Pinion shaft, disassembling and assembling

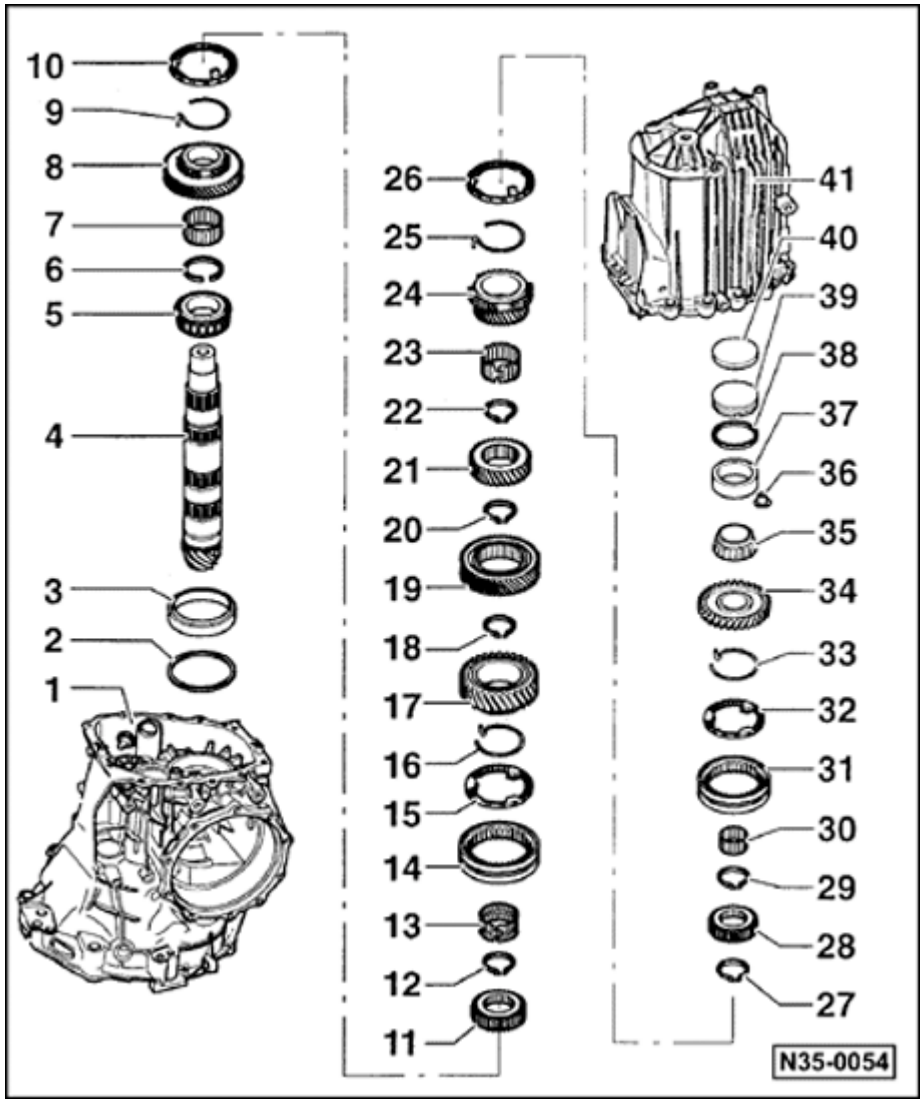
Special tools and equipment

- 204B installation tool for crankshaft seal
- VW401 thrust plate
- VW402 thrust plate
- VW407 punch
- VW408A punch
- VW412 punch
- VW415A tube
- VW421 tube
- VW455 thrust tube
- VW519 sleeve

- VW771 slide hammer-complete set

- 2010 sleeve
- 3062 thrust pad
- 3118 sleeve
- 3128 bushing puller
- Kukko 17/2 separating tool
- Kukko 21/1 extractor

35-23



Notes:

- *When installing the input shaft or the final drive set, consult technical data ⇒ Page 00-3 .*
- *Adjustments are required when replacing components marked with 1): ⇒ Page 39-33 , list of adjustments*

1 - Transmission housing

2 - Shim S3

- List of adjustments ⇒ Page 39-33

3 - Double tapered roller bearing outer race 1)

- Pulling out ⇒ Fig. 1
- Pressing in ⇒ Fig. 3

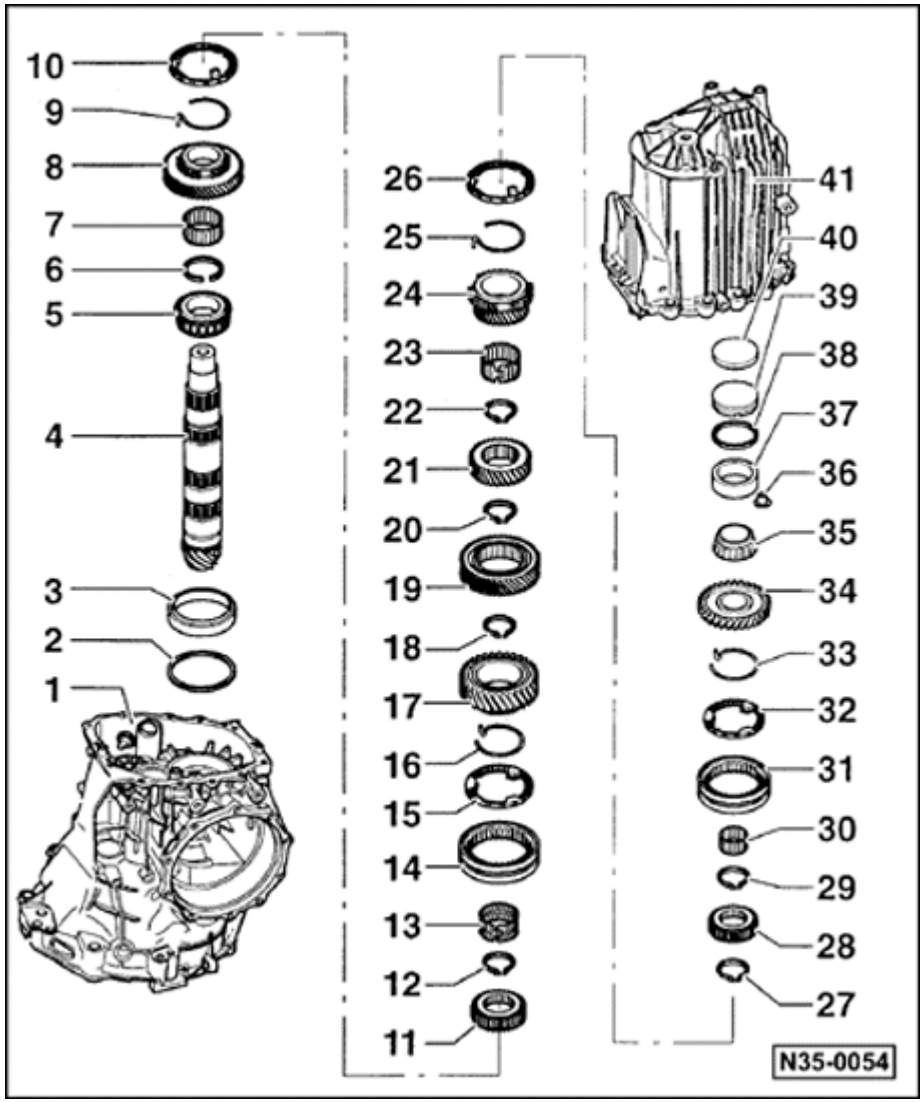
4 - Pinion shaft 1)

