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STEERING Assy group 121

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1 Work on mounted assemblies

1.1 Check, adjust steering clearance

Tools:

Locking device for drag link arm 905.3.32.502.0

Checking:

- 1 Lift vehicle with movable jack at axle housing of front axle until wheels just clear of the ground. Arrange suitable resting trestles under cross-beam (1).
- 2 Fix drag link arm with locking device special tool pos. no. 905.3.32.502.0 in central position (2). To do so insert centering beam of the three-part tool into the center tunnel and slide it quite to the front. Then screw centering nut with hexagon first onto clamping screw of drag link arm. Insert centering beam into centering collar of nut. During this move steering wheel or drag link arm resp. to and fro until the required center position has been found. Now clamp down centering beam with clamping strap.
- 3 Check cardan joints of steering shaft as well as ball joints of drag rod for playfree condition. To do so fix the respective joints by hand while moving the steering wheel to and fro. In case of a notable play, replace the respective part.
- 4 Check play between steering roller shaft and worm also by moving the steering wheel to and fro. During this, steering drop arm must not move and max. admissible play of steering wheel circumference must not exceed 60 mm (3).

Adjusting:

- 5 Loosen counter nut (4/1) and screw in adjusting screw (4/2) until there is no more play.
- 6 Detach locking device.
- 7 Turn steering wheel from stop to stop. Only a slight inhibition is admissible in the center area.
- 8 Tighten counter nut (4/1). Back up adjusting screw (4/2) with a screwdriver.
- 9 Lower front axle.



Fig. 1



Fig. 2

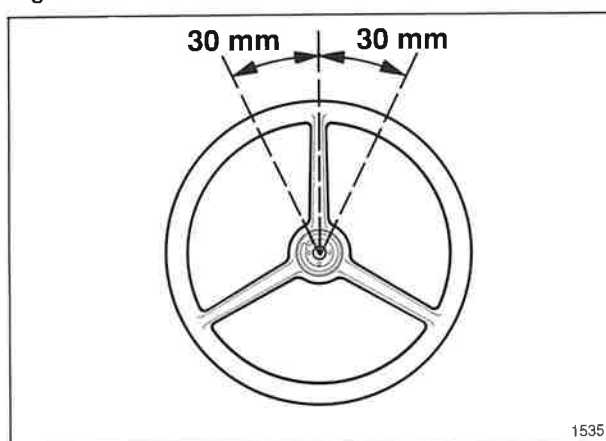


Fig. 3



Fig. 4

1.2 Change, remove and fit steering wheel

Tools:

Steering wheel puller

Kukko no. 31-1

905.0.14.502.0

Torque spanner 1/2"

25-130 Nm

001 589 66 21 00

Removing:

- 1 Place front wheels in straight-ahead position.
- 2 Remove cover (1).
- 3 Loosen fastening nut (2/1) of steering wheel and detach with spring washer (2/2).

NOTE: When steering wheel to be reused, mark original mounting position before detaching.

- 4 Unscrew cover of steering column-mounted switch (3).

- 5 Unscrew steering column-mounted switch bracket (4).

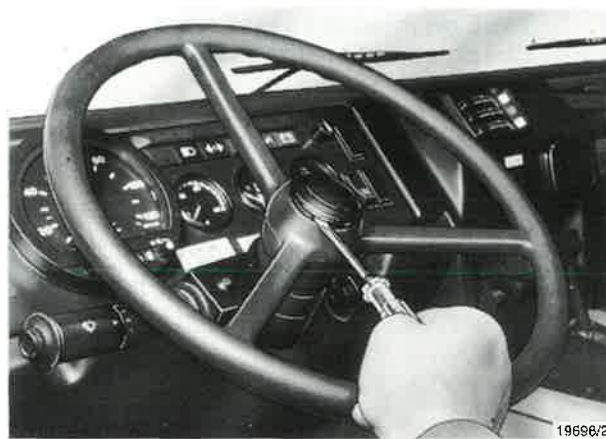


Fig. 1

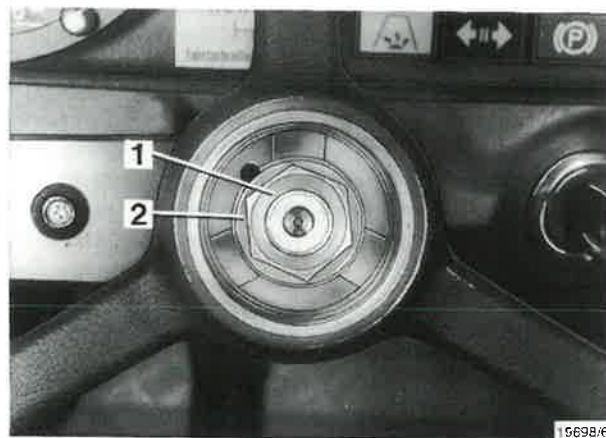


Fig. 2



Fig. 3



Fig. 4

- 6 Pull off steering wheel with steering wheel puller Kukko no. 31-1 and insert no. 6 special tool pos. no. 905.0.14.502.0 from steering spindle (5).

NOTE: Tension steering wheel puller a bit and knock off steering wheel by taps with a soft metal hammer on the puller spindle.



Fig. 5

- 7 When changing steering wheel, unscrew flasher return catch and mount it in identical position on new steering wheel (6).

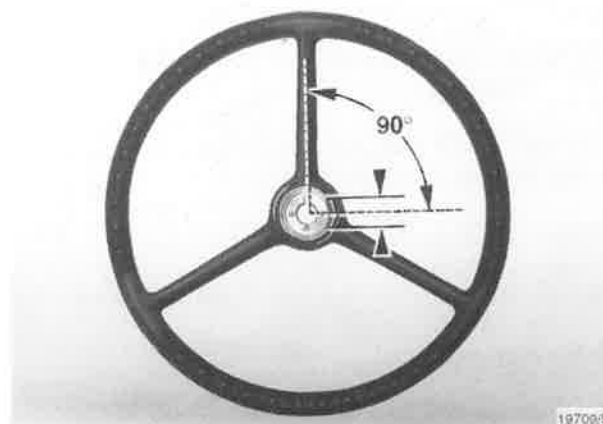


Fig. 6

Fitting:

- 8 Mount steering column-mounted switch (7/1) offset downwards in approx. 2 mm distance from upper collar (7/2) of steering spindle housing. Insert bracket positioning lug (7/3) into longitudinal groove (7/4) and tighten switch. Attach cover (3).

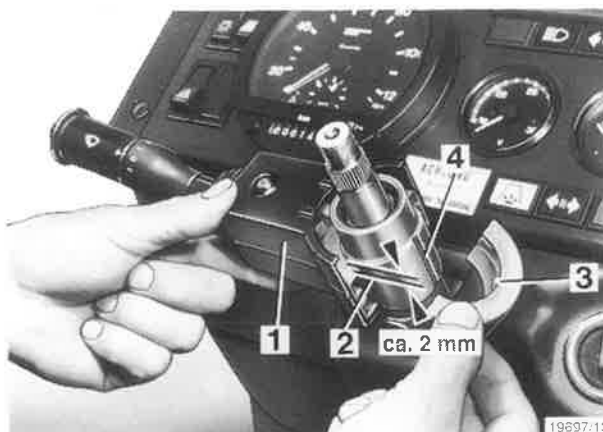


Fig. 7

- 9 Put steering wheel onto steering spindle observing markings made during dismounting, also take care that flasher return catch is in central position to steering column-mounted switch (8).



Fig. 8

- 10 Attach spring washer and hexagon nut and tighten steering wheel to 35-45 Nm (9).

WARNING: Mark the duly tightened steering wheel fastening nut with a white colour dot for easier check-up.

- 11 Attach cover (1).
- 12 Check steering wheel's center position during a short straight run on even area. One spoke of the steering wheel pointing to 12 o'clock (8). If this is not the case, reset steering wheel by one tooth or by some teeth resp.



Fig. 9

1.3 Change, remove and fit steering spindle housing

Includes: Changing, removing and fitting steering wheel see section 1.2/1-6, 8-12

Tools:

Torque spanner 1/2"
25-130 Nm

001 589 66 21 00

Removing:

- 1 Remove steering wheel see section 1.2/1-6.
- 2 Remove knee guard (1/1).
- 3 Loosen fastening screws (2/1) at cylindrical rotary valve bracket as well as clamping screw (2/2) to steering spindle housing.

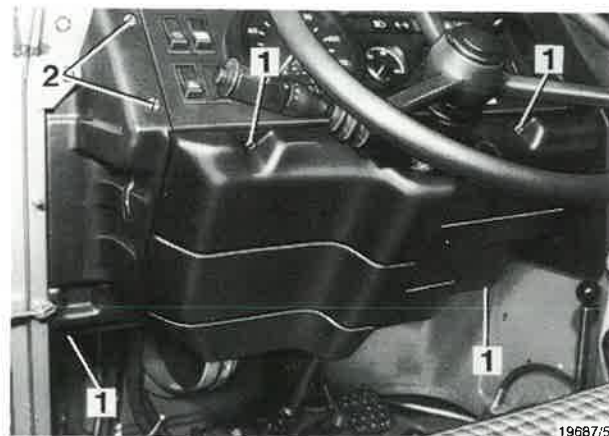


Fig. 1

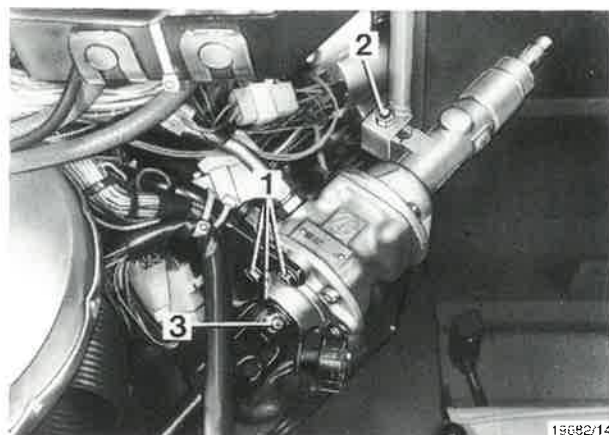


Fig. 2

- 4 Pull off coupling piece (3/1) from driving switch.



Fig. 3

- 5 Pull out steering spindle housing (3/2) only a bit from the bracket (3/2) so that the four retaining screws (4) can be easily loosened.
- 6 Turn key in steering lock into position "1" and remove steering spindle housing.



Fig. 4

Fitting:

- 7 Insert new self-aligning bearing ring (5) into steering spindle housing and secure with snap ring.



Fig. 5

- 8 Transfer steering lock (6/1) and retainer (6/2) to the new steering spindle housing. Turn key in steering lock into position "1". Loosen retainer and twist backwards so that locking pin (6/3) can be pressed in and steering lock be pulled out. Before inserting the steering lock into new housing slip on retainer. Maintain position "1" and take care that locking pin catches into bore (6/4) of steering spindle housing. Tighten retainer only moderately.

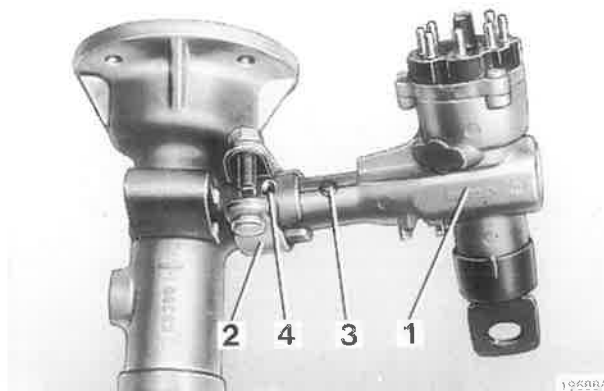


Fig. 6

- 9 Put on steering spindle housing (7) and tighten retaining screws (4) to 25 Nm.
- 10 Screw on cylindrical rotary valve (2/1) and fix steering spindle housing tension-free with clamping screw (2/2).
- 11 Put on coupling piece (3/1).



Fig. 7

- 12 Keep knee guard in mounting position and position steering lock. Detach knee guard again and tighten retainer (8).
- 13 Fit steering wheel see section 1.2/8-12.
- 14 Fit knee guard (1/1).



Fig. 8

1.4 Change, remove and fit steering spindle

Includes:

Changing, removing and fitting steering spindle housing see section 1.3/1-6, 9-11, 13 and 14

Tools:

Torque spanner 1/2"

25-130 Nm

001 589 66 21 00

Removing:

- 1 Remove steering spindle housing see section 1.3/1-6.
- 2 Loosen dowel screw (1/1), pull off steering spindle (1/2) or press off if necessary with a general-purpose spoon resp.

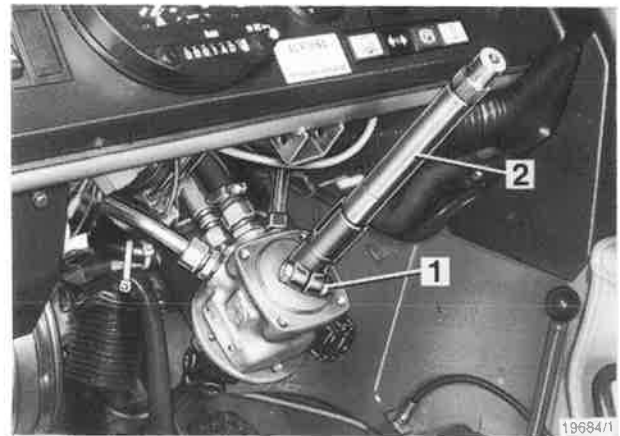


Fig. 1

Fitting:

- 3 Slip on steering spindle to the toothing at cylindrical rotary valve, so that groove (2) for locking wedge is pointing upwards, i.e. to 12 o'clock.
- 4 Fit dowel screw and tighten to 25 Nm (3).

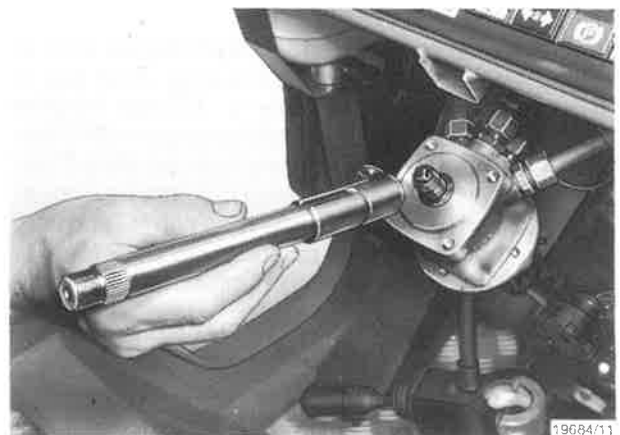


Fig. 2

WARNING: Mark the tightened dowel screw with a white colour dot for easier check-up.

- 5 Fit steering spindle housing, see section 1.3/9-11, 13 and 14.

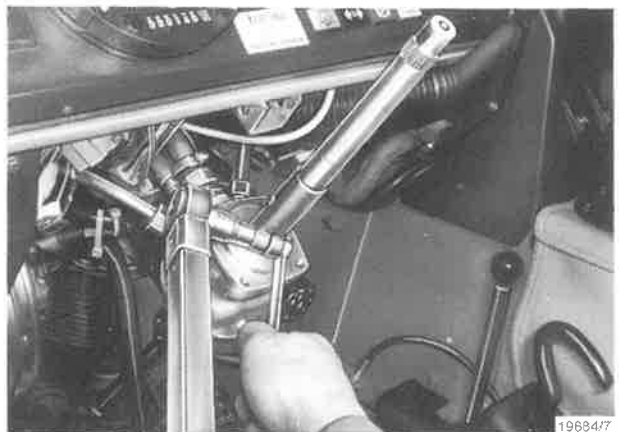


Fig. 3

1.5 Change, remove and fit complete steering lock

Removing:

- 1 Remove knee guard (1/1).

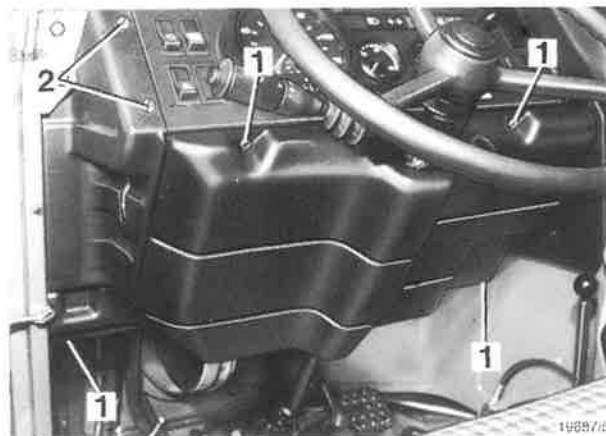


Fig. 1

- 2 Turn key (2/1) in steering lock into position "1".
- 3 Loosen clamping screw (2/2) to retainer. Twist retainer upwards and push quite to the left, so that locking pin (3) can be pressed in with a suitable screwdriver and steering lock can be removed.

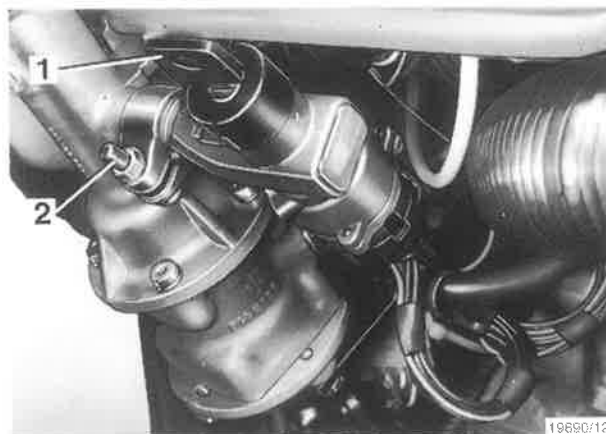


Fig. 2



Fig. 3

- 4 Pull off coupling piece (4) from steering lock or driving switch resp.



Fig. 4

- 5 Lift lock cylinder cover with suitable screwdriver and pull off. Insert key and turn into position "1". Press in locking gudgeon with drift pin Ø 2.0 mm (5) and remove lock cylinder.

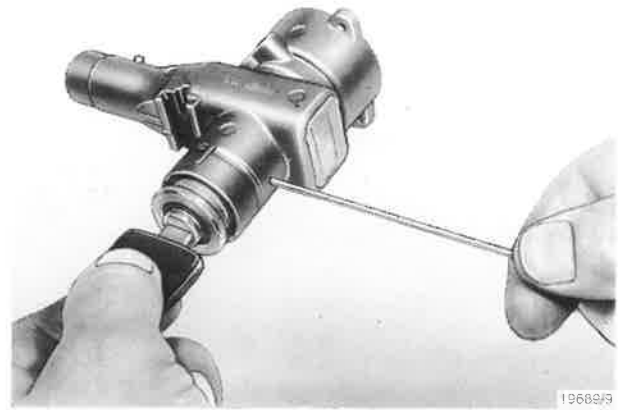


Fig. 5

Fitting:

- 6 Fitting is done in reverse sequence observing the following points:
 - For inserting lock cylinder turn key into position "1".
 - Insert steering lock (6/1) also in key position "1" observing that locking pin (6/3) catches into steering spindle housing bore (6/4). Tighten retainer (6/2) only moderately.
 - For positioning the steering lock keep knee guard in mounting position and align lock. Remove knee guard again and tighten retainer.

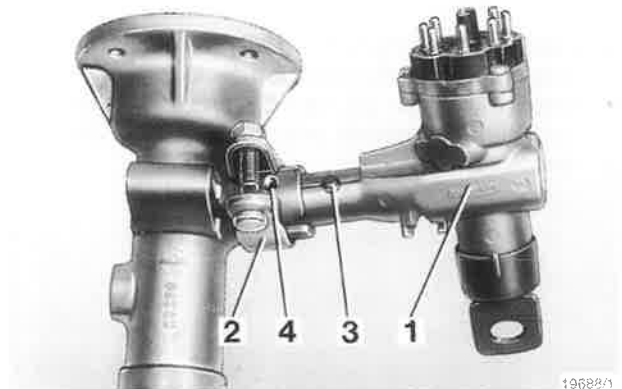


Fig. 6

1.6 Change, remove and fit driving switch

Removing:

- 1 Detach knee guard (1/1).

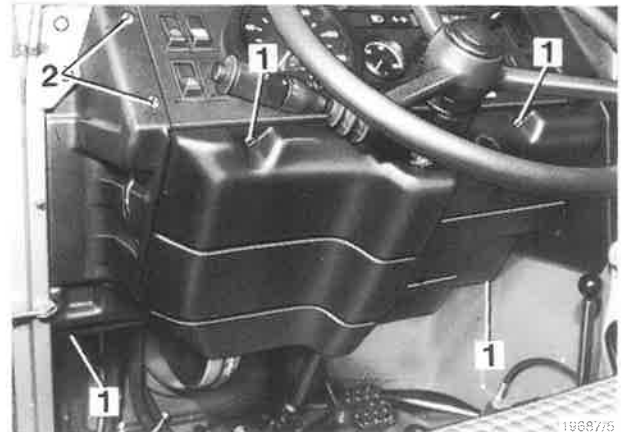


Fig. 1

- 2 Turn key (2/1) in steering lock into position "1".

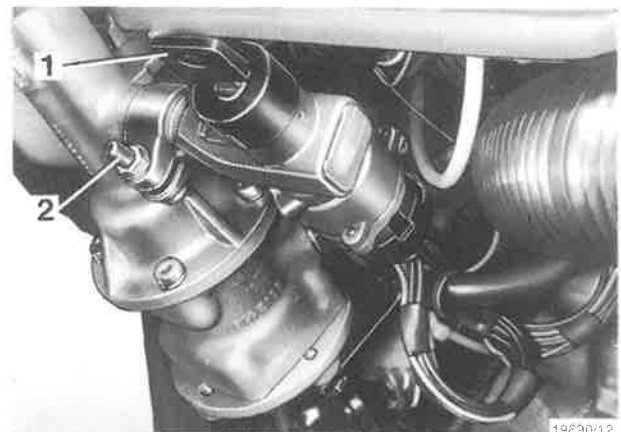


Fig. 2

- 3 Loosen clamping screw (2/2) to retainer. Twist retainer upwards and push quite to the left, so that locking pin (3) can be pressed in with a suitable screwdriver and steering lock can be taken out.



Fig. 3

- 4 Pull off coupling piece (4) from steering lock or driving switch resp.

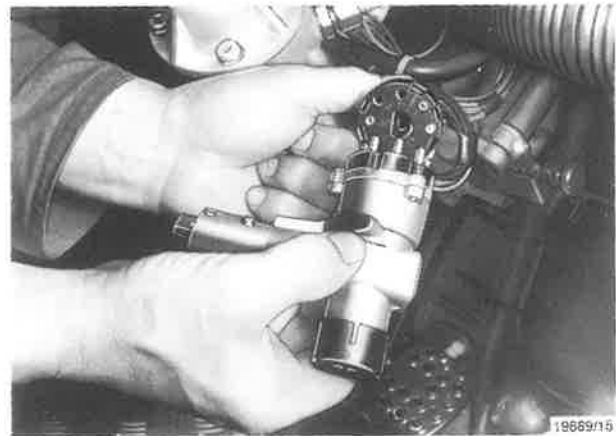


Fig. 4

- 5 Turn key in steering lock into position "0" and pull off. Loosen retaining screws (5) and remove switch.



Fig. 5

Fitting:

- 6 Turn switch engagement (6/1) with screwdriver until stop to the left.
- 7 Insert driving switch so that locking lug (6/2) catches into the steering lock recess (6/3).

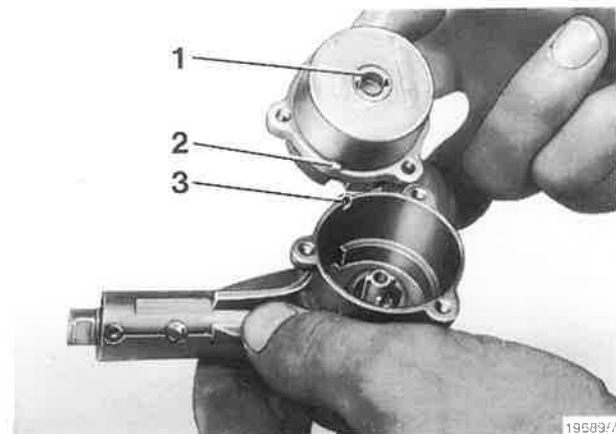


Fig. 6

- 8 Further mounting is made in reverse sequence observing the following points:
 - Insert steering lock in key position "1" observing that locking pin (7/3) catches into steering spindle housing bore (7/4). Tighten retainer only moderately.
 - For positioning steering lock keep knee guard in mounting position and align lock. Detach knee guard again and tighten retainer.

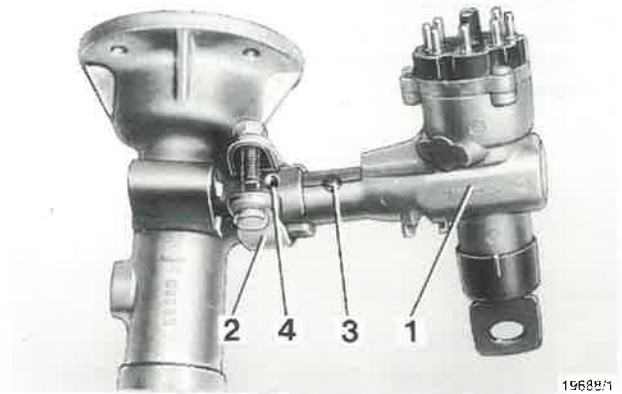


Fig. 7

1.7 Change, remove and fit lock cylinder

Removing:

- 1 Detach knee guard (1/1).
- 2 Lift lock cylinder cover (2) with a suitable screwdriver and pull off.
- 3 Insert key and switch into position "1". Press in locking gudgeon with drift pin Ø 2.0 mm (3).

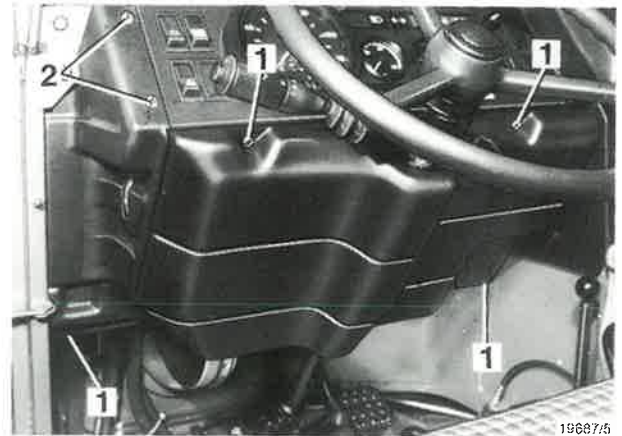


Fig. 1

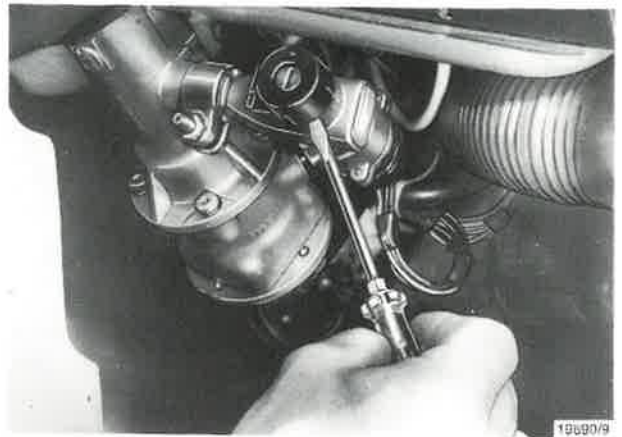


Fig. 2

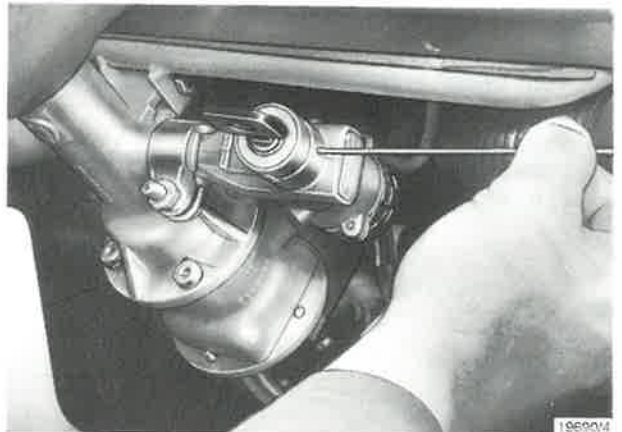


Fig. 3

4 Take out lock cylinder (4).

Fitting:

5 Fitting is made in reverse sequence.

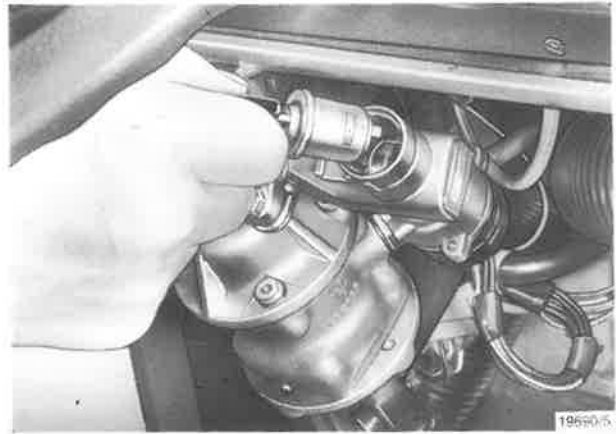


Fig. 4

1.8 Change, remove and fit steering shaft

Tools:

Torque spanner 1/2"

25-130 Nm

001 589 66 21 00

Removing:

1 Detach knee guard (1/1).

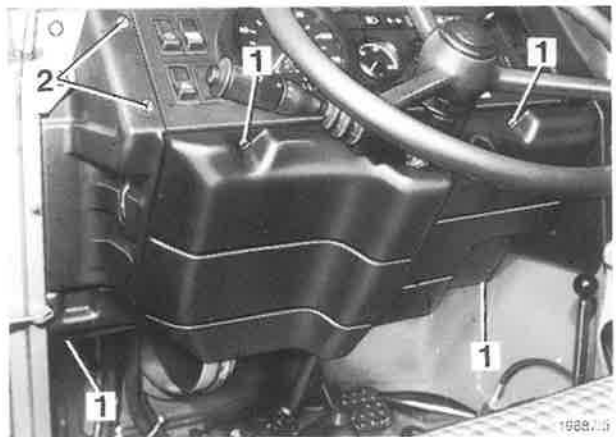


Fig. 1

2 Screw out clamping screws (2/1 and 2/2) of cardan joints.

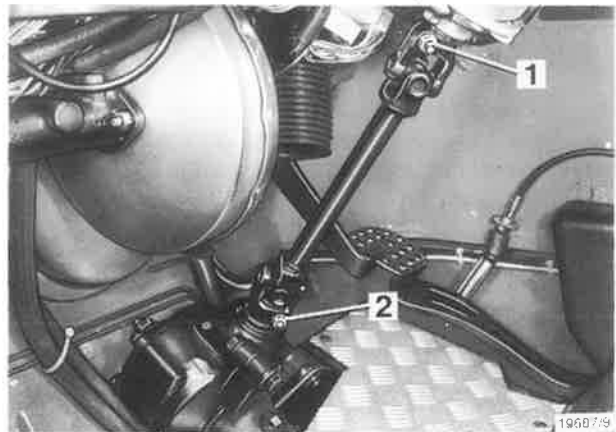


Fig. 2

3 Unscrew retaining screws (3/1) at cylindrical rotary valve bracket. Loosen a bit clamping screw (3/2) to steering spindle housing.

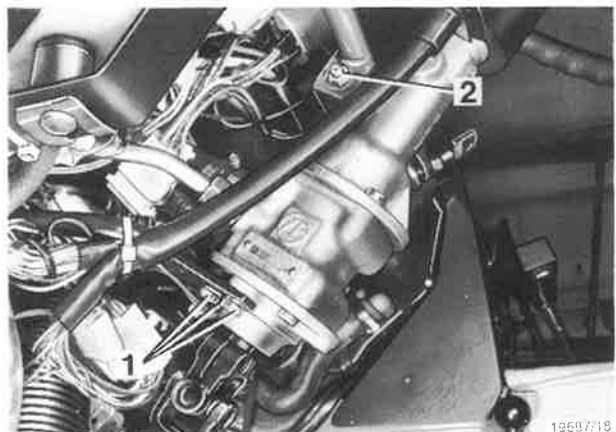


Fig. 3

- 4 Pull off or press off resp. upper cardan joint only so that position of cardan joint (center of clamping slot) with regard to shaft toothing can be marked (4).

