

Disassembly and Reassembly of Propeller Shaft

Job No.

41 — 4

Note: As a rule no repairs should be carried out on the universal joints. If the universal joints are damaged in any way, the front or rear propeller shaft should be replaced.

For this reason either the propeller shaft assembly, including the intermediate bearing, or the front or rear propeller shaft, is available as a replacement part. The spiders should only be replaced in exceptional cases, and only if the bores in the shaft yokes are still fully serviceable.

For such cases the spiders are supplied as part No. 180 410 01 31 complete with needle bearing bushings, bearing needles, sealing ring retainer, sealing ring, and pinion rim grease fitting.

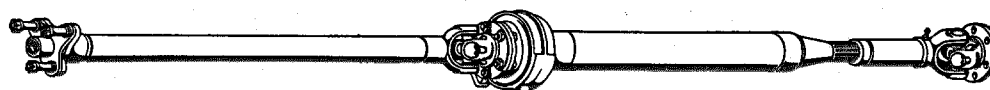


Fig. 41 — 4/1

A. Disassembly and Reassembly of Front and Rear Propeller Shaft

Disassembly:

1. Tap up the locking plates for the fixing bolts at the flange (5) and unscrew the hexagon nuts (Fig. 41 — 4/2).
2. Tap back the hexagon bolts and separate the front and rear propeller shafts (Fig. 41 — 4/2).
3. If the rear propeller shaft or the complete propeller shaft assembly is to be replaced, remove the bearing bracket (3) and the rubber mounting (4) of the intermediate bearing toward the rear (see Fig. 41 — 4/2).

Note: Replacement supply procedures have recently been changed in so far as both the propeller shaft assembly and the rear propeller shaft are supplied without bearing bracket (3) and without rubber mounting (4) (see Fig. 41 — 4/2).

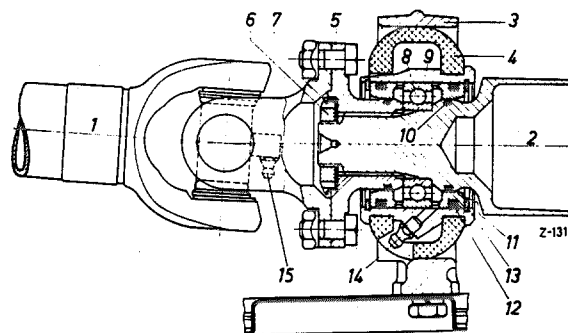


Fig. 41 — 4/2

- 1 Front propeller shaft yoke
- 2 Rear propeller shaft
- 3 Bearing bracket
- 4 Rubber mounting
- 5 Flange
- 6 Grooved nut
- 7 Locking plate
- 8 Annular grooved bearing
- 9 Housing of propeller shaft intermediate bearing
- 10 Oil ring
- 11 Spacer ring
- 12 Rubber sealing ring
- 13 Snap ring
- 14 Pinion rim grease fitting for annular grooved bearing
- 15 Pinion rim grease fitting for universal joint

4. If the front propeller shaft is to be replaced, remove the center cross (4) (Fig. 41 — 4/3).

Note: This is necessary, since the front propeller shaft is supplied without center cross.

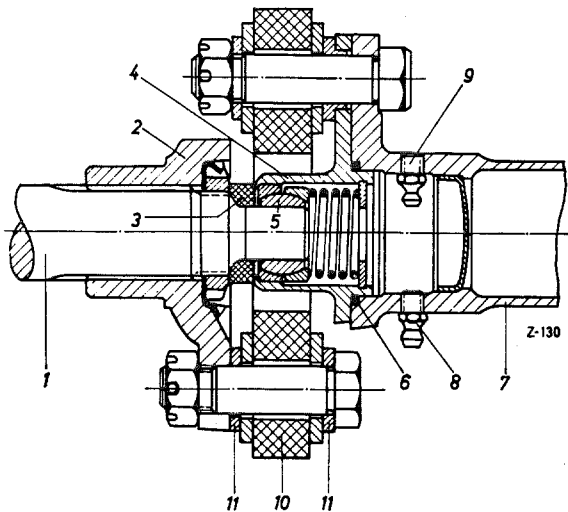


Fig. 41 — 4/3

- | | |
|----------------------------------|-----------------------------|
| 1 Transmission main shaft | 7 Propeller shaft |
| 2 Three-way flange on main shaft | 8 Pinion rim grease fitting |
| 3 Sealing ring | 9 Relief grease fitting |
| 4 Center cross | 10 Shaft plate |
| 5 Locating ball | 11 Washer 187 990 14 40 |
| 6 Sealing ring | |

5. Check the center cross (4).

If the locating ball (5) is worn or if the spring is broken, replace the center cross assembly (see Fig. 41 — 4/3).

