

Preliminary information

This manual covers the procedure for repairing the complete transmission.

The repairing of this transmission is only allowed to persons with specific training from ZF Getriebe GmbH.

The entire disassembly and assembly procedure is described in chronological order.

The photographs were kept general in nature so that they can be used with various applications; they are not binding in every case.

We use *Service Bulletins* and training courses to announce important information and application-specific changes that must be taken into consideration in maintenance work. If this repair manual is given to a third party, there will be no modification service.

The *Service Bulletins* regulations and specifications must be followed when making repairs.

Depending on the type of damage that has occurred, the repair work can be limited to that which is necessary to repair the damage.

In this case you must observe the following:

- Seals (such as O-rings, shaft seals, gaskets, and filters) should always be renewed.
- All O-rings, rectangular-section rings, and other sealing rings must always be lubricated with petroleum jelly before installation.
- All bearings must always be oiled lightly when installed.
- For transmissions that have covered a large number of kilometers (> 80,000 km), all lined clutch discs and steel clutch discs should be replaced.
- After clutches/brakes have been damaged, the converter, oil tubes, and oil cooler, must be cleaned thoroughly with a suitable cleaning agent.
- Needle roller thrust bearings with double-angle races must be inserted so that the angled discs are against the face of the component.

The following requirements should be met before the repair work is started:

- The required special tools should be available.
(The complete set of special tools is listed in Chapter 1.7)
- A suitable transmission testing rig should be available.
The required testing values can be found in the *Service Bulletins*.

1. General information

1.1 Picture of the transmission



1.4 Making adjustments

1.4.0 Measuring the clutch packs (procedure)

Place the two intermediate pieces 5p01 050 329/5p01 060 329 on the marked position on measuring fixture 5p01 000 330.



Using the knurled screw, turn adjusting device 5p01 001 458 to the upper limit.

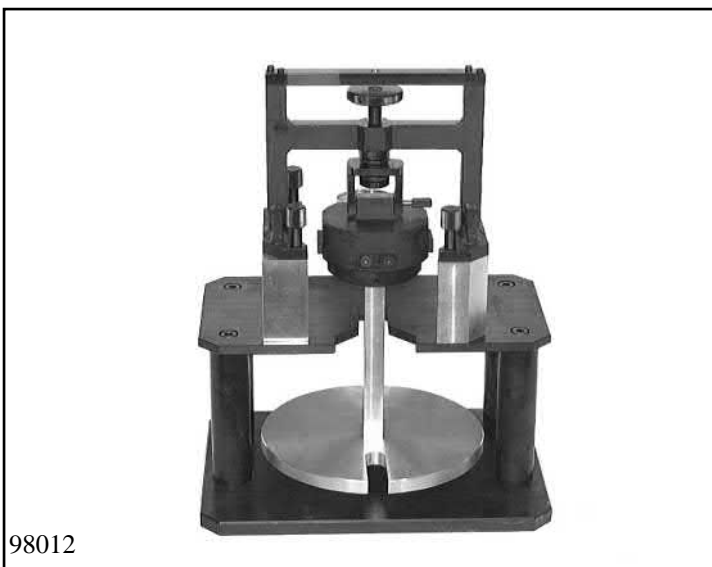
Attach force measuring unit 5p01 000 329 to adjusting device.

