Vorderachse
Front Axle
Essieu AV
Assale anteriore

PORSCHE

Workshop-Manual

914
914/6

DR.-ING. h. c. F. PORSCHE KG STUTTGART-ZUFFENHAUSEN

This publication contains the essential removal, installation and adjustment procedures for the Porsche 914-914/6 vehicles sold in the USA and Canada.

Components and procedures described in this manual are identical for both types unless differences are pointed out in the text.

It is assumed that the reader is familiar with basic automotive repair procedures. Special tools required in performing certain service operations are identified in the manual and recommended for usw. Use of tools or procedures other than those recommended in this repair manual may be detrimental to the vehicle's safe operation as well as the safety of the person servicing the vehicle.

The Porsche 914 - 914/6 Workshop Manual is divided into 8 volumes. The volumes are subdivided into 10 Main Groups as follows:

1st Volume	Engine and Clutch - 914	Main Group No. 1
2nd Volume	Fuel System - 914	Main Group No. 2
3rd Volume	Engine and Clutch - 914/6	Main Group No. 1
	Fuel System - 914/6	Main Group No. 2
4th Volume	Transmission	Main Group No. 3
5th Volume	Front Axle	Main Group No. 4
	Rear Axle	Main Group No. 5
6th Volume	Brakes, Wheels, Tires	Main Group No. 6
	Pedal System and Levers	Main Group No. 7
	Maintenance, Specifications	Main Group No. 0
7th Volume	Body	Main Group No. 8
8th Volume	Electrical System	Main Group No. 9

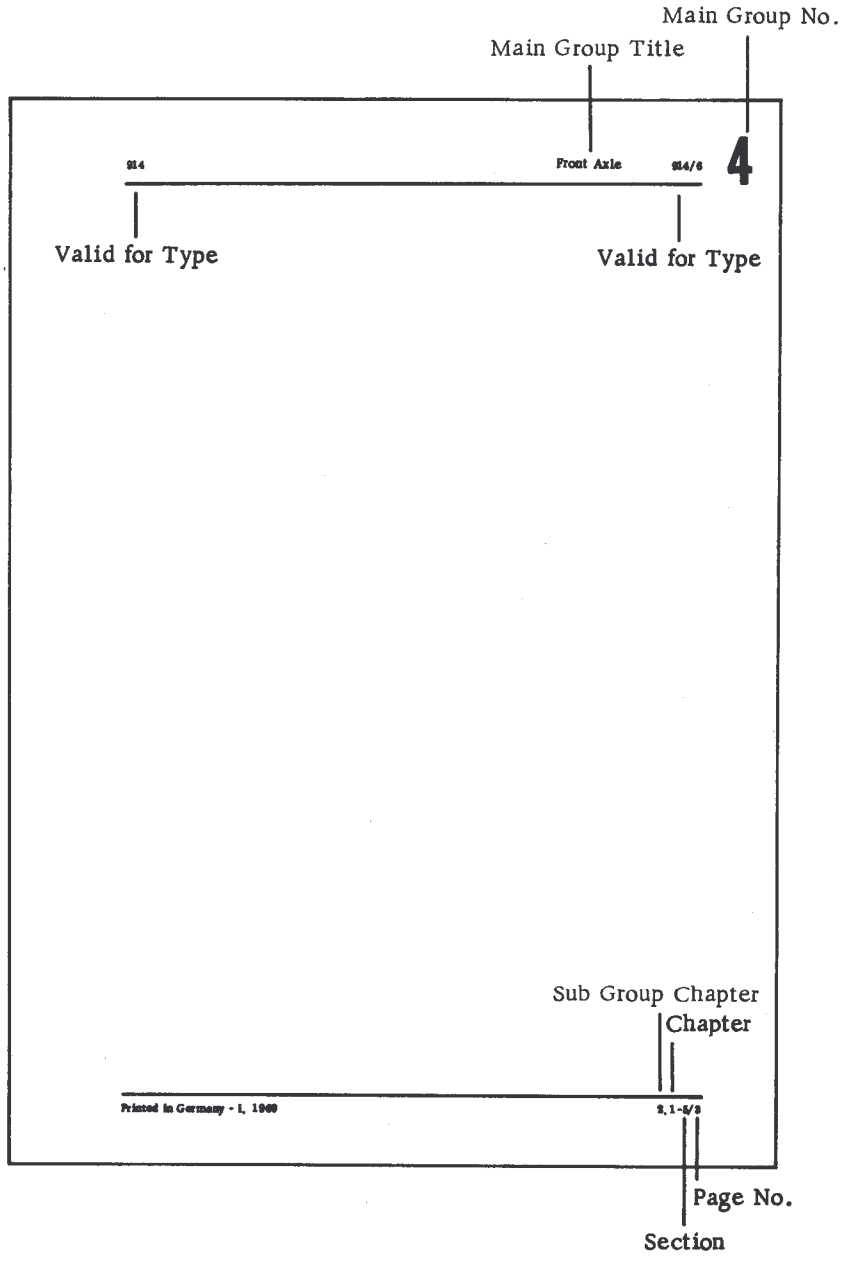
The binders have a transparent plastic pocket on the spine into which the appropriate volume title can be inserted.

