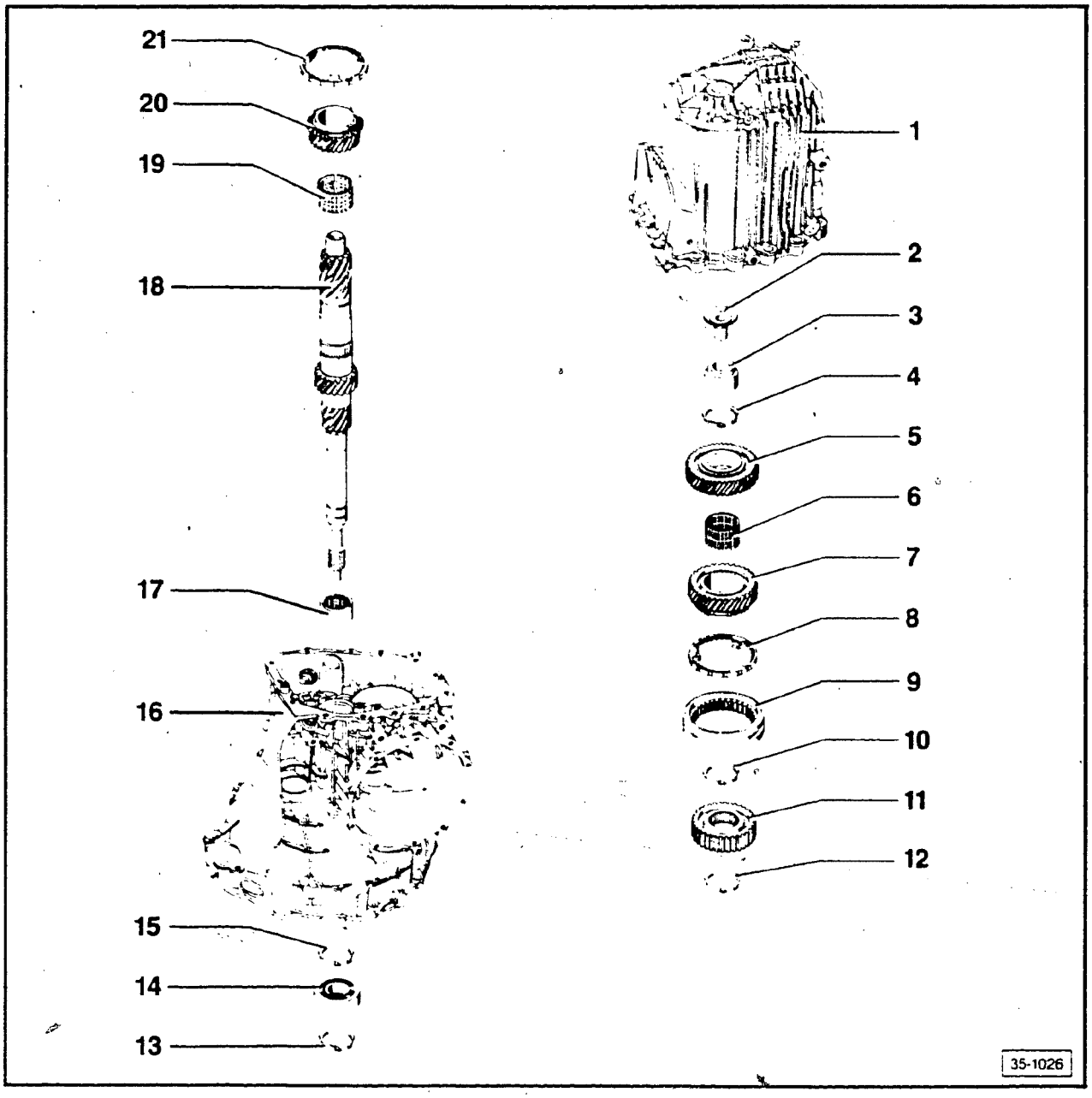
Index

5-speed 012



Note

When installing new gears or main shaft, refer also to Repair Group 00 for identifications and Repair Group 34 for technical data.
Circlips are different in thickness and diameter and should be measured as they are removed. If a gear or shaft is replaced, the corresponding circlip must be measured for correct fit.

1 — Gear carrier housing

2 — Plastic sleeve
- always replace
- not used on main shafts which lack oil holes for 3rd/4th gear

3 — Needle bearing — main shaft
- is damaged during removal
- always replace
- removing, Fig. 9
- drive in with **VW 416B** to a depth of 214 mm (8.43 in.), measured from housing face

4 — Circlip
- redetermine thickness when relacing 5th gear
- locating/selecting, Fig. 11 (no. 5)
- installing, Fig. 10

5 — 5th gear
- removing, Fig. 7
- installing, Fig. 8

6 — Needle bearing — 4th gear

7 — 4th gear
spring, assembling, Fig. 4

8 — Synchronizer ring — 4th gear
checking for wear, Fig. 5

9 — Operating sleeve — 3rd/4th gear
installed position, Fig. 6

10 — Circlip
- redetermine thickness when replacing the synchronizer hub
- locating/selecting, Fig. 11 (no. 4)
- installing, Fig. 10

11 — Synchronizer hub — 3rd/4th gear
- high collar faces 3rd gear
- pressing off, Fig. 12
- pressing on, Fig. 13

12 — Circlip
locating/selecting, Fig. 11 (no. 3)

13 — Circlip
- locating, Fig. 11 (no. 1)
- determining thickness, page 35.9
- if ball bearing and shaft are to be used again, circlip thickness must be checked, and circlip replaced with new one of same thickness

14 — Ball bearing — main shaft
- removing/installing, Repair Group 34
- pressing on, after main shaft is installed, Fig. 3

15 — Circlip
- locating, Fig. 11 (no. 2)
- determining thickness, page 35.9
- if ball bearing and shaft are to be used again, circlip thickness must be checked and circlip replaced with new one of same thickness

16 — Final drive housing

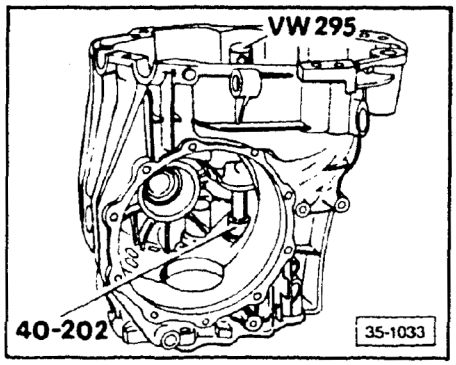
17 — Needle bearing — main shaft
- removing, Fig. 1
- press in with **40-202**
- installed depth, Fig. 2

