

Workshop Manual OCTAVIA

5-Speed Manual Gearbox 02K

List of Supplements to **OCTAVIA** Workshop Manual

Edition: 12.02

5-Speed Manual Gearbox 02K

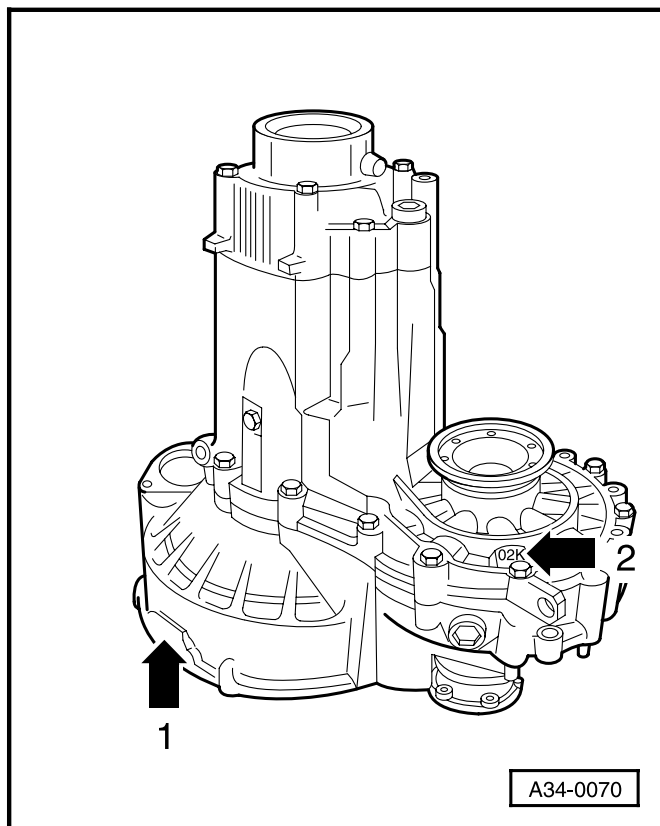
Replaces List of Supplements - Edition: 05.01

Supplement	Edition	Subject	Article number
	08.96	Basic Edition of Workshop Manual	S00.5115.50.20
1	11.96	Supplement to Basic Edition	S00.5115.51.20
2	03.97	Modifications to Special Tools	S00.5115.52.20
3	07.97	Supplement with New Manual Gearbox Types	S00.5115.53.20
4	02.98	Correct Tightening torque	S00.5115.54.20
5	10.98	Supplement with New Manual Gearbox Types	S00.5115.55.20
6	04.00	Modifications to Repair Group 00, 34, 35, 39	S00.5115.56.20
7	05.01	Modifications to Repair Group 30, 34, 39	S00.5115.57.20
8	12.02	Modifications to Repair Group 00, 34, 35, 39	S00.5115.58.20
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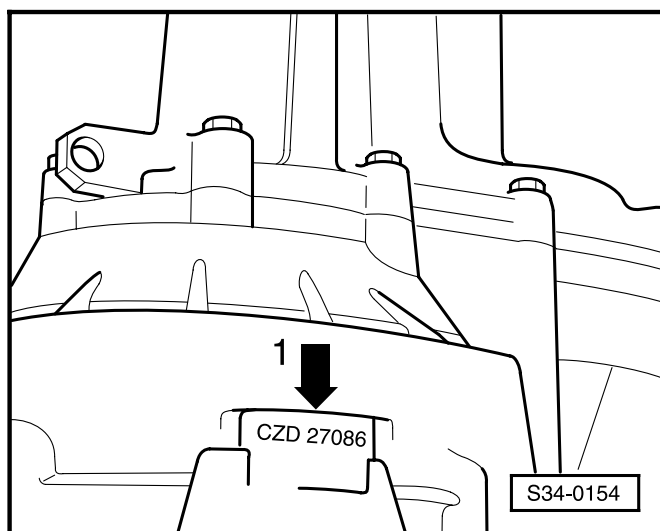
Identification of gearbox

Allocation ⇒ page 00-2.

◀ Location on gearbox

Code letters and date of manufacturer of gearbox (arrow 1)

Manual gearbox 02K (arrow 2)



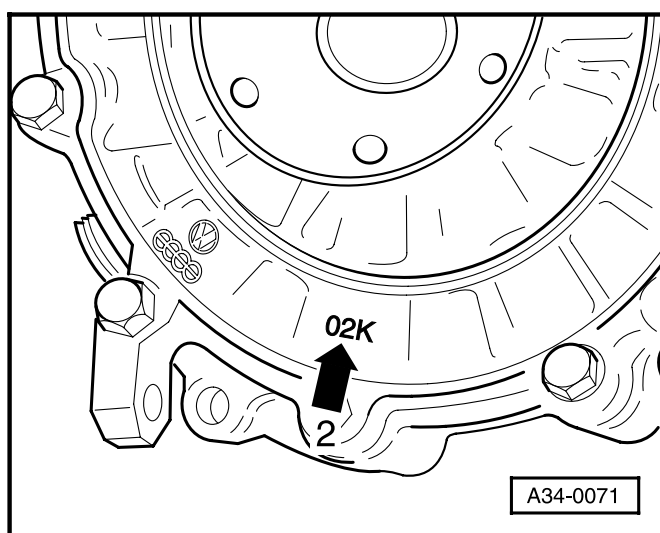
◀ Code letters and date of manufacturer of gearbox (arrow 1)

Example:	CZD	27	08	6
	Code letters	Day	Month	Year (1996) of manufacture

Additional data relate to production

Note:

The code letters of gearbox are also listed on the vehicle data sticker.



◀ Manual gearbox 02K (arrow 2)

Code letters, component assignment, transmission ratios, capacities

Code letters		CZE	DRY	DUT
Assignment:	Engine	1.6 I/55 kW		
Transmission ratio:	Final drive	67 : 15 = 4.467	67 : 15 = 4.467	67 : 15 = 4.467
	1st gear	38 : 11 = 3.455	38 : 11 = 3.455	38 : 11 = 3.455
	2nd gear	35 : 18 = 1.944	35 : 18 = 1.944	35 : 18 = 1.944
	3rd gear	36 : 28 = 1.286	36 : 28 = 1.286	36 : 28 = 1.286
	4th gear	31 : 33 = 0.939	31 : 33 = 0.939	31 : 33 = 0.939
	5th gear	38 : 51 = 0.745	38 : 51 = 0.745	38 : 51 = 0.745
	Reverse gear	20 : 12 x 38 : 12 = 3.167		
	Speedo	2.08	2.14	2.14
Capacity		1.6 + 0.1 litres		
Specification		Gear oil G 005 000 SAE 75W90 (synthetic oil)		
Gear oil change interval		filled for life		
Clutch mechanism		hydraulic		
Clutch plate Ø		200 mm		
Drive shaft flange Ø		90 mm		

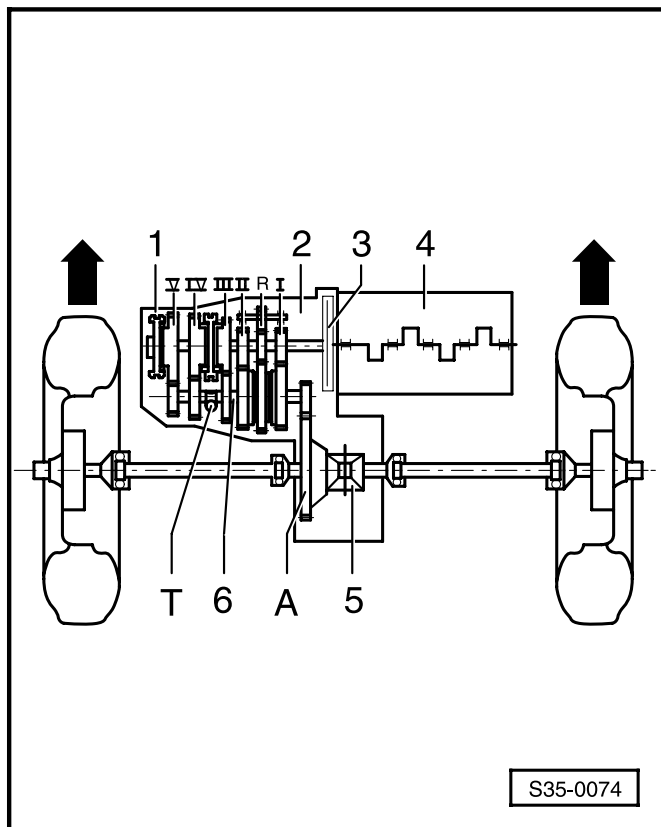
Code letters		CZD	DLP	DNZ
Assignment:	Engine	1.6 I/74 kW		
Transmission ratio:	Final drive	67 : 15 = 4.467	68 : 16 = 4.250	68 : 16 = 4.250
	1st gear	38 : 11 = 3.455	38 : 11 = 3.455	38 : 11 = 3.455
	2nd gear	35 : 18 = 1.944	35 : 18 = 1.944	35 : 18 = 1.944
	3rd gear	37 : 27 = 1.370	37 : 27 = 1.370	36 : 28 = 1.286
	4th gear	32 : 31 = 1.032	32 : 31 = 1.032	31 : 32 = 0.969
	5th gear	34 : 40 = 0.850	34 : 40 = 0.850	33 : 41 = 0.805
	Reverse gear	20 : 12 x 38 : 12 = 3.167		
	Speedo	2.08	2.14	2.14
Capacity		1.6 + 0.1 litres		
Specification		Gear oil G 005 000 SAE 75W90 (synthetic oil)		
Gear oil change interval		filled for life		
Clutch mechanism		hydraulic		
Clutch plate Ø		210 mm		
Drive shaft flange Ø		90 mm		

Code letters, component assignment, transmission ratios, capacities

Code letters		DUU	DUV	DUU
Assignment:	Engine	1.6 l/74 kW		1.6 l/75 kW
Transmission ratio:	Final drive	68 : 16 = 4.250	68 : 16 = 4.250	68 : 16 = 4.250
	1st gear	38 : 11 = 3.455	38 : 11 = 3.455	38 : 11 = 3.455
	2nd gear	35 : 18 = 1.944	35 : 18 = 1.944	35 : 18 = 1.944
	3rd gear	37 : 27 = 1.370	36 : 28 = 1.286	37 : 27 = 1.370
	4th gear	32 : 31 = 1.032	31 : 32 = 0.969	32 : 31 = 1.032
	5th gear	34 : 40 = 0.850	33 : 41 = 0.805	34 : 40 = 0.850
	Reverse gear	20 : 12 x 38 : 12 = 3.167		
	Speedo	2.14	2.14	2.14
Capacity		1.6 + 0.1 litres		
Specification		Gear oil G 005 000 SAE 75W90 (synthetic oil)		
Gear oil change interval		filled for life		
Clutch mechanism		Hydraulic		
Clutch plate Ø		210 mm		
Drive shaft flange Ø		90 mm		

Code letters		DUS	DRZ	DUW
Assignment:	Engine	1.9 l/50 kW SDI		1.4 l/55 kW
Transmission ratio:	Final drive	68 : 16 = 4.250	68 : 16 = 4.250	67 : 15 = 4.467
	1st gear	38 : 11 = 3.455	38 : 11 = 3.455	38 : 11 = 3.455
	2nd gear	35 : 18 = 1.944	35 : 18 = 1.944	35 : 18 = 1.944
	3rd gear	36 : 28 = 1.286	36 : 28 = 1.286	36 : 28 = 1.286
	4th gear	31 : 33 = 0.939	31 : 33 = 0.939	31 : 32 = 0.969
	5th gear	37 : 52 = 0.712	37 : 52 = 0.712	33 : 41 = 0.805
	Reverse gear	20 : 12 x 38 : 12 = 3.167		
	Speedo	2.14	2.14	2.14
Capacity		1.6 + 0.1 litres		
Specification		Gear oil G 005 000 SAE 75W90 (synthetic oil)		
Gear oil change interval		filled for life		
Clutch mechanism		hydraulic		
Clutch plate Ø		200 mm		
Drive shaft flange Ø		90 mm		

Survey of power transmission



Designation

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

Arrows point in direction of travel

Ratios

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

General repair information

Scrupulous care and cleanliness, as well as proper tools, are essential requirements for carrying out proper and successful gearbox repairs. All the general basic rules of safety naturally apply to repairwork on gearboxes.

A number of generally applicable notes for individual repair operations - which are otherwise listed at numerous points in the Workshop Manual - are summarised here.

- ◆ When installing the gearbox, ensure the dowel sleeves between engine and gearbox are correctly fitted.
- ◆ When replacing the gearbox, top up the gear oil to the lower edge of the filler hole.
- ◆ Capacity and specification ⇒ page 00-2.

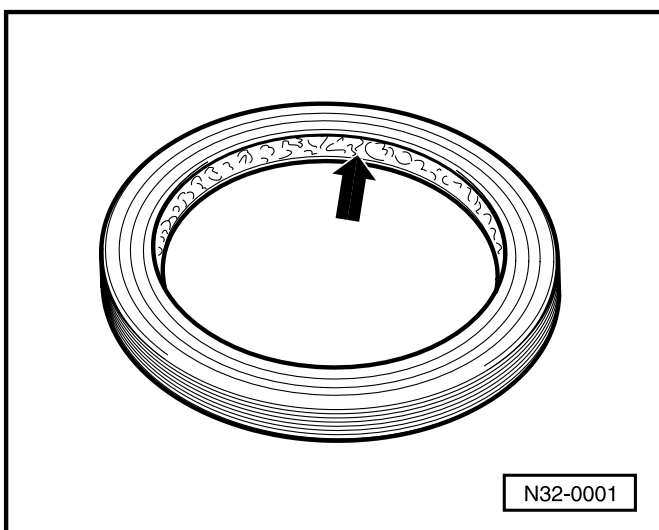
Seals and gaskets

On gearboxes with paper gaskets:

- ◆ Replace paper gaskets.

On gearboxes with sealant:

- ◆ Thoroughly clean the contact faces and apply an even - but not too thick - coat of sealant AMV 188 200 03.
- ◆ Replace O-rings.
- ◆ Radial shaft seals.

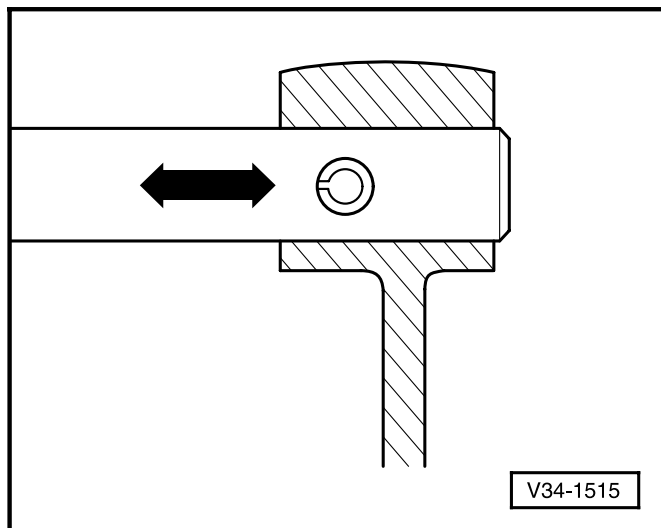


Before installing:

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

After installing:

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

**Locking elements**

- ◆ Replace circlips.
- ◆ Do not over-tension circlips.
- ◆ Circlips must be properly positioned in the base of the groove.
- ◆ Replace roll pins.
Fitting location: slot facing in direction of force.

Nuts, bolts

- ◆ Slacken and tighten nuts and bolts for attaching covers and housings diagonally.
- ◆ Do not twist parts which are particularly sensitive - e.g. clutch pressure plates - and slacken and tighten in stages diagonally.
- ◆ The tightening torques stated apply to nuts and bolts which have not been oiled.
- ◆ Always replace self-locking nuts and bolts.

Bearings

- ◆ Position needle bearings with the inscribed side (larger wall thickness) facing the insertion drift.
- ◆ Insert all bearings in the gearbox with gear oil. Oil particularly carefully for measuring the friction torque.
- ◆ Always replace all of the taper roller bearings which are fitted to the same shaft. Use the same make if possible!
- ◆ Heat inner races of taper roller bearings to about 100 °C before pressing on.
- ◆ Do not mix up the outer and inner races of bearings of equal size. The bearings are matched.

Shims

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

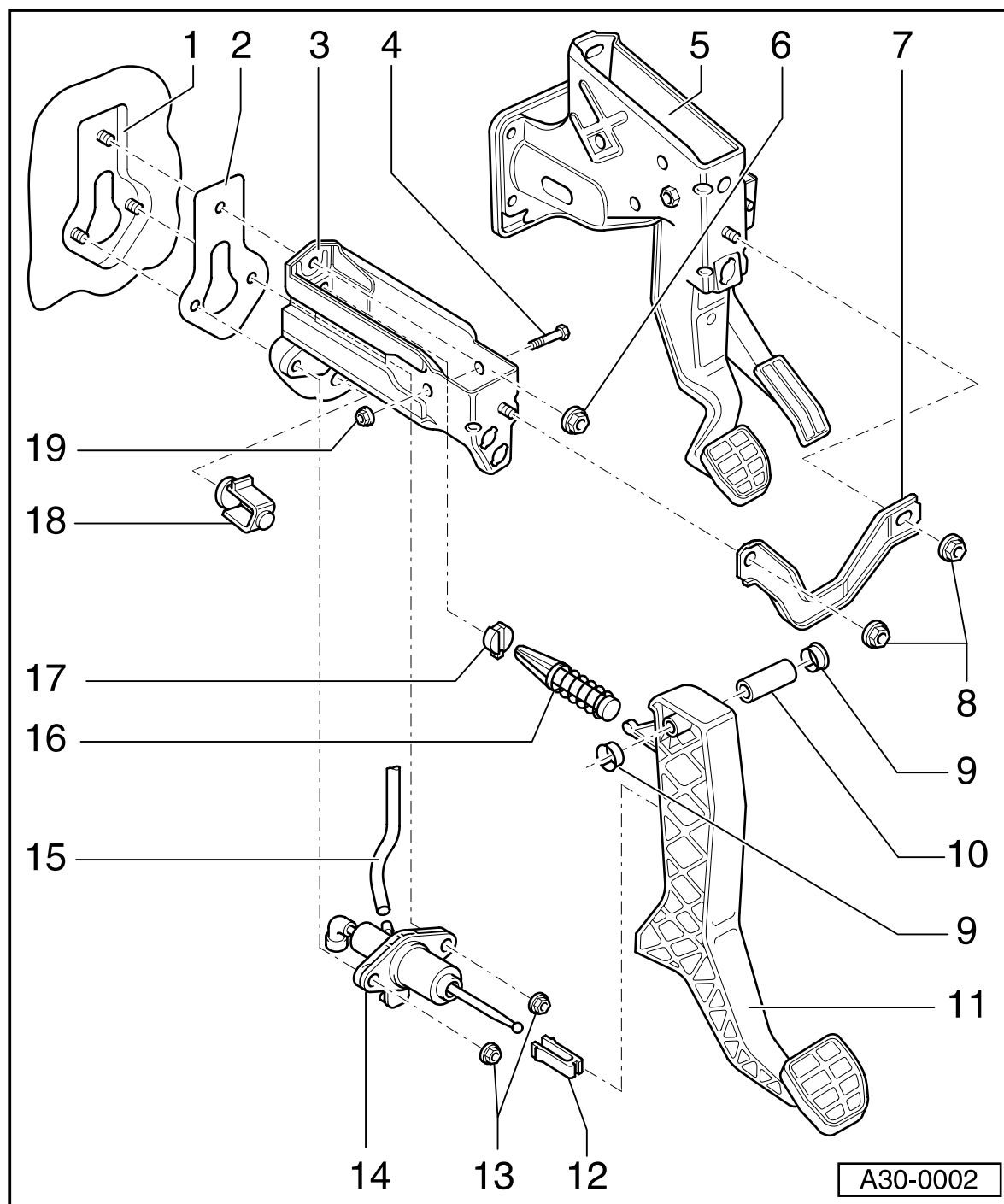
Synchroniser rings

- ◆ Do not mix up. Match the synchroniser rings to the same gear when re-using.
- ◆ Inspect for signs of wear and replace, if necessary.
- ◆ Moisten with gear oil before inserting.

Gear wheels

- ◆ Clean and heat on a heating plate to about 100 °C before fitting on.
- ◆ The temperature can be checked with a temperature measuring device (e.g. V.A.G 1558).

Servicing clutch mechanism



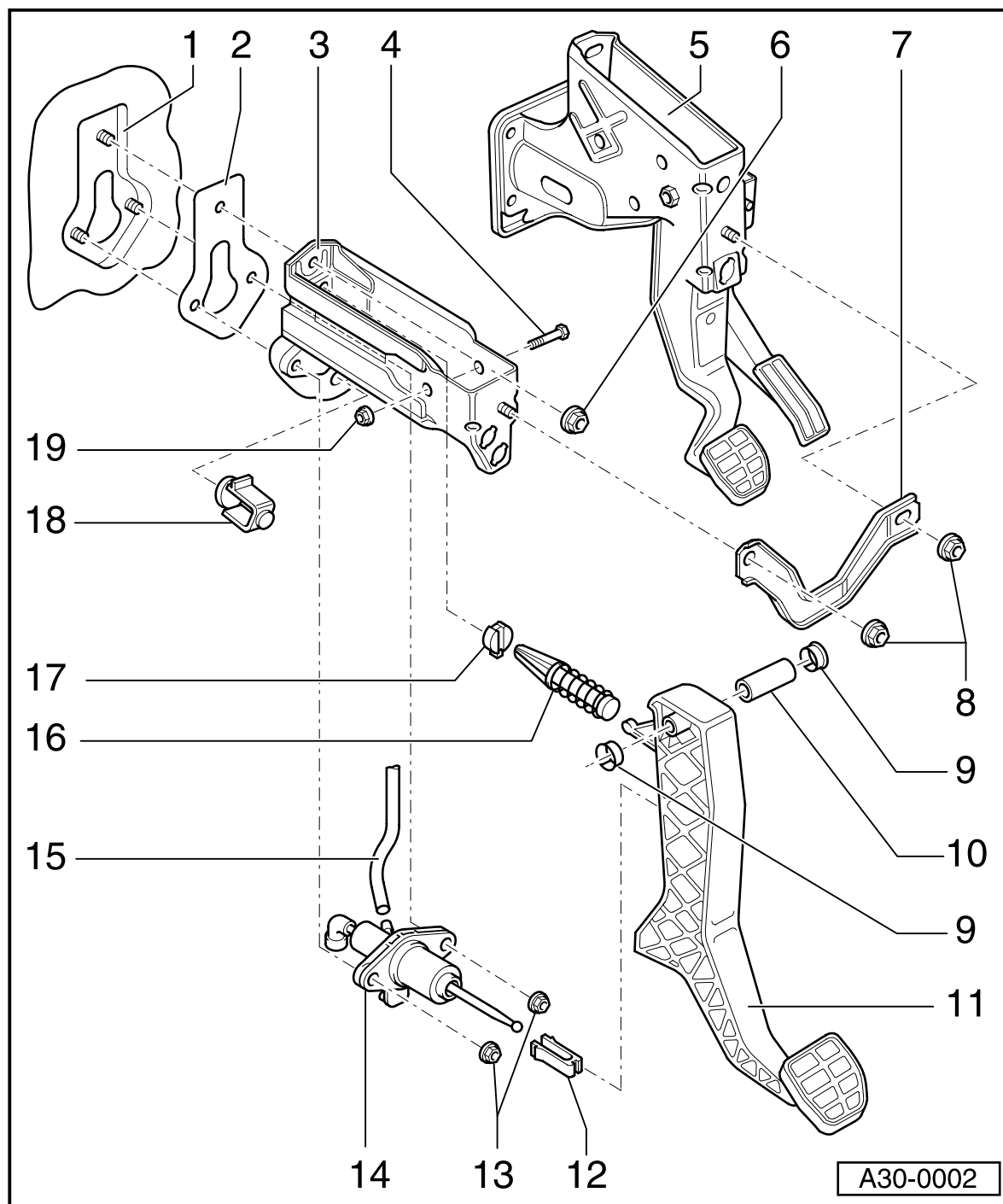
List of pedal components

Special tools, testers and aids required

- ◆ Polycarbamide grease G 052 142 A2

Notes:

- ◆ List of hydraulic components ⇒ page 30-5
- ◆ If vehicle fitted with coded radio set, determine coding.
- ◆ Disconnect earth strap from the battery.
- ◆ Grease all bearing and contact points with polycarbamide grease G 052 142 A2.
- ◆ Before carrying out any work on the pedal assembly, remove shelf on driver's side:
⇒ General Body Repairs; repair group 70; Removing and installing dash panel.

**1 - Bulkhead mount**

- ♦ for master cylinder and bearing bracket

2 - Gasket

- ♦ always replace

3 - Bearing bracket**4 - Hexagon bolt****5 - Accelerator/brake pedal assembly****6 - Self-locking hexagon nut, 25 Nm**

- ♦ always replace

7 - Connecting plate**8 - Self-locking hexagon nut, 20 Nm**

- ♦ always replace

9 - Spacer bushes**10 - Bearing bush****11 - Clutch pedal**

- ♦ removing and installing ⇒ 6-Speed Manual Gearbox 02M

12 - Mount

- ♦ removing and installing ⇒ page 30-5

13 - Self-locking hexagon nut, 25 Nm

- ♦ always replace

14 - Master cylinder

- ♦ removing and installing ⇒ page 30-5

15 - Feed hose**16 - Over-centre spring**

- ♦ removing and installing ⇒ 6-Speed Manual Gearbox 02M

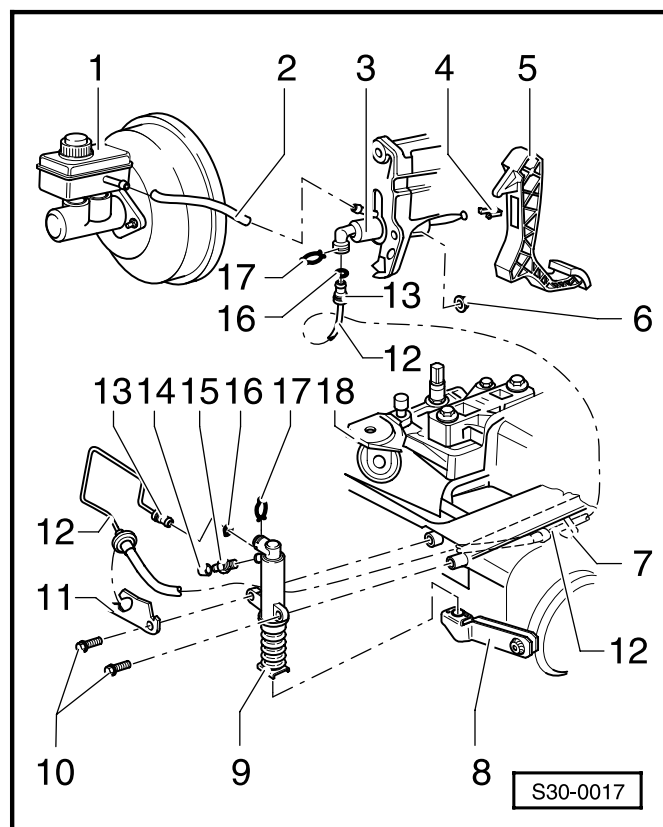
17 - Over-centre spring mounting

- ♦ insert into bearing bracket
- ♦ always replace

18 - Pedal stop**19 - Self-locking hexagon nut, 25 Nm**

- ♦ always replace

Summary of components of hydraulic system



1 - Brake fluid reservoir

2 - Supply hose

3 - Master cylinder

- ♦ Removing and installing on left-hand drive models ⇒ page 30-6

4 - Mount

- ♦ Replace only with master cylinder removed
- ♦ Removing ⇒ Fig. 1
- ♦ Pressing on ⇒ Fig. 2

5 - Clutch pedal

- ♦ Removing and installing ⇒ page 30-4

6 - Self-locking hexagon nut, 25 Nm

- ♦ Always replace

7 - Clip

- ♦ Attached to body

8 - Clutch lever

- ♦ Removing ⇒ page 34-52

9 - Slave cylinder

- ♦ To remove, slacken collar bolts (item 10) and pull off securing clip (item 17)

10 - Collar bolt, 25 Nm

11 - Bracket

12 - Pipe-hose line

- ♦ Refer to Parts List for correct assignment for left and right-hand drive models

13 - Pipe connection/plug connection

14 - Dust cap

15 - Bleeder valve

- ♦ Bleeding clutch system ⇒ page 30-8

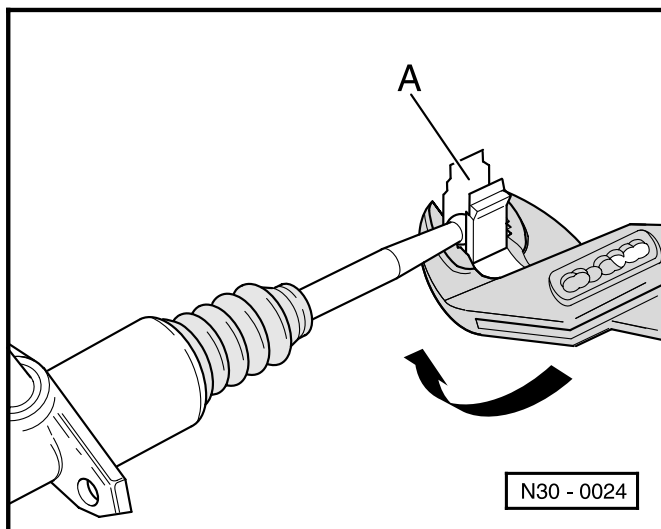
16 - O-ring

- ♦ Is not available as replacement part
- ♦ If O-ring is damaged, complete pipe-hose line has to be replaced

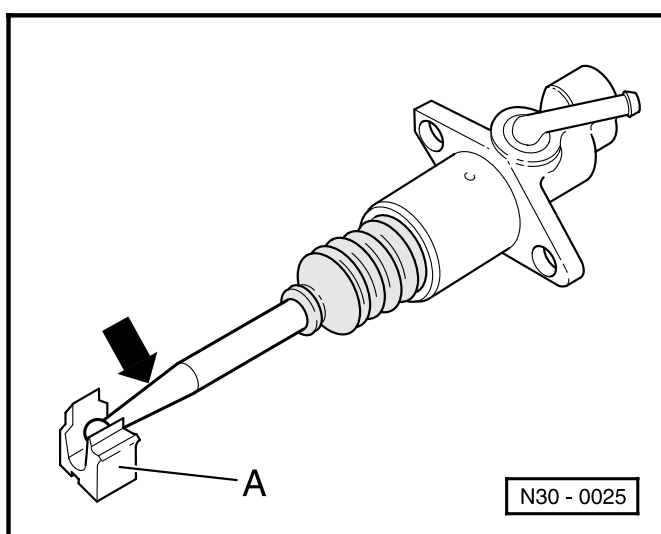
17 - Securing clip

- ♦ Removing ⇒ page 30-6

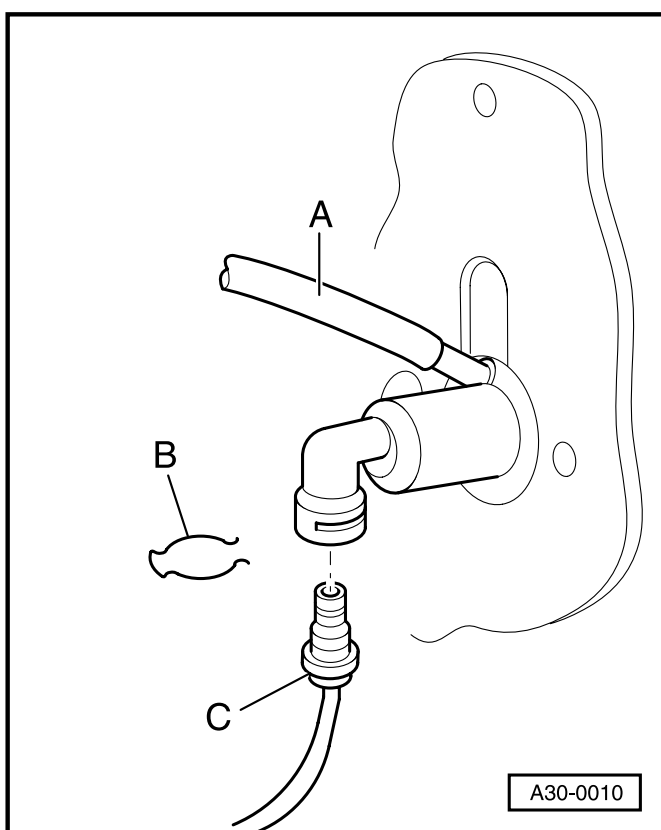
18 - Gearbox



◀ 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

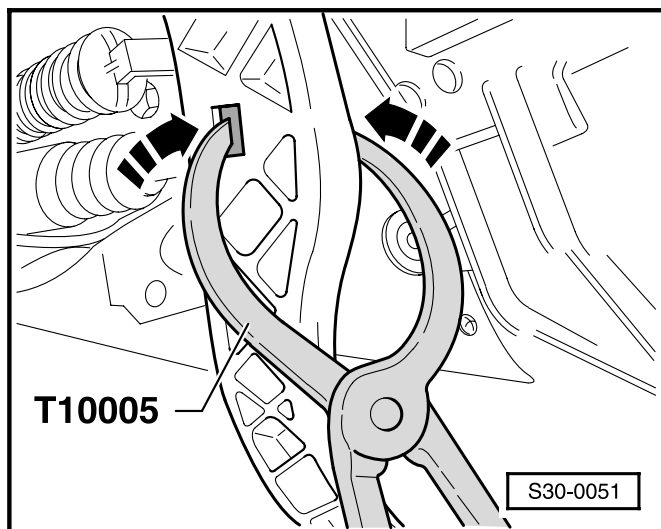
- ◆ Release tool 3309
- ◆ Pliers 10-208 A

Removing

Note:

Unbolt slave cylinder working from the passenger compartment.

- ◀ - Detach supply hose -A- to the brake fluid reservoir and seal.
- Pull out securing clip -B- of master cylinder.
- Pull out pipe -C- of master cylinder and seal.



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

Note:

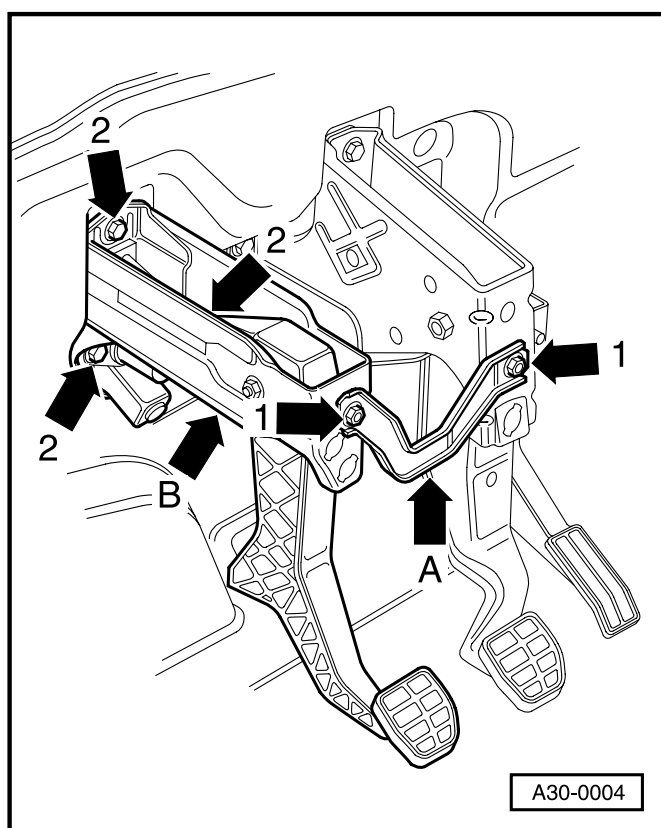
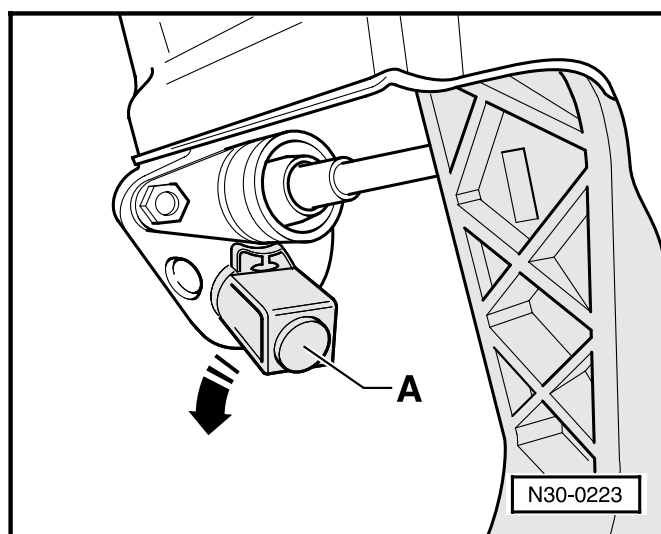
To take out the master cylinder, the clutch pedal assembly is removed complete. Before removing, however, it is necessary to separate the master cylinder from the clutch pedal.

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

- Insert pliers T10005 into the recesses of the clutch pedal.

- Press the mount together and separate the clutch pedal from the master cylinder.

- ◀ - Turn the stop -A- for the clutch pedal in direction indicated -arrow- and take out stop.



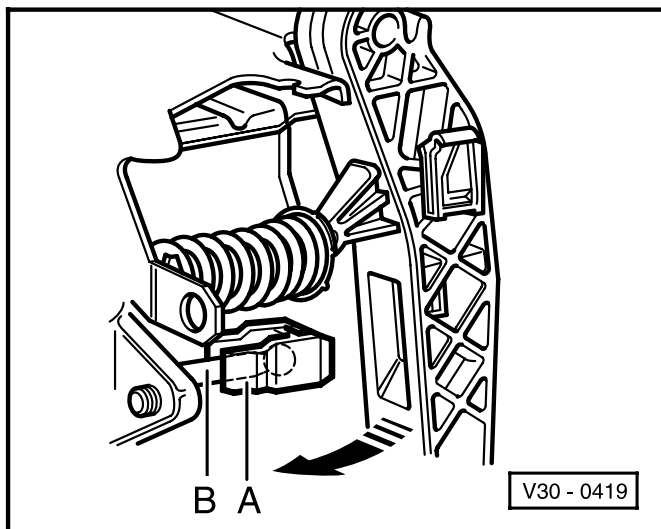
- ◀ - Unscrew hexagon nuts -arrow 1- and take off connecting plate -arrow A-.

- Unscrew hexagon nuts -arrow 2- and remove complete clutch pedal assembly -arrow B- together with master cylinder.

- Remove over-centre spring.
⇒ 6-Speed Manual Gearbox 02M; Repair Group 30; Removing and installing over-centre spring

- Turn over-centre spring mounting 90° and pull out ⇒ page 30-3, item 17.

- Remove master cylinder.



Installing

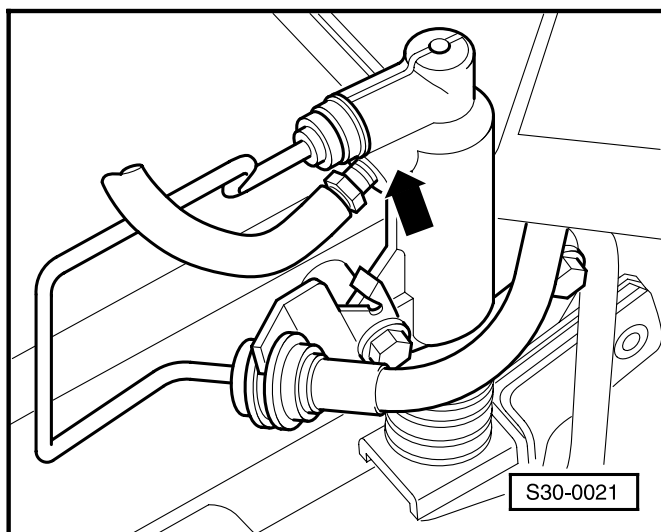
Installation is performed in the reverse order; pay attention to the following points:

- ◀ - The mount -A- must be located on the operating rod -B- of the master cylinder.
- To lock the mount in place, depress clutch pedal as far as the bulkhead (direction of arrow) and ensure that it is correctly locked.
- After installing the master cylinder, bleed clutch system

Bleeding clutch system

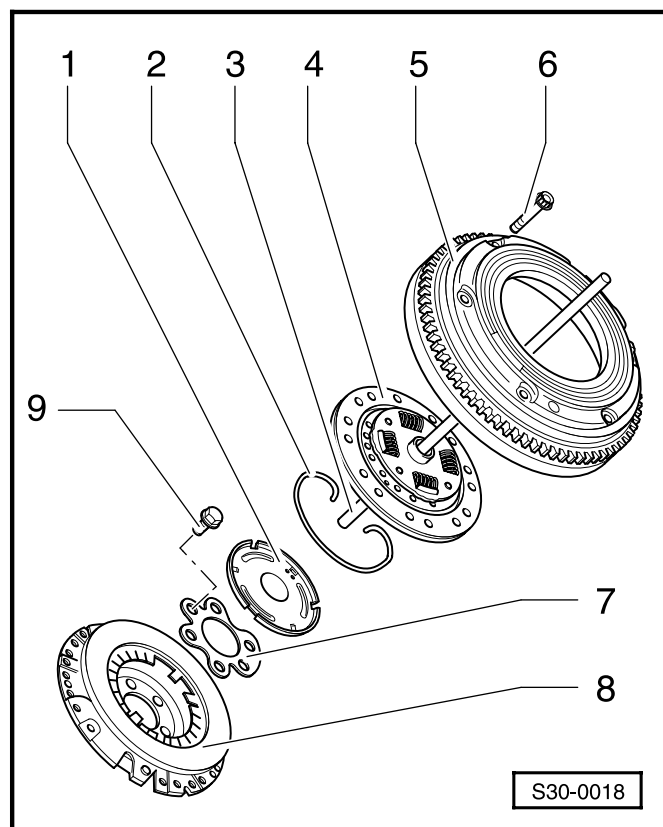
Special tools, testers and aids required

- ◆ Brake filling and bleeding appliance Romess S15
- ◆ Bleeder hose 670 mm



- Bleed clutch system using brake filling and bleeding appliance Romess S15.
- Use bleeder hose 670 mm for bleeding clutch system.
- Fit bleeder hose onto the connection of the bottle of the brake bleeding appliance.
- ◀ - Fit bleeder hose onto slave cylinder -arrow- and open bleeder valve.
- After completing the bleeding operation, depress the clutch pedal several times.

Servicing clutch



Special tools, testers and aids required

- ◆ Grease G 000 100

Notes:

- ◆ Replace clutch plates and pressure plates with damaged or loose riveted connection.
- ◆ Refer to Parts List and engine code letter for correct assignment of clutch plate and pressure plate.
- ◆ Assemble clutch so that the centering pins in the flywheel grip in the centering holes or centering slots in the pressure plate. If this is not done, TDC on flywheel will not be correct.