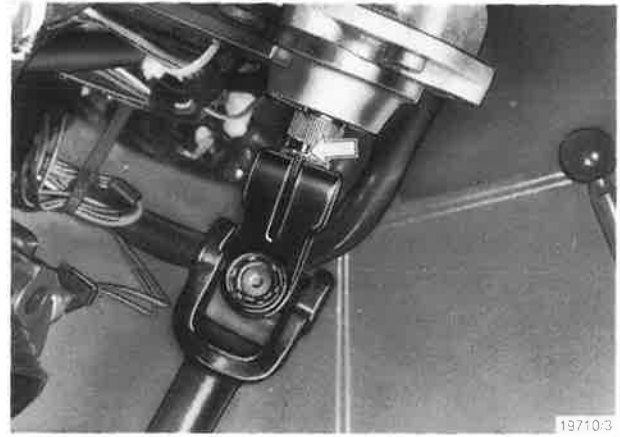


Fig. 4

- 5 Pull off lower cardan joint of steering shaft or press off resp. with general purpose spoon if necessary (5).

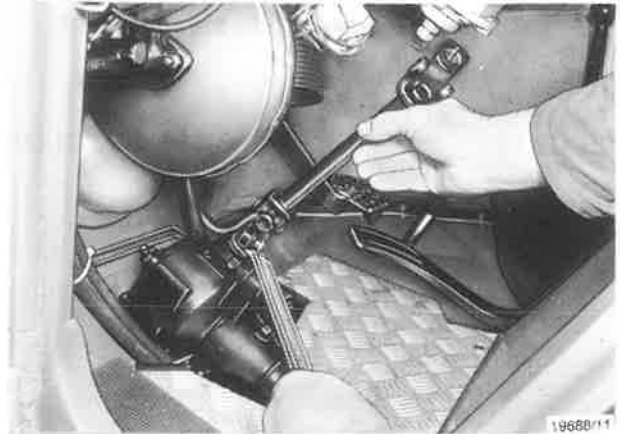


Fig. 5

Fitting:

- 6 Put lower cardan joint of steering shaft onto worm toothing in a way that indicated marking (6/1) is in line with center of clamping slot (6/2).

NOTE: Spray worm toothing with Loctite-Anti-Seize.

- 7 Slip upper cardan joint of steering shaft onto shaft toothing observing markings (4) made during dismounting.
- 8 Screw on cylindrical rotary valve (3/1) and fix steering spindle housing tension-free with clamping screw (3/2).
- 9 Insert both clamping screws (2/1 and 2/2) and tighten to 25 Nm (7).

NOTE: Observe different screw length and property class.

Upper clamping screw M 8x40 - 8.8

Lower clamping screw M 8x42 - 10.9

Use new, self-locking nuts.

WARNING: Mark the duly tightened clamping screws of cardan joints with a white colour dot for easier check-up.

- 10 Fit knee guard (1/1).

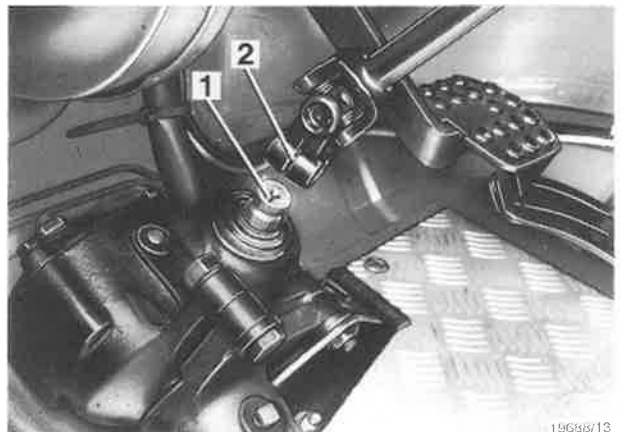


Fig. 6

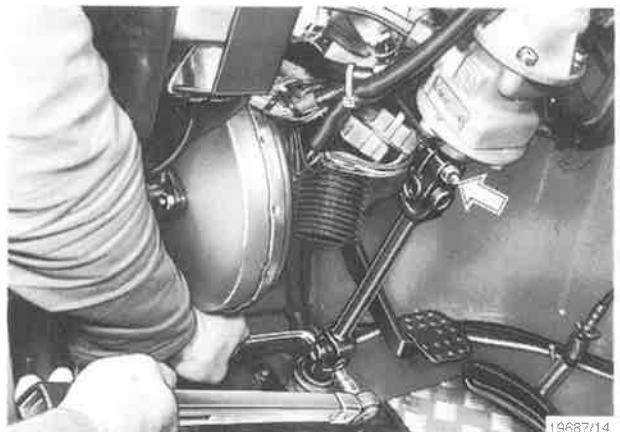


Fig. 7

1.9 Change, remove and fit complete steering gear

Tools:

Steering drop arm puller

Kukko 128-5 905.0.14.501.0

Box spanner socket, size 46, 3/4" 905.0.15.011.1

Torque spanner 1/2"

25-130 Nm 001 589 66 21 00

Torque spanner 3/4"

75-400 Nm standard

Removing:

- 1 Open tab washer at steering drop arm (1).
- 2 Unscrew fastening nut with box spanner socket, size 46, special tool pos. no. 905.0.15.011.1 (2).

NOTE: When loosening nut back up with steering wheel and take care that steering gear is not resting against final stop.

- 3 Pull off steering drop arm from steering roller shaft using puller Kukko no. 128-5 special tool pos. no. 905.0.14.501.0 (3).
- 4 Detach V-ring (12) and dust seal resp.

- 5 Turn quick fasteners of left floor pan to the left and remove floor pan (4)



Fig. 1

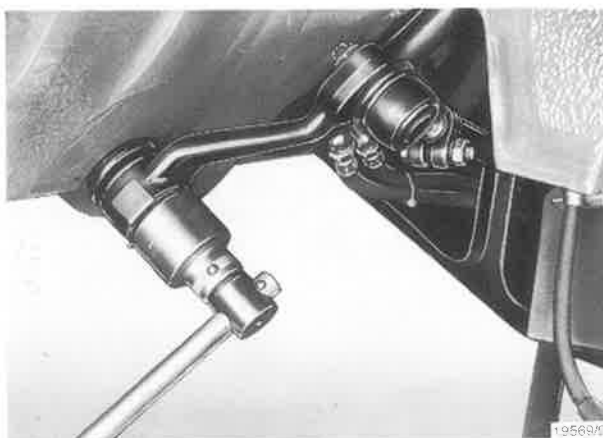


Fig. 2

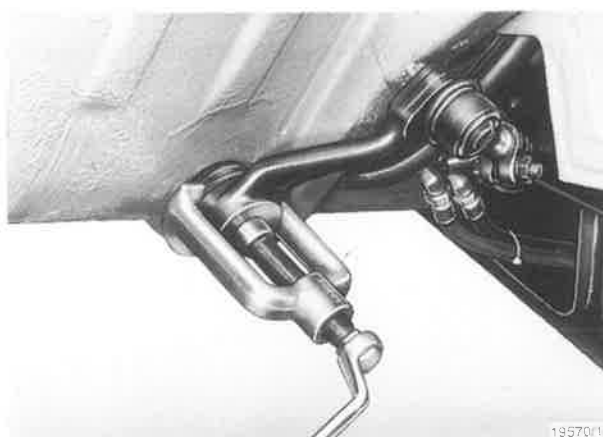


Fig. 3



Fig. 4

- 6 Turn key in steering lock into position "1" and loosen cardan joint clamping screw (5/1).
- 7 Cut through cable clamp (5/2).
- 8 Unscrew the three hexagon nuts to steering support (5/3), remove washers.
- 9 Loosen retaining screws of bearing bracket (5/4) and remove with special lock washers (chamfered version).

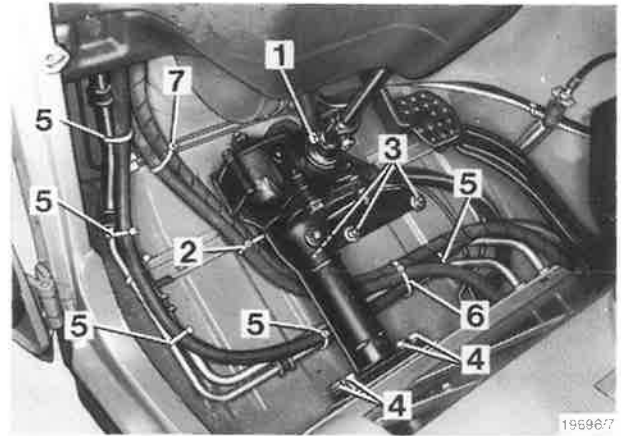


Fig. 5

- 10 Loosen left body support to central beam at front wall. For this purpose remove rubber stopper (6/1) from left fender half. Insert box spanner, size 24, through free bore and loosen hexagon screw (6/3). Back up nut (6/7) at front wall inner side. Remove bearing disk (6/6) and bearing rubber (6/5). Set back hexagon screw until being flush with spacer (6/4).

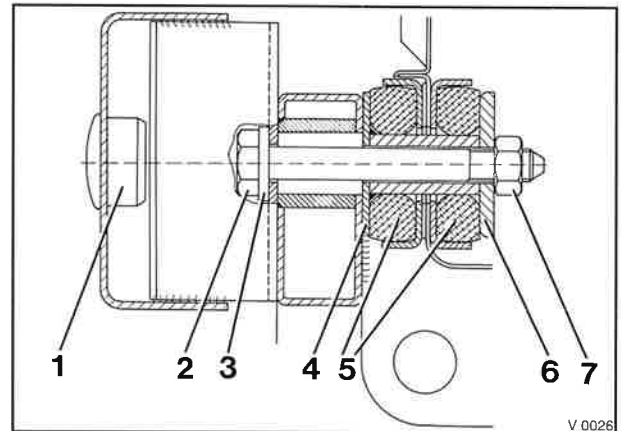


Fig. 6

- 11 Pull forward steering gear and steering support resp., lift a bit and turn it to the left and in this position pull off steering shaft cardan joint from steering gear and, if necessary, press off with suitable general-purpose spoon resp. (7).

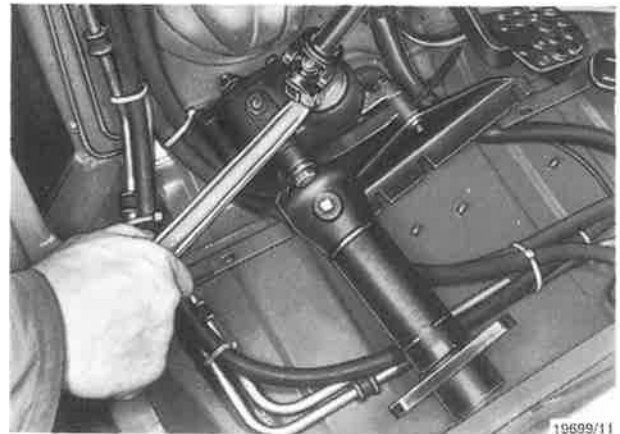


Fig. 7

- 12 Detach steering gear and unscrew steering support or transfer to new steering gear resp. and tighten to 115 Nm (8).

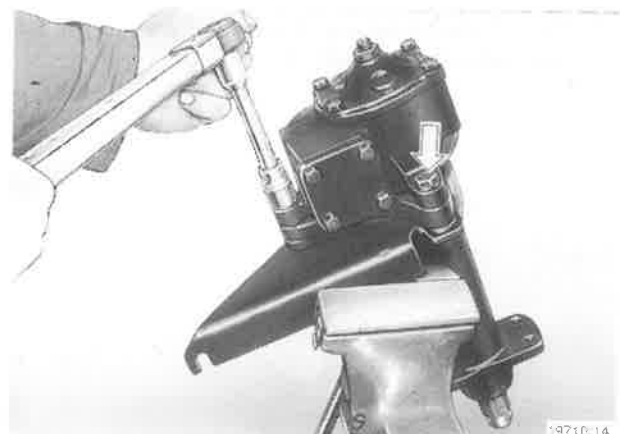


Fig. 8

Fitting:

- 13 Slip on steering shaft cardan joint to steering worm toothing so that clamping slot (9/1) is aligning with marking (9/2).

NOTE: Spray steering worm toothing with Loctite-Anti-Seize.

- 14 Screw on bearing bracket only moderately, i.e. until close fit.

NOTE: If necessary, use new special lock washers (chamfered version).

- 15 Attach washer and hexagon nut at steering support and tighten to 20 Nm (10/1).

- 16 Tighten bearing bracket screws to 45 Nm (10/2).

- 17 Insert clamping screw into cardan joint, attach new, self-locking nut and tighten to 25 Nm (11).

- 18 Attach cable clamp (5/2) for retaining hose leads in identical position as shown in fig. 5.

- 19 Fill space (12) of new dust seal (V-ring) with standard grease and slip on to steering roller shaft.

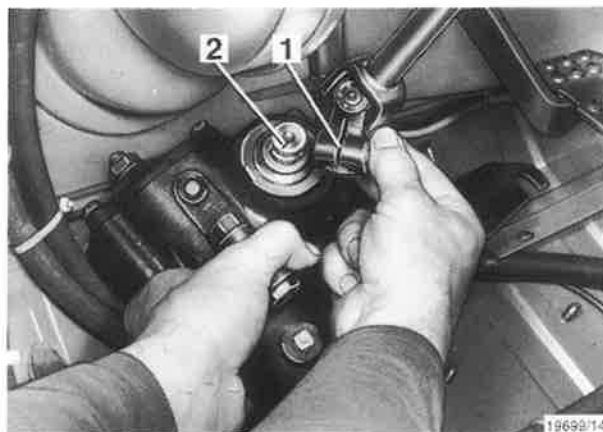


Fig. 9

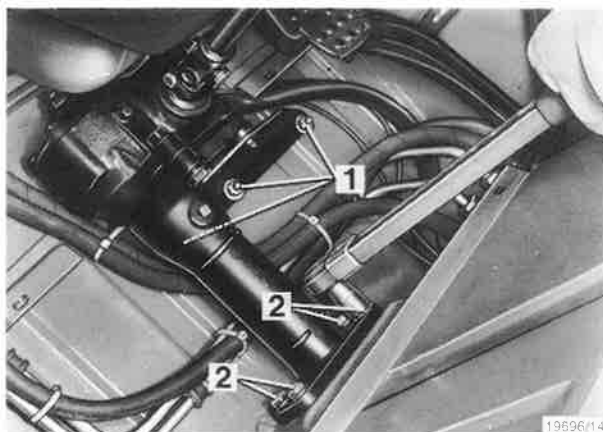


Fig. 10



Fig. 11

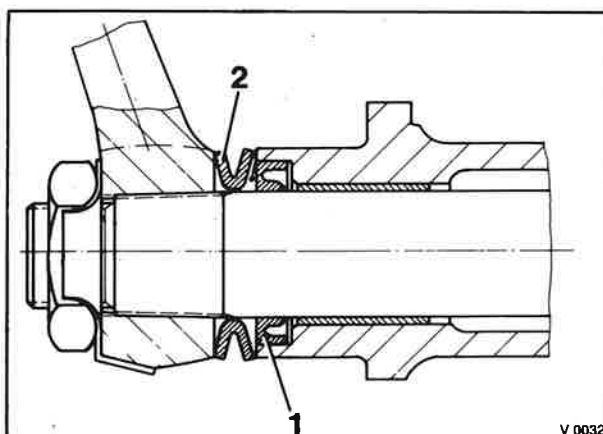


Fig. 12

- 20 Put new steering drop arm onto steering roller shaft toothing so that marking on steering drop arm (13/1) is in line with that marked on steering roller shaft (13/2).

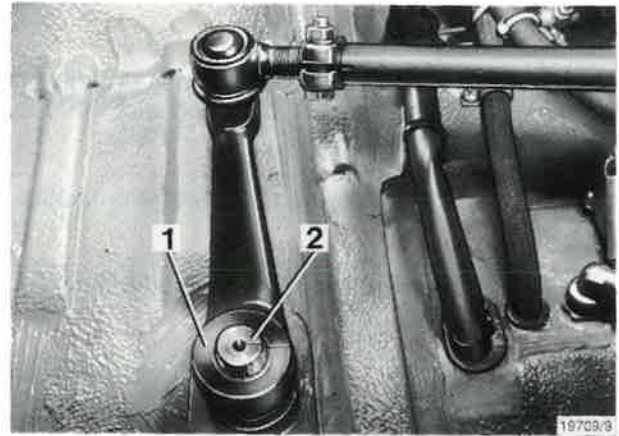


Fig. 13

- 21 Attach new tab washer. Tighten fastening nut to 250 Nm (14) and secure.

NOTE: When tightening nut back up with steering wheel and take care that steering gear is not resting against final stop.

WARNING: Mark the duly tightened and secured fastening nut of steering drop arm as well as cardan joint clamping screw with a white colour dot for easier check-up.

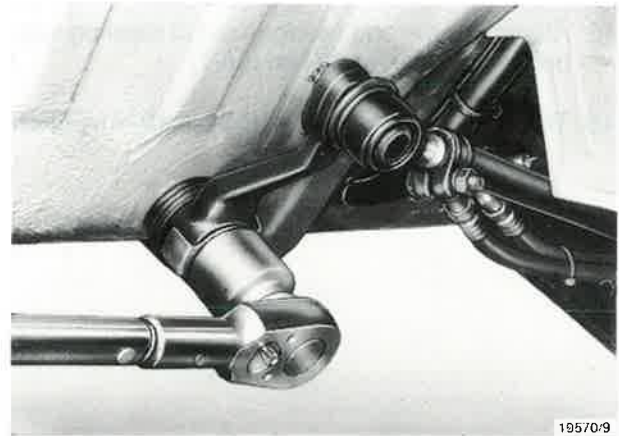


Fig. 14

- 22 Insert body support rubber (6/5), slide in hexagon screw until stop, slip on bearing disk (6/6), rounded side facing body support. Attach hexagon nut and tighten body support to 250 Nm (15).

- 23 Insert floor pan and fix with quick fasteners.



Fig. 15

- 24 Lift out oil plug (16/1) in steering housing with a screwdriver. Loosen screw plug (16/2) in bearing bracket. Fill in gear oil Pz-90 into bearing bracket first and then into steering housing until lower edge of filler openings. Attach again oil plug and screw plug.

- 25 Check steering wheel's centre position during a short straight run on an even area. One spoke of the steering wheel pointing to 12 o'clock. If this is not the case reset steering wheel by one tooth or by some teeth resp. See chapter 1.2/Changing, removing and fitting steering wheel.



Fig. 16

1.10 Change steering drop arm**Tools:**

Steering drop arm puller

Kukko 128-5 905.0.14.501.0

Box spanner socket, size 46, 3/4" 905.0.15.011.1

Track rod end extractor 905.3.33.502.0

Torque spanner 1/2"

25-130 Nm 001 589 66 21 00

Torque spanner 3/4"

75-400 Nm standard

Removing:

- 1 Lift vehicle with jack at axle housing of front axle until wheels just clear of the ground. Arrange suitable resting trestles under cross-beam (1).
- 2 Unscrew left front wheel.
- 3 Open tab washer at steering drop arm (2).

- 4 Unscrew fastening nut with box spanner socket, size 46, special tool pos. no. 905.0.15.011.1 (3).

NOTE: When loosening nut back up with steering wheel and take care that steering gear is not resting against final stop.

- 5 Remove crown nut split pin, unscrew nut and press off ball joint of drag link from steering drop arm using track rod end extractor special tool pos. no. 905.3.33.502.0 (4).

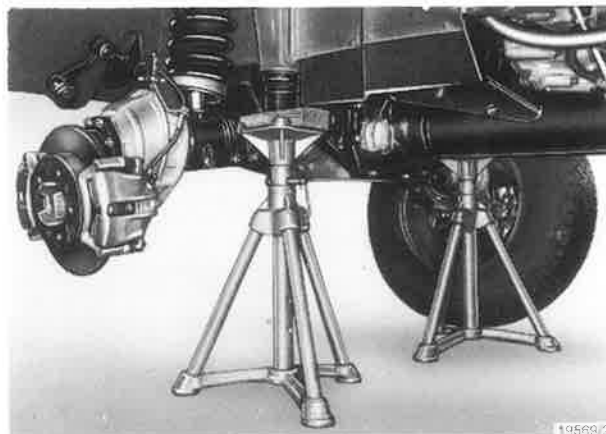


Fig. 1



Fig. 2

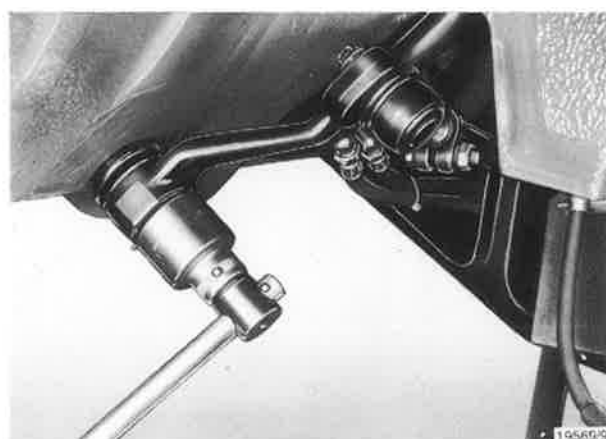


Fig. 3

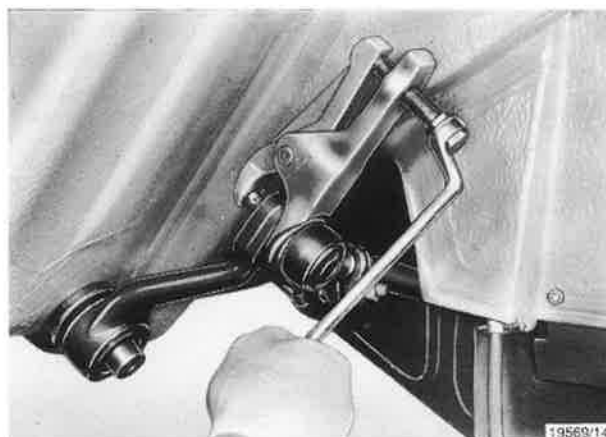


Fig. 4

- 6 Pull off steering drop arm from steering roller shaft using puller Kukko 128-5 special tool pos. no. 905.0.14.501.0 (5).

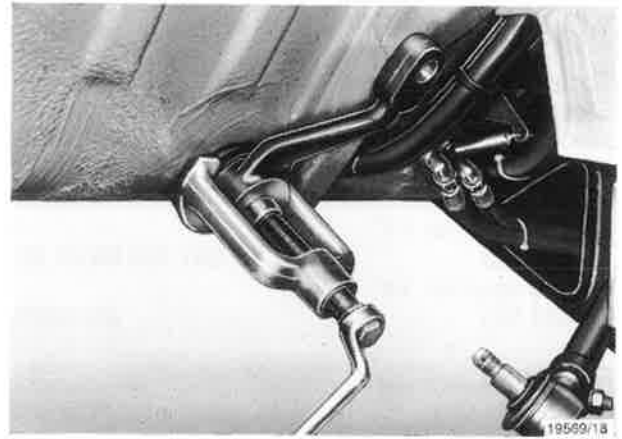


Fig. 5

Checking:

- 7 Check shaft sealing ring (6/1) for oil leakage, V-ring and dust seal resp. (6/2) for reusability. Check ball joint sealing bellows for o.k. condition.

Fitting:

- 8 Fill space (6) of dust seal (V-ring) with standard grease and slip onto steering roller shaft.

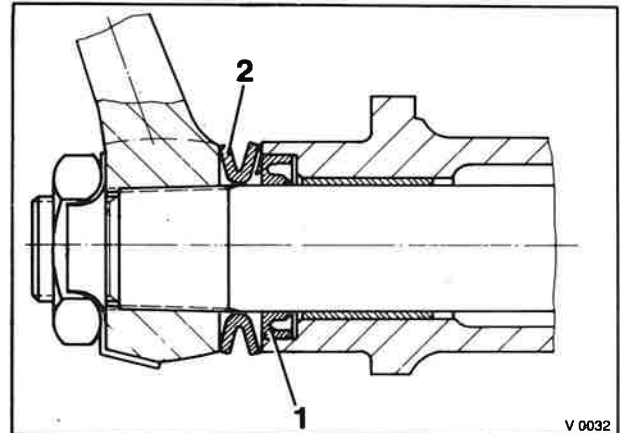


Fig. 6

- 9 Put on new steering drop arm to steering roller shaft toothing, so that marking on steering drop arm (7/1) is in line with that marked on steering roller shaft (7/2). Attach new tab washer and tighten fastening nut provisionally.



Fig. 7

- 10 Degrease taper in steering drop arm and cone of ball joint. Insert drag link and ball joint resp. into steering drop arm, screw on crown nut and tighten to 80 Nm (8). Set split pin to crown nut.

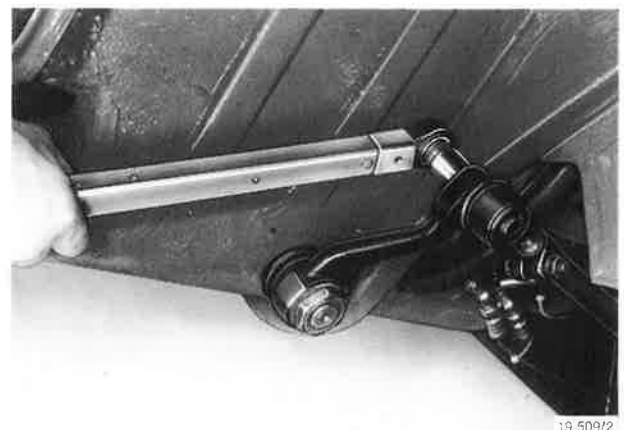


Fig. 8

- 11 Tighten fastening nut of steering drop arm using box spanner socket, size 46, special tool pos. no. 905.0.15.011.1 and torque spanner to 250 Nm (9) and secure.

NOTE: When tightening nut back up with steering wheel and take care that steering gear is not resting against final stop.

WARNING: Mark the tightened and secured crown nut of ball joint as well as steering drop arm fastening nut with a white colour dot for easier check-up.

- 12 Fit left front wheel.
- 13 Put vehicle on wheels and tighten wheel or ball collar screws resp. to 200 Nm.

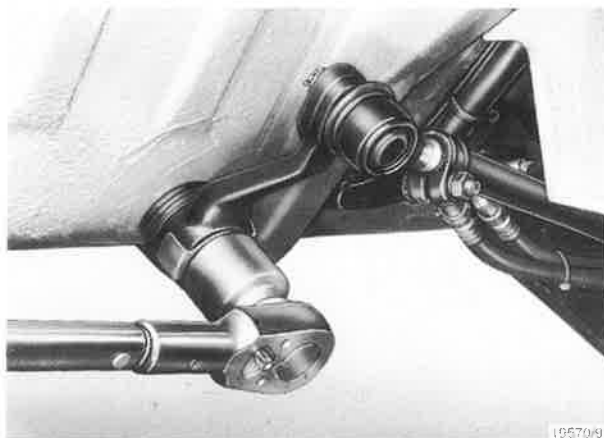


Fig. 9

1.11 Change shaft sealing ring in bearing bracket

Tools:

Press-on sleeve	905.3.33.205.1
Steering drop arm puller	
Kukko 128-5	905.0.14.501.0
Box spanner socket, size 46, 3/4"	905.0.15.011.1
Torque spanner 3/4"	
75-400 Nm	standard

Removing:

- 1 Open tab washer at steering drop arm (1).
- 2 Unscrew fastening nut with box spanner socket, size 46, special tool pos. no. 905.0.15.011.1 (2).

NOTE: When loosening nut back up with steering wheel and take care that steering gear is not resting against final stop.

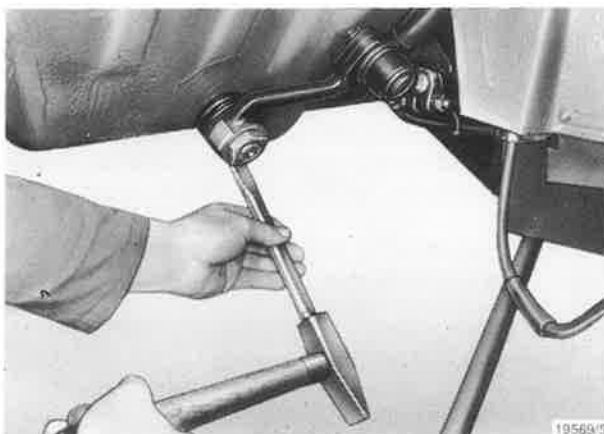


Fig. 1



Fig. 2

- 3 Pull off steering drop arm from steering roller shaft using puller Kukko no. 128-5, special tool pos. no. 905.0.14.501.0 (3).
- 4 Remove V-ring (6) and dust seal resp.

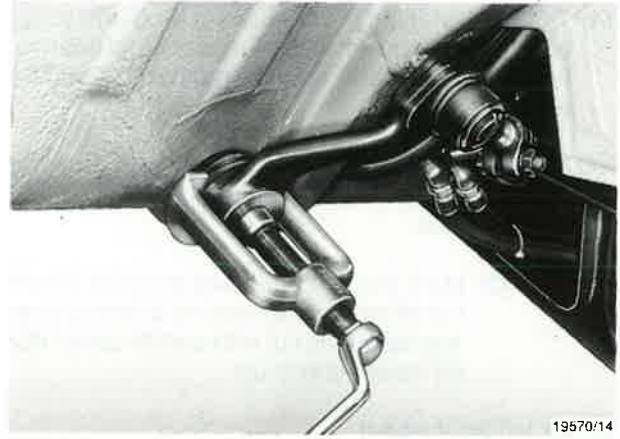


Fig. 3

- 5 Knock through front steel part of seal ring with a pointed drift pin and lift out carefully (4).

WARNING: Do not damage shaft and housing while doing this.

Checking:

- 6 Check steering roller shaft by moving up and down for excessive play, admissible play 0.2 mm. In case of excessive play renew bearing bush in bearing bracket, see sect. 2.1.



Fig. 4

Fitting:

- 7 Remove any rust from steering roller shaft. Fill space between both sealing lips with standard grease and drive in seal ring with press-on sleeve special tool pos. no. 905.3.33.205.1 until stop (5).

NOTE: Coat steering roller shaft toothing with thin nylon in order not to damage seal ring when sliding on.

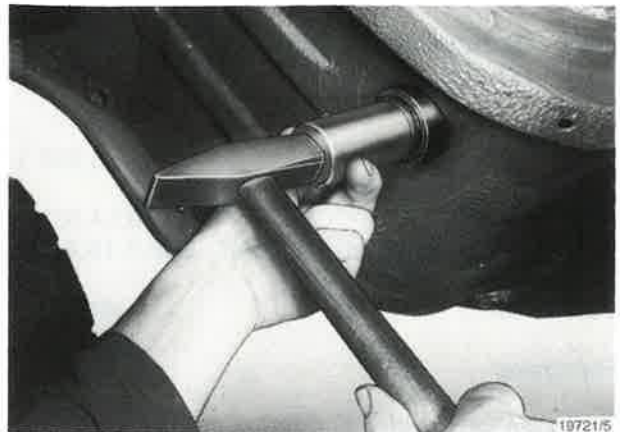


Fig. 5

- 8 Fill space (6) of new dust seal (V-ring) with standard grease and slip on to steering roller shaft.

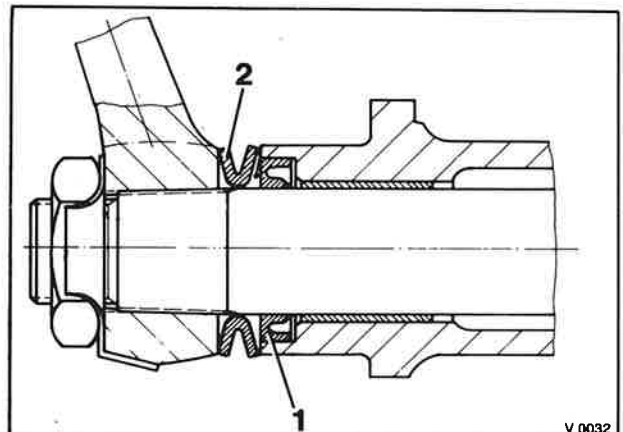


Fig. 6

- 9 Put on steering drop arm to steering roller shaft toothing, so that marking on steering drop arm (7/1) is in line with that marked on steering roller shaft (7/2).
- 10 Attach new tab washer. Tighten fastening nut with box spanner socket, size 46, special tool pos. no. 905.0.15.011.1 and torque spanner to 250 Nm (8) and secure.

NOTE: When tightening nut back up with steering wheel and take care that steering gear is not resting against final stop.

WARNING: Mark the duly tightened and secured fastening nut with a white colour dot for easier check-up.