18 — Main shaft
adjusting, page 35.9

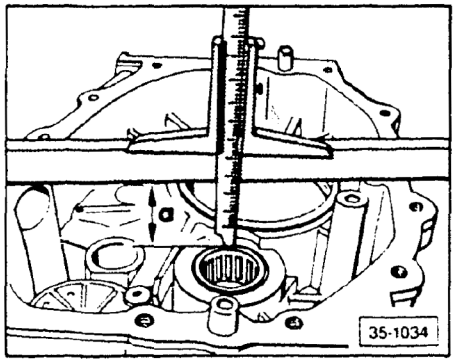
19 — Needle bearing — 3rd gear

20 — 3rd gear
spring, assembling, Fig. 4

21 — Synchronizer ring — 3rd gear
checking for wear, Fig. 5

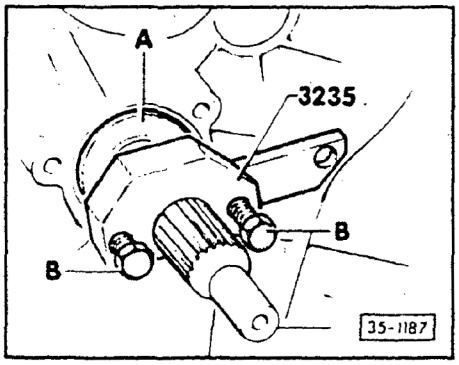


▶ **Fig. 1 Main shaft needle bearing, removing**



▶ **Fig. 2 Needle bearing, installed depth**

- measure from lower edge of straightedge to upper edge of bearing
  - dimension **a** = 39.5 mm (1.56 in.)



▶ **Fig. 3 Ball bearing, installing in housing**

install circlip on main shaft

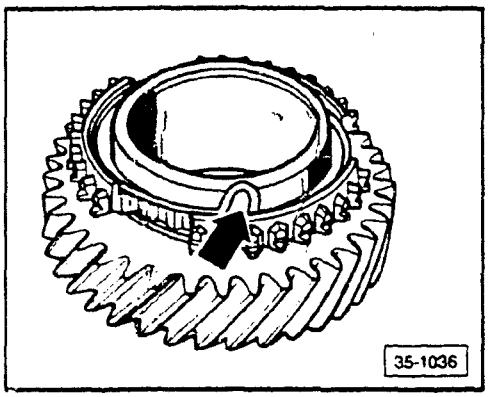
- install ball bearing on main shaft, up to stop
- position thrust pad **A** of press tool **3235**, onto ball bearing
- mount press tool **3235** behind clutch plate splines on input shaft
- apply pressure to bearing with two bolts **B** positioned in the thrust pad **A** recesses
- press bearing in, onto the stop, by tightening the two bolts alternately and evenly

CAUTION

Bolts **B** must be tightened in stages (i.e. 1/2 turn at a time) or ball bearing could tilt and become damaged.

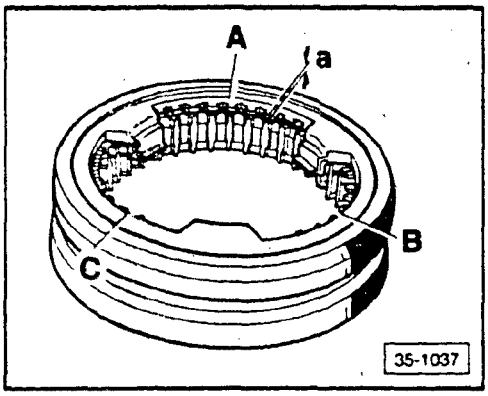
Note

Installation position of ball bearing:
open side of plastic cage faces guide sleeve.



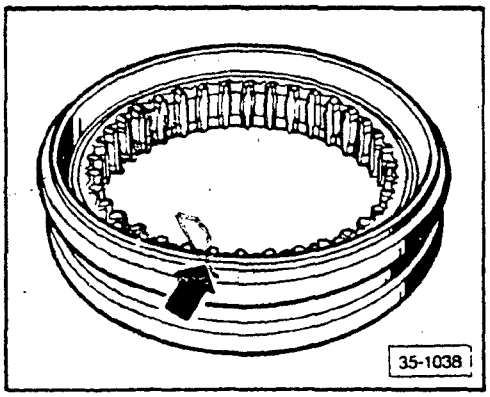
▶ **Fig. 4 Spring, installing in gear**

- assemble spring (**arrow**) in gear by installing angled end of spring in bore



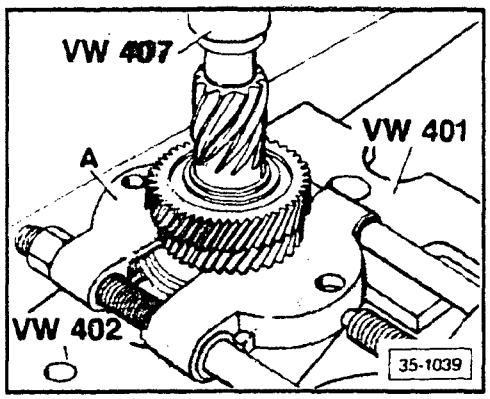
▶ **Fig. 5 Synchronizer ring, checking for wear**

- press synchronizer ring into operating sleeve and measure gap **a** with a feeler gage in positions **A**, **B**, and **C**
- add measured values and divide by 3
  - value obtained must not be less than 0.5 mm



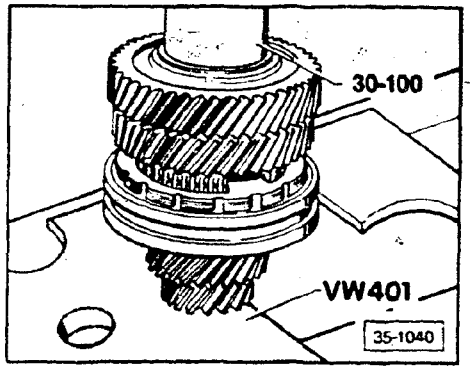
▶ **Fig. 6 Operating sleeve — 3rd/4th gear, installing**