1 - Release plate

- ◆ Apply a very thin film of grease G 000 100 to contact surface and mount for clutch pushrod

2 - Retaining ring

3 - Clutch pushrod

- ◆ Grease in area of the guide bush in the input shaft

4 - Clutch plate

- ◆ Centering ⇒ page 30-10
- ◆ Diameter ⇒ page 00-2

5 - Flywheel

- ◆ Ensure tightly located on centering pins
- ◆ Contact surface for clutch lining should be free of grooves, oil and grease
- ◆ Insertion depth of TDC sensor should be adapted to the different sizes of flywheels. That is why there are two different colour-coded screw plugs in clutch housing. Assignment ⇒ page 34-48

6 - Twelve-point bolt, 20 Nm

- ◆ Slacken and tighten in stages diagonally across

7 - Intermediate plate

- ◆ Installation position ⇒ page 30-11

8 - Pressure plate

- ◆ Removing and installing ⇒ page 30-10
- ◆ Internal distortion of pressure plate - max. 0.2 mm
- ◆ Replace pressure plate with damaged or loose riveted connection

9 - Hexagon bolt, 60 Nm + torque a further $\frac{1}{4}$ (90°)

- ◆ Replace

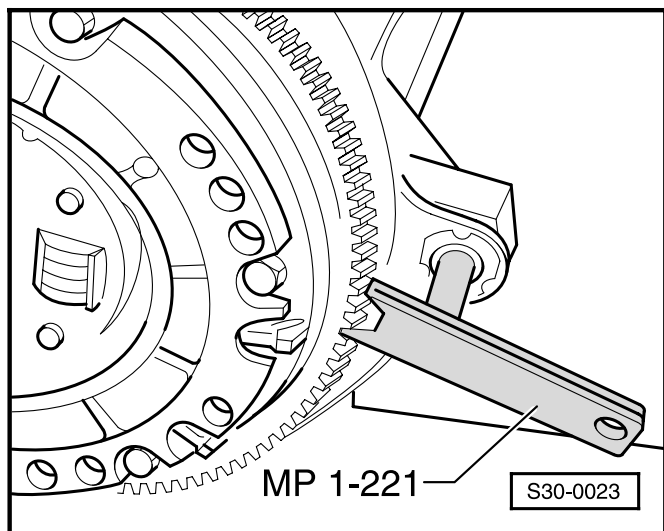
Removing and installing clutch

Special tools, testers and aids required

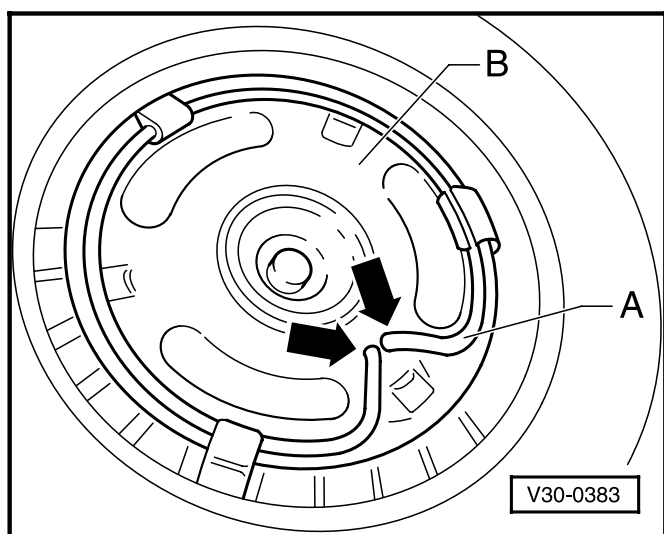
- ◆ Grease G 000 100
- ◆ Counterholder MP 1-221
- ◆ Centering device MP 2-400

Removing

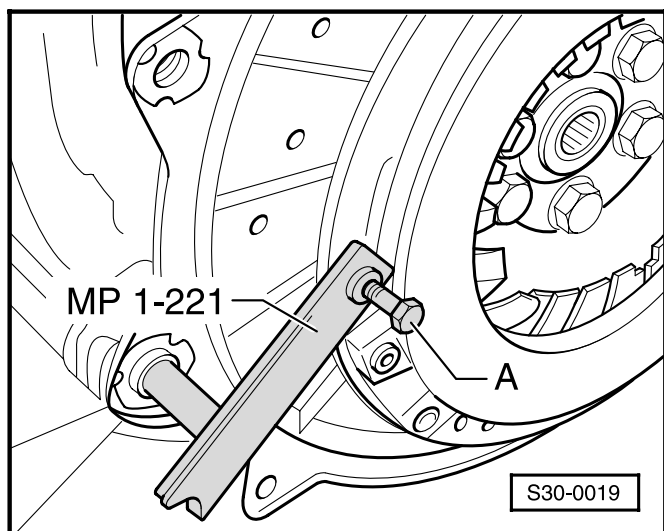
- ◀ - Remove flywheel; lock with counterholder MP 1-221 for this step.
- Take off clutch plate.

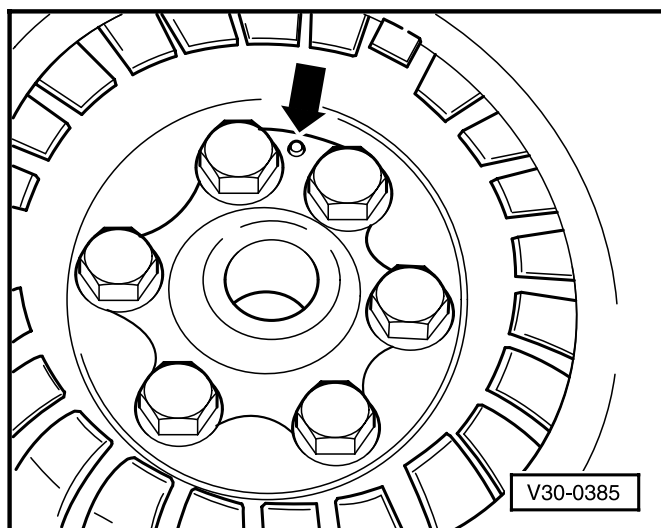


- ◀ - Use a screwdriver to lever retaining ring -A- for release plate -B- out of the holes (arrows) and remove.
- Take off release plate -B-.



- ◀ - Unbolt pressure plate; lock counterholder MP 1-221 at pressure plate with bolt -A- for this step.
- Take off pressure plate and intermediate plate.



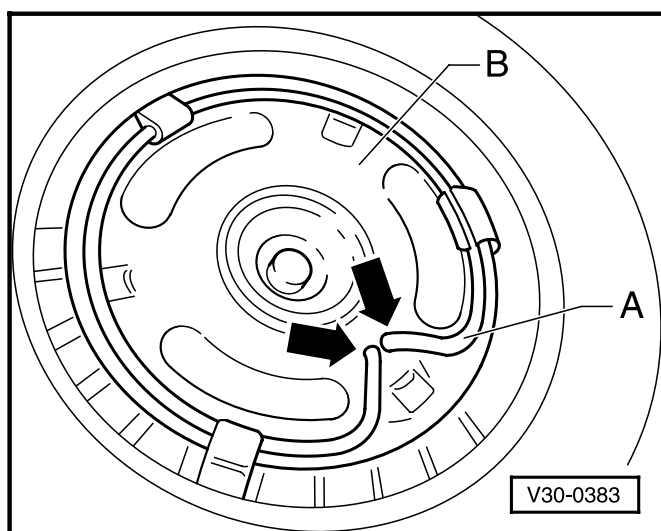
**Installing**

- Fit on pressure plate.
- Fit on intermediate plate.
- ◀ - Installation position of intermediate plate: The raised edge (arrow) points away from the pressure plate.

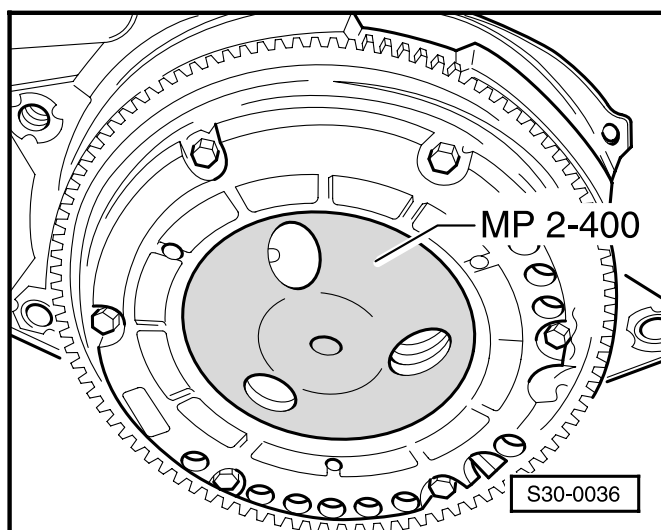
Note:

Insert new securing bolts.

- Tighten the securing bolts to 60 Nm and torque a further $\frac{1}{4}$ turn (90°). Lock pressure plate with counterholder MP 1-221 in the same way as when removing.

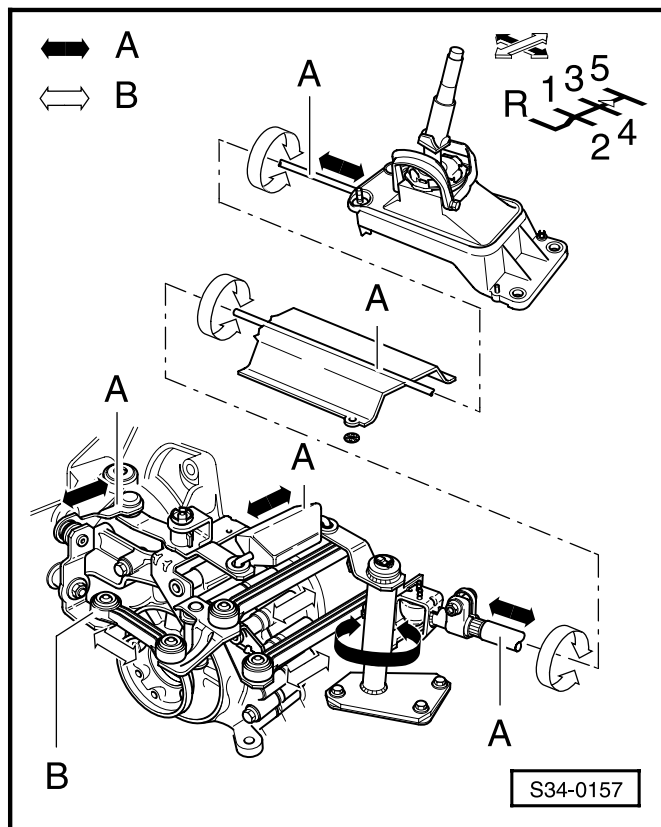


- ◀ - Insert release plate -B- and attach retaining ring -A- to pressure plate. Insert the two ends of the wire into the holes of the pressure plate (arrows).
- Apply a very thin layer of grease G 000 100 to the splines of the clutch plate. After this, move clutch plate back and forward on the input shaft of the gearbox until the hub moves freely on the shaft. It is essential to remove excess grease.
- Position clutch plate with flywheel against pressure plate.



- ◀ - Insert centering device MP 2-400 and tighten the bolts for attaching the flywheel alternately diagonally across.
- Lock the flywheel with counterholder MP 1-221 in the same way as when removing, in order to tighten the bolts.

Servicing shift mechanism



Fitting location of shift mechanism

A - Shift cable for shift movement

B - Selector cable for selector movement

Arrow -A- Shift movement

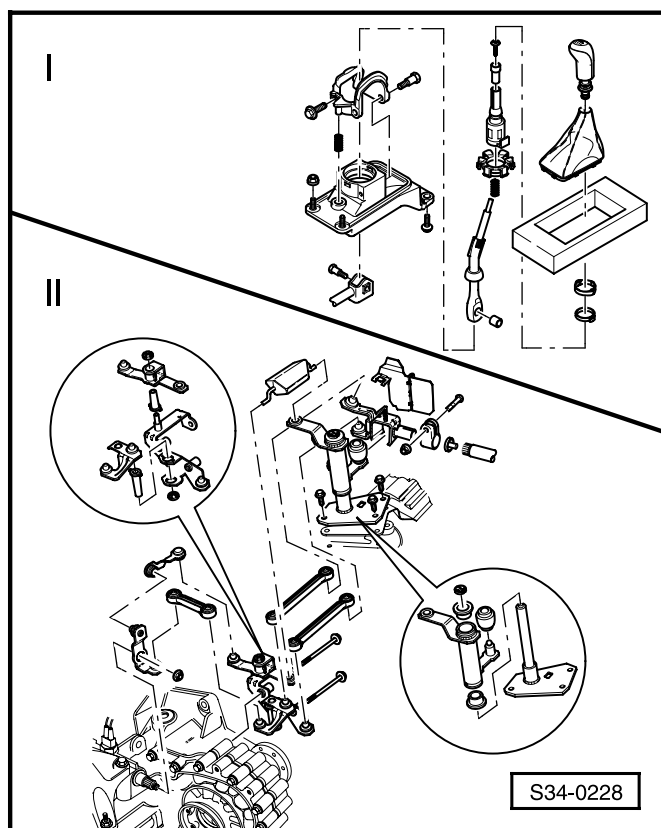
Arrow -B- Selector movement

Special tools, testers and aids required

- ◆ Poly resin grease G 000 450 02

Notes:

- ◆ Pay attention to coding of models fitted with coded radio set.
- ◆ Disconnect earth strap from battery when carrying out work on shift mechanism in engine compartment.
- ◆ Grease all bearing and contact surfaces with poly resin grease G 000 450 02.



7 - Spacer

8 - Hexagon collar bolt, 25 Nm

9 - Shift housing

♦ Remove and install ⇒ page 34-3

10 - Shift cable

♦ After installing set shift mechanism
⇒ page 34-10

11 - Hexagon bolt, 13 Nm

12 - Hexagon nut, self-locking

13 - Compression spring

14 - Stop

♦ After installing set shift mechanism
⇒ page 34-10

15 - Hexagon head bolt, 25 Nm

16 - Ball socket

♦ Remove and install ⇒ page 34-6

17 - Sleeve

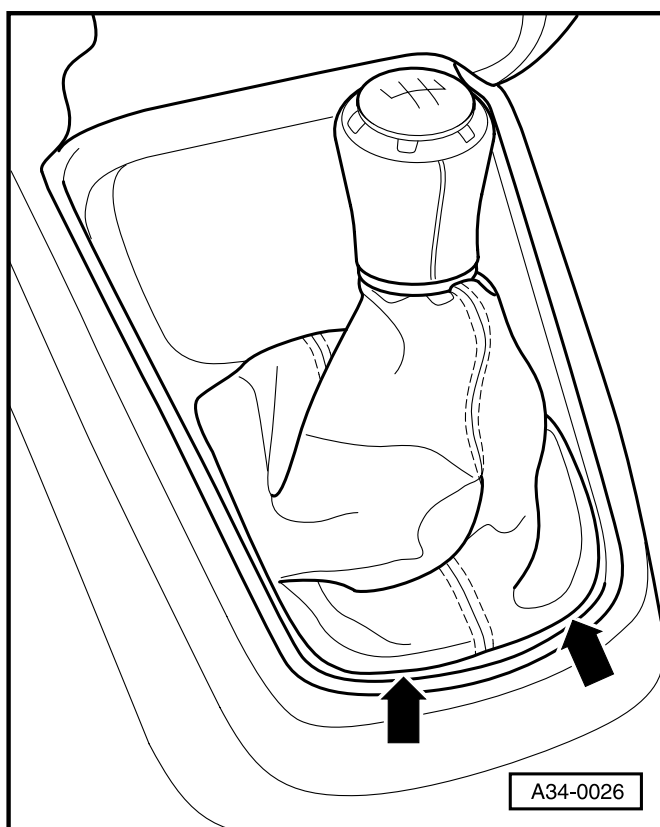
18 - Damper

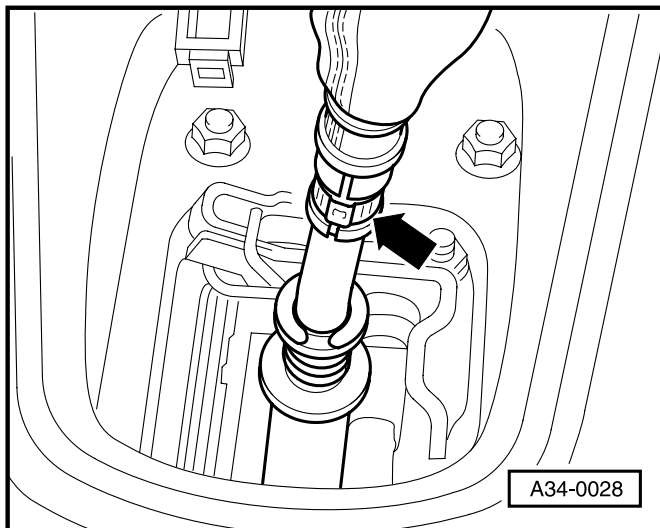
19 - Inner torx screws, 15 Nm

Removing and installing shift housing

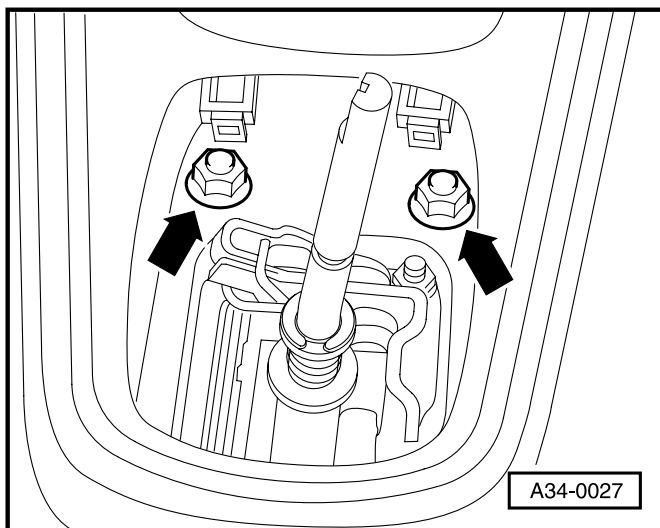
Remove

- ◀ - Lift off collar upwards (arrows) and pull out toward rear.

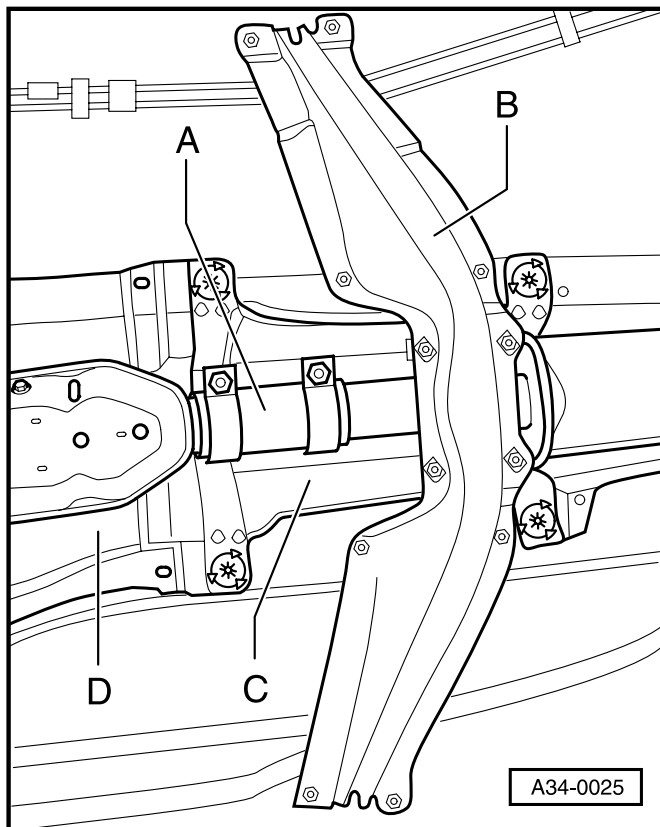




- Turn cover up over gearshift knob.
- ◀ - Open clip -arrow- and pull off gearshift knob together with cover.



- Take out noise insulation frame ⇒ item 3, page 34-2.
- ◀ - Unscrew securing nuts -arrows-.



- ◀ - Slacken double clamp -arrow A- and separate exhaust system.
- Unbolt cross member -B-.
- Remove heat shields -arrows C and D-.
- Slacken bolt for attaching shift rod/selector lever ⇒ item 15, page 34-9.
- Remove securing bolts ⇒ item 8, page 34-3.
- Lower shift housing and pull out to the rear complete with shift rod.

Installing

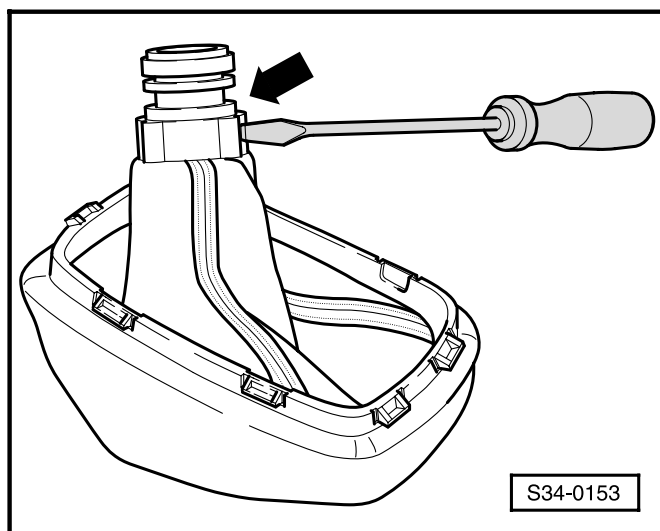
Installation is carried out in the reverse order.

Notes:

- ◆ *Setting shift mechanism* ⇒ page 34-10.
- ◆ *Aligning exhaust system:*
⇒ 4-Cylinder 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
Shift rod to selector lever	25 Nm



Separating gearshift knob from cover

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

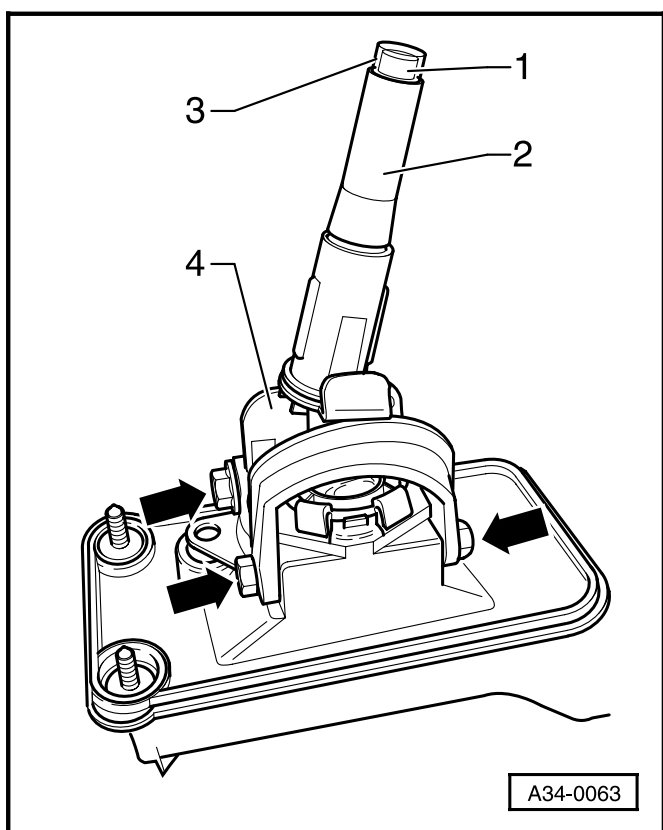
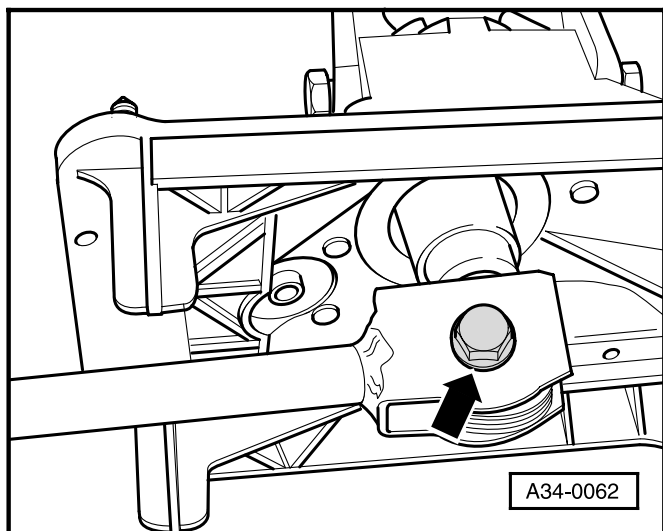
Installing

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

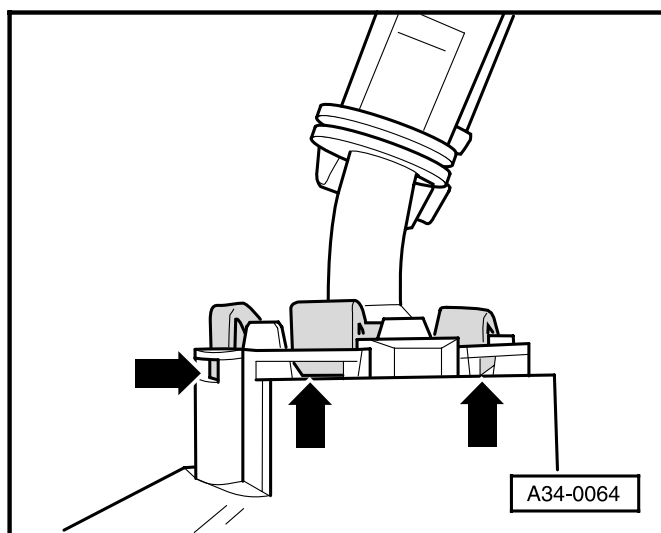
Removing and installing gearshift lever

Removing

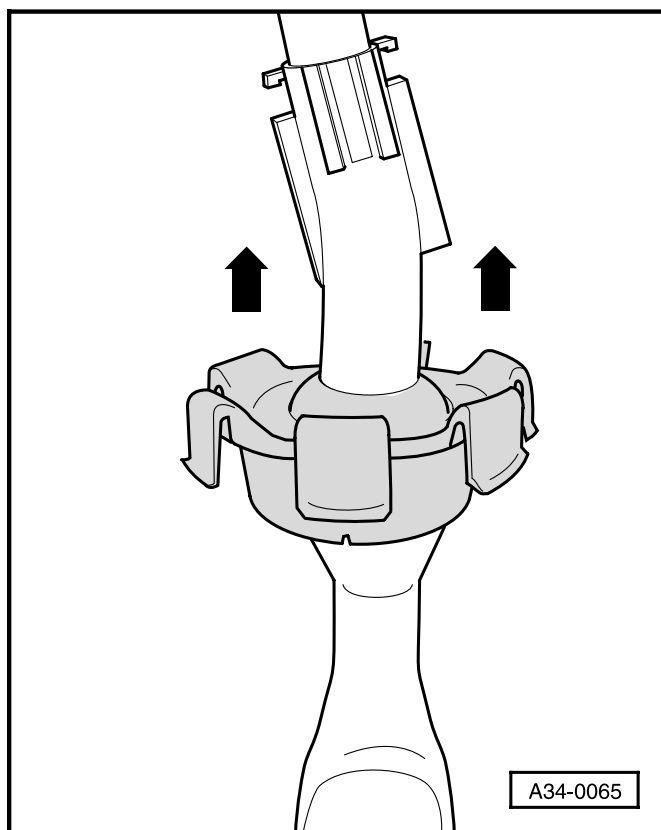
- Remove shift housing ⇒ page 34-3.
- ◀ - Unscrew hexagon bolt -arrow- and take shift rod off shift lever.



- ◀ - Unscrew bolt -1- and take off sleeve -2- together with damper -3-.
- Unscrew bolts -arrows- for stop -4-.



- ◀ - Use a screwdriver to press in hooks (6 in total) of ball socket -arrows- and carefully pull shift lever up and out of the shift housing.



- ◀ - Press ball socket off the gearshift lever in direction of arrow.

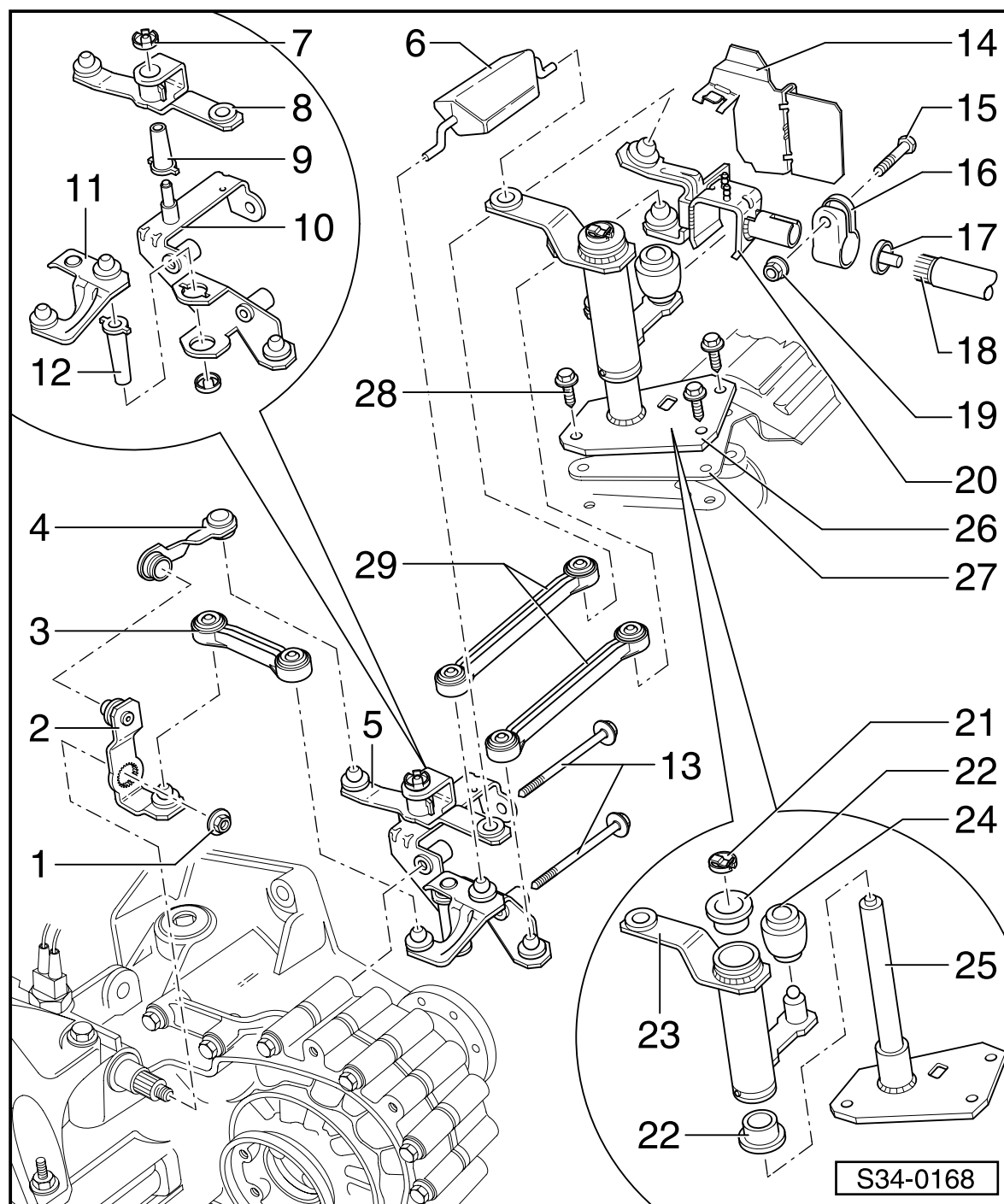
Installing:

Installation is carried out in the reverse order.

Notes:

- ◆ *Installing shift housing ⇒ page 34-3.*
- ◆ *Setting shift mechanism ⇒ page 34-10.*

Assembly overview - shift mechanism cables



1 - Hexagon nut, self-locking, 20 Nm

- ◆ Gearbox shift lever

2 - Gearbox shift lever

- ◆ Fits only in one position on gearshift shaft

3 - Speed selector cable

4 - Front selector cable

5 - Console

- ◆ Assembled
- ◆ For models ► 07.98 ⇒ item. 10
- ◆ For models 08.98 ► ⇒ page 34-9.1

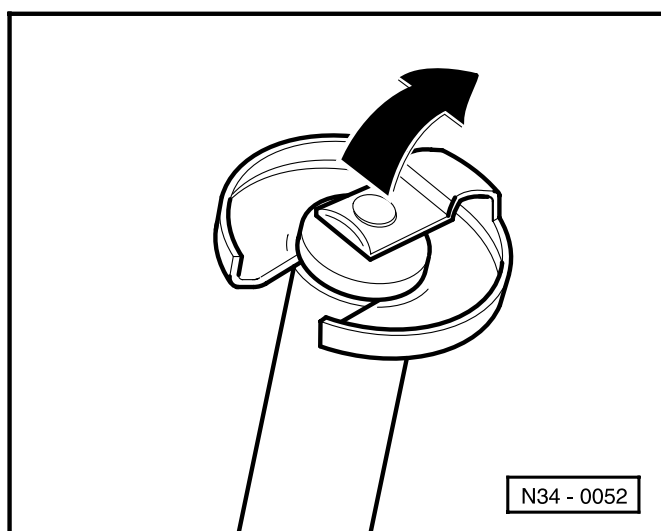
6 - Selector cable with balancing weight

7 - Lock washer

- ◆ Removing and installing ⇒ Fig.1

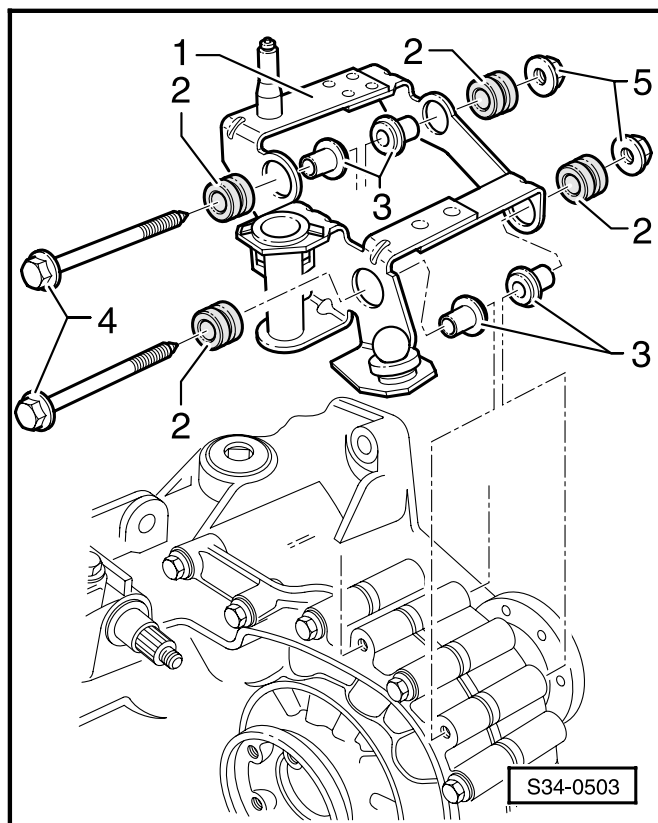
8 - Intermediate lever

- 9 - Bearing bush**
 - ◆ Insert from below into intermediate lever
- 10 - Mounting bracket**
 - ◆ For models ► 07.98
- 11 - Relay lever**
- 12 - Bearing bush**
 - ◆ Insert from above into mounting bracket
- 13 - 25 Nm**
- 14 - Shield**
 - ◆ Is pushed onto selector lever
- 15 - M 8 x 28 bolt**
- 16 - Collar clamp**
- 17 - Plug**
- 18 - Shift rod**
 - ◆ Setting ⇒ page 34-10
- 19 - 20 Nm**
 - ◆ Self-locking
- 20 - Selector lever**
- 21 - Lock washer**
 - ◆ Removing and installing ⇒ Fig. 1
- 22 - Bearing bush**
- 23 - Relay lever**
- 24 - Spherical sleeve**
- 25 - Bearing bracket**
- 26 - Bearing bracket**
 - ◆ With relay lever
- 27 - Shield**
- 28 - 25 Nm**
- 29 - Coupling rods**
 - ◆ Pay attention to different versions



◀ Fig. 1 Removing and installing lock washer

- Lift clamp in direction of arrow.

**Mounting bracket 08.98 ►****1 - Mounting bracket****2 - Rubber gland****3 - Bush****4 - 20 Nm****5 - Nut**

♦ replace

Setting shift mechanism

Special tools, testers and aids required

- ◆ Shift lever gauge 3421

Notes:

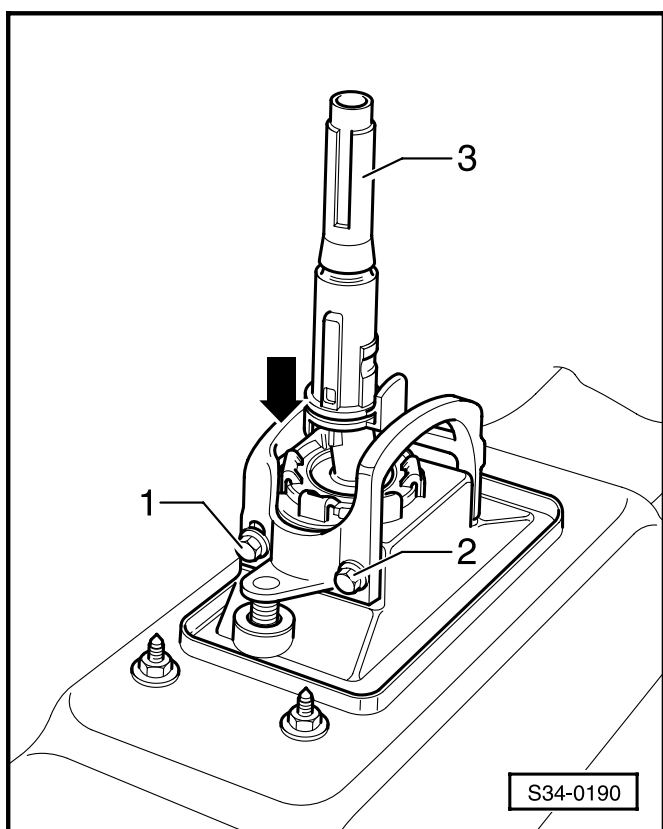
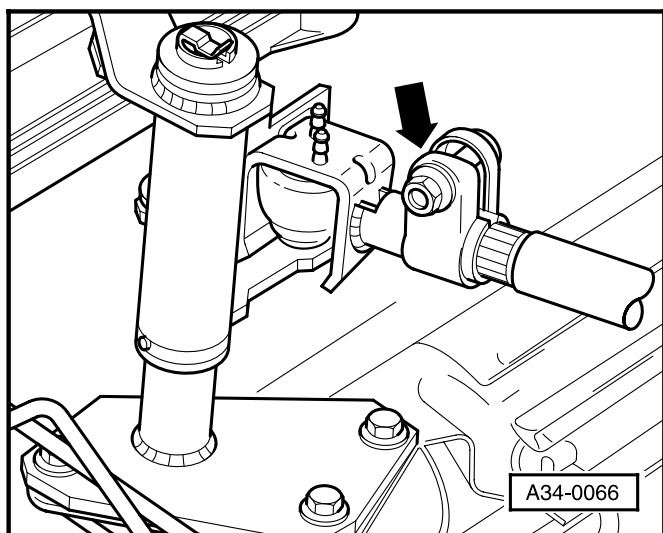
Requirements for correctly setting the shift mechanism:

- ◆ *The operating and transmission elements of the shift mechanism are in proper order.*
- ◆ *Shift mechanism operates freely.*

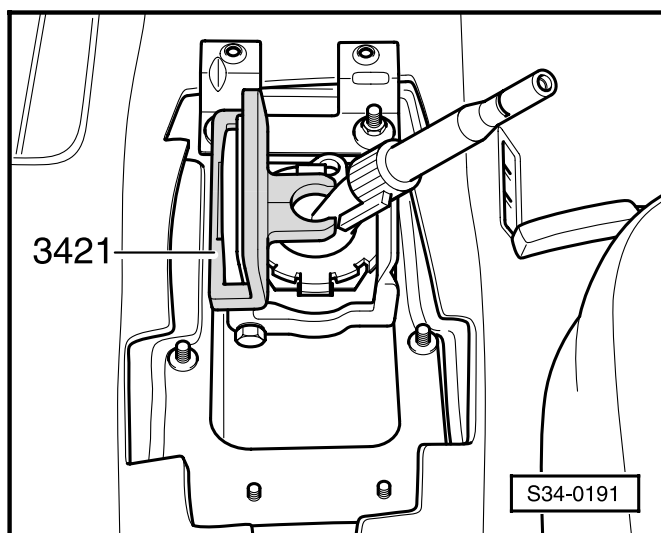
In addition, the gearbox, clutch and clutch mechanism should be in proper condition.

Transmission in neutral.

- Take off gearshift knob together with cover
⇒ page 34-3.
- ◀ - Slacken nut for clamp (arrow). The connection of shift rod/selector lever should operate freely.



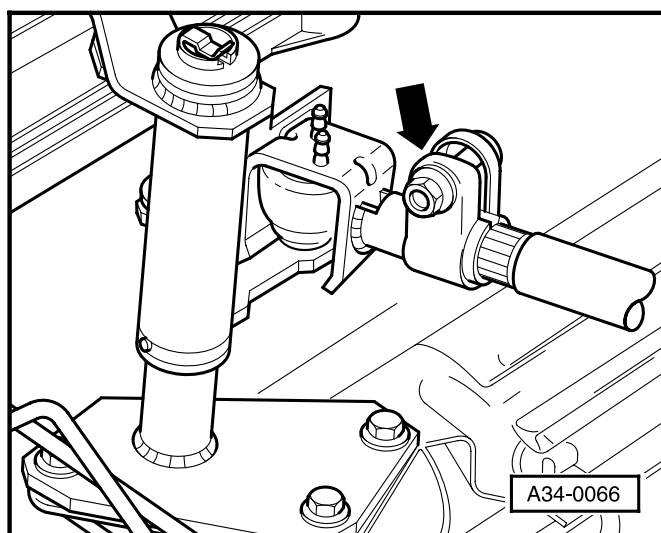
- ◀ - Take sleeve -3- off the shift lever
⇒ page 34-6.
- Slacken bolts -1- and -2- and push down stop on the right-hand side -arrow-. Re-tighten bolt -1-.



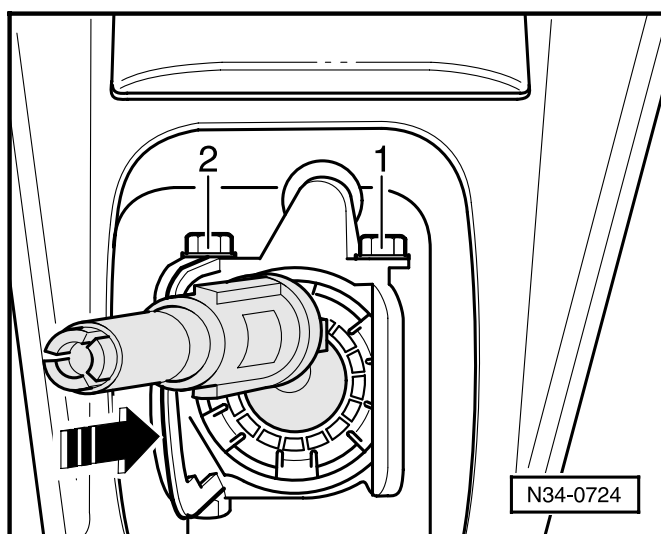
- ◀ - Fit on shift lever gauge 3421; turn shift lever fully to the right for this step.
- Press shift lever to the left into the mount of the shift lever gauge 3421.
- After this, align shift rod and selector lever free of stress.

Note:

- ♦ *It is important to ensure that no gear is engaged (neutral position).*



- Tighten nut for clamp to 20 Nm and remove shift lever gauge.
- Install sleeve for shift lever ⇒ page 34-6.

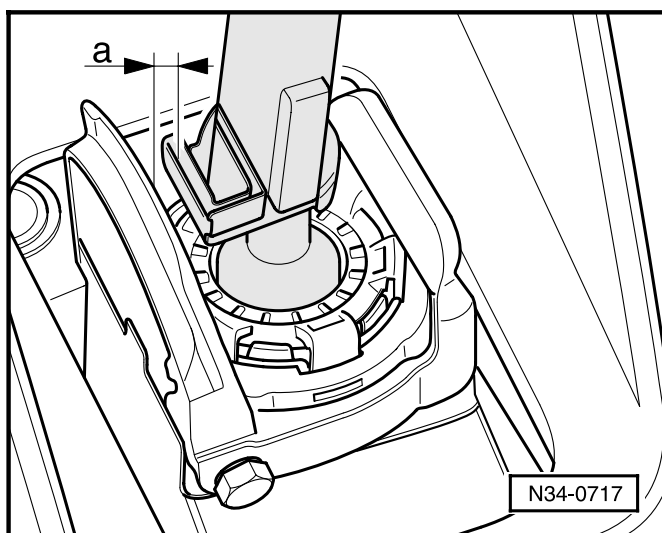


- Insert reverse gear.
- ◀ - Slacken bolt -1-.

