The present Workshop Manual for Clutches and Transmission contains the descriptions of all important assembly, adjusting and inspection jobs.

The pertinent data, adjusting values, dimensions and tolerances, as well as the tools, are listed in tables at the beginning of each section.

The entire contents of the Workshop Manual are extensively sub-divided into the Groups known from our technical literature. Details are shown in the section "Instructions for Use of Workshop Manuals".

The Survey in front of the Index Pages serves to locate the various units, the Installation Survey following each Index Page assists in finding the desired version. In addition, each unit version is initiated by a list of contents.

Additional Workshop Manuals of this type are available for

Engines
Axles
Brakes, Steering
Electrical System
Body
Vacuum Systems, Ventilation, Heating, Air Conditioning

As before, the loose-leaf arrangement of the Workshop Manuals has been retained to permit the iclusion of all significant Revisions and further improvements by means of Supplements as published by us at pertinent intervals.

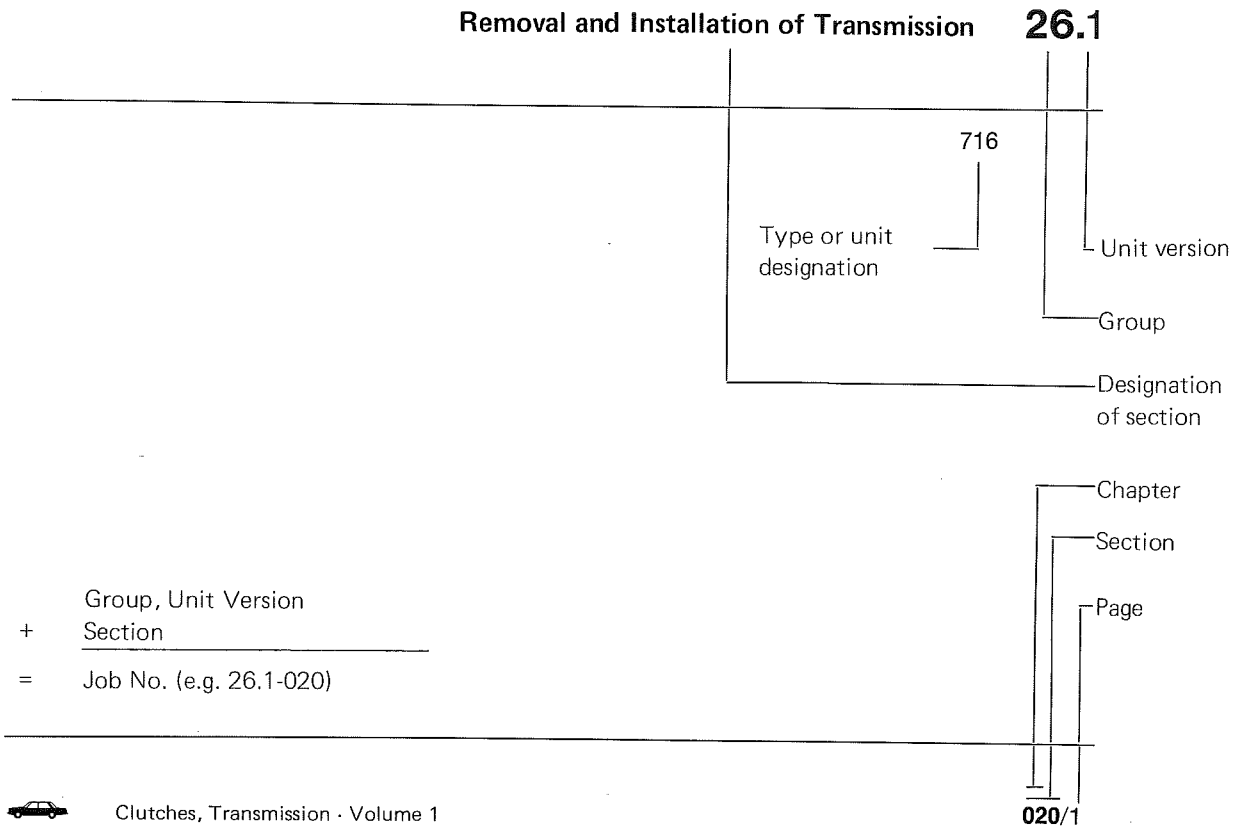
Daimler-Benz Aktiengesellschaft
Zentralkundendienst

May 1971

Subdivision of Service Manuals

The entire Series of Service Manuals for Passenger Cars comprises the following Unit Volumes:

Volume	contains the following Groups	
Engines	Engine-Mechanical System	00, 03, 05 13, 18, 20
	Engine-Combustion System	07.1, 07.2, 07.3 07.4. 07.5, 07.6 09, 47, 49
Clutches, Transmissions	Clutch and Pedal Assembly	25
	Manual Transmission	26
	Automatic Transmission	27
	Propeller Shaft	41
Axles	Suspension	32
	Front Axle	33
	Rear Axle	35
	Wheels and Chassis Measurement	40
Brakes, Steering Systems	Brakes	42
	Steering Systems	46
Electrical Systems	Electrical System of Engine (Starting Motor, Alternator)	15
	Electrical Equipment and Instruments, Wiring Diagrams	54
	Electrical System of Body Windshield Washer	82
Body	Body	60 to 98
Vacuum Systems, Ventilation, Heating, Air Conditioning	Vacuum Systems	80
	Ventilation, Heating, Air Conditioning	83



Arrangement of the Service Manuals

The contents of the engine and body volume are subdivided acc. to unit versions and groups.

The other volumes are subdivided first according to units and then according to unit versions.

In all the volumes the groups are subdivided into chapters and smaller, self-contained sections.

Each section begins with a new page and is identified with a three-digit number at the bottom.

The various unit versions are numbered consecutively starting with 1. Units having the same design characteristics, for example the transmission 716, have the same unit version number. Designation is by means of a numeral behind the group. Together the upper and the lower number are the job number.

In the event of deviations, the first page of a Section shows type or unit designation under headline.

The sections which apply to all unit versions are covered in version 0.

To prevent confusing these pages with pages from other service manuals, each righthand page shows the symbol of a passenger car and the volume designation.

Various sections are carrying an "R" both in the list of contents and on the individual pages. These sections are covering major repair jobs which require special expert knowledge, equipment and special tools.

Data, adjusting values, processing dimensions, tightening torques and tools are shown at the beginning of each Section to eliminate the need of references concerning data contained in text.

All the dimensions are in millimeters (mm), provided no other unit of measure is used.

Up to final conversion to "International System of Measuring Units" the Unit Volumes are showing the pertinent data first in new units, and the former units in brackets behind.

The indicated part numbers are serving exclusively for identification and better differentiation of individual versions. When ordering spare parts, the part rumbers must be taken from the spare parts literature on principle.

Explanations concerning Supplements

Supplements consist of "Revisions" and "Extensions".

Revisions

Each page subject to a modification, correction or addition carries on its bottom corner the serial number of the supplement, the remark "Revision", the date and the title of the service manual.

In addition, the first revised page of a Section shows a short reference concerning the reason for such changes.

Extensions

This note identifies newly added sections. The note "Extension" is also printed on each bottom corner, including the number of the supplement, the date and the title of the service manual.

Installation Survey

Designation of unit	Installed in vehicle model				Unit version
–	107	114	115	116	1

Clutch

Removal and Installation of Clutch . . . . . Job-Nr. 25.1–020
Checking Driven Plate 030
Checking Driven Plate for Wear in Installed Condition 040
Checking Pressure Plate 050

Clutch Actuation

Removal and Installation of Slave Cylinder 200
Removal and Installation of Master Cylinder 210
A. Model 107, 116 . . . . . /1
B. Model 114, 115 . . . . . /3
Venting Clutch Actuation 230
A. Venting with a Brake Bleeding Device
B. Venting with Assistance of Brake System
Adjustment of Clearance Between Push Rod and Piston in Master Cylinder 240
A. Adjustment without Brake Bleeding Device . . . . . /1
B. Adjustment with Brake Bleeding Device . . . . . /2
Removal and Installation of Throwout and Throwout Rocker 260

Pedal Assembly

Adjustment of Dead Center Spring 400
Removal and Installation of Pedal Assembly 450
A. Model 107, 116 . . . . . /1
B. Model 114, 115 . . . . . /6

Revision: Tightening torque, item 4 and 5 added, function test extended.

Tightening Torque	Nm	(kpm)
Bolts for pressure plate	25	(2.5)

Special Tool

Centering mandrel	 1100.6380	116 589 11 15 00

Removal

1 Remove transmission (26–020).

2 Loosen fastening bolts of pressure plate one after the other by 1 to 1 1/2 turns each until pressure plate is completely relaxed (Fig. 1).

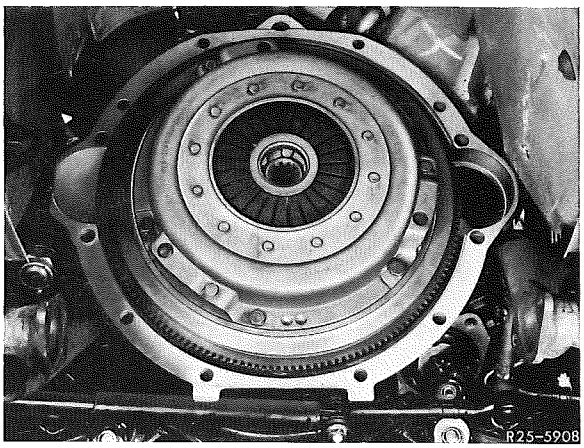


Fig. 1

Note: Immediate, complete loosening or tightening of the individual fastening bolts may result in damage to cup spring and may cause thrust ring to jump off.

3 Unscrew fastening bolts completely and remove pressure plate with driven plate.

4 Check pressure plate for burnt cracks and score marks.

5 Check flywheel for burnt cracks and score marks, refinish, if required ("Engines" 03–420).

Attention! Handle and store pressure plate carefully. Throwing or dropping of pressure plate may result in bending of spring bands between contact plate and cover plate, which in turn may result in considerable unbalance in installed condition coupled with grabbing or separation trouble.

Handle driven plate as carefully to avoid any bending (lateral runout) of lining.

Installation

6 Center driven plate with centering mandrel in relation to radial ball bearing in crankshaft (Fig. 2).

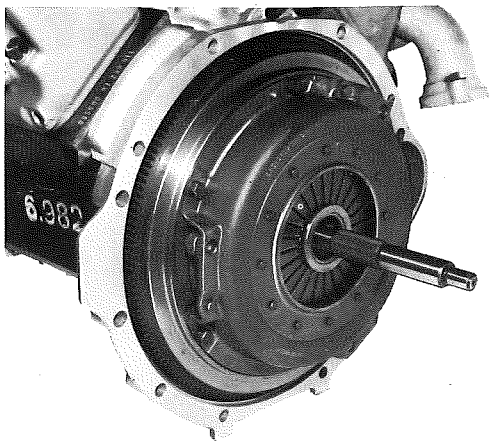


Fig. 2

7 Position pressure plate and tighten fastening bolts one after the other by 1 to 1 1/2 turns each until pressure plate has been tightened well. Then remove centering mandrel.

Attention! During assembly, make sure that the pressure plate is pulled into recess on flywheel uniformly and free of burr (Fig. 2).

8 Install transmission.

Function Test

9 Check clutch for unobstructed operation by engaging reverse gear with the engine running.

Note that a perfectly operating driven plate at idle speed and with transmission oil at operating temperature requires a little time after declutching up to stop. Each early engagement of reverse gear will necessarily result in noisy shifting.

10 Check actuation for function and system for leaks.

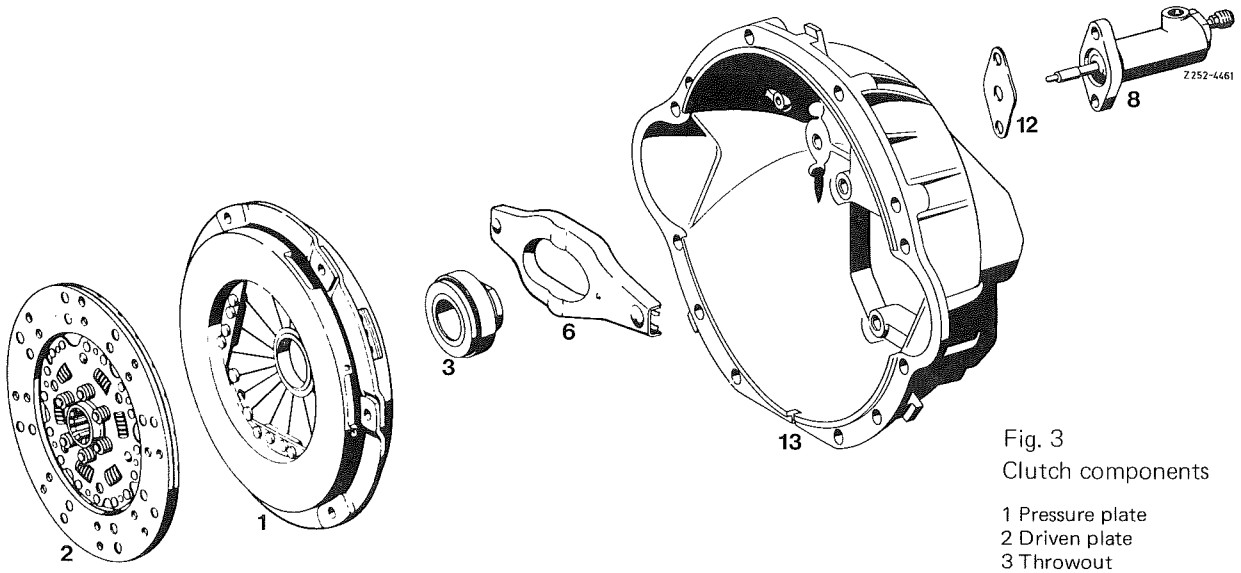


Fig. 3
Clutch components

1 Pressure plate
2 Driven plate
3 Throwout
6 Throwout rocker
8 Slave cylinder
12 Shim
13 Clutch housing

Revision: Data and checkup extended.

Data

Part No.	Lining thickness		Permissible total wear of linings	Permissible lateral runout of driven plate
	Clutch end	Flywheel end		
4- and 5-cylinder engines				
001 250 15 03 002 250 38 03	3.8–4.0			
002 250 73 03 003 250 36 03 003 250 43 03	3.6–3.8		2	0.5
6-cylinder engines				
001 250 11 03 001 250 88 03 002 250 16 03 002 250 28 03 002 250 60 03 003 250 35 03	3.9–4.1		2	0.5
8-cylinder engines				
002 250 32 03 002 250 83 03	4.3–4.5	3.3–3.5	2	0.5

Conventional Tools

Dial gauge A 1 DIN 878	e.g. made by Mahr, 73 Esslingen, Order No. 810 St.
Measuring stand	e.g. made by Mahr, 73 Esslingen, Order No. 815 P

Checking

1 Check driven plate for oiling up, greasing up, mechanical damage, cracks in lining and for thickness of lining.

2 Check stop bolt and hub for wear (arrow in Fig. 1).

3 Check driven plate for lateral runout, align with aligning fork, if required (Fig. 1).

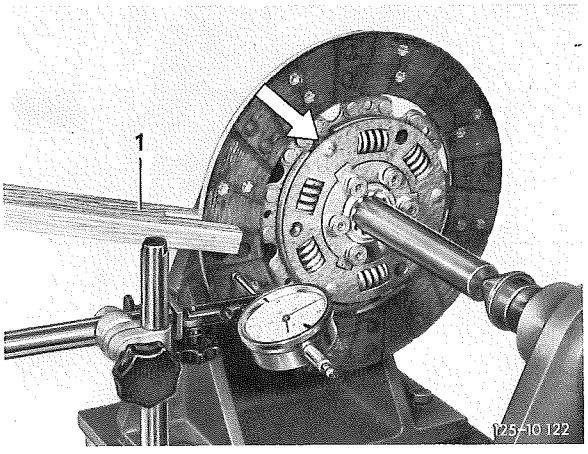


Fig. 1

1 Aligning fork (wood)

25.1 Checking Driven Plate for Wear in Installed Condition

Revision: Text revised.

Special Tool

Check gauge	115 589 07 23 00

Note

The time, when the driven plate is at its wear limit and should therefore be exchanged, cannot be readily determined.

The reasons are that the pressure plate keeps increasing its contact pressure against driven plate with increasing wear of lining and will therefore not permit the plate to slip, with the result that the automatically adjusting, free-of-play clutch actuation will not indicate at clutch pedal when the time for replacing the driven plate has come.

The wear condition of the driven plate can therefore be measured only indirectly on slave cylinder by means of a special check gauge.

Checking

1 Slip check gauge into groove of plastic shim (Fig. 3).

Wear condition **unobjectionable**

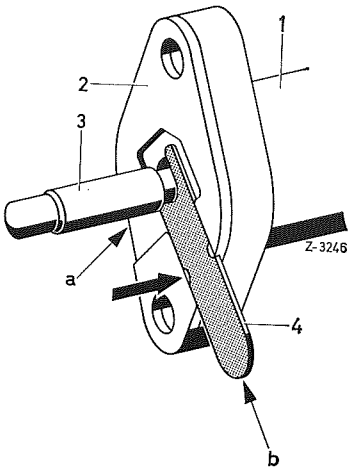


Fig. 1

1 Slave cylinder
2 Shim (plastics)
3 Thrust rod
4 Check gauge

2 When the notched marks in flange are disappearing, the driven plate is fully operable (Fig. 1). If the notched marks of the gauge slipped in up to stop remain visible, the wear limit of the driven plate has been attained (driven plate must be replaced), (Fig. 2).

Wear limit has been attained

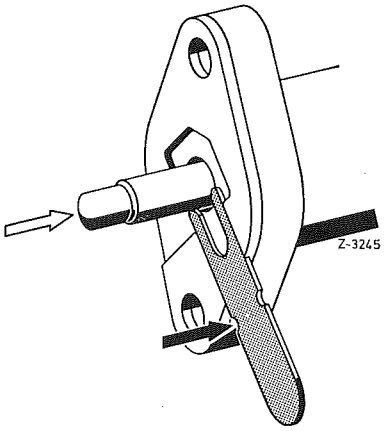


Fig. 2

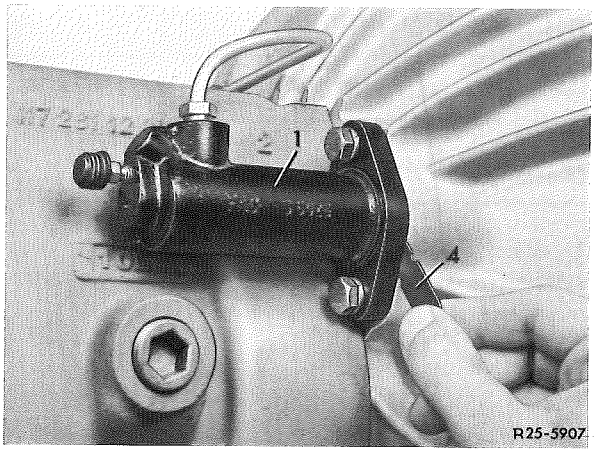


Fig. 3

1 Slave cylinder
4 Check gauge

Revision: Data, checkup revised.

Data

Part No.	Contact pressure N	(kp)
4- and 5-cylinder engines		
001 250 43 04	4900–5600	(490–560)
6-cylinder engines		
001 250 41 04	5400–6000 (with blue color dot)	(540–600)
001 250 42 04	6000–6600 (With yellow color dot)	(600–660)
8-cylinder engines		
001 250 77 04 002 250 22 04	7200–7900	(720–790)

Checking

1 Check pressure plate for burnt cracks and score marks.

Attention! Do not place pressure plates under screw press or the like. If thrust ring travels beyond max. 11 mm, the pressure plate will become unfit for use.

Revision: Data and note added, item 6 extended.

Data

Model	107.022, 107.042 114, 115 116.020, 116.024, 116.025	107.023, 107.043 116.028, 116.029
Nominal dia. mm.	23.81	22.2
Stroke	18	20

Note

The slave cylinder for vehicles with 8-cylinder engines differs externally as compared with the slave cylinder for vehicles with 4-, 5- and 6-cylinder engines by its longer thrust rod and a yellow ring on bleed screw (Fig. 1).

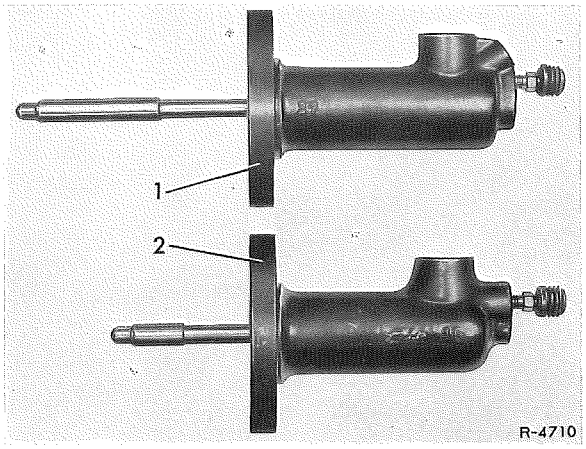


Fig. 1

1 Slave cylinder for 8-cylinder engines
2 Slave cylinder for 4-, 5- and 6-cylinder engines

Removal

1 Unscrew pressure line (3) on slave cylinder.

2 Close pressure line with a rubber cap to prevent loss of brake fluid.

3 Unscrew fastening bolts (4) for slave cylinder.

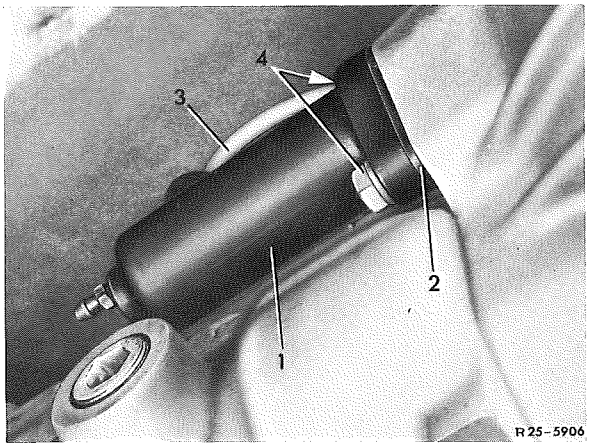


Fig. 2

1 Slave cylinder
2 Shim (plastics)
3 Pressure line
4 Fastening screw

4 Remove slave cylinder with thrust rod from clutch housing, watching out for shim (2).

Installation

5 Position shim (2) with grooved end against clutch housing and hold.

6 Introduce slave cylinder with push rod into clutch housing in such a manner that the push rod comes to rest in spherical recess of throwout rocker. Watch out for correct seat of dust sleeve in slave cylinder.

7 Screw slave cylinder with fastening screws to clutch housing.

8 Connect pressure line (3) to slave cylinder.

9 Bleed clutch actuation (25.1–230).

Revision: Data, model 116 and Section B, models 114, 115 added.

A. Model 107, 116

Data

Model	107, 116
Nominal dia. mm	19.05
Stroke	34

Note

The removal and installation of master cylinder for model 107 is described below. For model 116, assembly is essentially the same and may proceed as described here.

Removal

1 Remove floor mats and floor cover from cab leg room.

2 Remove cover under instrument panel (Fig. 1).

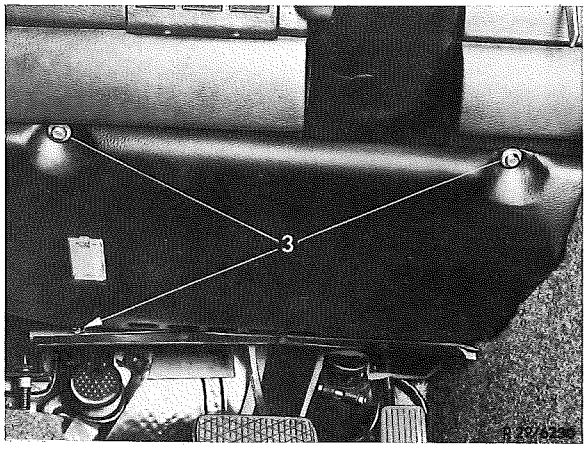


Fig. 1

3 Fastening screw

3 Draw brake fluid from **respective chamber** of supply tank until below minimum mark (Fig. 2).

4 Loosen connecting hose by pulling elbow out of rubber clamping ring on master cylinder (Fig. 3 and arrow in Fig. 4).

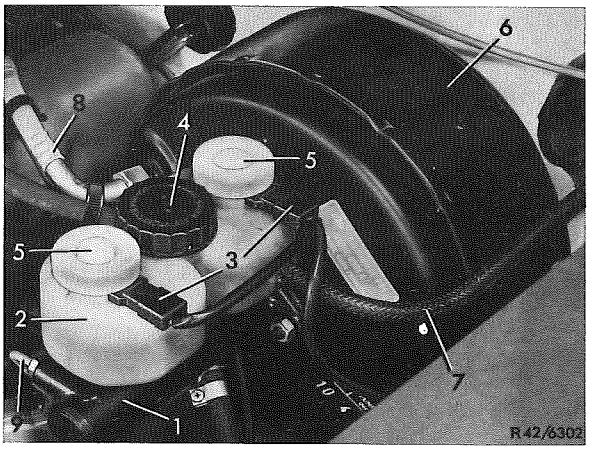


Fig. 2

2 Expansion tank 7 Feed line

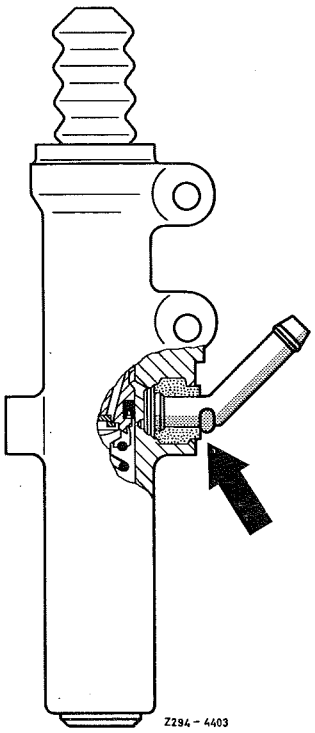


Fig. 3

25.1 Removal and Installation of Master Cylinder

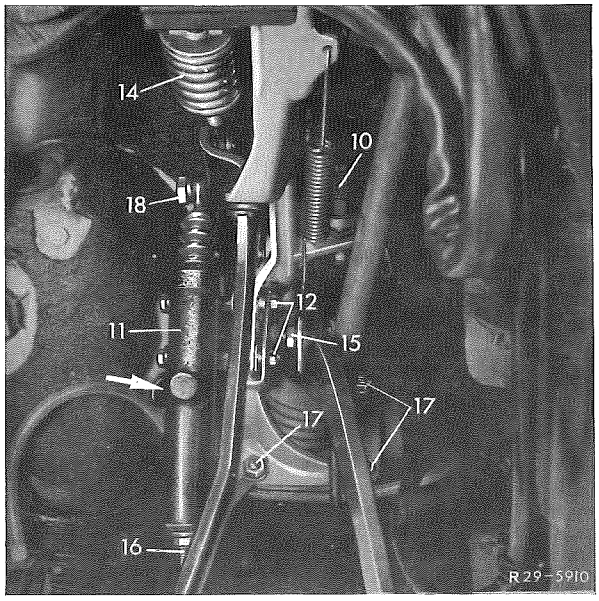


Fig. 4

10 Cable plug of brake light switch
11 Master cylinder
12 Fastening screws master cylinder
14 Dead center spring
15 Collar screw
16 Pressure line
17 Fastening nut
18 Eccentric pin

5 Unscrew pressure line (16) on master cylinder (Fig. 4).

6 Loosen piston rod for brake unit by removing collar screw (15) from brake pedal (Fig. 4).

7 Disconnect return spring on brake pedal and push pedal completely down against floor board.

8 Pull out fastening screws (12) to the right after unscrewing nuts with limit stop and remove master cylinder. Push rod remains on clutch pedal.

Installation

9 Introduce screws (12) with limit stop from the right into pedal bracket (Fig. 4).

Note: On models 116.020 and 116.025 the master cylinder is supported on rubber and the limit stop is cast to supporting sleeve of master cylinder

10 Slip master cylinder on push rod on clutch pedal, position against pedal bracket, insert fastening screws from the right and attach nuts.

11 Check clearance between push rod and piston in master cylinder and adjust, if required (25.1–240).

12 Connect feed line to master cylinder. For this purpose, insert elbow by means of screwdriver through assembly hole from direction of engine compartment (Fig. 5) carefully up to flange in rubber clamping ring of master cylinder (Fig. 3).

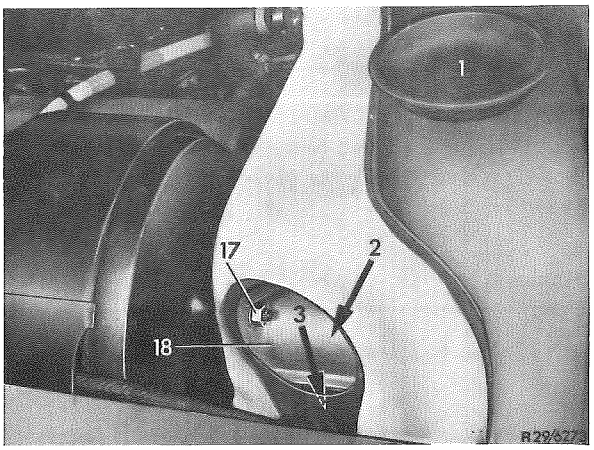


Fig. 5

1 Closing cover
2 Assembly hole
3 Elbow (master cylinder)
17 Nut for pedal bracket
18 Pedal bracket

13 Screw pressure line into master cylinder.

14 Attach piston rod for brake unit to brake pedal by means of collar screw (15).

15 Attach return spring for brake pedal.

16 Bleed clutch actuation (25.1–230) and then check level of brake fluid in supply tank and correct, if required.

17 Check clutch for unobstructed operation with the engine running by engaging reverse speed.

18 Check actuation for function and system for leaks.

19 Check clutch pedal travel. Clutch pedal should rest against stop of master cylinder, since otherwise separating troubles of clutch may occur.

20 Mount cover under instrument panel (Fig. 1).

21 Insert floor covering.

22 Carefully close assembly hole from direction of engine compartment by means of cover (1) (Fig. 5).

B. Model 114, 115

Data

Model	114, 115 LL	114, 115 RL
Nominal dia. mm	19.05	19.05
Stroke	34	32

Removal

1 Remove floor mats and floor covering from cab leg room.

2 Remove cover under instrument panel.

3 Draw brake fluid from **respective chamber** of supply tank to under minimum mark (Fig. 1).

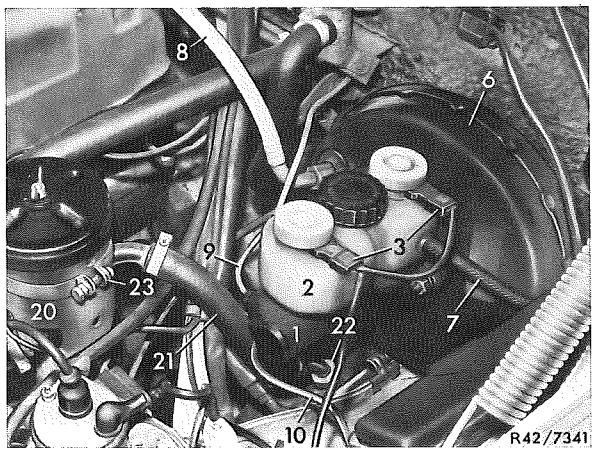


Fig. 1

2 Expanding tank 7 Connecting hose

4 Loosen connecting hose from master cylinder by pulling elbow out of rubber clamping ring (Fig. 2 and arrow in Fig. 3).

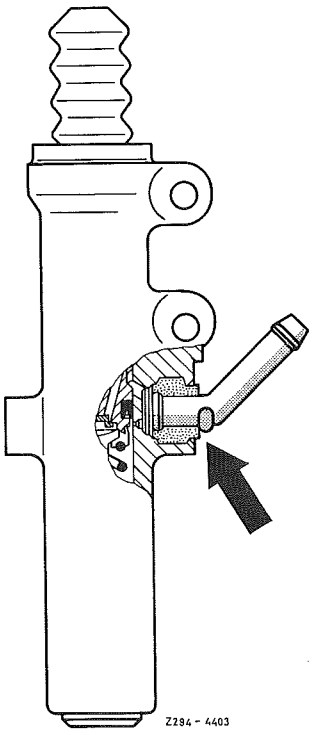


Fig. 2

5 Unscrew pressure line (10) on master cylinder (Fig. 3).

6 Pull out fastening screws (16) after unscrewing nuts and remove master cylinder. Push rod remains on clutch pedal.

25.1 Removal and Installation of Master Cylinder

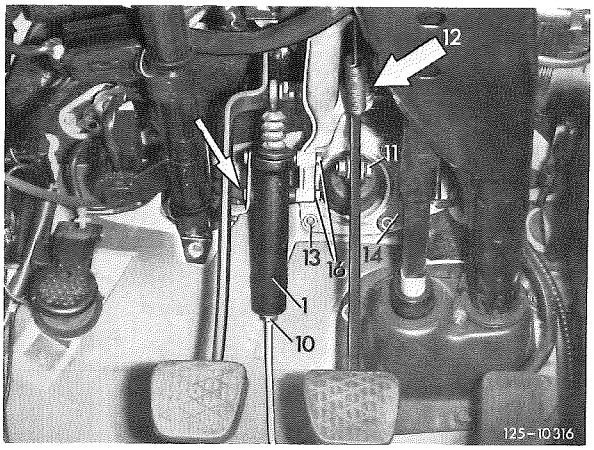


Fig. 3

1 Master cylinder
10 Pressure line
11 Hex. screw
12 Cable plug for brake light switch
13 Hex. nut
14 Bracket for plug connection of cable assembly
16 Fastening screws (master cylinder)

On models 114.06/07 the master cylinder is mounted on rubber and the limit stop is cast to supporting sleeve of master cylinder.

Installation

7 Slip master cylinder on push rod on clutch pedal.

8 Screw master cylinder with screws and limit stop to pedal bracket.

9 Check clearance between push rod and piston in master cylinder and adjust, if required (25.1–240).

10 Attach connecting hose to master cylinder. For this purpose, carefully push elbow up to flange into rubber clamping ring of master cylinder by means of a screwdriver (Fig. 2).

11 Screw pressure line into master cylinder.

12 Bleed clutch actuation (25.1–230) and then check level of brake fluid in expanding tank and correct, if required.

13 Check clutch for unobstructed operation with the engine running by engaging reverse speed.

14 Check actuation for function and system for leaks.

15 Check clutch pedal travel (lash). The clutch pedal should rest against stop of master cylinder since otherwise separating troubles of clutch may occur.

16 Mount cover under instrument panel.

17 Insert floor covering.

Revision: Important note added.

Important Note

Be careful when handling brake fluid.

a) Fill **brake fluid** only into containers where unintentional drinking of fluid is impossible. **(Fatal dose 100 cc).**

b) Make sure that brake fluid is not coming into contact with paintwork of vehicle, since fluid contains particles which act as a solvent for the paint.

c) Brake fluid is highly hygroscopic, that is, it will absorb moist air, which in turn will reduce the boiling point. For this reason, brake fluid may be stored only in well-sealed storage containers.

A. Venting with a Brake Bleeding Device

1 When using a brake bleeding device, proceed from the bottom up, that is, connect pressure line of bleeding unit to open venting screw of slave cylinder. The expanding tank should be almost empty, so that enough brake fluid can flow from the bottom up through system and the remaining air can escape in upward direction.

2 Set bleeding unit to lowest possible pressure.

3 Watch compensating tank to prevent any overflowing of brake fluid.

4 When the brake fluid is at its max. level in expanding tank, connect pressure line to bleeding device and then close venting screw on slave cylinder and remove pressure hose from venting screw.

5 Check clutch for unobstructed operation with the engine running by engaging reverse speed.

6 Check actuation for function and system for leaks.

7 Replenish brake fluid in expanding tank up to max. level.

B. Venting with Assistance of Brake System

Venting of the clutch actuation with the assistance of the brake system is in principle the same as when using a brake bleeding device, but with the difference that no special aids are required.

1 Check brake fluid level in mutual expanding tank for brake system and clutch actuation and replenish to max. level, if required.

2 Place hose on bleeder screw of righthand front caliper and open bleeder screw.

3 Let a second person carefully actuate brake pedal until hose is filled with brake fluid and no more air bubbles are showing up. Any flowing out of brake fluid is prevented by keeping the hose closed.

4 Place free hose end on bleeder screw on slave cylinder and open bleeder screw.

5 Keep stepping on brake pedal. Close bleeder screw of caliper, move brake pedal into release position. Open bleeder screw etc. until no more bubbles are showing up at mouth of inlet line laterally on compensating tank.

Note: It will be of advantage to replenish the fluid level in compensating tank in-between.

6 Close bleeder screws on brake caliper and slave cylinder and pull off hose.

7 Check clutch for unobstructed operation with the engine running by engaging reverse speed.

8 Check actuation for function and system for leaks.

9 Replenish brake fluid in expanding tank up to max. level.

Adjustment of Clearance Between Push Rod and Piston in Master Cylinder 25.1

Revision: Note and Section B added.

Note

In the event of complaints about vehicles for delayed separation and poor dosage of clutch, adjustments should be made according to Section B by means of brake bleeding device.

A. Adjusting without Brake Bleeding Device

Data

Clearance between push rod and piston in master cylinder	approx. 0.2

Adjusting

1 Loosen hex. nut of adjusting screw (3).

2 Turn adjusting screw in such a manner that the push rod (2) will have to cover the idle path "b" up to piston first when pedal is actuated.

3 Clearance "b" cannot be measured and must be determined by feel on pedal plate.

Note: When checking or adjusting clearance, make sure that the line marking on head of adjusting screw points toward the rear.

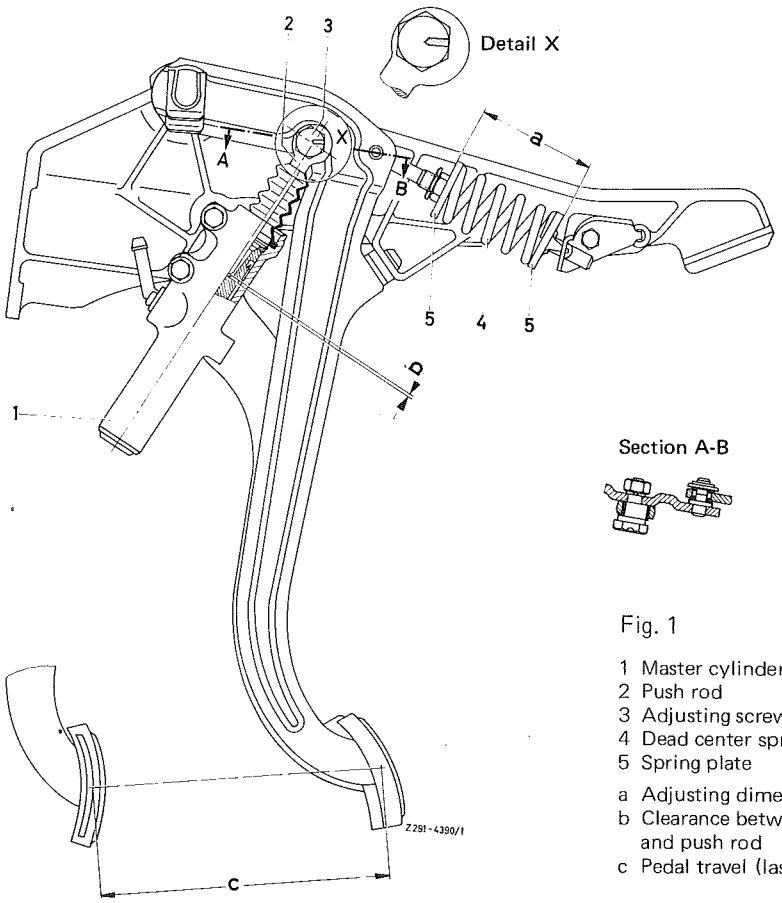


Fig. 1

1 Master cylinder
2 Push rod
3 Adjusting screw
4 Dead center spring
5 Spring plate

a Adjusting dimension of dead center spring
b Clearance between piston in master cylinder and push rod
c Pedal travel (lash)

B. Adjustment with Brake Bleeding Device

Adjusting

1 Draw brake fluid from respective chamber of expanding tank up to connection for clutch actuation.

2 Pull connecting hose (7) to master cylinder from expanding tank (2) (Fig. 1).

3 Open venting screw on clutch slave cylinder and evacuate clutch system by stepping repeatedly on clutch pedal.

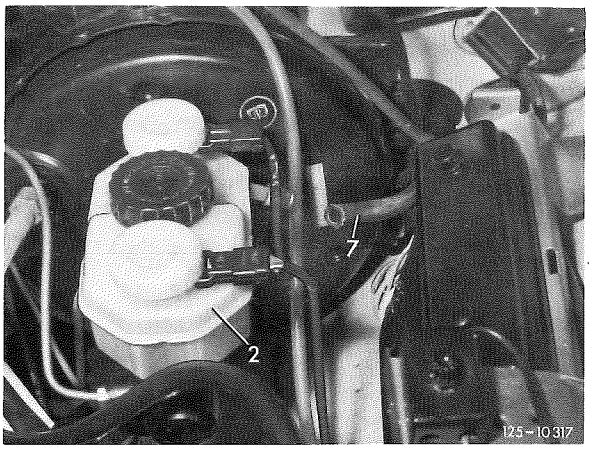


Fig. 1

2 Expanding tank 7 Connecting hose

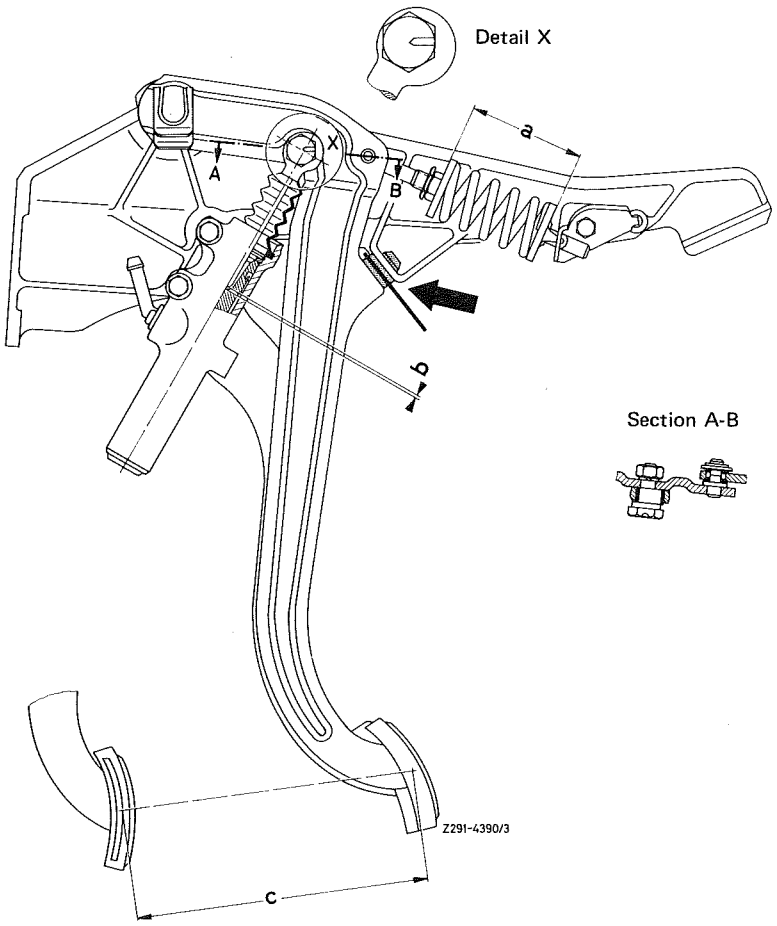


Fig. 2

4 Insert plastic hose of approx. 1 m in length, 8 mm dia., into connecting hose (7) and immerse other end into a container filled with water (Fig. 3).

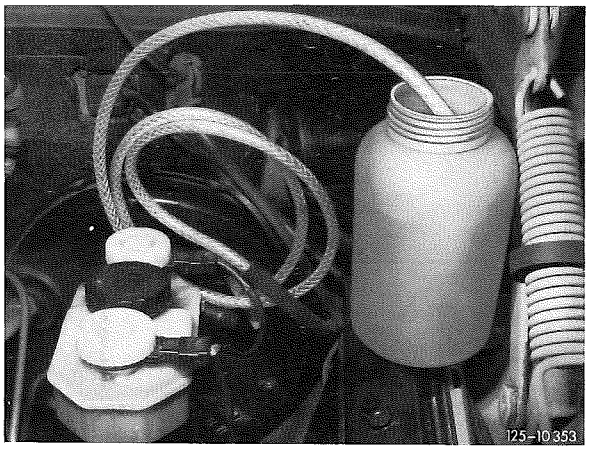


Fig. 3

5 Remove cover under instrument panel left.

6 Clamp sheet metal approx. 1.5 mm thick between upper pedal stop and rubber buffer (arrow in Fig. 2).

7 Fill brake bleeding device with air and set working pressure to **0.5 bar** gauge pressure.

8 Adjust brake bleeding device depending on make in such a manner that air is blown through clutch system and bubbles will rise in water tank.

Note: It will be of advantage to place water tank into lefthand leg room.

9 Turn adjusting screw on clutch pedal only until the air flow in interrupted and no more bubbles are rising in water tank. Then counterlock adjusting screw.

10 Remove sheet metal at upper pedal stop. Bubbles should again rise in water tank. Then set brake bleeding device to "0".

11 Connect feed line (7) to expanding tank (2).

12 Vent clutch actuation (25.1–230).

13 Check clutch actuation for function with engine running.

14 Attach cover under instrument panel left.

Revision: Type of grease added, item 4 extended.

Data

ID of throwout	34.05 34.11
OD of guide tube on front transmission housing cover	34.00 33.94
Clearance between throwout and guide tube on front transmission housing cover	0.05–0.17

Type of Grease

Longterm grease	refer to Specifications for Service Products page 266.2

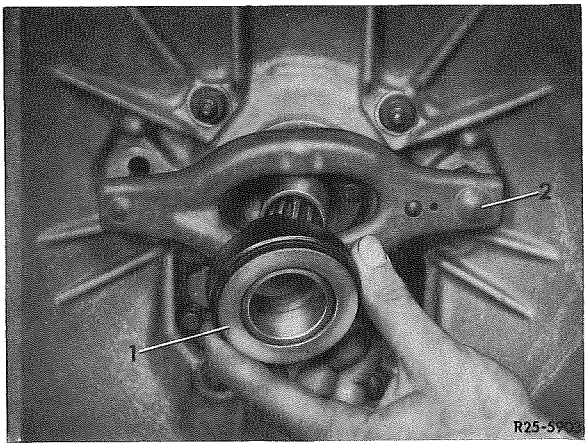


Fig. 1

1 Throwout 2 Throwout rocker

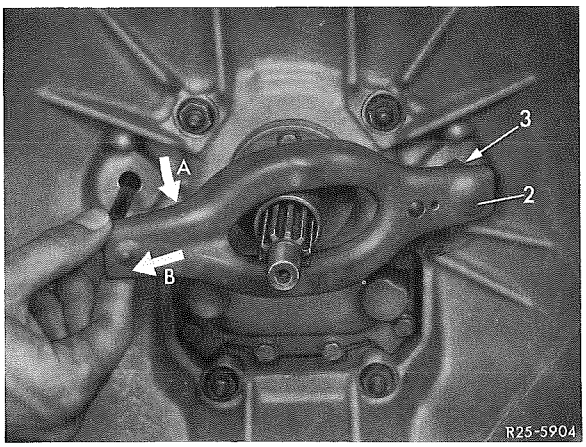


Fig. 2

2 Throwout rocker 3 Ball pin

Removal

1 Remove throwout (1) from bearing tube on front transmission cover (Fig. 1).

2 Move throwout rocker (2) in direction of arrow A and then pull in direction of arrow B from ball pin (3) on clutch housing and remove (Fig. 2).

Installing

3 Carefully grease bearing tube on front transmission cover, ball pin (3) on clutch housing and all points on throwout rocker (2) which come into contact with throwout (1) with longterm grease.

4 Push throwout rocker (2) in reverse direction of arrow B onto ball pin (3) until spring clip of rocker engages on ball pin. Then move rocker in reverse direction of arrow A until push rod of slave cylinder comes to rest in spherical recess of throwout rocker.

5 Grease throwout inside and on both lateral machine surfaces on rear sleeve portion.

6 Slip throwout (1) on guide tube on front transmission cover and keep turning until throwout snaps with its lateral machined surfaces into rocker (2). (Fig. 1).

25.1 Adjustment of Dead Center Spring

Data

Model			107	114 115	116
Adjusting dimension "a" of dead center spring adjusted across both spring retainers	with	metal retainer	66	45.5	66
		plastic retainer	68	47.5	68

1 Remove cover under instrument panel left.

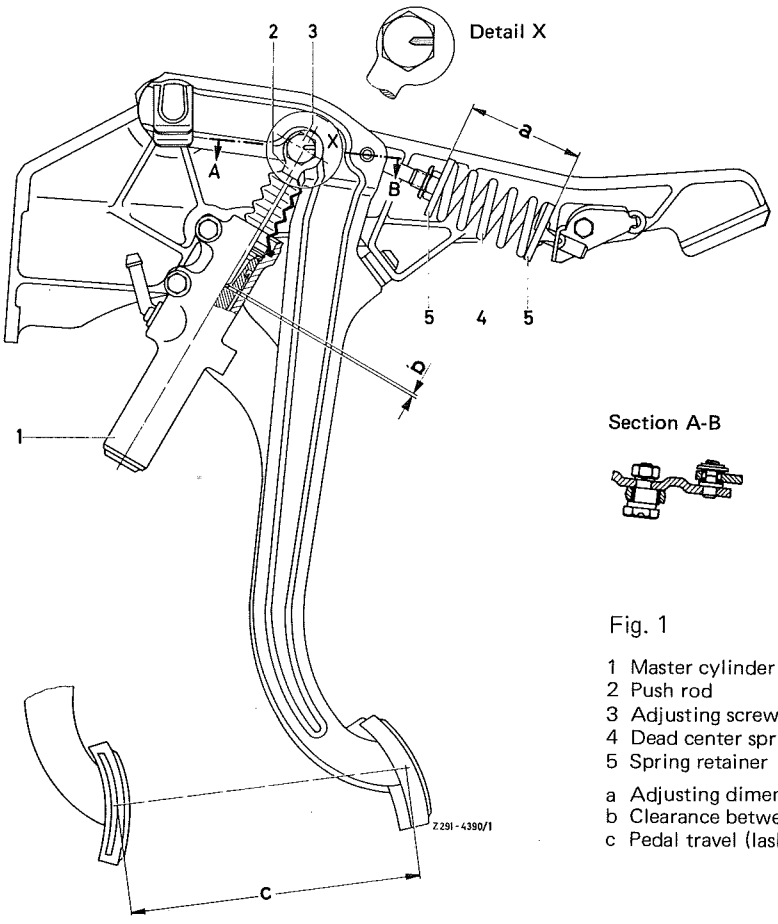
2 Measure dimension "a" with slide gauge across both spring retainers (Fig. 1).

3 Loosen counternut, preload dead center spring by turning adjusting nut until adjusting dimension is attained.

Note: If the dead center spring is given an excessive preload below the specified adjusting dimension, the pedal will remain stuck when clutching or will return hesitantly only.

If the dimension is too high, there will be insufficient support. This will increase the pedal pressure.

4 Tighten counternut and attach cover under instrument panel.



Section A-B

Fig. 1

1 Master cylinder
2 Push rod
3 Adjusting screw
4 Dead center spring
5 Spring retainer

a Adjusting dimension of dead center spring
b Clearance between piston in master cylinder and push rod
c Pedal travel (lash)

Revision: Data, model 116 and Section B, models 114, 115 added.

A. Model 107, 116

Adjusting Dimensions

Model			107, 116
Adjusting dimension "a" of dead center spring measured across both spring retainers	with	metal retainer	66
		plastic retainer	68
Clearance "b" between push rod and piston in master cylinder			approx. 0.2[1]
Lash "c"		brake pedal	approx. 150
		clutch pedal	approx. 162[2]

1) The clearance cannot be measured but must be determined at pedal plate by feel. 0.2 mm clearance between push rod and piston provide approx. 1 mm lash on pedal plate.
2) Up to rest against pedal stop.

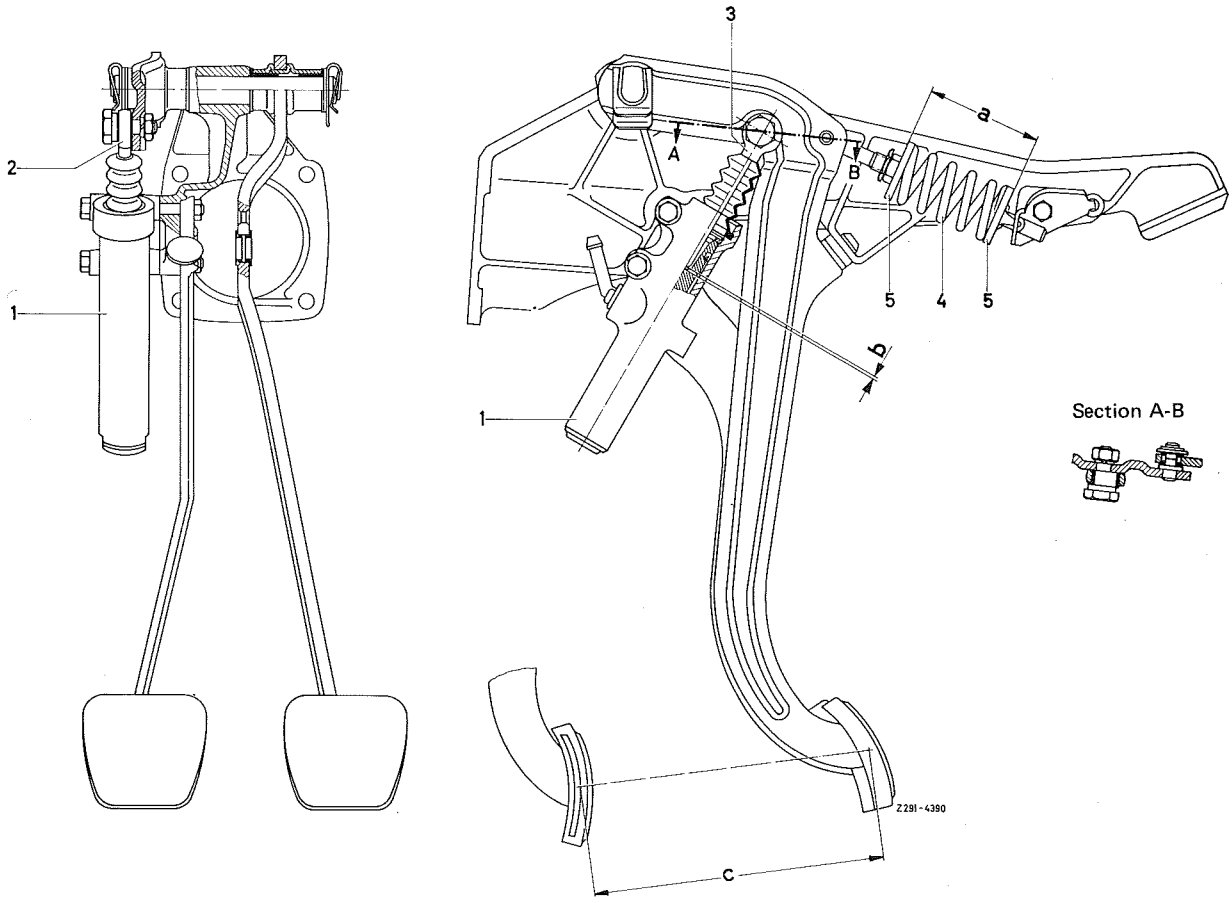


Fig. 1

1 Master cylinder
2 Push rod
3 Adjusting screw
4 Dead center spring
5 Spring retainer

a Adjusting dimension of dead center spring
b Clearance between piston in master cylinder and push rod
c Pedal travel (lash)

25.1 Removal and Installation of Pedal Assembly

Note

Removal and installation of pedal assembly for model 107 is described below. For model 116, assembly is essentially the same, so that procedure can be the same as described here.

Removal

1 Take floor mats and floor lining from leg room.

2 Remove instrument cluster ("Electrical Systems" 54–310).

3 Unscrew cover below instrument panel in leg room and pull in downward direction.

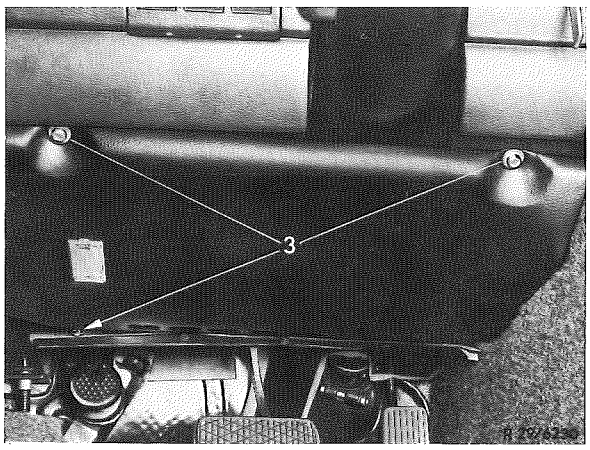


Fig. 2

3 Fastening bolts

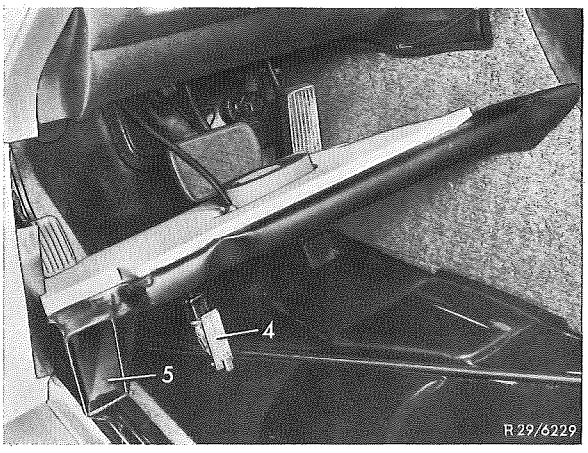


Fig. 3

4 Leg room light
5 Slot for door vents

4 Push out leg room light (4), remove plug and pull cable from cover.

5 Pull hose (6) for window nozzle on air duct (7) (Fig. 4).

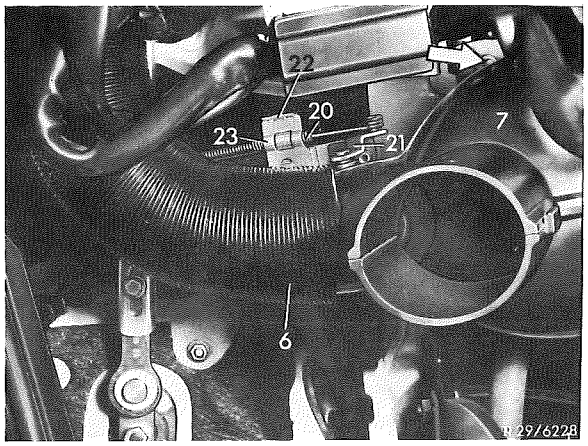


Fig. 4

6 Hose for window nozzle
7 Air duct
20 Bowden wire
21 Lever
22 Fastening clip
23 Holder

6 Disconnect bowden wire (20) on lever (21) and then remove clip (22) holding bowden wire to holder (23) (Fig. 4).

7 Unscrew bolt (arrow in Fig. 4) holding air duct in position.

8 Pull air duct (7) out of heater box and remove in downward direction.

9 Unscrew holder (8) from pedal bracket and pull downwards together with cable assembly (Fig. 5 and 6).

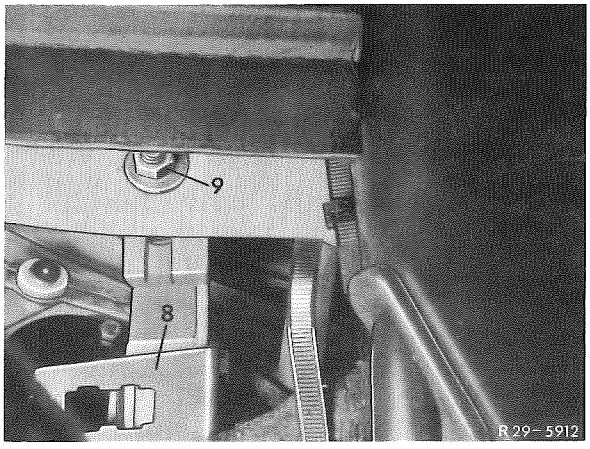


Fig. 5

8 Holder of plug connection for main line assembly
9 Fastening nut for pedal assembly

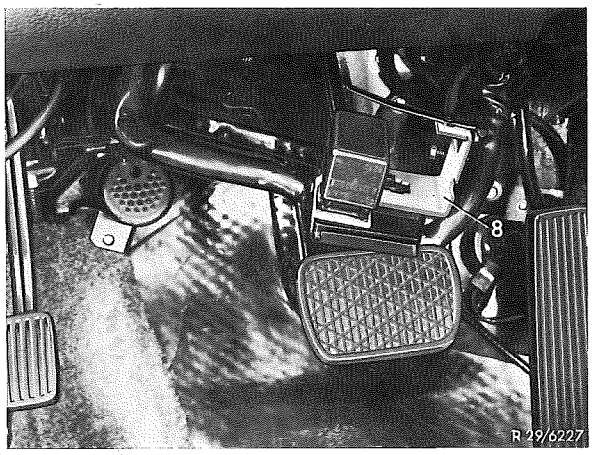


Fig. 6

8 Holder for plug connection of main line assembly

10 Loosen bolt holding pedal bracket and remove nut (9) with washer and snap ring in downward direction (Fig. 5).

Note: The fastening bolt itself can be removed only when the pedal bracket on the front wall has been loosened and can be displaced (item 18).

11 On model 116, the pedal bracket is attached to instrument panel by means of a holder and two sheet-metal screws.

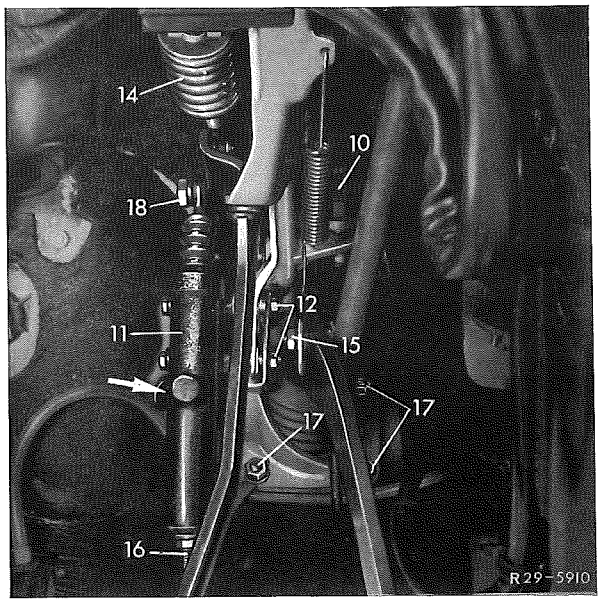


Fig. 7

10 Cable plug of stop light switch
11 Master cylinder
12 Fastening bolts master cylinder
14 Dead center spring
15 Flange line
16 Pressure line
17 Fastening nuts
18 Eccentric pin

12 Unscrew screw (15) with steel bushing for attaching piston rod of brake unit to brake pedal. Pull cable plug from stop light switch (Fig. 7).

13 To prevent contamination inside vehicle, draw brake fluid from **respective** chamber of combined brake and clutch expanding tank.

14 Loosen pressure line (16) on master cylinder (11) (Fig. 7).

15 Loosen connecting hose (arrow in Fig. 7) directly on master cylinder (11) by pulling elbow out of rubber clamping ring.

16 Close released line with blind plugs.

17 Unscrew the four nuts (17) holding pedal bracket to front wall (Fig. 7).

Note: Loosen upper lefthand nut from direction of engine compartment through opening adjacent to windshield wiper motor closed by a plastic cover (Fig. 8).

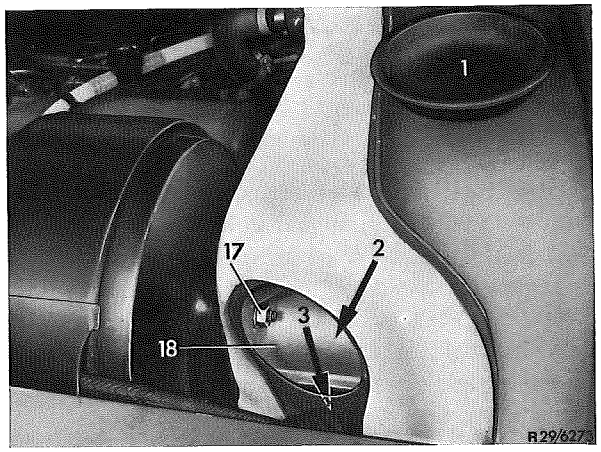


Fig. 8

1 Closing cover
2 Assembly hole
3 Elbow (master cylinder)
17 Nut for pedal bracket
18 Pedal bracket

18 Pull pedal assembly to the rear until the flange (18) of the carrier is free of the studs (19) on front wall. Then remove bolt attaching the pedal bracket to instrument carrier including washer (Fig. 9).

25.1 Removal and Installation of Pedal Assembly

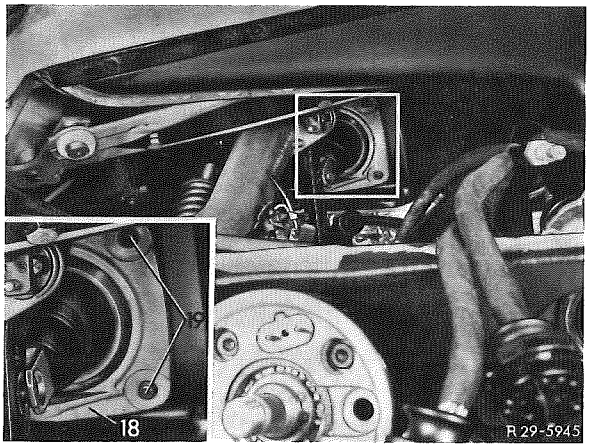


Fig. 9

18 Flange of pedal carrier
19 Stud

19 Then swivel carrier down in forward direction until the fork end no longer rests against instrument carrier and the pedal assembly can be removed in downward direction.

Note: Watch out for piston rod of brake unit when removing pedal assembly.

Installation

20 Insert pedal assembly into leg room vice versa to description under item 19, guide over piston rod of brake unit and slide on the four studs on front wall.

Note: The four studs are serving simultaneously for attaching the brake unit and are screwed into the flange of the latter. When inserting the pedal assembly, the studs and thereby the brake unit – to the extent the lines connected to the unit permit – may be displaced in the direction of the engine compartment and thereby make it impossible to screw on another nut.

In such a case, push brake unit away from engine compartment **without force** while counterholding pedal assembly.

21 Screw nuts (17) for attaching pedal carrier to front wall, but do not yet tighten (Fig. 10).

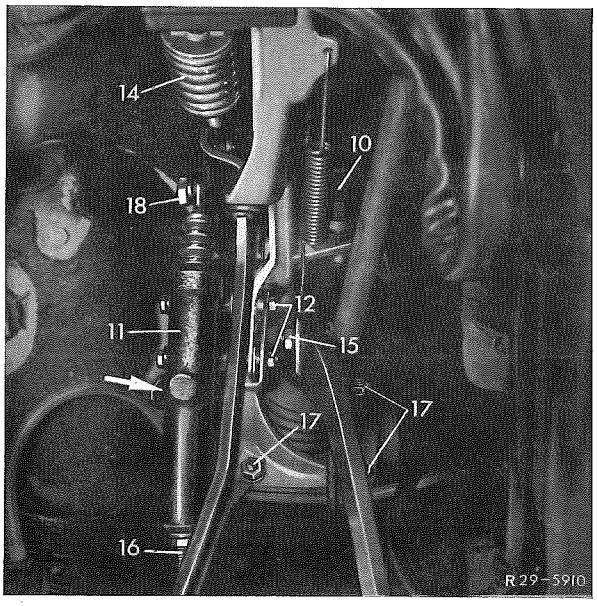


Fig. 10

10 Cable plug of stop light switch
11 Master cylinder
12 Fastening bolts master cylinder
14 Dead center spring
15 Flange bolt
16 Pressure line
17 Fastening nut
18 Eccentric pin

Note: Unscrew lefthand upper nut from direction of engine compartment through opening adjacent to windshield wiper motor.

22 Introduce bolt with washer for attaching pedal carrier to instrument carrier from above into fork end of carrier and into bore in instrument carrier, while screwing on the pertinent nut (9) with washer and snap ring from below, but do not yet tighten (Fig. 5).

23 On model 116, insert plate holder into forkshape end of pedal carrier and tighten with two sheet-metal screws.

24 Tighten all fastening bolts, starting with four nuts on front wall.

25 Connect pressure line (16) and connecting hose (arrow) to master cylinder (Fig. 10).

Note: Push elbow of connecting hose through assembly hole from direction of engine compartment up to bead in rubber clamping ring in master cylinder (arrow in Fig. 11).

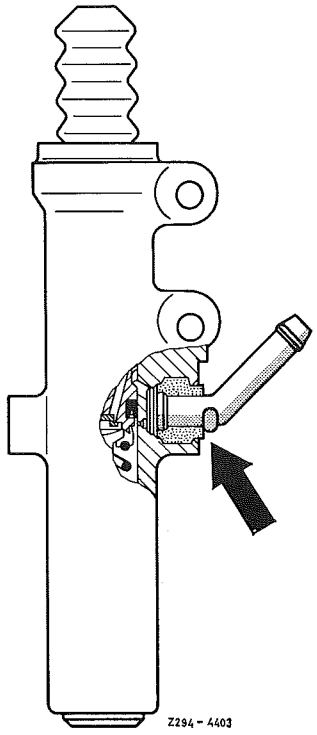


Fig. 11

26 Close assembly hole from direction of engine compartment with plastic cover.

27 Attach piston rod of brake unit with flange bolt (15) and steel bushing to brake pedal (Fig. 10).

28 Insert cable plug (10) for stop light switch and attach cable clip to pedal carrier (Fig. 10).

29 Push holder (8) with cable assembly up and screw to pedal carrier (Fig. 5 and 6).

30 Attach air duct (7) to heater box and screw down with bolt (arrow in Fig. 12).

31 Attach bowden wire (20) to lever (21) and attach clip (22) for holding bowden wire to holder (23) (Fig. 12).

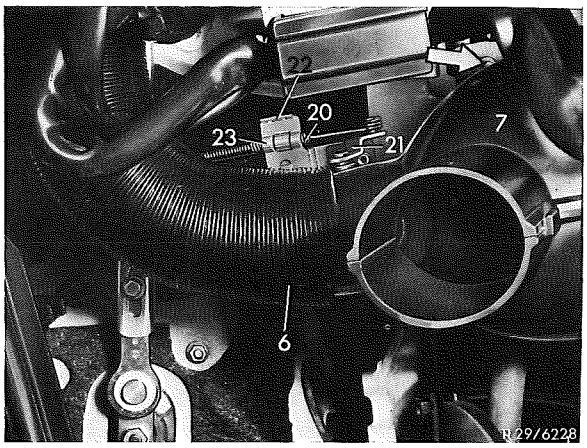


Fig. 12

6 Hose for window nozzle
7 Air duct
20 Bowden wire
21 Lever
22 Fastening clip
23 Holder

32 Place hose (6) for window nozzle on air duct (Fig. 12).

33 Vent hydraulic clutch actuation (25.1–230).

34 Check clutch actuation for function and leaks.

35 Pull cable for leg room light through cover, insert plug and push leg room light into cover (Fig. 3).

36 Insert leg room cover and screw down.

37 Install instrument cluster ("Electrical System" 54–130).

B. Model 114, 115

Adjusting Dimensions

Model			114, 115
Adjusting dimension "a" of dead center spring measured across both spring retainers	with	metal retainer	45.5
		plastic retainer	47.5
Clearance "b" between push rod and piston in master cylinder			approx. 0.2[1]
Lash "c"		brake pedal	approx. 150
		clutch pedal	approx. 141[2]

1) The clearance cannot be measured but must be determined at pedal plate by feel. 0.2 mm play between push rod and piston provide approx. 1 mm lash on pedal plate.
2) Up to rest against pedal stop.

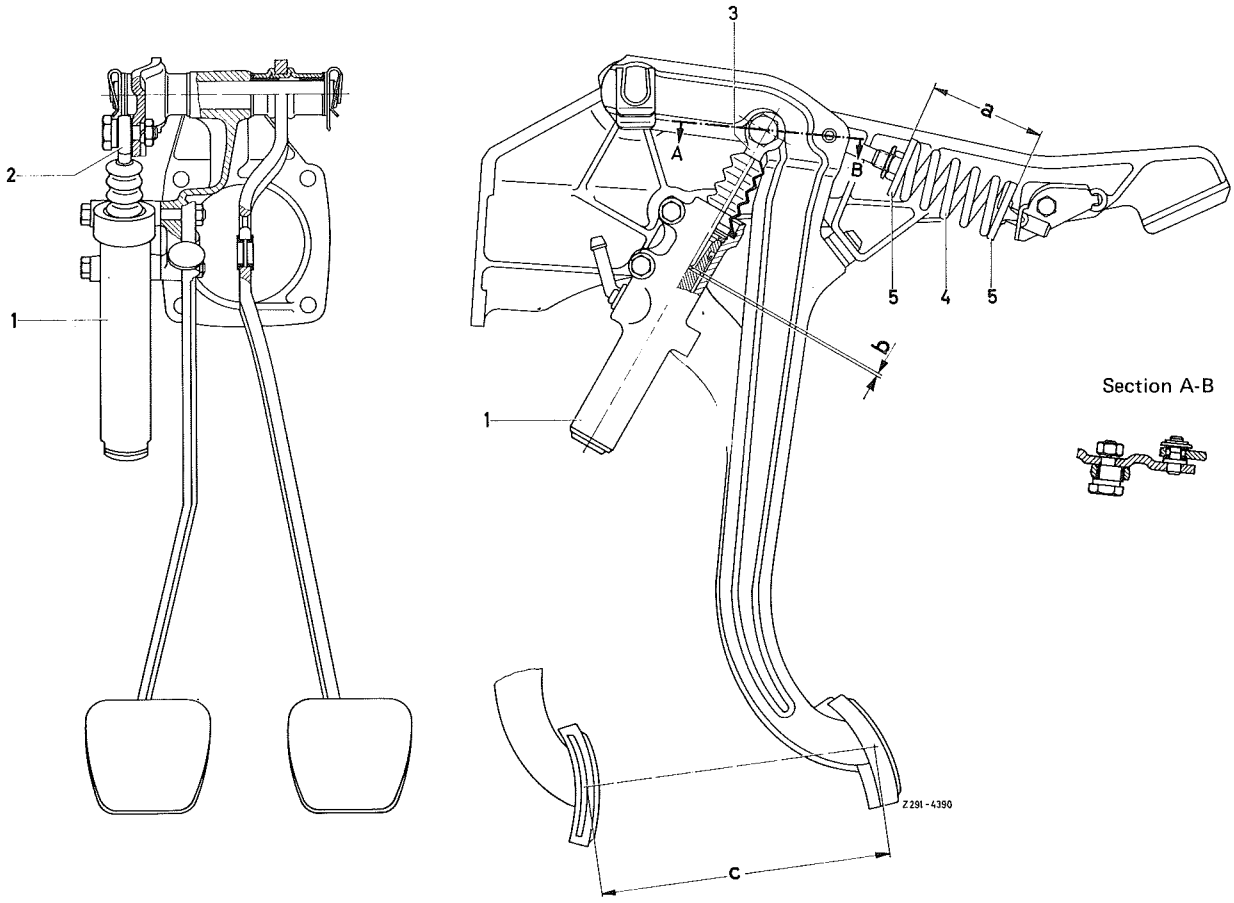


Fig. 1

1 Master cylinder
2 Push rod
3 Adjusting screw
4 Dead center spring
5 Spring retainer
a Adjusting dimension of dead center spring
b Clearance between piston in master cylinder and push rod
c Pedal travel (lash)

Removal

1 Take floor mats and floor lining from leg room.

2 Remove instrument cluster ("Electrical Systems" 54–310).

3 Unscrew cover below instrument panel left.

4 To prevent contamination inside vehicle, draw brake fluid from respective chamber of combined brake and clutch expanding tank.

5 Loosen pressure line (10) on master cylinder (1) (Fig. 2).

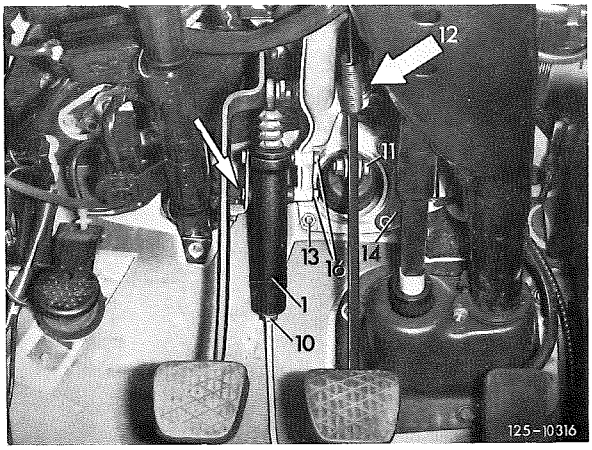


Fig. 2

1 Master cylinder
10 Pressure line
11 Hex. screw
12 Cable plug for stop light switch
13 Hex. nut
14 Holder for plug connection of cable assembly
16 Fastening screws (master cylinder)

6 Loosen connecting hose (arrow in Fig. 2) directly on master cylinder by pulling elbow out of rubber clamping ring.

7 Close released lines with blind plugs.

8 Loosen hex. screw (11) on brake pedal and remove with steel bushing (Fig. 2).

9 Pull cable plug (12) from stop light switch.

10 Unscrew nuts (13) by means of which the pedal assembly and the brake unit are attached together to front end and remove holder (14).

11 Unscrew screw (15) for attaching pedal assembly to instrument panel (Fig. 3).

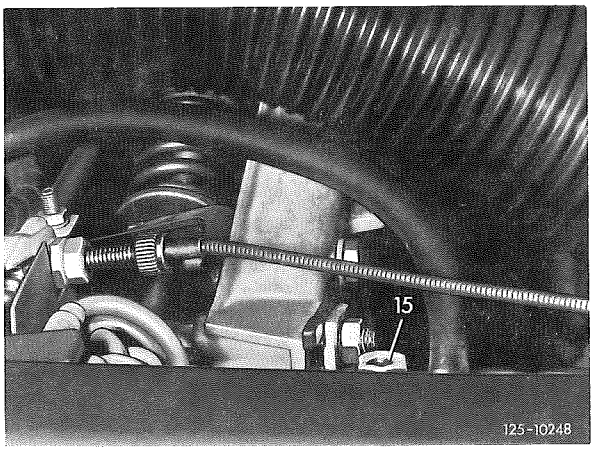


Fig. 3

15 Hex. screw

12 Move pedal assembly to the rear until screw plate of carrier will be free of the four studs of brake unit. Then remove entire pedal assembly in downward direction.

Installation

13 Slide pedal assembly under instrument panel and then place screw plate on the four bolts of the brake unit.

14 Insert hex. screw (15) with washer into bracket on carrier and screw on, but do not tighten (Fig. 3).

15 Screw pedal assembly and holder (14) to front end and then tighten hex. screw (15).

16 Attach push rod for brake unit with hex. screw (11) to brake pedal. Insert steel bushing first.

17 Attach cable plug (12) to stop light switch.

18 Connect pressure line (10) and connecting hose (arrow) to master cylinder (Fig. 2).

Attention! Push elbow of connecting hose up to bead into rubber clamping ring on master cylinder (arrow in Fig. 4).

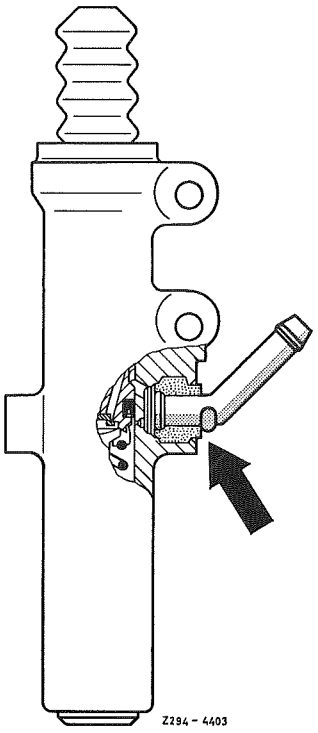


Fig. 4

19 Vent clutch actuation (25.1–230)

20 Check clutch actuation for function and leaks.

21 Attach cover under instrument panel left.

22 Place floor mats and floor covering into leg room.

23 Install instrument cluster ("Electrical Systems" 54–310).

Supplement

Workshop Manual

Clutches · Transmission

Passenger Cars

service

Supplement **12**

February 1976

The present Supplement comprises 68 pages and covers mainly Revisions on Manual Transmission — Group 26 —, additionally included as standard equipment in the course of time.

The scope of "Steering Wheel Gear Shift" jobs has been newly included.

Please instruct your trade personnel concerning this Supplement and then file individual pages into Manual.

The Survey overleaf will facilitate the work.

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	110/1 to 4	110/1 to 4	R
	120/3	120/3	R
	310/3 and 4	310/3 and 4	R
	320/1 and 2	320/1 and 2	R
	410/1 and 2	410/1 and 2	R
	420/1 to 9	420/1 to 9	R
	620/1 to 3	620/1 to 3	R
	–	710/1 and 2	E
	–	720/1 and 2	E
	–	740/1 to 5	E
	–	790/1	E
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	420/1 and 2	420/1 and 2	R
	420/7 and 8	420/7 and 8	R
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	610/1 and 2	610/1 and 2	R
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Illustrated Table Transmission 990

Revision: Text revised.

General

The design of the manual four-speed transmissions G 76/18, G 76/27, 716.0 as well as 716.1 is essentially the same. In the course of technological development, these transmissions have been modified several times since production started in January 1968. However, the assembly sequence has remained almost unchanged for all the above transmissions of the 716 series.

Since assembly is widely the same, the repair sequence is predominantly shown for transmission G 76/18. Specific deviations among transmissions G 76/18, G 76/27, 716.0 as well as 716.1 are specially referred to in the respective paragraphs.

Due to the partially different dimensions and the varying surface finishes of the tooth flanks, the components of the individual transmissions **cannot** be interchanged among each other.

For this reason, parts subject to wear should always be ordered on the basis of the spare parts data valid when the order is placed. The essential revisions (modifications) are shown in front of the respective Job No.

Revision Survey

Transmission	Transmission No.	Installed in model from ... to	Remarks or revision
G 76/18	to 669 557	114 115 from January 1968 to March 1972	–
716.002	starting 669 558	114.010 114.011 114.015 114.021 114.022 114.023 115 (all) starting March 1972 115.017 115.117 to October 1973	Reinforced 1st gear by wider helical gear of main and countershaft. 1st gear scraped, 2nd and 3rd gear, as well as constant gear scraped and lapped. Reversing gear of countershaft and rear transmission cover modified due to changed countershaft.
716.001	starting 000 001	107.022 107.042 114.060 114.062 114.072 114.073 116.020 116.024 116.025	Reinforced 1st gear by wider helical gear of main and countershaft. 1st gear scraped, 2nd and 3rd gear, as well as constant gear, ground. Reversing gear-countershaft and rear transmission cover modified due to changed countershaft.
716.003		115.017 115.117 starting October 1973 115.114	–
G 76/27	starting 049 594	108.016 108.018 108.019 109.016 111.024 111.025 starting March 1972	Modified countershaft, countershaft reversing gear and rear transmission cover. Reason: to match transmission 716.001.
716.100	starting 006 294	107.023 107.043 108.057 108.058 109.056 111.026 116.028 116.029 starting April 1972	Modified countershaft, reversing gear of countershaft and rear transmission cover. Reason: to match transmission 716.001.

Note: Upon installation of transmission gear G 76/27, 716.0 as well as 716.1 as standard equipment with the modifications shown in the Table, vehicle models 114.010, 114.021, 114.022, 108.019, 109.016, 111.024 as well as 111.025 were no longer on the production line. In the event of repairs, the above-named transmissions can be installed in the respective vehicles.

Revision: Revised and Section B added.

Oil Types/Filling Capacities

Automatic transmission fluid (ATF) Type A, Suffix A		refer to Specifications for Service Products page 236.1, 236.2	
Filling capacities in liters	model	114, 115, 107.022/042 116.020/024/025	1.6
		107.023/043 116.028/029	1.8

Tightening Torques	Nm	(kpm)
Universal shaft-clamping nut	30	(3)
Oil drain and filler plug	60	(6)

Special Tools

Torque wrench handle for open end wrench	001 589 35 21 00
Open end wrench, 46 mm, for clamping nut of universal shaft	000 589 13 01 00

A. Model 107, 116.028/029

Note

The following description covers removal and installation of transmission for models 107.023/043. For models 107.022/042 and 116.028/029 the assembly is essentially the same and the same instructions may therefore be used.

Removal

1 Disconnect grounding cable on battery.

2 Remove compensating connection (1) between the two exhaust pipes (Fig. 1).

3 Remove rear exhaust section with front and main muffler (Fig. 2).

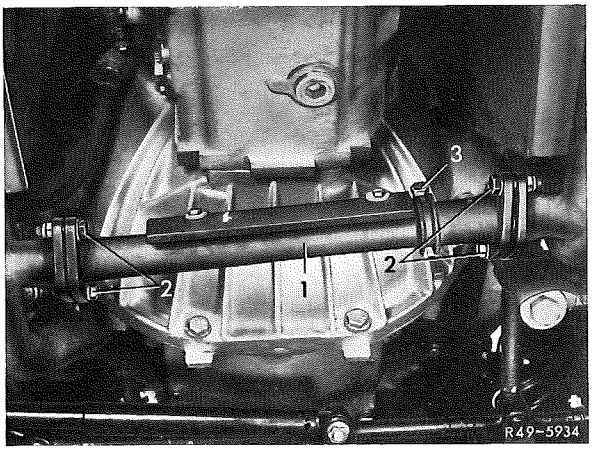


Fig. 1
1 Compensating connection
2 Fastening bolts
3 Fastening bolt for clamp

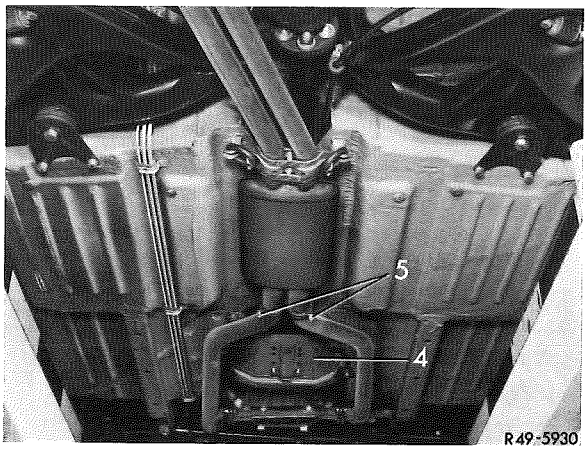


Fig. 2
4 Tunnel closing plate
5 Clamps

4 Separate pipe line (6) to slave cylinder at lefthand end on hose screw connection (arrow Fig. 3).

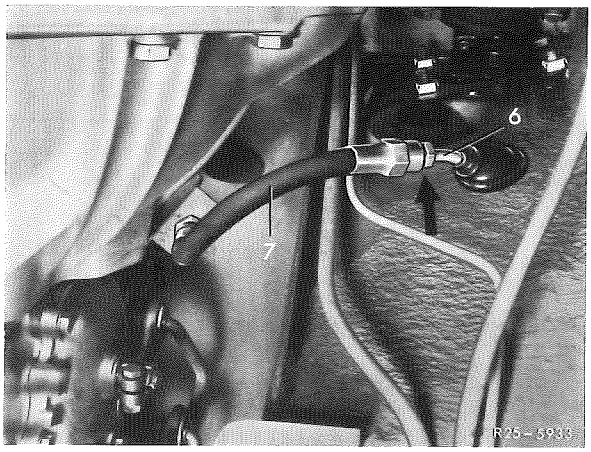


Fig. 3
6 Pipe line
7 Coupling hose

Note: Close lines with blind plugs or draw fluid from **rear** chamber of combination supply tank to prevent the brake fluid from running out.

5 Unscrew both fastening bolts (9) for rear engine rubber mount (Fig. 4).

6 Slightly raise transmission with vehicle jack or pit lift and unscrew tunnel closing plate (Fig. 4).

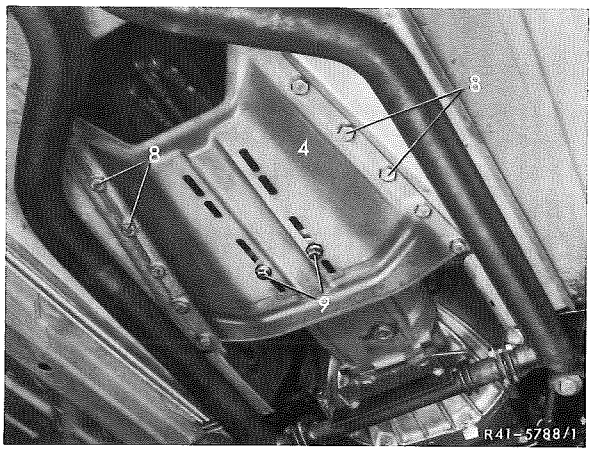


Fig. 4
4 Tunnel closing plate
8 Fastening bolts for tunnel closing plate
9 Fastening bolts for rear engine rubber mount

7 Loosen drive shaft (10) for tachometer on rear transmission cover and pull off.

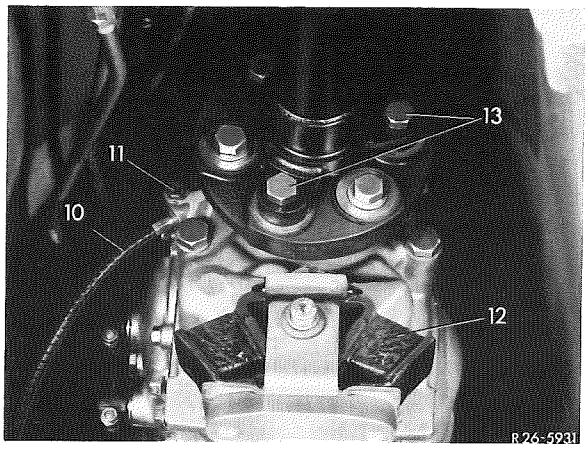


Fig. 5
10 Tachometer drive shaft
11 Fastening bolt
12 Rear engine rubber mount
13 Universal shaft bolt

8 Remove shift rods of gear shift from transmission shift levers upon removal of SL locks.

9 Loosen both fastening bolts (14) of universal shaft intermediate bearing, but do not screw out (Fig. 6).

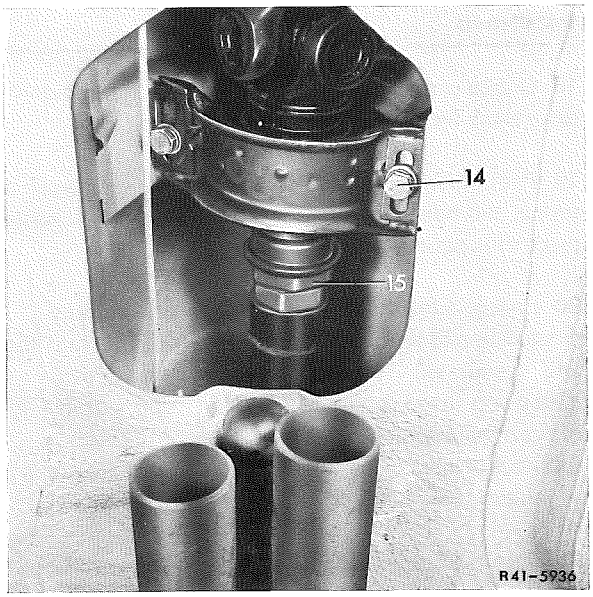


Fig. 6
14 Fastening bolts
15 Universal shaft clamping nut

10 Loosen universal shaft clamping nut (15) (Fig. 6 and 7).

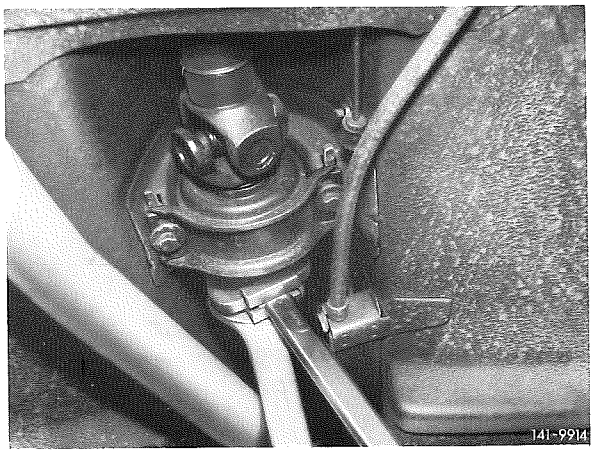


Fig. 7

Note: To maintain balanced condition mark universal plate in relation to universal shaft.

11 Unscrew universal shaft on transmission in such a manner that the universal plate remains on three-legged flange of transmission (Fig. 8).

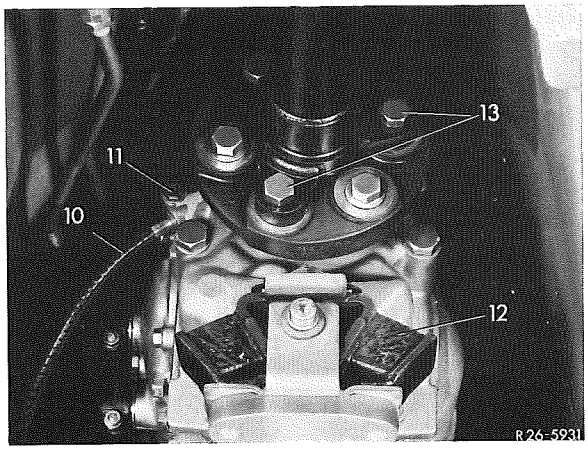


Fig. 8
10 Tachometer drive shaft
11 Fastening bolt
12 Rear engine rubber mount
13 Universal shaft bolt

12 Slide universal shaft toward the rear as far as the center bearing and the clamping piece permit.

13 Place suitable piece of wood underneath universal shaft in front of tunnel, so that shaft is pushed completely up (Fig. 9).

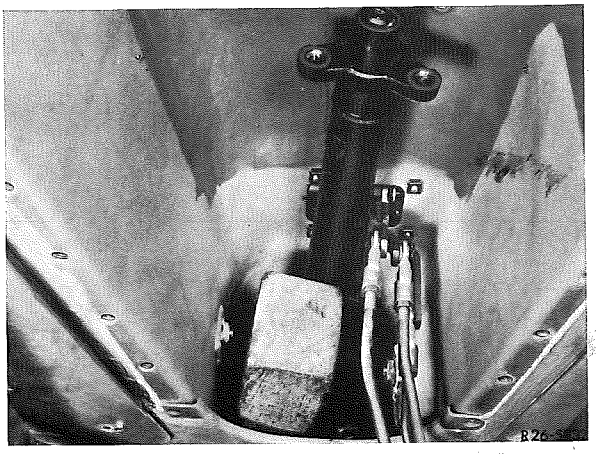


Fig. 9

14 Unscrew bolts for attaching starter and push starter out of its holding bracket.

Note: No nut is provided for upper starter bolt, since the threads are inside the starter flange.

15 Unscrew all bolts for attaching transmission to intermediate flange and remove the upper two bolts last.

Note: As a result of the heavy ribbing of the clutch housing most of the fastening bolts can only be reached by means of a 17 mm or 19 mm insert and extension (Fig. 10).

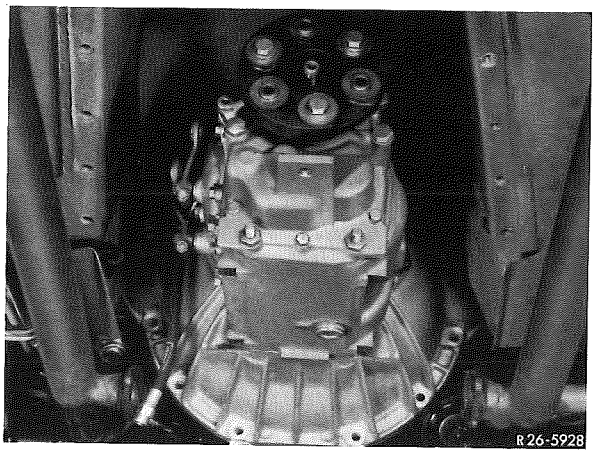


Fig. 10

16 Prior to pulling out of fitted round center, **turn transmission for at least 45° to the left** so that the starter domes on both sides of clutch housing cannot abut against front tunnel edge (Fig. 11).

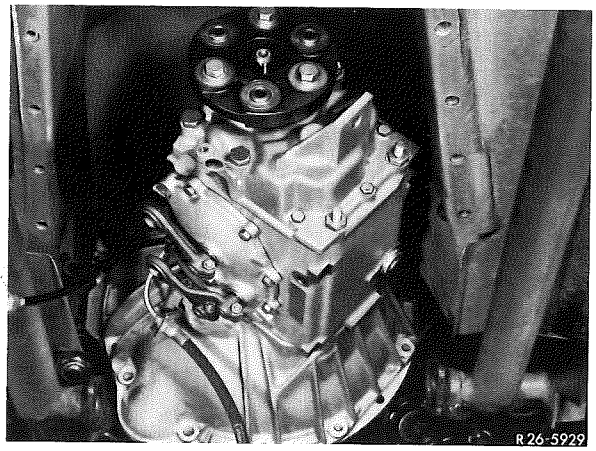


Fig. 11

17 Pull inclined transmission horizontally out of round center and clutch toward the rear and then remove in downward direction.

Attention! Tilt transmission to the rear only when the drive shaft is safely pulled out of driven plate hub. If this instruction is not observed, damage to driven plate may result.

Installation

18 Grease centering pin and splining on transmission drive shaft lightly with hot bearing grease.

19 Push universal shaft at front completely up against tunnel and hold in this position by means of a suitable piece of supporting wood (Fig. 9).

20 Engage one gear step and then introduce transmission at a longitudinal tilt of at least 45° toward the left into tunnel. Then introduce **horizontally** into clutch and fitted round center while rotating transmission main shaft in both directions until the splinings of the drive shaft and the driven plate are in alignment (Fig. 11).

21 Turn transmission to its normal position and screw to intermediate flange by means of pertinent fastening bolts, starting from the top. Watch out for grounding cable at left (Fig. 10).

22 Insert starter into holder on intermediate flange and tighten by means of the two fastening bolts.

23 Remove wooden support under universal shaft and attach shaft to transmission, while keeping respective marks in alignment to maintain the proper balanced condition between universal shaft and transmission. For this purpose, lift engine and transmission by means of a vehicle jack or pit lift (Fig. 12).

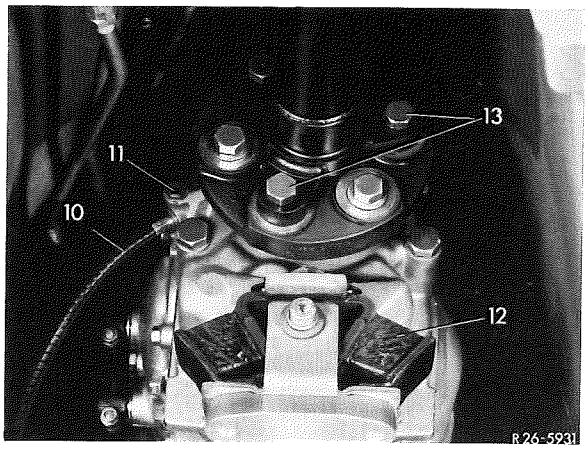


Fig. 12

10 Tachometer drive shaft
11 Fastening bolt
12 Rear engine rubber mount
13 Universal shaft bolt

24 If previously removed, check rear engine rubber mount (12) and screw to transmission (Fig. 12).

25 Attach transmission shift rods and secure with SL locks.

26 Attach drive shaft (10) for tachometer to rear transmission housing cover and tighten clamping bolt (11) (Fig. 12).

27 Mount tunnel closing plate (4). Tighten the twelve fastening bolts (8) uniformly (Fig. 13).

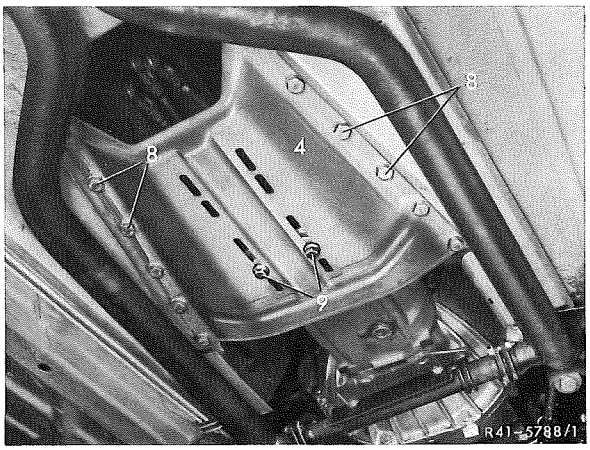


Fig. 13
4 Tunnel closing plate
8 Fastening bolts for tunnel closing plate
9 Fastening bolts for rear engine rubber mount

28 Insert both fastening bolts (9) for rear engine mount on tunnel closing plate and tighten (Fig. 13).

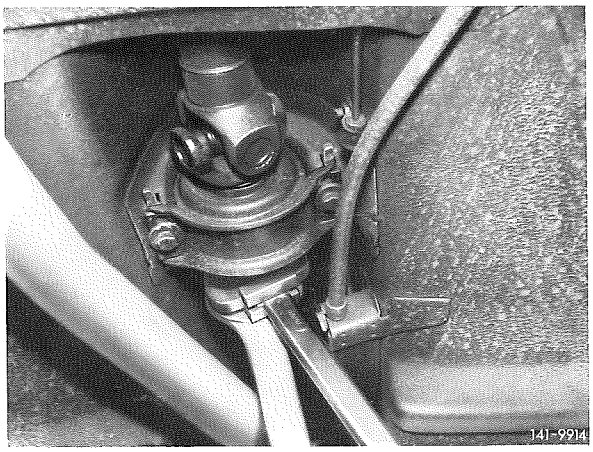


Fig. 14

29 Position fastening bolts for universal shaft intermediate bearing, but do not yet tighten.

30 Move vehicle several times back and forth and then tighten universal shaft clamping nut to a tightening torque of 30 Nm (3 kpm) (Fig. 14).