To find the individual repair operations, each main group is subdivided into "Chapters" and "Sections". Every main group is provided with a very detailed table of contents. Refer to example on next page.

The repair operations described in this Workshop Manual are based on the Type 914 vehicle. Repair operations which apply to Type 914/6 vehicles are described separately. The type vehicle to which the repair operation applies is given on the top left or right of the page.

When certain repair operations are similar for both type vehicles, the procedures are described together and the minor differences for the 914/6 emphasized by notes and remarks.

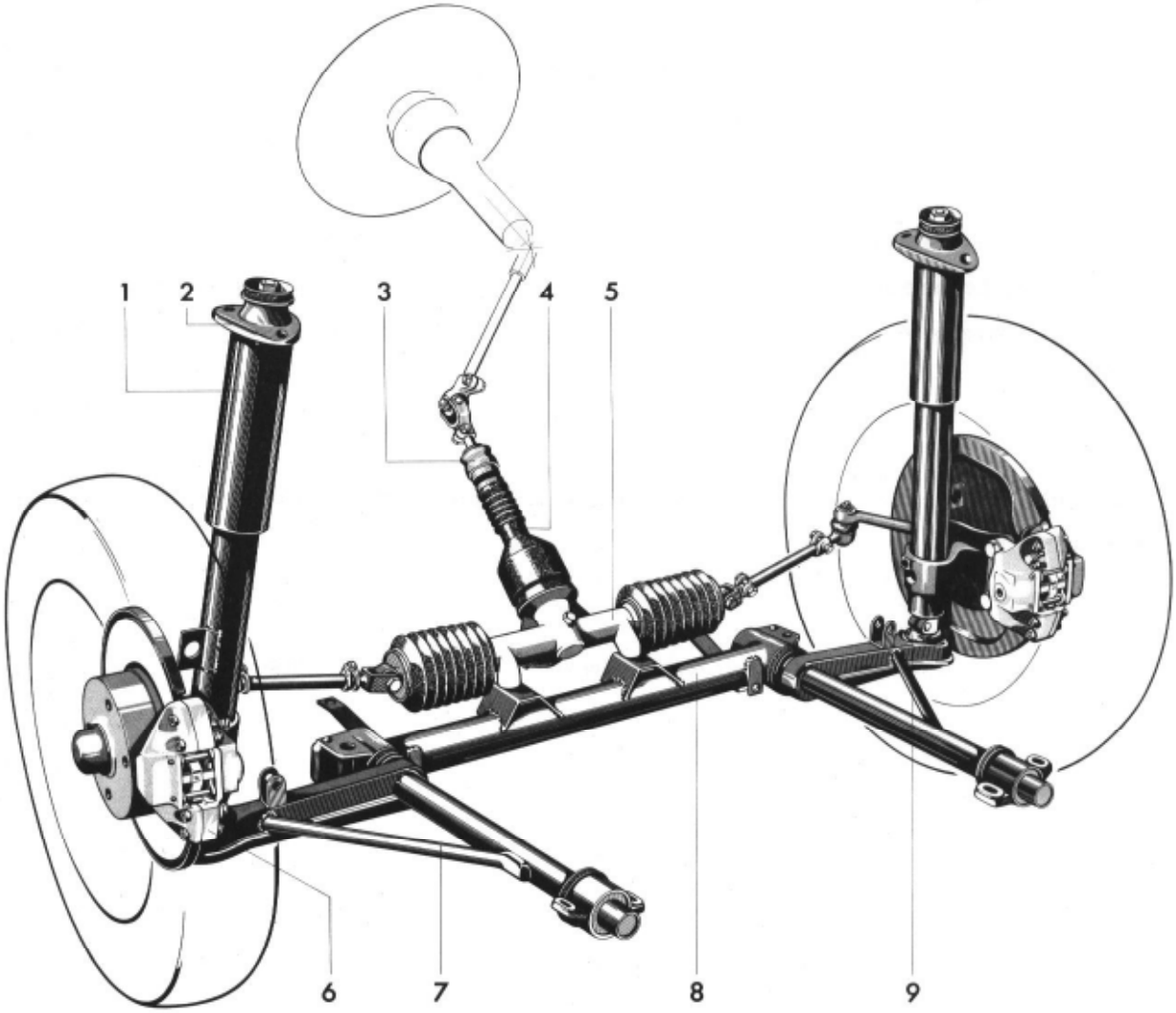
Sample Page



Technical Information

The "Technical Information" pages which are published from time to time should be filed in chronological order at the beginning of the respective Main Groups of the Workshop Manuals.

CONTENTS



1 Suspension strut
2 Strut support bracket with grommet
3 Steering shaft support bearing with grommet
4 Dust boot
5 Rack & pinion steering
6 Brake caliper, complete
7 Transverse control arm with rubber mounts
8 Axiliary support
9 Ball joint

