

46–340 Assembly and adjustment of manual steering

Data

	1st version	2nd version
Pitch steering nut/steering worm	9	10
Number of balls in ball races	64	
Bearing of steering worm	Tapered ball bearing	
Steering housing, housing dia. for outer race	$\frac{44.477}{44.452}$	$\frac{50.995}{50.970}$
Steering worm, shaft dia. for inner race	$\frac{19.615}{19.602}$	
Pitman shaft dia. at bearing points	$\frac{30.021}{30.008}$	
Pitman shaft bearing	Needle bearing	
Steering housing, basic bore dia.	$\frac{36.992}{36.967}$	





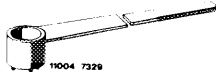

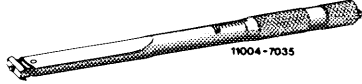

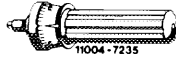

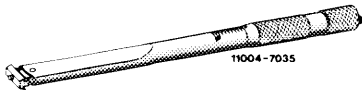
Adjusting values

	Ncm	(kpcm)
Friction torque ball circuit (new)	15–20	(1.5–2.0)
Friction torque ball circuit with sealing ring	23–30	(2.3–3)
Friction torque steering worm with tapered ball bearing	60–70	(6–7)
Total friction torque (pressure device adjusted, measured at steering worm)	100–120	(10–12)

Tightening torques

	Nm	(kpm)
Threaded ring	180–200	(18–20)
Hex screws for fastening housing cover	25	(2.5)
Hex nut on adjusting screw	30–40	(3–4)
SEAL-LOCK collar nut to adjusting screw	40–45	(4–4.5)

Special tools

Assembly plate for steering housing	 11004-7246	116 589 01 59 00
Insertion sleeve for sealing ring	 11004-7246	180 589 00 61 00
Insertion sleeve for sealing ring	 11004-7237	120 589 05 61 00
Special wrench for threaded ring	 11004-7240	115 589 11 07 00
Special wrench for adjusting ring (steering 1st version)	 11004-7329	115 589 12 07 00
Box wrench 46 mm for adjusting ring (steering 2nd version)	 11004-7252	123 589 00 03 00
Torque wrench handle 50–200 Nm (5–20 kpm)	 11004-7035	001 589 44 21 00
Insert 1/4" square for measuring friction torque of steering worm	 11004-7245	112 589 00 08 00
Torque screwdriver 0.15–0.65 Nm (1.5–6.5 kpcm)	 11004-7235	001 589 09 21 00
Torque measuring instrument 0.3–6 Nm (3–60 kpcm)	 11004-7074	001 589 49 21 00
Torque wrench handle 20–100 Nm (2–10 kpm)	 11004-7035	001 589 35 21 00

Self-made tools

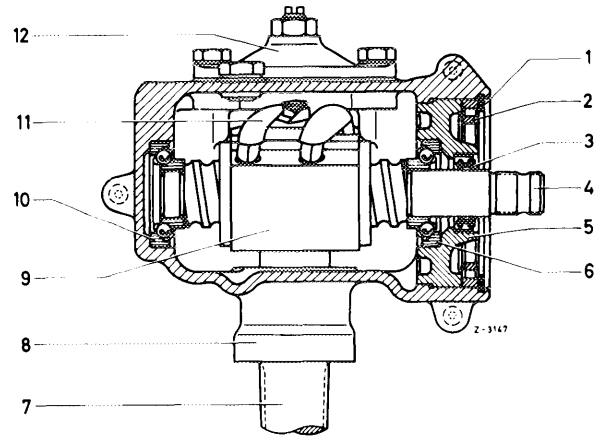
Assembly sleeve for sealing ring	refer to illustration, item 17, note
Assembly bolt for outer race	refer to illustration item 1, note