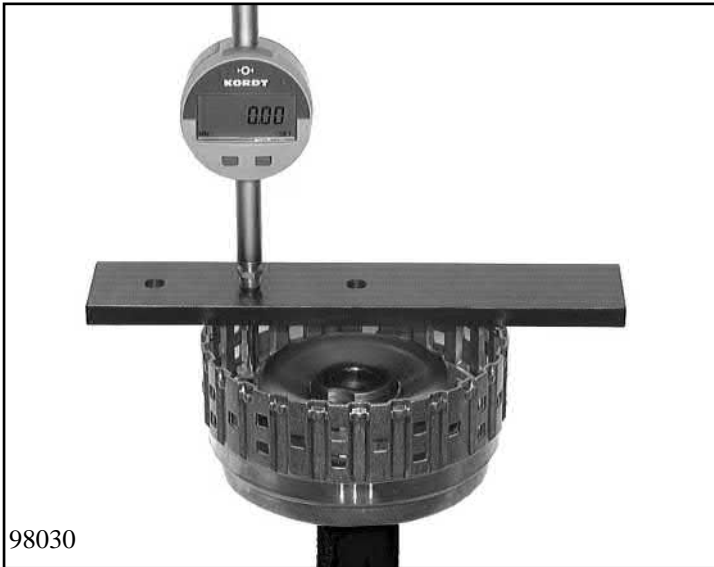


Fasten it with 4 knurled screws to the measuring fixture using the intermediate pieces.

Using a fixing pin, connect measuring plate 5p01 040 330 with the force measuring unit.

Using the knurled screw, clamp the clutch pack to be measured (with steel disc on the top and corrugated disc – if there is one – on the bottom) in the device at 200N.





98030

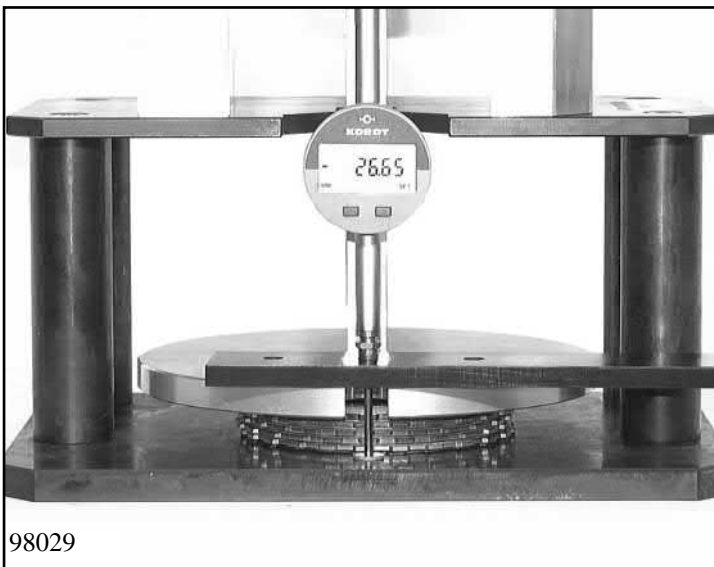
1.4.1.4 Clearance of clutch A (snap ring)

Determine clutch A installation space E_A with measuring bar 5p01 000 330.

To do this, place measuring bar 5p01 000 330 on the edge of the cylinder of clutch A. Place the base of the dial gauge on the highest point of the disc contact surface at the piston and set the dial gauge to "0".

Pull the measuring sensor up, insert it into the snap ring groove and press it against the upper edge of the groove. Repeat the measurement twice, after turning through 120° .

Take the average of $A_1, A_2, A_3 \Rightarrow W_A$



98029

Determine thickness M_A of the disc set for clutch A as described in **Chapter 1.4.0 "Measuring the clutch packs"**.

$\Rightarrow M_A$

Installation space E_A is obtained from measured value W_A plus base thickness $F \Rightarrow E_A$

Important!

The final disc has a step.

When measuring the disc set thickness, measure the lower step of the final disc.

Value P_A is then installation space E_A minus M_A .

Value P_A must be between 3.75 and 5.75 mm. **Test specification 1058 700 021**
(from STL 012 - 1058 700 140)

Use test gauge P_A to select snap ring S_A .

Calculation:

$$E_A = W_A + F$$

$$P_A = E_A - M_A$$

Clearance L_A should be 1.95 - 2.25 mm with six lined discs.

1.4.3 Bevel gear drive

1.4.3.1 Pinion position



Turn the transmission through 90° (converter bell facing down).