DESCRIPTION OF FRONT AXLE

The front wheels are independently suspended on double-acting suspension struts mounted in the body at the top, and on the suspension arm at the bottom.

A sealed ball joint connects each suspension strut with the suspension arms. The steering knuckle is unitized with the suspension strut. An adjustable torsion bar located in each suspension arm is used for springing. A progressive acting rubber buffer installed in each of the suspension struts provides additional springing.

Caster and camber adjustments are made by moving the seat of the suspension strut support bracket on the body shell.

The front axle is permanently lubricated with the exception of the front wheel bearings.

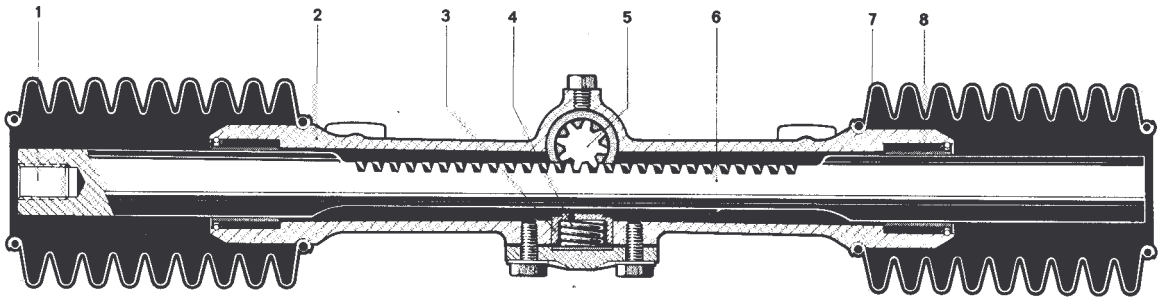
RACK & PINION STEERING

Description

The steering rack is mounted in two replaceable bushings, one at each outer end of the housing. The pinion is mounted on two ball bearings in the steering housing. A pressure block, spring, and adjusting shims, press the steering rack against the pinion, thereby ensuring continuous contact between rack and pinion. The correct drag can be obtained by inserting and/or removing adjusting shims.

