

Workshop Manual OCTAVIA

5-Speed Manual Gearbox 002

List of Supplements to **OCTAVIA** Workshop Manual

Edition: 09.00

5-Speed Manual Gearbox 002

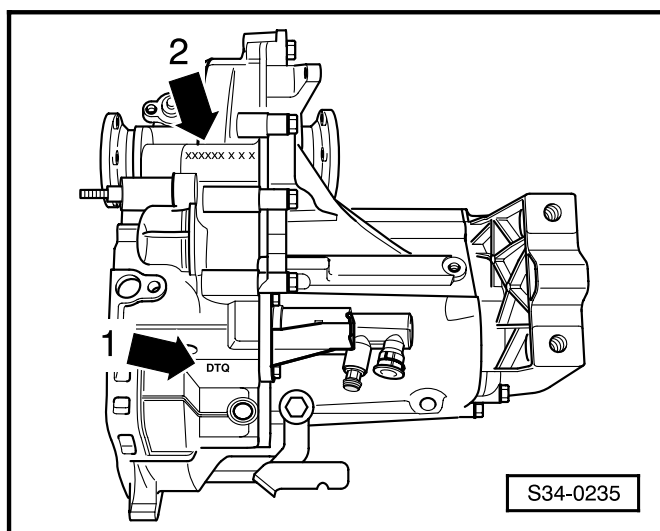
Replaces List of Supplements - Edition: 04.99

Supplement	Edition	Subject	Article Number
	04.99	Basic Edition of Workshop Manual	S00.5129.50.20
1	09.00	Supplement to Basic Edition	S00.5129.51.20
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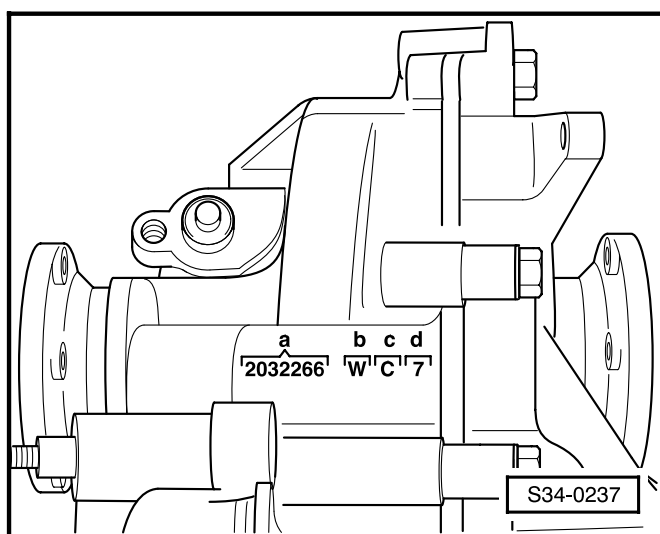
Identification of gearbox

Location on gearbox

The manual gearbox 002 is installed as a 5-speed gearbox in combination with the 1.4-ltr./44 kW engine in the Škoda Octavia.

Code letters of gearbox (arrow 1)

Date of construction of gearbox (arrow 2)



Date of construction of gearbox

a = Production number of gearbox

b = Identification of year of manufacture

Character	Year	Character	Year
T	1996	1	2001
V	1997	2	2002
W	1998	3	2003
X	1999	4	2004
Y	2000	5	2005

c = Month of manufacture

Character	Month	Character	Month
L	January	C	July
U	February	S	August
B	March	Z	September
D	April	R	October
K	May	T	November
N	June	P	December

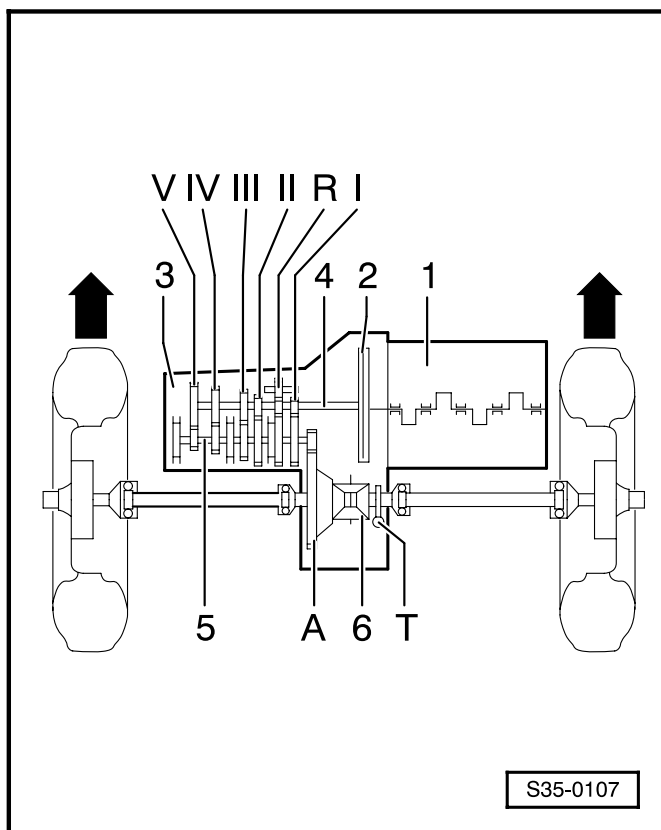
d = Gearbox ratio

Character	Transmission ratio of final drive
7	4.235

Code letters, component assignment, transmission ratios, capacities

Code letters		DTQ	FHW
Manufactured	from to	01.99 08.00	09.00
Assignment:	Engine	1.4-ltr./44 kW	1.4-ltr./44 kW
Transmission ratio:	Final drive	72 : 17 = 4.235	72 : 17 = 4.235
	1st gear	45 : 13 = 3.462	45 : 13 = 3.462
	2nd gear	45 : 23 = 1.957	45 : 23 = 1.957
	3rd gear	38 : 28 = 1.357	38 : 28 = 1.357
	4th gear	40 : 38 = 1.053	40 : 38 = 1.053
	5th gear	36 : 42 = 0.857	36 : 42 = 0.857
	Reverse	29 : 13 x 38 : 29 = 2.923	29 : 13 x 38 : 29 = 2.923
	Speedo	16 : 27 = 0.593	16 : 27 = 0.593
Capacity		2.4 ltr.	2.4 ltr.
Gear oil specification		Gear oil G50 SAE 75W90 (synthetic oil)	Gear oil G50 SAE 75W90 (synthetic oil)
Gear oil change interval		filled for life	filled for life
Clutch control		hydraulic	hydraulic
Clutch plate Ø		190 mm	190 mm
Drive shaft flange Ø		90 mm	90 mm

Survey of power transmission



Designation

- 1 - Engine
- 2 - Clutch
- 3 - Manual gearbox
- 4 - Input shaft
- 5 - Output shaft/drive pinion
- 6 - Differential

Arrows indicate direction of travel

Ratio

- I - 1st gear
- II - 2nd gear
- III - 3rd gear
- IV - 4th gear
- V - 5th gear
- R - Reverse
- A - Final drive
- T - Speedometer drive

General repair information

Extreme care and scrupulous cleanliness, as well as proper tools are essential requirements for conducting proper and successful repairs to the gearbox. The general applicable basic rules of safety naturally also apply to repair work.

A number of general applicable notes for individual repair operations - which are otherwise listed at various points in the workshop manual - are summarized here. They apply to this workshop manual.

Gearbox

- ◆ When installing, ensure the dowel sleeve between engine and gearbox are correctly located.
- ◆ If the gearbox is replaced, pour in gearbox oil up to the lower edge of the filler hole.
- ◆ Capacity and specification ⇒ page 00-2.

Seals, gaskets

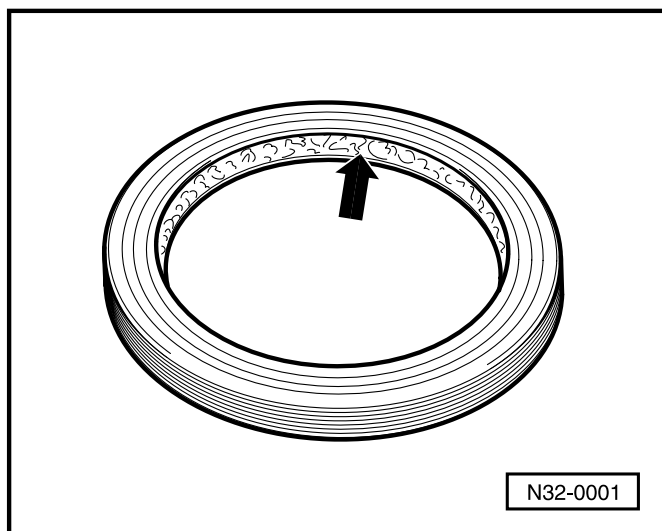
- ◆ Thoroughly clean contact surfaces and apply THREE BOND 1104 sealant.
- ◆ Apply sealant evenly - not too thick.
- ◆ Replace O-rings.
- ◆ Replace radial shaft seals.

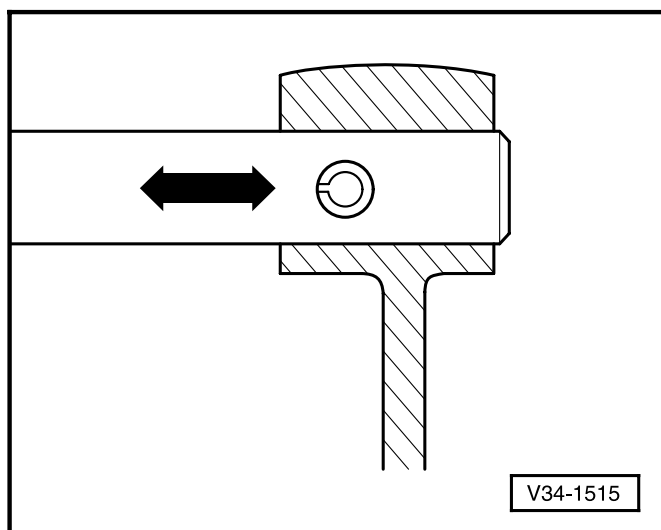
Before installing:

- ◀ Lightly oil outer diameter and pack space between sealing lips (arrow) with grease.

After installing:

Inspect gear oil level; top up if necessary to lower edge of filler hole. Specification ⇒ page 00-2.



**Locking elements**

- ◆ Replace circlips.
- ◆ Do not over-tension circlips.
- ◆ Circlips must be resting in the base of the slot.
- ◆ Replace roll pins.
Installation position: slot lengthwise to power flow.

Nuts, bolts

- ◆ Slacken and tighten nuts and bolts for attaching covers and the housings diagonally across.
- ◆ Do not twist particularly sensitive parts - for example clutch pressure plates - and slacken and tighten in stages diagonally across.
- ◆ The tightening torques apply to non-oiled nuts and bolts.
- ◆ Always replace self-locking nuts and bolts.

Bearings

- ◆ Insert all bearings in the gearbox with gear oil.
- ◆ Always replace all the tapered roller bearings mounted on a shaft. Use the same makes if possible!
- ◆ Heat inner races to about 100 °C for installing.
- ◆ Do not mix up the outer and inner races of bearings of the same size. Bearings are matched.
- ◆ Position needle bearing with the inscribed side (larger metal thickness) facing the insertion drift.

Shims

- ◆ Re-gauge shims at several points with a micrometer. Different tolerances make it possible to exactly gauge the required thickness of shim.
- ◆ Inspect for burrs or damage.
- ◆ Install only shims which are in perfect condition.

Synchronizer rings

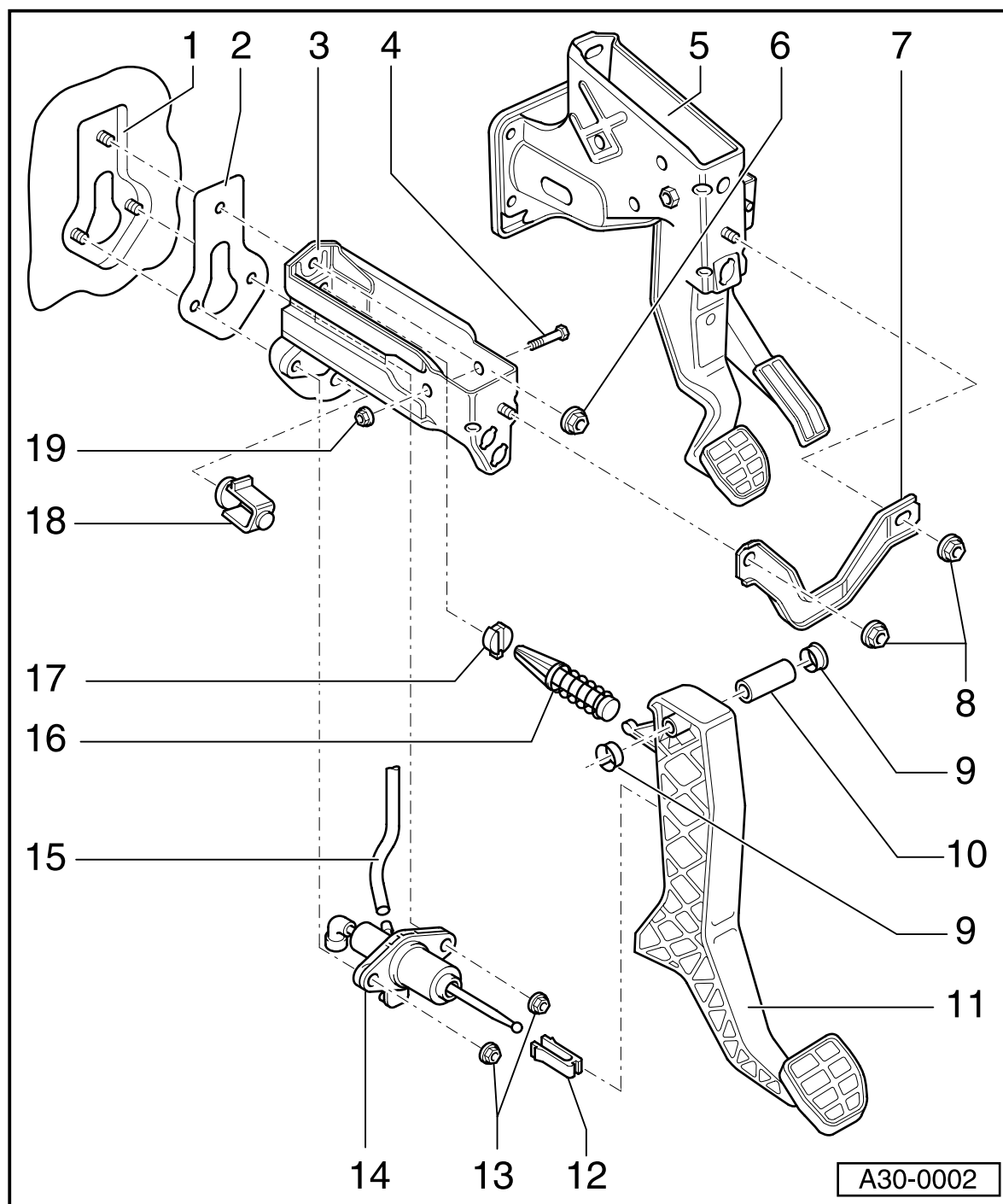
- ◆ Do not mix up. Assign synchronizer rings to the same gear when re-installing.
- ◆ Inspect for wear, replace if necessary.
- ◆ Insert with gear oil.

Gearwheels

- ◆ Clean and heat on a hot plate to approx. 100 °C before pressing on.
- ◆ The temperature can be checked with a temperature measuring instrument (e.g. V.A.G 1558).

Servicing clutch mechanism

Summary of components of pedal assembly



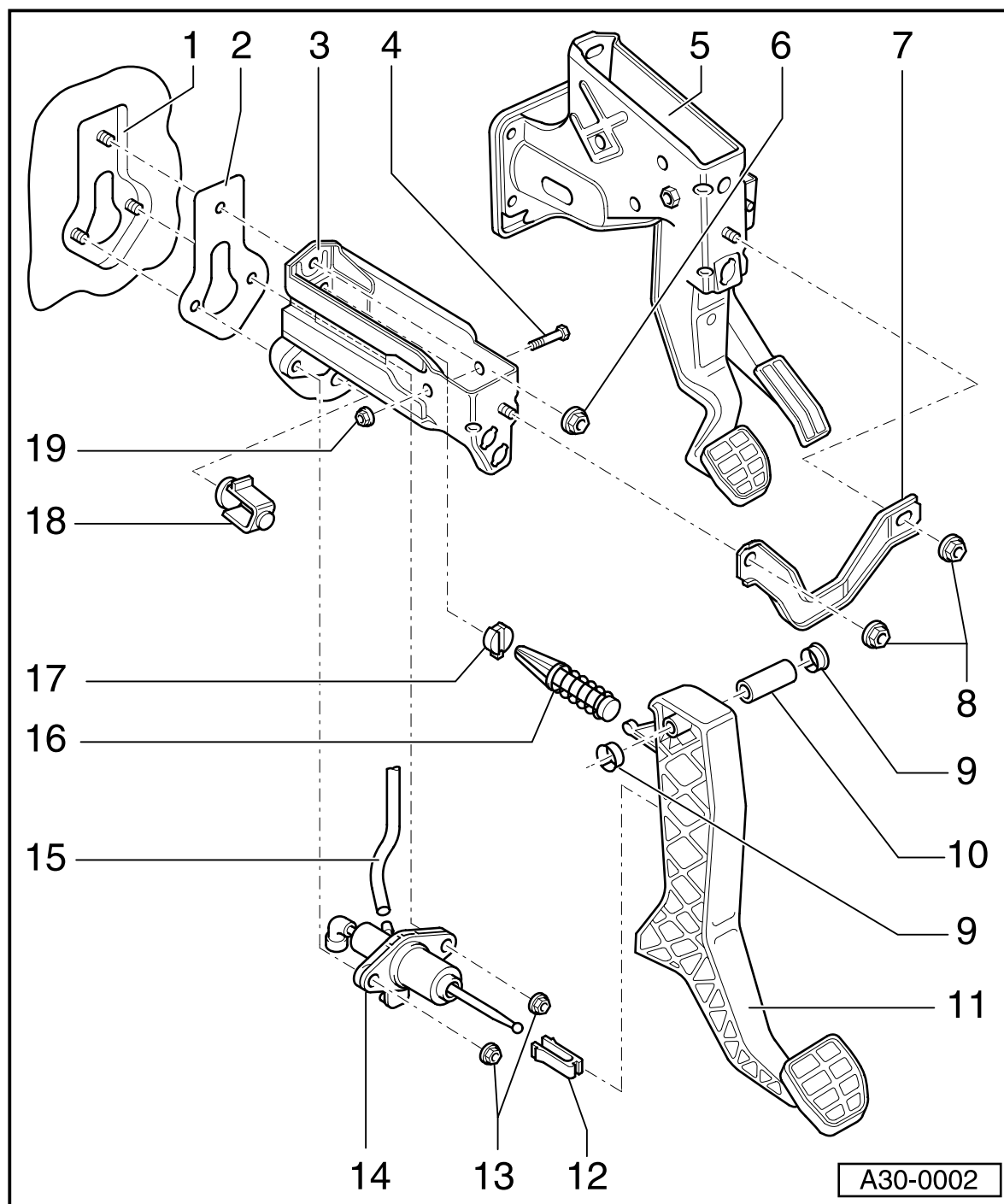
Special tools, testers and aids required

- ◆ Poly resin grease G 052 142 A2

Notes:

- ◆ Summary of components of hydraulic system ⇒ page 30-5.
- ◆ Disconnect earth strap of battery.
- ◆ Before disconnecting the battery, determine the coding of radio set fitted with anti-theft coding.
- ◆ When the battery is re-connected, check the vehicle equipment:
 - Encode radio
 - Re-set clock
 - Initialise power windows

⇒ Inspection and Maintenance



♦ Coat all bearing and contact surfaces with poly resin grease G 052 142 A2.

♦ Before carrying out work on the pedal assembly, remove storage compartment on driver's side:

⇒ Body Fitting Work; Repair Group 70; Removing and installing dash panel.

1 - Mount at bulkhead

- ♦ For master cylinder and bearing bracket

2 - Gasket

- ♦ Always replace

3 - Bearing bracket

4 - Bolt

5 - Accelerator/brake pedal assembly

6 - 25 Nm

- ♦ Always replace

7 - Connecting plate

8 - 20 Nm

- ♦ Always replace

9 - Spacer bush

10 - Bearing bush**11 - Clutch pedal**

- ◆ Removing and installing
⇒ page 30-4

12 - Mount

- ◆ Removing and installing
⇒ page 30-5

13 - 25 Nm

- ◆ Always replace

14 - Master cylinder

- ◆ Removing and installing
⇒ page 30-6

15 - Feed hose**16 - Overcentre spring**

- ◆ Removing and installing
⇒ page 30-3

17 - Mounting of overcentre spring

- ◆ Insert into bearing bracket
- ◆ Always replace

18 - Pedal stop**19 - 25 Nm**

- ◆ Always replace

Removing and installing overcentre spring

Special tools, testers and aids required

- ◆ Assembly clip 3317

Removing

- Remove storage compartment at bottom left on driver side:
⇒ Body Fitting Work; Repair Group 70; Removing and installing dash panel.
- ◀ - Tension overcentre spring with clutch pedal and press on assembly clip 3317 from above.

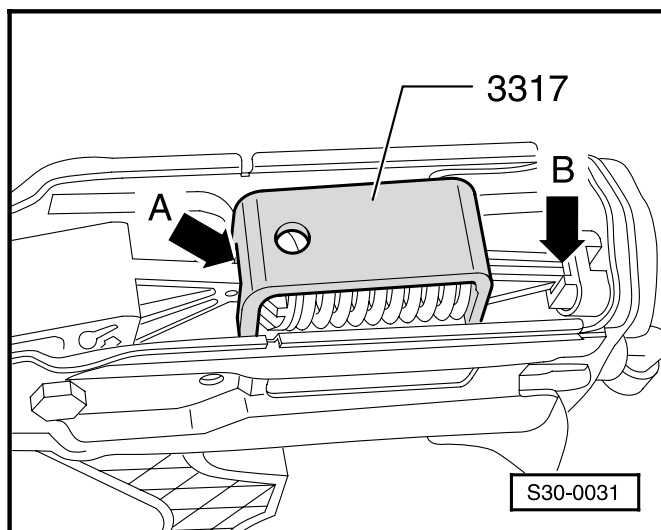
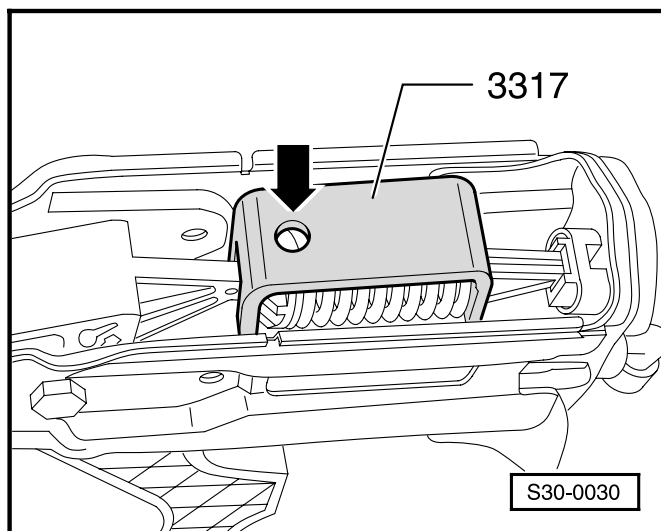
Note:

The hole (arrow) points toward clutch pedal.

- Move clutch pedal into rest position; at the same time, take off overcentre spring together with assembly clip 3317.

Installing

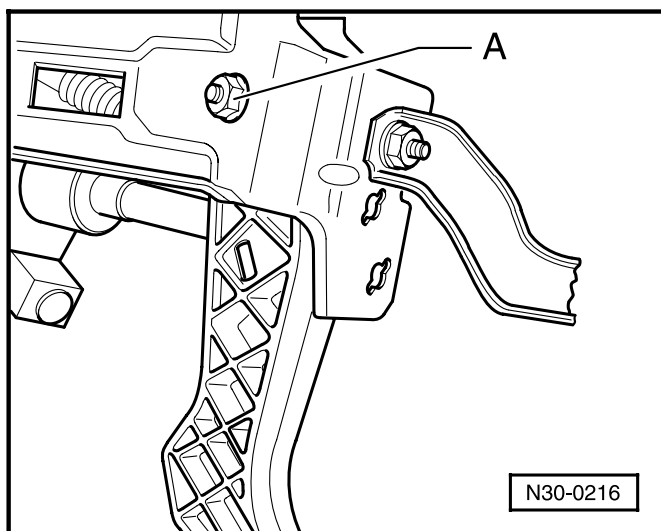
- Move clutch pedal into rest position.
- ◀ - First of all, position overcentre spring in mount -B- then depress clutch pedal fully until the locating stud of the clutch pedal -A- is positioned against overcentre spring.
- Tension overcentre spring with the clutch pedal and take off assembly clip 3317.



Removing and installing clutch pedal

Removing

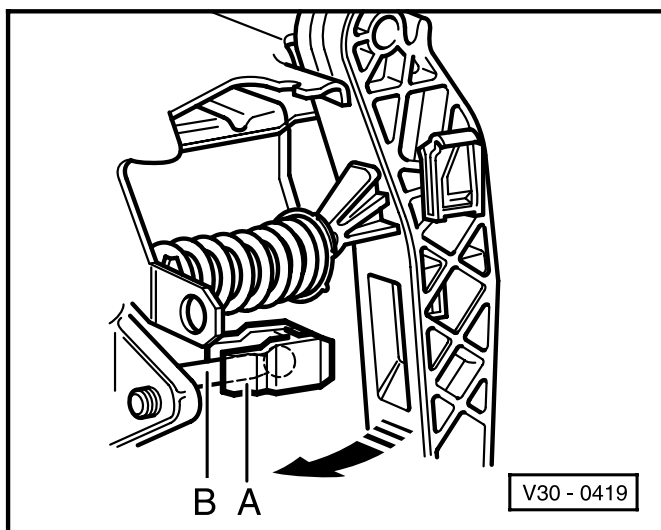
- Remove overcentre spring ⇒ page 30-3.
- Separate clutch pedal from master cylinder ⇒ page 30-6 and press operating rod as far as the stop toward engine compartment.
- ◀ - Unscrew hexagon nut -A- and pull hexagon bolt out of the bearing bracket.
- Remove clutch pedal.



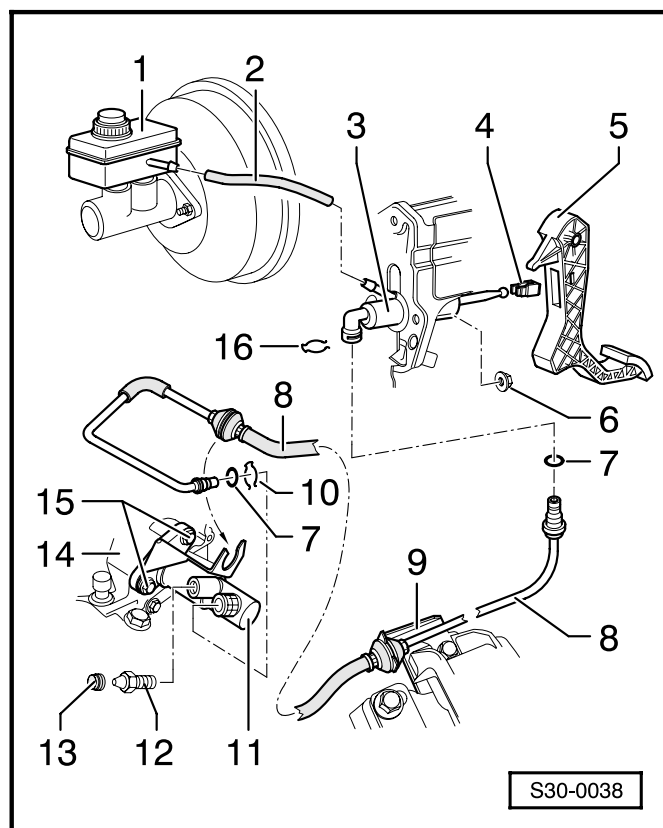
Installing

Installation is carried out in the reverse order. Pay attention to the following points:

- ◀ - The mount -A- must be located on the operating rod -B- of the master cylinder.
- To lock the mount in place, press clutch pedal toward bulkhead (direction of arrow); ensure it is correctly locked.



Summary of components of hydraulic system



1 - Brake fluid reservoir

2 - Feed hose

3 - Master cylinder

- ◆ Removing and installing
⇒ page 30-6

4 - Mount

- ◆ Replace only if master cylinder removed
- ◆ Removing ⇒ Fig. 1
- ◆ Pressing on ⇒ Fig. 2

5 - Clutch pedal

- ◆ Removing and installing
⇒ page 30-4

6 - 25 Nm

- ◆ Always replace

7 - O-rings

- ◆ Cannot be replaced
- ◆ If O-ring is damaged, complete pipe-hose line must be replaced

8 - Pipe-hose line

- ◆ Assign by referring to Parts List

9 - Bracket

- ◆ Attach to gearbox mount

10 - Securing clip

- ◆ Removing ⇒ page 30-6

11 - Slave cylinder

- ◆ To remove, unscrew collar bolts (item 15) and pull off securing clip (item 10)
- ◆ After installing, bleed clutch system
⇒ page 30-8

12 - Bleeder valve

- ◆ Bleeding clutch system ⇒ page 30-8

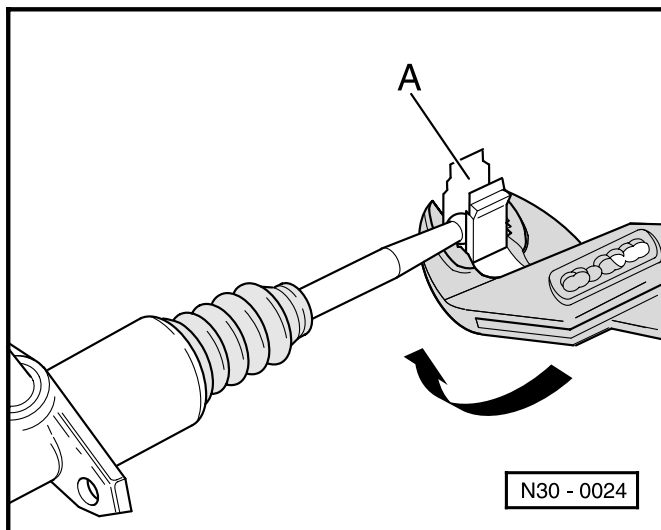
13 - Dust cap

14 - Gearbox

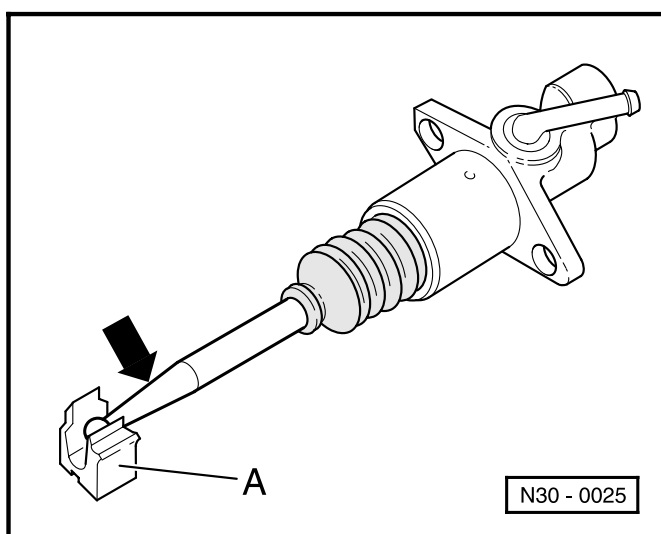
15 - 25 Nm

16 - Securing clip

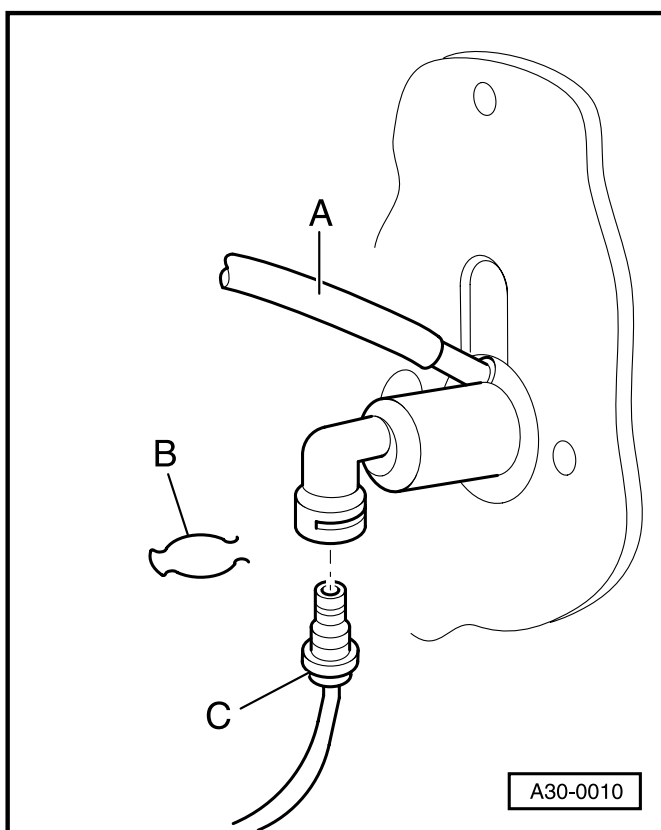
- ◆ Removing ⇒ page 30-6



◀ Fig. 1 Levering off mount -A- in direction of arrow



◀ Fig. 2 Pressing operating rod of master cylinder into mount -A- (direction of arrow)



Removing and installing master cylinder

Special tools, testers and aids required

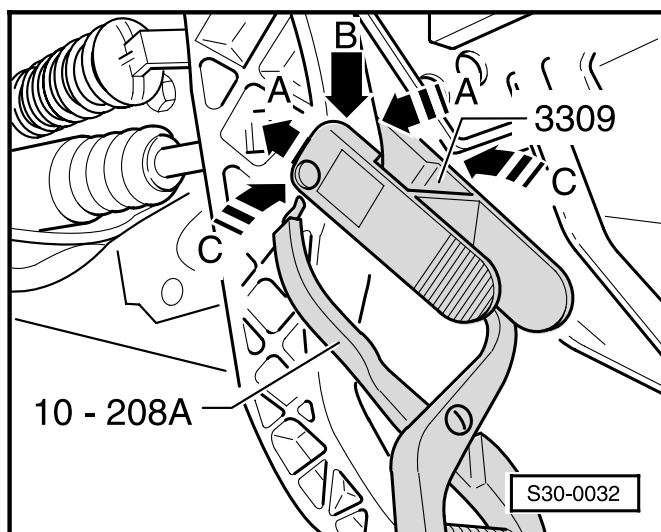
- ◆ Release tool 3309
- ◆ Pliers 10-208 A

Removing

Note:

Unbolt master cylinder by working from the passenger compartment.

- ◀ - Detach feed hose -A- to the brake fluid reservoir and seal.
- Pull out locking clip -B- at master cylinder.
- Pull out pipe -C- at master cylinder and seal.



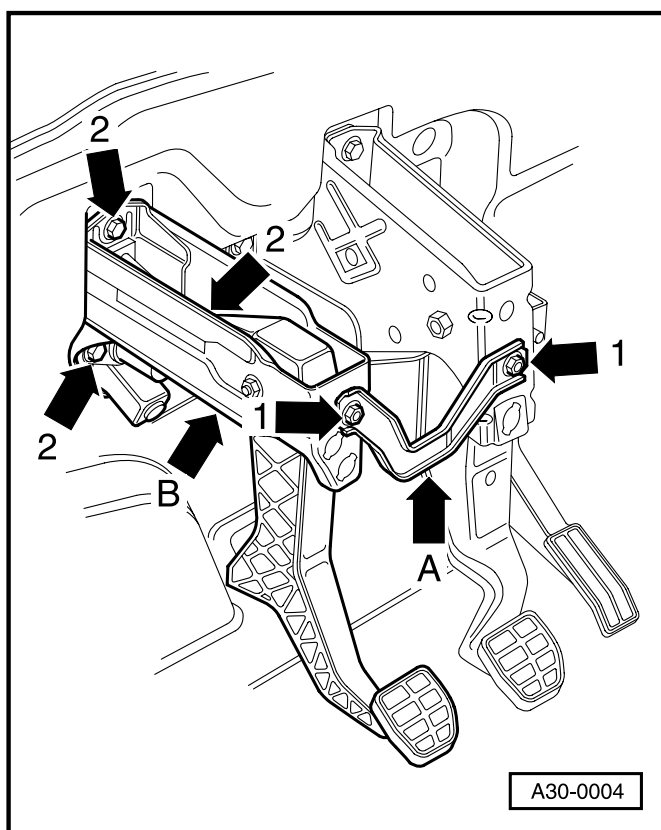
- Remove storage compartment at bottom left on driver side:
⇒ Body Fitting Work; Repair Group 70; Removing and installing dash panel.

Note:

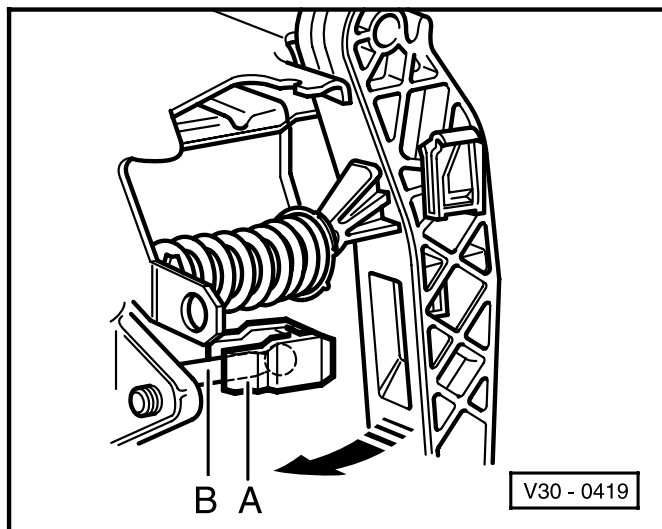
To remove the master cylinder, take out the complete clutch pedal assembly. Before removing, however, the master cylinder must be separated from the clutch pedal.