Note:

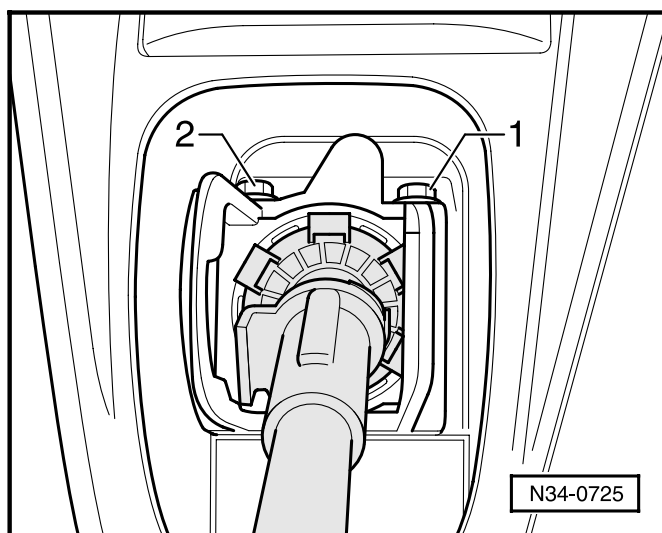
Stop is pushed to the left by the compression spring.

- Tighten bolts -1- and -2- to 25 Nm.
- Disengage reverse gear.
- Shift through all gears several times. It is particularly important to pay attention to operation of the reverse gear lock.



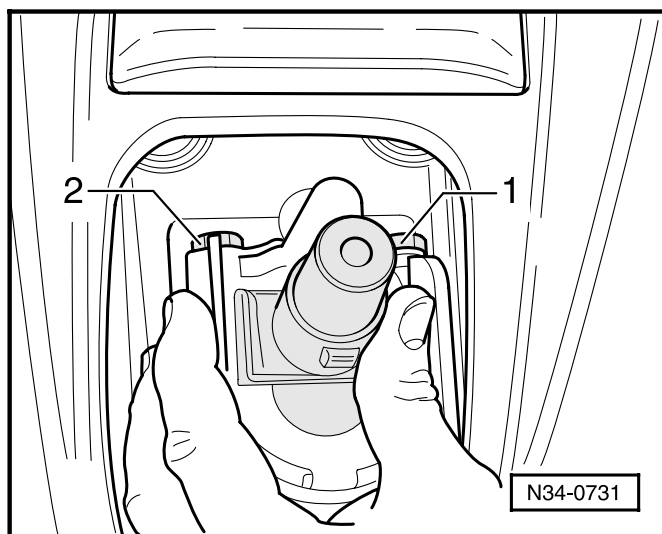
If a gear snatches repeatedly when it is engaged, proceed as follows:

- Engage 1st gear.
- Eliminate play in the shift mechanism by carefully pressing the shift lever to the left.
- ◀ ● The distance -a- should then be 2 ± 1 mm.
- If this is not the case, perform a precision setting.



Precision setting

- Shift lever should be in neutral in the gate of 3rd/4th gear.
- ◀ - Slacken bolts -1- and -2- only sufficiently for the stop to remain in place when it is moved into a new position.



- Engage 1st gear.
- Eliminate play in the shift mechanism by carefully pressing the shift lever to the left.
- Create distance -a- ($\Rightarrow$ page 34-11.1, Fig. N34-0717) by carefully altering the position of the stop.
- ◀ - Tighten bolts -1- and -2- again in this position to 25 Nm. Hold stop and shift lever in the correct position for this step.
- Install gearshift knob together with cover $\Rightarrow$ page 34-3.

Removing and installing gear-box

Special tools, testers and aids required

- ◆ Grease G 000 100
- ◆ Supporting device MP 9-200
- ◆ Removal device MP 3-470
- ◆ Mounting rails MP 3-457/1
- ◆ Gearbox mount 3282
- ◆ Adjustment plate 3282/5
- ◆ Gearbox suspension device MP 3-478
- ◆ Hexagon bolt M8 X 25

Removing

Note:

On vehicles fitted with coded radio set, pay attention to coding.

- Take off engine trim panel.
- Disconnect earth strap of battery.

On models with 1.6-ltr./74 kW and 1.9-ltr./50 kW engine:

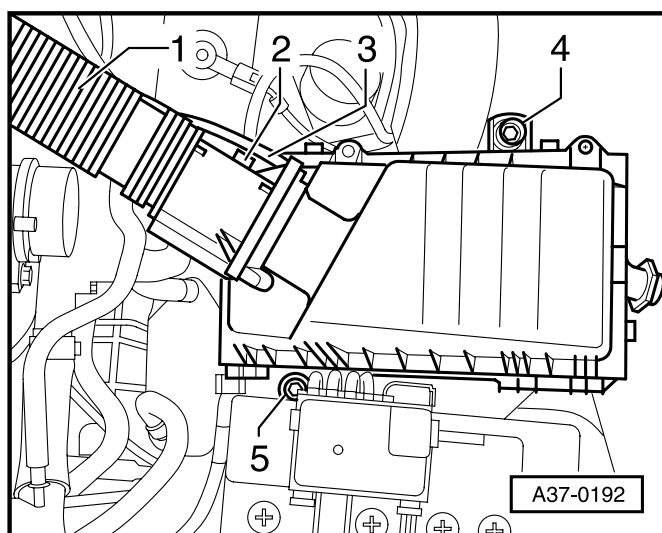
- ◀ - Detach air guide hose -1- and unplug connector -2- of air mass meter.

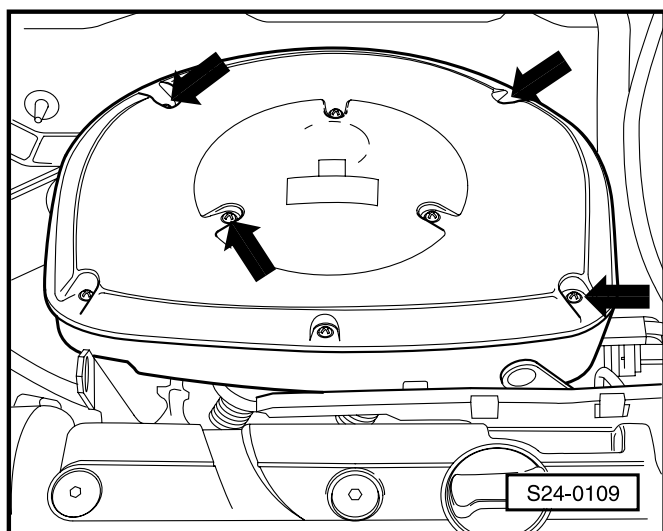
On models with 1.9-ltr./50 kW engine:

- Remove air hose -3- from air filter.

On models with 1.6-ltr./74 kW and 1.9-ltr./50 kW engine:

- Remove air filter housing complete by unscrewing bolts -4- and -5-.



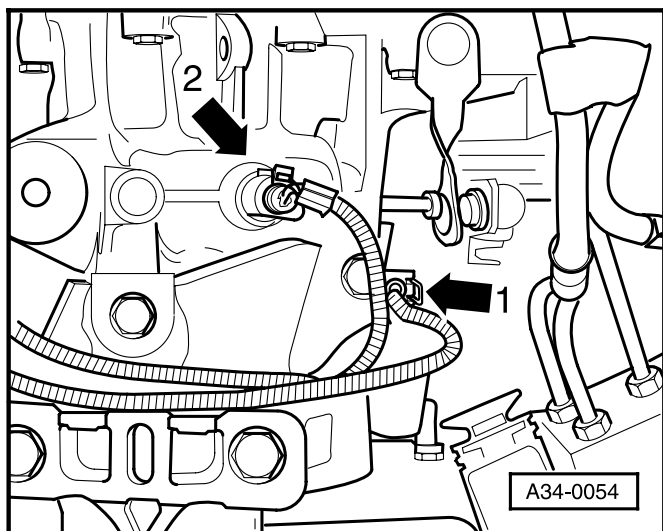


On models with 1.6-ltr./55 kW engine:

- ◀ - Remove air filter -arrows- and place to the side.

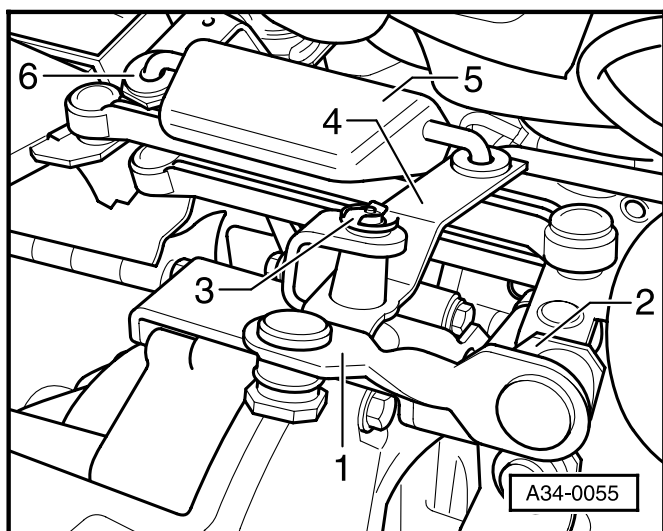
Note:

Do not use an electric or compressed air screw-driver.

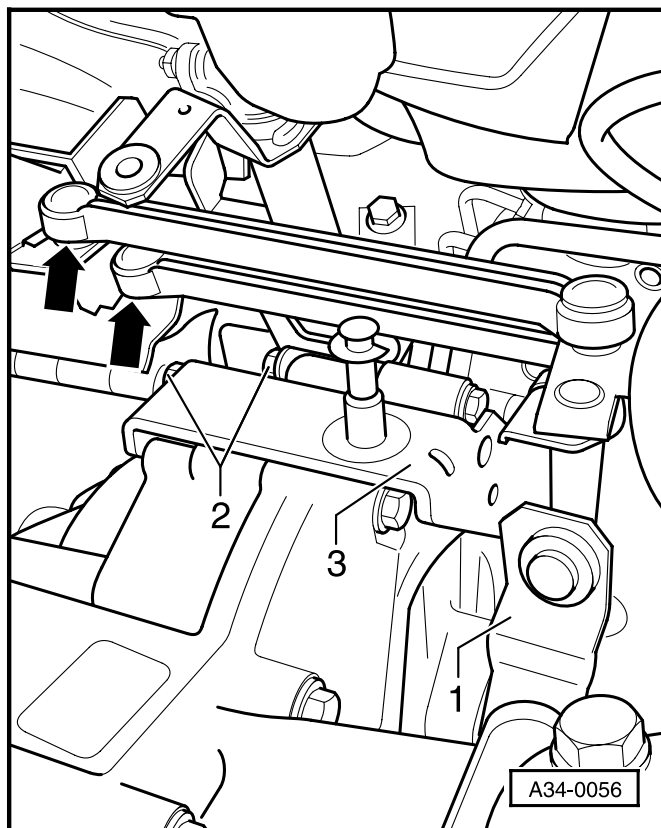


Continued for all models:

- ◀ - Unplug connector from the speedometer sender -1- and reversing light switch -2-.

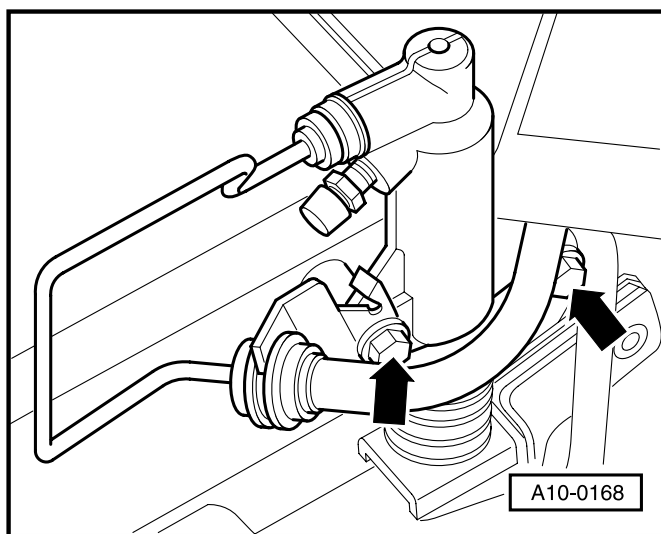


- ◀ - Use a screwdriver to lever off front shift rod -1- from shift lever -2-, take off locking plate -3- and lift bracket -4- up and out.
- Separate bracket -4- from shift rod together with balancing weight -5- by turning 90° to the right. Swivel shift rod and balancing weight up and separate from bearing bracket -6-.



◀ - Use a screwdriver to lever the long coupling rods off selector lever -arrows- and unbolt front shift lever -1- at gearbox.

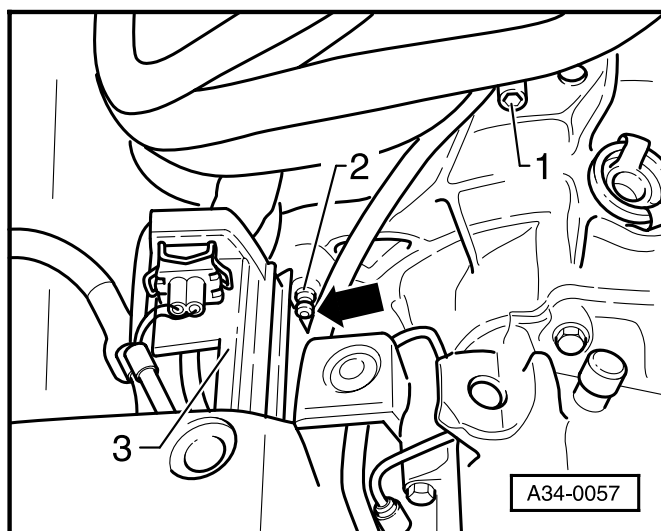
- Unscrew bolts -2- and take off shift bracket -3- together with coupling rods and front shift lever from the gearbox.



◀ - Unbolt clutch slave cylinder from gearbox, lift up and place down, secure with wire. Do not open the line system.

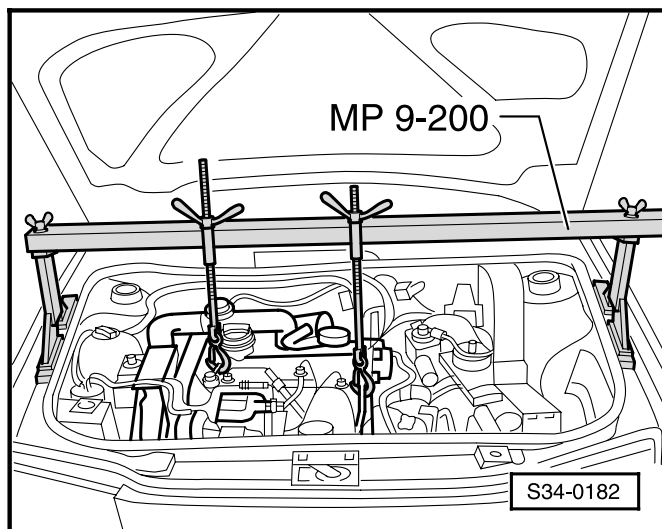
Note:

Do not depress clutch pedal.



◀ - Detach earth strap from top connecting bolt of engine/gearbox -1-.

- Unbolt cable bracket -3- at top of starter -arrow- and place to the side.
- Remove top bolt for attaching starter -2-.
- Unscrew all the bolts connecting engine/gearbox which are accessible from above.

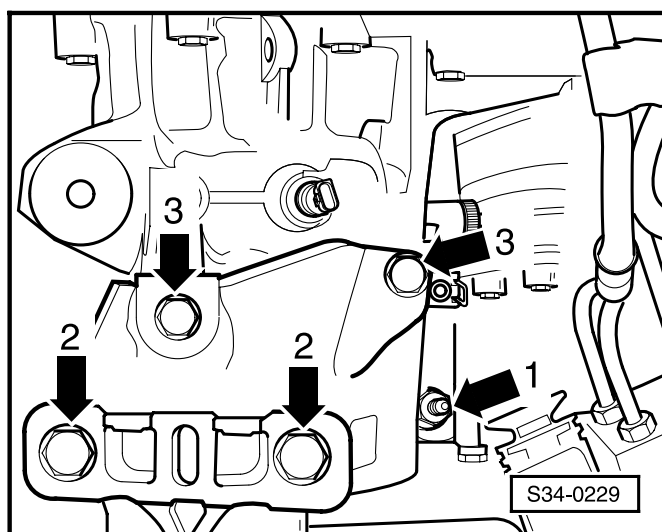


- ◀ - Install supporting device MP 9-200.

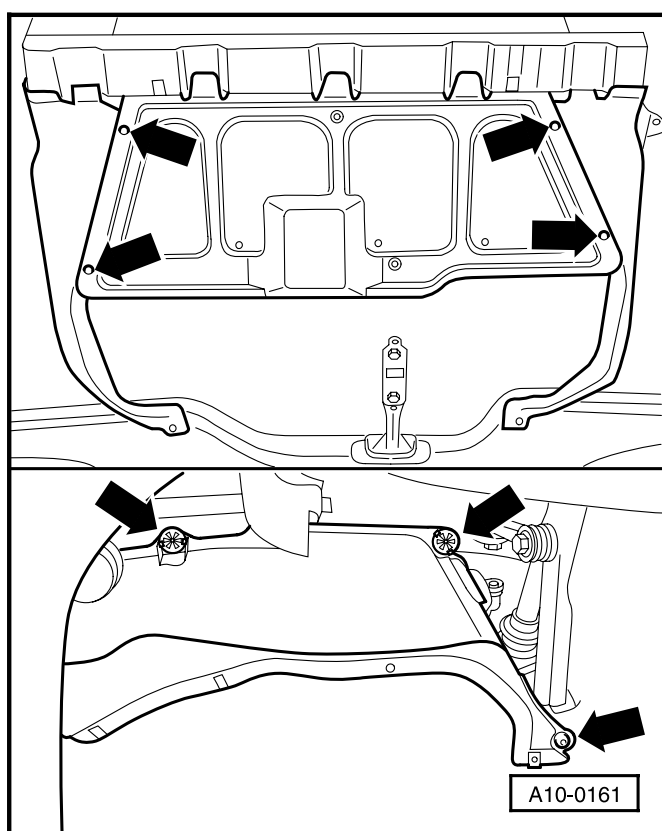
Note:

When inserting the hooks of the supporting device, pay attention to the hose and cable connections in the area of the engine lifting eyes in order to avoid damaging them.

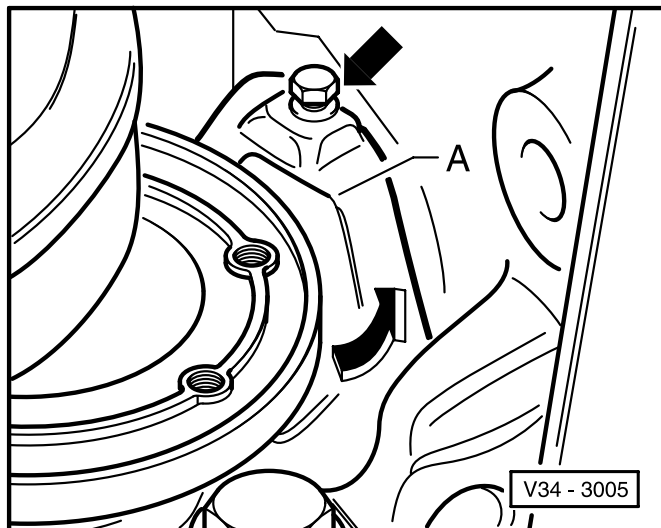
- Take up the weight of the engine/gearbox assembly at the spindles.



- ◀ - Detach the bracket for the power steering line at the rear bolt for the gearbox mounting bracket -arrow 1-.
- Unscrew the hexagon bolts -arrows 2- of the left gearbox mounting from the gearbox mount.
- Remove gearbox supporting bracket -arrows 3 and arrow 1-.

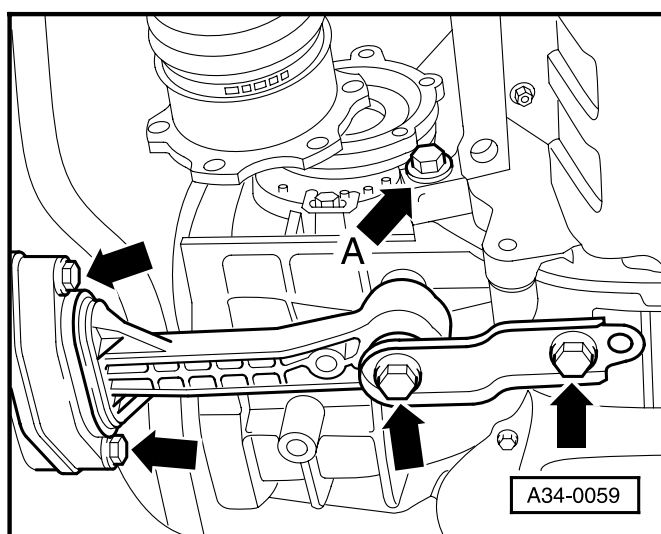


- ◀ - Remove complete noise insulation by unscrewing bolts -arrows-.
- Remove left wheelhouse liner:
⇒ Body Fitting Work, Repair Group 66.
- Remove starter:
⇒ Electrical System, Repair Group 27; Removing and installing starter.
- Take off protective cap for inner right CV joint from engine, if fitted.
- Separate drive shafts from flange shafts, turn steering to full left lock and tie up drive shaft as far as possible. Do not damage underbody protection.



On models with 1.6-ltr./74 kW and 1.9-ltr./50 kW engine:

- ◀ - Remove the small cover panel -A- for the flywheel behind the right flange shaft (arrows).

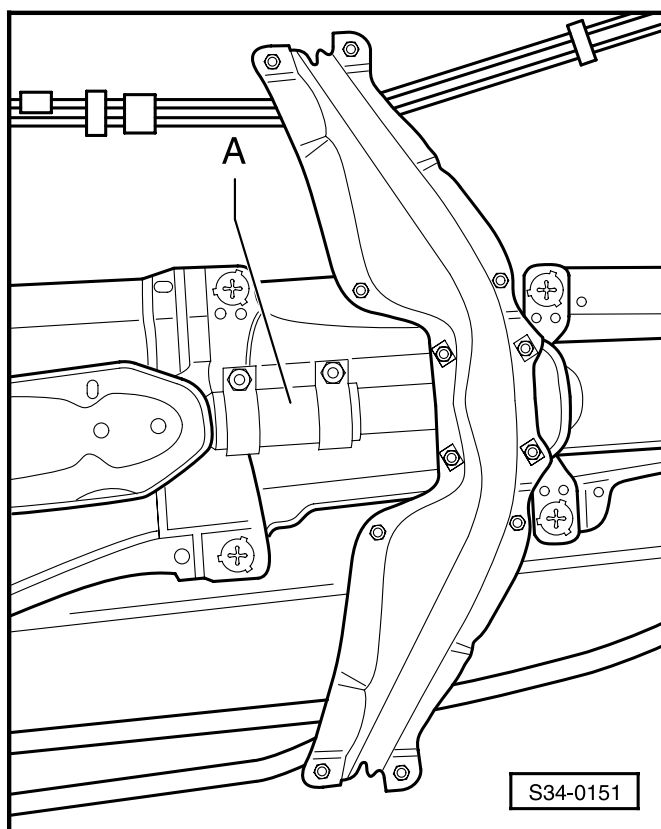


- ◀ - Unbolt pendulum support -arrows-.

- Unscrew the rear bolt connecting engine/ gearbox arrow -A-.

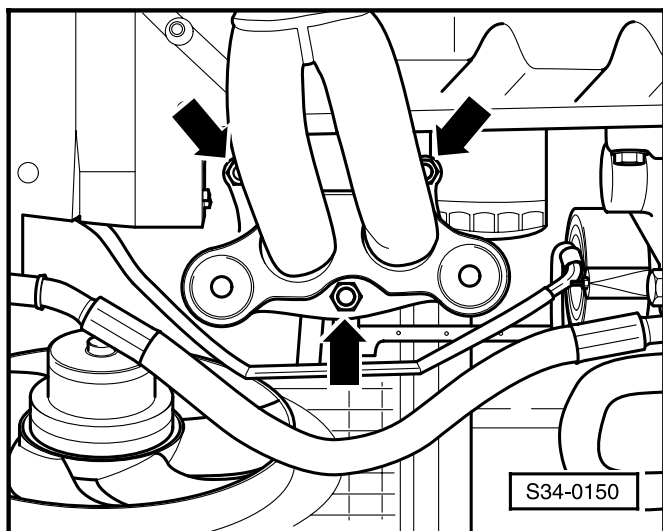
On models with 1.6-ltr./74 kW engine:

- Remove catalytic converter:
⇒ Engine, Mechanical Components, Repair Group 26; Removing and installing parts of exhaust system.



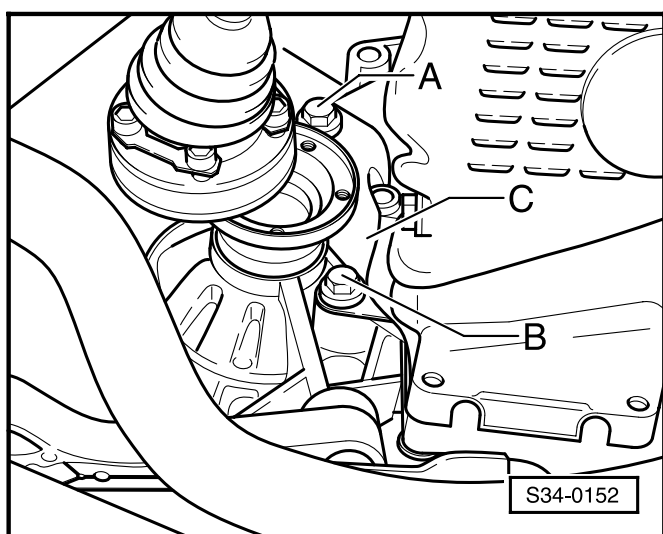
On models with 1.6-ltr./55 kW and 1.9-ltr./50 kW engine:

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



On models with 1.6-ltr./55 kW engine:

- ◀ - Separate catalytic converter from exhaust manifold by unscrewing the nuts -arrows-.

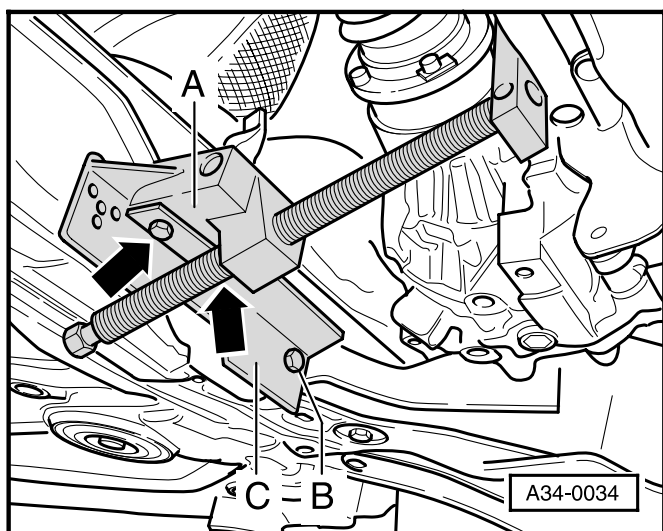


- Unbolt pendulum support ⇒ page 34-15, Fig. A34-0059.

- ◀ - Unscrew the rear bolts connecting engine/gearbox arrows -A- and -B- and remove the small cover plate for flywheel arrow -C-.

Note:

Pay attention to installation position of the cover plate.



Continued for all models:

A - Removal device MP 3-470

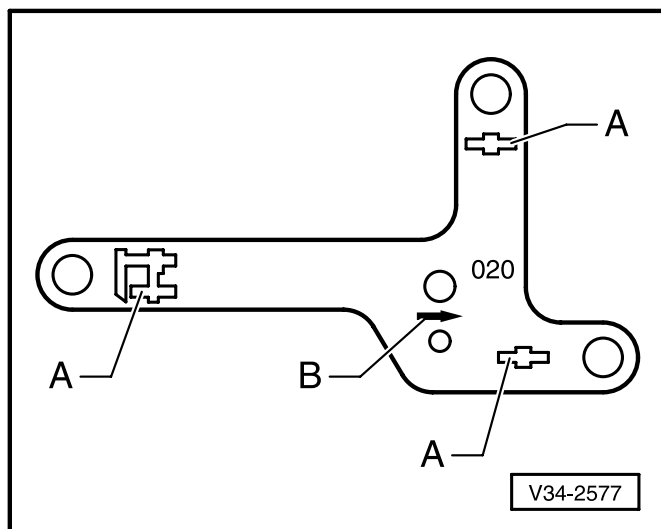
B - Bolt M8 x 25

C - Mounting rails MP 3-457/1

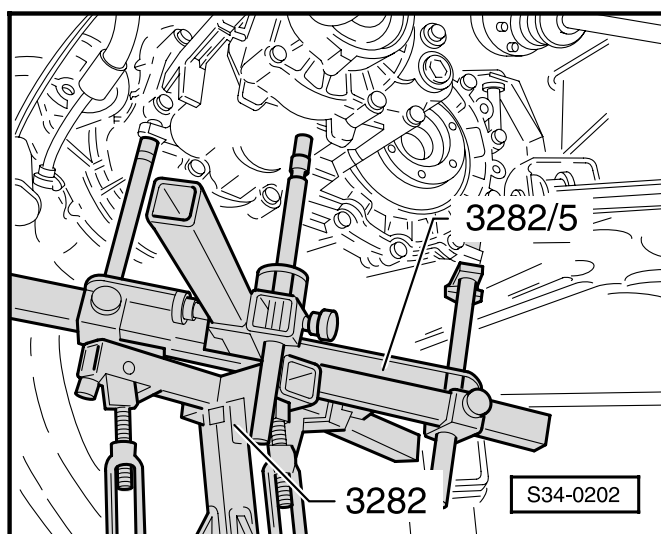
- Attach special tool -C- to the subframe (attachment of pendulum support) with bolt -B-.
- ◀ - Insert removal device -A- and tighten bolts -arrows-.
- Push engine/gearbox forward.

Note:

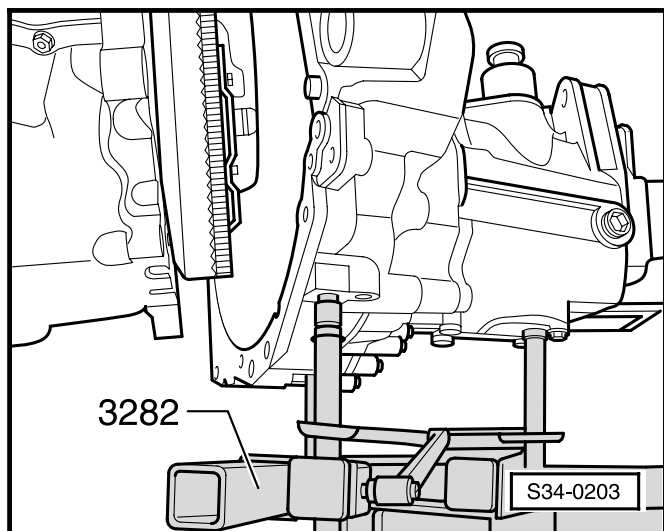
Pay attention to power steering line.



- Fit on gearbox jack with gearbox mount 3282, adjustment plate 3282/5 for gearbox „020“ and mounting elements, as follows:
- Fit adjustment plate 3282/5 onto gearbox mount 3282 (adjustment plate fits only in one position).
- Align the arms of the gearbox mount to match up the holes in the adjustment plate.
- ◀ - Screw in mounting elements -A-, as shown on adjustment plate.



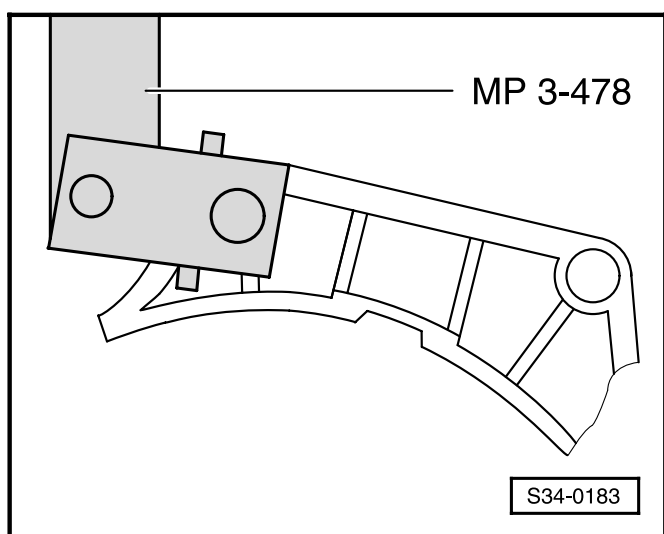
- ◀ - Position gearbox jack below vehicle, arrow symbol -B- (⇒ Fig. V34-2577) on adjustment plate points in direction of travel/vehicle.
- Align adjustment parallel to gearbox and lock securing mount at gearbox.
- Unscrew bottom bolts for attaching engine/gearbox.



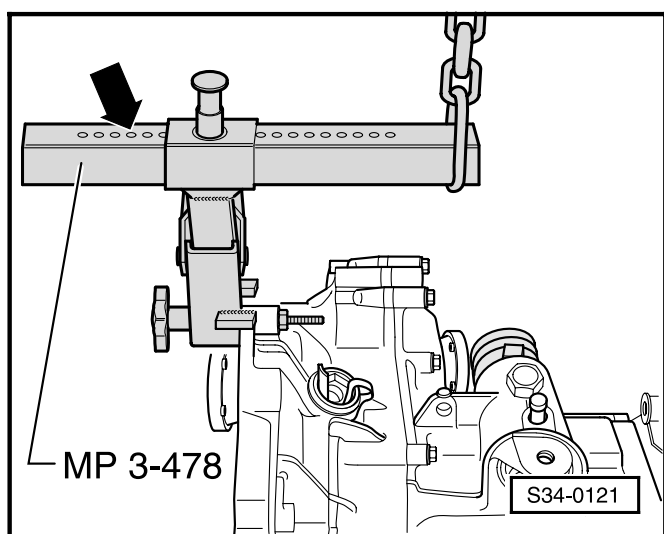
- ◀ - Press gearbox off the engine and swivel towards the assembly carrier.
- Lower gearbox carefully and at the same time change the position at the spindles of the gearbox jack.

Note:

Pay attention to power steering line when lowering the gearbox.



- ◀ - Screw down gearbox suspension device MP 3-478 onto clutch housing.



- ◀ - Adjust supporting arm at slide with locking pin (arrow).

Number of visible holes = 8.

- Raise gearbox with workshop crane and gearbox suspension device MP 3-478.
- Place down gearbox, e.g. in a transport container.

Installing

The installation of the gearbox occurs in reverse order. Install engine/gearbox mounting free of stress:

⇒ Engine, Mechanical Components, Repair Group 10, Removing and installing engine

Note:

- ◆ Clean the splines of the drive shaft and apply a thin film of grease G 000 100.
- ◆ If the gearbox is replaced, if provided, always replace gearshift lever and relay lever.
- ◆ If the gearbox is replaced, ensure the intermediate plate between the engine and gearbox is correctly installed.
- ◆ Check whether the dowel sleeves for centering the engine/gearbox are present in the cylinder blocks, insert if necessary.
- ◆ Installing starter/cables
⇒ Electrical System, Repair Group 27, Removing and installing starter
- ◆ Check gear oil ⇒ page 34-21
- ◆ Setting shift mechanism ⇒ page 34-10.
- ◆ If the battery earth strap is disconnected or connected carry out additional operations.
⇒ Electrical System, Repair Group 27

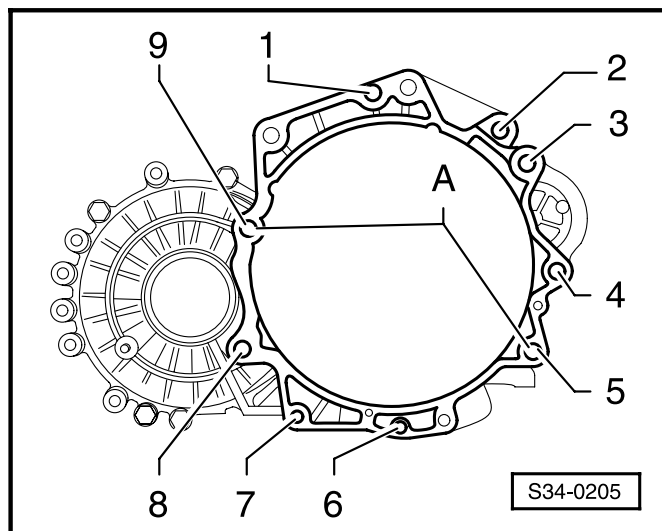
Tightening torques

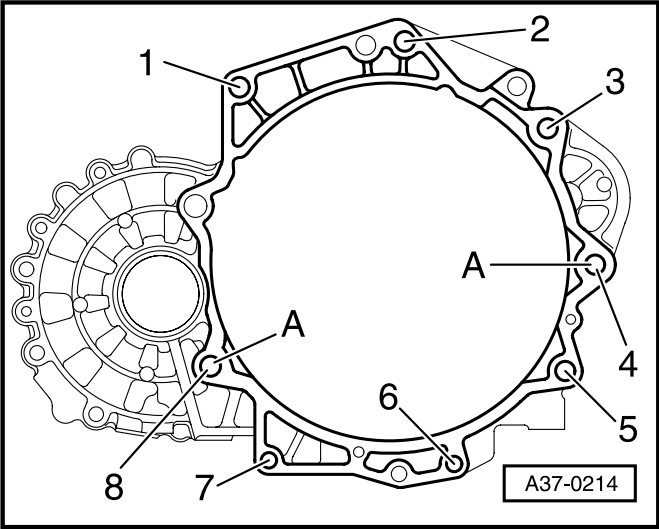
◀ Gearbox on 1.6 l/55 kW Engine

Pos.	Screw	Qty	Nm
1	M 12 x 55	1	80
2, 3 ¹⁾	M 12 x 55	1	80
4 ¹⁾	M 12 x 120	1	80
5	M 12 x 55	1	80
6, 7	M 10 x 50	1	45
8	M 12 x 35	1	20
9	M 12 x 55	1	80

¹⁾ Screw with threaded pin M8

A: Dowel sleeves for centering





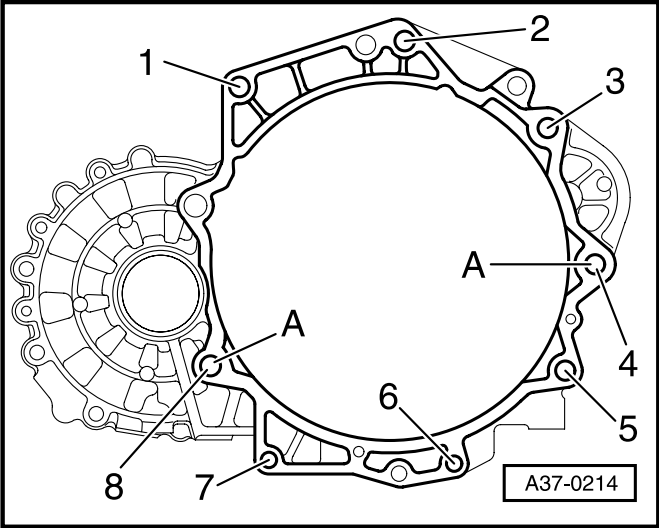
Tightening torques

◀ Gearbox to 1.6l/74 kW and 1.6l/75 kW engine

Item	Bolt	Qty.	Nm
1	M 12 x 65	1	80
2 ¹⁾	M 12 x 65	1	80
3, 4 ¹⁾	M 12 x 140	1	80
5, 6, 7	M 10 x 50	1	45
8	M 12 x 80	1	80

1) Bolt with M8 threaded pin

A: Dowel sleeves for centring

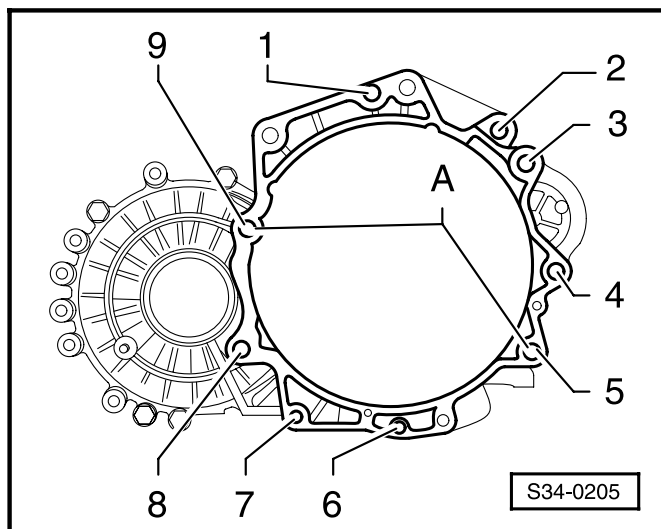


◀ Gearbox to 1.9l/50 kW engine

Item	Bolt	Qty.	Nm
1	M 12 x 55	1	80
2 ¹⁾	M 12 x 55	1	80
3, 4 ¹⁾	M 12 x 140	1	80
5, 6, 7	M 10 x 50	1	45
8	M 12 x 55	1	80

1) Bolt with M8 threaded pin

A: Dowel sleeves for centring



Tightening torques

◀ Gearbox to 1.4I/55 kW engine

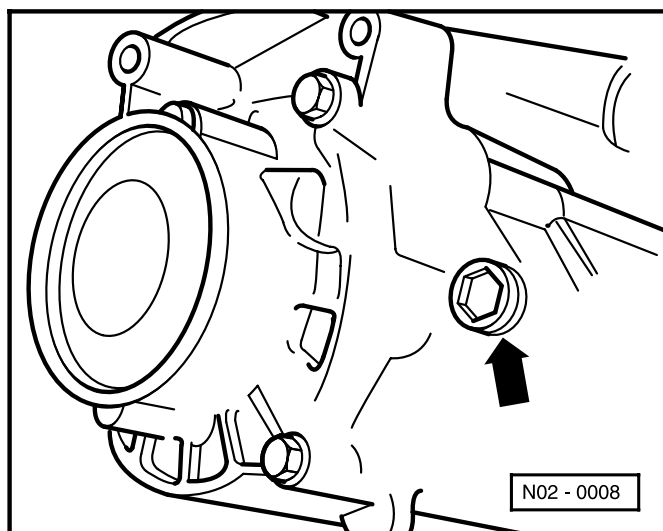
Item	Bolt	Qty.	Nm
1	M 12 x 65	1	80
2, 3 ¹⁾	M 12 x 65	1	80
4 ¹⁾	M 12 x 140	1	80
5	M 12 x 65	1	80
6, 7	M 10 x 50	1	45
8	M 12 x 35	1	20
9	M 12 x 65	1	80

¹⁾ Bolt with M8 threaded pin

A: Dowel sleeves for centering

Engine/gearbox mounting
⇒ Repair Group 10 of relevant engine

Drive shaft to flange shaft
⇒ Running Gear, Repair Group 40



Checking gear oil

Gear oil specification ⇒ page 00-2.

- ◀ - Unscrew plug for checking gear oil (arrow).

