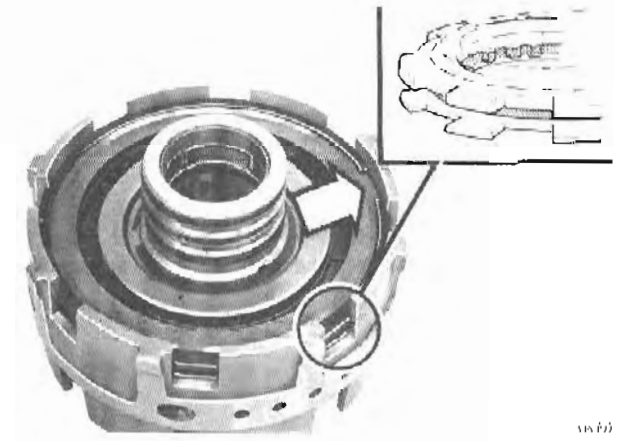
U19

Check function of pistons

Blow compressed air (max 14 psi) through oil passage (arrow).

When air supply is cut off a click should be heard.

Note!
Do not exceed 14 psi. If too much pressure is used, piston may be dislodged.
Check that piston is correctly positioned.



U20

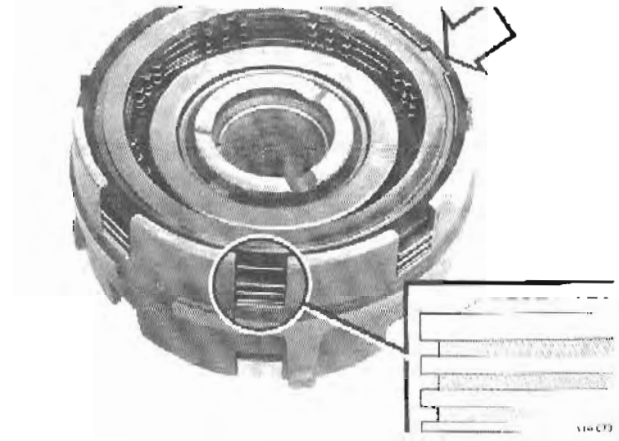
Install B1 brake discs

Install thin unlined disc first. Then lined disc and finally the bevelled thrust disc with bevel facing up. (Not fitted to late type transmissions)

U21

Install lock ring

Make sure that gap faces part of body and not one of the recesses.



U22

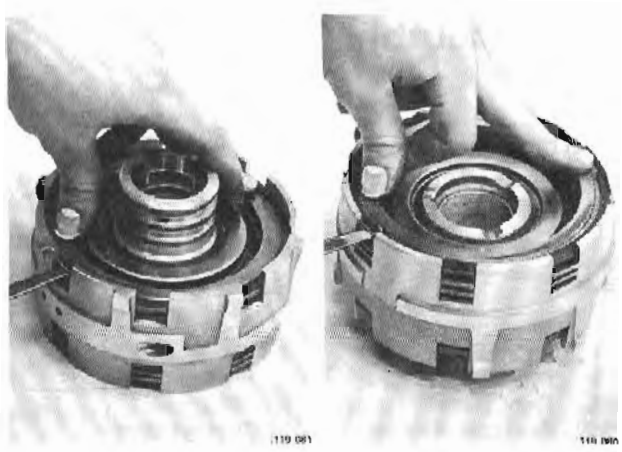
Install B2 brake discs

Install thin unlined disc first. Then alternate with lined and unlined discs. Finally install the bevelled thrust disc with bevel facing up. (Not fitted to late type transmissions).

U23

Install lock ring

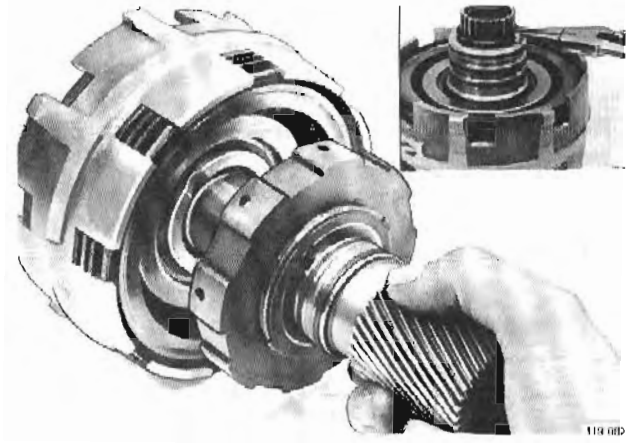
Make sure that gap faces part of body and not one of the recesses.



U24

Measure clearance between lock ring and top disc on B1 and B2 brakes

0.3–1.2 mm = 0.012–0.047 in



U25

Install one-way clutch + brake hub on sun gear shaft, see fig.

U26

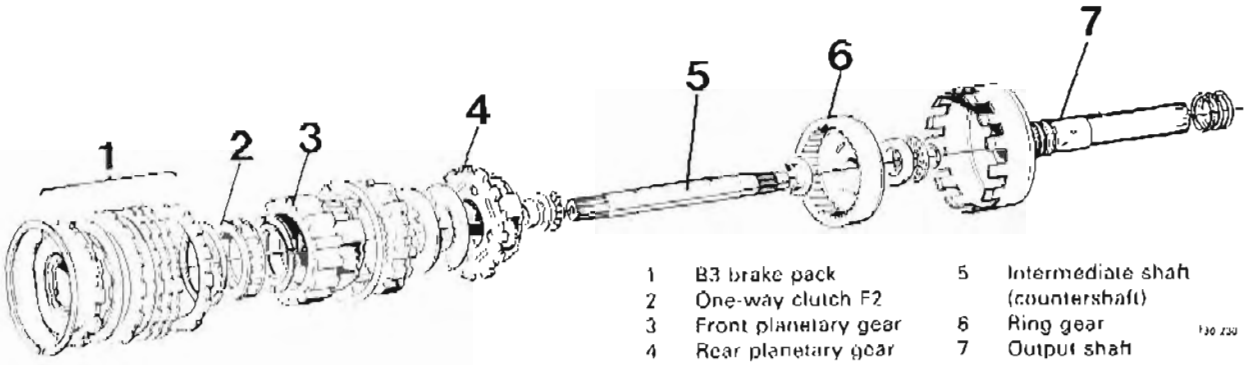
Install hub and shaft in center support assembly

Align all discs. Make sure that hub matches discs.

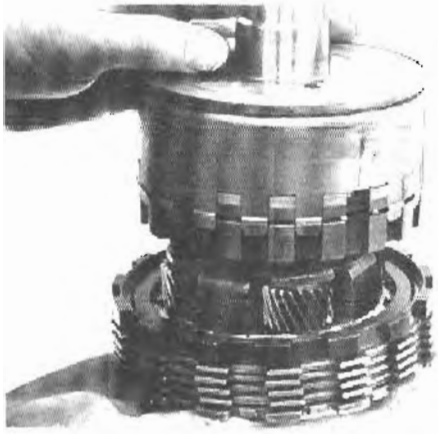
U27

Install lock ring on sun gear shaft.

V. Planetary gear assembly



1 B3 brake pack
2 One-way clutch F2
3 Front planetary gear
4 Rear planetary gear
5 Intermediate shaft (countershaft)
6 Ring gear
7 Output shaft

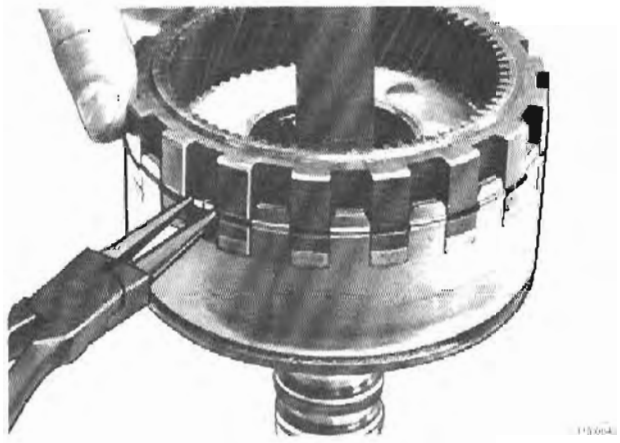


To disassemble

V1

Remove B3 brake discs, one-way clutch F2 and front planetary gear

Place complete planetary gear assembly on intermediate shaft as illustrated and ease off brake pack and front planetary gear assembly.



V2

Remove front ring gear

Place ring gear on output shaft.

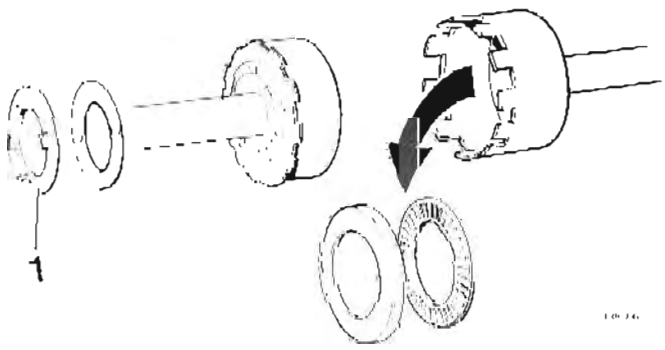
Compress lock ring to release front ring gear.

Lift off front gear.

V3

Remove thrust washers from rear planetary gear

(Washer (1) may remain fixed to front planetary gear.)



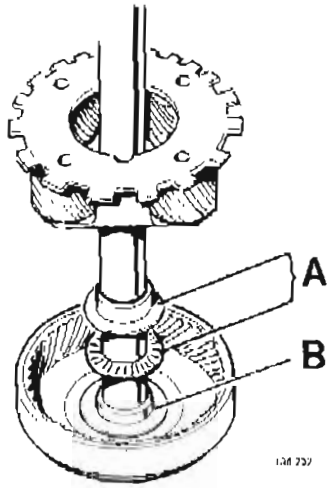
V4

Separate input and output shafts

Place planetary gear to one side and pull intermediate shaft in direction shown.

V5

Remove bearing race and needle bearing from output shaft

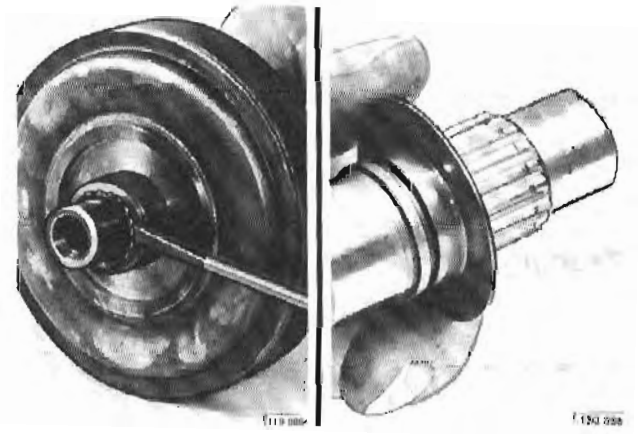


V6

Separate rear planetary gear assembly on rear ring gear

V7

(A) Remove bearing washer and needle bearing



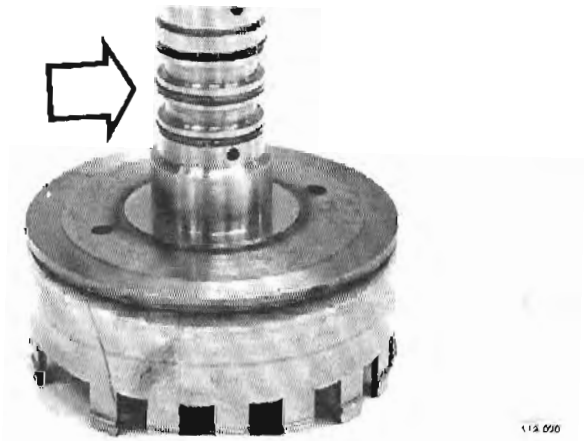
V8

Remove rear ring gear

Unclip lock ring with a screwdriver.

V9

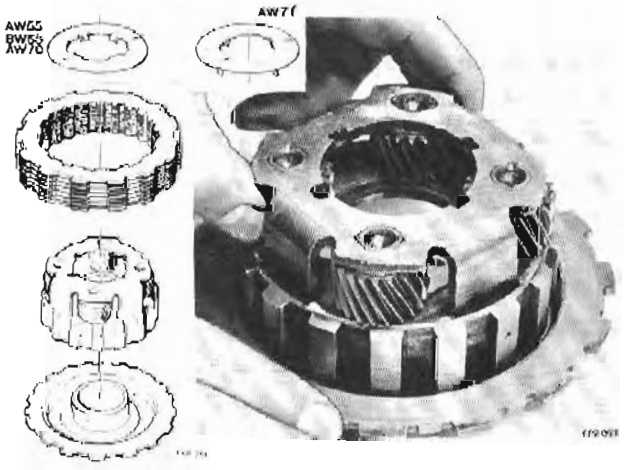
Remove rear bearing race (B) from intermediate shaft



V10

Remove oil sealing rings (3x) from output shaft

Unclip rings and lift off hub.



V11

Remove thrust washer from front planetary gear carrier

(See V3)

V12

Remove brake pack

V13

Detach front planetary gear carrier from brake pack thrust/reaction plate

Ease off planetary gear carrier from plate.

Planetary gear assembly

V14

Remove:

- lock ring
- bearing cages and one-way clutch F2
- thrust washer.

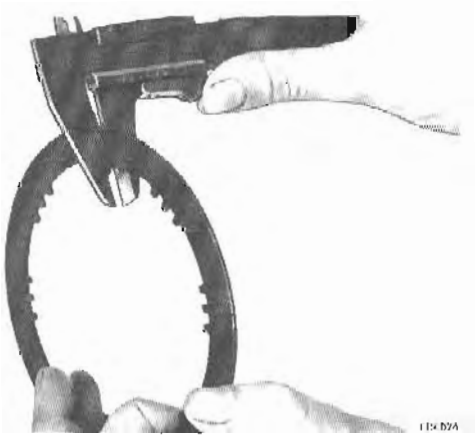
Cleaning and checking

V15

Wash all parts excluding brake discs, in solvent

Use compressed air to clean/dry channels.

Do **not** use rags or wadding.



V16

Check clutch discs

Check that discs are flat and not warped or damaged.

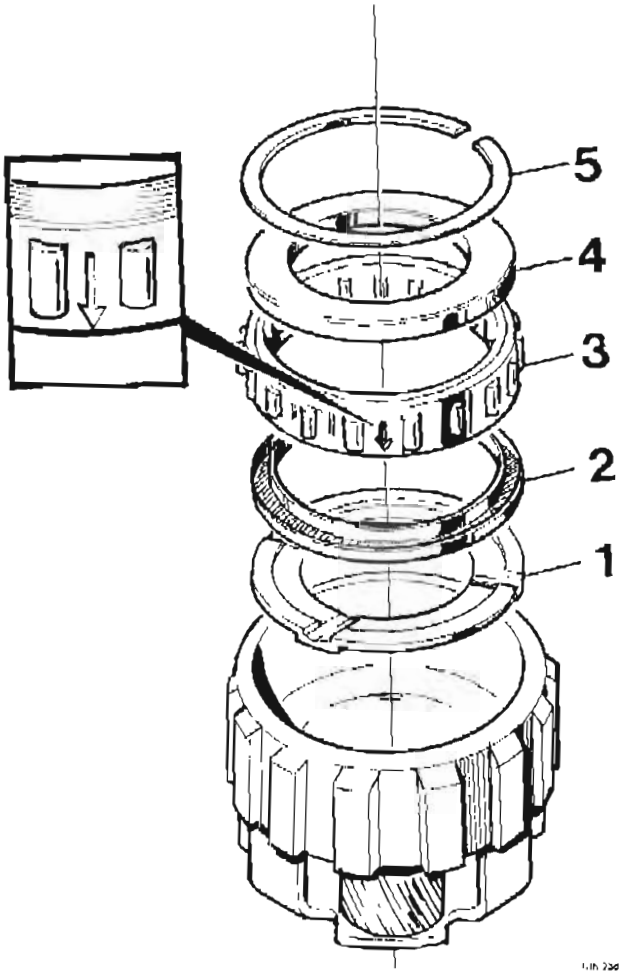
Min thickness, friction disc = 2.1 mm (0.083 in)

New thickness = 2.3 mm = (0.091 in)

V17

Check parts

Carefully inspect all parts for signs of wear, cracks etc.



To assemble

V18

Smear all moving parts in ATF

New discs should be soaked in ATF prior to installing.

V19

Install thrust washer (1)

AW71: Nylon washer

Install with lugs facing down. Make sure that lugs fit correctly in planetary gear carrier (washer can only be installed one way).

V20

Install lower bearing cage (2)

V21

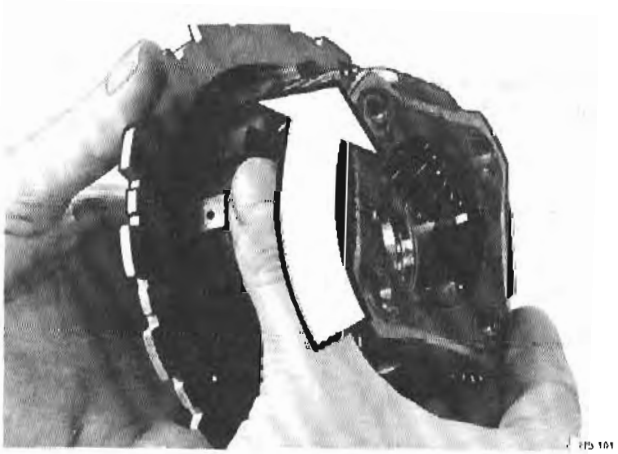
Install one-way clutch (3)

Press one-way clutch into position with hand. Arrow on outside of clutch must point down (i.e. flange side up).

V22

Install upper bearing cage (4) and lock ring (5)

Make sure that lock ring fits correctly in groove.



V23

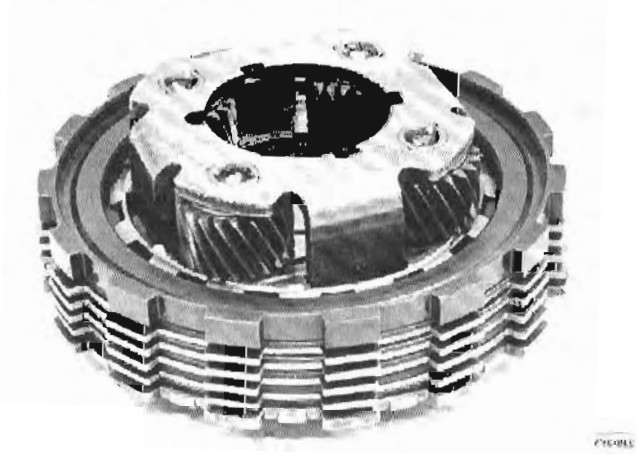
Assemble brake pack reaction plate to front planetary gear carrier.

V24

Check one-way clutch

Hold clutch as illustrated. It should be possible to turn front planetary gear counterclockwise but not clockwise (i.e. in direction of arrow).

One-way clutch must not bind or be loose.



V25

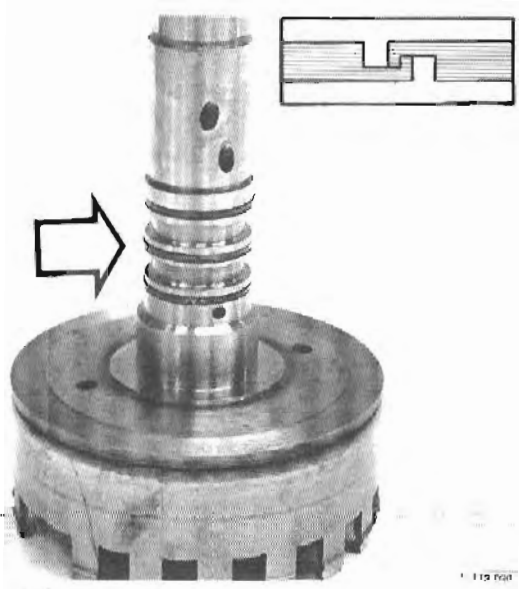
Place B3 brake pack on front planetary gear carrier

First place one lined disc on top of reaction plate. Then alternate with unlined and lined discs. Thrust disc should be outermost.

BW55
Improved friction material on B3 brake introduced with effect from:

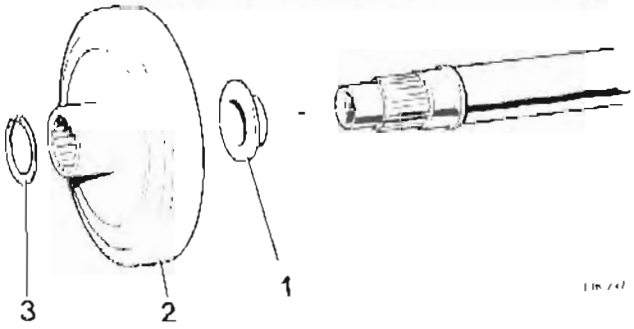
Serial number	Transmission code	Serial number	Transmission code
1306-	013	7837-	018
6954-	014	2141-	019
3532-	015	1001-	020
1162-	016	1265-	022
1134-	017	1034-	023

Note! Friction material is intended for brake discs and must not be used for clutches.



V26

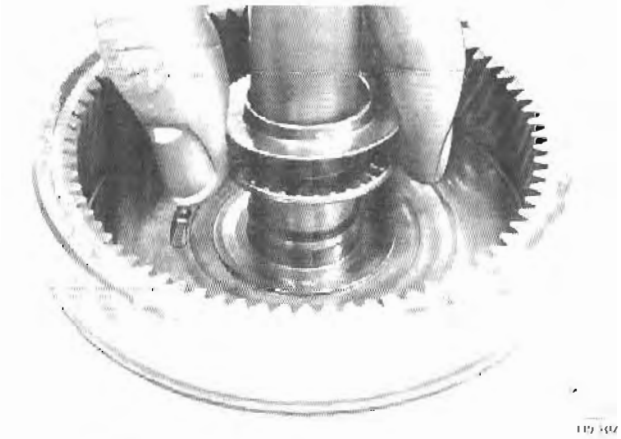
Install new oil sealing rings on output shaft



V27

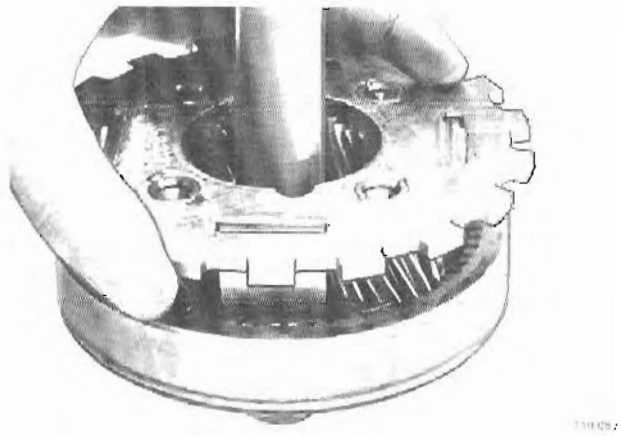
Install:

1. rear bearing race on intermediate shaft
2. rear ring gear on intermediate shaft
3. lock ring.