1.12 Check, adjust toe-in

Tools:

Locking device for drag link arm	905.3.32.502.0
Track and axle base measuring gauge	905.3.42.301.0
Open-ring spanner socket size 32	905.0.15.010.1
Torque spanner 1/2"	
25-130 Nm	001 589 66 21 00

NOTE: Carry out checking or adjusting toe-in when vehicle is loaded with 2 persons (driver's and co-driver's seat). The following prerequisites must be fulfilled:

- perfect disk wheels
- steering parts and pivots in wheel drives being as playfree as possible.

Checking:

- 1 Drive vehicle to an even, horizontal place and park with front wheels in straight-ahead position.
- 2 Check tyre pressure: front and rear 3.5 bar each.
- 3 Fix drag link arm with locking device special tool pos. no. 905.3.32.502.0 in central position (1). To do so insert centering beam of the three-part tool into the center tunnel and slide it quite to the front. Then screw centering nut with hexagon first onto clamping screw of drag link arm. Insert centering beam into centering collar of nut. During this move steering wheel or drag link arm resp. to and fro until the required center position has been found. Now clamp down centering beam with clamping strap.
- 4 Sit on front seats or load with 75 kg each.
- 5 Move vehicle to and fro in order to reach balance of half-axes corresponding to load.
- 6 Mark front wheels in height of wheel centers with a chalk line (2).

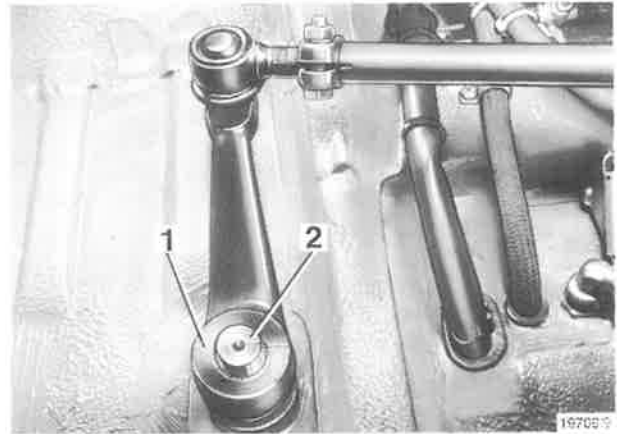


Fig. 7

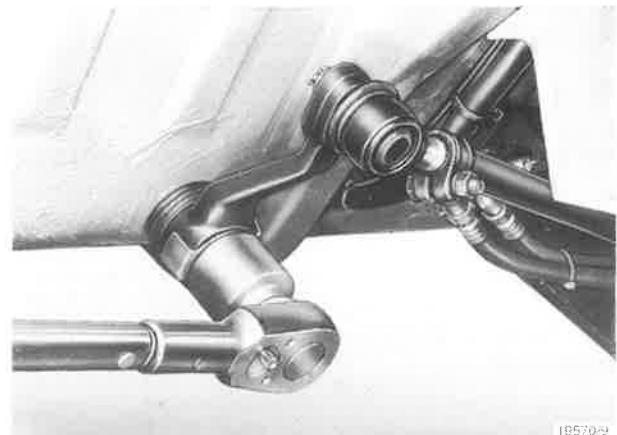


Fig. 8

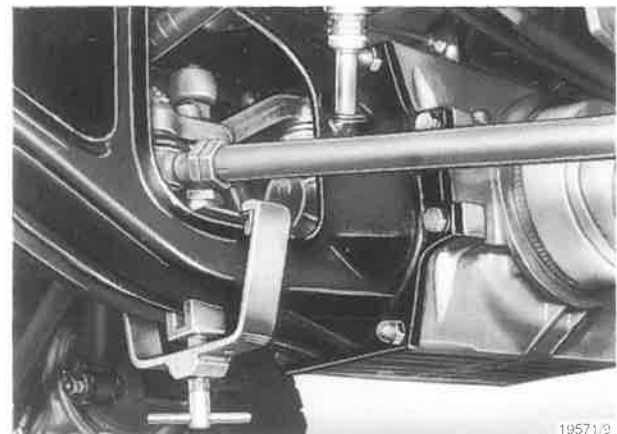


Fig. 1

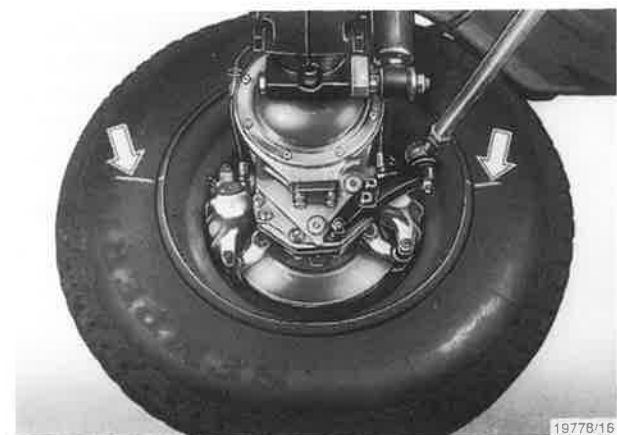


Fig. 2

- 7 Measure track width behind the axle.
- 8 Move vehicle by half a wheel turn forward or backward.
- 9 Measure track width in front of axle (3). Toe-in is set correctly, if measure is by 2-5 mm smaller than that measured behind the axle.

WARNING: Carry out measurements only in height of wheel centre. Slight deviations of measuring points from wheel centre lead to faulty measurement.

Adjusting:

- 10 Carry out steps 1-3.
- 11 Loosen outer and inner hexagon nuts for clamping track rods (4).

NOTE: Lefthand thread ball joints of track rods are mounted inside at the right track rod and outside at the left one. Moreover, lefthand threads are distinguishable by marking of the hexagon nuts at the corners (4).

- 12 Put ruler at rear wheels and bring front wheels into alignment (5) by twisting the track rod tubes.
- 13 Carry out steps 4-9. Before measuring track width in front of the axle adjust toe-in to prescribed measure of -2 to -5 mm by twisting **both** track rod tubes **equally**.

NOTE: Twisting of track rod tubes in driving direction = less toe-in
Twisting of track rod tubes against driving direction = more toe-in

- 14 Tighten hexagon nuts of track rods with opening spanner socket size 32 (6/1) special tool pos. no. 905.0.15.010.1 and torque spanner special tool pos. no. 001 589 66 21 00 to 80 Nm observing that **both** ball joints are fitting close in tightening direction when being tightened. Then check entire action space of ball joints by twisting the track rods into both directions.
- 15 Detach locking device.

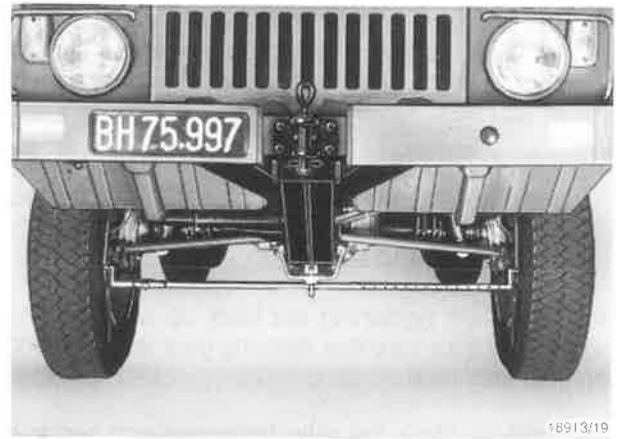


Fig. 3



Fig. 4



Fig. 5

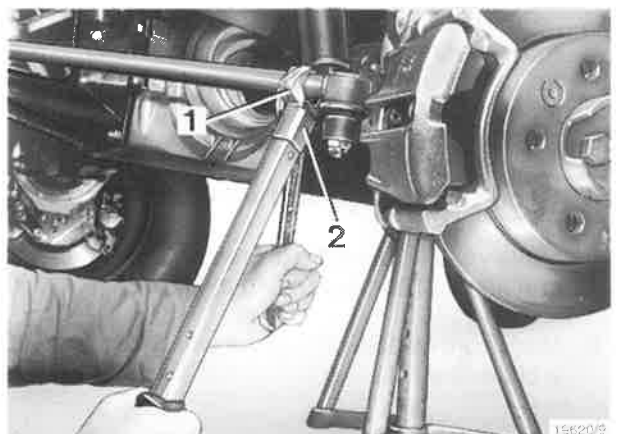


Fig. 6

1.13 Change drag link

Tools:

Locking device for drag link arm	905.3.32.502.0
Track rod end extractor	905.3.33.502.0
Ring spanner socket size 22	905.3.45.501.2
Torque spanner 1/2"	
25-130 Nm	001 589 66 21 00

Removing:

- 1 Turn wheels to the left. Remove first crown nut split pin of left track rod at drag link arm and screw off. Press out ball joint with track rod end extractor special tool pos. no. 905.3.33.502.0 (1).
- 2 Loosen split pins and crown nuts of drag link. Press out ball joints from steering drop arm and drag link arm also with track rod end extractor.

Legend for fig. 2:

Extracting ball joint at steering drop arm.

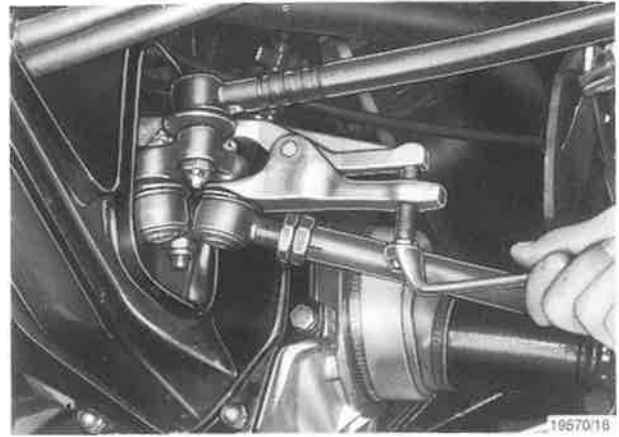


Fig. 1



Fig. 2

Legend for fig. 3:

Extracting ball joint at drag link arm.

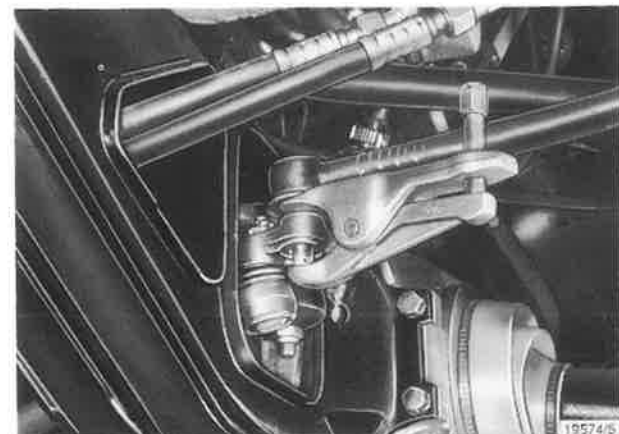


Fig. 3

Fitting:

WARNING: Drag link is a safety component and must not be straightened when having been deformed.

- 3 Adjust new drag link to length of dismantled. Degrease tapers of ball joints and cone in drag link arm and steering drop arm. Insert drag link with non-adjustable ball joint (4/1) into drag link arm observing that split pin hole is in alignment with longitudinal axis of drag link arm. Attach crown nut.

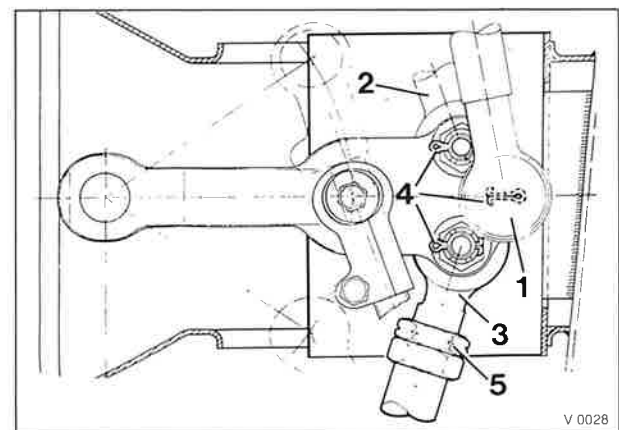


Fig. 4

- 4 Insert ball joint of track rod (4/2) into drag link arm. Split pin hole (4/4) must be situated parallel to the drag link arm longitudinal axis. Attach crown nut. Tighten ball joint of drag link as well as ball joint of track rod with ring spanner socket size 22 special tool pos. no. 905.3.45.501.2 and torque spanner special tool pos. no. 001.589 66 21 00 to 80 Nm (5) and attach split pin acc. to fig. 4.

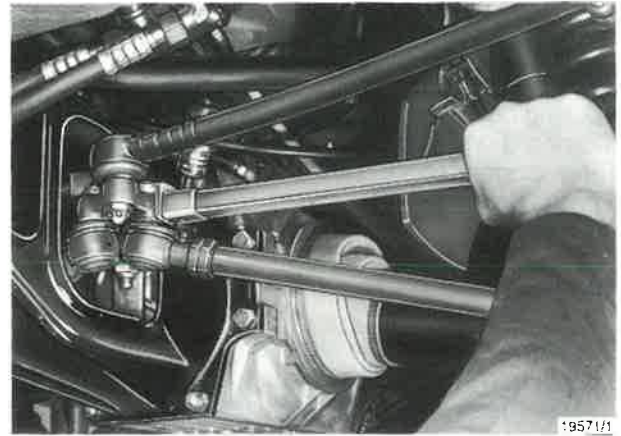


Fig. 5

- 5 Put wheels in straight-ahead position. Insert drag link into steering drop arm provisionally and fix drag link arm with locking device special tool pos. no. 905.3.32.502.0 in centre position (6). To do so insert centering beam of the three-part tool into the center tunnel and slide it quite to the front. Then screw centering nut with hexagon first onto tension screw of drag link arm. Insert centering beam into centering collar of nut. During this move steering wheel or drag link arm to and fro until the required center position has been found. Now clamp down centering beam with clamping strap.

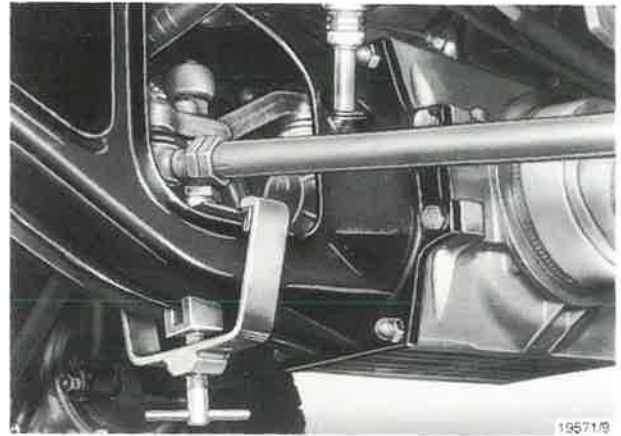


Fig. 6

- 6 Determine centre position of steering drop arm by turning steering wheel from stop to stop and adjust adjustable ball joint of drag link, so that it can be inserted tension-free into taper of steering drop arm. Attach crown nut, tighten to 80 Nm (7) and attach split pin.

WARNING: Mark the duly tightened and secured crown nuts of ball joints with a white colour dot for easier check-up.

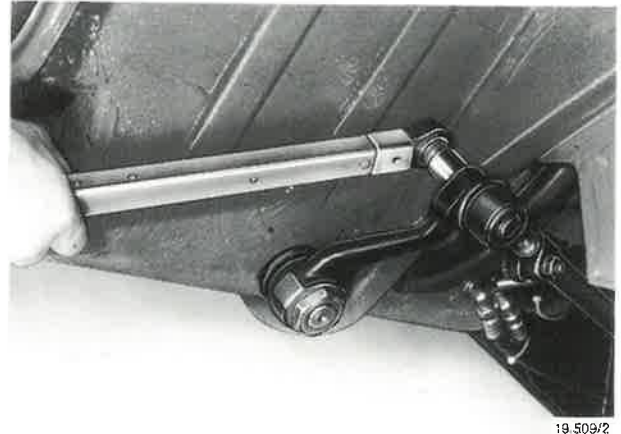


Fig. 7

- 7 Tighten clip (8). In this connection observe that both ball joints are fitting close in tightening direction when being tightened. Then check entire action space of ball joints by twisting the drag link into both directions.
- 8 Remove locking device.

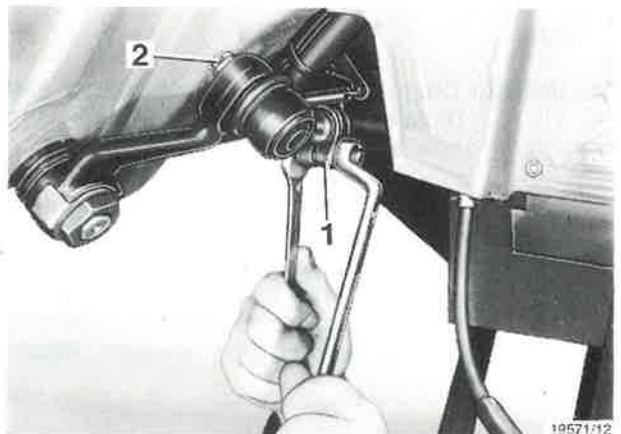


Fig. 8

1.14 Change ball joint of drag link

Tools:

Locking device for drag link arm	905.3.32.502.0
Track rod end extractor	905.3.33.502.0
Torque spanner 1/2"	
25-130 Nm	001 589 66 21 00

Removing:

- 1 Place wheels into straight-ahead position and attach locking device (1) special tool pos. no. 905.3.32.502.0 for fixing and central positioning of drag link arms at center beam.
- 2 Loosen clip (2/1), remove crown nut split pin (2/2) and screw off.

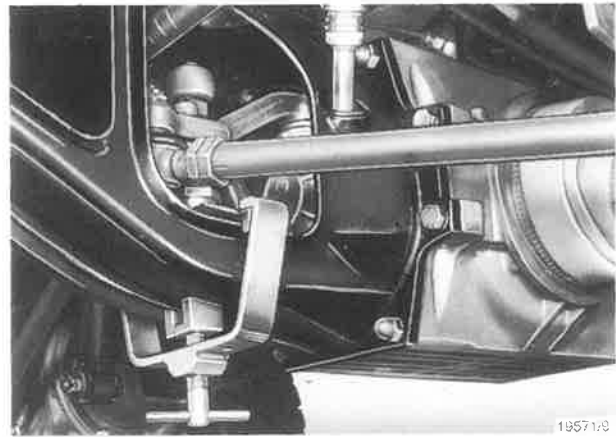


Fig. 1



Fig. 2

- 3 Press out ball joint of drag link with track rod end extractor special tool pos. no. 905.3.33.502.0 from steering drop arm (3) and unscrew.



Fig. 3

Fitting:

- 4 Determine centre position of steering drop arm by turning the steering wheel from stop to stop. Degrease cone in steering drop arm and taper of new ball joint. Screw in ball joint as far as drag link can be inserted tension-free. Attach crown nut, tighten to 80 Nm (4) and attach split pin.

WARNING: Mark the tightened and secured ball joint with a white colour dot for easier check-up.

- 5 Tighten clip (2/1). Take care that **both** ball joints are fitting close in tightening direction when being tightened. Then check entire action space of ball joints by twisting the drag link into both directions.
- 6 Detach locking device.



Fig. 4

1.15 Check drag link arm for axial play

Tool:

Locking device for drag link arm 905.3.32.502.0

Magnetic stand standard

Dial gauge 1/100 with extension pin standard

- 1 Lift vehicle with jack at axle housing of front axle until wheels just clear of the ground. Arrange suitable resting trestles under the cross-beam (1).
- 2 Fix locking device (2/1) special tool pos. no. 905.3.32.502.0 at center beam (but do not insert centering part of the device). Screw on dial gauge bracket (2/2) special tool pos. no. 905.3.16.101.0 and attach dial gauge 1/100 with extended probe pin to drag link arm with 1-3 mm pretension. Set dial gauge to "0".
- 3 Move or press resp. drag link arm with suitable general-purpose spoon (2/3) up and down and read off axial play from dial gauge.

Max. admissible axial play = 1.0 mm

In case that max. admissible play is exceeded, adjust drag link arm and balance axial play resp., see sect. 1.17.

- 4 Detach locking device and dial gauge. Put vehicle on wheels.



Fig. 1

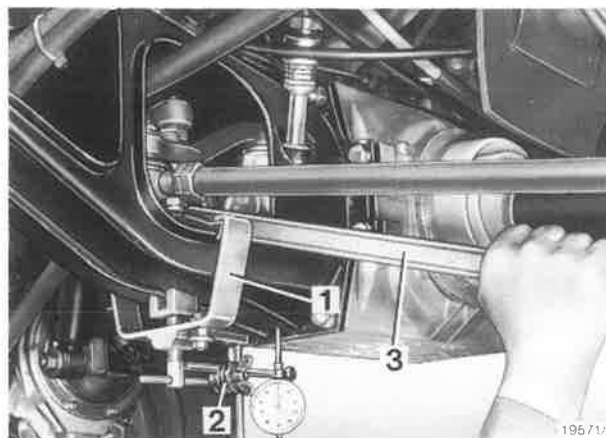


Fig. 2

1.16 Change, remove and fit top drag link arm

Includes:

Changing, removing and fitting center beam see group 150/sect. 1.1

Tools:

Track rod end extractor 905.3.33.502.0

Ring spanner socket size 22 905.3.45.501.2

Torque spanner 1/2"

25-130 Nm 001 589 66 21 00

Torque spanner 3/4"

75-400 Nm standard

Removing:

- 1 Remove centre beam see group 150/section 1.1/ 1-5, 8-11, 14 and 15.
- 2 Place oil catch pan under drag link arm housing. Turn drag link arm to the right and loosen clamping screw (1). Remove clamping screw with joint eye as well as bottom drag link arm with bearing disk, adjusting shim and O-ring.
- 3 Remove top drag link arm with track rod and drag link, bearing disk and O-ring.

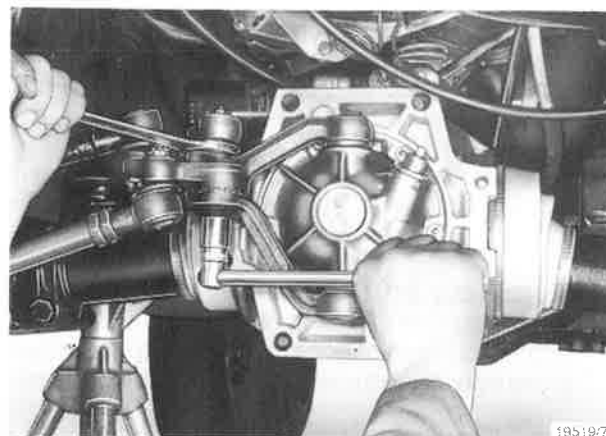


Fig. 1

- 4 Detach crown nut split pins of track rod and drag link and screw off. Press out first left track rod (2/1) and then drag link (2/2) using track rod end extractor special tool pos. no. 905.3.33.502.0.

NOTE: Mark left track rod.

Checking:

- 5 Check ball joints of track rod and drag link as well as joint eye to servo-steering hydraulic cylinder for wear.

Fitting:

- 6 Degrease cones of drag link arm as well as cones of ball joints to drag link and track rod. Insert drag link acc. to fig. (3/1) first and tighten crown nut to 80 Nm. Then insert left track rod with lefthand thread - counter nut marked at corners (4/1) - pointing outward, i.e. into track arm direction, into steering drop arm and tighten crown nut with ring spanner socket (4/2) special tool pos. no. 905.3.45.501.2 and torque spanner special tool pos. no. 001 589 66 21 00 to 80 Nm and attach split pin.

NOTE: When inserting ball joints of drag link and track rods, split pin bores (3/4) must be in alignment and parallel resp. to drag link arm longitudinal axis.

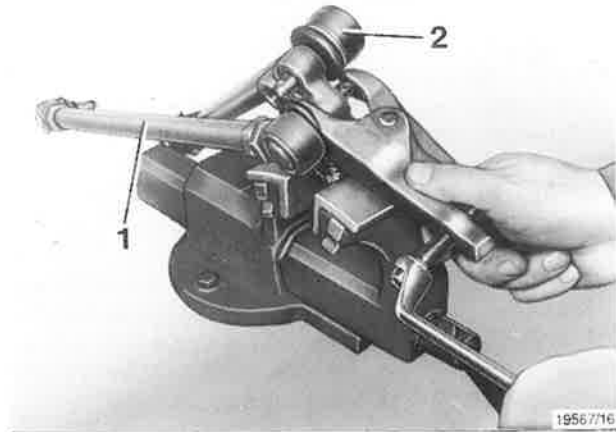


Fig. 2

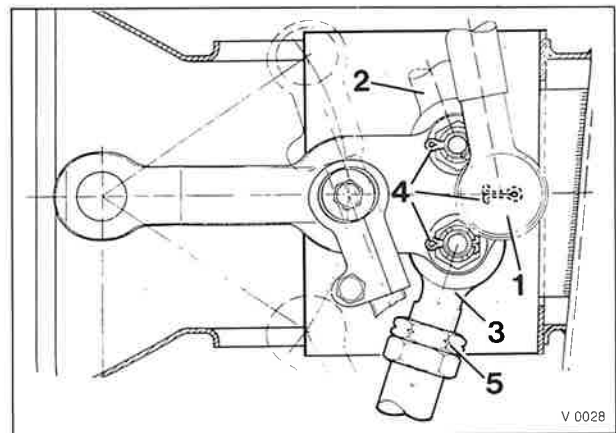


Fig. 3

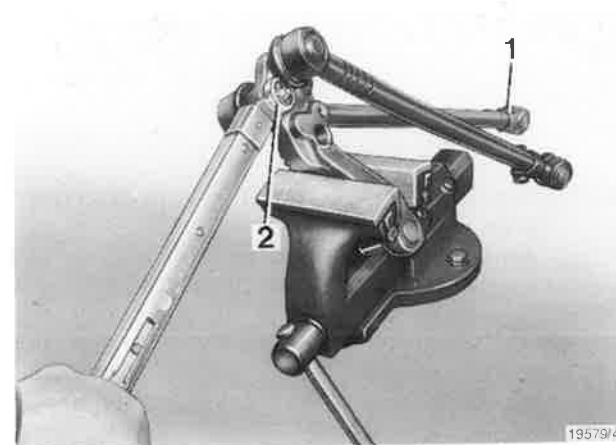


Fig. 4

- 7 Fix new O-rings (5/7) with standard grease in housing. Insert top drag link arm (5/1) and new bearing disk (5/9) and secure against distorting. Also, insert bottom drag link arm (5/2) with new bearing disk and adjusting shim already mounted before (5/8) between housing and bearing disk and insert resp. simultaneously into connection toothing of top drag link arm and mount tension screw (5/3) provisionally with old securing nut (5/4).

Key for fig. 5:

- 1 - top drag link arm
- 2 - bottom drag link arm
- 3 - tension screw
- 4 - hexagon nut
- 5 - drag link arm housing
- 6 - bearing bush
- 7 - O-ring
- 8 - adjusting shim
- 9 - bearing disk
- 10 - O-ring

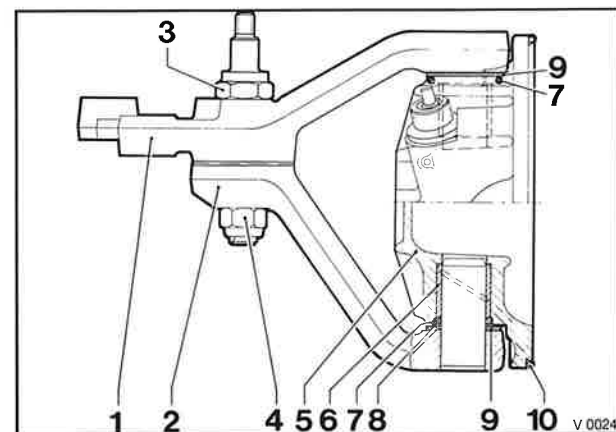


Fig. 5

- 8 For tightening tension screw insert drag link into steering drop arm and tighten ball joint provisionally. Tighten tension screw to 195 Nm (6), backing up at hexagon of tension screw and also with steering wheel resp.
 - 9 Unhinge drag link and check axial free-play movement of drag link arm. Adjusting shim thickness is correct, if drag link arm has no free-play but is free to move. If checking by feeler gauge reveals axial play between housing and bearing disk (7), adjust it by adding the respective adjusting shim. Adjusting shims are available in thicknesses of 0.1, 0.2 and 0.3 mm.
 - 10 After check-up or adjusting of axial play resp. screw on drag link arm with new, self-locking nut and tighten again to 195 Nm as described under step 8. For mounting center beam unhinge drag link again.
- WARNING:** Mark the duly tightened nut to tension screw as well as crown nuts of ball joints with a white colour dot for easier check-up.
- 11 Fit center beam, see group 150/section 1.1/18-22,25-30,32-37.
 - 12 Fill up axle drive oil to overflow level.

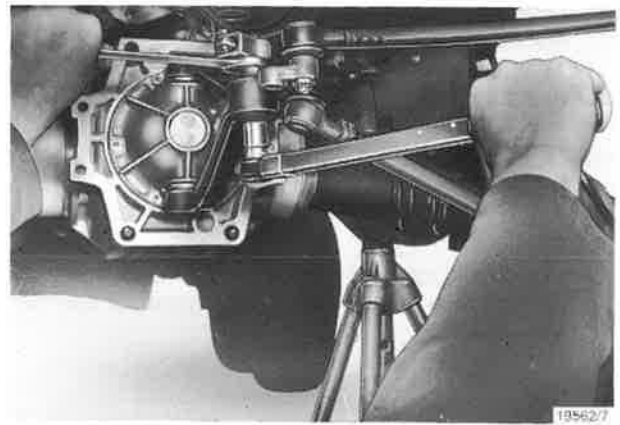


Fig. 6

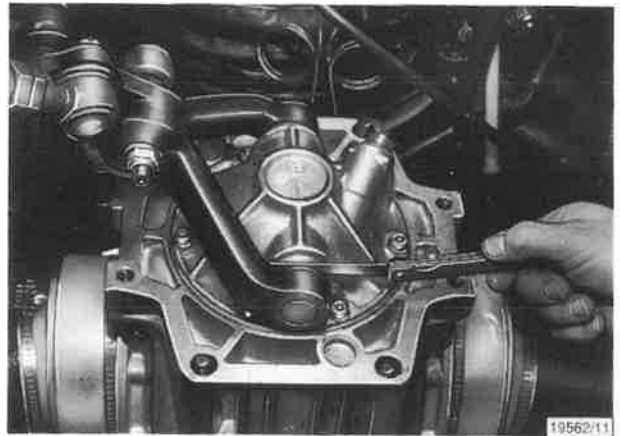


Fig. 7

1.17 Change, remove and fit bottom drag link arm

Adjust axial play of drag link arm

Includes:

Changing, removing and fitting center beam see group 150/section 1.1

Changing, removing and fitting top drag link arm see section 1.6/2,3 and 5,7-10

Removing:

- 1 Remove center beam, see group 150/section 1.1/1-5,8-11,14 and 15.
- 2 Remove top (1/1) or bottom resp. (1/2) drag link arm, see section 1.16/2,3 and 5.

Fitting:

- 3 Fit drag link arm, see section 1.16/7-10.
- 4 Fit center beam, see group 150/section 1.1/18-22,25-30,32-37.
- 5 Fill up axle drive oil to overflow level.

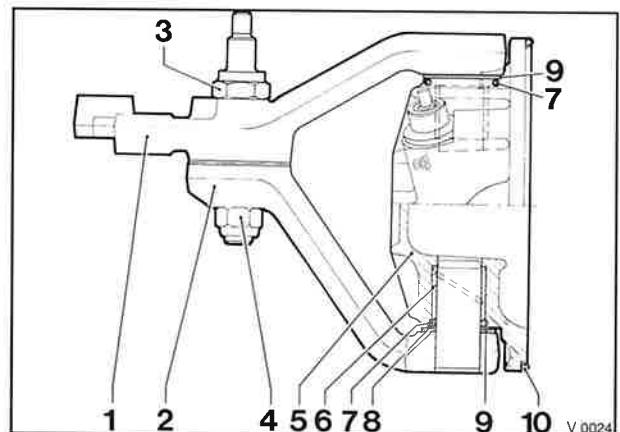


Fig. 1

1.18 Change bearing bushes to drag link arm

Includes:

Changing, removing and fitting center beam see group 150/section 1.1

Tools:

Press-in and -out tool for bearing bushes	905.3.33.301.0
Support Kukko no. 22-1	905.0.14.002.0
Inside puller Kukko no. 21-4	905.0.14.004.0
Torque spanner 3/4" 75-400 Nm	standard

Removing:

- 1 Remove centre beam, see group 150/section 1.1/1-5,8-11,14 and 15.
- 2 Drain oil from axle housing. Place oil catch pan in a way that area under drag link arm housing is also covered.
- 3 Remove drag link arm housing (1).
- 4 Clamp top drag link arm tight into vise and loosen nut to tension screw (2). Back up with open-ring spanner at hexagon of tension screw.
- 5 Remove bottom drag link arm (3/2), bearing disk (3/9), adjusting shim (3/8) and drag link arm housing (3/5) with O-rings (3/7).

