

Workshop Manual OCTAVIA

5-Speed Manual Gearbox 02J

List of Supplements to OCTAVIA Workshop Manual

Edition: 08.02

5-Speed Manual Gearbox 02J

Replaces List of Supplements - Edition: 11.00

Supplement	Edition	Subject	Article Number
	08.96	Basic Edition of Workshop Manual	S00.5114.50.20
1	10.96	Supplement to Basic Edition	S00.5114.51.20
2	03.97	Modifications to Special Tools	S00.5114.52.20
3	07.97	Supplement with New Manual Gearbox Types	S00.5114.53.20
4	12.97	Two-Mass Flywheel	S00.5114.54.20
5	03.98	Supplement of New Manual Gearbox Type	S00.5114.55.20
6	09.98	Supplement of New Manual Gearbox Types	S00.5114.56.20
7	05.99	New Shift Mechanism	S00.5114.57.20
8	02.00	Modifications to Repair Groups 00, 34, 35, 39	S00.5114.58.20
9	11.00	Modifications to synchromesh of 1st gear	S00.5114.59.20
10	08.02	Removal of 5-Speed Manual Gearbox	S00.5114.60.20
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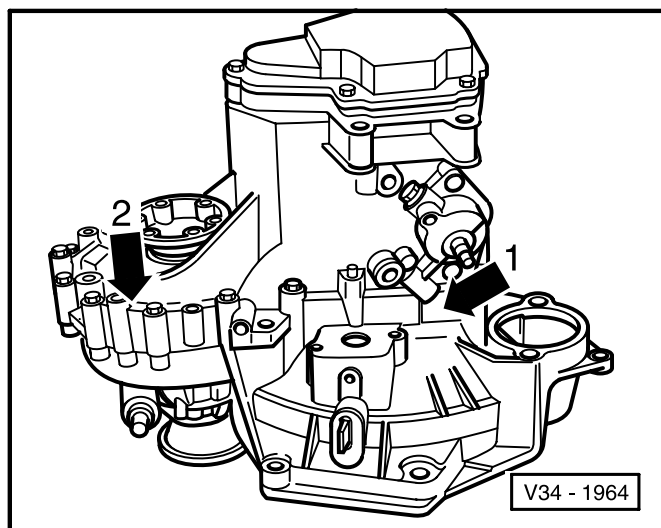
Identification of gearbox

Assignment ⇒ page 00-2.

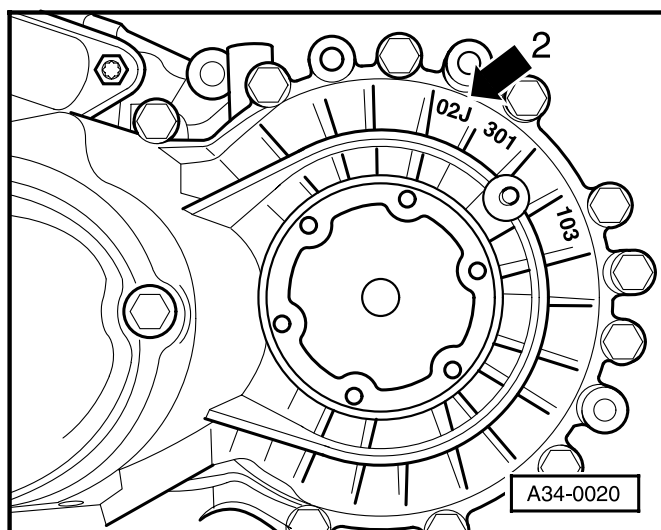
◀ Location on gearbox

Code letters and date of manufacture (arrow 1)

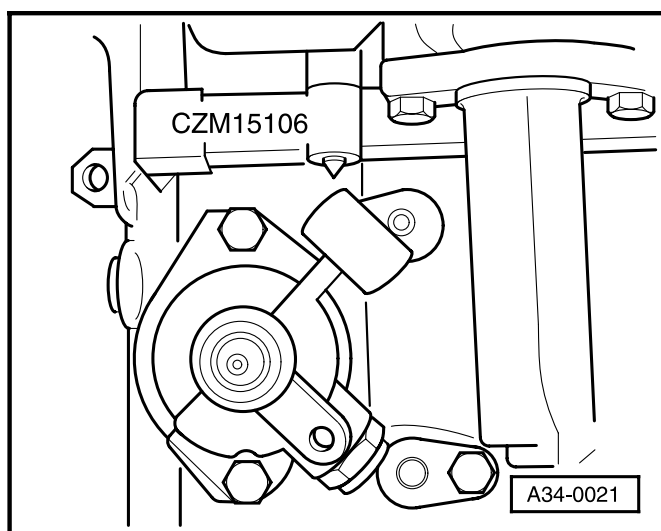
Manual gearbox 02J (arrow 2)



◀ Manual gearbox 02J (arrow 2)



◀ Code letters and date of manufacture of gearbox



Example:	CZM	15	10	6
	Code letters	Day	Month	Year (1996) of manufacture

Additional data are production-related.

Note:

The code letters of the gearbox are also listed in the data stickers of the vehicle.

Code letters, component assignment, ratios, capacities

Code letters		CZM	DTK	DBZ
Assignment:	Engine	1.8-ltr./92 kW	1.8-ltr./110 kW	1.8-ltr./110 kW
Ratio: Z ₂ :Z ₁	Final drive	72 : 17 = 4.235	70 : 19 = 3.684	70 : 19 = 3.684
	1st gear	33 : 10 = 3.300	33 : 10 = 3.300	33 : 10 = 3.300
	2nd gear	35 : 18 = 1.944	35 : 18 = 1.944	35 : 18 = 1.944
	3rd gear	34 : 26 = 1.308	34 : 26 = 1.308	34 : 26 = 1.308
	4th gear	35 : 34 = 1.029	35 : 34 = 1.029	35 : 34 = 1.029
	5th gear	36 : 43 = 0.837	36 : 43 = 0.837	36 : 43 = 0.837
	Reverse	17 : 10 x 36 : 20 = 3.060		
	Speedo	13 : 22 = 0.591		
Capacity		1.9 + 0.1 litres		
Specification		Gear oil G50 SAE 75W90 (synthetic oil)		
Engine oil change interval		filled for life		
Clutch control		hydraulic		
Clutch plate Ø		215 mm	219 mm (TMF) ¹⁾	
Drive shaft flange Ø		100 mm		

Code letters		ECW	ENJ	EBN
Assignment	Engine	1.8-ltr./110 kW	1.8-ltr./110 kW	1.8-ltr./110 kW
Ratio: $Z_2:Z_1$	Final drive	70 : 19 = 3.684	70 : 19 = 3.684	70 : 19 = 3.684
	1st gear	33 : 10 = 3.300	33 : 10 = 3.300	33 : 10 = 3.300
	2nd gear	35 : 18 = 1.944	35 : 18 = 1.944	35 : 18 = 1.944
	3rd gear	34 : 26 = 1.308	34 : 26 = 1.308	34 : 26 = 1.308
	4th gear	35 : 34 = 1.029	35 : 34 = 1.029	35 : 34 = 1.029
	5th gear	36 : 43 = 0.837	36 : 43 = 0.837	36 : 43 = 0.837
	Reverse	17 : 10 x 36 : 20 = 3.060		
	Speedo	13 : 22 = 0.591		
Capacity		1.9 + 0.1 litres		
Specification		Gear oil G51 SAE 75W90 (synthetic oil)	Gear oil G50 SAE 75W90 (synthetic oil)	Gear oil G51 SAE 75W90 (synthetic oil)
Engine oil change interval		filled for life		
Clutch control		hydraulic		
Clutch plate $\varnothing$		219 mm (TMF) ¹⁾		
Drive shaft flange $\varnothing$		108 mm		

1) 08.97 ► TMF = two-mass flywheel

Code letters		EGY ²⁾	EVS ²⁾	EHA ²⁾
Assignment:	Engine	1.8-ltr./110 kW		1.8-ltr./132 kW
Ratio: Z ₂ :Z ₁	Final drive	70 : 19 = 3.684	70 : 19 = 3.684	62 : 17 = 3.647
	1st gear	33 : 10 = 3.300	33 : 10 = 3.300	33 : 10 = 3.300
	2nd gear	35 : 18 = 1.944	35 : 18 = 1.944	35 : 18 = 1.944
	3rd gear	34 : 26 = 1.308	34 : 26 = 1.308	34 : 26 = 1.308
	4th gear	35 : 34 = 1.029	35 : 34 = 1.029	30 : 29 = 1.034
	5th gear	36 : 43 = 0.837	36 : 43 = 0.837	31 : 37 = 0.838
	Reverse	17 : 10 x 36 : 20 = 3.060		
	Speedo	13 : 22 = 0.591		
Capacity		1.9 + 0.1 litres		
Specification		Gear oil G51 SAE 75W90 (synthetic oil)	Gear oil G50 SAE 75W90 (synthetic oil)	
Gear oil change interval		filled for life		
Clutch mechanism		hydraulic		
Clutch plate Ø		225 mm (TMF) ¹⁾		
Drive shaft flange Ø		108 mm		

Code letters		EMR	EGU ²⁾	CZL
Assignment:	Engine	2.0-ltr./85 kW		1.9-ltr./66 kW TDI
Ratio: $Z_2:Z_1$	Final drive	71 : 18 = 3.994	71 : 18 = 3.994	62 : 17 = 3.647
	1st gear	33 : 10 = 3.300	33 : 10 = 3.300	33 : 10 = 3.300
	2nd gear	35 : 18 = 1.944	35 : 18 = 1.944	35 : 18 = 1.944
	3rd gear	34 : 26 = 1.308	34 : 26 = 1.308	34 : 26 = 1.308
	4th gear	35 : 34 = 1.029	35 : 34 = 1.029	33 : 36 = 0.917
	5th gear	36 : 43 = 0.837	36 : 43 = 0.837	33 : 46 = 0.717
	Reverse	17 : 10 x 36 : 20 = 3.060		
	Speedo	13 : 22 = 0.591		
Capacity		1.9 + 0.1 litres		
Specification		Gear oil G50 SAE 75W90 (synthetic oil)		
Gear oil change interval		filled for life		
Clutch mechanism		hydraulic		
Clutch plate Ø		215 mm		228 mm
Drive shaft flange Ø		100 mm		

1) TMF = two-mass flywheel

2) Gearbox with modified synchromesh for 1st gear

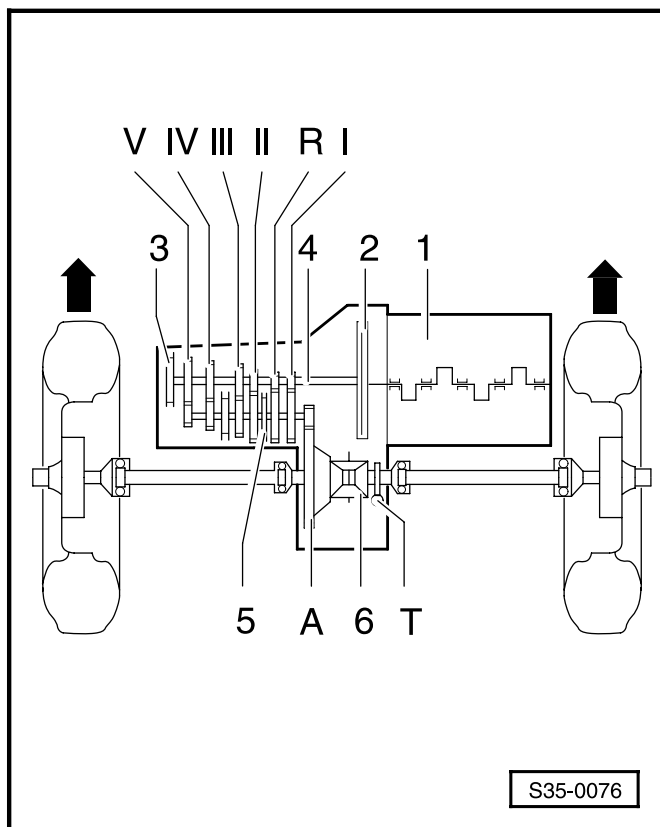
Code letters		DQY	EBJ	EGR ²⁾
Assignment:	Engine	1.9-ltr./66 kW TDI		
Ratio: $Z_2:Z_1$	Final drive	61 : 18 = 3.389	61 : 18 = 3.389	61 : 18 = 3.389
	1st gear	34 : 09 = 3.778	34 : 09 = 3.778	34 : 09 = 3.778
	2nd gear	36 : 17 = 2.118	36 : 17 = 2.118	36 : 17 = 2.118
	3rd gear	34 : 25 = 1.360	34 : 25 = 1.360	34 : 25 = 1.360
	4th gear	34 : 35 = 0.971	34 : 35 = 0.971	34 : 35 = 0.971
	5th gear	34 : 45 = 0.756	34 : 45 = 0.756	34 : 45 = 0.756
	Reverse	18 : 09 x 36 : 20 = 3.600		
	Speedo	13 : 22 = 0.591		
Capacity		1.9 + 0.1 litres		
Specification		Gear oil G50 SAE 75W90 (synthetic oil)		
Gear oil change interval		filled for life		
Clutch mechanism		hydraulic		
Clutch plate $\varnothing$		228 mm (219 mm TMF) ¹⁾	219 mm (TMF)	225 mm (TMF)
Drive shaft flange $\varnothing$		100 mm		

Code letters		DEA	EBF	EGS ²⁾
Assignment	Engine	1.9-ltr./81 kW TDI		
Ratio: $Z_2:Z_1$	Final drive	61 : 18 = 3.389	61 : 18 = 3.389	61 : 18 = 3.389
	1st gear	34 : 9 = 3.778	34 : 9 = 3.778	34 : 9 = 3.778
	2nd gear	33 : 16 = 2.063	33 : 16 = 2.063	33 : 16 = 2.063
	3rd gear	31 : 23 = 1.348	31 : 23 = 1.348	31 : 23 = 1.348
	4th gear	29 : 30 = 0.967	29 : 30 = 0.967	29 : 30 = 0.967
	5th gear	30 : 39 = 0.769	30 : 39 = 0.769	30 : 39 = 0.769
	Reverse	18 : 09 x 36 : 20 = 3.600		
	Speedo	13 : 22 = 0.591		
Capacity		1.9 + 0.1 litres		
Specification		Gear oil G50 SAE 75W90 (synthetic oil)		
Gear oil change interval		filled for life		
Clutch mechanism		hydraulic		
Clutch plate $\varnothing$		219 mm (TMF)		225 mm (TMF)
Drive shaft flange $\varnothing$		100 mm		

¹⁾ 08.97 ► TMF = two-mass flywheel

²⁾ Gearbox with modified synchromesh for 1st gear

Survey of power transmission



Designation

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

Arrows face 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 - Speedometer drive

General repair information

Scrupulous care and cleanliness, as well as proper tools are essential requirements for carrying out proper and successful gearbox repairs. The generally valid basic rules of safety naturally also apply when carrying out repair work.

A number of generally applicable notes for individual repair operations - which are otherwise listed several times at many points through the Workshop Manual - are summarised here. They apply to this Workshop Manual.

Gearbox

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

Gaskets, seals

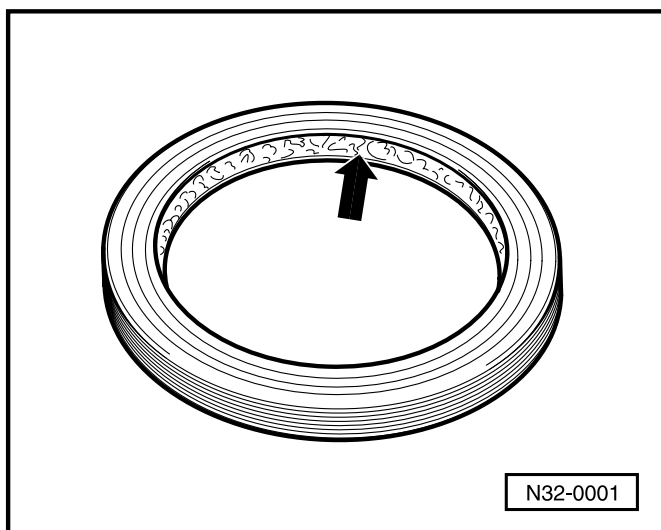
- ◆ Thoroughly clean the contact surfaces and apply sealant AMV 188 200 03.
- ◆ Apply an even film of sealant - not too thick.
- ◆ Replace O-rings.
- ◆ Replace radial shaft seals.

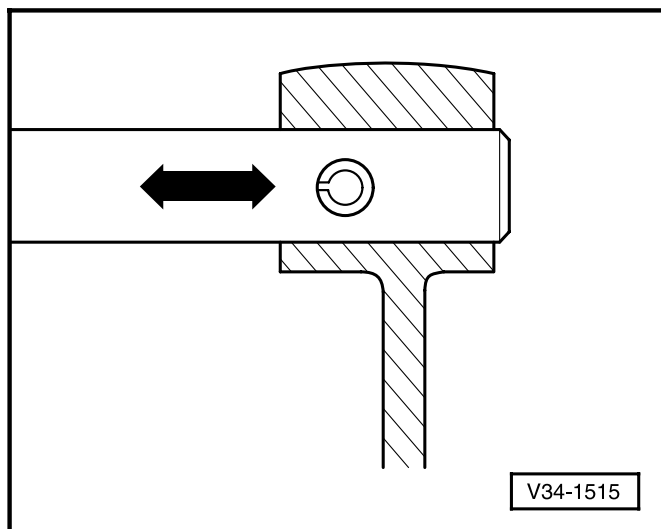
Before installing:

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

After installing:

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



**Locking elements**

- ◆ Replace circlips.
- ◆ Do not over-tension circlips.
- ◆ Circlips must be positioned in the base of the groove.
- ◆ Replace tensioning sleeves.
Fitting location: slot parallel to direction of force.

Nuts, bolts

- ◆ Slacken and tighten nuts and bolts for attaching covers and housings diagonally opposite.
- ◆ Do not twist particularly sensitive parts - e.g. clutch pressure plates - and slacken and tighten in stages diagonally opposite.
- ◆ The tightening torque's stated apply to uncoiled nuts and bolts.
- ◆ Always replace self-locking nuts and bolts.

Bearings

- ◆ *Do not treat new taper roller bearings for the output shaft and differential additionally with gear oil in order to measure the friction torque. The bearings are already factory-treated with a special oil for this purpose.*
- ◆ Insert all bearings in the gearbox with gear oil.
- ◆ Always replace all the taper roller bearings which are fitted to a shaft. Use the same makes, if possible.
- ◆ Heat inner races to about 100 °C for installing.
- ◆ Do not mix up the outer and inner races of bearings of equal size. Bearings are matched.
- ◆ Position the inscribed side of the needle bearing (larger metal thickness) facing toward the insertion drift.

Shims

- ◆ Re-gauge shims at several points with a micrometer. The different tolerances make it possible to exactly gauge the required thickness of shim.
- ◆ Inspect the shims for burrs or damage.
- ◆ Only install shims which are in proper condition.

Synchroniser rings

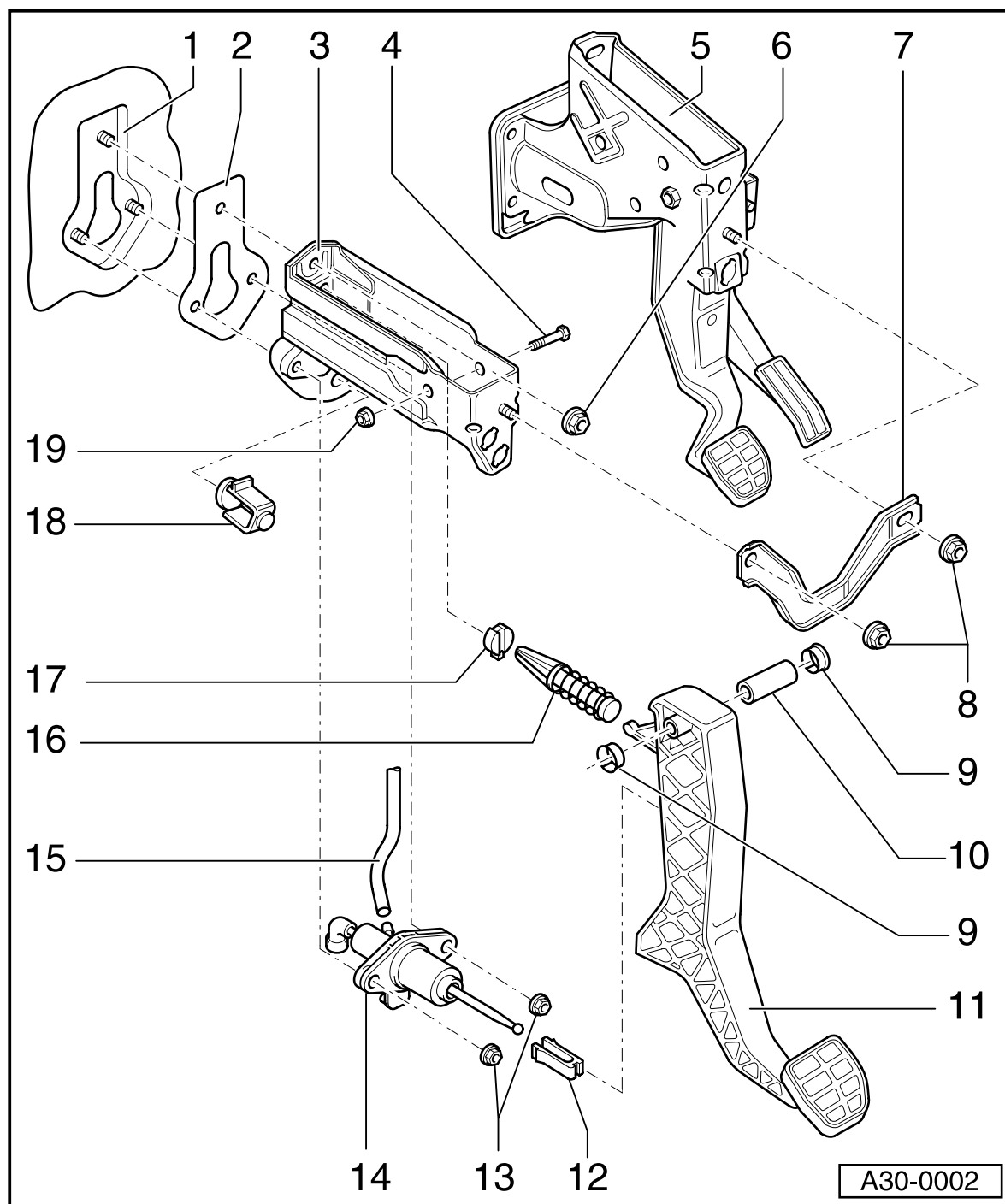
- ◆ Do not mix up. Assign synchroniser rings to the same gearwheel when re-using.
- ◆ Inspect for signs of wear; replace if necessary.
- ◆ Insert with gear oil.

Gearwheels

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

Servicing clutch mechanism

List of pedal assembly components



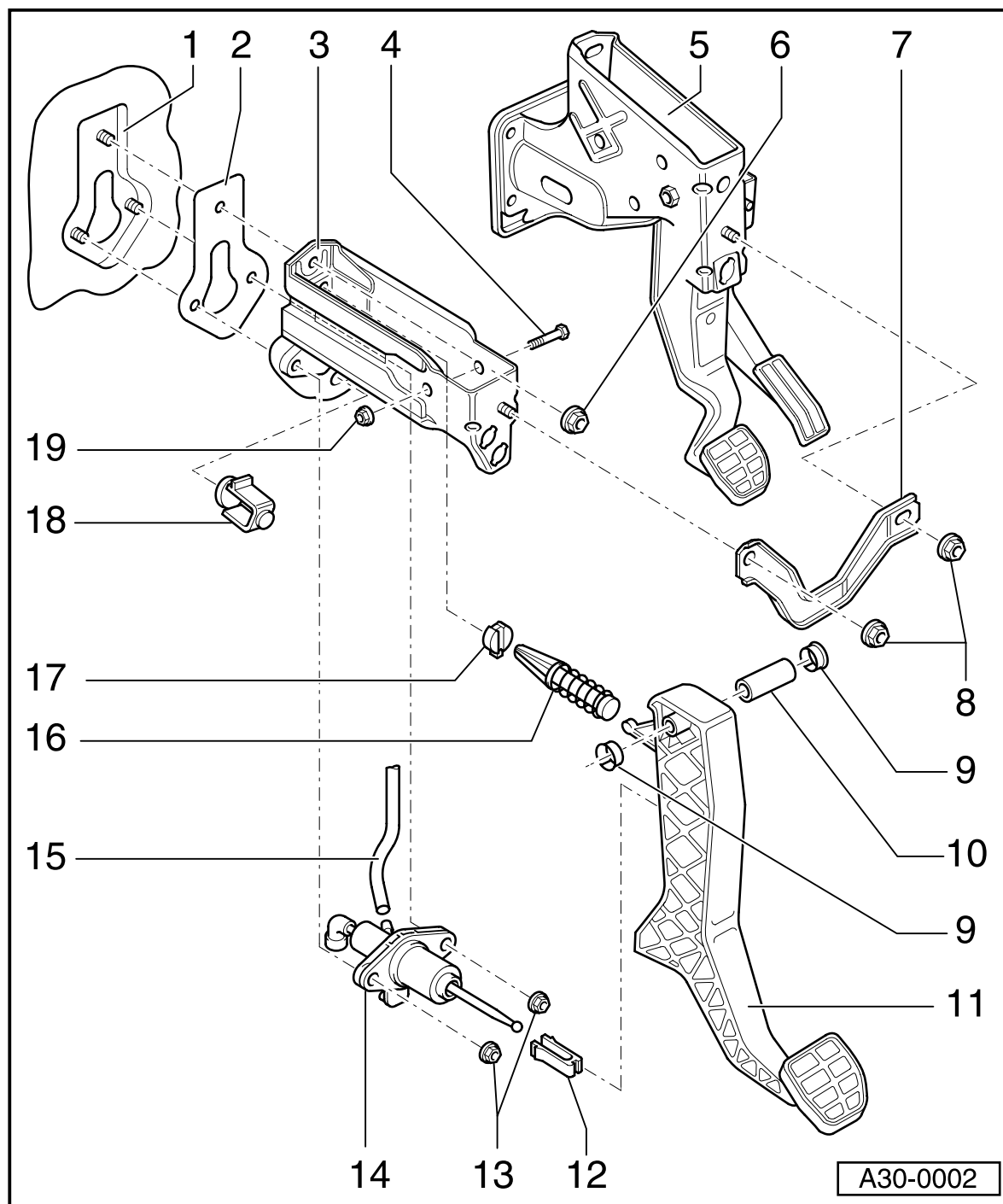
Special tools, testers and aids required

- ◆ Polycarbamide grease G 052 142 A2

Notes:

- ◆ List of components of hydraulic system
⇒ page 30-5

- ◆ Disconnect earth strap from the battery.
- ◆ Pay attention to the code of the radio set on models fitted with coded radio.
- ◆ Grease all bearing and contact surfaces with polycarbamide grease G 052 142 A2.
- ◆ Remove the shelf on the driver's side before carrying out work on the pedal assembly:
⇒ General Body Repairs; Repair Group 70; Removing and installing dash panel.

**1 - Bulk head 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 ⇒ page 30-4

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 - Overcentre spring**

- ◆ Removing and installing ⇒ page 30-3

17 - Mounting of overcentre spring

- ◆ Insert in bearing bracket
- ◆ Always replace

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

- ◆ Always replace

Removing and installing overcentre spring (LHD models)**Special tools, testers and aids required**

- ◆ Assembly clamp 3317

Removing

- Remove stowage area in bottom left of driver's side:
⇒ General Body Repairs; Repair Group 70; Removing and installing dash panel.
- ◀ - Tension overcentre spring with the clutch pedal and press on assembly clamp 3317 from above.

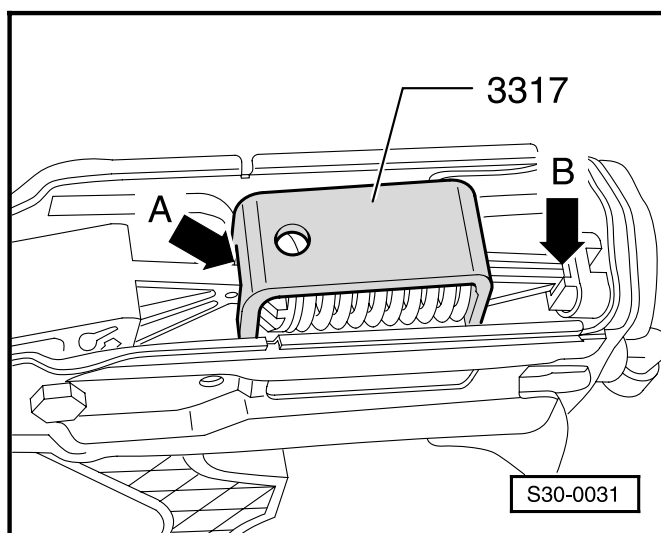
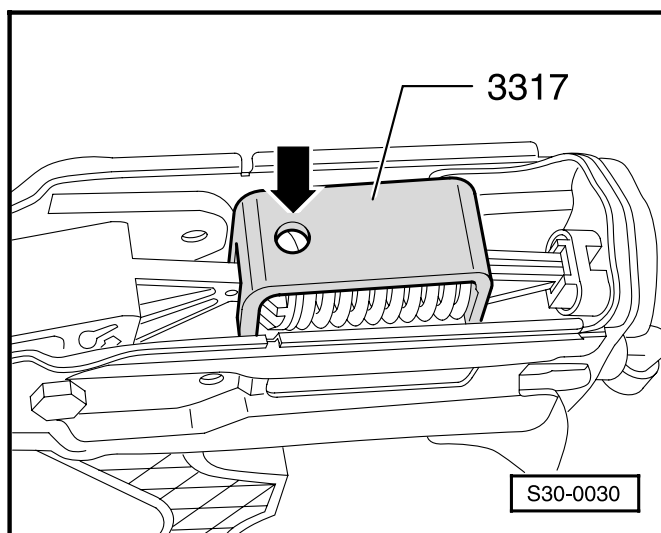
Note:

The hole (arrow) faces toward clutch pedal.

- Move clutch pedal into rest position and take off overcentre spring together with assembly clamp 3317.

Installing

- Move clutch pedal into rest position.
- ◀ - First of all fit on overcentre spring in the overcentre spring mounting -B-, then depress clutch pedal until the mounting journal of the clutch pedal -A- is resting against the overcentre spring.
- Tension overcentre spring with the clutch pedal and remove assembly clamp 3317.



Removing and installing over-centre spring (RHD models)

Removing

- Remove shelf on bottom left of driver's side:
⇒ General Body Repairs; Repair Group 70;
Removing and installing dash panel
- Position screwdriver between clutch pedal and over-centre spring.
- ◀ - Operate clutch pedal and lift over-centre spring off pedal in direction of arrow.

Installing

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

- Depress clutch pedal.
- Insert over-centre spring in mounting of over-centre spring and press onto the stud of the clutch pedal.

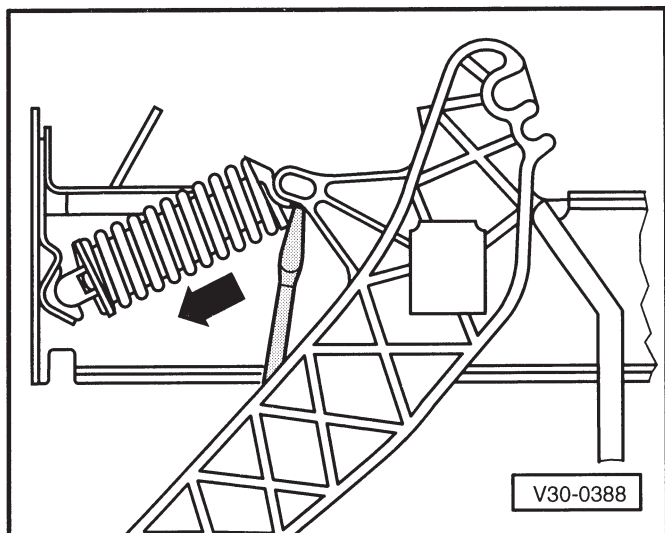
Removing and installing clutch pedal (LHD models)

Removing

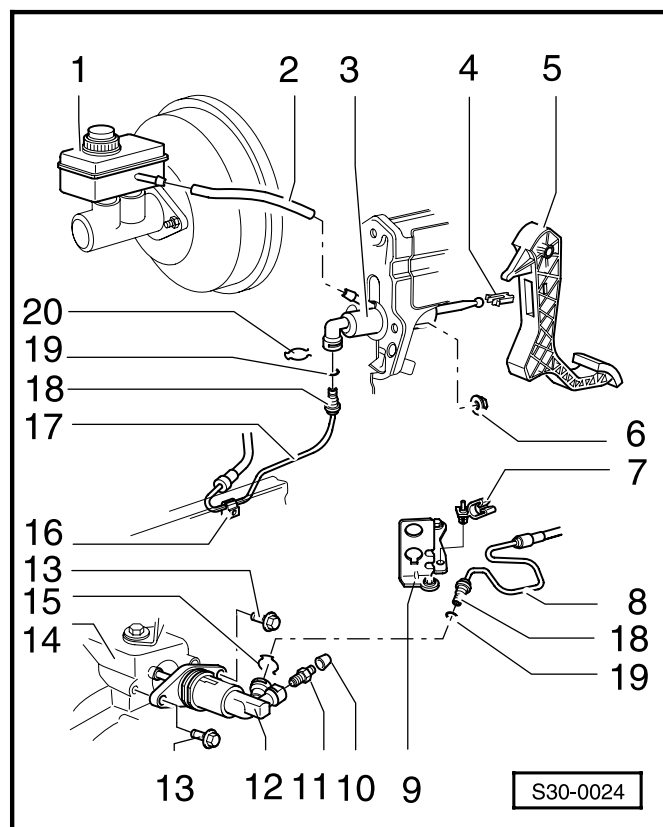
- Remove over-centre spring ⇒ page 30-3.
- Separate clutch pedal from master cylinder ⇒ page 30-6 and press operating rod toward engine compartment as far as the stop.
- Unscrew hexagon nut ⇒ item 19, page 30-3.
- Pull hexagon bolt out of bearing bracket ⇒ item 4, page 30-2.
- Take off clutch pedal.

Installing

Installation is performed in the reverse order.



Survey of components of hydraulic system



1 - Brake fluid reservoir

2 - Feed hose

3 - Master cylinder

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

4 - Mount

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

5 - Clutch pedal

- ♦ Removing and installing on left-hand drive models ⇒ page 30-4

6 - Self-locking hexagon nut, 25 Nm

- ♦ Always replace

7 - Bracket

- ♦ Attach to supporting bracket item 9

8 - Pipe-hose line

- ♦ Refer to parts list for assigning to LHD and RHD models

9 - Support bracket

10 - Dust cap

11 - Bleeder valve

- ♦ Bleeding clutch system ⇒ page 30-8

12 - Slave cylinder

- ♦ Can be removed without taking off shift mechanism parts

13 - Collar bolt, 25 Nm

14 - Gearbox

15 - Securing clip

- ♦ Removing ⇒ page 30-6

16 - Clip

- ♦ Attach to body

17 - Pipe-hose line

- ♦ Refer to parts list for assigning to LHD and RHD models

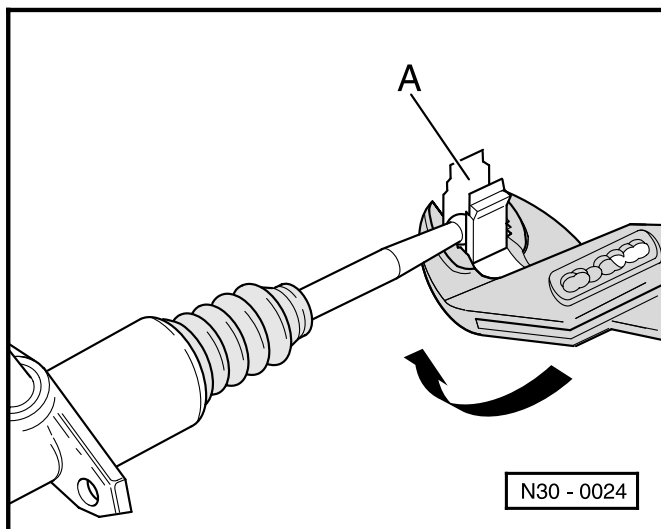
18 - Pipe connection/Plug connection

19 - O-rings

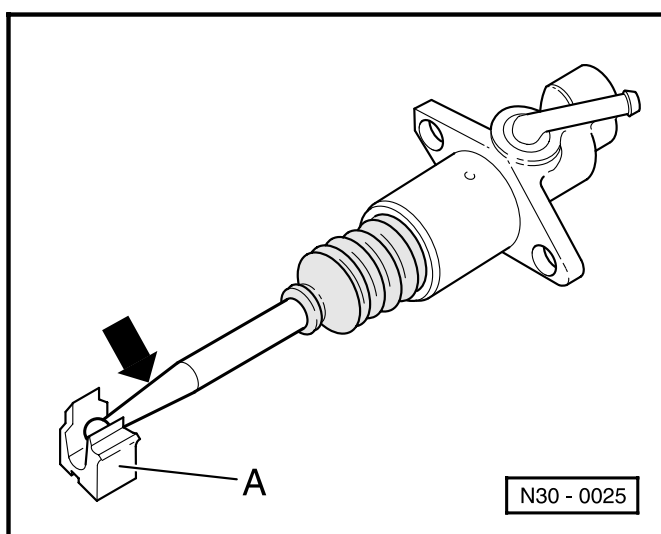
- ♦ Cannot be replaced
- ♦ If O-ring damaged, pipe-hose line has to be replaced complete

20 - Securing clip

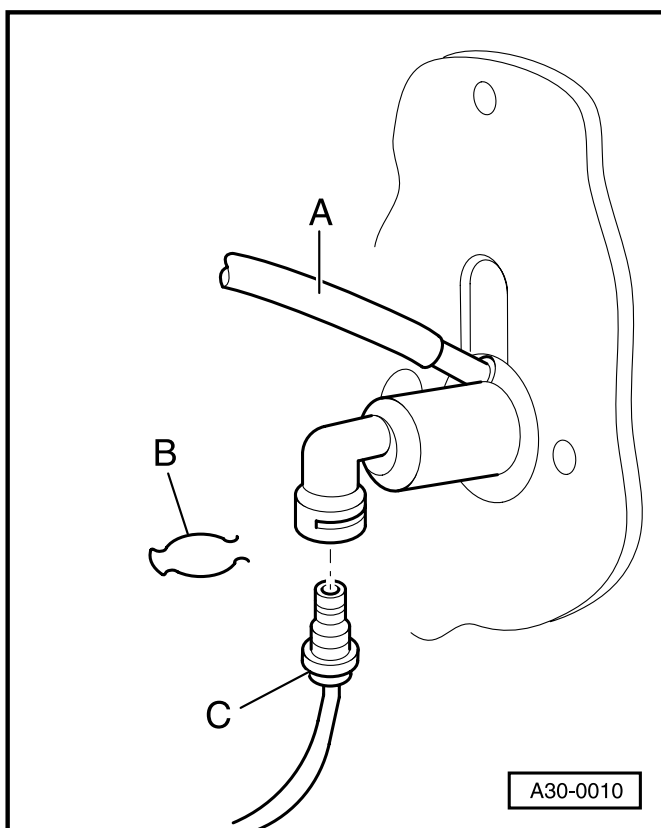
- ♦ Removing ⇒ page 30-6



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



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



Removing and installing master cylinder

Special tools, testers and aids required

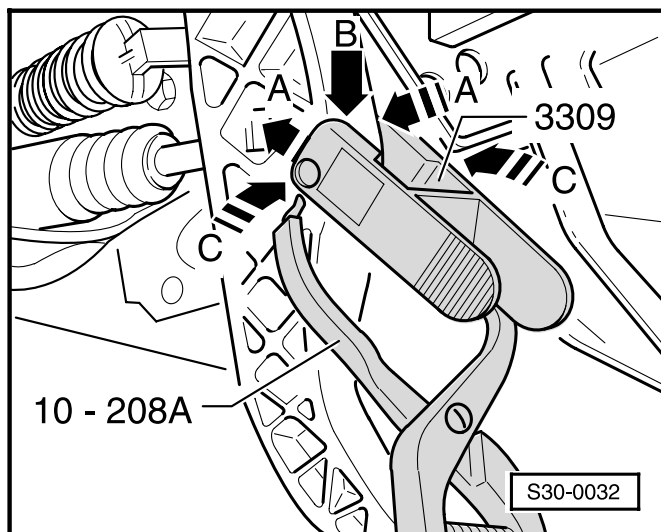
- ◆ Release tool 3309
- ◆ Pliers 10-208 A

Removing

Note:

Unbolt master cylinder from the passenger compartment.

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



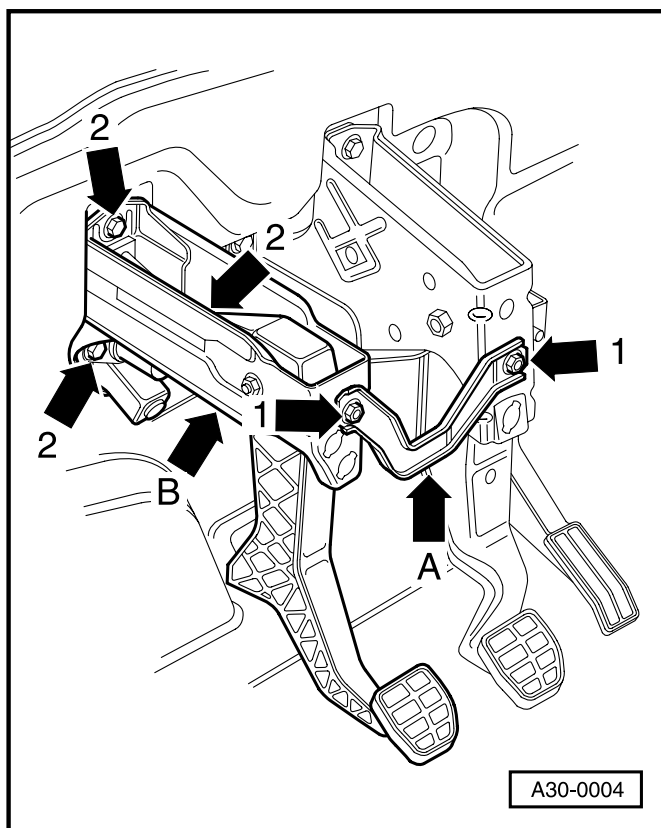
- Remove stowage area in bottom left of driver's side:
⇒ General Body Repairs; Repair Group 70; Removing and installing dash panel.

Note:

The clutch pedal assembly is removed complete in order to take out the master cylinder. The master cylinder has to be separated from the clutch pedal first of all, however, before removing.

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

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



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

Installing

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

- ◀ - The support -A- must be located on the actuator rod -B- of the master cylinder.
- To click in the support push the clutch pedal toward the front wall (in direction of arrow) and make sure it catches correctly.
- After installing the master cylinder bleed the clutch system ⇒ page 30-8.

Bleeding the clutch system

Special tools, testers and aids required

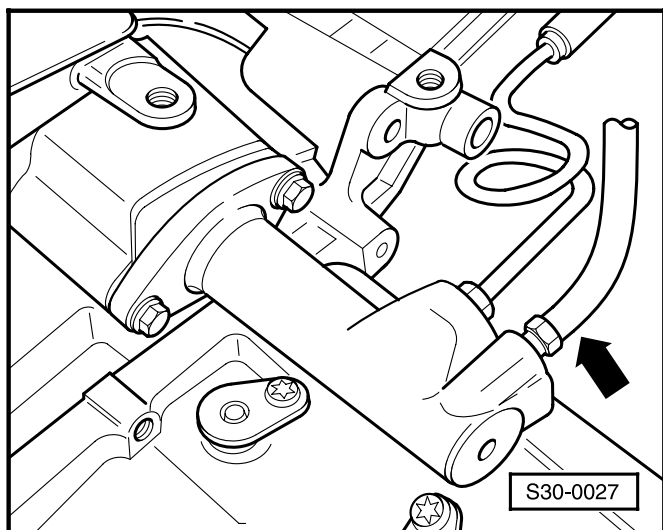
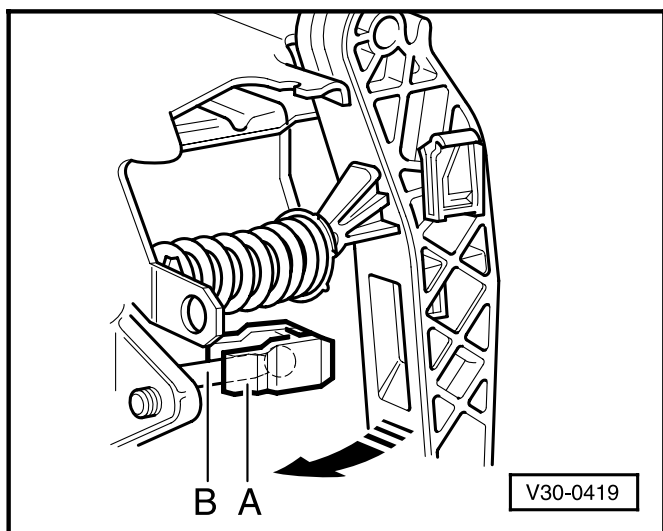
- ♦ Brake filling and bleeding device Romess S15

- ♦ Bleeder hose 670 mm

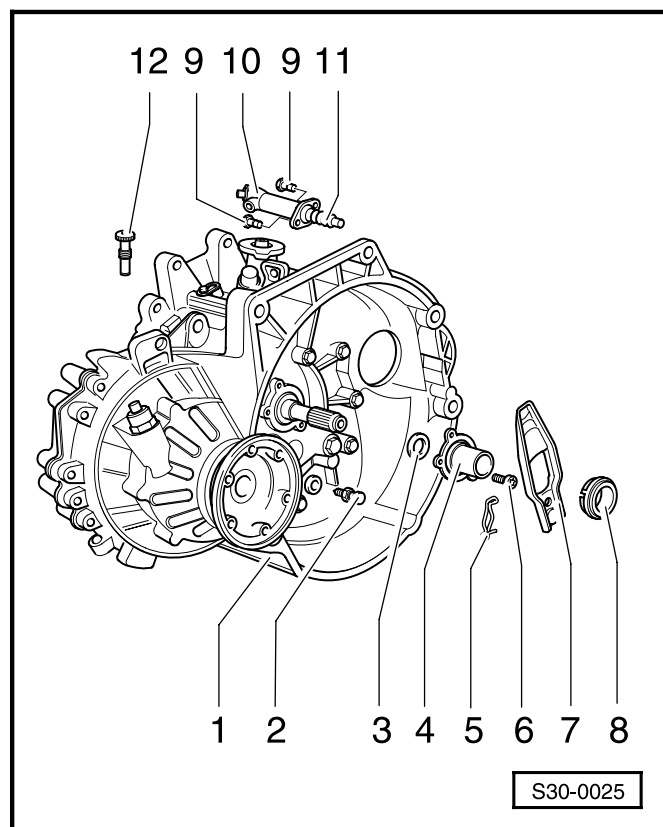
- Bleed the clutch system with brake filling and bleeding device Romess S15.
- Use bleeder hose 670 mm to bleed the clutch system.
- Fit bleeder hose onto the connection of the collecting bottle of the brake bleeding appliance.

- ◀ - Insert the bleeder hose on the slave cylinder (arrow) and open the bleeder device.

- After completing the bleeding procedure activate the clutch pedal repeatedly.



Servicing clutch release mechanism



8 - Clutch release bearing

- ◆ Do not wash the bearing, just wipe clean
- ◆ Replace noise bearing
- ◆ Grease contact points at release lever with MoS₂ grease

9 - Collar screw, 20 Nm

10 - Slave cylinder

- ◆ Removing and installing
⇒ page 30-5

11 - Tappet

- ◆ Grease tappet end with MoS₂ grease

12 - Mounting bolt

- ◆ Secures the clutch release lever when installing the gearbox ⇒ page 34-21
- ◆ Unscrew after the gearbox has been fitted

Note:

If a mounting bolt (item 12) is not provided, use bolt M8 x 35

Special tools, testers and aids required

- ◆ MoS₂ grease

1 - Gearbox

2 - Ball stud, 25 Nm

- ◆ Grease with MoS₂ Grease

3 - Gasket ring for drive shaft

- ◆ Replacing ⇒ page 34-41

4 - Guide Bushing with O-ring

- ◆ O-ring is fitted to guide bushing
- ◆ Replace guide bushing if damaged
- ◆ Grease clutch release bearing with MoS₂ grease

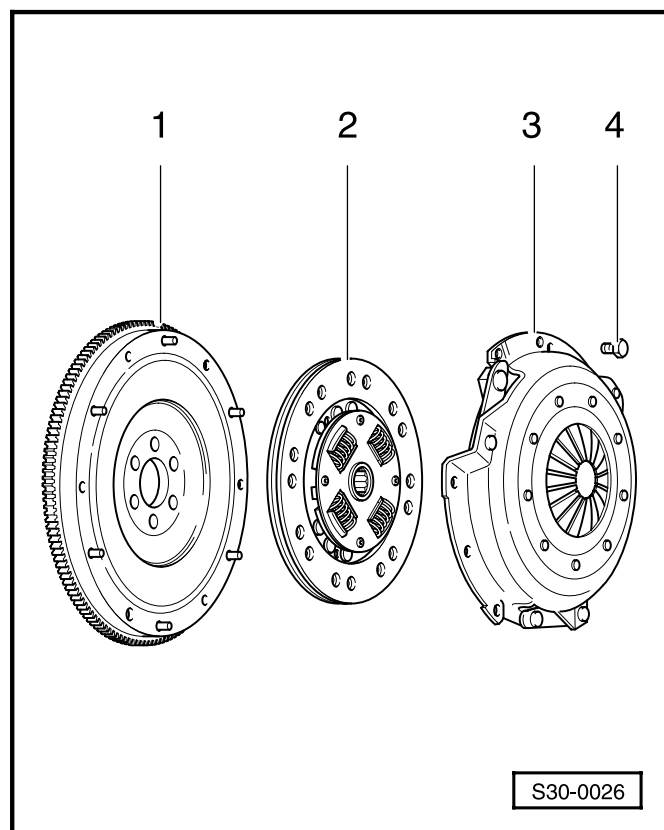
5 - Retaining spring

- ◆ Attach to clutch releaser

6 - Fillister head screw, 20 Nm

7 - Clutch release lever

Servicing clutch



Special tools, testers and aids required

- ◆ Grease G 000 100
- ◆ Locking device MP 1-223
- ◆ Centering drift MP 3-475

(Gearbox removed)

Notes:

- ◆ Replace clutch plates and pressure plates which have damaged or loose riveted connections.
- ◆ Assign clutch plate and pressure plate according to Parts Catalogue and engine code.

1 - Flywheel

- ◆ Ensure the centering pins are tight
 - ◆ Contact surface for clutch lining free of grooves, oil and grease
 - ◆ Removing and installing
- ⇒ 4-Cyl. Engine, Mechanical Components; Repair Group 13; Removing and installing sealing flanges and flywheel

2 - Clutch plate

- ◆ Diameter ⇒ page 00-2
- ◆ Pay attention to installation position; spring cage faces toward pressure plate
- ◆ Centering ⇒ Fig. 1
- ◆ Grease splines lightly

Note:

Clean splines of input shaft and, in the case of used clutch plates, splines of hub; remove corrosion and apply only a very thin film of grease Part No. G 000 100 to the splines of the input shaft. After this, move clutch plate back and forward on the input shaft until the hub on the shaft moves freely. It is essential to remove excess grease.

3 - Pressure plate

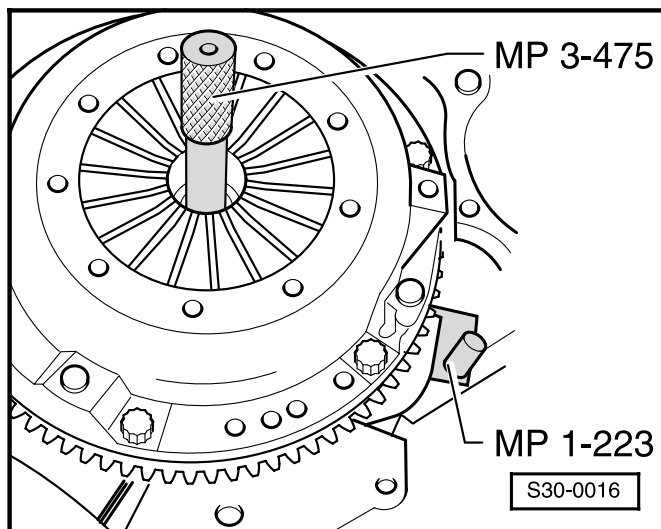
- ◆ Removing and installing ⇒ Fig. 1
- ◆ Inspecting ends of diaphragm spring ⇒ Fig. 2

Note:

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

4 - Twelve-point bolts, 20 Nm

- ◆ Slacken and tighten in stages diagonally opposite

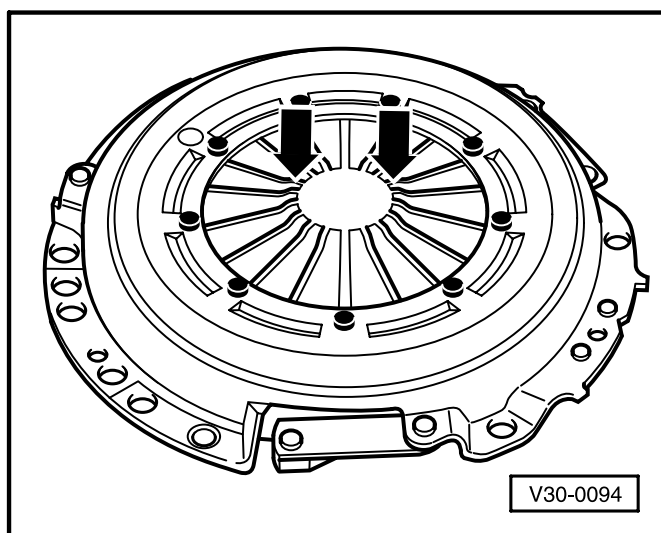


◀ Fig. 1 Centering clutch plate and removing and installing pressure plate

- Slacken or tighten the bolts in stages diagonally opposite.
- Turn over counterholder MP 1-223 when removing.

Note:

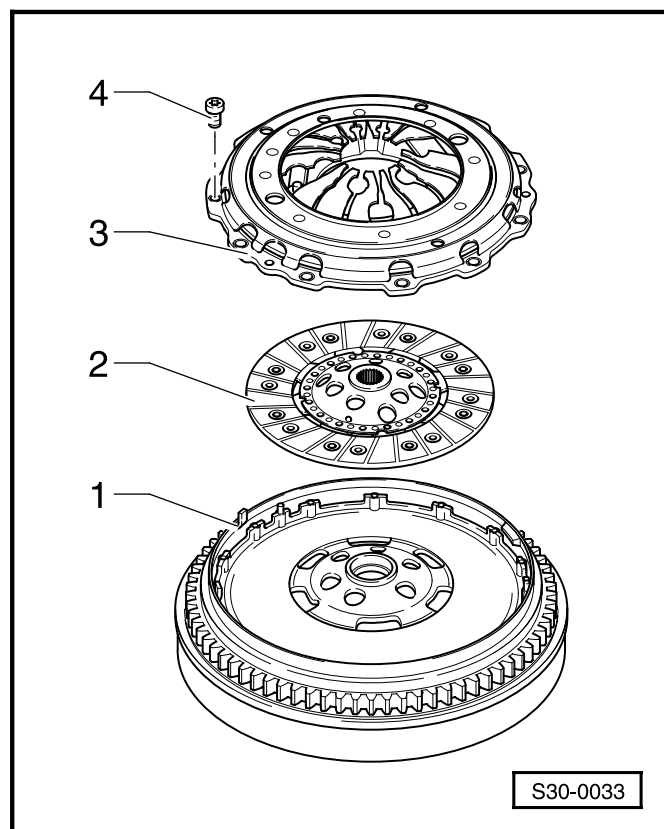
Contact surface of pressure plate and lining of clutch plate must be making proper contact all round with flywheel. Do not tighten securing bolts until this is the case. On no account pull on pressure plate. Centering holes of the pressure plate and the centering pins of the flywheel would otherwise be damaged.



◀ Fig. 2 Inspecting ends of diaphragm spring

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

Repairing the two mass flywheel



Special tools, testers and aids required

- ◆ Grease G 000 100
- ◆ Pressure pad MP 1-223
- ◆ Centering mandrel MP 3-475

(Gearbox removed)

Notes:

- ◆ Replace the clutch discs and pressure plates if the riveting is damaged or loose.
- ◆ Make the clutch disc and pressure plate coincide in accordance with the spare part catalogue and engine identification characters.