◀ Release operating rod of master cylinder from clutch pedal as follows:

- Insert release tool 3309 into the recesses of the clutch pedal (arrows A) for releasing the rod. The inscription "top/oben" (arrow B) is pointing toward the dash panel.
- Insert pliers 10-208 A into the recesses -arrows C- and in this way compress release tool 3309. Pull clutch pedal toward passenger compartment and in this way separate from master cylinder.



- ◀ - Unscrew hexagon nuts -arrows 1- and take off connecting plate -arrow A-.
- Unscrew hexagon nuts -arrows 2- and remove complete clutch pedal assembly -arrow B- together with master cylinder.
- Remove overcentre spring ⇒ page 30-3.
- Rotate mounting of overcentre spring 90° and pull out ⇒ page 30-3, item 17.
- Take out master cylinder.



Installing

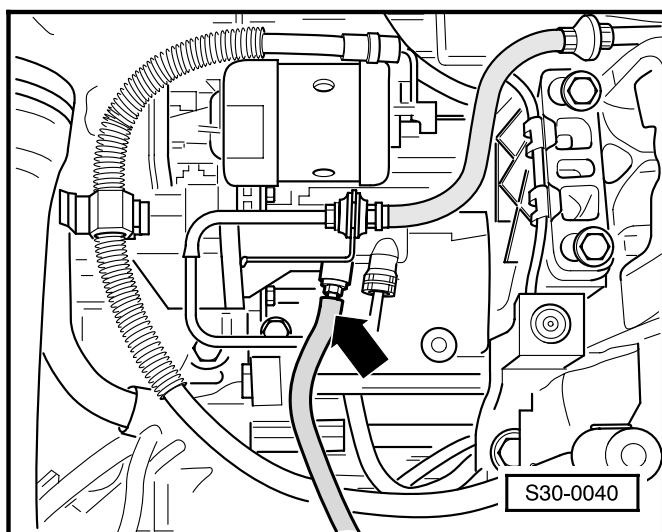
Installation is carried out in the reverse order. Pay attention to the following points:

- ◀ - The mount -A- must be positioned on the operating rod -B- of the master cylinder.
- To engage the mount in place, press clutch pedal toward bulkhead (direction of arrow); ensure it is correctly locked for this step.
- After installing the master cylinder, bleed clutch system ⇒ page 30-8.

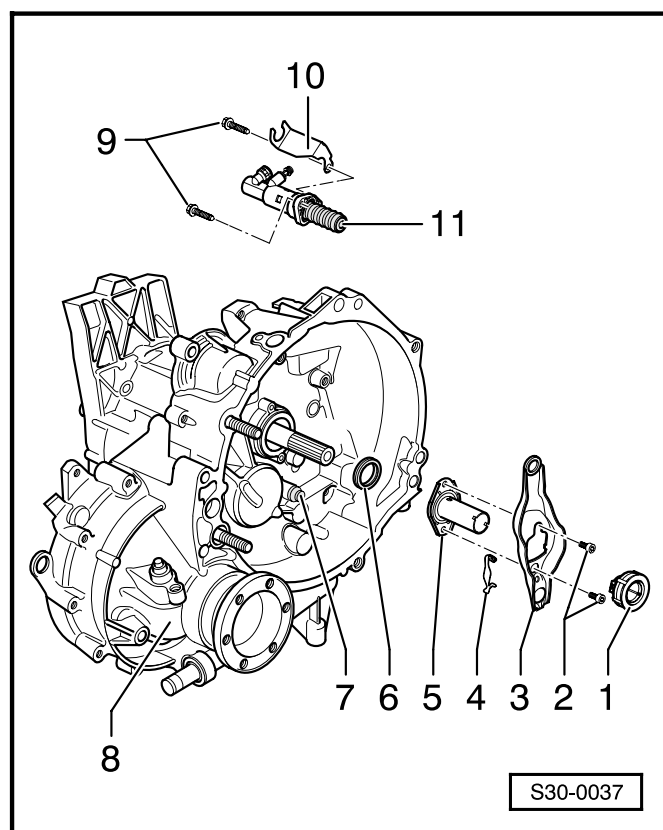
Bleeding clutch system

Special tools, testers and aids required

- ◆ Brake filling and bleeding appliance ROMESS S15
- ◆ Bleeder hose 670 mm
- Use the ROMESS S15 brake filling and bleeding appliance and bleed the clutch system.
- Use a 670 mm bleeder hose for bleeding the system.
- Fit the bleeder hose onto the connection of the bottle of the brake bleeding appliance.
- ◀ - Fit on bleeder hose at slave cylinder -arrow- and open bleeder valve.
- After completing the bleeding operation, depress the clutch pedal several times.



Servicing clutch release mechanism



Special tools, testers and aids required

- ◆ Tool for removing valve stem seal MP 1-174
- ◆ MoS₂ grease
- ◆ THREE BOND 1324 sealant

Note:

Remove and install release bearing -1- together with clutch release lever -3- and guide sleeve for release bearing -5- in order to avoid damaging the lugs on the release bearing.

1 - Release bearing

- ◆ Do not wash out bearing, only wipe off
- ◆ Replace loud bearings
- ◆ Grease contact points at release lever with MoS₂ grease
- ◆ Removing and installing ⇒ page 30-10; remove and install clutch release lever with release bearing and guide sleeve

2 - 10 Nm

- ◆ Apply THREE BOND 1324 sealant before installing

3 - Clutch release lever

- ◆ When replacing, release bearing must also be replaced (lugs on release bearing do not operate after bearing is removed from clutch release lever)
- ◆ Removing and installing ⇒ page 30-10; remove and install clutch release lever together with release bearing and guide sleeve

4 - Retaining spring

- ◆ Attach to clutch release lever

5 - Guide sleeve for release bearing

- ◆ Removing and installing ⇒ page 30-10; remove and install clutch release lever together with release bearing and guide sleeve
- ◆ Coat contact surface of release bearing with MoS₂ grease

6 - Input shaft seal

- ◆ Replacing ⇒ page 34-39, item 18

7 - Ball stud

- ◆ Grease with MoS₂ grease
- ◆ If clutch housing is replaced, knock in as far as the stop using extraction tool for valve stem seal MP 1-174

8 - Gearbox

9 - 25 Nm

10 - Bracket

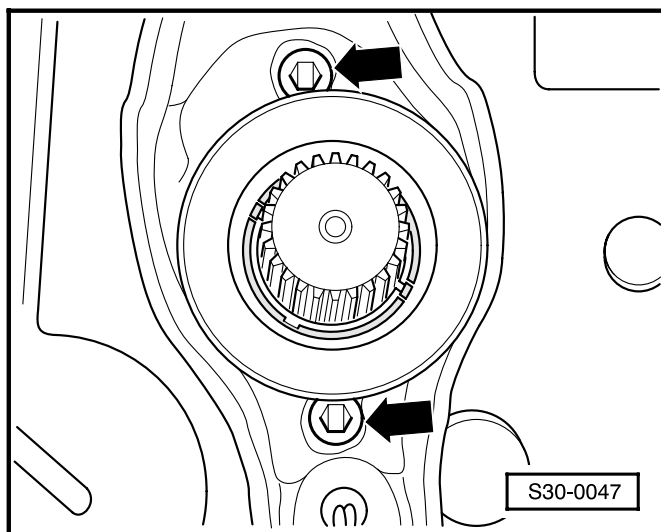
11 - Slave cylinder

- ◆ Removing and installing ⇒ page 30-5
- ◆ Grease end of tappet with MoS₂ grease

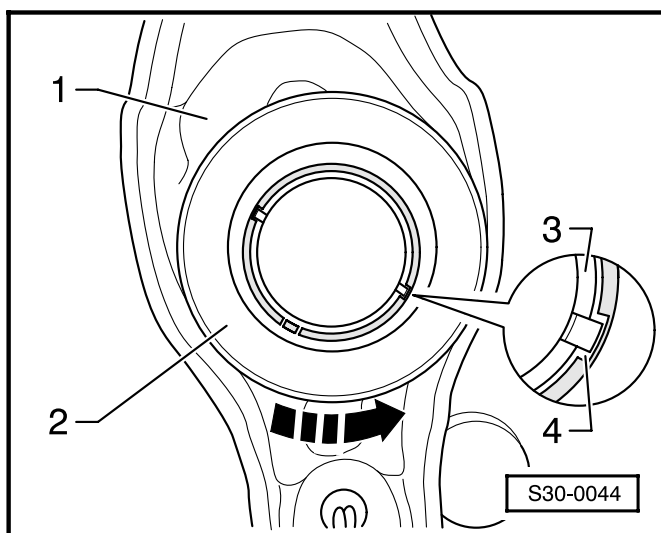
Removing and installing clutch release lever together with release bearing and guide sleeve

Removing

- ◀ - Unscrew bolts -arrows-.
- Pull clutch release lever together with release bearing and guide sleeve off input shaft and ball stud.



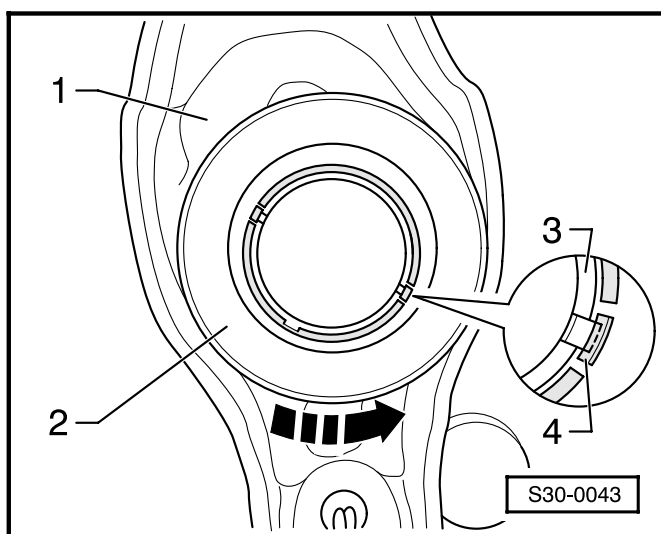
- ◀ - Turn release bearing -2- in direction of arrow vis-à-vis guide sleeve until locking lugs of guide sleeve -3- are aligned with the slot -4- of the release bearing.
- Take release bearing out of clutch release lever -1- in this position.



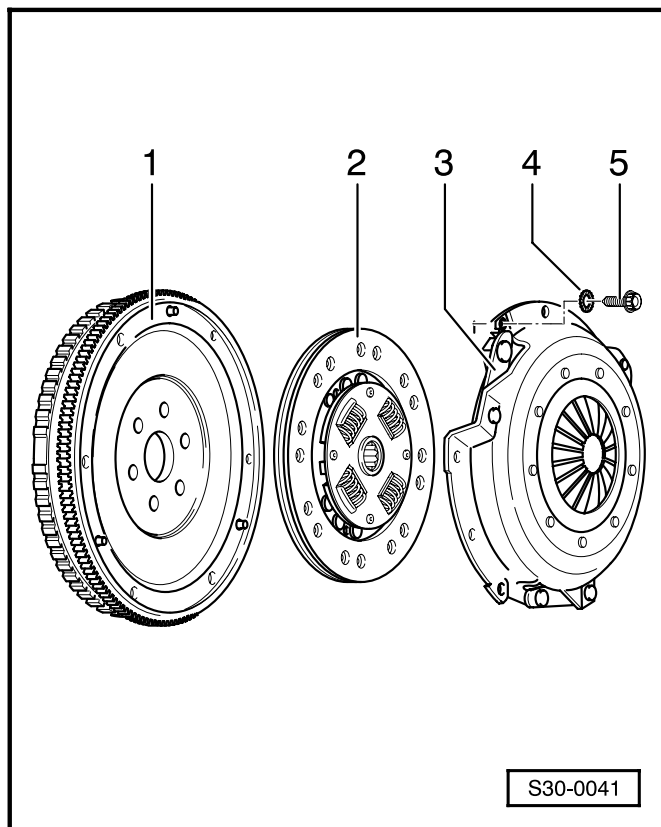
Installing

Installation is carried out in the reverse order. Pay attention to the following points:

- ◀ - Turn release bearing -2- in direction of arrow vis-à-vis guide sleeve -3- until the locking lugs of the guide sleeve are aligned with the spring segments -4- of the release bearing.
- Lock release bearing to clutch release lever -1-.
- Before installing the bolts, apply THREE BOND 1324 sealant.



Servicing clutch



Special tools, testers and aids required

- ◆ Grease G 000 100
- ◆ Counterholder MP 1-504
- ◆ Centering drift MP 2-501

(Gearbox removed)

Notes:

- ◆ Replace clutch plates and pressure plates if riveted connection is damaged or loose.
- ◆ Assign clutch plate and pressure plate by referring to Parts List and engine code.

1 - Flywheel

- ◆ Ensure tightly fitted on centering pins
- ◆ Contact surface for clutch lining free of grooves, oil and grease
- ◆ Removing and installing:
 - ⇒ 1.4-ltr./44 kW Engine, Mechanical Components; Repair Group 13; Disassembling and assembling cylinder block, crankshaft and flywheel

2 - Clutch plate

- ◆ Diameter ⇒ page 00-2
- ◆ Pay attention to installation position, spring cage points toward pressure plate
- ◆ Centering ⇒ Fig. 1
- ◆ Apply thin film of grease to splines

Note:

Clean splines of input shaft and also, if clutch plates are used, splines of hub, remove corrosion and apply only a very thin film of grease G 000 100 to the splines of the input shaft. After this, move clutch plate back and forward on the input shaft until the hub moves freely on the shaft. It is essential to remove excess grease.

3 - Pressure plate

- ◆ Removing and installing ⇒ Fig. 1
- ◆ Inspecting ends of diaphragm spring ⇒ Fig. 3

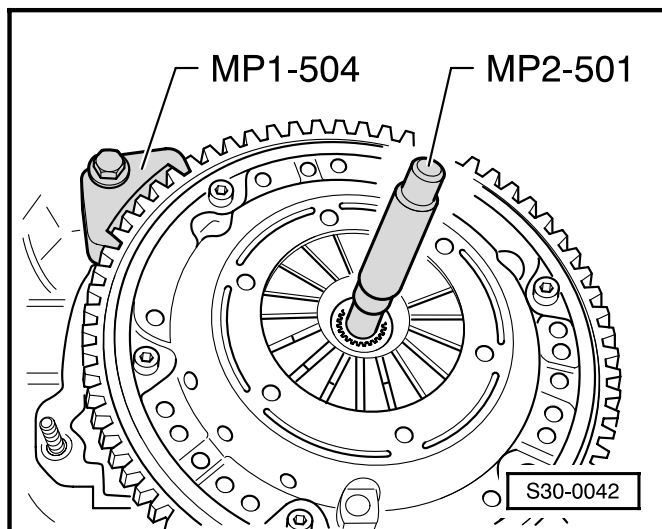
Note:

Pressure plates are protected against corrosion and grease. They must only be cleaned at the contact surface otherwise the life of the clutch will be considerably reduced.

4 - Locking washer

5 - 25 Nm

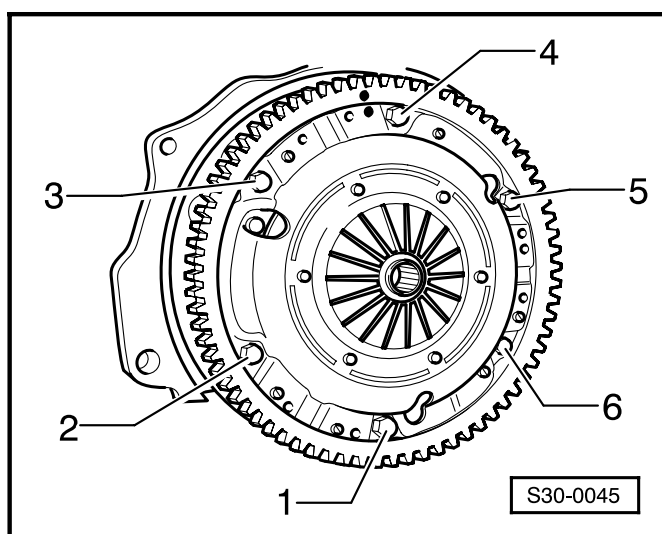
- ◆ Slacken and tighten in stages diagonally across
- ◆ Removing and installing ⇒ Fig. 2



◀ Fig. 1 Centering clutch plate and removing and installing pressure plate

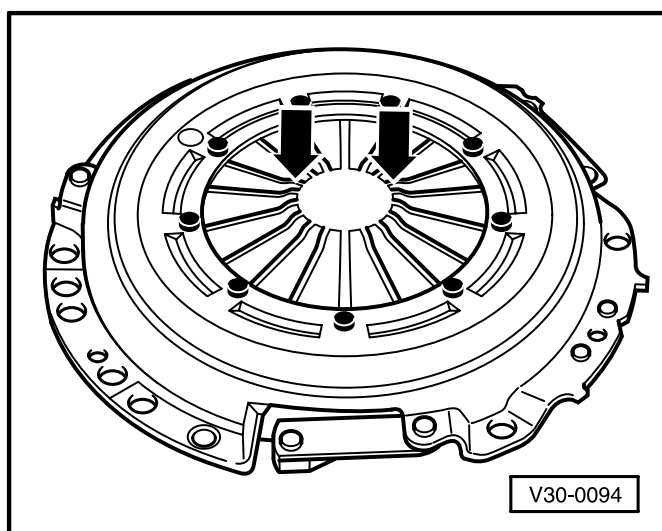
Note:

Contact surface of pressure plate and lining of clutch plate must be making contact with flywheel over complete surface. Only then, insert securing bolts. On no account pull on pressure plate. Otherwise centering holes of pressure plate and centering pins of flywheel will be damaged.



◀ Fig. 2 Tightening in stages in the specified order

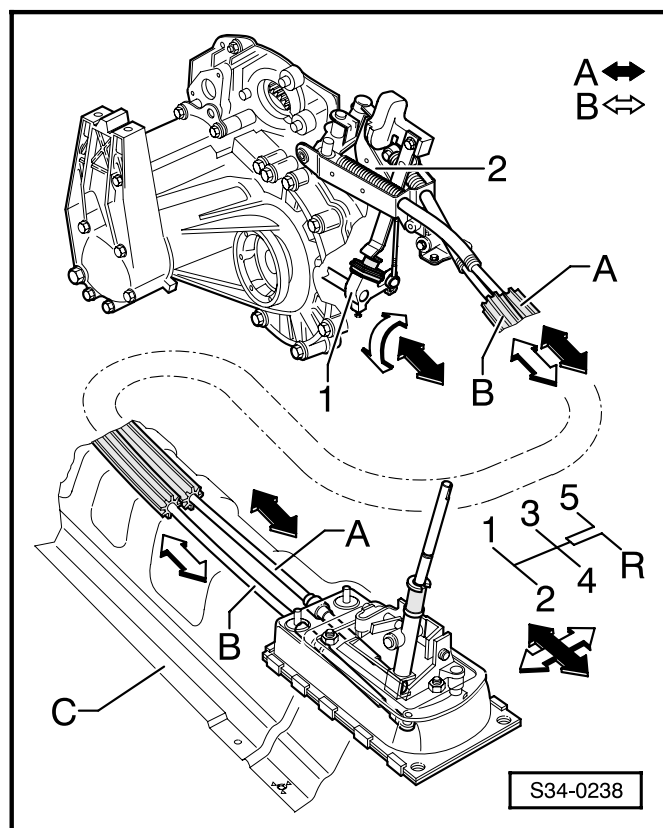
- Screw in bolts 1 to 6 by hand.
- Tighten bolts fully in the specified order of 1 - 3 - 5 - 2 - 4 - 6 in 3 stages (5 Nm, 15 Nm, 25 Nm).
- Remove clutch drift MP 2-501 and counter-holder MP 1-504.



◀ Fig. 3 Inspecting ends of diaphragm spring

- Wear down to half the thickness of the diaphragm spring is permissible.

Servicing shift mechanism



Installation position of shift mechanism

A - Shift cable for shift movement

B - Selector cable for selector movement

C - Heat shield

- ◆ Take off before removing the shift mechanism.

Arrow -A- Shift movement

Arrow -B- Selector movement

1 - Gearbox shift lever

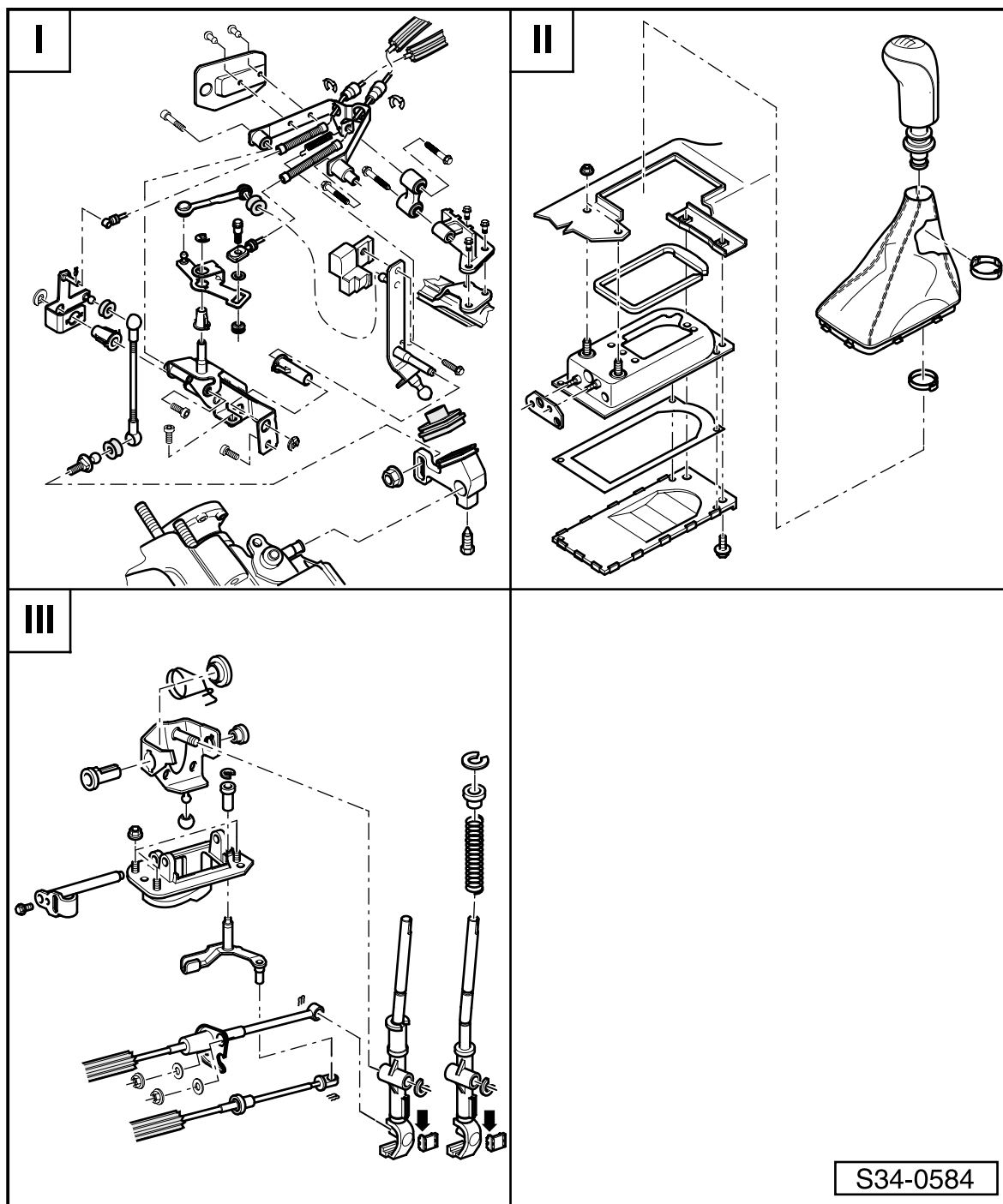
2 - Shift relay mechanism

Notes:

- ◆ Disconnect earth strap from the battery when working on the shift mechanism in the engine compartment.
- ◆ Before disconnecting the battery, determine the coding of radio sets with anti-theft code.
- ◆ When the battery is re-connected, check the vehicle equipment:
 - Encode radio
 - Re-set clock
 - Initialise power windows
- ⇒ Inspection and Maintenance
- ◆ Take out shift mechanism in order to replace the operating cables ⇒ page 34-7.
- ◆ Do not kink operating cables.

Special tools, testers and aids required

- ◆ Torque wrench 5...50 Nm (e.g. V.A.G 1331)
- ◆ Poly resin grease G 052 142 A2
- ◆ MoS₂ grease
- ◆ Loctite 648



I - Assembly overview - shift relay mechanism, shift mechanism cables
⇒ page 34-3

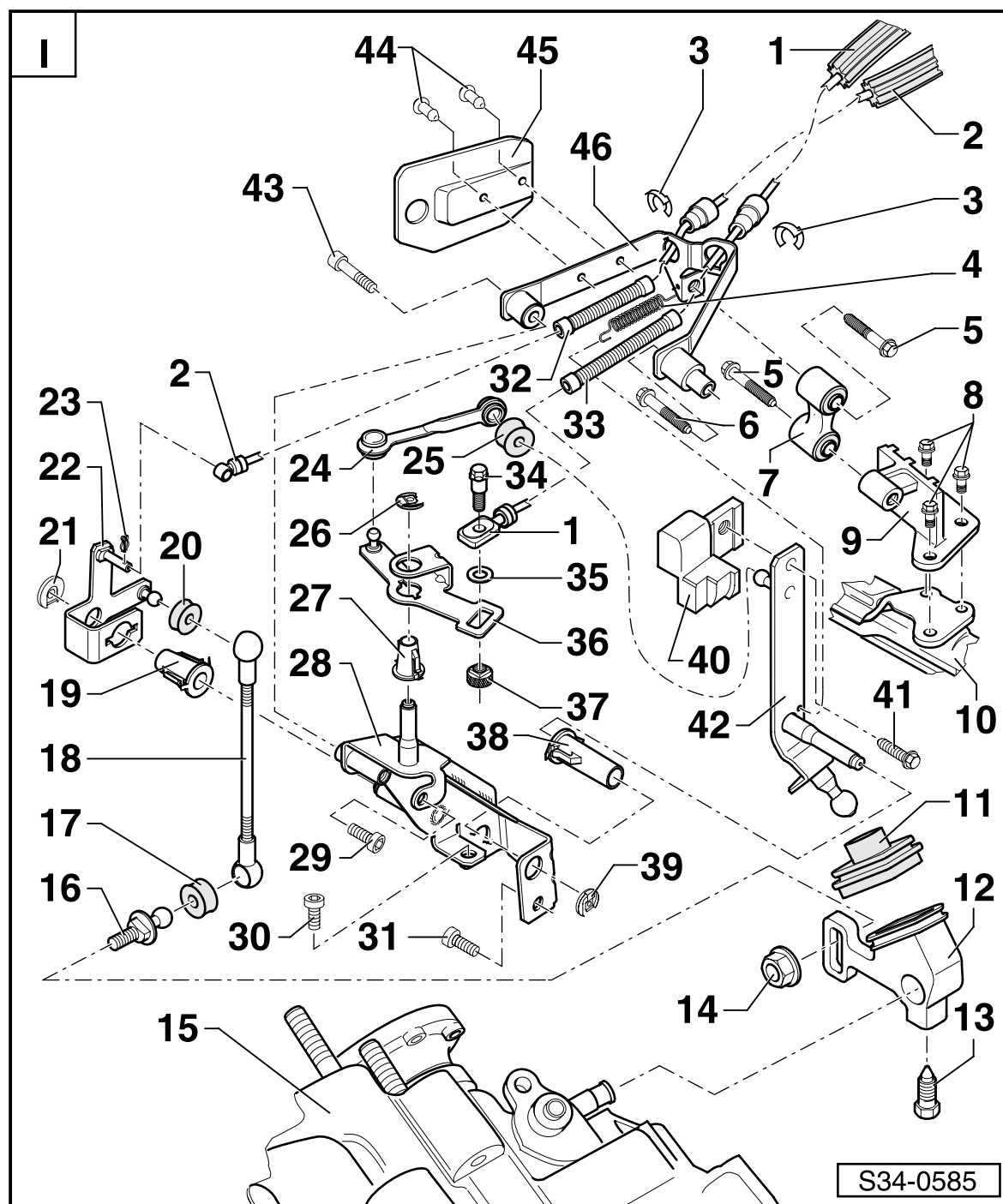
II - Assembly overview - shift housing
⇒ page 34-6

III - Assembly overview - shift mechanism cables, shift lever ⇒ page 34-10

Removing and installing shift housing ⇒ page 34-7.

Setting shift mechanism ⇒ page 34-12.

I - Assembly overview - shift relay mechanism, shift mechanism cables

**Note:**

Grease bearing points and contact surfaces with poly resin grease G 052 142 A2.

1 - Shift cable

- ◆ Fitting location ⇒ page 34-1

2 - Selector cable

- ◆ Fitting location ⇒ page 34-1

3 - Circlip

- ◆ Do not damage boot when removing

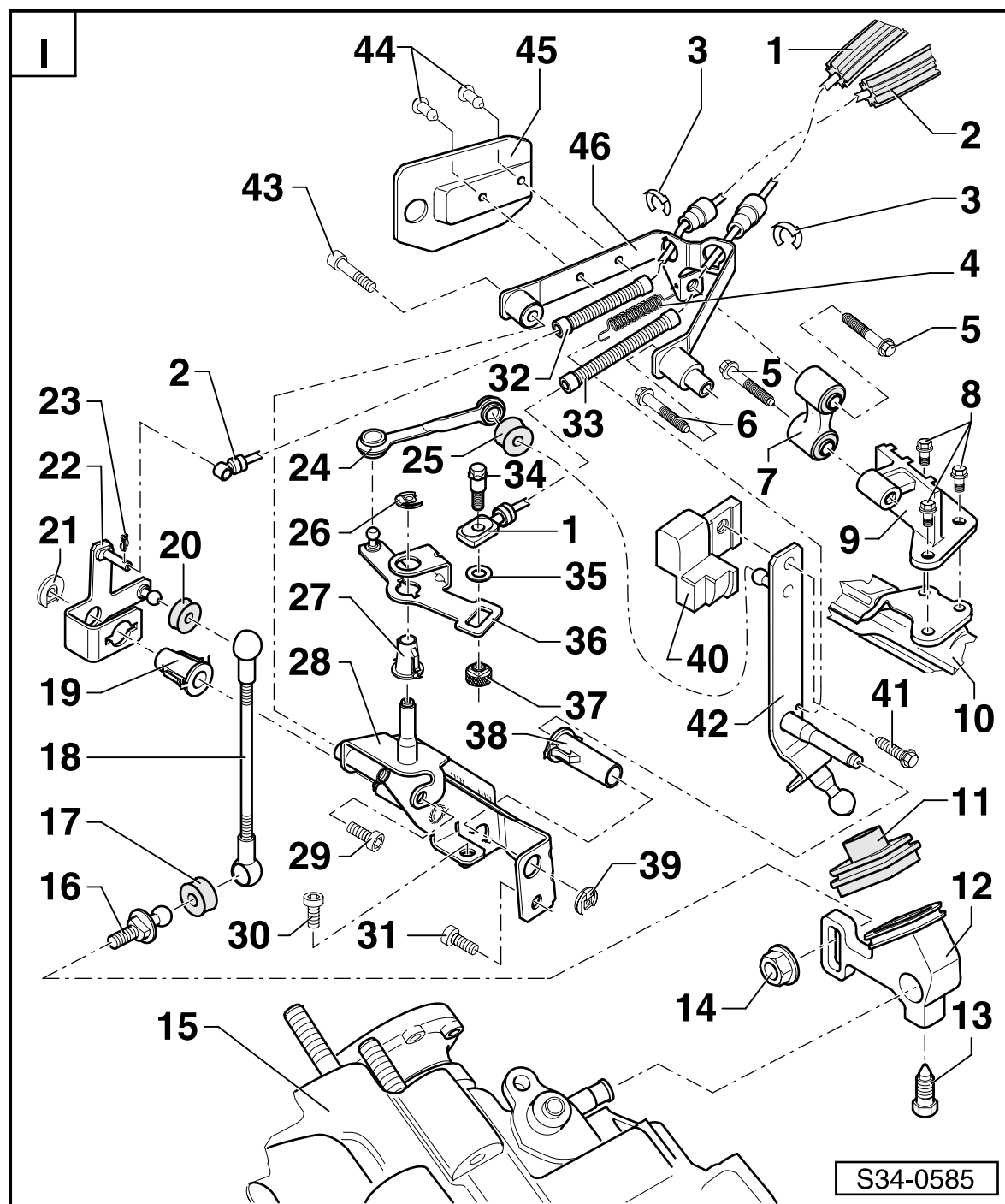
4 - Spring

- ◆ Models 03.99 ►

5 - 25 Nm**6 - 20 Nm****7 - Support****8 - 25 Nm**

- ◆ 2 in total

9 - Supporting angle bracket

**10 - PAS gear**

- ◆ With heat shield

11 - Boot**12 - Gearbox shift lever**

- ◆ Grease guide for ball stud/shift relay lever (item 42) with poly resin grease G 052 142 A2
- ◆ After installing, set shift mechanism ⇒ page 34-12

13 - 20 Nm

- ◆ Before installing, apply Loctite 648 locking fluid

14 - 25 Nm

- ◆ Tighten after setting shift mechanism

15 - Gearbox**16 - Ball stud****17 - Seal****18 - Selector rod**

- ◆ Grease ball sockets with poly resin grease G 052 142 A2 before installing

19 - Bush**20 - Seal****21 - Circlip****22 - Selector angle lever****23 - Split pin****24 - Coupling rod****25 - Seal****26 - Locking washer****27 - Bush****28 - Mounting bracket****29 - 20 Nm**

- ◆ For attaching mounting bracket to transmission

30 - 20 Nm

- ◆ For attaching mounting bracket to transmission

31 - 20 Nm

- ◆ For attaching mounting bracket to transmission

32 - Boot

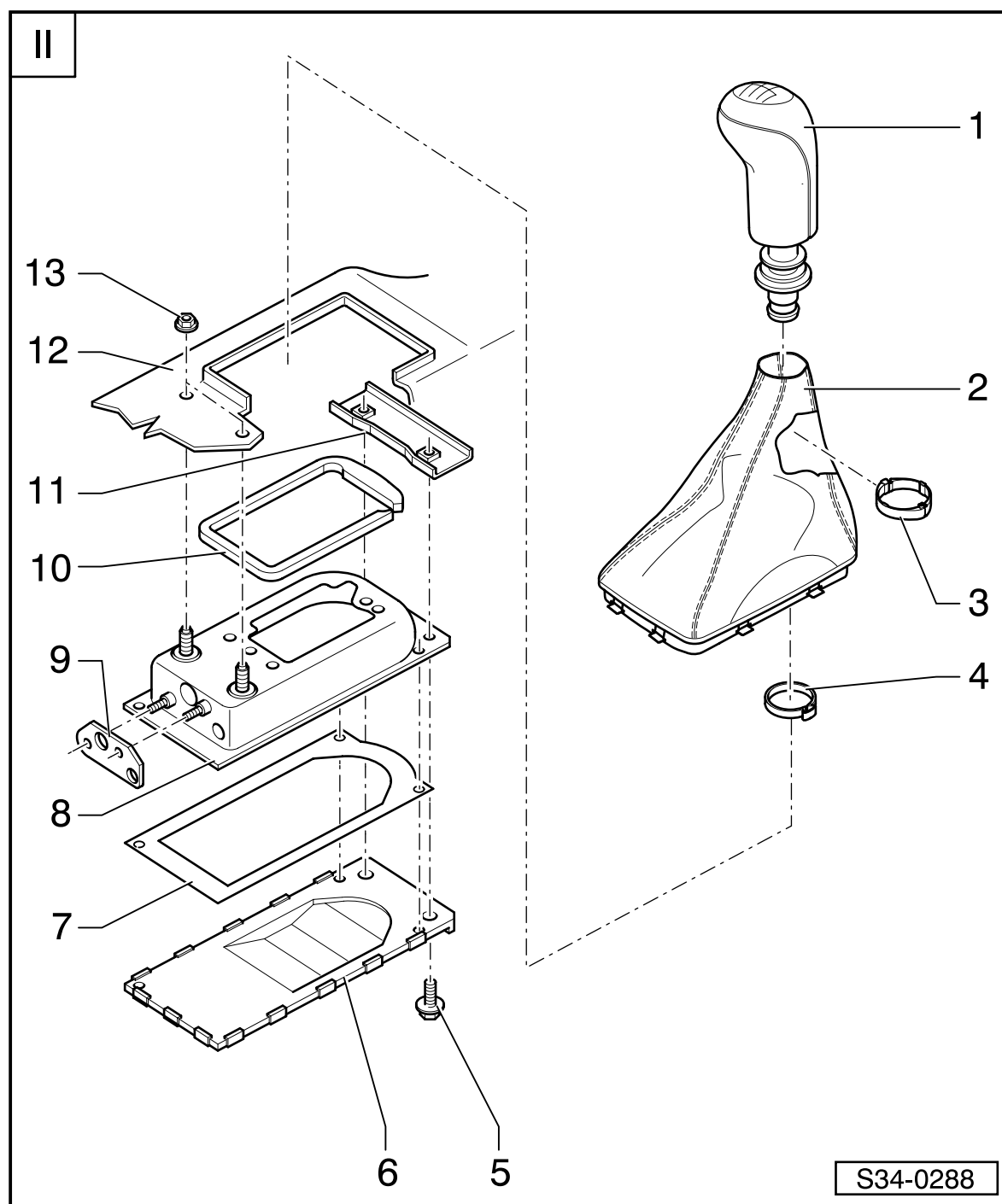
- ◆ Carefully pull over selector cable and end piece
- ◆ Grease with MoS₂ grease