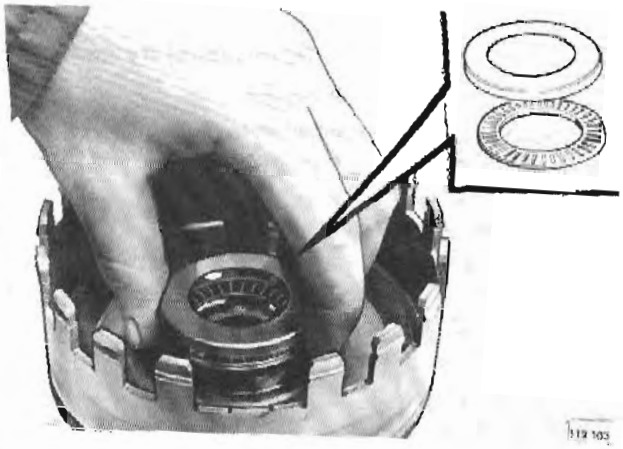
V28

Place needle bearing and bearing race on intermediate shaft



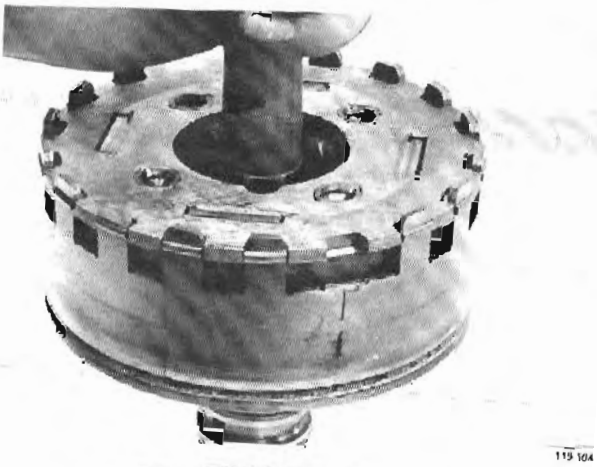
V29

Install rear planetary gear carrier in rear ring gear



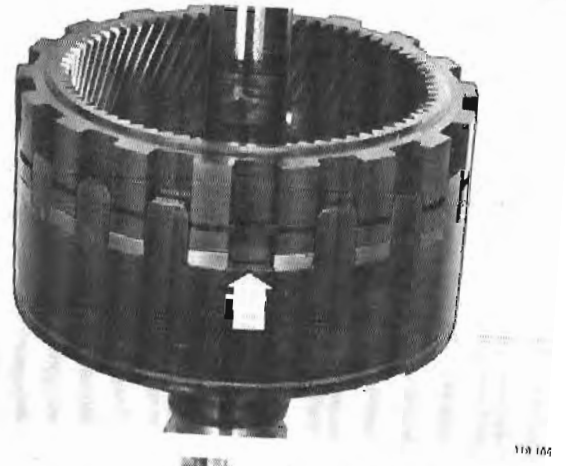
V30

Place neeedle bearing and bearing race on output shaft



V31

Assemble intermediate shaft to output shaft



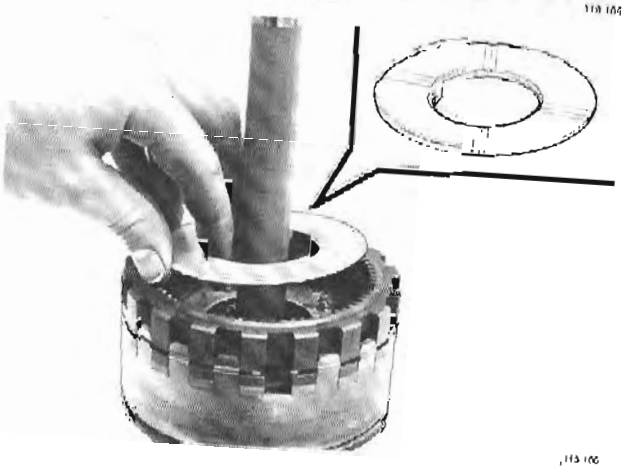
V32

Place front ring gear above rear ring gear

Position lock ring gap as illustrated (arrow).

(I.e. where lug is missing.)

When lock ring is correctly installed, gap should be just as wide as cog recess on front ring gear.



V33

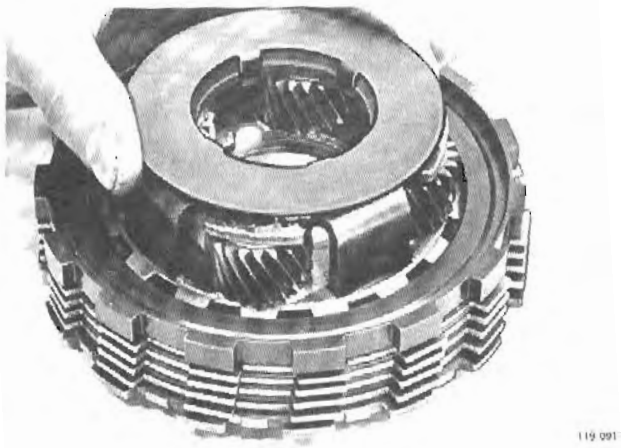
Install thrust washer on rear planetary gear

Align lugs on washer to rear planetary gear carrier.

Note! Type of washer varies with transmission:

AW 55 and BW55 = two lugs
AW70 = four lugs
AW71 = four lugs

Planetary gear assembly



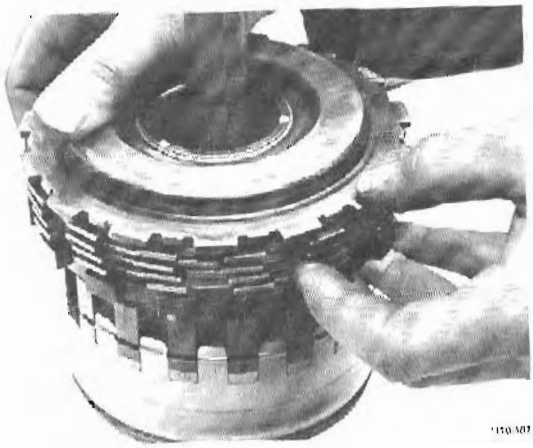
V34

Place thrust washer on front planetary gear

Secure washer with Vaseline.

Align washer lugs (4) to recesses in planetary gear carrier. AW55, BW55: have recesses in carrier

AW70/71 has holes in carrier.
AW55, AW70, BW55: steel washer
AW71: plastic washer.



V35

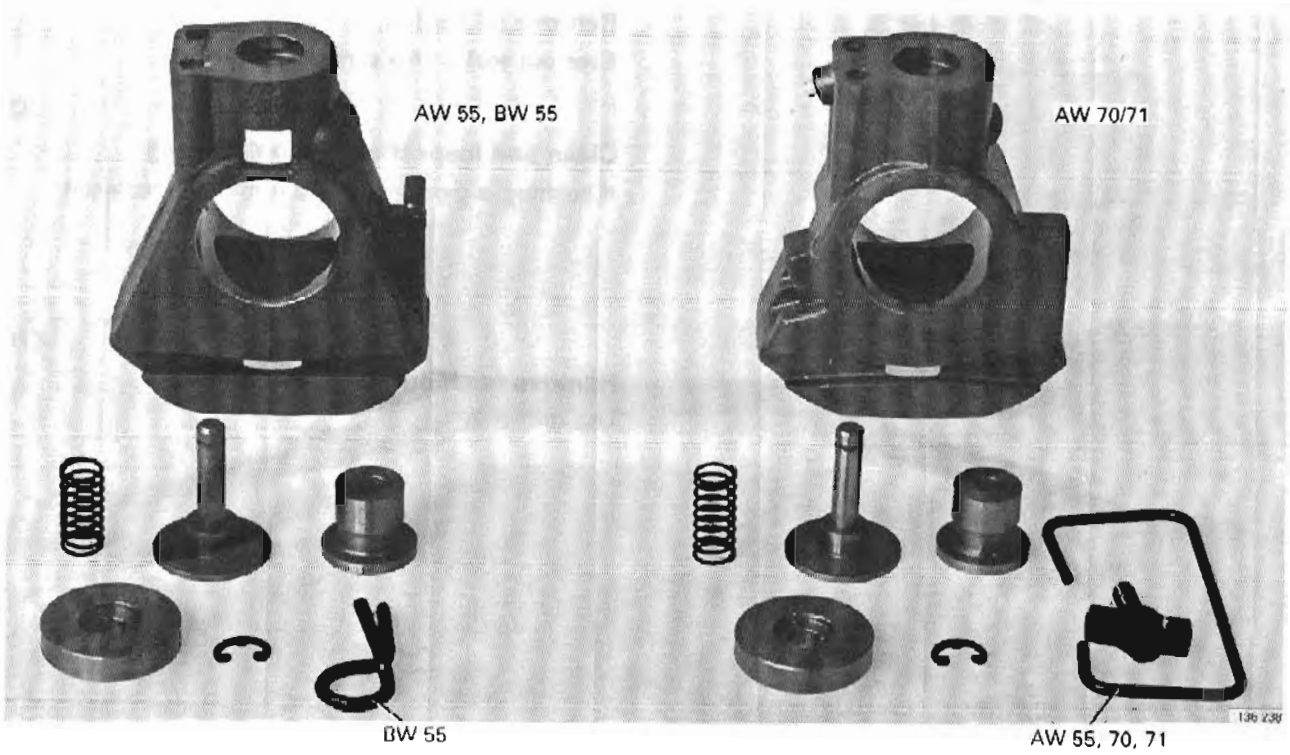
Assemble front and rear planetary gears

Check that thrust washers are installed correctly and that front planetary gear carrier fits in front ring gear.

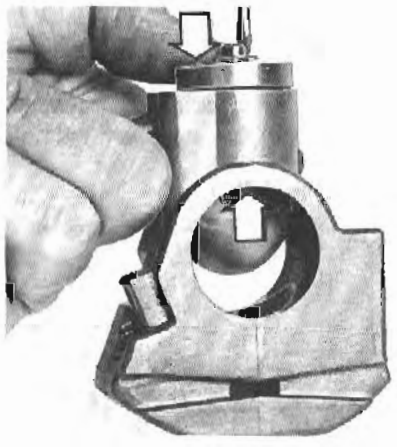
X. Governor and extension housing

Special tools: 5075, 5080

GOVERNOR – disassembly



X1



Remove:

- drive ring (clip)
- governor weight
- shaft
- governor
- spring

Cleaning and checking

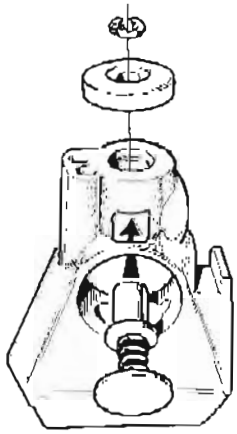
X2

Clean all parts with unused solvent

Blow – clean/dry oil passages and parts.

X3

Carefully inspect all parts for scoring, cracks and signs of wear etc.



To assemble

X4

Smear all parts in ATF

X5

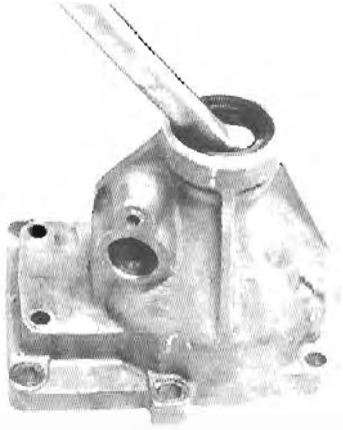
Install shaft, spring and governor in body

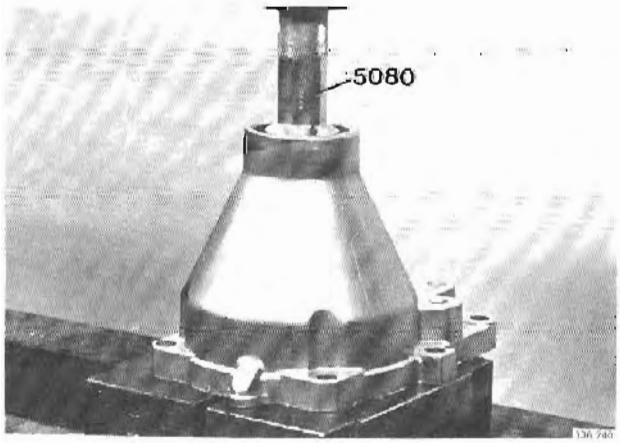
X6

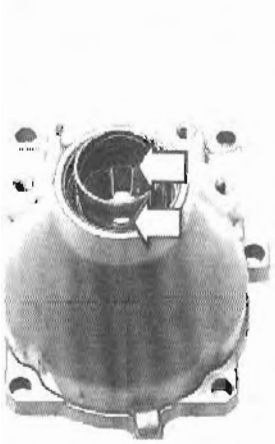
Install weight and drive ring

X7

Check that governor does not bind







EXTENSION HOUSING

Replacement of oil seal and bushing

X8

Remove oil seal

Ease out seal with a screwdriver.

X9

Clean and inspect extension housing

If bushing is worn or scored it must be replaced.

X10

Remove bushing

Use drift **5080.**

X11

Install bushing

Use drift **5080.**

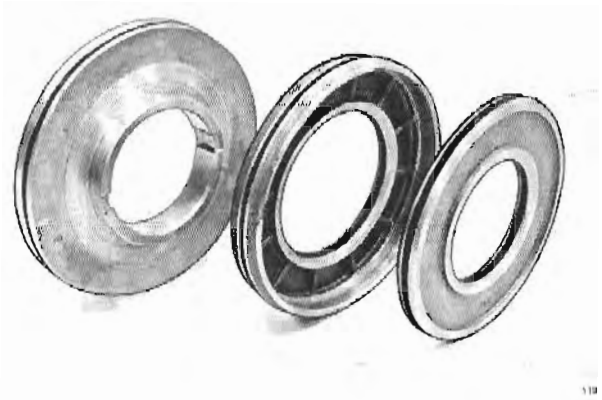
Bushing should be installed as illustrated i.e. blind hole opposite groove in body.

X12

Install oil seal

Attach new seal to drift **5075.** Install seal in extension housing.

Y. B3 brake pistons



Y1

Separate pistons (3) from each other

(By hand)

Y2

Remove O-rings

Y3

Clean and check all parts

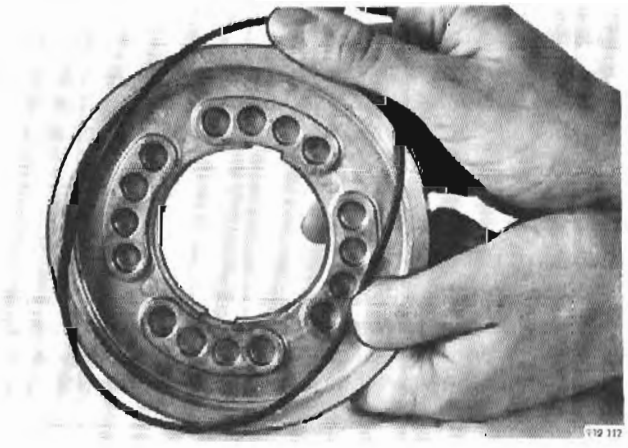
Wash parts in solvent.

Blow clean/dry with compressed air.

Do not use rags or wadding.

Check pistons and especially O-ring grooves for scoring, cracks, signs of wear, etc.

Also check return springs and spring retainer for B3 brake piston.



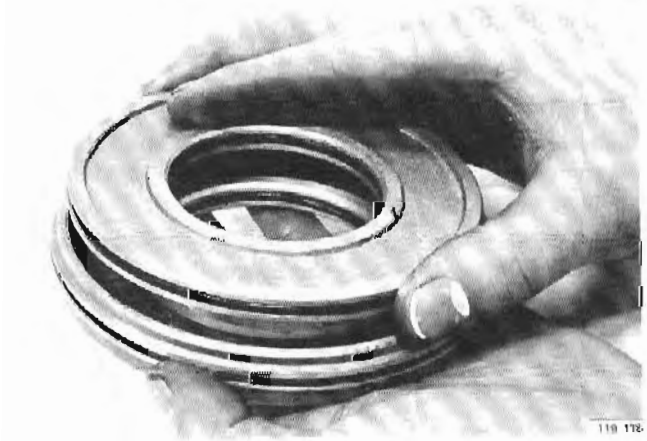
Y4

Install new O-rings on pistons

Do not turn O-rings in grooves.

Y5

Smear all friction surfaces in ATF



Y6

Assemble pistons

(By hand)

Z1–Z38 Valve bodies assembly

Special tool: 5231

	Page
General information	110
Disassembly:	
Valve body	111
Upper front valve body	113
Upper rear valve body	114
Lower valve body (AW55, BW55)	115
Lower valve body (AW70/71)	116
Cleaning and inspection	117
Assembly:	
General information	118
Upper front valve body	118
Upper rear valve body	120
Lower valve body (AW55, BW55)	122
Lower valve body (AW70/71)	124
Valve bodies, complete	126

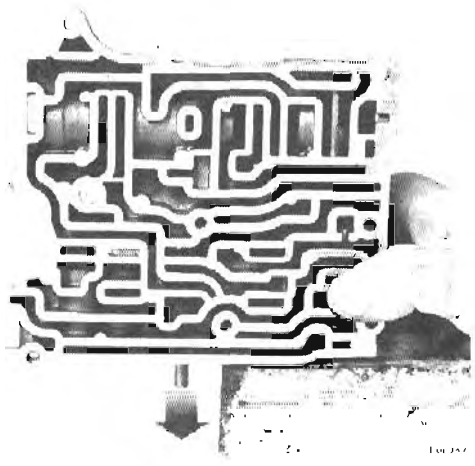
General information

Z1

Working procedures

As far as possible the procedures given in this section apply to AW55, 70, 71 and BW55 transmissions. Consequently the illustrations in this section do not always conform exactly to each specific valve body assembly.
For production modifications to valve body assemblies see page 11.

Do not interchange parts between different valve bodies, as incorrect parts can cause false shift speeds or no shift at all



Damage

Valve body assemblies are not often damaged, except during dismantling and reassembly. When dismantling inspect all parts and clean carefully before reassembly.

Sticking valves

Valve-valve body tolerances are very small and it is often very difficult to establish if a valve is sticking when the valve body is disassembled. The fault may only arise when the valve body is firmly screwed onto the gear case.

It may be possible to rectify sticking valve(s) by careful application of a fine grade emery cloth.

To remove sticking valves

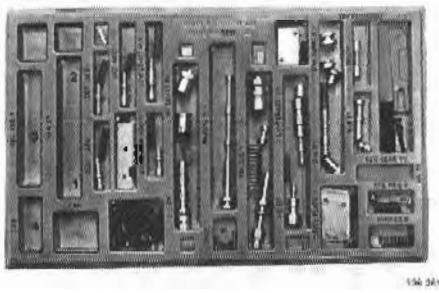
Seized or sticking valves should under no circumstances be removed by prying. The best method is to tap the valve body against a piece of wood.

Small, difficult to reach valve seats can be removed with a magnet prior to off-loading the spring.

Inspection

When dismantling, carefully inspect the valve body and separator plate for damage which could cause leakage.

Check for foreign materials, etc. Evidence of such could give advance warning of a transmission fault.

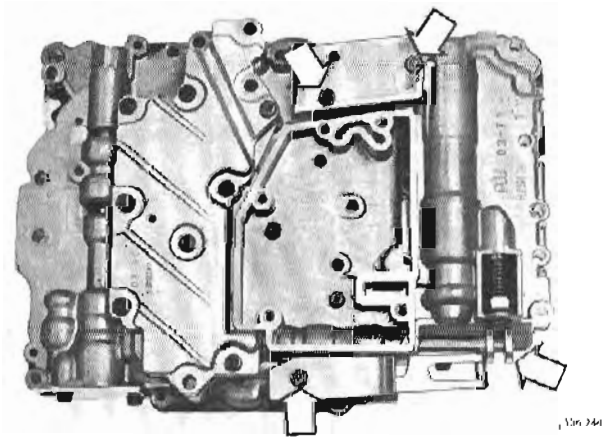


Display tray

Special tools

Display tray 5231 is very useful to place parts in as they are removed from the transmission. In this way loss is prevented and the risk of parts being interchanged is lessened.

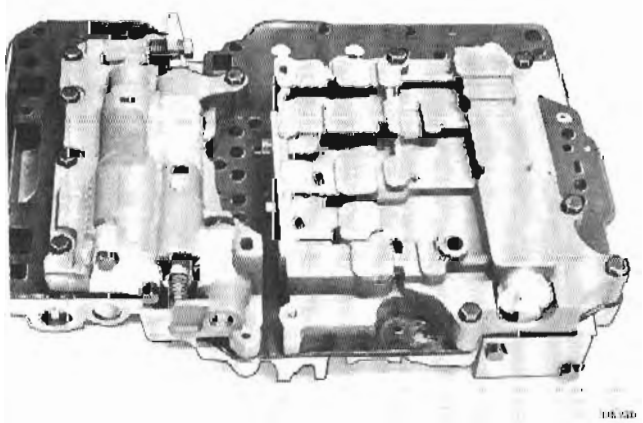
Valve body, disassembly



Z2

Remove:

- catch spring and bracket (not fitted to AW55)
- gear selector valve
- cover plate
- gasket (late type BW55 only).

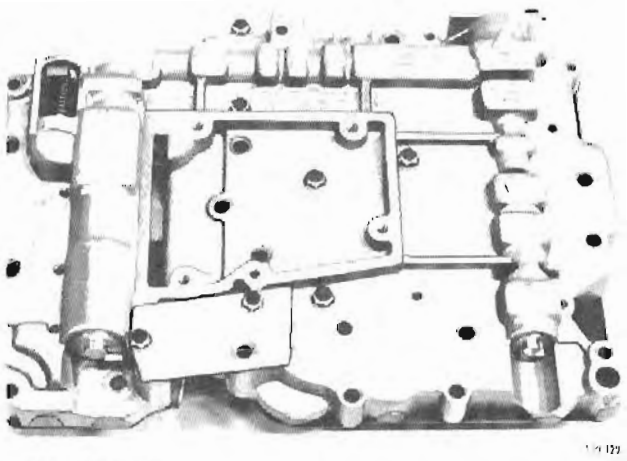


Z3

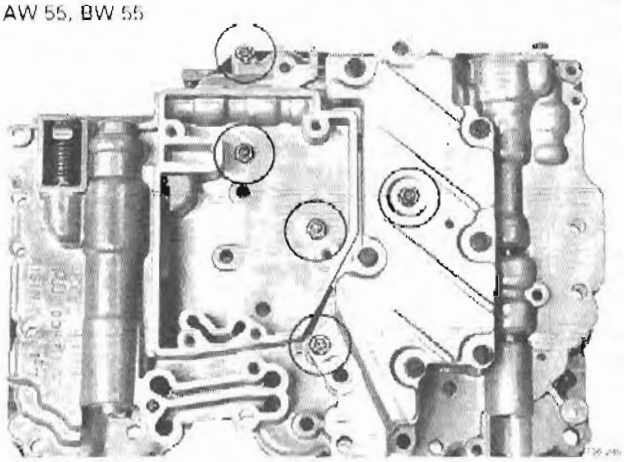
Remove screws retaining upper front and upper rear valve bodies

Ten screws.

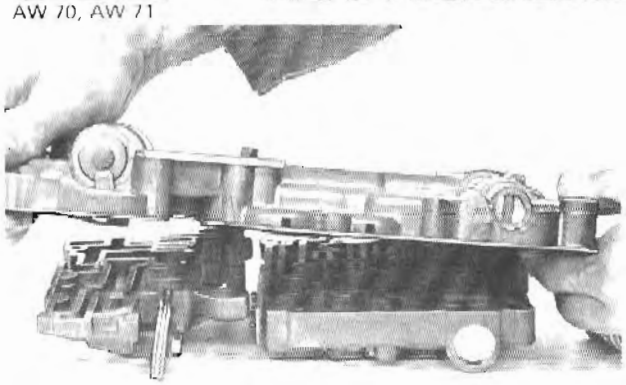
Valve bodies assembly

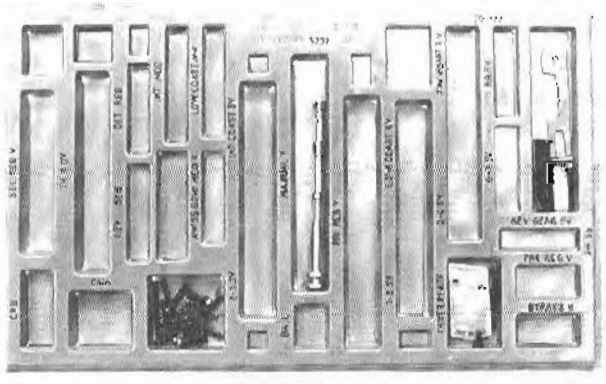


AW 55, BW 55



AW 70, AW 71





Location of parts

Z4

Turn assembly over

Z5

Remove 5 screws securing upper valve bodies to lower

Z6

Lift away lower valve body and put aside with gasket facing up

Hold gasket and separator plate to prevent valve balls and springs from falling out.

