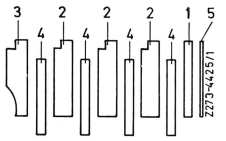
Adjusting Data

Idle travel "L" of plate clutch K 1	1.0 ± 0.2

Clutch Plates

	Thickness	Item No.
Outside plates	2.0	1
	5.0 or 5.5 optional	2
	5.5	3
Inside plates	2.5	4
Compensating washer	0.6	5

Clutch Plate Diagram

Clutch K 1		piston end

Special Tools

Assembly fixture	115 589 01 59 00
Introducing ring	116 589 02 61 00

Disassembly

1 Push circlip (2) out of groove with a screw driver and remove (Fig. 1).

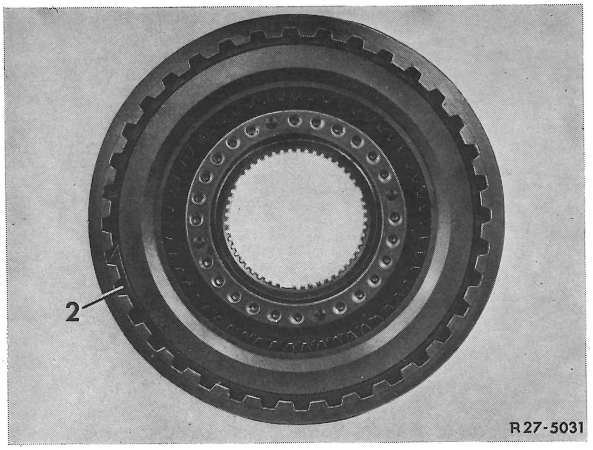


Fig. 1
2 Circlip

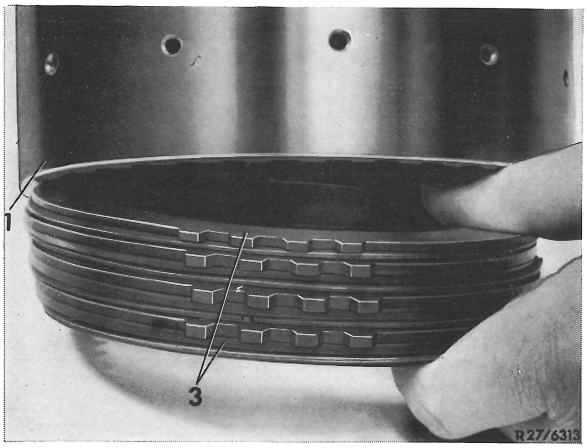


Fig. 2
1 Supporting flange
3 Plate assembly

2 Remove plate assembly (3) by tilting supporting flange (1) (Fig. 2).

3 Place assembly fixture (4) on spring retainer (5) in such a manner that the pressure ring is uniformly seated. Push spring retainer down with a press until circlip (6) is exposed and can be removed (Fig. 3).

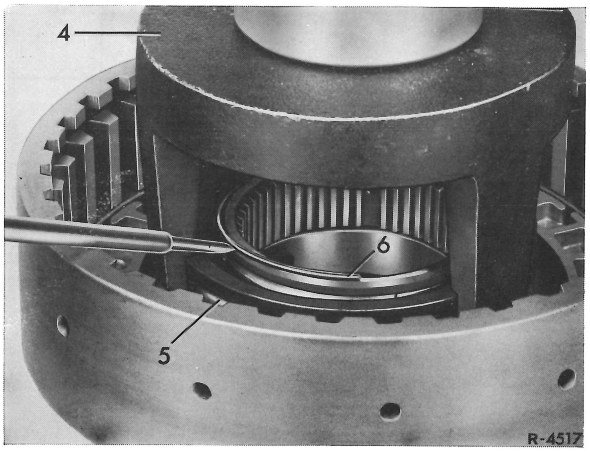


Fig. 3
4 Assembly fixture
5 Spring retainer
6 Circlip

4 Carefully release press, remove spring retainer (5) and springs (7) (Fig. 4).

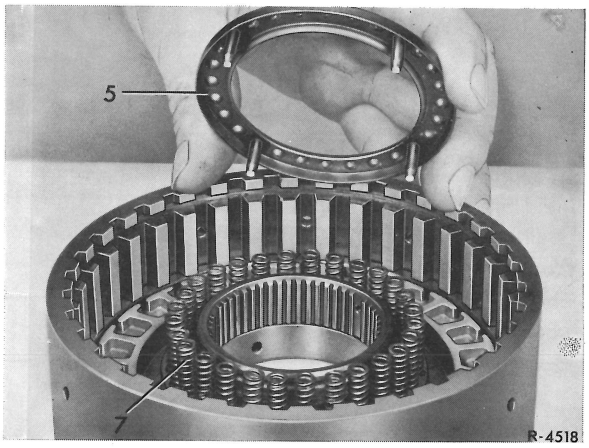


Fig. 4
5 Spring retainer
7 Springs

5 Hold piston (8) with two pointed pliers and pull out of supporting flange (1) until it can be held manually (Fig. 5).

6 Lift piston with lip sealing ring (9) out of supporting flange (1) and check lip sealing ring by sight.

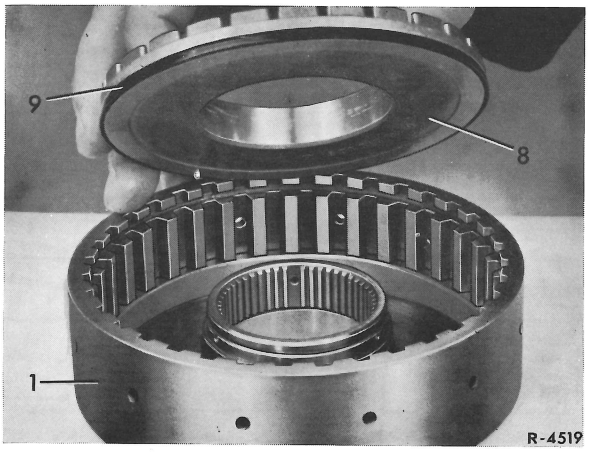


Fig. 5
1 Supporting flange
8 Piston
9 Lip sealing ring

Assembly

7 Install new lip sealing ring (11) to the extent required (Fig. 6).

Caution! Do not use sharp-edged tools.

The lip sealing ring should be correctly resting in groove (10) with the lip pointing downwards in direction of arrow (Fig. 6).

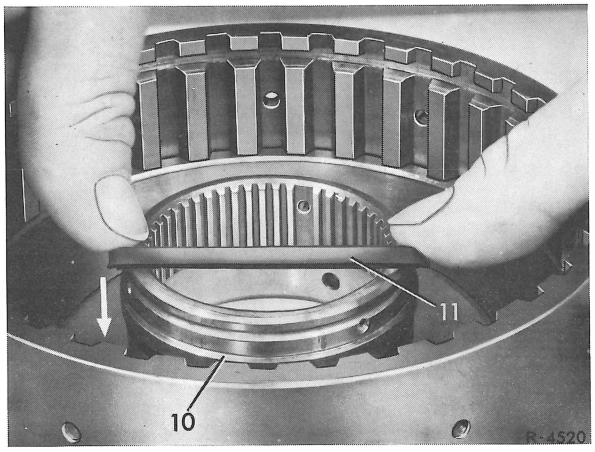


Fig. 6
10 Groove
11 Lip sealing ring

8 Insert introducing ring (12) into supporting flange (1) (Fig. 7).

9 Install new lip sealing ring (9) to the extent required; the sealing lip should point downwards in direction of arrow (Fig. 6 and 7).

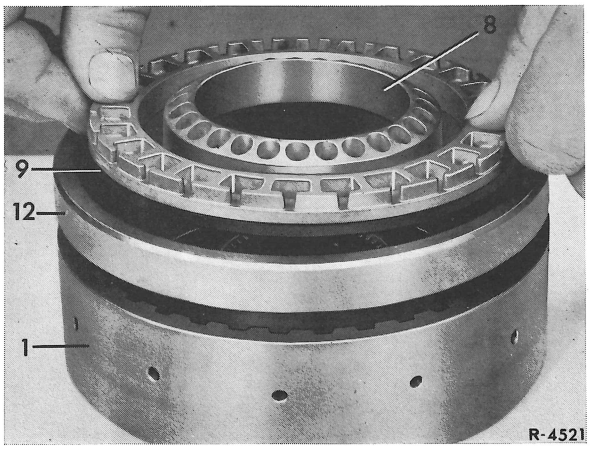


Fig. 7
1 Supporting flange
8 Piston
12 Introducing ring 116 589 02 61 00

10 Lubricate piston (8) and sealing ring, introduce and push on housing bottom without canting. Do not use force since this might damage lip sealing ring.

11 Insert piston retaining springs (7) into piston. Position spring retainer (5) in such a manner that each spring is centered in one prominence of the spring retainer (Fig. 4). Do not confuse springs with those of clutch K 2.

12 Mount assembly fixture (4) and push spring retainer carefully and without canting down under press until the circlip (6) can be inserted (Fig. 8).

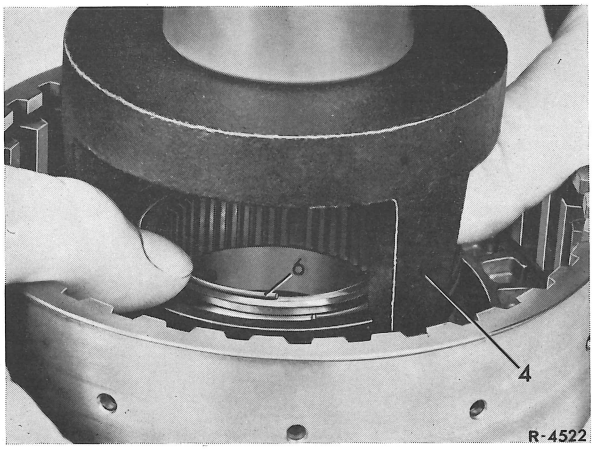


Fig. 8
4 Assembly fixture 115 589 01 59 00
6 Circlip

13 Carefully release press and watch out for correct seat of circlip (6).

14 Assemble plate assembly for clutch K 1 acc. to diagram. Immerse new lining plates first for a short moment in an ATF oil bath.

15 Insert plate assembly into outer plate carrier.

Caution! Replace outer plates showing badly burned spots and bends.

27.1 Disassembly, Reassembly and Measuring of Clutch K 1

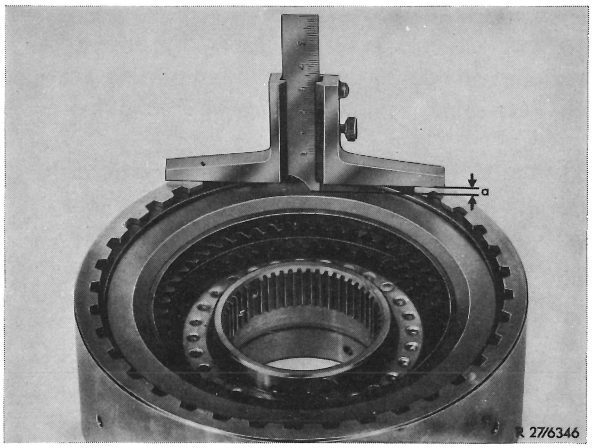


Fig. 9

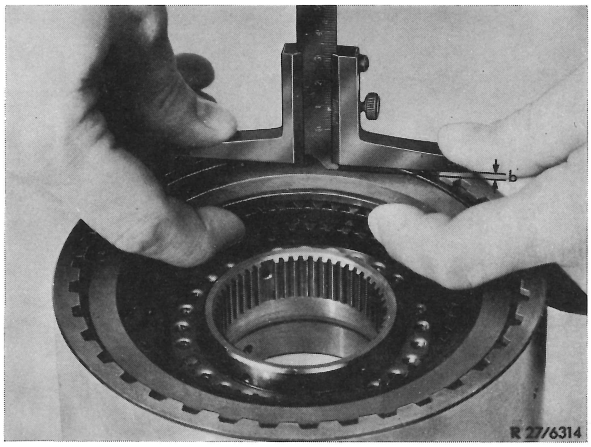


Fig. 10

16 Insert circlip (2) into groove and push down with screw driver (Fig. 1).

Caution! The resilient circlips of clutches K 1 and K 2 are different in spring force and should therefore not be confused.

The circlip of clutch K 1 has 6 undulations.

17 Determine idle travel „L" of clutch K 1. For this purpose, measure distance "a" (Fig. 9) and distance "b" (Fig. 10) with a depth gauge and determine "L". L = a–b.

18 When measuring distance "a", position depth gauge only lightly on plate assembly.

19 For measuring distance "b", push outer plate completely up (Fig. 10).

20 Idle travel can be optionally adjusted by means of compensating washers placed on piston or by means of outside plates (16 in Fig. 11) which are available 5.0 and 5.5 mm thick.

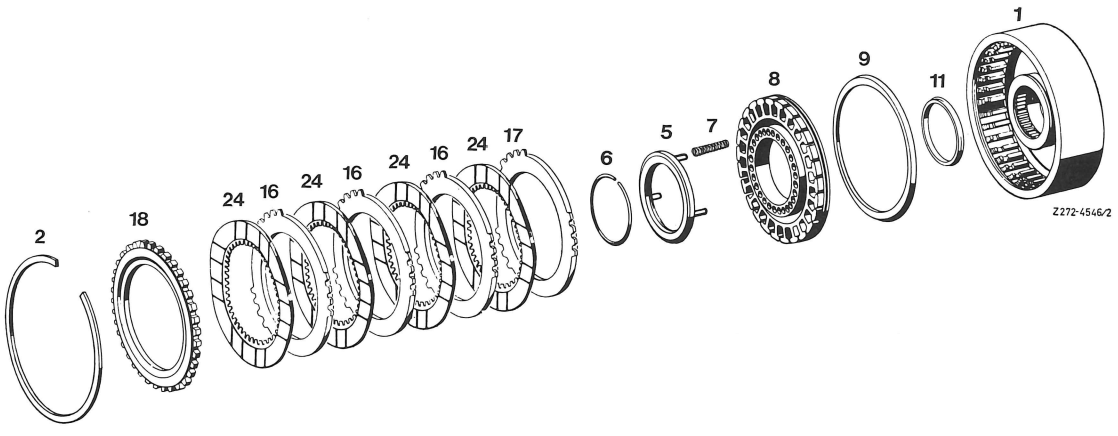


Fig. 11

Clutch K 1

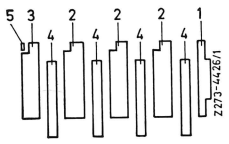
1 Supporting flange	7 Return pressure spring	16 Outside plates
2 Circlip	8 Piston	17 Outside plate
5 Spring plate	9 Lip sealing ring	18 Outside plate
6 Circlip	11 Lip sealing ring	24 Inside plates

Adjusting Data

Idle travel "L" of plate clutch K 2	1.0 ± 0.2

Clutch Plates	Thickness	Item No.
Outside plates	3.5	1
	5.0 or 5.5 optional	2
	5.0	3
Inside plates	2.5	4
Compensating washer	0.6	5

Clutch Plate Diagram

Clutch K 2		Piston end

Special Tool

Assembly punch	198 589 03 39 00

Disassembly

1 Hold supporting flange (21) down with assembly mandrel. Push straight circlip (20) out of groove with screw driver and remove (Fig. 1).

2 Remove supporting flange (21) with piston out of brake band drum B 2 (23) (Fig. 1).

Caution! Keep supporting flange and piston together, so that the piston cannot fall out.

3 Remove all return springs (28) and plate assembly (24) out of brake drum (23) (Fig. 2).

4 Push undulated circlip (25) with screw driver out of groove, if required and remove (Fig. 3).

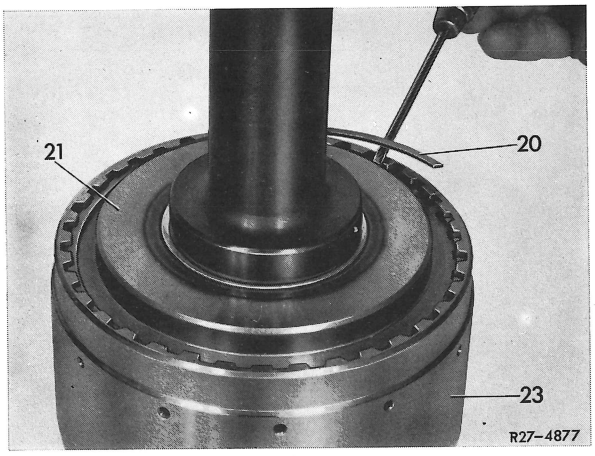


Fig. 1
20 Circlip
21 Supporting flange
23 Brake band drum B 2

27.1 Disassembly, Reassembly and Measuring of Clutch K 2

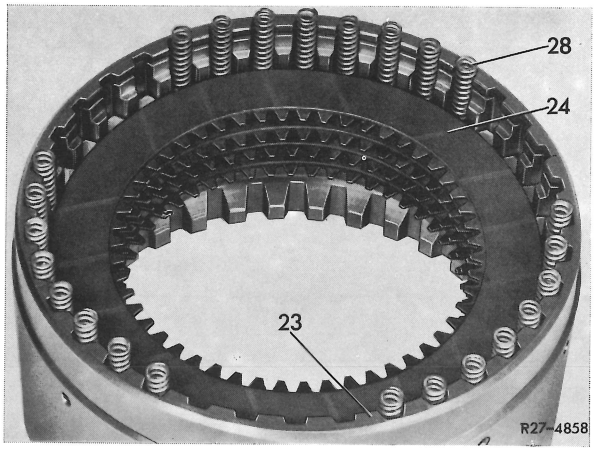


Fig. 2

23 Brake drum
24 Plate assembly
28 Return spring

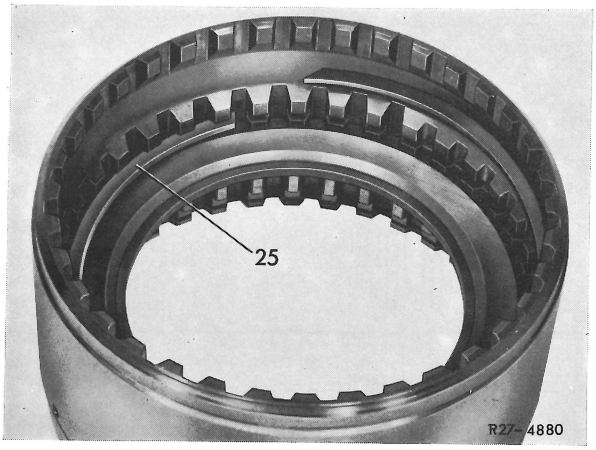


Fig. 3

25 Undulated circlip

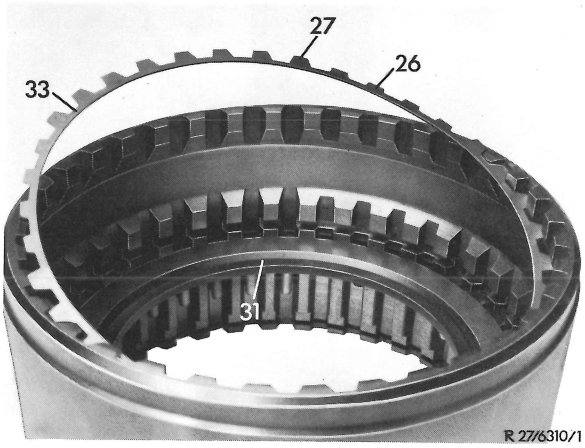


Fig. 4

26 Short lug
27 Long lug
31 Outside plate
33 Compensating washer

Caution! Circlips (20 and 25) are different from each other and should not be confused (Fig. 1 and 3).

5 Remove compensating washer (33) with outside plate (31) (Fig. 4) and guide ring (34) for return springs (Fig. 5).

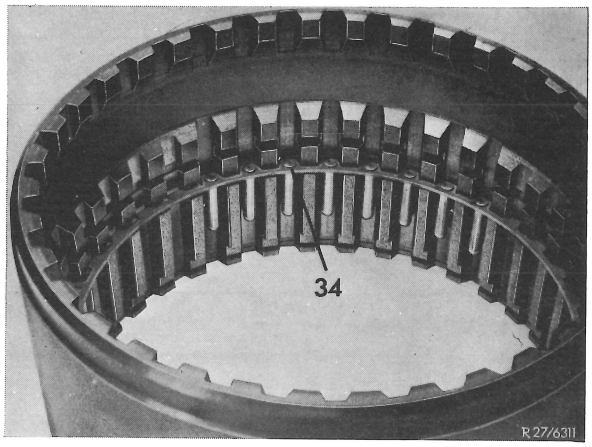


Fig. 5

34 Guide ring with return springs

6 Lift piston (22) with lip sealing ring (29) out of supporting flange (21) and check lip sealing ring by sight (Fig. 6).

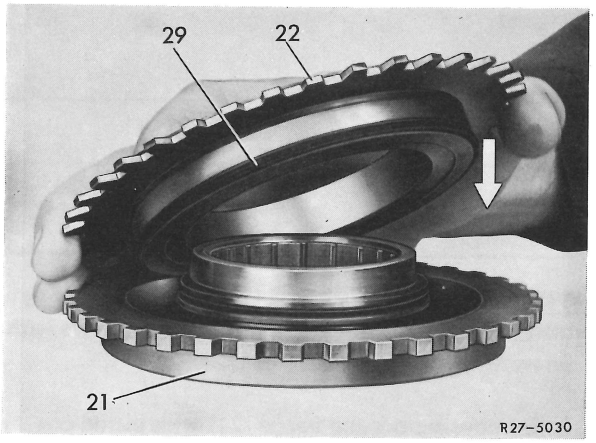


Fig. 6

21 Supporting flange
22 Piston
29 Lip sealing ring

Assembly

7 Insert guide ring (34) for return springs (Fig. 5), outside plate (31) and compensating washer (33) (Fig. 4).

8 Insert undulated circlip (25) into brake drum B 2 (23) (Fig. 3). Circlip should be tight in groove; assist with screw driver, if required.

Caution! The resilient circlips of clutches K 1 and K 2 differ in spring pressure and should therefore not be confused.

9 Assemble plate assembly for clutch K 2 acc. to clutch plate diagram. Immerse new lining plates shortly in an ATF bath.

10 Insert plate assembly into outside plate carrier, with the offset end of the outside plates (35) facing outwards (Fig. 7).

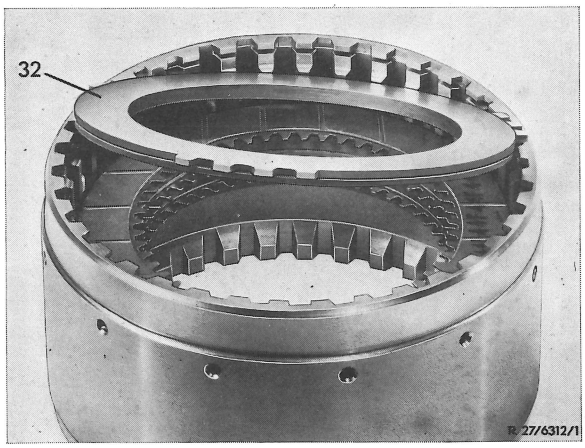


Fig. 7
32 Outside plate

11 Place clutch piston on plate assembly and determine dimension "a" from upper edge of outside plate carrier to clutch piston using depth gauge (Fig. 8).

12 Remove clutch piston.

Caution! Replace outside plates showing badly burned spots or bends.

13 Determine dimension "b" from top end of outside plate carrier to contact surface of supporting flange using depth gauge (Fig. 9).

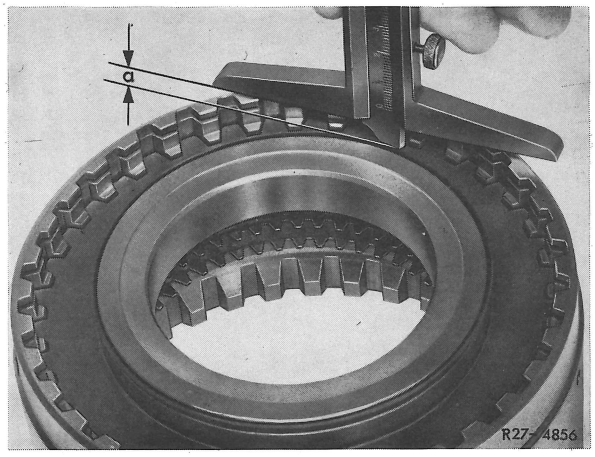


Fig. 8

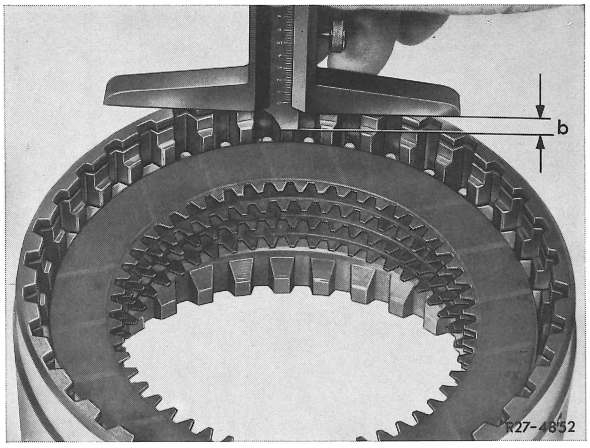


Fig. 9

14 Idle travel "L" of clutch K 2 results from a–b. Dimension "L" should be 1.0 ± 0.2 mm.

15 The idle travel can be adjusted by optionally using compensating washers placed on outside plate (32) (Fig. 4) or by outside plates (2) available in sizes 5.0 and 5.5 mm thick.

16 Place all return springs on guide pins "b" (Fig. 10).

17 Install new lip sealing ring (30) into supporting flange (21) to the extent required (Fig. 11). Lip sealing ring should rest correctly in slot (31) and the lip should face downwards in direction of arrow (Fig. 11).

18 Insert lip sealing ring (29) into groove of clutch piston (22). Sealing lip should face downwards in direction of arrow (Fig. 6).

27.1 Disassembly, Reassembly and Measuring of Clutch K 2

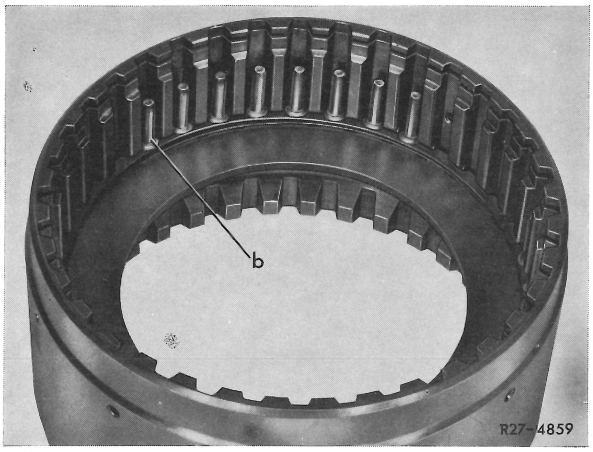


Fig. 10
b Guide pin

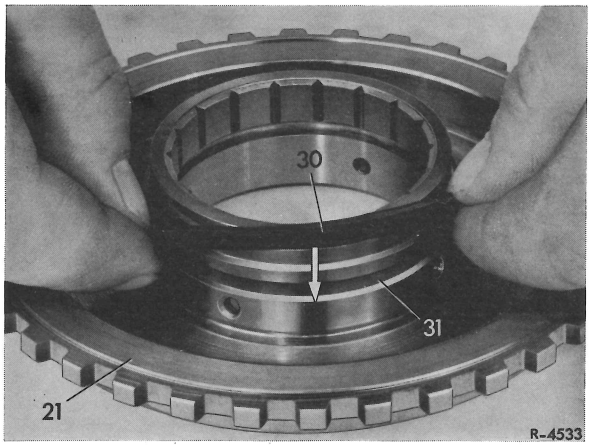


Fig. 11
21 Supporting flange
30 Lip sealing ring
31 Groove

19 Lubricate lip sealing rings (29 and 30) (Fig. 6 and 11). Insert piston (22) into supporting flange. Use a pencil or ball pen to push sealing lip into supporting flange, then push-in piston without canting (Fig. 12).

Caution! When inserting the lip sealing ring into groove and then pushing into the supporting flange, do not use pointed or sharp-edged tools.

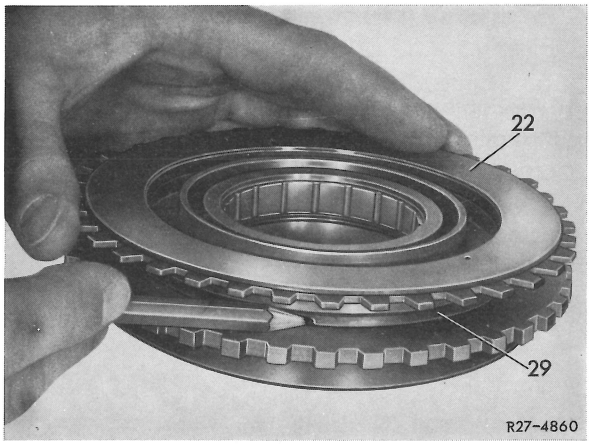


Fig. 12
22 Clutch piston
29 Lip sealing ring

20 Insert supporting flange (21) (Fig. 1).

21 Insert circlip (20) and push into groove with screw driver (Fig. 1).

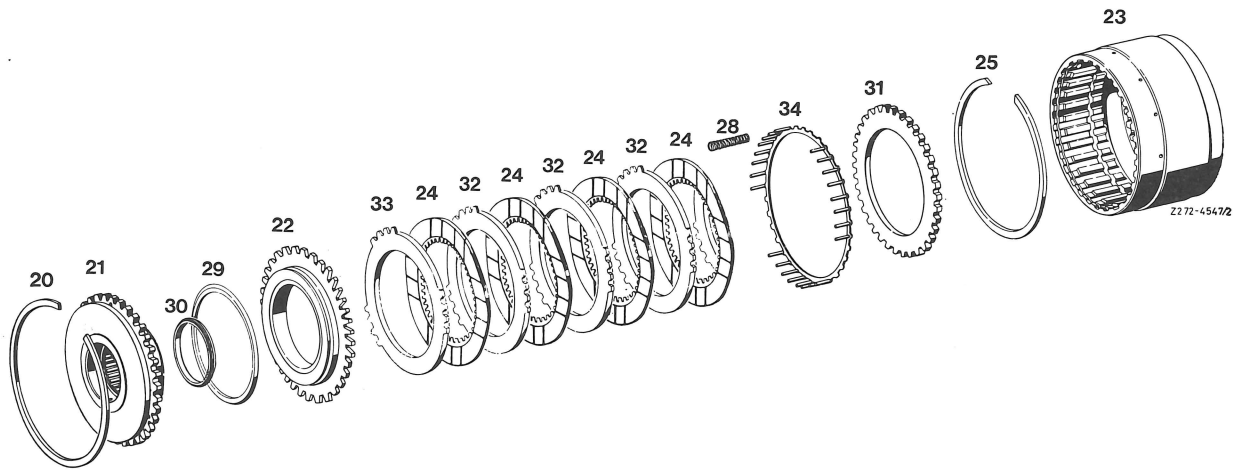


Fig. 13
Clutch K 2

20 Circlip
21 Supporting flange
22 Piston
23 Brake band drum B 2
24 Inside plates
25 Undulated circlip
28 Return springs
29 Lip sealing ring
30 Lip sealing ring
31 Outside plate
32 Outside plates
33 Outside plate
34 Guide ring

78

		Job No.
General Information		001
Maintenance Jobs		
Oil Level Checkup		010
Oil Change, Filter Change		020
Adjusting Jobs		
Adjustment of Control Pressure Rod and Selector Rod		110
Adjustment of Starter Locking-Backup Light Switch and Kickdown Switch		140
Transmission Checkup		
Checking the Torque Converter		310
Checkups during Test Drive		320
Measuring Instruments and their Connections		330
Measuring the Nominal Pressures		340
Shift Valve Housing		
Removal and Installation of Shift Valve Housing		400
Disassembly and Reassembly of Shift Valve Housing		420
Rear Transmission Case		
Removal and Installation of Rear Transmission Case		500
Removal and Installation of Centrifugal Governor		520
Removal and Installation of Parking Lock		540
Disassembly and Reassembly of Rear Transmission Case		560
Disassembly and Assembly of Centrifugal Governor		570
Renewal of Starter Lock and Backup Light Switch		580
Transmission		
Removal and Installation of Transmission		600
Disassembly and Assembly of Front Transmission Cover with Primary Pump	R	620
Disassembly and Assembly of Transmission (Partial Repairs)	R	630
Disassembly and Assembly of Transmission	R	640
Disassembly, Reassembly and Measuring of Gear Assembly	R	660
Disassembly, Reassembly and Measuring of Clutch K 1	R	680
Disassembly, Reassembly and Measuring of Clutch K 2	R	690

W 3 A 040

The new automatic transmission W 3 A 040 will be installed with a number of modifications into vehicle models 350 SL (107.043) and 350 SLC (107.023) as from July 1972.

At a later date, these modifications will also apply to transmission W 3 A 040 installed in US models. For better differentiation these modifications will be identified as **2nd version** in the pertinent job numbers, and the version installed up to now as **1st version.**

The modifications apply to the following job numbers:

1. The shift valve housing is provided with an additional double ball valve. (Disassembly and assembly of shift valve housing, Job No. 420).
2. Improved version of pressure receiving piston. (Disassembly and reassembly of rear transmission housing, Job No. 560).
3. The double-looped brake band B 2 is replaced by a single band, the brake band piston diameter is increased from 75 mm dia. to 88 mm dia. (Disassembly and reassembly of transmission, Job. No. 640).
4. The line-up of outer discs of K 1 and K 2 has been changed. (Disassembly, reassembly and measuring of clutch K 1 and K 2, Job No. 680 and 690).

W 3 B 050

The automatic transmission W 3 B 050 ist a reinforced version of the automatic transmission W 3 A 040. Design and function of the two transmission types are identical. Essential parts of transmission W 3 B 050 habe been reinforced to transmit higher torques.

The number of inner discs in clutch K 1 and K 2 has been increased, and the outside disc carriers K 1 and K 2 had to be widened accordingly.

As a result of the reinforced clutches K 1 and K 2, the transmission case is now longer by 10 mm as compared with the other transmission types, and the hollow shaft and the intermediate shaft were also extended accordingly.

The essential differences in the two transmission types are discussed in the pertinent job numbers of transmission W 3 B 050.

Oil Type

Automatic Transmission Fluid (ATF)	Type B, Dexron B
Approved Oil Types	Refer to Pertinent Specifications, Page 236.4

Special Tools

Filling Funnel	111 589 04 63 00
Syringe	112 589 00 72 00

Oil Level Checkup

Complete oil level checkup at least every 15,000 km (9,000 miles).

This checkup is made with the engine running, the parking brake pulled, and the selector lever in position „P", with the **vehicle resting on level ground in unloaded condition** and the **transmission at operating temperature** (approx. 80° C cooling water temperature). Prior to the inspection, run engine for approx. 1—2 minutes at idling speed so that the torque converter can fill up.

C a u t i o n ! At an oil temperature of 20°—30° C the max. oil level is in fact approx. 30 mm below the lower dipstick mark. This information is provided as an aid during an oil change, which is generally made at this oil temperature.

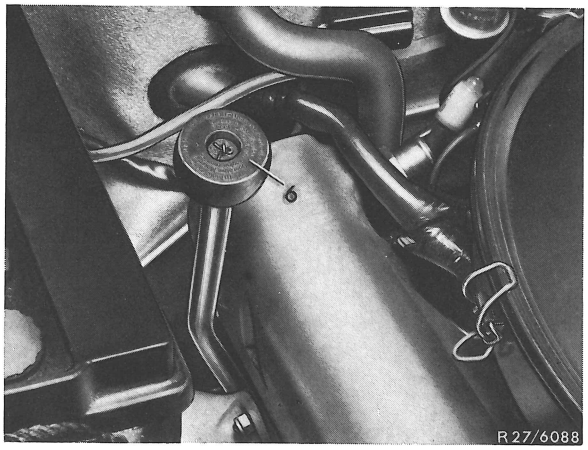


Fig. 1
6 Oil dipstick

Wipe oil dipstick (6) with a lintfree cloth (leather is best), immerse fully for measuring, pull out again and read oil level (Fig. 1).

Notes

A fully **cooled down transmission** will show an **oil level below the bottom dipstick mark** even when correctly filled with oil.

Add required oil through a funnel with a finemesh strainer into **pipe for oil dipstick** with the engine running. (Funnel 111 589 04 63 00 is recommended). A reference value is as follows: The distance between the upper and the lower dipstick mark corresponds to approx. 0.3 liters of transmission fluid.

If the oil level is too low the oil pump will **suck up air** which can be clearly heard. The **oil will foam** and provide **wrong results** during an oil level checkup. Wait until the oil foam is down (for approx. 2 minutes), add oil and check oil level.

Excessive transmission fluid must be drained or drawn off, since otherwise the transmission gears would be splashing in oil. The temperature will increase unnecessarily until the foaming oil will be ejected through breather. **Continuous operation** under such circumstances **will lead to transmission damage.** The syringe 112 589 00 72 00 for rinsing the oil cooler can be provided with a hose and can then be used for drawing off excess transmission fluid.

Actuate service brake when the upper dipstick mark is attained after adding oil.

27.2 Oil Level Checkup

Leave selector lever in position R—N—D—N—R— in each position for several seconds — and move back to position "P", so that the working pistons of the servo members are charged with oil. Then check oil level once again and make corrections, if required.

Oil Capacity in Liters				Oil Type
Type	107.023 107.043 116.028	107.024 107.044 108.067 108.068	109.057 116.032 116.033	
Initial capacity	7.9	8.9		ATF type B, Dexron B for approved oil types refer to pertinent „specifications" page 236.4
During oil change	6.9	7.9		

Oil Change Intervals

Oil change, filter change	every 45,000 km[1)] (27,000 miles)

1) For vehicles which are running under aggravated conditions (such as taxis, vehicles with trailers or on mountain roads) an additional oil change is required (without replacing filter.)

Tightening Torque	Nm	(kpm)
Fastening bolts of oil pan	7	(0.7)

Draining the Oil and Changing the Filter

The following conditions must be observed during an oil change: vehicle on level ground, transmission at operating temperature, engine shut off.

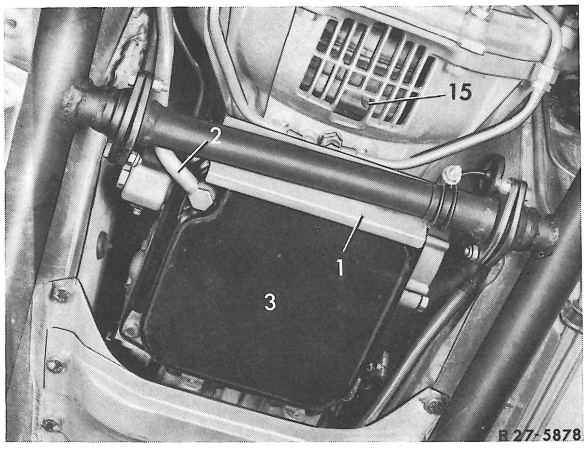


Fig. 1
1 Shielding plate
2 Oil filler pipe
3 Oil pan
15 Oil drain plug

Unscrew oil filler pipe (2) and let oil run out (Fig. 1).

Rotate crankshaft until the oil drain plug (15) shows up and can be screwed out (Fig. 1).

When no more oil runs out of transmission and torque converter, remove transmission oil pan and replace oil filter (4) (Fig. 2).

Mount oil pan and tighten fastening bolts to 7 Nm (0.7 kpm). Attach oil filler pipe.

Screw oil drain plug (15) into torque converter using a new sealing ring.

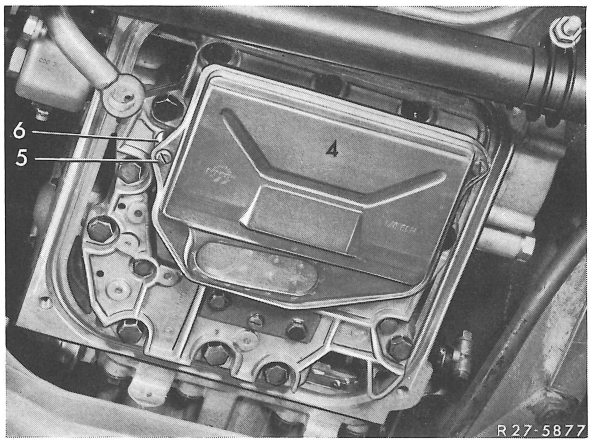


Fig. 2
4 Oil filter
5 Fastening bolts
6 Spacer sleeve

27.2 Oil Change, Filter Change

Filling-in Oil

First fill in a major quantity (approx. 4 liters) of an approved automatic transmission fluid through the hole for the oil dipstick with the engine stopped. Start engine in selector lever position "P" and run at idling speed, add remaining oil immediately.

Actuate service brake and leave selector lever in each position for several seconds. Then check oil level with the oil at operating temperature (refer to Job No. 27.2–010).

Caution! The oil level in the transmission changes with the oil temperature. The marks (max. and min.) on oil dipstick refer to an oil temperature of 80° C – normal temperature of transmission at operating temperature. – But at an oil temperature of 20–30°C the max. oil level is approx. 30 mm below the lower dipstick mark. This information serves for orientation during oil change, which is generally made at this oil temperature.

Caution! All the adjusting jobs described below should be made only with the vehicle standing on its wheels.

Adjustment of Control Pressure Rod

Remove air filter and disconnect control pressure linkage (13).

Throttle valve should rest against idling speed stop.

Push regulating lever (17) and angle lever (20) to idle throttle position.

Push control pressure rod (13) completely toward the rear against stop and check or adjust length free of stress in relation to ball head.

Note: When checking the control pressure linkage for length, hold ball socket to the left adjacent to ball head and not above, due to the circular movement of the linkage.

Adjustment of Selector Rod – Floor Shift all Models

Disconnect selector rod (5) on range selector lever (6). Set range selector lever (6) and selector lever (1) to „N", making sure that approx. 1 mm play is available between the selector lever (1) and the "N" stop on gate plate. Adjust length of selector rod (5) in such a manner that it can be attached free of stress; then tighten counternut (4) again.

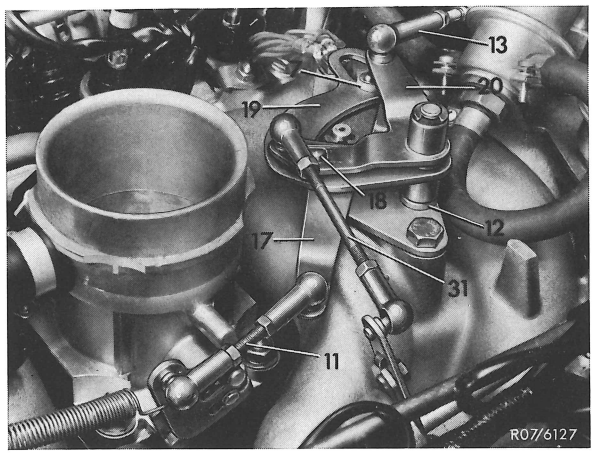


Fig. 1

7 Roller
11 Connecting rod
12 Bearing bracket
13 Control pressure rod
17 Regulating lever
18 Stop pin
19 Gate lever
20 Angle lever
31 Connecting rod

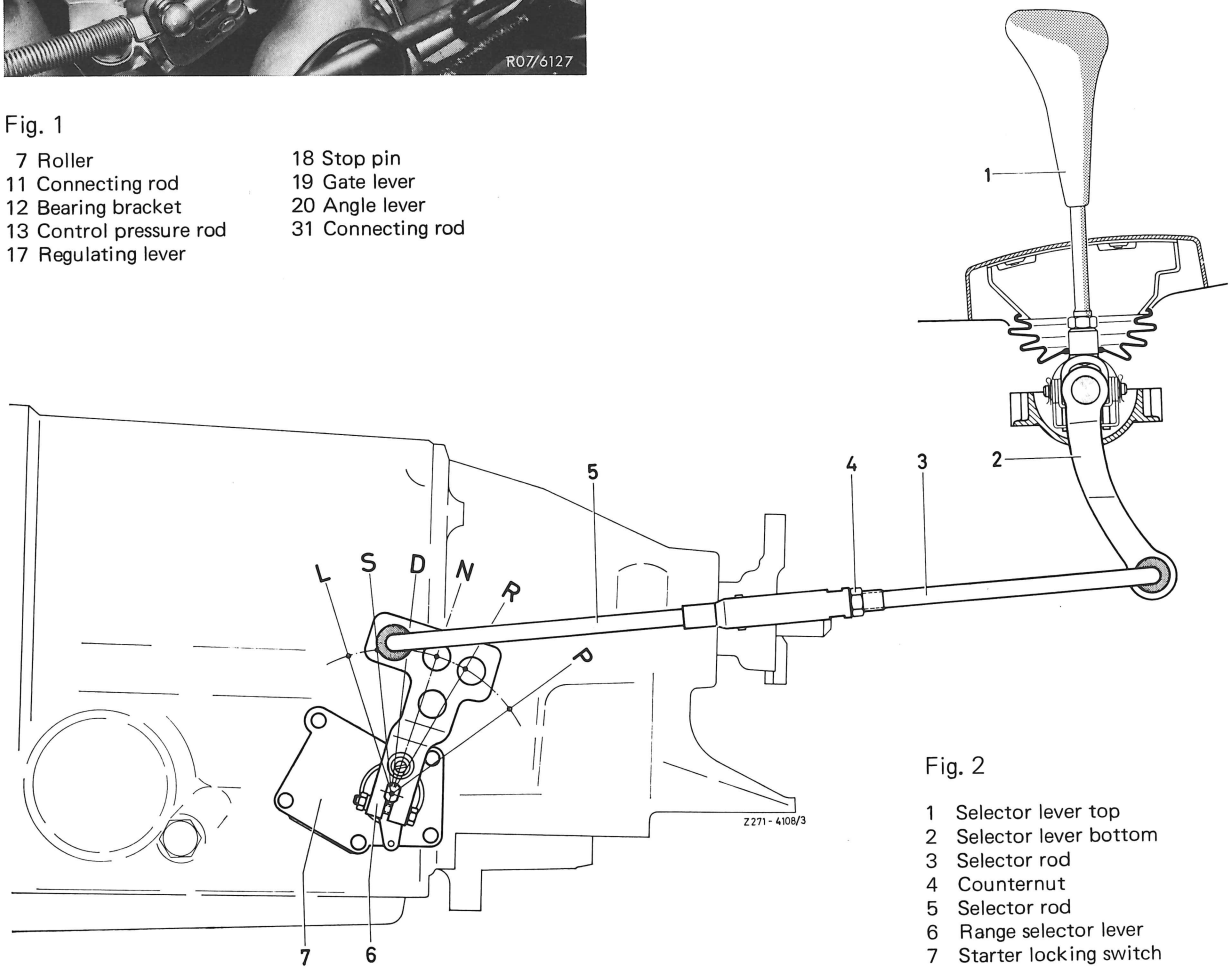


Fig. 2

1 Selector lever top
2 Selector lever bottom
3 Selector rod
4 Counternut
5 Selector rod
6 Range selector lever
7 Starter locking switch

27.2 Adjustment of Control Pressure Rod and Selector Rod

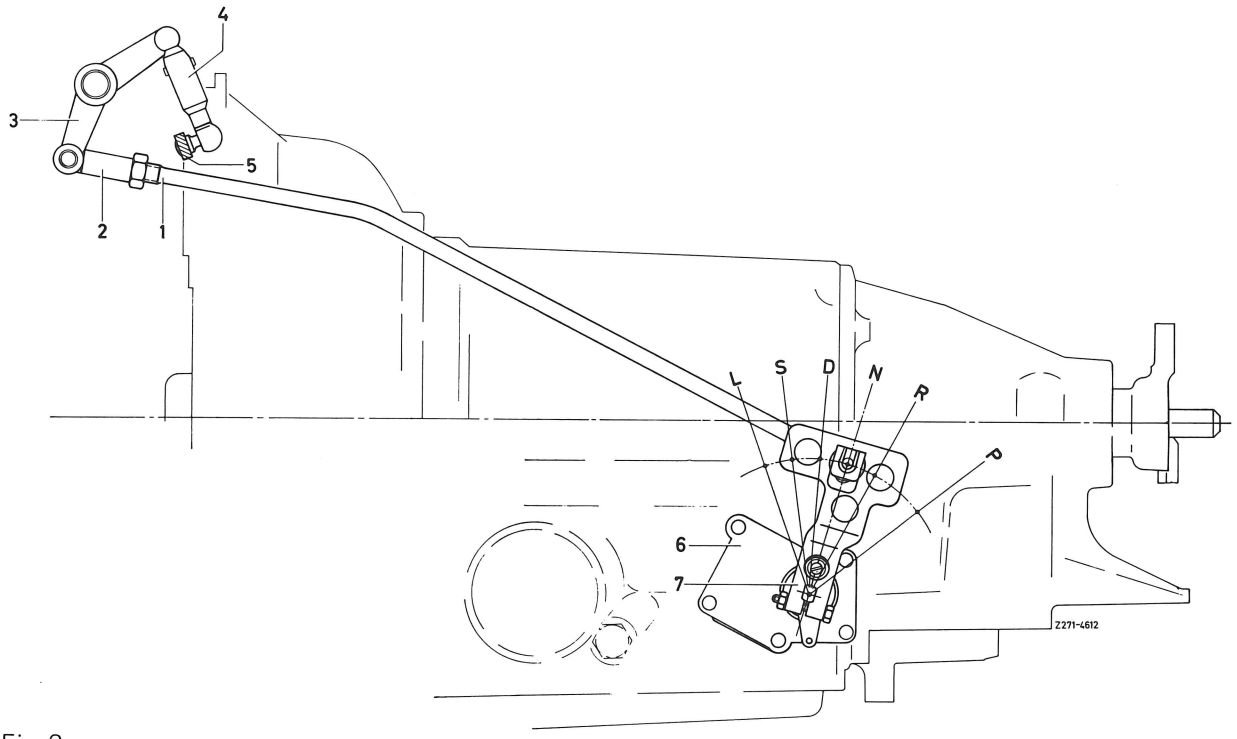


Fig. 3

Selector linkage model 108, 109

1 Selector rod
2 Ball socket
3 Intermediate lever
4 Elastic intermediate piece
5 Bearing bracket
6 Starterlock and backup light switch
7 Range selector lever

Adjustment of Selector Rod – Steering Column Shift Model 108, 109

Loosen counternut on ball socket (2). Disconnect selector rod (1) on shift bracket, set range selector lever (7) on transmission and selector lever on steering wheel to position "N". Adjust selector rod lengthwise until ball socket is in alignment with ball head on intermediate lever (3). Connect ball socket to intermediate lever, making sure that the clearance of the selector lever in position D and S is the same. Tighten counternut on ball socket.

Adjustment of Selector Lever Indication all Models

Adjust selector lever indication in selector lever position "N". The Bowden wire (3) from shift pipe to selector lever indicator can be adjusted lengthwise by means of a knurled nut (4) on selector lever indicator. For this purpose, loosen counternut (5) and tighten again following adjustment.

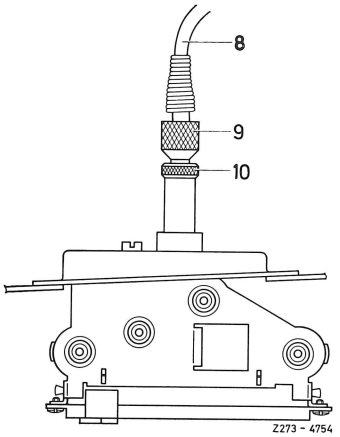


Fig. 4

8 Bowden wire
9 Knurled nut
10 Counternut

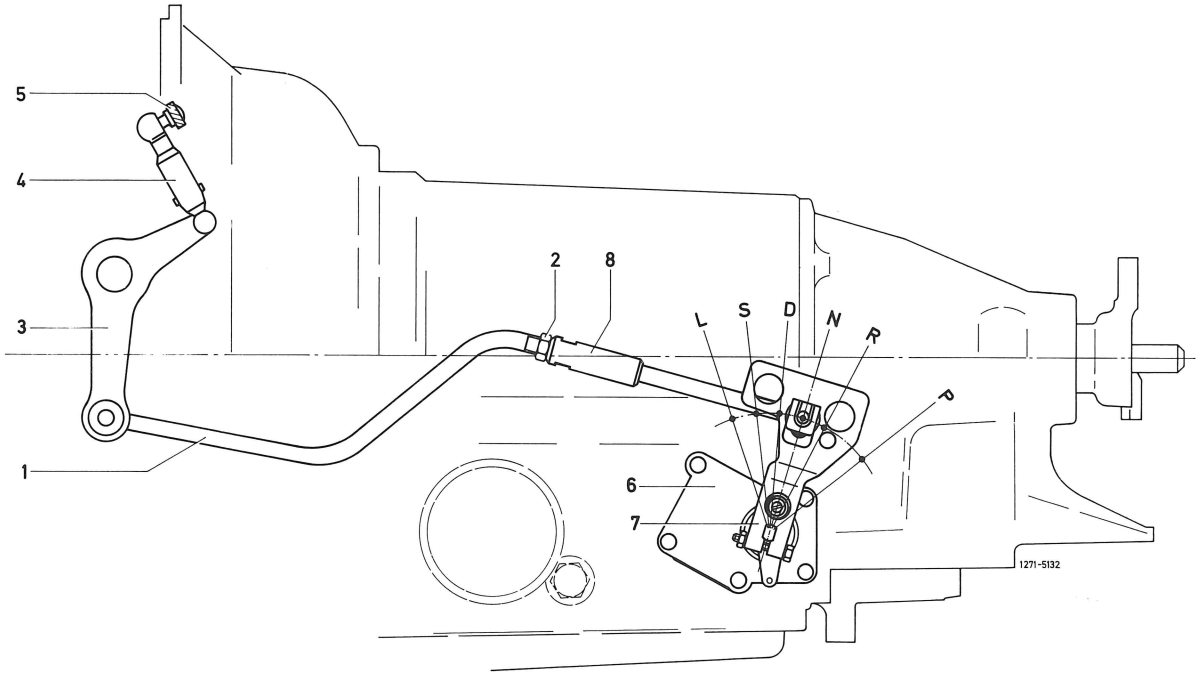


Fig. 5

Selector linkage model 116

1 Front selector rod
2 Counternut
3 Intermediate lever
4 Elastic intermediate piece
5 Bearing bracket
6 Starter and backup light switch
7 Range selector lever
8 Rear selector rod

Adjustment of Selector Rod — Steering Column Shift Model 116

Loosen counternut (2) on rear selector rod (8) while applying counter hold at both recesses of front selector rod (1) by means of an open end wrench. Disconnect selector rod (8) on range selector lever (7). Set range selector lever (7) on transmission and selector lever on steering wheel to position "N". Adjust selector rod lengthwise until bearing pin is in alignment with bearing bushing in range selector lever. Connect rear selector rod to range selector lever and secure with SL-lock. Make sure that the clearance of the selector lever in position D and S is the same. Tighten counternut on rear selector rod and apply counter hold at both recesses of front selector rod by means of open end wrench.

27.2 Adjustment of Starter Locking-Backup Light Switch and Kickdown Switch

Special Tool

Locating pin	115 589 18 63 00

Adjustment of Starter Locking and Backup Light Switch

Disconnect selector rod and move range selector lever (1) on transmission into position "N". Tighten clamping bolt (6) prior to making adjustments.

Loosen adjusting screw (3) and insert locating pin (5) through carrier into locating hole in gear shift housing.

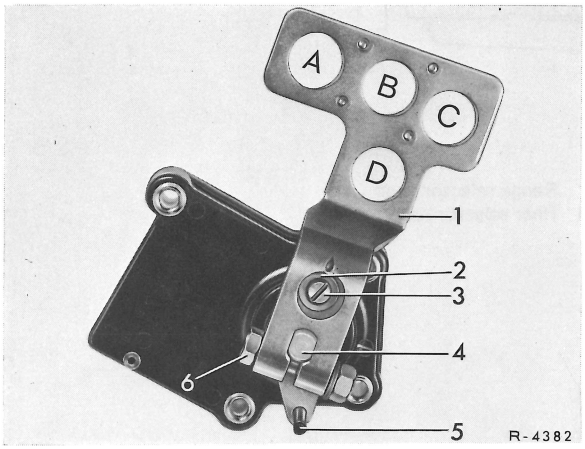


Fig. 1

1 Range selector lever
2 Washer
3 Adjusting screw
4 Shaft
5 Locating pin
6 Clamping bolt

Tighten adjusting screw (3) and remove locating pin (5).

Place selector lever of steering column or floorshift in position "N" and attach selector rod free of tension. Then check whether the engine can be started in selector lever position "N" or "P".

Adjustment of Kickdown Switch

The kickdown position of the magnetic valve is controlled by the accelerator pedal via the kickdown switch. Depress accelerator pedal (9) from inside vehicle against kickdown end position.

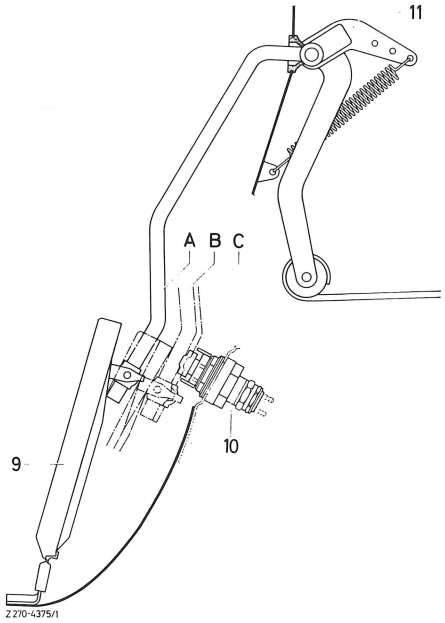


Fig. 2

9 Accelerator pedal
10 Kickdown switch
11 Retracting lever
A Idle throttle position
B Full throttle position
C Kickdown position

In this position the throttle valve lever should rest against the full load stop of venturi control unit.

Adjustments are made by loosening the clamping bolt (refer to arrow) on the retracting lever of the accelerator pedal shaft and turning of accelerator pedal. Then tighten clamping bolt again.

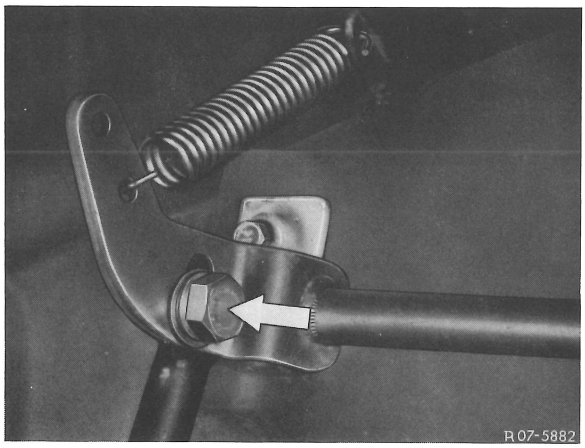


Fig. 3

General Note

A prerequisite for checking the stalling speed and the easy operation of the impeller is a perfectly operating engine, which means that the full power of the engine must be available.

Checking the Stalling Speed

Connect revolution counter in such a manner that it can be read from driver's seat.

Run engine prior to test for approx. 2 minutes at approx. 2,000/min, also make sure that engine is at operating temperature.

Tighten parking brake and actuate service brake with left foot.

Engage selector lever position "D", apply full throttle with right foot and check whether specified stalling speed is attained.

Caution! During this check, the entire power of engine in torque converter is changed into heat and for this reason this test should last **no longer than 5 seconds.**

When the stalling speed drops to approx. 1,200 to 1,300/min, the roller clutch in torque converter will be activated.

When the stalling speed is higher than 1,900/min, it is caused by transmission slip.

During this test, there must be the assurance that the rear wheels are not spinning.

Model		Torque converter dia.	Stalling speed
107.024 108.067 109.057 116.033	107.044 108.068 116.032	310 mm	1,900–2,000/min
107.023 107.023 107.043 116.028		270 mm	2,200–2,300/min

Notes

The test methods described below are used to check the normal functions of the automatic transmission. Judging the operation and troubles, if any, of transmission obviously requires experience in handling automatic transmissions. Without such experience it will be of advantage to use another automatic transmission in good order and of the same design for making comparisons. If the test shows irregular functions, reference to a system of **„Programmed Repairs"** will assist in finding the causes of such faults.

Prior to starting, be sure to check oil level, idling speed of engine, adjustment of selector rod of control pressure rod and of kickdown switch.

An example for checking the shifting sequence of model 107.044, partially under the influence of accelerator pedal and selector lever with the assistance of a pertinent program follows.

Shifting down with Kickdown

In selector lever position "D", accelerate vehicle while maintaining accelerator pedal position up to 70 km/h, then apply kickdown; transmission will shift back to 2nd speed.

Shifting up with Full Throttle

Return accelerator pedal to "full throttle" and accelerate. Shifting up from 2nd to 3rd speed occurs at 138 km/h.

Deceleration Shifts

Accelerator pedal in idling speed position.

Decelerate vehicle to approx. 80 km/h and move selector lever into position "S" (down shift into 2nd speed. Time up to begin of shift: max. 1 sec.).

Following a deceleration to approx 50 km/h, raise selector lever slightly and move into position "L". (Down shift into 1st speed. Time up to begin of shift: max. 1 sec.). Down shifts are effected under increased engine speed and a clearly shown decelerating effect on vehicle.

Accelerations with Kickdown

At a driving speed of approx. 35 km/h, move selector lever again to position "D"; transmission shifts to 2nd speed. Apply kickdown and hold pedal in kickdown position; transmission will shift back to 1st speed, upshift to 2nd speed will occur at 68 km/h.

Checkup of Parking Locks and Reverse Speed Lock

Above approx. 15 km/h, no shifting to selector lever positions "P" and "R" should be possible.

Starting at Full Throttle and Accelerating

Apply full throttle in selector lever position "D" and maintain full throttle position. Vehicle will start from stop in 1st speed and will shift to 2nd speed at 68 km/h. Keep accelerator pedal in full throttle position and wait for the upshift from 2nd to 3rd speed at 138 km/h. Decelerate vehicle up to stop.

Starting in Selector Lever Position "L"

Engage selector lever position "L" and start at part throttle. Vehicle will start from stop in 1st speed, there will be no changeover.

Shifting down at Part to Full Throttle

Decelerate vehicle in selector lever position "D" to 56 km/h, then apply full throttle; transmission will shift down to 2nd speed for acceleraction. Move selector lever to position "S" and decelerate vehicle to 20 km/h, then apply full throttle; transmission will shift down to 1st speed for acceleration.

27.2 Checkups during Test Drive

Shifting up at **part throttle** should be noticed only when listening carefully. At **full throttle** and **kickdown** the gear changes are clearly heard, but the new gear speed should obtain a smooth hold and the impression of an energetically pulling engine should remain. Sudden revving up of the engine when shifting up indicates the slipping of a servo member (brake or clutch) and should be checked.

Automatic **downshifts without applying the throttle** occur at very low speeds and will be heard only when listening very carefully (speed increase of engine). On the other hand, **downshifts under kickdown** are coupled with a clearly felt shifting impulse in addition to an increase in engine speed. At certain speed ranges, a downshift under part throttle to full throttle is possible.

Downshifts with the selector lever are either downshifts while applying the throttle (for example uphill) or decelerating shifts without applying throttle (for example downhill or when decelerating). Downshifts while applying the throttle require only a few fractions of a second for changing gears, while decelerating shifts without application of the throttle require from 1 to 2 seconds.

During the checkup make sure that the transmission, particularly under load, is not constantly shifting. During the shifting, the servo members develop considerable heat and pertinent dispersal requires some time. A **reference value** is: **Repeat a gear shift under load only max. once within 15 seconds.**

Driving in Reverse

Check transmission while driving in reverse. Move selector lever to position "R", accelerate vehicle quickly while backing up and decelerate again.

Caution! When decelerating, the engine provides no braking effect.

Shift Points

Vehicle model		107.024 107.044 116.032 116.033		107.023 107.043 116.028		108.067/068 109.057	
Position of gas pedal	Shift	▲ km/h	▼ km/h	▲ km/h	▼ km/h	▲ km/h	▼ km/h
Selector Lever Position "D"							
Idle throttle	1–2–1	30	19	27	17	29	19
	2–3–2	45	35	46	32	43	34
Full throttle	1–2–1	68	19	73	17	65	19
	2–3–2	138	60	139	67	131	58
Kickdown	1–2–1	68	51	73	60	65	49
	2–3–2	138	123	139	126	131	117
Selector Lever Position "S"							
Idle throttle	1–2–1	34	23	31	20	31	22
Full throttle	1–2–1	77	27	82	24	73	25
Kickdown	1–2–1	77	62	82	68	73	59

Explanation of symbols: ▲ Shifting up ▼ Shifting down

All speed values are approximate.

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Special Tool

Tester	112 589 05 21 00

The automatic transmission is provided with three measuring connections, so that the three most important fluid pressures (modulating pressure, operating pressure, governor pressure) can be measured by means of the tester.

The pressure gauge is suitably connected in such a manner, that the co-driver can read the indications during the trial run. The operating pressure test requires a pressure gauge with scale graduations up to 25 atü.

Connection of Tester

The tester is attached to the instrument panel of the vehicle. The pressure gauges are connected to their measuring points as usual via pressure hoses which are guided through the window of the righthand driver's door. The pressure hoses are clamped down by means of the window. Make sure that the hoses do not sag too much and do not rest against exhaust pipe.

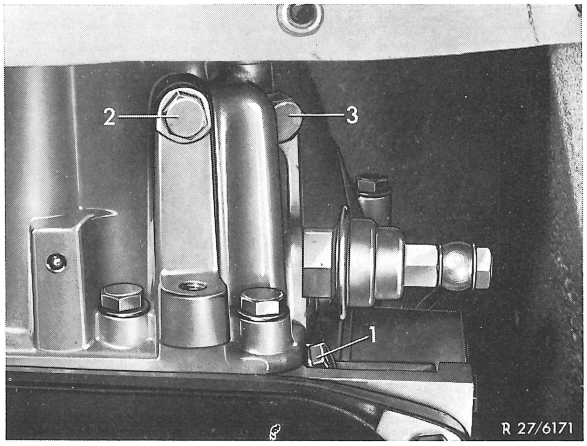


Fig. 1

1 Modulating pressure
2 Operating pressure
3 Governor pressure

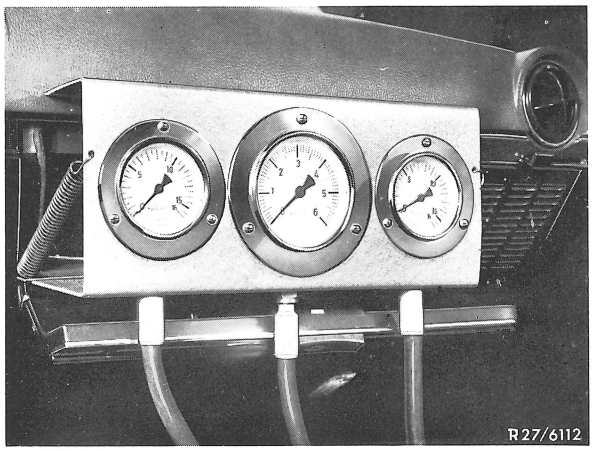


Fig. 2

Nominal Pressures in Bar*

Model		107.024 107.044 116.032 116.033	107.024 USA 107.044 USA 108.067 108.068 109.057	107.023 107.043 116.028	107.024 USA 107.044 USA 116.032 USA 116.033 USA
		W 3 B 050	**W 3 A 040** 1st Version page 001/1)	**W 3 A 040** 2nd Version page 001/1)	**W 3 A 040** 2nd Version page 001/1)
Modulating pressure	in position "D"	3.1[1]) 4.6[2])	3.1[1]) 4.5[2])	3.1[1]) 4.7[2])	3.1[1]) 4.7[2])
Working pressure	in position "L"	7.7 ± 0.4[1])	6.8 ± 0.4[1])	7.4 ± 0.4[1])	7.3 ± 0.4
	in position "S"	5.5 ± 0.2[1])	6.0 ± 0.2[1])	5.2 ± 0.2[1])	5.9 ± 0.2
	in position "D"	11.3 ± 0.4[2])	8.9 ± 0.4[2]	11.5 ± 0.4[2])	10.7 ± 0.4
	reverse speed	18 and above[2])			

Model		107.024 107.044 116.032 116.033	108.067/068 109.057	107.023 107.043 116.028
Regulating pressure	20 km/h	0.5 + 0.1	0.6 + 0.1	0.5 + 0.1
	40 km/h	1.2 + 0.1	1.4 + 0.1	1.4 + 0.2
	60 km/h	2.0 ± 0.1	2.0 ± 0.1	1.8 + 0.2
	90 km/h	2.6 ± 0.1	2.7 ± 0.1	2.4 + 0.3
	120 km/h	3.4 ± 0.1[3])	3.6 ± 0.1[3])	3.4 + 0.3[3])

[1]) Measured at 65 km/h with vacuum line connected at full throttle.
[2]) Measured with vehicle stopped, vacuum line closed and at full throttle (stalling speed).
[3]) Can be measured only at full throttle.
* Excess pressure data indicated in bar correspond to former pressure indication of kp/cm^2 (atü).

Special Tool

Tester for measuring nominal pressures	116 589 15 21 00

Modulating Pressure

Prior to testing all the pressures, measure the modulating pressure and adjust, if required. Use an accurately indicating oil pressure gauge or tester 116 589 15 21 00. When the modulating pressure is accurately adjusted, the working pressure will result by itself.

Measuring Modulating Pressure

Accelerate vehicle on dynamometer or on the road in selector lever position "D" to approx. 65 km/h. (With vacuum line connected). Apply full throttle while keeping vehicle speed with left foot on service brake to 65 km/h and read modulating pressure.

27.2 Measuring the Nominal Pressures

Caution! Check modulating pressure at 65 km/h, since this is the only pressure value which can be accurately measured.

The pressure values indicated with the vehicle stopped are reference values and are serving only for orientation when making adjustments.

Adjusting the Modulating Pressure

Disconnect vacuum line and make sure **that a counterhold is applied to the hexagon (SW 14) on vacuum box.**

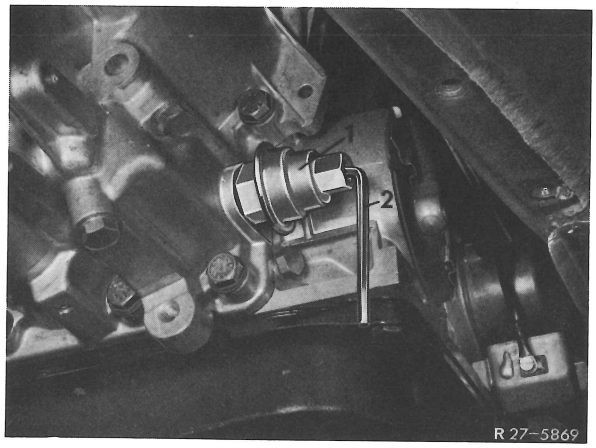


Fig. 1
1 Vacuum box 2 Allen wrench

The modulating pressure can be adjusted by applying a 4 mm Allen wrench (2) to adjusting screw of vacuum box (1).

Reference value:

One turn on adjusting screw provides a pressure change of approx. 0.2 atü.

Repeat measurement following adjustment.

Working Pressure

The working pressure is not adjustable and is established automatically when the modulating pressure is correctly set. Checking requires a pressure gauge having a scale reading of at least 25 bar (kp/cm^2).

Regulating Pressure

The regulating pressure is a partial pressure of the working pressure and is set to the required value by the centrifugal regulator attached to the output shaft. The regulating pressure can never exceed the working pressure and for this reason the upper pressure values can be measured only while driving at full throttle.

Measuring the Regulator Pressure

Measuring requires an accurate oil pressure gauge with a scale graduation of 1/10 bar (kp/cm^2).

Drive vehicle on dynamometer or on road while comparing regulator pressure with values shown in Table.

If no regulator pressure is measured or if deviating values are indicated, remove rear transmission case cover and then disassemble, clean and make regulator operable.

Control Pressure

The control pressure is a partial pressure of the modulating pressure. It is mechanically controlled in dependence of the position of the accelerator pedal. If the linkage is correctly adjusted (for adjustments refer to Job No. 27.2–110/1), the control pressure will be arrived at automatically.

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Tightening Torques in kpm

Hex. bolts for sump on transmission housing	0.7
Fastening bolts for fluid filter on shift valve housing	0.4
Hex. bolts for shift valve housing on transmission housing	1.3

Special Tools

1 Locating pin	self-made
2 Stud	self-made

Removal

1 Drain transmission fluid, detaching the fluid filler pipe (2) from sump for this purpose (Fig. 1).

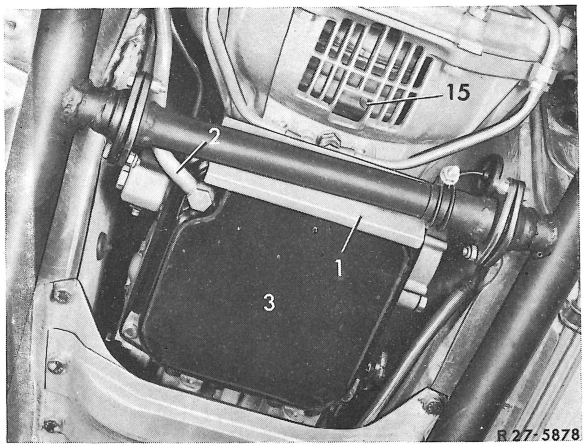


Fig. 1

1 Shield
2 Fluid filler pipe
3 Sump
15 Fluid drain plug

2 Unscrew the hex. bolts on sump and remove sump together with gasket.

Caution! If the transmission fluid smells burnt or if the sump contains abrasives, sludge or an abnormally large quantity of chips, **it will not be enough** merely to replace the shift valve housing since the entire transmission must be exchanged instead. The torque converter with fluid lines and fluid cooler should be cleaned and carefully rinsed.

3 Remove fluid filter (Fig. 2).

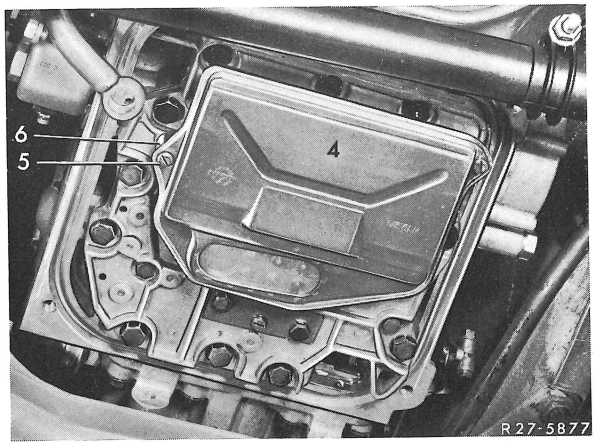


Fig. 2

4 Fluid filter
5 Fastening bolts
6 Spacer sleeves

27.2 Removal and Installation of Shift Valve Housing

4 Move selector lever in position "P". Unscrew fastening bolts (25) of shift valve housing (26) and remove shift valve housing (Fig. 3).

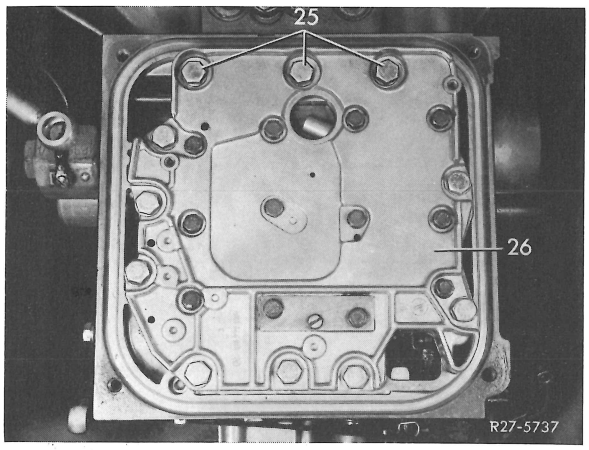


Fig. 3
25 Fastening bolts
26 Shift valve housing

5 Remove plug pipes with sealing bushes and pull sealing bushes (27) from plug pipes (Fig. 4).

Installation

6 Provide plug pipes on both sides with new sealing bushes (27) and insert into transmission. Screw two studs (30) into transmission housing (Fig. 4).

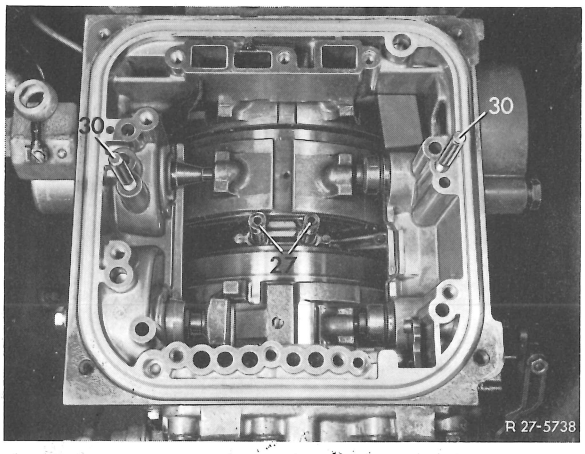


Fig. 4
27 Sealing bushes
30 Studs

7 Insert locating pin (12) for control pressure valve (13) into shift valve housing (Fig. 5).

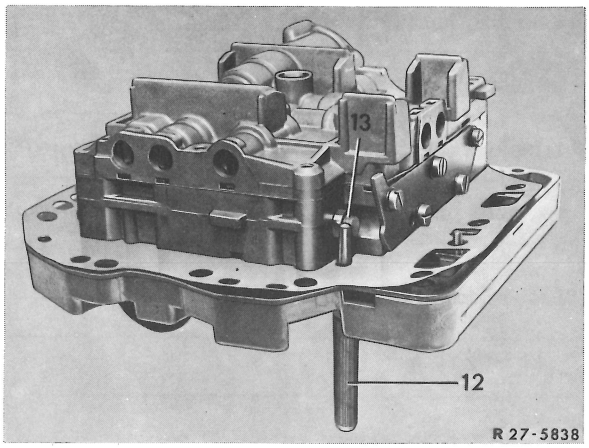


Fig. 5
12 Locating pin
13Control pressure valve

8 Carefully introduce shift valve housing (26) into transmission. Make particularly sure that the range selector valve (28) enters correctly into detent plate (29) (Fig. 6).

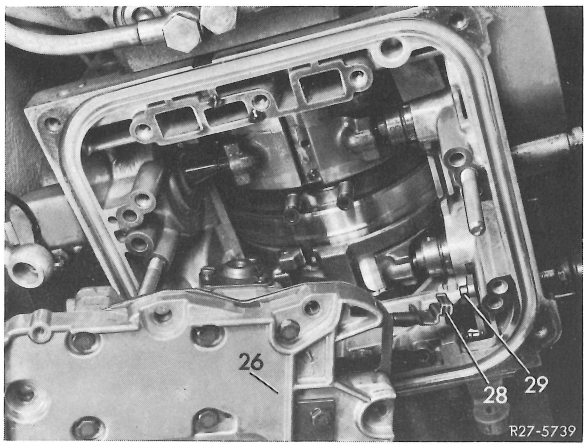


Fig. 6
26 Shift valve housing
28 Range selector valve
29 Detent plate

9 Screw-in fastening bolts (25) with spring washers and tighten to 1.3 kpm (Fig. 3).

Caution! The fastening bolts of the shift valve housing are of different length.

10 Remove locating pin (12) (Fig. 5).

11 Install fluid filter (Fig. 2).

12 Install sump with new gasket and tighten fastening bolts to 0.7 kpm (Fig. 1).

13 Screw fluid filler pipe to sump (Fig. 1).

14 Add transmission fluid as specified.

15 Check shifting pattern during trial run.

16 Check fluid level at operating temperature.

17 Tighten bolts on sump to 0.7 kpm.

Tightening Torque	Nm	(kpm)
Hex. bolts shift valve housing top and bottom	8	(0.8)

Special Tool	
Assembly fixture	112 589 09 59 00

General Notes

Observe particular cleanliness when working on shift valve housing. The work should be done as much as possible on a plastic surface. Do not use fuzzy cloth; leather would be best. Upon disassembly, wash all parts and blow out with compressed air.

1st Version W 3 A 040 (also refer to page 001/1)

Disassembly

Caution! The shift valve housing has 10 ball valves, 8 of 5.5 mm dia. and 2 of 7 mm dia. Be sure that the balls are not rolling off during disassembly.

1 Loosen hex. bolts from bottom and screw out except for two opposite bolts (Fig. 1).

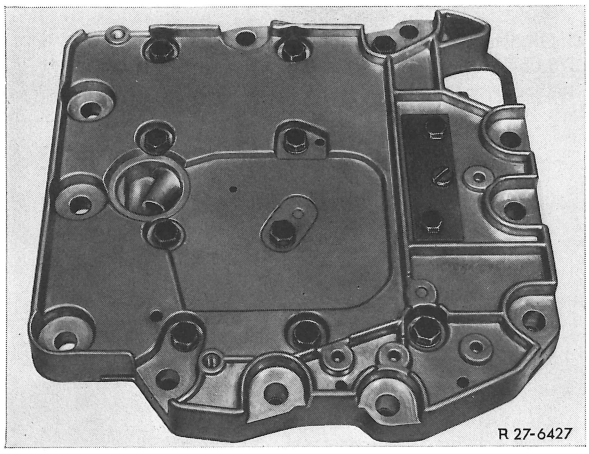


Fig. 1

2 Position shift valve housing on assembly fixture (Fig. 2).

3 Unscrew the two remaining hex. bolts from bottom and lift off top (B) with intermediate plate (E) (Fig. 3).

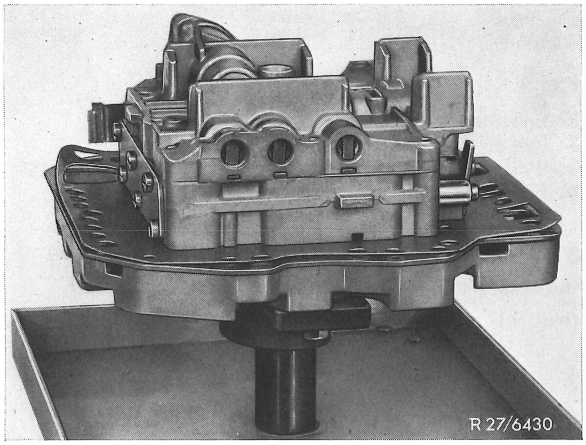


Fig. 2

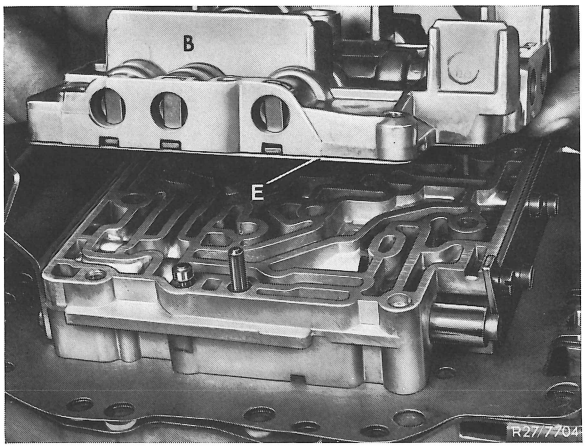


Fig. 3
B Top E Intermediate plate

4 Take off intermediate plate (E) and remove filter (50) together with spring (Fig. 4).

5 Remove two balls of 7 mm dia. (27 and 31) and one ball of 5.5 mm dia (34) including spring from pressure relief valve modulating pressure, as well as filter (50) with spring out of top (B) (Fig. 4).

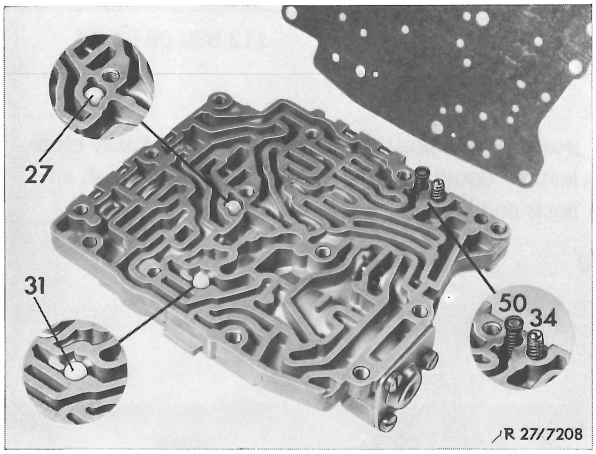


Fig. 4

27 Ball one-way throttle valve K 1
31 Ball one-way throttle valve K 2
34 Ball pressure relief valve modulating pressure with spring
50 Filter with spring

6 Lift bottom from assembly fixture and remove the four balls of 5.5 mm dia (10, 17, 22 and 26) (Fig. 11).

7 Remove ball of 5.5 mm dia. (16) piston brake shift (15) and check valve primary pump (24) including spring. Remove filler piece (26a) and shift pin 3–4 (11) together with spring (Fig. 5).

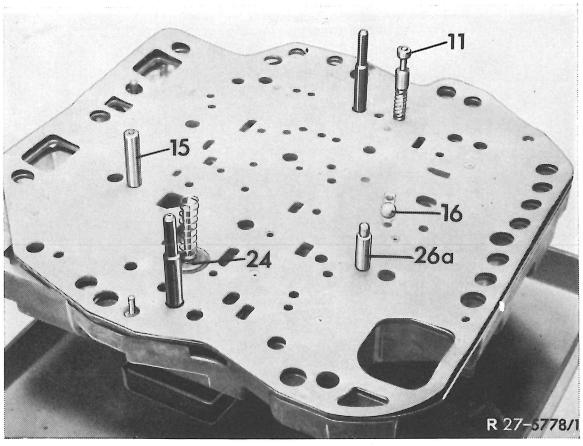


Fig. 5

11 Shift pin 3–4 with spring
15 Piston brake shift
16 Ball valve
24 Check valve primary pump with spring
26a Filler piece

8 Remove gasket (D) and intermediate plate (F) (Fig. 7).

9 Remove lube pressure valve (37) one-way throttle valve B 3 (38) and one-way throttle valve releasing end B 2 (41) from oil distributing plate (C) (Fig. 6).

10 Take oil distributing plate from assembly fixture and remove the two balls of 5.5 mm dia. (39, 40) by tilting (Fig. 6).

Assembly

11 Place oil distributing plate (C) on assembly fixture (Fig. 6).

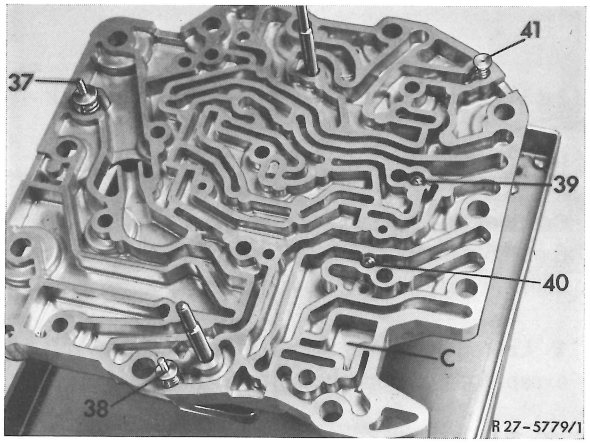


Fig. 6

C Oil distributing plate
37 Lube pressure valve
38 One-way throttle valve B3
39 Ball 5.5 mm dia.
40 Ball 5.5 mm dia.
41 One-way throttle valve B2

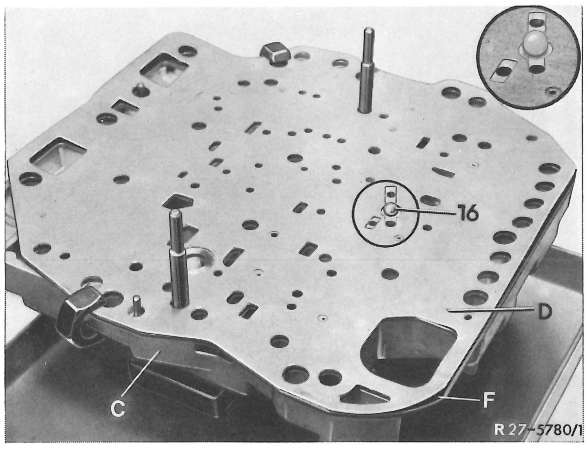


Fig. 7

C Oil distributing plate
D Gasket
F Intermediate plate
16 Ball 5.5 mm dia.

12 Insert lube pressure valve (37) one-way throttle valve B 3 (38) and one-way throttle valve releasing end B 2 (41) into their seat in oil distributing plate (Fig. 6).

13 Insert ball of 5.5 mm dia. (39) and ball of 5.5 mm dia. (40) into their countersunk seats (Fig. 6).

14 Place intermediate plate (F) with sealing ring (D) on oil distributing plate and clamp down with holding clips (Fig. 7).

Caution! After clamping the gasket and the intermediate plate down, check the spring-loaded valves for easy operation by pushing down on valve. The valve retainers should not be squeezed in between the oil distributing plate and the intermediate plate.

15 Place ball of 5.5 mm dia. (16) on intermediate plate (F) (Fig. 7).

16 Introduce check valve primary pump (24) with spring from below into shift valve housing bottom (A) (Fig. 8).

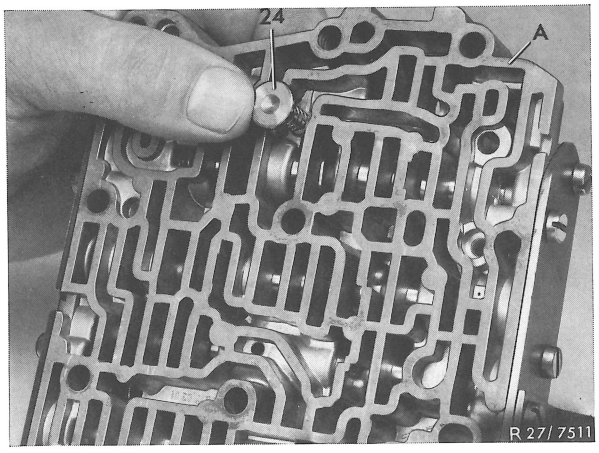


Fig. 8

A Bottom
24 Check valve primary pump with spring

17 Cant valve stem projecting from above by pushing laterally against shaft (Fig. 9).

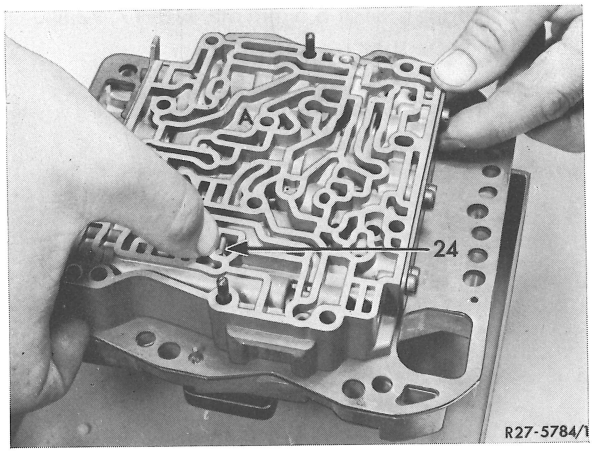


Fig. 9

A Bottom
24 Check valve primary pump

18 Place bottom (A) on oil distributing plate and release valve stem; valve should audibly knock against intermediate plate.

19 Insert piston brake shift 4–3 (15) as well as filler piece (26a) and shift valve releasing end B 2 (11) together with spring (Fig. 10).

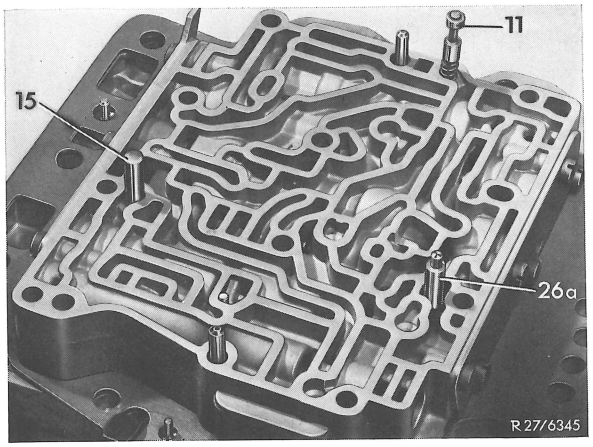


Fig. 10

11 Shift valve releasing end B 2
15 Piston brake shift 4–3
26a Filler piece

20 Insert four balls of 5.5 mm dia. (10, 17, 22 and 26) into countersunk seats (Fig. 11).

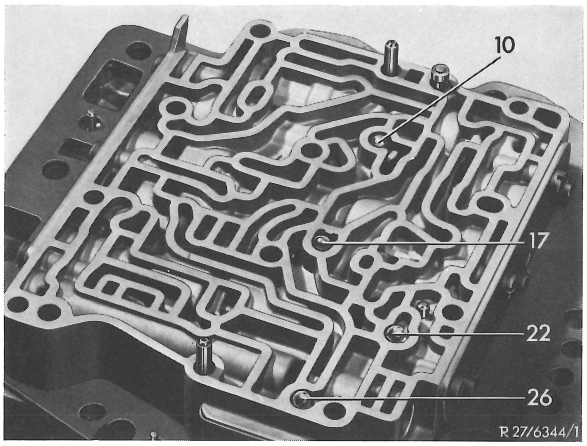


Fig. 11
10, 17, 22 and 26 Balls of 5.5 mm dia.

Caution! The two compression springs of shift valve B 2 (11) (Fig. 10) and filter (50) are similar. The compression spring of modulating pressure valve (34) exerts more pressure (Fig. 12).

Spring of item 11 = 0.45 mm wire dia.
Spring of item 34 = 0.6 mm wire dia.
Spring of item 50 = 0.45 mm wire dia.

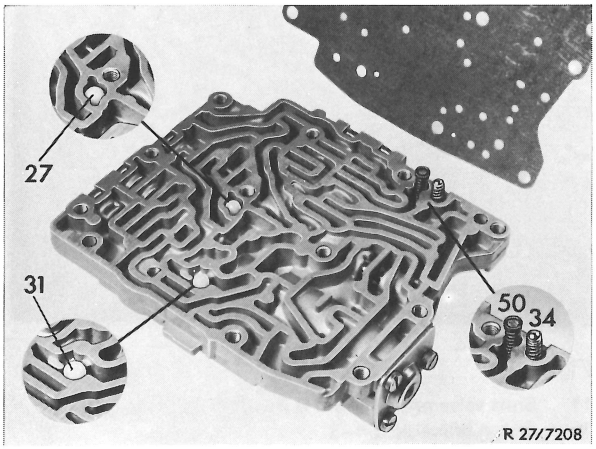


Fig. 12
27 Ball one-way throttle valve K 1
31 Ball one-way throttle valve K 2
34 Ball pressure relief valve modulating pressure with spring
50 Filter with spring

Top

21 Insert ball of 7 mm dia (27) of one-way throttle valve K 1, ball of 7 mm dia. (31) of one-way throttle valve K 2, ball of 5.5 mm dia. (34) with spring, as well as filter (50) with spring into top (B) (Fig. 12).

22 Place intermediate plate (E) on top (B) (Fig. 13), watching out for correct seat of spring loaded ball (34) and filter (50) (Fig. 12).

23 Hold intermediate plate (E) and top (B) tightly together, turn around and place on bottom.

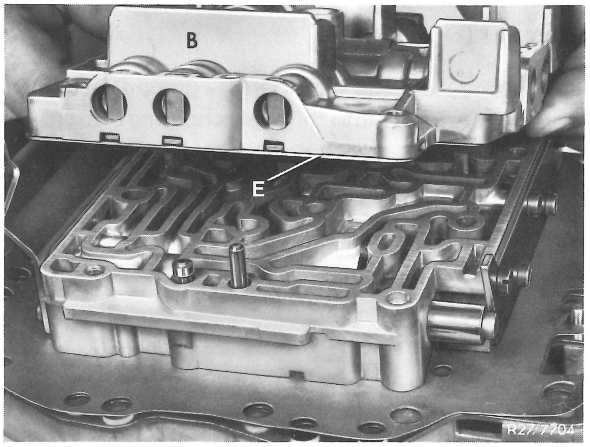


Fig. 13
B Top E Intermediate plate

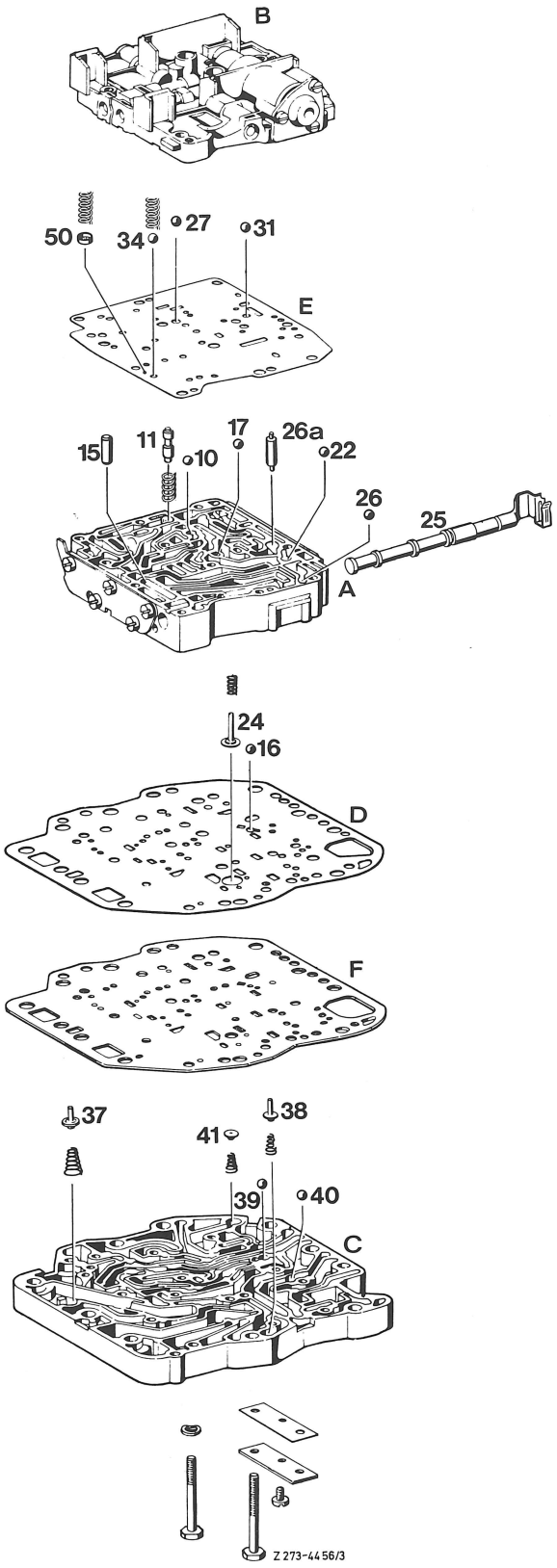
24 Insert two opposite bolts and tighten slightly.

25 Remove shift valve housing from assembly fixture, insert remaining bolts and tighten to 8 Nm (0.8 kpm) from inside out (Fig. 1).

Caution! Two hex. bolts are longer, they are used to screw cover plate down.

Fig. 14

A Shift valve housing bottom
B Shift valve housing top
C Oil distributing plate
D Gasket
E Small intermediate plate
F Large intermediate plate
10 Two-way ball valve
11 Shift valve releasing end B 2
15 Piston brake shift 4–3
16 Check ball valve
17 Three-throttle ball valve
22 Two-way ball valve
24 Check valve primary pump
25 Range selector valve
26 Two-way ball valve
26a Filler piece
27 One-way throttle valve K 1
31 One-way throttle valve K 2
34 Pressure relief valve modulating pressure
37 Lube pressure valve
38 One-way throttle valve B 3
39 Two-way ball valve
40 Two-way ball valve
41 One-way throttle valve B 2
50 Filter



27.2 Disassembly and Reassembly of Shift Valve Housing

2nd Version W 3 A 040 and W 3 B 050 (also refer to page 001/1).

Disassembly

Caution! The shift valve housing has 12 ball valves, 10 of 5.5 mm dia. and 2 of 7 mm dia. Be sure that the balls are not rolling off during disassembly.