- 6 Heat up drag link arm housing to abt. 100°C and clamp into vice. Pull out bearing bush with inside puller (4/1) Kukko no. 21-4 special tool pos. no. 905.0.14.004.0 and support (4/2) Kukko no. 21-1 special tool pos. no. 905.0.14.002.0 as well as support sleeve (4/3) of press-in and -out tool special tool pos. no. 905.3.33.301.0.

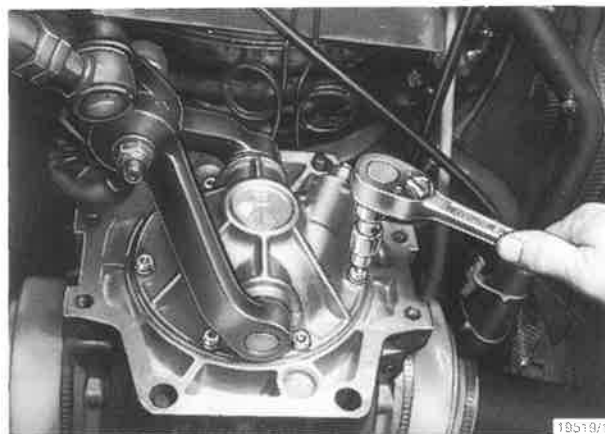


Fig. 1

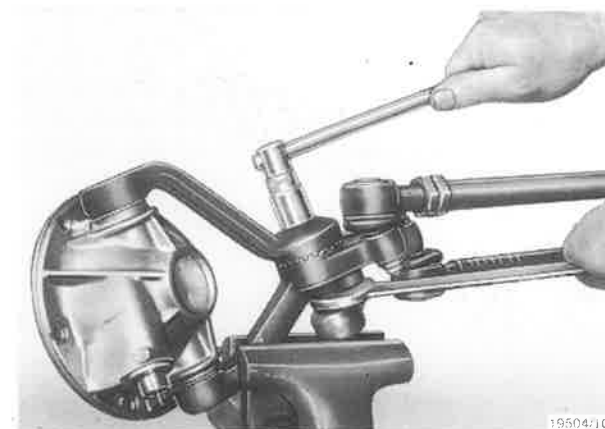


Fig. 2

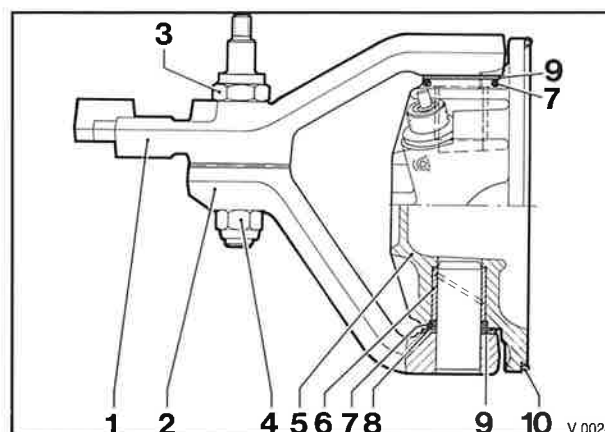


Fig. 3

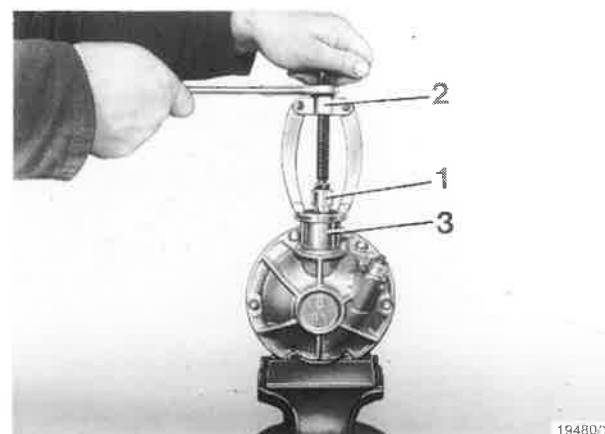


Fig. 4

Checking:

- 7 Check toothing of driven helical gear (5/1) to speedometer and tachograph drive for wear. Renew chevron-type sealing ring (5/2) and O-ring (5/3) in case of oil leakage, see group 091/ section 1.1.
Fix loose ball with Loctite 245.

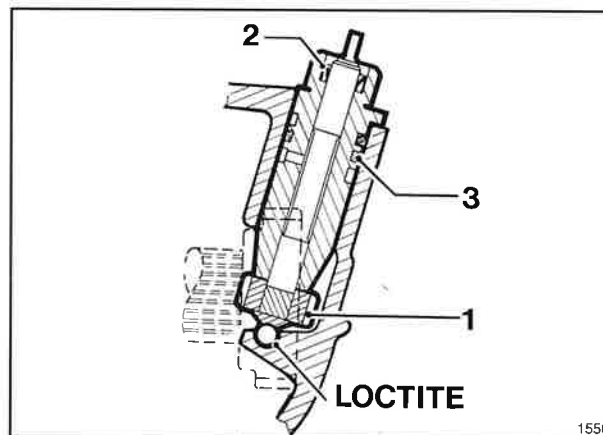


Fig. 5

Fitting:

- 8 Heat up drag link arm housing (6/1) to abt. 100°C and press in bearing bush (6/2) with bevelled side first until stop using press-in and -out tool (6/3) special tool pos. no. 905.3.33.301.0.

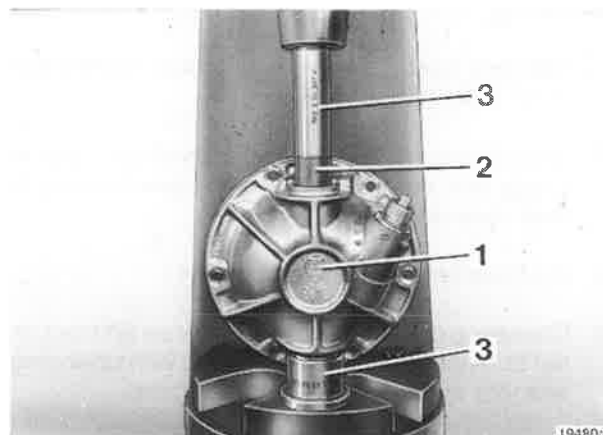


Fig. 6

- 9 Oil bearing bushes and fix new O-ring to top and bottom bearing bush in housing with some standard grease (7).



Fig. 7

- 10 Slip new bearing disk (8/1) over top drag link arm bolt (8/2) and put on drag link arm housing (8/3) with upper side first, so that bearing disk sits close and safe from distorting at housing.

NOTE: Drag link arms showing traces of wear at pivot pin must be replaced.

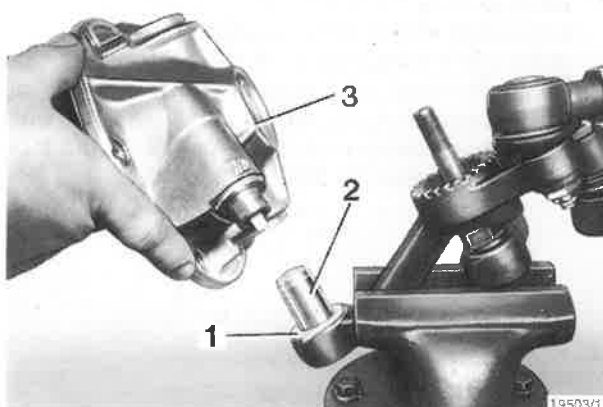


Fig. 8

- 11 Put on adjusting shim already having been mounted first (9/1) and then new bearing disk (9/2) safe from distorting at drag link arm housing. Attach bottom drag link arm and also insert resp. into toothing of top drag link arm.
- 12 Tighten the old nut on the drag link to 195 Nm and check axial free-play (10).
- 13 There should be no axial free-play, however, the drag link should be free or only slightly stiff to move. If checking by feeler gauge reveals axial play between housing and bearing disk (11), adjust it by adding the respective adjusting shims. Adjusting shims are available in thicknesses 0.1, 0.2 and 0.3 mm.
- 14 After checking and adjusting axial play, screw on drag link arm with new, self-locking nut and tighten to 195 Nm (10).

WARNING: Mark the tightened nut to tension screw with a white colour dot for easier check-up.

- 15 Smear sealing surfaces of drag link arm housing with sealant Loctite 574. Oil new O-ring moderately and insert into wedge-shaped groove (12). Attach washers to cheese head screws, spray thread with Loctite 242 and mount housing. Tighten cheese head screws equally and cross-wise (1).

NOTE: Fit drag link arm housing with utmost care, so that O-ring neither slips away nor gets damaged. It is recommended to put on housing with two cheese head screws facing each other in order not to turn housing for positioning.

- 16 Fit centre beam, see group 150/section 1.1/17-22,25-30,32-37.
- 17 Fill up axle drive oil to overflow level.

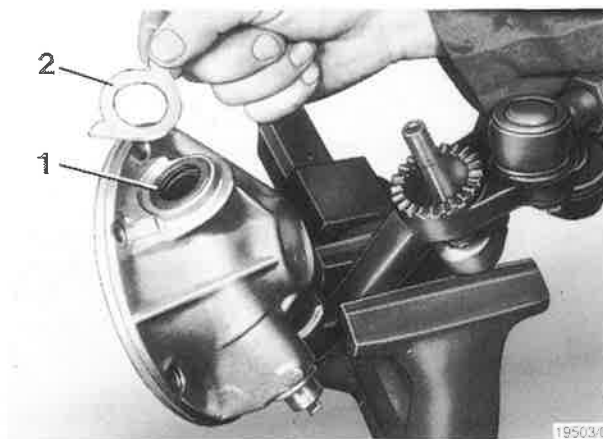


Fig. 9

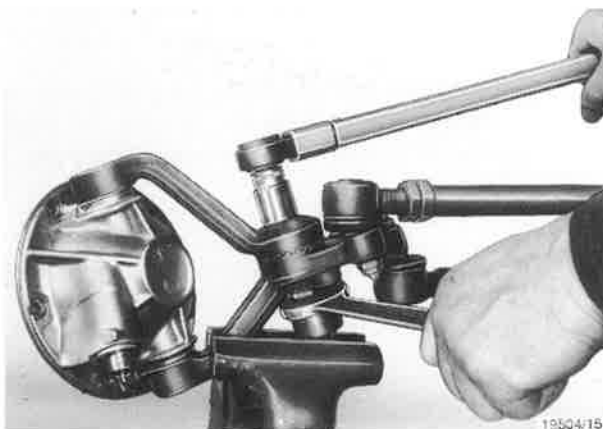


Fig. 10

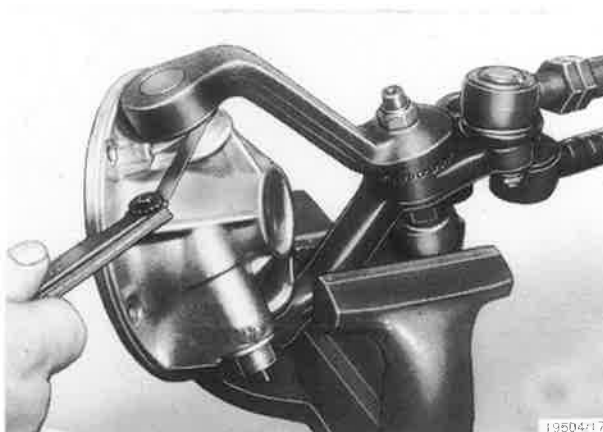


Fig. 11



Fig. 12

1.19 Change right track rod

Includes:

Checking, adjusting toe-in see section 1.12

Tools:

Open-ring spanner socket size 32 905.0.15.010.1

Track rod end extractor 905.3.33.502.0

Pull-on nut for joint eye 905.3.34.502.1

Ring spanner socket size 17 905.3.45.001.2

Ring spanner socket size 22 905.3.45.501.2

Torque spanner 1/2"

25-130 Nm 001 589 66 21 00

Torque spanner 3/4"

75-400 Nm standard

Removing:

- 1 Lift vehicle with jack at axle housing of front axle until wheels just clear of the ground. Arrange suitable resting trestles under cross-beam (1).
- 2 Unscrew right wheel.
- 3 Steer a bit to the left and loosen hexagon nut (2/2). Press off joint eye (2/3) with general-purpose spoon from tension screw (2/7) (3). Detach shaped disk (2/4) and top O-ring (2/5).

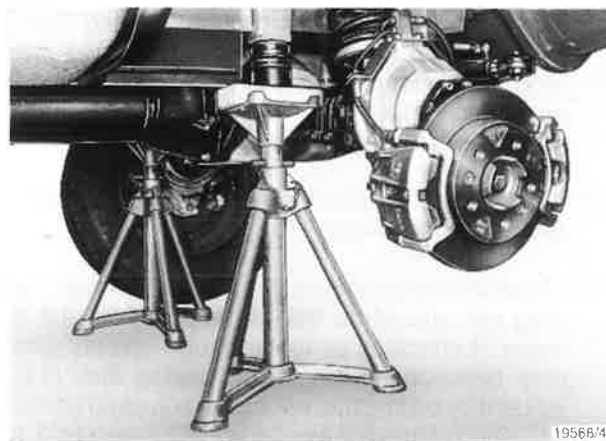


Fig. 1

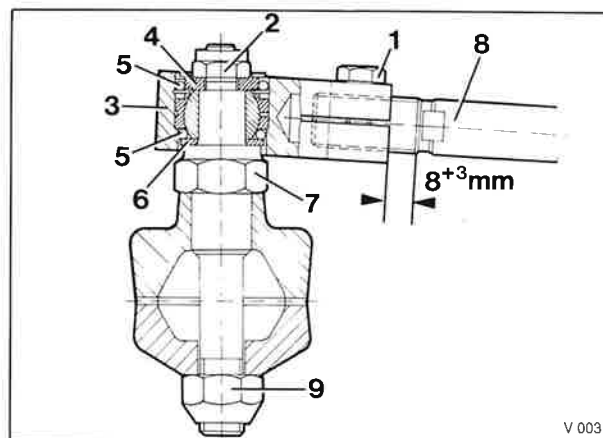


Fig. 2

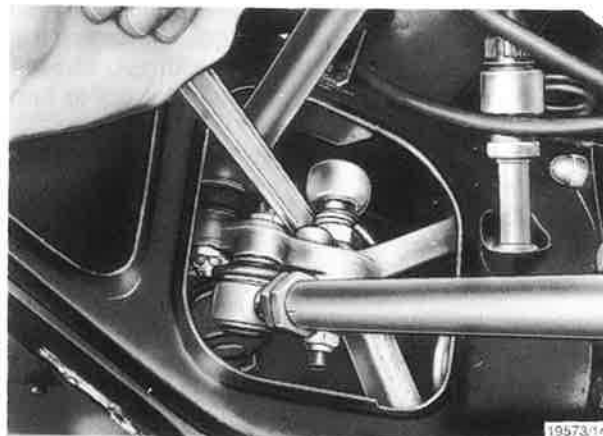


Fig. 3

- 4 Steer to the right, remove split pins from track rod ball joints and unscrew crown nuts. Press out interior (4) and exterior ball joint (5) with track rod end extractor special tool pos. no. 905.3.33.502.0.

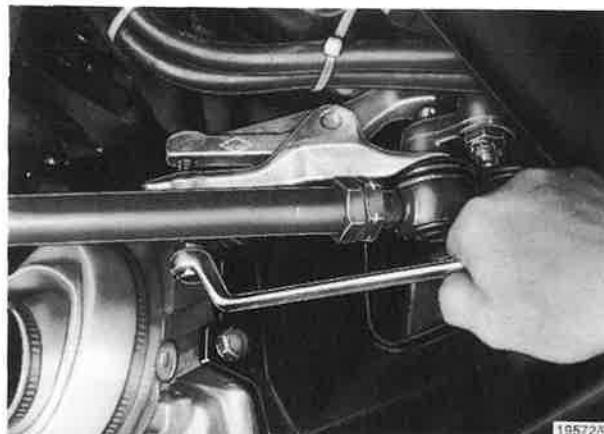
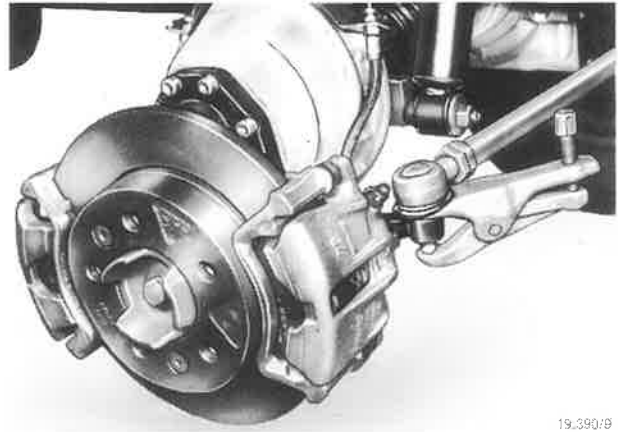


Fig. 4

Fitting:

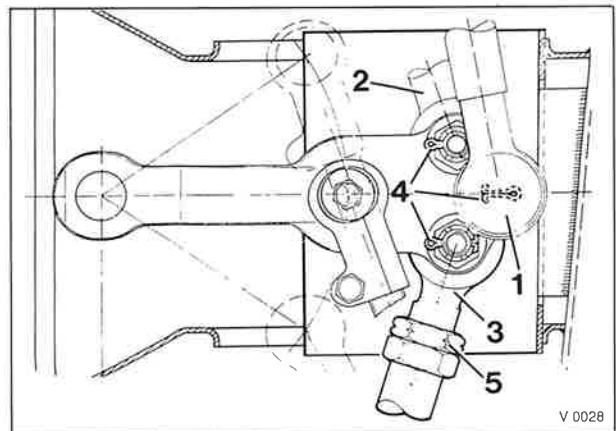
WARNING: Track rod is a safety component and must not be straightened when having been deformed.



19.390/8

Fig. 5

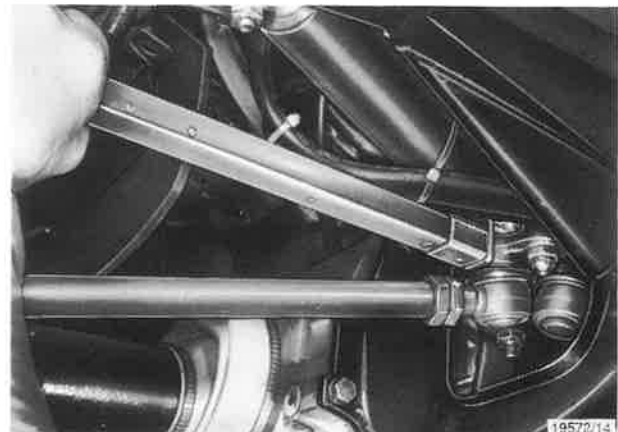
- 5 Adjust new track rod to length of dismantled one. For this purpose adjust both ball joints equally. Degrease cone in track arm and drag link arm as well as taper of ball joints. Insert ball joint with lefthand thread - distinguishable by the marked counter nut (6/5) - at drag link arm observing that split pin hole is parallel to longitudinal axis of drag link arm (6/4).



V 0028

Fig. 6

Attach crown nut and tighten with ring spanner socket size 22 special tool pos. no. 905.3.45.501.2 and torque spanner special tool pos. no. 001 589 66 21 00 to 80 Nm (7) and attach split pin.



19572/14

Fig. 7

- 6 Insert exterior ball joint of track rod into track arm. Attach crown nut, tighten to 80 Nm (8) and attach split pin.



19572/18

Fig. 8

- 7 Clean tension screw (2/7) and put on disk (2/6) again with bevelled side showing downwards. Fix new bottom O-ring with standard grease in joint eye. Pull on cleaned joint eye (9/1) to tension screw (9/3) using pull-on nut (9/2) special tool pos. no. 905.3.34.502.1. Turn round pull-on nut after some turns for perfect seat of joint eye.

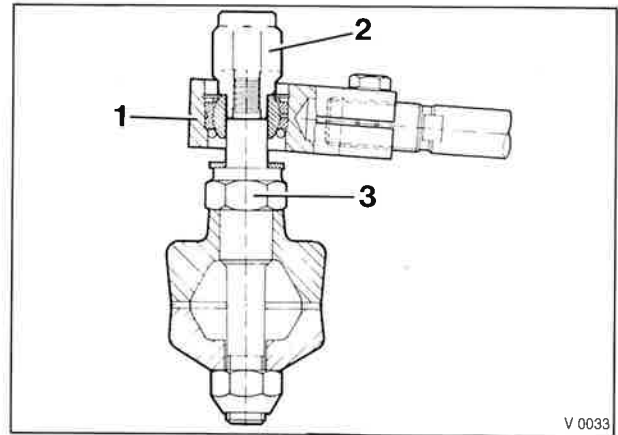


Fig. 9

- 8 Insert new top O-ring (2/5) and shaped disk (2/4). Tighten new, self-locking hexagon nut (2/2) with ring spanner socket size 17 special tool pos. no. 905.3.45.001.2 and torque spanner special tool pos. no. 001 589 66 21 00 to 60 Nm (10).

WARNING: Mark the duly tightened nut to tension screw as well as the tightened and secured crown nuts of ball joints with a white colour dot for easier check-up.

- 9 Grease joint eye and exterior joint end with a grease gun (SKF-grease Alfabub LMGE 2) until grease leaks laterally.

- 10 Fit wheel.

- 11 Put vehicle on wheels and tighten wheel screws or ball collar screws resp. to 200 Nm.

- 12 Check toe-in, adjusting see section 1.12/1-15.

- 13 Tighten hexagon nuts of track rod with open-ring spanner socket size 32 special tool pos. no. 905.0.15.010.1 and torque spanner special tool pos. no. 001 589 66 21 00 to 80 Nm (11) and take care that **both** ball joints sit close in tightening direction. Then check entire action space of ball joints by twisting track rod into both directions.

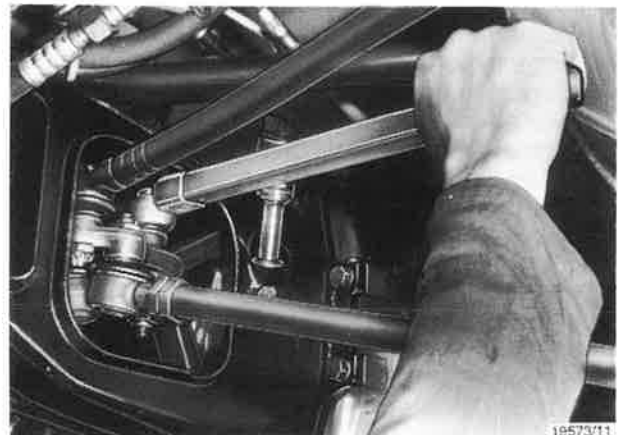


Fig. 10

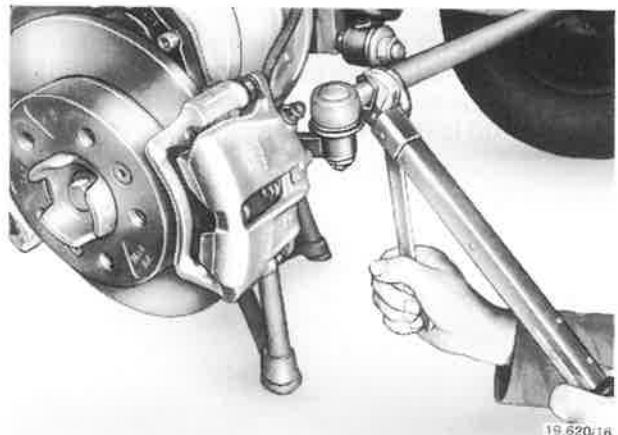


Fig. 11

1.20 Change left track rod

Includes:

Checking, adjusting toe-in see section 1.12/1-15

Tools:

Open-ring spanner socket size 32 905.0.15.010.1

Track rod end extractor 905.3.33.502.0

Ring spanner socket size 22 905.3.45.501.2

Torque spanner 1/2"

25-130 Nm 001 589 66 21 00

Torque spanner 3/4"

75-400 Nm standard

Removing:

- 1 Lift vehicle with jack at axle housing of front axle until wheels just clear of the ground. Arrange suitable resting trestles under the cross-beam (1).
- 2 Unscrew left wheel.
- 3 Steer a bit to the left, remove ball joint split pins of track rod and screw off crown nuts. Press out interior (2) and exterior ball joint (3) with track rod end extractor special tool pos. no. 905.3.33.502.0.

Fitting:

WARNING: Track rod is a safety component and must not be straightened when having been deformed.

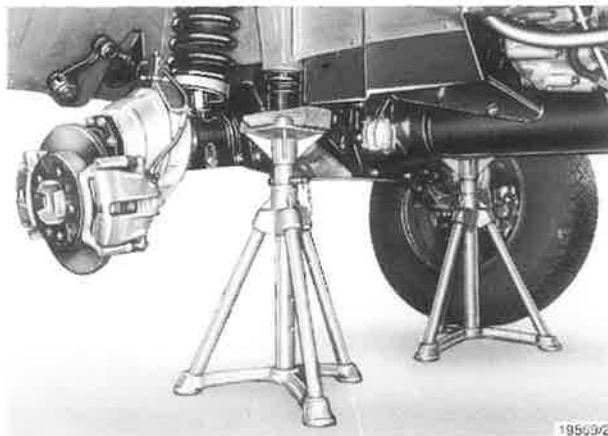


Fig. 1

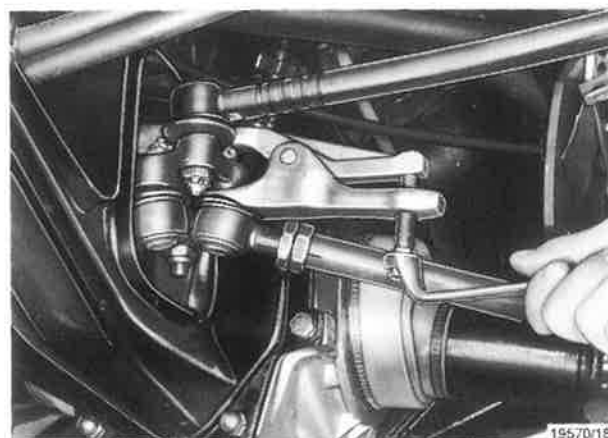


Fig. 2

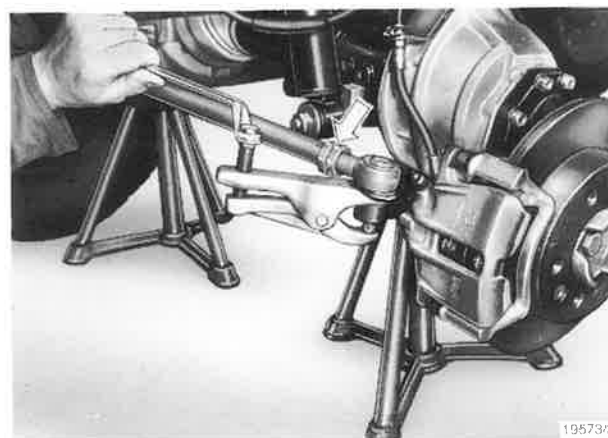


Fig. 3

- 4 Adjust new track rod to length of dismantled one. For this purpose adjust both ball joints equally. Degrease cone in track arm and drag link arm as well as taper of ball joints. Insert ball joint with lefthand thread - distinguishable by the marked counter nut (3) - at track arm. Insert ball joint with righthand thread into drag link arm observing that split pin hole is parallel to longitudinal axis of drag link arm (4/4).

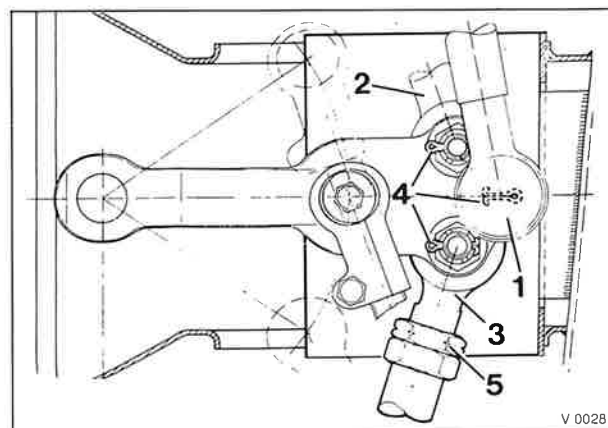


Fig. 4

- 5 Attach crown nuts and tighten interior ball joint (5) with ring spanner socket size 22 special tool pos. no. 905.3.45.501.2 and exterior ball joint (6) with customary box spanner socket and torque spanner special tool pos. no. 001 589 66 21 00 to 80 Nm and attach split pin.

WARNING: Mark the duly tightened and secured crown nuts of ball joints with a white colour dot for easier check-up.

- 6 Fit wheel.
- 7 Put vehicle on wheels and tighten wheel screws or ball collar screws resp. to 200 Nm.
- 8 Check toe-in, adjusting see section 1.12/1-15

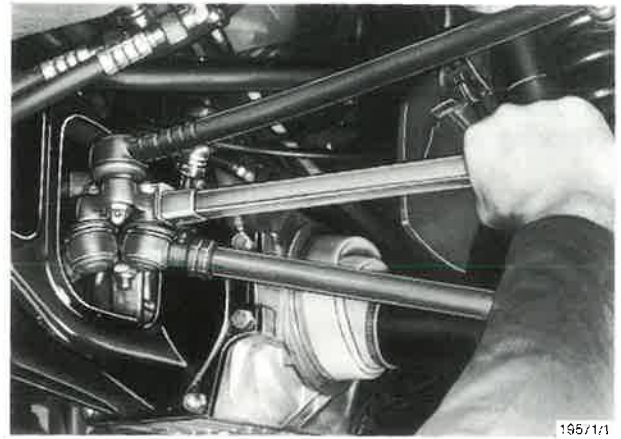


Fig. 5

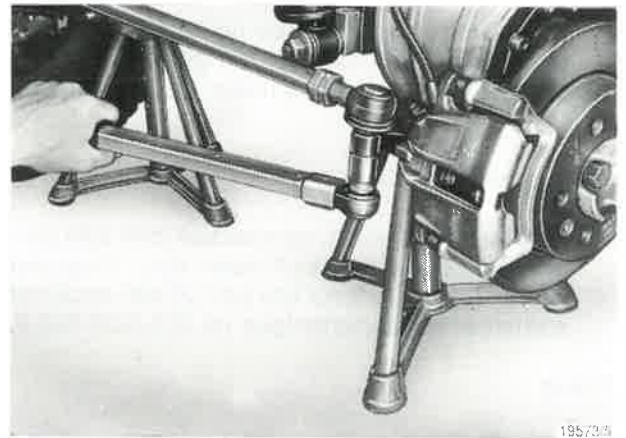


Fig. 6

- 9 Tighten hexagon nuts of track rod with open-ring spanner socket size 32 (7/1) special tool pos. no. 905.0.15.010.1 and torque spanner (7/2) special tool pos. no. 001 589 66 21 00 to 80 Nm and take care that **both** ball joints sit close in tightening direction. Then check entire action space of ball joints by twisting the track rod into both directions.

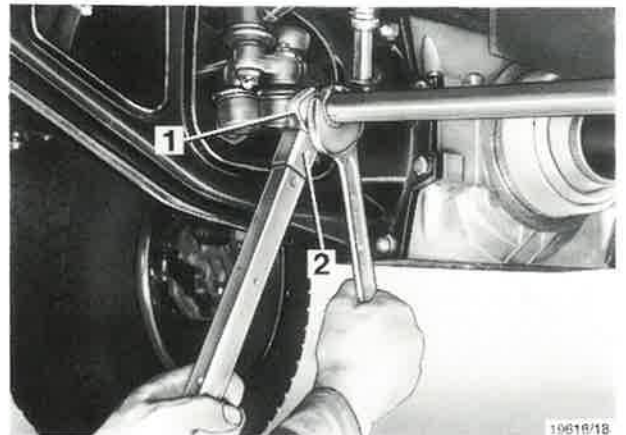


Fig. 7

1.21 Check ball joints

- 1 Coast vehicle on even area in straight-ahead position.
- 2 Clasp ball joint and pertaining lever for checking with thumb and forefinger (1).
- 3 Turn steering wheel alternately to the left and right. There must be no noticeable play.
- 4 Check sealing bellows for damage.