- recessed side (**arrow**) faces 3rd gear



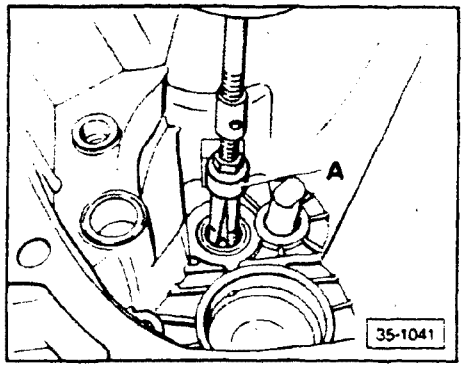
▶ **Fig. 7 5th gear, removing**

- **A** = 22 mm-115 mm separating device such as **Kukko 17/2**



▶ **Fig. 8 5th gear, installing**

- higher collar faces reverse gear
- oil traps face 4th gear

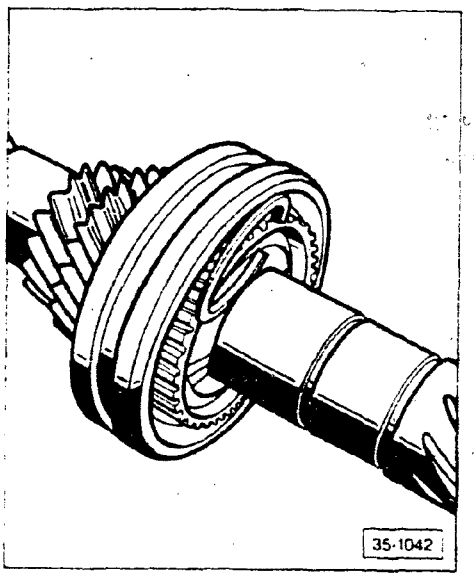


▶ **Fig. 9 Main shaft needle bearing, removing/ installing**

- **A** = 22 mm-28 mm puller, e.g. **Kukko 21/4**
- **B** = slide hammer **VW 771**

Note

Before positioning puller to remove bearing, crack/remove plastic sleeve, if present.
To install bearing, drive in with tube **VW 416 B**, to a depth of 214 mm (8.43 in.), as measured from housing face.



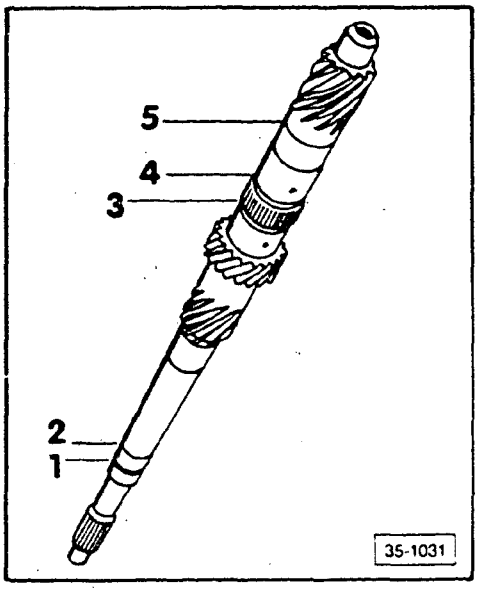
▶ **Fig. 10 4th gear circlip, installing**

- determine the thickest circlip that can be used, and install

Note

5th gear circlip is selected in same manner.

For listing of available circlips, see Fig. 11.



▶ **Fig. 11 Circlips, locating/selecting**

Note

Circlips are identified in the illustration at left, by their respective positions along the main shaft.

Thickness of circlips **1, 2, 4,** and **5** must be determined. Thickness of circlip **3** is always constant.

- determine thickness of circlips **1** and **2**
  - see page 35.9 — Main shaft, adjusting

Circlip **3** (brown)

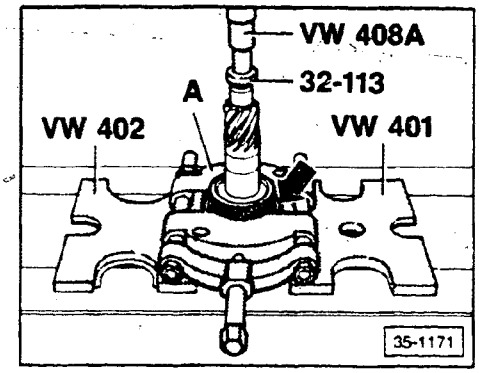
Thickness of circlip (mm)	Part number
2.00	N 902 945.01

Circlip **4** (blue)

Thickness of circlip (mm)	Part number
1.90	N 902 944.01
1.93	N 902 944.02
1.96	N 902 944.03
1.99	N 902 944.04
2.02	N 902 944.05
2.05	N 902 944.06

Circlip **5**

Thickness of circlip (mm)	Part number
1.90	N 902 942.02
1.93	N 902 942.03
1.96	N 902 942.04
1.99	N 902 942.05
2.02	N 902 942.06



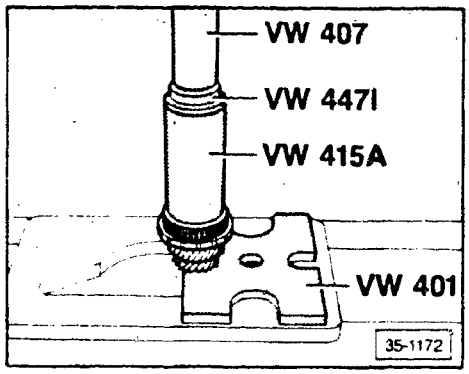
▶ **Fig. 12 3rd/4th gear synchronizer hub, removing**

- position the following tools, as shown:
  - **VW 401/VW 402** = thrust plates
  - **32-113** = disc
  - **VW 408A** = punch
  - **A** = 22 mm-115 mm separating device such as **Kukko 17/2**

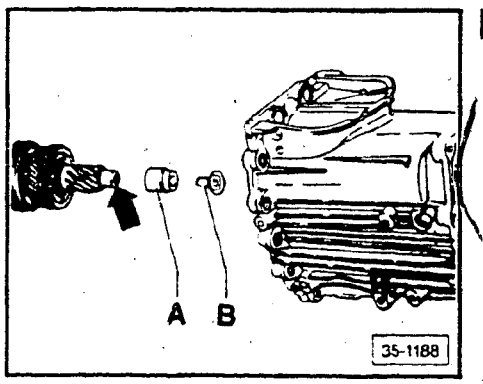
Note

Before installing separating device **A**, press 3rd gear synchronizer ring (**arrow**) toward 3rd gear.