Insert fixture 5p01 002 706 into differential housing with measuring radius facing bore in pinion shaft. Set measuring element 5p01 002 706 in calibrating device 5p89 004 524 to zero. Reference dimension = 93.6 mm (calibrating device)

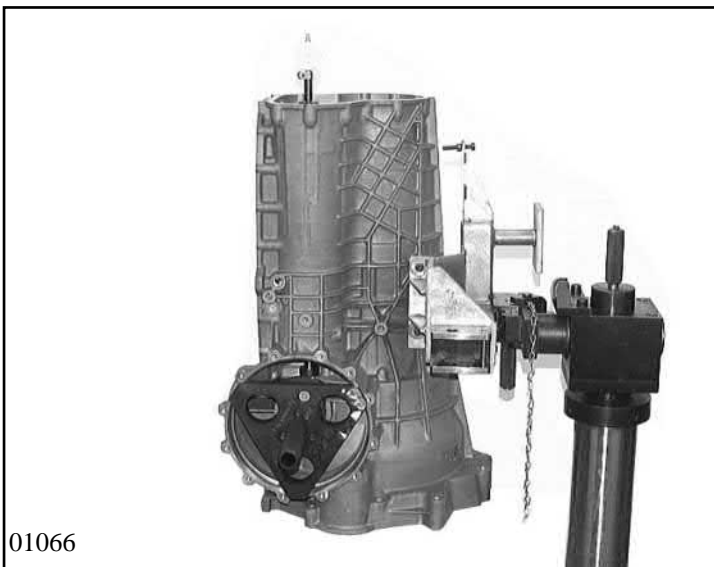
Adjust according to instruction

1058 700 137

[washer thickness steps = 0,03 mm]

1058 700 145

[washer thickness steps = 0,05 mm]



Place measuring element in transmission housing on the bearing contact surface.

Read off dimension M_R (measuring pin at measuring radius). Turn the transmission back through 90°.

Overall dimension G is obtained from the calibrating device measurement M_{ER} plus the measuring radius M_{MR} and the measured dimension M_R .

Calculation:

$$G = M_{ER} + M_{MR} + M_R$$

Note: !

M_R can also be negative; note direction of dial gauge pointer movement.



1.4.3.2 Installed bearing height pinion shaft bearing

Place the differential-side inner bearing race on the measuring plate.

Insert the outer bearing race in measuring sleeve 5p01 030 355 and place it on the bearing race.

Attach weight 5p01 010 355 and place centrally under the dial gauge sensor.

Set the dial gauge to "0".

Raise the measuring sensor and pull the measured component set forwards.

Take off the weight and remove the outer bearing race from the measuring sleeve.



1.4.7 Play at input (washer)

Attach the oil supply with at least two machine screws in opposed positions.

(Tightening torques: see Chapter 1.5)

Clamp measuring fixture 5p01 001 415 on the input shaft about 2 mm above the stator shaft, so that no play is present. Set the dial to "0".

Initial requirement:

Needle thrust bearing 10.390 and the thinnest shim 10.400 ($S_D = 1$ mm) must be in position.

Determine endplay by pressing and pulling the handle (repeat the measurement).

Nominal endplay $D = 0.1 - 0.3$ mm acc. to **test specification 1058 700 124**.

Take measurements M_1, M_2 and determine average value $\Rightarrow M$

Calculation:

$$M = (M_1 + M_2) / 2$$


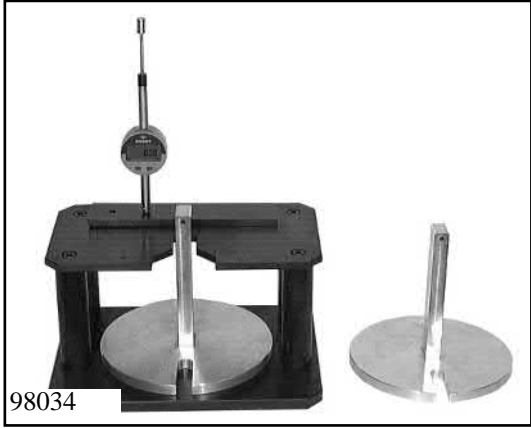

$$S = M + S_D - D$$




If there is a difference, install a correspondingly thicker shim washer 10.400.