1 - Flywheel

- ◆ Make sure the centering pins are tight.
- ◆ The locating face for the clutch lining must be free from grooves, oil and grease.
- ◆ Removing and installing: ⇒ Engine, Mechanical Components; Repair Group 13; removing and installing sealing flanges and flywheel.

2 - Clutch disc

- ◆ Diameter ⇒ page 00-2
- ◆ Pay attention to the fitting position, curved side pointing toward the pressure plate
- ◆ Centering ⇒ Fig. 1
- ◆ Slightly grease the serration

Note:

Clean the serration on the drive shaft and if the clutch discs have been used clean the hub serration, remove corrosion and only apply a very thin layer of grease SP No.:

G 000 100 on the drive shaft serration. Subsequently move the clutch disc up and down on the drive shaft until the hub fits smoothly on the shaft. Remove all excess grease.

3 - Pressure plate

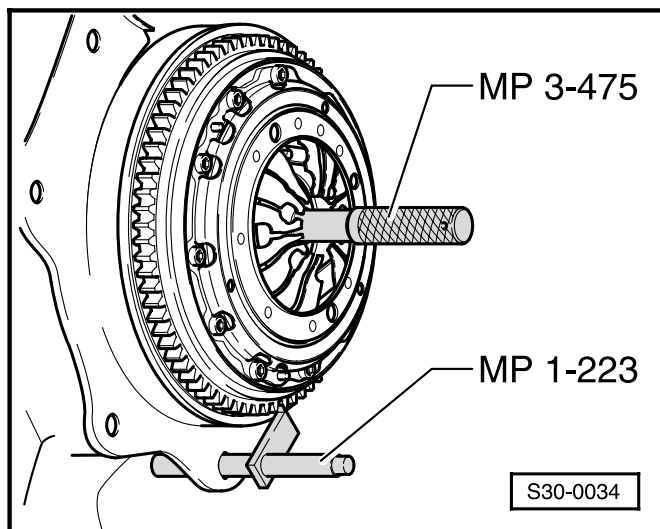
- ◆ Removing and installing ⇒ Fig. 1
- ◆ Check the extremities of the membrane spring ⇒ Fig. 2

Note:

The pressure plates are protected against corrosion and are greased. Only clean the thrust surface as otherwise the life of the clutch may be considerably reduced.

4 - Bolt, 13 Nm

- ◆ Loosen or tighten gradually in a cross pattern

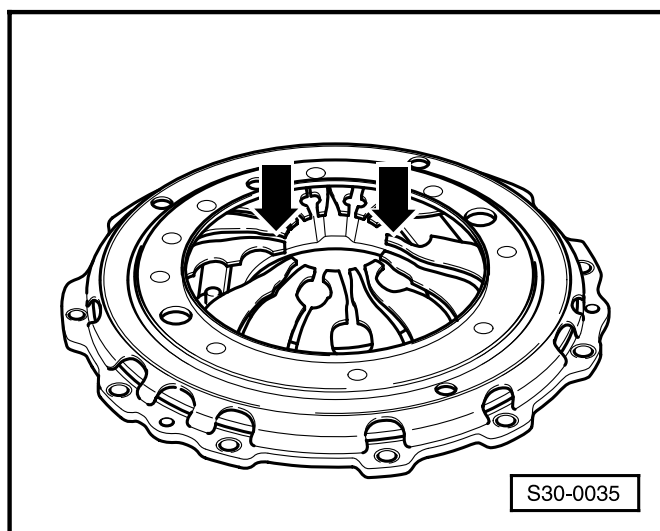


◀ Fig. 1 Centering clutch plate and removing and installing pressure plate

- Slacken or tighten in stages diagonally opposite.
- Turn over counterholder MP 1-223 when removing.

Note:

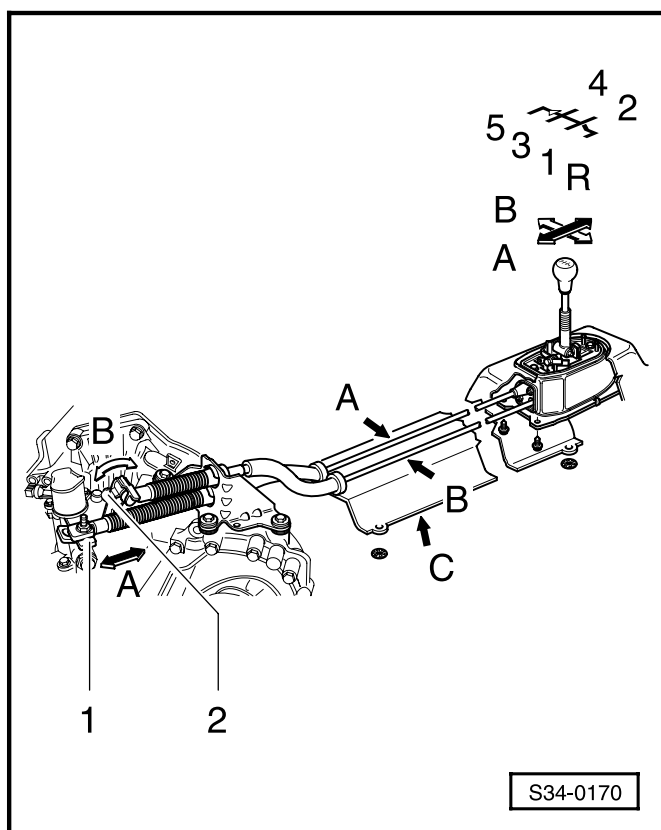
Contact surface of pressure plate and lining of clutch plate must be making proper contact all round with flywheel. Tighten securing bolts evenly diagonally opposite in order to avoid damaging centering holes of the pressure plate in the centering pins of the flywheel.



◀ Fig. 2 Inspecting ends of diaphragm spring

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

Servicing shift mechanism ► 04.99



Installation position of shift mechanism

A - Shift cable for shift movement

B - Selector cable for selector movement

C - Heat shield

- ◆ Take off before removing shift mechanism

Arrow -A- shift movement

Arrow -B- selector movement

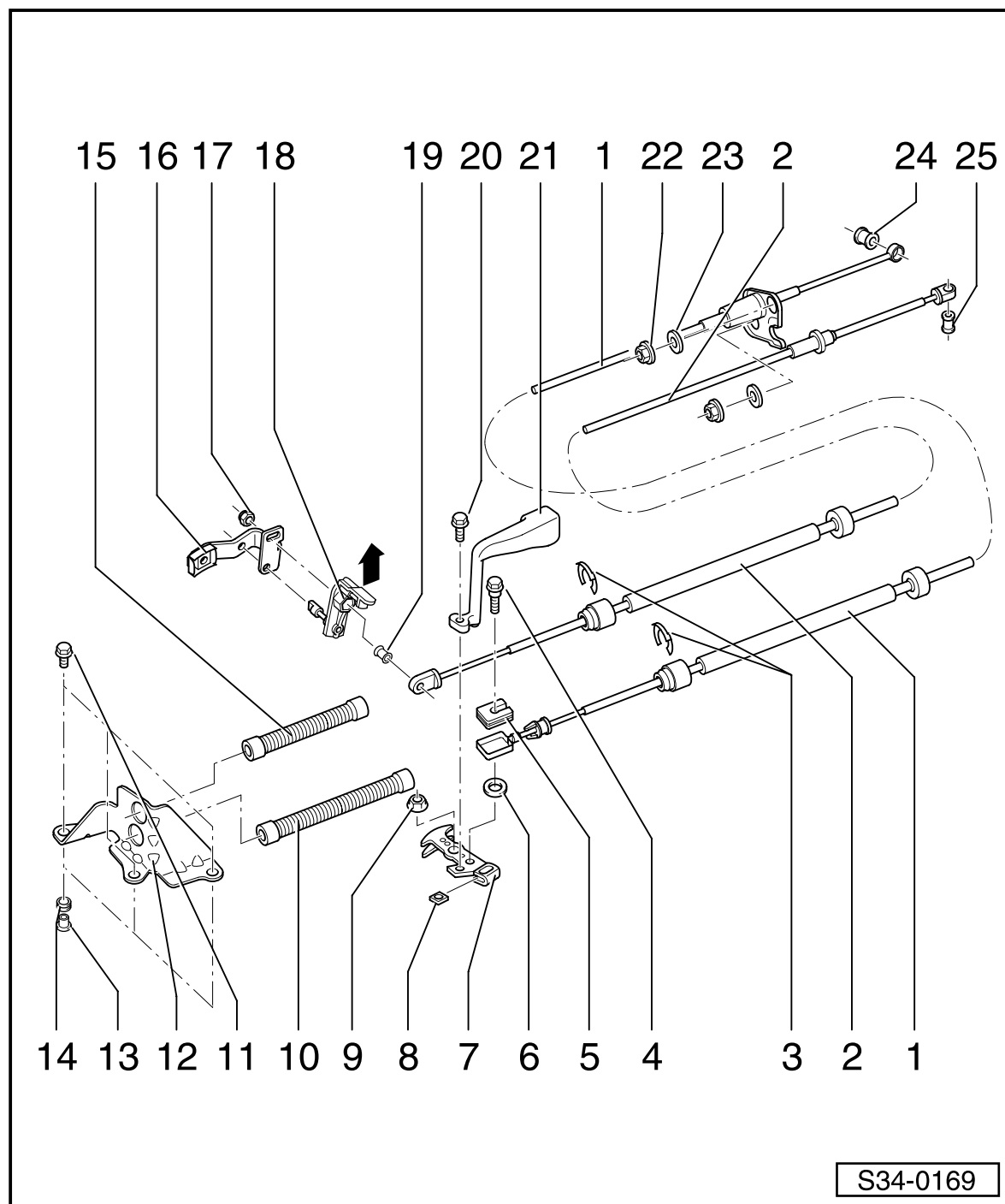
1 - Gearbox shift lever

2 - Relay lever with follower/selector cable

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.
- ◆ Remove shift mechanism complete in order to replace operating cables ⇒ page 34-7.
- ◆ Do not kink operating cables.
- ◆ Grease all bearing and contact surfaces with poly resin grease G 052 142 A2.
- ◆ Setting shift mechanism ⇒ page 34-12.

Removing and Installing operating cables



Special tools, testers and aids required

- ◆ Polycarbamide G 052 142 A2
- ◆ MoS₂ grease

Note:

Grease bearing and friction surfaces with polycarbamide grease G 052 142 A2.

1 - Shift cable

- ◆ Fitting position ⇒ page 34-1

2 - Selector cable

- ◆ Disconnect from driver (item 18) and pull peg in direction of arrow.
- ◆ Fitting location ⇒ page 34-1
- ◆ Assemble before installing shift cable

3 - Lock washer

- ◆ Do not damage bellows when removing

4 - Hexagon collar bolt, 25 Nm

- ◆ Shift cable at gearbox shift lever

5 - Insulation

- ◆ For shift cable/gearbox shift lever

6 - Washer

- ◆ Insert between shift cable and gearbox shift lever

7 - Gearbox shift lever

- ◆ Fits in one position only
- ◆ After installing set shift mechanism ⇒ 34-12
- ◆ Fitting location ⇒ page 34-4

8 - Square nut

- ◆ Insert in gearbox shift lever

9 - Hexagon nut, self-locking, 20 Nm

- ◆ For gearbox shift lever

10 - Bellow

- ◆ Carefully pull over shift cable/end part
- ◆ Use MoS₂ grease

11 - Hexagon screw, 25 Nm

- ◆ For release bearing

12 - Support**13 - Spacer****14 - Grommet**

- ◆ Mounting of support to gearbox

15 - Bellow

- ◆ Carefully pull over selector cable/end part
- ◆ Use MoS₂ grease

16 - Reversing lever

- ◆ Take off before removing servicing clutch mechanism
- ◆ Fitting location ⇒ page 34-4
- ◆ Servicing ⇒ page 34-46

17 - Hexagon nut, self-locking, 20 Nm

- ◆ For bell crank/driver
- ◆ Release setting shift mechanism

18 - Driver

- ◆ With spindle for mounting of the reversing lever
- ◆ Fitting location ⇒ page 34-4
- ◆ Servicing ⇒ 34-46

19 - Insulation

- ◆ For selector cable
- ◆ Press in and press out with drift

20 - Hexagon bolt 20 Nm + 90 °

- ◆ For balancing weight

21 - Balancing weight

- ◆ Remove when setting shift mechanism ⇒ page 34-12

22 - Hexagon nut, self-locking, 20 Nm

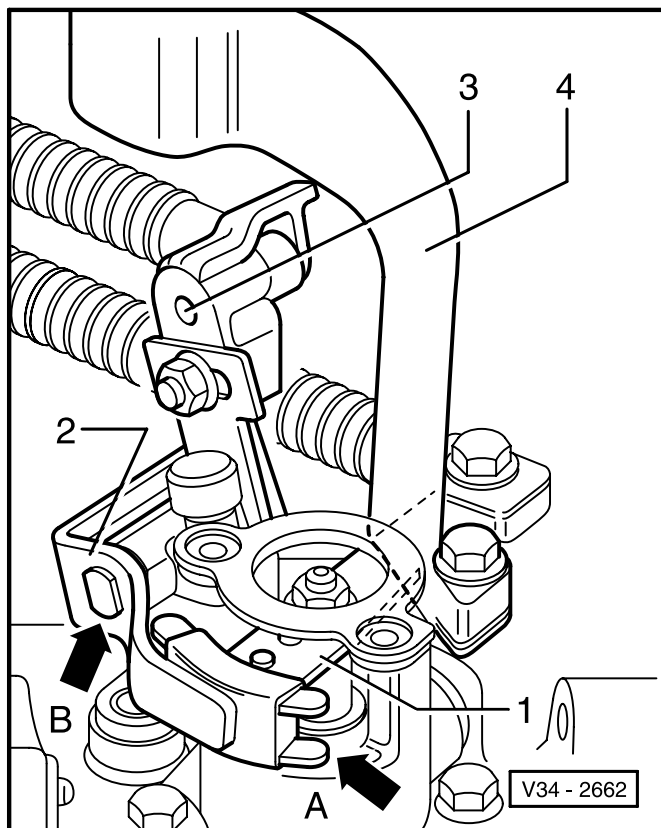
- ◆ For shift cable at shift housing

23 - Rubber washer**24 - Insulation**

- ◆ For shift cable/shift lever
- ◆ Press in and press out with drift

25 - Insulation

- ◆ For selector cable/selector angle plate
- ◆ Press in and press out with drift



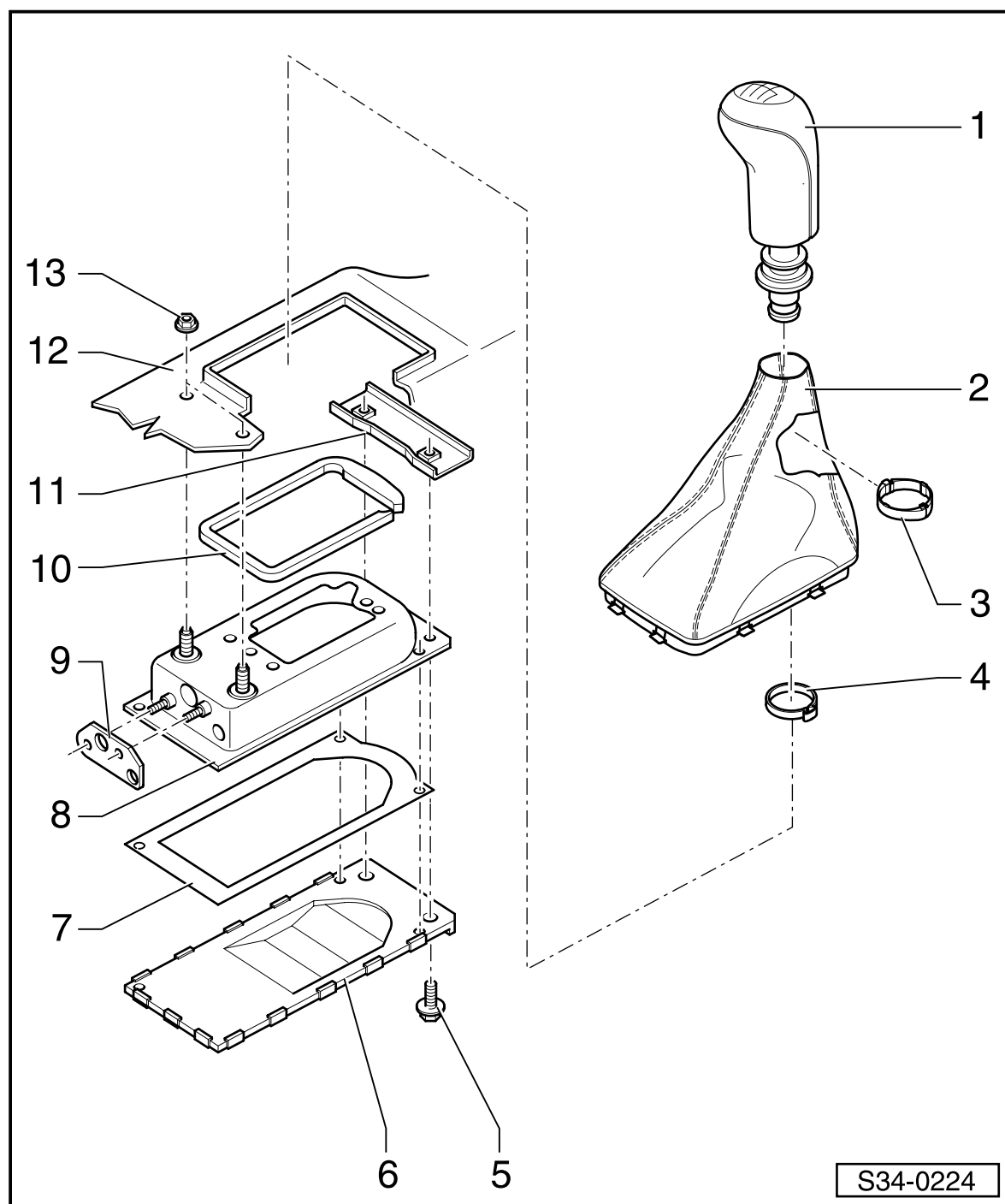
◀ Installation position of gearshift lever/relay lever
Driver/balancing weight

- 1 - Gearshift lever
- 2 - Relay lever
Engages over sliding shoe into guide rail of gearshift lever (arrow -A-); grease with MoS₂ grease
- 3 - Driver
Flats (arrow -B-) of shaft for mounting relay lever fit only in one position
- 4 - Balancing weight
Bolt to gearshift lever

Note:

Shift mechanism and reversing light switch are shown removed to simplify illustration.

Removing and installing shift housing



1 - Gearshift knob

- ◆ When removing, also take off cover item 2
- ◆ Removing ⇒ page 34-7

2 - Cover

- ◆ When removing, also take off gearshift knob item 1
- ◆ Removing ⇒ page 34-7
- ◆ Separate cover from gearshift knob ⇒ page 34-9

3 - Connection part

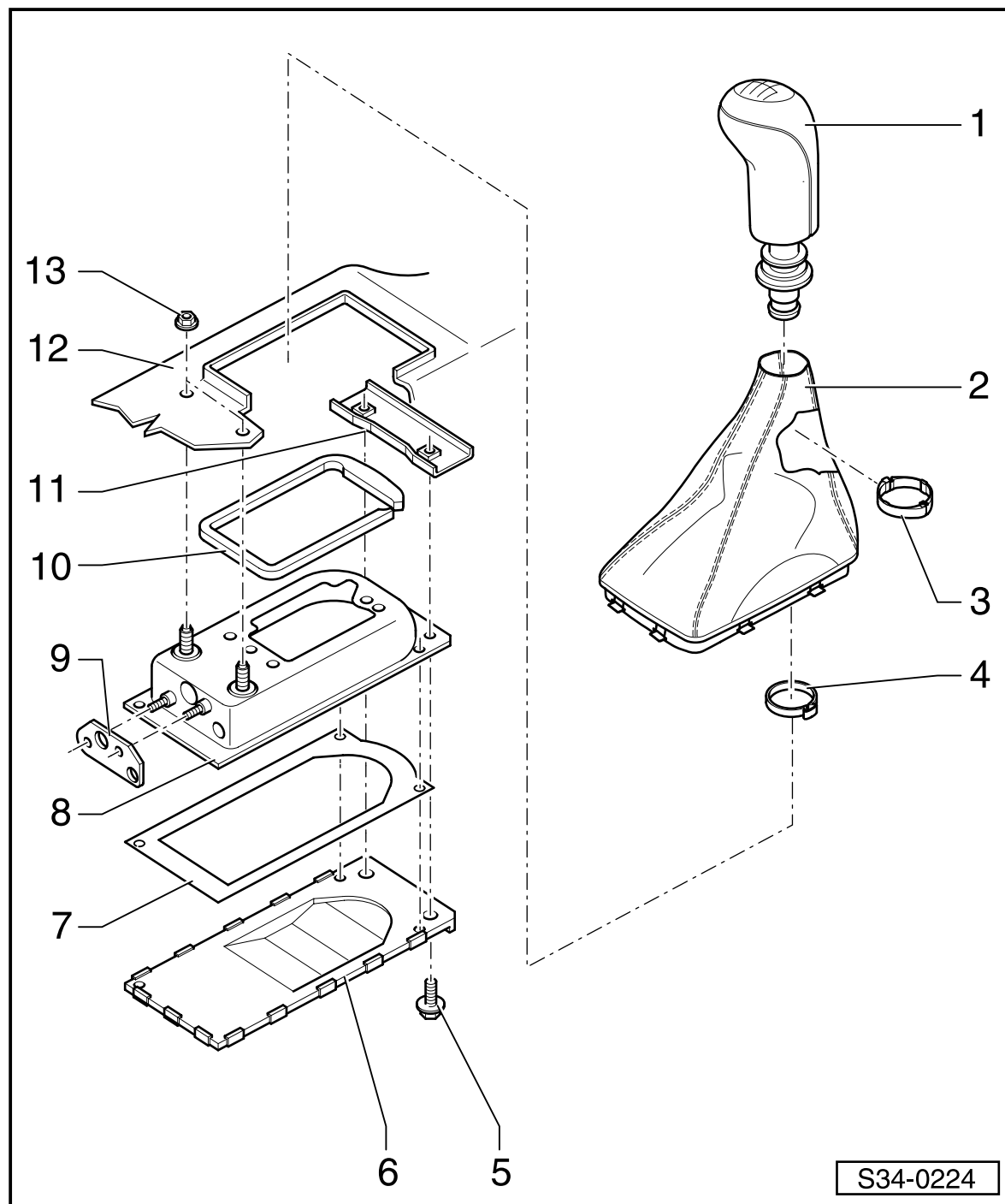
- ◆ Connects cover to gearshift knob
- ◆ Removing ⇒ page 34-9

4 - Clamp

- ◆ For attaching gearshift knob to shift lever

5 - Hexagon bolt, 25 Nm

6 - Cover panel



S34-0224

7 - Gasket

- ◆ Self-adhesive
- ◆ Stick onto cover panel

8 - Shift housing**9 - Gasket**

- ◆ Between operating cables and shift housing

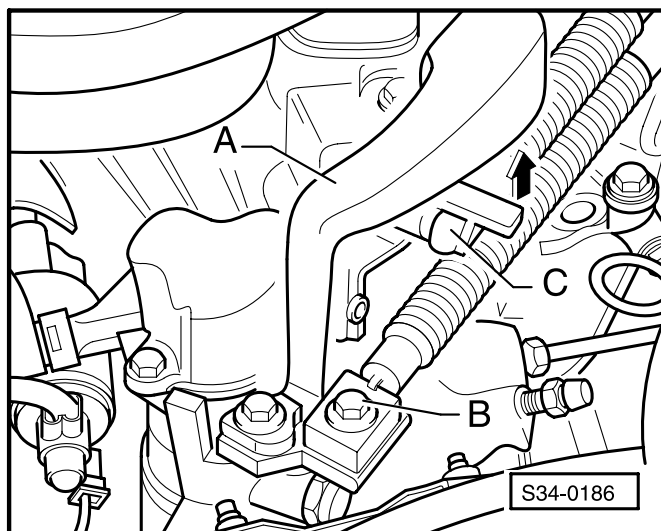
10 - Gasket

- ◆ Between shift housing and floor
- ◆ Self-adhesive
- ◆ Stick onto shift housing

11 - Bracket of shift housing

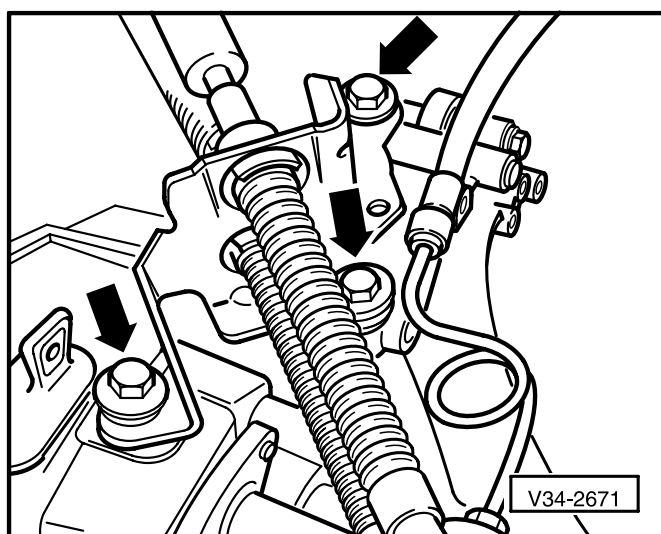
- ◆ Welded to body

12 - Body**13 - Self-locking hexagon nut, 25 Nm**

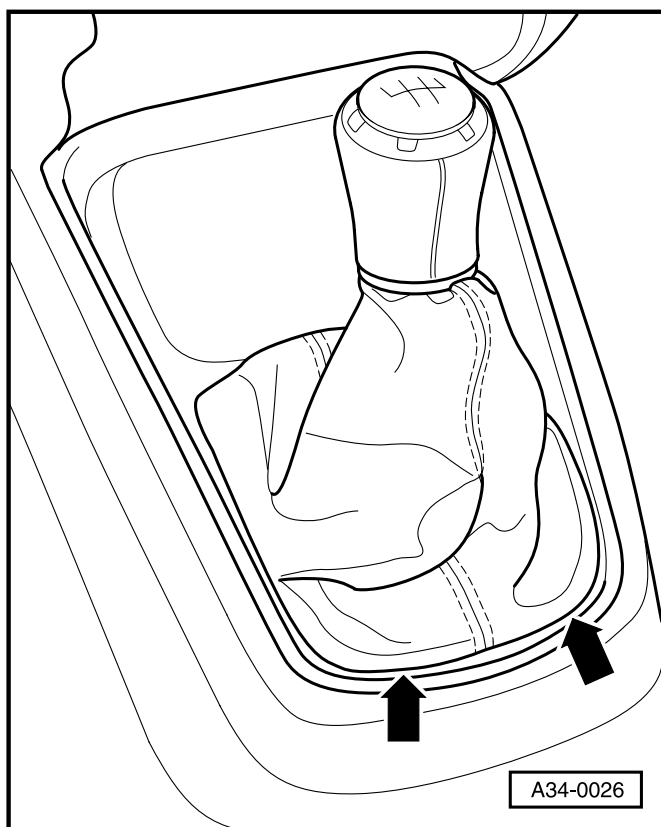


Removing shift housing

- Remove air filter housing completely
⇒ page 34-15.
- ◀ - Remove shift cable from gearbox shift lever, by unscrewing bolt -B-.
- Take off shift cable with washer and square nut.
- Pull off selector cable -C- from driver/circlip, by raising lug in direction of arrow.

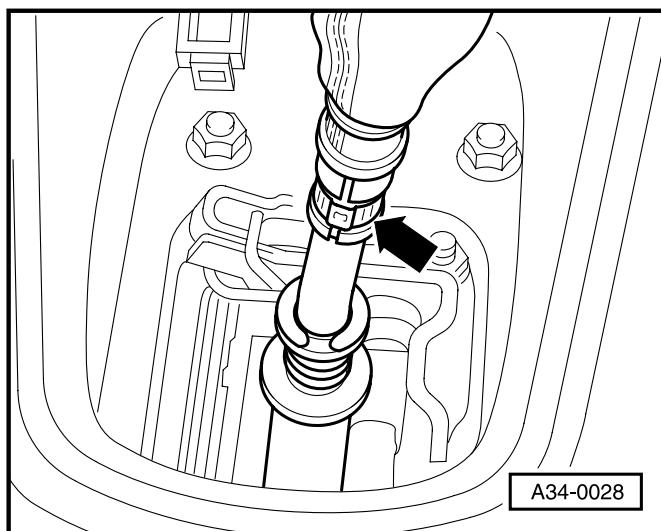


- Unclip hose line of slave cylinder at cable support.
- ◀ - Remove cable support from gearbox (arrow) and lay aside.

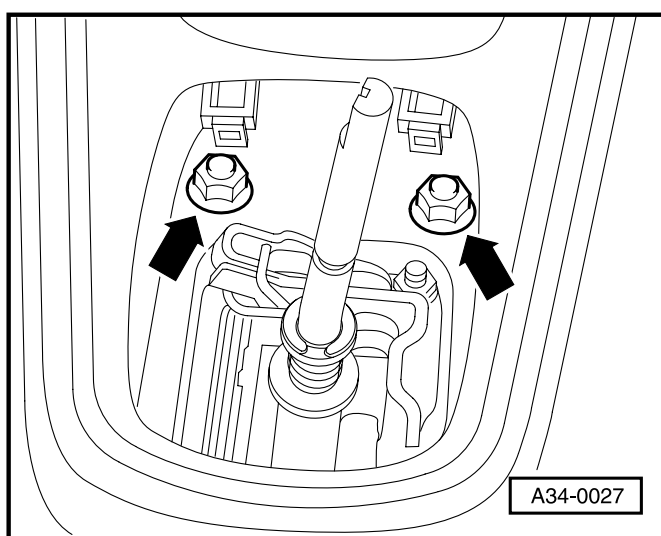


Remove gearshift knob and collar

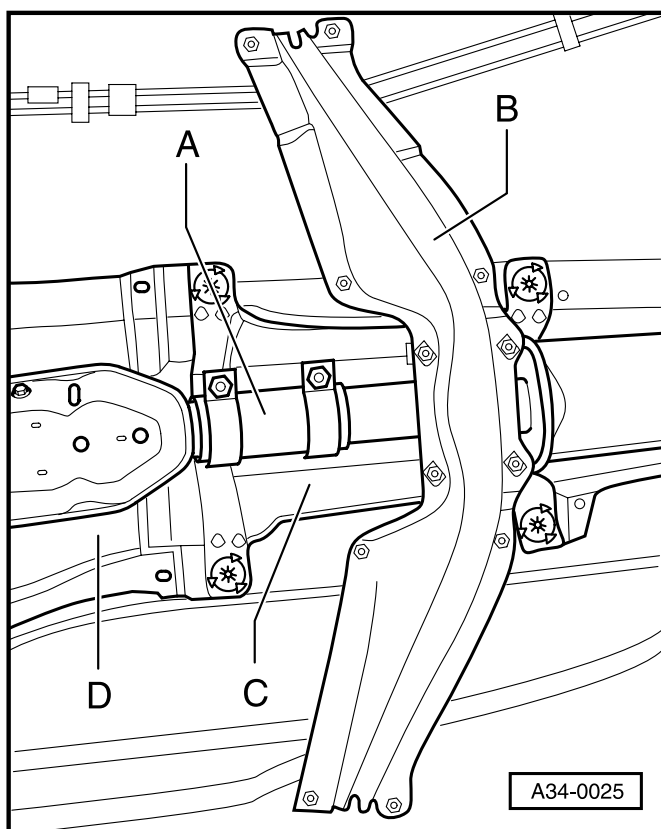
- ◀ - Lift off collar upwards -arrow- and pull out toward rear.



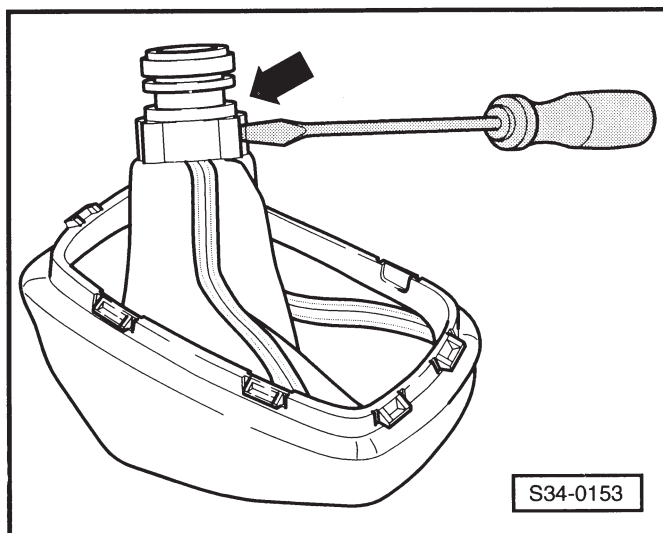
- Pull cover up and over gearshift knob.
- ◀ - Open clamp -arrow- and pull off gearshift knob together with cover.



- ◀ - Unscrew securing nuts -arrows-.



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



◀ Separating gearshift knob from cover

- Turn cover inside out.
- Use a screwdriver to lever off connection part -arrows-.
- Pull connection part off gearshift lever.
- Turn gearshift knob to outside and detach from the cover.

Installing:

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

Notes:

- ◆ *If the gasket between shift housing and floor is damaged, replace.*
- ◆ *Adjust shift mechanism ⇒ page 34-12.*
- ◆ *Align exhaust system:*
⇒ 4-Cylinder Engine, Mechanical Components; Repair Group 26; Removing and installing parts of the 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
Cable support bracket to gearbox	25 Nm
Bolt/shift cable to gearbox shift lever	25 Nm

10 - Bush**11 - Dog-leg spring****12 - Guide bush**

- ◆ Lock onto bearing bush item 8

13 - Lock washer

- ◆ Removing and installing ⇒ Fig. 2

14 - Spacer bush**15 - Compression spring****16 - Shift lever guide****17 - Lock washer**

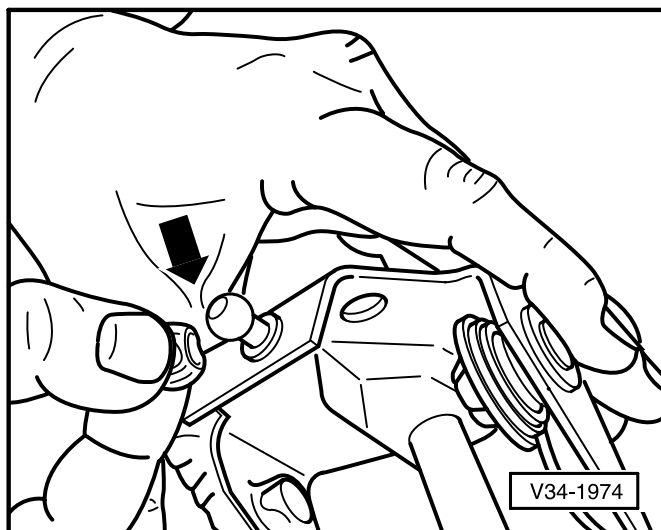
- ◆ Removing ⇒ Fig. 3

18 - Damper washer**19 - Bearing bush**

- ◆ Fits only in one position

20 - Selector angle bracket**21 - Split pin****22 - Shift lever****23 - Shock absorber**

- ◆ Installing ⇒ Fig. 4

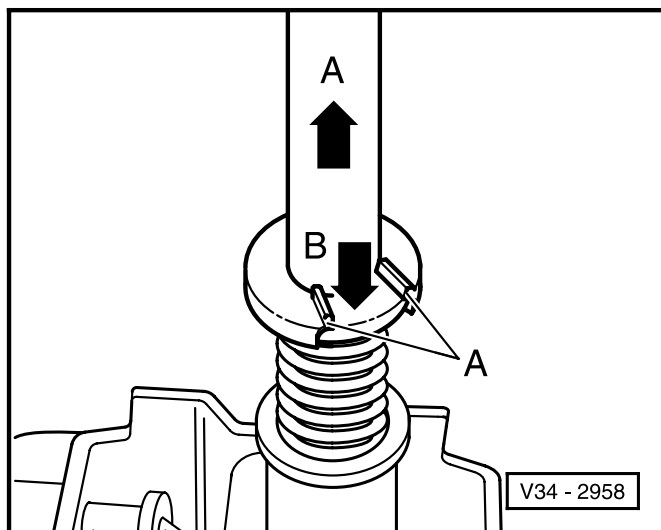


◀ **Fig. 1 Installing cap**

- Press on from the side (arrow).
- Press opening together to form a slot.

Note:

Heat cap if necessary (e.g. in hot water).

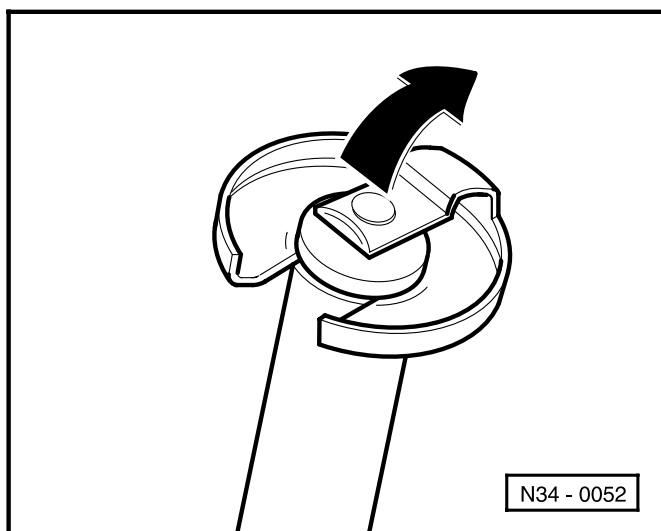


◀ **Fig. 2 Removing and installing lock washer**

- To remove and install the lock washer, pull shift lever in direction of arrow -A- and at the same time use a screwdriver to press down spacer bush in direction of arrow -B- as far as the stop.

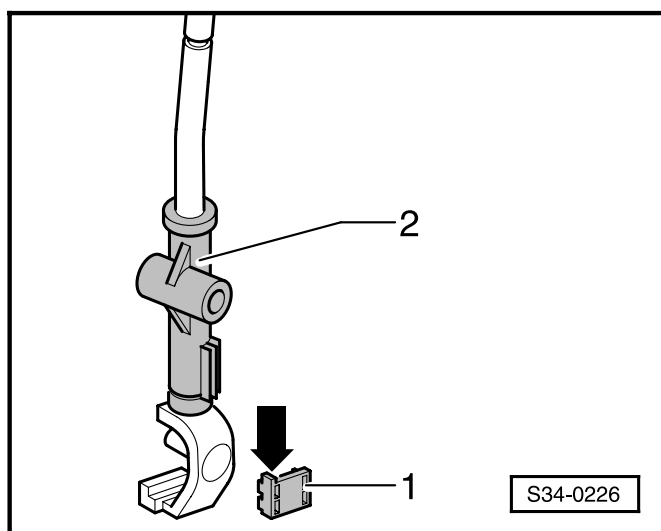
Note:

Do not twist spacer bush when pressing it down. Carefully release tension of mounting slot in shift lever for the lock washer.



◀ **Fig. 3** Removing lock washer for selector angle bracket and shift lever guide/selector housing

- Raise clip in direction of arrow.



◀ **Fig. 4** Installing shock absorber

Installation position:

The stud (arrow) on the shock absorber -1- points toward the shift lever guide -2-.

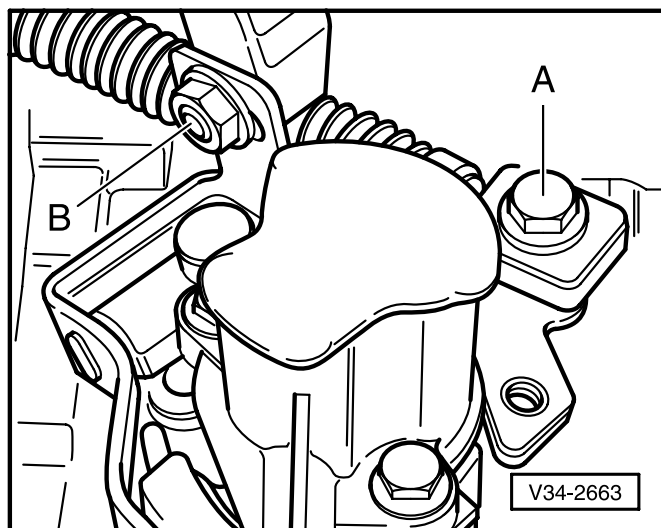
Setting shift mechanism

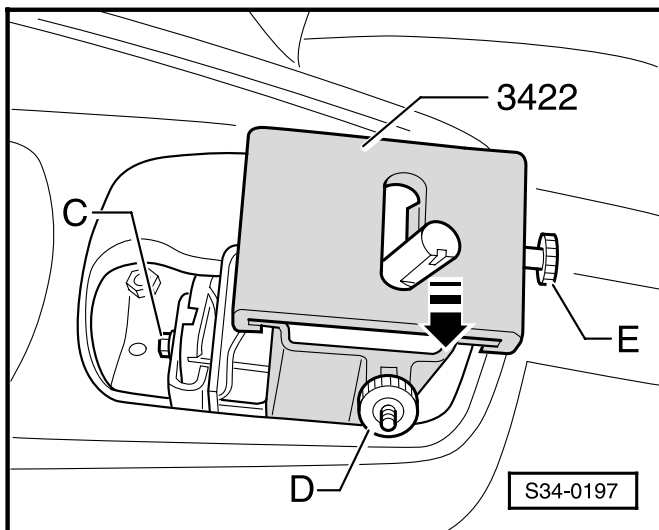
Special tools, testers and aids required

- ♦ Wedge 3192/1
- ♦ Shift lever gauge 3422

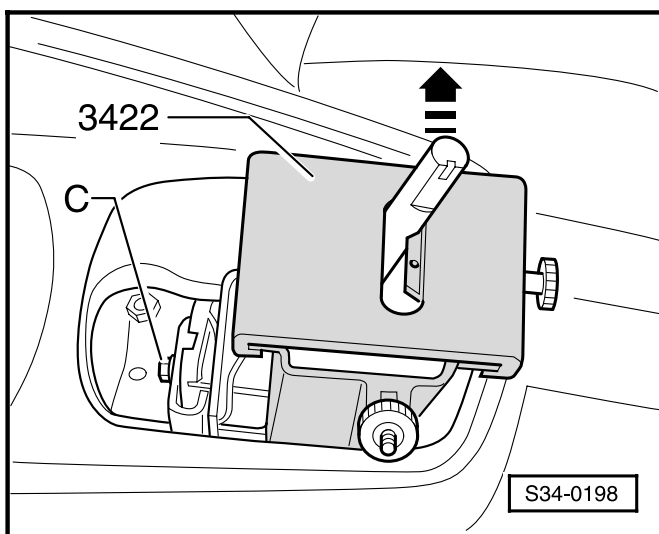
Gearbox in Neutral.

- Take off gearshift knob with cover ⇒ page 34-7.
- Remove air filter housing complete ⇒ page 34-15.
- Take off balancing weight ⇒ page 34-3.
- ◀ - Slacken bolt -A- and nut -B- until the shift cable and selector cable driver move freely in the slots.

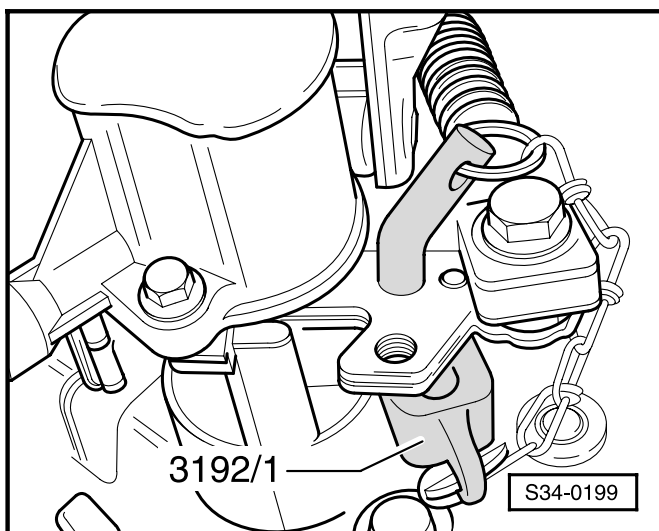




- ◀ - Slacken bolt -C-.
- Fit on shift lever gauge 3422.
- Swivel hook for attaching the gauge below bearing plate and tighten nut -D-.
- Press shift lever into the left detent of the sliding block.
- Press shift lever with sliding lock to the left as far as the stop (direction of arrow) and tighten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



- ◀ - Press shift lever into right detent (direction of arrow).
- Tighten bolt -C-.
- Insert wedge and locking pin.



- ◀ - Push in wedge 3192/1 free of play between gearbox shift lever and shift cover.

Note:

Wedge must not raise gearbox shift lever when this is done.

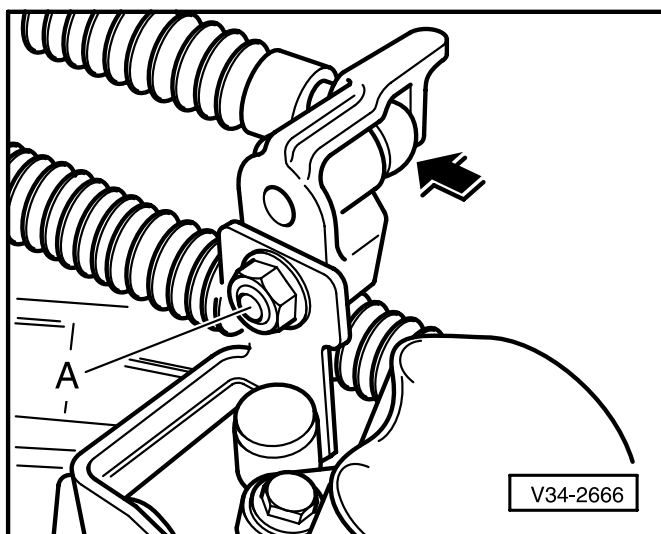
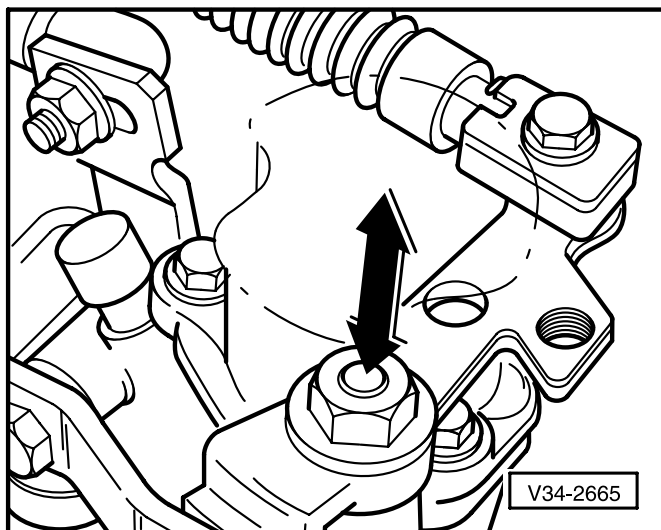
- Attach shift cable and selector cable driver in this position (bolt -A- and nut -B- in Fig. V34-2663 ⇒ page 34-12); check position of wedge for this step.
- Take off shift lever gauge.
- Install gearshift knob and cover.
- Remove wedge and locking pin.
- Install balancing weight.

Operation

- Shift lever should be in Neutral in gate of 3rd/4th gear.
- Depress clutch, start engine, wait about 3 ... 6 seconds to allow the input shaft of the gearbox to come to a stop.
- Shift through all the gears several times. Pay particular attention to proper operation of the reverse gear lock.

If sticking occurs when repeatedly engaging a gear, check the clearance (lift) of the shift shaft as follows:

- Engage 1st gear.
- Press shift lever fully to the left and release again.
- At the same time observe the shift shaft at the gearbox (2nd mechanic).
- ◀ - When the shift lever is moved, the shift shaft should make a stroke of about 1 mm (direction of arrow).



- ◀ - If this is not the case, disengage 1st gear and once again slacken nut -A- for the mounting stud of the selector cable driver. (The selector cable has slight play at the mounting stud as a result of the transmission elements).
- Eliminate the play of the selector cable by pressing it slightly towards the bulkhead with the mounting stud (direction of arrow).
- Re-tighten nut -A- in this position.

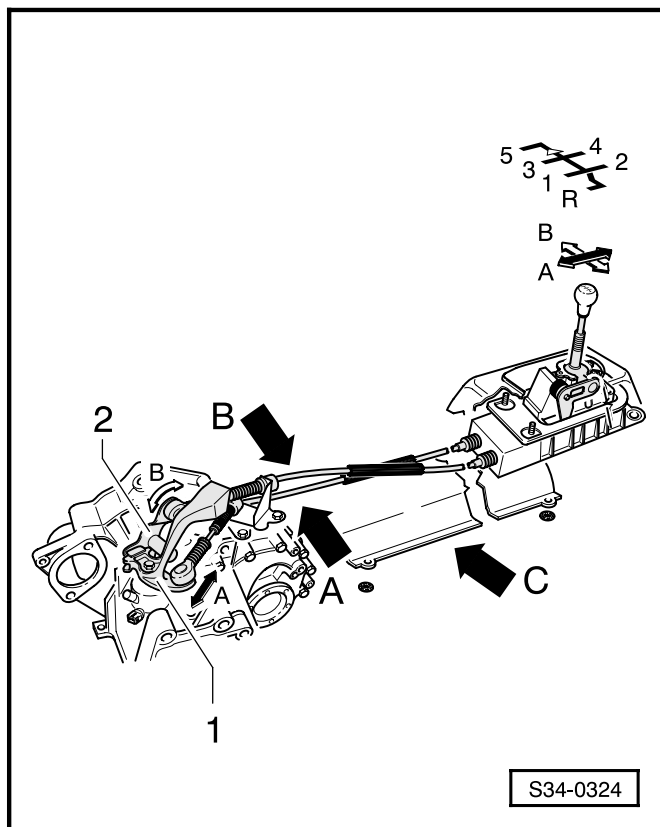
Notes:

Requirements for correct setting:

- ◆ *The operating and transmission elements of the shift mechanism should be in proper condition.*
- ◆ *The insulating pieces for mounting the shift and selector cables at all the operating elements should be in proper condition (not worn).*
- ◆ *Shift cable and selector cable should operate freely.*

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

Servicing shift mechanism 05.99 ➤



Installation position of shift mechanism

A - Shift cable for shift movement

B - Selector cable for selector movement

C - Heat shield

- ◆ Take off before removing shift mechanism

Arrow -A- shift movement

Arrow -B- selector movement

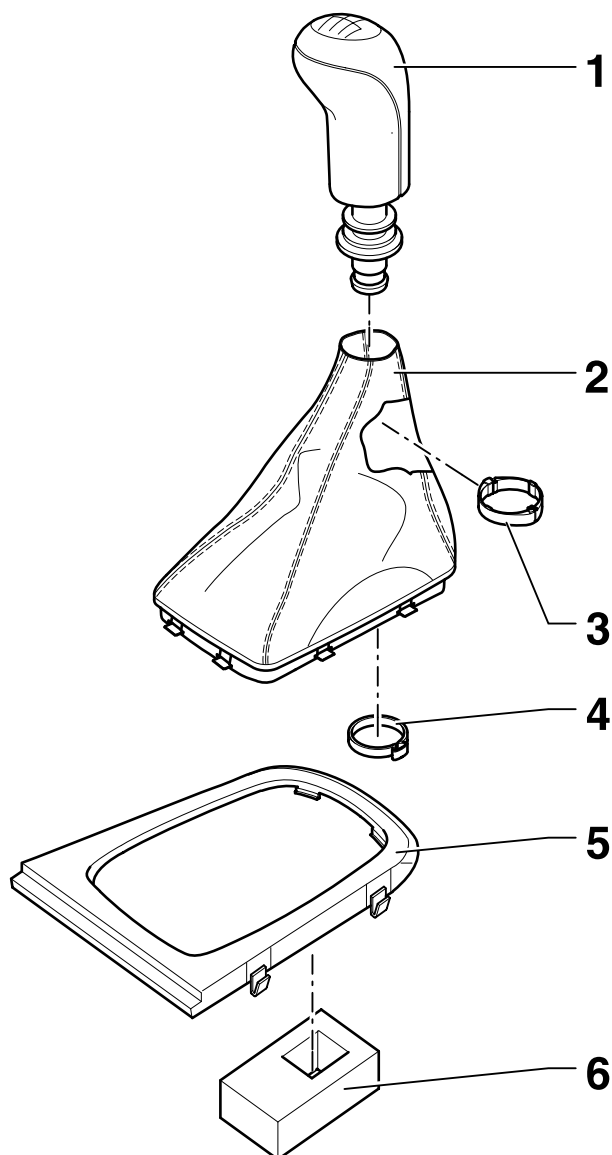
1 - Gearbox shift lever

2 - Relay lever with follower/selector cable

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.
- ◆ Remove shift mechanism complete in order to replace operating cables
⇒ page 34-14.6.
- ◆ Do not kick operating cables.
- ◆ Grease all bearing and contact surfaces with poly resin grease G 052 142 A2.
- ◆ Setting shift mechanism
⇒ page 34-14.12.

Removing and installing gearshift knob and cover



S34-0587

1 - Gearshift knob

- ◆ Remove together with cover item 2
⇒ Fig. 1

2 - Cover

- ◆ Remove together with gearshift knob item 1 ⇒ Fig. 1
- ◆ Separating cover from gearshift knob
⇒ Fig. 2

3 - Connection part

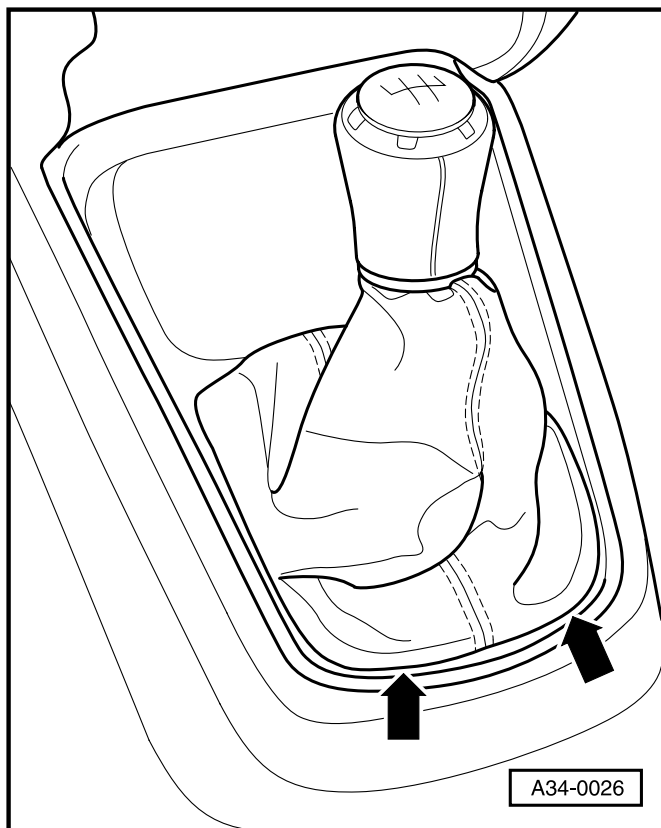
4 - Collar clamp

- ◆ For attaching gearshift knob to gearshift lever

5 - Surround

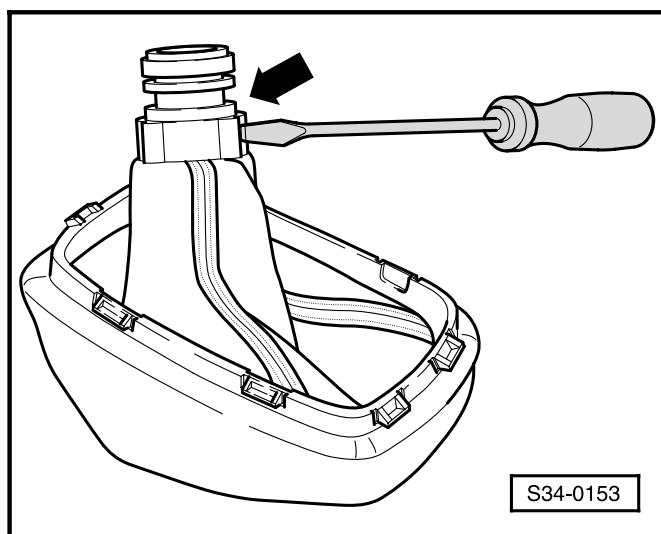
6 - Shift insulation

- ◆ Fitted only to certain models



◀ Fig. 1 Removing gearshift knob and cover

- Pull cover up and out -arrows-.