Conventional tools

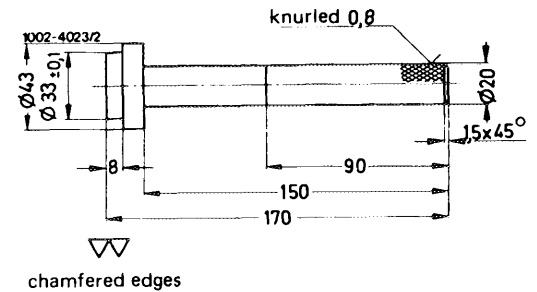
Pliers for inside locking ring J 1	e. g. made by Hazet, D-5630 Remscheid order No. 1846a-1
Pliers for inside locking ring J 3	e. g. made by Hazet, D-5630 Remscheid order No. 1846a-3
Box wrench 17 mm for torque wrench handle	e. g. made by Hahn and Kolb, D-7000 Stuttgart order No. 52251 170

1 Press outer race of lower tapered roller bearing (10) into steering housing by means of assembly bolt.

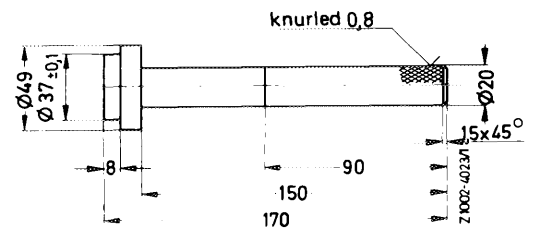
- 1 Locking ring
- 2 Threaded ring
- 3 Sealing ring
- 4 Steering worm
- 5 Adjusting ring
- 6 Tapered ball bearing
- 7 Pitman shaft
- 8 Steering housing
- 9 Steering nut
- 10 Tapered ball bearing
- 11 Fastening clip for ball guide tube
- 12 Housing cover



Note: Make assembly bolt yourself according to specified dimensions.



chamfered edges



chamfered edges

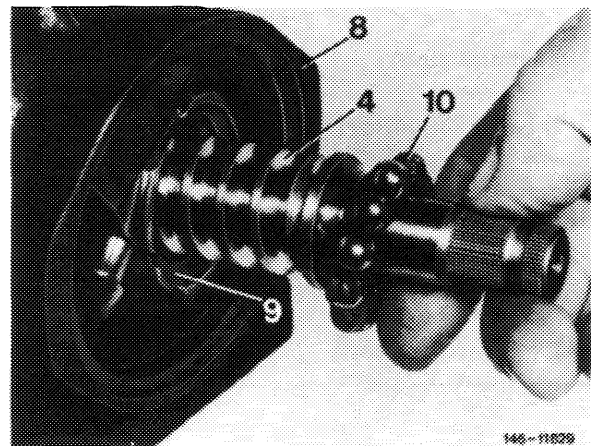
Assembly bolt for steering 2nd version

2 Press outer race of upper tapered ball bearing (6) into adjusting ring by means of assembly bolt.

3 Heat inner races of tapered ball bearing to approx. 80°C and press on steering worm.

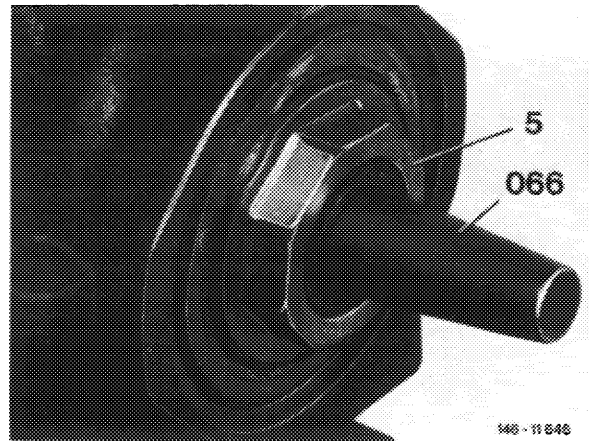
4 Place ball cage into lower outer race.