To do this, *take off the oil supply and the input* and install the shim of determined thickness in place of the original shim.

Then re-install the components according to *3. Assembly of input with oil supply*. Check endplay again.

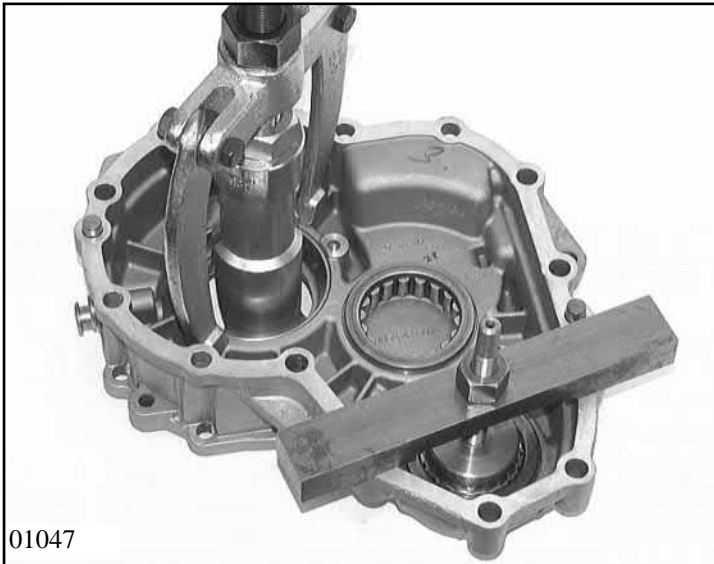
1.7 Special tools

OBJECT	Order-No. / Application	Remarks
<p style="text-align: center;">1</p>  <p>98008</p>	<p>5p01 000 329 -Force measuring unit</p>	<p>Identical</p> <p>4 HP 20 5 HP 19 5 HP 19 FL/A 5 HP 24</p>
<p style="text-align: center;">2</p>  <p>98034</p>	<p>5p01 000 330 -Measuring fixture, clutch play</p> <p>(Measuring plate: - short neck >20 mm - long neck <20 mm clutch pack thickness)</p>	<p>Identical</p> <p>4 HP 20 5 HP 19 5 HP 19 FL/A 5 HP 24</p>
<p style="text-align: center;">3</p>  <p>00045</p>	<p>5p01 000 331 -Height-measuring fixture, differential and side shaft</p>	<p>Identical</p> <p>5 HP 19 FL/A</p>

OBJECT	Order-No. / Application	Remarks
<p style="text-align: center;">43</p>  <p>99282</p>	<p>5x46 001 327 Drift, vibration damper shaft sealing ring</p>	<p>Identical 5 HP 19 FLA</p>
<p style="text-align: center;">44</p>  <p>99278</p>	<p>5x46 001 333 Assembly fixture, front axle shaft sealing ring</p>	
<p style="text-align: center;">45</p>  <p>99276</p>	<p>5x46 001 339 Mounting sleeve, front axle shaft sealing ring</p>	<p>Identical 5 HP 19 FLA</p>

Remarks	Order-No. / Application	OBJECT
<p>Identical</p> <p>5 HP 19 FLA</p>	<p>5x46 002 261 Drift for rear axle shaft needle roller sleeve, transfer box housing</p>	<p style="text-align: center;">70</p> <div style="text-align: center;">  </div> <p style="text-align: right;">00076</p>
<p>Identical</p> <p>5 HP 19 FLA</p>	<p>5x46 002 262 Retaining fixture, Torsen II</p>	<p style="text-align: center;">71</p> <div style="text-align: center;">  </div> <p style="text-align: right;">00077</p>
<p>Identical</p> <p>5 HP 19 FLA</p>	<p>5x46 002 273 Puller for output gear ball bearing, Rillex 6210</p>	<p style="text-align: center;">72</p> <div style="text-align: center;">  </div> <p style="text-align: right;">99281</p>

2.6.2 Intermediate housing



If fitted, undo the oil thrower sheet and take it off. Drive the shaft sealing ring out of the intermediate housing with a suitable tool.