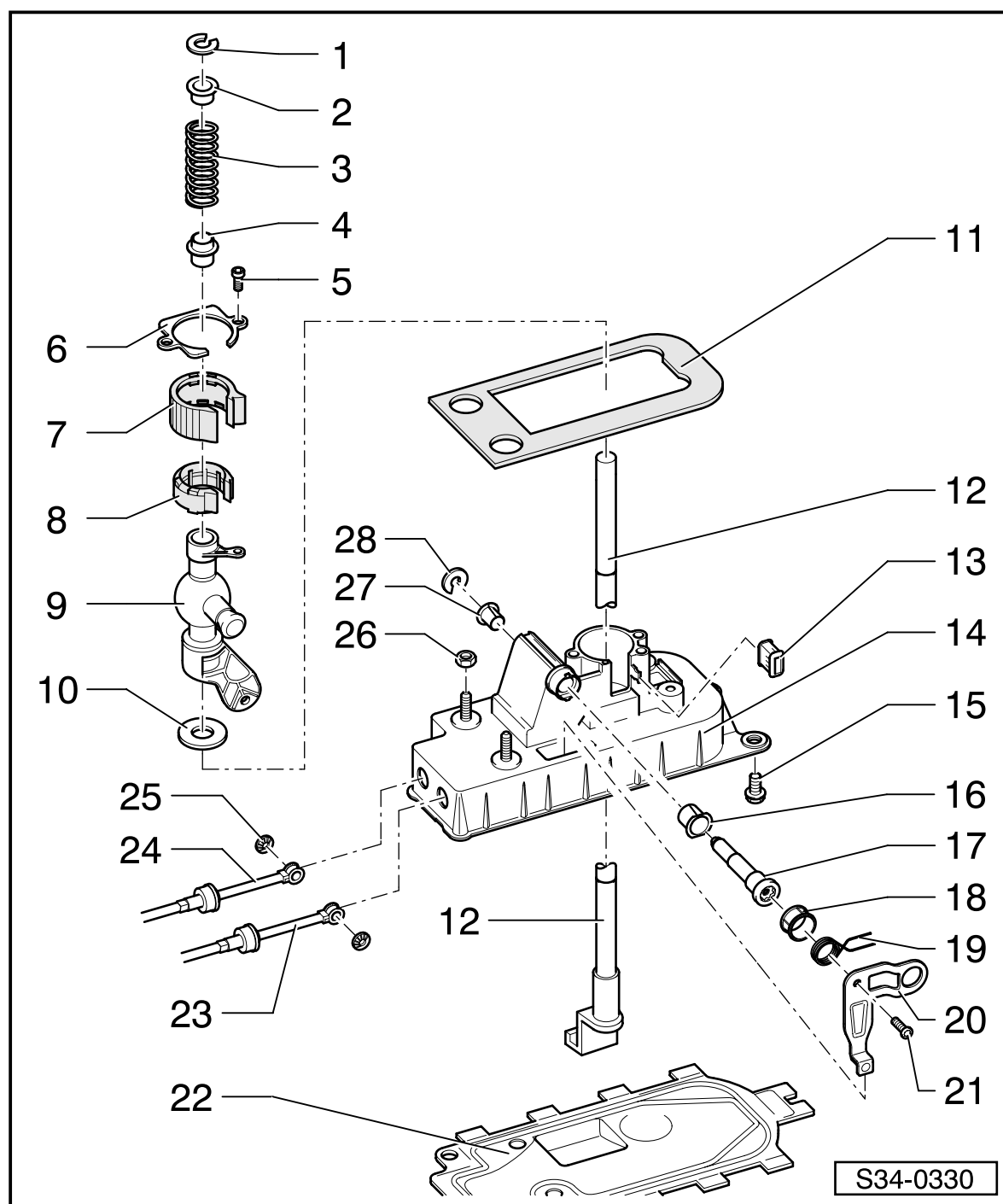
◀ Fig. 2 Separating cover from gearshift knob

- Turn cover inside out.
- Use a screwdriver to lever off connection part -arrows-.
- Pull connection part off the gearshift lever.
- Turn gearshift knob out and separate from cover.

Installing:

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

Servicing gearshift lever and shift housing

**Note:**

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

1 - Circlip

♦ Removing and installing ⇒ Fig. 1

2 - Bush**3 - Compression spring****4 - Bush**

5 - 5 Nm

6 - Cover**7 - Bearing shell****8 - Shock absorber****9 - Shift lever guide****10 - Shock absorber washer**

11 - Gasket

- ◆ Between shift housing and floor
- ◆ Self-adhesive
- ◆ Stick onto shift housing

12 - Shift lever**13 - Shock absorber****14 - Shift housing**

- ◆ Removing and installing
⇒ page 34-14.6

15 - 25 Nm**16 - Bush****17 - Pin****18 - Guide bush****19 - Compression spring**

- ◆ Installing ⇒ Fig. 2

20 - Bell crank**21 - 5 Nm****22 - Floor plate**

- ◆ Bend up tabs for removing

23 - Selector cable

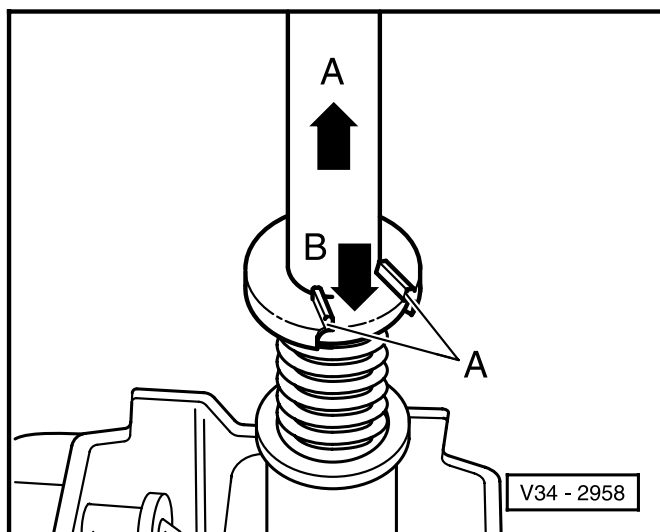
- ◆ At bell crank
- ◆ Installation position ⇒ page 34-14.1

24 - Shift cable

- ◆ Press onto shift lever guide
- ◆ Installation position ⇒ page 34-14.1

25 - Lock washer**26 - 25 Nm****27 - Bush**

- ◆ Fits only in one position

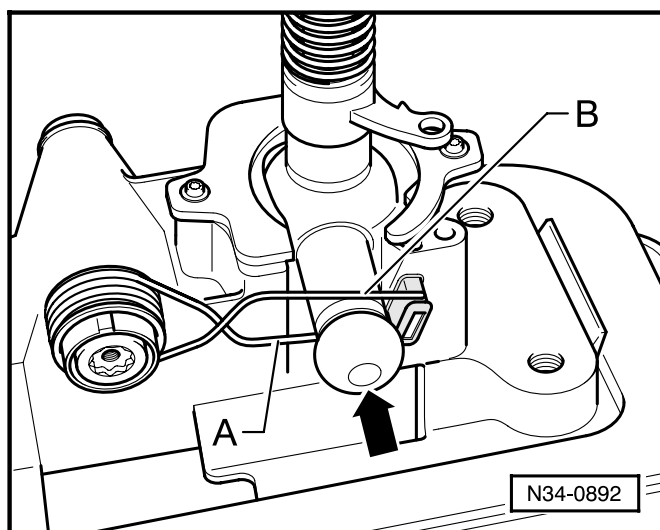
28 - Lock washer

◀ **Fig. 1 Removing and installing lock washer**

- To remove and install the lock washer, pull shift lever in direction of arrow -A- and at the same time use screwdriver to press down spacer bush in direction of arrow -B- as far as the stop.

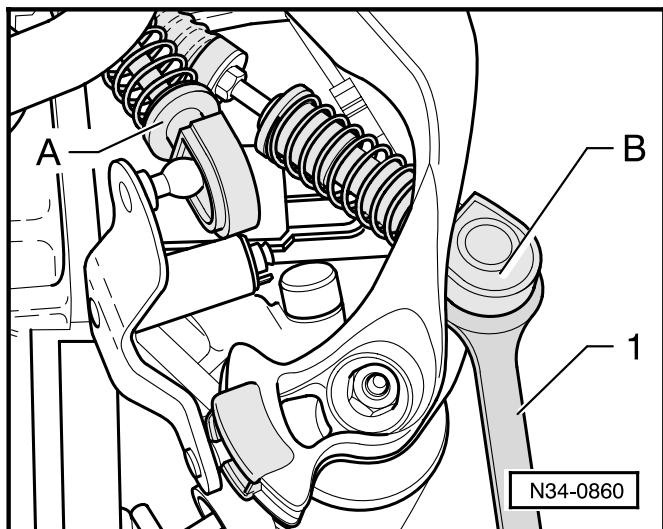
Note:

Do not twist spacer bush when pressing down. Carefully relieve stress at locating slot in shift lever for lock washer.



◀ **Fig. 2 Installing compression spring**

- Insert the compression spring so that the leg -A- is positioned below the stud (arrow).
- After this, pull the leg -B- sufficiently far toward shift lever so that it is positioned on the top of the stud (arrow).

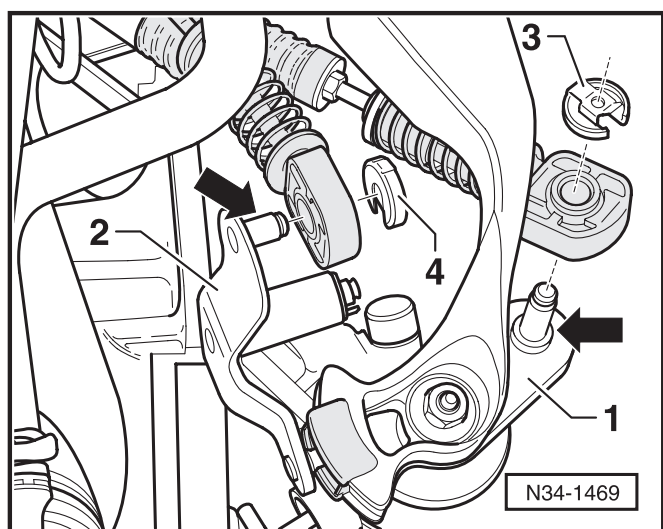


Removing and installing shift housing

Remove

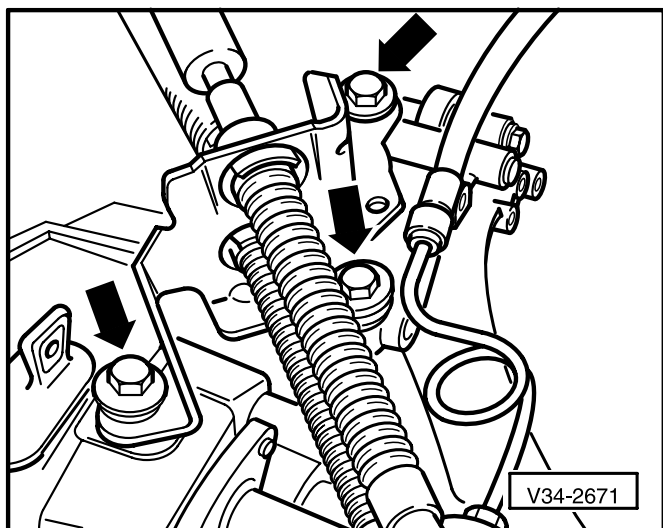
Shift mechanism up to 12.00

- ◀ - Use an open-end wrench -1- to lever off selector cable -A- and shift cable -B- at gear-box.



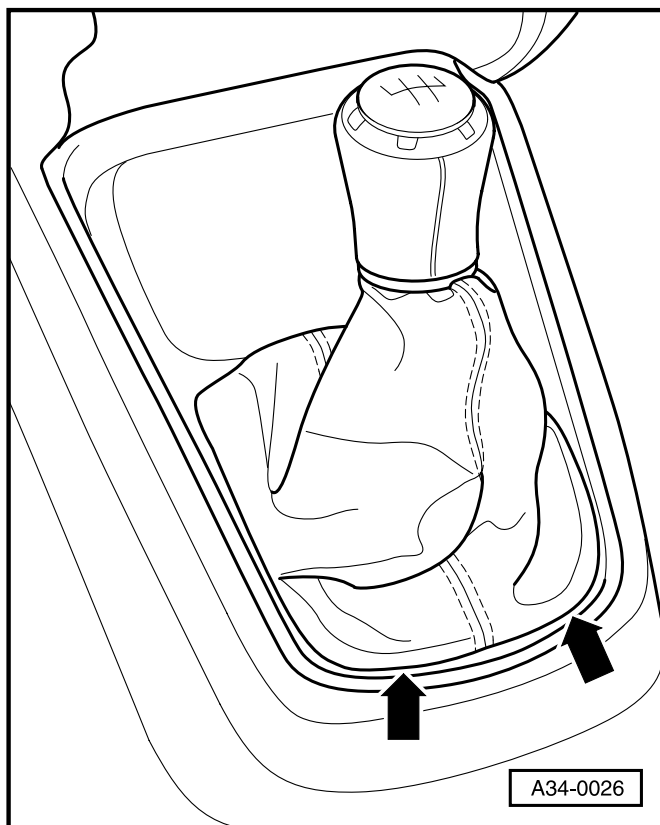
Shift mechanism from 01.01

- ◀ - Remove lock washer -3- for the shift cable at gearbox shift lever -1-.
- Remove lock washer -4- for the selector cable at circlip -2-.
- Pull off selector cable and shift cable from stud -arrow-.

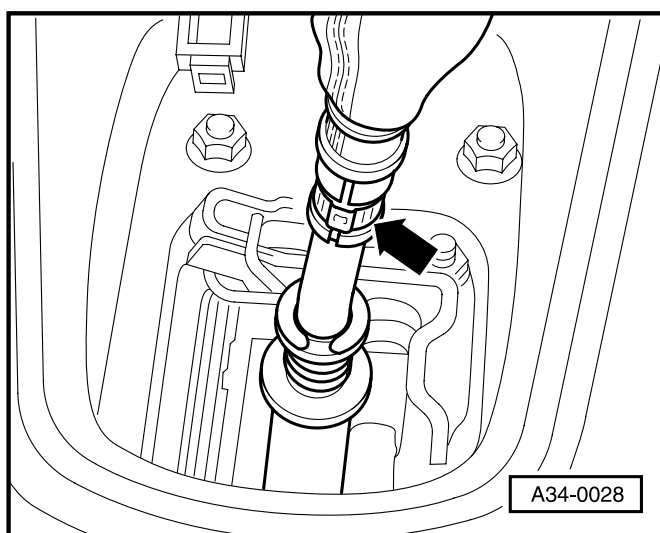


Continued for all shift mechanisms

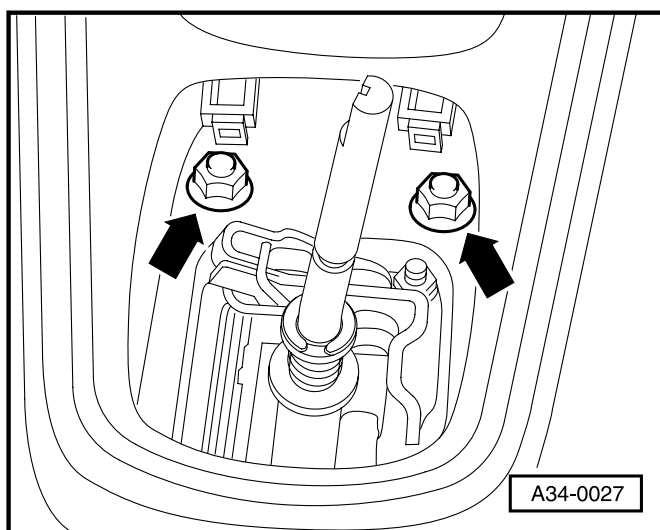
- ◀ - Remove cable support from gearbox -arrow-, if necessary, first unclip hose line at cable support.



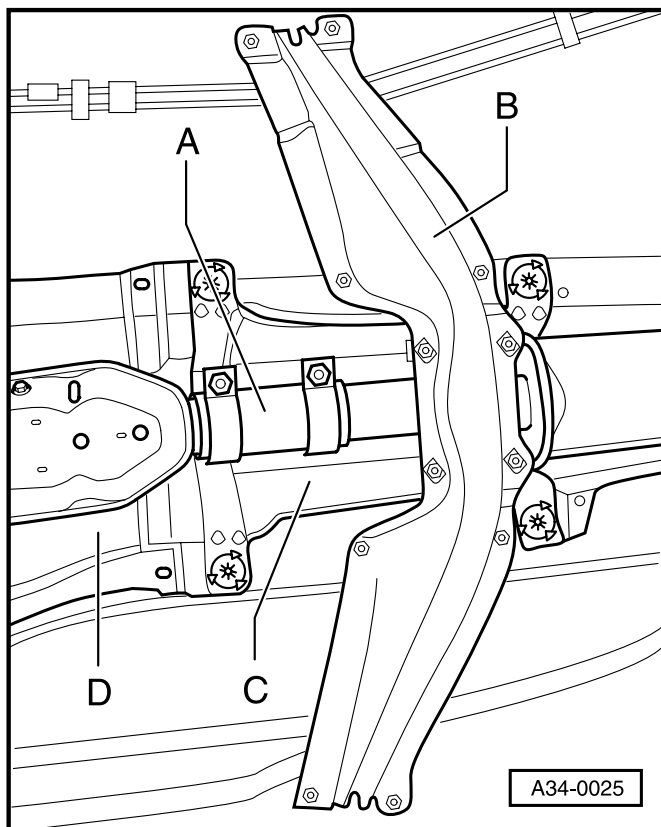
- ◀ - Pull cover with surround upwards -arrows-.



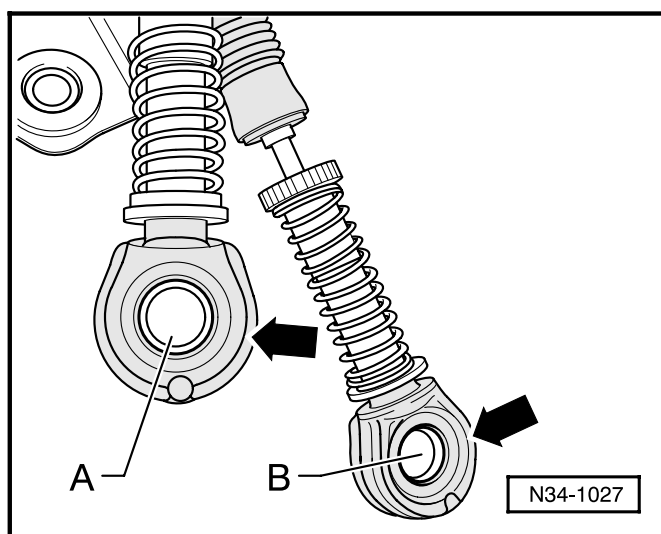
- ◀ - Open collar clamp -arrow- and pull off gear-shift knob together with cover.
- Remove rubber cover, if applicable.



- ◀ - Unscrew fixing nuts -arrow-.



- ◀ - Release double clamp -A- and separate the exhaust system.
- Unscrew cross member -B-
- Remove heat shields -C- and -D-.
- Release fixing screws (item 15) ⇒ page 34-14.5
- Lower shift housing and completely pull with cables toward rear.



Installing

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

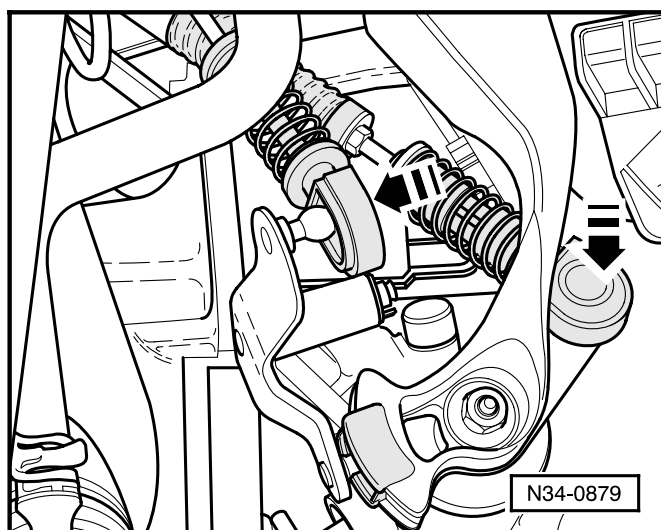
Shift Mechanisms up to 12.00

Replace cable locks if cables will be reused.

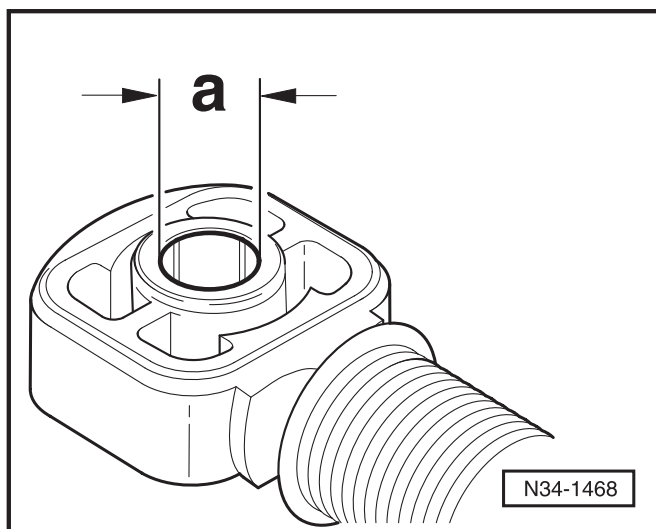
- ◀ - Coat with thin film of grease G 052 142 A2 in the ball head of the cable lock -A- and -B-.

Notes:

- ♦ The seals -arrows- on the outer ball head must be free of grease.



- ◀ - Press the shift cable on the gearshift lever and the selector cable on the circlip -arrows-.

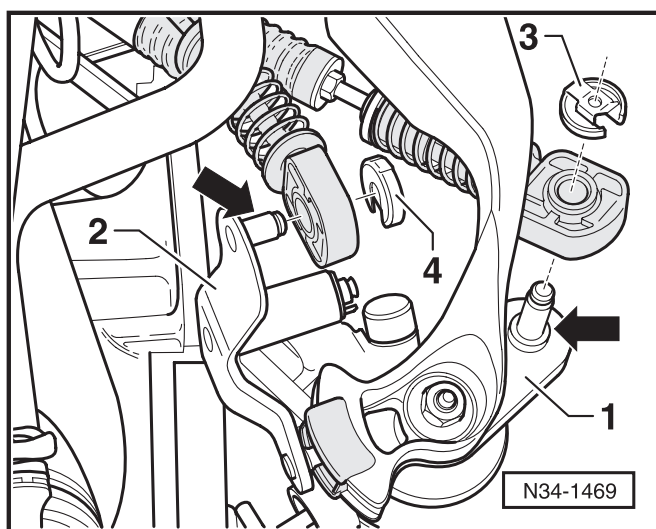


Shift mechanism from 01.01

The holes in the cable locks have different diameters.

Assignment

Cable lock for:	Dimension -a-
Shift cable at gearbox shift lever	10 mm
Selector cable at relay lever	8 mm



The cable locks do not have to be replaced after disassembling.

- ◀ - Coat with thin film of grease G 052 142 A2 pin -arrows- of gearbox shift lever -1- and relay lever -2-.
- Replace the lock washers -3- and -4- after each disassembling
- Secure the shift cable with the lock washer -3- and the selector cable with the lock washer -4-

Continued for all shift mechanisms

- Align shift housing parallel to body.

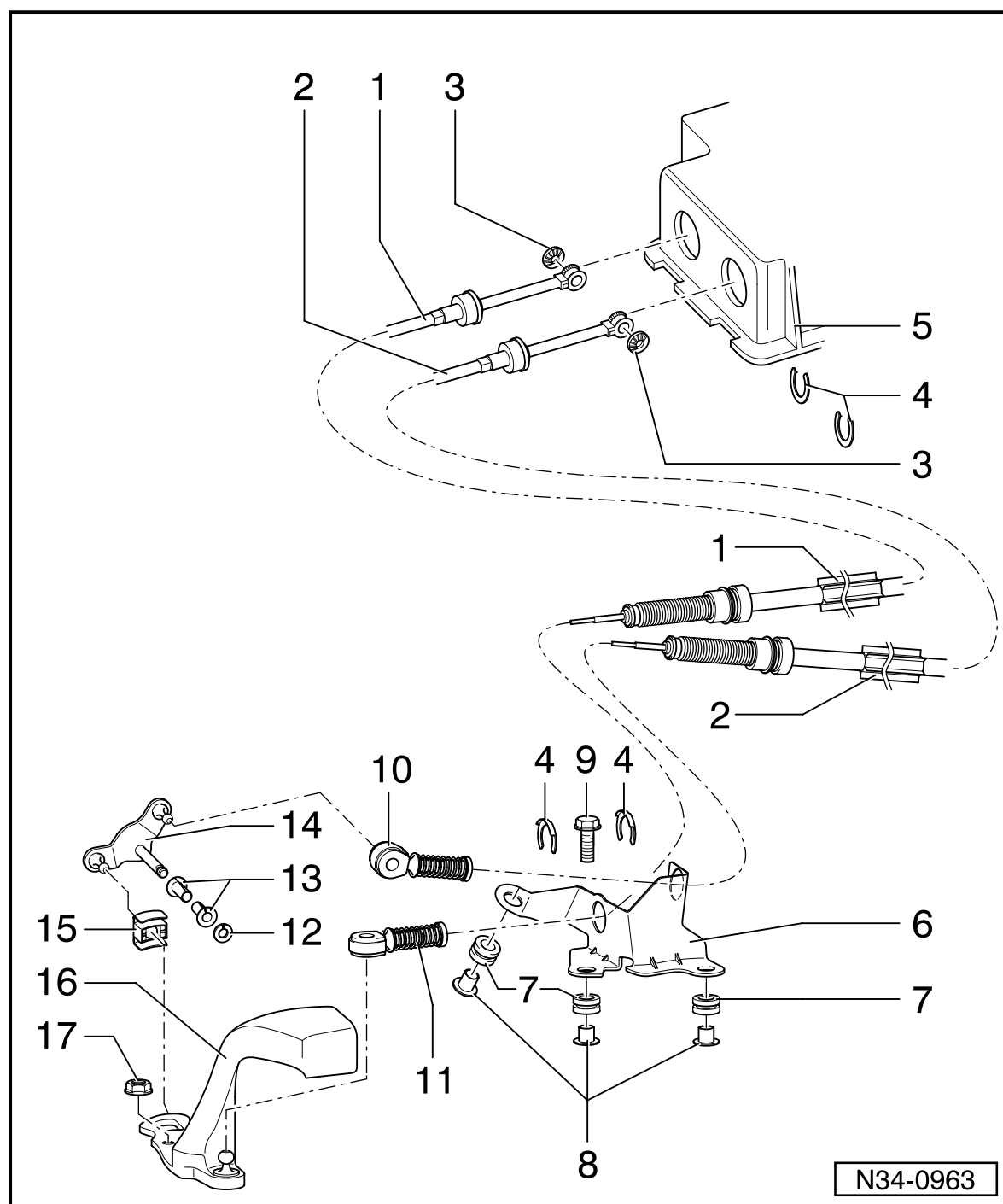
Notes:

- ◆ Replace gasket between shift housing and floor if damaged
- ◆ Setting shift mechanism ⇒ page 34-14.12.
- ◆ Aligning exhaust system:
⇒ Engine, Mechanical Components; Repair Group 26; Removing and installing parts of the exhaust system

Tightening torques

Shift housing to body	25 Nm
Cross member to body	25 Nm
Cable support to gearbox	25 Nm

Removing and installing operating cables - list of components



Note:

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

1 - Shift cable

- ◆ Press onto shift lever guide
- ◆ Installation position ⇒ page 34-14.1

2 - Selector Cable

- ◆ At bell crank
- ◆ Installation position ⇒ page 34-14.1

3 - Lock washer

4 - Lock washer

- ◆ Do not damage cables when removing

5 - Shift housing

6 - Support

7 - Grommet

8 - Spacer**9 - 20 Nm****10 - Cable lock**

- ◆ For selector cable
- ◆ 01.01 ► with through hole
⇒ page 34-14.6

11 - Cable lock

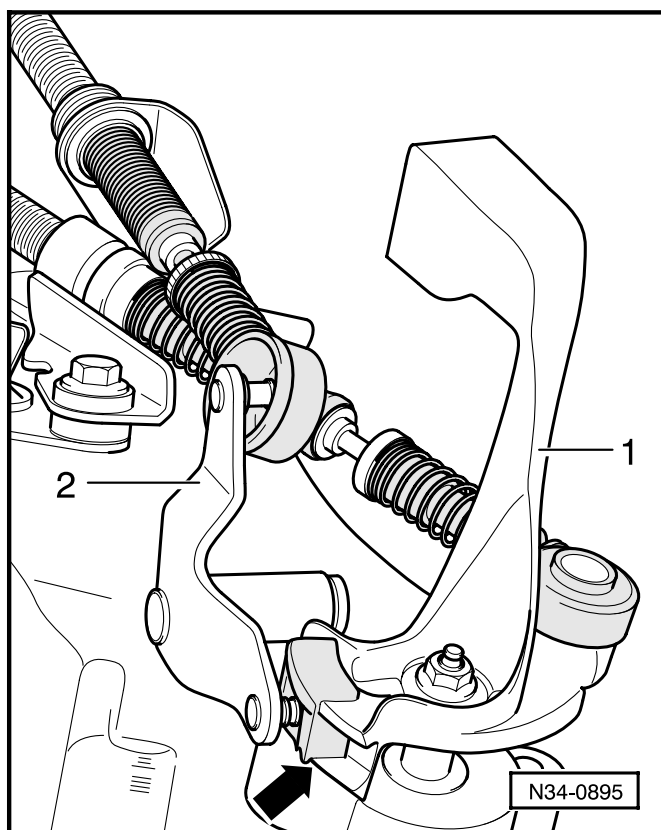
- ◆ For shift cable
- ◆ 01.01 ► with through hole
⇒ page 34-14.6

12 - Lock washer**13 - Bush****14 - Relay lever**

- ◆ Installation position
⇒ page 34-14.11

15 - Sliding shoe**16 - Gearbox shift lever**

- ◆ With balancing weight
- ◆ Insert so that interrupted tooth spacing matches the shift shaft
- ◆ After installing, set shift mechanism
⇒ page 34-14.12
- ◆ Installation position ⇒ page 34-14.11

17 - 20 Nm

◀ **Installation position of gearbox shift lever/
relay lever**

1 - Gearbox shift lever with balancing weight

2 - Relay lever - fits over sliding shoe to engage in sliding rail of gearbox shift lever
-arrow-

Setting shift mechanism

Special tools, testers and aids required

- ◆ T 10027 Locking pin

Notes:

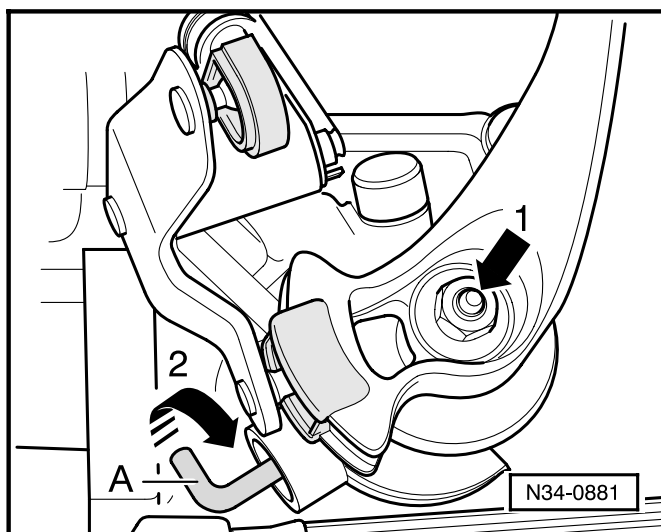
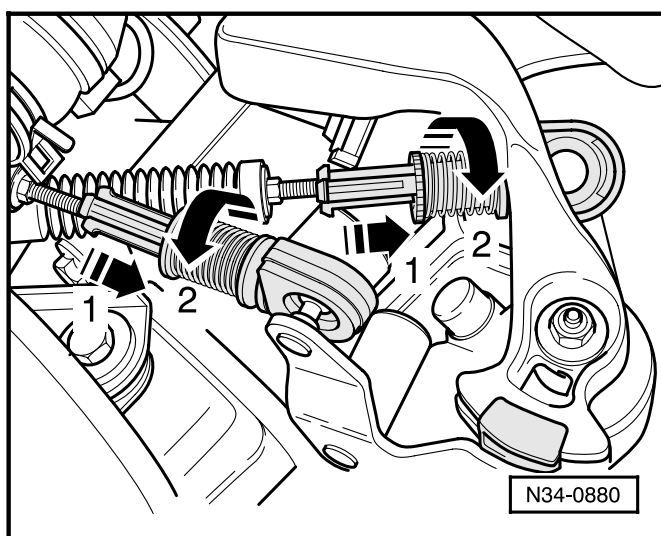
Pay attention to the following points to ensure correct setting of the shift mechanism:

- ◆ Operating and transmission elements of the shift mechanism in proper condition
- ◆ Shift mechanism operates easily

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

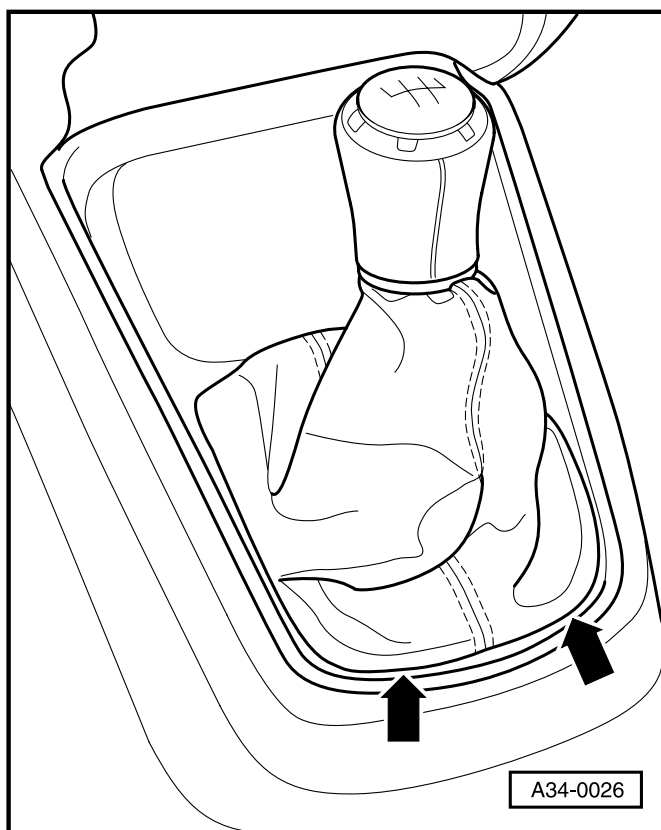
- Gearbox in Neutral

- ◀ - Pull locking mechanism at shift cable and at selector cable forward as far as the stop (arrow -1-) and then lock to the left (arrow -2-)

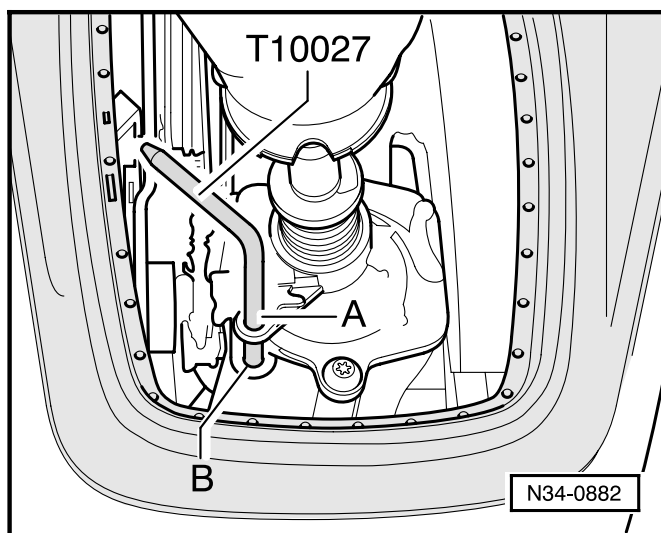


- ◀ Position the shift shaft as follows:

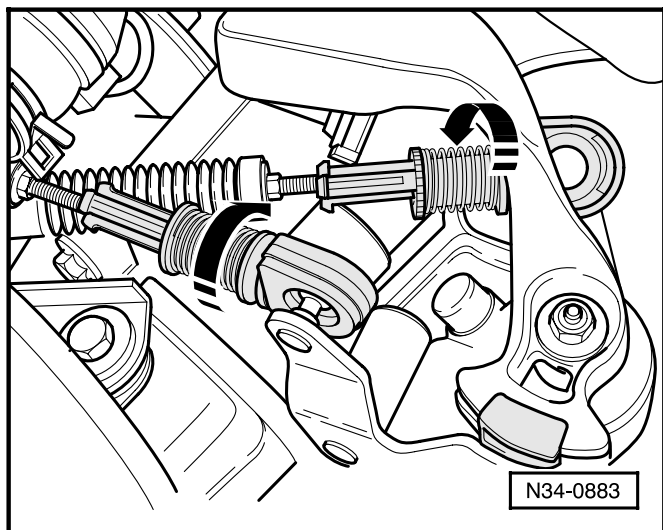
- Press the shift shaft down (direction of arrow -1-).
- When pressing down the shift shaft, turn the locking pin -A- in direction of arrow -2-.



- ◀ - Lift up cover -arrows- and pull out to the rear.
- Pull rubber cover, if fitted, toward shift knob.

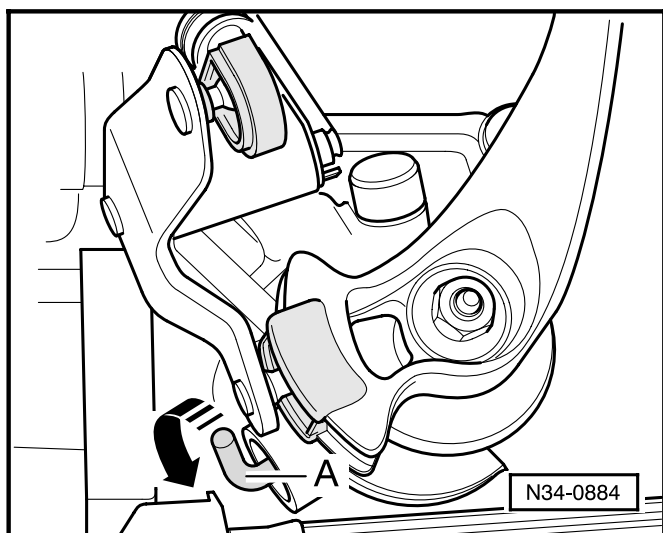


- ◀ Now position the shift lever as follows;
- Insert the locking pin T 10027 through the hole -A- into the hole -B-.

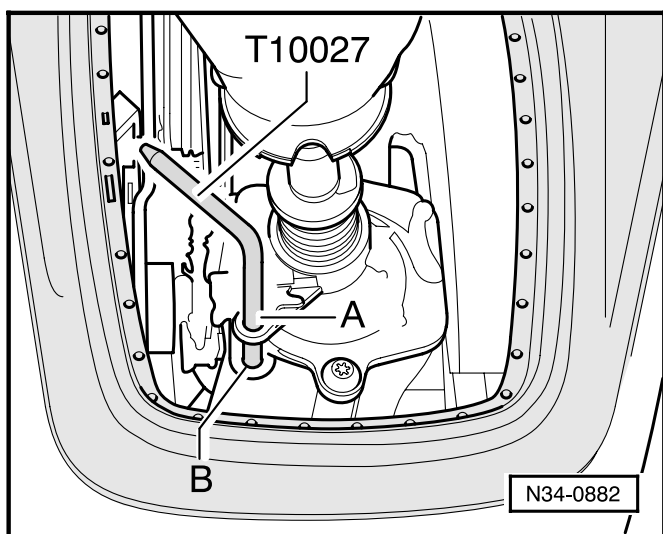


- ◀ - Now, turn the locking mechanism at the shift cable and at the selector cable as far as the stop on the right (direction of arrow).

The spring presses the locking mechanism into the initial position.



- ◀ - Now, turn the locking pin -A- into the initial position (direction of arrow).



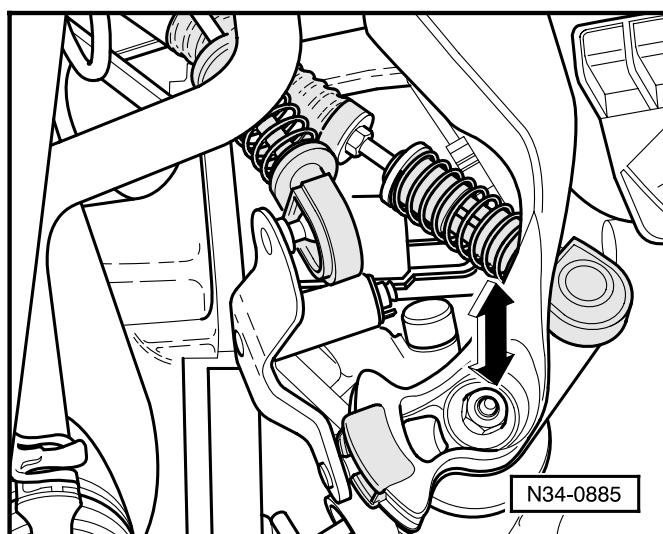
- ◀ - Withdraw the locking pin T 10027 from holes -A- and -B-.
- Insert cover into the surround.

Operation

- Shift lever must be in gate of 3rd/4th gear in Neutral.
- Depress clutch and shift through all gears several times. Pay particular attention to proper operation of the reverse gear lock.

If the gearshift lever catches when repeatedly engaging gear, inspect the play (lift) of this shift shaft as follows:

- Engage 1st gear.
- Press shift lever fully to the left and release again.
- At the same time, observe the shift shaft at the gearbox (2 nd mechanic).
- ◀ - When the gearshift lever is moved, the shift shaft must make a stroke of approx. 1 mm (direction of arrow).
- If this is not the case, set shift mechanism ⇒ page 34-14.12.



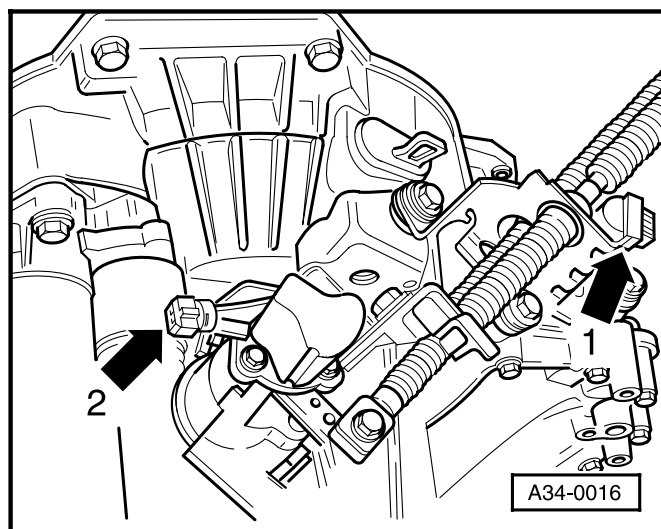
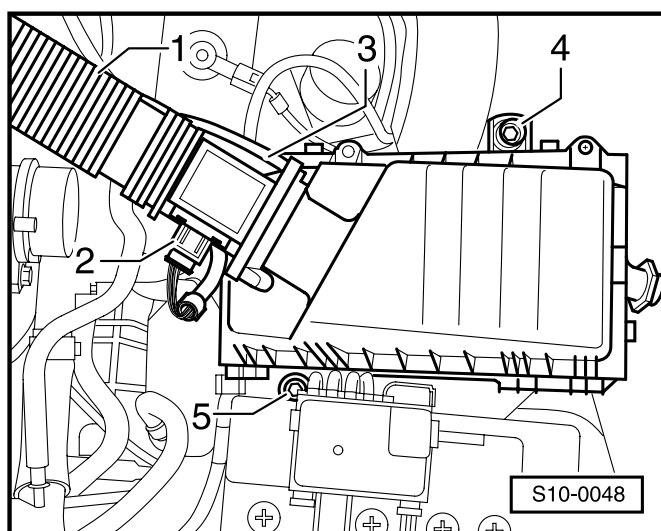
Removing and installing gearbox

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
- ◆ Gearbox mount MP 3-476
- ◆ Adjusting plate MP 3-476/8
- ◆ Transporting device MP 3-478

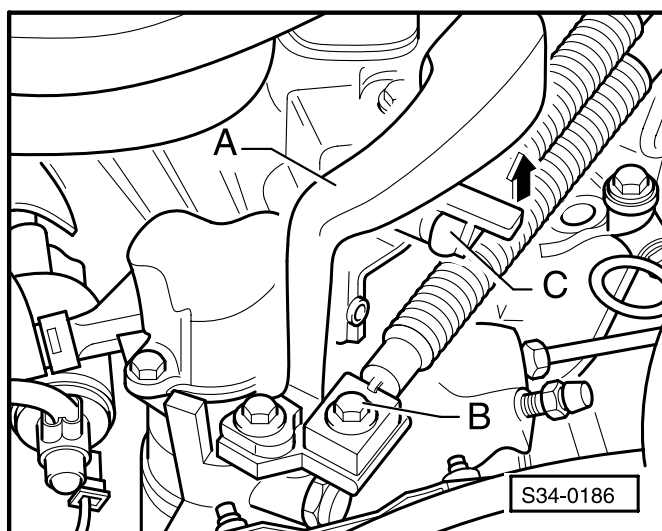
Removing

- Pay attention to coding on models fitted with coded radio set.
- Disconnect earth strap from battery.
- ◀ - Detach air guide hose -1- and unplug connector -2- from the air mass meter.
- Remove air filter housing complete by taking out screws -4- and -5-.
- Detach vent hose -3- (only on models with TDI engine).

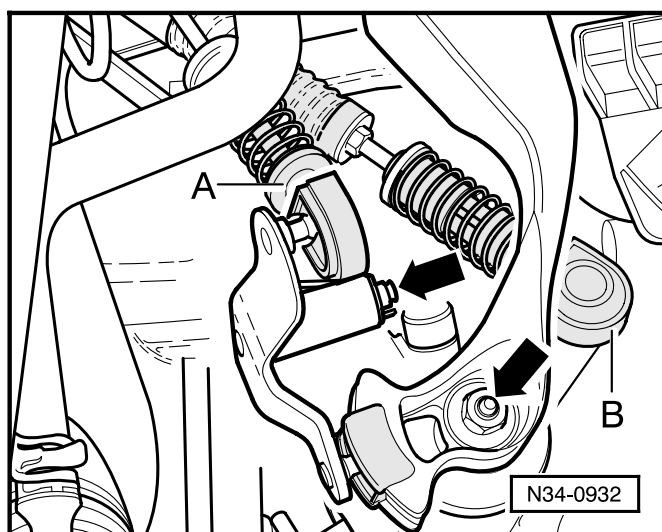


Models ► 04.99

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

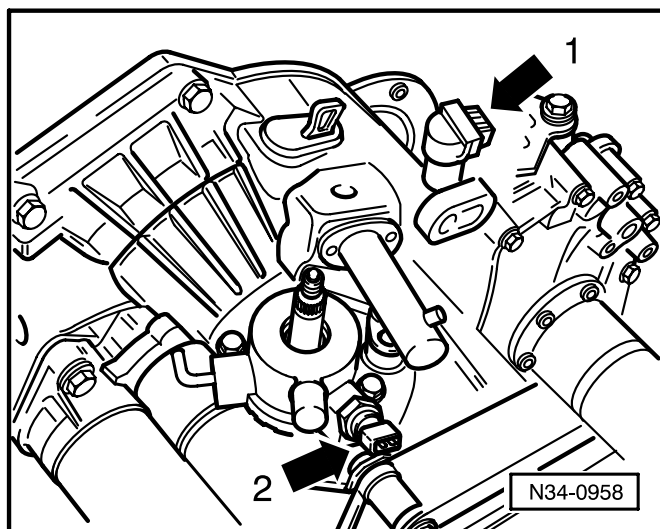


- ◀ - Detach balancing weight -A- and shift cable from gearbox shift lever by unscrewing bolt -B-.
- Take off shift cable together with washer and four-point nut.
- Detach selector cable -C- from follower/relay lever by raising lug in direction of arrow.



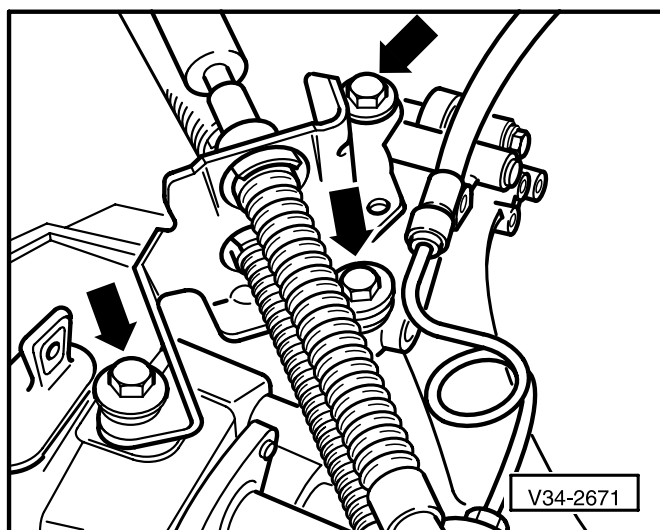
Models 05.99 ►

- ◀ - Detach selector cable -A- together with the relay lever by removing lock washer (arrow).
- Detach shift cable -B- together with gearbox shift lever by unscrewing nut (arrow).
- Then, tie up the shift cable with the gearbox shift lever and the selector cable with the relay lever.

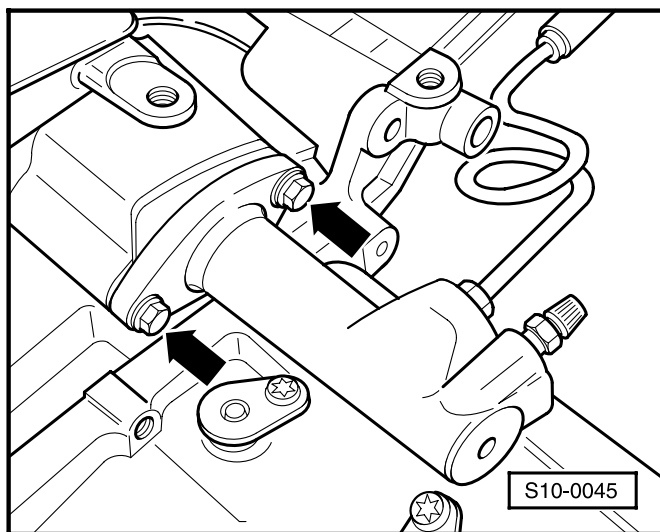


- ◀ - Unplug connector from speedometer sender -arrow 1- and connector for reversing light -arrow 2-.

Continued for all models



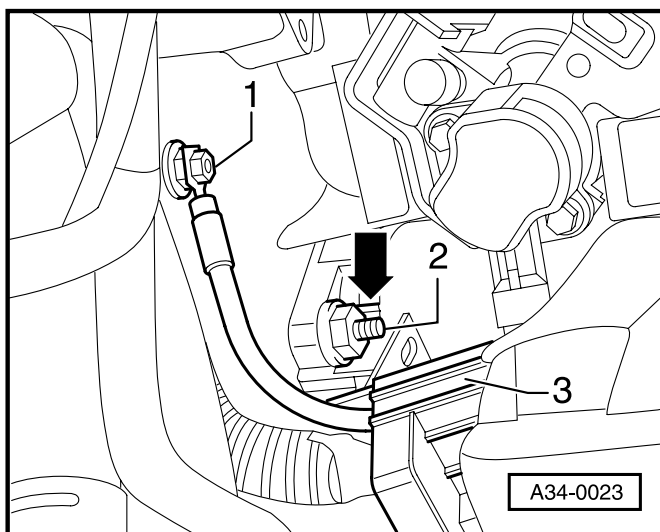
- Unclip hose line of slave cylinder at cable support.
- ◀ - Detach cable support from gearbox (arrows) and place down to the side.



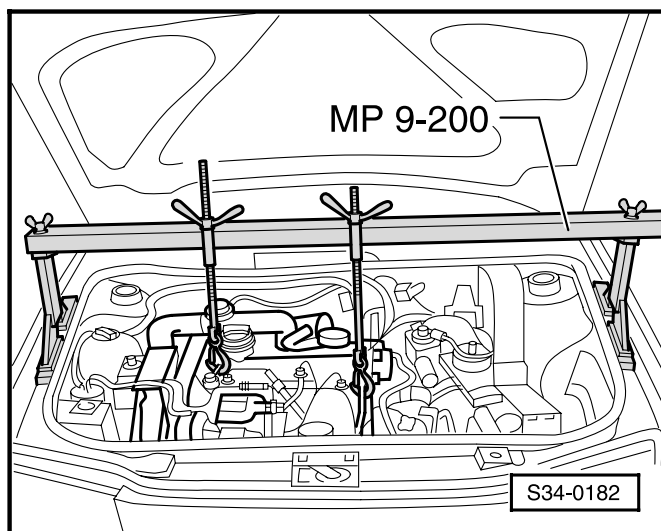
- ◀ - Remove slave cylinder and place down to the side, secure with wire. Do not open line system.

Note:

Do not depress clutch pedal.



- ◀ - Detach earth strap from bolt connecting engine/gearbox at top -1-.
- Remove all the bolts connecting engine/gearbox at top.
- Unscrew cable holder -3- at the top of the starter -arrow- and place to the side.
- Unscrew bolt attaching starter at top -2-.

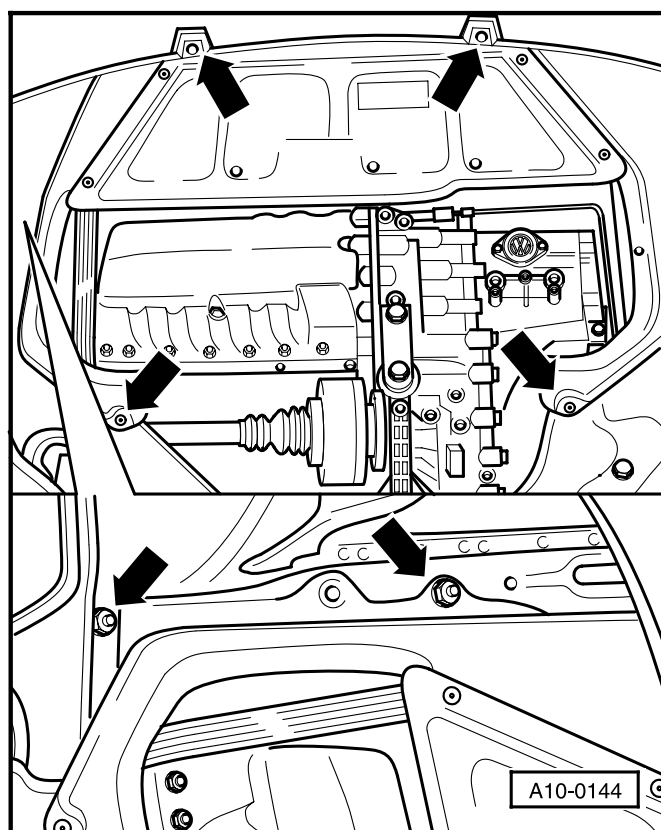


- ◀ - Install supporting device MP 9-200.

Note:

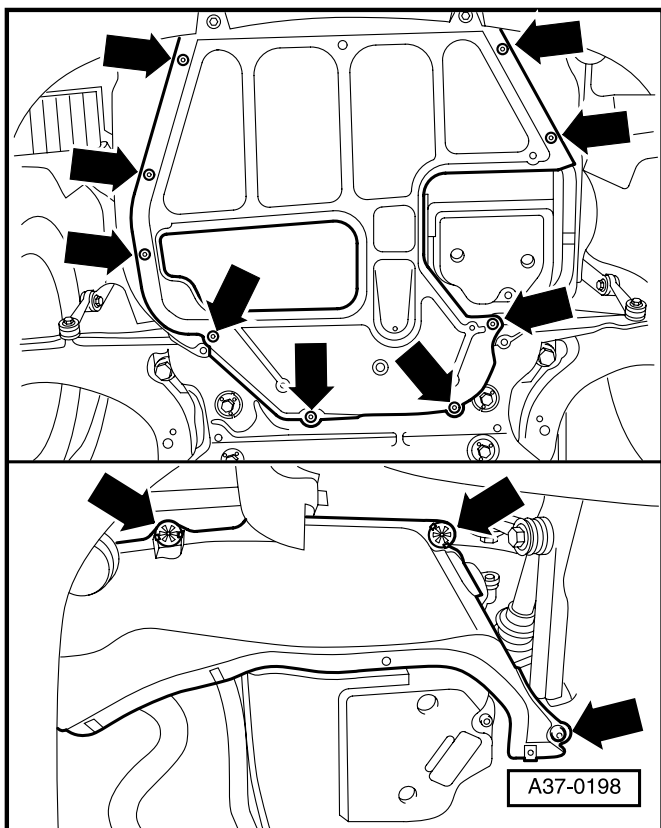
When fitting on the hooks of the supporting device, pay attention to the hose and cable connections in the area of the lifting eyes of the engine to ensure that these are not damaged.