1 Loosen hex. bolts from bottom and screw out except for two opposite bolts (Fig. 1).

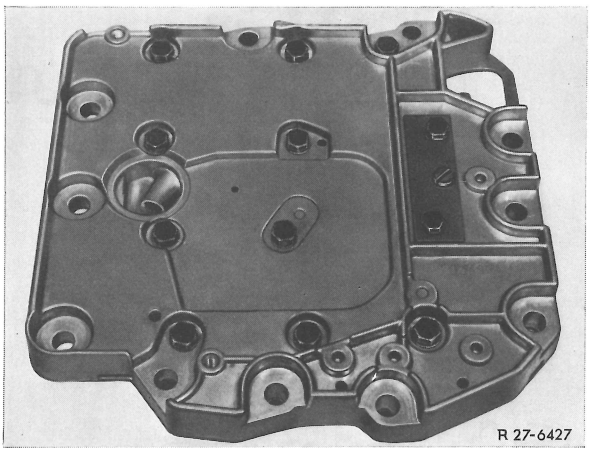


Fig. 1

2 Position shift valve housing on assembly fixture (Fig. 2).

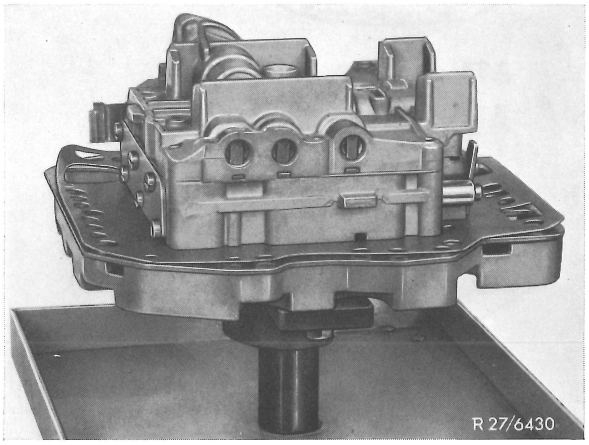


Fig. 2

3 Unscrew the two remaining hex. bolts from bottom and lift top (B) off together with intermediate plate (E) (Fig. 3).

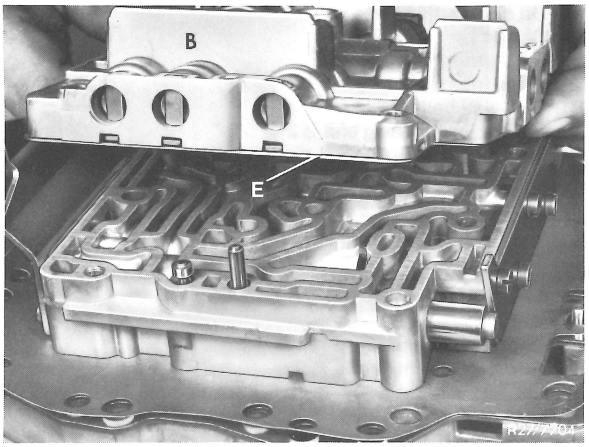


Fig. 3

B Top
E Intermediate plate

4 Take off intermediate plate (E) and remove filter (50) together with spring (Fig. 3 and 4).

5 Remove two balls of 7 mm dia. (27 and 31) and one ball of 5.5 mm dia. (34) including spring from pressure relief valve modulating pressure, as well as filter (50) together with spring from top (B) (Fig. 4).

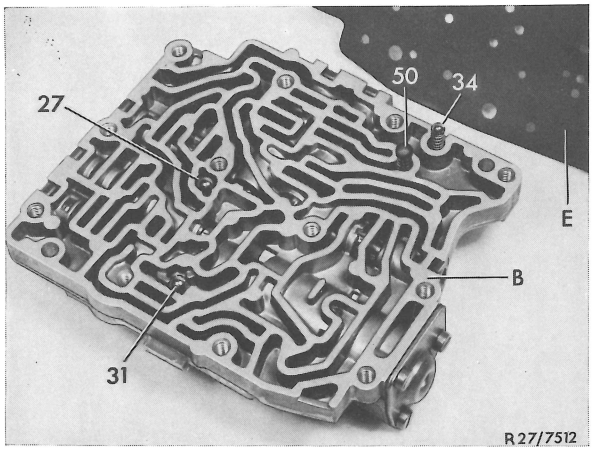


Fig. 4

B Top
E Intermediate plate
27 Ball one-way throttle valve K 1
31 Ball one-way throttle valve K 2
34 Ball pressure relief valve modulating pressure with spring
50 Filter with spring

6 Lift bottom from assembly fixture and remove five balls of 5.5 mm dia. (10, 17, 22, 26 and 52) by tilting (Fig. 11).

7 Remove plastic pin (53), piston brake shift (15) and check valve primary pump including spring. Remove filler piece (26a) and shift pin 3–4 (11) together with springs (Fig. 5).

8 Remove the two balls of 5.5 mm dia. (16 and 51) (Fig. 5).

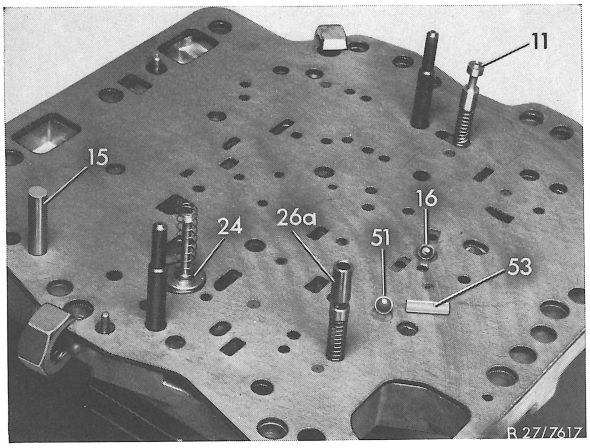


Fig. 5

11 Shift pin 3–4 with spring
15 Piston brake shift
16 Ball 5.5 mm dia.
24 Check valve primary pump with spring
26a Filler piece
51 Ball 5.5 mm dia.
53 Plastic pin

9 Remove gasket (D) and intermediate plate (F) (Fig. 7).

10 Remove lube pressure valve (37), one-way throttle valve B 3 (38) and one-way throttle valve releasing end B 2 (41) from oil distributing plate (C) (Fig. 6).

11 Take oil distributing plate from assembly fixture and remove the two balls of 5.5 mm dia. (39, 40) by tilting (Fig. 6).

Assembly

12 Place oil distributing plate (C) on assembly fixture (Fig. 6).

13 Insert lube pressure valve (37), one-way throttle valve B 3 (38) and one-way throttle valve releasing end B 2 (41) into their seat in oil distributing plate (Fig. 6).

Caution! The one-way throttle valve releasing end B 2 (41) has varying throttle diameters, W 3 A 040 1.5 mm dia. and W 3 B 050 1.0 mm dia. The throttle valve of 1.0 mm dia. is copperplated for identification.

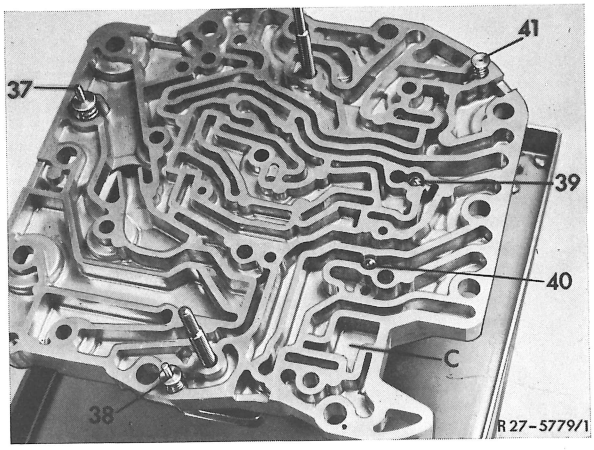


Fig. 6

C Oil distributing plate
37 Lube pressure valve
38 One-way throttle valve B 3
39 Ball 5.5 mm dia.
40 Ball 5.5 mm dia.
41 One-way throttle valve B 2

14 Place ball of 5.5 mm dia. (39) and ball of 5.5 mm dia. (40) into their countersunk seats (Fig. 6).

15 Place intermediate plate (F) with gasket (D) on oil distributing plate and clamp down with holding clips (Fig. 7).

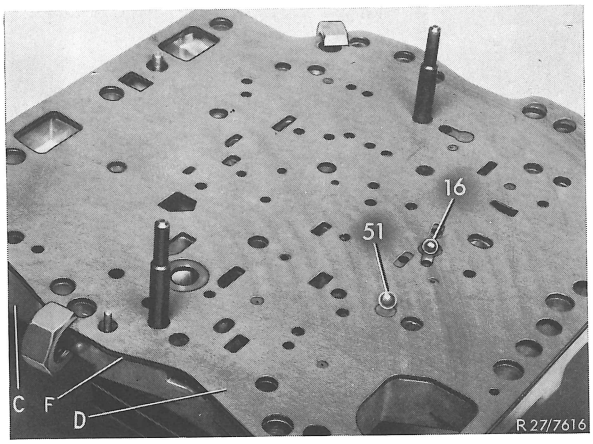


Fig. 7

C Oil distributing plate
D Gasket
F Intermediate plate
16 Ball 5.5 mm dia.
51 Ball 5.5 mm dia.

Caution! Upon clamping of gasket and intermediate plate, check spring-loaded valve for easy operation by pushing down. Valve discs should not be clamped in between oil distributor plate and intermediate plate.

16 Place two balls of 5.5 mm dia. (16 and 51) on intermediate plate (F) (Fig. 7).

27.2 Disassembly and Reassembly of Shift Valve Housing

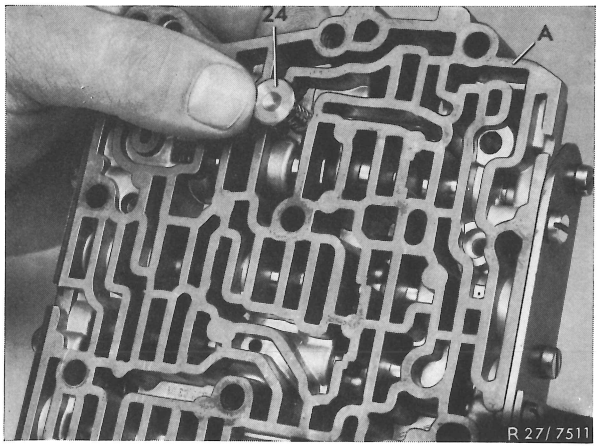


Fig. 8

A Bottom
24 Check valve primary pump with spring

17 Insert check valve primary pump (24) with spring from below into shift valve housing bottom (Fig. 8).

18 Cant valve stem projecting at top by applying lateral pressure. Place bottom (A) on oil distributing plate and release valve stem; valve should audibly knock against intermediate plate (Fig. 9).

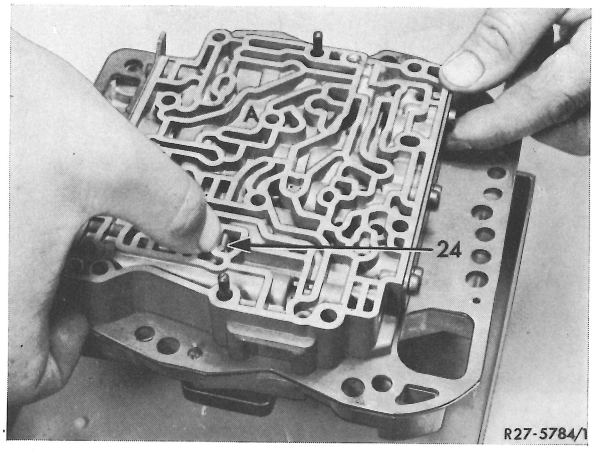


Fig. 9

A Bottom
24 Check valve primary pump

19 Insert piston brake shift 4–3 (15), as well as filler piece (26a), shift valve releasing end B 2 (11) with spring and plastic pin (53) (Fig. 10).

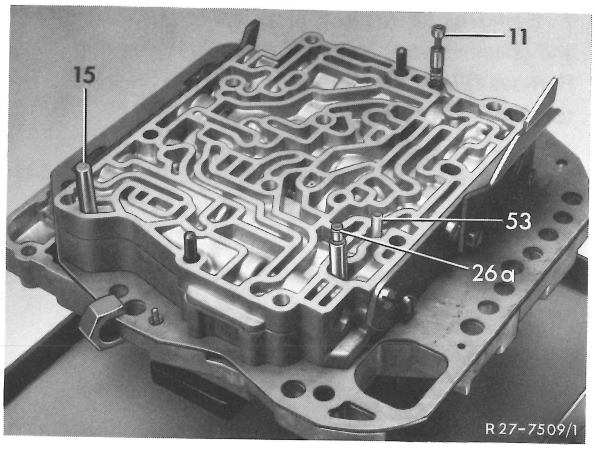


Fig. 10

11 Shift valve releasing end B 2
15 Piston brake shift 4–3
26a Filler piece
53 Plastic pin

20 Place five balls of 5.5 mm dia. (10, 17, 22, 26 and 51) into countersunk seats (Fig. 11).

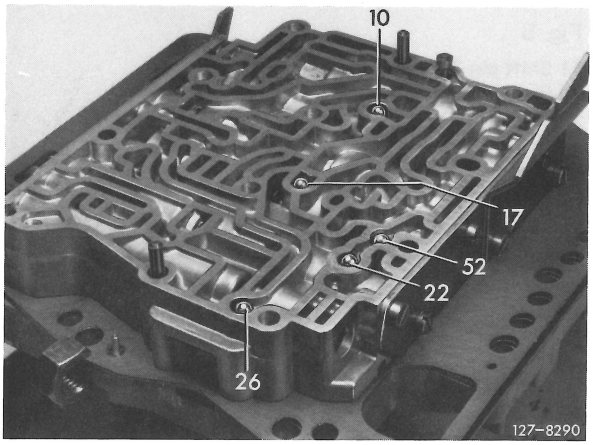


Fig. 11

10, 17, 22, 26 and 52 balls of 5.5 mm dia.

Caution! The two compression springs of releasing valve B 2 (11) and filter (50) are similar. The pressure of compression spring of modulating pressure valve (34) is heavier.

Spring of item 11 = 0.45 mm wire dia.
Spring of item 34 = 0.6 mm wire dia.
Spring of item 50 = 0.45 mm wire dia.

Top

21 Insert ball of 7 mm dia. (27) of one-way throttle valve K 1, ball of 7 mm dia. (31) of one-way throttle valve K 2, ball of 5.5 mm dia. (34) with spring as well as filter (50) with spring into top (B) (Fig. 12).

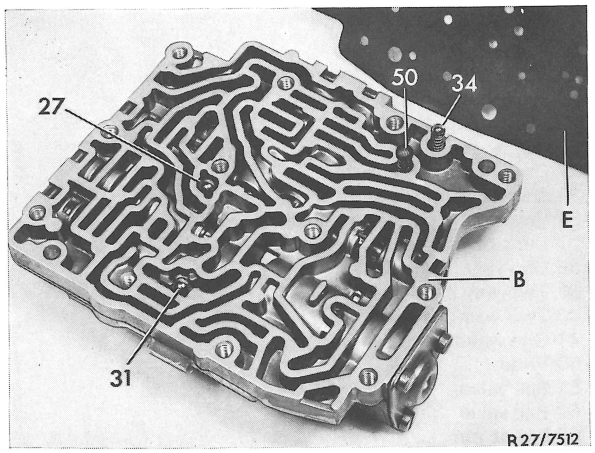


Fig. 12

27 Ball one-way throttle valve K 1
31 Ball one-way throttle valve K 2
34 Ball pressure relief valve modulating pressure with spring
50 Filter with spring

22 Place intermediate plate (E) on top (B), watching out for correct seat of spring-loaded ball (34) and filter (50) (Fig. 13).

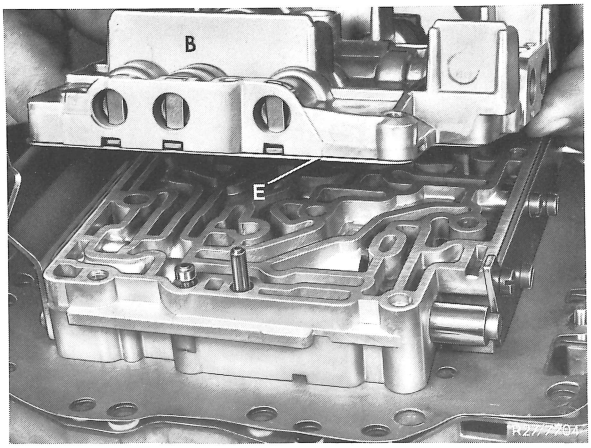


Fig. 13

B Top E Intermediate plate

23 Hold intermediate plate (E) and top (B) tightly together, turn around and place on bottom.

24 Insert two opposite bolts and tighten slightly.

25 Remove shift valve housing from assembly fixture, insert remaining bolts and tighten to 8 Nm (0.8 kpm) from inside out (Fig. 1).

Caution! Two hex. bolts are longer; they are used to screw cover plate down.

27.2 Disassembly and Reassembly of Shift Valve Housing

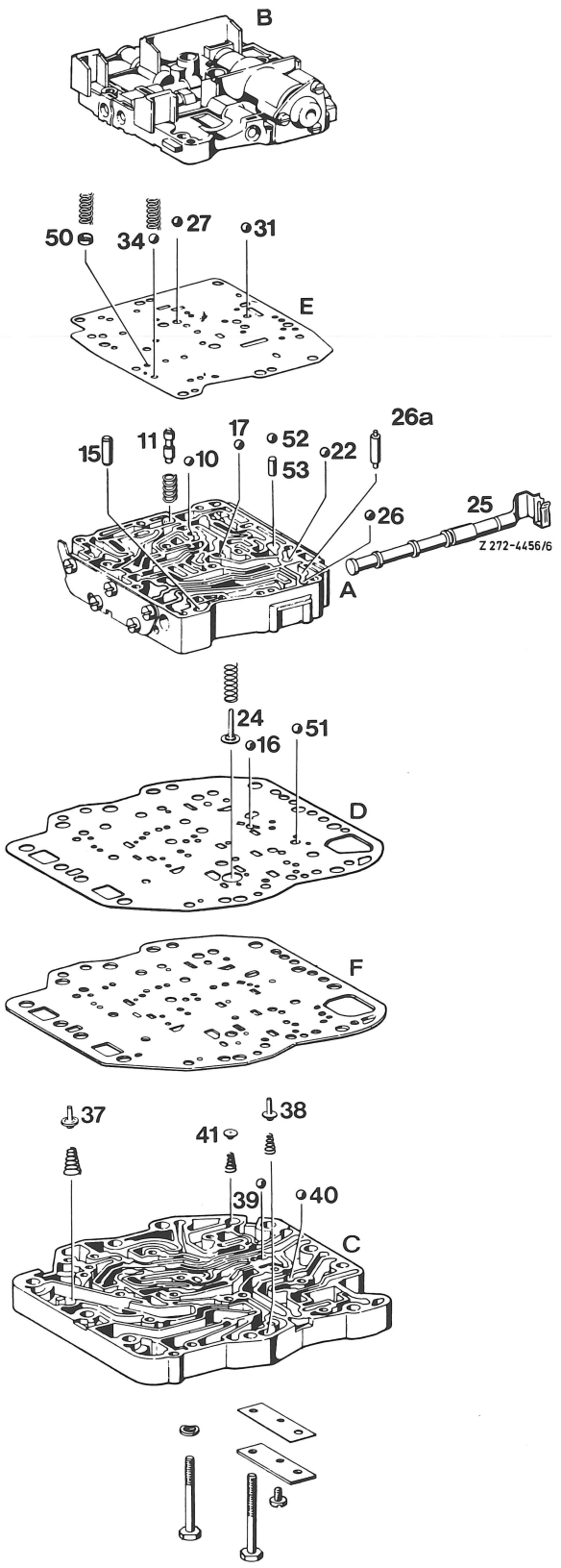


Fig. 14

A Shift valve housing bottom
B Shift valve housing top
C Oil distributing plate
D Gasket
E Small intermediate plate
F Large intermediate plate
10 Two-way ball valve
11 Shift valve releasing end B 2
15 Piston brake shift 4–3
16 Check-ball valve
17 Three-throttle ball valve
22 Two-way ball valve
24 Check valve primary pump
25 Range selector valve
26 Two-way ball valve
26a Filler piece
27 One-way throttle valve K 1
31 One-way throttle valve K 2
34 Pressure relief valve modulating pressure
37 Lube pressure valve
38 One-way throttle valve B 3
39 Two-way ball valve
40 Two-way ball valve
41 One-way throttle valve B 2
50 Filter
51 Ball valve
52 Ball valve
53 Plastic pin

Removal and Installation of Rear Transmission Housing 27.2

W 3 A 040

Tightening Torques in kpm

Shaft clamping nut	3.0
Hex. bolts of shaft intermediate bearing	2.0
Slotted nut on three-legged flange	12.0
Hex. bolts for rear transmission housing	1.3
Hex. bolts for modulating pressure housing on transmission housing	0.7

Special Tool

Screw driver for slotted plugs of secondary pump	116 589 00 11 00

Removal

1 Drain transmission fluid while loosening filler pipe on sump.

2 Slightly raise engine-transmission unit with top for pit lift, unscrew both fastening bolts (19) for rear engine mounting, loosen 12 bolts of tunnel closing plate (17) and remove (Fig. 1).

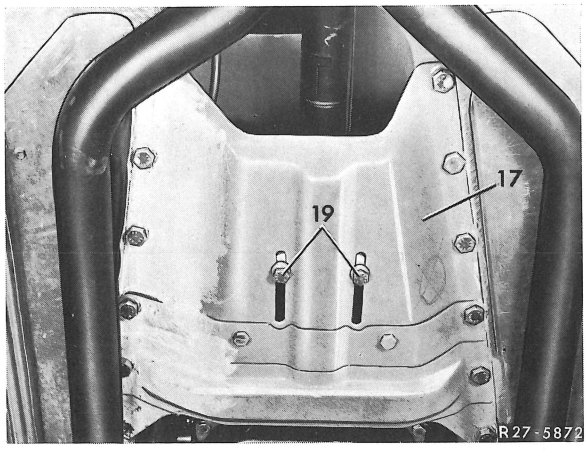


Fig. 1
17 Tunnel closing plate
19 Fastening bolts

3 Loosen tachometer shaft (16) on rear transmission cover and pull off (Fig. 2).

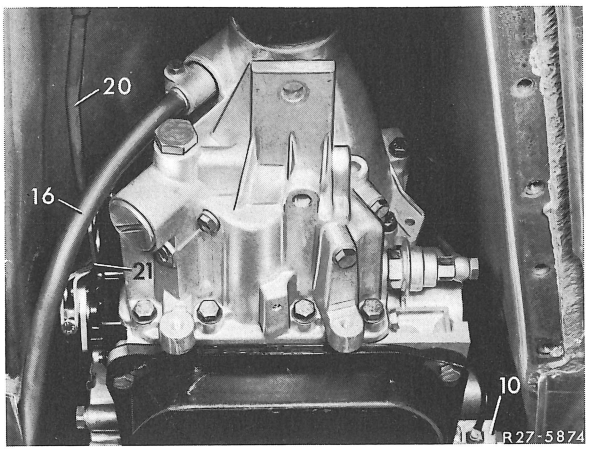


Fig. 2
10 Kickdown solenoid valve
16 Tachometer shaft
20 Selector rod
21 Range selector lever

4 Disconnect selector rod (20) on range selector lever (21) and move range selector lever to position "P" (Fig. 2).

5 Loosen both fastening bolts of propeller shaft intermediate bearing, but do not screw out.

6 Loosen propeller shaft clamping nut.

7 Unscrew propeller shaft on transmission, but leave universal plate on propeller shaft.

8 Slide propeller shaft to the rear to the extent the center bearing and the clamping piece permit.

9 Place suitable piece of wood under propeller shaft at front in tunnel in such a manner that the shaft is completely pushed up.

10 Unlock slotted nut on three-legged flange and screw off, remove three-legged flange.

11 Disconnect vacuum line (22) on vacuum box (23) while counterholding against hexagon head (SW 14) on vacuum box.

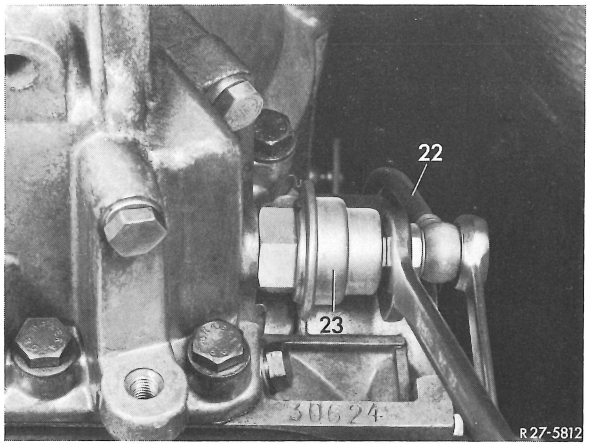


Fig. 3
22 Vacuum line
23 Vacuum box

12 Unscrew vacuum box (23).

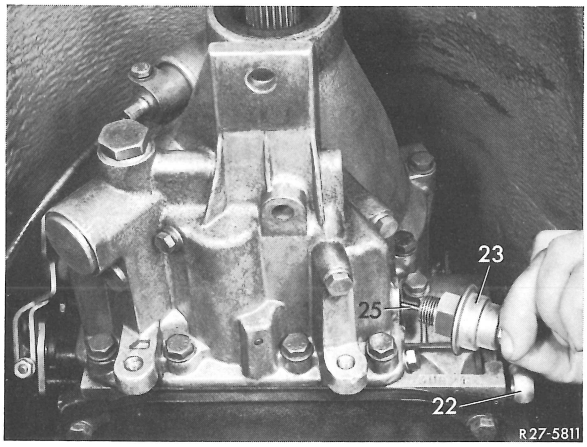


Fig. 4
22 Vacuum line
23 Vacuum box
25 Thrust pin

13 Unscrew plug for secondary pump (5) and remove compression spring.

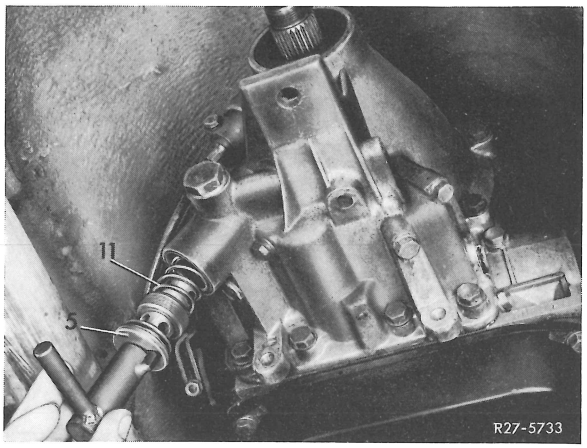


Fig. 5
5 Plug for secondary pump
11 Compression spring

14 Lower transmission to the extent possible and unscrew fastening bolts for rear transmission housing.

15 Loosen rear transmission housing by light blows with plastic hammer and remove. The centrifugal governor should remain on output shaft, that is, when pulling off the housing, also pull governor from guide of rear transmission housing at the same time.

16 Remove modulating pressure housing (9) and gasket (Fig. 6).

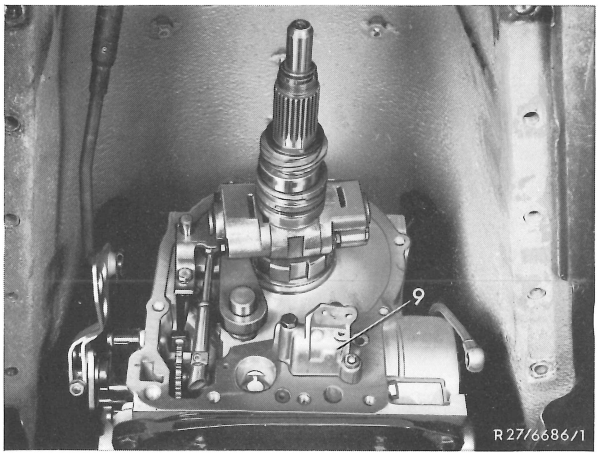


Fig. 6
9 Modulating pressure housing

Installation

17 Install modulating pressure housing (9) with new gasket for rear transmission housing (Fig. 6). Center gasket on sealing surface of transmission housing by means of two screws.

18 Mount rear transmission housing while moving tachometer drive with a screw driver until in mesh with worm gear.

19 Screw-in fastening bolts of rear transmission housing and tighten to 1.3 kpm.

20 Screw-in plug for secondary pump (5) together with compression spring (11) (Fig. 5).

21 Coat vacuum box (23) on threads with sealing compound and screw into rear transmission housing (Fig. 4).

22 Connect vacuum line (22) to vacuum box (23), **while counterholding on hexagon (SW 14) on vacuum box** (Fig. 3).

23 Place range selector lever in position "P".

24 Place three-legged flange on output shaft and tighten slotted nut to 12.0 kpm, secure slotted nut.

25 Attach selector rod to range selector lever.

26 Connect tachometer shaft to transmission.

27 Lift engine-transmission unit with top of pit lift as required. Remove wooden support under propeller shaft and screw the latter to transmission.

28 Check rear rubber mount and screw to transmission.

29 Screw-on rear half of tunnel closing plate (17) (Fig. 1).

30 Screw-in both fastening bolts (19) for rubber mount on end plate and tighten (Fig. 1). Lower pit lift.

31 Move vehicle back and forth and tighten propeller shaft clamping nut to 3 kpm.

32 Tighten fastening bolts on propeller shaft intermediate bearing to 2.0 kpm.

33 Fill up with transmission fluid. (27.2–020/1).

34 Shift through gears and correct oil level.

35 Check modulating pressure and adjust, if required (27.2–340).

36 Screw-on front end of tunnel closing plate.

W 3 A 040

Removal

1 Remove rear transmission housing (27.2–500).

2 Remove plate spring (85), worm gear of tachometer drive (15), eccentric ring for secondary pump (16) and centrifugal governor (17) from output shaft (Fig. 1).

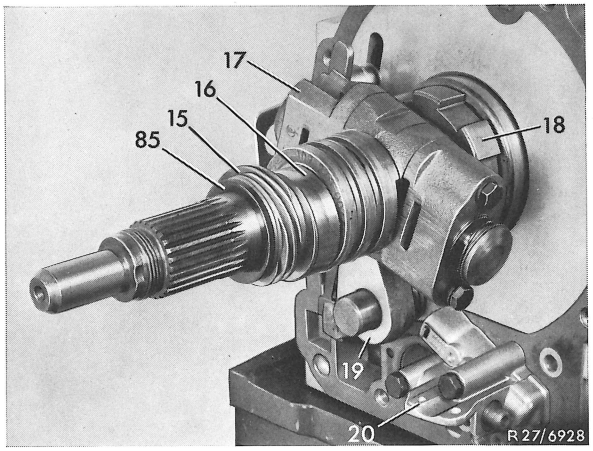


Fig. 1

15 Worm gear of speedometer drive
16 Eccentric ring for secondary pump
17 Centrifugal governor
85 Plate spring

Installation

3 Attach centrifugal governor (17), eccentric ring for secondary pump (16), worm gear of tachometer drive (15) and plate spring (85) to output shaft (Fig. 1). The flange of the worm gear (15) should face the centrifugal governor and the curvature of the plate spring (85) should face the worm gear (Fig. 2).

4 Install rear transmission housing (27.2–500).

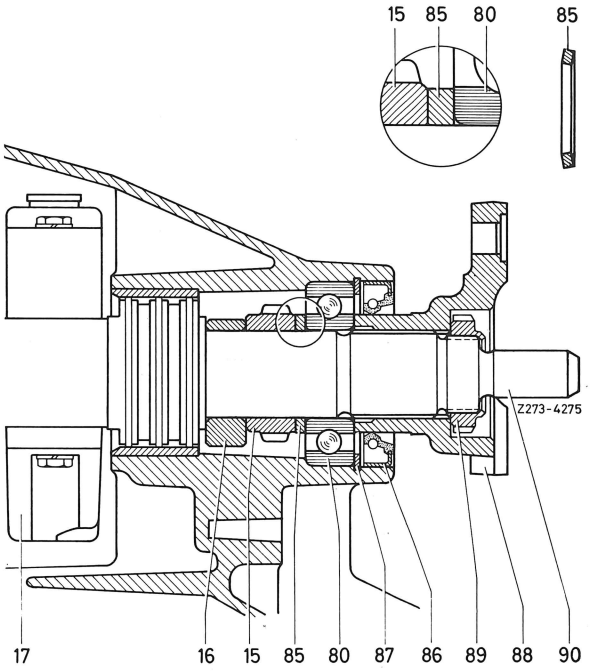


Fig. 2

15 Worm gear – tachometer drive
80 Ball bearing
85 Plate spring
89 Slotted nut

27.2 Removal and Installation of Parking Lock

W 3 A 040

Tightening Torque in kpm

Hex. bolt for leaf spring of detent plate	1.0

Removal

1 Remove rear transmission housing (27.2–500).

2 Remove centrifugal governor (27.2–520).

3 Screw fastening bolt from holder (14) and remove holder together with leaf spring (13) (Fig. 1).

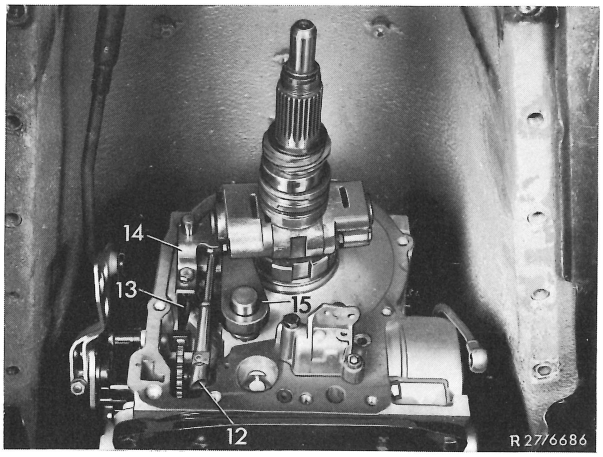


Fig. 1

12 Resilient linkage
13 Leaf spring
14 Holder
15 Parking lock pawl

4 Remove resilient linkage (12).

5 Remove parking lock pawl (15) together with clamping spring.

6 Pull parking lock gear (21) from output shaft (Fig. 2).

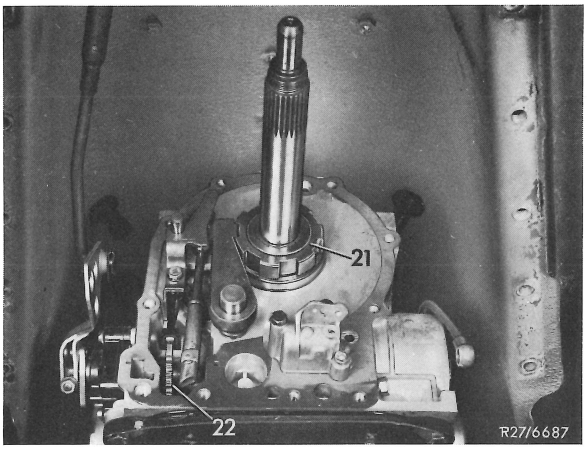


Fig. 2

21 Parking lock gear
22 Detent plate

Installation

7 Attach parking lock gear (21) to output shaft (Fig. 2) and slide parking lock pawl (15) with clamping spring on bearing pin (Fig. 1).

8 Install resilient linkage (12) (Fig. 1).

9 Install leaf spring (13), needle bearing supported roller and holder (14) and tighten fastening bolt to 1.0 kpm.

10 Place range selector lever in position "P" by checking whether the parking lock engages correctly.

11 Install centrifugal governor (27.2–520).

12 Install rear transmission housing (27.2–500).

Tightening Torques	Nm	(kpm)
Fastening bolt for tachometer drive and secondary pump	8	(0.8)
Phillips head screw for holding plate on locking piston	4	(0.4)

Special Tool	
Assembly mandrel	108 589 02 43 00

Disassembly

1 Remove rear transmission case (27.2–500).

2 Unscrew fastening bolt from cover plate of locking piston and remove locking piston (81) together with spring (Fig. 1).

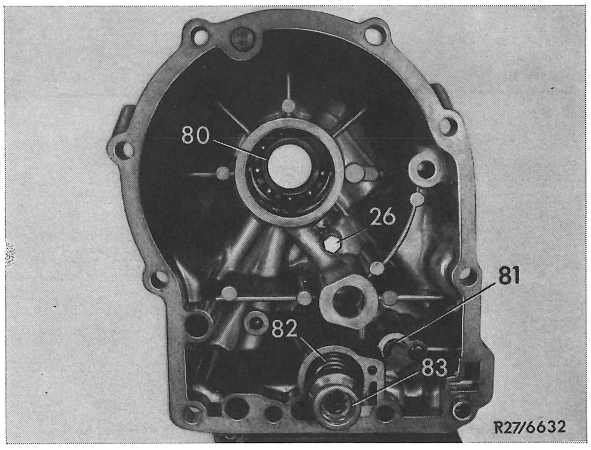


Fig. 1

26 Fastening bolt for secondary pump
80 Ball bearing
81 Locking piston
82 Pressure receiving springs
83 Spring plate

3 Remove spring plate (83) with two springs (82) and pressure receiving piston from rear transmission case cover.

4 Unscrew fastening bolt for tachometer drive.

5 Pull tachometer drive (31 to 33) out of rear transmission case, remove tachometer pinion (31) from bearing body (33) (Fig. 2).

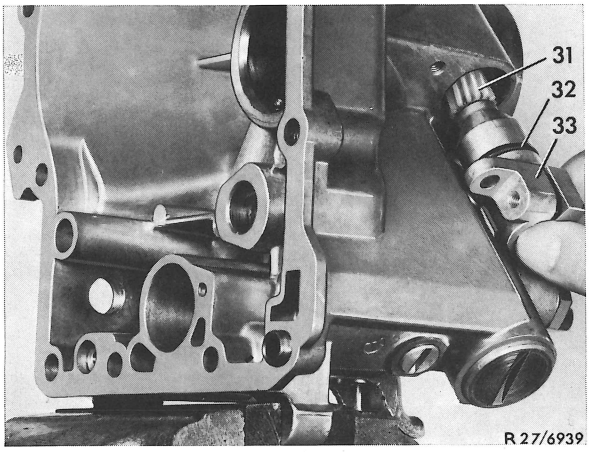


Fig. 2

31 Tachometer pinion
32 O-ring
33 Bearing body

6 Unscrew fastening bolt for secondary pump (26) (Fig. 1).

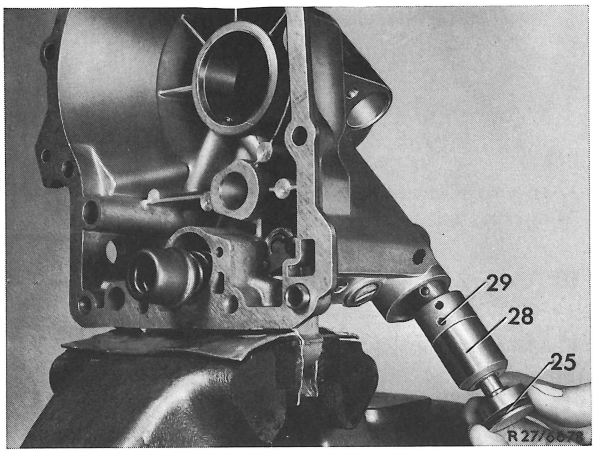


Fig. 3

25 O-ring
28 Secondary pump
29 Fastening bore

27.2 Disassembly and Reassembly of Rear Transmission Case

7 Remove secondary pump (28) from rear transmission case (Fig. 3).

8 Push sealing ring (86) out of rear transmission case (Fig. 4).

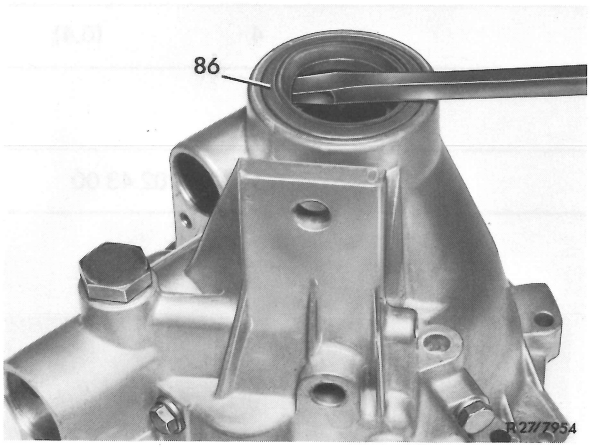


Fig. 4
86 Sealing ring

9 Remove locking ring (79) and press out ball bearing (80).

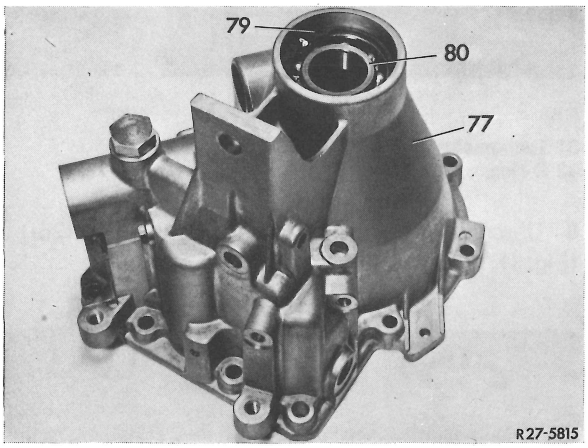


Fig. 5
77 Rear transmission case
79 Locking ring
80 Ball bearing

10 Unscrew the two measuring connection plugs.

11 Remove closing plug (13) together with compression spring (10) and glass ball (9) (Fig. 8).

12 Unscrew closing plug (17) and remove steel ball (16) (Fig. 6).

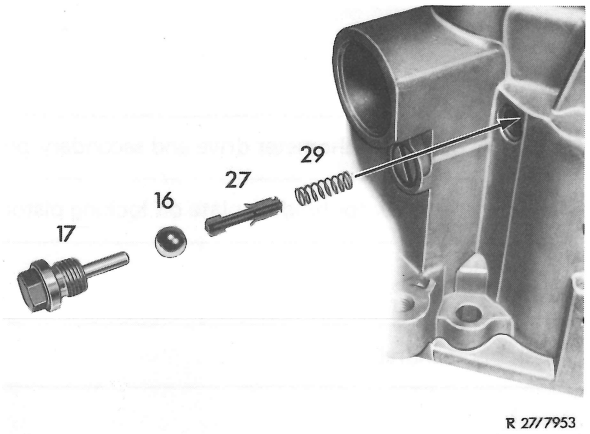


Fig. 6
16 Steel ball
17 Closing plug
27 Plastic pin
29 Compression spring

13 Check thrust pin (27) for smooth operation.

Caution! If the plastic pin (27) binds or drops out, be sure to replace. New transmission covers are already provided with the plastic pin (27), compression spring (29), ball (16) and closing plug (17).

Assembly

14 Press-in ball bearing (80) (Fig. 5) with assembly mandrel (78) (Fig. 7).

15 Insert locking ring (79) (Fig. 5), press-in sealing ring (86) (Fig. 4).

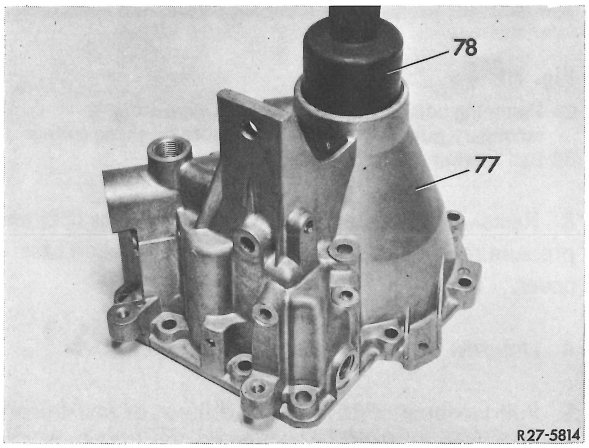


Fig. 7
77 Rear transmission case
78 Assembly mandrel 108 589 02 43 00

16 Insert locking piston (81) with spring and screw down holding plate at 4 Nm (0.4 kpm) (Fig. 1).

17 Introduce secondary pump (28) into rear transmission case until the fastening bore (29) is in alignment with the bore in transmission case (Fig. 3).

18 Tighten fastening bolt (26) of secondary pump to 8 Nm (0.8 kpm) (Fig. 1).

19 Insert tachometer pinion (31) into bearing body (33), introduce tachometer drive into rear transmission case until fastening bore is in alignment with bore in transmission case (Fig. 2).

20 Tighten fastening bolt of tachometer drive to 8 Nm (0.8 kpm).

21 Screw-in closing plug (13) with spring (10), as well as glass ball (9) and new sealing ring (Fig. 8).

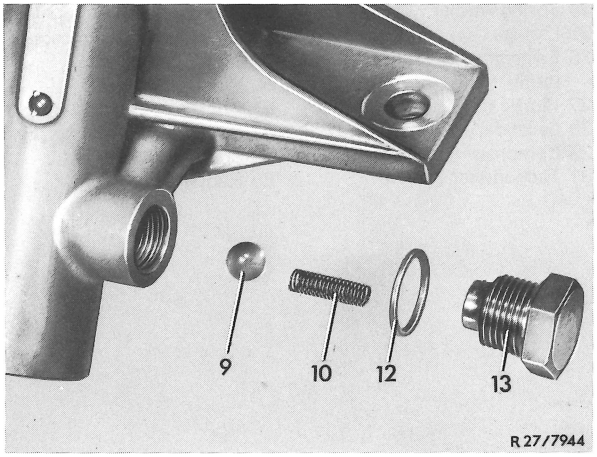


Fig. 8

9 Ball valve
10 Compression spring
12 Sealing ring
13 Closing plug

22 Screw-in the two measuring connection plugs with new sealing ring.

23 Insert pressure receiving piston:

a) **1st version W 3 A 040** (refer to page 001/1)

Insert pressure receiving pistón (23) into case, insert the two compression springs (82) with spring plate (83) into piston (Fig. 9).

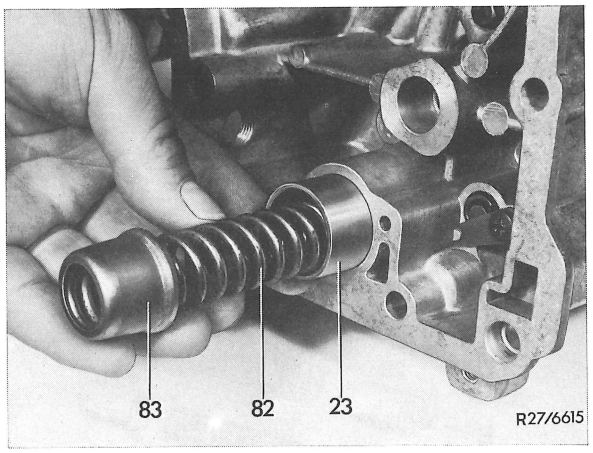


Fig. 9

23 Pressure receiving piston
82 Pressure receiving springs
83 Spring plate

b) **2nd version W 3 A 040 and W 3 B 050**

Insert compression spring (82) into piston (23) and introduce both together into case (Fig. 10).

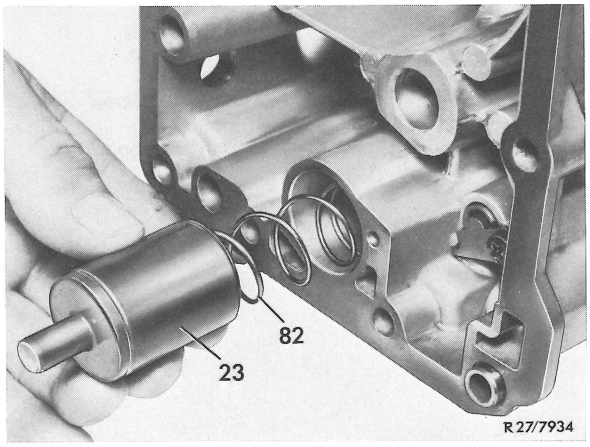


Fig. 10

23 Pressure receiving piston
82 Pressure receiving spring

27.2 Disassembly and Reassembly of Rear Transmission Case

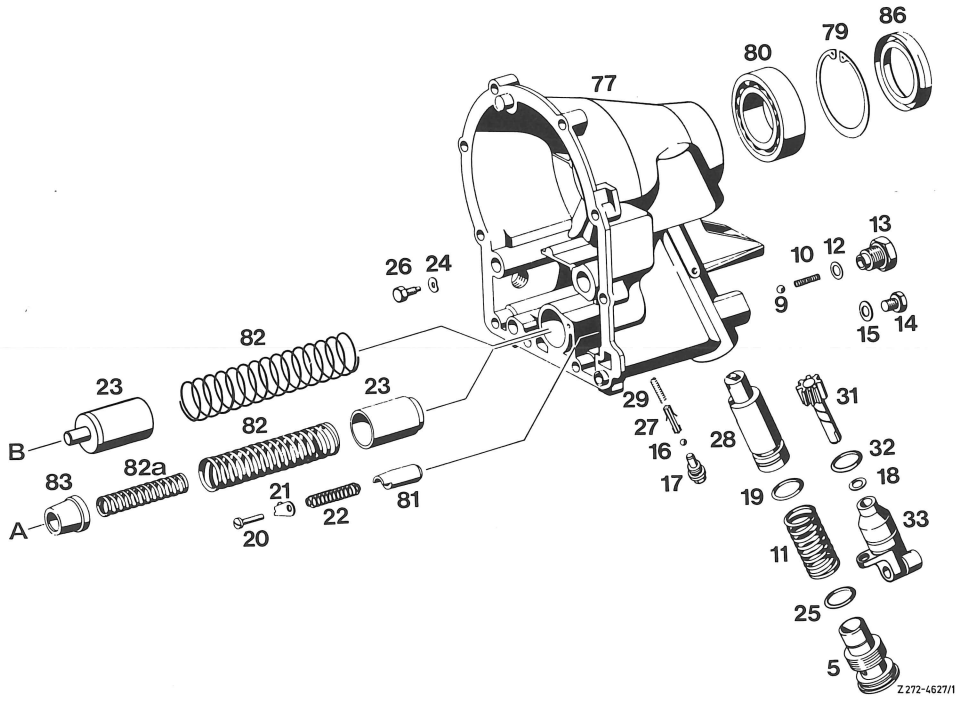


Fig. 11

A 1st version
B 2nd version
5 Plug with inlet valve for secondary pump
9 Ball
10 Compression spring
11 Compression spring
12 Sealing ring
13 Closing plug
14 Closing plug
15 Sealing ring
16 Ball
17 Closing plug
18 Sealing ring
19 O-ring
20 Oval-head screw
21 Holder
22 Compression spring
23 Pressure receiving piston
24 Spring washer
25 O-ring
26 Fastening bolt for secondary pump
27 Plastic pin
28 Secondary pump
29 Compression spring
31 Tachometer pinion
32 O-ring
33 Bearing body
77 Rear transmission case
79 Locking ring
80 Ball bearing
81 Locking piston
82 Pressure receiving springs
83 Spring plate
86 Radial sealing ring

Tightening Torques in kpm

Hex. bolts for shift housing and governor housing on centrifugal governor	0.8

Disassembly

1 Replace oil sealing rings (5) as required by disconnecting and removing oil sealing rings (Fig. 1).

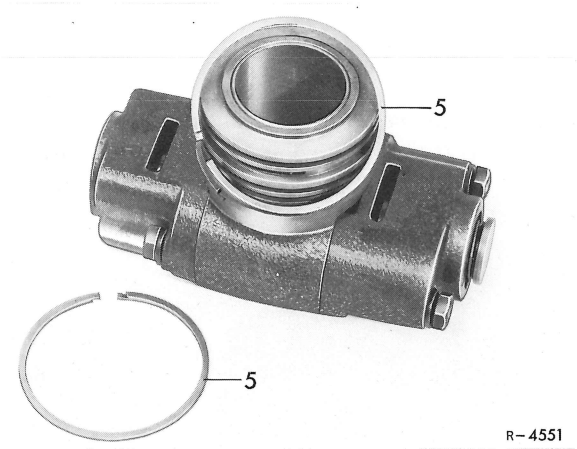


Fig. 1
5 Oil sealing rings

2 Unscrew hex. bolts (4) (Fig. 2).

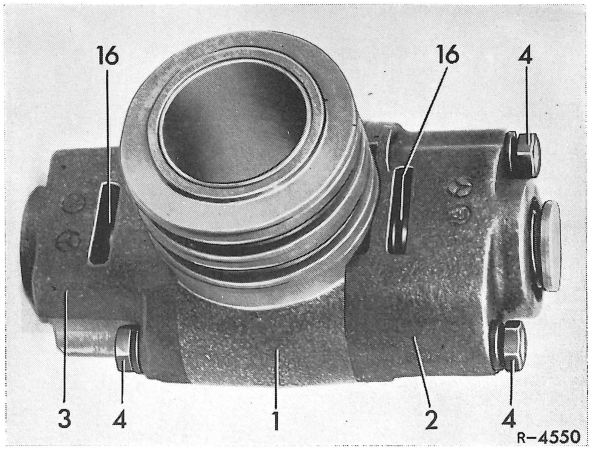


Fig. 2
1 Flange
2 Governor housing
3 Shift housing
4 Hex. bolts
6 Oil outlet slots

3 Remove shift housing (3) and governor housing (2) from flange (1).

4 Remove lock washer (6), compression spring (7), and shift valve (8) (Fig. 3).

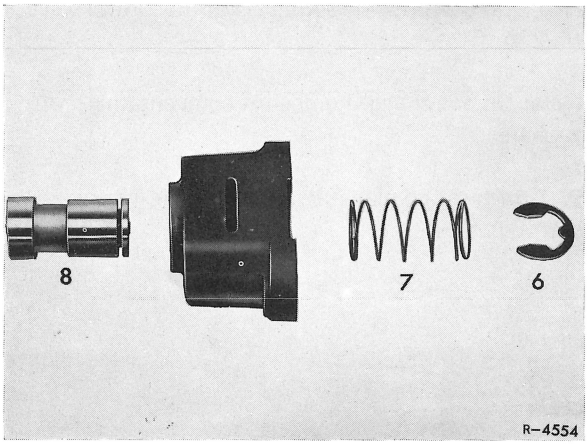


Fig. 3
6 Lock washer
7 Compression spring
8 Shift valve

5 Remove spring plate (9), centrifugal weight (10) and weak compression spring (11) in upward direction (Fig. 4).

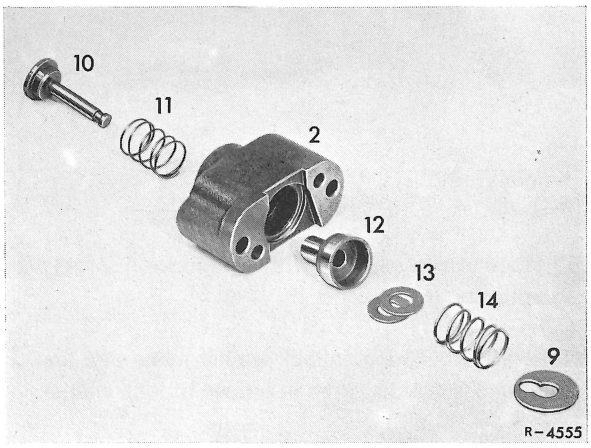


Fig. 4
2 Governor housing
9 Spring plate
10 Centrifugal weight
11 Compression spring
12 Control valve
13 Compensating washers
14 Compression spring

6 Remove compression spring (14) with compensating washers (13) and control valve (12) in downward direction.

Assembly

Caution! Clean all parts well in cleaning gasoline. Check shift valve (8) (Fig. 3) and control valve (12) (Fig. 4) for damage and easy sliding in their bores.

7 Insert control valve (12) into governor housing (2).

8 Introduce centrifugal weight (10) with weak compression spring (11) into control valve (12). Push down on control valve, insert compensating washers (13) with compression spring (14) into control valve (Fig. 4).

Note: Do not change number of compensating washers.

9 Attach spring plate (9), watching out for correct seat (Fig. 5).

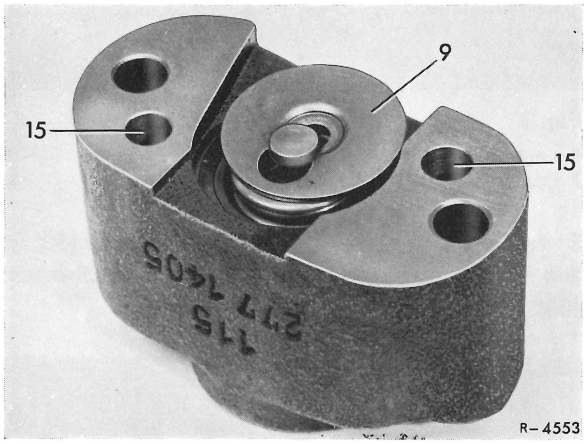


Fig. 5
9 Spring plate
15 Oil ducts

10 Insert shift valve (8) with compression spring (7) and push on lock washer (6) (Fig. 3).

Note: When pushing on lock washer make sure that the spring is not distorted in groove of lock washer.

11 Position shift housing (3) on flange (1) in such a manner that the oil outlet slots (16) are facing the oil seal rings (Fig. 2) and the oil ducts (15) are in agreement (Fig. 6).

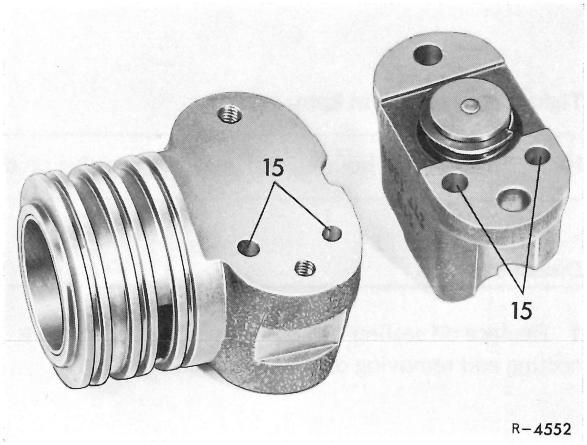


Fig. 6
15 Oil ducts

12 Insert strainer (17) into seat provided in oil duct (Fig. 7) and mount governor housing (2) with the oil outlet slots (16) facing the oil sealing rings (Fig. 2).

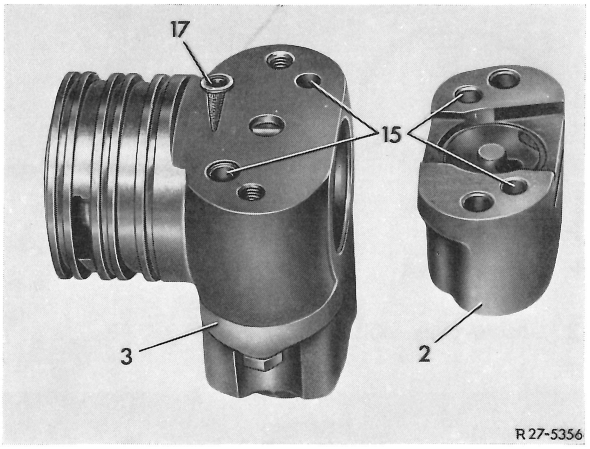


Fig. 7
2 Governor housing
3 Shift housing
15 Oil ducts
17 Strainer

13 Tighten hex. bolts (4) to 0.8 kpm (Fig. 2).

14 Replace oil sealing rings (5), if removed, by inserting into grooves and attaching as required (Fig. 1).

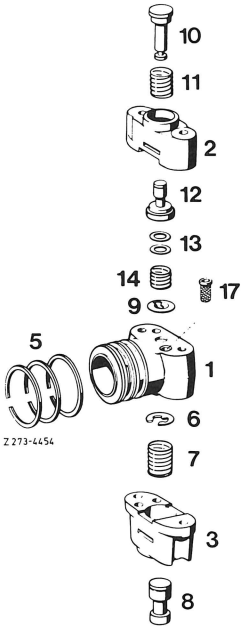


Fig. 8

1 Flange
2 Governor housing
3 Shift housing
5 Oil sealing rings
6 Lock washer
7 Compression spring
9 Spring plate
10 Centrifugal weight
11 Compression spring
12 Control valve
13 Compensating washers
14 Compression spring
17 Strainer

27.2 Removal and Installation of Starter Lock and Back-up Light Switch

W 3 A 040

Tightening Torques in kpm	
Adjusting screw for starter lock and backup light switch	0.2
Cheesehead screws for starter lock and backup light switch	0.5

Special Tool	
1 Locating pin	115 589 18 63 00

Removal

1 Disconnect selector rod on range selector lever.

2 Remove range selector lever (1) from shaft by loosening clamping screw (6) (Fig. 2).

3 Unscrew fastening screws of starter locking switch (7) (Fig. 1).

4 Remove starter locking switch (7) from shaft (4) (Fig. 1).

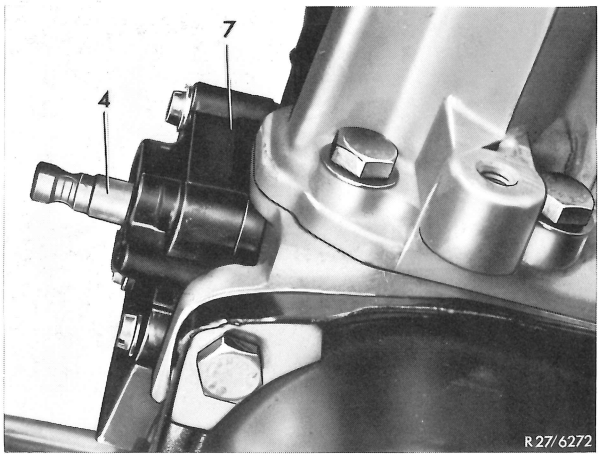


Fig. 1
4 Shaft
7 Starter locking switch

Installation

5 Screw starter locking switch (7) to transmission housing. Tighten fastening screws to 0.5 kpm.

6 Place range selector lever (1) on shaft and tighten with clamping screw (6).

7 Move range selector lever (1) into position "N" and loosen adjusting screw (3). Insert locating pin (5) through carrier sleeve into locating hole on switch housing, then carefully tighten adjusting screw (3) (tightening torque 0.2 kpm) and pull out locating pin (Fig. 2).

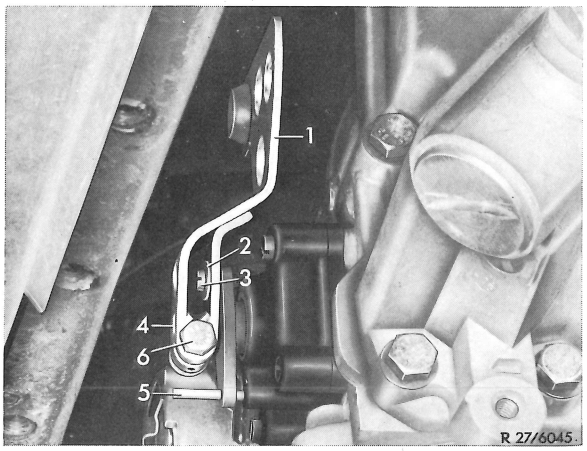


Fig. 2
1 Range selector lever
2 Washer
3 Adjusting screw
4 Shaft
5 Locating pin
6 Clamping screw

8 Attach selector rod to range selector lever and secure.

W 3 A 040

Tightening Torques in kpm

Propeller shaft clamping nut	3.0
Hex. bolts of propeller shaft intermediate bearing	2.0
Hex. bolts for torque converter on driven plate	4.2

Special Tools

Top for pit lift	BE 11 857
Torque wrench	001 589 44 21 00
Open end wrench	000 589 13 01 00
Flushing mandrel	116 589 00 15 00
Syringe	112 589 00 72 00
Holding plate for torque converter	116 589 02 62 00

Removal

1 Disconnect minus (negative) cable from battery.

2 Place vehicle on supporting stands.

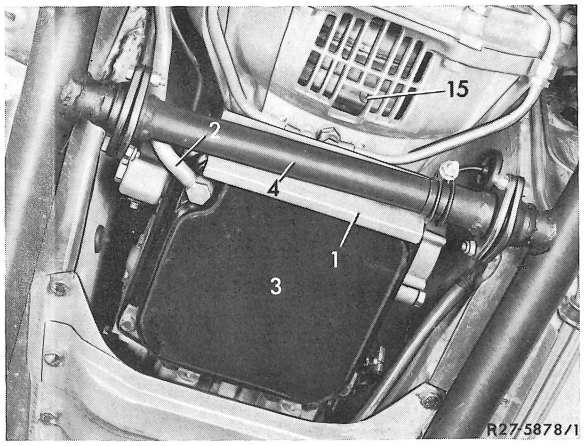


Fig. 1

1 Shielding plate
2 Oil filler pipe
3 Oil pan
4 Compensating connection
15 Drain plug

3 Drain transmission fluid. For this purpose, unscrew fluid filler pipe (2) on sump (3) of transmission and oil drain plug (15) on torque converter (Fig. 1). Use clean vessel only.

4 Remove complete exhaust system (Job No. 49.1–100).

5 Separate feed line (5) and return line (6) for oil cooler from connecting lines (Fig. 2).

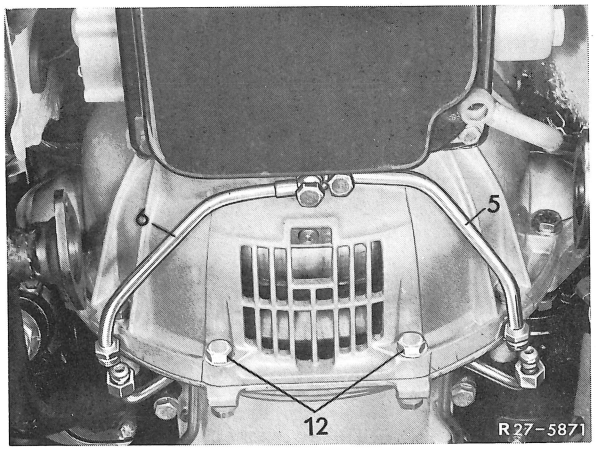


Fig. 2

5 Feed line
6 Return line
12 Fastening bolts

6 Close oil cooler lines with plastic plugs.

7 Loosen both fastening bolts (7) of propeller shaft intermediate bearing, but do not screw out (Fig. 3).

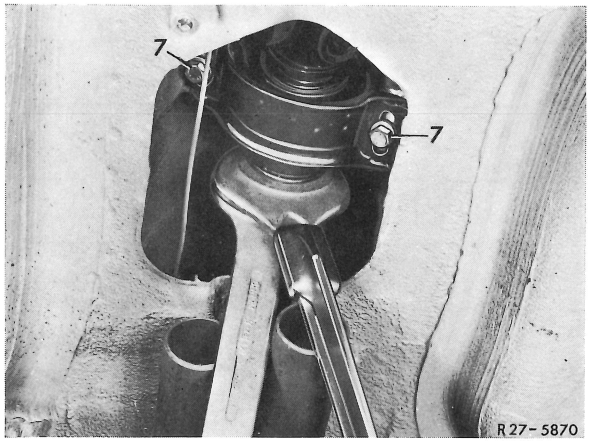


Fig. 3
7 Fastening bolts

8 Loosen propeller shaft clamping nut with torque wrench 001 589 44 21 00 and open end wrench 000 589 13 01 00 (Fig. 3).

9 Unscrew both fastening bolts (19) from engine mounting (Fig. 4).

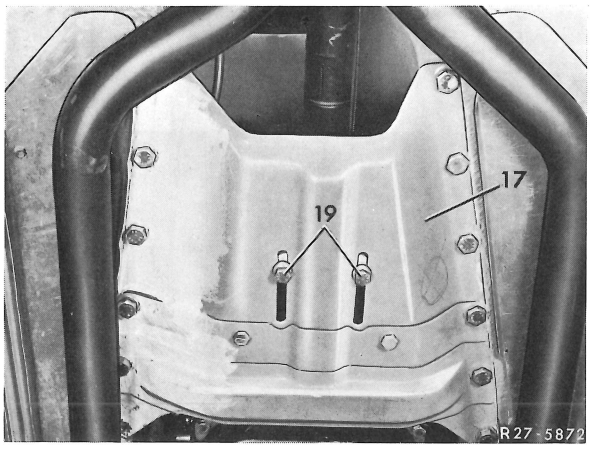


Fig. 4
17 Tunnel closing plate
19 Fastening bolts for engine mounting

10 Loosen and remove tunnel closing plate (17) attached with 12 bolts.

11 Unscrew rear engine mounting (18) on transmission (Fig. 5).

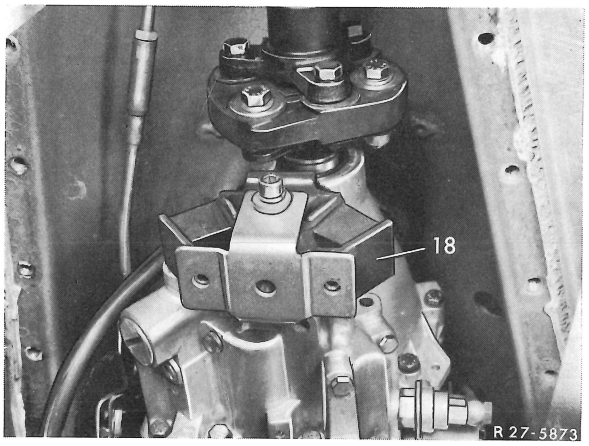


Fig. 5
18 Rear engine mounting

12 Unscrew propeller shaft on transmission while leaving universal plate on propeller shaft.

13 Slide propeller shaft toward the rear as far as the center bearing and the clamping piece permit.

14 Place suitable piece of wood underneath propeller shaft at front in tunnel in such a manner that the shaft is pushed completely upwards.

15 Pull out plug for starter lock and backup light switch (8) (Fig. 6).

16 Unscrew clamping screw from lever for control pressure (9) and pull lever from shaft (Fig. 6).

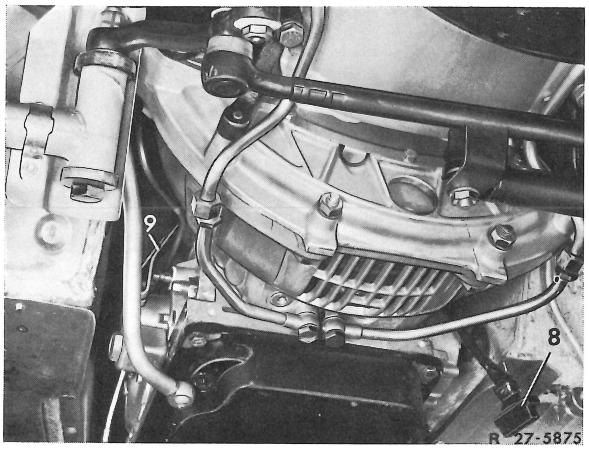


Fig. 6
8 Plug for starter lock and backup light switch
9 Lever for control pressure

17 Unscrew cable from kickdown solenoid valve (10) (Fig. 7).

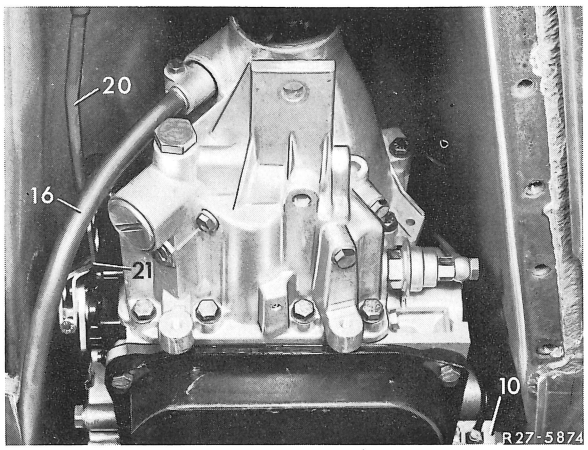


Fig. 7

10 Kickdown solenoid valve
16 Tachometer shaft
20 Shift rod
21 Range selector lever

18 Disconnect shift rod (20) on range selector lever (21) and set range selector lever to position "P".

19 Disconnect speedometer shaft (16) on transmission.

20 Unscrew vacuum line (22) from vacuum box (23), **while counterholding at hexagon SW 14 on diaphragm** (Fig. 8).

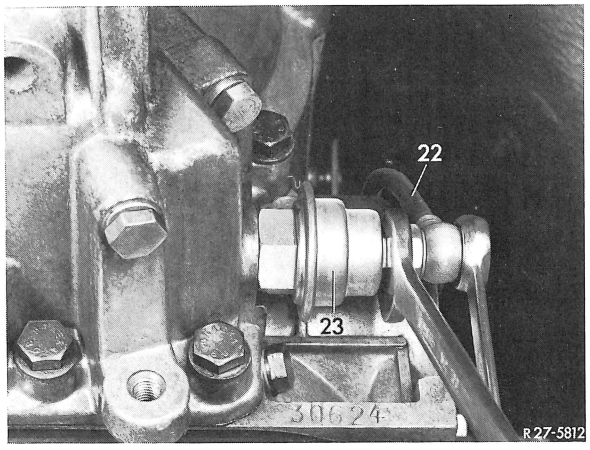


Fig. 8

22 Vacuum line
23 Vacuum box

21 Pull covering plug from intermediate flange. Separate hydraulic clutch from driven plate by unscrewing 6 hexagon bolts (11) (Fig. 9).

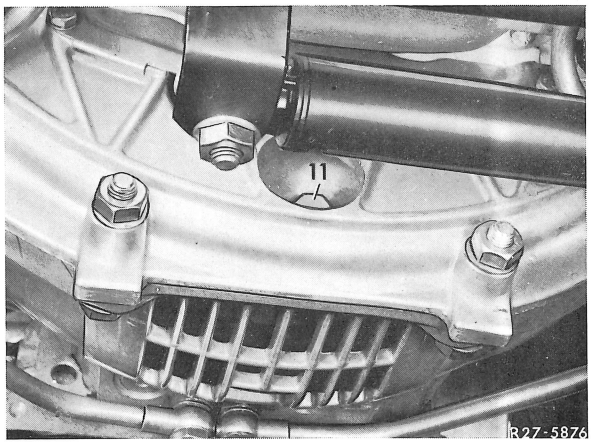


Fig. 9

11 Hex. bolts

22 Slightly raise engine-transmission unit with top for pit lift BE 11 857 (Fig. 10).

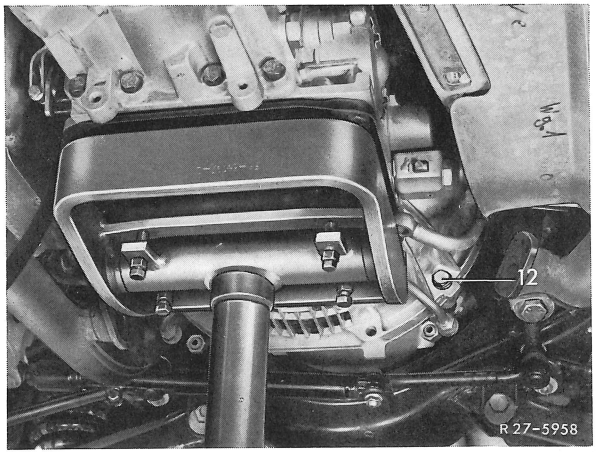


Fig. 10

12 Fastening bolt

23 Loosen all bolts for attaching transmission to intermediate flange and screw out. The two lateral screws (12) should be removed last (Fig. 10).

24 Push transmission with torque converter in direction of rear axle until the bearing journal of the hydraulic clutch can no longer touch the intermediate flange.

25 Carefully lower transmission with torque converter and then pull out in forward direction (Fig. 11).

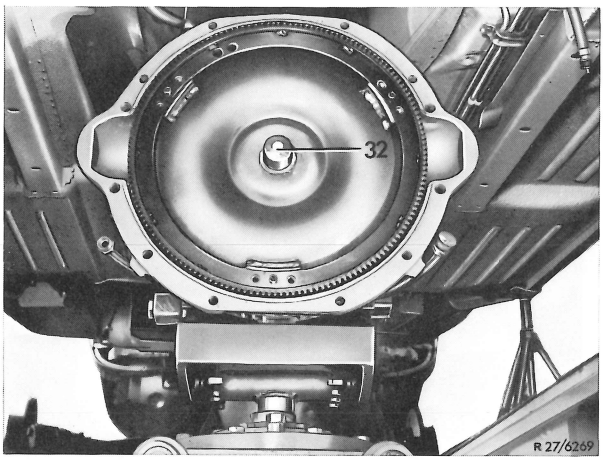


Fig. 11
32 Centering pin

26 Place transmission in vertical position. Screw holding plate 116 589 02 62 00 on torque converter and pull out in upward direction (Fig. 12).

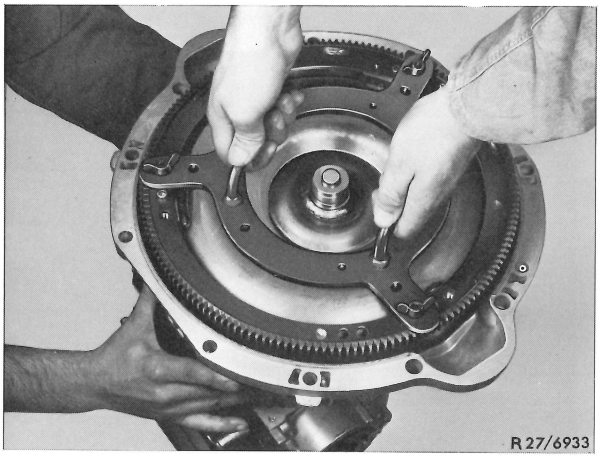


Fig. 12

Installation

Caution! If the amount of sludge or chips in transmission is abnormally high, clean torque converter from inside with flushing mandrel 116 589 00 15 00. If no flushing mandrel is available, the torque converter should also be replaced. Thoroughly flush transmission fluid cooler in lower header including feed lines with syringe 112 589 00 72 00 and cleaning gasoline and blow out. Also clean all pipelines well and blow out.

27 Place transmission in vertical position. Screw holding plate 116 589 02 62 00 on torque converter. Move claws of drive flange (29) in engaging direction opposite pump wheel (Fig. 13).

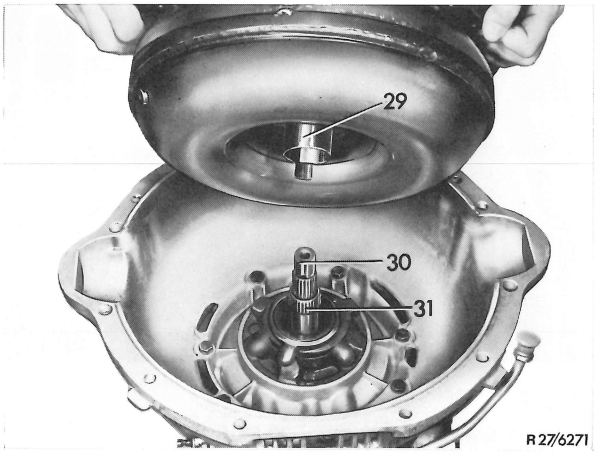


Fig. 13
29 Drive flange
30 Drive shaft
31 Stator shaft

Grease centering pin (32) and drive flange (29) of torque converter with some Molykote.

28 Carefully install torque converter while turning lightly back and forth (Fig. 12).

Caution! On a correctly installed torque converter the dimension "K" should be approx. 4 mm (Fig. 14).

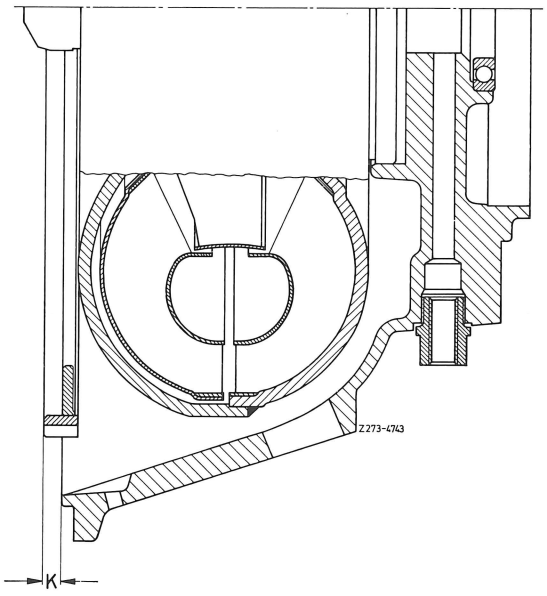


Fig. 14

Also make sure that when introducing the torque converter, the sealing lip of the radial sealing ring in the primary pump housing is not damaged. Check dimension ' K" once again prior to flanging-on transmission.

29 Place transmission on vehicle jack or pit lift. Turn torque converter in such a manner that two fastening bores are at bottom.

30 Rotate engine until two bores (13) in driven plate (14) for fastening bolts of torque converter are at bottom (Fig. 15).

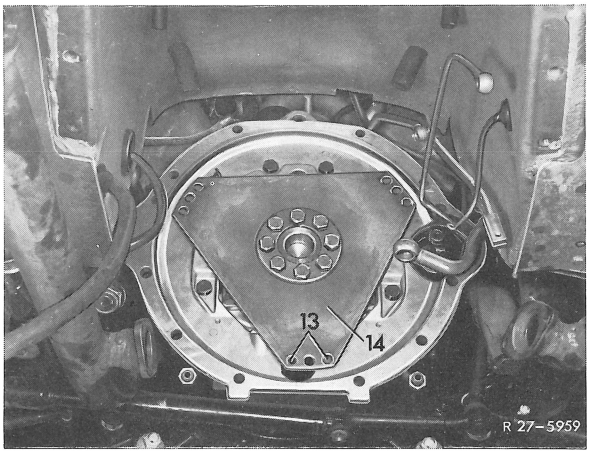


Fig. 15
13 Fastening bore 14 Driven plate

31 Introduce transmission and lift until the lower bolt holes of the clutch housing are in alignment with the bores in the intermediate flange. Push transmission forward until clutch housing is well seated. Do not use force.

32 Screw transmission with fastening bolts (12) to engine flange (Fig. 2).

33 Screw 6 hex. bolts 12 K (M 8 x 14) into torque converter and tighten to 4.2 kpm (item 11 in Fig. 9).

34 Connect vacuum line (22) to vacuum box (23) **while counterholding at hexagon (SW 14) on vacuum box** (Fig. 8).

35 Connect tachometer shaft (16) to transmission (Fig. 7).

36 Attach selector rod (20) to range selector lever (21) (Fig. 7).

37 Connect cable to kick-down solenoid valve (10) (Fig. 7).

38 Slide control pressure lever (9) on shaft and attach with clamping screw (Fig. 6).

39 Attach plug (8) for starter lock and backup light switch (Fig. 6).

40 Remove wooden support from under universal shaft and screw universal shaft to transmission.

41 Check rear engine mounting (18) and screw to transmission (Fig. 5).

42 Mount tunnel closing plate (17) while uniformly tightening the 12 fastening bolts (Fig. 4).

43 Screw both fastening bolts (19) into rear engine mounting and tighten (Fig. 4).

44 Remove vehicle from supporting stands, move slightly back and forth, then tighten universal shaft clamping nut with torque wrench 115 589 07 07 05 and open end wrench 000 589 13 01 00 to 3.0 kpm (Fig. 3).

45 Tighten fastening bolts (7) of universal shaft intermediate bearing (Fig. 3).

46 Completely install exhaust system (Job No. 49.1–100).

47 Screw feed line (5) and return line (6) for oil cooler to connecting lines (Fig. 2).

48 Screw oil filler pipe (2) to sump (3) of transmission and screw oil drain plug (15) into torque converter (Fig. 1).

49 Connect minus (negative) cable to battery.

50 Add transmission fluid (27.2–010).

Disassembly and Reassembly of Front Transmission Cover with Primary Pump 27.2

W 3 A 040

Tightening Torque in kpm	
Hex. bolts for primary pump	2.0

Special Tools	
Assembly mandrel for ball bearing in front transmission cover (punch of removing tool)	115 589 00 35 00
Pulling fixture for ball bearing in front transmission cover	116 589 07 33 00
Removing fixture for radial sealing ring of primary pump	116 589 08 33 00
Installation sleeve for primary pump	116 589 19 61 00
2 Studs	self-made
1 Sleeve	self-made

Disassembly

1 Pull ball bearing (3) from front transmission cover (1) with pulling fixture 116 589 07 33 00 (Fig. 1).

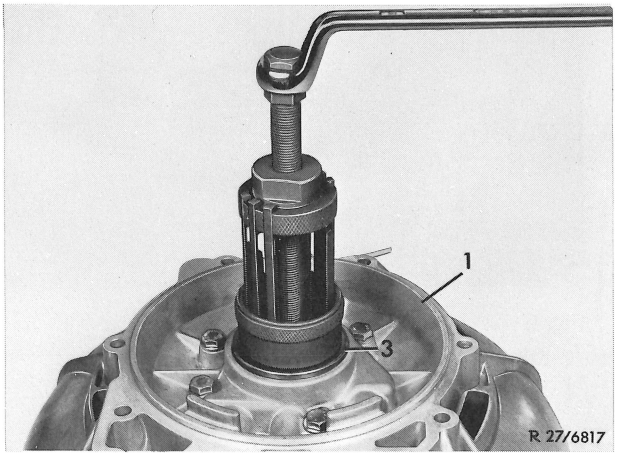


Fig. 1
1 Transmission cover
3 Ball bearing

2 Unscrew fastening bolts (4) (Fig. 2).

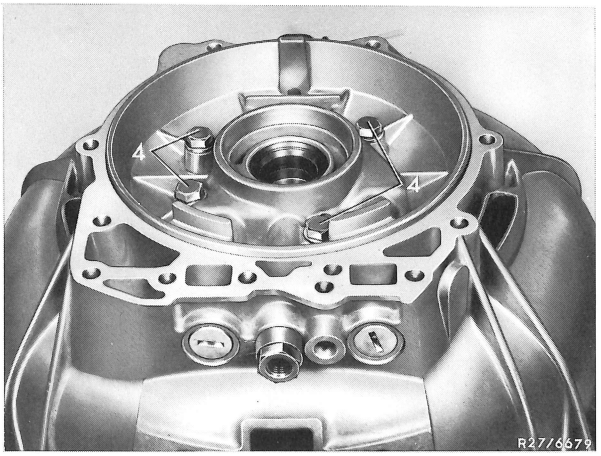


Fig. 2
4 Fastening bolts

3 Screw-in two hex. bolts approx. 50 mm long in opposite location (item 4, Fig. 3).

4 Loosen primary pump from transmission cover (1) by means of light blows against the two hex. bolts (4) (Fig. 3).

27.2 Disassembly and Reassembly of Front Transmission Cover with Primary Pump

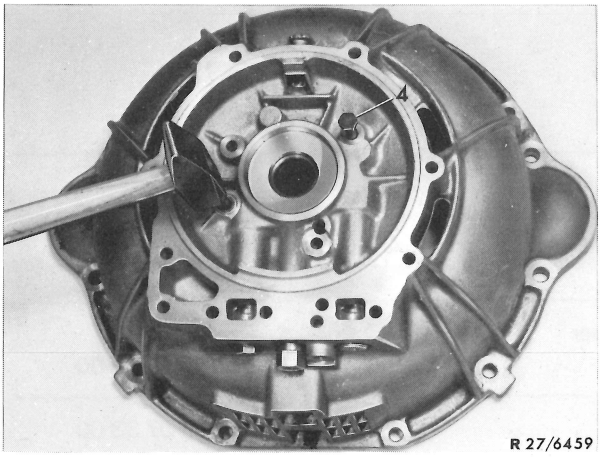


Fig. 3
4 Hex. bolts

5 Then remove primary pump (11) with intermediate plate (7) from front transmission cover (1) (Fig. 4).

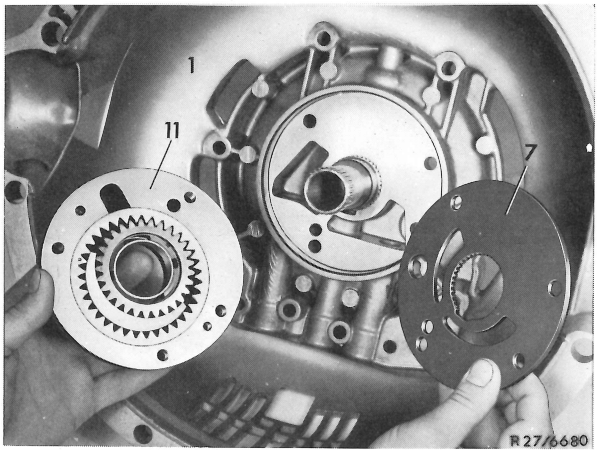


Fig. 4
1 Transmission cover
7 Intermediate plate
11 Pump housing

6 Remove primary pump gears (8) and (9) from pump housing (11) (Fig. 5).

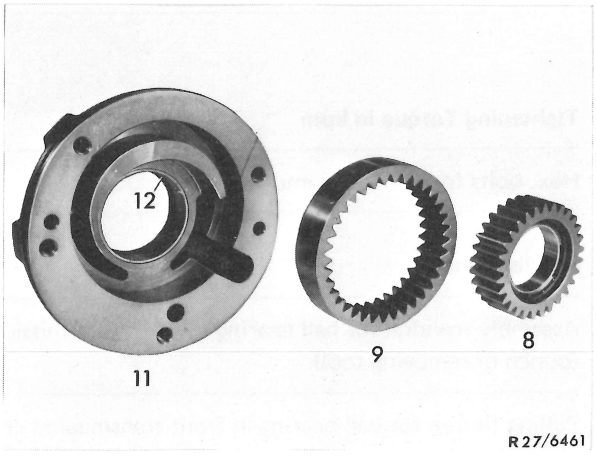


Fig. 5
8 Drive gear
9 Hollow gear
11 Pump housing
12 Bronze bushing

7 Remove O-ring (10) and radial seal (13), if required (Fig. 7).

Note: The removing fixture 116 589 08 33 00 shown in Fig. (6) can also be used on mounted transmission.

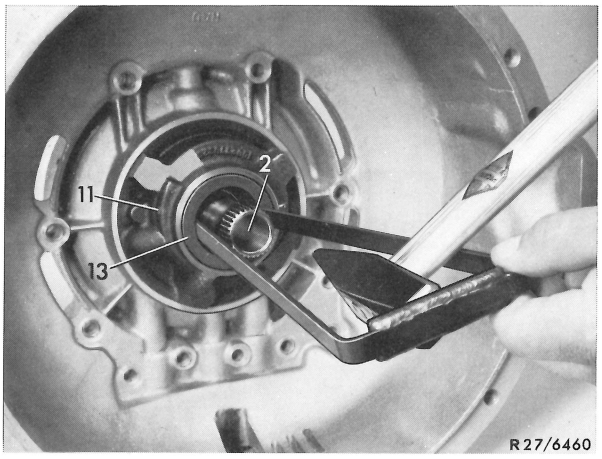


Fig. 6
2 Stator shaft
11 Pump housing
13 Radial sealing ring

Assembly

8 Install new O-ring (10) and radial sealing ring (13) into pump housing (11) (Fig. 7).

9 Lubricate primary pump gears (8 and 9) and insert into pump housing (11).

The bevelled outer edge of the pump gear (9) should face the bronze bushing (12) (Fig. 5).

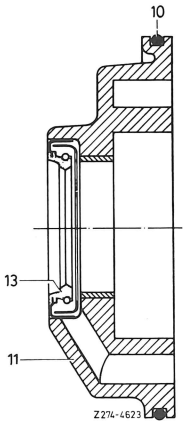


Fig. 7
10 O-ring
11 Pump housing
13 Radial sealing ring

10 Insert intermediate plate (7) in such a manner that the fastening bores for the primary pump are in alignment (Fig. 8).

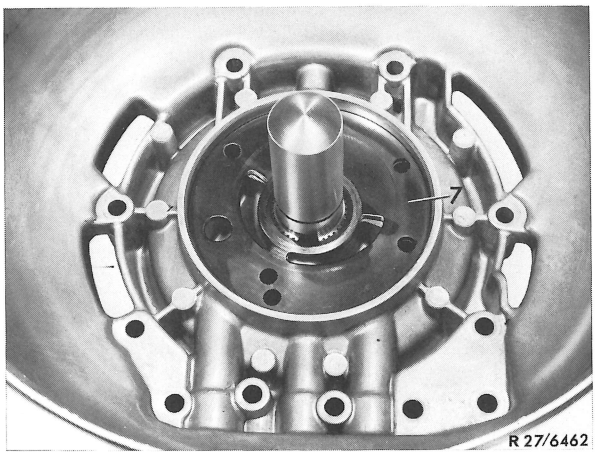


Fig. 8
7 Intermediate plate

11 Place installation sleeve 116 589 19 61 00 onto stator shaft and screw-in two studs for guiding primary pump (Fig. 9).

12 Insert primary pump into transmission cover and tighten fastening bolts (4) to 2.0 kpm (Fig. 2).

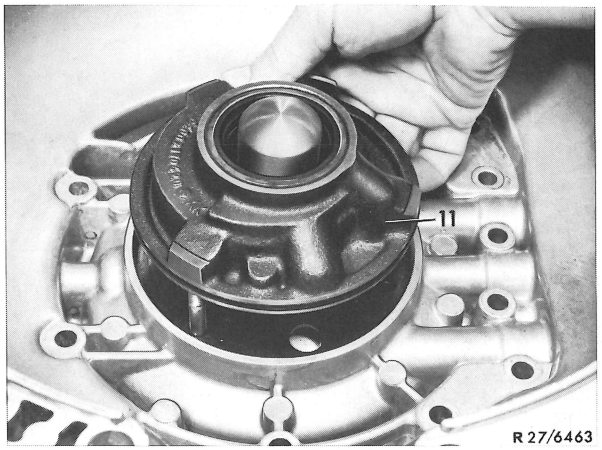


Fig. 9
11 Pump housing

13 Press ball bearing (3) into transmission cover (1) with suitable mandrel.
Use punch of remover 115 589 00 35 00 for this purpose (Fig. 10).

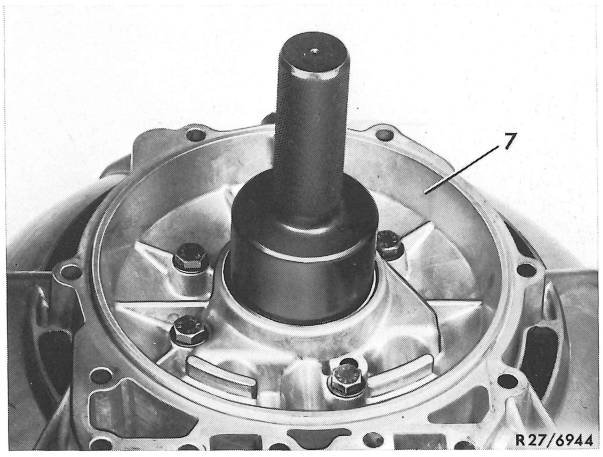


Fig. 10
1 Transmission cover

27.2 Disassembly and Reassembly of Front Transmission Cover with Primary Pump

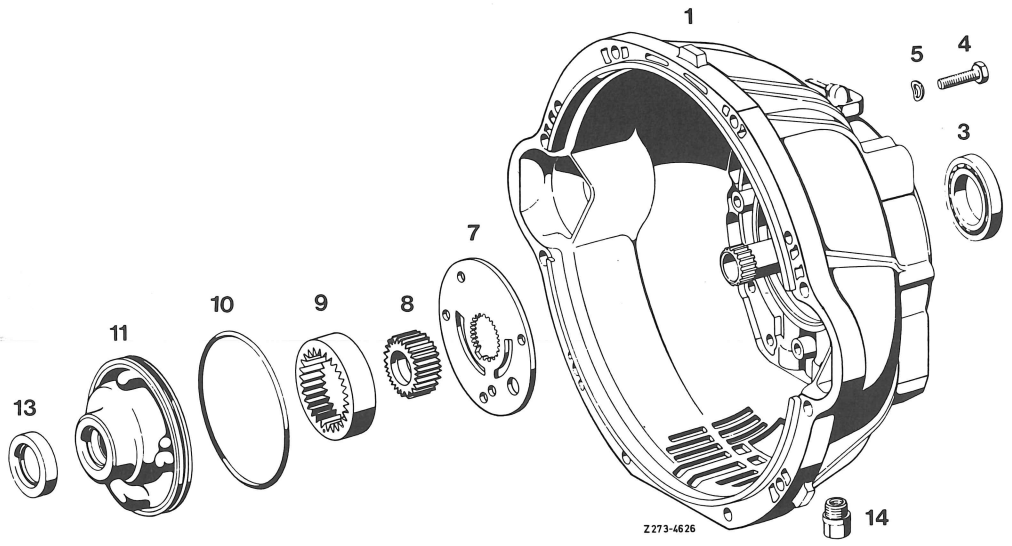


Fig. 11

1 Transmission cover
3 Ball bearing
4 Fastening screw
5 Spring washer
7 Intermediate plate
8 Drive gear
9 Ring gear
10 O-ring
11 Primary pump housing
13 Radial sealing ring
14 Threaded plug

Adjusting Data

End play of front transmission case cover or of gear assembly		0.5–0.1
Idle travel of brake band piston B 1 and B 2		3.0–4.0
Adjusting screw brake band B 3		Tighten adjusting screw to 5 Nm (0.5 kpm), then loosen by 1 3/4 turns and tighten counternut.
Thickness of compensating washers for radial bearing front transmission case cover		0.1–0.2–0.5
Length of thrust pins	for brake band B 1 and B 2	22–23–24–25–26–27–28
	for brake band B 3	45

Tightening Torques	**Nm**	(kpm)
Fastening bolts for oil pan on transmission case	7	(0.7)
Fastening bolts for oil filter	4	(0.4)
Hex. bolts for shift valve housing on transmission case	13	(1.3)
Hex. bolts for front transmission case	13	(1.3)
Kickdown solenoid valve	30	(3.0)

Special Tools

Assembly stand for automatic transmission	116 589 06 59 00
Installation ring for brake band piston B 2	115 589 18 61 00
Assembly fixture for brake band piston B 1	115 589 04 59 00
Measuring bridge	116 589 00 21 00
Locating pin for control pressure valve	self-made
2 Studs for shift valve housing	self-made

Notes

This scope is required for the following repair steps:

Replacement of brake bands B1, B 2 and B3, thrust bodies B1 and B2, as well as clutches K 1 and K 2. The rear transmission cover together with output shaft will remain screwed tightly to transmission. In the event of a burnt brake band or a burnt clutch, completely disassemble transmission according to Job No. 27.2–640.

Disassembly

1 Position transmission with oil pan up. Remove oil pan after loosening four fastening bolts (2) including washers (3) and gasket (Fig. 1).

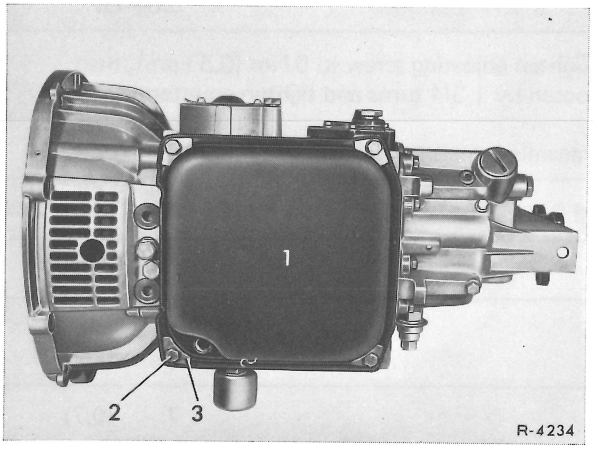


Fig. 1
1 Oil pan
2 Fastening bolt
3 Washer

2 Screw transmission to assembly stand 116 589 06 59 00 (Fig. 2).

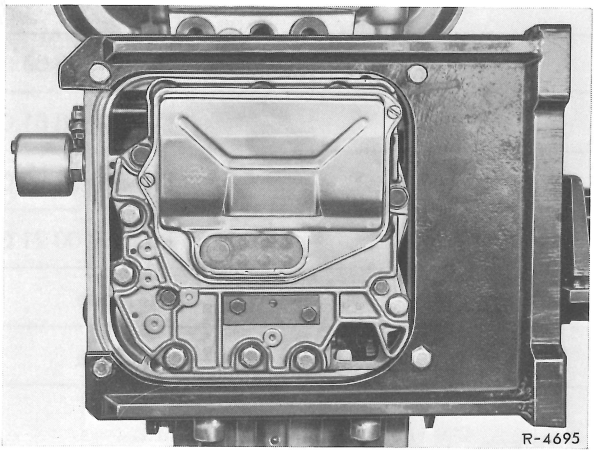


Fig. 2

3 Remove oil filter (4) (Fig. 3), unscrew fastening bolts (6) of shift valve housing (7). Move range selector lever between "P" and "R" and remove shift valve housing (Fig. 4).