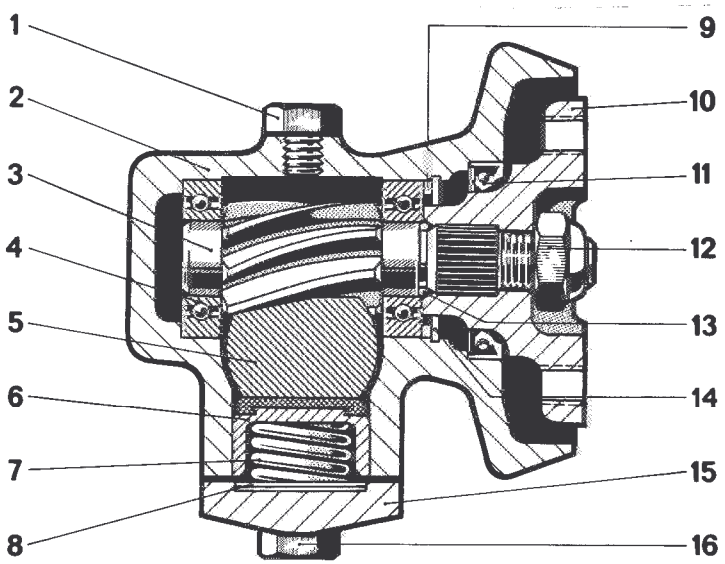
The rack and pinion steering assembly is lubricated during manufacture and requires no additional lubrication.

Side Section View



1 Thread for tie rod joint
2 Housing
3 Pressure block
4 Spring
5 Steering pinion
6 Steering rack
7 Dust boot
8 Bushing

Cross Section View



1 Filler plug M 8x8
2 Housing
3 Steering pinion
4 Ball bearing
5 Steering rack
6 Pressure block
7 Spring
8 Adjusting shim
9 Spacer
10 Connecting flange
11 Oil seal
12 Self-locking nut, M 10
13 O-ring
14 Snap ring
15 Housing cover
16 Hex bolt M 8x18

GENERAL DATA

Vehicle Type		914 (1.7 and 2.0 ltr.)	914/6
Wheel base		2,450 mm (96.5")	2,450 mm (96.5")
Track width front (at dead weight acc. to DIN)		1331 mm (4 1/2Jx15) (52,4 ") 1343 mm (5 1/2Jx15) (52,9")	1354 mm (5 1/2Jx15) (53,3 ") 1356 mm (5 1/2Jx14) (53,4 ")
Track circle dia.		approx. 10.35 m (33.9 ft.)	approx. 10.35 m (33.9 ft.)
Smallest turning circle dia.		11.0 m (36 ft.)	11.0 m (36 ft.)
Center of tire contact		40.5 mm (1.594")	50 mm (1.969")
Front axle load at perm. total load		650 kp (1,433 lbs)	650 kp (1,433 lbs)
Torsion bar:	Lenght	611.5 mm (24.075")	611.5 mm (24.075")
	Dia.	17.9 mm (0.705")	17.9 mm (0.705")
	Number of teeth	29	30
Total reduction of steering gear		17.78	17.78
Steering wheel turns from lock to lock		approx. 3.1	approx. 3.1

Adjustment Specifications and Wear Limits

Vehicle Type	914 (1.7 and 2.0 ltr.)	914/6
Overall track, front, pressed	+20' ±10'	+20' ±10'
Front wheel (pressed load)	15 kp (33 lbs)	15 kp (33 lbs)
Front wheel camber	0 ±20'	0 ±20'
Max. permissible camber difference between both sides	20'	20'
Track difference angle at 20° lock, to left to right	0 to +30' 0 to +30'	0 to +30' 0 to +30'
Front wheel caster	6° ±30'	6° ±30'
Front axle height adjustment (wheel center through rear torsion bar center)	90 mm ±5 mm (3.5 ± .2")	90 mm ±5 mm (3.5 ± .2")
Height difference, left to right	max. 5 mm (.2")	max. 5 mm (.2")
Steering friction (measured at the steering box flange with disconnected tie rods and steering damper)	6 - 10 cmkp	8 - 14 cmkp
Wheel load difference	Wheel load difference left to right may be 15 kp max. If corrections are required, adjustment can be made by readjusting the front axle torsion bars. The required height tolerances must, however, be maintained.	

