

Checking and Repairing of Steering

Models 220, 219, 220 a, 220 S

Job No.
L 5

Perfect functioning of the steering is particularly important for safety in traffic. Repair work should therefore be carried out with the greatest care. When deciding whether or not to reinstall steering assembly parts, very strict standards of examination should be applied.

A. Steering Worm and Steering Nut

The steering worm should be checked to see if it turns true. The steering worm and steering nut ball-races should be examined for scoring, denting or damage, particularly after an accident. The steering nut should also be checked to ensure that the ball guide tubes are not bent and that the ball pin is not damaged.

If any of these defects are present, the steering nut must be replaced, together with balls and steering worm.

This is necessary because at the factory, steering worm, steering nut and balls are matched so that the prescribed clearance is obtained and the steering functions perfectly. The matched steering worm and steering nut are always marked with a serial number.

The complete assembly as supplied also includes the taper-roller bearings and the angular contact bearings.

B. Bearings of Steering Worm

The contact surfaces of the bearing races and the steering worm and also the bearing rollers or balls, together with the retainers, must be checked for scoring and damage.

If the **taper roller bearings** of a steering assembly Type L 0 have to be replaced, these should be so selected that the specified oversize fit between the inner race and the bearing seat of the steering worm (0.010 to 0.015 mm) is obtained. If the **angular contact bearings** of the steering assembly Type L 1 are found to be damaged, the whole steering worm assembly must be replaced.

Dimensions and Tolerances of the Steering Worm Bearings

in mm

Steering L 0					
Taper-roller bearing				Steering worm	Steering housing
Part No.	Internal diameter	External diameter	Width	Bearing bed diameter	Base bore diameter
000 981 03 18	$\frac{19.590}{19.600}$	$\frac{44.475}{44.450}$	$\frac{14.180}{14.448}$	$\frac{19.615}{19.602}$	$\frac{44.470}{44.495}$
Steering L 1					
Angular contact bearing				Steering housing	
External diameter of outer race				Base bore diameter	
$\frac{42.995}{43.011}$				$\frac{43.000}{43.025}$	

C. Steering Shaft

The steering shaft should be examined for wear, distortion and damage.

The ball-cup in the steering shaft arm should be examined for scoring, cracks and damage. If necessary, the ball-cup of the Steering L 0 can be pressed out. When installing a new ball-cup, care must be taken to ensure that the prescribed oversize fit of 0.01 mm is obtained.

For production reasons, in current models of Steering L 0, Part No. 120 460 31 01, the steering shaft arm has a ball-cup with no shoulder. The new ball-cup (2b) is locked with a snap ring to prevent displacement (Fig. L 5/1).

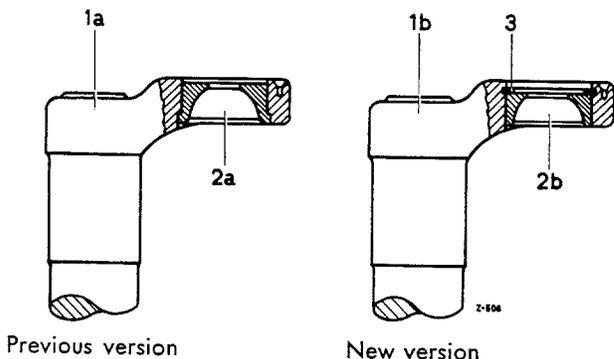


Fig. L 5/1

- 1a Steering shaft with ball-cup with shoulder
- 1b Steering shaft with ball-cup without shoulder
- 2a Ball-cup with shoulder
- 2b Ball-cup without shoulder
- 3 Snap ring

If repairs are being carried out, the old steering shaft, Part No. 186 460 01 11, can be replaced by the new steering shaft, Part No. 186 460 02 11.

Similarly, the two stop faces (a) at the side of the steering shaft arm should be checked for wear (Fig. L 5/2).

If any damaged parts or considerable wear is found, the steering shaft should be replaced.

D. Steering Housing

The steering housing should be checked for damage and the bearing bushings for wear. In case of steering L 0, particular care must be taken to check whether the housing is damaged at the steering shaft arm safety stop faces (b) Fig. L 5/2). If this is the case, the steering housing should be replaced.

No safety stop faces were fitted on the steering housing or steering shaft arm in the case of steering assembly Type L 1.