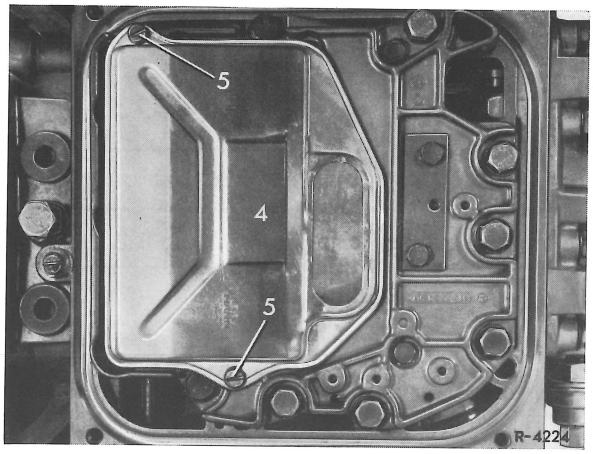


Fig. 3
4 Oil filter
5 Fastening bolts

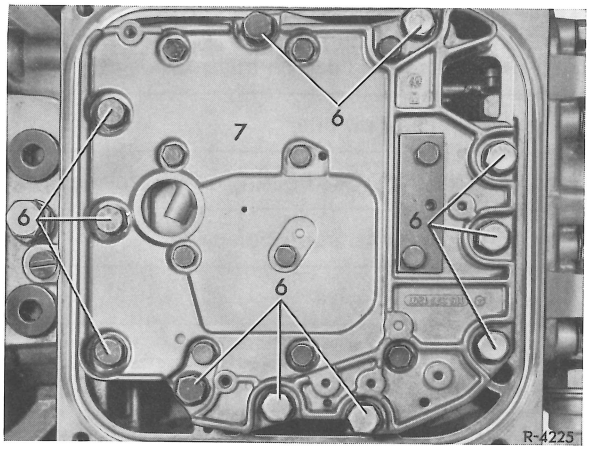


Fig. 4
6 Fastening bolts
7 Shift valve housing

4 Remove plug pipes (8), then pull sealing caps (9) from plug pipes (Fig. 5).

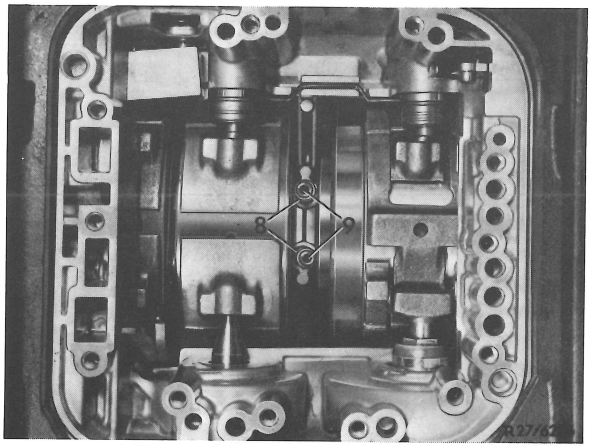


Fig. 5
8 Plug pipes
9 Sealing caps

5 Swivel transmission on assembly stand in such a manner that the rear transmission housing faces upwards. Unscrew fastening bolts (21) for front transmission housing (22) (Fig. 6).

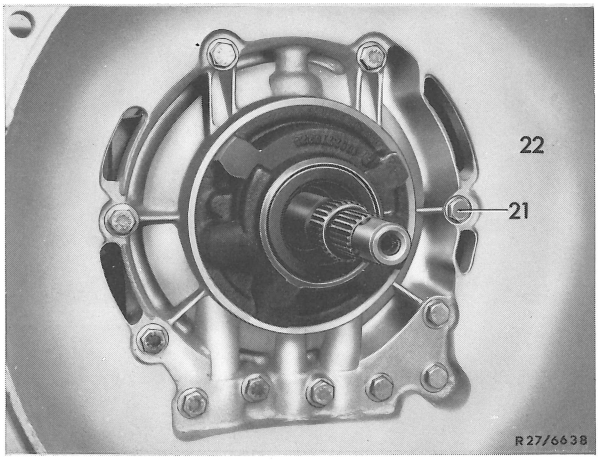


Fig. 6
21 Fastening bolts
22 Front transmission housing

6 Loosen front transmission housing by applying light blows with a plastic hammer and remove.

7 Swivel transmission on assembly stand into horizontal position.

8 Unscrew magnetic valve (25) and control pressure lever (28) (Fig. 7).

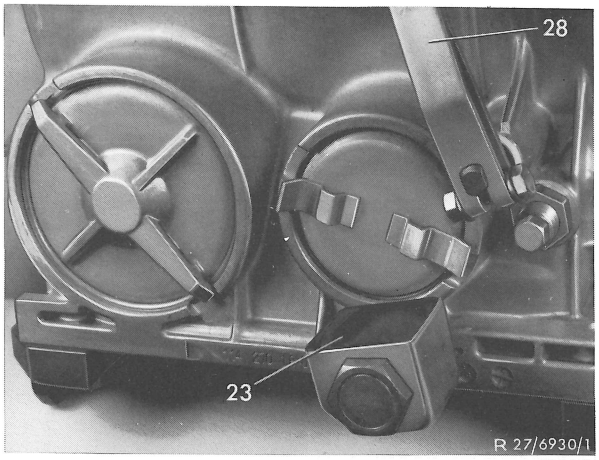


Fig. 7
25 Solenoid valve
28 Control pressure lever

9 Remove circlip (24) from brake band piston cover B 2 (65) and pull out brake band piston cover (Fig. 8).

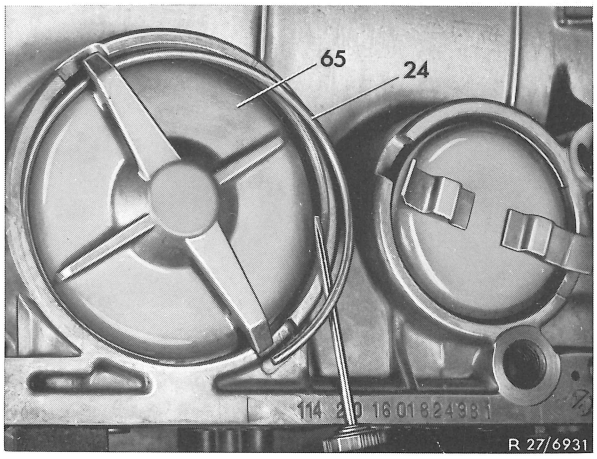


Fig. 8
24 Circlip
65 Brake band piston cover B 2

10 Mount assembly fixture 115 589 04 59 00 for brake band piston cover B1. Tension assembly fixture and remove circlip (Fig. 9).

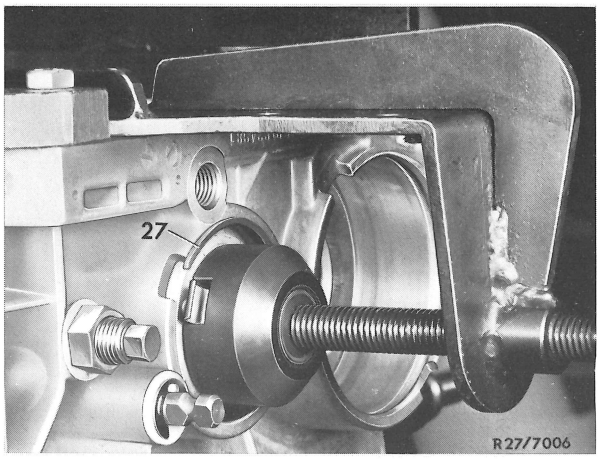


Fig. 9
27 Circlip

11 Slacken assembly fixture and unscrew fastening bolts. Remove brake band piston cover (29), brake band piston B 1 (30) and compression spring (31) (Fig. 10).

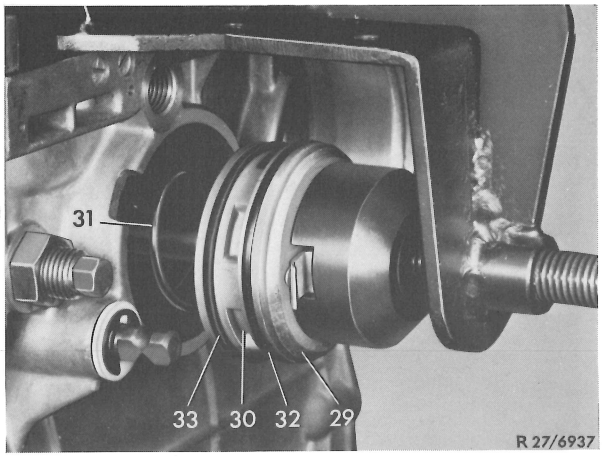


Fig. 10

29 Brake band piston cover B 1
30 Brake band piston B 1
31 Compression spring
32 O-ring
33 Lip sealing ring

12 Remove thrust pins (34) for B 1 and B 2 (Fig. 11).

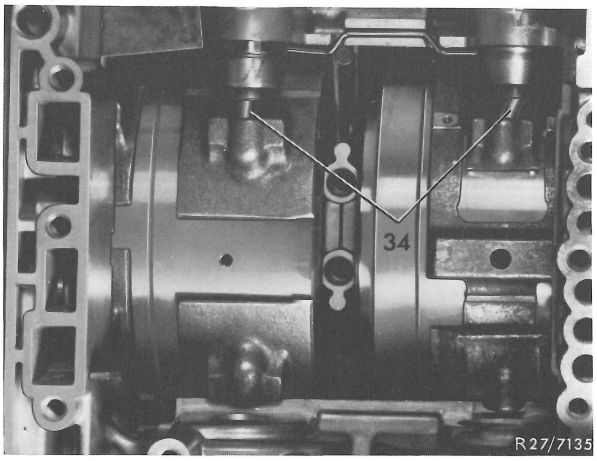


Fig. 11

34 Thrust pins

13 Unlock adjusting screw for brake band B 3 (35) by loosening counter nut (36) and screw out. Remove both thrust pins (37) (Fig. 12).

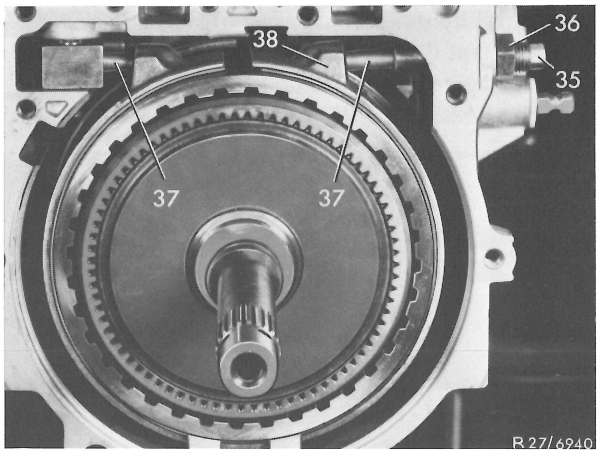


Fig. 12

35 Adjusting screw B 3
36 Counter nut
37 Thrust pin
38 Brake band B 3

14 Remove brake band B 3 (38) in forward direction (Fig. 13).

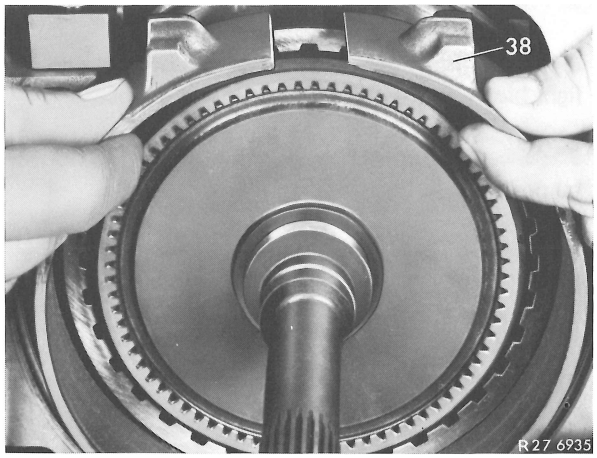


Fig. 13

38 Brake band B 3

15 Pull drive shaft (41) out of gear set (40) (Fig. 14).

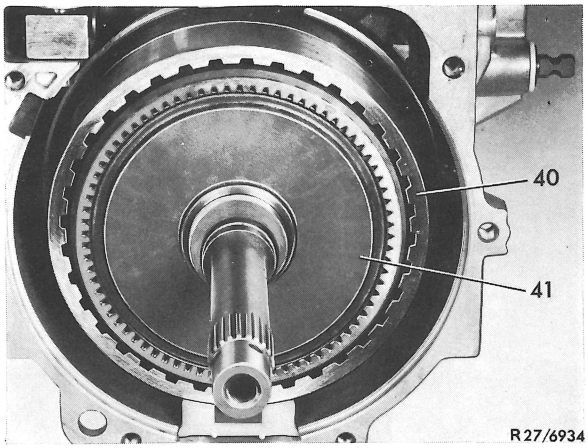


Fig. 14
40 Gear assembly
41 Input shaft

16 Tighten brake band B 1 (39) on drum with a circlip of brake band piston cover B 2 and remove gear assembly (40) from transmission case. Brake band B 2 will remain in transmission case (Fig. 15).

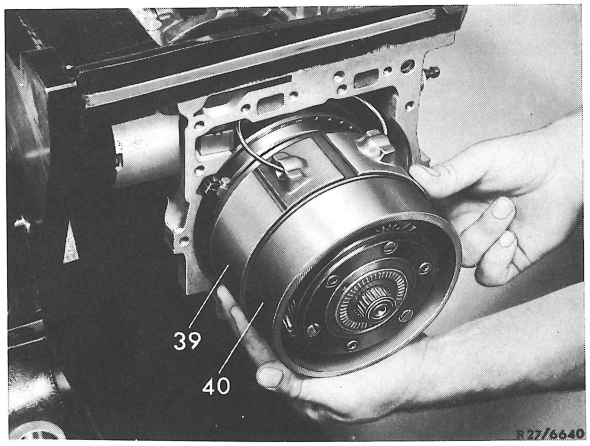


Fig. 15
39 Brake band B 1
40 Gear assembly

17 Remove brake band B 2 (77) from transmission case (Fig. 16).

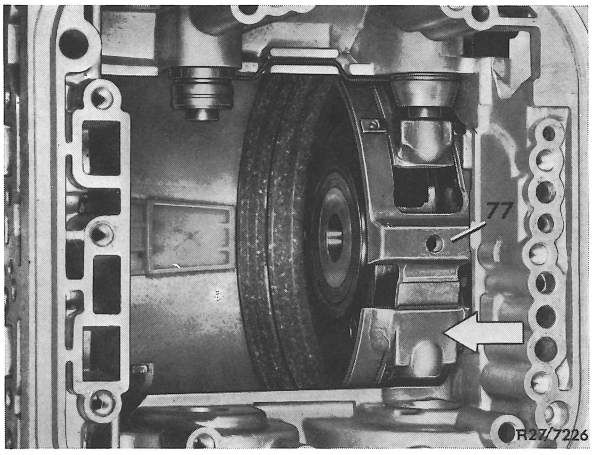


Fig. 16
77 Brake band B 2

18 Remove locking clip (58) for thrust bodies B 1 (59) and B 2 (61) and remove both thrust bodies (Fig. 17).

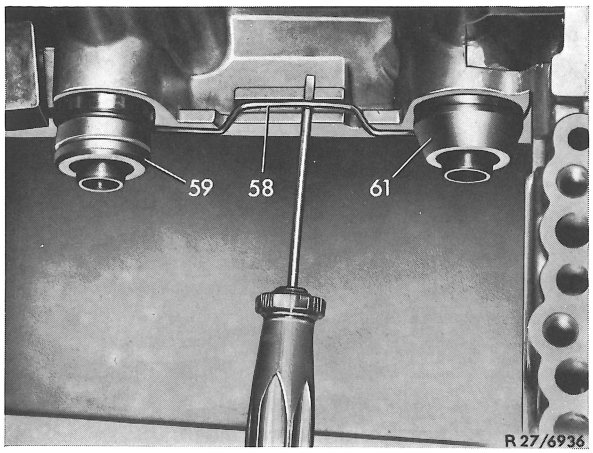


Fig. 17
58 Locking clip
59 Thrust body B 1
61 Thrust body B 2

Caution! For removal of clutch K 1 and K 2 refer to Job No. 27.2–660.

Assembly

19 Replace O-rings depending on version in transmission case (arrows Fig. 18) or on thrust bodies.

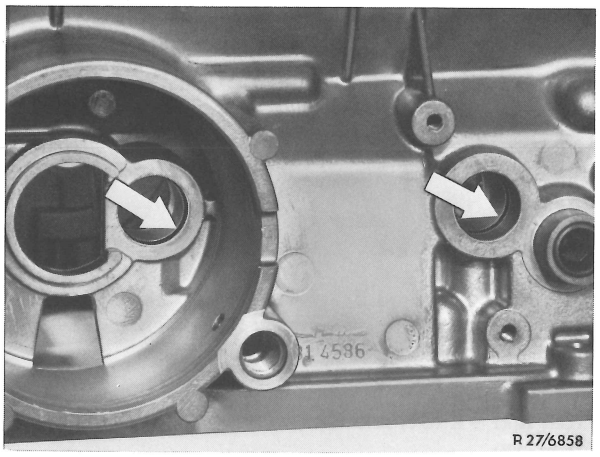


Fig. 18

20 Insert thrust body B 1 (59) with one groove (sharp-edged) in valve cap and thrust body B 2 (61) with chamfered valve cap into transmission case and lock with locking clip (58) (Fig. 17).

Brake Band B 2

1st version W 3 A 040
(refer to page 001/1)

21 Insert brake band B 2 (77) (double-looped steel band) into transmission case, welded-on plate should go on brake band piston end (arrow Fig. 19).

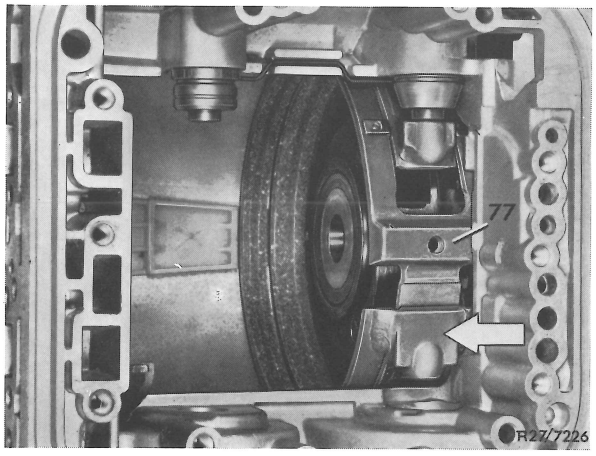


Fig. 19
77 Brake band B 2

2nd version W 3 A 040 and W 3 B 050
(refer to page 001/1)

22 Insert brake band B 2 (77) (thin steel band with radial groove lining) into transmission case (Fig. 20).

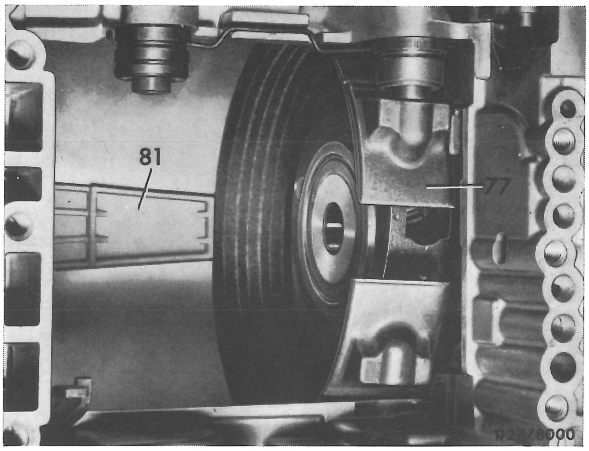


Fig. 20
77 Brake band B 2
81 Brake band guide

23 Insert axial bearing (78) and radial bearing (79) in gear assembly with grease (Fig. 21).

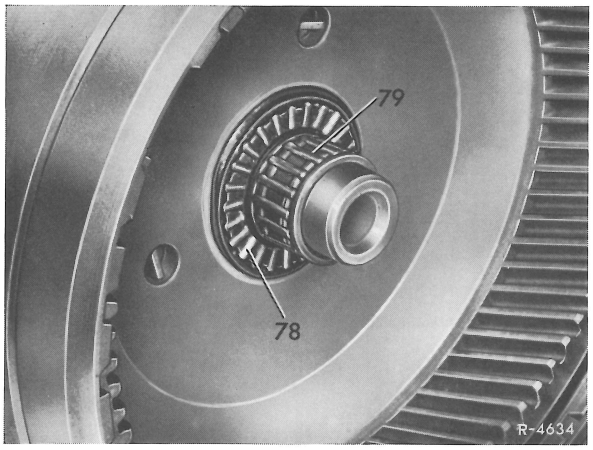


Fig. 21
78 Axial bearing
79 Radial bearing

24 Tighten brake band B 1 (39) (smooth lining) with circlip for brake band piston cover B 2 to brake band drum (Fig. 22).

25 Insert gear assembly (40) with brake band B 1 (39) while introducing supporting lever for oil feed sleeve into groove in transmission case (Fig. 22).

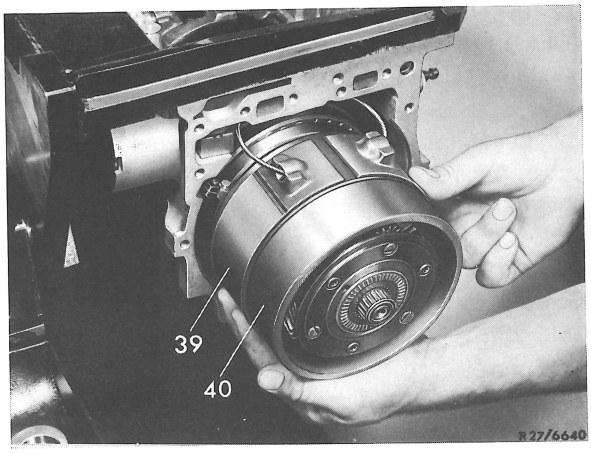


Fig. 22
39 Brake band B 1
40 Gear assembly

Note: When introducing gear assembly into transmission case, make sure that the segment teeth of the sun gear on output shaft are correctly engaging in brake drum B 2.

26 Insert input shaft (41) into gear assembly (40) (Fig. 14).

27 Insert brake band B 3 with radial groove lining (heavy steel band) (38) from the front into transmission case, insert both thrust pins (37) into brake band B 3 (38) and screw adjusting screw (35) with sealing compound into transmission case until brake band ist held (Fig. 23).

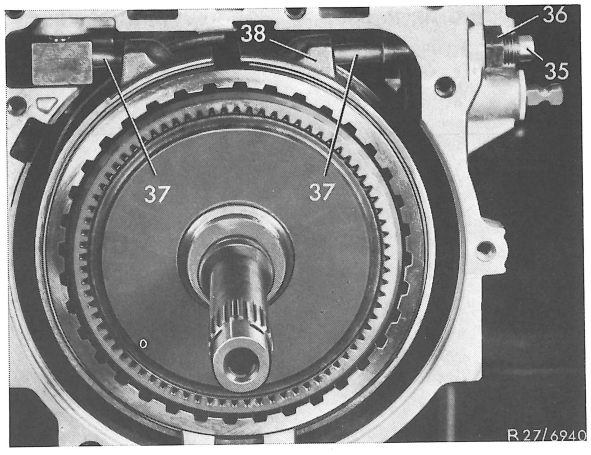


Fig. 23
35 Adjusting screw B 3
36 Counternut
37 Thrust pins
38 Brake band B 3

28 Turn transmission with assembly fixture in such a manner that the input shaft is pointing upward.

29 Measure end play of gear assembly by placing measuring bridge on transmission case and determining dimension "A" with depth gauge (Fig. 24).

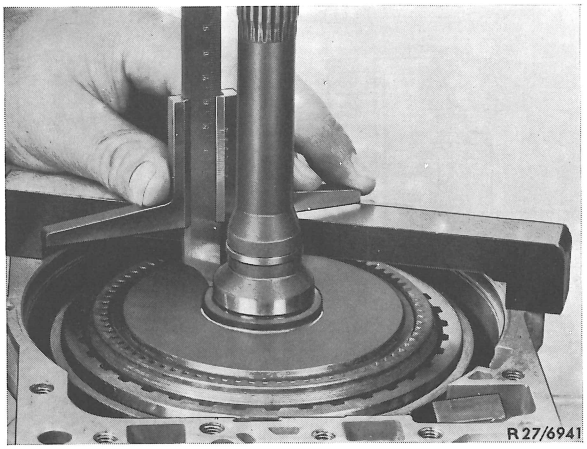


Fig. 24

30 Place new gasket on front transmission case and determine dimension "B" (Fig. 25).

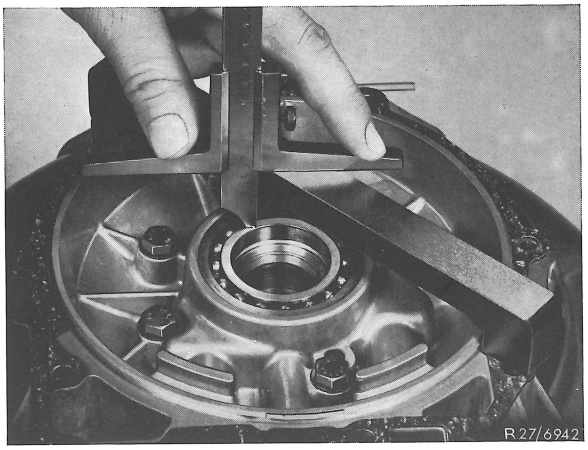


Fig. 25

Dimension "C" of gear assembly is obtained from the difference of dimension A and B (Fig. 26).

Starting point for computation is the thickness of measuring bridge of 30 mm.

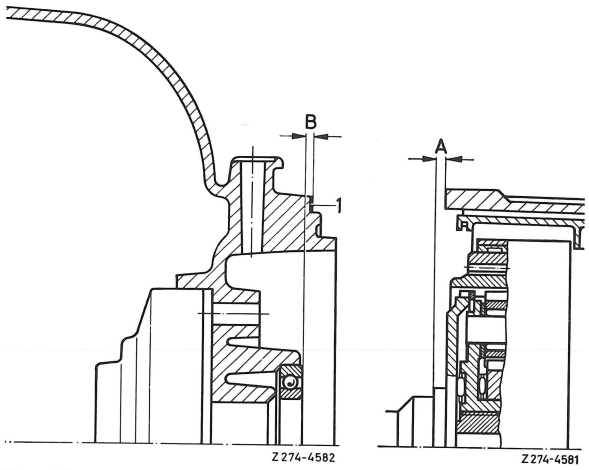


Fig. 26
1 Gasket

The end play dimension "C" is computed as follows:

1. 30 mm minus determined dimension "A".
2. Determined dimension "B" minus 30 mm.
3. The difference from the values determined under item 1 and 2 provides dimension "C".

Example:

Measuring bridge	=	30.0 mm
Dimension "A"	=	28.0 mm
		2.0 mm
Dimension "B"	=	32.4 mm
Measuring bridge	=	30.0 mm
		2.4 mm
Dimension "C"	=	2.4–2.0 = 0.4 mm.

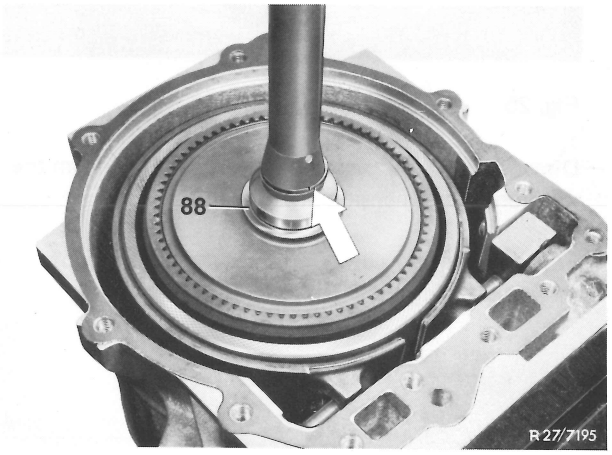


Fig. 27
88 Compensating disc

31 Increase dimension "C" end play to its value of 0.4 + 0.1 mm by adding compensating washers (88) onto input shaft (Fig. 27).

32 Center gasket prior to mounting front transmission cover. Align piston ring on input shaft in such a manner that the gap is in alignment with the slot (arrow Fig. 27).

33 Mount front transmission case (22) with new gasket. Screw-in fastening bolts and tighten to 13 Nm (1.3 kpm) (Fig. 28).

Note: Coat threads of lower seven bolts lightly with sealing compound.

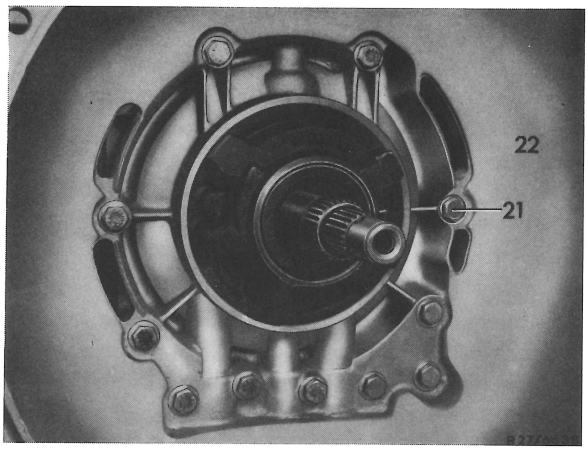


Fig. 28
21 Fastening bolts
22 Front transmission case

34 Insert both thrust pins (34) on opposite end of brake band piston (Fig. 29).

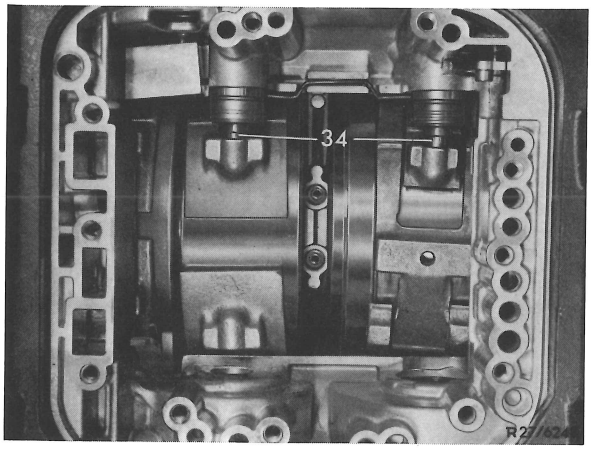


Fig. 29
34 Thrust pins

35 Check oil sealing ring (66) and by-pass valve for brake band piston B 2 by sight and for wear (Fig. 30).

36 Installation of brake band piston B 2:

1st version W 3 A 040 (refer to page 001/1)

Insert brake band piston B 2 (67) into brake band piston cover (65) (Fig. 30).

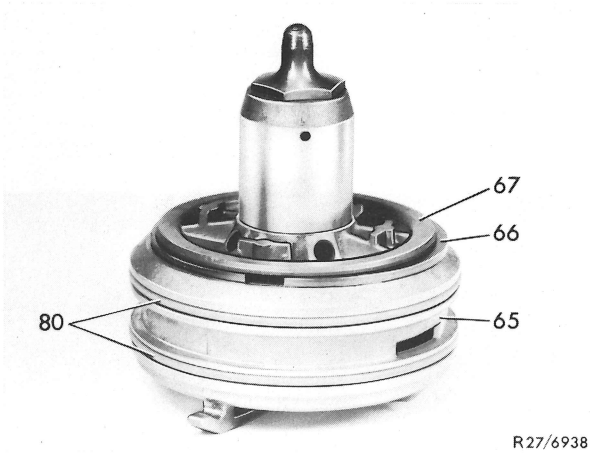


Fig. 30

65 Brake band piston cover B 2
66 Oil sealing ring
67 Brake band piston B 2
80 O-rings

Introduce brake band piston cover B 2 (65) with two new O-rings (80) (Fig. 30) into transmission case, making sure that the thrust pin of the brake band piston enters supporting plate on brake band.

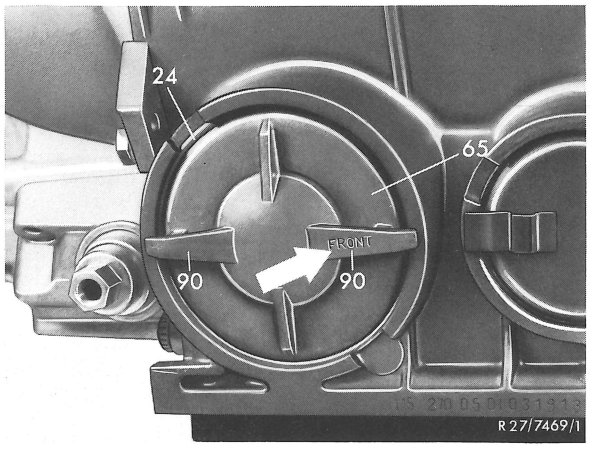


Fig. 31

24 Circlip
65 Brake band piston cover B 2
90 Locking plates

Insert circlip (24) into groove and push brake band piston cover (65) outwards (Fig. 8).

Caution! Install brake band piston covers identified with the legend "front" (refer to arrow Fig. 31) in such a manner that the locking plates (90) are accurately horizontal and the legend is facing toward front transmission cover (Fig. 31).

2nd version W 3 A 040 and W 3 B 050
(refer to page 001/1)

Insert brake band piston B 2 (67) with installation ring (66) into transmission case, watching out for correct insertion of thrust pin into bore in brake band (Fig. 32).

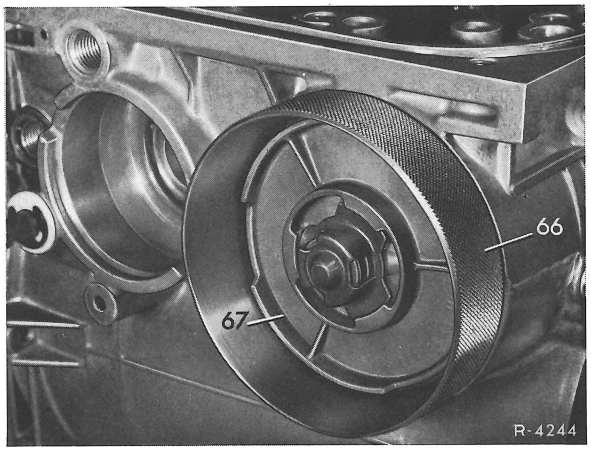


Fig. 32

66 Installation ring 115 589 18 61 00
67 Brake band piston B 2

Insert brake band piston cover B 2 (65) with a new O-ring and lock with circlip (24) (Fig. 25).

37 Replace O-ring (32) of brake band piston cover B 1 (Fig. 33).

38 Renew lip sealing ring (33) of brake band piston B 1 (30) and slide compression springs (31) on brake band piston (Fig. 33).

39 Place assembly fixture on transmission case and screw down. Introduce brake band piston cover B 1 (29) with assembly fixture (Fig. 26) and lock with circlip (Fig. 9).

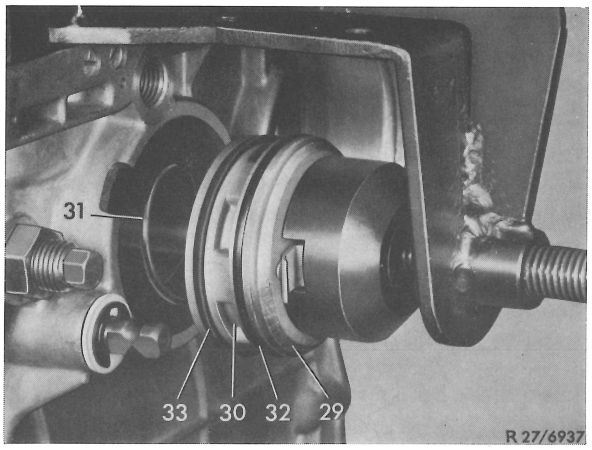


Fig. 33

29 Brake band piston cover B 1
30 Brake band piston B 1
31 Compression springs
32 O-ring
33 Lip sealing ring

40 Remove assembly fixture for brake band piston B 1.

41 Measure idle travel of brake band piston B 1 and B 2. For this purpose, move brake band piston B 2 with compressed air via bore lifting pressure (69) into lifting position and determine dimension "b". Then move brake band piston with compressed air via bore shift pressure B 2 (70) into shift position and determine dimension. The difference of the two measurements provides the idle travel "L" (Fig. 34).

The brake band piston B 1 is held in lifting position by the compression spring, determine dimension „a" in this position. Then move brake band piston with compressed air via bore shift pressure B 1 (71) into shift position and determine dimension. The difference of the two measurements provides the idle travel "L" (Fig. 34).

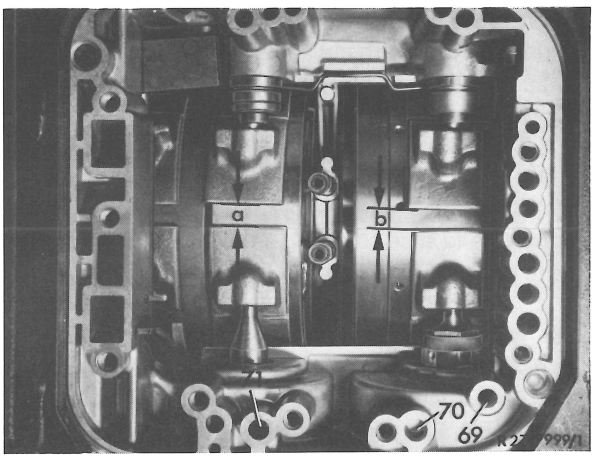


Fig. 34

69 Lifting pressure B 2
70 Shift pressure B 2
71 Shift pressure B 1

The idle travel "L" of the brake band piston B 1 and B 2 is 3.0–4.0 mm. The thrust pins have varying lengths of 22, 23, 24, 25, 26, 27, 28 mm.

When the idle travel "L" is too long, install a longer thrust pin (34), when it is too short, install a shorter thrust pin (Fig. 29).

42 Tighten adjusting screw (35) for brake band B 3 to 5 Nm (0.5 kpm) and then loosen by 1 3/4 turns. Lock adjusting screw with counternut (36) (Fig. 35).

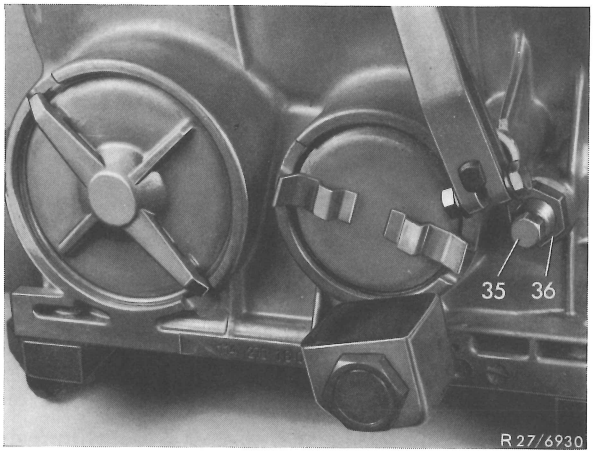


Fig. 35

35 Adjusting screw
36 Counternut

43 Insert both plug pipes (8) with new sealing caps (9) (Fig. 36).

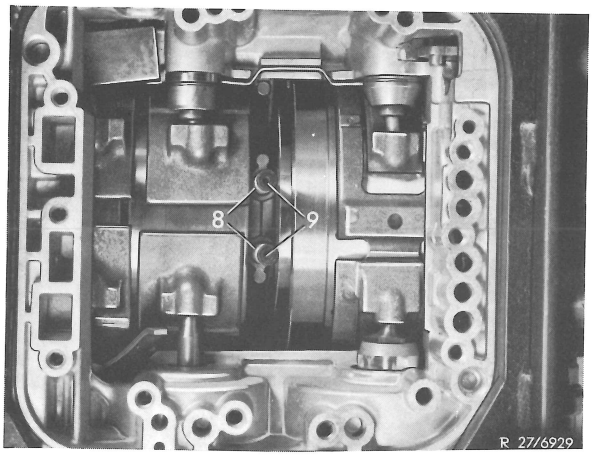


Fig. 36

8 Plug pipe
9 Sealing caps

44 Move range selector lever in between position "P" and "R". Insert locating pin for control pressure valve (72) into shift valve housing and screw guide pin (73) into transmission case (Fig. 37).

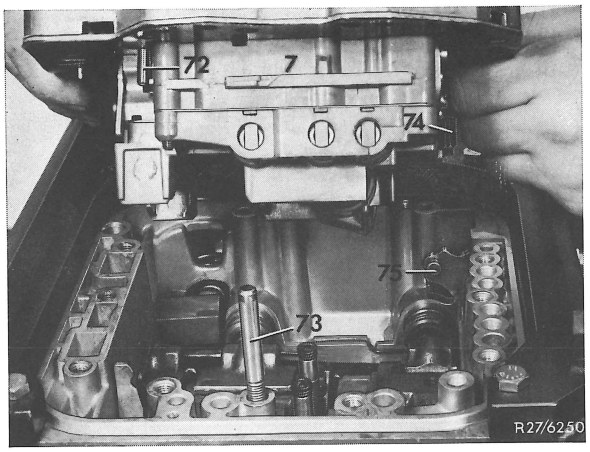


Fig. 37

7 Shift valve housing
72 Locating pin control pressure valve
73 Guide pin
74 Range selector valve
75 Range selector lever

45 Carefully introduce shift valve housing into transmission case, making particularly sure that the range selector valve (74) enters the range selector lever (75) (Fig. 37).

46 Unscrew guide pin (73) (Fig. 37), screw-in fastening bolts (6) with spring washers and tighten to 13 Nm (1.3 kpm) (Fig. 38).

Caution! Watch out for varying length of fastening bolts.

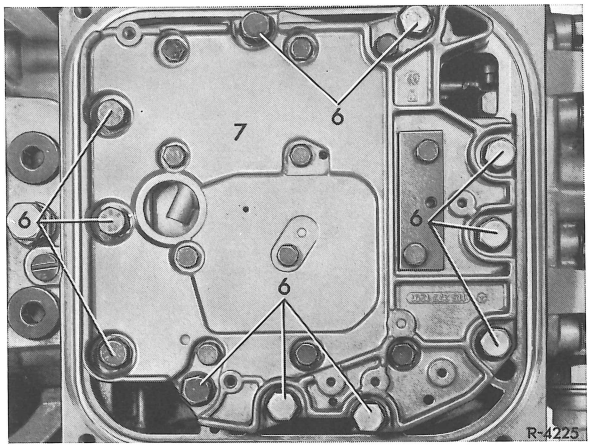


Fig. 38

6 Fastening bolts
7 Shift valve housing

47 Pull out locating pin (72) for control pressure valve.

48 Mount oil filter (4), screw-in fastening bolts (6) and tighten to 4 Nm (0.4 kpm) (Fig. 39).

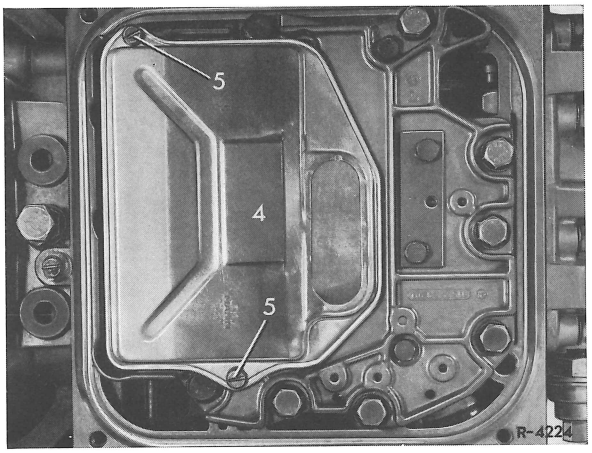


Fig. 39

4 Oil filter
5 Fastening bolts

49 Remove transmission from assembly stand.

50 Attach oil pan (1) with new gasket, screw-in fastening bolts (2) with washers and tighten to 7 Nm (0.7 kpm) (Fig. 40).

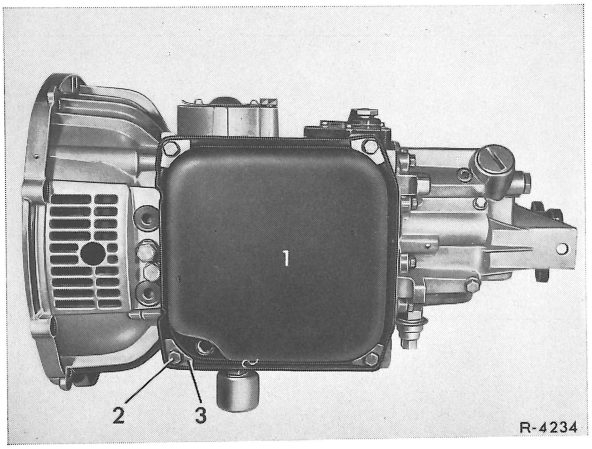


Fig. 40

1 Oil pan
2 Fastening bolts
3 Washers

51 Screw-on control pressure lever (28) (Fig. 7).

52 Screw-in solenoid valve (25) with new O-ring and sealing ring and tighten to 30 Nm (3.0 kpm) (Fig. 7).

Adjusting Date

End play of front transmission case cover or of gear assembly			0.5–0.1
Idle travel of brake band piston B 1 and B 2			3.0–4.0
Adjusting screw brake band B 3			Tighten adjusting screw to 0.5 kpm, then loosen by 1 3/4 turns and tighten counternut.
Thickness of compensating washers for radial ball bearing front transmission case cover			0.1–0.2–0.5
Lengths of thrust pins	for brake band B 1 and B 2		22–23–24–25–26–27–28
	for brake band B 3		45
	for modulating pressure transmitter	bright	39.65
		yellow	40.15
		black	40.65

Tightening Torques	**Nm**	(kpm)
Fastening bolts for oil pan on transmission housing	7	(0.7)
Fastening bolts for oil filter	4	(0.4)
Hex. bolts for shift valve housing on transmission case	13	(1.3)
Slotted nut on three-legged flange	120	(12.0)
Hex. bolts for rear transmission case	13	(1.3)
Hex. bolts for front transmission case	13	(1.3)
Kickdown solenoid valve	30	(3.0)
Hex. bolts for modulating pressure housing on transmission case	7	(0.7)
Hex. bolts for leaf spring of detent plate	10	(1.0)
Hex. socket bolt for detent plate on shaft of range selector lever	10	(1.0)
Cheesehead bolts for starter lock and backup light switch	5	(0.5)

Special Tools

Assembly stand for automatic transmission	116 589 06 59 00
Installation ring brake band piston B 2	115 589 18 61 00
Screw driver for slotted plugs	116 589 00 11 00
Pin spanner for slotted nut	115 589 08 07 00
Assembly fixture for brake band piston B 1	115 589 04 59 00
Measuring device for thrust pin modulating pressure	115 589 11 21 00
Measuring bridge	116 589 00 21 00
Locating pin for control pressure valve	self-made
2 Studs for shift valve housing	self-made
Locating pin for starter lock and backup light switch	115 589 18 63 00

Notes

Special attention must be paid to absolute cleanliness during all assembly jobs. The perfect function of the transmission depends on the fact that there is no dirt on transmission members, on control valve and in oil circuit. Therefore, wash all parts carefully upon disassembly, flush oil ducts and dry. **Do not use washing gasoline for rubber seals,** since this type of gasoline will attack the rubber.

Use spirit of alcohol for cleaning rubber parts. Also note, that the parts are not touched with woolen rags, since even the most minor contamination (for example by fuzz) may result in trouble.

When assembling transmission members, provide bearing points and sliding parts with specified automatic transmission fluid (refer to pertinent specifications, page 236.4).

Disassembly

1 Position transmission with oil pan up.

Remove oil pan after loosening the four fastening bolts (2) including gasket and washer (3) (Fig. 1).

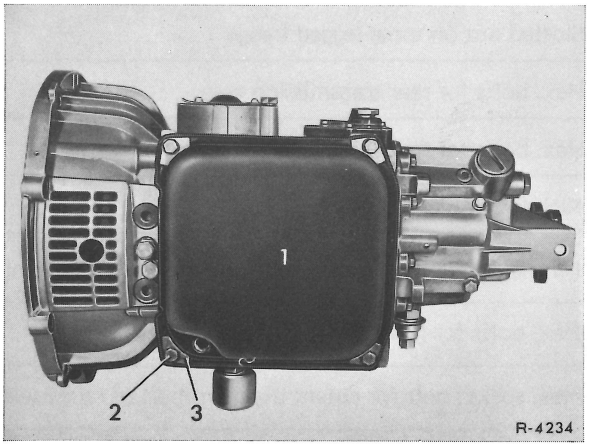


Fig. 1
1 Oil pan
2 Fastening bolt
3 Washer

2 Screw transmission to assembly stand (Fig. 2).

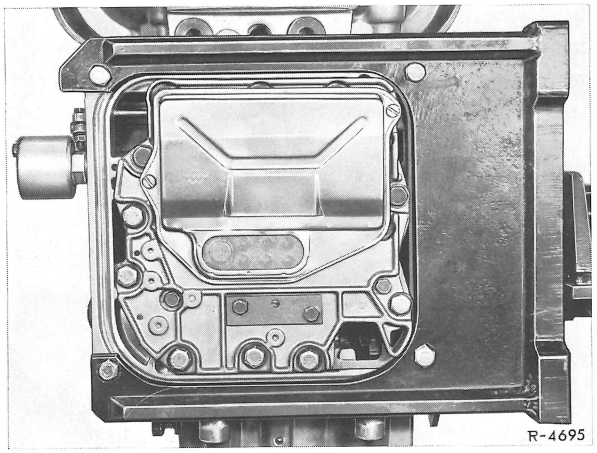


Fig. 2

3 Remove oil filter (4) (Fig. 3). Unscrew fastening bolts (6) of shift valve housing (7). Move range selector lever between position "P" and "R" and remove with valve housing (Fig. 4).

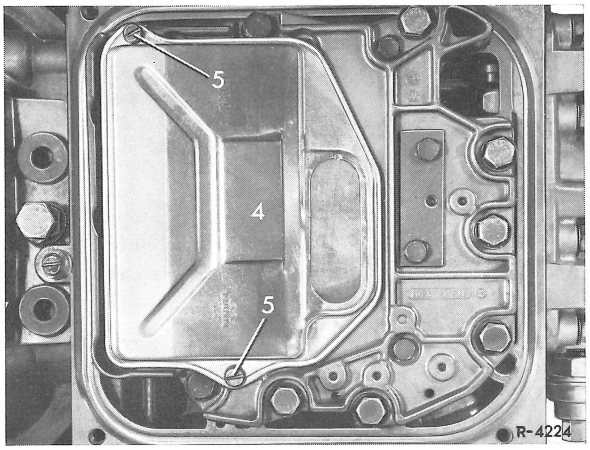


Fig. 3
4 Oil filter
5 Fastening bolts

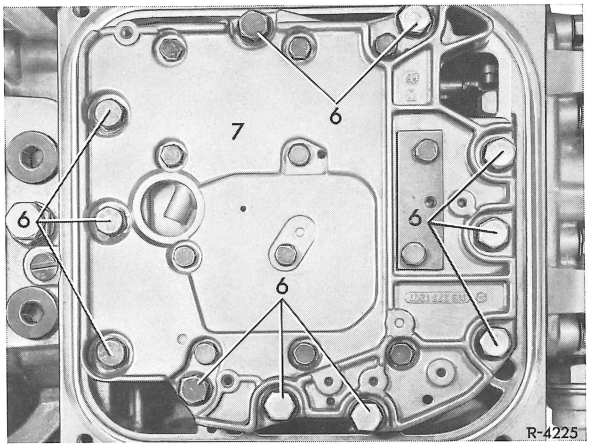


Fig. 4
6 Fastening bolts
7 Shift valve housing

4 Remove plug pipes (8) and pull the four sealing caps (9) from plug pipes (Fig. 5).

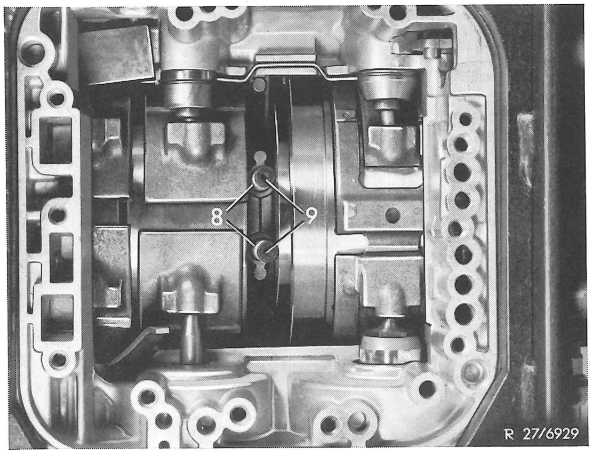


Fig. 5
8 Plug pipes
9 Sealing caps

5 Swivel transmission on assembly fixture in such a manner that the rear transmission housing faces upwards. Unscrew vacuum box (10) together with thrust pin (12) (Fig. 6).

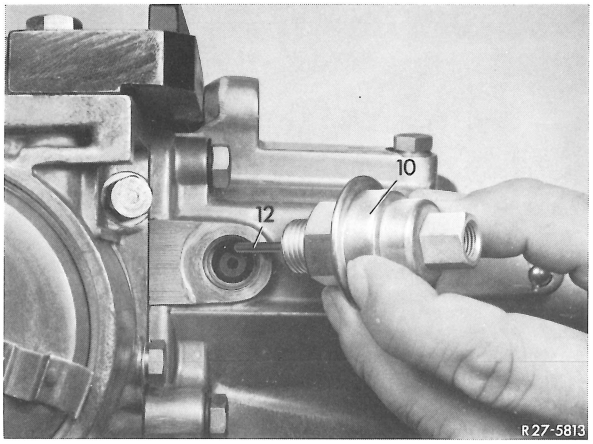


Fig. 6
10 Vacuum box
12 Thrust pin

6 Unscrew plug for secondary pump (13) with screw driver for slotted plug 116 589 00 11 00 and remove compression spring (14) (Fig. 7).

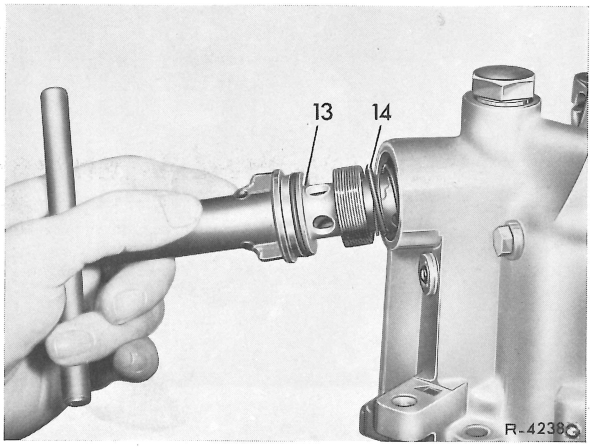


Fig. 7
13 Plug for secondary pump
14 Compression spring

7 Unlock slotted nut on three-legged flange and unscrew by means of pin spanner 115 589 08 07 00. Pull three-legged flange from output shaft.

8 Unscrew fastening bolts for rear transmission housing, loosen rear transmission housing by means of light blows with a plastic hammer and remove.

Disassemble rear transmission housing (27.1–500).

9 Remove plate spring (85) with worm gear of tachometer drive (15), remove eccentric ring for secondary pump (16) and centrifugal governor (17) from output shaft (Fig. 8).

10 Remove parking lock pawl (19) and spreading spring. Pull parking lock gear (18) from output shaft (Fig. 8).

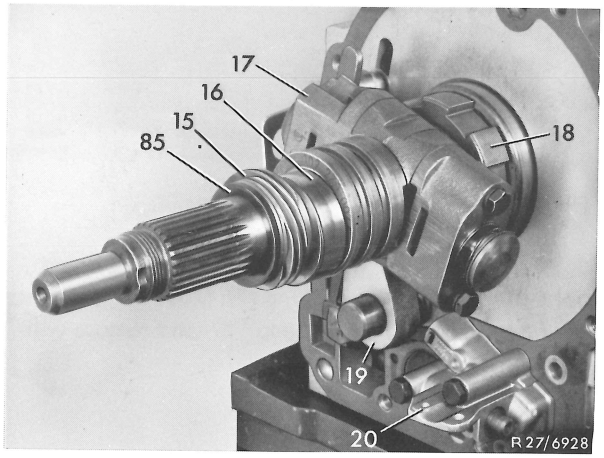


Fig. 8
15 Worm gear tachometer drive
16 Eccentric ring secondary pump
17 Centrifugal governor
18 Parking lock gear
19 Parking lock pawl
20 Modulating pressure housing
85 Plate spring

11 Swivel transmission on assembly stand so that the front transmission housing faces upwards. Unscrew fastening bolts (21) for front transmission housing (22) (Fig. 9).

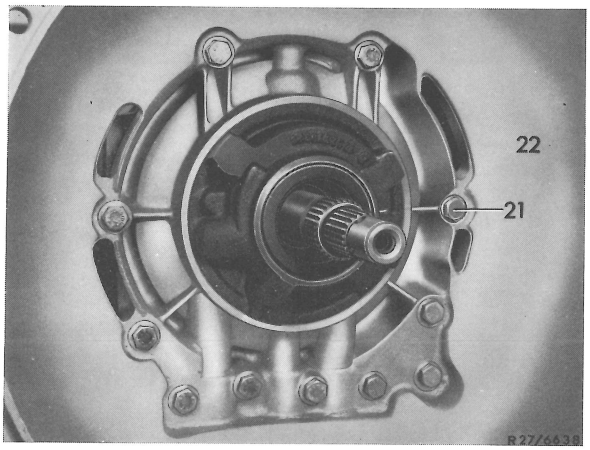


Fig. 9
21 Fastening bolts
22 Front transmission housing

12 Loosen front transmission housing by means of light blows with plastic hammer and remove.

13 Swivel transmission on assembly stand into horizontal position.

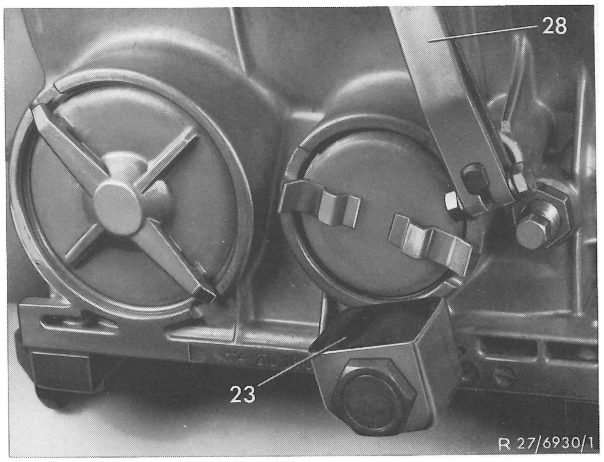


Fig. 10
25 Solenoid valve
28 Control pressure lever

14 Unscrew solenoid valve (25) and control pressure lever (28) (Fig. 10).

15 Remove circlip (24) from brake band piston cover B 2 (65) and pull out brake band piston cover (Fig. 11).

16 Pull brake band piston B 2 out of brake band piston cover.

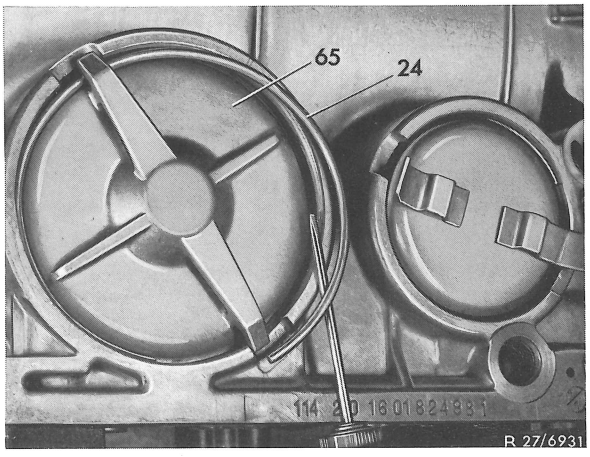


Fig. 11
24 Circlip
25 Brake band piston cover B 2

17 Position assembly fixture 115 589 04 59 00 for brake band piston cover B 1. Tension assembly fixture and remove circlip (27) (Fig. 12).

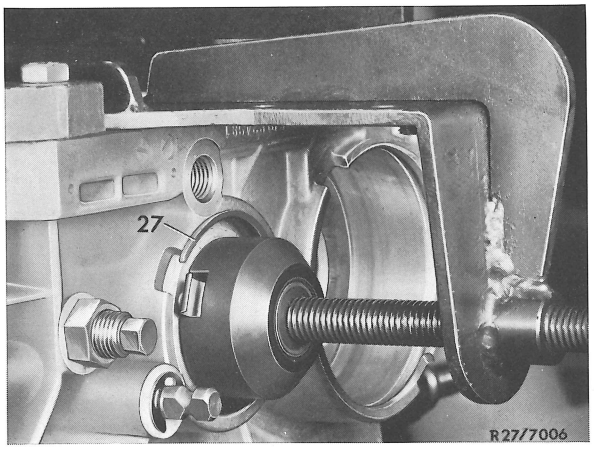


Fig. 12
27 Circlip

18 Slacken assembly fixture and unscrew fastening bolts. Remove brake band piston cover (29), brake band piston B 1 (30) and compression spring (31) (Fig. 13).

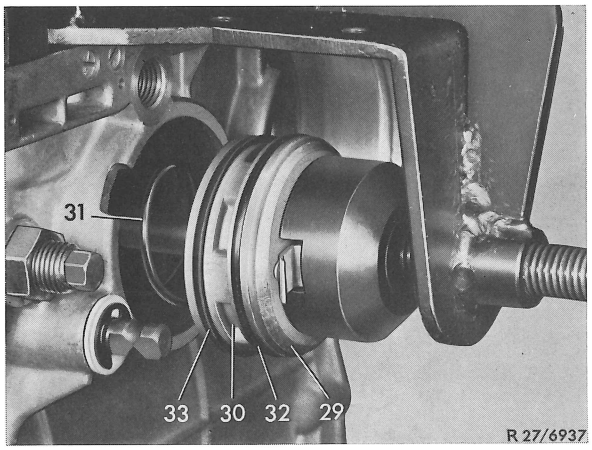


Fig. 13
29 Brake band piston cover B 1
30 Brake band piston B 1
31 Compression springs
32 O-ring
33 Lip sealing rin

19 Remove thrust pins (34) for B 1 and B 2 (Fig. 14).

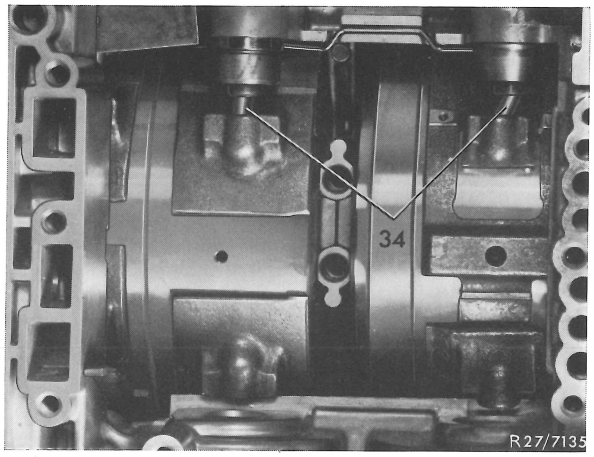


Fig. 14
34 Thrust pins

20 Unlock adjusting screw for brake band B 3 (35) by loosening counter nut (36) and screw out. Remove both thrust pins (37) (Fig. 15).

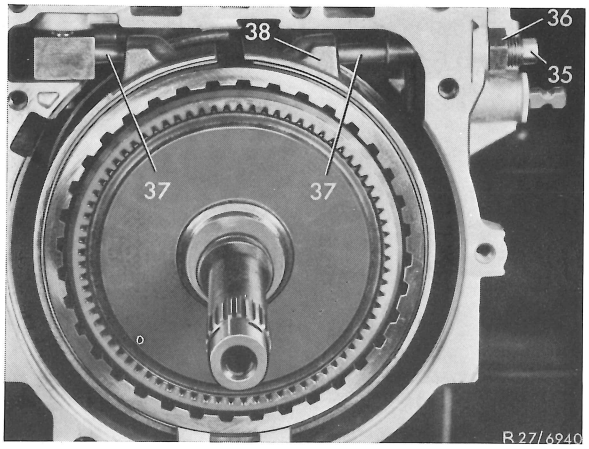


Fig. 15
35 Adjusting screw B 3
36 Counter nut
37 Thrust pins
38 Brake band B 3

21 Remove brake band B 3 (38) in forward direction (Fig. 16).

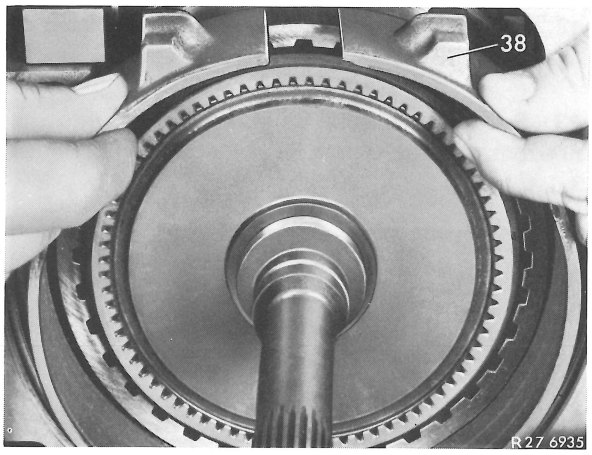


Fig. 16
38 Brake band B 3

22 Pull input shaft (41) from gear set (40) (Fig. 17).

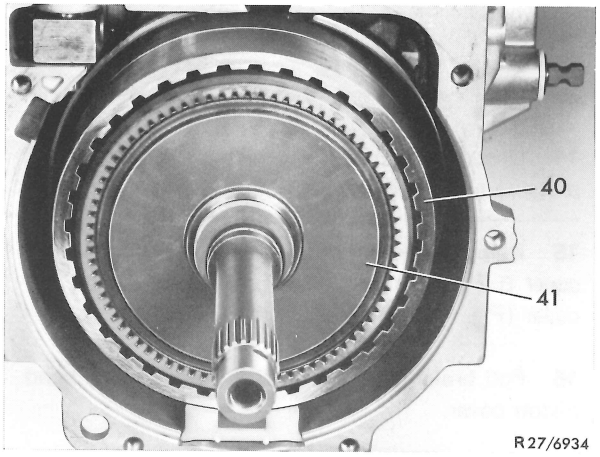


Fig. 17
40 Gear set
41 Input shaft

23 Clamp brake band B 1 (39) to drum with a circlip of brake band piston cover B 2 and remove gear set (40) from transmission housing. Brake band B 2 will remain in transmission housing (Fig. 18).

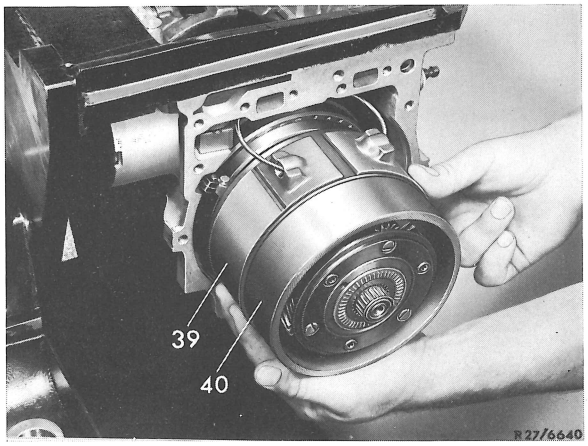


Fig. 18
39 Brake band B 1
40 Gear set

24 Remove brake band B 2 and output shaft from transmission housing.

25 Remove modulating pressure valve housing (20) after loosening the three fastening bolts including seal (42) for rear transmission housing (Fig. 19).

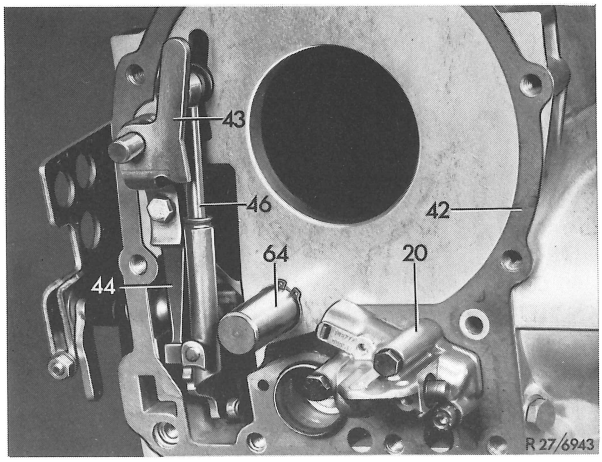


Fig. 19
20 Modulating pressure valve housing
42 Gasket
43 Holder parking lock
44 Leaf spring
46 Resilient linkage
64 Bearing pin for parking lock pawl

26 Remove holder (43) and leaf spring (44).

27 Unscrew clamping screw (45) on detent plate (Fig. 20).

28 Pull out range selector lever (48) and take detent plate (49) with resilient linkage (46) out of transmission housing. Remove needle bearing (47) (Fig. 20).

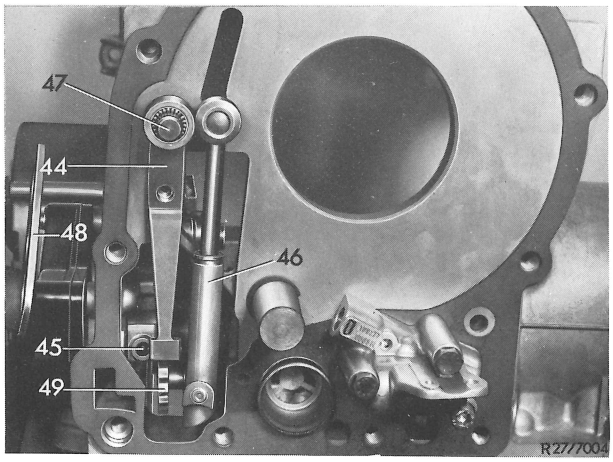


Fig. 20
44 Leaf spring
45 Clamping screw
46 Resilient linkage
47 Needle bearing
48 Range selector lever
49 Detent plate

29 Remove starter lock and backup light switch (50) after loosening fastening bolts (Fig. 21).

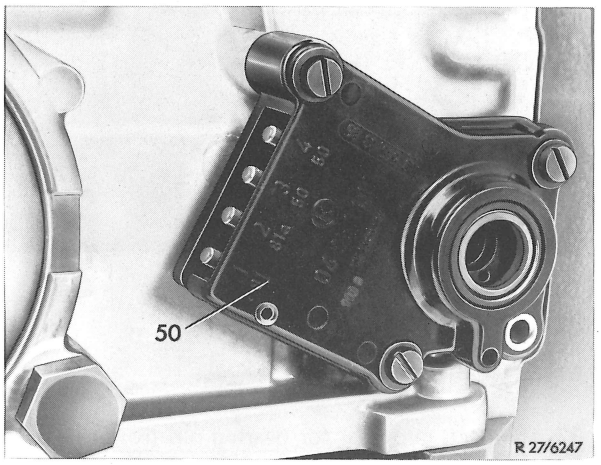


Fig. 21
50 Starter locking switch

30 Remove transmission housing from assembly stand.

31 Unlock brake band piston cover B 3, remove locking ring (51) and pull out cover (52) (Fig. 22).

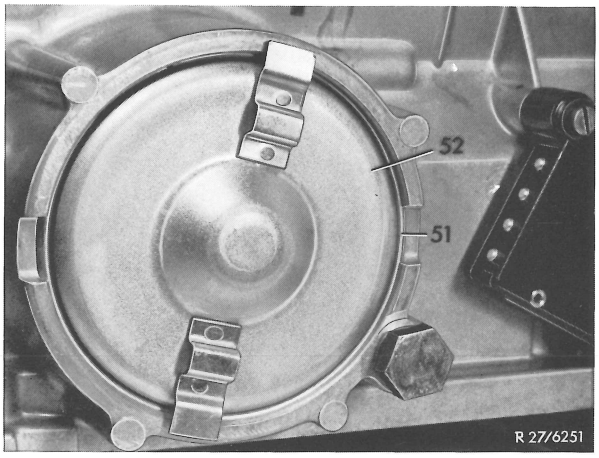


Fig. 22
51 Locking ring
52 Cover brake band piston B 3

32 Remove brake band piston B 3 (53) and truncated cone spring (54) (Fig. 23).

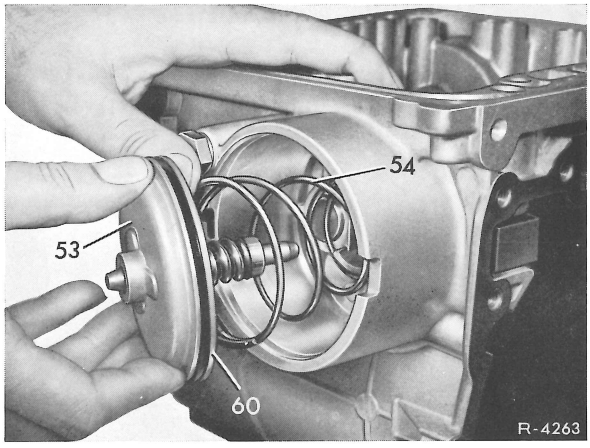


Fig. 23
53 Brake band piston B 3
54 Truncated cone spring
60 Lip sealing ring

33 Pull out clip (55) for bearing pin from brake band lever B 3 and knock out bearing pin (57) in downward direction (Fig. 24).

34 Remove brake band lever B 3 (56) from transmission housing.

35 Remove locking clip (58) for thrust body B 1 (59) and B 2 (61) and remove both thrust bodies (Fig. 25).

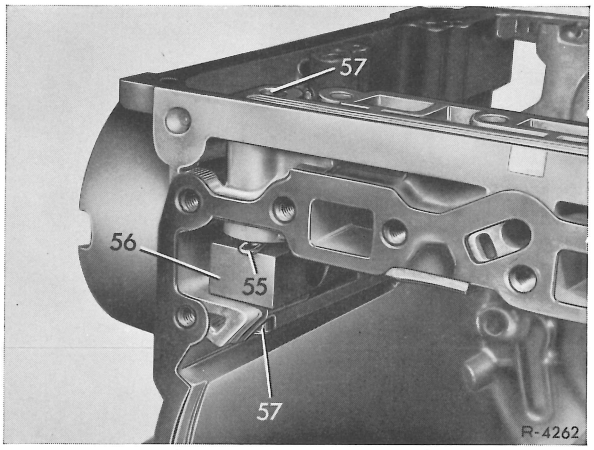


Fig. 24
55 Clip
56 Brake band lever B 3
57 Bearing pin

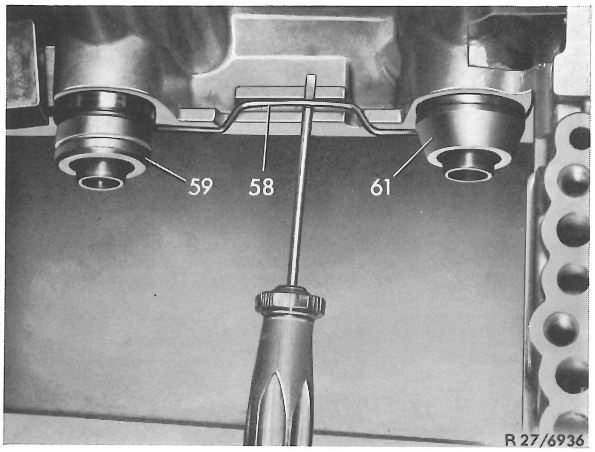


Fig. 25
58 Locking clip
59 Thrust body B 1
61 Thrust body B 2

Assembly

Caution! Replace brake band B 2 with thrust fork by reinforced brake band with welded-on lug. A thrust body with chamfered valve cap, as well as a brake band piston with dome-shaped thrust pin must be installed together with the reinforced brake band (Fig. 26).

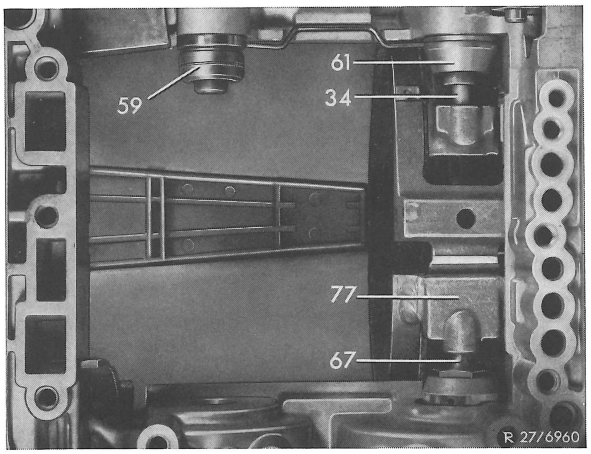


Fig. 26

34 Thrust pin
59 Thrust body B 1
61 Thrust body B 2
67 Brake band piston B 2
77 Brake band B 2

36 Replace O-rings depending on version in transmission case (arrows Fig. 27) or on thrust bodies.

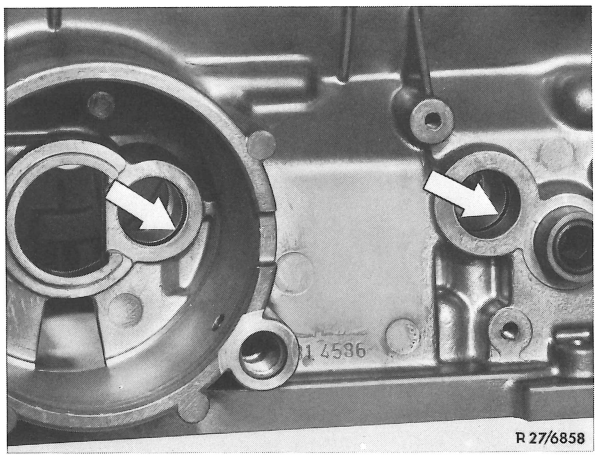


Fig. 27

37 Insert thrust body B 1 (59) with groove (sharp edged) into valve cap and thrust body B 2 (61) with chamfered valve cap into transmission case and lock with locking clip (58) (Fig. 25).

38 Insert brake band lever B 3 (56) into transmission case. Introduce bearing pin (57) from above and secure with clamp (55) (Fig. 24).

39 Introduce brake band piston B 3 (53) with new lip sealing ring (60) and compression spring (54) into transmission case (Fig. 23).

40 Mount brake band piston cover B 3 with a new O-ring and secure with locking ring (51) (Fig. 22).

41 Mount starter lock and backup light switch (50) and tighten fastening bolts to 5 Nm (0.5 kpm) (Fig. 21).

42 Insert detent plate (49) into transmission case. Introduce range selector lever (48) into teeth of detent plate (49) and tighten clamping screw (45) to 10 Nm (1.0 kpm) (Fig. 20).

43 Loosen adjusting screw (95), introduce locating pin (97) through carrier into locating bore in shift housing (Fig. 28).

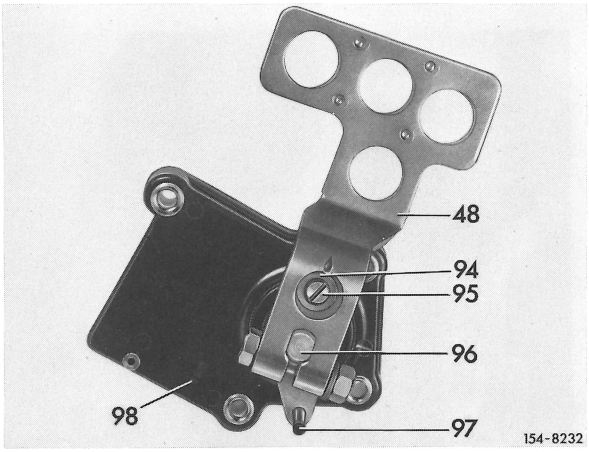


Fig. 28

48 Range selector lever
94 Washer
95 Adjusting screw
96 Shaft
97 Locating pin
98 Starter lock and backup light switch

44 Tighten adjusting screw (95) and remove locating pin (97) (Fig. 28).

45 Clamp transmission case on assembly fixture.

46 Insert elastic linkage (46) with washer (11) and roller (26) (Fig. 29).

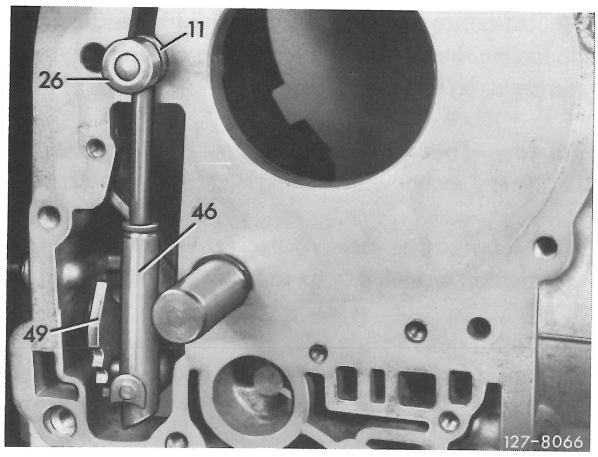


Fig. 29

11 Washer
26 Roller
46 Elastic linkage
49 Detent plate

47 Mount leaf springs (44) and needle bearing-supported roller (47) (Fig. 30).

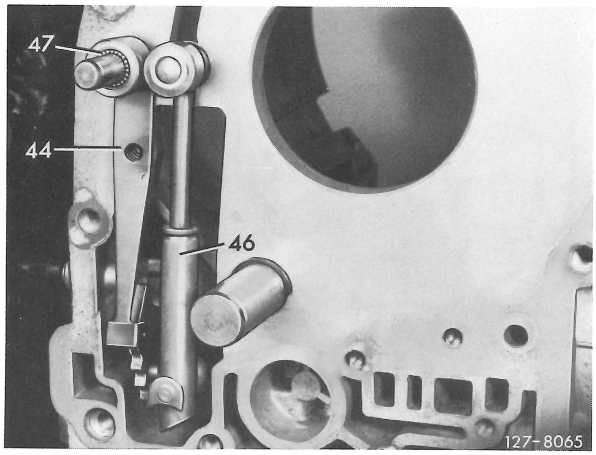


Fig. 30

44 Leaf spring
46 Elastic linkage
47 Needle bearing-supported roller

48 Tighten holder (43) with hex. bolt to 10 Nm (1.0 kpm) and mount bearing pin (64) for parking lock pawl (Fig. 19).

49 Mount modulating pressure valve housing (20) with new gasket (42) for rear transmission case. Tighten fastening bolts to 7 Nm (0.7 kpm) (Fig. 19).

Note: Prior to tightening modulating pressure valve housing, center gasket on bores for set pins.

Check valve for easy operation after tightening.

50 Insert upper brake band guide into slot in transmission case (Fig. 31).

Caution! Brake band guides are each matched to width of brake band B 2 and are therefore different in dimension.

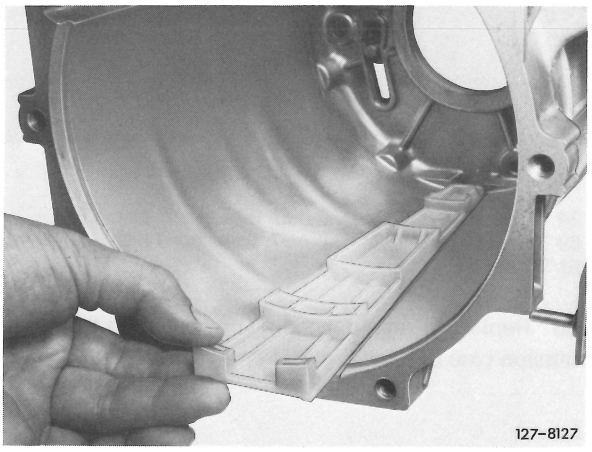


Fig. 31

51 Place output shaft (76) with radial ball bearing into transmission case and knock in with a plastic hammer (Fig. 32).

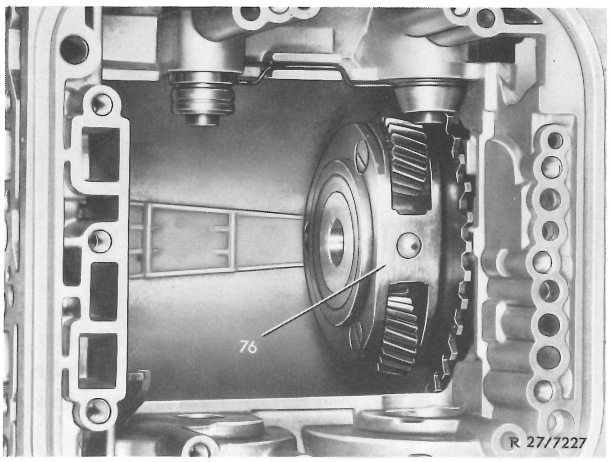


Fig. 32

76 Output shaft

Brake Band B 2:

1st version W 3 A 040 (refer to page 001/1)

52 Insert brake band B 2 (77) (double looped steel band) into transmission case, placing welded-on plate on brake band piston end (arrow Fig. 33).

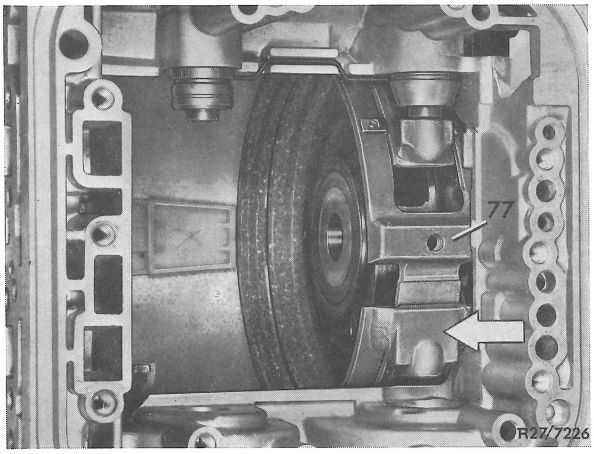


Fig. 33
77 Brake band B 2

2nd version W 3 A 040 and W 3 B 050
(refer to page 001/1)

Insert brake band B 2 (77) (light steel band with radial groove lining) into transmission case (Fig. 34).

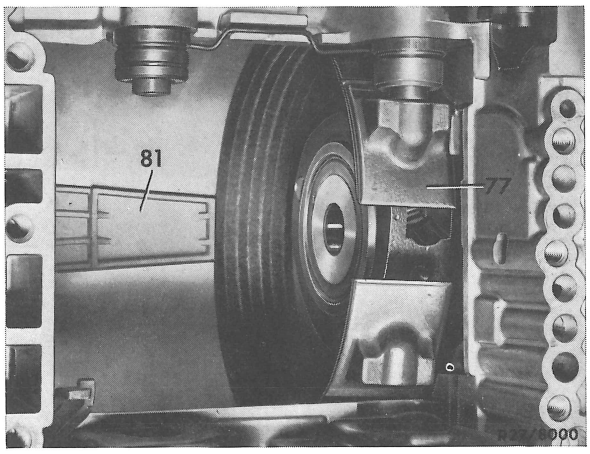


Fig. 34
77 Brake band B 2
81 Brake band guide

53 Insert axial bearing (78) and radial bearing (79) with grease into gear assembly (Fig. 35).

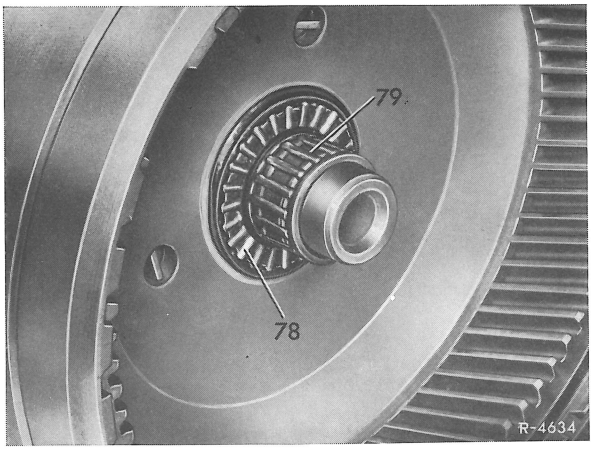


Fig. 35
78 Axial bearing
79 Radial bearing

54 Clamp brake band B 1 (39) (smooth lining) with circlip for brake band piston cover B 2 to brake band drum (Fig. 36).

55 Insert gear assembly (40) with brake band B 1 (39) while introducing supporting lever for oil feed sleeve into groove in transmission case (Fig. 36).

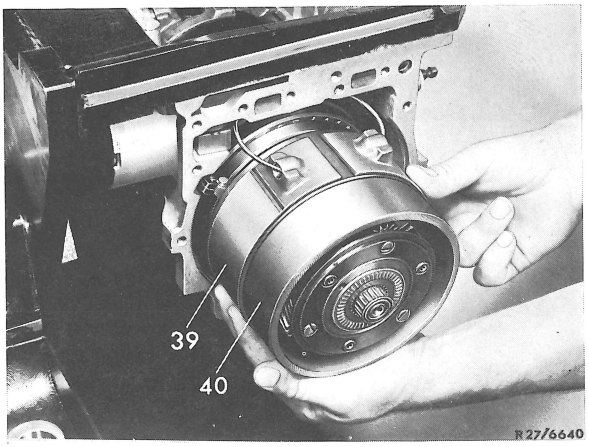


Fig. 36
39 Brake band B 1
40 Gear assembly

Note: When introducing gear assembly into transmission case, make sure that the segment teeth of sun gear on output shaft are correctly entering brake drum B 2.

56 Introduce input shaft (41) into gear assembly (40) (Fig. 37).

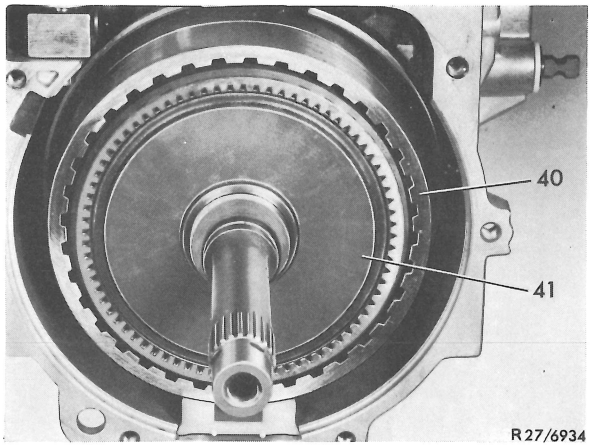


Fig. 37
40 Gear assembly
41 Input shaft

57 Insert brake band B 3 with radial groove lining (heavy steel band) (38) from the front into transmission case, insert both thrust pins (37) into brake band B 3 (38) and screw adjusting screw (35) with sealing compound into transmission case until brake band is held (Fig. 38).

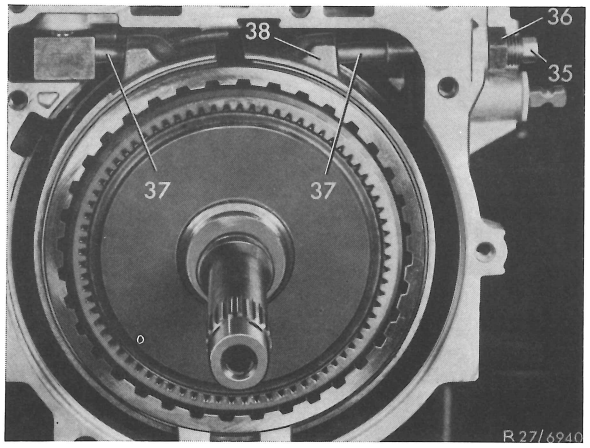


Fig. 38
35 Adjusting screw B 3
36 Counternut
37 Thrust pins
38 Brake band B 3

58 Turn transmission with assembly fixture in such a manner that **input shaft** is pointing upwards.

59 Support gear assembly front with assembly flange (61) included in assembly stand (Fig. 39).

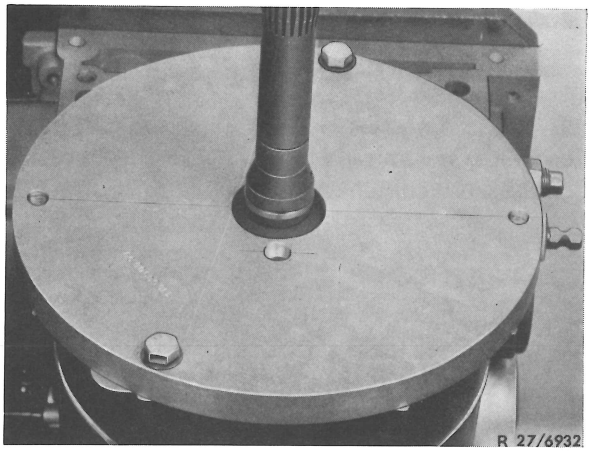


Fig. 39

60 Turn transmission with assembly fixture in such a manner that **output shaft** is pointing upwards.

61 Mount parking lock gear (18) (Fig. 41) on output shaft.

Place expanding spring (63) on bearing pin (64), connect to case (arrow) and tension (Fig. 40).

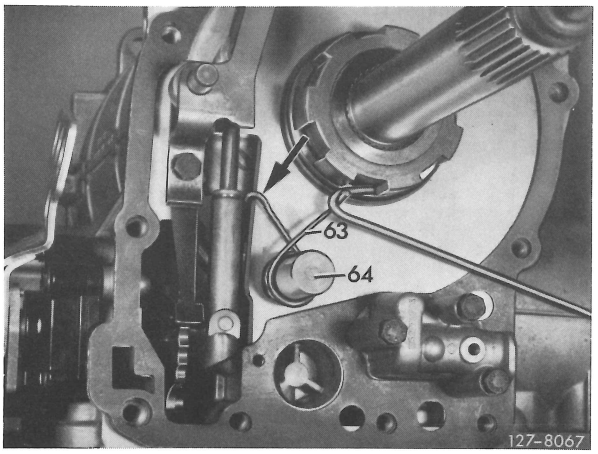


Fig. 40
63 Expanding spring
64 Bearing pin

Attach parking lock pawl (19), centrifugal governor (17), eccentric ring for secondary pump (16), worm gear for tachometer drive (15) and plate spring (85) on output shaft (Fig. 41).

62 Assemble rear transmission case (27.2–560).

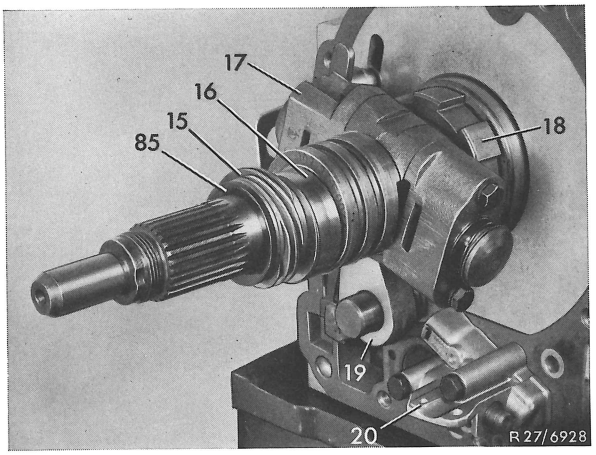


Fig. 41

15 Worm gear tachometer drive
16 Eccentric ring secondary pump
17 Centrifugal governor
18 Parking lock gear
19 Parking lock pawl
20 Modulating pressure housing
85 Plate spring

63 Check function of parking lock.

64 Installation of pressure receiving piston:

1st version W 3 A 040 (refer to page 001/1)

Insert pressure receiving piston (23) with two springs (82) and spring plate (83) into rear transmission case (Fig. 42).

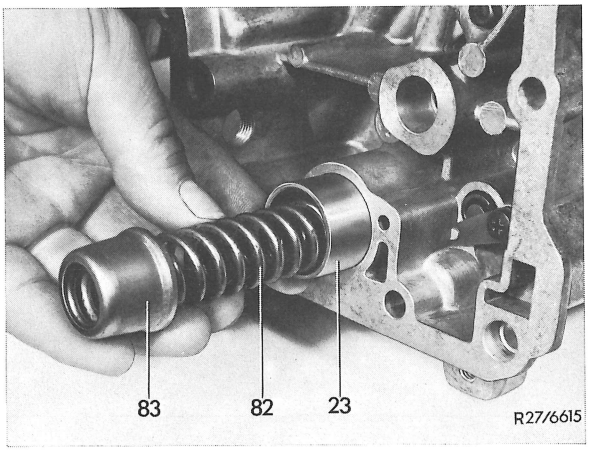


Fig. 42

23 Pressure receiving piston
82 Pressure receiving springs
83 Spring plate

2nd version W 3 A 040 and W 3 B 050
(refer to page 001/1)

Insert compression spring (82) with pressure receiving piston (23) into rear transmission case (Fig. 43).

65 Push delivery piston for secondary pump outwards and mount transmission case.

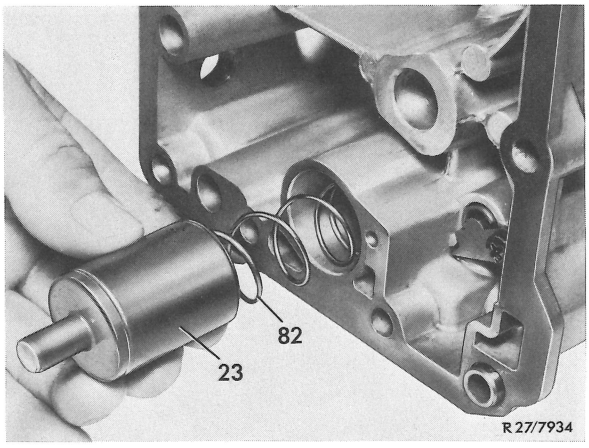


Fig. 43

23 Pressure receiving piston
82 Pressure receiving spring

66 Screw-in fastening bolts of rear transmission case and tighten to 13 Nm (1.3 kpm).

67 Screw-in plug for secondary pump (13) and compression spring (14) (Fig. 44).

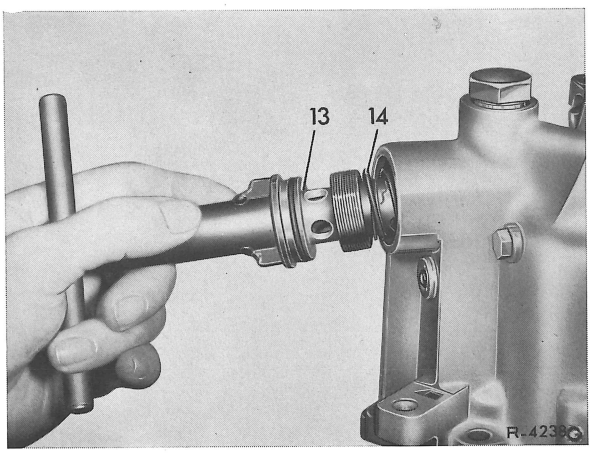


Fig. 44

13 Plug secondary pump
14 Compression spring

68 Screw measuring device (62) into case and tighten lightly. Insert thrust pin (12) and push in against stop (Fig. 45).

69 Thrust pin should be flush with face of measuring device. For this reason, thrust pins are available in three different lengths, all color-coded.

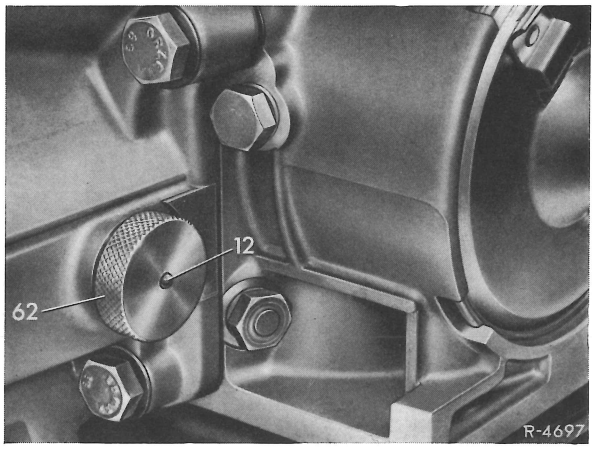


Fig. 45
12 Thrust pin 62 Measuring device

70 Glue thrust pin determined during measuring into vacuum box by means of Omnifit-Rapid Red M.

Coat vacuum box (10) on threads with sealing compound and screw into rear transmission case (Fig. 46).