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



Models with petrol engine:

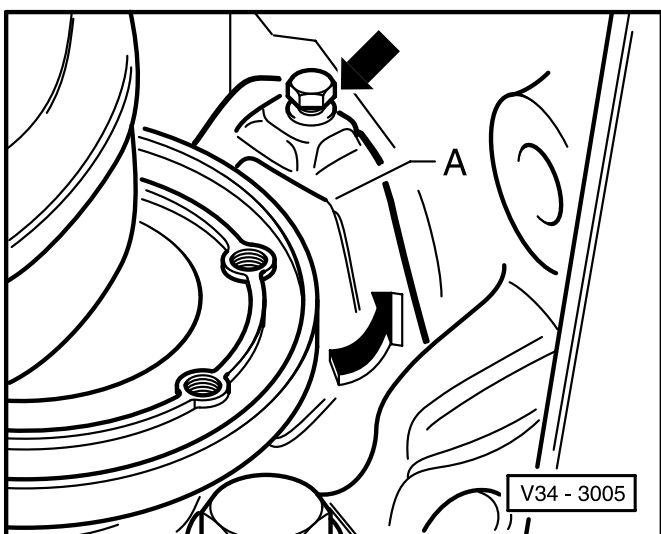
- ◀ - Remove noise insulation by taking out screws -arrows-.

**Models with TDI engine:**

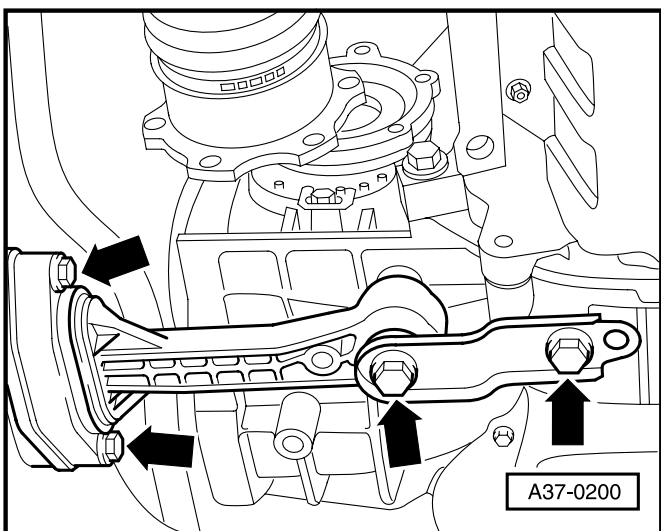
- ◀ - Remove noise insulation panel by unscrewing bolts -arrows-.

Continued for all models:

- Remove starter:
⇒ Electrical System; Repair Group 27; Removing and installing starter.
- Unbolt bracket for cable of PAS from gear-box.
- If fitted, take protective cap for inner right-hand CV joint off the engine.



- ◀ - Remove small cover plate -A- for flywheel behind the right-hand flange shaft (arrows).
- Detach the drive shafts from the flange shafts, turn steering to full left lock and tie up drive shafts as far as possible. Do not damage surface protection when doing this.

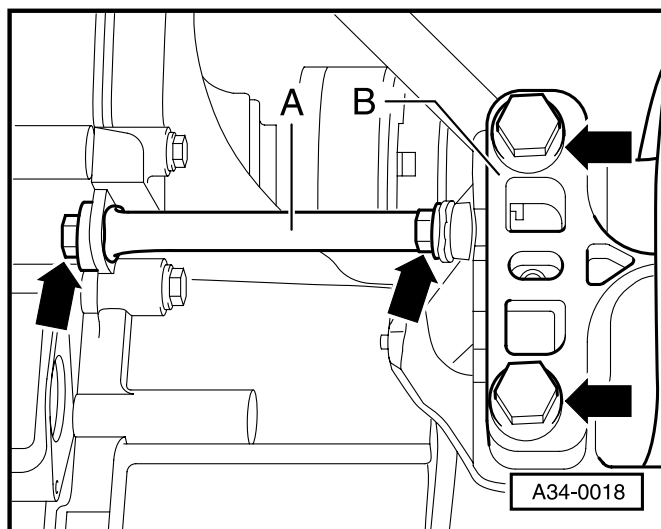


- Separate exhaust system downstream of catalytic converter:
⇒ 4-Cylinder Engine, Mechanical Components; Repair Group 26; Removing and installing parts of the exhaust system.

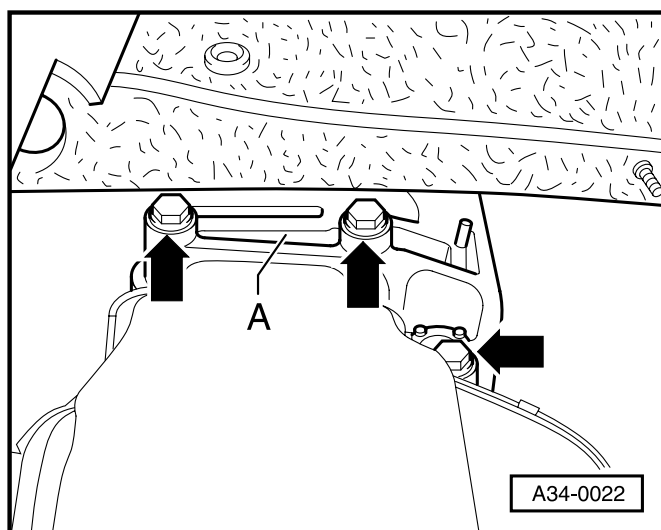
Note:

- ♦ On models with TDI engine, the exhaust pipe bracket on the subframe has to be removed.

- ◀ - Unbolt pendulum support -arrows-.



- ◀ - Unbolt support -A-.
- Unscrew the securing bolts -arrows- from the left gearbox mount -B-.



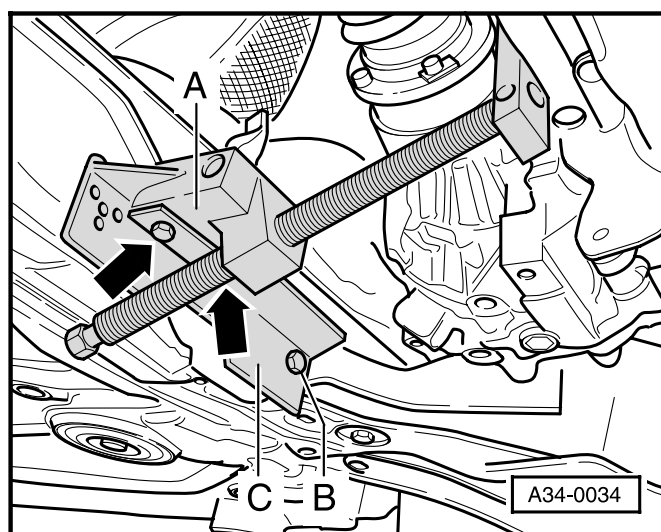
- ◀ - Take gearbox supporting bracket -A- off the gearbox.

Unscrew the securing bolts -arrows- for the gearbox supporting bracket as follows:

- Lower engine/gearbox assembly with the two spindles sufficiently far until the securing bolts of the gearbox supporting bracket -A- are accessible from the left wheelhouse.

Note:

Pay attention to the PAS pipe when altering the position of the engine/gearbox assembly.



A - Forcing device MP 3-470

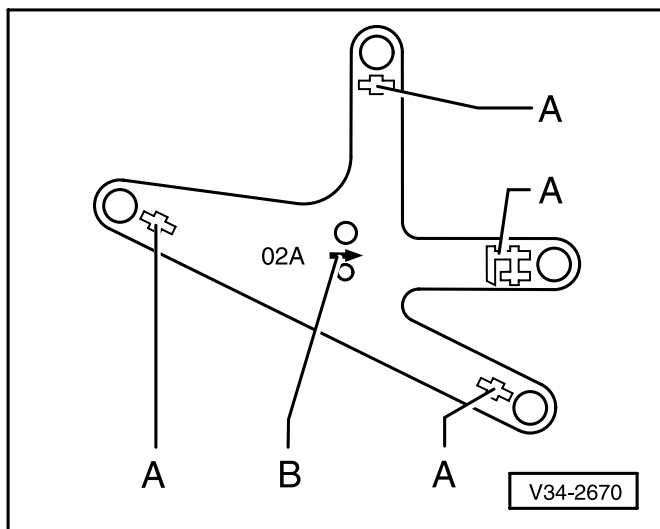
B - M8 x 25 bolt

C - Mounting rails MP 3-457

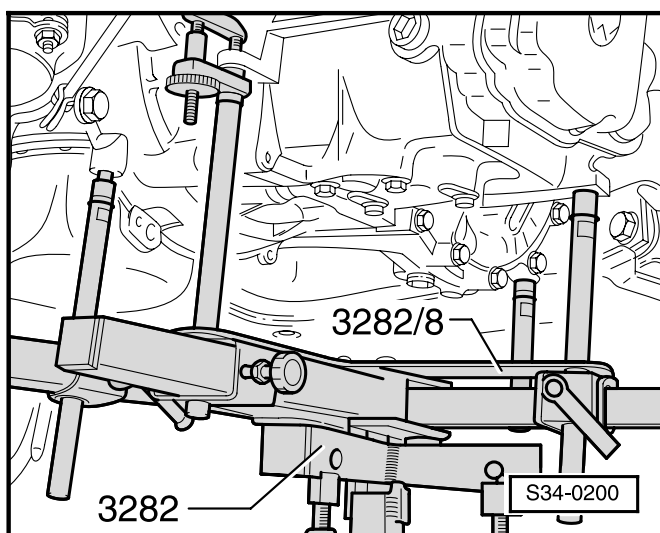
- ◀ - Attach special tool -C- to subframe (attachment of pendulum support) with bolt -B-.
- Insert forcing device -A- and tighten bolts -arrows-.
- Press engine/gearbox forward.

Note:

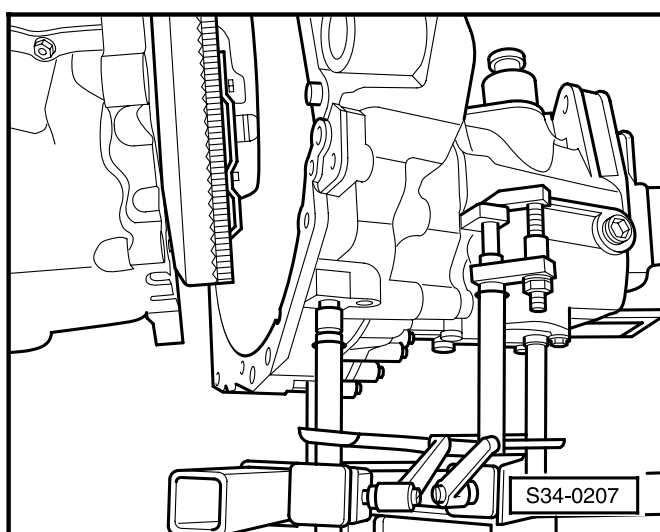
Pay attention to PAS pipe.



- Fit together the gearbox jack with gearbox mount 3282, adjusting plate 3282/8 for gearbox „02A“ and mounting elements as follows:
 - Fit adjusting plate 3282/8 onto gearbox mount 3282 (adjusting plate fits only in one position).
 - Align the arms of the gearbox mount to match the holes in the adjusting plate.
- ◀ - Screw in the mounting elements -A-, as shown on the adjusting plate.



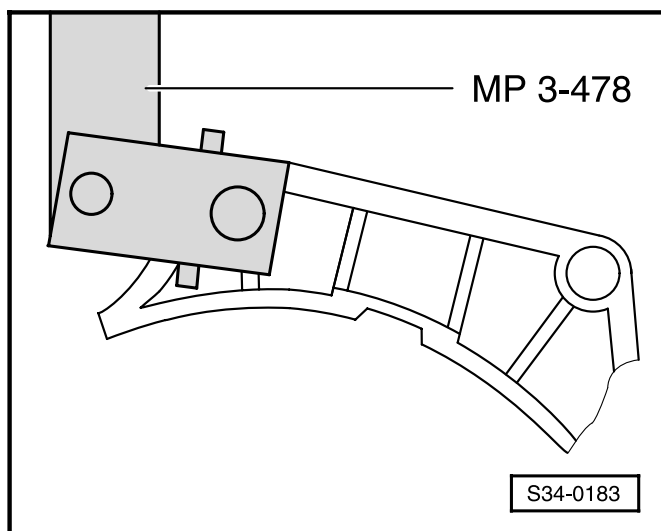
- ◀ - Position gearbox jack below vehicle; arrow symbol -B- (⇒ Fig. V34-2670 on page 34-20) on adjusting plate faces in direction of travel/ vehicle.
- Align adjusting plate parallel to gearbox and fix locking mount in place at gearbox.
 - Remove the bottom bolts for attaching engine/gearbox.



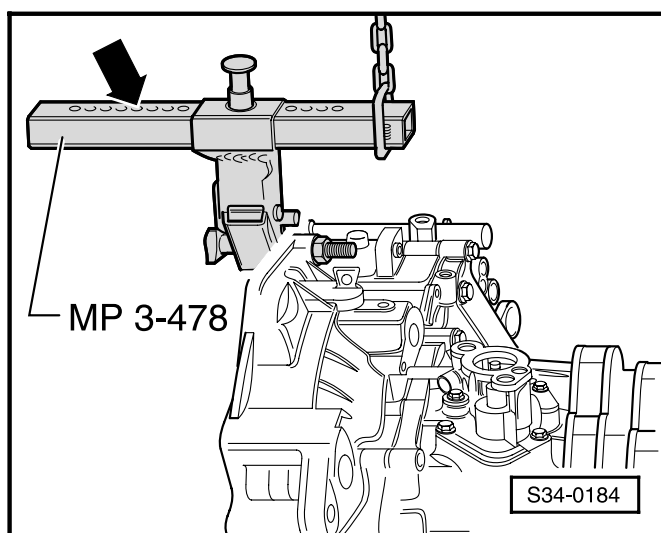
- ◀ - Press gearbox off the engine and turn toward the subframe.
- Carefully lower gearbox; adjust the position constantly at the spindles of the gearbox jack.

Note:

Pay attention to PAS pipe when lowering the gearbox.



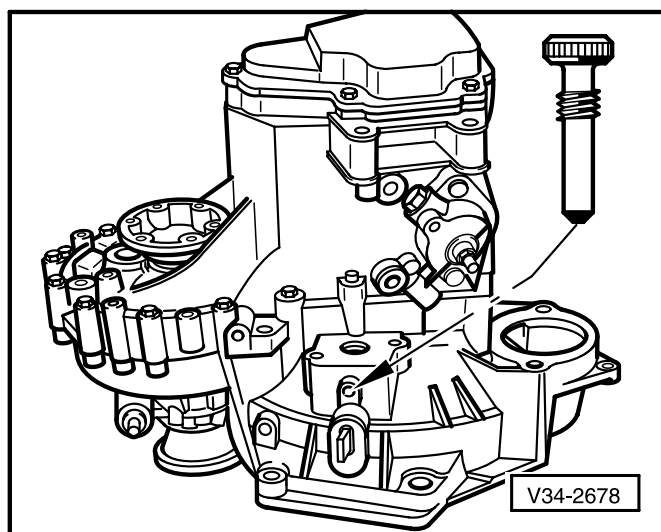
- ◀ - Bolt gearbox suspension device MP 3-478 to clutch housing.



- ◀ - Set supporting arm at slide with locking bolt (arrow).

Number of holes visible = 5

- Take up gearbox using workshop crane and gearbox suspension device MP 3-478.
- Place down gearbox, e.g. in container.



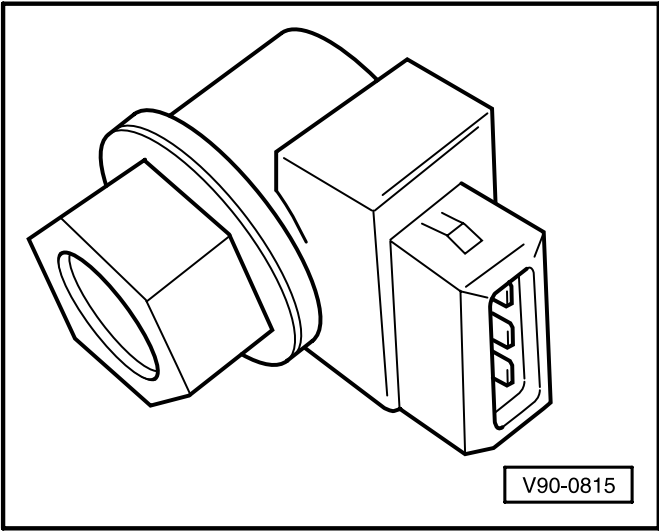
Installing

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

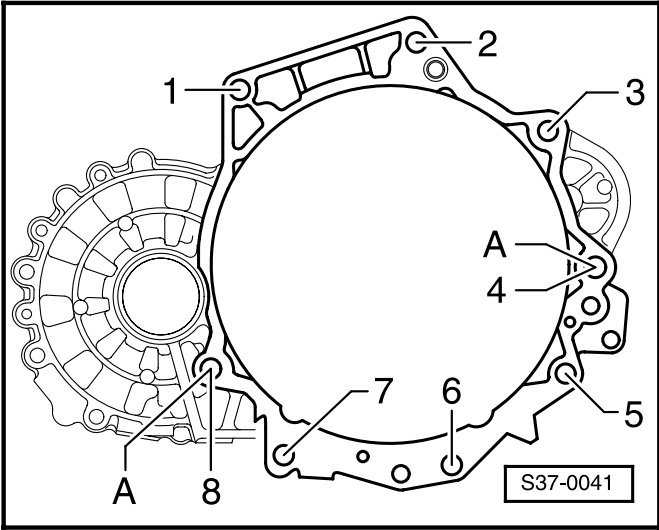
⇒ 4-Cylinder Engine, Mechanical Components; Repair Group 10; Removing and installing engine.

Notes:

- ◀ ♦ Press clutch release lever toward gearbox housing before installing the gearbox and secure with assembly bolt or M8 x 35 bolt. After installing gearbox, remove bolt. Hole is then sealed by the 3rd securing bolt for supporting bracket/operating cables.
- ♦ Clean splines of input shaft and apply a light film of G 000 100 grease.



- ◀ ♦ If the gearbox is replaced, use existing speedometer sender (Fig.), gearbox shift lever (item 7 ⇒ page 34-3) and relay lever, if fitted.
- ♦ If the gearbox is replaced, ensure the intermediate plate is correctly installed.
- ♦ Check whether dowel sleeves for centring engine/gearbox are present in the cylinder block; insert if necessary.
- ♦ Replacing seal of drive shaft
⇒ Running Gear; Repair Group 40; Servicing drive shaft
- ♦ Installing starter and cables
⇒ Electrical System; Repair Group 27; Removing and installing starter.
- ♦ Inspecting gear oil ⇒ page 34-23.
- ♦ Setting shift mechanism 04.99
⇒ page 34-12.
- ♦ Setting shift mechanism 05.99
⇒ page 34-14.11.



Tightening torques

◀ Gearbox to engine

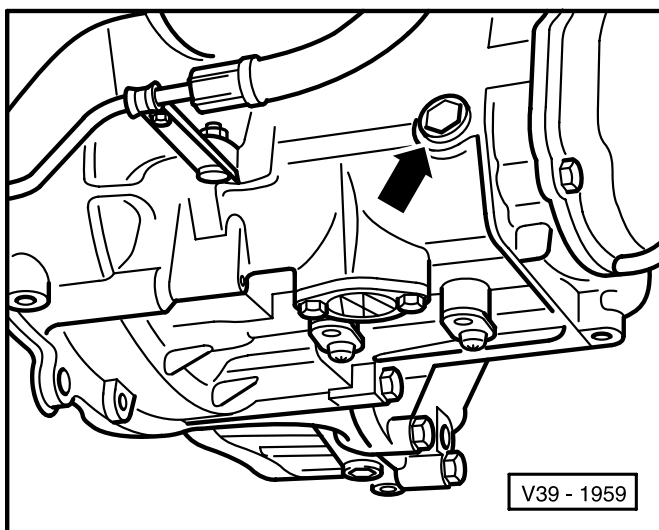
Item	Bolt	Qty.	Nm
1	M 12 x 55	1	80
2 ¹⁾	M 12 x 55	1	80
3 ¹⁾	M 12 x 150	1	80
4 ¹⁾	M 12 x 150	1	80
5	M 10 x 50	1	45
6	M 10 x 50	1	45
7	M 10 x 50	1	45
8	M 12 x 55	1	80

¹⁾ M8 bolt with threaded pin

A: Dowel sleeves for centring

Drive shaft to flange shaft:
⇒ Running Gear; Repair Group 40; Installation overview of wheel location, suspension strut, drive shaft, brake

Components	Tightening torques
Support to gearbox M8	25 Nm
Support to gearbox mounting bracket M8	25 Nm
Cable support bracket to gearbox	20 Nm
Cable to gearbox shift lever	25 Nm
Balancing weight to gearbox shift lever ► 04.99	20 Nm + 90°
Gearbox shift lever with balancing weight 05.99 ►	20 Nm



Inspect gear oil

Gear oil specification ⇒ page 00-2.

- ◀ - Unscrew gear oil filter plug -arrow-.

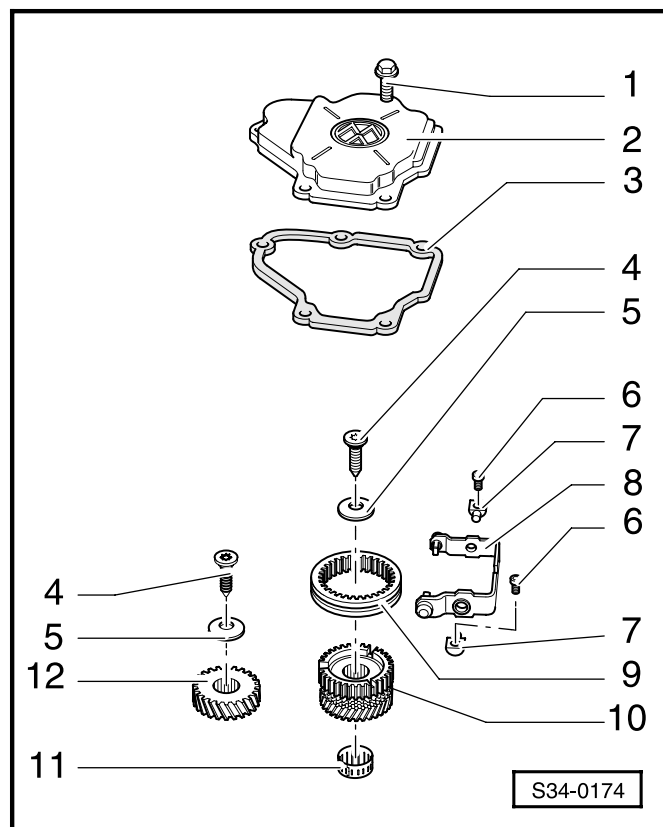
The oil is at correct level if the gearbox is filled up to the lower edge of the oil filler hole.

- Screw in plug -arrow- - 25 Nm.

Pay attention to the following points when refilling:

- Unscrew plug -arrow-.
- Pour in gearbox oil up to lower edge of filler hole and screw in plug.
- Screw in plug -arrow-
- Start engine, engage gear and allow gearbox to rotate for about 2 minutes.
- Switch off engine, unscrew plug -arrow- and once again fill up gear oil to lower edge of filler hole.
- Screw in plug -arrow- - 25 Nm.

Removing and installing cover for gearbox housing and 5th gear



1 - Hexagon screw, 14 Nm

- ◆ For cover at gearbox housing

2 - Cover for gearbox housing

Note:

If the gearbox housing cover is fitted with the gearbox mounted, inspect the oil level:

- Pour in oil up to lower edge of filler hole and plug filler hole with screw plug.
- Start engine, engage gear and allow gearbox to rotate for about 2 minutes.
- Switch off engine and once again fill up gear oil to lower edge of filler hole.

3 - Seal

4 - Inside Torx screw M10, 80 Nm

- ◆ Holds disc spring in position with sleeve socket on screw head

5 - Pressure plate

- ◆ Install ⇒ page 34-30

6 - Filister head screw, 25 Nm

- ◆ For bearing pins on the gearbox housing

7 - Bearing pins

8 - Shift fork for 5th gear

- ◆ Disassembling and assembling ⇒ page 34-50
- ◆ Setting ⇒ page 34-30

9 - Sliding sleeve for 5th gear

- ◆ Fitting location ⇒ page 34-29
- ◆ Setting ⇒ page 34-30

10 - Synchroniser body with sliding gear and synchroniser ring for 5th gear

- ◆ Disassembling and assembling ⇒ page 34-28

11 - Needle bearing

12 - Gear pinion for 5th gear

- ◆ Fitting location ⇒ page 34-28

Disassembling

Special tools, testers and aids required

- ◆ Two-arm extractor for example Kukko 20/10 with hook Matra V/170
- Raise vehicle.
- Remove left front wheel.
- Remove wheelhouse liner.
- ⇒ Body Work; Repair Group 66; remove and install front wheelhouse liner.

Vehicles equipped for bad road conditions

- Remove steel sheet under engine compartment.

Vehicles with xenon headlights

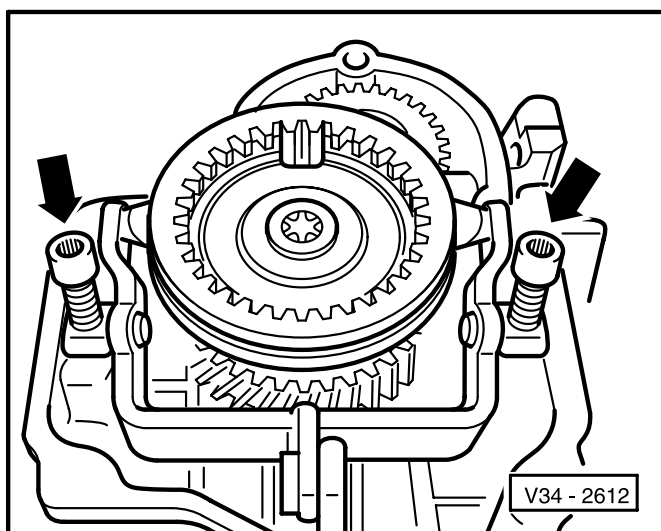
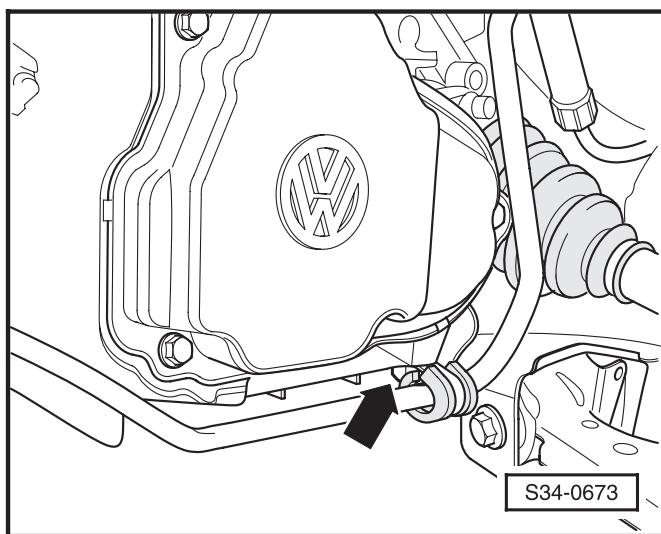
- Remove front left vehicle level sensor.
- ⇒ Electrical installation; Repair group 94; remove and install front sensor.

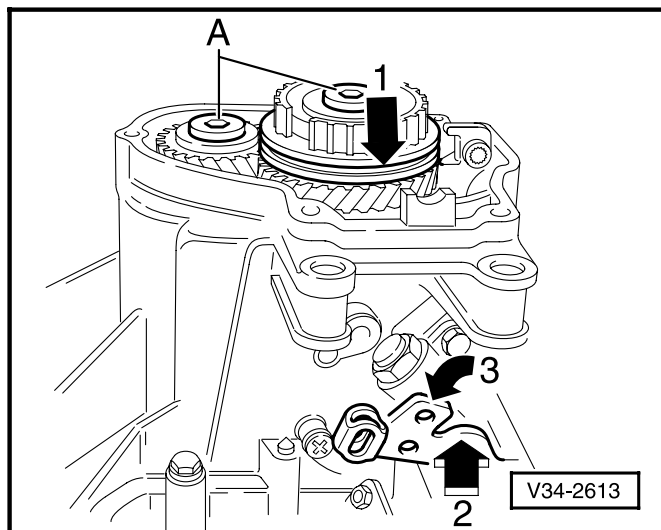
Continued for all vehicles

- Drain out gear oil, by unscrewing oil drain plug.
- ◀ - Unscrew fixing screw -arrow- for cable of power steering.
- Press down carefully cable of power steering.
- Position catch pan underneath.
- Unscrew fixing screws for cover of gearbox housing and remove gearbox cover.
- ◀ - Remove shift fork for 5th gear -arrow-

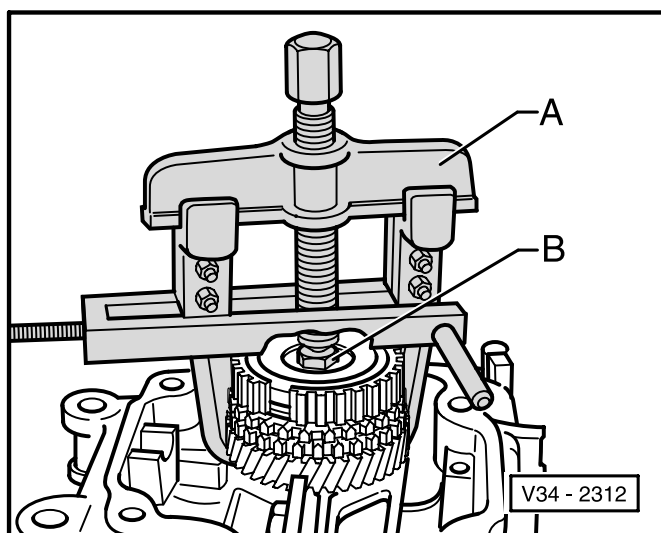
Note:

Take off spring and locking pieces before pulling upward sliding sleeve. Then secure sliding sleeve without shift forks again on the synchroniser body.





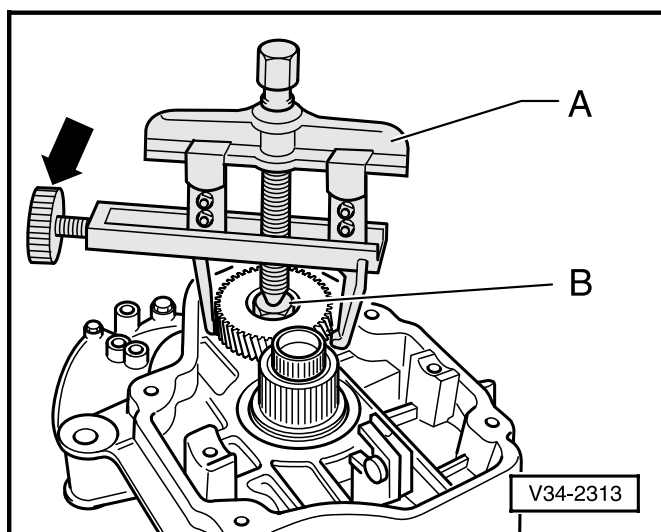
- ◀ - Release nuts -A- for synchroniser body and 5th gear pinion, while engaging the 5th gear (arrow 1) and 1st gear (arrow 2 and 3)
- When engaging both gears, the drive shaft and output shaft are blocked, synchroniser body and speed gear cannot rotate. Now it is possible to release the two bolts.



- Remove the 5th gear sliding sleeve.
- ◀ - Pull off synchroniser body with 5th speed sliding gear and remove with needle bearing.

A - Two-arm extractor for example Kukko 20/10 with hook Matra V/170

B - Hexagon screw M10 x 20



Notes:

When pulling off gear pinion, make sure the hooks do not bend outward, if necessary tighten screw (arrow). Check 5th gear for damages after removing.

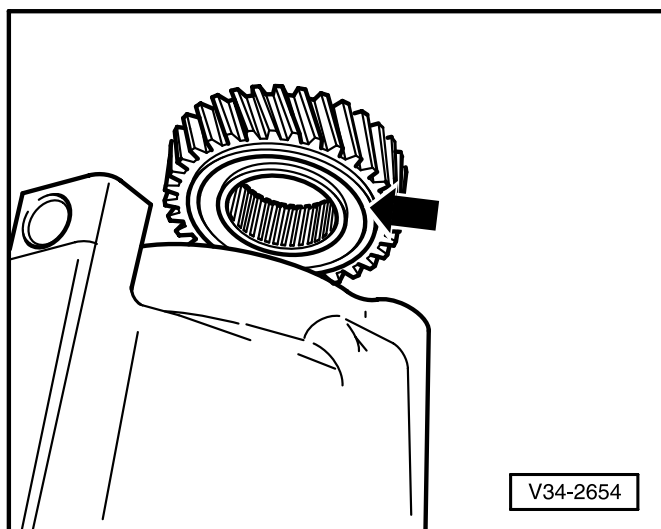
- ◀ - Pull off 5th speed sliding gear.

A - Two-arm extractor for example Kukko 20/10 with hook Matra V/170

B - Hexagon screws M10 x 20

Mounting sequence:

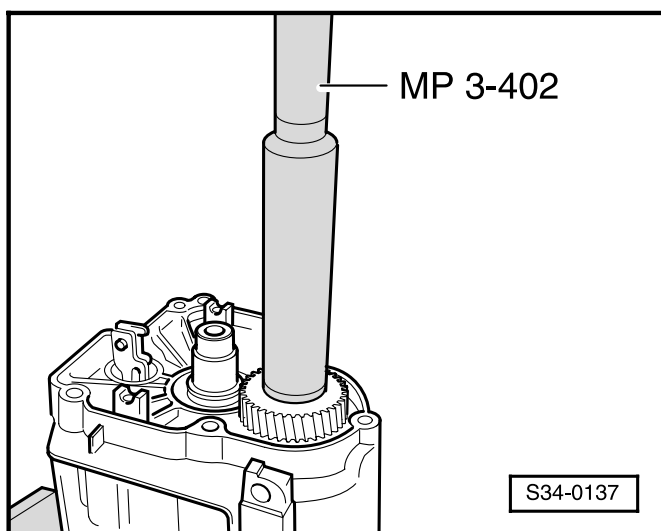
Set up two-arm extractor and centre by turning the screw (arrow). If necessary heat pinion with hot-air blower (e.g. V.A.G 1416) and remove with two-arm extractor.



Assembling

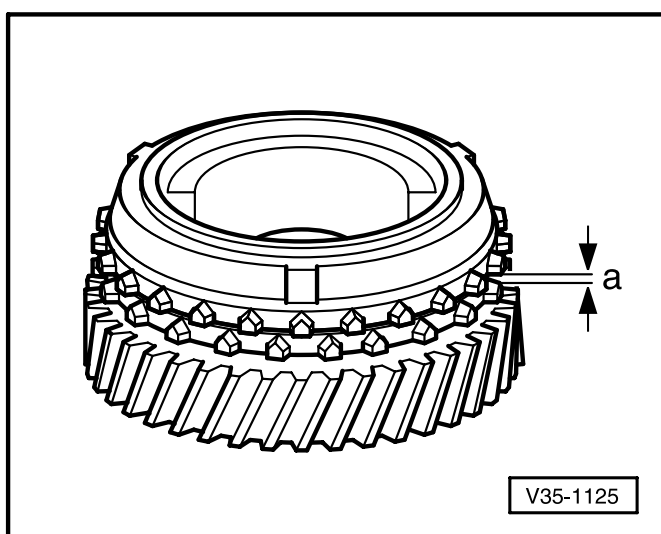
◀ Fitting position for 5th speed gear

The circular nut (arrow) points toward the gear-box housing.



- Warm up 5th speed gear up to 100 °C.

◀ - Install 5th speed gear.

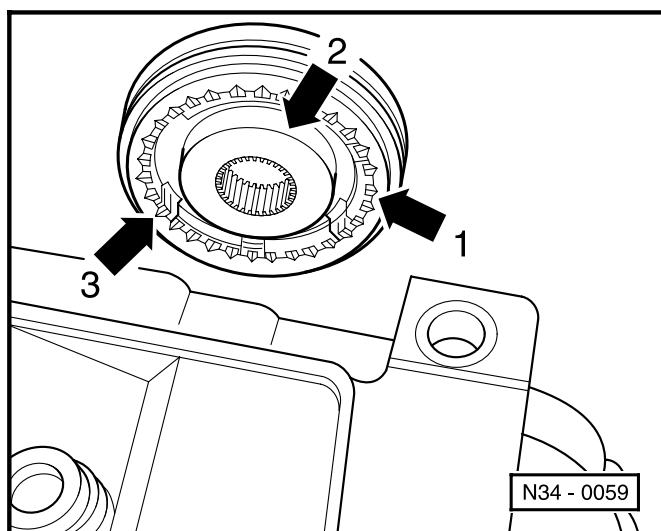


Check 5th gear synchroniser ring

◀ - Before refitting the 5th sliding gear and synchroniser ring press the synchroniser ring on the cone of the sliding gear and measure clearance -a- with a feeler gauge.

	Fitting measure	Determining wear thickness
Measure clearance -a-	1.1 ... 1.7 mm	0.5 mm

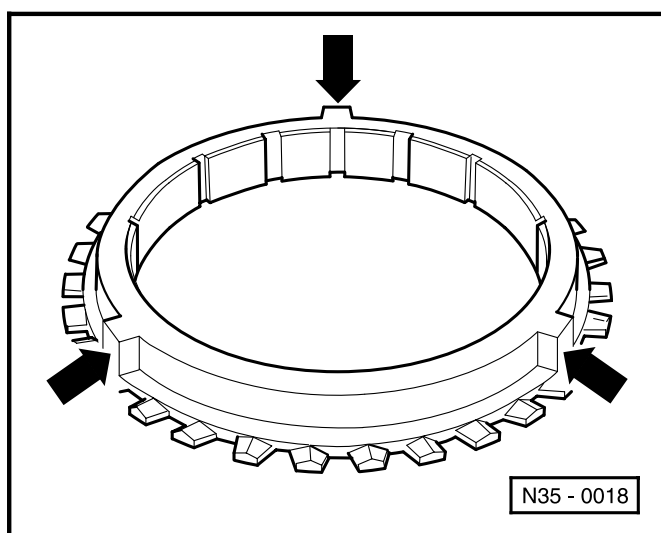
- Set up 5th speed sliding gear with needle bearing
- Set 5th gear synchroniser ring on sliding gear
- Assemble before installing 5th gear synchroniser body/sliding sleeve ⇒ page 35-8



◀ **Fitting position for 5th gear synchroniser body/sliding sleeve**

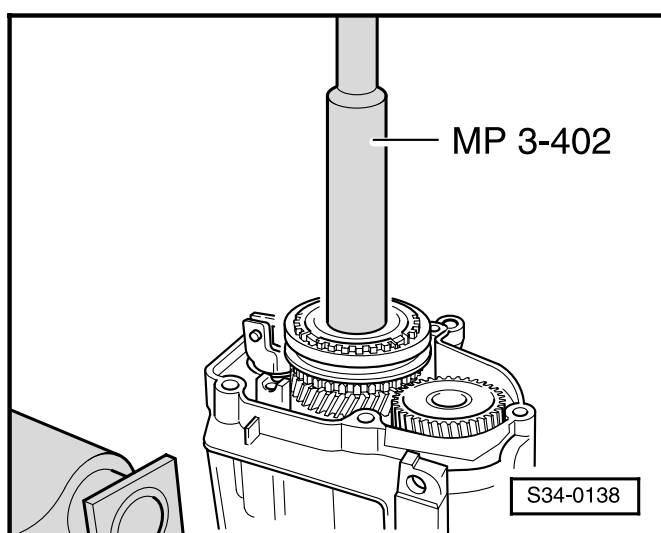
The sharp teeth of the sliding sleeve (arrow 1) and the high collar of the synchroniser body (arrow 2) point toward the gearbox housing.

The supports of the synchroniser body are on the same line as the integrated arresters of the synchroniser ring (arrows in Fig. N35-0018 ⇒ page 34-29).



◀ **5th gear synchroniser ring with integrated arresters -arrows-**

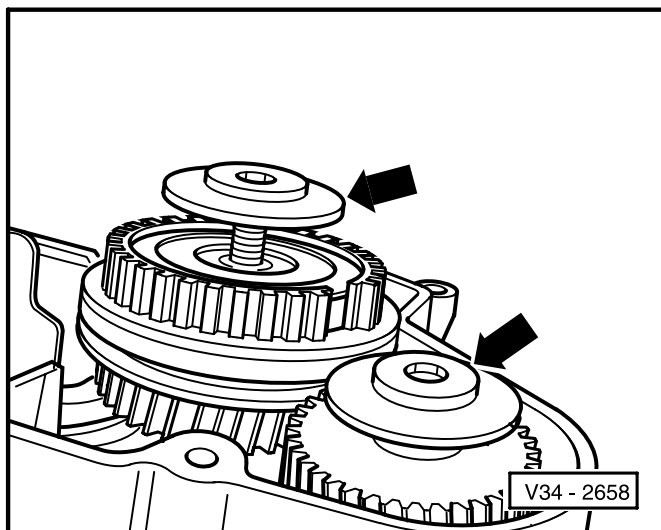
- Heat 5th gear synchroniser body/sliding sleeve to approx. 100 °C.



◀ - Drive in 5th gear synchroniser body/sliding sleeve

Note:

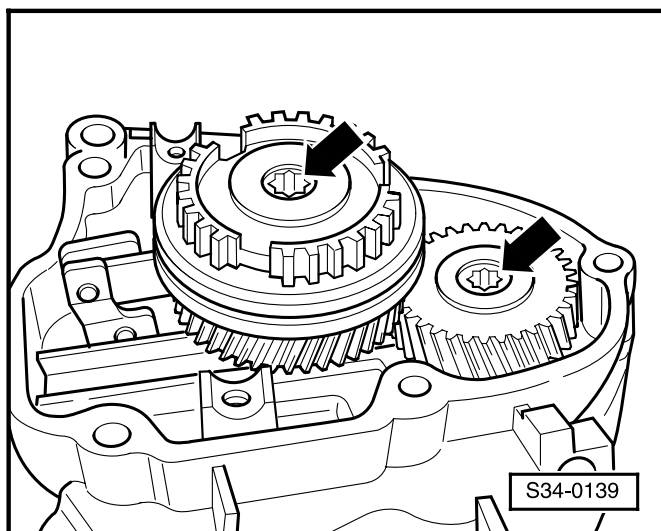
Pay attention to the free travel of the synchroniser ring during the driving in operation.



- Screw in bolts attaching the 5th speed gear and synchroniser body.

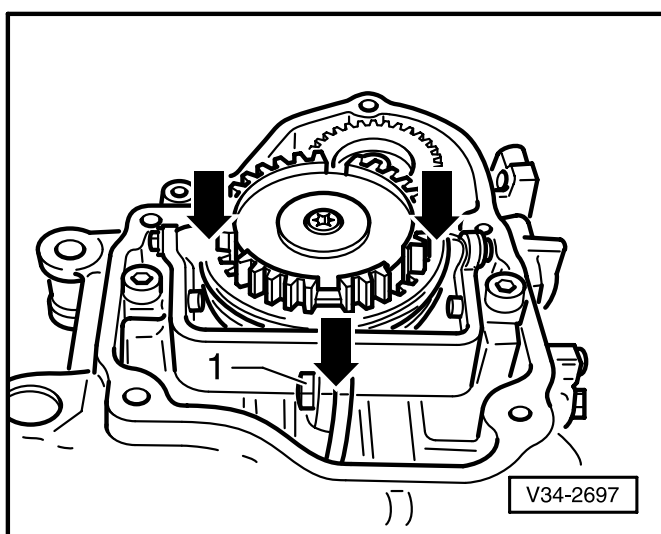
◀ **Installation position of the dished washers for bolts attaching 5th speed gear and synchroniser body**

The outer diameter (concave side -arrows-) points to the 5th gear.



- ◀ - Engage 2 gears before tightening the bolts attaching the 5th speed synchroniser body gear (arrows) (⇒ page 34-27, Fig V34-2613).

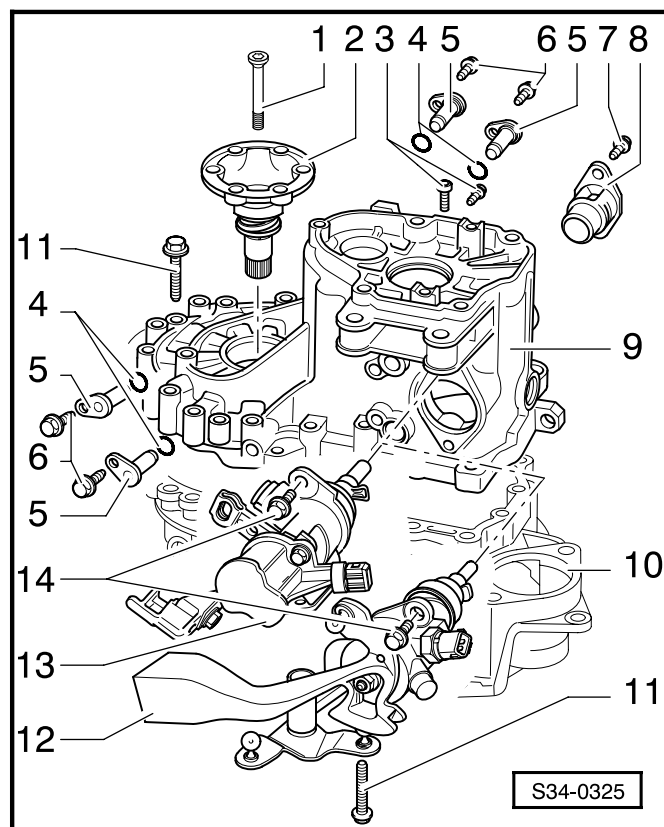
- Install 5th speed shift fork.



Setting the 5th gear

- ◀ - Engage 5th gear. Slacken screw -1-. Press sliding sleeve and shift fork in direction of arrow (pay attention to segment centering of the shift forks in the sliding sleeve groove) then tighten bolt -1- to 25 Nm.
- Inspection measurement:
It must not be possible to insert a 0.2 mm feeler gauge between sliding sleeve and sliding gear.
- Take out of 5th gear. Sliding sleeve must now be in neutral position. Synchroniser ring must move freely.
- Further installation must be carried out in reverse order.

Removing and installing gearbox housing and shift mechanism



Special tools, testers and aids required

- ◆ Sealant AMV 188 200 03

1 - Tapered screw, 25 Nm

2 - Flange shaft with compression spring

- ◆ Remove and install ⇒ page 39-12
- ◆ Fit remaining parts ⇒ page 39-5, from item 18

3 - Hexagon torque screw, 30 Nm

- ◆ For reverse idler shaft support
- ◆ Self-locking
- ◆ Always replace

4 - O-ring

- ◆ Always replace

5 - Bearing journal

6 - Bolt, 22 Nm

7 - Bolt, 22 Nm

8 - End cover

9 - Gearbox housing

- ◆ Servicing ⇒ page 34-41

10 - Clutch housing

- ◆ Servicing ⇒ page 34-41

11 - Hexagon bolt. 25 Nm and torque a further 90°

12 - Shift mechanism 05.99 ►

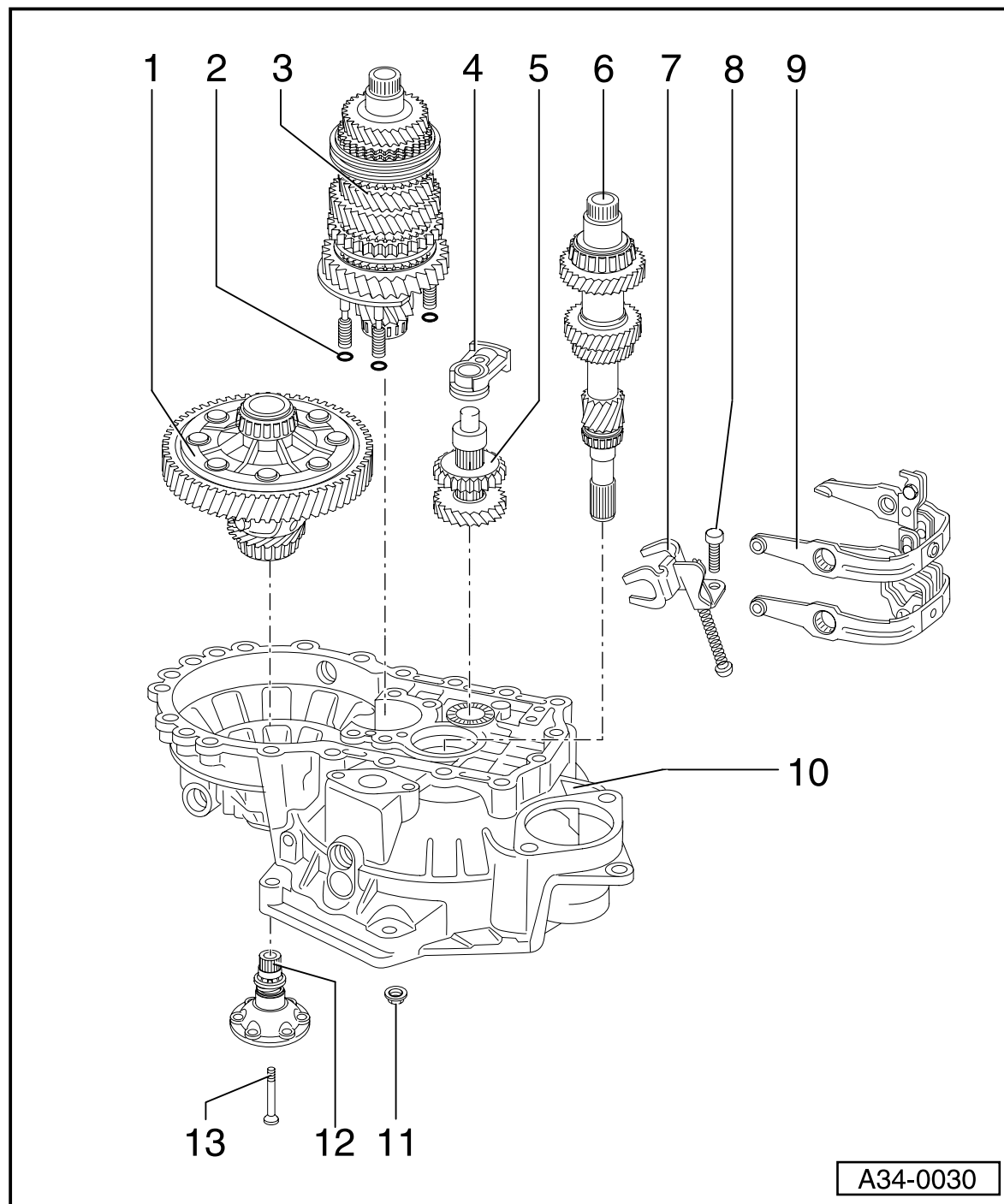
- ◆ Disassembling and assembling
⇒ page 34-48

13 - Shift mechanism ► 04.99

- ◆ Disassembling and assembling
⇒ page 34-46

14 - Hexagon bolt, 22 Nm

Disassembling and assembling input shaft, output shaft (drive pinion), differential and shift forks



1 - Differential

- ◆ Disassembling and assembling
⇒ page 39-3

2 - Seals

- ◆ 4 pieces
- ◆ Always replace

3 - Output shaft

- ◆ Disassembling and assembling
⇒ page 35-14

4 - Reverse shaft support

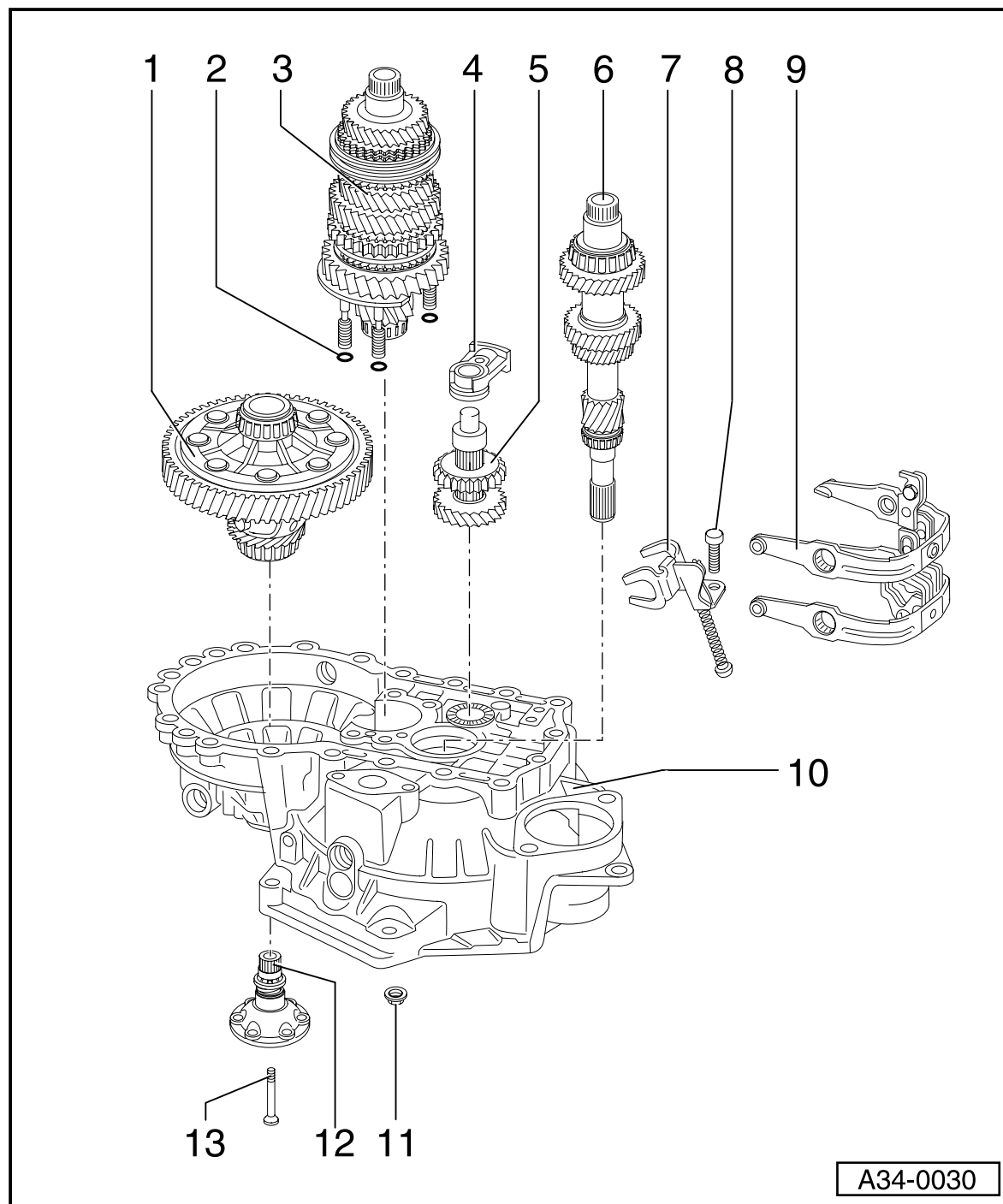
- ◆ Disassembling and assembling
⇒ page 35-29

5 - Reverse shaft

- ◆ Disassembling and assembling
⇒ page 35-29

6 - Input shaft

- ◆ Disassembling and assembling
⇒ page 35-1



A34-0030

7 - Shift fork reverse gear

- ◆ Disassembling and assembling
⇒ page 34-50
- ◆ Fitting location ⇒ page 34-38

8 - Inside torx screw, 25 Nm**9 - Shift mechanism**

- ◆ (Shift forks)
- ◆ Disassembling and assembling
⇒ page 34-50

10 - Clutch housing

- ◆ Servicing ⇒ page 34-41

11 - Tighten hexagon nut, 25 Nm and 90°

- ◆ 4 nuts for bearing support

12 - Flange shaft with pressure spring

- ◆ Remove and install ⇒ page 39-2
- ◆ Complete (item 18) ⇒ page 39-5

13 - Conical screw, 25 Nm

- ◆ Insert in gearbox with pressure springs of rear flange shaft

Mounting sequence

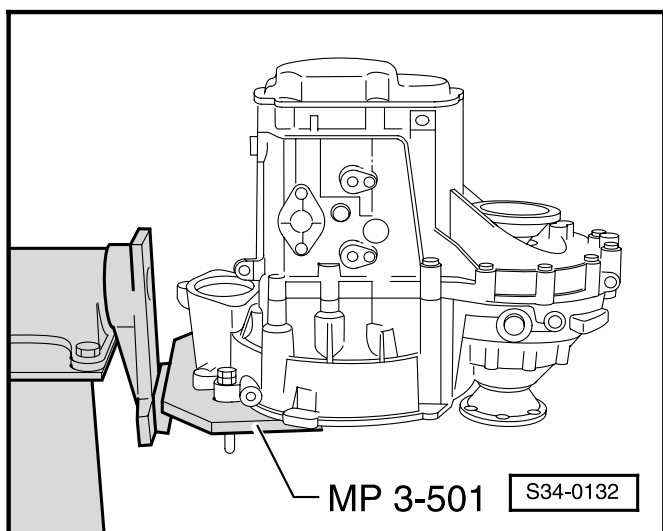
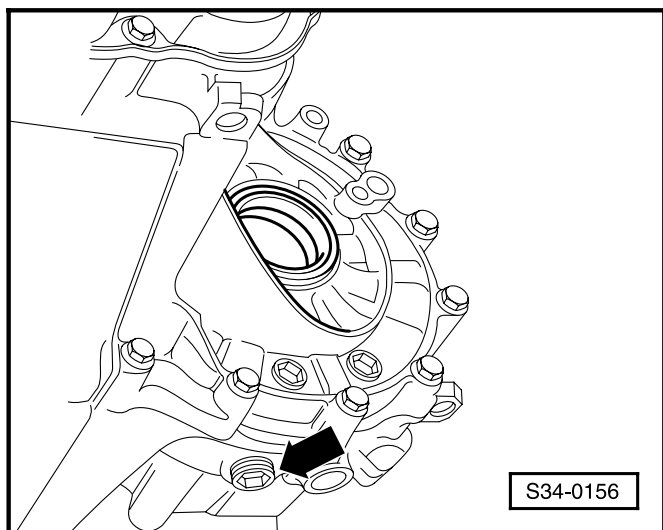
Disassembling and assembling the gearbox housing cover, shift mechanism, input shaft, output shaft (drive pinion), differential and shift forks

Special tools, testers and aids required

- ◆ Gearbox mount MP 3-501
- ◆ Two-arm extractor Kukko 20/10
- ◆ Extractor hook Matra V/170
- ◆ Drive bushing MP 3-402
- ◆ (Hot-air blower e.g. V.A.G 1416)

Disassembling

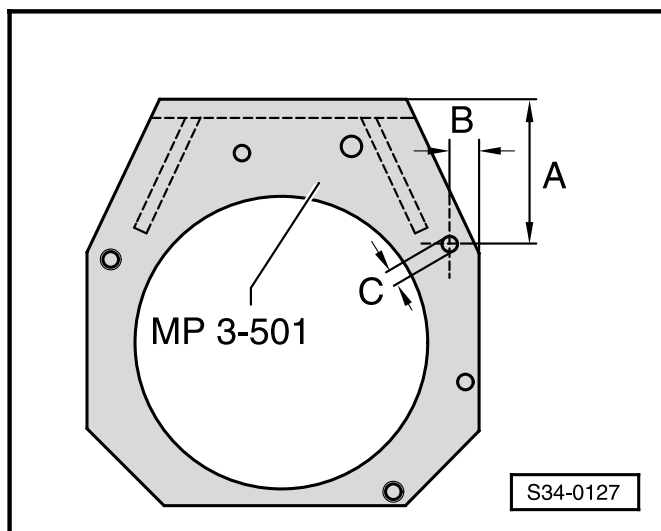
- ◀ - Drain gear oil, to this end unscrew oil drain plug -arrow-



- ◀ - Clamp the gearbox into the assembly support.