Use tools 5x46 022 002 (Kukko 22-2) and 5x46 021 008 (Kukko 21-8) to remove the outer bearing race.

Use tool 5x53 000 001 to pull both roller sleeves out of the intermediate housing.

Important: *Do not confuse these items.* Allocate the outer bearing races to the corresponding bearings, or else noise problems will result. Protect sealing areas from damage by placing plastic layers in between. The breathers remain in the housing unless they are damaged.



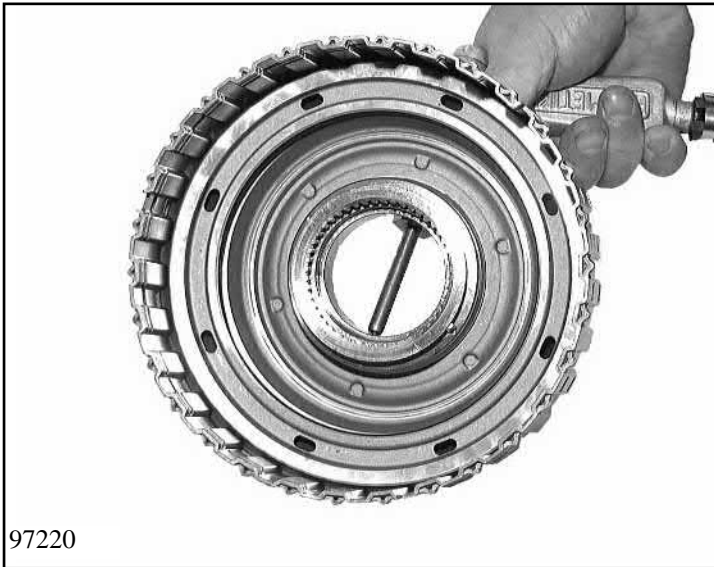
2.6.3 Cover

Drive out the shaft sealing ring with a suitable tool and take off sealing ring.



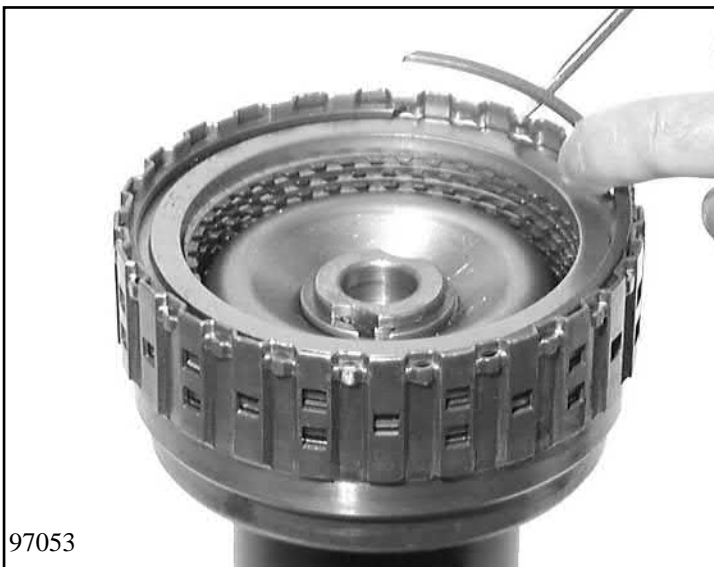
2.6.4 Transfer box housing

Use drift 5x46 002 278 to press the nut for the expansion bolt out of the output gearwheel in the mandrel press.