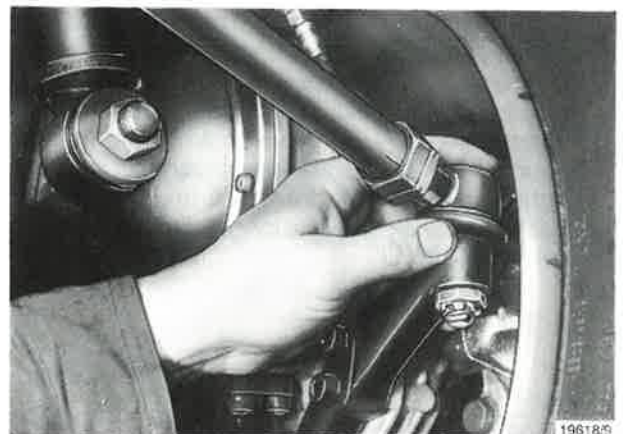


Fig. 1

1.22 Change exterior ball joints of track rods

Includes:

Checking, adjusting toe-in see section 1.12

Tools:

Open-ring spanner socket size 32 905.0.15.010.1

Track rod end extractor 905.3.32.502.0

Torque spanner 1/2"

25-130 Nm 001 589 66 21 00

Torque spanner 3/4"

75-400 Nm standard

Removing:

NOTE: The description refers to changing exterior ball joint of the left track rod. When changing exterior ball joint of right track rod proceed in the same way.

- 1 Lift vehicle with jack at axle housing of front axle until wheels just clear of the ground. Arrange suitable resting trestles under the center-beam (1).
- 2 Unscrew left wheel.
- 3 Loosen hexagon nut (2).
WARNING: Lefthand thread.

- 4 Remove split pin and unscrew crown nut. Press out ball joint with track rod end extractor special tool pos. no. 905.3.32.502.0 (3).
- 5 Detach ball joint together with taper ring and count number of unscrewing turns.

Fitting:

- 6 Transfer hexagon nut and taper ring to the new ball joint. Spray thread in track rod tube with Loctite-Anti-Seize and screw in ball joint acc. to number of counted turns.
- 7 Degrease taper of ball joint and cone in track arm. Insert ball joint, attach crown nut, tighten to 80 Nm (4) and attach split pin.

WARNING: Mark the duly tightened and secured crown nut with a white colour dot for easier check-up.

- 8 Fit wheel.
- 9 Put vehicle on wheels and tighten wheel screws or ball collar screws resp. to 200 Nm.

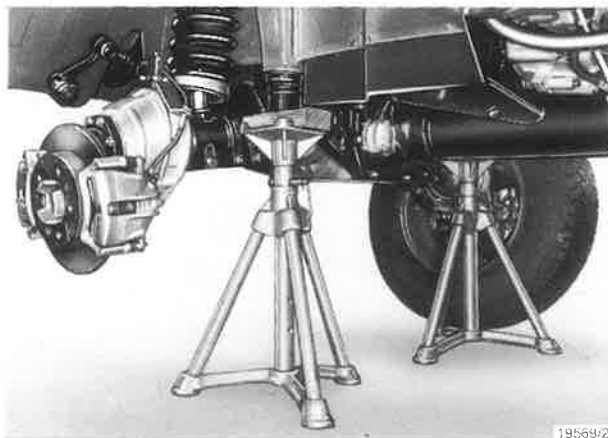


Fig. 1

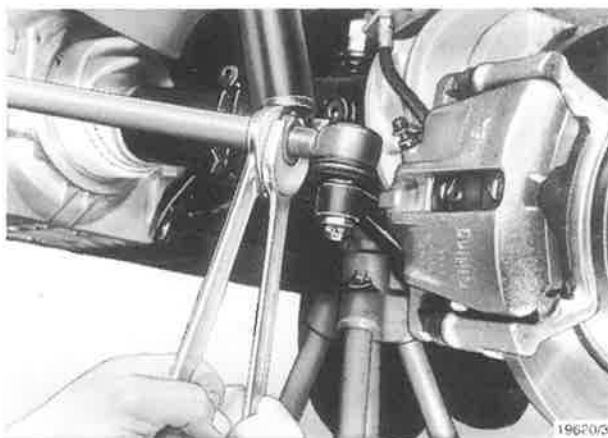


Fig. 2

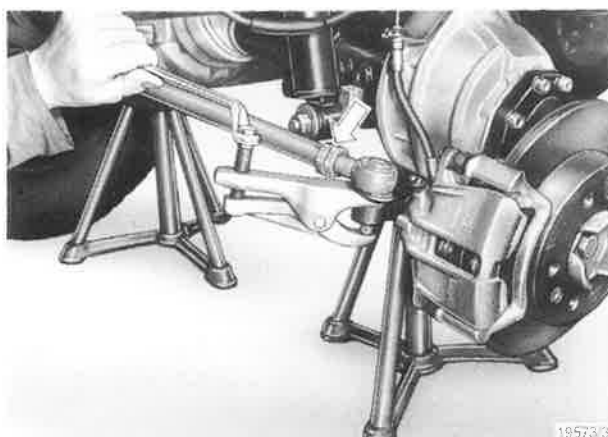


Fig. 3

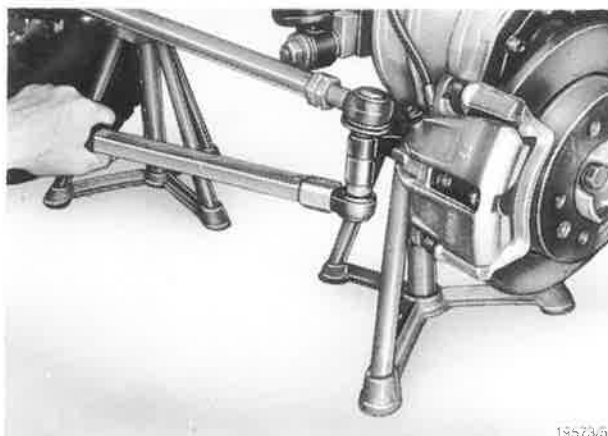


Fig. 4

- 10 Check, adjust toe-in, see section 1.12.
- 11 Tighten hexagon nut of track rod with open-ring spanner socket, size 32, (5/1) special tool pos. no. 9005.0.15.010.1 and torque spanner (5/2) special tool pos. no. 001 589 66 21 00 to 80 Nm and take care that **both** ball joints sit close in tightening direction. Then check entire action space of ball joints by twisting the track rod into both directions.

1.23 Change interior ball joint of right track rod

Includes:

Checking, adjusting toe-in see section 1.12

Tools:

Open-ring spanner socket size 32	905.0.15.010.1
Track rod end extractor	905.3.33.502.0
Pull-on nut for joint eye	905.3.34.502.1
Ring spanner socket size 17	905.3.45.001.2
Ring spanner socket size 22	905.3.45.501.2
Torque spanner 1/2"	
25-130 Nm	001 589 66 21 00
Torque spanner 3/4"	
75-400 Nm	standard

Removing:

- 1 Lift vehicle with jack at axle housing of front axle until wheels just clear of the ground. Arrange suitable resting trestle right below cross-beam (1).
- 2 Steer a bit to the left and loosen hexagon nut (2/2). Press off joint eye (2/3) to servo-steering hydraulic cylinder with a general-purpose spoon from tension screw (3). Detach shaped disk (2/4) and top O-ring (2/5).

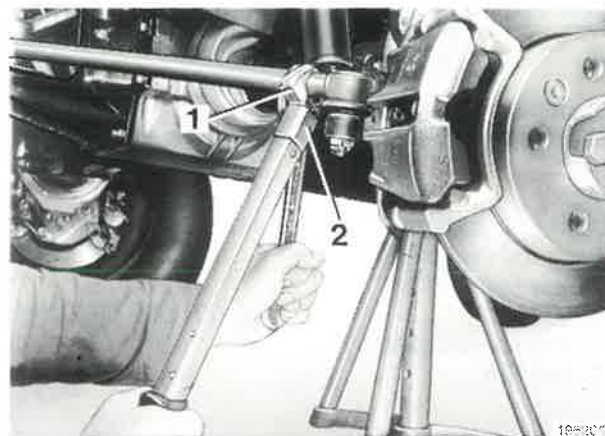


Fig. 5



Fig. 1

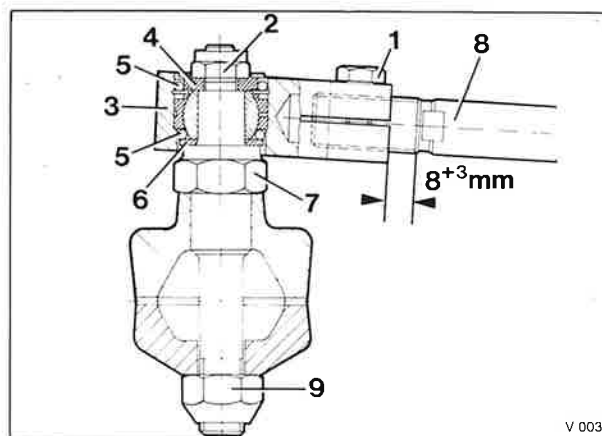


Fig. 2

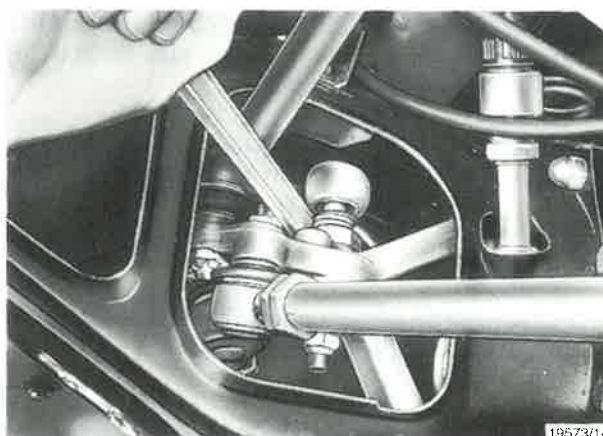


Fig. 3

- 3 Loosen hexagon nut (4).
WARNING: Left-handed thread

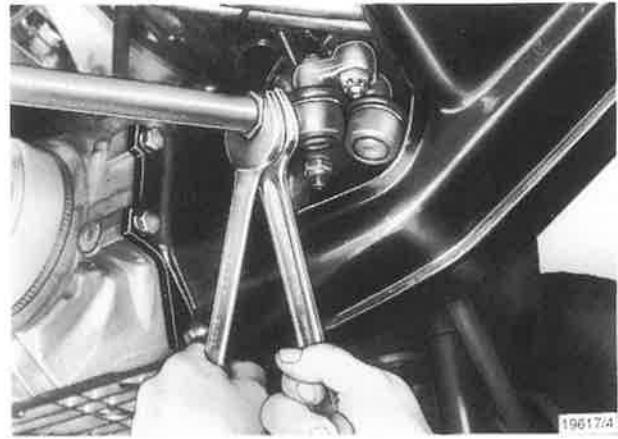


Fig. 4

- 4 Remove split pin and unscrew crown nut. Press out ball joint with track rod end extractor special tool pos. no. 905.3.32.502.0 (5).
5 Remove ball joint together with taper ring and count number of unscrewing turns.

Fitting:

- 6 Transfer hexagon nut and taper ring to the new ball joint. Spray thread in track rod tube with Loctite-Anti-Seize and screw in ball joint acc. to number of counted turns.
7 Degrease taper of ball joint and cone in drag link arm. Insert ball joint. Take care that split pin hole is parallel to drag link arm longitudinal axis (6/4).

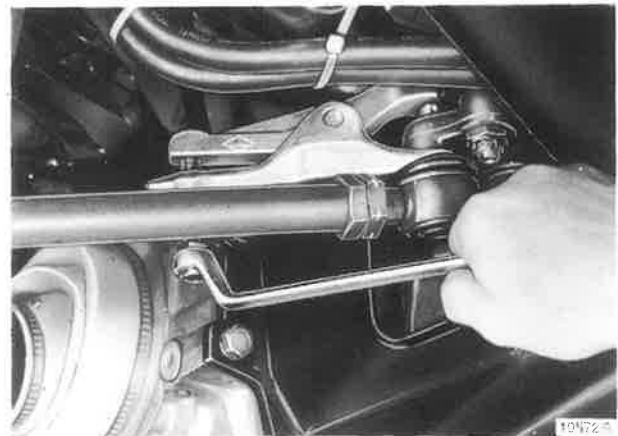


Fig. 5

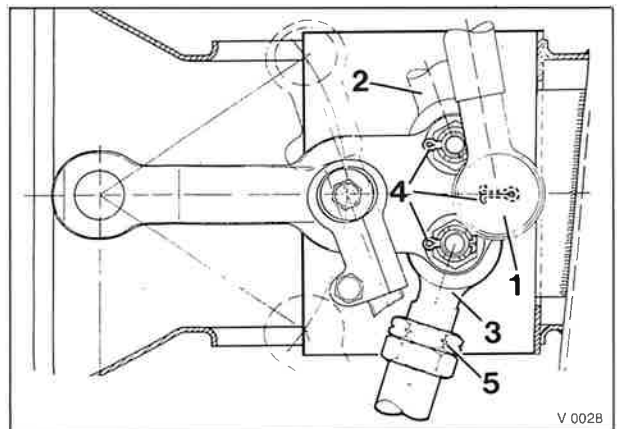


Fig. 6

- 8 Attach crown nut and tighten ball joint with ring spanner socket size 22 special tool pos. no. 905.3.45.501.2 and torque spanner special tool pos. no. to 80 Nm (7) and attach split pin.

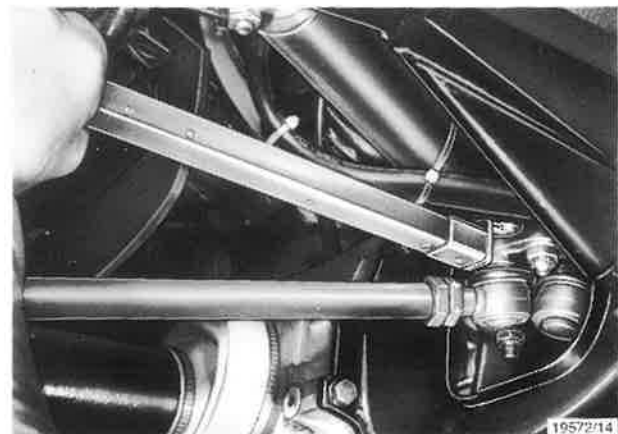


Fig. 7

- 9 Clean tension screw (2/7) and put on disk (2/6) again with bevelled side pointing downwards. Fix new bottom O-ring with standard grease in joint eye. Pull on cleaned joint eye (8/1) to tension screw (8/3) using pull-on nut (8/2) special tool pos. no. 905.3.34.502.1. Turn round pull-on nut after some turns for perfect seat of joint eye.

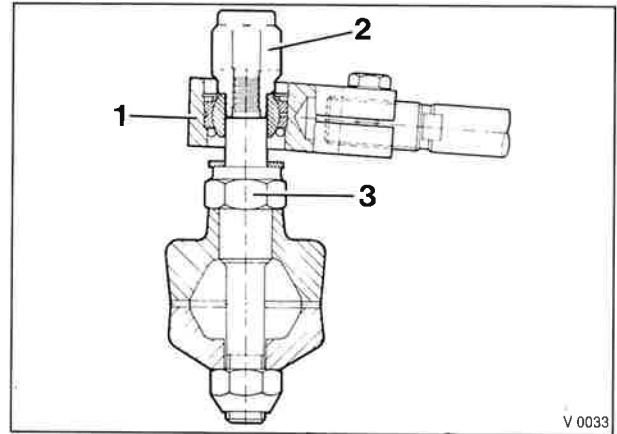


Fig. 8

- 10 Insert new top O-ring (2/5) and shaped disk (2/4). Tighten new, self-locking hexagon nut (2/2) with ring spanner socket, size 17, special tool pos. no. 905.3.45.001.2 and torque spanner special tool pos. no. 001 589 66 21 00 to 60 Nm (9).

WARNING: Mark the tightened nut to tension screw as well as the tightened and secured crown nut of ball joint with a white colour dot for easier check-up.

- 11 Grease joint eye with a grease gun (SKF-grease Alfalub LGME 2) until grease leaks laterally.
- 12 Fit wheel.
- 13 Put vehicle on wheels and tighten wheel screws or ball collar screws resp. to 200 Nm.
- 14 Check, adjust toe-in, see section 1.12.
- 15 Tighten hexagon nut of track rod with open-ring spanner socket (10/1), size 32, special tool pos. no. 905.0.15.010.1 and torque spanner (10/2) special tool pos. no. 001 589 66 21 00 to 80 Nm and take care that **both** ball joints sit close in tightening direction. Then check free play of ball joints by twisting track rod into both directions.

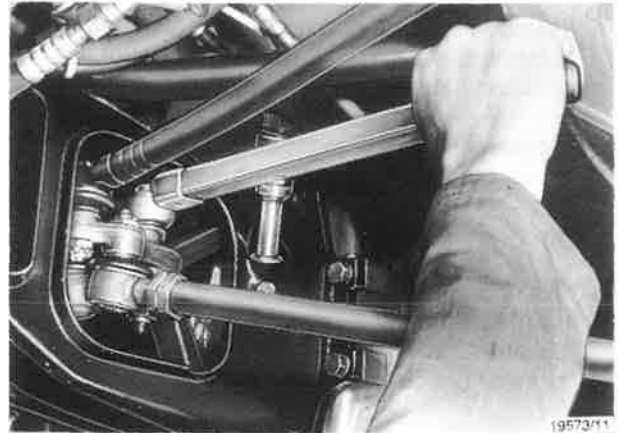


Fig. 9

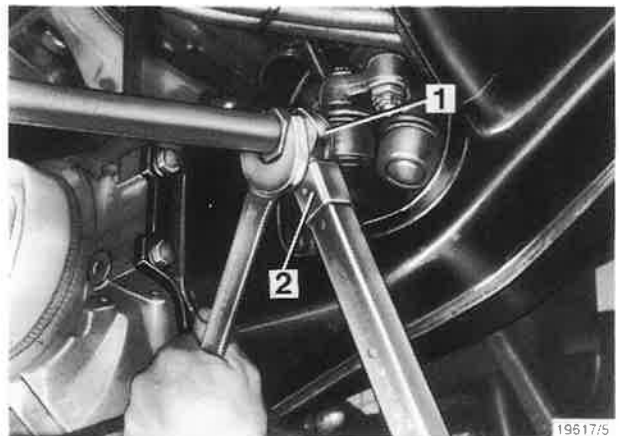


Fig. 10

1.24 Change interior ball joint of left track rod

Includes:

Checking, adjusting toe-in see section 1.12

Tools:

Open-ring spanner socket size 32 905.0.15.010.1

Track rod end extractor 905.3.33.502.0

Ring spanner socket size 22 905.3.45.501.2

Torque spanner 1/2"

25-130 Nm 001 589 66 21 00

Removing:

- 1 Loosen hexagon nut (1).
- 2 Steer wheels to the left. Remove split pin and unscrew crown nut. Press out ball joint with track rod end extractor special tool pos. no. 905.3.33.502.0 (2).
- 3 Detach ball joint together with taper ring and count number of unscrewing turns.

Fitting:

- 4 Transfer hexagon nut and taper ring to the new ball joint. Spray thread in track rod tube with Loctite-Anti-Seize and screw in ball joint acc. to number of counted turns.
- 5 Degrease taper of ball joint and cone in drag link arm. Insert ball joint. Take care that split pin hole is parallel to drag link arm longitudinal axis (3/4).

- 6 Attach crown nut and tighten ball joint with ring spanner socket, size 22, special tool pos. no. 905.3.45.501.2 to 80 Nm (4) and attach split pin.

WARNING: Mark the tightened and secured crown nut with a white colour dot for easier check-up.

- 7 Check, adjust toe-in, see section 1.12.

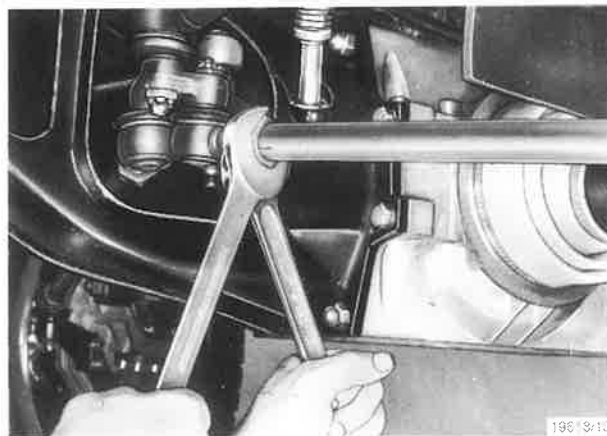


Fig. 1

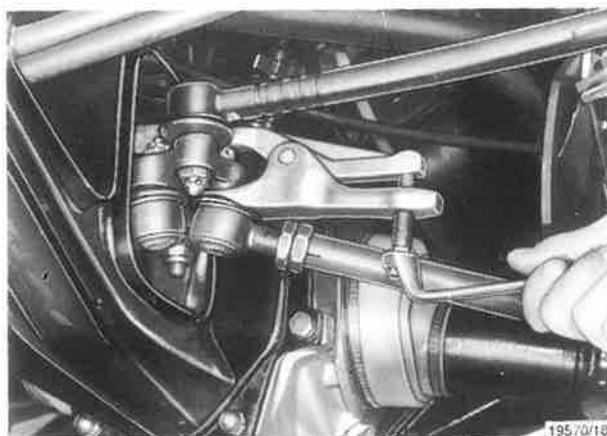


Fig. 2

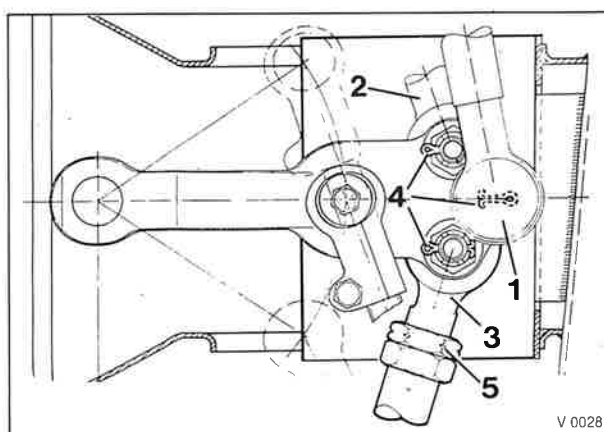


Fig. 3

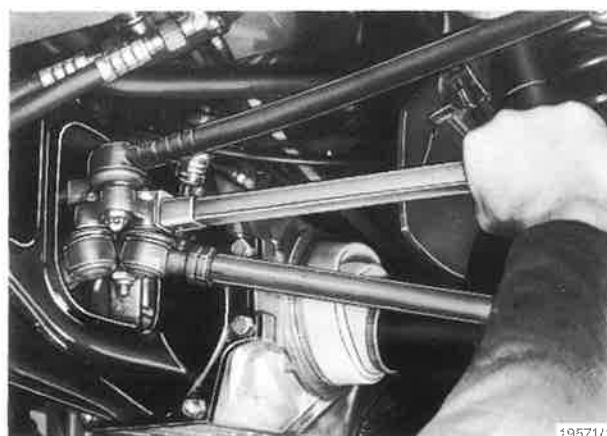


Fig. 4

- 8 Tighten hexagon nut of track rod with open-ring spanner socket, size 32, (5/1) special tool pos. no. 905.0.15.010.1 and torque spanner (5/2) special tool pos. no. 001 589 66 21 00 to 80 Nm taking care that **both** ball joints sit close in tightening direction. Then check movability of ball joints by twisting track rod into both directions.

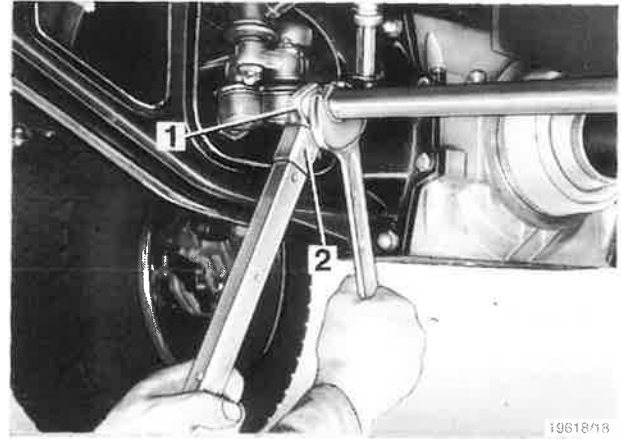


Fig. 5

1.25 Hydraulic steering unit - oil filling, bleeding

- 1 Remove covering and engine cover (1/1).
- 2 Loosen small reservoir plug (2/1) and fill reservoir (2/3) with hydraulic oil up to max. mark.
- 3 Lift vehicle with movable jack at axle housing of front axle until wheels just clear of ground.
- 4 Start engine and let idle.

WARNING: Do not let engine idle in enclosed spaces without ventilation.

- 5 Bleed steering unit by turning steering wheel several times from stop to stop. Steering unit is bled completely when air bubbles have stopped rising or there is no more foaming resp. and oil level remains unchanged.

NOTE: During bleeding ensure there is sufficient hydraulic oil in reservoir.

- 6 Stop engine and lower front axle. Rectify reservoir oil level when vehicle is in horizontal position, i.e. fill up or suck off resp. to max. level if necessary.

NOTE: Minor rising of oil level (abt. 2-3 mm) after stopping of engine is characteristic for the facility and quite normal.

- 7 Attach reservoir plug (2/1).
- 8 Fit engine cover (1/1) and covering.

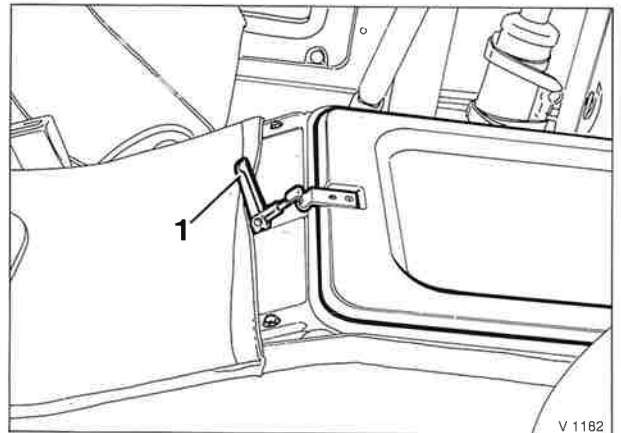


Fig. 1

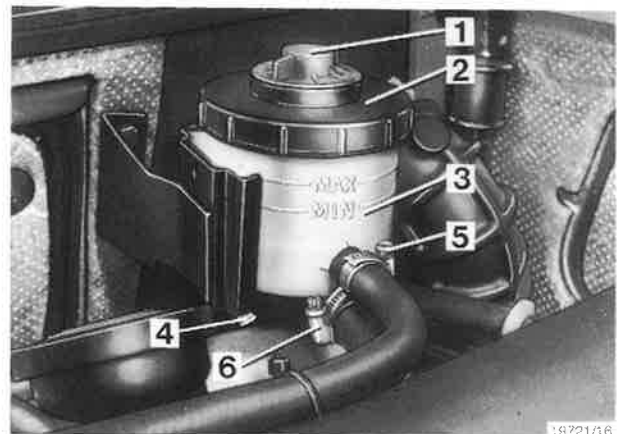


Fig. 2

1.26 Change suction pipe

Includes:

Hydraulic steering unit - oil filling, bleeding see section 1.25

Removing:

- 1 Remove covering and engine cover (1/1).

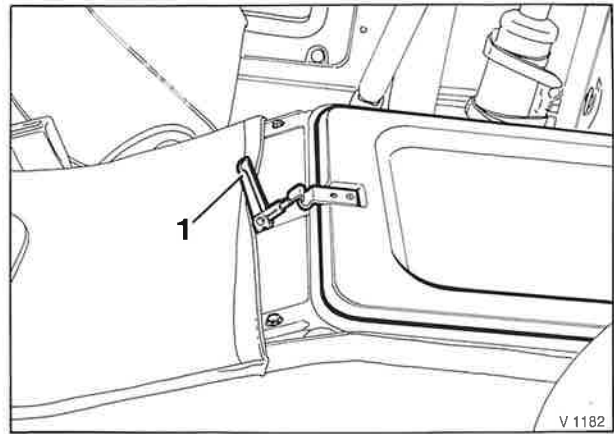


Fig. 1

- 2 Loosen large reservoir plug (2/1). Compress retention catches left and right at bottom side of oil reservoir (2/2) with thumb and forefinger and pull reservoir simultaneously upwards out of bracket. Detach plug (2/1) and pressure spring. Drain reservoir and pipes. Do not lose filter and filter bracket. After draining complete reservoir again and put into bracket.
- 3 Cut through cable clip (2/4).
- 4 Loosen suction pipe hose clips at reservoir (2/5) and at servo-steering pump (2/6) and detach hose.

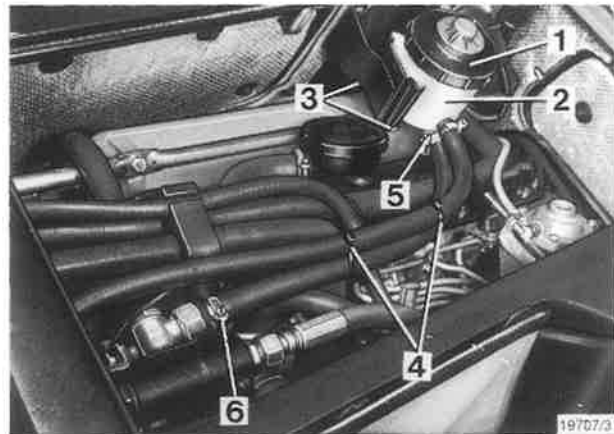


Fig. 2

Fitting:

- 5 Fix new hose with hose clips and mount cable clip in identical position - see fig 2.

NOTE: Tighten cable clips only moderately in order not to crush the hose.

- 6 Hydraulic steering unit - oil filling, bleeding see section 1.25
- 7 Fit engine cover and covering.

1.27 Change return hose

Includes:

Removing and fitting driver's seat see group 171/section ***/1-5 and 8

Hydraulic steering unit - oil filling, bleeding see section 1.25

Removing:

- 1 Remove driver's seat, see group 171/section 1-5.
- 2 Remove covering and engine cover.
- 3 Remove left maintenance cover (1).
- 4 Loosen large reservoir plug (2/2). Compress retention catches (2/4) right and left at the bottom side of oil reservoir (2/3) with thumb and forefinger and pull reservoir simultaneously upwards out of bracket. Detach plug (2/2) and pressure spring. Drain reservoir and hoses. Do not lose filter and filter bracket. After draining complete again oil reservoir and put into bracket.
- 5 Loosen hose clip (2/5). Pull off return hose and detach clip. Plug hose and connection at reservoir provisionally.
- 6 Cut through both cable clips (3/1) and take out return pipe (3/2) from hose guide (3/3). Pull off clip (3/4) for fixing accelerator cable.

NOTE: For better illustration the figure has been made with removed engine cover.

- 7 Also cut through both cable clips (4/1) at the bottom side of the floor pan and screw off retaining clip (4/2).
- 8 Pull return hose downwards through clip (3/5) at fan ring and drain. Reattach provisional plug.