Reassembly:

6. Screw the two propeller shaft halves together, using new locking plates.
7. Slide a new rubber sealing ring onto the center cross (see Fig. 41 — 4/3) and insert the center cross in the front propeller shaft.

Note: A pinion rim grease fitting (8) is screwed in at the front of the propeller shaft, lubricating the locating ball (5) and the center cross of the transmission main shaft.

The pinion rim grease fitting (9) inside the propeller shaft operates as a relief valve so that the air can escape during lubrication.

The lubrication operation is completed as soon as grease emerges from the pinion rim grease fitting (9) (see Fig. 41 — 4/3).

B. Removal and Installation of the Annular Grooved Bearing of the Intermediate Bearing

Removal:

8. Pull the slip coupling off the splined journal of the rear propeller shaft.

Note: Both slip coupling and splined journal must be marked before the propeller shaft is removed from the vehicle (see Job No. 41 — 1, Paragraph 4).

9. Tap up the locking plate (7) and unscrew the grooved nut (6) by means of Special Wrench 187 589 06 07 (Fig. 41 — 4/4) and pull off the flange (5).

10. Unscrew the pinion rim grease fitting.

Then pull out the bearing bracket (3) and the rubber mounting (4) toward the front (see Fig. 41 — 4/4).

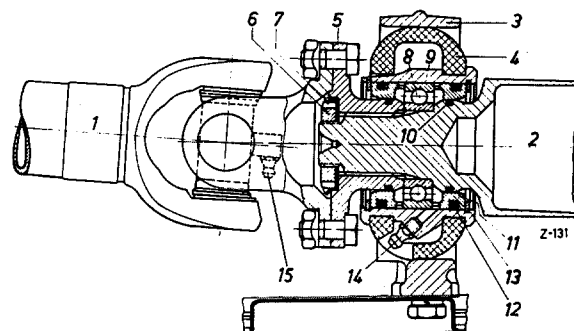


Fig. 41 — 4/4

- | |
|--|
| 1 Front propeller shaft yoke |
| 2 Rear propeller shaft |
| 3 Bearing bracket |
| 4 Rubber mounting |
| 5 Flange |
| 6 Grooved nut |
| 7 Locking plate |
| 8 Annular grooved bearing |
| 9 Housing of propeller shaft intermediate bearing |
| 10 Oil ring |
| 11 Spacer ring |
| 12 Rubber sealing ring |
| 13 Snap ring |
| 14 Pinion rim grease fitting for annular grooved bearing |
| 15 Pinion rim grease fitting for universal joint |

11. Pull off the housing (9) of the propeller shaft intermediate bearing, together with spacer rings (11) and annular grooved bearing (8), by means of a suitable puller (see Fig. 41 — 4/4).

12. Take the oil rings (10) off the propeller shaft and the flange (see Fig. 41 — 4/4).

13. Remove the snap rings (13) on both sides of the housing (9) and press the two spacer rings (11), together with the annular grooved bearing, out of the housing (see Fig. 41 — 4/4).

14. Remove the two rubber sealing rings (13) from the spacer rings.

Checking:

15. Check the housing (9) for cracks.

16. Check the annular grooved bearing for serviceability.

Note: When new, the annular grooved bearing DIN 6006—C3 has a radial play of 0.020 to 0.037 mm and an end play of approx. 0.20—0.37 mm. In judging the serviceability of the bearing, apply the standards laid down in Job No. 35—5 for Ball and Roller Bearings.

17. Check the spacer rings (11) for wear (see Fig. 41 — 4/4). Worn spacer rings must be replaced.

18. Check the rubber mounting (4) for cracks. If the rubber mounting is cracked or has deteriorated as a result of contact with grease, it must be replaced.

19. Check the bearing bracket (3) for cracks.

Installation:

20. Insert the front snap ring (13) in the housing (9).

21. Press the spacer ring (11) with a new rubber sealing ring (12) into the housing in such a way that the beveled side points toward the outside (see Fig. 41 — 4/4).

The spacer ring must fit snugly against the snap ring.

22. Press the annular grooved bearing into the housing.

23. Press the second spacer ring (11) with a new rubber sealing ring (12) into the housing in such a way that the beveled side points toward the outside and a recess at the inside of the spacer ring lies above the bore for the grease passage (see Fig. 41 — 4/4).

24. Insert the rear snap ring (13) (see Fig. 41 — 4/4).

25. Install a new oil ring (10) on the propeller shaft and on the flange (see Fig. 41 — 4/4).

26. Carefully tap the housing (9), together with the annular grooved bearing, onto the splined journal of the propeller shaft.