- Matched to ring gear; always replace together as a set
- Adjusting pinion shaft and ring gear ⇒ Page 39-29

5 - Tapered roller bearing inner race1)

- Always replace
- Damaged when removed
- Pressing off ⇒ Fig. 2
- Pressing on ⇒ Fig. 4

35-24



6 - Circlip

- Identification
- Installed position ⇒ Fig. 15 , item -1-
- Re-determine thickness if double roller bearing is replaced ⇒ Fig. 5

7 - Needle bearing for for 1st gear

8 - 1st gear

9 - Spring

- Inserting in 1st gear ⇒ Fig. 16
- Allocation of spring to gear ⇒ parts catalog

10 - Synchronizer ring for 1st gear

- Checking for wear ⇒ Fig. 17

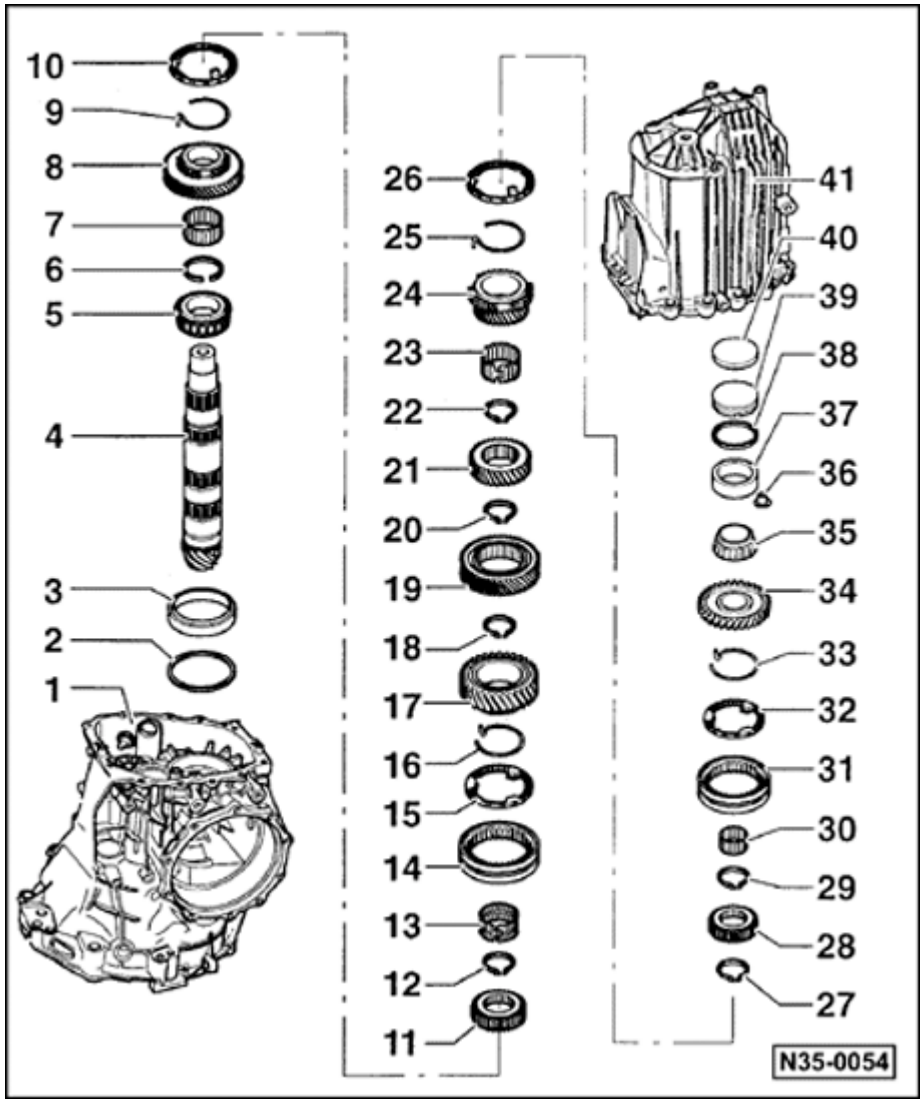
11 - Synchronizer hub for 1st and 2nd gears

- Pressing off ⇒ Fig. 14
- Pressing on ⇒ Fig. 18

12 - Circlip

- Identification
- Installed position Fig. , item -2-
- Re-determine thickness when replacing synchronizer body ⇒ Fig. 5