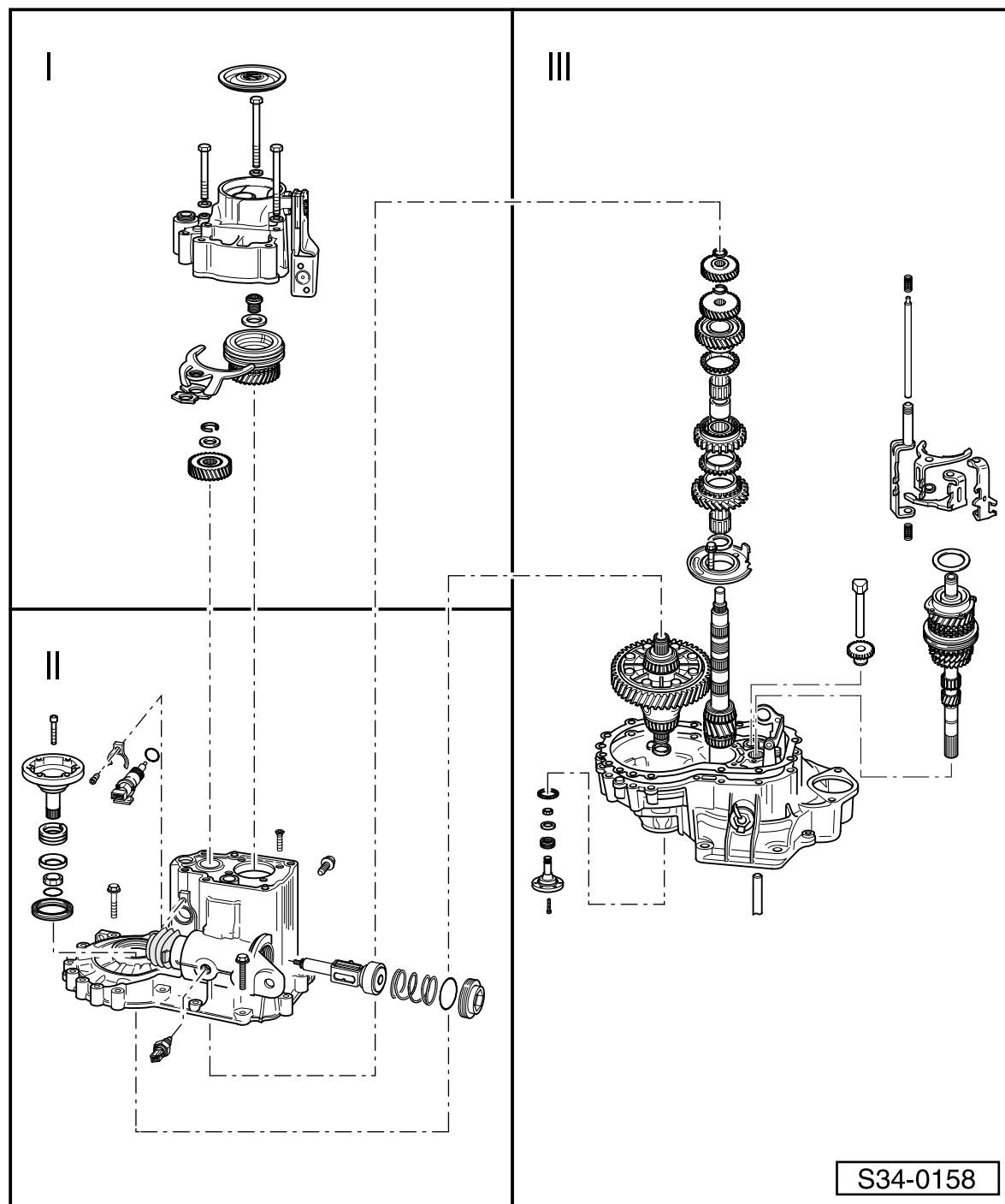
The oil is at the correct level if the gearbox is filled up to the lower edge of the oil filler hole.

- Screw in plug (arrow).

Pay attention to the following points when refilling:

- Unscrew plug (arrow).
- Pour in gear oil up to lower edge of filler hole.
- Tighten plug (arrow) to 25 Nm.
- Start engine, engage a gear and allow gearbox to rotate for about 2 minutes.
- Unscrew plug (arrow).
- Switch off engine and once again pour in gear oil up to lower edge of filler hole.
- Tighten plug (arrow) to 25 Nm.

Disassembling and assembling gearbox



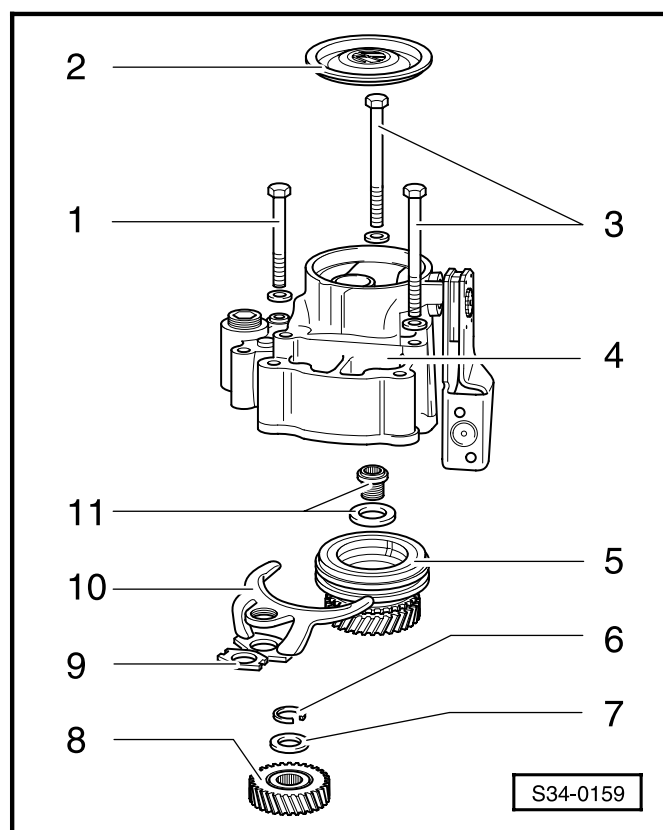
Sequence of operations ⇒ page 34-28

I - Removing and installing cover for gearbox housing and 5th gear ⇒ page 34-23

II - Removing and installing gearbox housing and shift shaft ⇒ page 34-24

III - Removing and installing input shaft, output shaft, differential and shift forks ⇒ page 34-25

Removing and installing cover for gearbox housing and 5th gear



Special tools, testers and aids required

◆ Locking fluid D 000 600 A2

◆ Sealant AMV188 200 03

1 - M 8 x 62, 25 Nm

◆ 4 x

2 - End cover

- ◆ Replace
- ◆ Removing: pierce and lever out
- ◆ Installing ⇒ page 34-52

3 - M 8 x 85, 25 Nm

◆ 2 x, one bolt below end cover

4 - Cover for gearbox housing

- ◆ Servicing ⇒ page 34-52
- ◆ Removing and installing
⇒ page 34-28

5 - Sliding sleeve/synchroniser body for 5th gear with stop ring

- ◆ Disassembling and assembling
⇒ page 35-1

6 - Circlip

◆ Replace

7 - Thrust washer

8 - 5th speed gear

◆ Installation position: groove faces up

9 - Locking plate

◆ Replace

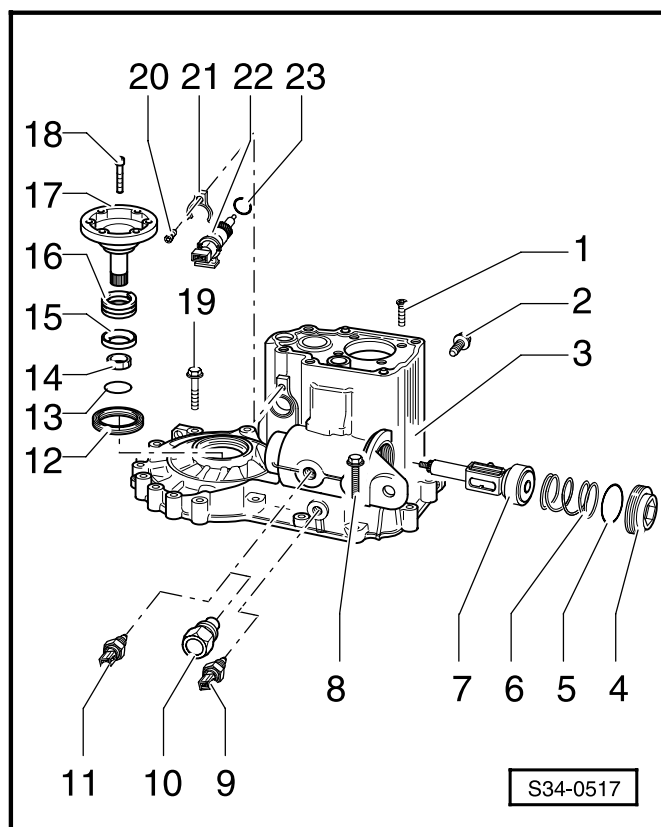
10 - 5th speed shift fork

◆ Setting ⇒ page 34-28

11 - M 17, 150 Nm

- ◆ Replace
- ◆ Coat new bolt with locking fluid D 000 600 A2
- ◆ Pay attention to correct order for slackening and attaching bolt
⇒ page 34-28

Removing and installing gearbox housing and shift mechanism



Special tools, testers and aids required

- ◆ Sealant AMV 188 200 03

1 - Oval head countersunk screw M 7 x 23, 15 Nm

- ◆ 4 x
- ◆ For tensioning plate of grooved ball bearing

2 - 20 Nm

3 - Gearbox housing

- ◆ Servicing ⇒ page 34-45

4 - End cover, 50 Nm

5 - O-ring

- ◆ If fitted, replace

6 - Compression spring

- ◆ Pushes shift shaft and shift lever into gate of 3rd and 4th gear

7 - Shift shaft

- ◆ Disassembling and assembling ⇒ page 34-45

8 - M 8 x 35, 25 Nm

- ◆ 2 x
- ◆ Screw in below reversing light switch

9 - Reversing light switch, 25 Nm

- ◆ For models 08.98 ➤
- ◆ Coat with sealant AMV 188 200 03

10 - Locking bolt, 40 Nm

- ◆ For models 08.98 ➤

11 - Reversing light switch, 25 Nm

- ◆ For models ➤ 07.98
- ◆ Coat with sealant AMV 188 200 03
- ◆ Also acts as lock of shift shaft

12 - Seal

- ◆ Replace ⇒ page 39-1

13 - Circlip

- ◆ Holds spherical ring, thrust washer and compression spring in position when flange shaft removed

14 - Spherical ring

- ◆ Installation position: cone points toward differential housing

15 - Thrust washer

- ◆ Installation position: collar points toward compression spring, webs toward spherical ring

16 - Compression spring

17 - Left flange shaft

- ◆ Removing and installing ⇒ page 34-28

18 - Hexagon socket bolt with M 8 x 63, 25 Nm

19 - M 8 x 52, 25 Nm

- ◆ 12 x

20 - Screw for attaching speedometer drive, 5 Nm

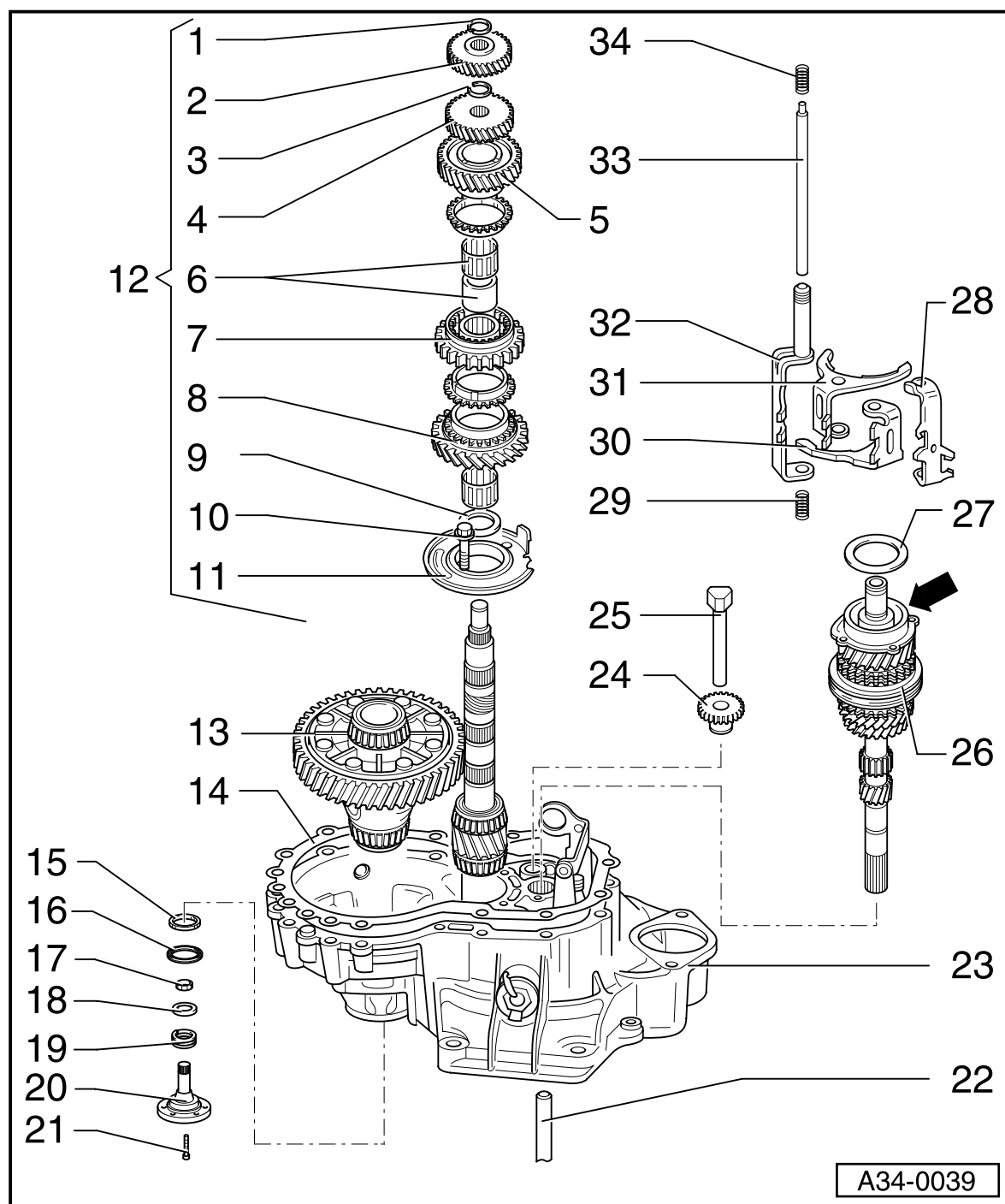
21 - Fixture

22 - Speedometer drive

23 - O-ring

- ◆ Always replace

Disassembling and assembling input shaft, output shaft, differential and shift forks



Special tools, testers and aids required

- ◆ Sealant AMV 188 200 03

1 - Circlip

- ◆ Always replace

2 - 4th speed gearwheel

- ◆ Fitting location: ⇒ from page 34-28

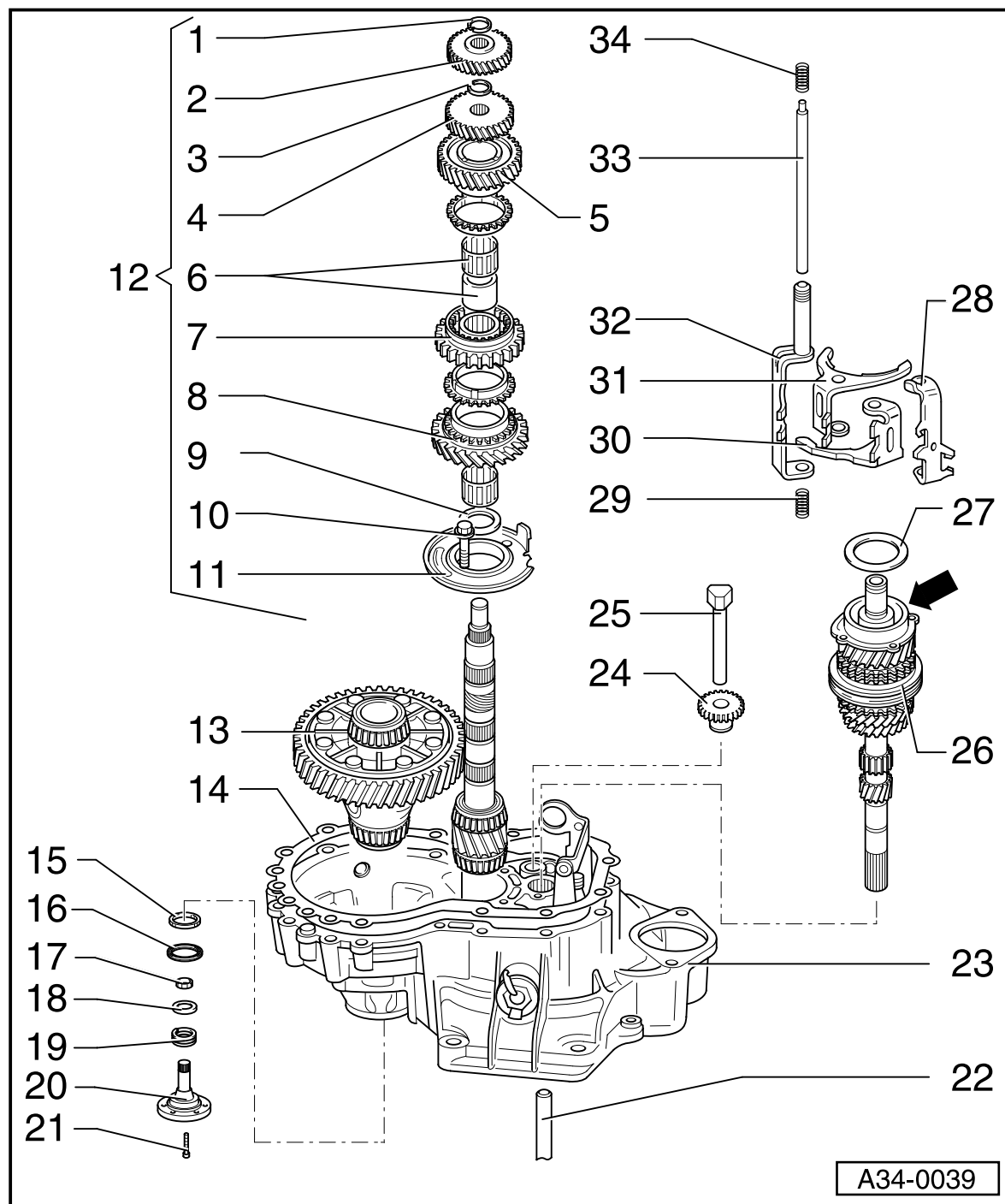
3 - Circlip

- ◆ For 3rd speed gearwheel
- ◆ Re-determining thickness
⇒ page 34-28

4 - 3rd speed gearwheel

- ◆ Fitting location ⇒ from page 34-28
- ◆ Adjusting axial play ⇒ from page 34-28

5 - 2nd speed selector gear



A34-0039

6 - Needle bearing

- ◆ Bearing dimensions 32 x 37 x 27.7
- ◆ Bush dimensions 28.1 x 32 x 28.1
- ◆ For 2nd gear
- ◆ Pulling off inner race ⇒ page 34-28
- ◆ Pressing on inner race ⇒ page 34-28

7 - Sliding sleeve with synchroniser body for 1st and 2nd gear**8 - 1st speed shift gear****9 - Thrust washer**

- ◆ Installation position ⇒ page 34-28

10 - 25 Nm and torque a further 90°**11 - Bearing mount**

- ◆ With large taper roller bearing outer race and reverse idler gear stop

12 - Output shaft complete

- ◆ Disassembling and assembling ⇒ page 35-9

13 - Differential

- ◆ Disassembling and assembling ⇒ page 39-3

14 - Gasket

- ◆ If fitted, replace; otherwise coat contact surface with sealant

15 - Seal

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

16 - Circlip

- ◆ Installed behind flange shafts in combination with compression springs
- ◆ Holds spherical ring, thrust washer and compression spring in position when flange shaft removed

17 - Spherical ring**18 - Thrust washer****19 - Compression spring for flange shaft****20 - Flange shaft****21 - Conical bolt, 25 Nm****22 - Clutch pushrod****23 - Clutch housing**

- ◆ Servicing ⇒ page 34-48

24 - Reverse idler gear**25 - Reverse idler gear shaft****26 - Input shaft**

- ◆ Disassembling and assembling ⇒ page 35-1
- ◆ Press off grooved ball bearing (arrow) before installing ⇒ from page 35-1
- ◆ Install new grooved ball bearing in gearbox housing ⇒ page 34-28

27 - Shim

- ◆ It is not necessary to set the input shaft. It is important, however, to re-install the shim fitted in production, after completing repairs. It is also possible that no shim is fitted. In this case, assemble without shim.
It is no longer necessary to insert the shim if the bearing or the clutch housing or gearbox housing is replaced.

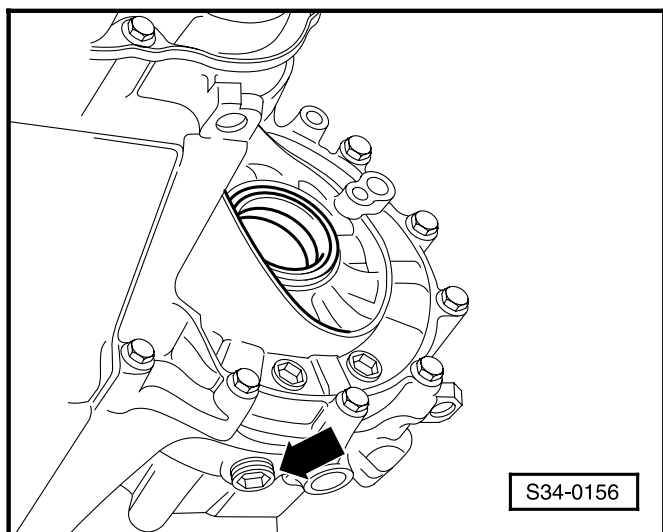
28 - Shift fork for reverse gear**29 - Compression spring****30 - Shift fork for 1st and 2nd gear****31 - Shift fork for 3rd and 4th gear****32 - Shift bridge with shift tube for 5th gear****33 - Shift rod****34 - Compression spring**

Removal and installation sequence

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

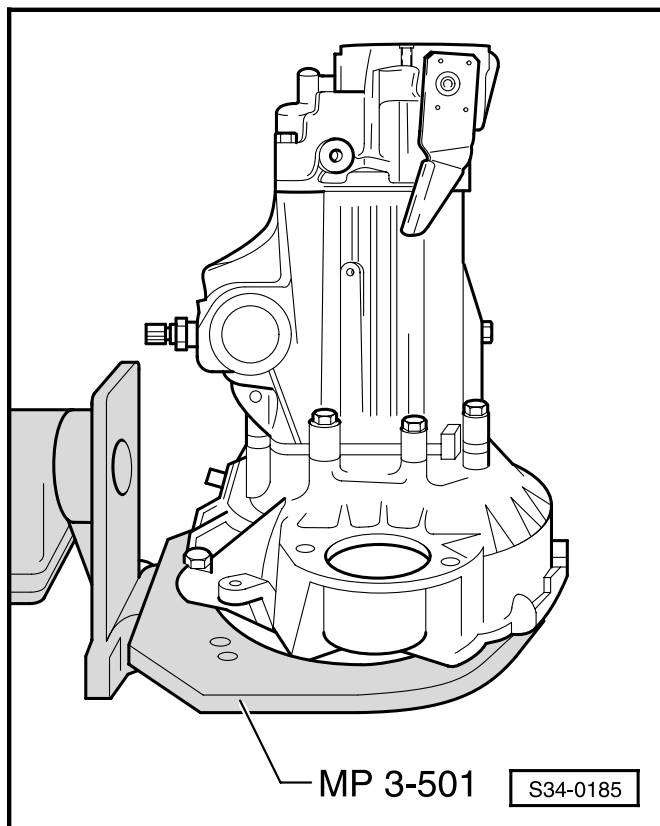
Special tools, tester and aids required

- ◆ Sealant AMV 188 200 03
- ◆ Locking fluid D 000 600 A2
- ◆ Gearbox holder MP 3-501
- ◆ Supporting beam MP 3-425
- ◆ Pipe wrench MP 3-433
- ◆ Thrust piece MP 3-410
- ◆ Thrust piece MP 3-431
- ◆ Two-legged puller Kukko 20/10
- ◆ Extraction hook Kukko 1-250
- ◆ Extraction hook Matra V 170
- ◆ Removal device MP 3-432
- ◆ Thrust washer MP 3-455
- ◆ Insertion sleeve MP 3-402
- ◆ Insertion sleeve MP 3-412
- ◆ Adapter piece MP 3-403/1
- ◆ Pressure plunger MP 3-423
- ◆ Insertion sleeve MP 6-504
- ◆ Pliers e.g. 6547



Removing

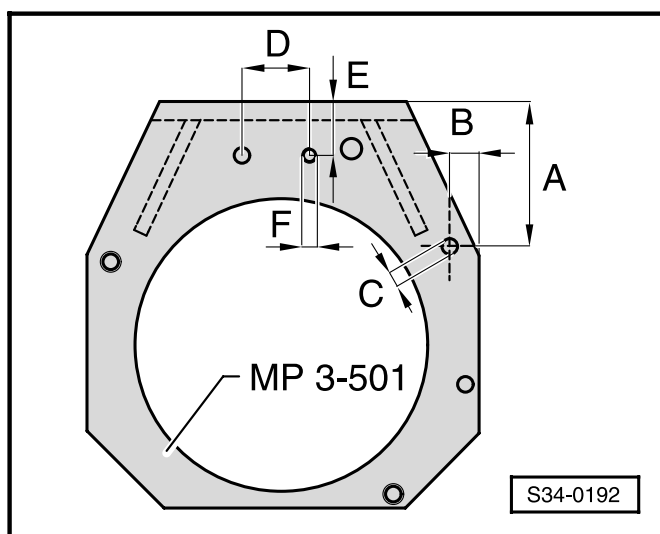
- ◀ - Drain gear oil by unscrewing oil drain plug -arrow-.



- ◀ - Clamp gearbox to the assembly stand. Pay attention to Note.

Note:

Before the first engine mounting, the gearbox holder is reworked according to the dimensions given below.



- ◀ - Drill an additional hole into the gearbox holder.

A = 118.5 mm

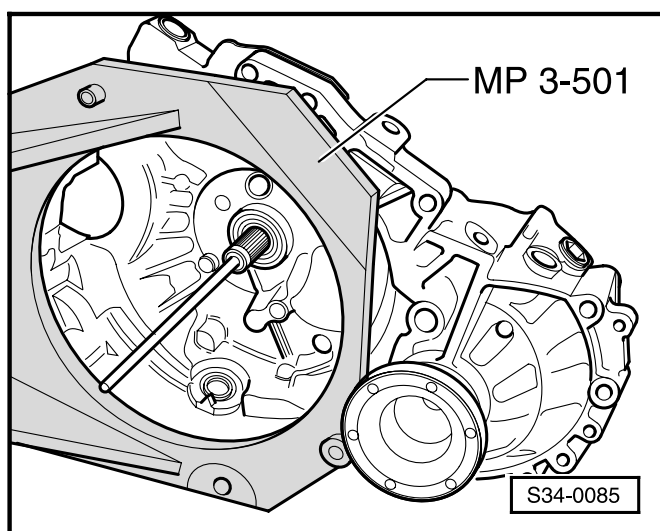
B = 23.5 mm

Ø C = 11.0 mm

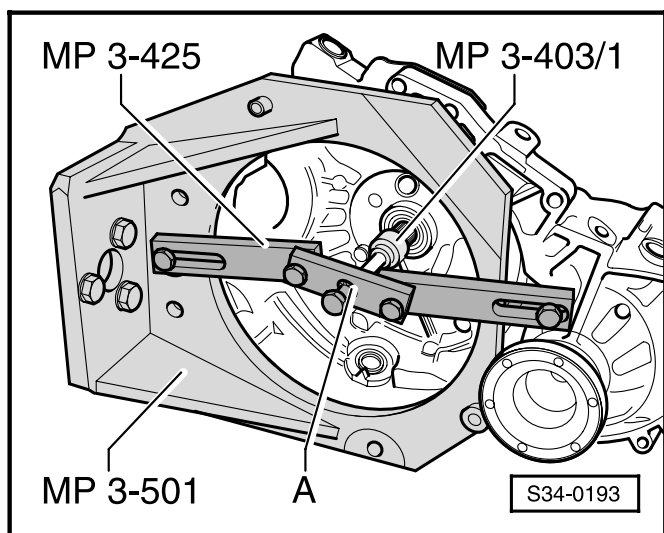
D = 40 mm

E = 55 mm

F = M10



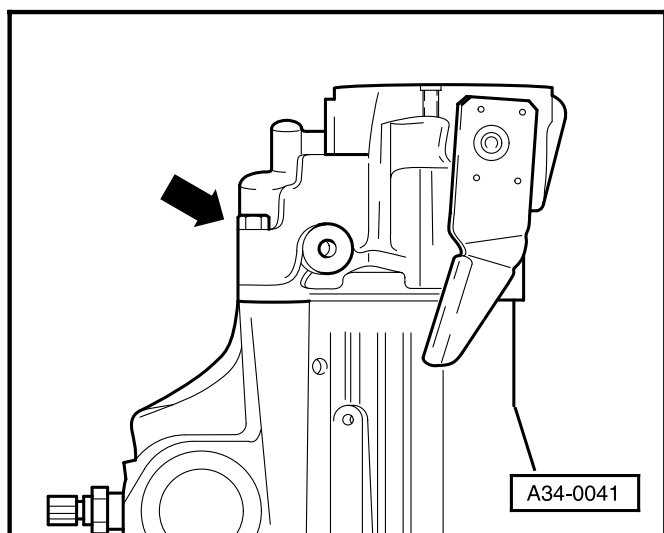
- ◀ - Pull clutch pressure rod out of the drive shaft.



- ◀ - Install supporting bridge MP 3-425 for input shaft.

A - M 12 lock nut

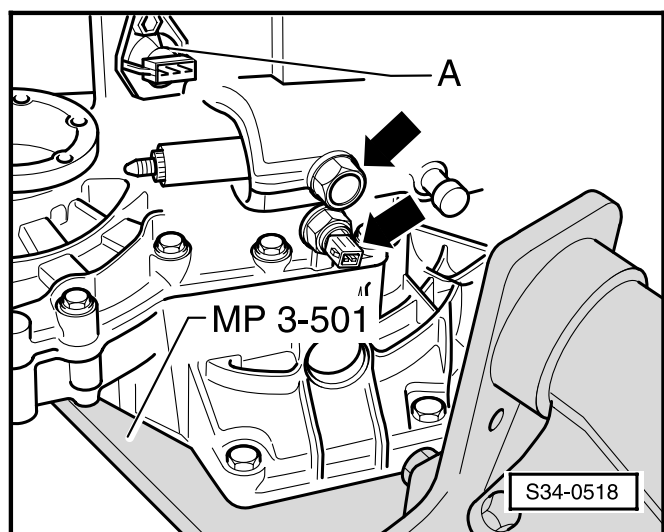
- Raise MP 3-403/1 until it touches input shaft, by means of the bolt, and lock nut -A-.



- ◀ - Unscrew bolts -arrows- for gearbox housing cover (6 x).

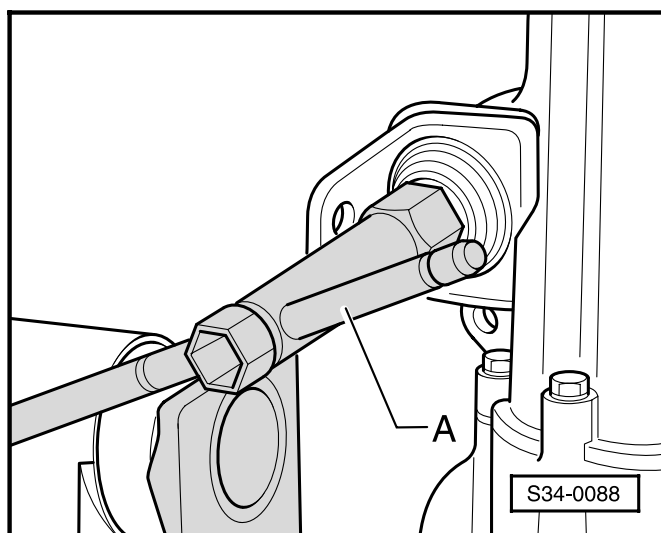
Note:

One bolt is located in the housing; take off green end cover for removing.

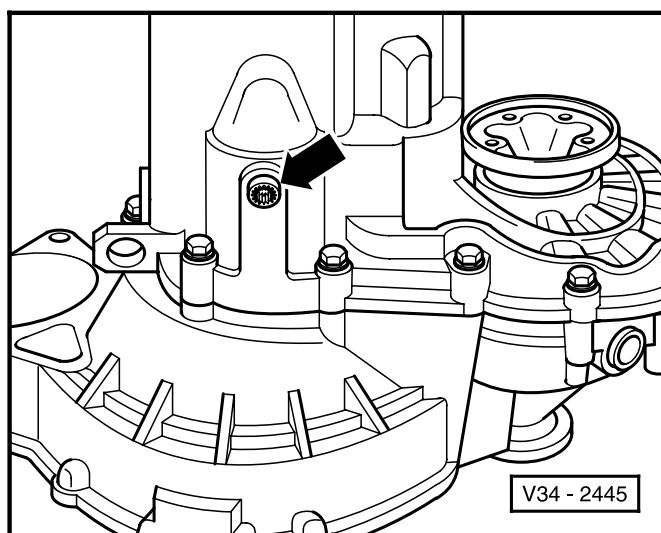


- ◀ - Take off the locking bolt and the reversing light switch (arrows).

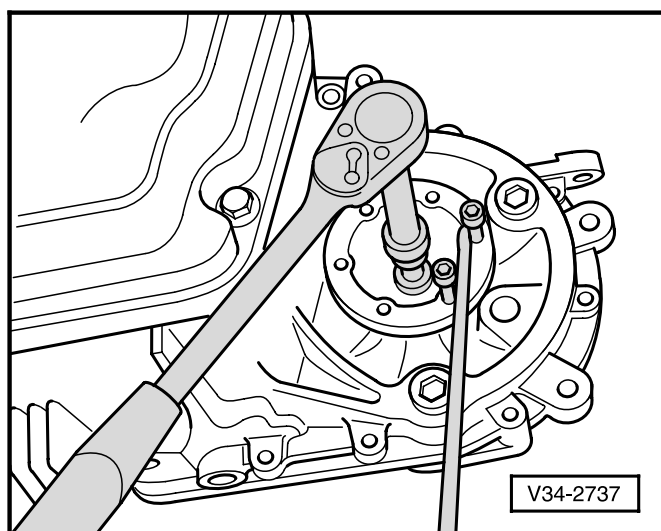
- Remove speedometer drive -A-.



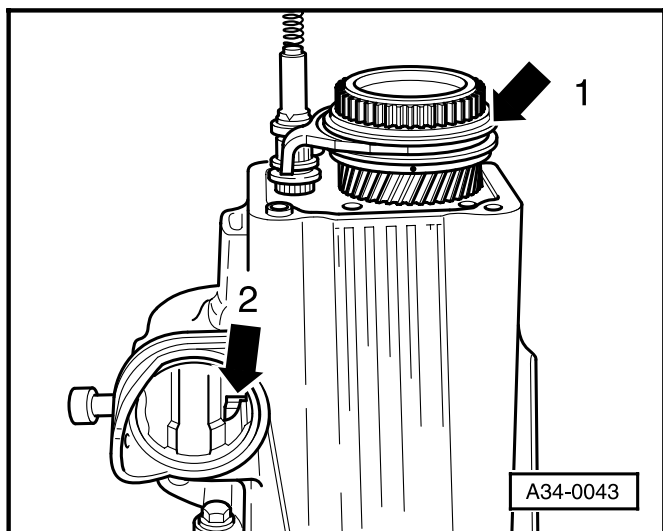
- ◀ - Use spark plug wrench -A- or 27 mm socket wrench to remove the end cover for the shift shaft and take out together with compression spring.
- Move shift shaft into neutral position and pull out of gearbox housing.



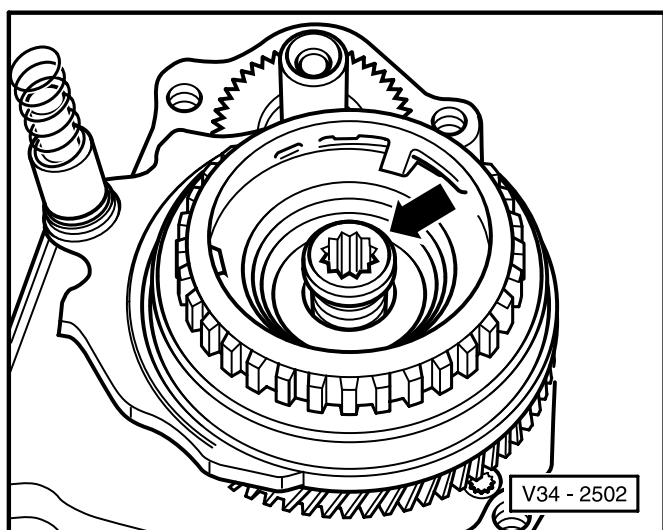
- ◀ - Unscrew Torx bolt for attaching the reverse idler gear shaft (arrow).



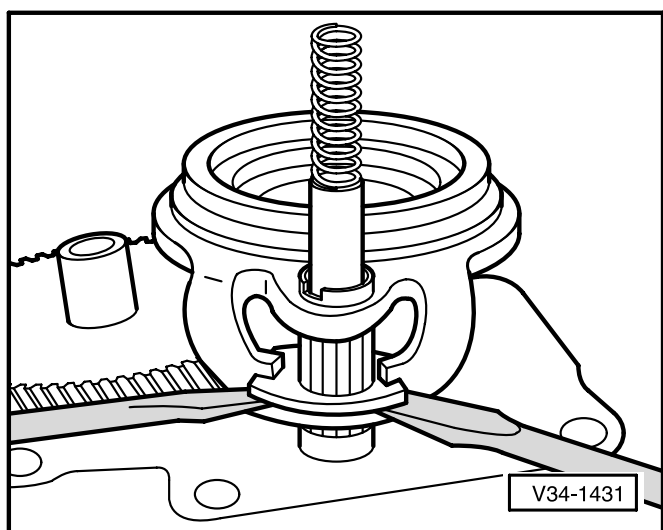
- ◀ - Remove left flange shaft.
- Take out flange shafts together with compression springs, thrust washers and spherical rings.



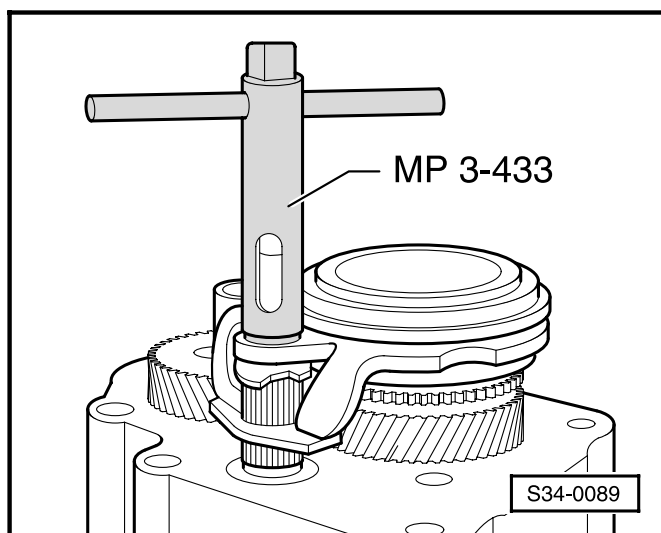
- ◀ - Engage 5th gear (arrow 1).
- Engage reverse gear (arrow 2) (front shift jaw facing down).



- ◀ - Use 12 mm internally serrated wrench for unscrewing bolt of synchroniser body (arrow).



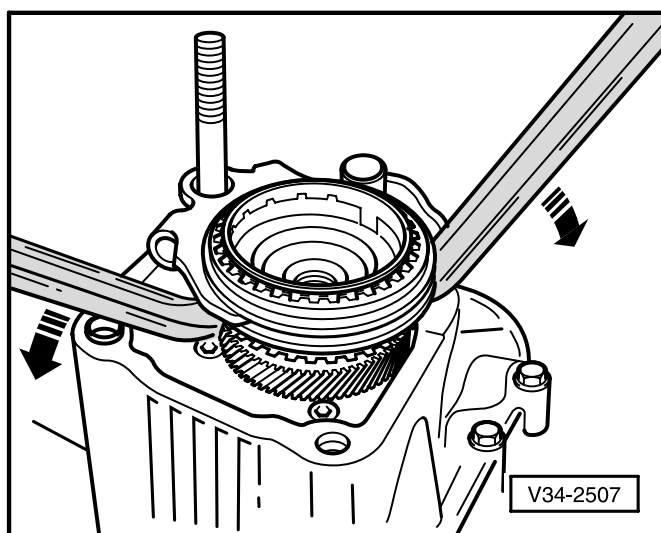
- ◀ - Press locking washer for shift tube free.



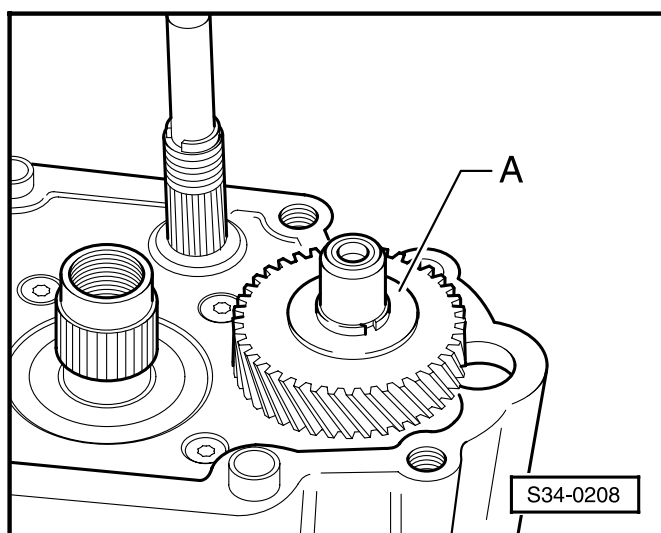
- ◀ - Unscrew shift tube from shift fork -by turning to the left-.

Note:

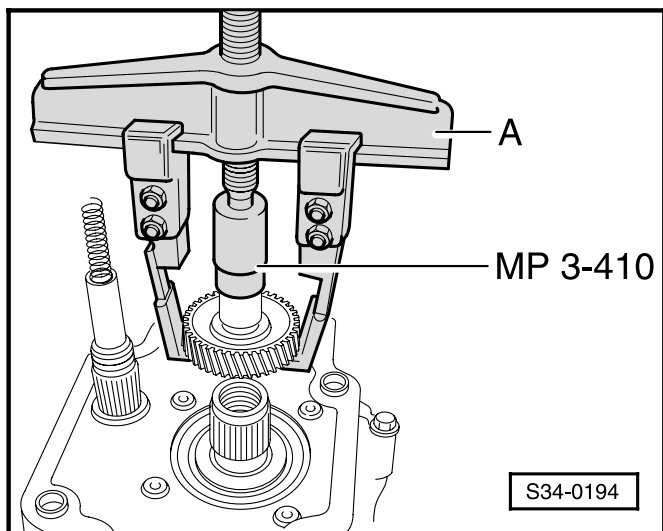
Do not pull shift rod out of shift tube.



- ◀ - Take off synchronizer body complete with 5th speed shift gear and shift fork; press clear slightly with 2 assembly irons, if necessary; do not damage sealing surface of housing during this step.
- Pay attention to thrust washer for shift gear below synchronizer body.

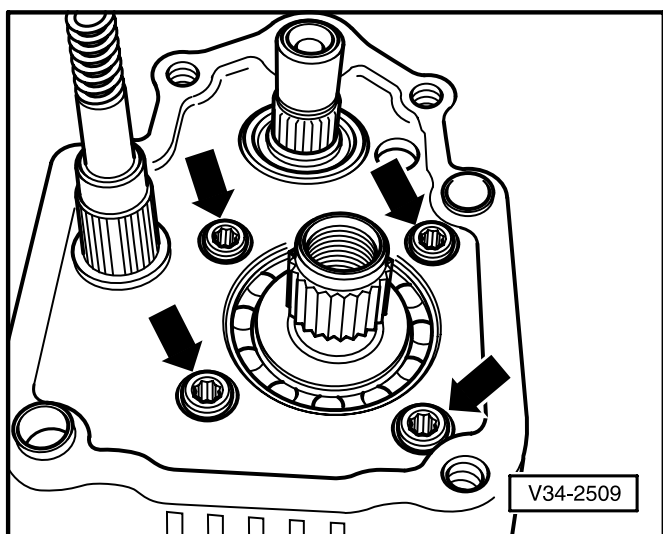


- ◀ - Take off locking ring and thrust washer -A- for 5th speed gear.