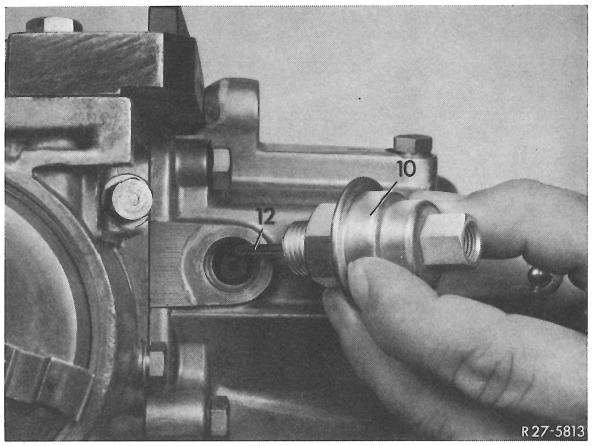


Fig. 46
10 Vacuum box 12 Thrust pin

71 Place three-armed flange on output shaft and tighten slot nut to 120 Nm (12.0 kpm), lock slot nut (arrow Fig. 47).

72 Turn transmission with assembly fixture in such a manner that output shaft is facing upwards, remove assembly flange.

73 Measure end play of gear assembly, while placing measuring bridge on transmission case and determining dimension "A" with depth gauge (Fig. 48).

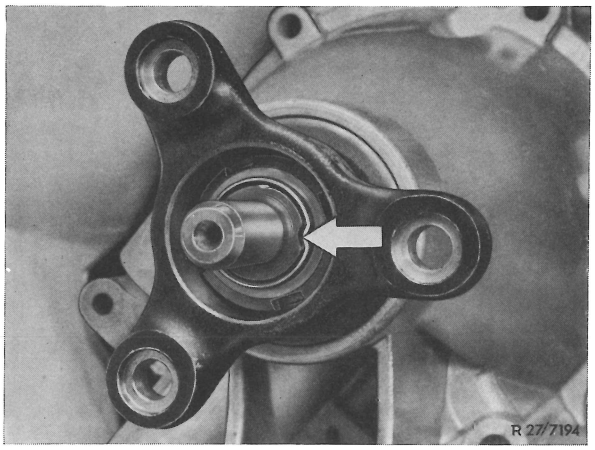


Fig. 47

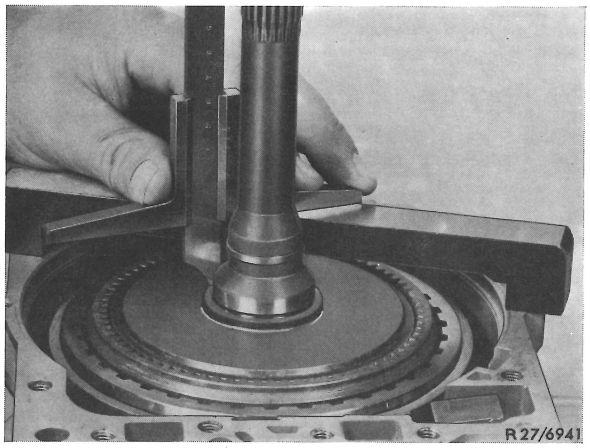


Fig. 48

74 Place new gasket on front transmission case and determine dimension "B" (Fig. 49).

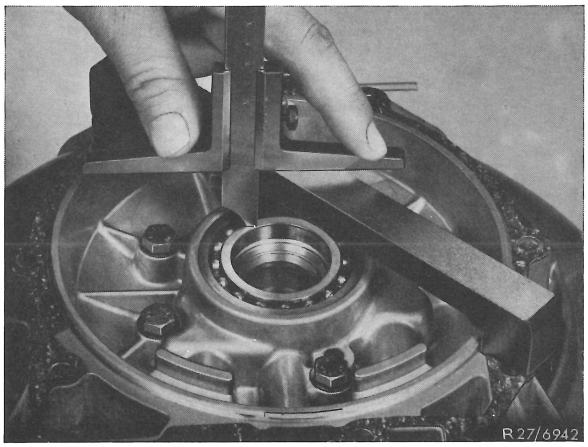


Fig. 49

The difference between dimension A and B provides clearance "C" of gear assembly (Fig. 50).

Starting point for computation is the thickness of the measuring bridge of 30 mm.

The end play dimension "C" results from the following computation:

1. 30 mm minus determined dimension "A".
2. Determined dimension "B" minus 30 mm.
3. The difference from the values determined under item 1 and 2 provides dimension "C".

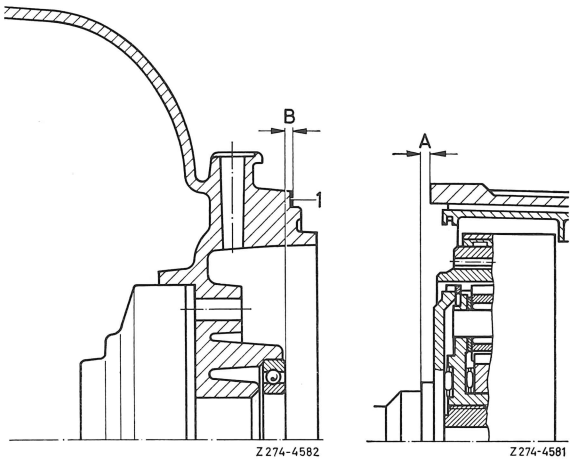


Fig. 50
1 Gasket

Example:

Measuring bridge	=	30.0 mm
Dimension "A"	=	28.0 mm
		2.0 mm
Dimension "B"	=	32.4 mm
Measuring bridge	=	30.0 mm
		2.4 mm
Dimension "C"	=	2.4–2.0 = 0.4 mm

75 Increase dimension "C" end play to its value of 0.4 + 0.1 mm by adding compensating washers (88) onto input shaft (Fig. 51).

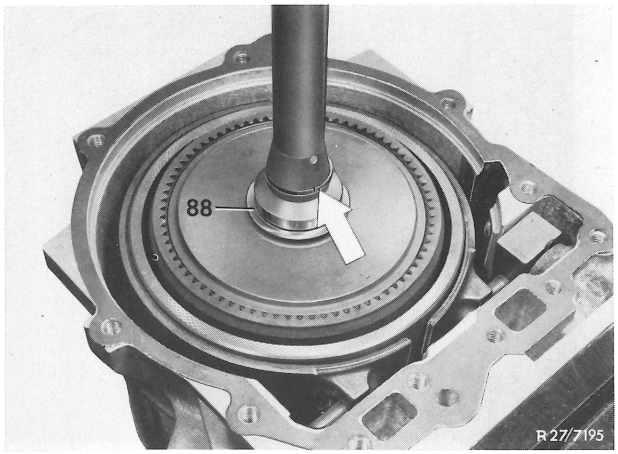


Fig. 51
88 Compensating washer

76 Center gasket prior to mounting front transmission cover. Align piston ring on input shaft in such a manner that the gap is in alignment with the slot (arrow Fig. 51).

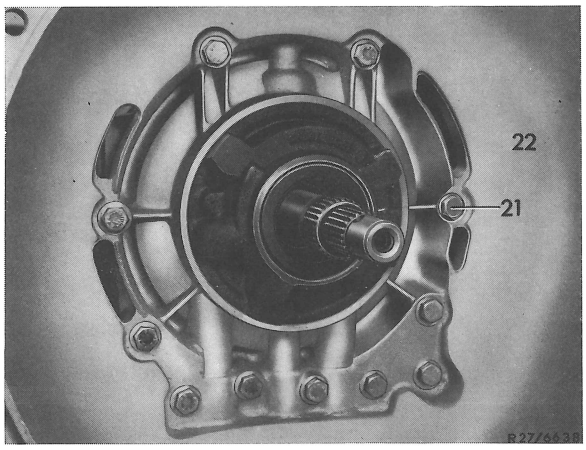


Fig. 52
21 Fastening bolts
22 Front transmission case

77 Mount front transmission case (22) with new gasket, screw-in fastening bolts and tighten to 13 Nm (1.3 kpm) (Fig. 52).

Note: Coat threads of lower seven bolts lightly with sealing compound.

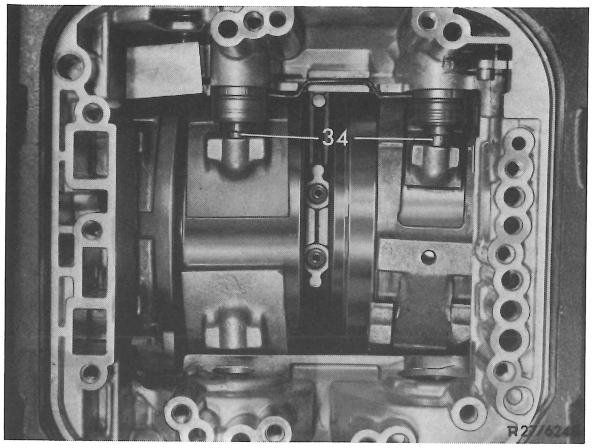


Fig. 53
34 Thrust pins

78 Insert the two thrust pins (34) on opposite end of brake band piston (Fig. 53).

79 Check oil sealing ring (66) and by-pass valve for brake band piston B 2 by sight and for wear.

80 Installation of brake band piston B 2:

1st version W 3 A 040 (refer to page 001/1)

Insert brake band piston B 2 (67) into brake band piston cover (65) (Fig. 54).

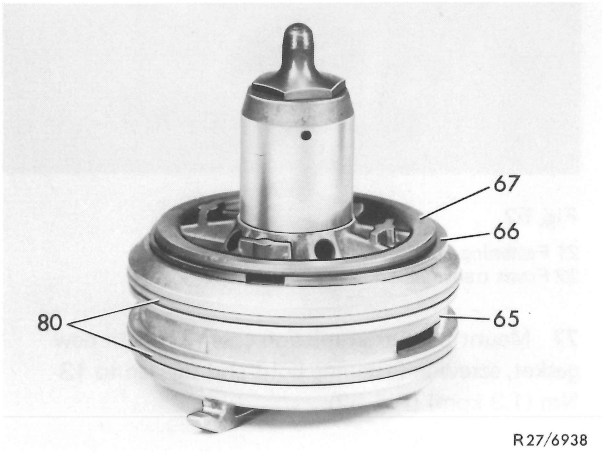


Fig. 54
65 Brake band piston cover B 2
66 Oil sealing ring
67 Brake band piston B 2
88 O-rings

Introduce brake band piston cover B 2 (65) with two new O-rings (80) (Fig. 54) into transmission case, making sure that the thrust pin of the brake band piston enters the supporting plate on brake band.

Insert circlip (24) into groove and push brake band piston cover (65) outwards (Fig. 55).

Caution! Brake band piston covers identified with the legend "front" (refer to arrow Fig. 55) must be installed in such a manner that the locking plates (90) are accurately horizontal and the legend is facing toward front transmission case (Fig. 55).

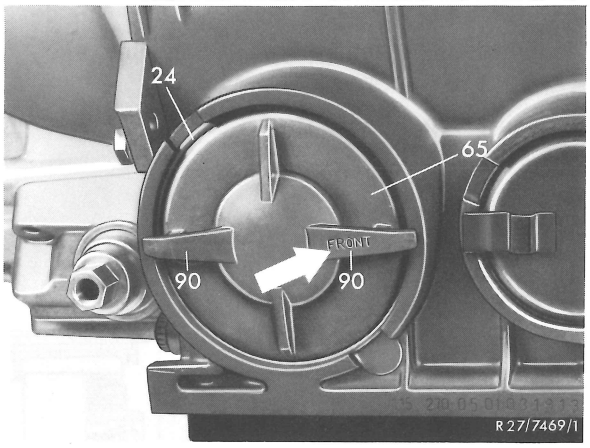


Fig. 55
24 Circlip
65 Brake band piston cover B 2
90 Locking plates

2nd version W 3 A 040 and W 3 B 050
(refer to page 001/1)

Introduce brake band piston B 2 (67) with installation ring (66) into transmission case, watching out for correct entry of thrust pin into bore in brake band (Fig. 56).

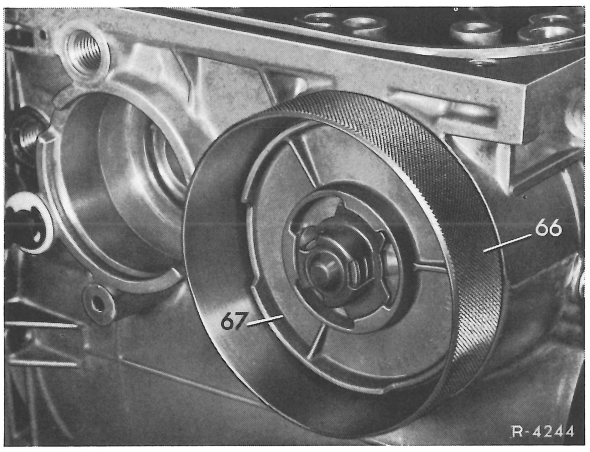


Fig. 56
66 Installation ring 115 589 18 61 00
67 Brake band piston B 2

Insert brake band piston cover B 2 (65) with new O-ring and lock with circlip (24).

81 Renew O-ring (32) of brake band piston cover B 1 (Fig. 57).

82 Renew lip sealing ring (33) of brake band piston B 1 (30) and slide compression springs (31) on brake band piston (Fig. 57).

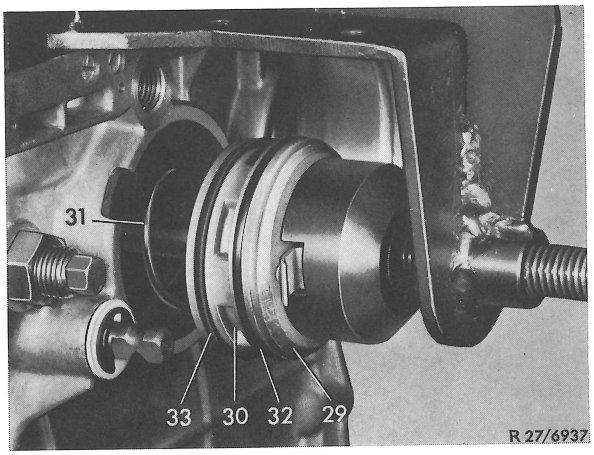


Fig. 57

29 Brake band piston cover B 1
30 Brake band piston B 1
31 Compression springs
32 O-ring
33 Lip sealing ring

83 Place assembly fixture on transmission case and screw down. Introduce brake band piston cover B 1 with assembly fixture and lock with circlip (27) (Fig. 12).

84 Remove assembly fixture for brake band piston B 1.

85 Measure idle travel of brake band piston B 1 and B 2. For this purpose, move brake band piston B 2 with compressed air via bore lifting pressure (69) into lifting position and determine dimension "b". Then move brake band piston with compressed air via bore, shifting pressure B 2 (70) into shift position and determine dimension. The difference of the two measurements provides the idle travel "L" (Fig. 58).

The compression spring keeps brake band piston B 1 in lifting position, determine dimension "a" in this position. Then move brake band piston with compressed air via bore shifting pressure B 1 (71) into shift position and determine dimension. The difference of the two measurements provides the idle travel "L".

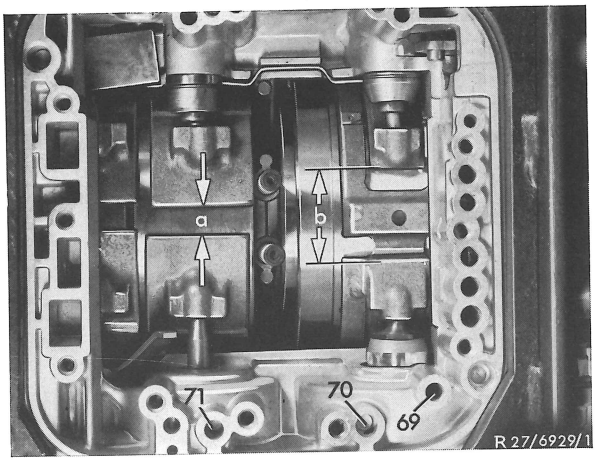


Fig. 58

69 Lifting pressure B 2
70 Shift pressure B 2
71 Shift pressure B 1

The idle travel "L" of brake band piston B 1 and B 2 should be 3.0—4.0 mm. The thrust pins have varying lengths of 22, 23, 24, 25, 26, 27 and 28.mm.

When the idle travel "L" is too long, install a longer thrust pin (34), when it is too short, install a shorter thrust pin.

86 Tighten adjusting screw (35) for brake band B 3 to 5 Nm (0.5 kpm) and then loosen by 1 3/4 turns. Lock adjusting screw with counternut (36) (Fig. 59).

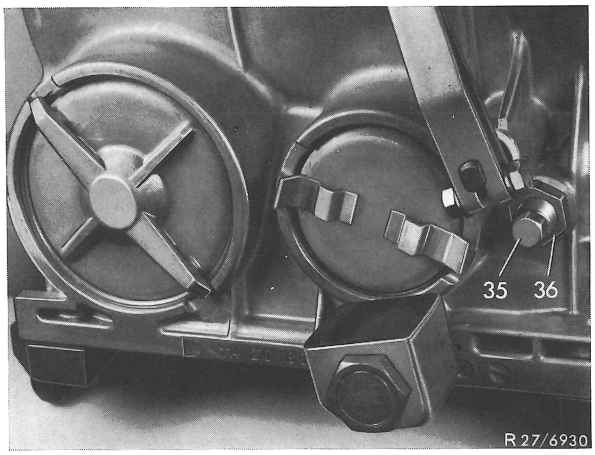


Fig. 59

35 Adjusting screw
36 Counternut

87 Insert both plug pipes (8) with new sealing caps (9) (Fig. 60).

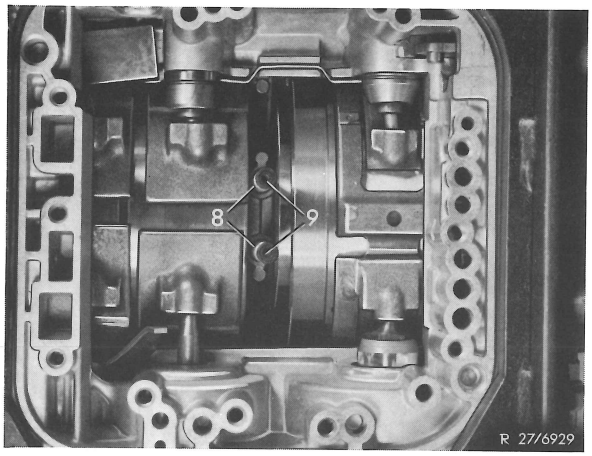


Fig. 60
8 Plug pipe
9 Sealing caps

88 Move range selector lever in between position "P" and "R". Insert assembly mandrel for control pressure valve (72) into shift valve housing and screw guide bolt (73) into transmission case (Fig. 61).

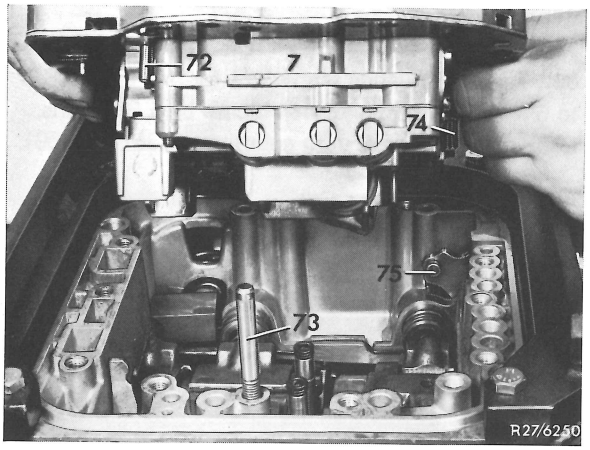


Fig. 61
7 Shift valve housing
72 Locating pin control pressure
73 Guide pin
74 Range selector valve
75 Range selector lever

89 Carefully introduce shift valve housing into transmission case. Make particularly sure that the range selector valve (74) enters the range selector lever (75) (Fig. 61).

90 Unscrew guide pin (73) (Fig. 61). Screw-in fastening bolts (6) with spring washers and tighten to 13 Nm (1.3 kpm) (Fig. 62).

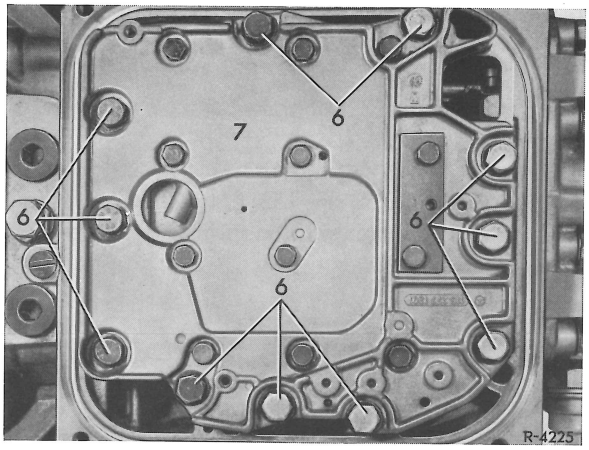


Fig. 62
6 Fastening bolts
7 Shift valve housing

Caution! Watch out for varying lengths of fastening bolts.

91 Pull out locating pin (72) for control pressure valve.

92 Mount oil filter (4), screw-in fastening bolts (5) and tighten to 4 Nm (0.4 kpm) (Fig. 63).

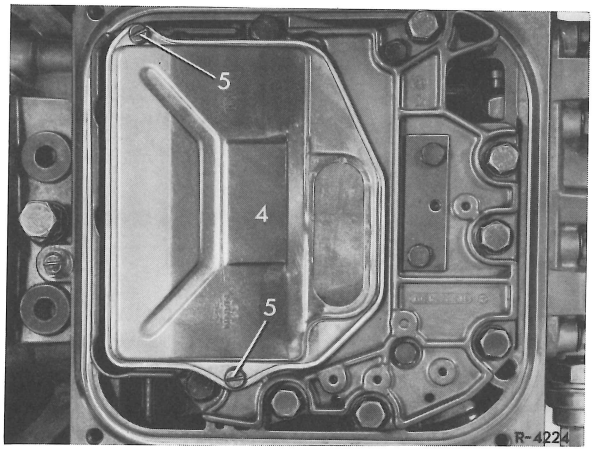


Fig. 63
4 Oil filter
5 Fastening bolts

93 Remove transmission from assembly stand.

94 Mount oil pan (1) with new gasket, screw-in fastening bolts (2) with washers (3) and tighten to 7 Nm (0.7 kpm) (Fig. 64).

95 Screw-on control pressure lever (28) (Fig. 10).

96 Screw-in solenoid valve (25) with new O-ring and sealing ring and tighten to 30 Nm (3.0 kpm) (Fig. 10).

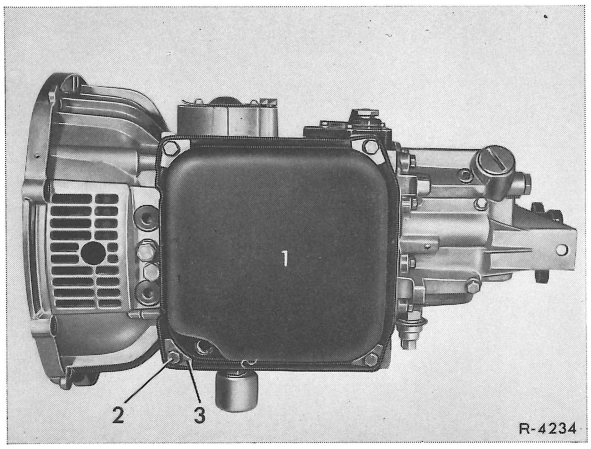


Fig. 64

1 Oil pan
2 Fastening bolts
3 Washers

Adjusting Data

End play of hollow shaft	0.3–0.4
End play of sun gear 1st gear assembly	0.2–0.3

Special Tools

Assembly fixture	112 589 07 59 00
Pulling fixture	000 589 98 33 00
Assembly mandrel	198 589 03 39 00

Disassembly

1 Remove output shaft (18) together with rear planetary gear carrier.

2 Remove radial bearing (20) and axial bearing (19) (Fig. 1).

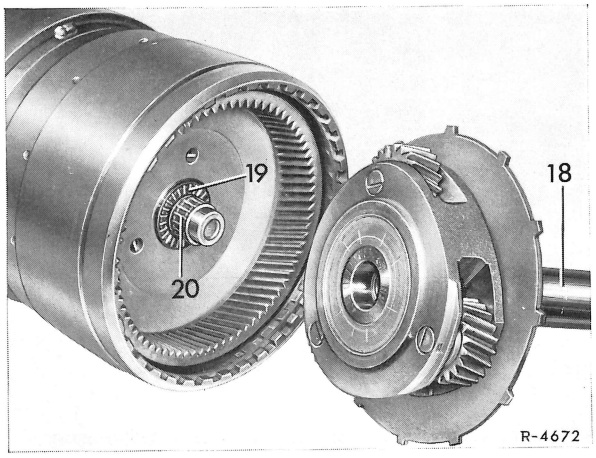


Fig. 1

18 Output shaft
19 Axial bearing
20 Radial bearing

3 Place gear assembly with input shaft in upward direction on assembly fixture 112 589 07 59 00 (Fig. 2).

4 Remove input shaft (1) with ring gear, as well as radial bearing (24) (Fig. 2 and 3).

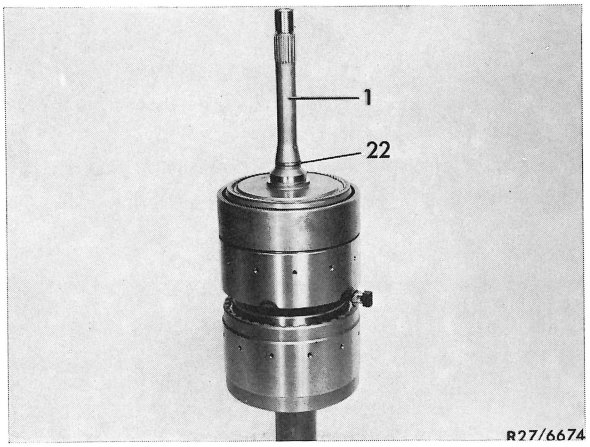


Fig. 2

1 Input shaft
22 Lube pressure ring

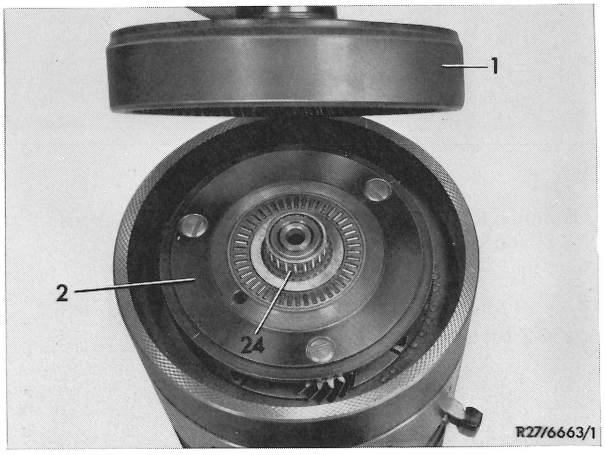


Fig. 3

1 Input shaft
2 Planetary carrier
24 Radial bearing

5 Remove planetary carrier first gear assembly (2) (Fig. 3).

6 Remove sun gear (3) and needle bearing (28) Fig. 4).

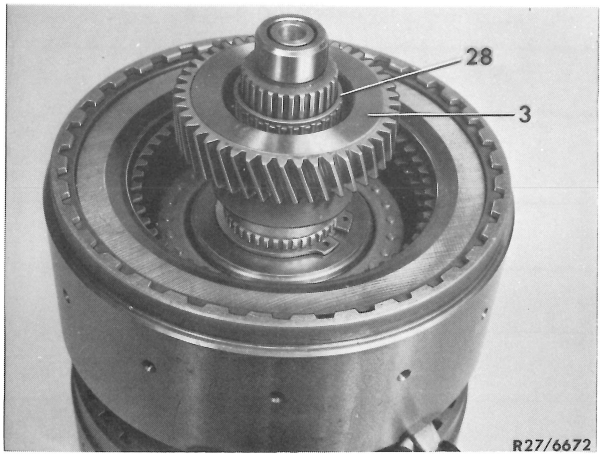


Fig. 4

3 Sun gear
28 Needle bearing

7 Remove circlip (31) and compensating washers (32) and pull off clutch K 1 (6) (Fig. 5).

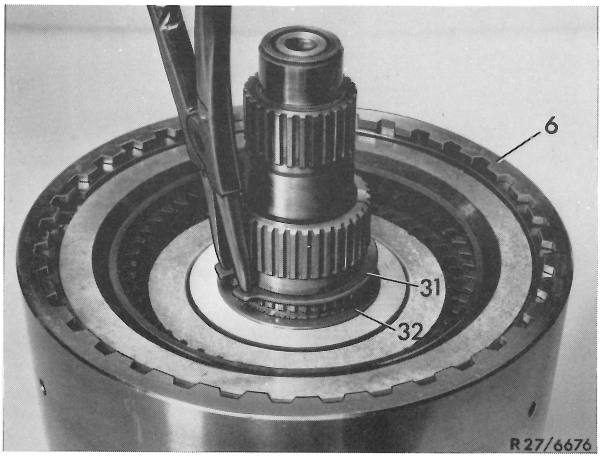


Fig. 5

6 Clutch K 1
31 Circlip
32 Compensating washers

8 Pull oil feeding sleeve (7) from supporting flange of K 2 (8) and remove (Fig. 6).

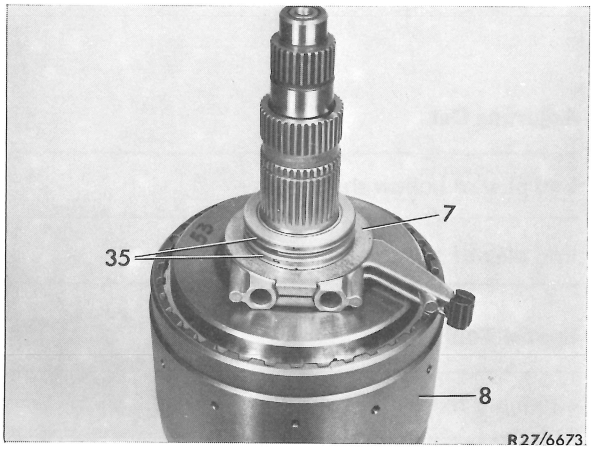


Fig. 6

6 Oil feeding sleeve
8 Supporting flange K 2
35 Oil sealing rings

9 Remove hollow shaft (11) with clutch K 2 (8) from intermediate shaft (12) (Fig. 7).

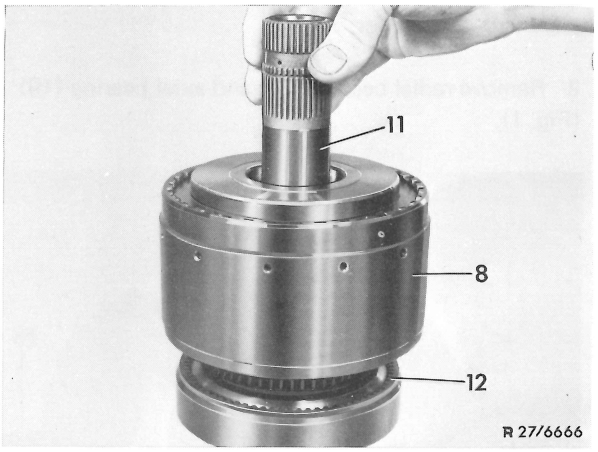


Fig. 7

8 Clutch K 2
11 Hollow shaft
12 Intermediate shaft

10 Remove needle bearing (44) and thrust washer (45) from intermediate shaft (12) (Fig. 8).

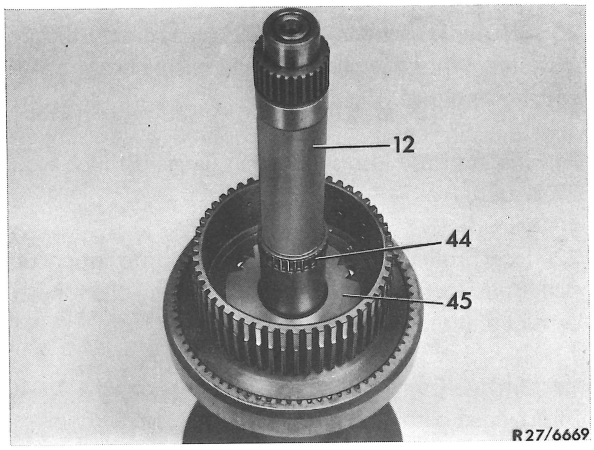


Fig. 8

12 Intermediate shaft
44 Needle bearing
45 Thrust washer

11 Remove hollow shaft (11) and roller clutch (43) from clutch K 2 (8) (Fig. 9).

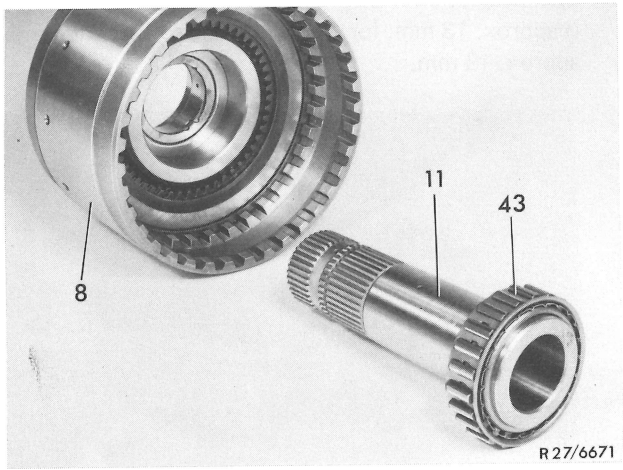


Fig. 9

8 Clutch K 2
11 Hollow shaft
43 Roller clutch

12 Pull out thrust washer (37) (Fig. 10).

13 Disassemble clutch K 2 (8) (Job No. 27.2–690).

14 Compress circlip (15) with pointed pliers and lift roller clutch outer race (14) from supporting flange K 2 (Fig. 11).

15 Pull ball bearing (16) from output shaft (18) by means of puller (17) (Fig. 12).

16 Remove thrust washer (41) with sun gear (40), as well as needle bearings (39) and (46) (Fig. 13 and 14).

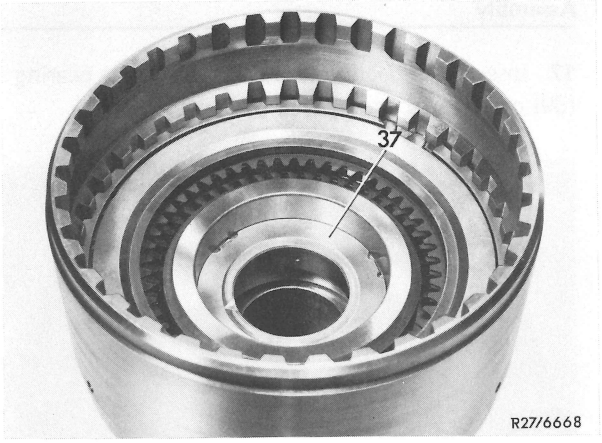


Fig. 10

37 Thrust washer

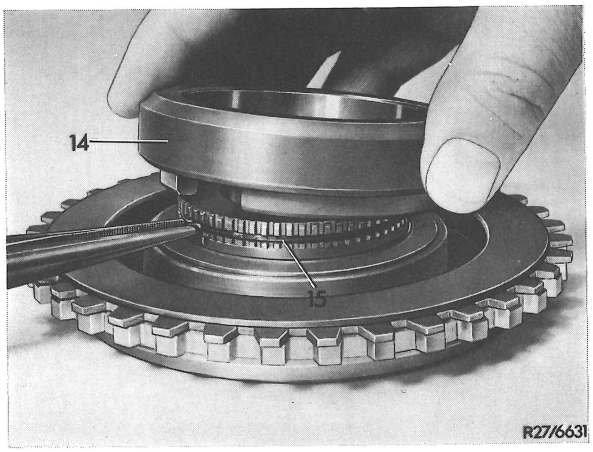


Fig. 11

14 Roller clutch outer race
15 Circlip

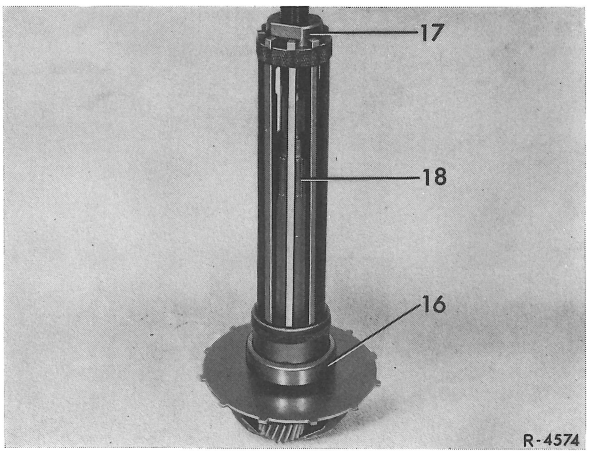


Fig. 12

16 Ball bearing
17 Puller
18 Output shaft

Assembly

17 Insert axial bearing (46) and split needle bearing (39) coated with grease (Fig. 13).

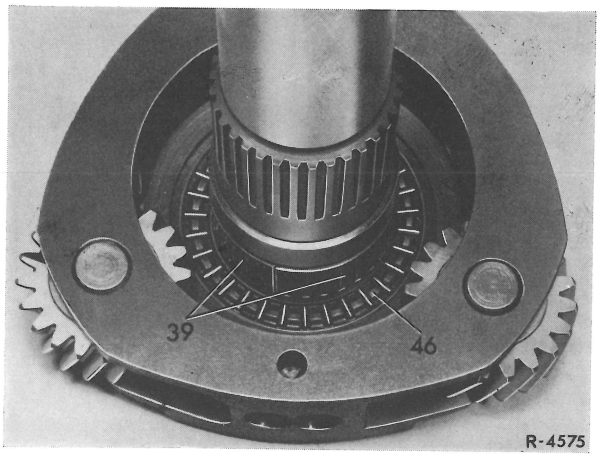


Fig. 13
39 Needle bearing
46 Axial bearing

18 Mount sun gear (40) and thrust washer (41), with offset end of thrust washer facing sun gear (Fig. 14).

19 Press-on ball bearing (16) and parking lock gear (42) with assembly mandrel (Fig. 14).

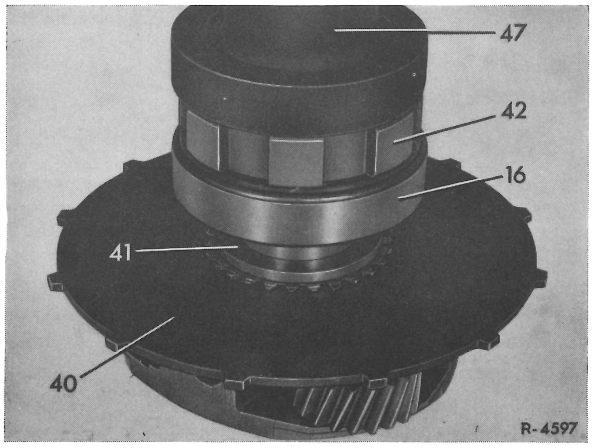


Fig. 14
16 Ball bearing
40 Sun gear
41 Thrust washer
42 Parking lock gear
47 Assembly mandrel

20 Place intermediate shaft (12) on assembly fixture, then insert thrust washer (45) and needle bearing (44) with some grease (Fig. 8).

21 Insert piston into supporting flange (8) (Job No. 27.2–690, Fig. 7).

22 Insert roller clutch outer race (14) into supporting flange and lock with circlip (15) watching out for correct seat of circlip (Fig. 11).

Caution! As from April 1972, transmission W 3 A 040 ist provided with a roller clutch outer race and holding plate.

The holding plate (50) encloses the roller clutch outer race (14) with roller clutch (43) and thrust washer (37) (Fig. 14a). The roller clutch with holding plate is a replacement for the version used up to then.

The installation width for the W 3 A 040 roller clutch is approx. 13 mm, for the W 3 B 050 roller clutch approx. 19 mm.

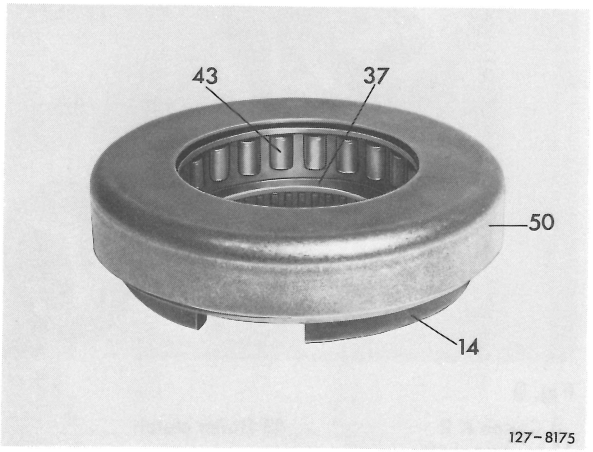


Fig. 14a
14 Roller clutch outer race
37 Thrust washer
43 Roller clutch
50 Holding plate

23 Assemble clutch K 2 and measure (Job No. 27.2–690).

24 Insert thrust washer (37) coated with grease (Fig. 10).

25 Insert roller clutch (43) into outer race (14). The edge with outward bead (refer to arrow) should face upwards (Fig. 15).

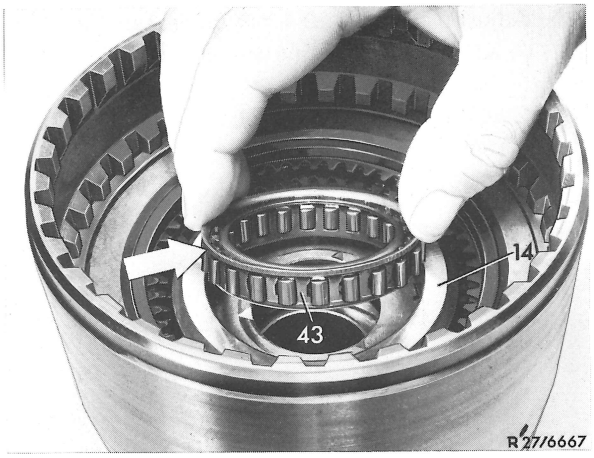


Fig. 15
14 Free-running assembly outer race
43 Free-running assembly

26 Insert hollow shaft (11) into free-running assembly (43) while rotating hollow shaft in direction of arrow (Fig. 16).

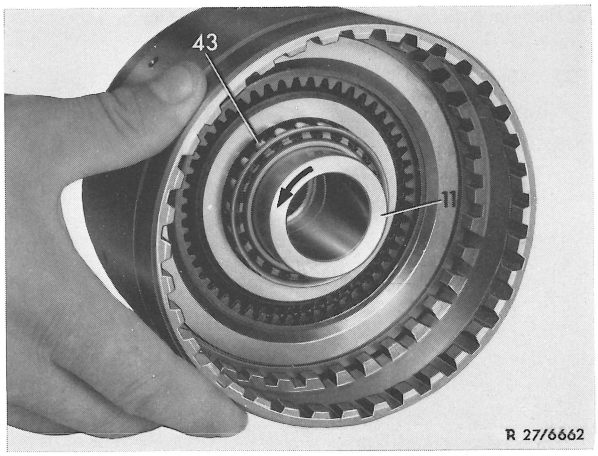


Fig. 16
11 Hollow shaft
43 Free-running assembly

Caution: Upon insertion of hollow shaft, the shaft should lock opposite to the direction of the arrow shown in Fig. 16.

27 Insert intermediate shaft (12) into clutch K 2 while rotating slightly, so that the teeth of the inner disc carrier enter the inner discs (Fig. 17).

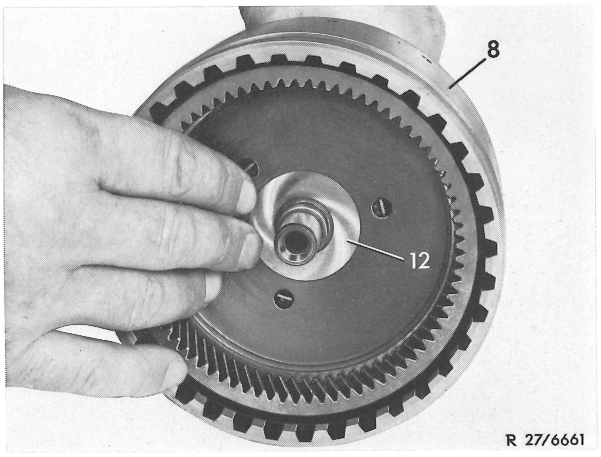


Fig. 17
8 Clutch K 2
12 Intermediate shaft

28 Place gear assembly again on assembly fixture.

29 Insert radial bearing (36) in between hollow shaft (11) and supporting flange K 2 (8) (Fig. 18).

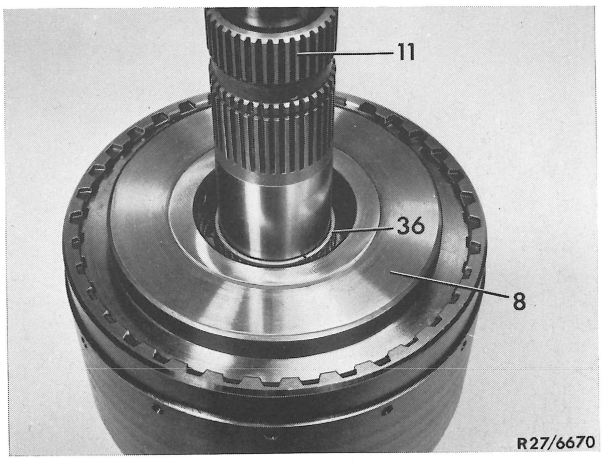


Fig. 18
8 Supporting flange K 2
11 Hollow shaft
36 Radial bearing

30 Check oil sealing rings (35) on oil feeding sleeve and replace, if required.

31 Insert oil feeding sleeve (7) into supporting flange K 2 (8), while completely pushing down so that both oil sealing rings will enter the supporting flange K 2 (Fig. 19).

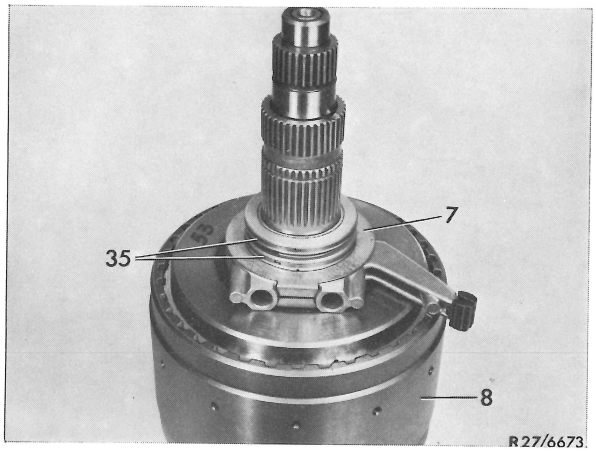


Fig. 19

7 Oil feeding sleeve
8 Supporting flange K 2
35 Oil sealing rings

32 Position K 1 (6), also watch out for correct engagement of oil sealing rings.

33 Insert circlip (31) (Fig. 20).

34 Check play with feeler gauge (Fig. 20).

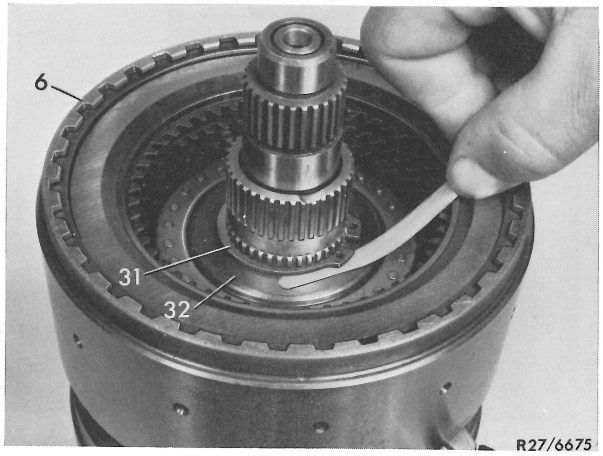


Fig. 20

6 Clutch K 1
31 Circlip
32 Compensating washers

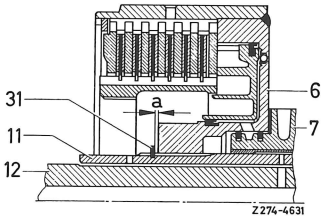


Fig. 21

6 Clutch K 1
7 Oil distributing sleeve
11 Hollow shaft
12 Intermediate shaft
31 Circlip

35 Adjust play to 0.3–0.4 mm (dimension "a", Fig. 21) by adding compensating washers (32).

36 Glue axial bearing (27) with some grease to planetary carrier (2) (Fig. 22).

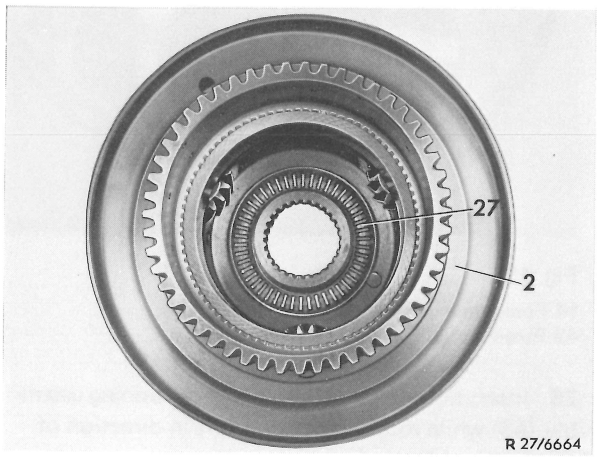


Fig. 22

2 Planetary carrier
27 Axial bearing

37 Measure with depth gauge distance from face of inner plate carrier to a roller of the axial bearing (27) and determine dimension "a" (Fig. 23).

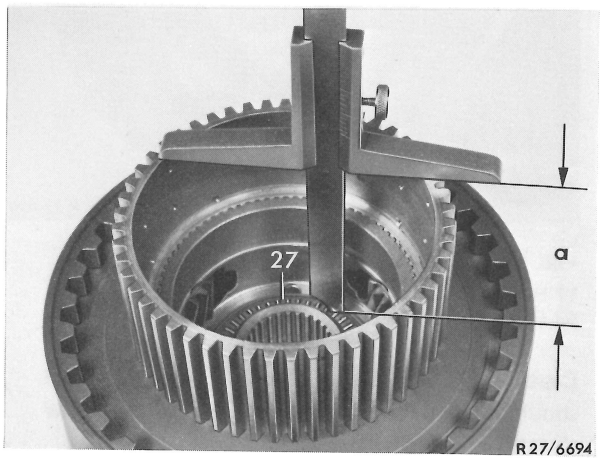


Fig. 23

27 Axial bearing

38 Measure distance from face of inner plate carrier to shoulder of planetary gear carrier and determine dimension "b" (Fig. 24).

39 Measure distance from face of intermediate shaft (12) to shoulder of intermediate shaft and determine dimension "d" (Fig. 25).

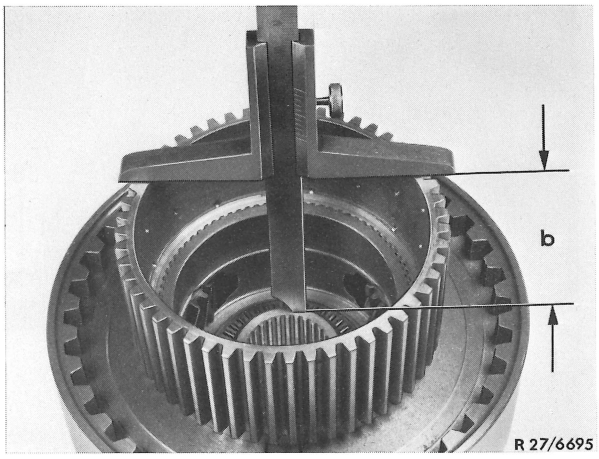


Fig. 24

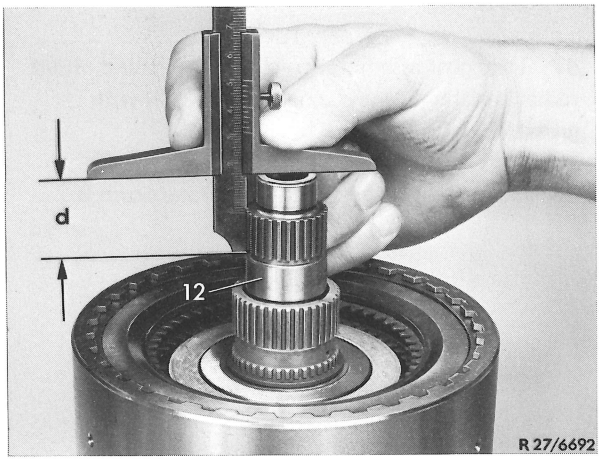


Fig. 25
12 Intermediate shaft

40 Place sun gear (3) on hollow shaft and insert needle bearing (28) (Fig. 26).

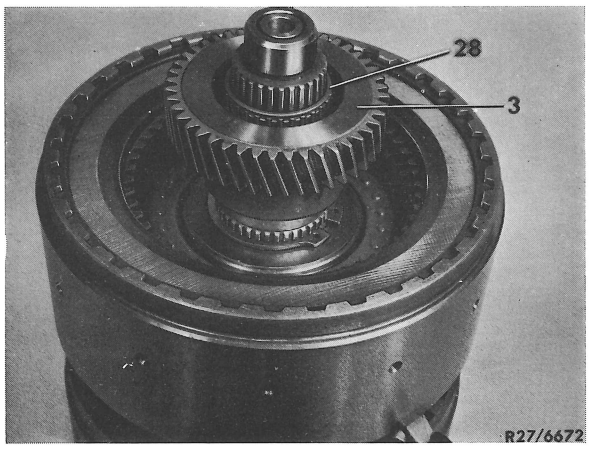


Fig. 26
3 Sun gear
28 Needle bearing

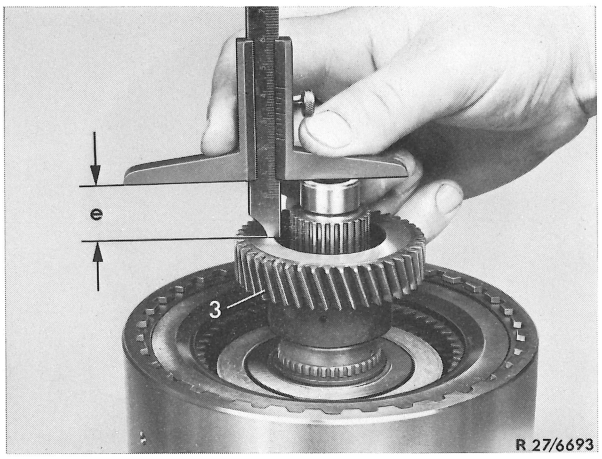


Fig. 27
3 Sun gear

41 Measure distance from face of intermediate shaft to face of sun gear (3) and determine dimension "e" (Fig. 27).

42 The play is determined from the following computation:
Dimension "a" – "b" = "c"
Dimension "d" – "e" = "f"
Dimension "c" – "f" provides the play.

43 Adjust play to 0.2–0.3 mm by adding compensating washers under axial bearing (27) (Fig. 22).

Measuring Points for Figs. 23, 24, 26 and 27

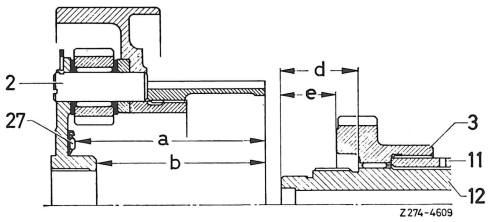


Fig. 26
2 Planetary gear carrier
3 Sun gear
11 Hollow shaft
12 Intermediate shaft
27 Axial bearing

44 Position planetary gear carrier (2) while slightly turning back and forth, so that the inner plate carrier enters the teeth of the plates, then insert radial bearing (24) (Fig. 29).



Fig. 29

2 Planetary gear carrier
24 Radial bearing

45 Mount input shaft (1) (Fig. 30).

46 Insert new lube pressure ring (22) on input shaft (1) into groove and engage (Fig. 30).

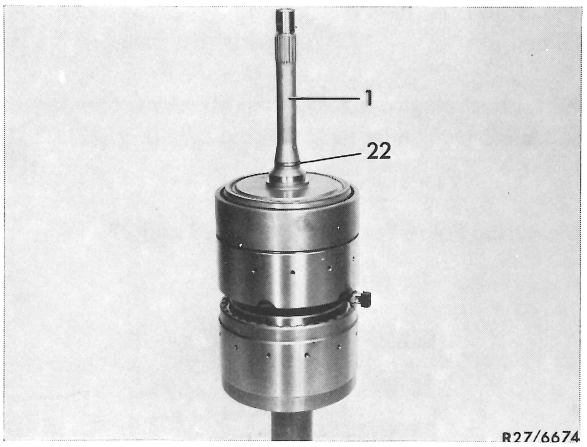


Fig. 30

1 Input shaft
22 Lube pressure ring

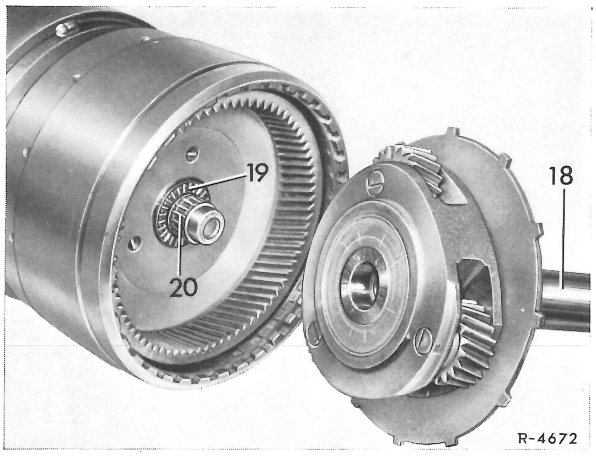


Fig. 31

18 Output shaft
19 Axial bearing
20 Radial bearing

47 Take gear assembly from assembly stand, insert radial bearing (20) and axial bearing (19) with grease (Fig. 31).

48 Insert output shaft (18) into brake drum B 2.

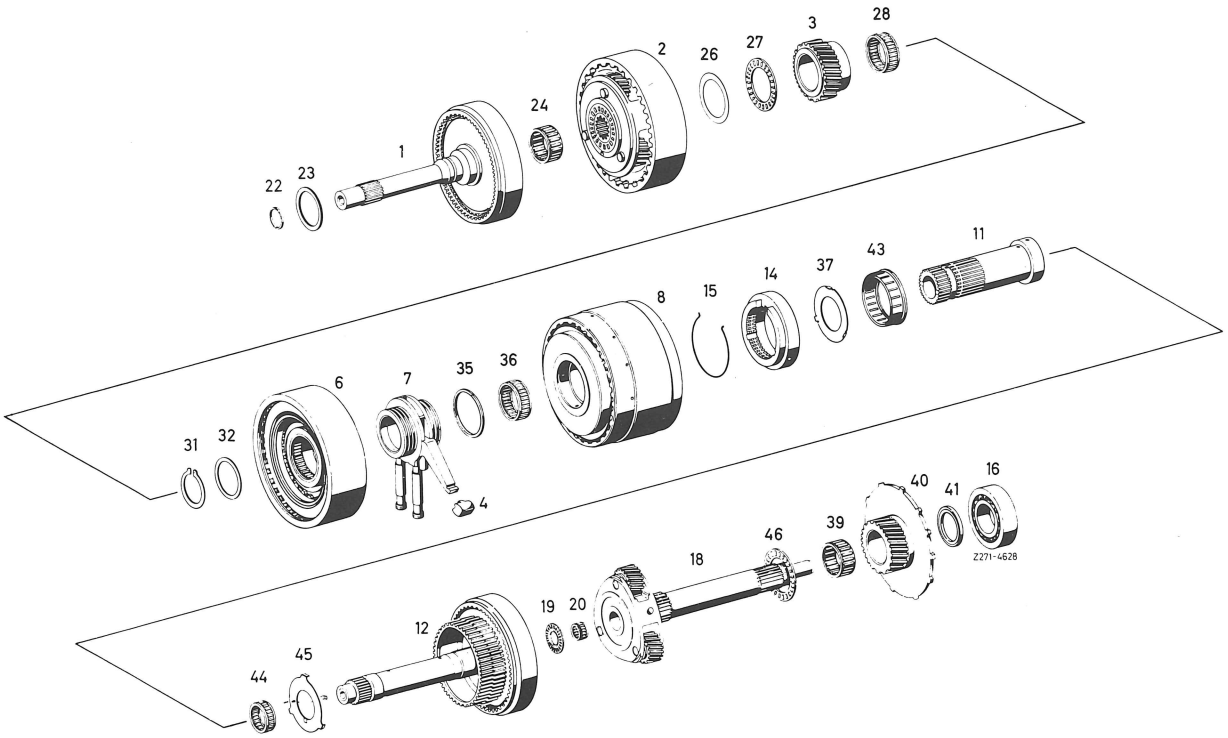


Fig. 32

1 Input shaft
2 Planetary gear carrier
3 Sun gear front gear assembly
6 Clutch K 1
7 Oil distributing sleeve
8 Clutch K 2
11 Hollow shaft
12 Intermediate shaft
14 Free-running assembly outer race
15 Circlip
16 Ball bearing
18 Output shaft
19 Axial bearing
20 Radial bearing
22 Lube pressure ring
23 Compensating washer
24 Radial bearing
26 Compensating
27 Axial bearing
28 Radial bearing
31 Circlip
32 Compensating washer
35 Oil sealing ring
36 Radial bearing
37 Thrust washer
39 Split needle bearing
40 Sun gear rear gear assembly
41 Thrust washer
43 Free-running assembly
44 Axial bearing
45 Thrust washer
46 Axial bearing

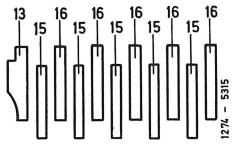
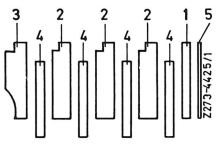
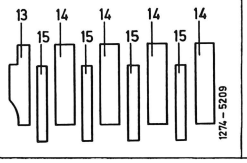
Adjusting Data

Release play "L" of plate clutch K 1	1.0 ± 0.2

Clutch Plates

	W 3 B 050		W 3 A 040 1st Version (refer to page 001/1)		W 3 A 040 2nd Version (refer to page 001/1)	
	Thickness	Item No.	Thickness	Item No.	Thickness	Item No.
Outside plates	5.0	13	2.0	1	5.0	13
	3.0 or 3.5 optionally	16	5.0	2	4.5 or 5.0 optionally	14
			5.5	3		
Inside plates	2.1	15	2.5	4	2.1	15
Compensating washer	–	–	0.6	5	–	–

Clutch Plate Diagram

Clutch K 1			 piston end

Special Tool

Assembly fixture	115 589 01 59 00
Introducing ring	116 589 17 61 00

Disassembly

1 Push circlip (2) out of groove with a screwdriver and remove (Fig. 1).

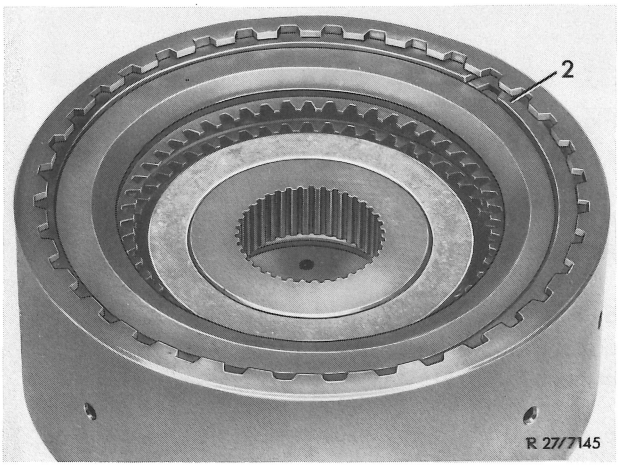


Fig. 1
2 Undulated circlip

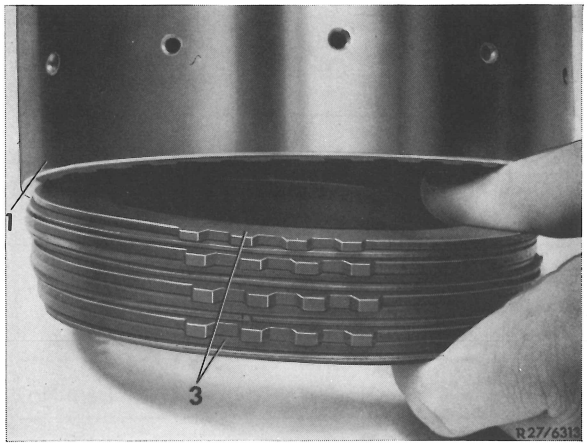


Fig. 2
1 Supporting flange 3 Plate assembly

2 Remove plate assembly (3) by tilting supporting flange (1) (Fig. 2).

3 Place assembly fixture (4) on spring retainer (5) in such a manner that the pressure ring is uniformly seated. Push spring retainer down with a press until circlip (6) is exposed and can be removed (Fig. 3).

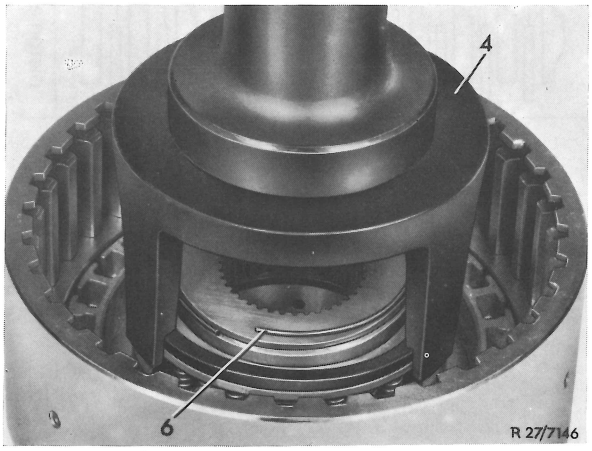


Fig. 3
4 Assembly fixture 6 Circlip

4 Carefully release press, remove spring retainer (5) and springs (7) (Fig. 4).

5 Hold piston (8) with two pointed pliers and pull out of supporting flange (1) until it can be held manually (Fig. 5).

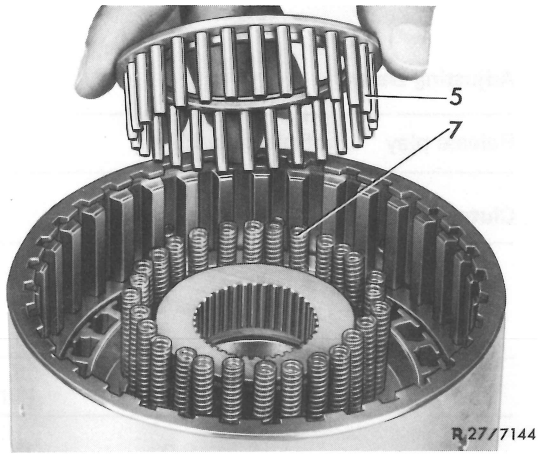


Fig. 4
5 Spring retainer 7 Springs

6 Lift piston with lip sealing ring (9) out of supporting flange (1) and check lip sealing ring by sight.

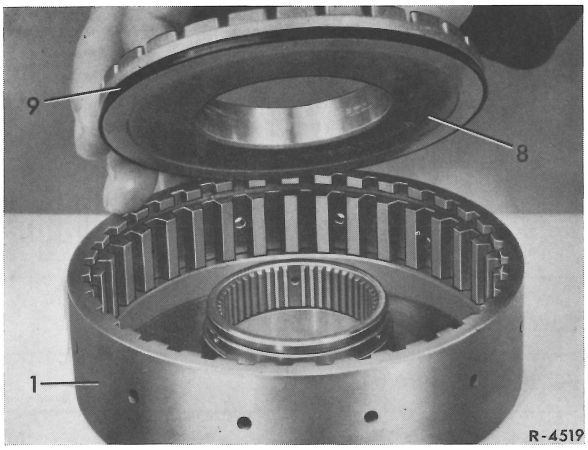


Fig. 5
1 Supporting flange 9 Lip sealing ring
8 Piston

Assembly

7 Install new lip sealing ring (11), if required (Fig. 6).

Caution! Do not use sharp-edged tools.

The lip sealing ring should be correctly resting in groove (10) with the lip pointing downwards (in direction of arrow) (Fig. 6).

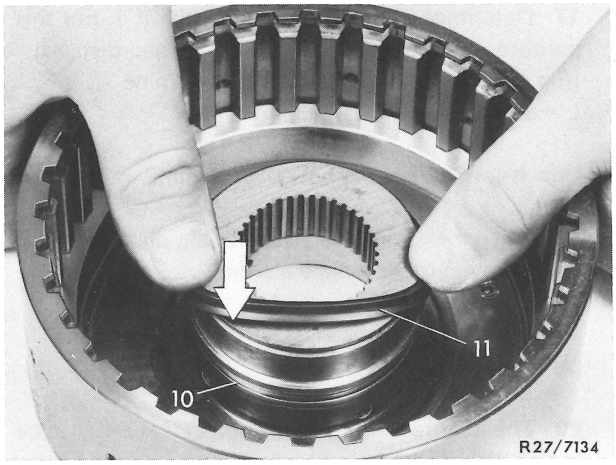


Fig. 6
10 Groove 1 Lip sealing ring

8 Insert introducing ring (12) into supporting flange (1) (Fig. 7).

9 Install new lip sealing ring (9) to the extent required; the sealing lip should point downwards in direction of arrow.

10 Lubricate piston (8) and lip sealing rings, introduce and push on housing bottom without canting. Do not use force since this might damage lip sealing ring.

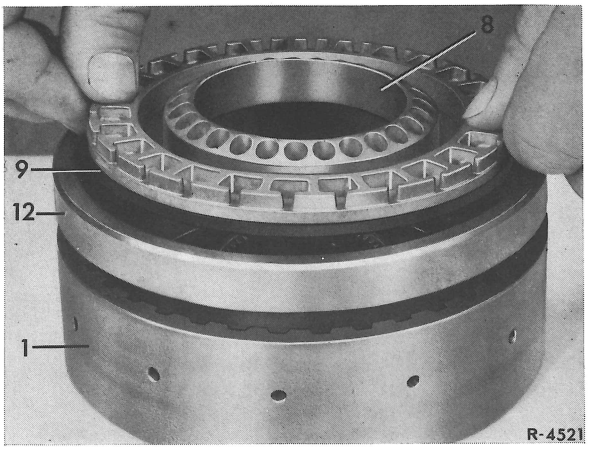


Fig. 7
1 Supporting flange 9 Lip sealing ring
8 Piston 12 Introducing ring

11 Insert piston return spring (7) into piston. Position spring retainer (5) in such a manner that each spring is centered in one prominence of the spring retainer (Fig. 4). Do not confuse springs with those of clutch K 2.

12 Mount assembly fixture (4) and push spring retainer carefully and without canting down under press until the circlip (6) can be inserted (Fig. 8).

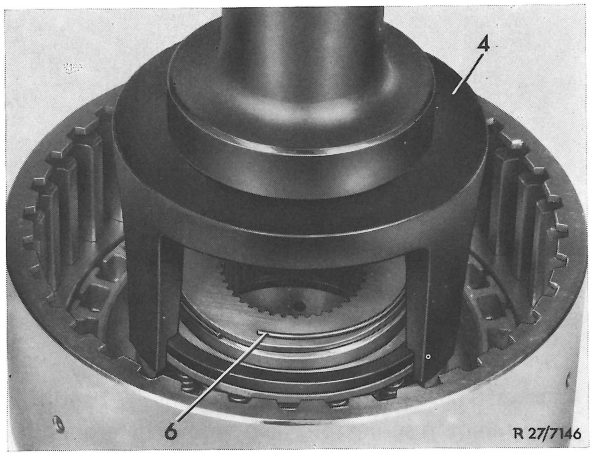


Fig. 8
4 Assembly fixture 6 Circlip

13 Carefully release press and watch out for correct seat of circlip (6).

14 Assemble plate assembly for clutch K 1 according to diagram. Immerse new lining plates first for a short moment in an ATF oil bath.

15 Insert plate assembly in outer plate carrier.

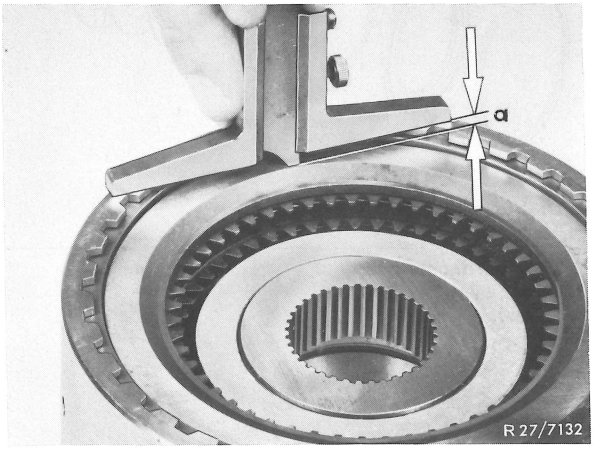


Fig. 9

16 Insert undulated circlip (2) into groove and push down into groove with screwdriver (Fig. 1).

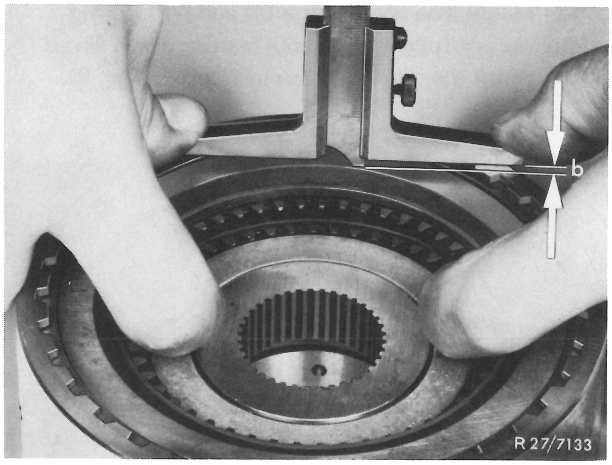


Fig. 10

Caution! The resilient circlips of clutches K 1 and K 2 are different in spring force and should therefore not be confused.

The circlip of clutch K 1 has 6 undulations.

17 Determine idle travel "L" of clutch K 1. For this purpose, measure distance "a" (Fig. 9) and distance "b" (Fig. 10) with a depth gauge and determine "L".
L = a–b.

Dimension "L" should be 1.0 ± 0.2 mm.

18 When measuring the distance "a", place depth gauge only lightly on plate assembly.

19 For measuring distance "b", push outer plate completely upwards (Fig. 10).

20 The idle travel on transmission W 3 A 040 can be optionally adjusted by means of compensating washers which are placed on piston or by means of outer plates which are available 4.5 and 5.0 mm thick. On transmission W 3 B 050 the idle travel is adjusted by plates available 3.0 and 3.5 mm thick.

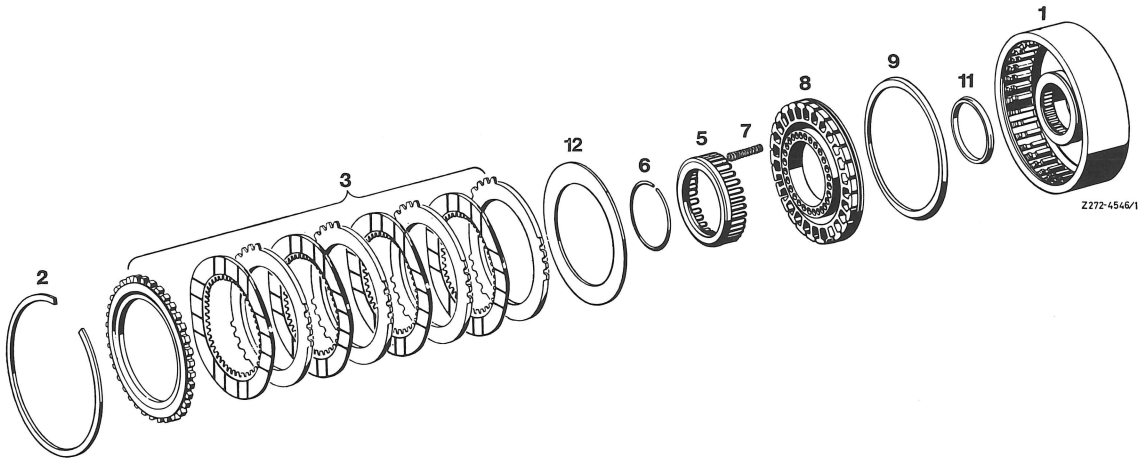


Fig. 11

Clutch K 1

1 Supporting flange
2 Undulated circlip
3 Plate assembly
5 Spring retainer
6 Circlip
7 Return springs
8 Piston
9 Lip sealing ring
11 Lip sealing ring

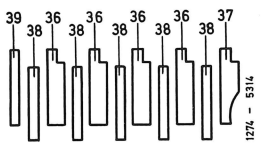
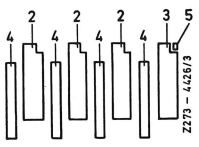
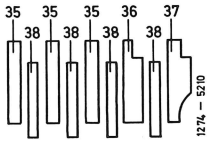
Adjusting Data

Release play "L" of brake clutch K 2	1.0 ± 0.2

Clutch Plates

	W 3 B 050		W 3 A 040 1st Version (refer to page 001/1)		W 3 A 040 2nd Version (refer to page 001/1)	
	Thickness	Item No.	Thickness	Item No.	Thickness	Item No.
Outside plates	2.0	39	3.5	1	3.0 or 3.5 optionally	35
	4.5 or 5.0 optionally	36	5.0	2	4.5 or 5.0 optionally	36
			5.0	3	5.0	37
Inside plates	2.1	38	2.5	4	2.1	38
Compensating washer	–	–	0.6	5	–	–

Clutch Plate Diagram

Clutch K 2	piston end			

Special Tool

Assembly fixture	115 589 01 59 00

Disassembly

1 Push straight circlip (20) out of groove with a screwdriver and remove (Fig. 1)

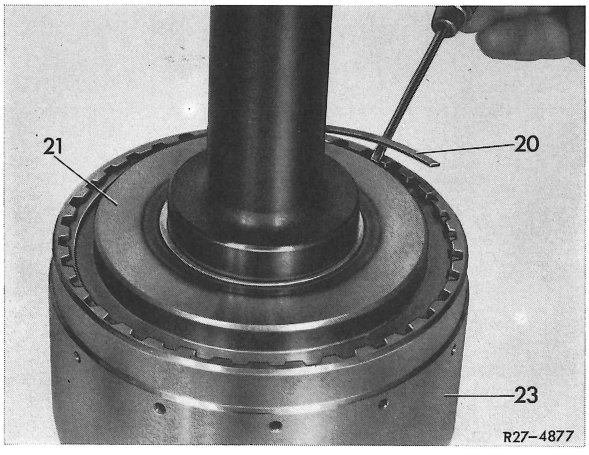


Fig. 1
20 Circlip
21 Supporting flange
23 Brake band drum B 2

2 Remove supporting flange (21) with piston out of brake band drum B 2 (23) (Fig. 1).

Caution! Keep supporting flange and piston together, so that the piston cannot fall out.

3 Remove all return springs (28) and plate assembly (4) from brake drum (23) (Fig. 2).

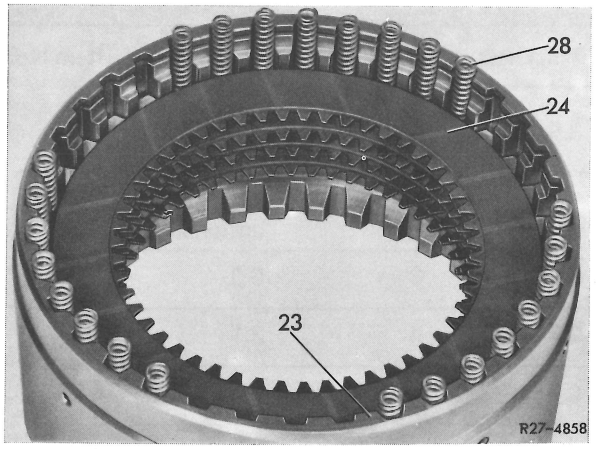


Fig. 2

23 Brake drum
24 Plate assembly
28 Return springs

4 Push undulated circlip (25) with a screwdriver out of groove, if required, and remove (Fig. 3).

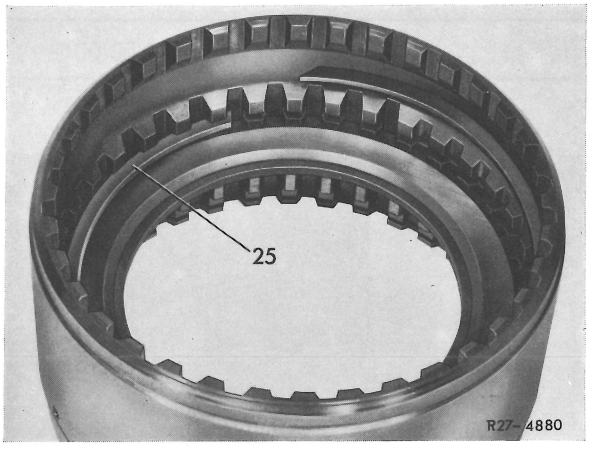


Fig. 3

25 Undulated circlip

Caution! Circlips (20 and 25) are different from each other and should not be confused (Fig. 1 and 3).

5 Remove compensating washer (33) with outside plate (32) (Fig. 4) and guide ring (34) for return springs (Fig. 5).

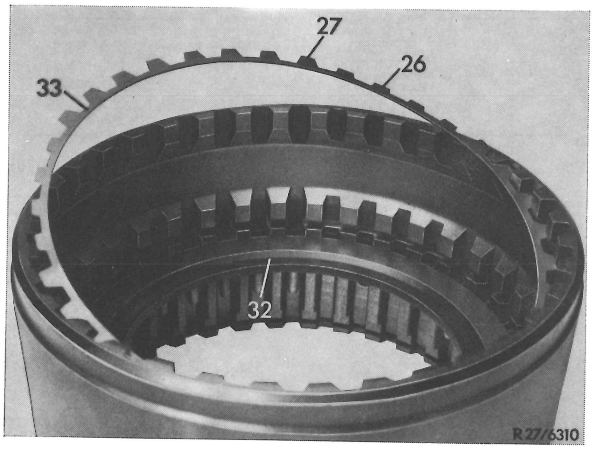


Fig. 4

26 Short lug
27 Long lug
32 Outside plate
33 Compensating washer

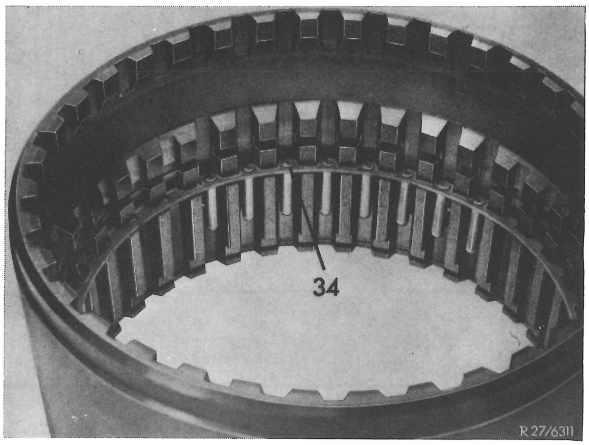


Fig. 5

34 Guide ring for return springs

6 Compress circlip (15) with pointed pliers and lift roller clutch outer race (14) (Fig. 13).

7 Lift piston (22) out of supporting flange (21) and check lip sealing ring (29) by sight (Fig. 6).

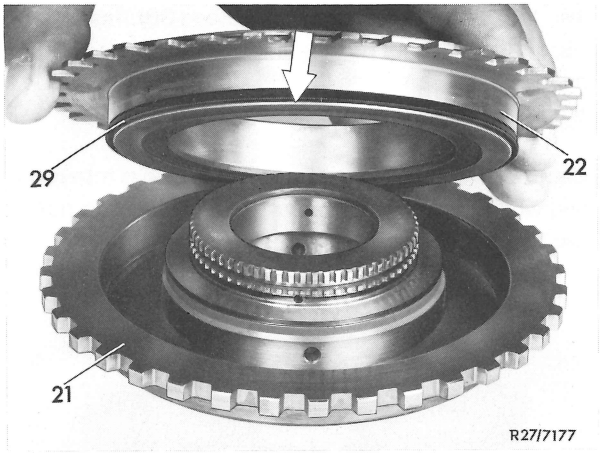


Fig. 6

21 Supporting flange
22 Piston
29 Lip sealing ring

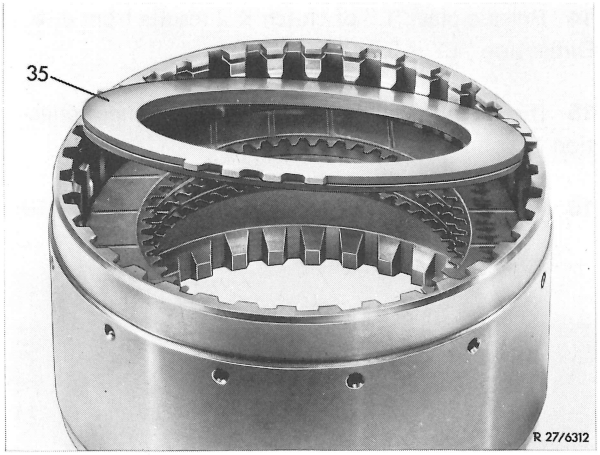


Fig. 7

35 Outside plate

Assembly

8 Insert guide ring (34) for return springs (Fig. 5), outside plate (32) and compensating washer (33) (Fig. 4).

9 Insert undulated circlip (25) into brake drum B 2 (23) (Fig. 3). The circlip should be tight in groove; assist with screw driver, if required.

The resilient circlips of clutches K 1 and K 2 are different in their spring force and should therefore not be confused.

10 Assemble plate assembly for clutch K 2 according to clutch plate diagram. Immerse new lining plates shortly in an ATF bath.

11 Insert plate assembly into outside plate carrier, with the offset end of the outside plates (35) facing downwards (Fig. 7).

12 Place clutch piston on plate assembly and determine dimension "a" from upper edge of outside plate carrier to clutch piston using depth gauge (Fig. 8).

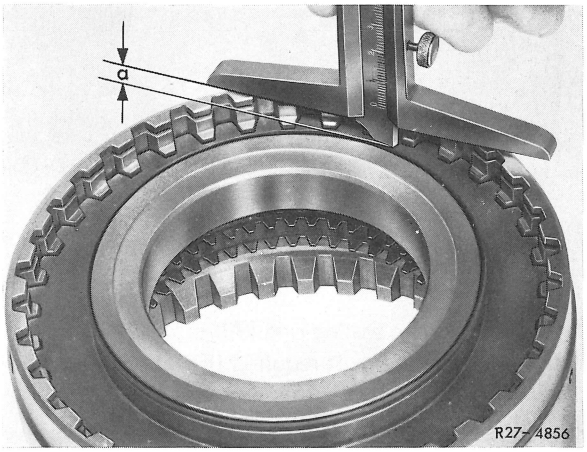


Fig. 8

13 Determine dimension "b" from top edge of outside plate carrier to contact surface of supporting flange using depth gauge (Fig. 9).

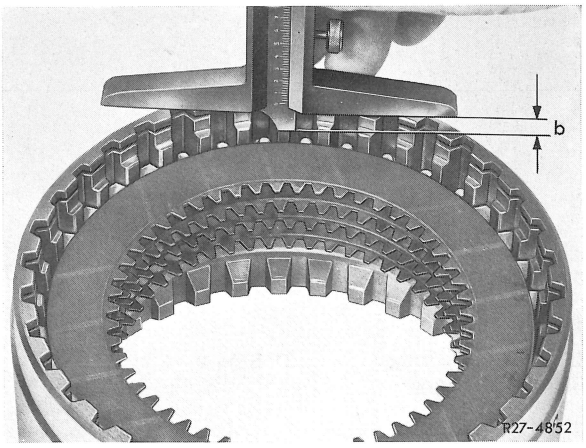


Fig. 9

27.2 Disassembly, Reassembly and Measuring of Clutch K 2

14 Release play "L" of clutch K 2 results from a–b. Dimension "L" is 0.7–1.2 mm.

15 If required, adjust release play by pertinent selection of compensating washers.

16 Place all return springs on guide pins "b" (Fig. 10).

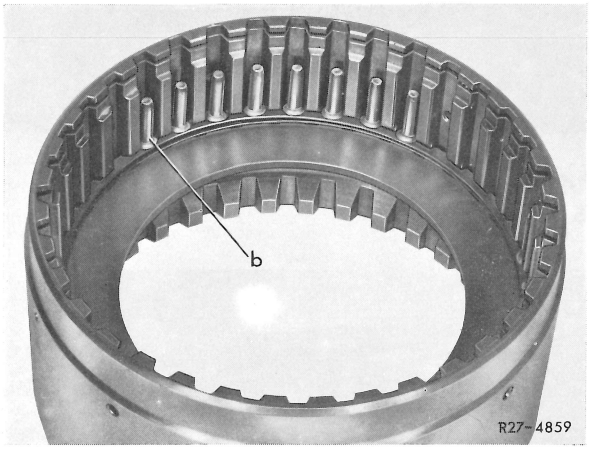


Fig. 10
b Guide pin

17 Install new lip sealing ring (30) into supporting flange (21) to the extent required (Fig. 11). The lip sealing ring should rest correctly in slot (31) and the lip should face downwards in direction of arrow (Fig. 11).

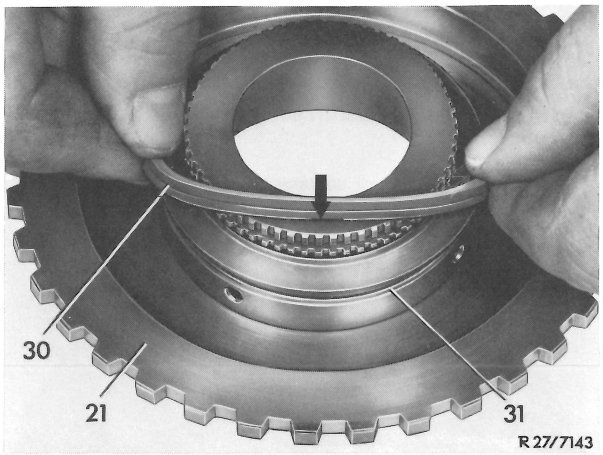


Fig. 11
21 Supporting flange
30 Lip sealing ring
31 Groove

18 Insert lip sealing ring (29) into groove of clutch piston (22). The sealing lip should face downwards in direction of arrow (Fig. 6).

19 Lubricate lip sealing rings (29 and 30). Insert piston (22) into supporting flange. Use a pencil or ball pen to push sealing lip into supporting flange, then push in piston without canting (Fig. 12).

Caution! When inserting the lip sealing rings into groove and when pushing into the supporting flange do not use pointed or sharp-edged tools.

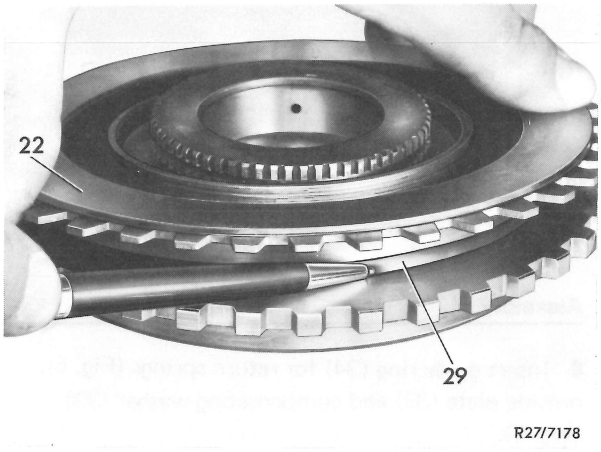


Fig. 12
22 Clutch piston
29 Lip sealing ring

20 Insert circlip (15) into groove in supporting flange, compress with pointed pliers and insert free-running assembly outer race (14) (Fig. 13).

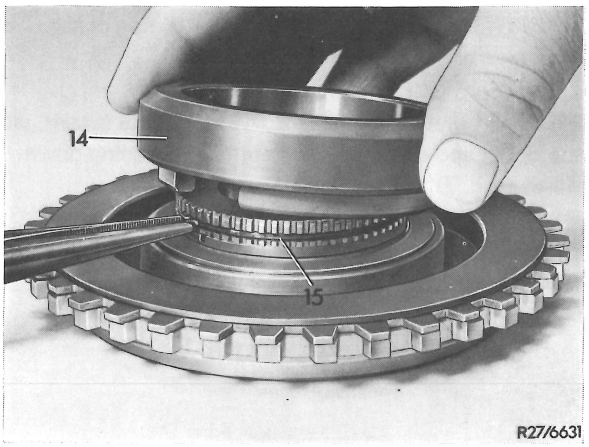


Fig. 13
14 Free-running assembly-outer race
15 Circlip

21 Insert supporting flange (21) (Fig. 1).

22 Insert circlip (20) and push into groove with screw driver.

Caution! No compensating washer is required for transmission W 3 A 040, 2nd version. The idle travel is adjusted by means of the outside plates available 3.0–3.5, 4.0 and 4.5 mm thick. For transmission W 3 B 050, the idle travel is adjusted by means of the outside plates available 4.5 and 5.0 mm thick.

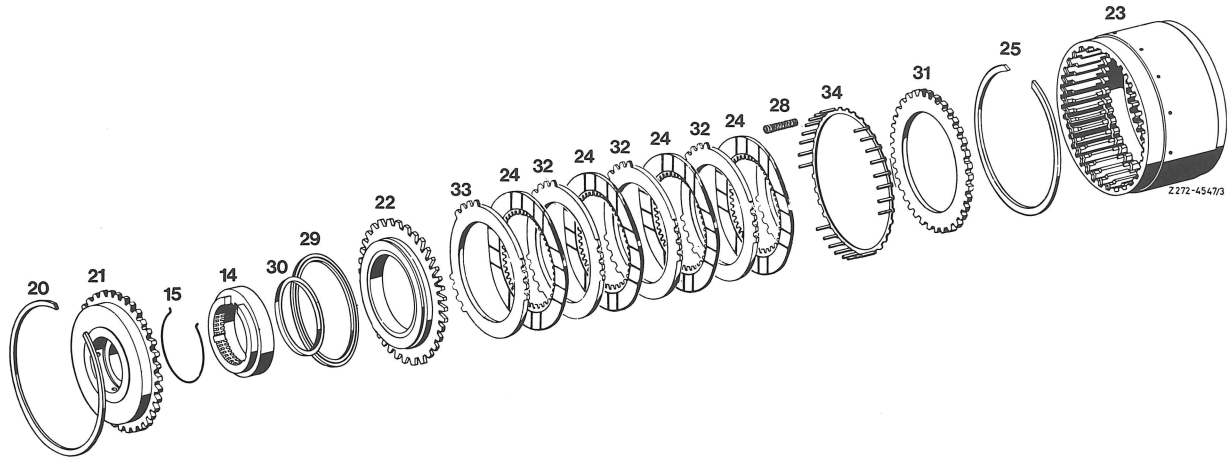


Fig. 14

Clutch K 2

14 Roller clutch outer race
15 Circlip
20 Circlip
21 Supporting flange
22 Piston
23 Brake band drum
24 Inside plate
25 Undulated circlip
28 Return springs
29 Lip sealing ring
30 Lip sealing ring
32 Outside plate
33 Outside plate
34 Guide ring

General Note . . . . . Job No. 27.3–001

Maintenance Jobs Job. No.

Oil Level Checkup 010
Oil Change, Filter Care 020

Adjusting Jobs

Adjustment of Control Pressure Rod and Selector Rod 110
A. Adjustment of Control Pressure Rod . . . . . /1
B. Adjustment of Selector Rod – Floor Shift . . . . . /5
C. Adjustment of Selector Rod – Steering Column Shift . . . . . /6
D. Adjustment of Selector Lever Indication . . . . . /7
Adjustment of Starter Locking and Backup Light Switch and Kickdown Switch 140

Transmission Checkup

Checkup of Torque Converter Stalling Speed 310
Checkups during Test Drive 320
Measuring Instruments and their Connections 330
Measuring the Nominal Pressures 340

Shift Valve Housing

Removal and Installation of Shift Valve Housing 400
Disassembly and Reassembly of Shift Valve Housing 420

Rear Transmission Housing

Removal and Installation of Rear Transmission Housing 500
Removal and Installation of Centrifugal Governor 520
Removal and Installation of Parking Lock 540
Disassembly and Reassembly of Rear Transmission Housing 560
Disassembly and Assembly of Centrifugal Governor 570
Removal and Installation of Starter Lock and Back-up Light Switch 580

Transmission

Removal and Installation of Transmission 600
Disassembly and Reassembly of Front Transmission Cover with Primary Pump . . . . . R 620
Disassembly and Assembly of Transmission . . . . . R 640
Disassembly, Reassembly and Measuring of Gear Assembly . . . . . R 660
Disassembly, Reassembly and Measuring of Clutch K 1 . . . . . R 680
Disassembly, Reassembly and Measuring of Clutch K 2 . . . . . R 690

177

W 4 B 025

The automatic transmission W 4 B 025 is installed into vehicles of series 114/115 since the introduction date of August 1973. In this connection, the transmission underwent a number of modifications, which were simultaneously incorporated in the transmissions of vehicle models 116.020 and 116.024.

External modifications include the starter locking and backup light switch, which is provided with an injection-molded housing, as well as the location of the kickdown magnetic valve, which is installed at an angle from the front.

These modifications are identified in the respective Job Nos. as 2nd version, and the version used up to that time as the 1st version. A new item is a quick-filling valve, which is connected in line with brake band piston B 3 and provides a quick connection for reverse gear when engaging selector lever position "R".

The transmissions are also different with regard to the diameter of brake band pistons B 1 and B 2, as well as the width of brake band B 2. Transmissions for vehicles with engine M 110 or M 130 are provided with a brake band piston B 1 of 71 mm dia. and B 2 of 92 mm dia., as well as with a brake band B 2 of 50 mm width, while the remaining transmissions are keeping a brake band piston dia. of 62 mm for B 1 and of 88 mm for B 2, as well as a width of 38 mm for brake band B 2.

The upper brake band guide is installed in two versions matching the respective brake band widths of B 2.

The lower brake band guide for B 2 used up to now, screwed to the shifting sleeve housing, is no longer installed. A brake band guide made of polyamide is installed as a replacement and is also available in two widths matching brake band B 2.

K 4 C 025

The reinforced transmission K 4 C 025 (part No. 115 270 07 01) has been provided with the improved shifting pressure pickup, which has been installed into transmission W 4 B 025 since the start of the series. The shifting pressure pickup installed up to now is identified in the respective Job No. as 1st version, and the improved shifting pressure pickup as the 2nd version.

As from December 1972 the transmission carries the part No. 114 270 21 01 and therefore additional modifications covering the following points:

1. The number of internal discs of clutches K 1 and K 2 is reduced from 4 to 3.

2. The additional piston on brake band piston B 1 is no longer installed.

3. Brake band B 1 is given a double-slotted lining and in connection therewith an external disc carrier K 1 is installed with 2 rows of holes.

Revision: note covering oil level.

Oil Grade

Automatic transmission fluid (ATF) Approved oil types	Type B, Dextron B refer to pertinent specifications page 236.4

Special Tools

Filling funnel	111 589 04 63 00
Syringe	112 589 00 72 00

Oil Level Checkup

Complete oil level checkup at the latest every 15,000 km.

This checkup is made with the engine running, the parking brake pulled and the selector lever in position "P", with the **vehicle resting on level ground ready for driving** and the **transmission at operating temperature** (approx. 80° C transmission fluid temperature). Prior to the inspection, run engine for approx. 1–2 minutes at idling speed so that the hydraulic clutch or torque converter will fill up.