31 Tighten fastening bolts of universal shaft intermediate bearing (Fig. 15).

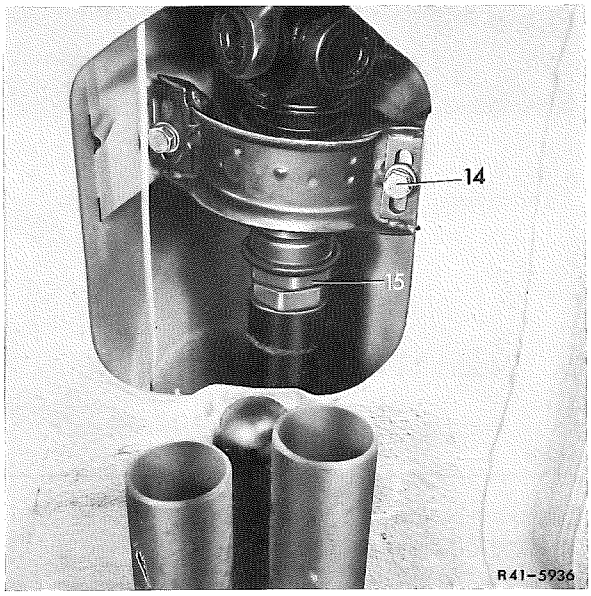


Fig. 15
14 Fastening bolts for universal shaft intermediate bearing
15 Universal shaft clamping nut

32 Mount rear portion of exhaust system.

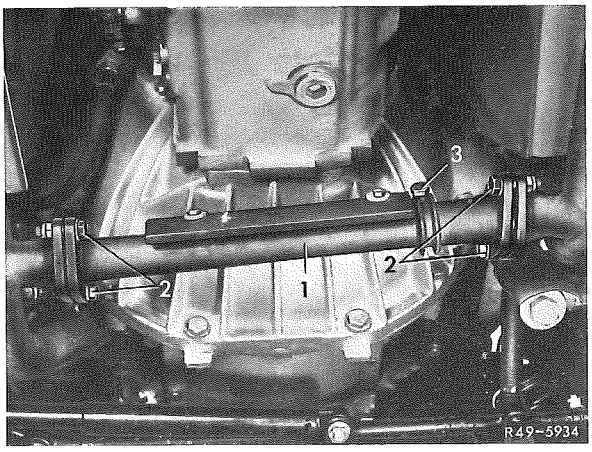


Fig. 16
1 Compensating connection
2 Fastening bolts
3 Fastening bolt for clamp

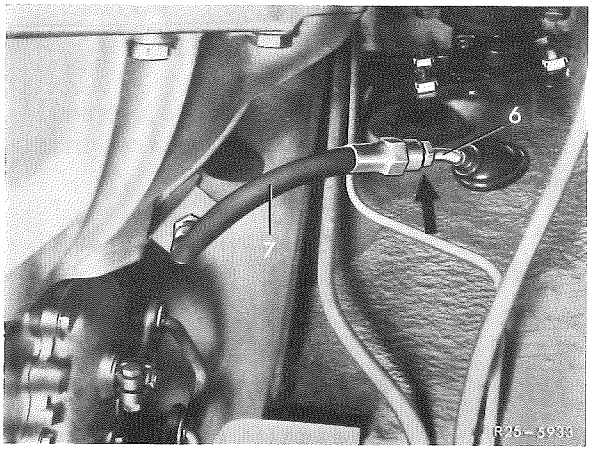


Fig. 17
6 Pipe line
7 Clutch hose

33 Install compensating connection (1) between the two exhaust pipes front. Tighten flange bolts (2) uniformly, since otherwise leaks might occur (Fig. 16).

34 Screw pipe line (6) of hydraulic clutch actuation with clutch hose (7) to hose connection (arrow).

35 Vent hydraulic clutch actuation from bottom in upward direction and correct fluid level in combined compensating tank for brake and clutch system (25.1–230).

36 Connect grounding cable to battery.

37 Check transmission and clutch for perfect function.

B. Model 114, 115, 116.020/024/025

Note

Removal and installation of transmission for models 114 and 115 is described below.

For models 116.020/024/025, assembly is essentially the same and the following instructions can also be applied.

Removal

1 Disconnect grounding cable on battery.

2 Disconnect shift rod: On steering wheel gear shift, disconnect shift rods (1 and 2) on shift bracket and shift rod (3) on reverse speed shift lever of transmission shift cover (Fig. 1 and 2).

On floor-mounted gear shift, disconnect shift rods on shift levers on transmission shift cover.

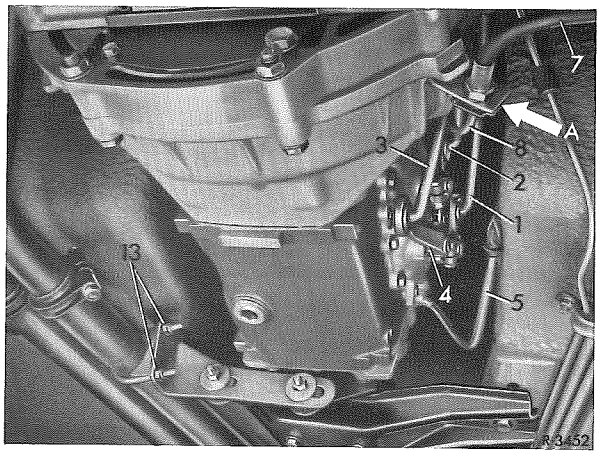


Fig. 1
1 Shift rod for 1st and 2nd speed
2 Shift rod for 3rd and 4th speed
3 Shift rod for reverse speed
4 Shift lever for reverse speed
5 Tachometer drive shaft
7 Coupling hose
8 Pipe line
13 Nuts for clamps of exhaust support
A Connection point coupling hose to pressure line

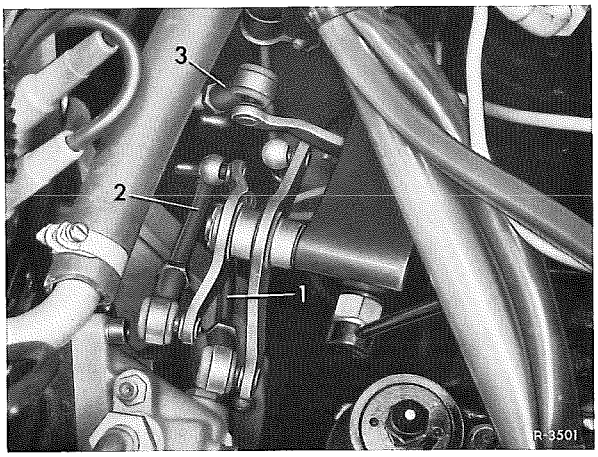


Fig. 2
1 Shift rod for 1st and 2nd speed
2 Shift rod for 3rd and 4th speed
3 Shift rod for reverse speed

3 Loosen drive shaft (5) for tachometer on rear transmission cover and pull off (Fig. 3).

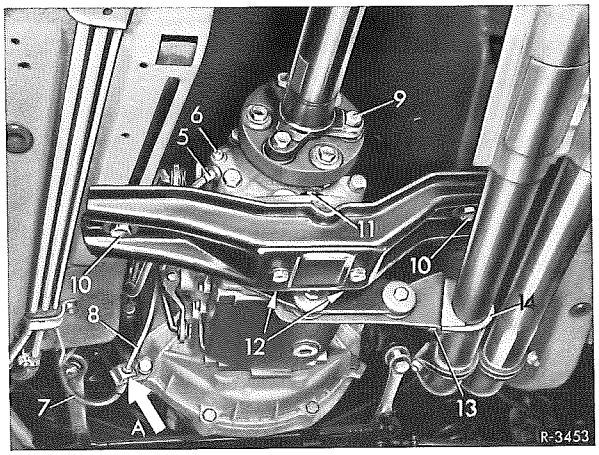


Fig. 3
5 Tachometer drive shaft
6 Screw
7 Coupling hose
8 Pipe line
9 Universal shaft bolt
10 Bolt for cross member
11 Bolt for rear engine mount
12 Nut for exhaust support
13 Nut for clamp of exhaust support
14 Clamp
A Connection coupling hose to pipe line

4 Separate pipe line (8) to slave cylinder on hose screw connection "A" (arrow in Fig. 3).

Note: Close lines with blind plugs or draw off liquid from respective chamber of combined compensating tank to avoid flowing out of brake fluid.

5 Support transmission with a pit lift or vehicle jack.

6 Unscrew bolts (10) for cross member on frame floor (Fig. 3).

7 Unscrew nuts (12) for exhaust support (18).

8 Loosen nuts (13) for clamp (14) and turn exhaust support downwards (Fig. 4).

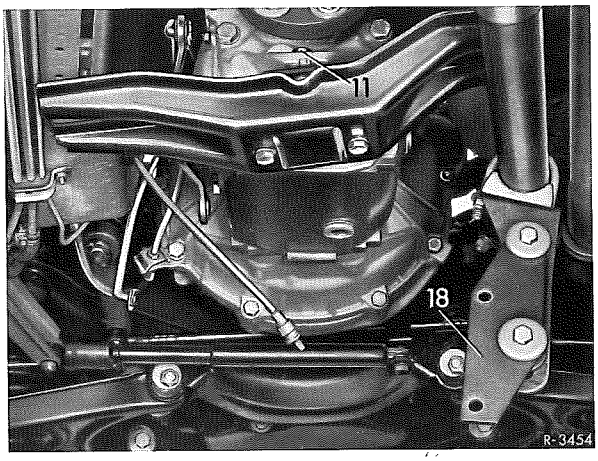


Fig. 4
11 Nut for rear engine mount
18 Exhaust support

9 Unscrew nut (11) for rear engine mount and remove cross member together with engine mounting (Fig. 4).

10 Loosen clamping nut of universal shaft (Fig. 5).

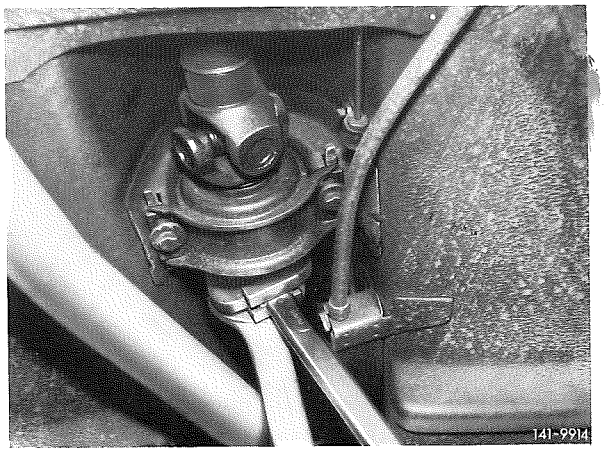


Fig. 5

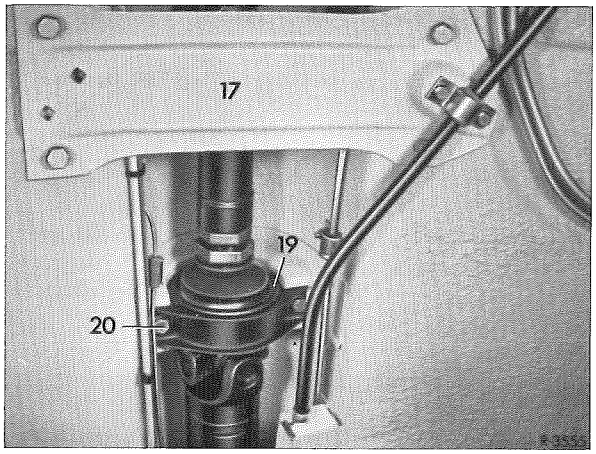


Fig. 6
17 Cross strut
19 Universal shaft intermediate bearing
20 Bolts

11 Loosen bolts (20) of universal shaft intermediate bearing, but do not yet screw out (Fig. 6).

12 Mark companion plate in relation to universal shaft to maintain balanced condition.

13 Unscrew universal shaft from transmission in such a manner that companion shaft remains on three-arm flange of transmission (Fig. 7).

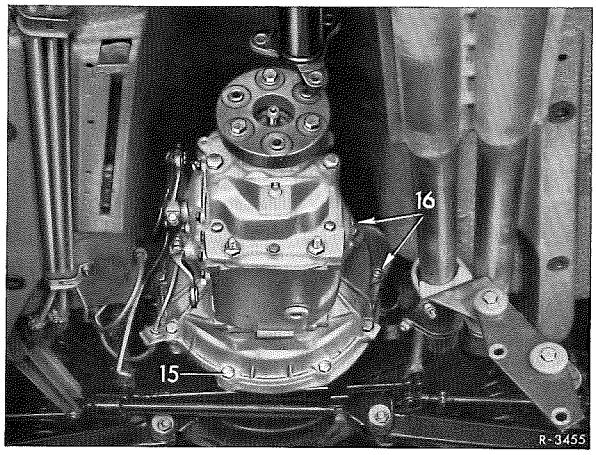


Fig. 7
15 Fastening bolts for transmission
16 Fastening bolts for starter

14 Slip universal shaft toward the rear to the extent permitted by intermediate bearing and clamping piece.

15 Push universal shaft upwards and support at cross strut (17) by means of a suitable piece of wood (Fig. 8).

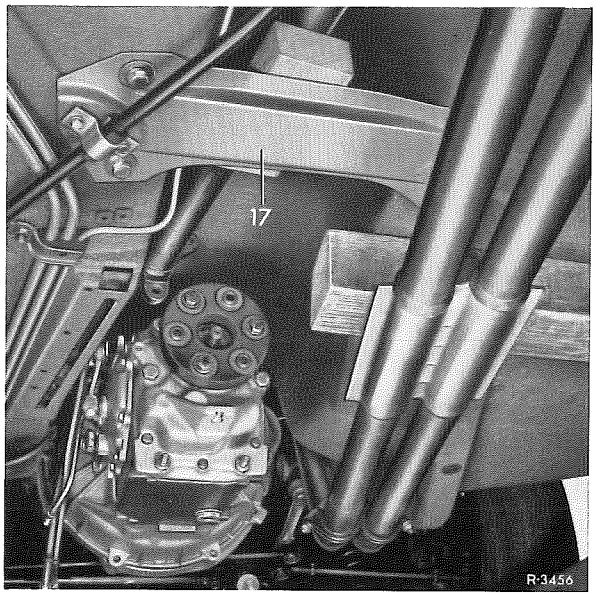


Fig. 8
17 Cross strut

16 Unscrew bolts (16) for attaching starter and push starter out of its bracket (Fig. 7).

17 Unscrew all bolts for fastening transmission to intermediate flange, but remove the two upper bolts last.

18 Pull transmission horizontally out of round centering fit and clutch toward the rear and then remove in downward direction (Fig. 9).

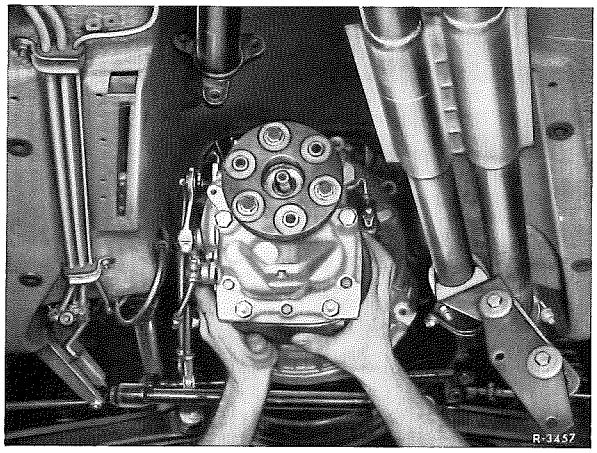


Fig. 9

Attention! Tilt transmission toward the rear only when the input shaft has been completely pulled out of driven plate. If this is not done, damage to driven plate may result.

Installation

19 Slightly grease centering pin and splining on transmission input shaft with longterm grease.

20 Engange one gear step, then introduce transmission horizontally into clutch while turning the main transmission shaft back and forth until the splining of the input shaft and the driven plate is in alignment (Fig. 9).

21 Tighten transmission fastening bolts starting at the top. Make sure that the grounding cable is not squeezed in (Fig. 7).

22 Insert starter into recess and tighten by means of bolts. Screw-on grounding cable with bottom bolt (Fig. 7).

Attention! On starter without helicoil insert, tighten bolts only to 60 Nm (6 kpm).

23 Extend universal shaft in slide piece as required and flange to transmission. Observe markings.

24 Screw cross member and rear engine mount to transmission by means of nut (11) (Fig. 10).

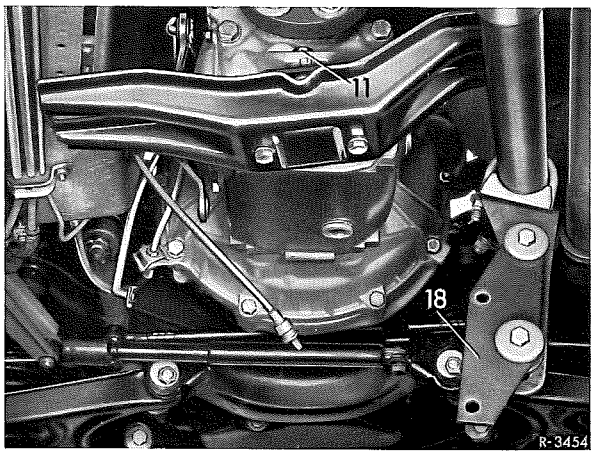


Fig. 10
11 Nut for rear engine mount
18 Exhaust support

25 Connect drive shaft (5) for tachometer to rear transmission cover and tighten with screw (6) (Fig. 11).

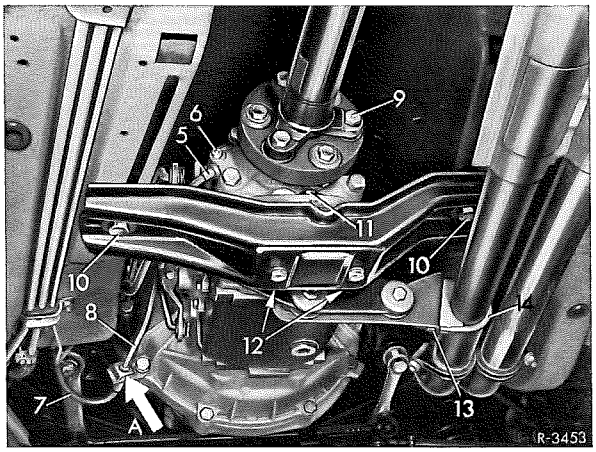


Fig. 11
5 Drive shaft for tachometer
6 Screw
7 Coupling hose
8 Pipe line
9 Universal shaft bolt
10 Screw for cross member
11 Nut for rear engine mount
12 Nut for exhaust support
13 Nut for clamp of exhaust support
14 Clamp
A Connection coupling hose to pipe line

26 Connect pipe line (8) for slave cylinder at screw connection "A" (arrow in Fig. 11).

27 Turn exhaust support (18) upwards, plug on bolts at rear transmission cover and tighten by means of nuts (12) (Fig. 10 and 11).

28 Lower pit lift or vehicle jack on transmission and on rear axle.

29 Tighten nuts (13) for clamp (14) of exhaust support (18) (Fig. 11).

30 Tighten universal shaft intermediate bearing free of tension.

31 Move vehicle several times back and forth and then tighten clamping nut of universal shaft at a tightening torque of 30 Nm (3.0 kpm) (Fig. 12).

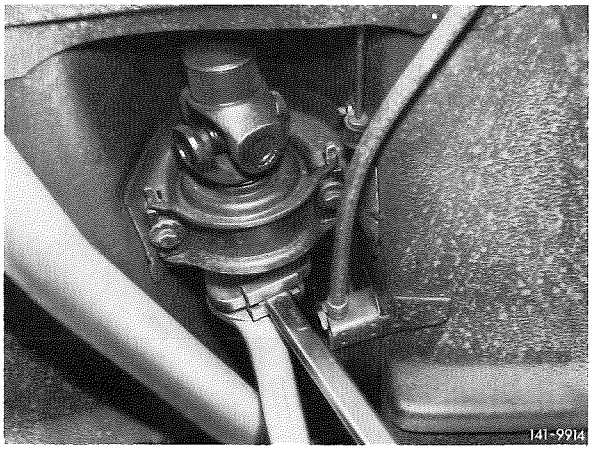


Fig. 12

32 Connect shift rods: With steering wheel gear shift, connect shift rods (1 and 2) to bearing body and shift rod (3) to reversing speed shift lever (4) on transmission shift cover (Fig. 13). For floor-mounted gear shift, connect shift rods to shift levers on transmission shift cover and secure with SL-locks.

33 Bleed hydraulic clutch actuation (25.1–230).

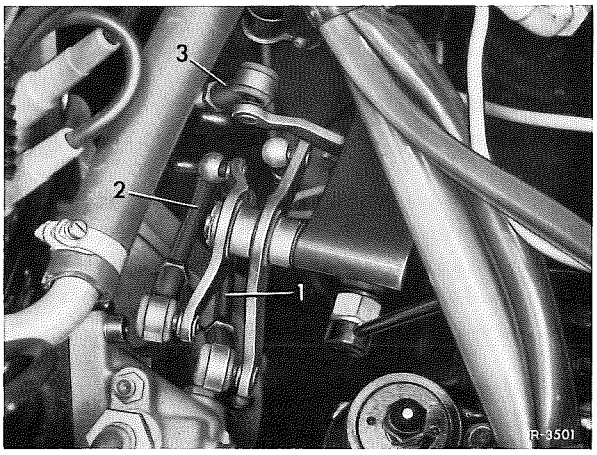


Fig. 13
1 Shift rod for 1st and 2nd speed
2 Shift rod for 3rd and 4th speed
3 Shift rod for reverse speed

34 Check oil level in transmission and correct, if required.

35 Connect grounding cable to battery.

36 Check transmission and clutch for perfect function.

Removal and Installation of Transmission Shift Cover 26.1

Revision: Revision reference extended (*), Note and Fig. 10 and 11 added.

Oil Types/Filling Capacites

Automatic transmission fluid type A, Suffix A	refer to Specifications for Service Products Page 236.1, 236.2	
Filling capacities	G 76/18 716.0	1.6
	G 76/27 716.1	1.8

Tightening Torque	Nm	(kpm)
Fastening bolts for shift cover	15	(1.5)

Special Tool

Special wrench 14 x 17 mm for oil drain plug	000 589 24 07 00

Revision Reference

Designation	Transmission	starting with transmission No.
Increasing height of breather neck on transmission shift cover by means of a spacing sleeve	G 76/18	124 950
Increasing height of breather neck on transmission shift cover on casting. No spacing sleeve (on G 76/18)	G 76/18	315 700
	G 76/27 716.100	as from start of series
Sealing of needle sleeve for gear-shifting shaft bearing 1st and 2nd speed changed from lip sealing ring to O-ring.	716.001	006 336
	716.002	771 951
	716.003	as from start of series
	716.100	008 471
Transmission breather replaced by end cap Breather plug on transmission shift cover reinforced	716.001	048 101*
	716.002	093 500* (as from Dec. 18, 1974)
	716.003	083 420*
	716.100	013 684*

26.1 Removal and Installation of Transmission Shift Cover

Removal

1 Drain transmission fluid.

2 Remove shift lever (112 a) for reverse speed after loosening clamping bolt (Fig. 1).

3 Force lock washer (121) from gear shifting shaft (112) for reverse speed and remove washer (120) (Fig. 2).

4 Unscrew fastening bolts (124) for shift cover (114).

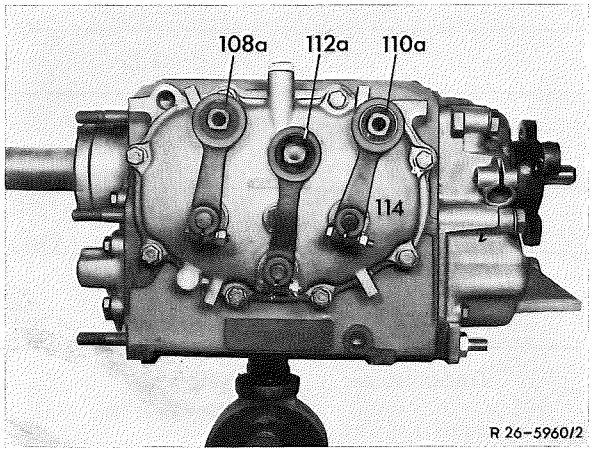


Fig. 1
108a Shift lever 3rd and 4th speed
110a Shift lever 1st and 2nd speed
112a Shift lever reverse speed
114 Shift cover

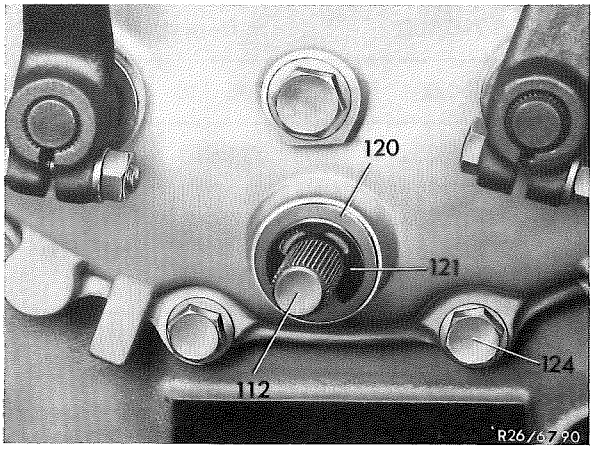


Fig. 2
112 Gear shifting shaft for reverse speed
120 Washer
121 Lock washer
124 Fastening bolt

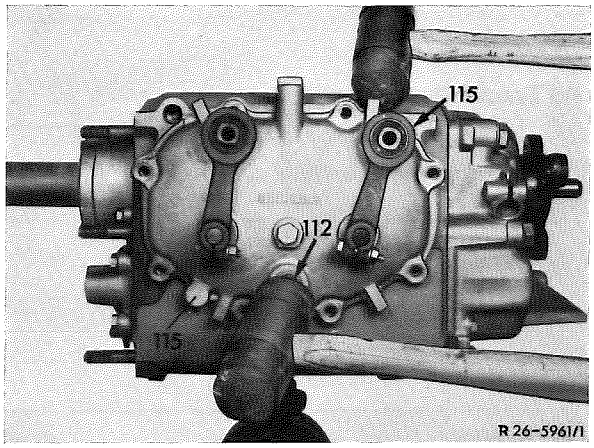


Fig. 3
112 Gear shifting shaft for reverse speed
115 Fitted pins

5 Carefully knock shift cover from fitted pins (115) while simultaneously using a second hammer against gear shifting shaft (112) for reverse speed to follow up in inward direction until the distance between the shift cover and the parting surface of the transmission housing is so large that fingers can be entered in between (Fig. 3 and 4).

6 Remove shift forks (106 and 107) in direction of arrow as shown in Fig. 4 from shift rockers (108 and 110).

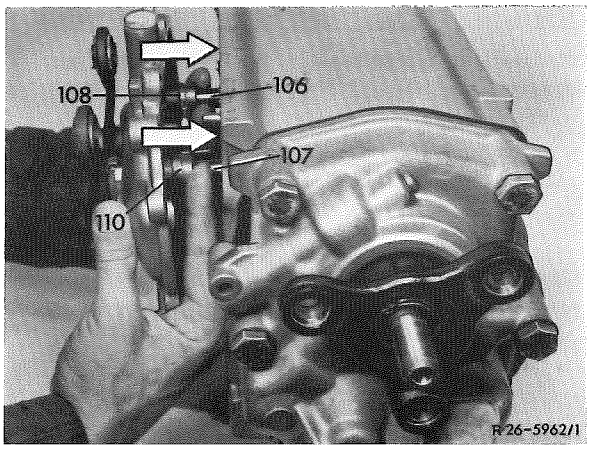


Fig. 4
106 Shift fork 3rd and 4th speed
107 Shift fork 1st and 2nd speed
108 Shift rocker 3rd and 4th speed
110 Shift rocker 1st and 2nd speed

7 Tilt shift cover first in direction of arrow A, then move in direction of arrow B and remove (Fig. 5).

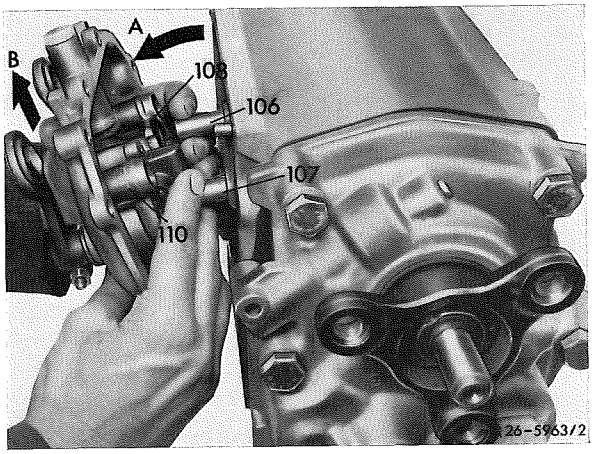


Fig. 5
106 Shift fork 3rd and 4th speed
107 Shift fork 1st and 2nd speed
108 Shift rocker 3rd and 4th speed
110 Shift rocker 1st and 2nd speed

Installation

8 Glue new paper seal with grease on carefully cleaned parting surface on transmission housing (Fig. 6).

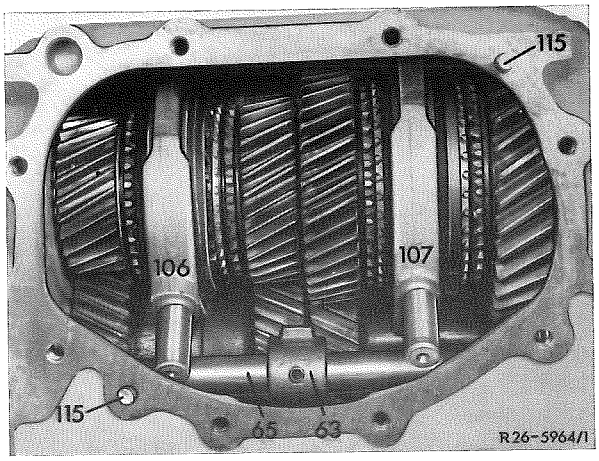


Fig. 6
63 Shifter for reverse speed
65 Shift rod for reverse speed
106 Shift fork for 3rd and 4th speed
107 Shift fork for 1st and 2nd speed
115 Fitted pins

9 Place shifter (63) for reverse speed shift rod (65) accurately in center position (Fig. 6).

10 Then position shift cover as shown in Fig. 7 in direction of arrow A in such a manner that the shifting finger (112 in Fig. 9) for reverse speed enters into groove on shifter (63) (arrow in Fig. 8). Then move shift cover in direction of arrow B, while simultaneously introducing shift forks (106 and 107) into shift rockers (108 and 110) (Fig. 7).

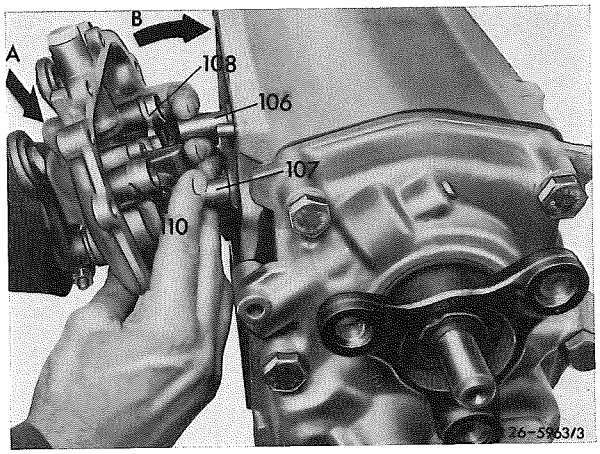


Fig. 7
106 Shift fork 3rd and 4th speed
107 Shift fork 1st and 2nd speed
108 Shift rocker 3rd and 4th speed
110 Shift rocker 1st and 2nd speed

Note! The shift cover can be positioned correctly only when the gear shifting shaft and thereby shift finger (112) for reverse speed has first been placed far enough out on shift cover inside surface (distance B in Fig. 9).

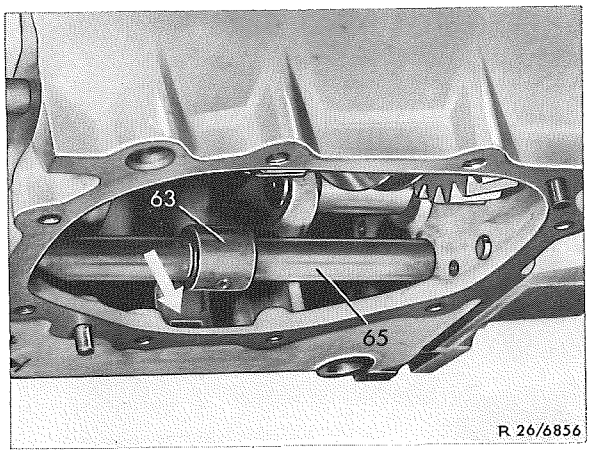


Fig. 8
63 Shifter for reverse speed
65 Shift rod for reverse speed

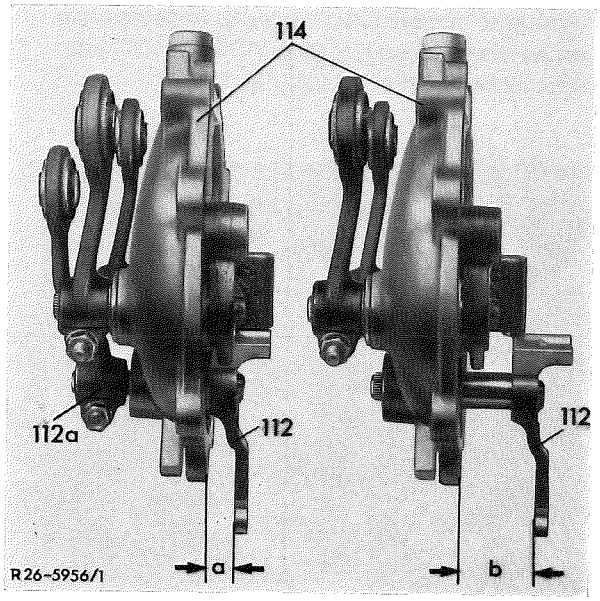


Fig. 9

a 10 mm
Distance between parting surface and shifting finger with shift cover in operating condition
b approx. 25 mm
Distance between shifting finger and cover required for assembly reasons
112 Shift finger with shaft for reverse speed
112a Shift lever for reverse speed
114 Shift cover

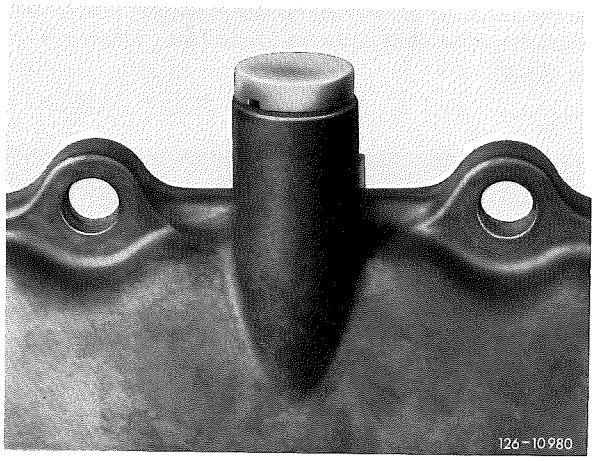


Fig. 10

Transmission breather 1st version

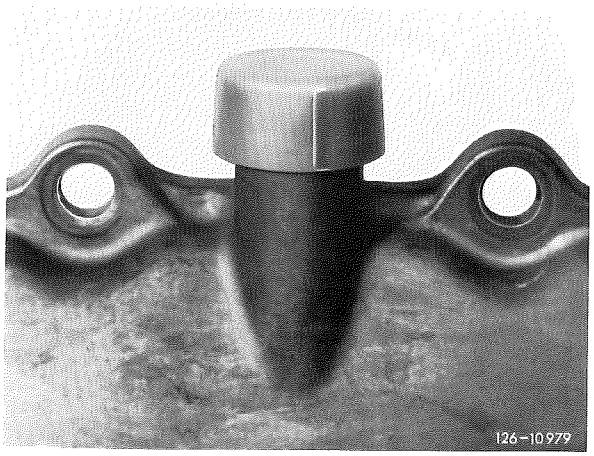


Fig. 11

Transmission breather 2nd version

11 Move shift cover against parting surface of transmission housing with light hammer blows, making sure that the shift cover is correctly guided on the two fitted pins (115) (Fig. 6). The gear shifting shaft for reverse speed should come out of cover by the same distance the shift cover is moved against the parting surface of the transmission housing.

12 Tighten shift cover fastening bolts (124) uniformly and crosswise (Fig. 2).

Note: To prevent leaks on shift cover, make sure of careful and uniform tightening of fastening bolts.

13 Slip washer (120) in position and insert lock washer (121) into ring groove on gear shifting shaft for reverse speed (Fig. 2).

14 Slide shift lever (112a) for reverse speed with reference to adjusting dimension on splining of gear shifting shaft and tighten clamping screw (Fig. 1).

15 Check shift cover for function by shifting through all the gears.

16 Fill up with ATF up to overflow at filler hole.

Note: When repairing transmission 716.003, install end cap and the transmission cover with reinforced breather plug (Fig. 10 and 11).

Revision: Note and Fig. 7 and 8 added.

Assembly

5 Push locking cage (109) with fitted pin into bore of cover and push with fitted bore against locating pin. Then tighten with fastening screw (122) and secure with lock washer (123) or use a spring washer (Fig. 3).

6 Grease shafts of shift rockers (108 and 110) and of shift finger (112) for reverse gear lightly with anti-friction bearing grease and insert in shift cover according to Fig. 3. Make particularly sure that the O-rings (111) are not damaged (Fig. 3 and 4).

7 Place washers (120) on shafts of shift rockers (108 and 110) on front end of cover and secure by sliding lock washers (121) on gear-shifting shaft (Fig. 3).

8 Secure shift finger (112) for reverse gear only after screwing cover to transmission using washer (120) and shaft lock (121).

Attaching and clamping of shift levers (108a, 110a and 112a) on gear-shifting shafts is suitably done after screwing cover to transmission in accordance with reference drawing.

Note: When repairing transmission 716.003, install end cap and the transmission cover with reinforced breather plug (Fig. 7 and 8).

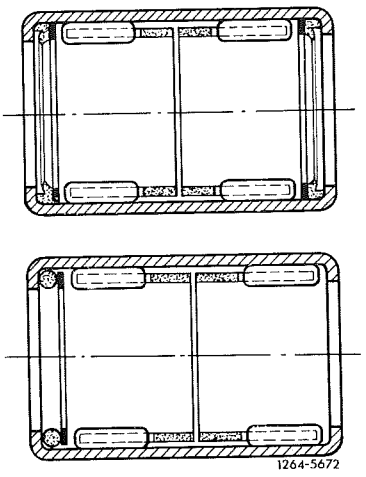


Fig. 6
Top view: Self-sealing needle bearing
Bottom view: Needle bearing with O-ring

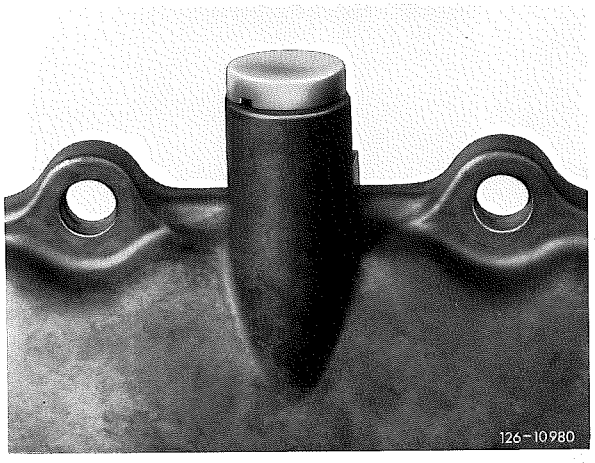


Fig. 7
Transmission breather 1st version

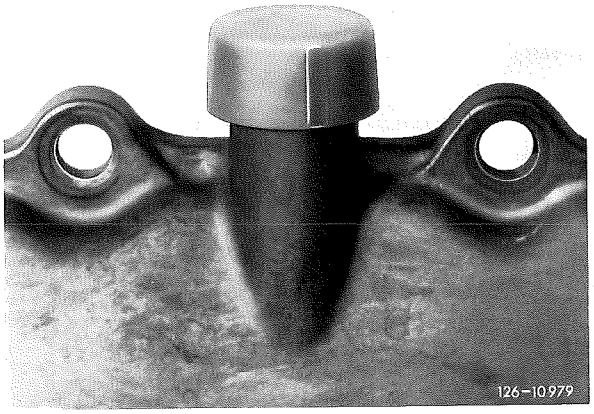


Fig. 8
Transmission breather 2nd version

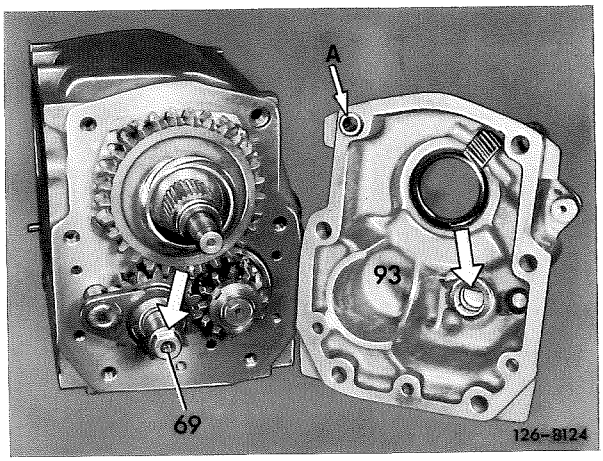


Fig. 5
69 Reversing shaft
93 Transmission cover rear

Note: No special preparations are required for gear assembly of transmission when removing rear cover.

Replacement of Radial Sealing Ring

4 Force radial sealing ring (101) out of cover by means of a suitable mandrel of approx. 52 mm dia. (Fig. 6).

5 Press new radial sealing ring into cover flush with outer edge (Fig. 6).

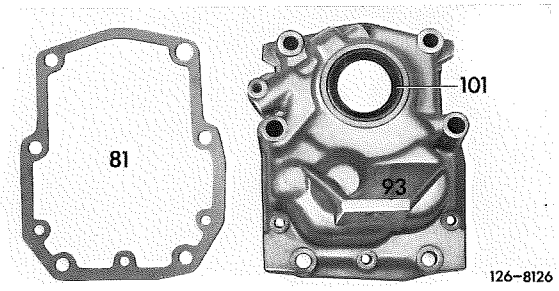


Fig. 6
81 Gasket
93 Transmission cover rear
101 Radial sealing ring

Screwing-On

6 Glue new gasket with grease on parting surface of cover to facilitate assembly (Fig. 6).

7 Carefully slide cover over main shaft against parting surface of transmission housing, watching the fitted sleeve (arrow A) and making particularly sure that the milled surface (arrow) of the reversing shaft (69) is on top and is correctly introduced into the locating bore (arrow in cover) (Fig. 5).

8 Screw down cover uniformly and crosswise by means of fastening bolts (94, 102, 103 and 105) (Fig. 4).

9 Grease three-arm flange on running surface of radial sealing ring.

10 Slide three-arm flange on main shaft and screw on slot nut for attaching flange by hand.

11 Tighten slot nut with socket wrench insert while counterholding with slot nut wrench.

Note: For attaching three-arm flange, use slot nut with polystop insert or slot nut with pinch collar. When repairing a transmission with polystop nut, use new polystop nut, since the main shaft has no slot for securing pinch nut (Fig. 7).

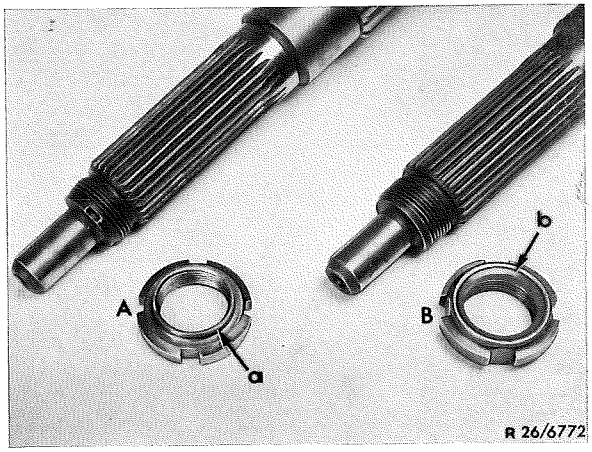


Fig. 7
A Slot nut with pinch collar and shaft
B Slot nut with polystop insert and shaft
a Pinch collar
b Polystop insert

26.1 Screwing Transmission Cover Rear Off and On, Replacement of Sealing Ring

Revision: Attention added.

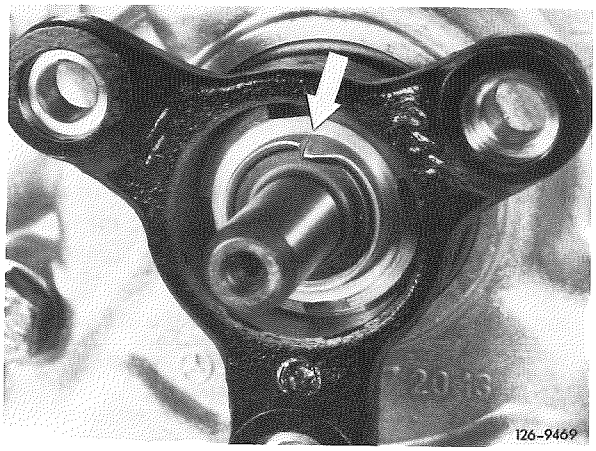


Fig. 8

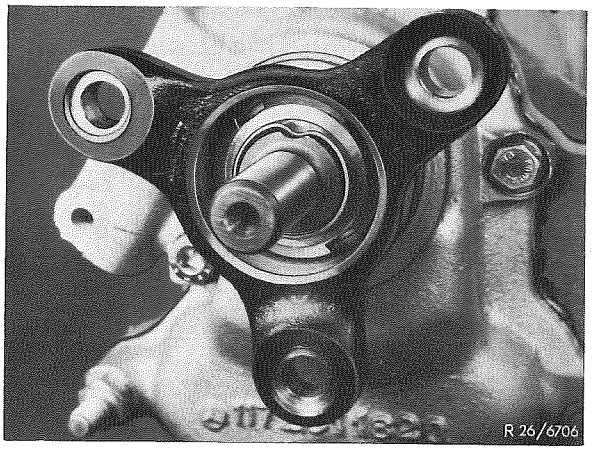


Fig. 9

12 Secure slot nut.

On main shafts with triangular groove, secure slot nut by means of a punch by cutting pinch collar (Fig. 8 and 10), and on main shafts with round groove by pressing down pinch collar (Fig. 9 and 10).

Attention! Replace tachometer drive, that is helical gear on main shaft and drive pinion in rear transmission cover in pairs **only**.

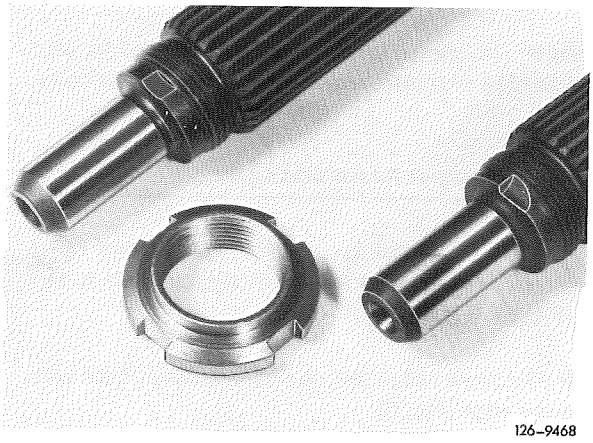


Fig. 10

Revision: Revision reference (*) extended, Attention added following Item 10.

Revision Reference

Designation	Transmission	starting with transmission No.
Seal for tachometer drive on rear transmission cover has been changed from a plug to a ball (Fig. 1)	G 76/18	412 370
	G 76/27	032 430
	716.100	001 001
Helical gear on main shaft has been changed from brass to plastics Drive pinion changed from steel to sintered metal	716.001	0056 570*
	716.002	171 580* (as from July 15, 1975)
	716.003	119 795*
	716.100	015 290*

Removal

1 Unscrew transmission cover at rear (26.1–310).

2 Press out tachometer drive in direction toward ball with the aid of suitable supports and a mandrel, using a manually-operated press.

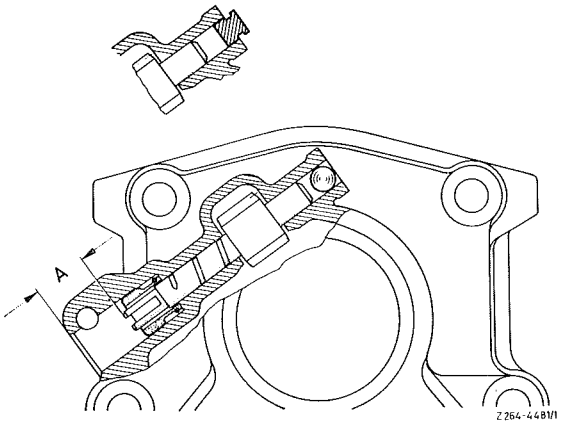


Fig. 1
A = 19 mm

Note: On transmissions with plug, remove plug prior to pressing out tachometer drive by means of a screwdriver or pliers.

3 Pull radial sealing ring (99) out of tachometer drive.

Note: To facilitate the removal, screw a hex. bolt M 12 into sealing ring and clamp into vice. Apply light blows with a plastic hammer against cover while removing radial sealing ring (Fig. 2).

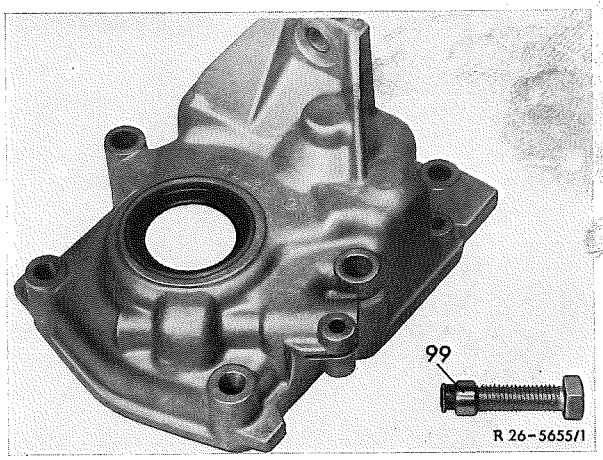


Fig. 2
99 Radial sealing ring

4 Check individual parts of tachometer for wear and damage.

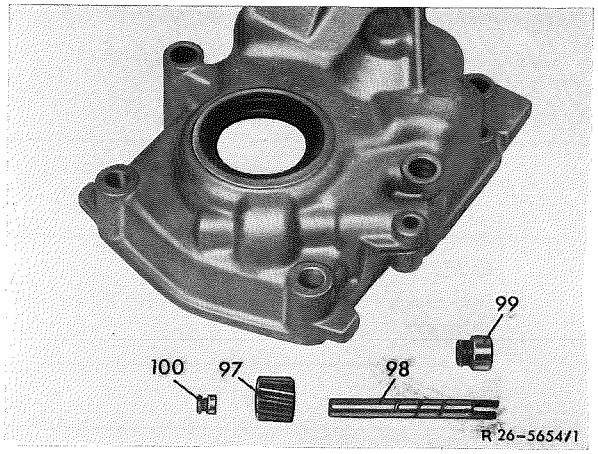


Fig. 3

97 Drive pinion
98 Shaft – drive for tachometer
99 Radial sealing ring
100 Plug or ball

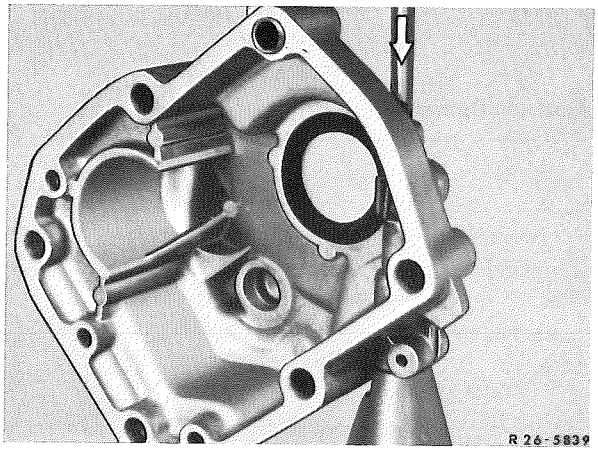


Fig. 4

Installation

5 Place radial sealing ring (99) flush on side of drive shaft (98) on which the groove for connecting flexible tachometer shaft is milled in.

6 Insert drive pinion (97) into rear transmission cover.

7 Press in drive shaft (98) with radial sealing ring (99) on a manual press until the distance A of 19 mm between cover and upper edge of drive shaft is established (Fig. 1).

8 Press in sealing ball until it is flush with upper edge of transmission cover (Fig. 1 and 4).

9 On transmissions with plug, coat plug with sealing compound and knock in by lightly tapping with a plastic hammer.

10 Screw on rear transmission cover (26.1–310).

Attention! Replace tachometer drive, that is, helical gear on main shaft and drive pinion in rear transmission cover in pairs **only.**

Revision: Revision reference extended (*)

Tightening Torques	Nm	(kpm)
Fastening bolts M 10 for rear transmission cover	45	(4.5)
Fastening bolts M 7 for rear transmission cover	15	(1.5)
Slot nut with polystop insert or with pinch collar for three-arm flange	150	(15)
Slot nut or hex. nut with pinch collar on countershaft rear	150	(15)

Special Tools

Slot nut wrench insert 3/4" square for slot nut on transmission flange	115 589 01 07 00
Socket wrench for counterholding on transmission flange when loosening and tightening slot nut	116 589 10 07 00

Revision Reference

Designation	Transmission	starting with transmission No.
Change of complete reversing gear set from taper to round points Reason: to improve shifting of reverse gear	G 76/18	064 856
Change from slot nut to hex. nut on countershaft rear	G 76/18	554 275
	G 76/27	044 079
	716.100	003 737
Change of reversing gear on countershaft Reason: to match transmission G 76/18 B	G 76/27	049 594
	716.100	006 294
With synchronizing unit Reason: to improve shifting of reverse gear	716.100	014 398
	716.001	057 804 *

26.1 Removal and Installation of Reverse Speed Gear

A. Without Synchronizing Unit

Note

If the assembly jobs are exclusively restricted to reversing gears, no removal of transmission is required.

Removal

1 Unscrew transmission cover at rear (26.1–310).

2 Remove worm gear (45) for tachometer drive (Fig. 1).

3 Pull reverse gear (35) from main shaft.

4 Pull reverse shaft (69) for reversing slide gear (70) from transmission housing while holding slide gear in position (Fig. 2).

5 Unlock slot nut (62) on countershaft rear and screw off (Fig. 2), while placing three-arm flange provisionally on main shaft and counterholding with slot nut wrench when loosening slot nut.

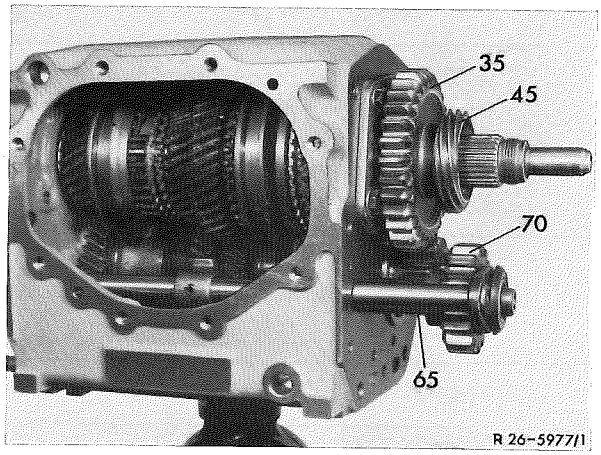


Fig. 1
35 Reverse gear – main shaft
45 Worm gear, tachometer drive
65 Shift rod for reverse gear
70 Reverse speed slide gear

6 Force reverse gear – countershaft (58) from countershaft by means of screw driver.

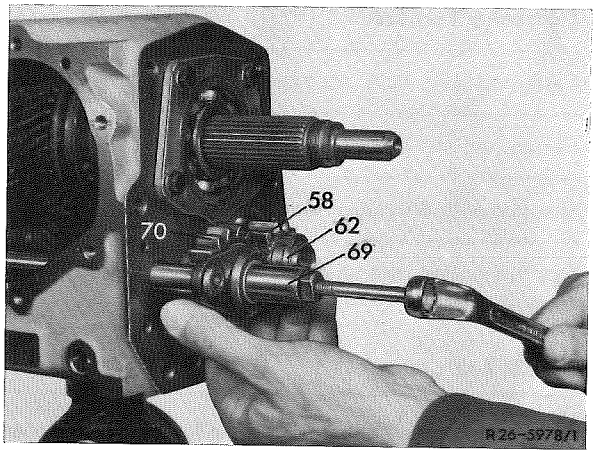


Fig. 1
58 Reverse gear – countershaft
62 Slot nut or hex. nut
69 Reverse shaft
70 Reverse speed slide gear

Installation

7 Slide reverse gear – countershaft (58) on countershaft and attach with nut (62).

Note: Slot nut (62) on countershaft can be replaced by a hex. nut with pinch collar. This hex. nut is now standard.

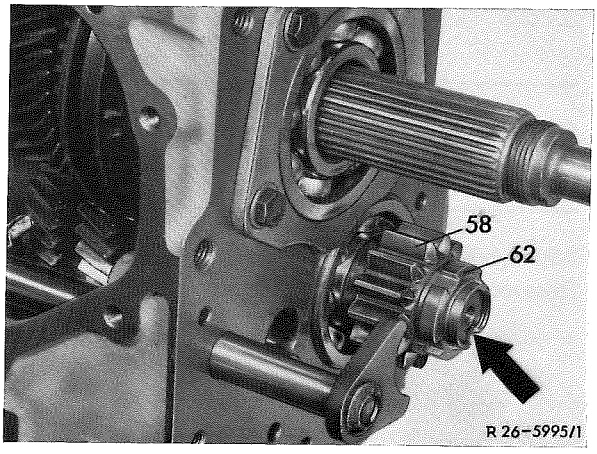


Fig. 3
58 Reverse speed gear – countershaft
62 Slot nut or hex. nut

8 Carefully secure nut (62) by peening pinch collar into groove provided in countershaft (arrow in Fig. 3).

Revision: Adjusting dimension of countershaft revised.

Modification

Designation	Transmission	starting with transmission No.
Change from slot nut to hex. nut with pinch collar on countershaft front	G 76/18	547 750
	G 76/27	043 408
	716.100	003 262
Web in transmission housing for mounting reversing shaft has been removed. Reversing shaft has therefore become shorter	G 76/18	496 842
	G 76/27	041 501
	716.100	001 648

Adjusting Dimension or End Play

Input shaft (drive shaft)	0–0.05
Main shaft	0–0.05
Countershaft	0.07–0.15

Tightening Torques	Nm	(kpm)
Slot nut or hex. nut with pinch collar on countershaft front	150	(15.0)
Slot nut on input shaft 716.100	150	(15.0)

Special Tools

Pin spanner 14 x 17 mm for oil plug	000 589 24 07 00
Puller for ball bearing on main shaft	001 589 02 33 00
Puller for ball bearing on countershaft	000 589 94 33 00
Slot nut wrench insert 1/2" square for slot nut on countershaft front	115 589 03 07 00
Slot nut wrench insert 1/2" square for slot nut on countershaft rear	115 589 04 07 00
Clamping device for transmission housing	111 589 08 31 00
Slot nut wrench 1/2" square for slot nut on input shaft 716.100	116 589 09 07 00
Slot nut wrench insert 3/4" square for slot nut on transmission flange	115 589 01 07 00
Adjustable pin spanner for counterholding transmission flange when loosening and tightening slot nut	116 589 10 07 00

26.1 Removal and Installation of Gear Assembly

Removal

1 Unscrew clutch housing (26.1–050).

2 Remove transmission shift cover (26.1–110).

3 Unscrew transmission cover front (26.1–210).

4 Unscrew transmission cover rear (26.1–310).

5 Remove reverse gear (26.1–410).

6 Unscrew shift forks (106 and 107) upon removal of shift cover (Fig. 1 and 2).

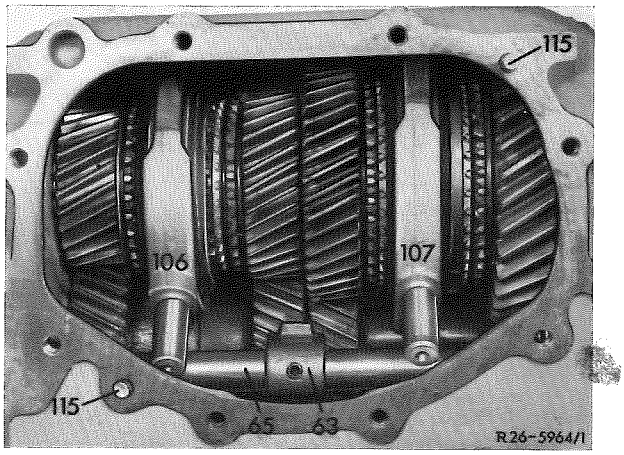


Fig. 1
63 Shifter for reverse speed
65 Shift rod for reverse speed
106 Shift fork 3rd and 4th speed
107 Shift fork 1st and 2nd speed
115 Fitted pin

7 Knock out dowel sleeve (64) of shifter (63) of gear shifting shaft for reverse speed and set shifter as far as possible in forward direction (Fig. 3).

8 Pull shift rod (65) out of housing while simultaneously removing shifter (63) in forward direction.

9 Unlock slot nut or hex. nut with pinch collar (48), loosen with slot nut wrench and unscrew (Fig. 4).

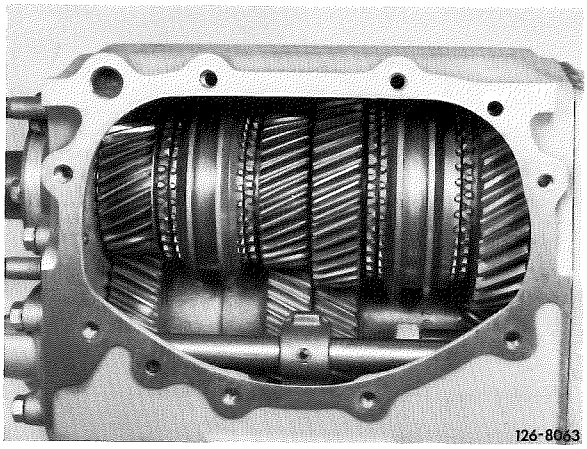


Fig. 2

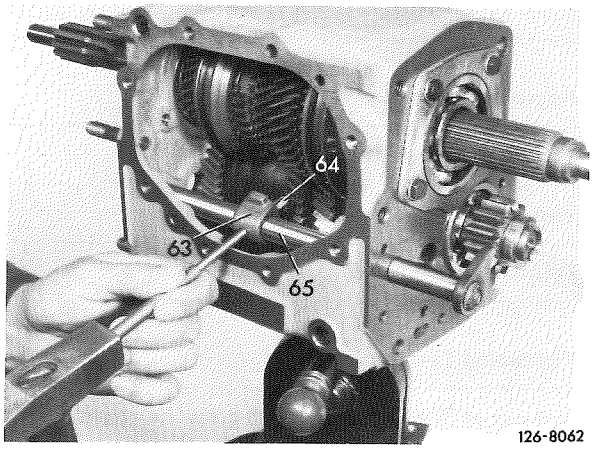


Fig. 3
63 Shifter for reverse speed
64 Dowel sleeve
65 Shift rod for reverse speed

Note: To facilitate loosening of slot nut or hex. nut, two speeds may be simultaneously engaged to lock gear assembly.

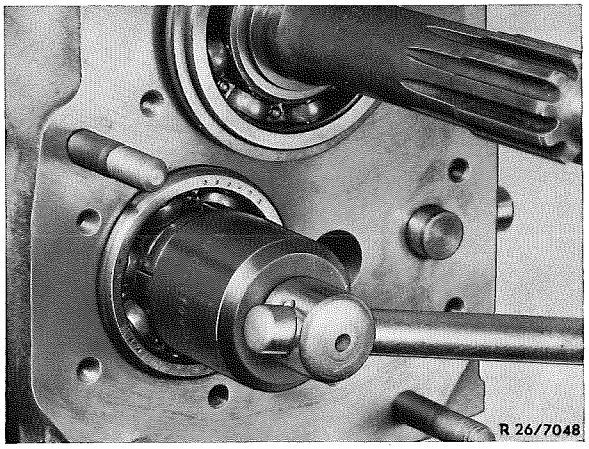


Fig. 4

10 Unscrew fastening bolts of holding ring (32) and remove under proper consideration of compensating washers from main shaft bearing (Fig. 5).

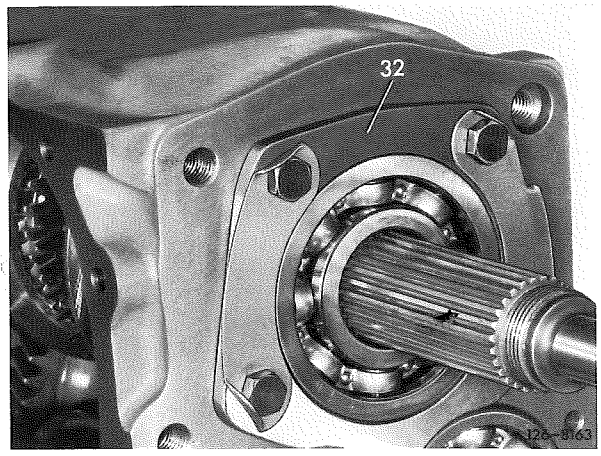


Fig. 5

11 Pull off radial ball bearing of countershaft front and rear (Fig. 6 and 7).

Note: Items 11a to 18a of scope apply to transmission 716.100.

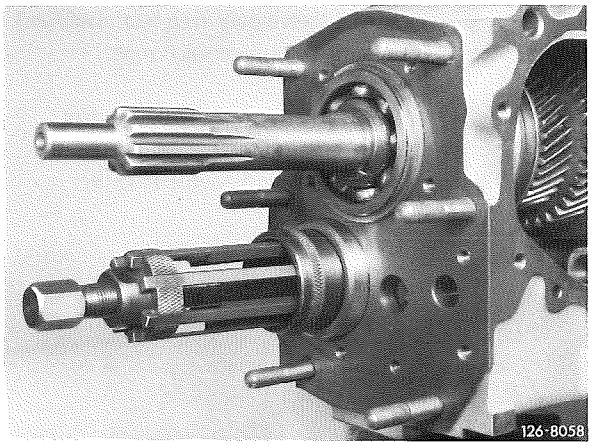


Fig. 6

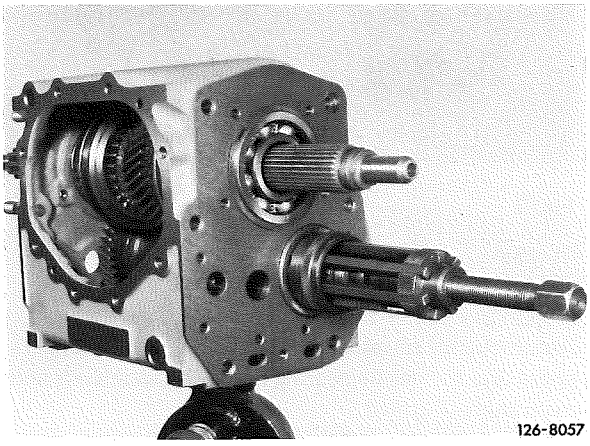


Fig. 7

12 Pull off radial ball bearing of main shaft rear.

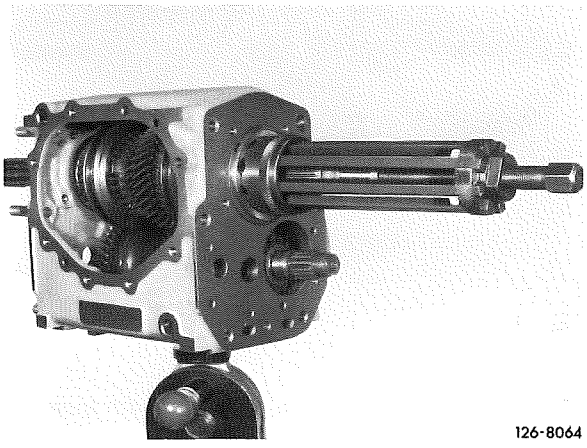


Fig. 8

13 Slide one assembly sleeve over free rear shaft end and tighten with slot nut of universal flange.

Assembly sleeve prevents any slipping of 1st gear wheel from its needle bearing, which would make removal and installation more difficult (Fig. 9).

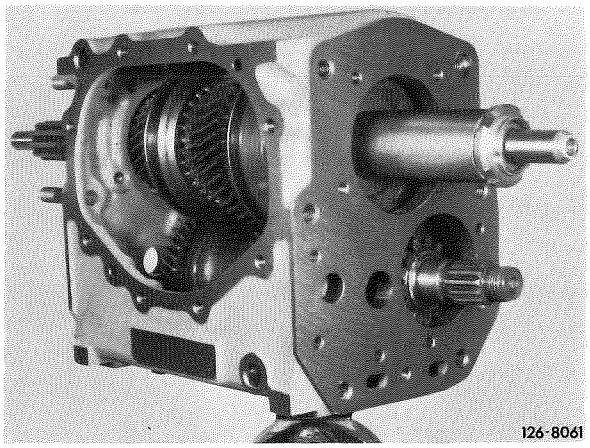


Fig. 9

14 Lift main shaft at the rear and pull input shaft completely out of housing in forward direction. Watch out for released synchronizing ring of 4th speed and for needle bearing between input shaft and main shaft (Fig. 10).

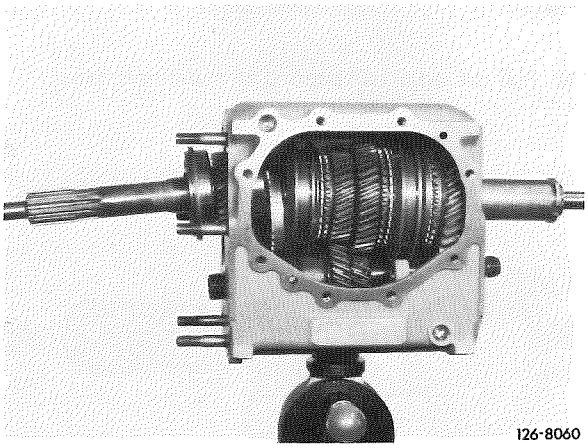


Fig. 10

15 Move sliding sleeve (11a) of 3rd and 4th speed into 3rd speed position, push main shaft completely toward the rear and then remove at an angle in forward direction out of housing (Fig. 11).

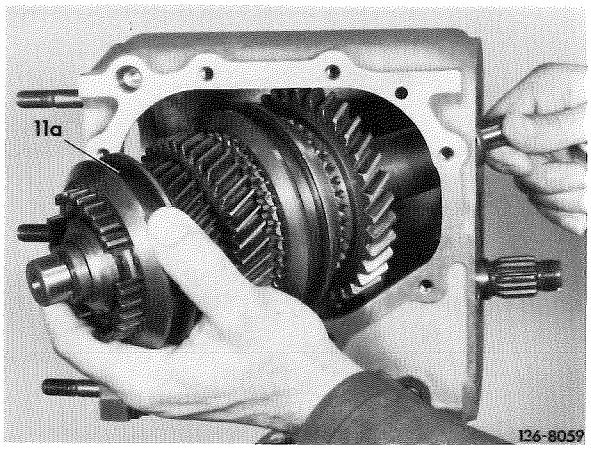


Fig. 11
11a Sliding sleeve 3rd and 4th speed

16 Remove countershaft from transmission housing similar to removing main shaft (Fig. 12).

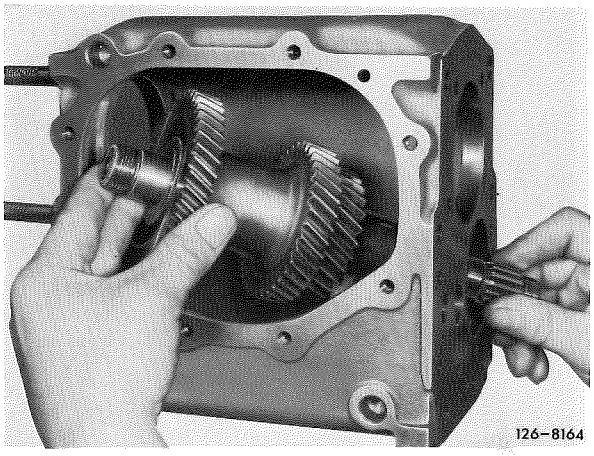


Fig. 12

17 Check gear assembly components for re-use. Refer to test instruction in Job No. 26.1–440 item 13.

Assembly Deviations on Transmission Type 716.100

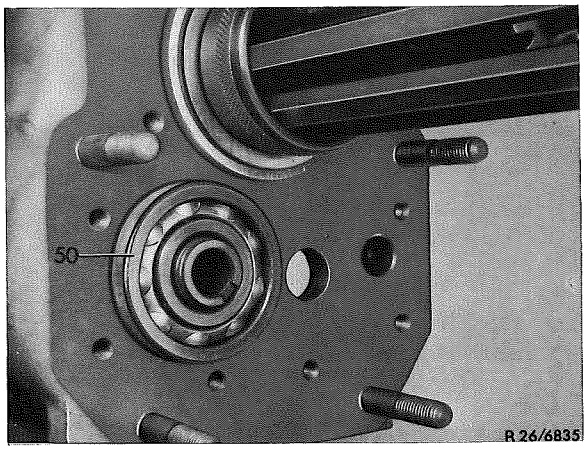


Fig. 13
50 Bevelled shoulder bearing

On transmission 716.100 up to transmission No. 544 the countershaft has been provided with a bevelled shoulder bearing at the front (Fig. 13). This bearing cannot be pulled off and procedure for removal of gear assembly as from item 11 should be as follows:

11a Pull off radial ball bearing of countershaft rear (Fig. 7).

12a Unscrew slot nut (1a) on input shaft (Fig. 14).

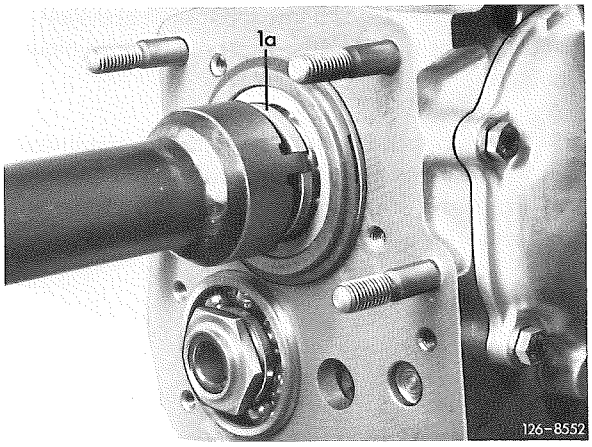


Fig. 14
1a Slot nut

13a Pull off radial ball bearing of input shaft and main shaft rear (Fig. 15 and 16).

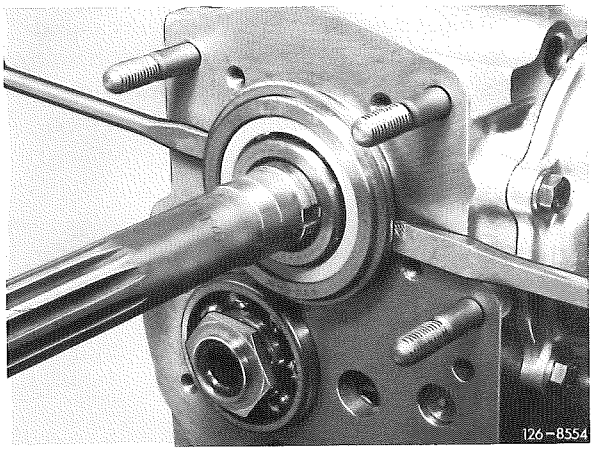


Fig. 15

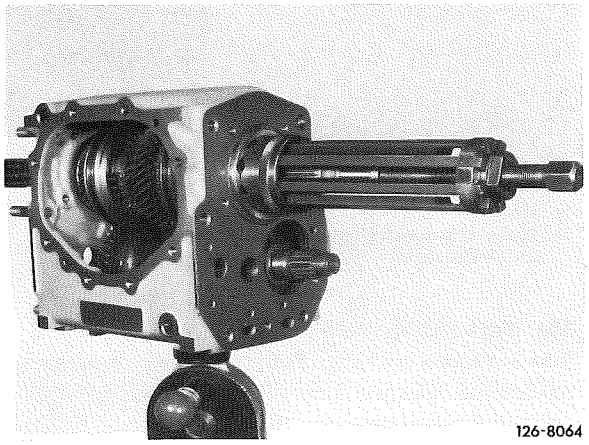


Fig. 16

14a Lift input and main shaft together as high as possible (using helper) and push or knock bevelled shoulder bearing toward the rear until bearing comes completely out of housing bore (shown on 5-speed transmission in Fig. 17).

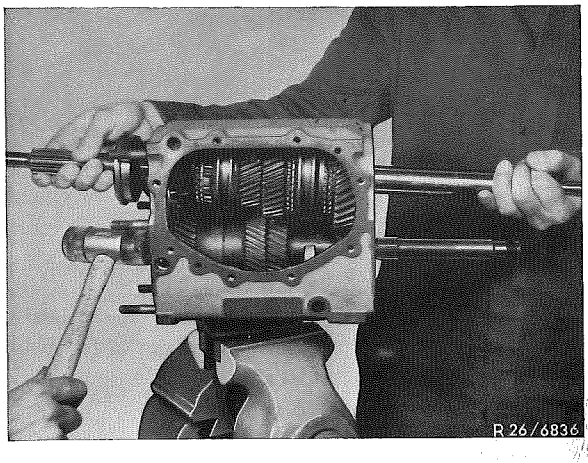


Fig. 17

15a Pull input shaft with radial ball bearing pulled off in forward direction out of transmission housing, while watching out for freed synchronizing ring of 4th speed and needle bearing between input and main shaft (Fig. 18).

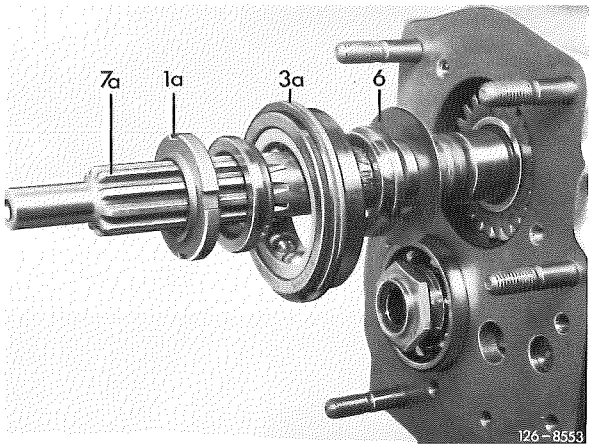


Fig. 18

1a Slot nut
3a Radial ball bearing with split inner race
6 Oil thrower disc
7a Input shaft

16a Move sliding sleeve (11a) of 3rd and 4th speed into 3rd speed position. Push main shaft completely toward the right and then take out of housing at an angle in forward direction (Fig. 19).

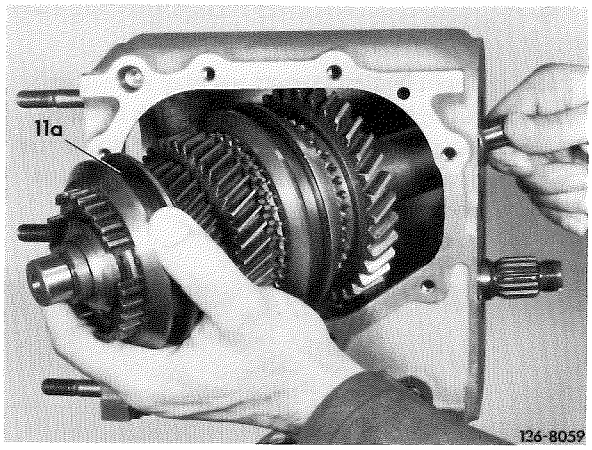


Fig. 19

11a Sliding sleeve 3rd and 4th speed

17a Remove countershaft with bevel shoulder bearing in the same manner as main shaft out of transmission housing and force off bevel shoulder bearing (Fig. 20).

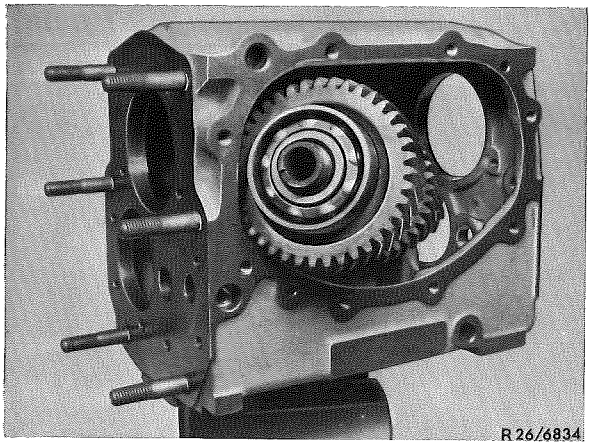


Fig. 20

18a Check gear assembly components for re-use, observing test instructions in Job No. 26.1–440 item 13.

Installation

19 Introduce countershaft into housing (Fig. 12).

20 Slide assembly sleeve over free, rear end of main shaft and tighten with slot nut of three-arm flange.

21 Move sliding sleeve (11a) of 3rd and 4th speed into 3rd speed position and introduce main shaft at an angle toward the rear into housing (Fig. 11).

22 Insert needle bearing into input shaft and slide synchronizing ring for 4th speed onto cone on input shaft gear.

23 Introduce input shaft completely into transmission housing from the front, while lifting main shaft until bearing journal at its front end can be introduced into needle bearing of input shaft without tension.

Assembly Deviations of Transmission Type 716.100

23a Since in the event of repairs the countershaft is provided at the front with a bevelled shoulder bearing instead of a radial ball bearing, the drive shaft can be installed complete with bearing as described in item 23 (also refer to note following item 25).

23b Tighten slot nut (1a) on input shaft to specified torque and secure (Fig. 18).

---

24 Remove assembly sleeve from rear main shaft end and mount radial ball bearing. When knocking in bearing, apply counterhold to input shaft to prevent shaft from slipping out.

25 Knock in radial ball bearing of countershaft front and rear with the aid of a steel mandrel or steel hammer, applying light blows. Raise countershaft for this purpose, so that bearings can be easier mounted.

Note: Transmission 716.100 has been provided for some time with a bevel shoulder bearing on countershaft front. In the event of repairs, only a radial ball bearing may be installed. As a result, the assembly procedure is the same as for other transmission types.

26 Lock gear assembly by simultaneously engaging two speeds, tighten slot nut (48) on countershaft front with slot nut wrench to specified torque (Fig. 21).

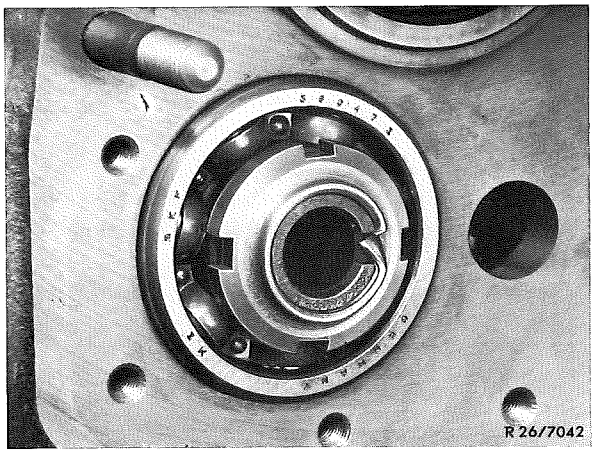


Fig. 21

Note: Instead of slot nut, the countershaft front can also be provided with a hex. nut with pinch collar. In the event of repairs, the slot nut can be replaced against a hex. nut (Fig. 22).

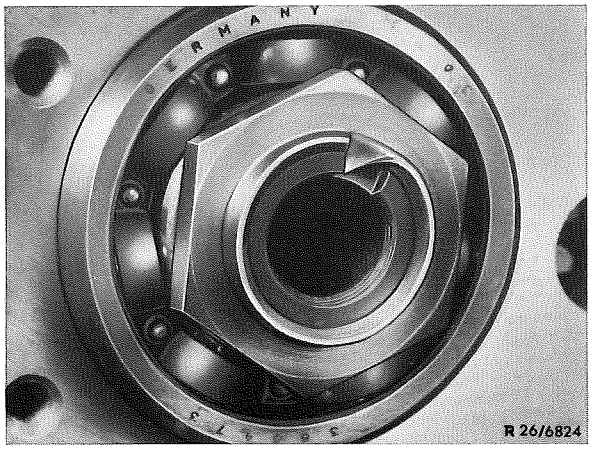


Fig. 22

27 Adjust end play **C** of main shaft to **0—0.05 mm,** trying for **0.**

For this purpose, measure depth **A** of recess in holding ring (Fig. 23) as well as distance **B** between face of circlip on main shaft bearing and parting surface of transmission housing (Fig. 24) with a depth micrometer or depth gauge.

Determine thickness of spacing washers required for adjustment according to following **example:**

Depth **A**	2.00 mm
Distance **B**	— 1.89 mm
Difference	0.11 mm
End play **C**	— 0.00 mm
Dimension to be compensated	0.11 mm

Spacing washers are available at 0.1, 0.2 and 0.3 mm (refer to Spare Parts Catalog).

In this example a spacing washer of 0.1 mm would be required, in which case a play of 0.01 mm would remain.

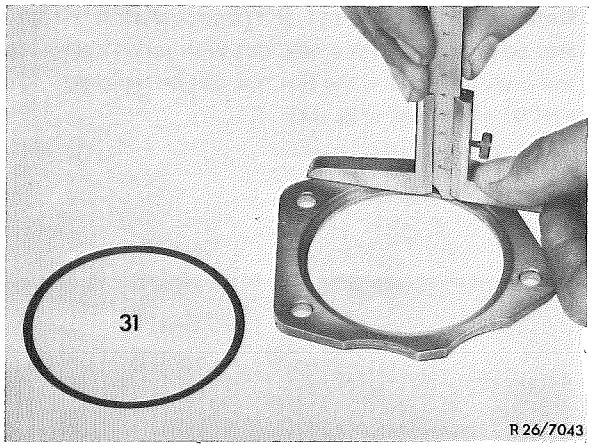


Fig. 23

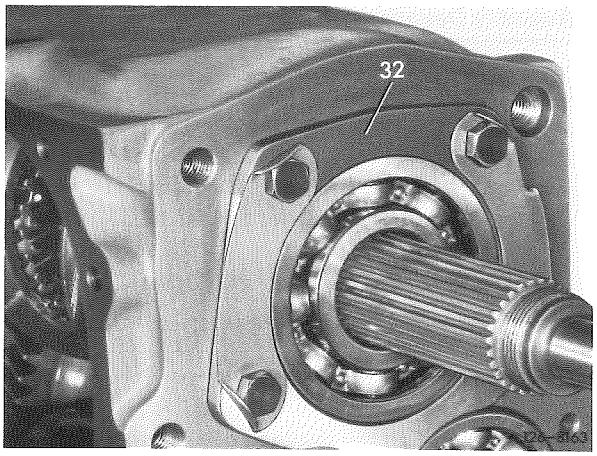


Fig. 25
32 Holding ring

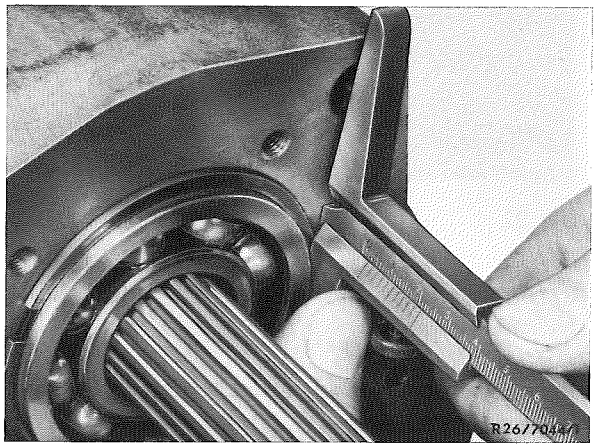


Fig. 24

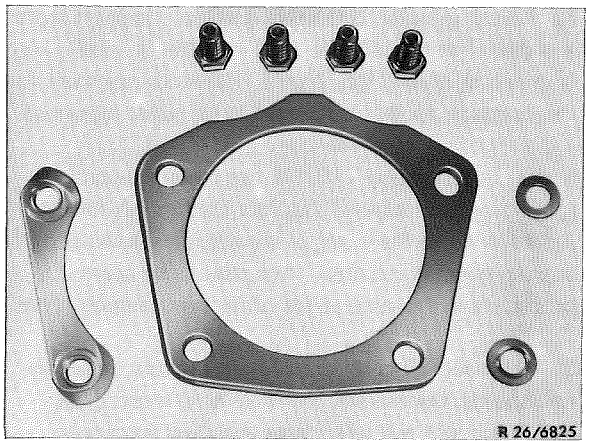


Fig. 26

28 Insert determined compensating washers into spacing ring and glue down with grease to facilitate assembly.

29 Carefully slide holding ring (32) over bearing of main shaft and screw down (Fig. 25).

Note: Instead of sheet metal locks, spring washers may also be used (Fig. 26).

30 Mount reverse gears (26.1–410).

31 Screw on transmission cover rear (26.1–310).

32 Set **end play C** of input shaft to 0–0.05 mm, trying for **0.**

For this purpose, measure depth **A** of recess in front transmission cover (Fig. 27) **with gasket mounted** as well as distance **B** between face of circlip on input shaft bearing and parting surface of transmission housing (Fig. 28) with a depth micrometer or a depth gauge.

Determine thickness of spacing washers required for adjustments according to the following **example:**

Depth **A** (with gasket)	4.70 mm
Distance **B**	– 4.50 mm
Difference	0.20 mm
End play **C**	– 0.00 mm
Dimension to be compensated	0.20 mm

Spacing washers are available in dimensions of 0.1, 0.2 and 0.3 mm (refer to Spare Parts Catalog).

In this example, a spacing washer of 0.2 mm or two washers of 0.1 mm would be required, in which case the play would be cancelled, that is, 0.

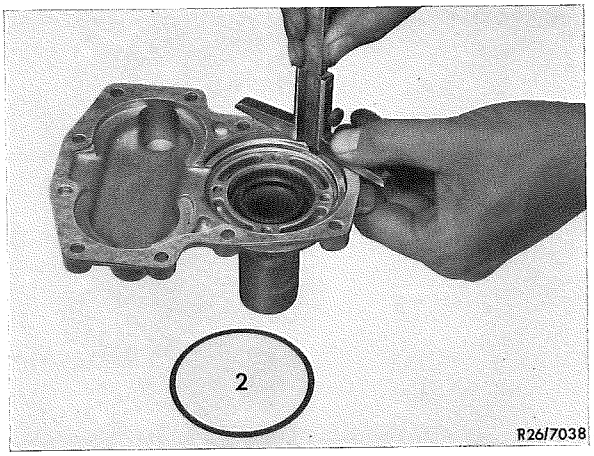


Fig. 27

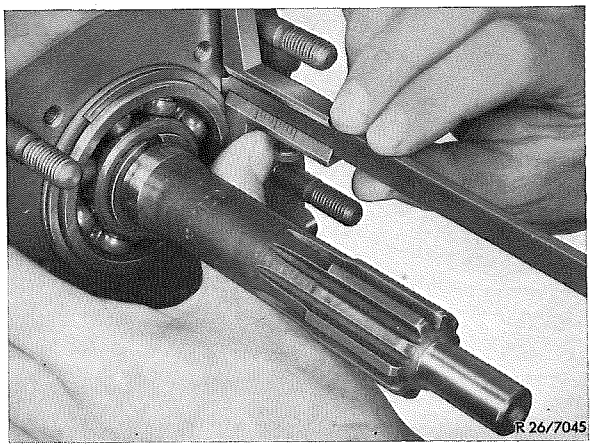


Fig. 28

33 Adjust **end play C** of countershaft to **0.07 to 0.15 mm.**

For this purpose, measure depth **A** of recess in front transmission cover (Fig. 29) **with gasket mounted** as well as distance **B** between face of bearing outer race and parting surface of transmission housing (Fig. 30) with a depth micrometer or depth gauge. For this purpose, countershaft should rest well against rear transmission cover.

Determine thickness of spacing washers required for adjustment according to the following **example:**

Depth **A** (with gasket)	5.70 mm
Distance **B**	– 4.70 mm
Difference	1.00 mm
End play **C**	– 0.15 mm
Dimension to be compensated	0.85 mm

Spacing washers are available in dimensions of 0.1, 0.25 and 0.5 mm (refer to Spare Parts Catalog). In this example, one spacing washer each of 0.1, 0.25 and 0.5 mm would be required to obtain a play of 0.15 mm.

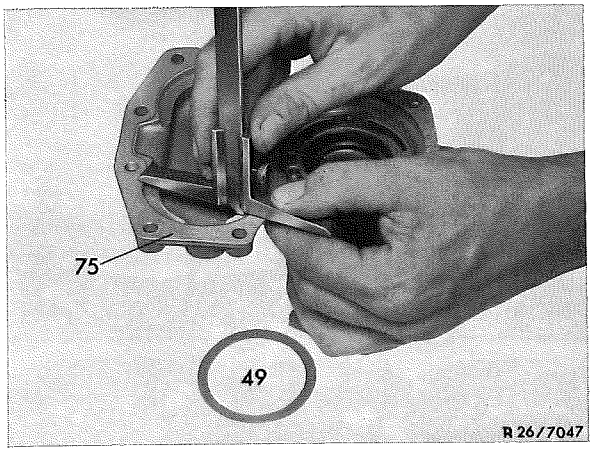


Fig. 29
49 Spacing washer 75 Gasket

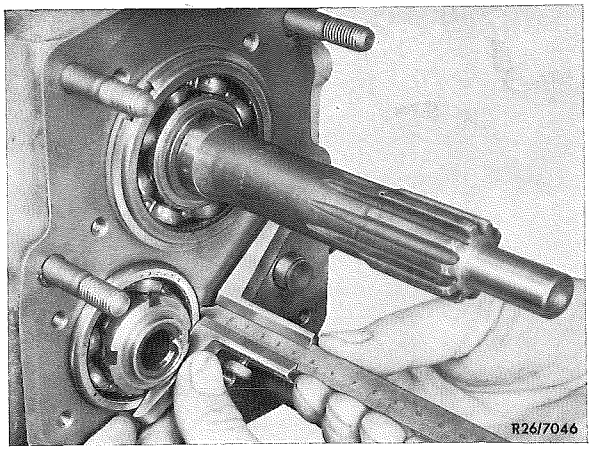


Fig. 30

34 Insert spacing washers into front transmission cover and glue down with grease.

35 Screw on transmission cover front (26.1–210).

36 Install shift cover (26.1–110).

37 Screw on clutch housing (26.1–050).

Removal and Installation, Disassembly and Assembly of Gearshift Lever

Revision: Self-made tool added, Item 6 revised, Fig. 4, 5 and 7 renewed.

Special Tool

Box wrench for closing cap (octagon) on shift lever	115 589 00 03 00

Self-made Tool

Holding device for shift lever	refer to Fig. 5

Removal

1 Pull shift lever cuff (7) from bead of recess on cover and move upwards (Fig. 1).

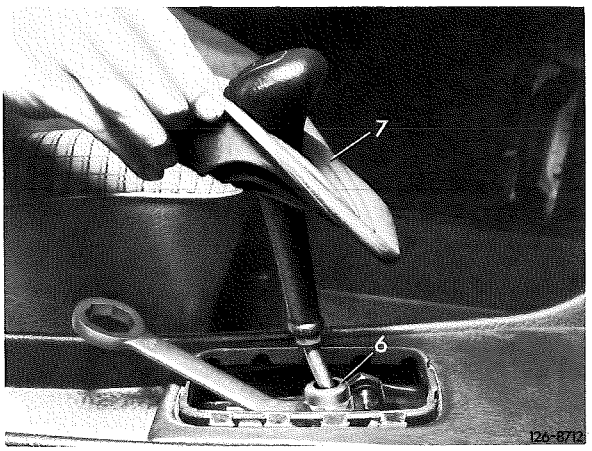


Fig. 1
6 Closing cap
7 Shift lever cuff

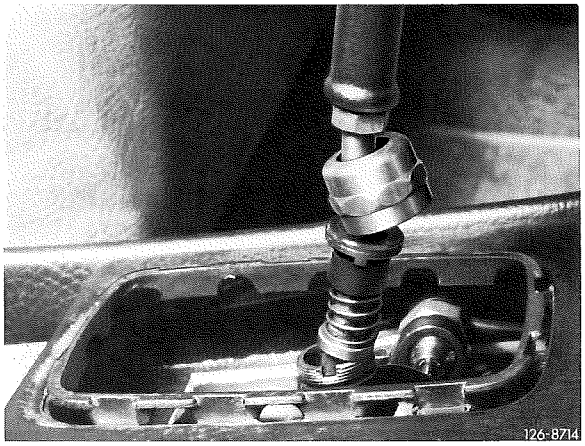


Fig. 2

2 Loosen closing cap (6) with box wrench and unscrew (Fig. 1).

3 Pull shift lever out of shift tube in upward direction (Fig. 2).

Disassembly

4 Unscrew shift lever handle with shift lever cuff and hex. nut from shift lever (Fig. 3).

5 Remove closing cap from shift lever.

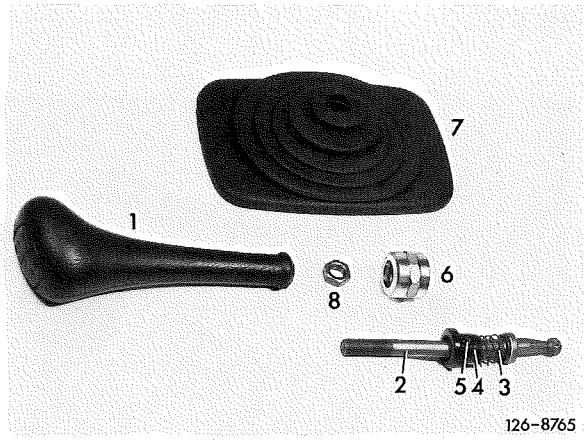


Fig. 3
1 Shift lever handle
2 Shift lever
3 Compression spring
4 Bushing
5 Slotted bushing
6 Closing cap
7 Shift lever cuff
8 Nut

6 Insert shift lever into holding device and knock out slotted bushing by means of a punch (Fig. 4).

26.1 Removal and Installation, Disassembly and Assembly of Gearshift Lever

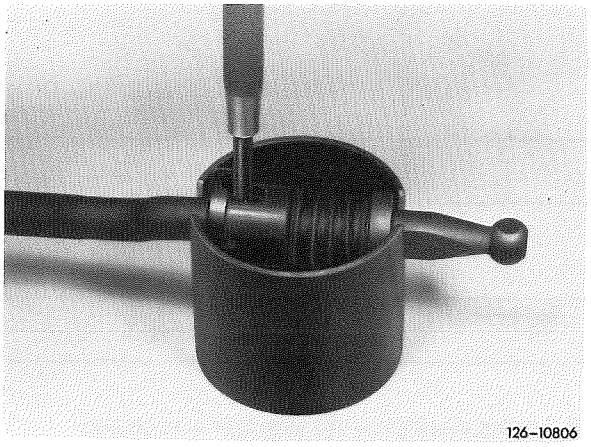


Fig. 4

7 The holding device is self-made according to dimensions below (Fig. 5).

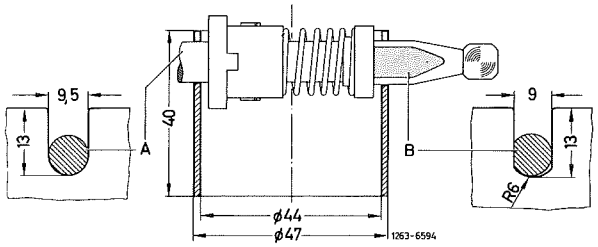


Fig. 5

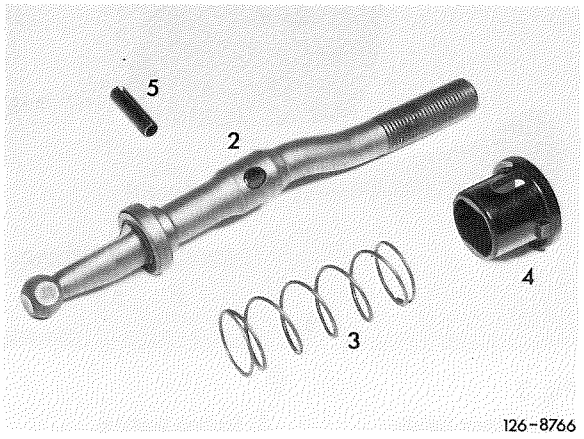


Fig. 6

2 Shift lever
3 Compression spring
4 Bushing
5 Slotted bushing

8 Remove bushing (4) and compression spring (3) from shift lever (2) (Fig. 6).

9 Check components for wear and condition.

Assembly

Attention! A change on shift lever reduced bore in shift lever from 5 mm dia. to 4 mm dia. Accordingly, the dia. of the slotted bushing (5), as well as that of the oblong hole in bushing (4) was also reduced. During assembly, make sure that only parts with similar dimensions are mounted. Also note that in the 4-speed gear shift only the black plastic bushing (4) is installed. If the white plastic bushing (5-speed) is installed, reverse speed cannot be shifted.

