Input shaft, disassembling and assembling

Special tools and equipment

♦ VW222A pilot drift
♦ VW295 needle-bearing drift
♦ VW295A needle-bearing drift
♦ VW401 thrust plate and VW402 thrust plate
♦ VW407 punch and VW408A punch
♦ VW415A tube and VW416B tube
♦ VW447I thrust pad
♦ VW771 slide hammer-complete set
♦ 30-24 drift
♦ 30-100 press tube
♦ 40-105 thrust piece

♦ 40-202 press-out piece

♦ Kukko 17/2 separating tool

♦ 21/4 KUKKO extractor
Notes:

- When installing the input shaft or new gears, consult technical data ⇒ Page 00-3.
- By replacing items - 2 -, - 4 - and/or - 6 -, the position of the ball bearing is influenced. In this case, the input shaft must be re-adjusted ⇒ Page 35-17.

1 - Circlip
   - Identification
   - Installed position ⇒ Fig. 15, item -1-
   - Determining thickness ⇒ Page 35-17

2 - Input shaft ball bearing
   - Removing and installing ⇒ Page 34-49

3 - Circlip
   - Identification
   - Installed position ⇒ Fig. 15, item -2-
   - Determining thickness ⇒ Page 35-17

4 - Transmission housing
5 - Needle bearing
- Secured with bolt ⇒ Fig. 1
- Driving out ⇒ Fig. 2
- Allocation of input shaft/needle bearing ⇒ Fig. 3
- Installed position ⇒ Fig. 4
- Pressing in ⇒ Fig. 5
- Securing ⇒ Fig. 6

6 - Input shaft
- With oiling sleeve
- Driving in oiling sleeve ⇒ Fig. 7
- Adjusting ⇒ Page 35-17
- Allocation of input shaft/needle bearing ⇒ Fig. 3

7 - Needle bearing for 3rd gear
- Identification

8 - 3rd gear

9 - Spring
- Inserting in 3rd gear ⇒ Fig. 13
- Allocation of spring to gear ⇒ parts catalog

10 - Synchronizer ring for 3rd gear
Checking for wear ⇒ Fig. 14
11 - Circlip

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

12 - Synchronizer hub for 3rd and 4th gears

- Shoulder faces third gear
- Pressing off ⇒ Fig. 12
- Pressing on ⇒ Fig. 17

13 - Circlip

- Identification
- Installed position ⇒ Fig. 15, item 4
- Re-determining thickness when replacing synchronizer body ⇒ Fig. 16

14 - Operating sleeve for 3rd and 4th gears

- Installed position ⇒ Fig. 18

15 - Synchronizer ring for 4th gear

- Checking for wear ⇒ Fig. 14

16 - Spring

- Inserting in 4th gear ⇒ Fig. 13
- Allocation of spring to gear ⇒ parts catalog

17 - 4th gear
18 - Needle bearing for 4th gear
   ♦ Identification

19 - 5th gear
   ♦ Pressing off ⇒ Fig. 11
   ♦ Pressing on ⇒ Fig. 19

20 - Circlip
   ♦ Identification
   ♦ Installed position ⇒ Fig. 15, item -5-
   ♦ If 5th gear is replaced, re-determine thickness of circlip ⇒ Fig. 16

21 - Roller sleeve
   ♦ Always replace
   ♦ Damaged when removed
   ♦ Pulling out ⇒ Fig. 8
   ♦ Installed position ⇒ Fig. 9
   ♦ Driving in ⇒ Fig. 10

22 - Plastic sleeve
   ♦ Made of plastic

23 - Transmission cover
   ♦ With reverse idler gear ⇒ Page 35-44
Coat sealing surfaces with a thin layer of sealant AMV 188 001 02
**Fig. 1** Securing bolt for needle bearing  
- Remove securing bolt (arrow).

**Fig. 2** Driving out needle bearing
To avoid damage due to improper assembly, check the following after replacing the input shaft:

- Input shaft must be able to be guided in.
- Input shaft must have no play.