Caution! At an oil temperature of 20°–30° C the max. oil level of transmission K 4 C 025 is at the minimum mark and that of transmission W 4 B 025 is 30 mm below minimum mark. This information is provided as an aid during an oil change, which is generally made at this oil temperature.

Wipe oil dipstick (6) with a lintfree cloth (leather is best), immerse fully for measuring, pull out again and read oil level (Fig. 1).

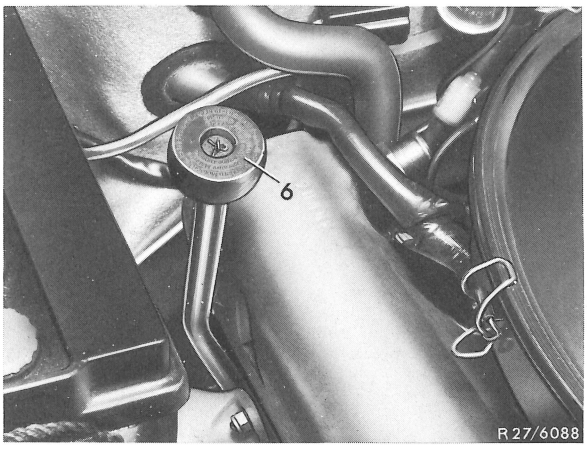


Fig. 1
6 Oil dipstick

Notes

A fully **cooled down** transmission will show an **oil level below the bottom dipstick mark** even when correctly filled with oil.

Add oil through a funnel with a fine-mesh strainer into **pipe for oil dipstick** with the engine running (funnel 111 589 04 63 00 is recommended). A reference value is as follows: The distance between the upper and the lower dipstick mark corresponds to approx. 0.3 liters of transmission fluid.

If the oil level is too low the oil pump will **suck up air** which can be clearly heard. The **oil will foam** and provide **wrong results** during an oil level checkup. Wait until the oil foam is down (for approx. 2 minutes), add oil and check oil level.

It is imperative to drain or draw off **excessive transmission fluid,** since otherwise the transmission gears would be splashing in oil. The temperature will increase unnecessarily until the foaming oil will be ejected through breather. **Continuous operation** under such circumstances **will lead to transmission damage.** The syringe 112 589 00 72 00 for rinsing the oil cooler can be provided with a hose and can then be used for drawing off excess transmission fluid.

Actuate service brake when the upper dipstick mark is attained after adding oil. Leave selector lever in position R–N–4–N–R – for several seconds in each position – and move back to position "P", so that the working piston of the servo members is charged with oil. Then check oil level once again and make corrections, if required.

Revision: oil-filling capacities (*), table extended.

Tightening Torque	Nm	(kpm)
Fastening bolts of oil pan	7	(0,7)

Oil Type

Automatic transmission fluid (ATF) approved oil grades	Type B, Dexron B Refer to pertinent instructions page 236.4

Filling Capacity in Liters

Model	114.062 114.072	114.015 115.017 115.015 115.117 115.115 115.110	114.011 114.023 114.060 114.062 114.072 114.073 116.020 116.024 116.025
Transmission type	K 4 C 025	W 4 B 025	W 4 B 025
For refilling	5,5	6,1 *	6,6 *
For oil change	4,5	4,8 *	5,3 *

Oil Change Intervals

Oil change, filter change	every 45,000 km[1] (28,000 miles)

1) Vehicles running under aggravated conditions (i.e., taxis, vehicles operating predominantly in cities or mountainous regions, or towing trailers) require an additional oil change (without renewing filter) in-between.

Special Tools

Funnel	111 589 04 63 00
Syringe	112 589 00 72 00

Draining Oil and Replacing Filter

The following conditions must be met during an oil change: vehicle ready for driving on level ground, transmission at operating temperature, engine stopped.

Unscrew oil filler pipe (1) on oil pan (3) and permit oil to drain (Fig. 1).

Rotate crankshaft until oil drain plug (2) shows up and can be screwed out (Fig. 1).

When no more oil flows out of transmission and torque converter or hydraulic clutch, remove transmission oil pan and renew oil filter (4) (Fig. 2).

Mount oil pan and tighten fastening bolts to 7 Nm (0.7 kpm). Attach oil filler pipe.

Screw oil drain plug (2) into torque converter or hydraulic clutch, using a new sealing ring.

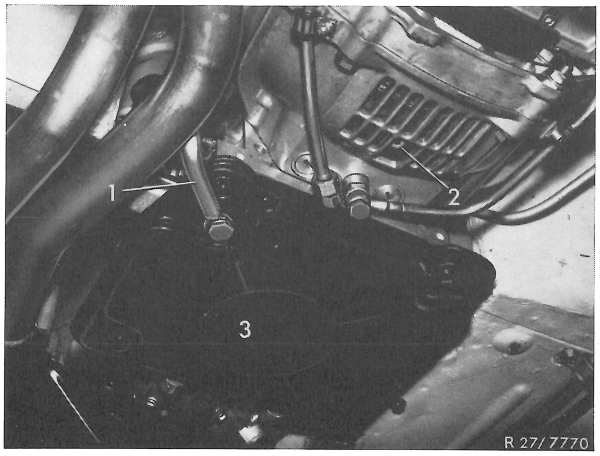


Fig. 1

1 Oil filler pipe
2 Drain plug
3 Oil pan

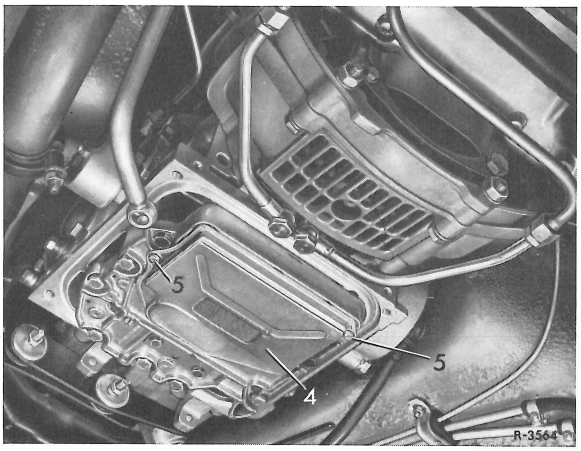


Fig. 2

4 Oil filter
5 Fastening bolts

Filling-in Oil

First, fill a major quantity of oil, (approx.4 lits.) of an approved automatic transmission fluid through a funnel with a fine-meshed strainer into tube for oil dipstick with the engine stopped. Start engine in selector lever position "P" and run at idling speed. Add remaining oil immediately.

Operate service brake and leave selector lever in each position for a few seconds. Then check oil level (refer to Job No. 27.3–010).

Caution! The oil level in the transmission will change with the oil temperature. The markings (max. and min.) on oil dipstick refer to an oil temperature of 80° C – normal operating temperature of transmission during operation. However, at an oil temperature of 20–30° C the max. oil level of transmission K 4 C 025 is at minimum mark, and that of transmission W 4 B 025 is 30 mm below minimum mark on oil dipstick. These data serve for orientation during an oil change, which is generally made at this oil temperature.

Revision: model 114/115 added.

Special Tool

Adjusting gauge	115 589 30 23 00

Note

All the adjusting jobs made below may be completed only with vehicle standing on its wheels.

Prior to adjusting control pressure rod, the linkage toward carburetor or venturi control unit, as well as idling speed, must be correctly set.

A. Adjusting Control Pressure Rod

Model 115.110, 115.115, 115.117

1 Turn rotary knob of cable control for idling speed adjustment completely to the right.

2 Disconnect elastic control linkage (1), control pressure rod (7) and pushrod (6) (Fig. 3).

3 Attach adjusting gauge (11) with idle speed detent (13) to intermediate lever (2) (Fig. 1).

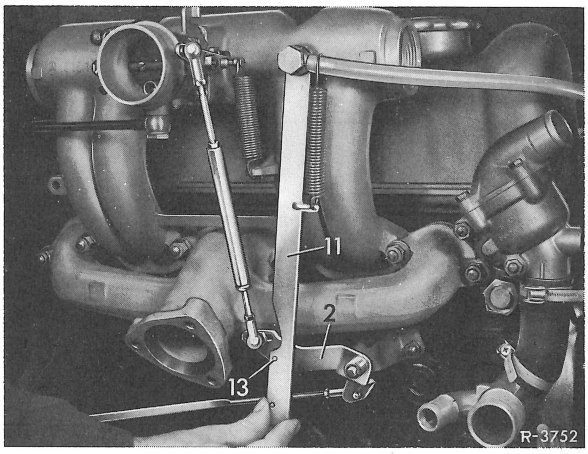


Fig. 1
2 Intermediate lever
11 Adjusting gauge
13 Idle speed detent

4 Attach elastic control linkage (1 in Fig. 3) for throttle valve free of tension.

Note: The elastic control linkage should be completely contracted and the throttle valve should rest against idle speed stop.

5 Push control pressure lever (8) by means of control pressure rod (7) toward the rear against idle speed stop while adjusting control pushrod lengthwise in such a manner that it can be attached free of tension (Fig. 3).

6 Attach pressure rod (6) and apply full throttle at accelerator pedal (9) (Fig. 3).

7 Adjusting gauge (11) should permit attachment to full throttle detent (12) free of tension (Fig. 2). If this is not attained, make adjustments at ball head of pushrod (6 in Fig. 3) or on regulating shaft on splash wall.

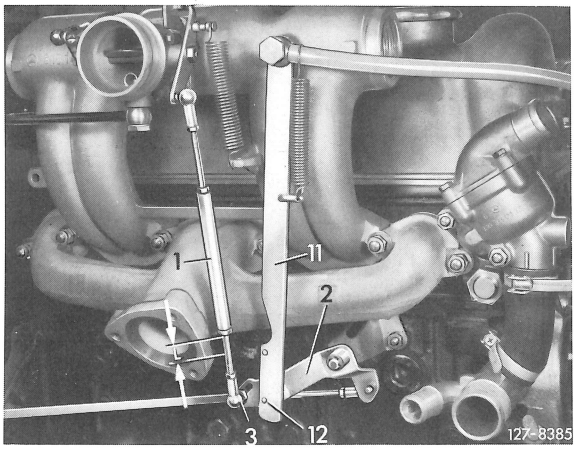


Fig. 2
1 Elastic control linkage
2 Intermediate lever
3 Ball head
11 Adjusting gauge
12 Full throttle detent
L Idle travel

8 When the adjusting gauge (11) is attached to full throttle detent (12), the elastic control linkage (1) should be pulled out another approx. 6 mm in addition to idle travel "L". This is obtained by shifting adjustable ball head (3) in oblong hole of intermediate lever (2) (Fig. 2).

9 Remove adjusting gauge.

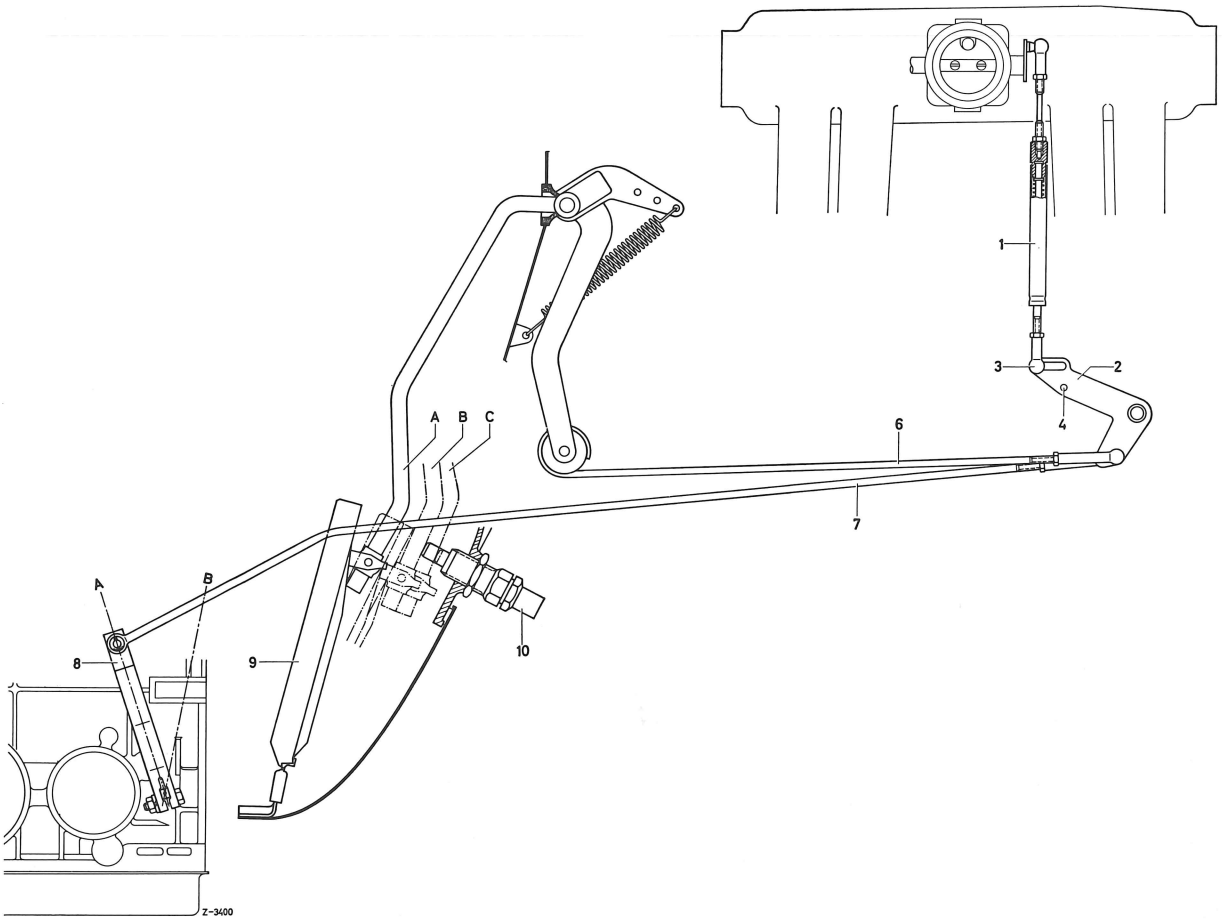


Fig. 3

1 Elastic control linkage
2 Intermediate lever
3 Ball head
4 Bore for adjusting gauge
6 Pressure rod
7 Control pressure rod
8 Control pressure lever
9 Accelerator pedal
10 Kickdown switch
A Idle position
B Full throttle position
C Kickdown position

Model 115.017, 115.015

1 Unscrew vacuum regulator on carburetor.

2 Switch off starting device, so that throttle valve rests against idle speed stop.

3 Disconnect control pressure rod (7).

4 Idle travel "L" on pressure rod (1) must be fully pulled out (Fig. 4), which can be attained, if required, by making adjustments on restoring lever of regulating shaft on splash wall.

5 Push control pressure rod (7) completely toward the rear against idle speed stop and adjust lengthwise on ball head (5) in such a manner that rod can be attached free of tension (Fig. 4).

6 Tighten counternut on ball head (5).

7 Screw back vacuum regulator.

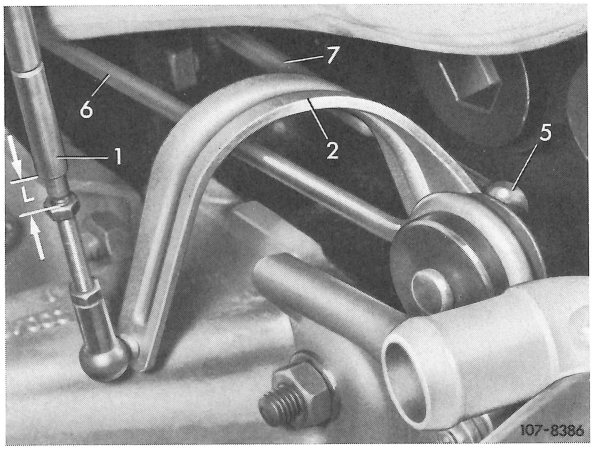


Fig. 4

1 Pressure rod
2 Intermediate lever
5 Ball socket
6 Pressure rod
7 Control pressure rod
L Idle travel

Note

On vehicles with four-point generator bracket and air-conditioning system, the ball socket (5 in Fig. 4) is poorly accessible. In such a case, adjustments are made on ball socket (9 in Fig. 5). Then check whether at full throttle on accelerator pedal the throttle valve rests against full load stop. If required, adjust restoring lever of regulating shaft on splash wall.

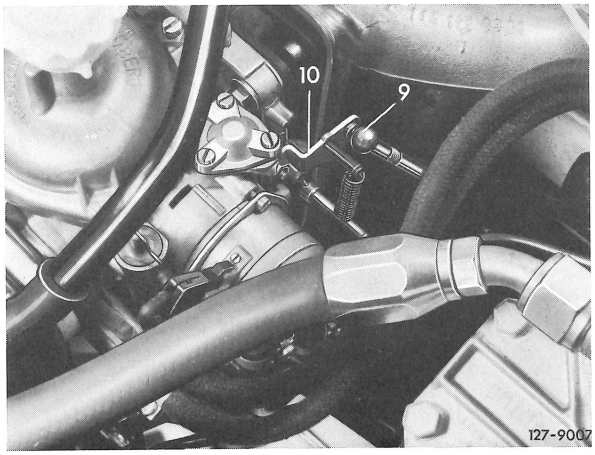


Fig. 5

9 Ball socket
10 Throttle valve lever

Model 114.011, 114.023

1 Disconnect connecting rod from front to rear carburetor.

2 Disconnect automatic starting device by opening starter valve with hand while simultaneously applying full throttle for a short moment.

3 Disconnect control pressure rod (7) and push toward the rear against idle throttle stop (Fig. 6).

4 Loosen the two clamping screws (4) on intermediate lever (2), turn adjusting lever (3) until ball head (11) can be attached free of tension, with idle travel on pressure rod (1) fully pulled out (Fig. 6).

5 Tighten clamping screws (4) again.

Note: If the adjusting path on adjusting lever (3) is inadequate, additional adjustments can be made on ball head (11).

27.3 Adjustment of Control Pressure Rod and Selector Rod

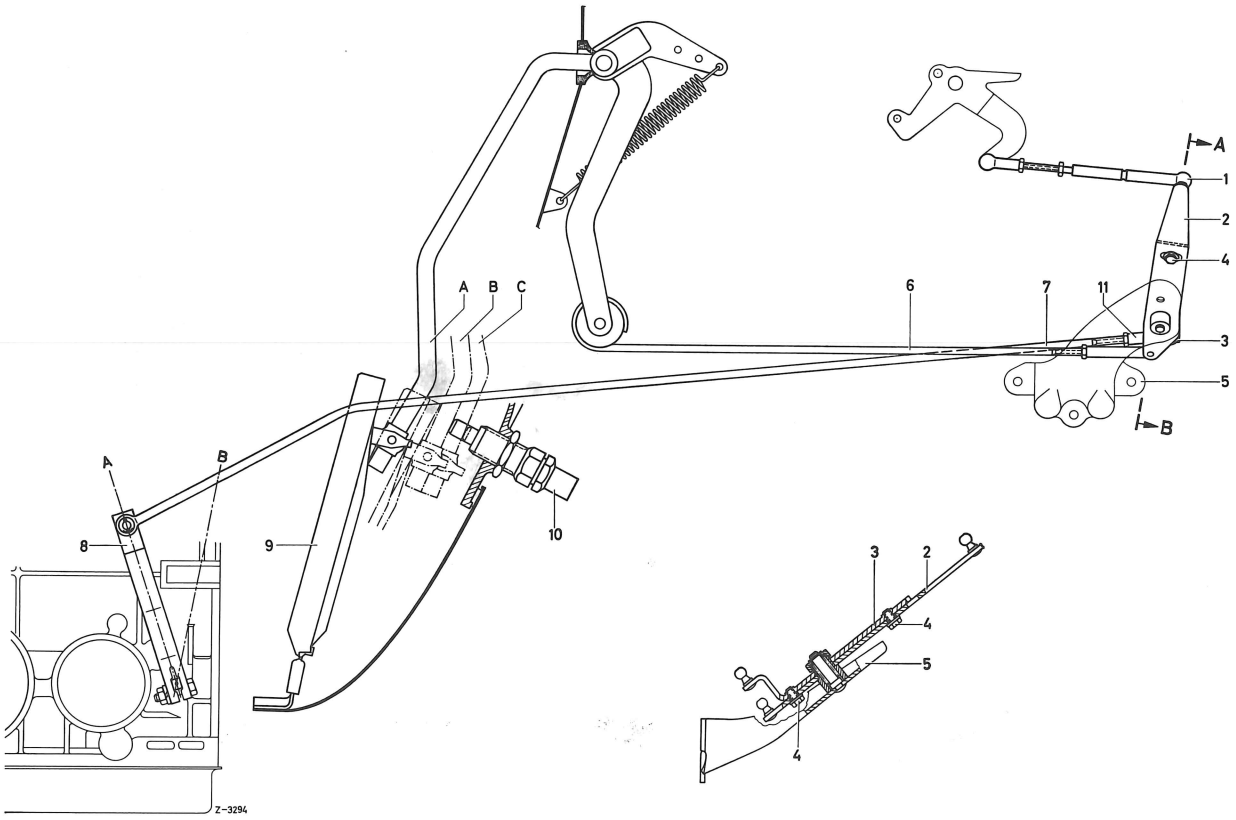


Fig. 6

1 Pressure rod
2 Intermediate lever
3 Adjusting lever
4 Clamping screw
5 Bearing bracket
6 Pressure rod
7 Control pressure rod
8 Lever-control pressure
9 Accelerator pedal
10 Kickdown switch
11 Ball head

A Idle position
B Full throttle position
C Kickdown position

Model 114.060, 114.062, 114.072, 114.073, 116.020, 116.024, 116.025

Disconnect control pressure rod (57), push angle lever (120) toward the rear (in direction of arrow Fig. 7). Push control pressure rod toward the rear against stop and adjust with ball socket (58) lengthwise to permit attachment free of tension. Tighten counter-nut (59) on ball socket (58).

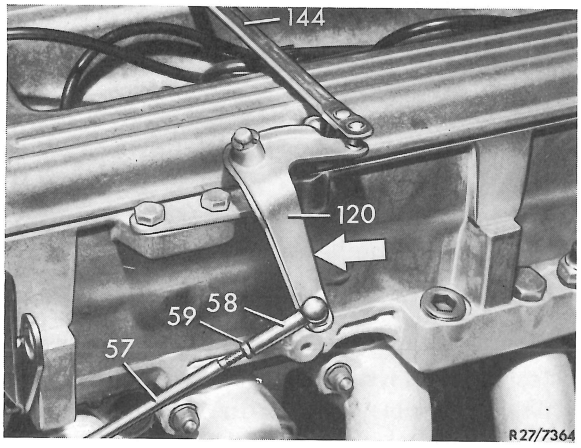


Fig. 7

57 Control pressure rod
58 Ball socket
59 Counternut
120 Angle lever
144 Connecting rod

B. Adjustment of Selector Rod — Floor Shift

All Types

Disconnect selector rod (5) on range selector lever (6). Set range selector lever (6) and selector lever (1) to "N", making sure that approx. 1 mm clearance is available between selector lever (1) and "N"-stop on gate plate. Adjust selector rod (5) lengthwise for attachment free of tension; then tighten counternut (4) again (Fig. 1).

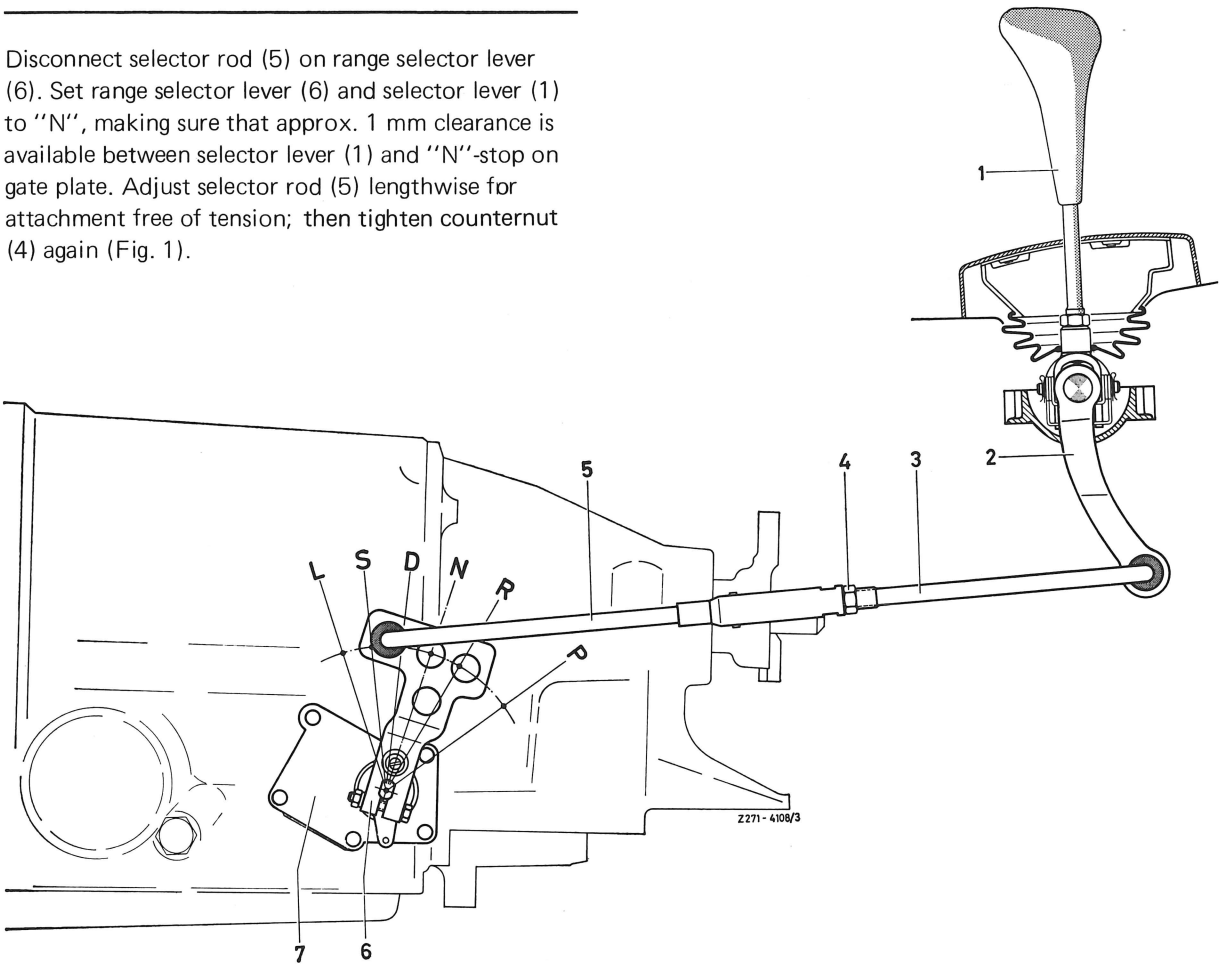


Fig. 1

1 Selector lever — top
2 Selector lever — bottom
3 Selector rod
4 Counternut
5 Selector rod
6 Range selector lever
7 Starter locking switch

C. Adjustment of Selector Rod — Steering Column Shift

Type 114/115

Loosen counternut on ball socket (2). Disconnect selector rod (1) on shift bracket, set range selector lever (7) on transmission and selector lever on steering wheel to position "N". Adjust selector rod lengthwise until ball socket is in alignment with ball head on intermediate lever (3). Attach ball socket to intermediate lever, making sure that clearance of selector lever in positions "D" and "S" is the same. Tighten counternut on ball socket.

Type 116

Loosen counternut (2) on rear selector rod (8) while applying counterhold with an open-end wrench on both recesses of front selector rod (1). Disconnect selector rod (8) on range selector lever (7). Set range selector lever (7) on transmission and selector lever on steering wheel to position "N". Adjust selector rod lengthwise until bearing journal is in alignment with bearing bushing in range selector lever. Attach rear selector rod on range selector lever and secure with SL-lock. Make sure that clearance of selector lever in position "D" and "S" is the same. Tighten counternut on rear selector rod and apply counterhold with an open-end wrench at the two recesses of front selector rod.

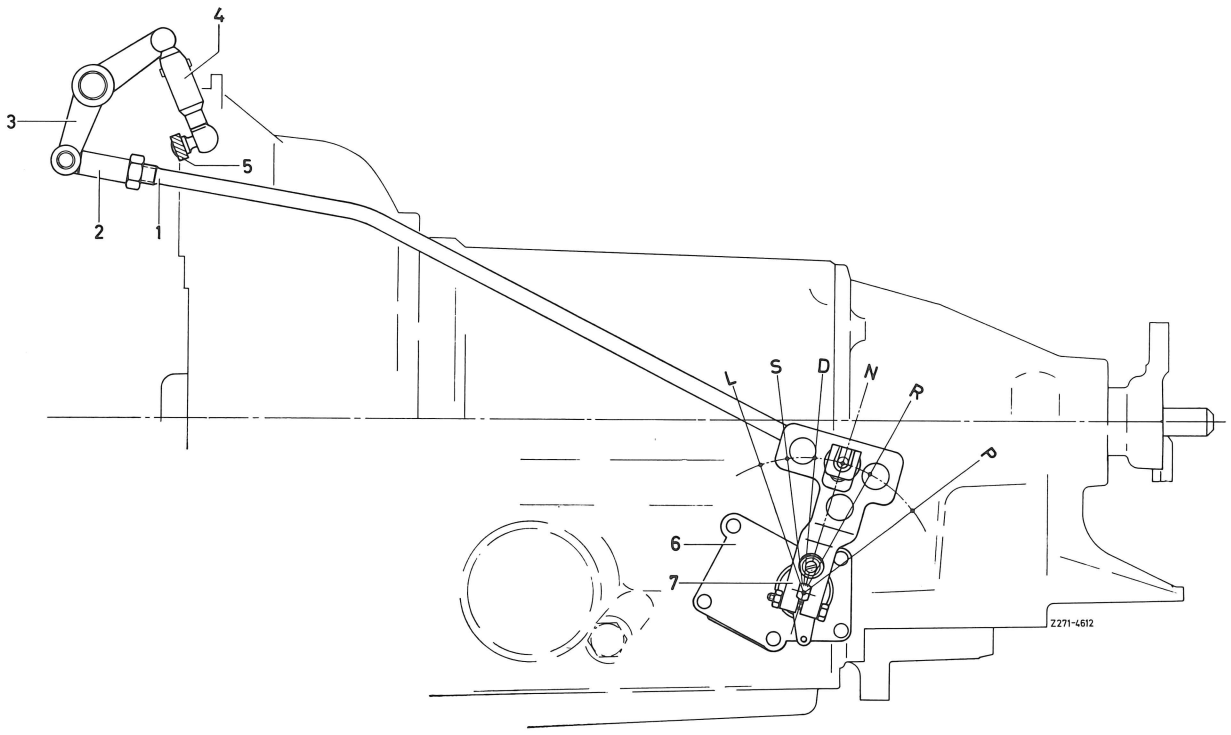


Fig. 1
Typ 114/115

1 Selector rod
2 Ball socket
3 Intermediate lever
4 Elastic intermediate piece
5 Bearing bracket
6 Starter locking and backup light switch
7 Range selector lever

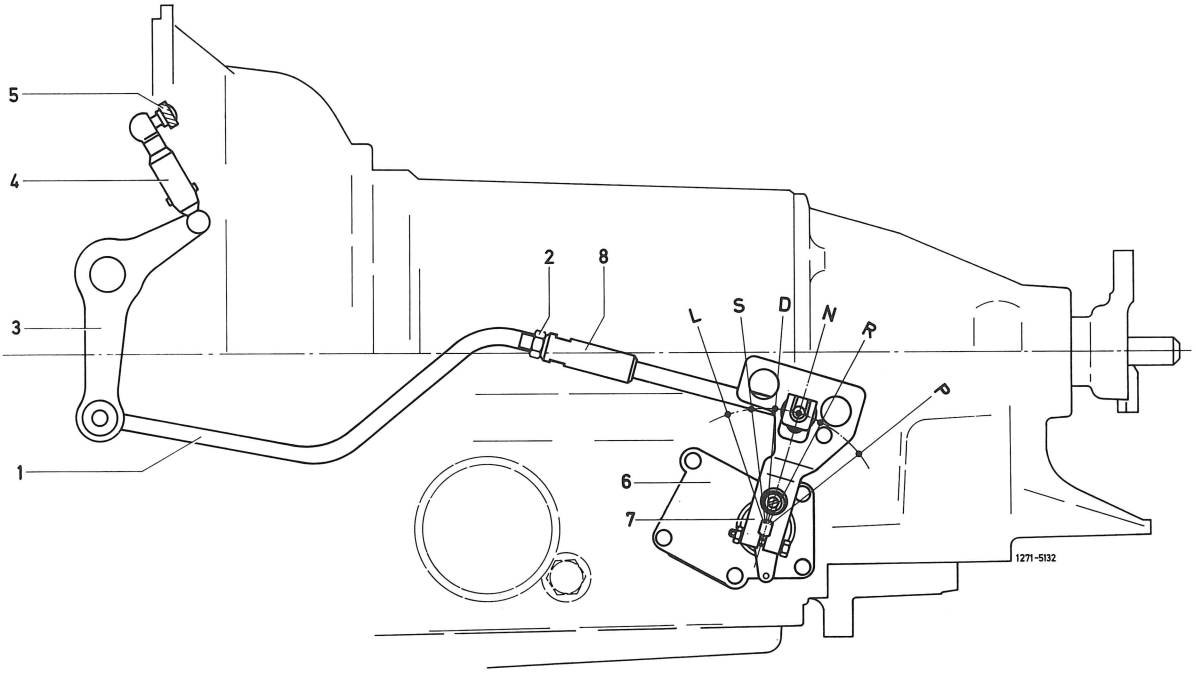


Fig. 2
Type 116

1 Front selector rod
2 Counternut
3 Intermediate lever
4 Elastic intermediate piece
5 Bearing bracket
6 Starter locking and backup light switch
7 Range selector lever
8 Rear selector rod

D. Adjustment of Selector Lever Indication

All Models

The selector lever indication is set in selector lever position "N". The Bowden wire (8) between shift tube and selector lever indication can be adjusted lengthwise on selector lever indicator by means of a knurled nut (9). For this purpose, loosen counternut (10) and tighten again following adjustment.

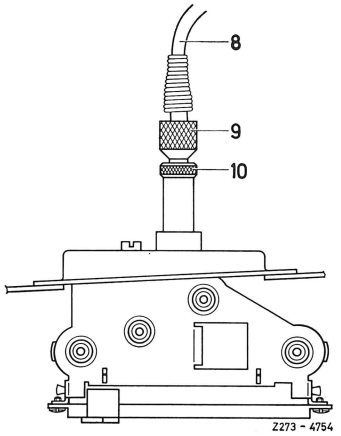


Fig. 1

8 Bowden wire
9 Knurled nut
10 Counternut

Adjustment of Starter Locking and Backup Light Switch and Kickdown Switch 27.3

Revision: new starter locking and backup light switch; adjusting instructions kickdown switch revised.

Special Tool

Locating pin	115 589 18 63 00

Adjusting Starter Locking and Backup Light Switch

1 Engage selector lever position "N" and disconnect selector rod on range selector lever (1).

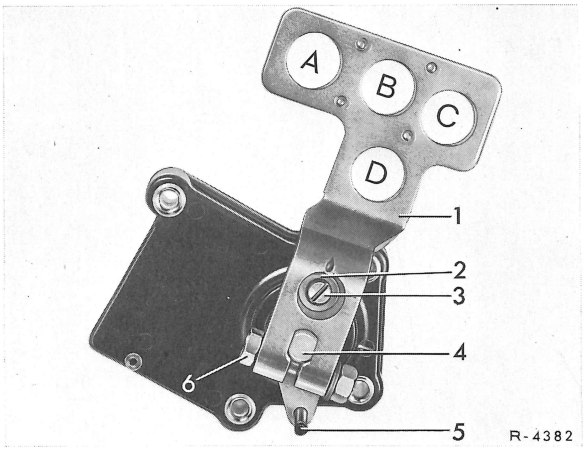


Fig. 1
1st version

1 Range selector lever
2 Washer
3 Adjusting screw
4 Shaft
5 Locating pin
6 Clamping screw

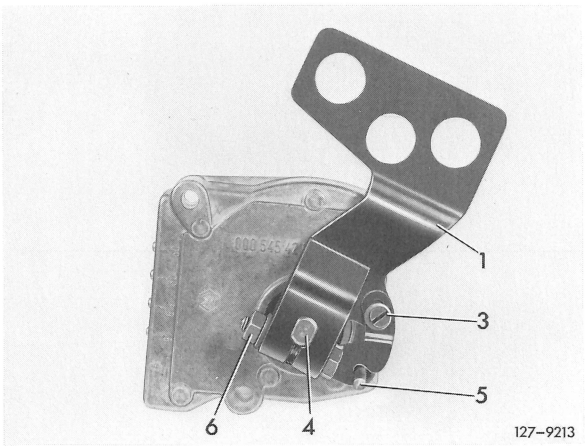


Fig. 2
2nd version

1 Range selector lever
3 Adjusting screw
4 Shaft
5 Locating pin
6 Clamping screw

2 Loosen adjusting screw (3) and introduce locating pin (5) through driver in locating bore in shift housing (Fig. 1).

3 Tighten adjusting screw (3) and remove locating pin.

4 Attach selector lever and secure with SL-lock. Then check whether engine can be started in position "N" and "P".

Adjusting Kickdown Switch

1 Push accelerator pedal (1) against kickdown end stop (C) from inside vehicle (Fig. 3).

2 In this position, throttle valve should rest against full load stop.

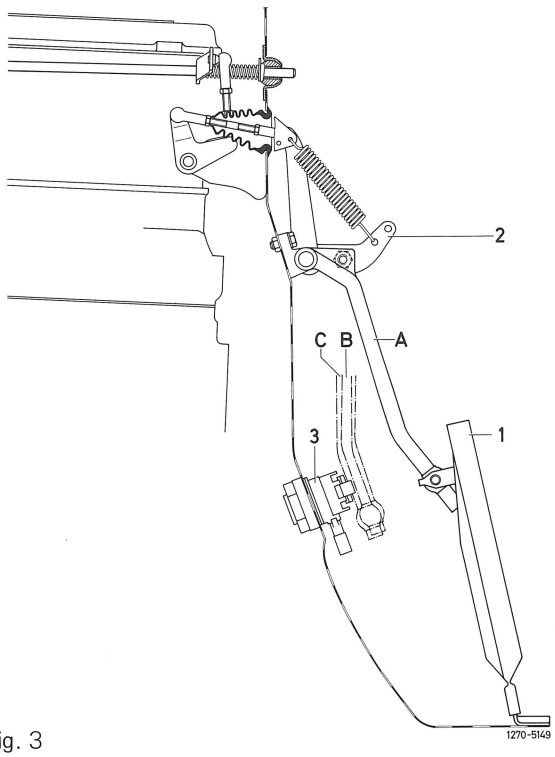


Fig. 3

1 Accelerator pedal
2 Angle lever
3 Kickdown switch
A Idle position
B Full throttle position
C Kickdown position

27.3 Adjustment of Starter Locking and Backup Light Switch and Kickdown Switch

3 Adjustments are made by loosening clamping screw on angle lever (2) and turning angle lever (Fig. 3).

4 Tighten clamping screw again.

Note: The layout shown in Fig. 2 applies to models 114 with engine M 110 and all models 116. On all other models, adjustments are made by means of restoring lever on splash wall (arrow in Fig. 4).

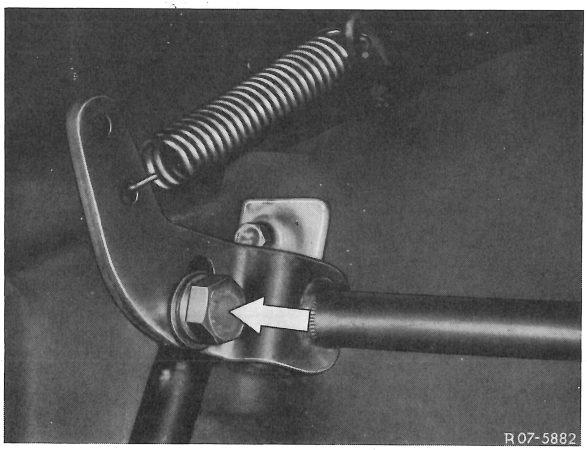


Fig. 4

Checkup of Torque Converter Stalling Speed 27.3

Data

Model	Stalling speed/min.	Torque converter dia.
115.110	1400	
115.115	1450	
115.117	1500	
115.010	1600	
115.017	1880	
114.015	1740	270
114.011 114.023	2000	
114.060 114.073 116.020	1950	
114.062 114.072 116.024 116.025	2050	

Special Tool

Revolution counter

Caution! During this checkup, the entire output of the engine in torque converter is converted into heat, and for this reason the checkup should **not last longer than 5 seconds.** Make sure that rear wheels are not rotating during this test.

Also observe the following: To check stalling speed and easy running of impeller, a prerequisite is that the engine is at operating speed and in order, i.e., the full engine output must be available. In addition, auxiliary units such as the refrigerant compressor for the air-conditioning system must be disengaged.

Do not make test with installed vehicle revolution counters.

Checking of Stalling Speed

1 Connect revolution counter for reading from driver's seat.

2 Run engine prior to test for approx. 2 minutes at about 2,000/min.

3 Tighten parking brake and actuate service brake with left foot.

4 Engage selector lever position "D", apply full throttle with right foot, so that the specified stalling speed is attained.

Note: The measured stalling speed may vary by approx. 100/min. up or down.

If the stalling speed drops by approx. 300 to 600/min below specified value, the free wheel in torque converter is slipping.

If the stalling speed is higher by more than 300/min. than specified, slip in transmission is responsible.

K 4 C 025
W 4 B 025

Notes

The test methods described below are used to check the normal functions of the automatic transmission. Judging the operation and troubles, if any, of transmission obviously requires experience in handling automatic transmissions. Without such experience it will be of advantage to use another automatic transmission in good order and of the same design for making comparisons. If the test shows irregular functions, reference to a system of **"Programmed Repairs"** will assist in finding the causes of such faults.

Prior to starting these checkups, be sure to check the oil level, the engine idling speed, adjustment of selector rod of control pressure linkage and kickdown switch first.

An example for checking the shifting sequence, partially while influencing the accelerator pedal and the selector lever, with the assistance of a pertinent program follows.

K 4 C 025

Starting at Part Throttle

Set selector lever to position "D", transmission is in 2nd gear. Slowly accelerate vehicle at part throttle. Transmission will start in 1st gear, at approx. 10 km/h will shift to 2nd gear, at approx. 30 km/h to 3rd gear and at approx. 45 km/h to 4th gear.

Shifting Down with Kickdown

In selector lever position "D" accelerate vehicle while maintaining accelerator pedal position up to 50 km/h, then apply kickdown; transmission will shift back to 3rd speed.

Shifting Up with Full Throttle

Return accelerator pedal to "full throttle" and accelerate. Shifting up from 3rd to 4th speed occurs at 135 km/h.

Deceleration Shifts

Accelerator pedal in idling speed position.

Decelerate vehicle to approx. 80 km/h and move selector lever into position "S" (shifting down to 3rd speed. Time up to begin of shift: approx. 1 sec. max.). Following a deceleration to approx. 50 km/h, raise selector lever slightly and move into position "L" (shifting down to 2nd speed, time up to begin of shift: approx. 1 sec. max.). Shifting down is effected under increased engine speed and a clearly shown decelerating effect on vehicle.

Accelerations with Kickdown

At a driving speed of approx. 25 km/h move selector lever again to position "D"; the transmission shifts to 3rd speed. Apply kickdown and hold pedal in kickdown position; the transmission will shift back to 2nd speed for acceleration, shifting up to 3rd speed occurs at 60 km/h.

Checkup of Parking Locks and Reverse Speed Lock

Above approx. 15 km/h no shifting to selector lever positions "P" and "R" should be possible.

Starting at Full Throttle and Accelerating

Apply full throttle in selector lever position "D" and maintain full throttle position. Vehicle will start from stop in 1st speed and will shift to 2nd speed at approx. 25 km/h. Keep accelerator pedal in full throttle position and wait for the up-shift from 2nd to 3rd speed at 60 km/h. Decelerate vehicle up to stop.

27.3 Checkups during Test Drive

Starting in Selector Lever Position "L"

Engage selector lever position "L" and start at part throttle. Vehicle will start from stop in 1st speed and will shift to 2nd at approx. 40 km/h. Decelerate to approx. 7 km/h. During acceleration, the transmission should shift down to 1st speed. Wait for shifting up to 2nd speed, then decelerate vehicle up to stop; transmission remains in 2nd speed.

Shifting Down at Part to Full Throttle

Decelerate vehicle in selector lever position "D" to approx. 40 km/h, then apply full throttle; transmission will shift down to 3rd speed for acceleration. Move selector lever to position "S" and decelerate vehicle to approx. 32 km/h, then apply full throttle; transmission will shift down to 2nd speed for acceleration.

Move selector lever to position "L" and decelerate vehicle to approx. 12 km/h, then apply full throttle; transmission will shift down to 1st gear for acceleration.

Driving in Reverse

Check transmission while driving in reverse. Move selector lever to position "R", accelerate vehicle quickly while backing up and decelerate again.

W 4 B 025

Starting at Part Throttle

Set selector lever to position "D", transmission is in 2nd gear. Slowly accelerate vehicle at part throttle. Transmission will start in 2nd gear, at approx. 30 km/h will shift to 3rd gear and at approx. 50 km/h to 4th gear.

Shifting Down with Kickdown

While maintaining accelerator pedal position, accelerate vehicle up to approx. 70 km/h, then apply kickdown. Transmission will shift back to 3rd gear.

Shifting Up with Full Throttle

Return accelerator pedal to "full throttle" and accelerate. Shifting up from 3rd to 4th speed occurs at 130 km/h.

Deceleration Shifts

Accelerator pedal in idling speed position.

Decelerate vehicle to approx. 80 km/h and move selector lever into position "S" (shifting down to 3rd speed. Time up to begin of shift: approx. 1 sec. max.).

Following a deceleration to approx. 50 km/h, raise selector lever slightly and move into position "L" (shifting down to 2nd speed, time up to begin of shift: approx. 1 sec. max.). Shifting down is effected under increased engine speed and a clearly shown decelerating effect on vehicle.

Accelerations with Kickdown

At a driving speed of approx. 25 km/h move selector lever again to position "D"; the transmission shifts to 3rd speed. Apply kickdown and hold pedal in kickdown position; the transmission will shift back to 2nd speed for acceleration, shifting up to 3rd speed occurs at 60 km/h.

Checkup of Parking Locks and Reverse Speed Lock

Above approx. 15 km/h no shifting to selector lever positions "P" and "R" should be possible.

Starting at Kickdown and Accelerating

Apply full throttle in selector lever position "D" and maintain full throttle position. Vehicle will start from stop in 1st speed and will shift to 2nd speed at approx. 35 km/h. Keep accelerator pedal in kickdown position and wait for the up-shift from 2nd to 3rd speed at 63 km/h. Decelerate vehicle up to stop.

Revision: on Tables, Models added to Shifting Points.

Starting in selector lever position "L"

Move engine selector lever to position "L" and start at part throttle. Vehicle will start from stop in 1st speed and will shift to 2nd at approx. 40 km/h. Decelerate to approx. 8 km/h. During acceleration, the transmission should shift down to 1st speed. Wait for shifting up to 2nd speed, then decelerate vehicle up to stop; transmission remains in 2nd speed.

Shifting-down at Part to Full Throttle

Decelerate vehicle in selector lever position "D" to approx. 40 km/h, then apply full throttle; transmission will shift down to 3rd speed for acceleration. Move selector lever to position "S" and decelerate vehicle to approx. 32 km/h, then apply full throttle; transmission will shift down to 2nd speed for acceleration.

Move selector lever to position "L" and decelerate vehicle to approx. 12 km/h, then apply full throttle; transmission will shift down to first gear for acceleration.

Driving in Reverse

Check transmission while driving in the reverse. Move selector lever to position "R", accelerate vehicle quickly while backing up and decelerate again.

Shifting-up at **part throttle** should be noticed only when listening carefully. At **full throttle** and **kick-down** the gear changes are clearly heard, but the new gear speed should obtain a smooth hold and the impression of an energetically pulling engine should remain. Sudden revving-up of the engine when shifting-up, for example, indicates the slipping of a servo-member (brake band or clutch) and should be checked.

Automatic **downshifts without applying the throttle** occur at very low speeds and will be heard only when listening very carefully (speed increase of engine). On the other hand, **downshifts under kickdown** are coupled with a clearly felt shifting impulse in addition to an increase in engine speed. At certain speed ranges a downshift under part to full throttle is possible.

Downshifts with the selector lever are either downshifts while applying the throttle (e.g., uphill) or decelerating shifts without applying throttle (e.g., downhill or when decelerating). Downshifts while applying the throttle require only a few fractions of a second for changing gears, while decelerating shifts without applying the throttle require from 1 to 2 seconds.

During the checkup, make sure that the transmission, particularly under load, is not constantly shifting. During the shifting, the servo-members develop considerable heat and pertinent dispersal requires some time. A **reference value** is: **repeat a gear shift under load only max. once within 15 seconds.**

27.3 Check-up during Test Drive

Shifting Points

Vehicle model		114.062 114.072		114.011 114.062 116.020 114.015 114.072 116.024 114.023 114.073 116.025 114.060 115.017	
Transmission type		K 4 C 025		W 4 B 025	
Accelerator pedal position	gearshift	▲ km/h	▼ km/h	▲ km/h	▼ km/h
Selector Lever Position "D"					
Idle	1–2–1	10	7	–	–
	2–3–2	30	22	28	20
	3–4–3	47	34	47	35
Full throttle	1–2–1	28	7	–	–
	2–3–2	60	22	63	20
	3–4–3	131	57	131	57
Kickdown	1–2–1	32	20	35	22
	2–3–2	60	48	63	47
	3–4–3	131	114	131	114
Selector Lever Position "S"					
Idle	1–2–1	10	7	–	–
	2–3–2	37	32	33	26
Full throttle	1–2–1	28	7	–	–
	2–3–2	78	37	78	32
Kickdown	1–2–1	32	20	35	22
	2–3–2	78	68	78	65
Selector Lever Position "L"					
Idle	1–2–1	40	7	41	8
Full throttle	1–2–1	40	20	41	22
Kickdown	1–2–1	40	34	41	35

Symbols: ▲ = upshift
▼ = downshift

All speeds are approximate.

Shifting Points

Vehicle model		115.015		115.117		115.110 115.115	
Transmission type		W 4 B 025		W 4 B 025		W 4 B 025	
Accelerator pedal position	gearshift	▲ km/h	▼ km/h	▲ km/h	▼ km/h	▲ km/h	▼ km/h
Selector Lever Position "D"							
Idle	1–2–1	–	–	–	–	–	–
	2–3–2	26	18	28	20	26	19
	3–4–3	42	32	41	34	39	32
Full throttle	1–2–1	–	–	–	–	–	–
	2–3–2	59	18	53	33	50	31
	3–4–3	113	49	93	57	88	54
Kickdown	1–2–1	32	17	31	20	29	19
	2–3–2	59	45	53	46	50	44
	3–4–3	113	98	93	81	88	77
Selector Lever Position "S"							
Idle	1–2–1	–	–	–	–	–	–
	2–3–2	29	22	28	20	26	19
Full throttle	1–2–1	–	–	–	–	–	–
	2–3–2	67	25	53	33	50	31
Kickdown	1–2–1	32	17	31	20	29	19
	2–3–2	67	55	53	46	50	44
Selector Lever Position "L"							
Idle	1–2–1	36	7	33	8	31	7
Full throttle	1–2–1	36	22	33	18	31	17
Kickdown	1–2–1	36	32	33	30	31	28

Symbols: ▲ = upshift
▼ = downshift

All speeds are approximate.

K 4 C 025
W 4 B 025

Special Tool

Tester	116 589 15 21 00

The automatic transmission carries three test connections, so that with the assistance of the tester the three most important oil pressures (modulating pressure, working pressure, regulating pressure) can be measured.

The pressure gauge is suitably connected in such a manner that it can be read from the passenger seat during the test drive. Checking the working pressure requires a pressure gauge with a scale value up to 25 atü.

Connection of Tester

The tester is attached to the instrument panel of the vehicle. The pressure gauges are connected to their measuring points as usual by means of pressure hoses guided through the window of the righthand driver's door. The pressure hoses are held in position by the window. Make sure that the hoses are neither too slack nor resting against exhaust pipe.

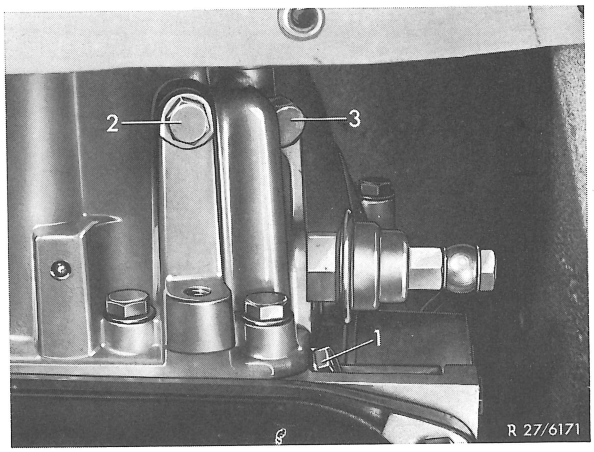


Fig. 1

1 Modulating pressure
2 Working pressure
3 Regulating pressure

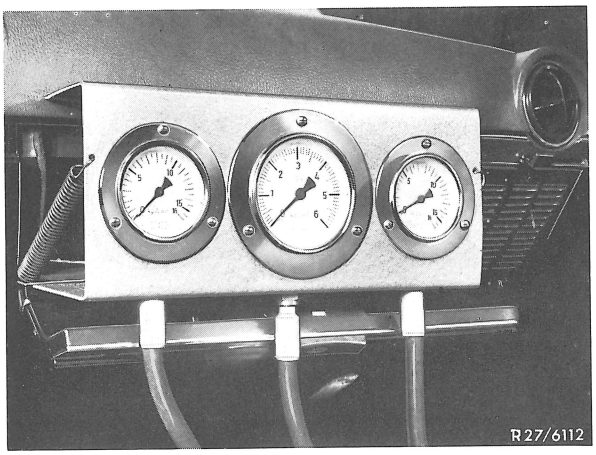


Fig. 2

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Revision: pressure data extended.

takes off in second

W 4 B 025 Nominal Pressures in bar (kp/cm²)

Vehicle model		116.024 116.025 114.062 114.072	116.020 114.060 114.073	114.011 114.023	114.015
Modulating pressure	in position "D"		3.7 [1] (3.8) [1]	6.2 [2] (6.3) [2]	
Working pressure	in position "L"	–	–	–	–
	in position "S"	6.3 ± 0.4 [1] (6.4 ± 0.4) [1]	6.2 ± 0.4 [1] (6.3 ± 0.4) [1]	5.7 ± 0.2 [1] (5.8 ± 0.2) [1]	6.3 ± 0.2 [1] (6.4 ± 0.2) [1]
	in position "D"	10.5 ± 0.4 [2] (10.7 ± 0.4) [2]	10.4 ± 0.4 [2] (10.6 ± 0.4) [2]	9.5 ± 0.3 [2] (9.7 ± 0.3) [2]	10.5 ± 0.4 [2] (10.7 ± 0.4) [2]
	reverse speed	17.6 (18) and above [2]			

Vehicle model		115.017	115.015	115.117	115.110 115.115
Modulating pressure	in position "D"	3.7 [1] (3.8) [1]	6.2 [2] (6.3) [2]	2.7 [3] (2.8) [3]	4.7 [4] (4.8) [4]
Working pressure	in position "L"	–	–	13.4 ± 0.6 [2] (13.6 ± 0.6) [2]	12.6 ± 0.5 [2] (12.8 ± 0.5) [2]
	in position "S"	6.2 ± 0.2 [1] (6.3 ± 0.2) [1]	5.5 ± 0.2 [1] (5.6 ± 0.2) [1]	5.1 ± 0.2 [1] (5.2 ± 0.2) [1]	4.6 ± 0.2 [1] (4.7 ± 0.2) [1]
	in position "D"	10.0 ± 0.3 [2] (10.2 ± 0.3) [2]	9.2 ± 0.3 [2] (9.4 ± 0.3) [2]	8.5 ± 0.4 [2] (8.7 ± 0.4) [2]	8.0 ± 0.4 [2] (8.2 ± 0.4) [2]
	reverse speed	17.6 (18) and above [2]			

Vehicle model		114.060 114.073 Federal emission control model year 1974	114.060 114.073 California emission control and 115.015 Federal model year 1974
Modulating pressure	in position "D"	3.7 [1] (3.8) [1]	6.2 [2] (6.3) [2]
Working pressure	in position "L"	–	–
	in position "S"	5.7 ± 0.2 [1] (5.8 ± 0.2) [1]	5.9 ± 0.2 [1] (6.0 ± 0.2) [1]
	in position "D"	10.0 ± 0.4 [2] (10.1 ± 0.4) [2]	10.2 ± 0.4 [2] (10.3 ± 0.4) [2]
	reverse speed	17.6 (18) and above [2]	

1) Measured at 65 km/h with vacuum line connected under full throttle.
2) Measured stationary with vacuum line disconnected under full throttle, **not kickdown** (stalling speed).
3) Measured at 65 km/h at full throttle.
4) Measured stationary and at full throttle, **not kickdown** (stalling speed).
Caution! Due to extreme development of heat, maintain stalling speed max. **5 seconds**, while braking vehicle well by means of parking brake and service brake.

27.3 Measuring Nominal Pressures

W 4 B 025 Nominal Pressures in bar (kp/cm²)

Vehicle model		115.117		115.015 115.115 115.110	
Regulating pressure	20 km/h	0.6 ± 0.1	(0.6 ± 0.1)	0.6 ± 0.1	(0.6 ± 0.1)
	40 km/h	1.6 ± 0.1	(1.6 ± 0.1)	1.7 ± 0.1	(1.7 ± 0.1)
	60 km/h	2.4 ± 0.1	(2.4 ± 0.1)	2.5 ± 0.1	(2.5 ± 0.1)
	90 km/h	3.4 ± 0.2 2)	(3.5 ± 0.2) 2)	3.6 ± 0.2 2)	(3.7 ± 0.2) 2)
	120 km/h	4.9 ± 0.2 2)	(5.0 ± 0.2) 2)	5.3 ± 0.2 2)	(5.4 ± 0.2) 2)

Vehicle model		115.017 114.015 114.011 114.023 114.060 114.062 114.072 114.073	
Regulating pressure	20 km/h	0.6 ± 0.1	(0.6 ± 0.1)
	40 km/h	1.5 ± 0.1	(1.5 ± 0.1)
	60 km/h	2.3 ± 0.1	(2.3 ± 0.1)
	90 km/h	3.1 ± 0.2 2)	(3.2 ± 0.2) 2)
	120 km/h	4.4 ± 0.2 2)	(4.5 ± 0.2) 2)

K 4 C 025 Nominal Pressures in bar (kp/cm²)

Vehicle model			114.062	114.072
Modulating pressure		basic pressure	0.65 ± 0.1 1)	(0.65 ± 0.1) 1)
		max. pressure	3.7	(3.8)
Working pressure	1st and reverse speed	basic pressure	6.9 ± 0.4	(7.0 ± 0.4)
		max. pressure	13.8 ± 0.4	(14.1 ± 0.4)
	2nd speed pos. "2"	basic pressure	6.9 ± 0.4	(7.0 ± 0.4)
	2nd–4th speed	basic pressure	2.9 ± 0.2	(3.0 ± 0.2)
		max. pressure	6.0 ± 0.2	(6.1 ± 0.2)
Regulating pressure at		20 km/h	0.75 ± 0.1	(0.75 ± 0.1
		40 km/h	1.3 ± 0.1	(1.35 ± 0.1)
		60 km/h	2.1 ± 0.2	(2.1 ± 0.2)
		90 km/h	3.0 ± 0.2 2)	(3.1 ± 0.2) 2)
		120 km/h	4.4 ± 0.3 2)	(4.5 ± 0.3) 2)

1) This value is obtained only under decelerating conditions while coasting.
2) Can be measured at full throttle only.

Special Tool

Tester	116 589 15 21 00

Note

Prior to testing all the pressures, measure the modulating pressure and adjust, if required. This requires an accurately measuring oil pressure gauge (up to 0.05 bar (kp/cm^2), scale value 6 bar) or tester 116 589 15 21 00. When the modulating pressure is accurately adjusted, the working pressure will result by itself.

Measuring the Modulating Pressure K 4 C 025

Disconnect vacuum line, while counterholding at hexagon (SW 14) on vacuum box. Connect pressure gauge.

Run engine and rev up to approx. 1.500–2.000/min (rpm) by slightly moving accelerator pedal, while reading modulating pressure (max. pressure).

Measuring the Modulating Pressure W 4 B 025

Accelerate vehicle on dynamometer or on road in selector lever position "D" to approx. 65 km/h (with vacuum line connected). Apply full throttle while keeping speed to 65 km/h with left foot on service brake and read modulating pressure.

Caution! Be sure to check modulating pressure at 65 km/h, since only this pressure value can be accurately measured.

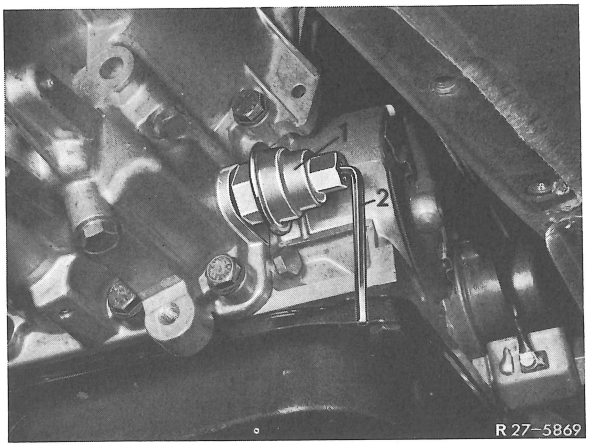


Fig. 1

1 Vacuum
2 Hexagon socket wrench

Adjusting the Modulating Pressure

The modulating pressure can be adjusted by means of a 4 mm hexagon socket wrench (2) applied to adjusting screw in vacuum box (1).

Reference value:

One revolution of adjusting screw provides a pressure change of approx. 0.2 bar (kp/cm^2).

Working Pressure

The working pressure is not adjustable and is automatically established with correctly adjusted modulating pressure. For checking, use pressure gauge with a scale value up to at least 25 bar (kp/cm^2).

Regulating pressure

The regulating pressure is a partial pressure of the working pressure and is set to the required value by the centrifugal regulator attached to the output shaft. The regulating pressure can never exceed the working pressure and for this reason the upper pressure values can be measured only while driving at full throttle.

Measuring the Regulating Pressure

Measuring requires an accurate oil pressure gauge with a scale rating up to 6 bar (kp/cm^2).

Drive vehicle on dynamometer or on road while comparing regulator pressure with values shown in Table.

If no regulator pressure is measured or if values are deviating, remove rear transmission housing cover and disassemble, clean regulator, and make operable.

Control Pressure

The control pressure is a partial pressure of the modulating pressure. It is mechanically controlled in dependence of the position of the accelerator pedal. If the linkage is correctly adjusted (for adjustments refer to Job No. 27.3–110), the control pressure will be arrived at automatically.

Removal and Installation of Shift Valve Housing 27.3

K 4 C 025
W 4 B 025

Tightening Torques in mkp	Nm	(kpm)
Hex. bolts for oil pan on transmission housing	7	(0.7)
Fastening bolts for oil filter on shift valve housing	4	(0.4)
Hex. bolts for shift valve housing on transmission housing	13	(1.3)

Special Tools	
1 Locating pin	self-made
2 Stud	self-made

Removal

1 Drain transmission fluid. For this purpose remove oil filler pipe from oil pan (Fig. 1).

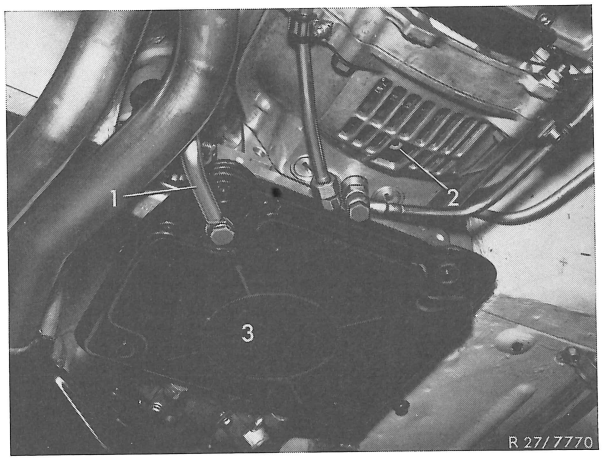


Fig. 1
1 Oil filler pipe
2 Oil drain plug
3 Oil pan

2 Unscrew four hex. bolts on oil pan and remove oil pan together with seal.

Caution! If the transmission fluid smells burned and if the oil pan holds abrasive matter, sludge or an abnormally large number of chips, **it is not enough** to replace the shift valve housing alone, but the entire transmission must be exchanged. The torque converter together with the oil lines and the oil cooler must be flushed clean and well.

3 Remove oil filter (Fig. 2).

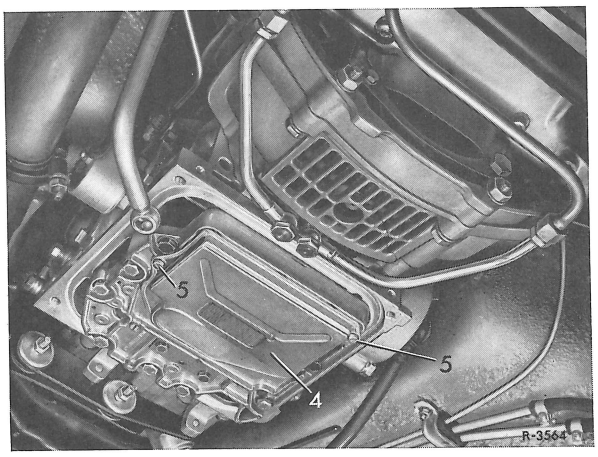


Fig. 2
4 Oil filter
5 Fastening bolts

27.3 Removal and Installation of Shift Valve Housing

4 Move selector lever in position "P". Unscrew fastening bolts (25) of shift valve housing (26) and remove shift valve housing (Fig. 3).

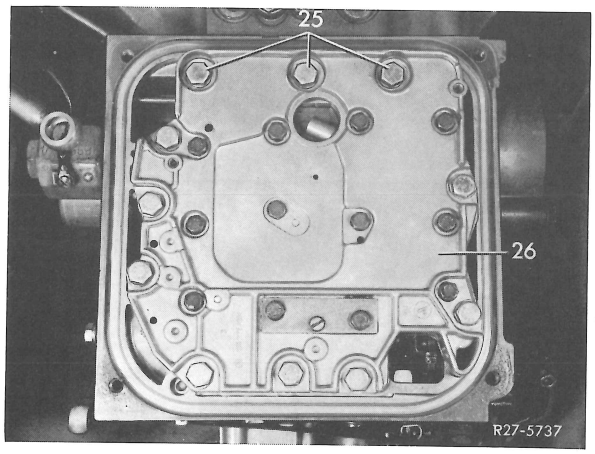


Fig. 3
25 Fastening bolts
26 Shift valve housing

5 Remove plug pipes with sealing bushings and pull sealing bushings (27) from plug pipes (Fig. 4).

Installation

6 Provide plug pipes on both sides with new sealing bushings (27) and insert in transmission. Screw two studs (30) into transmission housing (Fig. 4).

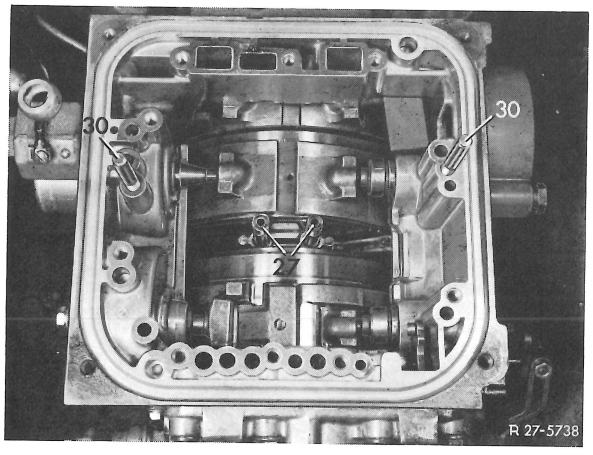


Fig. 4
27 Sealing bushings
30 Studs

7 Insert locating pin (12) for control pressure valve (13) into shift valve housing (Fig. 5).

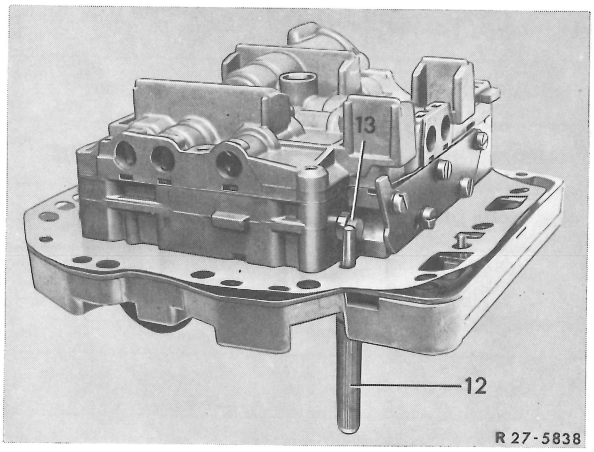


Fig. 5
12 Locating pin
13 Control pressure valve

8 Carefully introduce shift valve housing (26) into transmission. Make particularly sure that the range selector valve (28) enters correctly into the detent plate (29) (Fig. 6).

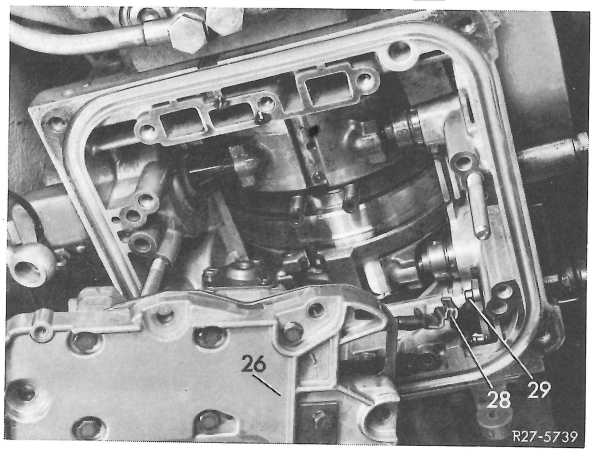


Fig. 6
26 Shift valve housing
28 Range selector valve
29 Detent plate

9 Screw-in fastening bolts (25) with spring washers and tighten to 13 Nm (1.3 kpm) (Fig. 3).

Caution! The fastening bolts of the shift valve housing are of different length.

10 Remove locating pin (12) (Fig. 5).

11 Install oil filter (Fig. 2).

12 Mount oil pan with new seal and tighten fastening bolts to 7 Nm (0.7 kpm) (Fig. 1).

13 Screw oil filler pipe to oil pan (Fig. 1).

14 Add transmission fluid. Complete oil level checkup according to Job. No. 27.3–010.

15 Check shift program during test drive (refer to Job No. 27.3–320).

16 Check oil level at operating temperature.

17 Retighten bolts on oil pan to 7 Nm (0.7 kpm).

Disassembly and Reassembly of Shift Valve Housing 27.3

1st : take off
2nd : take off

K 4 C 025
W 4 B 025

Tightening Torques	Nm	(kpm)
Hex. bolts shift valve housing top and bottom	8	(0.8)

Special Tools	
Assembly fixture	112 589 09 59 00

General directions

Observe particular cleanliness when working on shift valve housing. The work should be done as much as possible on a plastic surface. Do not use fuzzy cloth; leather would be best. Upon disassembly, wash all parts and blow out with compressed air.

K 4 C 025 1st take off

Disassembly

Caution! The shift valve housing has 10 ball valves, 8 of 5.5 mm dia. and 2 of 7 mm dia. Be sure that the balls are not rolling off during disassembly.

1 Loosen hex. bolts from bottom and screw out except for two opposite bolts (Fig. 1).

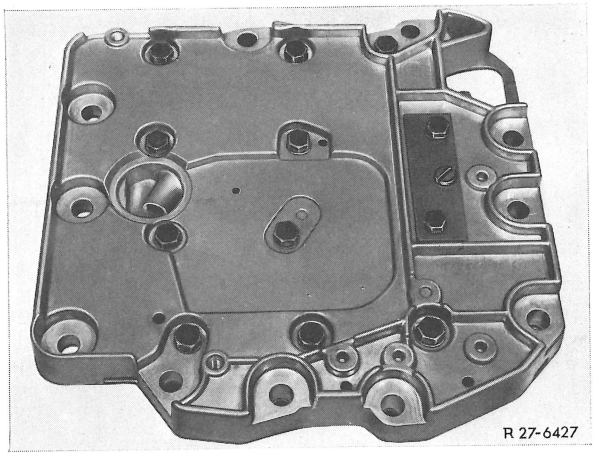


Fig. 1

2 Position shift valve housing on assembly fixture 112 589 09 59 00 (Fig. 2).

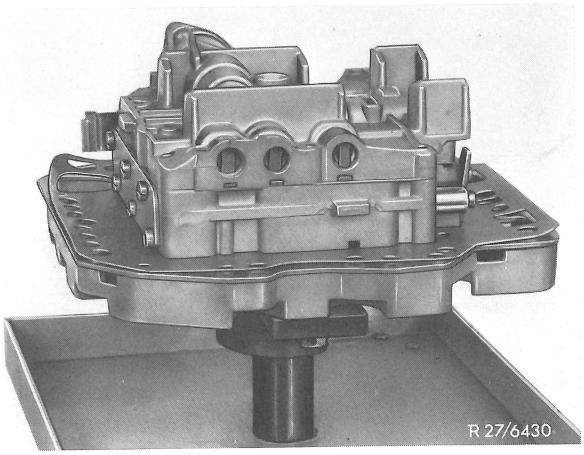


Fig. 2

3 Unscrew the two remaining hex. bolts from bottom and top (B) with intermediate plate (E) (Fig. 3).

4 Remove intermediate plate (E) and strainer filter (50) together with spring (Fig. 4).

27.3 Disassembly and Reassembly of Shift Valve Housing

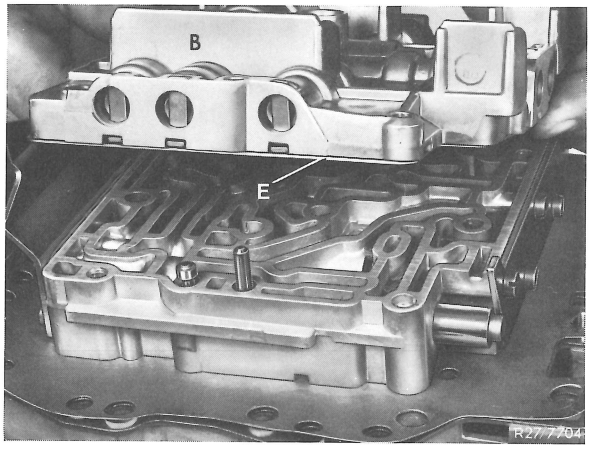


Fig. 3
B Top
E Intermediate plate

5 Remove two balls of 7 mm dia. (27 and 31) and one ball of 5.5 mm dia. (34) including spring from excess pressure valve modulating pressure from top (Fig. 4).

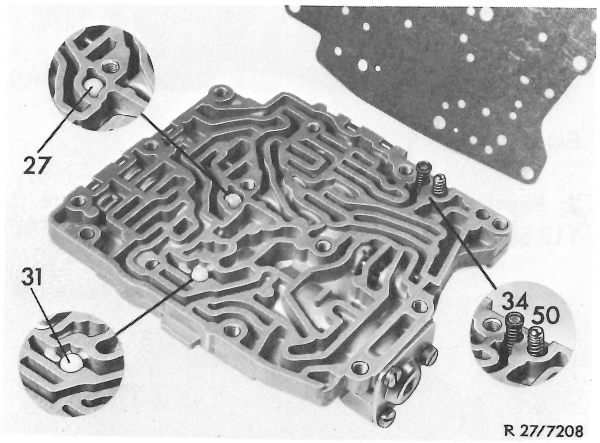


Fig. 4
27 Ball one-way throttle valve K 1
31 Ball one-way throttle valve K 2
34 Ball pressure relief valve modulating pressure with spring
50 Strainer filter with spring

6 Lift bottom from assembly fixture and remove the four balls of 5.5 mm dia. (10, 17, 22 and 26) by tilting (Fig. 11).

7 Remove ball of 5.5 mm dia. (16), piston brake shift (15) and check valve primary pump (24) incl. spring. Remove detent valve K 2 (26a) and shift valve releasing end B 2 (11) together with springs (Fig. 5).

8 Remove gasket (4) and intermediate plate (5) (Fig. 7).

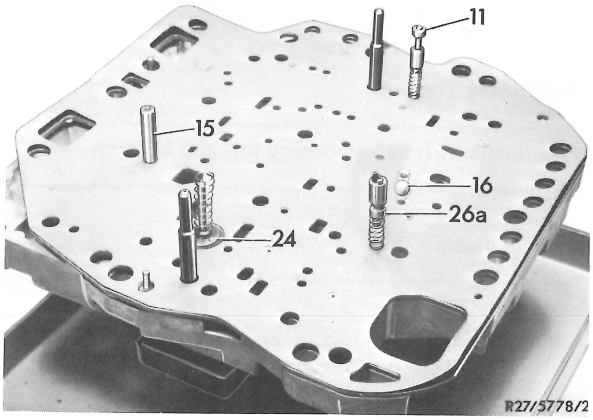


Fig. 5
11 Shift valve releasing end B 2
15 Piston brake shift
16 Ball 5.5 mm dia.
24 Check valve primary pump
26a Detent valve K 2

9 Remove lube pressure valve (37), one-way throttle valve B 3 (38) and one-way throttle valve releasing end B 2 (41) from oil distributing plate (C) (Fig. 6).

10 Take oil distributing plate from assembly fixture and remove the two balls of 5.5 mm dia. (39.40) by tilting (Fig. 6).

Assembly

11 Place oil distributing plate (C) on assembly fixture (Fig. 6).

12 Insert lube pressure valve (37), one-way throttle valve B 3 (38) and one-way throttle valve releasing end B 2 (41) in their seat in oil distributing plate (Fig. 6).

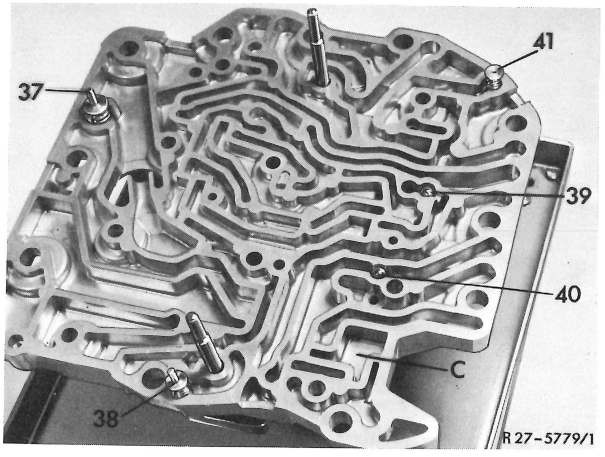


Fig. 6
C Oil distributing plate
37 Lube pressure valve
38 One-way throttle valve B 3
39 Ball 5.5 mm dia.
40 Ball 5.5 mm dia.
41 One-way throttle valve B 2

13 Place ball of 5.5 mm dia. (39) and ball of 5.5 mm dia. (40) into their countersunk seats (Fig. 6).

14 Place intermediate plate (F) with sealing ring (D) on oil distributing plate (C) and clamp down with holding clips (Fig. 7).

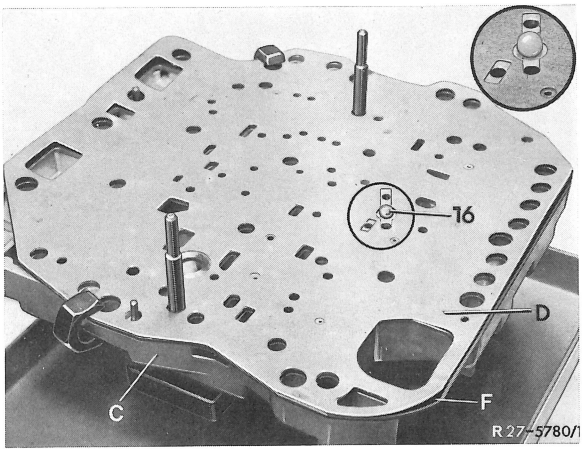


Fig. 7

C Oil distributing plate
D Gasket
F Intermediate plate
16 Ball 5.5 mm dia.

Caution! After clamping the gasket and the intermediate plate down, check the spring-loaded valves for easy operation by pushing down on valve. The valve retainers should not be squeezed in between the oil distributing plate and the intermediate plate.

15 Place ball of 5.5 mm dia. (16) on intermediate plate (F) (Fig. 7).

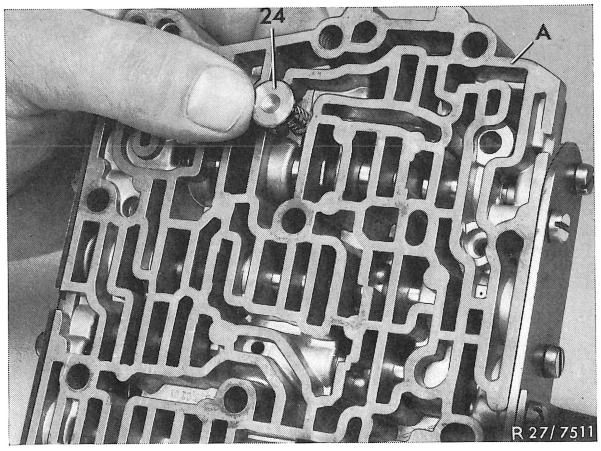


Fig. 8

A Bottom
24 Check valve primary pump

16 Introduce check valve primary pump (24) with spring from below into shift valve housing bottom (A) (Fig. 8).

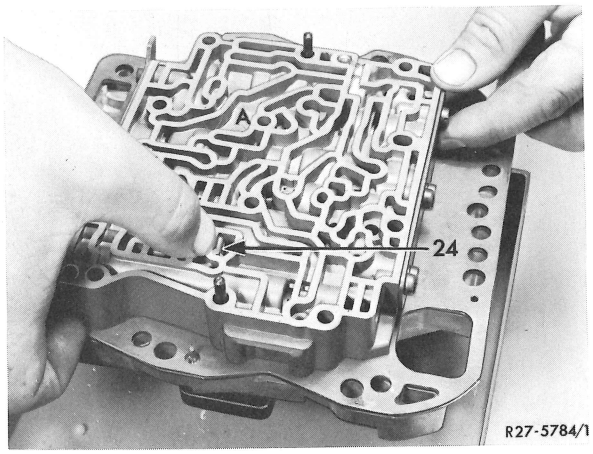


Fig. 9

A Bottom
24 Check valve primary pump

Cant valve stem projecting from above by pushing in lateral direction (Fig. 9).

17 Place bottom (A) on oil distributing plate and release valve stem; the valve should audibly knock against intermediate plate.

18 Insert piston brake shift 4–3 (15), as well as detent valve (26a) and shift valve releasing end B 2 (11) with spring (Fig. 10).

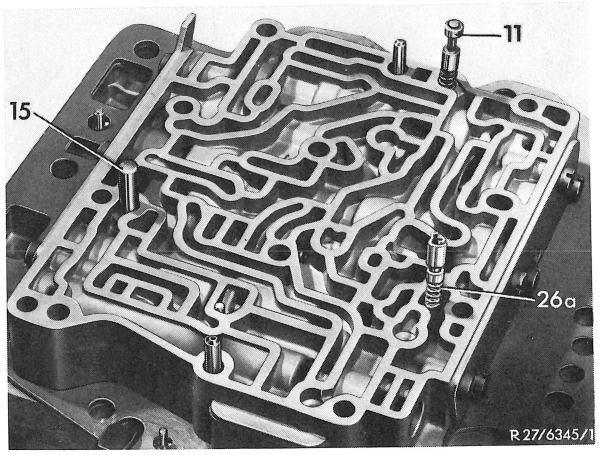


Fig. 10

11 Shift valve releasing end B 2
15 Piston brake shift 4–3
26a Detent valve K 2

27.3 Disassembly and Reassembly of Shift Valve Housing

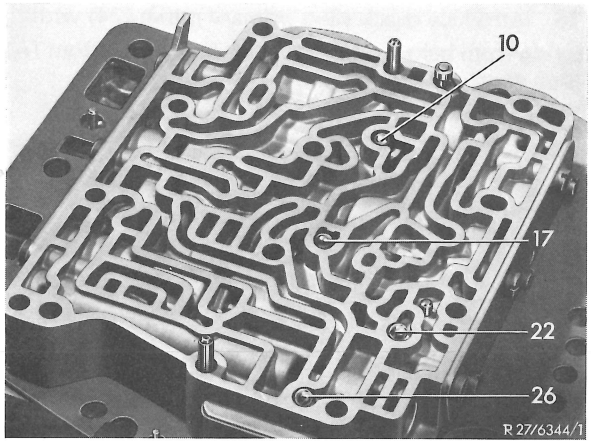


Fig. 11

10 Ball 5.5 mm dia.
17 Ball 5.5 mm dia.
22 Ball 5.5 mm dia.
26 Ball 5.5 mm dia.

19 Insert four balls of 5.5 mm dia. (10, 17, 22 and 26) into countersunk seats (Fig. 11).

Caution! The three compression springs of releasing valve B 2(11), detent valve K 2 (26a) and strainer filter (50) are uniform. The compression spring of modulating pressure valve (34) deviates in pressure.

Spring Table

Item	Wire dia.	Unloaded length
11	0.45	15.3
26 a	0.45	15.3
34	0.6	13.5
50	0.45	15.3

Top

20 Insert ball of 7 mm dia. (7) of one-way throttle valve K 1, ball of 7 mm dia. (8) of one-way throttle valve K 2 insert ball of 5.5 mm dia. (34) with spring, as well as strainer filter (50) with spring into top (B) (Fig. 12).

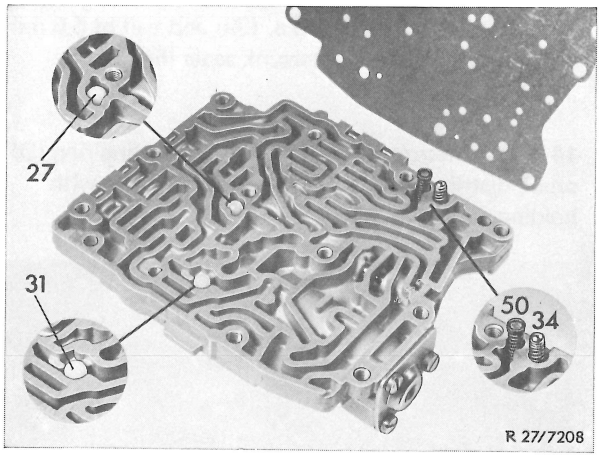


Fig. 12

27 Ball valve K 1
31 Ball valve K 2
34 Ball valve modulating pressure with spring
50 Strainer filter with spring

21 Place intermediate plate (E) on top (B), watching out for correct seat of spring-loaded ball (34) and strainer filter (50) (Fig. 12).

22 Hold intermediate plate (E) and top (B) tightly together, turn around and place on bottom (Fig. 13).

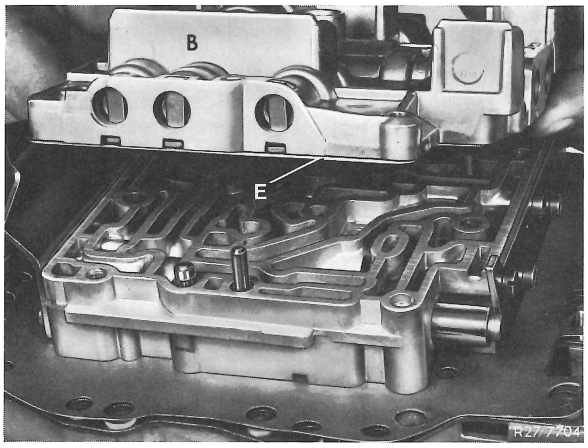


Fig. 13

B Top
E Intermediate plate

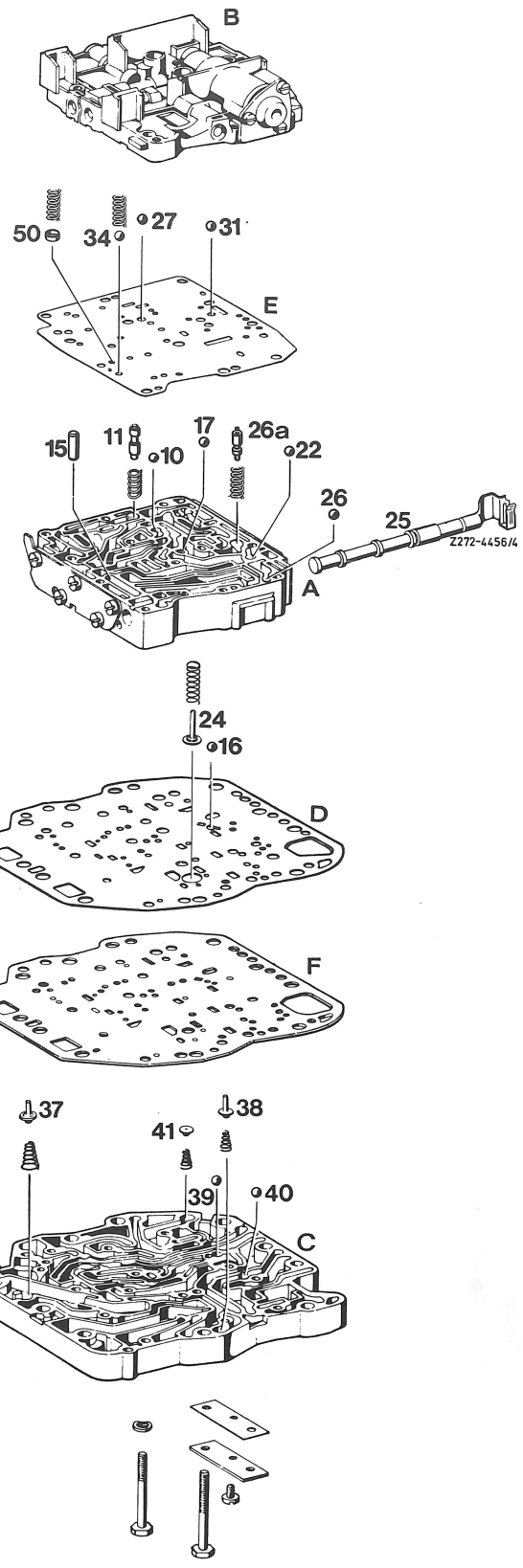
23 Insert two opposite bolts and tighten slightly.

24 Remove shift valve housing from assembly fixture, insert remaining bolts and tighten to 0.8 kpm from inside out (Fig. 1).

Caution! Two hex. bolts are longer; they are used to screw cover plate (29) down (Fig. 1).

Fig. 14

A	Shift valve housing bottom
B	Shift valve housing top
C	Oil distributing plate
D	Gasket
E	Small intermediate plate
F	Large intermediate plate
10	Two-way ball valve
11	Shift valve release end B 2
15	Piston brake shift 4–3
16	Ball-type check valve
17	Three-throttle ball valve
22	Two-way ball valve
24	Check valve – primary pump
25	Range selector valve
26	Two-way ball balve
26a	Detent valve K 2
27	One-way throttle valve K 1
31	One-way throttle valve K 2
34	Pressure relief valve modulating pressure
37	Lube pressure valve
38	One-way throttle valve B 3
39	Two-way ball valve
40	Two-way ball valve
41	One-way throttle valve B 2
50	Strainer filter



27.3 Disassembly and Reassembly of Shift Valve Housing

W 4 B 025

Disassembly

Caution! The shift valve housing has 12 ball valves, 10 of 5.5 mm dia. and 2 of 7 mm dia. Be sure that the balls are not rolling off during disassembly.

1 Loosen hex. bolts from bottom and screw out except for two opposite bolts (Fig. 1).

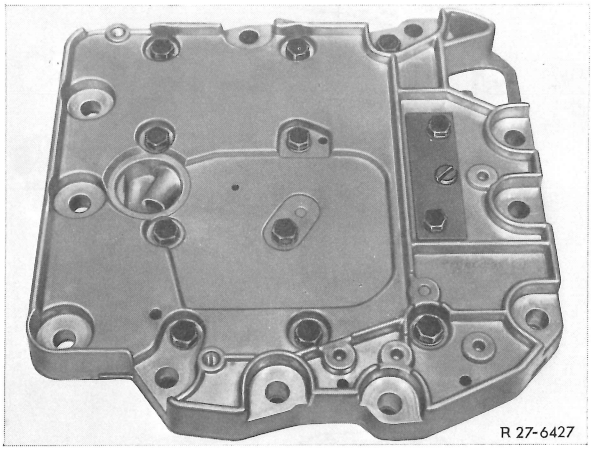


Fig. 1

2 Position shift valve housing on assembly fixture 112 589 09 59 00 (Fig. 2).

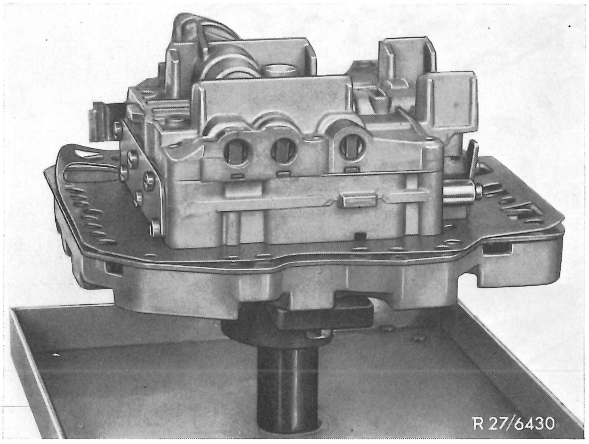


Fig. 2

3 Screw the two remaining hex. bolts out of bottom and lift-off top (B) together with intermediate plate (E) (Fig. 3).

4 Remove intermediate plate (E) and take out strainer filter (50) together with spring (Fig. 4).

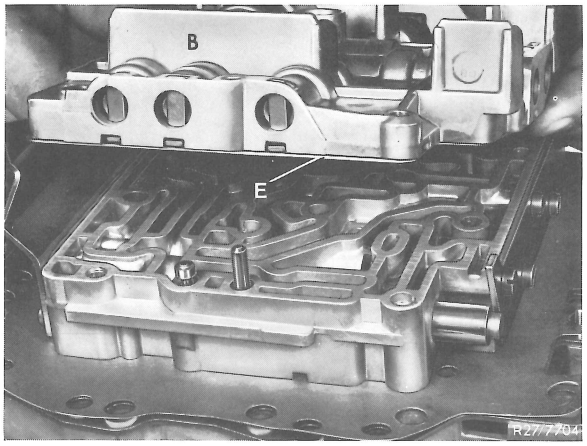


Fig. 3
B Top
E Intermediate plate

5 Remove two balls of 7 mm dia. (27 and 31) and one ball of 5.5 mm dia. (34) including spring of pressure relief valve modulating pressure from top (B) (Fig. 4).

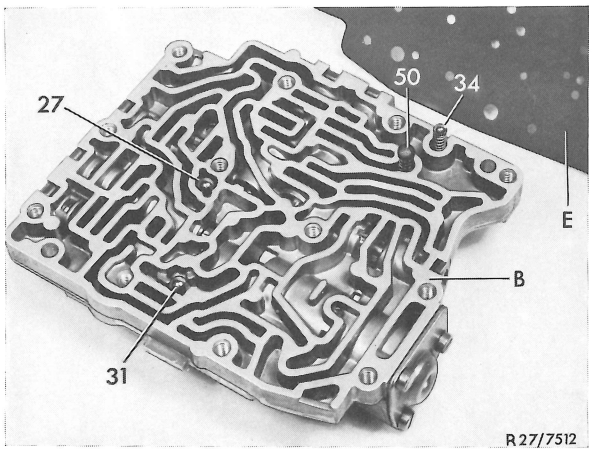


Fig. 4
B Top
E Intermediate plate
27 Ball one-way throttle valve K 1
31 Ball one-way throttle valve K 2
34 Ball pressure relief valve modulating pressure with spring
50 Strainer filter with spring

6 Lift bottom from assembly fixture and remove five balls of 5.5 mm dia. (10, 17, 22, 26, and 52) by tilting (Fig. 11).

7 Remove piston brake shift (15) and check valve primary pump including spring. Remove detent valve (26 a) and shift pin 3–4 (11) together with springs (Fig. 5).

8 Remove the two balls of 5.5 mm dia. (16 and 51) (Fig. 5)

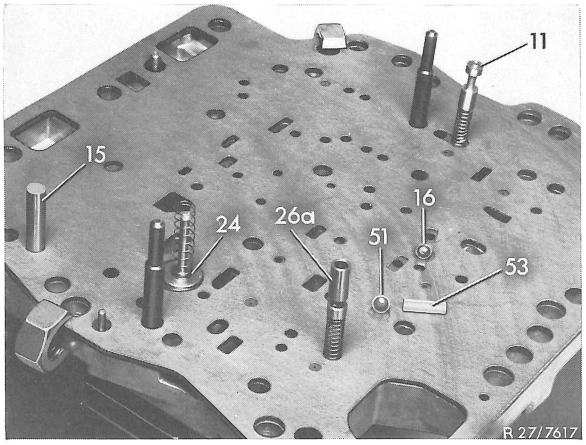


Fig. 5

11 Shift pin 3–4 with spring
15 Piston brake shift
16 Ball valve
24 Check valve Primary pump with spring
26 a Detent valve K 2 with spring
51 Ball valve
53 Plastic pin

9 Remove gasket (D) and intermediate plate (F) (Fig. 7).

10 Remove lube pressure valve (37), one-way throttle valve B 3 (38) and one-way throttle valve releasing end B 2 (41) from oil distributing plate (C) (Fig. 6).

11 Take all distributor plates from assembly fixture and remove both balls of 5.5 mm dia. (39, 40) by tilting (Fig. 6).

Assembly

12 Place oil distributing plate (C) on assembly fixture (Fig. 6).

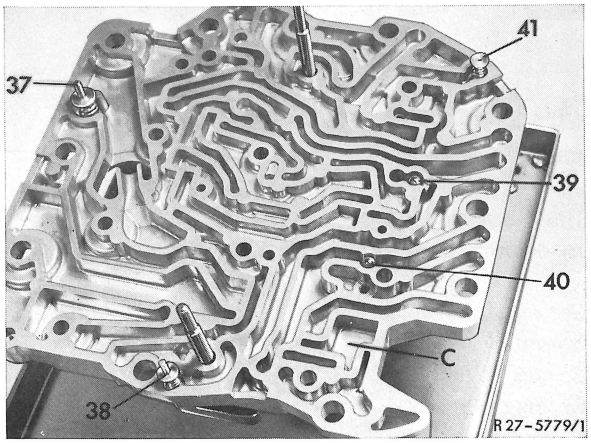


Fig. 6

C Oil distributing plate
37 Lube pressure valve
38 One-way throttle valve B3
39 Ball 5.5 mm dia.
40 Ball 5.5 mm dia.
41 One-way throttle valve B2

13 Place lube pressure valve (37), one-way throttle valve B 3 (38) and one-way throttle valve releasing end B 2 (41) into their seat in oil distributing plate (Fig. 6).

14 Place ball of 5.5 mm dia. (39) and ball of 5.5 mm dia. (40) into their countersunk seats (Fig. 6).

15 Place intermediate plate (F) with gasket (D) on oil distributing plate and clamp down with holding clips (Fig. 7).

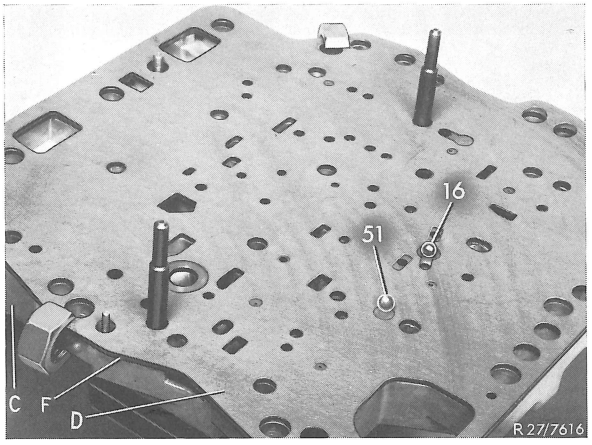


Fig. 7

C Oil distributing plate
D Gasket
F Intermediate plate
16 Ball 5.5 mm dia.
51 Ball 5.5 mm dia.