Upper front valve body, disassembly

27

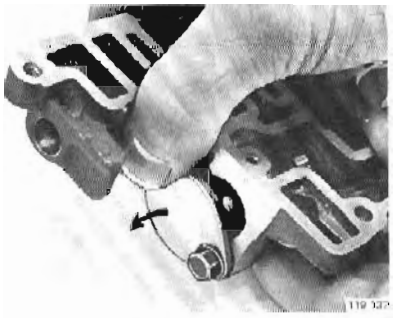
Valves

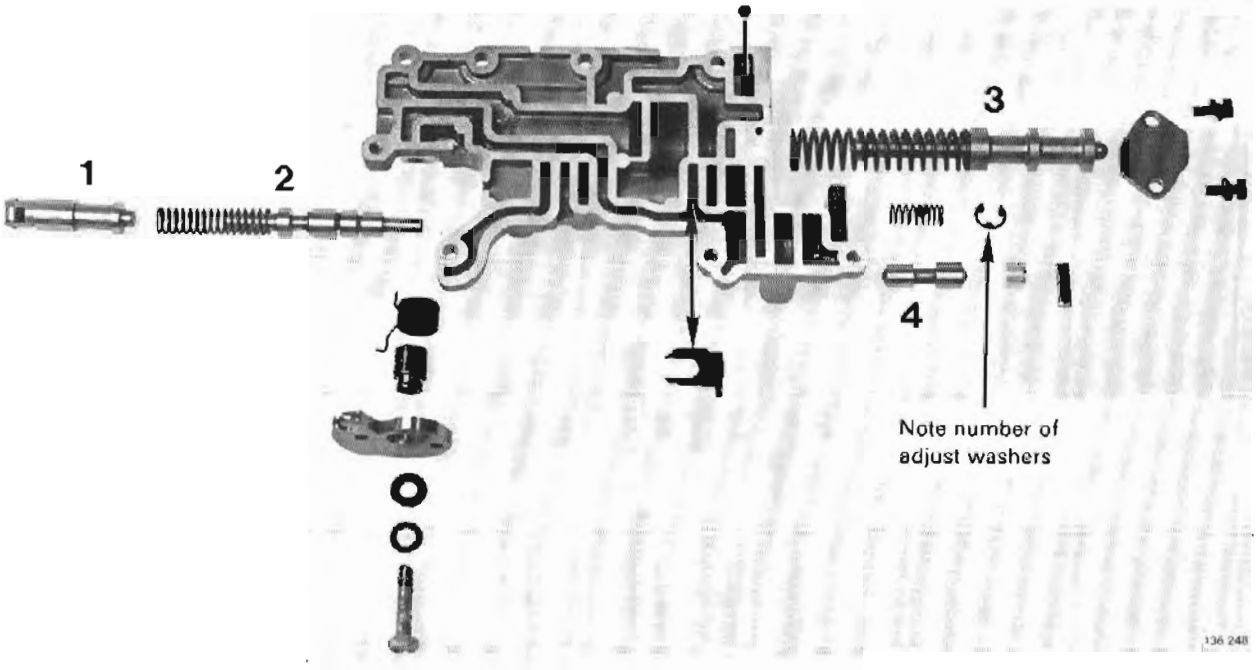
1. Kick-down valve + spring
2. Throttle valve (retainer not fitted to all types of BW55)
3. Secondary regulator valve
4. Cut-back valve

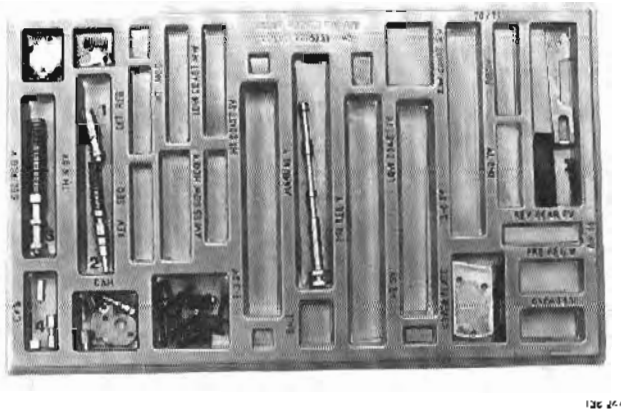
Remove secondary regulator valve

Remove one screw from cover plate and slide cover to one side to obtain access to valve.

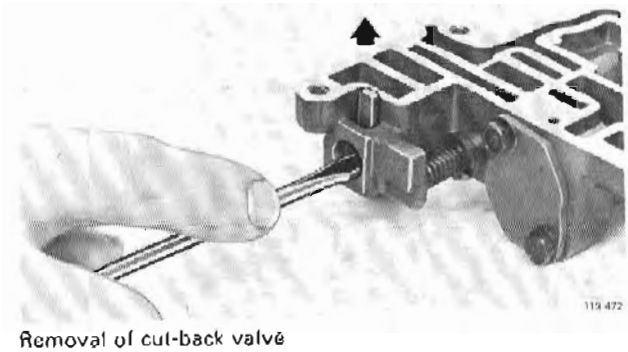
Note! Strong spring force.







Location of parts



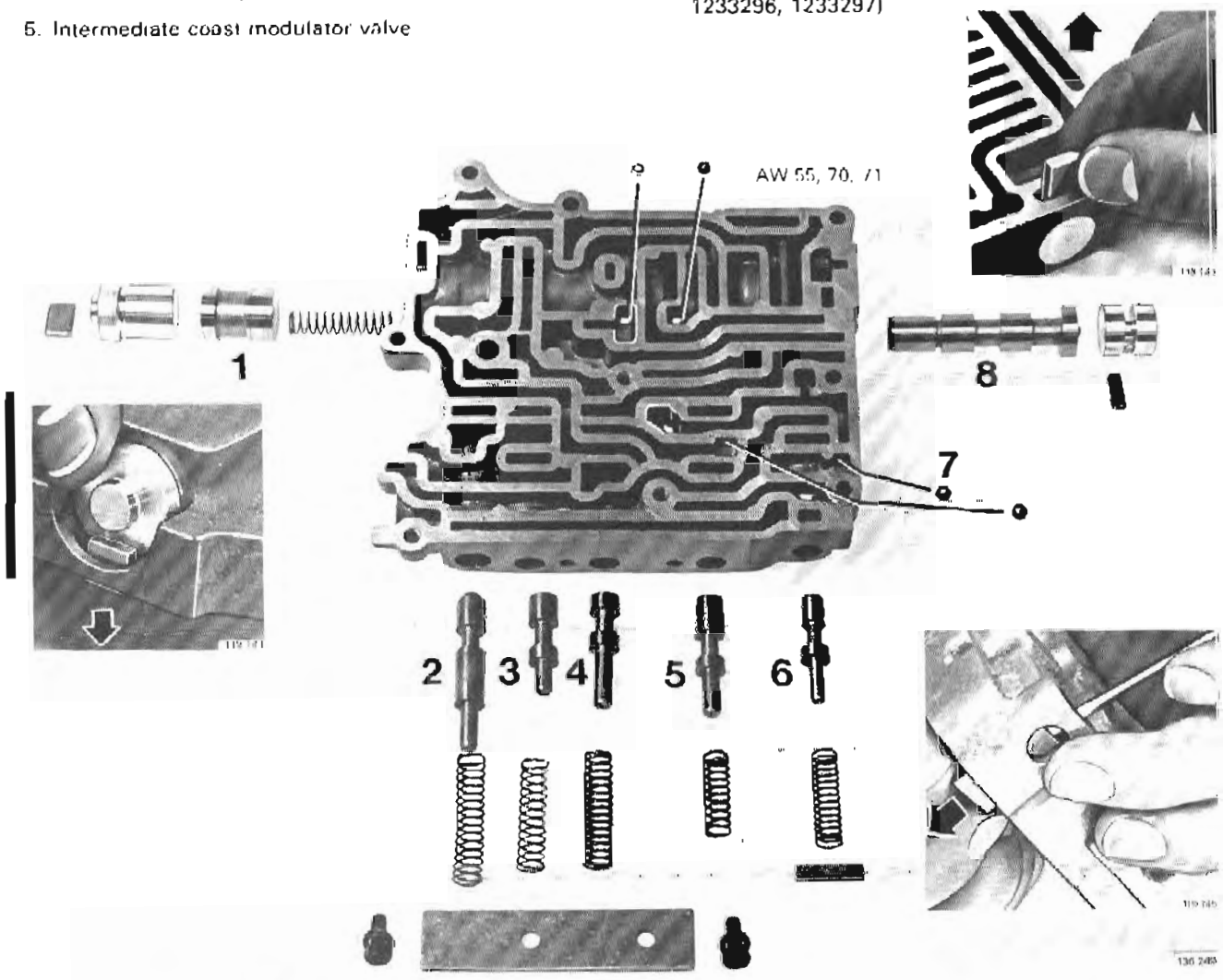
Removal of cut-back valve

Upper rear valve body, disassembly

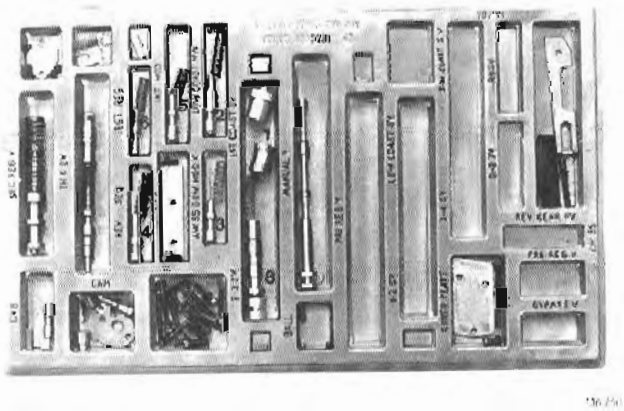
Z8

Valves

1. Intermediate coast shift valve
2. Low coast modulator valve
3. Governor modulator (valve spring + valve replaced by plug on BW55 with effect from P/N 1233280, 1233281, 1233289)
4. Reverse clutch sequence valve
5. Intermediate coast modulator valve
6. Detent regulator valve
7. Rubber valve ball (5.5 mm (not fitted on early type AW55 i.e. AW55 with valve body P/N 1233556)
8. 2–3 shift valve
9. Rubber ball diameter 5.5 mm (discontinued on BW55 with effect from valve body P/N 1233295, 1233296, 1233297)

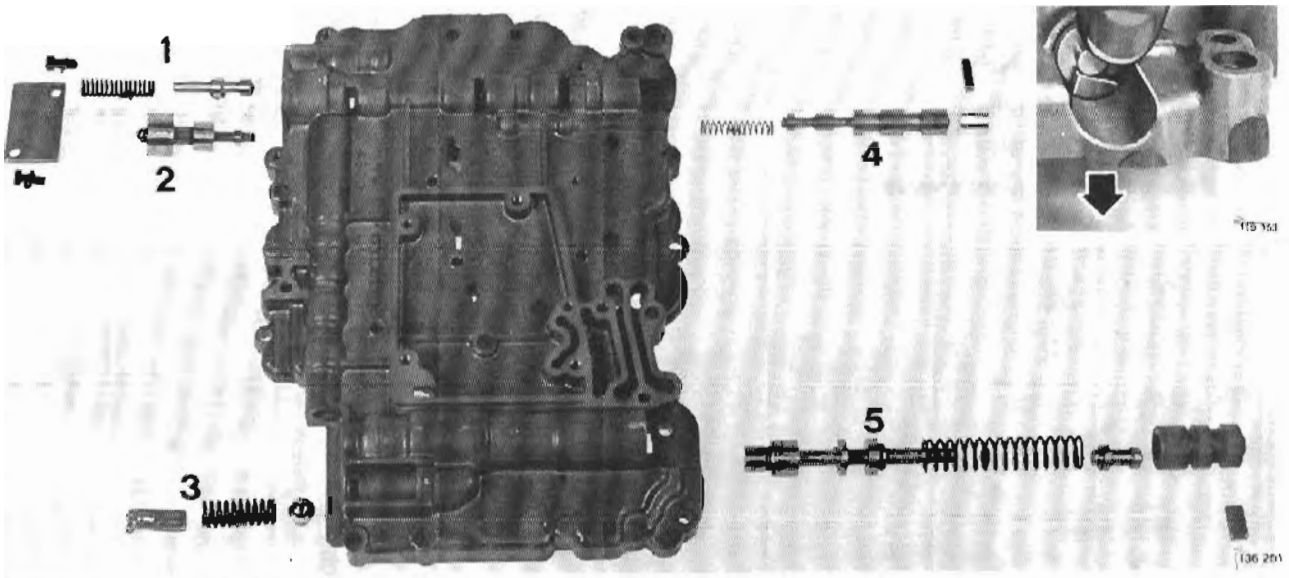


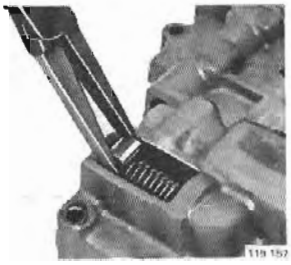
Location of valve balls on BW55



Location of parts

Lower valve body, disassembly (AW55, BW55)



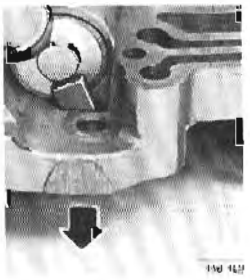


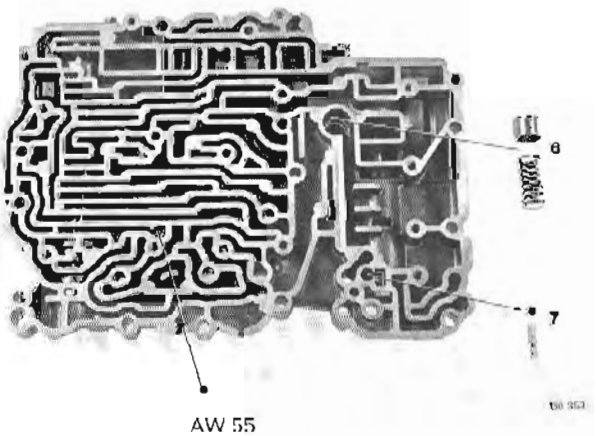
Remove retainer for pressure relief valve. Use flat nosed pliers.

Note! Strong spring pressure, place hand over spring

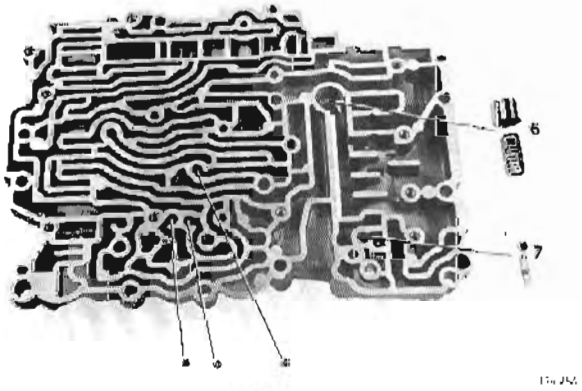
Press in primary regulator valve until retainer drops out.

Note! Strong spring pressure





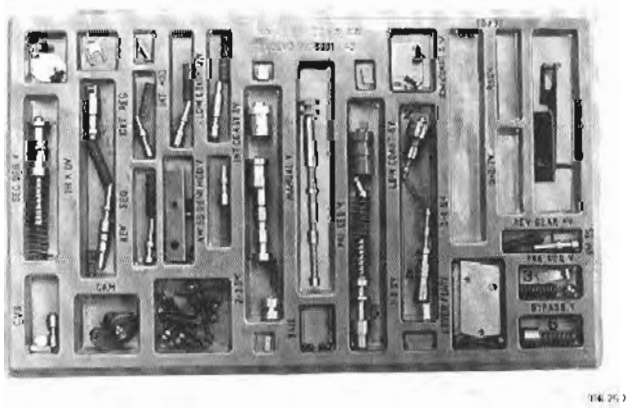
AW 55



BW 55

Valves

1. Reverse gear pilot valve (AW55 only)
2. Low coast shift valve
3. Pressure relief valve (BW55: only on valve body P/N 1233148, code 5015)
4. 1–2 shift valve (twin type introduced on late type BW55 with effect from valve body P/N 1233149, 1233370, 1233371)
5. Primary regulator valve
6. Cooler by pass valve
7. Damping valve (ball + spring) (discontinued on BW55 with effect from valve body P/N 1233295, 1233296, 1233297).



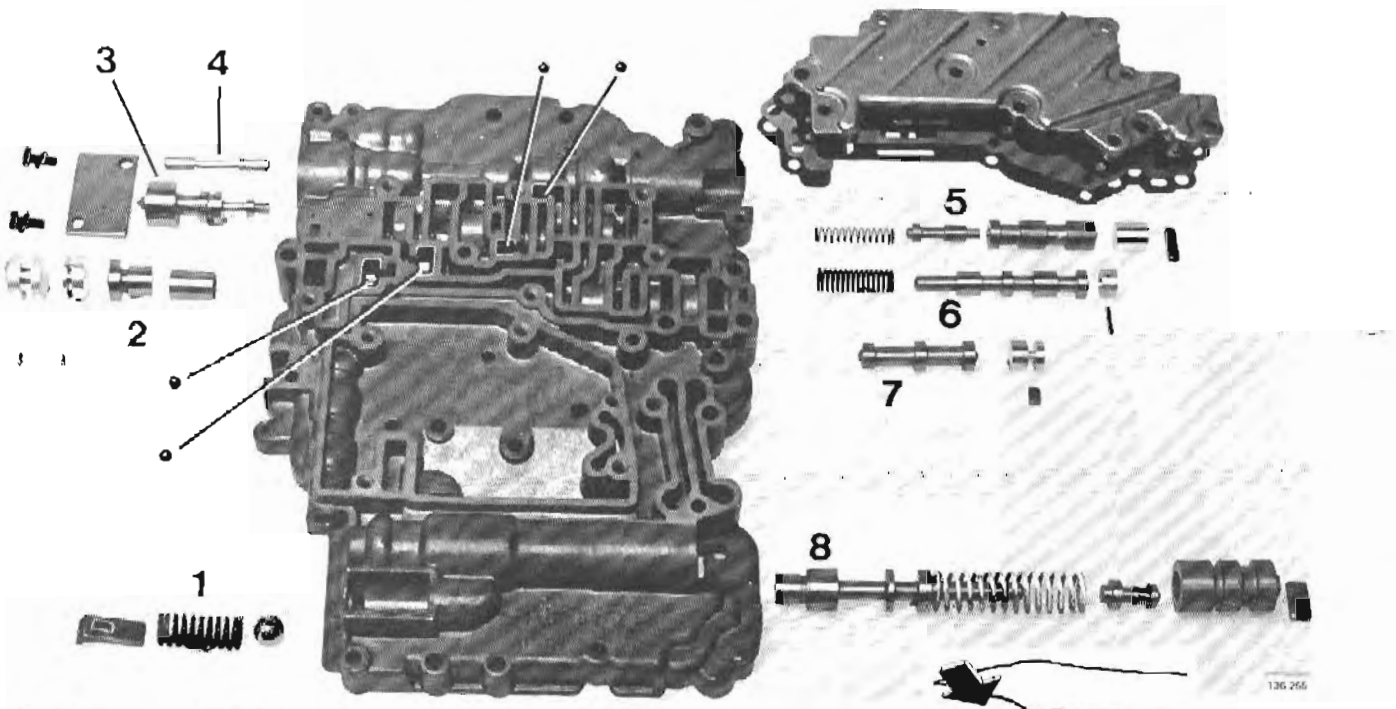
Location of parts

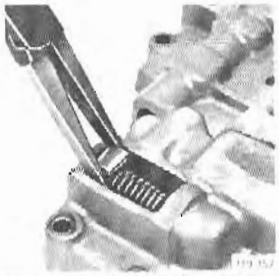
Z10

Lower valve body, disassembly (AW70, 71)

Valves

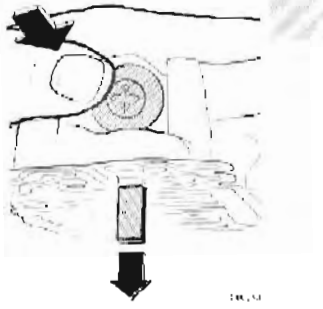
1. Pressure relief valve
2. High coast shift valve
3. Low coast shift valve
4. Reverse gear sequence valve
5. 1–2 shift valve (two part valve introduced with effect from:
   AW70 1 KC 80659-
   AW71 KF 80439-
6. 3–4 shift valve
7. Detent regulator valve
8. Primary regulator valve



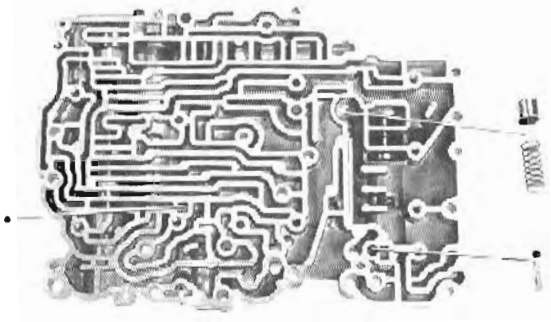


Remove retainer for pressure relief valve. Use flat nosed pliers.

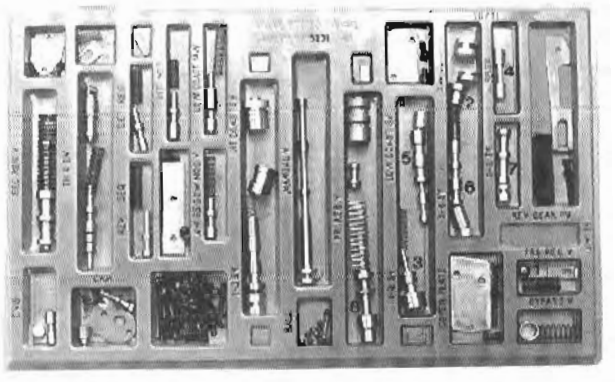
Note! Strong spring pressure, cover spring with hand.



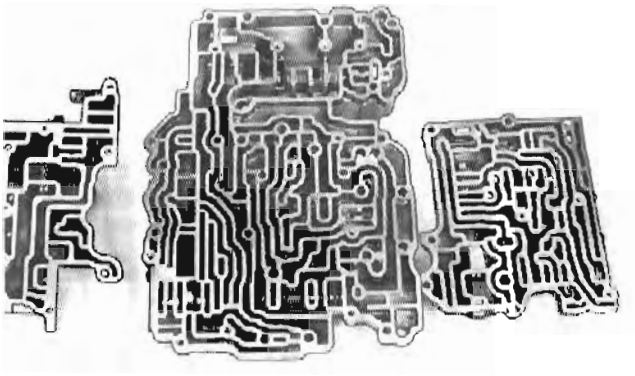
Press in primary regulator valve until retainer drops out. Note! Strong spring force.



Removal of cooler by-pass valve and valve balls



Location of parts



Cleaning and inspection

Z11

Cleaning

Carefully clean all parts[1] with solvent, petrol, paraffin or tricloroethylene. Dry parts with compressed air. If rags are used they must be lint free, best material is chamois leather. Cotton wadding must not be used.

[1] Not non-metallic parts.

Z12

Check valve body housing

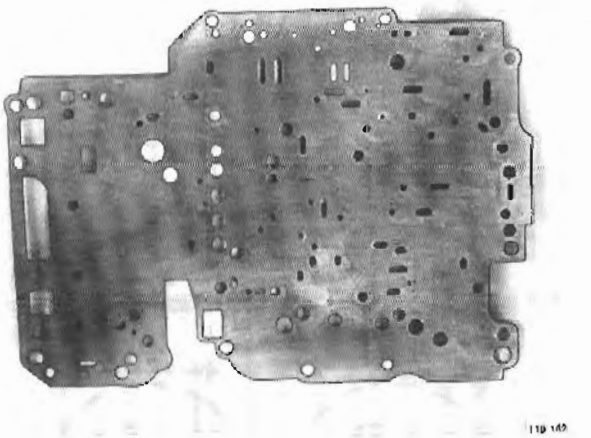
Ensure oil passages are free from dirt. Check that bores are not scored or worn.

Z13

Check valves

Check valves for scoring and signs of wear etc. Make sure that valves move smoothly in bores. If necessary valves can be carefully cleaned with a fine grade emery cloth.

Note! That valves may appear to be perfect when valve body assembly is dismantled but seize when valve body is screwed onto transmission gear case. This is because of very small tolerances between valve and valve body. It may help to rub valve down with very fine grade emery cloth. **Carefully.**



Z14

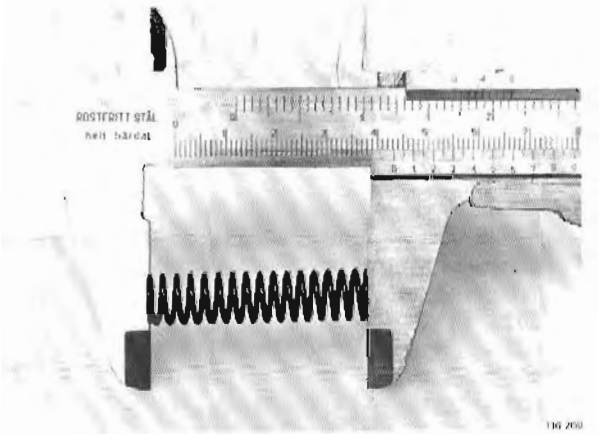
Check kick-down valve roller

Check that roller is not worn or seized.

Z15

Check separator plate

Check that all holes are free from dirt.



Z16

Check valve spring height

See specifications on pages 6, 7 and 10.

Note! Type of spring varies with valve body type, see page 11.

Assembly, general

Z17

IMPORTANT

Vaseline

Petroleum jelly such as Vaseline must not be used to retain valve balls and springs in position, as balls may stick.

Do not force valves into bores

If valves cannot be installed with light force then check for dirt or burrs. If necessary carefully rub down valve with a very fine grade emery cloth.

Always use new gaskets

Always install new gaskets on valve body assembly, to lessen chance of leakage.