10 Slip compression spring (3) and bushing (4) on shift lever (2).

11 Insert shift lever into holding device and knock slotted bushing into shift lever by means of a punch until its two ends are flush with bushing (4) (Fig. 7).

The slot of the slotted bushing should point toward spring.

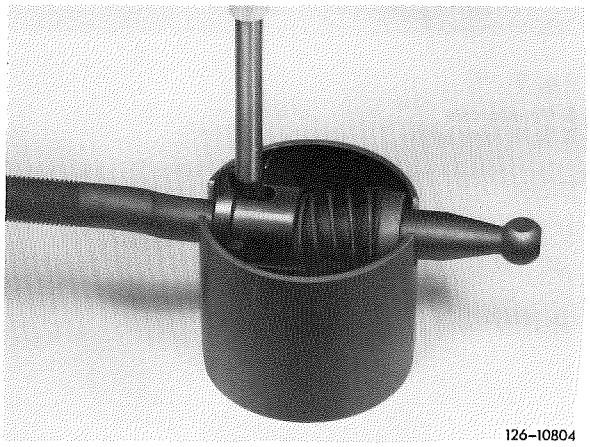


Fig. 7

12 Slip closing cap (6) on shift lever.

13 Screw hex. nut and shift lever handle with shift lever cuff as far as possible on shift lever.

14 Insert shift lever from above into shift tube, making sure that both locating pins at collar of bushing (4) are well-seated in machined recesses on shift tube provided and that the machined end at bottom of shift lever is at the right (arrows in Fig. 8).

15 Tighten cap (6) with special wrench (Fig. 1).

16 Turn shift lever into correct position and tighten hexagon counter nut.

17 Push shift lever cuff into bead of recess on cover.

18 Check gearshift for function with engine running.

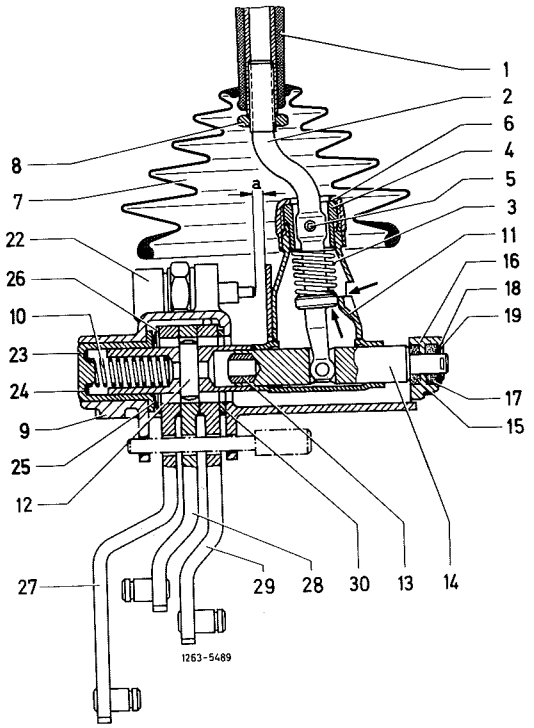


Fig. 8

1 Shift lever handle
2 Shift lever
3 Compression spring
4 Bushing
5 Slotted bushing
6 Cap
7 Cuff for shift lever
8 Nut
9 Bearing bracket
10 Compression spring
11 Shift tube
12 Bolt in shift tube
13 Damping bushing
14 Guide pin
15 Guide ring
16 Bearing cap
17 Guide ring
18 Washer
19 Lock
22 Backup light switch
23 Bushing
24 Washer
25 Spring plate
26 Washer
27 Intermediate lever for reverse speed
28 Intermediate lever for 1st and 2nd speed
29 Intermediate lever for 3rd and 4th speed
30 Washer

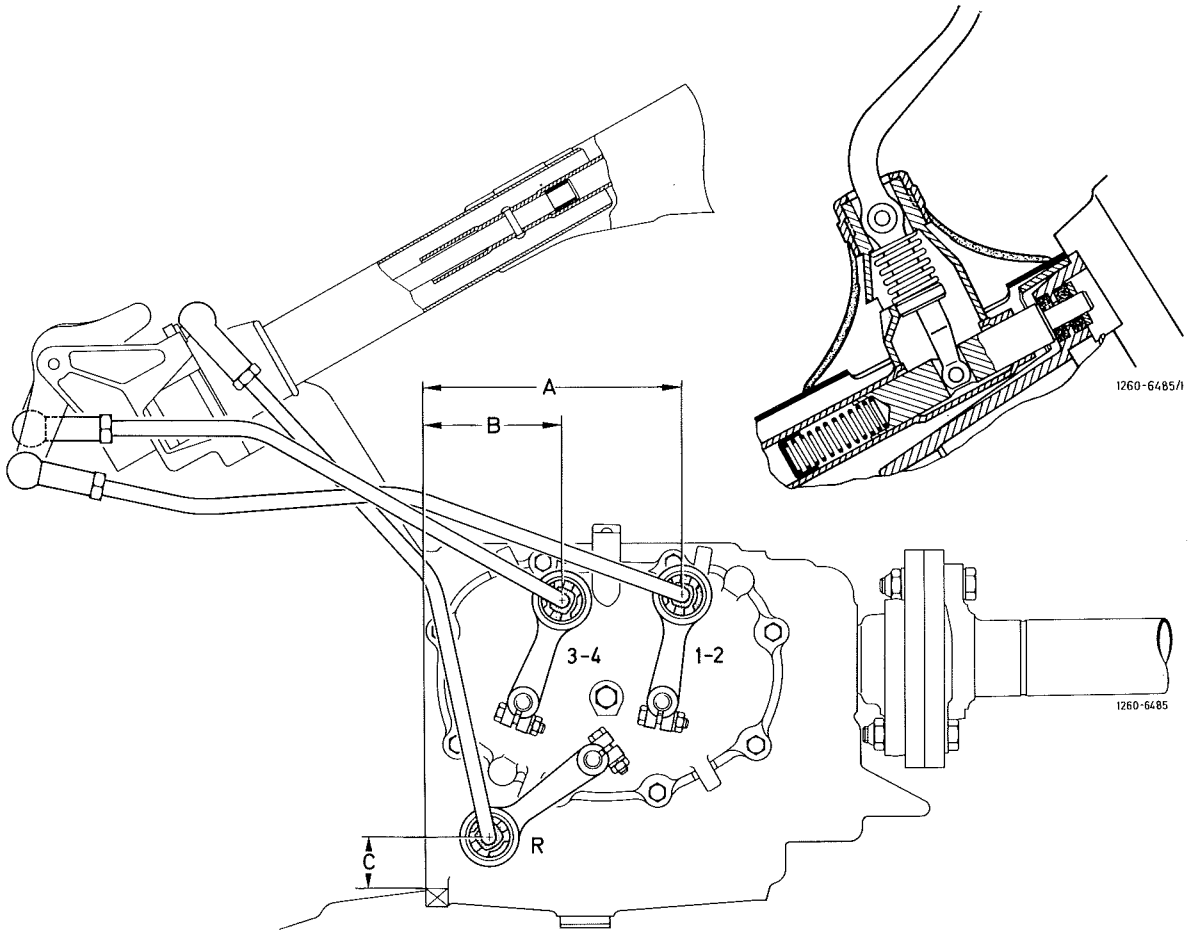


Fig. 1

Dimensions for Adjustment of Shift Levers with Steering Wheel Gearshift

Adjusting dimension	G 76/18, 716.0 (Model 114, 115)	
	Lefthand steering	Righthand steering
A = 1st and 2nd speed	152	166
B = 3rd and 4th speed	81	90
C = Reverse speed	26	30

Adjustment

1 Disconnect shift rods on levers of shift bracket of steering wheel gear shift.

2 Locate the three intermediate shift levers on shift bracket by slipping the locating pin into the holes provided for this purpose (Fig. 2).

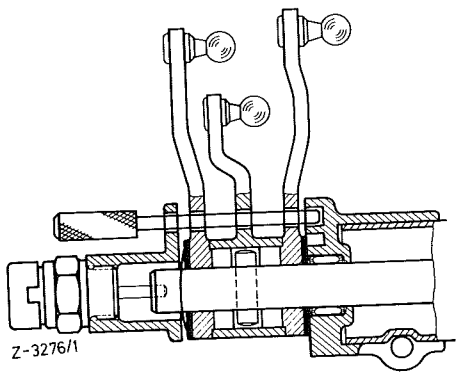


Fig. 2

3 Shift transmission into idle speed position, then check position of shift levers on transmission shift cover with regard to specified dimensions and correct, if required (Fig. 1 and Table).

4 Adjust shift rods to length by turning ball sockets and force sockets free of tension on ball heads of intermediate shift levers. The shift levers with insulating bushings on transmission shift cover should not move out of their center position.

5 Remove locating pins out of intermediate shift levers.

Attention! If the backup lamp lights up on shift level 1st and 2nd speed, screw out backup light switch and remove sealing ring.

6 Check gear shift for function with engine running.

Special Tool

Box wrench for closing cap (octagon) on shift lever	115 589 00 03 00

Self-made Tool

Holding device for shift lever	refer to Fig. 5

Removal and Disassembly

1 Loosen closing cap (6) with box wrench and screw off (Fig. 1).

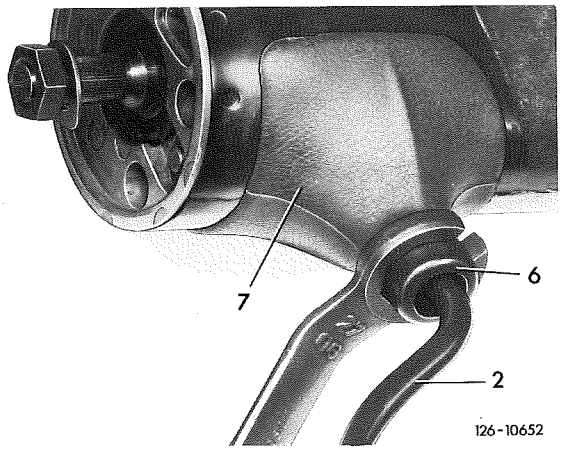


Fig. 1
2 Shift lever
6 Closing cap
7 Shift lever cuff

2 Pull shift lever (2) out of shift tube (Fig. 1 and 2).

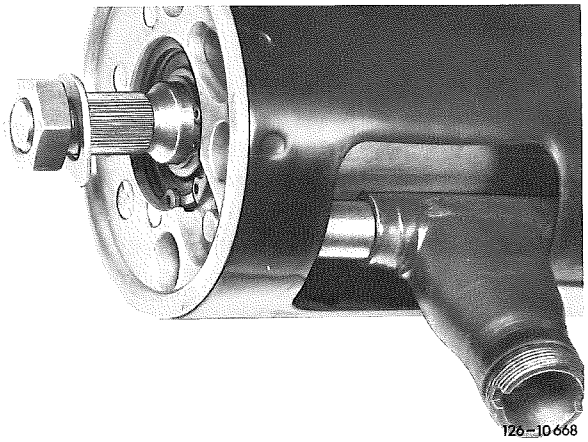


Fig. 2

3 Unscrew shift lever knob and hex. nut from shift lever and remove shift lever cuff (Fig. 3).

4 Remove closing cap from shift lever.

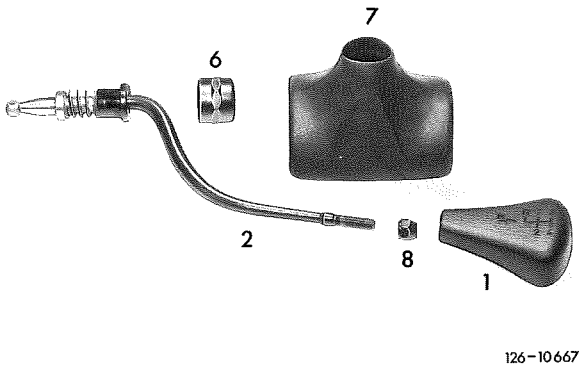


Fig. 3
1 Shift lever knob
2 Shift lever
6 Closing cap
7 Shift lever cuff
8 Hex. nut

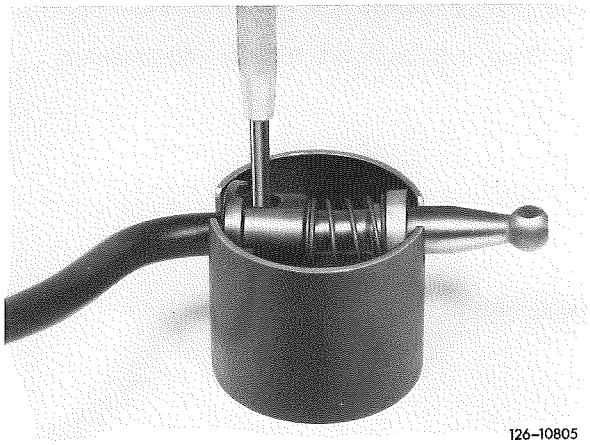


Fig. 4

5 Insert shift lever into holding device and knock out slotted bushing with a punch (Fig. 4).

6 The holding device is self-made according to dimensions shown below (Fig. 5).

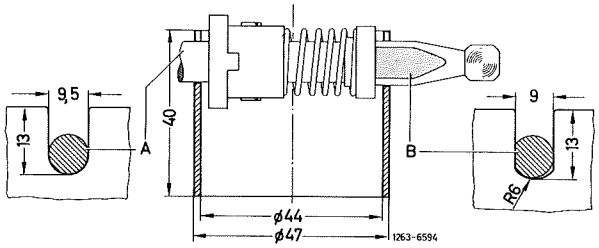


Fig. 5

7 Remove bushing (4) and compression spring (3) from shift lever (2) (Fig. 6).

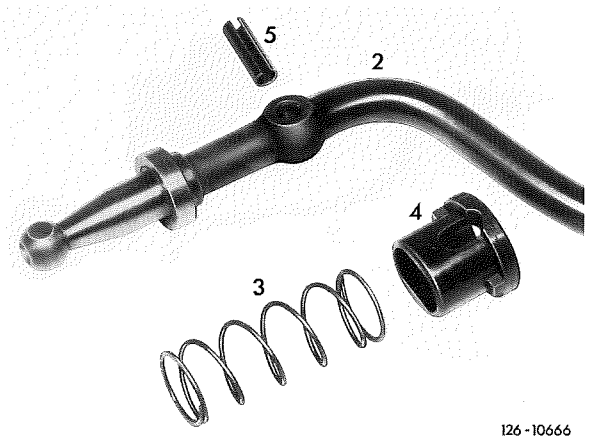


Fig. 6

2 Shift lever
3 Compression spring
4 Bushing
5 Slotted bushing

8 Check individual parts for wear and condition.

Assembly and Installation

9 Slip compression spring (3) and bushing (4) on shift lever (2).

10 Insert shift lever into holding device and knock slotted bushing into shift lever by means of a punch until the two ends are flush with bushing (Fig. 7).

The slot of the slotted bushing should face the spring.

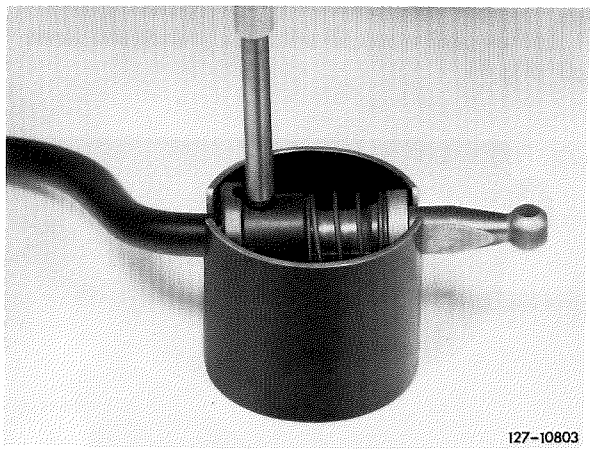


Fig. 7

11 Slip closing cap (6) and shift lever cuff (7) on shift lever.

12 Screw hex. nut and shift lever knob as far as possible on shift lever.

13 Insert shift lever into shift tube, making sure that the two locating pins on collar of bushing (4) are correctly seated in cutout on shift tube provided for this purpose.

14 Tighten closing cap (6) by means of box wrench.

15 Mount shift lever cuff in such a manner that the two reinforcing ribs are facing downwards.

16 Turn shift lever knob into correct position and counterlock with hex. nut.

17 Check gear shift for function with engine running.

Grease Type

Longterm grease	refer to Specifications for Service Products Page 266.2

Special Tool

Box wrench for closing cap (octagon) on shift lever	115 589 00 03 00

Note

The jobs described below can also be completed with the jacket tube installed.

Disassembly

1 Remove shift lever (26.1–720).

2 Remove the two safety clips (44) and force ball sockets (41) from intermediate levers (28 and 29) (Fig. 1).

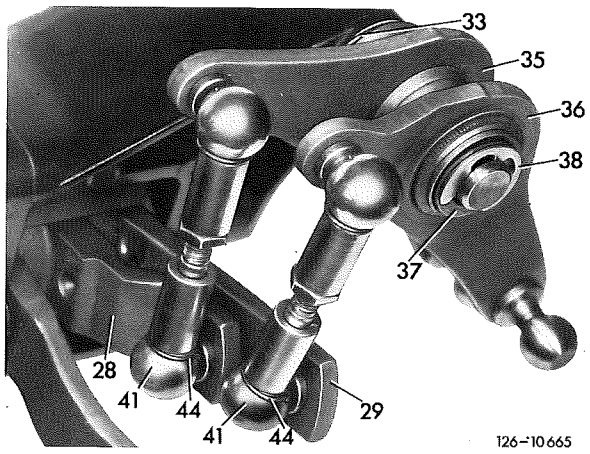


Fig. 1

28 Intermediate lever for 1st and 2nd speed
29 Intermediate lever for 3rd and 4th speed
33 Spring washer
35 Guide lever for 1st and 2nd speed
36 Guide lever for 3rd and 4th speed
37 Compensating washer
38 Lock
41 Ball socket
44 Safety clip

3 Upon removal of lock (38) and compensating washer (37), remove guide levers (36 and 35) together with spring washer (33) (Fig. 1 and 2).

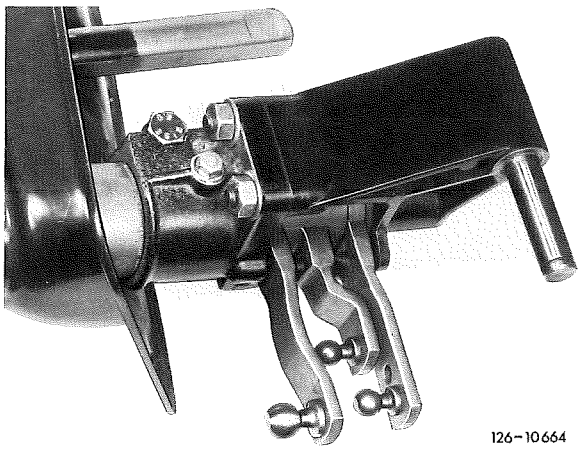


Fig. 2

4 Unscrew the three nuts (23) and remove lower half of bearing bracket (32), while paying attention to plastic washer (31) (Fig. 3).

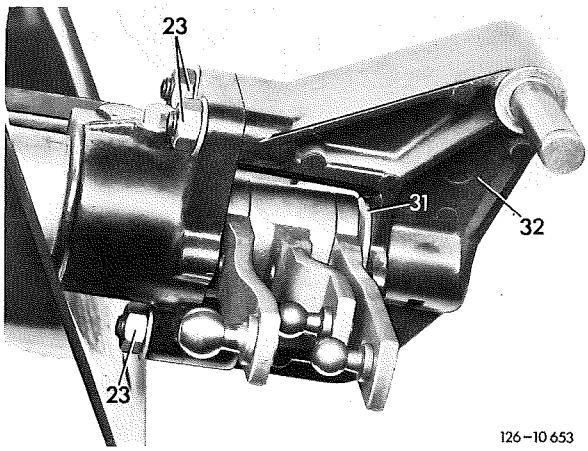


Fig. 3

23 Nuts
31 Plastic washer
32 Lower half of bearing bracket

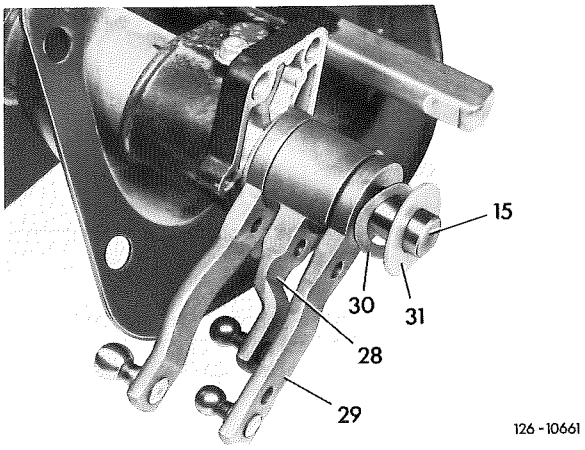


Fig. 4
15 Shift tube
28 Intermediate lever for 1st and 2nd speed
29 Intermediate lever for 3rd and 4th speed
30 Spring washer
31 Plastic washer

5 Pull plastic washer (31), spring washer (30), intermediate levers (29 and 28) from shift tube (15) (Fig. 4).

6 Remove bolt (16) in shift tube (Fig. 5).

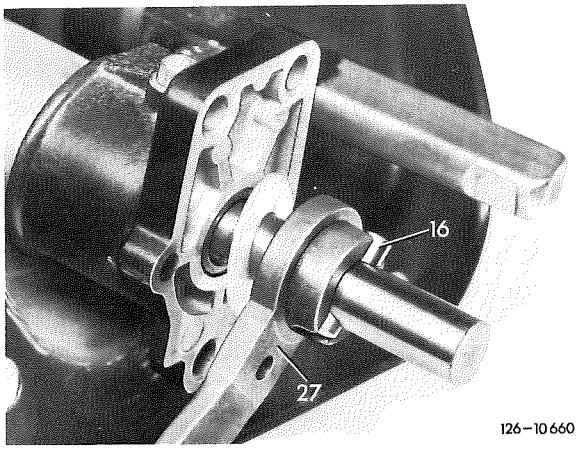


Fig. 5
16 Bolt in shift tube
27 Intermediate lever for reverse speed

7 Pull intermediate lever (27) and plastic washer (26) from shift tube (Fig. 6).

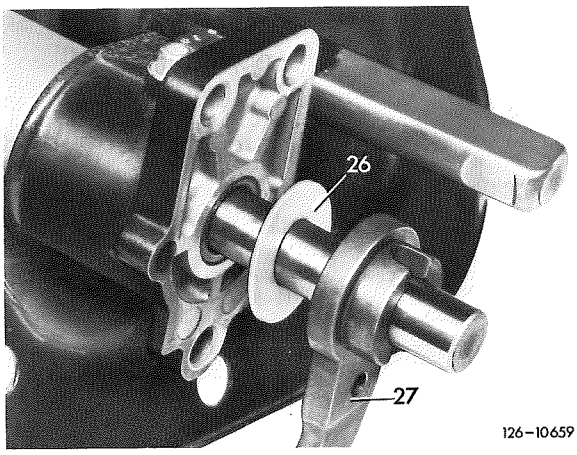


Fig. 6
26 Plastic washer
27 Intermediate lever for reverse gear

8 Unscrew locating screw (18) and clamping screw (20), then remove upper half of shift bracket (Fig. 7).

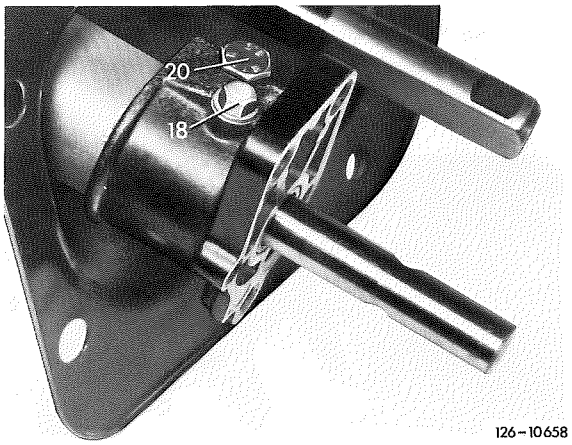


Fig. 7
18 Locating screw
20 Clamping screw

9 Remove steering wheel (46.2–610).

10 Remove locking ring from bearing body (Fig. 8).

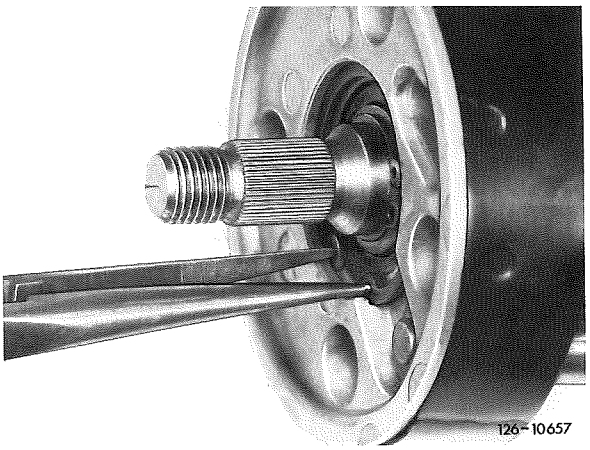


Fig. 8

11 Turn guide pin (13) by 180°, remove lock (9) with washer (10) and guide ring (11) (Fig. 9).

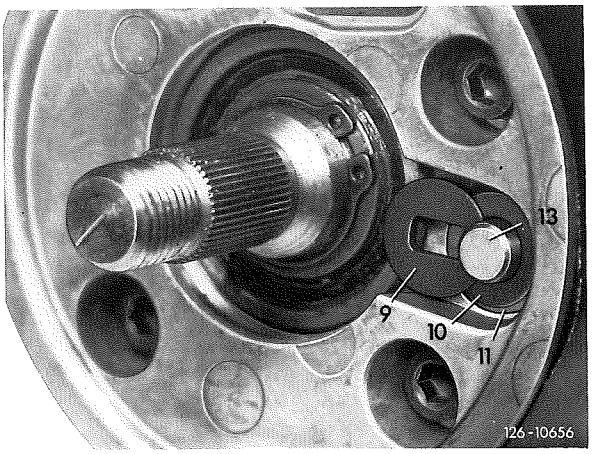


Fig. 9

9 Lock
10 Washer
11 Guide ring
13 Guide pin

12 Remove steering shaft (46.2–630).

13 Remove guide ring (12), guide pin (13) and compression spring (14) from shift tube (Fig. 10).

14 Turn shift tube by 180° and take out of jacket tube.

15 Clean all parts and check needle bearing (25) in upper half of shift bracket for wear or condition, renew if required.

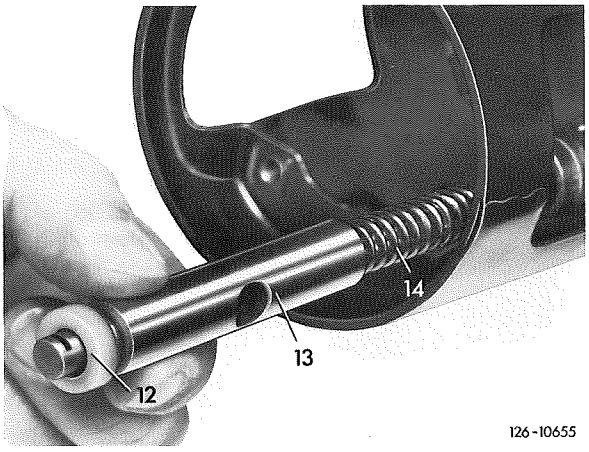


Fig. 10

12 Guide ring
13 Guide pin
14 Compression spring

Assembly

Attention! For assembly, grease all bearing points with longterm grease.

16 Introduce shift tube into jacket tube and turn by 180°.

17 Insert compression spring (14), guide pin (13) with guide ring (12) into shift tube in such a manner that the bore in guide pin faces the shift lever (Fig. 10).

18 Install steering shaft (46.2–630).

19 Insert guide ring (11) with washer (10) and lock (9) into guide pin (13) (Fig. 11).

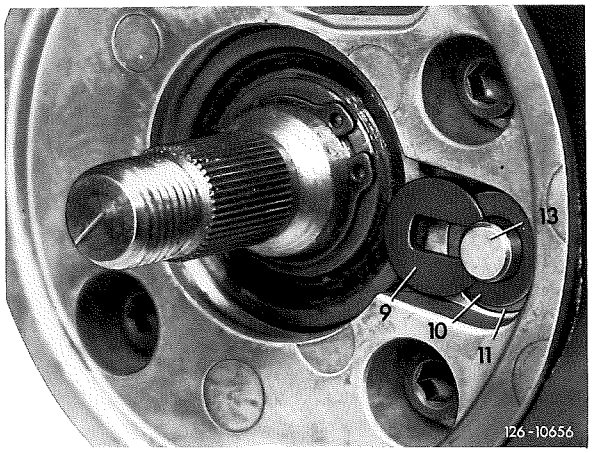


Fig. 11

9 Lock
10 Washer
11 Guide ring
13 Guide pin

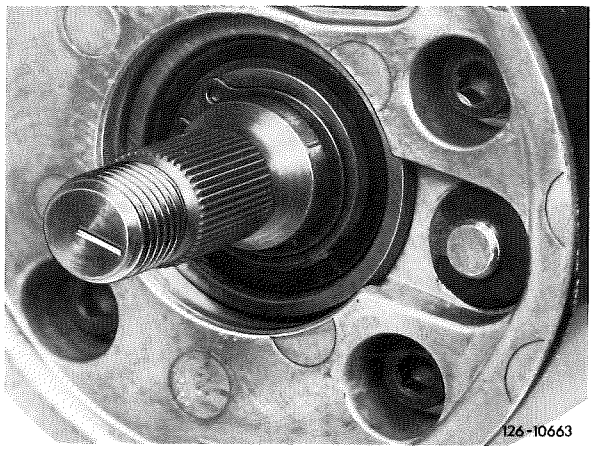


Fig. 12

20 Secure lock against slipping out by turning guide pin by 180° (Fig. 12).

21 Insert locking ring into bearing body (Fig. 8).

22 Install steering wheel (46.2–610).

23 Slip upper half of shift bracket (17) on jacket tube so that the threaded bore is in alignment with locating bore in jacket tube (Fig. 13).

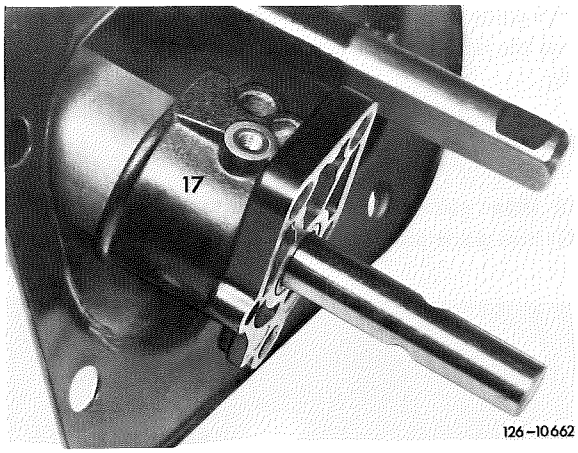


Fig. 13
17 Upper half of shift bracket

24 Insert locating screw (18) and clamping screw (20) and tighten (Fig. 14).

25 Slip plastic washer (26) and intermediate lever (27) on shift tube (Fig. 15).

26 Insert bolt (16) into shift tube (Fig. 16).

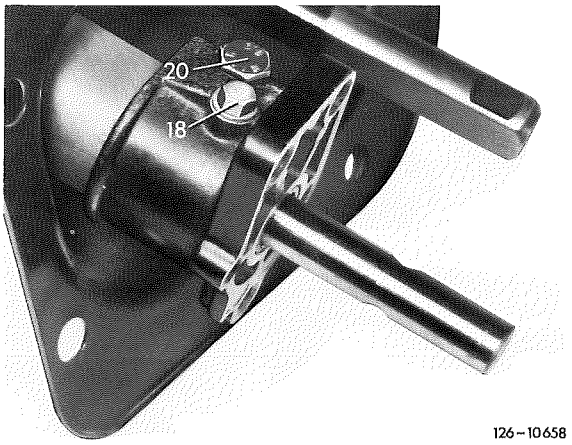


Fig. 14
18 Locating screw
20 Clamping screw

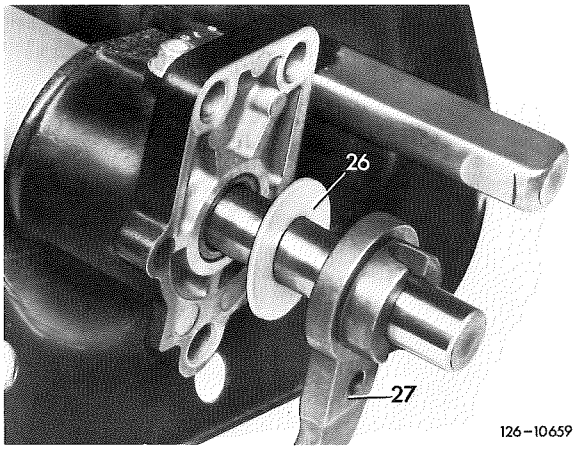


Fig. 15
26 Plastic washer
27 Intermediate lever for reverse speed

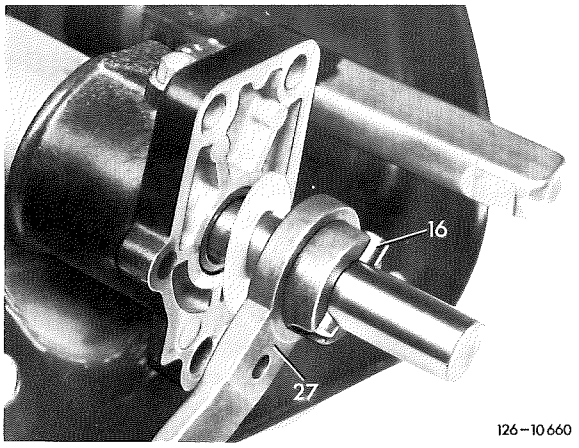


Fig. 16
16 Bolt in shift tube
27 Intermediate lever for reverse speed

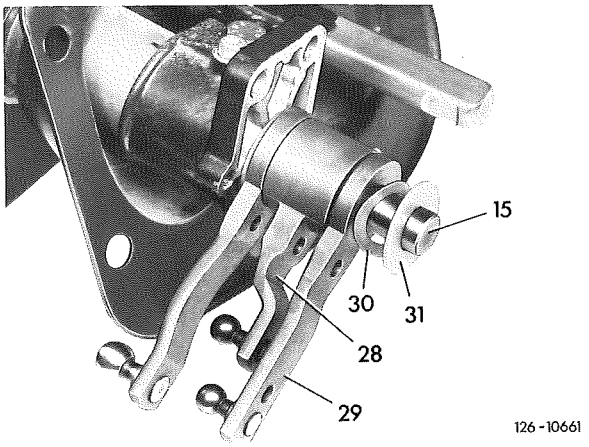


Fig. 17
28 Intermediate lever for 1st and 2nd speed
29 Intermediate lever for 3rd and 4th speed
30 Spring washer
31 Plastic washer

27 Slip intermediate levers (28 and 29), spring washer (30) and plastic washer (31) on shift tube (Fig. 17).

28 Mount lower half of shift bracket (32) and tighten with the three nuts (Fig. 18).

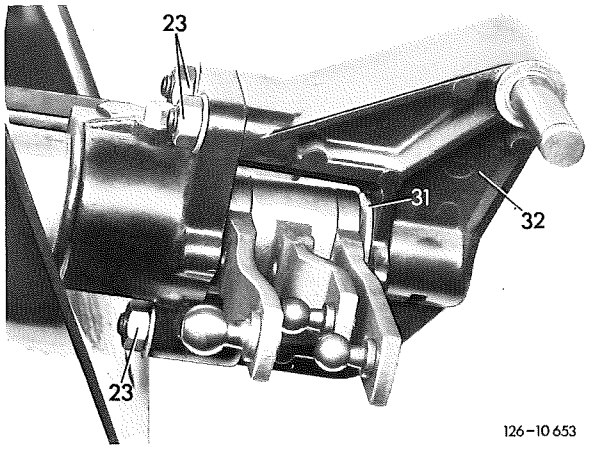


Fig. 18
23 Nuts
32 Lower half of shift bracket

29 Slip spring washer (33), guide levers (35 and 36) on to bearing pin and insert compensating washer (37) together with lock (38) (Fig. 19).

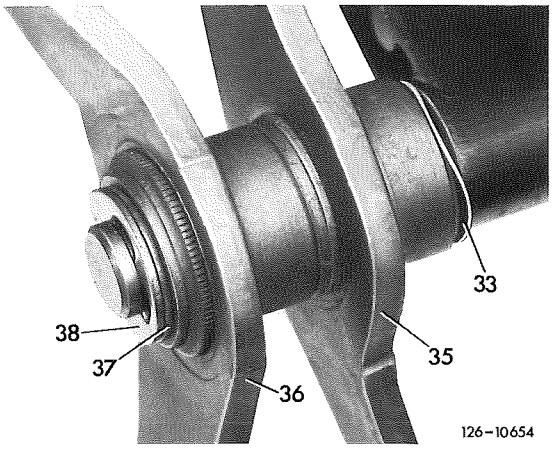


Fig. 19
33 Spring washer
35 Guide lever for 1st and 2nd speed
36 Guide lever for 3rd and 4th speed
37 Compensating washer
38 Fuse

30 Force ball sockets (41) on intermediate levers (28 and 29) and secure with safety clip (44) (Fig. 20).

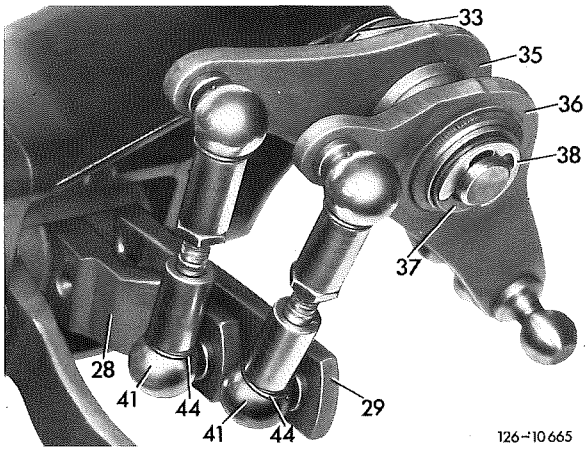


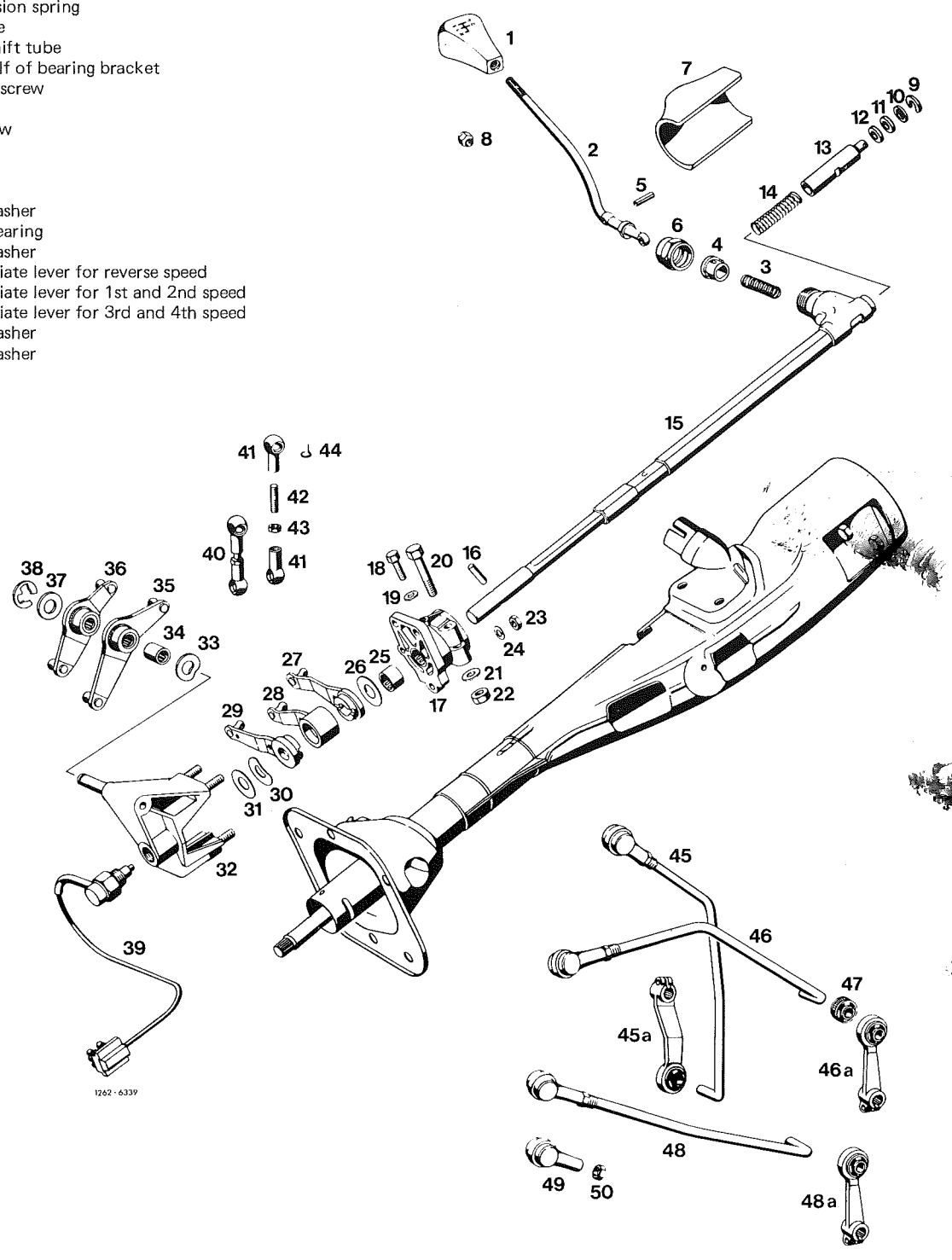
Fig. 20
28 Intermediate lever for 1st and 2nd speed
29 Intermediate lever for 3rd and 4th speed
41 Ball socket
44 Safety clip

31 Install shift lever (26.1–720).

32 Adjust steering wheel gear shift (26.1–710).

33 Check steering wheel gear shift for function with the engine running.

1 Shift lever knob
2 Shift lever
3 Compression spring
4 Bushing
5 Slotted bushing
6 Closing cap
7 Cuff for shift lever
8 Nut
9 Lock
10 Washer
11 Guide ring
12 Guide ring
13 Guide pin
14 Compression spring
15 Shift tube
16 Bolt in shift tube
17 Upper half of bearing bracket
18 Locating screw
19 Washer
20 Hex. screw
21 Washer
22 Nut
23 Nut
24 Spring washer
25 Needle bearing
26 Plastic washer
27 Intermediate lever for reverse speed
28 Intermediate lever for 1st and 2nd speed
29 Intermediate lever for 3rd and 4th speed
30 Spring washer
31 Plastic washer
32 Lower half of bearing bracket
33 Spring washer
34 Needle bearing
35 Guide lever for 1st and 2nd speed
36 Guide lever for 3rd and 4th speed
37 Compensating washer
38 Lock
39 Backup light switch
40 Pull rod
41 Ball socket
42 Threaded bolt
43 Nut
44 Safety clip
45 Shift rod for reverse speed
45a Shift lever for reverse speed
46 Shift rod for 1st and 2nd speed
46a Shift lever for 1st and 2nd speed
47 Insulating bushing
48 Shift lever for 3rd and 4th speed
48a Shift lever for 3rd and 4th speed
49 Ball socket
50 Nut



Removal and Installation of Transmission Shift Cover 26.2

Revision: Note, Fig. 11 and 12 added, revision reference (*) extended.

Tightening Torque	Nm	(kpm)
Fastening bolts for shift cover	15	(1.5)

Revision Reference

Designation	starting transmission No.
Needle sleeve seal for gear-shifting shaft bearing 1st/2nd speed changed from lip sealing ring to O-ring	008 855
Transmission breather replaced by end cap Breather plug on transmission shift cover reinforced	010 211 *

Removal

1 Drain transmission fluid.

2 Remove shift lever (112a) for 5th and reverse gear after loosening clamping screw (Fig. 1).

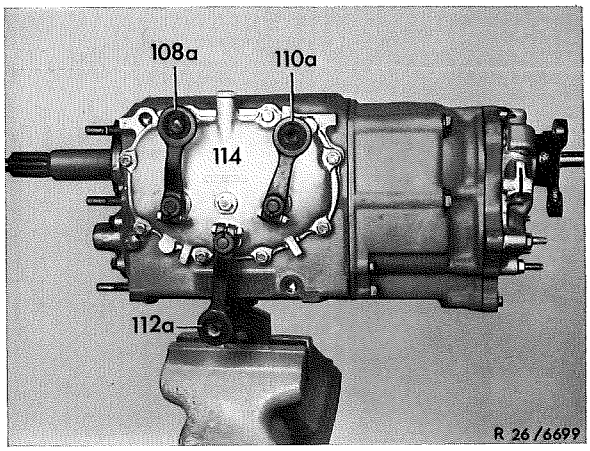


Fig. 1
108a Shift lever 3rd and 4th speed
110a Shift lever 1st and 2nd speed
112a Shift lever 5th and reverse speed
114 Shift cover

3 Force lock washer (121) from gear shifting shaft (112) for 5th and reverse gear and remove washer (120) (Fig. 2).

4 Unscrew fastening bolts (124) of shift cover (114).

5 Carefully knock shift cover from set pins (115), while simultaneously applying a second hammer to move gear shifting shaft (112) for 5th and reverse gear inwards to the point where the distance between the shift cover and the parting surface of the transmission housing is so large that the flat hand can be inserted in between (Fig. 3 and 4).

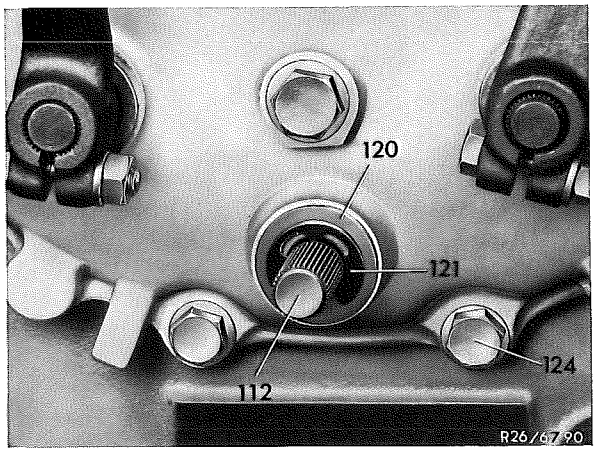


Fig. 2
112 Gear shifting shaft for 5th and reverse speed
120 Washer
121 Lock washer
124 Fastening bolt

26.2 Removal and Installation of Transmission Shift Cover

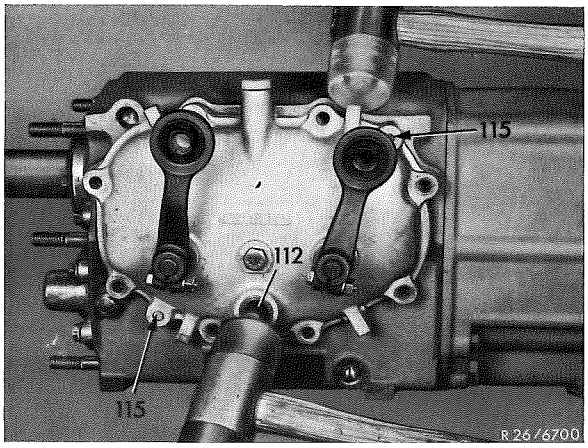


Fig. 3

112 Gear shifting shaft 5th and reverse speed
115 Set pins

6 Remove shift forks (106 and 107) from shift rockers (108 and 110) in direction of arrow as shown in Fig. 4.

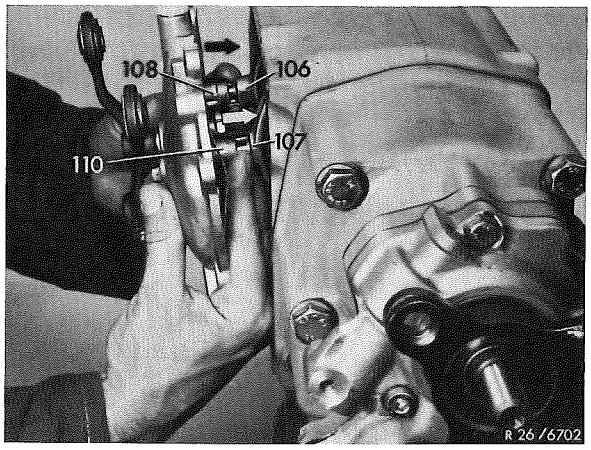


Fig. 4

106 Shift fork 3rd and 4th gear
107 Shift fork 1st and 2nd gear
108 Shift rocker 3rd and 4th gear
110 Shift rocker 1st and 2nd gear

7 Tilt shift cover first in direction of arrow A, then move in direction of arrow B and remove (Fig. 5).

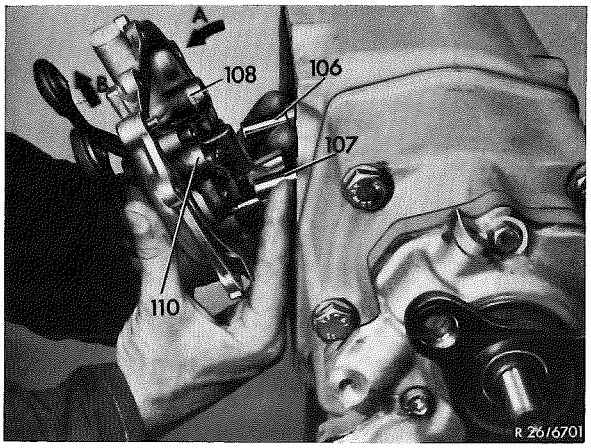


Fig. 5

106 Shift fork 3rd and 4th gear
107 Shift fork 1st and 2nd gear
108 Shift rocker 3rd and 4th gear
110 Shift rocker 1st and 2nd gear

Installation

8 Glue new paper gasket with grease on carefully cleaned parting surface on transmission housing (Fig. 6).

9 Move shifter (63) for 5th and reverse gear shift rod (65) accurately to center position (Fig. 6).

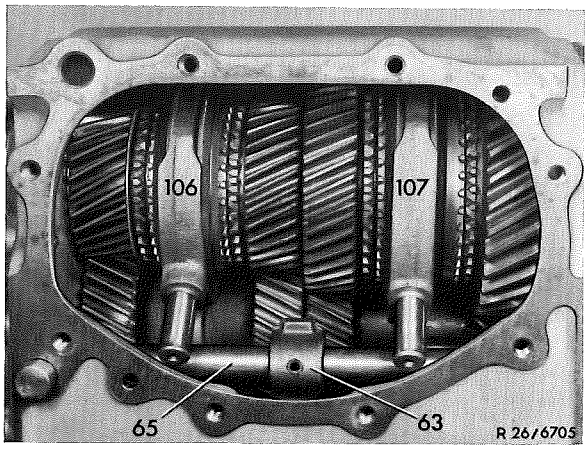


Fig. 6

63 Shifter for 5th and reverse gear
65 Shift rod for 5th and reverse gear
106 Shift fork 3rd and 4th gear
107 Shift fork 1st and 2nd gear

10 Then position shift cover as shown in Fig. 7 in direction of arrow A in such a manner that the shift finger (112 in Fig. 9) for 5th and reverse gear enters the groove on shifter (63) (arrow in Fig. 8). Then move shift cover in direction of arrow B while simultaneously introducing shift forks (106 and 107) into shift rockers (108 and 110) (Fig. 7).

Attention! The shift cover can be positioned accurately only when the gear shifting shaft and thereby the shifting finger (112) for 5th and reverse gear is first moved far enough out on shift cover inside (distance b in Fig. 9).

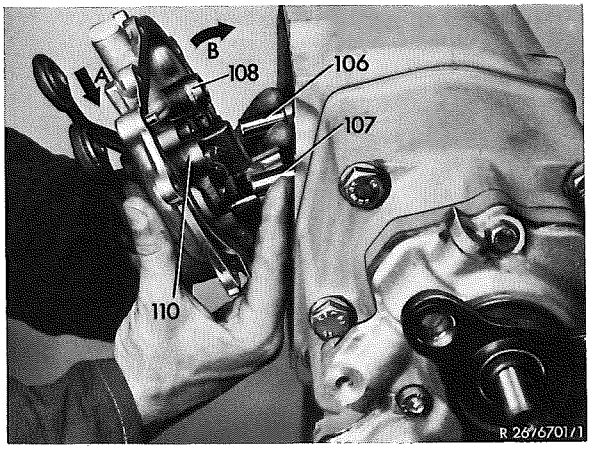


Fig. 7
106 Shift fork 3rd and 4th gear
107 Shift fork 1st and 2nd gear
108 Shift rocker 3rd and 4th gear
110 Shift rocker 1st and 2nd gear

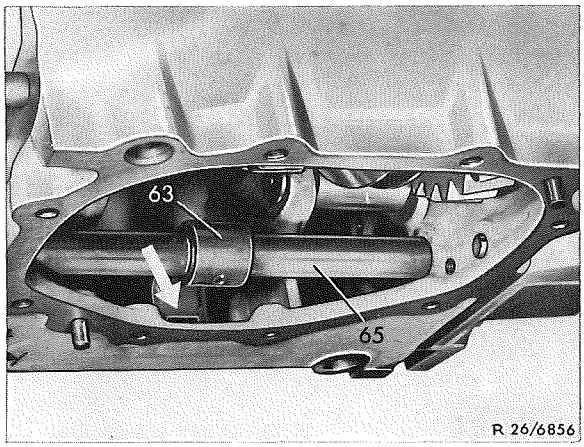


Fig. 8
63 Shifter for 5th and reverse gear
65 Shift rod for 5th and reverse gear

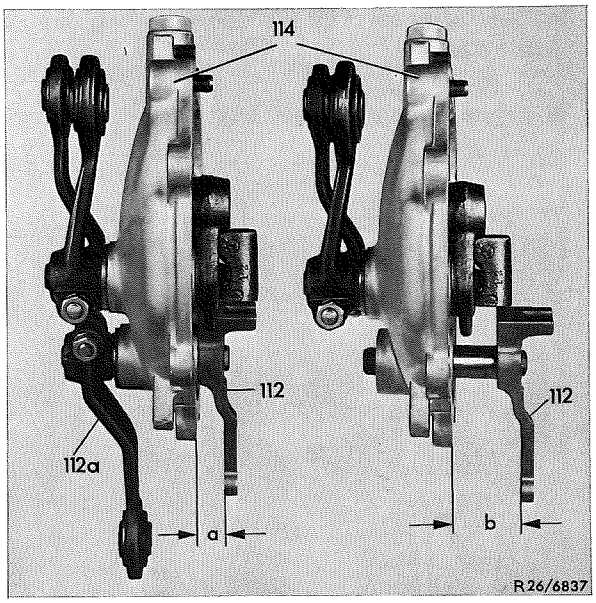


Fig. 9
a) 10 mm
Distance between parting surface and shifting finger on cover ready for operation
b) approx. 25 mm
Distance between shifting finger and cover required for assembly
112 Shift finger with shaft for 5th and reverse gear
112a Shift lever for 5th and reverse gear
114 Shift cover

11 Move shift cover against parting surface of transmission housing by means of light hammer blows. Make sure that the shifting cover is correctly guided on the two set pins (115) (Fig. 6). During this process the gear shifting shaft for 5th and reverse gear should come out of the cover at the same ratio at which the shifting cover is moved against the parting surface of the transmission housing.

12 Screw shift cover uniformly and crosswise on shift cover by means of fastening bolts (124) (Fig. 2).

Note: To prevent leaks on shift cover, make sure of careful, uniform tightening of fastening bolts.

13 Attach washer (120) and slide lock washer (121) into ring groove on gear shifting shaft for 5th and reverse gear (Fig. 2).

14 Slide shift lever (112a) for 5th and reverse gear with due consideration of adjusting dimension "C" (Fig. 10) on teeth of gear shifting shaft and tighten clamping screw.

15 Check shift cover for function by shifting through all gear steps.

16 Fill up with transmission fluid.

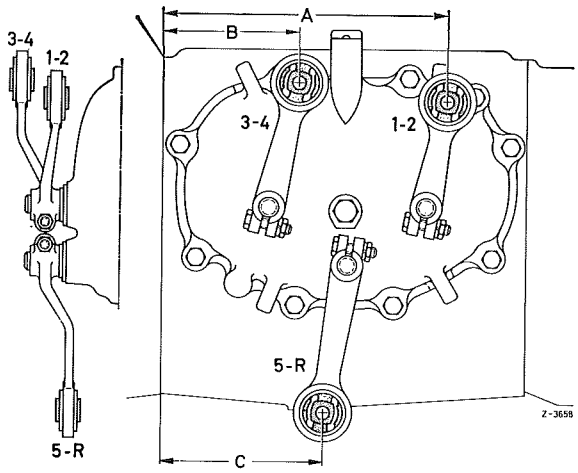


Fig. 10

Lever position with floor shift

A = 168 mm
B = 86 mm, for 107.022/042 72 mm
C = 95 mm

Note: The end cap for the transmission breather can be mounted on transmission shift cover only with reinforced breather plug (Fig. 11 and 12).

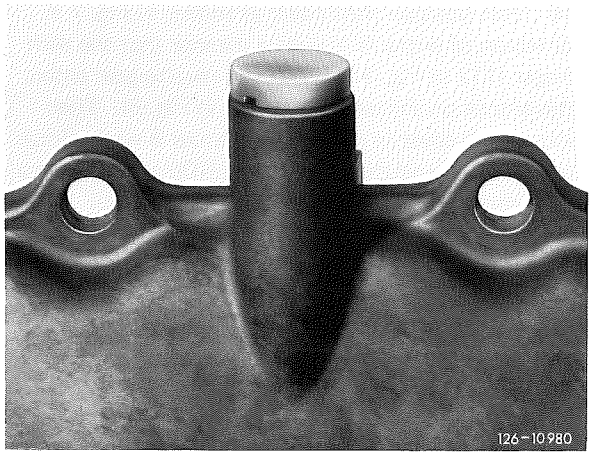


Fig. 11

Transmission breather 1st version

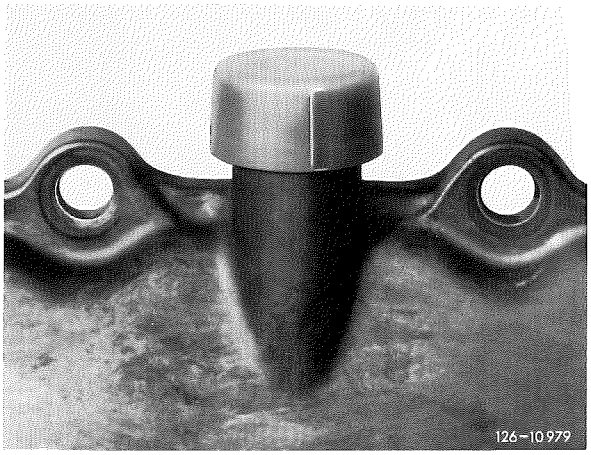


Fig. 12

Transmission breather 2nd version

Revision: Adjusting dimension of countershaft revised.

Adjusting Dimension or End Play	
Drive shaft	0–0.05
Main shaft	0–0.05
Countershaft	0.07–0.15

Tightening Torque in kpm	Nm	(kpm)
Slotted nut on countershaft front	150	(15)

Special Tools	
Puller for ball bearing on main shaft	001 589 02 33 00
Puller for ball bearing on countershaft	000 589 94 33 00
Pin spanner insert 1/2" square for slotted nut on countershaft front	115 589 03 07 00
Clamping fixture for manual transmission	111 589 08 31 00

Removal

1 Unscrew clutch housing (26.2–050).

2 Remove transmission shift cover (26.2–110).

3 Unscrew transmission cover front (26.2–210).

4 Unscrew transmission cover rear (26.2–310).

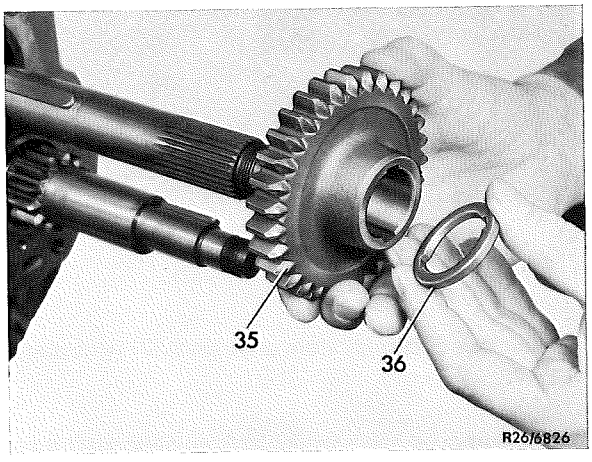


Fig. 1
35 Reversing gear main shaft 36 Compensating washer

5 Remove fifth and reverse gear (26.2–415).

6 Pull compensating washer (36) and reversing gear (35) manually from shaft (Fig. 1).

7 Remove woodruff key (56) from countershaft by means of a screwdriver (Fig. 2).

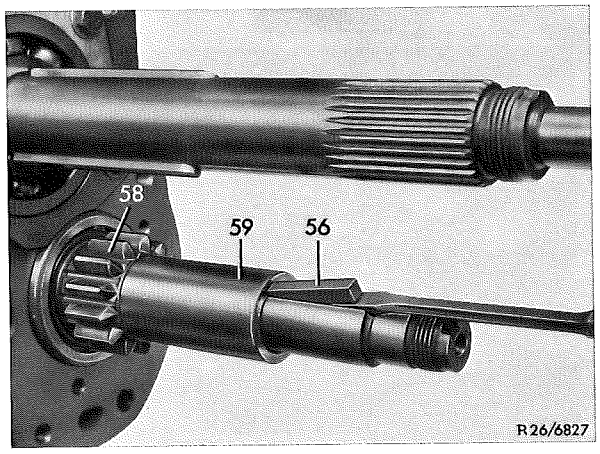


Fig. 2
56 Woodruff key
58 Reversing gear countershaft
59 Spacer bushing fifth gear

8 Pull spacer sleeve (59) and reversing gear (58) manually from shaft (Fig. 3).

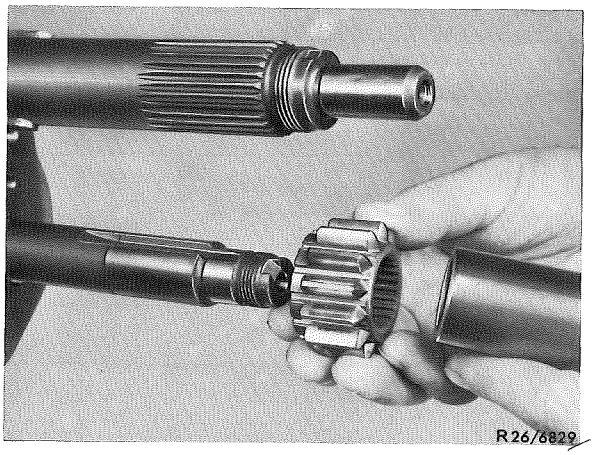


Fig. 3

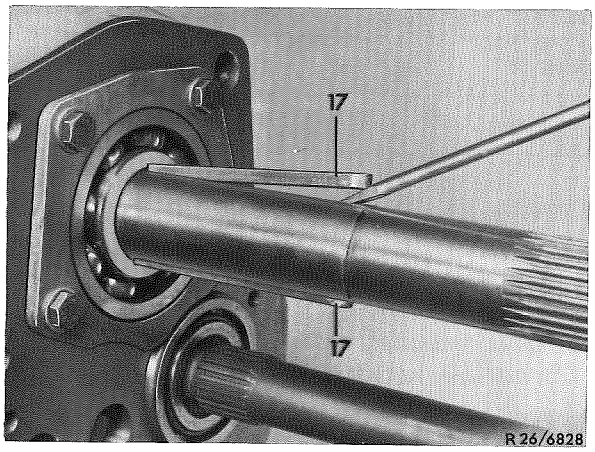


Fig. 4
17 Woodruff key

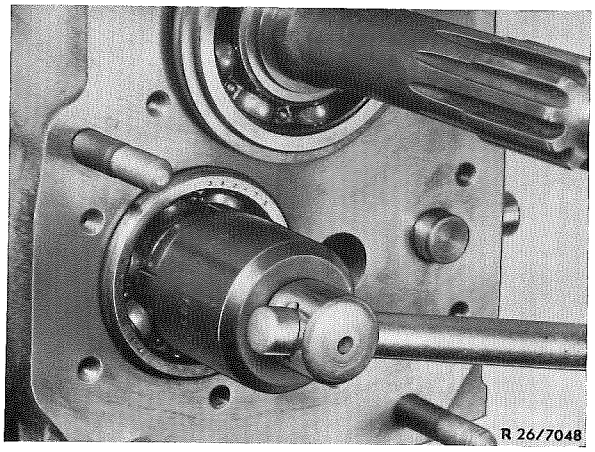


Fig. 5

9 Remove both woodruff keys (17) from main shaft with screw driver (Fig. 4).

10 Lock gear assembly by simultaneous engagement of 2 gear steps. Unlock slotted nut (48) on counter-shaft front, loosen with slot nut wrench and unscrew (Fig. 5).

11 Unscrew fastening bolts of holding ring (32) and remove holding ring while taking care of compensating washers from main shaft bearing (Fig. 6).

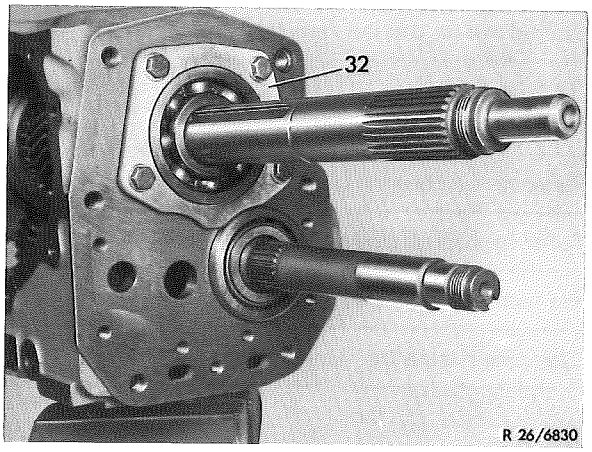


Fig. 6
32 Holding ring

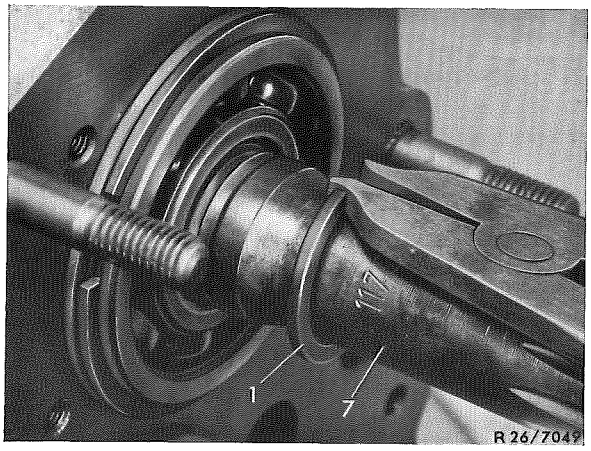


Fig. 7
1 Circlip
7 Drive shaft

12 Remove circlip (1) from drive shaft (7) with pliers (Fig. 7).

13 Pull grooved ball bearing (3) from drive shaft by means of puller (Fig. 8).

Revision: Adjusting dimension in Item 43 revised.

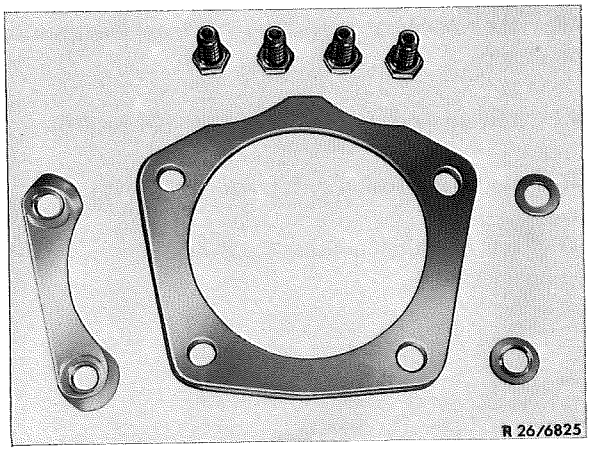


Fig. 25

36 Slide reversing gear (58) and spacer bushing (59) on countershaft and carefully knock in woodruff key (56) with a hammer (Fig. 26).

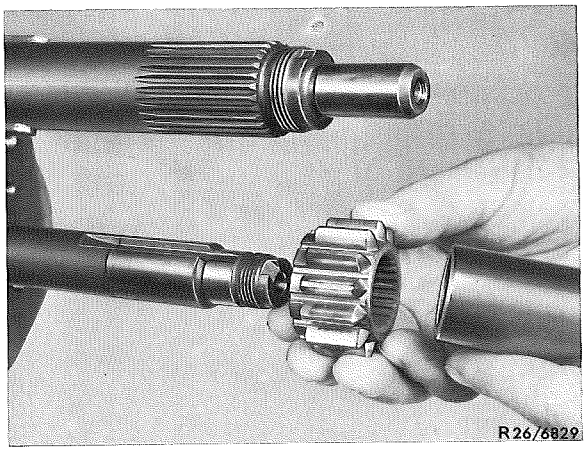


Fig. 26

37 Carefully knock both woodruff keys (17) onto main shaft.

38 Carefully knock reversing gear (35) on main shaft by using a matching piece of tubing.

39 Slide compensating washer (36) on main shaft.

40 Mount fifth and reverse gear (26.2–415).

41 Screw on rear transmission cover (26.2–310).

42 Adjust end play of drive shaft as specified. For this purpose, determine difference in dimension from circlip upper edge of drive shaft bearing and parting surface of transmission housing, as well as of depth of recess on front transmission cover by means of depth gauge. The adjusting dimension or end play is **0–0.05 mm** (Fig. 27 and 28).

The thickness of the gasket must be taken into consideration when measuring cover.

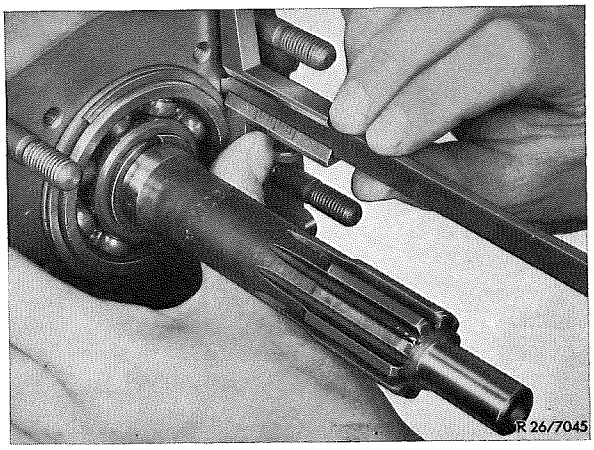


Fig. 27

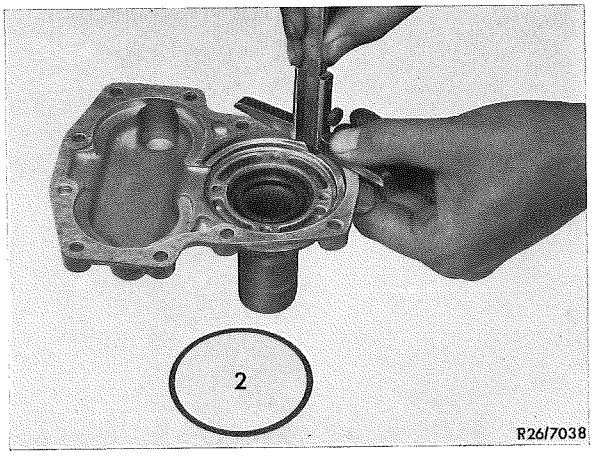


Fig. 28

43 Adjust end play of countershaft as specified. Position depth gauge against outer edge of front bearing and measure in direction of transmission housing parting surface. For this purpose, the countershaft must be pushed completely toward the rear, that is well against rear cover. Place depth gauge against parting surface of front transmission cover and measure depth of recess. Compensate difference less specified play by means of compensating washers. The thickness of the gasket must be taken into consideration when measuring the cover. The adjusting dimension or end play is **0.07–0.15 mm** (Fig. 29 and 30).

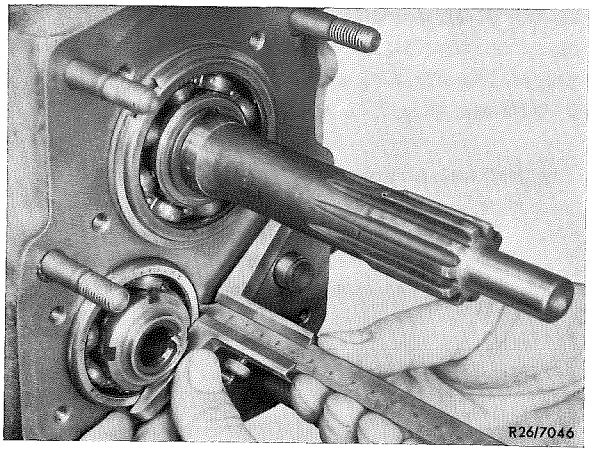


Fig. 29

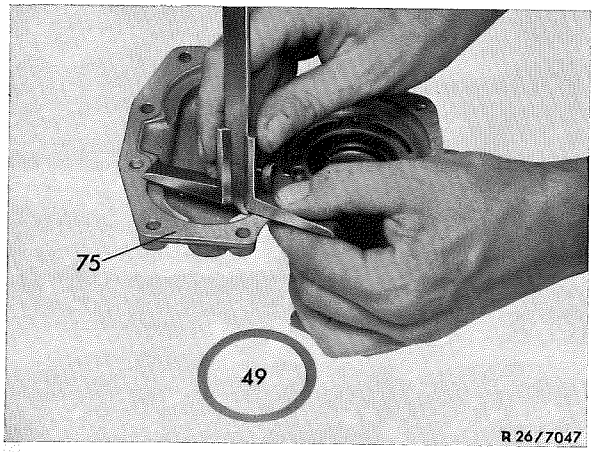


Fig. 30

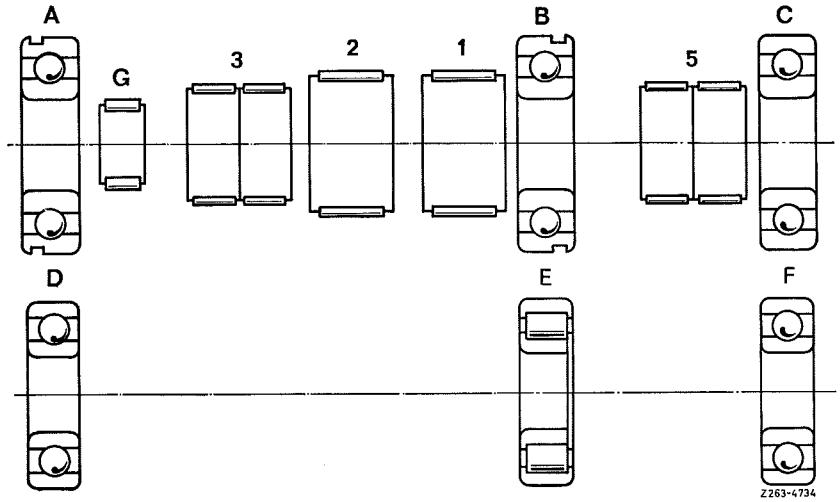
44 Place compensating washers into front transmission cover and glue down with grease.

45 Screw on front transmission cover (26.2–210).

46 Install transmission shift cover (26.2–110).

47 Screw on clutch housing (26.2–050).

Revision: Part No. of grooved ball bearing revised.



Item	Item in exploded view 26.2–990/1	Designation		Dimensions OD	ID	Width
Bearing of Drive Shaft in Transmission Housing						
A	3	Grooved ball bearing	002 981 06 25	72	30	19
Bearing of Main Shaft						
B	29	Grooved ball bearing	002 981 06 25	72	30	19
C	44	Grooved ball bearing	001 981 41 25	72	35	17
G	8	Needle cage Needle cage	004 981 04 10 002 981 81 10	30	22	15
Bearing of Countershaft						
D	50	Grooved ball bearing	001 981 23 25	62	25	17
E	57	Cyl. roller bearing	NUP 206 DIN 5412 005 412 600 206	62	30	16
F	61	Grooved ball bearing	001 981 35 25	52	20	15
Bearing of 1st and 2nd Gear Wheel						
1 2	26 18	Needle cage	000 981 82 12 004 981 08 10	47	42	28.2
Bearing of 3rd Gear Wheel						
3	15	Needle cage	001 981 86 10 004 981 07 10 002 981 00 10 003 981 04 10 003 981 12 10	40	35	35
Bearing of 5th Gear Wheel						
5	40	Needle cage Needle cage (split)	003 981 62 10 004 981 23 10	40	35	38

Revision: Table for adjusting dimensions added.

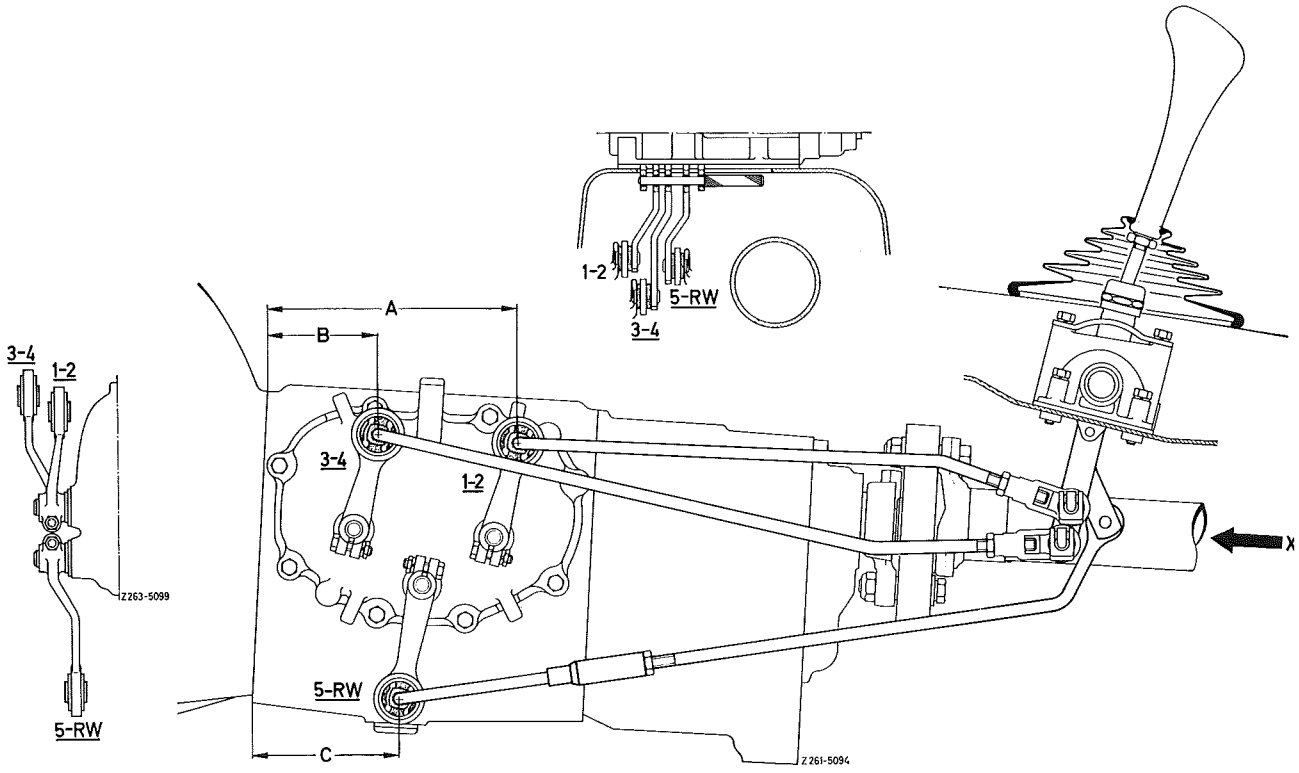


Fig. 1

Dimensions for Adjustment of Shift Levers for Floor-mounted Gear Shift

Model	A	B	C
All except 107.022/042	168	86	95
107.022/042		72	

Adjustment

1 Disconnect shift rods on intermediate shift levers on floor shift bearing bracket after removing SL lock (Fig. 2).

2 Locate the three intermediate shift levers at bottom on shift bracket by inserting a locating pin (A) of 6 mm dia. into holes provided (Fig. 2 and 3).

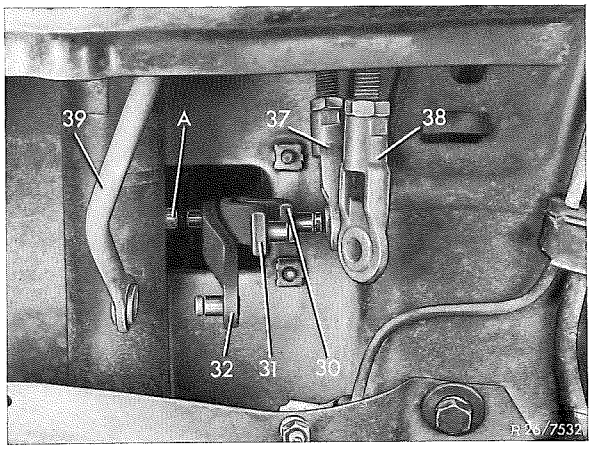


Fig. 2

A Locating pin
30 Intermediate shift lever 1st and 2nd speed
31 Intermediate shift lever 3rd and 4th speed
32 Intermediate shift lever 5th and reverse speed
37 Shift rod 1st and 2nd speed
38 Shift rod 3rd and 4th speed
39 Shift rod 5th and reverse speed

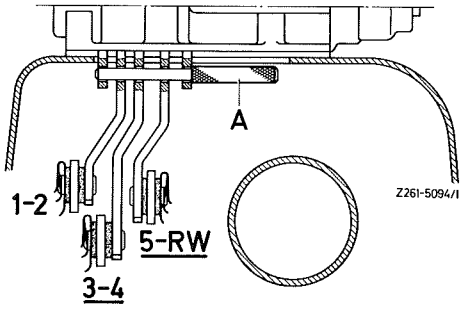


Fig. 3
A Locating pin

3 Shift transmission into idling position, then check position of shift levers on transmission shift cover with reference to specified dimensions and make corrections, if required (Fig. 1).

4 Expose shift bracket by removing cover (Fig. 4).

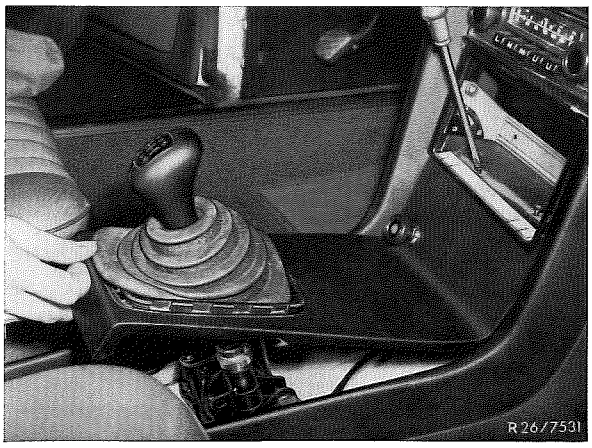


Fig. 4

5 Push shift lever in idling range completely to the right against stop and then push in direction of shift gear and hold in position (Fig. 5).

6 Loosen fastening screws (35), shift stop plate (34) toward stop finger on shift tube (10) until both members are in alignment along line "X" and chamfers are resting against each other without intermediate space (Fig. 5 and 6).

7 Tighten fastening screws (35) of stop plate (Fig. 6).

8 Adjust shift rods to length and force rod heads free of tension against pins of intermediate shift lever and secure with SL locks (Fig. 2 and 3). Shift levers on transmission shift cover should not move out of their center position (Fig. 1).

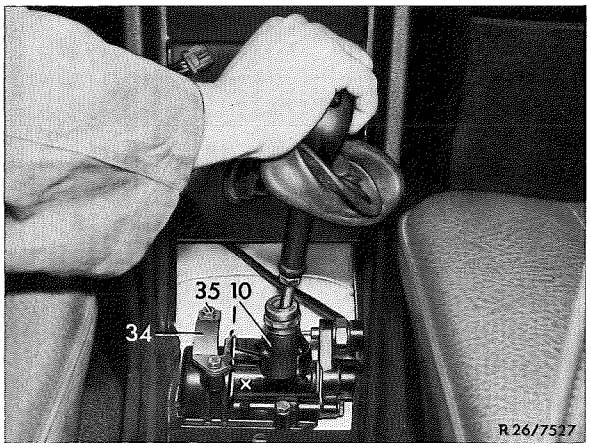


Fig. 5
"X" Straight line between stop plate and stop finger
10 Shift tube with stop finger
34 Stop plate
35 Fastening screw

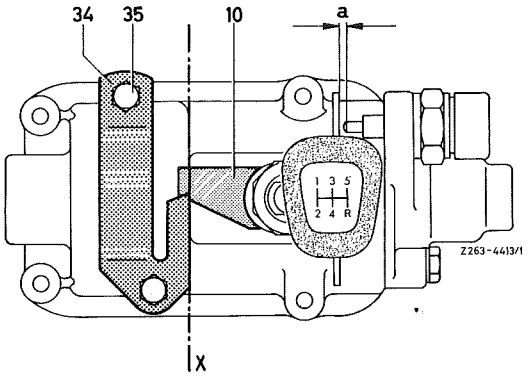


Fig. 6
"a" 1.5 mm adjusting dimension for contact pin of back-up light switch, if stop plate (34) and stop finger (10) are in alignment according to straight line "X"
"X" Straight line between stop plate and stop finger
10 Shift tube with stop finger
34 Stop plate
35 Fastening screw

9 Remove locating pins from intermediate shift levers.

10 Mount cover (Fig. 4).

11 Check gear shift for function with engine running.

Revision: Self-made tool added and contents revised.

Special Tool

Box wrench for closing cap (octagon) on shift lever	115 589 00 03 00

Self-made Tool

Holding device for shift lever	refer to Fig. 5

Removal

1 Pull shift lever cuff (7) from bead of recess on cover and move upwards (Fig. 1).

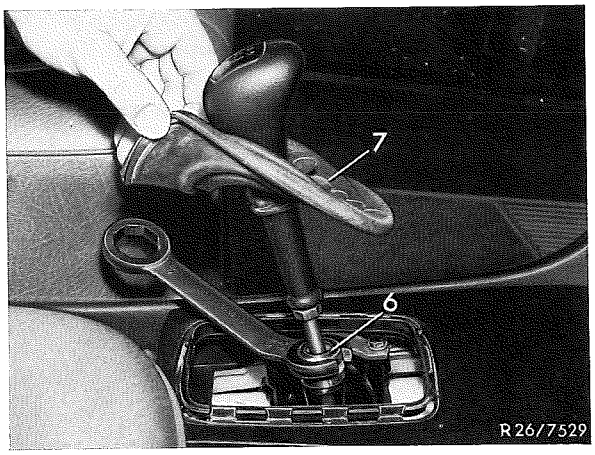


Fig. 1
6 Closing cap
7 Shift lever cuff

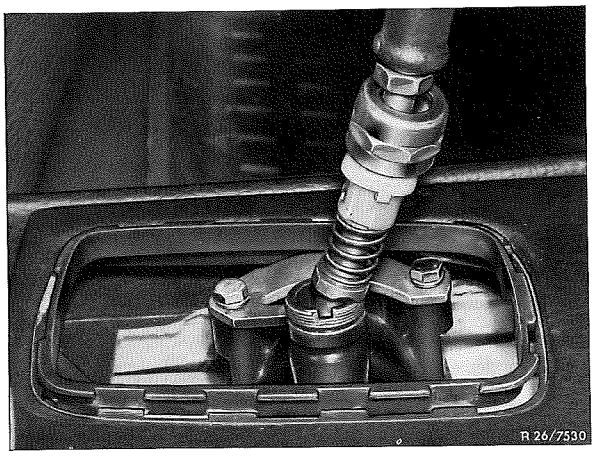


Fig. 2

2 Loosen closing cap (6) with box wrench and unscrew (Fig. 1).

3 Pull shift lever out of shift tube in upward direction (Fig. 2).

Disassembly

4 Unscrew shift lever handle with shift lever cuff and hex. nut from shift lever (Fig. 3).

5 Remove closing cap from shift lever.

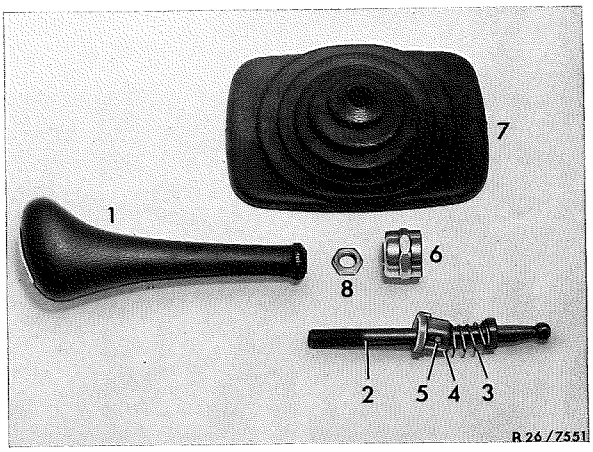


Fig. 3

1 Shift lever handle	5 Slotted bushing
2 Shift lever	6 Closing cap
3 Compression spring	7 Shift lever cuff
4 Bushing	8 Nut (SW 15)

6 Insert shift lever into holding device and knock out slotted bushing by means of a punch (Fig. 4).

26.2 Removal and Installation, Disassembly and Assembly of Shift Lever

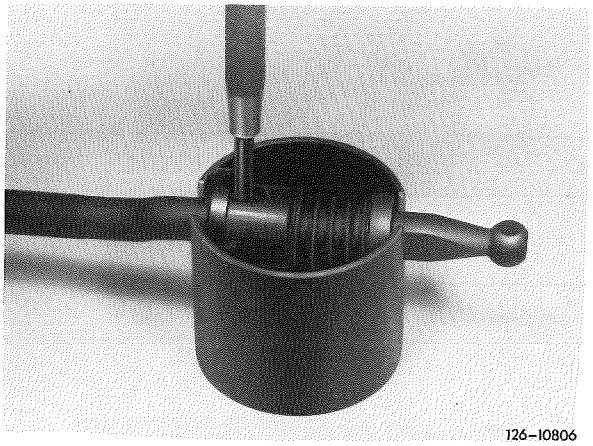


Fig. 4

7 The holding device is self-made according to dimensions below (Fig. 5).

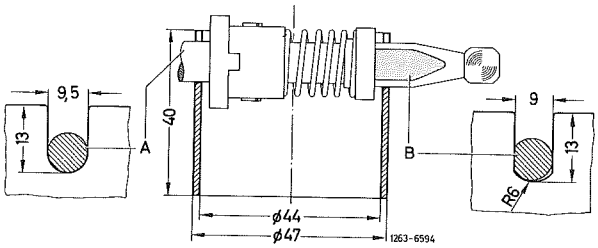


Fig. 5

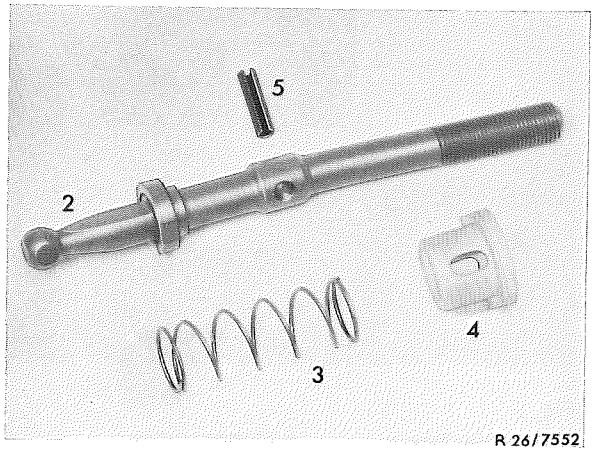


Fig. 6

2 Shift lever
3 Compression spring
4 Bushing
5 Slotted bushing

8 Remove bushing (4) and compression spring (3) from shift lever (2) (Fig. 6).

9 Check components for wear and condition.

Assembly

Note: A change on shift lever reduced bore in shift lever from 5 mm dia. to 4 mm dia. Accordingly, the dia. of the slotted bushing (5), as well as that of the oblong hole in bushing (4) was also reduced. During assembly, make sure that only parts with similar dimensions are mounted.

Also note that in the 5-speed gear shift only the **white plastic bushing** (4) is installed.

Note: If the black plastic bushing (4-speed) is installed, reverse speed cannot be shifted.

10 Slip compression spring (3) and bushing (4) on shift lever (2).

11 Insert shift lever into holding device and knock slotted bushing into shift lever by means of a punch until its two ends are flush with bushing (4) (Fig. 7).

The slot of the slotted bushing should point toward spring.

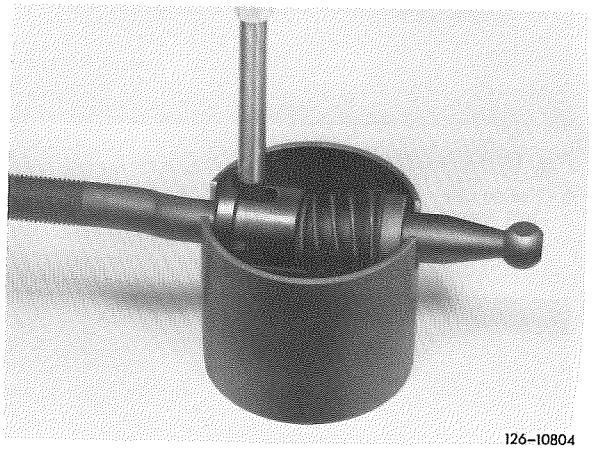


Fig. 7

12 Slip closing cap (6) on shift lever (Fig. 3).

13 Screw hex. nut and shift lever handle with shift lever cuff as fas as possible on shift lever (Fig. 2).

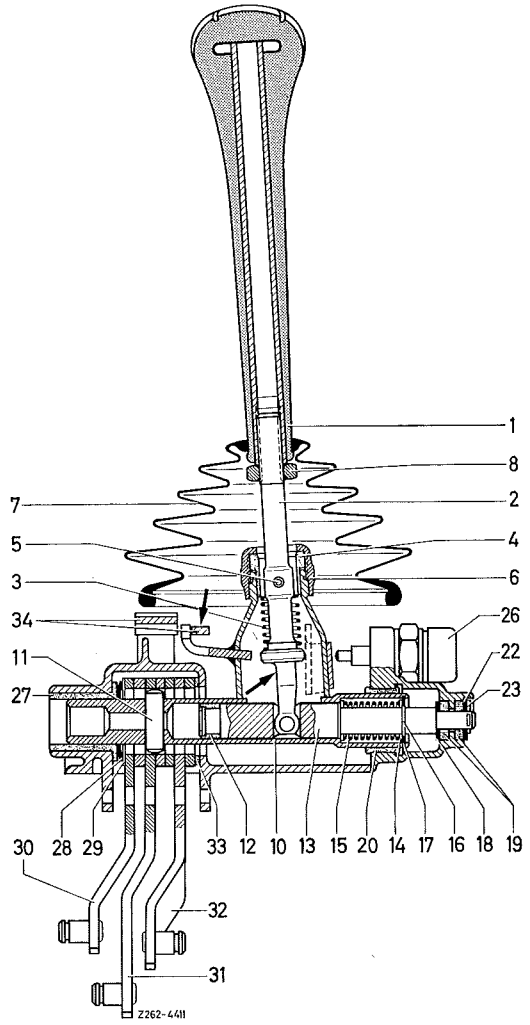


Fig. 8

14 Insert shift lever from above into shift tube, making sure that the two locating pins on collar of bushing (4) are fully seated in pertinent cutouts provided on shift tube and that the machined end at bottom of shift lever is on the left (arrows in Fig. 8).

15 Tighten closing cap (6) with special wrench (Fig. 1).

16 Turn shift lever into correct position and counterlock with hex. nut.

17 Force shift lever sleeve into bead of recess in cover.

18 Check gearshift for function with engine running.

95

Workshop Manual

Clutches · Transmission

Passenger Cars · Volume 1

service

Clutches and Pedal Assembly
Manual Transmission
Automatic Transmission
Universal Shaft

Daimler-Benz Aktiengesellschaft
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The present Service Manual for Clutches and Transmissions contains the descriptions of all important assembly, adjusting and inspection jobs.

The pertinent data, adjusting values, dimensions and tolerances are listed in Tables at the beginning of each section.

The entire contents of this Service Manual are extensively subdivided into the Groups known from our technical literature, but they are organized according to a new system. Details are shown in the engine volume in Group A – Instructions for Use for Service Manuals.

The Group Index serves to facilitate finding the Groups, the Contents in front of each Group serve to find the individual Sections. An Installation Survey in front of the Index Pages is also included.

Additional Service Manuals of this type are available covering

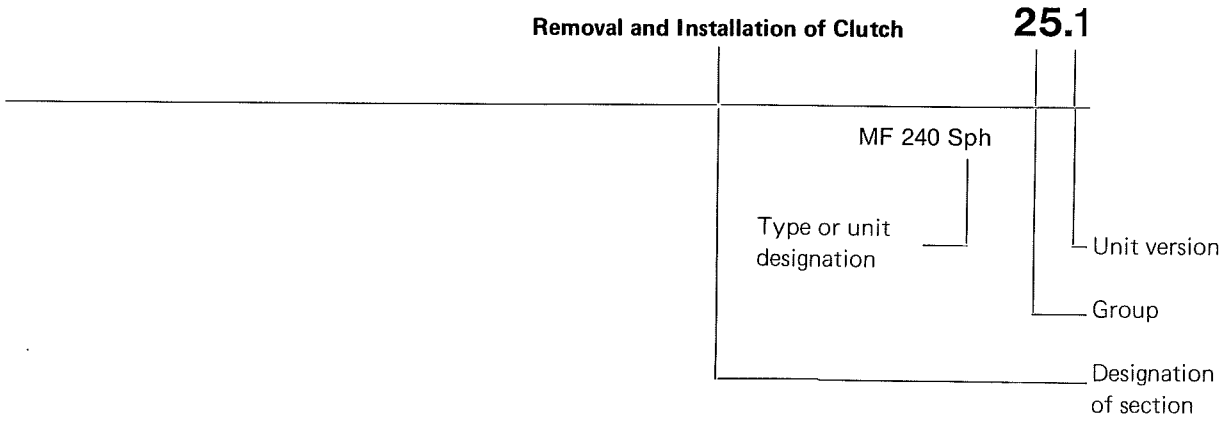
Engines
Axles
Brakes, Steering Systems
Electrical Systems
Bodies

As before, the loose-leaf arrangement of the Service Manuals has been used to permit the inclusion of all significant modifications and further improvements by means of Supplement published by us at pertinent intervals.

Daimler-Benz Aktiengesellschaft
Export Service

May 1971

Designation of pages





For additional details concerning organization and subdivision of Service Manuals refer to Engine Volume in Group A.

Installation Survey

Designation of unit	Installed in vehicle model			Unit version
MF 240 Sph and 240 GSD	**107.043**	**108.057**	**108.058**	**1**
	109.056	**111.026**		

	Job. No.
Clutch	
Removal and Installation of Clutch	010
Inspection of Clutch Pressure Plate	020
Inspection of Driven Plate	022
Inspection of Flywheel	025
Checking Clutch Driven Plate for Wear in Installed Condition	030
Clutch Actuation	
Venting of Hydraulic Clutch Actuation	110
Removal and Installation of Master Cylinder	115
Removal and Installation of Slave Cylinder	120
Adjustment of Play between Push Rod and Piston in Master Cylinder	130
Removal und Installation of Throwout and Throwout Rocker	150
Pedal Assembly	
Removal and Installation of Pedal Assembly	520

Special Tool

Centering mandrel	116 589 03 61 00

Removal

1 Remove transmission (26.1-000).

2 Loosen fastening bolts of clutch one after the other each time by 1 to 1 1/2 turns until clutch is no longer under tension (Fig. 1).