35-25



13 - Needle bearing 2nd gear

14 - Operating sleeve for 1st and 2nd gear

- Installed position ⇒ Fig. 19

15 - Synchronizer ring for 2nd gear

- Checking for wear ⇒ Fig. 17

16 - Spring

- Inserting in 2nd gear ⇒ Fig. 16
- Allocation of spring to gear ⇒ parts catalog

17 - 2nd gear

18 - Circlip

- Identification
- Installed position ⇒ Fig. 15 , item -3-

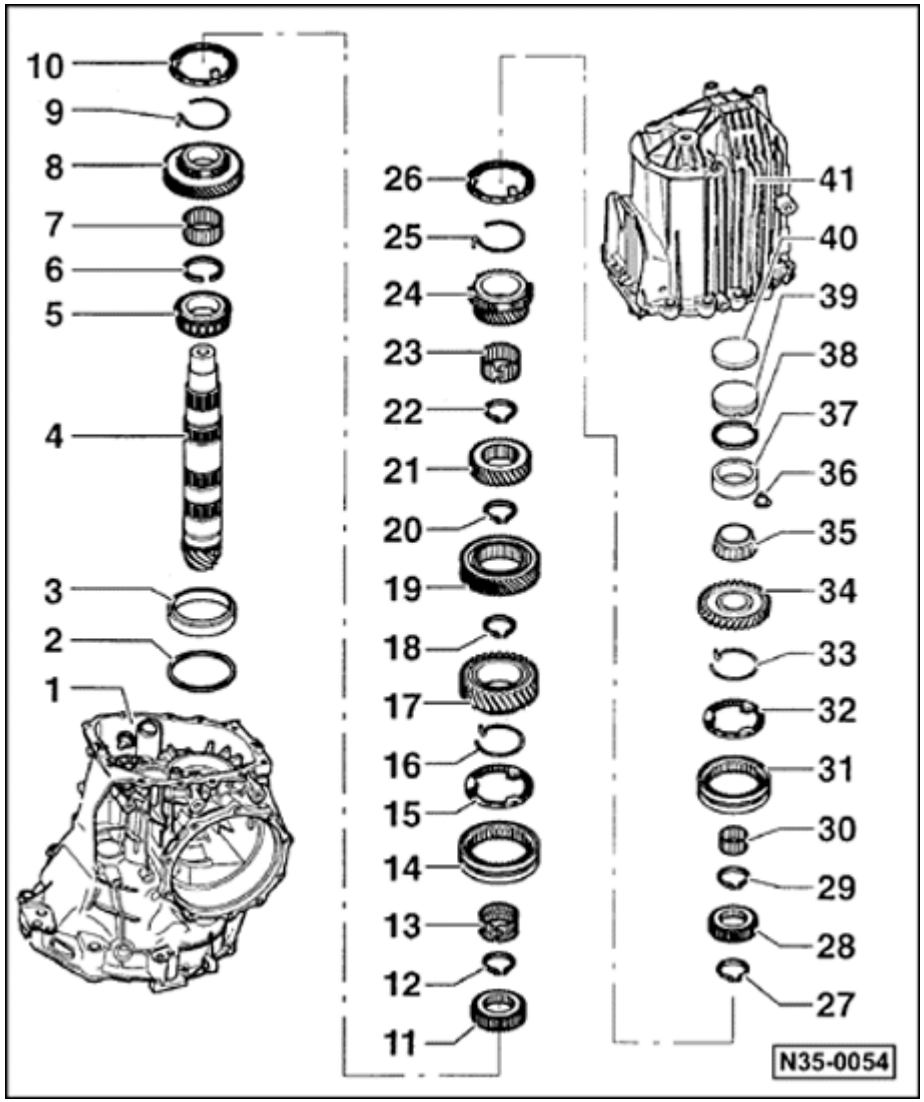
19 - 3rd gear

- Pressing off ⇒ Fig. 13
- Pressing on ⇒ Fig. 20

20 - Circlip

- Identification
- Installed position ⇒ Fig. 15 , item -4-
- If 3rd gear is replaced, re-determine thickness of circlip ⇒ Fig. 5

35-26



21 - 4th gear

- Pressing off ⇒ Fig. 12
- Pressing on ⇒ Fig. 21

22 - Circlip

- Identification
- Installed position ⇒ Fig. 15 , item -5-
- If 4th gear is replaced, re-determine thickness of circlip ⇒ Fig. 5

23 - Needle bearing

24 - 5th gear

25 - Spring

- Inserting in 5th gear ⇒ Fig. 16
- Allocation of spring to gear ⇒ parts catalog

26 - Synchronizer ring for 5th gear

- Checking for wear ⇒ Fig. 17

27 - Circlip

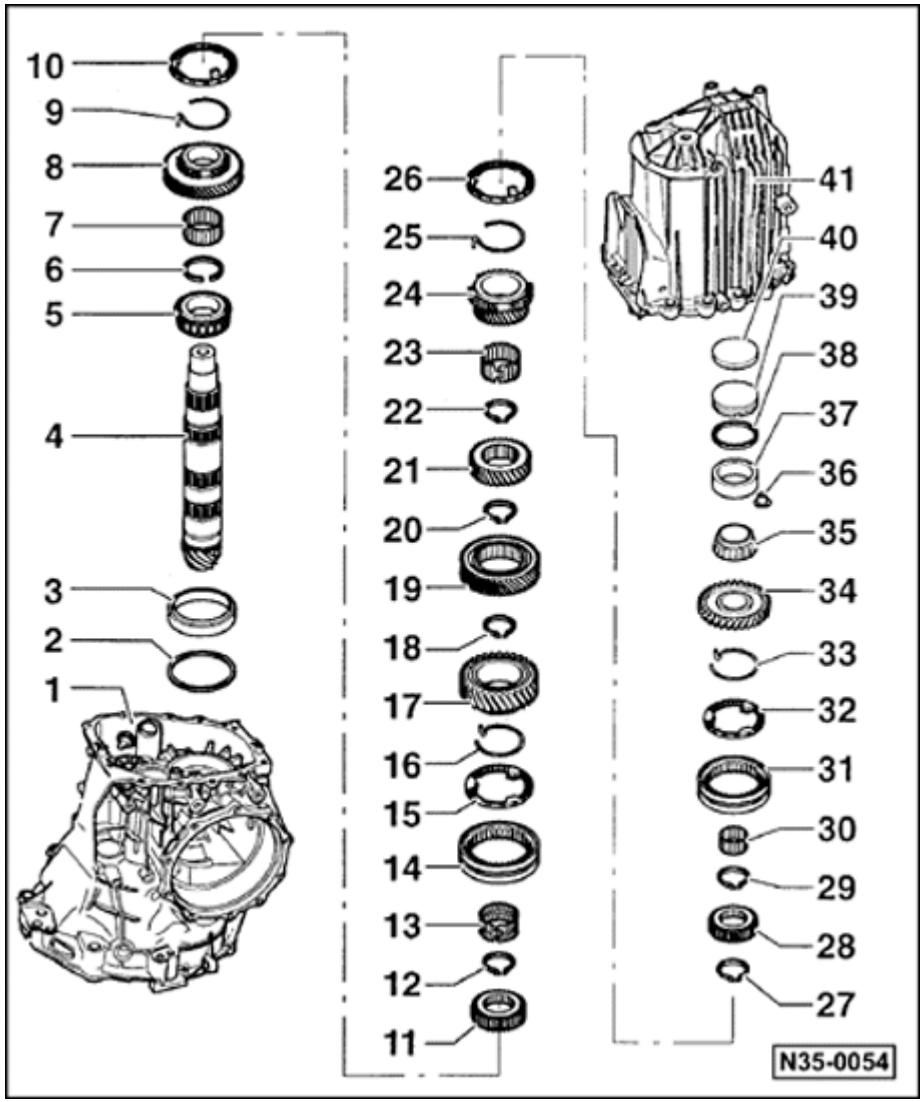
- Identification
- Installed position ⇒ Fig. 15 , item -6-