- remove synchronizer hub



▶ **Fig. 13 3rd/4th gear synchronizer hub, installing**



▶ **Fig. 14 Plastic sleeve, installing**

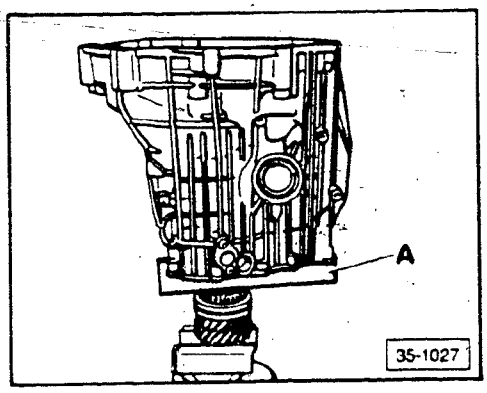
Note

Plastic sleeve **B** is used only on main shafts with oil passages (**arrow**) for 3rd/4th gear.

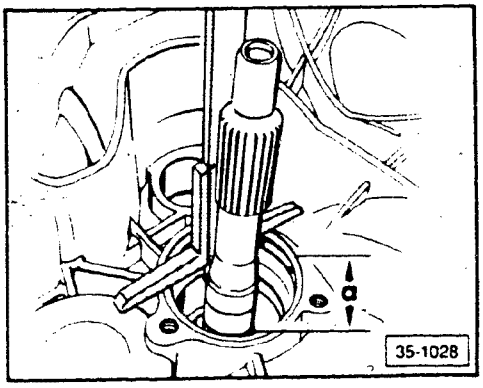
- install plastic sleeve **B** along with needle bearing **A**

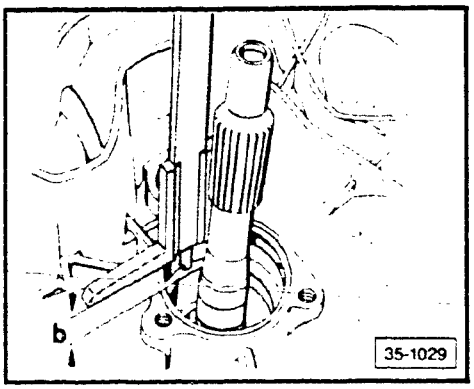
Main shaft, adjusting

- tighten main shaft in vise equipped with soft jaw covers
- place **A**, spacer gauge **3167**, on 3rd gear
- install housing onto spacer gauge via main shaft



- place depth gauge on housing and measure to the lower groove in shaft
  - dimension **a** = 28.5 mm





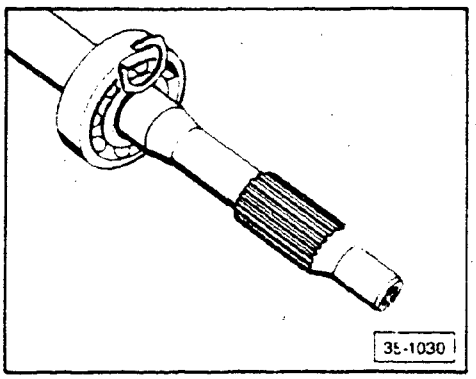
- place depth gauge on housing and measure to ball bearing seat
  - dimension **b** = 26.8 mm
- find thickness for lower circlip

Dimension **x**

x = a - b
x = 28.5 mm - 26.8 mm = 1.70 mm

- find circlip thickness in table

Measurement	Thickness	Part number
1.64 - 1.71	1.69	N 902 941.05
1.72 - 1.79	1.77	N 902 941.06
1.80 - 1.87	1.85	N 902 941.07
1.88 - 1.95	1.93	N 902 941.08
1.96 - 2.03	2.01	N 902 941.09
2.04 - 2.11	2.09	N 902 941.10
2.12 - 2.19	2.17	N 902 941.11
2.20 - 2.27	2.25	N 902 941.12
2.28 - 2.35	2.33	N 902 941.13



- install circlip and ball bearing on shaft with press tube **30-100**
- find the thickest circlip which can just be inserted

Note

The following circlips are available:

Thickness (mm)	Part number
1.69	N 902 941.05
1.77	N 902 941.06
1.85	N 902 941.07
1.93	N 902 941.08
2.01	N 902 941.09
2.09	N 902 941.10
2.17	N 902 941.11
2.25	N 902 941.12
2.33	N 902 941.13