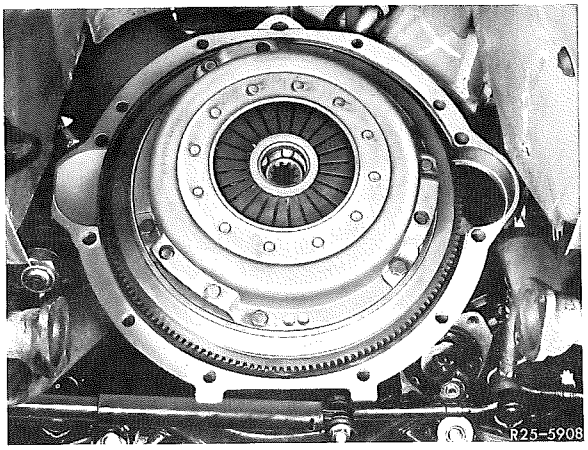


Fig. 1

Note: Any immediate and complete release or tightening of the individual fastening bolts may result in damage to plate spring and to jumping off of thrust ring.

3 Screw fastening bolts out completely and remove clutch together with driven plate.

Caution! Handle and store clutch carefully. Any throwing or dropping of the clutch may result in distortion of the spring bands between the pressure and the cover plate, which in turn may lead to a high unbalance in installed condition.

Handle driven plate as carefully to prevent any bending (lateral runout) of the facing.

Installation

4 Center driven plate with centering mandrel in relation to grooved ball bearing in crankshaft (Fig. 2).

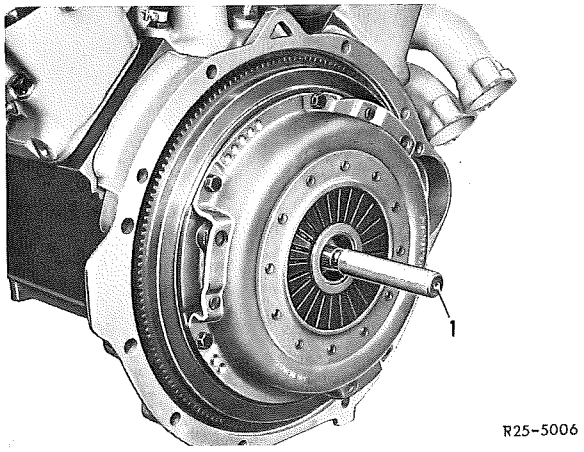


Fig. 2

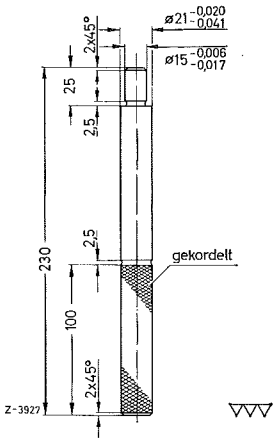


Fig. 3

Centering mandrel
gekordelt = knurled

25.1 Removal and Installation of Clutch

5 Position clutch and tighten fastening bolts one after the other each time by 1 to 1 1/2 turns until the clutch is completely tight. Then remove centering mandrel.

Caution! During assembly, make sure that the clutch is perfectly pulled into recess on flywheel (Fig. 2).

6 Install transmission.

Function Test

7 Check clutch by engaging reverse speed with the engine running for function and for stopping.

Note that a perfect driven plate at idling speed and with the transmission fluid at operating temperature requires from 3 to 7 seconds of time for stopping after unclutching. Any premature engagement of the reverse speed will necessarily result in tooth noise.

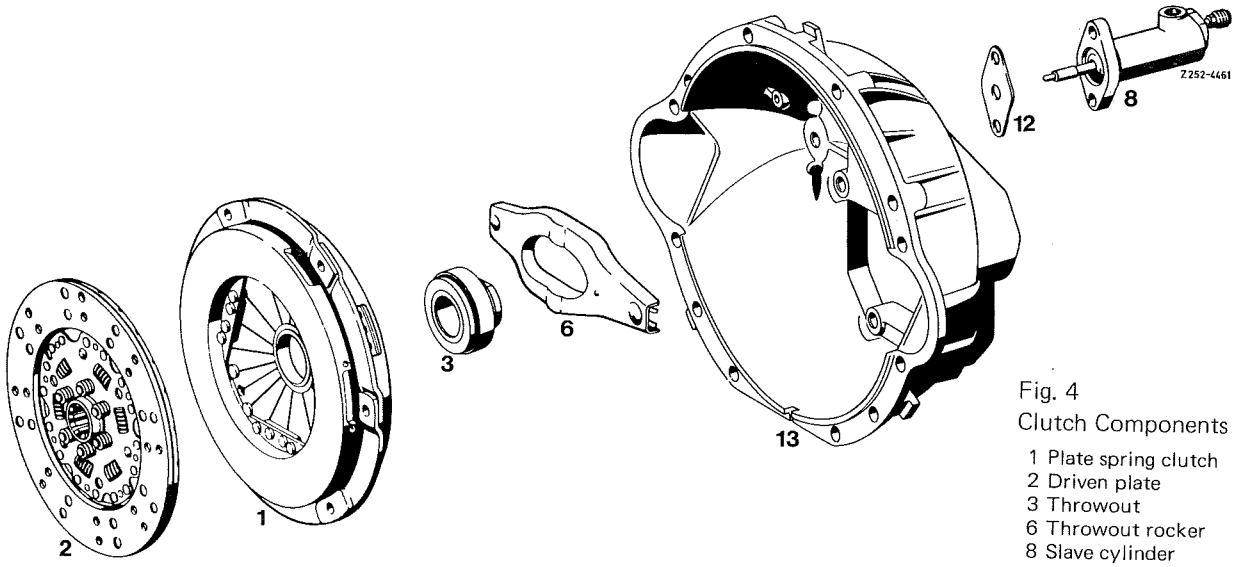


Fig. 4
Clutch Components

1 Plate spring clutch
2 Driven plate
3 Throwout
6 Throwout rocker
8 Slave cylinder
12 Shim
13 Clutch housing

Inspection of Clutch Pressure Plate 25.1

MF 240 Sph

Data

Part No.		001 250 77 04
Contact pressure		760–840 kp
Throwout path "e" on thrust ring[1)]		9 + 1[2)]
Path "f" of thrust ring[1)] through permissible wear of driven plate		8
Reference dimension "d" [1)]	of new driven plate	44.7
	of max. worn driven plate	52.7

1) Refer to Fig. 1
2) **Caution!** Never place plate spring clutch under screw press or the like. After max. 11 mm travel of thrust ring the clutch will be unusable.

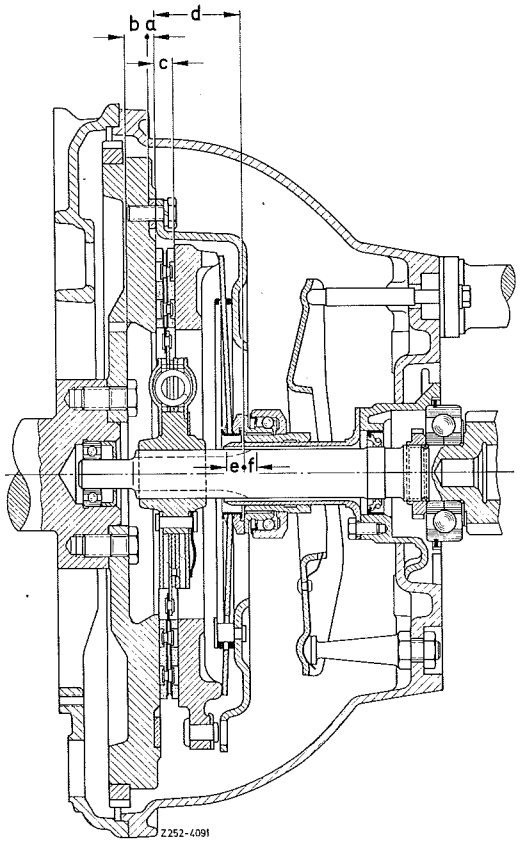


Fig. 1

Arrangement of plate spring clutch
The location of the throwout rocker with slave cylinder and ball pin is shown turned by 90°.

a Distance between clutch surface and support on flywheel
b Distance between clutch surface and fastening flange on flywheel
c Thickness of new driven plate in compressed condition (clutch contact pressure)
d Reference dimension for clutch between clutch surface on flywheel and outer surface of thrust ring on clutch of new driven plate
e Throwout path
f Path of thrust ring through permissible wear of driven plate

Inspection

1 Check clutch pressure plate for heat cracks and score marks.

2 Screw clutch pressure plate to flywheel, with new driven plate if required, and check according to dimensions provided (Fig. 1).

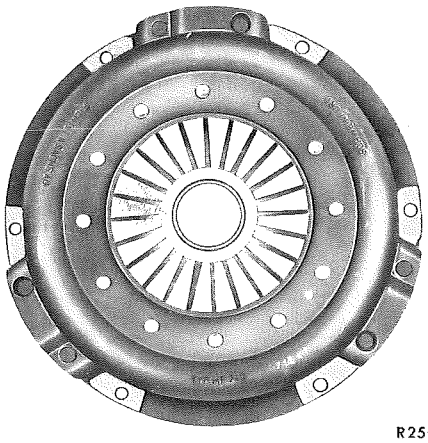


Fig. 2
Clutch pressure plate

25.1 Inspection of Driven Plate

240 GSD

Data

Part No.			002 250 32 03
Thickness of driven plate "c"[1]	no pressure	new	10.35 ± 0.45
		at max. wear	7.75 ± 0.45
	under pressure	new	9.3 ± 0.3
		at max. wear	6.7 ± 0.3
Thickness of facing			4.0
Perm. lateral runout			max. 0.5

1) Refer to 25.1-020, Fig. 1.

Inspection

1 Check driven plate for oiling up, greasing up, mechanical damage, facing cracks and facing thickness.

2 Check driven plate for lateral runout. If required, align with aligning fork (Fig. 1).

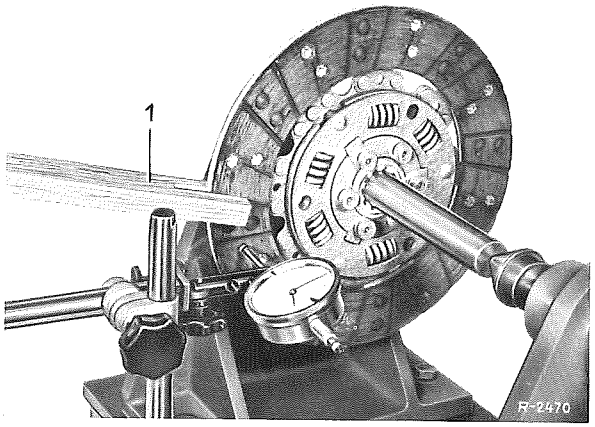


Fig. 1
1 Aligning fork (wood)

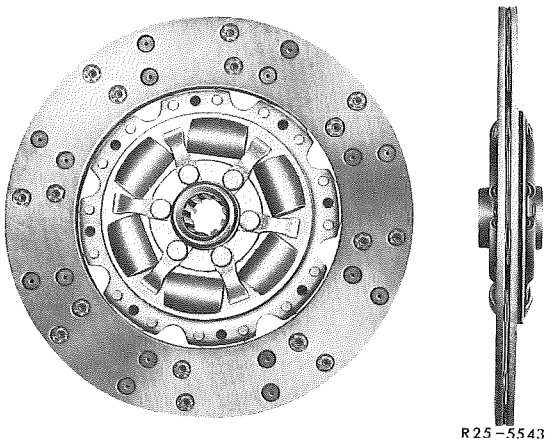


Fig. 2
Driven plate

Data

Type		M 116, M 117
Distance "a" between clutch surface and clutch contact surface		3.8 + 0.1
Distance "b" between clutch surface and fastening flange of flywheel[1)]	when new	27.5 – 0.1
	when repaired at least	26.4
Perm. lateral runout of assembled flywheel		0.05

Inspection

1 Check surface "A" of flywheel for heat cracks and score marks. If the cracks or score marks are deeper than the max. permissible material allowance, replace flywheel.

Refinishing

Refinish by grinding or machining on lathe, while always trying for minimum material removal.

Clamp flywheel perfectly for refinishing, so that the permissible lateral runout of 0.05 mm is not exceeded.

The required measurements for refinishing are shown on table.

In addition make sure, that the distance "a" is always maintained. For this reason, the fastening surface "B" for the clutch must be refinished in accordance with the material removed on clutch surface "A".

The clutch surface should show no cavities or chatter marks.

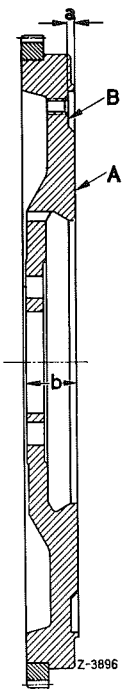


Fig. 1

25.1 Checking Clutch Driven Plate for Wear

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In Installed Condition

Special Tool

Inspection Gauge	115 589 07 23 00

Note

The time when the driven plate has reached its wear limit and should therefore be removed is not easily recognized on vehicles with plate spring clutch.

The reasons are first, that the plate spring clutch even increases its contact pressure under increasing wear of facing on driven plate and that for this reason the plate will not slip, and second, that the automatically adjusting, free-of-play clutch throwout does not indicate via the clutch pedal when the time for replacing the driven plate has come.

The wear on the driven plate can therefore be measured only indirectly on the slave cylinder by means of a special inspection gauge.

Inspection

1 Slide inspection gauge into groove of plastic shim (Fig. 3).

Condition of wear **unobjectionable.**

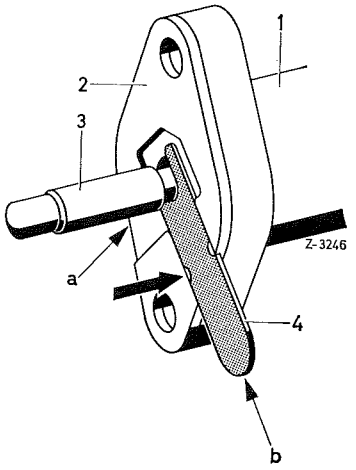


Fig. 1

1 Clutch slave cylinder
2 Shim (plastics)
3 Push rod
4 Inspection gauge 115 589 07 23 00

2 If the notch marks disappear in flange, the driven plate is fully operable (Fig. 1). If the notch marks on the gauge inserted up to stop remain visible, the driven plate ist down to its wear limit and must be replaced (Fig. 2).

Wear limit has been attained

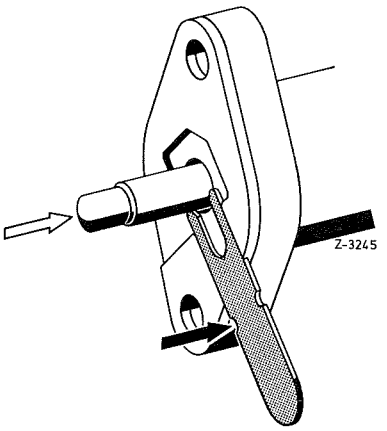


Fig. 2

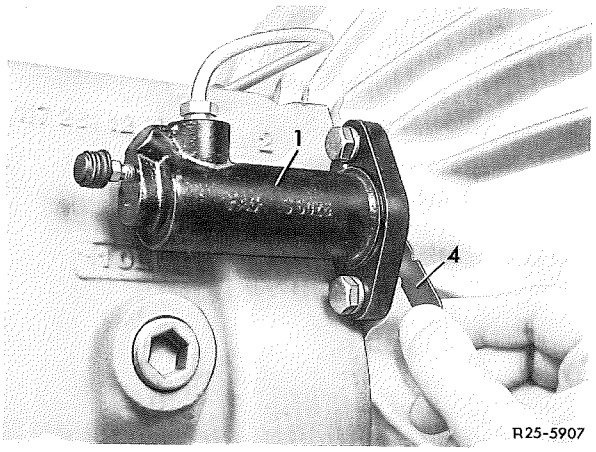


Fig. 3

1 Slave cylinder
4 Inspection gauge

The two most effective venting methods are:
A. Venting with a Venting Unit
B. Venting with Assistance of Brake System

A. Venting with a Venting Unit

1 When using a venting unit, vent from the bottom up, that is, connect pressure line of venting unit to the opened vent screw of the slave cylinder. The compensating tank should then be almost empty so that enough brake fluid can flow from the bottom upwards through the system and the remaining air can escape in upward direction.

2 Set venting unit to lowest possible pressure.

3 Watch compensating tank to prevent any overflowing of brake fluid.

4 If the brake fluid level has approached its max. level in the compensating tank, remove pressure line on venting unit and then close vent screw on slave cylinder and remove pressure hose from vent screw.

5 Check clutch actuation by engaging reverse speed with the engine running for function and leaks.

6 Replenish brake fluid level in compensating tank up to max. level.

B. Venting with Assistance of Brake System

Venting of the clutch actuation with the assistance of the brake system is in principle the same as when using a venting unit, but with the difference that no special aids are required.

1 Check brake fluid level in mutual compensating tank for brake system and clutch actuation and replenish to max. level, if required.

2 Place hose on bleeder screw of righthand front caliper and open bleeder screw.

3 Let a second person carefully actuate brake pedal until hose is filled with brake fluid and no more air bubbles are showing up. Any flowing out of brake fluid is prevented by keeping the hose closed.

4 Place free hose end on bleeder screw on slave cylinder and open bleeder screw.

5 Keep stepping on brake pedal. Close bleeder screw of caliper, move brake pedal into released position. Open bleeder screw etc. until no more bubbles are showing up at mouth of inlet line laterally on compensating tank.

Note: It will be of advantage to replenish the fluid level in compensating tank in between.

6 Close bleeder screws on caliper and slave cylinder and pull off hose.

7 Check clutch actuation by engaging reverse speed with the engine running for function and leaks.

8 Replenish brake fluid in compensating tank up to max. level.

Removal

1 Remove floor mats and floor lining from cab leg-room.

2 Remove cover under instrument panel (Fig. 1).

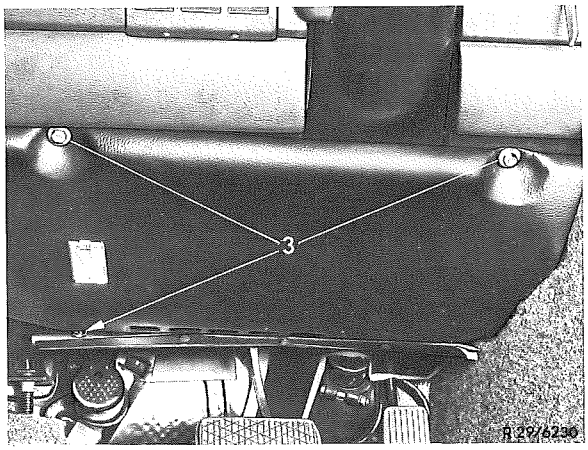


Fig. 1

3 Fastening screw

3 Draw brake fluid from **rear chamber** of supply tank to below minimum mark (Fig. 2).

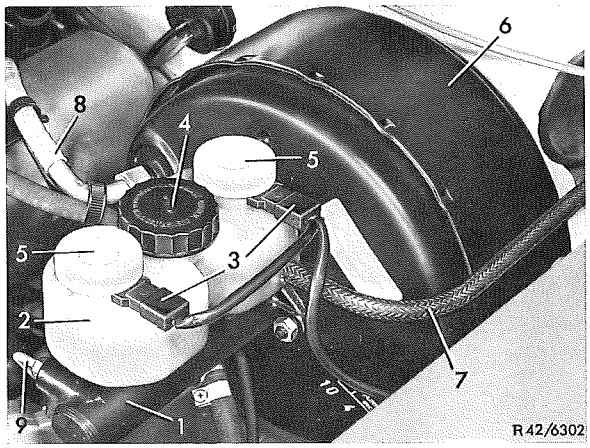


Fig. 2

2 Compensating tank
7 Feed line

4 Loosen input line by pulling elbow out of rubber clamping ring on master cylinder (Fig. 3 and arrow in Fig. 4).

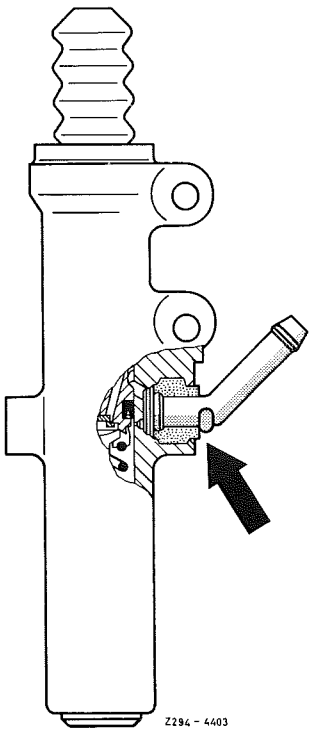


Fig. 3

5 Unscrew pressure line (16) on master cylinder (Fig. 4).

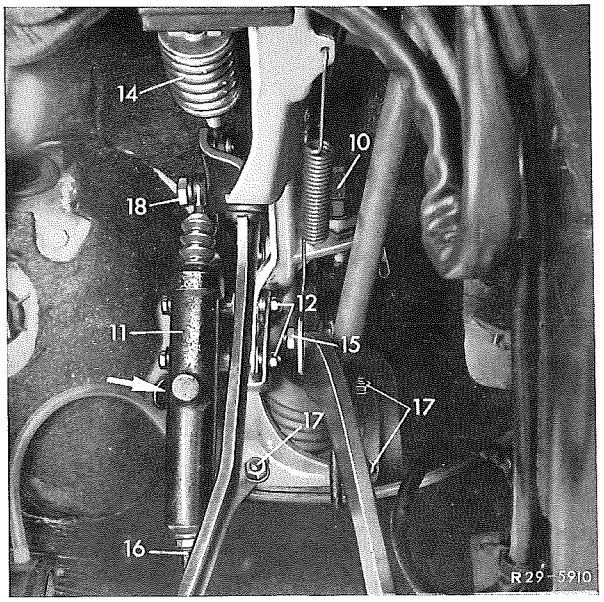


Fig. 4

12 Fastening bolts master cylinder
16 Pressure line

6 Loosen piston rod of brake unit by removing collar screw (15) from brake pedal (Fig. 4).

7 Disconnect return spring on brake pedal and push the latter completely down against floor board.

8 Pull fastening screws (12) out toward the right after unscrewing nuts and remove master cylinder. Push rod remains on clutch pedal.

Caution! The travel limit stop for the clutch pedal is simultaneously attached with screws (12) and spaced by means of washers. Write down number of washers used for installation.

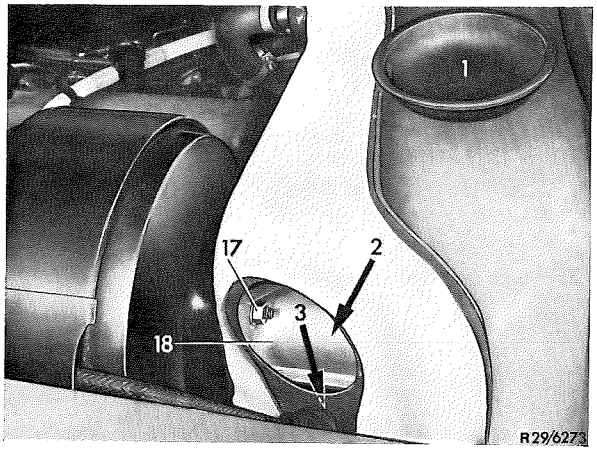


Fig. 5

1 Closing cover
2 Assembly hole
3 Elbow (master cylinder)
17 Nut for pedal bracket
18 Pedal bracket

Installation

9 Insert screws (12) with pedal stop and spacing washers from the right into the pedal bracket (Fig. 4).

10 Slide master cylinder on push rod on clutch pedal, place against pedal bracket, insert fastening screws from the right and screw on nut.

11 Check play between push rod and piston in master cylinder and adjust, if required (25.1-130).

12 Connect input line to master cylinder by carefully pushing elbow up to collar in rubber clamping ring of master cylinder (Fig. 3) by means of a screw driver applied through assembly hole from direction of engine compartment (Fig. 5).

13 Screw pressure line into master cylinder.

14 Attach piston rod for brake unit with flange bolt (15) to brake pedal.

15 Attach return spring for brake pedal.

16 Vent hydraulic clutch actuation (25.1–110) and then check level of brake fluid in supply tank and correct, if required.

17 Check clutch actuation by engaging reverse speed with the engine running for function and leaks.

18 Mount cover under instrument panel (Fig. 1).

19 Insert floor lining.

20 Carefully close assembly hole from direction of engine compartment with cover (1) (Fig. 5).

Removal

1 Unscrew pressure line (3) on slave cylinder.

2 Close pressure line with rubber cap to prevent loss of brake fluid.

3 Unscrew fastening screws (4) for slave cylinder.

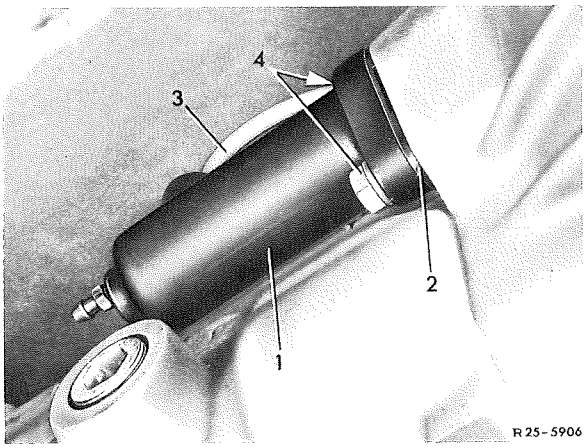


Fig. 1

1 Slave cylinder
2 Shim (plastics)
3 Pressure line
4 Fastening screw

4 Remove slave cylinder with push rod from clutch housing, watching out for shim (2).

Installation

5 Place shim (2) with grooved end against clutch housing and hold in position.

6 Insert slave cylinder with push rod into clutch housing, while watching for correct seat of dust sleeve in slave cylinder.

7 Screw slave cylinder with fastening bolts to clutch housing.

8 Connect pressure line (3) to slave cylinder.

9 Vent hydraulic clutch actuation (25.1–110).

25.1 Adjustment of Play between Push Rod and Piston in Master Cylinder

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Data

Play between push rod and piston in master cylinder	0.2

Adjustment

1 Loosen hex. nut of adjusting screw (3).

2 Turn adjusting screw in such a manner that push rod (2) will first travel idle distance "b" to piston when the pedal is actuated.

3 Play "b" cannot be measured and must be determined by feel on pedal plate.

Note: When checking or adjusting play, make sure that the line marking (arrow) on head of adjusting screw points rearward.

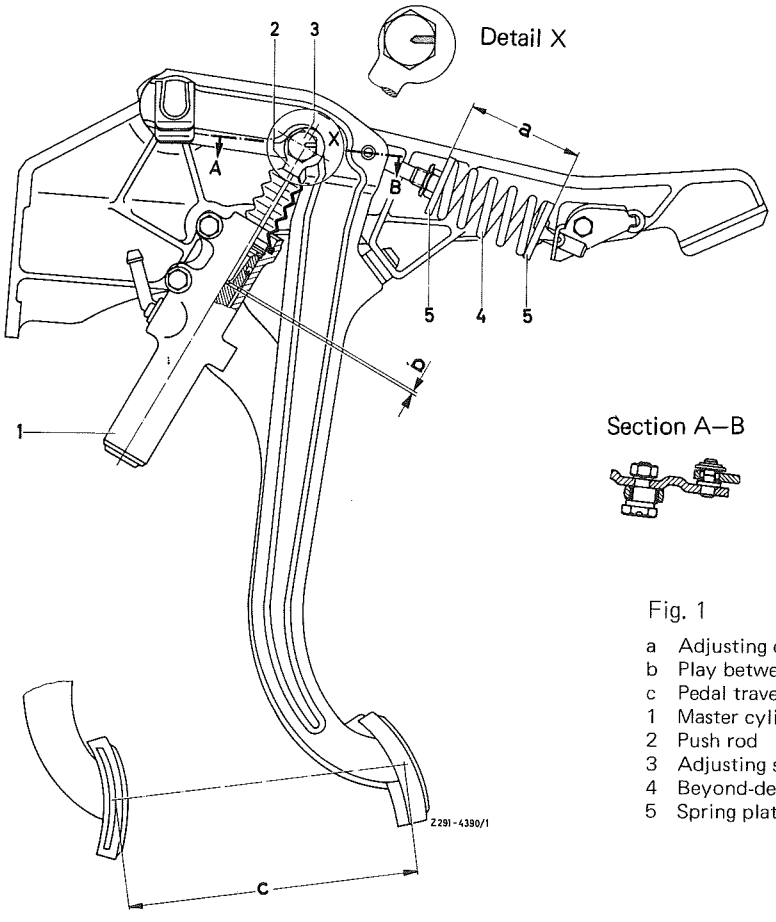


Fig. 1

a Adjusting dimension of beyond-dead-center spring
b Play between piston in master cylinder and push rod
c Pedal travel
1 Master cylinder
2 Push rod
3 Adjusting screw
4 Beyond-dead-center spring
5 Spring plate

Data

ID of throwout	34.05 34.11
OD of guide tube on front transmission housing cover	34.00 33.94
Play between throwout and guide tube on front transmission housing cover	0.05–0.17

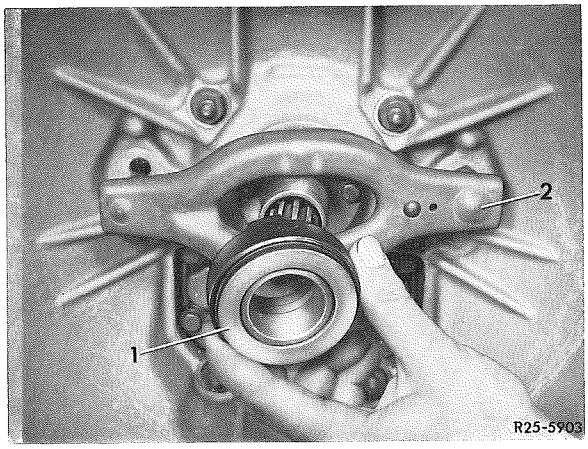


Fig. 1
1 Throwout
2 Throwout rocker

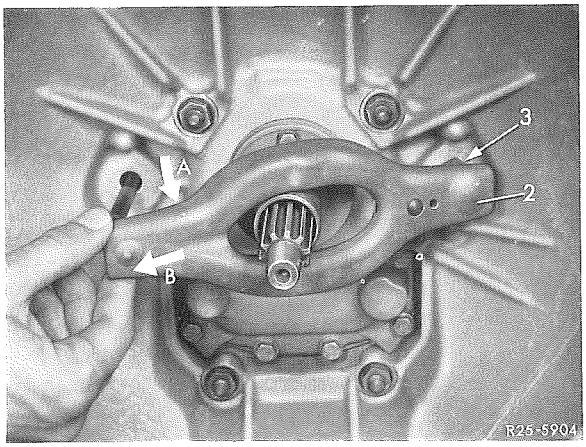


Fig. 2
2 Throwout rocker
3 Ball pin

Removal

1 Remove throwout (1) from bearing tube on front transmission cover (Fig. 1).

2 Move throwout rocker (2) in direction of arrow A and then pull from ball pin (3) on clutch housing in direction of arrow B and remove (Fig. 2).

Installation

3 Carefully grease bearing tube on front transmission cover, ball pin (3) on clutch housing and all points on throwout rocker (2) which come into contact with the throwout (1) with a suitable lubricant. Do not use pure molybdenum disulphide lubricants.

4 Push throwout rocker (2) in reverse direction of arrow B on ball pin (3) until the spring clip of the rocker engages the ball pin. Then move rocker in reverse direction of arrow A.

5 Grease throwout inside and on both lateral cuts on rear sleeve portion.

6 Slide throwout (1) on guide tube on front transmission cover and turn until it snaps into rocker (2) with its lateral cuts (Fig. 1).

Adjusting Dimensions

Adjusting dimension "a" of beyond-dead-center spring measured across both spring retainers		52 ± 0.5
Play "b" between push rod and piston in master cylinder[1)]		0.2
Lash "c" of	Brake pedal	min. 150
	Clutch pedal[2)]	162

1) The play cannot be measured but must be determined at pedal plate by feel. 0.2 mm play between push rod and piston provide approx. 1 mm travel on pedal plate.
2) Up to rest against pedal stop.

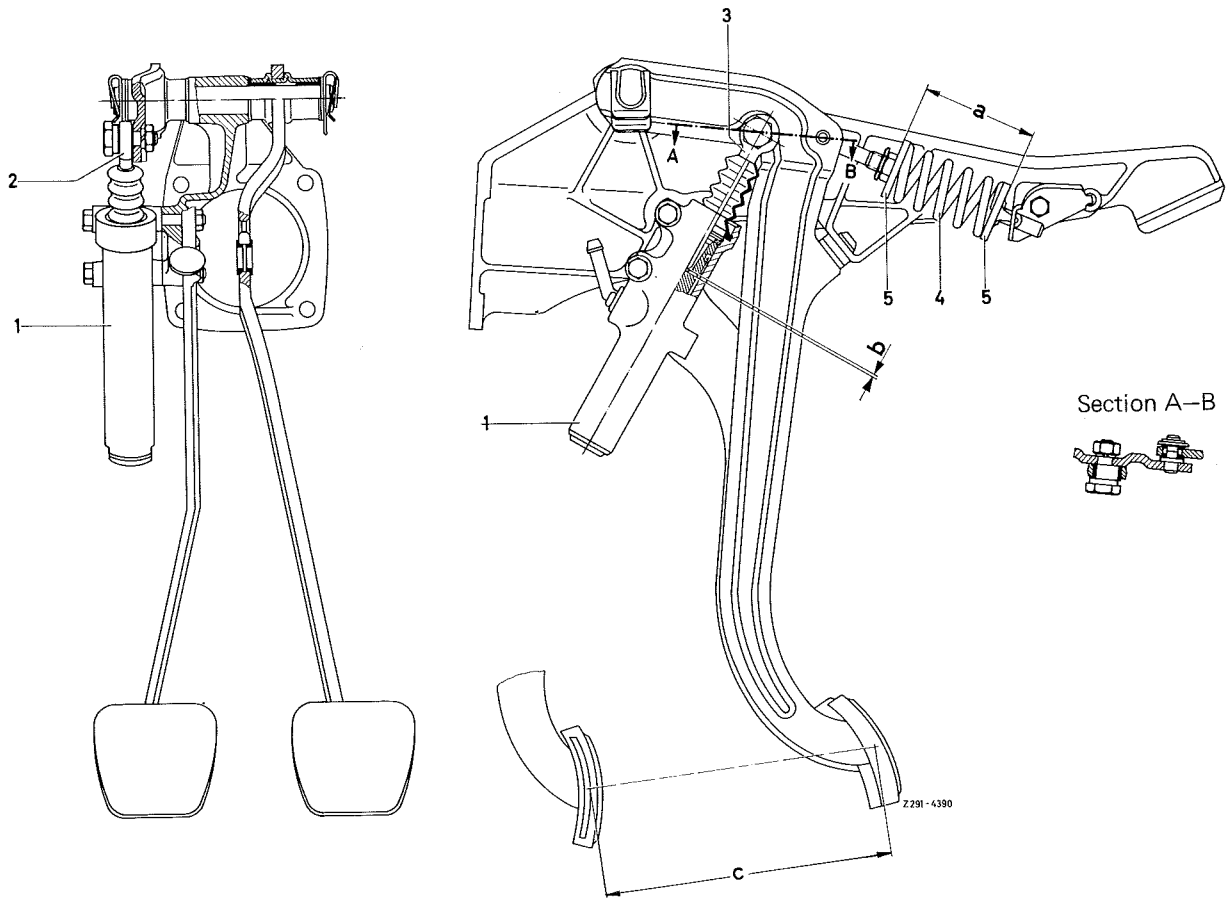


Fig. 1

1 Master cylinder
2 Push rod
3 Adjusting screw
4 Beyond-dead-center spring
5 Spring retainer
a Adjusting dimension of beyond-dead-center spring
b Play between piston in master cylinder and push rod
c Pedal lash

25.1 Removal and Installation of Pedal Assembly

Removal

1 Take floor mats and floor lining from leg area.

2 Remove instrument cluster (54.1–310).

3 Unscrew cover below instrument panel in legroom and pull in downward direction.

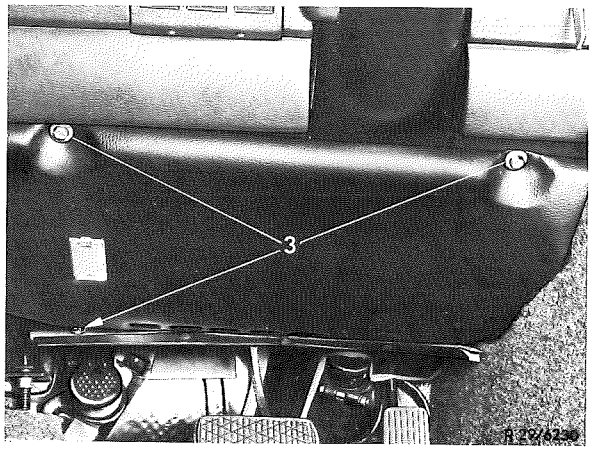


Fig. 2
3 Fastening bolts

4 Push out legroom light (4), remove plug and pull cable from cover.

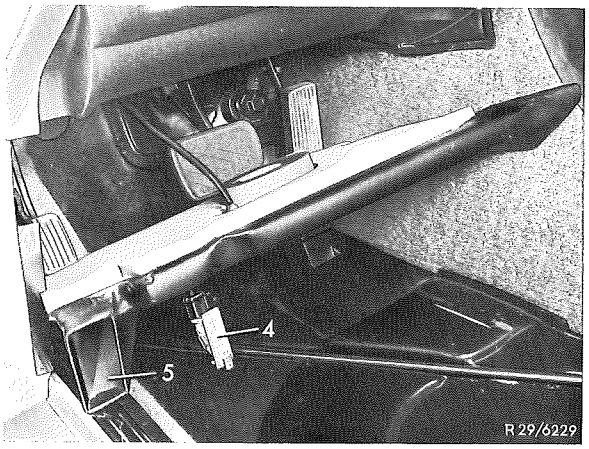


Fig. 3
4 Legroom light
5 Slot for door vents

5 Pull hose (6) for window nozzle on air duct (7) (Fig. 4).

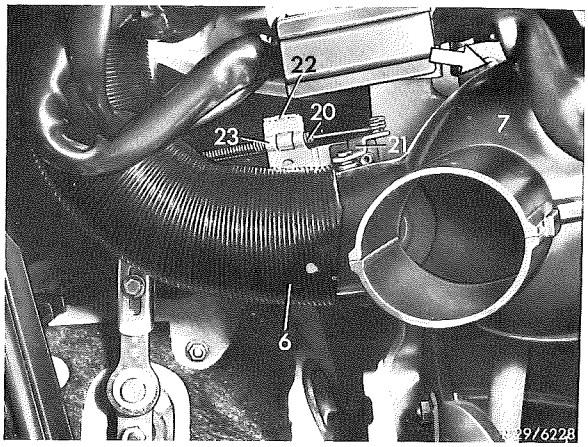


Fig. 4
6 Hose for window nozzle
7 Air duct
20 Bowden wire
21 Lever
22 Fastening clip
23 Holder

6 Disconnect bowden wire (20) on lever (21) and then remove clip (22) holding bowden wire to holder (23) (Fig. 4).

7 Unscrew bolt (arrow in Fig. 4) holding air duct in position.

8 Pull air duct (7) out of heater box and remove in downward direction.

9 Unscrew holder (8) from pedal bracket and pull downwards together with cable assembly (Fig. 5 and 6).

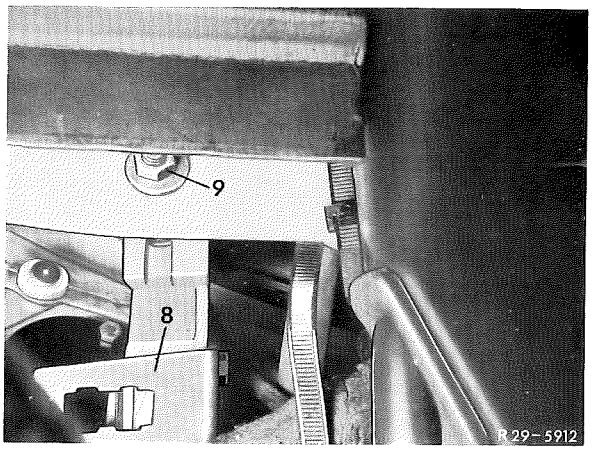


Fig. 5
8 Holder of clip connection for main line assembly
9 Fastening nut for pedal assembly

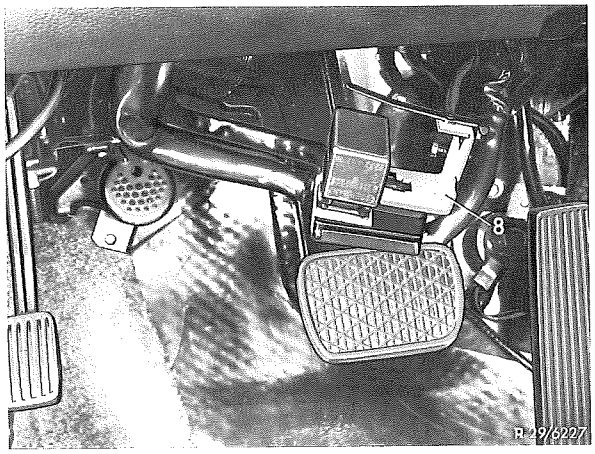


Fig. 6
8 Holder for plug connection of main line assembly

10 Loosen bolt holding pedal bracket and remove nut (9) with washer and snap ring in downward direction (Fig. 5).

Note: The fastening bolt itself can be removed only when the pedal bracket on the front wall has been removed and can be displaced (Item 18).

11 Unscrew collar bolt (15) holding piston rod of brake unit to brake pedal (Fig. 7).

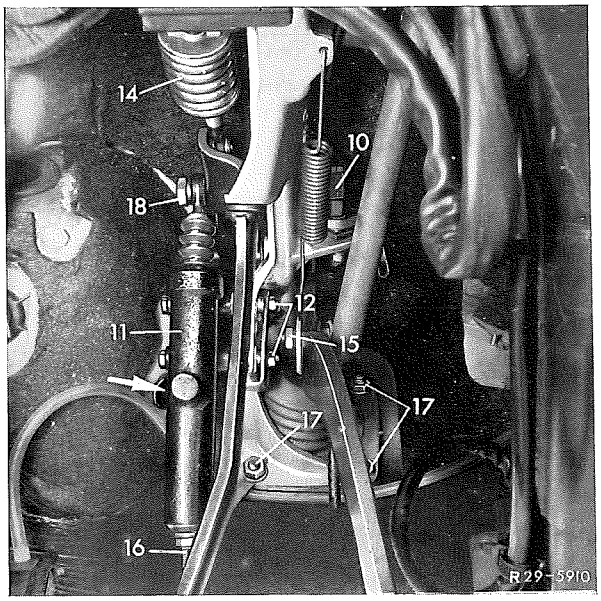


Fig. 7
10 Cable plug of stop light switch
11 Master cylinder
12 Fastening bolts master cylinder
14 Beyond-dead-center spring
15 Flange bolt
16 Pressure line
17 Fastening nuts
18 Cam bolt

13 To prevent contamination inside vehicle, draw brake fluid from **rear** chamber of combination brake and clutch compensating tank.

14 Loosen pressure line (16) on master cylinder (11) (Fig. 7).

15 Loosen inflow line (arrow in Fig. 7) directly on master cylinder (11) by pulling elbow from rubber clamping ring.

16 Close released lines with blind plugs.

17 Unscrew the four nuts (17) holding pedal bracket to front wall (Fig. 7).

Note: Loosen upper lefthand nut from direction of engine compartment through aperture adjacent to windshield wiper motor closed by a plastic cover. (Fig. 8).

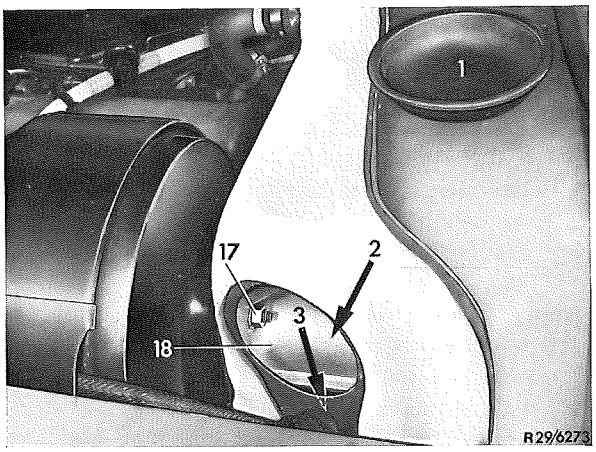


Fig. 8
1 Closing cover
2 Assembly hole
3 Elbow (master cylinder)
17 Nut for pedal bracket
18 Pedal bracket

18 Pull pedal assembly to the rear until flange (18) of the carrier is free of the studs (19) on front wall. Then remove bolt attaching the pedal bracket to instrument carrier including washer (Fig. 9).

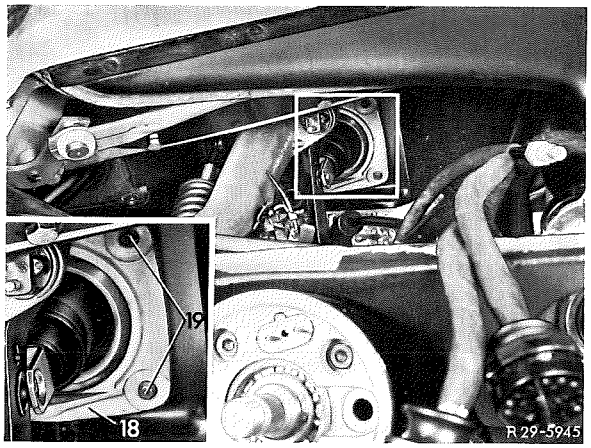


Fig. 9
18 Flange of pedal carrier
19 Stud

19 Then swivel carrier down in forward direction until the fork end no longer rests against instrument carrier and the pedal assembly can be removed in downward direction.

Note: Watch out for piston rod of brake unit when removing pedal assembly.

Installation

20 Insert pedal assembly into legroom vice versa to description in Item 19, guide over piston rod of brake unit and slide on the four studs on front wall.

Note: The four studs are serving simultaneously for attaching the brake unit and are screwed into the flange of the latter. When inserting the pedal assembly, the studs and thereby the brake unit — to the extent the lines connected to the unit permit — may be displaced in the direction of the engine compartment and thereby make it impossible to screw on another nut.

In such a case push brake unit away from engine compartment **without force** while counterholding pedal assembly.

21 Screw nuts (17) for attaching pedal carrier to front wall, but do not yet tighten (Fig. 10).

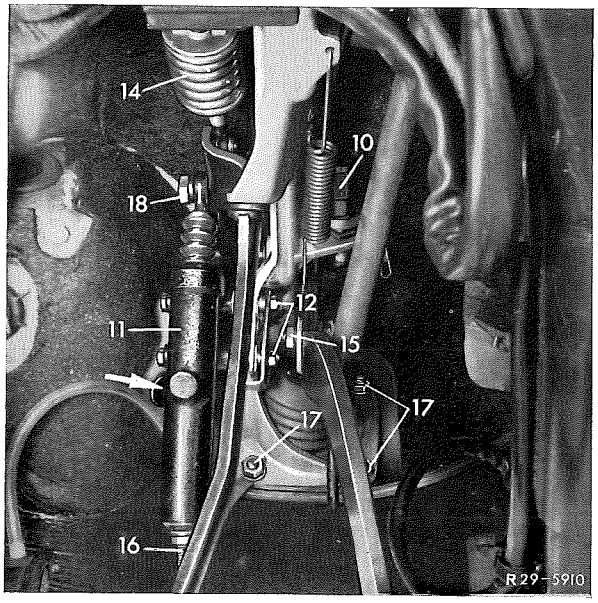


Fig. 10
10 Cable plug of brake light switch
11 Master cylinder
12 Fastening bolts master cylinder
14 Beyond-dead-center spring
15 Flange bolt
16 Pressure line
17 Fastening nut
18 Cam bolt

Note: Unscrew lefthand upper nut from direction of engine compartment through the aperture adjacent to windshield wiper motor.

22 Introduce bolt with washer for attaching pedal carrier to instrument carrier from above into fork end of carrier and into bore in instrument carrier, while screwing on the pertinent nut (9) with washer and snap ring from below, but do not yet tighten (Fig. 5).

23 Tighten all fastening bolts, starting with the four nuts on front wall.

24 Connect pressure line (16) and inflow line (arrow) to master cylinder (Fig. 10).

Note: Push connecting elbow of inflow line into rubber clamping ring in master cylinder through assembly hole from direction of engine compartment up to bead (arrow in Fig. 11).

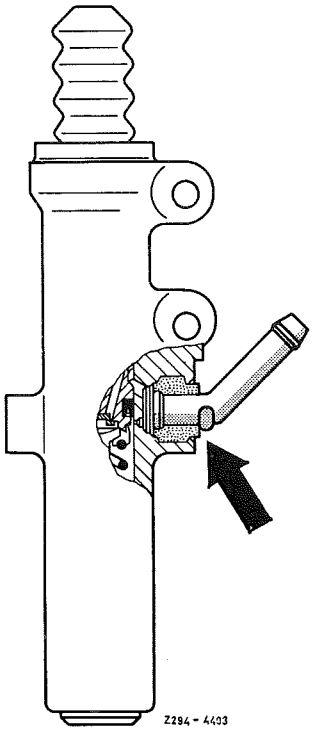


Fig. 11

25 Close assembly hole from direction of engine compartment with plastic cover.

26 Attach piston rod of brake unit with flange bolt (15) to brake pedal (Fig. 10).

27 Insert cable plug (10) for brake light switch and attach cable with cable clip to pedal carrier (Fig. 10).

28 Push holder (8) with cable assembly up and screw to pedal carrier (Fig. 5 and 6).

29 Attach air duct (7) to heater box and screw down with bolt (arrow in Fig. 12).

30 Attach bowden wire (20) to lever (21) and attach clip (22) for holding bowden wire to holder (23) (Fig. 12).

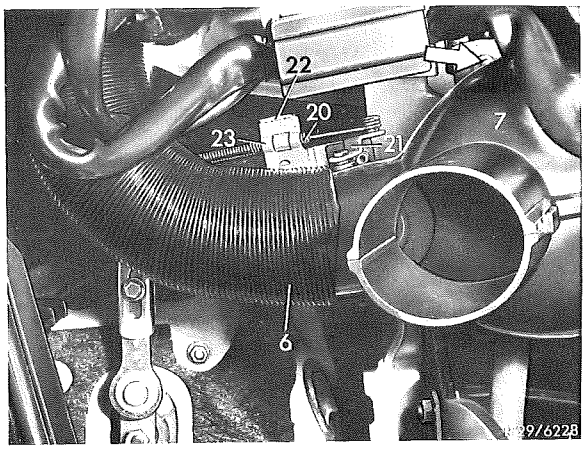


Fig. 12

6 Hose for window nozzle
7 Air duct
20 Bowden wire
21 Lever
22 Fastening clip
23 Holder

31 Place hose (6) for window nozzle on air duct (Fig. 12).

32 Vent hydraulic clutch actuation (25.1–110).

33 Check clutch actuation for function and leaks.

34 Pull cable for legroom light through cover, insert plug and push legroom light into cover (Fig. 3).

35 Insert legroom cover and screw down.

36 Install instrument cluster (54.1–130).

Revision: New unit (*) and models added.

Installation Survey

Designation of Unit	Transmission Type	Installed in Vehicle Model	Unit Version
G 76/18	—	**114** **115** as from start of series	
G 76/18 A	**716.002**	**114.010** **114.011** **114.015** **114.021** **114.022** **114.023** **115** starting March 1972 **115.017** **115.117** up to October 1973	
G 76/18 B	**716.001**	**107.022** **107.042** **114.060** **114.062** **114.072** **114.073** **116.020** **116.024** **116.025** as from start of series	**1**
G 76/18 C*	**716.003**	**115.017** **115.117** starting October 1973 **115.114** as from start of series	
G 76/27	—	**108.016** **108.018** **108.019** **109.016** **111.024** **111.025** starting May 1969	
G 76/27 A	**716.100**	**107.023** **107.043** **108.057** **108.058** **109.056** **111.026** **116.028** **116.029** as from start of series	
G 76/27-5	**717.000**	**107.022** **107.042** as from start of series **108.016** **108.018** **108.019** **109.016** **111.024** **111.025** starting May 1969 **114.010** **114.015** **114.021** **114.022** starting March 1969 **114.011** **114.023** starting August 1972 **114.060** **114.062** **114.072** **114.073** **116.020** **116.024** **116.025** as from start of series	**2**

Transmission

General Information and Survey Covering Changes . . . . . Job No. 26.1 005

Removal and Installation of Transmission
Type 107.023, 107.043 020

Clutch Housing

Screwing Clutch Housing Off and On 050

Transmission Shift Cover

Removal and Installation of Transmission Shift Cover 110

Disassembly, Assembly of Gear Shift Cover, Sealing Shafts of Shift Rockers 120

Transmission Cover Front

Screwing Transmission Cover Front Off and On 210

Screwing Bearing Tube of Transmission
Cover Front Off and On, Replacement of Sealing Ring 220

Transmission Cover Rear

Screwing Transmission Cover Rear Off and On, Replacement of Sealing Ring 310

Removal and Installation of Tachometer (Speedometer) Drive 320

Transmission Gear Assembly

Removal and Installation of Reverse Speed Gear . . . . . R 410

A. Without Synchronizing Unit . . . . . /2
B. With Synchronizing Unit . . . . . /3

Removal and Installation of Gear Assembly . . . . . R 420

Disassembly and Assembly of Main Shaft . . . . . R 440

Disassembly and Assembly of Synchronizing Body (Coil Spring Synchronization) . . . . . R 450

Disassembly and Assembly of Synchronizing Body (Circular Spring Synchronization) . . . . R 452

Disassembly and Assembly of Countershaft . . . . . R 460

Bearings of Transmission Shafts and Gear Wheels . . . . . R 480

Gearshift

Adjustment of Floor-Mounted Gearshift 610

Removal and Installation, Disassembly and Assembly of Shift Lever 620

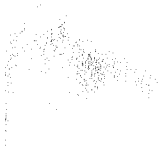
Removal and Installation of Floor-Mounted Gearshift 630

Disassembly and Assembly of Floor-Mounted Gearshift . . . . . R 640

Illustrated Table

Floor-Mounted Gearshift 690

Transmission 990



Revision: New unit (*) and models added.

General

Manual four-speed transmissions G 76/18, G 76/18 A, G 76/18 B, G 76/18 C, G 76/27 as well as G 76/27 A are essentially the same. A few changes in these transmission types have been made since the start of the series in January 1968 in the course of general technological development. However, assembly procedure for all the named transmissions of series G 76 remains almost unchanged.

Based on a thorough similarity of assembly procedures, the reconditioning sequence is predominantly shown with reference to transmission type G 76/18. Specific deviations between transmission types G 76/18, 18 A, 18 B, 18 C, 27, as well as 27 A are specially referred to in the respective sections.

Due to the in part differing dimensions and the varying surface finishes of the toothed flanks, the components of the individual transmission types **cannot** be exchanged in relation to each other.

Parts subject to wear should therefore be ordered in principle according to the pertinently valid Spare Parts Catalog. Essential modifications are always placed ahead of the respective job number.

26.1 General Information and Survey Covering Changes

Survey Covering Changes

Unit Designation	Unit No.	Installed in Vehicle Model from .....to	Remarks or Pertinent Change
G 76/18	up to 669 557	114 115 from January 1968 to March 1972	–
G 76/18 A Type Designation 716.002	as from 669 558	114.010 114.011 114.015 114.021 114.022 114.023 115 (all) starting March 1972 115.017 115.117 up to October 1973	Reinforced 1st speed by wider helical gear of main and countershaft. 1st speed scraped, 2nd and 3rd speed as well as constant gear scraped and lapped. Reversing gear of countershaft and rear transmission cover modified due to modified countershaft.
G 76/18 B Type Designation 716.001	as from 000 001	107.022 107.042 114.060 114.062 114.072 114.073 116.020 116.024 116.025	Reinforced 1st speed by wider helical gear of main and countershaft. 1st speed scraped, 2nd and 3rd speed as well as constant gear ground. Reversing gear of countershaft and rear transmission cover modified due to modified countershaft.
G 76/18 C* Type Designation 716.003		115.017 115.117 starting October 1973 115.114	–
G 76/27	as from 049 594	108.016 108.018 108.019 109.016 111.024 111.025 starting March 1972	Modification of countershaft, of countershaft reversing gear and of rear transmission cover. Reason: matching to transmission type G 76/18 B
G 76/27 A Type Designation 716.100	as from 006 294	107.023 107.043 108.057 108.058 109.056 111.026 116.028 116.029 starting April 1972	Modification of countershaft, of reversing gear of countershaft and of rear transmission cover. Reason: matching to transmission type G 76/18 B

Note: During series production of transmission types G 76/18 A, G 76/27 as well as G 76/27 A with the modifications named in table, vehicle models 114.010, 114.021, 114.022, 108.019, 109.016, 111.024 as well as 111.025 were already no longer included in series production.
In the event of repairs, the transmission types named above can be installed in the respective vehicles.

G 76/27 A with floor-mounted shift lever

Filling Capacity in Liters

Automatic transmission fluid (ATF)	1.8

Tightening Torques in kpm

Universal shaft clamping nut	max. 3
Oil drain and filler plug	max. 6

Special Tools

Torque wrench for special open end wrench	115 589 07 07 05
Special open end wrench for clamping nut of universal shaft	000 589 13 01 00

Removal

1 Disconnect grounding cable on battery.

2 Remove compensating connection (1) between the two exhaust pipes (Fig. 1).

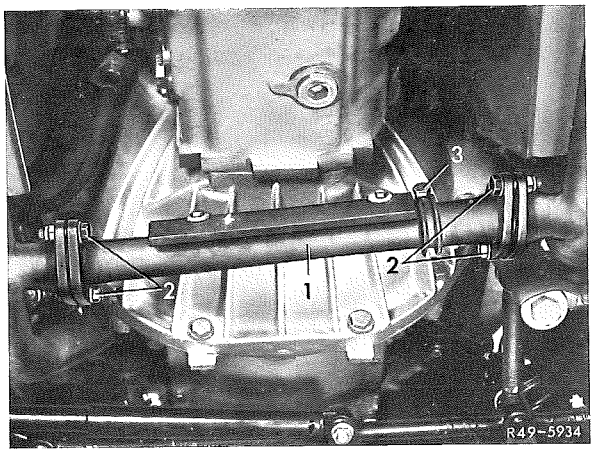


Fig. 1
1 Compensating connection
2 Fastening bolts
3 Fastening bolt for clamp

3 Remove rear exhaust section with front and main muffler (Fig. 2).

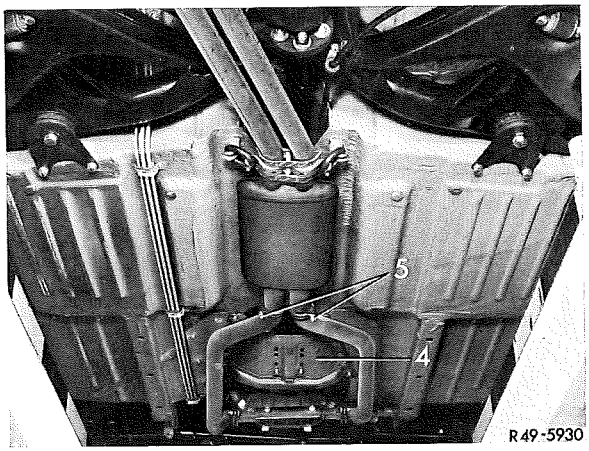


Fig. 2
4 Tunnel closing plate
5 Clamps

4 Separate pipe line (6) to slave cylinder at lefthand end on hose screw connection (arrow Fig. 3).

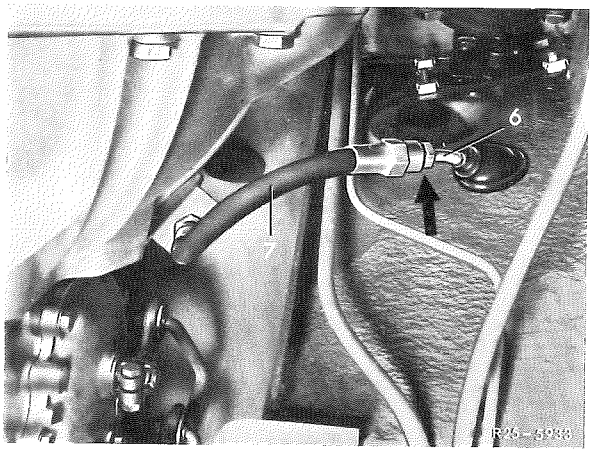


Fig. 3
6 Pipe line
7 Coupling hose

Note: Close lines with blind plugs or draw fluid from **rear** chamber of combination supply tank to prevent the brake fluid from running out.

5 Unscrew both fastening bolts (9) for rear engine rubber mount (Fig. 4).

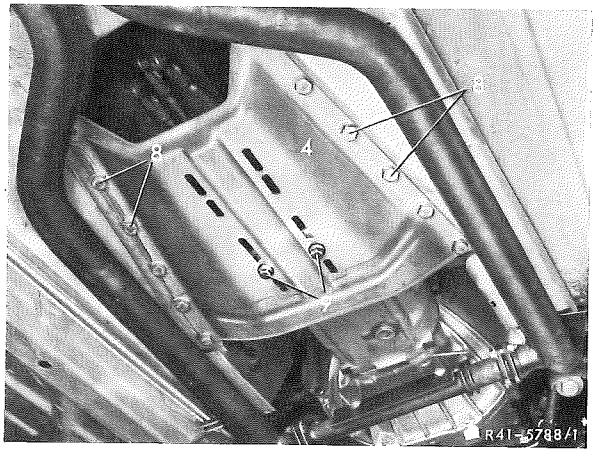


Fig. 4
4 Tunnel closing plate
8 Fastening bolts for tunnel closing plate
9 Fastening bolts for rear engine rubber mount

6 Slightly raise transmission with vehicle jack or pit lift and unscrew tunnel closing plate (Fig. 4).

7 Loosen drive shaft (10) for speedometer on rear transmission cover and pull off.

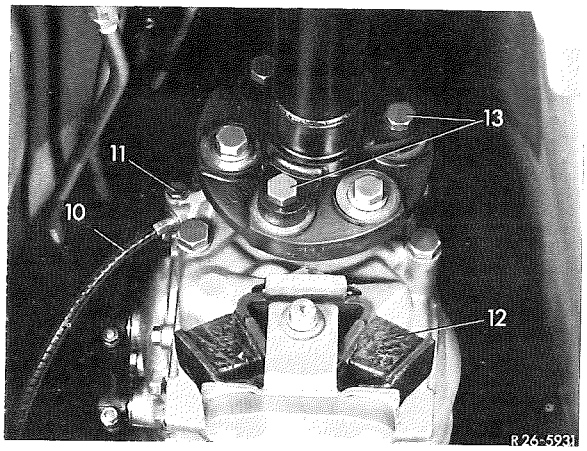


Fig. 5
10 Speedometer drive shaft
11 Fastening bolt
12 Rear engine rubber mount
13 Universal shaft bolt

8 Remove shift rods of gear shift from transmission shift levers upon removal of SL locks.

9 Loosen both fastening bolts (14) of universal shaft intermediate bearing, but do not screw out. (Fig. 6).

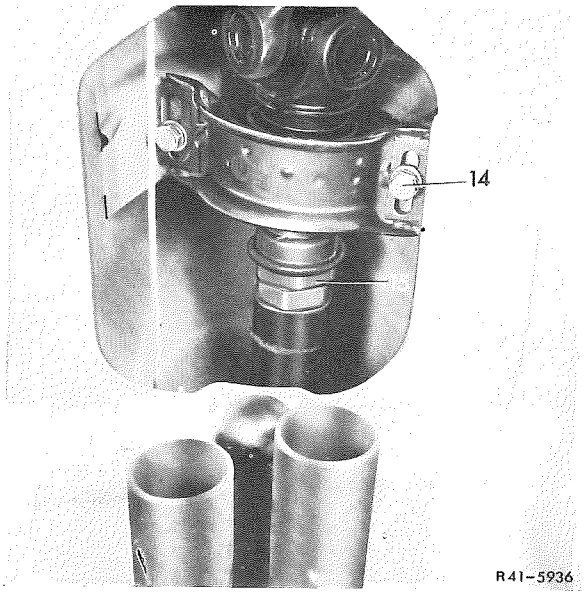


Fig. 6
14 Fastening bolts
15 Universal shaft clamping nut

10 Loosen universal shaft clamping nut (15) (Fig. 6 and 7).

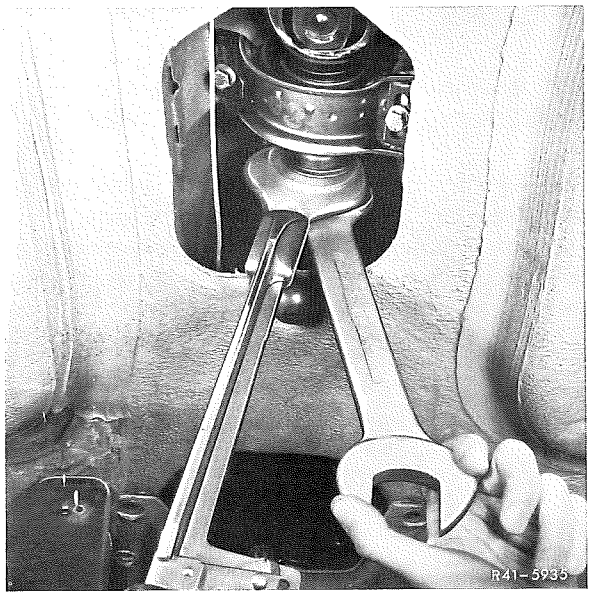


Fig. 7

Note: To maintain balanced condition mark universal plate in relation to universal shaft.

11 Unscrew universal shaft on transmission in such a manner that the universal plate remains on three-legged flange of transmission (Fig. 8).

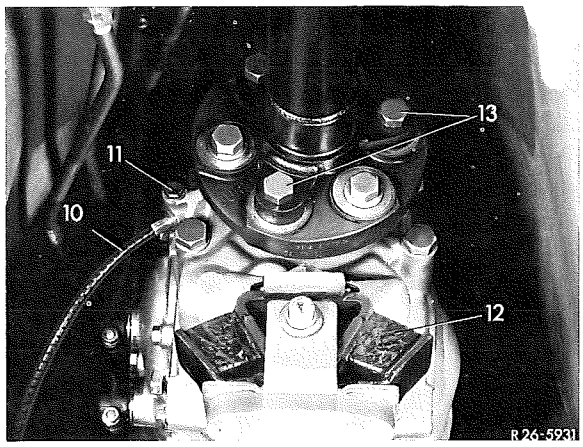


Fig. 8
10 Speedometer drive shaft
11 Fastening bolt
12 Rear engine rubber mount
13 Universal shaft bolt

12 Slide universal shaft toward the rear as far as the center bearing and the clamping piece permit.

13 Place suitable piece of wood underneath universal shaft in front of tunnel, so that shaft is pushed completely up (Fig. 9).

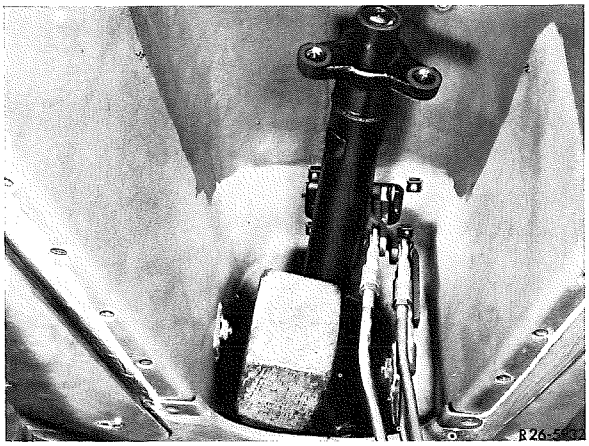


Fig. 9

14 Unscrew bolts for attaching starter and push starter out of its holding bracket.

Note: No nut is provided for upper starter bolt, since the threads are inside the starter flange.

15 Unscrew all bolts for attaching transmission to intermediate flange and remove the upper two bolts last.

Note: As a result of the heavy ribbing of the clutch housing most of the fastening bolts can only be reached by means of a 17 mm or 19 mm insert and extension (Fig. 10).

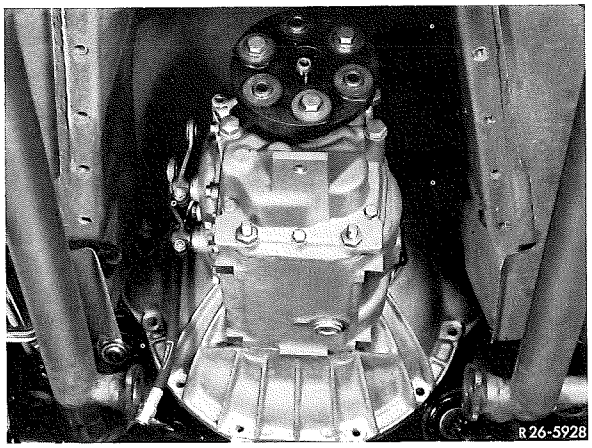


Fig. 10

16 Prior to pulling out of fitted round center, **turn transmission for at least 45° to the left** so that the starter domes on both sides of clutch housing cannot abut against front tunnel edge (Fig. 11).

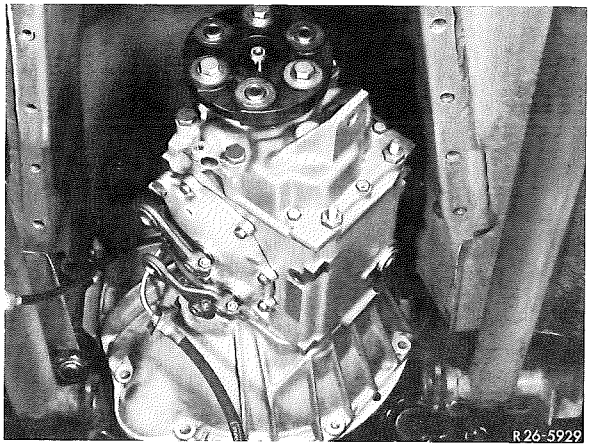


Fig. 11

17 Pull inclined transmission horizontally out of round center and clutch toward the rear and then remove in downward direction.

Caution! Tilt transmission to the rear only when the drive shaft is safely pulled out of driven plate hub. If this instruction is not observed, damage to driven plate may result.

Installation

18 Grease centering pin and splining on transmission drive shaft lightly with hot bearing grease.

19 Push universal shaft at front completely up against tunnel and hold in this position by means of a suitable piece of supporting wood (Fig. 9).

20 Engage one gear step and then introduce transmission at a longitudinal tilt of at least 45° toward the left into tunnel. Then introduce **horizontally** into clutch and fitted round center while rotating transmission main shaft in both directions until the splinings of the drive shaft and the driven plate are in alignment (Fig. 11).

21 Turn transmission to its normal position and screw to intermediate flange by means of pertinent fastening bolts, starting from the top. Watch out for grounding cable at left (Fig. 10).

22 Insert starter into holder on intermediate flange and tighten by means of the two fastening bolts.

23 Remove wooden supports under universal shaft and screw shaft to the transmission **in the same position as during removal.** To do so, lift engine-transmission unit by means of vehicle jack or pit lift as required (Fig. 12).

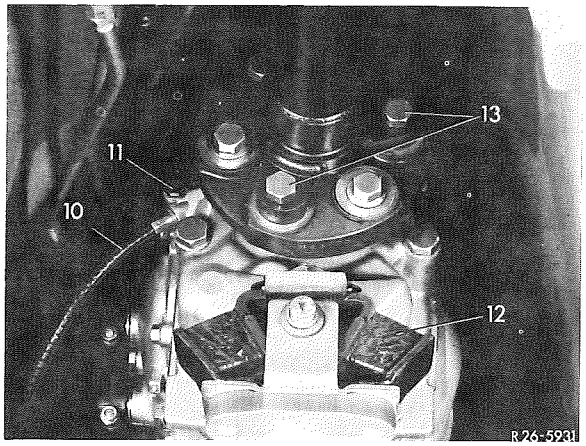


Fig. 12
10 Speedometer drive shaft
11 Fastening bolt
12 Rear engine rubber mount
13 Universal shaft bolt

24 If previously removed, check rear engine rubber mount (12) and screw to transmission (Fig. 12).

25 Attach transmission shift rods and secure with SL locks.

26 Attach drive shaft (10) for speedometer to rear transmission housing cover and tighten clamping bolt (11) (Fig. 12).

27 Mount tunnel closing plate (4). Tighten the twelve fastening bolts (8) uniformly (Fig. 13).

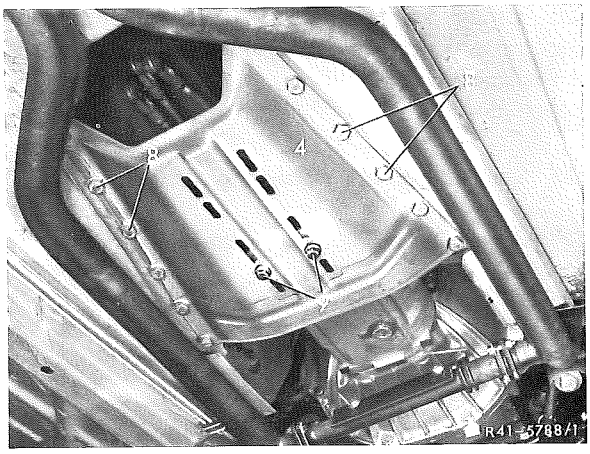


Fig. 13

4 Tunnel closing plate
8 Fastening bolts for tunnel closing plate
9 Fastening bolts for rear engine rubber mount

28 Insert both fastening bolts (9) for rear engine mount on tunnel closing plate and tighten (Fig. 13).

29 Position fastening bolts for universal shaft intermediate bearing, but do not yet tighten.

30 Move vehicle several times back and forth and then tighten universal shaft clamping nut to a tightening torque of 3 kpm (Fig. 14).

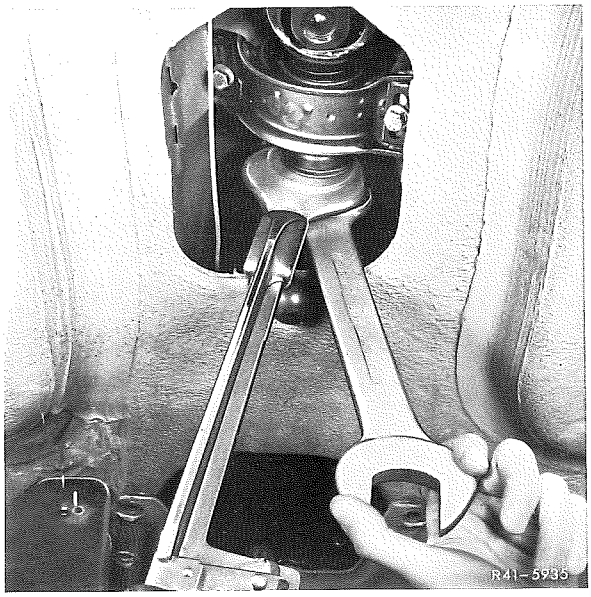


Fig. 14

31 Tighten fastening bolts of universal shaft intermediate bearing (Fig. 15).

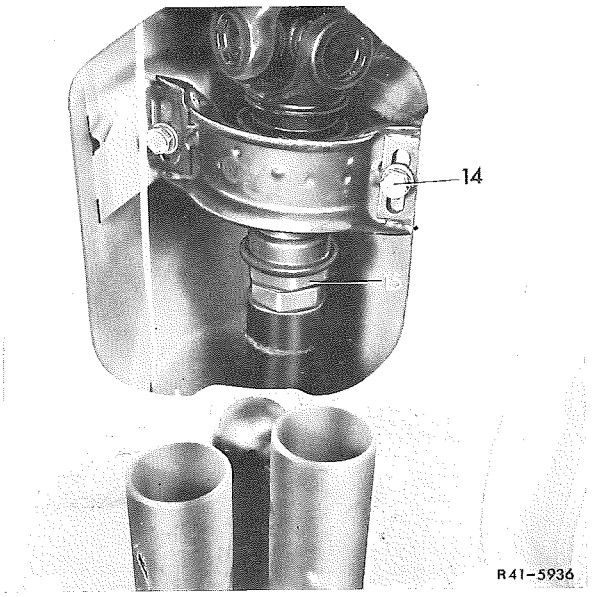


Fig. 15

14 Fastening bolts for universal shaft intermediate bearing
15 Universal shaft clamping nut

32 Mount rear portion of exhaust system.

33 Install compensating connection (1) between the two exhaust pipes front. Tighten flange bolts (2) uniformly, since otherwise leaks might occur (Fig. 16).

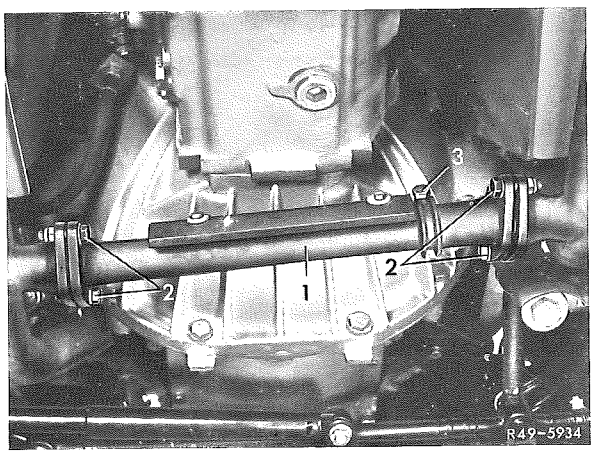


Fig. 16

1 Compensating connection
2 Fastening bolts
3 Fastening bolt for clamp

34 Screw pipe line (6) of hydraulic clutch actuation with clutch hose (7) to hose connection (arrow).

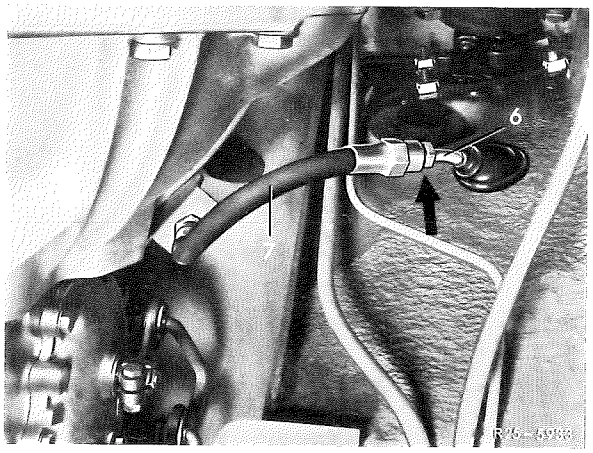


Fig. 17
6 Pipe line
7 Clutch hose

35 Vent hydraulic clutch actuation from bottom in upward direction and correct fluid level in combined compensating tank for brake and clutch system (25.1–110).

36 Connect grounding cable to battery.

37 Check transmission and clutch for perfect function.

Revision: Note extended.

Note

The manual transmissions of series G 76 are a compact unit and are for this reason supplied without clutch housing in the event of replacements.

In contrast to transmission versions supplied up to now, in which the clutch housing is screwed to the transmission by means of 6 screws, the transmission G 76/18 C is provided with 8 screw connections (Fig. 4).

Screwing-Off

1 Remove clutch throwout and clutch throwout rocker (25.1–150).

2 Loosen fastening nuts for clutch housing uniformly and remove together with shaft washers (Fig. 1).

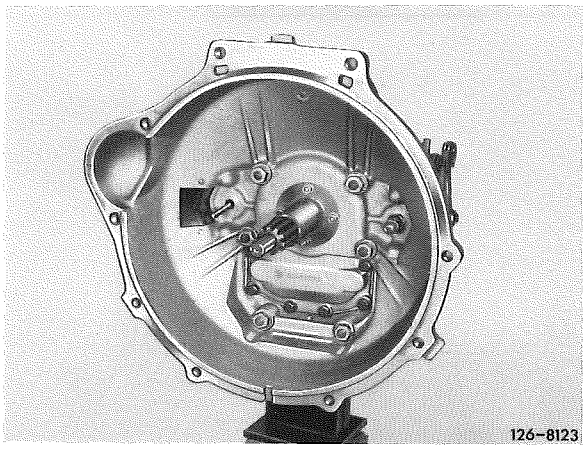


Fig. 1

3 Knock clutch housing from fitted flange (arrow) on front transmission housing cover with light hammer blows (Fig. 2) and remove completely with slave cylinder (5) and pressure line (6) from studs (Fig. 3).

Screwing-On

4 Slip clutch housing complete with slave cylinder and pressure line on studs of transmission housing and force onto fitted flange on front transmission housing cover by means of light hammer blows until seated against parting surface on transmission housing (Fig. 2).

5 Position fastening nuts with shaft washers and tighten uniformly (Fig. 1).

6 Attach clutch throwout rocker and clutch throwout.

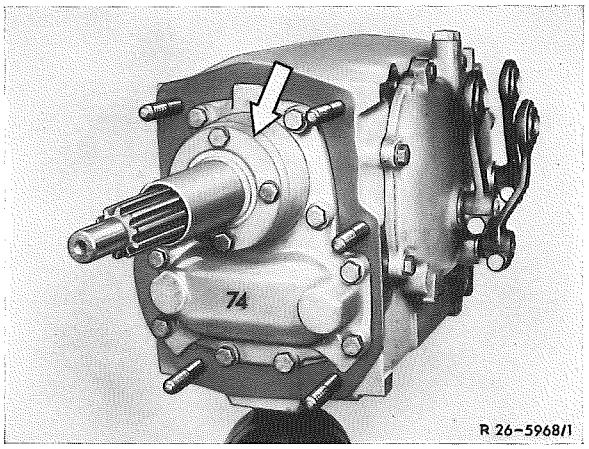


Fig. 2
74 Front transmission cover

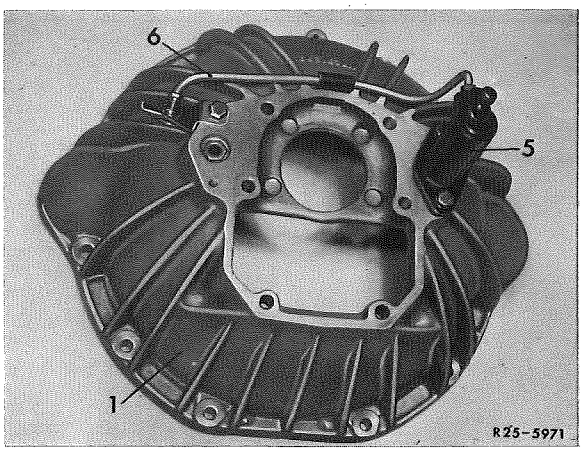


Fig. 3
1 Clutch housing
5 Slave cylinder
6 Pressure line

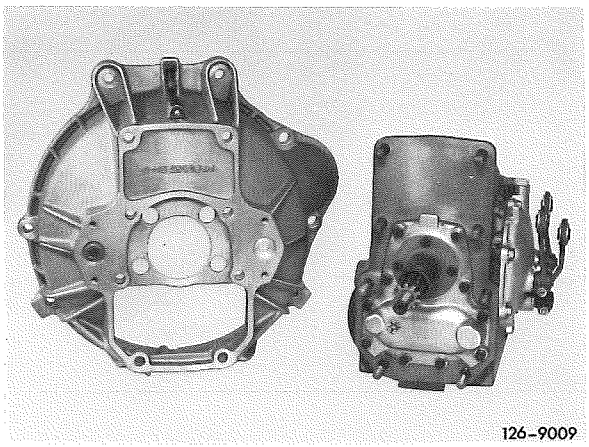


Fig. 4

Removal and Installation of Transmission Shift Cover 26.1

Revision: Revision reference extended (*).

Oil Grades / Filling Capacities

Automatic transmission fluid Type A, Suffix A		refer to "Specifications for Service Products" on page 236.1, 236.2
Filling Capacities	G 76/18, A, B, C	1.6
	G 76/27, A	1.8

Tightening Torque	Nm	(kpm)
Fastening bolts for shift cover	15	(1.5)

Special Tools

Socket wrench for hex. socket oil drain plug 14 mm	000 589 24 07 00
Hexagon insert (subject to wear)	000 589 24 07 01

Revision Reference

Designation	Unit Designation	As from Unit No.
Increasing height of breather neck on transmission shift cover by means of spacer sleeve	G 76/18	124 950
Increasing height of breather neck on transmission shift cover on casting. No spacer sleeve (on G 76/18)	G 76/18	315 700
	G 76/27 G 76/27 A	as from start of series
Sealing of needle sleeve for gear-shifting shaft bearing 1st and 2nd speed changed from lip sealing ring to O-ring	G 76/18 A	771 951 *
	G 76/18 B	006 336 *
	G 76/18 C	as from start of series *
	G 76/27 A	008 471 *

Removal

1 Drain transmission fluid.

2 Remove shift lever (112 a) for reverse speed after loosening clamping bolt (Fig. 1).

3 Force lock washer (121) from gear shifting shaft (112) for reverse speed and remove washer (120) (Fig. 2).

4 Unscrew fastening bolts (124) for shift cover (114).

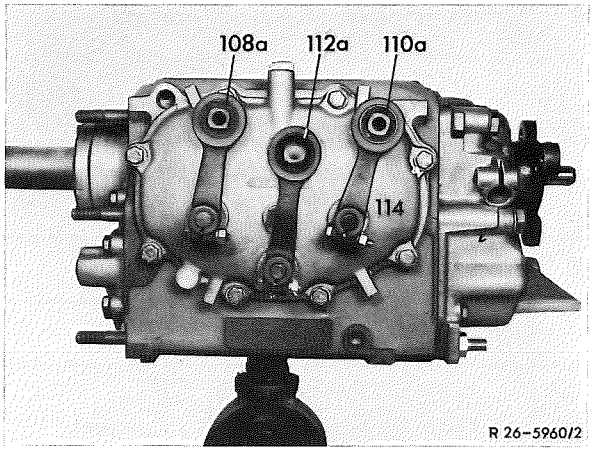


Fig. 1
108a Shift lever 3rd and 4th speed
110a Shift lever 1st and 2nd speed
112a Shift lever reverse speed
114 Shift cover

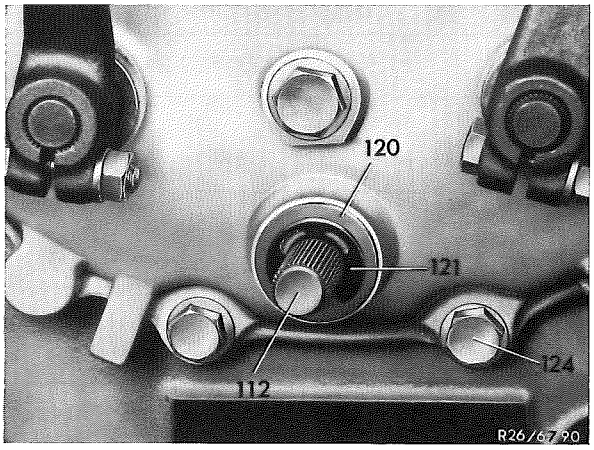


Fig. 2
112 Gear shifting shaft for reverse speed
120 Washer
121 Lock washer
124 Fastening bolt

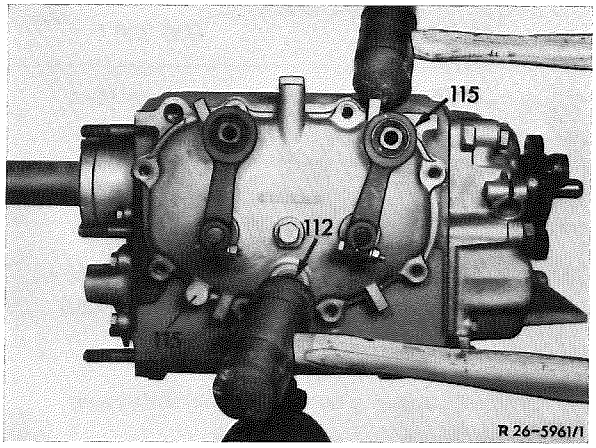


Fig. 3
112 Gear shifting shaft for reverse speed
115 Fitted pins

5 Carefully knock shift cover from fitted pins (115) while simultaneously using a second hammer against gear shifting shaft (112) for reverse speed to follow up in inward direction until the distance between the shift cover and the parting surface of the transmission housing is so large that fingers can be entered in between (Fig. 3 and 4).

6 Remove shift forks (106 and 107) in direction of arrow as shown in Fig. 4 from shift rockers (108 and 110).

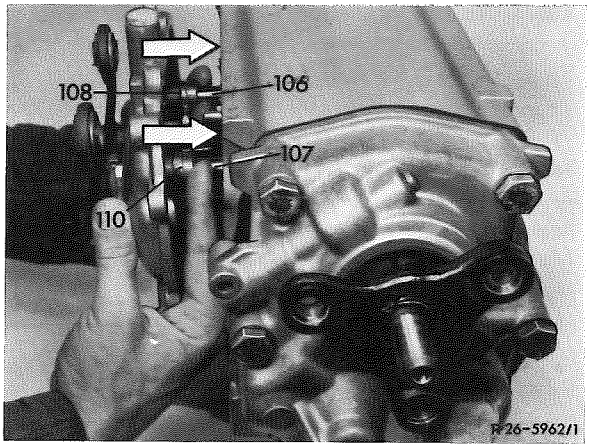


Fig. 4
106 Shift fork 3rd and 4th speed
107 Shift fork 1st and 2nd speed
108 Shift rocker 3rd and 4th speed
110 Shift rocker 1st and 2nd speed

7 Tilt shift cover first in direction of arrow A, then move in direction of arrow B and remove (Fig. 5).

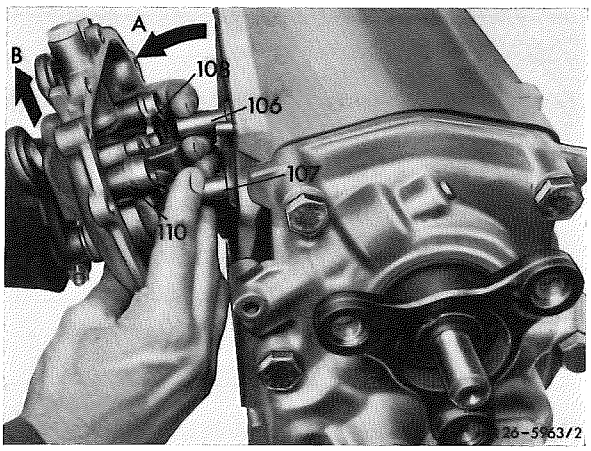


Fig. 5
106 Shift fork 3rd and 4th speed
107 Shift fork 1st and 2nd speed
108 Shift rocker 3rd and 4th speed
110 Shift rocker 1st and 2nd speed

Installation

8 Glue new paper seal with grease on carefully cleaned parting surface on transmission housing (Fig. 6).

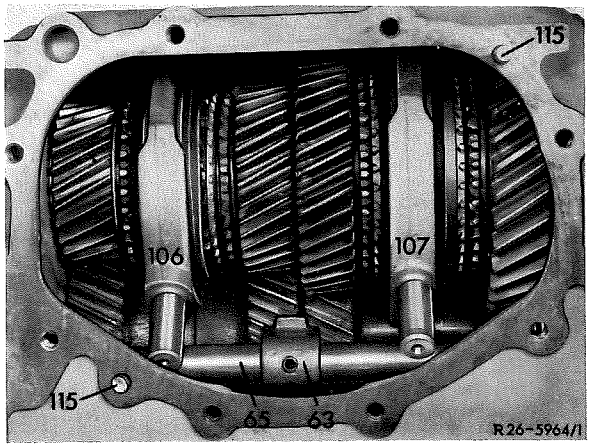


Fig. 6
63 Shifter for reverse speed
65 Shift rod for reverse speed
106 Shift fork for 3rd and 4th speed
107 Shift fork for 1st and 2nd speed
115 Fitted pins

9 Place shifter (63) for reverse speed shift rod (65) accurately in center position (Fig. 6).

10 Then position shift cover as shown in Fig. 7 in direction of arrow A in such a manner that the shifting finger (112 in Fig. 9) for reverse speed enters into groove on shifter (63) (arrow in Fig. 8). Then move shift cover in direction of arrow B, while simultaneously introducing shift forks (106 and 107) into shift rockers (108 and 110) (Fig. 7).

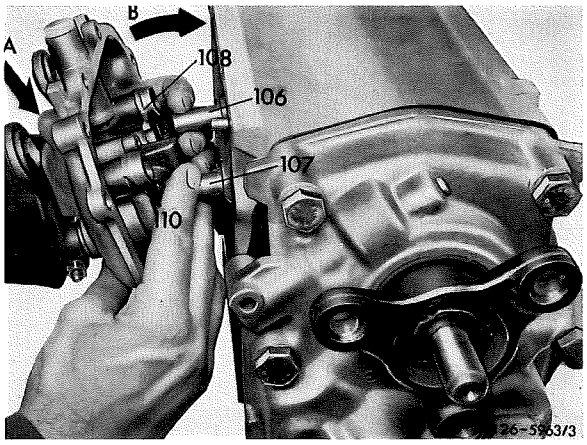


Fig. 7
106 Shift fork 3rd and 4th speed
107 Shift fork 1st and 2nd speed
108 Shift rocker 3rd and 4th speed
110 Shift rocker 1st and 2nd speed

Note! The shift cover can be positioned correctly only when the gear shifting shaft and thereby shift finger (112) for reverse speed has first been placed far enough out on shift cover inside surface (distance B in Fig. 9).

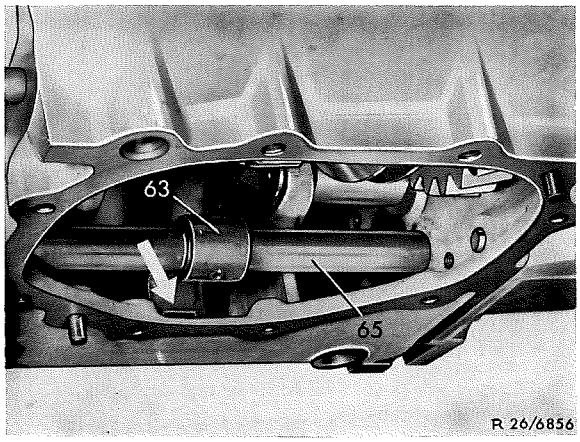


Fig. 8
63 Shifter for reverse speed
65 Shift rod for reverse speed

11 Move shift cover against parting surface of transmission housing with light hammer blows, making sure that the shift cover is correctly guided on the two fitted pins (115) (Fig. 6). The gear shifting shaft for reverse speed should come out of cover by the same distance the shift cover is moved against the parting surface of the transmission housing.

12 Tighten shift cover fastening bolts (124) uniformly and crosswise (Fig. 2).

Note: To prevent leaks on shift cover, make sure of careful and uniform tightening of fastening bolts.

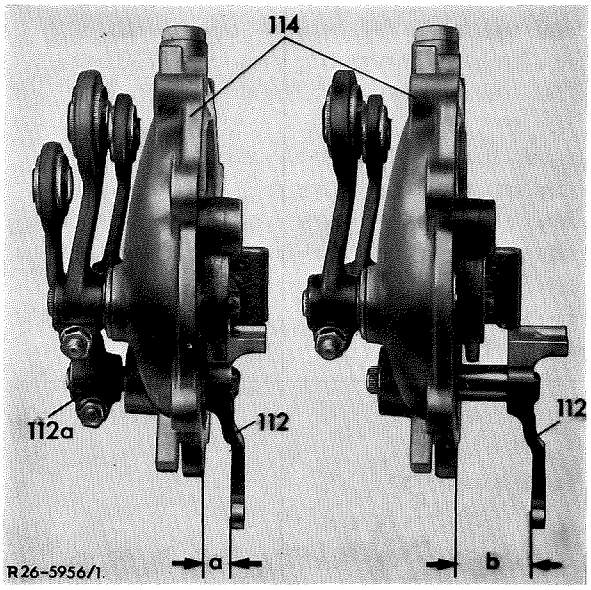


Fig. 9

a 10 mm
Distance between parting surface and shifting finger with shift cover in operating condition
b approx. 25 mm
Distance between shifting finger and cover required for assembly reasons
112 Shift finger with shaft for reverse speed
112a Shift lever for reverse speed
114 Shift cover

13 Slip washer (120) in position and insert lock washer (121) into ring groove on gear shifting shaft for reverse speed (Fig. 2).

14 Slide shift lever (112a) for reverse speed with reference to adjusting dimension on splining of gear shifting shaft and tighten clamping screw (Fig. 1).

15 Check shift cover for function by shifting through all the gears.

16 Fill-up with ATF up to overflow at filler hole.

Revision: Sealing on needle bearing changed, Fig. 6 added.

Tightening Torque	Nm	(kpm)
Fastening bolt for locking cage in shift cover	25	(2.5)

Note

The transmission shift cover may require disassembly in the event of leaks on shaft bearings of shift rockers and of defects on locking cage and on needle bearing for shift rocker of 1st and 2nd speed.

Shift covers differ in their dimensions in relation to differences in size between transmission types G 76/18 and G 76/27 or G 76/27 A.

Disassembly

1 Loosen clamping bolts and pull-off shift levers (Fig. 1).

Note: Shift lever (112a) has already been removed when removing shift cover from transmission.

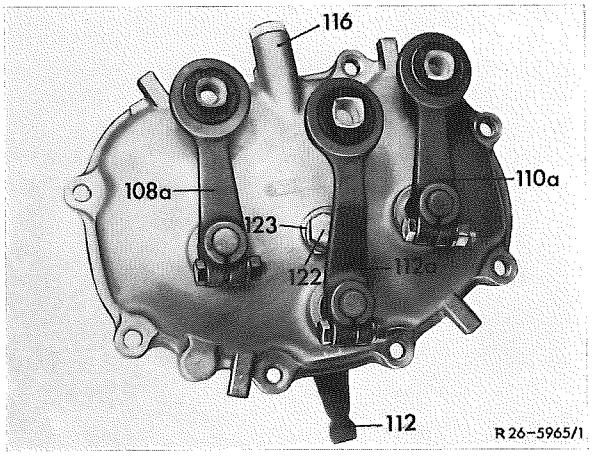


Fig. 1
108a Shift lever 3rd and 4th speed
110a Shift lever 1st and 2nd speed
112 Shift finger for reverse speed
112a Shift lever for reverse speed
116 Transmission breather
122 Fastening bolt for locking cage
123 Sheet metal lock or spring washer

2 Force lock washers (121) from gear shifting shafts and remove together with washers (120) (Fig. 3).

3 Pull shift rockers (108 and 110) and shift fingers (112) from inside of shift cover (Fig. 2).

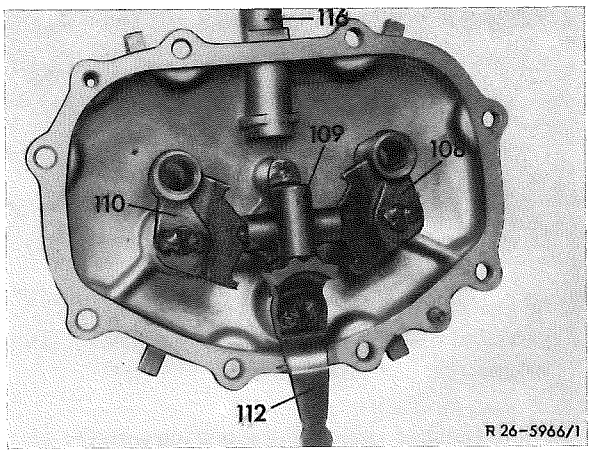


Fig. 2
108 Shift rocker for 3rd and 4th speed
109 Locking cage
110 Shift rocker for 1st and 2nd speed
112 Shift finger for reverse speed
116 Transmission breather

4 After unbending lock washer (123), unscrew fastening bolt (122) for locking cage (109) and carefully force locking cage from locating pin in cover and remove (Fig. 1 and 2).

Note: Instead of lock washer, a spring washer may already be installed or may be installed now.

Sealing Jobs

In the event of leaks on shafts of shift rocker for 3rd and 4th speed (108) or of shift finger for reverse speed (112), replace O-rings (111) by new ones (Fig. 4).