33 - Boot

- ◆ Carefully pull over shift cable and end piece
- ◆ Grease with MoS₂ grease

34 - 25 Nm**35 - Pulley****36 - Intermediate lever****37 - Nut****38 - Bush****39 - Circlip****40 - Balancing weight****41 - 20 Nm****42 - Relay lever****43 - 20 Nm****44 - Rivet****45 - Shield****46 - Support bracket**

II - Summary of components of shift housing



1 - Gearshift knob

- ◆ When removing also take off cover -item 2-

2 - Cover

- ◆ When removing also take off gearshift knob -item 1-
- ◆ Separating cover from gearshift knob ⇒ page 34-9

3 - Connection part

- ◆ Connects cover to gearshift knob
- ◆ Removing ⇒ page 34-9

4 - Clip

- ◆ For attaching gearshift knob to gearshift lever

5 - 25 Nm

6 - Cover panel

7 - Gasket

- ◆ Self-adhesive
- ◆ Stick onto cover panel

8 - Shift housing

- ◆ Removing and installing
⇒ page 34-7

9 - Gasket

- ◆ Install between operating cables and shift housing

10 - Gasket

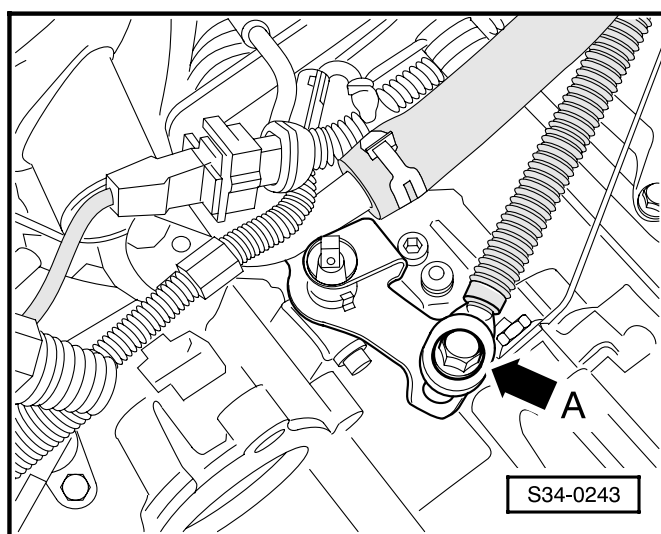
- ◆ Install between shift housing and floor
- ◆ Self-adhesive
- ◆ Stick onto shift housing

11 - Bracket for shift housing

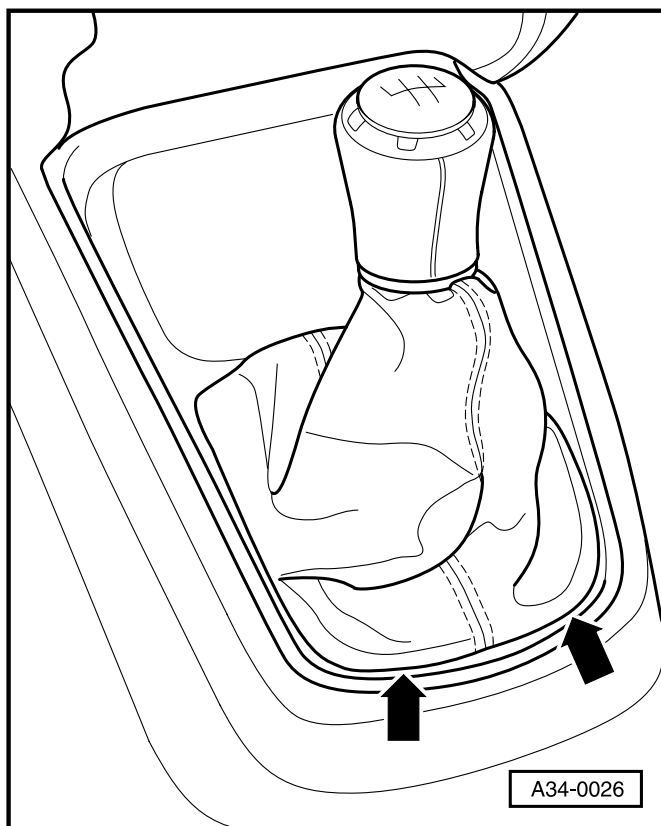
- ◆ Welded to body

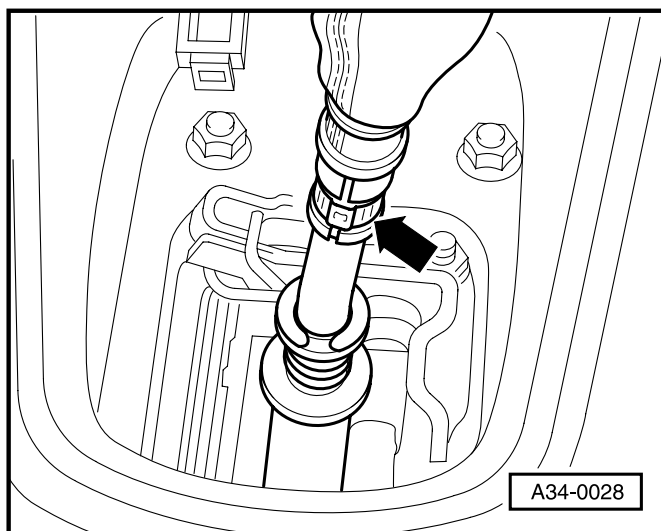
12 - Body**13 - 25 Nm**

- ◆ Always replace

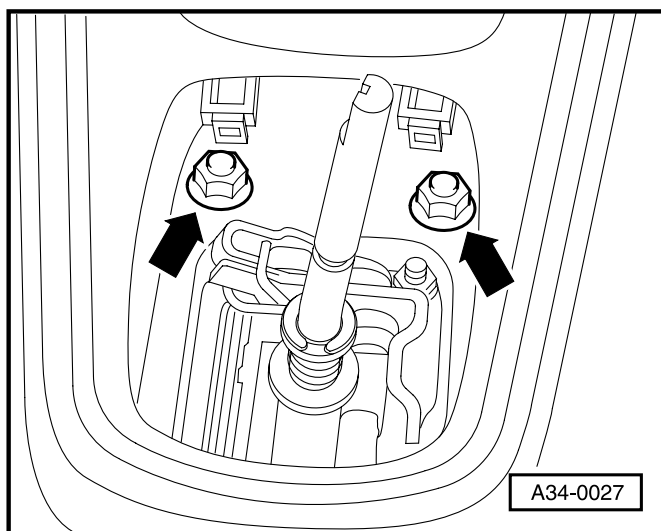
**Removing and installing shift housing****Removing**

- Remove air filter housing complete ⇒ page 34-14.
- ◀ - Detach shift cable from shift intermediate lever by unscrewing bolt -arrow A-.
- Take off shift cable together with washer and nut.
- Detach selector cable from selector bell crank ⇒ page 34-5, item 21.
- Pull boots off to the front.
- Remove locking washers for cables.
- ◀ - Lift out gearshift lever cover -arrows- and pull out to the rear.

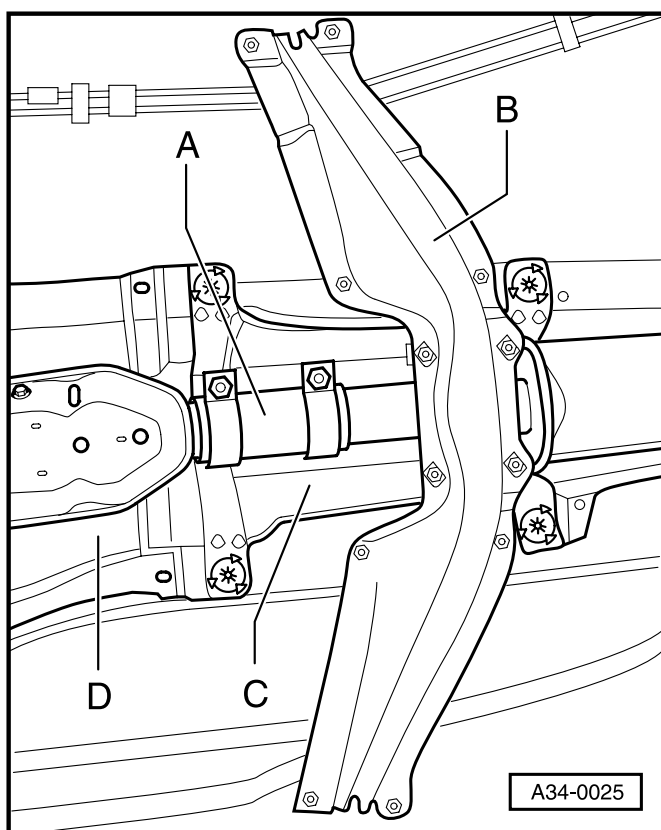




- Pull cover up over gearshift knob.
- ◀ - Use a screwdriver to open clip -arrow- and pull off gearshift knob together with cover.



- ◀ - Unscrew securing nuts -arrows-.



- ◀ - Slacken double clip -A- and separate exhaust system.
- Unbolt cross member -B-.
- Remove heat shields -C- and -D- for operating cables.
- Unscrew securing bolts ⇒ page 34-6, item 5.
- Lower shift housing and pull out to the rear together with cables.

Installing

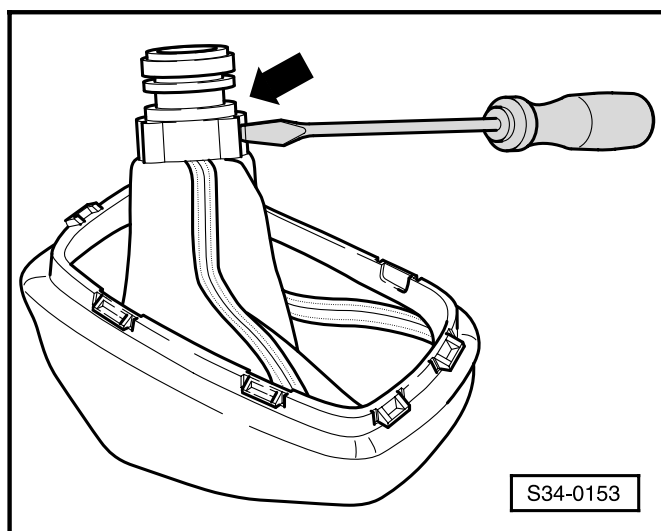
Installation is carried out in the reverse order.

Notes:

- ◆ Replace gasket between shift housing and floor if it is damaged.
- ◆ Setting shift mechanism ⇒ page 34-12.
- ◆ Aligning exhaust system:
⇒ 1.4-ltr./44 kW Engine, Mechanical Components; Repair Group 26; Removing and installing parts of exhaust system

Tightening torques

Shift housing to body M8 bolt	25 Nm
Shift housing to body M8 nut	25 Nm
Cross member to body	25 Nm
Bolt of shift cable to shift intermediate lever	25 Nm

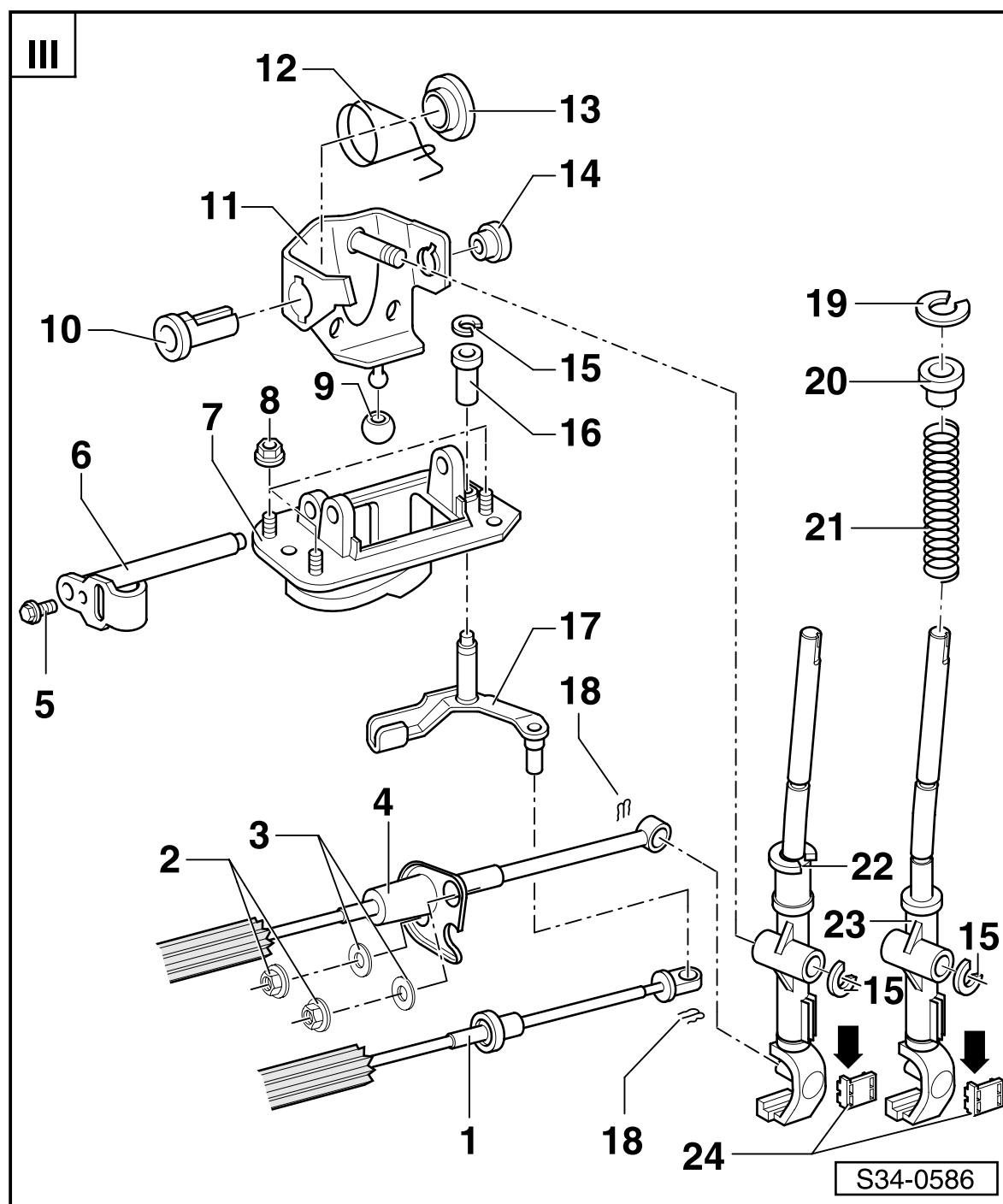
**Separating cover from gearshift knob**

- Turn the cover inside out.
- ◀ - Use a screwdriver to lever off connection part -arrow-.
- Pull connection part off gearshift knob.
- Turn gearshift knob to the outside and pull it off the cover.

Installing

- Turn cover inside out.
- Insert gearshift knob into cover.
- Push connection part over gearshift knob and cover and compress until it locks in place.

III - Assembly overview - shift mechanism cables, shift lever



Note:

Grease bearing points and contact surfaces with poly resin grease G 052 142 A2.

1 - Selector cable

♦ To selector angle bracket

2 - 20 Nm

♦ Always replace

3 - Rubber washer

4 - Shift cable

♦ To shift lever

5 - 15 Nm

6 - Pin

7 - Bearing plate

8 - 25 Nm

♦ Always replace

9 - Cap

- ◆ Heat cap before fitting on (for example in hot water)

10 - Bush**11 - Selector housing**

- ◆ Insert into bearing plate after assembling complete shift lever

12 - Spring**13 - Guide bush**

- ◆ Insert into bush item 10

14 - Bush**15 - Circlip****16 - Bush**

- ◆ Fits only in one position

17 - Selector lever**18 - Split pin****19 - Circlip**

- ◆ Removing and installing ⇒ Fig. 1
- ◆ For models 08.99 ➤

20 - Spacer sleeve

- ◆ For models 08.99 ➤

21 - Spring

- ◆ For models 08.99 ➤

22 - Shift lever

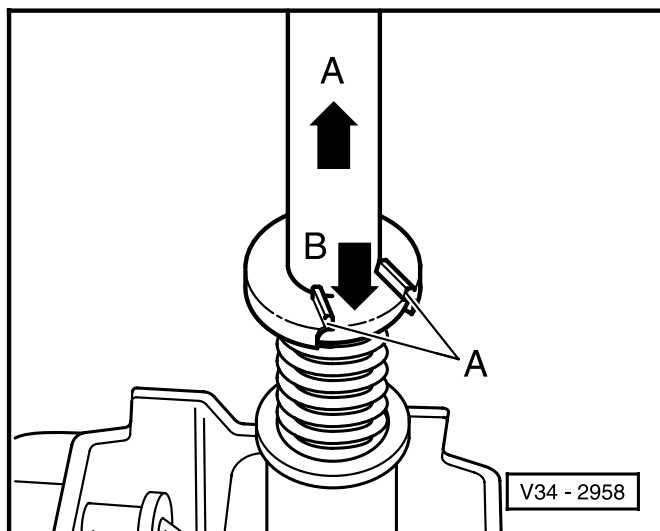
- ◆ Shift lever and shift lever guide are assembled to form single component

23 - Shift lever

- ◆ Shift lever and shift lever guide are assembled to form single component
- ◆ For models 08.99 ➤

24 - Shock absorber plate

- ◆ Clip onto shift lever
- ◆ Fitting location: the lug -arrow- points toward shift lever mounting



◀ Fig. 1 Removing and installing circlip

- Pull shift lever in direction -arrow A- and at the same time use a screwdriver to push the spacer sleeve down fully in direction -arrow B- and remove the circlip.

Note:

Do not twist spacer sleeve when pushing down with screwdriver. Carefully relieve pressure on mounting slot in shift lever for circlip.

Setting shift mechanism

Special tools, testers and aids required

- ◆ Shift lever gauge 3422

- ◆ Sliding block T30006

◀ - The shift lever gauge is composed of the bottom part of the gauge 3422 and the sliding block T30006.

- Replace sliding block of shift lever gauge 3422 with sliding block T30006 after slackening the screw (arrow).

Notes:

Requirements for correct setting of the shift mechanism are as follows:

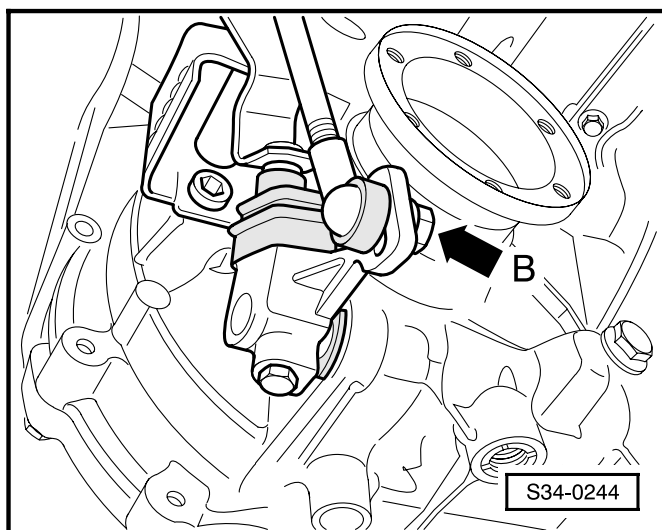
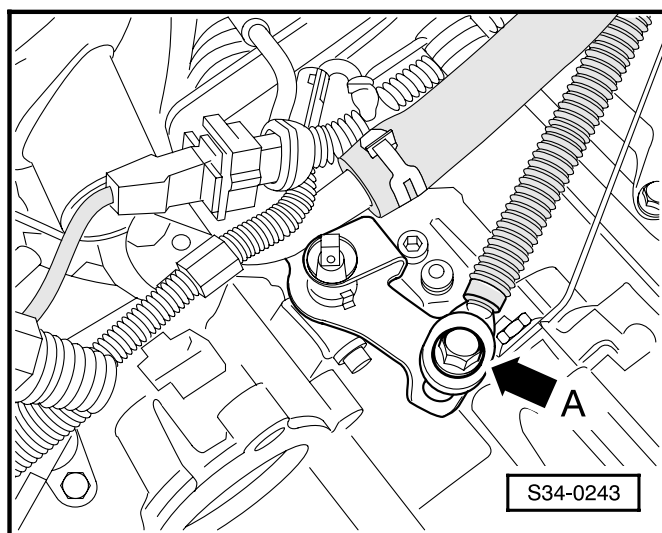
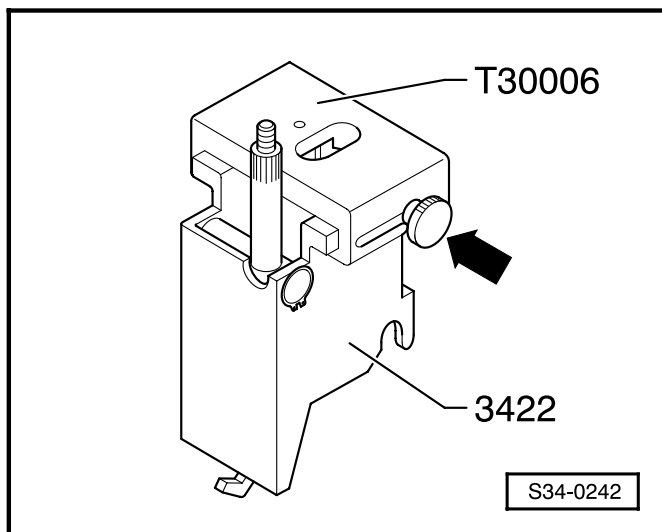
- ◆ *Operating and transmission elements of shift mechanism in proper condition.*
- ◆ *Insulating pieces for mounting shift and selector cables in proper order at all operating elements (not worn).*
- ◆ *Shift cable and selector cable operate freely.*

In addition, the gearbox, clutch and clutch mechanism must be in proper condition.

Gearbox in Neutral position.

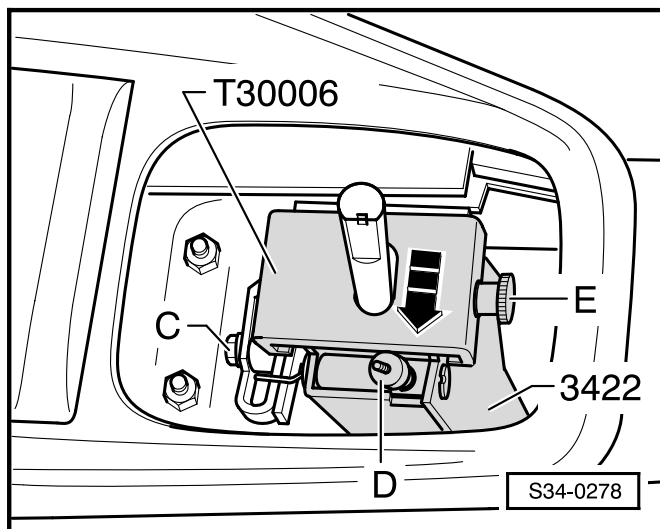
- Detach gearshift knob together with cover ⇒ page 34-7.

◀ - Slacken bolt of shift cable of shift intermediate lever -arrow A-.

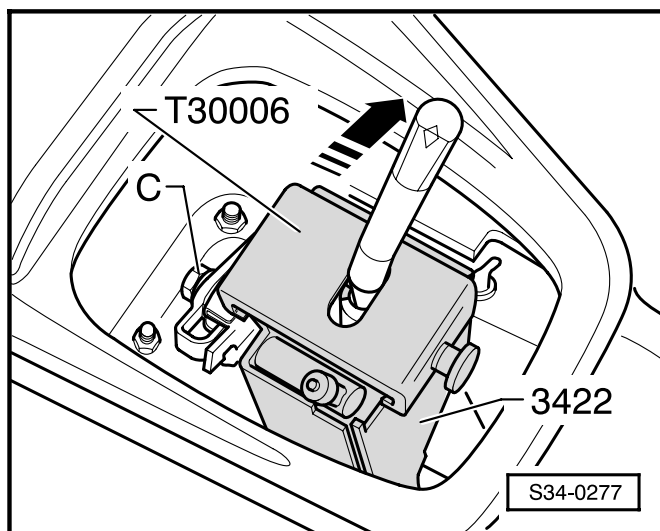


◀ - Slacken nut of selector rod of gearbox shift lever -arrow B-.

- Shift cable and selector rod must now move freely in the slots.



- ◀ - Slacken bolt -C-.
- Fit on shift lever gauge 3422 together with sliding block T30006.
- Swivel hook for attaching the gauge below the bearing plate and tighten nut -D-.
- Press shift lever into the left detent of the sliding block.
- Press shift lever together with sliding block fully to the left (direction of arrow) and tighten sliding block with screw -E-.

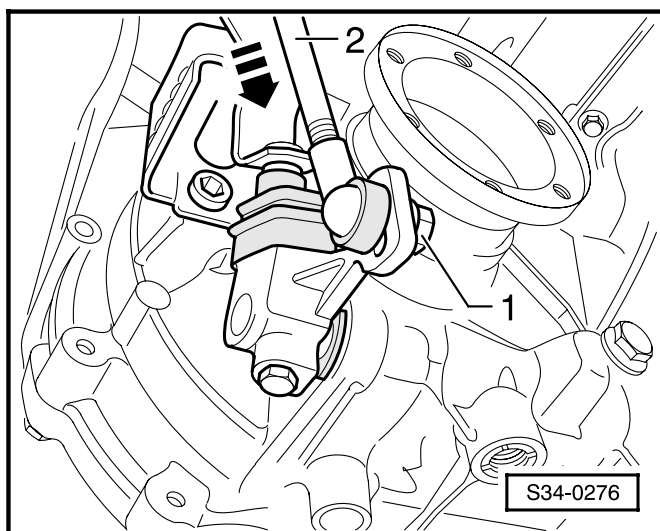


- ◀ - Press shift lever into the right detent (direction of arrow).
- Tighten bolt -C-.
- Tighten bolted connections -arrow B- in Fig. S34-0244 and -arrow A- in Fig. S34-0243 ⇒ page 34-12.
- Take off shift lever gauge.

Operation

- Shift lever must be positioned in Neutral in gate of 3rd/4th gear.
- Operate clutch.
- Shift through all gears several times.

If mechanism still catches when repeatedly engaging a gear, proceed as follows:



- Fit on shift lever gauge 3422 together with sliding block T30006 without slackening bolt -C- ⇒ Fig. S34-0278, page 34-13, and move shift lever into gate of 3rd/4th gear ⇒ Fig. S34-0277.
- ◀ - Slacken nut -1-.
- Eliminate the play of the selector cable by pulling selector rod -2- down slightly -direction of arrow-.
- Re-tighten nut -1- in this position.
- Fit on cover and gearshift knob.

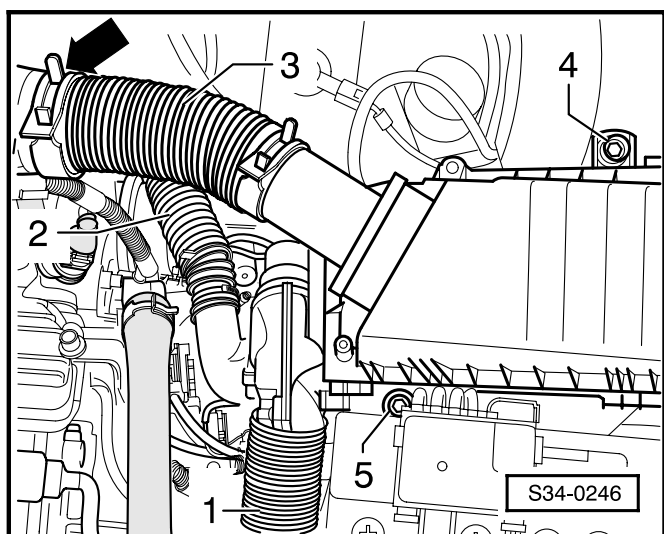
Removing and installing gear-box

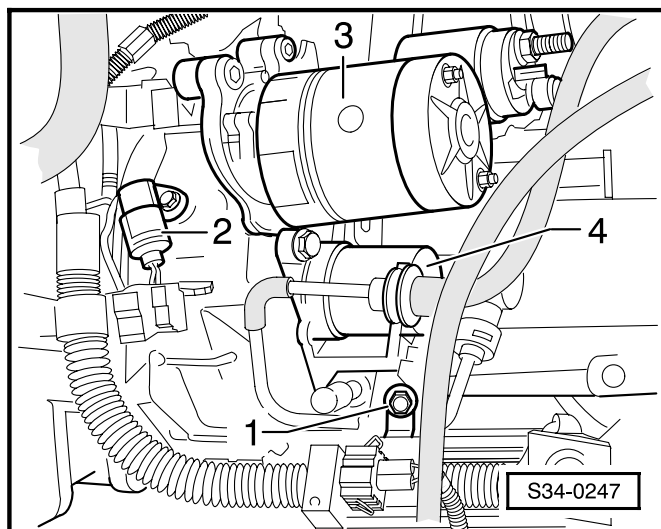
Special tools, testers and aids required

- ◆ Gearbox mount 3282
- ◆ Adjusting plate T30007
- ◆ Adapter MP 3-419/40
- ◆ Transporting device MP 3-478
- ◆ Assembly device MP 5-402
- ◆ Supporting device MP 9-200
- ◆ Grease G 000 100
- ◆ Loctite 648

Removing

- Remove engine trim panel.
- Seal oil filler neck.
- Before disconnecting the battery, determine the coding of radio sets fitted with anti-theft code.
- Disconnect earth strap of battery.
- ◀ - Detach intake hose -1- from lock carrier.
- Detach air hose -2- from warm air baffle of exhaust manifold.
- Detach intake hose -3- from intake connection of throttle valve control unit -arrow-.
- Remove air filter housing complete by unscrewing bolts -4- and -5-.
- Detach earth strap from top bolt connecting engine and gearbox.



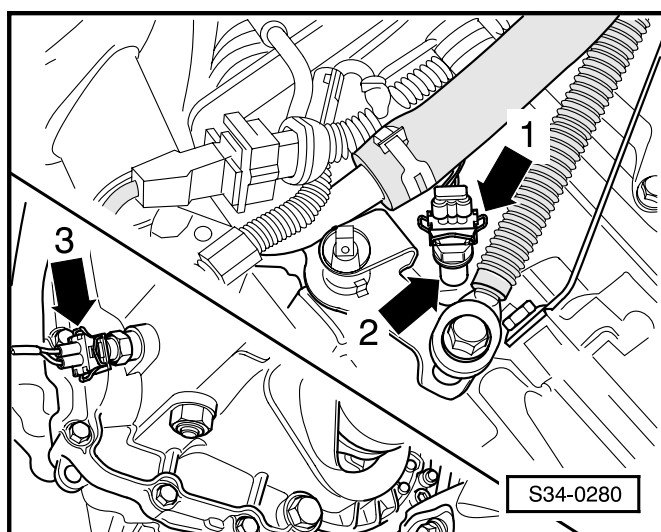


- ◀ - Unbolt bracket -1- from gearbox and place to the side together with lines.
- Remove engine speed sender -G28- -2-.
- Remove slave cylinder -4-, place down to the side and secure with wire. Do not open line system.

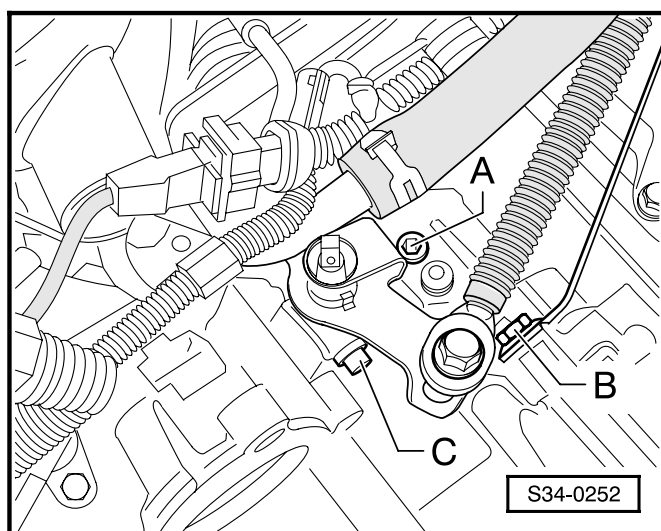
Note:

Do not depress clutch pedal.

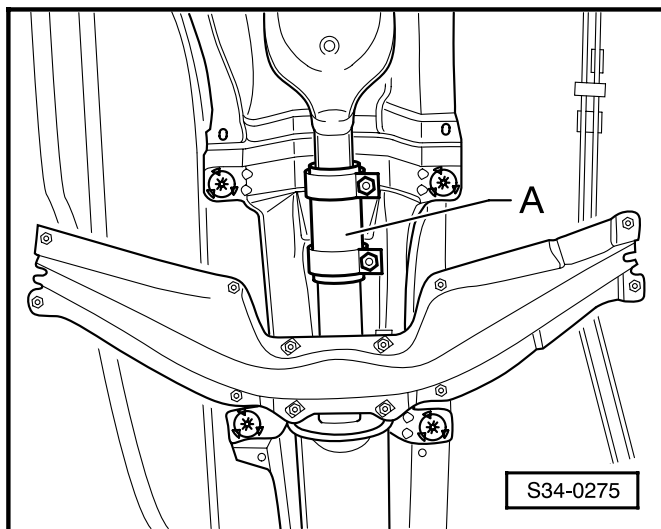
- Remove starter -3-.
- ⇒ Electrical System; Repair Group 27; Removing and installing starter



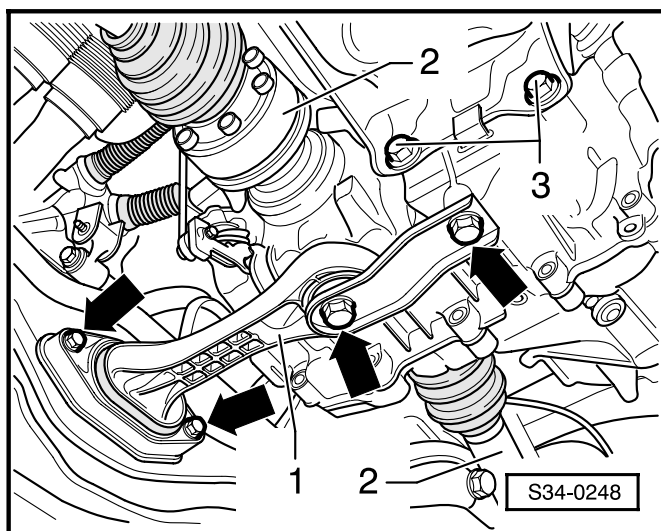
- ◀ - Unplug connector (arrow 1) from speedometer sender -G22-.
- Unbolt speedometer sender -G22- (arrow 2) from the guide bush.
- Unplug connector (arrow 3) from the reversing light switch -F4-.



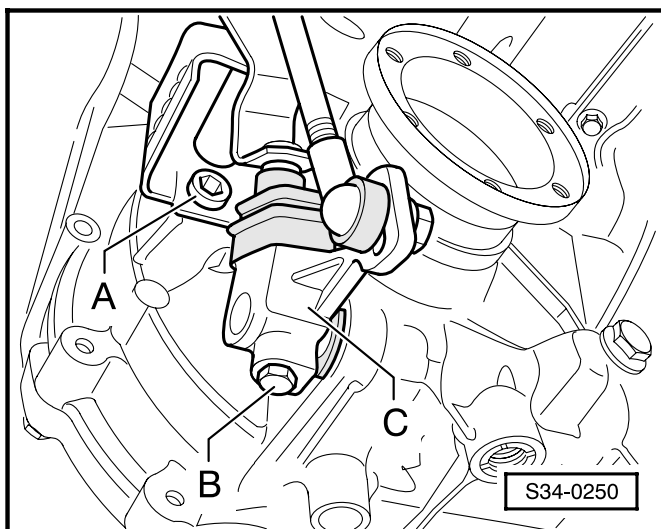
- ◀ - Detach cable support and mounting bracket from top of gearbox by unscrewing bolts -A-, -B- and -C-.
- Unscrew all the nuts of the stud bolts of engine/gearbox which are accessible from above.
- Take off front right wheel and raise vehicle.
- Remove complete noise insulation.



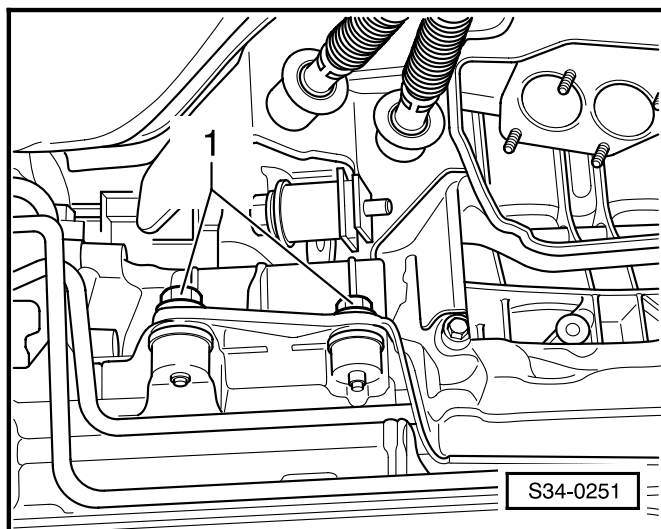
- ◀ - Slacken double clip -A- and separate exhaust system.