THIS FRAME INTENTIONALLY LEFT

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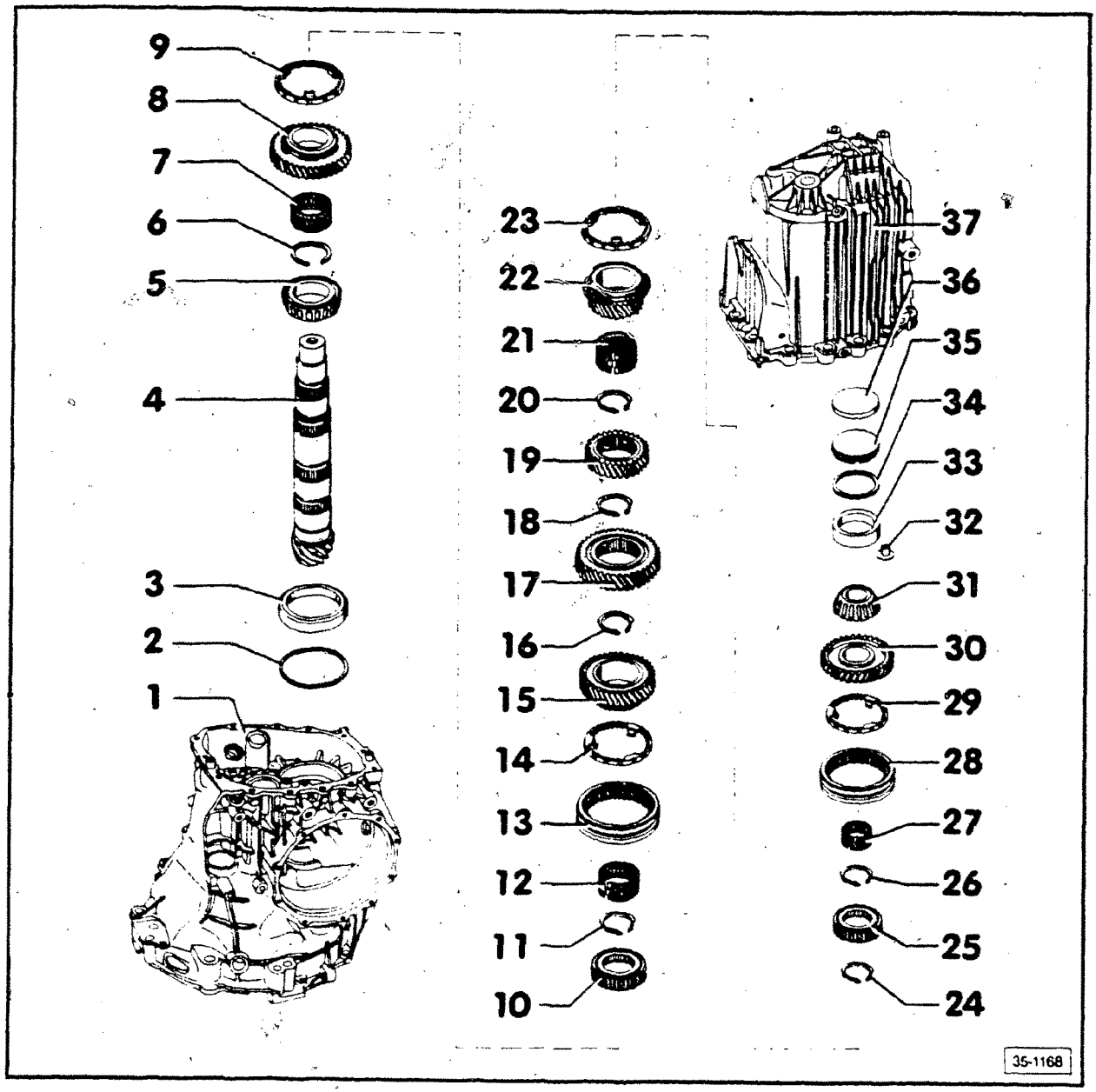


CAUTION

If pinion bearings are to be replaced it is important to measure the position of the pinion before removing it. See Repair Group 39.

Do not damage seal lips between taper roller bearings.

Note

If installing new gears or gear set, refer also to Repair Group 00 for identifications and Repair Group 34 for technical data.
Circlips are different in thickness and diameter and should be measured as they are removed. If a gear or shaft is replaced, the corresponding circlip must be measured for correct fit.

1 — **Final drive housing**

2 — **Shim S3**
adjustment overview (see Repair Group 39)

3 — **Double taper roller bearing — outer race**
- removing, Fig. 1
- installing, Fig. 2

4 — **Pinion**
- matched with ring gear (ring gear pinion set)
- when replacing ring gear pinion set, adjust pinion along with hollow shaft and ring gear (see Repair Group 39)

5 — **Double taper roller bearing — inner race**
- removing, Fig. 3
- installing, Fig. 4

6 — **Circlip**
- installing, Fig. 20
- locating/selecting, Fig. 21 (no. 1)

7 — **Needle bearing — 1st gear**

8 — **1st gear**
spring, assembling, Fig. 5

9 — **Synchronizer ring — 1st gear**
checking for wear, Fig. 6

10 — **Synchronizer hub — 1st/2nd gear**
- high collar faces 2nd gear
- press off together with 1st gear; use thrust plates **VW 401** and **VW 402**
- press on with tube **VW 415A** and sleeve **VW 519**

11 — **Circlip**
- installing, Fig. 20
- locating/selecting, Fig. 21 (no. 2)

12 — **Needle bearing — 2nd gear**

13 — **Operating sleeve — 1st/2nd gear**
installing, Fig. 7

14 — **Synchronizer ring — 2nd ring**
checking for wear, Fig. 6

15 — **2nd gear**
spring, assembling, Fig. 5

16 — **Circlip**
locating/selecting, Fig. 21 (no. 3)

17 — **3rd gear**
- groove faces 4th gear
- removing, Fig. 8
- installing, Fig. 9

18 — **Circlip**
- installing, Fig. 20
- locating/selecting, Fig. 21 (no. 4)

19 — **4th gear**
- collar faces 3rd gear
- removing, Fig. 10
- installing, Fig. 11

20 — **Circlip**
- installing, Fig. 20
- locating/selecting, Fig. 21 (no. 5)

21 — **Needle bearing — 5th gear**

22 — **5th gear**
spring, assembling, Fig. 5

23 — **Synchronizer ring — 5th gear**
checking for wear, Fig. 6

24 — **Circlip**
locating/selecting, Fig. 21 (no. 6)

25 — **Synchronizer hub — 5th/reverse gear**
- high collar faces 5th gear
- press off with 5th gear, Fig. 12
- press on using sleeve **2010**

26 — **Circlip**
- installing, Fig. 20
- locating/selecting, Fig. 21 (no. 7)

27 — **Needle bearing — reverse gear**

28 — **Operating sleeve — 5th/reverse gear**
installing, Fig. 16

29 — **Synchronizer ring — reverse gear**
checking for wear, Fig. 6

30 — **Reverse gear**
spring, assembling, Fig. 5

31 — **Taper roller bearing — inner race**
- removing, Fig. 14
- installing, Fig. 15

32 — **Locking bushing for taper roller bearing outer race**
- removing, Fig. 17
- reinstallation not necessary once outer race is replaced (bushing required only during production)

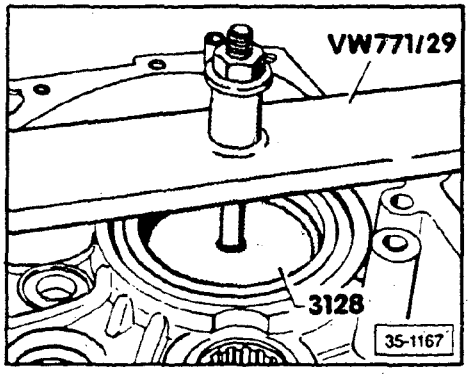
33 — **Taper roller bearing — outer race**
- removing, Fig. 18
- installing, Fig. 19