28 - Synchronizer hub for 5th and reverse gear

- Pressing off ⇒ Fig. 11

♦ Pressing on ⇒ Fig. 22

35-27



29 - Circlip

- Identification
- Installed position ⇒ Fig. 15 , item -5-
- Re-determine thickness when replacing synchronizer hub ⇒ Fig. 5

30 - Needle bearing

- For reverse gear

31 - Operating sleeve for 5th and reverse gear

- Installed position ⇒ Fig. 23

32 - Synchronizer ring for reverse gear

- Checking for wear ⇒ Fig. 17

33 - Spring

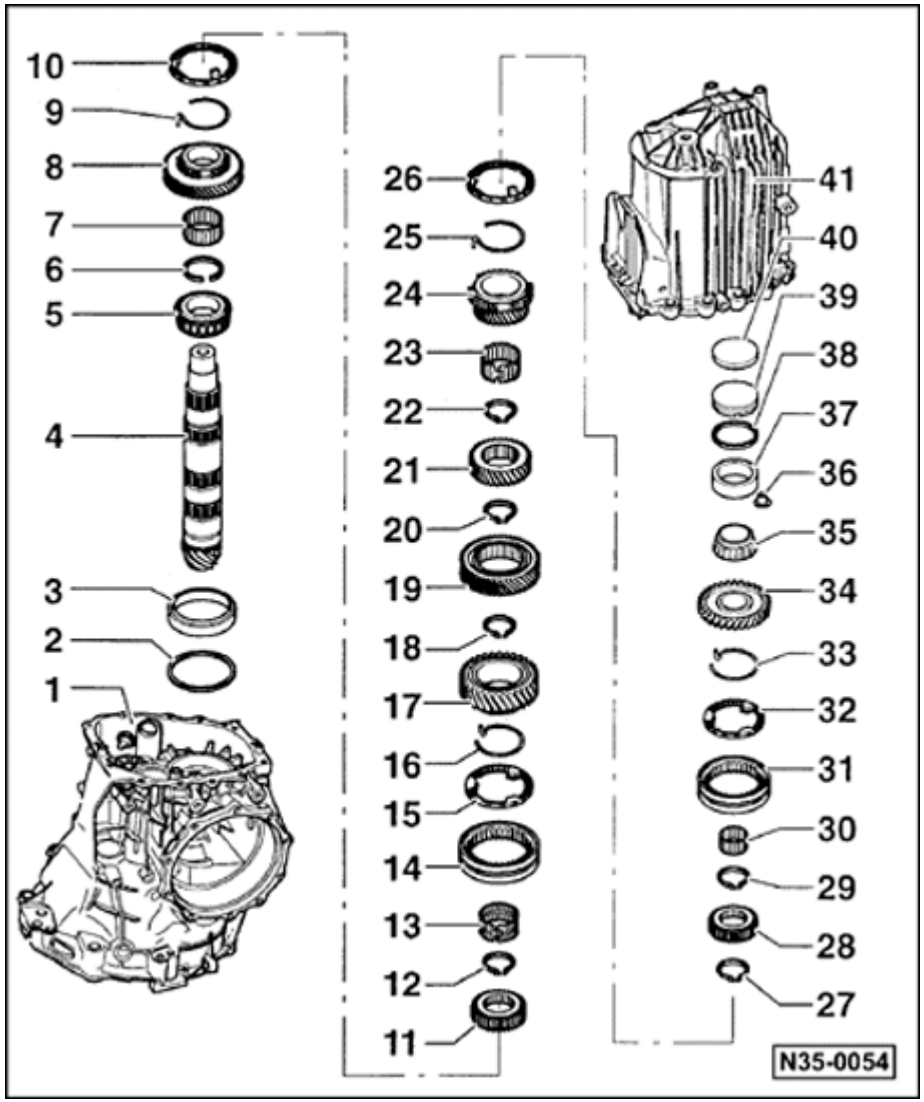
- Inserting in reverse gear ⇒ Fig. 16
- Allocation of spring to gear ⇒ parts catalog

34 - Reverse gear

35 - Tapered roller bearing inner race1)

- Pressing off ⇒ Fig. 9
- Pressing on ⇒ Fig. 10

35-28



36 - Bushing

- Secures tapered roller bearing inner race
- Pulling out ⇒ Fig. 6
- Does not need to be installed after tapered roller bearing has been replaced

37 - Tapered roller bearing outer race1)

- Pulling out ⇒ Fig. 7
- Pressing in ⇒ Fig. 8

38 - Shim S4

- List of adjustments ⇒ Page 39-33

39 - Pressure plate

- Varying thickness ⇒ Fig. 25

40 - Rubber washer

- Compensated length variations
- To remove, install self-tapping screw into center of rubber washer and pull out at screw
- Thickness: 7.0 mm (0.28 in.)

41 - Transmission cover

- With reverse idler gear ⇒ Page 35-44
- Coat sealing surfaces with thin layer of

sealant AMV 188 001 02

35-29

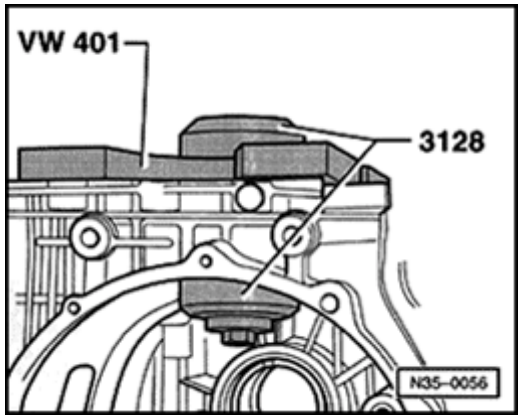


Fig. 1 Pulling out double tapered roller bearing outer race

- Remove differential ⇒ Page 39-10 .
- Place pressure piece from 3128 bushing puller under outer race.
- Install threaded part of 3128 bushing puller onto transmission housing using VW401 thrust plate.

When the bolt is tightened, the outer race will be pulled out of the housing.

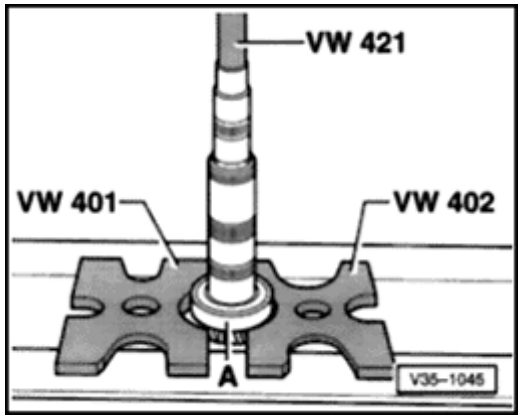


Fig. 2 Pressing off double tapered roller bearing inner race

- Remove circlip before pressing off.

  Outer race -A- must be installed to press off inner race.