Caution! After clamping gasket and intermediate plate, check spring-loaded valves for easy operation by pushing down on valve. Valve discs should not become stuck between oil distributing plate and intermediate plate.

16 Place two balls of 5.5 mm dia. (16 and 51) on intermediate plate (F) (Fig. 7).

17 Insert check valve primary pump (24) with spring from below into shift valve housing bottom (Fig. 8).

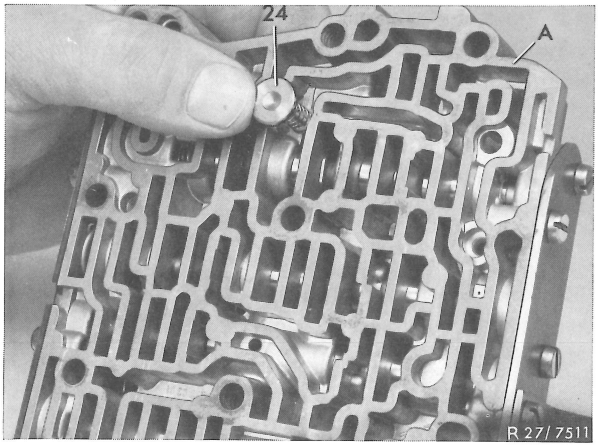


Fig. 8

A Bottom
24 Check valve primary pump with spring

18 Cant valve stem projecting at top by applying lateral pressure. Place bottom (A) on oil distributing plate and release valve stem; valve should audibly knock against intermediate plate (Fig. 9).

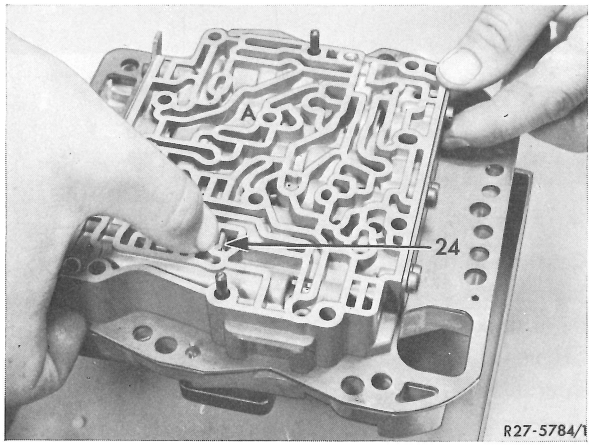


Fig. 9

A Bottom
24 Check valve primary pump

19 Insert piston brake shift 4–3 (15) as well as detent valve K 2 (26a) with spring, shift valve releasing end B 2 (11) with spring and plastic pin (53) (Fig. 10).

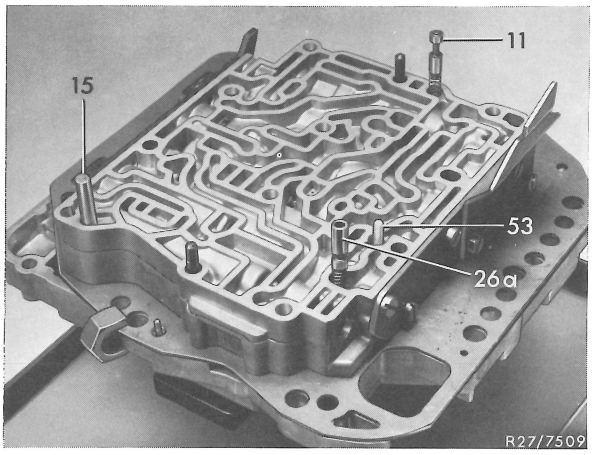


Fig. 10

11 Shift sleeve releasing end B 2
15 Piston brake shift 4–3
26a Detent valve K 2
53 Plastic pin

20 Insert five balls of 5.5 mm dia. (10, 17, 22, 26 and 51) into countersunk seats (Fig. 11).

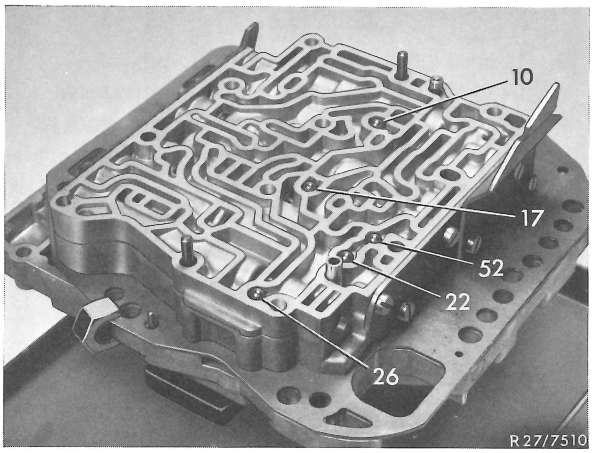


Fig. 11

10 Ball 5.5 mm dia.
17 Ball 5.5 mm dia.
22 Ball 5.5 mm dia.
26 Ball 5.5 mm dia.
52 Ball 5.5 mm dia.

Caution! The three compression springs of releasing valve B 2 (11), of detent valve K 2 (26a) and strainer filter (50) are uniform. The compression spring of modulating pressure valve (34) exerts a higher pressure.

Spring of item 11 = 0.45 mm wire dia.
Spring of item 26a = 0.45 mm wire dia.
Spring of item 34 = 0.6 mm wire dia.
Spring of item 50 = 0.45 mm wire dia.

Top

21 Insert ball of 7 mm dia. (27) of one-way throttle valve K 1, ball of 7 mm dia. (31) of one-way throttle valve K 2, ball of 5.5 mm dia. (34) of spring, as well as strainer filter (50) with spring into top (B) (Fig. 12).

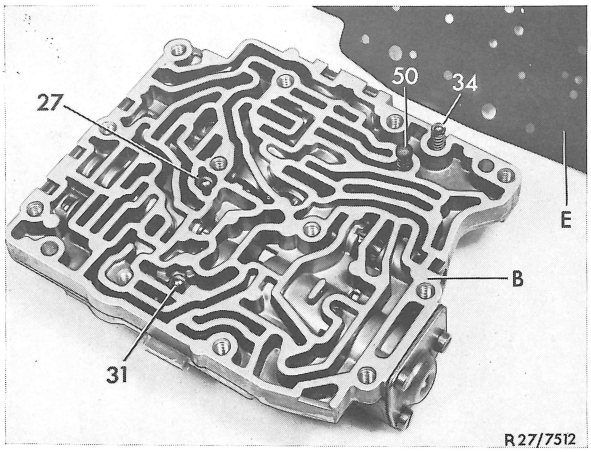


Fig. 12

B Top
E Intermediate
27 Ball one-way throttle valve K 1
31 Ball one-way throttle valve K 2
34 Ball pressure relief valve modulating pressure with spring
50 Strainer filter with spring

22 Place intermediate plate (E) on top (B), watching out for correct seat of spring-loaded ball (34) and strainer filter (50) (Fig. 12).

23 Hold intermediate plate (E) and top (B) tightly together, turn around and place on bottom (Fig. 13).

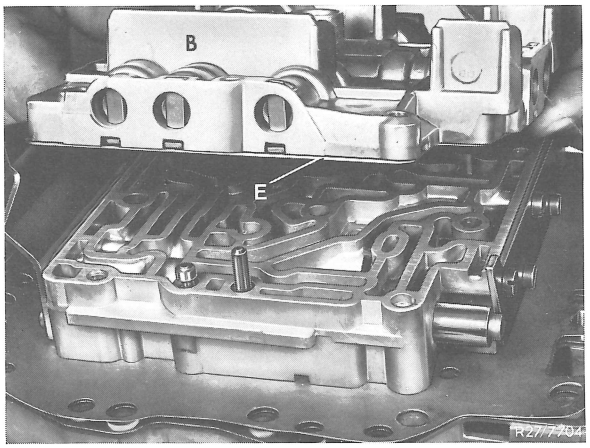


Fig. 13

B Top
E Intermediate plate

24 Insert two opposite screws and tighten slightly.

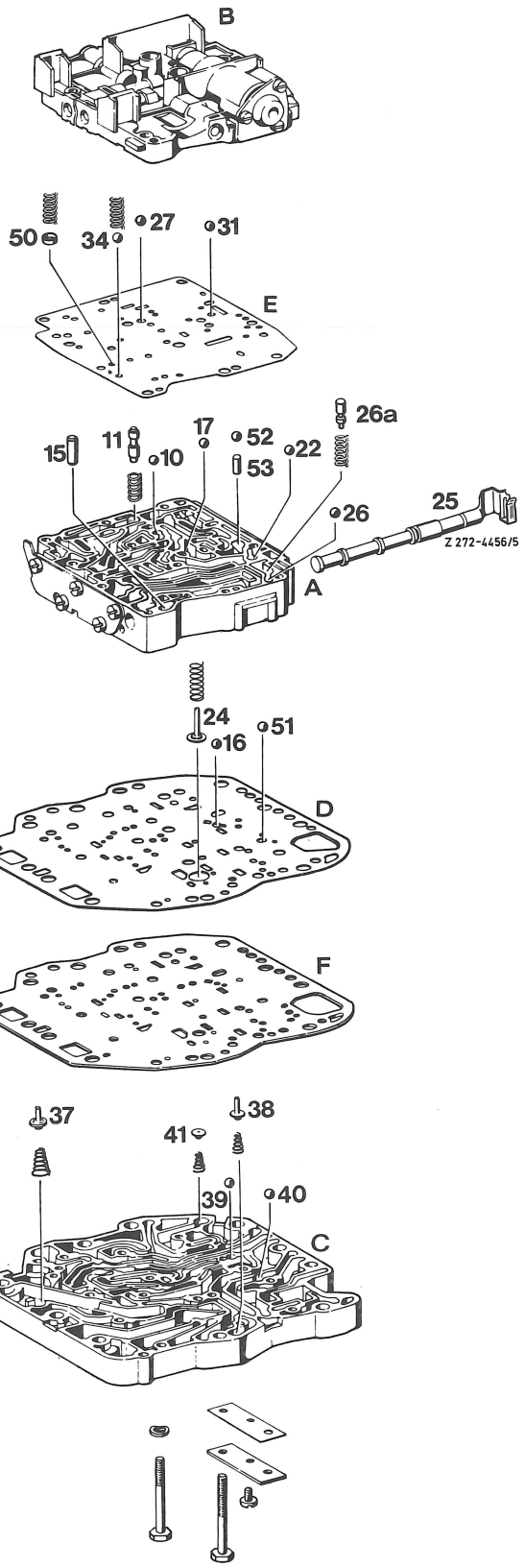
25 Remove shift valve housing from assembly fixture, insert remaining screws and tighten to 8 Nm (0.8 kpm) from inside out (Fig. 1).

Caution! Two hex. screws are longer; they serve the additional purpose of screwing down the cover plate.

27.3 Disassembly and Reassembly of Shift Valve Housing

Fig. 14

A	Shift valve housing bottom
B	Shift valve housing top
C	Oil distributing plate
D	Gasket
E	Small intermediate plate
F	Large intermediate plate
10	Two-way ball valve
11	Shift valve releasing end B 2
15	Piston brake shift 4–3
16	Ball-type check valve
17	Three-throttle ball valve
22	Two-way ball valve
24	Check valve primary pump
25	Range selector valve
26	Two-way ball valve
26a	Detent valve K 2
27	One-way throttle valve K 1
31	One-way throttle valve K 2
34	Pressure relief valve modulating pressure
37	Lube pressure valve
38	One-way throttle valve B 3
39	Two-way ball valve
40	Two-way ball valve
41	One-way throttle valve B 2
50	Strainer filter
51	Ball valve
52	Ball valve
53	Plastic pin



K 4 C 025
W 4 B 025

Tightening Torques	Nm	(kpm)
Universal shaft clamping nut	30	(3.0)
Hex. bolts of universal shaft intermediate bearing	20	(2.0)
Slotted nut on three-legged flange	118	(12.0)
Hex. bolts for rear transmission housing	13	(1.3)
Hex. bolts for modulating pressure housing on transmission housing	7	(0.7)

Special Tool

Screw driver for slotted plugs of secondary pump	116 589 00 11 00

Removal

1 Drain transmission fluid while loosening oil filler pipe on oil pan.

2 Slightly raise engine-transmission unit with top for pit lift. Remove rear engine mount complete with engine carrier (17) (Fig. 1).

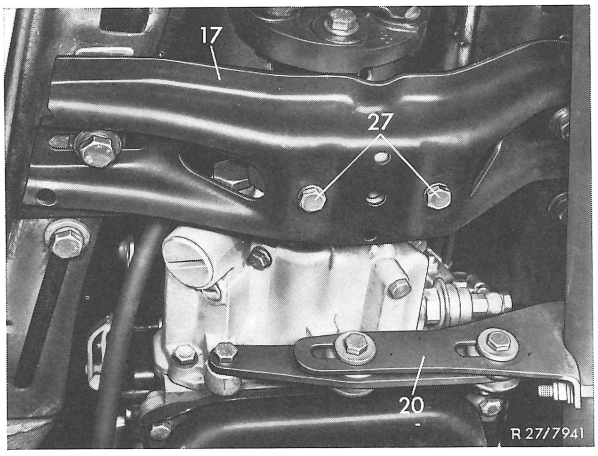


Fig. 1
17 Engine carrier
20 Exhaust mounting bracket
27 Fastening screws rear engine mount

3 Remove mounting bracket (20) for front exhaust pipe (Fig. 1).

4 Loosen speedometer shaft (16) on rear transmission cover and pull off (Fig. 2).

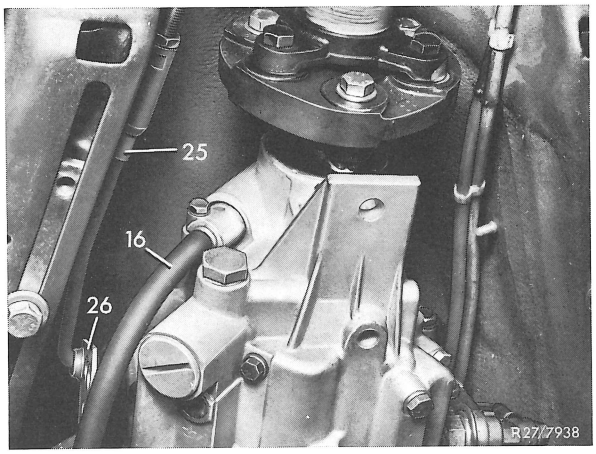


Fig. 2
16 Speedometer shaft
25 Selector rod
26 Range selector lever

5 Disconnect selector rod (25) on range selector lever (26) and move range selector lever to position "P" (Fig. 2).

6 Loosen both fastening bolts of universal shaft intermediate bearing, but do not screw out.

7 Loosen universal shaft clamping nut.

8 Unscrew universal shaft on transmission, but leave universal plate on universal shaft.

9 Slide universal shaft to the rear to the extent the center bearing and the clamping piece permit.

10 Place suitable piece of wood under universal shaft front in tunnel in such a manner that the shaft is completely pushed up.

11 Unlock slotted nut on three-legged flange and screw-off, remove three-legged flange.

12 Disconnect vacuum line (30) on vacuum box (28) while counterholding against hexagon (SW 14) on vacuum box.

13 Unscrew mounting bracket (36) for vacuum line (30) on rear transmission cover (Fig. 3).

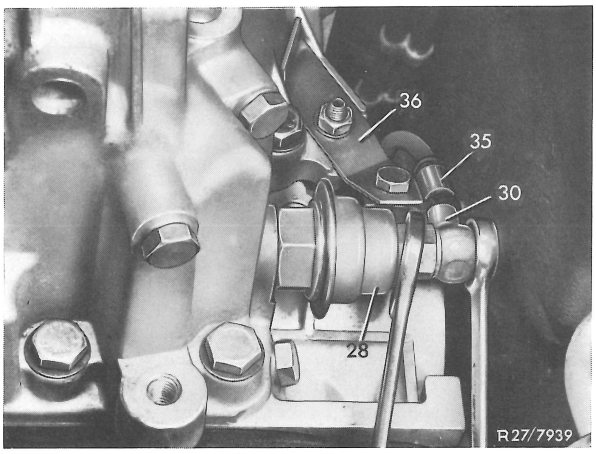


Fig. 3

28 Vacuum box
30 Vacuum line
35 Fastening clip
36 Mounting bracket

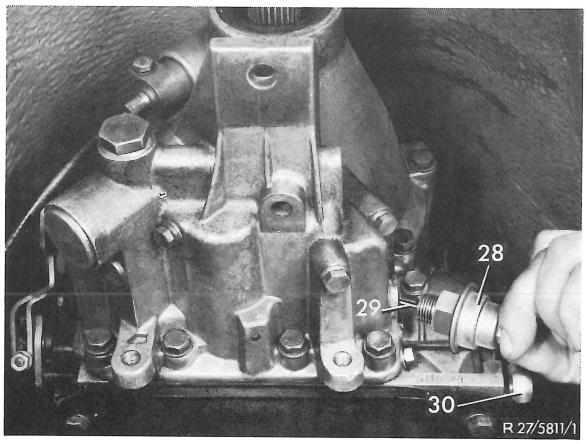


Fig. 4

28 Vacuum box
29 Thrust pin
30 Vacuum line

14 Unscrew vacuum box (28) on hex. head SW 22 (Fig. 4).

15 Unscrew plug for secondary pump (5) and remove compression spring (11).

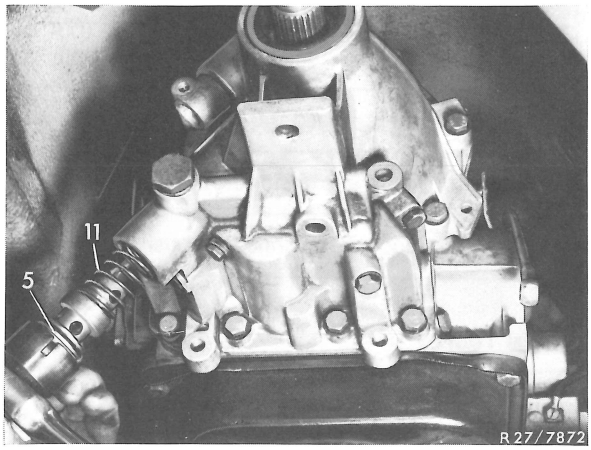


Fig. 5

5 Plug for secondary pump
11 Compression spring

16 Lower transmission to the extent possible and unscrew fastening bolts for rear transmission housing.

17 Loosen rear transmission housing by light blows of a plastic hammer and take off. The centrifugal governor should remain on output shaft, that is, when pulling off the housing, also pull governor from guide of rear transmission housing at the same time.

18 Remove modulating pressure housing (9) and gasket (Fig. 6).

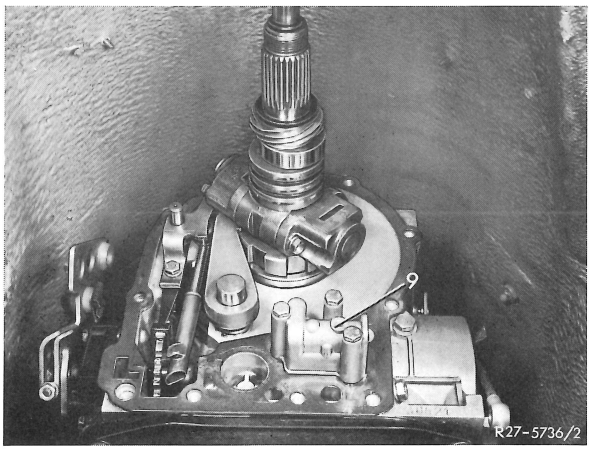


Fig. 6

9 Modulating pressure housing

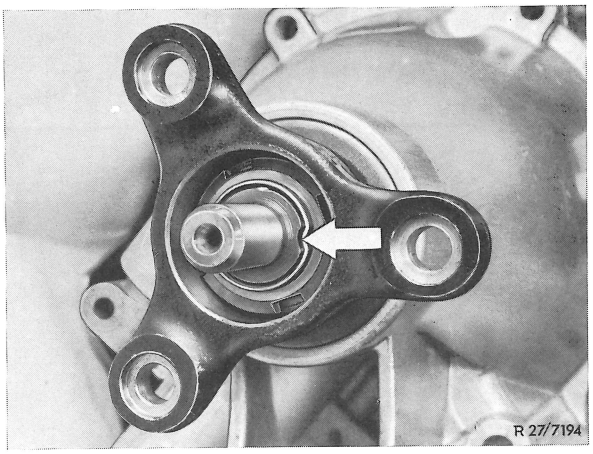


Fig. 7

Installation

19 Install modulating pressure housing (9) with new gasket for rear transmission housing (Fig. 6). Center gasket on sealing surface of transmission housing by means of two set pins.

20 Mount rear transmission housing while moving speedometer drive with a screw driver until in mesh with worm gear.

21 Screw-in fastening bolts of rear transmission housing and tighten to 13 Nm (1.3 kpm).

22 Screw-in plug for secondary pump (5) together with compression spring (11) (Fig. 5).

23 Coat vacuum box (28) on threads with sealing compound and screw into rear transmission housing (Fig. 4).

24 Connect vacuum line (30) to vacuum box (28) while counterholding on hexagon (SW 14) on vacuum box (Fig. 3).

25 Screw mounting bracket (36) for vacuum line (30) to rear transmission cover (Fig. 3).

26 Place range selector lever in position "P".

27 Place three-legged flange on output shaft and tighten slotted nut to 118 Nm (12 kpm), secure slotted nut (refer to arrow Fig. 7).

28 Attach shift rod to range selector lever.

29 Connect speedometer shaft to transmission.

30 Lift engine transmission unit with top for pit lift as required. Remove wooden support under universal shaft and screw the latter to transmission.

31 Install rear engine mount with engine carrier (17) (Fig. 1).

32 Lower pit lift.

33 Install mounting bracket (20) for front exhaust pipe (Fig. 1).

34 Move vehicle back and forth and tighten universal shaft clamping nut to 30 Nm (3 kpm).

35 Tighten fastening bolts on universal shaft intermediate bearing to 20 Nm (2.0 kpm).

36 Fill up with transmission fluid.

37 Shift through transmission and complete oil level checkup according to Job No. 27.3–010.

38 Check modulating pressure and adjust, if required. (Refer to Job No. 27.3–340).

27.3 Removal and Installation of Centrifugal Governor

K 4 C 025
W 4 B 025

Removal

1 Remove rear transmission housing (27.3–500).

2 Remove plate spring (85), worm gear of speedometer drive (15), eccentric ring for secondary pump (16) and centrifugal governor (17) from output shaft (Fig. 1).

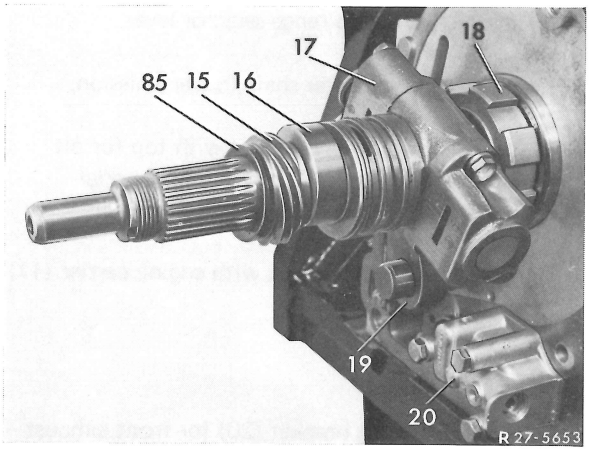


Fig. 1

15 Worm gear of speedometer drive
16 Eccentric ring for secondary pump
17 Centrifugal governor
85 Plate spring

Installation

3 Attach centrifugal governor (17), eccentric ring for secondary pump (16), worm gear of speedometer drive (15) and plate spring (85) to output shaft (Fig. 1). The flange of the worm gear (15) should face the centrifugal governor, and the curvature of the plate spring (85) should face the worm gear (15) (Fig. 2).

4 Install rear transmission housing (27.3–500).

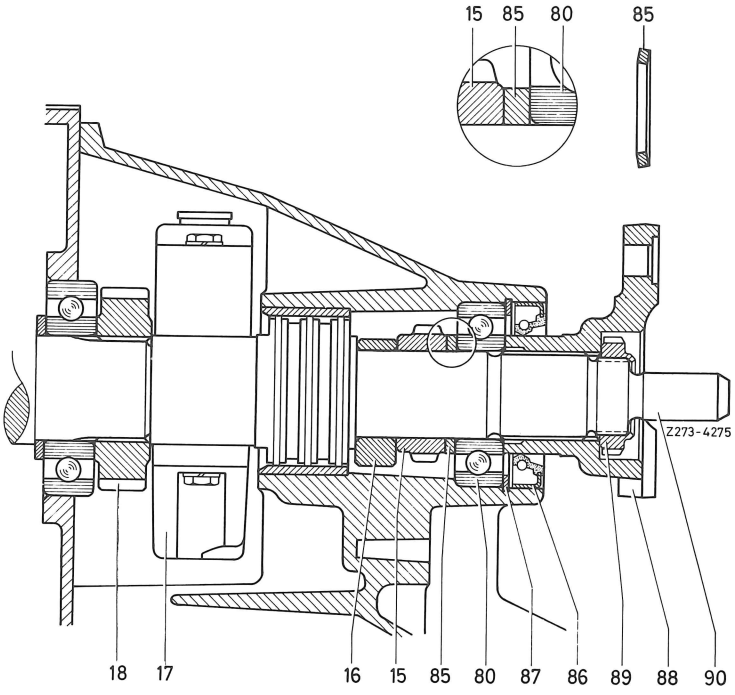


Fig. 2

15 Worm gear speedometer drive
80 Ball bearing
85 Plate spring
89 Slotted nut

K 4 C 025
W 4 B 025

Tightening Torque	Nm	(kpm)
Hex. bolt for leaf spring of detent plate	10	(1.0)

Removal

1 Remove rear transmission housing (27.3–500).

2 Remove centrifugal governor (27.3–520).

3 Screw fastening bolt from holder (14) and remove holder together with leaf spring (Fig. 1).

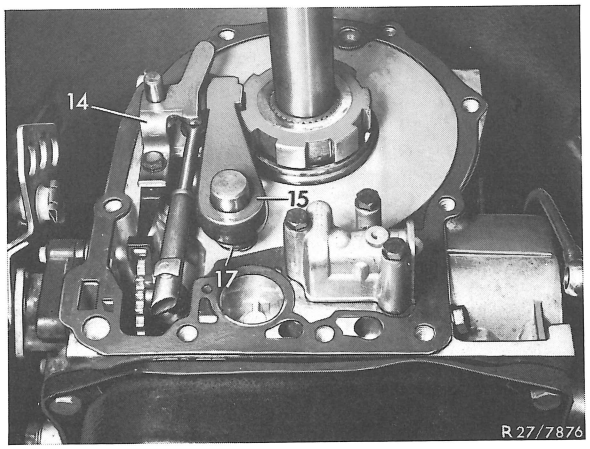


Fig. 1
14 Mounting bracket
15 Parking lock pawl
17 Tensioning spring

4 Remove parking lock pawl (15) together with clamping spring (17) (Fig. 1).

5 Remove leaf spring (13) and needle bearing-mounted roller (16) (Fig. 2).

6 Remove resilient linkage (12) (Fig. 2).

7 Pull parking lock gear (21) from output shaft (Fig. 2)

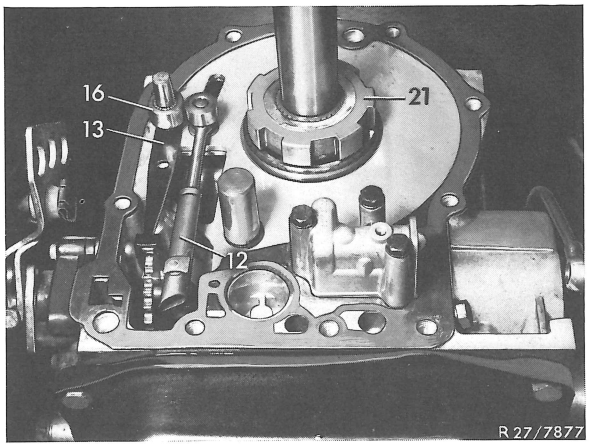


Fig. 2
12 Resilient linkage
13 Leaf spring
16 Needle bearing mounted roller
21 Parking lock wheel

Installation

8 Attach parking lock wheel (21) to output shaft (Fig. 3).

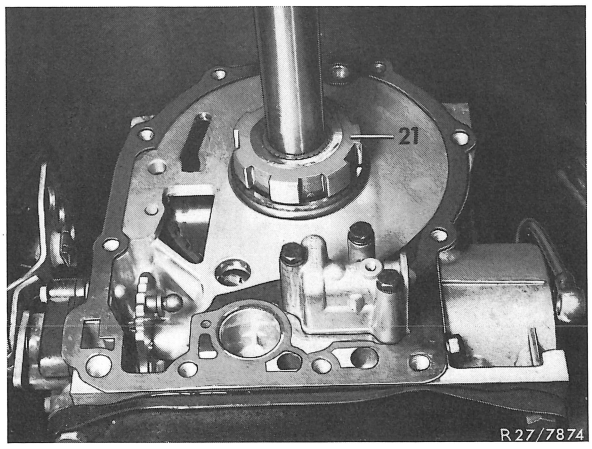


Fig. 3
21 Parking lock wheel

9 Attach resilient linkage (12) with washer (18) and roller (19) and push-on detent plate (22) (Fig. 4).

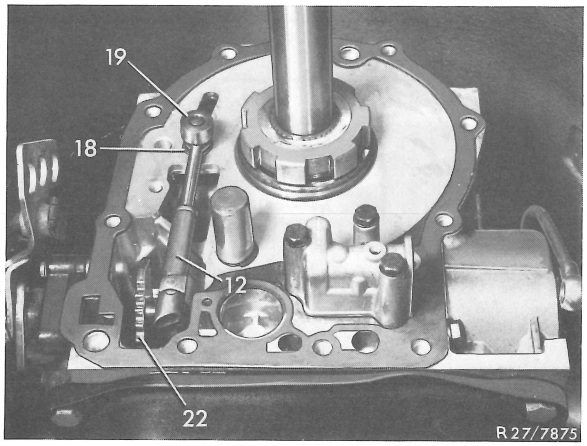


Fig. 4

12 Resilient linkage
18 Washer
19 Roller
22 Detent plate

10 Install leaf spring (13) with needle bearing mounted roller (16) (Fig. 2).

11 Attach mounting bracket (14) and tighten fastening screw to 10 Nm (1.0 kpm) (Fig. 5).

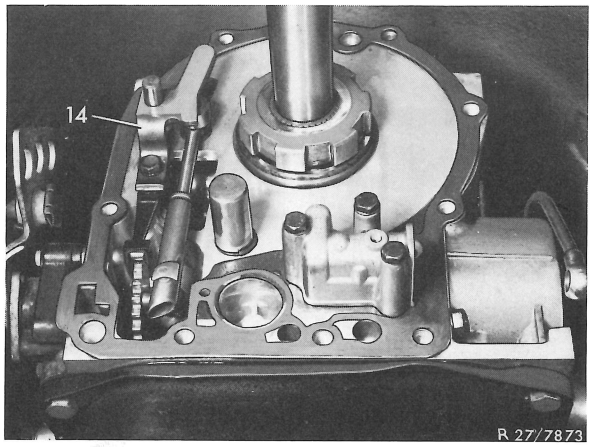


Fig. 5

14 Mounting bracket

12 Slide tensioning spring (17) on bearing pin (20) and attach to transmission housing (refer to arrow in Fig. 6). Pull tensioning spring (17) outwards with a tracer pin (Fig. 6) and slide-on parking lock pawl (Fig. 1).

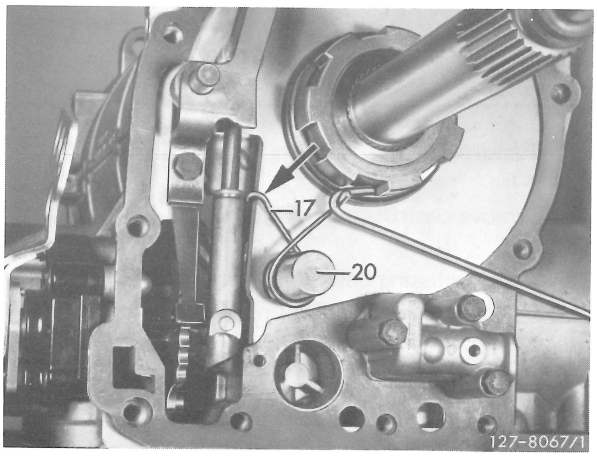


Fig. 6

17 Tensioning spring
20 Bearing bolt

13 Place range selector lever in position "P" by checking whether the parking lock engages correctly.

14 Install centrifugal governor (27.3–520).

15 Install rear transmission housing (27.3–500).

Revision: model 114/115 added.

Tightening Torques	Nm	(kpm)
Fastening bolt for speedometer drive and secondary pump	8	(0.8)
Phillips head screw for holding plate on locking piston	4	(0.4)

Special Tool	
Assembly mandrel	108 589 02 43 00

Disassembly

1 Remove rear transmission housing (27.3–500).

2 Unscrew fastening bolt from cover plate of locking piston and remove locking piston (81) together with spring (Fig. 1).

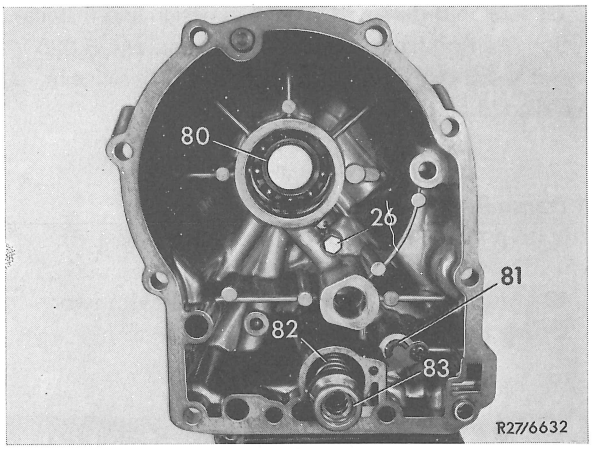


Fig. 1
26 Fastening bolt for secondary pump
80 Ball bearing
81 Locking piston
82 Pressure receiving springs
83 Spring plate

3 Remove spring plate (83) with two springs (82) and pressure receiving piston from rear transmission housing cover.

4 Unscrew fastening bolt for speedometer drive.

5 Pull speedometer drive (31 to 33) from rear transmission housing, remove speedometer pinion (31) from bearing body (33) (Fig. 2).

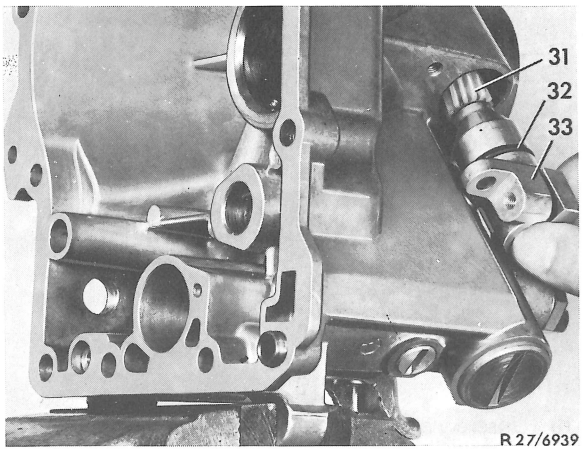


Fig. 2
31 Speedometer pinion
32 O-ring
33 Bearing body

6 Unscrew fastening bolt for secondary pump (26) (Fig. 1).

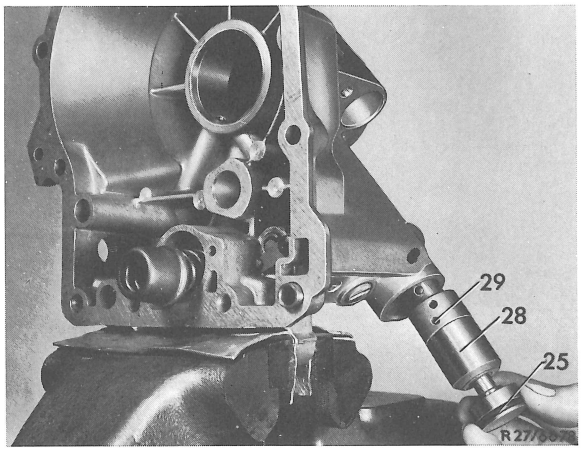


Fig. 3
25 O-ring
28 Secondary pump
29 Fastening hole

7 Remove secondary pump (28) from rear transmission housing (Fig. 3).

8 Remove sealing ring out of rear transmission housing.

9 Remove locking ring (79) and press-out ball bearing (80).

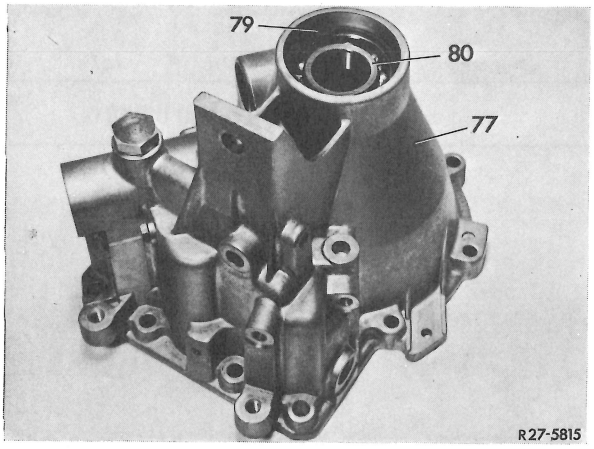


Fig. 4
77 Rear transmission housing
79 Locking ring
80 Ball bearing

10 Unscrew all measuring screw connections and closing plugs with ball valves.

Assembly

11 Press-in ball bearing (80 in Fig. 4) by means of assembly mandrel (78) (Fig. 5)

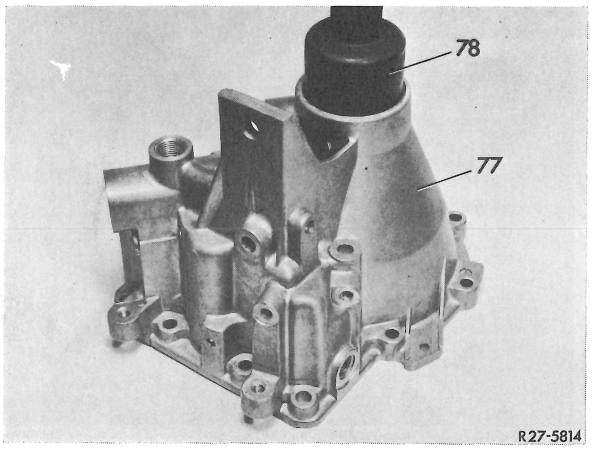


Fig. 5
77 Rear transmission housing
78 Assembly mandrel 108 589 02 43 00

12 Insert locking ring (79) and press-in sealing ring (Fig. 4).

13 Insert locking piston (81) with spring and tighten holding plate to 4 Nm (0.4 kpm) (Fig. 1).

14 Introduce secondary pump (28) into rear transmission housing until fastening bore (29) is in alignment with bore in transmission housing (Fig. 3).

15 Tighten fastening screw (26) of secondary pump to 8 Nm (0.8 kpm) (Fig. 1).

16 Renew O-ring (32) of bearing body (33).

17 Insert tachometer pinion (31) into bearing body (33). Introduce tachometer drive into rear transmission housing and tighten fastening screw to 8 Nm (0.8 kpm) (Fig. 2).

18 Screw-in all measuring screw connections and closing plugs with ball valves.

Caution! The pressure receiving piston of K 4 C 025 1st version differs with regard to design and installation position from that of transmission W 4 B 025 and K 4 C 025 2nd version. Observe difference in design during assembly.

Transmission Type K 4 C 025 1st Version
(with pressure receiving piston version A Fig. 8).

19 Insert pressure pickup piston (23) with two springs (82) and spring plate (83) (Fig. 6).

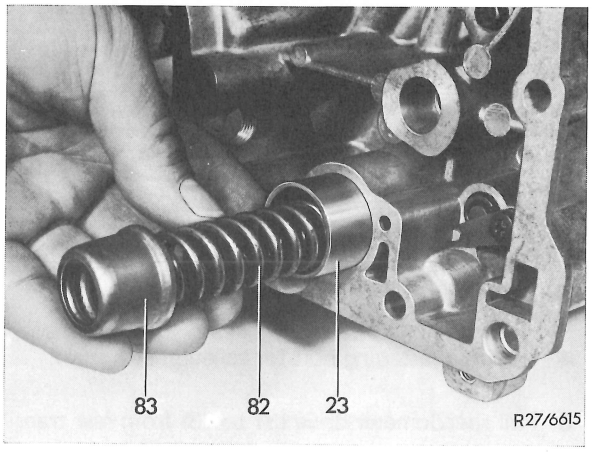


Fig. 6
23 Pressure receiving piston
82 Pressure receiving springs
83 Spring plate

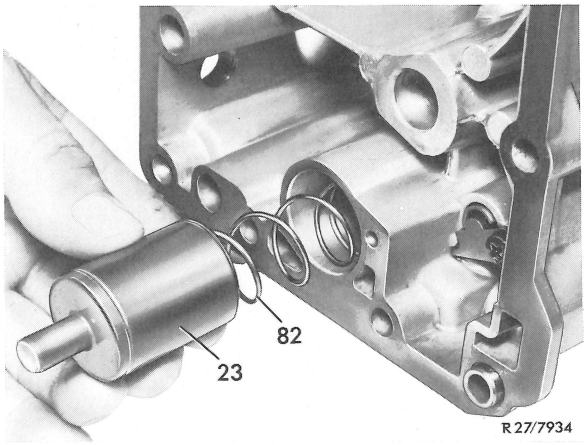


Fig. 7

23 Pressure receiving piston
82 Spring

Transmission Type W 4 B 025 and K 4 C 025
2. Version (with pressure receiving piston version B Fig. 8)

20 Insert spring (82) with pressure receiving piston (23) (Fig. 7).

21 Install rear transmission housing (27.3–500).

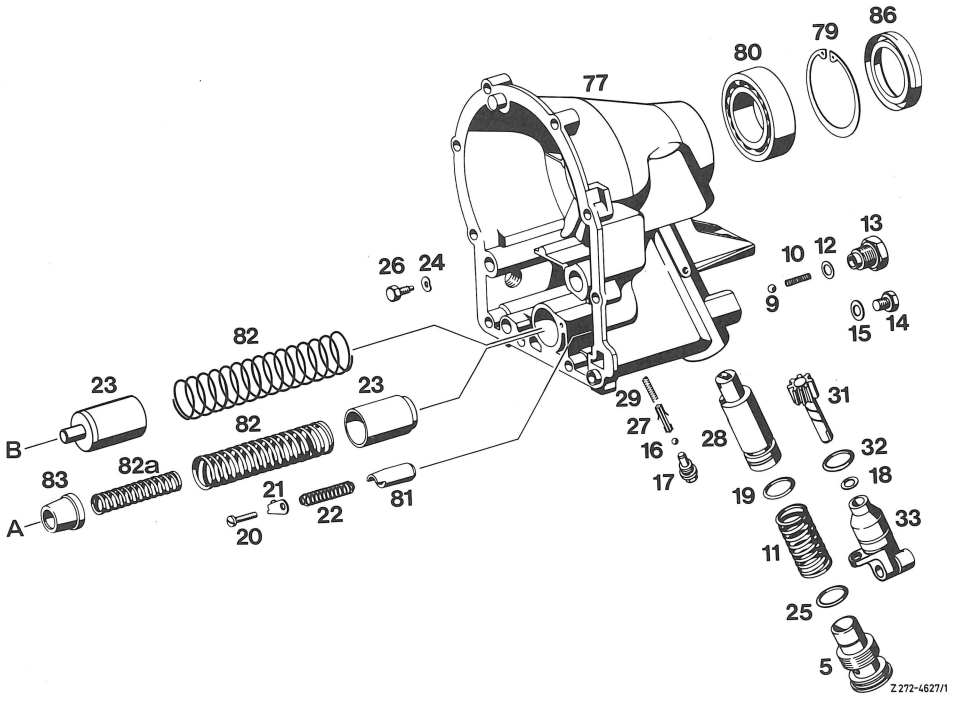


Fig. 8

A 1. Version for K 4 C 025
B Version for W 4 B 025 and K 4 C 025 2. Version
5 Plug with inlet valve for secondary pump
9 Ball
10 Compression spring
11 Compression spring
12 Sealing ring
13 Closing plug
14 Closing plug
15 Sealing ring
16 Ball
17 Closing plug
18 Sealing ring
19 O-ring
20 Oval head screw
21 Holder
22 Compression spring
23 Pressure receiving piston
24 Spring washer
25 O-ring
26 Fastening screw for secondary pump
27 Thrust pin
28 Secondary pump
29 Spring
31 Tachometer pinion
32 O-ring
33 Bearing body
77 Rear transmission housing
79 Locking ring
80 Ball bearing
81 Detent piston
82 Pressure receiving spring
82a Pressure receiving spring
83 Spring retainer
86 Radial sealing ring
88 Three-arm flange
89 Slot nut

Disassembly and Assembly of Centrifugal Governor 27.3

K 4 C 025
W 4 B 025

Tightening Torque	Nm	(kpm)
Hex. bolts for shift housing and governor housing on centrifugal governor	80	(0.8)

Disassembly

1 Replace oil sealing rings (5) as required, by disconnecting and removing oil sealing rings (Fig. 1).

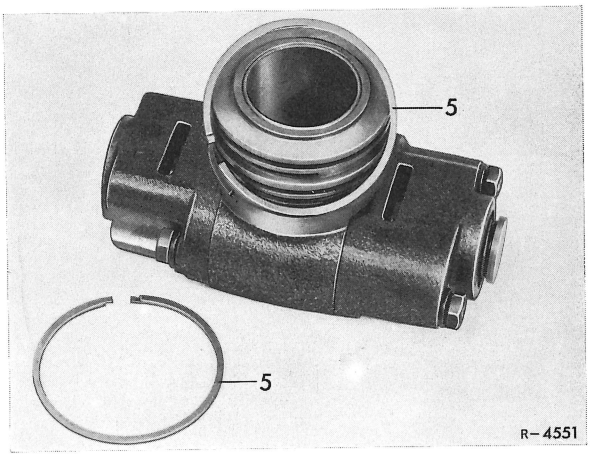


Fig. 1
5 Oil sealing rings

2 Unscrew hex. bolts (4) (Fig. 2).

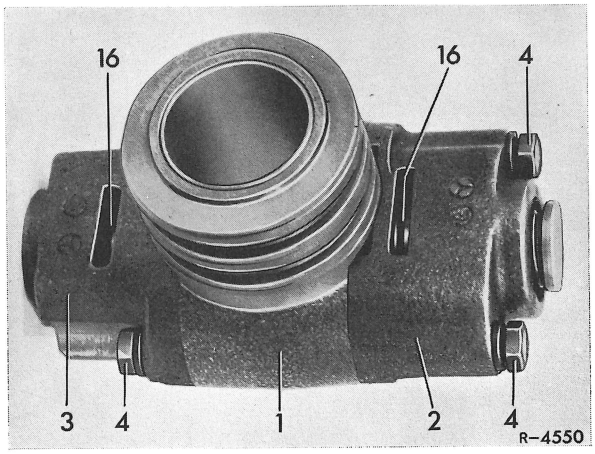


Fig. 2
1 Flange
2 Governor housing
3 Shift housing
4 Hex bolts
16 Oil outlet slots

3 Remove shift housing (3) and governor housing (2) from flange (1).

4 Remove lock washer (6), compression spring (7) and shift valve (8) (Fig. 3).

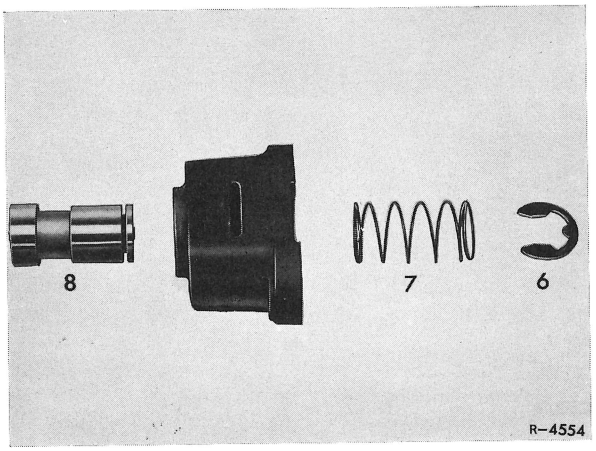


Fig. 3
6 Lock washer
7 Compression spring
8 Shift valve

Transmission Type K 4 C 025
(with governor housing version A Fig. 9).

5 Remove spring plate (9), remove centrifugal weight (10) and weak compression spring (11) in upward direction (Fig. 4).

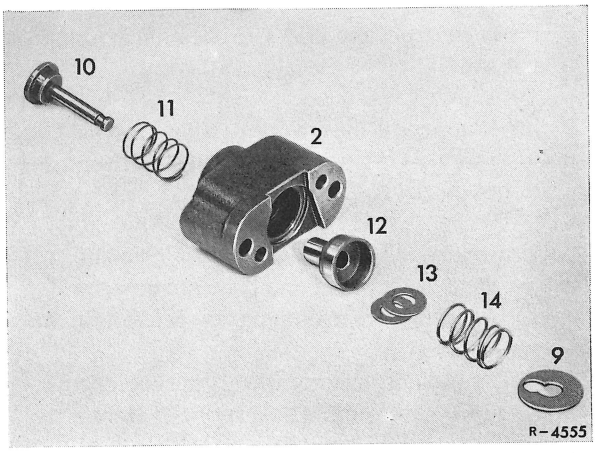


Fig. 4
2 Governor housing
9 Spring plate
10 Centrifugal weight
11 Compression spring
12 Control valve
13 Compensating washers
14 Compression spring

27.3 Disassembly and Assembly of Centrifugal Governor

Transmission Type W 4 B 025
(with governor housing version B Fig. 9)

6 Force-off spring retainer (9), remove flyweight (10) with spring guide (18) and weak compression spring (11) in upward direction (Fig. 5).

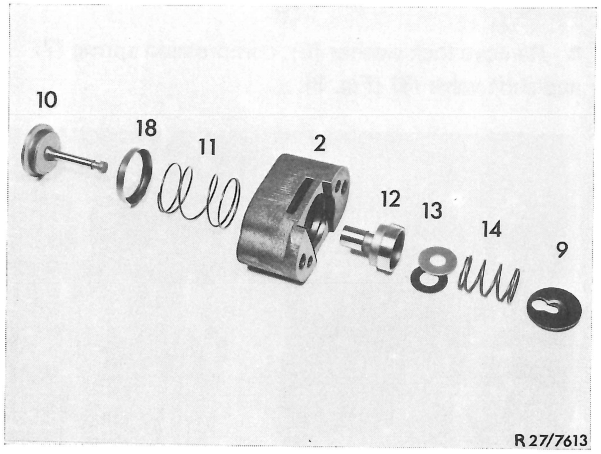


Fig. 5

2 Governor housing
9 Spring retainer
10 Flyweight
11 Compression spring
12 Governor valve
13 Compensating washers
14 Compression spring
18 Spring guide

7 Remove compression spring (14) with compensating washers (13) and control valve (12) in downward direction.

Assembly

Caution! Clean all parts well in dry cleaning gasoline. Check shift valve (8) (Fig. 3) and control valve (12) (Fig. 4 and 5) for damage and easy sliding in their bores.

8 Insert control valve (12) into governor housing (2) (Fig. 4 and 5).

9 Introduce centrifugal weight (10) with weak compression spring (11) into control valve (12) for transmission type K 4 C 025 (Fig. 4).

10 Introduce flyweight (10) with spring guide (18) and weak compression spring (11) into governor valve (12) for transmission type W 4 B 025 (Fig. 5).

11 Push-through governor valve, insert compensating washers (13) with compression spring (14) into governor valve (Fig. 4 and 5).

Note: Do not change number of compensating washers.

12 Attach spring plate (9) watching out for correct seat (Fig. 6).

13 Insert shift valve (8) with compression spring (7) and push on lock washer (Fig. 3).

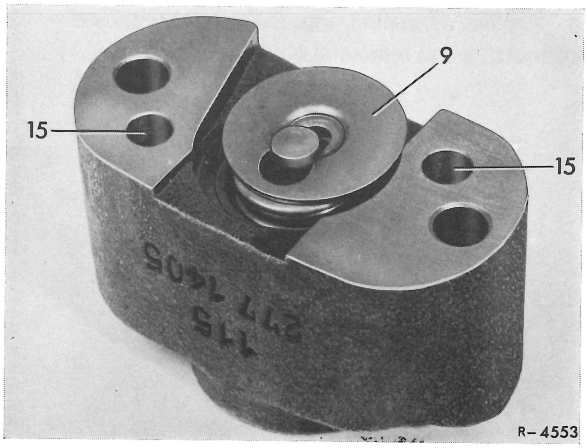


Fig. 6

9 Spring plate
15 Oil ducts

Note: When pushing on lock washer make sure that the spring end is not distorted in groove of lock washer.

14 Position shift housing (3) on flange (1) in such a manner that the oil outlet slots (16) are facing the oil sealing rings (Fig. 2) and the oil ducts (15) are in alignment (Fig. 7).

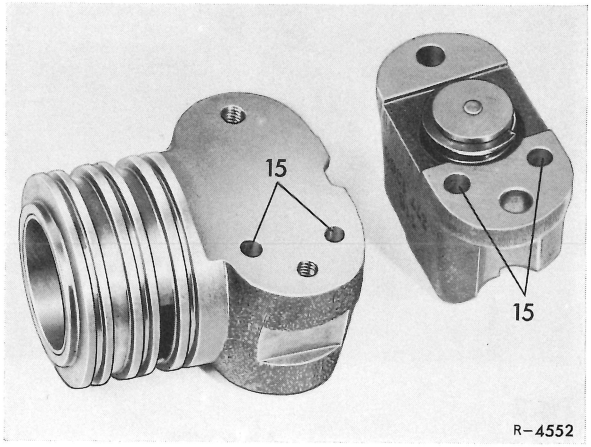


Fig. 7

15 Oil ducts

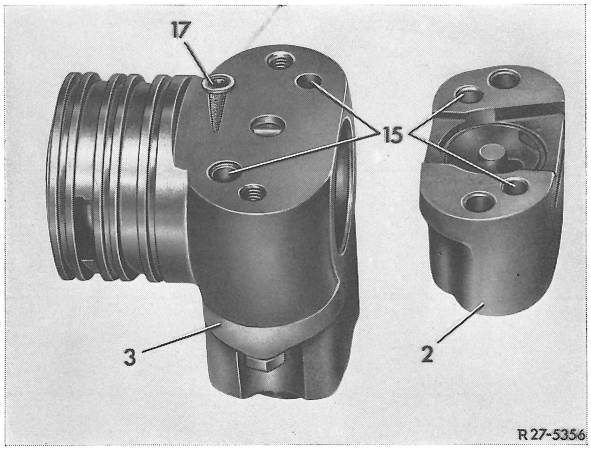


Fig. 8

2 Governor housing
3 Shift housing
15 Oil ducts
17 Strainer

15 Insert strainer (17) into seat provided in oil duct (Fig. 8 and 9) and mount governor housing (2) with the oil outlet slots (16) facing the oil sealing rings (Fig. 2).

16 Tighten hex. bolts (4) to 80 Nm (0.8 kpm) (Fig. 2).

17 Renew oil sealing rings (5), if previously removed (Fig. 9); also insert oil sealing rings into grooves and attach (Fig. 1).

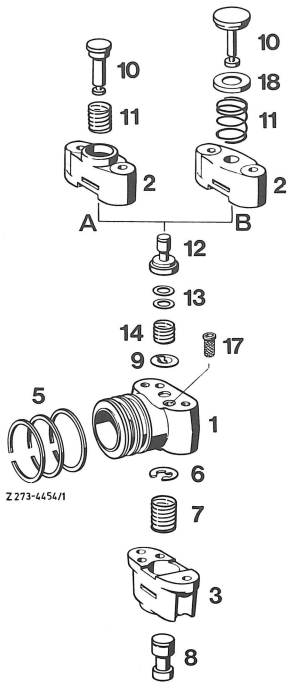


Fig. 9

1 Flange
2 Governor housing
A Version for K 4 C 025
B Version for W 4 B 025
3 Shift housing
5 Oil sealing rings
6 Lock washer
7 Compression spring
8 Shift valve
9 Spring retainer
10 Flyweight
11 Compression spring
12 Governor valve
13 Compensating washers
14 Compression spring
17 Strainer
18 Spring guide

27.3 Removal and Installation of Starter Lock and Back-up Light Switch

K 4 C 025
W 4 B 025

Tightening Torques	Nm	(kpm)
Adjusting screw for starter lock and back-up light switch	20	(0.2)
Cheesehead screws for starter lock and back-up light switch	50	(0.5)

Special Tool

1 Locating pin	115 589 18 63 00

Removal

1 Disconnect selector rod on range selector lever.

2 Remove range selector lever (1) from shaft by loosening clamping screw (6) (Fig. 2).

3 Unscrew fastening screws of starter locking switch (7) (Fig. 1).

4 Remove starter locking switch (7) from shaft (4) (Fig. 1).

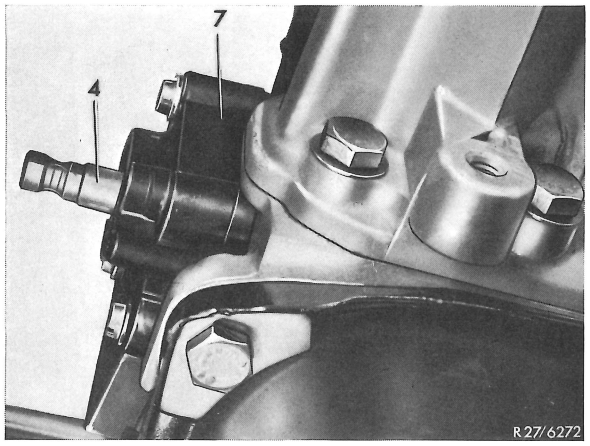


Fig. 1
4 Shaft
7 Starter locking switch

Installation

5 Screw starter locking switch (7) to transmission housing. Tighten fastening screws to 50 Nm (0.5 kpm).

6 Place range selector lever (1) on shaft and tighten with clamping screw (6).

7 Move range selector lever (1) into position "N" and loosen adjusting screw (3). Insert locating pin (5) through carrier sleeve into locating hole on switch housing, then carefully tighten adjusting screw (3) (tightening torque 0.2 kpm) and pull out locating pin (Fig. 2).

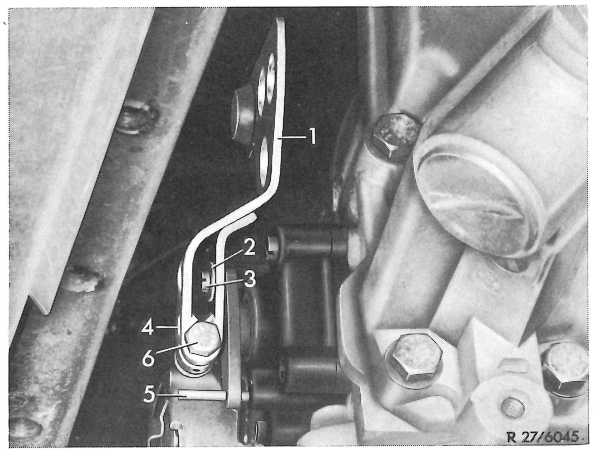


Fig. 2
1 Range selector lever
2 Washer
3 Adjusting screw
4 Shaft
5 Locating pin
6 Clamping screw

8 Attach selector rod to range selector lever and secure.

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K 4 C 025
W 4 B 025

Tightening Torques	Nm	(kpm)
Universal shaft clamping nut	30	(0.3)
Hex. bolts of universal shaft intermediate bearing	20	(2.0)
Hex. bolts for hydraulic clutch on driven plate	42	(4.2)

Special Tools

Top for pit lift	BE 11 857
Torque wrench	115 589 07 07 05
Open end wrench	000 589 13 01 00
Flushing mandrel	115 589 24 63 00
Syringe	112 589 00 72 00
Holding plate	116 589 05 62 00

Removal

1 Disconnect minus cable from battery.

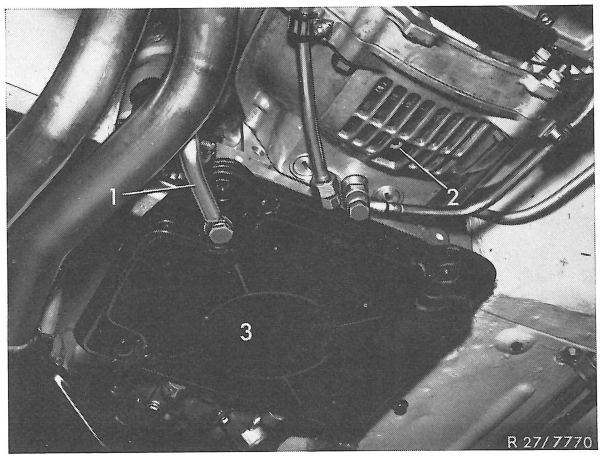


Fig. 1
1 Oil filler tube
2 Oil drain plug
3 Oil pan

2 Drain transmission fluid. For this purpose, unscrew oil filler pipe (1) on oil pan (3) of transmission and oil drain plug (2) on hydraulic clutch

3 Place vehicle on supporting stand.

4 Unscrew feed line (11) and return line (12) for oil cooler on transmission housing (Fig. 2).

5 Unscrew both fastening clips (13) on transmission cover (Fig. 2).

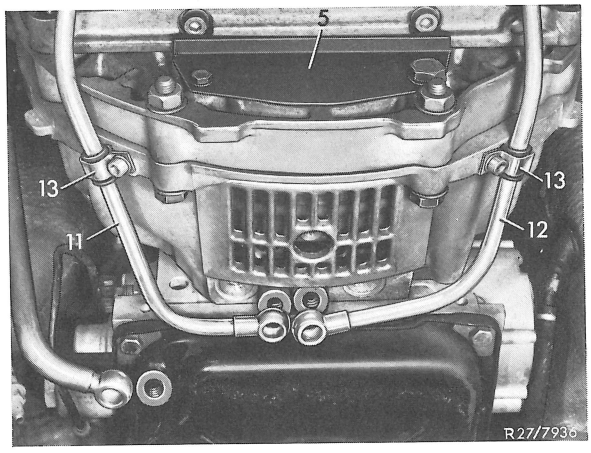


Fig. 2
5 Cover plate clutch housing
11 Feed line toward oil cooler
12 Return line from oil cooler
13 Fastening clips

6 Unscrew fastening clips (10) of feed line and return line for oil cooler left and right on engine oil pan and turn both lines aside (Fig. 3).

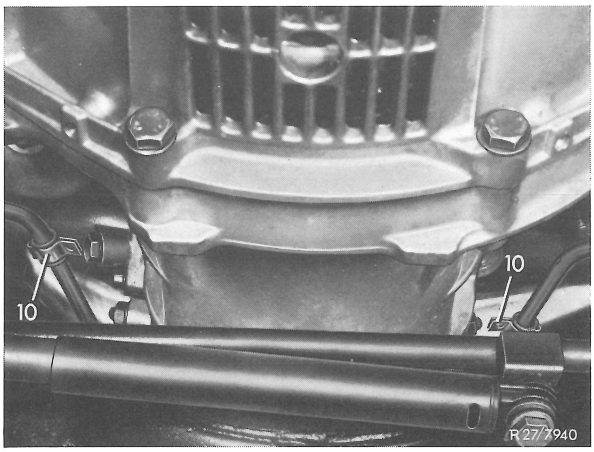


Fig. 3
10 Fastening bolts

7 Loosen both fastening bolts (7) of universal shaft intermediate bearing, but do not yet screw out (Fig. 4).

8 Loosen universal shaft clamping nut with torque wrench 115 589 07 07 05 and open end wrench 000 589 13 01 00 (Fig. 4).

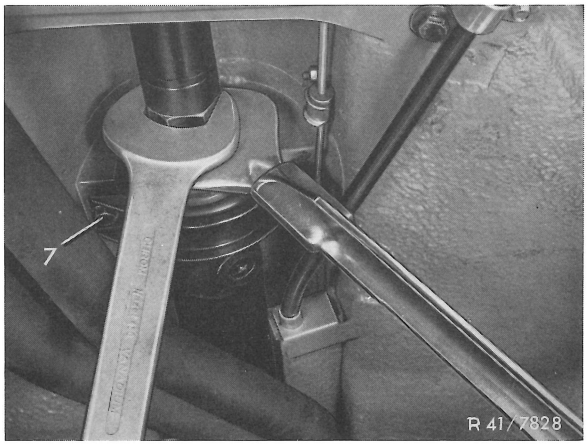


Fig. 4
7 Fastening screws

9 Unscrew mounting bracket (20) for front exhaust pipe (Fig. 5).

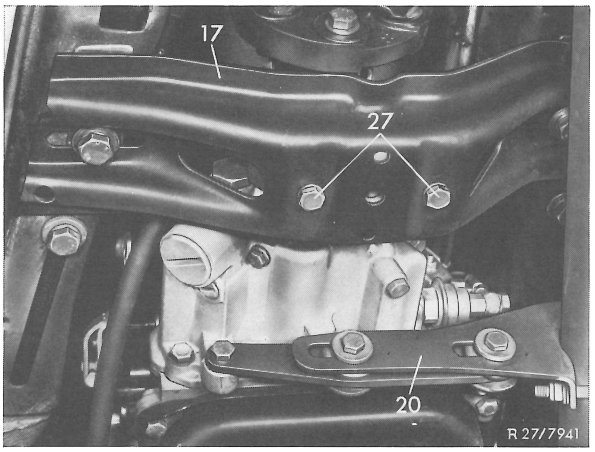


Fig. 5
17 Engine carrier
20 Exhaust mounting bracket
27 Fastening screws

10 Unscrew both fastening screws (27) from engine mount and remove engine carrier (17) (Fig. 5).

11 Unscrew rear engine mount (18) on transmission (Fig. 6).

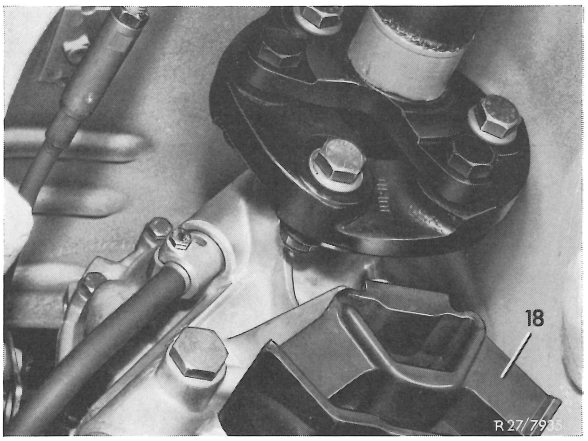


Fig. 6
18 Engine mount

12 Disconnect selector rod (25) on range selector lever (26) and move range selector lever to position "P" (Fig. 7).

13 Disconnect tachometer shaft (16) on transmission (Fig. 7).

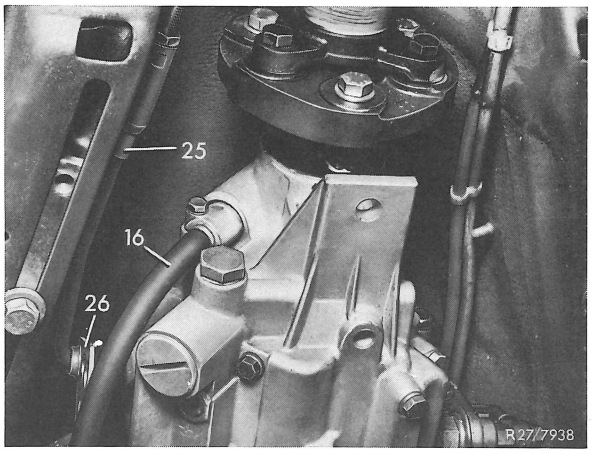


Fig. 7

16 Tachometer shaft
25 Selector rod
26 Range selector lever

14 Unscrew cable from kickdown solenoid valve (15) (Fig. 8).

15 Unscrew clamping screw from lever for control pressure (14) and pull lever from shaft (Fig. 8).

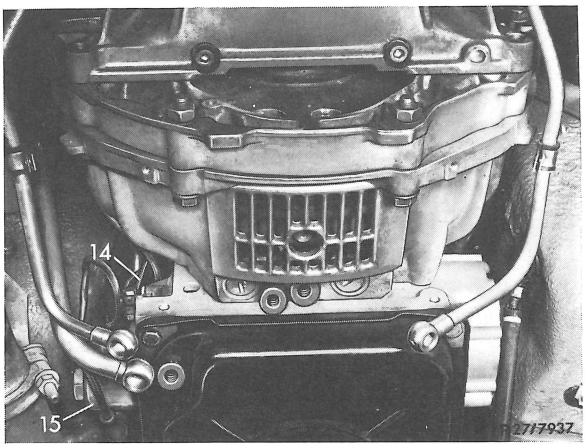


Fig. 8

14 Control pressure lever
15 Kickdown solenoid valve

16 Pull out plug for starter lock and back-up light switch.

17 Unscrew universal shaft on transmission while leaving universal plate on universal shaft.

18 Slide universal shaft toward the rear as far as the center bearing and the clamping piece permit.

19 Place suitable piece of wood underneath universal shaft front in tunnel in such a manner that the shaft is pushed completely upwards.

20 Unscrew vacuum line (30) from vacuum box (28) while counterholding at hexagon SW 14 on diaphragm (Fig. 9).

21 Unscrew fastening clip (35) from mounting bracket (36) (Fig. 9).

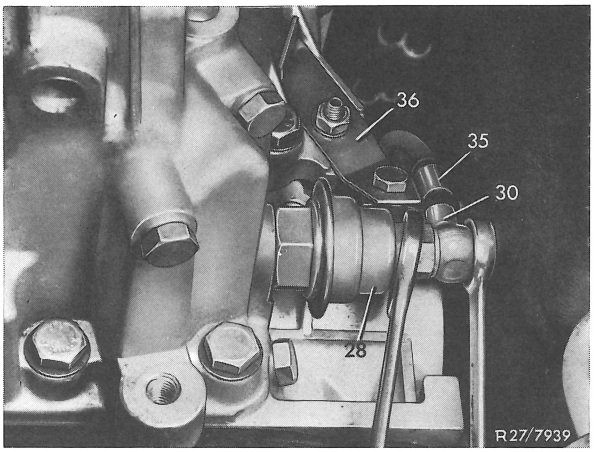


Fig. 9

28 Vacuum box
30 Vacuum line
35 Fastening clip
36 Mounting bracket

22 Unscrew cover plate (5) from clutch housing. Separate hydraulic clutch from drive plate, by unscrewing 3 x 2 hex. screws (21) (Fig. 10).

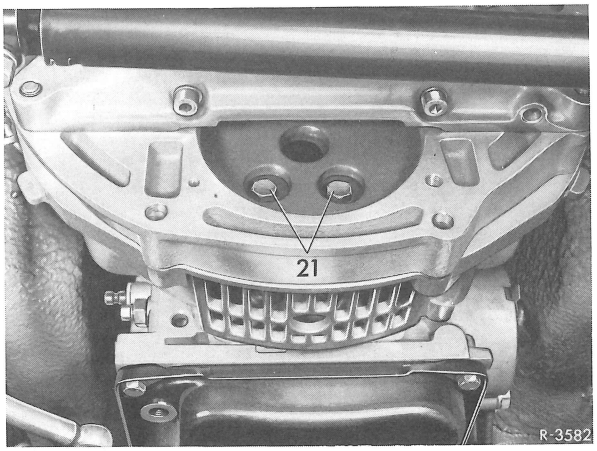


Fig. 10

21 Hex. screws

23 Slightly raise engine transmission unit with top for pit lift BE 11 857 (Fig. 11).

24 Loosen all bolts for attaching transmission to intermediate flange and screw out. The two lateral screws should be removed last.

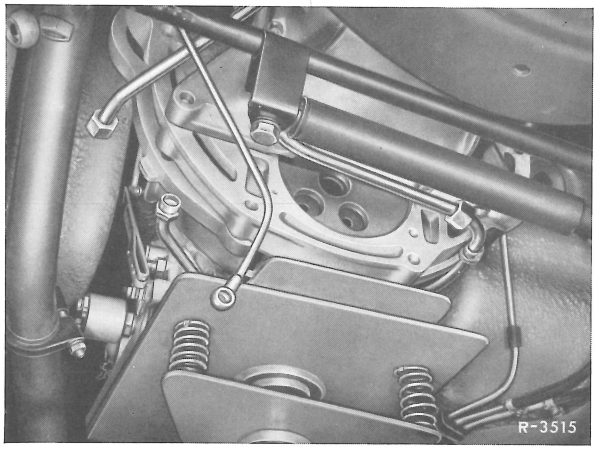


Fig. 11

25 Push transmission with hydraulic clutch or torque converter in direction of rear axle until the bearing journal of the hydraulic clutch can no longer touch the intermediate flange.

26 Carefully lower transmission with hydraulic clutch or torque converter and then pull out in forward direction (Fig. 12).

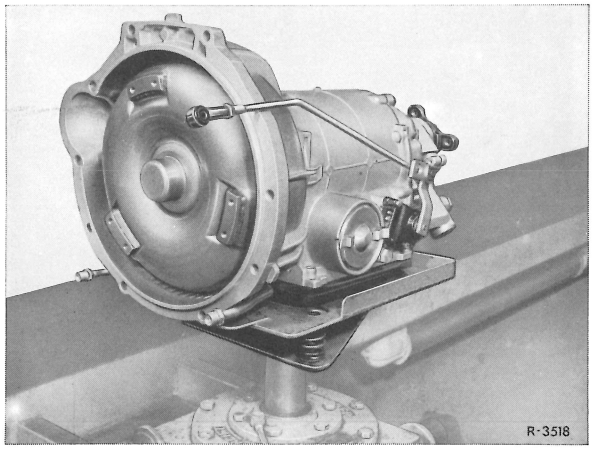


Fig. 12

27 Place transmission in vertical position. Screw holding plate 116 589 05 62 00 to torque converter or hydraulic clutch and pull out in upward direction (Fig. 13).

28 Sight-check hydraulic clutch and clean inside with flushing mandrel 115 589 24 63 00.

If no flushing mandrel is available, replace hydraulic clutch.

Caution! The torque converter cannot be flushed. If abrasions are heavy or if there are chips in the oil, replace.

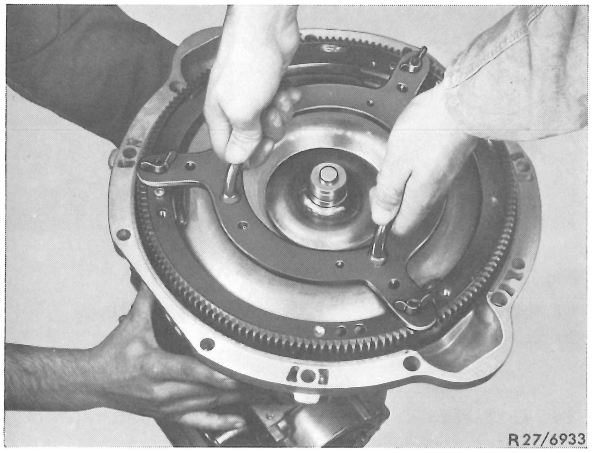


Fig. 13

Installation

29 Prior to installing the transmission, thoroughly flush transmission oil cooler in lower water header including feed lines with syringe 112 589 00 72 00 and dry cleaning gasoline and blow out. Also thoroughly clean and blow out all pipelines.

Caution! All exchange and warranty transmissions are provided with a guard for the vacuum box. This guard prevents damage to vacuum box during shipment or installation of transmissions. Remove guard only

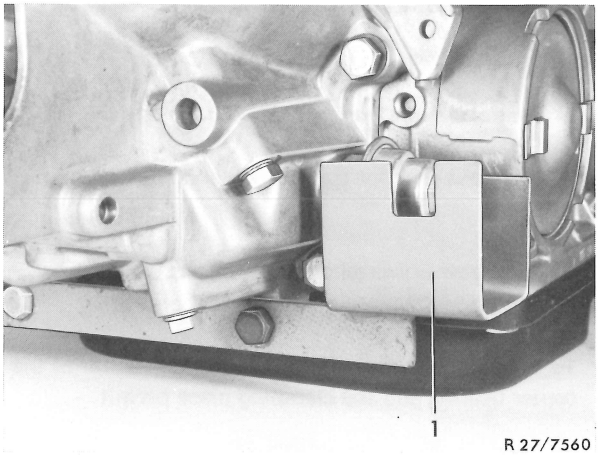


Fig. 14

after installing transmission, then screw back to removed transmission and return together with the latter (Fig. 14).

30 Place transmission in vertical position. Screw holding plate 116 589 05 62 00 on torque converter or on hydraulic clutch. Move claws of drive flange (32) into engaging direction opposite pump wheel (Fig. 15). Grease centering pin and drive flange (32) of torque converter or of hydraulic clutch with some molykote.

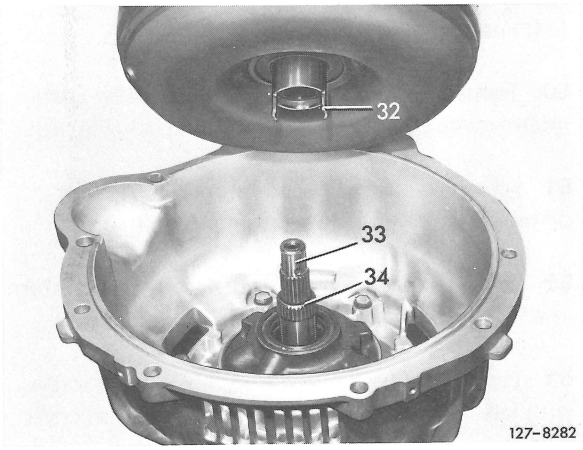


Fig. 15

32 Drive flange
33 Drive shaft
34 Stator shaft

31 Carefully introduce torque converter or hydraulic clutch, turning lightly back and forth (Fig. 13).

Caution! With the torque converter or hydraulic clutch correctly installed, dimension "K" should be more than 4 mm (Fig. 16). Also note that when introducing torque converter or hydraulic clutch, the sealing lip of the radial sealing ring in primary pump housing is not damaged.

Check dimension "K" once again prior to flanging on transmission.

32 Place transmission on vehicle jack or pit lift. Turn clutch in such a manner that two fastening bores are at bottom.

33 Rotate engine until two bores (12) in driven plate (23) for fastening bolts of clutch are at bottom (Fig. 17).

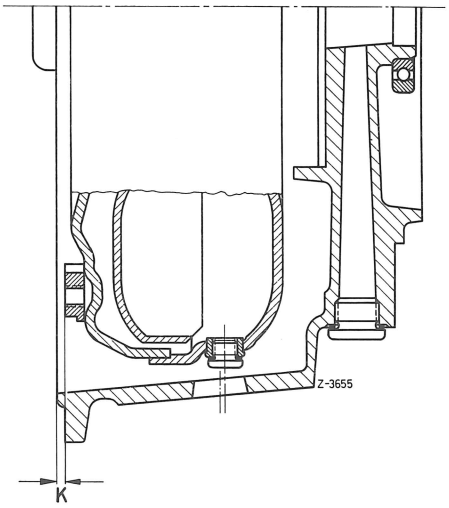


Fig. 16

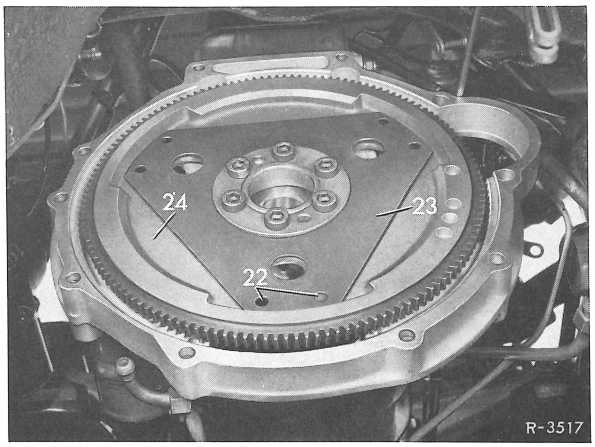


Fig. 17

22 Fastening hole
23 Driven plate
24 Flywheel

34 Introduce transmission and lift until the lower bolt holes of the clutch housing are in alignment with the bores in the intermediate flange. Push transmission forward until clutch housing is well seated. Do not use force.

35 Screw transmission with fastening bolts to engine flange.

36 After screwing engine and transmission to round centering of clutch bowl, force torque converter with a screw driver through cooling slots on clutch bowl in forward direction (in direction of arrow Fig. 18) so that the distance "A" (Fig. 18) is cancelled.

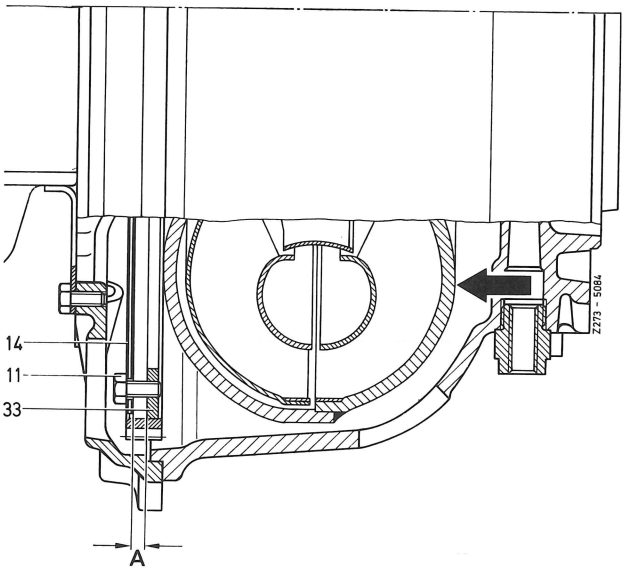


Fig. 18

37 Screw six hex. screws 12 K (M 8 x 14) into hydraulic clutch or torque converter and tighten to 45 Nm (4.5 kpm) (item 21 in Fig. 10). Screw cover plate (5) to clutch housing (Fig. 2).

38 connect vacuum line (30) to vacuum box (28), while applying counterhold to hex. head (SW 14) on vacuum box (Fig. 9).

39 Screw fastening clip (35) to mounting bracket (36) (Fig. 9).

40 Remove wooden support from under universal shaft and screw universal shaft to transmission.

41 Attach plug for starter lock and back-up light switch (19).

42 Slide control pressure lever (14) on shaft and attach with clamping screw (Fig. 8).

43 Connect cable to kickdown solenoid valve (Fig. 8).

44 Connect speedometer shaft (16) to transmission (Fig. 7).

45 Attach selector rod (25), to range selector lever (26) (Fig. 7).

46 Check rear engine mount (18) and screw to transmission (Fig. 6).

47 Install rear engine carrier (17), screw-in both fastening screws (27) of engine mount and tighten (Fig. 5).

48 Screw-on mounting bracket (20) for front exhaust pipe (Fig. 5).

49 Remove vehicle from supporting stands, move slightly back and forth, then tighten universal shaft clamping nut with torque wrench 115 589 07 07 05 and open end wrench 00 589 13 01 00 to 30 Nm (3.0 kpm) (Fig. 4).

50 Tighten fastening screws (7) of propeller shaft intermediate bearing to 20 Nm (2.0 kpm) (Fig. 4).

51 Screw feed line (11) and return line (12) for oil cooler to transmission housing (Fig. 2).

52 Screw fastening clips (10) of feed line and return line for oil cooler left and right to oil pan (Fig. 3).

53 Turn both lines toward transmission and screw with fastening clips (13) to front transmission cover (Fig. 2).

54 Screw oil filler pipe (1) to oil pan (3) of transmission and screw oil drain plug (2) into hydraulic clutch (Fig. 1).

55 Connect minus cable to battery.

56 Fill up with transmission fluid (27.3–010).

Disassembly and Reassembly of Front Transmission Cover with Primary Pump

W 4 B 025

Tightening Torque	Nm	(kpm)
Hex. bolts for primary pump	20	(2.0)

Special Tools

Assembly mandrel for ball bearing in front transmission cover	115 589 02 35 02
Pulling fixture for ball bearing in front transmission cover	116 589 07 33 00
Removing fixture for radial sealing ring of primary pump	116 589 08 33 00
Insertion sleeve for primary pump	116 589 19 61 00
2 Studs	self-made

Disassembly

1 Unscrew fastening bolts (4) (Fig. 1).

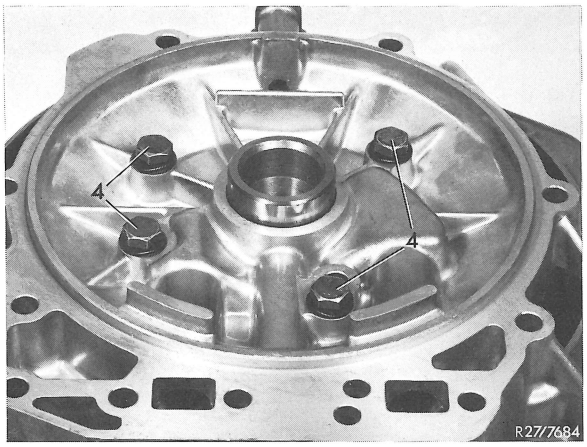


Fig. 1
4 Fastening bolts

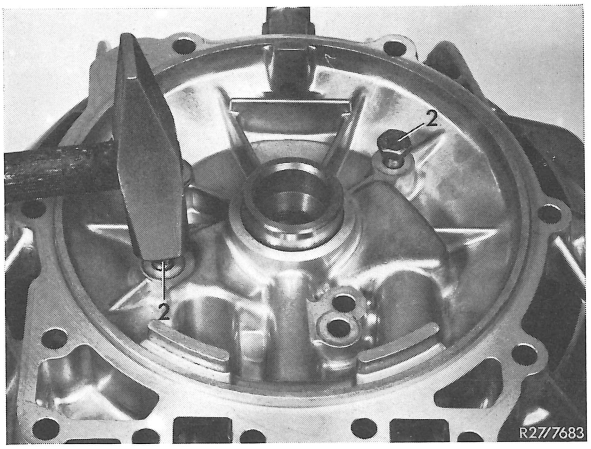


Fig. 2
2 Hex. bolts

2 Screw in two hex. bolts (2) approx. 50 mm long in opposite location (Fig. 2).

3 Loosen primary pump from transmission cover (1) by means of light blows against the two hex. bolts (2) (Fig. 2).

27.3 Disassembly and Reassembly of Front Transmission Cover with Primary Pump

4 Then remove primary pump (11) with intermediate plate (7) from front transmission cover (1) (Fig. 3).

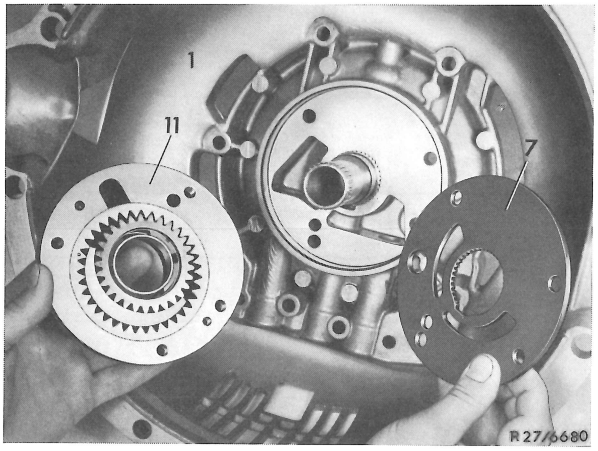


Fig. 3

1 Transmission cover
7 Intermediate plate
11 Pump housing

5 Remove primary pump gears (8 and 9) from pump housing (11) (Fig. 4).

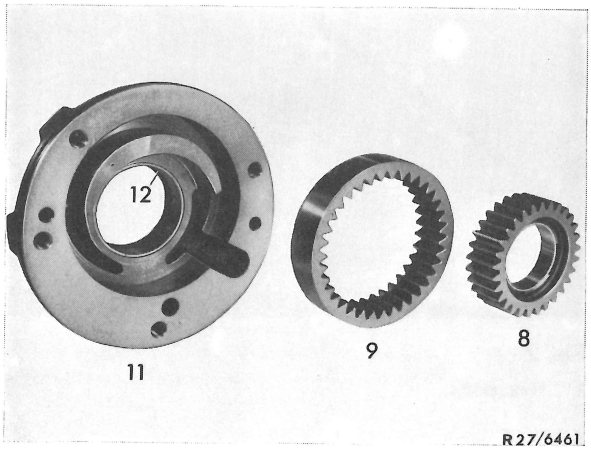


Fig. 4

8 Drive gear
9 Ring gear
11 Pump housing
12 Bronze bushing

6 Remove O-ring (10) and radial seal (13), if required (Fig. 5).

Note: The remover 116 589 08 33 00 shown in Fig. 6 can be used with sleeve also on assembled transmission.

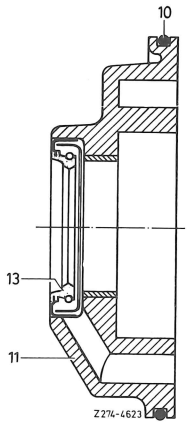


Fig. 5

10 O-ring
11 Pump housing
13 Radial sealing ring

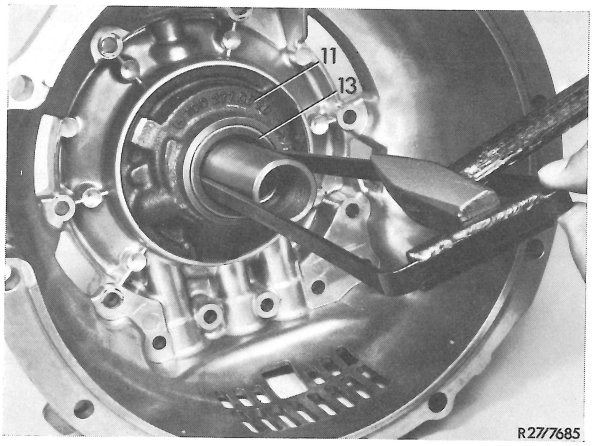


Fig. 6

11 Pump housing
13 Radial sealing ring

7 If the transmission cover must be renewed, pull ball bearing (3) with puller 116 589 07 33 00 from front transmission cover (1) (Fig. 7).

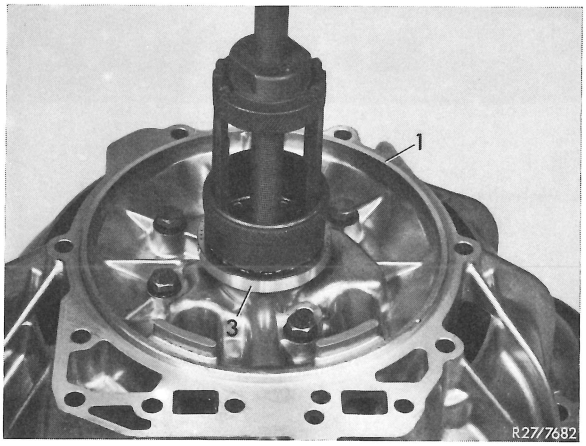


Fig. 7

1 Transmission cover
3 Ball bearing

Assembly

8 Install new O-ring (10) and radial sealing ring (13 into pump housing (11) (Fig. 5).

9 Lubricate primary pump gears (8 and 9) and insert in pump housing (11). The bevelled outer edge of the pump gear (9) should face the bronze bushing (12) (Fig. 4).

10 Insert intermediate plate (7) in such a manner that the fastening holes for the primary pump are in alignment (Fig. 8).

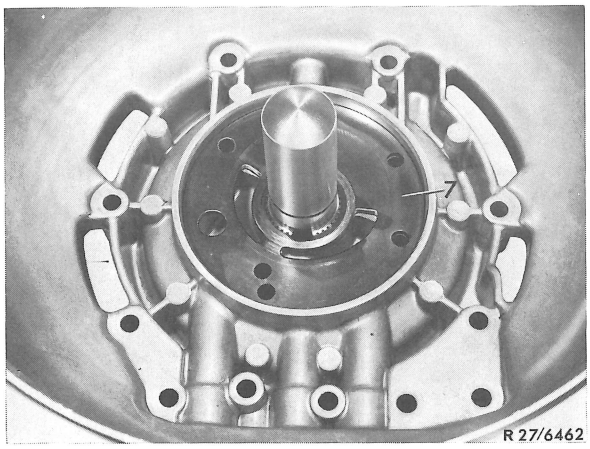


Fig. 8
7 Intermediate flange

11 Place insertion sleeve 116 589 19 61 00 on stator shaft and screw two studs into primary pump for guiding (Fig. 9).

12 Insert primary pump into transmission cover and tighten fastening screws (4) to 20 Nm (2.0 kpm) (Fig. 1).

13 Press ball bearing (3) on transmission cover (1) with assembly mandrel 115 589 02 35 02 (Fig. 10).

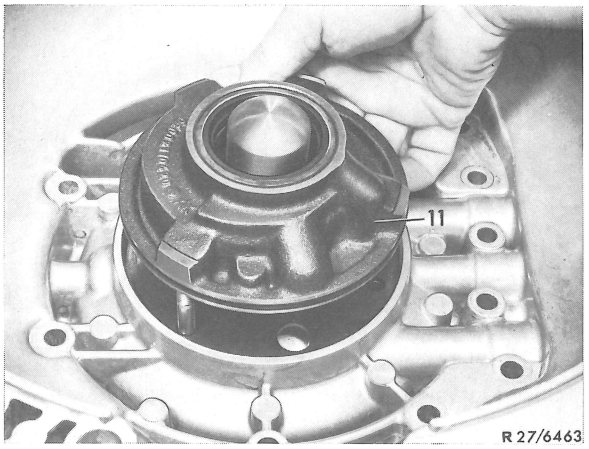


Fig. 9
11 Pump housing

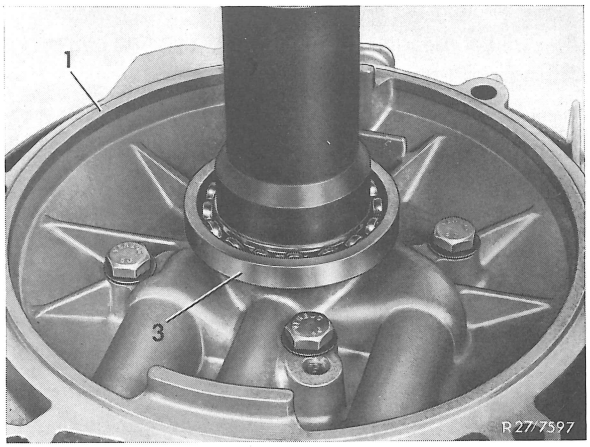


Fig. 10
1 Transmission cover
3 Ball bearing

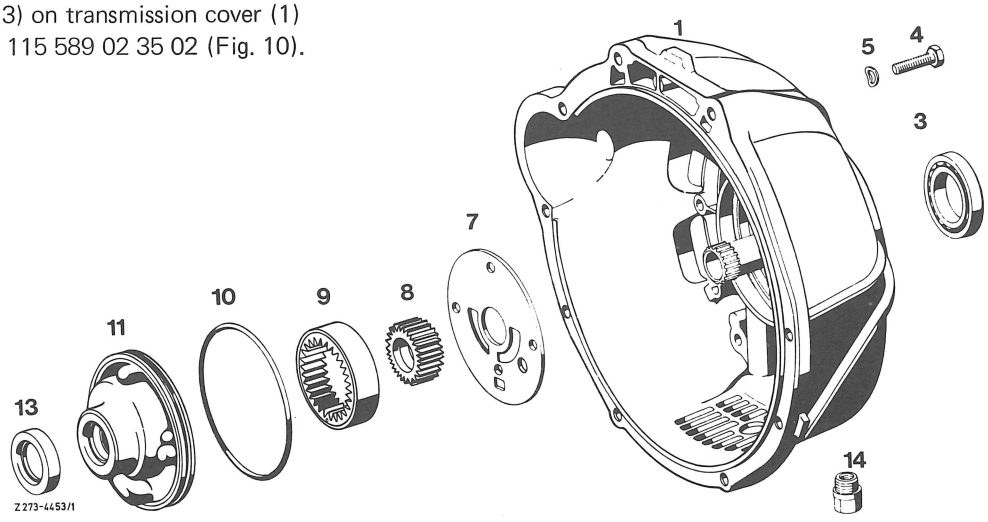


Fig. 11
1 Transmission cover
3 Ball bearing
4 Fastening bolt
5 Spring washer
7 Intermediate plate
8 Drive gear
9 Ring gear
10 O-ring
11 Primary pump housing
13 Radial sealing ring
14 Threaded plug

27.3 Disassembly and Reassembly of Front Transmission Cover with Primary Pump

K 4 C 025

Tightening Torque	Nm	(kpm)
Hex. bolts for primary pump	20	(2.0)

Special Tools

Assembly mandrel for ball bearing in front transmission cover	115 589 02 35 02
Puller for ball bearing in front transmission cover	116 589 07 33 00
Remover for radial sealing ring of primary pump	116 589 08 33 00

Disassembly

1 Pull ball bearing (5) with puller 116 589 07 33 00 from front transmission cover (7) (Fig. 1).

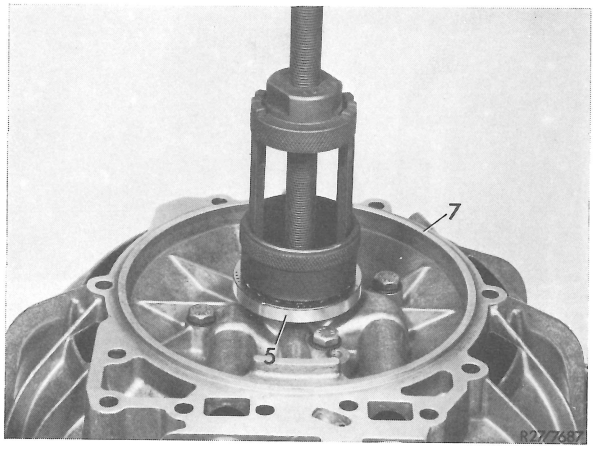


Fig. 1
5 Ball bearing
7 Transmission cover

2 Unscrew fastening bolts (4) (Fig. 2).

3 Screw-in two opposite hex. bolts (8) approx. 50 mm long (Fig. 3).

4 Loosen primary pump from transmission cover (7) by applying light blows against two hex. bolts (8) (Fig. 3).

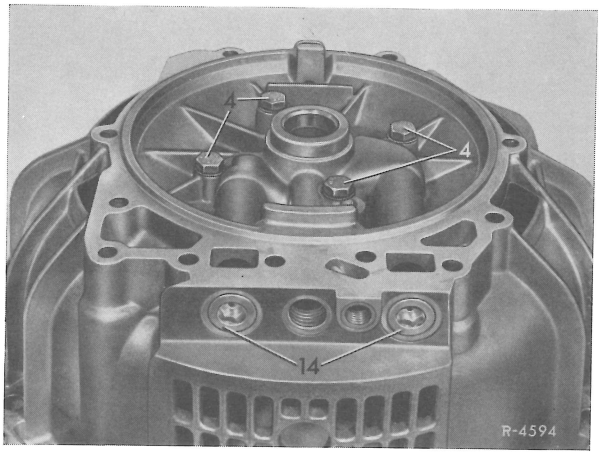


Fig. 2
4 Fastening bolts
14 Closing plugs

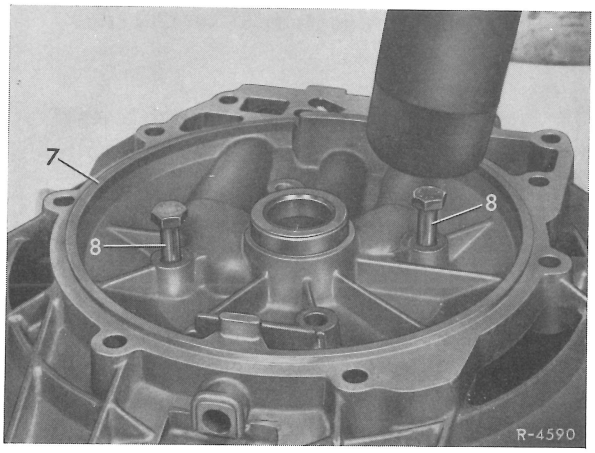


Fig. 3
7 Transmission cover
8 Hex. bolts

5 Then take primary pump (1) with intermediate plate (9) out of front transmission cover (7) (Fig. 4).

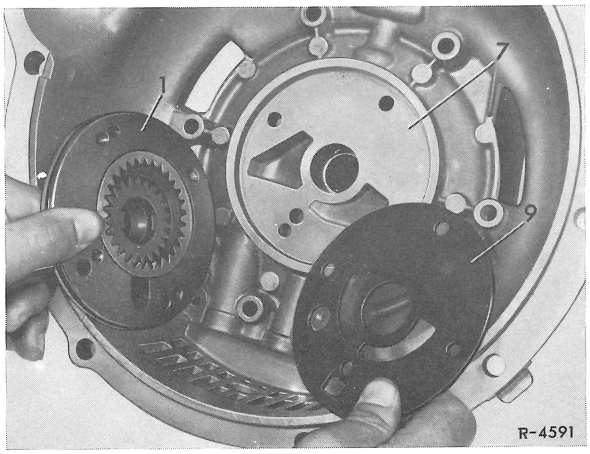


Fig. 4

1 Pump housing
7 Transmission cover
9 Intermediate plate

6 Remove primary pump gears (10 and 11) from pump housing (1) (Fig. 5).

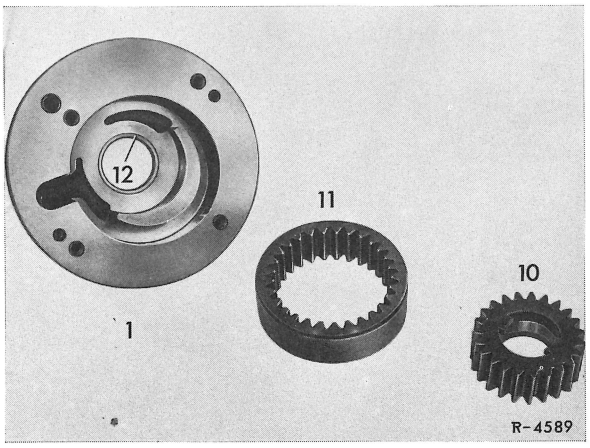


Fig. 5

1 Pump housing
10 Drive gear
11 Ring gear
12 Bronze bushing

7 Remove O-ring (3) and radial sealing ring (2) (Fig. 7).

Note: The remover 116 589 08 33 00 shown in Fig. 6 can also be used together with sleeve on assembled transmission

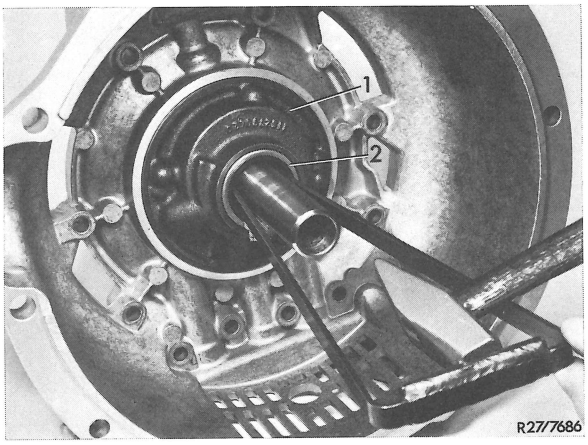


Fig. 6

1 Pump housing
2 Radial sealing ring

Assembly

8 Install new O-ring (3) and radial sealing ring (2) into pump housing (1) (Fig. 7).

9 Lubricate primary pump gears (10 and 11) and insert into pump housing (1), with the driven end of the drive gear (10) facing the transmission end. The chamfered outer edge of the pump gear (11) should face the bronze bushing (12) (Fig. 5).