34 — **Shim S4**
adjustment overview (see Repair Group 39)

35 — **Pressure plate**

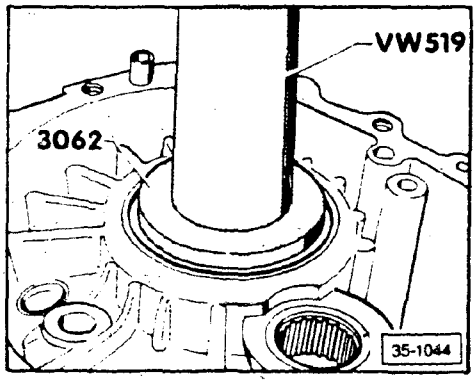
36 — **Washer**
- compensates for length, depending on temperature (heat)
- to remove, drill hole in washer and pry out with sheet metal screw

37 — **Gear carrier housing**

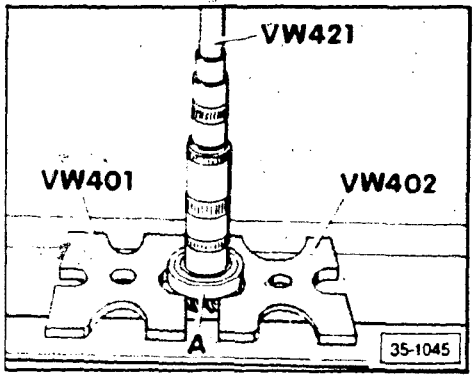


▶ Fig. 1 Double taper roller bearing — outer race, removing

- place pressure piece from puller **3128** under outer race
- position support bridge **VW 771/29** and install a bolt on transmission housing
  - when tightening bolt, outer race is pulled out of housing



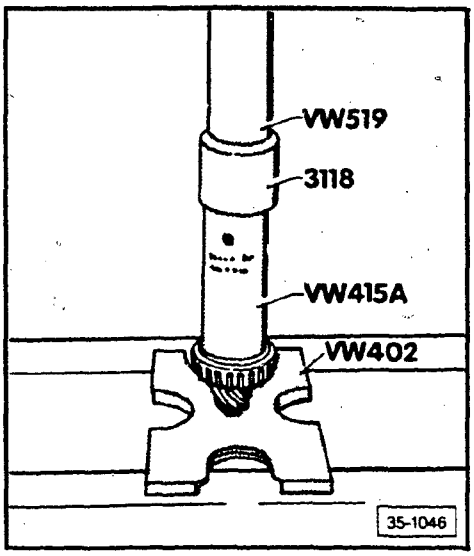
▶ Fig. 2 Double taper roller bearing — outer race, installing



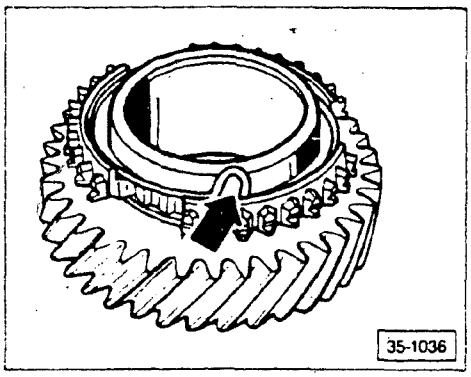
▶ Fig. 3 Double taper roller bearing — inner race, removing

Note

Outer race **A** must be in place, to remove inner race.

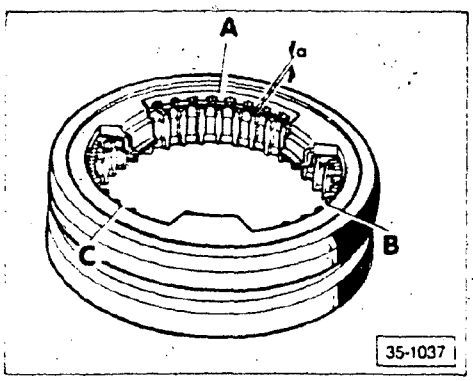


▶ **Fig. 4 Double taper roller bearing — inner race, installing**



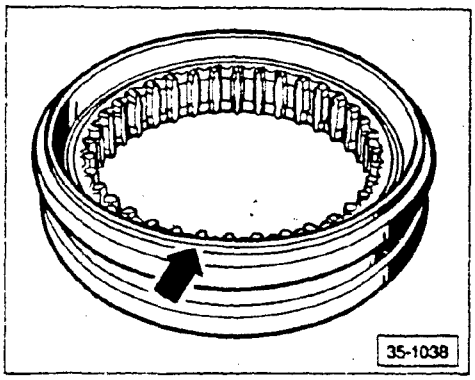
▶ **Fig. 5 Spring, installing in gear**

- assemble spring (**arrow**) in gear by installing angled end of spring in bore



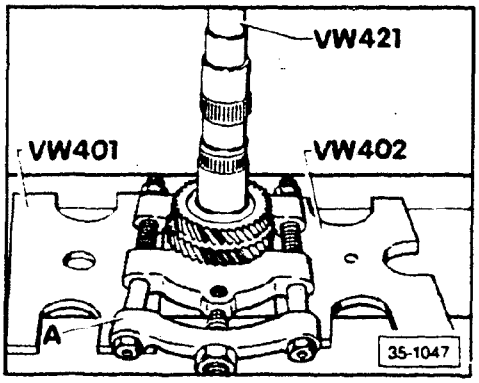
▶ **Fig. 6 Synchronizer ring, checking for wear**

- press synchronizer ring into operating sleeve and measure gap **a** with a feeler gauge in positions **A**, **B**, and **C**
- add values obtained and divide by 3
  - the measured value must not be less than 0.5 mm