27. Slide the rubber mounting (4) and the bearing bracket (3) onto the housing (9) of the propeller shaft intermediate bearing (see Fig. 41 — 4/4). Screw in the pinion rim grease fitting.

28. Tap the flange (5) onto the splined journal and install a new locking plate (7).

29. Screw on the grooved nut (6) by means of Special Wrench 187 589 06 07 and tighten firmly (Fig. 41 — 4/4).

30. Tap over the locking plate (7) in the direction of the grooved nut and the flange (see Fig. 41 — 4/4).

31. Slide the slip coupling onto the rear splined journal, paying attention to the markings made during removal.

Note: If necessary, replace the felt ring in the slip coupling.

C. Replacing Universal Joint Spider in Front or Rear Propeller Shaft

Disassembly:

32. Press out the four crescent-shaped snap rings (1) from the four needle bearing bushings (2) of the spider (Fig. 41 — 4/5).

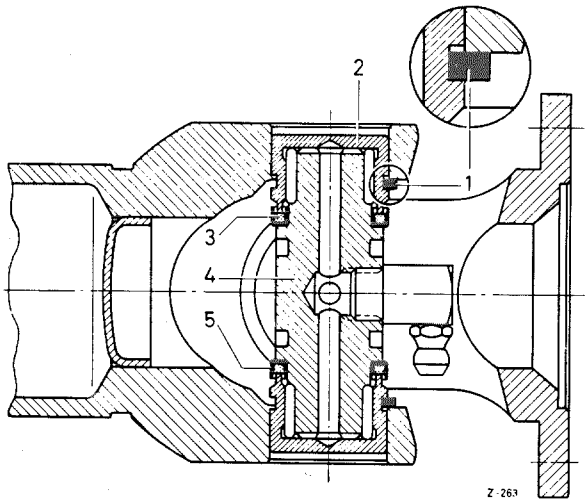


Fig. 41 — 4/5

- 1 Crescent-shaped snap ring
- 2 Needle bearing bushing
- 3 Sealing ring
- 4 Spider
- 5 Sealing ring retainer

33. Using a suitable support (2), place the yoke of the joint flange (3) under an arbor press (Fig. 41 — 4/6).
34. Use a suitable sleeve (4) to press the yoke (1) down as far as possible (see Fig. 41 — 4/6), thus pressing out the needle bearing bushing.
35. Turn the yoke over and press the opposite needle bearing bushing out in the same way.
36. Then press the needle bearing bushings out of the other yokes.

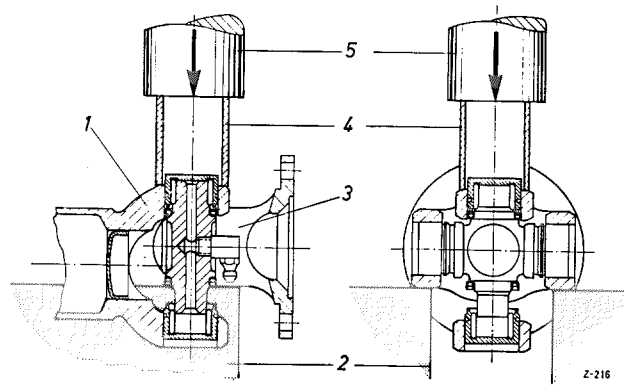


Fig. 41 — 4/6

- 1 Yoke
- 2 Support
- 3 Joint flange
- 4 Sleeve
- 5 Arbor

Checking:

37. Check the bores in the yokes. For measurements see Table below. If the bores are worn, the yokes must not be repaired; the front or rear propeller shaft assembly must be replaced.
38. The needle bearing bushings are available in two sizes (see Table below).
Select the needle bearing bushings to comply with the specified oversize fit.

Note: As replacement parts the spiders are supplied complete with needle bearing bushings and needles. When ordering replacements, please indicate whether size I or II is required. It is not permissible to replace individual needles or to replace the needle bearing bushings without a new spider.

Dimensions and Tolerances of Needle Bearing Bushing and Shaft Yoke in mm

Type	Marking	External diameter of needle bearing bushing	Bore in shaft yoke	Force-fit dimension	Internal diameter of needle bearing bushing	Trunnion diameter	Clearance
I	1 white dot	$\frac{26.015}{26.022}$	$\frac{26.000}{26.010}$	+ 0.005 to + 0.022	$\frac{20.120}{20.107}$	$\frac{15.089}{15.100}$	0.02 to 0.05
II	2 white dots	$\frac{26.023}{26.028}$	$\frac{26.011}{26.021}$	+ 0.002 to + 0.017			

Reassembly:

39. Put the yoke on a suitable support and press a needle bearing bushing with needles in slightly more than half its length (Fig. 41 — 4/7).