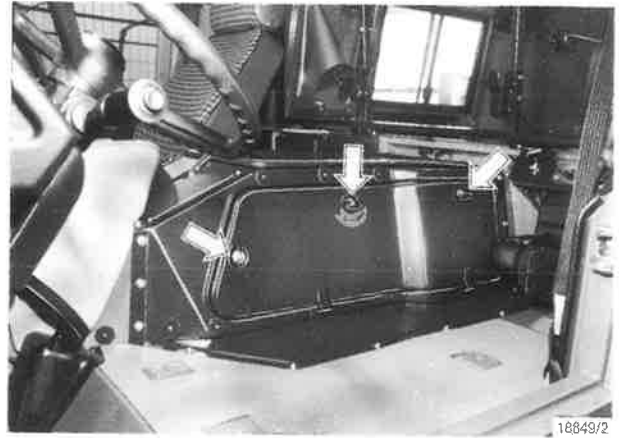


Fig. 1

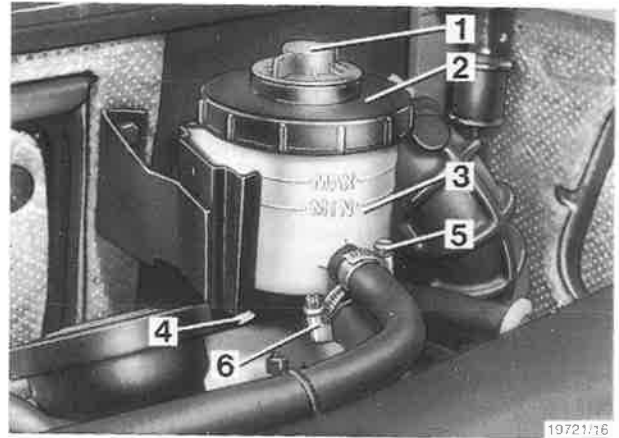


Fig. 2

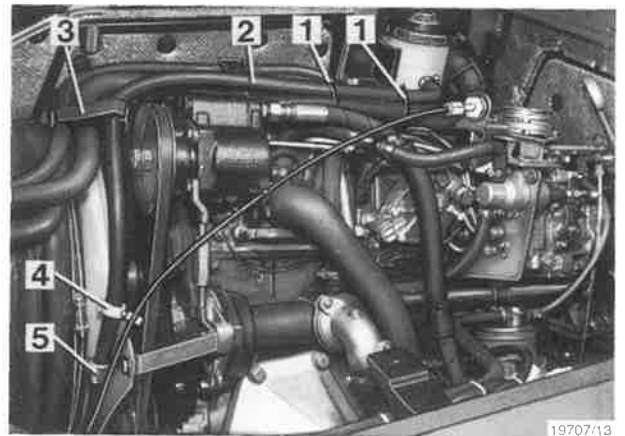


Fig. 3

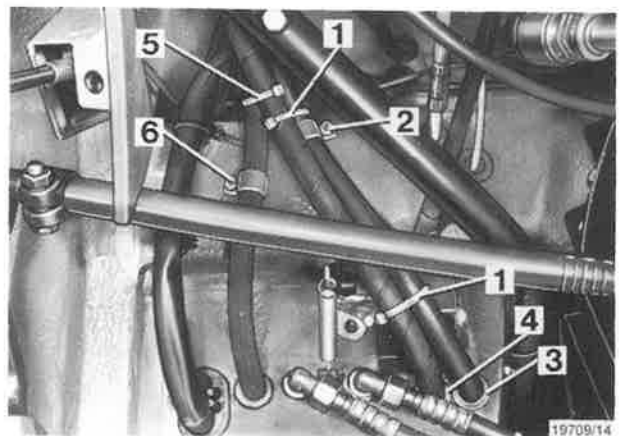


Fig. 4

9 Detach knee guard (5/1).

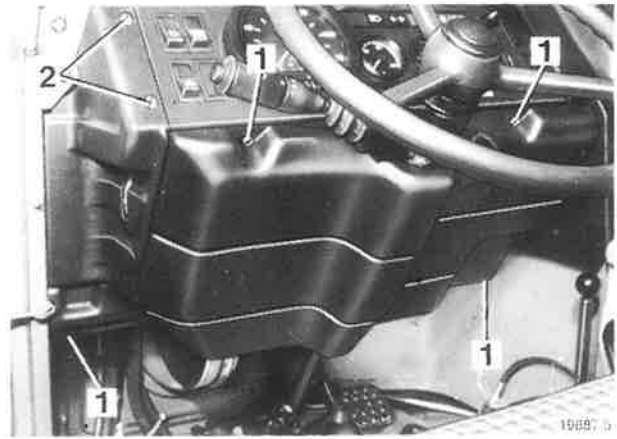


Fig. 5

10 Loosen quick fasteners (6) of left floor plate and remove floor plate.

11 Cut through seven cable clips (7/5 and 7/6) along the return hose.

12 Place a cleaning rag below connection at cylindrical rotary valve. Loosen hose clip (8/1) and pull off return hose (8/2).

13 Close hose with a short stable plug provisionally and fix a not too thin string with clip (8/2) to assist inserting. Pull out hose carefully downwards and disconnect inserting string and detach hose clip resp.

14 Remove return hose with rubber grommet and retaining clip at floor pan.



Fig. 6

Fitting:

15 Fitting is made in reverse sequence observing the following points:

- Before fitting place rubber grommet and retaining clip at approximately identical position at new return hose.
- Blow through return hose with filtered compressed air and plug provisionally for mounting.
- Tighten cable clip only moderately. Hose dia must not be narrowed.
- Fit driver's seat, see group 171/section ***/8.
- Hydraulic steering unit - oil filling, bleeding, see section 1.25.

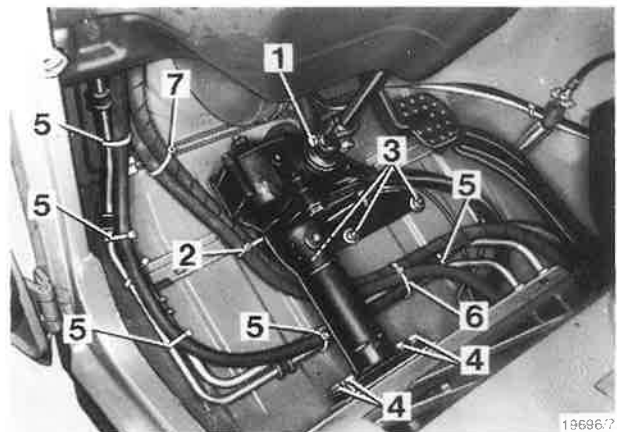


Fig. 7

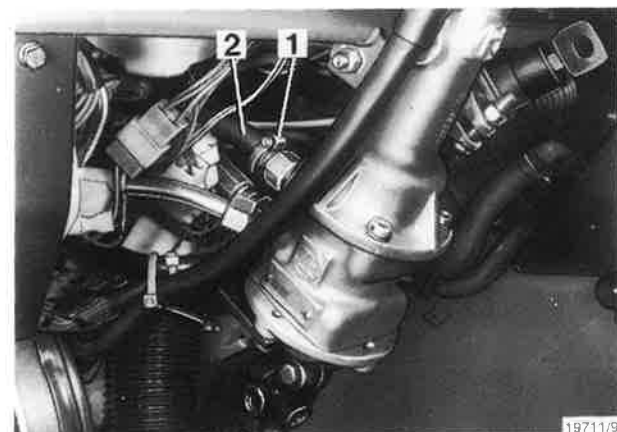


Fig. 8

1.28 Change pressure hose between servo-steering pump and cylindrical rotary valve

Includes:

Removing and fitting driver's seat see group 171/section ***/1-5 and 8

Hydraulic steering unit - oil filling, bleeding see section 1.25

Removing:

- 1 Remove driver's seat see group 171/section ***/1-5.
- 2 Remove covering and engine cover.
- 3 Remove left maintenance cover (1).
- 4 Loosen union nut (2/1). To do so back up at screw neck, plug pipe provisionally.
- 5 Cut through both cable clips (2/2 and 2/3).

NOTE: For better illustration the figure has been made with engine cover removed.



Fig. 1

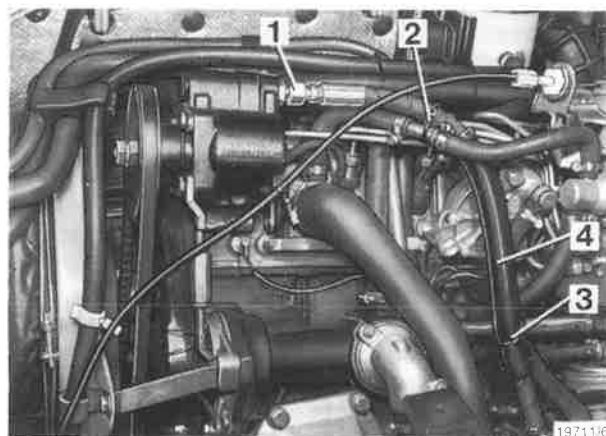


Fig. 2

- 6 Cut through cable clips (3/1) at cooling water tubes as well as at bottom side of floor pan (4/1 and 4/5).
- 7 Pull pressure hose through cable clip (3/2) at support tube to engine mounting downwards and drain. Reattach provisional plug.

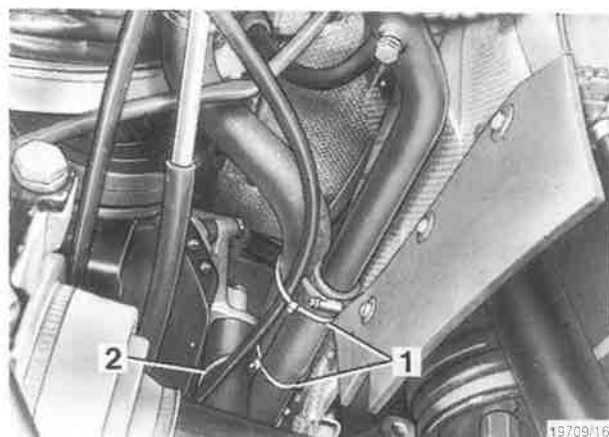


Fig. 3

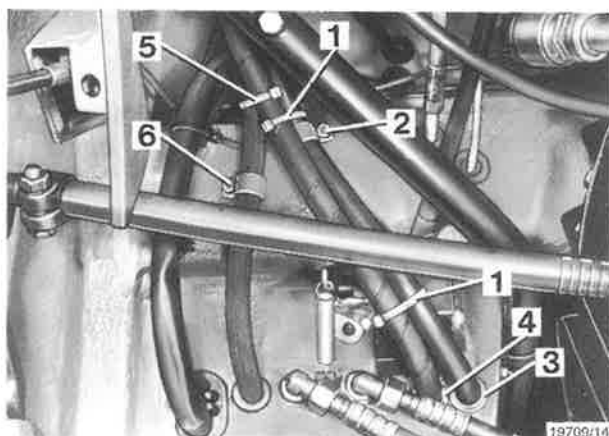


Fig. 4

- 8 Pull off key from steering lock and detach knee guard (5/1).

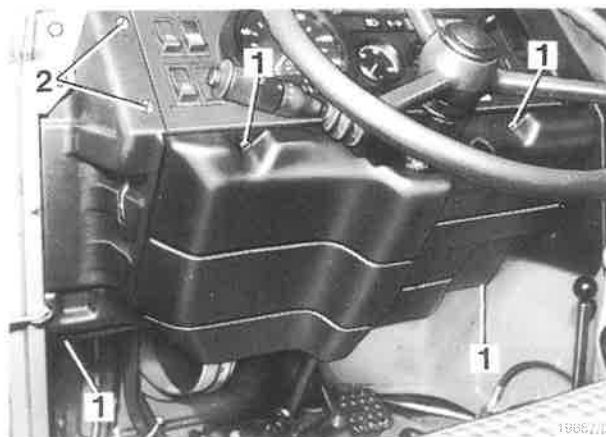


Fig. 5

- 9 Loosen quick fasteners (6) of left floor pan and remove floor pan.



Fig. 6

- 10 Cut through three cable clips (7/2, 7/6 and 7/7) along pressure hose.

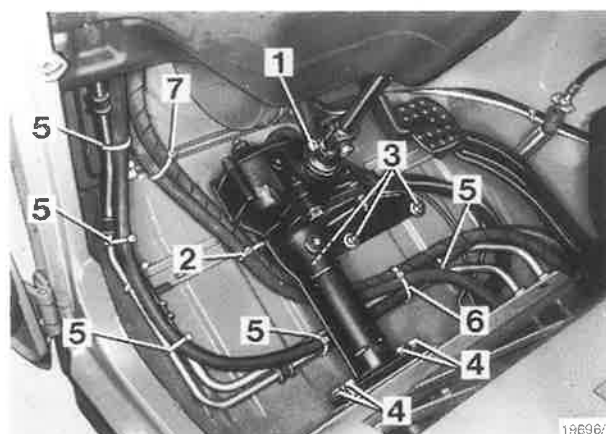


Fig. 7

- 11 Pull off air hose (8/1) from air distributor (8/2) and take out from cable clip (8/3).

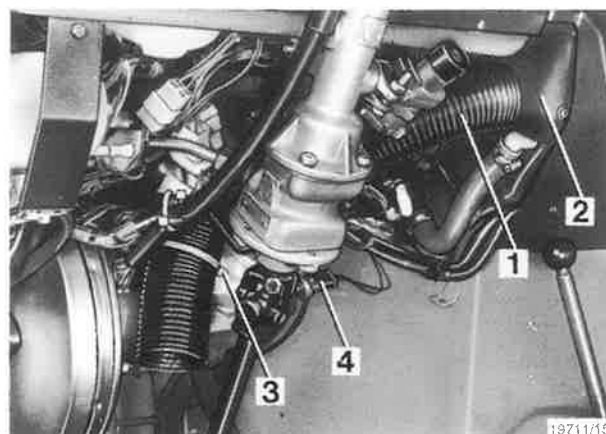


Fig. 8

- 12 Arrange a cleaning rag below screw neck of right tubing and of pressure hose at cylindrical rotary valve. While backing up the respective screw neck unscrew union nut (9/1) of right tubing first and pull tubing out of screw neck. Then unscrew pressure hose (9/2) and plug provisionally.

NOTE: For better illustration the figure (9) has been made with steering lock removed.

- 13 Fix a not too thin string to assist drawing-in behind the union nut at pressure hose and pull out hose carefully downwards. Loosen draw-in string and take away pressure hose with rubber grommet (4/4) at floor pan.

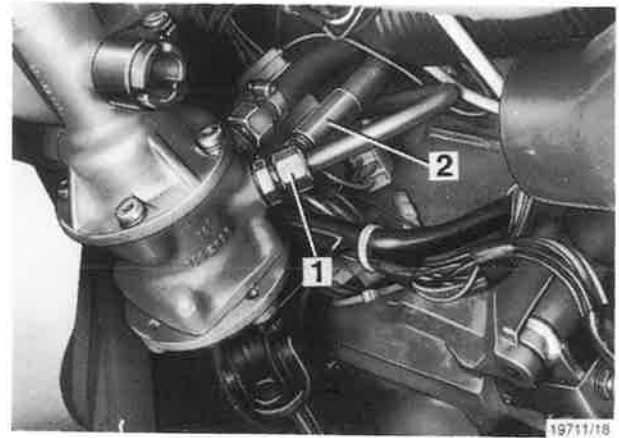


Fig. 9

Fitting:

- 14 Fitting is made in reverse sequence observing the following points:
- Before fitting place rubber grommet in approximately identical position at new pressure hose.
 - Blow through pressure hose with filtered compressed air and plug provisionally for mounting
 - Use union nuts of old pressure hose.
 - Fitting cutting rings see under "Generals".
 - Attach cable clips again in identical position, as shown.
 - Position protection hose (2/4) acc. to fig. 2.
 - Fit driver's seat, see group 171/section ***/8.
 - Hydraulic steering unit - oil filling, bleeding, see section 1.25.

1.29 Change tubings from cylindrical rotary valve to bulkhead stuffing boxes at floor pan

Includes:

Changing, removing and fitting steering gear see section 1.9/1-11, 13-23

Changing, removing and fitting complete pedal bracket see group 130/section 1.4

Hydraulic steering unit - oil filling, bleeding see section 1.25

NOTE: Description and figures refer to changing of right tubing. When changing left tubing, proceed in the same way. Steps "removing and fitting pedal bracket" are not applicable.

Removing:

- 1 Pull off key from steering lock and detach knee guard (1/1).
- 2 Remove steering gear see section 1.9/1-11.
- 3 Cut through cable clips (2) along tubing.
- 4 Remove pedal bracket see group 130/section 1.4/2-8.
- 5 Loosen union nut (3) of tubing backing up bulkhead stuffing box and pull out tubing. Catch leaking hydraulic oil in a suitable basin, plug tubing provisionally.
- 6 Loosen union nut (4/1) of tubing at cylindrical rotary valve backing up screw neck (4/2) and pull out tubing from neck. Catch leaking hydraulic oil with a cleaning rag, then plug tubing provisionally.

NOTE: For better illustration figure (4) has been made with steering lock removed.

- 7 Take tubing from floor pan and dismount union nuts.

Fitting:

- 8 Fitting is made in reverse sequence observing the following points:
 - Transfer rubber grommets (3 pieces) to the new tubing.
 - Fitting union nuts and cutting rings resp. see under "Generals".
 - Position cable clips and rubber grommets acc. to fig. 2.
 - Tighten cable clips, also retaining return hose, only moderately. Hose dia must not be narrowed.
 - Fit pedal bracket see group 130/section 1.4/9 and 10.
 - Fit steering gear see section 1.9/13-23.
 - Hydraulic steering unit - oil filling, bleeding see section 1.25.

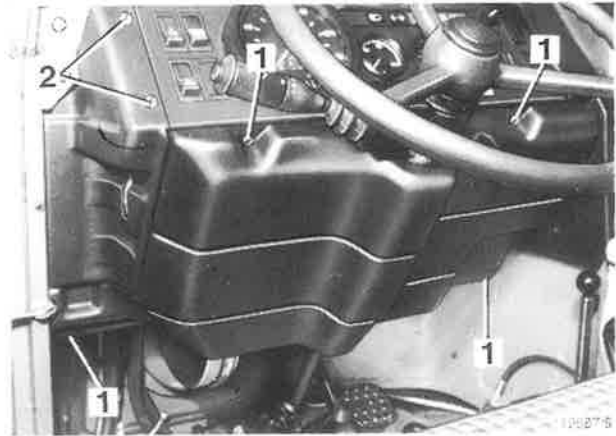


Fig. 1

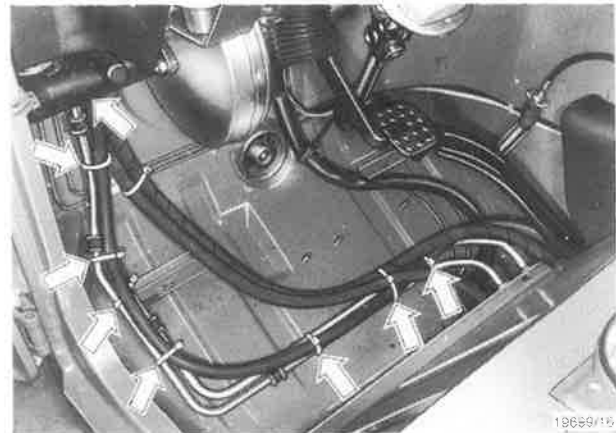


Fig. 2

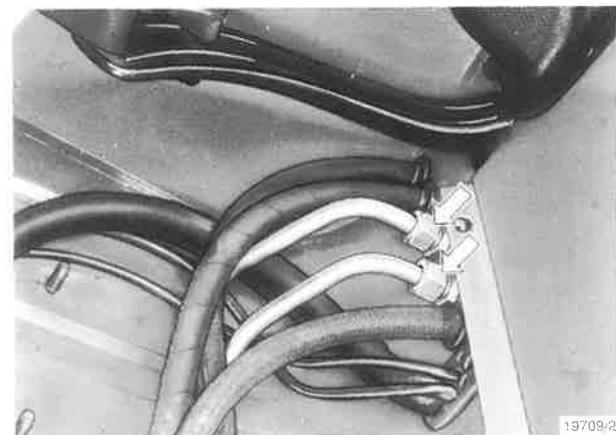


Fig. 3

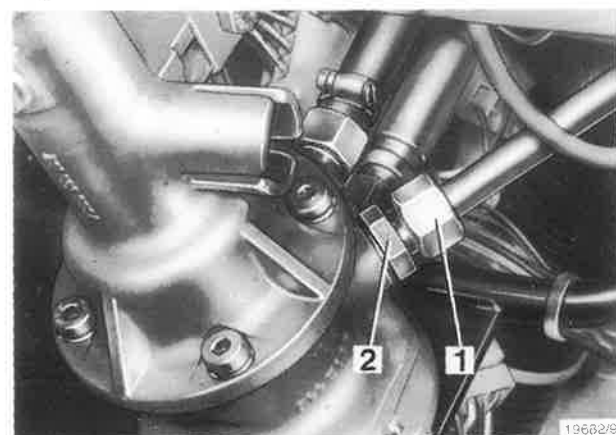


Fig. 4

1.30 Change pressure hoses from bulkhead stuffing boxes to working cylinder

Includes:

Hydraulic steering unit - oil filling, bleeding see section 1.25

Removing:

NOTE: When changing both pressure hoses, mark connecting points at bulkhead stuffing boxes and at working cylinder to each other.

- 1 Cut through cable clips (1/2 and 1/4) and loosen union nut (1/5) of the respective pressure hose at the swivelling screw fitting (1/3). Catch leaking hydraulic oil in a suitable basin. Plug pressure pipe provisionally.
- 2 Cut through cable clip (2/2) and loosen union nut (2/1) of the respective pressure hose at bulkhead stuffing boxes at the floor pan's bottom side. Catch leaking hydraulic oil in a suitable basin. Plug bulkhead stuffing box and pressure hose provisionally.
- 3 Remove pressure hose and union nuts.

Fitting:

- 4 Fitting is made in reverse sequence observing the following points:
 - Fitting cutting rings see under "Generals".
 - When both pressure hoses have been changed, check correctness of connections (A1 and A2) acc. to fig. 3.
 - Adjust cable clip (3/3) as shown.
 - Hydraulic steering unit - oil filling, bleeding see section 1.25.

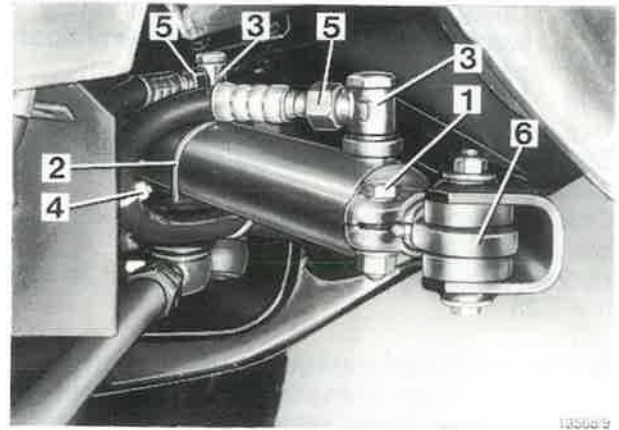


Fig. 1

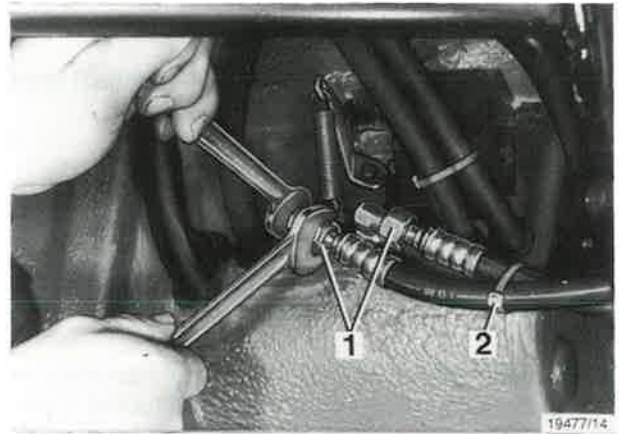


Fig. 2

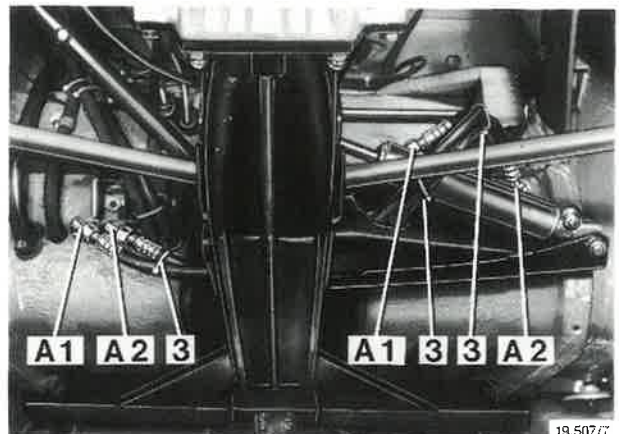


Fig. 3

1.31 Change, remove and fit oil reservoir

Includes:

Hydraulic steering unit - oil filling, bleeding see section 1.25

Removing:

- 1 Remove covering and engine cover (1/1).
- 2 Loosen large reservoir plug (2/2) as well as hose clips to return pipe (2/5) and suction pipe (2/6).
- 3 Compress retention catches (2/4) left and right at bottom side of oil reservoir (2/3) with thumb and forefinger and pull out reservoir simultaneously upwards from bracket.
- 4 Detach plug (3/2) and pressure spring (3/6), drain reservoir. Do not lose filter (3/9) and filter bracket (3/8).
- 5 Pull off return pipe and suction pipe. Catch leaking hydraulic oil in suitable basin.

Fitting:

- 6 Fitting is made in reverse sequence observing the following points:
- Check new reservoir acc. to fig. 3 for completeness and interior cleanliness.

Key for fig. 3:

- 1 - foamed material
- 2 - small reservoir plug
- 3 - seal ring
- 4 - seal ring
- 5 - large reservoir plug
- 6 - pressure spring
- 7 - reservoir
- 8 - bracket
- 9 - filter

- Do not interchange hoses when connecting.
Bottom connection = suction pipe, leads to servo-steering pump at engine
Top connection = return pipe, leads to cylindrical rotary valve at steering gear

- 7 Hydraulic steering unit - oil filling, bleeding see section 1.25.

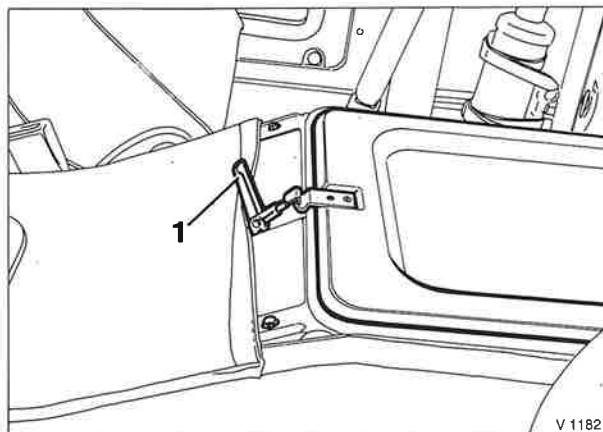


Fig. 1

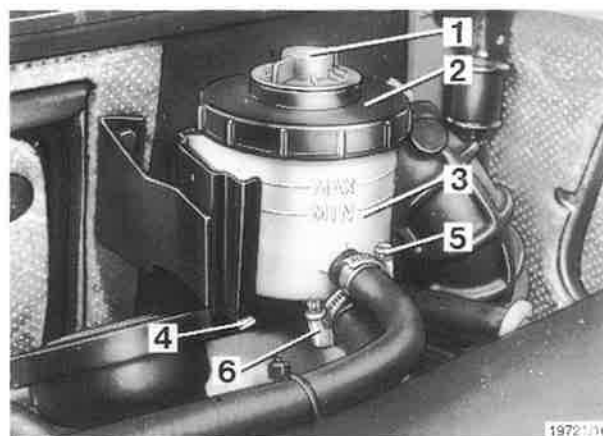


Fig. 2

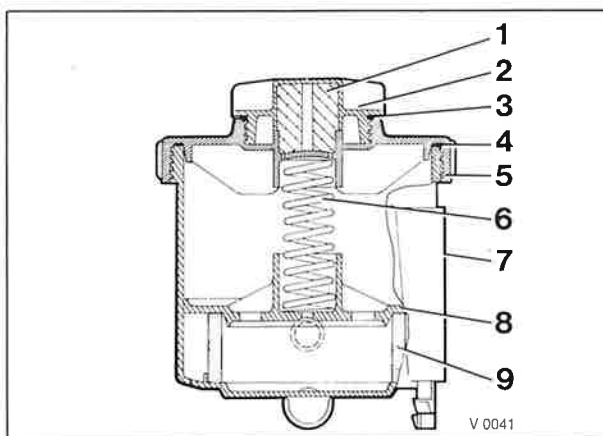


Fig. 3

1.32 Measure servo-steering pump pressure

Includes:

Bleeding steering unit see section 1.25/2, 4-8

Tools:

Pressure gauge with
shut-off valve 0-150 bar standard

- 1 Lift vehicle with jack at axle housing of front axle until wheels just clear of the ground. Arrange suitable resting trestles under cross-beam (1).

NOTE: Whole angle of steering turn must not be impeded.

- 2 Remove covering and engine cover (2/1).

- 3 Cut through cable clip (3) and loosen union nut (4/2) of pressure hose at servo-steering pump. Back up screw neck (4/3).



Fig. 1

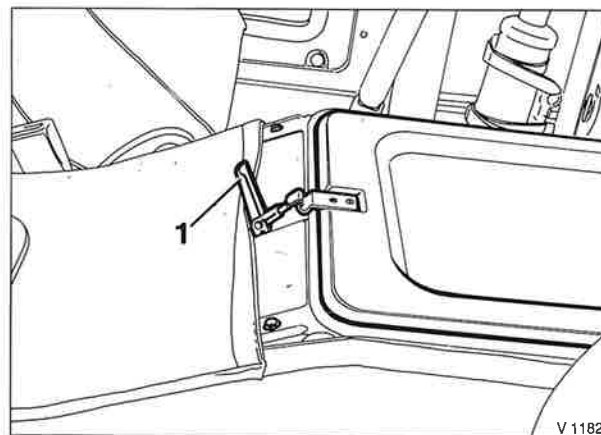


Fig. 2

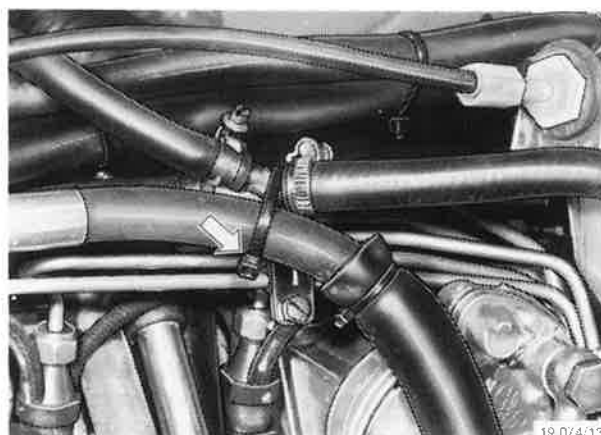


Fig. 3

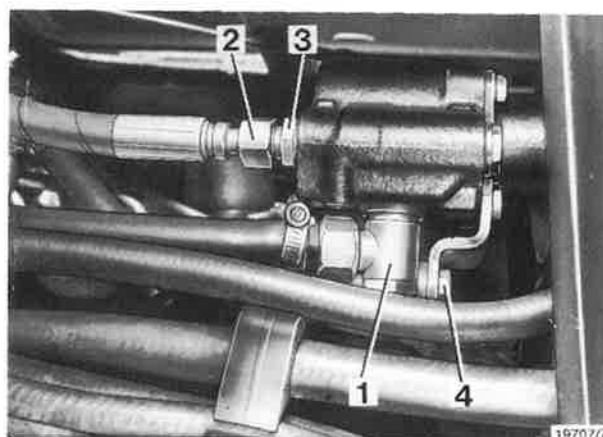


Fig. 4

- 4 Fit pressure gauge with shut-off valve between screw neck and pressure hose (5). For bleeding open shut-off valve.
- 5 Bleed steering unit, see section 1.25/2,4 and 5.
- 6 Stop engine and close shut-off valve (5).

WARNING: For careful treatment of pressure gauge actuate shut-off valve only when engine is not running.

- 7 Start engine and and increase revs. up to approx. 1200-1500 $\frac{1}{\text{min}}$. Indication must be **at least $100 \pm 10 \%$ bar** (5). If this is not the case change servo-steering pump, see section 1.33.

WARNING: For careful treatment of servo-steering pump max. working pressure must not be built up longer than 10 seconds.

- 8 Stop engine, remove pressure gauge and shut-off valve resp. Screw on pressure hose (4/2) and attach cable clip (3) in identical position.
- 9 Bleed steering unit see sect. 1.25/2,4-8.

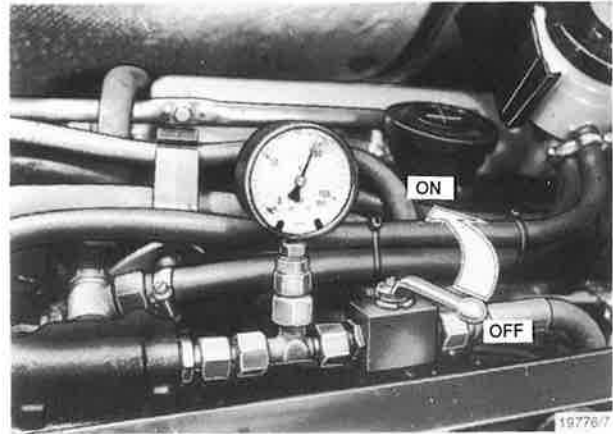


Fig. 5

1.33 Change, remove and fit servo-steering pump

Includes:

Removing and fitting driver's seat see group 171/ section ***/1-5 and 8

Hydraulic steering unit - oil filling, bleeding see section 1.25

Tools:

V-belt tension testing device	001 589 69 21 00
Torque spanner 1/2"	
25-130 Nm	001 589 66 21 00

Removing:

- 1 Remove driver's seat see group 171/ section ***/ 1-5.
- 2 Remove covering and engine cover.
- 3 Remove left maintenance cover (1).
- 4 Loosen large reservoir plug (2/2). Compress retention catches (2/4) left and right at the bottom side of oil reservoir (2/3) with thumb and forefinger and pull out reservoir simultaneously upwards from bracket. Detach plug (2/2) and pressure spring, drain reservoir and hoses. Do not lose filter and filter bracket. After draining complete reservoir again and put into bracket.