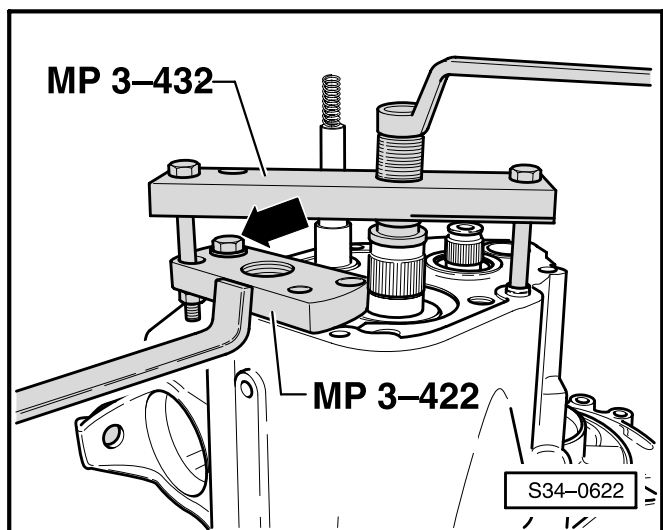


- ◀ - Pull off 5th speed gear.

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



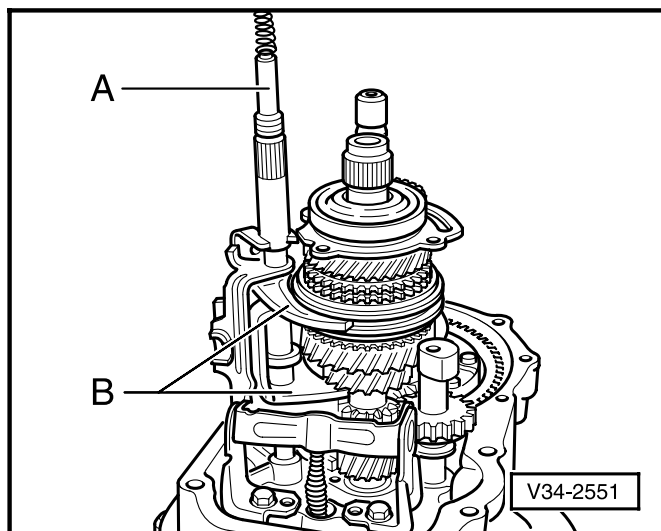
- ◀ - Unscrew tensioning plate (mount for ball bearing/input shaft) (arrows).
- Take off bolts attaching gearbox housing to clutch housing.



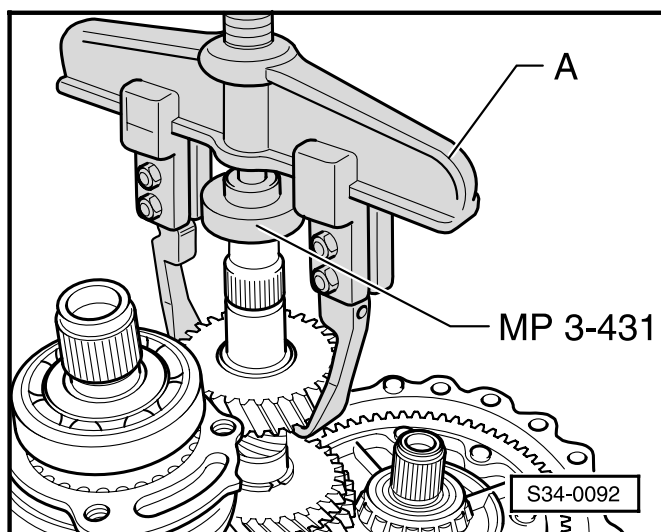
- ◀ - Attach assembly tool MP 3-422 to gearbox housing with the bolt -arrow-.
- Attach pulling device MP 3-432, as shown in illustration.
- Pull off gearbox housing.

Notes:

- ♦ Before mounting MP 3-432 onto gearbox housing, screw bolt of synchroniser body into the input shaft ⇒ page 34-22, Fig. V34-2502. Otherwise there is a risk of damaging the input shaft.
- ♦ Remove bolt again after taking off the clutch housing.



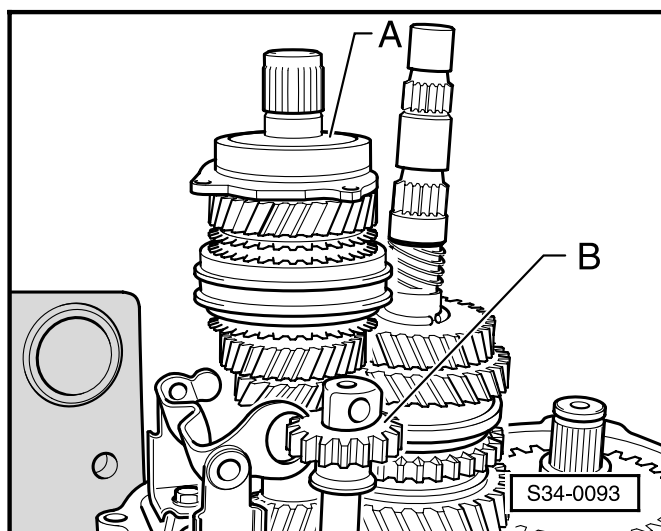
- ◀ - Pull shift rod -A- out of the hole in the clutch housing and swivel out shift forks -B-.



- Use e.g. pliers 6547 to take off circlip for 4th speed gear/output shaft.

- ◀ - Pull off 4th speed gear.

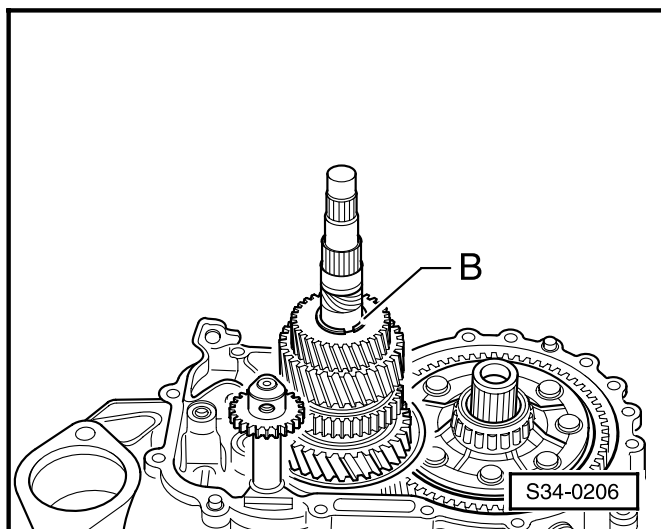
A - Two-legged puller e.g. Kukko 20/10 with hook Matra V/170.



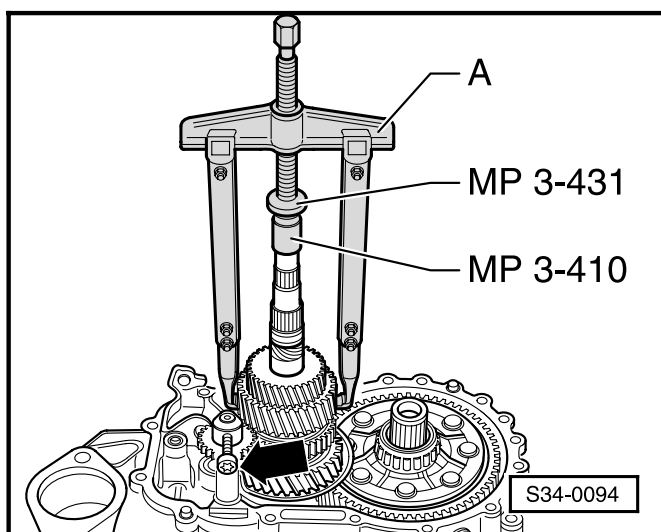
- ◀ - Take out input shaft -A- complete.

Note:

Reverse gear -B- must not be engaged.



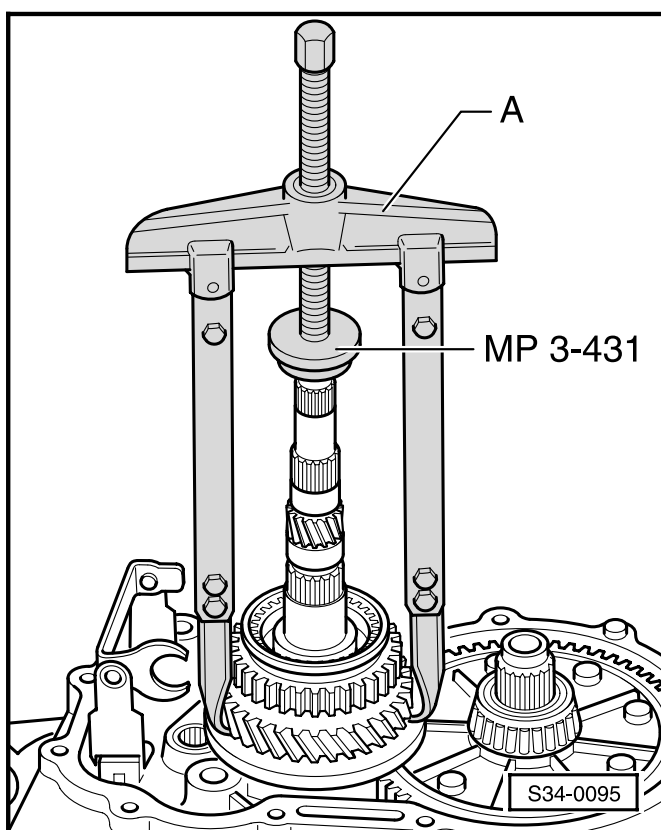
- ◀ - Take off circlip -B- at 3rd speed gear.



- ◀ - Pull off 3rd speed gear together with 2nd speed selector gear.

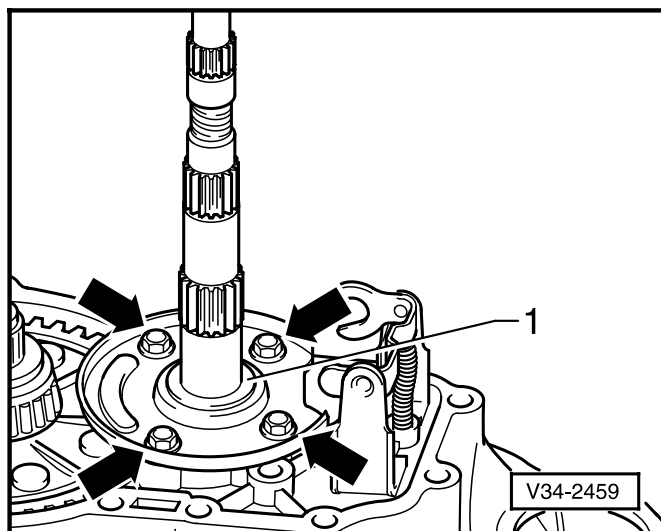
A - Two-legged puller e.g. Kukko 20/10 with hook for 250 mm tensioning depth.

- Take off synchroniser ring and needle bearing.
- Use plastic-headed hammer to knock out reverse idler gear shaft by striking inserted bolt (arrow).
- Take reverse idler gear out of relay lever.



- ◀ - Pull off synchroniser body/sliding sleeve and 1st speed selector gear together with needle bearing inner race of 2nd gear.

A - Two-legged puller e.g. Kukko 20/10 with hook for 250 mm tensioning depth.

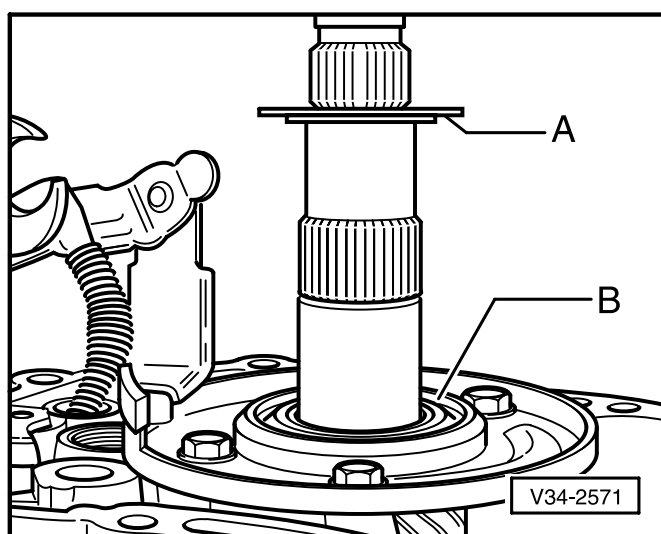


- ◀ - Unbolt bearing mount (arrows) and take out output shaft. Pay attention to thrust washers -1-.

- Remove right flange shaft and take off differential assembly.

Note:

*Removal is identical to that of left flange shaft
⇒ page 34-31.*



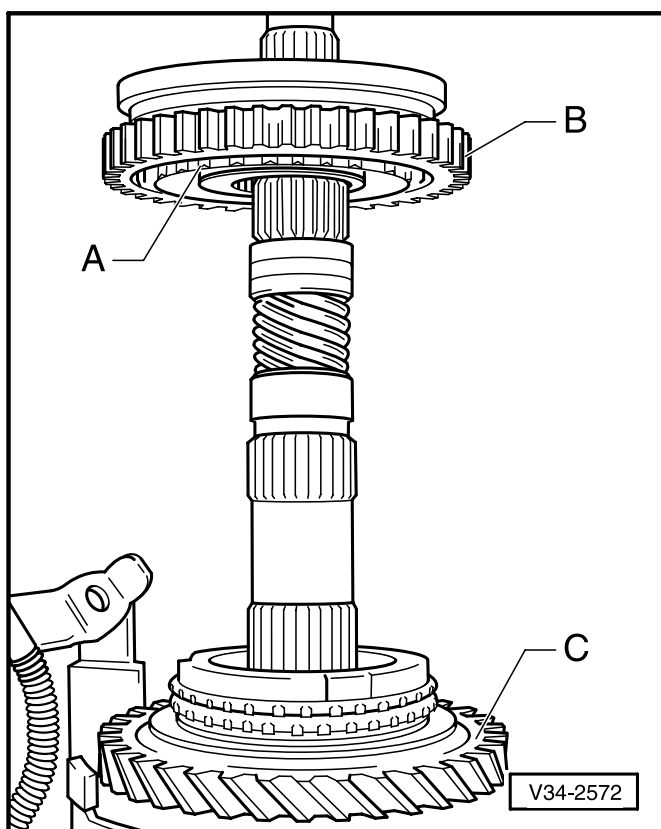
Installing

- Insert differential assembly.
- Insert output shaft.
- Tighten bolts for bearing mount/output shaft.

- ◀ - Fitting location of thrust washer for needle bearing of 1st speed selector gear:

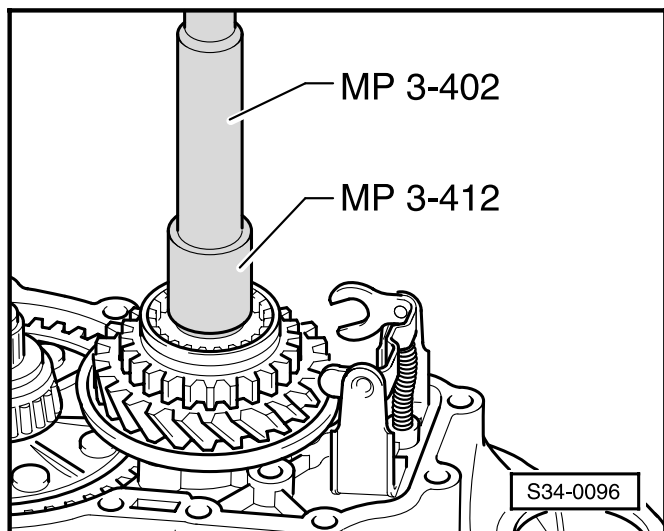
Shoulder -A- on inner diameter faces toward bearing mount -B-.

- Fit on thrust washer, needle bearing, selector gear and synchroniser ring for 1st gear.



- ◀ - Fitting location of sliding sleeve/synchroniser body of 1st/2nd gear:

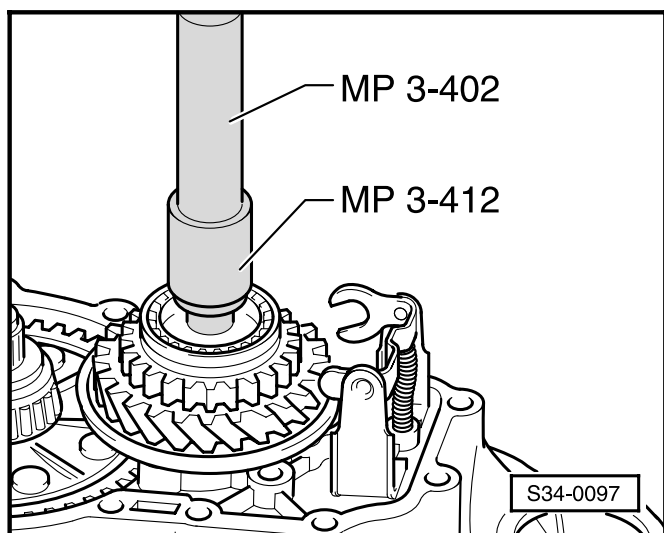
The identification groove on the face end -A- and the outer splines on the sliding sleeve -B- face toward 1st speed selector gear -C-.



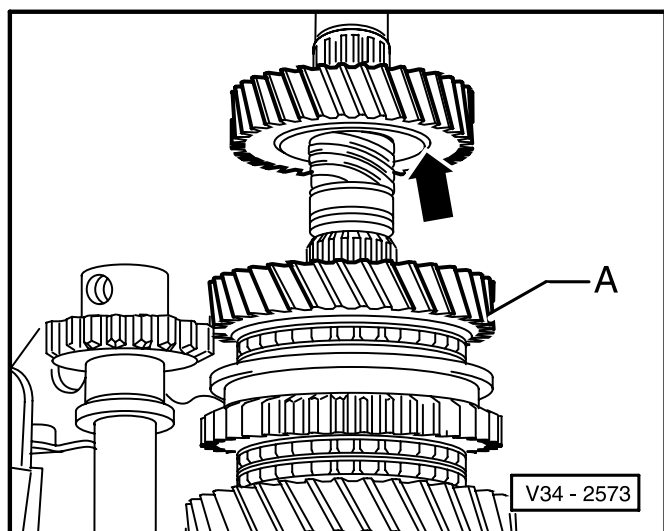
- ◀ - Heat sliding sleeve/synchroniser body of 1st/2nd gear to about 100 °C, fit on and drive on until fully home.

Rotate synchroniser ring so that the grooves are aligned with the locking pieces.

- Install reverse idler gear; insert shaft, as need be, for this step.



- ◀ - Fit on inner race for needle bearing of 2nd speed selector gear as far as the stop.

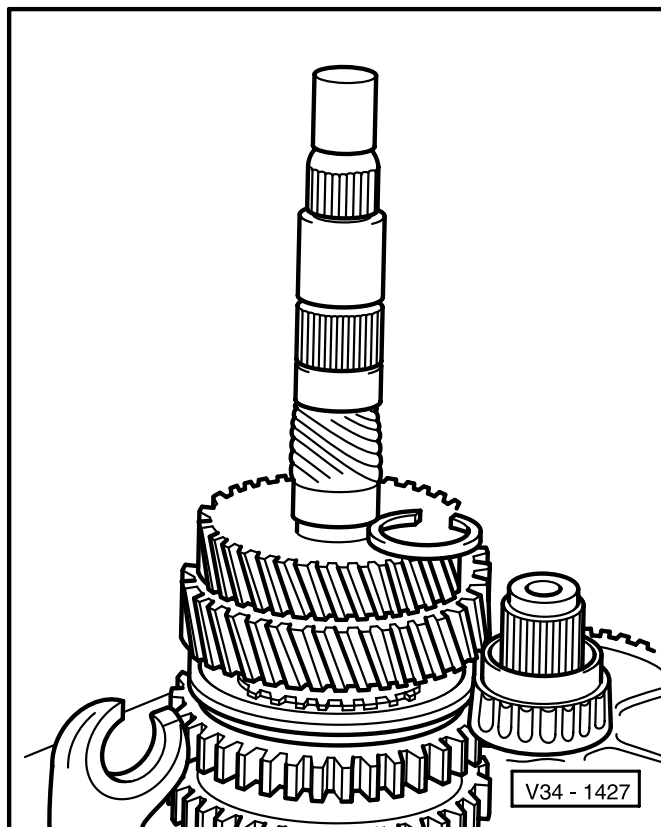


- Fit on needle bearing, synchroniser ring, selector gear for 2nd speed and gearwheel for 3rd speed.

◀ Fitting location of 3rd speed gearwheel

Shoulder (arrow) facing 2nd speed selector gear -A-.

- Use tool MP 3-402 to insert 3rd speed gearwheel as far as the stop.



◀ Set axial play at 3rd speed gear as follows:

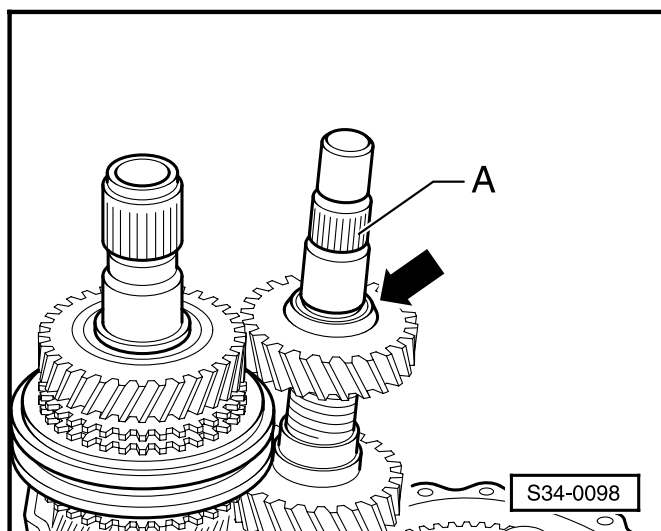
- Determine the thickest circlip which can still just be inserted and fit on.

The following circlips are available:

Part No.	Thickness (mm)	Identification
020 311 381 F	2.5	brown
020 311 381 G	2.6	black
020 311 381 H	2.7	blank
020 311 381 J	2.8	copper
020 311 381 K	2.9	brass
020 311 381 L	3.0	blue

Notes:

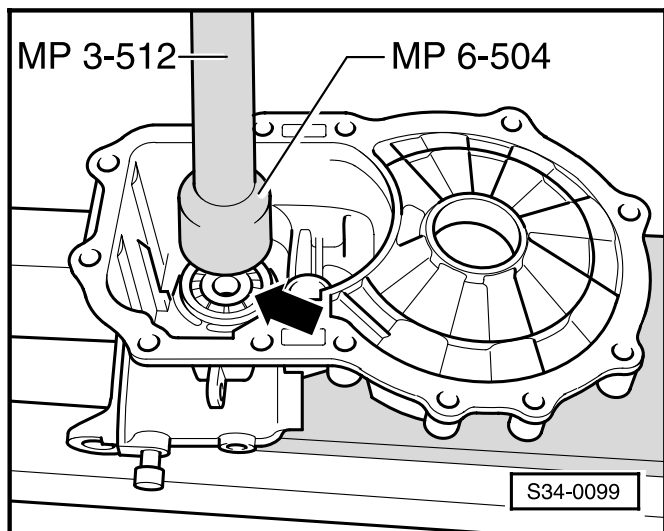
- ♦ If the input shaft has not been disassembled:
- ♦ Press off grooved ball bearing for output shaft
⇒ page 35-3, item 10.
- ♦ Take off tensioning plate of ball bearing
⇒ page 35-3, item 11.
- Insert complete input shaft without grooved ball bearing. Input shaft is supported by supporting bar MP 3-425, adapter piece MP 3-403/1 and an M 12 lock nut ⇒ page 34-30.



◀ Installation position of 4th speed gear

Collar (arrow) points toward spline of 5th gear -A-.

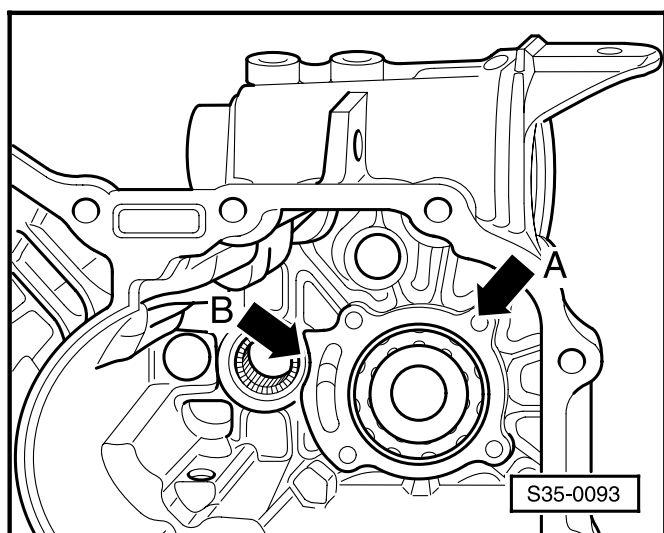
- Mount 4th speed gear onto output shaft, press on with insertion sleeve MP 3-402 and secure with locking ring -B-.



◀ - Press in grooved ball bearing of input shaft.

Fitting location:

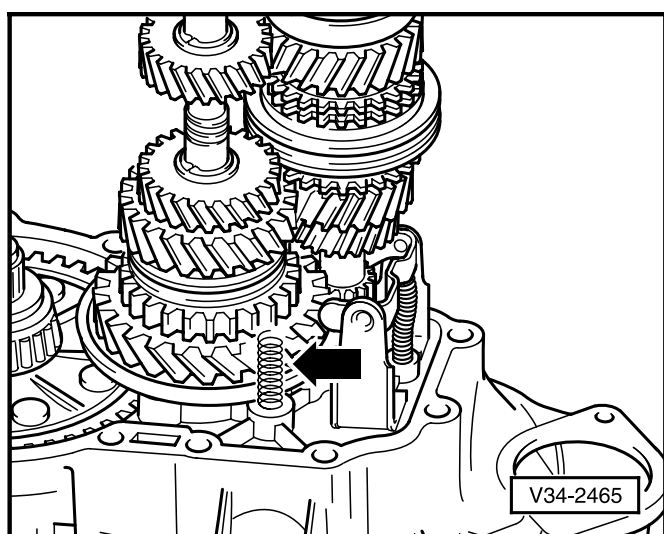
Wide collar (arrow) on inner race points toward the insertion tool.



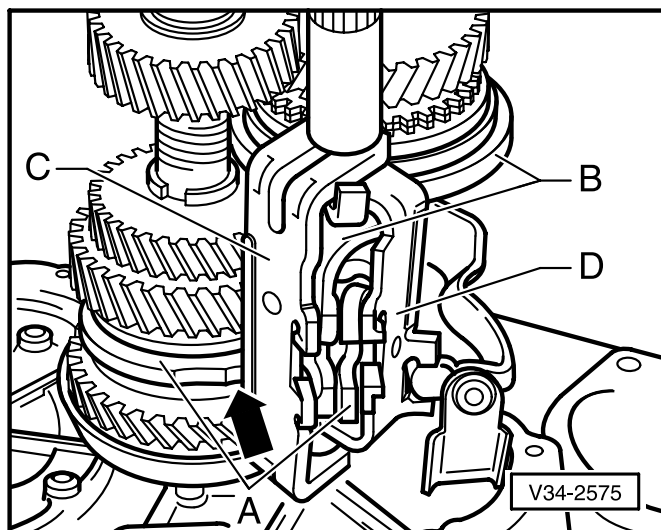
◀ - Tighten tensioning plate (arrow A).

Note:

Tensioning plate fits in only one position (arrow B).



◀ - Before installing the set of shift forks, insert bottom spring (arrow) for shift rod into the clutch housing.



- ◀ - Install set of shift forks and align shift pawls.

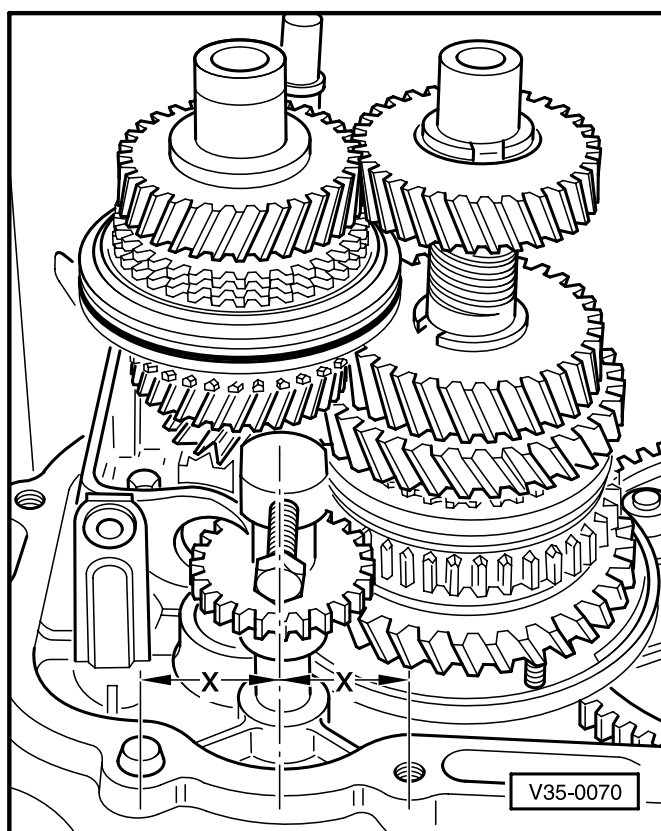
A - 1st/2nd gear shift fork
 Arrow points toward recess for shift bridge
 -C-

B - 3rd/4th gear shift fork

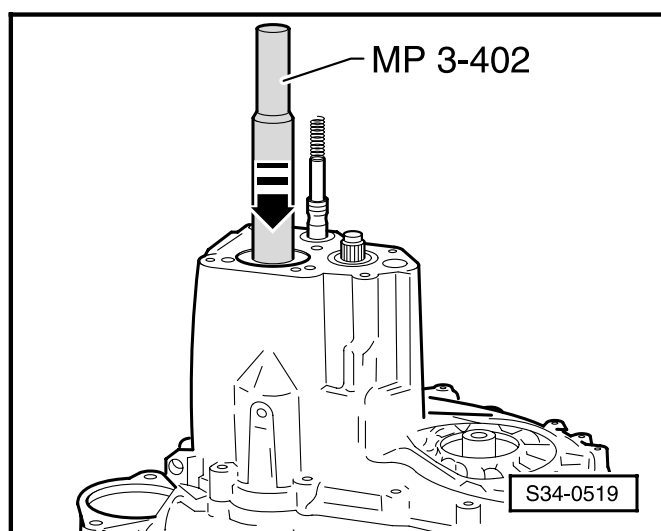
C - Shift bridge with shift tube for 5th gear

D - Reverse gear shift fork

- Push in shift rod.



- ◀ - Align reverse idler gear shaft.
 Distances x identical

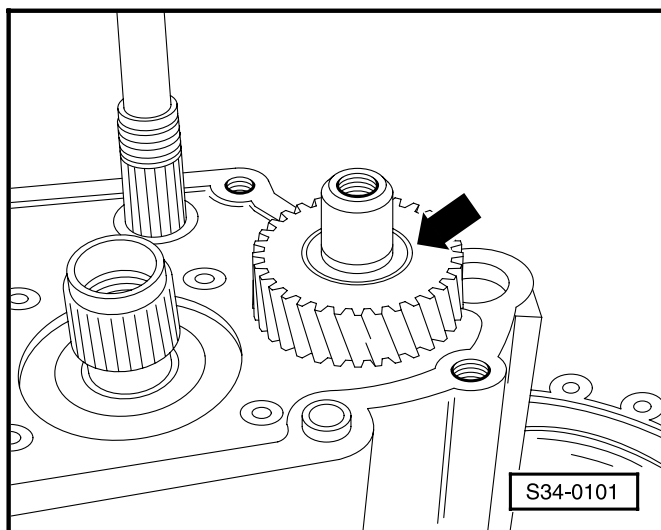


- Apply an even film of sealant, e.g. AMV 188 200 03 to sealing surface.

- ◀ - Knock on gearbox housing; ensure, first of all, that input shaft is properly supported by supporting bridge MP 3-425 and adapter piece MP 3-403/1 ⇒ page 34-28.

- Tighten reverse idler gear shaft fully.

- Tighten hexagon bolts for attaching gearbox housing to 25 Nm.

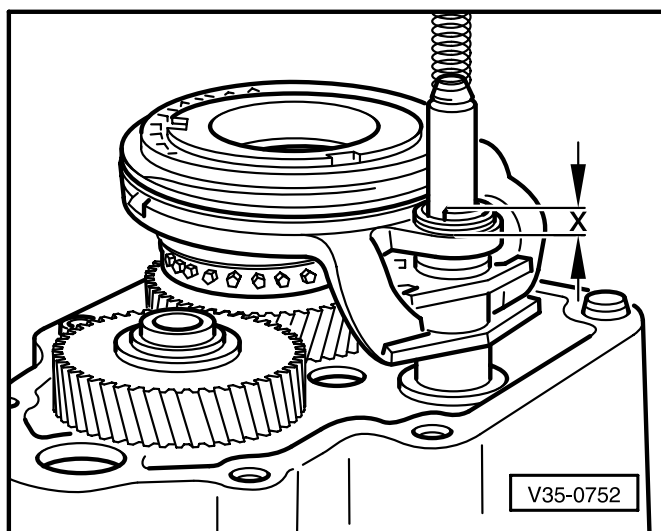


- Tighten recessed screws at tensioning plate for grooved ball bearing to 15 Nm.
- Fit on 5th speed gear.

◀ Installation position:

Groove (arrow) faces up.

- Fit on thrust washer and circlip.
- Fit on 5th gear synchronizer body complete with sliding sleeve, shift gear and shift fork for 5th gear and new locking plate.
- Use pipe wrench MP 3-433 to screw shift tube to the right into the shift fork.

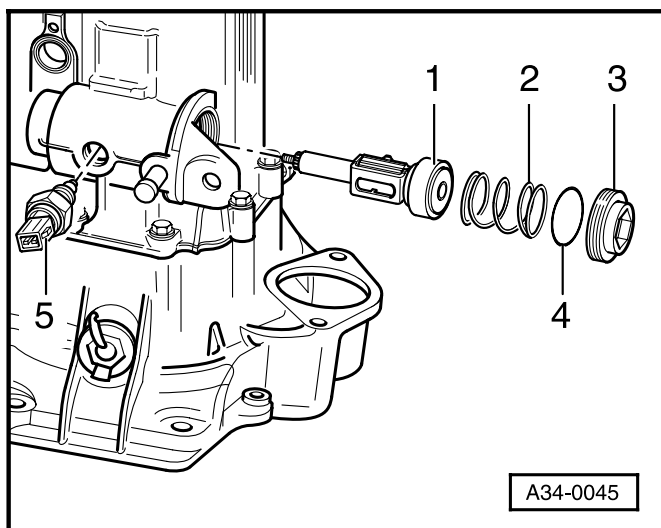


- ◀ - Unscrew shift tube sufficiently until a projection of $x = 5.0$ mm is achieved.

Note:

Do not pull shift rod out of the shift tube (this can be caused by tilting the pipe wrench) otherwise the shift forks in the gearbox will fall apart and the gearbox will have to be disassembled. Use a screwdriver, if necessary, to press down the shift rod through the side slot when removing the pipe wrench.

- Coat new bolt for synchronizer body with locking fluid D 000 600 A2 and tighten with a 12 mm internally serrated wrench. Engage 5th gear and reverse gear for this step
⇒ page 34-32 (front shift jaw down).



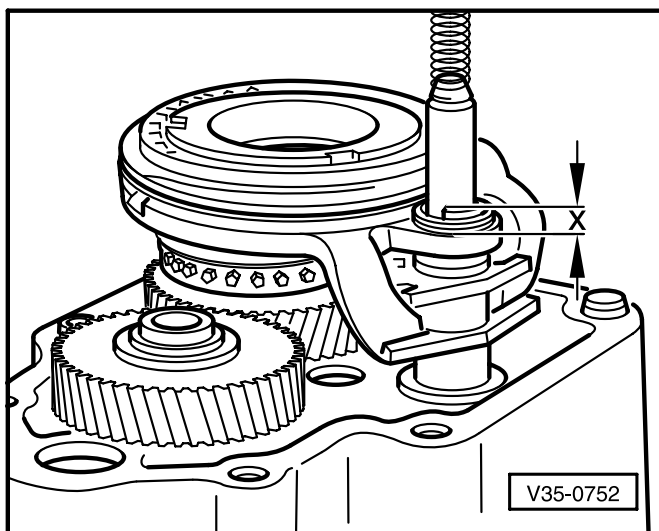
- Move shift forks into neutral position before installing the shift shaft.

◀ Insert shift shaft -1-.

- Insert compression spring -2- for shift shaft and tighten end cover -3-.

Note:

If the end cover was sealed with sealing ring -4-, replace this sealing ring.



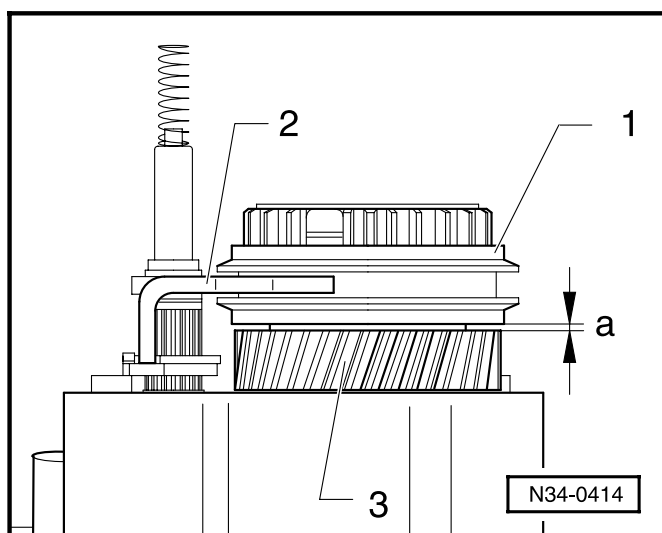
- Insert reversing light switch -5- with sealant AMV 188 200 03.

Set 5th speed shift fork as follows:

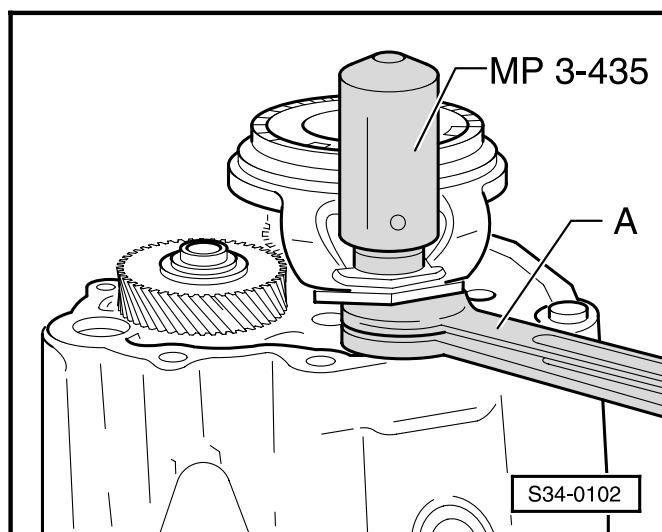
Note:

Carry out the setting with scrupulous care in order to eliminate any „gear skipping“.

- ◀ - Check the projection of the shift tube - dimension „x“ = 5.0 mm and set, if necessary, with pipe wrench MP 3-433.
- Screw lever for shift shaft onto the shift shaft and engage 5th gear (pull shift shaft out fully and turn to the left).



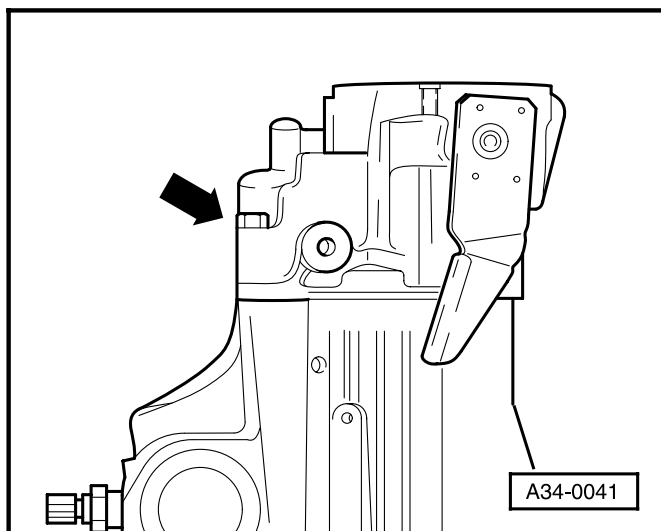
- ◀ - Align sliding sleeve -1- together with shift fork -2- to 5th speed selector gear -3- free of play.
- Check measurement:
The dimension „a“ = 1.3 mm should exist between sliding sleeve and selector gear. Adjust to this dimension, if necessary, by turning the shift tube.
- Disengage 5th gear. Sliding sleeve should now be in Neutral position and synchroniser ring should move freely.



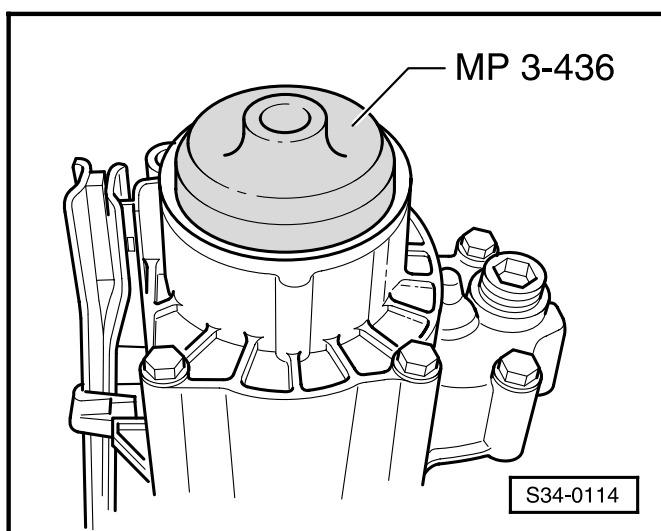
- Insert a spacer about 12 mm thick (e.g. two 19 mm forks -A-) between shift fork and housing.
- ◀ - Secure shift tube with new lock washer. Install new lock washer with MP 3-345.

Note:

Do not damage the gearbox sealing edge when supporting the shift fork and securing the shift tube.



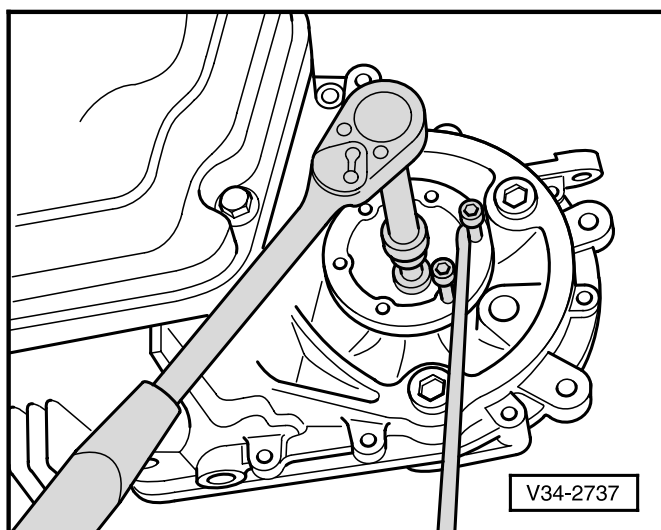
- ◀ - Before fitting on the cover -arrow-, proceed as follows:
 - ◆ Insert clutch pushrod into input shaft from 5th gear side; slacken supporting bridge for input shaft (⇒ page 34-30, Fig. S34-0193) for this step.
 - ◆ Fit release bearing onto clutch pushrod.
- Shift through all gears in stages.



- ◀ - Install new end cover.