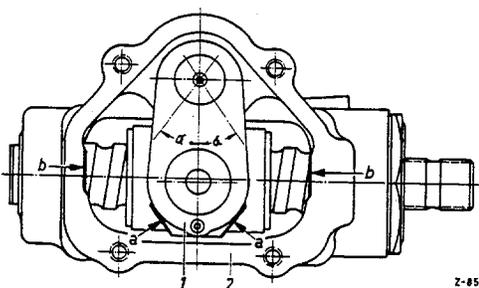


Fig. L 5/2

- 1 Steering shaft arm
- 2 Steering housing
- a Stop faces at the steering shaft arm
- b Safety stop faces at the housing
- Angle of lock $\alpha = 35^\circ 30'$ for Type L 0
- 36° for Type L 1

The angle of left and right lock of the steering shaft, measured from the center position, is

in case of Steering L 1 36° on each side

in case of Steering L 0 $35^\circ 30'$ on each side

If wear or chafed spots are found at the bearing bushings, the bushings should be replaced. When installing the new bushings, care must be taken to ensure that the open end of the oil groove is facing upward. The upper bearing bushing is locked to prevent displacement by flaring (expanding) the upper edge (Fig. L 5/3). When the bushings have been pressed in, they should be reamed out to the finished dimensions.

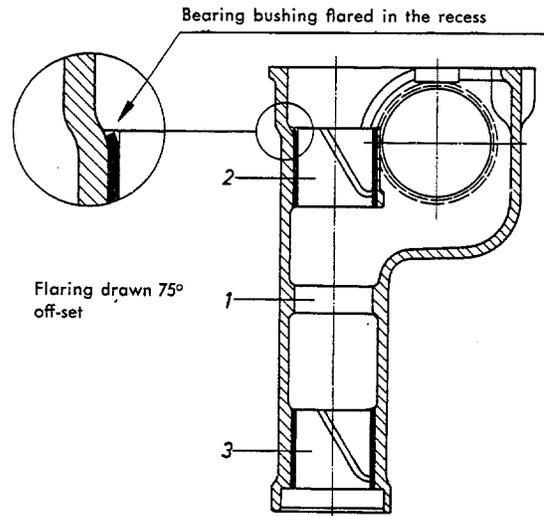


Fig. L 5/3

- 1 Housing
- 2 Upper bearing bushing
- 3 Lower bearing bushing

Dimensions and Tolerances of the Steering Housing in mm

Steering Type	Steering shaft	Upper and lower bearing bushing			Steering housing
	Bearing surfaces diameter	Internal diameter Rough-turning dimension	Internal diameter Finished dimension	External diameter	Base bore diameter
L 0	$\frac{29.993}{29.980}$	$\frac{29.5}{29.6}$	$\frac{30.000}{30.013}$	$\frac{32.059}{32.043}$	$\frac{32.000}{32.025}$
L 1	$\frac{28.480}{28.459}$	$\frac{28.3}{28.4}$	$\frac{28.500}{28.521}$	$\frac{32.543}{32.559}$	$\frac{32.500}{32.525}$

E. Pressure Block Assembly

Examine the pressure sleeve, compression spring and set screw to see whether they are still serviceable. As a rule, if the parts in question are damaged, they should be replaced. As an expedient, the pressure face of the pressure sleeve can be reground if slight scoring is found.

Dimensions and Tolerances in mm

Compression Spring

Steering Type	External diameter mm	Gage of wire mm	Length free mm	Length under load mm	kg
L 0	$17.5 - 0.1$	3.5	23.6 ± 0.2	18.7	$80 \pm \frac{10}{5}$
L 1	13 ± 0.1	3.5	$18 \pm \frac{0.1}{0.3}$	16	$80 \pm \frac{10}{5}$

Pressure Sleeve

Steering Type	External diameter	Internal diameter	Length
L0	$\frac{22.048}{22.035}$	$\frac{17.8}{18.0}$	22
L1	$\frac{17.139}{17.128}$	$\frac{13.1}{13.2}$	19.5

Set Screw

Type Steering	External diameter	Internal diameter	Tightening of set screw in cover
L0	M28 × 1.5	$\frac{22.2}{22.3}$	Screw in till tight and then turn out 3–4 mm, measured at the circumference of the set screw
L1	M24 × 1.5	$\frac{17.2}{17.3}$	Screw in till tight and then turn out 2 mm approx