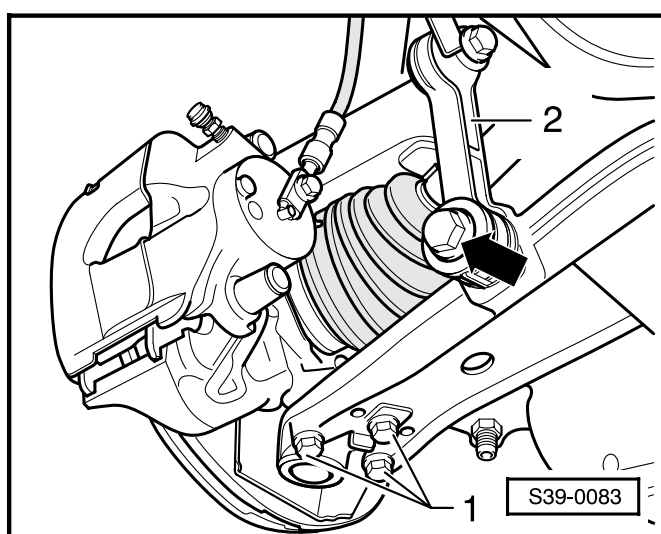
- ◀ - Unbolt pendulum support -1- -arrows-.
- Detach drive shafts -2- from flange shafts, turn steering to full left lock and tie up left drive shaft as much as possible without damaging the surface protection.
- Unscrew bolts -3- at bottom for attaching engine and gearbox.



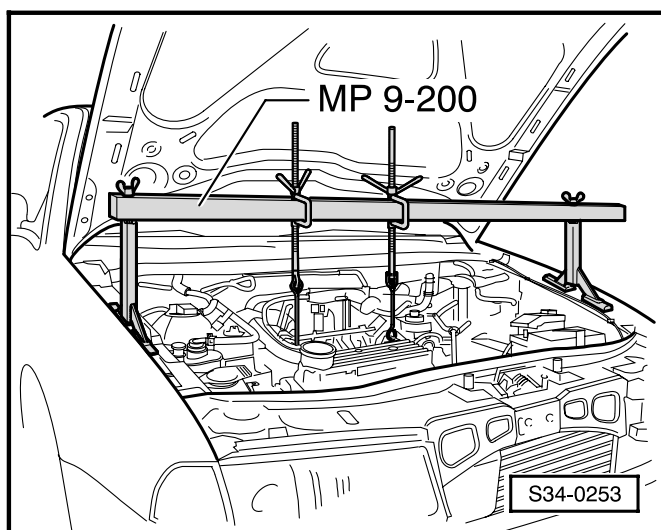
- ◀ - Unscrew bolt -A- from mounting bracket.
- Engage 4th gear (arrow).
- Slacken bolt -B- sufficiently to enable the shift finger -C- to be pulled off at the shift shaft.



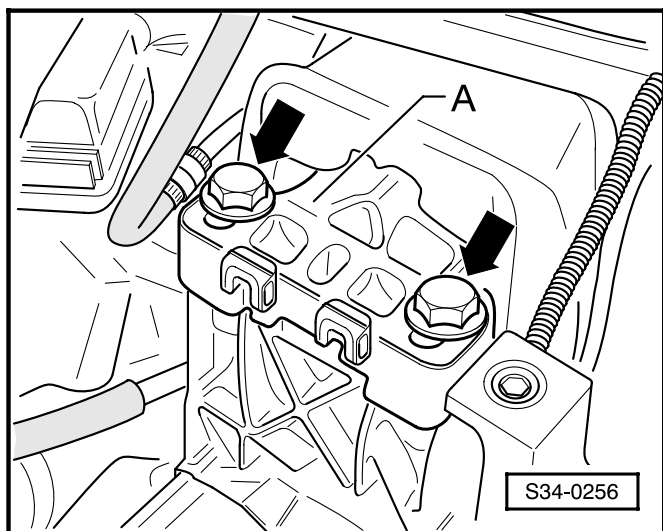
- ◀ - Detach the supporting angle bracket from the steering gear by unscrewing the bolts -1-.
- Tie up support plate together with mounting bracket and supporting angle.
- Unbolt fixture of power steering line at gear-box.



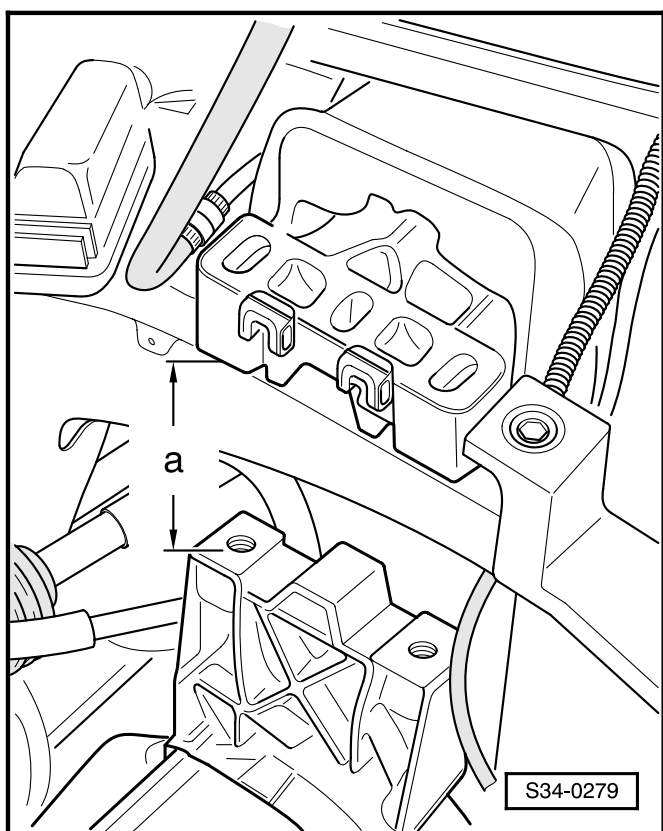
- ◀ - Mark installation position of bolts -1- for right steering joint otherwise steering geometry has to be checked.
- Unscrew bolts -1-.
- Unbolt coupling rod -2- from the right track control arm -arrow-.
- Press engine/gearbox forward.
- Now, move the right drive shaft forward and tie up at the subframe.



- ◀ - Install supporting device MP 9-200.
- Take up weight of engine/gearbox unit at the spindles.



- ◀ - Unscrew the bolts -arrows- attaching the gearbox mount -A-.



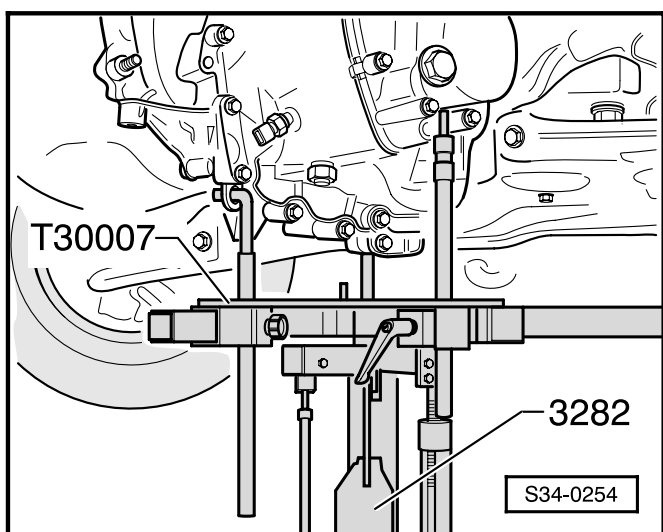
- ◀ - Lower engine/gearbox unit max. 80 mm at both spindles -a-.

Note:

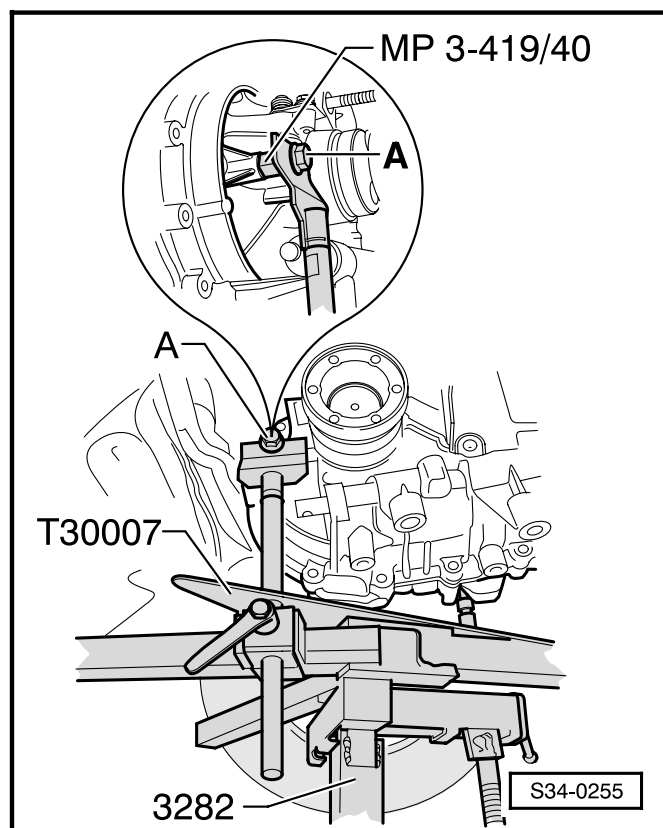
Pay attention to power steering line when lowering engine/gearbox unit.

Fit together gearbox lift with gearbox mount 3282, adjusting plate T30007 for gearbox "002" and the mounting elements as follows:

- Fit adjusting plate T30007 onto gearbox mount 3282 (adjusting plate fits only in one position).
- Align the arms of the gearbox mount to match the holes in the adjusting plate.
- Screw in mounting elements as shown on adjusting plate.



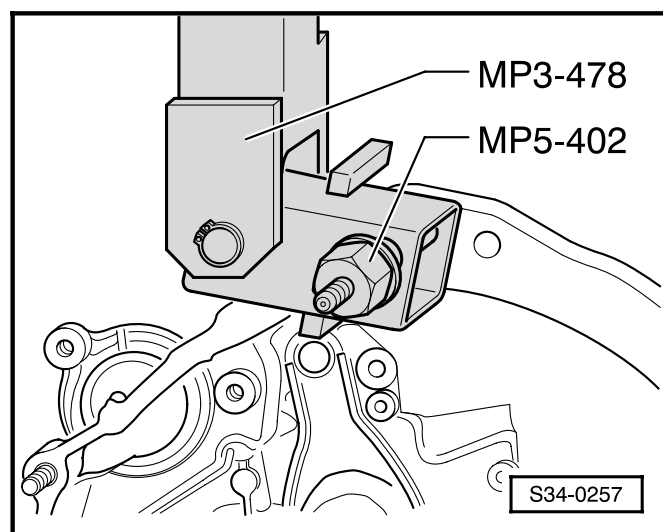
- ◀ - Position gearbox jack below the vehicle. Arrow symbol on adjusting plate points in direction of travel/vehicle.
- Align adjusting plate parallel to gearbox.



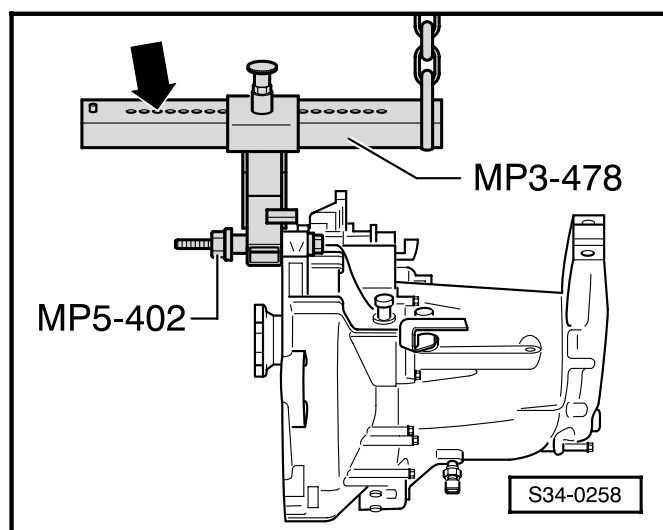
- ◀ - Screw adapter MP 3-419/40 into the threaded hole of the clutch housing, as shown in illustration.
- Secure gearbox on gearbox mount 3282 with the bolt -A-.
- Unscrew nut of stud bolt at rear of engine/gearbox.
- Unscrew bolt attaching engine/gearbox at front.
- Press gearbox off the engine and swivel toward subframe.
- Carefully lower gearbox; constantly correct position during this step at the spindles of the gearbox jack.

Note:

Pay attention to power steering line when lowering gearbox.



- ◀ - Use special tool MP 5-402 to bolt gearbox suspension device MP 3-478 to clutch housing.



- ◀ - Set supporting arm at sliding block with detent pin.
- Number of visible holes = 8 (arrow)
- Use workshop crane and gearbox suspension device MP 3-478 to raise gearbox.
 - Place down gearbox, e.g. in shipping crate.

Installing

- Before installing, unscrew plug for inspecting gearbox oil level and pour in gearbox oil.

Capacity and specification ⇒ page 00-2.

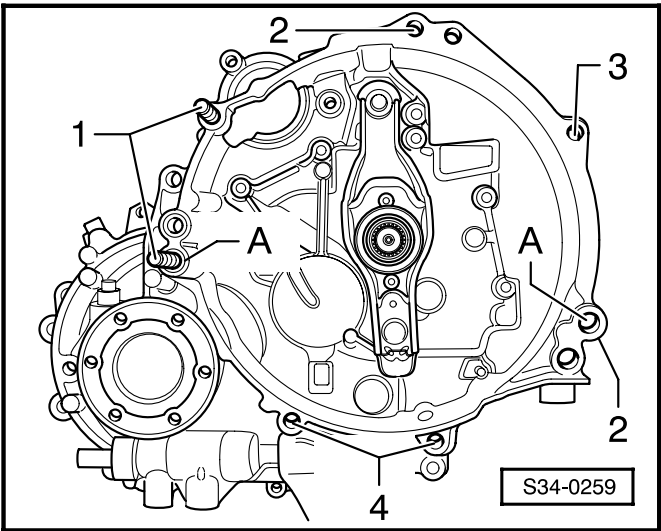
Installation of the gearbox is carried out in the reverse order. Install engine/gearbox mounting free of stress.

⇒ 1.4-ltr./44 kW Engine, Mechanical Components; Repair Group 10; Removing and installing engine

- After installing, inspect gearbox oil ⇒ page 34-22.

Notes:

- ◆ Clean splines of input shaft and apply a thin film of grease G 000 100.
 - ◆ When replacing the gearbox, ensure the intermediate plate between engine and gearbox is correctly positioned.
 - ◆ Check whether dowel sleeves are present in cylinder block for centering engine/gearbox; insert if necessary.
 - ◆ Install starter/cable:
⇒ Electrical System; Repair Group 27; Removing and installing starter
 - ◆ Set shift mechanism ⇒ page 34-12.
 - ◆ When re-connecting the battery, check the vehicle equipment:
 - Encode radio
 - Re-set clock
 - Initialise power windows
- ⇒ Inspection and Maintenance



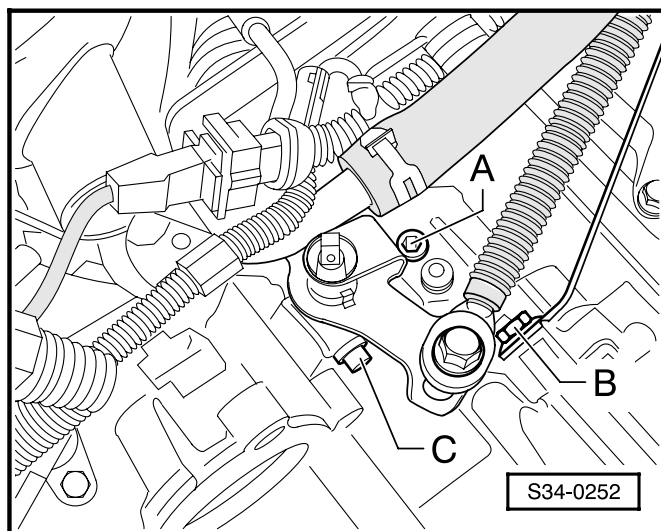
Tightening torques

◀ Gearbox to engine

Item	Nut/Bolt	Qty.	Nm
1	Nut M10	2	45
2	Nut M10	2	45
3 ¹⁾	Bolt M10	1	45
4	Bolt M10	2	45

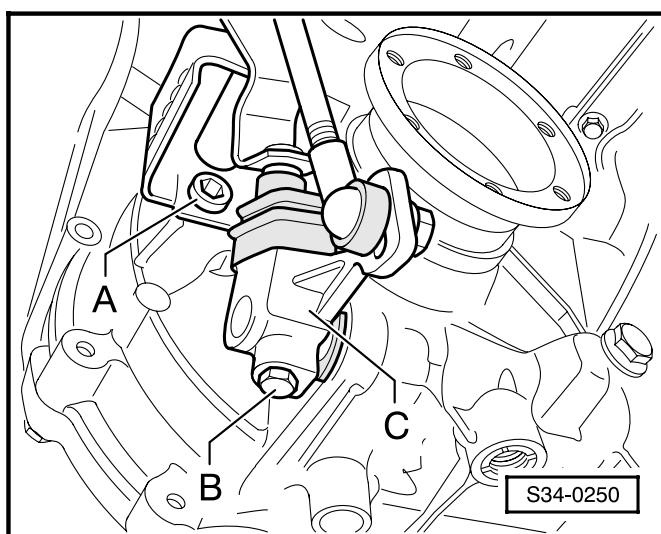
1) Always replace these bolts M8.

A: dowel sleeves for centering



◀ Supporting bracket and mounting bracket at top of gearbox

Bolt -A- for mounting bracket and guide bush (speedo) to gearbox	20 Nm
Bolt -B- and -C-	20 Nm



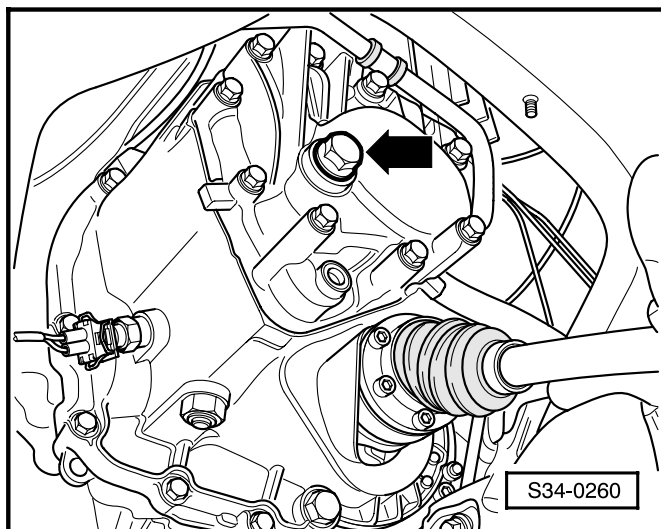
◀ Mounting bracket to bottom of gearbox

Bolt -A-	20 Nm
Bolt -B- for attaching shift lever -C- to shift shaft ¹⁾	20 Nm

¹⁾ Apply Loctite 648 locking fluid before installing.

Components	Tightening torque
Supporting angle bracket - gearbox PAS M8	25 Nm
Cover for gearbox housing - gearbox mount ¹⁾ M12	80 Nm
Pendulum support - gearbox ¹⁾ M10	40 Nm + 90°
Pendulum support - subframe ¹⁾ M8	20 Nm + 90°
Drive shaft - flange shaft ¹⁾ (tighten diagonally across in 2 stages) M8 ⇒ Running Gear, Repair Group 40	
Steering joint - track control arm ¹⁾ M8	20 Nm + 90°
Coupling rod - track control arm	45 Nm
Starter - gearbox M8	25 Nm
Wheel bolts - wheel hub	120 Nm
Nut for attaching double clamp/exhaust system	40 Nm

¹⁾ Always replace these bolts.



Inspecting gearbox oil

Inspection requirement

- Vehicle standing on level ground

Specification of gearbox oil ⇒ page 00-2

- Turn steering to full left lock.
- ◀ - Unscrew plug for inspecting gearbox oil (arrow).

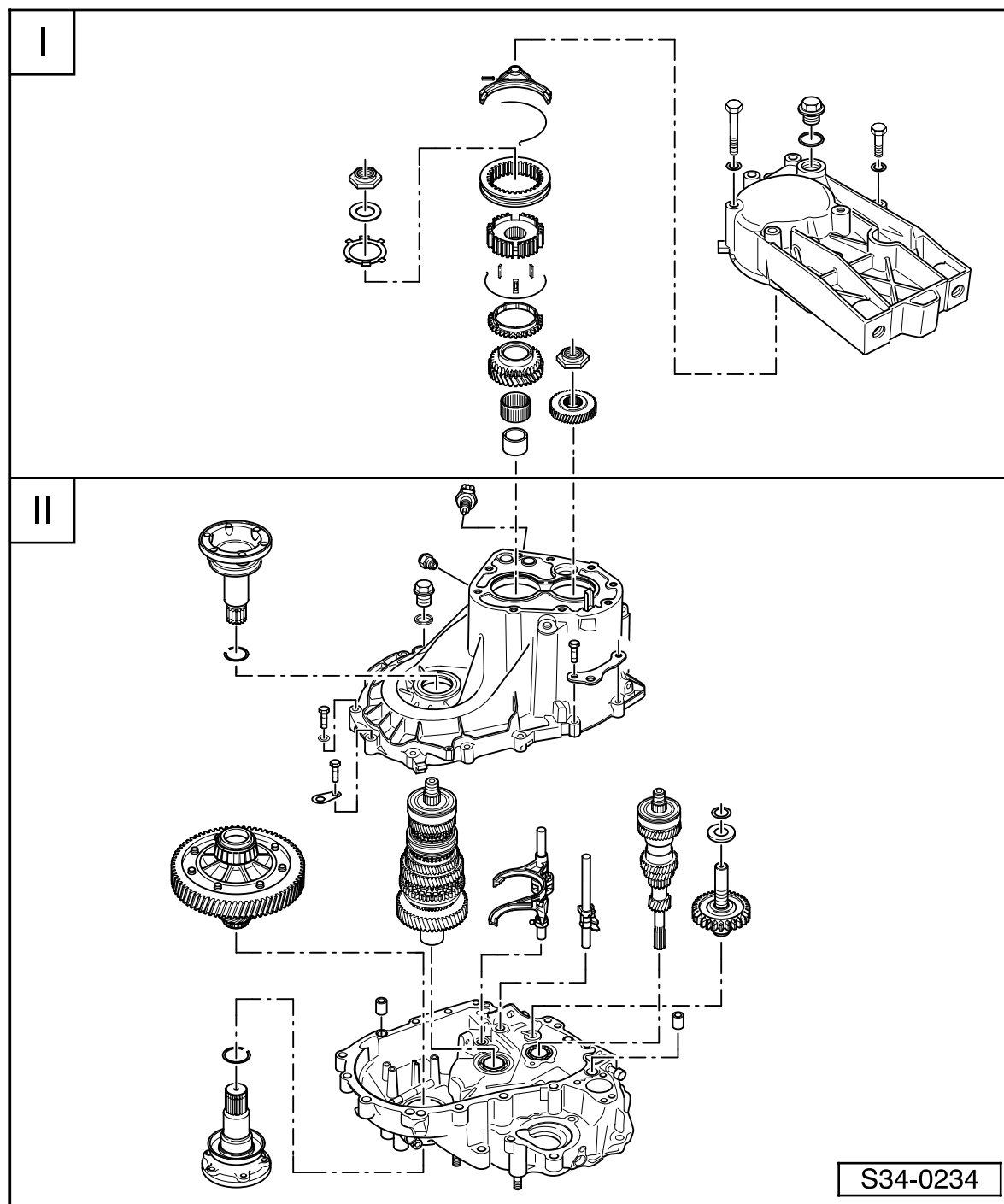
The oil is at the correct level if the gearbox is filled up to the lower edge of the oil filler hole.

- Screw in plug (arrow) with new seal, 35 Nm.

When re-filling, pay attention to the following points:

- Unscrew plug (arrow).
- Pour in gearbox oil up to lower edge of filler hole.
- Screw in plug (arrow).
- Start engine, engage a gear and allow gearbox to rotate for about 2 minutes.
- Switch off engine and unscrew plug (arrow).
- Once again pour in gearbox oil up to lower edge of filler hole.
- Screw in plug (arrow) with new seal, 35 Nm.

Disassembling and assembling gearbox

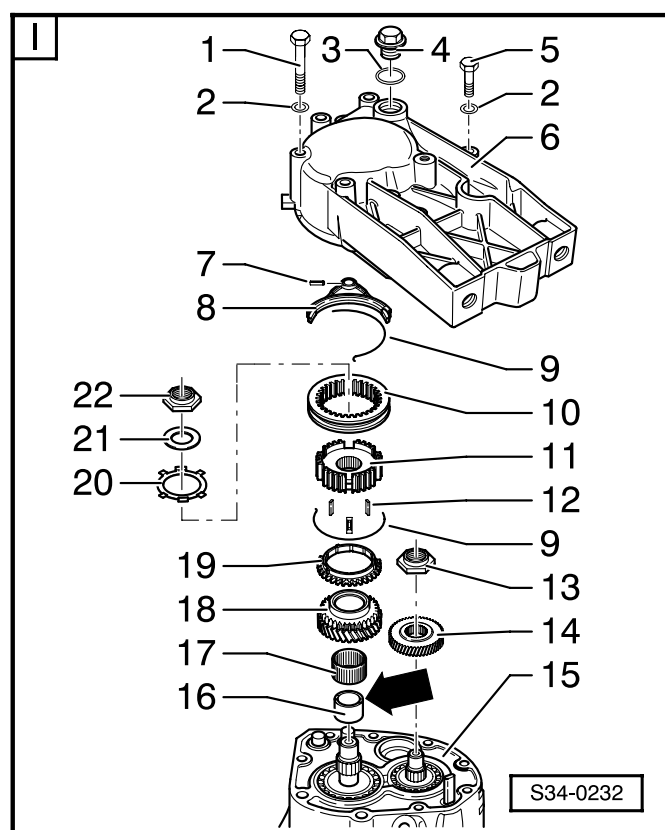


Removal and installation sequence
⇒ page 34-28

**I - Removing and installing cover for gear-
box housing and 5th gear ⇒ page 34-24**

**II - Removing and installing gearbox hous-
ing, input shaft, output shaft (drive pinion),
differential and shift forks ⇒ page 34-25**

I - Removing and installing cover for gearbox housing and 5th gear



Notes:

- ♦ The gearbox must be lowered with the supporting device MP 9-200 in order to be able to remove and install the cover of the gearbox housing.
- ♦ If the cover of the gearbox housing is fitted on with the gearbox installed, top up gear oil and check oil level ⇒ page 34-22.

1 - M 8 x 80, 25 Nm

- ♦ 4 total

2 - Washer

3 - Seal

- ♦ Replace

4 - Plug for inspecting gear oil, 35 Nm

5 - M 8 x 45, 25 Nm

- ♦ 5 in total

6 - Cover for gearbox housing

7 - Roll pin 5 x 22 mm

- ♦ Replace
- ♦ Removing and installing ⇒ from page 34-28

8 - 5th gear shift fork

- ♦ Removing and installing ⇒ from page 34-28

9 - Spring

10 - 5th gear sliding sleeve

- ♦ Removing and installing ⇒ from page 34-28

11 - 5th gear synchronizer body

12 - Locking piece (3 in total)

13 - Nut, 60 Nm

- ♦ For input shaft
- ♦ Always replace
- ♦ Pay attention to removal and installation sequence for slackening and tightening the nut ⇒ from page 34-28

14 - 5th speed gearwheel

- ♦ Installation position ⇒ page 34-33

15 - Gearbox housing

- ♦ Servicing ⇒ page 34-35

16 - Sleeve for needle bearing

- ♦ Installation position: oil pockets -arrow- point toward 5th gear synchronizer body

17 - Needle bearing

18 - 5th speed shift gear

19 - 5th speed synchronizer ring

20 - Supporting ring

- ♦ Prevents locking pieces from moving out

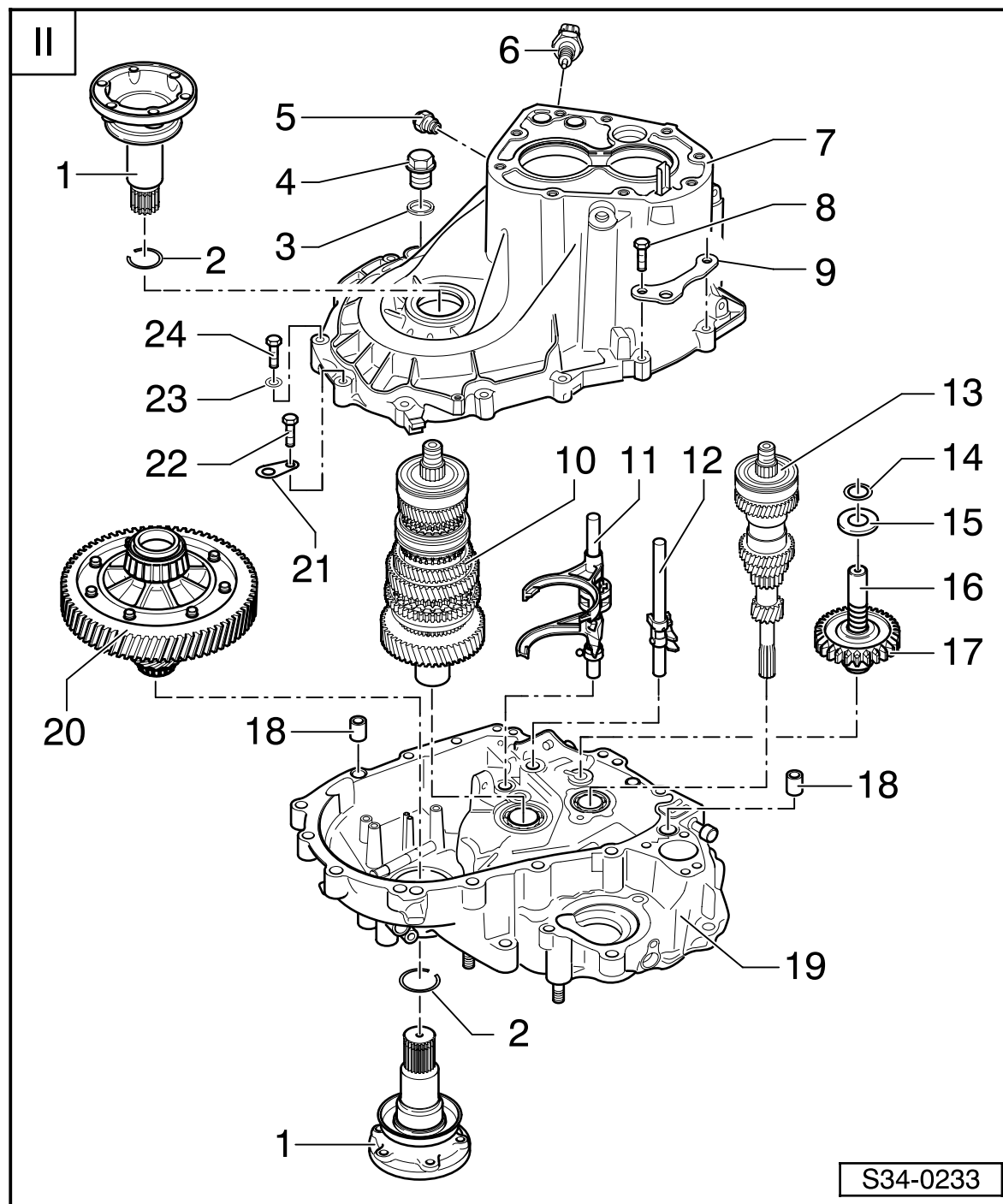
21 - Dished washer

- ♦ Installation position: the higher outer diameter points toward the cover for gearbox housing

22 - Nut, 60 Nm

- ♦ For output shaft
- ♦ Always replace
- ♦ Pay attention to removal and installation sequence for slackening and tightening the nut ⇒ from page 34-28

II - Removing and installing gearbox housing, input shaft, output shaft (drive pinion), differential and shift rods



1 - Flange shaft

- ◆ Removing and installing
⇒ page 39-1

2 - Circlip

- ◆ Always replace
- ◆ Removing and installing
⇒ page 34-33

3 - Seal

- ◆ Replace

4 - Oil drain plug, 35 Nm

- ◆ Without magnet

5 - Locking bolt, 35 Nm

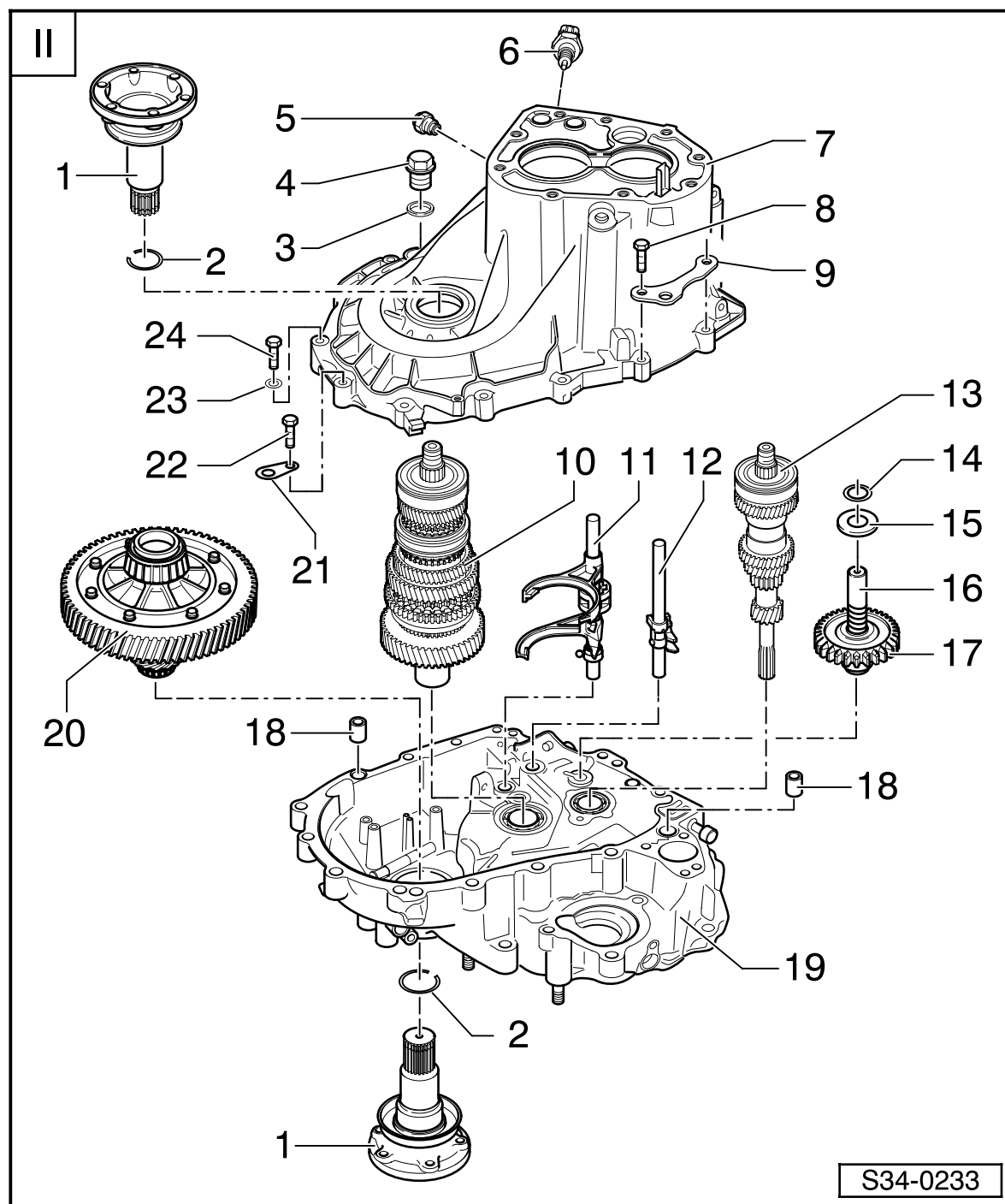
- ◆ Before installing, apply THREE BOND 1305 sealant
- ◆ Installing ⇒ page 34-35

6 - Reversing light switch -F4-, 15 Nm

- ◆ Before installing, apply THREE BOND 1324 sealant

7 - Gearbox housing

- ◆ Servicing ⇒ page 34-35



8 - M 8 x 45, 25 Nm

♦ 13 in total

9 - Suspension eye

10 - Output shaft

♦ Disassembling and assembling
⇒ page 35-5

11 - Shift rod with shift forks for 1st to 4th gear

♦ Disassembling and assembling
⇒ page 34-44

12 - Shift rod for reverse and 5th gear

13 - Input shaft

♦ Disassembling and assembling
⇒ page 35-1

14 - O-ring

15 - Washer

16 - Reverse idler gear shaft

♦ Installation position of roll pin in reverse idler gear shaft ⇒ Fig. 1

17 - Reverse idler gear

- ◆ Insert with reverse idler gear shaft

18 - Roll pin

- ◆ 2 in total

19 - Clutch housing

- ◆ Servicing ⇒ page 34-37

20 - Differential

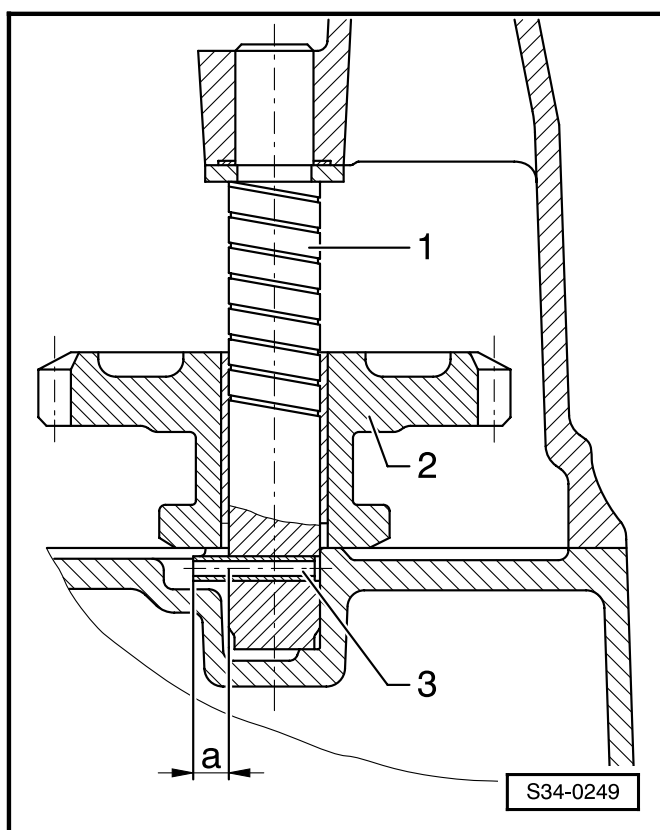
- ◆ Disassembling and assembling
⇒ page 39-5