### Notes:

*Measure the dimension from the top edge of the straight-edge and subtract the height of the straight-edge from the measured dimension.*

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**Fig. 3  Allocation of input shaft/needle bearing**

<table>
<thead>
<tr>
<th>Input shaft diameter</th>
<th>Needle bearing part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>a: 27 mm (1.062 in.)</td>
<td>012 311 123 D</td>
</tr>
<tr>
<td>a: 29 mm (1.141 in)</td>
<td>012 311 123</td>
</tr>
</tbody>
</table>

**Fig. 4  Allocation of needle bearing**

Dimension -a- from lower edge of straight-edge to upper edge of needle bearing: 39.5 mm (1.555 in.)

**Note:**

*Measure the dimension from the top edge of the straight-edge and subtract the height of the straight-edge from the measured dimension.*
**Fig. 5  Pressing in needle bearing**
- Install securing bolt and tighten to 25 Nm (18 ft lb).

**Fig. 6  Installing securing bolt (arrow)**

Tightening torque: 25 Nm (18 ft lb).
Installed position: Flared edge of oiling sleeve faces tool.

Installation depth: 3.5 mm (0.138 in.) below upper edge.

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### Fig. 7  Driving in oiling sleeve into input shaft

<table>
<thead>
<tr>
<th>Item</th>
<th>Diameter of oiling sleeve</th>
<th>Tool</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>14 mm (0.551 in.)</td>
<td>VW222A pilot drift</td>
</tr>
<tr>
<td>B</td>
<td>16 mm (0.629 in.)</td>
<td>30-24 drift</td>
</tr>
</tbody>
</table>

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### Fig. 8  Pulling out roller sleeve

A - Internal puller 22-28 mm, e.g. Kukko 21/4

Plastic sleeve inside roller sleeve must be destroyed to install internal puller.
Fig. 9  Installed position of roller sleeve

Dimension \( a = 216 \text{ mm} \) (8.5 in.)

Note:

Measure from upper edge of cover to upper edge of bearing.

Fig. 10  Driving in roller sleeve
Fig. 11 Pressing off 5th gear
- Remove circlip before pressing off.
A - Separating device 22-115 mm, e.g. Kukko 17/2 separating tool

Fig. 12 Pressing off synchronizer hub for 3rd and 4th gears
- Remove circlip before pressing off.
- Press 3rd gear synchronizer ring (arrow) toward 3rd gear, and install separating device -A-.
A - Separating device 22-115 mm, e.g. Kukko 17/2 separating tool
**Fig. 13  Inserting spring into gear**

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

**Fig. 14  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 (0.019 in.).
Fig. 15  Allocation of circlips

- Circlips -1- and -2- secure the input shaft ball bearing.
  Determining thickness ⇒ Page 35-17, input shaft, adjusting
- Circlip -3- secures the 3rd and 4th gear synchronizer hub.
  Thickness: 2.00 mm (0.078 in.).
  Identification: brown in color.
- Circlip -4- secures the 3rd and 4th gear synchronizer hub.
  Determining thickness ⇒ Page 35-14, table
  Identification: blue in color.
- Circlip -5- secures the 5th gear.
  Determining thickness ⇒ Page 35-14, table
The following circlips are available for synchronizer hub for 3rd and 4th gear

<table>
<thead>
<tr>
<th>Circlip thickness (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.90 1.96 2.02</td>
</tr>
<tr>
<td>1.93 1.99 2.05</td>
</tr>
</tbody>
</table>

The following circlips are available for 5th gear

<table>
<thead>
<tr>
<th>Circlip thickness (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.90 1.96 2.02</td>
</tr>
<tr>
<td>1.93 1.99</td>
</tr>
</tbody>
</table>

Fig. 16  Determining thickness of circlip

- Determine thickest circlip which can still just be installed and install it.
- Determine circlip according to table. Part number ⇒ parts catalog
Fig. 17 Pressing on synchronizer hub for 3rd and 4th gears

Fig. 18 Installation position of operating sleeve

Operating sleeves with chamfer -A- as well as operating sleeves with a large offset -B- are installed.

Installed position:

- The chamfer (arrow -1-) faces 4th gear
- The small stepped side (arrow -2-) faces 3rd gear
- The large stepped side (arrow -3-) faces 4th gear
**Fig. 19  Pressing on 5th gear**

**WARNING!**

*Wear protective gloves!*

- Heat 5th gear to approx. 100° C (212° F) before pressing on.

Installation position: shoulder faces reverse gear.