26.1 Disassembly, Assembly of Gear Shift Cover, Sealing Shafts of Shift Rockers

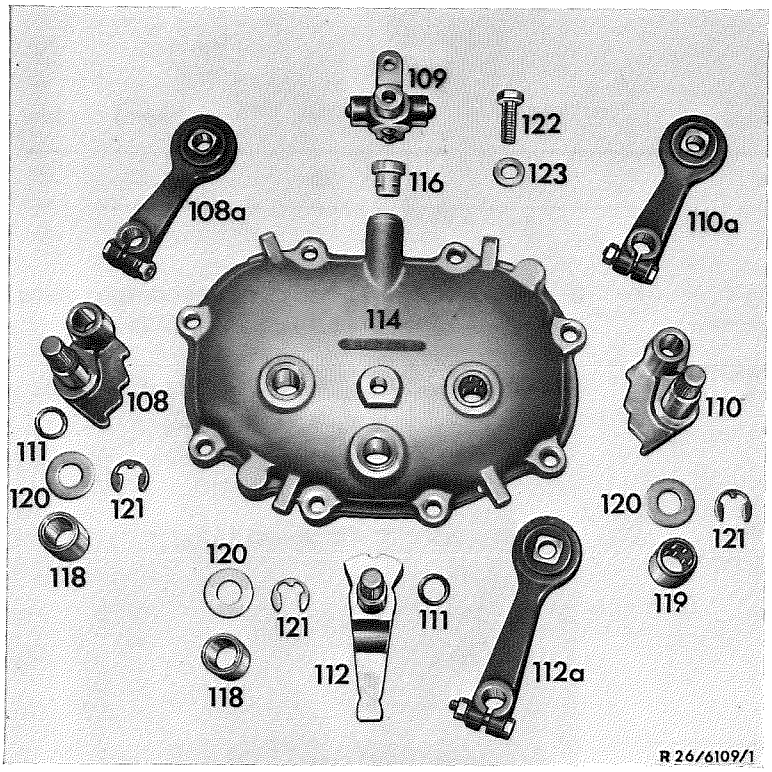


Fig. 3

108	Shift rocker for 3rd and 4th speed
108a	Shift lever for 3rd and 4th speed
109	Locking cage
110	Shift rocker for 1st and 2nd speed
110a	Shift lever for 1st and 2nd speed
111	O-ring
112	Shift finger for reverse speed
112a	Shift lever for reverse speed
114	Gear shifting cover
116	Breather
118	Bushing (bearing of gear shifting shaft 3rd and 4th speed or reverse speed)
119	Needle sleeve (bearing of gear shifting sleeve 1st and 2nd speed)
120	Washer
121	Lock washer
122	Hex. bolt
123	Lock washer or spring plate

If oil losses are noticed on shaft of shift rocker for 1st and 2nd speed (110) the self-sealing needle bearing (119) must be replaced (Fig. 3).

As from October 1972 a needle bearing with O-ring has been installed instead of self-sealing needle bearing (Fig. 6).

During sealing jobs only replace O-ring.

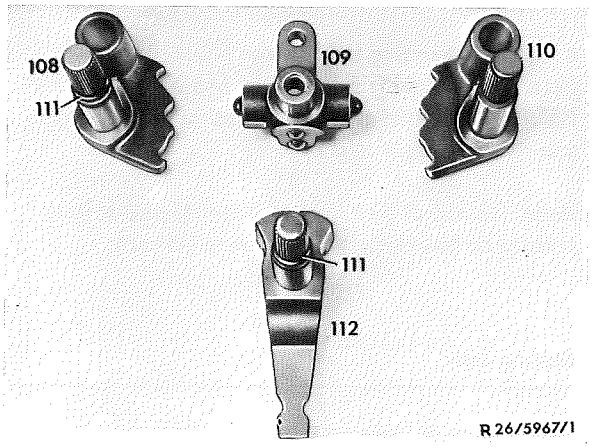


Fig. 4

108 Shift rocker for 3rd and 4th speed
109 Locking cage
110 Shift rocker for 1st and 2nd speed
111 O-ring
112 Shift finger for reverse speed

Note: As a result of the different dimensions of the gear shifting covers, the locking cages are different with regard to their lateral extension. When replacing locking cage, make sure that the correct locking cage is mounted in each gear shifting cover. Replacement of locking cage (109) does not require disassembly of gear shifting cover (Fig. 5).

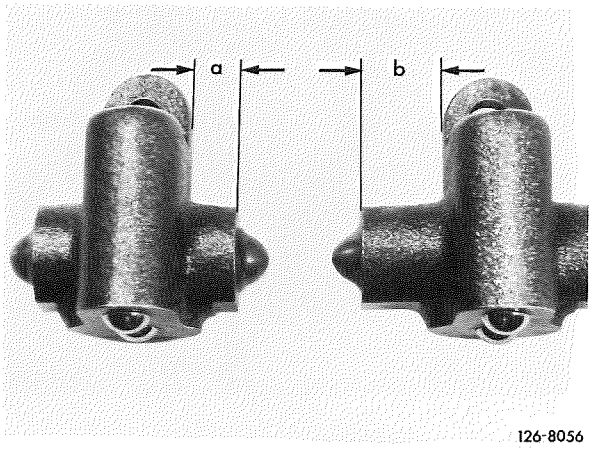


Fig. 5
Locking cage

At the left version for transmission G 76/18, 18 A, 18 B and 18 C
At the right version for transmission B 76/27 or G 76/27 A
Difference in distance "a" approx. 7 mm, "b" approx.13 mm

Assembly

5 Push locking cage (109) with fitted pin into bore of cover and push with fitted bore against locating pin. Then tighten with fastening screw (122) and secure with lock washer (123) or use spring washer (Fig. 3).

6 Grease shafts of shift rockers (108 and 110) and of shift finger (112) for reverse gear lightly with anti-friction bearing grease and insert in shift cover according to Fig. 3. Make particularly sure that the O-rings (111) are not damaged (Fig. 3 and 4).

7 Place washers (120) on shafts of shift rockers (108 and 110) on front end of cover and secure by sliding lock washers (121) on gear shifting shafts (Fig. 3).

Note: Secure shift finger (112) for reverse gear only after screwing cover to transmission using washer (120) and shaft lock (121).

Attaching and clamping of shift levers (108a, 110a and 112a) on gear shifting shafts is suitably done after screwing cover to transmission in accordance with reference drawing.

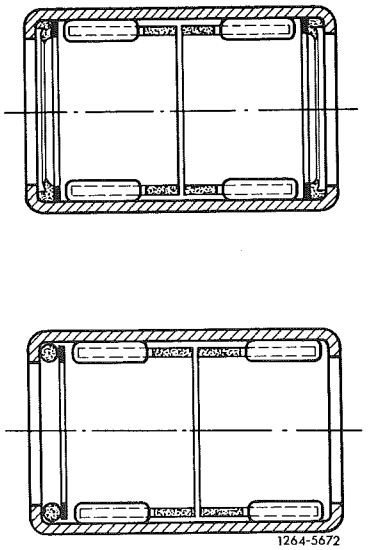


Fig. 6
Upper view: Self-sealing needle bearing
Lower view: Needle bearing with O-ring

Tightening Torque	Nm	(kpm)
Bolts for attaching front transmission cover	15	(1.5)

Screwing-Off

1 Remove clutch throwout and throwout rocker (25.1–150).

2 Unscrew clutch housing (26.1–050).

3 Unscrew fastening bolts for front transmission cover (Fig. 1).

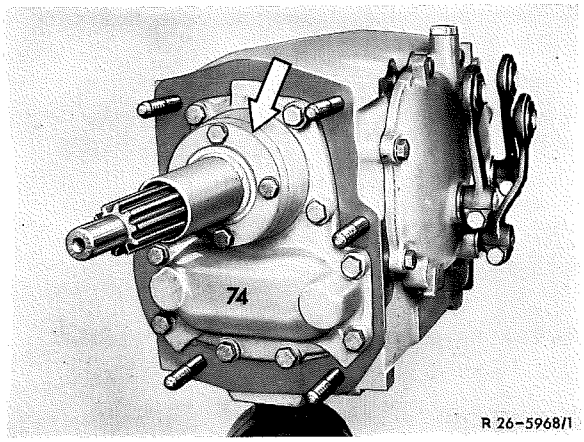


Fig. 1
74 Front transmission cover

4 Carefully pull-off front transmission cover over input shaft, while watching compensating washer (2) for input shaft and compensating washer (49) for countershaft (Fig. 2 and 3).

Screwing-On

5 Place spacing discs (2 and 49) and gasket (75) in or on cover and glue down with grease to facilitate assembly (Fig. 3).

6 Grease sealing ring on sealing lip and running surface on drive shaft.

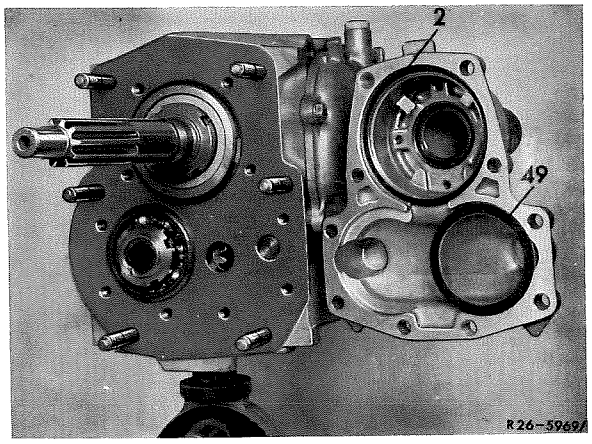


Fig. 2
2 Compensating washer for input shaft
49 Compensating washer for countershaft

7 Make bolts and threads in transmission housing free of grease and coat with a non-hardening sealing compound.

8 Slide cover (74) carefully on input shaft well against parting surface of transmission housing.

9 Screw-in fastening bolts and tighten uniformly and crosswise.

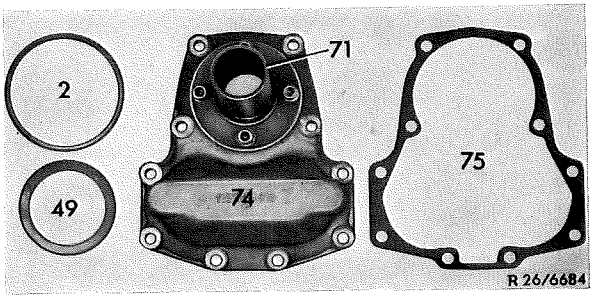


Fig. 3
2 Compensating washer for input shaft
49 Compensating washer for countershaft
71 Bearing tube
74 Front transmission cover
75 Gasket

26.1 Screwing Bearing Tube of Transmission Cover Front Off and On, Replacement of Sealing Ring

Scope

1 Unscrew clutch housing (26.1–050).

2 Unscrew transmission cover front (26.1–210).

3 Unscrew fastening bolts for bearing tube (71) and remove bearing tube (Fig. 1).

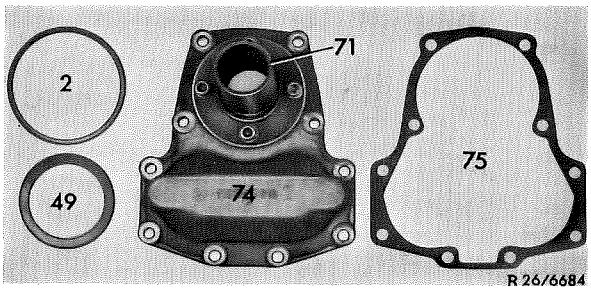


Fig. 1
2 Compensating washer for input shaft
49 Compensating washer for countershaft
71 Bearing tube
74 Front transmission cover
75 Gasket

4 Force sealing ring (76) out of cover (74) with a suitable mandrel of approx. 45 mm dia. (Fig. 2).

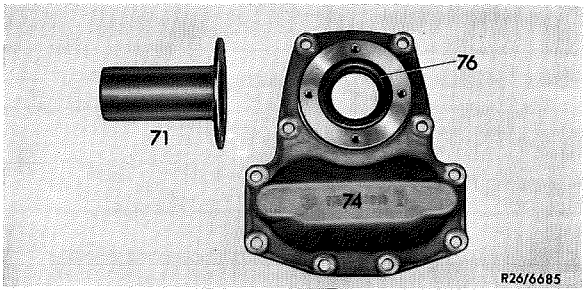


Fig. 2
71 Bearing tube
74 Front transmission cover
76 Sealing ring

5 Press new sealing ring (76) into cover flush with parting surface (Fig. 2).

6 Screw bearing tube (71) lightly on cover by means of fastening bolts, but do not yet tighten (Fig. 1).

7 Mount transmission cover front (26.1–210).

8 Screw-on clutch housing (26.1–050).

9 Then tighten fastening bolts of bearing tube (71) (Fig. 1).

Screwing Transmission Cover Rear Off and On Replacement of Sealing Ring 26.1

Revision: Special tools part No. changed, new tool added, revision reference extended (*), Fig. 2 changed, Fig, 3, 8 and 10 added, item 11 and 12 edited.

Tightening Torques	Nm	(kpm)
Fastening bolts M 10	45	(4.5)
Fastening bolts M 7	15	(1.5)
Slot nut for three-arm flange	150	(15)

Special Tools

Slot nut wrench insert 3/4" square for slot nut on transmission flange	115 589 01 07 00
Socket wrench for counter-holding transmission flange when loosening and tightening slot nut	116 589 10 07 00 *
Puller for three-arm flange	116 589 19 33 00 *

Revision Reference

Designation	Unit Designation	as from Unit No.
Change from slot nut with pinch collar to slot nut to polystop insert on three-arm flange (Fig. 7)	G 76/18	005 001
Change from slot nut with polystop insert to slot nut with pinch collar on three-arm flange (Fig. 7)	G 76/18	239 470
	G 76/27 G 76/27 A	–
To protect slot on three-arm flange, the round groove used up to now has been replaced by a triangular groove milled into main shaft (Fig. 10)	G 76/18 A	793 237 *
	G 76/18 B	009 922 *
	G 76/18 C	as from start of series *
	G 76/27 A	010 233 *
With transmissions G 76/18 A and B installed in production vehicles, a modified rear transmission cover is employed. Stop collar for rear countershaft bearing machined deeper by 1 mm. New and old cover cannot be interchanged (Fig. 1)	G 76/18	–
	G 76/27	049 594
	G 76/27 A	006 294

26.1 Screwing Transmission Cover Rear Off and On, Replacement of Sealing Ring

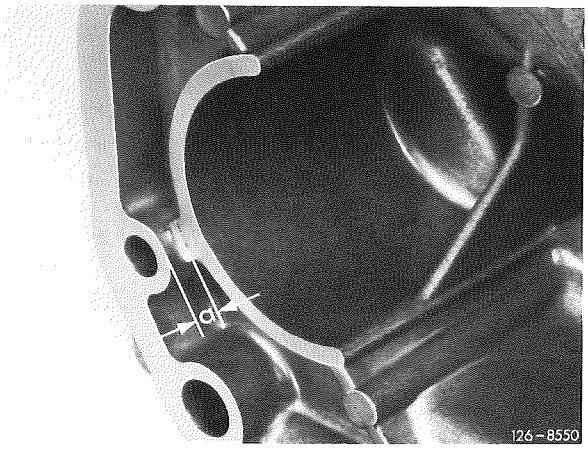


Fig. 1
Dimension "a" on old cover 4 mm
on new cover 5 mm

Attention! If the rear transmission cover of transmission types G 76/18, G 76/27 and G 76/27 A is renewed, a cover with a lateral, machined depth of 4 mm must be installed again (Fig. 1).

In exceptional cases, the 4-mm version can also be replaced by the modified transmission cover with its stop point for the rear countershaft bearing machined 5 mm deeper. However, this requires placing a steel washer 1 mm thick between teeth of 1st speed of countershaft and rear bearing after pulling-off rear countershaft bearing. If this is not done, the countershaft will have too much end play and the gear wheels of 2nd gear main shaft and 3rd gear countershaft will touch each other. In addition, the new, shorter reversing gear must be mounted on countershaft, since otherwise no accurate locking of slot nut or hex. nut is possible.

Screwing-Off

1 Unlock slot nut for attaching universal flange and loosen and unscrew with slot nut wrench insert while counterholding with socket wrench (Fig. 2).

2 Remove universal flange with puller (Fig. 3).

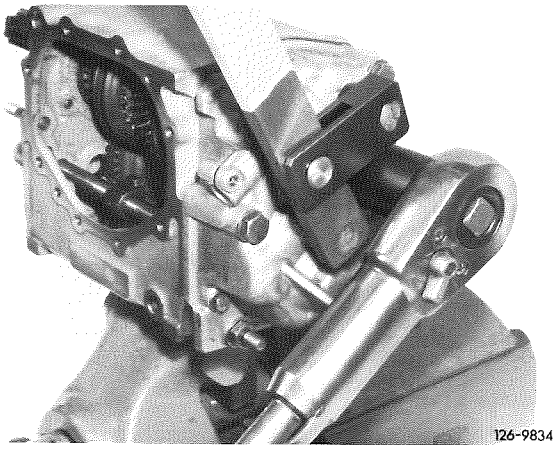


Fig. 2

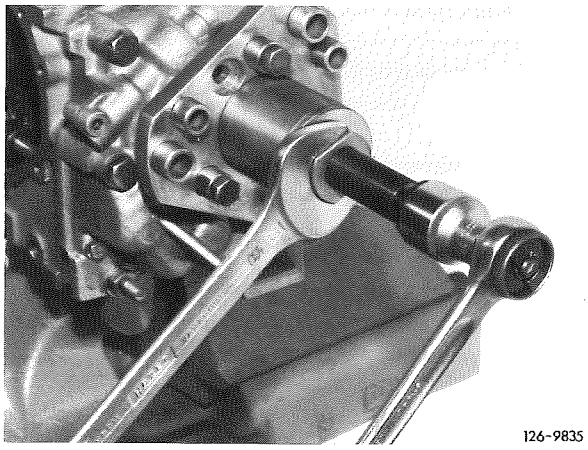


Fig. 3

3 Unscrew fastening bolts (94, 102, 103 and 105) and remove rear transmission cover (Fig. 4 and 5).

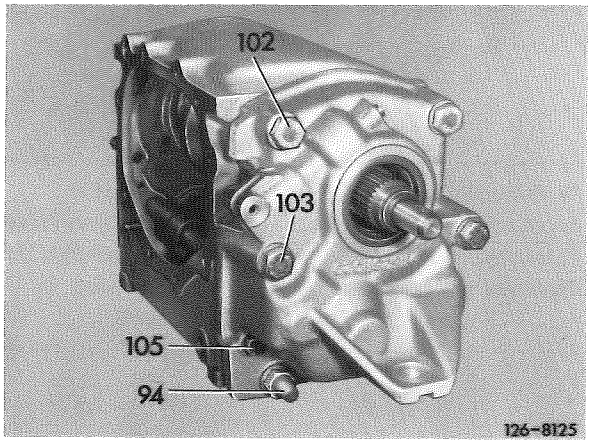


Fig. 4
94 Collar screws
102, 103, 105 Hex. bolts

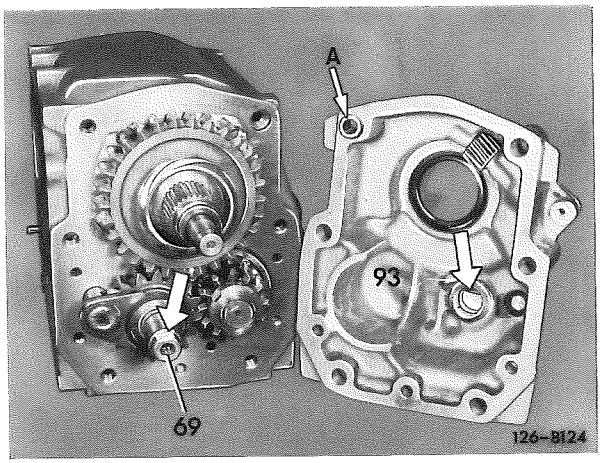


Fig. 5
69 Reversing shaft
93 Transmission cover rear

Note: No special preparations are required for gear assembly of transmission when removing rear cover.

Replacement of Radial Sealing Ring

4 Force radial sealing ring (101) out of cover by means of a suitable mandrel of approx. 52 mm dia. (Fig. 6).

5 Press new radial sealing ring into cover flush with outer edge (Fig. 6).

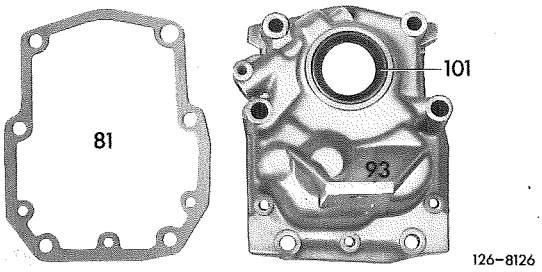


Fig. 6
81 Gasket
93 Transmission cover rear
101 Radial sealing ring

Screwing-On

6 Glue new gasket with grease on parting surface of cover to facilitate assembly (Fig. 6).

7 Carefully slide cover over main shaft against parting surface of transmission housing, watching the fitted sleeve (arrow A) and making particularly sure that the milled surface (arrow) of the reversing shaft (69) is on top and is correctly introduced into the locating bore (arrow in cover) (Fig. 5).

8 Screw down cover uniformly and crosswise by means of fastening bolts (94, 102, 103 and 105), (Fig. 4).

9 Grease three-arm flange on running surface of radial sealing ring.

10 Slide three-arm flange on main shaft and screw-on slot nut for attaching flange by hand.

11 Tighten slot nut with socket wrench insert while counterholding with slot nut wrench.

Note: For attaching three-arm flange, use slot nut with polystop insert or slot nut with pinch collar. When repairing a transmission with polystop nut, use new polystop nut, since the main shaft has no slot for securing pinch nut (Fig. 7).

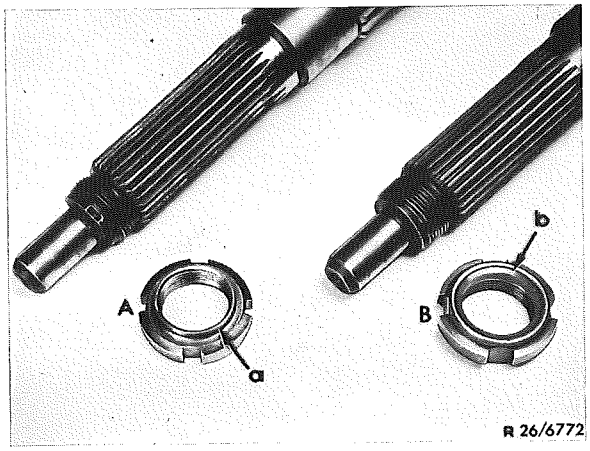


Fig. 7
A Slot nut with pinch collar and shaft
B Slot nut with polystop insert and shaft
a Pinch collar
b Polystop insert

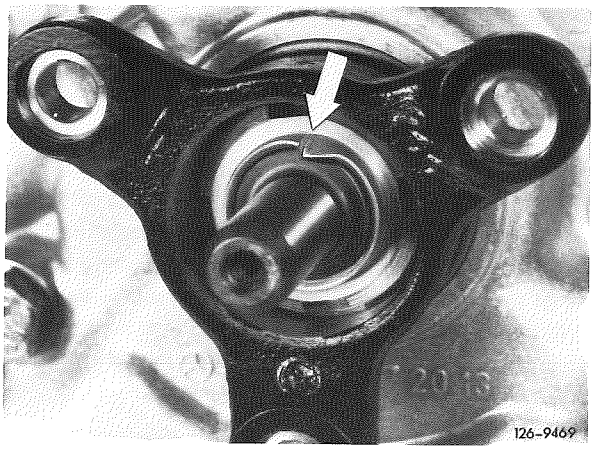


Fig. 8

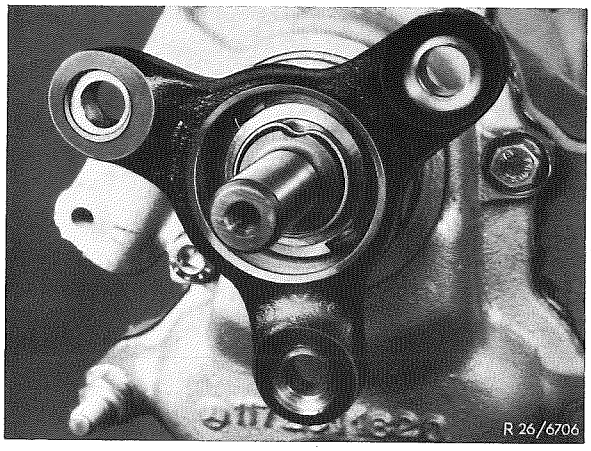


Fig. 9

12 Secure slot nut.

On main shafts with triangular groove, secure slot nut by means of a punch by cutting pinch collar (Fig. 8 and 10), and on main shafts with round groove by pressing down pinch collar (Fig. 9 and 10).

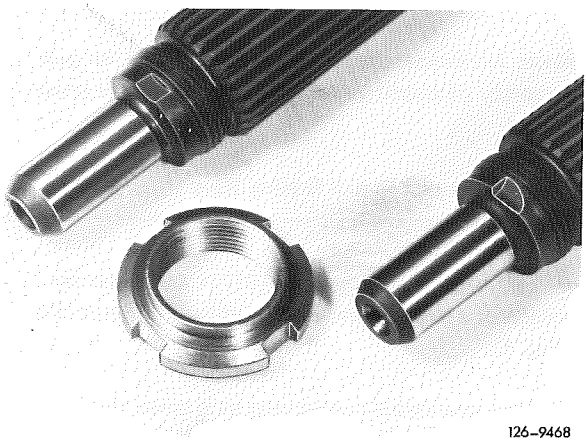


Fig. 10

Revision

Designation	Unit Designation	As from Unit No.
Seal for tachometer drive on rear transmission cover has been changed from a plug to a ball (Fig. 1).	G 76/18	412 370
	G 76/27	032 430
	G 76/27 A	001 001

Removal

1 Unscrew transmission cover at rear (26.1–310).

2 Press-out speedometer drive in direction toward ball with the aid of suitable supports and a mandrel, using a manually operated press.

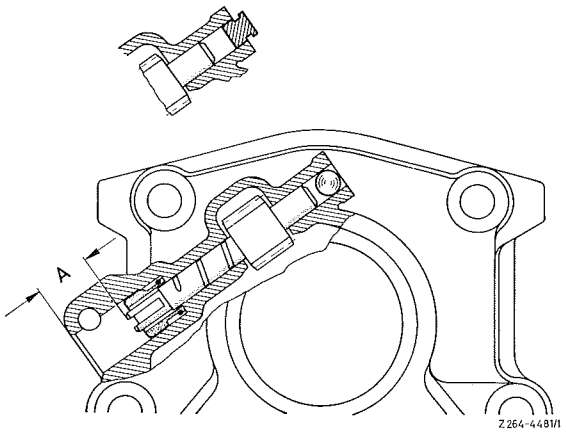


Fig. 1
A = 19 mm

Note: On transmissions with plug, remove plug prior to pressing-out tachometer drive by means of screw driver or pliers.

3 Pull radial sealing ring (99) out of tachometer drive.

Note: To facilitate removal, screw a hex. bolt M 12 into sealing ring and clamp into vise. Apply light blows with a plastic hammer against cover while removing radial sealing ring (Fig. 2).

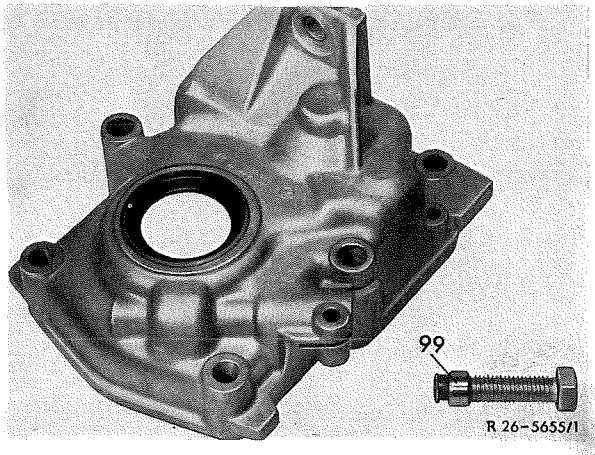


Fig. 2
99 Radial sealing ring

4 Check individual parts of speedometer drive for wear and damage.

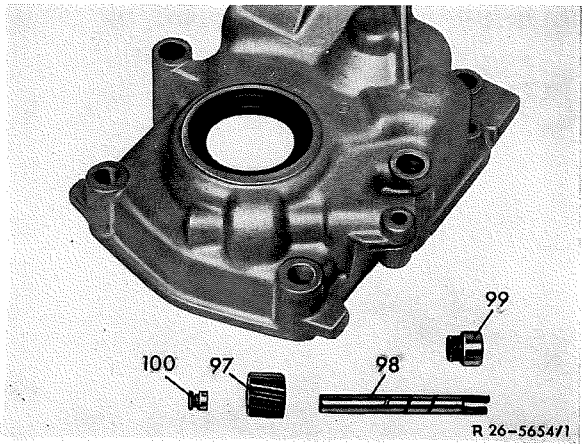


Fig. 3
97 Drive pinion
98 Shaft – drive for speedometer
99 Radial sealing ring
100 Plug or ball

Installation

5 Place radial sealing ring (99) flush on side of drive shaft (98) on which the groove for connecting the flexible speedometer shaft is milled in.

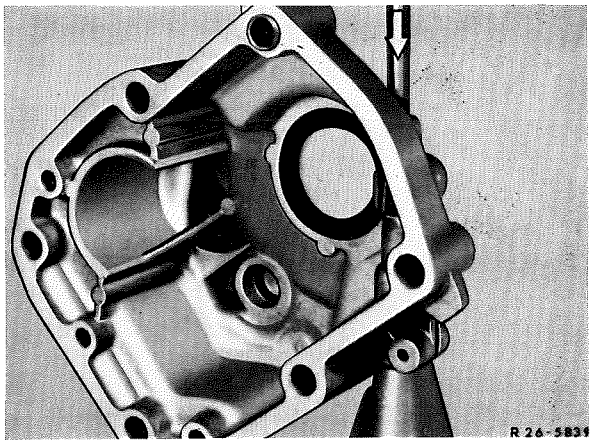


Fig. 4

6 Insert drive pinion (97) into rear transmission cover.

7 Press-in drive shaft (98) with radial sealing ring (99) on a manual press until the distance A of 19 mm between cover and upper edge of drive shaft is established (Fig. 1).

8 Press-in sealing ball until it is flush with upper edge of transmission cover (Fig. 1 and 4).

Note: On transmissions with plug, the latter is coated with sealing compound and knocked in by lightly tapping with a plastic hammer.

9 Screw-on rear transmission cover (26.1–310).

Removal and Installation of Reverse Speed Gear 26.1

Revision: Special tool part No. changed, revision reference extended (*), section B Synchronizing Unit added.

Tightening Torques	Nm	(kpm)
Fastening bolts M 10 for rear transmission cover	45	(4.5)
Fastening bolts M 7 for rear transmission cover	15	(1.5)
Slot nut with polystop insert or with pinch collar for three-arm flange	150	(15)
Slot nut or hex. nut with pinch collar on countershaft rear	150	(15)

Special Tools

Slot nut wrench insert 3/4" square for slot nut on transmission flange	115 589 01 07 00
Socket wrench for counterholding on transmission flange when loosening and tightening slot nut	116 589 10 07 00 *

Revision Reference

Designation	Unit Designation	As from Unit No
Change of complete reversing gear set from taper to round points Reason: to improve shifting of reverse gear	G 76/18	064 856
Change from slot nut to hex. nut on countershaft rear	G 76/18	554 275
	G 76/27	044 079
	G 76/27 A	003 737
Change of reversing gear on countershaft Reason: to match transmission G 76/18 B	G 76/27	049 594
	G 76/27 A	006 294
With synchronizing unit Reason: to improve shifting of reverse gear	G 76/27 A	014 398 *

26.1 Removal and Installation of Reverse Speed Gear

A. Without Synchronizing Unit

Note

If the assembly jobs are exclusively restricted to reversing gears, no removal of transmission is required.

Removal

1 Unscrew transmission cover at rear (26.1–310).

2 Remove worm gear (45) for speedometer drive (Fig. 1).

3 Pull reverse gear (35) from main shaft.

4 Pull reverse shaft (69) for reversing slide gear (70) from transmission housing while holding slide gear in position (Fig. 2).

5 Unlock slot nut (62) on countershaft rear and screw-off (Fig. 2), while placing three-arm flange provisionally on main shaft and counterholding with slot nut wrench when loosening slot nut.

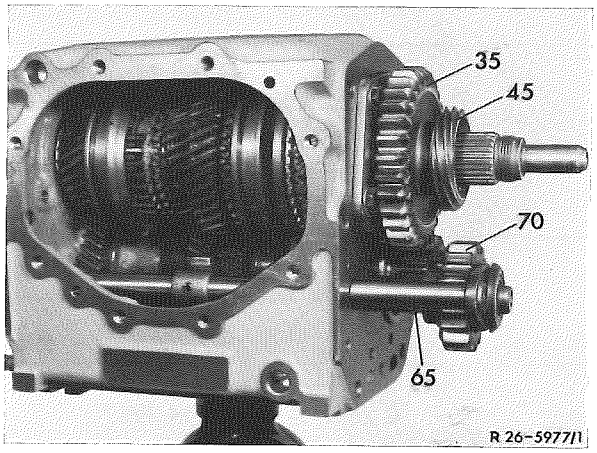


Fig. 1

35 Reverse gear – main shaft
45 Worm gear, tachometer drive
65 Shift rod for reverse gear
70 Reverse speed slide gear

6 Force reverse gear – countershaft (58) from countershaft by means of screw driver.

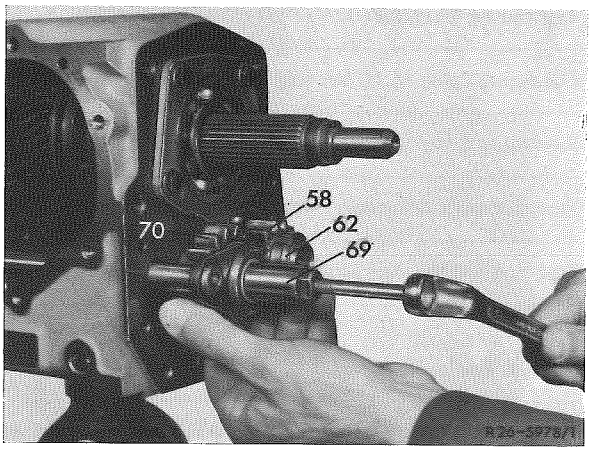


Fig. 2

58 Reverse gear – countershaft
62 Slot nut or hex. nut
69 Reverse shaft
70 Reverse speed slide gear

Installation

7 Slide reverse gear – counterhsaft (58) on countershaft and attach with nut (62).

Note: Slot nut (62) on countershaft can be replaced by a hex. nut with pinch collar. This hex. nut is now standard.

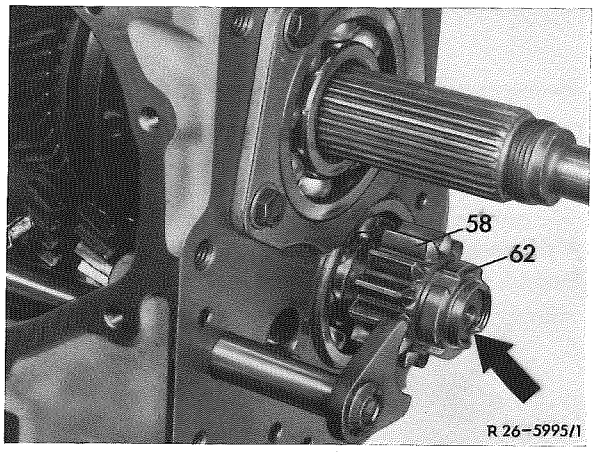


Fig. 3

58 Reverse speed gear – countershaft
62 Slot nut or hex. nut

8 Carefully secure nut (62) by peening pinch collar into groove provided in countershaft (arrow in Fig. 3).

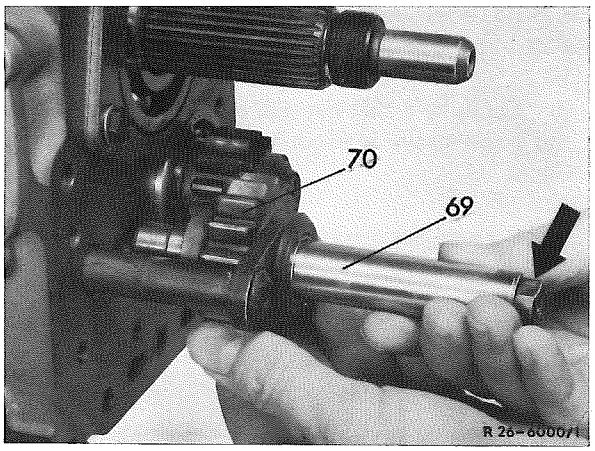


Fig. 4
69 Reverse shaft 70 Reverse speed slide gear

9 Insert reverse speed slide gear (70) with its ring groove into shifting claw of reverse speed gear shifting shaft and reverse shaft (69) for reverse speed slide gear through the latter into transmission housing. **Make sure that the milled surface on the shaft journal is on top** (arrow in Fig. 4).

10 Slide-on reverse speed gear – main shaft (35) as well as worm gear (45) for speedometer drive. Recess of worm gear (45) should face toward the rear (Fig. 1).

11 Screw-on rear transmission cover (26.1–310).

B. With Synchronizing Unit

Note

If the assembly jobs are exclusively restricted to reversing gears, no removal of transmission is required.

Removal

1 Remove transmission shift cover and take out shift forks (26.1–110).

2 Unscrew transmission cover at rear (26.1–310).

3 Remove worm gear (45) for speedometer drive (Fig. 1).

4 Pull reverse gear (35) from main shaft.

5 Pull reverse shaft (69) for reverse speed slide gear (70a) out of transmission housing, holding reverse speed slide gear, synchronizing ring (70b) with locking bolts, retaining plate (70c) and compression spring (70d) in place (Fig. 2 and 3).

6 Remove reverse speed slide gear with synchronizing members.

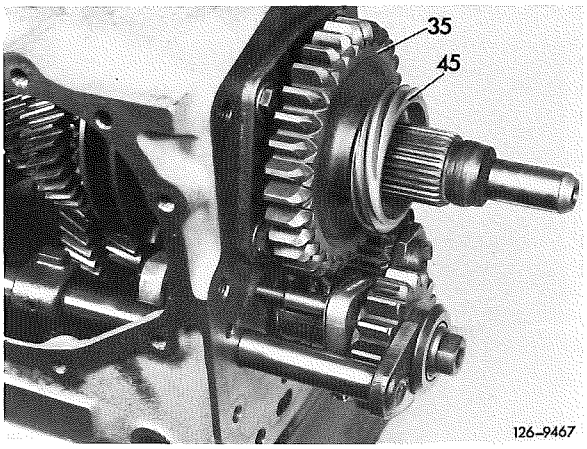


Fig. 1
35 Reverse gear – main shaft
45 Worm gear – tachometer drive

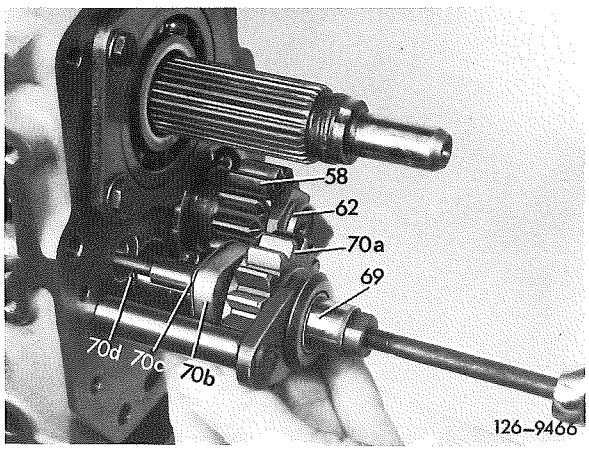


Fig. 2
58 Reverse speed gear – countershaft
62 Hex. nut
69 Reverse shaft
70a Reverse speed slide gear
70b Synchronizing ring
70c Retaining plate
70d Compression spring

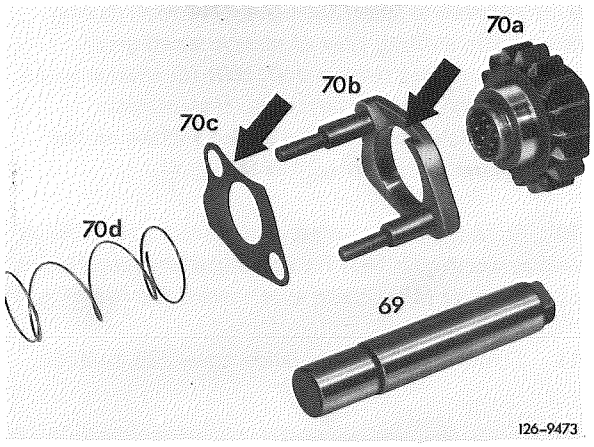


Fig. 3

69 Reverse shaft
70a Reverse speed slide gear
70b Synchronizing ring
70c Retaining plate
70d Compression spring

7 Unlock slot nut (62) on countershaft rear and screw-off (Fig. 2 and 5), while placing three-arm flange provisionally on main shaft and counterholding with slot nut wrench when loosening slot nut.

8 Force reverse gear – countershaft (58) from countershaft by means of screw driver.

Installation

Note: When renewing reverse gear countershaft (58), watch out for gear width (Fig. 4).

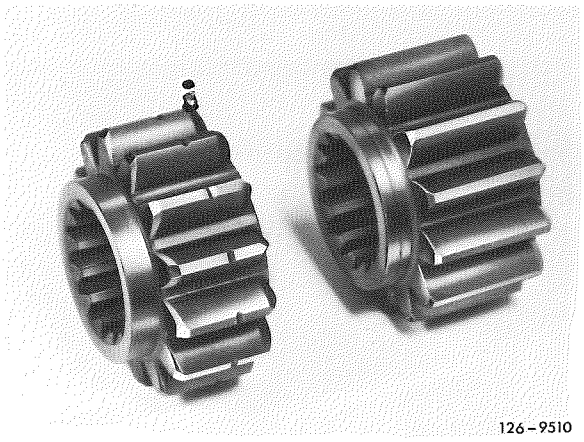


Fig. 4

At the left: Reverse gear/countershaft without synchronizing unit

At the right: Reverse gear/countershaft with synchronizing unit

9 Slide reverse gear – countershaft (58) on countershaft and attach with nut (62).

10 Carefully secure nut (62) by peening pinch collar into groove provided in countershaft (arrow in Fig. 5).

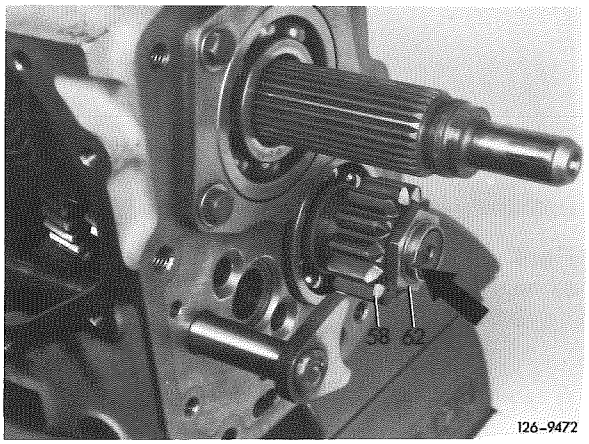


Fig. 5

58 Reverse speed gear – countershaft
62 Hex. nut

11 Insert reverse speed slide gear (70a) into shifting claw of reverse speed gear shifting shaft and mount together with synchronizing ring (70b), retaining plate (70c) and compression spring (70d) in such a manner that recesses of synchronizing ring (70d) and retaining plate (70c) are facing the countershaft bearing (arrows in Fig. 3 and 6).

Note: Mount reverse speed slide gear (70a) in such a manner that points of gear flanks are facing transmission housing.

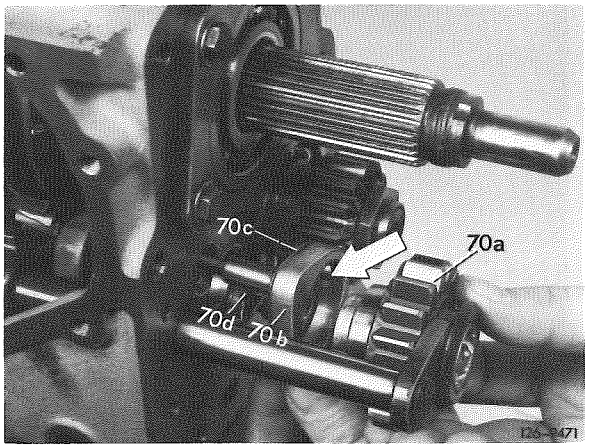


Fig. 6

70a Reverse speed slide gear
70b Synchronizing ring
70c Retaining plate
70d Compression spring

12 Slip reverse shaft (9) into reverse speed slide gear.

Make sure that milled flat on shaft journal is facing upwards (arrow in Fig. 7).

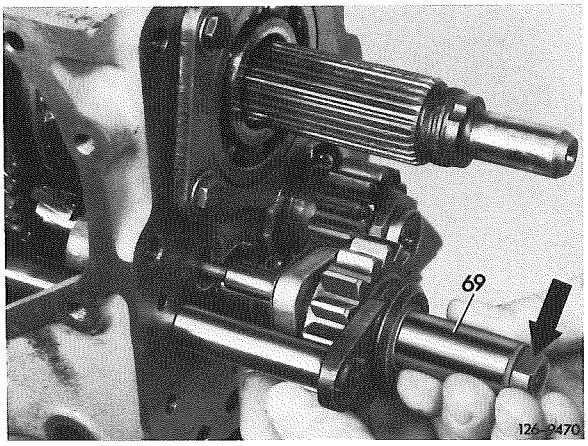


Fig. 7

13 Mount reverse gear main shaft (35) as well as helical gear (45) for tachometer drive. Recess of helical gear (45) should face toward the rear (Fig. 1).

Note: Mount reverse gear main shaft (35) in such a manner that points of tooth flanks are facing toward the rear.

14 Screw-on rear transmission cover (26.1–310).

15 Insert shift forks into shift sleeves of synchronizing bodies and install transmission shift cover (26.1–110).

Modification

Designation	Unit Designation	As from Unit N°
Change from slot nut to hex. nut with pinch collar on countershaft front	G 76/18	547 750
	G 76/27	043 408
	G 76/27 A	003 262
Web in transmission housing for mounting reversing shaft has been removed. Reversing shaft has therefore become shorter	G 76/18	496 842
	G 76/27	041 501
	G 76/27 A	001 648

Adjusting Dimension or End Play

Input shaft (drive shaft)	0–0.05
Main shaft	0–0.05
Countershaft	0.15–0.20

Tightening Torques	Nm	(kpm)
Slot nut or hex. nut with pinch collar on countershaft front	150	(15.0)
Slot nut on input shaft G 76/27 A	150	(15.0)

Special Tools

Socket wrench for hex. socket oil plug SW 14	000 589 24 07 00
Hexagon insert (subject to wear)	000 589 24 07 01
Puller for ball bearing on main shaft	001 589 02 33 00
Puller for ball bearing on countershaft	000 589 94 33 00
Slot nut wrench insert 1/2" square for slot nut on countershaft front	115 589 03 07 00
Slot nut wrench insert 1/2" square for slot nut on countershaft rear	115 589 04 07 00
Clamping device for transmission housing	111 589 08 31 00
Slot nut wrench for slot nut on input shaft G 76/27 A	116 589 09 07 00

Special Tools (ctd.)

Slot nut wrench insert 3/4" square for slot nut on transmission flange	115 589 01 07 00
Socket wrench for counterholding on transmission flange when loosening and tightening slot nut	115 589 00 07 00

Removal

1 Unscrew clutch housing (26.1–050).

2 Remove transmission shift cover (26.2–110).

3 Unscrew transmission cover front (26.1–210).

4 Unscrew transmission cover rear (26.1–310).

5 Remove reverse gear (26.1–410).

6 Unscrew shift forks (106 and 107) upon removal of shift cover (Fig. 1 and 2).

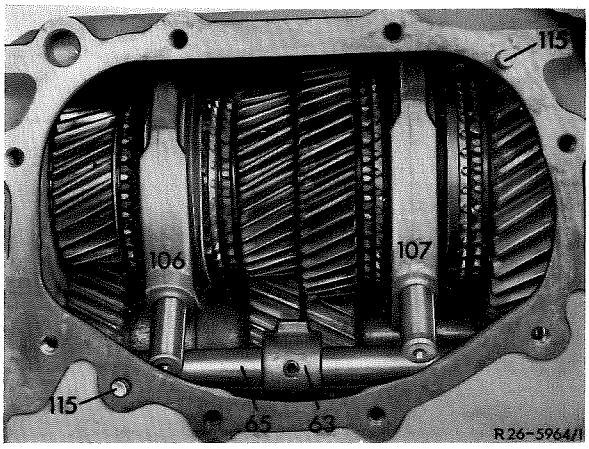


Fig. 1

63 Shifter for reverse speed
65 Shift rod for reverse speed
106 Shift fork 3rd and 4th speed
107 Shift fork 1st and 2nd speed
115 Fitted pin

7 Knock-out dowel sleeve (64) of shifter (63) of gear shifting shaft for reverse speed and set shifter as far as possible in forward direction (Fig. 3).

8 Pull shift rod (65) out of housing while simultaneously removing shifter (63) in forward direction.

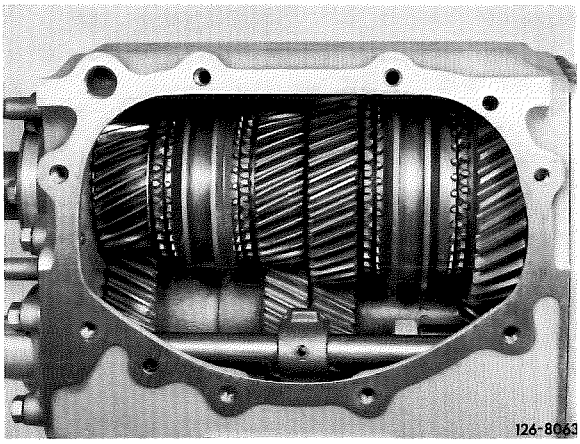


Fig. 2

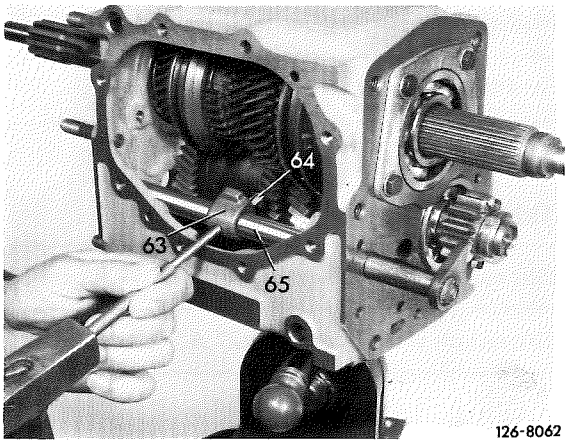


Fig. 3

63 Shifter for reverse speed
64 Dowel sleeve
65 Shift rod for reverse speed

9 Unlock slot nut or hex. nut with pinch collar (48), loosen with slot nut wrench and unscrew (Fig. 4).

Note: To facilitate loosening of slot nut or hex. nut, two speeds may be simultaneously engaged to lock gear assembly.

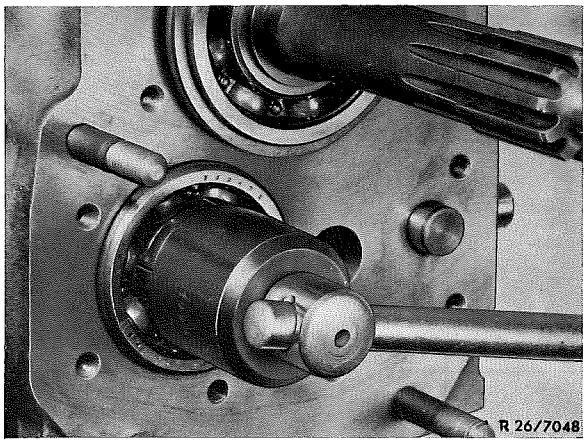


Fig. 4

10 Unscrew fastening bolts of holding ring (32) and remove under proper consideration of compensating washers from main shaft bearing (Fig. 5).

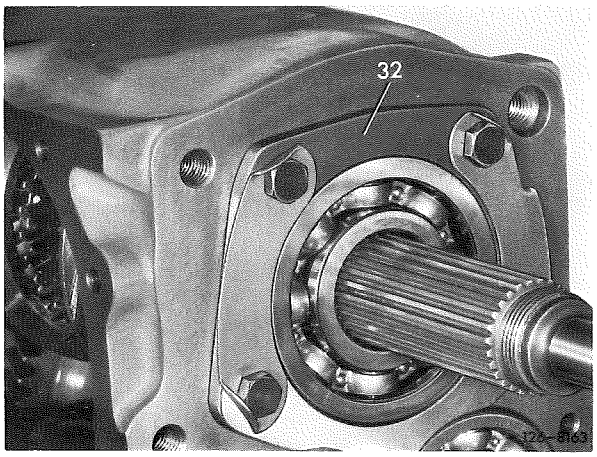


Fig. 5

11 Pull-off radial ball bearing of countershaft front and rear (Fig. 6 and 7).

Note: Items 11a to 18 a of scope apply to transmission G 76/27 A.

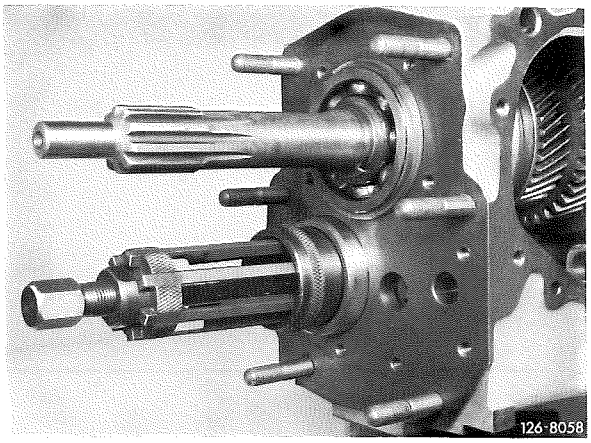


Fig. 6

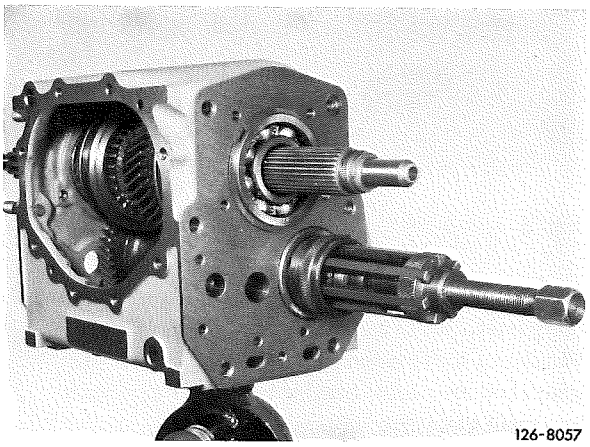


Fig. 7

12 Pull-off radial ball bearing of main shaft rear.

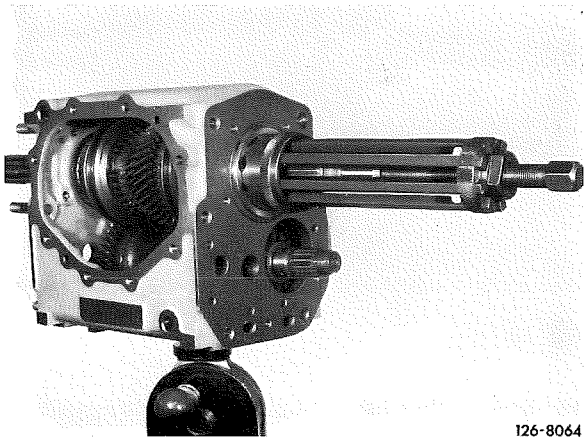


Fig. 8

13 Slide one assembly sleeve over free, rear shaft end and tighten with slot nut of universal flange.

Assembly sleeve prevents any slipping of 1st gear wheel from its needle bearing, which would facilitate removal and installation (Fig. 9).

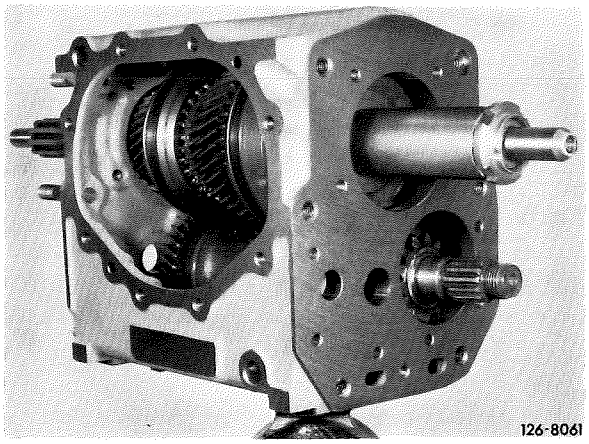


Fig. 9

14 Lift main shaft at the rear and pull input shaft completely out of housing in forward direction. Watch out for released synchronizing ring of 4th speed and for needle bearing between input shaft and main shaft (Fig. 10).

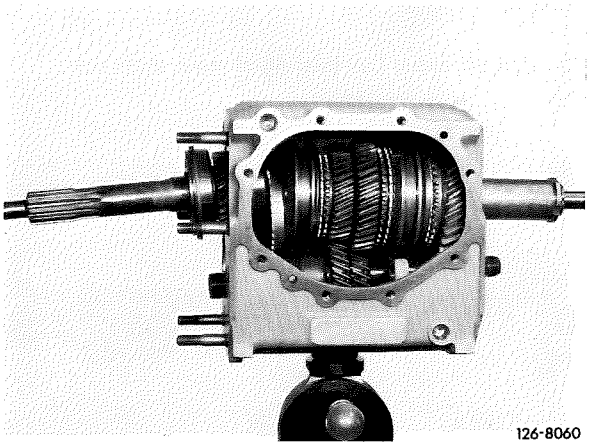


Fig. 10

15 Move sliding sleeve (11a) of 3rd and 4th speed into 3rd speed position, push main shaft completely toward the rear and then remove at an angle in forward direction out of housing (Fig. 11).

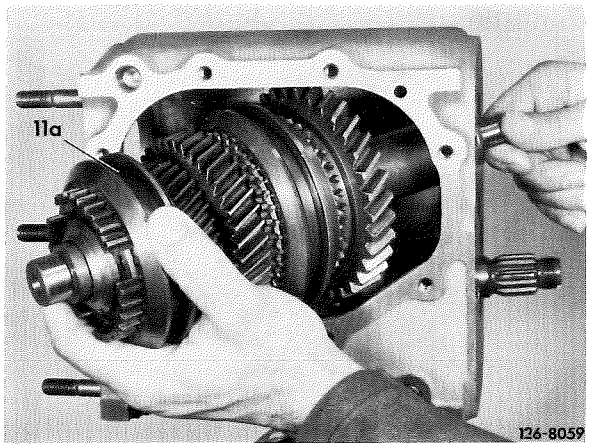


Fig. 11

11a Sliding sleeve 3rd and 4th speed

16 Remove countershaft from transmission housing similar to removing main shaft (Fig. 12).

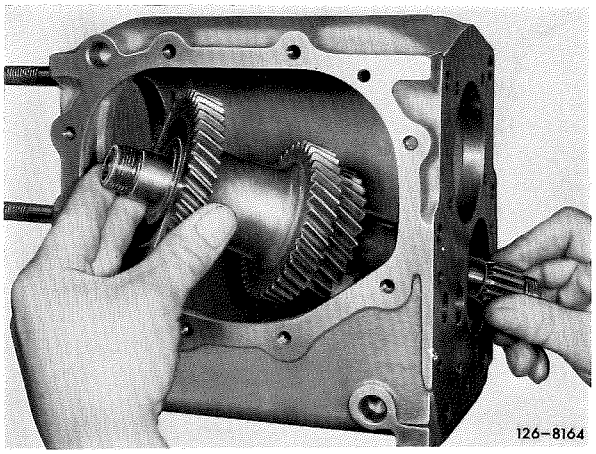


Fig. 12

17 Check gear assembly components for re-use. Refer to test instruction in Job No. 26.1–440 item 13.

Assembly Deviations on Transmission Type G 76/27 A

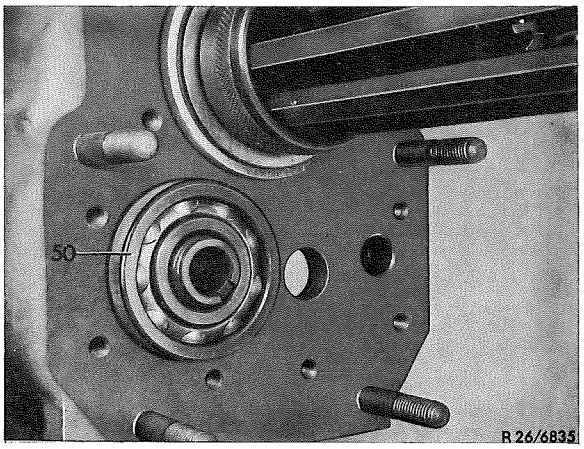


Fig. 13
50 Bevelled shoulder bearing

On transmission G 76/27 A up to unit No. 544 the countershaft has been provided with a bevelled shoulder bearing at the front (Fig. 13). This bearing cannot be pulled off and procedure for removal of gear assembly as from item 11 should be as follows:

11a Pull-off radial ball bearing of countershaft rear (Fig. 7).

12a Unscrew slot nut (1a) on input shaft (Fig. 14).

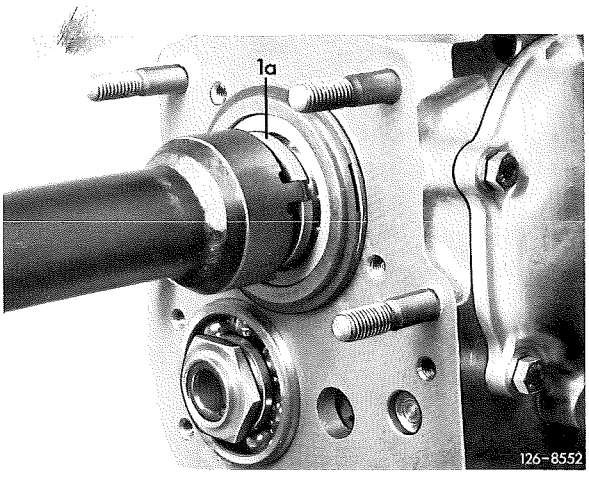


Fig. 14
1a Slot nut

13a Pull-off radial ball bearing of input shaft and main shaft rear (Fig. 15 and 16).

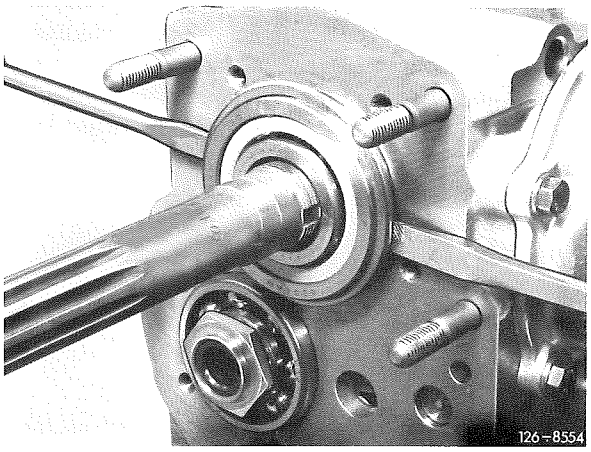


Fig. 15

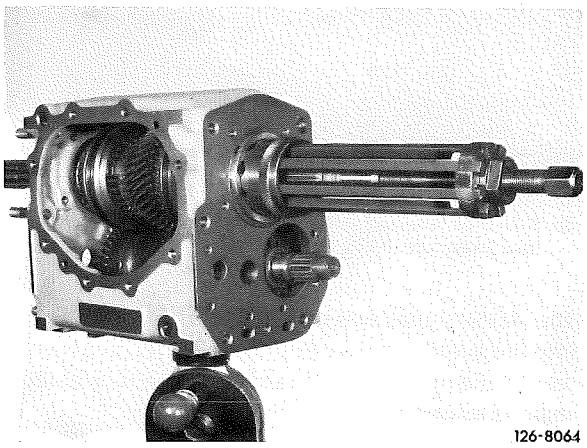


Fig. 16

14a Lift input and main shaft together as high as possible (using helper) and push or knock bevelled shoulder bearing toward the rear until bearing comes completely out of housing bore (shown on 5-speed transmission in Fig. 17).

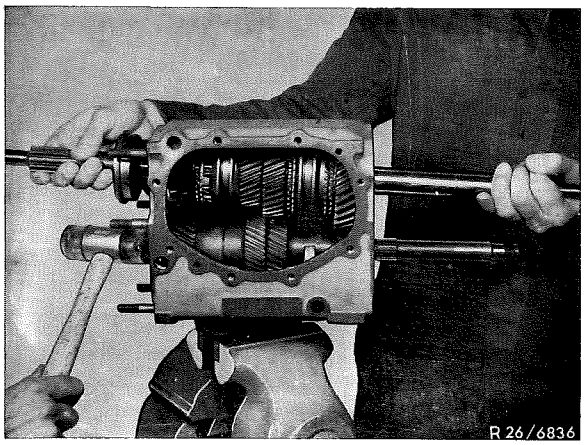


Fig. 17

15a Pull input shaft with radial ball bearing pulled off in forward direction out of transmission housing, while watching out for freed synchronizing ring of 4th speed and needle bearing between input and main shaft (Fig. 18).

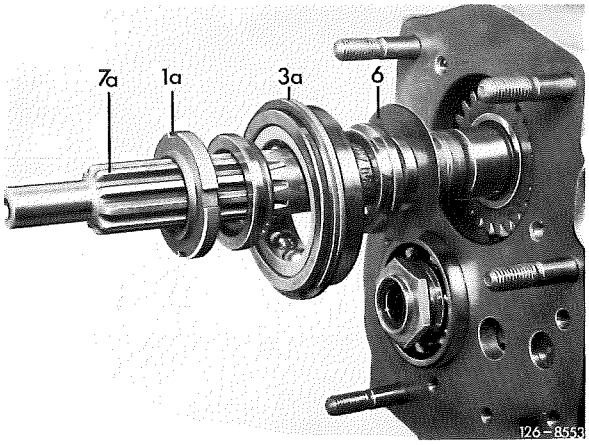


Fig. 18

1a Slot nut
3a Radial ball bearing with split inner race
6 Oil thrower disc
7a Input shaft

16a Move sliding sleeve (11a) of 3rd and 4th speed into 3rd speed position. Push main shaft completely toward the right and then take out of housing at an angle in forward direction (Fig. 19).

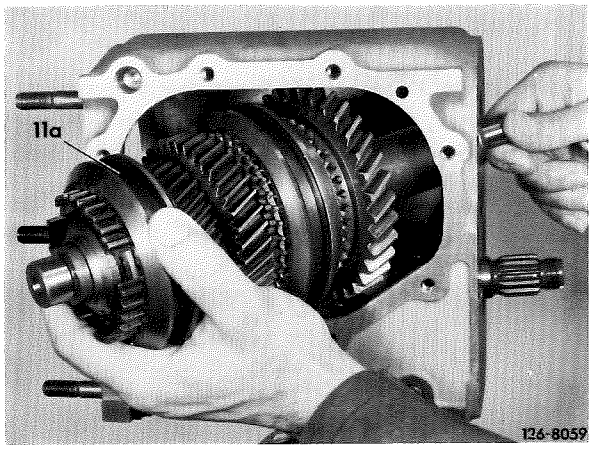


Fig. 19

11a Sliding sleeve 3rd and 4th speed

17a Remove countershaft with bevel shoulder bearing in the same manner as main shaft out of transmission housing and force-off bevel shoulder bearing (Fig. 20).

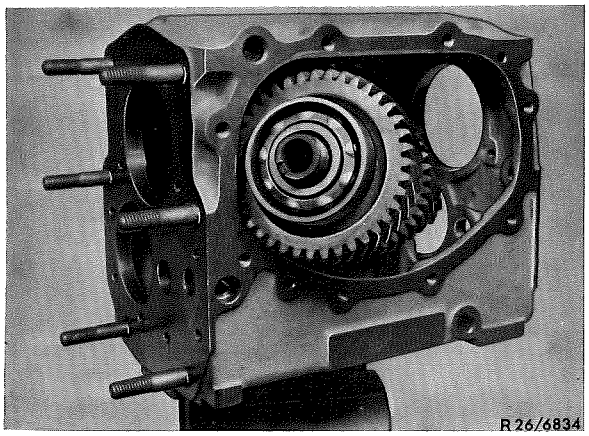


Fig. 20

18a Check gear assembly components for re-use, observing test instructions in Job No. 26.1—440 item 13.

Installation

19 Introduce countershaft into housing (Fig. 12).

20 Slide assembly sleeve over free, rear end of main shaft and tighten with slot nut of three-arm flange.

21 Move sliding sleeve (11a) of 3rd and 4th speed into 3rd speed position and introduce main shaft at an angle toward the rear into housing (Fig. 11).

22 Insert needle bearing into input shaft and slide synchronizing ring for 4th speed onto cone on input shaft gear.

23 Introduce input shaft completely into transmission housing from the front, while lifting main shaft until bearing journal at its front end can be introduced into needle bearing of input shaft without tension.

Assembly Deviations of Transmission Type G 76/27 A

23a Since in the event of repairs the countershaft is provided at the front with a bevelled shoulder bearing instead of a radial ball bearing, the drive shaft can be installed complete with bearing as described in item 23 (also refer to note following item 25).

23b Tighten slot nut (1a) on input shaft to specified torque and secure (Fig. 18).

24 Remove assembly sleeve from rear main shaft end and mount radial ball bearing. When knocking-in bearing, apply counterhold to input shaft to prevent shaft from slipping out.

25 Knock-in radial ball bearing of countershaft front and rear with the aid of a steel mandrel or steel hammer, applying light blows. Raise countershaft for this purpose, so that bearings can be easier mounted.

Note: Transmission type G 76/27 A has been provided for some time with a bevel shoulder bearing on countershaft front. In the event of repairs, only a radial ball bearing may be installed. As a result, the assembly procedure is the same as for other transmission types.

26 Lock gear assembly by simultaneously engaging to speed, tighten slot nut (48) on countershaft front with slot nut wrench to specified torque (Fig. 21).

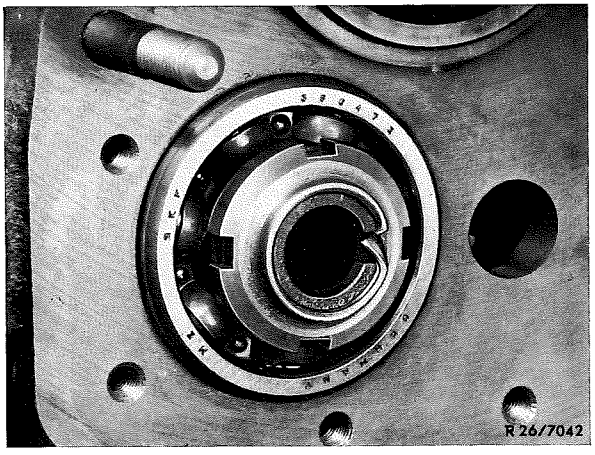


Fig. 21

Note: Instead of slot nut, the countershaft front can also be provided with a hex. nut with pinch collar. In the event of repairs, the slot nut can be replaced against a hex. nut (Fig. 22).

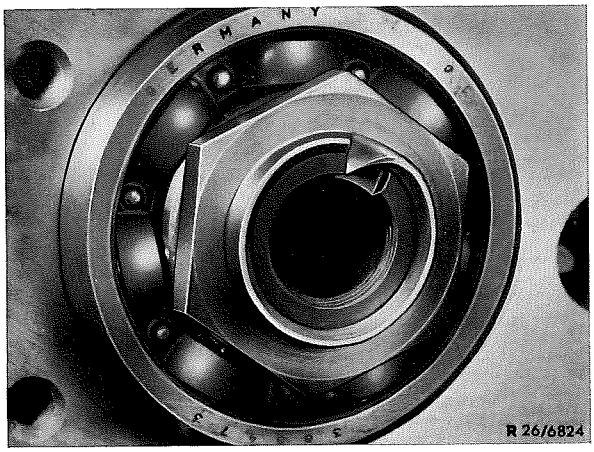


Fig. 22

27 Adjust end play **C** of main shaft to **0–0.05 mm,** trying for **0.**

For this purpose, measure depth **A** of recess in holding ring (Fig. 23) as well as distance **B** between face of circlip on main shaft bearing and parting surface of transmission housing (Fig. 24) with a depth micrometer or depth gauge.

Determine thickness of spacing washers required for adjustment according to following **example:**

Depth **A**	2.00 mm
Distance **B**	– 1.89 mm
Difference	0.11 mm
End play **C**	– 0.00 mm
Dimension to be compensated	0.11 mm

Spacing washers are available at 0.1, 0.2 and 0.3 mm (refer to Spare Parts Catalog).

In this example a spacing washer of 0.1 mm would be required, in which case a play of 0.1 mm would remain.

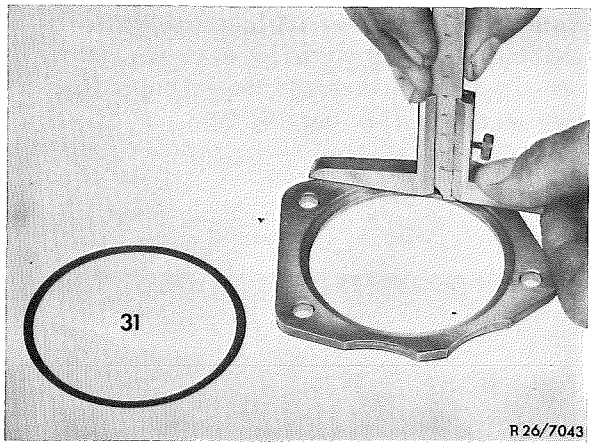


Fig. 23

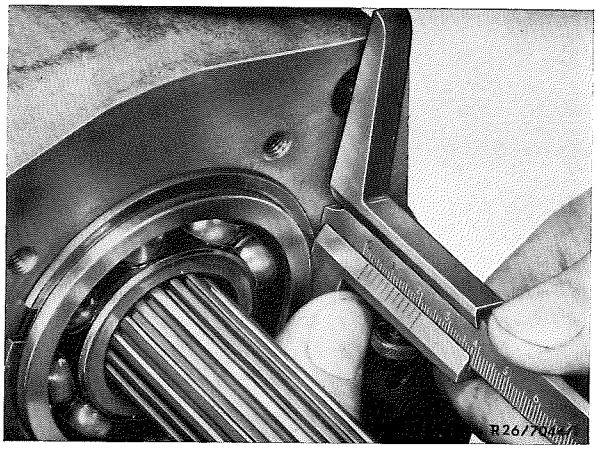


Fig. 24

28 Insert determined compensating washers into spacing ring and glue down with grease to facilitate assembly.

29 Carefully slide holding ring (32) over bearing of main shaft and screw down (Fig. 25).

Note: Instead of sheet metal locks, spring washers may also be used (Fig. 26).

30 Mount reverse gears (26.1–410).

31 Screw-on transmission cover rear (26.1–310).

32 Set **end play C** of input shaft to 0–0.05 mm, trying for **0.**

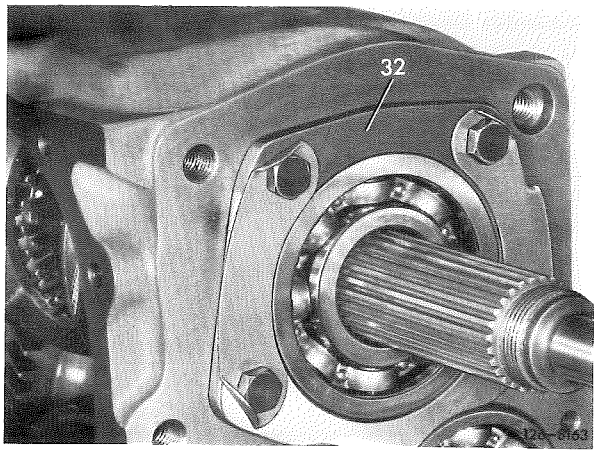


Fig. 25
32 Holding ring

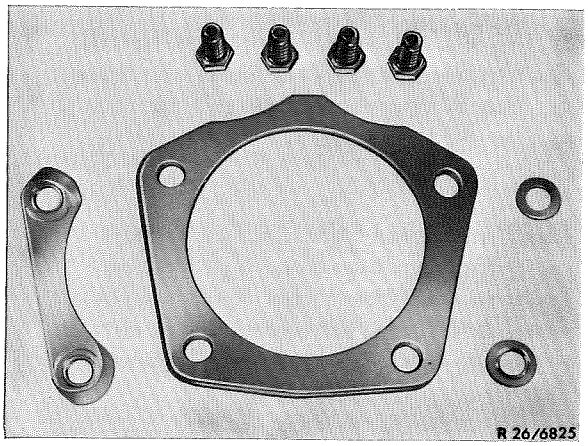


Fig. 26

For this purpose, measure depth **A** of recess in front transmission cover (Fig. 27) **with gasket mounted** as well as distance **B** between face of circlip on input shaft bearing and parting surface of transmission housing (Fig. 28) with a depth micrometer or a depth gauge.

Determine thickness of spacing washers required for adjustments according to the following **example:**

Depth **A** (with gasket)	4.70 mm
Distance **B**	– 4.50 mm
Difference	0.20 mm
End play **C**	– 0.00 mm
Dimension to be compensated	0.20 mm

Spacing washers are available in dimensions of 0.1, 0.2 and 0.3 mm (refer to Spare Parts Catalog).

In this example, a spacing washer of 0.2 mm or two washers of 0.1 mm would be required, in which case the play would be cancelled, that is, 0.

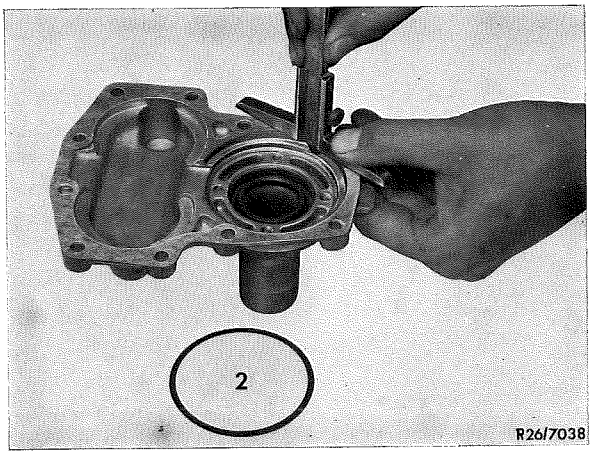


Fig. 27

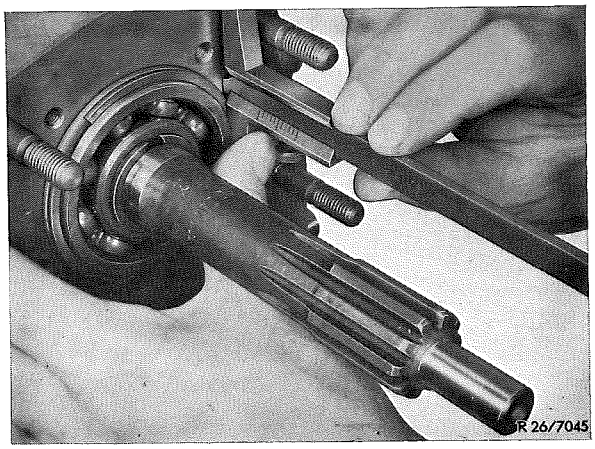


Fig. 28

33 Adjust **end play C** of countershaft to **0.15 to 0.2** mm.

For this purpose, measure depth **A** of recess in front transmission cover (Fig. 29) **with gasket mounted** as well as distance **B** between face of bearing outer race and parting surface of transmission housing (Fig. 30) with a depth micrometer or depth gauge. For this purpose, countershaft should rest well against rear transmission cover.

Determine thickness of spacing washers required for adjustment according to the following **example:**

Depth **A** (with gasket)	5.70 mm
Distance **B**	– 4.70 mm
Difference	1.00 mm
End play **C**	– 0.15 mm
Dimension to be compensated	0.85 mm

Spacing washers are available in dimensions of 0.1, 0.25 and 0.5 mm (refer to Spare Parts Catalog). In this example, one spacing washer each of 0.1, 0.25 and 0.5 mm would be required to obtain a play of 0.15 mm.

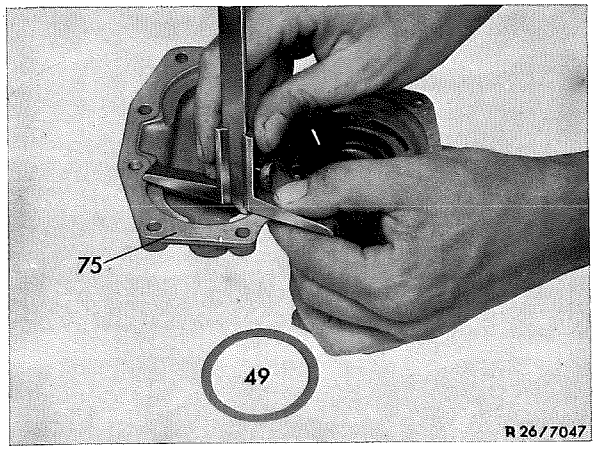


Fig. 29

49 Spacing washer 75 Gasket

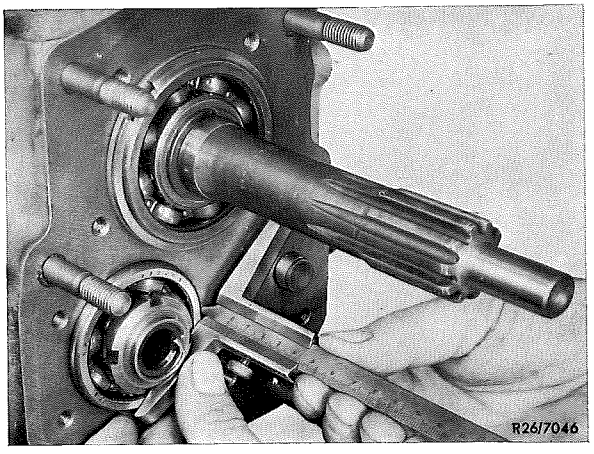


Fig. 30

34 Insert spacing washers into front transmission cover and glue down with grease.

35 Screw-on transmission cover front (26.1–210).

36 Install transmission shift cover (26.1–110).

37 Screw-on clutch housing (26.1–050).

Revision: Special tool part No. changed, revision reference extended (*), Fig. 1 changed, assembly note added following Fig. 13.

Test Dimension	
Wear limit of synchronizing rings (distance between synchronizing ring and short teeth on gear wheel) (Fig. 13)	min. 0.5 mm

Tightening Torque	Nm	(kpm)
Slot nut or hex. nut 41 mm for main shaft front	80	(8)

Special Tools	
Slot nut wrench insert 1/2" square for slot nut on transmission main shaft	115 589 05 07 00
Insert SW 41 mm for hex. nut on transmission main shaft	116 589 02 09 00
Socket wrench for hex. socket oil drain plug 14 mm	000 589 24 07 00
Hexagon insert (subject to wear)	000 589 24 07 01
Puller for ball bearing on main shaft	001 589 02 33 00
Puller for ball bearing on countershaft	000 589 94 33 00
Slot nut wrench insert 1/2" square for slot nut on countershaft front	115 589 03 07 00
Slot nut wrench insert 1/2" square for slot nut on countershaft rear	115 589 04 07 00
Clamping device for transmission housing	111 589 08 31 00
Slot nut wrench for slot nut on input shaft G 76/27a	116 589 09 07 00
Slot nut wrench insert 3/4" square for slot nut on transmission flange	115 589 01 07 00
Socket wrench for counterholding on transmission flange when loosening and tightening slot nut	116 589 10 07 00 *

Revision Reference

Designation	Unit Designation	As from Unit No.
Change from slot nut to hex. nut on main shaft front	G 76/18	556 950
	G 76/27	044 141
	G 76/27 A	003 737
Change from coil spring synchronization to annular spring synchronization	G 76/18 A	766 041 *
	G 76/18 B	005 991 *
	G 76/18 C	as from start of series *
	G 76/27 A	008 151 *

26.1 Disassembly and Assembly of Main Shaft

Disassembly

1 Remove gear assembly (26.1–420).

2 Clamp main shaft into vise by means of three-arm flange.

3 Loosen slot nut or hex. nut on main shaft front on synchronizing body for 3rd and 4th speed with slot nut wrench (Fig. 1).

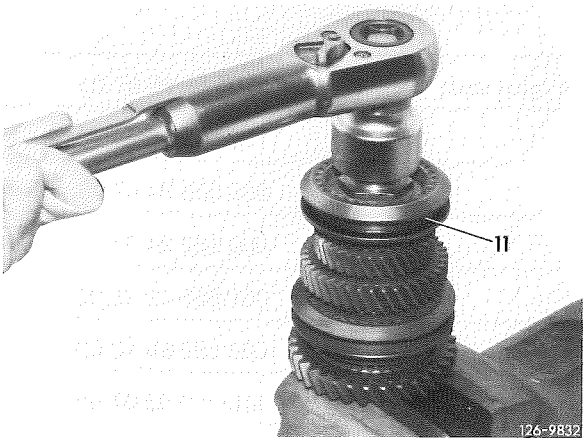


Fig. 1

11 Synchronizing body

4 Remove synchronizing body (11) for 3rd and 4th speed from main shaft (Fig. 2).

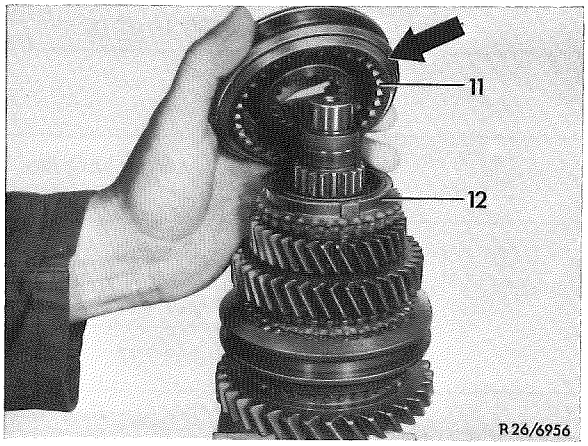


Fig. 2

11 Synchronizing body
12 Synchronizing ring for 3rd speed

5 Remove thrust washer (13) with internal teeth from shaft (Fig. 3).

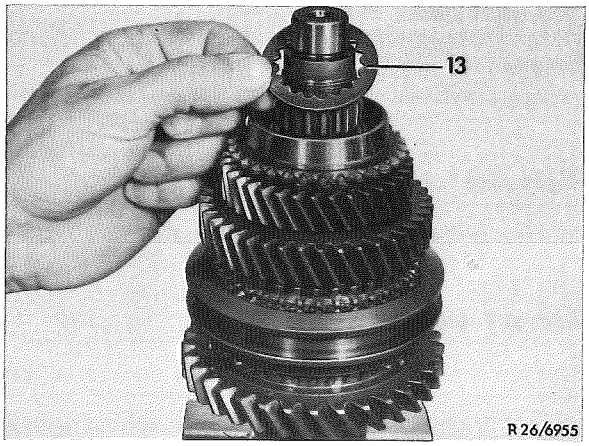


Fig. 3

13 Thrust washer

6 Remove helical gear (14) for 3rd speed and needle cage (15) (Fig. 4).

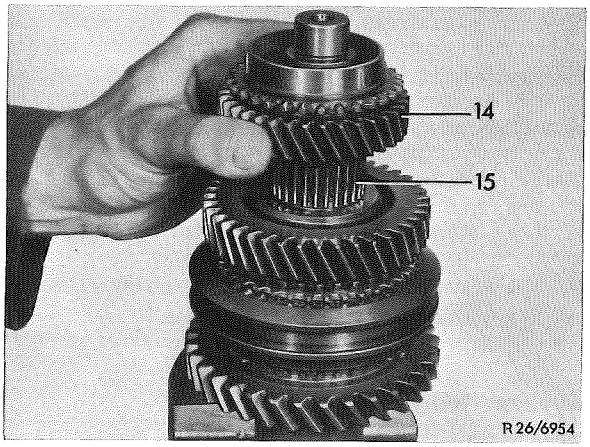


Fig. 4

14 Helical gear for 3rd speed
15 Needle cage for 3rd gear wheel

7 Turn main shaft around and clamp into vise by means of input shaft and inserted needle cage.

Note: Use aluminum jaws to protect input shaft against damage.

8 Remove thrust washer (28) and helical gear (27) for 1st gear, as well as needle cage (26) from main shaft (Fig. 5 and 6).

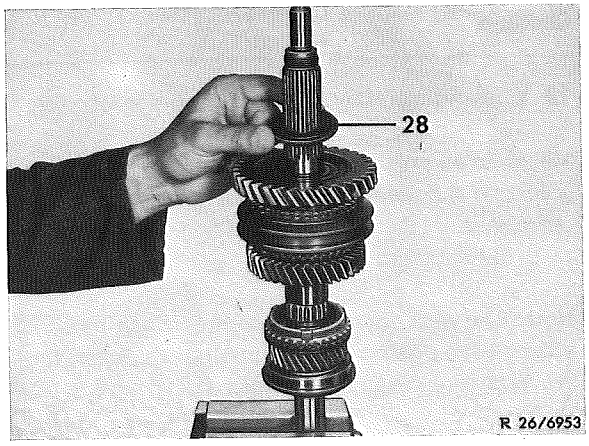


Fig. 5

28 Thrust washer

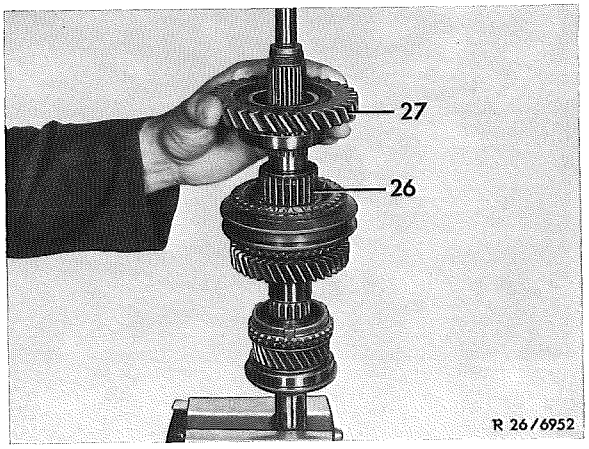


Fig. 6

26 Needle cage for helical gear 1st speed
27 Helical gear for 1st speed

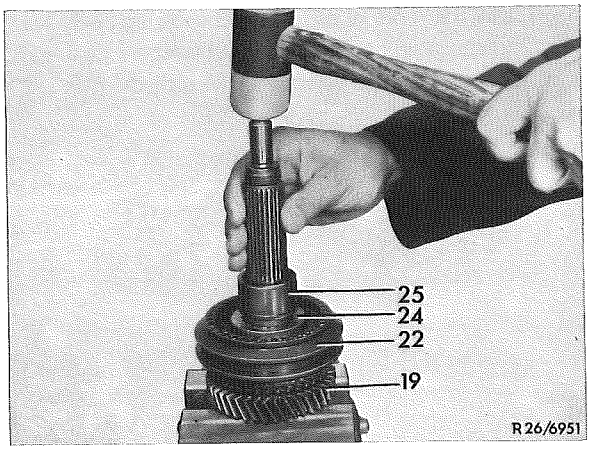


Fig. 7

19 Helical gear 2nd speed
22 Synchronizing body 1st and 2nd speed
24 Thrust washer
25 Race 1st gear wheel bearing

9 Knock race (25) of 1st gear wheel bearing from shaft by placing main shaft with helical gear (19) of 2nd speed on pertinently opened vise and knock in downward direction (Fig. 7 and 8).

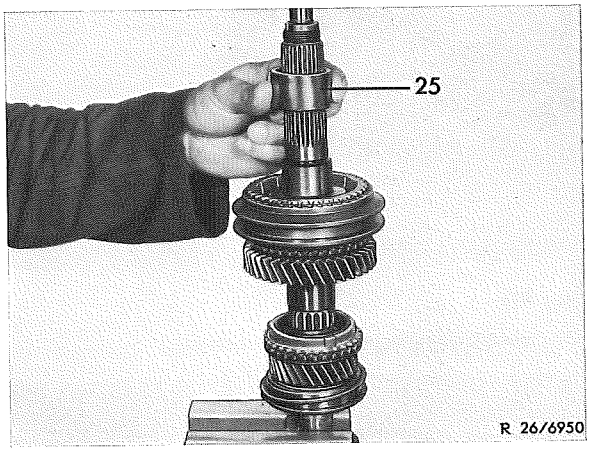


Fig. 8

25 Race 1st gear wheel bearing

10 Remove thrust washer (24), synchronizing ring (23), synchronizing body (22) and thrust washer (20) (Fig. 9, 10 and 11).

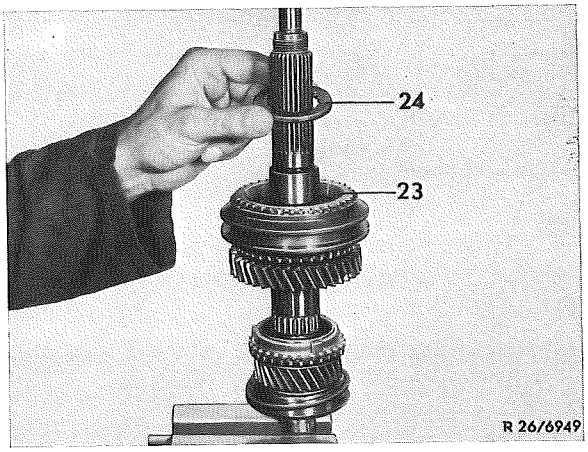


Fig. 9

23 Synchronizing ring for 1st speed
24 Thrust washer

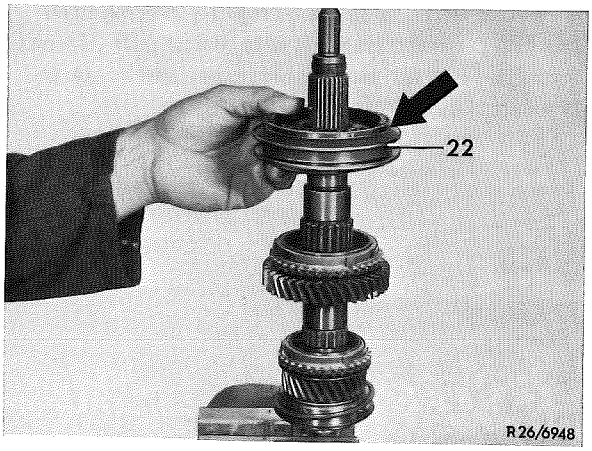


Fig. 10

22 Synchronizing body 1st and 2nd speed

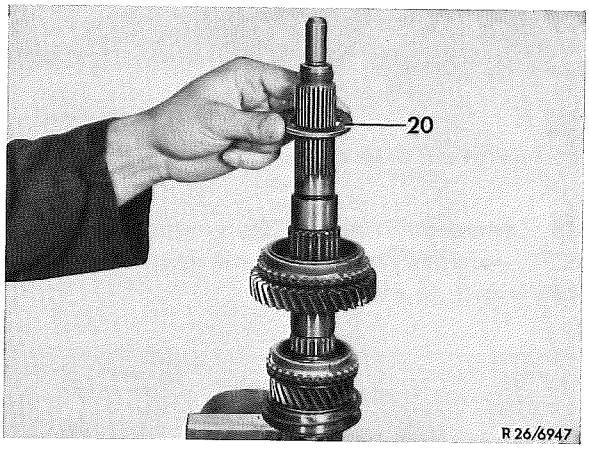


Fig. 11

20 Thrust washer

11 Remove helical gear (19) with synchronizing ring (21) for 2nd speed and needle cage (18) from main shaft (Fig. 12).

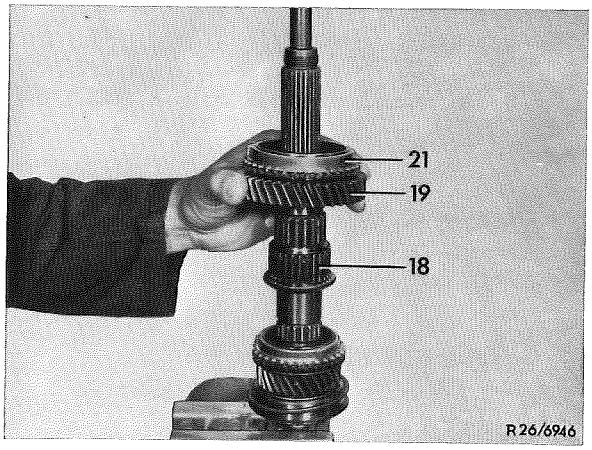


Fig. 12

18 Needle cage
19 Helical gear 2nd speed
21 Synchronizing ring 2nd speed

Checkup

12 Check all parts for wear and condition of wear.

13 Place all synchronizing rings on pertinent helical gear cone and use feeler gauge to measure distance between short teeth of synchronizing ring and short teeth of helical gear (Fig. 13).

Note: The wear limit of the synchronizing ring is attained at a distance of 0.5 mm. In such a case, the synchronizing ring must be replaced.

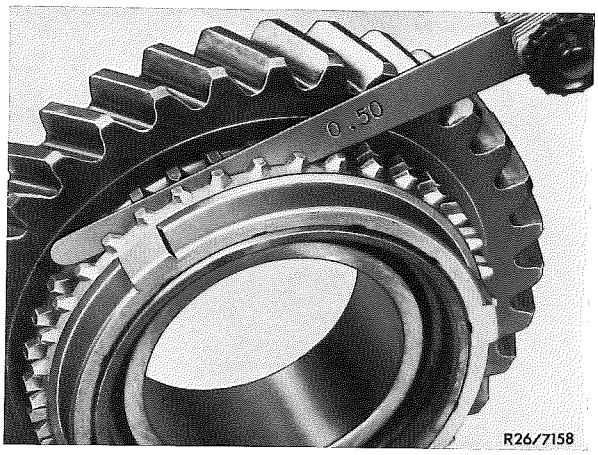


Fig. 13

Attention! If in the event of repairs a transmission is changed from coil spring synchronization to annular spring synchronization, the renewal of the synchronizing body for 3rd/4th gear will eliminate thrust washer (13), and the renewal of the synchronizing body for 1st/2nd speed will eliminate thrust washers (20) and (24) as a result of pertinent widening of the hub (Fig. 3, 9 and 11).

Assembly

14 Clamp main shaft into vise (Fig. 14).

Note: To prevent damage to main shaft when clamping into vise, use aluminum jaws. In addition, the main shaft can also be clamped by means of input shaft.

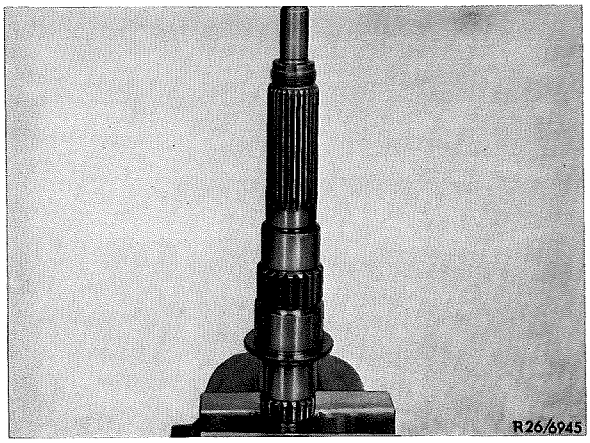


Fig. 14

15 Place lubricated needle cage (18), helical gear (19) with synchronizing ring (21) for 2nd speed and steel thrust washer (20) on main shaft (Fig. 11 and 12).

16 Place synchronizing body (22) of 1st and 2nd speed on main shaft in such a manner that flange (arrow) is facing 1st gear wheel (Fig. 15).

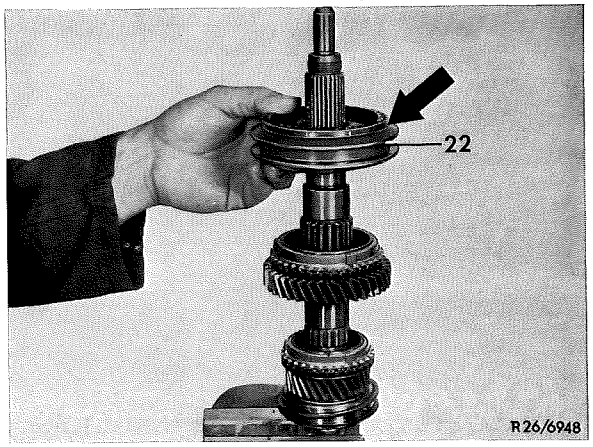


Fig. 15

17 Mount synchronizing ring (23) and thrust washer (14) (Fig. 9).

18 Place main shaft on a sturdy support and knock-on heated race (25) of 1st gear wheel bearing with a piece of tube of approx. 42 x 3 x 260 mm (Fig. 16 and 17).

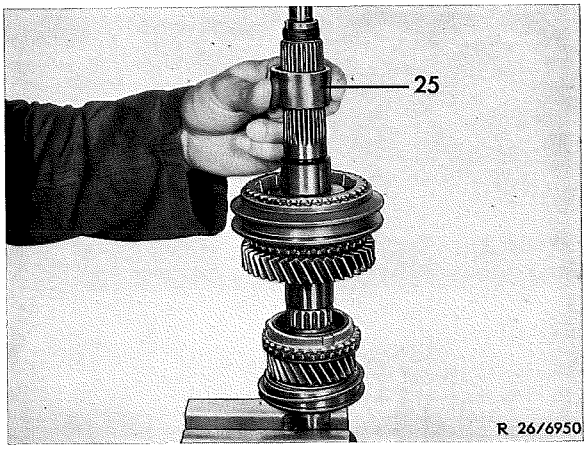


Fig. 16

25 Race of 1st gear wheel bearing

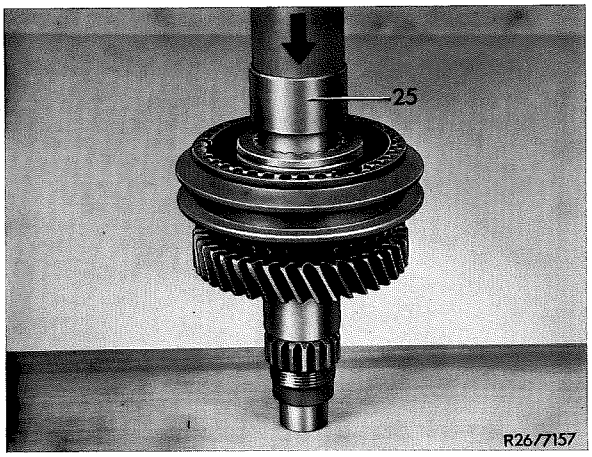


Fig. 17

19 Mount needle cage (26) and helical gear (27) for 1st speed (Fig. 6).

20 Place steel thrust washer (28) on 1st gear wheel, slip assembly sleeve on main shaft and tighten with slot nut or hex. nut manually.