Do not interchange parts between different valve bodies

Interchanging springs/valves can cause incorrect shift speeds or no shift at all.

If it is necessary to change an entire valve body assembly it is of utmost importance that the governor is changed as well, even if it is in perfect working order. Valve body assembly and governor are very carefully matched to ensure correct shift speeds. See page 11 for modifications, differences, code numbers, part numbers and serial numbers of the different types.

Different types of valve body assemblies

It is very important that a valve body which has been disassembled, is reassembled in its original execution. This is because of the many different types of valve bodies in use and also because of production modifications.

BW: Modifications to BW transmissions are indicated by a code stamped on the gearcase.

AW: Modifications are indicated by changes in the serial and part numbers.

Tightening torques

When reassembling, tighten screws to specified torque. Do not overtorque. Tighten crosswise.

Overtorquing may damage threads. Also uneven load may be placed on valves which could cause valves to seize.

Tightening torques.

Screws: M5: 5–6 Nm (3.6–4.3 ft lbs)
M6: 6–9 Nm (4.3–6.5 ft lbs)

High standards of cleanliness are essential

If, despite all recommendations to the contrary, rags have been used, check carefully that components are free from lint.

Upper front valve body, assembly

Z18

Valves

1. Kick-down valve
2. Throttle valve
3. Secondary regulator valve (two types in use on BW55).

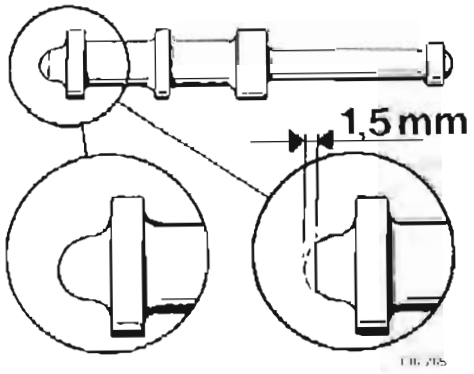
   Type 1 up to valve body P/N 1233349, 1233370, 1233371

   Type 2 with effect from valve body P/N 1233387, 1233388 and 1233389. (Introduced to counteract cold start problems. Serial numbers quoted on page 18.)

   If cold start problems are encountered and pressure test 1 indicates that secondary regulator valve functions fully then change to type 2 valve.

   If late type secondary regulator valve is defective, early type can (if no new valve is available) be modified by carefully grinding off 1.5 mm (0.06 in) from rounded end of valve. Use a very fine grade emery cloth.

[1]Pressure test carried out before transmission is dismantled, see 01-13 page 40

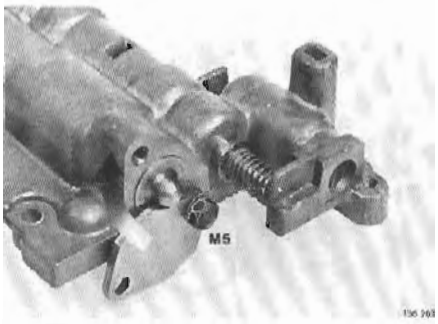


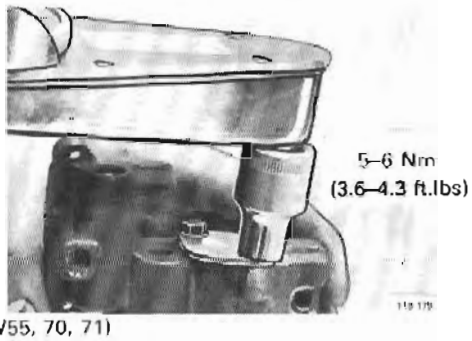
4. Cut-back valve
   BW55: Only found on transmissions with serial numbers from.
   Transmission code
   002 – 11336
   005 – 3414
   006 – 3056
   007 – 2818

Springs

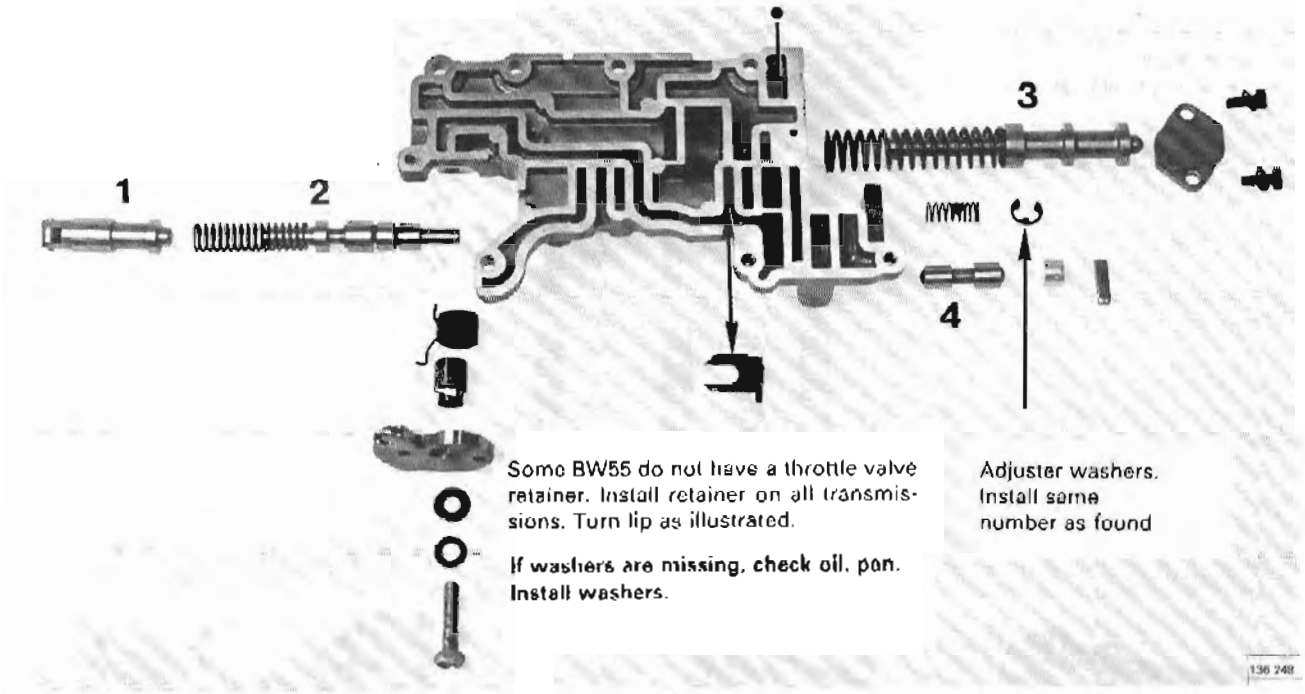
Note! Many different types of springs are in use, see specifications on pages 6, 7 and 10. Springs can be identified by measuring length.

Note! No lock washers on BW55 with effect from valve body P/N 1233295, 1233296, 1233297. Remove washers on earlier valve body assemblies.





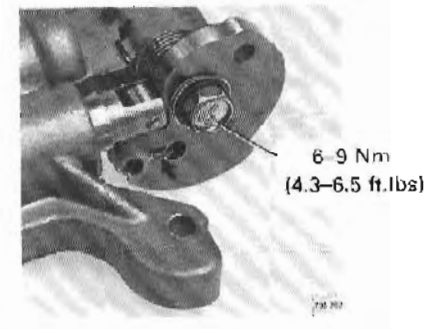
Valve ball ∅ 5.5 mm (AW55, 70, 71)
∅ 8 mm (BW55)

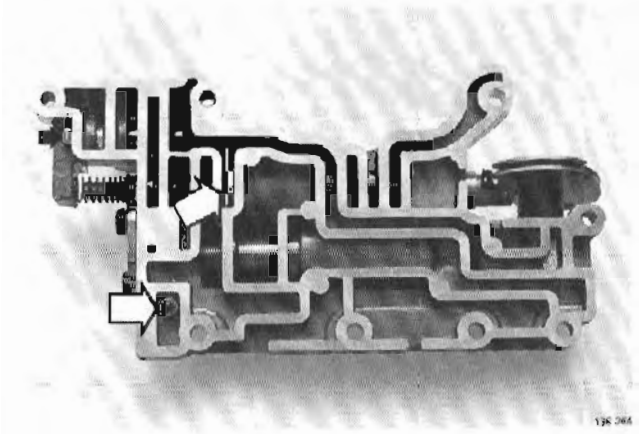


Some BW55 do not have a throttle valve retainer. Install retainer on all transmissions. Turn lip as illustrated.

If washers are missing, check oil. pan. Install washers.

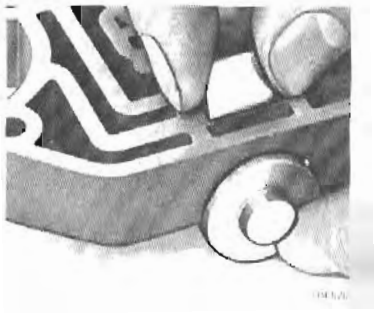
Adjuster washers. Install same number as found

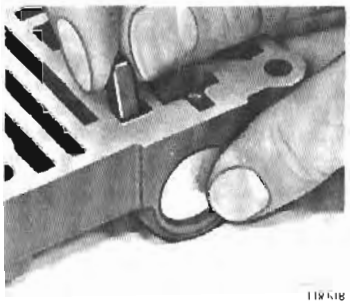




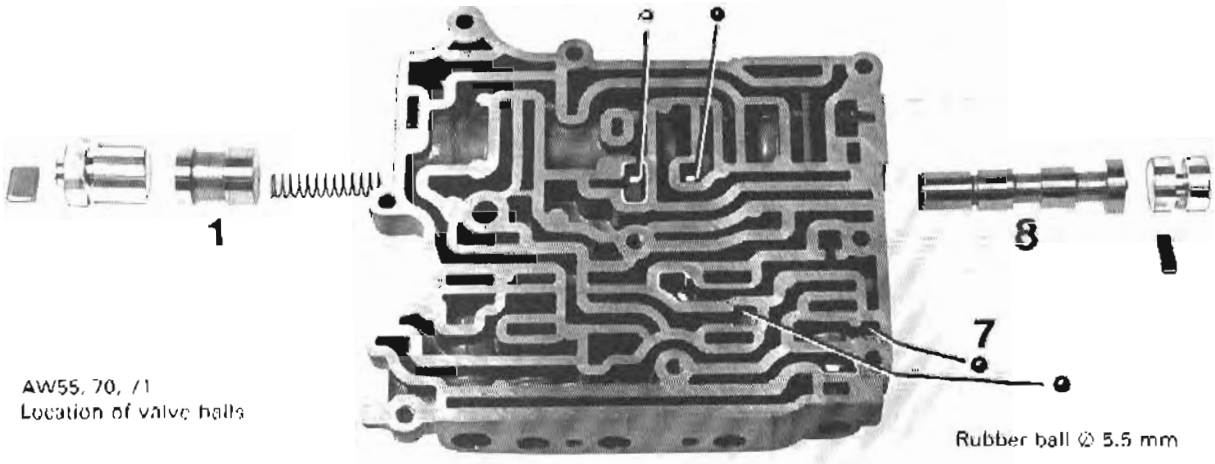
Valve bodies assembly

Upper rear valve body, assembly



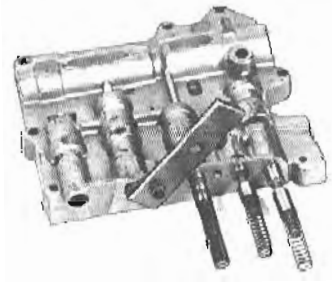


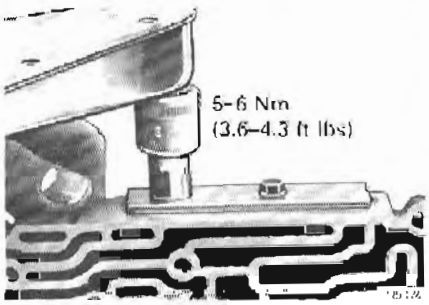
Steel ball Ø 5.5 mm Rubber ball Ø 5.5 mm

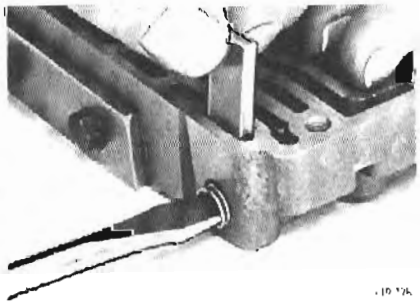


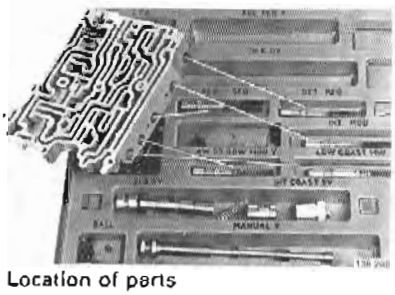
AW55, 70, 71
Location of valve balls

Rubber ball Ø 5.5 mm









Location of parts

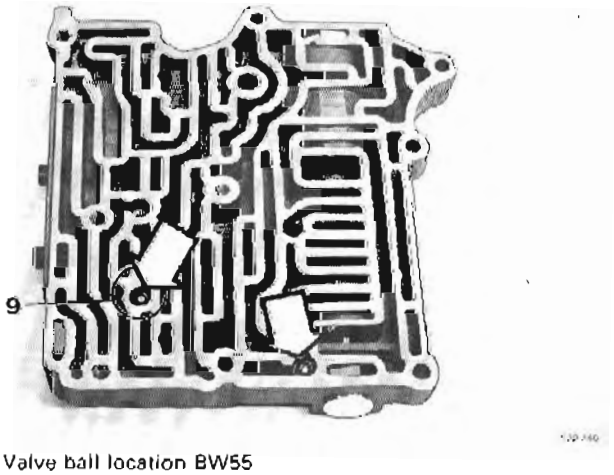
Springs

Springs can be identified by measuring length. For specifications see pages 6, 7 and 10.

Note! Different types of valves, springs, valve body housing, etc. are in use. See section on valve bodies on page 11.

Valves

1. Intermediate coast shift valve
2. Low coast modulator valve
3. Governor modulator valve (spring and valve replaced by plug on BW55 with effect from valve body P/N 1233280, 1233281, 1233289)
4. Reverse clutch sequence valve
5. Intermediate coast modulator valve
6. Detent regulator valve
7. Rubber ball ∅ 5.5 mm (Not fitted on early type AW555 valve body P/N 1233356)
8. 2–3 shift valve
9. Rubber ball ∅ 5. 5mm (discontinued on BW55 with effect from valve body P/N 1233295, 1233296, 1233297).



Valve ball location BW55

BW55 Valve balls

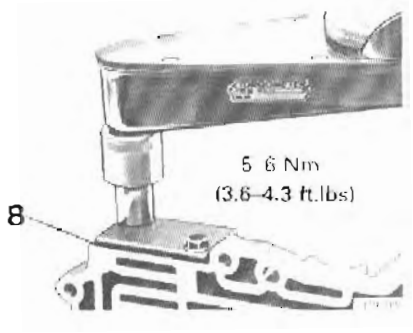
Early type BW55 have ∅ 6.3 mm (1/4") valve balls. These balls were replaced by ∅ 5.5 mm (7/32 in) balls to lessen chance of seizing. Early type valve balls should be replaced with new smaller type in upper rear valve body housing.

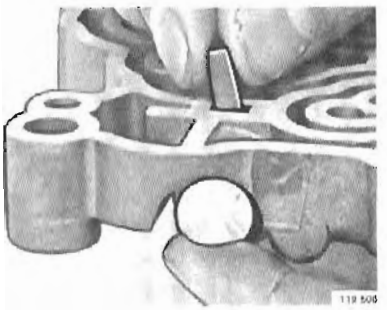
BW55 lock washers

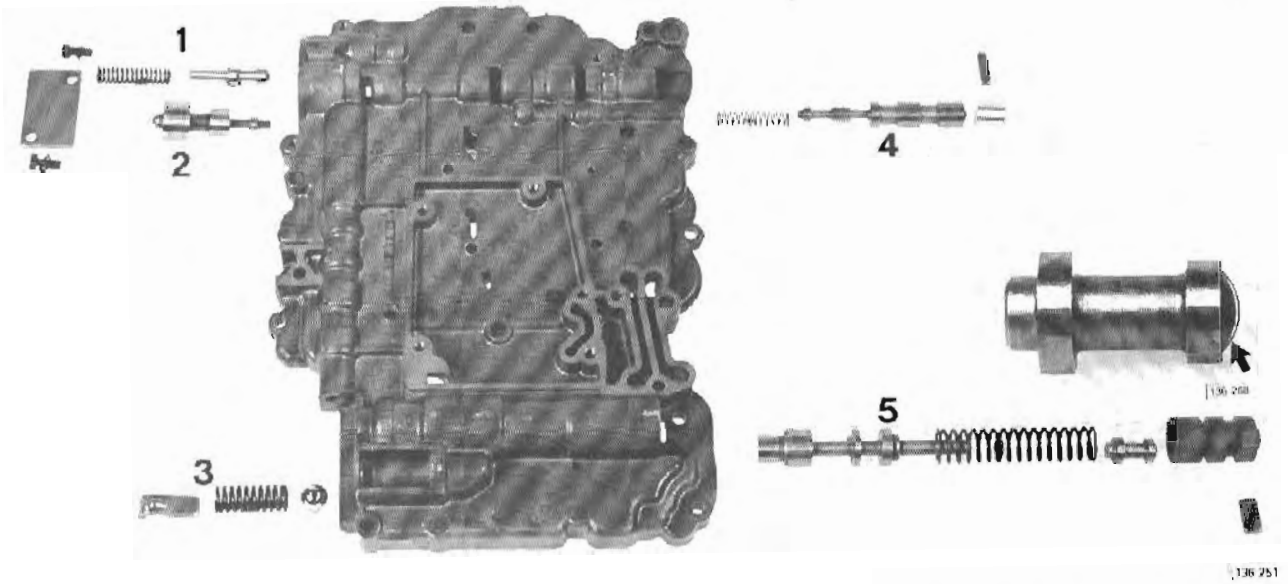
No lock washers fitted on BW55 with effect from valve body P/N 1233295, 1233296, 1233297. Remove washers on early valve body assemblies.

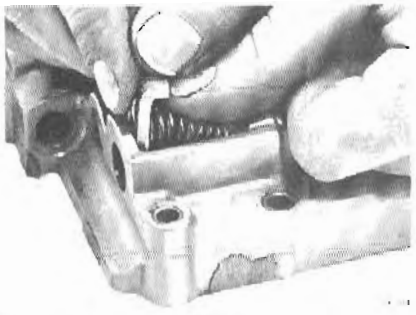
Z20

Lower valve body, assembly (AW 55, BW 55)







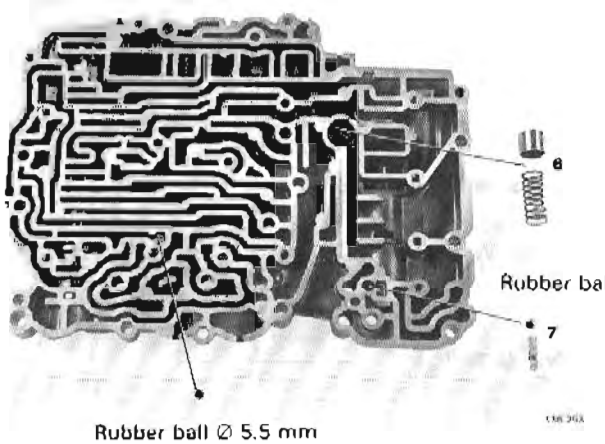


Place valve ball in position
Compress spring and retainer together

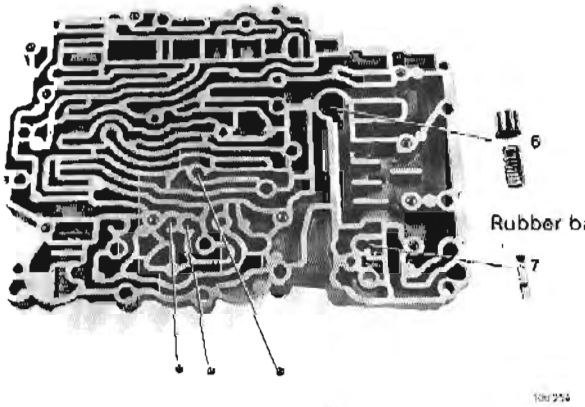
Springs

Springs can be identified by measuring length. For specifications see pages 6, 7 and 10.

AW 55



BW 55



Note! Different types of valves, springs, valve body housings, etc. are in use. See section on valve bodies on page 11.

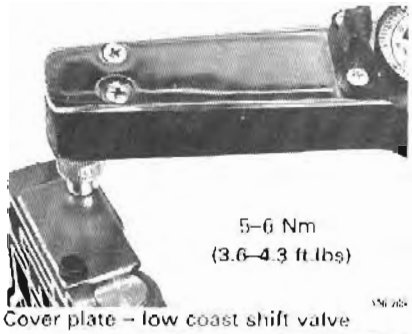
Valves

1. Reverse gear pilot valve (AW55 only)
2. Low coast shift valve
3. Pressure relief valve (only fitted on early type BW55 with effect from valve body P/N 1233148 (code number 5015).
4. 1–2 shift valve (Two part valve introduced on later types of BW55 with effect from valve body P/N 1233295, 1233296, 1233297).
5. Primary regulator valve (sleeve modified on BW55 with effect from valve body P/N 1233295, 1233296, 1233297).
6. Cooler by-pass valve (type varies). (Two springs are used on very early types of BW55 with valve body P/N 1233148).

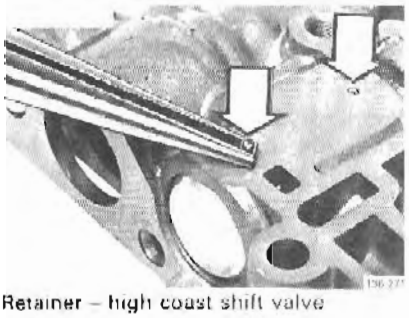
   Note! Cooler by-pass valve spring and primary regulator valve spring are matched and must be replaced at same time.
7. Damping valve (ball + spring) (discontinued on BW55 with effect from valve body P/N 1233295, 1233296, 1233297).
8. Some early type BW55 do not have a cover plate gasket. Install gasket on all transmissions.

Valve balls to BW55. Early type ∅ 6.3 mm (1/4 in) replaced by ∅ 5.5 mm (7/32 in) to lessen chances of seizing. Replace early type with new smaller balls in lower valve body housing.

Lower valve housing, assembly (AW70/71) Z21



Cover plate – low coast shift valve



Retainer – high coast shift valve

Valves

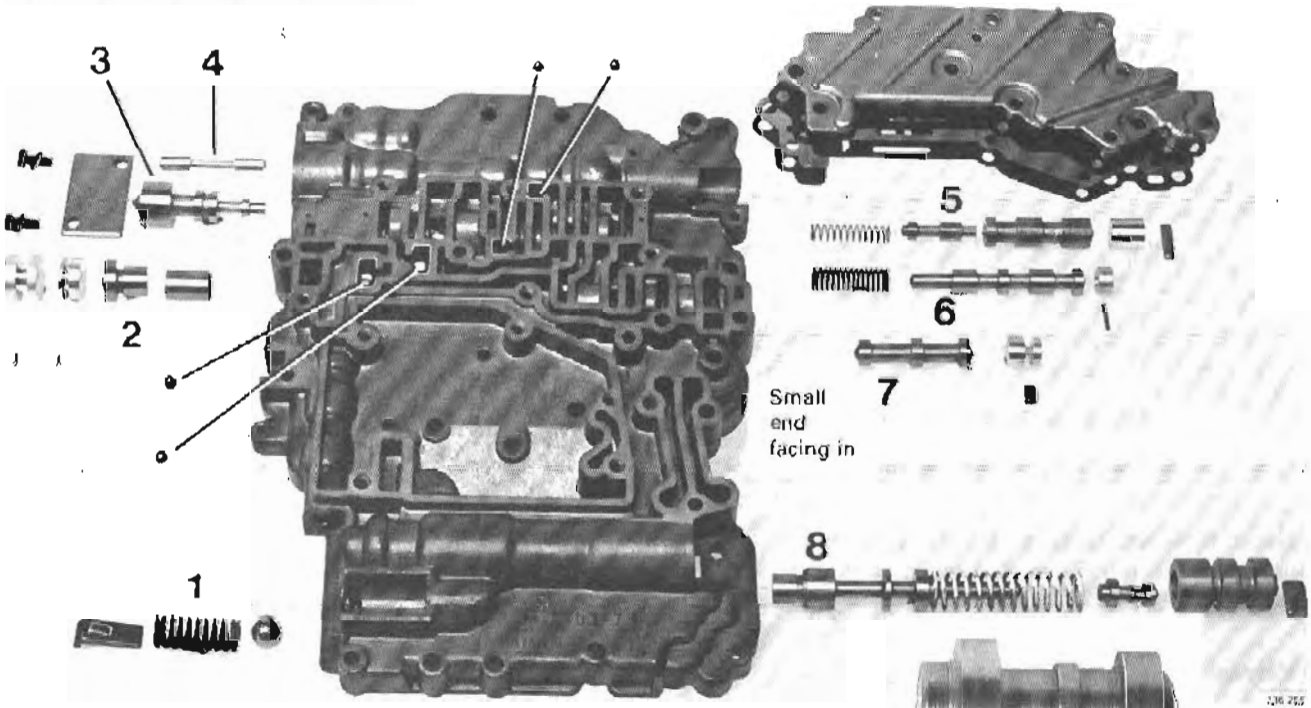
1. Pressure relief valve
2. High coast shift valve
3. Low coast shift valve
4. Reverse gear sequence valve
5. 1–2 shift valve (two part valve introduced with effect from AW70 80659- AW71 80439-
6. 3-4 shift valve
7. Detent regulator valve (small end facing in)
8. Primary regulator valve (end should be flush with body)

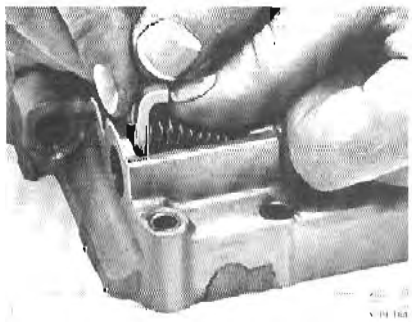
Springs

Spring type can be identified by measuring length, see specifications on page 10.