21 - Suspension eye

22 - M 8 x 50, 25 Nm

23 - Washer

24 - M 8 x 55, 25 Nm



◀ **Fig. 1** **Installation position of roll pin in reverse idler gear shaft**

- Use extractor MP 3-508 to knock roll pin -3- into reverse idler gear shaft -1- to maintain dimension -a- = 6 mm.
- 2 - Reverse idler gear

Sequence of removal and installation operations

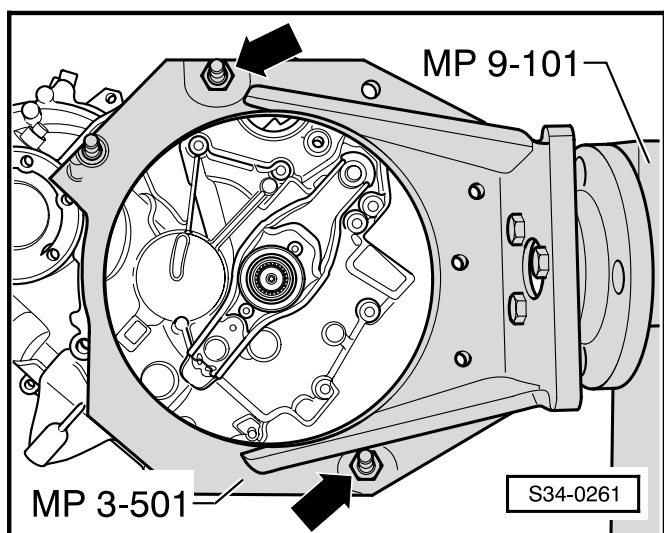
Removing and installing cover for gearbox housing, input shaft, output shaft (drive pinion), differential and shift rods

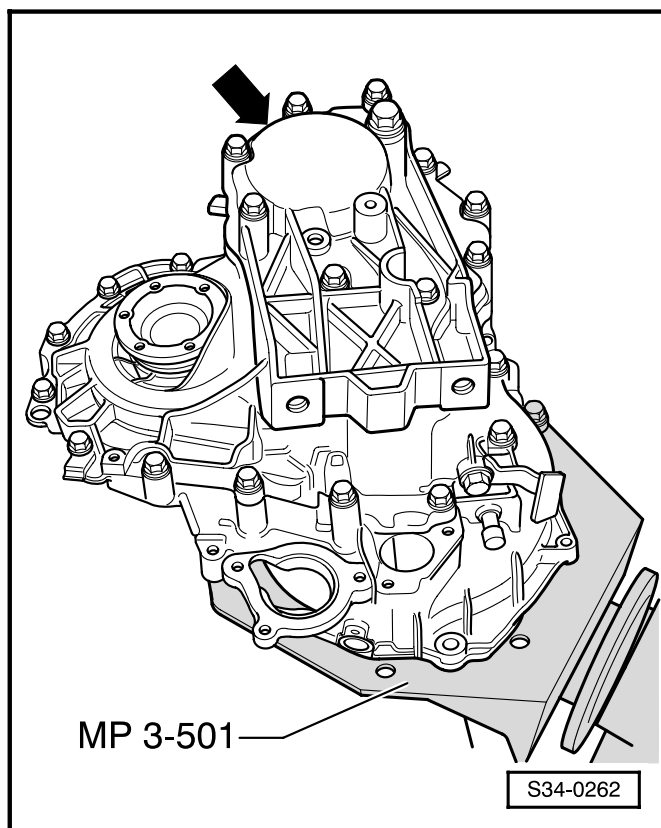
Special tools, testers and aids required

- ◆ Universal tool MP 3-419
- ◆ Adapter MP 3-419/40
- ◆ Gearbox holder MP 3-501
- ◆ Extractor for roll pin MP 3-509
- ◆ Cross-cut chisel MP 3-533
- ◆ Special tool for securing nut MP 3-605
- ◆ Repair stand MP 9-101
- ◆ Sealant, e.g. THREE BOND 1104
- ◆ Sealant, e.g. THREE BOND 1305
- ◆ Sealant, e.g. THREE BOND 1324

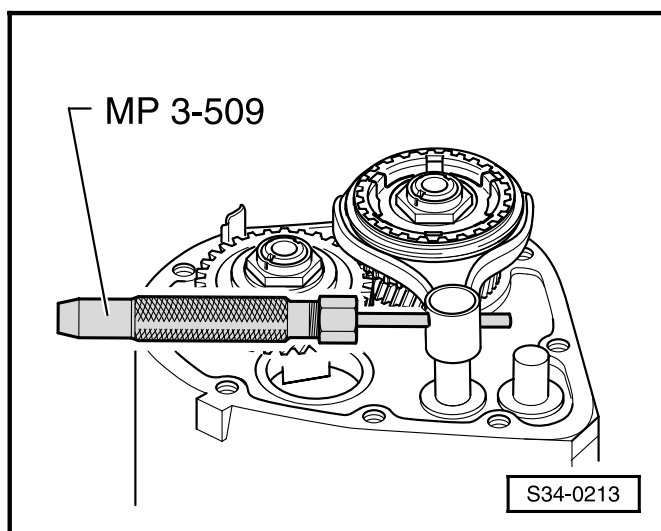
Removing

- Drain gear oil.
- ◀ - Attach gearbox to repair stand (arrows).
- Remove clutch release lever, release bearing and guide sleeve ⇒ page 30-9.

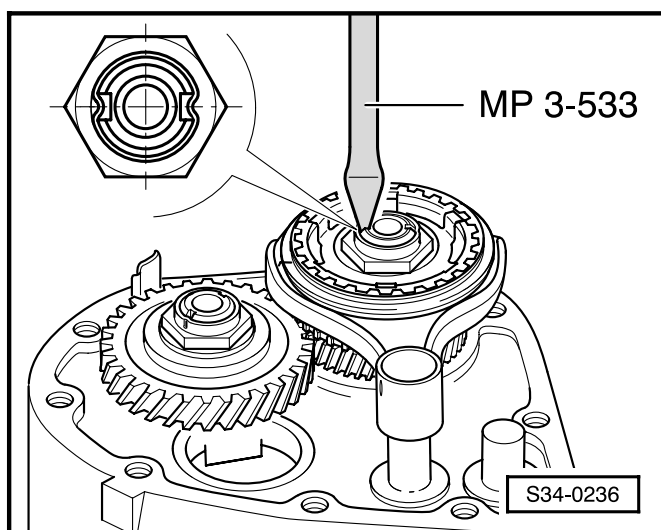




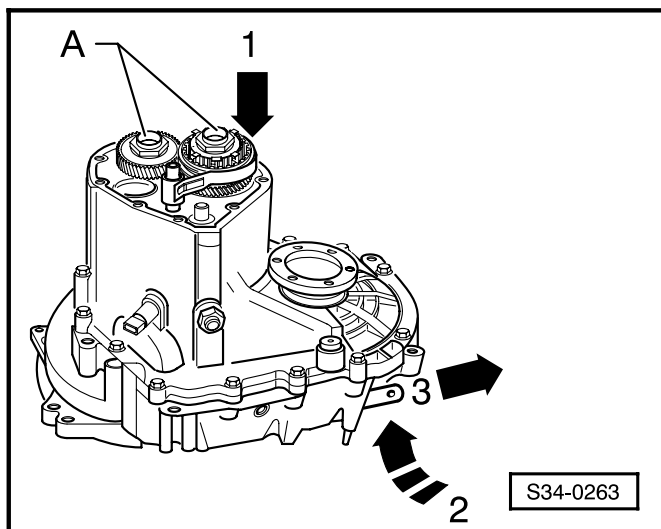
- ◀ - Unbolt cover (arrow) for gearbox housing.



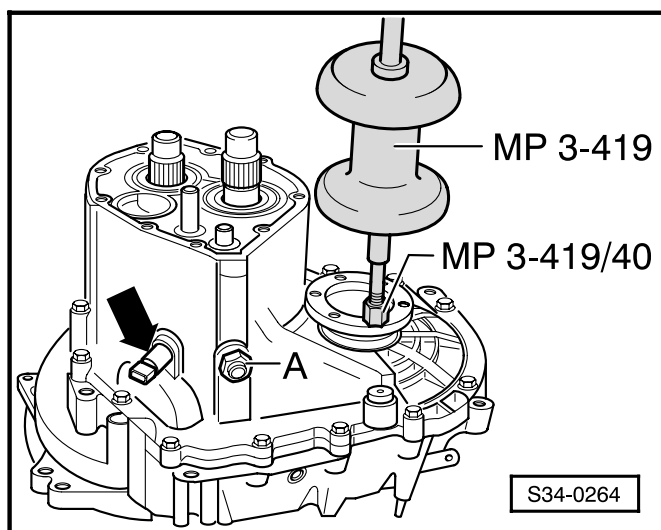
- ◀ - Use special tool MP 3-509 to knock out roll pin for shift fork of 5th gear.



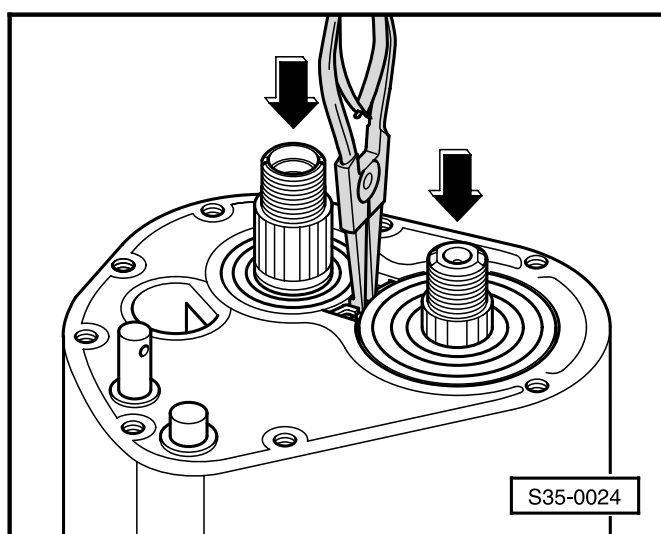
- ◀ - Use cross-cut chisel MP 3-533 to release nuts for input and output shaft.



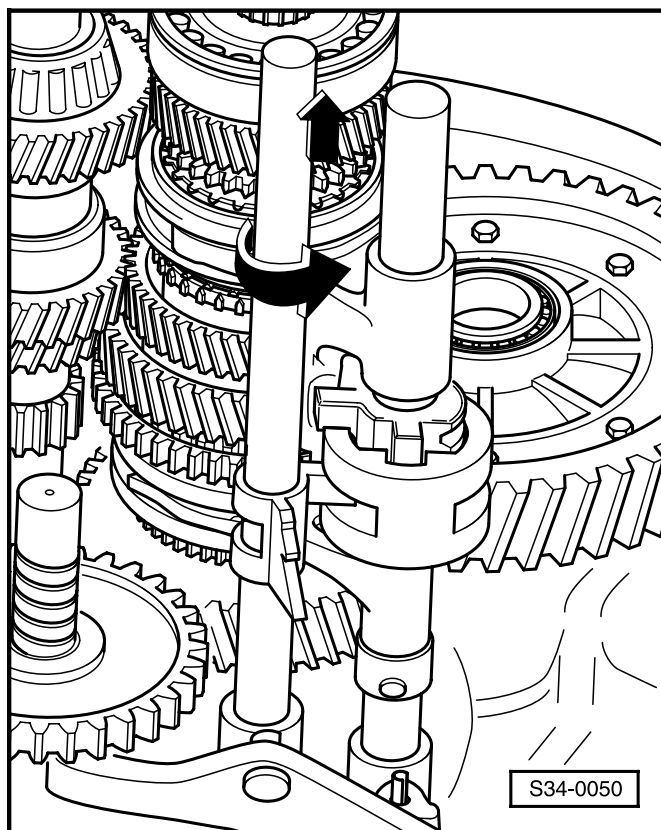
- ◀ - Unscrew nuts -A- for synchromesh body and gearwheel of 5th speed; engage 5th gear (arrow 1) and 1st gear (arrows 2 and 3) for this step.
- After engaging both gears, the input and output shafts are blocked, the synchromesh body and gearwheel can no longer rotate. It is now possible to slacken both nuts.
- Disengage 5th gear by means of the sliding sleeve.
- Move shift shaft into Neutral position.
- Take off 5th speed shift fork, sliding sleeve, synchronizer body together with 5th speed sliding gear together.



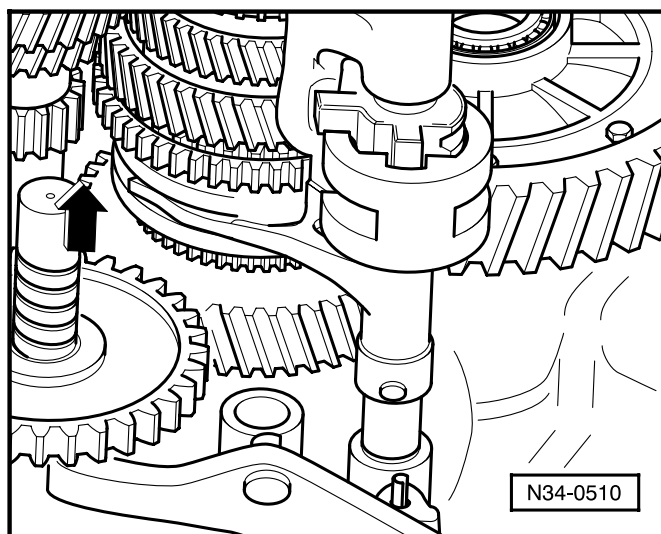
- Take off 5th speed gearwheel.
- ◀ - Pull out flange shaft on left and right.
- The illustration shows the left flange shaft being pulled out. The procedure for the right flange shaft is identical.
- Remove reversing light switch -F4- (arrow).
- Remove locking bolt -A- for shift rod of 1st to 4th gear.
- Unscrew hexagon bolts for gearbox housing at clutch housing.



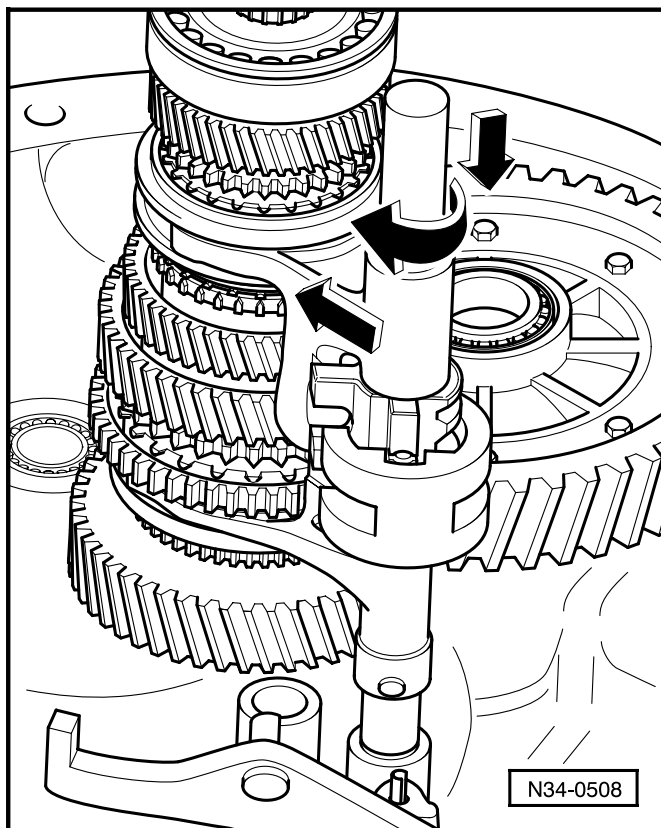
- ◀ - Use pliers to spread apart circlips of grooved ball bearings for input and output shafts.
- Press down input and output shafts as far as the stop -arrows-.
- Carefully lever off gearbox housing at the housing webs which project all round. Do not damage the sealing surfaces during this step.



- ◀ - Remove shift rod for 5th gear and reverse gear; move shift rod in direction of arrow for this purpose.

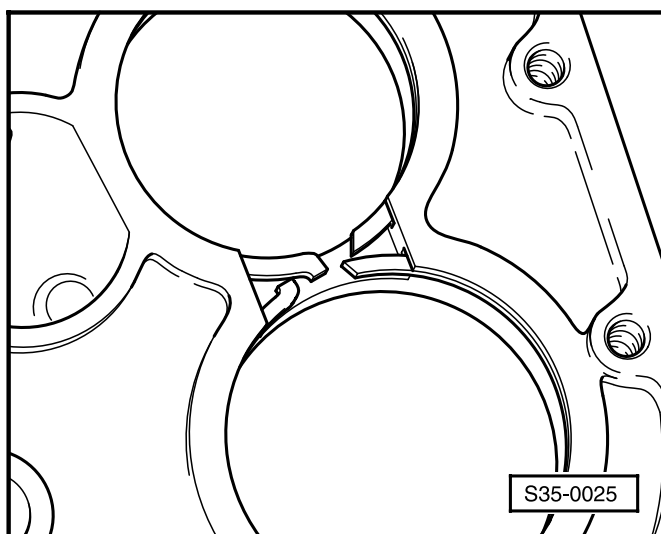


- ◀ - Pull out reverse idler gear with shaft -arrow-.
- Take out input shaft complete.
- Take shift rod of 1st to 4th gear together with output shaft off the clutch housing.
- Remove differential.

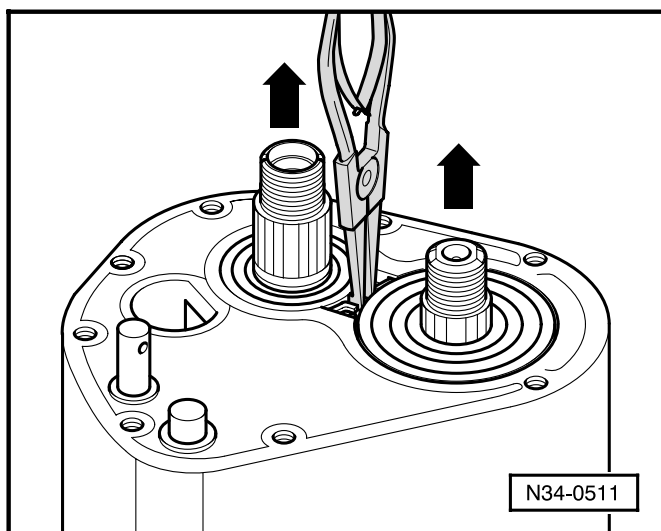


Installing

- Insert differential.
- ◀ - Insert output shaft together with shift rod of 1st to 4th gear into clutch housing; move shift rod in direction of arrow during this step.
- Insert complete input shaft together with grooved ball bearings.
- Install reverse idler gear and shaft.



- ◀ - Circlips for grooved ball bearings of input and output shafts must be inserted into the slot of the gearbox housing, as shown in illustration.
- Apply an even coat of sealant, e.g. **THREE BOND 1104**, to the sealing surface.
- Mount gearbox housing onto clutch housing.

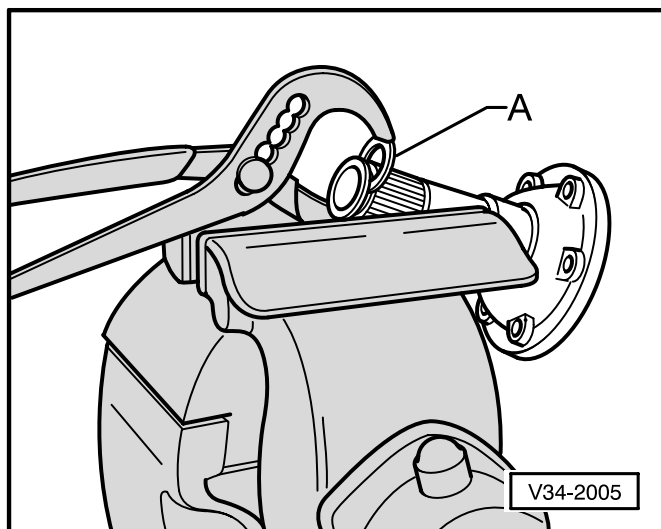


- ◀ - Use pliers to spread apart circlips.
- Pull input and output shafts up -arrows- until the circlips engage in the grooves of the ball bearings.
- Tighten the hexagon bolts for attaching the gearbox housing to 25 Nm.

- Insert reversing light switch -F4- and locking bolt for shift rod of 1st to 4th gear with sealant or locking fluid, respectively.

Note:

When inserting the locking bolt, ensure that the sleeve of the shift finger is not at the level of the hole. If this is the case, raise sleeve of shift finger slightly in order to avoid damage to the thread.

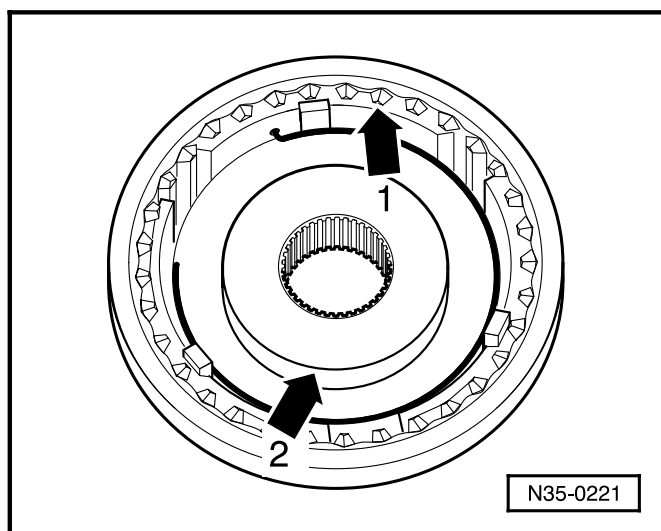


- ◀ - Clamp flange shaft in vice, using protective jaws. Press previous circlip out of the groove with new circlip -A-.
- Use a plastic-headed hammer to knock in left flange shaft and right flange shaft.

Installation position of 5th speed gearwheel

The shoulder on the inner diameter points toward gearbox housing.

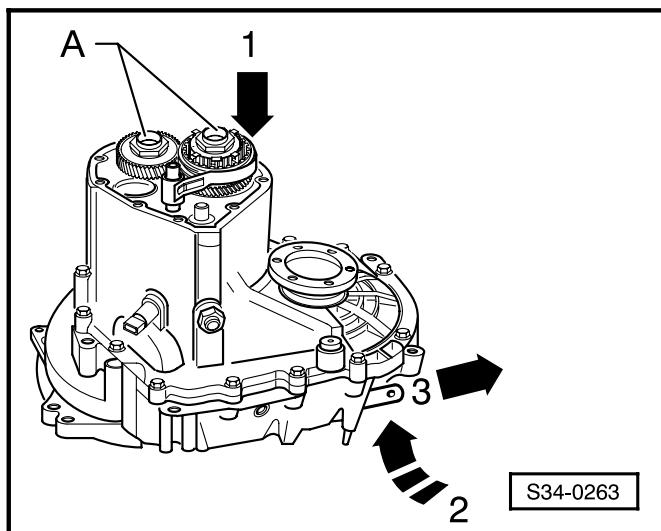
- Fit on 5th speed gearwheel.
- Place sleeve for needle bearing of 5th gear onto the output shaft, with the oil pockets facing up.
- Fit on shift gear of 5th speed together with needle bearing.
- Fit synchronizer ring of 5th speed onto the shift gear.
- Assemble synchronizer body/sliding sleeve of 5th gear before installing ⇒ page 35-6, items 5 and 6.



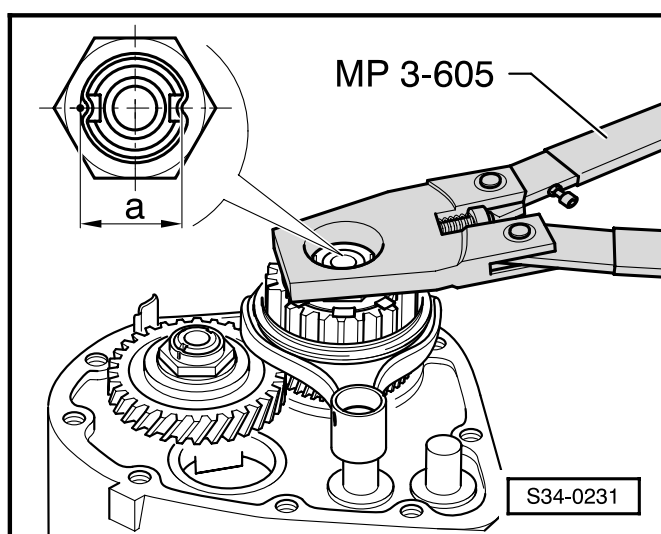
◀ **Installation position of synchronizer body/sliding sleeve of 5th gear**

The sharp pointed teeth of the sliding sleeve (arrow 1) and the high shoulder of the synchronizer body (arrow 2) point toward gearbox housing.

- Fit on shift fork of 5th gear together with synchronizer body and sliding sleeve.
- Place supporting ring and dished washer onto synchronizer body of 5th gear.

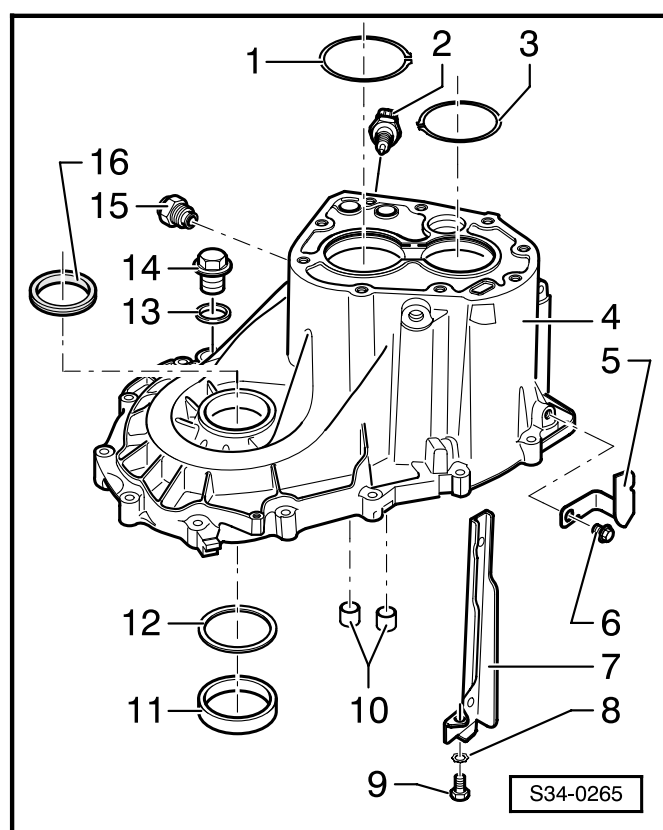


- ◀ - Engage 2 gears before tightening the nuts
-A- for attaching synchronizer body and 5th speed gearwheel (arrows 1 to 3).



- ◀ - Secure nuts on input and output shafts.
 $a = 24.2 \pm 0.3 \text{ mm}$
- Disengage 5th gear by means of the sliding sleeve.
- Attach shift fork of 5th gear with new roll pin on the shift rod.
- Shift through all gears.
- Apply an even coat of sealant, e.g. **THREE BOND 1104**, to the sealing surface.
- Install cover for gearbox housing.
- Install clutch release lever, release bearing and guide sleeves ⇒ page 30-9.

Servicing gearbox housing



Special tools, testers and aids required

- ◆ Universal tool MP 3-419
- ◆ Insertion drift MP 3-606
- ◆ Internal extractor Kukko 21/2
- ◆ Sealant THREE BOND 1305
- ◆ Sealant THREE BOND 1324

1 - Circlip

- ◆ For grooved ball bearing of output shaft
- ◆ Installation position ⇒ Fig. 1

2 - Reversing light switch, 15 Nm

- ◆ Apply sealant THREE BOND 1324 before installing

3 - Circlip

- ◆ For grooved ball bearing of input shaft
- ◆ Installation position ⇒ Fig. 1

4 - Gearbox housing

5 - Bracket

6 - 35 Nm

7 - Oil guide

8 - Locking washer

9 - 10 Nm

10 - Bearing bush for shift rod

- ◆ Removing ⇒ Fig. 2
- ◆ Inserting ⇒ Fig. 3

11 - Outer race of taper roller bearing

- ◆ For differential
- ◆ Removing and installing
⇒ page 39-5
- ◆ If replaced: set differential
⇒ page 39-12

12 - Shim

- ◆ For differential
- ◆ Determining thickness ⇒ page 39-13

13 - Seal

- ◆ Always replace

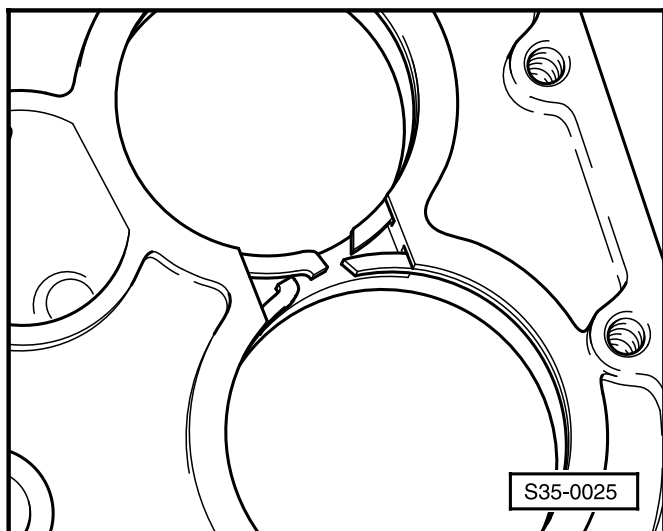
14 - Oil drain plug, 35 Nm

15 - Locking bolt, 35 Nm

- ◆ Apply sealant THREE BOND 1305 before installing

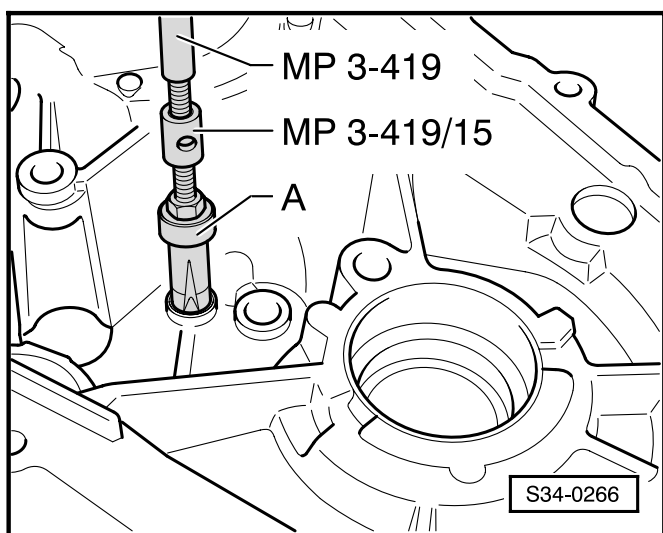
16 - Seal

- ◆ For left flange shaft
- ◆ Replacing ⇒ page 39-1



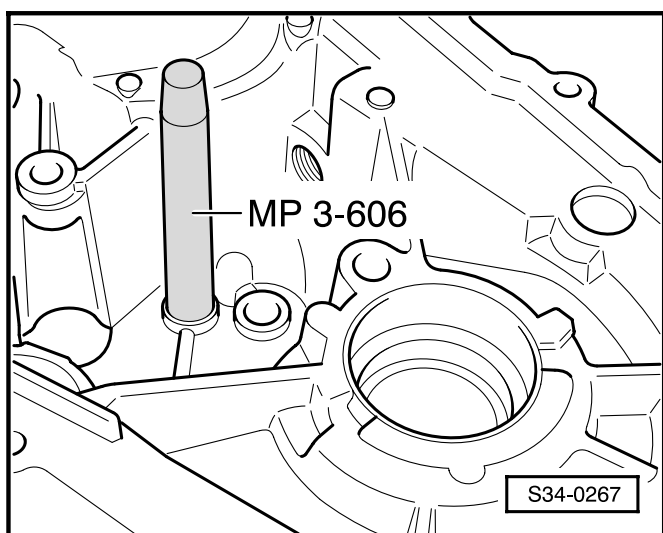
◀ **Fig. 1 Installation position of the circlips for input and output shaft**

- Insert circlips into the groove of the gearbox housing as shown.



◀ **Fig. 2 Removing bearing bush for shift rod**

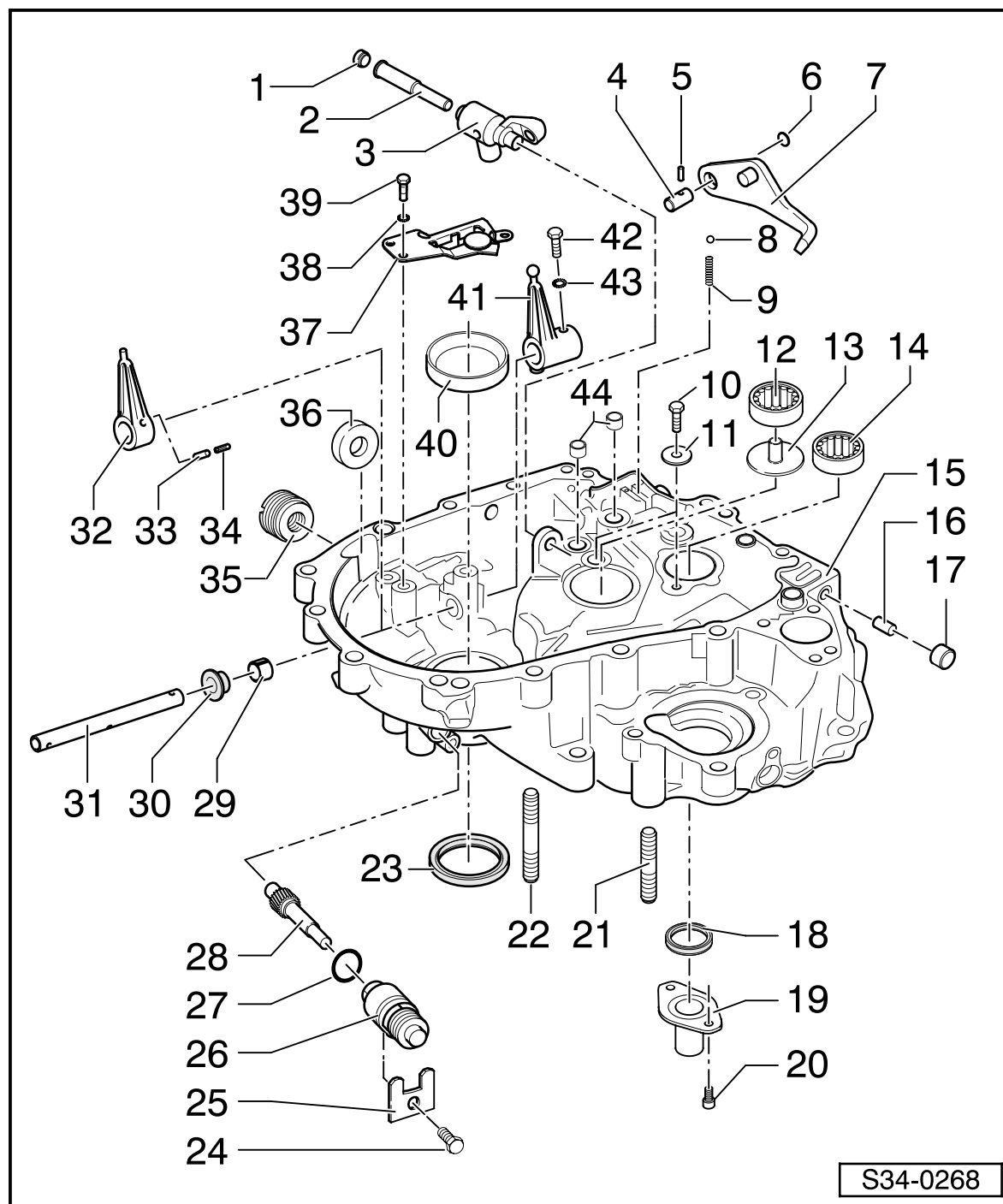
A - Internal extractor 14.5 ... 18.5 mm, e.g. Kukko 21/2



◀ **Fig. 3 Knocking in bearing bush for shift rod as far as the stop**

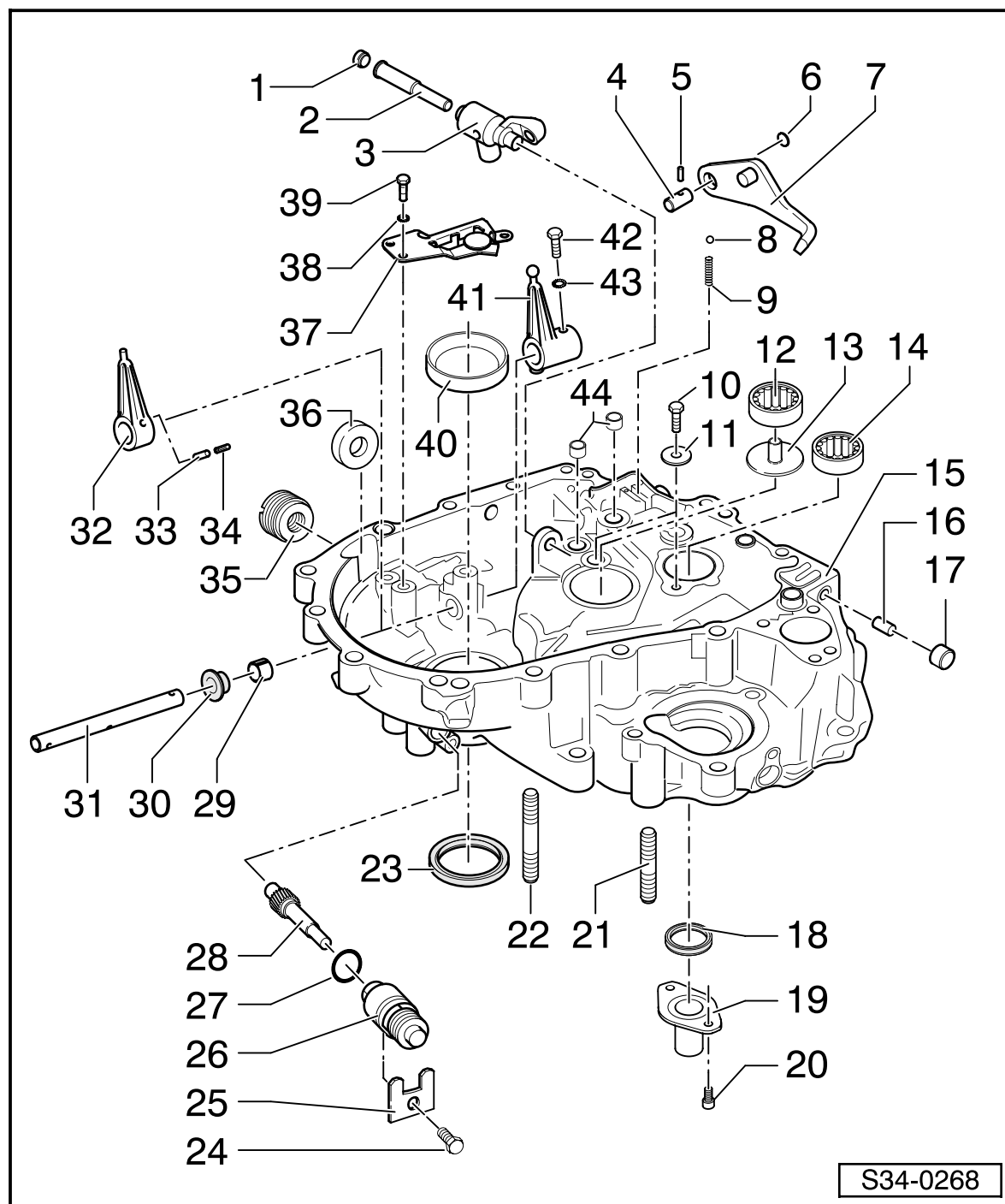
Use special tool MP 3-606 which at the same time prevents the bearing bush from wandering out.