Note:

Before the first gearbox mounting, the gearbox mount has to be reworked according to specified measures.

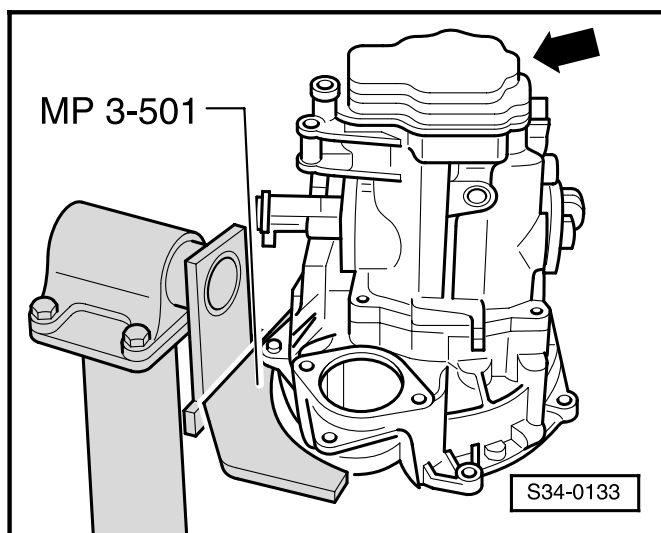


◀ - Attach additional hole in gearbox mount.

A = 118.5 mm

B = 23.5 mm

Ø C = 11.0 mm

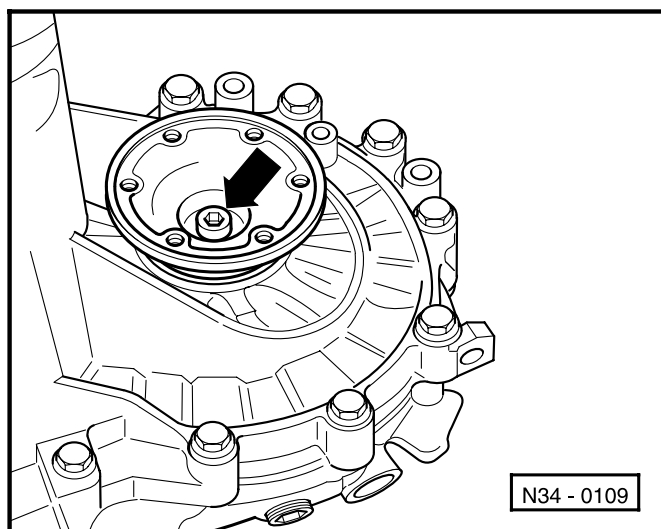


- Remove clutch release lever and clutch release bearing ⇒ page 30-9

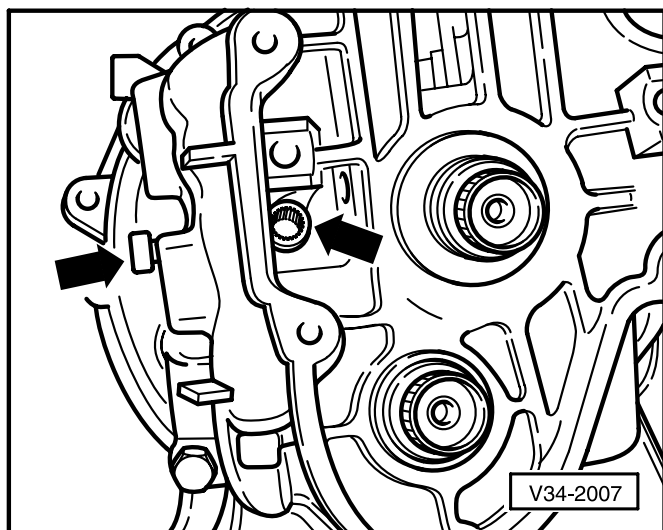
- Unscrew guide bushing ⇒ page 30-9

◀ - Unscrew gearbox housing cover -arrow-.

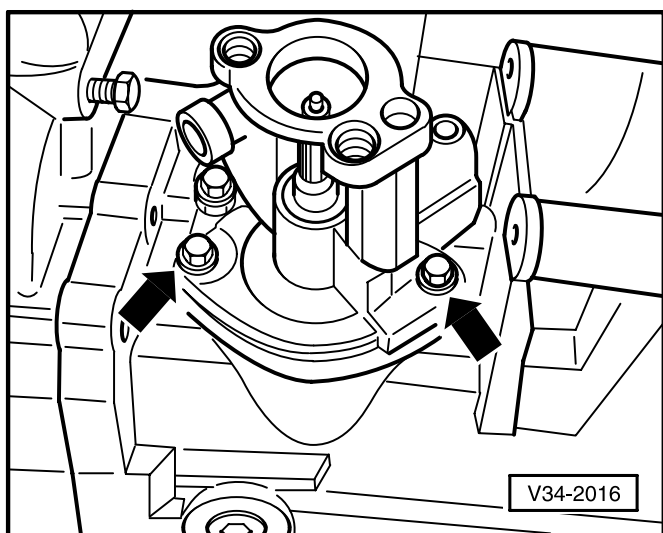
- Remove 5th speed gear ⇒ page 34-25



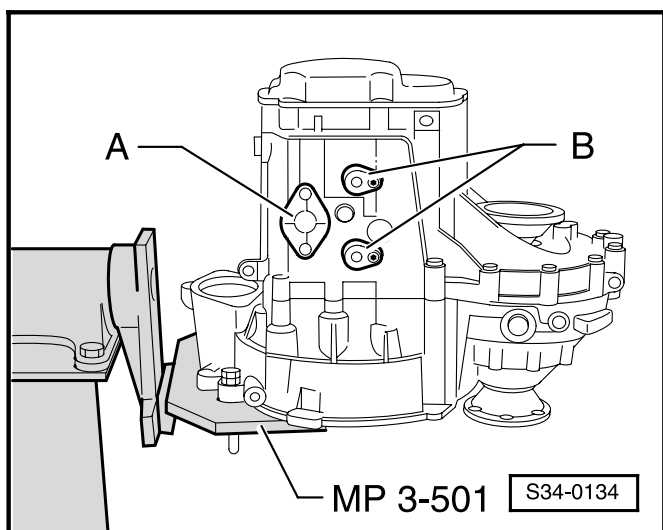
◀ - Remove left flange shaft, use drift to secure against turning and unscrew conical screw -arrow-.



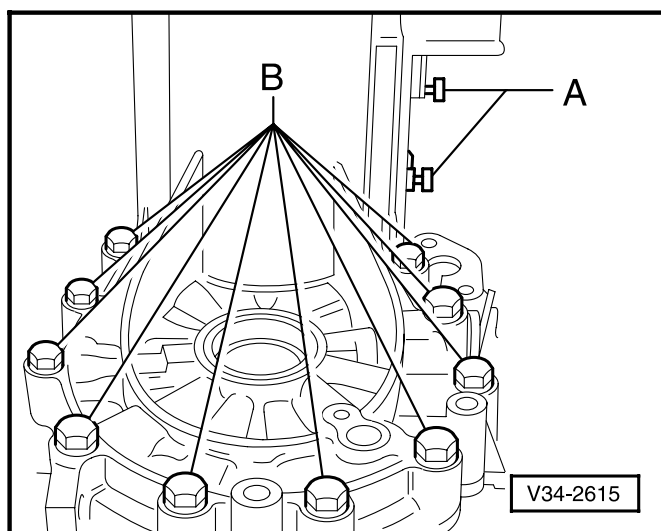
- ◀ - Remove both screws -arrows- for support/ reverse shaft



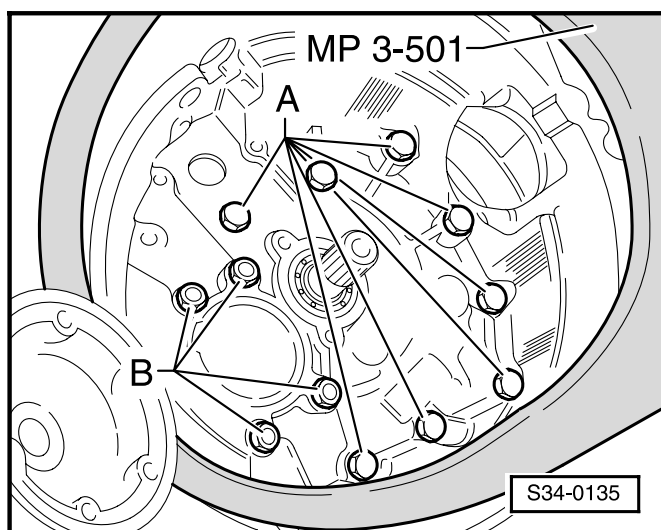
- ◀ - Remove the gearshift shaft with cover, to do this, put the gearshift shaft in idle position. Subsequently unscrew screws -arrows- and remove the gearshift shaft from the gearbox housing.



- ◀ - Remove the cover -A- and bearing pins -B- at the bottom of the gearbox.



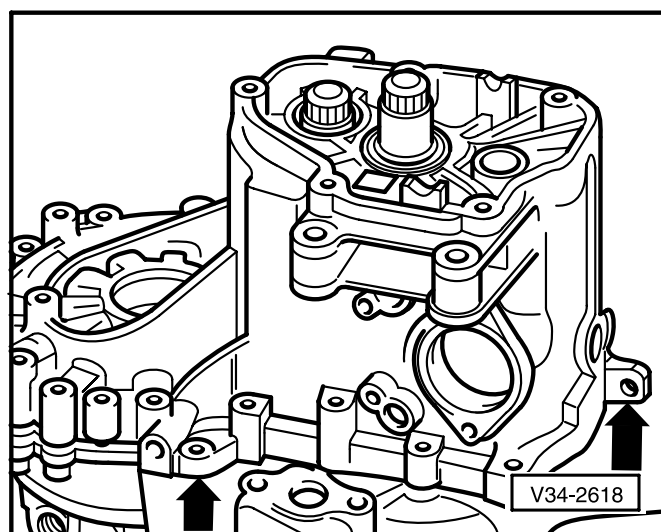
- ◀ - Remove bearing pins -A- on the top side of the gearbox and fixing screws -B- for the gearbox housing on the clutch housing near the differential gear.



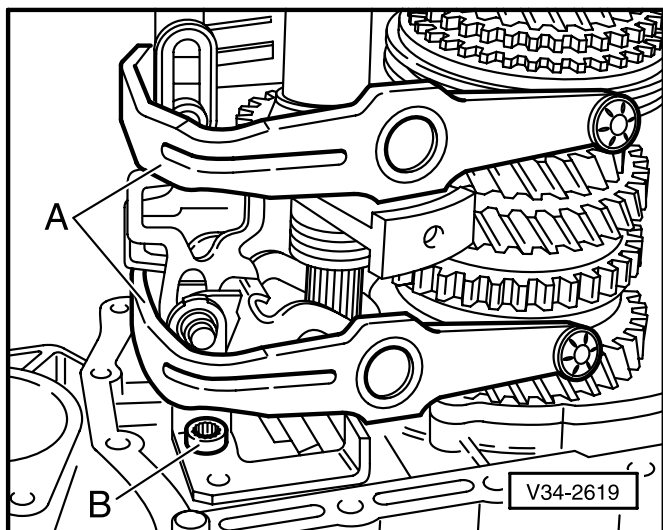
- ◀ - Release screws -A- that serve to secure the gearbox housing from the clutch housing.

Note:

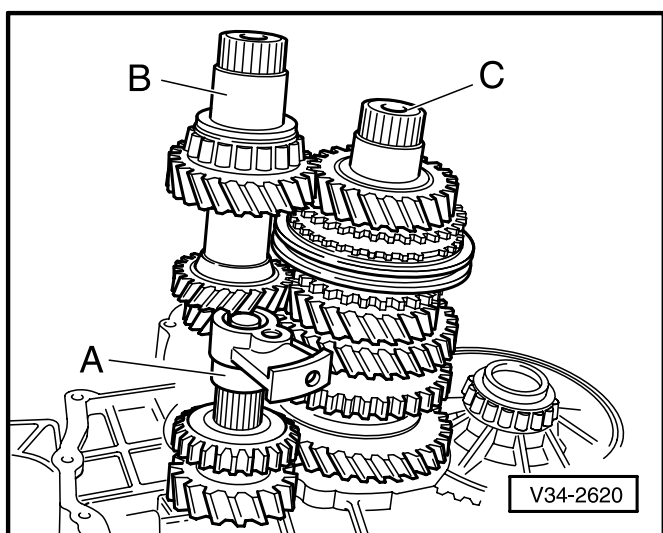
Do not release nuts -B- for the output shaft bearing support.



- ◀ - Carefully release the gearbox housing from the projecting housing lands (arrows) and make sure the sealing surfaces are not damaged in the process.



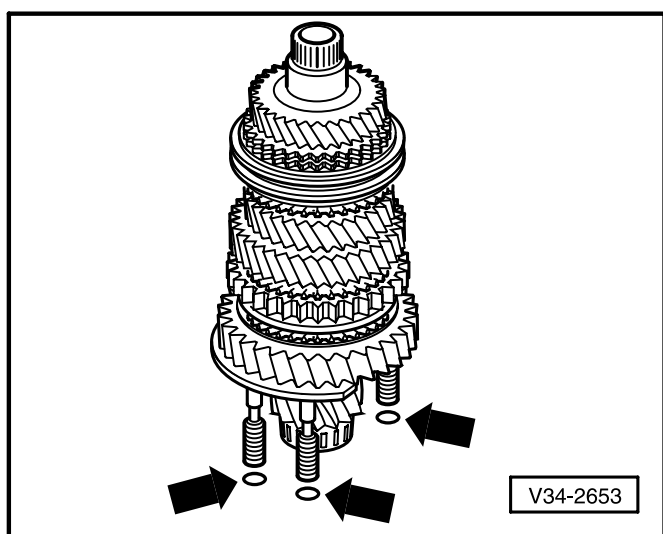
- ◀ - Remove shift fork -A- together with shift rails.
- Unscrew shift mechanism/reverse gear -B-.



- Release nuts for the bearing support/output shaft (item -B- Fig. S34-0135 ⇒ page 34-37).
- ◀ - Successively remove the reverse gear -A-, drive shaft -B- and output shaft -C- from the clutch housing.
- Remove right flange shaft and take out differential gear.

Note:

Identical when removing left flange shaft ⇒ page 34-35.



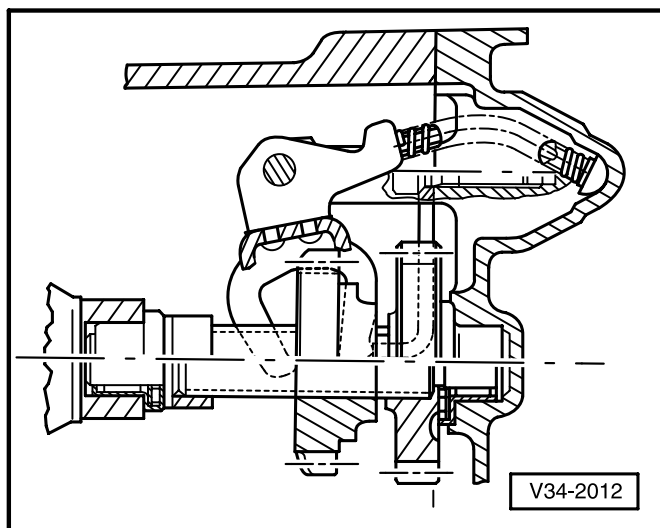
Assembling

- Insert differential gear.
- ◀ - Always replace gasket rings (arrows) for bearing support/output shaft.

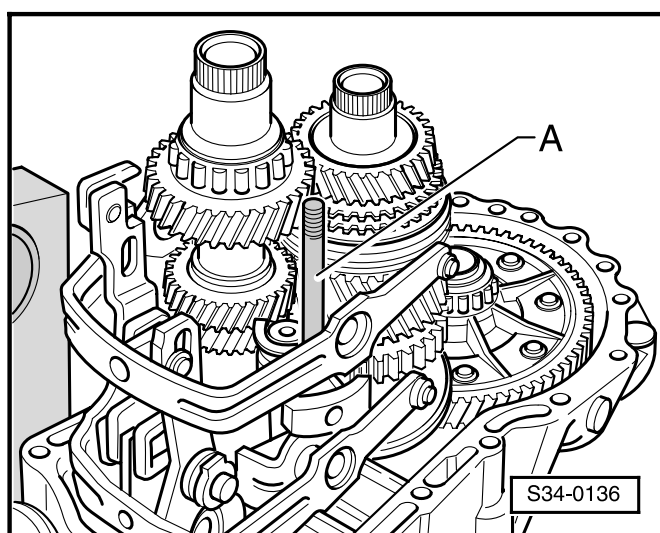
Note:

The Fig. only shows 3 of the 4 gasket rings.

- Replace the drive shaft, output shaft and reverse shaft together.
- Tighten nut for bearing support/output shaft.
- Remove locking agent from the thread in the reverse shaft (arrow Fig. V34-2293 ⇒ page 34-39). Clean with a screw tap.



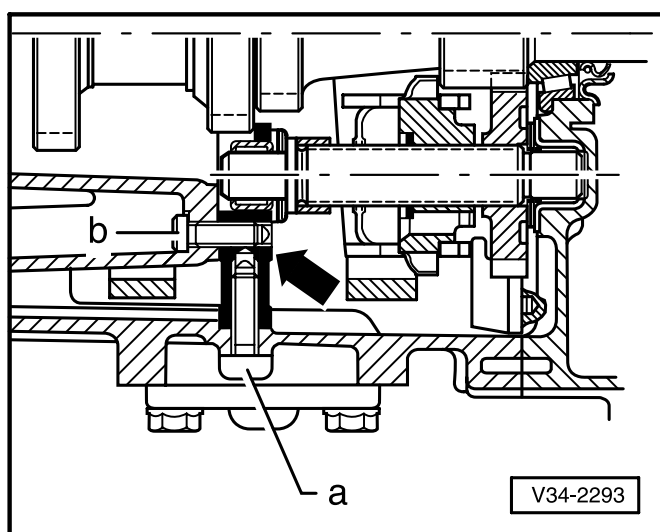
- Insert reverse shaft support.
 - Mount shift mechanism/reverse gear.
- ◀ Fitting location.
- Mount shift forks together with shift rails.



- ◀ - Screw the studs -A- M8 x 100 mm in the reverse shaft support, to ensure it is aligned once the gearbox housing has been fitted.
- Align shift rails.

Note:

The shift segments must be positioned in the slots of the sliding sleeves.



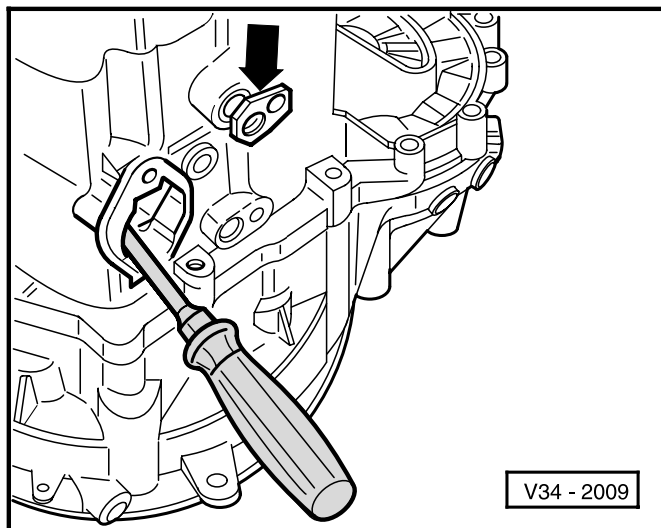
- Fit gearbox housing.

Insert the screws for the reverse shaft support (arrow) as follows:

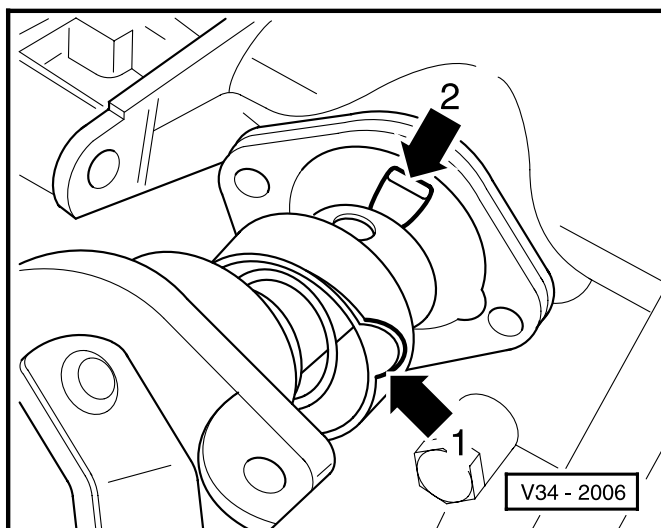
- ◀ - Insert the screw -a-, release stud (⇒ page 34-39, Fig. S34-0136), mount screw -b- and tighten by hand.

Tightening sequence:

- 1 - Screw -a- 30 Nm
- 2 - Screw -b- 25 Nm



- ◀ - Fit bearing pins (arrow) for shift forks. Align the shift mechanism with a screwdriver to ensure that the relevant bearing pin can be fitted.
- Fit shift shaft cap.



◀ Fit shift shaft as follows:

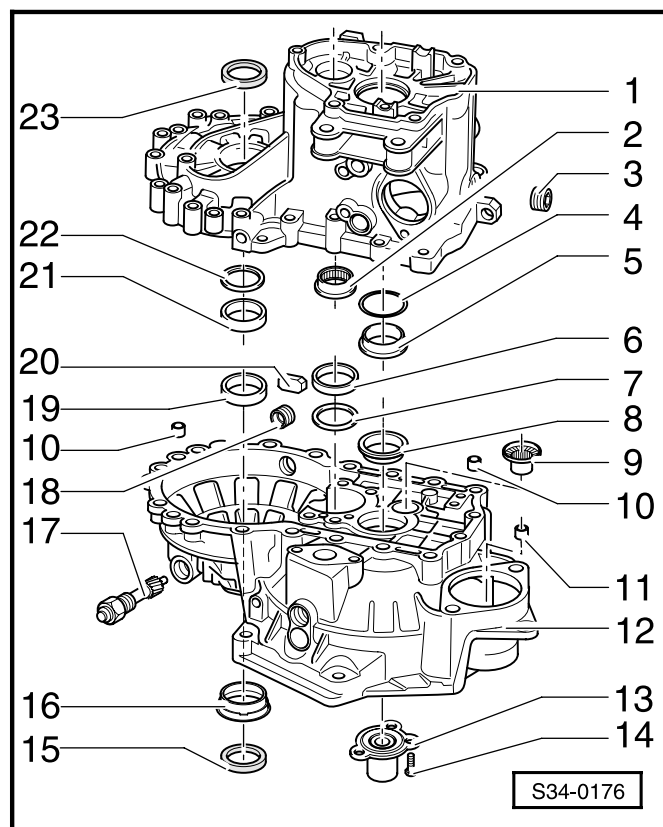
- Put shift rails in Neutral position.
- Position lug -arrow 1- in the recess of the gearbox housing. Align the gearshift shaft in such a way that the shift finger -arrow 2- is inserted in the shift rails.
- Fit shift shaft cover.
- Fit 5th speed gear and gearbox housing cover ⇒ page 34-25

Note:

When assembling pay attention to the note on ⇒ page 34-25

- Fit all flange shafts ⇒ page 34-31
- Fit guide bushing for clutch release bearing ⇒ page 30-9
- Fit clutch release lever and clutch release bearing ⇒ page 30-9

Servicing gearbox housing and clutch housing



Special tools, testers and aids required

- ◆ Sealant AMV 188 200 03
- ◆ Drift MP 3-400
- ◆ Extractor MP 3-401
- ◆ Drift MP 3-403
- ◆ Auxiliary part MP 3-403/1
- ◆ Pressure plate MP 3-411
- ◆ Threaded rod MP 3-434
- ◆ Pipe section MP 3-450
- ◆ Thrust washer MP 3-455
- ◆ Thrust washer MP 3-460
- ◆ Pressure plate MP 3-420

1 - Gearbox housing

- ◆ If replacing: insert input shaft and differential gear ⇒ page 39-11

2 - Needle bearing

- ◆ For output shaft
- ◆ Remove ⇒ Fig. 1
- ◆ Fit and secure ⇒ Fig. 2

3 - Oil drain plug, 25 Nm

- ◆ Without magnet

4 - Adjusting washer

- ◆ For input shaft
- ◆ Setting overview ⇒ page 39-11

5 - Taper roller bearing outer race

- ◆ For input shaft
- ◆ Remove and install ⇒ page 35-3
- ◆ If replacing: insert input shaft ⇒ page 35-9

6 - Taper roller bearing outer race

- ◆ For output shaft
- ◆ Remove and install ⇒ page 35-16
- ◆ If replacing: insert output shaft ⇒ page 35-26

7 - Adjusting washer

- ◆ For output shaft
- ◆ Setting overview ⇒ page 39-11

8 - Taper roller bearing outer

- ◆ For input shaft
- ◆ Remove and install ⇒ page 35-6
- ◆ If replacing: insert input shaft ⇒ page 35-9

9 - Needle bushing

- ◆ Remove and install ⇒ page 35-30

10 - Dowel sleeve

- ◆ 2 pieces

11 - Bush for starter

- ◆ Pull out ⇒ Fig. 5
- ◆ Knock in ⇒ Fig. 6
- ◆ Replace when fitting gearbox

12 - Clutch housing

- ◆ If replacing:
⇒ setting overview, page 39-11

13 - Guide sleeve with O-ring

- ◆ O-ring attached to guide sleeve. If damaged, replace guide sleeve
- ◆ With seal
- ◆ Remove seal ⇒ Fig. 3
- ◆ Insert seal ⇒ Fig. 4
- ◆ Remove guide sleeve in order to replace seal

14 - Fillister head screw, 20 Nm

- ◆ Self-locking
- ◆ Always replace

15 - Seal

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

16 - Sleeve

- ◆ For right seal (item 15)
- ◆ Remove ⇒ Fig. 7
- ◆ Install ⇒ Fig. 8

17 - Speedometer drive, 30 Nm**18 - Oil drain plug, 25 Nm**

- ◆ Without magnet

19 - Taper roller bearing outer race

- ◆ For differential
- ◆ Remove and install ⇒ page 39-3
- ◆ If replaced, set differential ⇒ page 39-12

20 - Magnet

- ◆ Is held by contact surface of housing

21 - Taper roller bearing outer race

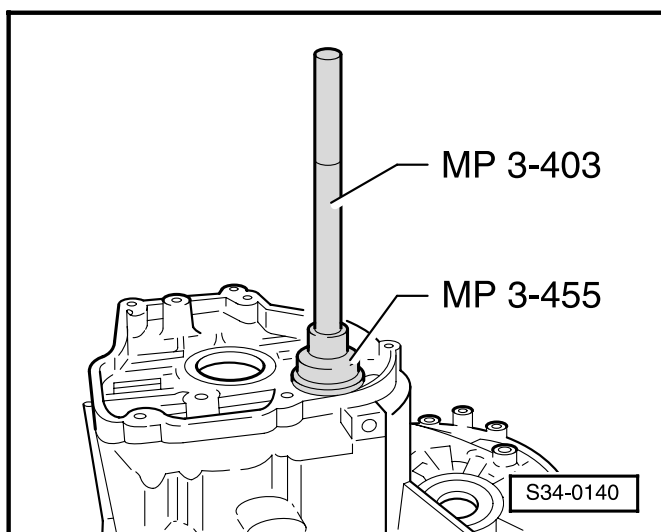
- ◆ For differential
- ◆ Remove and install ⇒ page 39-3
- ◆ If replaced, set differential ⇒ page 39-12

22 - Shim

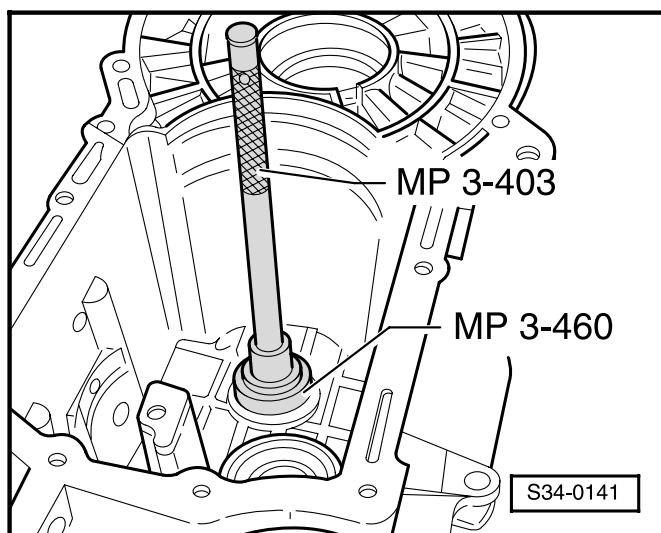
- ◆ For differential
- ◆ List of settings ⇒ page 39-11

23 - Seal

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

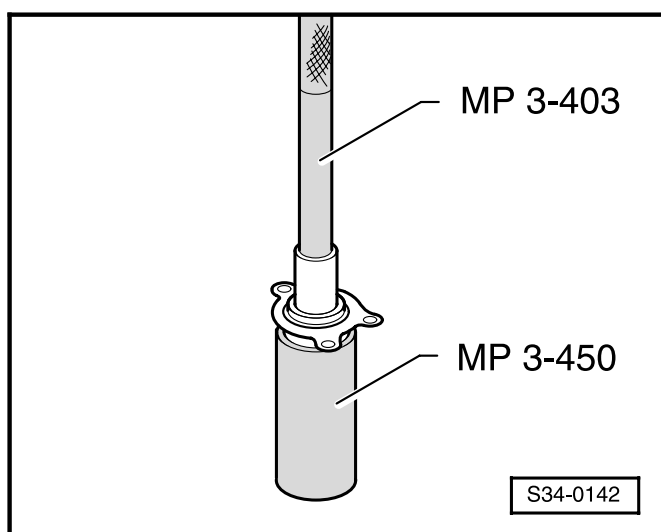


◀ Fig. 1 Knock out needle bearing

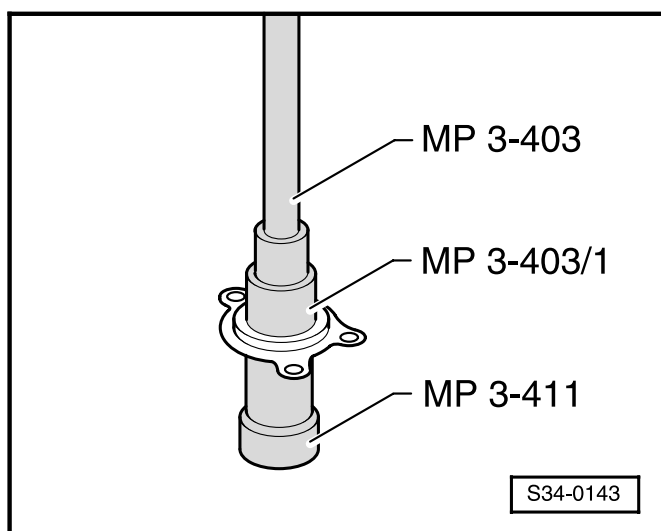


◀ Fig. 2 Drive in needle bearing up to the stop

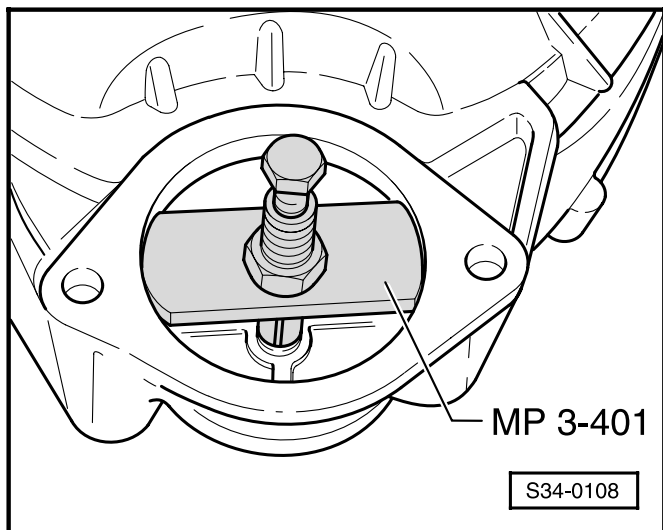
- Using a drift secures needle bearing in three points in the gearbox housing with 120° off-set.



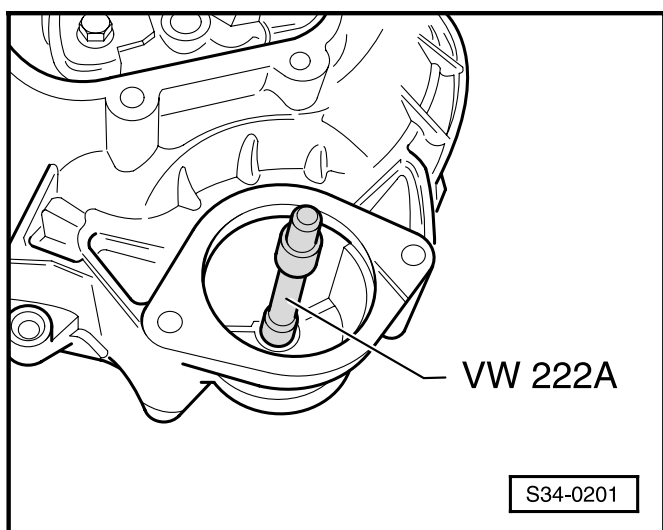
◀ Fig. 3 Drive out guide bushing



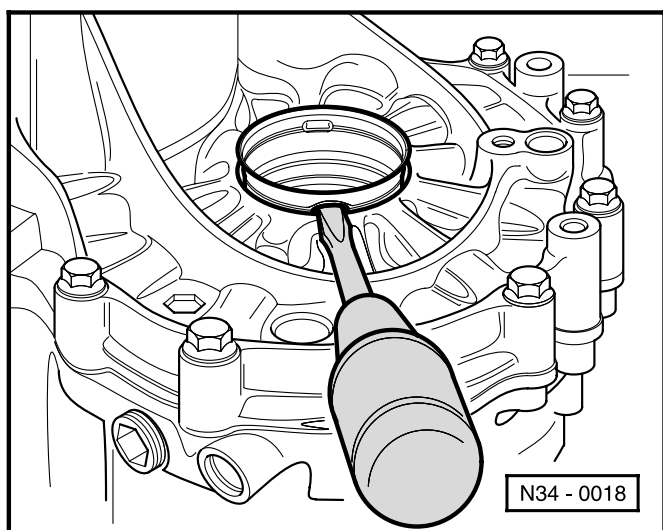
◀ Fig. 4 Drive gasket ring into guide bushing up to the stop



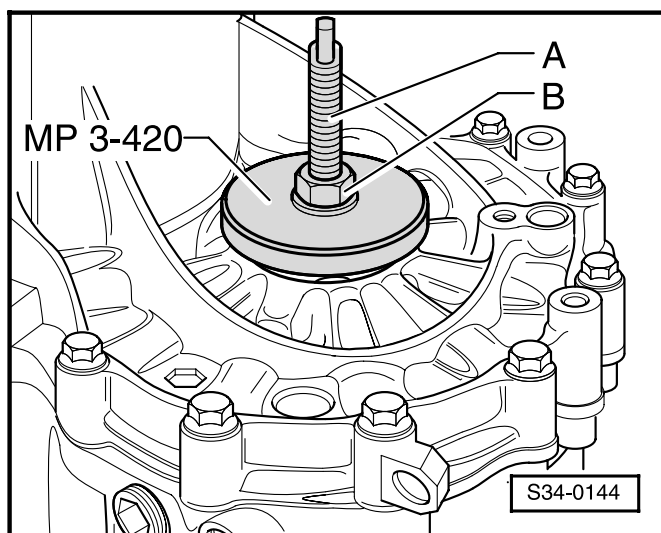
◀ Fig. 5 Pull out bush for starter



◀ Fig. 6 Drive in bush for starter



◀ Fig. 7 Lever off bushing with screwdriver



◀ Fig. 8 Insert sleeve

A - Screw threaded rod MP 3-434 from assembly device into the threaded part of the differential.

B - Nut M12 with washer.

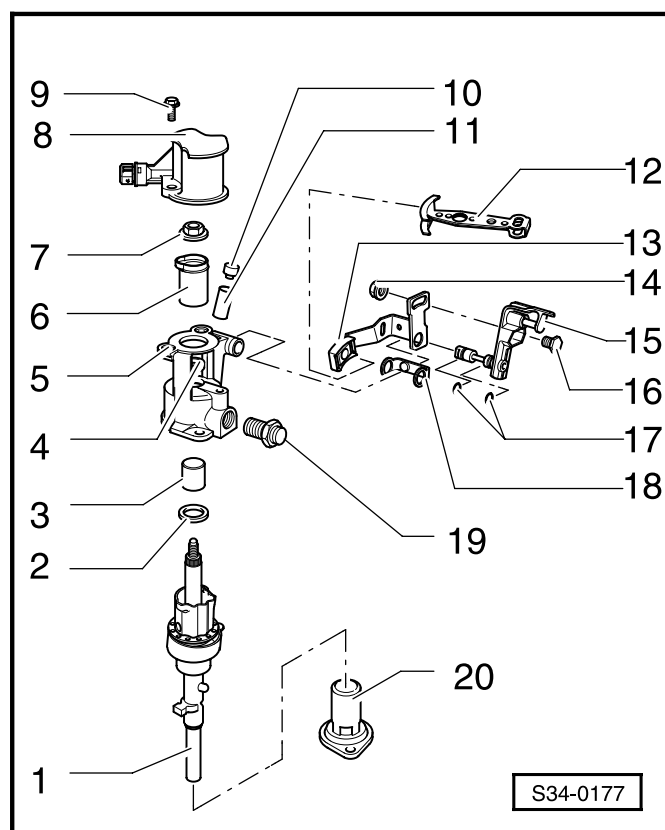
- By turning the nut -B- insert the bushing over the pressure plate MP 3-420 up to the stop.

Note:

If the gearbox is disassembled press the bushing with pressure plate MP 3-420 up to the stop.

Disassembling and assembling shift mechanism at gearbox side

► 04.99



Special tools, testers and aids required

- ◆ Thrust washer MP 3-455
- ◆ Guide piece MP 3-454
- ◆ Thrust plate MP 3-407
- ◆ Pressure die MP 3-448
- ◆ Internal extractor Kukko 21/3
- ◆ Fitting tool MP 1-212

1 - Shift shaft

2 - Stop ring

3 - Spherical sleeve

- ◆ Remove ⇒ Fig. 1
- ◆ Insert ⇒ Fig. 2

4 - Seal

- ◆ Use screwdriver to lever out
- ◆ Install ⇒ Fig. 3

5 - Shift cover

6 - Bowl

- ◆ Lug points toward
- ◆ Brush the nose lightly with MoS₂ grease

7 - Hexagon nut, 25 Nm

- ◆ Self-locking
- ◆ Always replace

8 - Bracket

- ◆ With reversing light

9 - Bolt

10 - Cap

- ◆ For gearbox ventilation

11 - Sleeve

- ◆ Insert as stop

12 - Gearbox shift lever

- ◆ Insert so that interrupted tooth spacing matches the shift shaft
- ◆ Can be replaced with shift mechanism
- ◆ Installation position ⇒ page 34-4

13 - Relay lever

- ◆ Installation position ⇒ page 34-4

14 - Nut, 15 Nm

15 - Follower

- ◆ With shaft for mounting relay lever
- ◆ Installation position ⇒ page 34-4

16 - Bolt

- ◆ Press into follower

17 - O-rings

- ◆ Fit onto shaft of follower

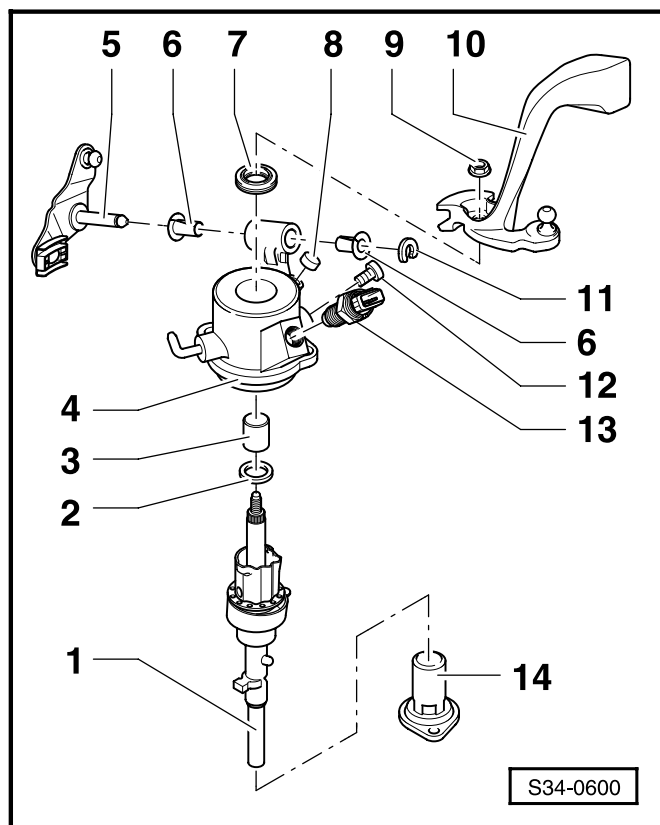
18 - Spacer

- ◆ Press into relay lever

19 - Locking bolt, 40 Nm

20 - End cover

Disassembling and assembling shift mechanism at gearbox side 05.99 ►



Special tools, testers and aids required

- ◆ Thrust disc MP 3-456
- ◆ Guide piece MP 3-454
- ◆ Thrust plate MP 3-406
- ◆ Thrust plunger MP 3-448
- ◆ Internal extractor Kukko 21/3
- ◆ Insertion tool MP 1-212

1 - Shift shaft

- ◆ Ensure correctly assigned ⇒ Parts List

2 - Stop ring

3 - Conical sleeve

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

4 - Shift cover

- ◆ With interference-fit sleeve for lock
- ◆ Ensure correctly assigned ⇒ Parts List

5 - Relay lever

- ◆ Fitting location ⇒ page 34-14.10

6 - Bearing bush

7 - Seal

- ◆ Use screwdriver to lever out
- ◆ Installing ⇒ Fig. 3

8 - Cap

- ◆ For gearbox breather

9 - 20 Nm

10 - Gearbox shift lever

- ◆ Insert so that interrupted tooth spacing matches shift shaft
- ◆ Fitting location ⇒ page 34-14.10

11 - Lock washer

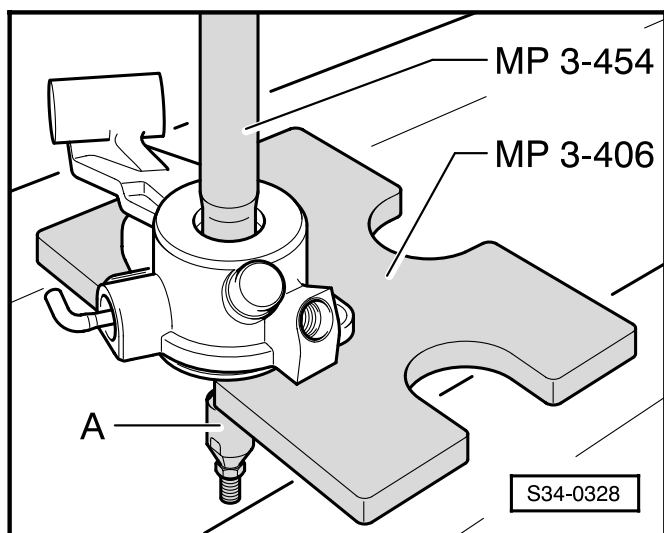
12 - 15 Nm

- ◆ Secures shift shaft
- ◆ Take out before removing shift shaft

13 - Reverse light switch, 20 Nm

- ◆ 20 Nm
- ◆ Apply a thin film of MoS₂ grease (Molykote) to lug

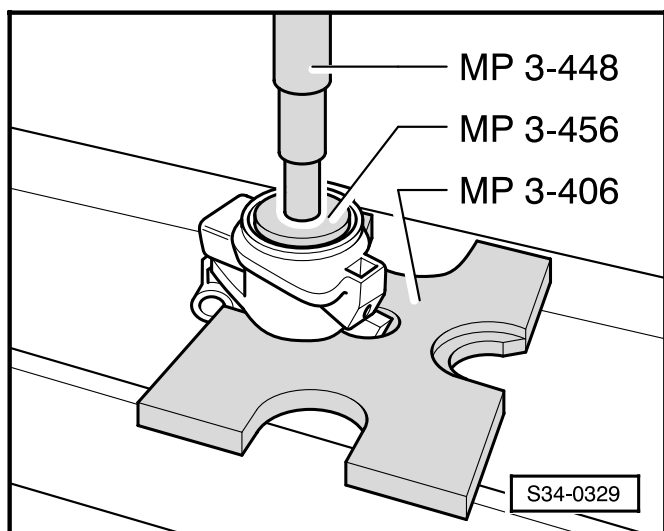
14 - End cover



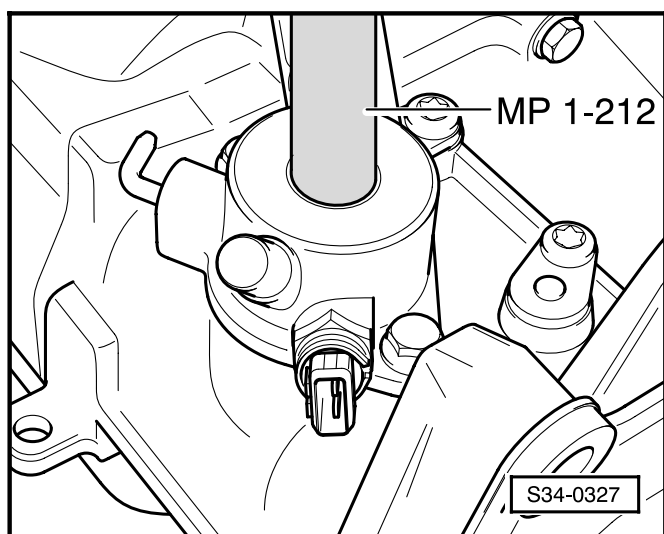
◀ Fig. 1 Removing spherical sleeve for shift cover

- Before pulling out spherical sleeve, destroy plastic cage and take out balls.

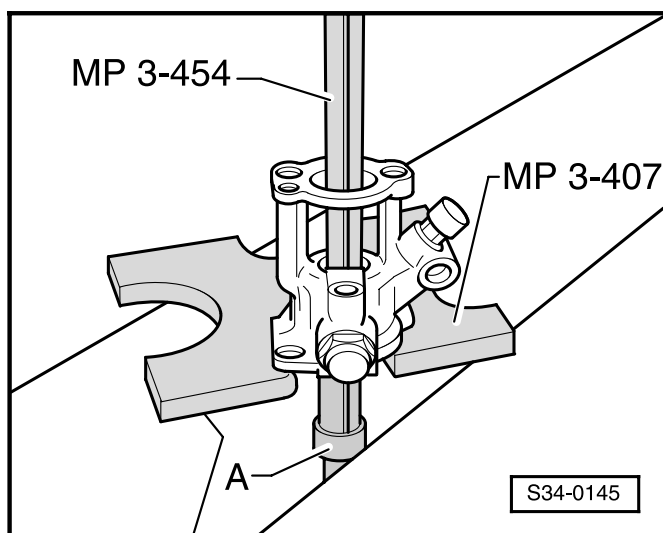
A - Internal extractor, e.g. Kukko 21/3, 18.5 ... 23.5 mm



◀ Fig. 2 Knocking spherical sleeve flush into shift cover



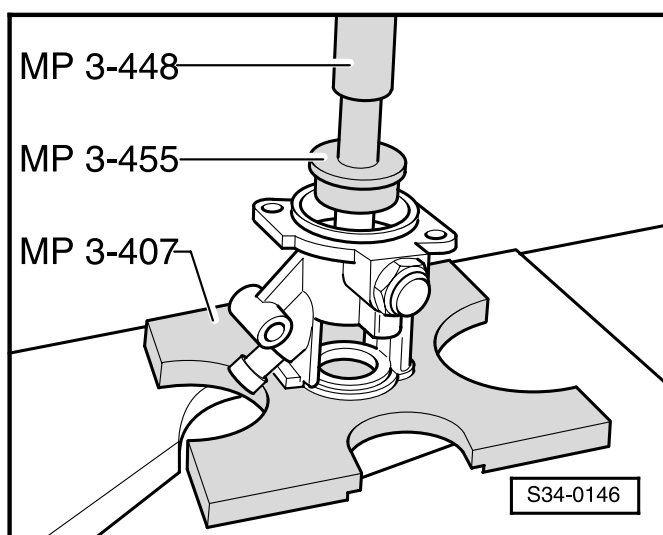
◀ Fig. 3 Inserting seal as far as the stop



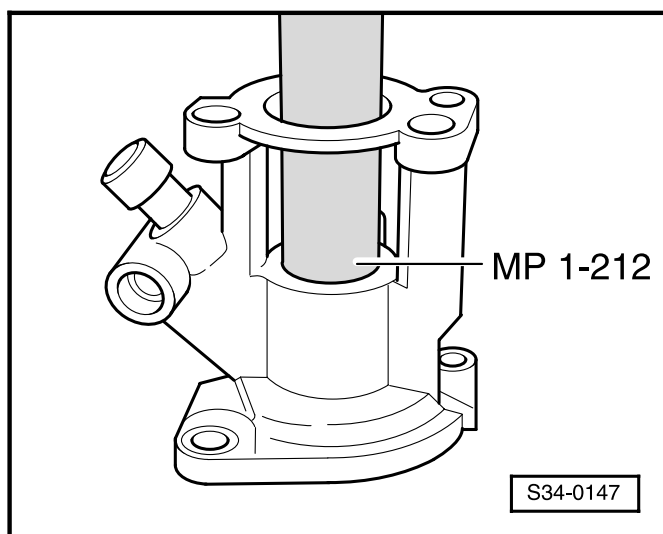
◀ Fig. 1 Remove ball sleeve from cover

- Before pulling out the ball sleeve destroy the plastic cage and remove the balls.