Cover one of the two oil feed bores and press out the piston with compressed air. Pull the three O-rings off piston B.

97220



Disengage snap ring for clutch A and take out the complete clutch A disc set.

97053

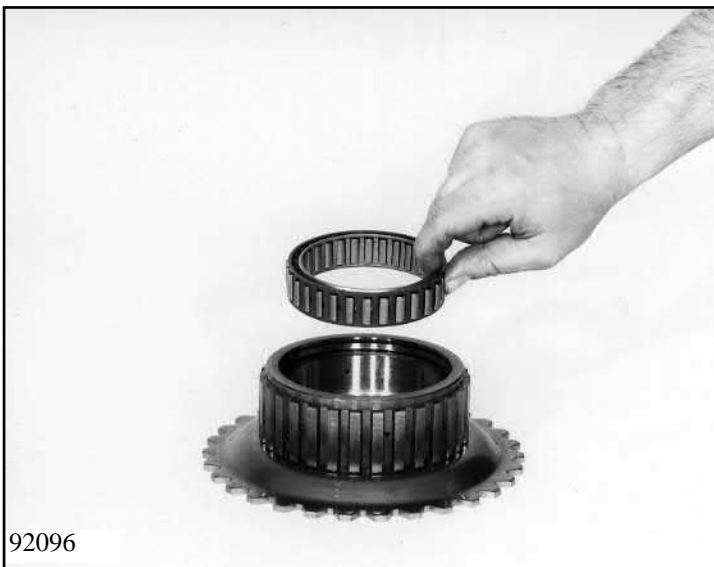


Using installation bracket 5x46 001 499, press the baffle plate down and remove snap ring with suitable pliers. Take out baffle plate and cup spring and remove O-ring from baffle plate.

97054



Start adding parts to 1st gear freewheel 77.120 by pressing in one of the two cover plates 77.120/120 for the complete freewheel into freewheel ring F.



Insert freewheel cage 77.120/120 into the freewheel outer ring with the collar upwards.