Valve body types

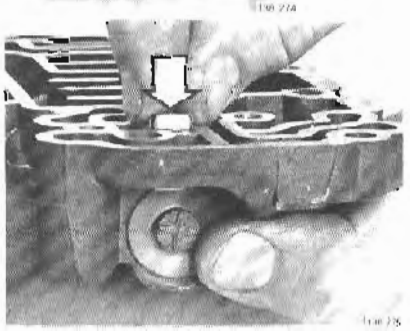
Refer to page 11 for specifications.





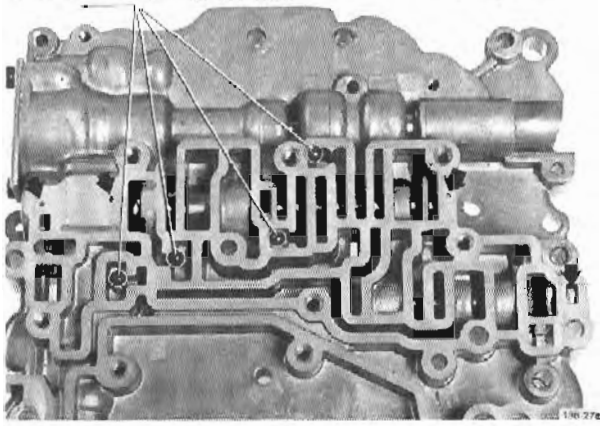
Place valve ball in position. Compress spring and retainer together

Assemble primary regulator valve piston and sleeve
Insert dome end of piston first.



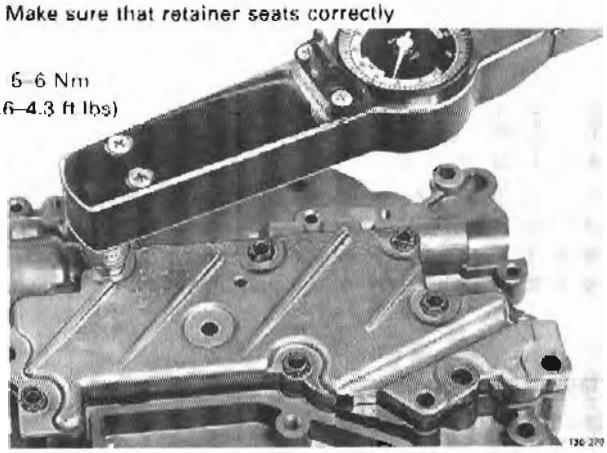
Rubber valve ball Ø 5.5 mm

Installing retainer and ball



Make sure that retainer seats correctly

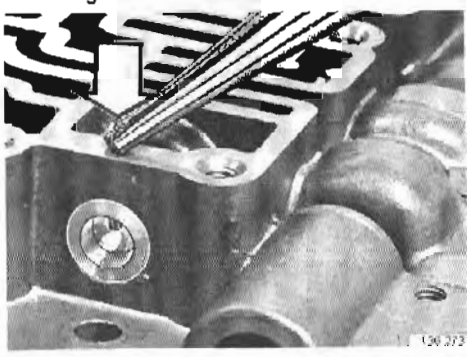
5–6 Nm
(3.6–4.3 ft lbs)



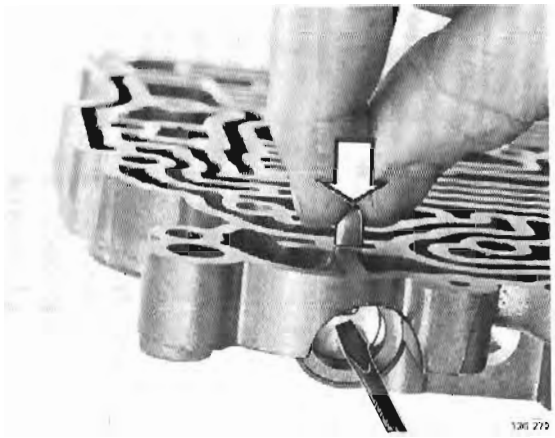
Installation of cover
Install gasket, separator plate, gasket and cover.

Note! The gaskets are different

Installing 3–4 shift valve

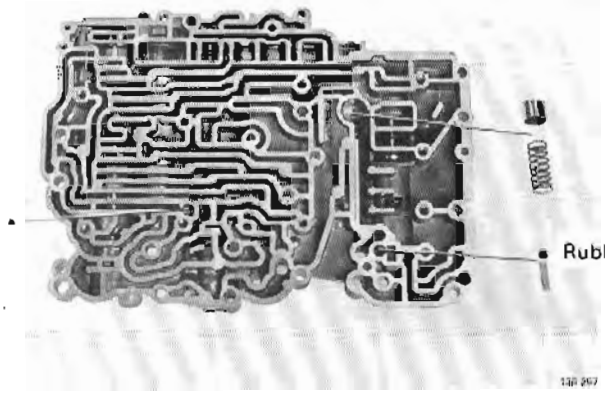


Installing 1–2 shift valve



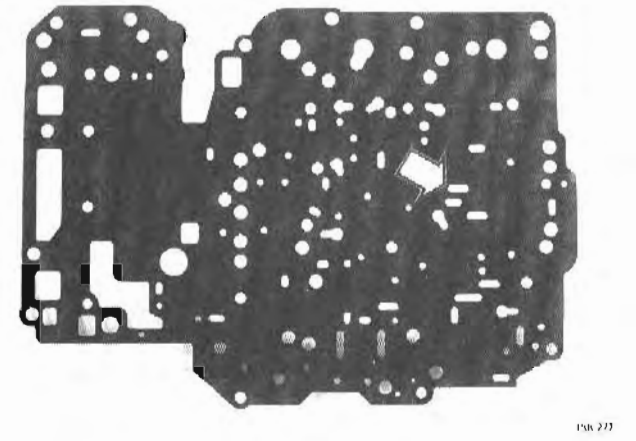
Location of cooler by pass valve

Rubber valve ball Ø 5.5 mm



Rubber valve ball Ø 6.3 mm

Valve body assembly



Z22

Gasket – important

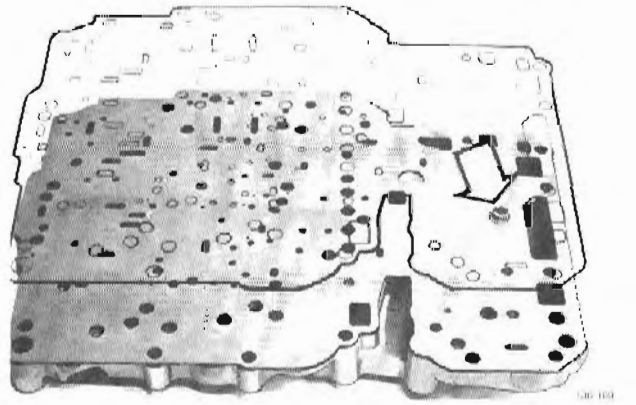
Upper and lower gaskets are different and must be installed in correct position.

Z23

Gasket kit – BW55

CAUTION!

A hole (arrow) may be missing in some BW55 gasket kits (P/N 2373685), see fig. If the gasket is installed, B1 brake will burn up during driving in position 2, which would result in a lack of engine braking. It is therefore essential to check that the hole is not missing on kits for BW55 transmission.



Z24

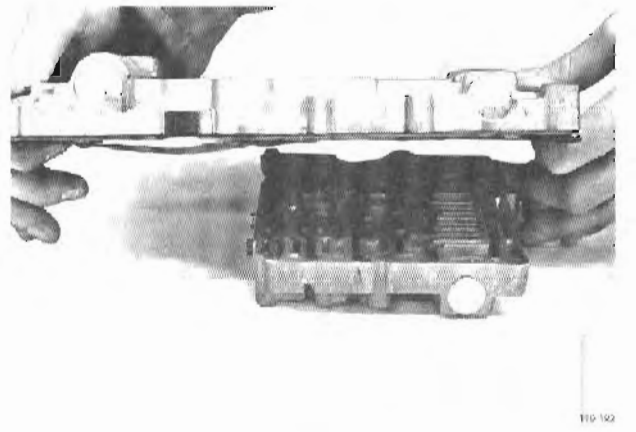
Place lower gasket and separator plate on lower valve housing

Check that valve balls, cooler by-pass valve, spring and valve retainer (AW70/71) are in place. Install a new gasket. (Check that it is of same type as original). Secure separator plate loosely with a bolt (arrow).

Z25

Place upper gasket on separator plate

Use a new gasket. Make sure that it is same as original.



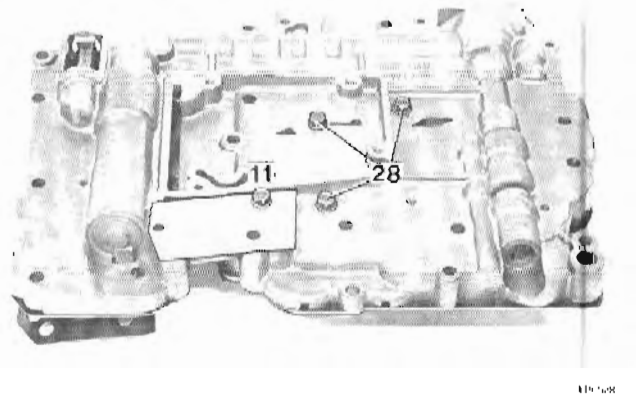
Z26

Check that all valve balls and retainers are in position in upper rear valve body

Z27

Place lower valve body on rear valve body

Ensure gasket and holes coincide.



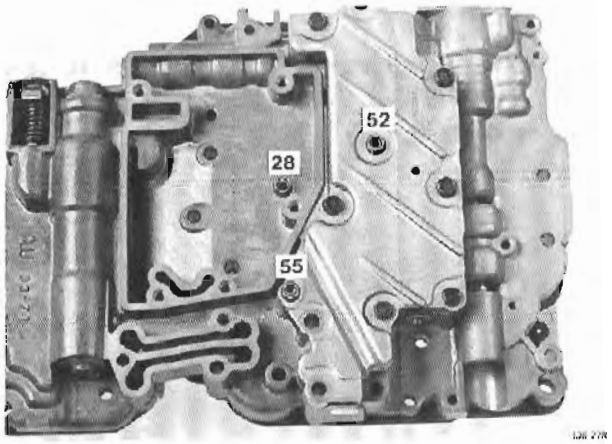
Z28

AW55, BW55:

Install screws for upper rear valve body, hand tight.

Also install cover panel (do not forget gasket on BW55).

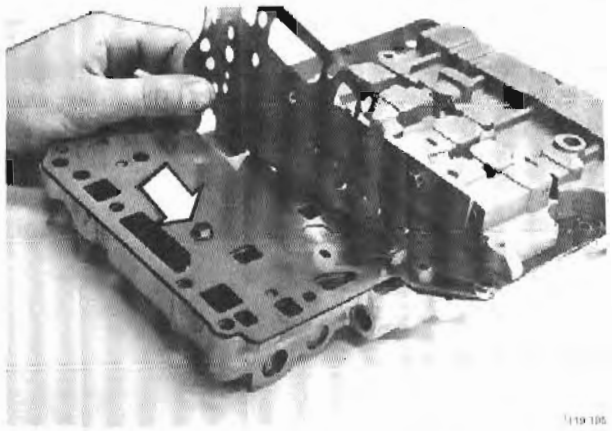
Four screws (length in mm).



Z29

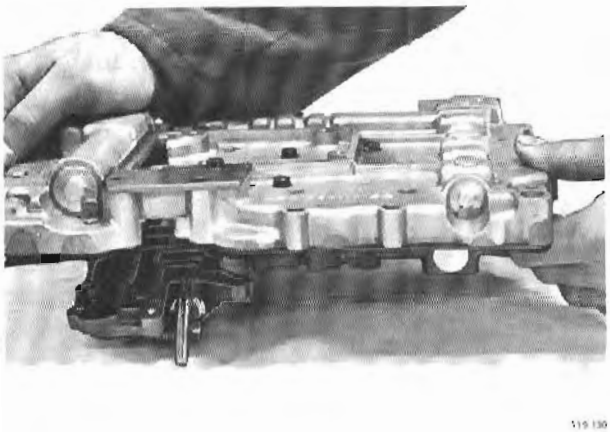
AW70/71: Install screws for rear upper valve body, hand tight

Three screws (length in mm).



Z30

Invert valve body and remove bolt retaining separator plate

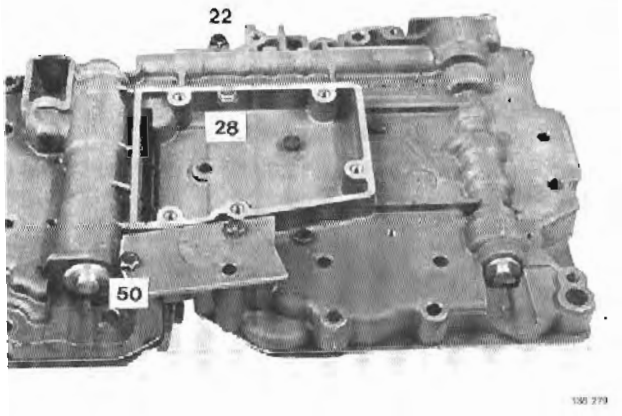


Z31

Place lower valve body on upper front valve body

Check that valve ball and throttle valve stop washer are in position in upper front valve body.

Ensure gasket and holes coincide.

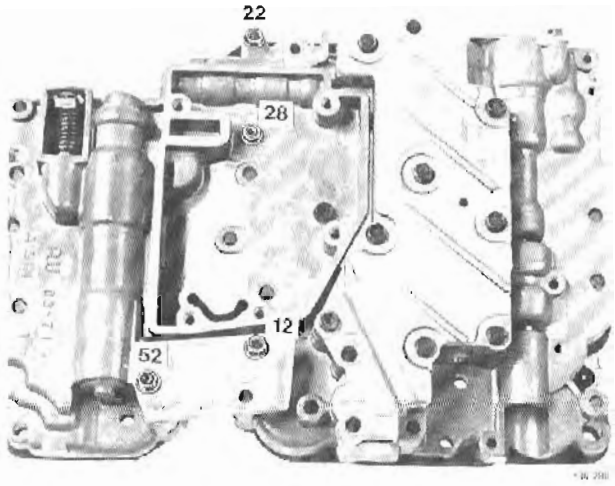


Z32

AW55, BW55: Install screws for upper front valve body, hand tight

Three screws (length in mm).

Valve body

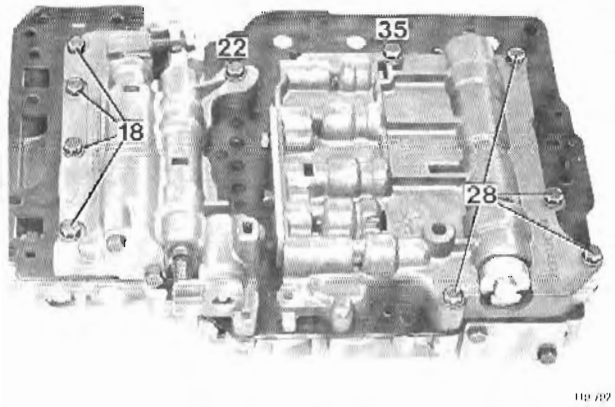


Z33

AW70/71: Install screw for upper front valve body, hand tight

Also install cover plate

Four screws (length in mm).

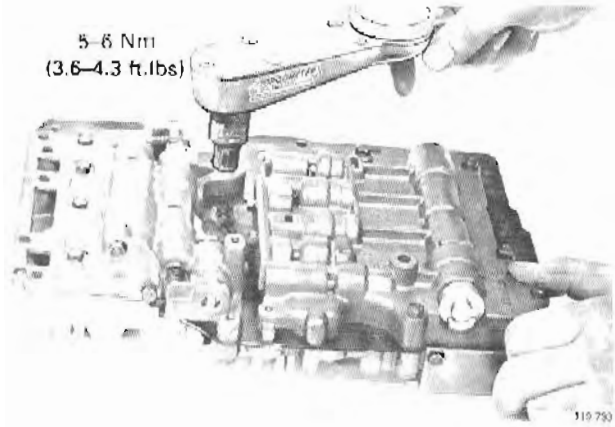


Z34

Invert valve body and install 5 screws in upper front valve body and 5 screws in upper rear valve body (screw length in mm).

Z35

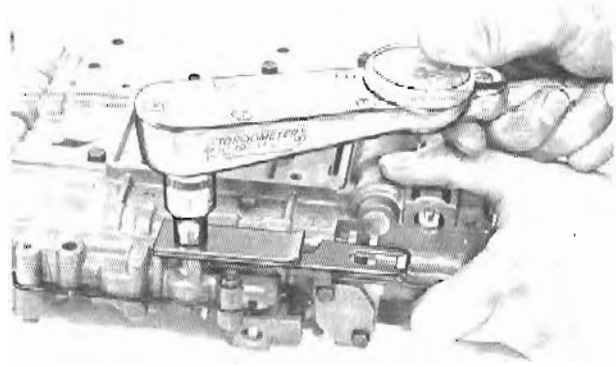
Check that gaskets are correctly located for tightening screws



Z36

Torque screws to 5–6 mm (3.6–4.3 ft lbs)

Tighten from both sides.



Z37

Install gear selector valve

Z38

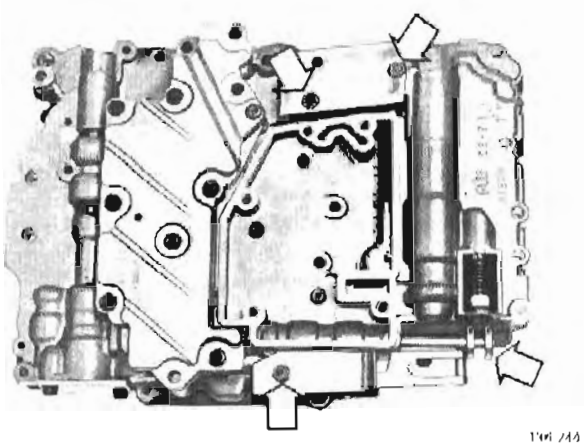
Install retaining spring and bracket

Torque screws to 5–6 Nm (3.6–4.3 ft. lbs) (Not fitted to BW55 transmissions).

AZ. Delayed engagement — replacement of upper front valve body AW70/71

Delayed engagement and/or loss of drive after driving about 100 metres when the engine is started cold is usually due to a low oil level in the automatic transmission. If the problem persists with a maximum oil level in a cold transmission, the upper front valve body in the valve body assembly must be replaced.
The new valve body contains a valve that directs the air in the system into the valve body instead of into the pump.

Materials:	Part No.
Upper front valve body	1 340 084-1
Ball valve	1 340 085-8
Gasket set	274 029-8



AZ1

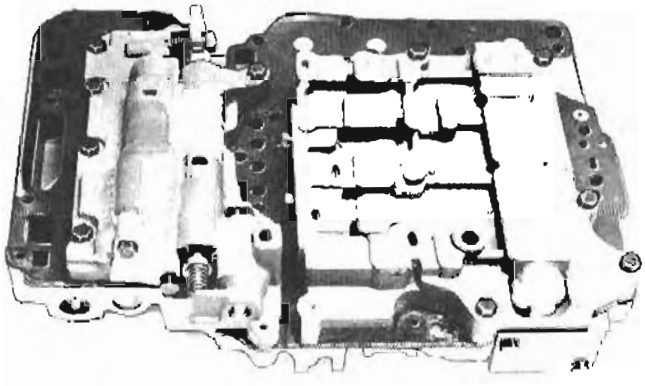
Detach the valve body from the transmission

See operations J1–7, page 50.

AZ2

Remove:

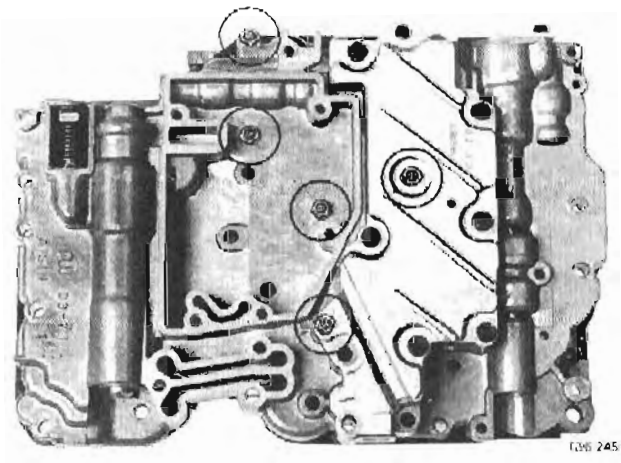
- retaining spring and bracket
- gear selector valve
- cover plate
- gasket



AZ3

Remove the screws retaining the upper front and upper rear valve bodies

Ten screws.

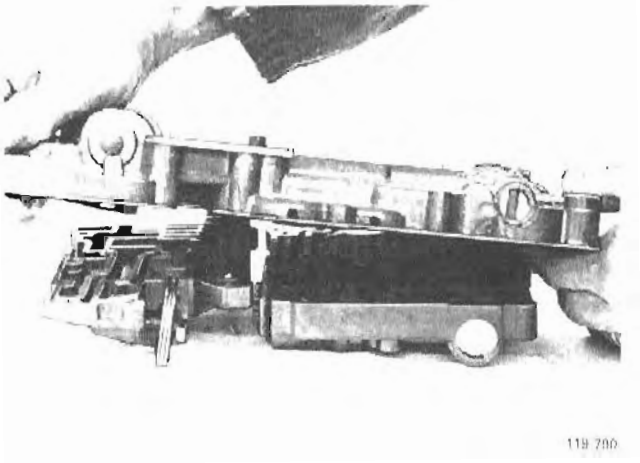


AZ4

Turn the valve body assembly over

AZ5

Remove the five screws securing the upper valve body to the lower



AZ6

Lift away the lower valve body and put it aside with the gasket facing up

Hold the gasket and the separator plate to prevent the valve balls and the springs from falling out.