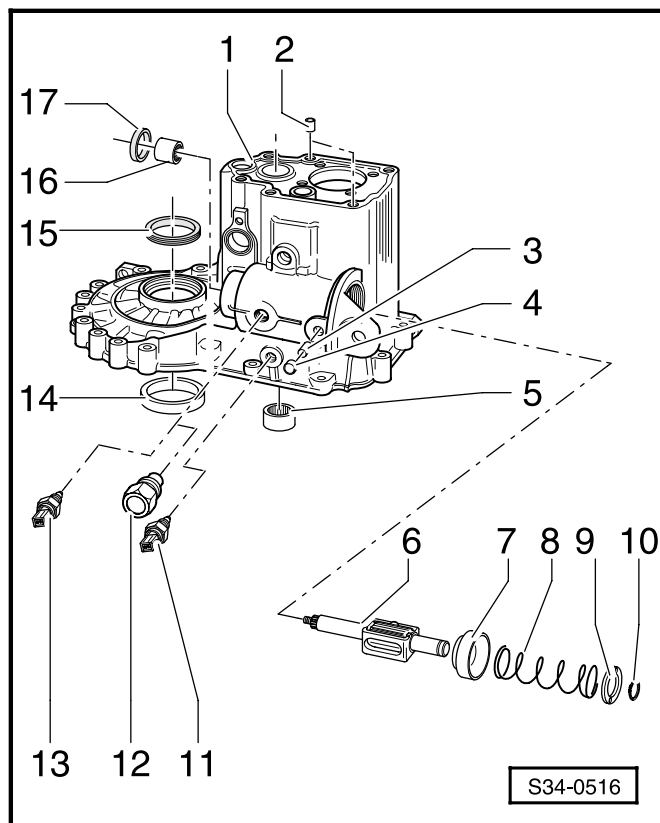
Note:

Sealing surface on gearbox housing cover must be free of grease.



- ◀ - Install both flange shafts.

Servicing gearbox housing and shift shaft



Special tools, testers and aids required

- ◆ Sleeve MP 3-462/2
- ◆ Assembly device MP 3-436
- ◆ Internal extractor Kukko 21/3
- ◆ Counter support Kukko 22/1
- ◆ Insertion tool MP 3-428
- ◆ Drift MP 3-426
- ◆ Drift MP 3-403
- ◆ Adapter MP 3-403/1

1 - Gearbox housing

- ◆ If replacing: set differential
⇒ page 39-11

2 - Dowel sleeve

- ◆ 2 pieces

3 - Sleeve

- ◆ Remove with pliers
- ◆ Drive as far as the stop

4 - Cap

- ◆ For gearbox breather

5 - Needle bearing

- ◆ For output shaft
- ◆ Drive out ⇒ Fig. 5
- ◆ Drive in ⇒ Fig. 6

6 - Shift shaft

- ◆ Removing and installing
⇒ page 34-28

7 - Stop cap

8 - Pressure spring

9 - Retaining bracket

- ◆ When removing circlip (item. 10) retaining bracket. Then release pressure spring (item 8) carefully.

10 - Circlip

- ◆ Always replace

11 - Reversing light switch, 25 Nm

- ◆ For models 08.98 ➤

12 - Locking screw, 40 Nm

- ◆ For models 08.98 ➤

13 - Reversing light switch, 25 Nm

- ◆ For models ➤ 07.98
- ◆ Used also for locking the shift shaft

14 - Taper roller bearing outer race

- ◆ For differential
- ◆ Drive in and out ⇒ as of page 39-3
- ◆ If replacing: Set differential
⇒ page 39-11

15 - Seal

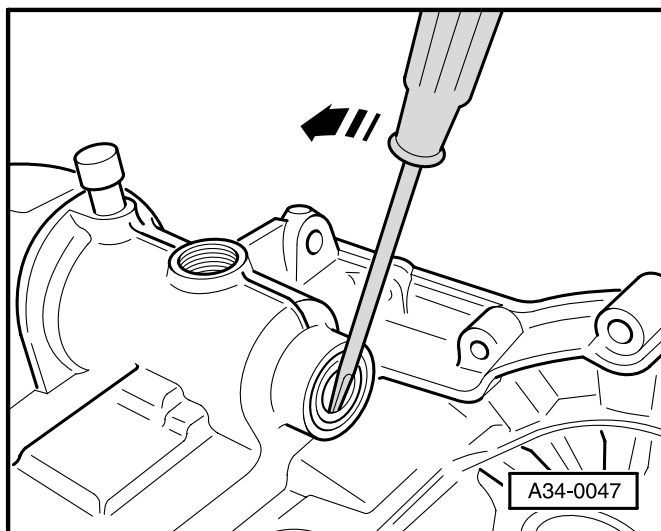
- ◆ For flange shaft
- ◆ Replace ⇒ page 39-1

16 - Ball sleeve

- ◆ For shift shaft
- ◆ Pulling out ⇒ Fig. 3
- ◆ Pulling in ⇒ Fig. 4

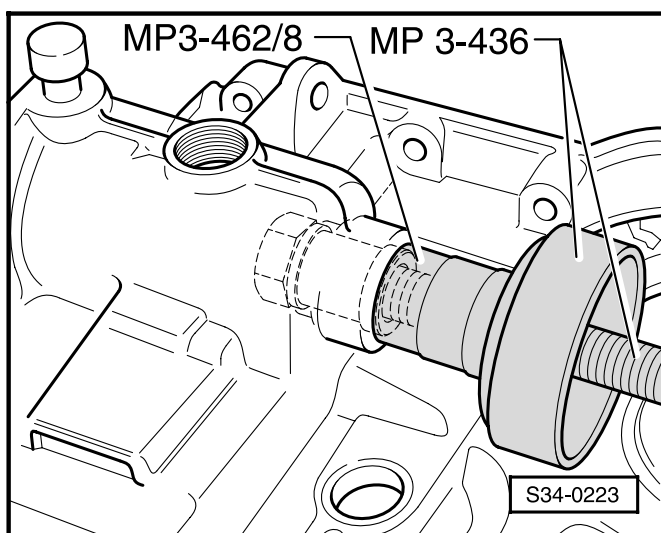
17 - Seal

- ◆ For shift shaft
- ◆ Can be replaced on installed gearbox
- ◆ Removing ⇒ Fig. 1
- ◆ Installing ⇒ Fig. 2



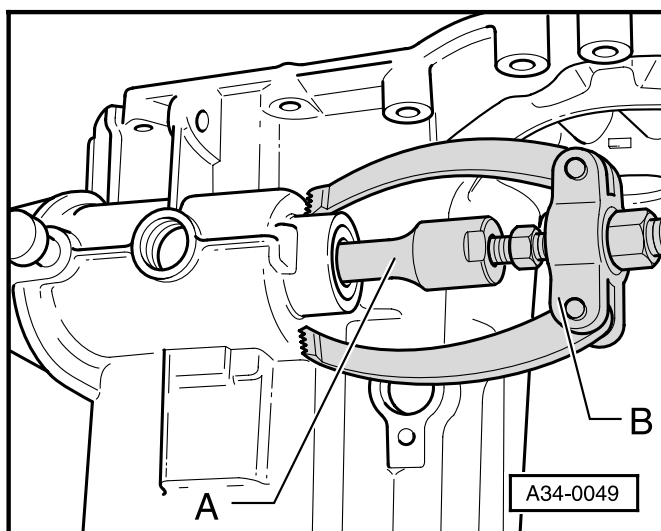
◀ Fig. 1 Removing seal for shift shaft

- Use a screwdriver to lever out seal in direction of arrow.



◀ Fig. 2 Inserting seal for shift shaft

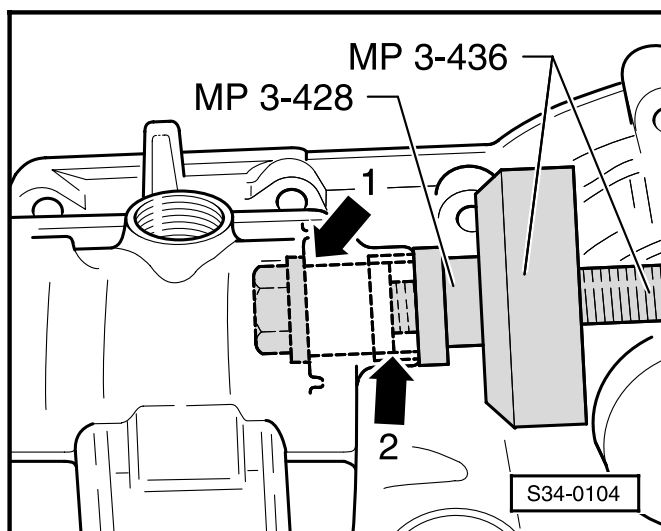
- Insert as far as the stop.
- Use MP 3-462/8 to insert seal with gearbox removed.



◀ Fig. 3 Removing spherical sleeve for shift shaft

A - Internal extractor 18 ... 23 mm, e.g. Kukko 21/3

B - Countersupport, e.g. Kukko 22/1

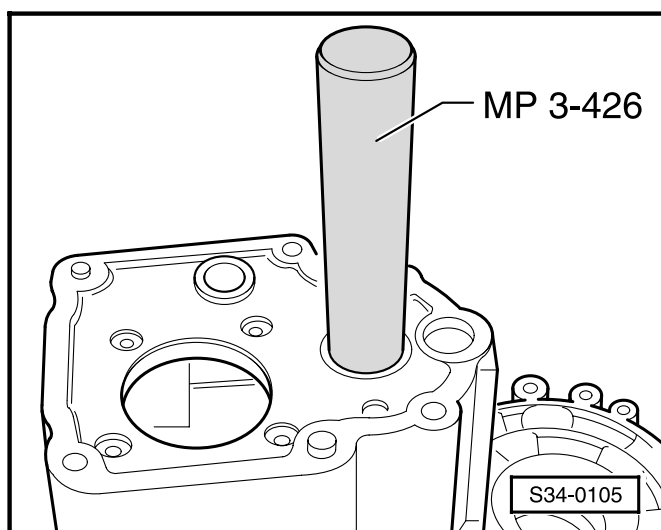


◀ Fig. 4 Inserting spherical sleeve for shift shaft

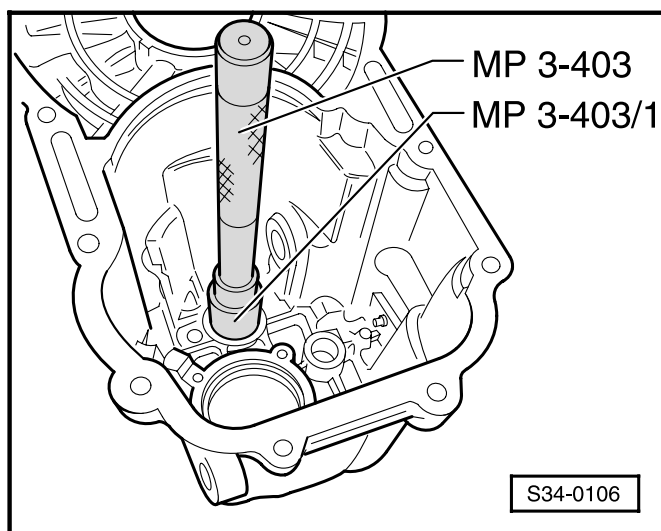
- Insert as far as the stop (arrow 1).

Fitting location:

The spherical sleeve projects out of the hole at the seal side (arrow 2).

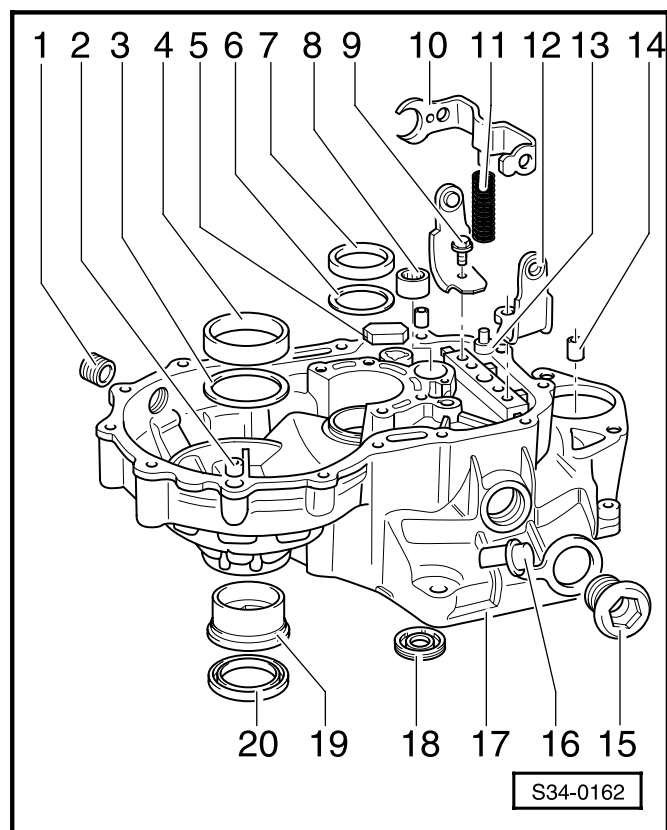


◀ Fig. 5 Removing needle bearing



◀ Fig. 6 Inserting needle bearing as far as stop

Servicing clutch housing



Special tools, testers and aids required

- ◆ Sealant AMV 188 200 03
- ◆ Gearbox holder MP 3-501
- ◆ Internal extractor Kukko 21/3
- ◆ Restraining device Kukko 22/1
- ◆ Drift MP 3-403
- ◆ Extractor MP 3-401
- ◆ Drift VW 222 A
- ◆ Removing lever MP 3-418
- ◆ Sleeve MP 3-424
- ◆ Thrust washer MP 3-413

1 - Oil drain plug, 25 Nm

- ◆ Without magnet

2 - Dowel sleeve

- ◆ (2 in total)

3 - Shim S2

- ◆ Always 1 mm thick)

4 - Taper roller bearing outer race

- ◆ For differential
- ◆ Removing and inserting ⇒ from page 39-3
- ◆ If replaced: set differential ⇒ page 39-11

5 - Magnet

- ◆ Is held by the contact surface of the housing
- ◆ Insert with sealant AMV 188 200 03

6 - Shim

- ◆ For output shaft
- ◆ List of settings ⇒ page 39-10

7 - Taper roller bearing outer race

- ◆ For output shaft
- ◆ Removing and inserting ⇒ from page 35-9
- ◆ If replaced: set output shaft ⇒ page 35-14

8 - Needle bearing

- ◆ For input shaft
- ◆ Extracting ⇒ Fig. 1
- ◆ Inserting ⇒ Fig. 2

9 - Hexagon bolt, 25 Nm

- ◆ With locking teeth below bolt head

10 - Relay lever

11 - Compression spring

12 - Support for relay lever

13 - Slide

14 - Bush for starter

- ◆ Extracting ⇒ Fig. 3
- ◆ Inserting ⇒ Fig. 4
- ◆ Can be replaced with gearbox installed

15 - Screw plug

- ◆ green - clutch diameter 210 mm
- ◆ white - clutch diameter 190 and 200 mm

Note:

Pay attention to correct assignment, for example when replacing a gearbox or fitting on existing clutch.

Consequences if screw plugs mixed up:

1. White screw plug - 210 mm Ø clutch
 - The TDC sensor will be destroyed, and the markings on the flywheel damaged. Parts of TDC sensor in clutch chamber.
2. Green screw plug - 190 and 200 mm Ø clutch
 - Either no or inaccurate - fluctuating - readout in tester.

16 - Cap**17 - Clutch housing**

- ♦ if replaced ⇒ List of setting, page 39-10

18 - Input shaft seal

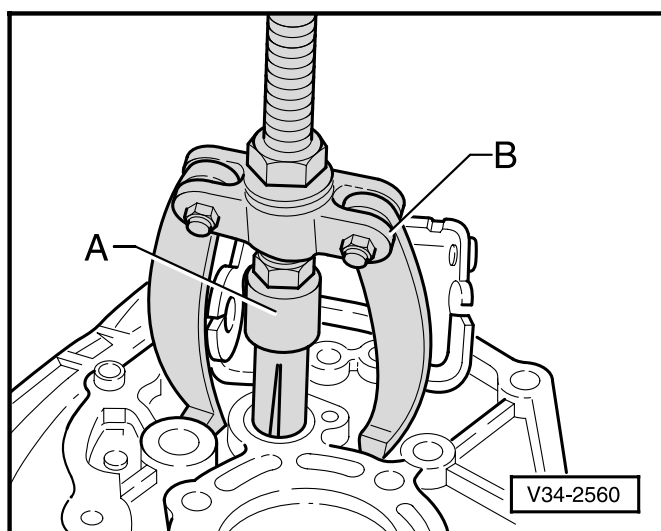
- ♦ pulling out ⇒ Fig. 5
- ♦ inserting ⇒ Fig. 6

19 - Sleeve

- ♦ for seal (item 20)
- ♦ levering out ⇒ Fig. 7
- ♦ inserting ⇒ Fig. 8

20 - Flange shaft seal

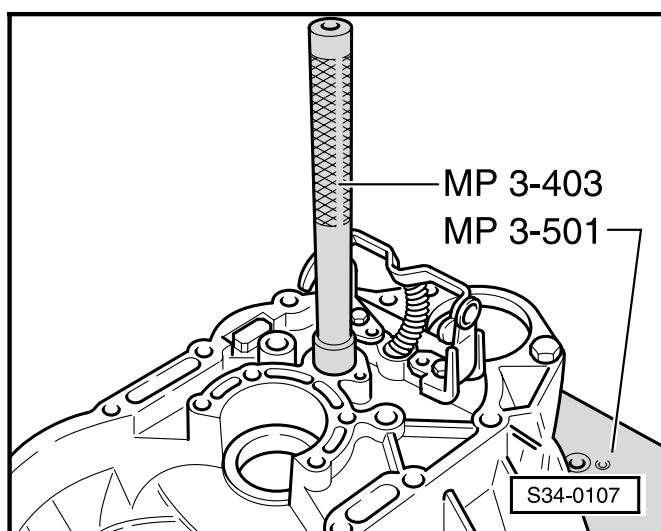
- ♦ replacing ⇒ page 39-1



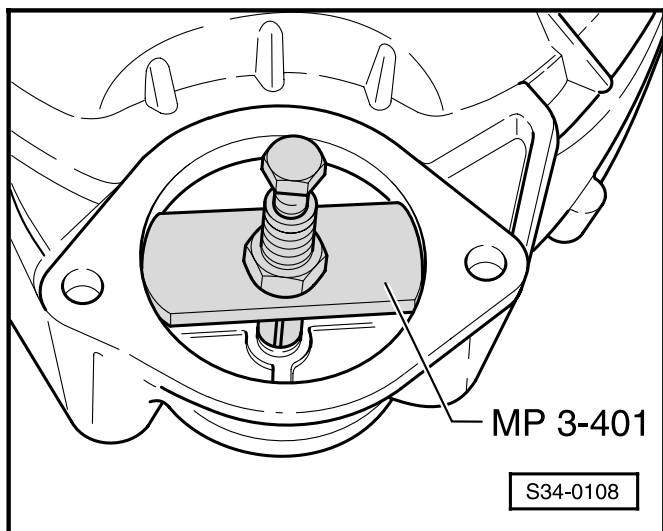
◀ Fig. 1 Pulling out input shaft needle bearing

A - Internal extractor, 20...30 mm, e.g. Kukko 21/4

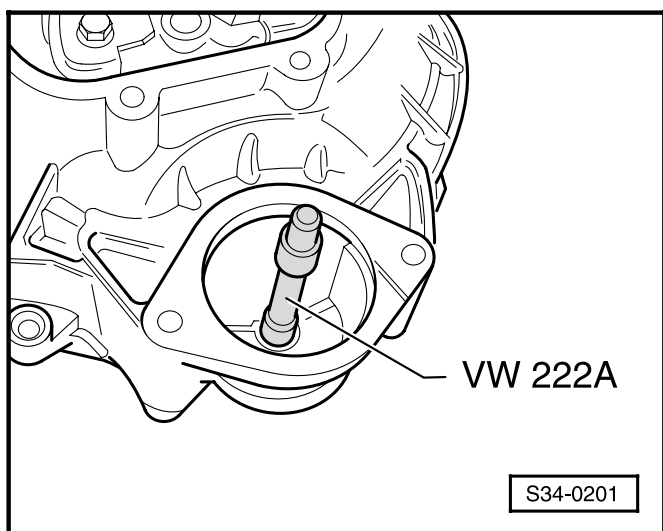
B - Countersupport, e.g. Kukko 22/1



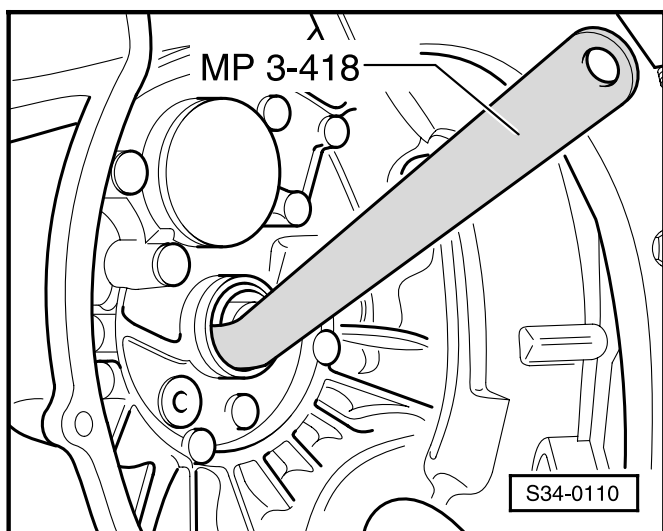
◀ Fig. 2 Inserting input shaft needle bearing



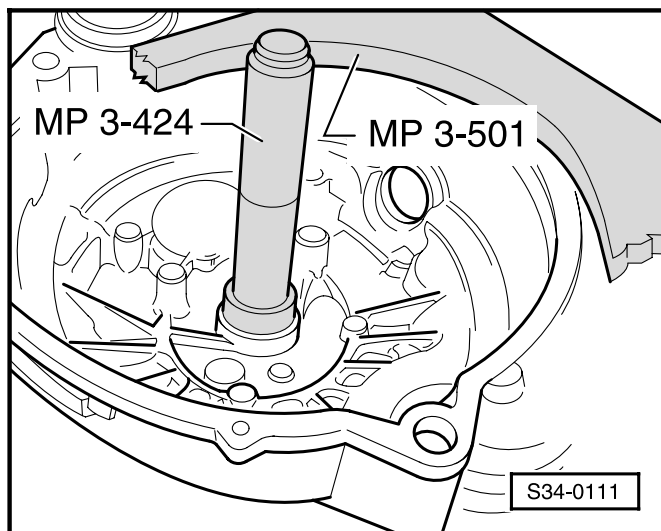
◀ Fig. 3 Removing bush for starter



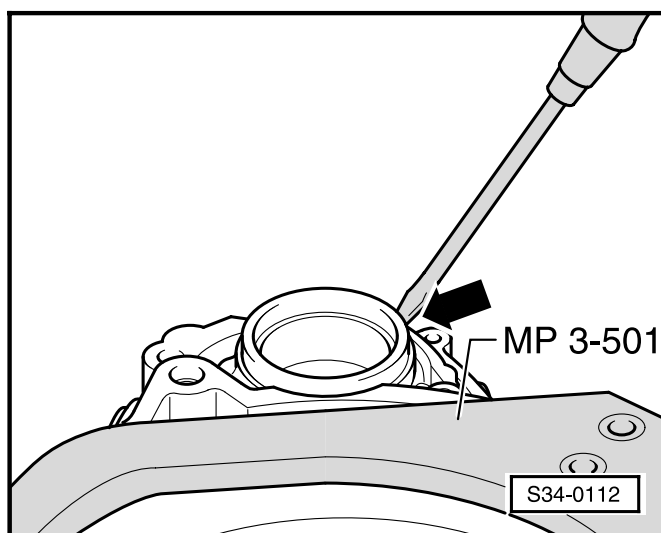
◀ Fig. 4 Inserting bush for starter



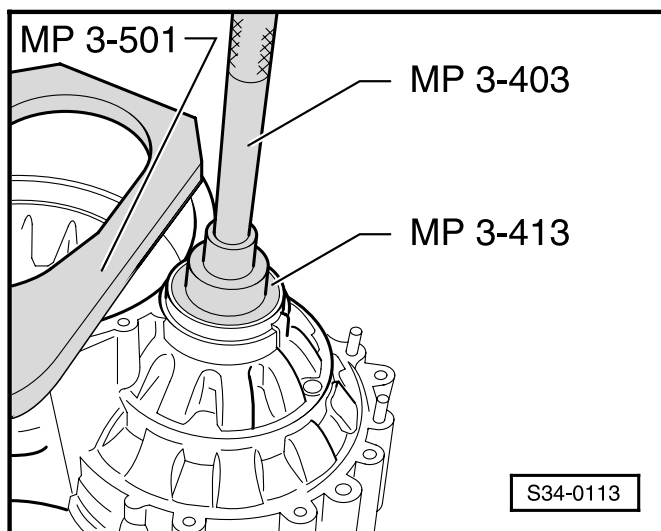
◀ Fig. 5 Removing seal for input shaft



◀ Fig. 6 Inserting seal for input shaft

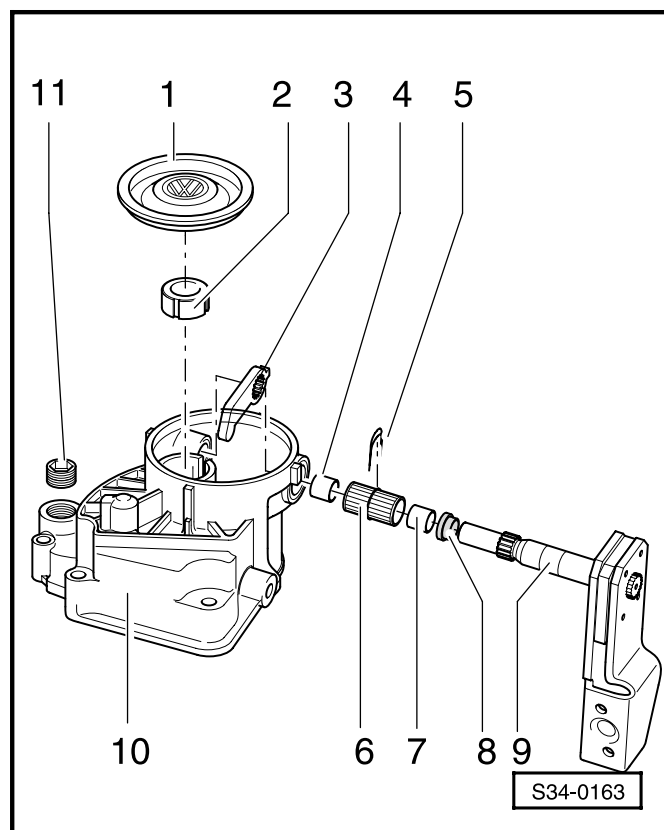


◀ Fig. 7 Using screwdriver to lever out sleeve (arrow)



◀ Fig. 8 Inserting sleeve

Servicing cover for gearbox housing



Special tools, testers and aids required

- ◆ Insertion tool MP 3-436
- ◆ Fitting tool MP 1-174
- ◆ Insertion tool MP 3-504
- ◆ Pressure plate MP 3-407
- ◆ Internal extractor Kukko 21/1
- ◆ Support Kukko 22/1
- ◆ Pipe section MP 3-409
- ◆ Extractor MP 1-502

1 - End cover

- ◆ Replace
- ◆ Removing: pierce and lever out
- ◆ Installing ⇒ Fig. 1

2 - Release bearing

- ◆ Can be replaced with gearbox installed

3 - Clutch lever

- ◆ To remove, take off locking clip (item 5)
- ◆ Fits only in one position

4 - Small bearing bush

- ◆ Extracting ⇒ Fig. 4
- ◆ Inserting ⇒ Fig. 5

5 - Locking clip

6 - Needle bearing

7 - Large bearing bush

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

8 - Seal

- ◆ Inserting ⇒ Fig. 6
- ◆ Can be replaced with gearbox installed; remove release shaft (item 9) for this purpose

9 - Release shaft

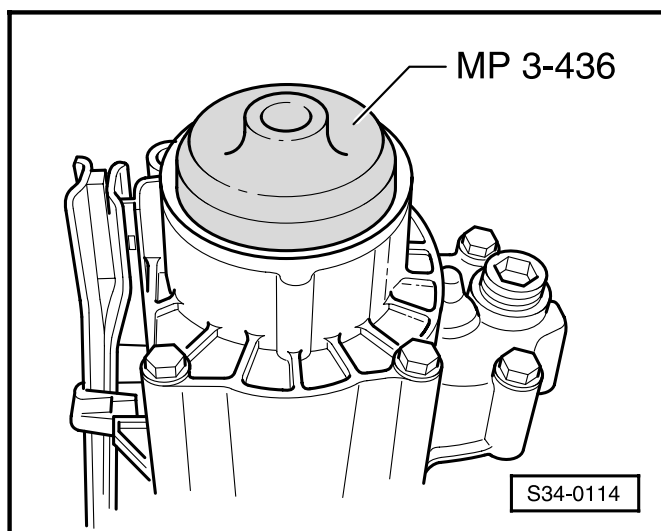
- ◆ Removing: pull locking clip (item 5) out of needle bearing (item 6). Pull release shaft out of gearbox housing cover.

10 - Cover for gearbox housing

- ◆ Only version with bearing bushes (items 7 and 4) available as replacement part

11 - Oil filler plug, 25 Nm

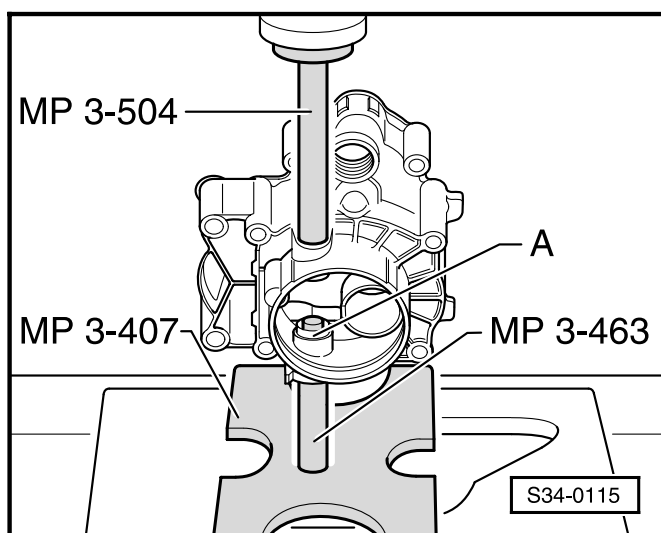
- ◆ without magnet



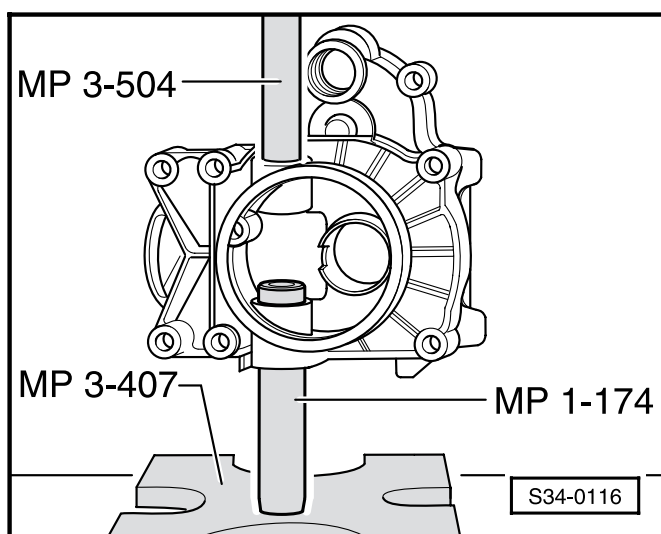
◀ Fig. 1 Installing end cover

Notes:

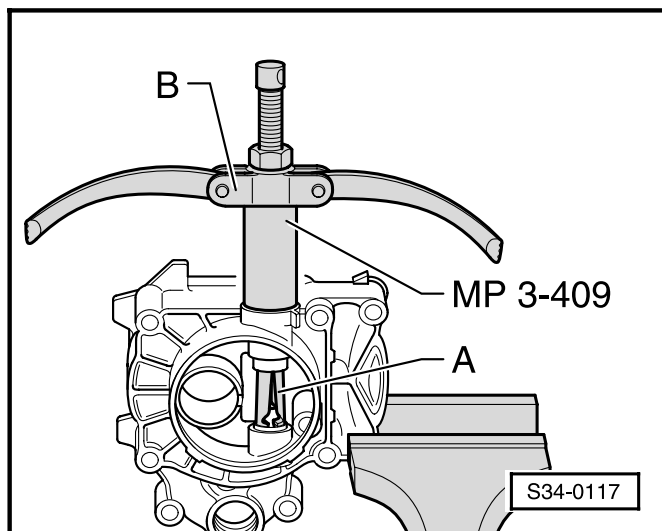
- ◆ Sealing surface at gearbox housing cover must be free of grease.
- ◆ Always install a new end cover.



◀ Fig. 2 Pressing out large bearing bush -A-



◀ Fig. 3 Pressing in large bearing bush



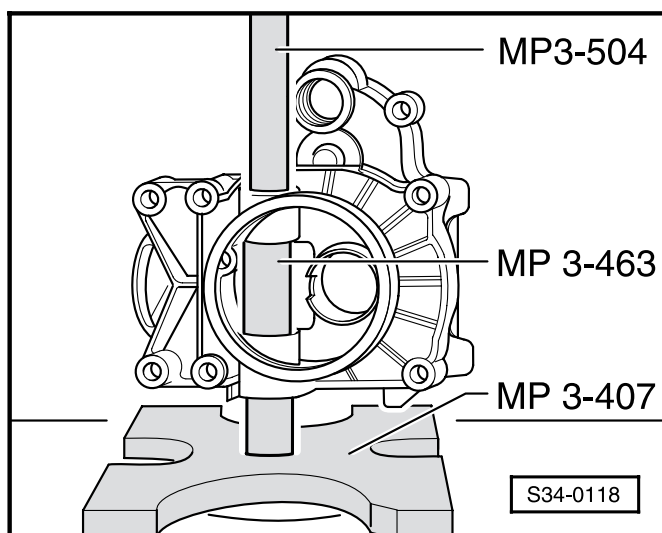
◀ Fig. 4 Removing small bearing bush

A - Internal extractor 12 ... 14.5 mm, e.g. Kukko 21/1

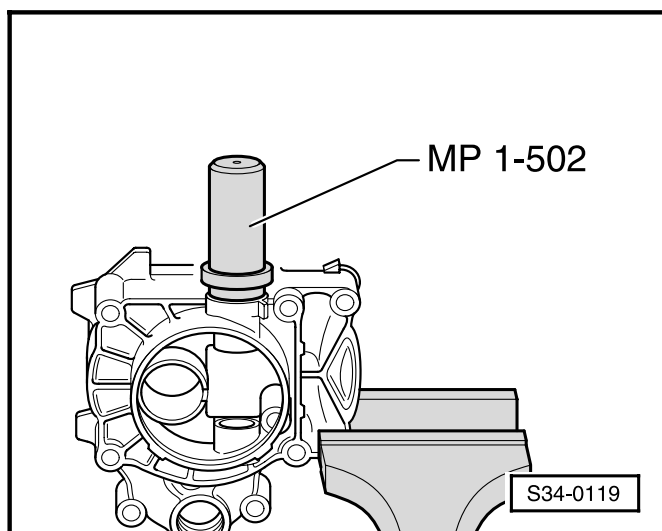
B - Support, e.g. Kukko 22/1

Note:

Bearing bush is damaged when removed; always replace.



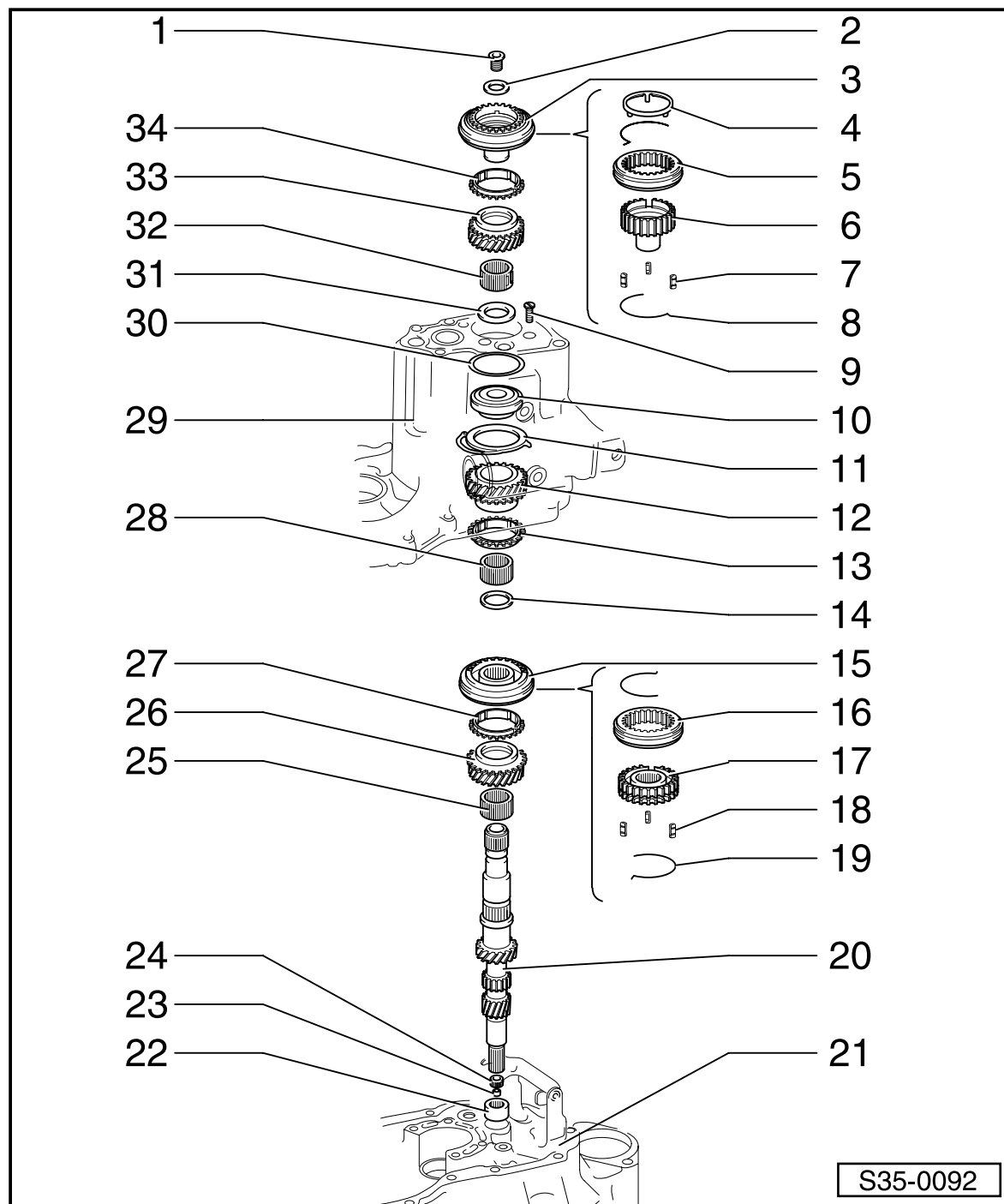
◀ Fig. 5 Inserting small bearing bush



◀ Fig. 6 Inserting seal for release shaft

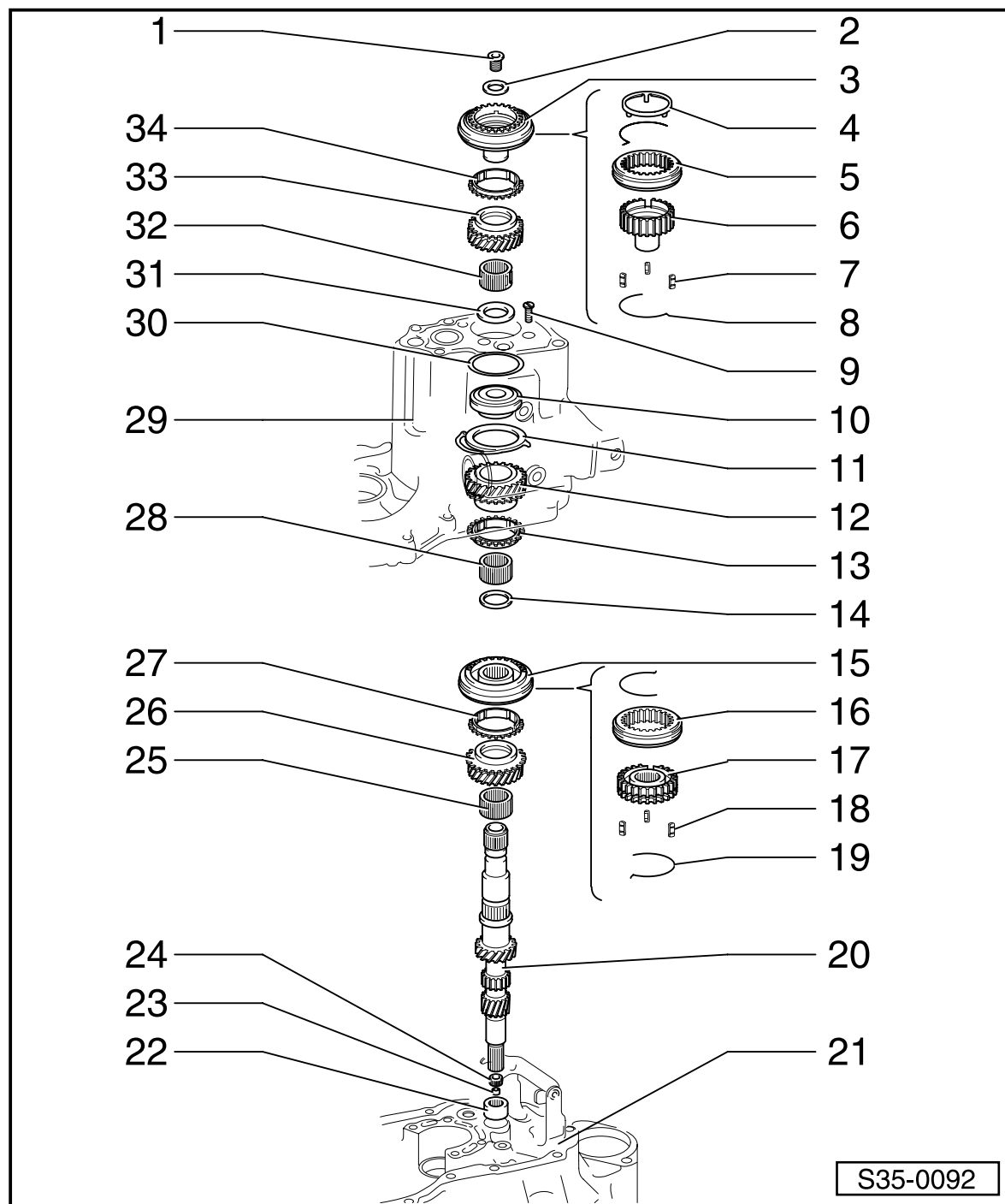
- Clamp cover for gearbox housing in vice; use protective jaws.

Disassembling and assembling input shaft



Special tools, testers and aids required

- ◆ Drift MP 3-403
- ◆ Internal extractor Kukko 21/1
- ◆ Restraining device Kukko 22/1
- ◆ Universal tool MP 3-419
- ◆ Threaded piece MP 3-419/15
- ◆ Thrust piece MP 3-460
- ◆ Driver MP 1-304
- ◆ Plunger MP 3-423
- ◆ Pipe section MP 3-4013
- ◆ Thrust plate MP 3-407
- ◆ Thrust plate MP 3-406
- ◆ Separating device Kukko 17/1



♦ Pipe section MP 3-429

♦ Insertion sleeve MP 3-427

Note:

♦ When installing new gears, pay attention to technical data ⇒ page 00-2.