Servicing clutch housing



Special tools, testers and aids required

- ◆ Gearbox holder MP 3-501
- ◆ Wrench for threaded bush T30009
- ◆ Universal tool MP 3-419
- ◆ Sleeve MP 3-424
- ◆ Tube section MP 3-4013
- ◆ Adapter for resetting tool MP 3-604
- ◆ Insertion drift for bearing bush of shift rod MP 3-606
- ◆ Resetting tool MP 9-501
- ◆ Extractor MP 3-508
- ◆ THREE BOND 1305 sealant
- ◆ THREE BOND 1324 sealant
- ◆ Loctite 648



S34-0268

1 - Screw plug, 30 Nm

- ◆ Apply THREE BOND 1324 sealant before installing

2 - Bell crank pin

- ◆ Removing and installing ⇒ Fig. 1

3 - Bell crank**4 - Pin**

- ◆ For reverse gear lever

5 - Roll pin

- ◆ 4 x 25 mm
- ◆ Use extractor for locking pin Ø 4 mm MP 3-508 for installing

6 - Plug

- ◆ Apply THREE BOND 1305 sealant before installing

7 - Reverse gear lever**8 - Locking ball****9 - Locking spring****10 - 10 Nm****11 - Washer**

12 - Cylinder roller bearing

- ◆ For output shaft
- ◆ Removing and installing
⇒ page 35-7, item 32
- ◆ Installation position ⇒ Fig. 2

13 - Connection piece**14 - Cylinder roller bearing**

- ◆ For input shaft
- ◆ Removing and installing
⇒ page 35-1, item 9
- ◆ Installation position ⇒ Fig. 2

15 - Clutch housing**16 - Breather tube**

- ◆ Use pliers for removing
- ◆ Use drift to knock in as far as stop

17 - Cap

- ◆ For gearbox breather

18 - Seal for input shaft

- ◆ Removing ⇒ Fig. 3
- ◆ Installing ⇒ Fig. 4

19 - Guide sleeve for release bearing**20 - 10 Nm**

- ◆ Apply THREE BOND 1324 sealant before installing

21 - Stud bolt, M 10**22 - Stud bolt, M 10****23 - Seal**

- ◆ For right flange shaft
- ◆ Replacing ⇒ page 39-1

24 - 20 Nm**25 - Bracket****26 - Guide bush****27 - O-ring**

- ◆ Always replace

28 - Drive shaft with pinion

- ◆ For speedometer

29 - Bearing bush

- ◆ For shift shaft
- ◆ Removing ⇒ Fig. 5
- ◆ Inserting ⇒ Fig. 6

30 - Seal

- ◆ For shift shaft
- ◆ Can be replaced with gearbox installed
- ◆ Use screwdriver to lever out
- ◆ Inserting ⇒ Fig. 7

31 - Shift shaft**32 - Shift gate arm**

- ◆ For removing, knock roll pins -item 33- and -item 34- down and out
- ◆ For installing, knock in roll pins from above

33 - Roll pin

- ◆ 5 x 22 mm
- ◆ Installation position ⇒ Fig. 8

34 - Roll pin

- ◆ 3 x 22 mm
- ◆ Installation position ⇒ Fig. 8

35 - Threaded bush, 50 Nm

- ◆ Apply THREE BOND 1305 sealant before installing
- ◆ Removing and installing ⇒ Fig. 9

36 - Magnet

- ◆ Is held by the contact surface of the housing

37 - Guide gate**38 - Locking washer****39 - 10 Nm****40 - Outer race of taper roller bearing**

- ◆ For differential
- ◆ Removing and inserting ⇒ from page 39-5
- ◆ If replaced: set differential
⇒ page 39-12

41 - Shift lever

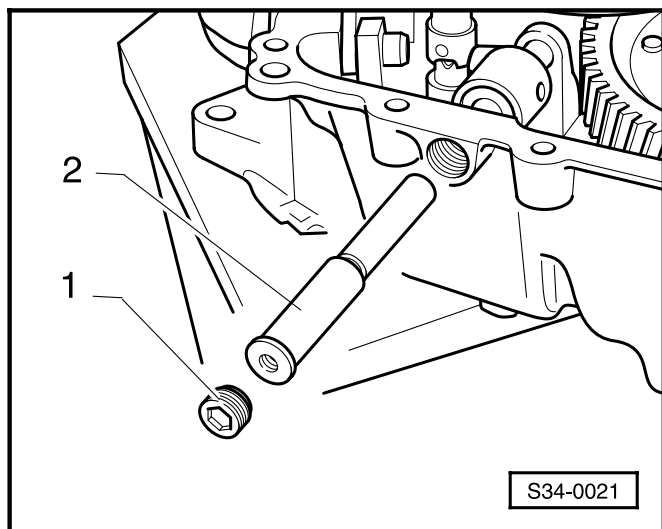
- ◆ Setting position of shift lever
⇒ Fig. 10

42 - 15 Nm

- ◆ Apply Loctite 648 before installing

43 - Locking washer**44 - Bearing bush for shift rod**

- ◆ Removing ⇒ Fig. 11
- ◆ Inserting ⇒ Fig. 12



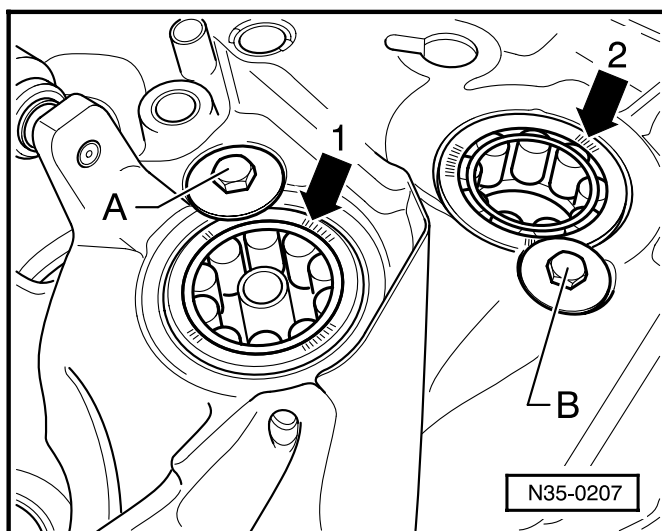
◀ Fig. 1 Removing and installing bell crank pin

Removing

- Remove screw plug -1-.
- Use setting tool MP 9-501 and adapter for setting tool MP 3-604 to knock out bell crank pin -2-.

Installing

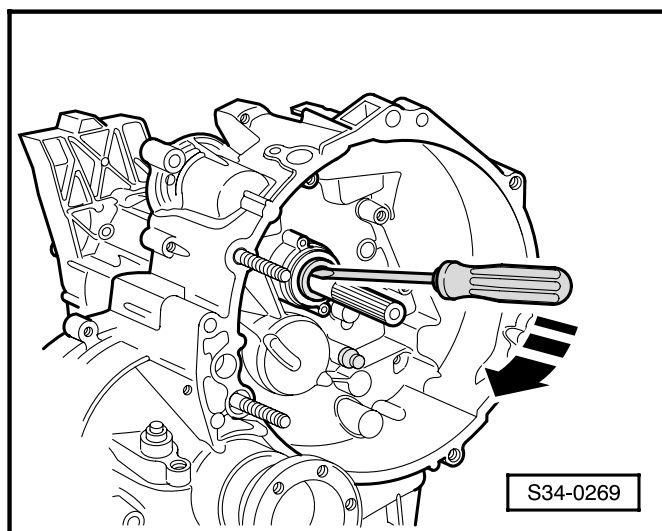
- Install bell crank pin -2-.
- Coat screw plug -1- with THREE BOND 1324 sealant and tighten to 30 Nm.



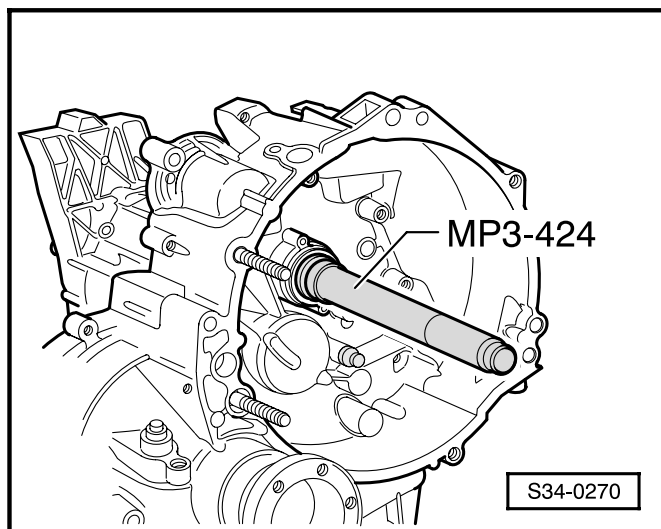
◀ Fig. 2 Installation position of cylinder roller bearings for input and output shaft

The designation on the cylinder roller bearings for output shaft -arrow 1- and input shaft -arrow 2- must be visible after installing (points up).

Secure both bearings after installing with hexagon bolts -A- and -B-.

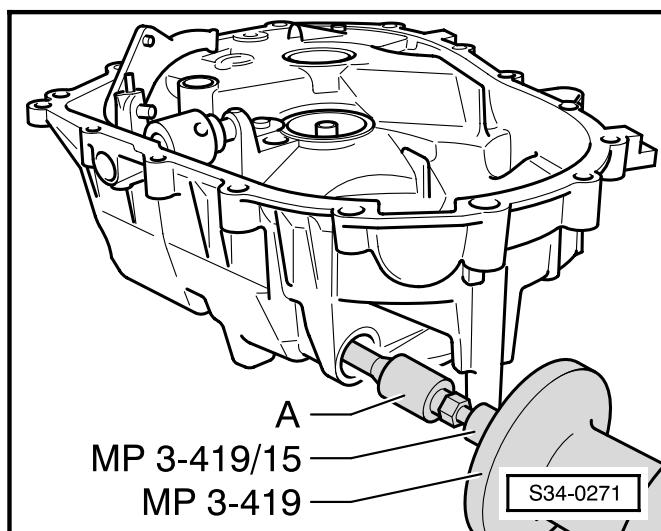


◀ Fig. 3 Removing seal for input shaft



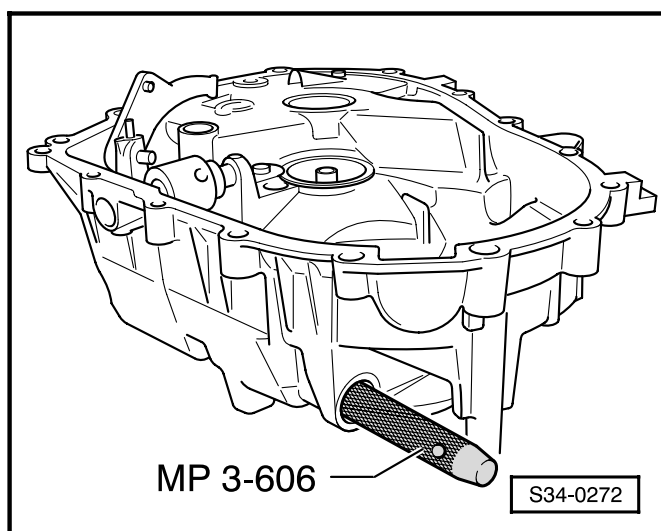
◀ **Fig. 4** Inserting seal for input shaft (with care, not as far as stop)

The seal is in its correct installation position once the guide sleeve has been installed.



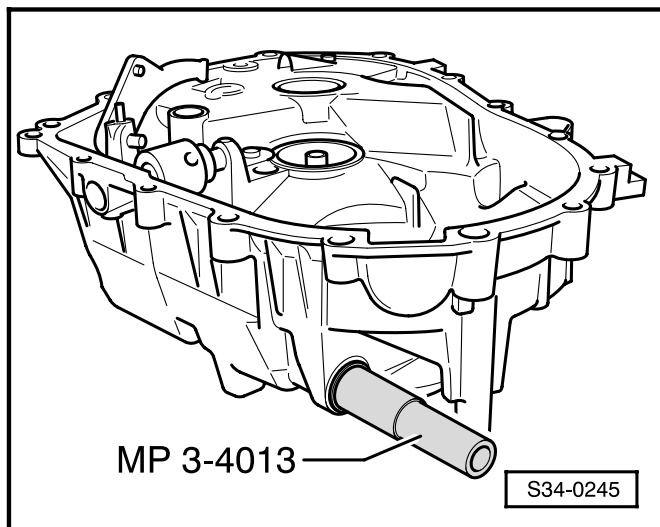
◀ **Fig. 5** Removing bearing bush for shift shaft

A - Internal extractor 14 ... 19 mm, e.g. Kukko 21/2

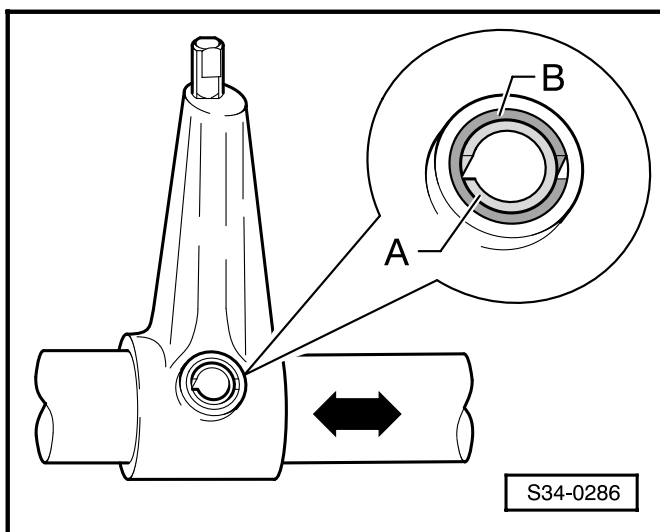


◀ **Fig. 6** Inserting bearing bush for shift shaft as far as the stop

Use special tool MP 3-606 as this at the same time prevents the bearing bush from wandering out.

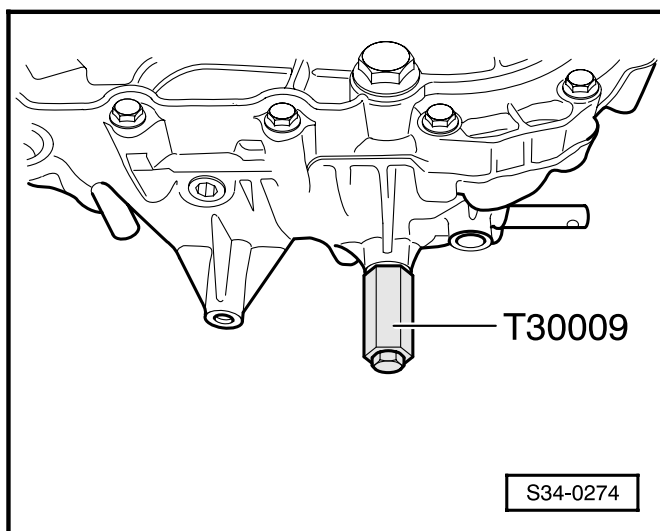


◀ Fig. 7 Inserting seal as far as stop



◀ Fig. 8 Installation position of roll pins for shift gate arms

Both roll pins -A- and -B- fit into one another. Both slots must be opposite and be facing longitudinally to the power flow -arrow-.



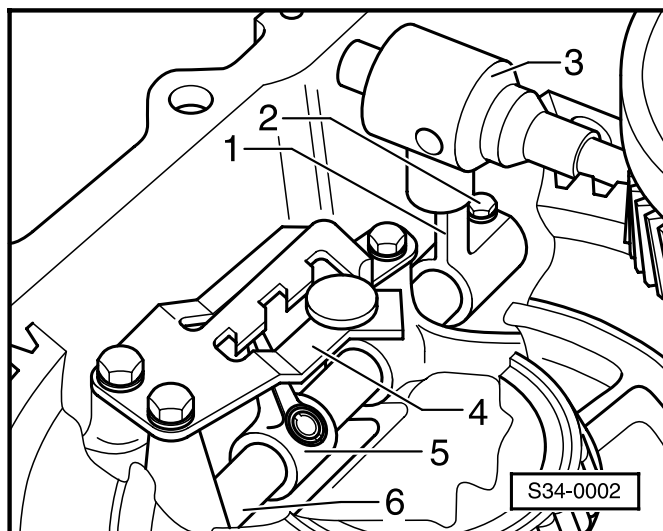
◀ Fig. 9 Removing and inserting threaded bush in clutch housing

Removing

- Connect wrench for threaded bush T30009 to threaded bush in clutch housing.
- Turn out threaded bush.

Installing

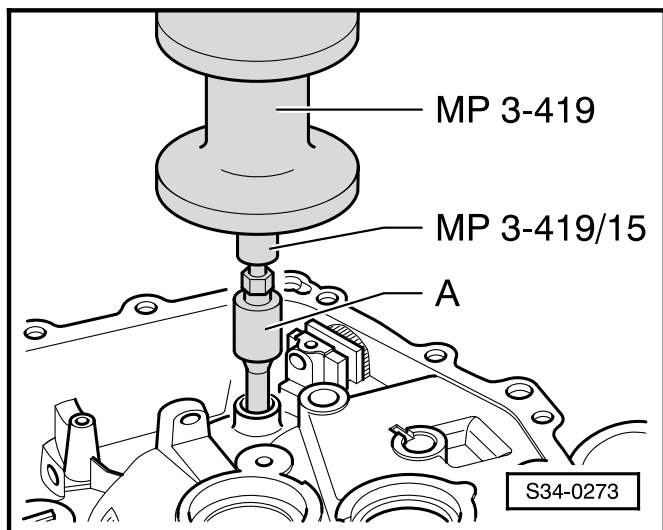
- Connect threaded bush to wrench for threaded bush T30009.
- Coat the outer thread of the threaded bush with THREE BOND 1305 sealant.
- Turn threaded bush into the clutch housing and tighten to the specified torque.



◀ Fig. 10 Setting position of shift lever

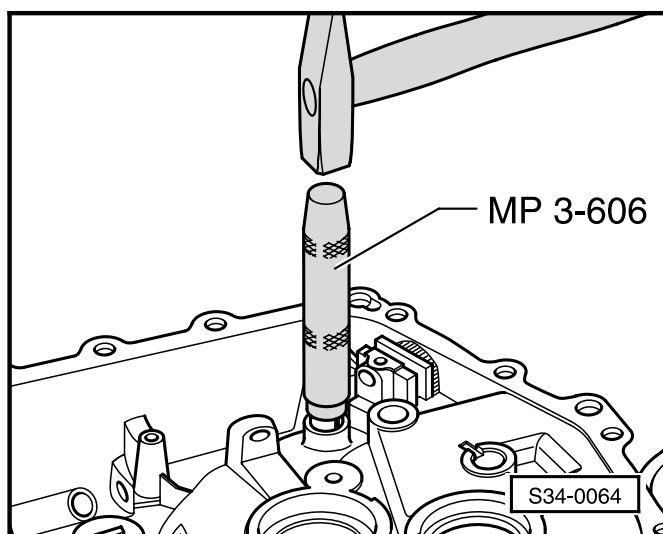
Notes:

- ♦ The opening for securing the shift shaft -6- must be facing up.
- ♦ The position of the shift lever -1- to the shift shaft -6- is important for installation to ensure that the end of the shift gate arm -5- does not come into contact with the guide gate -4- when the shift rod is moved.
- Screw in bolt -2- with Loctite 648, do not tighten fully.
- Set end of shift gate arm -5- so that the shift gate arm -5- does not make contact with the guide gate -4- when the shift rod is moved.
- Tighten bolt -2- to 15 Nm.
- The shift gate arm -5- must be replaced if the hole for the roll pins is damaged.



◀ Fig. 11 Removing bearing bush for shift rod

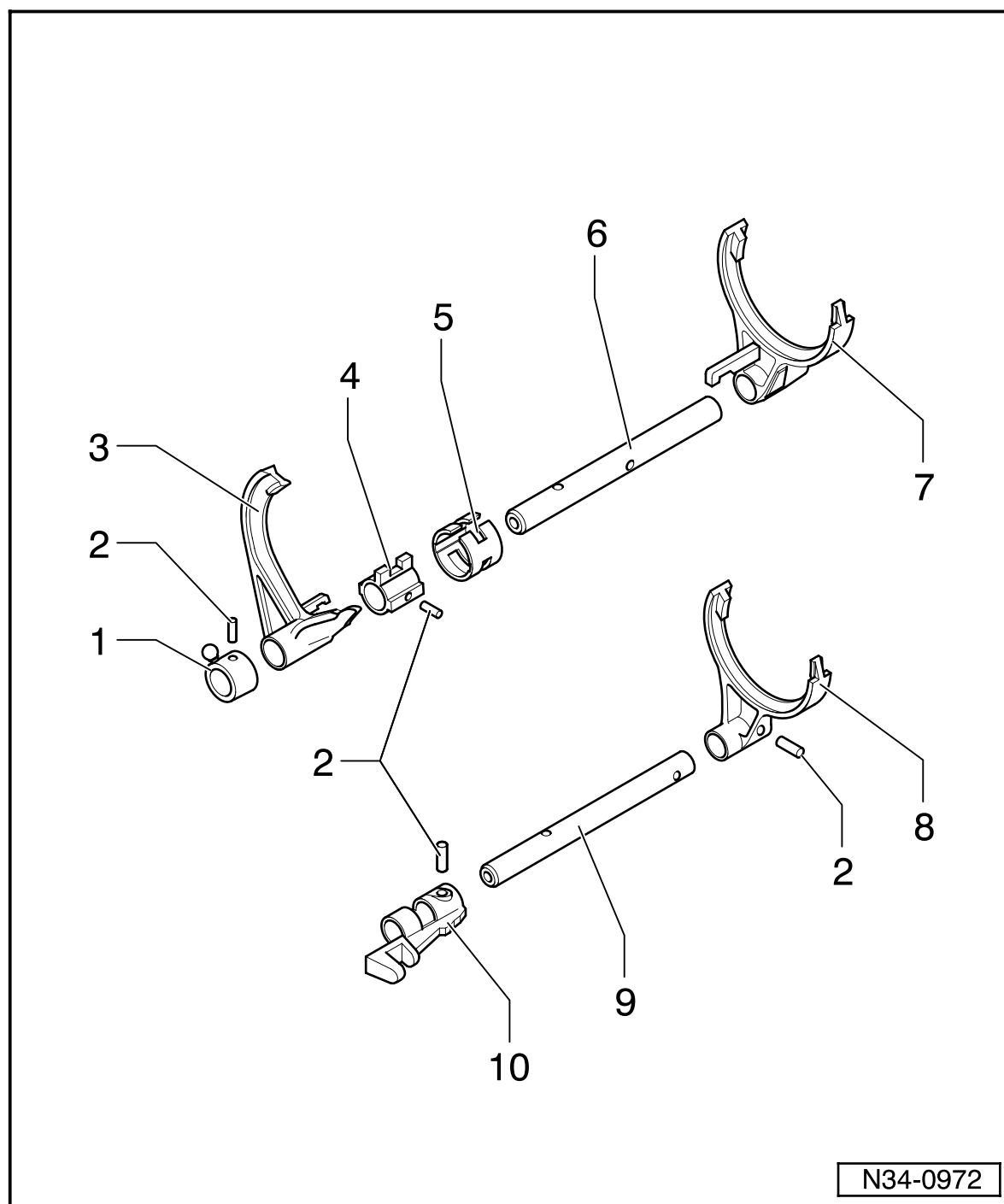
A - Internal extractor 14 ... 19 mm, e.g. Kukko 21/2



◀ Fig. 12 Inserting bearing bush for shift rod as far as the stop

Use insertion drift for bearing bush of shift rod MP 3-606 as this at the same time prevents the bearing bush from wandering out.

Disassembling and assembling shift rods with shift forks



Special tools, testers and aids required

- ◆ Extractor for locking pin MP 3-509

1 - Sleeve

2 - Roll pin

- ◆ 5 x 22 mm
- ◆ Use extractor for locking pin $\varnothing$ 5 mm MP 3-509 for removing

3 - Shift fork for 1st and 2nd gear

4 - Shift finger

5 - Sleeve of shift finger

6 - Shift rod of 1st, 2nd, 3rd and 4th gear

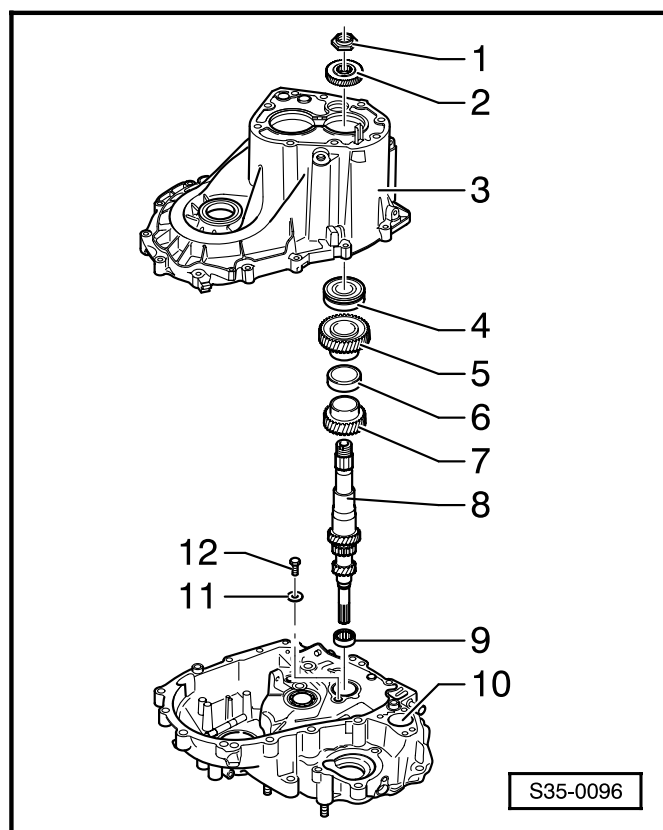
7 - Shift fork of 3rd and 4th gear

8 - Shift fork of 5th gear

9 - Shift rod of 5th gear and reverse

10 - Shift finger of 5th gear and reverse

Disassembling and assembling input shaft



Note:

Pay attention to technical data when installing new gearwheels ⇒ page 00-2.

1 - Nut, 60 Nm

- ◆ Always replace
- ◆ Pay attention to removal and installation sequence for slackening and tightening the nut ⇒ page 34-28

2 - 5th speed gearwheel

- ◆ Removing and installing ⇒ from page 34-28

3 - Gearbox housing

4 - Grooved ball bearing

- ◆ Pressing off ⇒ Fig. 1
- ◆ Pressing on ⇒ Fig. 2

5 - 4th speed gearwheel

- ◆ Pressing off ⇒ Fig. 3
- ◆ Pressing on ⇒ Fig. 6
- ◆ Collar points toward 3rd gear

6 - Spacer sleeve

7 - 3rd speed gearwheel

- ◆ Pressing off ⇒ Fig. 4
- ◆ Pressing on ⇒ Fig. 5
- ◆ Collar points toward 4th gear

8 - Input shaft

9 - Cylinder roller bearing

- ◆ Removing ⇒ Fig. 7
- ◆ Inserting ⇒ Fig. 8
- ◆ Installation position: designation on bearing points up ⇒ page 34-40, Fig. 2

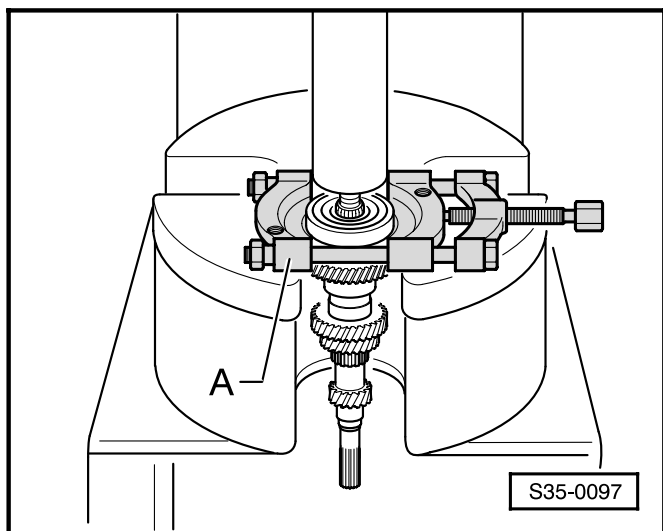
10 - Clutch housing

11 - Washer

12 - 10 Nm

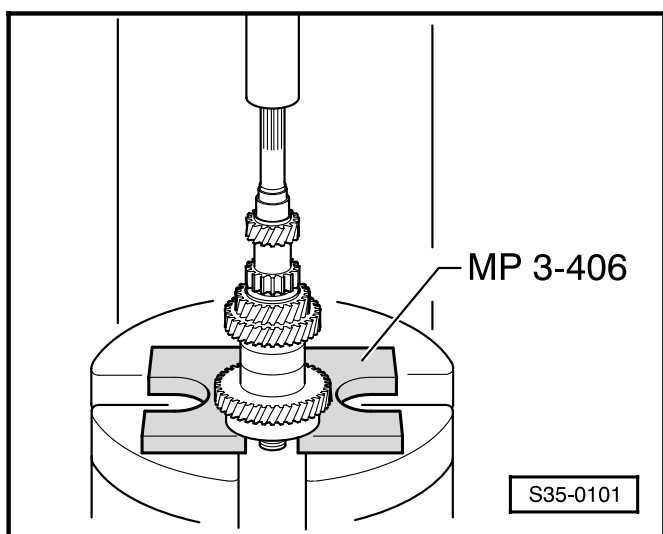
Special tools, testers and aids required

- ◆ Pressure plate MP 3-406
- ◆ Pressure plate MP 3-407
- ◆ Thrust piece MP 3-411
- ◆ Plunger MP 3-448
- ◆ Tube section MP 3-450
- ◆ Tube section MP 3-451
- ◆ Thrust washer MP 3-4014
- ◆ Separating device Kukko 17/1
- ◆ Separating device Kukko 17/2
- ◆ Workshop press, e.g. V.A.G 1290 A



◀ Fig. 1 Pressing off grooved ball bearing

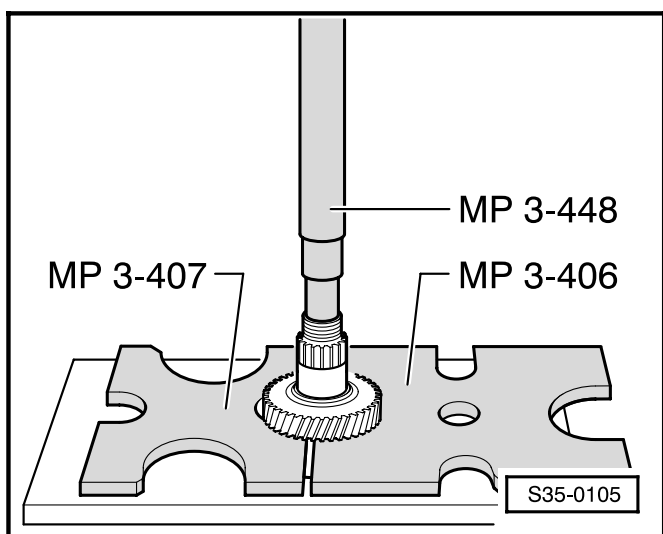
A - Separating device 12...75 mm, e.g. Kukko 17/1



◀ Fig. 2 Pressing on grooved ball bearing

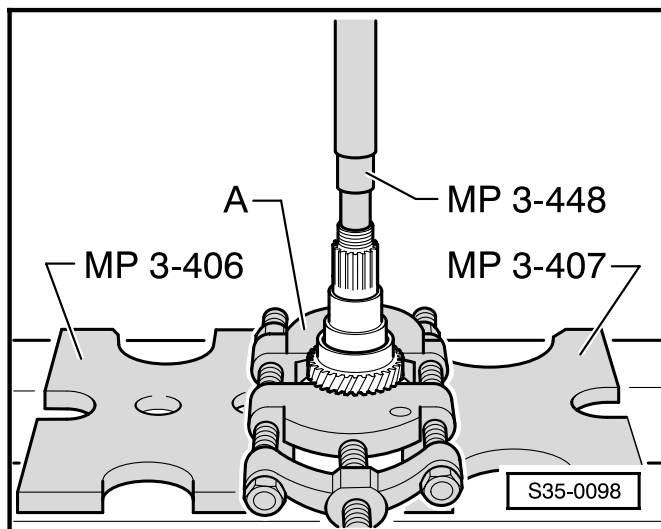
Installation position:

Slot for circlip points toward thread for nut.



◀ Fig. 3 Pressing off 4th speed gearwheel

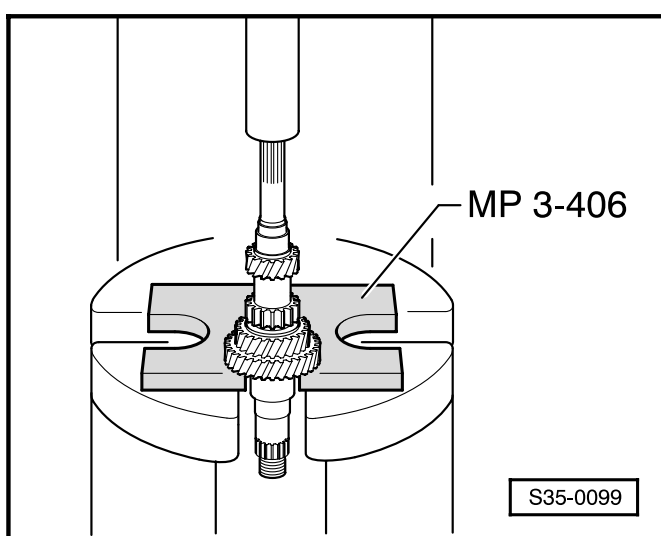
- Use commercially available workshop press, e.g. V.A.G 1290 A, to press off 4th speed gearwheel.



◀ Fig. 4 Pressing off 3rd speed gearwheel

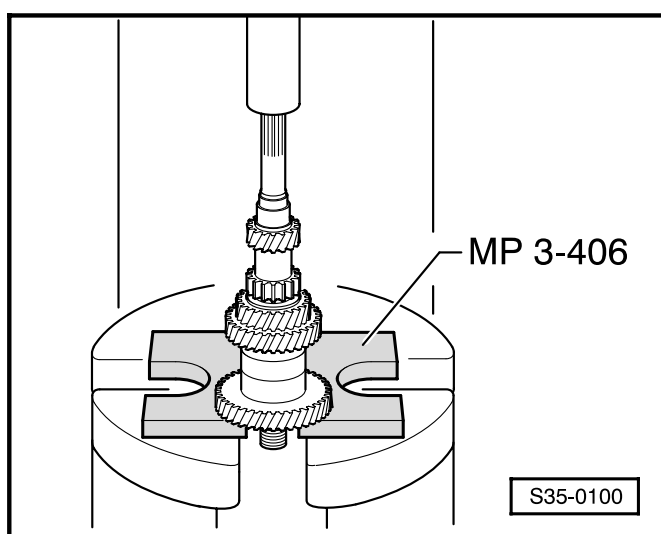
- Use commercially available workshop press, e.g. V.A.G 1290 A, to press off 3rd speed gearwheel.