21 Turn main shaft around and carefully clamp into vise at assembly sleeve.

22 Lubricate needle cage (15) and place on shaft together with helical gear (14) (Fig. 18).

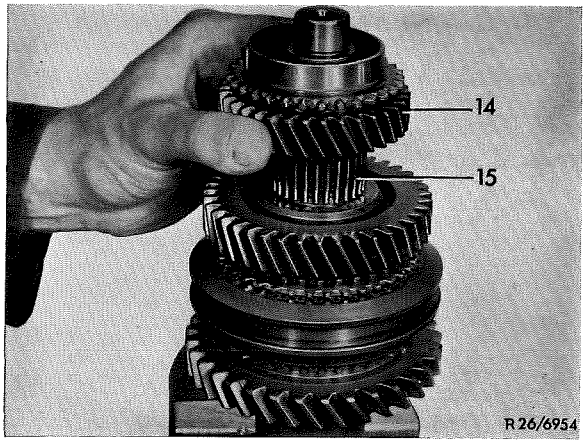


Fig. 18

14 Helical gear for 3rd speed
15 Needle cage for 3rd speed wheel

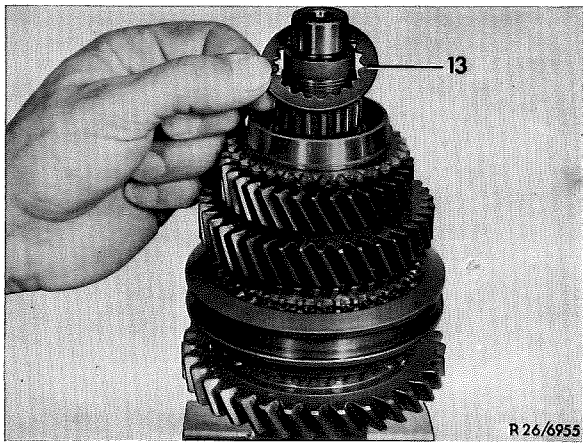


Fig. 19

13 Thrust washer

23 Insert or mount brass thrust washer (13) with internal teeth and synchronizing ring (12) (Fig. 19 and 20).

24 Place synchronizing body (11) for 3rd and 4th speed on shaft in such a manner that the end with the machined groove (arrow) faces 3rd speed (Fig. 20).

25 Tighten slot nut or hex. nut with pinch collar on main shaft front with slot nut wrench to specified torque, clamping main shaft into vise by means of three-arm flange.

Note: As from transmission No. **6350** the main shaft is provided at the front with a hex. nut SW 41 with pinch collar instead of the slot nut. In the event of repairs, the slot nut can be replaced by a hex. nut (Fig. 21 and 22).

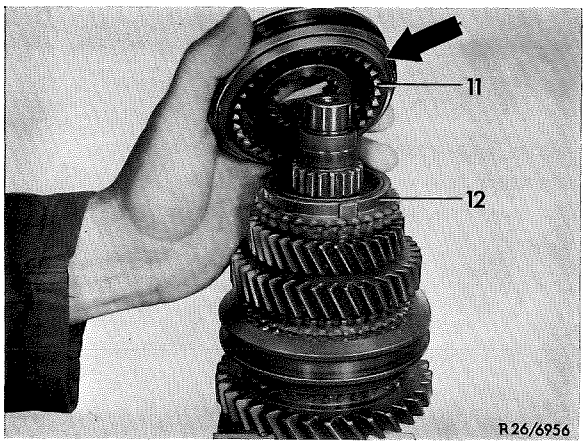


Fig. 20

11 Synchronizing body 3rd and 4th speed
12 Synchronizing ring 3rd speed

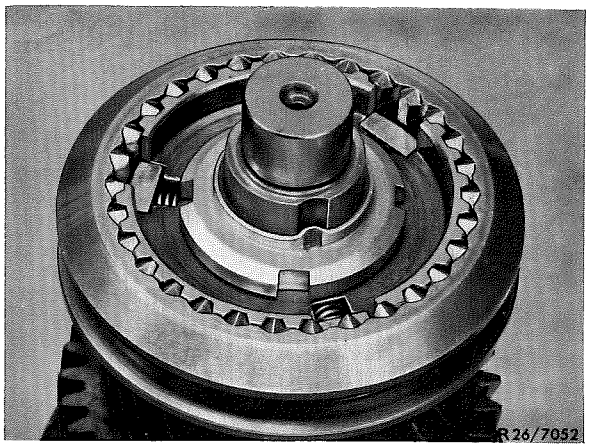


Fig. 21

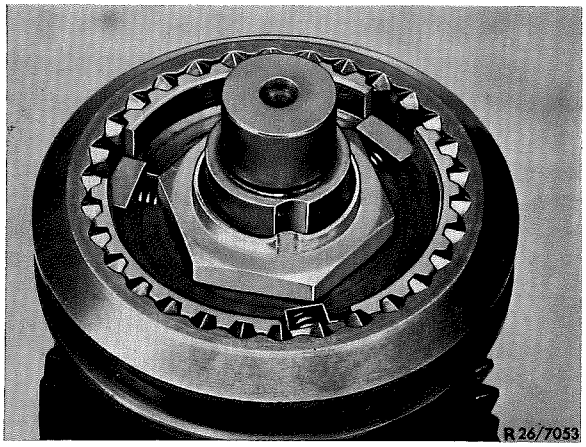


Fig. 22

26 Install gear assembly (26.1–420).

Disassembly

1 Wrap synchronizing body in a cloth so that steel balls and springs will not be lost when forcing apart.

2 Force synchronizing body including drive member from sliding sleeve.

3 Check individual parts for wear and condition of wear.

Assembly

4 Insert springs (c) and drive members (e) into synchronizing body and introduce synchronizing body into sliding sleeve (Fig. 1).

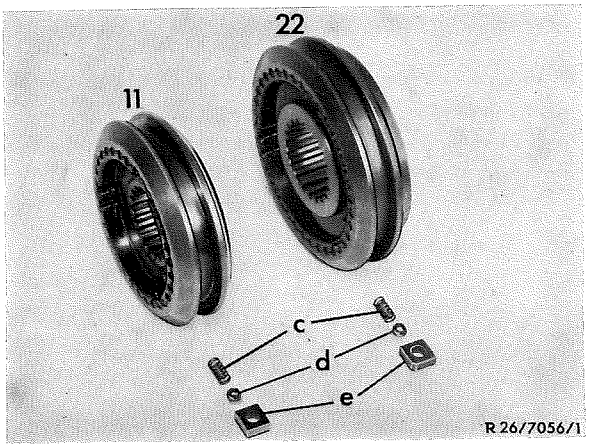


Fig. 1

c Synchronizer spring
d Steel ball
e Drive member
11 Synchronizing body 3rd and 4th speed
22 Synchronizing body 1st and 2nd speed

5 Push one drive member forward at a time, insert one ball and push drive member back (Fig. 2).

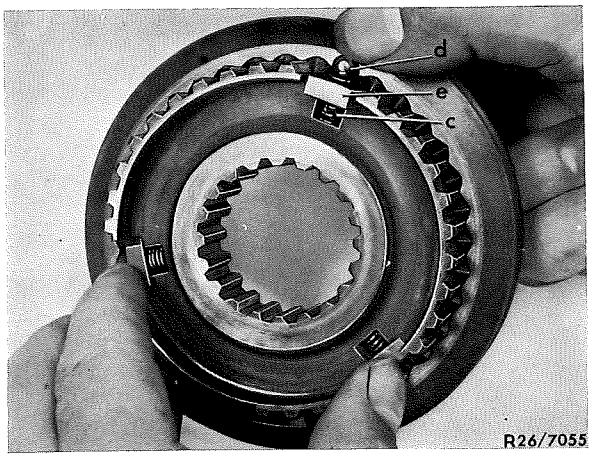


Fig. 2

c Spring
d Steel ball
e Drive member

6 For better differentiation, the drive members of the synchronizing body for 1st and 2nd speed are characterized by a chamfer (arrow). Drivers should be mounted in such a manner that the chamfer faces the side of the 2nd gear wheel (Fig. 3).

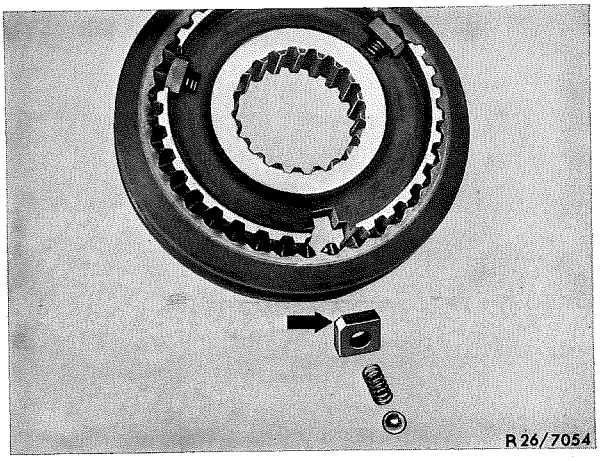


Fig. 3

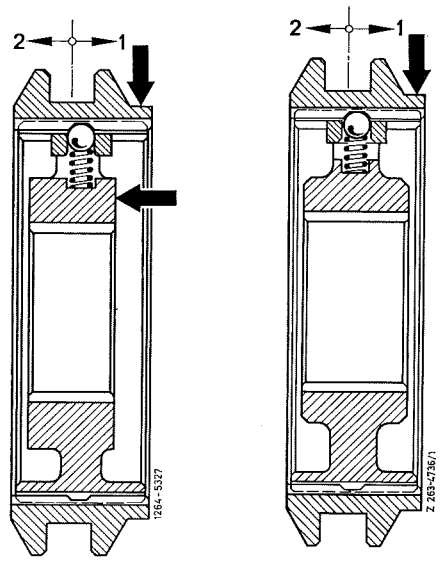


Fig. 4

Synchronizing body 1st and 2nd speed

G 76/18
G 76/18 A
G 76/18 B
G 76/27
G 76/27 A

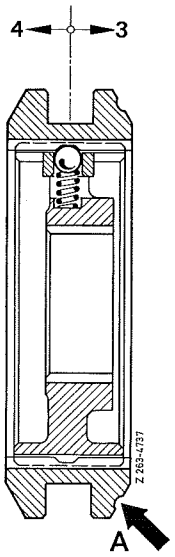


Fig. 5

7 Mount synchronizing body for **1st and 2nd speed** of transmission types G 76/18, 18 A and 18 B in such a manner that the shorter hub end and the flange on sliding sleeve (arrows) are facing first speed (Fig. 4).

8 Mount synchronizing body for **3rd and 4th speed** in such a manner that the wide hub end and the machined groove of sliding sleeve (arrow) are on the same side (Fig. 5).

Disassembly

1 Force synchronizing body out of sliding sleeve (Fig. 1).

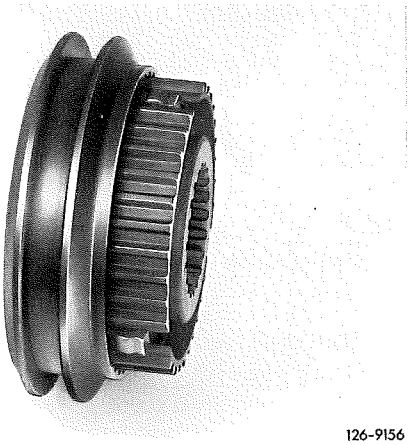


Fig. 1

2 Remove drive member (er) and circular spring (cr) out of synchronizing body (Fig. 2).

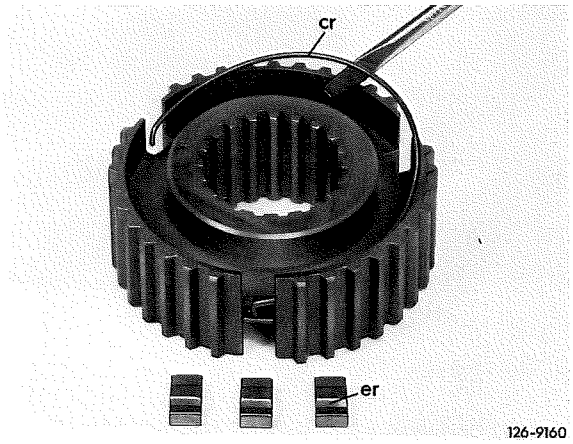


Fig. 2

cr Circular spring er Drive member

3 Check components for wear and condition (Fig. 3).

Note: Circular springs differ in accordance with varying diameters of synchronizing bodies (Fig. 3).

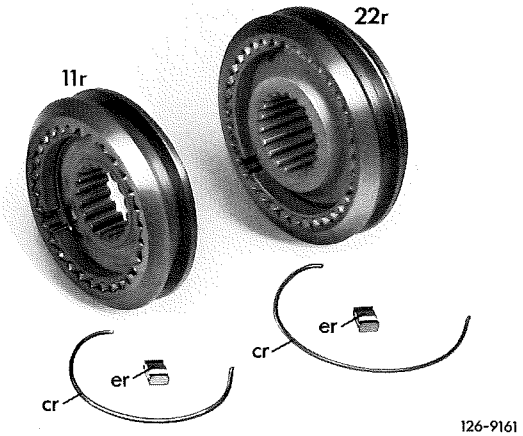


Fig. 3

11r Synchronizing body 3rd and 4th speed
cr Circular spring
er Drive member
22r Synchronizing body 1st and 2nd speed
cr Circular spring
er Drive member

Assembly

4 Mount synchronizing bodies for 1st and 2nd speed of transmission types G 76/18 A and 18 B in such a manner that the shorter hub end and the flange on sliding sleeve (arrows) are facing 1st speed (Fig. 4).

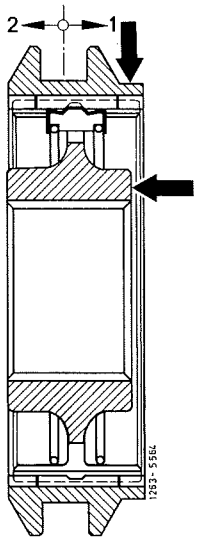


Fig. 4

Synchronizing body 1st and 2nd speed

G 76/18 A G 76/18 B

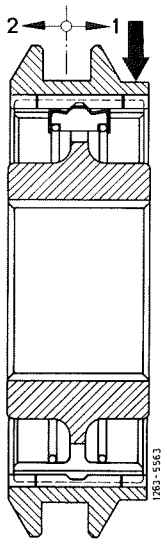


Fig. 5
Synchronizing body 1st and 2nd speed
G 76/27 A

5 Mount synchronizing body for 3rd and 4th speed in such a manner that the wide hub end and the machined groove of sliding sleeve (arrow) are on the same side (Fig. 6).

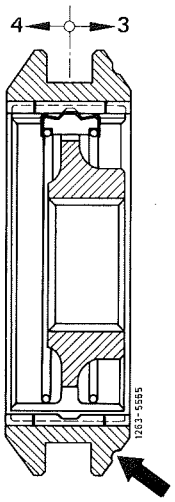


Fig. 6
Synchronizing body 3rd and 4th speed

6 Angular end of the one spring and free end of the other should rest against same drive member (arrows Fig. 7).

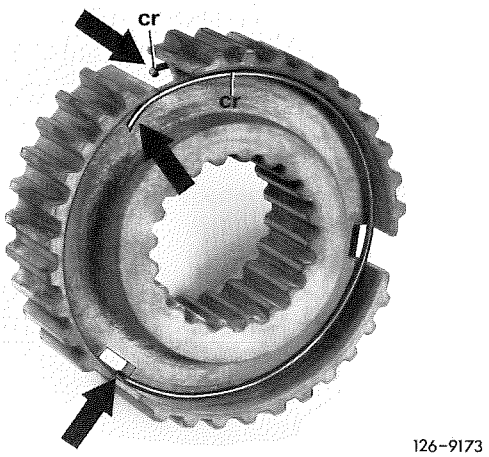


Fig. 7
cr Circular spring

7 Place drive members (er) one after the other on circular springs and slip sliding sleeve over synchronizing body and drive members (Fig. 8).

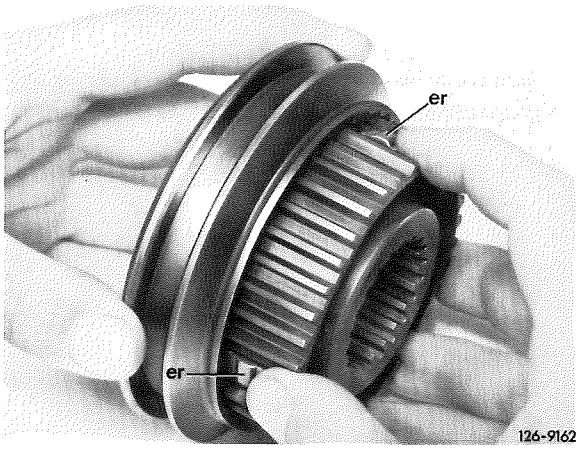


Fig. 8
er Drive member

Revision

Designation	Unit Designation	As from Unit No.
Change of countershaft Reason: to match transmission G 76/18 B	G 76/27	049 594
	G 76/27 A	006 294

Disassembly

1 Position countershaft with the aid of suitable supports on 3rd gear wheel (53) as required and press-out shaft by means of press (Fig. 1).

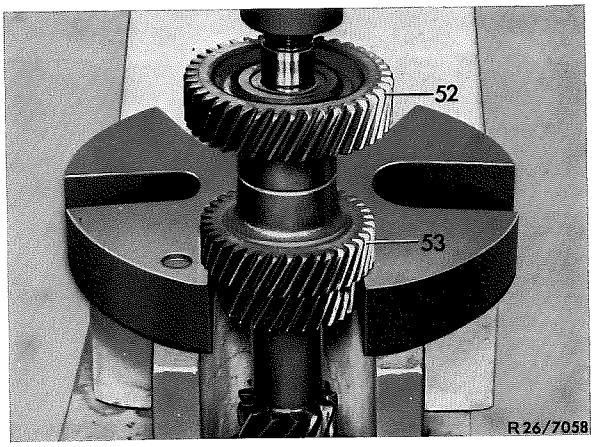


Fig. 1

52 Countershaft helical gear – constant gear
53 Countershaft helical gear 3rd speed

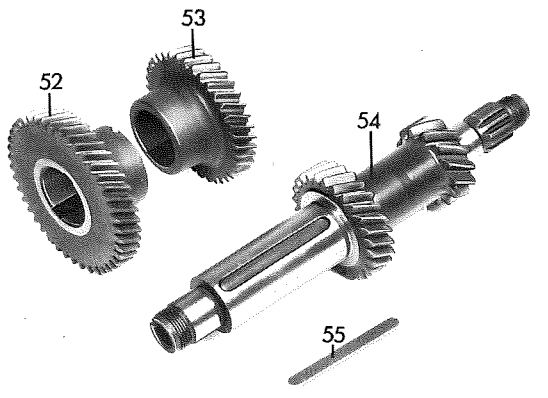


Fig. 2

52 Countershaft helical gear – constant gear
53 Countershaft helical gear 3rd speed
54 Countershaft with helical teeth for 2nd and 1st speed
55 Woodruff key

2 Remove woodruff key from shaft by means of screw driver.

3 Check all parts for wear and condition of wear (Fig. 2).

Assembly

4 Knock woodruff key into countershaft.

5 Position countershaft at helical gears for 2nd speed and press-on 3rd gear wheel (53) with high flange in upward direction (Fig. 3).

6 Press-on countershaft helical gear – constant gear (52) with high flange in downward direction.

When pressing-on, make sure that no material is scraped from woodruff key. Before countershaft gear for 3rd speed comes to rest against helical gears for 2nd speed, check whether material has been scraped off. If required, remove such material, since the faces of the flanges must be clean. Only now press-on countershaft gears until seated.

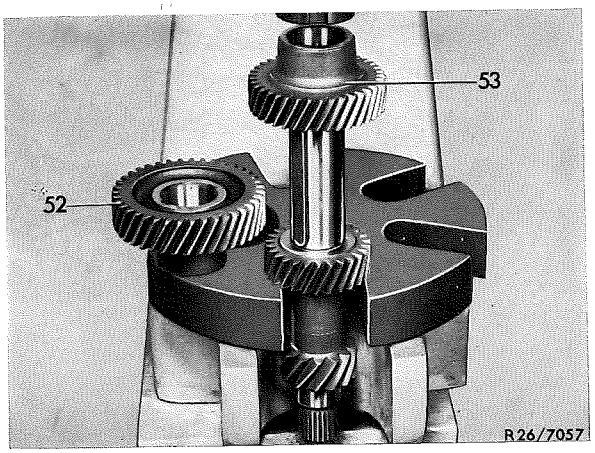
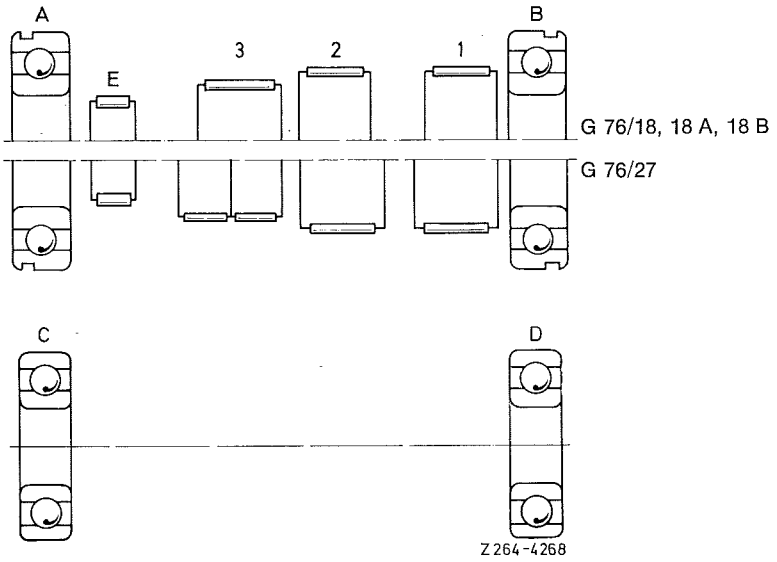


Fig. 3

52 Countershaft helical gear – constant gear
53 Countershaft helical gear 3rd speed



Item	Item in Exploded View 26.1–990	Designation	Dimensions OD	ID	Width
Bearing of Input Shaft in Transmission Housing G 76/18, 18 A, 18 B, 27					
A	3	Radial ball bearing 000 981 99 25 Radial ball bearing 001 981 31 25	72	30	19
Bearing of Input Shaft in Transmission Housing G 76/27 A					
A	3 a	Radial ball bearing 000 981 68 25 with split inner race	72	30	19
Bearing of Main Shaft G 76/18, 18 A, 18 B, 27, 27 A					
B	29	Radial ball bearing 136 981 02 25 Radial ball bearing 001 981 32 25 Radial ball bearing 000 981 68 25 (G 76/27 A)	72	30	19
E	8	Needle cage 004 981 04 10 Needle cage 002 981 81 10	30	22	15
Bearing of Countershaft G 76/18, 18 A, 18 B, 27, 27 A					
C	50	Radial ball bearing 000 625 036 305 (6305 C 3)	62	25	17
D	57	Radial ball bearing 001 981 20 25 Radial ball bearing 001 981 23 25 Radial ball bearing 002 981 00 25 Radial ball bearing 001 981 71 25			
Bearing of 1st and 2nd Gear Wheel G 76/18, 18 A, 18 B					
1 2	26 ° 18 °	Needle cage 004 981 06 10 Needle cage 003 981 10 10 Needle cage 003 981 11 10	42	35	24,5

Item	Item in Exploded View 26.1–990	Designation		Dimensions OD	ID	Width
Bearing of 1st and 2nd Gear Wheel G 76/27, 27 A						
1	26	Needle cage	000 981 82 12	47	42	28,2
2	18	Needle cage	004 981 08 10			
		Needle cage	003 981 13 10 } only G 76/27			
		Needle cage	003 981 14 10 }			
Bearing of 3rd Gear Wheel G 76/18, 18 A, 18 B						
3	15	Needle cage	003 981 08 10	40	35	28,5
		Needle cage	003 981 09 10			
		Needle cage	003 981 03 10			
		Needle cage	004 981 05 10			
Bearing of 3rd Gear Wheel G 76/27, 27 A						
3	15	Needle cage (split)	001 981 86 10	40	35	34,7
		Needle cage	002 981 00 10			
		Needle cage	003 981 04 10			
		Needle cage (split)	003 981 12 10			

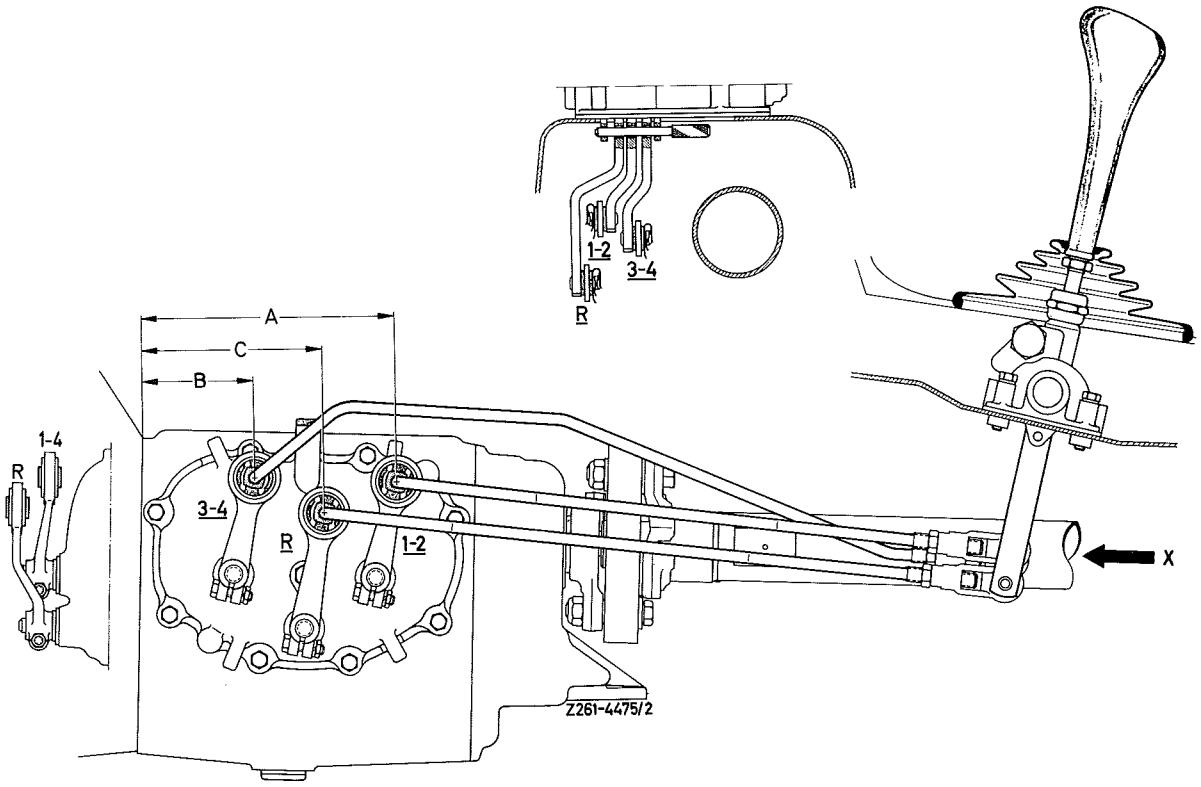


Fig. 1

Dimensions for Adjusting Shift Levers of Floor-Mounted Gearshift

Adjusting dimension	G 76/18, G 76/18 A, G 76/18 B (Types 114, 115, 116.020/024/025)	G 76/27, G 76/27 A (Types 107, 108, 109, 116.028/029)
A = 1st and 2nd speed	152	168
B = 3rd and 4th speed	70	62
C = rev. speed	111	120

Adjustment

1 Disconnect shift rods on levers of bearing bracket of floor shift after removing SL-locks (Fig. 2).

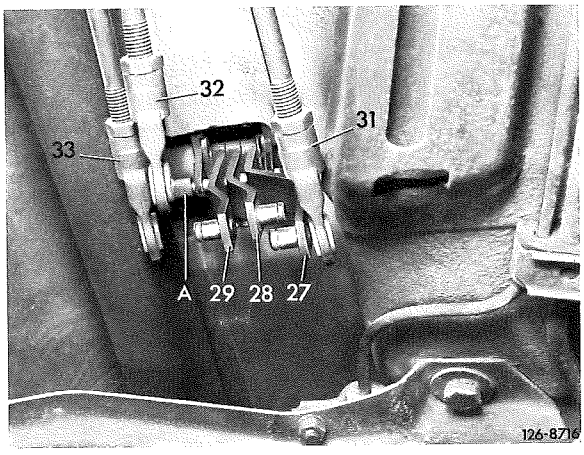


Fig. 2

27 Intermediate lever for reverse speed
28 Intermediate lever for 1st and 2nd speed
29 Intermediate lever for 3rd and 4th speed
31 Shift rod for reverse speed
32 Shift rod for 1st and 2nd speed
33 Shift rod for 3rd and 4th speed
A Locating pin

2 Locate the three intermediate shift levers at bottom on shift bracket by inserting locating pin into holes provided (Fig. 2 and 3).

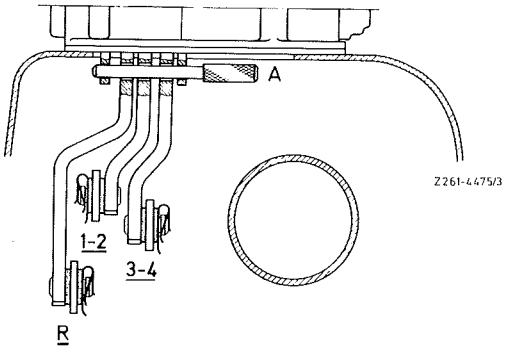


Fig. 3
A Locating pin

3 Move transmission into idle position, check position of shift levers on transmission shift cover for specified dimensions and correct, if required (Fig. 1 and table).

4 Adjust shift rods to length and push rod heads free of tension on bolts of intermediate shift levers and secure with SL locks. Shift levers on transmission shift cover should not move out of their center position.

5 Remove locating pin out of intermediate shift levers.

6 Check gearshift for function with engine running.

Special Tool

Special wrench for octagon nut on shift lever	115 589 00 03 00

Removal

1 Pull shift lever cuff (7) from bead of recess on cover and move upwards (Fig. 1).

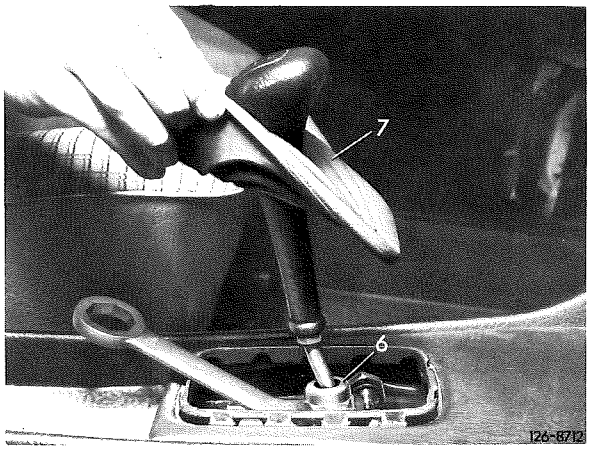


Fig. 1
6 Cap
7 Shift lever cuff

2 Loosen cap (6) with special wrench and screw-off (Fig. 1).

3 Pull shift lever out of shift tube in upward direction (Fig. 2).

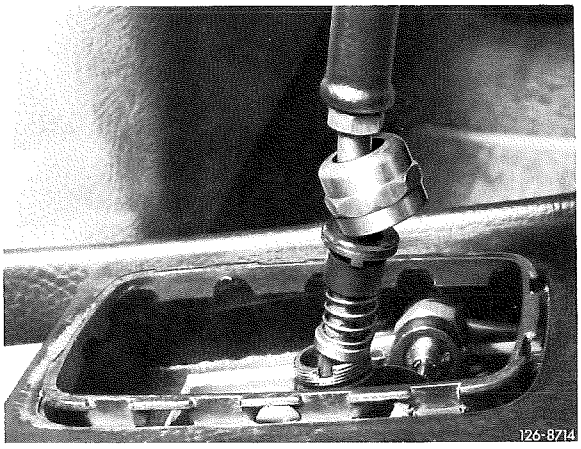


Fig. 2

Disassembly

4 Unscrew shift lever handle with shift lever cuff and hex. nut from shift lever (Fig. 3).

5 Remove cap from shift lever.

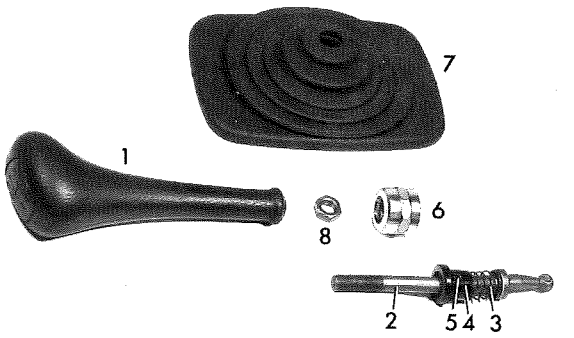


Fig. 3
1 Shift lever handle
2 Shift lever
3 Compression spring
4 Bushing
5 Slotted bushing
6 Cap
7 Shift lever cuff
8 Nut

6 Ease slotted bushing and knock out of shift lefer by means of a punch (Fig. 4).

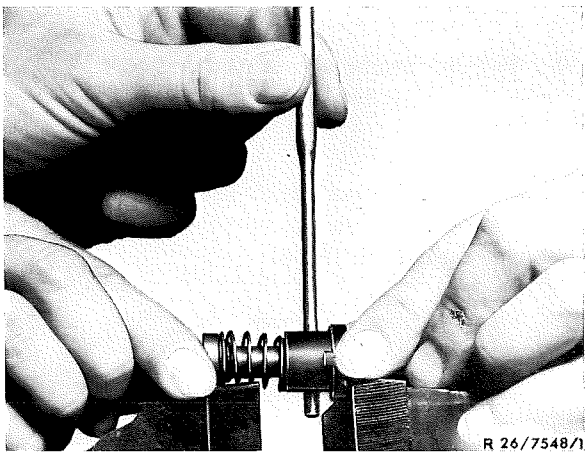


Fig. 4

26.1 Removal and Installation, Disassembly and Assembly of Gearshift Lever

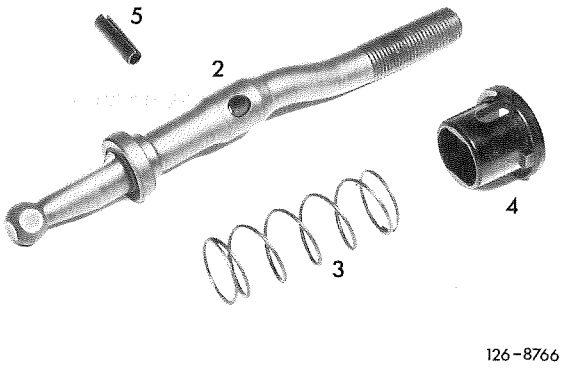


Fig. 5

2 Shift lever
3 Compression spring
4 Bushing
5 Slotted bushing

7 Remove bushing (4) and compression spring (3) from shift lever (2) (Fig.5).

8 Check components for wear and condition.

Assembly

Caution! A change on shift lever reduced bore in shift lever from 5 mm dia. to 4 mm dia. Accordingly, the dia. of the slotted sleeve (5), as well as that of the oblong hole in bushing (4) were also reduced. During assembly, make sure that only parts with similar dimensions are mounted. Also note that in the 4-speed gearshift only the black plastic bushing (4) is installed. If the white plastic bushing (5-speed) is installed, reverse speed cannot be shifted.

9 Slip compression spring (3) and bushing (4) on shift lever (2).

10 Push bushing (4) against compression spring (3) until bores of shift lever and bushing are one above the other.

11 Knock slotted bushing (5) with punch into shift lever until both ends of slotted bushing are flush with bushing (4) (Fig.6).

12 Slip cap (6) on shift lever.

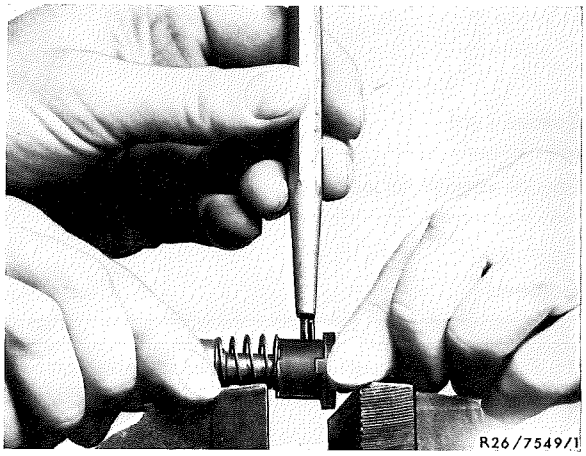


Fig. 6

13 Screw hex. nut and shift lever handle with shift lever cuff as far as possible on shift lever.

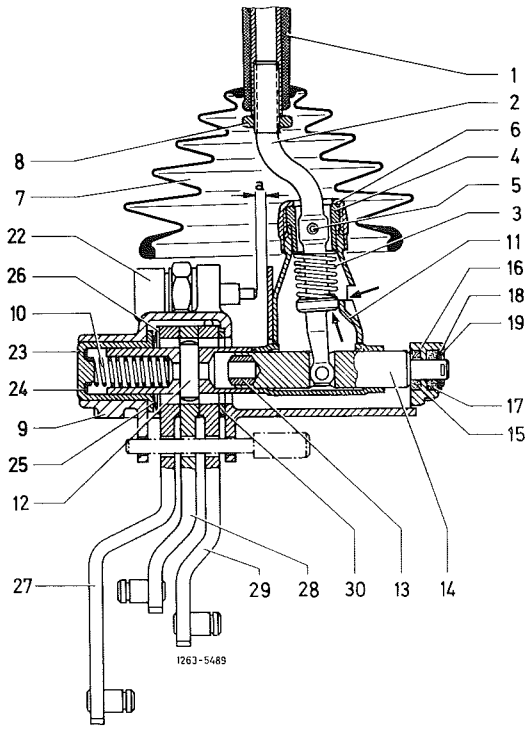
14 Insert shift lever from above into shift tube, making sure that both locating pins at collar of bushing (4) are well-seated in machined recesses on shift tube provided and that the machined end at bottom of shift lever is at the right (arrows in Fig.7).

15 Tighten cap (6) with special wrench (Fig. 1).

16 Turn shift lever into correct position and tighten hexagon counter nut.

17 Push shift lever cuff into bead of recess on cover.

18 Check gearshift for function with engine running.



1 Shift lever handle
2 Shift lever
3 Compression spring
4 Bushing
5 Slotted bushing
6 Cap
7 Cuff for shift lever
8 Nut
9 Bearing bracket
10 Compression spring
11 Shift tube
12 Bolt in shift tube
13 Damping bushing
14 Guide pin
15 Guide ring
16 Bearing cap
17 Guide ring
18 Washer
19 Lock
22 Backup light switch
23 Bushing
24 Washer
25 Spring plate
26 Washer
27 Intermediate lever for reverse speed
28 Intermediate lever for 1st and 2nd speed
29 Intermediate lever for 3rd and 4th speed
30 Washer

Fig. 7

Removal

1 Disconnect shift rods on levers of bearing bracket of floor shift after removing SL locks (Fig. 1).

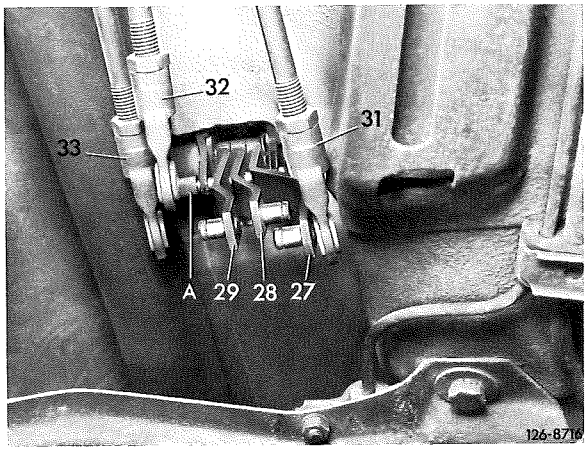


Fig. 1

27 Intermediate shift lever reverse speed
28 Intermediate shift lever 1st and 2nd speed
29 Intermediate shift lever 3rd and 4th speed
31 Shift rod reverse speed
32 Shift rod 1st and 2nd speed
33 Shift rod 3rd and 4th speed
A Locating pin

2 Remove ashtray and cover (Fig. 2).



Fig. 2

3 Loosen backup light switch (22) on shift bracket and screw out (Fig. 3).

4 Unscrew fastening screws from shift bracket (Fig. 3).

5 Remove shift bracket with gasket (38) (Fig. 4).

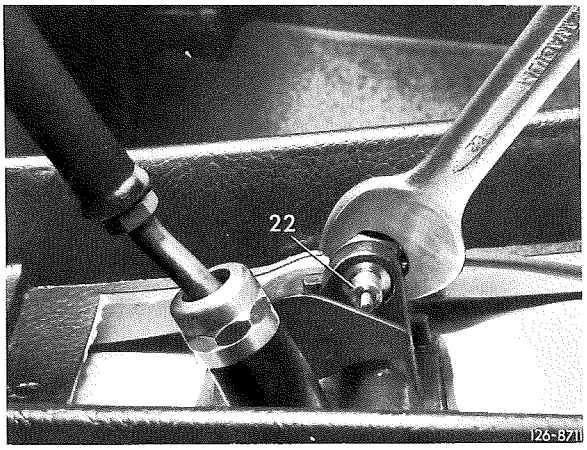


Fig. 3
22 Backup light switch

Caution! When removing shift bracket, make particularly sure that tunnel cover is not damaged.

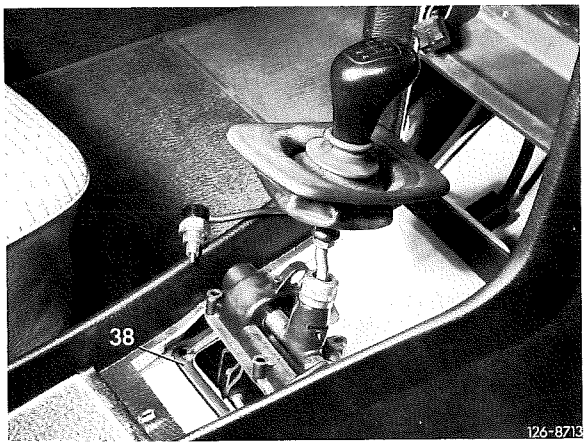


Fig. 4
38 Gasket

Installation

6 Place gasket on shift bracket and insert fastening screws.

7 Carefully introduce shift bracket with gasket and fastening screws through tunnel cover and screw down (Fig. 3 and 4).

Caution! When tightening screws of shift bracket, make absolutely sure that rear righthand fastening screw extends into tunnel only to the extent that a minimum distance of "a" = 8 mm is available between screw and universal shaft (Fig. 5).

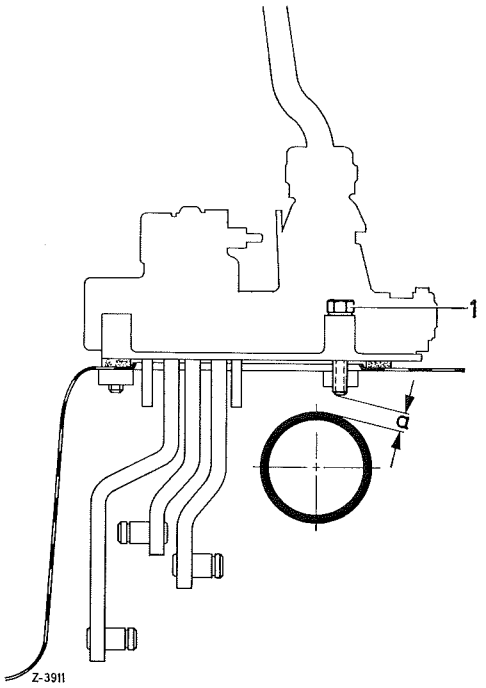


Fig. 5

a Distance toward universal shaft min. 8 mm

8 Screw backup light switch (22) into bearing cap of shift bracket (Fig. 3).

9 Push shift lever into 1st gear level and check distance between contact pin of backup light switch and contact plate. Distance should be 4 mm (Fig.6).

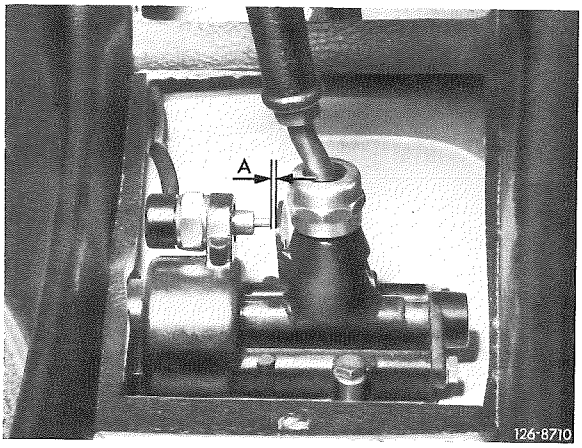


Fig. 6

A = 4 mm adjusting dimension for contact pin of backup light switch

10 Install cover and insert ashtray (Fig. 2).

11 Check adjustment of gearshift (26.1-610).

12 Push shift rods on bolts of intermediate shift lever and secure with SL locks.

13 Check gearshift for function with engine running.

Lubricant

e.g. Longterm 2	refer to pertinent instructions page 266.2

Special Tool

Special wrench for octagon nut on shift lever	115 589 00 03 00

1 Remove floor shift (26.1-630).

2 Remove shift lever (26.1-620).

3 Unscrew fastening screws (21) of bearing cap (16). Pull bearing cap with guide bolt (14) out of shift tube (11) (Fig. 1).

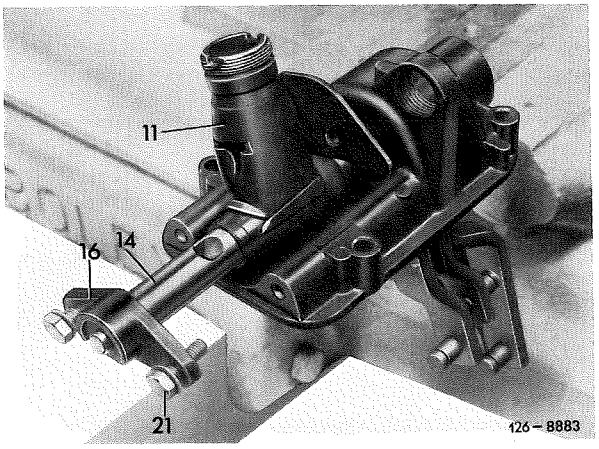


Fig. 1

11 Shift tube
14 Guide bolt
16 Bearing cap
21 Hex. screw

4 Pull shift tube (11) out of shift bracket (9) or intermediate shift lever (27, 28 and 29) (Fig. 2 and ill.table).

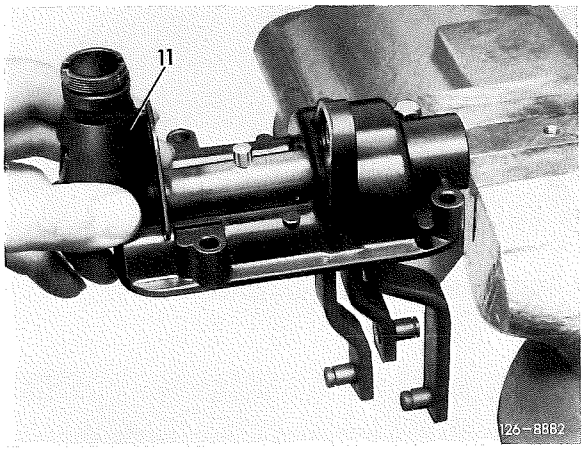


Fig. 2

11 Shift tube

5 Pull pin (12) out of shift tube (Fig. 3).

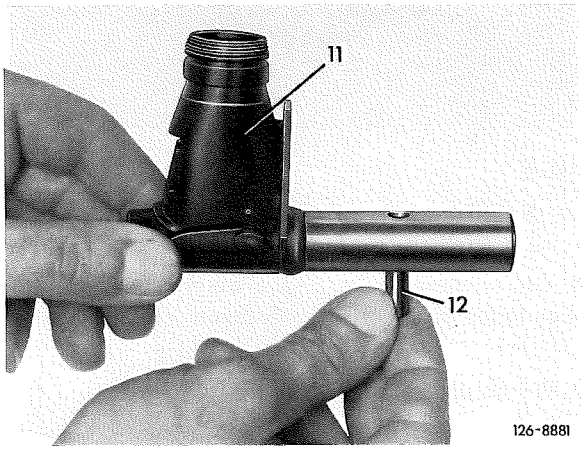


Fig. 3

11 Shift tube
12 Pin

6 Push out lock (19) on bearing cap by means of screw driver and remove together with compensating washers. This requires turning guide bolt first by 180° (Fig. 4).

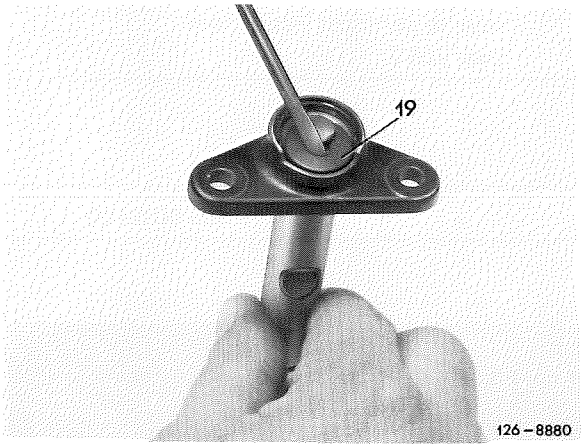


Fig. 4

19 Lock

7 Pull bearing cap (16) from guide bolt (14) (Fig. 5).

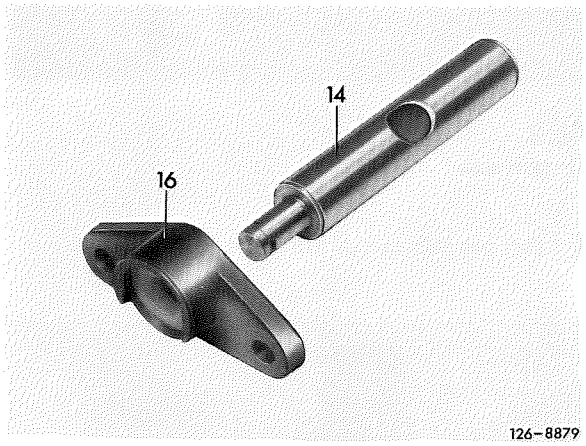


Fig. 5

14 Guide bolt 16 Bearing cap

8 Carefully push guide rings (15 and 17) out of bearing cap by means of screw driver (Fig. 6).

9 Pull damping bushing (13) out of guide bolt (Fig. 7).

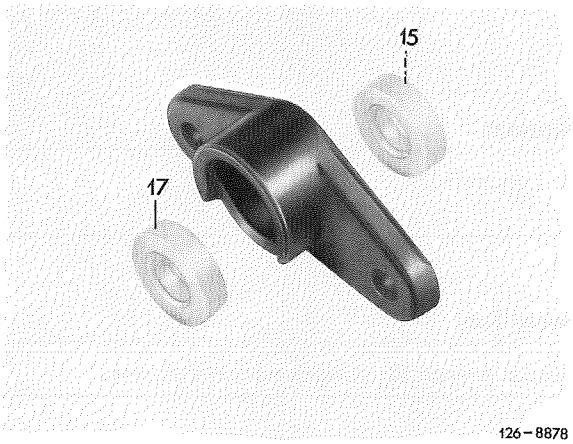


Fig. 6

15 Guide ring 17 Guide ring

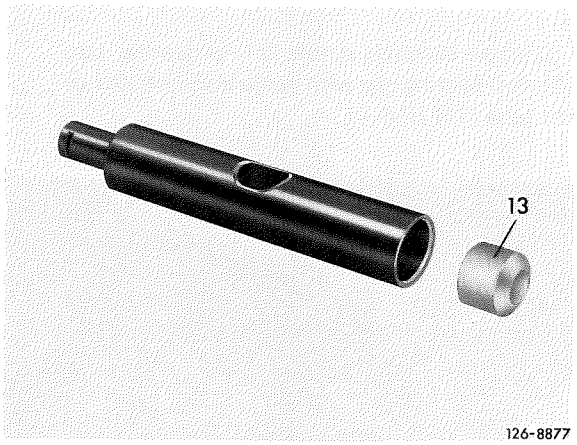


Fig. 7

13 Damping bushing

10 Remove compression spring (10) from shift bracket (Fig. 8).

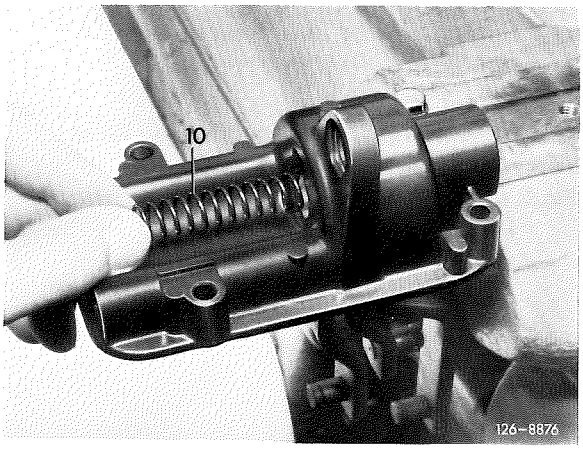


Fig. 8

10 Compression spring

11 Remove released intermediate levers (27, 28 and 29), as well as washer (26) and spring plate (25) out of bearing bracket (Fig. 9).

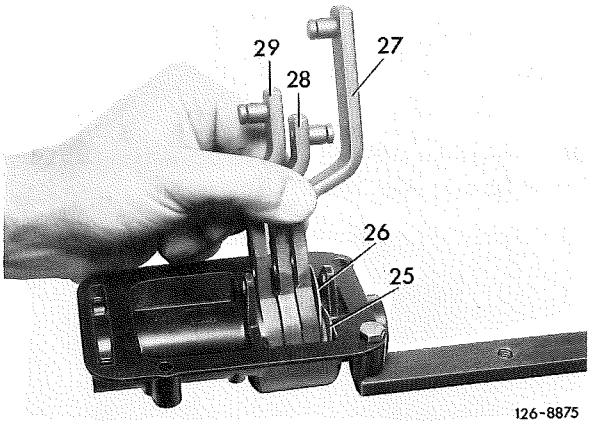


Fig. 9

25 Spring plate
26 Washer
27 Intermediate lever for reverse speed
28 Intermediate lever for 1st and 2nd speed
29 Intermediate lever for 3rd and 4th speed

12 Remove plastic washer (30) for shift tube out of bearing bracket (Fig. 10).

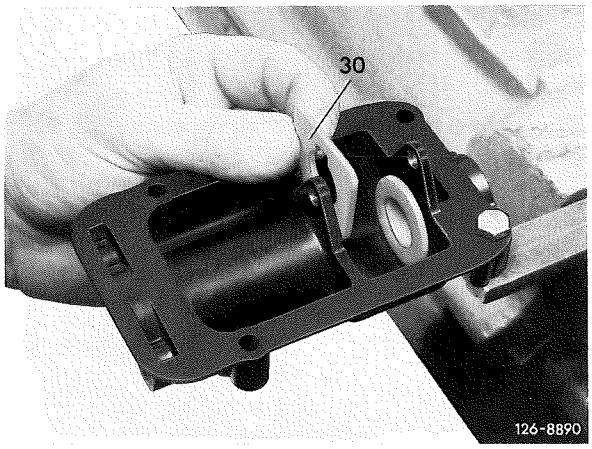


Fig. 10

30 Plastic washer

13 Push plastic bushing (23) out of bearing bracket (Fig. 11).

14 Check all parts for wear or condition and renew, if required.

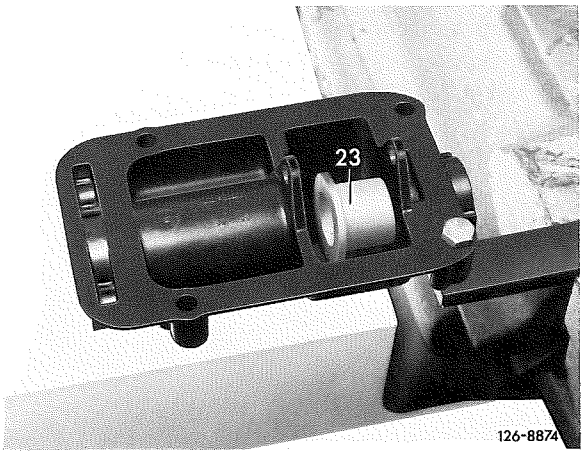


Fig. 11

23 Plastic bushing

Assembly

Caution! Prior to inserting plastic bushing, check whether washer (24) is inserted (illustrated table 26.1-690). Use grease to insert washer into bushing, if required.

15 Push plastic bushing (23) manually into bearing bracket (Fig. 11).

16 Insert plastic washer (30) into bearing bracket (Fig. 10).

17 Insert intermediate levers (27, 28 and 29) together into bearing bracket and hold by inserting locating pin (Fig. 12).

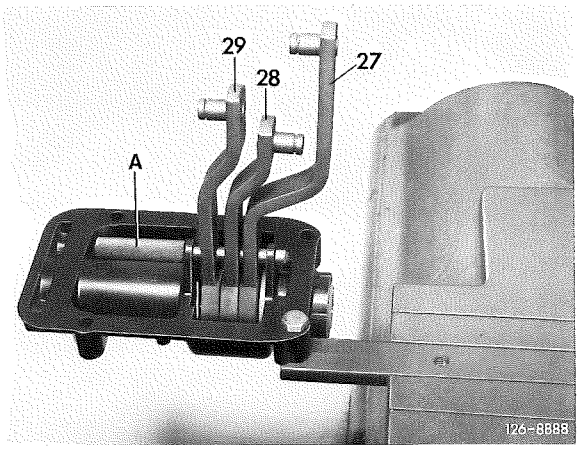


Fig. 12

27 Intermediate lever for reverse speed
28 Intermediate lever for 1st and 2nd speed
29 Intermediate lever for 3rd and 4th speed
A Locating pin

18 Push spring plate (25) and washer (26) into bearing bracket so that spring plate (25) faces collar of bushing (23) (Fig. 13).

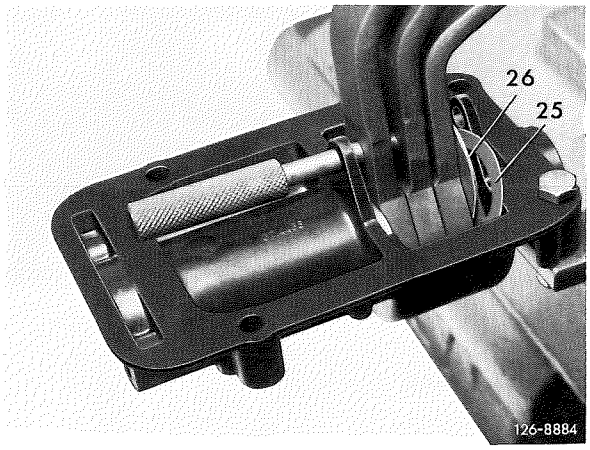


Fig. 13

25 Spring plate 26 Washer

19 Insert centering mandrel into bearing bracket so that intermediate levers (27, 28 and 29), as well as spring plate (25) and washer (26) are all in alignment. Then pull out centering mandrel (Fig. 14).

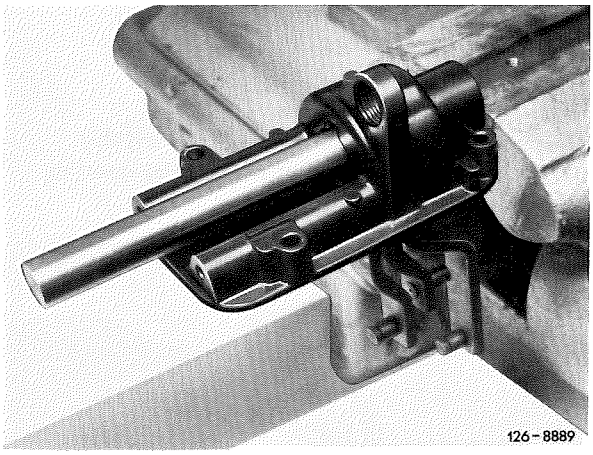


Fig. 14

Note: The following drawing shows dimension for suitable, self-made centering mandrel (Fig. 15).

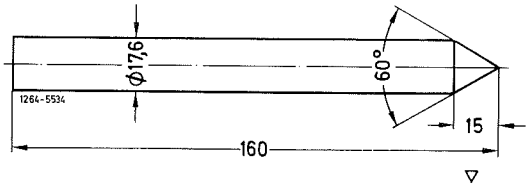


Fig. 15

20 Insert pin (12) and compression spring (10) into shift tube (Fig. 16).

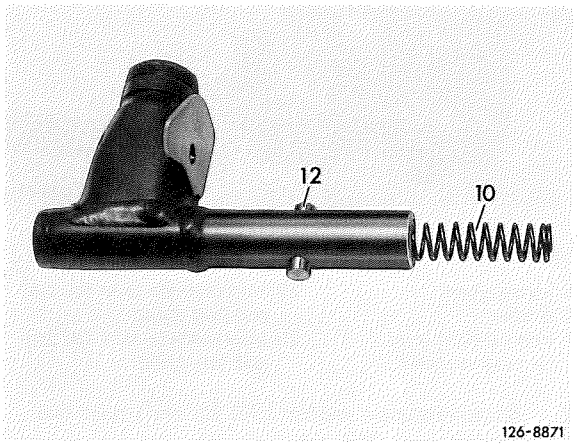


Fig. 16

10 Compression spring 12 Pin

21 Introduce shift tube (11) into bearing bracket (Fig. 17).

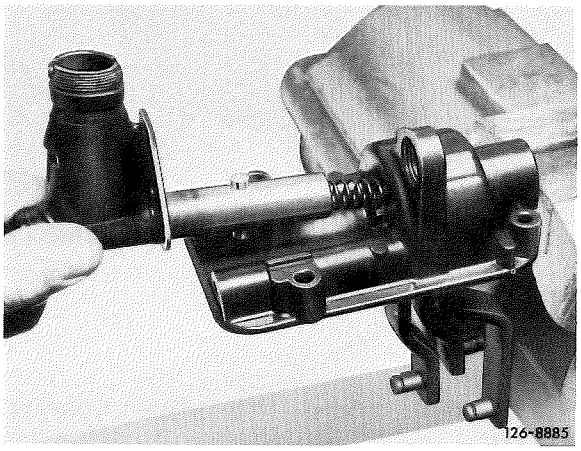


Fig. 17

22 Force damping bushing (13) into guide bolt (14) (Fig. 18).

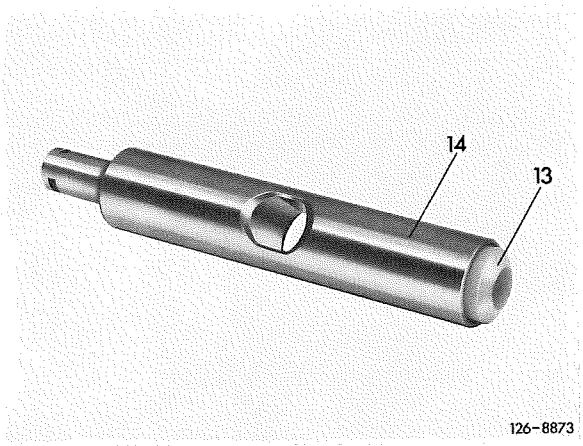


Fig. 18

13 Damping bushing 14 Guide bolt

23 Push guide ring (15 and 17) into bearing cap (Fig. 19).

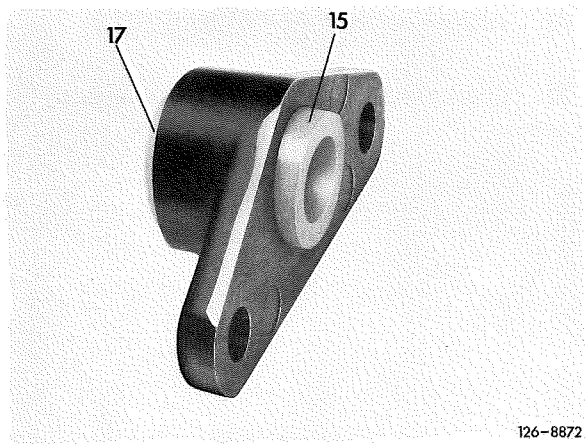


Fig. 19

15 Guide ring 17 Guide ring

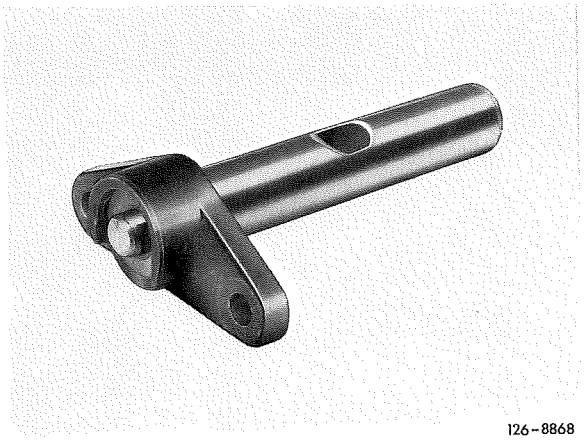


Fig. 20

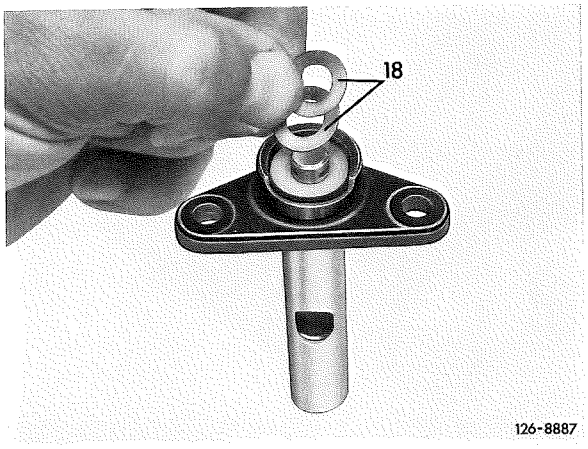


Fig. 21

18 Compensating washer

24 Place bearing cap with guide rings on guide bolt (Fig. 20).

25 Turn guide bolt until lock can be pushed into grooves from below. First add enough compensating washers (18), so that lock slips on tightly (Fig. 21 and 22).

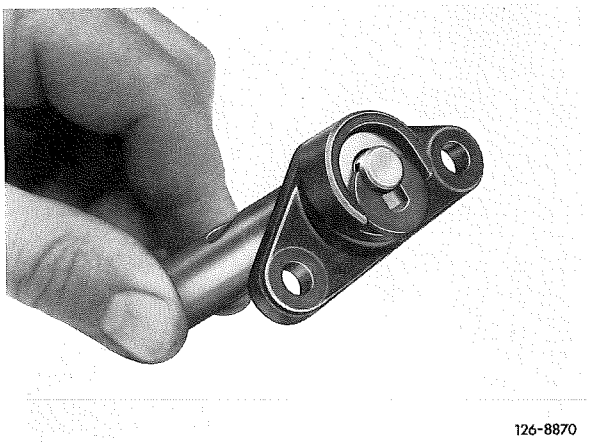


Fig. 22

26 Secure lock against slipping out by turning guide bolt by 180° (Fig. 23).

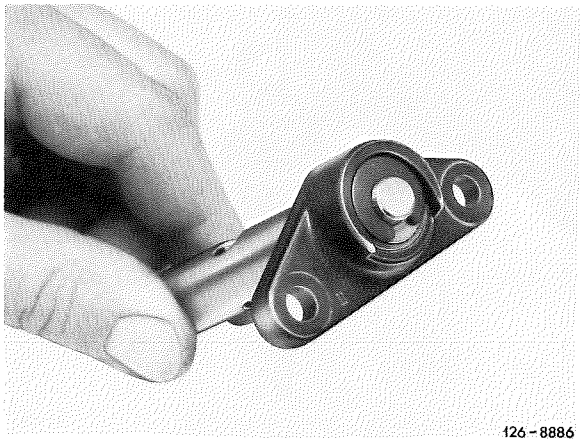


Fig. 23

27 Push shift tube (11) against compression spring (10), insert guide bolt with bearing cap into shift tube and screw to shift bracket (Fig. 24).

28 Pull locating pin out of intermediate shift lever.

29 Install shift lever (26.1-620).

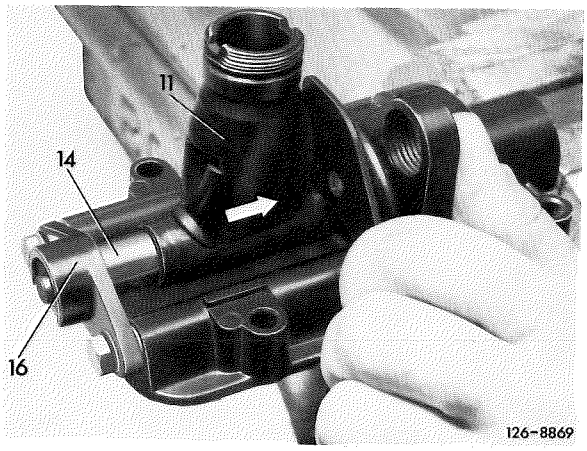


Fig. 24

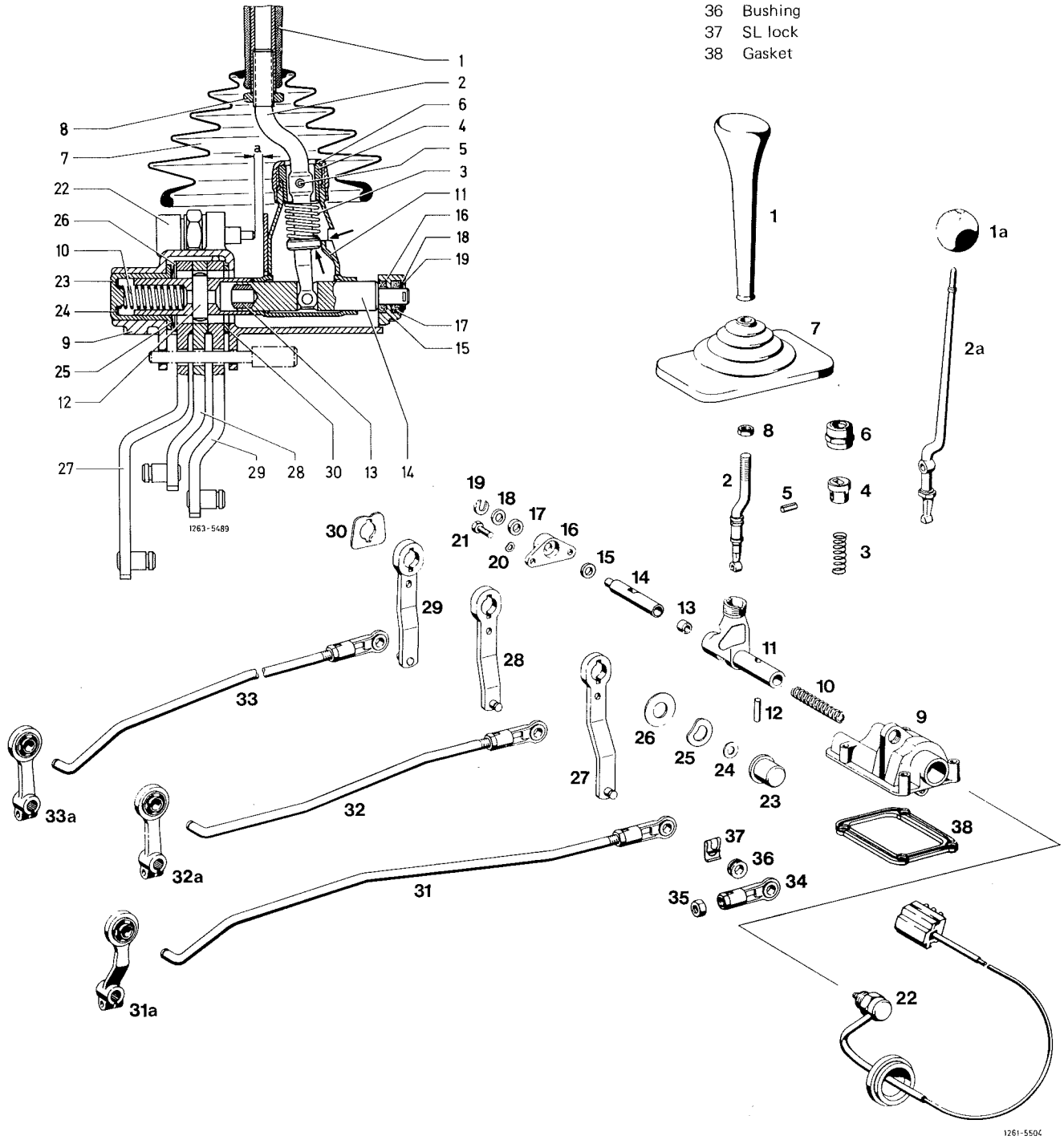
11 Shift tube
14 Guide bolt
16 Bearing cap

30 Install floor shift (26.1-630).

31 Adjust floor shift (26.1-610).

32 Check floor shift for function with engine running.

1 Shift lever handle
1a Shift lever knob
2 Shift lever
2a Shift lever
3 Compression spring
4 Bushing
5 Slotted bushing
6 Cap
7 Cuff for shift lever
8 Nut
9 Bearing bracket
10 Compression spring
11 Shift tube
12 Pin in shift tube
13 Damping bushing
14 Guide bolt
15 Guide ring
16 Bearing cap
17 Guide ring
18 Washer
19 Lock
20 Spring plate
21 Hex. screw
22 Backup light switch
23 Bushing
24 Washer
25 Spring plate
26 Washer
27 Intermediate lever for reverse speed
28 Intermediate lever for 1st and 2nd speed
29 Intermediate lever for 3rd and 4th speed
30 Washer
31 Shift rod for reverse speed
31a Shift lever for reverse speed
32 Shift rod for 1st and 2nd speed
32a Shift lever for 1st and 2nd speed
33 Shift rod for 3rd and 4th speed
33a Shift lever for 3rd and 4th speed
34 Rod head
35 Hex. nut
36 Bushing
37 SL lock
38 Gasket



Layout of 5-Speed Transmission with Sectional View . . . . . Job No. 26.2 – 010

Removal and Installation of Transmission 020

Clutch Housing

Screwing Clutch Housing Off and On 050

Transmission Shift Cover

Removal and Installation of Transmission Shift Cover 110

Disassembly, Assembly of Gear Shift Cover, Sealing Shafts of Shift Rockers 120

Transmission Cover Front

Screwing Transmission Cover Front Off and On 210

Screwing Bearing Tube of Transmission Cover Front Off and On, Replacement of Sealing Ring 220

Transmission Cover Rear

Screwing Transmission Cover Rear Off and On, Replacement of Sealing Ring 310

Removal and Installation of Tachometer (Speedometer) Drive 320

Transmission Gear Assembly

Removal and Installation of Fifth and Reverse Speed . . . . . R 415

Removal and Installation of Gear Assembly . . . . . R 420

Disassembly and Assembly of Main Shaft . . . . . R 440

Disassembly and Assembly of Synchronizing Body (Coil Spring Synchronization) . . . . . R 450

Disassembly and Assembly of Synchronizing Body (Circular Spring Synchronization) . . . . R* 452

Disassembly and Assembly of Countershaft . . . . . R 460

Bearings of Transmission Shafts and Gear Wheels . . . . . R 480

Gearshift

Adjustment of Floor-Mounted Gearshift 610

Removal and Installation, Disassembly and Assembly of Gearshift Lever 620

Removal and Installation of Floor-Mounted Gearshift 630

Disassembly and Assembly of Floor-Mounted Gearshift . . . . . R 640

Illustrated Table Floor-Mounted Gearshift 690

Illustrated Table Transmission 990

Design of 5-Speed Transmission and Sectional View 26.2

The 5-speed transmission G 76/27-5 corresponds in its basic design with the laterally-shifted four-speed transmissions.

Gear steps 1 to 4 are housed in the actual transmission housing, which is similar to the 4-speed transmission G 76/27.

A connecting housing flanged to the rear parting surface of this housing receives the 5th and the reverse gear step.

The connecting housing has an open end toward the rear and is closed by an intermediate plate which is simultaneously supporting the rear shaft bearings.

The countershaft is mounted in three bearings supported in housings. The main shaft runs in 2 housing bearings and in 1 roller bearing in drive shaft. The drive shaft itself is mounted in a single bearing. The front transmission housing cover and the shift cover are essentially the same as for the 4-speed transmission.

The rear cover, on the other hand, has been specially developed for the 5-speed transmission.

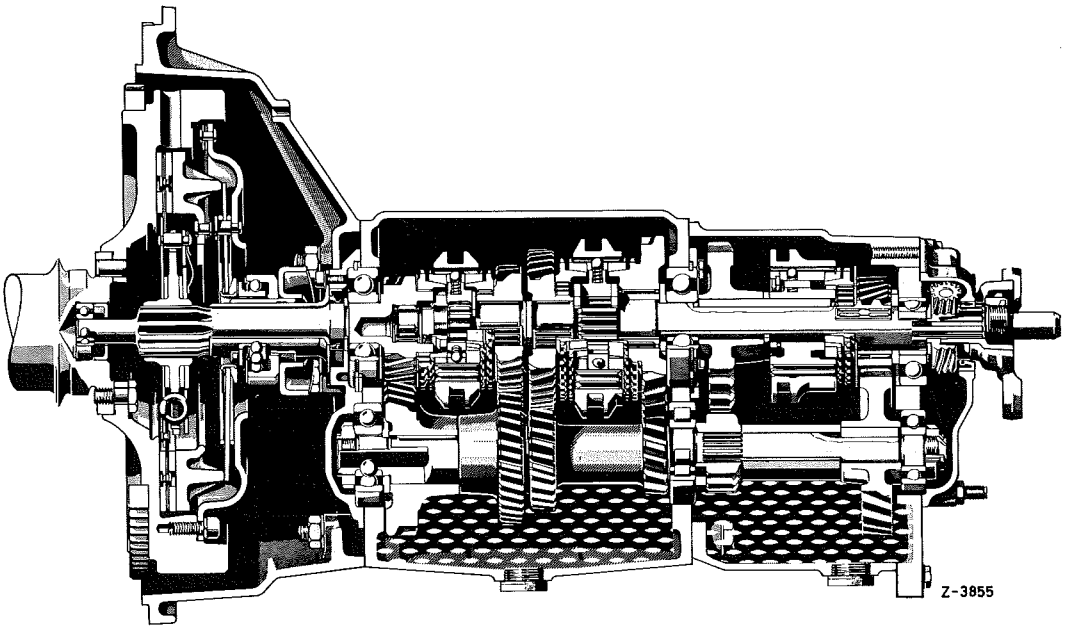


Fig. 1



Oil Grades/Filling Capacities

Automatic transmission fluid (ATF) approved oil types Filling capacity in lits.	Type A, Suffix A refer to pertinent instructions 2.5	page 236.1, 236.2

Tightening Torques	Nm	(kpm)
Self-locking nuts for attaching companion plates	45	(4.5)
Oil drain and filler plug	60	(max. 6)
Clamping nut on universal shaft (propeller shaft)	30–40	(3–4)
Hex. bolt on shaft intermediate bearing	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

Note

This Supplement covers the removal and installation of MB 5-speed transmission G 76/27-5 for type series 114.

For types 108.016, 108.018, 108.019, 109.016, 111.024 and 111.025 removal and installation of transmission is essentially the same. Consequently, procedure for these types is the same as described in these assembly instructions.

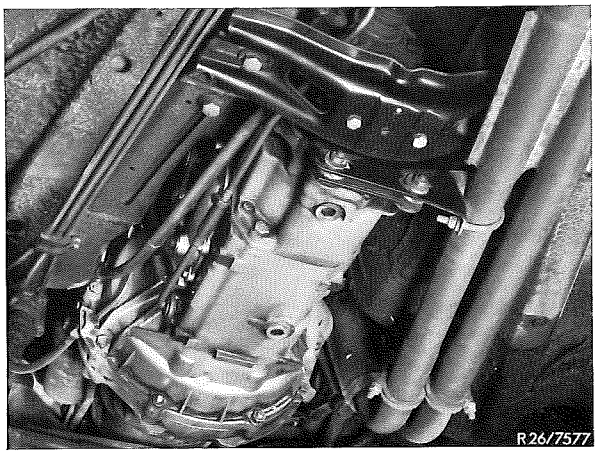


Fig. 1

Removal

1 Disconnect grounding cable on battery.

2 Support transmission with pitlift or vehicle jack.

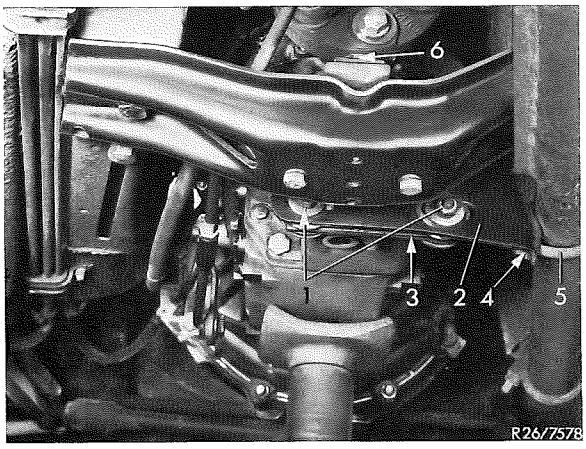


Fig. 2

1 Screw for exhaust support
2 Exhaust support
3 Fastening plate
4 Nut for clamp
5 Clamp
6 Nut for rear engine rubber mounting

3 Unscrew fastening screws (1) for exhaust support (2) on fastening plate (3) and remove together with disc washers. Watch out for rubber washers (Fig. 2).

4 Loosen nuts (4) for clamp (5) and turn exhaust support in downward direction (Fig. 2 and 3).

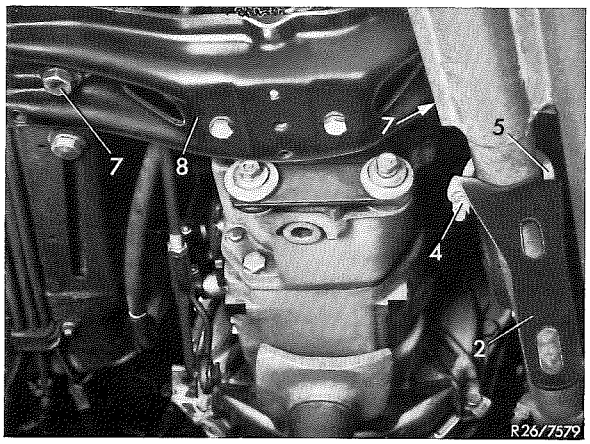


Fig. 3

2 Exhaust support
4 Nut for clamp
5 Clamp
7 Screw for cross member
8 Cross member

5 Unscrew fastening nut (6) for rear engine rubber mounting on bracket (Fig. 2).

6 Unscrew screws (7) for cross member (8) on frame floor (Fig. 3).

7 Remove cross member (8) (Fig. 4).

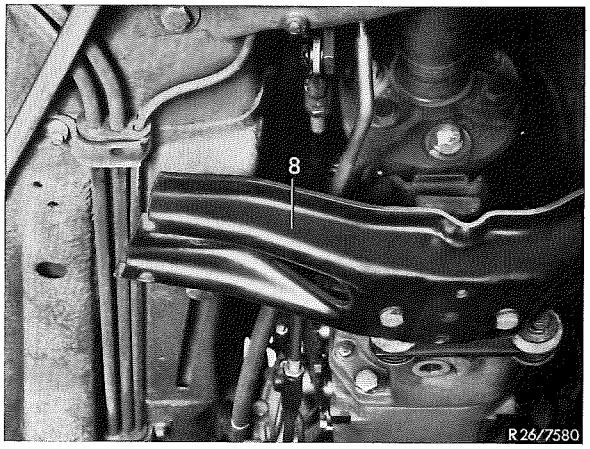


Fig. 4

8 Disconnect shift rods on intermediate levers (30, 31 and 32) of shift bracket after removing SL-locks (Fig. 5).

9 Pull-off input shaft (9) for speedometer (tachometer) after loosening clamping screw (10) on rear transmission cover (Fig. 5 and 6).

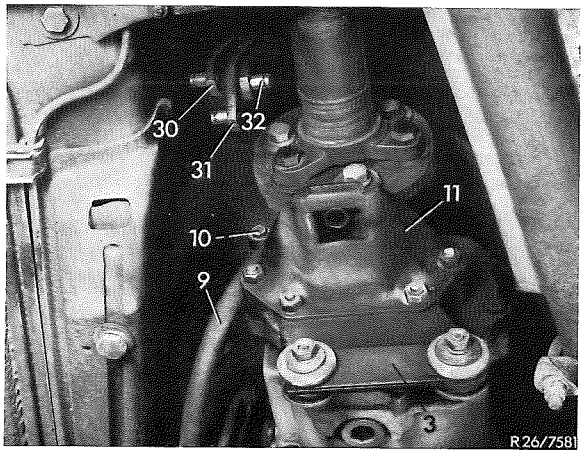


Fig. 5

3 Fastening plate
9 Input shaft for tachometer
10 Clamping screw
11 Bracket
30 Intermediate shift lever 1st and 2nd speed
31 Intermediate shift lever 3rd and 4th speed
32 Intermediate shift lever 5th and reverse speed

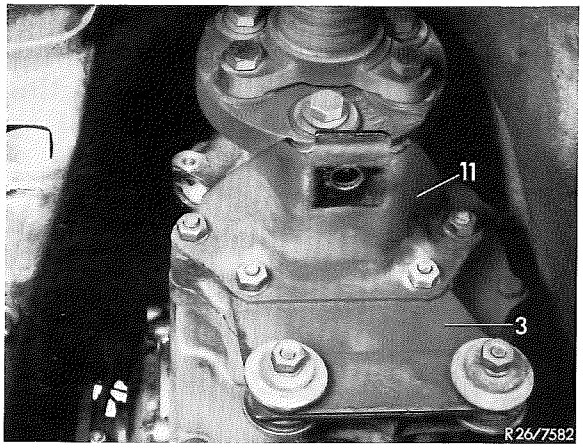


Fig. 6

3 Fastening plate
11 Bracket

10 Unscrew bracket (11) on rear transmission cover and remove together with fastening plate (3) for exhaust support (Fig.6).

11 Loosen clamping nut of propeller shaft (Fig. 7).

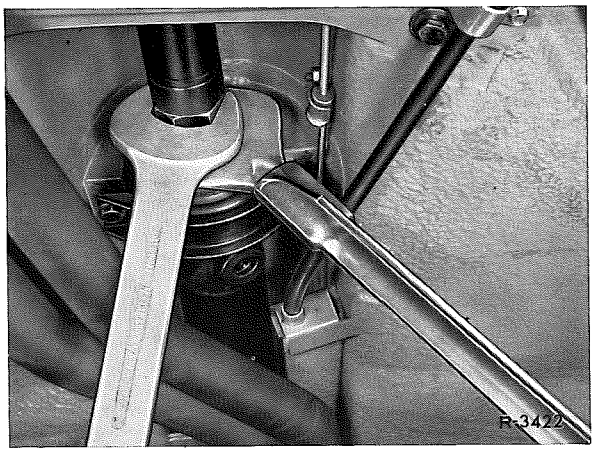


Fig. 7

12 Unflange propeller shaft on transmission and on rear axle in such a manner that the two companion plates remain on shaft.

Note: To facilitate job of releasing propeller shaft, raise vehicle on rear axle until wheels are rotating freely.

13 Unscrew screws (20) of universal shaft intermediate bearing (Fig. 8).

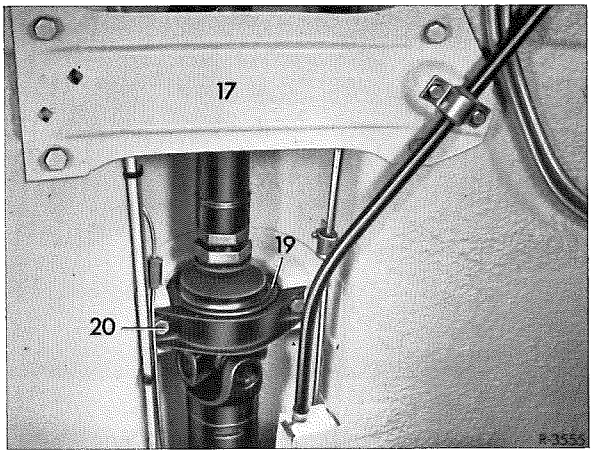


Fig. 8

17 Cross strut
19 Universal shaft intermediate bearing
20 Screw for intermediate bearing

14 Unscrew stiffening (18) on frame floor (Fig. 10).

15 Compress propeller shaft in slide piece, pull out of centering journal and push as far as possible toward the rear (Fig. 11).

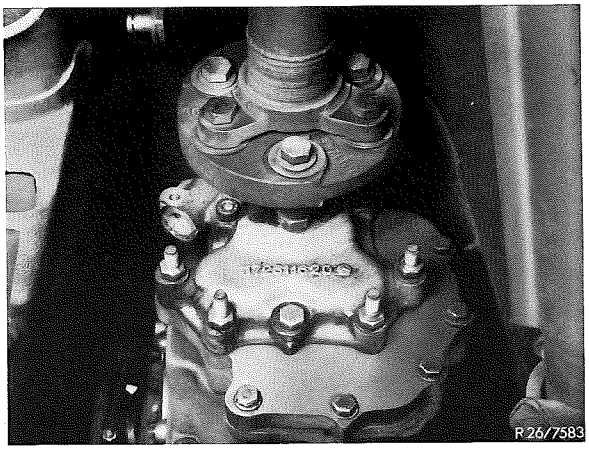


Fig. 9

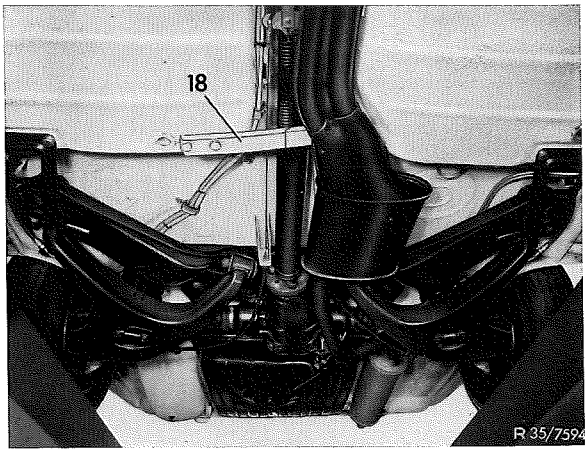


Fig. 10

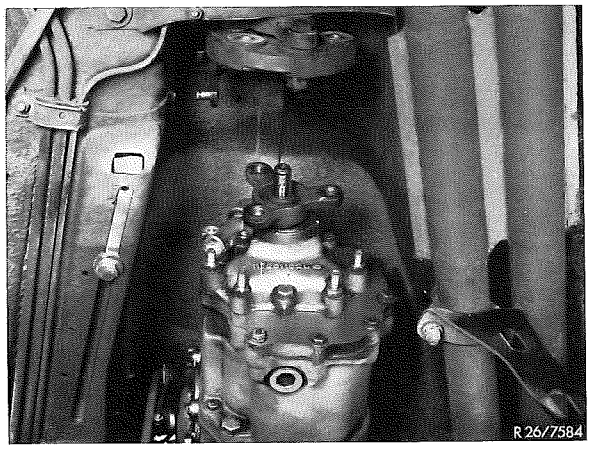


Fig. 11

16 Unscrew both mountings (21 and 22) for pressure line to slave cylinder (Fig. 12).

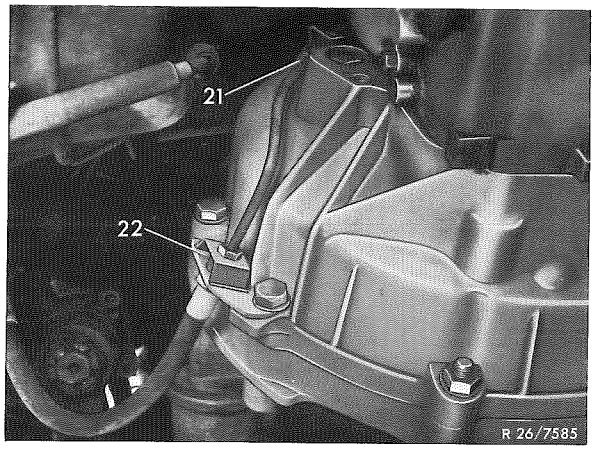


Fig. 12

21 Upper mounting 22 Lower mounting

17 Unscrew slave cylinder (23) with plastic shim and place on upper left on engine without loosening pressure line (Fig. 13).

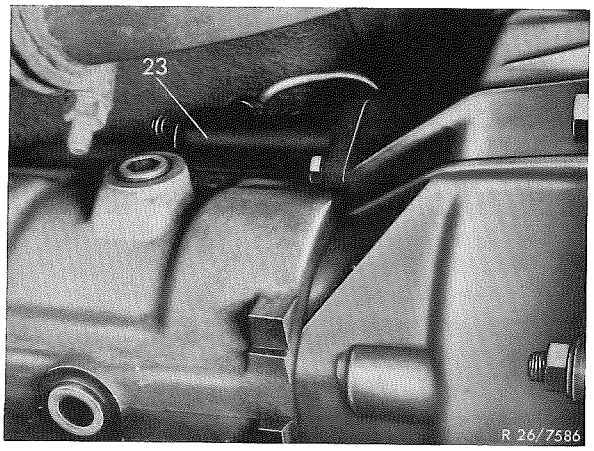


Fig. 13

18 Unscrew screws for attaching starter and force starter out of its fitting.

19 Unscrew all screws for fastening transmission on intermediate flange, removing the two upper screws last (Fig. 14).

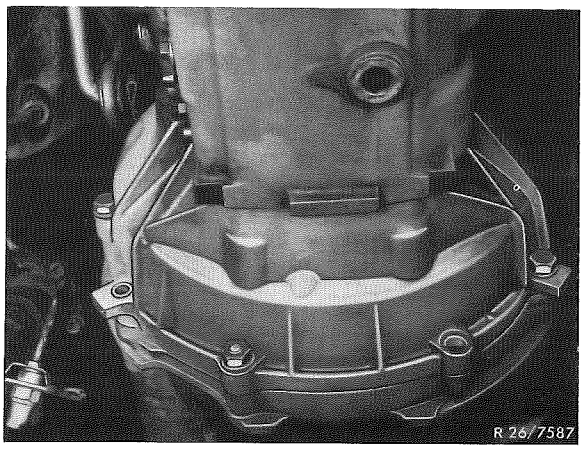


Fig. 14

20 Move transmission horizontally toward the rear until propeller shaft is definitely separated from hub of driven plate and then remove in downward direction (Fig. 15).

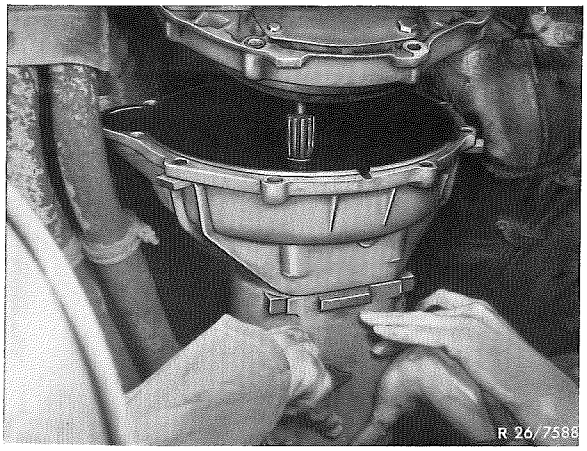


Fig. 15

Installation

21 **Lightly** grease centering journal and splining on transmission input shaft with hot bearing grease.

22 Engage one speed, then introduce transmission horizontally into clutch while rotating transmission main shaft back and forth until splining of input shaft and driven plate are in alignment.

23 Screw-down transmission with fastening bolts starting at the top. Make sure that grounding cable is not caught (Fig. 14).

24 Position starter in fitting and tighten screws. Screw-on grounding cable at top screw (Fig. 14).

25 Introduce slave cylinder with plastic shim into clutch housing and screw down (Fig. 13).

26 Tighten both brackets (21 and 22) for delivery line to slave cylinder (Fig. 12).

27 Flange propeller shaft to rear axle and screw stiffening (18) to frame floor (Fig. 10).

28 Screw-in screws for universal shaft intermediate bearing for several turns, but do not tighten.

29 Pull propeller shaft apart in slide piece as much as required and flange to transmission.

30 Screw fastening plate (3) and bracket (11) to rear transmission cover (Fig. 16).

31 Connect input shaft (9) for tachometer to rear transmission cover and tighten clamping screw (10) (Fig. 16).

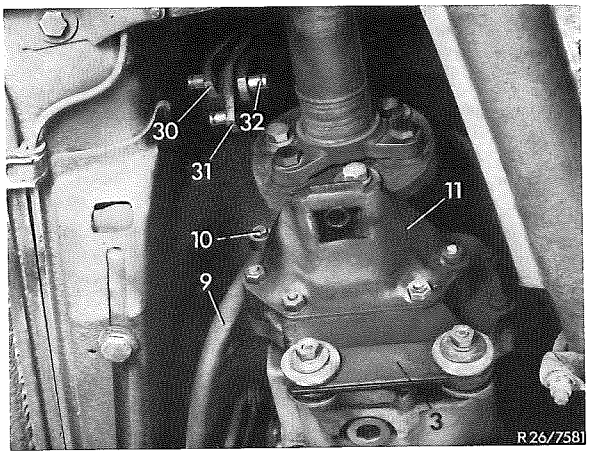


Fig. 16

3 Fastening plate
9 Input shaft for tachometer
10 Clamping screw
11 Bracket
30 Intermediate shift lever 1st and 2nd speed
31 Intermediate shift lever 3rd and 4th speed
32 Intermediate shift lever 5th and reverse speed

32 Connect transmission shift rods to intermediate lever of shift bracket and secure with SL-lock (Fig. 16).

33 Screw cross member (8) to frame floor (Fig. 17).

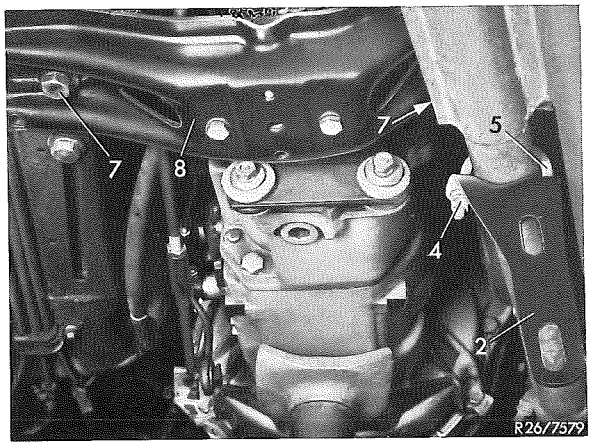


Fig. 17

2 Exhaust support
4 Nut for clamp
5 Clamp
7 Screw for cross member
8 Cross member

34 Screw nut (6) for rear engine rubber mounting to bracket (Fig. 18).

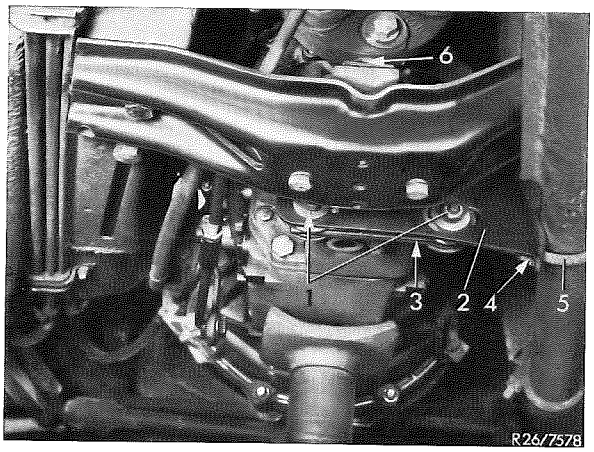


Fig. 18

35 Lower pit lift or vehicle jack on transmission and on rear axle.

36 Turn exhaust support (2) in upward direction and mount with rubber and disc washers to fastening plate, but do not yet tighten. Tighten clamp (5) with nuts (4) on exhaust pipe first, then screw exhaust mounting bracket to fastening plate (Fig. 17 and 18).