AZ7

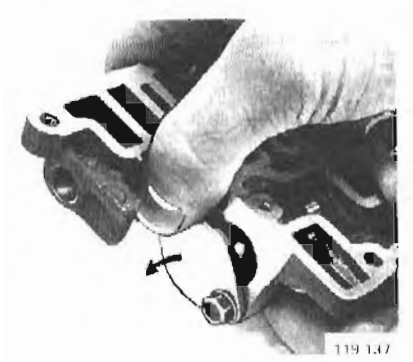
Take apart the upper front valve body

AZ8

To remove the secondary regulator valve

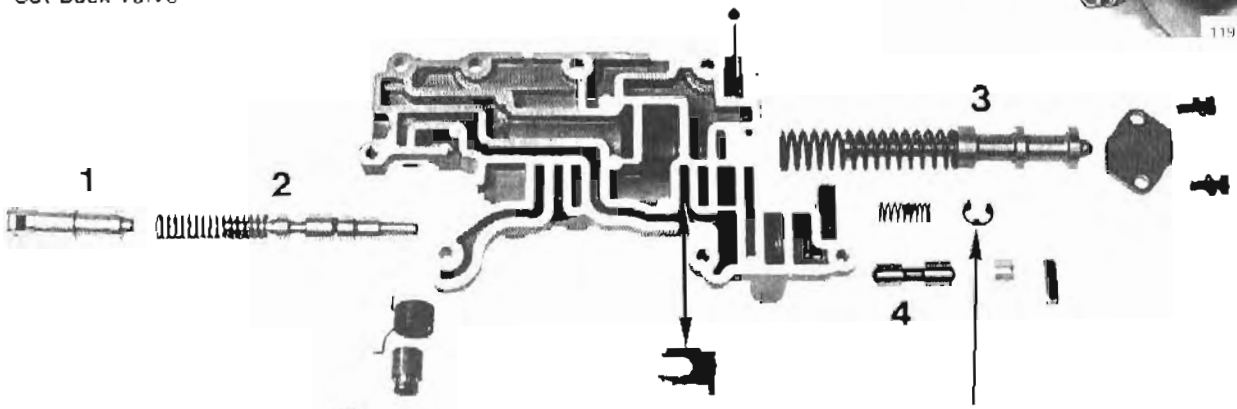
Remove one screw from the cover plate and slide the cover to one side to expose the valve.

Note! Powerful spring force.

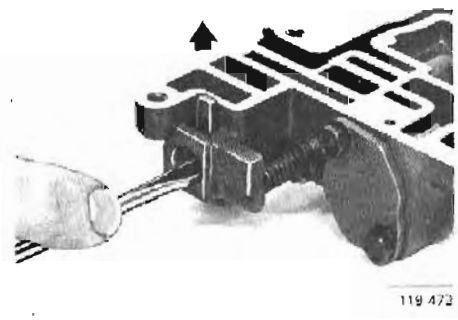


Valves

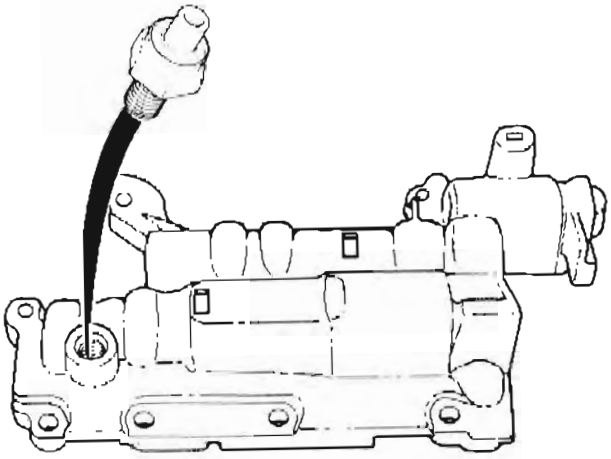
1. Kick-down valve
2. Throttle valve
3. Secondary regulator valve
4. Cut-back valve



Note number of adjusting washers!



Removal of cut-back valve



139 834

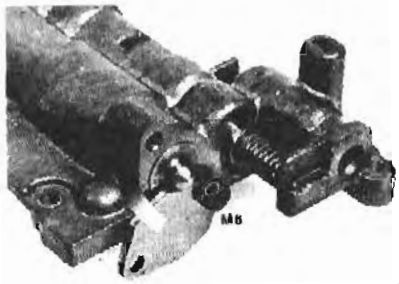
Assembly

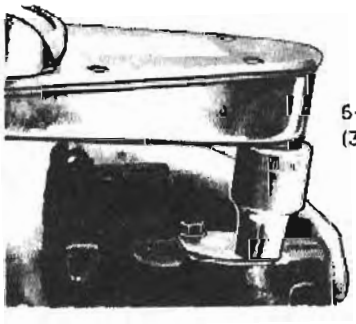
AZ9

Screw the ball valve into the new valve body

AZ10

Fit the parts in the new valve body

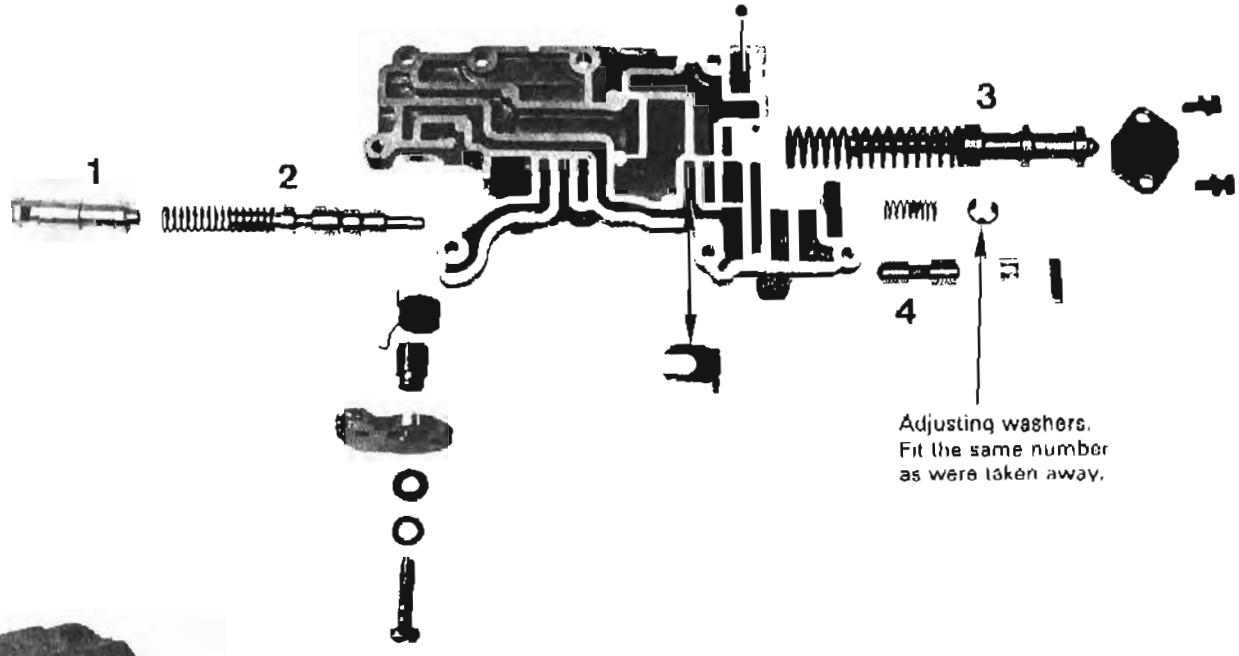




6–6 Nm
(3.5 4.6 ft lbs)

119 178

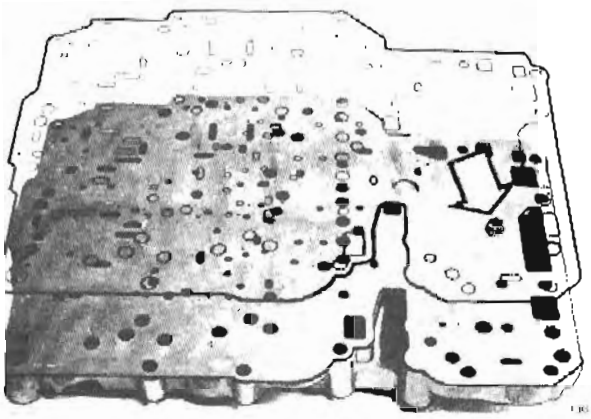
Ball Ø 5.5 mm =0.2167 in) (AW 70, 71)



136 248

6–9 Nm
(4.5–6.5 ft lbs)

130 263



AZ11

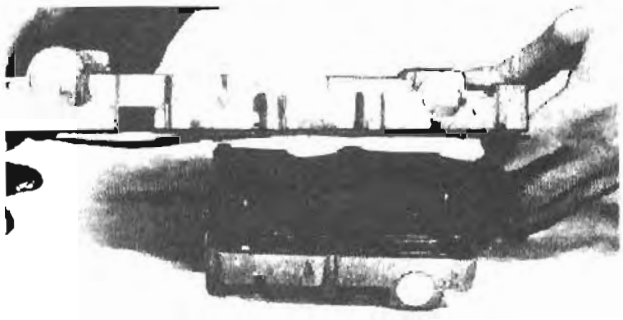
Gaskets – important!

The upper and lower gaskets are different. Make sure the gaskets are properly located and positioned

AZ12

Put the lower gasket and the separator plate on the lower valve body

Check that the valve balls, the cooler bypass valve, the spring and the valve retainers are in place. Fit a new gasket. Make sure it is the same type as the old one Secure the separator plate loosely with a screw.



AZ13

Put the upper gasket on the separator plate

Use a new gasket. Make sure it is of the same type as the old one.

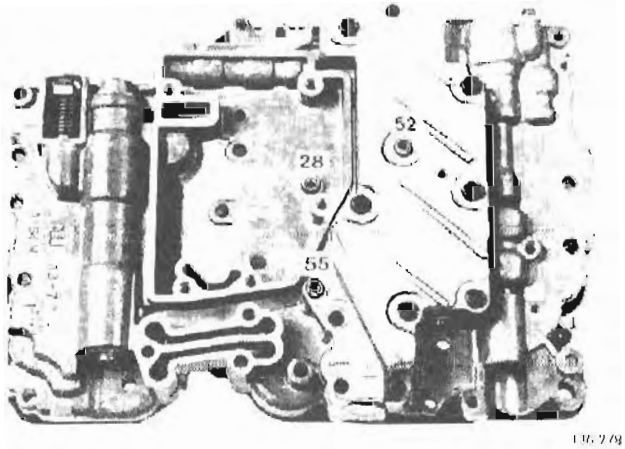
AZ14

Check that all valve balls and retainers are in place in the upper rear valve body

AZ15

Place the lower valve body on the rear valve body

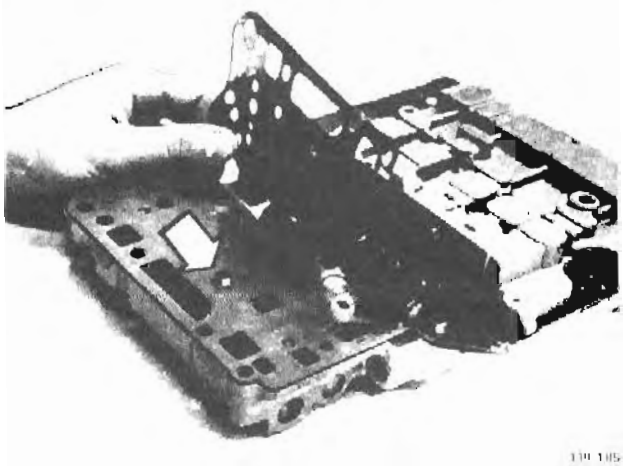
Make sure that the gasket and the holes coincide.



AZ16

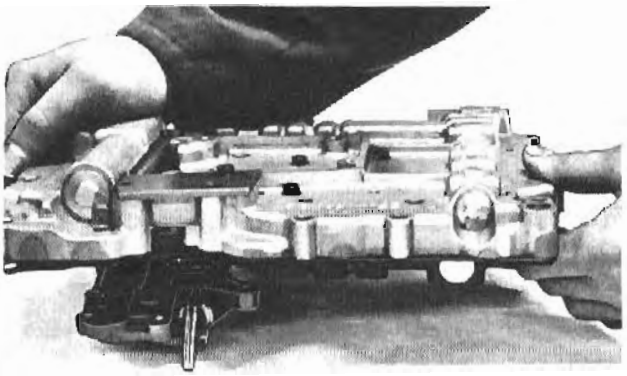
Fit the screws for the upper rear valve body hand tight

Three screws.



AZ17

Turn over the valve bodies and remove the screw from the separator plate

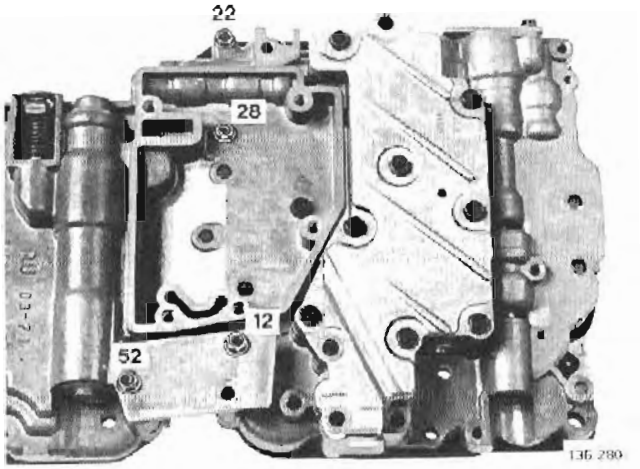


AZ18

Put the lower valve body on the upper front valve body

Check that the valve ball and the throttle valve stop washer are in place in the upper front valve body.

Make sure that the gasket and the holes coincide.

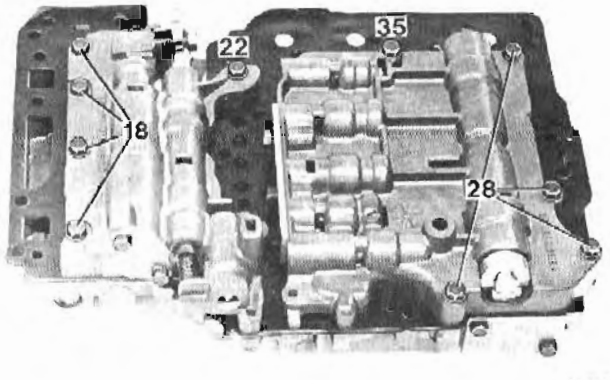


AZ19

Fit the screws for the upper front valve body hand tight

Fit the cover plate at the same time.

Four screws.

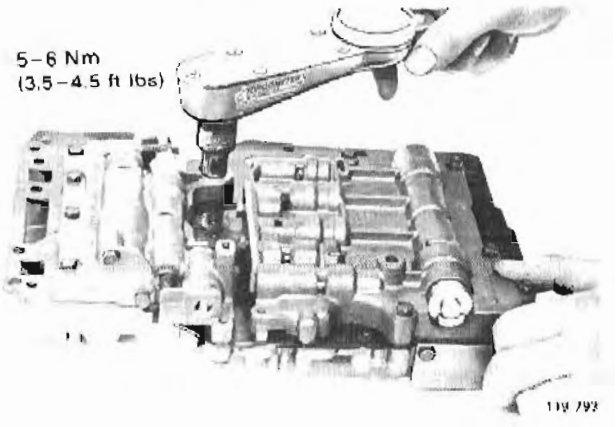


AZ20

Turn over the valve body and fit five screws in the upper front valve body and five screws in the upper rear valve body

AZ21

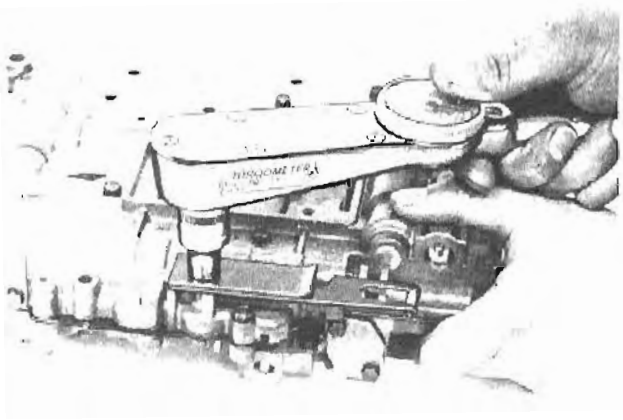
Check that the gaskets are correctly positioned before tightening the screws



AZ22

Tighten the screws to the valve bodies to 5–6 Nm (3.5–4.5 ft lbs)

Tighten from both sides.



AZ23

Fit the gear selector valve

AZ24

Fit the retaining spring and the bracket

Tighten the screw to **5—6 Nm** (3.5 - 4.5 ft lbs).

AZ25

Fit the valve body in the transmission

Use a new oil pan gasket.
Follow operations J1--J19 on page 50

Z39. Miscellaneous parts

Z39

Clean and check all parts

It is important that:

- oil pan
- oil filter
- oil tube (AW70/71)
- magnet are all thoroughly cleaned prior to installing.

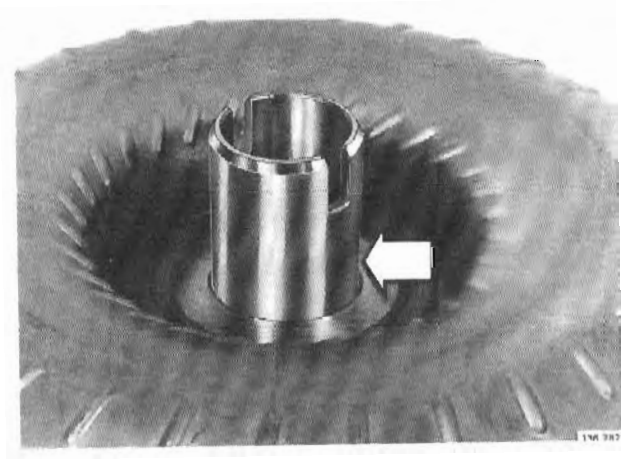
Dry parts with compressed air.

Do **not** use rags or wadding.

Inspect all parts for cracks, signs of wear etc.

Note! Refer to section on in-car repairwork for:

	Operation	Page
Accumulator piston	**L1–8**	**56**
Gear selector mechanism	**K1–18**	**53**
Solenoid valve	**M1–7**	**58**



Torque converter

Check converter neck for signs of damage, wear etc.

If scored excessively, fluid may leak from oil pump oil ring.

Z40–86. Assembling transmission

Special tools: 2520, 5070, 5073, 5075, 5118, 5149, 5241

Check all parts carefully prior to installing. Ensure that thrust washers and needle bearing are correctly located.

Remember to soak new discs in ATF prior to installing.

Vaseline may only be used to keep thrust washers, needle bearings and races in position during assembly, and must not be used on other parts.

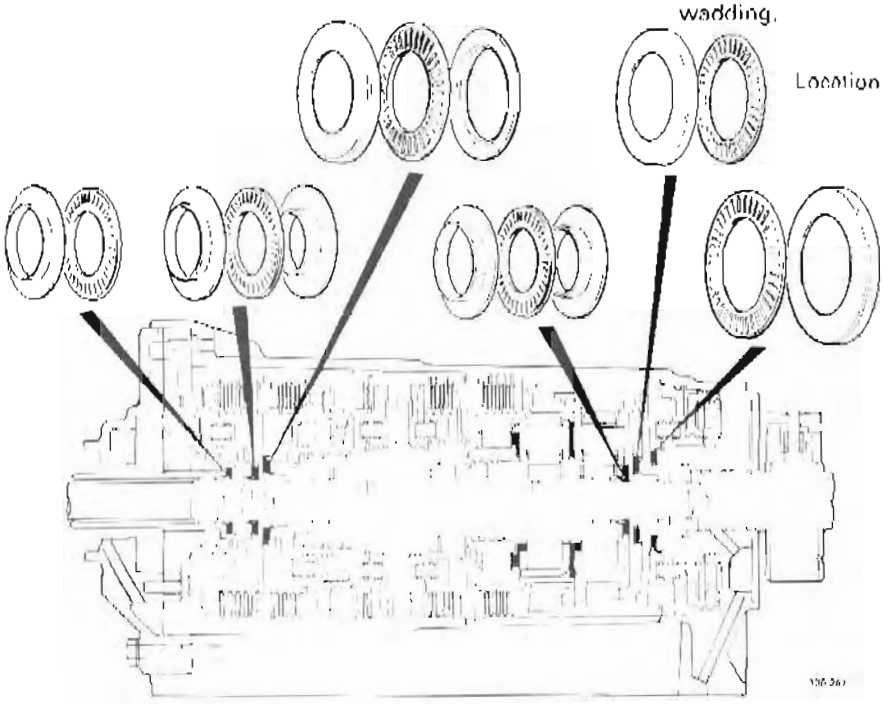
Smear transmission parts (not mentioned above) for models AW70/AW71 1984 and after in Dexron type II. All other models and years should use ATF type G(F).

Always install new O-rings, sealing rings and gaskets

Do not use gaskel sealer etc.

Dry parts only with compressed air. Do not use rags or wadding.

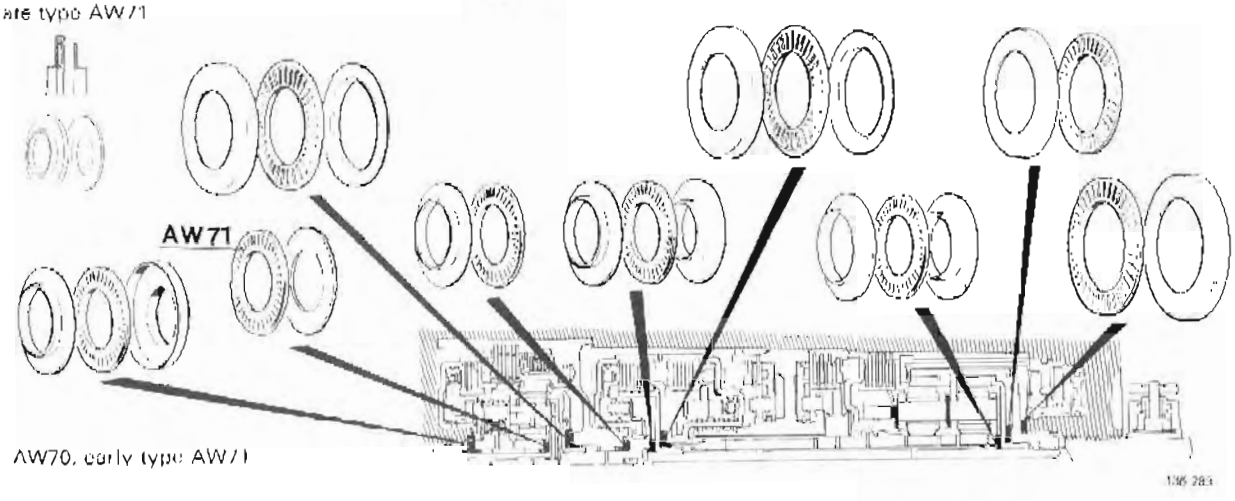
BW 55 AW 55



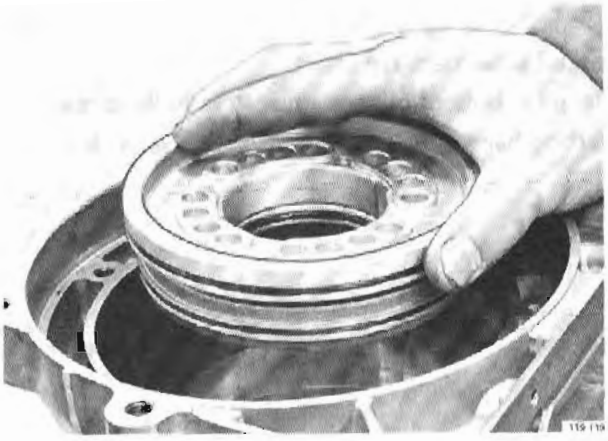
Location of bearing races and needle bearings

AW 70 AW 71

Late type AW71



AW70, early type AW71

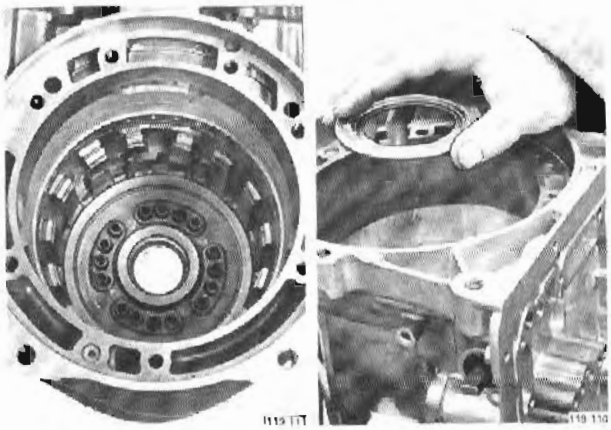


Z40

Install B3 brake piston in transmission gear case

Carefully press in piston, taking care not to damage O-rings.

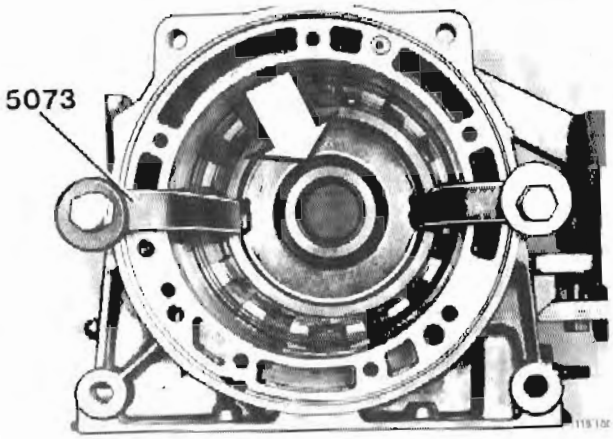
Special tool **5073** can be used if necessary.