A - Separating device 22...115 mm, e.g. Kukko 17/2



◀ Fig. 5 Heating 3rd speed gearwheel to approx. 100 °C and pressing on

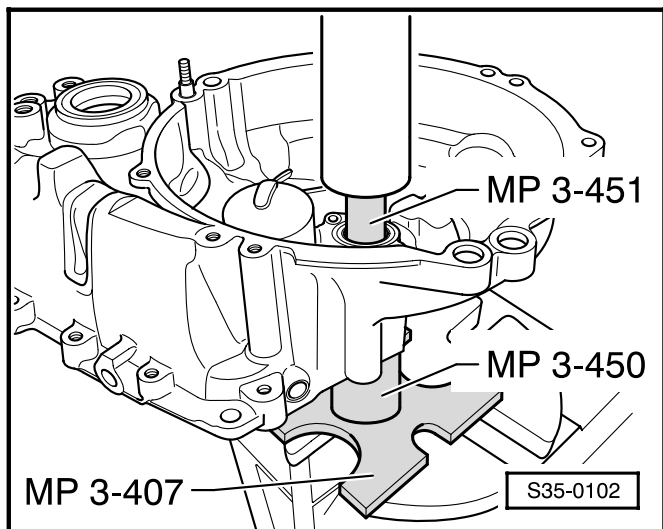
Collar points toward 4th gear.



◀ Fig. 6 Heating 4th speed gearwheel to approx. 100 °C and pressing on

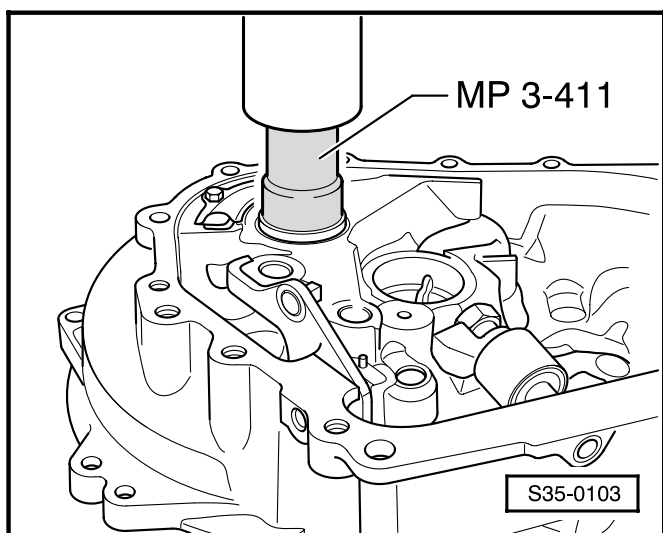
- Fit on spacer sleeve first of all.

Collar points toward 3rd gear.



◀ Fig. 7 Pressing cylinder roller bearing out of clutch housing

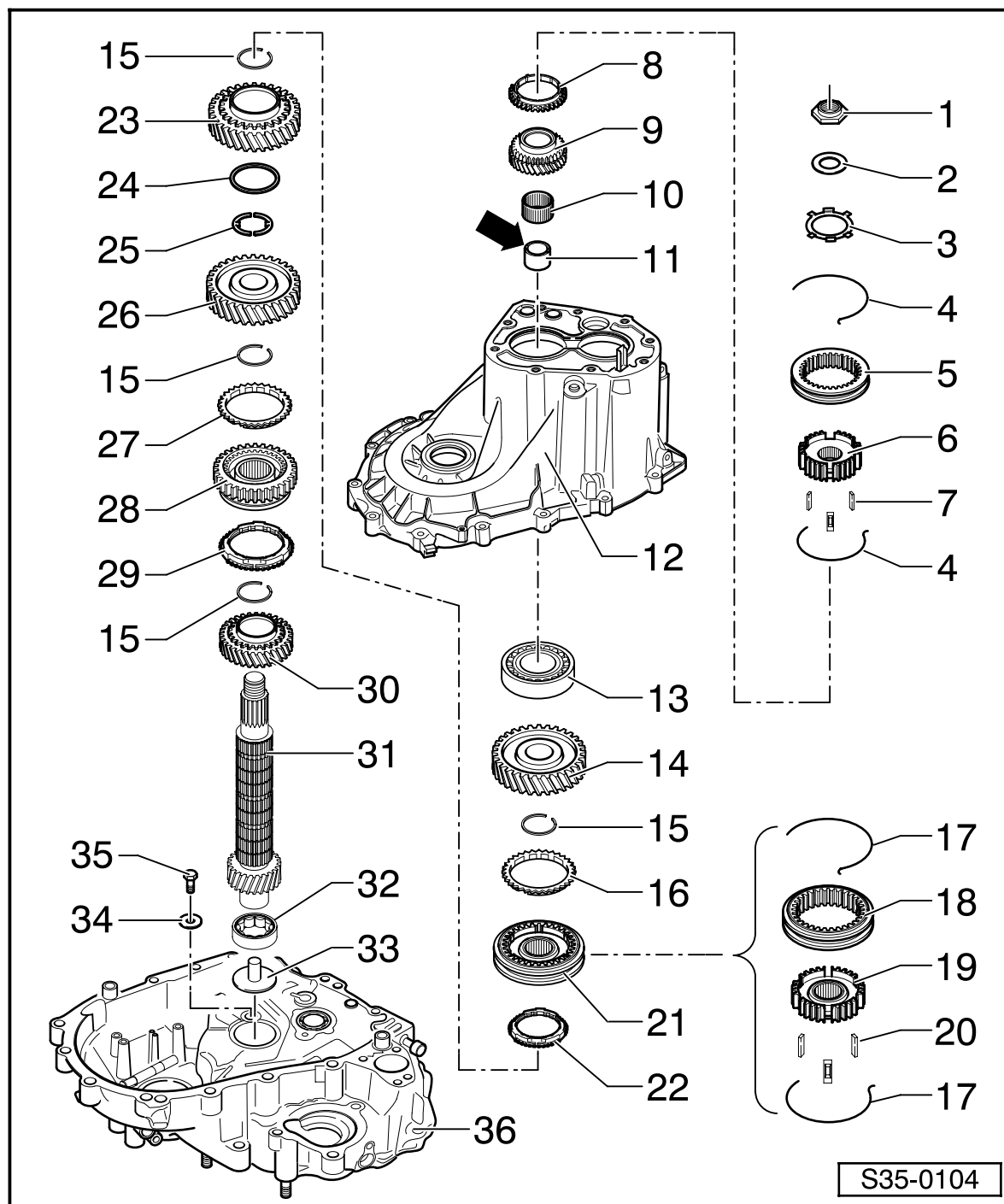
- Use tube section MP 3-450 to support clutch housing directly below bearing mount.



◀ Fig. 8 Pressing cylinder roller bearing into clutch housing

- Use thrust piece MP 3-4014 (not visible in illustration) to support clutch housing directly below bearing mount.

Disassembling and assembling output shaft (drive pinion)

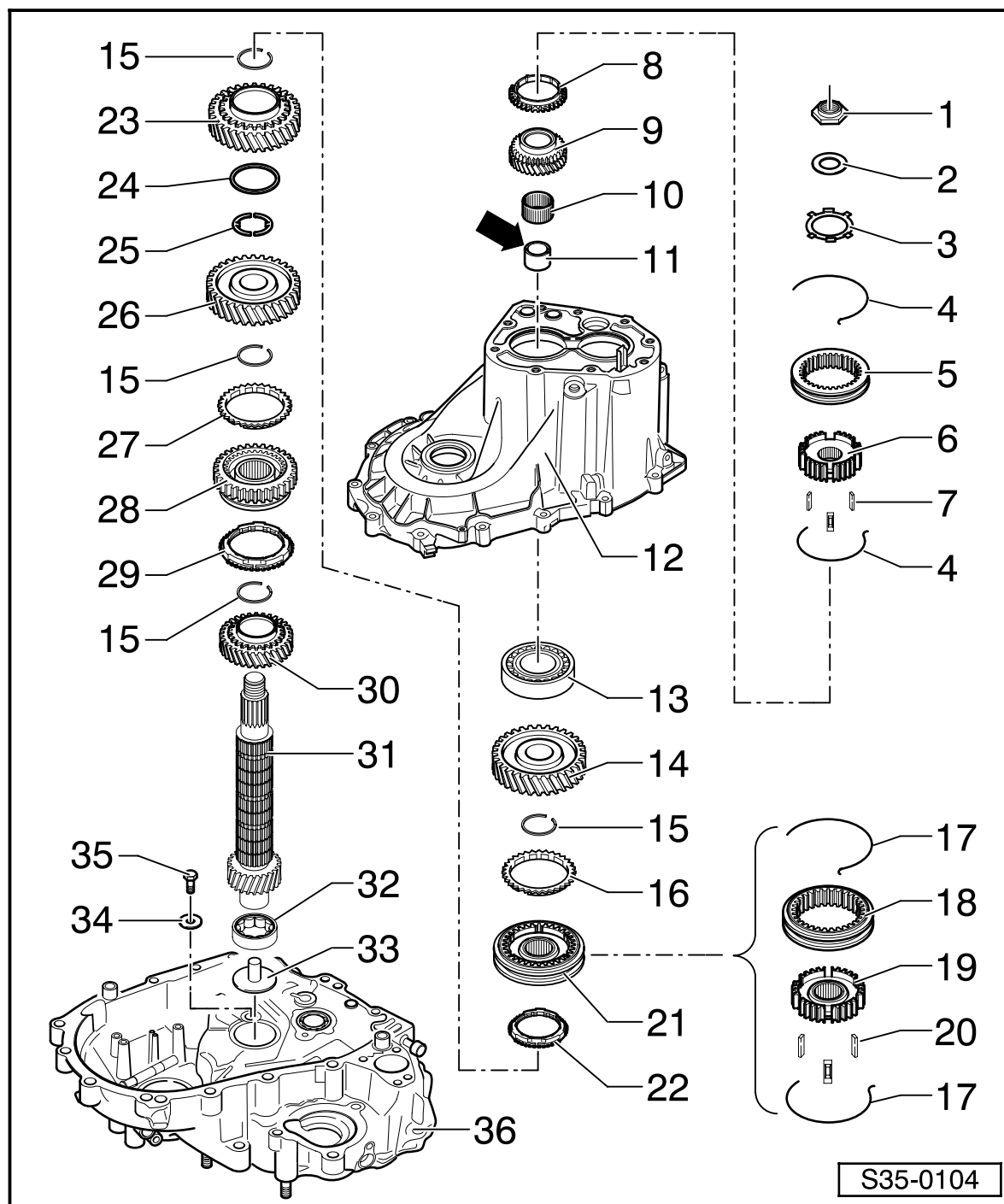


Special tools, testers and aids required

- ◆ Thrust piece MP 3-411
- ◆ Adapter for setting tool (of MP 9-501) MP 3-507
- ◆ Insertion drift for roller bearing MP 3-513
- ◆ Puller MP 3-520
- ◆ Setting tool MP 9-501

Notes:

- ◆ Pay attention to technical data when installing new gearwheels or a new output shaft ⇒ page 00-2.
- ◆ Insert all bearings, sliding gears and synchronizer rings in gearbox with gear oil.
- ◆ Do not mix up synchronizer rings; always assign to original sliding gear if re-used.



S35-0104

1 - Nut, 60 Nm

- ◆ Always replace
- ◆ Pay attention to removal and installation sequence for slackening and tightening the nut ⇒ page 34-28

2 - Dished washer

- ◆ Installation position: the higher outer diameter points toward cover for gear-box housing

3 - Supporting ring**4 - Spring**

- ◆ Installation position ⇒ Fig. 4

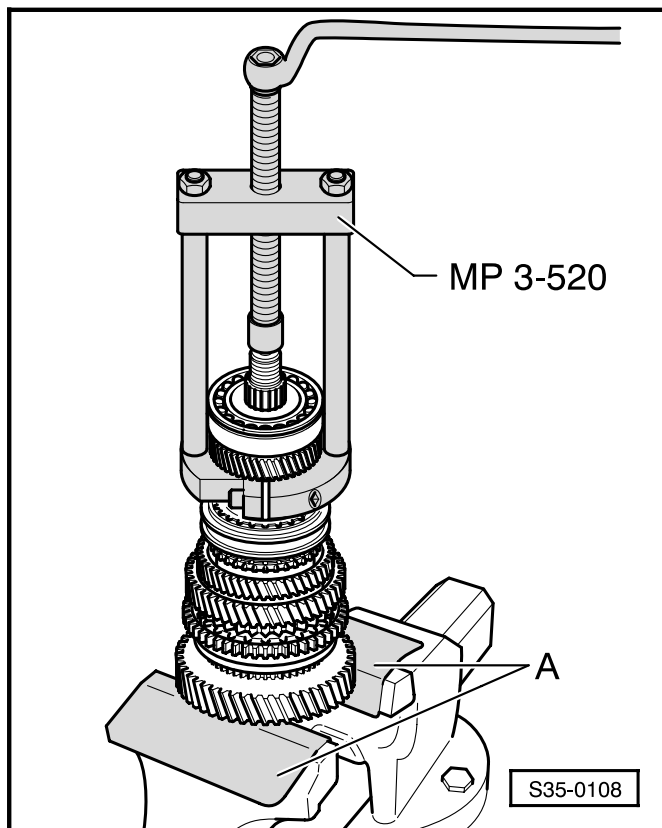
5 - Sliding sleeve of 5th gear

- ◆ Removing and installing ⇒ from page 34-28
- ◆ Disassembling and assembling sliding sleeve and synchronizer body ⇒ Fig. 3 and Fig. 4

6 - Synchronizer body of 5th gear

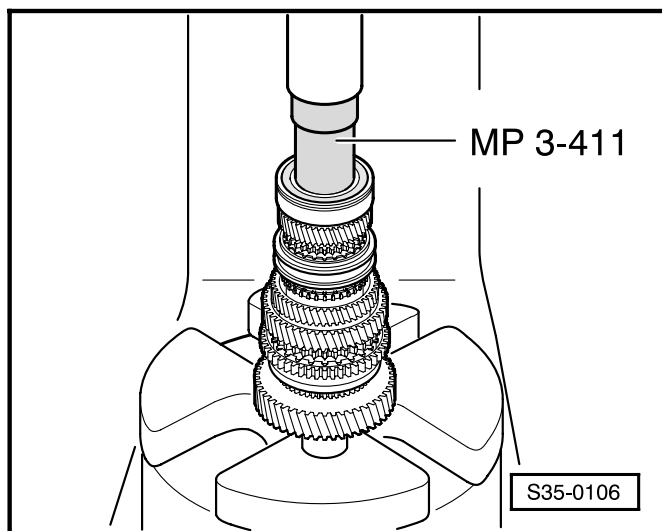
- ◆ Removing and installing ⇒ from page 34-28
- ◆ Disassembling and assembling sliding sleeve and synchronizer body ⇒ Fig. 3 and Fig. 4

- 7 - Locking pieces (3 in total)**
♦ Installation position ⇒ Fig. 4
- 8 - Synchronizer ring of 5th gear**
♦ Inspecting for wear ⇒ Fig. 8
- 9 - 5th speed sliding gear**
- 10 - Needle bearing**
- 11 - Sleeve for needle bearing**
♦ Installation position: oil pockets -arrow- point toward synchronizer body of 5th gear
- 12 - Gearbox housing**
- 13 - Grooved ball bearing**
♦ Removing ⇒ Fig. 1
♦ Pressing on ⇒ Fig. 2
- 14 - 4th speed sliding gear**
- 15 - Circlip**
♦ Replace
- 16 - Synchronizer ring of 4th gear**
♦ Inspecting for wear ⇒ Fig. 8
- 17 - Spring**
- 18 - Sliding sleeve of 3rd and 4th gear**
- 19 - Synchronizer body of 3rd and 4th gear**
- 20 - Locking pieces (3 in total)**
- 21 - Sliding sleeve with synchronizer body of 3rd and 4th gear**
♦ Assembling sliding sleeve/synchronizer body ⇒ Fig. 3 and Fig. 4
♦ Installation position of sliding sleeve/synchronizer body ⇒ Fig. 5
- 22 - Synchronizer ring of 3rd gear**
♦ Inspecting for wear ⇒ Fig. 8
- 23 - 3rd speed sliding gear**
- 24 - Washer**
♦ Holds thrust washers -item 25- in position on output shaft
- 25 - Thrust washers of 2nd and 3rd gear**
- 26 - 2nd speed sliding gear**
- 27 - Synchronizer ring of 2nd gear**
♦ Inspecting for wear ⇒ Fig. 8
- 28 - Sliding sleeve with synchronizer body for 1st and 2nd gear**
♦ Assembling sliding sleeve/synchronizer body ⇒ Fig. 6 and Fig. 7
- 29 - Synchronizer ring of 1st gear**
♦ Inspecting for wear ⇒ Fig. 8
- 30 - 1st speed sliding gear**
- 31 - Output shaft**
♦ Is matched with gearwheel of final drive; always replace together
- 32 - Cylinder roller bearing**
♦ Removing ⇒ Fig. 9
♦ Inserting ⇒ Fig. 10
♦ Installation position: designation on bearing points up ⇒ page 34-40, Fig. 2
- 33 - Connection piece**
♦ For oil guide
- 34 - Washer**
- 35 - 10 Nm**
- 36 - Clutch housing**



◀ Fig. 1 Pulling off grooved ball bearing over 4th speed sliding gear

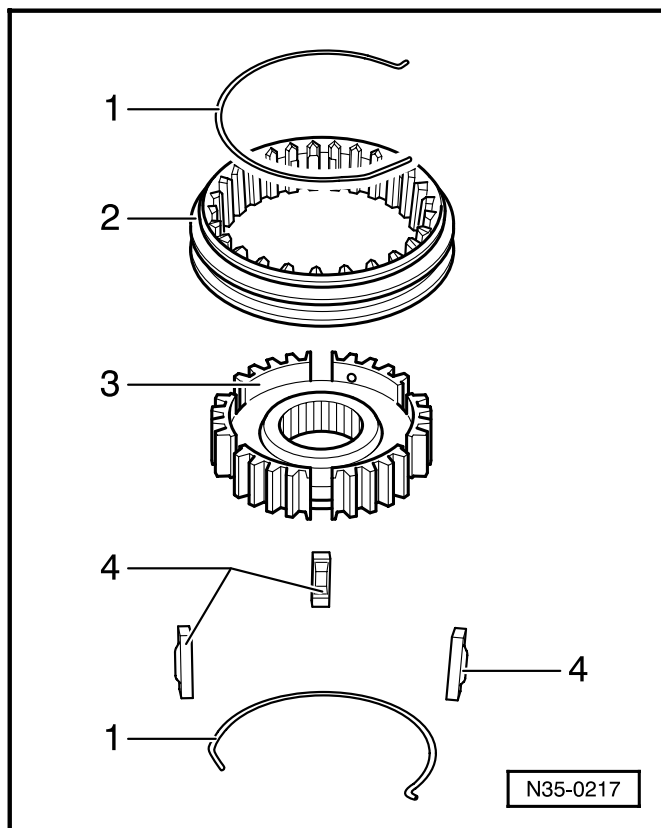
- Carefully clamp output shaft in a vice using protective jaws -A-.



◀ Fig. 2 Pressing on grooved ball bearing

Installation position:

Slot for circlip points toward thread for nut.

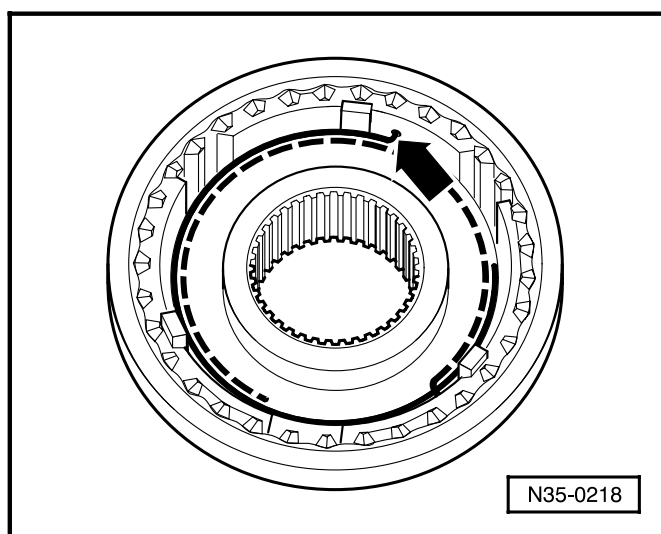


◀ **Fig. 3 Disassembling and assembling sliding sleeve and synchronizer body of 3rd, 4th and 5th gear**

- 1 - Spring
- 2 - Sliding sleeve
- 3 - Synchronizer body
- 4 - Locking piece

- Push sliding sleeve over the synchronizer body.

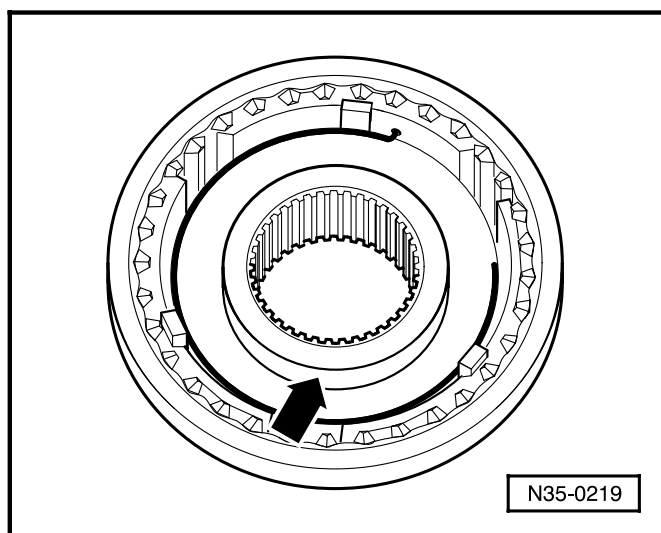
Recesses for locking pieces on synchronizer body and sliding sleeve must be positioned one above the other.



◀ **Fig. 4 Assembling sliding sleeve/synchronizer body of 3rd, 4th and 5th gear**

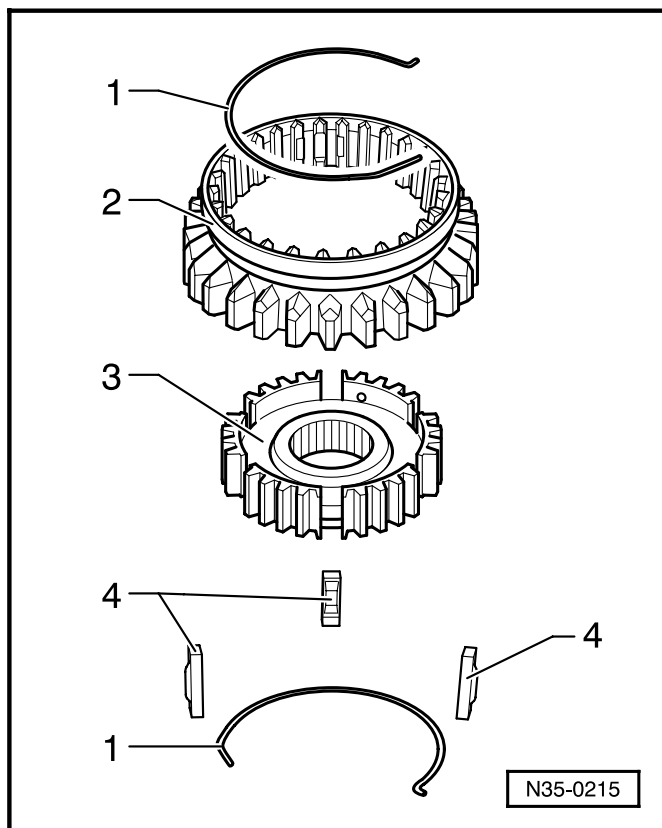
Sliding sleeve is pushed over the synchronizer body.

- Insert locking pieces and install springs offset 120°. The angled end of the spring must engage in the hole of the synchronizer body -arrow-.



◀ **Fig. 5 Installation position of sliding sleeve/synchronizer body of 3rd and 4th gear**

The wider shoulder of the synchronizer body (arrow) points toward 4th gear.

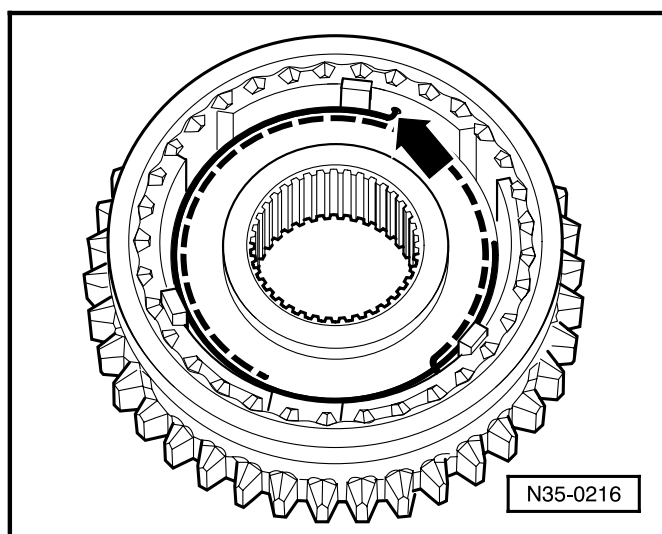


◀ **Fig. 6 Disassembling and assembling sliding sleeve and synchronizer body of 1st and 2nd gear**

- 1 - Spring
- 2 - Sliding sleeve
- 3 - Synchronizer body
- 4 - Locking piece

- Push sliding sleeve over the synchronizer body.

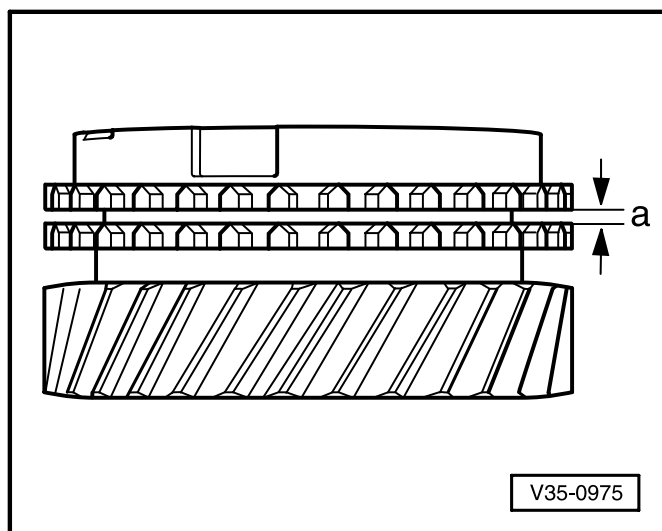
Recesses for locking pieces on synchronizer body and sliding sleeve must be positioned one above the other.



◀ **Fig. 7 Assembling sliding sleeve/synchronizer body of 1st and 2nd gear**

Sliding sleeve is pushed over the synchronizer body.

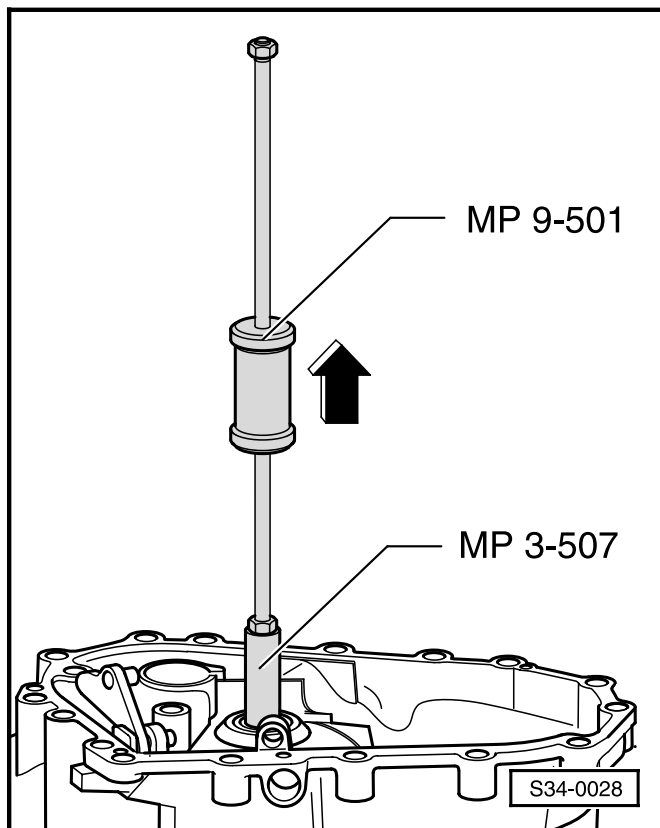
- Insert locking pieces and install springs offset 120°. The angled end of the spring must engage in the hole of the synchronizer body -arrow-.



◀ **Fig. 8 Inspecting synchronizer ring for wear**

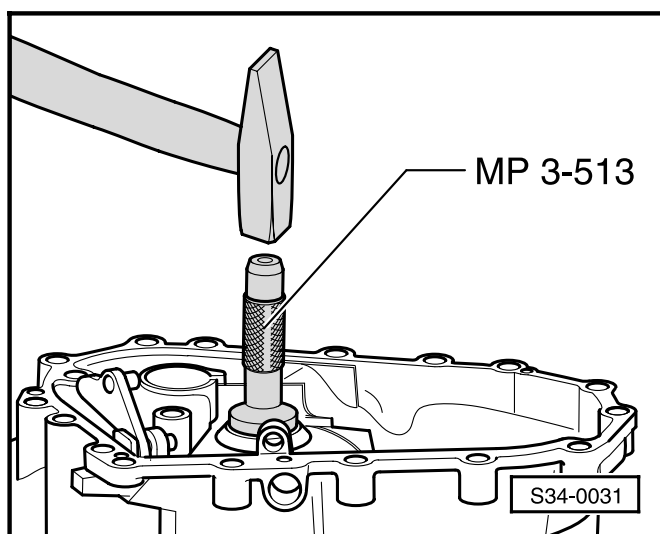
- Press synchronizer ring onto the taper of the sliding gear and measure size of gap "a" with a feeler gauge.

Gap "a"	Installation dimension	Wear limit
1st to 5th gear	1.2 ... 1.8 mm	0.5 mm



◀ Fig. 9 Pulling cylinder roller bearing out of clutch housing

- Insert resetting tool adapter MP 3-507 into cylinder roller bearing and turn.
- Use resetting tool MP 9-501 to pull out bearing.



◀ Fig. 10 Knocking cylinder roller bearing into clutch housing

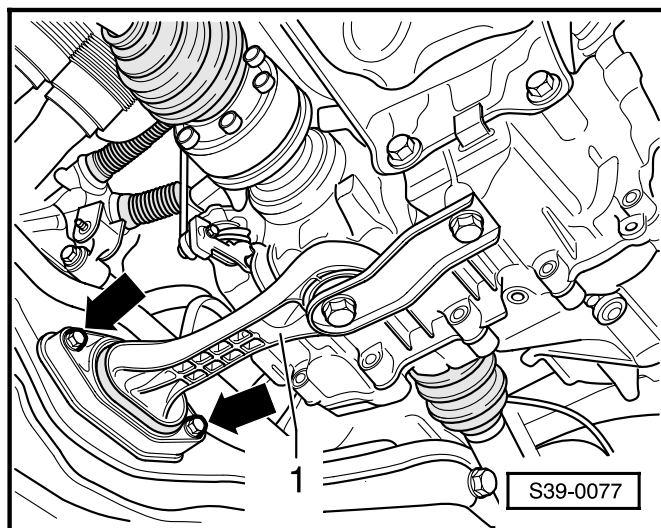
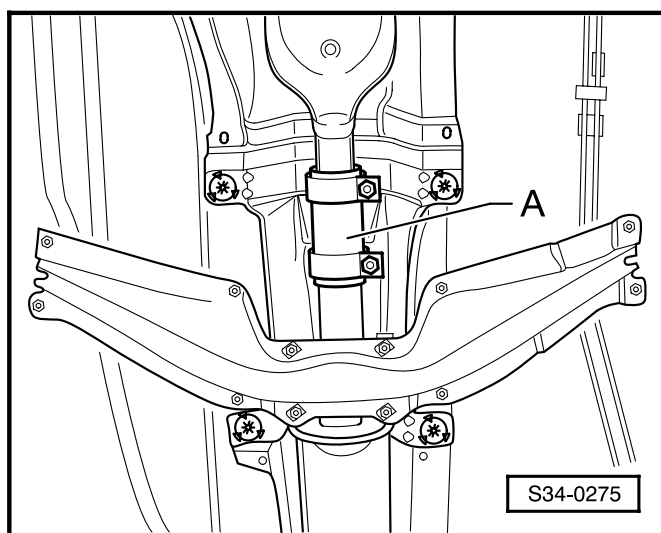
Replacing seals for flange shafts (gearbox installed)

Special tools, testers and aids required

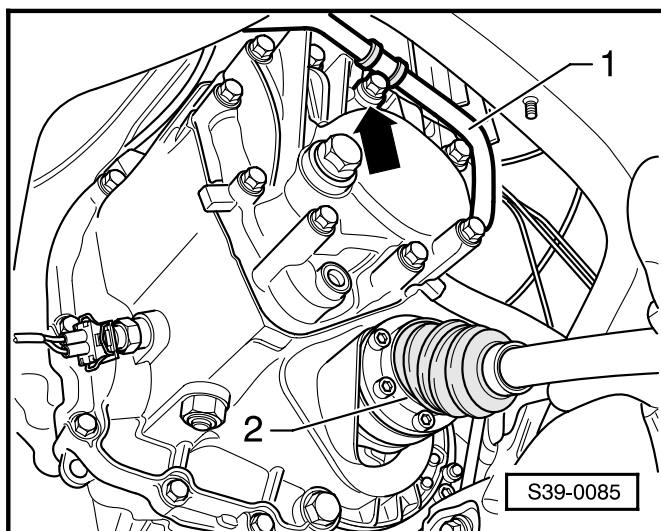
- ◆ Universal tool MP 3-419
- ◆ Additional part MP 3-419/37
- ◆ Adapter MP 3-419/40
- ◆ Insertion tool for seal MP 3-610
- Pay attention to the general repair instructions ⇒ page 00-4.

Removing

- Take off front wheel and raise vehicle.
- Remove noise insulation.
- ◀ - Slacken double clip -A- and separate exhaust system.

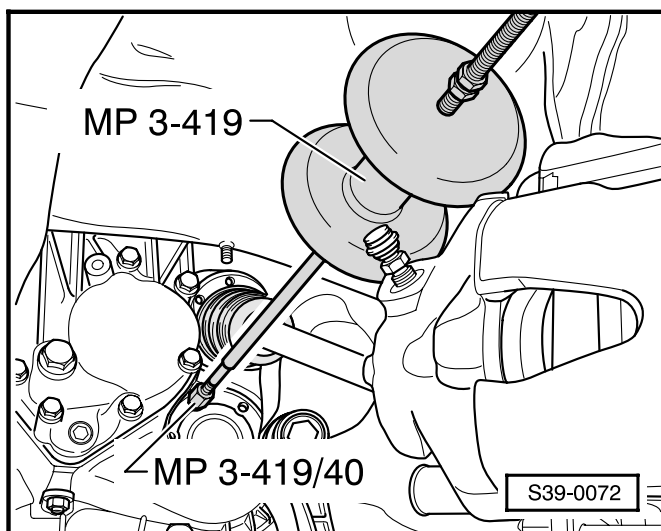


- ◀ - Detach pendulum support -1- from the subframe -arrows-.



Before replacing left seal:

- Turn steering to full left lock.
- ◀ - Unbolt fixture for power steering line from gearbox -arrow-.
- Tie up power steering line -1-.
- Unbolt drive shaft -2- from flange shaft.
- Tie up drive shaft sufficiently far. Avoid damaging the paintwork of the drive shaft.
- Place drip tray below.
- Carefully push engine/gearbox forward and secure (second mechanic) to enable the flange shaft to be removed.



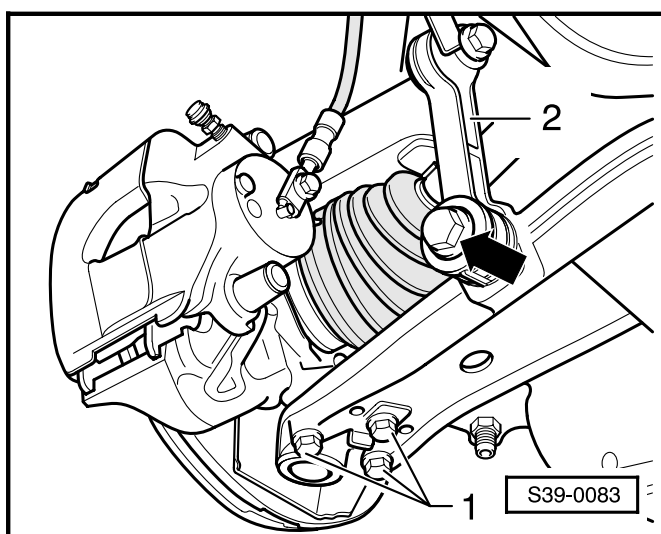
- ◀ - Remove left flange shaft by turning adapter MP 3-419/40 into flange shaft and pulling flange shaft out of large differential bevel gear with universal tool MP 3-419.

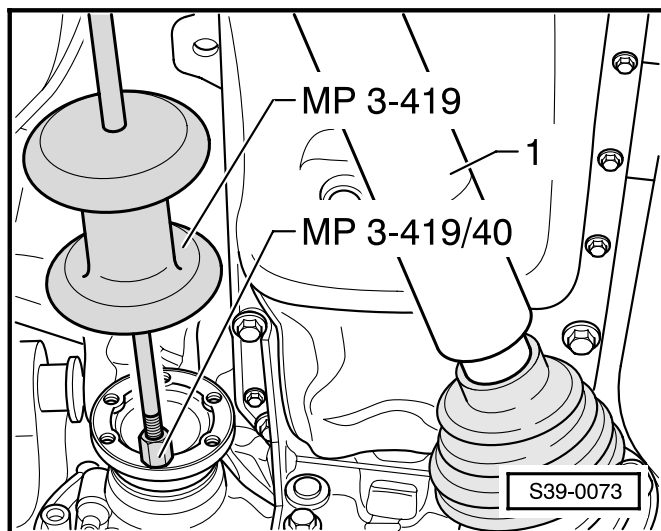
Note:

Push brake hose at brake caliper to the side when pulling out flange shaft.