1 - M 17, 150 Nm

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

2 - Dished washer

- ♦ Dimensions 18 x 34 x 2.8

3 - Sliding sleeve/synchroniser body for 5th gear

- ♦ Removing and installing
⇒ page 34-28

4 - Stop ring

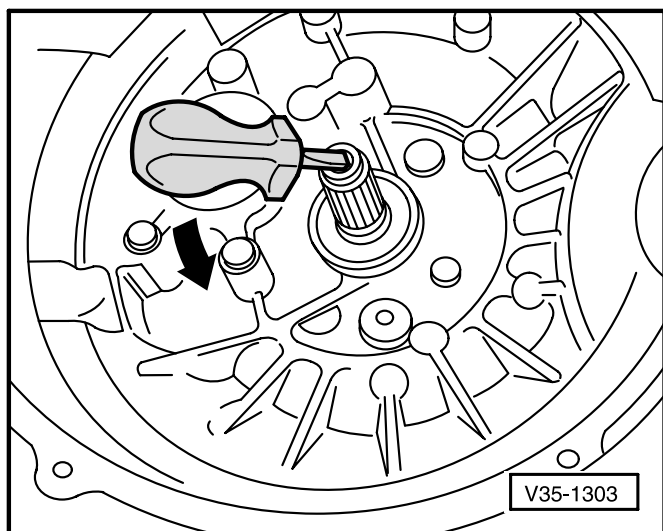
- ♦ Prevents the locking pieces wandering out
- ♦ Removing ⇒ Fig. 14
- ♦ Installing ⇒ Fig. 15

5 - 5th speed sliding sleeve

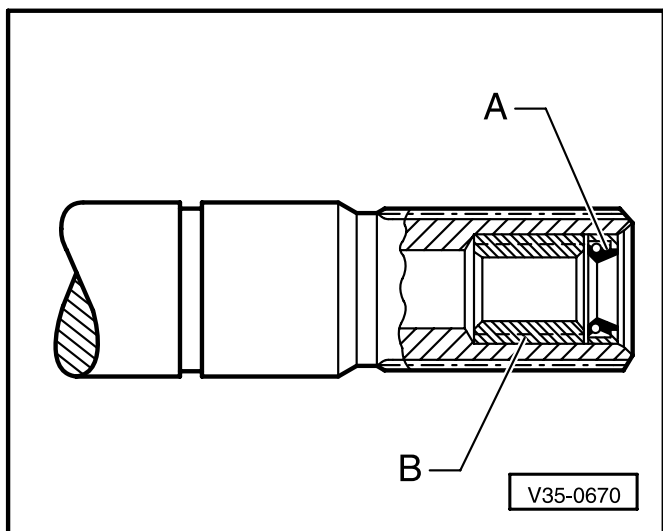
- ♦ Installation position ⇒ Fig. 12

6 - 5th speed synchroniser body

- 7 - Locking pieces (3x)**
- 8 - Spring (2x)**
- 9 - Oval head countersunk screw**
M 7 x 23, 15 Nm
♦ 4x
- 10 - Grooved ball bearing**
♦ Pressing off ⇒ Fig. 6
♦ Is pressed into gearbox housing when input shaft installed ⇒ page 34-28
- 11 - Tensioning plate**
♦ Secures grooved ball bearing
- 12 - 4th speed shift gear**
- 13 - 4th speed synchroniser ring**
♦ Inspecting for wear ⇒ Fig. 8
- 14 - Circlip**
♦ Replace
- 15 - Sliding sleeve and synchroniser body of 3rd and 4th gear**
♦ Press off together with 3rd speed shift gear ⇒ Fig. 7
♦ Installation position of synchroniser body ⇒ Fig. 9
♦ Assembling ⇒ Fig. 10
♦ Pressing on ⇒ Fig. 11
- 16 - Sliding sleeve**
- 17 - Synchroniser body**
- 18 - Locking pieces (3x)**
- 19 - Spring (2x)**
- 20 - Input shaft**
- 21 - Clutch housing**
- 22 - Needle bearing**
♦ Dimensions 24 x 32 x 18
♦ For input shaft
♦ Removing and installing
⇒ page 34-48
- 23 - Seal for clutch pushrod**
♦ Can be replaced with gearbox removed (not disassembled)
♦ Use screwdriver for levering out ⇒ Fig. 1
♦ Installation position ⇒ Fig. 2
♦ Inserting ⇒ Fig. 3
- 24 - Bearing bush for clutch pushrod**
♦ Installation position ⇒ Fig. 2
♦ Removing ⇒ Fig. 4
♦ Can be replaced with gearbox removed (not disassembled)
♦ Inserting ⇒ Fig. 5
- 25 - Needle bearing**
♦ Dimensions 32 x 37 x 24.8
♦ For 3rd speed shift gear
- 26 - 3rd speed shift gear**
- 27 - 3rd speed synchroniser ring**
♦ Inspecting for wear ⇒ Fig. 8
- 28 - Needle bearing**
♦ Dimensions 32 x 37 x 24.8
♦ For 4th speed shift gear
- 29 - Gearbox housing**
- 30 - Shim**
♦ For input shaft
♦ Pay attention to page 34-27
- 31 - Thrust washer**
♦ Installation position ⇒ Fig. 13
♦ Fit onto synchroniser body (item 6) after installing 5th speed synchroniser ring (item 34), 5th speed shift gear (item 33)
- 32 - Needle bearing**
♦ Dimensions 18 x 34 x 2.8
♦ For 5th speed shift gear
- 33 - 5th speed shift gear**
- 34 - 5th speed synchroniser ring**
♦ Inspecting for wear ⇒ Fig. 8

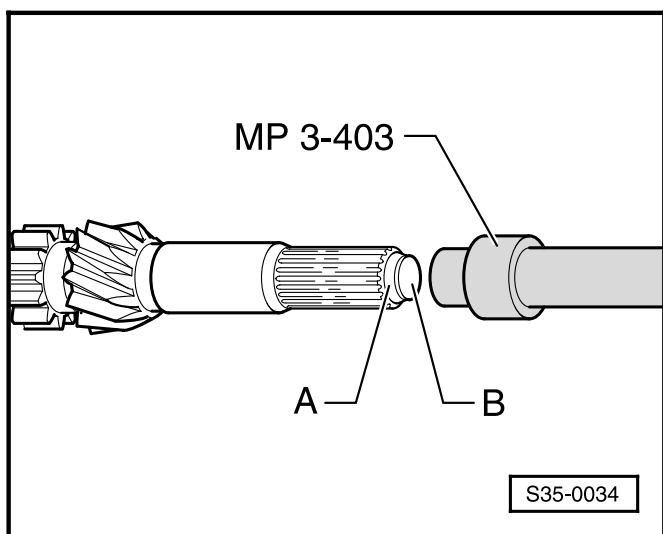


◀ Fig. 1 Levering out seal for clutch push-rod



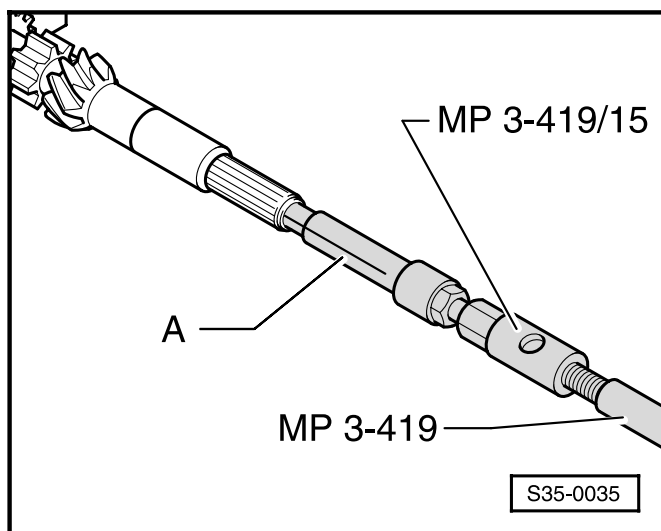
◀ Fig. 2 Installation position of seal and bearing bush

- A - Seal for clutch pushrod
- B - Bush for clutch pushrod



◀ Fig. 3 Inserting seal for clutch pushrod

- Knock in seal -A- flush with the assembly plug -B- supplied. Take off assembly plug. The seal now has the specified installation depth of 0.8 ... 1.3 mm. Lightly oil sealing lip.



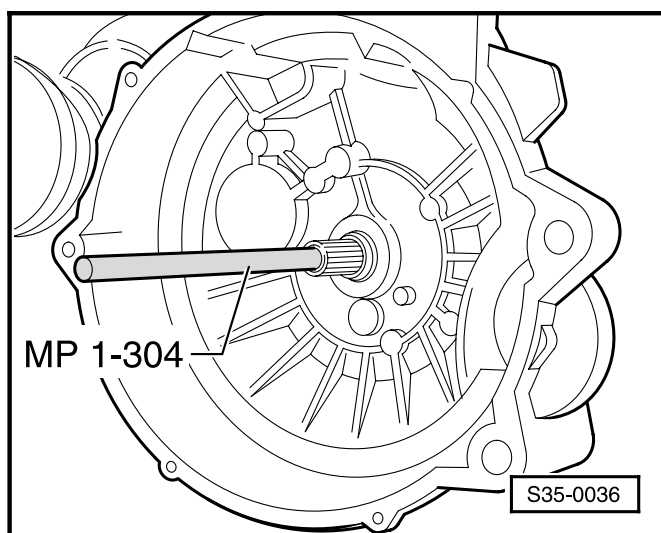
◀ Fig. 4 Extracting bearing bush for clutch pushrod

A - Internal extractor, e.g. Kukko 21/1, 8...12 mm

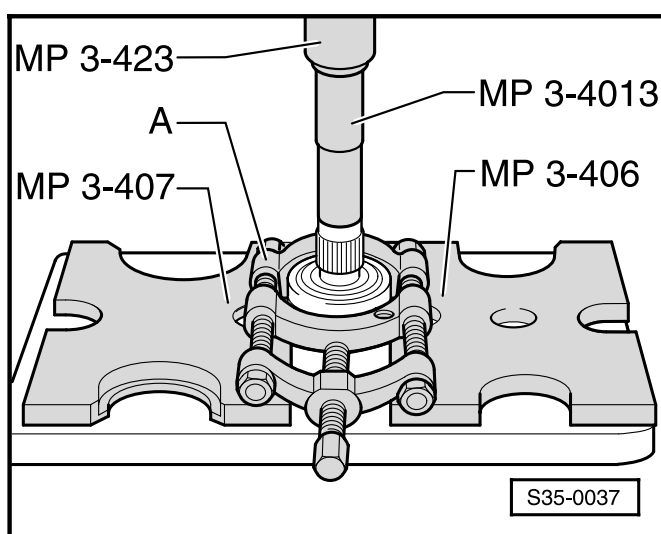
- Use threaded adapter of countersupport, e.g. Kukko 22/1, for connecting internal extractor and special tool MP 3-419/15.

Note:

With input shaft installed, use countersupport, e.g. Kukko 22/1, to pull out bearing bush over thrust piece MP 3-460.

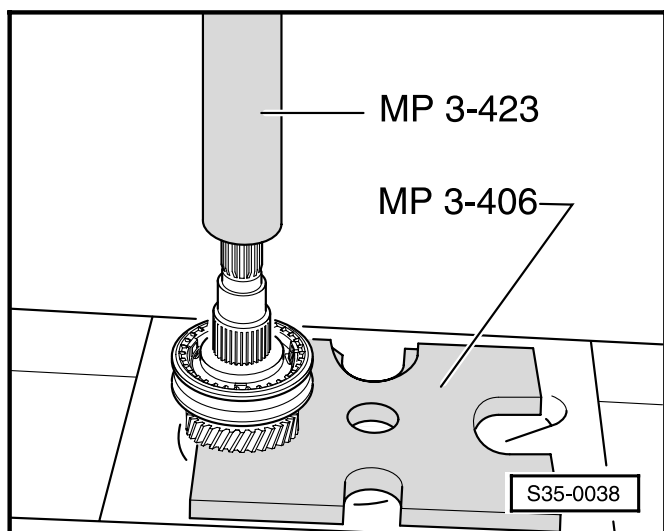


◀ Fig. 5 Inserting bearing bush for clutch pushrod as far as the stop

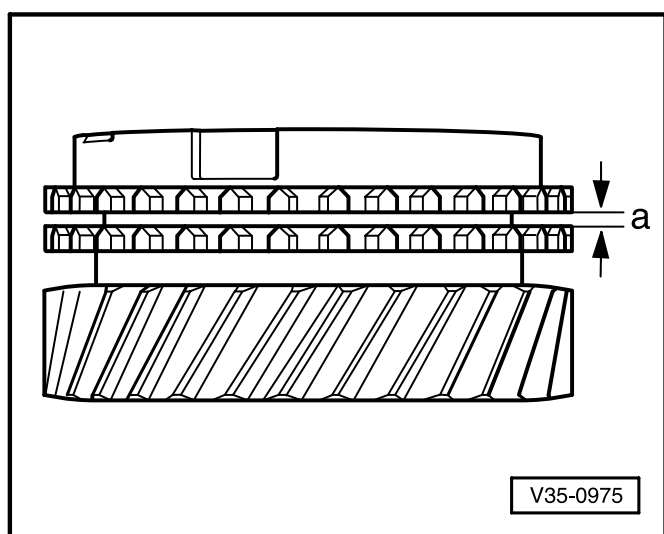


◀ Fig. 6 Pressing off grooved ball bearing

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



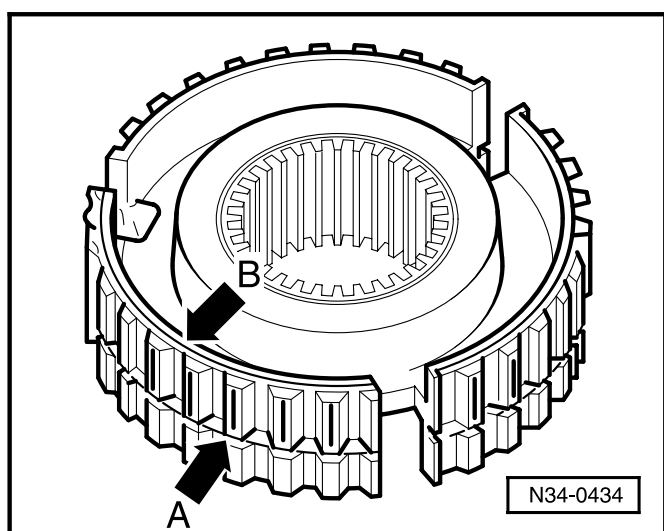
◀ Fig. 7 Pressing off synchroniser body/
sliding sleeve of 3rd and 4th gear
together with 3rd speed shift gear



◀ Fig. 8 Inspecting synchroniser ring for
wear

- Press synchroniser ring onto the taper of the shift gear and measure size of gap „a“ with a feeler gauge.

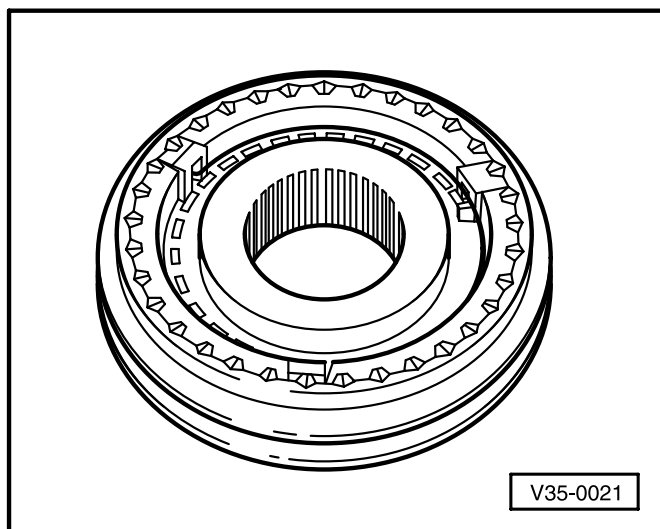
	Installation dimension „a“	Wear limit „a“
3rd gear	1.15 ... 1.75 mm	0.5 mm
4th gear	1.3 ... 1.9 mm	
5th gear	1.3 ... 1.9 mm	



◀ Fig. 9 Installation position of 3rd and 4th
gear synchroniser body

The shorter splines below groove (arrow A) which runs all round, points toward 3rd gear.

The groove on the face end (arrow B) points toward 4th gear.

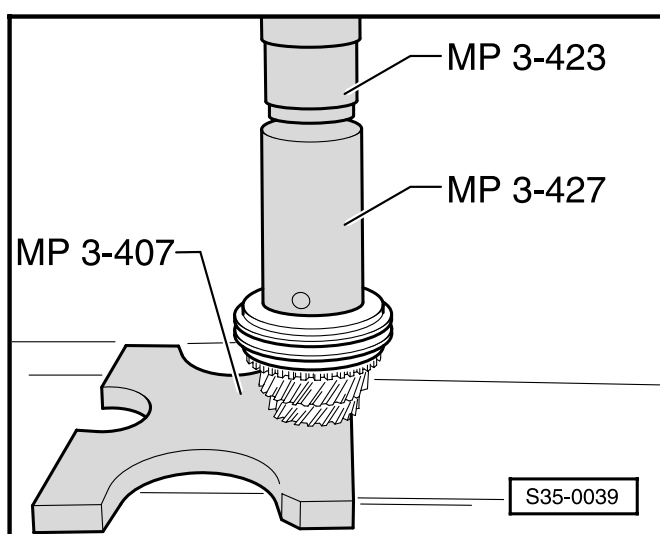


◀ Fig. 10 **Assembling sliding sleeve/synchroniser body of 3rd and 4th gear**

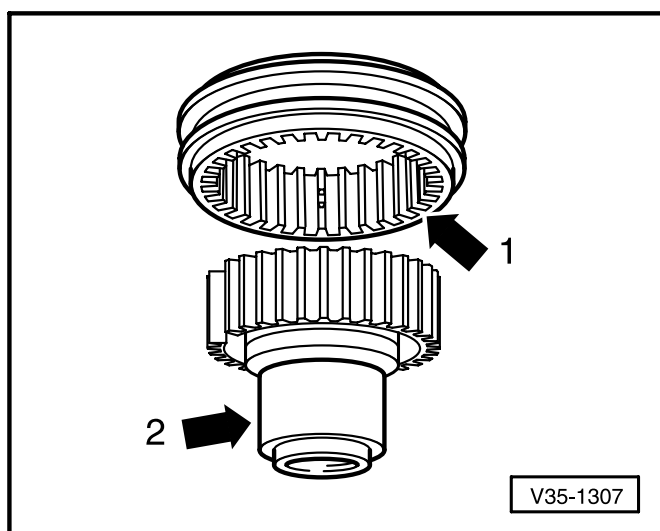
- Push sliding sleeve over the synchroniser body.

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

- Insert locking pieces and install springs offset by 120°. The angled end of the spring must grip in the hollow locking piece.



◀ Fig. 11 **Pressing on synchroniser body and sliding sleeve of 3rd and 4th gear**



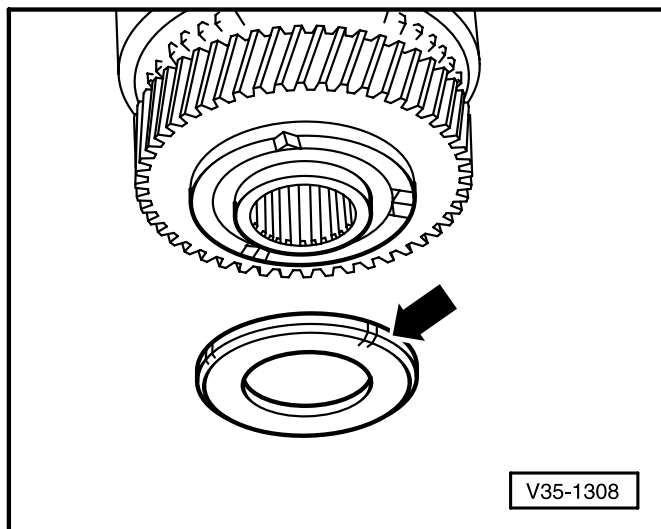
◀ Fig. 12 **Installation position of 5th gear sliding sleeve**

- Push sliding sleeve over the synchroniser body.

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

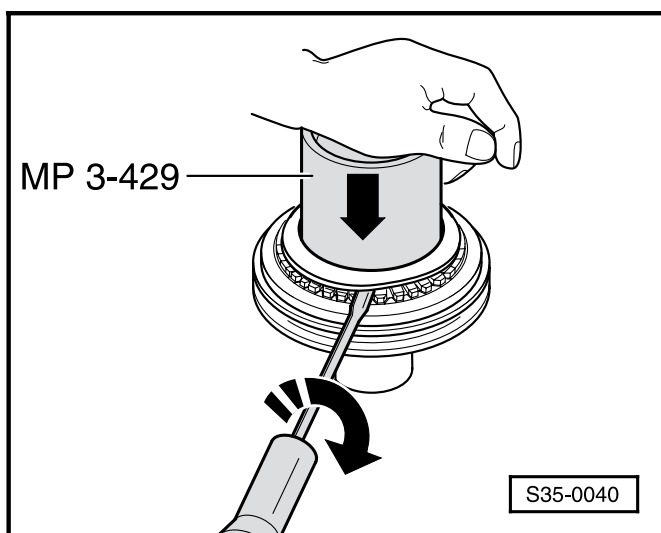
The chamfer on the splines (arrow 1) points in this case toward the shaft (arrow 2) of 5th gear synchroniser body.

- Insert locking pieces and install springs offset by 120°. The angled end of the spring must grip in the hollow locking piece.



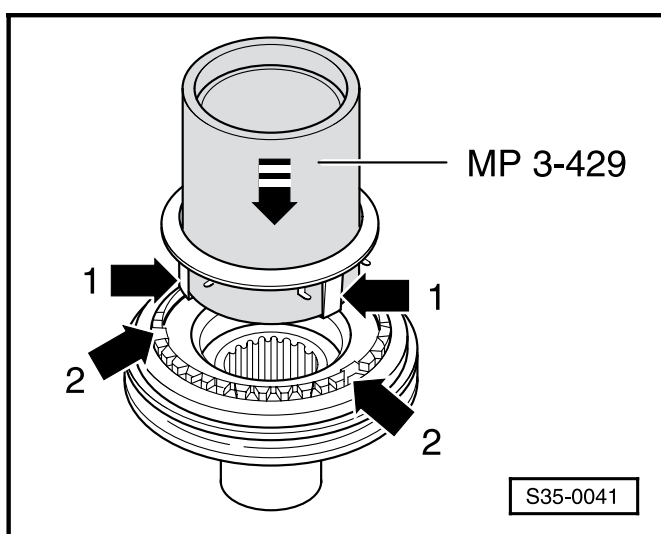
◀ Fig. 13 Installation position of thrust washer for 5th speed shift gear

The chamfer (arrow) is positioned opposite the shift gear.



◀ Fig. 14 Taking off stop

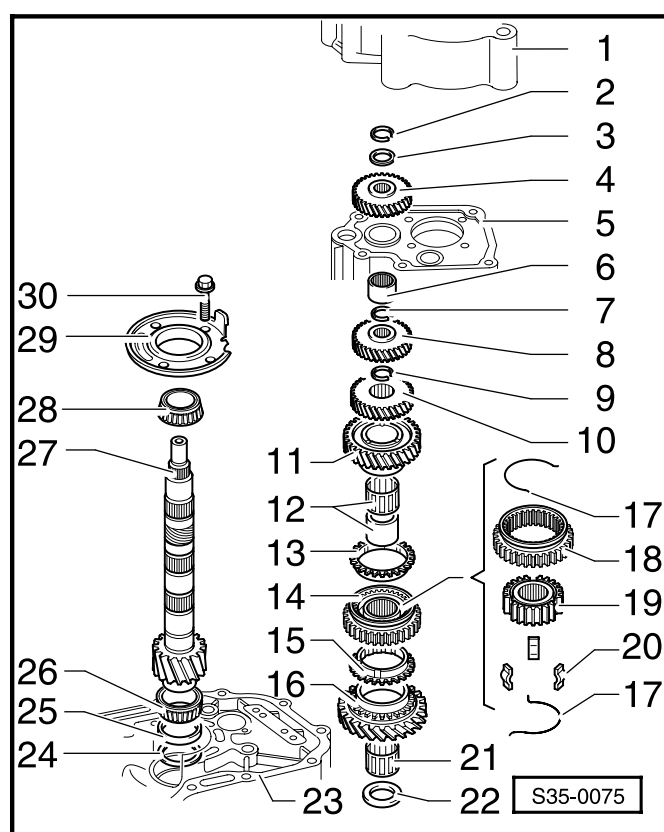
- Press pipe section MP 3-429 into the synchroniser body/stop ring. Lever stop ring out of synchroniser body by working up alternately.
- The stop ring must be completely positioned on the pipe section MP 3-429 ⇒ Fig. 15.
- Take off stop ring together with pipe section MP 3-429.



◀ Fig. 15 Installing stop

- Insert stop ring together with pipe section MP 3-429 into 5th gear synchroniser body/sliding sleeve. The webs (arrow 1) lock into the recesses (arrow 2) for the locking pieces of the synchroniser body.
- Take off pipe section MP 3-429; when this is done, the webs in the synchroniser body must lock in place.

Disassembling and assembling output shaft



1 - Cover for gearbox housing

2 - Circlip for 5th speed gear

♦ Replace

3 - Thrust washer

4 - 5th speed gear

♦ Installing ⇒ page 34-28

5 - Gearbox housing

6 - Needle bearing

♦ Dimensions 22 x 33 x 19

♦ Removing and installing
⇒ page 34-47

7 - Circlip for 4th speed gear

♦ Replace

8 - 4th speed gear

9 - Circlip for 3rd speed gear

♦ Replace

♦ Redetermining thickness
⇒ page 34-28

10 - 3rd speed gear

♦ Installation position ⇒ page 34-28

♦ Setting axial play ⇒ page 34-28

11 - 2nd speed shift gear

12 - Needle bearing for 2nd speed shift gear

♦ Bearing dimensions 32 x 37 x 27.7

♦ Bush dimensions 28.1 x 32 x 28.1

♦ Pulling off inner race ⇒ page 34-28

♦ Pressing on inner race ⇒ page 34-28

13 - 2nd speed synchroniser ring

♦ Inspecting for wear ⇒ Fig. 1

14 - 1st and 2nd gear sliding sleeve and synchroniser body

♦ Assembling sliding sleeve/synchroniser body ⇒ Fig. 3 and Fig. 4

♦ Removing and installing
⇒ page 34-28

15 - 1st speed synchroniser ring

♦ Inspecting for wear ⇒ Fig. 1

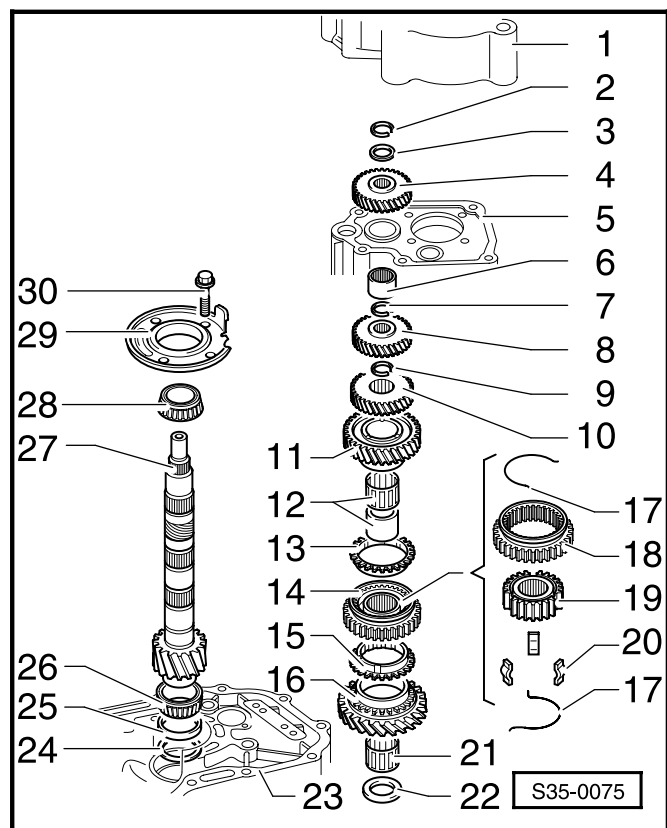
♦ Marking ⇒ Fig. 2

Special tools, testers and aids required

- ♦ Internal extractor Kukko 21/6
- ♦ Countersupport Kukko 22/2
- ♦ Drift MP 3-403
- ♦ Thrust plate MP 3-460
- ♦ Drift MP 1-178
- ♦ Separating device Kukko 17/1
- ♦ Extractor MP 1-502
- ♦ Pipe section MP 3-414
- ♦ Thrust plate MP 3-407

Notes:

- ♦ When installing new gears or new output shaft, pay attention to technical data ⇒ page 00-2.
- ♦ If output shaft or taper roller bearings are replaced, it is then necessary to carry out setting of output shaft ⇒ page 35-14.



16 - 1st speed shift gear

17 - Spring

18 - Sliding sleeve

19 - Synchroniser body

20 - Locking pieces (3x)

21 - Needle bearing

- ◆ Dimensions 32 x 37 x 27.7
- ◆ For 1st gear

22 - Thrust washer

- ◆ Installation position ⇒ page 34-28

23 - Clutch housing

24 - Shim

- ◆ For output shaft
- ◆ List of settings ⇒ page 39-10

25 - Small taper roller bearing outer race

- ◆ Removing ⇒ Fig. 5
- ◆ Inserting ⇒ Fig. 6

26 - Small taper roller bearing inner race

- ◆ Pressing off ⇒ Fig. 7
- ◆ Pressing on ⇒ Fig. 9
- ◆ Is matched with final drive gear; always replace both parts together

27 - Output shaft

- ◆ Setting ⇒ page 35-14

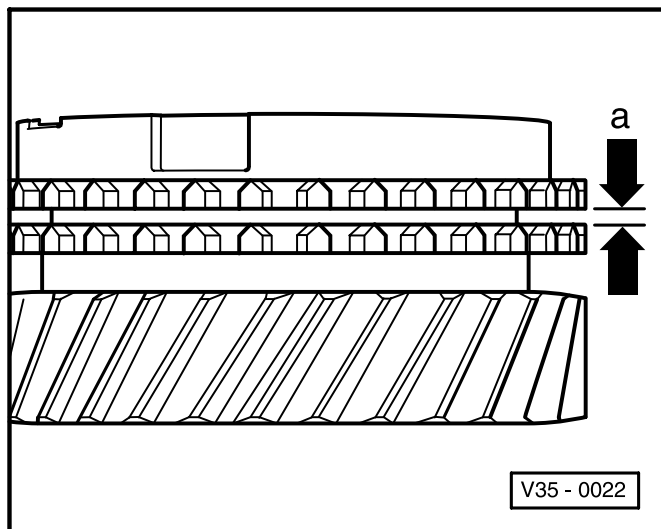
28 - Large taper roller bearing inner race

- ◆ Pressing off ⇒ Fig. 8
- ◆ Pressing on ⇒ Fig. 9

29 - Bearing mount

- ◆ With large taper roller bearing outer race and reverse idler gear stop
- ◆ Always replace outer race together with large taper roller bearing and bearing mount

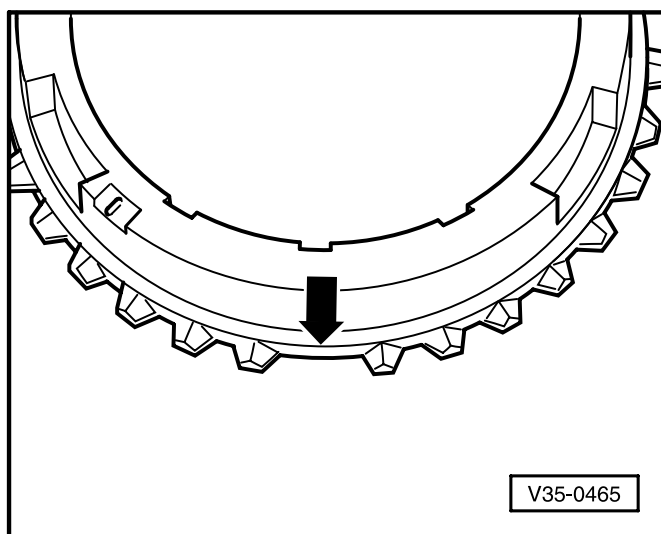
30 - Hexagon bolt, 25 Nm and torque a further 90°



◀ Fig. 1 Inspecting wear of 1st and 2nd gear synchroniser ring

- Press synchroniser ring onto the tape of the shift gear and measure size of gap „a“ with a feeler gauge.

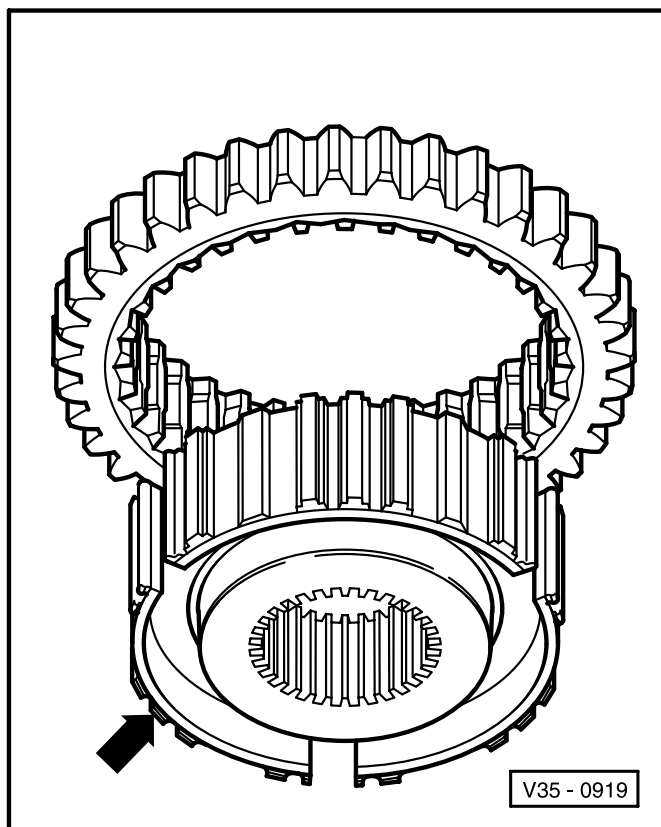
	Installation dimension	Wear limit
Dimension „a“	1.1 ... 1.7 mm	0.5 mm



◀ Fig. 2 Marking of 1st gear synchroniser ring

Marking: 1 tooth missing at 3 points (arrow).

This synchroniser ring must only be installed on 1st gear.



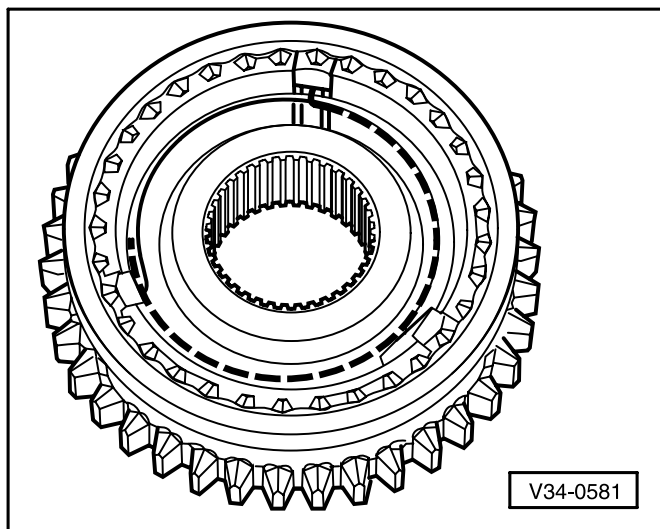
◀ Fig. 3 Assembling 1st and 2nd gear sliding sleeve and synchroniser body

Installation position of synchroniser body:

Marking groove on face end (arrow) points toward outer splines of sliding sleeve.

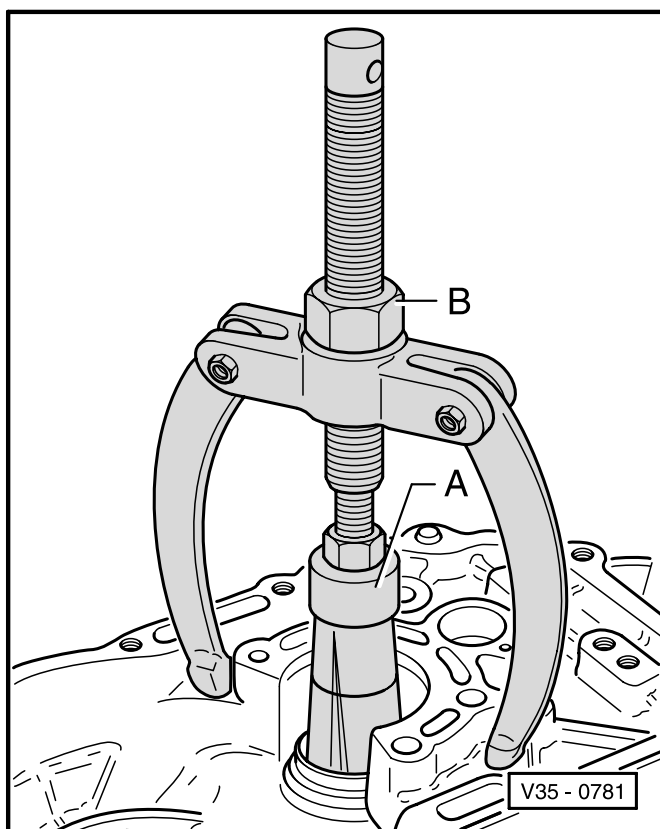
- Push sliding sleeve over the synchroniser body.

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



◀ Fig. 4 Assembling 1st and 2nd gear sliding sleeve/synchroniser body

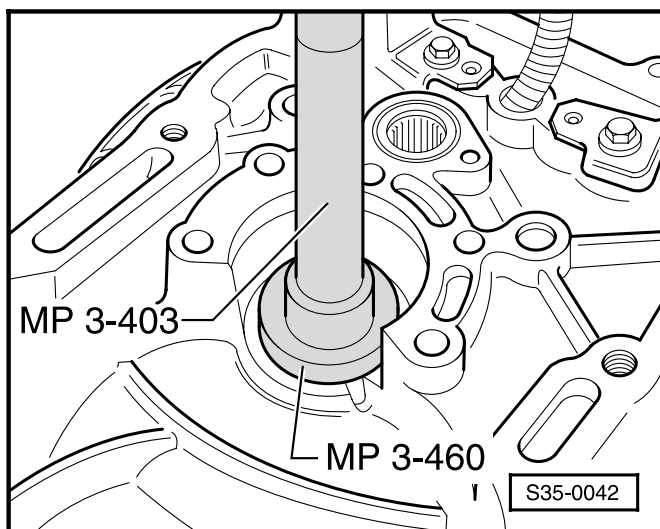
- Insert locking pieces and install springs offset by 120°. The angled end of the spring must grip into the hollow locking piece.



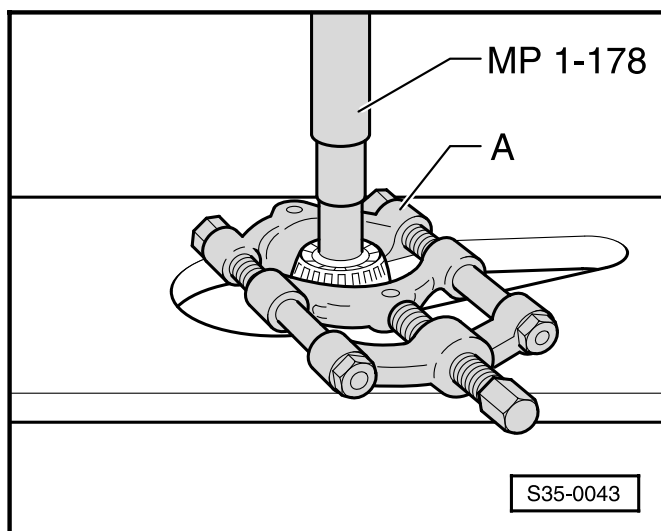
◀ Fig. 5 Extracting small taper roller bearing outer race

A - Internal extractor 37...46 mm, e.g. Kukko 21/6

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

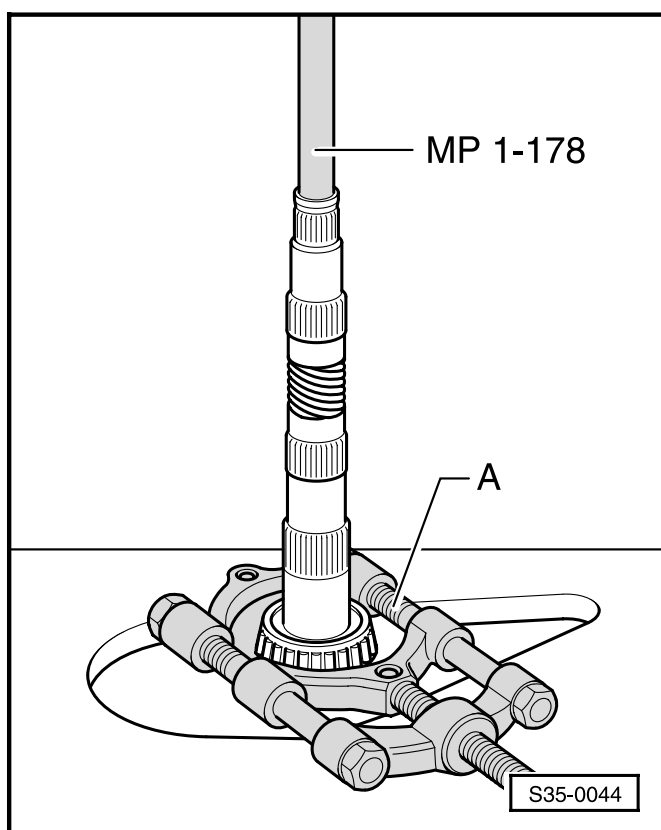


◀ Fig. 6 Pressing in small taper roller bearing outer race



◀ Fig. 7 Pressing off small taper roller bearing inner race

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

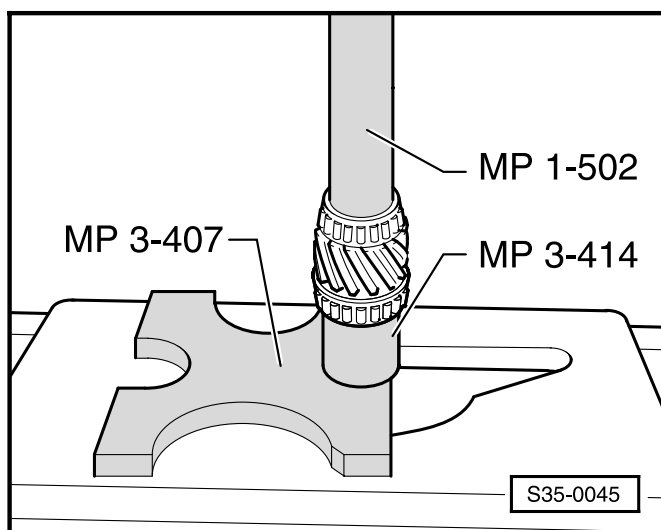


◀ Fig. 8 Pressing off large taper roller bearing inner race

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

Note:

Inner race can also be removed with taper roller bearing puller V.A.G 1582 and grip V.A.G 1582 /7.



◀ Fig. 9 Heating small and large taper roller bearing inner race to approx. 100°C, fitting on and pressing home

Setting input shaft

Special tools, testers and aids required

- ◆ Drift MP 3-403
- ◆ End gauge plate MP 3-405/17
- ◆ Countersupport Kukko 22/2
- ◆ Threaded rod MP 3-434
- ◆ Internal extractor Kukko 21/6
- ◆ Universal dial gauge holder MP 3-447
- ◆ Thrust disc MP 3-460

(Determining shim for input shaft)

It is necessary to re-set the input shaft if the following components are replaced:

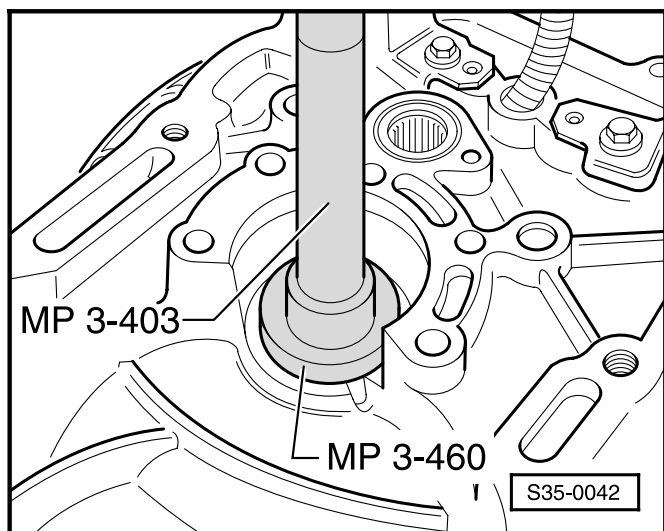
- ◆ Drive train
- ◆ Clutch housing

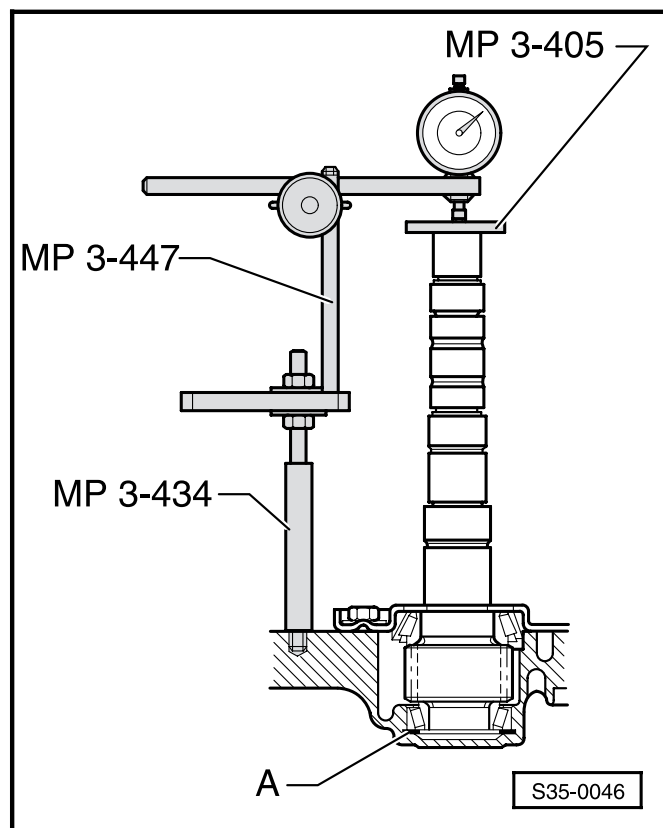
or

- ◆ Taper roller bearings

List of settings ⇒ page 39-16

- ▶ - Press in small tapered roller bearing outer race in the clutch housing with a 0.65 mm shim as far as the stop.
- Insert input shaft then tighten hexagon bolts for the bearing support to 25 Nm and turn a further 90°.