A - Interior extractor, e.g. Kukko 21/3, 18.5 ... 23.5 mm



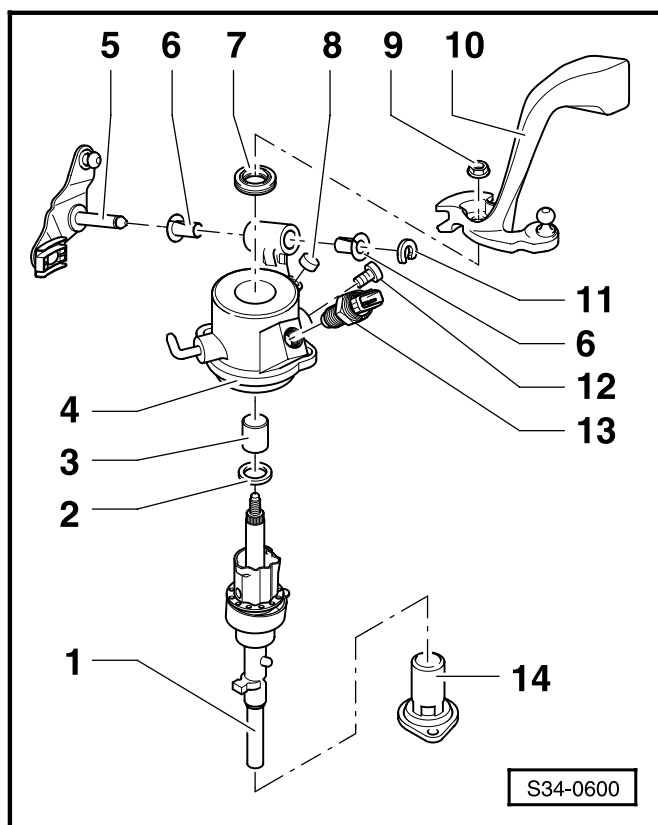
◀ Fig. 2 Press ball sleeve flush into gear-shift cover



◀ Fig. 3 Insert seal up to the stop

Disassembling and assembling shift mechanism at gearbox side

05.99 ►



Special tools, testers and aids required

- ◆ Thrust disc MP 3-456
- ◆ Guide piece MP 3-454
- ◆ Thrust plate MP 3-406
- ◆ Thrust plunger MP 3-448
- ◆ Internal extractor Kukko 21/3
- ◆ Insertion tool MP 1-212

1 - Shift shaft

- ◆ Ensure correctly assigned ⇒ Parts List

2 - Stop ring

3 - Conical sleeve

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

4 - Shift cover

- ◆ With interference-fit sleeve for lock
- ◆ Ensure correctly assigned ⇒ Parts List

5 - Relay lever

- ◆ Fitting location ⇒ page 34-14.10

6 - Bearing brush

7 - Seal

- ◆ Use screwdriver to lever out
- ◆ Installing ⇒ Fig. 3

8 - Cap

- ◆ For gearbox breather

9 - 20 Nm

- ◆ Self-locking
- ◆ Always replace

10 - Gearbox shift lever

- ◆ Insert so that interrupted tooth spacing matches shift shaft
- ◆ Fitting location ⇒ page 34-14.10

11 - Lock washer

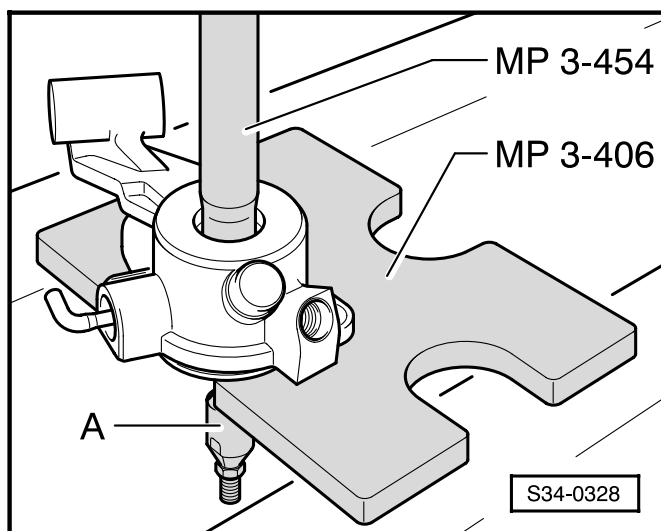
12 - 15 Nm

- ◆ Secures shift shaft
- ◆ Take out before removing shift shaft

13 - Reversing light switch, 20 Nm

- ◆ Apply a thin film of MoS₂ grease (Molykote) to lug

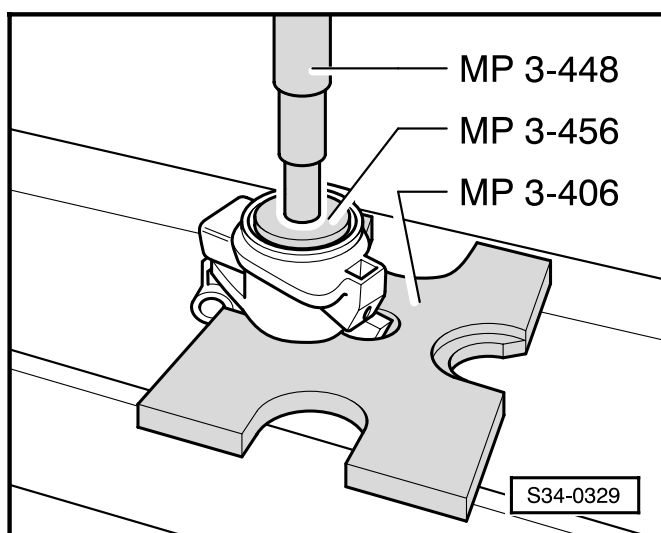
14 - End cover



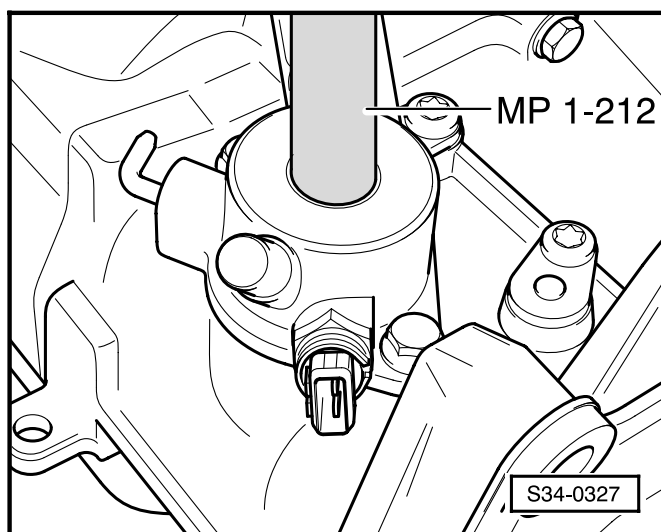
◀ Fig. 1 Remove ball sleeve from cover

- Before pulling out the ball sleeve destroy the plastic cage and remove the balls.

A - Interior extractor e.g. Kukko 21/3, 18.5 ... 23.5 mm

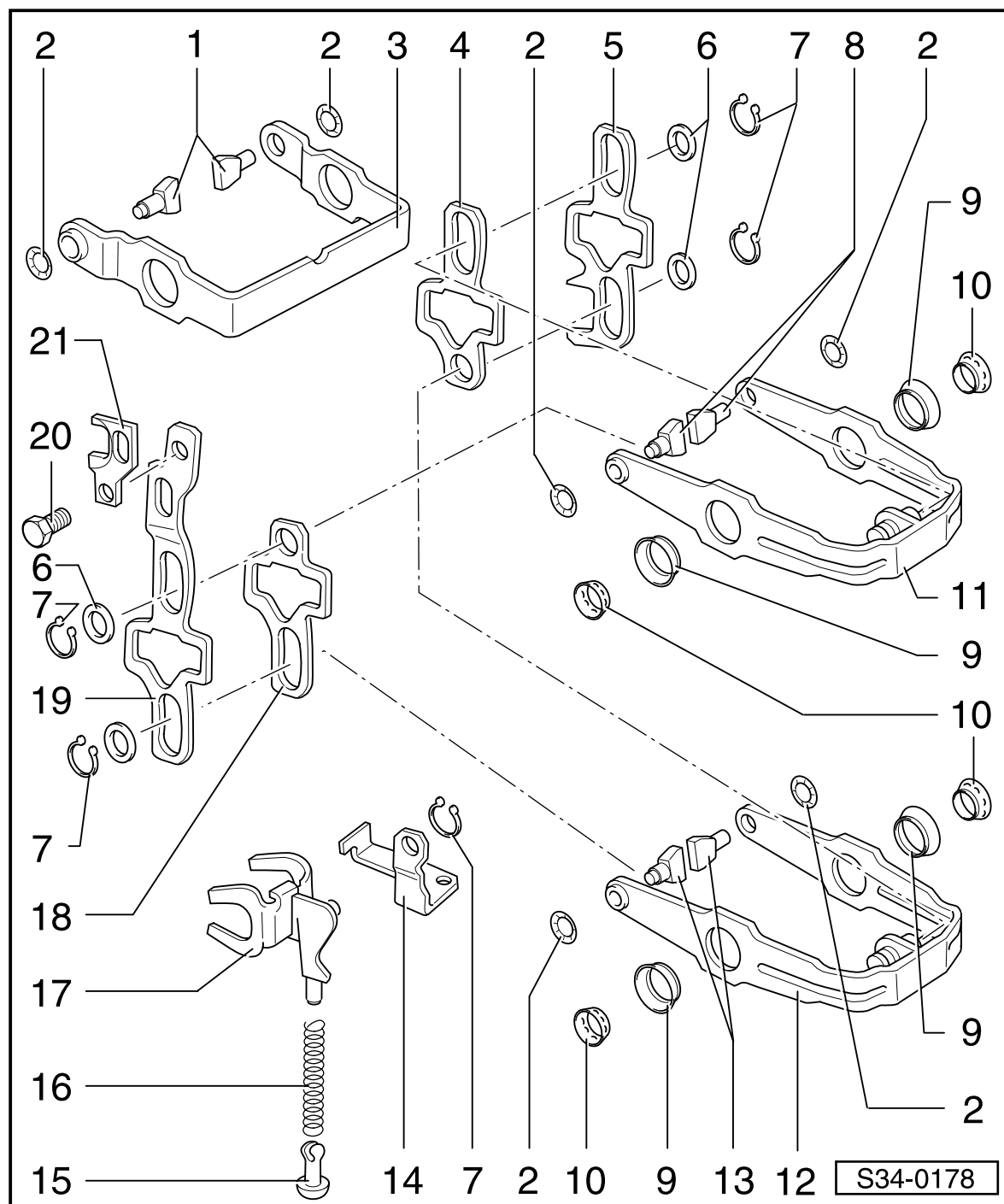


◀ Fig. 2 Press ball sleeve flush into gear-shift cover.



◀ Fig. 3 Insert seal up to the stop.

Disassembling and assembling shift forks



Special tools, testers and aids required

- ◆ Pressure plate MP 3-407
- ◆ Driver MP 3-423
- ◆ Pressure spindle MP 3-448
- ◆ Pressure plate MP 3-453
- ◆ Thrust washer MP 3-455

- ◆ Pressure lever MP 8-506

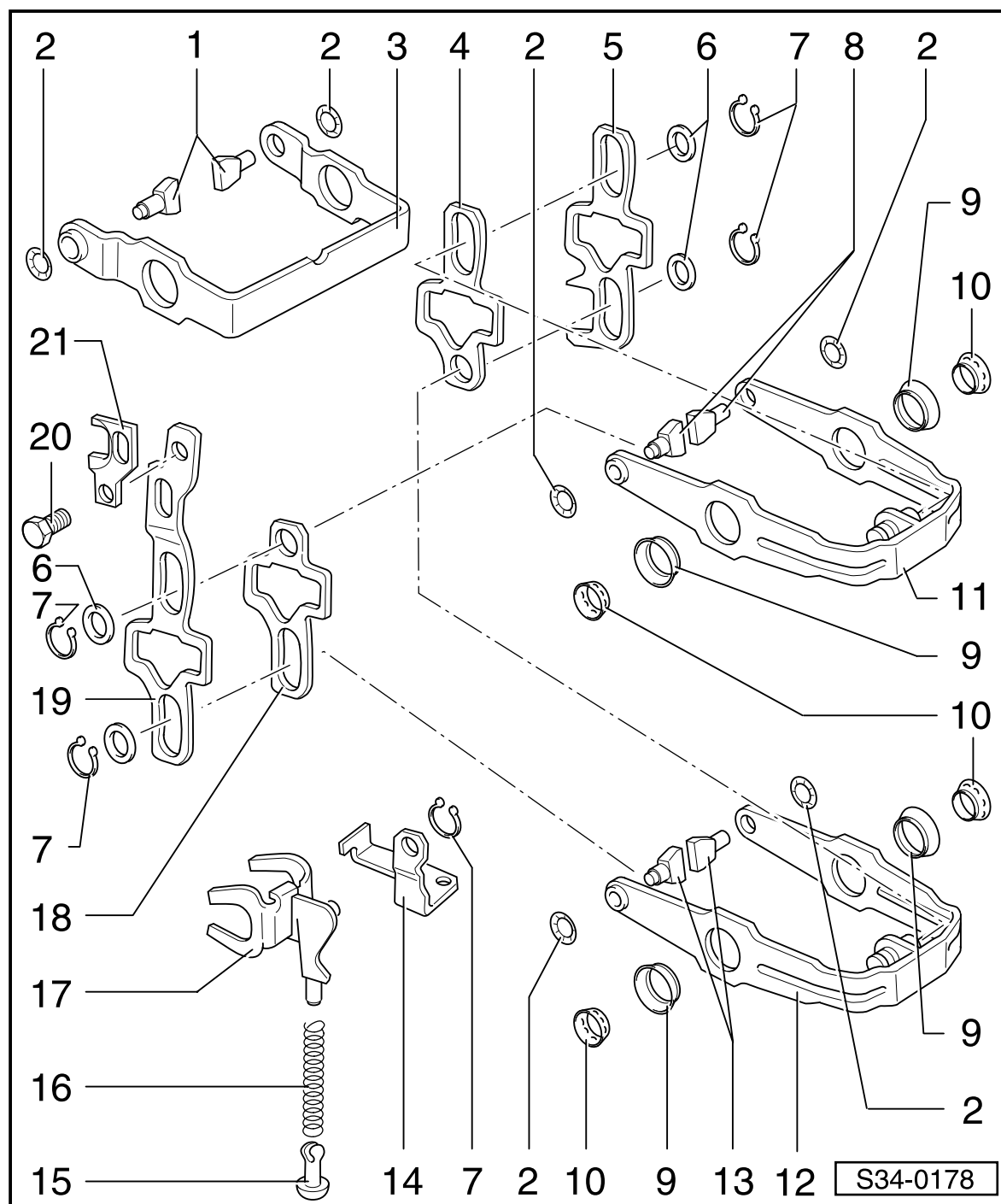
- ◆ Distance sleeve MP 3-458

1 - Shift segment

- ◆ Identification ⇒ Fig. 1
- ◆ It must still be possible to rotate the segment freely once the circlip has been fitted.

2 - Circlip

- ◆ Lift off with e.g. pressure lever MP 8-506
- ◆ Replace ⇒ Fig. 2
- ◆ Always replace

**3 - 5th gear shift fork**

- ◆ Setting ⇒ page 34-30

4 - 1st and 2nd gear shift rail**5 - Reverse gear shift rail****6 - Washer****7 - Circlip****8 - Shift segment**

- ◆ Identification ⇒ Fig. 1
- ◆ It must still be possible to rotate the segment freely once the circlip has been fitted

9 - Inner race bearing ball

- ◆ Press out ⇒ Fig. 3
- ◆ Press in ⇒ Fig. 4

10 - Bearing ball**11 - 3rd and 4th gear shift fork**

- ◆ With shift segment ⇒ Fig. 5

12 - 1st and 2nd gear shift fork

- ◆ With shift segment ⇒ Fig. 5

13 - Shift segment

- ◆ Identification ⇒ Fig. 1
- ◆ It must still be possible to rotate the segment freely once the circlip has been fitted,

14 - Support for reverse gear shift fork

15 - Sliding block (mushroom)

16 - Spring

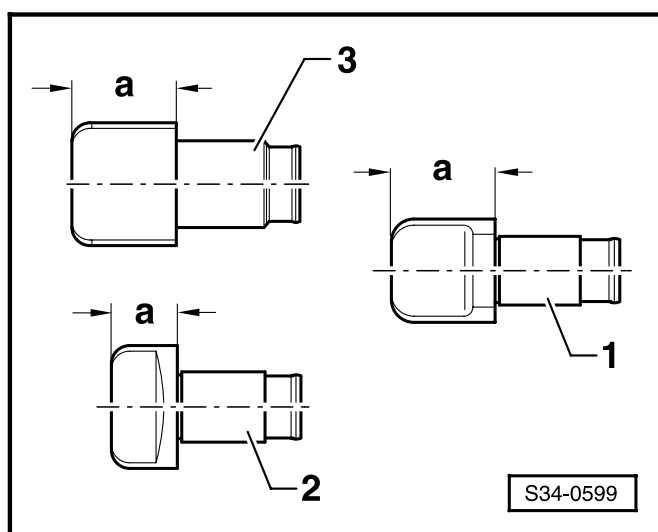
17 - Reverse gear shift fork

18 - 3rd and 4th gear shift rail

19 - 5th gear shift rail

20 - Screw, 25 Nm

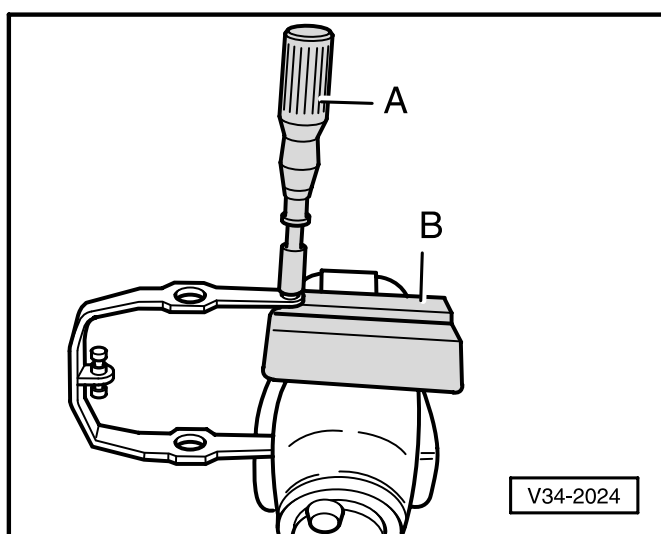
21 - 5th gear shift fork



◀ Fig. 1 Shift segment identification

Dimension -a-

1 -	1st and 2nd	gear shift segment	
	➤ 08.00		= 12.0 mm
	08.00 ➤		= 11.4 mm
2 -	3rd and 4th	gear shift segment	= 7.6 mm
3 -	5th gear		= 12.0 mm



◀ Fig. 2 Fit circlip

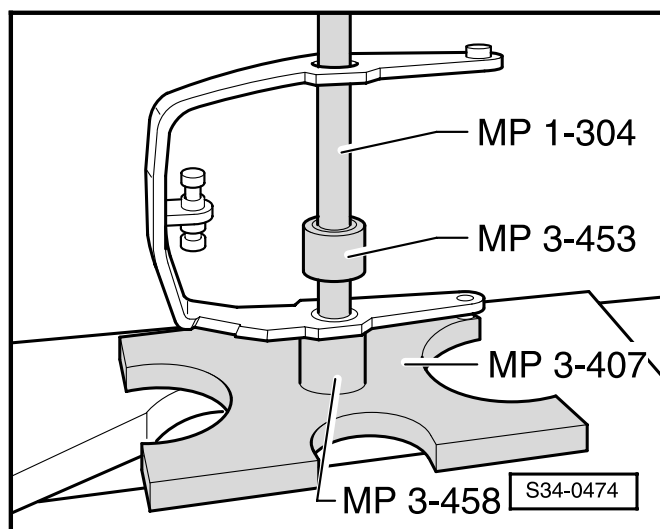
- Press the circlip with a handle wrench into the slot of the shift segment.

Notes:

It must still be possible to rotate the shift segment freely once the circlip has been fitted.

A - Handle wrench, wrench size 10 mm

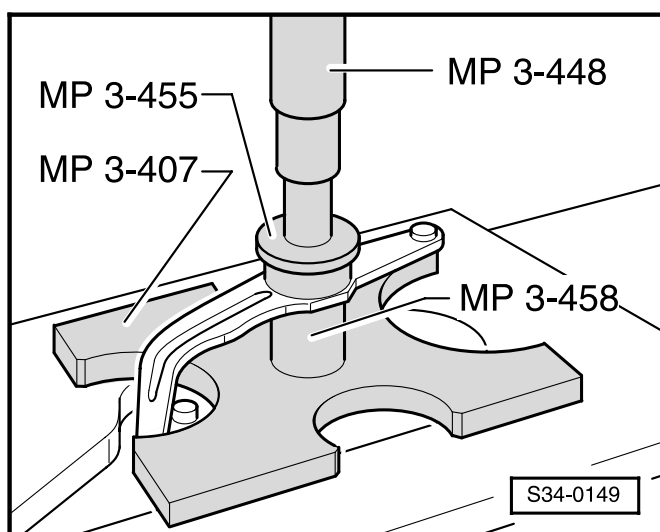
B - Protective jaws



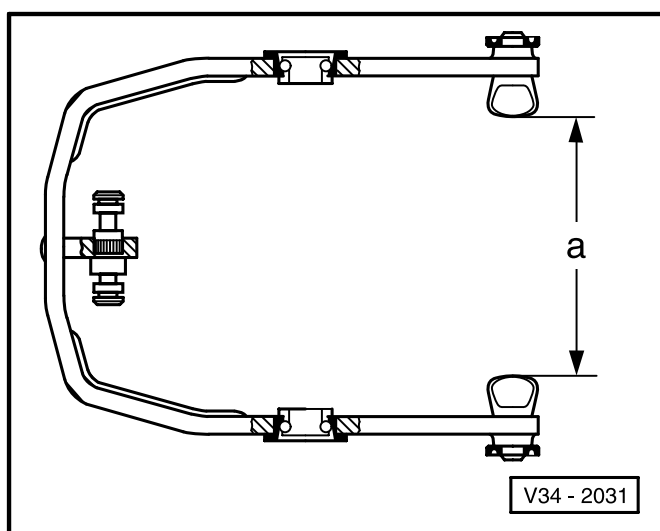
◀ Fig. 3 Remove inner race bearing ball

Note:

Do not bend when removing and installing the inner race shift forks



◀ Fig. 4 Press inner race bearing ball up to the stop

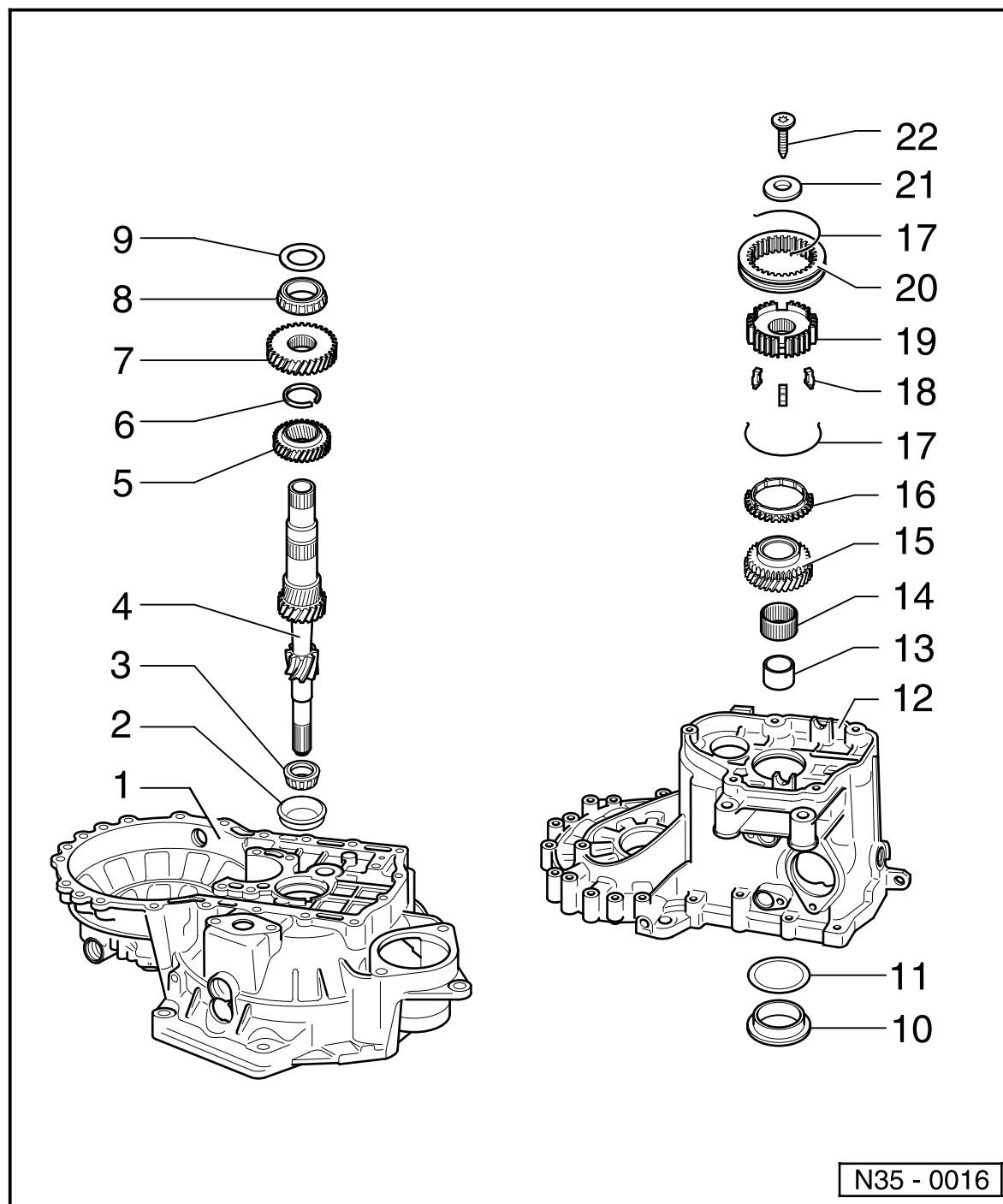


◀ Fig. 5 Shift fork fitted with shift segments

	Dimension -a- (mm)
1st and 2nd gear shift fork	
➤ 08.00	87.2.....87.9
08.00 ➤	88.4.....89.1
3rd and 4th gear shift fork	96.0....96.7

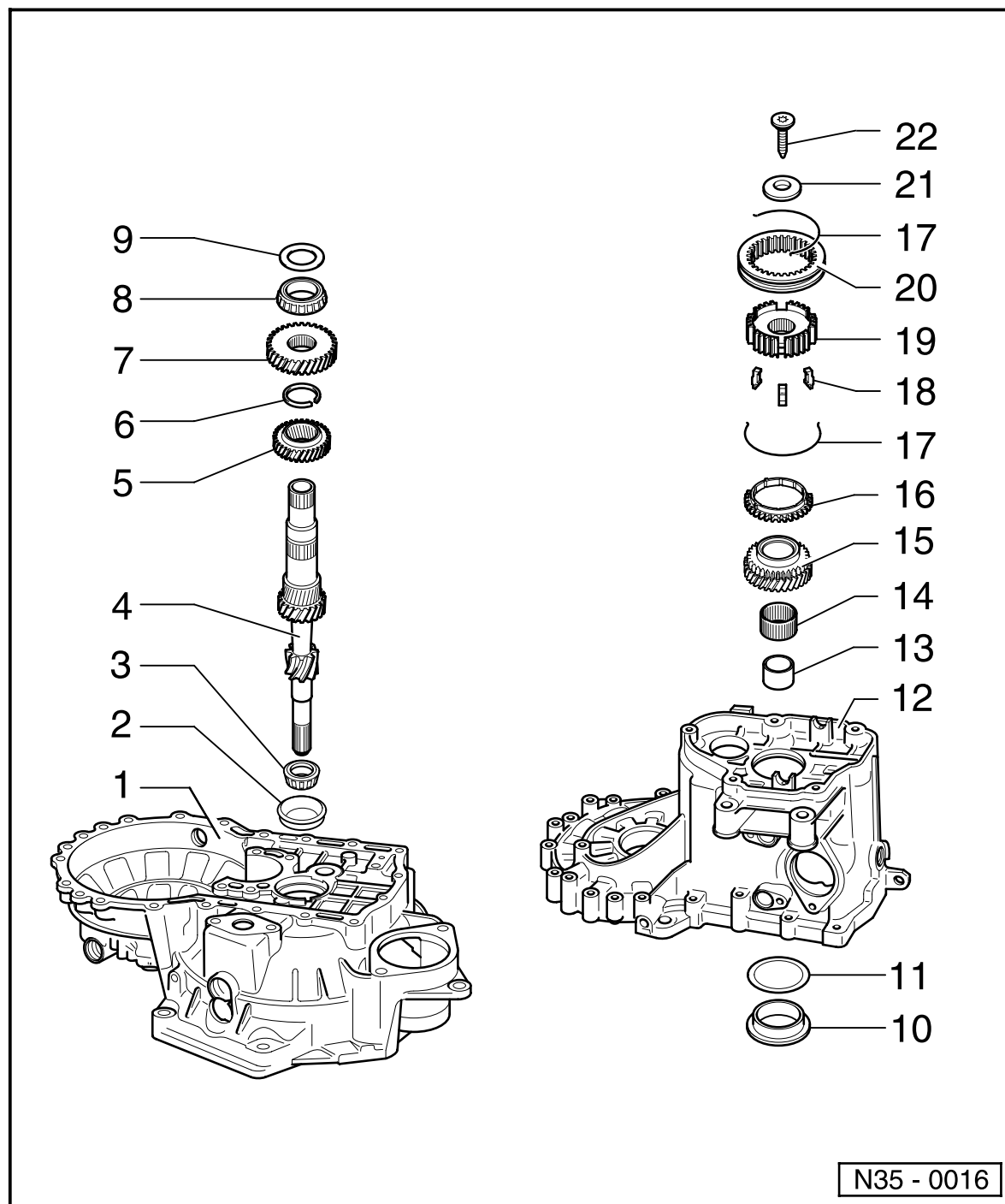
Assignment of shift segment ⇒ Fig. 1

Disassembling and assembling input shaft



Special tools, testers and aids required

- ◆ Thrust plate MP 3-406
- ◆ Plunger MP 3-408
- ◆ Thrust piece MP 3-411
- ◆ Thrust washer MP 3-413
- ◆ Driver MP 3-423
- ◆ Plunger MP 3-448
- ◆ Pipe section MP 3-451
- ◆ Thrust washer MP 3-455
- ◆ Thrust washer MP 3-456
- ◆ Pipe section MP 3-4013



Notes:

- ♦ Pay attention to technical data when installing new gears ⇒ page 00-2.
- ♦ If the position of the taper roller bearings is affected as a result of replacing parts, it is then necessary to re-set the input shaft. List of settings ⇒ page 39-11

1 - Clutch housing

2 - Taper roller bearing outer race

- ♦ Remove ⇒ Fig 1
- ♦ Insert ⇒ Fig. 2

3 - Taper roller bearing inner race

- ♦ Remove ⇒ Fig. 14
- ♦ Insert ⇒ Fig. 3

4 - Input shaft

- ♦ Setting ⇒ page 35-9

5 - 3rd speed gear

- ♦ Shoulder points toward 4th gear
- ♦ Press off ⇒ Fig. 5
- ♦ Press on ⇒ Fig. 6

6 - Circlip

- ♦ Always replace

7 - 4th speed gear

- ◆ Press off with taper roller bearing outer race and sleeve ⇒ Fig. 4
- ◆ Press on ⇒ Fig. 7
- ◆ Collar points toward 3rd gear

8 - Taper roller bearing inner race

- ◆ Press off with 4th speed gear and sleeve ⇒ Fig. 4
- ◆ Press on ⇒ Fig. 8

9 - Thrust washer

- ◆ Dimensions 29.2x49x2.5

10 - Taper roller bearing outer race

- ◆ Press out ⇒ Fig. 10
- ◆ Press in ⇒ Fig. 11

11 - Shim

- ◆ Determining thickness ⇒ Setting input shaft, page 35-9

12 - Gearbox housing**13 - Sleeve**

- ◆ For needle bearing
- ◆ Press off together with 4th speed gear and taper roller bearing inner race ⇒ Fig. 4
- ◆ Press on ⇒ Fig. 9
- ◆ Fit on thrust washer (item 9) before installing
- ◆ Dimensions 29x35x24.1

14 - Needle bearing

- ◆ Dimensions 35x40x23.8

15 - 5th gear sliding gear

- ◆ Pull off 5th speed synchroniser body ⇒ page 34-25

16 - 5th speed synchroniser ring

- ◆ With cast locking pieces ⇒ page 34-29, Fig. N35-0018
- ◆ Inspect for wear ⇒ page 34-28

17 - Spring

- ◆ Fitting location ⇒ Fig. 14

18 - Locking pieces (3x)

- ◆ Fitting location ⇒ Fig. 12

19 - 5th speed synchroniser body

- ◆ Remove and install ⇒ page 34-25

20 - 5th speed sliding sleeve

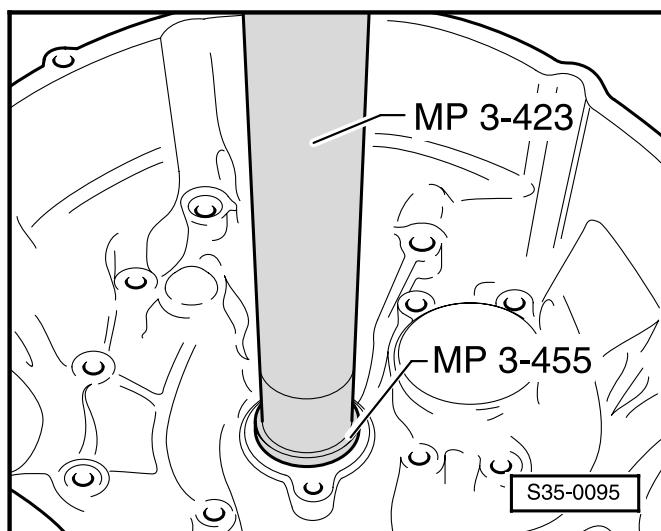
- ◆ Remove and install ⇒ page 34-25

21 - Dished washer

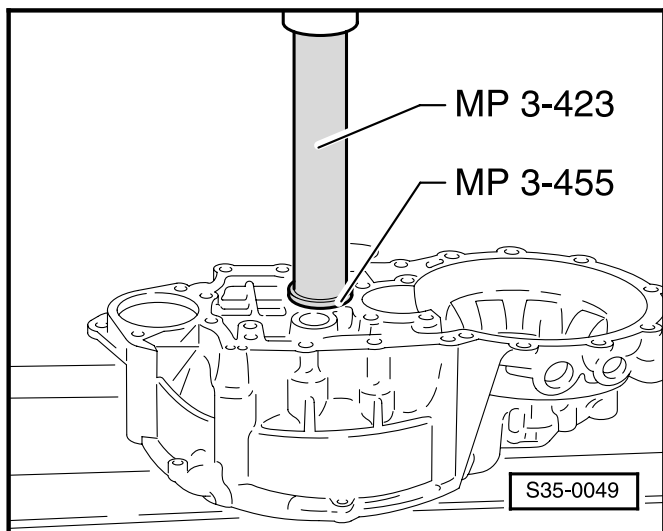
- ◆ Fitting location ⇒ page 34-30

22 - 80 Nm

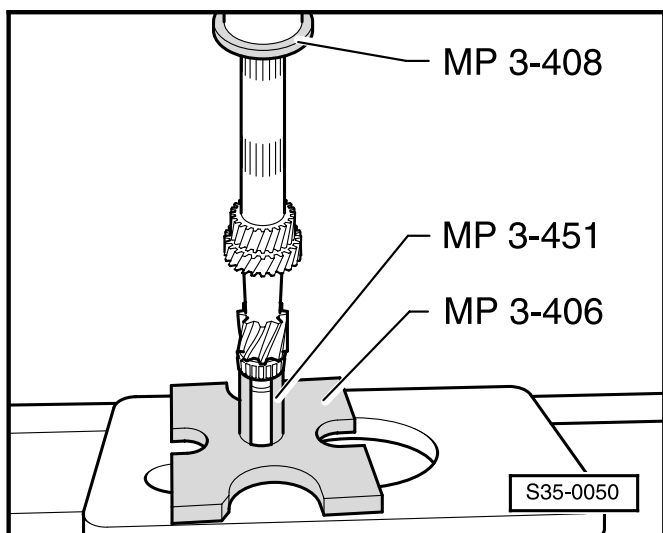
- ◆ Holds dished washer in position with fit piece at bolt head ⇒ page 34-30



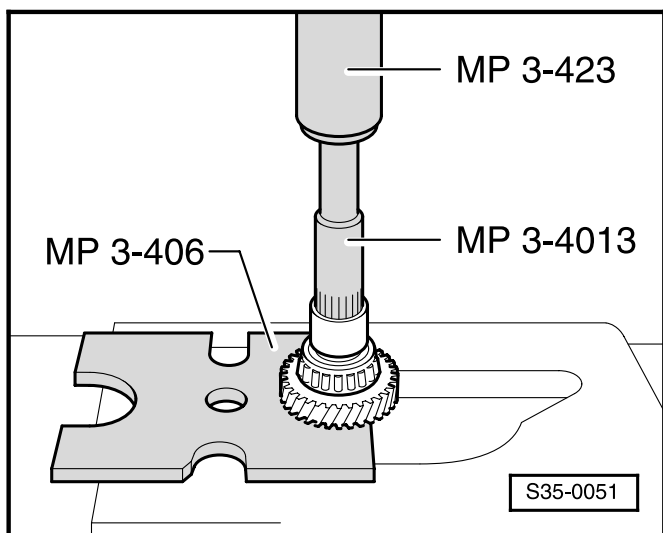
◀ Fig. 1 Press out taper roller bearing outer race



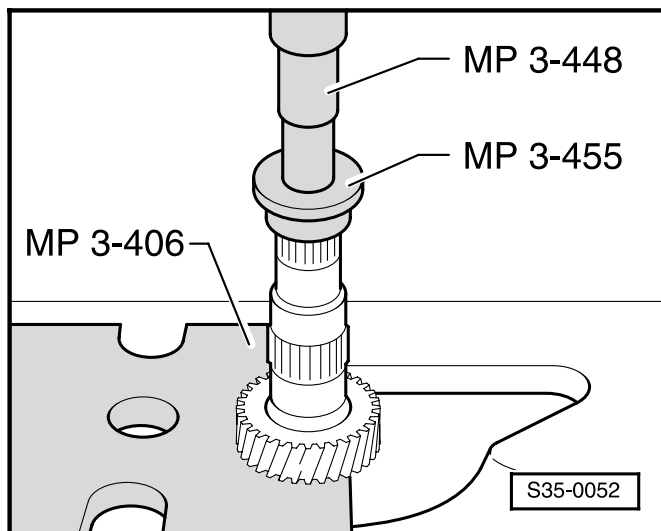
◀ Fig. 2 Inserting outer race of taper roller bearing



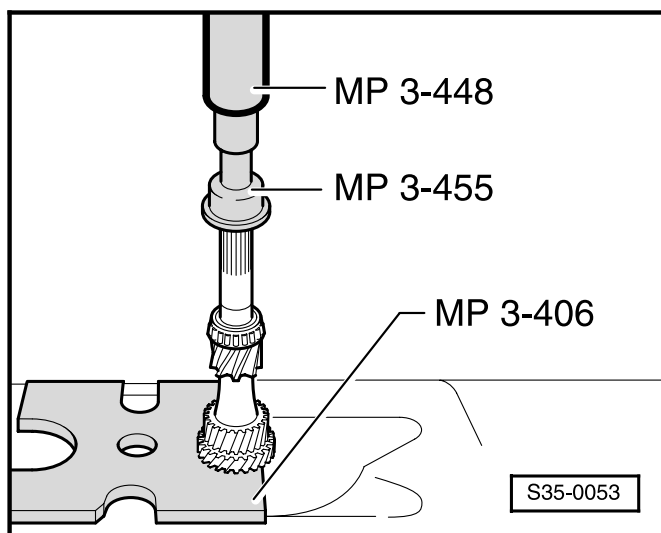
◀ Fig. 3 Pressing on inner race of taper roller bearing



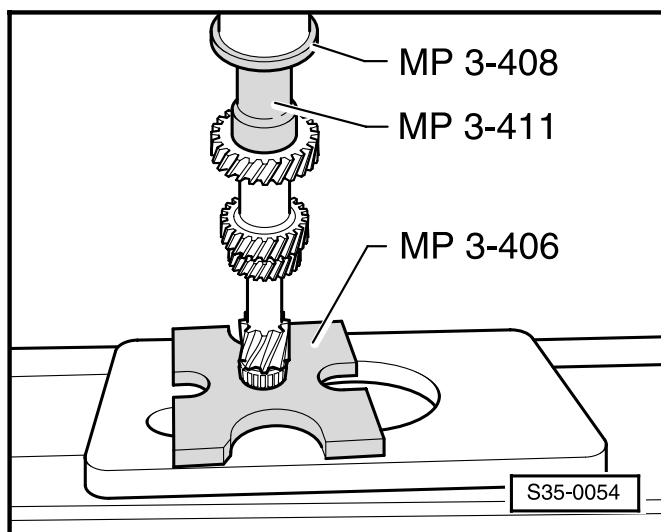
◀ Fig. 4 Pressing off 4th speed gearwheel with taper roller bearing and sleeve



◀ Fig. 5 Pressing off 3rd speed gearwheel

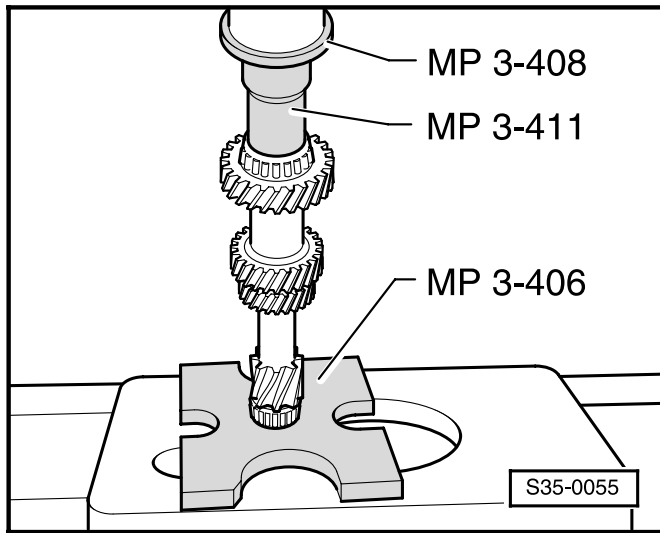


◀ Fig. 6 Pressing on 3rd speed gearwheel

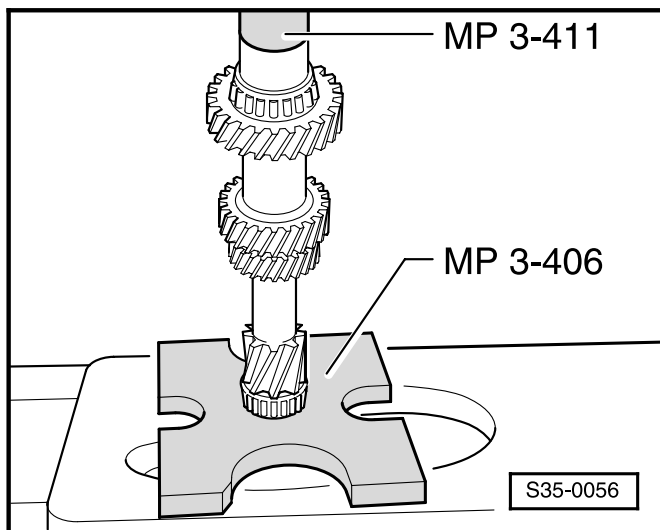


◀ Fig. 7 Pressing on 4th speed gearwheel

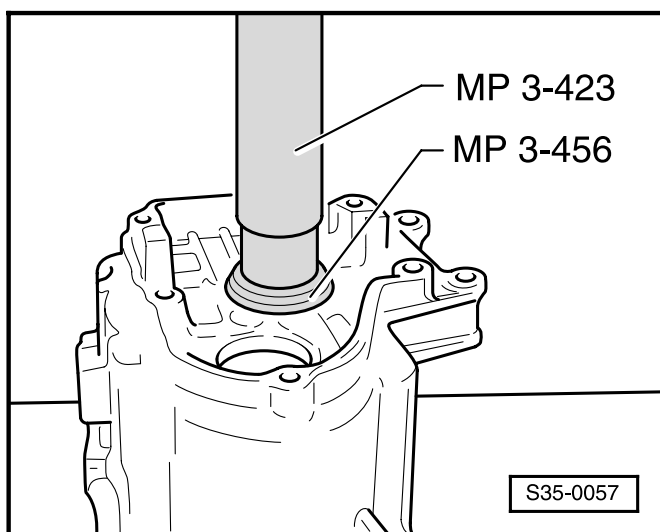
Shoulder faces toward 3rd gear.



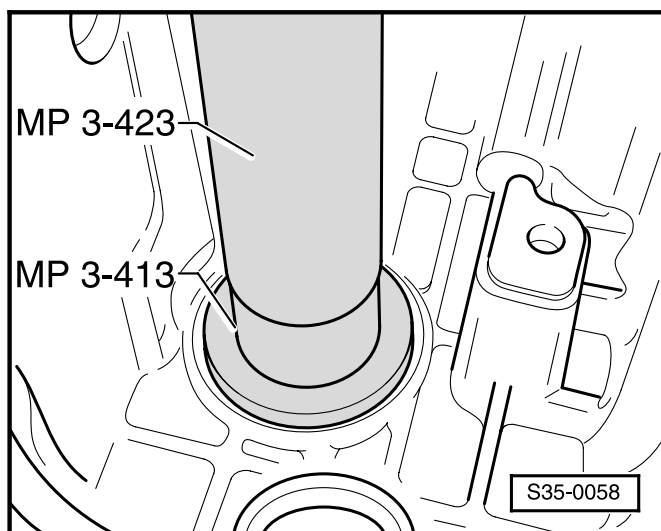
◀ Fig. 8 Pressing on inner race of taper roller bearing



◀ Fig. 9 Pressing on sleeve for needle bearing

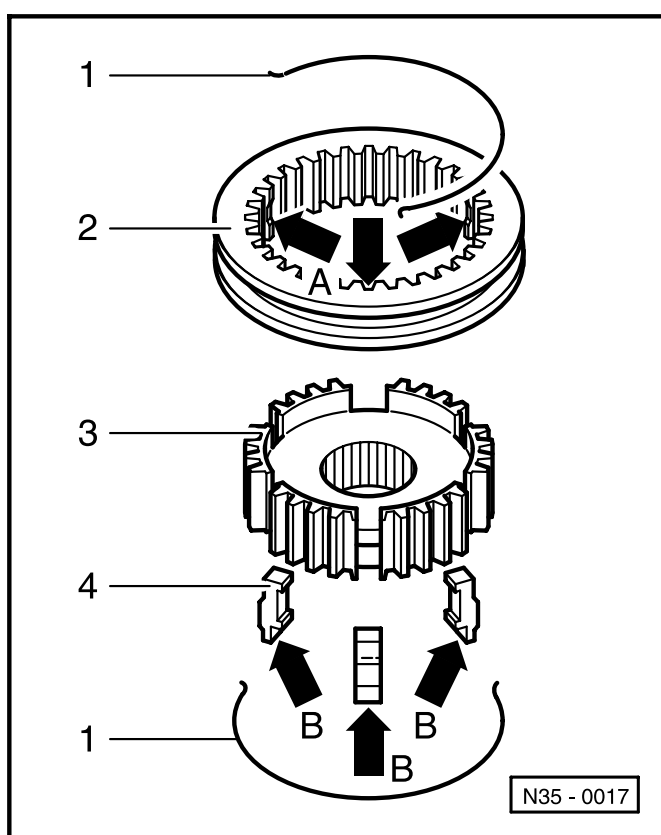


◀ Fig. 10 Removing outer race of taper roller bearing



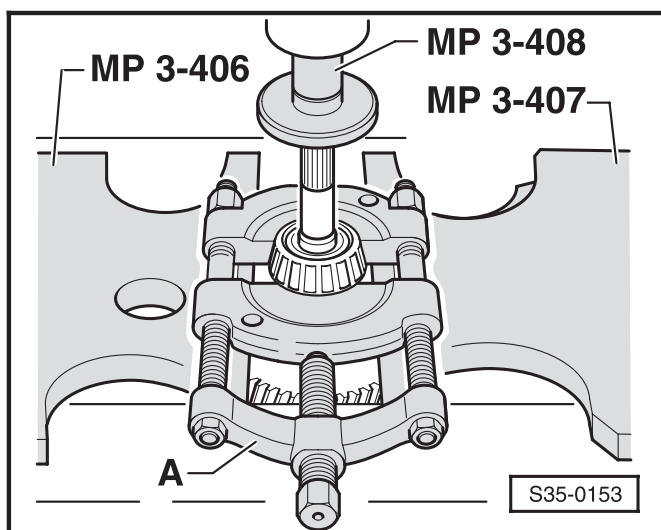
◀ Fig. 11 Press in taper roller bearing outer race

- Replace shim after setting input shaft.



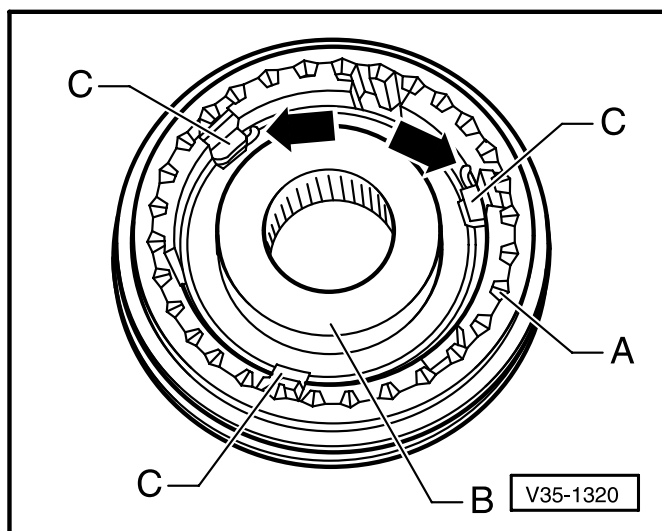
◀ Fig. 12 5th speed synchroniser

- 1 - Springs for locking pieces
- 2 - Sliding sleeve with 3 recesses (arrow A) for the locking pieces (item 4)
- 3 - Synchroniser body
- 4 - Locking pieces
Fitting location: The leg (arrows B) points to the sharp teeth of the sliding sleeve (item 2).



◀ Fig. 13 Press off taper roller bearing inner race

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

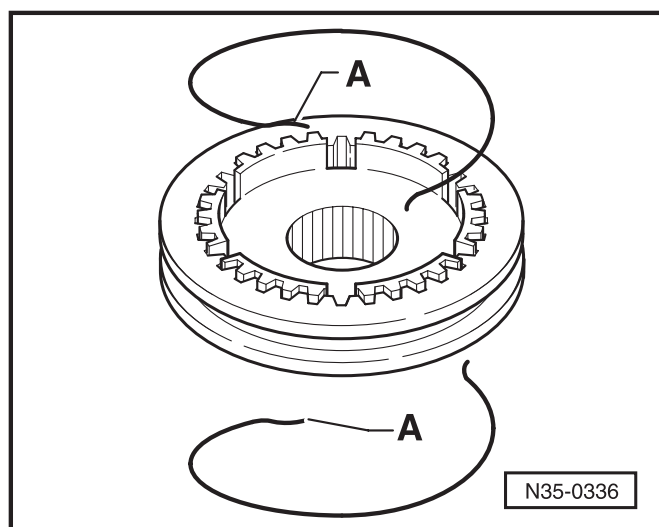


◀ Fig. 14 Assemble 5th gear sliding sleeve with synchroniser body

- Push sliding sleeve over the synchroniser body

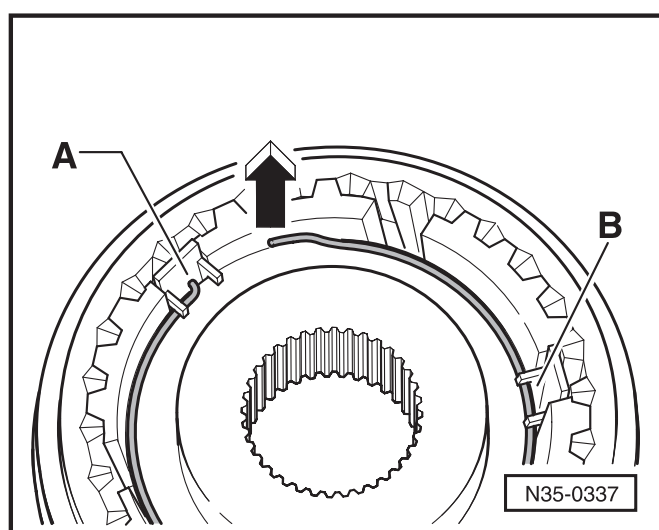
Teeth -A- of sliding sleeve with pointed tips and shoulder -B- of synchroniser body point in one direction. The recesses for the locking pieces in sliding sleeve and in synchroniser body must be positioned opposite each other (Fig. 12).

- Insert locking pieces (Fig. 12 shows installation position)
- Install springs below shoulder -C- offset 120°. The angled ends of the springs must be positioned ahead of the locking pieces (arrows).



◀ Springs for 5th gear synchroniser body 05.01 ▶

- The extremities -A- of the springs are bent at right angles as of above mentioned manufacturer's date
- The modified springs are fitted on both sides
- For the previous gearboxes the modified springs can only fit in combination with arresters, which are hollow inside
- Insert arresters (Fitting position Fig. 12)



Fitting position of springs

- Mount springs with 120° offset
- The spring with angled end -A- must be inserted into the hollow arrester.

It must be located under shoulder -B- of the arrester.

The angled end points always away from the synchroniser body (direction of arrow)

Setting input shaft

(Determining shim for input shaft)

Special tools, testers and aids required

- ◆ Gauge block MP 3-405/17
- ◆ Thrust washer MP 3-413
- ◆ Clamp MP 3-416
- ◆ Plunger MP 3-423
- ◆ Universal dial gauge holder MP 3-447
- ◆ Thrust washer MP 3-456
- ◆ Gearbox holder MP 3-501
- ◆ Commercially available torque gauge

It is necessary to re-set the input shaft if

- ◆ gearbox housing
- ◆ clutch housing
- ◆ input shaft
- ◆ 4th speed gear

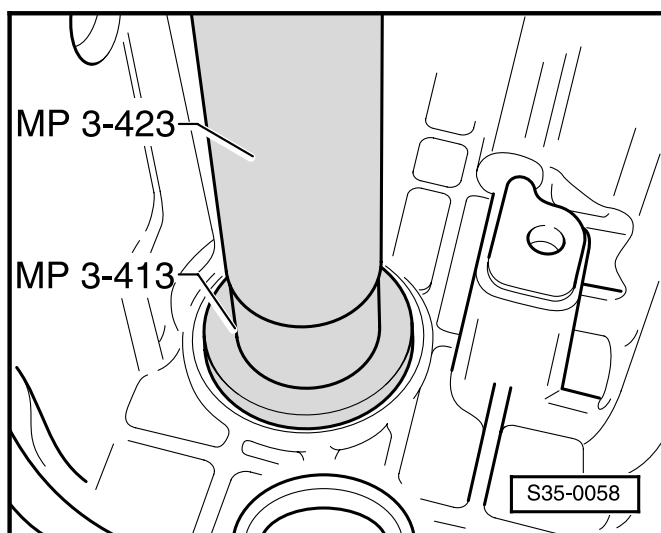
or the

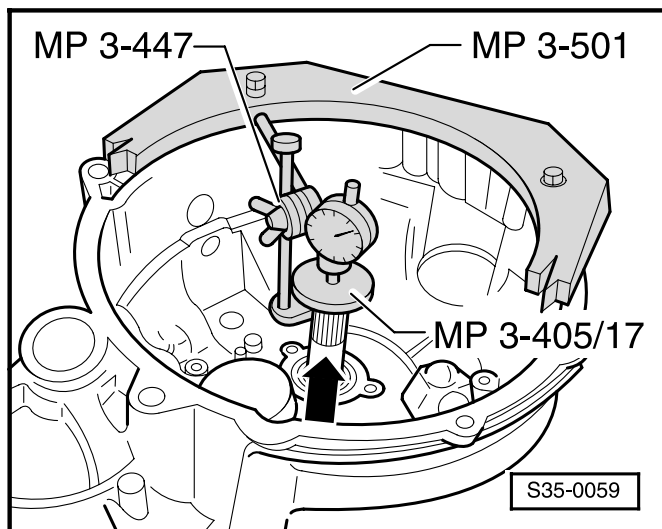
- ◆ taper roller bearings are replaced.

List of settings ⇒ page 39-11

- Press outer race of taper roller bearing into clutch housing as far as stop ⇒ page 35-4 Fig. 2.

- ◀ - Use MP 3-413 to press outer race of taper roller bearing into gearbox housing as far as the stop without shim.





- Place input shaft into the clutch housing and fit on gearbox housing. Tighten hexagon bolts to 25 Nm and torque a further 90°.
- ◀ - Install measuring device and dial gauge in clutch housing.
- Before carrying out measurement, rotate input shaft several times so that the taper roller bearings settle. Zero dial gauge with a preload of 1 mm.

Note:

This procedure should be repeated for each additional measurement for the dial gauge moves back into the initial position (0 position) without once again turning in the bearings.

- Press input shaft in direction of dial gauge (direction of arrow).
- Read off play on dial gauge and note (example 1.21).

Note:

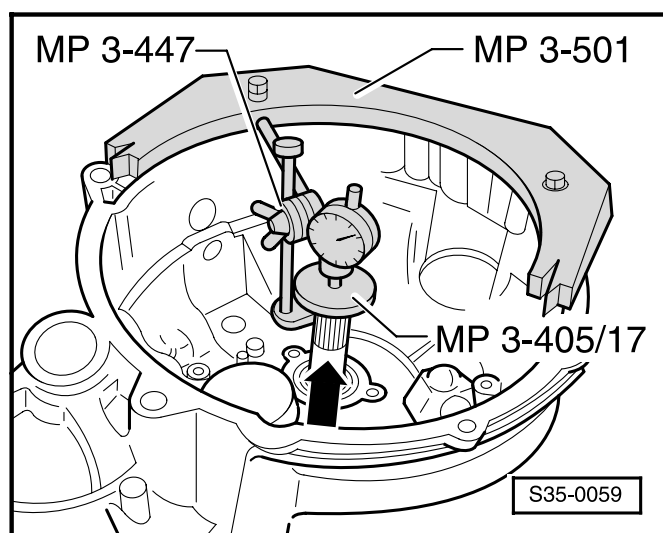
Dial gauge does not move back into initial position.