GENERAL DATA - 1975 MODELS

Vehicle Type	914 - 1.8 liter	914 - 2.0 liter
Wheelbase at DIN curb-weight at full load	2451.5 mm/96.51 in. 2448 mm/96.37 in.	2451.5 mm/96.51 in. 2448 mm/96.37 in.
Front track width (5 1/2 J x 15 wheels) at DIN curb weight at full load	 1343 mm/52.87 in. 1360 mm/53.54 in.	 1343 mm/52.87 in. 1360 mm/53.54 in.
Min. turning dia.	approx. 11.0 m/36 ft	approx. 11.0 m/36 ft.
Max. axle load, front	650 kp/1430 lb	650 kp/1430 lb
Stabilizer dia., front/rear (optional extra)	15 mm/16 mm (0.59 in./0.62 in.)	15 mm/16 mm (0.59 in./0.62 in.)
Torsion bar: length diameter splines	611.5 mm/24.07 in. 17.9 mm/0.7 in. 29	611.5 mm/24.07 in. 17.9 mm/0.7 in. 29
Total steering ratio	17.78	17.78
Steering wheel turns from stop to stop	approx. 3.1	approx. 3.1
Steering torque (measured at steering gear flange with tie rods disconnected)	6 - 10 cmkp	6 - 10 cmkp
Specifications (at DIN curb weight)		
Total front wheel toe (pressed)	+ 20' ± 10'	+ 20' ± 10'
Max. pressure to press front wheels together	15 kp/33 lb	15 kp/33 lb
Front wheel camber	0 ± 20'	0 ± 20'
Max. difference in camber betw. both sides	20'	20'
Toe difference angle at 20° steering lock	0 to + 30'	0 to + 30'
Castor	6° ± 30'	6° ± 30'
Front axle height (wheel center above center of torsion bar)	90 mm ± 5 mm (3.54 in. ± 0.19 in.)	90 mm ± 5 mm (3.54 in. ± 0.19 in.)
Height difference left to right	max. 5 mm/0.19 in.	max. 5 mm/0.19 in.
Wheel load difference	Max. load difference between left and right wheels is 15 kp. Corrections, if required, can be made on the torsion bars. Adjustments must, however, be made within height tolerances.	

TIGHTENING TORQUES FOR FRONT AXLE AND STEERING

(Information set off in parentheses applies only to 914/6)

Location	Description	Thread Type	Grade	Torque mkp	Torque ft. lbs.
Front Axle					
Screw for clamp nut	Fillister head screw (Allen head screw)	M 7	10 K	(1.5)	(10.8)
Hollow screw on brake caliper	Hollow screw	M 10x1		2.0	14.5
Brake caliper to steering knuckle	Bolt	M12x1.5x30	8 G	7.0	50.6
Wheel hub to brake disc	Nut	(M 8)	(6 S)	(2.3)	(16.6)
Disc shroud to steering knuckle	Bolt	M 8x12	8 G	2.5	18.1
Suspension strut bottom to ball joint	Bolt	M 10x30	10 K	6.5	47.0
Suspension strut to support bracket	Nut	M 14x1.5	6 S	8.0	57.9
Suspension strut support bracket to body	Fillister head screw (Allen head screw)	M 10x20	8 G	4.7	34.0
Control arm bracket cap to body	Fillister head screw	M 10x20	8 G	4.5	32.5
Control arm forward bearing to body	Bolt	M 10x30	8 G	4.7	34.0
Ball joint to control arm Thread, oiled	Slotted nut	M 45x1.5	8 G	25.0	180.0
Floor pan to body	Bolt	M 10x20	8 G	4.7	34.0
Floor pan to auxiliary	Bolt	M 8x8	8 G	1.5	10.8
Auxiliary support to body	Bolt	M 12x1.5x80	8 G	9.0	65.1
Wheel bolt	Bolt	m 14x1.5	Ck 35	15	108.0
Wheel nut	Nut	M 14x1.5	(ck 35)	(13)	(94.0)
Steering					
Housing cover to steering gear housing	Bolt	M 8x18	8 G	1.5	10.8