Note: Make sure that the correct size needle bearing bushing is fitted.

Use as little grease as possible to hold the needles in the needle bearing bushings; the trunnions of the spider should only be given a very light coating of grease.

The 22 needles of a needle bearing bushing must not be installed in another needle bearing bushing.

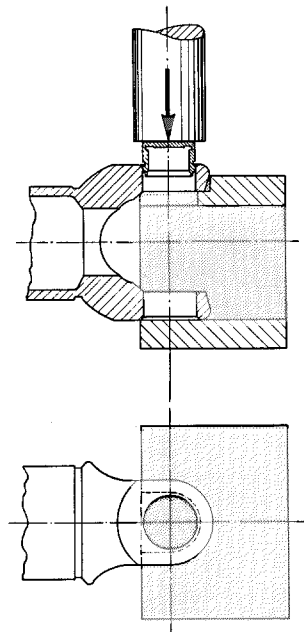


Fig. 41 — 4/7

40. Install the spider, with pinion rim grease fitting screwed in and with new pressed-cork seals (3), into the needle bearing bushing which is pressed in halfway (see Fig. 41 — 4/9).

Note: When installing the slip coupling and the corresponding joint flange, make sure that the pinion rim grease fittings point in the same direction (Fig. 41 — 4/8).

The pinion rim grease fittings of the front propeller shaft and of the universal joint must also point in the same direction.

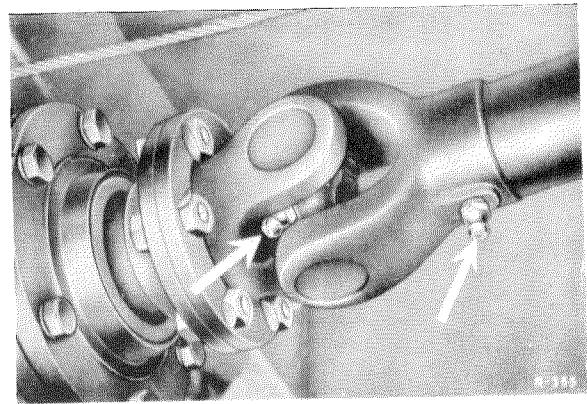


Fig. 41 — 4/8

41. Press the needle bearing bushing home and install the crescent-shaped snap ring (1) (Fig. 41 — 4/9).

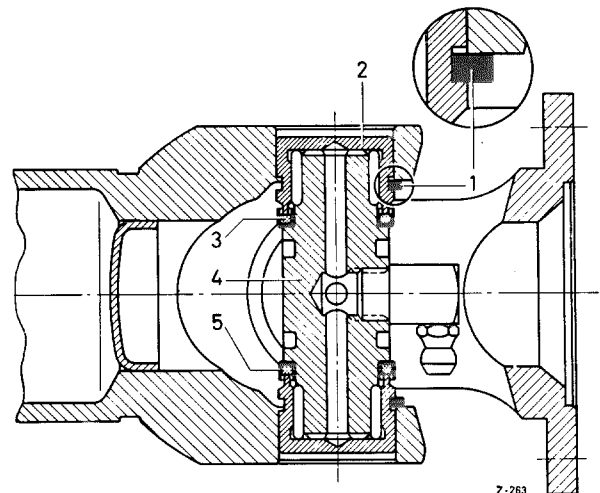


Fig. 41 — 4/9

- 1 Crescent-shaped snap ring
- 2 Needle bearing bushing
- 3 Sealing ring
- 4 Spider
- 5 Sealing ring retainer

42. Put in the opposite needle bearing bushing and press it in.

43. Install a crescent-shaped snap ring (1) in the second needle bearing bushing (see Fig. 41 — 4/9).

44. Then put the yokes on a support and relieve the stresses by a tap with a plastic hammer.

Note: The yoke must slowly drop by its own weight.

If the universal joints are difficult to move, install thinner crescent-shaped snap rings. If the joints move too freely, install thicker crescent-shaped snap rings. The crescent-shaped snap rings are available in the following thicknesses:

1.6 mm	Part No. 180 994 09 34
1.65 mm	Part No. 180 994 08 34
1.7 mm	Part No. 180 994 10 34

This check must be made with the utmost care since the universal joints become noisy on a change-over from pushing to pulling if they have too much axial play. If the joints do not move easily, the needle bearings tend to become scored.

For the same reason it is necessary to ensure that on reassembly a minimum of grease is used, since otherwise it becomes impossible to rely on experience when determining the axial play.

45. The other needle bearing bushings are installed in the same way.