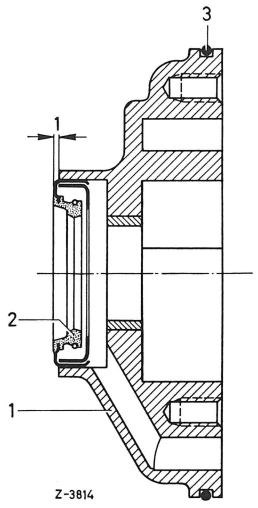


Fig. 7

1 Pump housing
2 Radial sealing ring
3 O-ring

10 Insert intermediate plate (9) and primary pump (1) into transmission cover (7) (Fig. 4).

27.3 Disassembly and Reassembly of Front Transmission Cover with Primary Pump

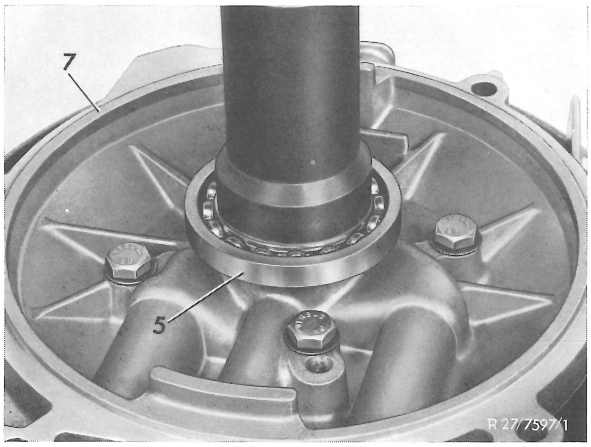


Fig. 8

5 Ball bearing
7 Transmission cover

11 Tighten fastening bolts (4) to 20 Nm (2.0 kpm) (Fig. 2).

12 Press ball bearing (5) with assembly mandrel 115 589 02 35 02 on transmission cover (7) (Fig. 8).

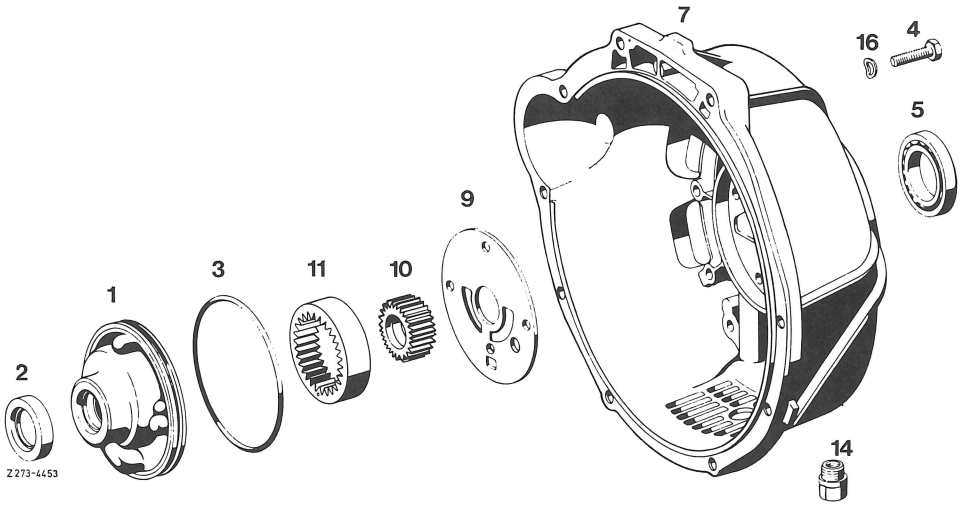


Fig. 9

1 Primary pump housing
2 Radial sealing ring
3 O-ring
4 Fastening screw
5 Ball bearing
7 Transmission cover
9 Intermediate plate
10 Drive gear
11 Ring gear
14 Threaded plug
16 Spring washer

Revision: due to installation of new housings.

Adjusting Data

End play of front transmission housing cover or of gear assembly			0.4 + 0.1
Idle travel of brake band pistons B 1 and B 2			3.0 – 4.0
Adjusting screw brake band B 3			Tighten adjusting screw to 0.5 kpm, then loosen by 1 3/4 turns and tighten counternut.
Thickness of compensating washers for grooved bearing front transmission housing cover			0.1–0.2–0.5
Lengths of thrust pins	for brake band B 1 and B 2		22 – 23 – 24 – 25 – 26 – 27 – 28
	for brake band B 3		45
	for modulating pressure transmitter	bright	39.65
		yellow	40.15
		black	40.65

Tightening Torques	Nm	(kpm)
Fastening bolts for oil pan on transmission housing	7	(0.7)
Fastening bolts for oil filter	4	(0.4)
Hex. bolts for shift valve housing on transmission housing	13	(1.3)
Slotted nut on three-legged flange	118	(12.0)
Hex. bolts for rear transmission housing	13	(1.3)
Hex. bolts for front transmission housing	13	(1.3)
Kickdown magnetic valve	29	(3.0)
Hex. bolts for modulating pressure housing on transmission housing	7	(0.7)
Hex. bolts for leaf spring of detent plate	10	(1.0)
Hexagon socket bolt for detent plate on shaft of range selector lever	10	(1.0)
Cheesehead bolts for starter lock and backup light switch	5	(0.5)
Adjusting screw B 3	5	(0.5)

27.3 Disassembly and Assembly of Transmission

Special Tools

Insertion ring for double piston B 1 W 4 B 025	116 589 14 61 00
Insertion ring for double piston B 1 K 4 C 025	116 589 05 61 00
Assembly stand for automatic transmission	116 589 06 59 00
Screw driver for slotted plugs	116 589 00 11 00
Pin spanner for slotted nut	115 589 08 07 00
Assembly fixture for brake band piston B 1	115 589 04 59 00
Measuring device for thrust pin modulating pressure	115 589 11 21 00
Measuring bridge	116 589 00 21 00
Locating pin for shift valve housing	self-made
2 Studs for shift valve housing	self-made
Locating pin for starter lock and backup light switch	115 589 18 63 00
Introducing ring brake band piston B 2 (88 mm dia.)	115 589 18 61 00
Introducing ring brake band piston B 2 (92 mm dia.)	116 589 05 14 00

Notes

Special attention must be paid to absolute cleanliness during all assembly jobs. The perfect function of the transmission depends on the fact that there is no dirt on transmission members, on control valves and in oil circuit. Therefore, wash all parts carefully upon disassembly, flush oil ducts and dry. **Do not use washing gasoline for rubber seals,** since this type of gasoline will attack the rubber.

Use spirit of alcohol for cleaning rubber parts. Also note that the parts are not touched with woolen rags, since even minor contaminations (for example by fuzz) may result in trouble.

When assembling transmission members, provide bearing points and sliding parts with specified automatic transmission fluid.

Disassembly

1 Position transmission with oil pan up.

Remove oil pan after loosening the four fastening bolts (2) including gasket and washer (3) (Fig. 1).

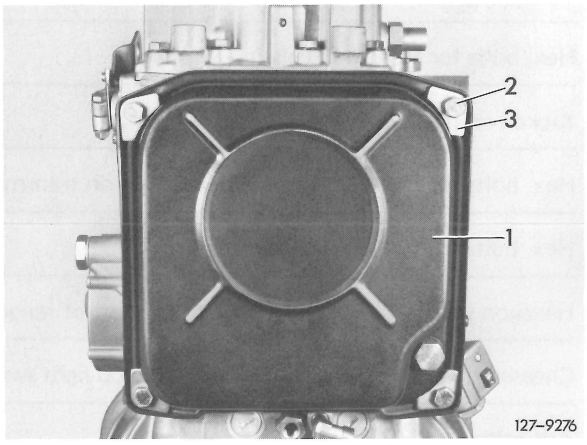


Fig. 1
1 Oil pan
2 Fastening bolt
3 Washer

240

2 Screw transmission to assembly stand 116 589 06 59 00 (Fig. 2).

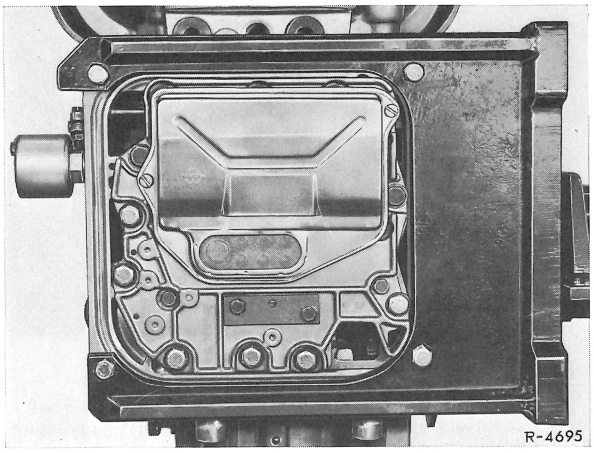


Fig. 2

3 Remove oil filter (4) (Fig. 3). Unscrew fastening bolts (6) of shift valve housing (7). Move range selector lever between position "P" and "R" and remove shift valve housing (Fig. 4).

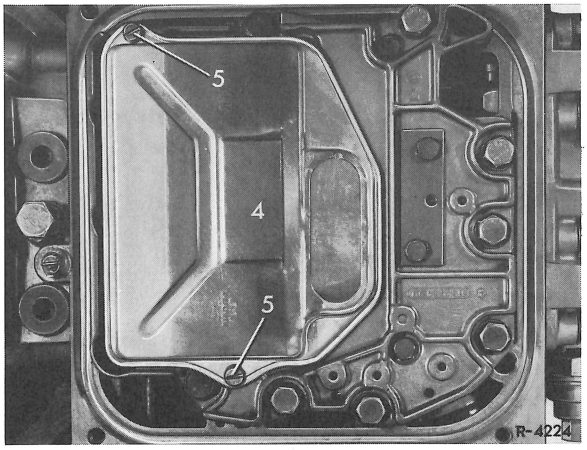


Fig. 3
4 Oil filter
5 Fastening bolts

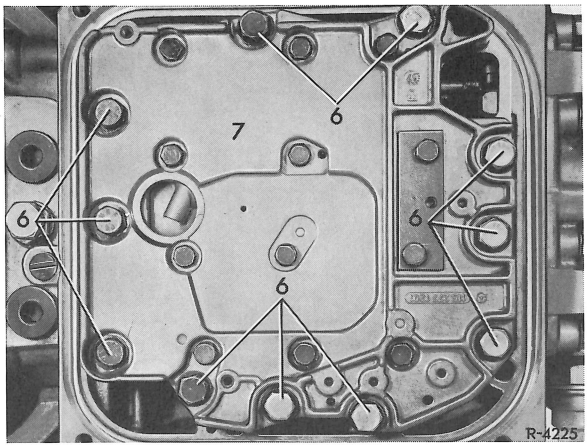


Fig. 4
6 Fastening bolts
7 Shift valve housing

4 Remove plug pipes (8) and pull sealing caps (9) from plug pipes (Fig. 5).

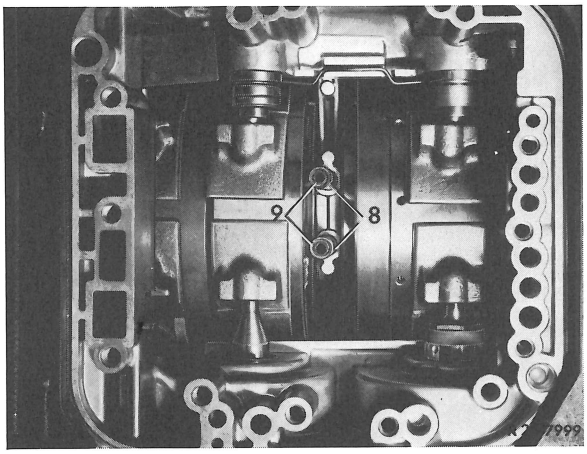


Fig. 5
8 Plug pipes
9 Sealing caps

5 Swivel transmission on assembly fixture in such a manner that the rear transmission housing faces upwards. Unscrew vacuum box (10) together with thrust pin (12) (Fig. 6). Unscrew adjusting screw (107) with compression spring (107) on transmissions for Diesel vehicles (Fig. 50).

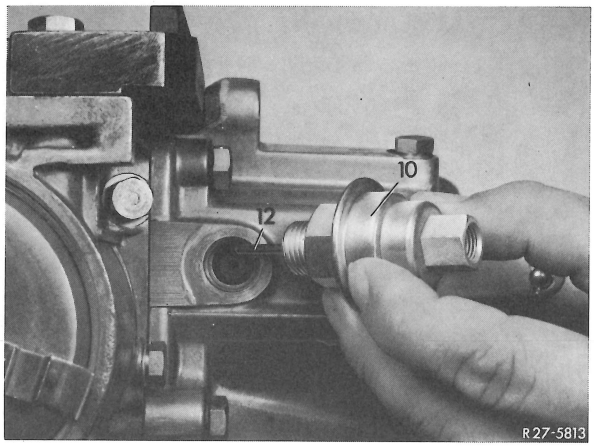


Fig. 6
10 Vacuum box
12 Thrust pin

6 Unscrew plug for secondary pump (13) with screw driver for slotted plugs 115 589 00 11 00 and remove compression spring (14) (Fig. 7).

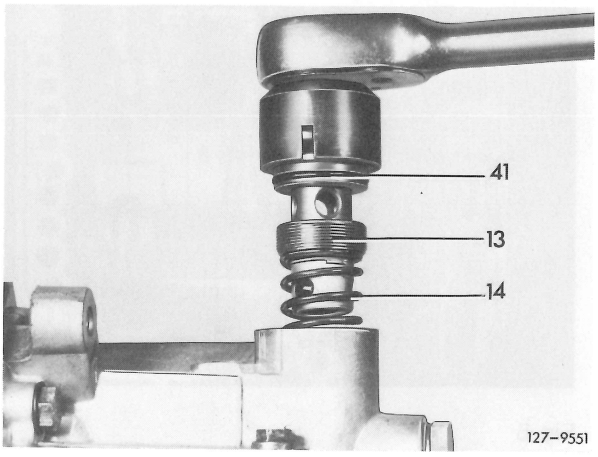


Fig. 7
13 Plug for secondary pump
14 Compression spring
41 O-ring

7 Unlock slotted nut on three-legged flange and unscrew by means of pin spanner 115 589 08 07 00. Pull three-legged flange from drive shaft.

8 Unscrew fastening bolts for rear transmission housing, loosen rear transmission housing by means of light blows with plastic hammer and remove.

For disassembly of rear transmission housing refer to 27.3–500.

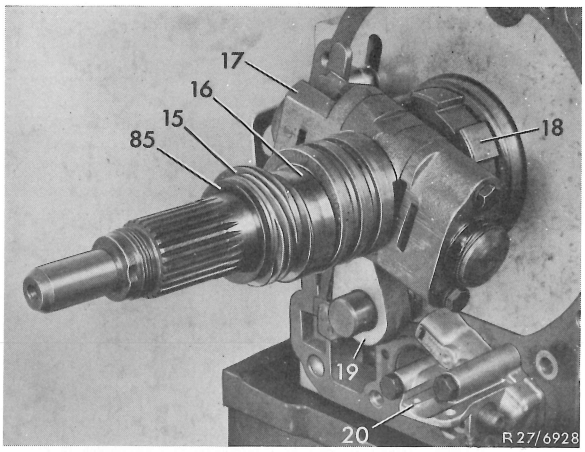


Fig. 8
15 Worm gear speedometer drive
16 Eccentric ring secondary pump
17 Centrifugal governor
18 Parking lock gear
19 Parking lock pawl
20 Modulating pressure housing
85 Plate spring

9 Remove plate spring (85) with worm gear of speedometer drive (15), eccentric ring for secondary pump (16) and centrifugal governor (17) from drive shaft (Fig. 8).

10 Remove parking lock pawl (19) and spreading spring. Pull parking lock gear (18) from drive shaft (Fig. 8).

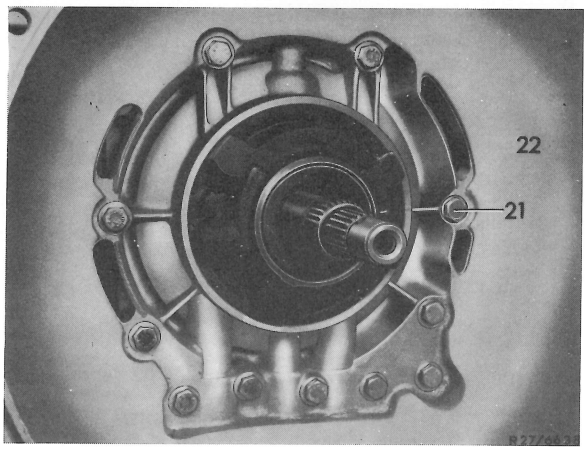


Fig. 9
21 Fastening bolts
22 Front transmission housing

11 Swivel transmission on assembly stand so that the front transmission housing faces upwards. Unscrew fastening bolts (21) for front transmission housing (22) (Fig. 9).

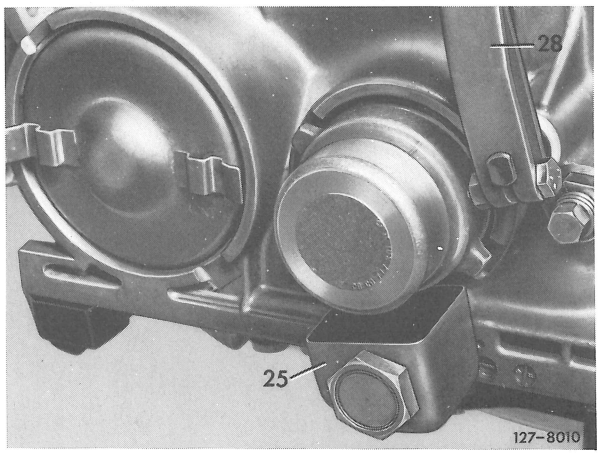


Fig. 10
25 Solenoid valve
28 Control pressure lever

12 Loosen front transmission housing by light blows with a plastic hammer and remove.

13 Swivel transmission on assembly bench into horizontal position.

14 Unscrew solenoid valve (25) and control pressure lever (28) (Fig. 10).

15 Remove circlip (24) from brake band piston cover B 2 (65) and pull out brake band piston cover (Fig. 11).

16 Pull brake band piston B 2 out of brake band piston cover.

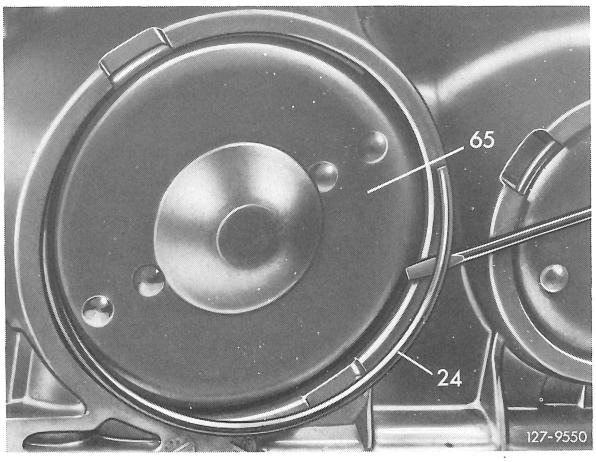


Fig. 11
24 Circlip
65 Brake band piston cover B 2

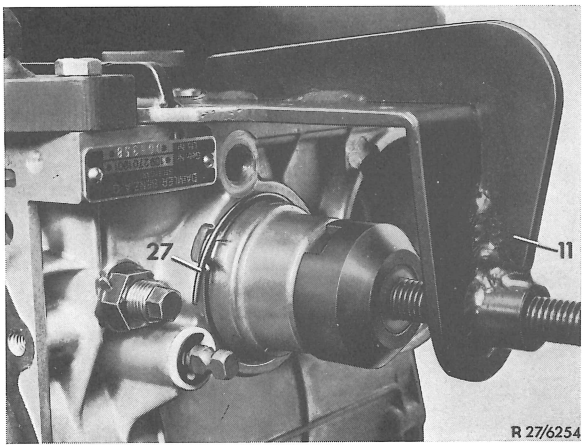


Fig. 12
11 Assembly device 115 589 04 59 00
27 Circlip

17 Mount assembly device 115 589 04 59 00 for brake band piston cover B 1. Tighten assembly device and remove circlip (27) (Fig. 12).

18 Slacken assembly device and unscrew fastening screws. Remove assembly device with brake band piston cover (29), brake band piston B 1 (30) and both compression springs (31) (Fig. 13).

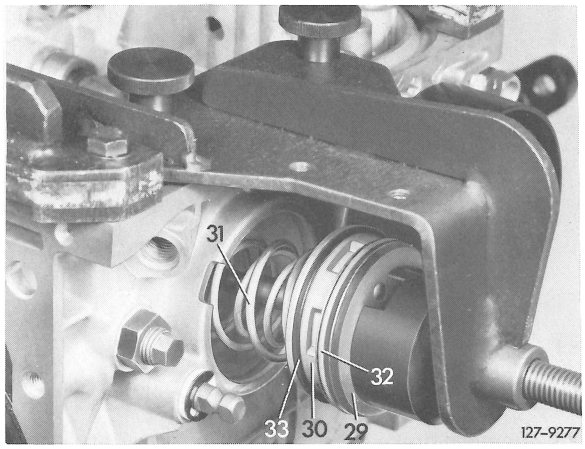


Fig. 13
29 Brake band piston cover B 1
30 Brake band piston B 1
31 Compression spring
32 O-ring
33 Lip sealing ring

19 Remove thrust pin (34) for B 1 and B 2 (Fig. 14).

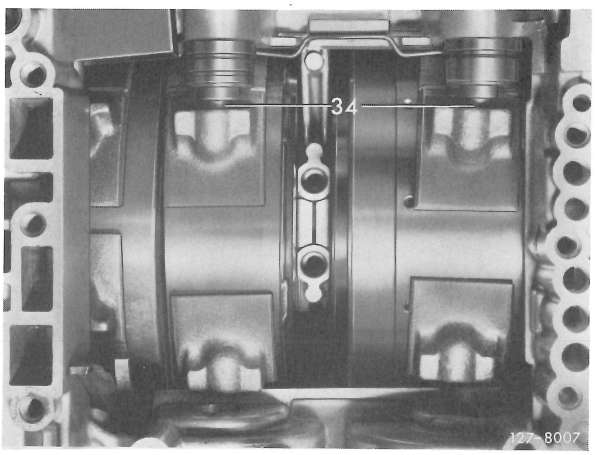


Fig. 14
34 Thrust pin

20 Unlock adjusting screw for brake band B 3 (35) by loosening counter nut (36) and screw out. Remove both thrust pins (37) (Fig. 15).

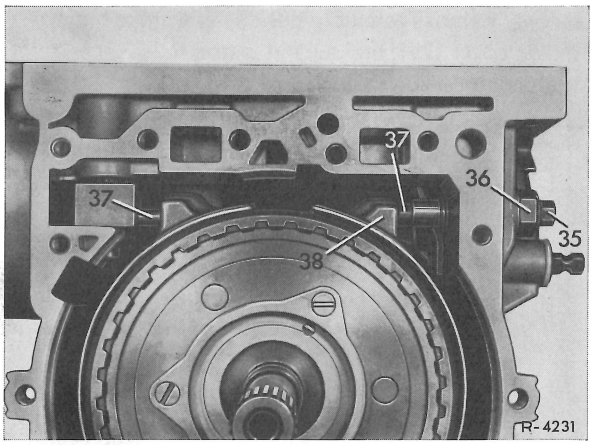


Fig. 15
35 Adjusting screw B 3
36 Counter nut
37 Thrust pin
38 Brake band B 3

21 Remove brake band B 3 (38) in forward direction (Fig. 16).

22 Clamp brake band B 1 (39) on drum by means of a circlip of brake band piston cover B 2 and remove gear assembly (40) from transmission housing (Fig. 17). Brake band B 2 will remain in transmission housing.

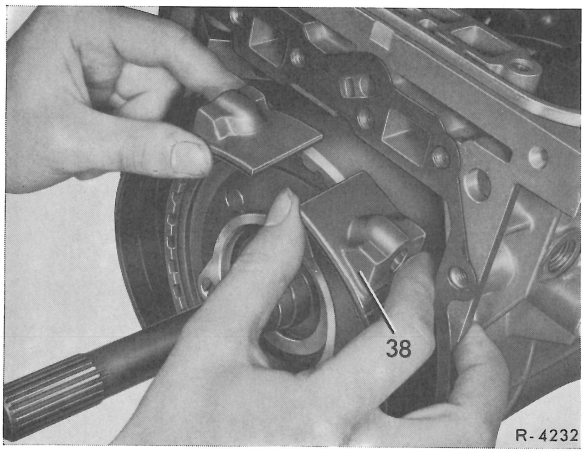


Fig. 16
36 Brake band B 3

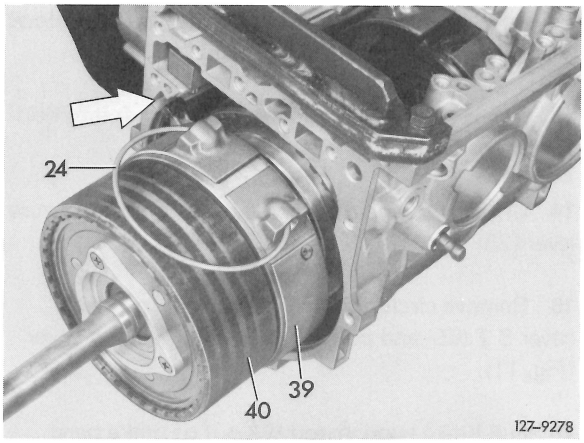


Fig. 17
24 Circlip
39 Brake band B 1
40 Gear assembly

23 Remove brake band B 2 from transmission housing.

24 Remove modulating pressure sleeve housing (20) after loosening three fastening screws including seal (42) for rear transmission housing (Fig. 18).

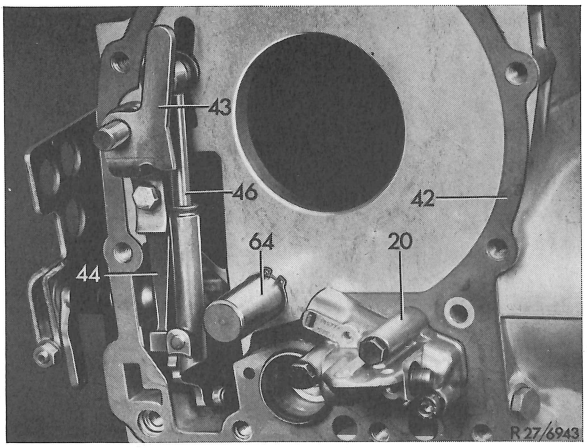


Fig. 18

20 Modulating pressure valve housing
42 Gasket
43 Detent parking lock
44 Leaf spring
46 Elastic linkage
64 Bearing pin parking lock pawl

25 Remove bracket (43) and leaf spring (44).

26 Unscrew clamping screw (45) on detent plate (Fig. 19).

27 Pull out range selector lever (48) and remove detent plate (49) with elastic linkage (46) from transmission housing. Remove needle bearing (47) (Fig. 20).

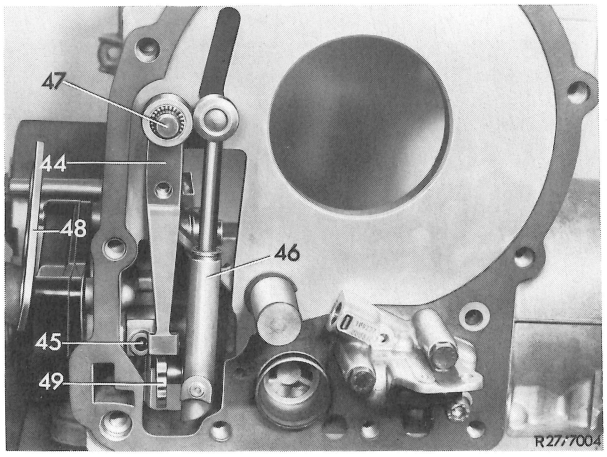


Fig. 19

44 Leaf spring
45 Clamping screw
46 Elastic linkage
47 Needle bearing
48 Range selector lever
49 Detent plate

28 Remove lock (101) with plastic washer (102) and take out control pressure shaft (100) (Fig. 20).

29 Remove transmission housing from assembly stand.

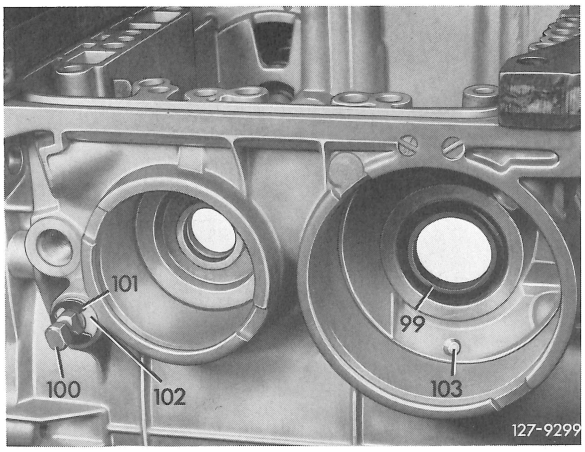


Fig. 20

99 Lip sealing ring
100 Control pressure shaft
101 Lock
102 Plastic washer
103 Throttle bore

30 Remove starter locking and backup light switch (50) after loosening fastening screws (Fig. 21).

31 Remove locking ring for brake band piston cover B 3 (24) and pull out cover (65) (Fig. 21).

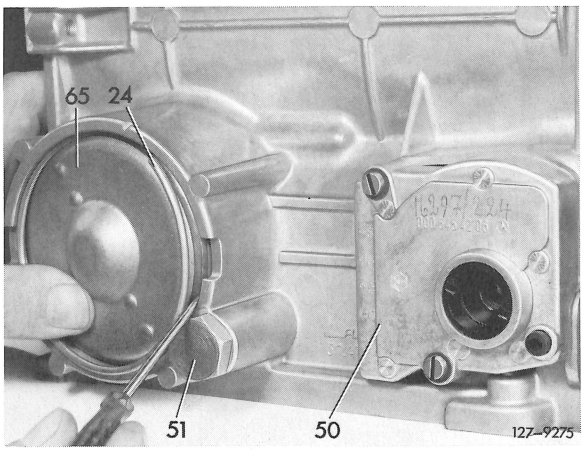


Fig. 21

24 Locking ring
50 Starter locking switch
51 Quick-filling valve
65 Brake band piston cover

32 Remove brake band piston B 3 (53) and take out truncated cone spring (54) (Fig. 22).

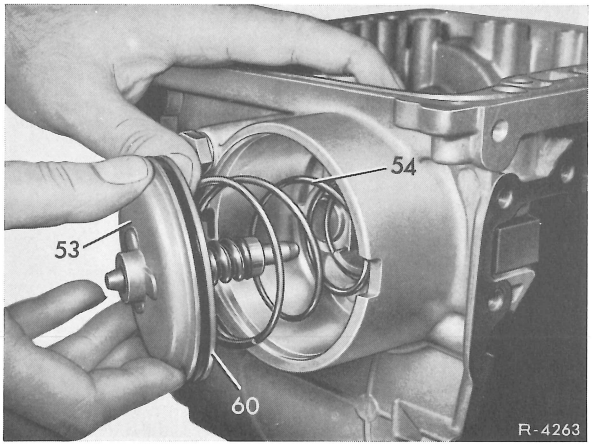


Fig. 22
53 Brake band piston B 3
54 Truncated cone spring
60 Lip sealing ring

33 Pull clamp (55) for bearing pin from brake band lever B 3 and knock out bearing pin (57) in downward direction (Fig. 23).

34 Remove brake band lever B 3 (56) from transmission housing.

35 Remove locking clip (58) for pressure body B 1 (59) and B 2 (61) and take out both pressure bodies (Fig. 24).

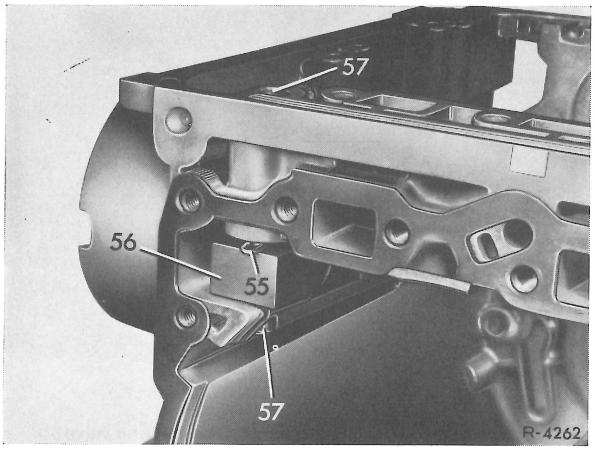


Fig. 23
55 Clamp
56 Brake band lever B 3
57 Bearing pin

Caution! The sealing rings still remaining in transmission housing cannot be used for a spare housing. Press-in new sealing rings carefully.

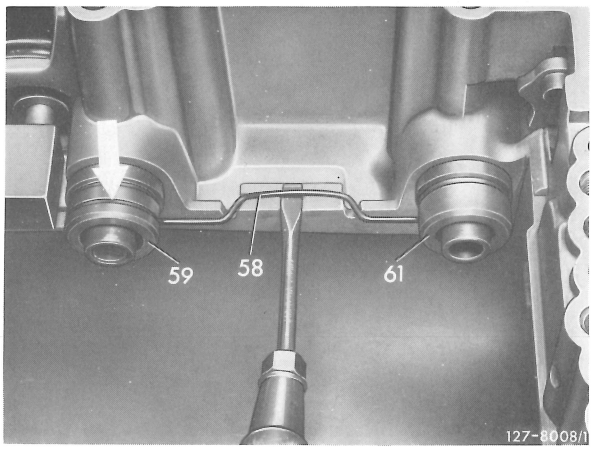


Fig. 24
58 Locking clip
59 Pressure body B 1
61 Pressure body B 2

Assembly

36 Insert brake band lever B 3 (56) into transmission housing. Introduce bearing pin (57) from above and secure with clamp (55) (Fig. 23).

37 Insert O-rings (104) into receiving holes for pressure bodies. Press sealing ring (105) into bore for range selector lever flush with housing (Fig. 25).

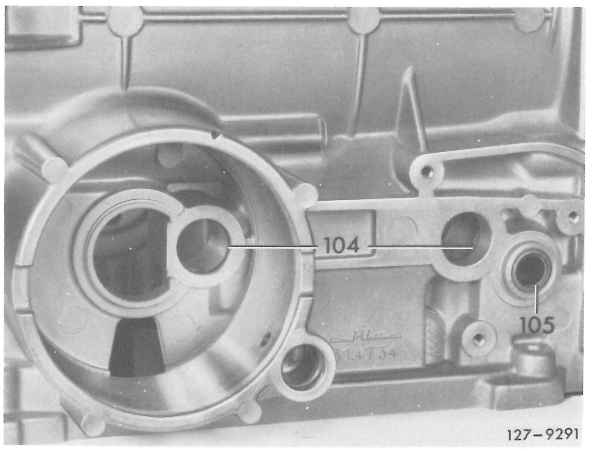


Fig. 25
104 O-rings
105 Sealing ring

38 Mount starter locking and backup light switch (50) and tighten fastening screws to 5 Nm (0.5 kpm) (Fig. 26).

39 Mount closing plug (51) or on transmission 2nd version quick-filling valve (51) with new aluminum sealing ring (Fig. 26).

40 Insert brake band piston B 3 (53) with a new lip sealing ring (60) and compression spring (54) into transmission housing (Fig. 22).

41 Mount brake band piston cover B 3 (65) with a new O-ring (80) and secure with locking ring (24) (Fig. 26).

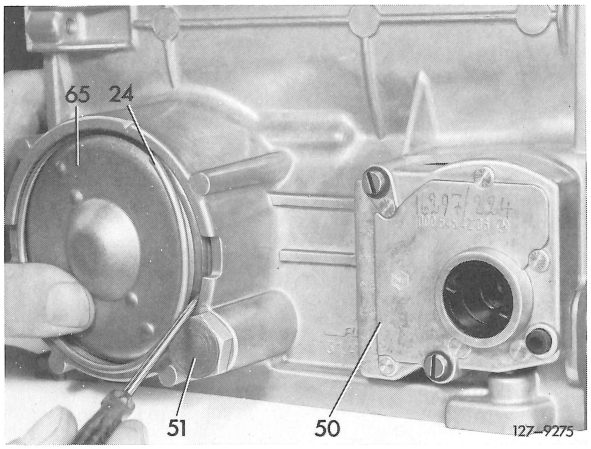


Fig. 26

24 Locking ring
50 Starter locking and backup light switch
51 Quick-filling valve
65 Brake band piston cover

42 Insert detent plate (49 in Fig. 19) into transmission housing. Introduce range selector lever (48) with shaft (96 in Fig. 27) into teeth of detent plate and tighten clamping screw (45) to 10 Nm (1.0 kpm) (Fig. 19).

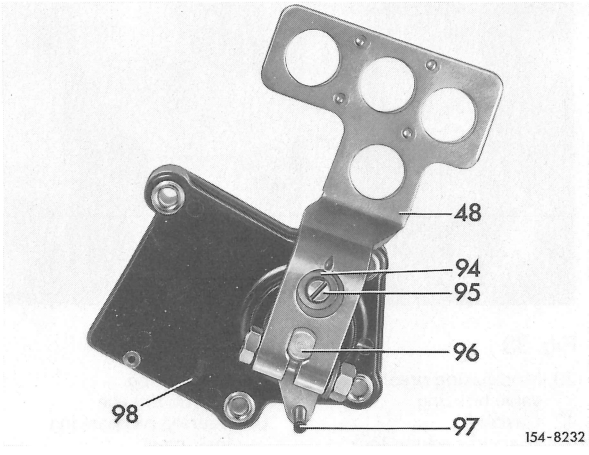


Fig. 27

Starter locking and backup light switch 1st version

48 Range selector lever
94 Washer
95 Adjusting screw
96 Shaft
97 Locating pin
98 Clamping screw

43 Loosen adjusting screw (95) and introduce locating pin (97) through driver in locating hole in shift housing (Fig. 27 and 28).

44 Tighten adjusting screw (95) and remove locating pin (97) (Fig. 27 and 28).

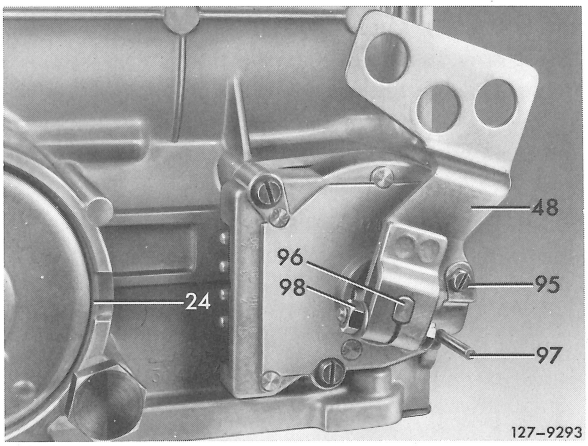


Fig. 28

Starter locking and backup light switch 2nd version

24 Circlip
48 Range selector lever
95 Adjusting screw
96 Shaft
97 Locating pin
98 Clamping screw

45 Clamp transmission housing on assembly fixture.

46 Install control pressure shaft (100), insert plastic washer (102) with lock (101) (Fig. 29).

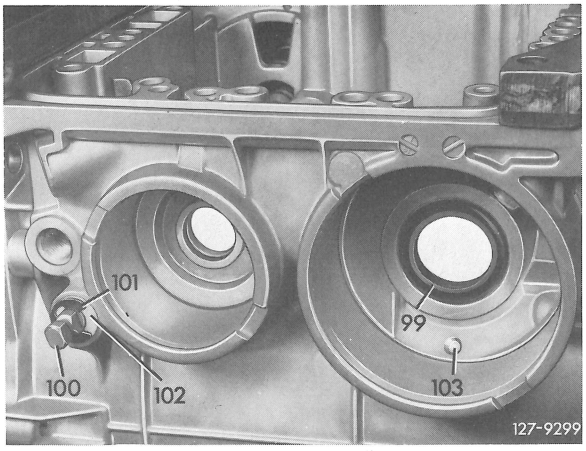


Fig. 29

99 Lip sealing ring
100 Control pressure shaft
101 Lock
102 Plastic washer
103 Throttle hole

47 Press-in radial sealing ring (99) for releasing side B 2 until flush with housing (Fig. 29).

48 Insert pressure body B 1 (59) with two oblong identification grooves (arrow) as well as pressure body B 2 (61) without identification groove into transmission housing and secure with locking clip (58) (Fig. 30).

Caution! Transmission K 4 C 025 with part No. 115 270 07 01 is provided with a pressure body B 1 having only one square identification groove (arrow in Fig. 24). A pressure body B 1 with two grooves is also squarely installed in transmission K 4 C 025 carrying part No. 114 270 21 01.

49 Insert upper brake band guide (81) and lower brake band guide for B 2 (52) into housing (Fig. 30).

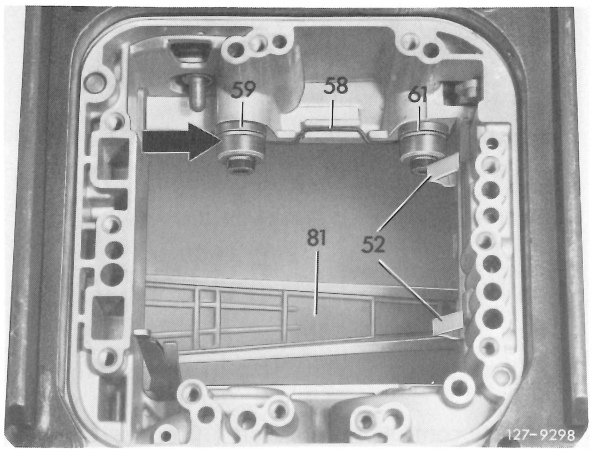


Fig. 30

52 Brake band guide B 2
58 Locking clip
59 Pressure body B 1
61 Pressure body B 2
81 Brake band guide top
→ Identification grooves

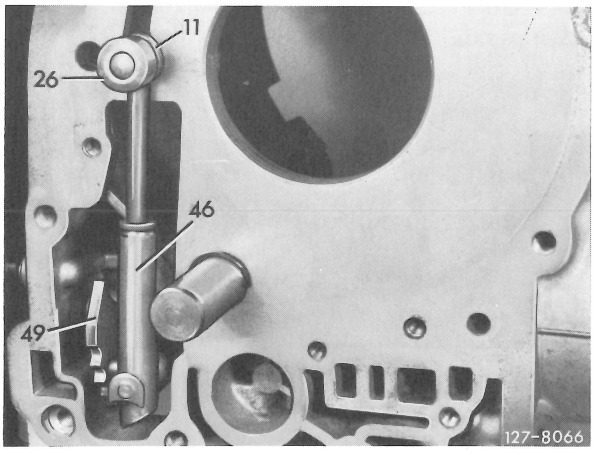


Fig. 31

11 Washer
26 Roller
46 Elastic linkage
49 Detent plate

50 Swivel assembly fixture.

51 Attach elastic linkage (46) with washer (11) and roller (26) (Fig. 31).

52 Attach leaf spring (44) and needle bearing-supported roller (47) (Fig. 32).

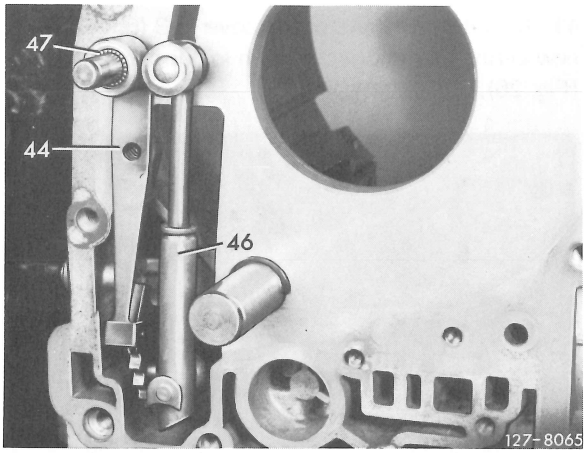


Fig. 32

44 Leaf spring
46 Elastic linkage
47 Needle bearing-supported roller

53 Tighten bracket (43) with hex. screw to 10 Nm (1.0 kpm) and mount bearing pin (64) for parking lock pawl (Fig. 33).

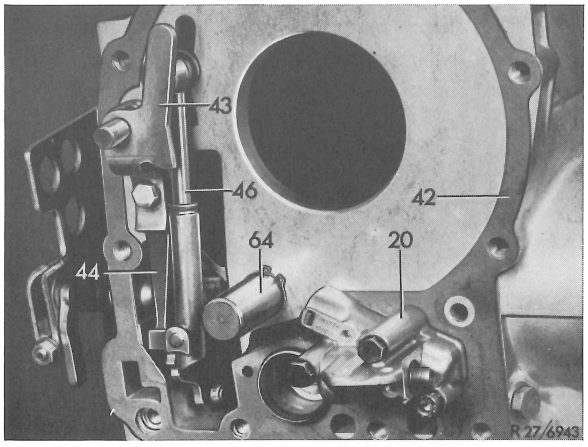


Fig. 33

20 Modulating pressure valve housing
42 Gasket
43 Bracket parking lock
44 Leaf spring
46 Elastic linkage
64 Bearing pin parking lock pawl

54 Mount modulating pressure valve housing (20) with new gasket (42) for rear transmission housing. Tighten fastening screws to 7 Nm (0.7 kpm) (Fig. 33).

Note: Prior to tightening modulating pressure valve housing, center gasket on bores for fitted pins.

Check valve for easy operation after tightening.

Do not loosen or adjust adjusting screw on modulating pressure valve housing with bimetallic coil.

55 Swivel transmission on assembly stand into horizontal position.

56 Insert output shaft (76) with radial ball bearing into transmission housing and knock-in with a plastic hammer (Fig. 34).

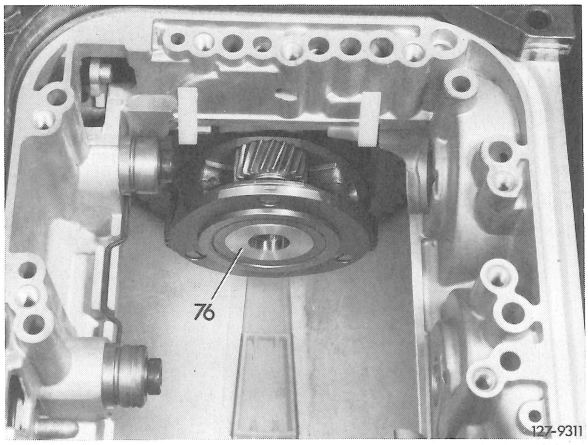


Fig. 34
76 Output shaft

57 Brake band B 2 (77) with radial groove lining (insert thin steel band into transmission housing, Fig. 35). (Refer to Note on page 27.3–001).

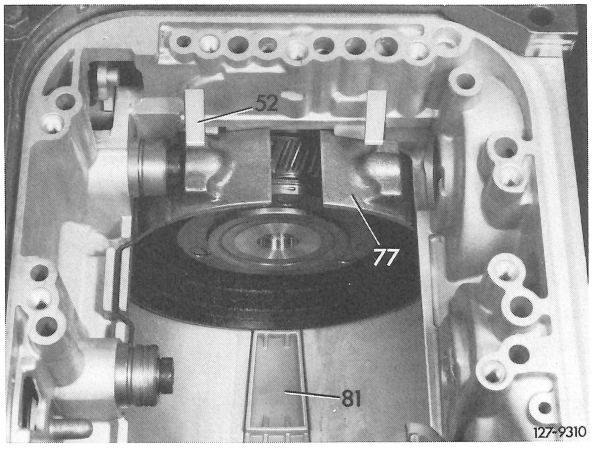


Fig. 35
52 Brake band guide B 2
77 Brake band B 2
81 Brake band guide

58 Insert axial bearing (78) and radial bearing (79) with grease into gear assembly (Fig. 36).

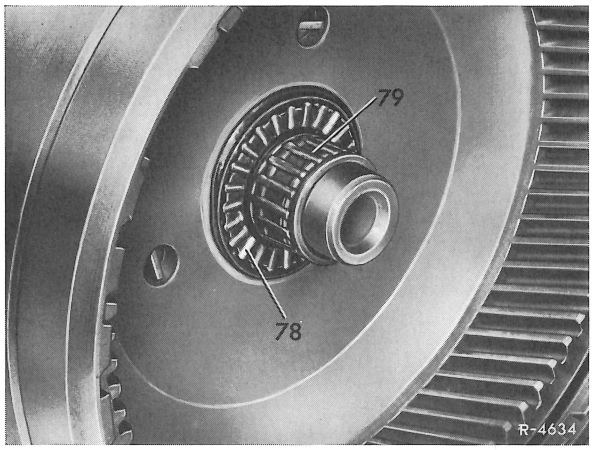


Fig. 36
78 Axial bearing
79 Radial bearing

59 Clamp brake band B 1 (39) (smooth lining) with circlip (24) for brake band piston cover B 2 on brake band drum (Fig. 38).

Caution! Brake band B 1 is supplied with single and double grooved lining (arrow in Fig. 37). A brake band B 1 (39) with double grooved lining may be installed only in combination with a supporting flange K 1 (106) with two rows of holes (arrow). The same applies to reverse case (Fig. 37).

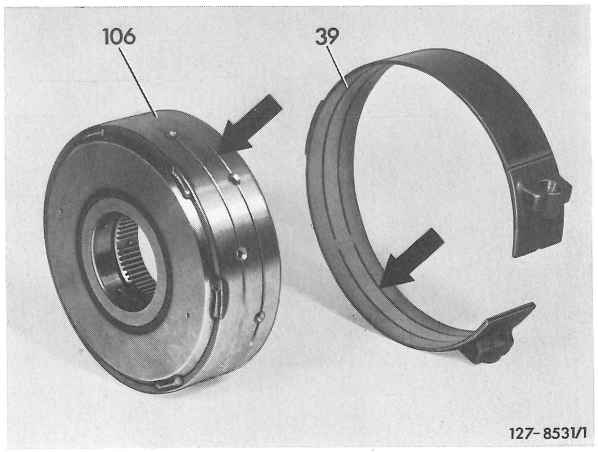


Fig. 37
39 Brake band B 1
106 Supporting flange K 1

60 Insert gear assembly (40) with brake band B 1 (39) while introducing supporting lever (arrow) for oil feed sleeve into groove in transmission housing (Fig. 38).

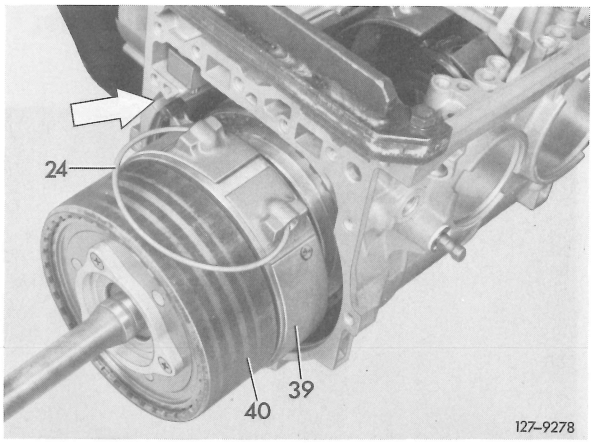


Fig. 38

24 Circlip
39 Brake band B 1
40 Gear assembly

Note: When introducing gear assembly into transmission housing, make sure that segment teeth of sun gear on output shaft are correctly entering brake drum B 2.

61 Insert brake band B 3 with radial groove lining (thick steel band) (38) into transmission housing from the front, plug pressure pins (37) into brake band B 3 (38) and screw adjusting screw (35) with sealing compound into transmission housing until brake band is held (Fig. 39).

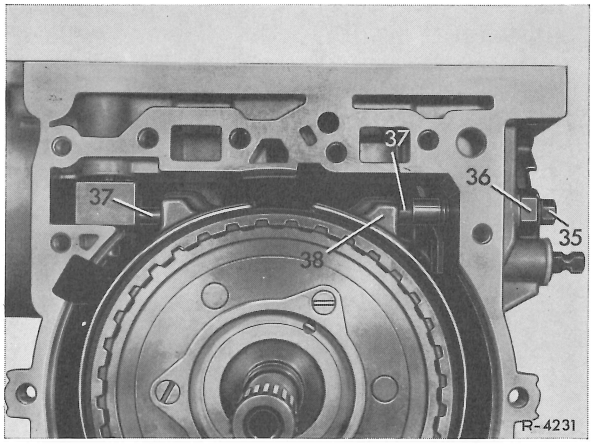


Fig. 39

35 Adjusting screw B 3
36 Counternut
37 Pressure pin
38 Brake band B 3

62 Support gear assembly front with assembly flange for assembly block (Fig. 40).

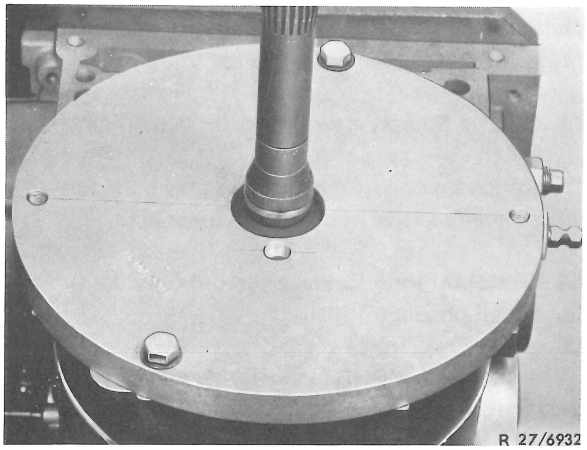


Fig. 40

63 Turn transmission with assembly fixture.

64 Place parking lock wheel (18) on output shaft.

65 Slip tensioning spring (63) on bearing pin (64) and attach to transmission housing (refer to arrow). Pull tensioning spring (63) with a tracer pin outwards (Fig. 41) and slip-on parking lock pawl (19) (Fig. 42).

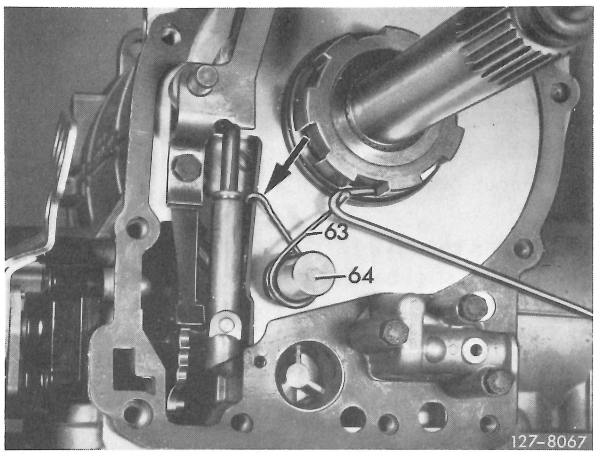


Fig. 41

63 Tensioning spring
64 Bearing bolt

66 Check function of parking lock. Place eccentric ring for secondary pump (16), helical gear for tachometer drive (15) and plate spring (85) on output shaft (Fig. 42).

67 Assemble rear transmission housing (27.3–560).

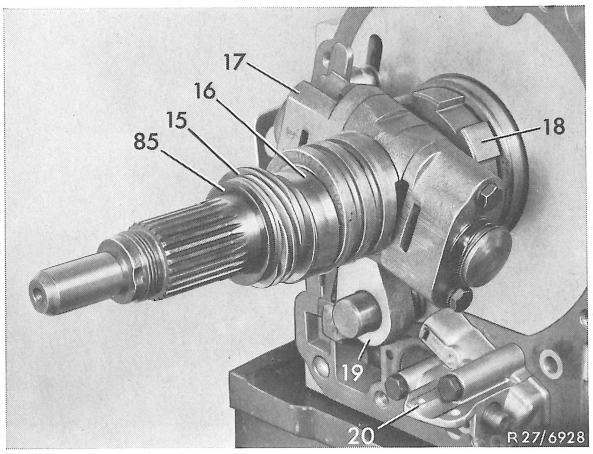


Fig. 42

15 Helical gear tachometer drive
16 Eccentric ring secondary pump
17 Centrifugal governor
18 Parking lock wheel
19 Parking lock pawl
20 Modulating pressure housing
85 Plate spring

68 Install pressure receiving piston:

1st Version K 4 C 025
(refer to page 27.3–001/1)

Insert pressure receiving piston (23) with the two pressure springs (82) and spring plate (83) into rear transmission housing in sequence shown in illustration (Fig. 43).

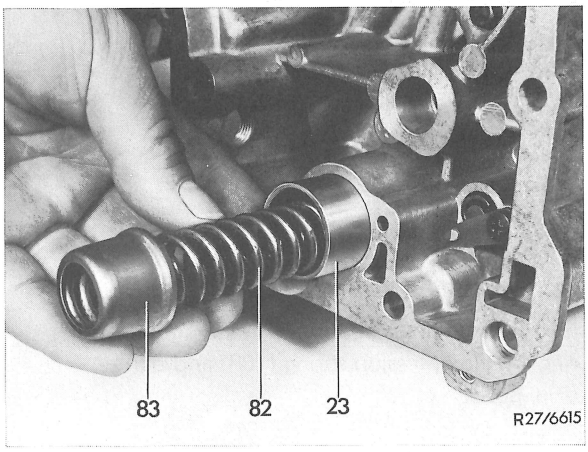


Fig. 43

23 Pressure receiving piston
82 Pressure receiving springs
83 Spring cup

2nd Version K 4 C 025 and W 4 B 025
(refer to page 27.3–001/1)

Insert pressure receiving spring (82) with pressure receiving piston (23) into rear transmission housing in sequence shown in illustration (Fig. 44).

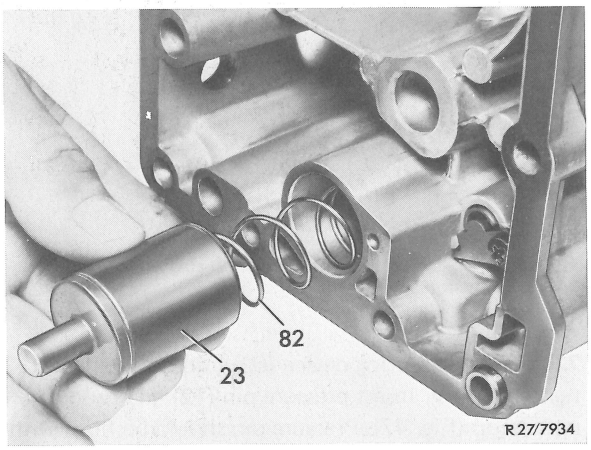


Fig. 44

23 Pressure receiving piston
82 Pressure receiving spring

69 Push delivery piston for secondary pump outwards and mount transmission housing (Fig. 45).

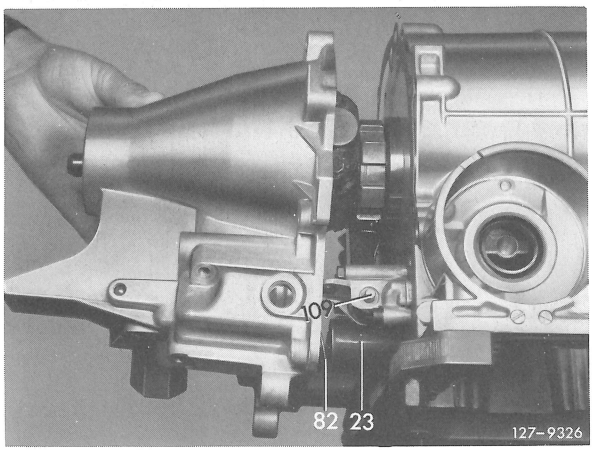


Fig. 45

23 Pressure receiving piston
82 Pressure receiving spring
109 Modulating pressure control valve

70 Screw-in fastening screws of rear transmission housing and tighten to 13 Nm (1.3 kpm).

71 Screw-in plug for secondary pump (13) using new O-ring (41) and compression spring (14) (Fig. 46).

27.3 Disassembly and Assembly of Transmission

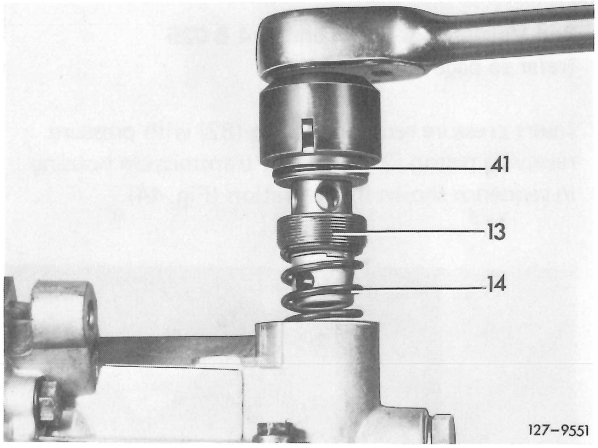


Fig. 46
13 Plug for secondary pump
14 Compression spring
41 O-ring

72 Screw measuring device (62) into housing and tighten lightly. Insert pressure pin (12) and push in up to stop (Fig. 47). Pressure pin should be flush with face of measuring device. For this reason, pressure pins of three different lengths are available, identified by their color.

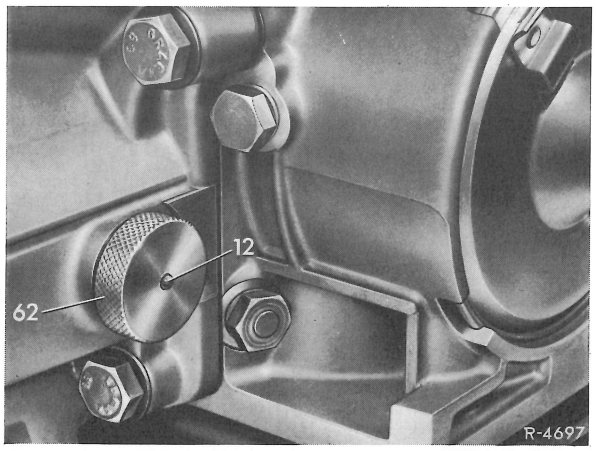


Fig. 47
12 Pressure pin
62 Measuring device 115 589 11 21 00

73 Glue pressure pin selected when measuring into vacuum box by means of Omnifit-Rapid Red M.

74 Coat vacuum box (10) on threads with sealing compound and screw into rear transmission housing (Fig. 48).

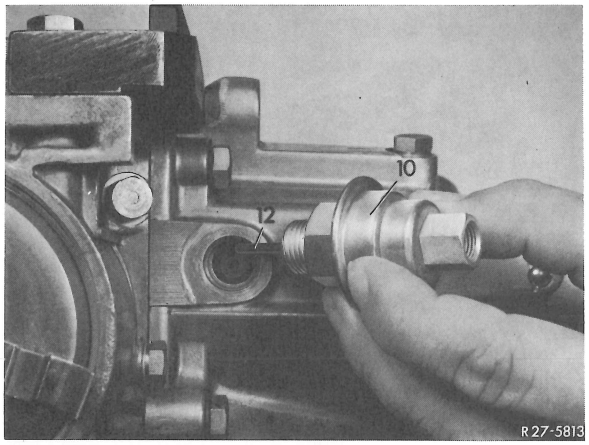


Fig. 48
10 Vacuum box
12 Pressure pin

Caution! Transmission W 4 B 025 for vehicle (model 115.015) required installation of vacuum box with two identification grooves (arrow in Fig. 49).

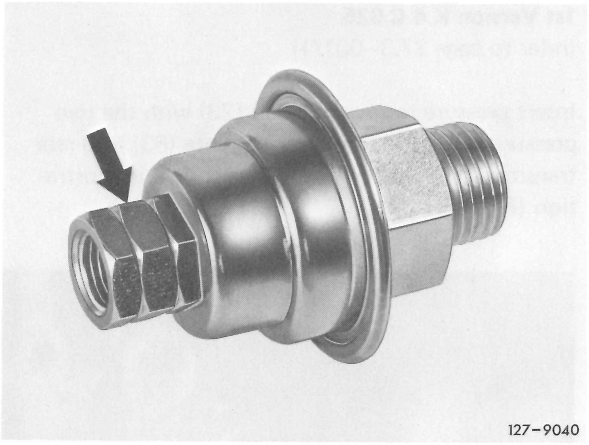


Fig. 49

75 Screw-in adjusting screw (107) on transmissions for Diesel engines together with aluminum sealing ring and compression spring (108) and tighten (Fig. 50).

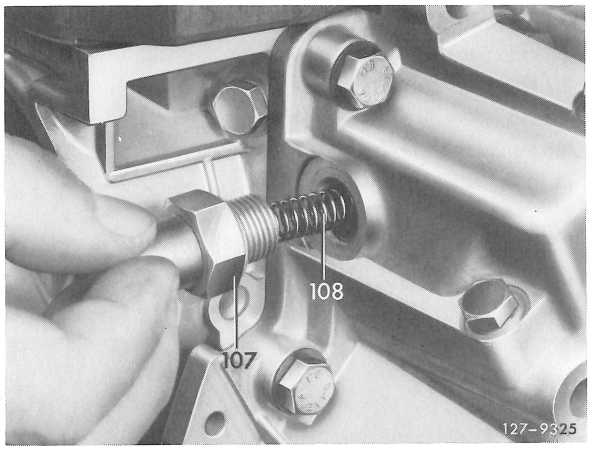


Fig. 50
107 Adjusting screw 108 Compression spring

76 Place three-armed flange on output shaft and tighten slot nut to 120 Nm (12.0 kpm), secure slot nut (arrow in Fig. 51).

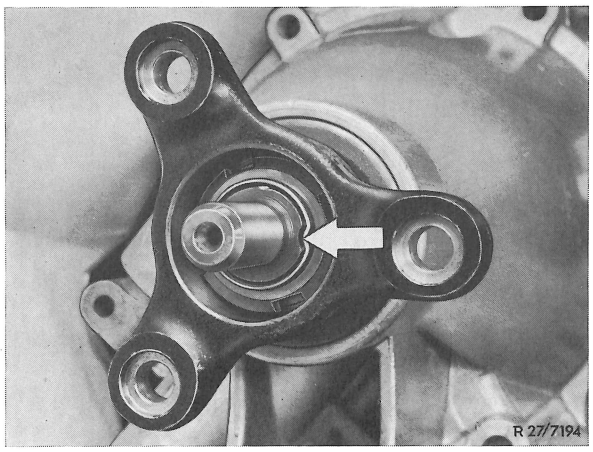


Fig. 51

77 Turn transmission with assembly fixture in such a manner that output shaft is facing outward. Remove assembly flange.

78 Determine end play of gear assembly by placing measuring bridge on transmission housing and determining dimension "A" with depth gauge (Fig. 52).

79 Place new gasket on front transmission housing and determine dimension "B" (Fig. 53).

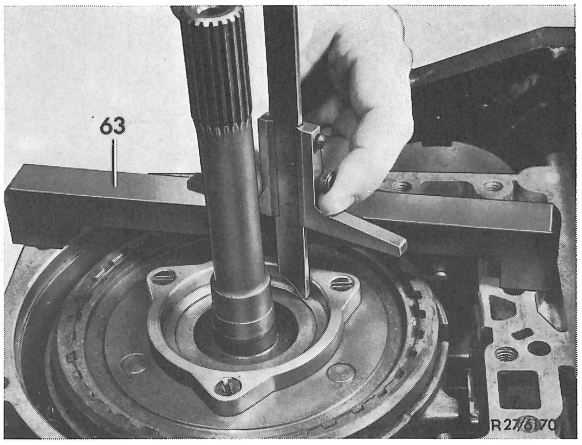


Fig. 52
63 Measuring bridge 116 589 00 21 00

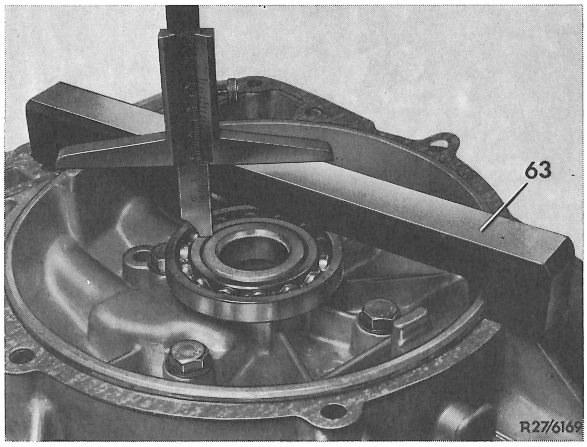


Fig. 53
63 Measuring bridge 116 589 00 21 00

Play "C" of the gear assembly is a difference from dimensions A–B (refer to example).

Starting point for computation is the thickness of the measuring bridge amounting to 30 mm.

The end play dimension "C" results from the following computation:

1. Determined dimension "A" minus 30 mm.

2. 30 mm minus determined dimension "B".

3. The difference from the values determined under item 1 and 2 provide dimension "C".

27.3 Disassembly and Assembly of Transmission

Example:

Dimension "A"	=	38.5 mm
Measuring bridge	=	30.0 mm
		8.5 mm
Measuring bridge	=	30.0 mm
Dimension "B"	=	22.0 mm
		8.0 mm

Dimension "C" = 8.5 mm – 8.0 mm = 0.5 mm

80 Raise dimension "C" end play to its value of 0.4 + 0.1 mm by adding compensating washers (86) in supporting flange (Fig. 54).

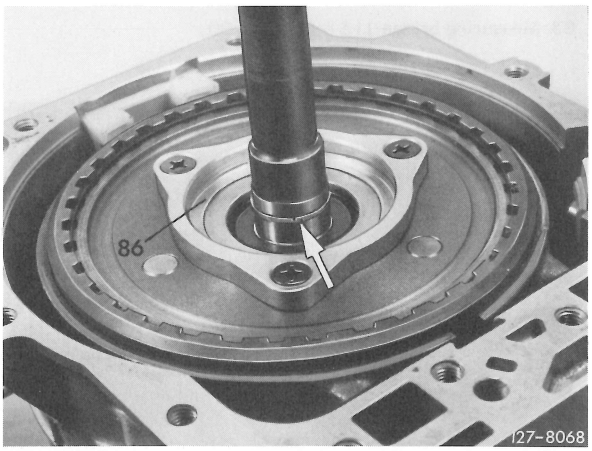


Fig. 54
86 Compensating washer

81 Center gasket when mounting front transmission cover. Align piston ring on drive shaft, so that piston ring is completely in groove at gap (arrow in Fig. 54).

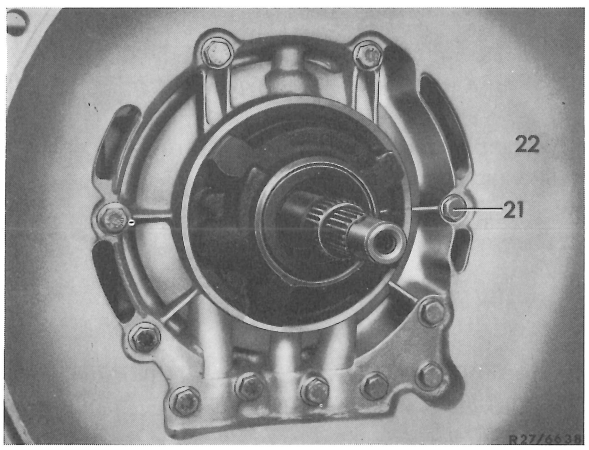


Fig. 55
21 Fastening screws
22 Front transmission housing

82 Mount front transmission housing (22) with new gasket. Screw-in fastening screws and tighten to 13 Nm (1.3 kpm) (Fig. 55).

Note: Coat threads slightly with sealing compound at lower seven screws.

83 Insert both pressure pins (34) opposite of brake band piston (Fig. 56).

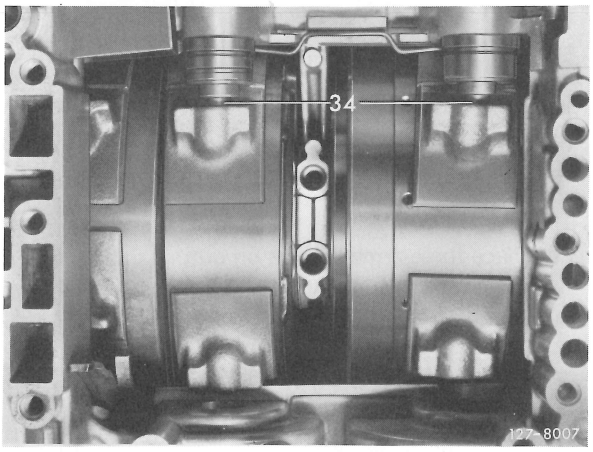


Fig. 56
34 Pressure pins

84 Check oil sealing ring and bypass valve for brake band piston B 2 by sight and for wear (Fig. 57).

85 Introduce brake band piston B 2 (67) with insertion ring (66) into transmission housing and watch out for correct seat of pressure pin in bore of brake band B 2 (Fig. 57).

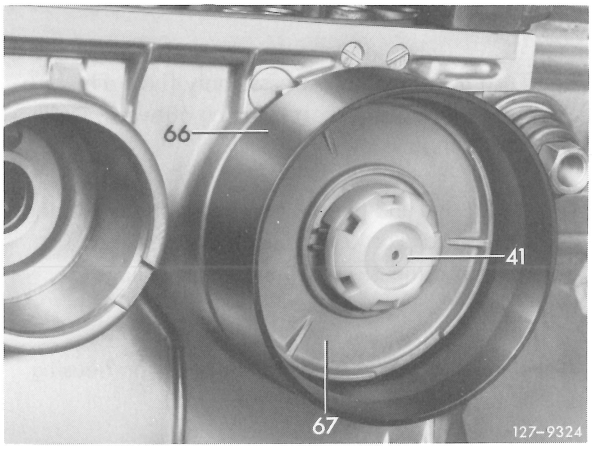


Fig. 57
41 Bypass valve
66 Inserting ring 115 589 18 61 00 or 116 589 05 14 00
67 Brake band piston B 2

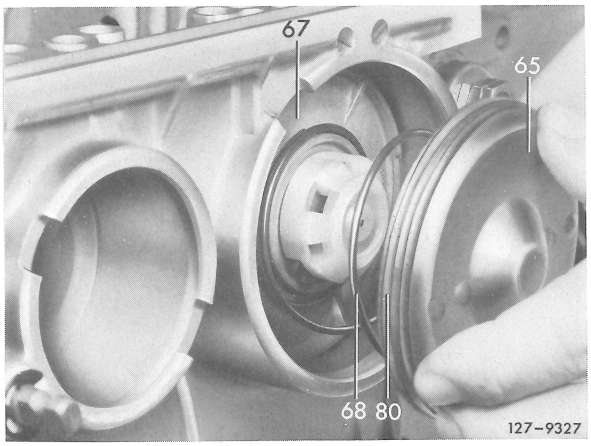


Fig. 58

65 Brake band piston cover B 2
67 Brake band piston B 2
68 Truncated cone spring
80 O-ring

Caution! Transmission types W 4 B 025 and K 4 C 025 2nd version are additionally provided with a truncated cone spring (68) on brake band piston B 2 (67). The spring is placed on brake band piston B 2 with its small diameter (Fig. 58).

86 Insert brake band piston cover B 2 (65) with a new O-ring and secure with circlip (24) (Fig. 59).

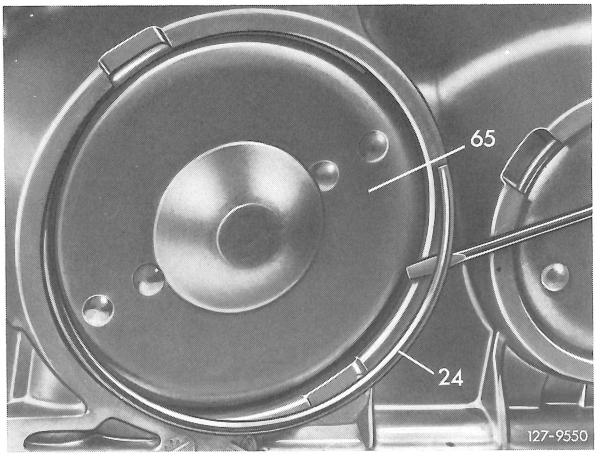


Fig. 59

24 Circlip
65 Brake band piston cover B 2

87 Renew O-ring (87) and lip sealing ring (88) of supplementary piston B 1 (89) and insert into brake band piston cover B 1 (29) with inserting ring 116 589 05 61 00 or 116 589 14 61 00. Renew lip sealing ring (90) and O-ring (91) of cover (92), place cover on supplementary piston and secure with locking ring (93).

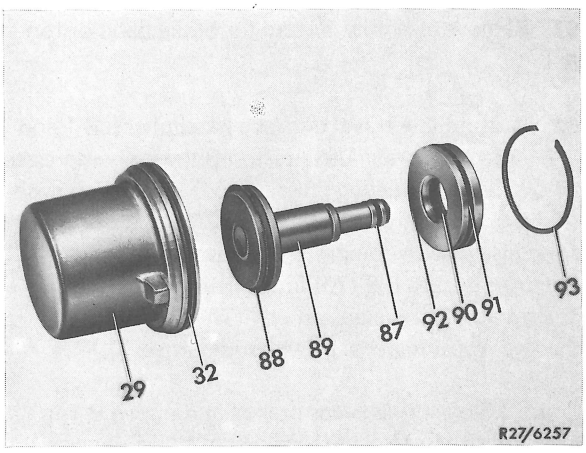


Fig. 60

29 Brake band piston cover B 1
32 O-ring
87 O-ring
88 Lip sealing ring
89 Supplementary piston B 1
90 Lip sealing ring
91 O-ring
92 Cover
93 Locking ring

88 Renew O-ring (32) of brake band piston cover B 1 (Fig. 60).

89 Renew lip sealing ring (33) of brake band piston B 1 (30). Attach supplementary piston and brake band piston B 1 to each other. Slip compression springs (31) on brake band piston (Fig. 61).

90 Position assembly fixture 115 589 04 59 00 with brake band piston B 1 and screw down. Introduce brake band piston cover B 1 (29) with assembly fixture (Fig. 61) and secure with circlip (27) (Fig. 12).

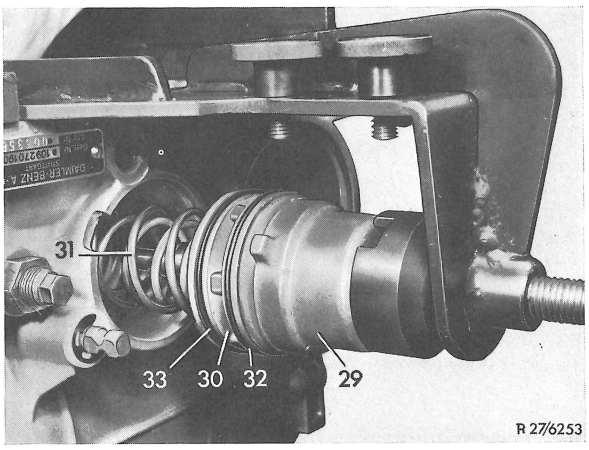


Fig. 61

29 Brake band piston cover B 1
30 Brake band piston B 1
31 Compression springs
32 O-ring
33 Lip sealing ring

91 Remove assembly fixture for brake band piston B 1.

92 Measure idle travel of brake band piston B 1 and B 2 by moving brake band piston B 2 with compressed air over bore for lifting pressure (69) into lifting position and determine dimension "b". Then move brake band piston with compressed air over bore for shifting pressure B 2 (70) into shifting position and determine again dimension "b". The difference of the two measurements provides idle travel "L".

Compression spring keeps brake band piston B 1 in lifting position. Measure dimension "a" in this position. Then move brake band piston into shifting position by means of compressed air via bore shifting pressure B 1 (71) (Fig. 62), while again measuring dimension "a". Difference between the two measurements provides idle travel "L".

Idle travel "L" of brake band piston B 1 and B 2 should be 3.0–4.0 mm. Pressure pins have various lengths of 22, 23, 24, 25, 26, 28 mm.

When idle travel "L" is too large, install a longer pressure pin, when it is too small, install a shorter pressure pin (34) (Fig. 56).

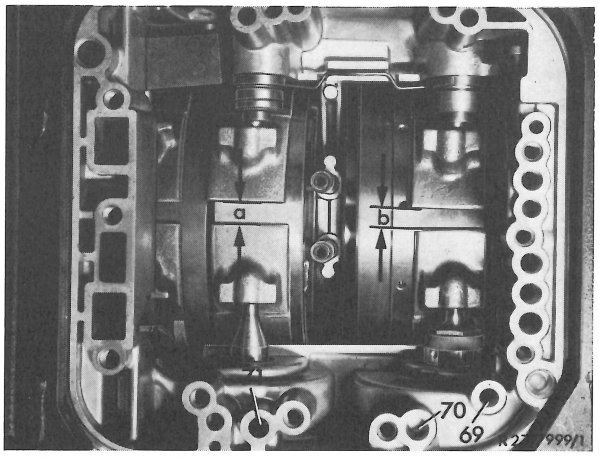


Fig. 62
69 Lifting pressure B 2
70 Shift pressure B 2
71 Shift pressure B 1

93 Tighten adjusting screw (35) for brake band B 3 to 5 Nm (0.5 kpm) and then loosen by 1 3/4 turns. Secure adjusting screw with counternut (36) (Fig. 63).

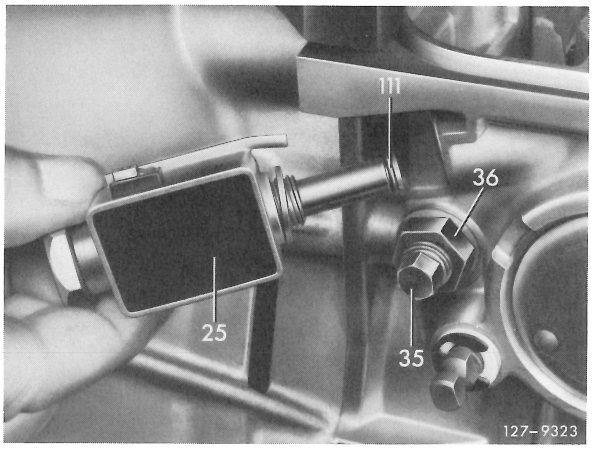


Fig. 63
25 Solenoid valve
35 Adjusting screw
36 Counternut
111 O-ring

94 Screw-in solenoid valve (25) with new O-ring (111) and sealing ring, and tighten to 30 Nm (3.0 kpm).

95 Insert both plug pipes (8) with new mushroom seals (9) (Fig. 64).

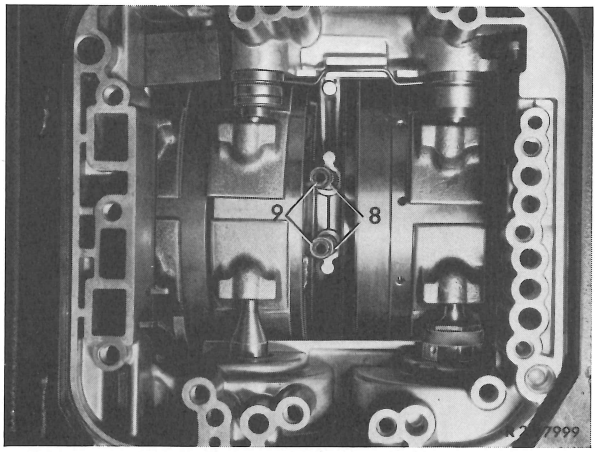


Fig. 64
8 Plug pipe
9 Mushroom seals

96 Move range selector lever in-between position "P" and "R". Insert locating pin for control pressure valve (72) into shift valve housing and screw guide bolt (73) into transmission housing (Fig. 65).

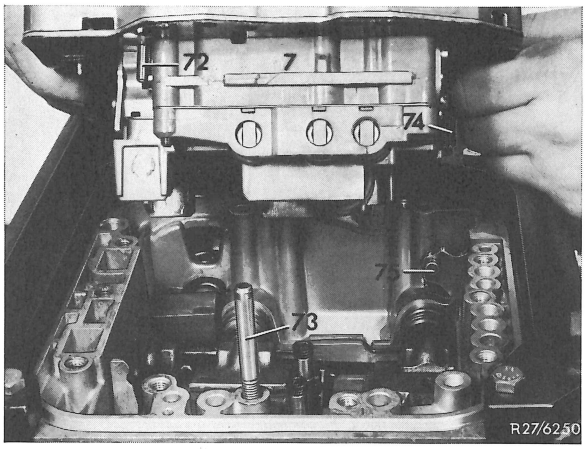


Fig. 65

7 Shift valve housing
72 Locating pin control pressure
73 Guide bolt
74 Range selector valve
75 Range selector lever

97 Introduce shift valve housing carefully into transmission housing, making sure that range selector valve (74) enters into range selector lever (75) (Fig. 65).

98 Unscrew guide bolt (73) (Fig. 65). Screw-in fastening screws (6) with spring washers and tighten to 13 Nm (1.3 kpm) (Fig. 66).

Caution! Watch out for varying length of fastening screws.

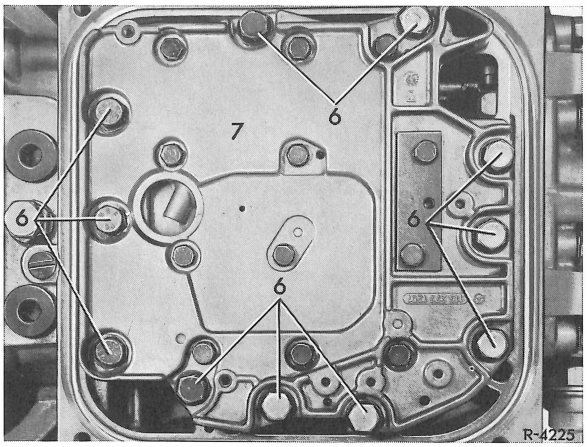


Fig. 66

6 Fastening screws
7 Shift valve housing

99 Pull out locating pin (72) for control pressure valve (Fig. 65).

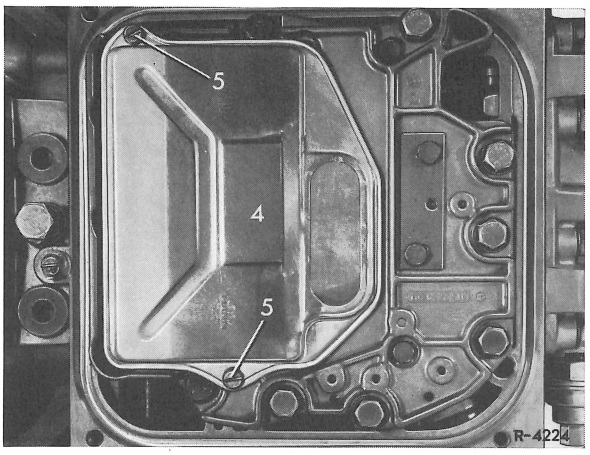


Fig. 67

4 Oil filter
5 Fastening screws

100 Mount oil filter (4), screw-in fastening screws (5) and tighten to 4 Nm (0.4 kpm) (Fig. 67).

101 Remove transmission from assembly stand.

102 Mount oil pan (1) with new gasket, screw-in fastening screws (2) with undulated washers and shims (3) and tighten to 7 Nm (0.7 kmp) (Fig. 68).

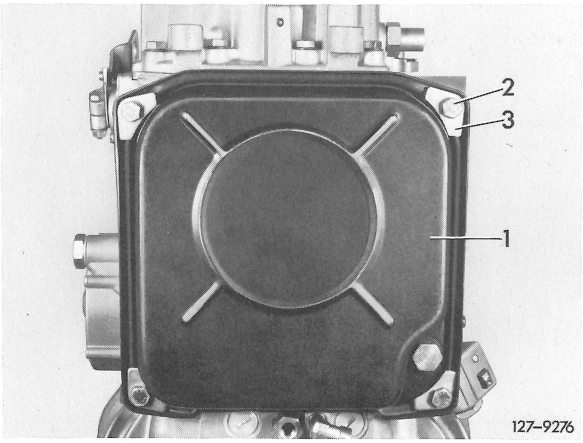


Fig. 68

1 Oil pan
2 Fastening screws
3 Shim

K 4 C 025
W 4 B 025

Adjusting Data

End play of sun gear, rear planetary gear set	0.25 + 0.1
End play of ring gear	0.2 + 0.1
End play of sun gear, center planetary gear set	0.2 + 0.1

Tightening Torque	**Nm** (kpm)
Countersunk screws on supporting flange gear assembly	70 (0.7)

Special Tools

Assembly fixture	112 589 07 59 00
Pulling fixture for ball bearing	000 589 98 33 00
Assembly mandrel	198 589 03 39 00

Disassembly

1 Remove output shaft (18) together with rear planetary gear carrier (Fig. 1).

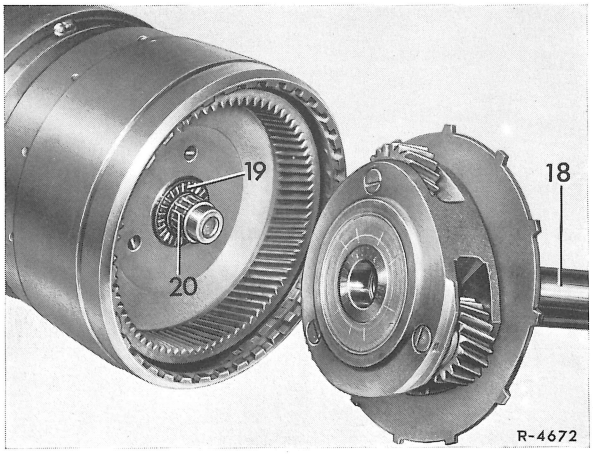


Fig. 1
18 Output shaft
19 Axial bearing
20 Radial bearing

2 Remove radial bearing (20) and axial bearing (19).

3 Place gear assembly with input shaft (3) in upward position on assembly fixture 112 589 07 59 00 (Fig. 2).

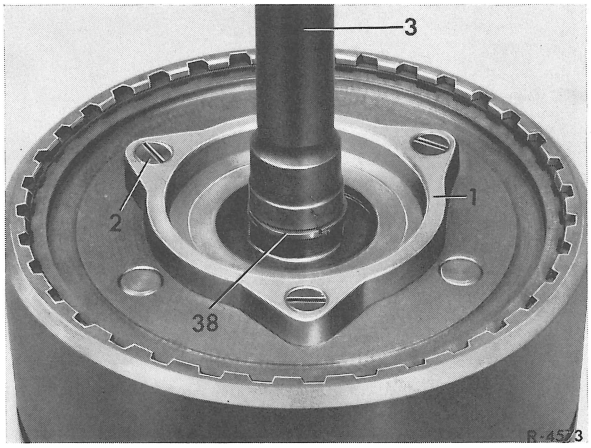


Fig. 2
1 Supporting flange
2 Countersunk screw
3 Input shaft
38 Lube pressure ring

4 Remove supporting flange (1) after loosening the three countersunk screws (2) (Fig. 2).

5 Pull out input shaft (3) with sun gear (4) of front planetary gear set (Fig. 3).

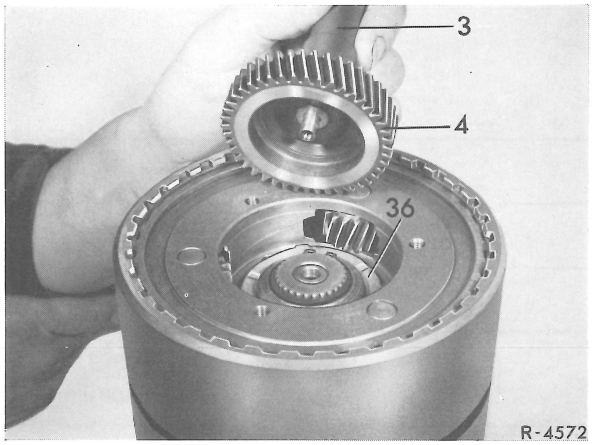


Fig. 3

3 Input shaft
4 Planetary gear
36 Thrust washer

6 Remove locking ring intermediate shaft (5) and circlip gear assembly (6) (Fig. 4).

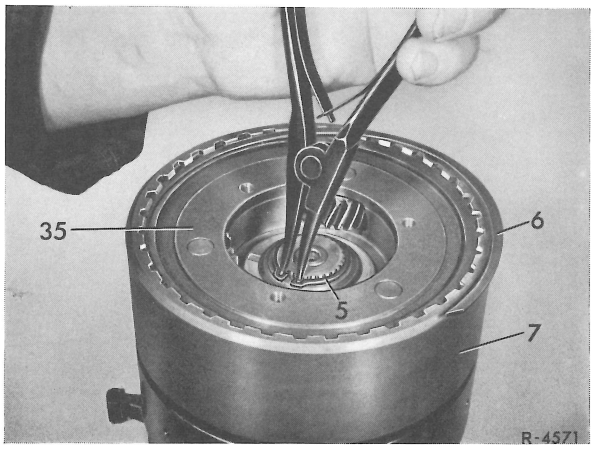


Fig. 4

5 Locking ring intermediate shaft
6 Circlip gear assembly
7 Brake band drum B 3
35 Planetary gear carrier front planetary gear set

7 Lift off brake band drum B 3 (7) together with front and center planetary gear set (Fig. 5).

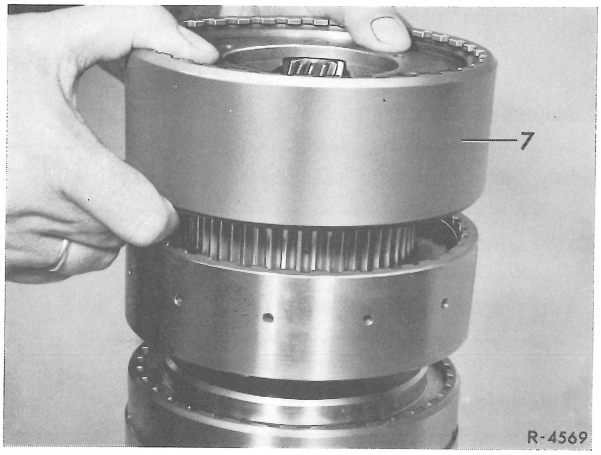


Fig. 5

7 Brake band drum B 3

8 Remove brake band drum B 3 from gear sets (Fig. 6).

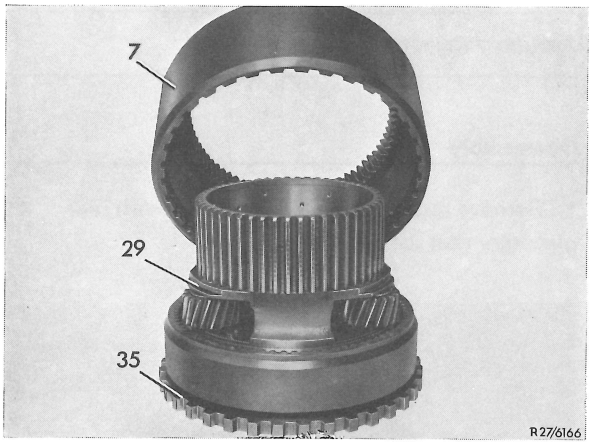


Fig. 6

7 Brake band drum B 3
29 Planetary gear carrier center planetary gear set
35 Planetary gear carrier front planetary gear set

9 Lift off planetary gear for center planetary gear set (8) and brake band drum B 1 (9) (Fig. 7).

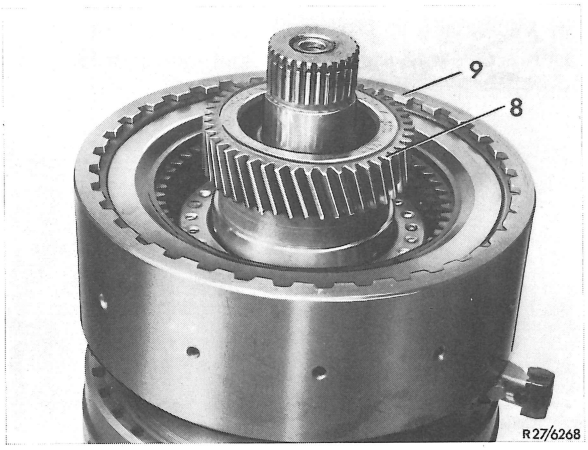


Fig. 7

8 Sun gear of center gear set
9 Brake band drum B 1

10 Pull off oil feed sleeve (11). Remove brake band drum B 2 (12) together with plate clutch K 2 (Fig. 8).

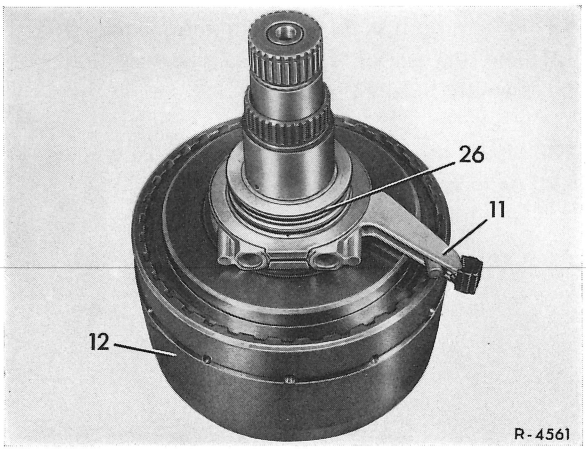


Fig. 8

11 Oil feed sleeve
12 Brake band drum B 2
26 Oil sealing rings
50 Spacer

11 Remove hollow shaft (13) with inner plate carrier K 2 (14) and free-rolling clutch (15) from intermediate shaft (21) (Fig. 9).