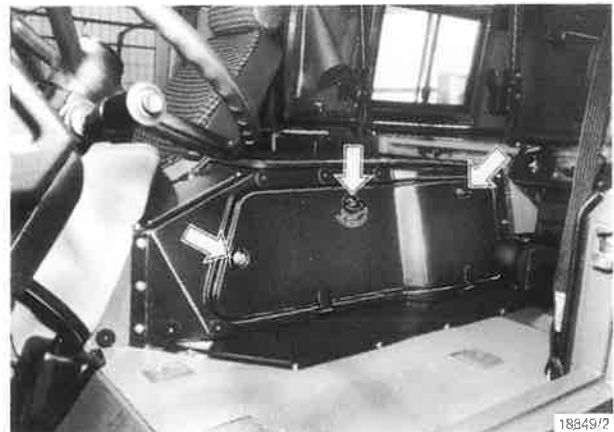


Fig. 1

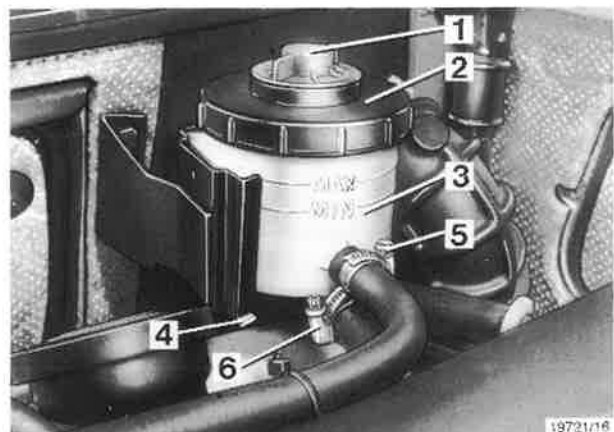


Fig. 2

- 5 Loosen swivelling screw fitting (3/1) of suction pipe. Also loosen union nut (3/2) of pressure hose, backing up at screw neck (3/3). Plug hoses and connections at servo-steering pump provisionally. Loosen retaining screw (3/4) to swivelling fork.

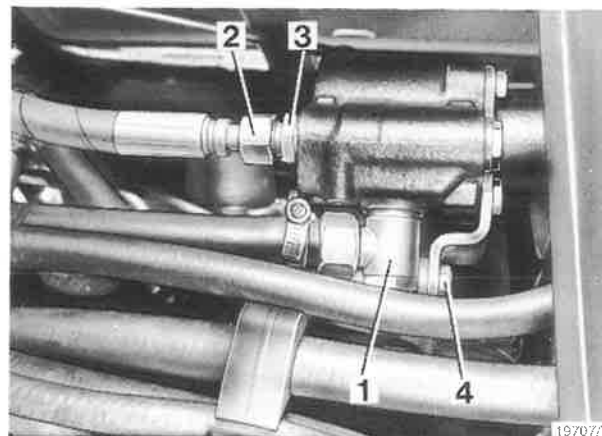


Fig. 3

- 6 Cut through cable clip (4/1). Loosen counter nuts (4/2). Loosen bottom retaining screw (4/3) of tensioner only partly, top retaining screw (4/4) completely. Release V-belt.

NOTE: Lefthanded thread of turnbuckle nut is marked at the corners (4/5).

- 7 Remove retaining screw (3/4) to swivelling fork, remove V-belt and servo-steering pump.

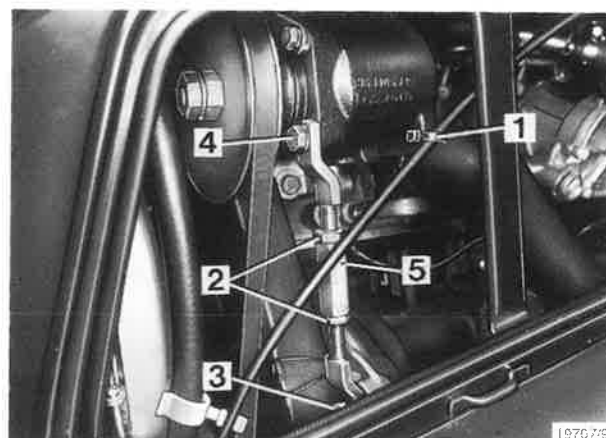


Fig. 4

- 8 Remove screw neck (5/1), suspension bracket (5/2), swivelling fork (5/3) and pulley (5/4).

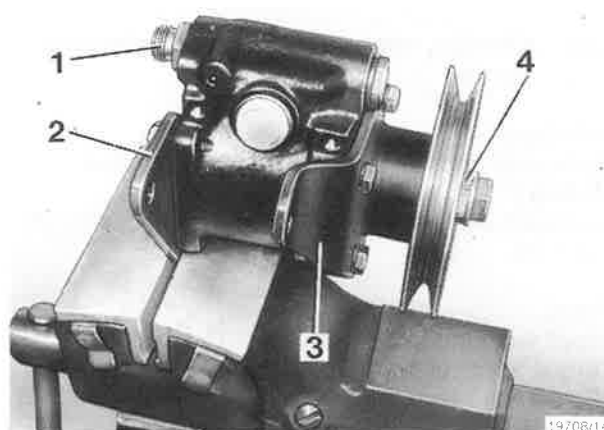


Fig. 5

Fitting:

- 9 Fitting is made in reverse sequence observing the following points:
 - Tighten V-belt pulley to 75 Nm (6).
 - Insert V-belt into center key groove of V-belt pulley at crankshaft.
 - Tension V-belt and measure tension with V-belt tension testing device.
 - Hydraulic steering unit - oil filling, bleeding, see section 1.25.

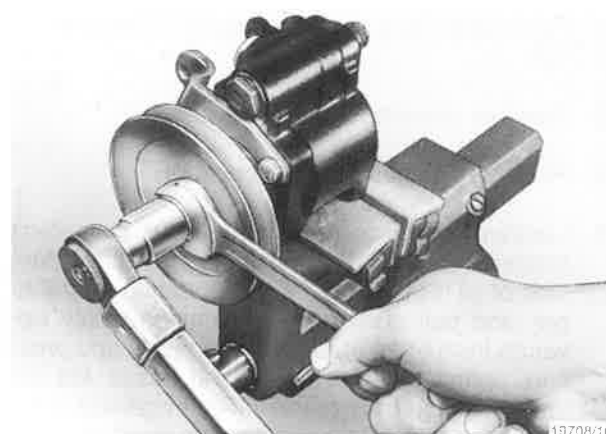


Fig. 6

1.34 Change tensioning device to servo-steering pump

Includes:

Removing and fitting driver's seat see group 171/section ***/1-5 and 8

Tools:

V-belt tension testing device 001 589 69 21 00

Removing:

- 1 Remove driver's seat see group 171/section ***/1-5.
- 2 Remove covering and engine cover (1/1).
- 3 Remove left maintenance cover (2).

- 4 Loosen retaining screw (3/4) to swivelling fork.

- 5 Loosen counter nuts (4/2) and retaining screws (4/3 and 4/4). Release V-belt and unscrew tensioning device.

NOTE: Lefthand thread of turnbuckle nut is marked at the corners (4/5).

Fitting:

- 6 Fitting is made in reverse sequence observing the following points:
 - Place V-belt into center key groove of V-belt pulley at crankshaft.
 - Tension V-belt and measure tension with V-belt tension testing device.

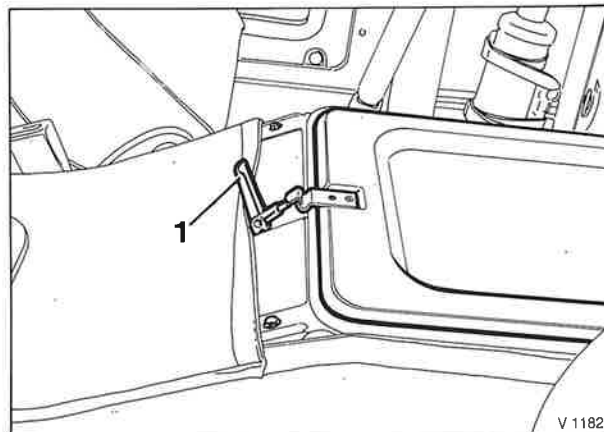


Fig. 1

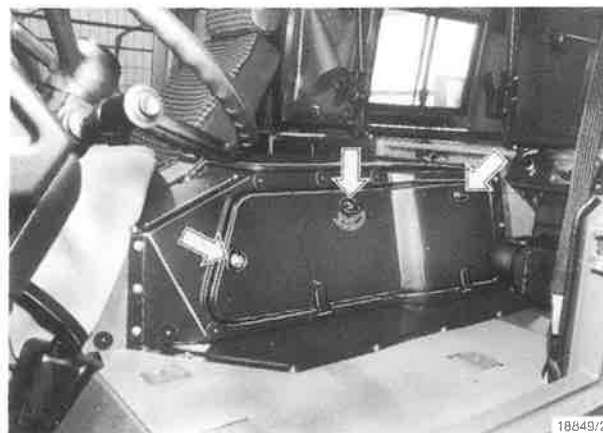


Fig. 2

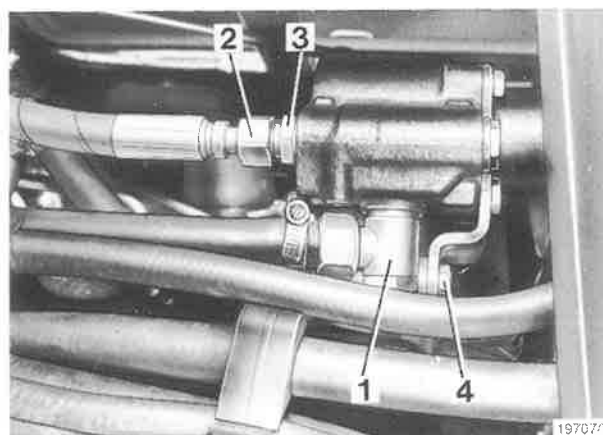


Fig. 3

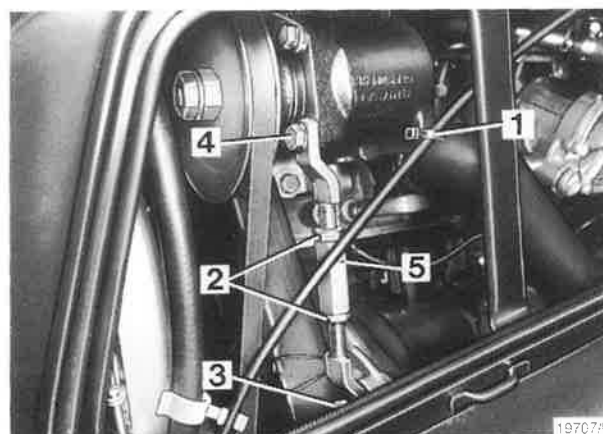


Fig. 4

1.35 Check function of cylindrical rotary valve

Includes:

Measuring servo-steering pump pressure, see section 1.32

- 1 Measure servo-steering pump pressure, see section 1.32/1-7.
- 2 Open shut-off valve and turn steering wheel to left and right until stop. Keep steering wheel in each final stopping position and read off pressure gauge.
Indication must be **at least $100 \pm 10\%$ bar** (1) and must be identical with the previously measured pump pressure resp. If this is not the case, change cylindrical rotary valve, see section 1.36.

WARNING: For careful treatment of servo-steering pump max. working pressure must not be built up longer than 10 seconds.

NOTE: During steering from stop to stop pressure controlled via torsion bar and steering valve can be observed on pressure gauge at any steering movement. This pressure differs from vehicle to vehicle, depending on the different coefficients of friction of the steering unit. It is important that during each steering movement a certain pressure is conveyed into the unit and that the max. pressure described under step 2 is reached at final stop.

- 3 Stop engine and remove shut-off valve. Screw on pressure hose (2/2) and attach cable clip (3) in identical position.
- 4 Bleed steering unit, see section 1.25/2,4-8.

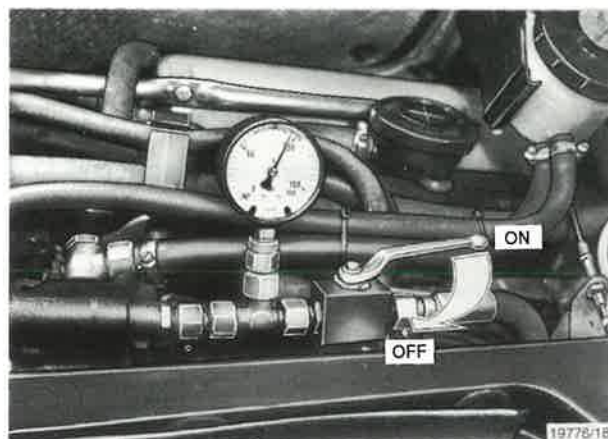


Fig. 1

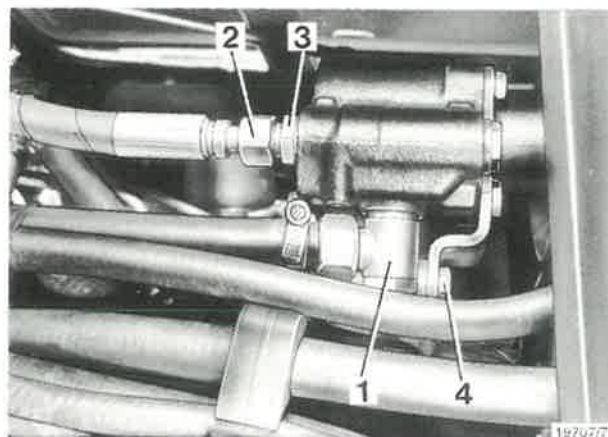


Fig. 2

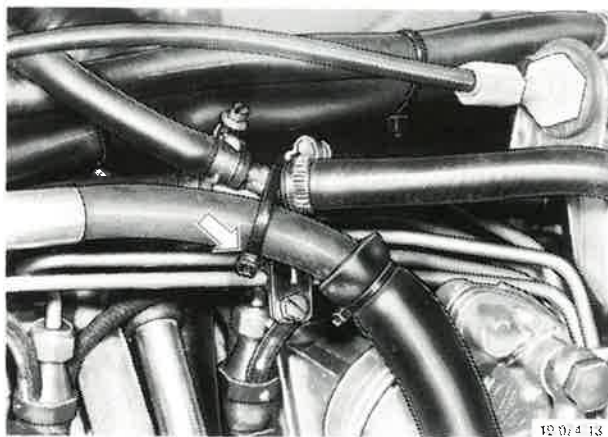


Fig. 3

1.36 Change, remove and fit cylindrical rotary valve

Includes:

Changing, removing and fitting steering wheel see section 1.2/1-6,8-12

Hydraulic steering unit - oil filling, bleeding see section 1.25

Tools:

Torque spanner 1/2"

25-130 Nm

001 589 66 21 00

Removing:

- 1 Remove knee guard (1/1).
- 2 Remove steering wheel, see section 1.2/1-6.
- 3 Pull off coupling piece (2/1) from driving switch.

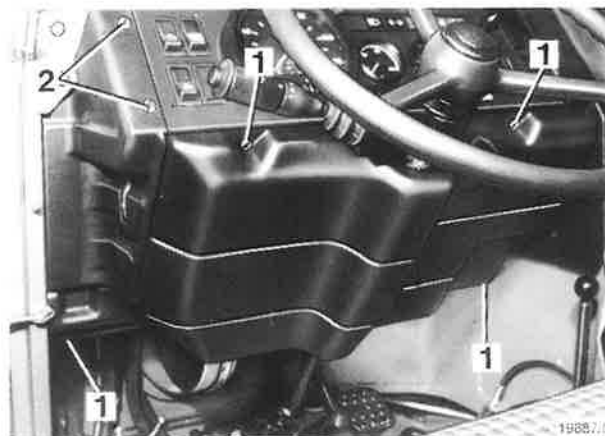


Fig. 1



Fig. 2

- 4 Loosen retaining screws (3/1) at cylindrical rotary valve bracket as well as clamping screw (3/2) to steering spindle housing and clamping screw (3/3) of top cardan joint of steering shaft.

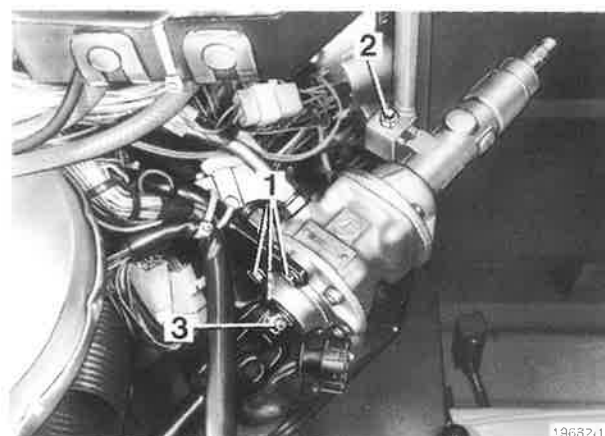


Fig. 3

- 5 Pull steering spindle housing not yet completely out of bracket (4/2) below instrument panel, but loosen union nuts of left (4/3) and right tubing (4/4) as well as return pipe (4/5) and pressure pipe (4/6) while backing up at respective screw neck. Catch leaking hydraulic oil in suitable container. Plug tubes provisionally.

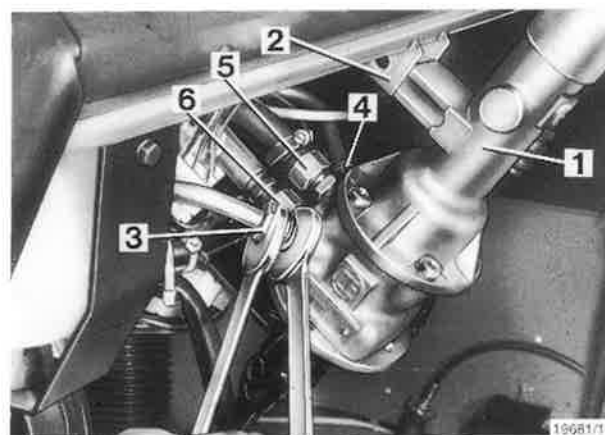


Fig. 4

- 6 Tilt steering spindle housing out of bracket at instrument panel and pull off cylindrical rotary valve from steering shaft or, if necessary, press off with general-purpose spoon resp. (5).

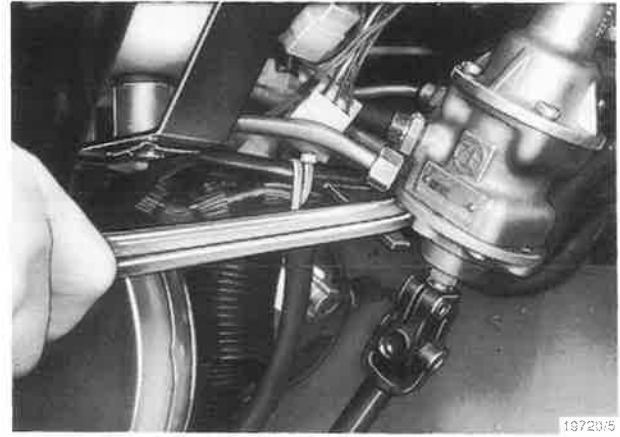


Fig. 5

- 7 Clamp steering spindle housing with aluminium jaws into vice and unscrew screw neck (6).

NOTE: Mark screw neck according to numbers on housing in order to be in agreement again with sealing tapers (cutting rings) of connection pipes.

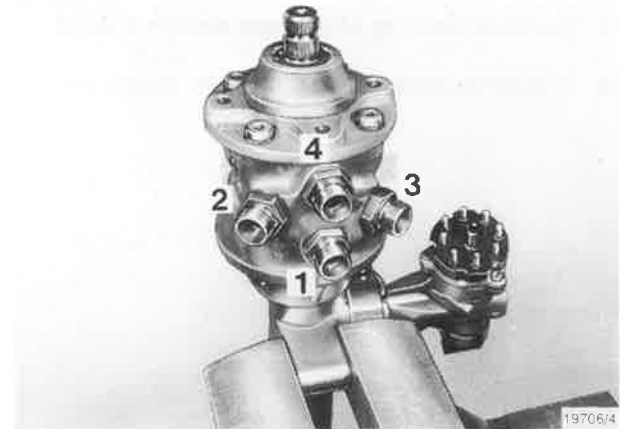


Fig. 6

- 8 Screw in two longer hexagon screws into cylindrical rotary valve and together with these clamp cylindrical rotary valve into vice and unscrew steering spindle housing (7). For detaching housing shift key in steering lock into position "1".

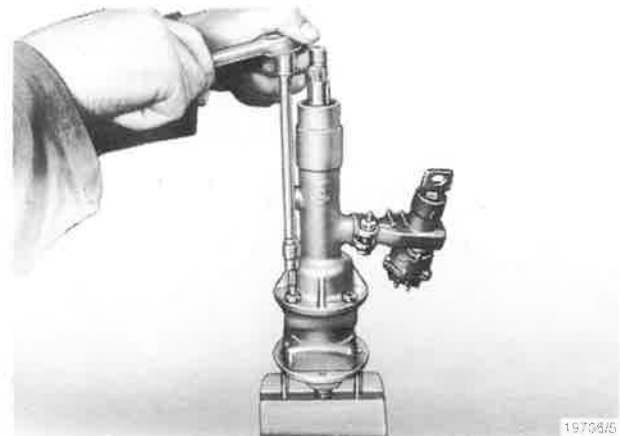


Fig. 7

- 9 Loosen dowel screw (8/1) and pull off steering spindle (8/2) or, if necessary, press off with general-purpose spoon.

Fitting:

- 10 Fitting is made in reverse sequence observing the following points:
 - Put on steering spindle (8/2), tighten dowel pin (8/1) and steering spindle housing (7) to 25 Nm.

WARNING: Mark the duly tightened dowel pin with a white colour dot for easier check-up.

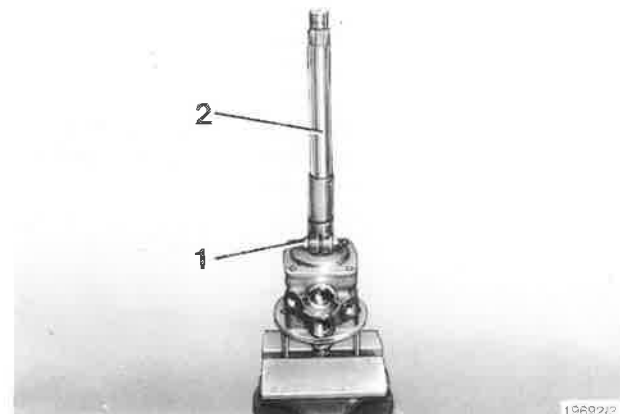


Fig. 8

- Remove screw neck thread from Loctite residues, spray again with Loctite-Hydraulic sealing 542 (9), screw in corresponding to marking and tighten to 30 Nm (10).
- Tighten pressure pipe first and then return pipe. Tighten both pipes only moderately and tighten finally not before having screwed on cylindrical rotary valve and having positioned steering spindle housing.
- Fix steering spindle housing tension-free with clamping screw (3/2).
- Tighten clamping screw (3/3) to cardan joint of steering shaft to 25 Nm.
- Fit steering wheel, see section 1.2/8-12.
- Hydraulic steering unit - oil filling, bleeding, see section 1.25.
- Check tightness of pipe connections at cylindrical rotary valve.
- Attach knee guard (1/1).



Fig. 9

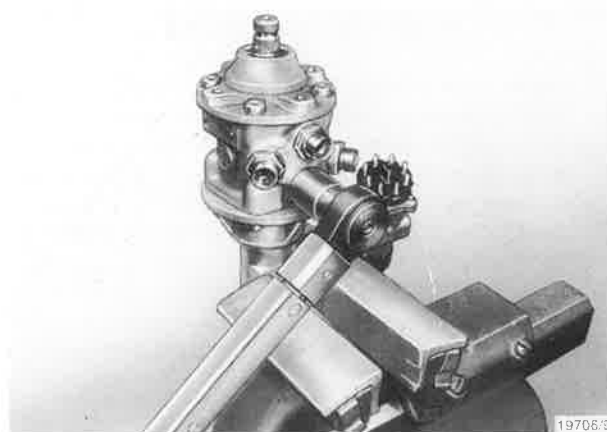


Fig. 10

1.37 Check interior tightness of working cylinder

Includes:

Bleeding steering unit, see section 1.25

Tools:

Torque spanner 1/2"

25-130 Nm

001 589 66 21 00

Pressure gauge with
shut-off valve 0-150 bar

standard

- 1 Lift vehicle with jack at axle housing of front axle until wheels just clear of the ground. Arrange suitable resting trestles under cross-beam (1).

NOTE: Whole angle of steering turn must not be impeded.

- 2 Steer front wheels to the right until stop. Arrange oil catch pan under hydraulic cylinder. Loosen screw to clamp (2/1), cut through cable clips (2/2 and 2/4) and loosen union nut (2/5) of exterior pressure hose.



Fig. 1

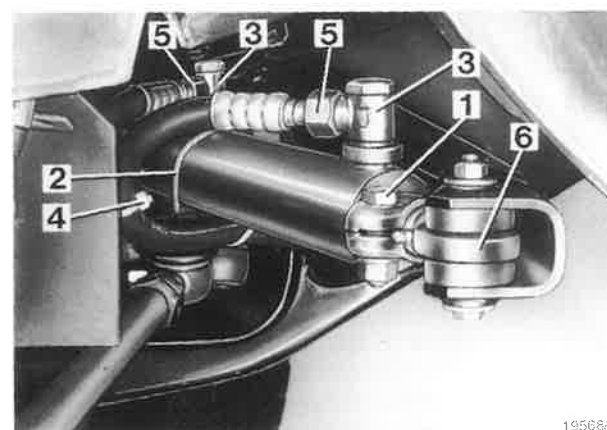


Fig. 2

- 3 Fit pressure gauge (4/1) with shut-off valve (4/2) between swivelling screw fitting (4/3) and pressure hose (4/4). For bleeding open shut-off valve.
- 4 Bleed steering unit, see section 1.25/1,2,4 and 5.
- 5 To determine that servo-steering pump produces max. working pressure, steer front wheels to the left until stop and increase revs. to abt. 1200-1500 1/min. Steer to final stop for several times, keep steering wheel in stopping position and read off pressure gauge at opened shut-off valve. Indication must be **at least 100 ± 10% bar** (3).

WARNING: For careful treatment of servo-steering pump max. working pressure must not be built up longer than 10 seconds.

- 6 Steer front wheels when engine is idling to the right until stop and close shut-off valve (4). Increase revs. again to abt. 1200-1500 1/min. and steer strongly to final stop for several times. Keep steering wheel in stopping position and observe pressure gauge. When there is interior tightness of the hydraulic cylinder, no pressure build-up must be observed. Even slightest pressure increase signals beginning leakage; in this case hydraulic cylinder must be replaced, see section 1.38.
- 7 Stop engine, dismount pressure gauge and shut-off valve resp. and screw on pressure hose (2/5).
- 8 Put joint end (2/6) into centre position. Connections (2/3) for pressure hoses must be vertical to the vehicle's longitudinal axis. Tighten clamping screw (2/1) to 25 Nm.
- 9 Attach cable clips (2/2 and 2/4) in identical position as shown in fig. 2.
- 10 Bleed steering unit, see section 1.25/2,4-8.

1.38 Change, remove and fit hydraulic cylinder

Includes:

Hydraulic steering unit - oil filling, bleeding, see section 1.25

Tools:

Pulling-out and -in tool
for bolt to joint end

905.3.34.501.0

Torque spanner 1/2"

25-130 Nm

001 589 66 21 00

Removig:

- 1 Loosen screw to clamp (1/1) and remove cable clip (1/2). Tilt hydraulic cylinder by ab. 90°, so that swivelling screw fittings (1/3) will be in horizontal position.

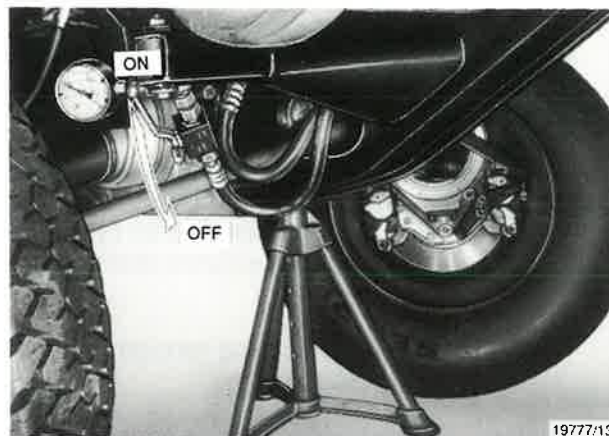


Fig. 3

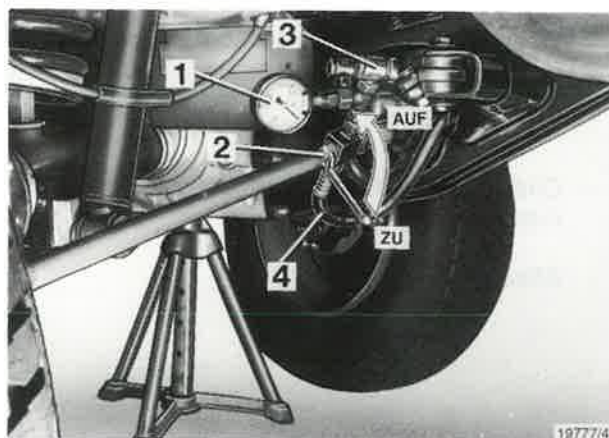


Fig. 4

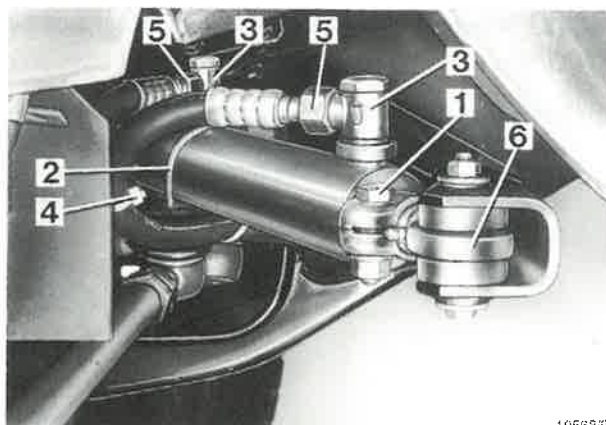


Fig. 1

- 2 Arrange oil catch pan under hydraulic cylinder. Loosen swivelling screw fittings (2) of pressure hoses and plug just like connections at hydraulic cylinder provisionally.

NOTE: Clean swivelling screw fitting area carefully before loosening. Mark interior or exterior pressure hose.

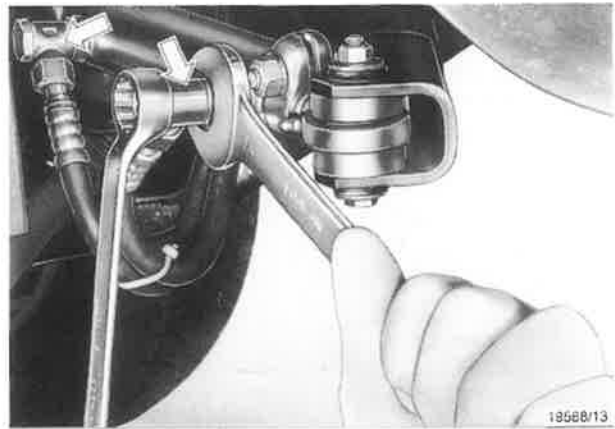


Fig. 2

- 3 Loosen hexagon nut (3/3) and remove hexagon screw (3/1) with washers (3/2). Pull out bolt (3/4) to joint end (3/7) using pull-out and -in tool (4/1) special tool pos. no. 905.3.34.501.0.