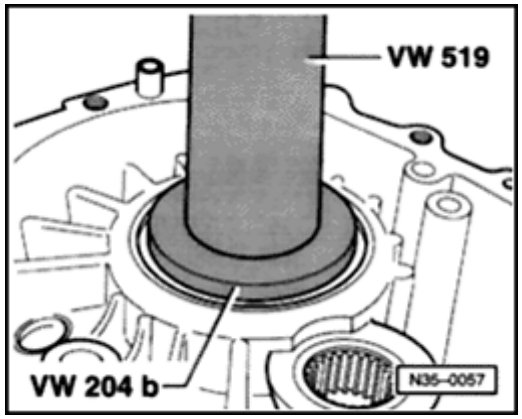


Fig. 3 Pressing in double tapered roller bearing outer race

The smaller diameter of the VW204B arbor faces the outer race.

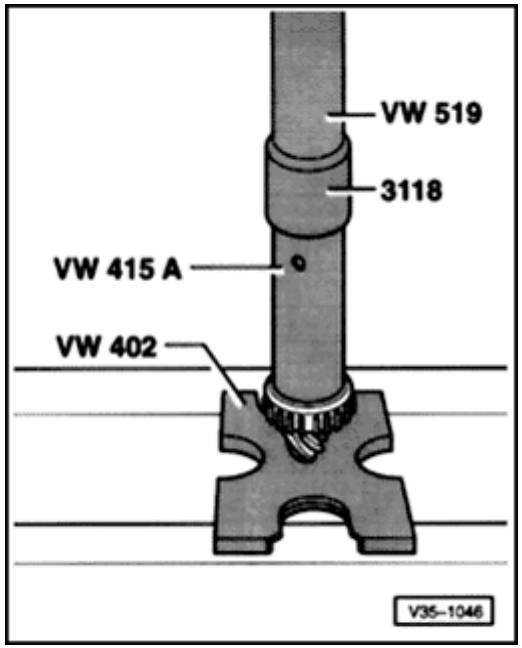


Fig. 4 Pressing on double tapered roller bearing inner race

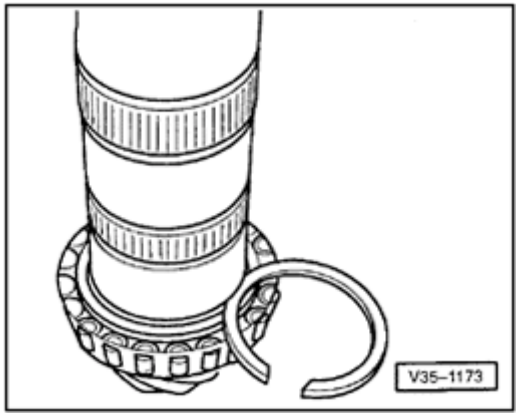


Fig. 5 Determining thickness of circlip

- Determine thickest circlip which can still just be installed and install it.
- Circlips for synchronizer hubs and individual gears should be determined using same method as for tapered roller bearing as shown.

  Available circlips and part numbers ⇒ parts catalog

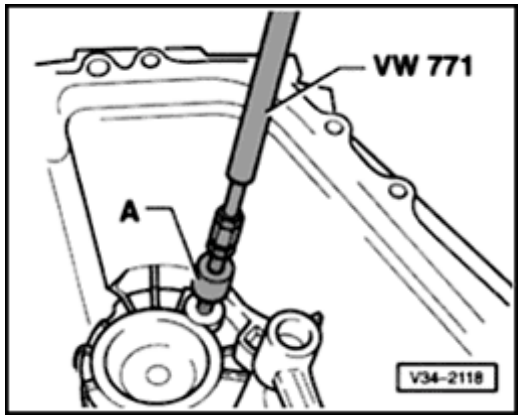


Fig. 6 Pulling out bushing securing tapered roller bearing outer race

A - Kukko 21/1 extractor 12-14.5 mm

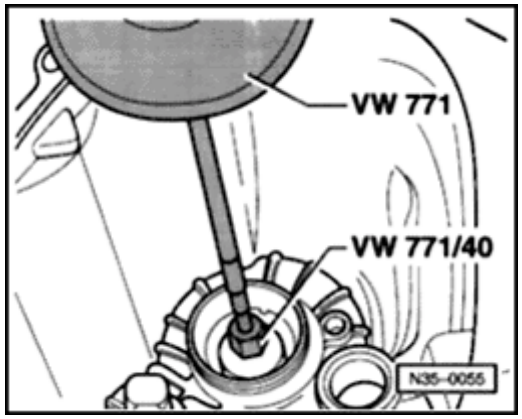


Fig. 7 Pulling out tapered roller bearing outer race

- Install VW771/40 adaptor into pressure plate.
- Install VW771 slide hammer-complete set and pull out outer race over pressure plate.

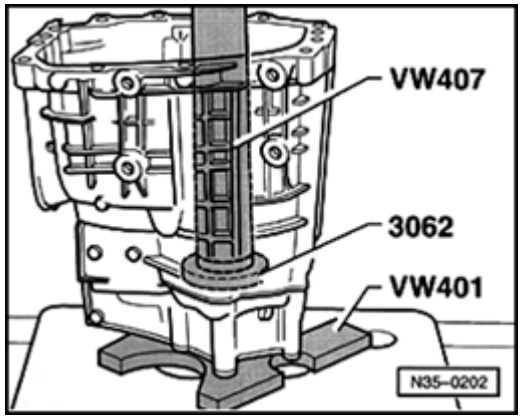


Fig. 8 Pressing in tapered roller bearing outer race

- Before pressing on inner race, install circlip.

35-33

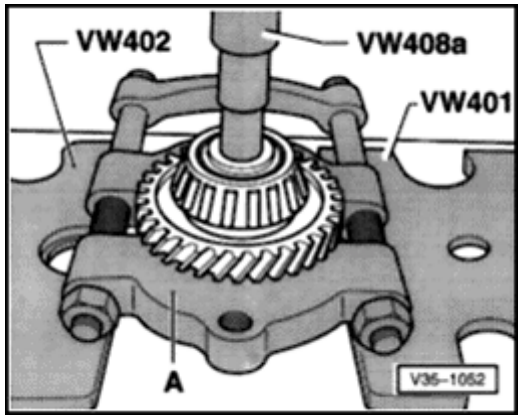


Fig. 9 Pressing off tapered roller bearing inner race

- Press off inner race together with reverse gear.