5 Insert steering worm including steering nut into housing.

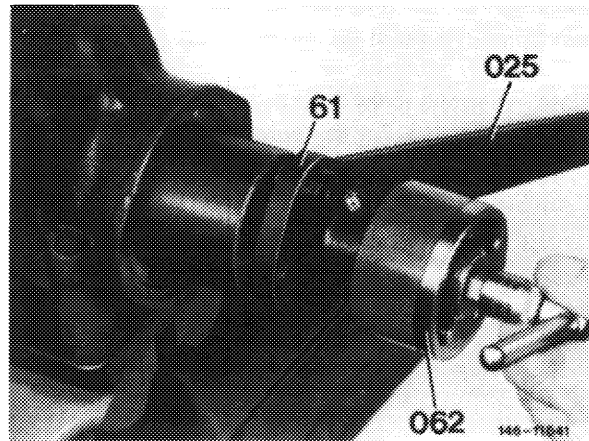


6 Place upper ball cage on steering worm. Slip insertion sleeve (066) on steering worm and screw adjusting ring (5) into steering housing for a few turns, then remove insertion sleeve and tighten adjusting ring until the steering worm can still be easily rotated.

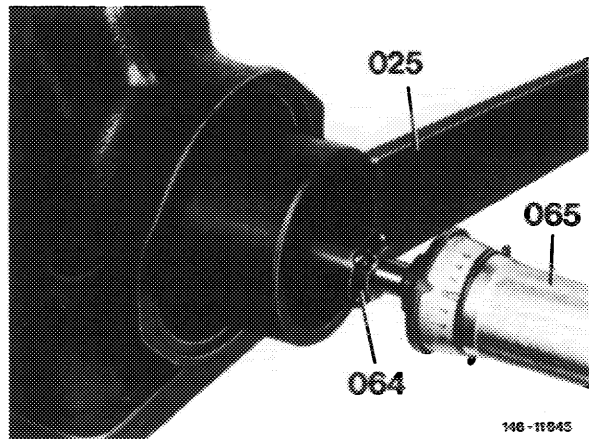
7 Coat threads in steering housing with sealing compound, then screw threaded ring into steering housing.



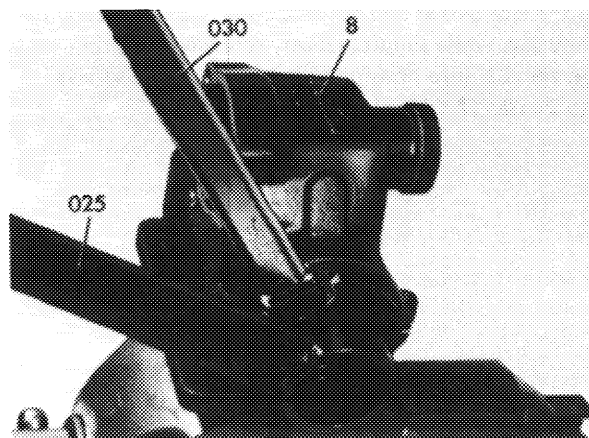
8 Slip steering coupling on splining of steering worm and measure friction torque required for turning steering worm by means of torque measuring instrument. The friction torque should amount to 60–70 Ncm (6–7 kpcm) and is set on adjusting ring with special wrench or box wrench (025).



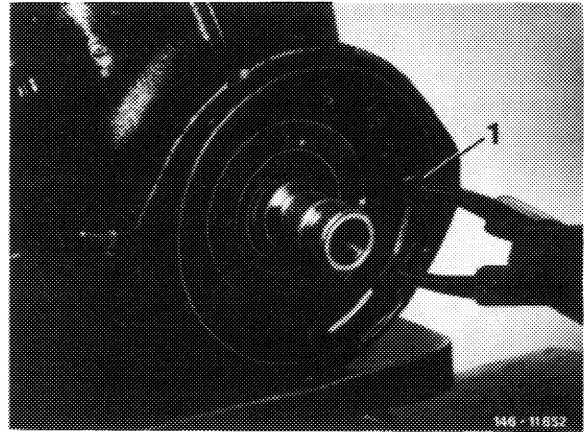
Note: The friction torque can also be measured with the torque screwdriver.



9 Tighten threaded ring with special wrench (030) to 180 to 200 Nm (18 to 20 kpm) while holding adjusting ring in position so that the adjustment cannot change. Then measure the friction torque required for turning the steering worm once again.