- Determine thickness of shim from table
⇒ page 35-11 (example 1.175).
- Remove input shaft and use MP 3-456 to press outer race of taper roller bearing out of gearbox housing.
- Use MP 3-413 to press outer race of taper roller bearing into gearbox housing together with 1.175 shim.
- Fit on gearbox housing and tighten hexagon bolt to 25 Nm and torque a further 90°.

Table of shims

Bearing play Measurement obtained (mm)	Shim	
	Thickness (mm)	Part No.
0.671 ... 0.699	0.650	02A 311 140
0.700 ... 0.724	0.675	02A 311 140 A
0.725 ... 0.749	0.700	02A 311 140 B
0.750 ... 0.744	0.725	02A 311 140 C
0.775 ... 0.799	0.750	02A 311 140 D
0.800 ... 0.824	0.775	02A 311 140 E
0.825 ... 0.849	0.800	02A 311 140 F
0.850 ... 0.874	0.825	02A 311 140 G
0.875 ... 0.899	0.850	02A 311 140 H
0.900 ... 0.924	0.875	02A 311 140 J
0.925 ... 0.949	0.900	02A 311 140 K
0.950 ... 0.974	0.925	02A 311 140 L
0.975 ... 0.999	0.950	02A 311 140 M
1.000 ... 1.024	0.975	02A 311 140 N
1.025 ... 1.049	1.000	02A 311 140 P
1.050 ... 1.074	1.025	02A 311 140 Q
1.075 ... 1.099	1.050	02A 311 140 R
1.100 ... 1.124	1.075	02A 311 140 S
1.125 ... 1.149	1.100	02A 311 140 T
1.150 ... 1.174	1.125	02A 311 140 AA
1.175 ... 1.199	1.150	02A 311 140 AB
1.200 ... 1.224	1.175	02A 311 140 AC
1.225 ... 1.249	1.200	02A 311 140 AD
1.250 ... 1.274	1.225	02A 311 140 AE
1.275 ... 1.229	1.250	02A 311 140 AF
1.300 ... 1.324	1.275	02A 311 140 AG
1.325 ... 1.349	1.300	02A 311 140 02A 311 140
1.350 ... 1.374	1.325	02A 311 140 02A 311 140 A
1.375 ... 1.399	1.350	02A 311 140 A 02A 311 140 A
1.400 ... 1.424	1.375	02A 311 140 A 02A 311 140 B
1.425 ... 1.449	1.400	02A 311 140 B 02A 311 140 B
1.450 ... 1.474	1.425	02A 311 140 B 02A 311 140 C
1.475 ... 1.499	1.450	02A 311 140 C 02A 311 140 C
1.500 ... 1.524	1.475	02A 311 140 C 02A 311 140 D

Bearing play Measurement obtained (mm)	Shim	
	Thickness (mm)	Part No.
1.525 ... 1.549	1.500	02A 311 140 D 02A 311 140 D
1.550 ... 1.574	1.525	02A 311 140 D 02A 311 140 E
1.575 ... 1.599	1.550	02A 311 140 E 02A 311 140 E
1.600 ... 1.624	1.575	02A 311 140 E 02A 311 140 F
1.625 ... 1.649	1.600	02A 311 140 F 02A 311 140 F
1.650 ... 1.674	1.625	02A 311 140 F 02A 311 140 G
1.675 ... 1.699	1.650	02A 311 140 G 02A 311 140 G
1.700 ... 1.724	1.675	02A 311 140 G 02A 311 140 H
1.725 ... 1.749	1.700	02A 311 140 H 02A 311 140 H
1.750 ... 1.774	1.725	02A 311 140 H 02A 311 140 J
1.775 ... 1.791	1.750	02A 311 140 J 02A 311 140 J

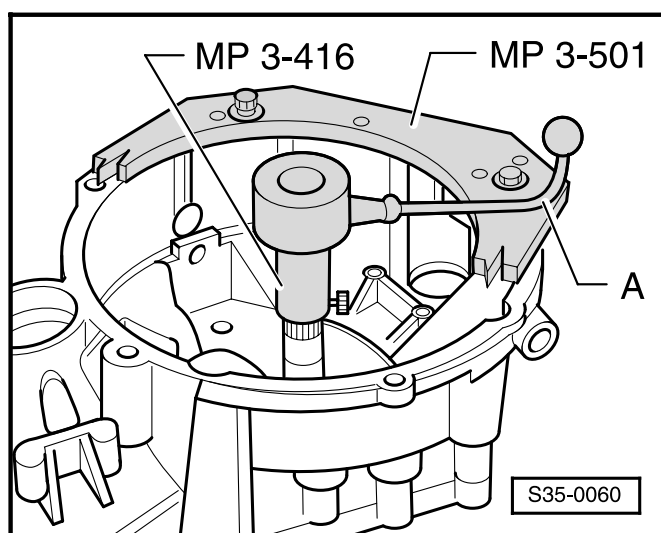


Carrying out a check measurement

- ◀ - Install measuring device and dial gauge.
- Rotate input shaft several times so that the taper roller bearings settle.
- Press input shaft in direction of arrow.
- The bearing play should be min. 0.01 ... max. 0.09 mm.

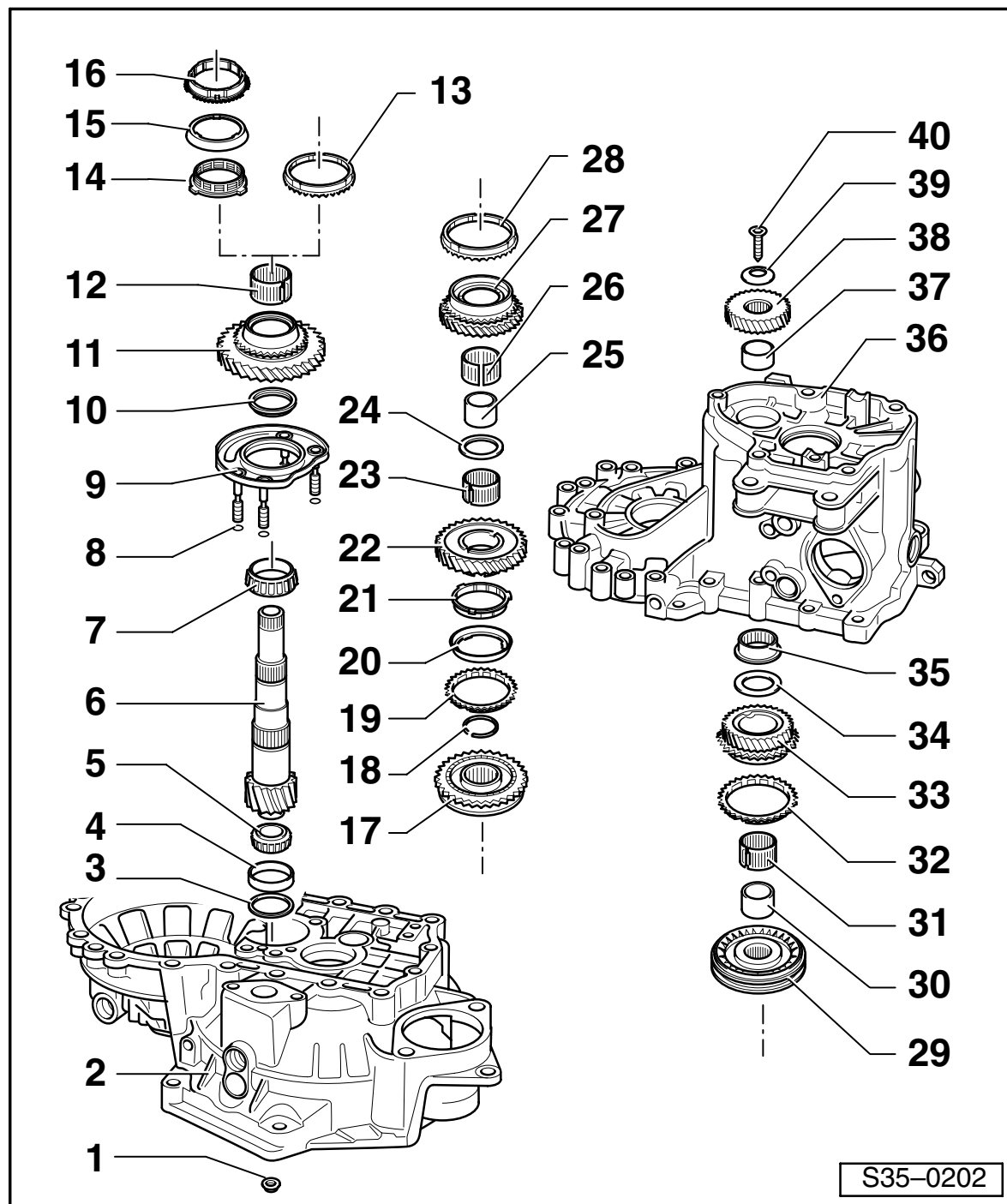
Note:

If no bearing play can be measured, but the input shaft has perceptible rock and can be easily rotated, the setting is also correct.



◀ - Max. friction torque 20 Ncm.

Disassembling and assembling output shaft (pinion shaft)



Special tools, testers and aids required

- ◆ Thrust plate MP 3-407
- ◆ Thrust plunger MP 3-408
- ◆ Thrust piece MP 3-411
- ◆ Thrust plunger MP 3-423
- ◆ Two-legged puller Kukko 20/10
- ◆ Hook Kukko 1-250
- ◆ Countersupport Kukko 22/2
- ◆ Separating device Kukko 17/2
- ◆ Internal extractor Kukko 21/6
- ◆ Thrust plunger MP 3-448
- ◆ Thrust plunger MP 3-449

- ◆ Mounting rails MP 3-457
- ◆ Thrust disc MP 3-460
- ◆ Tube section MP 3-461
- ◆ Insertion tool MP 3-466
- ◆ V.A.G 1582
- ◆ V.A.G 1582/5
- ◆ Tube section MP 3-450
- ◆ Thrust ring MP 3-452
- ◆ Thrust disc MP 3-455

Notes:

- ◆ *Pay attention to the technical data ⇒ page 00-2 when installing new gears or a new output shaft assignment ⇒ Parts List.*
- ◆ *Removing and installing output shaft ⇒ page 34-34*
- ◆ *Always replace both taper roller bearings together*
- ◆ *Since 08.00 the gearboxes have been manufactured with a modified synchromesh for 1st gear*

1 - Nuts, 25 Nm + 90°

- ◆ 4 nuts for mounting bearing

2 - Clutch housing**3 - Shim**

- ◆ Determining thickness ⇒ page 35-26, Setting output shaft

4 - Small taper roller bearing outer race

- ◆ Remove ⇒ Fig. 1
- ◆ Press on ⇒ Fig. 2

5 - Small taper roller bearing inner race

- ◆ Pull off ⇒ Fig. 3
- ◆ Press on ⇒ Fig. 4

6 - Output shaft

- ◆ Is matched to final drive gear, always replace together
- ◆ Setting ⇒ page 35-26

7 - Large taper roller bearing inner race

- ◆ Pull off ⇒ Fig. 7
- ◆ Press on ⇒ Fig. 8

8 - Seal

- ◆ Place seals (4 in total) onto the bolts of the bearing mount

9 - Bearing mount

- ◆ With large taper roller bearing outer race and bolts
- ◆ Replace outer only together with large taper roller bearing and bearing mount

10 - Thrust washer

- ◆ Shoulder of thrust washer points toward taper roller bearing

11 - 1st speed sliding gear**12 - Needle bearing**

- ◆ For 1st gear
- ◆ Dimensions 38x43x25

13 - 1st gear synchroniser ring

- ◆ For gearbox ► 08.00
- ◆ Inspect for wear ⇒ Fig. 9
- ◆ Marking ⇒ Fig. 14

14 - 1st gear inner race

- ◆ For gearbox 08.00 ►
- ◆ Inspect for wear ⇒ Fig. 16
- ◆ Inspect lugs for wear
- ◆ Fitting location ⇒ Fig. 29

15 - 1st gear outer race

- ◆ For gearbox 08.00 ►
- ◆ Place onto inner race (item 14), fitting location ⇒ Fig. 29
- ◆ Replace if scores or signs of wear present

16 - 1st gear synchroniser ring

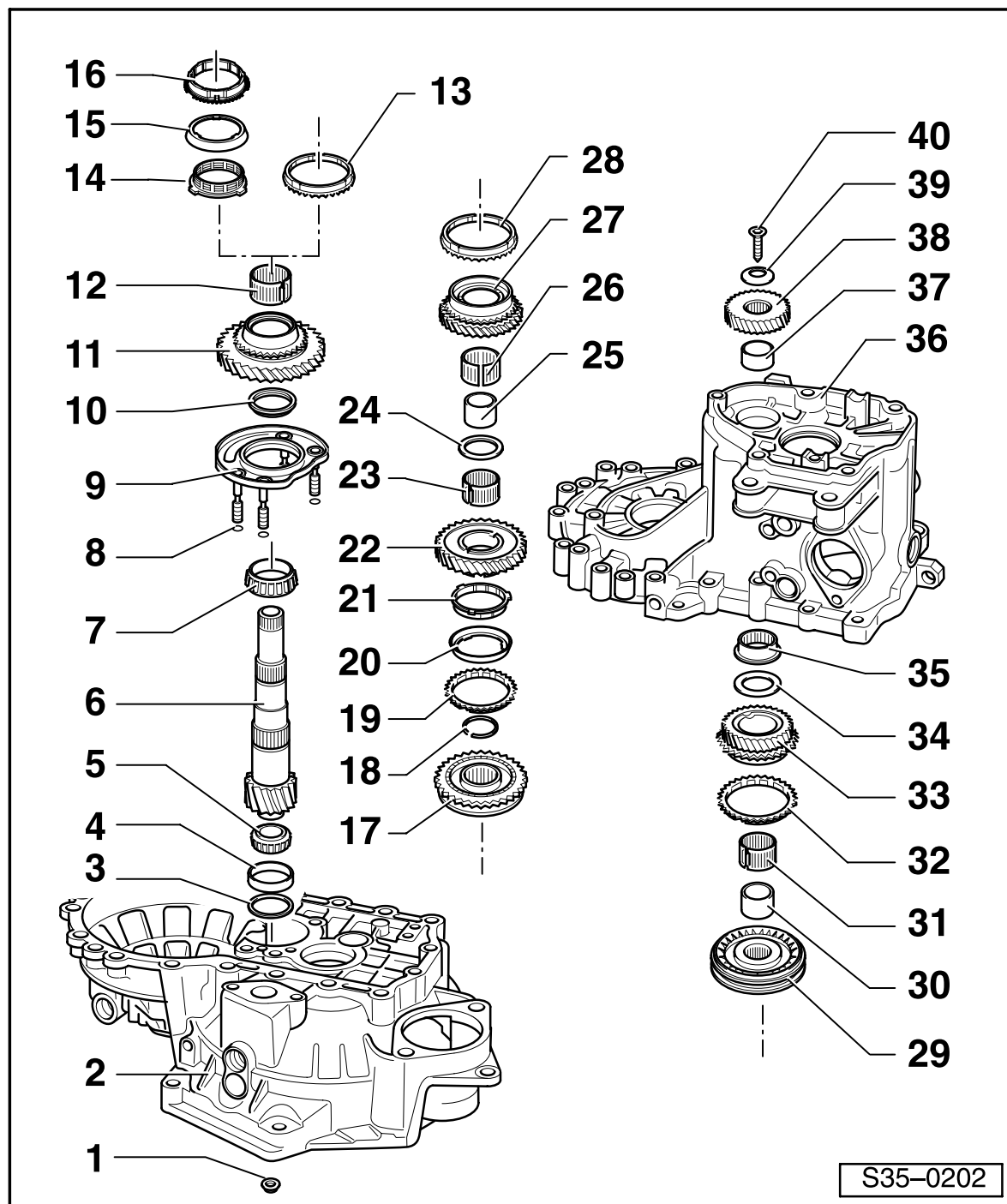
- ◆ For gearbox 08.00 ►
- ◆ Marking ⇒ Fig. 30
- ◆ Inspect for wear ⇒ Fig. 17
- ◆ Fitting location ⇒ Fig. 29

17 - 1st and 2nd gear sliding sleeve with synchroniser body

- ◆ Pull off over bearing mount after removing circlip (item 18) ⇒ Fig. 6
- ◆ Disassemble ⇒ Fig. 10
- ◆ Assemble sliding sleeve with synchroniser body ⇒ Fig. 10 and Fig. 11
- ◆ Fitting location ► 08.00 ⇒ Fig. 12
- ◆ Fitting location 08.00 ► ⇒ Fig. 31
- ◆ Press on ⇒ Fig. 13

18 - Circlip**19 - 2nd gear synchroniser ring**

- ◆ Marking ► 08.00 ⇒ Fig. 14
- ◆ Marking 08.00 ► ⇒ Fig. 30
- ◆ Inspect for wear ⇒ Fig. 17
- ◆ Insert so that recesses engage in the locking pieces of the sliding sleeve (item 17)



20 - 2nd gear outer race

- ◆ Insert into synchroniser ring (item 19) fitting location ⇒ Fig. 18
- ◆ Replace if scores or signs of wear are present

21 - 2nd gear inner race

- ◆ Inspect for wear ⇒ Fig. 16
- ◆ Inspect lugs for wear
- ◆ Fitting location ⇒ Fig. 19

22 - 2nd speed sliding gear

- ◆ Fitting location ⇒ Fig. 20

23 - Needle bearing

- ◆ For 2nd gear
- ◆ Dimensions 35 x 40 x 23.8

24 - Thrust washer

- ◆ Dimensions 30.8 x 52 x 3,5

25 - Sleeve for needle bearing of 3rd gear

- ◆ Press off together with 2nd speed sliding gear ⇒ Fig. 5
- ◆ Press on ⇒ Fig. 21
- ◆ Dimensions 30.6 x 35 x 25.85

26 - Needle bearing

- ◆ For 3rd gear
- ◆ Dimensions 35 x 39.6 x 25.5

27 - 3rd speed sliding gear**28 - 3rd gear synchroniser ring**

- ◆ Inspect for wear ⇒ Fig. 9

29 - 3rd and 4th gear sliding sleeve with synchroniser body

- ◆ Press off together with 2nd speed sliding gear (item 22) and 3rd speed sliding gear (item 27) ⇒ Fig. 5
- ◆ Disassemble ⇒ Fig. 23
- ◆ Fitting location of sliding sleeve with synchroniser body ⇒ Fig. 25
- ◆ Assemble sliding sleeve with synchroniser body ⇒ Fig. 23 and Fig. 24
- ◆ Press on ⇒ Fig. 26

30 - Sleeve

- ◆ For needle bearing
- ◆ Press off together with 3rd and 4th gear sliding sleeve and synchroniser body (item 29) ⇒ Fig. 5
- ◆ Press on ⇒ Fig. 27
- ◆ Dimensions 29 x 35 x 24.1

31 - Needle bearing

- ◆ For 4th gear
- ◆ Dimension 35 x 40 x 23.8

32 - 4th gear synchroniser ring

- ◆ Inspect for wear ⇒ Fig. 9

33 - 4th speed sliding gear**34 - Thrust washer**

- ◆ Dimensions 29.2 x 49 x 2.5

35 - Needle bearing

- ◆ For output shaft
- ◆ Removing and installing ⇒ page 34-42

36 - Gearbox housing**37 - Sleeve**

- ◆ For needle bearing of output shaft
- ◆ Press off ⇒ Fig. 5
- ◆ Press on ⇒ Fig. 28
- ◆ Dimensions 29 x 34 x 18.15

38 - 5th speed sliding gear

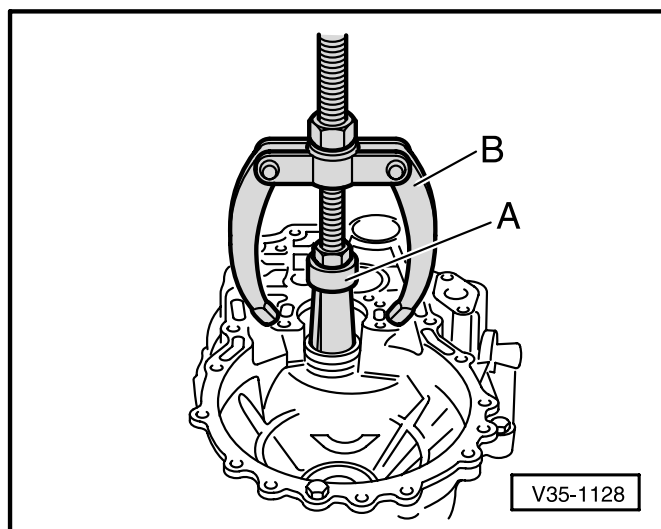
- ◆ Remove and install ⇒ Fig. 34-25

39 - Dished washer

- ◆ Fitting location ⇒ page 34-30

40 - 80 Nm

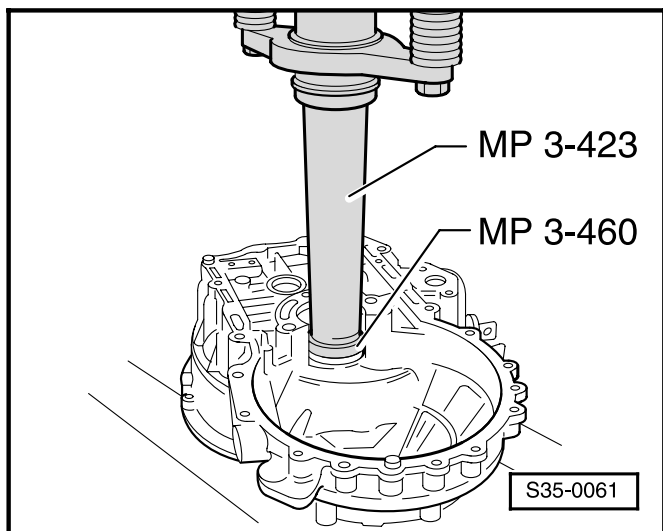
- ◆ Holds dished washer



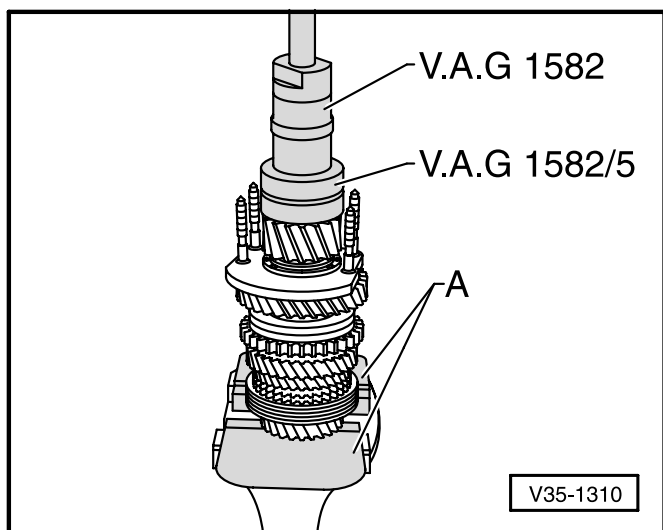
◀ Fig. 1 Pull out small taper roller bearing outer race

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

B - Counter support, e.g. Kukko 22/2



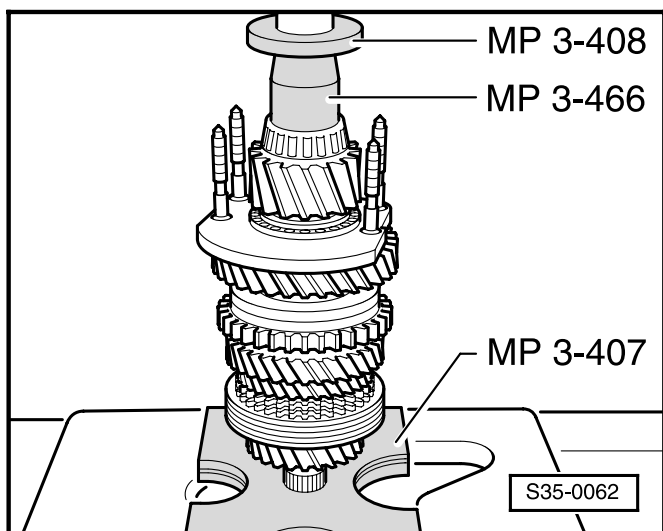
◀ Fig. 2 Pressing in small taper roller bearing outer race



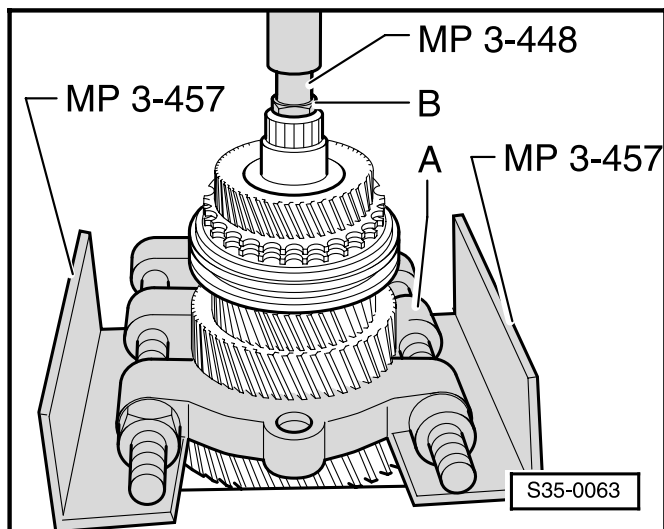
◀ Fig. 3 Pulling off small taper roller bearing inner race

A - Vice/soft protector jaws

- Position grip behind the rollers of the bearing and pull off inner race.



◀ Fig. 4 Pressing on small taper roller bearing inner race



◀ Fig. 5 Pressing off 2nd, 3rd and 4th speed synchroniser body, sliding sleeve, sliding gear together with sleeve for needle bearing

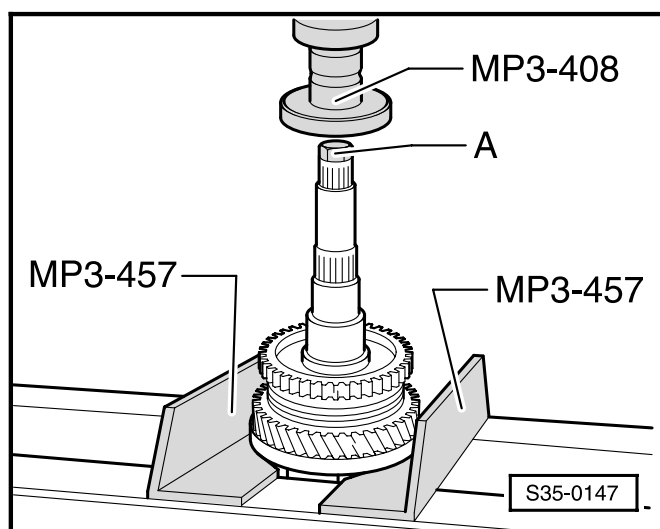
A - Separating device 22...115 mm,
e.g. Kukko 17/2

B - M10 x 20 bolt

- Position separating device below 2nd speed sliding gear (item 22) and press off.

Note:

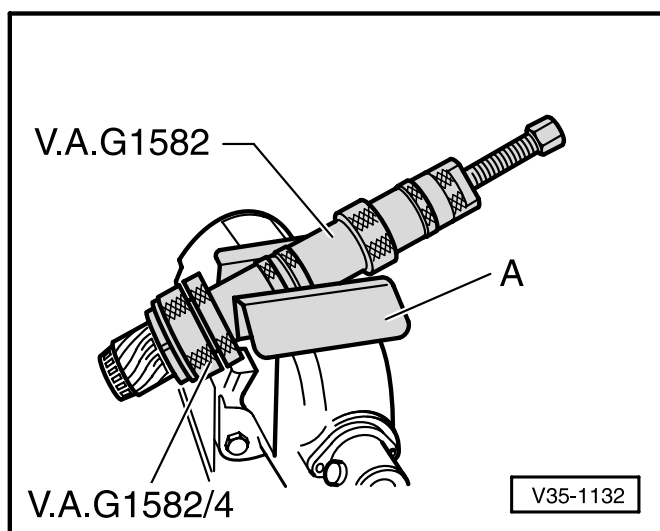
Support the separating device in such a way that 1st and 2nd gear sliding sleeve is not pulled off at the same time.



◀ Fig. 6 Pulling off sliding sleeve with synchroniser body over bearing mount

A - M10 x 20 bolt

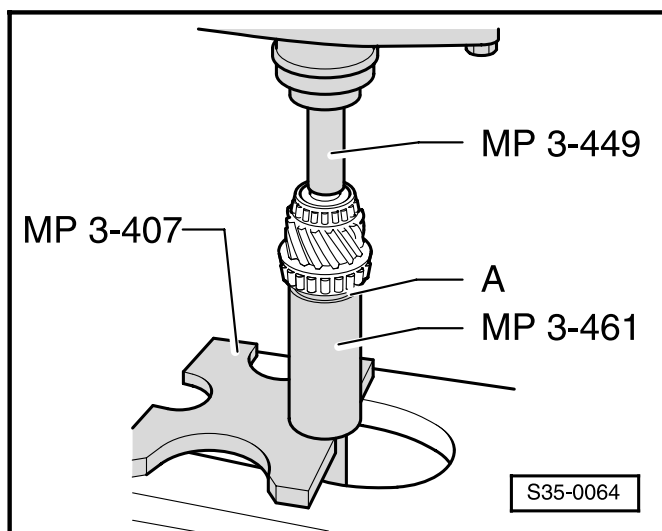
- Remove circlip (item 18 ⇒ page 35-14.1).
- Pull off together with 1st speed sliding gear and 1st and 2nd gear sliding sleeve with synchroniser body.



◀ Fig. 7 Pulling off large taper roller bearing inner race

A - Soft protective jaws

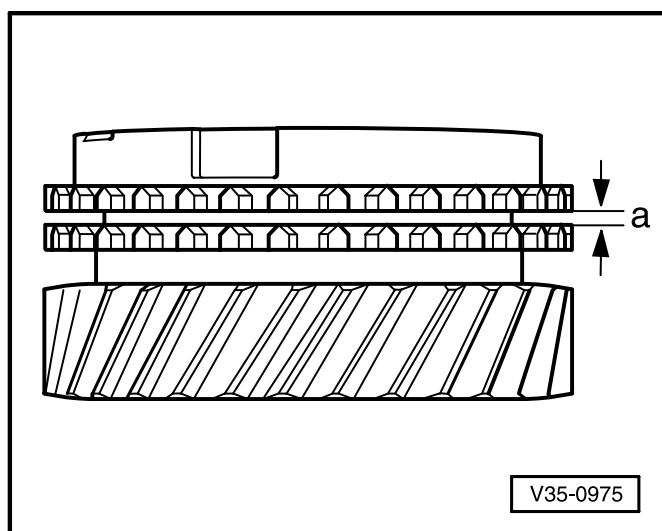
- Insert M10 x 20 bolt into the hole of the output shaft before fitting on the pulling device.



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

A - Thrust washer

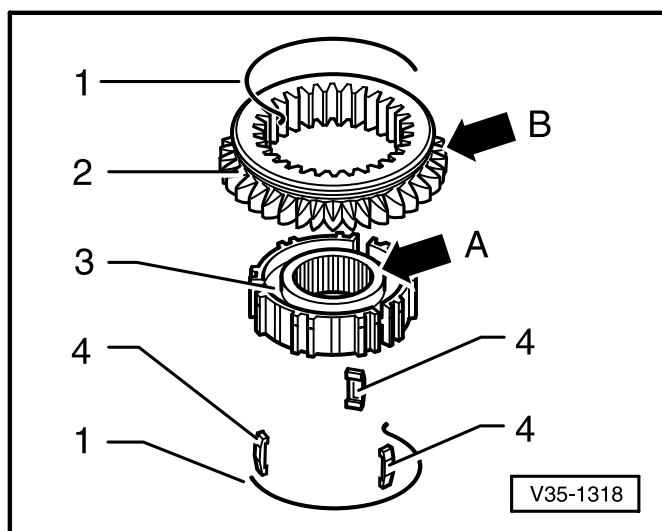
- Insert thrust washer before pressing on the inner race. The shoulder is positioned on the inner race side.



◀ Fig. 9 Inspecting synchroniser ring of 1st gear > 08.00, of 3rd and 4th gear for wear

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

	Installed dimension	Wear limit
Dimension -a-	1.0...1.7 mm	0.5 mm



◀ Fig. 10 Disassembling and assembling 1st and 2nd gear sliding sleeve and synchroniser body

- 1 - Spring
- 2 - Sliding sleeve
- 3 - Synchroniser body
- 4 - Locking pieces for synchroniser body

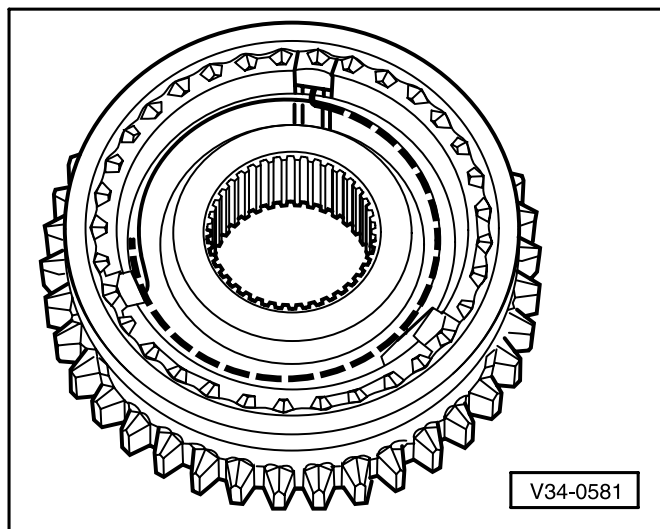
- Push sliding sleeve over the synchroniser body.

Gearbox > 08.00

The wider shoulder of the synchroniser body (arrow A) and the outer teeth of the sliding sleeve (arrow B) point in the opposite direction after being assembled. The recesses for locking pieces at synchroniser body and sliding sleeve must be positioned opposite.

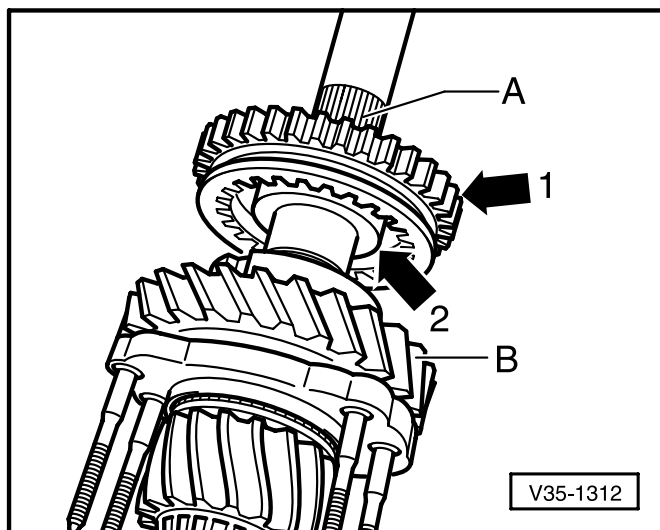
Gearbox 08.00 >

Chamfered edge (Fig. 31 ⇒ page 35-25) and the outer teeth of the sliding sleeve (arrow B) point in the same direction after being assembled. The recesses for the locking pieces at the synchroniser body and sliding sleeve must be positioned opposite.



◀ Fig. 11 Assembling 1st and 2nd gear sliding sleeve and synchroniser body

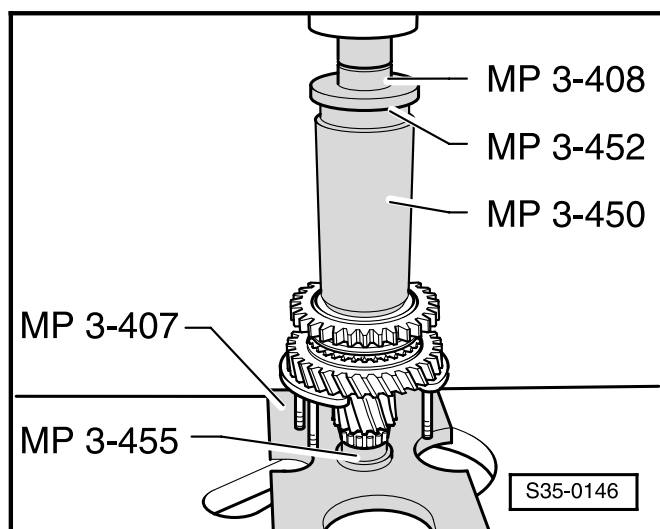
- Sliding sleeve has been pushed over synchroniser body.
- Insert locking pieces and install springs off-set 120°. The angled end of the springs must engage in the recesses in the locking piece.



◀ Fig. 12 Fitting location of 1st and 2nd sliding sleeve and synchroniser body
➤ 08.00

The teeth on the sliding sleeve (arrow 1) point toward the splines for 3rd and 4th gear synchroniser body -A-.

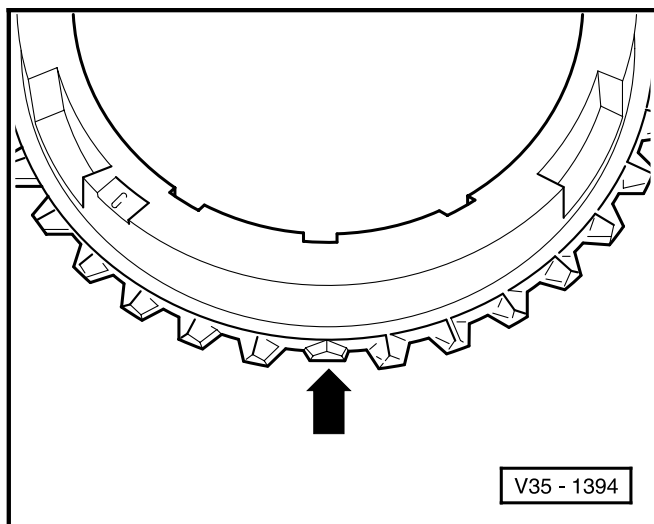
The wide shoulder of the synchroniser body (arrow 2) then points toward 1st gear -B-.



◀ Fig. 13 Pressing on 1st and 2nd gear sliding sleeve and synchroniser body

Note:

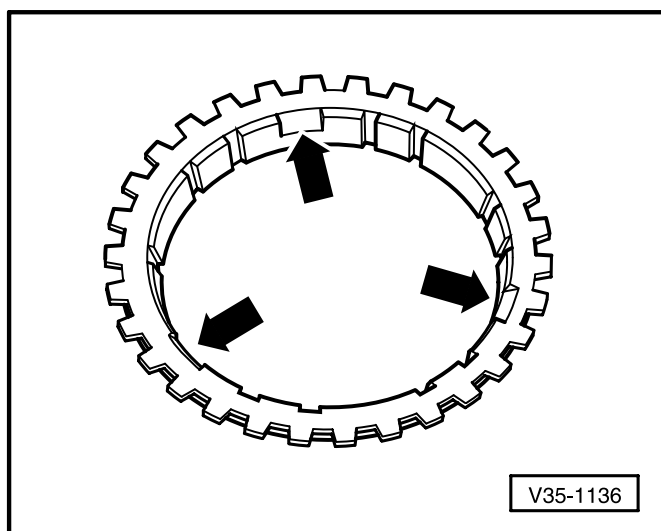
Place 1st gear synchroniser ring onto 1st speed sliding gear before pressing on.



◀ Fig. 14 Marking of 1st and 2nd gear synchroniser rings ▶ 08.00

- ◆ 1st gear synchroniser ring - 3 halfway up the flattened tooth (arrow)
- ◆ 2nd gear synchroniser ring - 3 or 2 halfway up flattened tooth (arrow)

Only the synchroniser ring with 2 half-flattened teeth is available as a replacement part for 2nd gear.



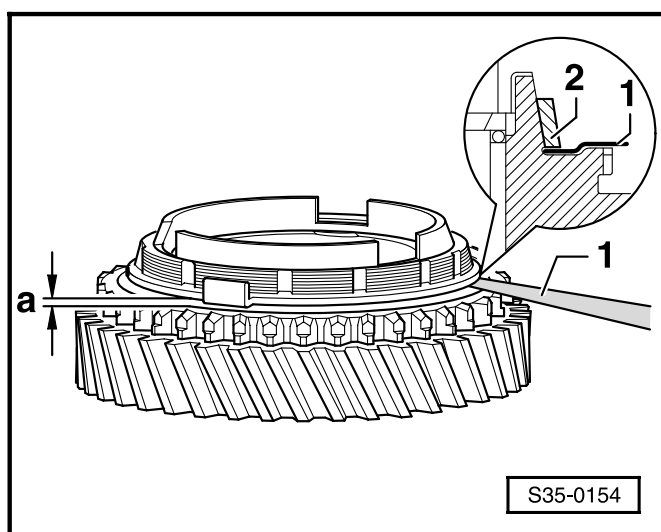
◀ Fig. 15 Distinguishing synchroniser rings for 1st gear and 2nd gear

Gearbox ▶ 08.00

- ◆ Synchroniser ring for 1st gear - has no recess
- ◆ Synchroniser ring for 2nd gear - has three recesses (arrows)

Gearbox 08.00 ▶

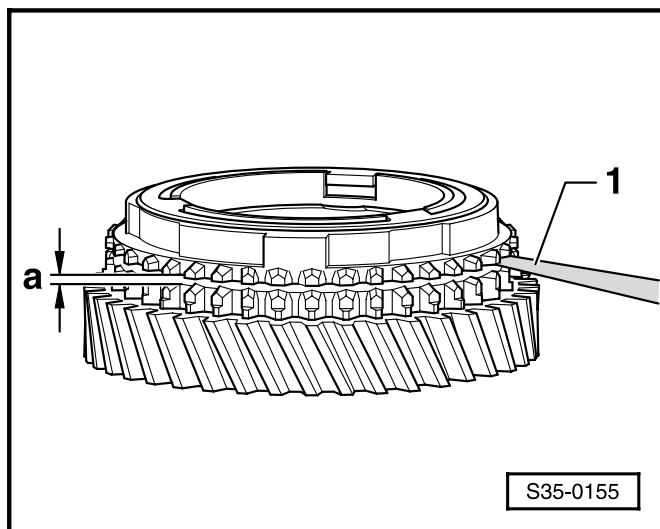
- ◆ Synchroniser rings for 1st and 2nd gear are identical; marking ⇒ page 35-25, Fig. 30



◀ Fig. 16 Inspecting inner race for 1st gear and 2nd gear for wear

- Press inner race onto the taper of the sliding gear and measure size of gap „a“ with a feeler gauge.

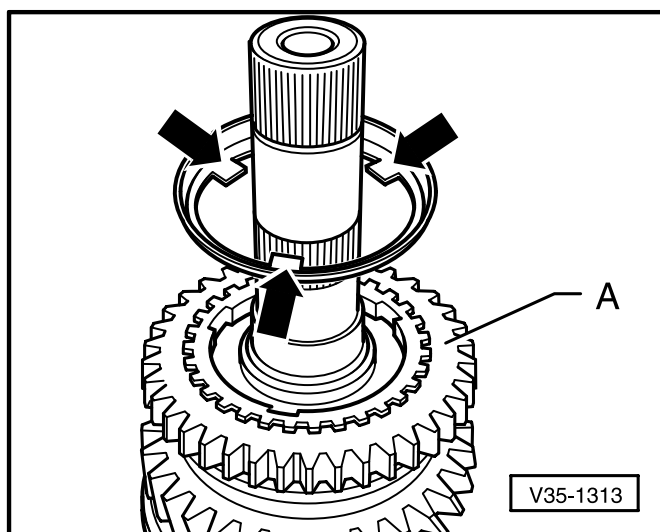
	Installed dimension	Wear limit
Dimension -a-	0.75...1.25 mm	0.3 mm



◀ Fig. 17 Inspecting inner races for 1st gear and 2nd gear for wear

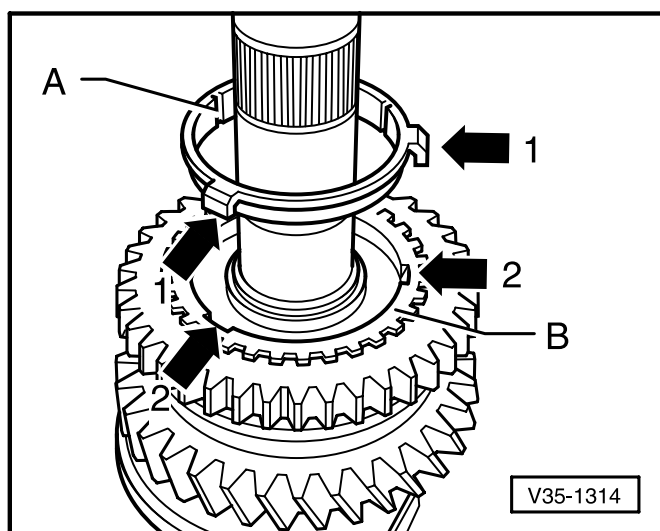
- Press synchroniser ring (outer race and inner race) onto the taper of the sliding gear and measure size of gap „a“ with a feeler gauge.

	Installed dimension	Wear limit
Dimension -a-	1.2...1.8 mm	0.5 mm



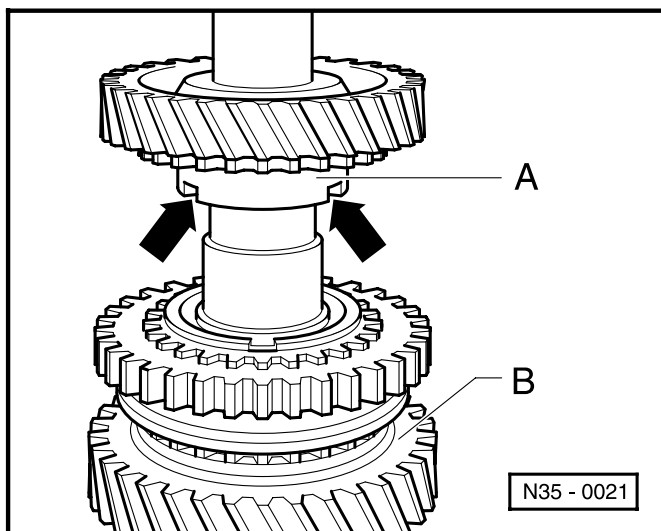
◀ Fig. 18 Fitting location of outer race

The lugs (arrows) point toward 1st gear -A-.



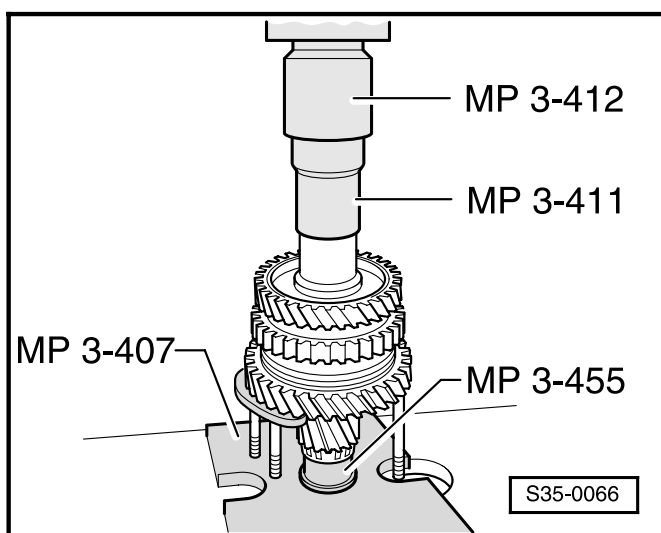
◀ Fig. 19 Fitting location of inner race -A-

The lugs (arrow 1) engage in the recesses (arrow 2) of the synchroniser ring -B-.



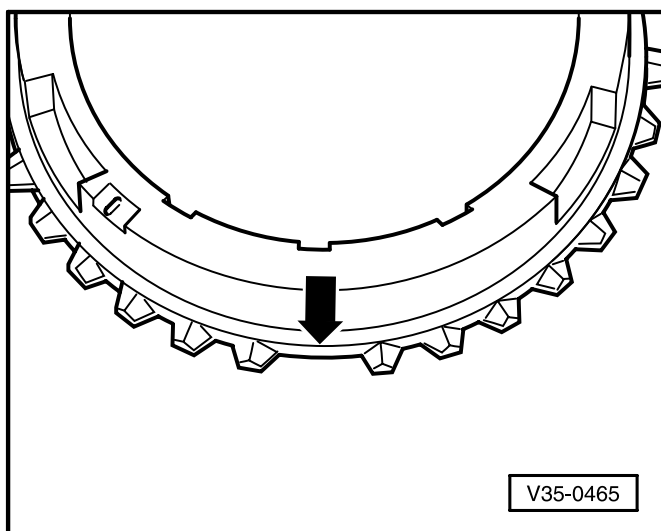
◀ Fig. 20 Fitting location of 2nd speed sliding gear

The higher shoulder -A- points toward 1st gear -B-. The recesses in the shoulder (arrows) engage in the lugs of the outer race (arrow ⇒ Fig. 18).



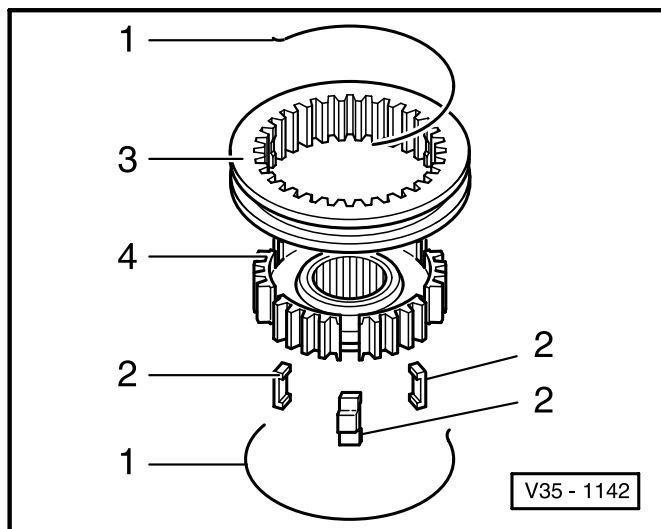
◀ Fig. 21 Fitting on thrust washer and pressing on sleeve for 3rd gear needle bearing

- Fit on needle bearing, 3rd speed sliding gear and synchroniser ring.



◀ Fig. 22 Marking of synchroniser ring for 3rd gear

Marking: 3 x 1 teeth missing in each case -arrows-.

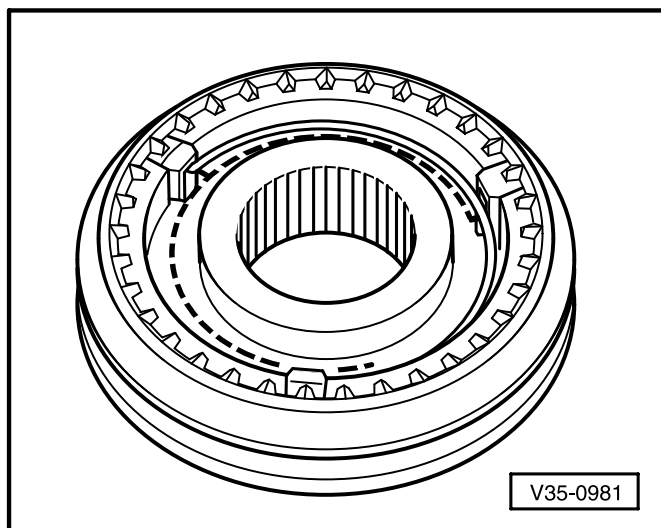


◀ **Fig. 23 Disassembling and assembling 3rd and 4th gear sliding sleeve and synchroniser body**

- 1 - Spring
- 2 - Locking pieces for synchroniser body
- 3 - Sliding sleeve
- 4 - Synchroniser body

- Push sliding sleeve over the synchroniser body.

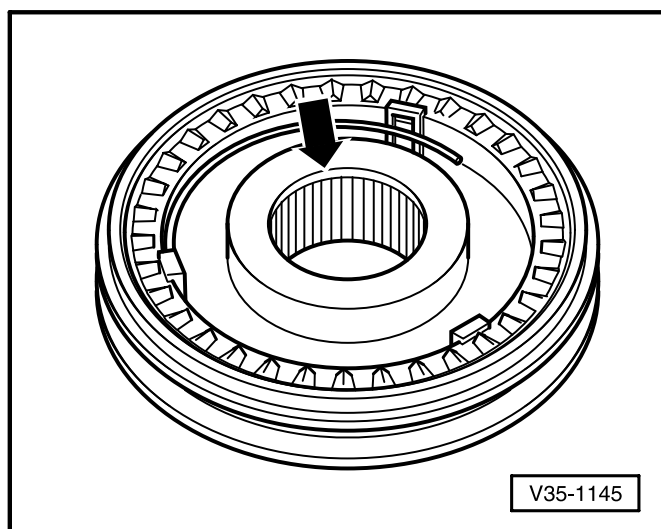
Recesses for locking pieces at synchroniser body and at sliding sleeve must be positioned opposite.



◀ **Fig. 24 Assembling 3rd and 4th gear sliding sleeve and synchroniser body**

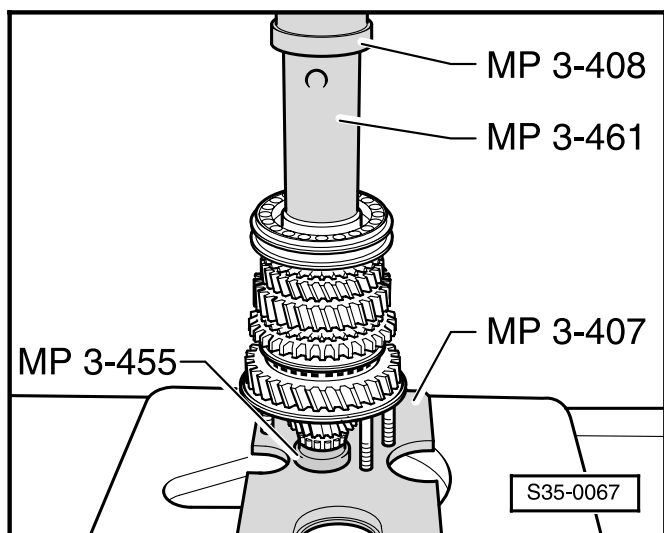
Sliding sleeve has been pushed over synchroniser body.

- Insert locking pieces and install springs offset 120°. The angled end of the springs must engage in the recesses in the locking piece.

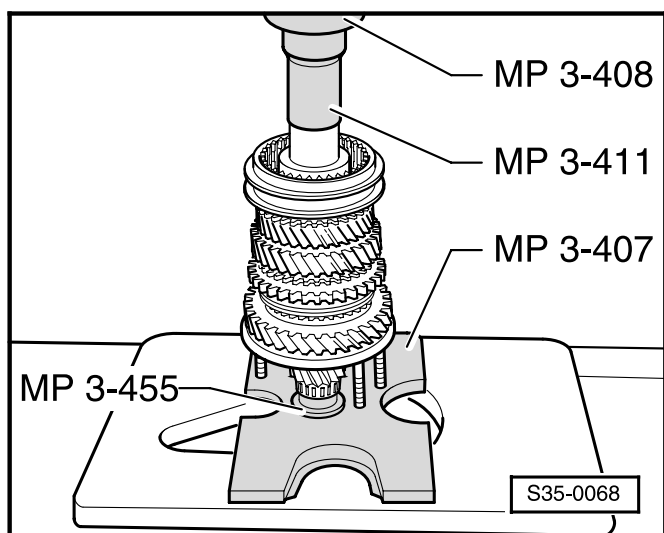


◀ **Fig. 25 Fitting location of 3rd and 4th gear sliding sleeve and synchroniser body**

Chamfered edge (arrow) points toward 4th gear.