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

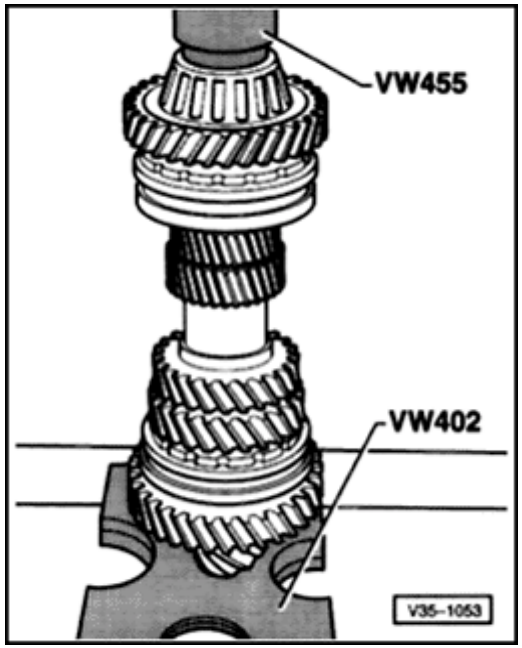


Fig. 10 Pressing on tapered roller bearing inner race

- Before pressing on inner race, install circlip.

35-34

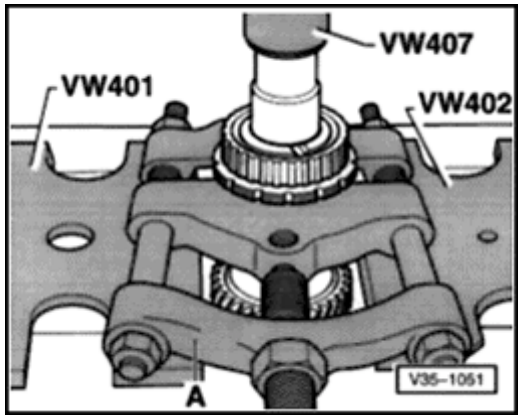


Fig. 11 Pressing off synchronizer hub for 5th and reverse gear

- Remove circlip before pressing off.
- Press off synchronizer hub together with 5th gear.

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

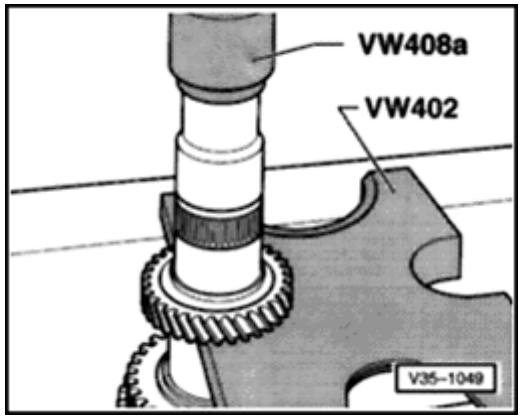


Fig. 12 Pressing off 4th gear

- Remove circlip before pressing off.

35-35

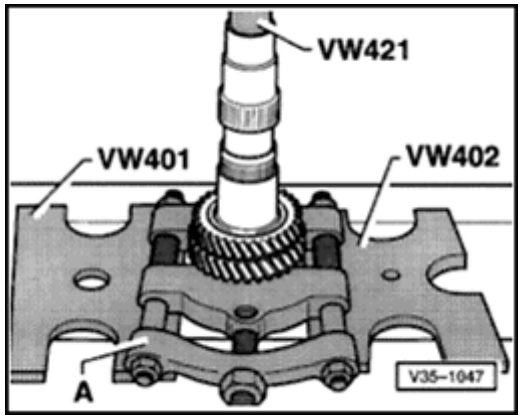


Fig. 13 Pressing off 3rd gear

- Remove circlip before pressing off.
- Press off 3rd gear together with 2nd gear.

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

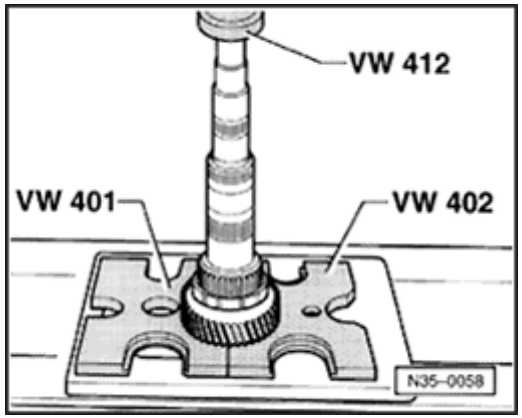


Fig. 14 Pressing off synchronizer hub for 1st and 2nd gears

- Remove circlip before pressing off.
- Press off synchronizer hub together with 1st gear.

35-36

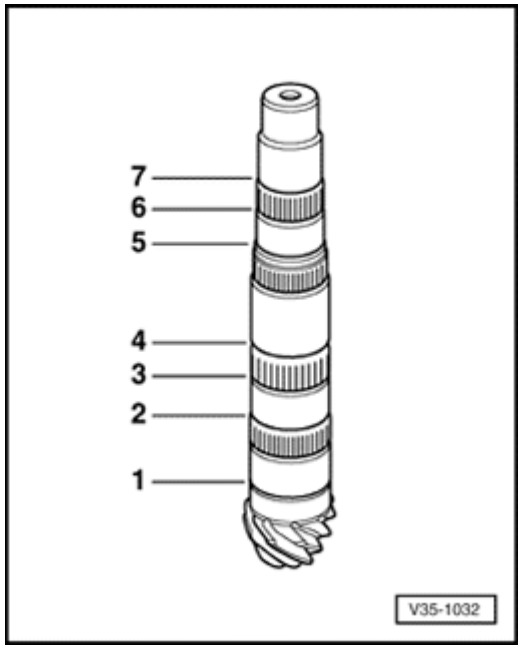


Fig. 15 Installation position of circlips

- Circlips for synchronizer hubs, needle bearings and individual gears should be determined as shown in Fig. ⇒ 5 .

♦ Circlip -1- secures the tapered roller bearing inner race.

Circlip thickness (mm)		
2.00	2.06	2.12
2.03	2.09	2.15

♦ Circlip -2- secures the synchronizer hub for 1st and 2nd gear.

Characteristic: blue in color

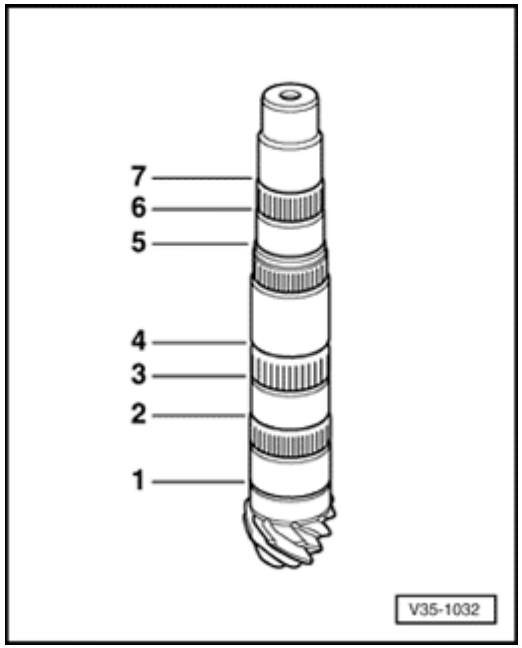
Circlip thickness (mm)		
1.90	1.96	2.02
1.93	1.99	

♦ Circlip -3- secures the needle bearing for 2nd gear.