Z41

Install return springs (16x) and spring retainer

Note! It is very important that the springs are installed vertically.



Z42

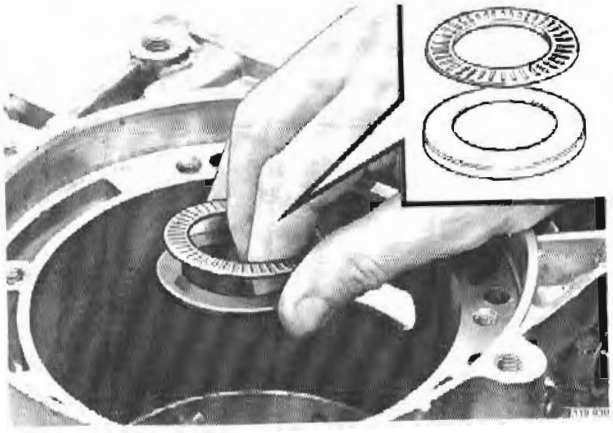
Install retaining ring

Off-load springs with tool **5073** before installing ring.

(Take care when using tool)

Tighten screws crosswise, first by hand and then with a spanner wrench.

Make sure that retaining plate is installed "square". Install retaining ring. Remove tool 5073.



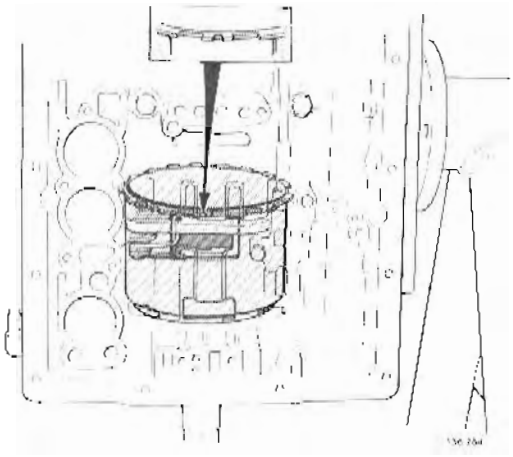
Z43

Turn gear case to vertical position

Z44

Place rear bearing and race in gear case

Install race as illustrated.

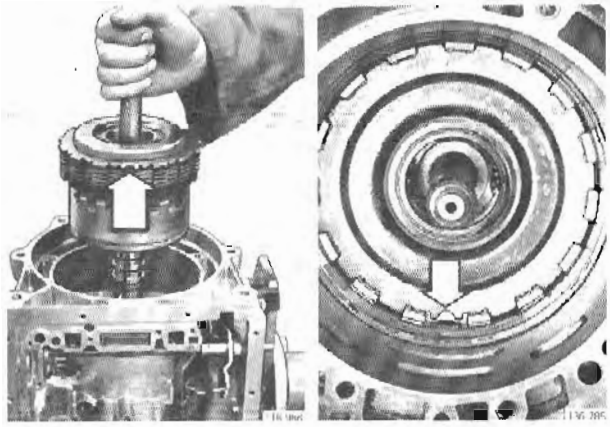


Z45

Install intermediate shaft

Flange at bottom of shaft must fit in brake piston.

Parking ball lug must be opposite recess in shaft.

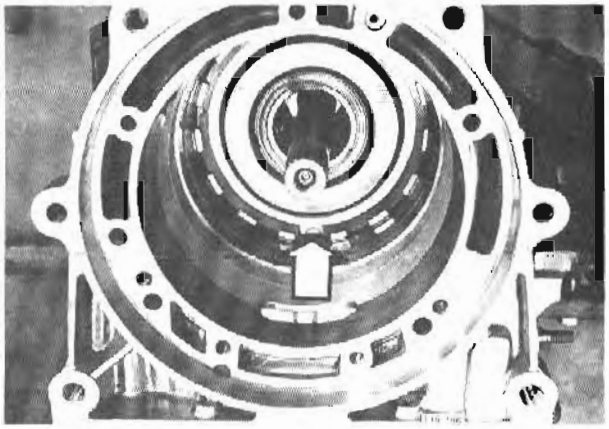


Z46

Install planetary gear carrier + B3 brake pack

Align discs with groove in gear case. Recess in brake pack reaction plate must face oil pan.

Lower brake pack carefully into gear case.

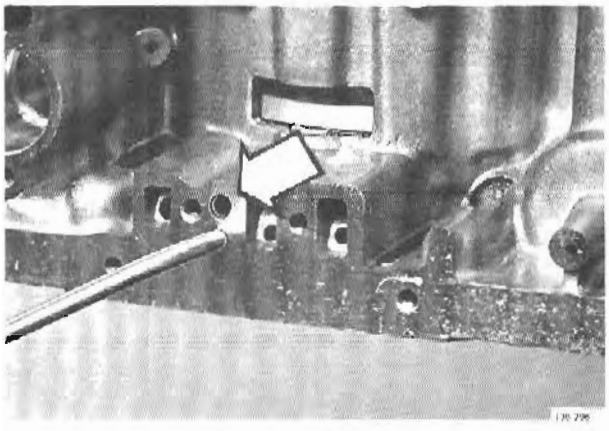


Z47

Install lock ring

Use two screwdrivers.

Make sure that gap in lock ring is between two recesses, see fig.



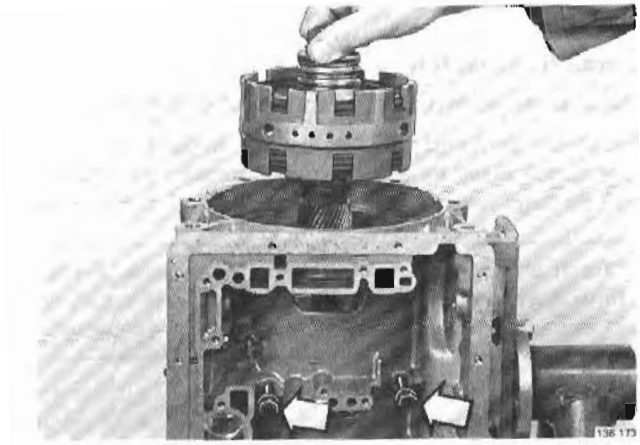
Z48

Check B3 brake pistons

Apply compressed air (max 14 psi) to feed hole (arrow).

A clear click should be heard.

If piston does not move, dismantle and check.

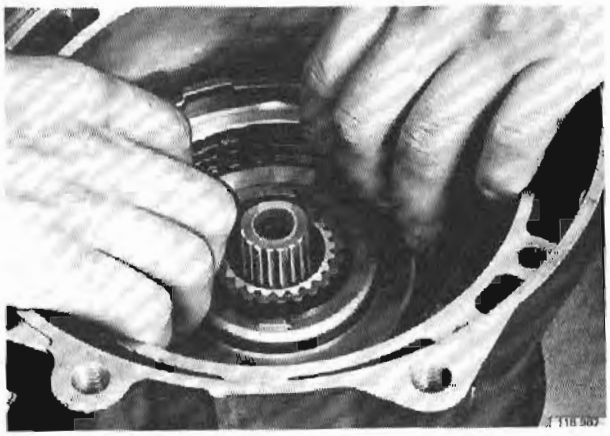


Z49

Install center support assembly

Install screws hand tight to avoid uneven load.

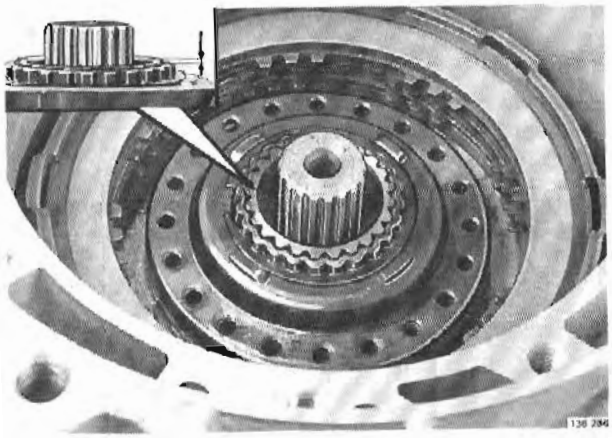
Do not torque screws.



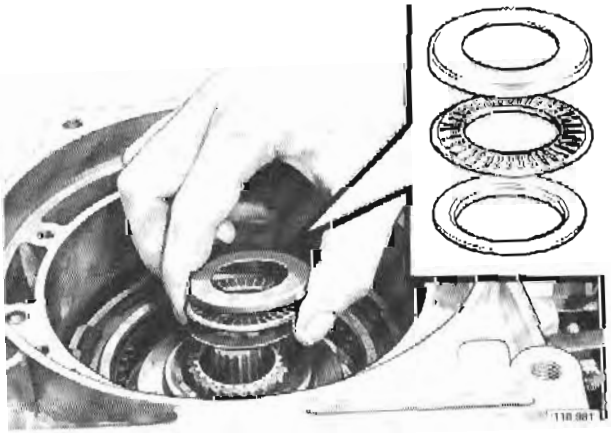
Z50

Install rear clutch

Align discs in center support assembly.



When correctly installed, clutch should lie flush or slightly lower than sun gear shaft.

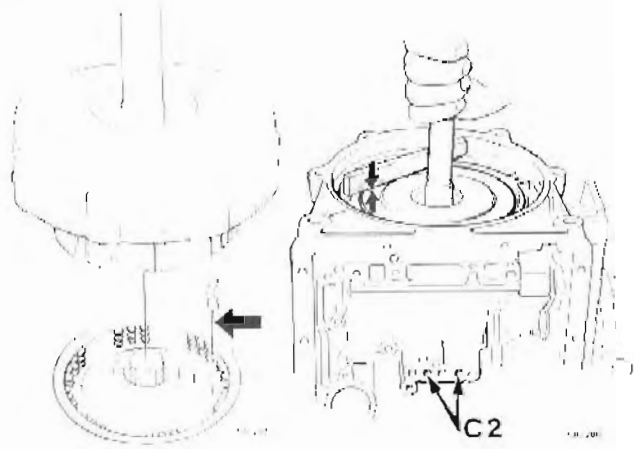


Z51

Install bearing races and needle bearing

Install races as illustrated. Apply Vaseline to races to keep them in position.

Assembly



Z52

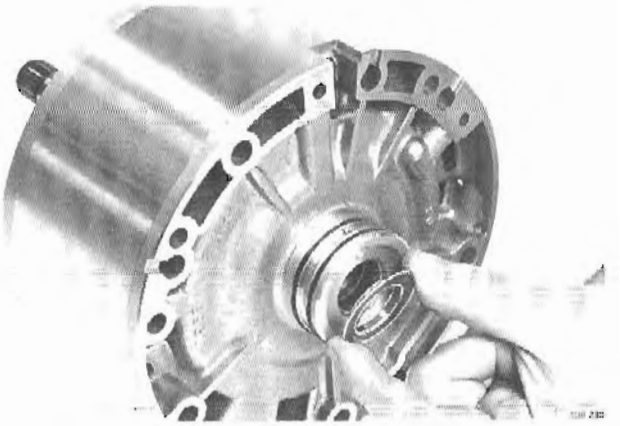
Install front clutch

Use a small screwdriver to align rear clutch discs.

Assemble front and rear clutch discs. (It can help to lock rear clutch discs by applying compressed air (max 14 psi) through feed hole as illustrated.)

Clutch should be slightly below gear case. If too high, it will not fit correctly and if oil pump is installed in this position, rear clutch discs will be damaged.

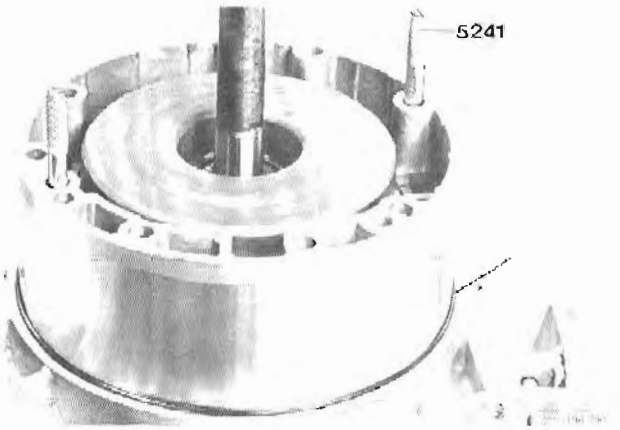
Check that needle bearing and race are installed on input shaft.



Z53

AW70/71: install bearing race in rear of overdrive housing

Apply a small amount of Vaseline.

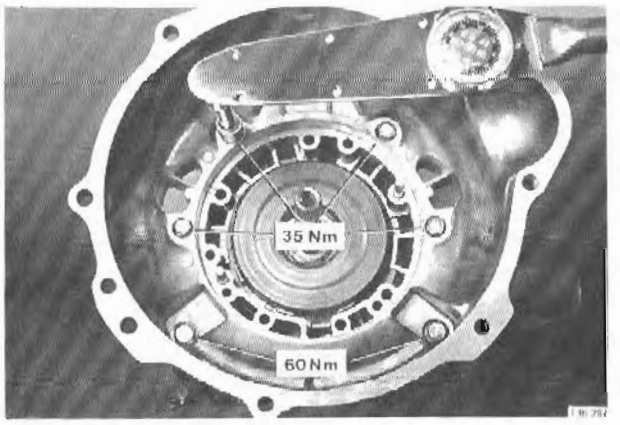


Z54

AW70/71: install:

— guide pins **5241** to center overdrive
— overdrive. Turn recess towards oil pan
O-ring

Check that CO clutch is approx 3.5 mm (0.14 in) beneath edge of overdrive housing (see R51)

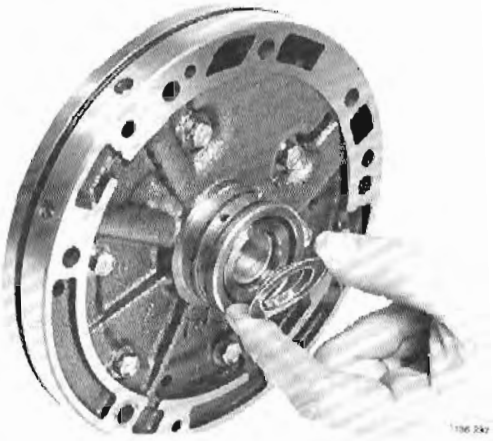


Z55

AW70/71: install torque converter casing

Lubricate overdrive contact surfaces with Vaseline

Torque: 4 upper screws to **35 Nm** (25 ft. lbs)
2 lower screws to **60 Nm** (43 ft. lbs).



Z56

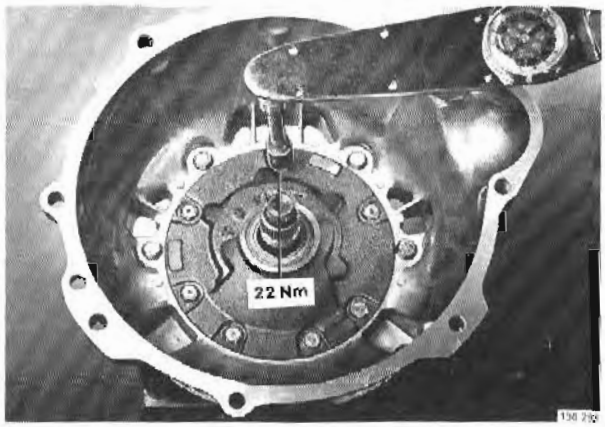
Install race in rear of oil pump

Use a small amount of Vaseline.

Install O-ring

AW55, 70, 71 (early types), BW55: all have same type of bearing and race.

Late type AW71: needle bearing and front thrust washer form one unit.



Z57

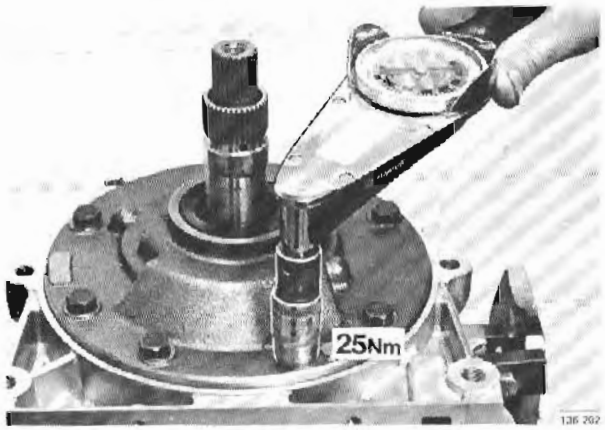
AW70/71: install oil pump

Lubricate oil pump O-ring with ATF

Remove guide pins **5241**. Apply Silicon to heads of screws.

Install oil pump screws with new washers (P/N 1233270-6). Ensure oil pump seat for washer is free from paint.

Torque screws crosswise to **22 Nm** (16 ft. lbs). Make sure that O-ring is not twisted out of position.



Z58

AW55, BW55: install oil pump

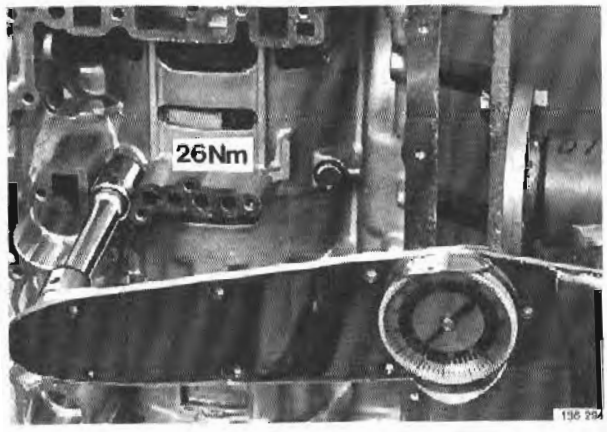
Lubricate oil pump O-ring with ATF

Smear screw heads with silicon.

Install screws with new washers.

Oil pump surface must be clean and free from paint if washers are to have max effect.

Torque screws crosswise to **25 Nm** (18 ft lbs). Make sure that O-ring is not twisted out of position.



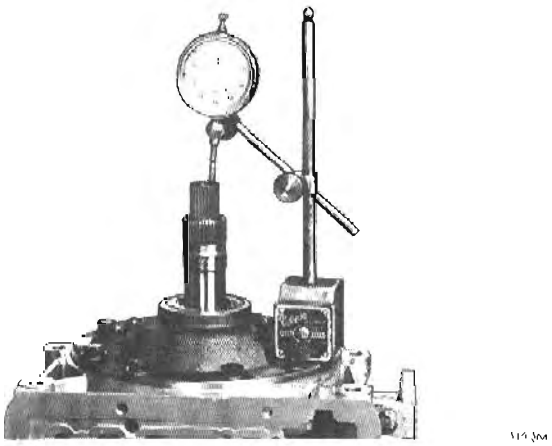
Z59

Torque center support assembly

Torque bolt nearest to accumulator pistons to **7 Nm** (5 ft lbs).

Then torque next bolt to **7 Nm** (5 ft lbs).

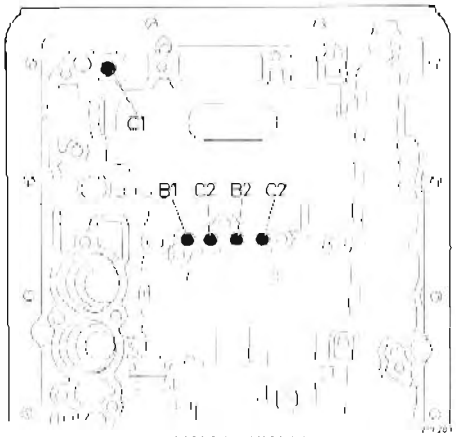
Continue torquing bolts crosswise to **14 Nm** (10 ft. lbs), **21 Nm** (15 ft. lbs) and finally **25 Nm** (19 ft. lbs).



Z60

Check end float of input and output shafts

End float
AW55, BW55 = 0.20–0.5 mm (0.008–0.020 in).
AW70/71 = 0.3–0.9 mm (0.012–0.035 in).

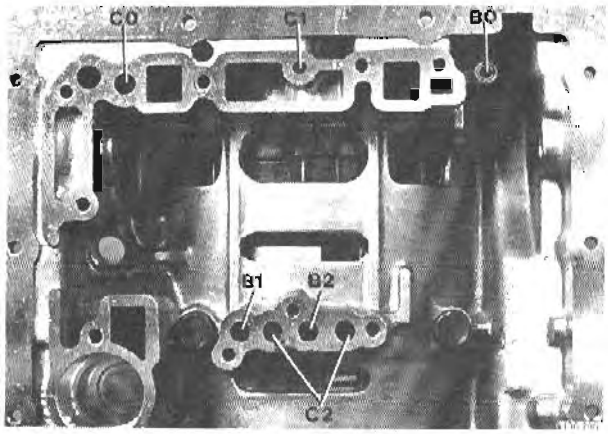


AW 55, BW 55

Z61

Check pistons

Apply compressed air (max 14 psi) to feed holes illustrated. A clear click should be heard.



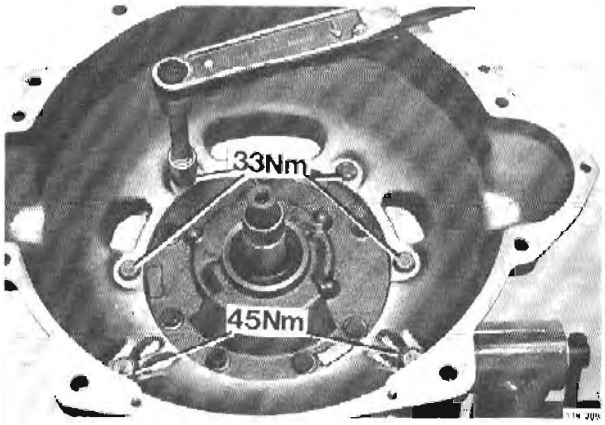
AW 70, AW 71

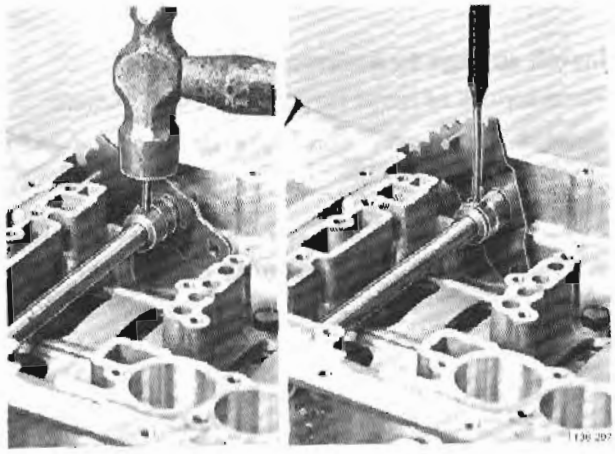
If pistons do not move, dismantle and check.

Z62

AW55, BW55: install torque converter casing

Torque: M10 (4x) to **33 Nm** (24 ft. lbs)
M12 (2x) to **45 Nm** (33 ft. lbs).





Z63

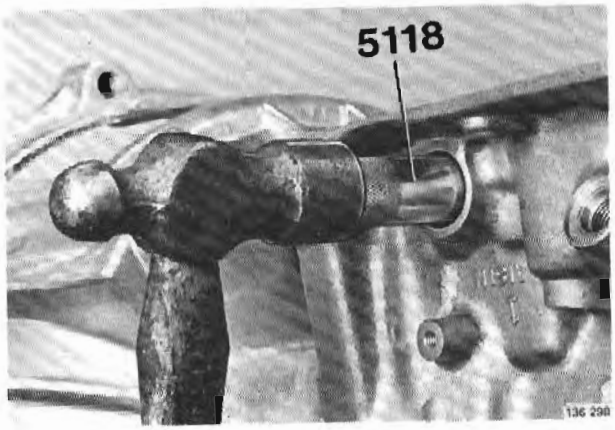
Install gear selector shaft and cam

Tap in a new pivot pin.

Install lock ring. (Applies to late type transmissions).

Note! Type of shaft and pin varies with transmission, see section on replacement, K5, page 54.

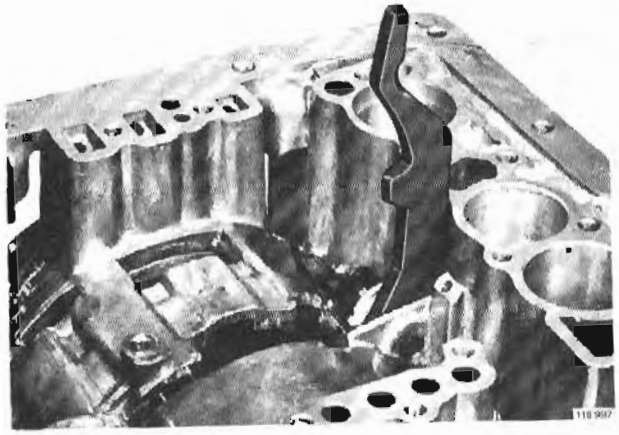
Late type shafts should be installed.