- ◀ - Insert dial gauge (3 mm range) and set to „0“ with a preload of 1 mm.

A - Shim 0.65 mm thick

- Move output shaft up and down, read off play on dial gauge and note (example: 0.30 mm).

Note:

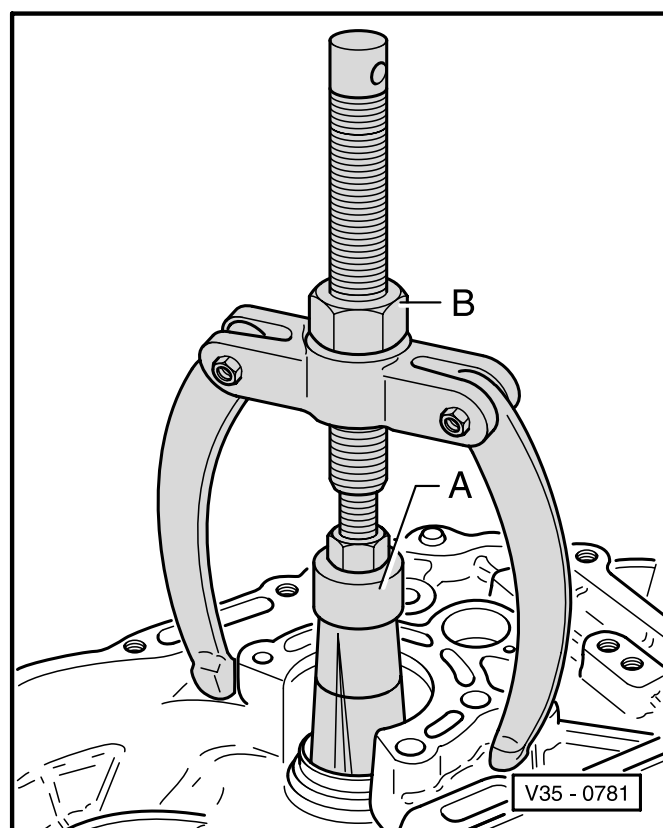
When carrying out measurement, do not rotate output shaft otherwise the bearing will settle and the result of the measurement will be incorrect.

Determining size of shim

The specified bearing preload is achieved if a constant value for compression (0.20 mm) is added to the reading obtained (0.30 mm) and to the shim inserted (0.65 mm).

Example:

Shim inserted	0.65 mm
+ reading	0.30 mm
+ compression (constant value)	0.20 mm
Thickness of shim	1.15 mm



- ◀ - Remove output shaft and pull out outer race for small taper roller bearing.

A - Internal extractor 37 ... 46 mm, e.g. Kukko 21/6

B - Support, e.g. Kukko 22/2

The following shims are available:

Thickness (mm)	Part no.
0.65	020 311 391 P
0.70	020 311 391 Q
0.75	020 311 391
0.80	020 311 391 A
0.85	020 311 391 B
0.90	020 311 391 C
0.95	020 311 391 D
1.00	020 311 391 E
1.05	020 311 391 F
1.10	020 311 391 G
1.15	020 311 391 H
1.20	020 311 391 J
1.25	020 311 391 K
1.30	020 311 391 L
1.35	020 311 391 M
1.40	020 311 391 N

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

- Press in small tapered roller bearing outer race with determined shim (for example 1.15 mm) ⇒ page 35-12 and install input shaft.
- Tighten hexagon bolts for bearing support in the clutch housing with tightening torque.

Replacing flange shaft seals (gearbox installed)

Special tools, testers and aids required

- ◆ Setting tool MP 9-501
- ◆ Additional part MP 3-419/37
- ◆ Insertion sleeve MP 3-430
- ◆ Grease, e.g. G 052 142 A2
- Pay attention to general repair information
⇒ page 00-4.

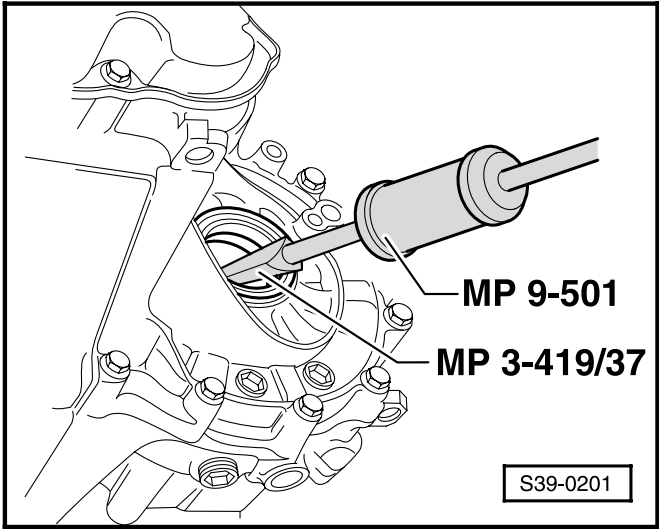
Removing

Right-hand seal

- Turn steering to full right lock.
- Take off protective cap for drive shaft at engine.

Continued for both drive shafts

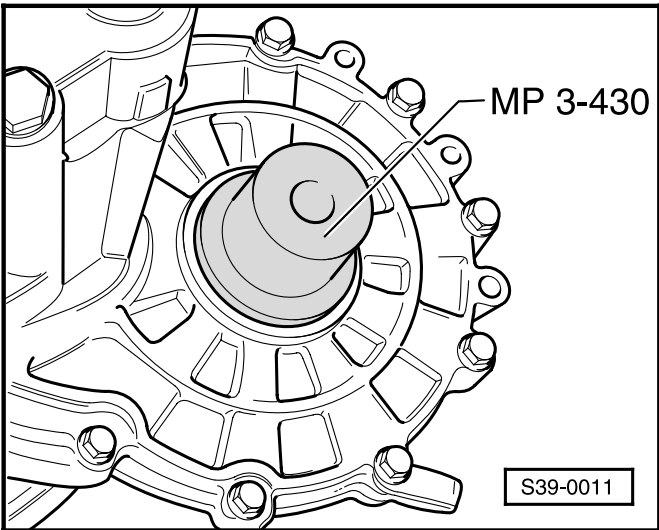
- Unbolt drive shaft from flange shaft.
- Tie up drive shaft as far as possible. Avoid damaging paintwork of drive shaft.
- Place drip tray below.
- Use 6 mm wrench socket (commercially available) to remove conical screw for flange shaft; secure with drift to prevent it turning.
- Pull out flange shaft with compression spring.



◀ - Pull out seal.

Notes:

- ♦ Do not damage sleeve otherwise risk of leaks.
- ♦ If sleeve is damaged, replace ⇒ page 34-48.



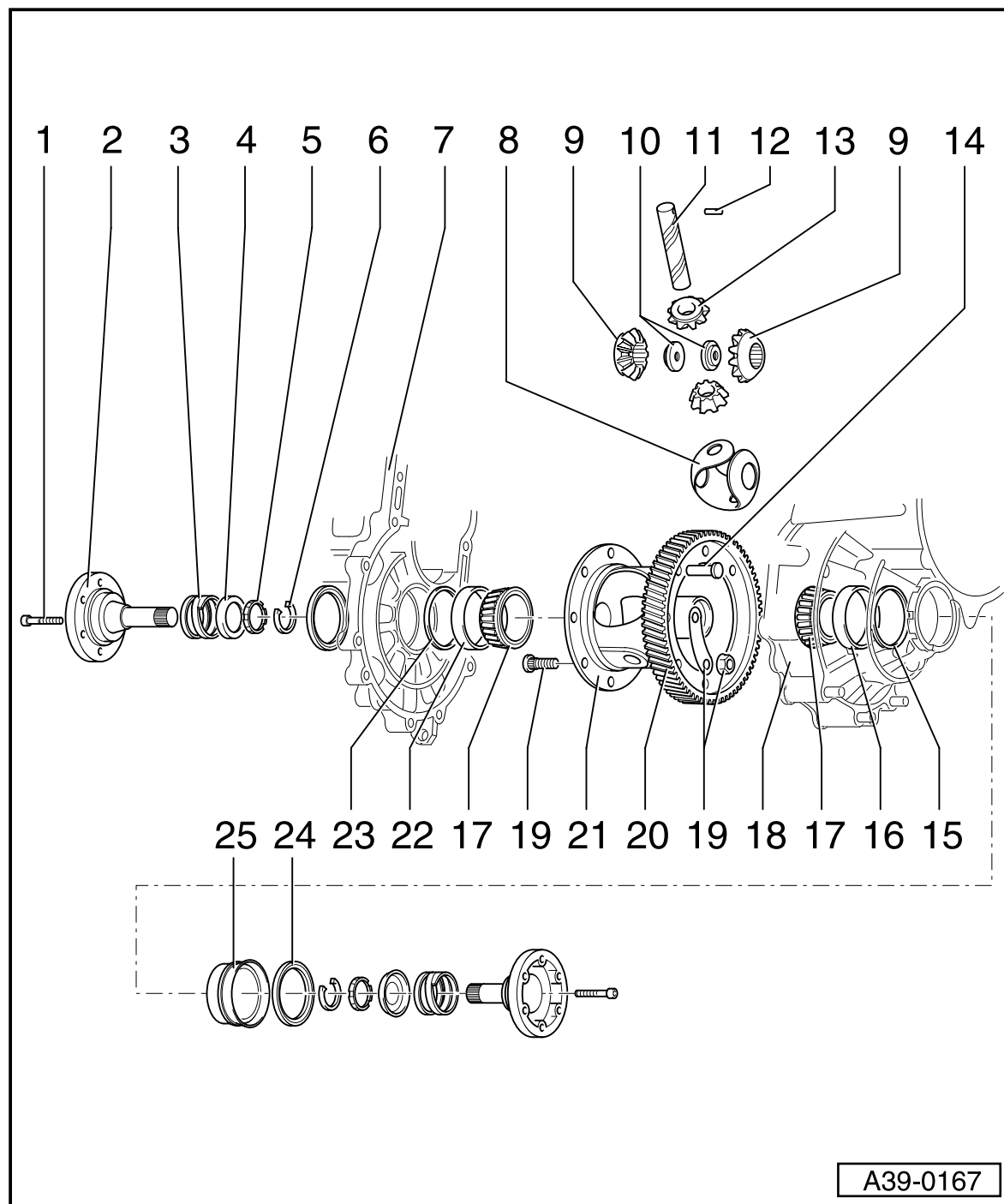
Installing

- ◀ - Knock in new seal until it abuts the sleeve; do not twist the seal.
- Pack space between sealing lip and dust lip with grease, e.g. G 052 142 A2.
 - Install flange shaft.
 - Bolt right drive shaft to flange shaft.
 - Screw on protective cap for drive shaft, if fitted.
 - Pour in gear oil ⇒ page 34-21.

Tightening torques

Flange shaft to gearbox	25 Nm
Protective cap of drive shaft to engine	35 Nm
Drive shaft to flange shaft ⇒ Running Gear; Repair Group 40	

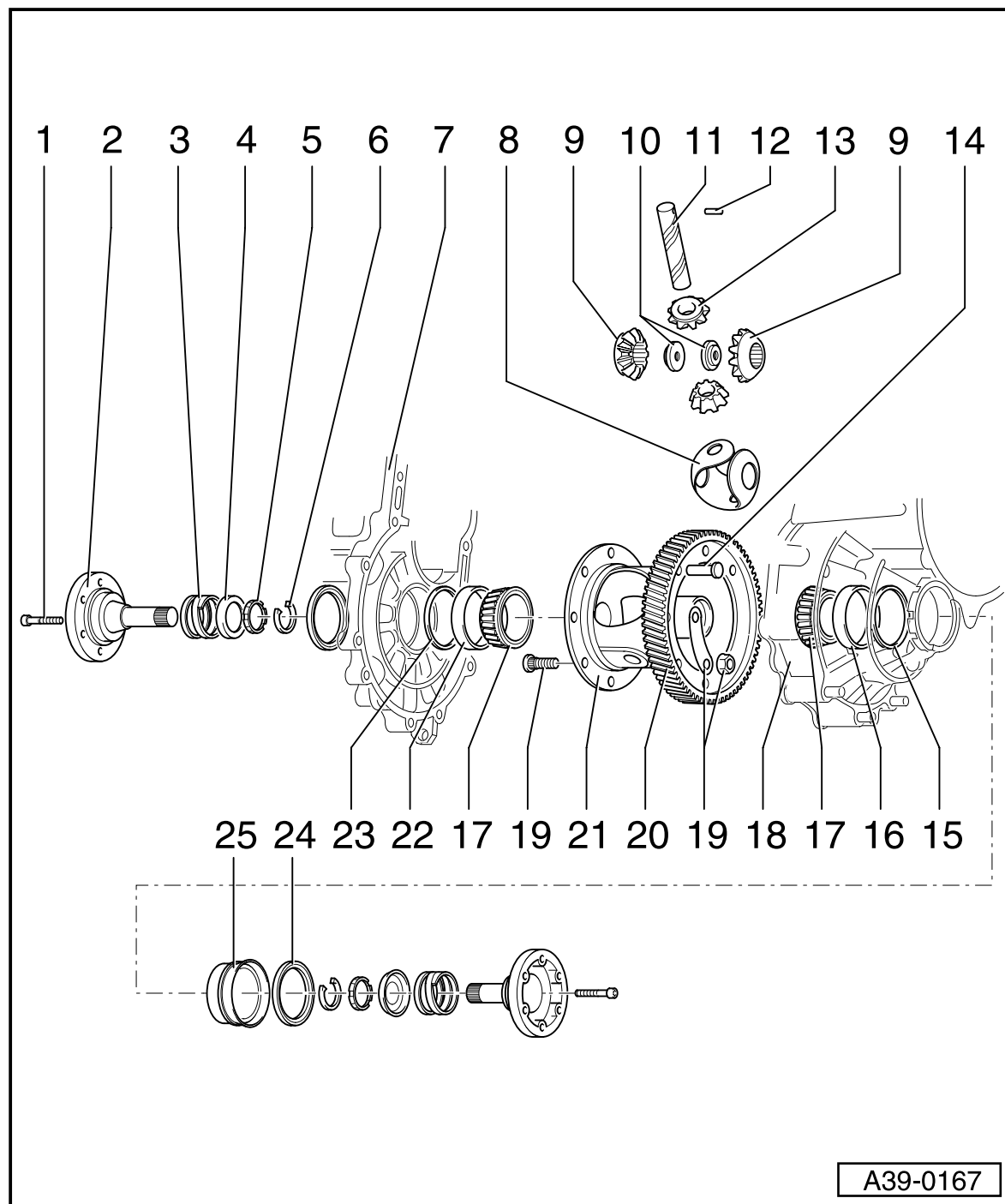
Disassembling and assembling differential



Special tools, testers and aids required

- ◆ Gearbox holder MP 3-501
- ◆ Drift MP 3-403
- ◆ Thrust piece MP 3-417
- ◆ Insertion drift MP 3-511
- ◆ Thrust piece MP 3-431
- ◆ (V.A.G 1582) and (V.A.G 1582/3)

- ◆ Plunger MP 3-448
- ◆ Thrust piece MP 3-411
- ◆ Pressure plate MP 3-406
- ◆ Pressure plate MP 3-407
- ◆ Insertion sleeve MP 3-412
- ◆ Thrust plate MP 3-413
- ◆ Drift MP 3-510

**Notes:**

- ♦ Heat inner race of taper roller bearing to 100 °C before installing.
- ♦ Always replace both taper roller bearings.
- ♦ When replacing the taper roller bearings, the differential housing, the gearbox housing and the clutch housing, set differential ⇒ page 39-11.

1 - Tapered screw, 25 Nm

- ♦ For attaching flange shaft with threaded piece (item 10)

2 - Flange shaft

- ♦ With hole for tapered screw
- ♦ Removing and installing
⇒ page 39-1

3 - Compression spring for flange shaft

- ♦ Installed behind flange shafts

4 - Guide plate

- ♦ Installed in combination with compression springs behind flange shafts
- ♦ Fitting location:
Collar faces toward compression spring; webs toward conical ring

5 - Spherical ring

- ◆ Installed behind flange shafts in combination with compression springs
- ◆ With slots for engaging with thrust washer
- ◆ Installation position: taper points toward differential housing

6 - Circlip

- ◆ Installed behind flange shafts in combination with compression springs
- ◆ Holds spherical ring, thrust washer and compression spring in position when flange shaft removed

7 - Gearbox housing**8 - Thrust washer assembly**

- ◆ Insert with gear oil

9 - Large differential bevel gear

- ◆ Installing ⇒ Fig. 13

10 - Threaded piece

- ◆ Installed behind flange shafts in combination with compression springs ⇒ Fig. 13

11 - Differential bevel gear shaft

- ◆ Use MP 3-510 for pressing off

12 - Roll pin

- ◆ For securing differential bevel gear shaft
- ◆ Removing and installing ⇒ Fig. 8

13 - Small differential bevel gear

- ◆ Installing ⇒ Fig. 13

14 - Rivet

- ◆ For attaching crown wheel to differential housing
- ◆ Drilling off ⇒ Fig. 7

15 - Shim S2

- ◆ 1 mm thick

16 - Taper roller bearing outer race

- ◆ Removing ⇒ Fig. 1; remove sleeve (item 24) first

17 - Taper roller bearing inner race

- ◆ Removing ⇒ Fig. 3
- ◆ Pressing on ⇒ Fig. 4

18 - Clutch housing**19 - Attachment kit**

- ◆ Only for Service Sector
- ◆ Installing ⇒ Fig. 12
- ◆ Hexagon nut, 65 Nm

20 - Final drive gear

- ◆ Riveted in series production
- ◆ Bolted ⇒ Fig. 12
- ◆ Heat to 100 °C before installing
- ◆ Pressing off ⇒ Fig. 9
- ◆ Installation position ⇒ Fig. 10
- ◆ Mount onto differential housing ⇒ Fig. 11
- ◆ Is matched with output shaft; always replace together

21 - Differential housing**22 - Taper roller bearing outer race**

- ◆ Removing ⇒ Fig. 5
- ◆ Inserting ⇒ Fig. 6

23 - Shim S1

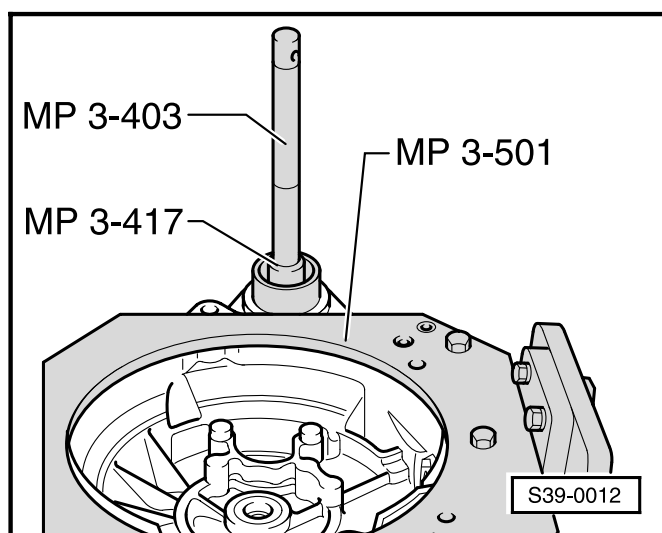
- ◆ Determining thickness ⇒ Page 39-12

24 - Seal

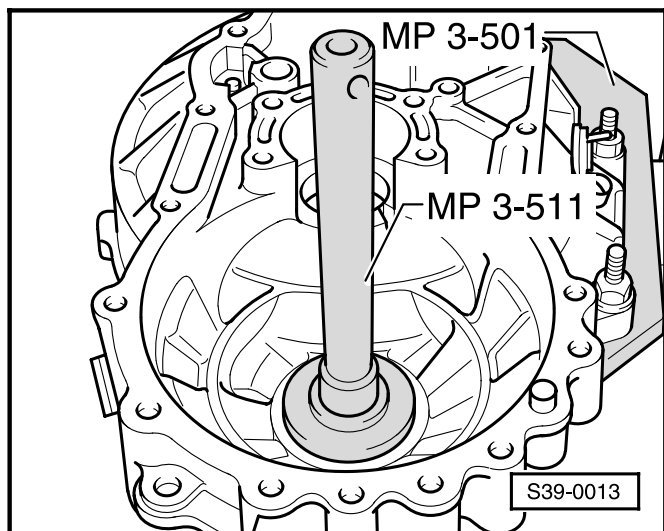
- ◆ Removing and installing ⇒ page 39-1

25 - Sleeve

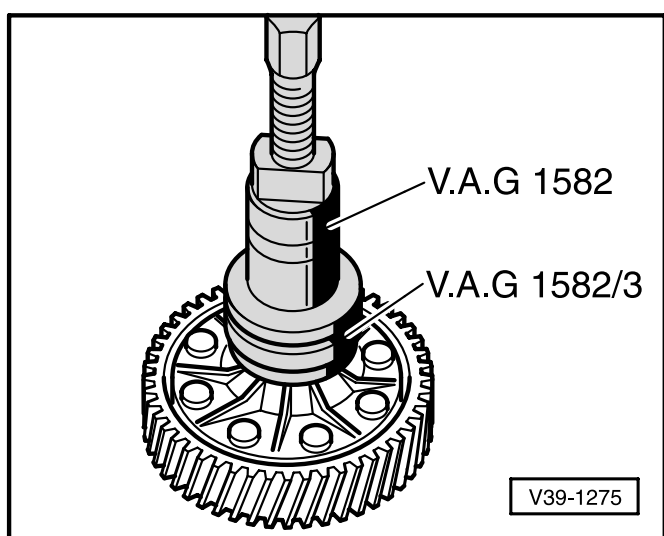
- ◆ Removing and installing ⇒ page 34-51



◀ Fig. 1 Knocking taper roller bearing outer race out of clutch housing



◀ Fig. 2 Driving tapered roller bearing outer race into the clutch housing

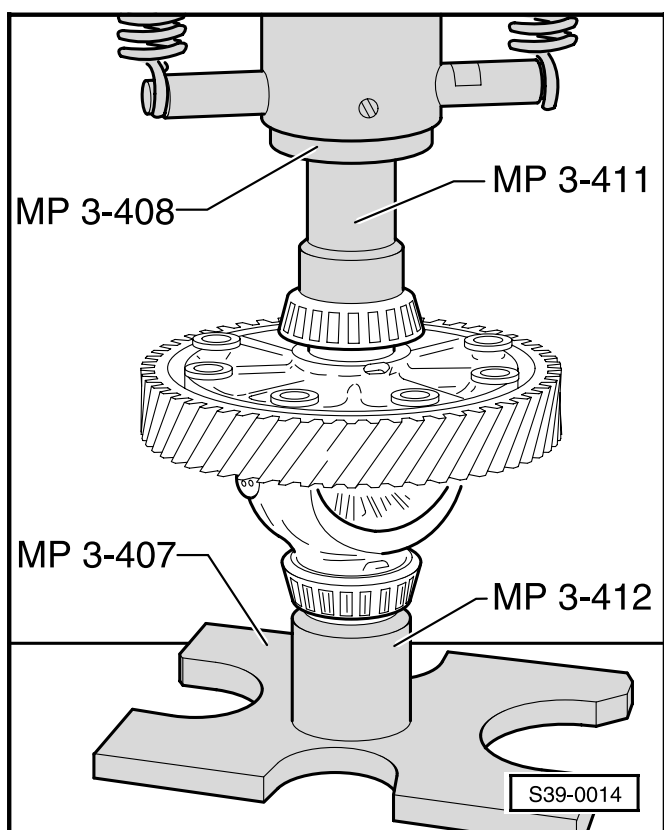


◀ Fig. 3 Pulling off tapered roller bearing inner race

- Before fitting the extractor position, place thrust plate MP 3-431 onto the differential housing.

Note:

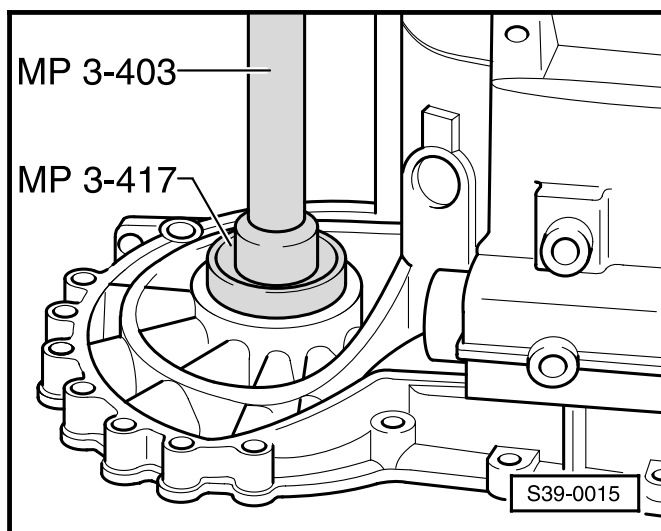
Both tapered roller bearings inner races are removed in the same way.



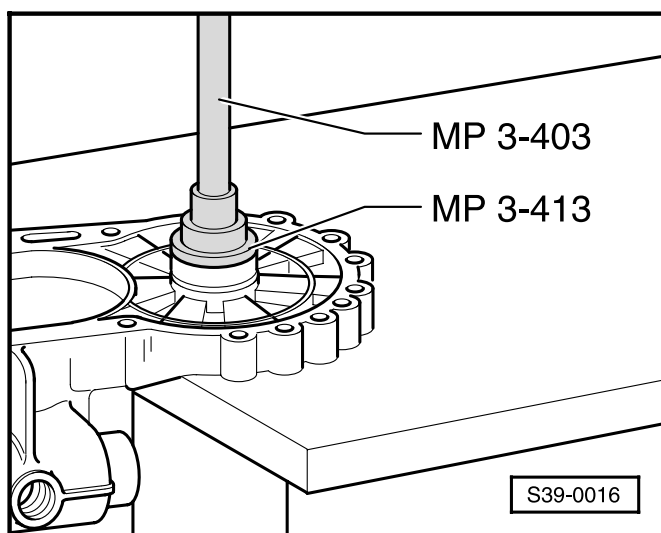
◀ Fig. 4 Pressing on tapered roller bearing inner race

Note:

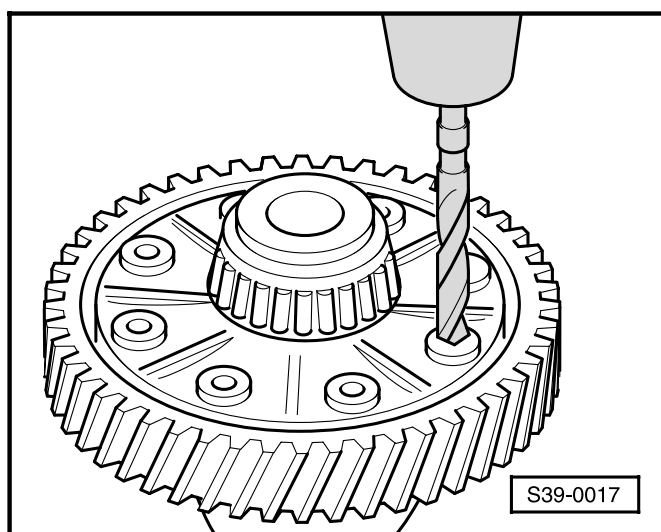
The tapered roller bearing inner race for the gearbox housing and clutch housing are pressed on with the same pressure tools.



◀ Fig. 5 Driving tapered roller bearing outer race out of the gearbox housing.



◀ Fig. 6 Driving tapered roller bearing outer race into the gearbox housing

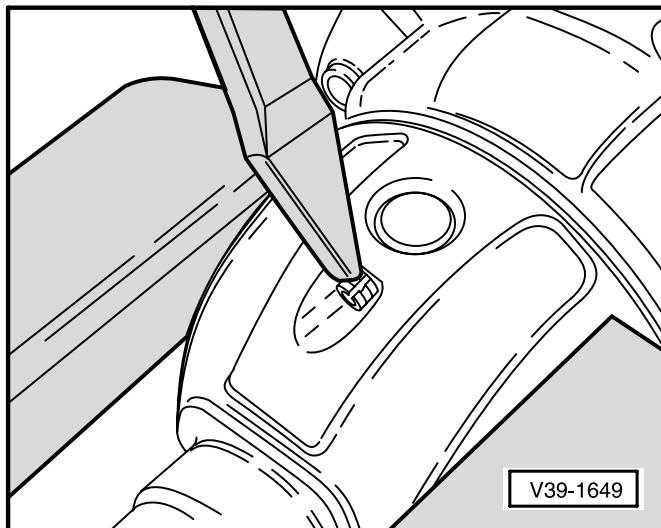


◀ Fig. 7 Bore out rivet heads

- Bore out the rivet heads on the sunken side with a 12 mm drill and drive out rivets with a drift.

Note:

Clean differential before and after drilling, protect tapered roller bearing from boring swarf.

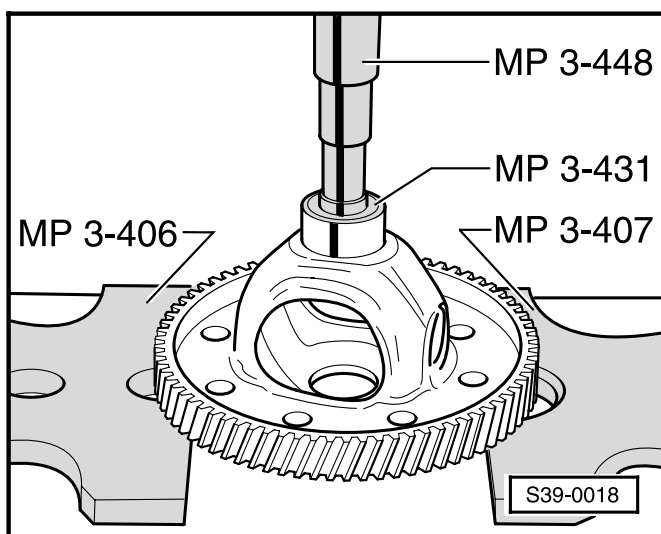


◀ Fig. 8 Removing and installing tensioning sleeve for differential bevel gear

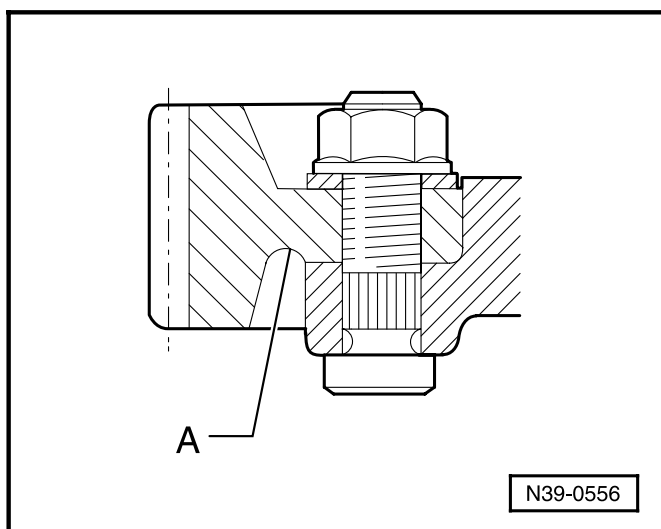
- Cover tapered roller bearing inner race and drive wheel for speedometer to avoid any possible damage and swarf.
- Drive out tensioning sleeve with a chisel, position the chisel in the circular slot.
- Press out differential bevel gear with MP 3-510.

Installing

- Drive into the differential housing as far as the stop.

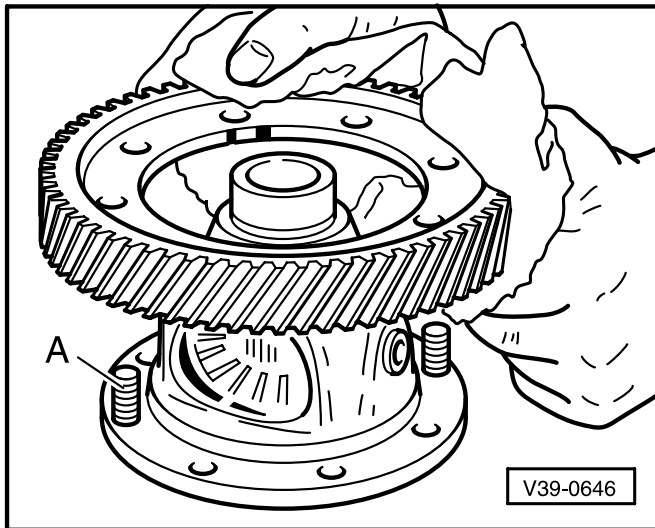


◀ Fig. 9 Pressing off pinion/final drive



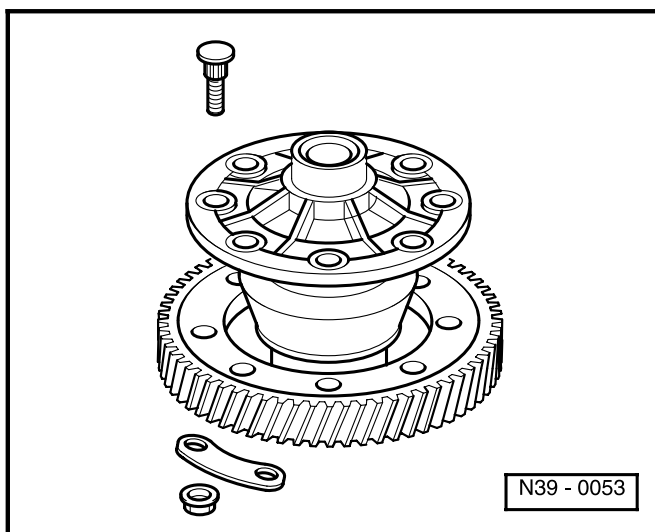
◀ Fig. 10 Fitting location of the pinion/final drive

- The circular slot -A- points to the screw-on surface of the differential housing.



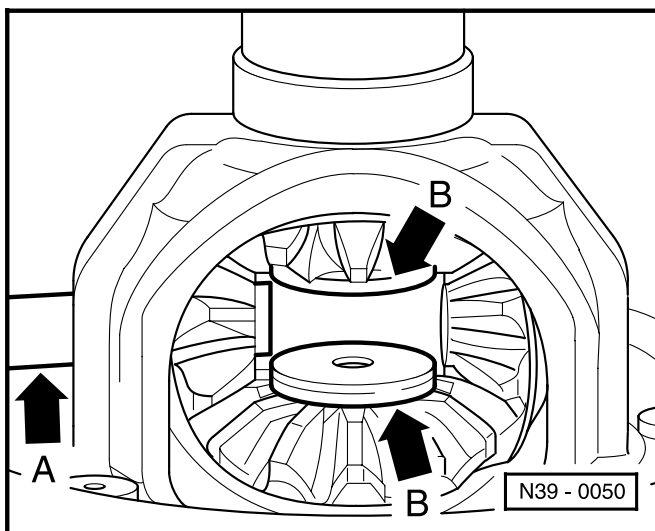
◀ Fig. 11 Heat up pinion/final drive to approx. 100 °C and install

- Guide the pinion/final drive when fitting with screws -A- from the repair kit for Gearbox 02K.



◀ Fig. 12 Screw pinion/final drive and differential housing

Use special screws with shims and nuts from the Spare Part catalogue.



◀ Fig. 13 Installing differential bevel gear

- Insert oil thrust washer compound with gear-box oil.
- Insert both large differential bevel gears and secure (e.g. with flange shaft).
- Insert both small differential bevel gears with a 180° offset and swivel into place.
- Press in differential bevel gear shaft arrow -A- as far as the first small differential bevel gear.
- Fit threaded pieces arrow -B- into large differential bevel gears.
Fitting location: shoulder points toward differential bevel gear.
- Knock in shaft for differential bevel gears fully into end position and secure with a new tensioning sleeve.

List of settings

Note:

When carrying out removal and installation work on the gearbox, it is only necessary to re-set the output shaft or differential if parts which directly affect the setting of the gearbox, are replaced. Pay attention to the table below to avoid unnecessary setting operations:

		Carry out setting of:	
		Output shaft ⇒ page 35-14	Differential (S1 and S2) ⇒ page 39-11
Parts replaced:	Gearbox housing		x
	Clutch housing	x	x
	Taper roller bearings for differential		x
	Output shaft (drive pinion assembly)	x	
	Differential housing		x
	Taper roller bearings for output shaft	x	

Setting differential

Special tools, testers and aids required

- ◆ Gearbox holder MP 3-501
- ◆ Impact drift MP 3-511
- ◆ Universal dial gauge holder MP 3-447
- ◆ End gauge plate MP 3-405/17
- ◆ Drift MP 3-403
- ◆ Thrust piece MP 3-417

It is necessary to re-set the differential if

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

or the

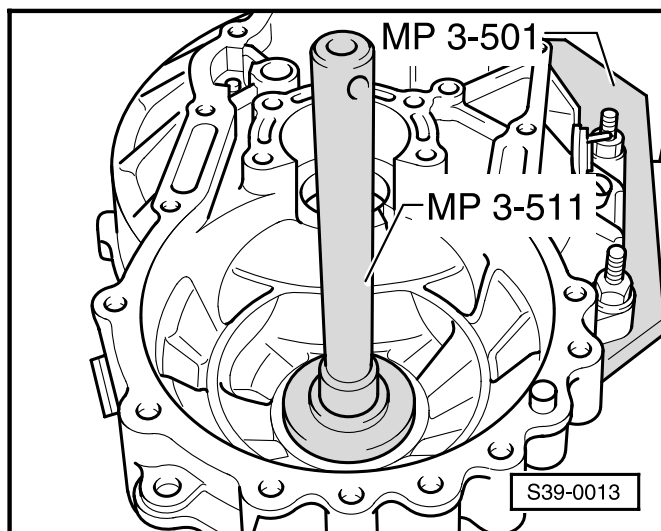
- ◆ taper roller bearings of the differential

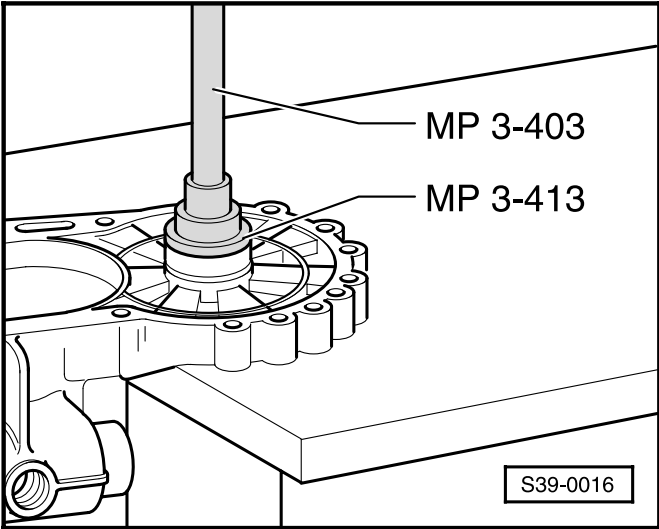
are replaced.

List of settings ⇒ page 39-10

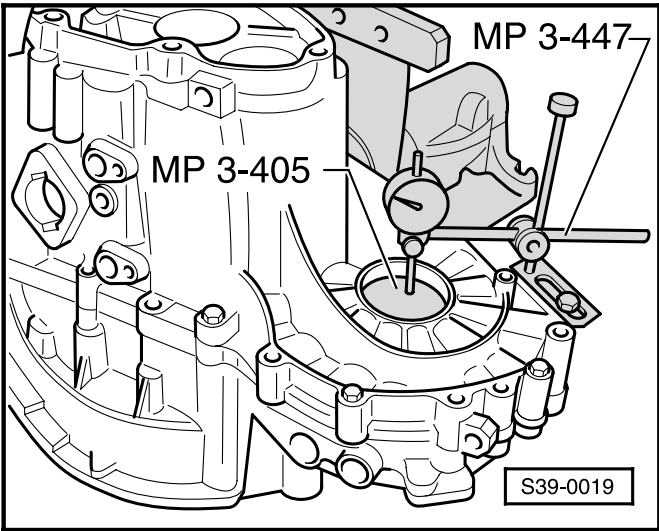
- ◀ - Press tapered roller bearing outer race with shim S2 (always 1 mm thickness) into the clutch housing.

The inner and outer races of the tapered roller bearings are paired. Do not interchange!





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



- ◀ - Install dial gauge and set to „0“ with a preload of 1 mm.
 - Move differential up and down, read off play on dial gauge and note.
- (Example: 0.90 mm)

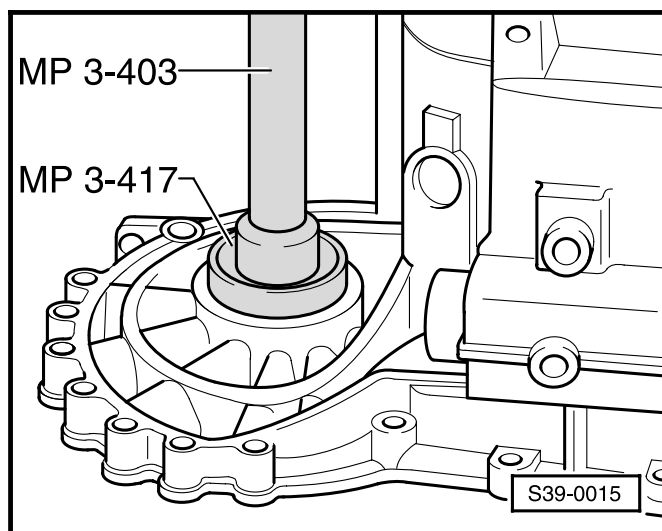
Note:
When carrying out measurement do not rotate the differential otherwise the bearings will settle and the result of the measurement will be incorrect.

Determining shim S1

The specified bearing preload is achieved if a constant value for compression (0.40 mm) is added to the reading obtained for S1 (example: 0.90 mm).

Example:

Reading	0.90 mm
+ compression (constant value)	0.40 mm
Thickness of shim S1 =	1.30 mm



- ◀ - Take off gearbox housing and knock outer race of taper roller bearing out of gearbox housing.
- Insert calculated thickness of shim S1; the thickest shim first.
- Re-insert outer race and bolt gearbox housing tight.

The following sizes of shims are available:

Thickness (mm)	Part No.
0.65	02K 409 210
0.70	02K 409 210 A
0.75	02K 409 210 B
0.80	02K 409 210 C
0.85	02K 409 210 D
0.90	02K 409 210 E
0.95	02K 409 210 F
1.00	02K 409 210 G
1.05	02K 409 210 H
1.10	02K 409 210 J
1.15	02K 409 210 K
1.20	02K 409 210 L
1.25	02K 409 210 M

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

If the thickness measured for the shim is greater than that listed in the table, it is also possible to install 2 shims equalling the reading obtained.