Characteristic: blue in color

Thickness: 2.50 mm (0.098 in.)

35-37



➢

- Circlip -4- secures the 3rd gear

Circlip thickness (mm)		
1.90	1.98	2.06
1.94	2.02	

- Circlip -5- secures the 4th gear

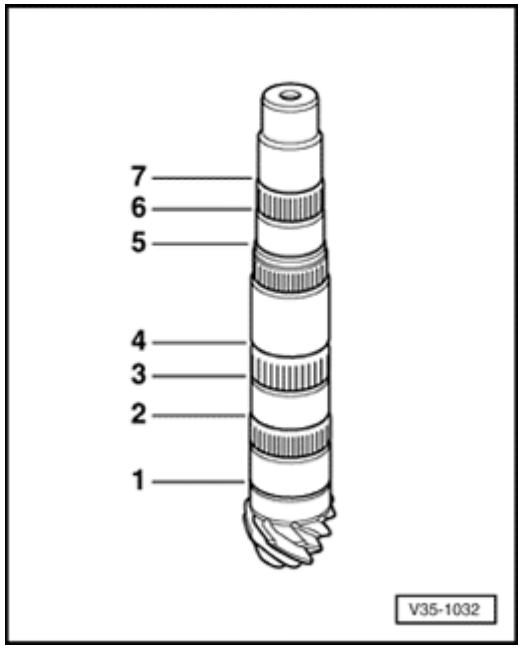
Circlip thickness (mm)		
1.86	1.94	
1.90	1.98	

- Circlip -6- secures the needle bearing for 5th gear.

  Thickness: 2.00 mm (.0787 in.)

  Identification: brown in color

35-38



- Circlip -7- secures the synchronizer hub for 5th and reverse gear.

  Characteristic: blue in color

Circlip thickness (mm)		
1.90	1.96	2.02
1.93	1.99	2.05

- Determine circlips according to table. Part numbers ⇒ parts catalog

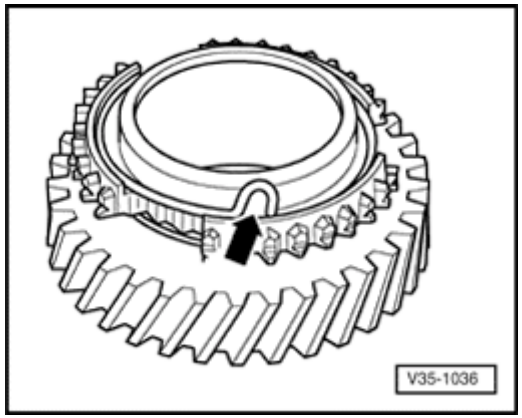


Fig. 16 Inserting spring into gear

The bent end of the spring (arrow) must be hooked into the hole of the gear.

35-39

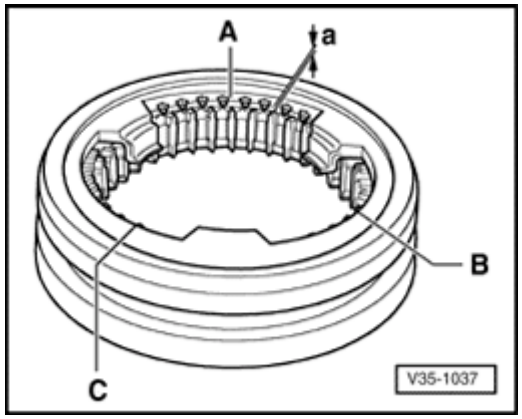


Fig. 17 Checking synchronizer ring for wear

- Press synchronizer ring into operating sleeve and measure gap -a- using feeler gauge at positions -A-, -B- and -C-.
- Add measured values and divide total by three to calculate average.

  The calculated gap must not be less than 0.5 mm (0.002 in.).

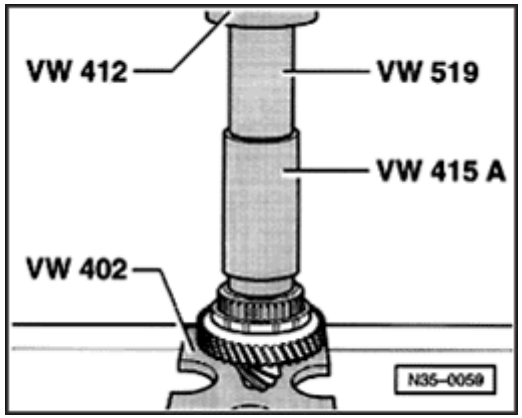


Fig. 18 Pressing on synchronizer hub for 1st and 2nd gears

- Installation position:

  Higher inner collar faces 2nd gear.

35-40

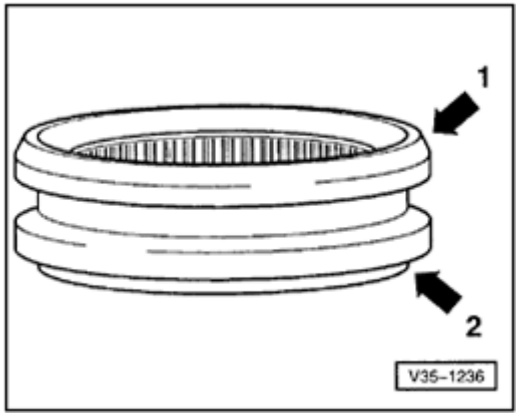


Fig. 19 Installation position of operating sleeve for 1st and 2nd gear

Installation position:

- Chamfer (arrow -1-) faces 2nd gear
- Stepped side (arrow -2-) faces 1st gear

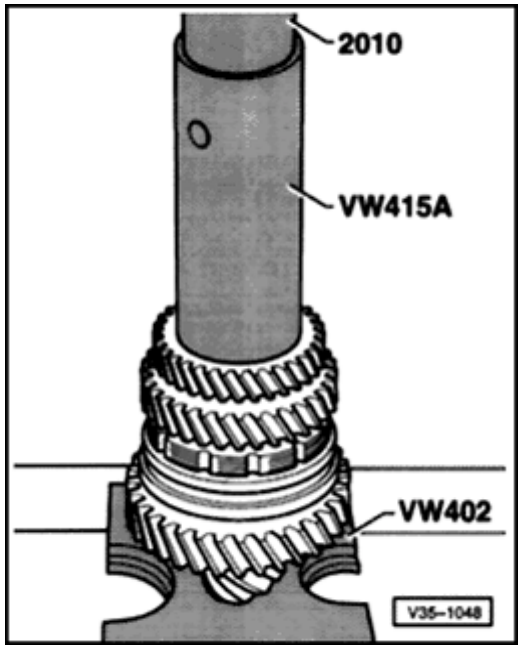


Fig. 20 Pressing on 3rd gear

Installation position: the groove on the gear faces 4th gear.