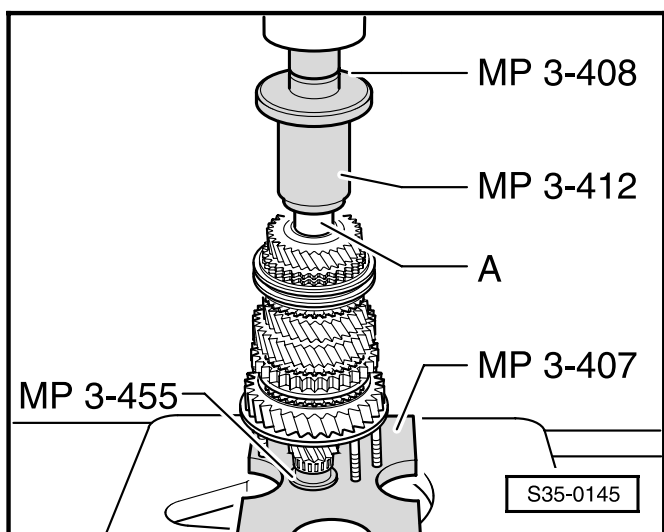


◀ Fig. 26 Pressing on 3rd and 4th gear synchroniser body and sliding sleeve

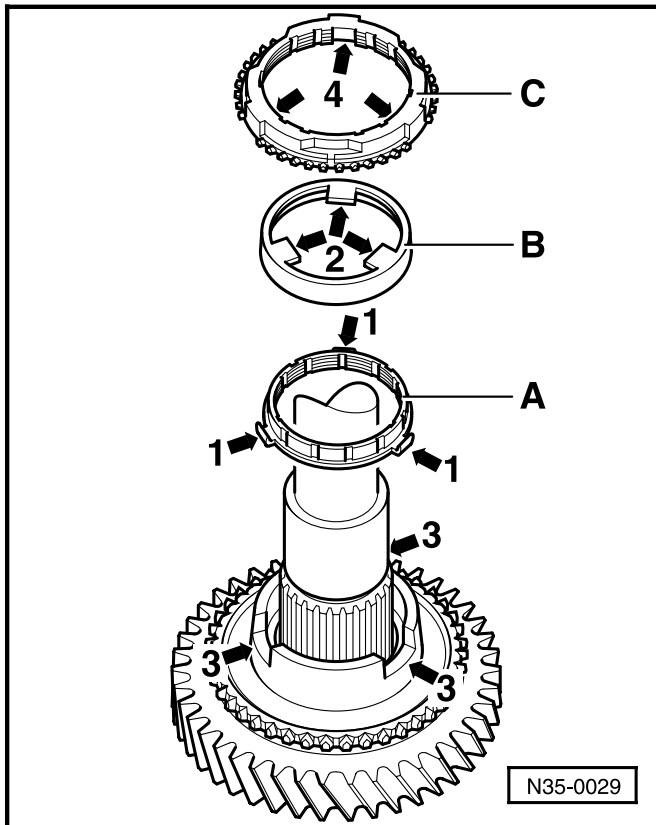


◀ Fig. 27 Pressing on sleeve for 4th gear needle bearing

- Fit on needle bearing, synchroniser ring and 4th speed sliding gear.
- Place thrust washer over 4th speed sliding gear.



◀ Fig. 28 Pressing on sleeve for needle bearing of output shaft -A-



◀ Fig. 29 Fitting location of outer race, inner race and synchroniser ring of 1st gear

- Place inner race -A- onto 1st speed sliding gear.

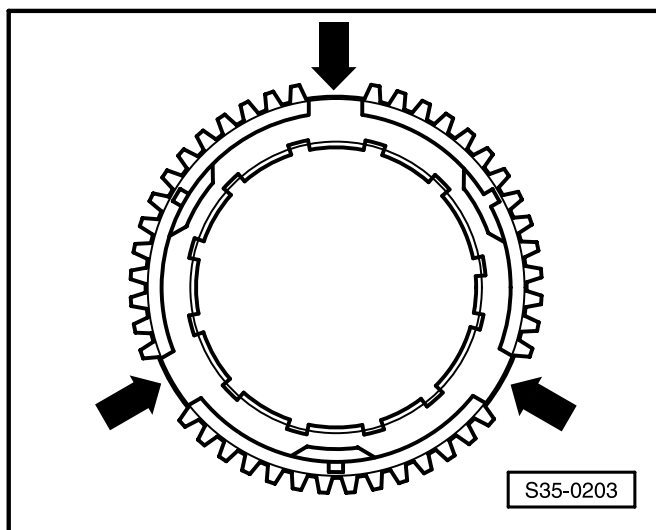
The angled shoulders -arrow 1- point toward the outer race -B-.

- Fit on outer race -B-.

The shoulders -arrows 2- engage in the recesses -arrows 3- of the sliding gear.

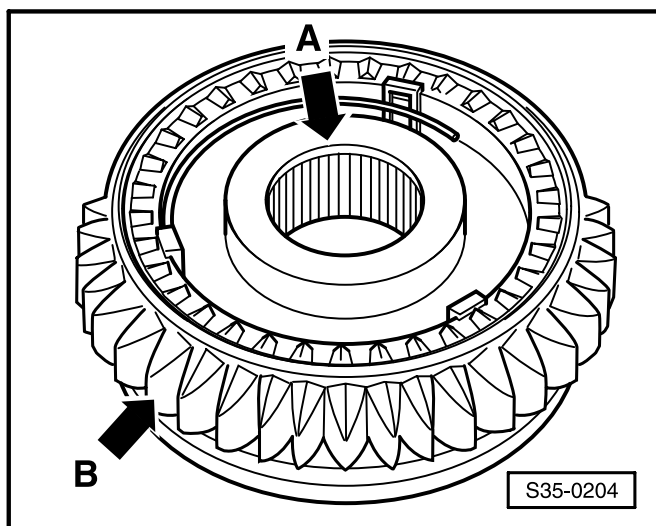
- Fit on synchroniser ring -C-.

The recesses -arrows 4- engage in the shoulders -arrows 1- of the inner race -A-.



◀ Fig. 30 Marking of synchroniser rings of 1st and 2nd gear 08.00 ▶

Marking: 3 x 2 teeth missing in each case -arrows-



◀ Fig. 31 Fitting location of 1st and 2nd gear sliding sleeve and synchroniser body 08.00 ▶

Chamfered edge -arrow A- and outer teeth of sliding sleeve -arrows B- point toward 2nd speed sliding gear.

Setting output shaft

(Determining shim for output shaft)

Special tools, testers and aids required

- ◆ End gauge MP 3-405/17
- ◆ Universal dial gauge holder MP 3-447
- ◆ Commercially available torque gauge
- ◆ Threaded piece MP 3-4004/2

Resetting output shaft is necessary if

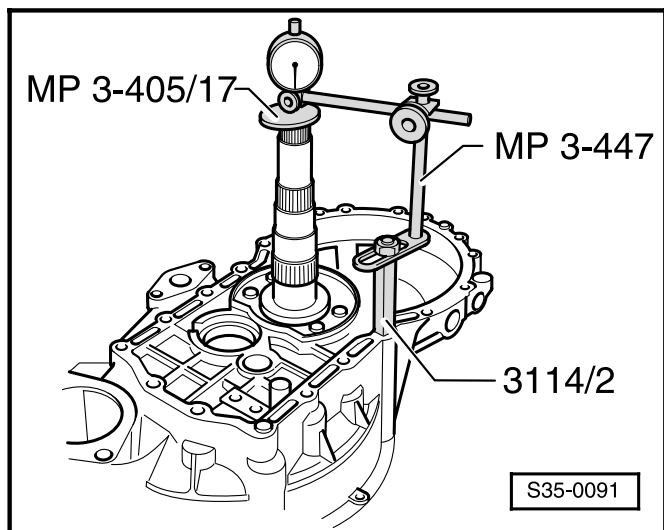
- ◆ drive pinion and crown wheel
 - ◆ clutch housing
- or
- ◆ taper roller bearing

have been replaced.

List of settings ⇒ page 39-11

Notes:

- ◆ *New taper roller bearings for output shaft are low-friction types. For this reason, the friction torque can only be used to a limited extent and a reference. It is only possible to correctly set the bearing preload by determining the thickness of the shim.*
- ◆ *Do not additionally treat new taper roller bearings with gearbox oil for measuring friction torque. The bearings have already been factory-treated with a special oil for this purpose.*
- Press small taper roller bearing outer race together with a 0.65 mm thick shim into the clutch housing as far as the stop ⇒ page 35-16.
- Insert output shaft and tighten nuts for mounting bearing to 25 Nm and torque a further 90°.
- ◀ - Insert dial gauge (3 mm range) and set to „O“ with a preload of 1 mm.
- Move output shaft up and down, read off play on dial gauge and note (example: 0.30 mm).



Note:

Do not rotate the output shaft during the measurement otherwise the bearings will settle and falsify the result of the measurement.

Determining shim

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

Example:

Shim inserted	0.65 mm
+ Measurement	0.30 mm
+ Compression (constant value)	0.20 mm
Thickness of shim	1.15 mm

- Remove output shaft and take out outer race for small taper roller bearing ⇒ page 35-16.

The following sizes of 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 taper roller bearing outer race with calculated size of shim (in example 1.15 mm) ($\Rightarrow$ page 35-16) and install output shaft. Tighten nut for mounting bearing in clutch housing to 25 Nm and torque a further 90°.

Inspecting friction torque

Notes:

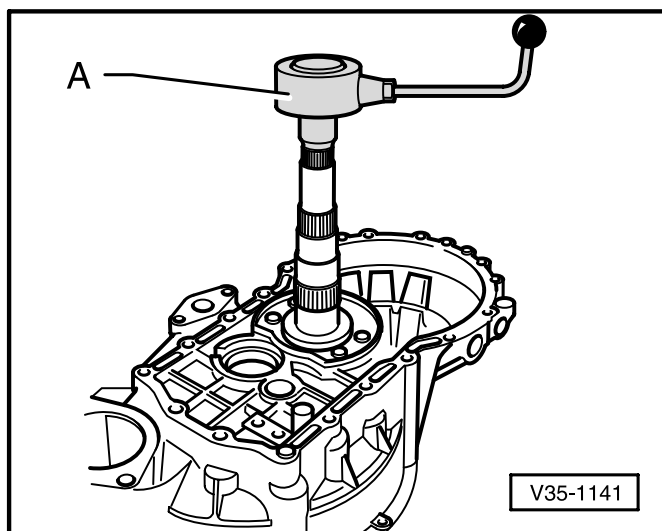
- ♦ *New taper roller bearings for the output shaft are a low-friction design. For this reason, it is only possible to use the friction torque as a reference size with certain restrictions. Correct setting of the bearing preload is only possible by calculating the thickness of the shim.*
- ♦ *Do not treat new taper roller bearings additionally with gear oil for measuring friction torque. The bearings are already factory-treated with a special oil for this purpose.*

- Screw in M 10 bolt $\Rightarrow$ page 35-14, item 37, onto output shaft.
- Insert appropriate attachment onto torque wrench -A- and measure friction torque.

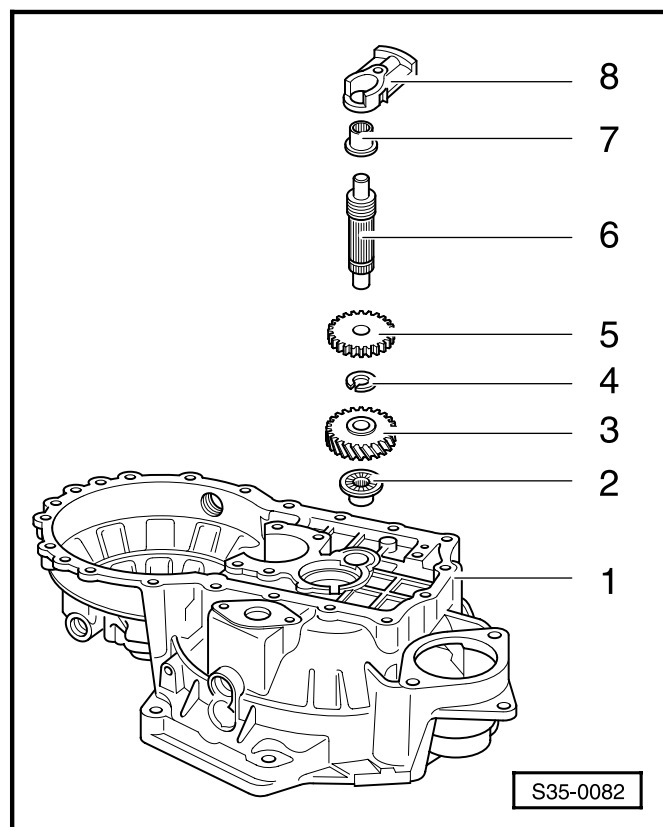
◀ A - Commercially available torque gauge 0 ... 600 Ncm.

The friction torque for new taper roller bearings should be 130 ... 180 Ncm.

The friction torque for used taper roller bearings should be at least 30 Ncm.



Disassembling and assembling reverse idler shaft



Special tools, testers and aids required

- ◆ Thrust plate MP 3-406
- ◆ Thrust piece MP 3-411
- ◆ Plunger MP 3-423
- ◆ Locking device Kukko 22/1
- ◆ Internal extractor Kukko 21/2
- ◆ Plunger MP 3-448
- ◆ Plunger MP 3-449
- ◆ Thrust washer MP 3-455
- ◆ Centering drift MP 3-463

1 - Clutch housing

2 - Needle sleeve

- ◆ Removing ⇒ Fig. 1
- ◆ Inserting ⇒ Fig. 2
- ◆ Always replace after removing

3 - Reverse idler gear

4 - Circlip

- ◆ Always replace after removing

5 - Reverse selector gear

- ◆ Take off circlip before replacing
- ◆ Shoulder faces toward reverse gear

6 - Reverse idler shaft

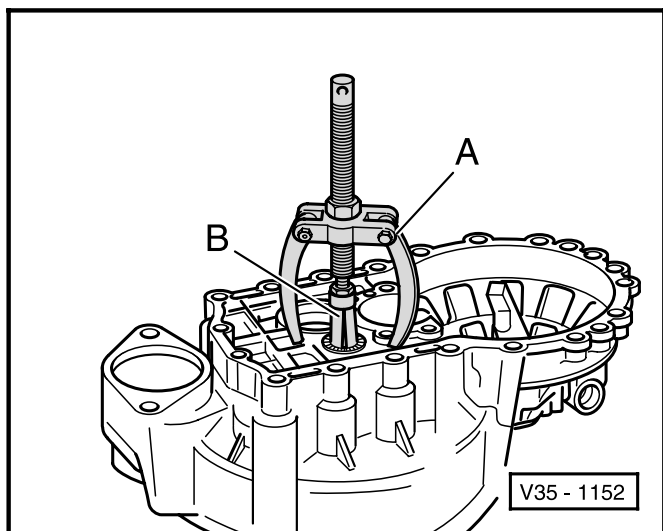
- ◆ Removing ⇒ page 34-29

7 - Needle sleeve

- ◆ Removing ⇒ Fig. 3
- ◆ Inserting ⇒ Fig. 4
- ◆ Always replace after removing

8 - Reverse idler shaft support

- ◆ Removing and installing
⇒ page 34-29



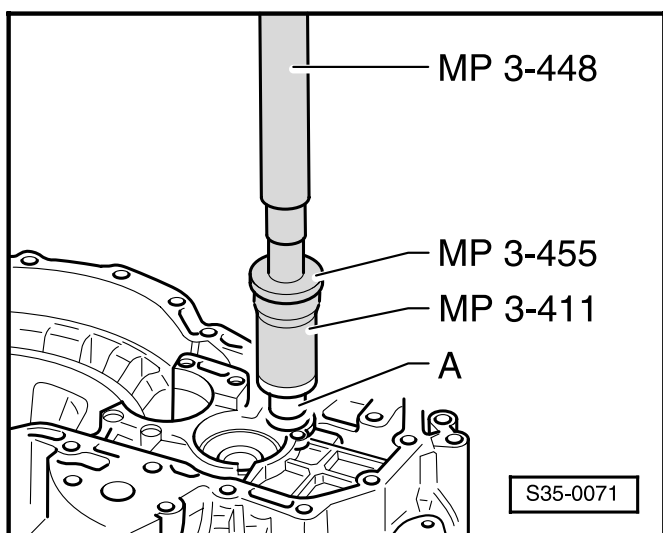
◀ Fig. 1 Removing needle sleeve from clutch housing

A - Locking device, e.g. Kukko 22/1

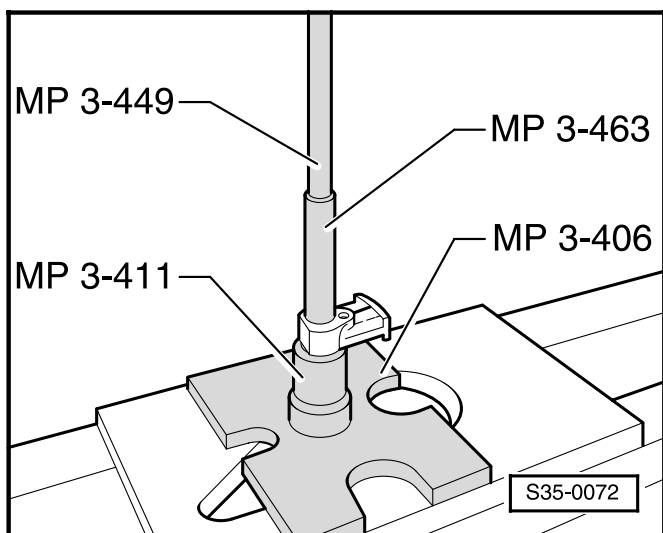
B - Internal extractor 14.5 ... 18.5 mm, e.g. Kukko 21/2

Note:

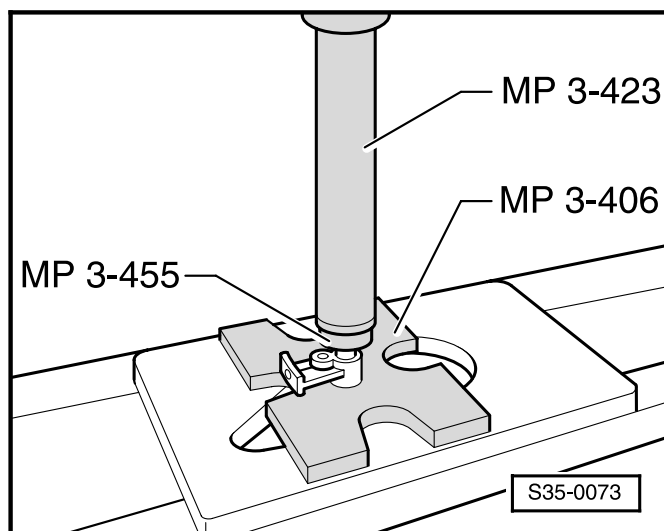
Needle sleeve is destroyed when it is removed and has to be replaced.



◀ Fig. 2 Inserting needle sleeve -A- into clutch housing



◀ Fig. 3 Pressing needle sleeve out of reverse idler shaft support



◀ Fig. 4

Pressing needle sleeve into reverse
idler shaft support

Replacing seals for flange shafts (gearbox installed in vehicle)

Special tools, testers and aids required

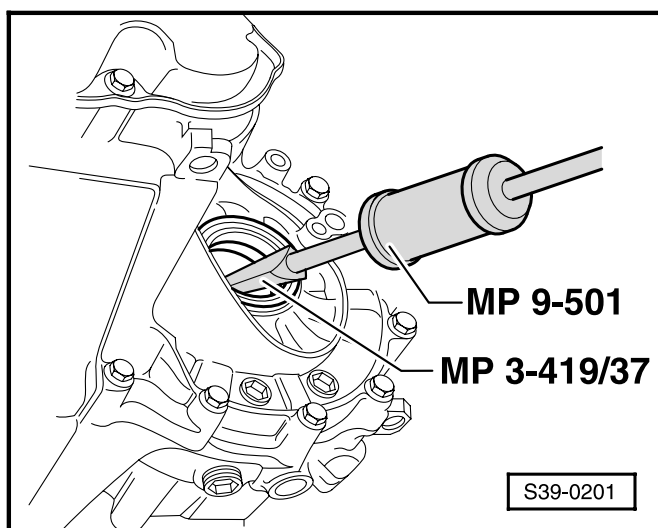
- ◆ 6 mm wrench
- ◆ Universal tool MP 9-501
- ◆ Additional part MP 3-420
- ◆ Insertion drift MP 3-415
- Pay attention to general repair information
⇒ page 00-4

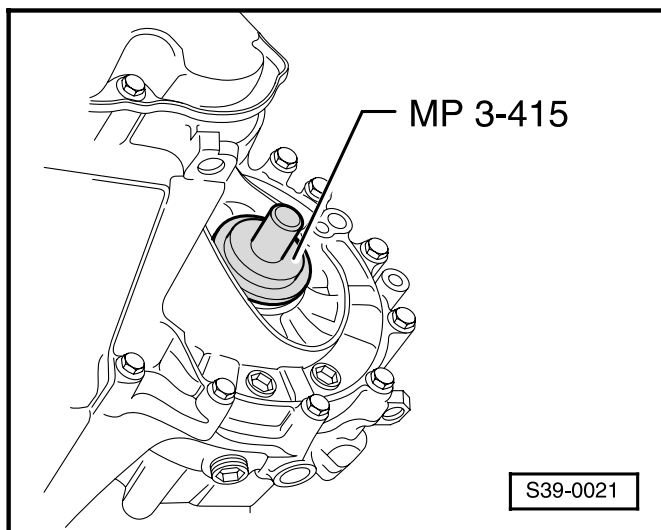
Removing

- Turn steering to full right lock (for seal on right), or to full left lock (for seal on left).
- Remove protective cap for right drive shaft at engine.
- Unbolt drive shaft from flange shaft.
- Tie up drive shaft sufficiently. Avoid damaging paintwork of drive shaft during this step.
- Place drip tray below.
- Remove spherical bolt for flange shaft; secure shaft with drift to prevent it from also rotating.
- Pull out flange shaft together with compression spring.
- ◀ - Remove seal.

Notes:

- ◆ Do not damage seal otherwise risk of leaks.
- ◆ If damaged, replace seal ⇒ page 34-43.





Installing

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

- ◀ - Knock new seal fully into sleeve; do not twist seal.
- Pack space between sealing lip and dust lip with universal grease.
- Pour in gear oil ⇒ page 34-23.

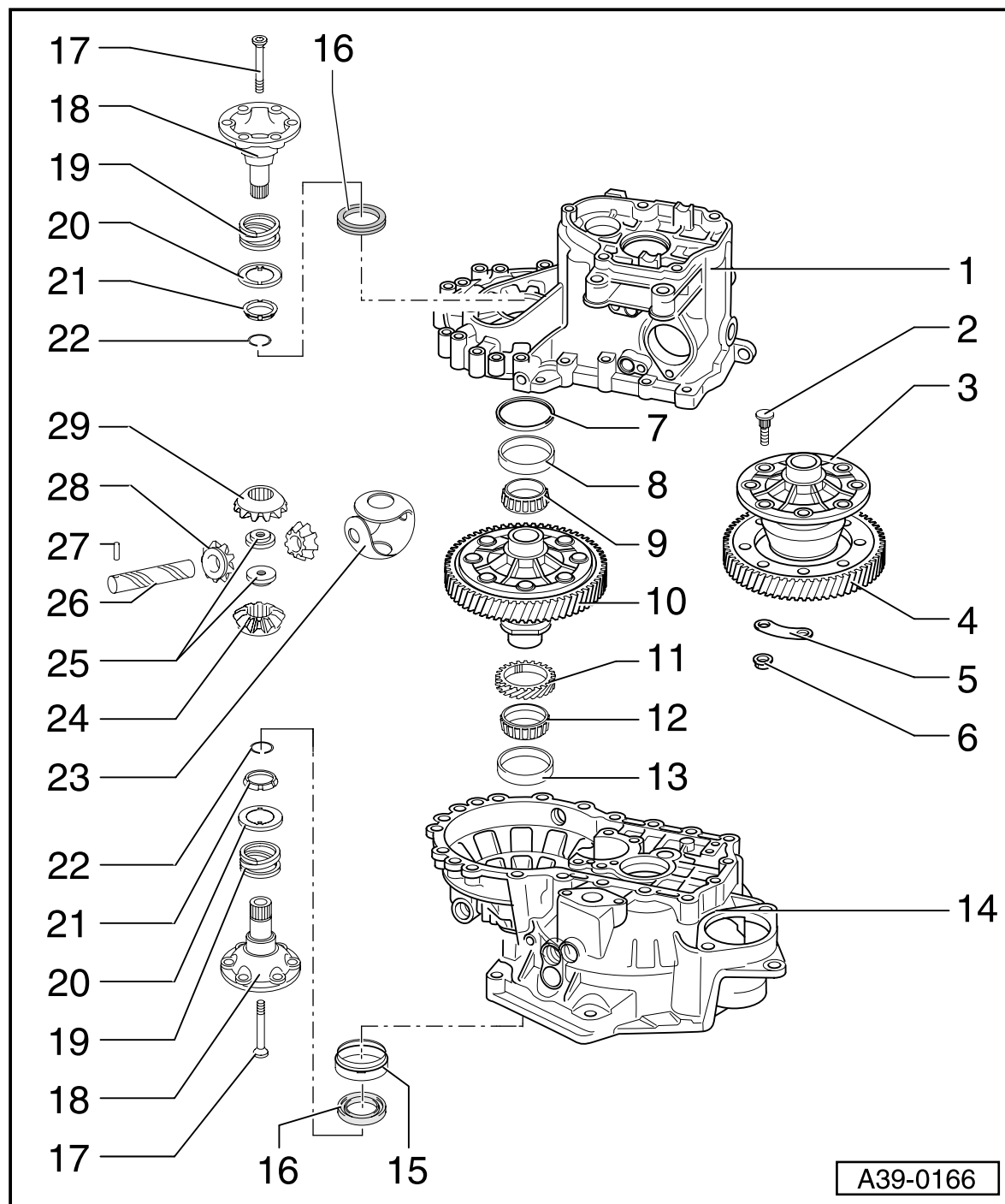
Tightening torques

Drive shaft to flange shaft:

⇒ Running Gear; Repair Group 40; Assembly overview of wheel location, suspension strut, drive shaft, brake

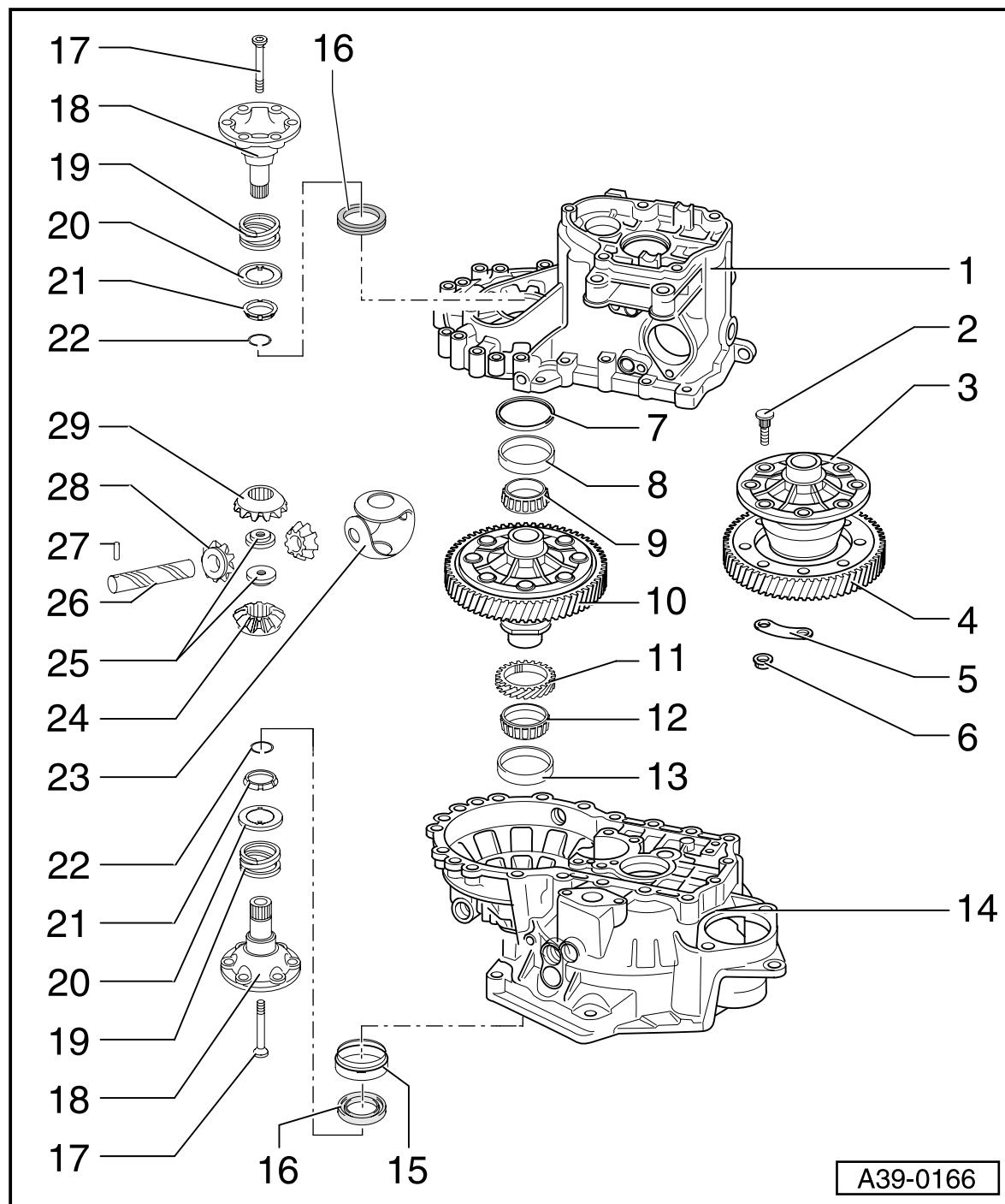
Flange shaft to gearbox	25 Nm
Protective cap to engine	35 Nm

Disassembling and assembling differential



Special tools, testers and aids required

- ◆ Sealant AMV 188 200 03
- ◆ Pressure plate MP 3-406
- ◆ Pressure plate MP 3-407
- ◆ Thrust piece MP 3-459
- ◆ Drift MP 3-510
- ◆ Plunger MP 3-448
- ◆ Pressure plate MP 3-464
- ◆ Pressure plate MP 3-467
- ◆ Plunger MP 3-408
- ◆ Insertion sleeve MP 3-427
- ◆ Countersupport Kukko 22/2



◆ Internal extractor Kukko 21/7

◆ Sleeve MP 3-474

◆ Thrust piece MP 3-468

Notes:

◆ Heat taper roller bearing inner race to 100 °C before installing.

◆ Always replace both taper roller bearing together.

◆ If the taper bearings, the differential housing, the gearbox housing and the clutch housing are replaced, set the differential ⇒ page 39-12

◆ Items 2...6 apply only to service selector

1 - Gearbox housing

2 - Bolt

3 - Differential housing

- ◆ Bolt to final drive gear
- ◆ In gearboxes with compression springs behind flange shafts for mounting conical rings (item 21), ground chamfer on both sides ⇒ Fig. 7
- ◆ Pay attention to different versions

4 - Final Drive gear

- ◆ Riveted in production
- ◆ Bolted ⇒ Fig. 12
- ◆ Heat to 100 °C before installing
- ◆ Press off ⇒ Fig. 9
- ◆ Mount on differential housing ⇒ Fig. 11
- ◆ Is matched to output shaft; always replace both parts together

5 - Base plate**6 - Nut, 70 Nm****7 - Shim**

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

8 - Taper roller bearing outer race

- ◆ Knock out ⇒ Fig. 5
- ◆ Press in ⇒ Fig. 6

9 - Taper roller bearing inner race

- ◆ Pull off ⇒ Fig. 3
- ◆ Press on ⇒ Fig. 4

10 - Differential housing

- ◆ With riveted final drive gear
- ◆ If final drive gear is replaced, drill off rivet heads ⇒ Fig. 8
- ◆ Attach final drive gear with bolts ⇒ Fig. 12
- ◆ In gearboxes with compression springs behind flange shafts for mounting conical rings (item 21), ground chamfer on both sides ⇒ Fig. 7

11 - Speedometer drive gear

- ◆ Place onto differential housing as far as stop before pressing on inner race

12 - Taper roller bearing inner race

- ◆ Pull off ⇒ Fig. 3
- ◆ Press on ⇒ Fig. 4

13 - Taper roller bearing outer race

- ◆ Knock out ⇒ Fig. 1
- ◆ Press in ⇒ Fig. 2

14 - Clutch housing**15 - Sleeve**

- ◆ For mounting seal (item 16)
- ◆ Remove and install ⇒ page 34-44

16 - Seal

- ◆ Replace ⇒ page 39-1

17 - 25 Nm

- ◆ Screw in with threaded piece (item 25) for attaching flange shafts

18 - Flange shaft

- ◆ With hole for conical bolt
- ◆ Remove and install ⇒ page 39-2

19 - Compression spring for flange shaft

- ◆ Installed behind flange shafts

20 - Thrust washer

- ◆ Installed behind flange shafts in combination with compression springs
- ◆ Installed position: flange pointing to compression spring, webs toward conical ring

21 - Conical ring

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

22 - Circlip

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

23 - Thrust washer assembly

- ◆ Insert with gear oil
- ◆ Pay attention to different versions

24 - Large differential bevel gear

- ◆ Install ⇒ Fig. 14
- ◆ Pay attention to different versions

25 - Threaded piece

- ◆ Installed behind flange shafts in combination with compression springs ⇒ Fig. 14
- ◆ Pay attention to different versions

26 - Differential bevel gear shaft

- ◆ Use MP 3-510 for pressing off
- ◆ Install ⇒ Fig. 14
- ◆ Pay attention to different versions

27 - Roll pin

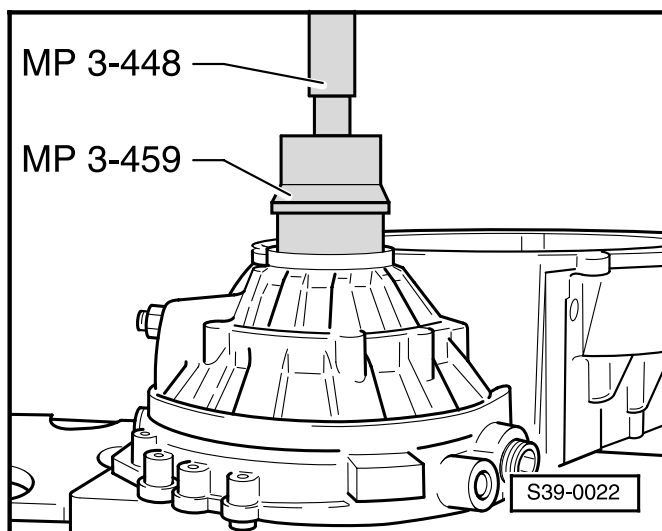
- ◆ For locking shaft for differential bevel gears
- ◆ Remove and install ⇒ Fig. 13

28 - Small differential bevel gear

- ◆ Install ⇒ Fig. 14
- ◆ Pay attention to different versions

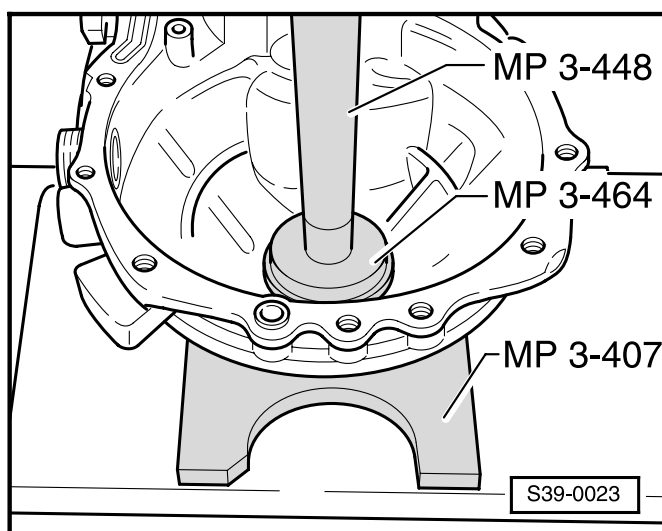
29 - Large differential bevel gear

- ◆ Install ⇒ Fig. 14
- ◆ Pay attention to different versions



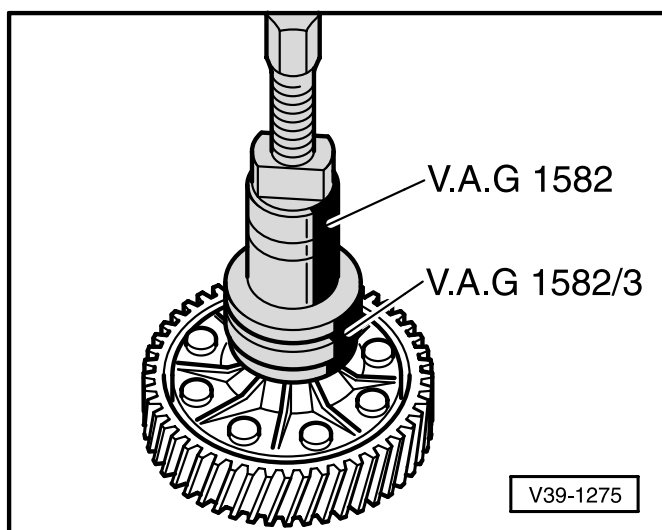
◀ Fig. 1 Knocking outer race of taper roller bearing out of clutch housing

- Remove flange shaft seal and mounting sleeve for seal first of all.



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

No shim is installed on the clutch housing side.

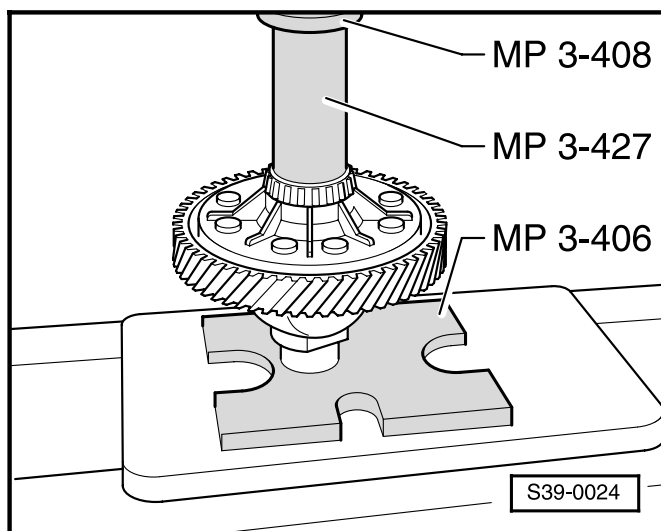


◀ Fig. 3 Pulling off inner races of taper roller bearing

- Place thrust plate MP 3-467 onto differential housing before fitting on the pulling device.

Note:

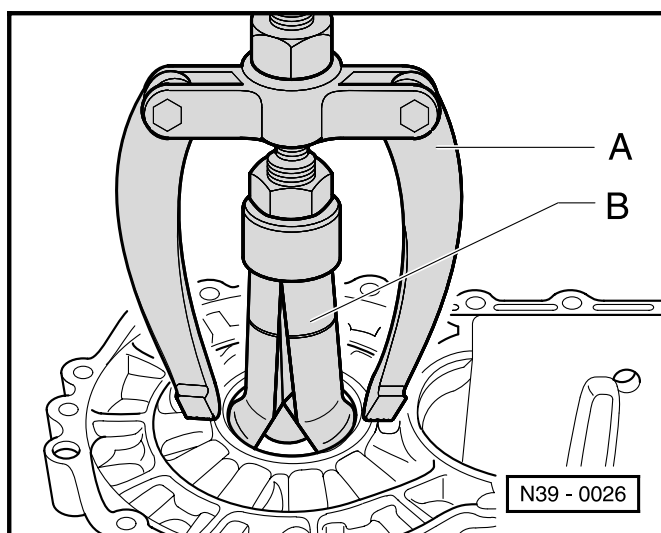
The procedure for pulling off both inner races of the taper roller bearing of the differential housing is identical.



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

Note:

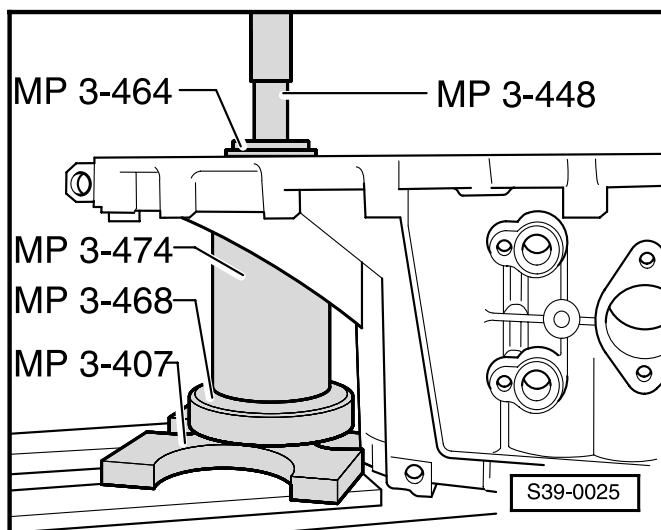
Inner races of taper roller bearings for gearbox housing and clutch housing are pressed on with the same tools.



◀ Fig. 5 Removing outer race of taper roller bearing from gearbox housing

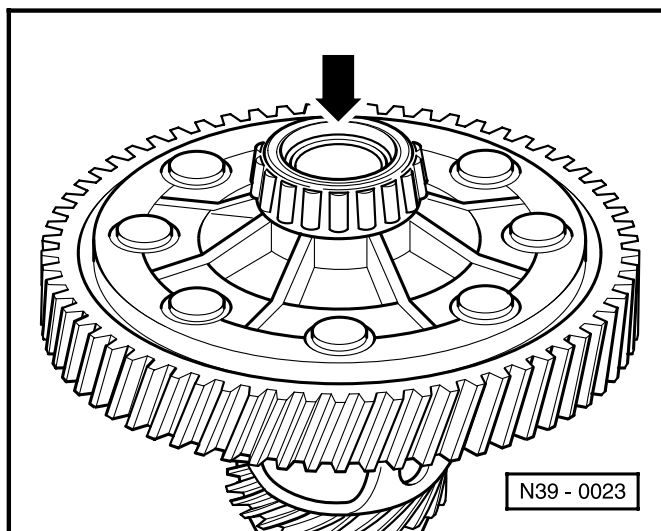
A - Locking device, e.g. Kukko 22/2

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

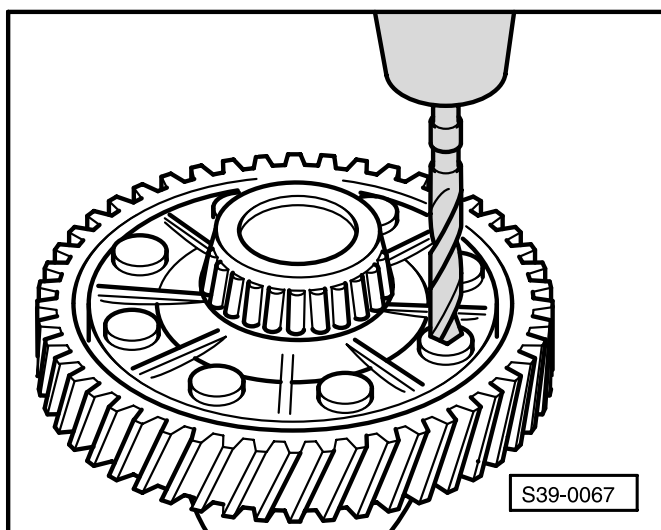


◀ Fig. 6 Pressing outer race of taper roller bearing into gearbox housing

- Fit on shim below outer race.
- Use sleeve MP 3-474 to support gearbox housing directly below bearing mount.



◀ Fig. 7 Differential housing with chamfer on both sides (arrow) for mounting conical rings/compression springs

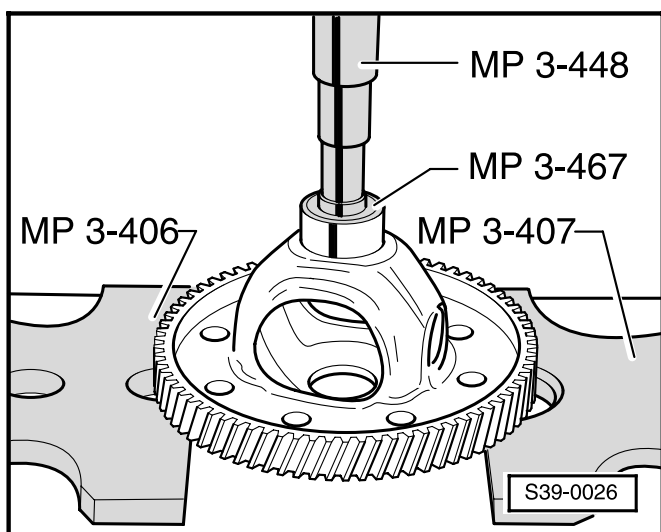


◀ Fig. 8 Drilling off rivet heads

- Use a 12 mm drill to drill off rivet heads on the recessed side and knock out rivets with a drift.

Note:

Clean differential before and after drilling; protect taper roller bearings from drilling swarf.

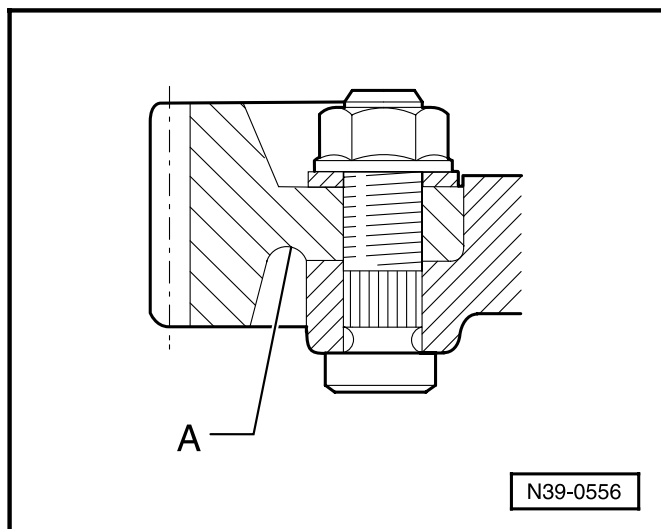


◀ Fig. 9 Pressing off final drive gear

- Fit pressure plate MP 3-467 onto differential housing.

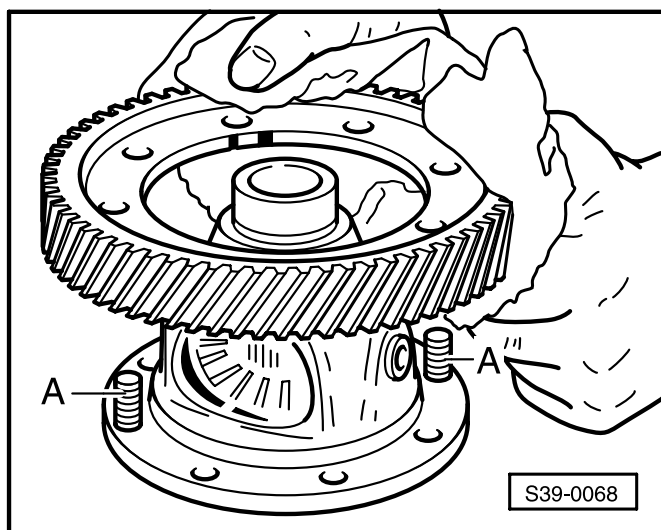
Note:

The pressure plate MP 3-467 can be used for all differential housings.



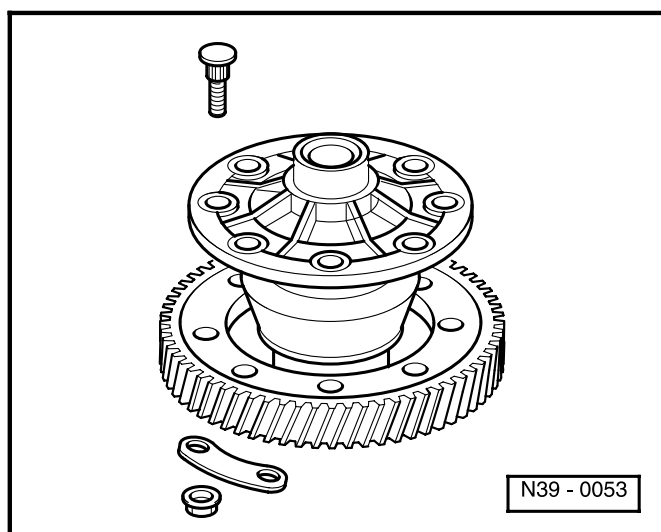
◀ Fig. 10 Fitting location of final drive gear

- The groove all round -A- points toward the bolted face of the differential housing.



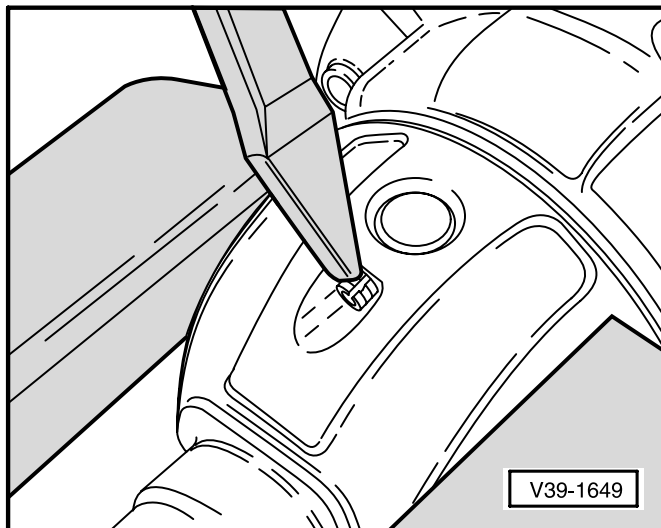
◀ Fig. 11 Heating final drive gear to about 100 °C and fitting on

- Guide final drive gear with bolts -A- from repair kit when fitting on.



◀ Fig. 12 Bolting final drive gear and differential housing together

Use special bolts from the repair kit for gearbox 02J.



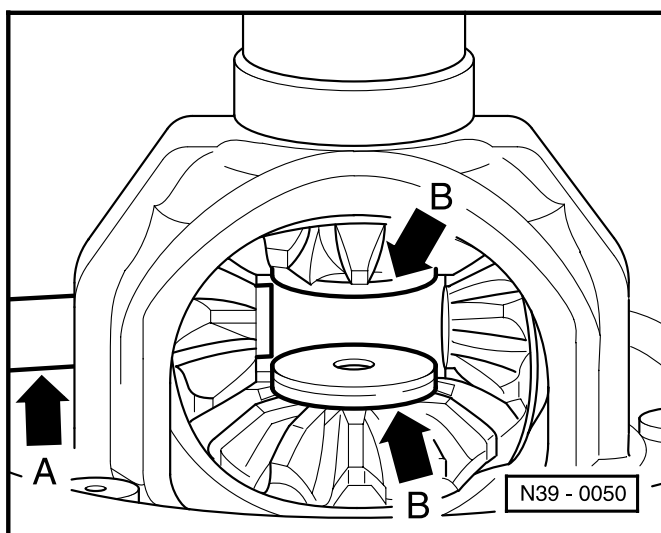
◀ **Fig. 13 Removing and installing roll pin for differential bevel gear shaft**

Removing

- Cover over taper roller bearing inner race and speedometer drive gear to avoid any damage and swarf entering.
- Use a chisel to knock out roll pin by positioning chisel in the groove which runs all round.
- Press off differential bevel gear shaft with MP 3-510.

Installing:

- Replace roll pin and knock into differential housing as far as the stop.



◀ **Fig. 14 Installing differential bevel gears**

- Insert thrust washer assembly with gear oil.
- Insert both large differential bevel gears and secure (e.g. with flange shaft).
- Insert small differential bevel gears offset 180° and swivel into place.
- Press in differential bevel gear shaft (arrow -A-) as far as the first small differential bevel gear.
- Fit threaded pieces (arrows -B-) to the large differential bevel gears.
Fitting location: shoulder faces differential bevel gear.
- Insert shaft for differential bevel gears into end position and secure with new roll pin.

List of settings

Note:

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

		Carry out setting of:		
		Input shaft ⇒ page 35-9	Output shaft ⇒ page 35-36	Differential ⇒ page 39-12
Part replaced:	Gearbox housing	x		x
	Clutch housing	x	x	x
	Input shaft	x		
	Output shaft (crown wheel + drive pinion)		x	
	Differential housing			x
	Taper roller bearings for input shaft	x		
	Taper roller bearings for output shaft		x	
	Taper roller bearings for differential			x
	4th speed gear	x		

Setting differential

Special tools, testers and aids required

- ◆ Block gauge MP 3-405/17
- ◆ Universal dial gauge holder MP 3-447
- ◆ Thrust plate MP 3-464
- ◆ Thrust piece MP 3-459
- ◆ Setting device MP 3-462/4
- ◆ Sleeve MP 3-462/7
- ◆ Commercially available torque gauge

It is only necessary to re-set the differential if

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

or the

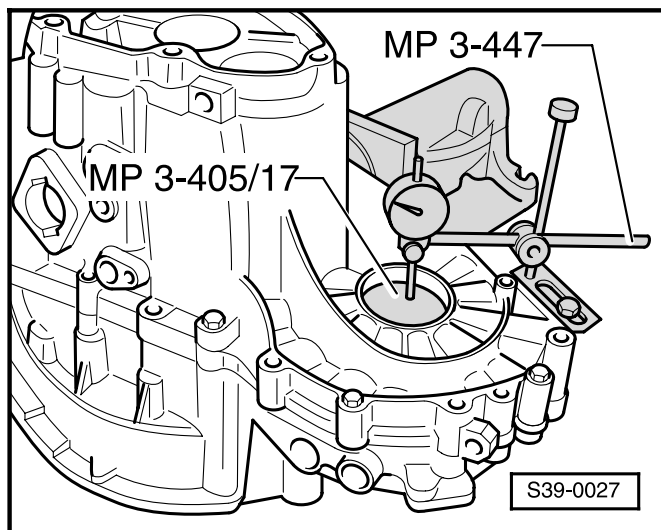
- ◆ taper roller bearings of the differential

are replaced.

List of settings ⇒ page 39-11.

Notes:

- ◆ *New taper roller bearings for the output shaft are a low-friction design. For this reason, the friction torque can only be used as a check with reservations. It is only possible to correctly set the bearing preload by determining the thickness of the shim.*
- ◆ *Do not treat new taper roller bearings additionally with gear oil for measuring the friction torque. The bearings have already been factory-treated with a special oil for this purpose.*
- ◆ *Inner and outer races of taper roller bearings are matched. Do not mix up.*



- Use thrust plate MP 3-464 to insert outer race of taper roller bearing into clutch housing without the shim ⇒ page 39-6.
 - Use thrust plate MP 3-464 to insert outer race of taper roller bearing into the gearbox housing without the shim ⇒ page 39-7.
 - Insert differential into the bearing housing.
 - Fit on gearbox housing and tighten the 5 bolts to 25 Nm.
 - ◀ - Install dial gauge and zero with a preload of 1 mm.
 - Move differential up and down, read off play on dial gauge and note.
- (Example: 0.70 mm)

Note:

Do not rotate the differential during the measurement otherwise the bearings will settle and falsify the result of the measurement.

Determining size of shim

The specified bearing preload is achieved if a constant value for compression (0.40 mm) is added to the measurement obtained.

Example:

Measurement	0.70 mm
+ Compression (constant value)	0.40 mm
Thickness of shim	1.10 mm

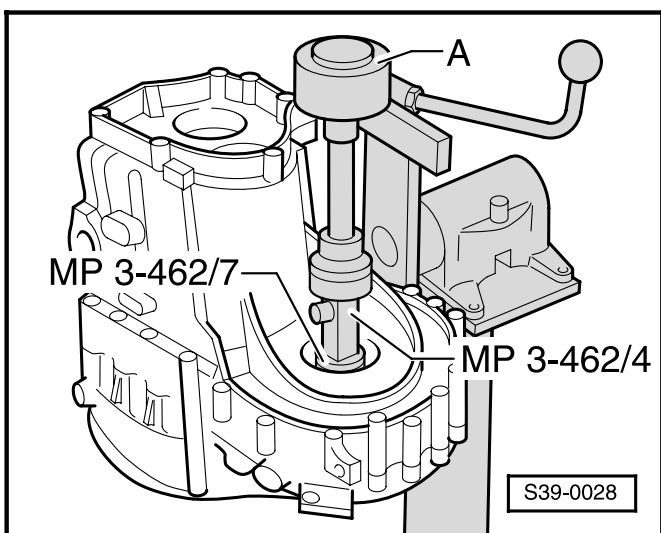
- Take off gearbox housing and pull outer race of taper roller bearing out of gearbox housing ⇒ page 39-7 or knock out with thrust piece MP 3-459.
- Insert a shim of the calculated thickness; the thickest shim first of all.
- Re-insert outer race and bolt gearbox housing tight.

The following sizes of shims are available:

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

If the thickness of shim measured is greater than the shims listed in the table, it is possible to install 2 shims which together make up the measurement obtained.

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



◀ Inspecting friction torque

A - Commercially available torque gauge
0 ... 600 Ncm

Notes:

- ◆ *New taper roller bearings for the output shaft are a low-friction design. For this reason, the friction torque can only be used as a check with reservations. It is only possible to correctly set the bearing preload by determining the thickness of the shim.*
- ◆ *Do not treat new taper roller bearings additionally with gear oil for measuring the friction torque. The bearings have already been factory-treated with a special oil for this purpose.*

Friction torque for:

- ◆ new taper roller bearings 120 ... 320 Ncm.
- ◆ used taper roller bearings, at least 30 Ncm.