Location	Description	Thread Type	Grade	Torque mkp	Torque ft. lbs.
Filler plug in steering housing	Bolt	M 8x8	8 G	1.5	10.8
Coupling flange to drive pinion	Self-locking hex nut	M 10	8 G	4.7	34.0
Boot retainer for eyebolt	Grooved nut	M 16x1.5	6 S	7.0	50.6
Yoke to eyebolt	Pivot bolt	M 10	8 G	4.7	34.0
Steering shaft to steering coupling	Bolt	M 8x42	8 G	2.5	18.1
Steering housing to auxiliary support	Bolt	M 10x22	8 G	4.7	34.0
Tie rod joint to steering arm	Castle nut	M 10x1	6 S	4.5	32.5
U-joint to steering shaft	Self-locking nut	M 8	8 G	2.5	18.1
Tie rod clamp	Nut	M 8	8 G	1.5	10.8
Steering wheel retaining nut	Nut	M 18x1.5	6 S	(7.5) 5-6	(54.2) 36.2-43.4
Steering switch assembly to body	Fillister head screw	M 8	8 G	1.0	7.2
Switch assembly to steering shaft tube	Fillister head screw	M 8	8 G	1.0	7.2

LIST OF REQUIRED SPECIAL TOOLS

Pressure plate	VW 401
Pressure die	VW 407
Pressure die	VW 410
Pipe tool 28 mm dia. (1.1")	VW 421
Pressure piece	VW 433
Pressure plate	VW 447f
Pressure plate	VW 447g
Pressure plate	VW 447h
Pressure plate	VW 447i
Test fixture for steering arm	P 284c
Test fixture for steering arm	P 284b
Test fixture for steering knuckle and shock absorber strut	P 286c
Test fixture for steering knuckle and shock absorber strut	P 286b
Hub cap puller	VW 637/2
Hook spanner 62 mm dia. (2.4")	commercial
Test fixture for transverse control arm	P 288b
Spanner	P 280b
Adjusting gauge for steering gear	P 285b
Hook spanner 42 mm dia. (1.7")	commercial
Depth gauge	commercial
Torsiometer 0 - 25 cmkp	commercial
Kukko puller 22-1	commercial
Kukko internal puller No. 21/2	commercial
Kukko internal puller No. 21/4	commercial

MEASURING THE FRONT AXLE

General

The height adjustment of the front axle as well as the position of the wheels is of decisive importance for the road holding and cornering characteristics of a vehicle. Non-permissible deviations from the specified valus for height adjustment, track, camber, caster and track differential angle may considerably influence otherwise good driving characteristics and result in abnormal wear of the tires.

The following chapter describes how to measure the adjusting data of the front wheels on the vehicle and how to make corrections.
Successful completion is, however, subject to the following prerequisites:

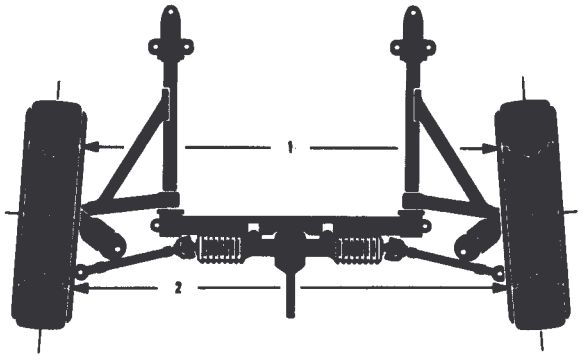
1. Dead weight of vehicle acc. to DIN 70020, that is, the vehicle ready for driving with gasoline tank filled and with spare wheel.

2. All moving parts of the steering gear and the wheel guiding system must have the correct running clearances.

3. The rims should have no non-permissible vertical or lateral wobble.

4. The tire pressure should be as specified and the tires themselves should be worn more or less uniformly.

Measuring the vehicle requires an optical axle measuring device of the type, offered by dealers in various makes. For this reason, the actual measuring of the vehicle is not described in closer detail here, and only instructions for adjusting and correcting the adjusting data are given.