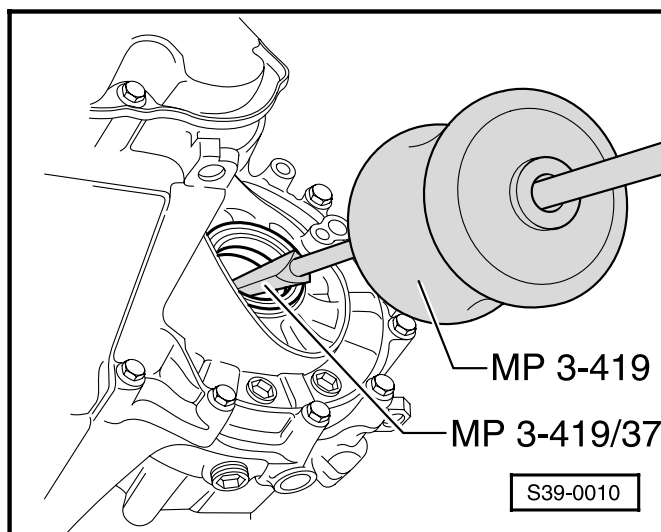
Before replacing right seal:

- Turn steering to full right lock.
- Unbolt drive shaft from flange shaft.
- ◀ - Mark installation position of bolts -1- for right steering joint otherwise the axle geometry must be checked.
- Unscrew bolts -1-.
- Unbolt coupling rod -2- from track control arm -arrow-.



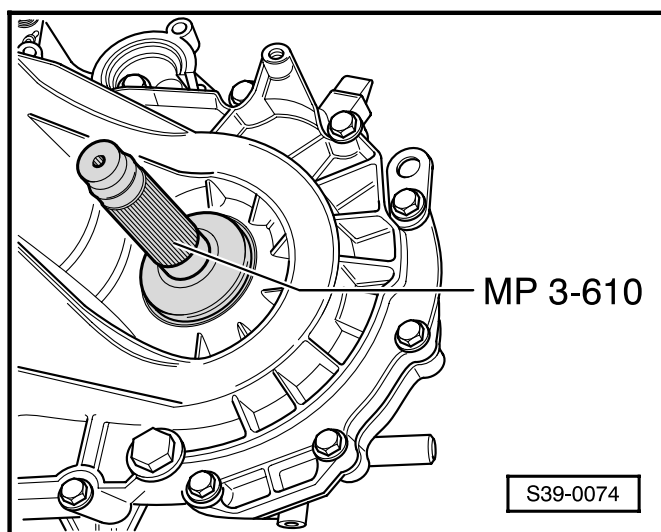


- Carefully push engine/gearbox forward to enable the flange shaft to be moved forward.
- ◀ - Move right drive shaft -1- forward and tie up at the subframe.
- Place drip tray below.
- Remove right flange shaft by inserting adapter MP 3-419/40 into flange shaft and pulling flange shaft out of large differential bevel gear with universal tool MP 3-419.



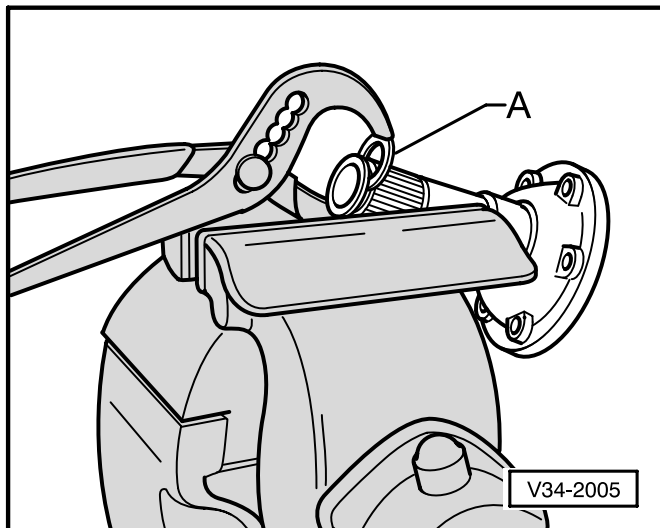
Continued for both seals:

- ◀ - Pull out seal.



Installing

- ◀ - Insert new seal as far as the stop; do not twist seal during this step.
- Pack space between sealing lip and dust lip with universal grease.



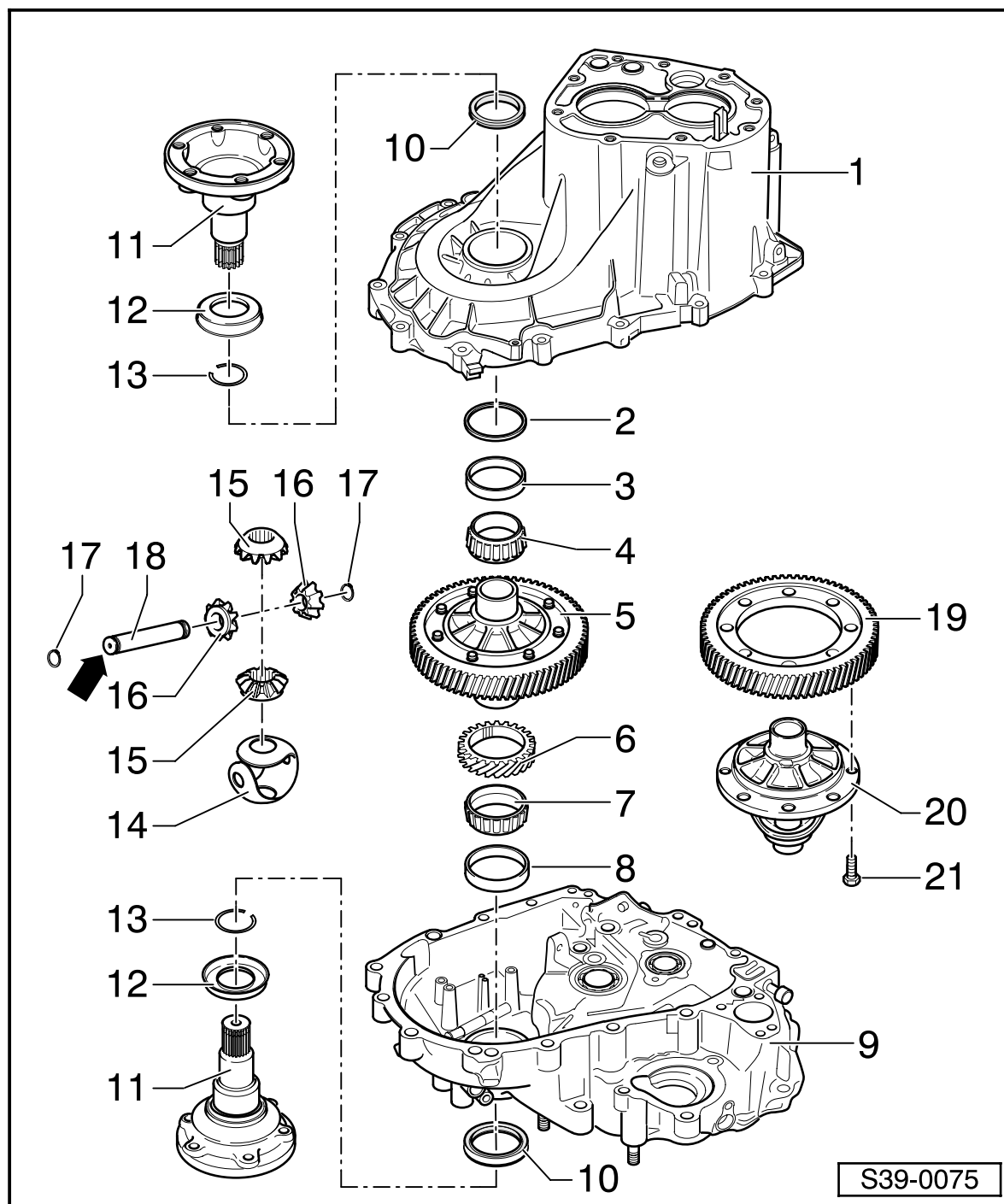
- ◀ - Clamp flange shaft in a vice using protective jaws. Press circlip out of groove of flange shaft with new circlip -A-.
- Use plastic-headed hammer to knock in flange shaft.
- Bolt left drive shaft or right drive shaft, respectively, to flange shaft.
- Further installation is carried out in the reverse order.
- Inspect gear oil level; top up to lower edge of filler hole if necessary ⇒ page 34-22.

Tightening torques

Component	Tightening torque
Drive shaft - flange shaft ¹⁾ (tighten diagonally across in 2 stages) M8 ⇒ Running Gear, Repair Group 40	
Steering joint - track control arm ¹⁾ M8	20 Nm + 90°
Coupling rod - track control arm	45 Nm
Pendulum support - subframe ¹⁾ M8	20 Nm + 90°
Wheel bolts - wheel hub	120 Nm
Nut for attaching double clamp/exhaust system	40 Nm

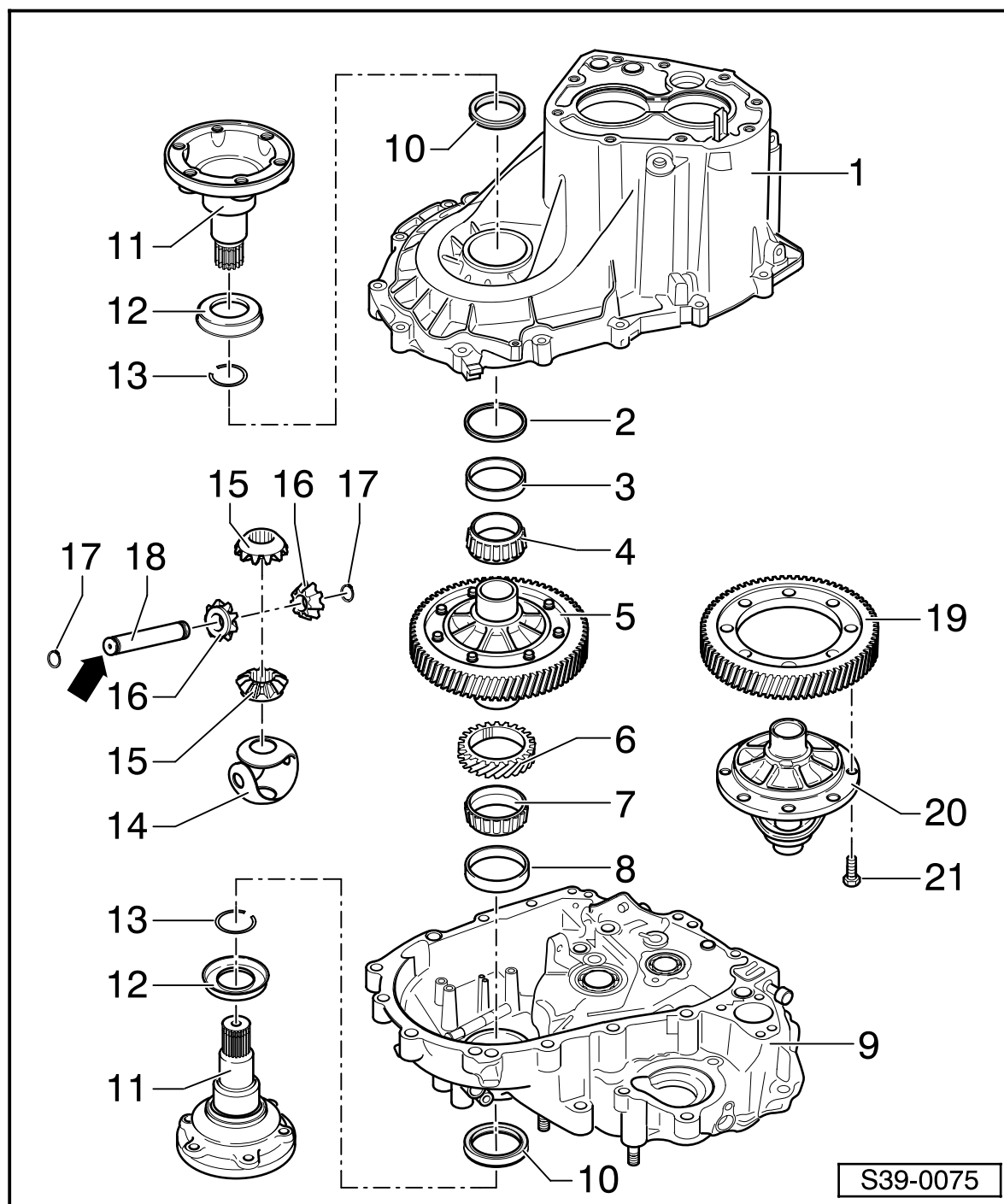
¹⁾ Always replace these bolts.

Disassembling and assembling differential



Special tools, testers and aids required

- ◆ Counterholder MP 1-223
- ◆ Pressure plate MP 3-407
- ◆ Thrust piece MP 3-431
- ◆ Tube section MP 3-450
- ◆ Insertion drift MP 3-511
- ◆ Tube section MP 3-4013
- ◆ Two-legged puller Kukko 20/10
- ◆ Extraction hook Matra V/170
- ◆ Internal extractor Kukko 21/7
- ◆ Countersupport Kukko 22/2

**Notes:**

- ◆ Heat inner race of taper roller bearing to 100 °C before installing.
- ◆ Always replace both taper roller bearings.
- ◆ If taper roller bearings, differential housing, gearbox housing and clutch housing are replaced, set differential ⇒ page 39-12.

1 - Gearbox housing**2 - Shim**

- ◆ For differential
- ◆ Determining thickness ⇒ page 39-13

3 - Outer race of taper roller bearing

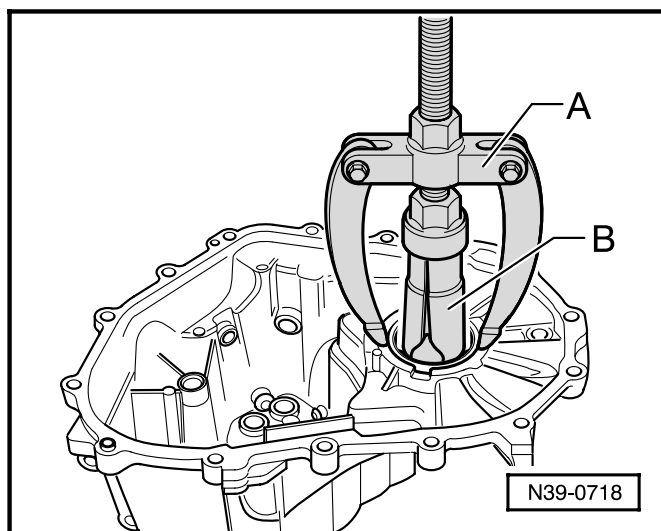
- ◆ Removing ⇒ Fig. 1
- ◆ Inserting ⇒ Fig. 2

4 - Inner race of taper roller bearing

- ◆ Pulling off ⇒ Fig. 3
- ◆ Pressing on ⇒ Fig. 4

5 - Differential housing with gearwheel

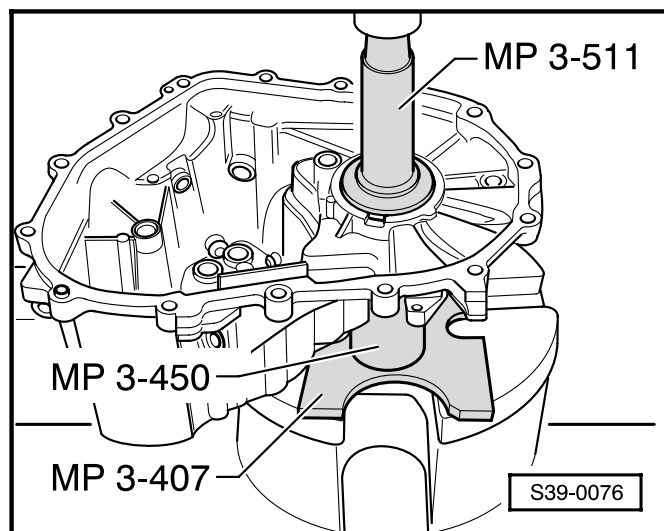
- 6 - Drive gear for speedometer**
 - ◆ Fit on to differential housing before pressing on inner race
- 7 - Inner race of taper roller bearing**
 - ◆ Pulling off ⇒ Fig. 3
 - ◆ Pressing on ⇒ Fig. 4
- 8 - Outer race of taper roller bearing**
 - ◆ Removing ⇒ Fig. 5
 - ◆ Pressing in ⇒ Fig. 6
- 9 - Clutch housing**
- 10 - Seal**
 - ◆ Replacing ⇒ from page 39-1
- 11 - Flange shaft**
 - ◆ Removing and installing ⇒ from page 39-1
- 12 - Dust plate**
 - ◆ For flange shaft
 - ◆ Pulling off ⇒ Fig. 7
 - ◆ Pressing on ⇒ Fig. 8
- 13 - Circlip**
 - ◆ Always replace
- 14 - Thrust washer assembly**
 - ◆ Insert with gear oil
- 15 - Large differential bevel gear**
 - ◆ Installing ⇒ Fig. 11
- 16 - Small differential bevel gear**
 - ◆ Installing ⇒ Fig. 10
- 17 - Circlip**
 - ◆ Replace
- 18 - Differential bevel gear shaft**
 - ◆ Shaft has different diameters, face end with centering hole -arrow- indicates smaller diameter
 - ◆ Removing ⇒ Fig. 9
 - ◆ Inserting ⇒ Fig. 10
- 19 - Gearwheel for final drive**
 - ◆ Is matched with output shaft; always replace together
- 20 - Differential housing**
 - ◆ Bolted to gearwheel for final drive
- 21 - 80 Nm**



◀ Fig. 1 Pulling outer race of taper roller bearing out of gearbox housing

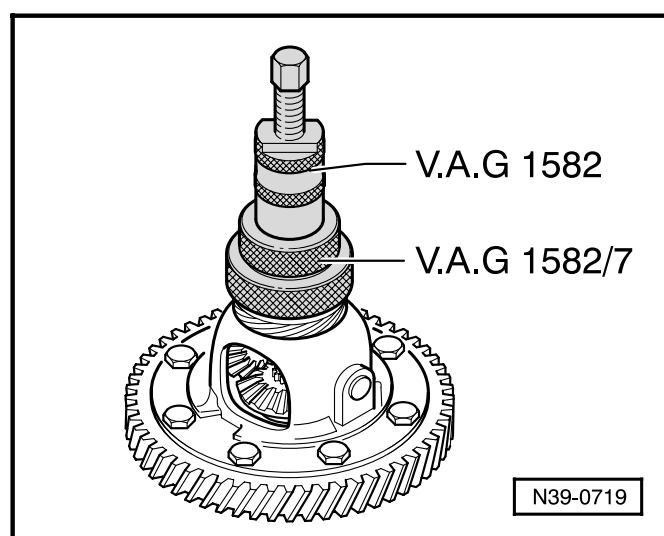
A - Countersupport, e.g. Kukko 22/2

B - Internal extractor 46...58 mm, e.g. Kukko 21/7



◀ Fig. 2 Pressing outer race of taper roller bearing into gearbox housing

- Place shim below outer race.
- Use tube section MP 3-450 to support gearbox housing directly below bearing mount.

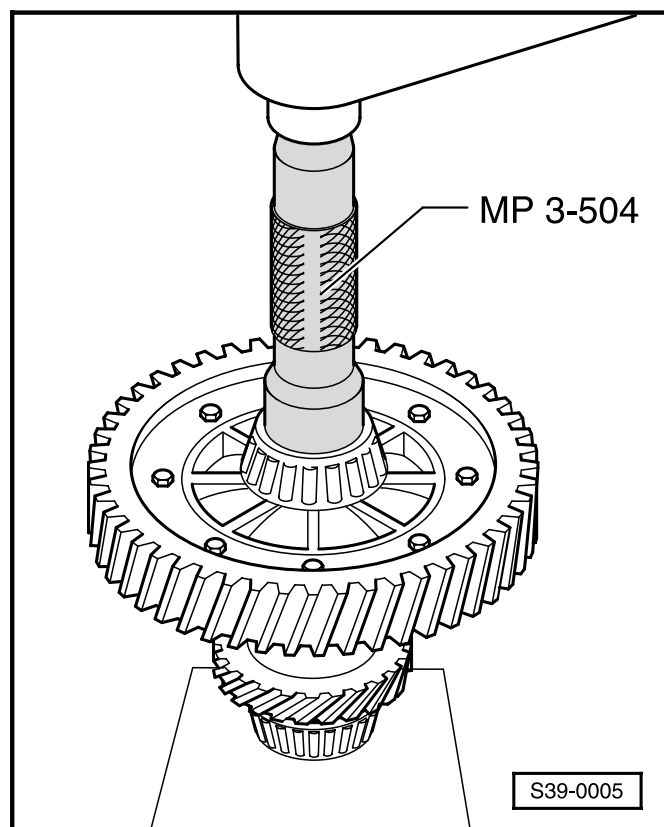


◀ Fig. 3 Pulling off inner races of taper roller bearing

- Mount thrust piece MP 3-431 onto differential housing before fitting on puller.

Note:

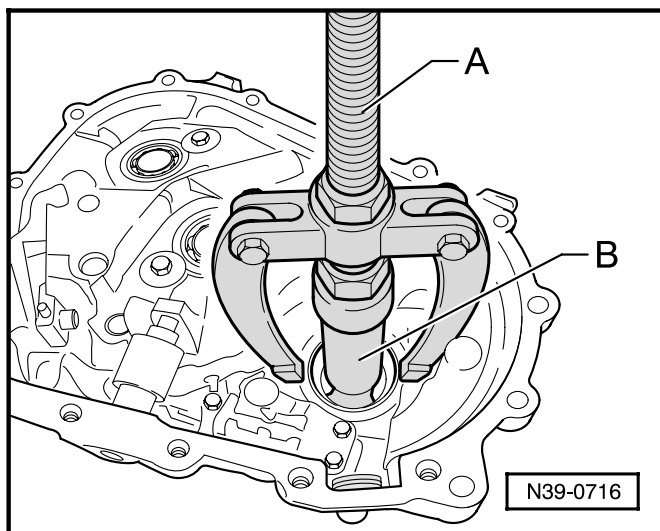
The procedure for pulling off both inner races of the taper roller bearing of the differential housing is identical.



◀ Fig. 4 Pressing on inner races of taper roller bearing

Note:

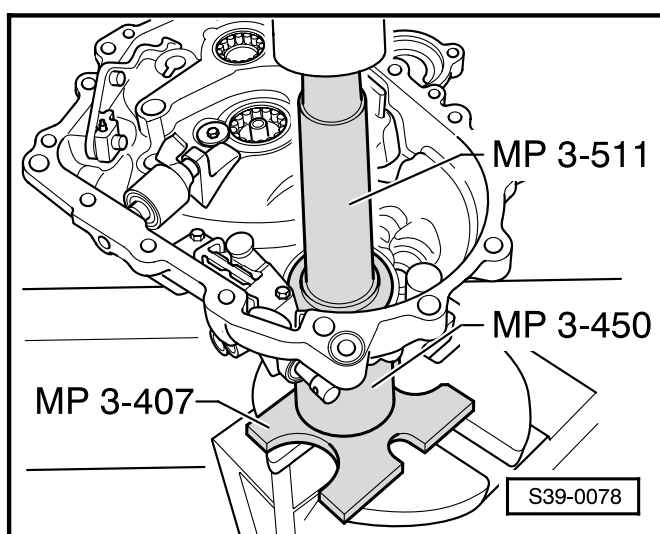
The inner races of the taper roller bearing for gearbox housing and clutch housing are pressed on with the same special tools.



◀ Fig. 5 Pulling outer race of taper roller bearing out of clutch housing

A - Countersupport, e.g. Kukko 22/2

B - Internal extractor 46...58 mm, e.g. Kukko 21/7

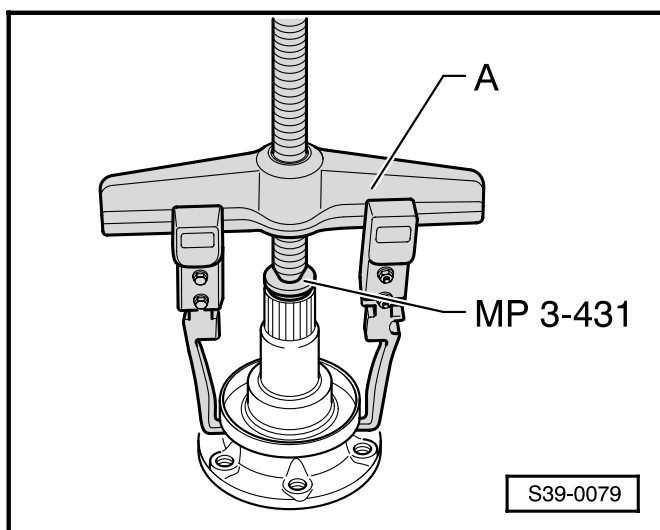


◀ Fig. 6 Pressing outer race of taper roller bearing into clutch housing

Note:

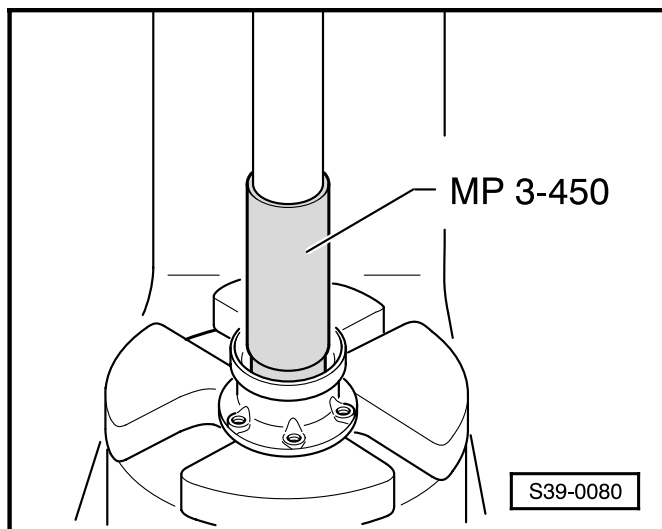
No shim is installed on the clutch housing side.

- Use tube section MP 3-450 to support clutch housing directly below bearing mount.

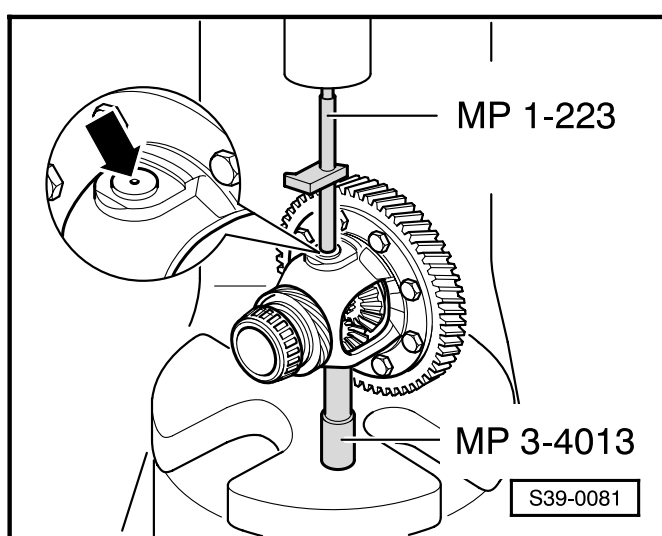


◀ Fig. 7 Pulling off dust plate of flange shaft

A - Two-legged puller, e.g. Kukko 20/10, with hook Matra V/170

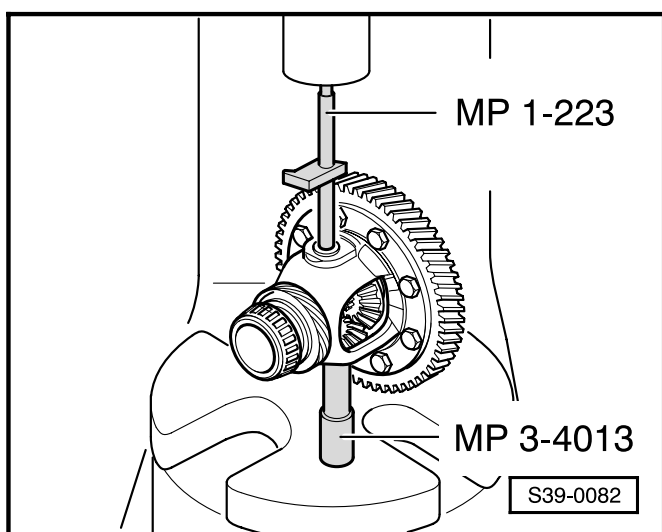


◀ Fig. 8 Pressing on dust plate of flange shaft



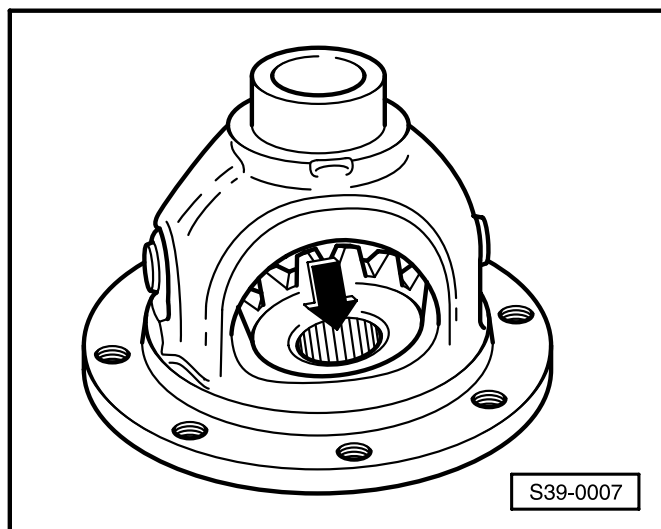
◀ Fig. 9 Pressing out differential bevel gear shaft

- Take circlips off the differential bevel gear shaft.
- Position special tool MP 1-223 onto the face end of the shaft with centering hole -arrow- and press out shaft.



◀ Fig. 10 Pressing in differential bevel gear shaft

- Insert thrust washer assembly with gear oil.
- Fit on circlip on the side of the differential bevel gear shaft with the larger diameter.
- Push differential bevel gear shaft into the differential housing from the side with the smaller diameter (centering hole on face end of shaft).
- Push small differential bevel gears onto the shaft.
- Press in differential bevel gear shaft as far as the end position and secure with a second circlip.



◀ Fig. 11 Installing large differential bevel gears

- Insert large differential bevel gears offset 180° and swivel into place (arrow).

Setting differential

Special tools, testers and aids required

- ◆ End gauge MP 3-405/17
- ◆ Pressure plate MP 3-407
- ◆ Universal dial gauge holder MP 3-447
- ◆ Tube section MP 3-450
- ◆ Insertion drift MP 3-511
- ◆ Internal extractor Kukko 21/7
- ◆ Countersupport Kukko 22/2
- ◆ Dial gauge

It is necessary to re-set the differential if

- ◆ gearbox housing
- ◆ clutch housing
- ◆ differential housing

or the

- ◆ taper roller bearings of the differential

are replaced.

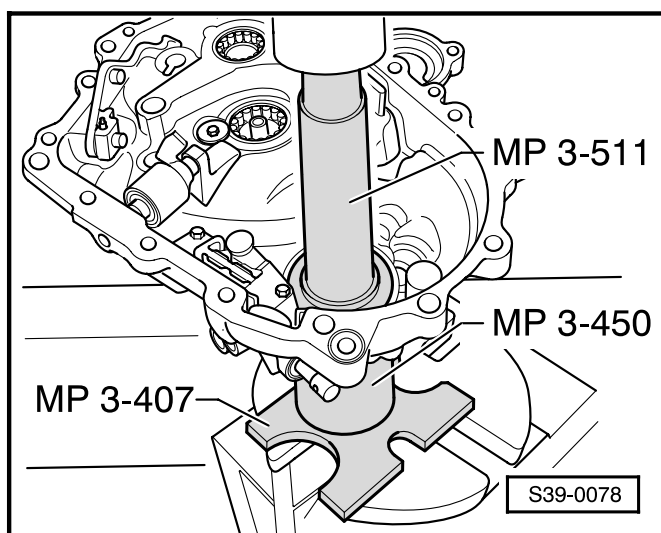
Notes:

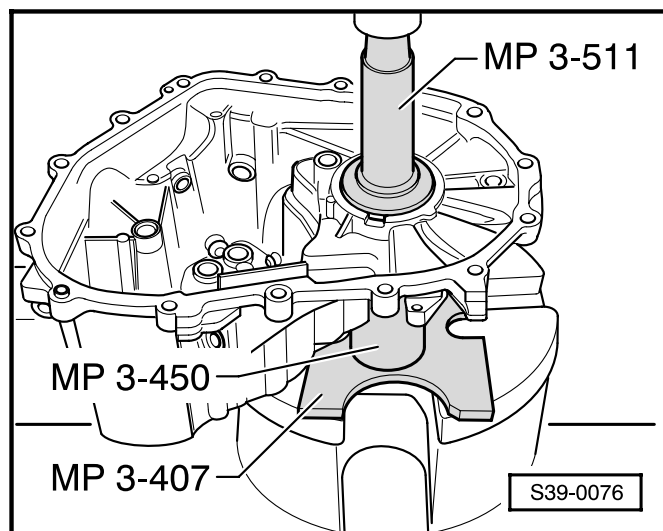
- ◆ *New taper roller bearings for the differential have a low friction. For this reason, the friction torque can only be used as a means of inspection to a limited extent. It is only possible to correctly set the bearing preload by determining the thickness of the shim.*
- ◆ *The inner and outer races of taper roller bearings are matched. Do not mix up.*

- ◀ - Use tube section MP 3-450 to support clutch housing directly below bearing mount.
- Use insertion drift MP 3-511 to press outer race of taper roller bearing into clutch housing.

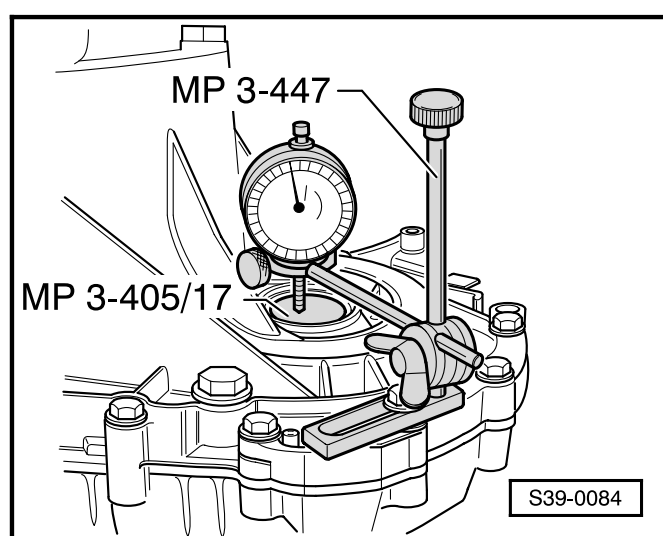
Note:

No shim is fitted on the side of the clutch housing.





- ◀ - Press outer race of taper roller bearing into the gearbox housing without a shim.
- Insert differential into the clutch housing.
- Fit on gearbox housing and tighten the 5 bolts to 25 Nm.



- ◀ - Fit on dial gauge and zero with a preload of 1 mm.
- Move differential up and down, read off play on dial gauge and note.

(Example: 2.30 mm)

Note:

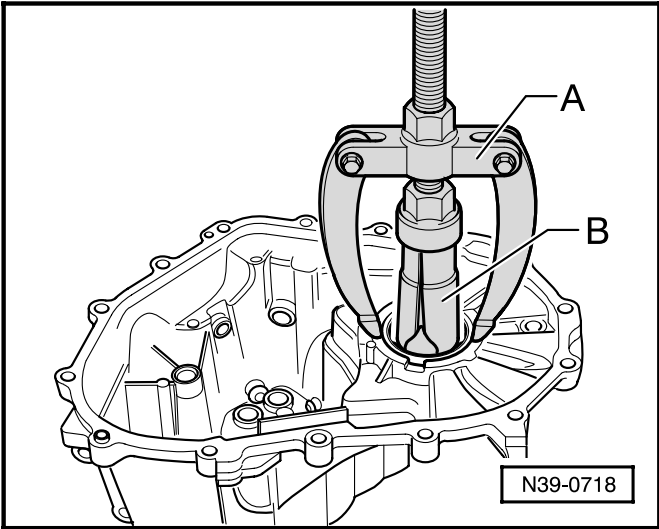
When carrying out the measurement, do not rotate the differential otherwise the bearings will settle and the result of the measurement will be falsified.

Determining size of shim

The specified bearing preload is achieved if a constant figure for compression (0.20 mm) is added to the measurement obtained.

Example:

Measurement obtained	2.30 mm
+ Compression (constant figure)	0.20 mm
Thickness of shim =	2.50 mm



- ◀ - Take off gearbox housing and pull outer race of taper roller bearing out of gearbox housing
- A - Countersupport, e.g. Kukko 22/2
- B - Internal extractor 46...58 mm, e.g. Kukko 21/7
- Insert the calculated size of shim.
- Press in outer race again and bolt gearbox housing tight.

The following shims are available:

Thickness (mm)	Part No.
2.0	002 409 383 A
2.1	002 409 383 B
2.2	002 409 383 C
2.3	002 409 383 D
2.4	002 409 383 E
2.5	002 409 383 F
2.6	002 409 383 G
2.7	002 409 383

Different tolerances make it possible to exactly gauge the required thickness of shim.