37 Move vehicle several times back and forth and then tighten clamping nut of propeller shaft to a tightening torque of 30–40 Nm (3–4 kpm) (Fig. 19).

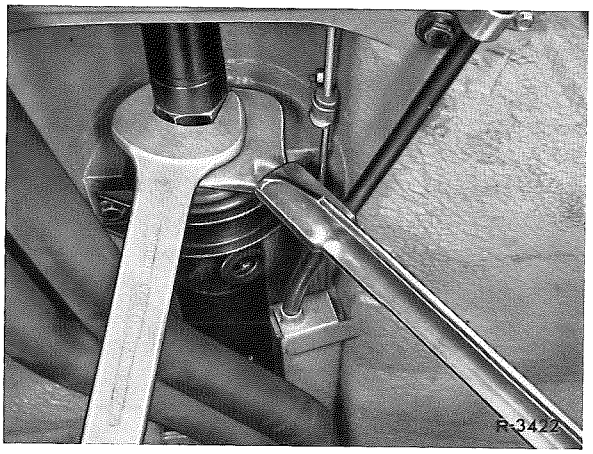


Fig. 19

38 Tighten nuts of universal shaft intermediate bearing (Fig. 20).

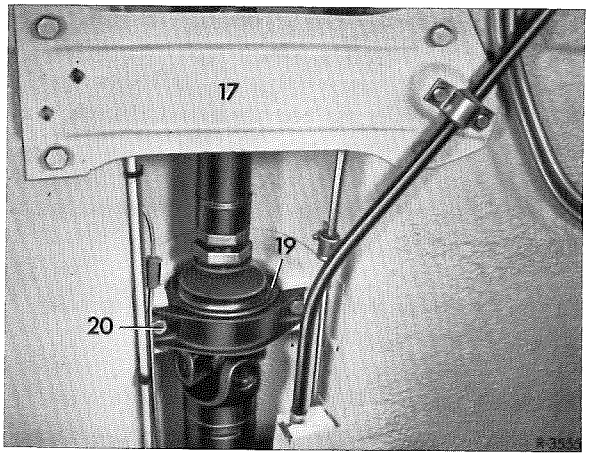


Fig. 20

39 Connect grounding cable to battery.

40 Check transmission and clutch for perfect function.

Screwing-off

1 Remove clutch throwout and clutch throwout rocker.

2 Loosen fastening nuts for clutch housing uniformly and remove together with spring washers (Fig. 1).

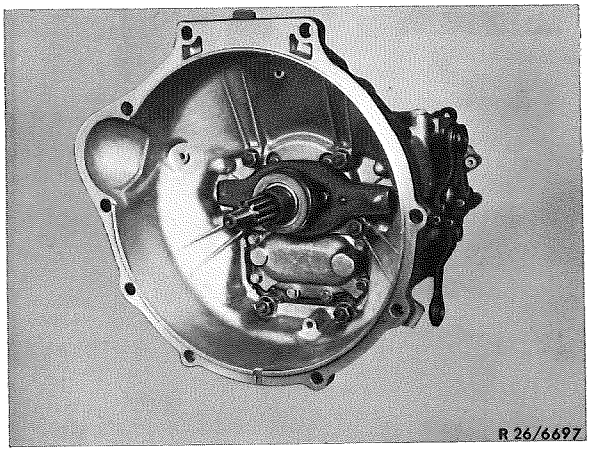


Fig. 1

3 Knock clutch housing from fitted flange (arrow) on front transmission housing cover (Fig. 2) by means of light hammer blows and remove completely with slave cylinder (5) and pressure line (6) from studs (Fig. 3).

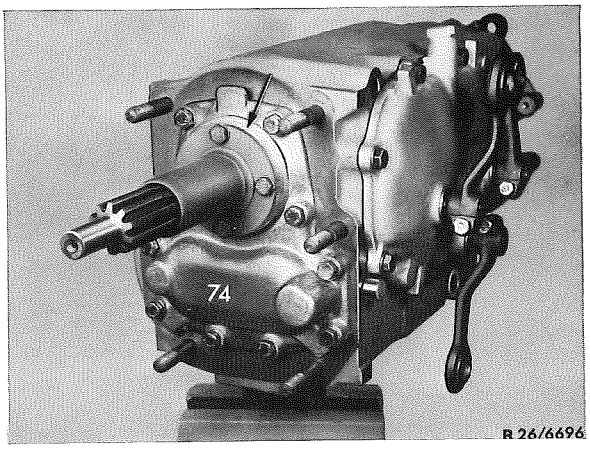


Fig. 2
74 Front transmission cover

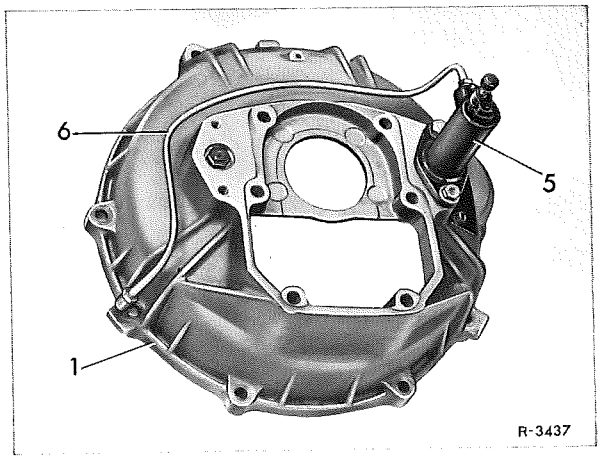


Fig. 3
1 Clutch housing
5 Slave cylinder
6 Pressure line

Screwing-on

4 Slide clutch housing complete with slave cylinder and pressure line on studs of transmission housing and knock by means of light hammer blows against fitted flange on front transmission housing cover up to stop against parting surface on transmission housing (Fig. 2).

5 Position fastening nuts with spring washers and tighten uniformly well (Fig. 1).

6 Attach clutch throwout rocker and clutch throwout.

Removal and Installation of Transmission Shift Cover 26.2

Revision: Revision reference added.

Tightening Torque	Nm	(kpm)
Fastening bolts for shift cover	15	(1.5)

Revision Reference	
Designation	As from Unit No.
Sealing of needle sleeve for gear-shifting shaft bearing 1st and 2nd speed changed from lip sealing to O-ring	008 855

Removal

1 Drain transmission fluid.

2 Remove shift lever (112 a) for 5th and reverse gear after loosening clamping screw (Fig. 1).

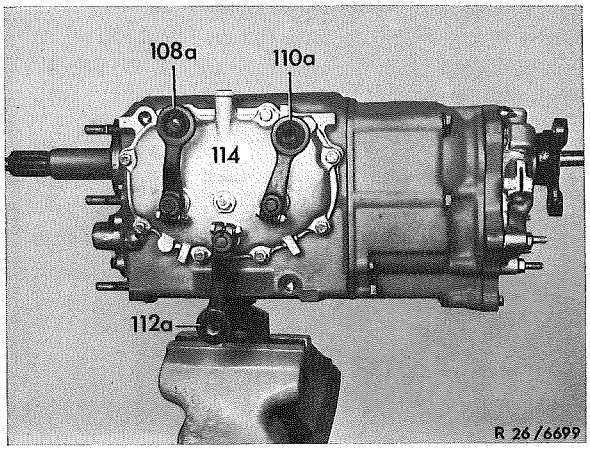


Fig. 1
108a Shift lever 3rd and 4th speed
110a Shift lever 1st and 2nd speed
112a Shift lever 5th and reverse speed
114 Shift cover

3 Force lock washer (121) from gear shifting shaft (112) for 5th and reverse gear and remove washer (120) (Fig. 2).

4 Unscrew fastening bolts (124) of shift cover (114).

5 Carefully knock shift cover from set pins (115), while simultaneously applying a second hammer to move gear shifting shaft (112) for 5th and reverse gear inwards to the point where the distance between the shift cover and the parting surface of the transmission housing is so large that the flat hand can be inserted in between (Fig. 3 and 4).

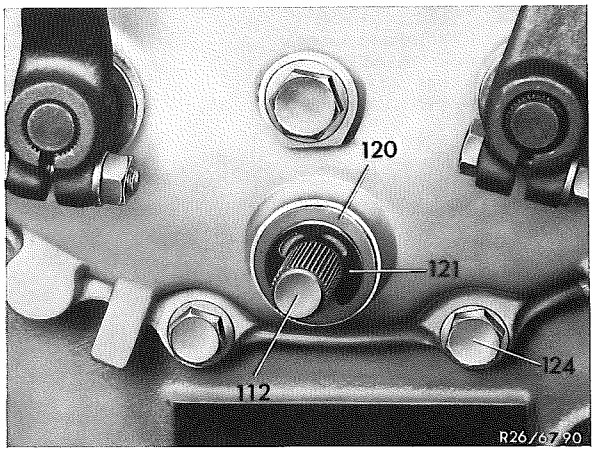


Fig. 2
112 Gear shifting shaft for 5th and reverse speed
120 Washer
121 Lock washer
124 Fastening bolt

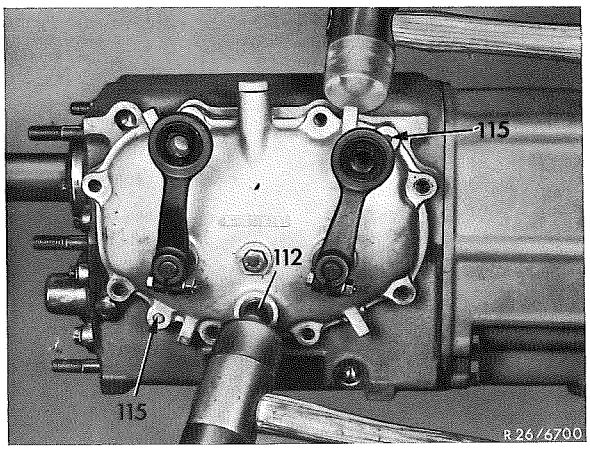


Fig. 3
112 Gear shifting shaft 5th and reverse speed 115 Set pins

6 Remove shift forks (106 and 107) from shift rockers (108 and 110) in direction of arrow as shown in Fig. 4.

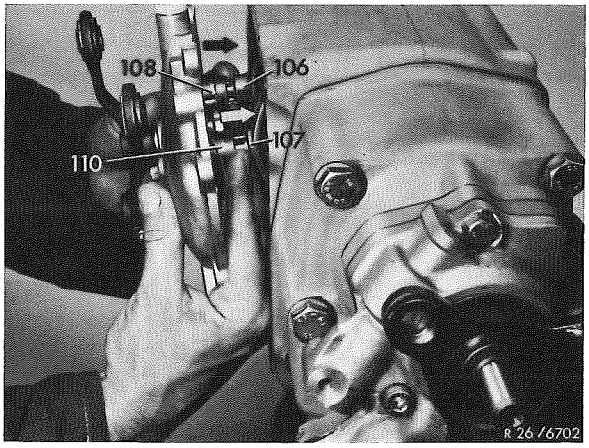


Fig. 4
106 Shift fork 3rd and 4th gear
107 Shift fork 1st and 2nd gear
108 Shift rocker 3rd and 4th gear
110 Shift rocker 1st and 2nd gear

7 Tilt shift cover first in direction of arrow A, then move in direction of arrow B and remove (Fig. 5).

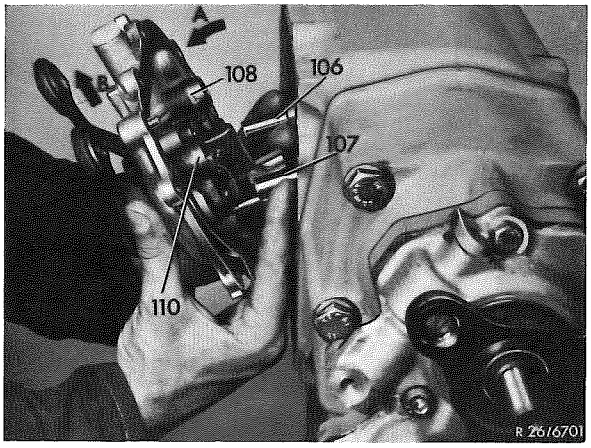


Fig. 5
106 Shift fork 3rd and 4th gear
107 Shift fork 1st and 2nd gear
108 Shift rocker 3rd and 4th gear
110 Shift rocker 1st and 2nd gear

Installation

8 Glue new paper gasket with grease on carefully cleaned parting surface on transmission housing (Fig. 6).

9 Move shifter (63) for 5th and reverse gear shift rod (65) accurately to center position (Fig. 6).

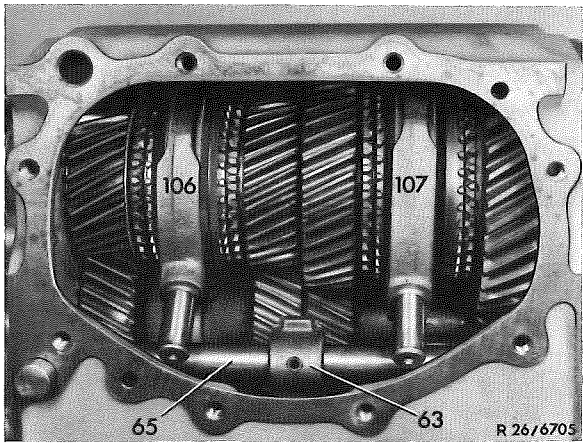


Fig. 6
63 Shifter for 5th and reverse gear
65 Shift rod for 5th and reverse gear
106 Shift fork 3rd and 4th gear
107 Shift fork 1st and 2nd gear

10 Then position shift cover as shown in Fig. 7 in direction of arrow A in such a manner that the shift finger (112 in Fig. 9) for 5th and reverse gear enters the groove on shifter (63) (arrow in Fig. 8). Then move shift cover in direction of arrow B while simultaneously introducing shift forks (106 and 107) into shift rockers (108 and 110) (Fig. 7).

Attention! The shift cover can be positioned accurately only when the gear shifting shaft and thereby the shifting finger (112) for 5th and reverse gear is first moved far enough out on shift cover inside (distance b in Fig. 9).

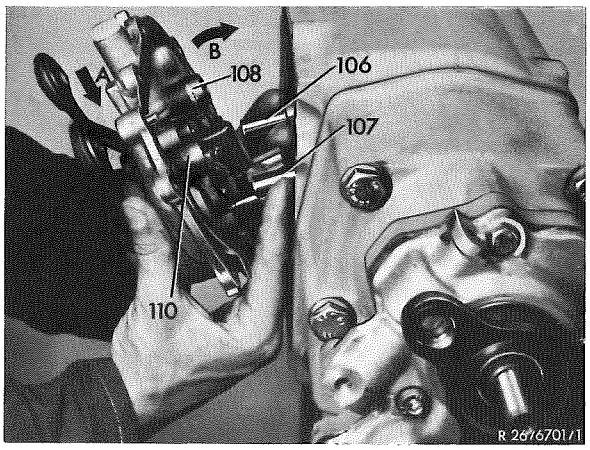


Fig. 7
106 Shift fork 3rd and 4th gear
107 Shift fork 1st and 2nd gear
108 Shift rocker 3rd and 4th gear
110 Shift rocker 1st and 2nd gear

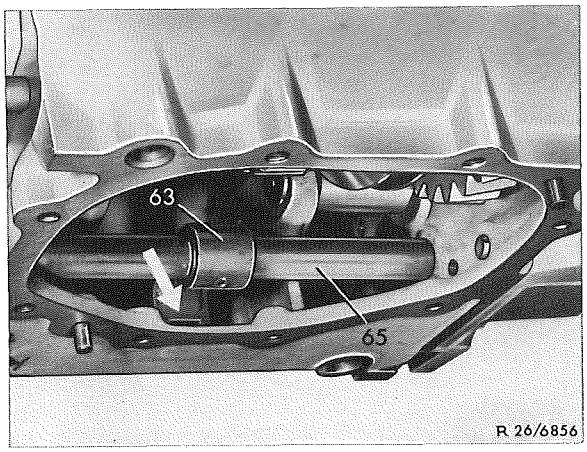


Fig. 8

63 Shifter for 5th and reverse gear
65 Shift rod for 5th and reverse gear

11 Move shift cover against parting surface of transmission housing by means of light hammer blows. Make sure that the shifting cover is correctly guided on the two set pins (115) (Fig. 6). During this process, the gear shifting shaft for 5th and reverse gear should come out of the cover at the same ratio at which the shifting cover is moved against the parting surface of the transmission housing.

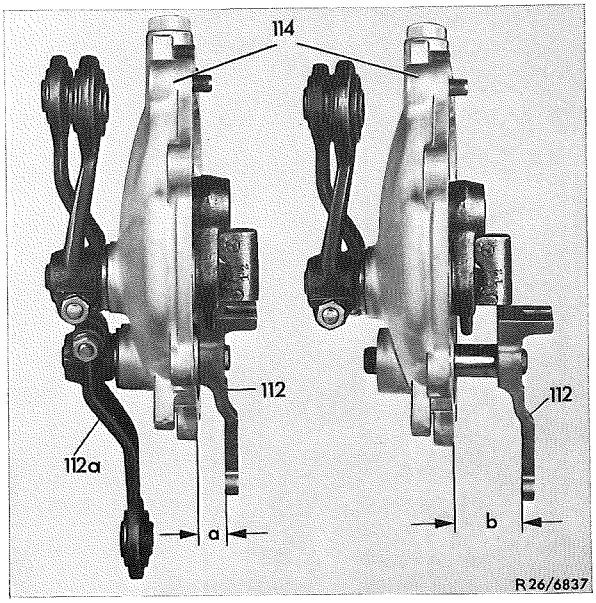


Fig. 9

a) 10 mm
Distance between parting surface and shifting finger on cover ready for operation
b) approx. 25 mm
Distance between shifting finger and cover required for assembly
112 Shift finger with shaft for 5th and reverse gear
112aShift lever for 5th and reverse gear
114 Shift cover

12 Screw shift cover uniformly and crosswise on shift cover by means of fastening bolts (124) (Fig. 2).

Note: To prevent leaks on shift cover, make sure of careful, uniform tightening of fastening bolts.

13 Attach washer (120) and slide lock washer (121) into ring groove on gear shifting shaft for 5th and reverse gear (Fig. 2).

14 Slide shift lever (112a) for 5th and reverse gear with due consideration of adjusting dimension "C" (Fig. 10) on teeth of gear shifting shaft and tighten clamping screw.

15 Check shift cover for function by shifting through all gear steps.

16 Fill in transmission fluid.

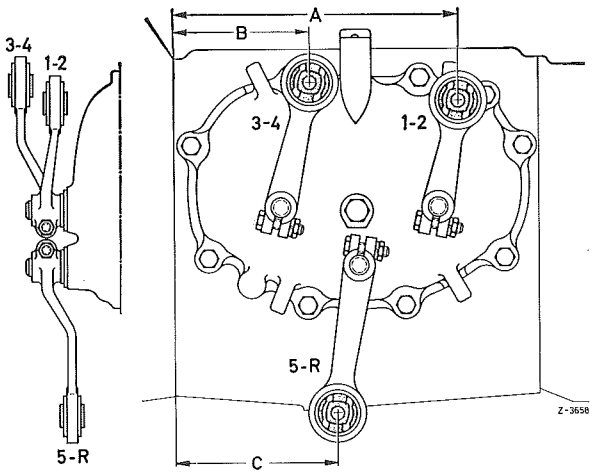


Fig. 10

Lever position with floor shift

A = 168 mm
B = 81 mm
C = 95 mm

Disassembly, Assembly of Gear Shift Cover, Sealing Shafts of Shift Rockers

Revision: Sealing on needle sleeve changed, Fig. 5 added.

Tightening Torque in kpm	Nm	(kpm)
Fastening bolt for detent cage in shift cover	25	(2.5)

Disassembly

1 Loosen clamping screws and pull off shift lever.

Note: The shift lever (112a) has already been removed from transmission by removing the shift cover.

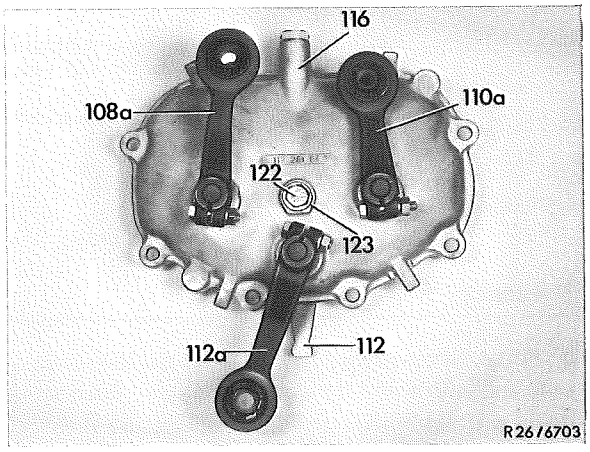


Fig. 1

108a Shift lever 3rd and 4th gear
110a Shift lever 1st and 2nd gear
112 Shift finger for 5th and reverse gear
112a Shift lever for 5th and reverse gear
116 Transmission breather
122 Fastening screw for detent cage
123 Lock washer or disc spring

2 Force lock washers (121) from gear shifting shafts and remove together with washers (120) (Fig. 3).

3 Pull out shift rockers (108 and 110) and shift fingers (112) at inside of shift cover (Fig. 2).

4 Screw out fastening screw (122) for detent cage (109) after unbending lock washer (123) and force detent cage carefully from locating pin in cover and remove (Fig. 1 and 2).

Note: Instead of a lock washer, a spring disc may already be installed or may be installed now.

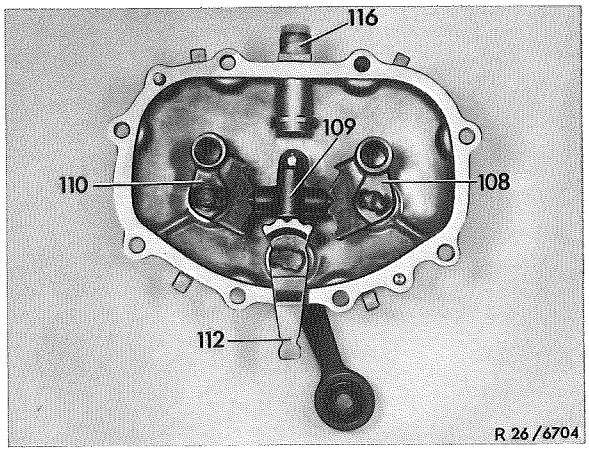


Fig. 2

108 Shift rocker for 3rd and 4th gear
109 Detent cage
110 Shift rocker for 1st and 2nd gear
112 Shift finger for 5th and reverse gear
116 Transmission breather

Sealing Jobs

In the event of leaks on shafts of shift rockers for 3rd and 4th gear (108) or of shift finger for 5th and reverse gear (112), replace O-rings (111) by new ones (Fig. 4).

If the shaft of the shift rocker for 1st and 2nd gear (110) shows oil losses, replace self-sealing needle bearing (119) (Fig. 3).

As from October 1972 a needle bearing with O-ring has been installed instead of self-sealing needle bearing (Fig. 5).

During sealing jobs only replace O-ring.

Note: Replacement of detent cage (109) does not require disassembly of shift cover.

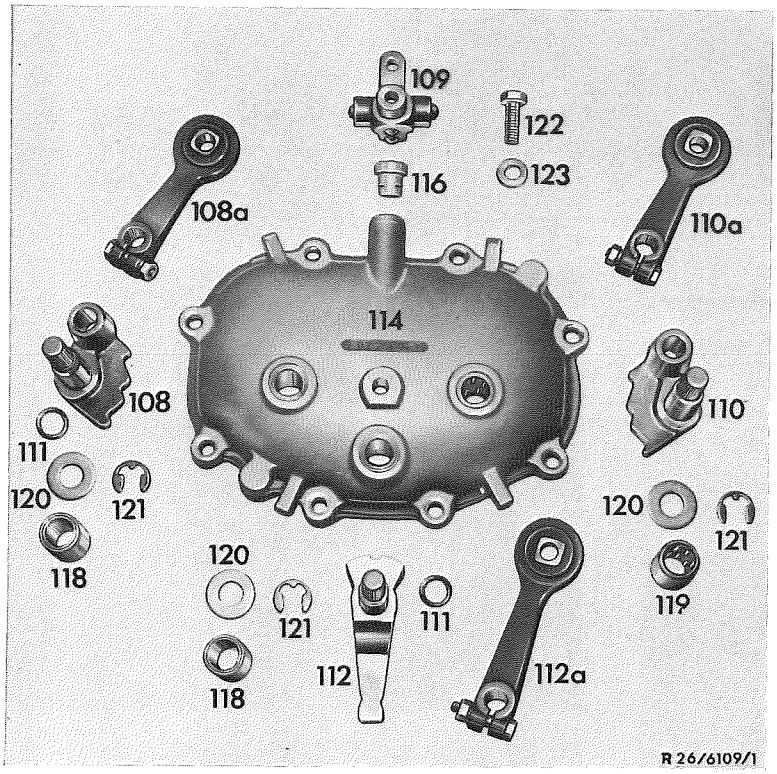


Fig. 3

108 Shift rocker for 3rd and 4th gear
108a Shift lever for 3rd and 4th gear
109 Detent cage
110 Shift rocker for 1st and 2nd gear
110a Shift lever for 1st and 2nd gear
111 O-ring.
112 Shift finger for 5th and reverse gear
112a Shift lever for 5th and reverse gear
114 Transmission shift cover
116 Breather
118 Bushing (bearing of gear shifting shaft 3rd and 4th gear, or 5th and reverse gear)
119 Needle sleeve (bearing of gear shifting shaft 1st and 2nd gear)
120 Washer
121 Lock washer
122 Hex. screw
123 Lock washer or disc spring

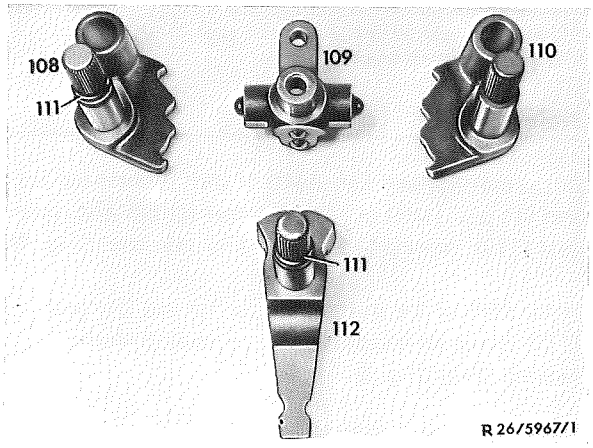


Fig. 4

108 Shift rocker for 3rd and 4th gear
109 Detent cage
110 Shift rocker for 1st and 2nd gear
111 O-ring
112 Shift finger for 5th and reverse gear

Reassembly

5 Force dentent cage (109) with set pin into cover bore and with fitted bore on locating pin. Then screw down with fastening screw (122) and secure with lock washer or use a disc spring.

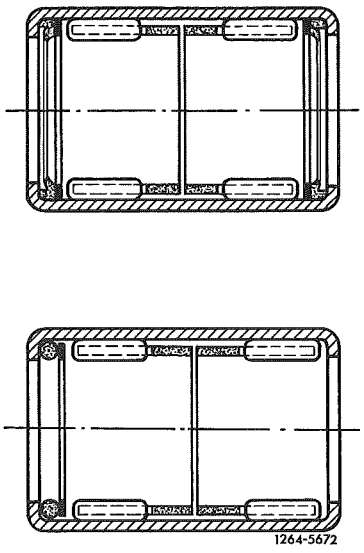


Fig. 5

Upper view: Self-sealing needle bearing
Lower view: Needle bearing with O-ring

6 Grease shafts of shift rockers (108 and 110) and of shift finger (112) for 5th and reverse gear lightly with anti-friction bearing grease and insert into shift cover acc. to Fig. 3. Make particularly sure that the O-rings (111) are not damaged (Fig. 3 and 4).

7 Place washers (120) on shafts of shift rockers (108 and 110) on front end of cover and secure by sliding lock washers (121) on gear shifting shafts (Fig. 3).

Note: The shift finger (112) for 5th and reverse gear is secured only after screwing cover to transmission by means of washer (120) and lock washer (121).

The shift levers (108a, 110a and 112a) are suitably placed and tightened on gear shifting shafts after screwing cover to transmission in accordance with reference drawing (26.2–110).

Tightening Torque in kpm

Bolts for attaching front transmission cover	1.5

Screwing-off

1 Remove clutch throwout and clutch throwout rocker (25.2–150).

2 Unscrew clutch housing (26.2–050).

3 Unscrew fastening bolts for front transmission cover (Fig. 1).

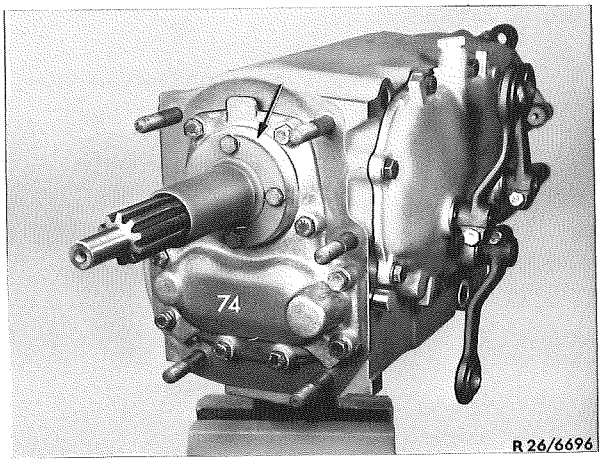


Fig. 1
74 Front transmission cover

4 Carefully pull front transmission cover (74) across drive shaft while watching compensating washer (2) for drive shaft and compensating washer (49) for countershaft (Fig. 2 and 3).

Screwing-on

5 Place spacing washers (2 and 49) and paper gasket (75) in or on cover and glue down with grease to facilitate assembly (Fig. 3).

6 Grease sealing ring on sealing lip and running surface on drive shaft.

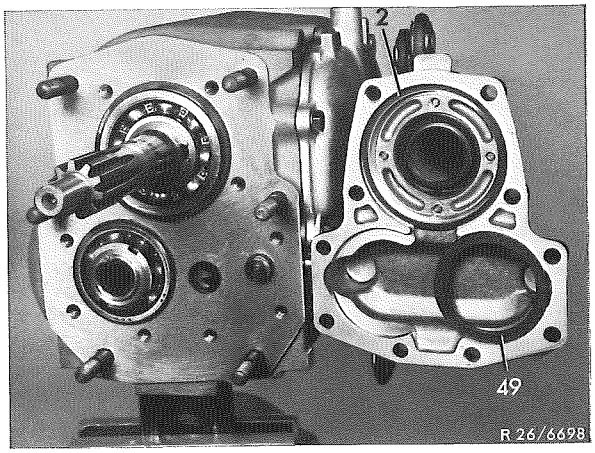


Fig. 2
2 Spacing washer for drive shaft
49 Spacing washer for counterhsaft

7 Make bolts and threads in transmission housing free of grease and coat with a non-hardening sealing compound (Fig. 1).

8 Slide cover (74) carefully on drive shaft well against parting surface of transmission housing.

9 Tighten cover uniformly and crosswise with fastening bolts.

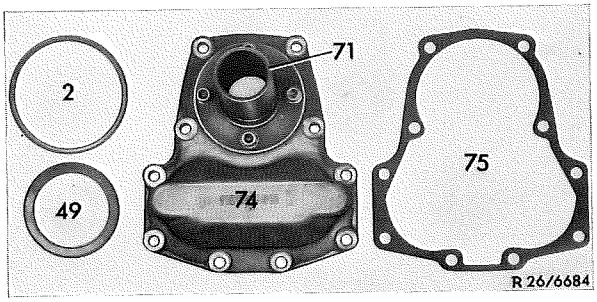


Fig. 3
2 Spacing washer for drive shaft
49 Spacing washer for counterhsaft
71 Bearing tube
74 Front transmission cover
75 Gasket

26.2 Screwing Bearing Tube of Transmission Cover Front Off and On Replacement of Sealing Ring

Scope of operations

1 Unscrew clutch housing (26.2–050).

2 Unscrew transmission cover front (26.2–210).

3 Unscrew fastening bolts for bearing tube (71) and remove bearing tube (Fig. 1).

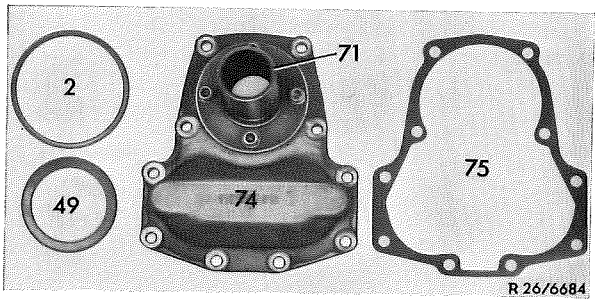


Fig. 1

2 Compensating washer for drive shaft
49 Compensating washer for countershaft
71 Bearing tube
74 Front transmission cover
75 Gasket

4 Force sealing ring (76) out of cover (74) with a suitable mandrel of approx. 45 mm dia. (Fig. 2).

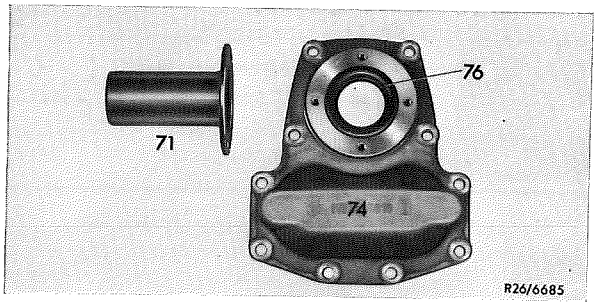


Fig. 2

71 Bearing tube
74 Front transmission cover
76 Sealing ring

5 Press new sealing ring (76) into cover flush with parting surface (Fig. 2).

6 Screw bearing tube (71) lightly on cover by means of fastening bolts, but do not yet tighten (Fig. 1).

7 Screw-on clutch housing (26.2–050).

8 Then tighten fastening bolts of bearing tube (71) (Fig. 1).

Screwing Transmission Cover Rear Off and On, Replacement of Sealing Ring 26.2

Revision: Special tool part No. changed (*), revision reference added, Fig. 1 changed, Fig. 2, 7 and 9 added, item 11 and 12 edited.

Tightening Torques	Nm	(kpm)
Fastening bolts M 10	45	(4.5)
Fastening bolts M 7	15	(1.5)
Slot nut for three-arm flange	150	(15)

Special Tools	
Slot nut wrench insert 3/4" square for slot nut on transmission flange	115 589 01 07 00
Puller for three-arm flange	116 589 19 33 00 *
Socket wrench for counter-holding transmission flange when loosening and tightening slot nut	116 589 10 07 00 *

Revision Reference	
Designation	As from Unit No.
To protect slot nut on three-arm flange, the round groove used up to now has been replaced by a triangular groove milled into main shaft	009 041

Screwing-off

1 Unlock slot nut holding joint flange and loosen with slot nut wrench while counterholding with holding wrench and screw off (Fig. 1).

2 Remove joint flange with puller (Fig. 2).

3 Unscrew fastening bolts (94–96 and 102–104) and remove rear transmission cover (93) (Fig. 3 and 4).

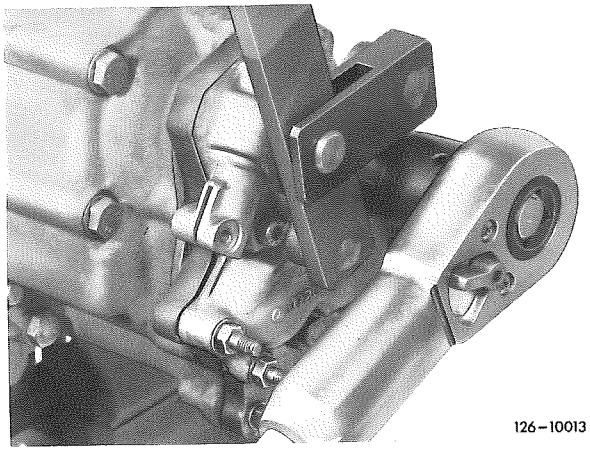


Fig. 1

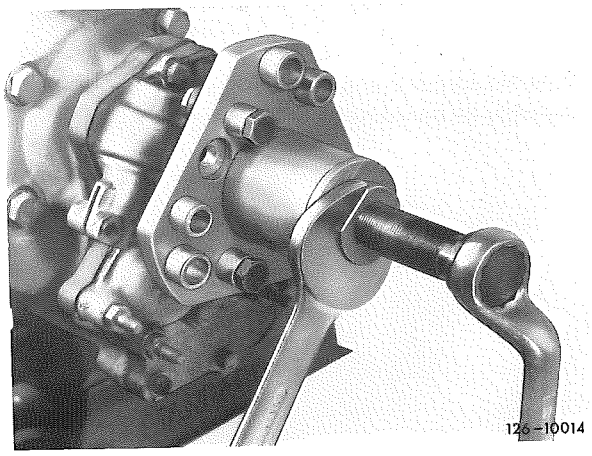


Fig. 2

26.2 Screwing Transmission Cover Rear Off and On, Replacement of Sealing Ring

As from transmission No. **7040** the rear transmission cover has been changed from a sandcasting to a die casting. Instead of the cheesehead screw (104) the new cover is using a hex. bolt.

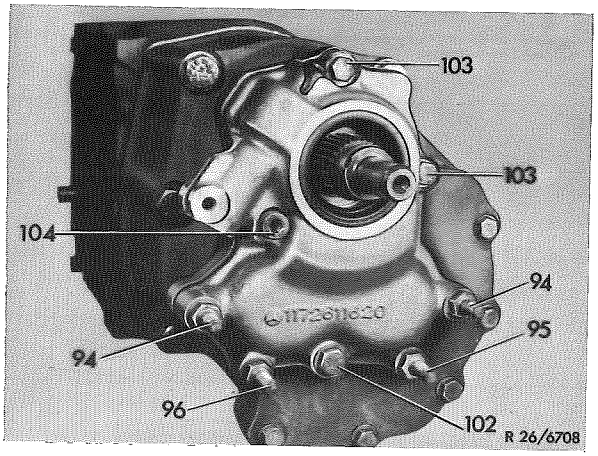


Fig. 3
94–96 Collar bolts 102–104 Hex. bolts

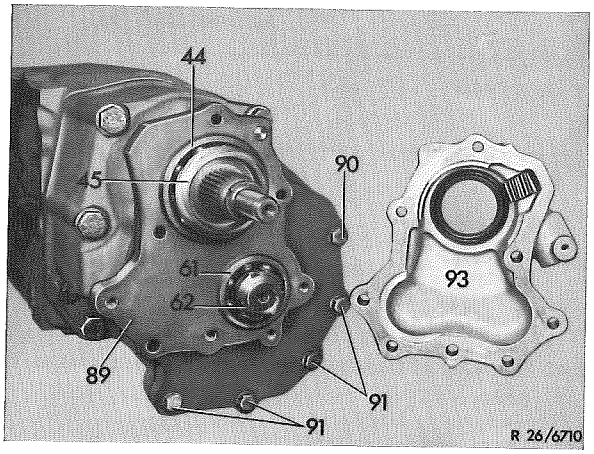


Fig. 4

Note: No special preparations are required for gear assembly of transmission when removing rear cover.

Replacement of Sealing Ring

4 Force sealing ring (101) out of cover by means of a suitable mandrel of approx. 52 mm dia. (Fig. 5).

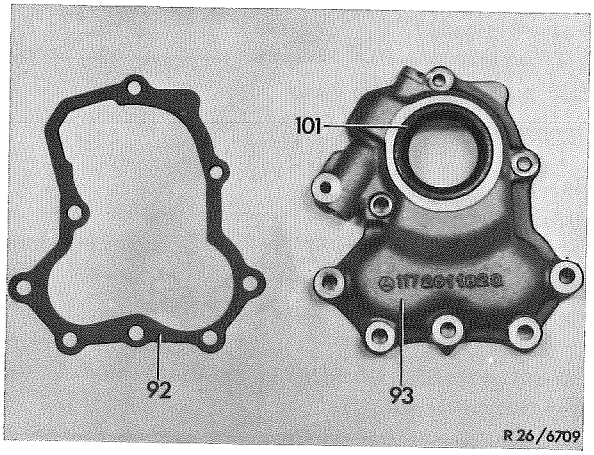


Fig. 5
92 Gasket 101 Sealing ring
93 Transmission cover rear

5 Press new sealing ring into cover flush with outer edge (Fig. 5).

Screwing-on

6 Glue new paper seal with grease on parting surface of cover to facilitate assembly (Fig. 5).

7 Carefully slide cover over main shaft against parting surface of transmission housing.

8 Screw down cover uniformly and crosswise by means of fastening bolts (94–96 and 102–104).

9 Grease three-arm flange on running surface of sealing ring.

10 Slide three-arm flange on main shaft and screw-on slot nut for attaching flange by hand.

11 Tighten slot nut with slot nut wrench insert while counterholding with socket wrench.

Note: Attaching the three-arm flange requires a polystop nut or a pinch nut. When repairing a transmission with polystop nut, a new polystop nut should be used during assembly, since the main shaft has no groove for securing the pinch nut (Fig. 6).

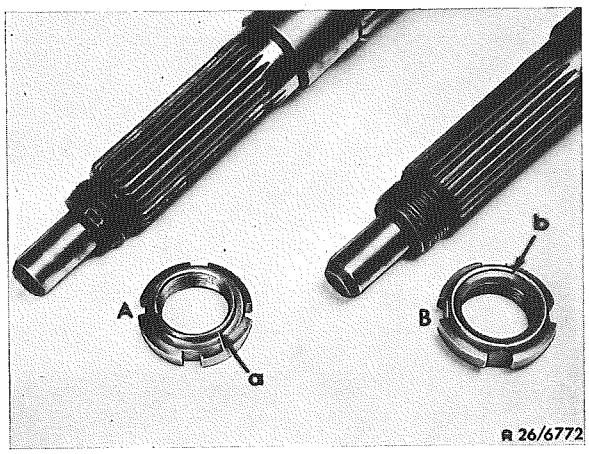


Fig. 6

A = Shaft with pinch nut
B = Shaft with polystop nut
a = Pinch groove
b = Polystop insert

12 Secure slot nut.

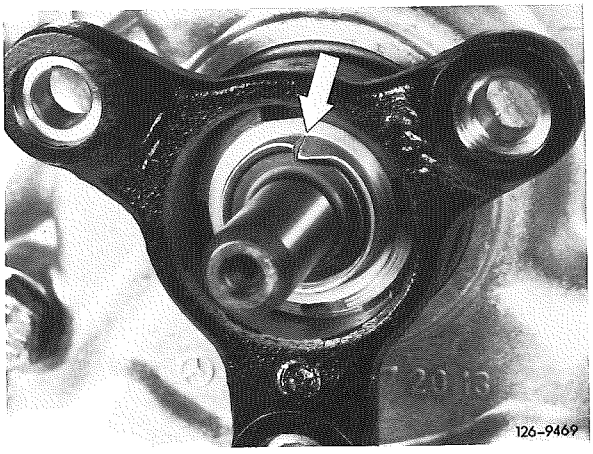


Fig. 7

On main shafts with triangular groove, secure slot nut by means of a punch by cutting pinch groove (Fig. 7 and 9), and on main shafts with round groove by pressing down pinch groove (Fig. 8 and 9).

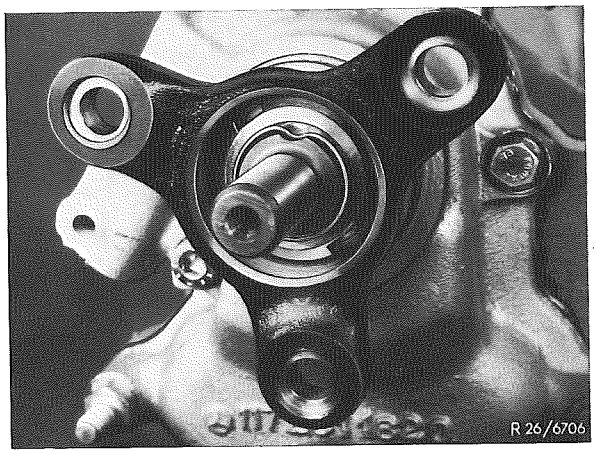


Fig. 8

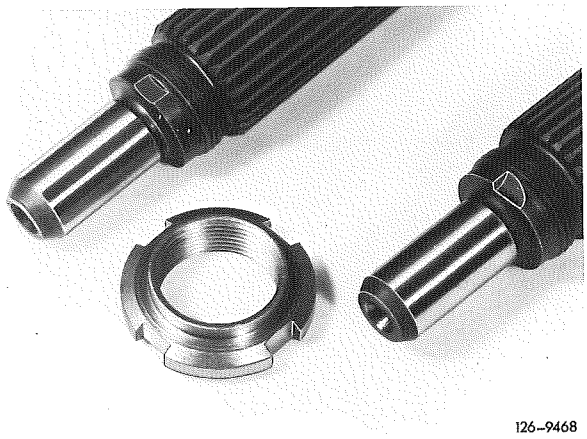


Fig. 9

Removal

1 Unscrew transmission cover at rear (26.2–310).

2 Press out tachometer drive in direction toward sealing ball with the aid of suitable supports and a mandrel, using a manually operated press.

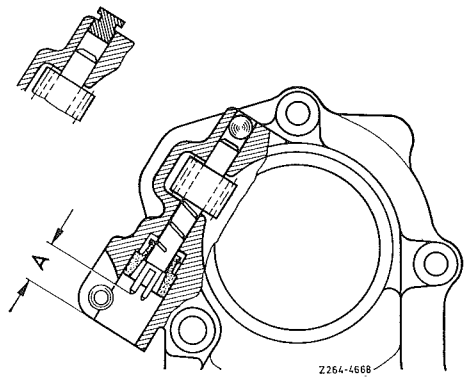


Fig. 1

A = 19 mm
97 Small driving pinion
98 Shaft
99 Sealing ring
100 Plug or ball

Note: On transmissions with plug, the plug must be pushed out prior to removing tachometer drive by means of a screw driver or pliers.

3 Pull sealing ring (99) out of tachometer drive.

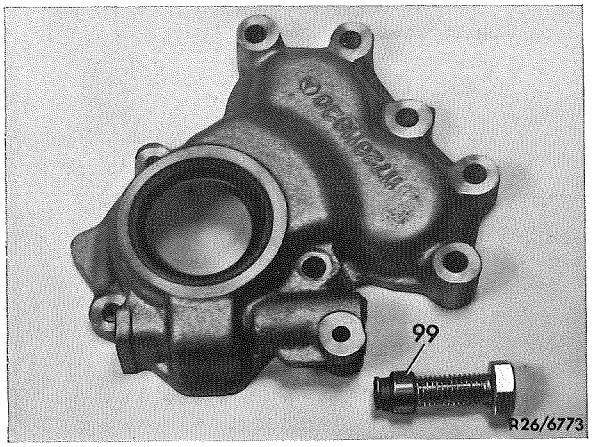


Fig. 2

99 Sealing ring

Note: To facilitate removal, screw a hex. bolt M 12 into sealing ring and clamp into vice. Apply light blows with a plastic hammer against cover while removing sealing ring (Fig. 2).

4 Check individual parts of tachometer drive for wear and damage.

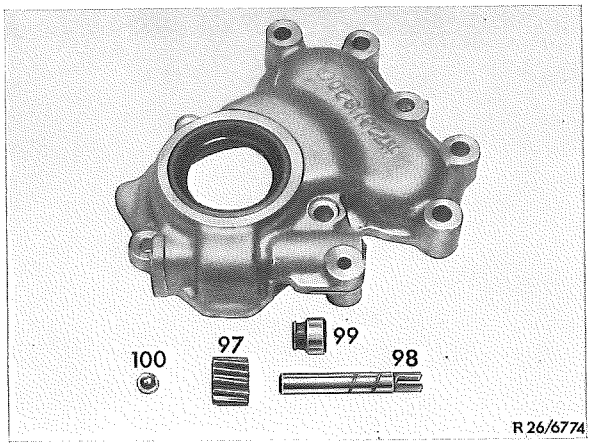


Fig. 3

97 Small drive pinion
98 Shaft – drive for speedometer
99 Sealing ring
100 Plug or ball

5 Place sealing ring (99) flush on side of drive shaft (98) on which the groove for connecting the flexible tachometer shaft is milled in.

6 Insert small drive pinion (97) into rear transmission cover.

7 Press in drive shaft (98) with sealing ring (99) on a manual press until the distance "A" between the cover and the upper edge of the drive shaft is 19 mm (Fig. 1).

8 Press in sealing ball until flush with upper edge of transmission cover (Fig. 1 and 4).

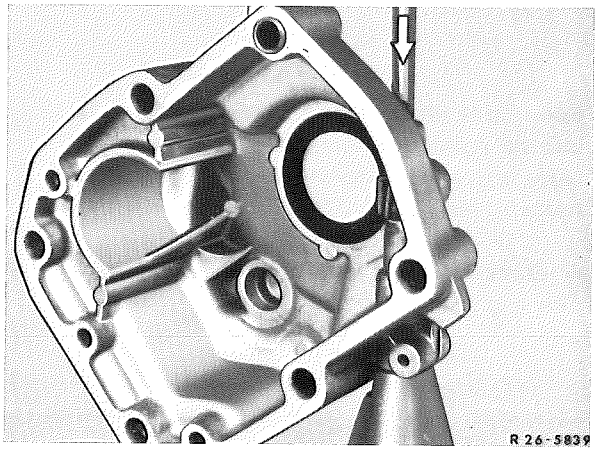


Fig. 4

Note: On transmissions with a plug, the latter is knocked in by means of light blows with a plastic hammer.

9 Screw-off rear transmission cover (26.2–310).

Tightening Torque in kpm

Fastening nut to countershaft rear	15

Special Tools

Pin spanner insert 1/2" square head for slotted nut on countershaft rear	115 589 04 07 00
Two-claw puller	001 589 01 33 00

Removal

1 Remove transmission shift cover and take-off shift forks (26.2–110).

2 Screw-off transmission cover rear (26.2–310).

3 Pull worm gear (45) from tachometer drive (Fig. 1).

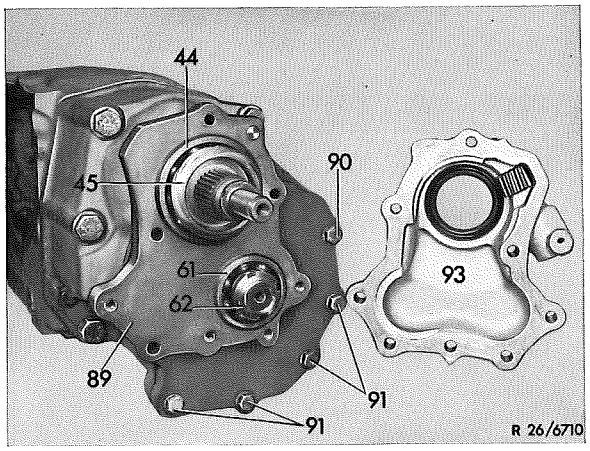


Fig. 1

44 Grooved ball bearing main shaft
45 Helical gear, speedometer drive
61 Grooved ball bearing countershaft
62 Slotted nut
89 Intermediate plate
90 Hex. bolt
91 Hex. bolt
93 Transmission housing cover rear

4 Unlock slotted nut (62), loosen with pin spanner and screw off (Fig. 1).

As from transmission No. 6431, a hex. nut is mounted instead of slot nut (62).

Note: To facilitate loosening slotted nut or hex. nut, two gear steps may be engaged simultaneously to block the transmission.

5 Unscrew fastening bolts (90 and 91) of intermediate plate (89) and remove together with grooved ball bearings (44 and 61) (Fig. 1 and 2).

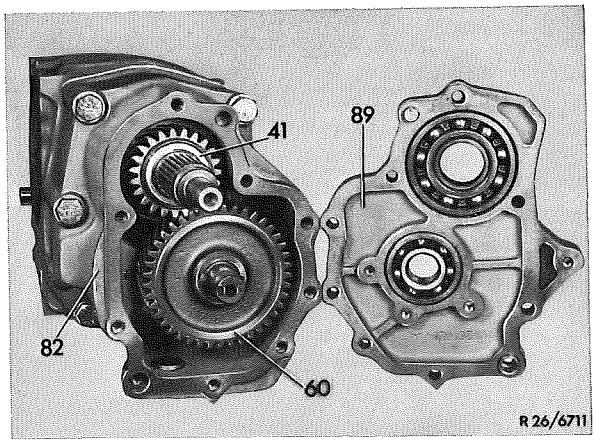


Fig. 2

41 5th Speed gear wheel main shaft
60 5th Speed gear wheel countershaft
82 Connection housing
89 Intermediate plate

6 Pull 5th speed gear wheel (60) from countershaft by means of two-claw puller (Fig. 3).

Note: The grooved ball bearing may occasionally be so tightly connected to shaft, that it must be pulled off together with gear wheel (60).

7 Loosen fastening bolts (84–87) and remove transmission connecting housing (Fig. 4 and 5).

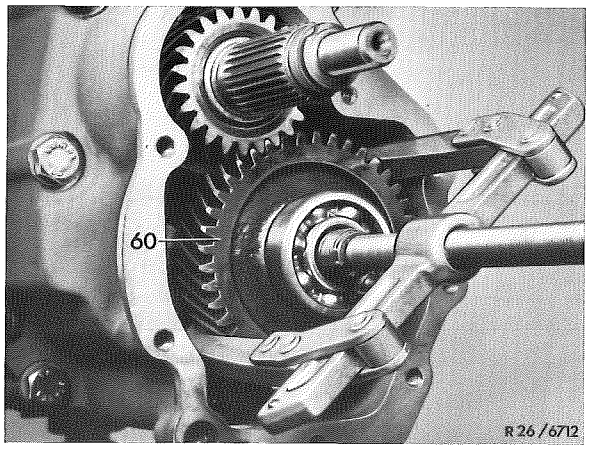


Fig. 3
60 5th Speed gear wheel countershaft

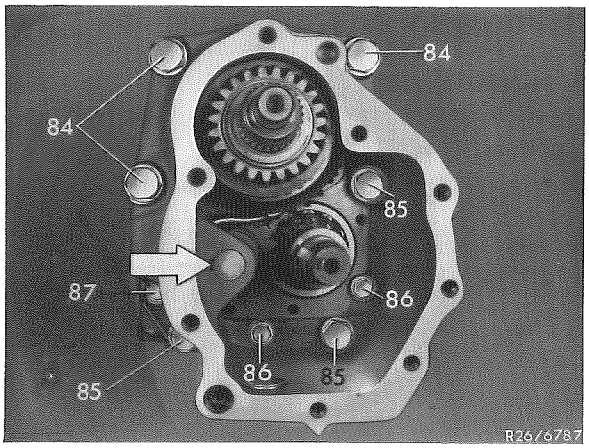


Fig. 4
84 Hex. bolt
85 Hex. bolt
86 Hex. bolt
87 Hex. bolt

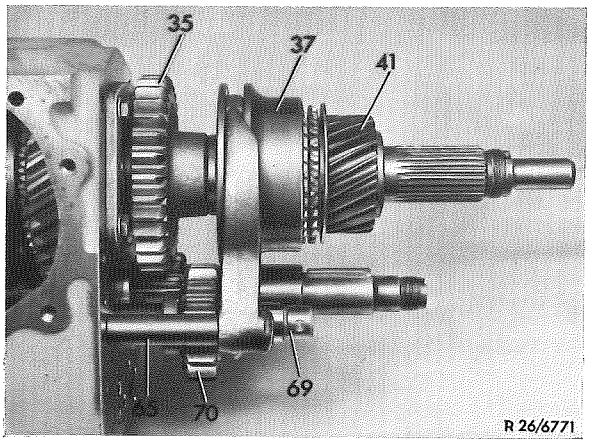


Fig. 5
35 Reversing gear main shaft
37 Synchronizing member 5th gear
41 Helical gear 5th speed
65 Shift rod for 5th and reverse gear
69 Reversing shaft
70 Reversing slide gear

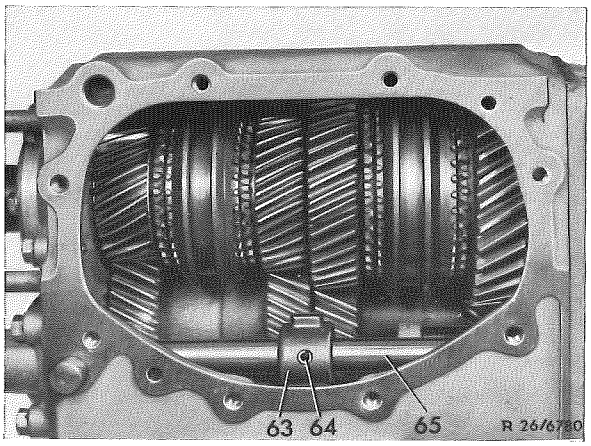


Fig. 6
63 Shifter for 5th and reverse gear
64 Clamping sleeve
65 Shift rod for 5th and reverse gear

8 Knock-out clamping sleeve (64) of shifter (63) of gear shifting shaft for 5th and reverse gear and place shifter as far to the front as possible (Fig. 6).

9 Pull out shift lock (66) for 5th and reverse gear with pliers (Fig. 7 and 8).

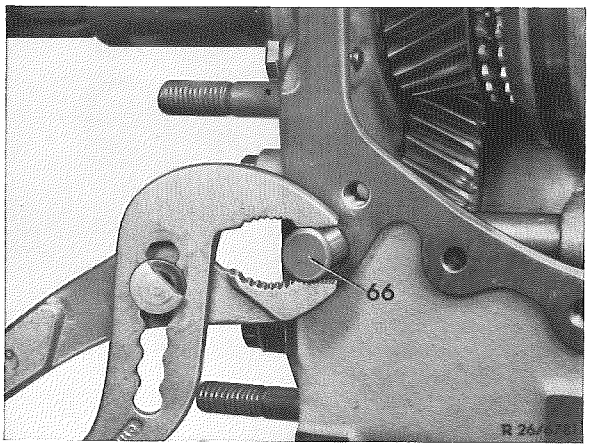


Fig. 7
66 Spring sleeve for shift lock

10 Pull reversing shaft (69) for reversing slide gear (70) out of transmission housing while holding slide gear in position and remove both (Fig. 9).

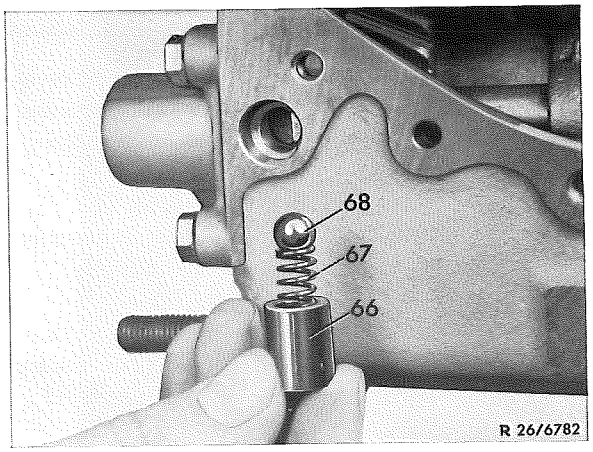


Fig. 8

66 Spring bushing
67 Compression spring
68 Steel ball

} Shift lock for 5th and reverse gear

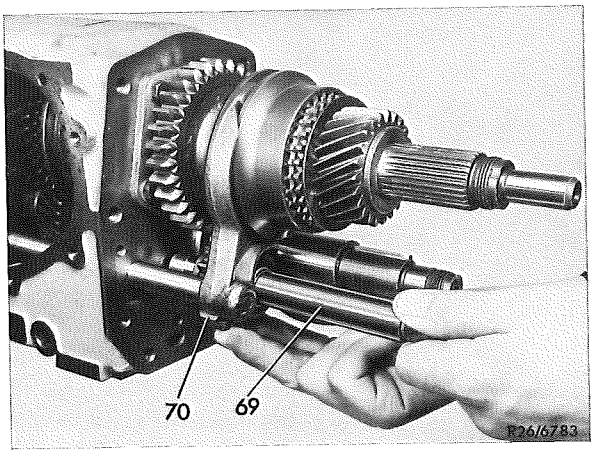


Fig. 9

69 Reversing shaft
70 Reversing slide gear

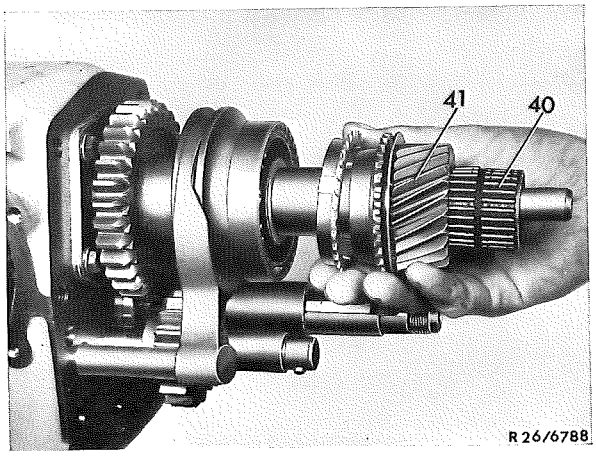


Fig. 10

40 Needle cage
41 Helical wheel for 5th gear

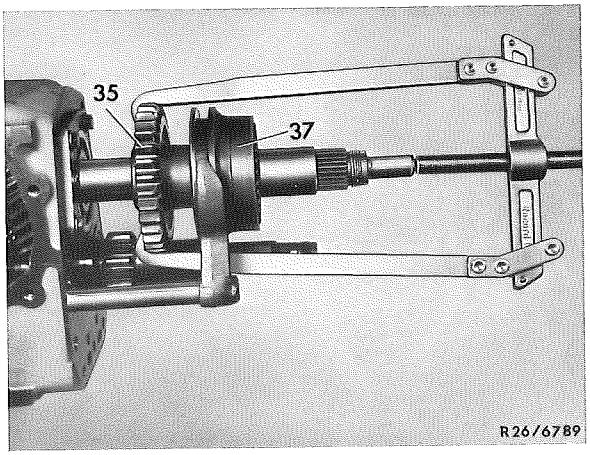


Fig. 11

35 Reversing gear main shaft
37 Synchronizing member 5th gear

11 Remove thrust washer 5th gear wheel (41) with needle cage (40) manually (Fig. 10).

12 Pull off synchronizing member (37), 5th gear and reversing gear (35) with a two-claw puller (Fig. 11).

Note: When pulling synchronizing member and reversing gear, the shift rod of the 5th and the reverse gear must be simultaneously pulled out and the shifter (63) must be moved forward on shift rod.

13 Remove race (39) manually (Fig. 12).

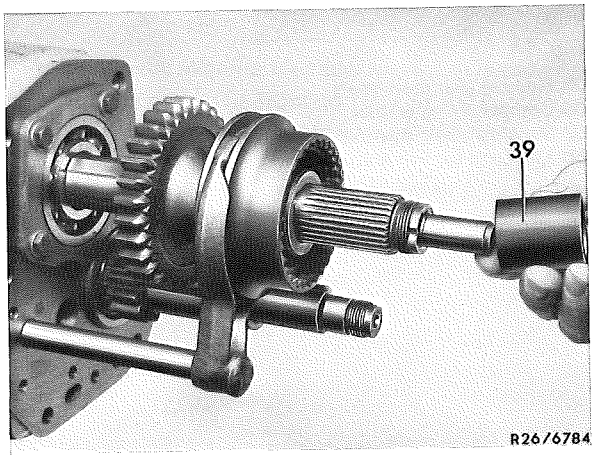


Fig. 12

39 Race

14 Pull or remove synchronizing member (37) and shift rod (65) together while simultaneously pulling shifter from shift rod in forward direction (Fig. 13 and 14).

26 Check reverse slide gear (70) for unobstructed running.

27 Place shifter (63) into correct position and knock-in clamping sleeve (64) (Fig. 20).

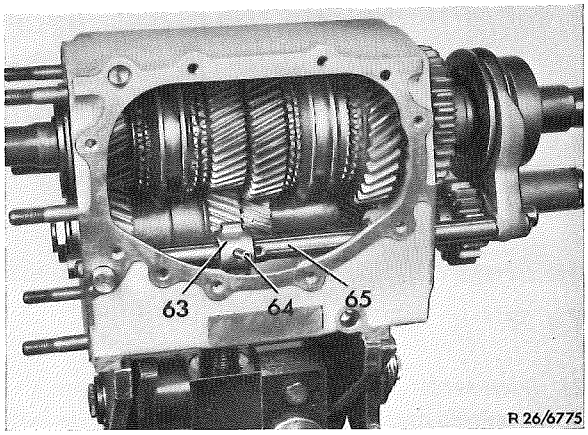


Fig. 20

63 Shifter
64 Clamping sleeve
65 Shift rod for 5th and reverse gear

28 Grease gasket (81) and glue on parting surface of connecting housing.

29 Apply a non-hardening sealing compound to the threads of all fastening bolts.

30 Mount connecting housing (82) to transmission housing (80), but do not yet tighten bolts. Also note that the pin on the reversing shaft is at the left and is introduced correctly into cutout on connecting housing (arrow in Fig. 21).

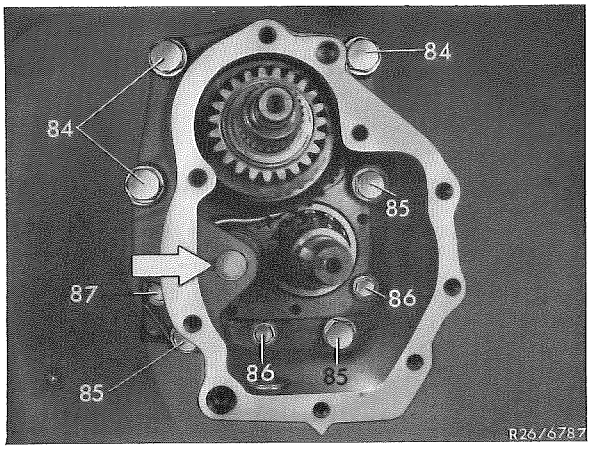


Fig. 21

84 Hex. bolt
85 Hex. bolt
86 Hex. bolt
87 Hex. bolt

Note: The connecting housing should be aligned in relation to the countershaft and main shaft as follows:

31 Push intermediate plate (89) without bearing on the two set pins at the rear on connecting housing.

32 Slide main shaft and countershaft bearings on shafts up to intermediate plate and check whether bearings can be pushed free of tension into bearing bores of intermediate plate. If an offset is observed between the bearing and the bearing bore, remove by slight hammer blows against pertinent end of connecting housing.

33 Tighten outer fastening bolts of connecting housing.

34 Remove intermediate plate (89) with main shaft and countershaft bearings and also tighten inner fastening bolts of connecting housing (Fig. 21).

35 Knock countershaft helical gear (60) for fifth gear with suitable mandrel on countershaft.

36 Grease gasket (88) and glue on parting surface of intermediate plate (89).

37 Slide intermediate plate (89) with main shaft and countershaft bearings on two set pins at rear of connecting housing and tighten, watching out for the different lengths of bolts (Fig. 22).

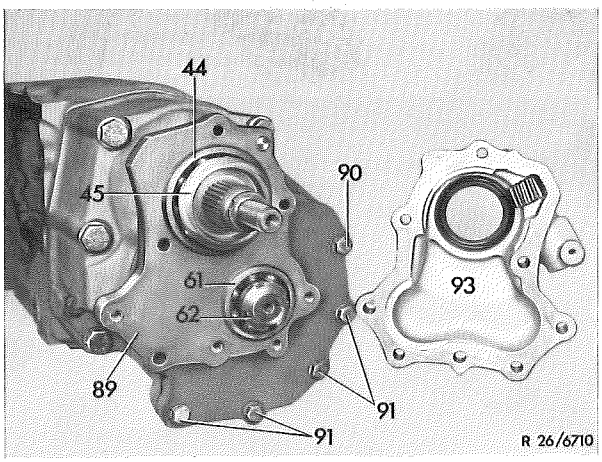


Fig. 22

44 Grooved ball bearing main shaft
45 Helical gear, speedometer drive
61 Grooved ball bearing countershaft
62 Slotted nut countershaft rear
89 Intermediate plate
90 and 91 Hex. bolt
93 Transmission housing cover rear

38 Tighten slotted nut or hex. nut (62) for countershaft rear with torque wrench and secure. (Fig. 21).

39 Slide helical gear (65) for tachometer drive on main shaft. The recess of the helical gear should face toward the rear.

Important Note

To prevent any jumping out of fifth gear, the backing of the short toothing of the fifth gear wheel and the backing of the short toothing of the sliding sleeve has been changed from 1:15 to 1:10 as from transmission No. **5926.**

For better recognition of fifth gear wheel with a backing of 1:10, the tooth tips of the short toothing have been provided with a groove (arrow Fig. 23).

The sliding sleeve with a backing of 1:10 is also provided with a groove at the rear side wall of the shifting groove (arrow Fig. 24).

When the fifth gear jumps out, replace old parts against new ones carrying the specified grooves. To prevent gear noise, also exchange fifth gear wheel of countershaft.

40 Screw-on transmission cover rear (26.2–310).

41 Insert shift forks into synchronizing members and install transmission shift cover (26.2–110).

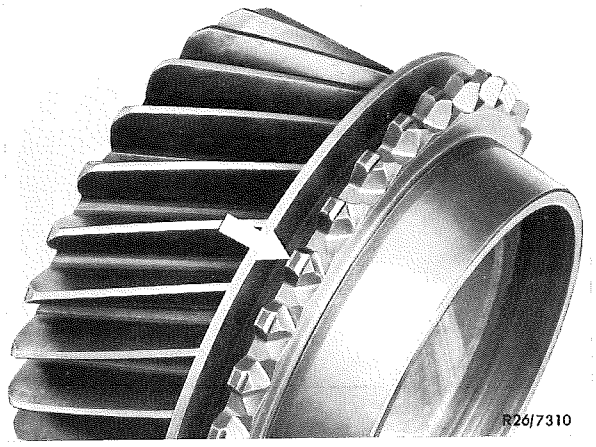


Fig. 23

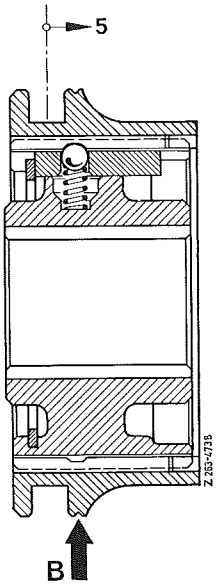


Fig. 24

Adjusting Dimension or End Play

Drive shaft	0–0.05
Main shaft	0–0.05
Countershaft	0.15–0.20

Tightening Torque in kpm

Slotted nut on countershaft front	15.0

Special Tools

Puller for ball bearing on main shaft	001 589 02 33 00
Puller for ball bearing on countershaft	000 589 94 33 00
Pin spanner insert 1/2" square for slotted nut on countershaft front	115 589 03 07 00
Clamping fixture for manual transmission	111 589 08 31 00

Removal

1 Unscrew clutch housing (26.2–050).

2 Remove transmission shift cover (26.2–110).

3 Unscrew transmission cover front (26.2–210).

4 Unscrew transmission cover rear (26.2–310).

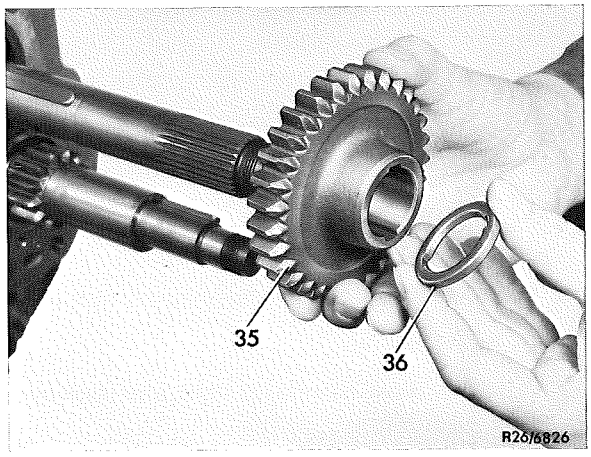


Fig. 1

35 Reversing gear main shaft
36 Compensating washer

5 Remove fifth and reverse gear (26.2–415).

6 Pull compensating washer (36) and reversing gear (35) manually from shaft (Fig. 1).

7 Remove woodruff key (56) from countershaft by means of a screw driver (Fig. 2).

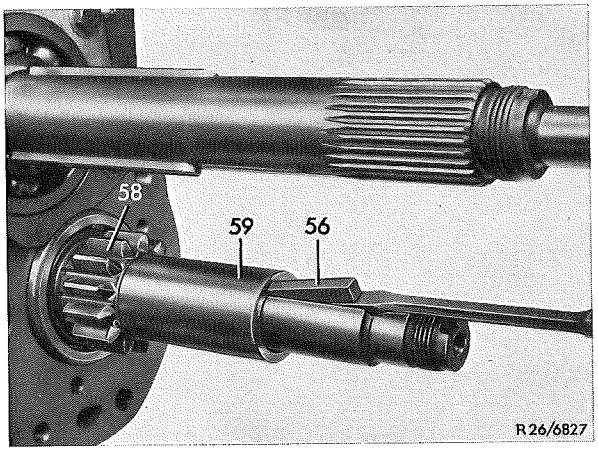


Fig. 2

56 Woodruff key
58 Reversing gear countershaft
59 Spacer bushing fifth gear

8 Pull spacer sleeve (59) and reversing gear (58) manually from shaft (Fig. 3).

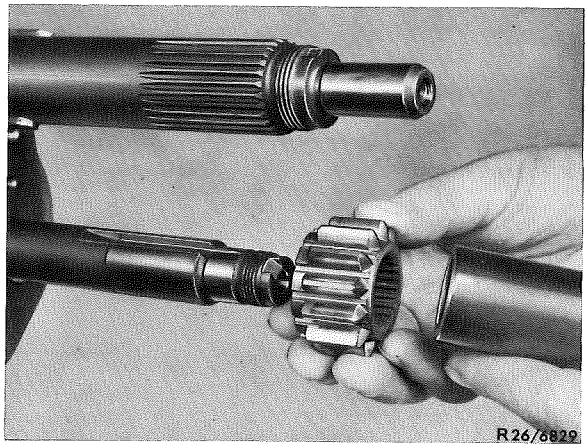


Fig. 3

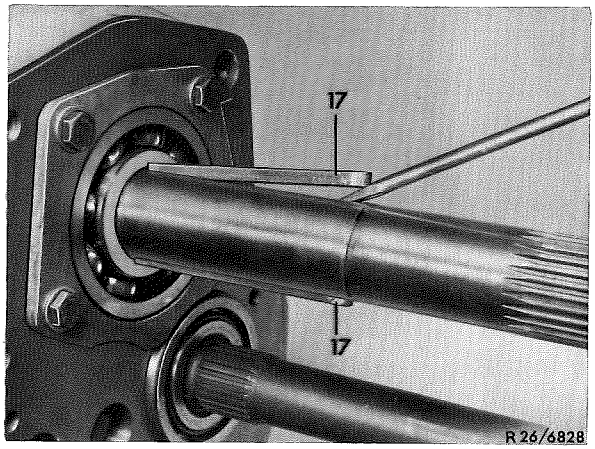


Fig. 4
17 Woodruff key

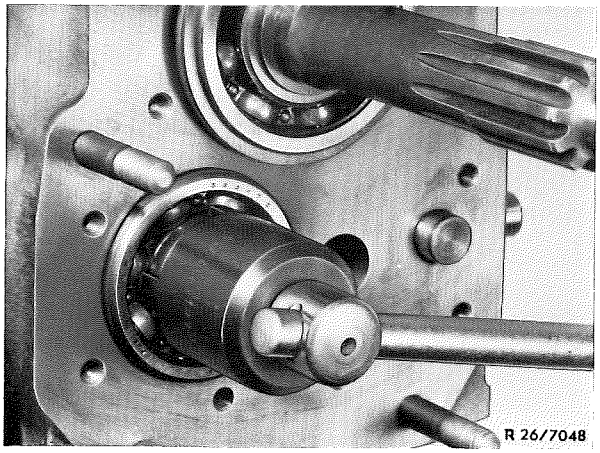


Fig. 5

9 Remove both woodruff keys (17) from main shaft with screw driver (Fig. 4).

10 Lock gear assembly by simultaneous engagement of 2 gear steps. Unlock slotted nut (48) on counter-shaft front, loosen with slot nut wrench and unscrew (Fig. 5).

11 Unscrew fastening bolts of holding ring (32) and remove holding ring while taking care of compensating washers from main shaft bearing (Fig. 6).

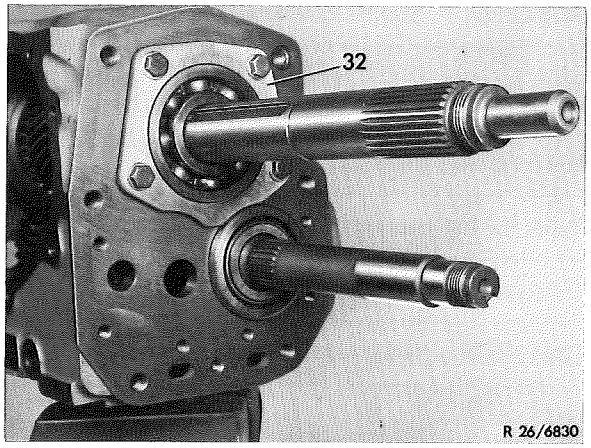


Fig. 6
32 Holding ring

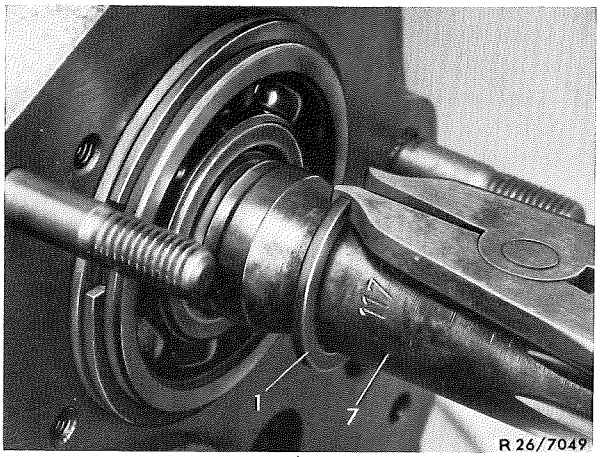


Fig. 7
1 Circlip
7 Drive shaft

12 Remove circlip (1) from drive shaft (7) with pliers (Fig. 7).

13 Pull grooved ball bearing (3) from drive shaft by means of puller (Fig. 8).

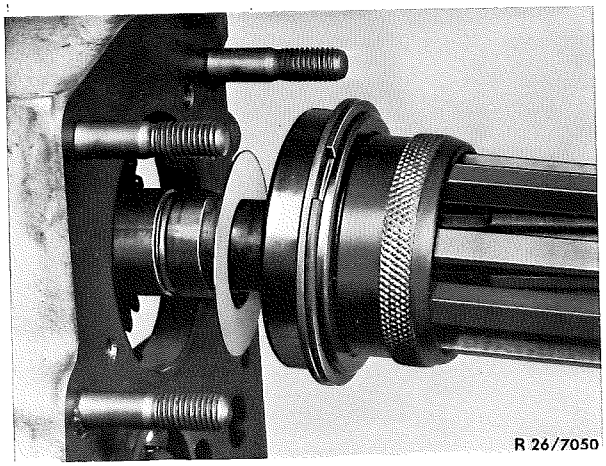


Fig. 8

14 Pull grooved ball bearing of main shaft rear by means of puller and remove bearing from shaft (Fig. 9).

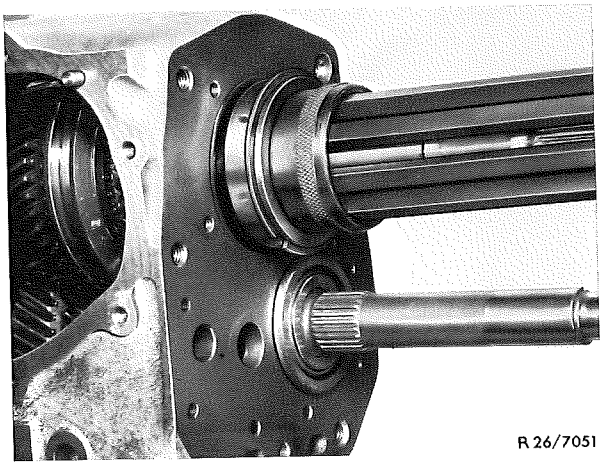


Fig. 9

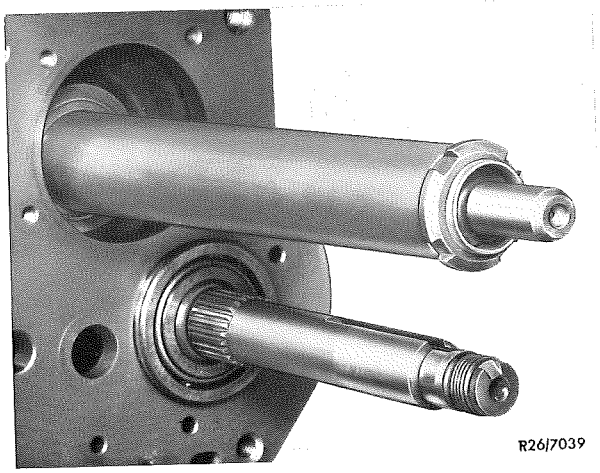


Fig. 10

15 Slide assembly sleeve on free rear shaft end and tighten with slotted nut of three-legged flange. The assembly sleeve prevents any slipping of first gear wheel from its needle bearing, which would make removal and installation more difficult. (Fig. 10).

16 Pull grooved ball bearing on countershaft front from shaft by means of puller (Fig. 11).

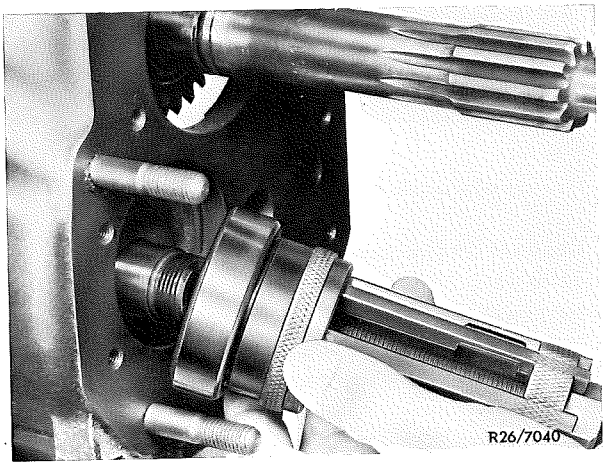


Fig. 11

17 Lift drive and main shaft together as much as possible (with helper) and push or knock countershaft toward the rear, until the cylinder roller bearing is completely out of housing bore (Fig. 12).

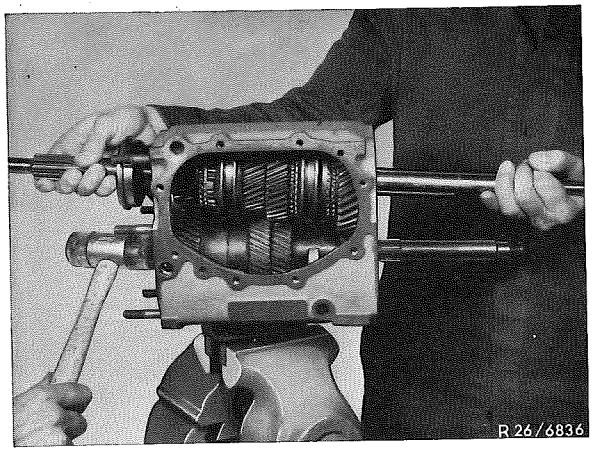


Fig. 12

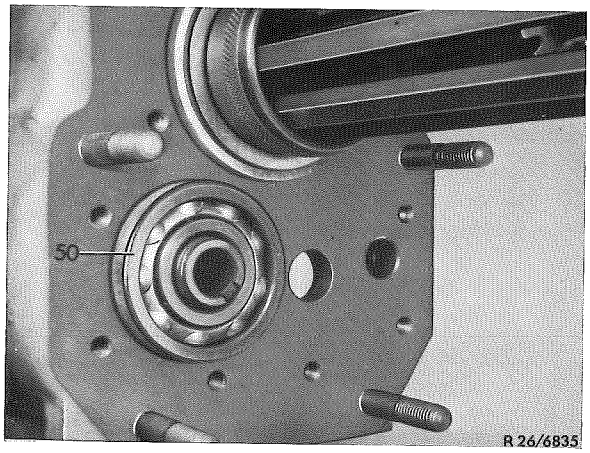


Fig. 13
50 Inclined shoulder bearing

Caution! On five-speed transmissions up to unit No. **3270** the countershaft is carrying an inclined shoulder bearing at the front. This bearing cannot be pulled off. It is left on the countershaft and knocked out of housing toward the rear on countershaft (Fig. 13 and 14).
In the event of repairs, be sure to install grooved ball bearing.

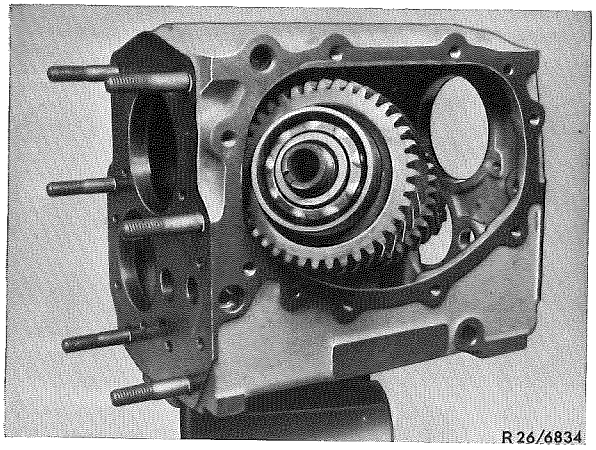


Fig. 14

18 Force cyl. roller bearing from countershaft by means of two mounting levers (Fig. 15).

19 Pull drive shaft (7) with grooved ball bearing (3) and oil thrower disc (6) out of transmission housing in forward direction, watching out for the now released synchronizing ring of 4th gear and for needle bearing between drive and main shaft (Fig. 16).

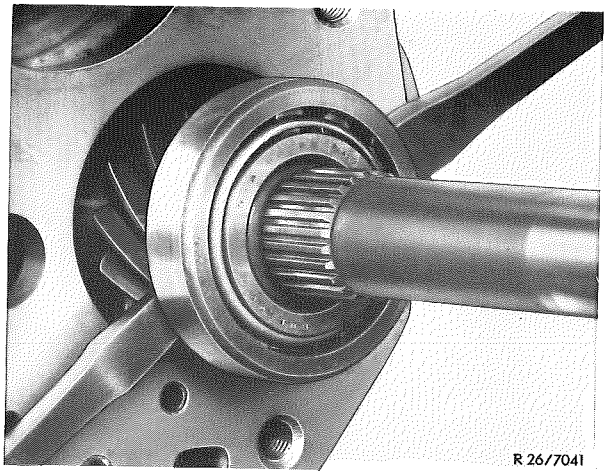


Fig. 15

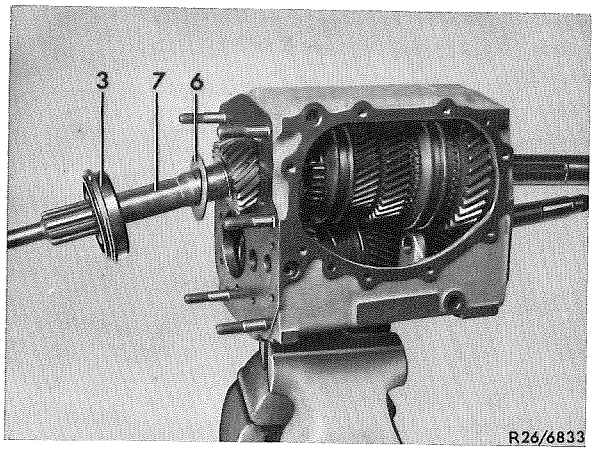


Fig. 16
3 Grooved ball bearing
6 Oil thrower disc
7 Drive shaft

20 Move sliding sleeve (11a) of 3rd and 4th gear into 3rd speed position, push main shaft completely to the right and then take out of housing at an angle in forward direction (Fig. 17).

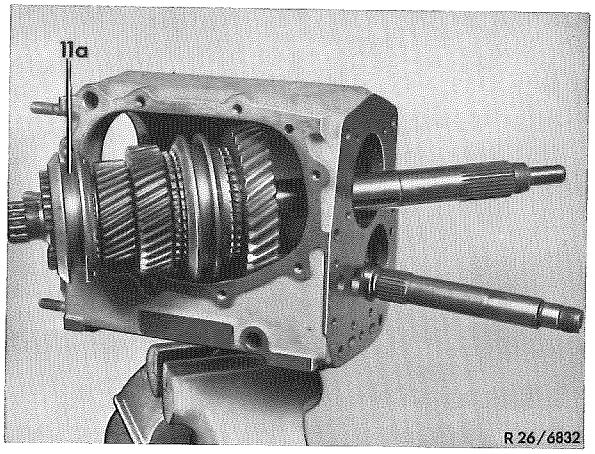


Fig. 17
11a Sliding sleeve 3rd and 4th gear

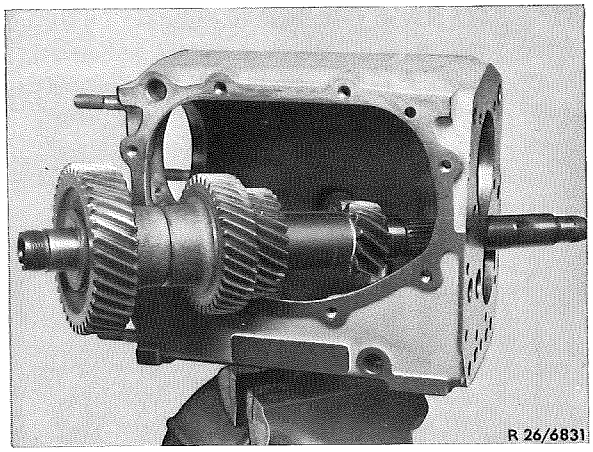


Fig. 18

21 Remove countershaft from transmission housing similar to removal of main shaft (Fig. 18).

Note: Check gear assembly parts for reuse. Refer to test procedure in Job No. 26.2—440, 450, 460.

Installation

22 Introduce countershaft into housing (Fig. 18).

23 Slide assembly sleeve across free, rear end of main shaft and tighten with slotted nut of three-legged flange.

24 Move sliding sleeve (11a) of 3rd and 4th gear into 3rd gear position and introduce main shaft at an angle toward the rear into housing (Fig. 17).

25 Insert needle bearing for mounting main shaft in drive shaft into the latter and place synchronizing ring for fourth gear on cone of drive shaft gear.

26 Introduce drive shaft into transmission housing from the front, while raising the main shaft to the extent that the bearing journal at its front end can be inserted into the needle bearing of the drive shaft without tension.

27 Raise drive and main shaft together (with helper) so that the countershaft can be aligned in relation to the gears of the main shaft.

28 Knock-in grooved ball bearing and cyl. roller bearing by means of light blows and using a steel mandrel or steel hammer. This involves raising the countershaft so that the bearings can be easily fitted.

29 Slide oil thrower disc (6) and grooved ball bearing (3) with compensating washer (2) on drive shaft (7) (Fig. 19).

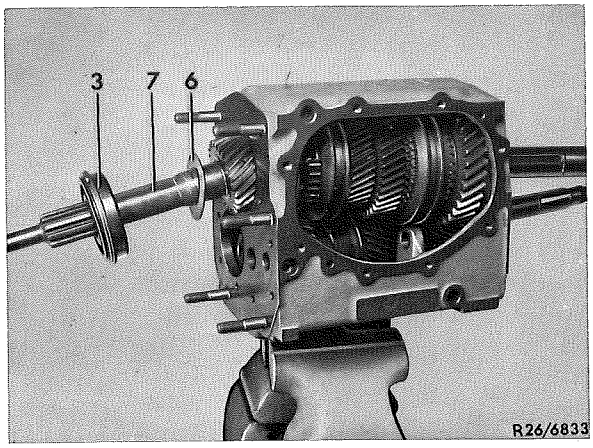


Fig. 19

3 Grooved ball bearing
6 Oil thrower disc
7 Drive shaft

30 Knock-in grooved ball bearing (3) by means of a pressing-in mandrel while counterholding at rear main shaft end until the bearing circlip (4) rests against transmission housing and fit circlip (1) with pliers.

Note: When knocking in the grooved ball bearing make sure that the synchronizing ring of fourth gear does not slip from cone of drive shaft gear and is not jammed and damaged in between the shafts.

31 Remove assembly sleeve from rear main shaft end and mount grooved ball bearing. When knocking in the bearing, apply counterhold against drive shaft to prevent the latter from slipping out.

32 Block gear set by simultaneous engagement of two gear steps, tighten slot nut (48) with slot nut wrench to specified torque and secure (Fig. 20).

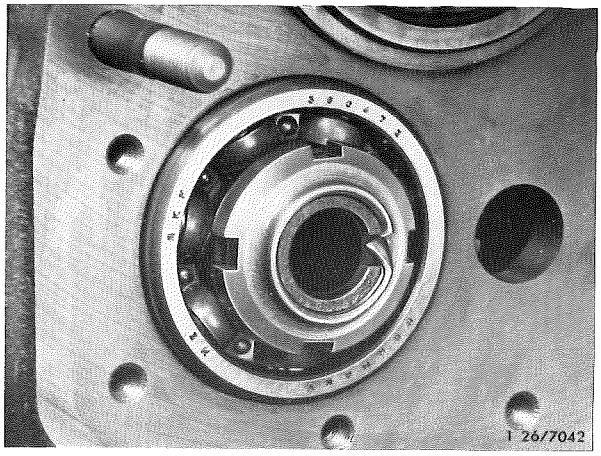


Fig. 20

Note: As from transmission No. **6431,** the slot nut at front of countershaft is replaced by a hex. nut with pinch collar. In the event of repairs, the slot nut can be replaced against a hex. nut with pinch collar (Fig. 21).

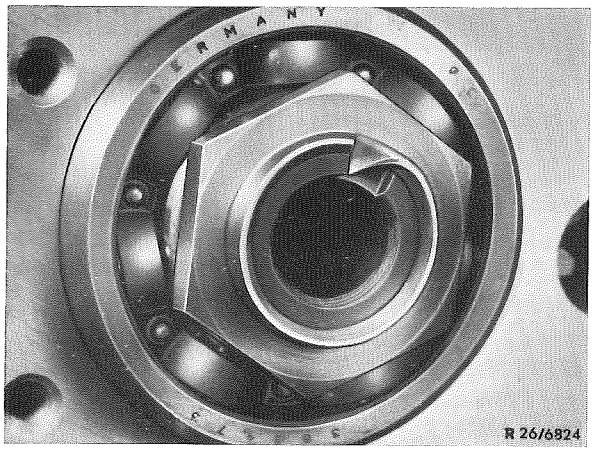


Fig. 21

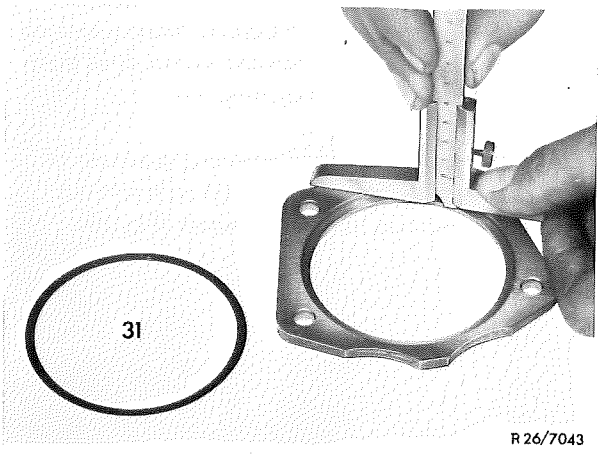


Fig. 22

33 Set end play of main shaft as specified. For this purpose, determine difference in dimension between depth of recess in holding ring and distance between upper edge of main shaft bearing circlip and parting surface of transmission housing by means of a depth gauge. The adjusting dimension or end play is **0—0.05** mm (Fig. 22 and 23).

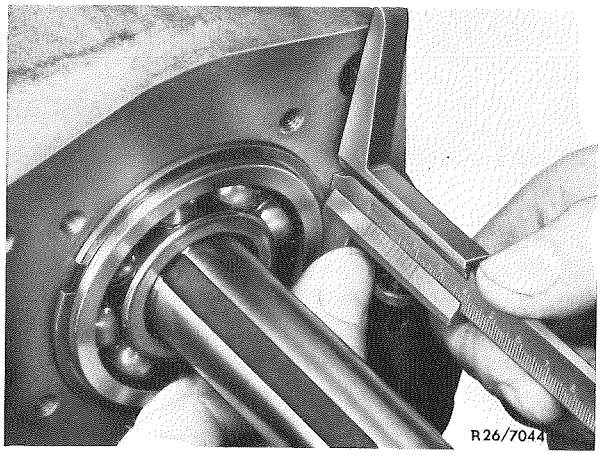


Fig. 23

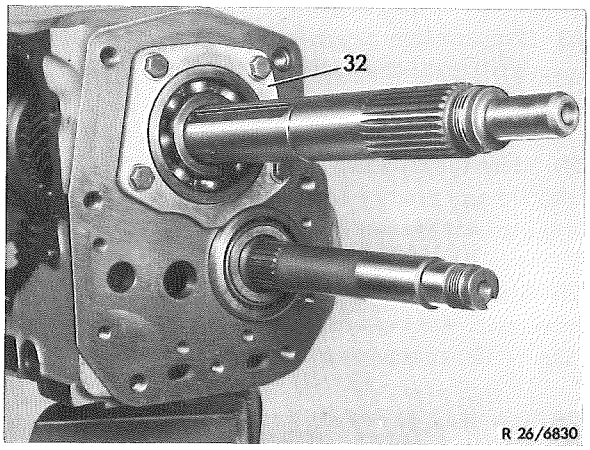


Fig. 24
32 Holding ring

34 Insert compensating washers into holding ring according to dimensional difference and glue down with grease to facilitate assembly.

35 Carefully slide holding ring (32) over main shaft bearing and screw down (Fig. 24).

Note: The locking plates can also be replaced by spring washers (Fig. 25).

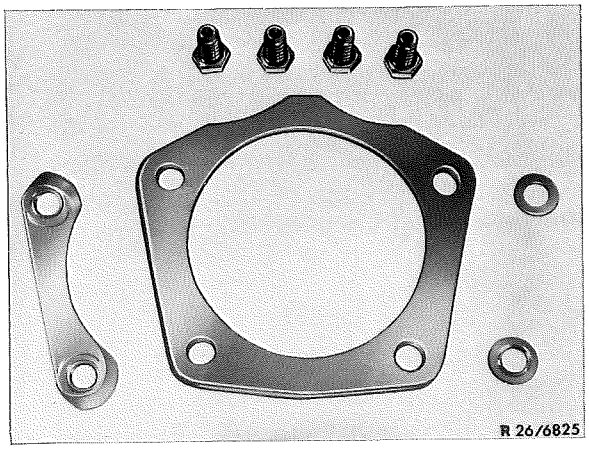


Fig. 25

36 Slide reversing gear (58) and spacer bushing (59) on countershaft and carefully knock-in woodruff key (56) with a hammer (Fig. 26).

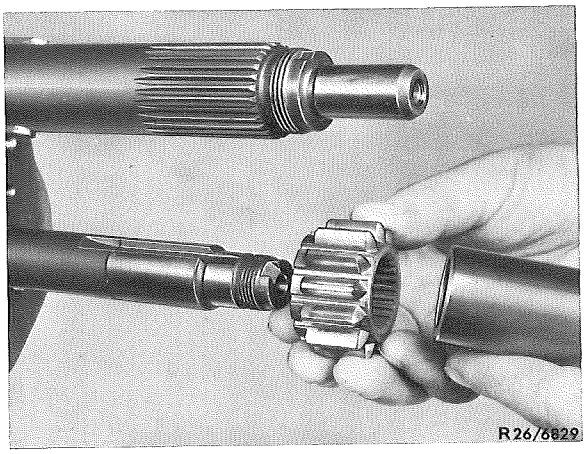


Fig. 26

37 Carefully knock both woodruff keys (17) onto main shaft.

38 Carefully knock reversing gear (35) on main shaft by using a matching piece of tubing.

39 Slide compensating washer (36) on main shaft.

40 Mount fifth and reverse gear (26.2–415).

41 Screw-on rear transmission cover (26.2–310).

42 Adjust end play of drive shaft as specified. For this purpose, determine difference in dimension from circlip upper edge of drive shaft bearing and parting surface of transmission housing, as well as of depth of recess on front transmission cover by means of depth gauge. The adjusting dimension or end play is **0–0.05** mm (Fig. 27 and 28).

The thickness of the gasket must be taken into consideration when measuring cover.