35-41

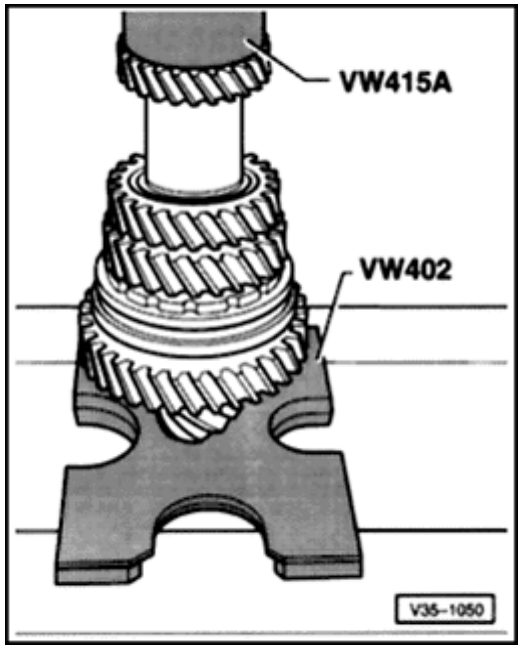


Fig. 21 Pressing on 4th gear

Installation position: higher inner collar faces 3rd gear.

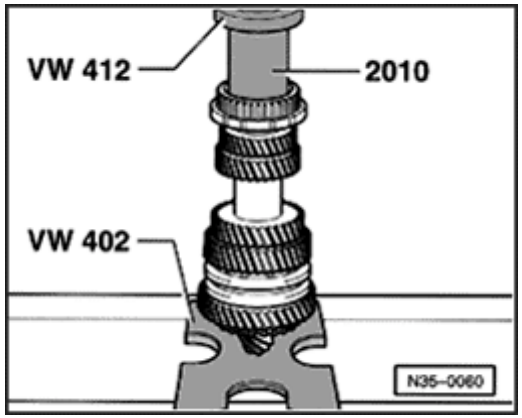


Fig. 22 Pressing on synchronizer hub for 5th and reverse gear

Installation position: higher inner collar faces 5th gear.

Note:

The large inner diameter of 2010 sleeve faces the synchronizer hub.

35-42

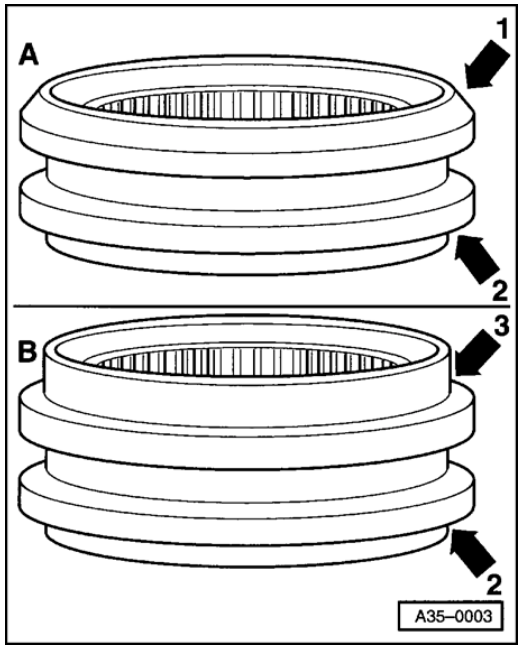


Fig. 23 Installation position of operating sleeve for 5th and reverse gear

Operating sleeves with chamfer -A- (arrow -1-), as well as operating sleeves with a large offset -B- (arrow -3-), are installed.

- Note the location of operating sleeve to reverse idler gear ⇒ Fig. 24 .
- Installation position:

  Chamfer (arrow -1-) faces 4th gear.

  Small stepped side (arrow -2-) faces 5th gear.

  Large stepped side (arrow -3-) faces reverse gear.

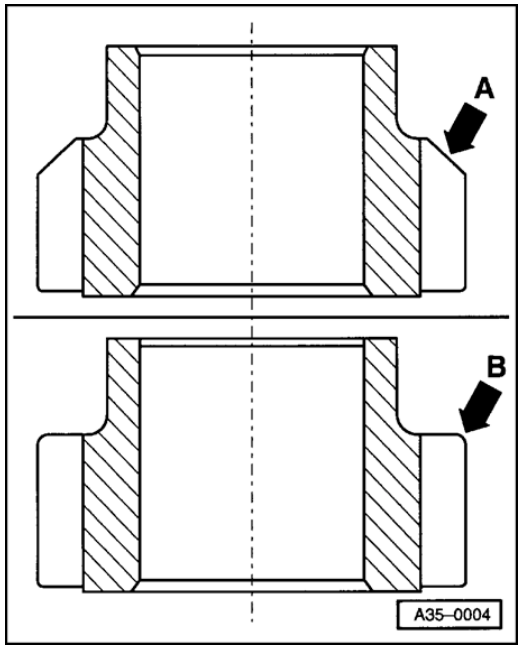


Fig. 24 Allocation of operating sleeve to reverse idler gear

A Reverse idler gear with chamfer	Both types of operating sleeves (with chamfer or with large offset) can be installed.
B Reverse idler gear without chamfer	Only operating sleeves with large offset can be installed. Do not install operating sleeve with chamfer.

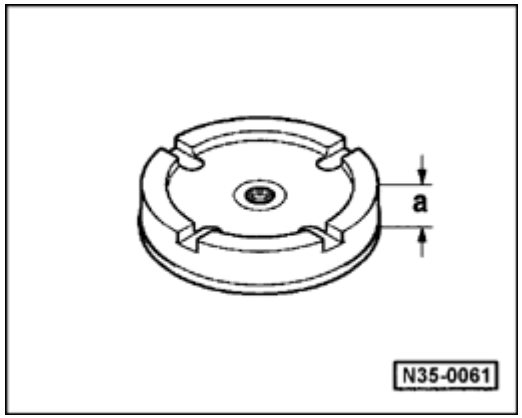


Fig. 25 Pressure plate variations

Transmission housing	Dimension -a-
Aluminum	14.8 or 15.3 mm