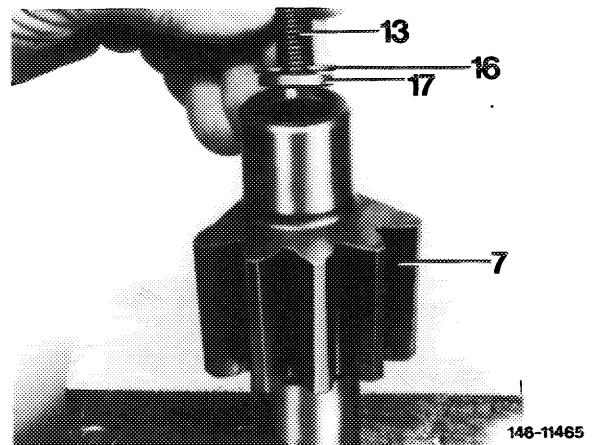


10 Insert locking ring (1) into housing.

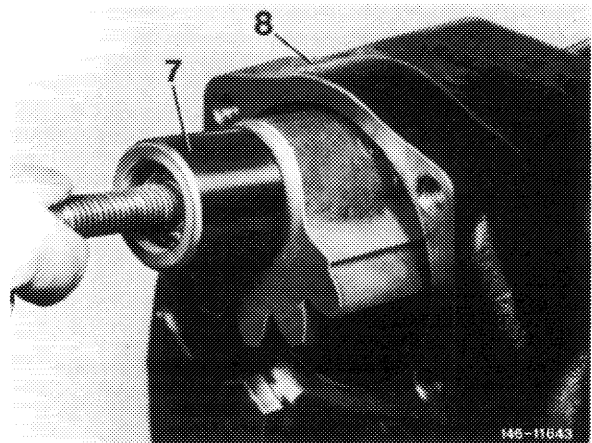


11 Insert adjusting screw (13), spacing washer (17) and locking ring (16) into pitman shaft (7).

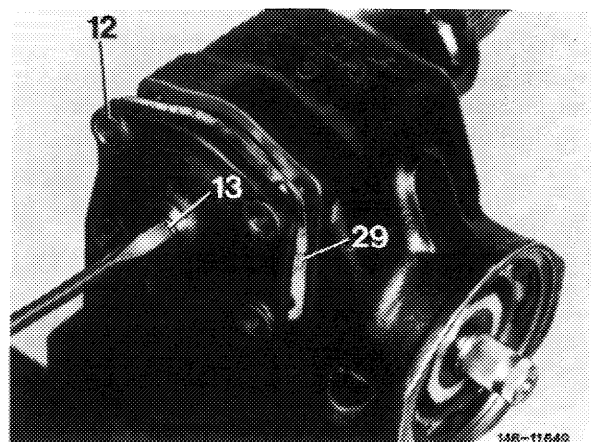
Note: Adjusting screw must be installed into pitman shaft free of play. For this purpose, spacing washers 3.0, 3.2 and 3.3 mm thick are available.



12 Insert pitman shaft (7) into housing so that the center tooth enters the center tooth gap of the steering nut.



13 Place gasket and housing cover (12) on steering housing, while simultaneously screwing adjusting screw (13) into housing cover. Tighten hex screws to 25 Nm (2.5 kpm).

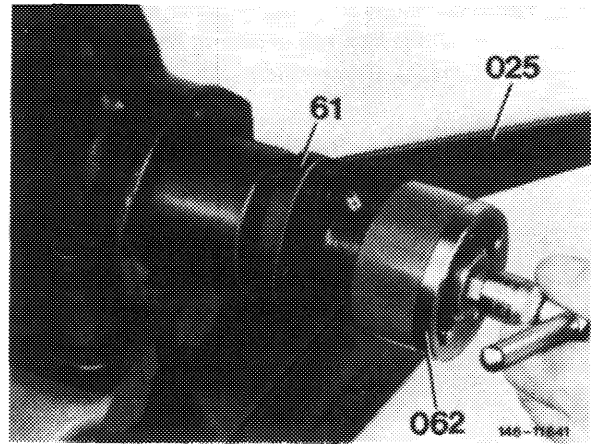


14 Turn steering worm completely to the left, slip steering coupling (61) on steering worm and turn steering beyond center position to the right by means of torque measuring instrument (062).