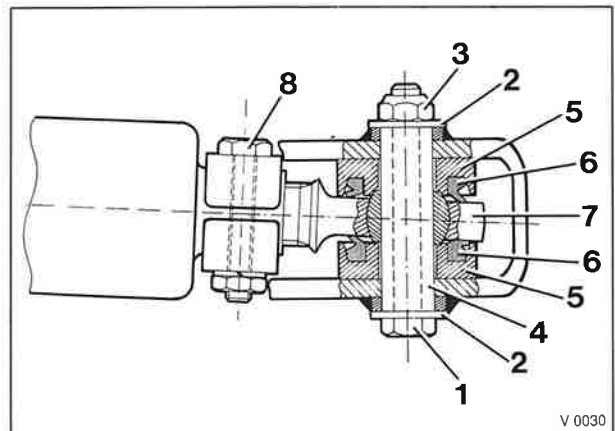


Fig. 3

NOTE: For pulling out bolt insert short spindle (4/3). Turn collar nut (4/4) to the right and back up hexagon screw (4/5).

- 4 Pull hydraulic cylinder (4/2) with joint end, clamping rings (3/5) and V-rings (3/6) out of bracket.

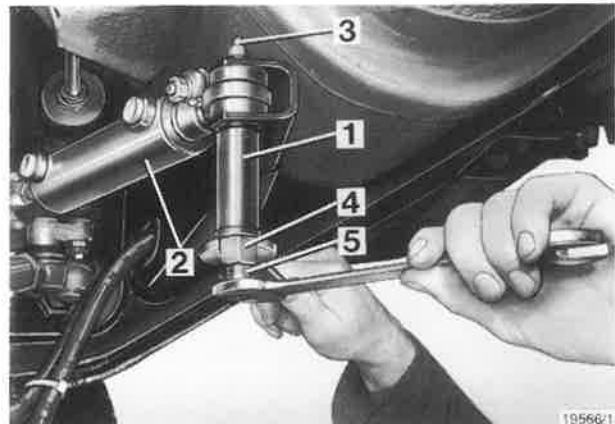


Fig. 4

- 5 Steer wheels to the right, loosen clamping screw (5/1), screw out piston rod (5/2) from joint eye as well as unscrew joint end (5/3).

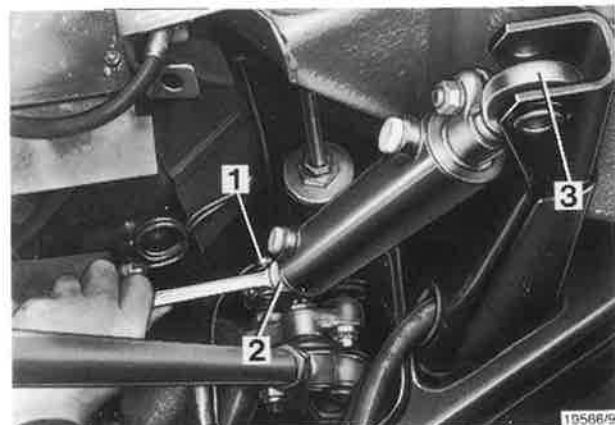


Fig. 5

Checking:

- 6 Check joint eye and joint end for wear. Joints must have neither axial nor radial play.

Fitting:

- 7 Spray joint end thread with Loctite-Anti-Seize and screw in completely into hydraulic cylinder. Lubricating nipple must point backwards in final position.
- 8 Spray piston rod thread also with Loctite-Anti-Seize and screw in into joint eye (6/3) so that $8 + 3$ mm thread remain visible. Spray clamping screw (6/1) thread with Loctite 242 and tighten to 25 Nm.
- 9 Insert joint end (3/7) with clamping rings (3/5) and new V-rings (3/6) into bracket. Spray bolt (7/1) with Loctite-Anti-Seize and pull in flush with bracket using pull-out and -in tool (7/2) special tool pos. no. 905.3.34.501.0.

NOTE: For pulling in bolt use longer spindle (7/3) and washers (7/4). Turn collar nut (7/5) to the right and back up hexagon screw (7/6).

Detach special tool. Spray hexagon screw (3/1) with Loctite-Anti-Seize, insert with washers (3/2) and nut (3/3) acc. to fig. 3 and tighten to 25 Nm.

- 10 Remove provisional fasteners and screw on pressure hoses and swivelling screw fittings (8) to hydraulic cylinder observing markings made during dismantling and tighten to 100 Nm.
- 11 Put joint end (1/6) into centre position. Connections for pressure hoses (1/3) must be vertical to the vehicle's longitudinal axis. Tighten clamping screw (1/1) to 25 Nm.

- 12 Check laying and correctness of connected pressure hoses acc. to fig. 9. Replace missing cable clips (9/3).
- 13 Lubricate joint end and joint eye with grease gun (SKF-grease Alfalub LGME 2) until grease leaks laterally.
- 14 Hydraulic steering unit - oil filling, bleeding, see section 1.25.

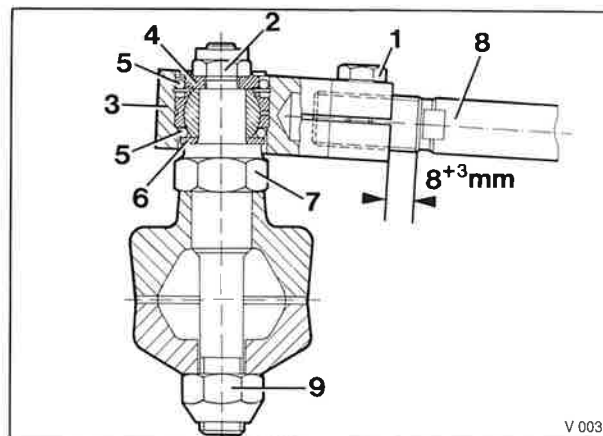


Fig. 6

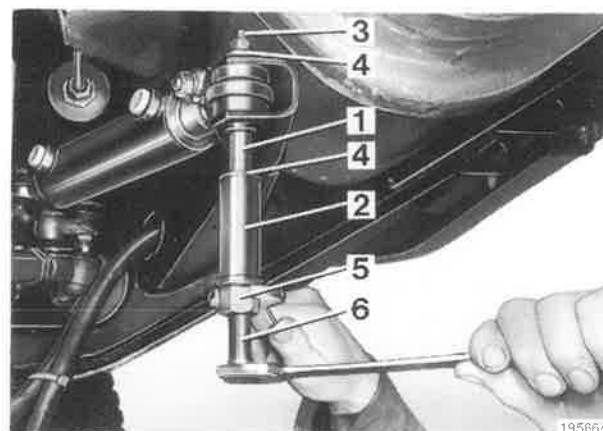


Fig. 7

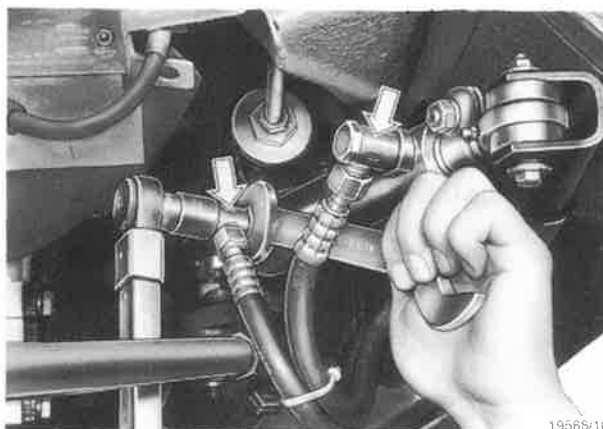


Fig. 8

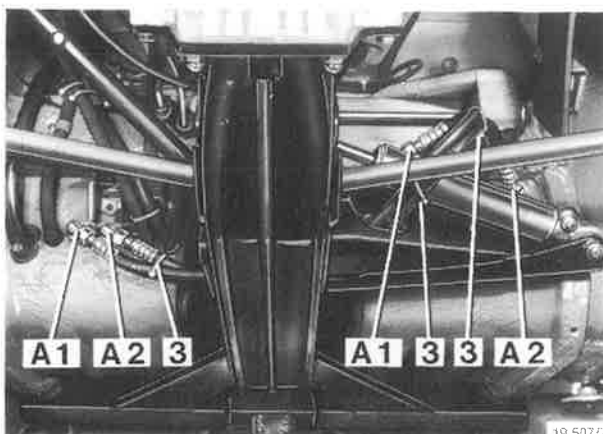


Fig. 9

1.39 Change, remove and fit joint end to servo-steering hydraulic cylinder

Tools:

Pull-out and -in tool

for bolt to joint eye

905.3.34.501.0

Torque spanner 1/2"

25-130 Nm

001 589 66 21 00

Removing:

- 1 Loosen clamping screw (1/8) partly. Loosen hexagon nut (1/3) completely and detach hexagon screw (1/1) with washers (1/2). Pull out bolt (1/4) to joint end (1/7) using pull-out and -in tool (2/1) special tool pos. no. 905.3.34.501.0.

NOTE: For pulling out bolt insert short spindle (2/2), twist collar nut (2/3) to the right and back up hexagon screw (2/4).

- 2 Detach hydraulic cylinder (2/5) with joint end, clamping rings (1/5) and V-rings (1/6). Unscrew joint end from hydraulic cylinder.

Fitting:

- 3 Spray thread of new joint end with Loctite-Anti-Seize and screw in completely into hydraulic cylinder. Lubricating nipple must be pointing backwards in final position.
- 4 Insert joint end (1/7) with clamping rings (1/5) and new V-rings (1/6) into bracket. Spray bolt (3/2) with Loctite-Anti-Seize and pull in flush with bracket using pull-out and -in tool (3/3) special tool pos. no. 905.3.34.501.0.

NOTE: For pulling in bolt use longer spindle (3/4) and washers (3/5). Twist collar nut (3/6) to the right and back up hexagon screw (3/7).

Detach special tool. Spray hexagon screw (1/1) with Loctite-Anti-Seize, insert with washers (1/2) and nut (1/3) acc. to fig. 1 and tighten to 25 Nm.

- 5 Before tightening clamping screw (1/8) to 25 Nm place joint end (4/1) into centre position. Connections (4/2) for pressure hoses must be vertical to the vehicle's longitudinal axis.
- 6 Lubricate joint end and joint eye with grease gun (SKF-grease Alfabub LGME 2) until grease leaks laterally.

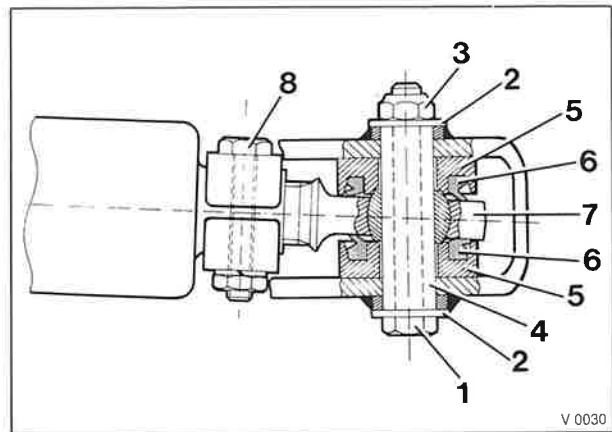


Fig. 1

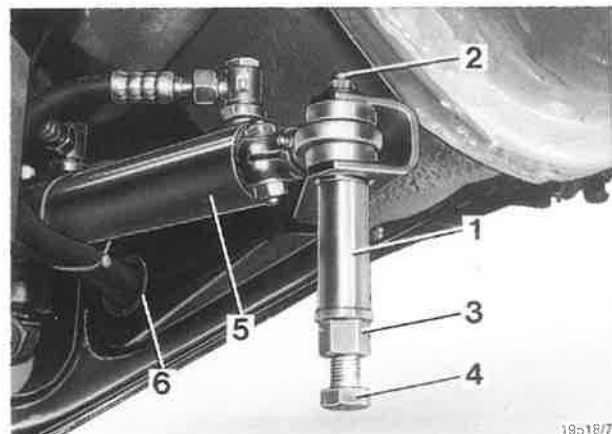


Fig. 2

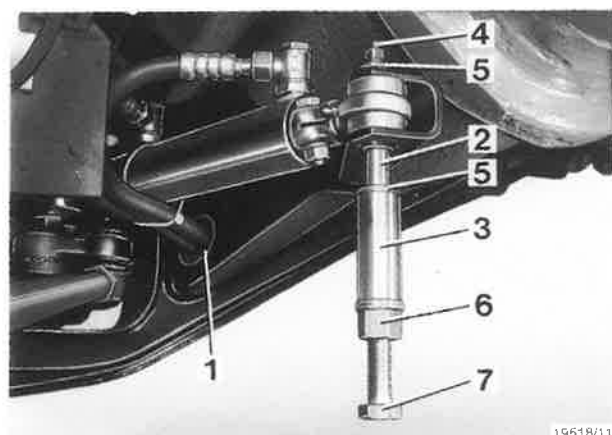


Fig. 3

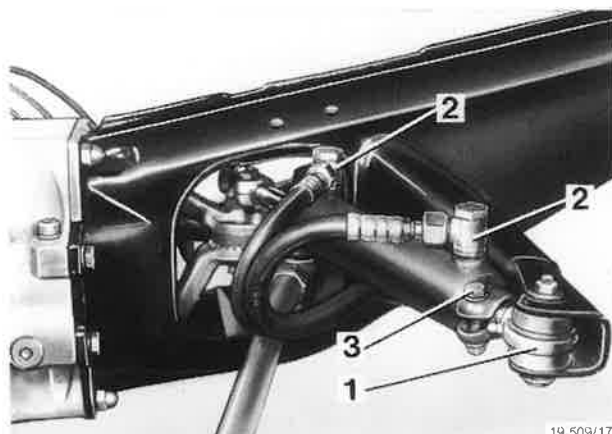


Fig. 4

1.40 Change, remove and fit joint eye to servo-steering hydraulic cylinder

Tools:

Ring spanner socket, size 17	905.3.45.001.2
Pull-on nut for joint eye	905.3.34.502.1
Torque spanner 1/2"	
25-130 Nm	001 589 66 21 00

Removing:

- 1 Lift vehicle with jack at axle housing of front axle until wheels just clear of the ground. Arrange suitable resting trestles under cross-beam (1).
- 2 Steer wheels to the right until stop, loosen clamping screw (2/1).
- 3 Steer wheels a bit to the left and loosen hexagon nut (2/2). Press off (3) joint eye (2/3) from tension screw (2/7) using general-purpose spoon. Remove shaped disk (2/4) and top O-ring (2/5).
- 4 Unscrew joint eye from piston rod (2/8) of servo-steering hydraulic cylinder.

Fitting:

- 5 Spray piston rod thread with Loctite-Anti-Seize and screw on joint eye, so that $8 + 3$ mm thread remain visible. Joint eye must be positioned in a way that clamping screw (2/1) can be inserted from above.
- 6 Clean tension screw. Put on disk (2/6) with inside bevelled side pointing downwards. Fix bottom O-ring with standard grease in joint eye.
- 7 Pull on joint eye (4/1) using pull-on nut (4/2) special tool pos. no. 905.3.34.502.1 to tension screw (4/3). Turn round pull-on nut after some turns for completely tight seat of joint eye.



Fig. 1

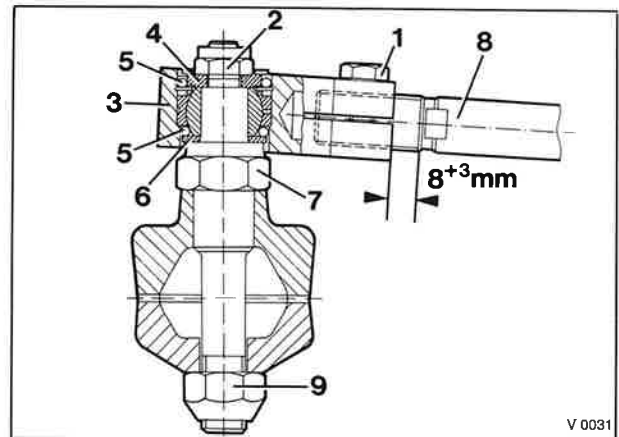


Fig. 2

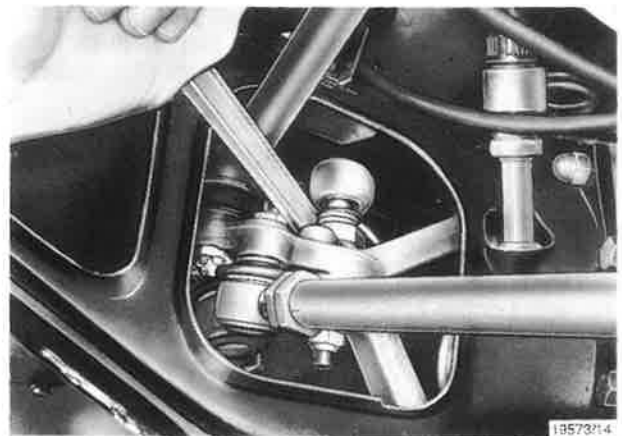


Fig. 3

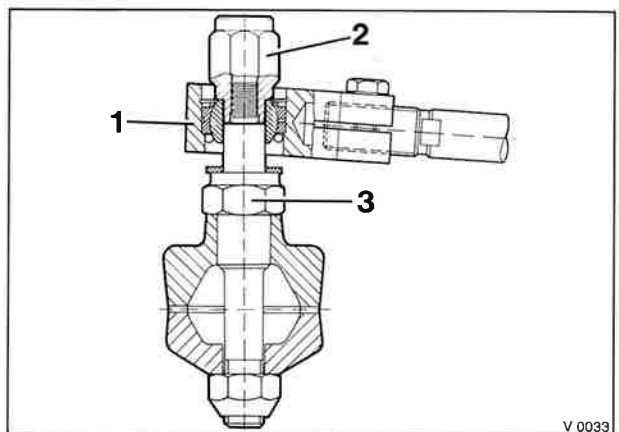


Fig. 4

- 8 Insert top O-ring (2/5) and shaped disk (2/4) and tighten new, self-locking hexagon nut (2/2) with ring spanner socket, size 17, special tool pos. no. 905.3.45.001.2 and torque spanner special tool pos. no. 001 589 66 21 00 to 60 Nm (5).

WARNING: Mark the tightened nut with a white colour dot for easier check-up.

- 9 Steer wheels to the right until stop. Clean thread of clamping screw (2/1), spray with Loctite 242 and tighten to 25 Nm.
- 10 Lubricate joint eye and exterior joint end with grease gun (SKF-grease, Alfabub LGME 2) until grease leaks laterally.
- 11 Put vehicle on wheels.

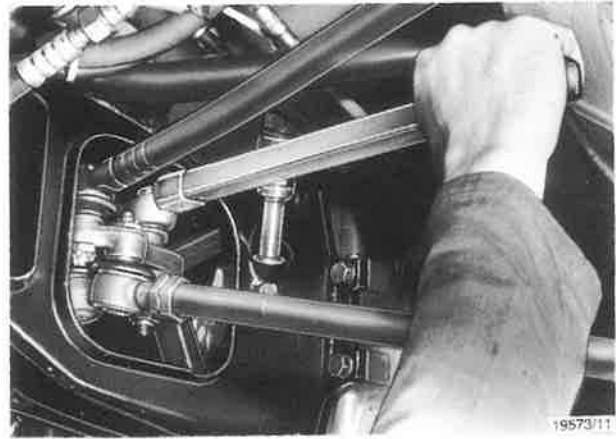


Fig. 5



Fig. 1

1.41 Change, remove and fit tension screw to drag link arms

Tools:

Pull-on nut for joint eye	905.3.34.502.1
Ring spanner socket, size 17	905.3.45.001.2
Ring spanner socket, size 22	905.3.45.501.2
Torque spanner 1/2"	
25-130 Nm	001 589 66 21 00
Torque spanner 3/4"	
75-400 Nm	standard

Removing:

- 1 Lift vehicle with jack at axle housing of front axle until wheels just clear of the ground. Arrange suitable resting trestles under cross-beam (1).
- 2 Steer wheels a bit to the left and loosen hexagon nut (2/2). Press off joint eye (2/3) from tension screw (2/7) using general-purpose spoon (3). Remove shaped disk (2/4) and top O-ring (2/5).
- 3 Loosen hexagon nut (2/9) only partly. Back up at hexagon of tension screw (2/7) and with steering wheel.

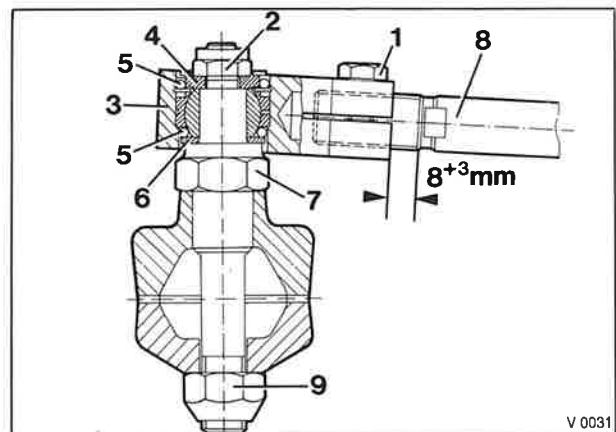


Fig. 2

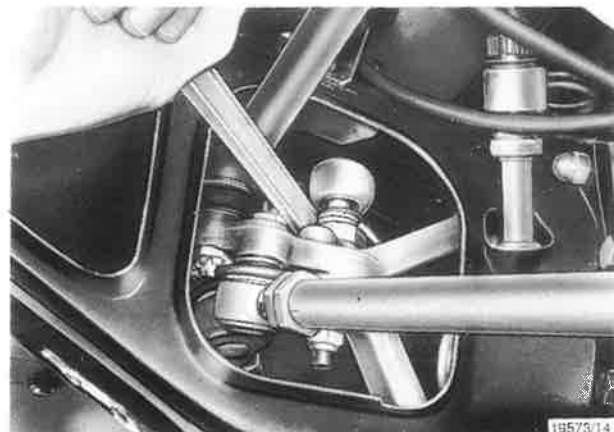


Fig. 3

- 4 Insert suitable general-purpose spoon (4/1) through drain opening of center beam and fix bottom drag link arm in mounting position. Unscrew now hexagon nut (2/9) completely and remove tension screw (4/2).

Checking:

- 5 Check joint eye for wear.

Fitting:

- 6 Insert tension screw and tighten new, self-locking nut (2/9) with ring spanner socket, size 22, special tool pos. no. 905.3.45.501.2 and torque spanner to 195 Nm (5). Doing this back up again at hexagon of tension screw (2/7) and with steering wheel resp. Remove general-purpose spoon.
- 7 Put on disk (1/6) with inside bevelled side pointing downwards. Fix bottom O-ring with standard grease in joint eye.
- 8 Pull on joint eye (6/1) to tension screws (6/3) using pull-on nut (6/2) special tool pos. no. 905.3.34.502.1. Turn round put-on nut after some turns for perfect seat of joint eye.

- 9 Insert top O-ring (2/5) and shaped disk (2/4). Tighten new, self-locking nut (2/2) with ring spanner socket, size 17, special tool pos. no. 905.3.45.001.2 and torque spanner special tool pos. no. 001 589 66 21 00 to 60 Nm (7).
- 10 Lubricate joint eye and exterior joint end with grease gun (SKF-grease Alfalub LMGE 2) until grease leaks laterally.

WARNING: Mark the tightened nuts to tension screw and to joint eye with a white colour dot for easier check-up.

- 11 Put vehicle on wheels.

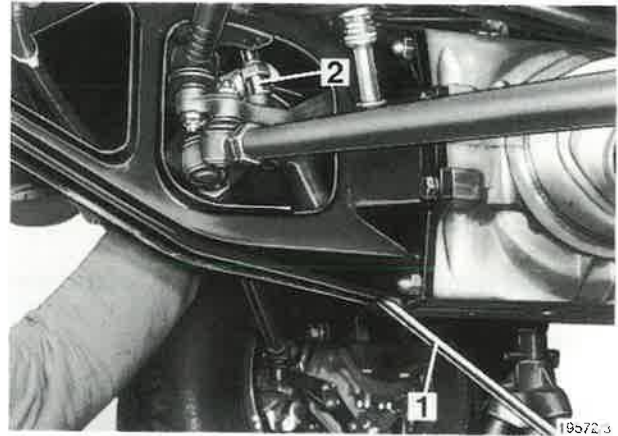


Fig. 4

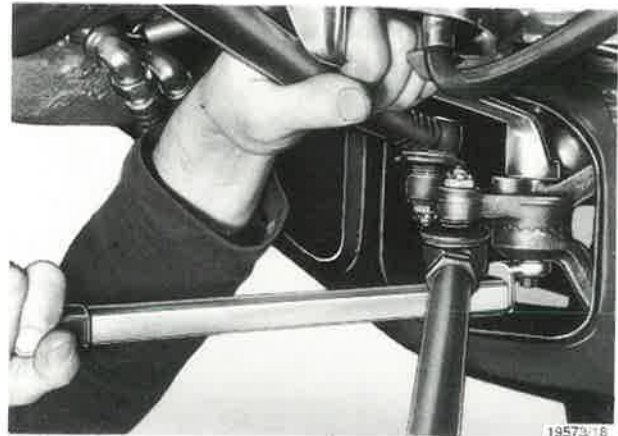


Fig. 5

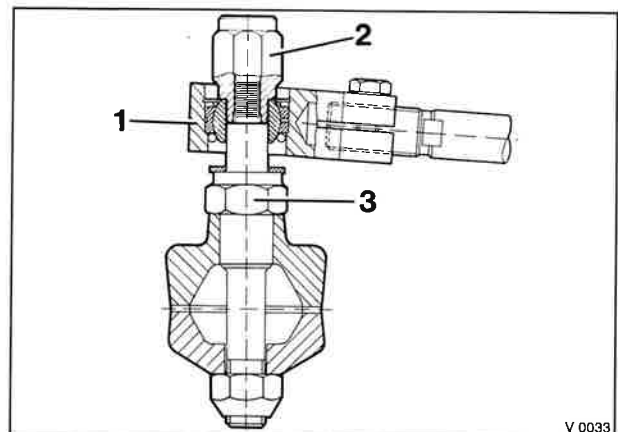


Fig. 6

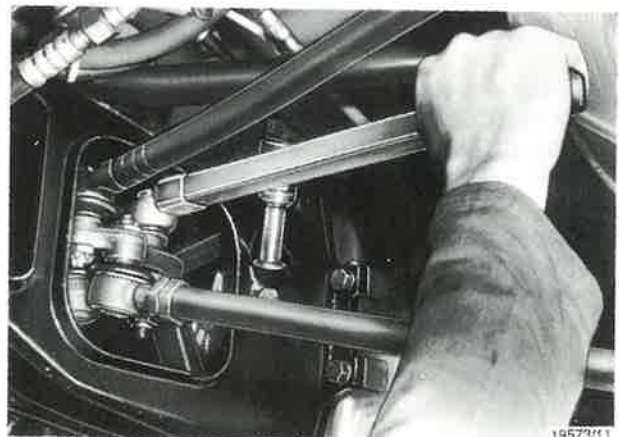


Fig. 7

2. Works at dismantled assemblies

2.1 Change bearing bush in bearing bracket

Includes:

Changing, removing and fitting steering gear see section 1.9/1-25

Tools:

Puller stopper	905.3.34.402.1
Support Kukko no. 22-2	905.0.14.001.0
Internal extractor Kukko no. 21-5	905.0.14.024.0

Removing:

- 1 Remove steering gear, see section 1.9/1-12.
- 2 Clamp bearing bracket with aluminium jaws into vise and loosen hexagon screw (1/1).
- 3 Unclamp bearing bracket. Attach suitable general-purpose spoon between bearing bracket and steering gear and press off bearing bracket. Catch leaking gear oil in suitable basin.
- 4 Pull out bearing bush together with sealing ring using internal extractor (2/1) Kukko no. 21-5 special tool pos. no. 905.0.14.024.0 and support Kukko no. 22-2 special tool pos. no. 905.0.14.001.0. Remove O-ring (5).

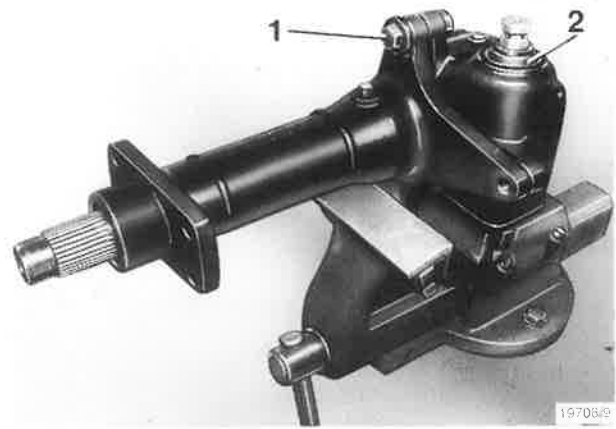


Fig. 1

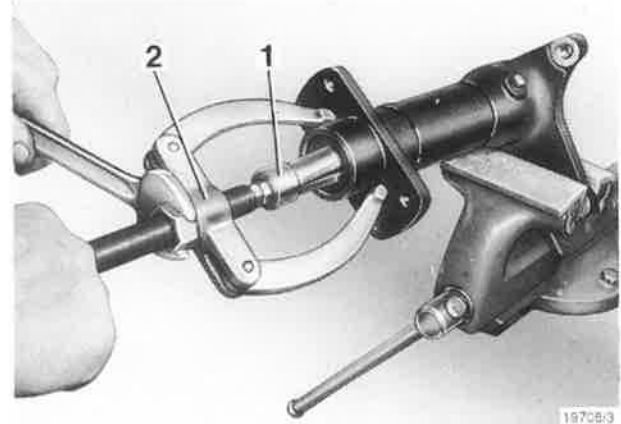


Fig. 2

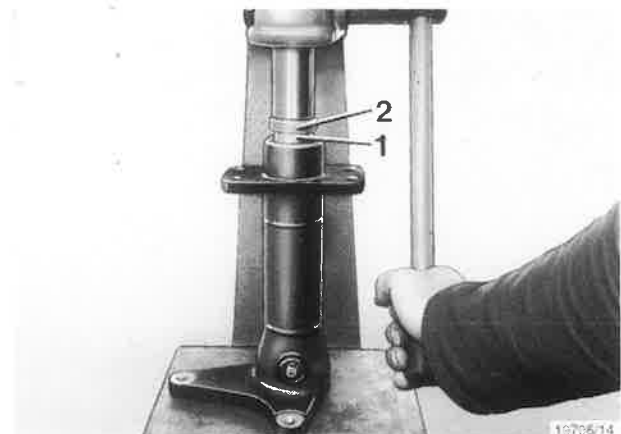


Fig. 3

Fitting:

- 5 Press in bearing bush (3/1) as well as sealing ring (4/1) with puller stopper (3/2 and 4/2) special tool pos. no. 905.3.34.402.1 until stop.

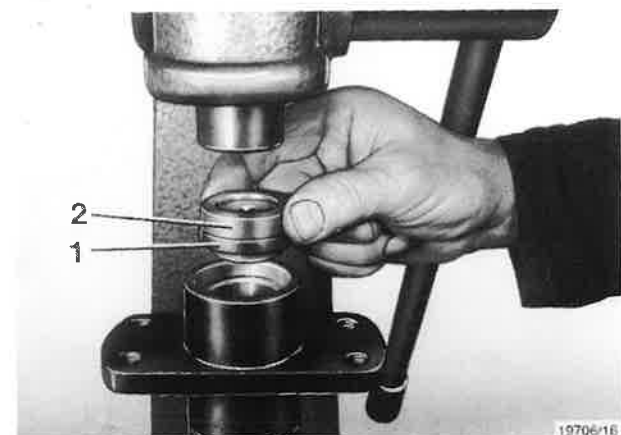


Fig. 4

- 6 Insert new O-ring (5) and oil well.
- 7 Insert steering gear and tighten retaining screw (1/1) moderately. Renew dust seal (1/2) if necessary.

NOTE: Tighten screw finally when remaining two retaining screws and steering support have been fitted.

- 8 Fit steering gear, see section 1.9/13-25.

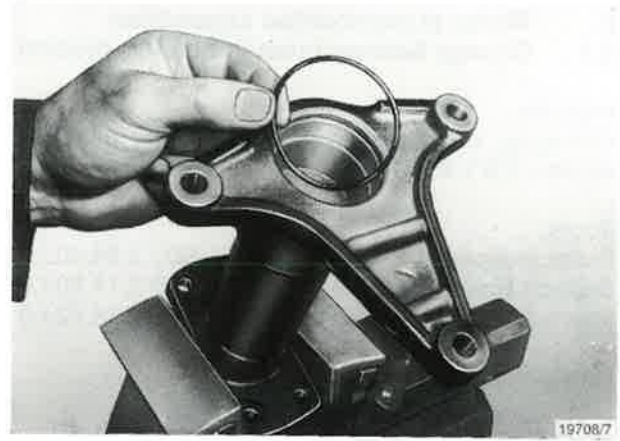


Fig. 5