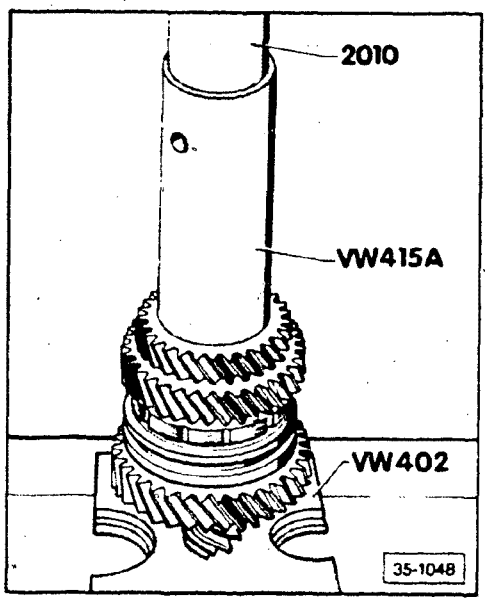
▶ **Fig. 7 Operating sleeve — 1st/2nd gear, installing**

- recessed side (**arrow**) faces 1st gear



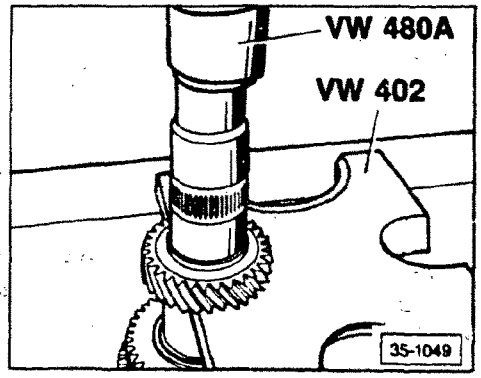
▶ **Fig. 8 3rd gear, removing**

- **A** = 22 mm-115 mm separating device, e.g. **Kukko 17/2**

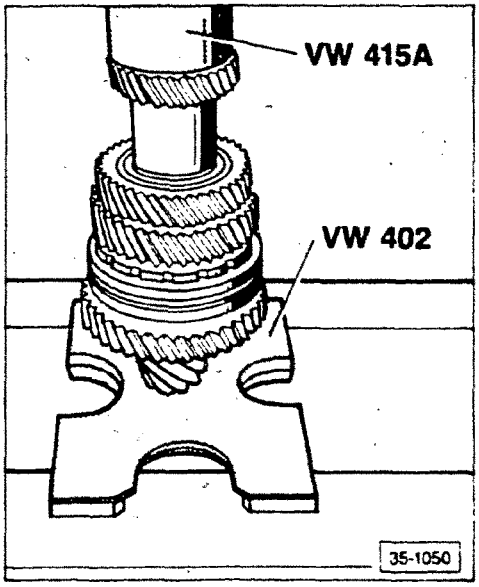


▶ **Fig. 9 3rd gear, installing**

- installation position: groove faces 4th gear

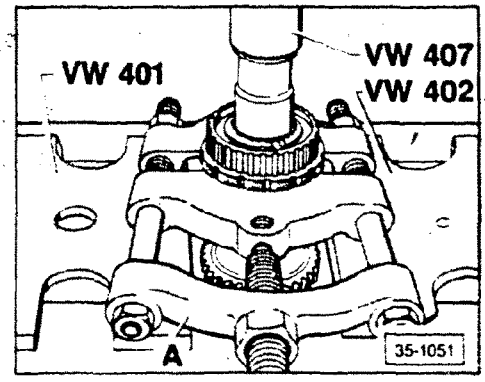


▶ **Fig. 10 4th gear, removing**



▶ **Fig. 11 4th gear, installing**

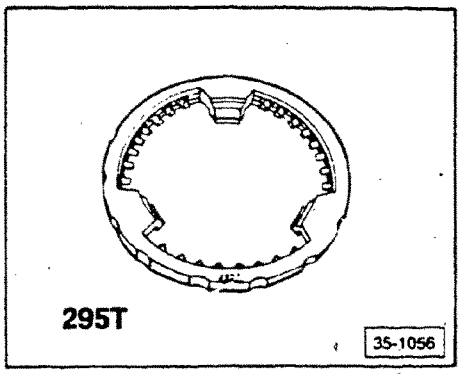
- collar faces 3rd gear



▶ **Fig. 12 Synchronizer hub, removing**

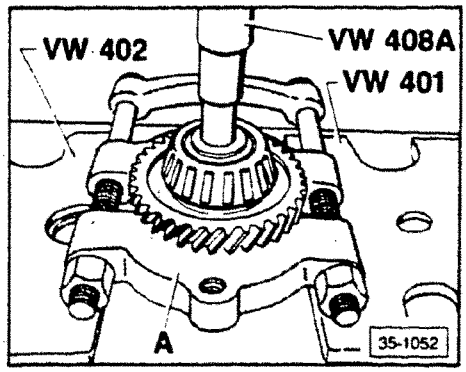
■ remove synchronizer hub with 5th gear

- use 22 mm-115 mm separating device, **A** (e.g. **Kukko 17/2**)



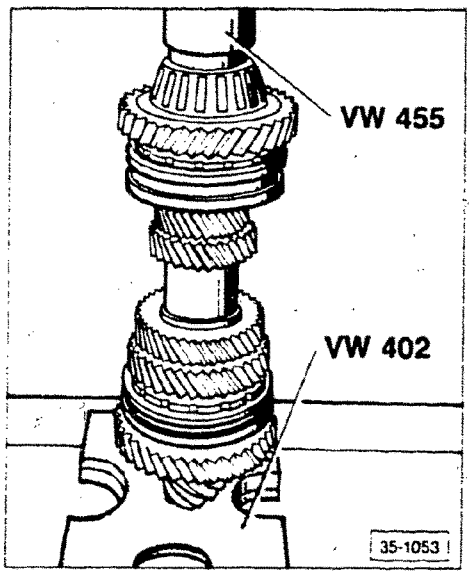
▶ **Fig. 13 Synchronizer ring, identifying**

- the recess above the 3 lugs has been discontinued

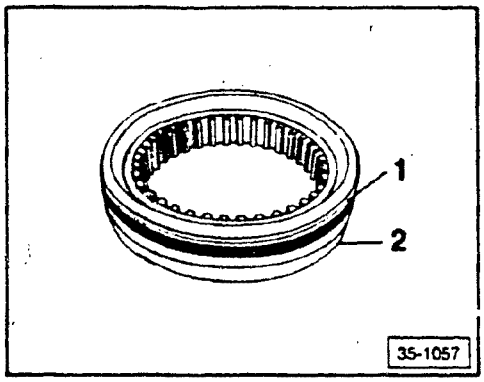


▶ **Fig. 14 Taper roller bearing — inner race, removing**

- remove inner race with reverse gear
  - use 22 mm-115 mm separating device, **A** (e.g. **Kukko 17/2**)