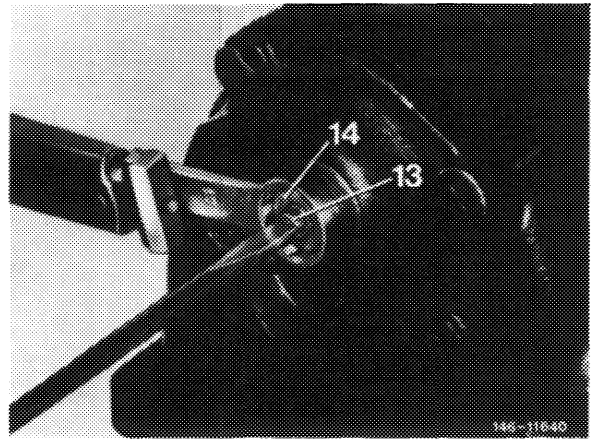
The friction torque is adjusted at adjusting screw (13) and should amount to 100–120 Ncm (10–12 kpcm).

Attention!

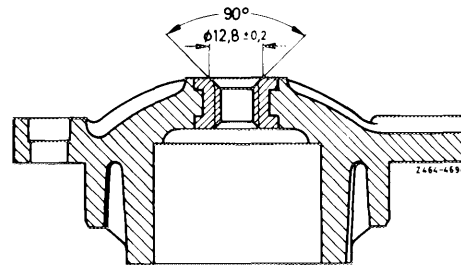
When turning the steering worm beyond the center position, the steering should not bind, but a slight pressure point should be noticed.



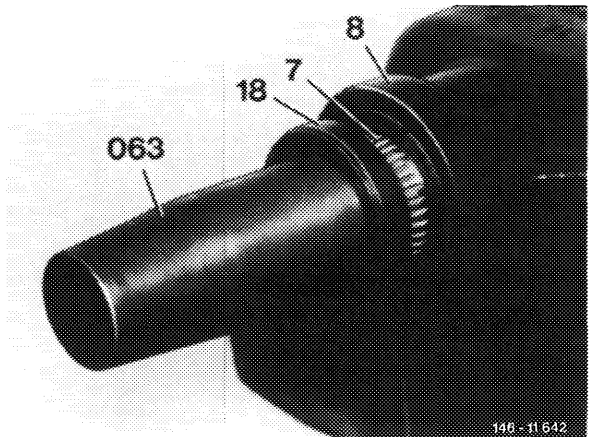
15 Screw SEAL-LOCK collar nut on adjusting screw and tighten to 40–45 Nm (4–4.5 kpm) with torque wrench handle, while applying counterhold to adjusting screw. Then check total friction torque of steering once again.



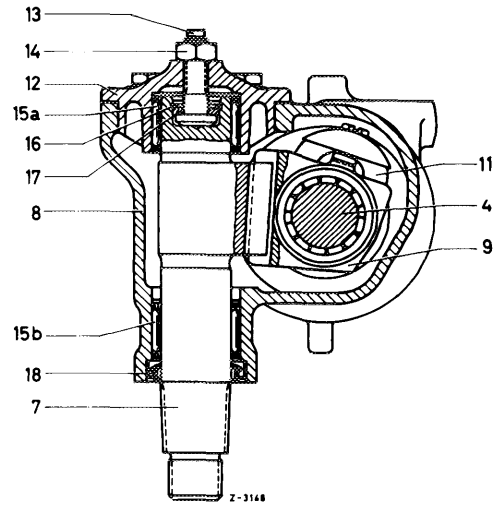
Note: The adjusting screw can be secured either with a standard hex nut or a SEAL-LOCK collar nut. A plastic sealing ring is rolled into the SEAL-LOCK collar nut. The SEAL-LOCK collar nut may be used only when the 2.5 mm housing cover chamfer amounts to 90°. Refinish cover, if required.



16 Slip insertion sleeve over splining of pitman shaft (7).



17 Fill shaft sealing ring (18) between the two sealing lips with grease and press into steering housing by means of assembly sleeve.



Note: The assembly sleeve must be self-made according to specified dimensions.