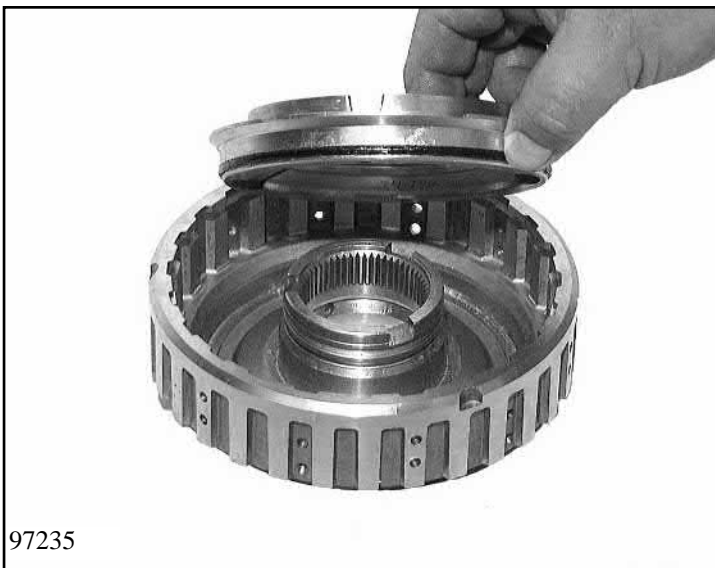
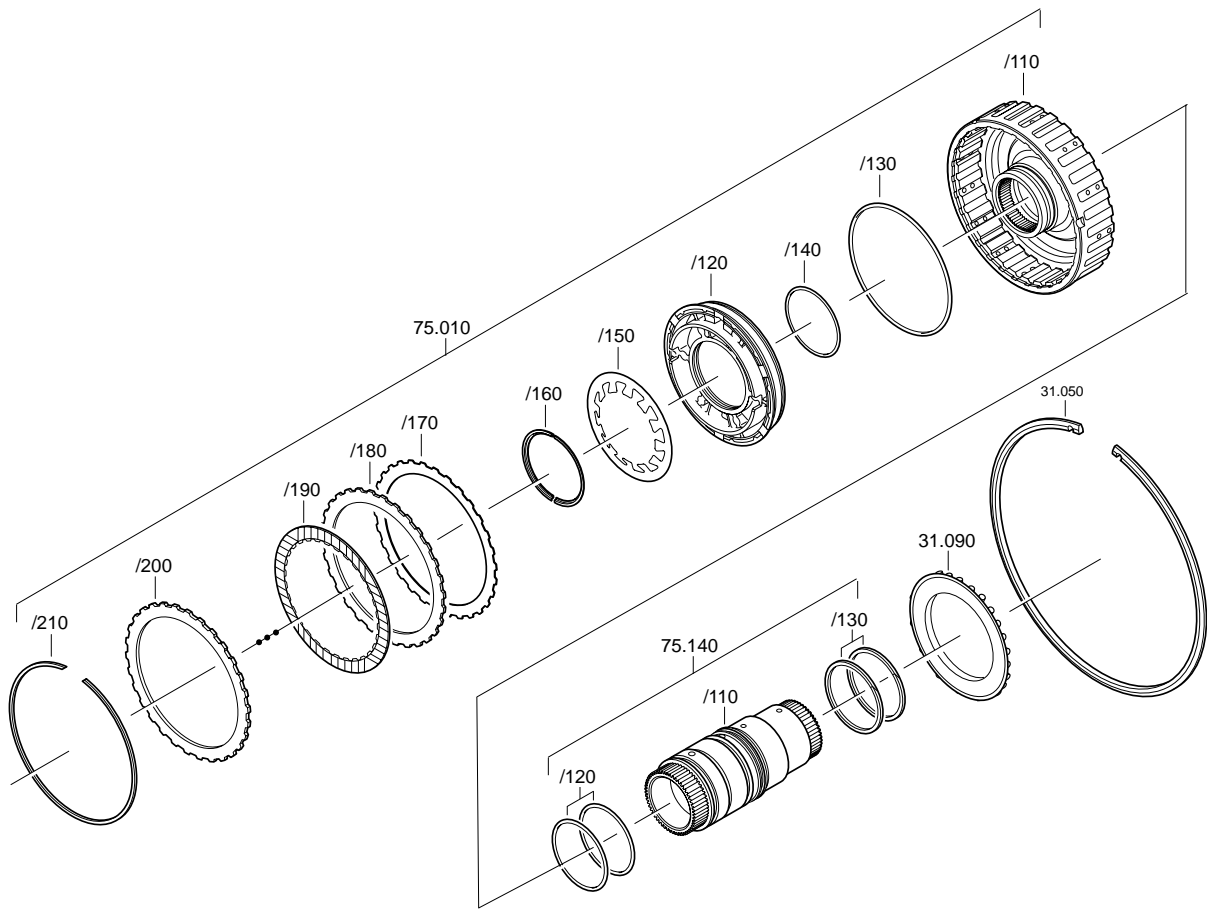
Important:

If installation is done in the reverse order, the freewheel's locking direction will be incorrect.



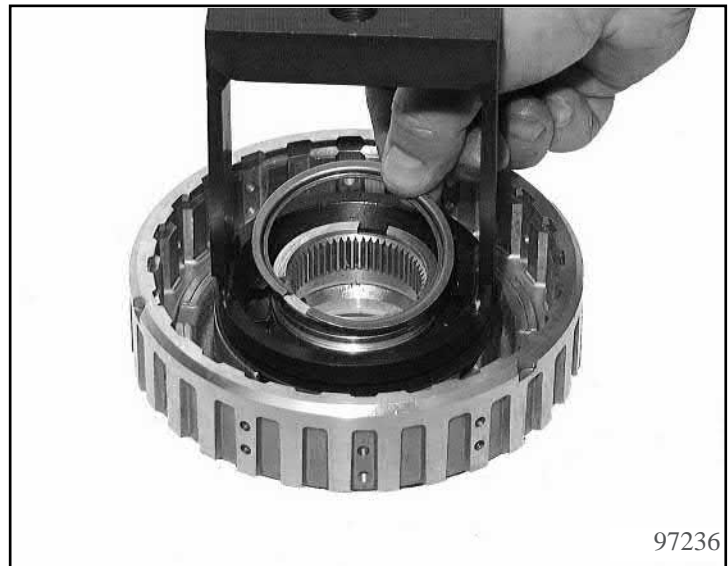
Apply the freewheel cover disc and press in.