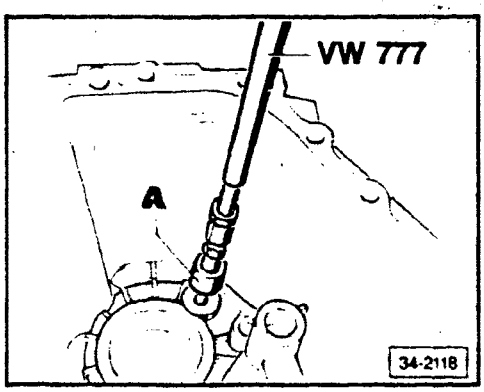


▶ **Fig. 15 Taper roller bearing — inner race, installing**



▶ **Fig. 16 Operating sleeve — 5th/reverse gear, installing**

- diagonal **1** faces reverse gear
- recessed side **2** faces 5th gear

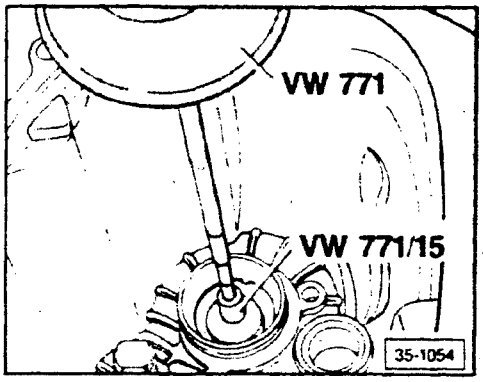


▶ **Fig. 17 Locking bushing for taper roller bearing outer race, removing**

- use 12 mm-15 mm puller, **A** (e.g. **US 1010** or **Kukko 21/1)**

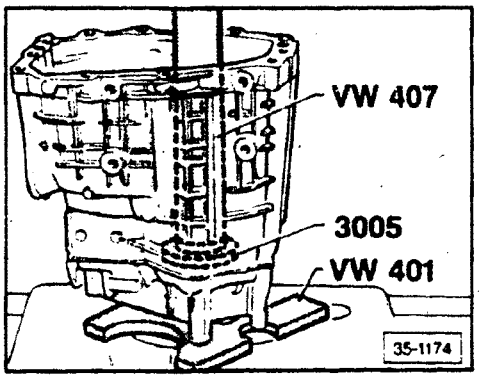
Note

Bushing reinstallation not necessary once outer race is replaced. (Bushing required only during production.)

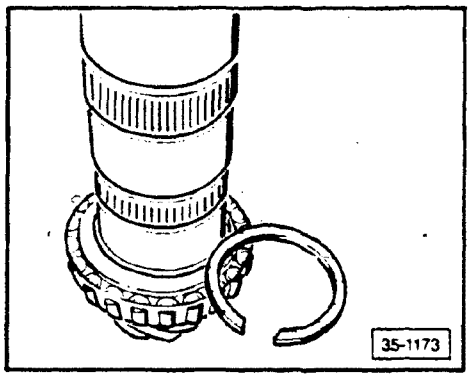


▶ **Fig. 18 Taper roller bearing — outer race, removing**

- thread special removal stud into pressure plate
  - M10 stud (length = 50 mm), reduced at one end to M8 diameter
- remove pressure plate and outer race from housing using slide hammer



▶ **Fig. 19 Taper roller bearing — outer race, installing**

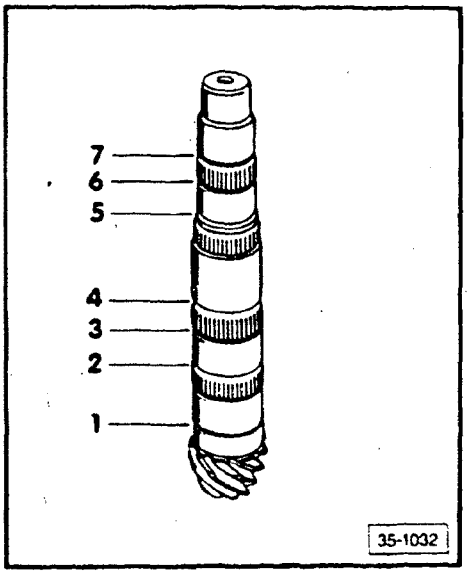


▶ **Fig. 20 Taper roller bearing — circlip, installing**

- determine the thickest circlip that can be used, and install
  - synchronizer hub circlips and 3rd/4th gear circlip are determined in same manner as taper roller bearing circlip

Note

For listing of available circlips, see Fig. 20.



▶ **Fig. 21 Circlips, locating/selecting**

Note

Circlips are identified in the illustration at left, by their respective positions along the pinion shaft.

- determine thickness of circlips **1, 2, 4, 5,** and **7**
  - thickness of circlips **3** and **6** is always constant (see table)

Circlip **1**

Thickness (mm)	Part number
2.00	N 902 950.01
2.02	N 902 950.02
2.04	N 902 950.03
2.06	N 902 950.04
2.08	N 902 950.05
2.10	N 902 950.06

Circlip **2** (blue)

Thickness (mm)	Part number
1.90	N 902 947.01
1.93	N 902 947.02
1.96	N 902 947.03
1.99	N 902 947.04
2.02	N 902 947.05

Circlip **3** (blue)

Thickness (mm)	Part number
2.50	N 902 947.06

Circlip **4**

Thickness (mm)	Part number
1.90	N 902 946.02
1.93	N 902 946.03
1.96	N 902 946.04
1.99	N 902 946.05
2.02	N 902 946.06

Circlip **5**

Thickness (mm)	Part number
1.87	N 902 952.01
1.90	N 902 952.02
1.93	N 902 952.03
1.96	N 902 952.04

Circlip **6** (brown)

Thickness (mm)	Part number
2.00	N 902 945.01

Circlip **7** (blue)

Thickness (mm)	Part number
1.90	N 902 944.01
1.93	N 902 944.02
1.96	N 902 944.03
1.99	N 902 944.04
2.02	N 902 944.05
2.05	N 902 944.06