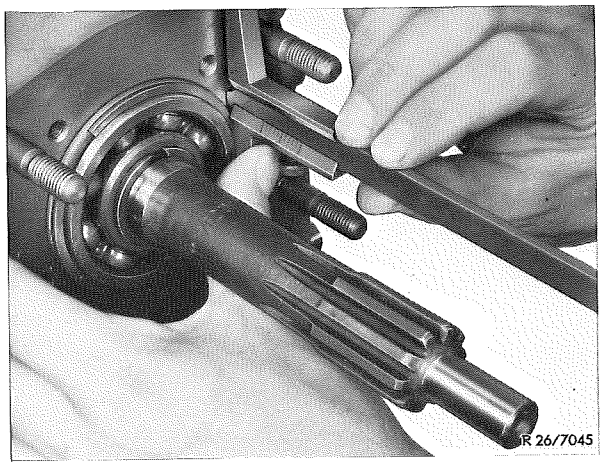


Fig. 27

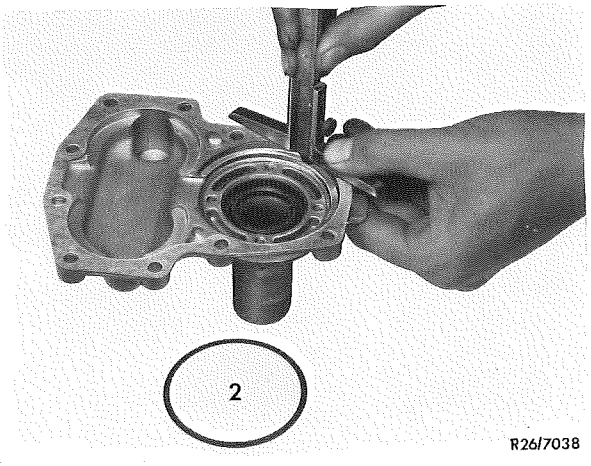


Fig. 28

43 Adjust end play of countershaft as specified. Position depth gauge against outer edge of front bearing and measure in direction of transmission housing parting surface. For this purpose, the countershaft must be pushed completely toward the rear, that is well against rear cover. Place depth gauge against parting surface of front transmission cover and measure depth of recess. Compensate difference less specified play by means of compensating washers. The thickness of the gasket must be taken into consideration when measuring the cover. The adjusting dimension or end play is **0.15–0.2** mm (Fig. 29 and 30).

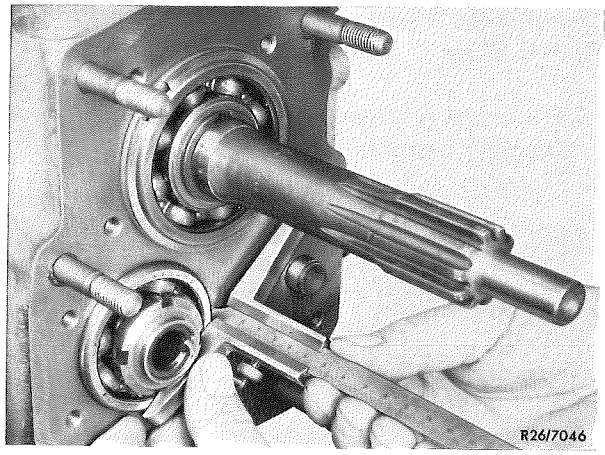


Fig. 29

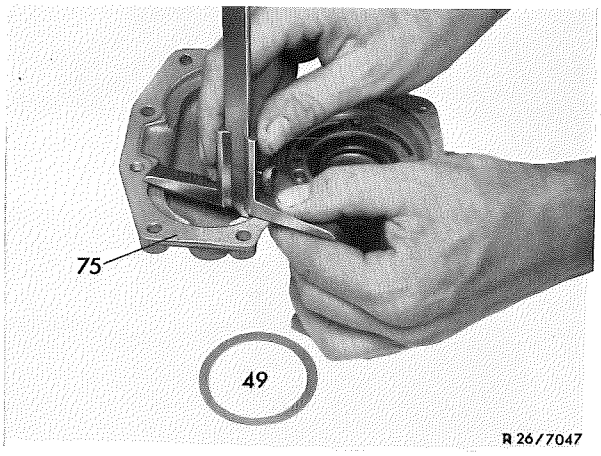


Fig. 30

44 Place compensating washers into front transmission cover and glue down with grease.

45 Screw-on front transmission cover (26.2–210).

46 Install transmission shift cover (26.2–110).

47 Screw-on clutch housing (26.2–050).

Revision: Revision reference added, Fig. 1 changed, assembly note added following Fig. 13.

Test Dimension	
Wear limit of synchronizing rings (distance between synchronizing ring and short toothing on gear wheel) (Fig. 13)	min. 0.5

Tightening Torque	Nm	(kpm)
Slot nut for main shaft front	80	(8)

Special Tool	
Slot nut wrench insert 1/2" square for slot nut on transmission main shaft	115 589 05 07 00

Revision Reference	
Designation	As from Unit No.
Change from coil spring synchronization to annular spring synchronization 1st – 4th gear	008 555
5th gear	009 313

Note

To provide uniformity when mounting gear assembly the illustrations used for the 4-speed transmission were also widely used here.

Disassembly

1 Remove gear assembly (26.2–420).

2 Clamp main shaft into vice by means of three-arm flange.

3 Loosen slot nut on main shaft front on synchronizing member for 3rd and 4th gear by means of pin spanner (Fig. 1).

4 Remove synchronizing member (11) for 3rd and 4th gear from main shaft (Fig. 2).

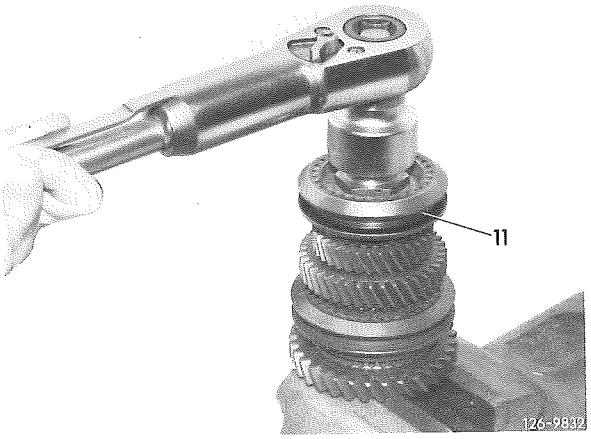


Fig. 1
11 Synchronizing member

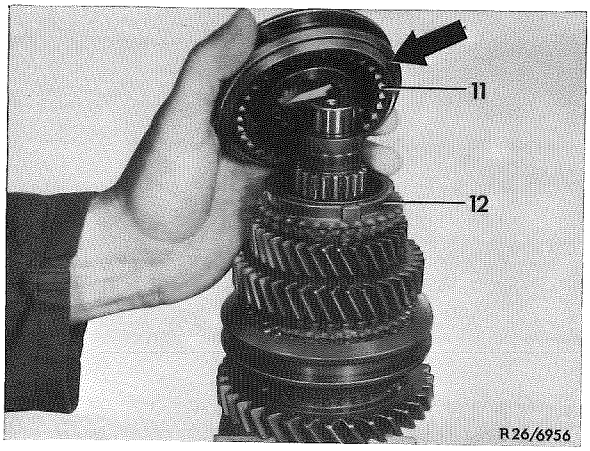


Fig. 2
11 Synchronizing member
12 Synchronizing ring for 3rd gear

5 Remove thrust washer (13) with internal teething from shaft (Fig. 3).

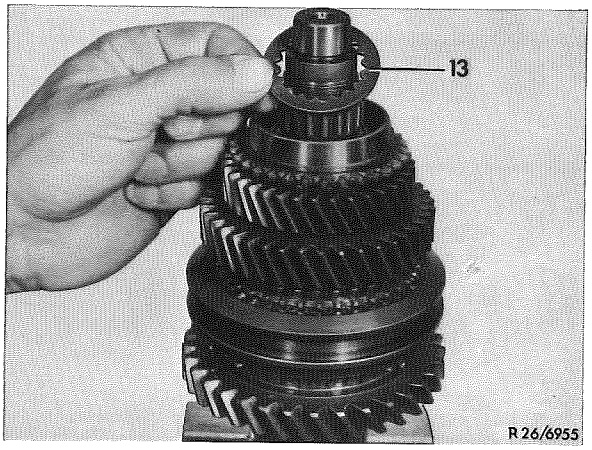


Fig. 3
13 Thrust washer

6 Remove helical gear (14) for third gear and needle cage (15) (Fig. 4).

7 Turn main shaft around and clamp into vice by means of drive shaft and inserted needle cage.

Note: Use aluminum jaws to protect drive shaft against damage.

8 Remove thrust washer (28) and helical gear (27) for 1st gear, as well as needle cage (26) from main shaft (Fig. 5 and 6).

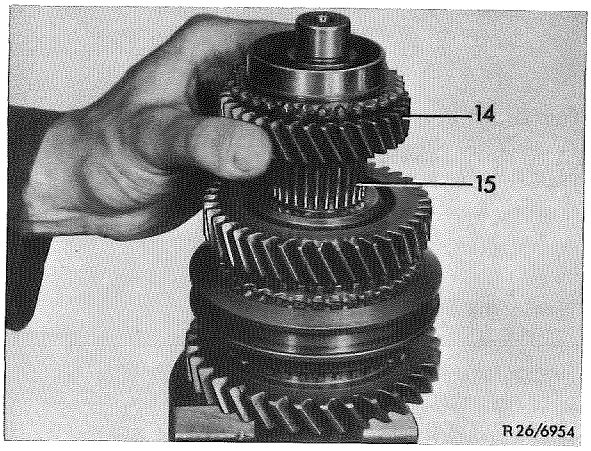


Fig. 4
14 Helical gear wheel for 3rd gear
15 Needle cage for 3rd gear wheel

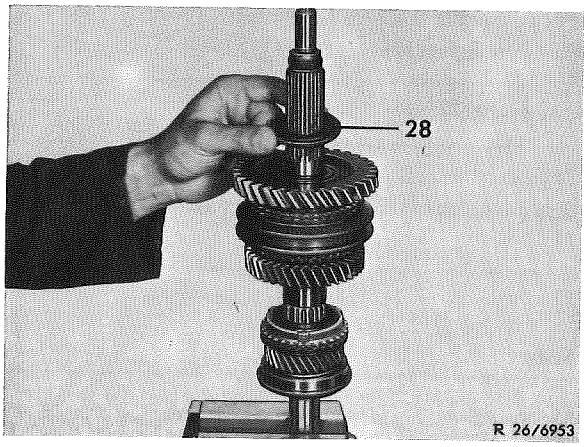


Fig. 5
28 Thrust washer

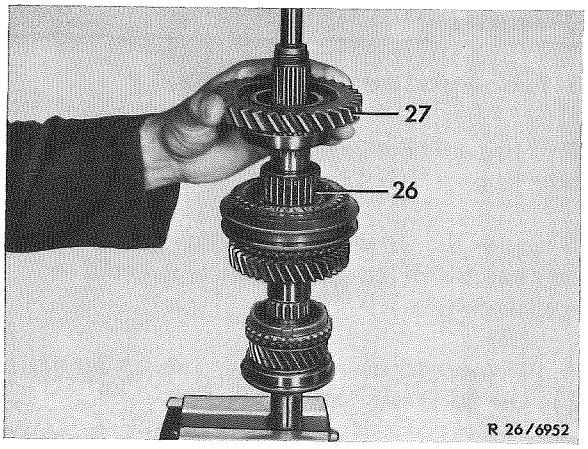


Fig. 6
26 Needle cage for helical gear wheel 1st gear
27 Helical gear wheel for 1st gear

9 Knock race (25) of 1st gear wheel bearing from shaft. For this purpose, place main shaft together with helical gear wheel (19) of 2nd gear on pertinently opened vice and knock down (Fig. 7 and 8).

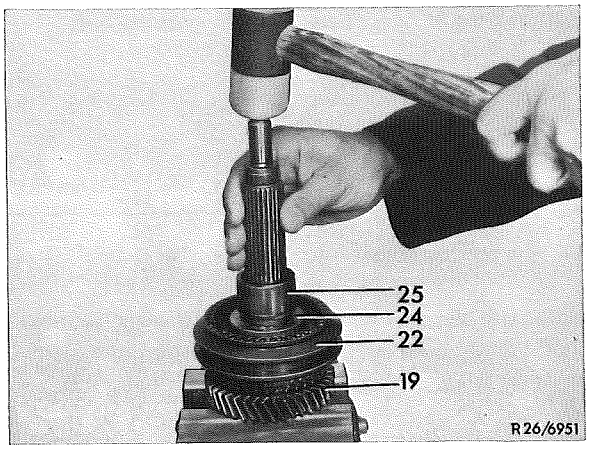


Fig. 7
19 Gear wheel 2nd gear
22 Synchronizing member 1st and 2nd gear
24 Thrust washer
25 Race 1st gear wheel bearing

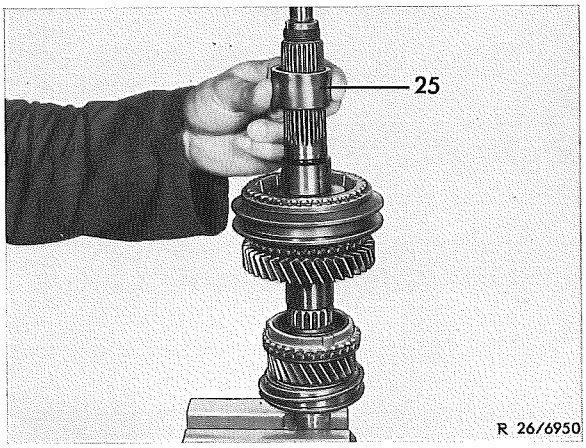


Fig. 8
25 Race 1st gear wheel bearing

10 Remove thrust washer (24), synchronizing ring (23), synchronizing member (22) and thrust washer (20) (Fig. 9, 10 and 11).

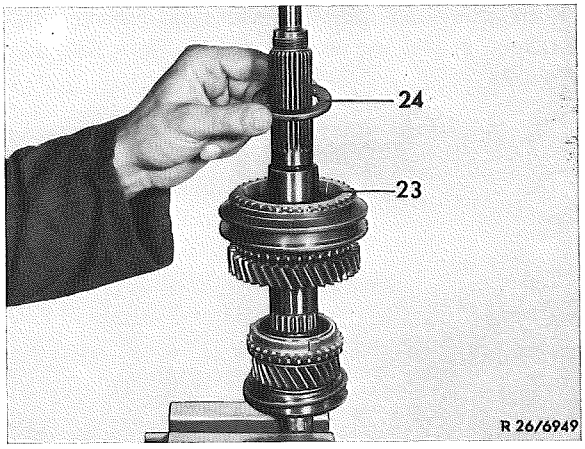


Fig. 9
23 Synchronizing ring for 1st gear
24 Thrust washer

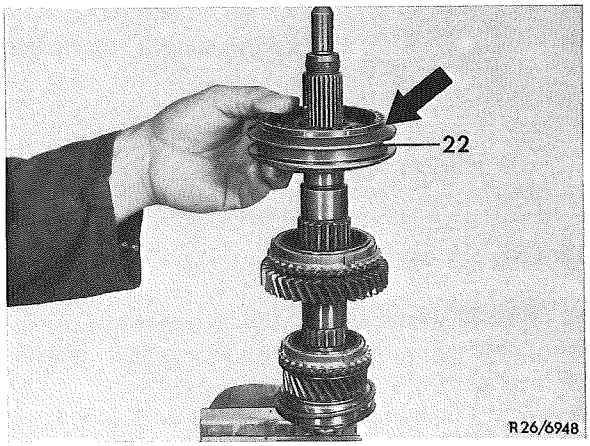


Fig. 10
22 Synchronizing member 1st and 2nd gear

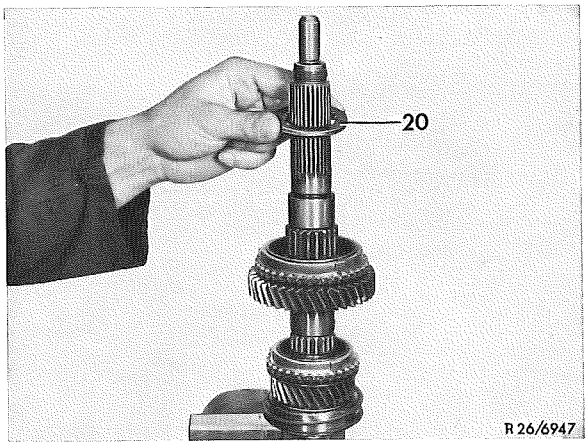


Fig. 11
20 Thrust washer

11 Remove helical gear (19) with synchronizing ring (21) for 2nd gear and needle cage (18) from main shaft (Fig. 12).

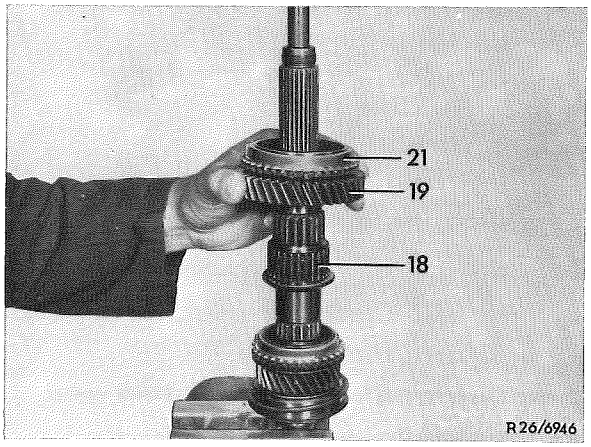


Fig. 12

18 Needle cage
19 Helical gear wheel 2nd gear
21 Synchronizing ring 2nd gear

Checkup

12 Check all parts for wear and condition.

13 Place all synchronizing rings on pertinent helical gear cone and check dimension of gap between short toothing of synchronizing ring and short toothing of helical gear with feeler gauge (Fig. 13).

Note: The wear limit of the synchronizing ring is attained when the gap dimension amounts to 0.5 mm. In such a case, the synchronizing ring must be replaced.

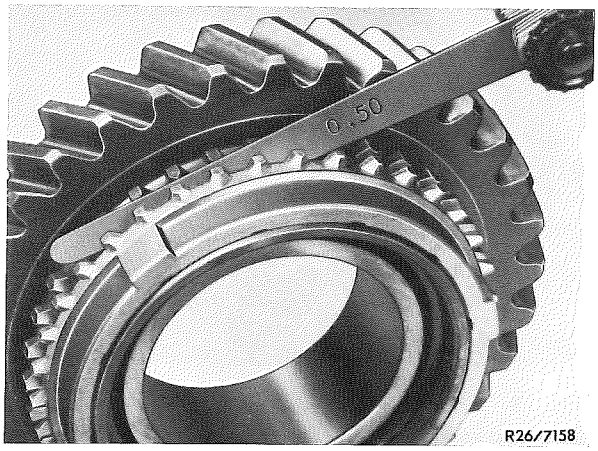


Fig. 13

Attention! If in the event of repairs a transmission is changed from coil spring synchronization to annular spring synchronization, the renewal of the synchronizing body for 3rd/4th gear will eliminate thrust washer (13), and the renewal of the synchronizing body for 1st/2nd speed will eliminate thrust washers (20) and (24) as a result of pertinent widening of the hub (Fig. 3, 9 and 11).

Assembly

14 Clamp main shaft into vice (Fig. 14).

Note: Use aluminum jaws to prevent damage to main shaft when clamping into vice. In addition, the main shaft can also be clamped by means of drive shaft.

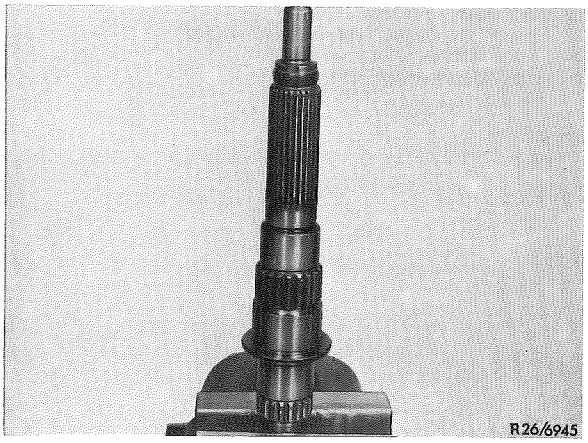


Fig. 14

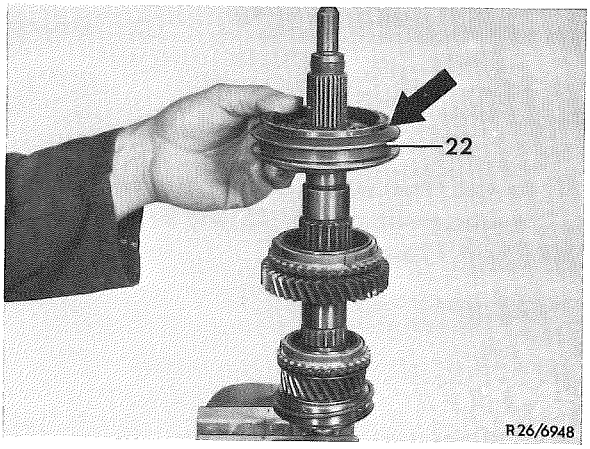


Fig. 15

15 Place lubricated needle bearing (18), helical gear (19) with synchronizing ring (21) for second gear and steel thrust washer (20) on main shaft (Fig. 11 and 12).

16 Place synchronizing member (22) of 1st and 2nd gear on main shaft in such a manner that the collar (arrow) faces the 1st gear wheel (Fig. 15).

17 Mount synchronizing ring (23) and thrust washer (24) (Fig. 9).

18 Place main shaft on a solid base and knock-on heated race (25) of 1st gear wheel bearing by means of a piece of tubing approx. 42 x 3 x 260 mm (Fig. 16 and 17).

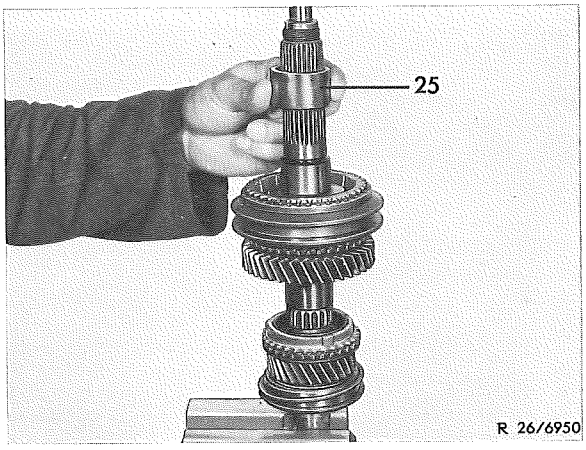


Fig. 16
25 Thrust ring 1st gear wheel bearing

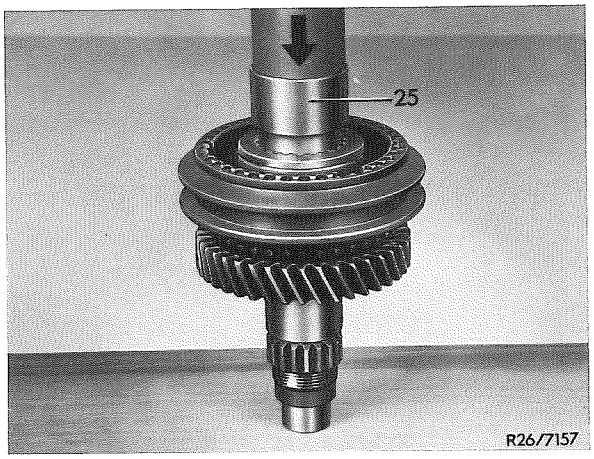


Fig. 17

19 Mount needle cage (26) and helical gear (27) for 1st gear (Fig. 6).

20 Place steel thrust washer (28) on 1st gear wheel, slide assembly sleeve on main shaft and tighten slot nut by hand.

21 Turn main shaft around and carefully clamp into vice at assembly sleeve.

22 Lubricate needle cage (15) and place on shaft together with helical gear (14) (Fig. 18).

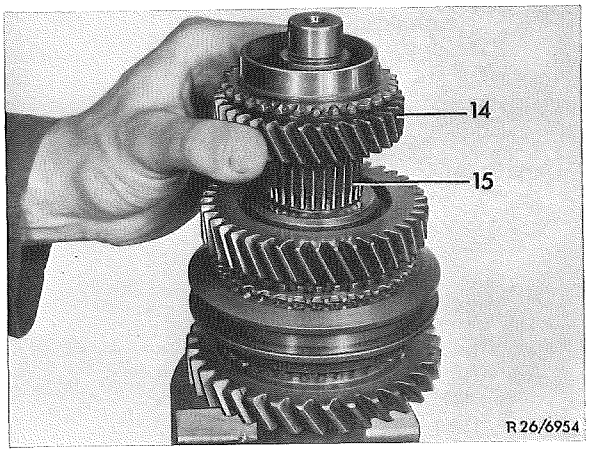


Fig. 18
14 Helical gear wheel for 3rd gear
15 Needle cage for 3rd gear wheel

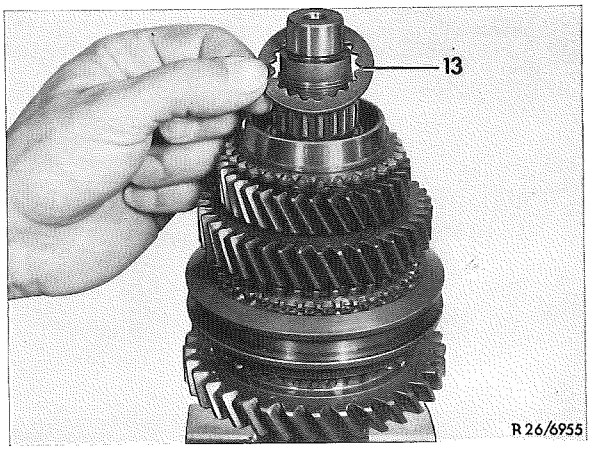


Fig. 19
13 Thrust washer

23 Mount or position brass thrust washer (13) with internal toothing and synchronizing ring (12) (Fig. 19 and 20).

24 Place synchronizing member (11) for 3rd and 4th gear on shaft in such a manner that the end with the machined groove (arrow) faces 3rd gear (Fig. 20).

25 Tighten slot nut on main shaft front with pin spanner to specified torque.

For tightening slot nut, clamp main shaft into vice by means of three-arm flange.

Note: As from transmission No. **6350** the slot nut on front of main shaft is replaced by an SW 41 hex. nut with pinch collar. In the event of repairs, the slot nut can be replaced by a hex. nut (Fig. 21 and 22).

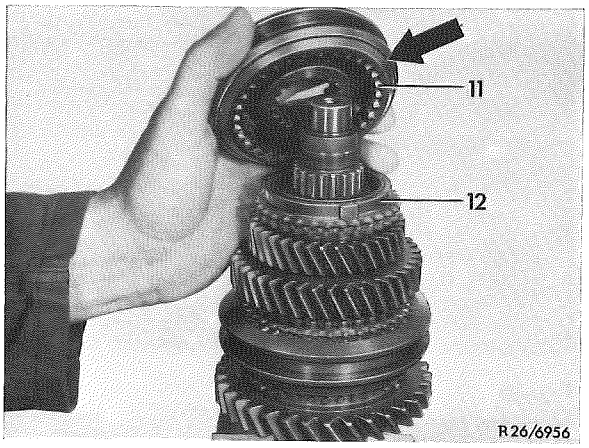


Fig. 20
11 Synchronizing member 3rd and 4th gear
12 Synchronizing ring 3rd gear

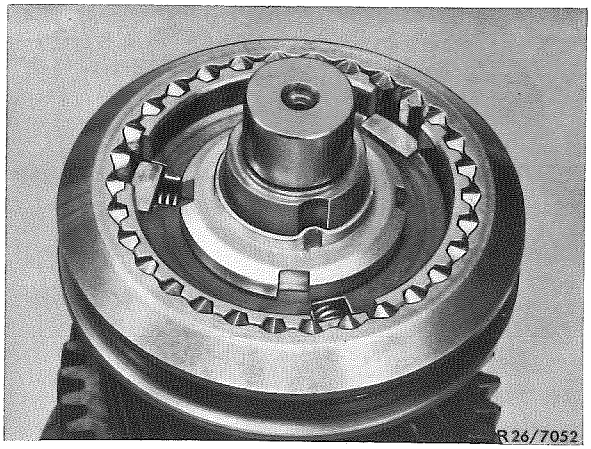


Fig. 21

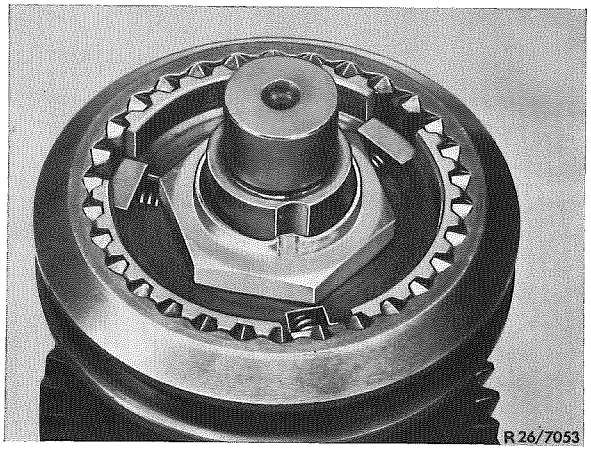


Fig. 22

26 Install gear assembly (26.2–420).

Disassembly

1 Wrap synchronizing body in cloth, so that no steel balls and springs are lost when pushing body apart.

2 Push synchronizing body out of sliding sleeve including drive member.

3 Check components for wear and condition.

Assembly

4 Insert springs (c) and drive members (e) into synchronizing body and introduce synchronizing body into sliding sleeve (Fig. 1).

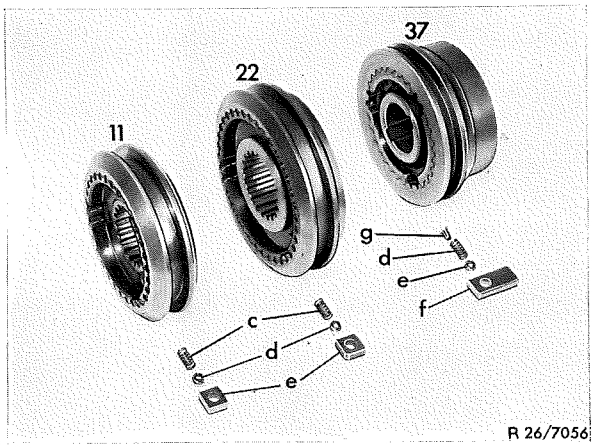


Fig. 1

11 Synchronizing body 3rd and 4th speed
22 Synchronizing body 1st and 2nd speed
- c Synchronizing spring
- d Steel ball
- e Drive member

37 Synchronizing body 5th speed
- d Synchronizing spring
- e Steel ball
- f Drive member
- g Guide sleeve

5 Push one drive member forward each time, insert one ball and push drive member back (Fig. 2).

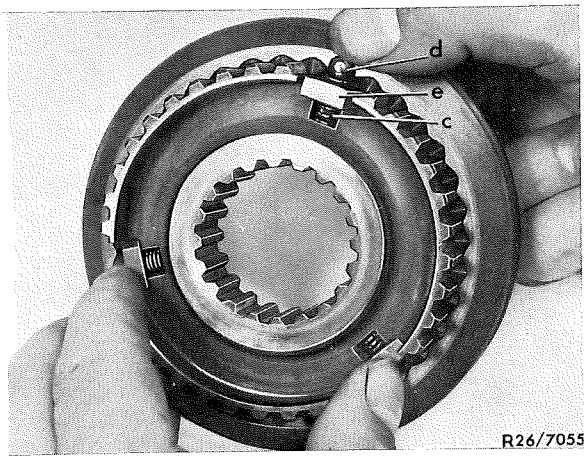


Fig. 2

c Spring
d Steel ball
e Slide piece

6 For better differentiation, slide pieces of synchronizing body for 1st and 2nd speed are identified by a chamfer (arrow). Mount slide pieces so that chamfer faces side of 2nd gear wheel (Fig. 3).

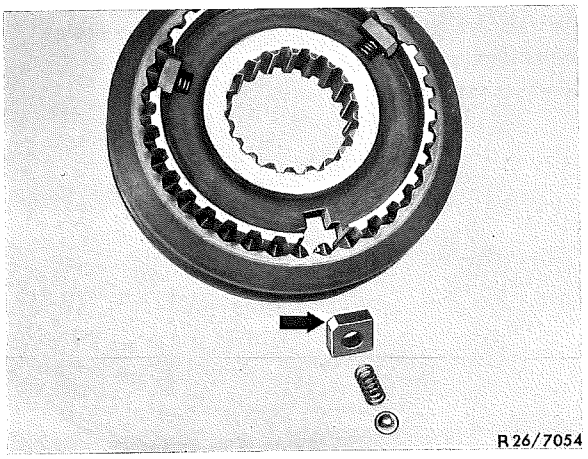


Fig. 3

7 Mount synchronizing body for 3rd and 4th speed so that wide hub end and machined groove of sliding sleeve (arrow) are on the same side (Fig. 4).

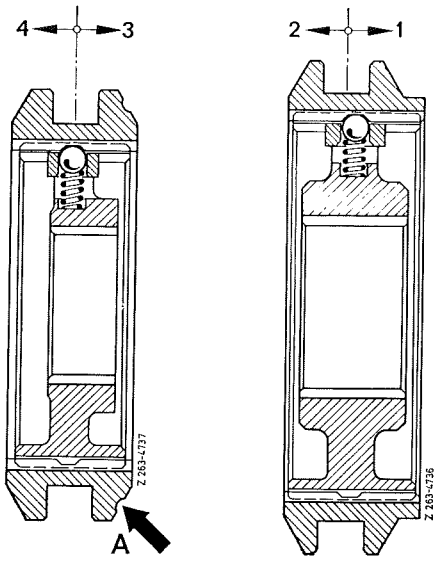


Fig. 4

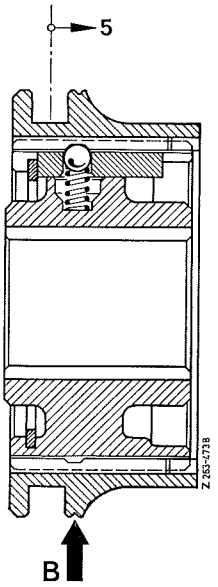


Fig. 5

8 Three guide sleeves installed in synchronizing body of 1st speed serve for better stabilization of springs. During assembly, introduce guide sleeves into body first and then springs (Fig. 1).

Note: The respective guide bushing is installed in unit No. **4921** to **5077**.

As from use of short tooth assy 1:10, guide sleeves are eliminated due to changed spring guides in synchronizing body.

9 Install synchronizing body so that wide hub end faces 5th speed (Fig. 5).

Disassembly

1 Push synchronizing body out of sliding sleeve (Fig. 1).

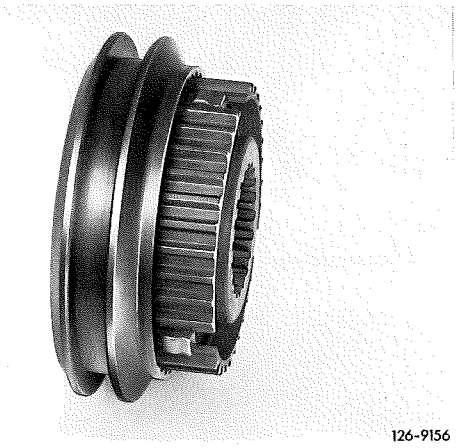


Fig. 1

2 Remove drive member (er) and circular spring (cr) from synchronizing body (Fig. 2).

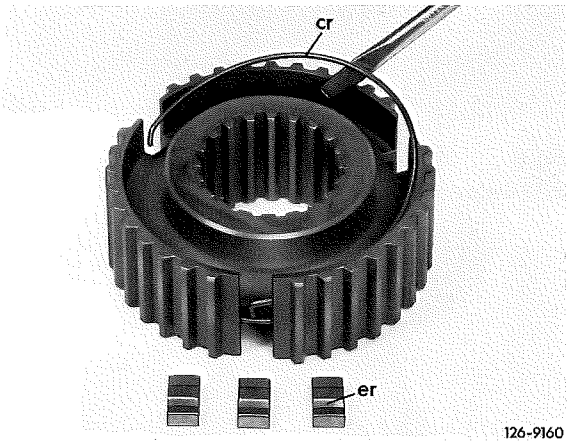


Fig. 2

cr Circular spring er Drive member

3 On synchronizing body of 5th speed, remove inner retaining ring (37a) by means of pliers prior to pushing out synchronizing body (Fig. 3).

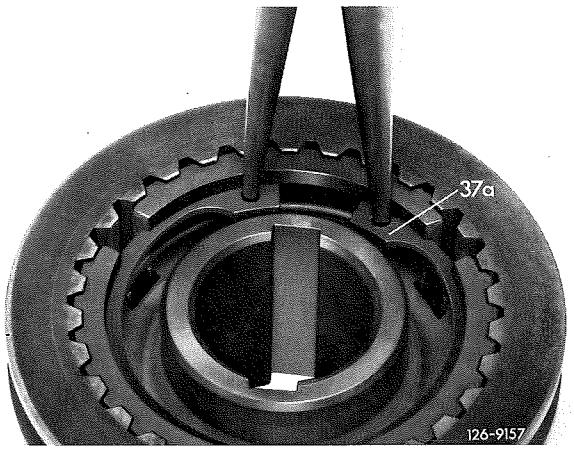


Fig. 3

37a Inner retaining ring

4 Check components for wear and condition (Fig. 4).

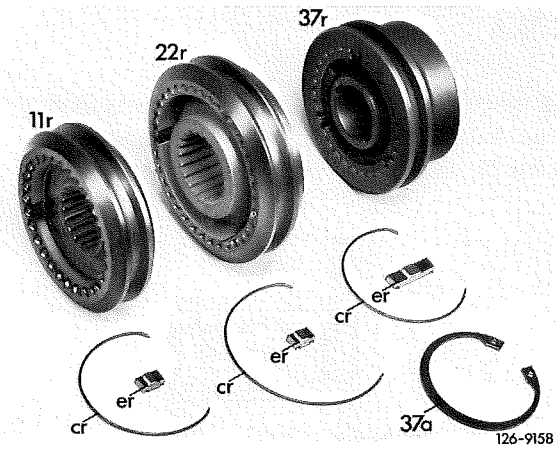


Fig. 4

11r Synchronizing body 3rd and 4th speed
cr Circular spring
er Drive member
22r Synchronizing body 1st and 2nd speed
cr Circular spring
er Drive member
37r Synchronizing body 5th speed
cr Circular spring
er Drive member
37a Inner retaining ring

Note: Circular springs differ in accordance with varying diameters of synchronizing bodies (Fig. 4).

Assembly

5 Insert synchronizing body for 3rd and 4th speed so that wide hub end and machine groove of sliding sleeve (arrow) are on same side (Fig. 5).

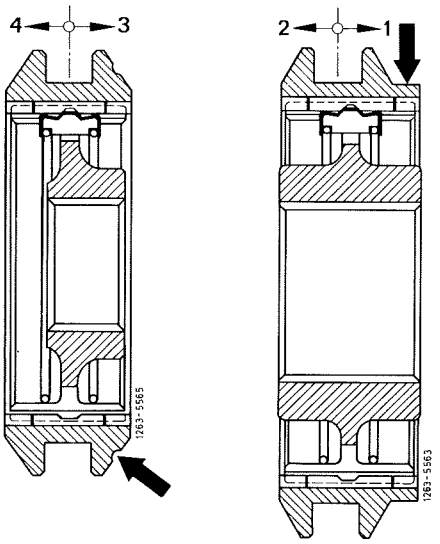


Fig. 5

6 Insert synchronizing body of 5th speed so that hub end with larger diameter faces 5th speed (Fig. 6).

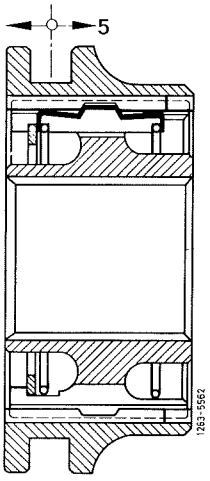


Fig. 6

7 Angular end of one spring and free end of other spring should rest against same drive member (arrows Fig. 7).

8 Position drive members (er) one after other on circular springs (cr) and slip sliding sleeves over synchronizing body and drive member (Fig. 8 and 9).

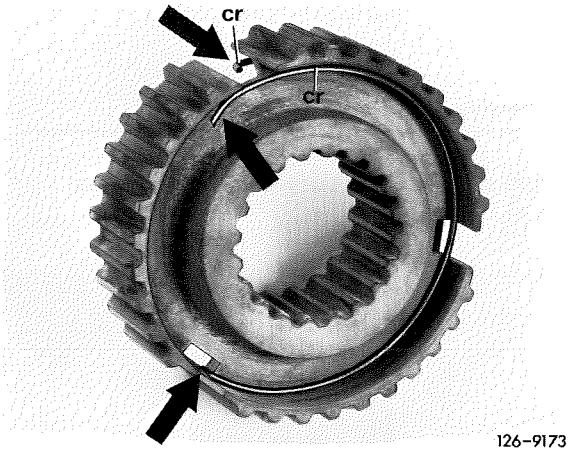


Fig. 7
cr Circular springs

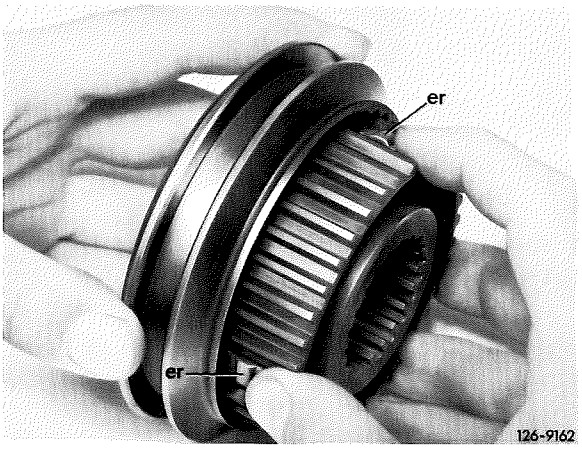


Fig. 8
er Drive member

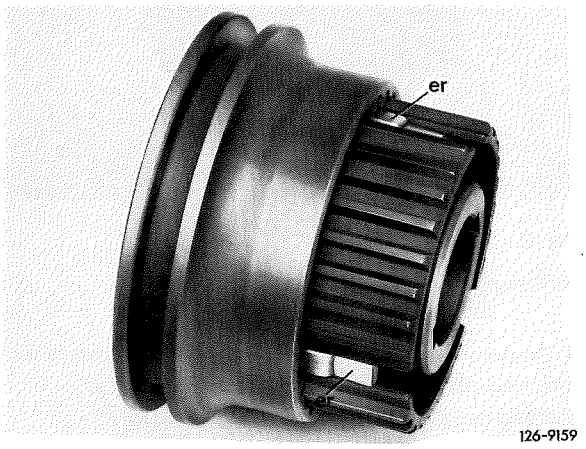


Fig. 9
er Drive member

9 Install inner retaining ring (37 a) on synchronizing body of 5th speed (Fig. 3).

Disassembly

1 Position countershaft by means of suitable shims on 3rd gear wheel (53) and press out shaft by means of an arbor press (Fig. 1).

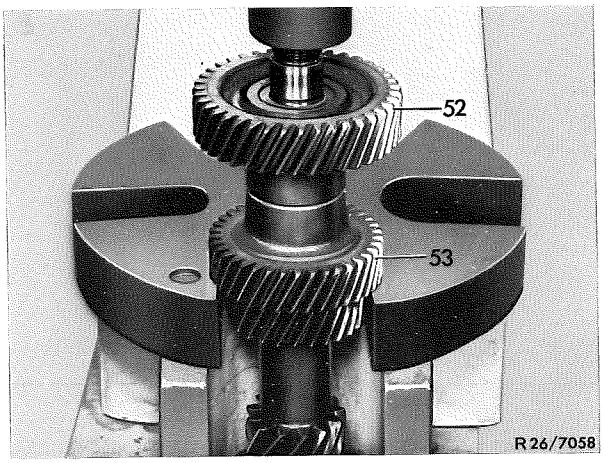


Fig. 1

52 Countershaft helical gear wheel – constant gear
53 Countershaft helical gear wheel – 3rd gear

2 Push woodruff key out of shaft by means of screw driver.

3 Check all parts for wear and condition (Fig. 2).

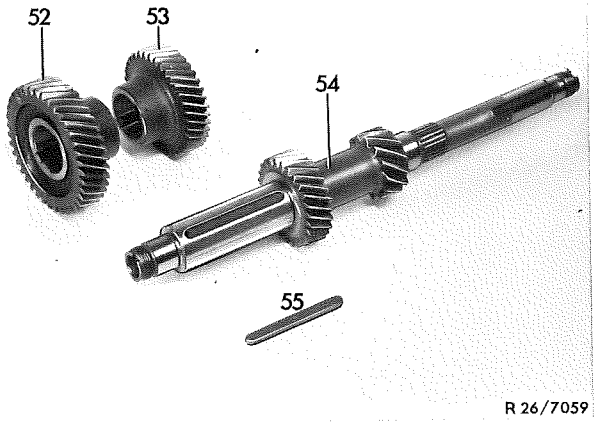


Fig. 2

52 Countershaft helical gear wheel – constant gear
53 Countershaft helical gear whee – 3rd gear
54 Countershaft with helical teeth for second and first gear
55 Woodruff key

Assembly

4 Knock woodruff key into countershaft.

5 Position countershaft at helical teeth for second gear and press on 3rd gear wheel (53) with high collar up (Fig. 3).

6 Press on countershaft constant gear wheel (52) with high collar down.

When pressing on, make sure that no material is scraped from woodruff key. Prior to abutment of the countershaft gear wheel for 3rd gear against helical teeth for 2nd gear, check whether any material has come off. If so, remove such material, since the faces of the collars must be absolutely clean. Only then press on countershaft wheels to abut.

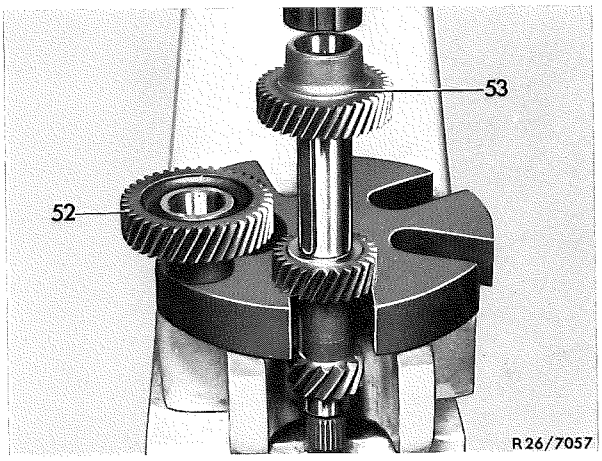
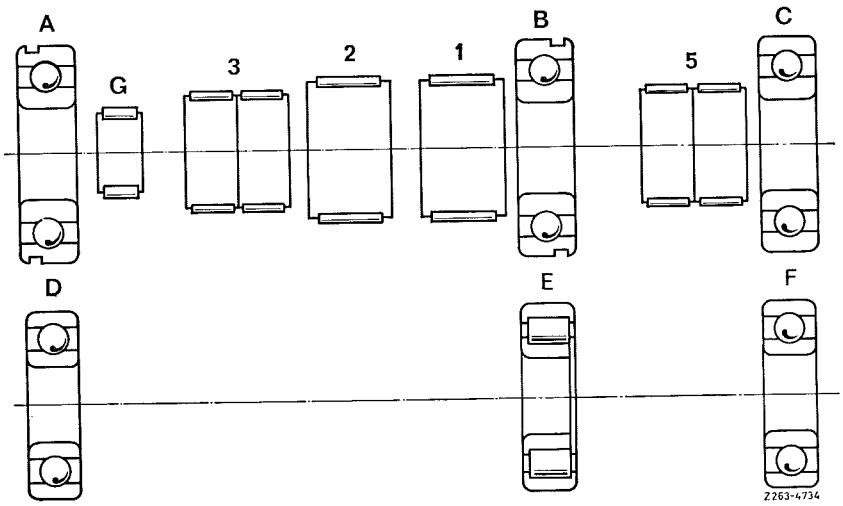


Fig. 3

52 Countershaft helical gear wheel – constant gear
53 Countershaft helical gear wheel – 3rd gear



Item	Item in exploded view 26.2–990/1	Designation		Dimensions OD	ID	Width
Bearing of Drive Shaft in Transmission Housing						
A	3	Grooved ball bearing	001 981 31 25	72	30	19
Bearing of Main Shaft						
B	29	Grooved ball bearing	001 981 32 25	72	30	19
C	44	Grooved ball bearing	001 981 36 25	72	35	17
G	8	Needle cage Needle cage	004 981 04 10 002 981 23 25	30	22	15
Bearing of Countershaft						
D	50	Grooved ball bearing Grooved ball bearing	001 981 20 25 001 981 23 25	62	25	17
E	57	Cyl. roller bearing NUP 206 DIN 5412	005 412 600 206	62	30	16
F	61	Grooved ball bearing	001 981 34 25	52	20	15
Bearing of 1st and 2nd Gear Wheel						
1 2	26 18	Needle cage	000 981 82 12 004 981 08 10	47	42	28,2
Bearing of 3rd Gear Wheel						
3	15	Needle cage	001 981 86 10 004 981 07 10 002 981 00 10 003 981 04 10 003 981 12 10	40	35	35
Bearing of 5th Gear Wheel						
5	40	Needle cage Needle cage (split)	003 981 62 10 004 981 23 10	40	35	38

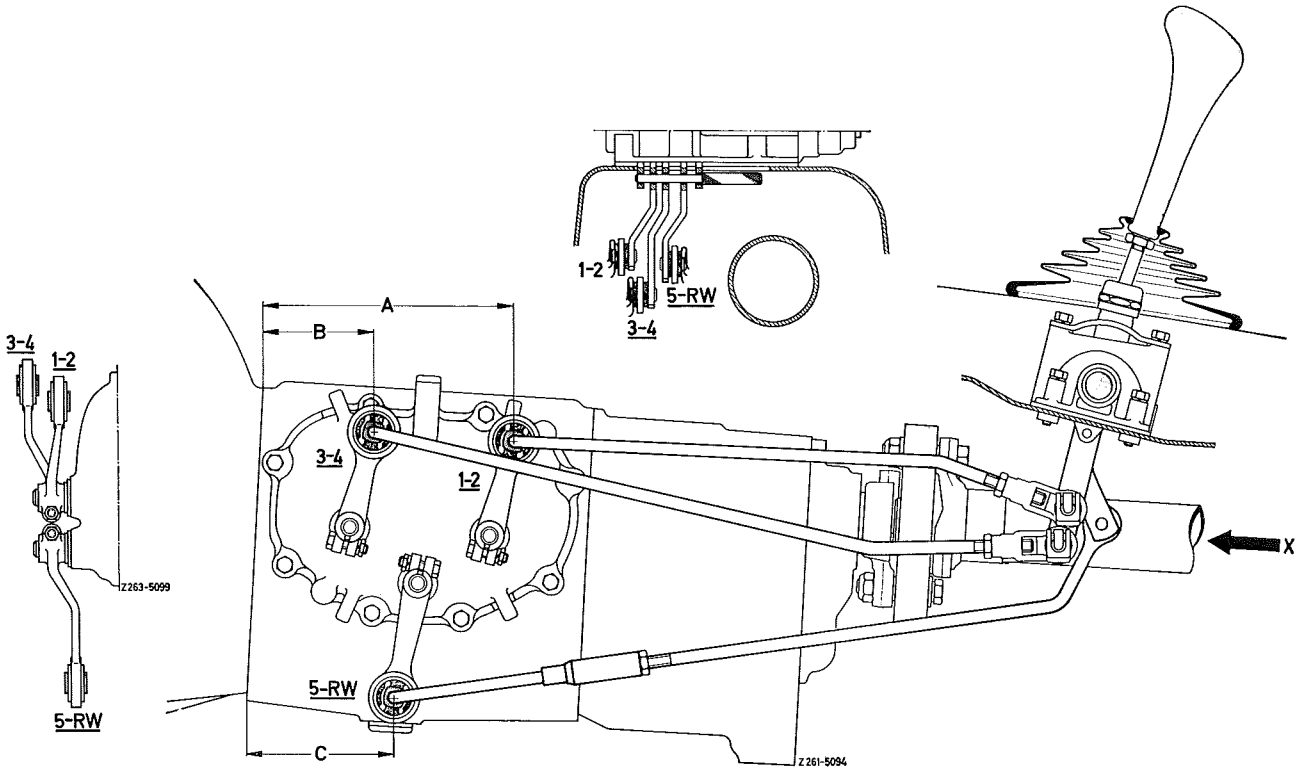


Fig. 1 A = 168 B = 81 C = 95

Adjustment

1 Disconnect shift rods on intermediate shift levers on floor shift bearing bracket after removing SL-lock (Fig. 2).

2 Locate the three intermediate shift levers at bottom on shift bracket by inserting a locating pin (A) of 6 mm dia. into holes provided (Fig. 2 and 3).

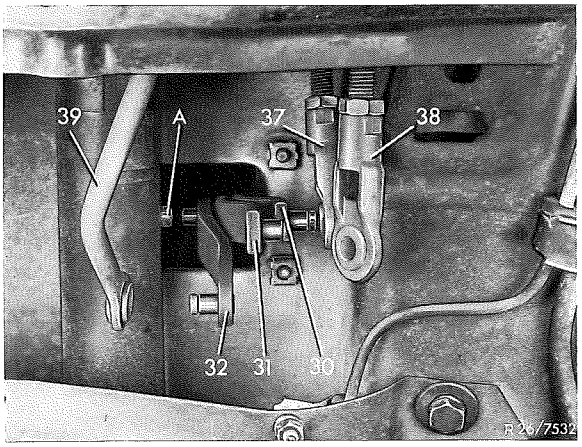


Fig. 2

A Locating pin
30 Intermediate shift lever 1st and 2nd speed
31 Intermediate shift lever 3rd and 4th speed
32 Intermediate shift lever 5th and reverse speed
37 Shift rod 1st and 2nd speed
38 Shift rod 3rd and 4th speed
39 Shift rod 5th and reverse speed

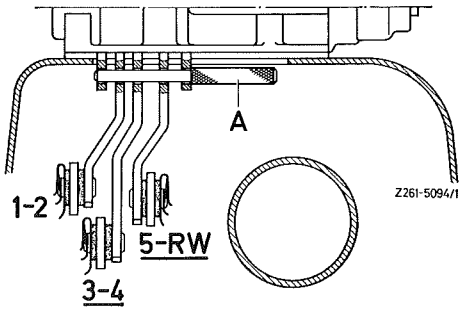


Fig. 3

A Locating pin

3 Shift transmission into idling position, then check position of shift levers on transmission shift cover with reference to specified dimensions and make corrections, if required (Fig. 1).

4 Expose shift bracket by removing cover (Fig. 4).

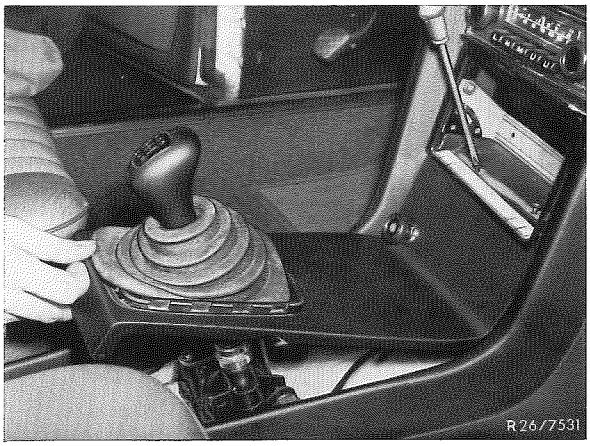


Fig. 4

5 Push shift lever in idling range completely to the right against stop and then push in direction of shift gear and hold in position (Fig. 5).

6 Loosen fastening screws (35), shift stop plate (34) toward stop finger on shift tube (10) until both members are in alignment along line „X" and chamfers are resting against each other without intermediate space (Fig. 5 and 6).

7 Tighten fastening screws (35) of stop plate (Fig. 6).

8 Adjust shift rods to length and force rod heads free of tension against pins of intermediate shift lever and secure with SL-locks (Fig. 2 and 3). Shift levers on transmission shift cover should not move out of their center position (Fig. 1).

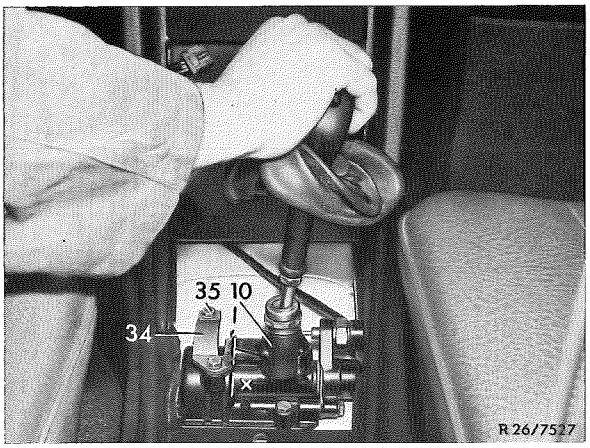


Fig. 5

„X" Straight line between stop plate and stop finger
10 Shift tube with stop finger
34 Stop plate
35 Fastening screw

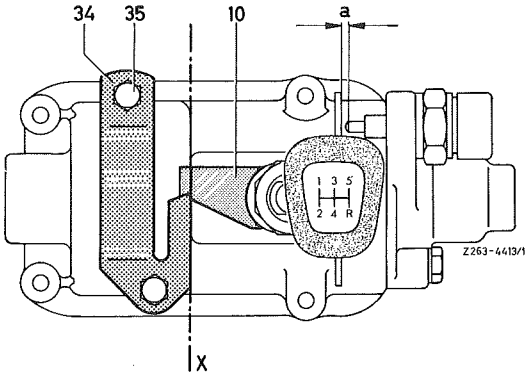


Fig. 6

„a" 1.5 mm adjusting dimension for contact pin of backup light switch, if stop plate (34) and stop finger (10) are in alignment according to straight line „X"
„X" Straight line between stop plate and stop finger
10 Shift tube with stop finger
34 Stop plate
35 Fastening screw

9 Remove locating pins from intermediate shift levers.

10 Mount cover (Fig. 4).

11 Check gear shift for function with engine running.

Special Tool

Special wrench for octagon nut on shift lever	115 589 00 03 00

Removal

1 Pull shift lever sleeve (7) out of head on recess of cover and push upwards (Fig. 1).

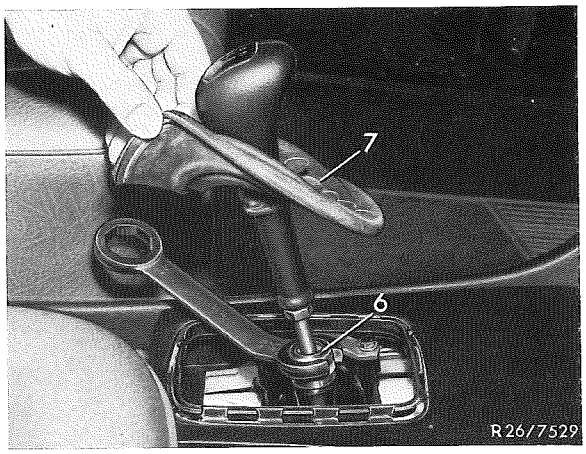


Fig. 1

6 Closing cap
7 Sleeve for shift lever

2 Unscrew closing cap (6) with special wrench (Fig. 1).

3 Pull shift lever upwards out of shift tube (Fig. 2).

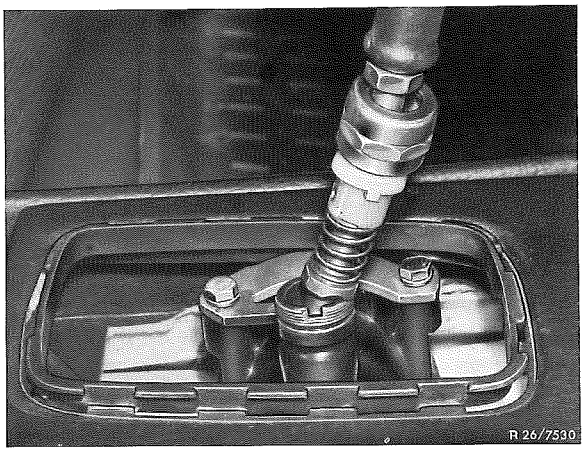


Fig. 2

Disassembly

4 Unscrew shift lever handle with shift lever sleeve and hex. nut from shift lever (Fig. 3).

5 Remove closing cap from shift lever (Fig. 3).

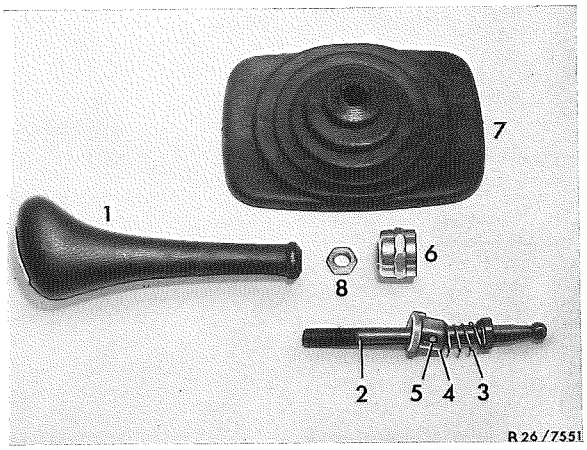


Fig. 3

1 Shift lever handle
2 Shift lever
3 Compression spring
4 Bushing
5 Set sleeve
6 Closing cap
7 Shift lever sleeve
8 Hex. nut (SW 15)

6 Slacken set sleeve by applying pressure and knock out of shift lever by means of a punch (Fig. 4).

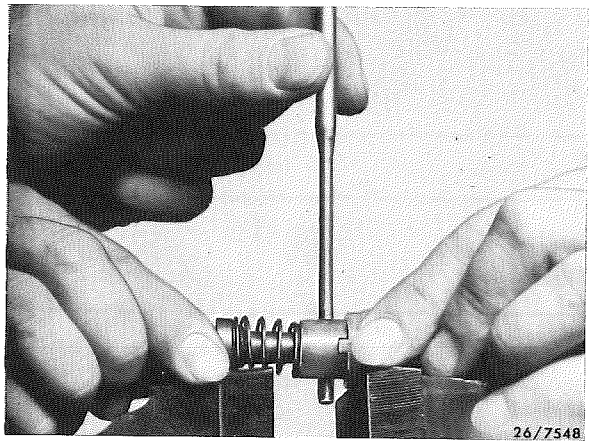


Fig. 4

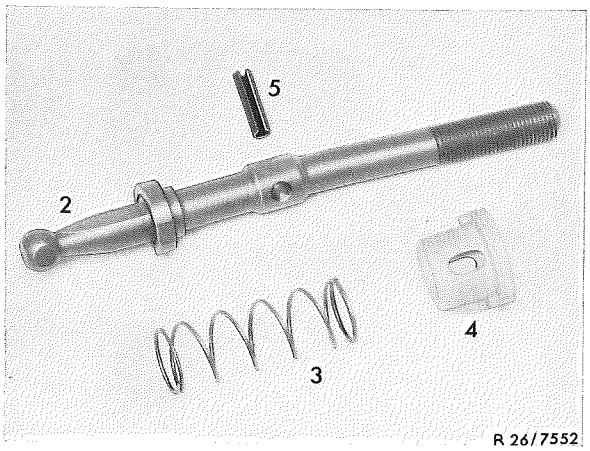


Fig. 5

2 Shift lever
3 Compression spring
4 Bushing
5 Set sleeve

7 Remove bushing (4) and compression spring (3) from shift lever (2) (Fig. 5).

8 Check parts for wear and condition.

Assembly

Note: A change of shift lever resulted in reducing hole in shift lever from 5 mm dia. to 4 mm dia. Accordingly, the dia. of set sleeve (5) and that of oblong hole in bushing (4) have also been reduced. During assembly, make sure that only parts with similar dimensions are installed.

Also note that only the **white plastic bushing (4)** is installed with 5-speed gearshift.

Note: Shifting of reverse gear is impossible when black plastic bushing (four-speed gearshift) is installed.

9 Slide compression spring (3) and bushing (4) on shift lever (2).

10 Push bushing (4) against compression spring (3) until holes of shift lever and bushing are one above the other.

11 Knock set sleeve (5) with punch into shift lever until both ends of set sleeve are flush with bushing (Fig. 6).

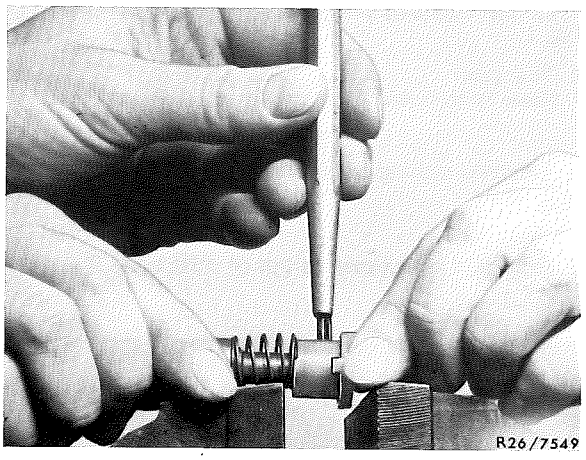


Fig. 6

12 Slide closing cap (6) on shift lever (Fig. 3).

13 Screw hex. nut and shift lever handle together with shift lever sleeve as far as possible on shift lever (Fig. 2).

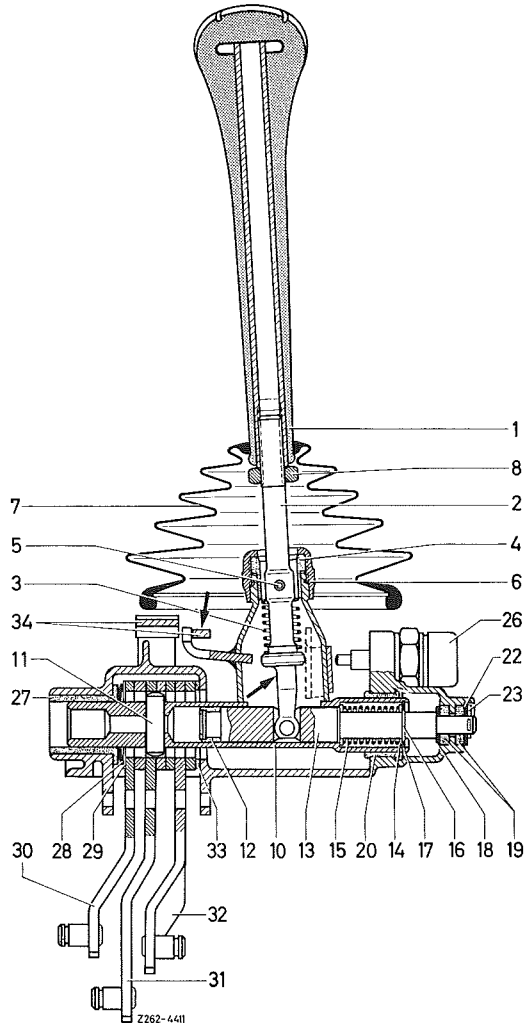


Fig. 7

14 Insert shift lever from above into shift tube, making sure that the two locating pins on coller of bushing (4) are fully seated in pertinent cutouts provided on shift tube and that the machined end at bottom of shift lever is on the left (arrows in Fig. 7).

15 Tighten closing cap (6) with special wrench (Fig. 1).

16 Turn shift lever into correct position and counter-lock with hex. nut.

17 Force shift lever sleeve into bead of recess in cover.

18 Check gearshift for function with engine running.

Removal

1 Disconnect shift rods on levers of floor shift bearing bracket after removing SL-lock (Fig. 1).

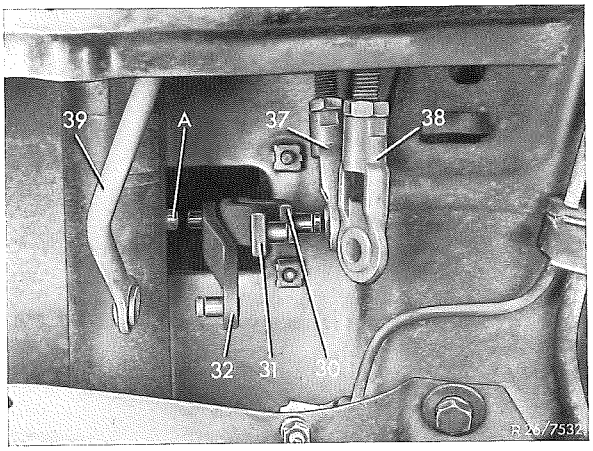


Fig. 1

A Locating pin
30 Intermediate shift lever 1st and 2nd speed
31 Intermediate shift lever 3rd and 4th speed
32 Intermediate shift lever 5th and reverse speed
37 Shift rod 1st and 2nd speed
38 Shift rod 3rd and 4th speed
39 Shift rod 5th and reverse speed

2 Remove ashtray and cover (Fig. 2).

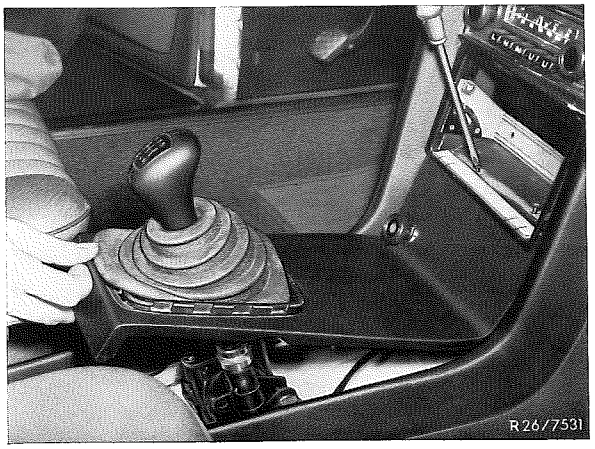


Fig. 2

3 Loosen backup light switch (26) on bearing cap of shift bracket, but do not screw out (Fig. 3).

4 Unscrew fastening screws from shift bracket (Fig. 3).

5 Remove shift bracket with gasket (44) (Fig. 4).

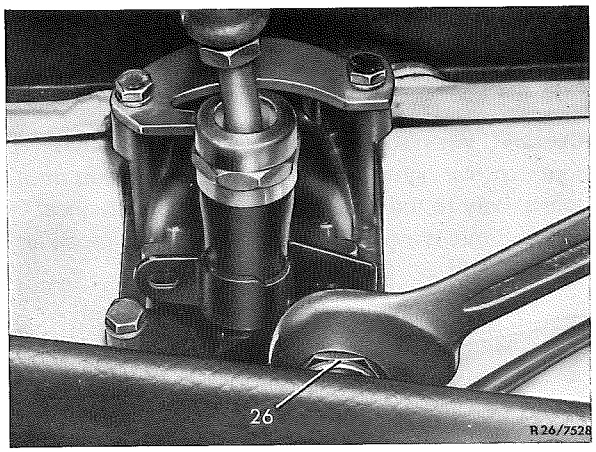


Fig. 3

26 Backup light switch

Caution! When removing shift bracket, make particularly sure that tunnel cover is not damaged.

6 Unscrew backup light switch manually (Fig. 4).

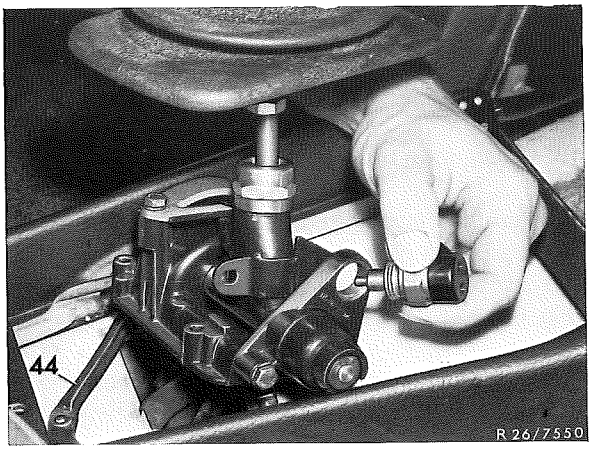


Fig. 4

44 Gasket

Installation

7 Place gasket on shift bracket and insert fastening screws.

8 Screw backup light switch into bearing cap of shift bracket (Fig. 4).

9 Introduce shift bracket with gasket and fastening bolts carefully through tunnel cover and screw down (Fig. 3 and 4).

Caution! When screwing down shift bracket, make sure that rear righthand fastening screw projects into tunnel only to the extent that a minimum distance „a" of 8 mm is available between screw and propeller shaft (Fig. 5).

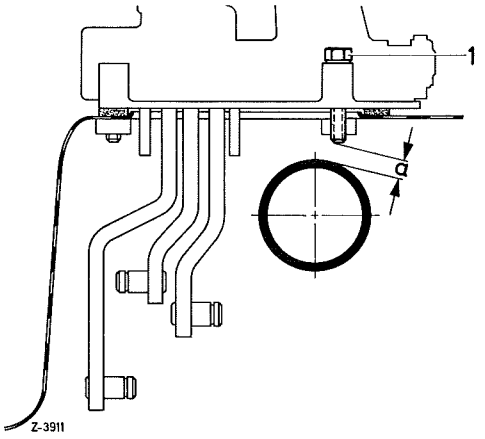


Fig. 5

a Distance from propeller shaft at least 8 mm

10 Screw down backup light switch (Fig. 3).

11 Push shift lever into 5th speed flat and check distance between contact pin of backup light switch and contact plate. Distance should be 1.5 mm (Fig. 6).

Increase distance „a" by adding washers on backup light switch or decrease by pertinent refinishing of contact plate.

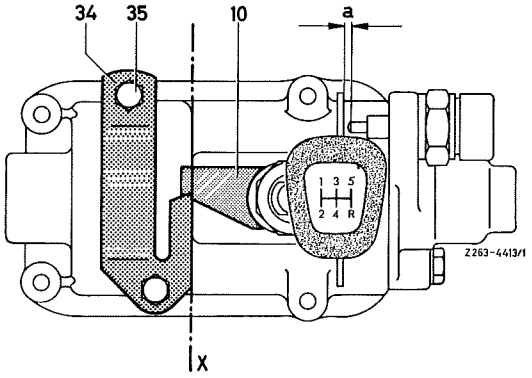


Fig. 6

„a" = 1.5 mm adjusting dimension for contact pin of back-up light switch, when stop plate (34) and stop finger (10) are in alignment along line „X"
„X" Straight line between stop plate and stop finger
10 Shift tube with stop finger
34 Stop plate
35 Fastening screw

12 Install cover and insert ashtray (Fig. 2).

13 Check adjustment of gearshift (26.2–610).

14 Push shift rods on pins of intermediate shift levers and secure with SL-locks (Fig. 1).

15 Check gearshift for function with engine running.

Lubricant

for example Longterm 2	refer to pertinent instructions on page 266.2

Special Tools

Special wrench for octagon nut on shift lever	115 589 00 03 00

Disassembly

1 Remove floor shift (26.2–630).

2 Remove shift lever (26.2–620).

3 Turn guide journal (13) by 180° (Fig. 1). Push-out lock (23) on bearing cap (21) with screw driver and remove together with washers (22) (Fig. 2).

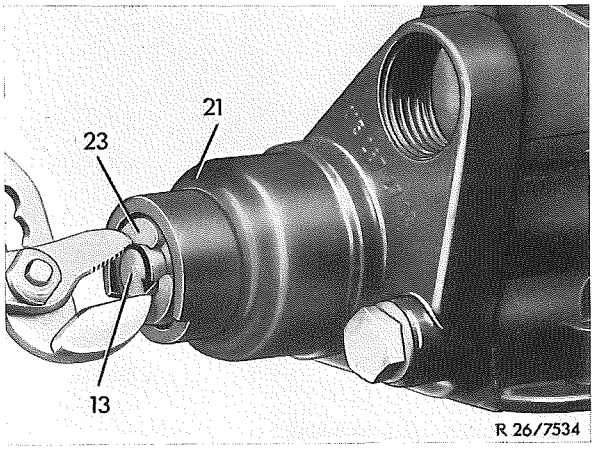


Fig. 1

13 Guide journal
21 Bearing cap
23 Lock

4 Unscrew fastening screws (24) of bearing cap (21) (Fig. 2). Pull bearing cap, as well as guide ring (19) and fitted washer (18) from guide journal (Fig. 3).

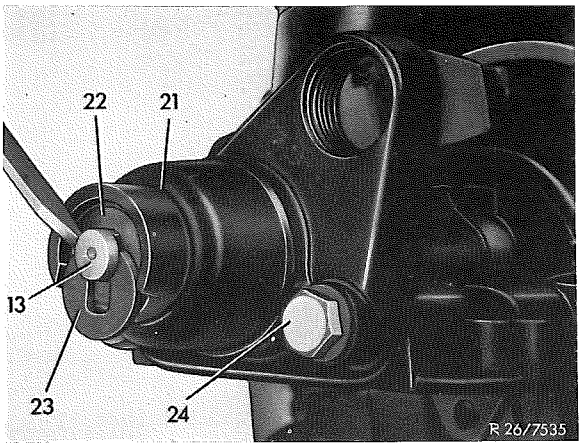


Fig. 2

13 Guide journal
21 Bearing cap
22 Washer
23 Lock
24 Hex. screw

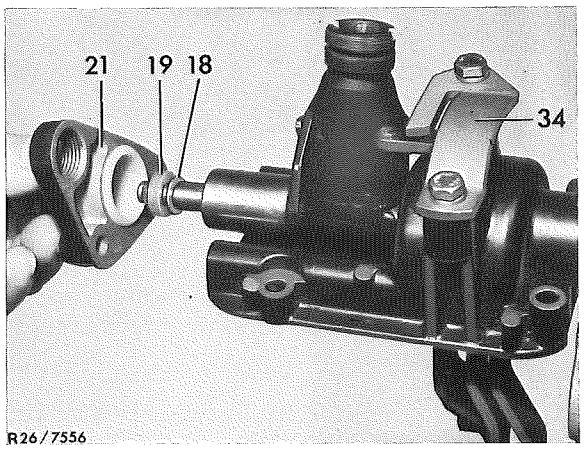


Fig. 3

18 Fitted washer
19 Guide ring
21 Bearing cap
34 Stop plate

5 Force guide ring (19) in bearing cap and bushing (20) out of bearing cap by means of screw driver (Fig. 4).

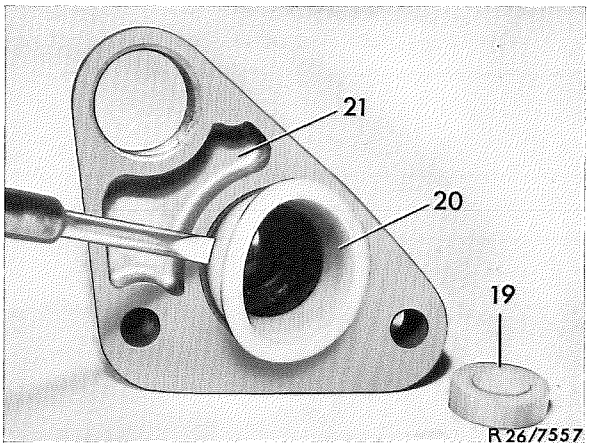


Fig. 4

19 Guide ring
20 Bushing
21 Bearing cap

6 Unscrew stop plate (34) from bearing bracket (Fig. 3).

7 Insert locating pin into intermediate levers (Fig. 15).

8 Pull shift tube (10) complete with guide journal (13) out of bearing bracket (9) by hand (Fig. 5).

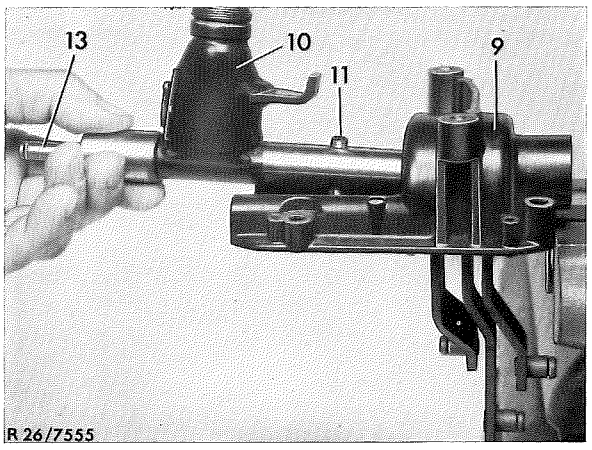


Fig. 5

9 Bearing bracket
10 Shift tube
11 Pin (in shift tube)
13 Guide journal

9 Pull pin (11) out of shift tube (Fig. 6).

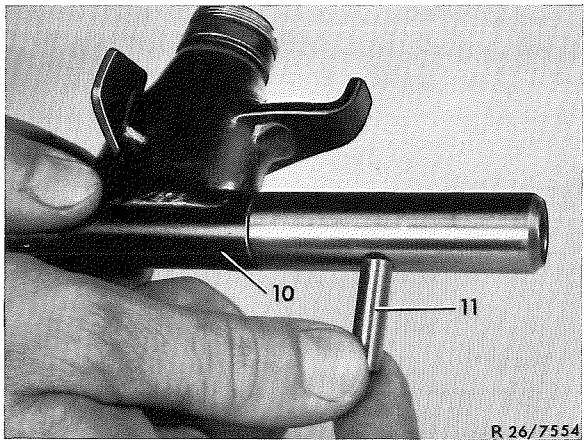


Fig. 6

10 Shift tube
11 Pin (in shift tube)

10 Push guide journal (13) into shift tube and remove locking ring (17) with locking pliers (Fig. 7).

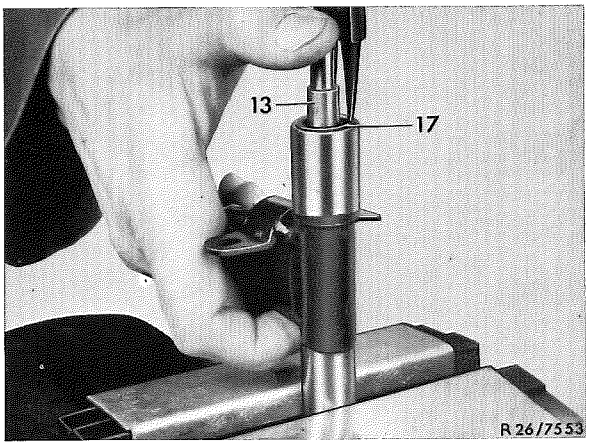


Fig. 7

13 Guide journal
17 Locking ring

11 Remove guide journal (13) from shift tube (Fig. 8).

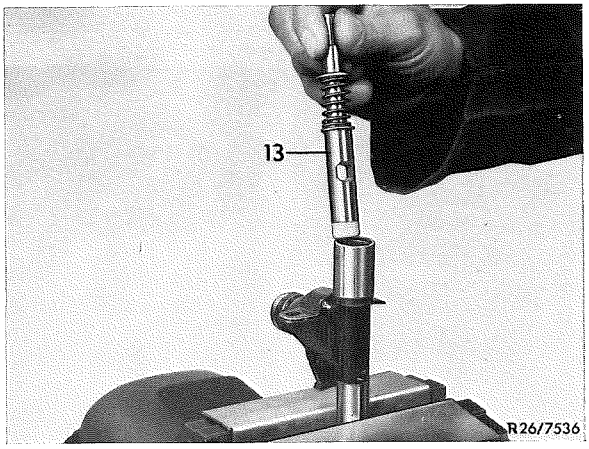


Fig. 8

13 Guide journal

12 Compress compression spring (15) on guide journal and remove locking ring (16) with pertinent pliers (Fig. 9).

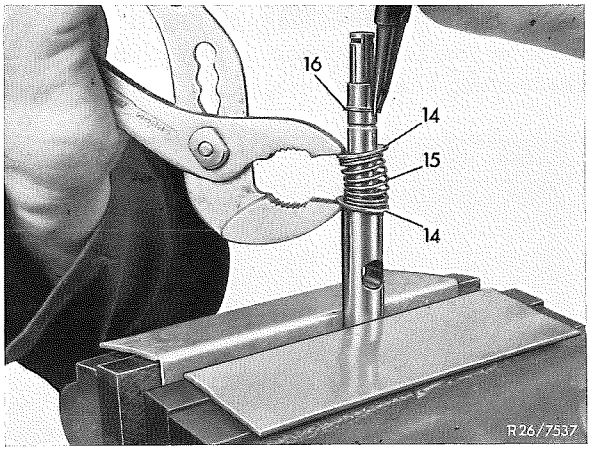


Fig. 9

14 Washer
15 Compression spring
16 Locking ring

13 Remove washers (14), compression spring (15) and bushing (12) from guide journal (13) (Fig. 10).

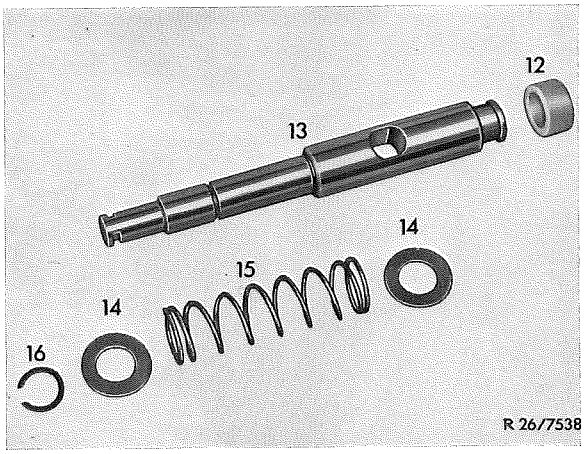


Fig. 10

12 Bushing
13 Guide journal
14 Washer
15 Compression spring
16 Locking ring

14 Pull locating pin out of intermediate lever.

15 Remove released intermediate levers (30, 31 and 32) as well as spring washer (28) and washer (29) out of bearing bracket (Fig. 11).

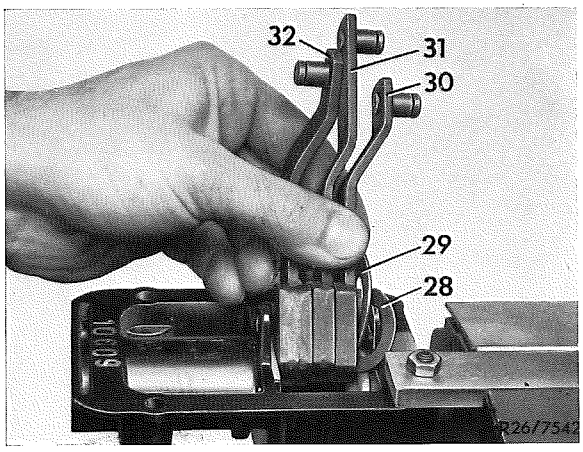


Fig. 11

28 Spring washer
29 Washer
30 Intermediate lever for 1st and 2nd speed
31 Intermediate lever for 3rd and 4th speed
32 Guide lever for 5th and reverse speed

16 Remove plastic disc (33) for shift tube manually from bearing bracket (Fig. 12).

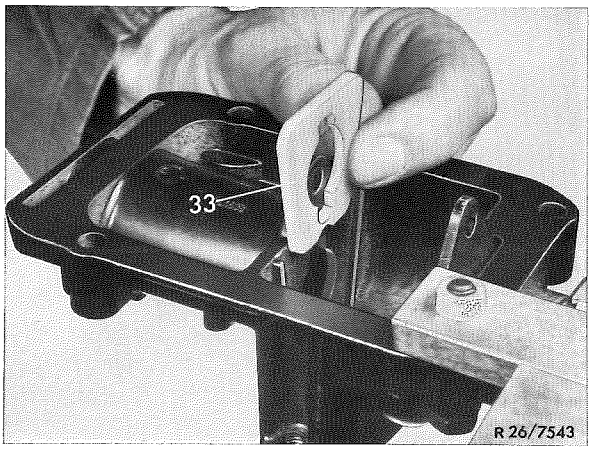


Fig. 12

33 Plastic disc for shift tube

17 Force plastic bushing (27) out of bearing bracket by means of screw driver (Fig. 13).

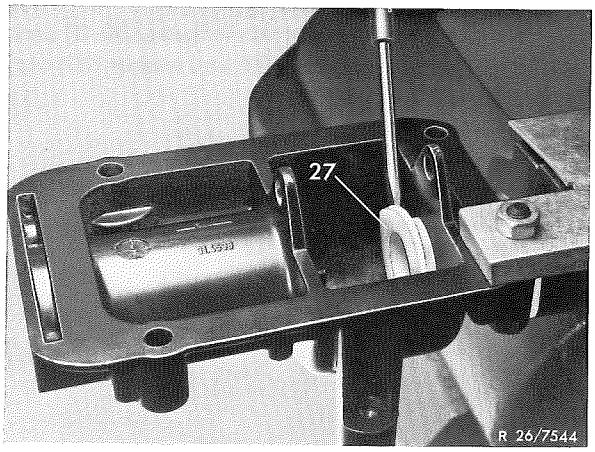


Fig. 13

18 Check all parts for wear or condition and remove, if required.

Assembly

19 Insert plastic bushing (27) manually into bearing bracket (Fig. 14).

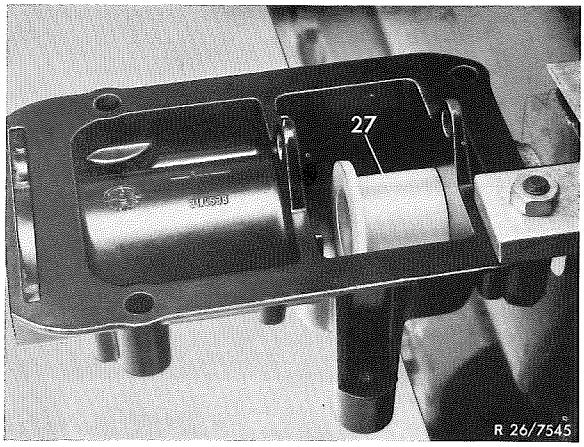


Fig. 14

20 Insert plastic disc (33) into bearing bracket (Fig. 12).

21 Introduce intermediate levers (30, 31 and 32) together into bearing bracket and hold in position by inserting locating pin (Fig. 15).

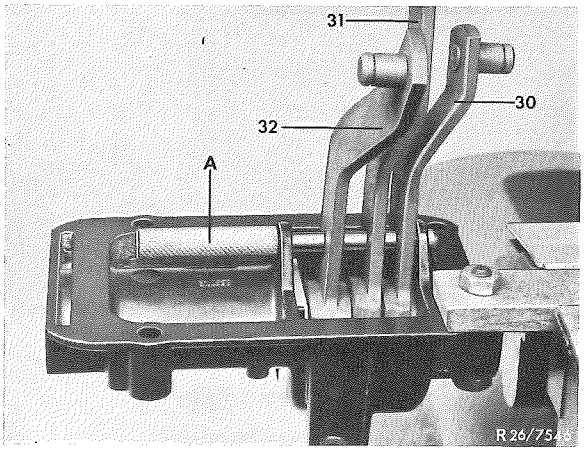


Fig. 15

A Locating pin
30 Intermediate lever for 1st and 2nd speed
31 Intermediate lever for 3rd and 4th speed
32 Intermediate lever for 5th and reverse speed

22 Push spring washer (28) and washer (29) into bearing bracket in such a manner that spring washer (28) is facing collar of plastic bushing (Fig. 16).

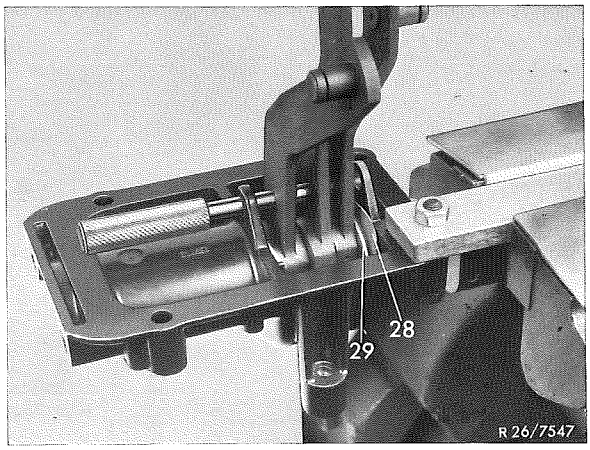


Fig. 16

28 Spring washer 29 Washer

23 Align intermediate levers (30, 31 and 32), as well as spring washer (28) and washer (29) by sliding shift tube into bearing bracket. Then pull shift tube out again (Fig. 17).

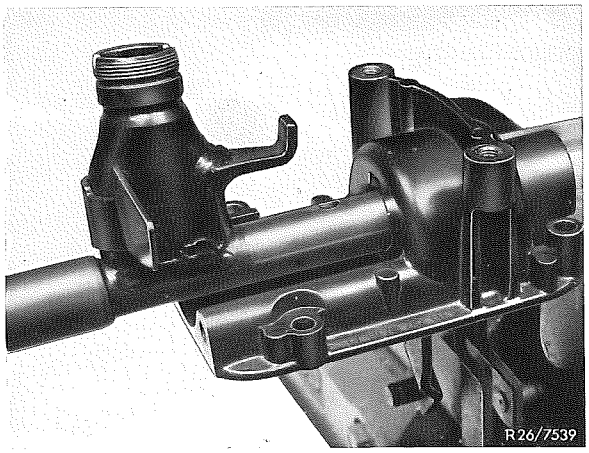


Fig. 17

24 Place washers (14) and compression spring (15) on guide journal, compress compression springs and insert locking ring (16) by means of pertinent pliers (Fig. 9).

25 Place bushing (12) on guide journal (Fig. 10).

26 Push guide journal (13) into shift tube (Fig. 7).

27 Insert locking ring (17) into shift tube by means of pertinent pliers (Fig. 7).

28 Insert pin (11) into shift tube (Fig. 6).

29 Introduce shift tube (10) into bearing bracket (9) and pull locating pin out of intermediate levers (Fig. 18).

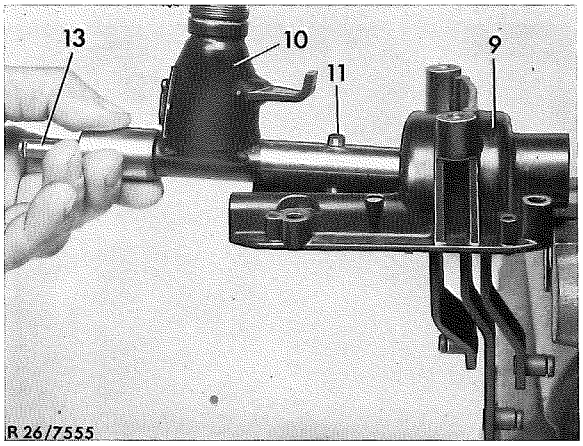


Fig. 18

30 Screw stop plate (34) to bearing bracket (Fig. 3).

31 Push plastic bushing (20) and 1st guide ring manually into bearing cap (Fig. 4 and 19).

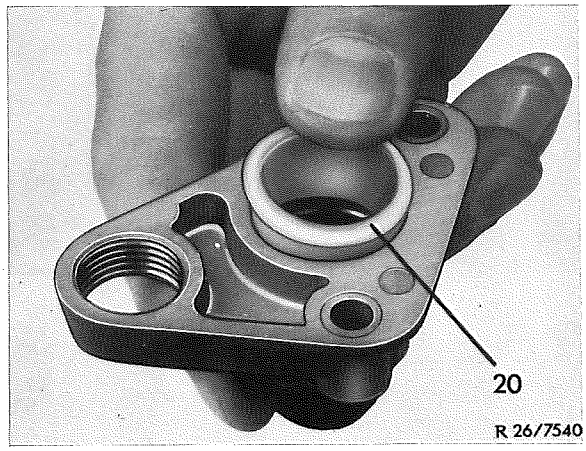


Fig. 19

32 Place fitted washer (18) and 2nd guide ring (19) on guide journal (Fig. 3).

33 Slide complete bearing cap on guide journal and screw to shift bracket.

34 Turn guide journal with pliers in such a manner that locking ring can be pushed from below into groove. Add compensating washers (22), so that locking ring can be inserted at a tight fit only. Force-in locking ring by means of pliers (Fig. 20 and 21).

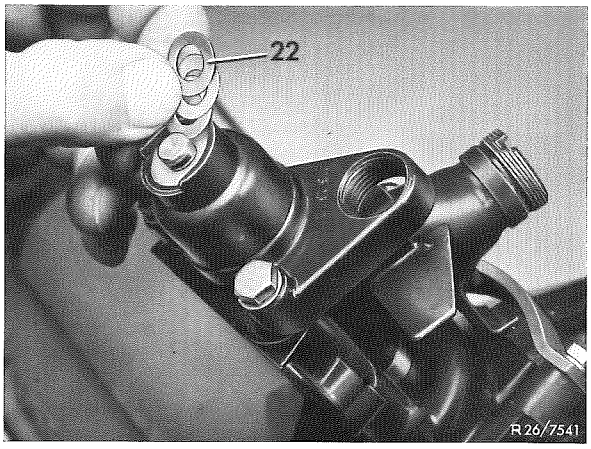


Fig. 20

22 Washer

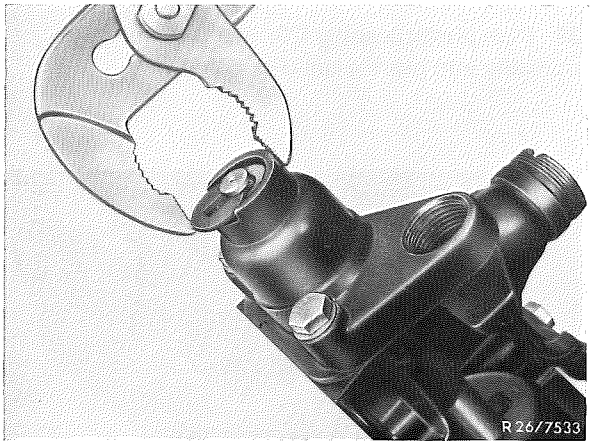


Fig. 21

35 Secure locking ring against slipping out by turning guide journal by 180° (Fig. 22).

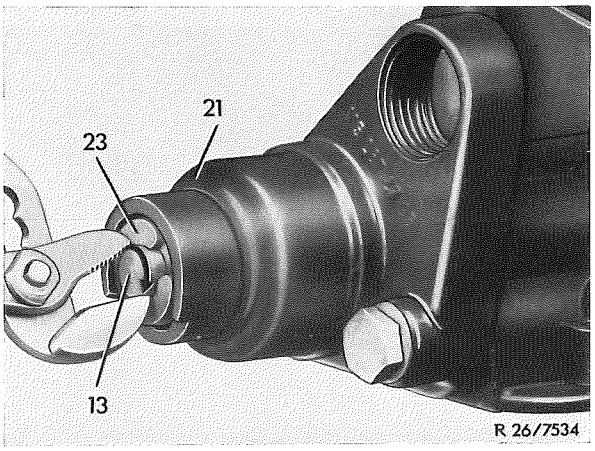


Fig. 22

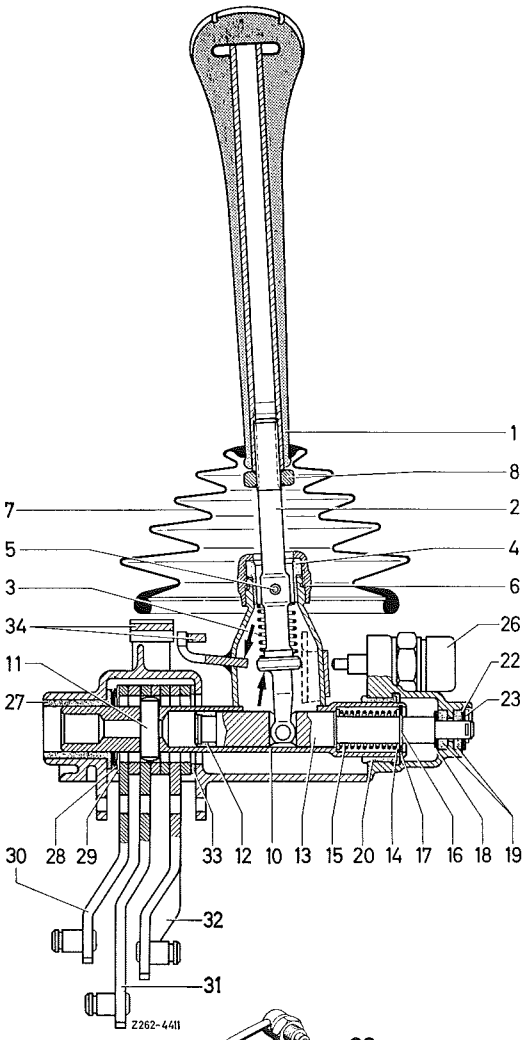
13 Guide journal
21 Bearing cap
23 Lock

36 Install shift lever (26.2–620).

37 Install floor-mounted gearshift (26.2–630).

38 Adjust floor-mounted gearshift (26.2–610).

39 Check floor-mounted gearshift for function with engine running.



1 Shift lever handle
1a Shift lever knob (1st version)
2 Shift lever
2a Shift lever (1st version)
3 Compression spring
4 Bushing
5 Set sleeve
6 Closing cap
7 Sleeve for shift lever
8 Nut
9 Bearing bracket
10 Shift tube
11 Pin (in shift tube)
12 Bushing (for guide journal)
13 Guide journal for shift tube
14 Washer
15 Compression spring
16 Locking ring
17 Locking ring
18 Fitted washer
19 Guide ring
20 Bushing
21 Bearing cap
22 Washer
23 Lock
24 Hex. bolt
25 Spring washer
26 Backup light switch with plug connection
27 Bushing
28 Spring washer
29 Washer
30 Intermediate lever for 1st and 2nd speed
31 Intermediate lever for 3rd and 4th speed
32 Intermediate lever for 5th and reverse speed
33 Washer for shift tube
34 Stop washer
35 Hex. screw
36 Snap ring
37 Shift rod for 1st and 2nd speed
37a Shift lever for 1st and 2nd speed
38 Shift rod for 3rd and 4th speed
38a Shift lever for 3rd and 4th speed
39 Shift rod half at shift end
39a Shift lever for 5th and reverse speed
39b Shift rod half at transmission end
39c Hex. nut
40 Rod head
41 Hex. nut
42 Bushing
43 SL-lock
44 Gasket