Z64

Install oil seals for gear selector shaft

Use drift **5118**.

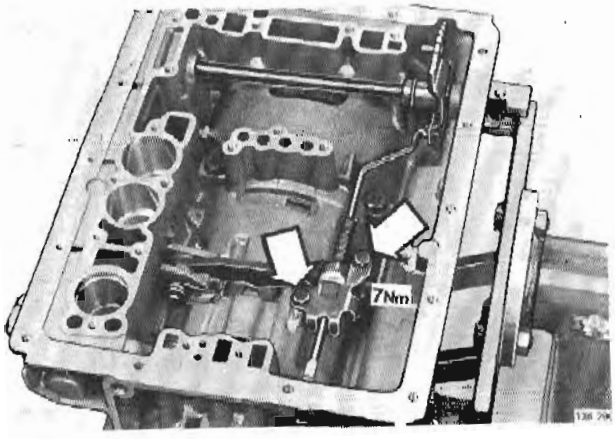


Z65

Install parking pawl, spring and pin

Spring should be installed as illustrated.

Note! See K8 page 54 for details of different types of parking pawls in use. Late type parking pawl should be installed.



Z66

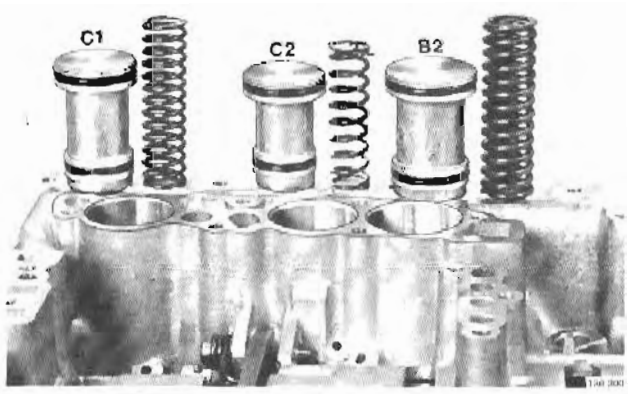
Install thrust rod

Connect rod to gear selector cam and install lock plate.

Torque screws to **7 Nm** (5 ft. lbs).

Note! Type of thrust rod varies with transmission type. (See K8, page 54).

Late type rod should be installed.



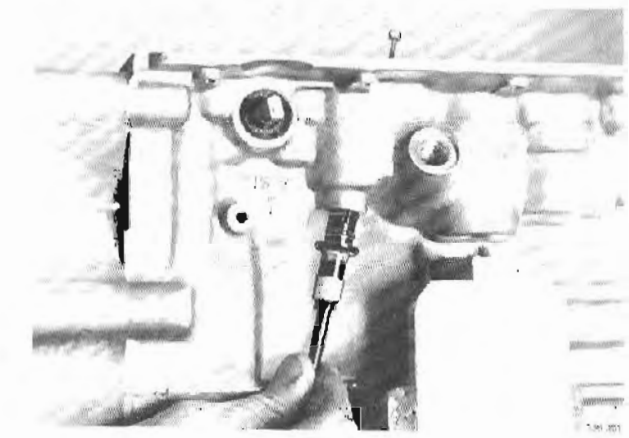
Z67

Install springs to accumulator pistons

Place springs as found (smallest spring in center).

Note! Some transmission types do not have center springs, see L6 on page 57.

Identification
BW55: C1 spring larger than B2 spring.
AW55, AW70/71: B2 spring larger than C1 spring.

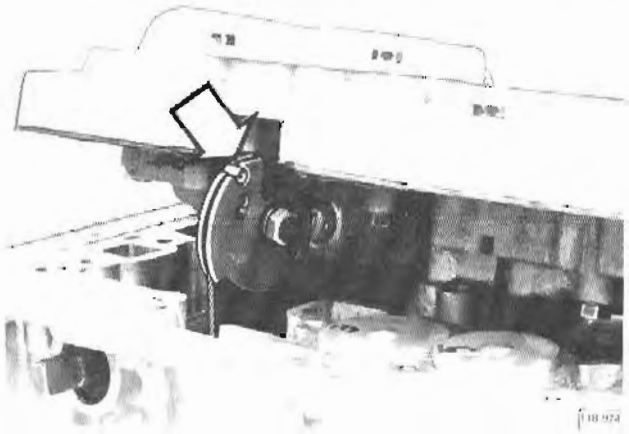


Z68

Install new O-rings on accumulator pistons. Install pistons

Note! O-ring type depends on piston type, see L4 on page 56.

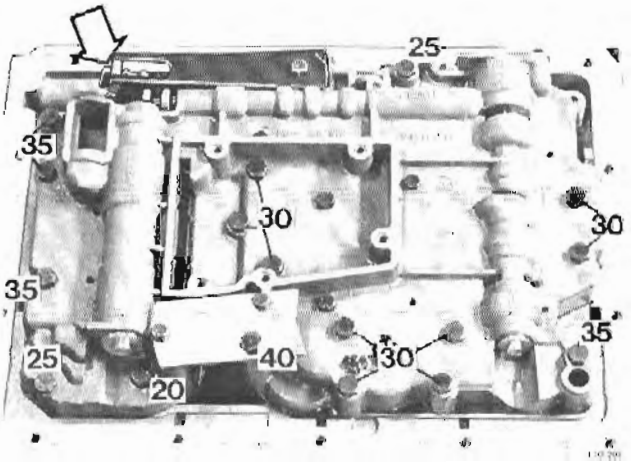
Place smallest piston in center.



Z69

Connect kick-down cable to gear case

Note! Type of kick-down cable depends on engine type and transmission type.



Z70

Connect cable to cam. Place valve body assembly in position and install screws hand tight

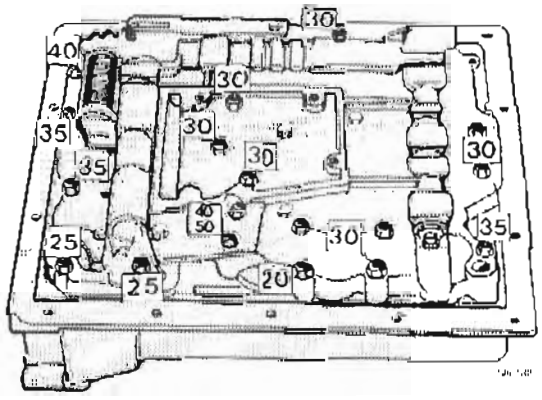
Align cam pin (arrow) with groove in gear selector valve.

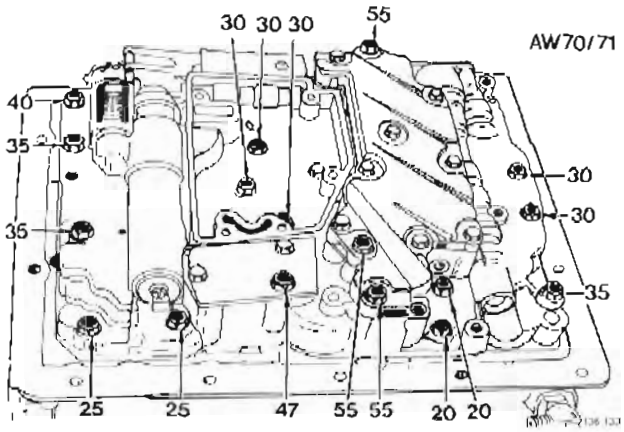
Note! Screw length varies on AW55, BW55 and AW70/71 transmission.

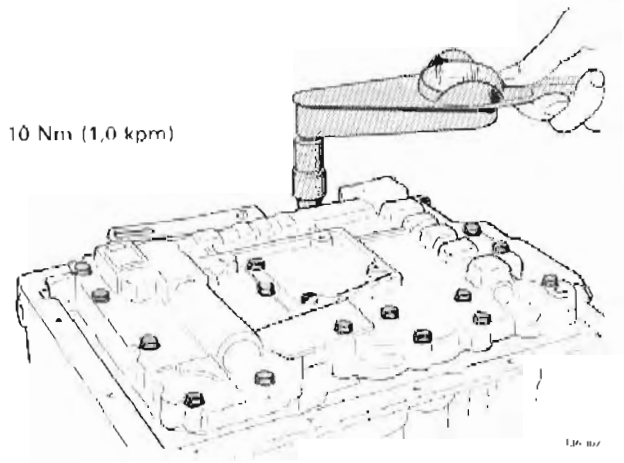
Location of screws is shown below (numbers refer to length in millimeters).

Arrange screws according to length and install shortest two screws first.

AW55

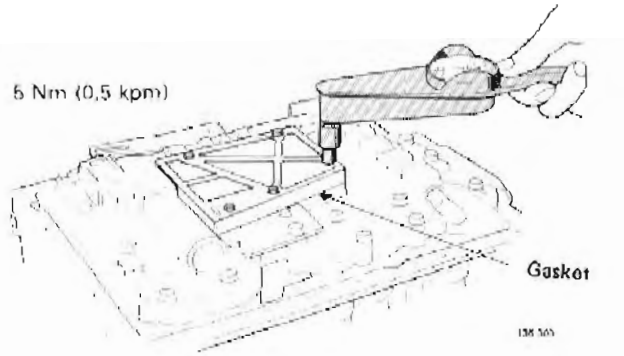


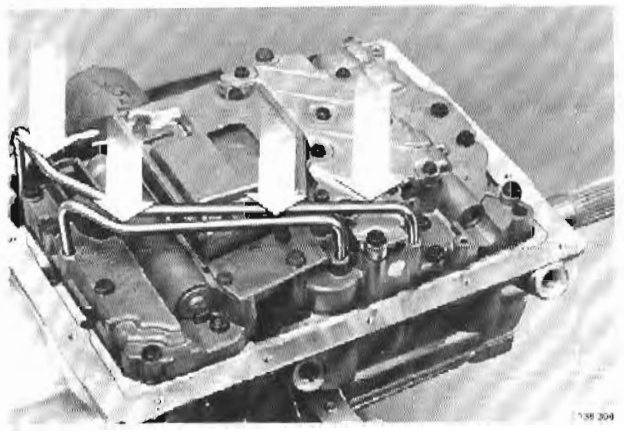




Z71

Torque screws to 10 Nm (7 ft. lbs)





Z72

Install:

- gasket
  spacer (applies to AW70/71, AW55 and BW55 with deep oil pan)
- oil filter.

Torque screws to **5 Nm** (3.6 ft. lbs)

BW55. two different types of oil filter are in use, either brass or steel.

Steel type is improvement on brass type. Spare stock brass filters may only be used on transmissions for B17, B19 and B21 engines.

Steel filters must be fitted to police and taxi vehicles.

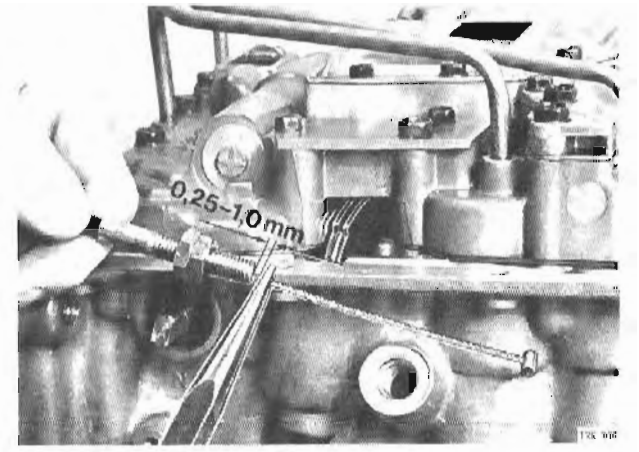
Steel filters were introduced with effect from following serial numbers:

Code	Code	Code	Code
013 1750-	019 7579-	025 1911	031 2193-
015 12960-	020 8776-	026 1415-	
016 1925-	022 1839-	027 1430-	
017 1300-	023 21187-	030 1822-	

Brass filter installed on transmission 014 until stocks used up, thereafter steel filter.

AW70/71: Connect oil pipes

Carefully tap pipes into position with a plastic mallet.

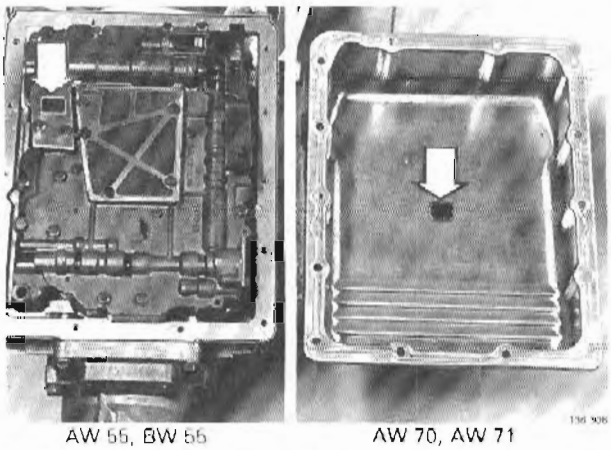


Z74

Secure cable clip

Carefully pull cable until cam is just about to move.

Attach clip 0.25–1.0 mm (0.01–0.04 in) from end of thread, see fig.



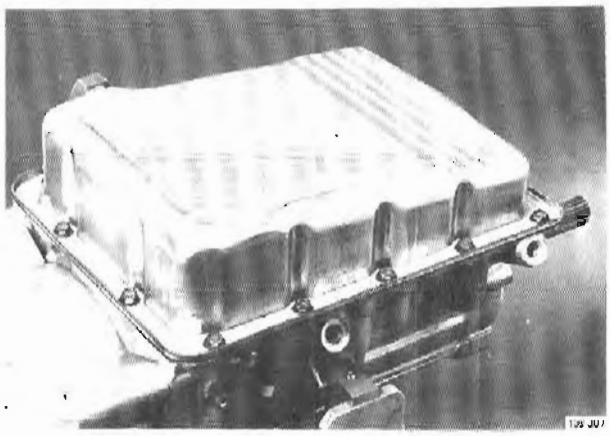
AW 55, BW 55 AW 70, AW 71

Z75

Install magnet (cleaned)

AW55, BW55: Place magnet in valve body cover plate

AW70/71: Place magnet in oil pan beneath oil filter.

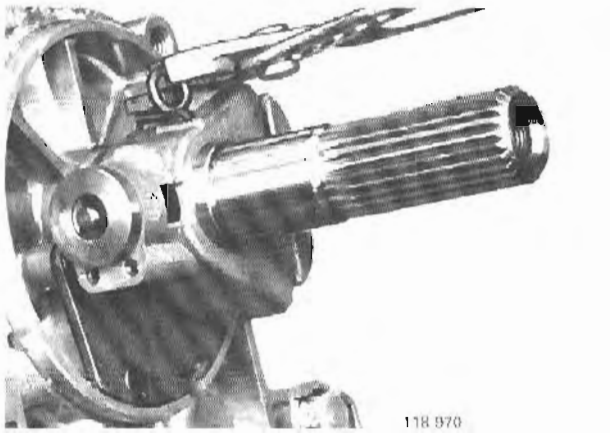


Z76

Install oil pan + new gasket

Tightening torques:

AW55
Grey cork gasket = 4.5 Nm (3.3 ft lbs)
BW55
Yellow gasket = 8 Nm (5.8 ft lbs)
Blue gasket = 10 Nm (7 ft lbs)
(Smear blue gasket with ATF prior to installing).
AW70/71
5 Nm (3.6 ft lbs).



Z77

Install plate + new gasket for oil passages, to governor

AW: Install oil filter in passage.

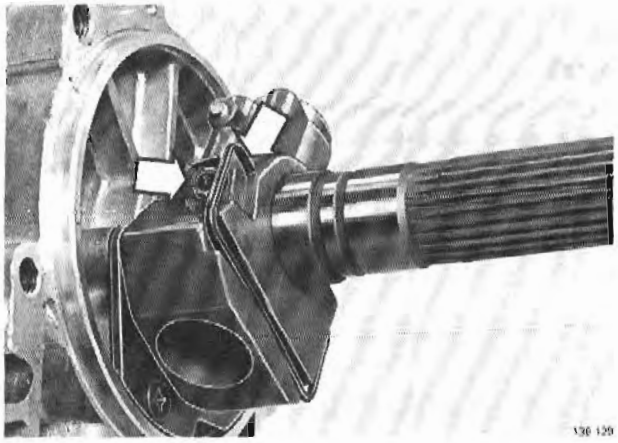
Z78

Install governor

Fit drive ring (clip) in hole in shaft.

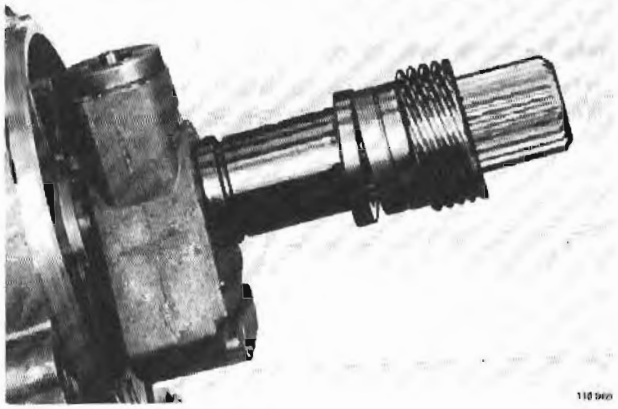
BW55: Turn ring until tight.

AW55: Hook on ring (also applies to early type AW70).



AW70/71: Install screw, bracket and drive ring. Tightening torque 4 Nm (2.9 ft lbs).

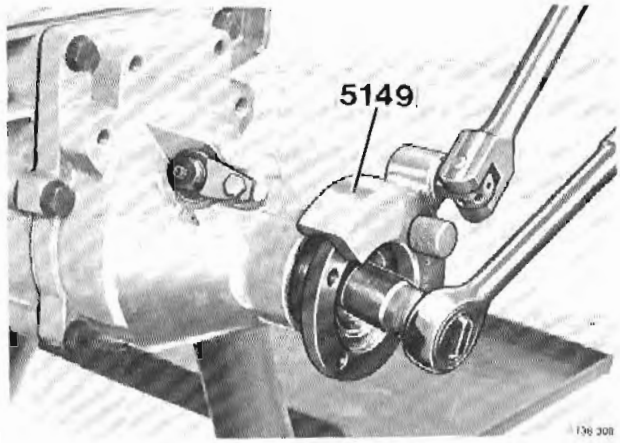
Z79



Install:

- spacer
- speedometer drive, see fig.

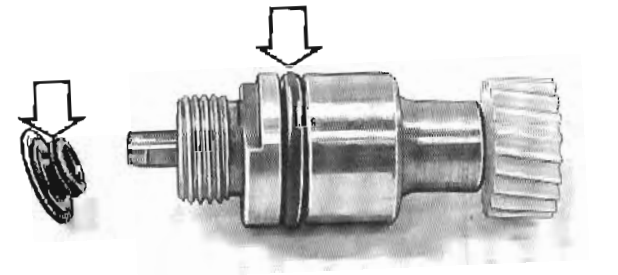
Z80

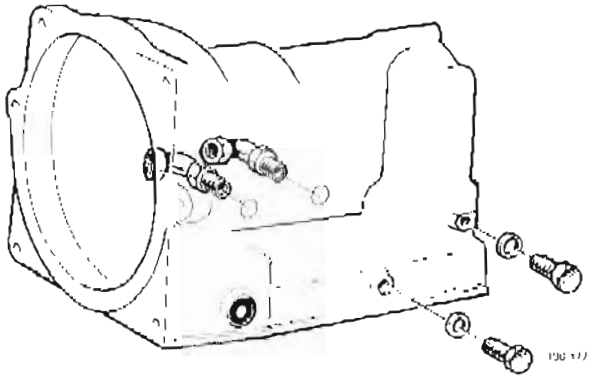


Install:

- extension housing + new gasket[1]
  Tightening torque **35 Nm** (25 ft lbs).
- speedometer driven gear + new O-rings. Turn recess in retainer towards hole in gear case.
  Tightening torque **8 Nm** (5.8 ft lbs).
- coupling flange. Use wrench **5149.**
  Tightening torque **45 Nm** (33 ft lbs).

[1] AW70/71: Do not forget to reconnect wire to solenoid valve, see Z86 on page 143.

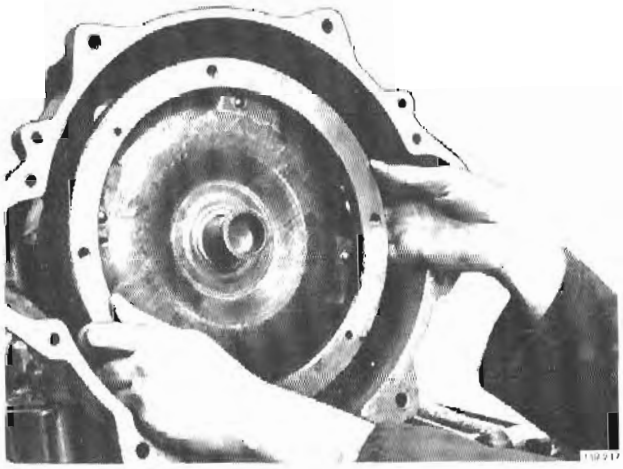




Z81

Install:

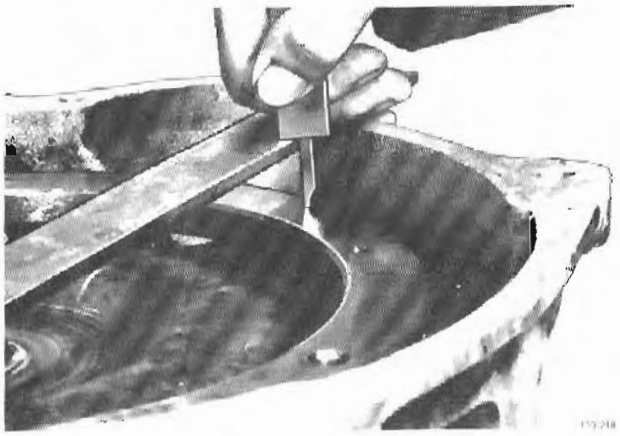
- nipples for oil cooler tubes. Use new O-rings. Adjust nipples to align with oil tubes.
- plugs for pressure gauge connections. Install new O-rings. Tightening torque **8 Nm** (5.8 ft lbs).



Z82

Install torque convertor

Rest torque convertor on input shaft. Turn it slowly and check that it slides in correctly on splines.



Z83

Check position

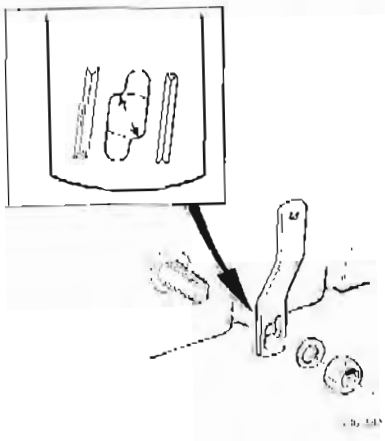
Place a straight edge across housing.

Measure distance from straight edge to converter face ring with a vernier caliper.

Tolerance – 16.2–19.60 mm = 0.64–0.77 in.

Z84

Remove transmission from stand 2520 and remove fixture 5070

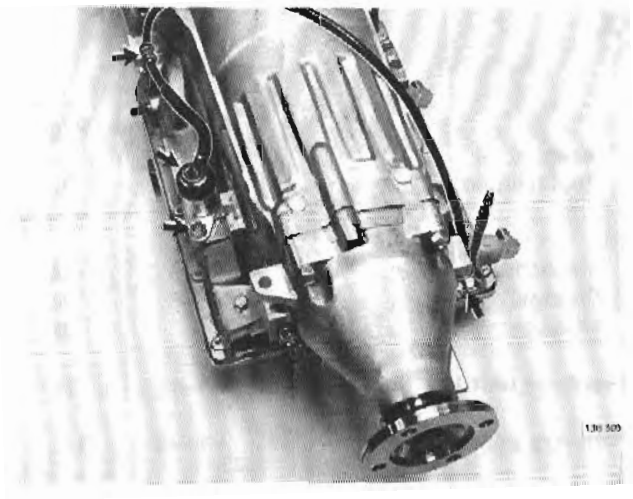


Z85

Install:

– selector lever. Torque to **14 Nm** (10 ft lbs).

Note! Type of lever varies, see K13, page 55.



Z86

AW70/71: Install solenoid + new O-rings

Smear O-rings with Vaseline prior to installing.

Tightening torque **13 Nm** (9.4 ft. lbs).

Connect wire to solenoid. Clamp wire to gear case.

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