3.4.2 Clutch C



Install new O-rings 75.010/130 and 75.010/140 on piston C 75.010/120. Press piston into cylinder C 75.010/110.

Insert disc spring C 75.010/150 and use installation bracket 5x46 030 167 to press it down in the mandrel press; secure with divided stop ring 75.010/160.



Insert complete disc set C starting with spring disc 75.010/170 followed by outer clutch disc 75.010/180 and lined clutch disc 75.010/190. Secure upper outer clutch disc 75.010/200 with snap ring 75.010/210.



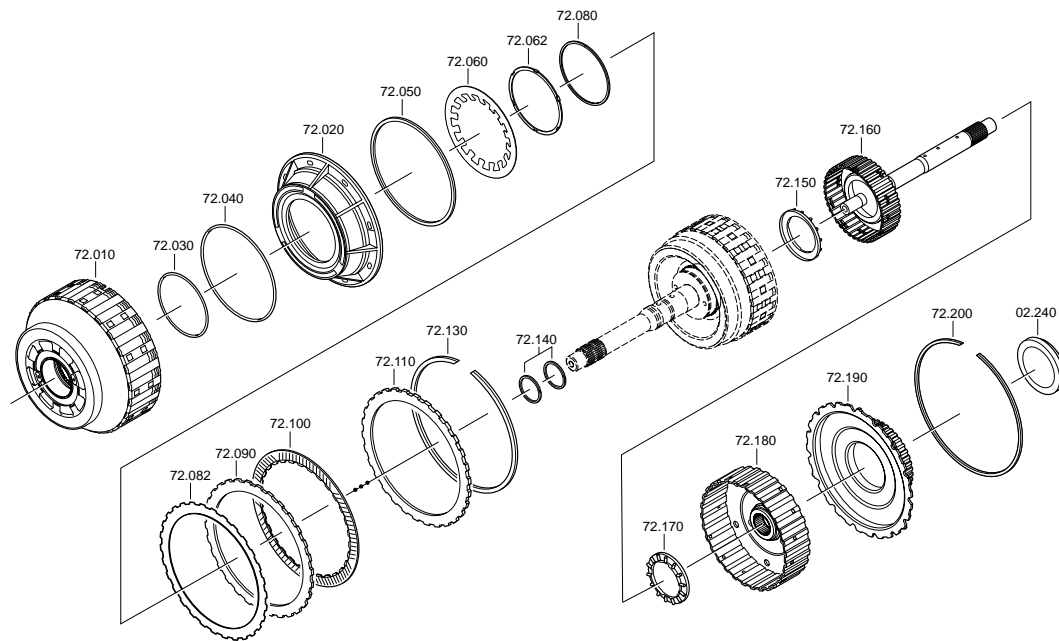
Important:
For adjusting work, see **Chapter 1.4.4**

Pull two O-rings 75.140/120 and 2 sealing rings 75.140/130 on to sun wheel shaft 75.140/110. Insert sun wheel shaft at cylinder C by hand.

Important:
If using new rectangular-section rings, stick them to the groove with a small amount of Vaseline.



3.5.2 Clutch B (input)



Pull two O-rings 72.030, 72.040 and sealing ring 72.050 on to piston B 72.020.
Press piston B into cylinder B.