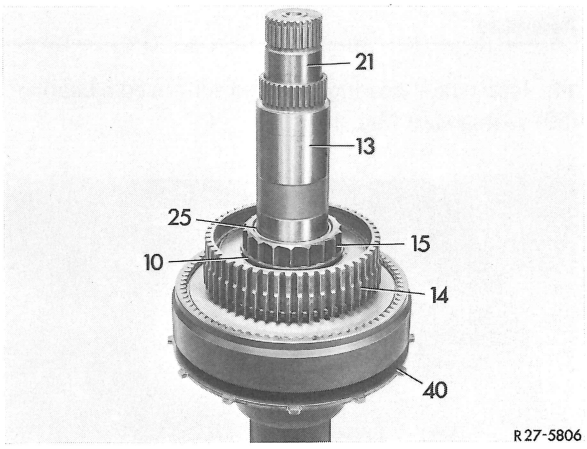


Fig. 9

10 Circlip
13 Hollow shaft
14 Inner plate carrier K 2
15 Free-rolling clutch
21 Intermediate shaft
25 Needle bearing
40 Sun gear rear gear assembly

12 Pull radial ball bearing (16) with puller (17) from output shaft (18) (Fig. 10).

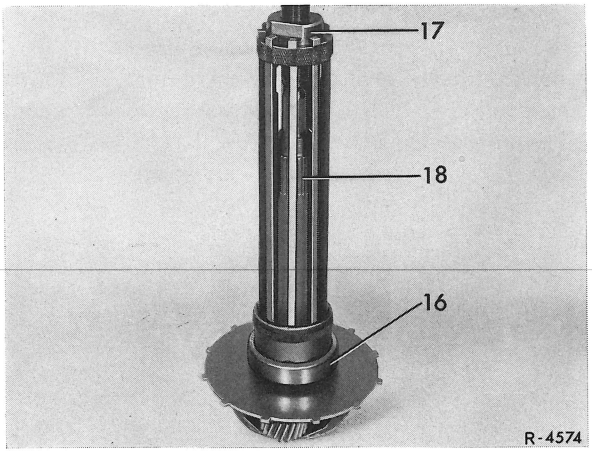


Fig. 10

16 Radial ball bearing
17 Puller 000 589 98 33 00
18 Output shaft

13 Remove sun gear and needle bearing.

Assembly

14 Insert axial bearing (46) and split needle bearing (39) with grease (Fig. 11).

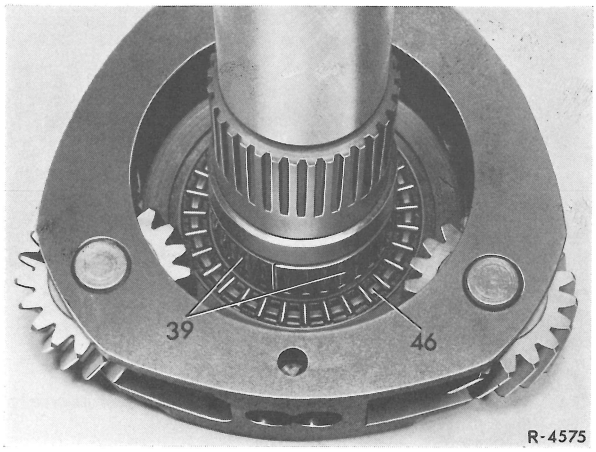


Fig. 11

39 Needle bearing
46 Axial bearing

15 Insert sun gear (40) with thrust washer (41) so that the offset end of thrust washer is directed downward to the sun gear. Then press on radial ball bearing (16) and parking lock gear (42) with assembly mandrel (Fig. 12). (The clearance is self-adjusting).

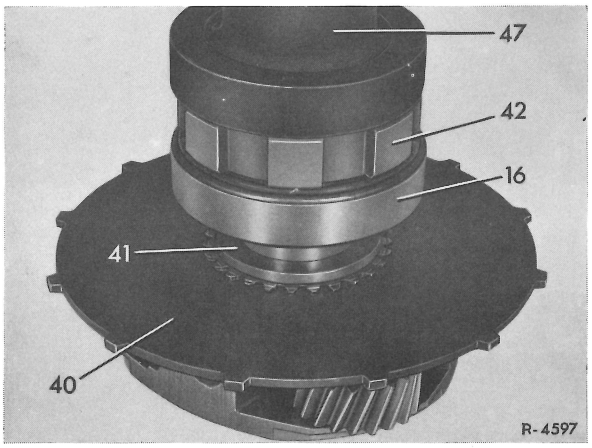


Fig. 12

16 Radial ball bearing
40 Sun gear behind gear assembly
41 Thrust washer
42 Parking lock gear
47 Assembly mandrel 198 589 03 39

16 Set axial (19) and radial bearing (20) with some grease into intermediate shaft and attach output shaft (18) (Fig. 13).

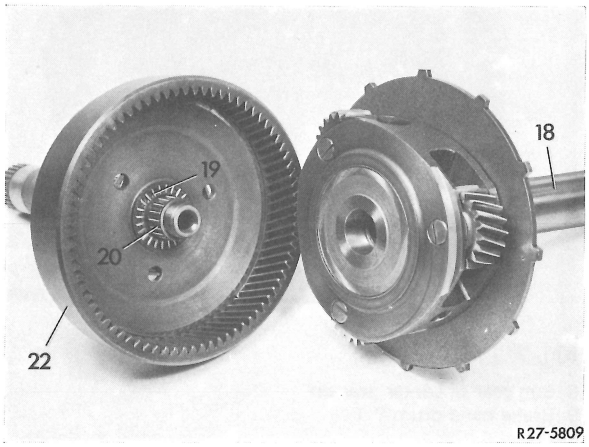


Fig. 13

18 Output shaft
19 Axial bearing
20 Radial bearing
22 Ring gear of rear planetary gear carrier set

17 Place output shaft (18) with intermediate shaft (21) and ring gear of rear planetary gear set (22) on assembly fixture (Fig. 14).

18 Mount needle bearing (23) and thrust washer (24) on intermediate shaft (Fig. 14).

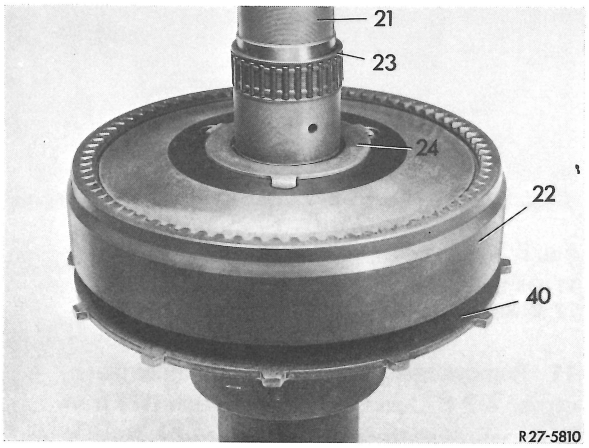


Fig. 14

21 Intermediate shaft
22 Ring gear of rear gear assembly
23 Needle bearing
24 Thrust washer
40 Sun gear of rear gear assembly

19 Introduce hollow shaft (13) with free rolling clutch into brake band B 2 (12) watching out for correct engagement of clutch plates (Fig. 15).

20 Place hollow shaft with brake band drum B 2 on intermediate shaft and introduce needle bearing (25) into free-rolling clutch (Fig. 15).

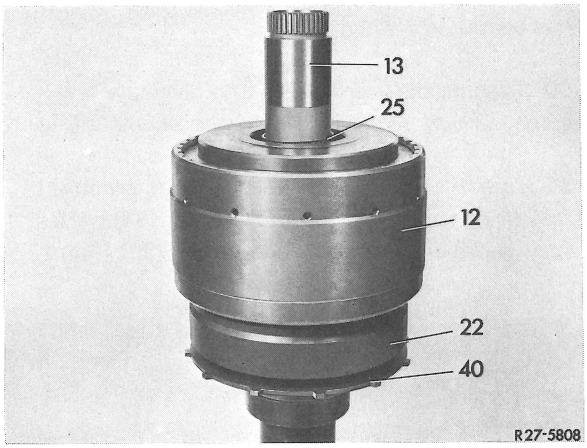


Fig. 15

12 Brake band drum B 2
13 Hollow shaft
22 Ring gear of rear gear assembly
25 Needle bearing
40 Sun gear of rear gear assembly

21 Check oil sealing rings (26) on oil feed sleeve.

22 Insert oil feed sleeve (11) into brake band drum B 2 (12). Push oil feed sleeve completely down, so that both oil sealing rings will enter the supporting flange K 2 (Fig. 16).

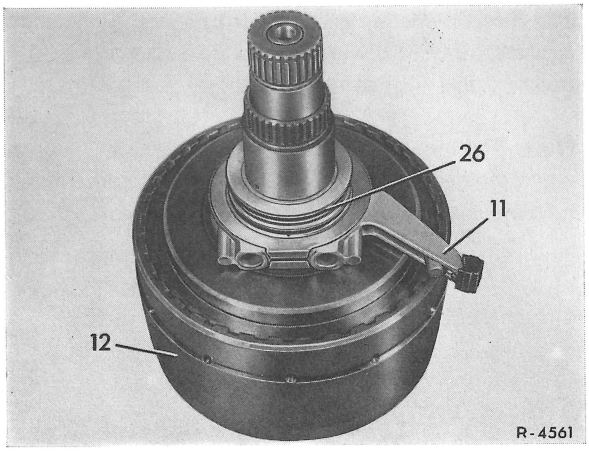


Fig. 16

11 Oil feed bushing
12 Brake band drum B 2
26 Oil sealing rings

23 Position brake band drum B 1 (9) with plate clutch K 1.

24 Attach needle bearing (27) to hollow shaft (13). Insert sun gear of center gear assembly into teeth of brake band drum B 1 (Fig. 17).

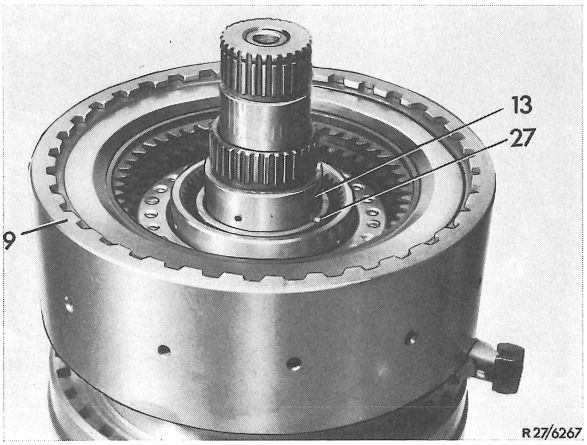


Fig. 17

9 Brake band drum B 1
13 Hollow shaft
27 Needle bearing

25 Determine dimension "a" from inner plate carrier K 1 (32) to thrust washer (31) by means of depth gauge (Fig. 18).

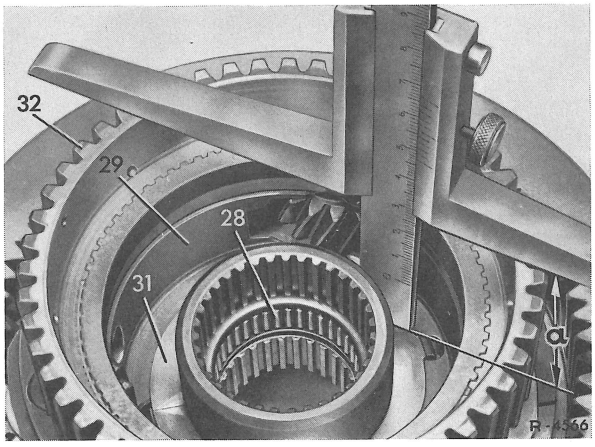


Fig. 18

28 Needle bearing
29 Planetary gear carrier of center planetary gear assembly
31 Thrust washer
32 Inner plate carrier K 1

26 Determine dimension "b" from inner plate carrier K 1 (32) to shoulder (44) with depth gauge (Fig. 19).

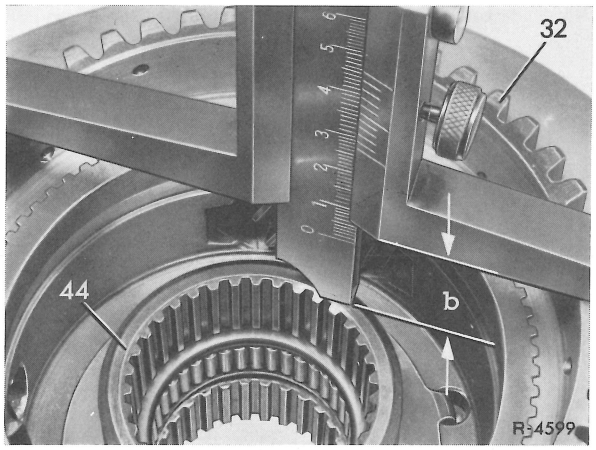


Fig. 19
32 Inner plate carrier K 1
44 Shoulder

27 Determine dimension "d" from thrust surface of sun gear to shoulder of hollow shaft (43) with depth gauge (Fig. 20 and 21).

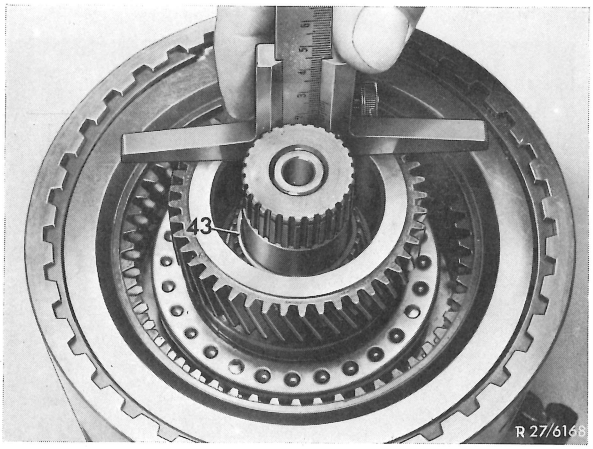


Fig. 20
43 Shoulder of hollow shaft

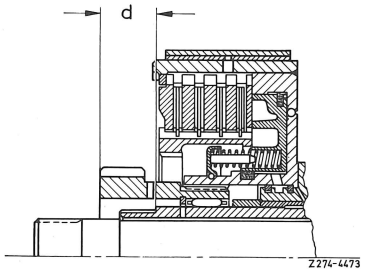


Fig. 21

28 The play results from the dimensions a—b = "c" and c—d = "S".

29 The end play is adjusted to 0.2—0.3 mm by adding compensating washers.

30 Push needle bearing (28) into planetary gear carrier (29) of center planetary gear assembly (Fig. 18).

31 Insert compensating washer (30) determined by measuring together with thrust washer (31) coated with grease into planetary gear carrier (29) (Fig. 22).

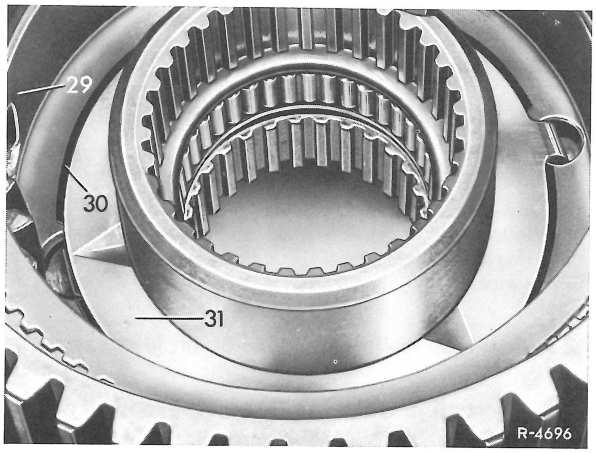


Fig. 22
29 Planetary gear carrier of center planetary gear assembly
30 Compensating washer
31 Thrust washer

32 Insert planetary gear carrier of center planetary gear assembly (29) with inner plate carrier K 1 (32) and ring gear (45) of front planetary gear assembly.

Note: The inner plate carrier K 1 is correctly mounted when the distance from the shoulder of the intermediate shaft to the needle bearing is approx. 2 mm.

33 Determine dimension "a" with depth gauge (Fig. 23). (From top edge of intermediate shaft to shoulder of intermediate shaft).

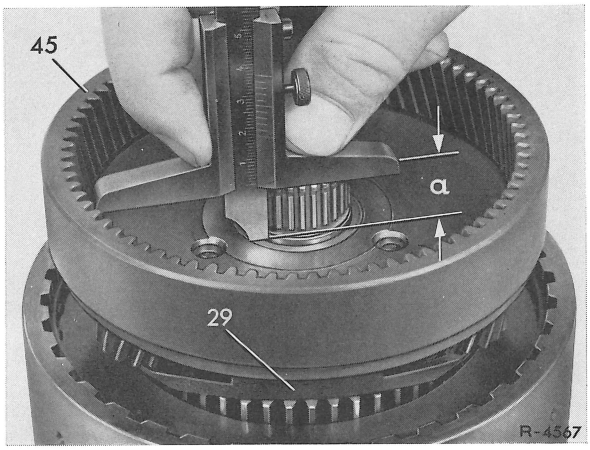


Fig. 23

29 Planetary gear carrier of center planetary gear
45 Ring gear of front planetary gear assembly

34 Determine dimension "b" with depth gauge (Fig. 24). (From top edge of intermediate shaft to thrust washer).

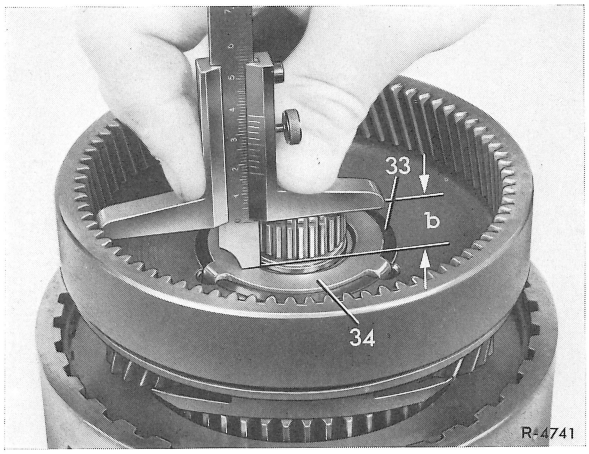


Fig. 24

33 Compensating washer
34 Thrust washer

35 The play results from the dimension b—a = "S".

36 Adjust play to its value of 0.2 to 0.3 mm by adding compensating washers.

37 Insert measured compensating washers (33) and thrust washer (34) coated with grease (Fig. 24).

38 Lift off planetary gear carrier of center gear assembly (29), put back brake band drum B 3 (7) with planetary gear carrier of center gear assembly (29).

39 Introduce planetary gear carrier (35) of front planetary gear assembly and secure intermediate shaft (5) with locking ring (Fig. 25).

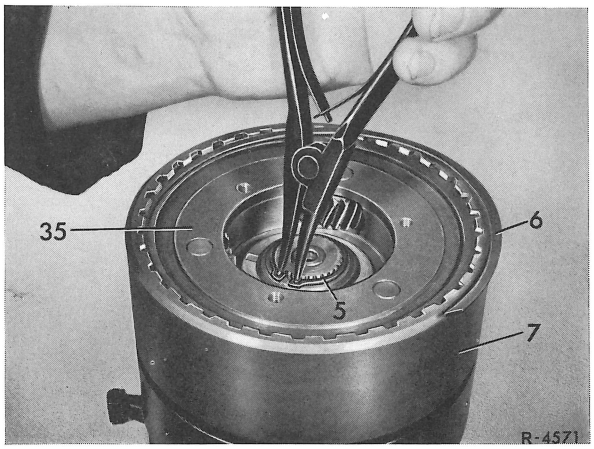


Fig. 25

5 Circlip
6 Circlip for gear assembly
7 Brake band drum B 3
35 Planetary gear carrier of front planetary gear assembly

40 Push brake band drum B 3 (7) in upward direction and secure gear assembly (6) with circlip (Fig. 25).

41 Insert thrust washer (36) and input shaft (3) together with sun gear (Fig. 26). (The play is self-adjusting).

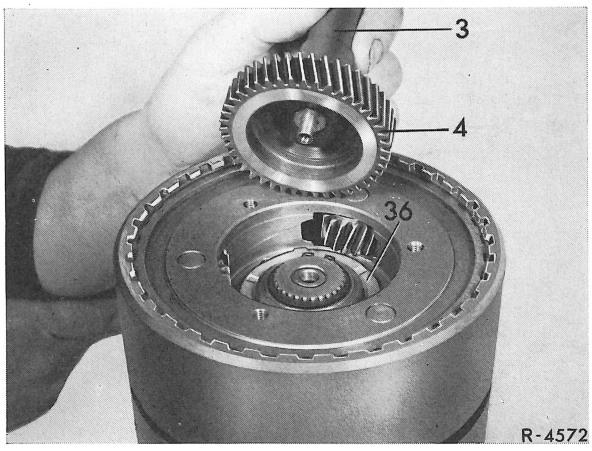


Fig. 26

3 Input shaft
4 Sun gear
36 Thrust washer

42 Position supporting flange (1) and thrust washer (37) (Fig. 27) and coat the 3 fastening bolts (2) at the three front threads with Loctite hydraulic sealer and tighten to 70 Nm (0.7 kpm) (Fig. 28).

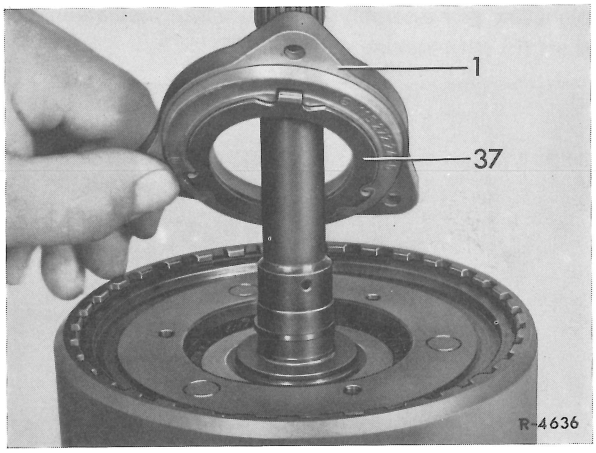


Fig. 27

1 Supporting flange
37 Thrust washer
51 Needle bearing

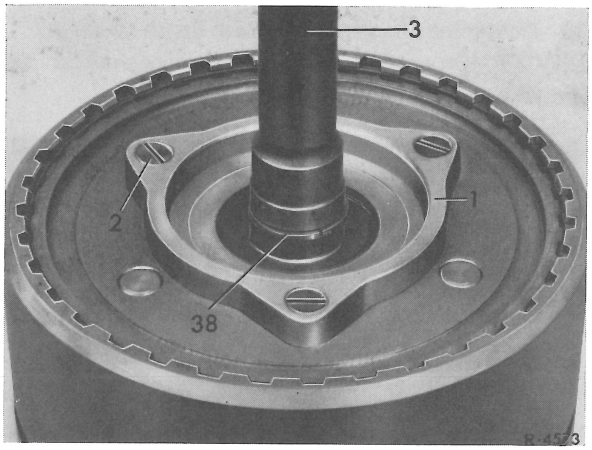


Fig. 28

1 Supporting flange
2 Fastening bolts
3 Input shaft
28 Lube pressure ring

43 Insert lube pressure ring (38) into groove and attach (Fig. 28).

44 Remove gear assembly from assembly fixture.

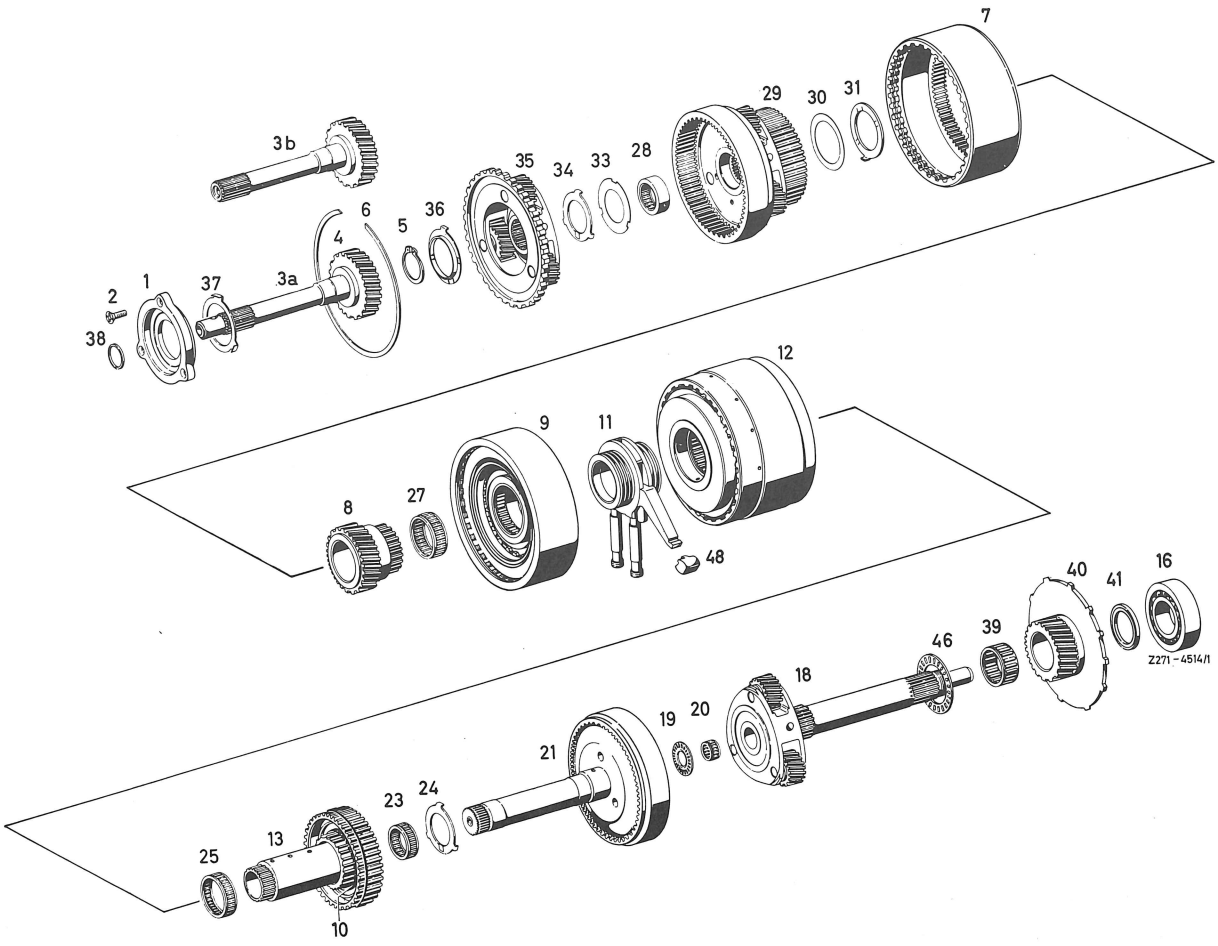


Fig. 29

1 Supporting flange
2 Countersunk screws
3a Drive shaft W 4 B 025
3b Drive shaft K 4 C 025
4 Sun gear
5 Circlip intermediate shaft
6 Circlip gear assembly
7 Brake band drum B 3
8 Sun gear center gear assembly
9 Brake band drum B 1 with K 1
10 Circlip free-rolling clutch
11 Oil feed sleeve
12 Brake band drum B 2 with K 2
13 Hollow shaft
16 Radial ball bearing
18 Output shaft
19 Axial bearing
20 Radial bearing
21 Intermediate shaft
23 Needle bearing intermediate shaft
24 Thrust washer
25 Needle bearing intermediate shaft
27 Needle bearing sun gear
28 Needle bearing planetary gear carrier
29 Planetary gear carrier center gear assembly
30 Compensating washer
31 Thrust washer
33 Compensating washer
34 Thrust washer
35 Planetary gear carrier of front gear assembly
36 Thrust washer
37 Thrust washer
38 Lube pressure ring
39 Split needle bearing
40 Sun gear rear gear assembly
41 Thrust washer
46 Axial bearing
48 Rubber cap
50 Spacer bushing
51 Axial bearing

Disassembly, Assembly and Measuring of Clutch K 1 27.3

Revision: due to model 114/115, new plate diagram added and Note of Item 16 extended.

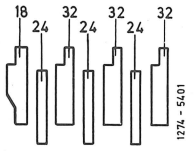
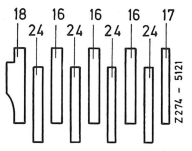
Adjusting Data

Idle travel "L" of plate clutch K 1	1.0 ± 0.2

Clutch Plates

	Thickness	Item No.
Outside plates	2.0	17
	3.0 or 3.5 selectively	16
	5.0	18
	4.5 or 5.0 selectively	32
Inside plates	2.1	24

Clutch Plate Diagram

Vehicle model	115 114.015	114.011, 114.023, 114.060, 114.062, 114.072, 114.073, 116.020, 116.024 116.025	
Clutch K 1			Piston end

Special Tools

Assembly fixture	115 589 01 59 00
Introducing ring	112 589 01 61 00

Disassembly

1 Push circlip (2) out of groove with a screw driver and remove (Fig. 1).

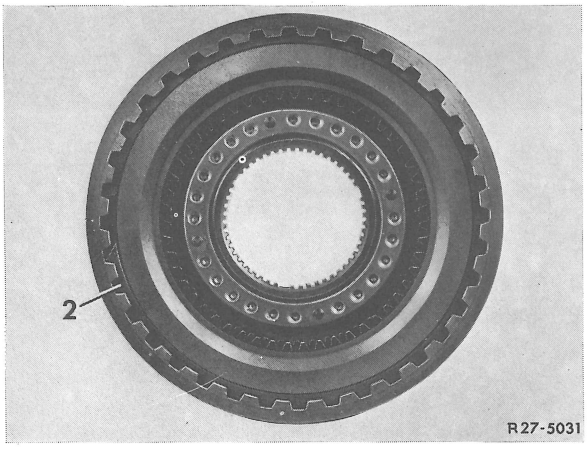


Fig. 1
2 Circlip

2 Remove plate package (3) by tilting supporting flange (1) (Fig. 2).

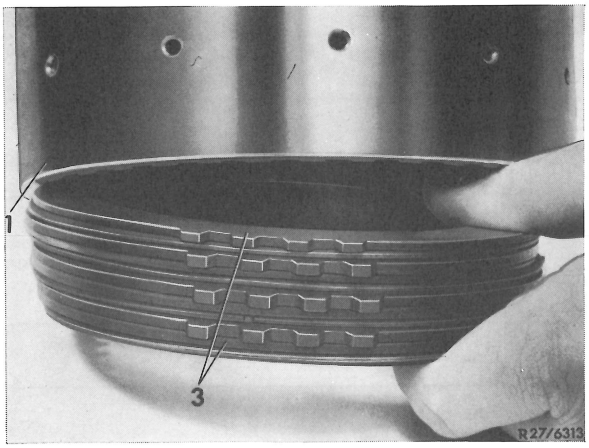


Fig. 2
1 Supporting flange
3 Plate package

3 Place assembly fixture (4) on spring retainer (5) in such a manner that the pressure ring is uniformly seated. Push spring retainer down with a press until the circlip (6) is exposed and can be removed (Fig. 3).

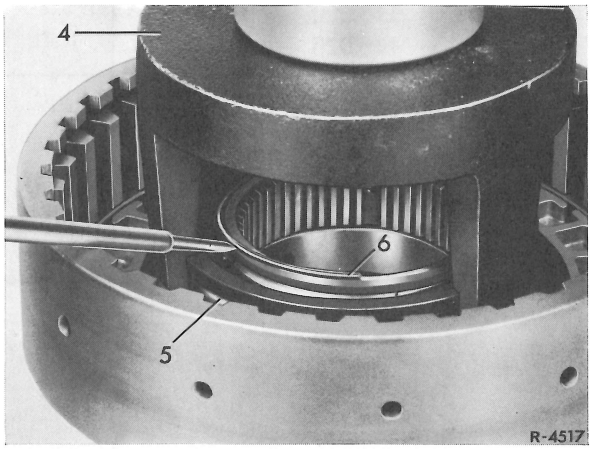


Fig. 3
4 Assembly fixture 115 589 01 59 00
5 Spring retainer
6 Circlip

4 Carefully release press, remove spring retainer (5) and springs (7) (Fig. 4).

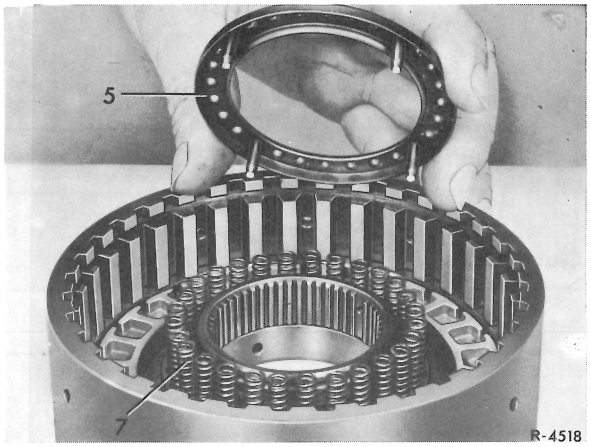


Fig. 4
5 Spring retainer
7 Springs

5 Hold piston (8) with two pointed pliers and pull out of supporting flange (1) until it can be held manually (Fig. 5).

6 Lift piston with lip sealing ring (9) out of supporting flange (1) and check lip sealing ring by sight.

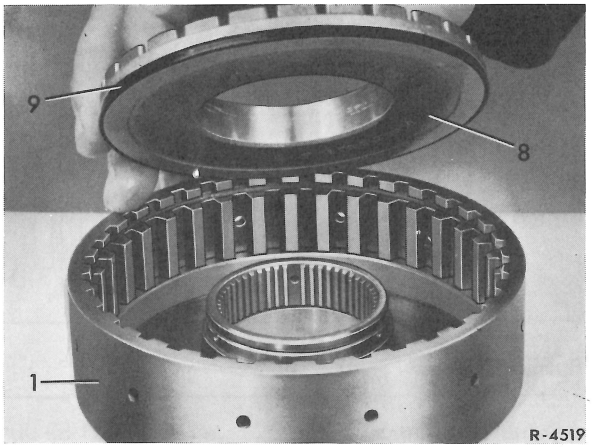


Fig. 5
1 Supporting flange
8 Piston
9 Lip sealing ring

Assembly

7 Install new lip sealing ring (11) to the extent required (Fig. 6).

Caution! Do not use sharp-edged tools.

The lip sealing ring should be correctly resting in groove (10) with the lip pointing downwards (in direction of arrow) (Fig. 6).

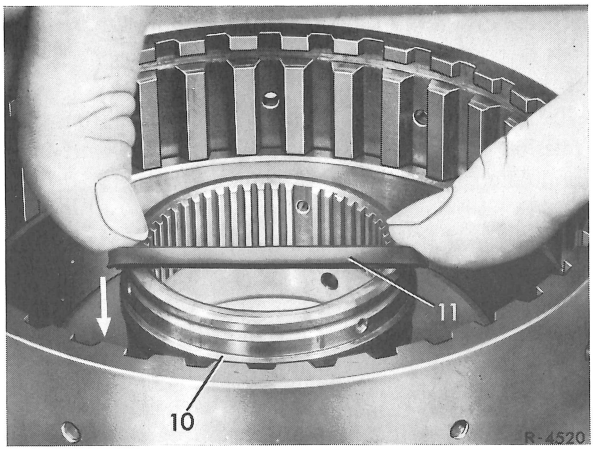


Fig. 6
10 Groove 11 Lip sealing ring

8 Insert introducing ring (12) into supporting flange (1) (Fig. 7).

9 Install new lip sealing ring (9) to the extent required; the sealing lip should point downwards in direction of arrow.

10 Lubricate piston (8) and lip sealing ring, introduce and push on housing bottom without canting. Do not use force since this might damage lip sealing ring.

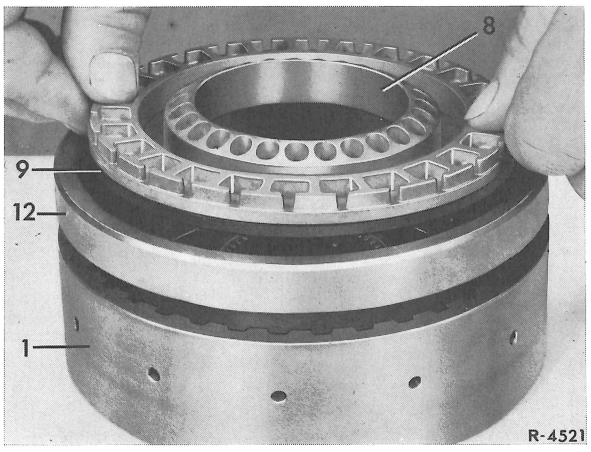


Fig. 7
1 Supporting flange
8 Piston
9 Lip sealing ring
12 Introducing ring 112 589 01 61 00

11 Insert piston returning springs (7) into piston. Position spring retainer (5) in such a manner that each spring is centered in one prominence of the spring retainer (Fig. 4). Do not confuse springs with those of clutch K 2.

12 Mount assembly fixture (4) and push spring retainer carefully and without canting down under press until the circlip (6) can be inserted (Fig. 8).

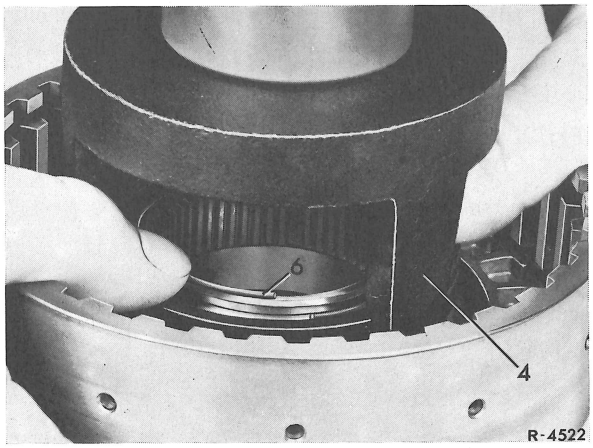


Fig. 8
4 Assembly fixture 115 589 01 59 00 6 Circlip

13 Carefully release press and watch out for correct seat of circlip (6).

14 Assemble plate package for clutch K 1 acc. to diagram. Immerse new lining plates first for a short moment in a ATF oil bath.

15 Insert plate package in outer plate carrier.

Caution! Outside plates, which have badly burnt spots or are bent, must be replaced.

27.3 Disassembly, Assembly and Measuring of Clutch K 1

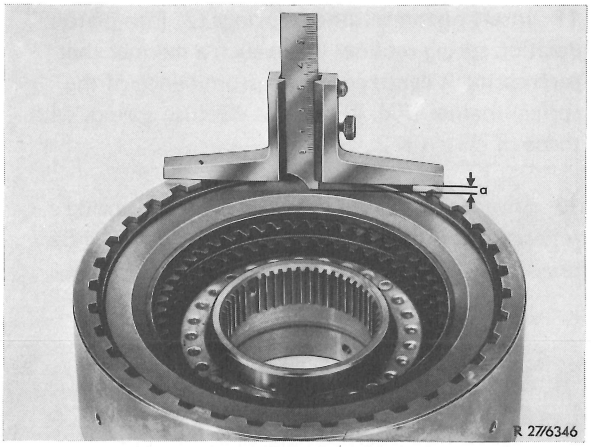


Fig. 9

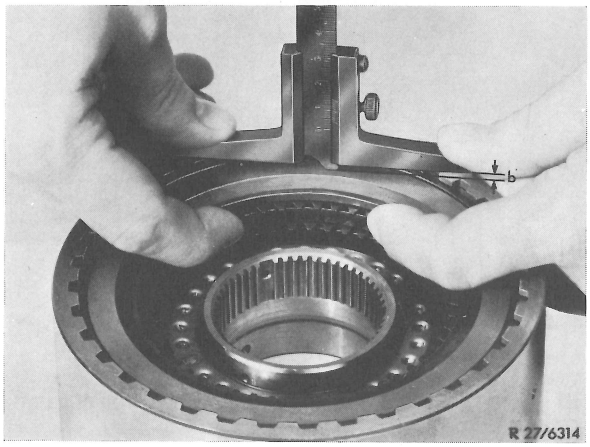


Fig. 10

16 Insert circlip (2) in groove and push down with screw driver (Fig. 1).

Caution! The resilient circlips of clutches K 1 and K 2 are different in spring force and should therefore not be confused.

The circlip of clutch K 1 has 6 undulations. Transmissions for Diesel engines are not provided with an undulated, but with a rigid circlip (2) (Fig. 1).

17 Determine release play "L" of clutch K 1. For this purpose, measure distance "a" (Fig. 9) and distance "b" (Fig. 10) with a depth gauge and determine "L". L = a–b.

Dimension "L" is 1.0 ± 0.2

18 When measuring the distance "a", position depth gauge only lightly on plate package.

19 For measuring distance "b", push outer plate completely up (Fig. 10).

20 Outside plates are available 3.0 and 3.5 mm thick. Adjust release play by inserting the relevant outside plates.

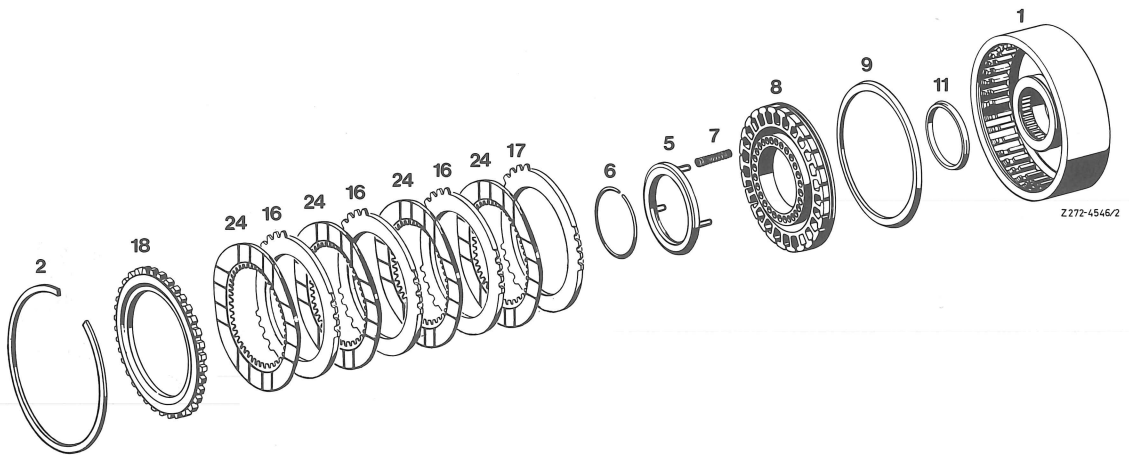


Fig. 11

Clutch K 1

1 Supporting flange
2 Circlip
5 Spring retainer
6 Circlip
7 Return spring
8 Piston
9 Lip sealing ring
11 Lip sealing ring
16 Outer plates
17 Outer plate
18 Outer plate
24 Inner plates

Disassembly, Assembly and Measuring of Clutch K 2 27.3

Revision: due to model 114/115, new plate diagram added and Note of Item 8 extended.

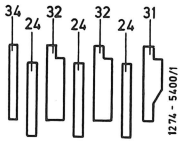
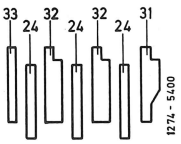
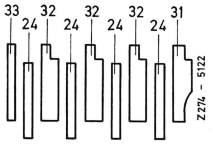
Adjusting Data

Idle travel "L" of plate clutch K 2	1.0 ± 0.2

Clutch Plates

	Thickness	Item No.
Outside plates	5.0	31
	4.5 or 5.0 selectively	32
	2.0	33
	3.0	34
Inside plates	2.1	24

Clutch Plate Diagram

Vehicle model		115.1	115.0 114.015	114.001, 114.023, 114.060, 114.062 114.072, 114.073, 116.020, 116.024, 116.025
Clutch K 2	Piston end			

Special Tools

Assembly fixture	198 589 03 39 00

Disassembly

1 Push supporting flange (21) on press down with assembly mandrel 115 589 01 59 00, until circlip (20) is without load and can be removed (Fig. 1).

2 Remove supporting flange (21) with piston out of brake band drum B 2 (23) (Fig. 1).

Caution! Keep supporting flange and piston together, so that the piston cannot fall out.

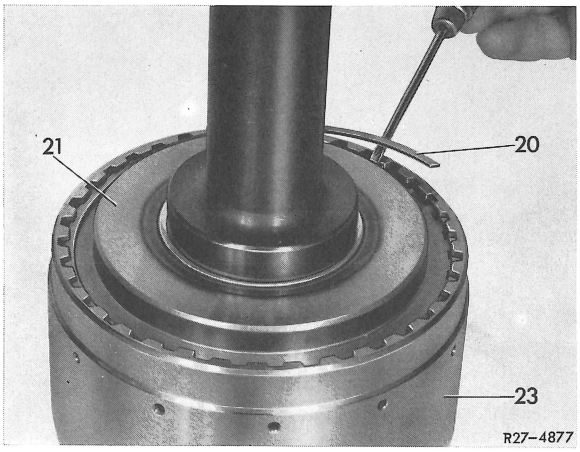


Fig. 1
20 Circlip
21 Supporting flange
23 Brake band drum B 2

3 Remove all return springs (28) and compensating plate (33) with entire plate assembly out of brake band drum (23) (Fig. 2).

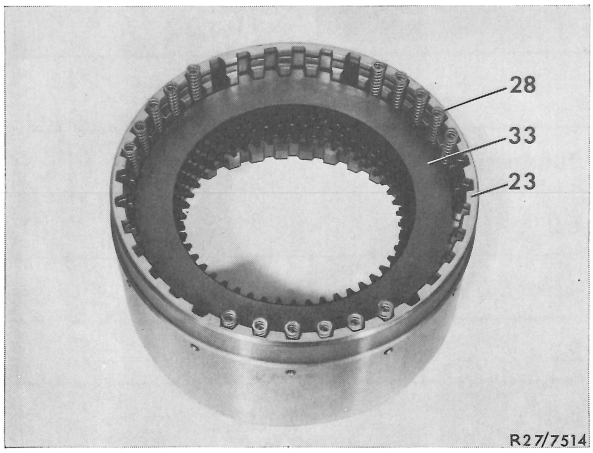


Fig. 2
23 Brake band drum
28 Return springs
33 Compensating plate

4 Push undulated circlip (25) out of groove by means of screwdriver and remove (Fig. 3).

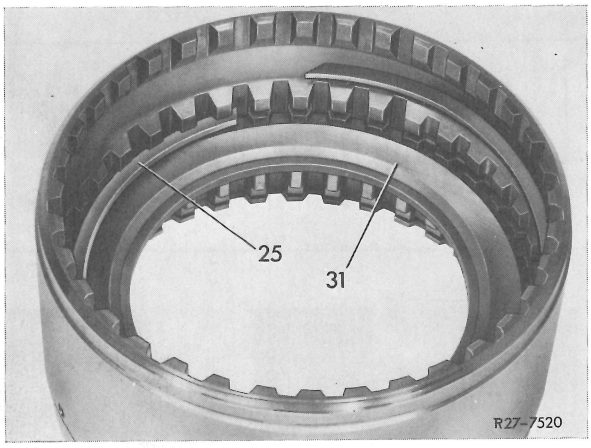


Fig. 3
25 Undulated circlip
31 Outside plate

5 Remove outside plate (31 in Fig. 3) and guide ring for return springs (34) (Fig. 4).

6 Remove piston (22) out of supporting flange (21) (Fig. 5).

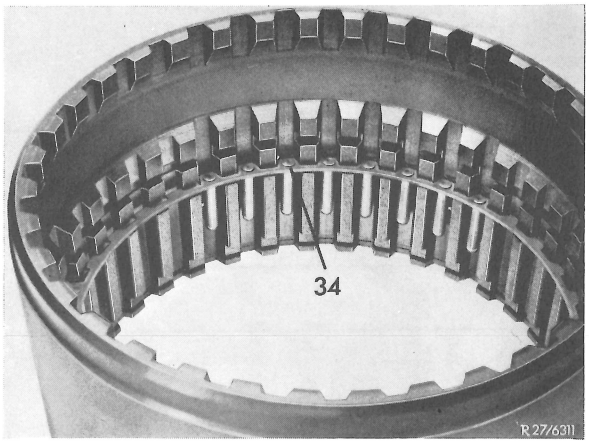


Fig. 4
34 Guide ring-return springs

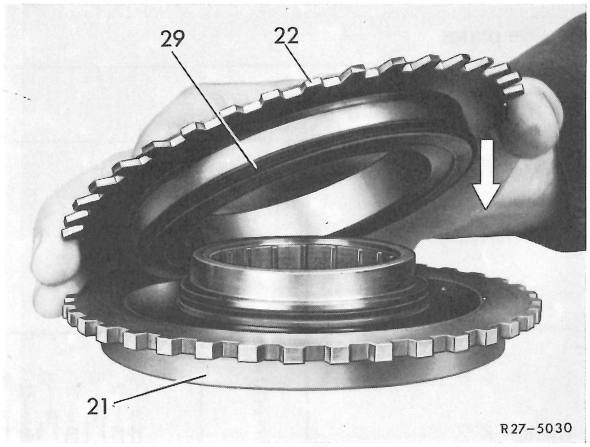


Fig. 5
21 Supporting flange
22 Piston
29 Lip seal

Assembly

7 Insert guide ring (34) for return spring (Fig. 4).

8 Insert outside plate (31) and undulated circlip (25) (Fig. 3).

Caution! The elastic circlips of clutches K 1 and K 2 are different in spring force and should therefore not be confused. Circlip of K 2 has 5 undulations.

Transmissions for Diesel engines are not provided with an undulated, but with a rigid circlip (25) (Fig. 3).

9 Assemble plate package for clutch K 2 acc. to clutch plate diagram (page 690/1). Immerse new lining plates shortly in an ATF bath.

10 Insert plate package into outside plate carrier, with the offset end of the outside plates (32) facing outwards (Fig. 6).

Caution: Outside plates, which have badly burnt spots or are bent, must be replaced.

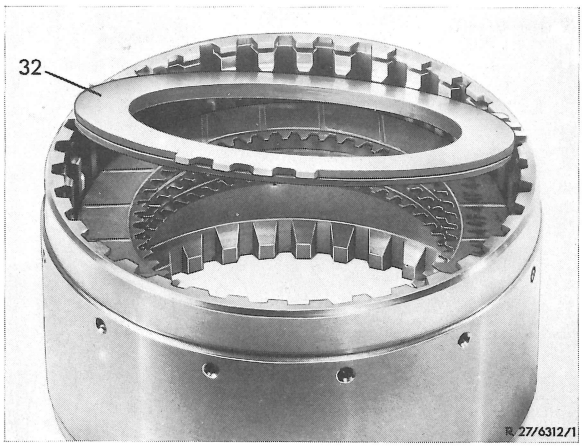


Fig. 6
32 Outer plate

11 Place clutch piston on plate package and determine dimension "a" from upper edge of outside plate carrier to clutch piston using depth gauge (Fig. 7).

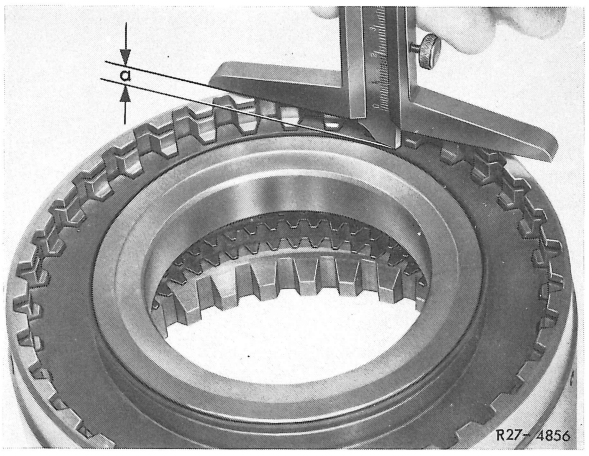


Fig. 7

12 Remove clutch piston.

13 Determine dimension "b" from top edge of outside plate carrier to contact surface of supporting flange using depth gauge (Fig. 8).

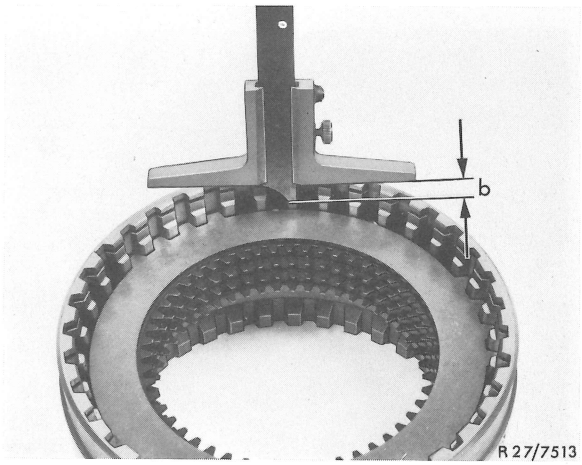


Fig. 8

Note: Determine idle travel "L" of clutch K 2. Dimension "L" results from a–b and should be 0.8–1.2 mm. The idle travel "L" is adjusted by means of pertinent outer plates. Outer plates (32) are available 4.5 and 5.0 mm thick.

14 Place return springs (28) on guide pins and distribute as shown in Fig. 2.

15 Install new lip sealing ring (30) into supporting flange (21) to the extent required (Fig. 9). The lip sealing ring should rest correctly in slot (31) and the lip should face downwards (in direction of arrow) (Fig. 9).

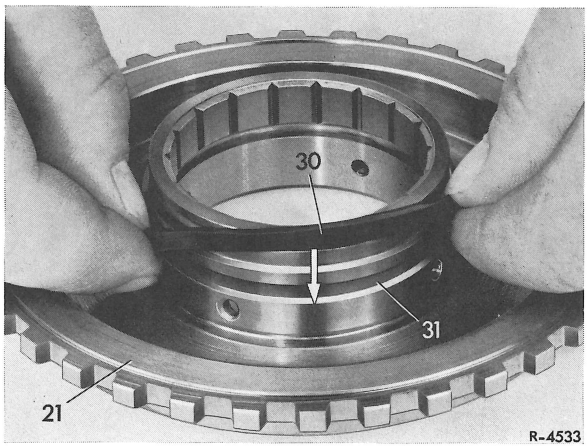


Fig. 9
21 Supporting flange
30 Lip sealing ring
31 Groove

16 Insert lip sealing ring (29) into groove of clutch piston (22). The sealing lip should face downwards in direction of arrow (Fig. 5).

27.3 Disassembly, Reassembly and Measuring of Clutch K 2

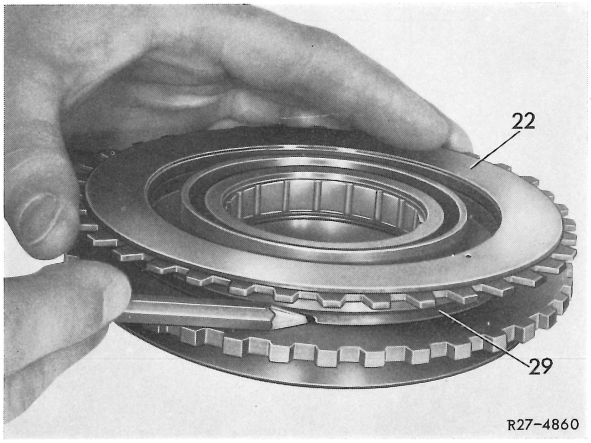


Fig. 10
22 Clutch piston
29 Lip sealing ring

17 Lubricate lip sealing rings (29 and 30) (Fig. 5 and 9). Insert piston (22) into supporting flange. Use a pencil or ball pen to push sealing lip into supporting flange, then push in piston without canting (Fig. 10).

Caution! When inserting the lip sealing rings into groove and when pushing into the supporting flange do not use pointed or sharp-edged tools.

18 Insert supporting flange (21) (Fig. 1).

19 Insert circlip (20) and push into groove with screw driver.

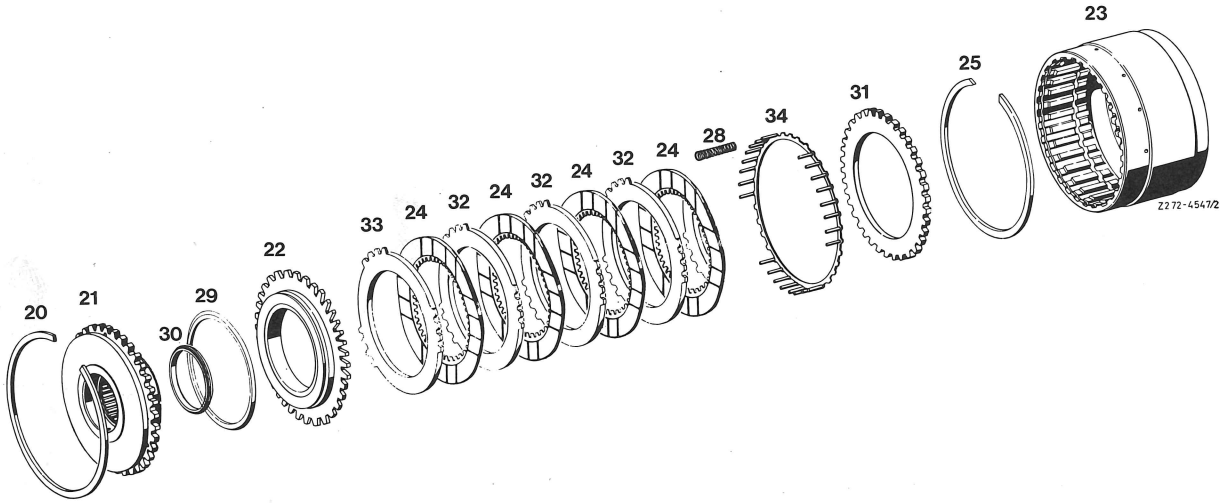


Fig. 11 Clutch K 2

20 Circlip
21 Supporting flange
22 Piston
23 Brake band drum
24 Inside plates
25 Undulated circlip
28 Return springs
29 Lip sealing ring
30 Lip sealing ring
31 Outside plate
32 Outside plates
33 Outside plate
34 Guide ring

274

Installation Survey

Designation of unit	Installed in vehicle model	Unit version
–	107, 114, 115, 116	1

275

Universal Shaft
Removal and Installation of Universal Shaft, type 107, 116 020
Removal and Installation of Universal Shaft, type 114, 115 030

Reconditioning of Universal Shaft
Removal and Installation of Universal Shaft Intermediate Bearing 100
Replacement of Centering Sleeve 110

Illustration Universal Shaft 990

Universal Bearings .946 Dia (24mm)
O/A Measurement over Bearings 75mm.
(CORTINA)

Lubricants

Centering sleeve, per sleeve approx. 6 grams	Molykote Longterm 2
Clamp connection	

Tightening Torques

		Nm	(kpm)
Self-locking nuts for attachment of companion plates	M 10	45	(4.5)
	M 12	65	(6.5)
Clamping nut to universal shaft		30–40	(3–4)
Combination hex. bolt to universal shaft intermediate bearing		25	(2.5)
	M 8	25	(2.5)
Hex. bolt for attaching tunnel closing plate to frame floor	M 10	45	(4.5)
Hex. bolt for attaching engine mount to tunnel closing plate		25	(2.5)

Special Tools

Torque wrench 20–100 Nm (2–10 kpm)	001 589 35 21 00
Special open end wrench 46 mm SW	000 589 13 01 00

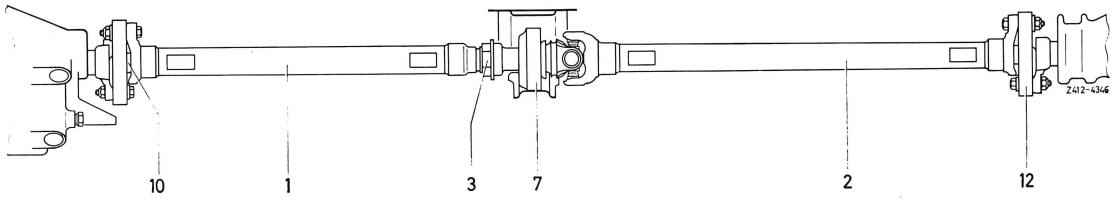


Fig. 1

1 Front universal shaft
2 Rear universal shaft
3 Clamping nut
7 Universal shaft intermediate bearing
10 Centering sleeve
12 Universal plate

Removal

1 Remove exhaust system ("Engines" 49.1–100).

2 Unscrew shielding plate.

3 Support transmission on intermediate flange.

4 Loosen clamping nut of universal shaft for about 2 turns without pushing back rubber sleeve (slides along).

5 Unscrew hex. bolts on tunnel closing plate as well as those for rear engine mount and remove tunnel closing plate (Fig. 2 and 3).

6 Unflange universal shaft on transmission and on rear axle (Fig. 4).

7 Unscrew hex. bolts for attaching universal shaft intermediate bearing on frame floor.

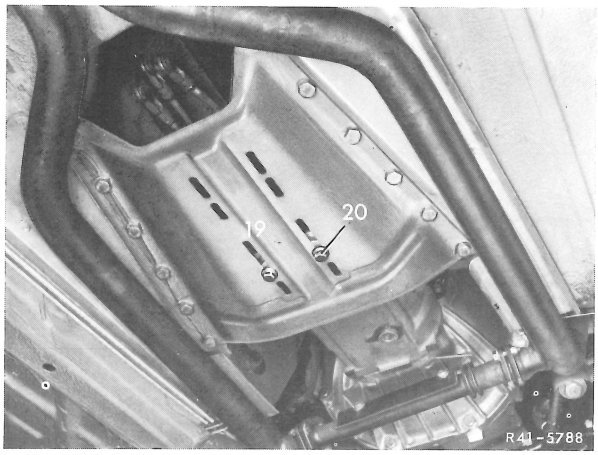


Fig. 2

19 Tunnel closing plate
20 Hex. bolt for attaching engine mount

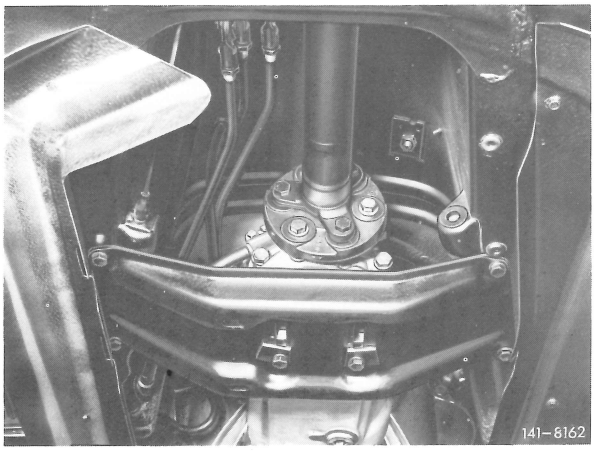


Fig. 3

8 Remove universal shaft from centering pin of rear axle and pull out in rearward direction (Fig. 5), making sure that the universal shaft is not separated.

Important Note! If the universal shaft must be separated, mark components in relation to each other for subsequent reassembly, so that the completely balanced shaft will not become unbalanced.

9 Check universal plates, centering sleeves and universal shaft intermediate bearing for damage. Replace damaged parts.

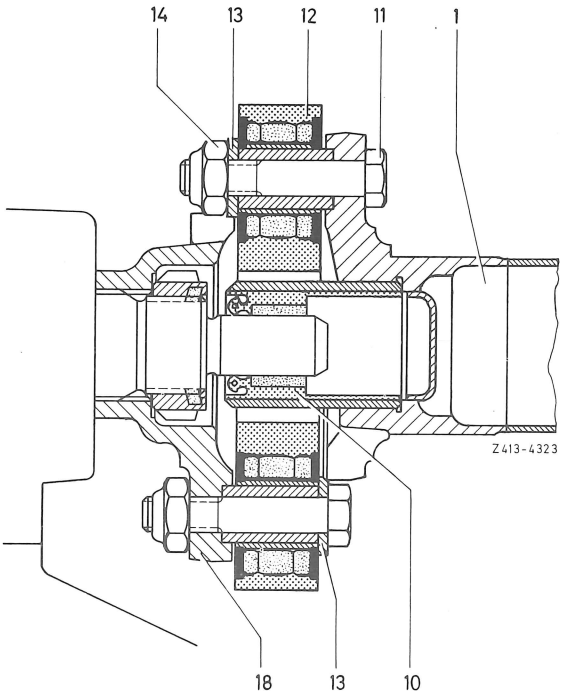


Fig. 4

1 Front universal shaft
10 Centering sleeve
11 Hex. bolt
12 Companion plate
13 Washer
14 Self-locking nut
18 Three-legged transmission flange



Fig. 5

Installation

10 Fill cavities of two centering sleeves with Molykote longterm 2.

11 Slide universal shaft complete with companion plates on centering pins on transmission and on rear axle.

12 Lightly attach universal shaft intermediate bearing.

13 Flange universal shaft to transmission and to rear axle (Fig. 6). Tightening torques refer to page 1.

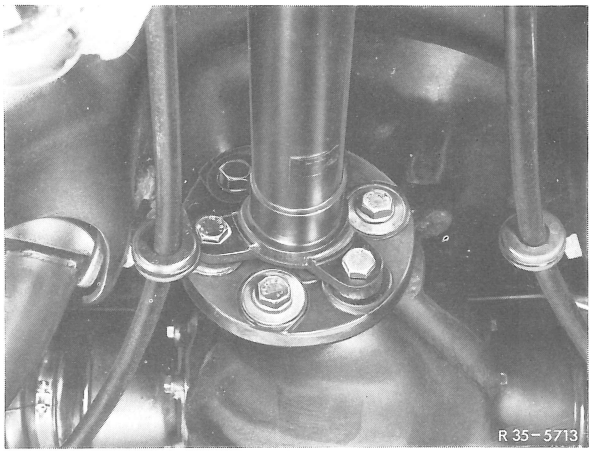


Fig. 6

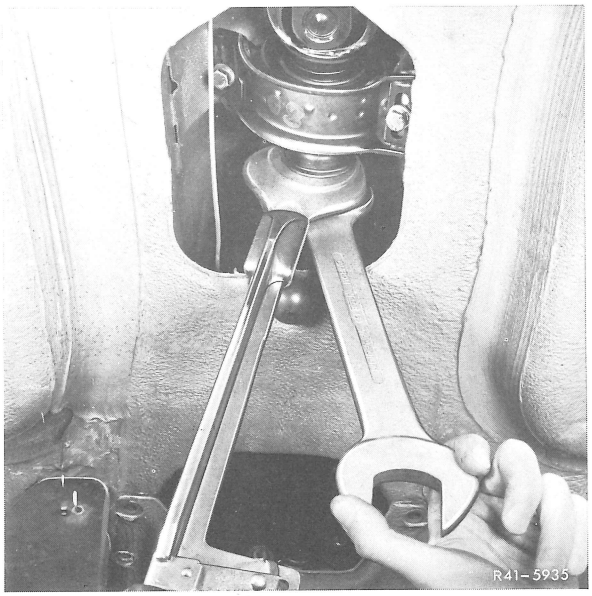


Fig. 7

14 Attach tunnel closing plate to frame floor (Fig. 2 and 3). Tightening torques refer to page 1.

15 Remove transmission from support, position hex. bolts for rear engine mount and tighten to 25 Nm (2.5 kpm).

16 Move vehicle ready for driving back and forth several times. Only this will adjust the universal shaft for correct length and installation free of tensions is assured.

17 Tighten clamping nut on universal shaft, watching out for good seat of sleeve (Fig. 7). Tightening torque 30–40 Nm (3-4 kpm).

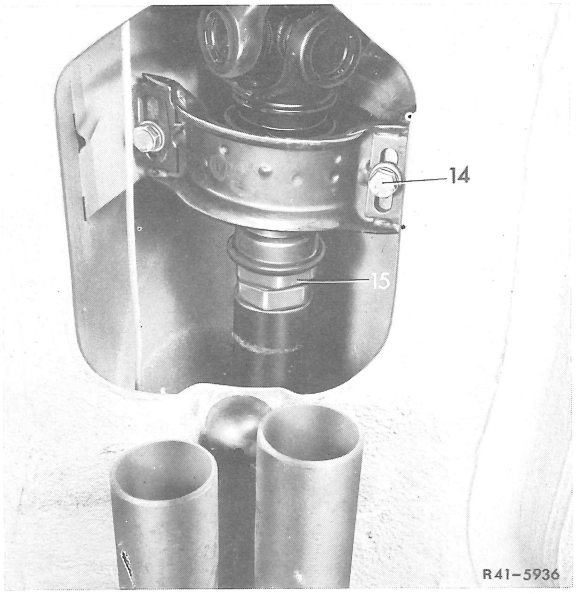


Fig. 8
14 Combination hex. bolt 15 Clamping nut

18 Tighten hex. bolts for attaching universal shaft intermediate bearing to frame floor to 25 Nm (2.5 kpm) (Fig. 8).

19 Mount shielding plate (Fig. 9).

20 Install exhaust system (“Engines” 49.1–100).

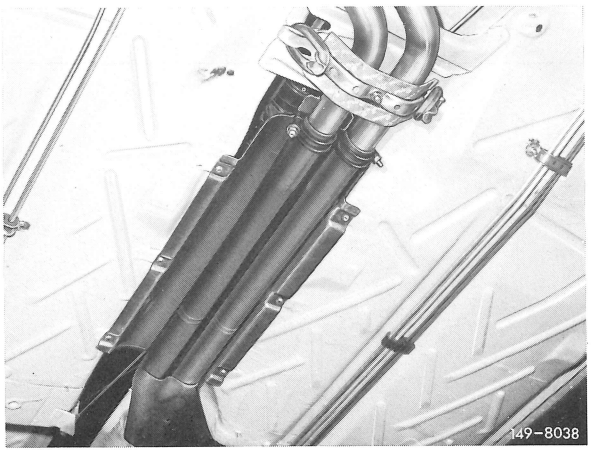


Fig. 9

114, 115

Lubricants

Centering sleeve, per sleeve approx. 6 g	Molykote Longterm 2
Clamp connection	

Tightening Torques			**Nm**	(kpm)
Self-locking nut for attaching companion plate			45	(4.5)
Hex. bolts to universal shaft intermediate bearing			25	(2.5)
Hex. bolts for bridges on frame floor		M 8	25	(2.5)
		M 10	45	(4.5)
Clamping nut of universal shaft	2-piece shaft		30–40	(3–4)
	3-piece shaft	front	30–40	(3–4)
		rear	200	(20)

Special Tools

Torque wrench	20–100 Nm (2–10 kpm)	001 589 35 21 00
	50–200 Nm (5–20 kpm)	001 589 44 21 00
Special open end wrench 46 mm SW (width over flats)		000 589 13 01 00

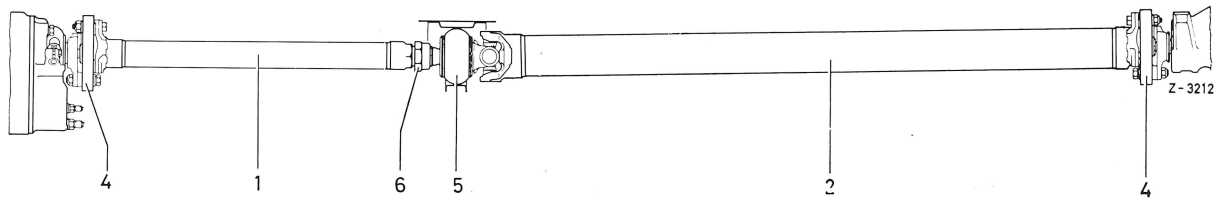


Fig. 1

1 Front universal shaft
2 Rear universal shaft
4 Companion plate
5 Universal shaft intermediate bearing
6 Clamping nut

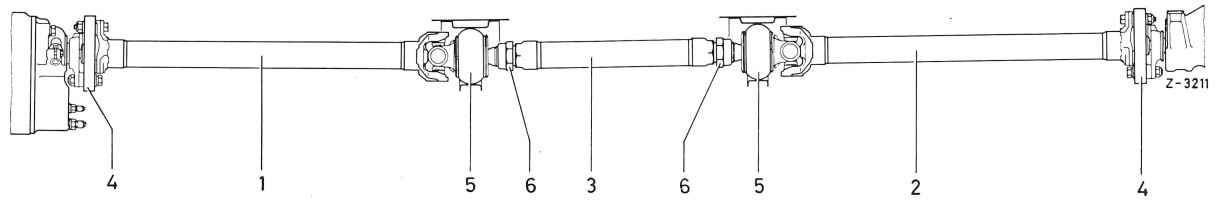


Fig. 2

1 Front universal shaft
2 Rear universal shaft
3 Intermediate shaft
4 Companion plate
5 Universal shaft intermediate bearing
6 Clamping nut

Removal

1 Disconnect cable controls of parking brake on compensating lever and remove compensating lever ("Brakes" 42.2–525).

2 Unscrew both bridges on frame floor (Fig. 3).

Note: For loosening lefthand hex. bolts on rear bridge, lower rear exhaust line slightly, if required.

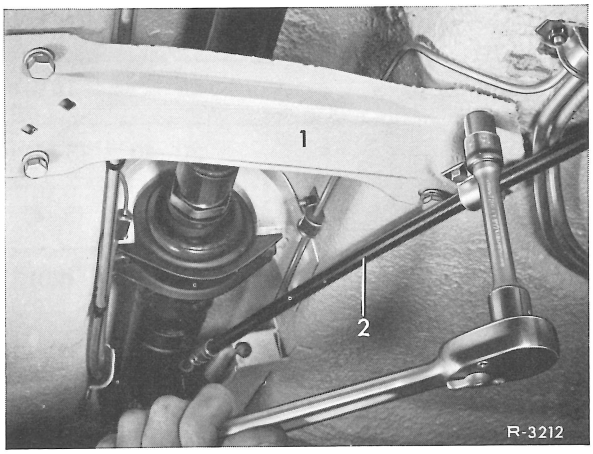


Fig. 3
1 Bridge
2 Front brake cable control

3 Slacken clamping nut of universal shaft for approx. 2 turns without pushing back rubber sleeve (slides along).

On 2-piece universal shaft, loosen only front clamping nut (6) (Fig. 2).

4 Unflange universal shaft on transmission and on rear axle (Fig. 4).

5 Unscrew hex. bolts for attaching universal shaft intermediate bearing to frame floor.

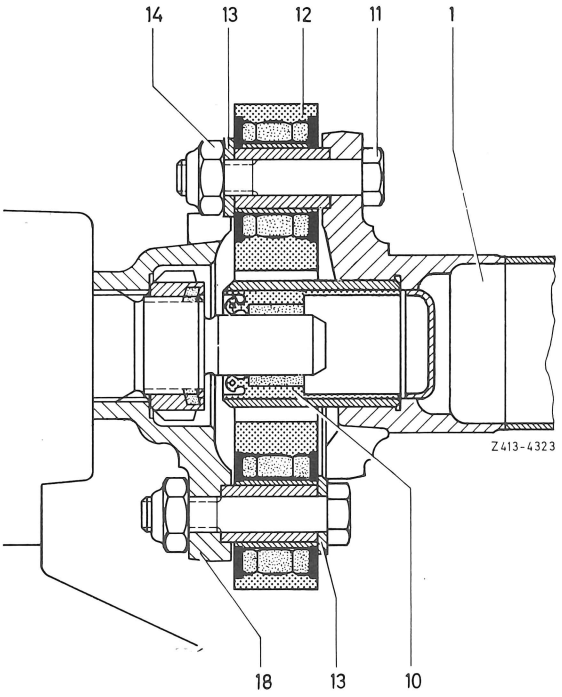


Fig. 4
1 Front universal shaft
10 Centering sleeve
11 Hex. bolt
12 Companion plate
13 Washer
14 Self-locking nut
18 Transmission three-arm flange

6 Push universal shaft from centering pin of rear axle and remove in rear direction (Fig. 5). Make sure that universal shaft is not separated.



Fig. 5

Important Note: If the universal shaft must be separated, mark components in relation to each other for subsequent reassembly, so that the completely balanced shaft will not become unbalanced.

7 Check companion plates, centering sleeves and universal shaft intermediate bearing for damage. Renew damaged parts.

Installation

8 Grease cavities of the two centering sleeves with Molykote Longterm 2.

9 Slide universal shaft complete with companion plates on centering pins on transmission and on rear axle.

10 Lightly attach universal shaft intermediate bearing to frame floor.

11 Flange universal shaft to transmission and to rear axle (Fig. 6). Tightening torque 45 Nm (4.5 kpm).

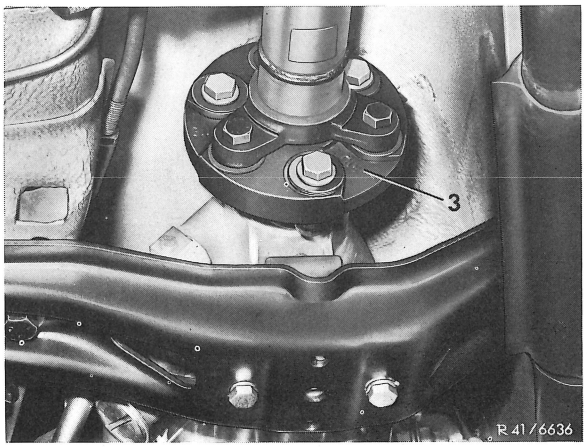


Fig. 6
3 Companion plate

12 Attach both bridges to frame floor. For tightening torque refer to page 1.

13 Attach cable controls of parking brake and adjust ("Brakes" 42.2–525).

14 Push vehicle back and forth several times in condition ready for driving. This will adjust universal shaft to its correct length and installation free of tensions is assured.

15 Tighten clamping nut on universal shaft, watching out for good seat of sleeve (Fig. 7). Tightening torque refer to page 1.

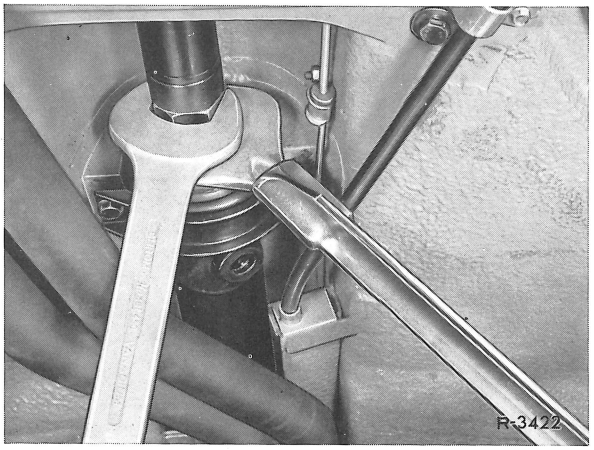


Fig. 7

Note: Prior to tightening clamping nuts on intermediate shaft of three-piece universal shaft, make sure that the intermediate shaft is not knocking against front or rear universal shaft intermediate bearing. This means, that at its end the intermediate shaft should have approx. the same distance in relation to pertinent intermediate bearing.

16 Tighten hex. bolts for attaching universal shaft intermediate bearing to frame floor to 25 Nm (2.5 kpm).

Special Tools

Pressing out and pressing in fixture for radial ball bearing	116 589 09 43 00
Assembly mandrel for pressing-in universal shaft intermediate bearing	116 589 01 15 00
Puller arms (2 each)	116 589 03 33 00
Two-arm puller	000 589 88 33 00

Important Note!

The components of the universal shaft are individually balanced at the factory. To remove any unbalance which may still remain, the complete universal shaft including the universal plates is again balanced. This is why during disassembly of the complete universal shaft (for example when changing the intermediate bearing) the **individual components must be marked in relation to each other** and reassembled as originally delivered.

Removal

1 Mark the individual shaft members in relation to each other. Separate front and rear universal shaft on clamp connection.

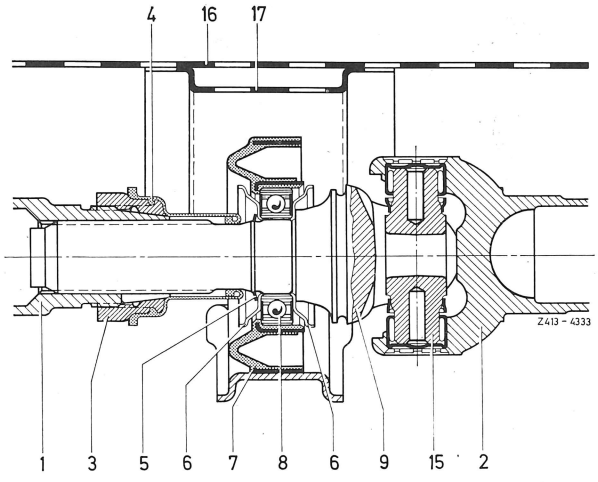


Fig. 1 Models 107, 116

1 Front universal shaft
2 Rear universal shaft
3 Clamping nut
4 Rubber sleeve
5 Locking ring
6 Protective cap
7 Universal shaft intermediate bearing
8 Radial ball bearing
9 Yoke
15 Universal spider with needle bearing and bushing
16 Frame floor
17 Universal shaft tunnel

2 Pull off rubber sleeve across splining (Fig. 2).

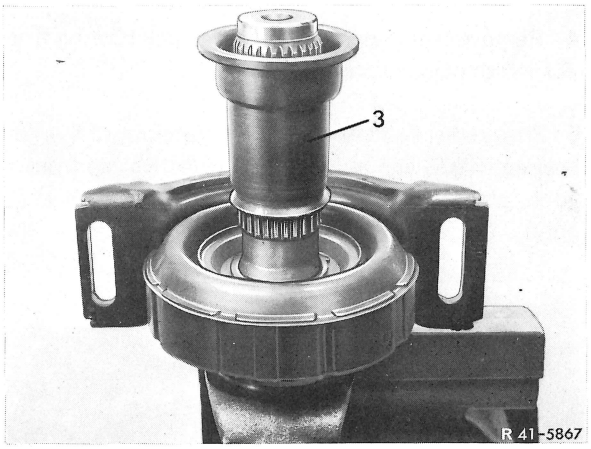


Fig. 2

3 Rubber sleeve

3 Remove locking ring from groove and remove front protective cap (Fig. 3).

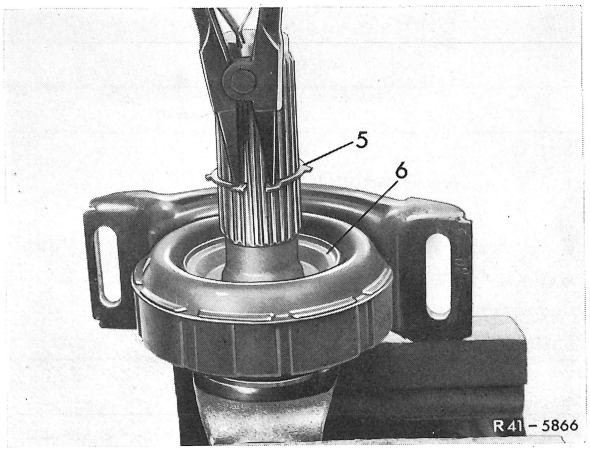


Fig. 3

5 Locking ring
6 Protective cap

41.1 Removal and Installation of Universal Shaft Intermediate Bearing

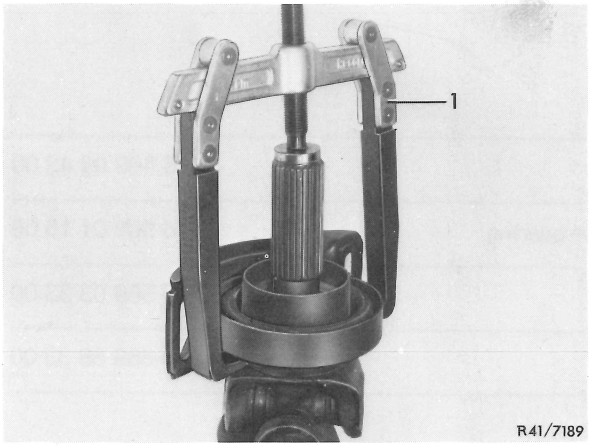


Fig. 4
1 Puller

4 Remove V-fold bearing and radial ball bearing from yoke with commercial puller (Fig. 4).

5 Press radial ball bearing with fixture out of V-fold bearing (Fig.5) and remove rear protective cap from yoke (protective cap used on models 107 and 116 only).

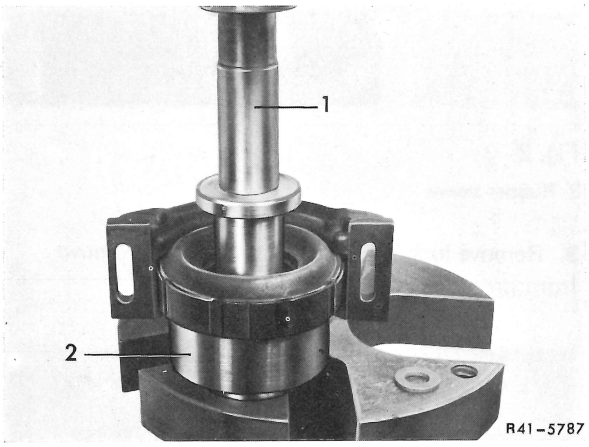


Fig. 5
1, 2 Remover and installer

6 Check V-fold bearing and radial ball bearing and replace, if required.

Installation

7 Slowly press radial ball bearing (8) into rubber coated bearing seat, watching out for good seat of bearing (Fig. 6).

8 Insert rear protective cap (for types 107 and 116 only). Press V-fold bearing with pressed-in radial ball bearing on yoke. (Fig. 7).

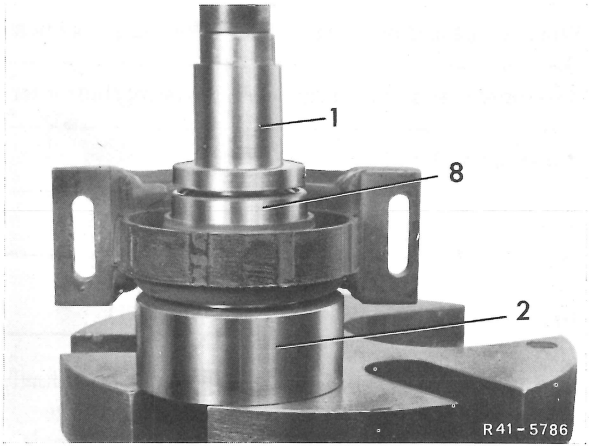


Fig. 6
1, 2 Remover and installer
8 Grooved ball bearing

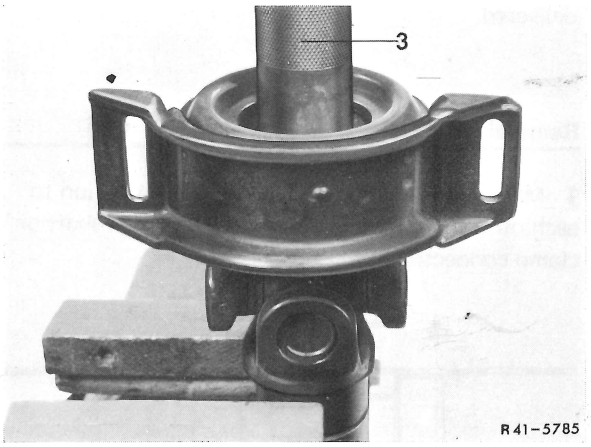


Fig. 7
3 Assembly mandrel

Important Note! On models 107 and 116 the V-fold of the rubber mounting should face in driving direction (Fig. 1).
On models 114 and 115 with two-piece universal shaft, the V-fold should face the rear, opposite to driving direction (Fig. 8).
On three-piece universal shaft, the V-fold of the front rubber mount should face in driving direction and that of the rear rubber mount opposite to the driving direction.

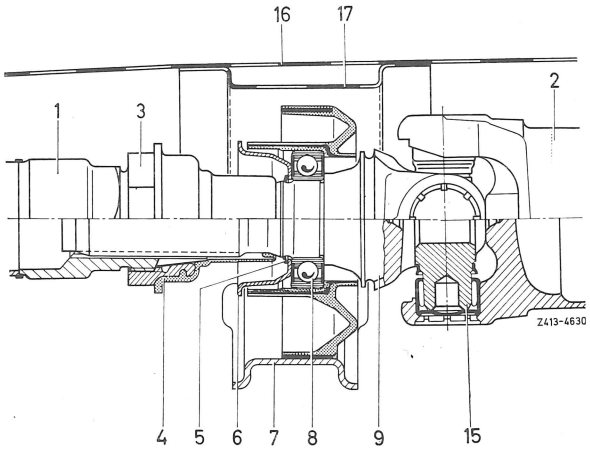


Fig. 8 Models 114, 115

1 Front universal shaft
2 Rear universal shaft
3 Clamping nut
4 Rubber sleeve
5 Locking ring
6 Protective cap
7 Universal shaft intermediate bearing
8 Radial ball bearing
9 Yoke
15 Universal spider with needle bearing and bushing
16 Frame floor
17 Universal shaft tunnel

9 Attach protective cap and insert the axially resilient locking ring into groove of yoke with the protective cap resting securely against inner bearing race.

10 Pull rubber sleeve (4) across splining of yoke. Make sure that the sleeve is correctly seated at small diameter (Fig. 1 and 8).

11 Coat splining with Molykote Longterm 2 during assembly.

12 Assemble front and rear universal shaft as marked.

Lubricants

Centering sleeve	Molykote Longterm 2
Capacity per sleeve	approx. 6 grams

Tightening Torques		**Nm**	(kpm)
Self-locking nut for attaching universal plates	M 10	45	(4.5)
	M 12	65	(6.5)

Note

In the event of wear or damage on sealing lip in centering sleeve of front or rear universal shaft the complete universal shaft need not be replaced, since the centering sleeve can be individually replaced.

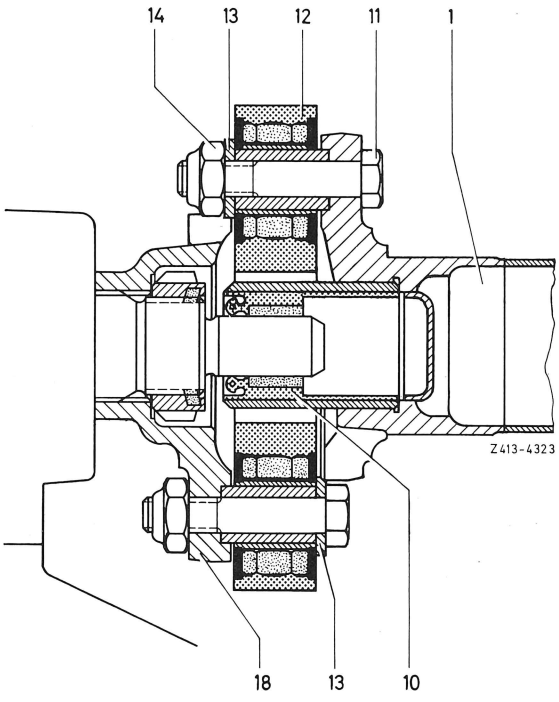


Fig. 1

1 Front universal shaft
10 Centering sleeve 1
11 Hex. bolt
12 Companion plate
13 Washer
14 Self-locking nut
18 Three-legged transmission flange

Removal

1 Unscrew universal plate from flange of universal shaft.

2 Drill a hole of approx. 10 mm dia. at a right angle through the sleeves approx. 15 mm from face of centering sleeve (Fig. 2).

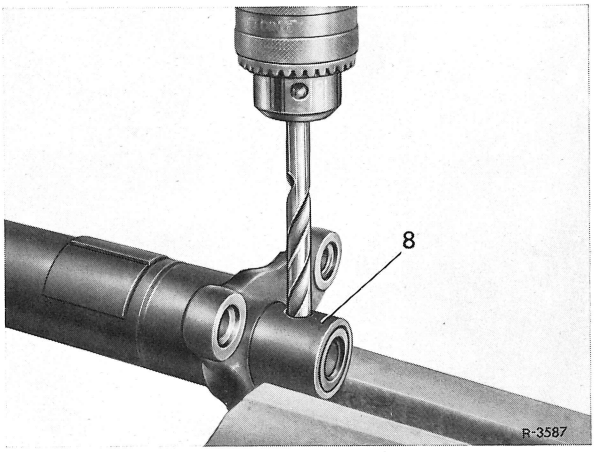


Fig. 2

8 Centering sleeve

3 Insert mandrel into hole and pull centering sleeve out of universal shaft by means of two rods (Fig. 3).

41.1 Replacement of Centering Sleeve

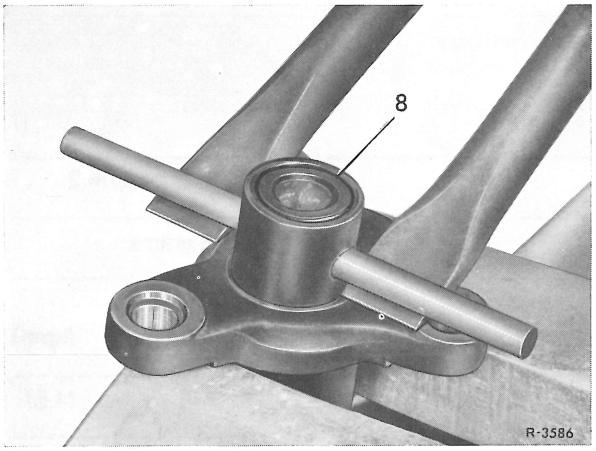


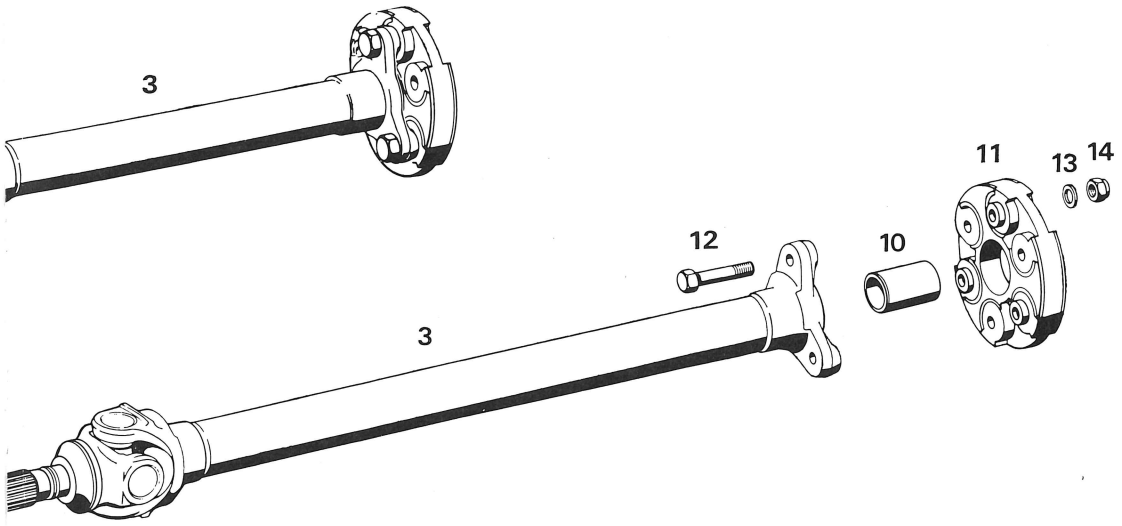
Fig. 3
8 Centering sleeve

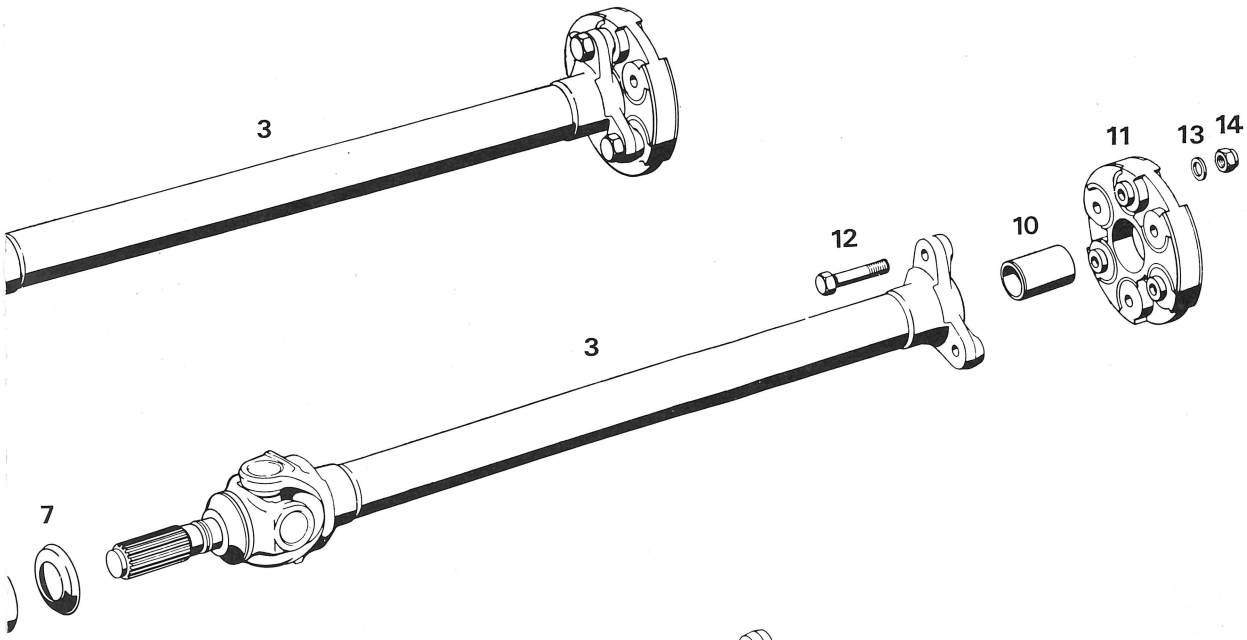
Installation

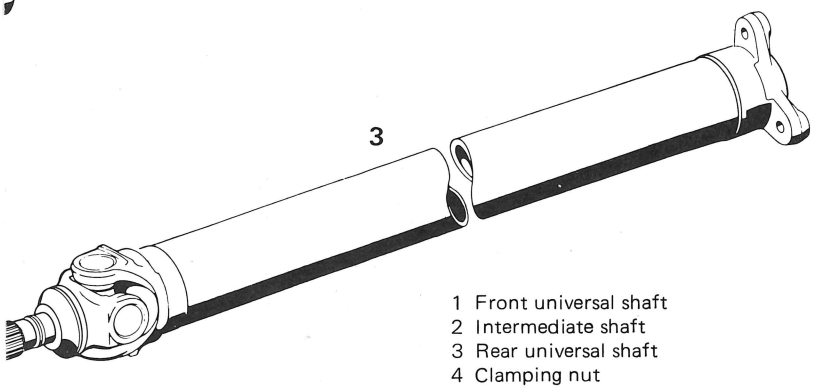
4 Coat new centering sleeve at portion of OD which is in universal flange with sealing compound and press in.

5 Fill cavity of centering sleeve with Molykote Longterm 2.

6 Mount companion plate and tighten self-locking nuts. Tightening torque of nuts 4.5 kpm.







2-Piece universal shaft
Model 115.1, 114
with standard wheel base

1 Front universal shaft
2 Intermediate shaft
3 Rear universal shaft
4 Clamping nut
5 Rubber sleeve
6 Locking ring
7 Protective cap
8 Radial ball bearing
9 Universal shaft intermediate bearing
10 Centering sleeve
11 Companion plate
12 Hex. screw
13 Washer
14 Self-locking hex. nut