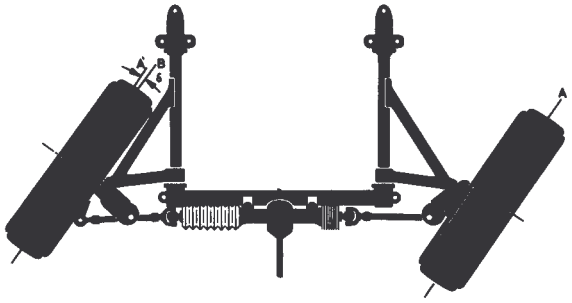


Dimension 1 is smaller than dimension 2

Toe-in

Toe-in is the distance of the wheels of an axle measured at the level of the wheel center, which is smaller in the front than at the rear.

Camber and road contact resistance on the front whees wheels cause the wheels to move automatically outwards. To counteract these forces, the toe-in value must be adjusted to a value which does not permit the occurance of toe-out as a result of the counter forces occuring while driving under the influence of the clearances of the individual axle components.



A' = Parallel to A
B = Wheel center
δ = Differential angle

Track Differential Angle

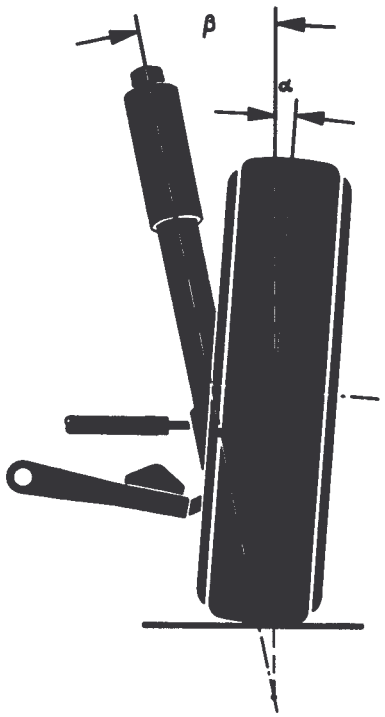
The front axle wheels are guided in parallel, that is, the trapezoidal layout of the front axle and the steering components is designed in such a manner that movements of the steering wheel will not cause any essential changes in the angle of the wheel at the near end of the curve in relation to the wheel on the outer end. Only the preset toe-in and given tolerances in the steering members are showing different angles. As compared with the conventional differential angles during steering lock, the parallel guiding of the wheels shows a differential angle in the direction of the toe-in.

Camber and Inclination

Camber is the lateral angular deviation of the wheel plane from a vertical line erected at the contact point of the wheel and the ground.

Inclination is the lateral deviation of the center line passing through the shock absorber strut in relation to vertical.

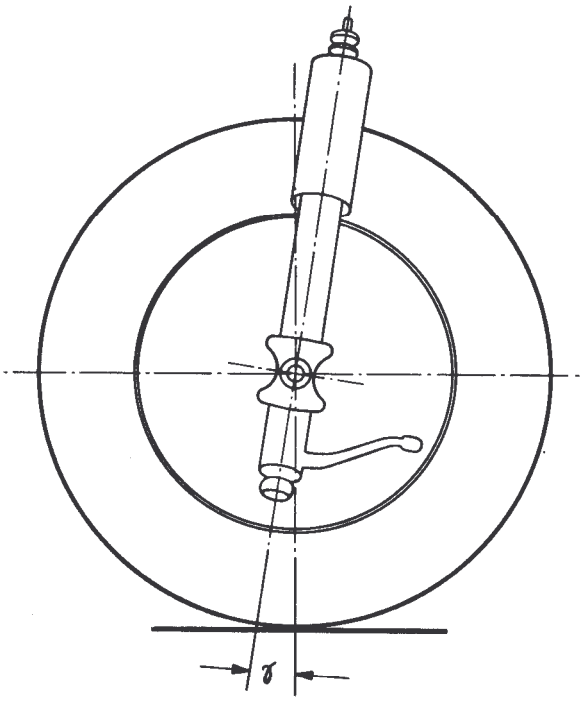
Camber and inclination serve the purpose of keeping the distance between the tire road contact point and the extension of the center line of the shock absorber strut in a given, favorable relative relationship, as a result of which the ground contact radius of the wheels while turning the steering wheel is kept as small as possible on the one hand, while the transmission of road shocks to the steering gear is prevented on the other.



a = Chamber
ß = Inclination

Caster

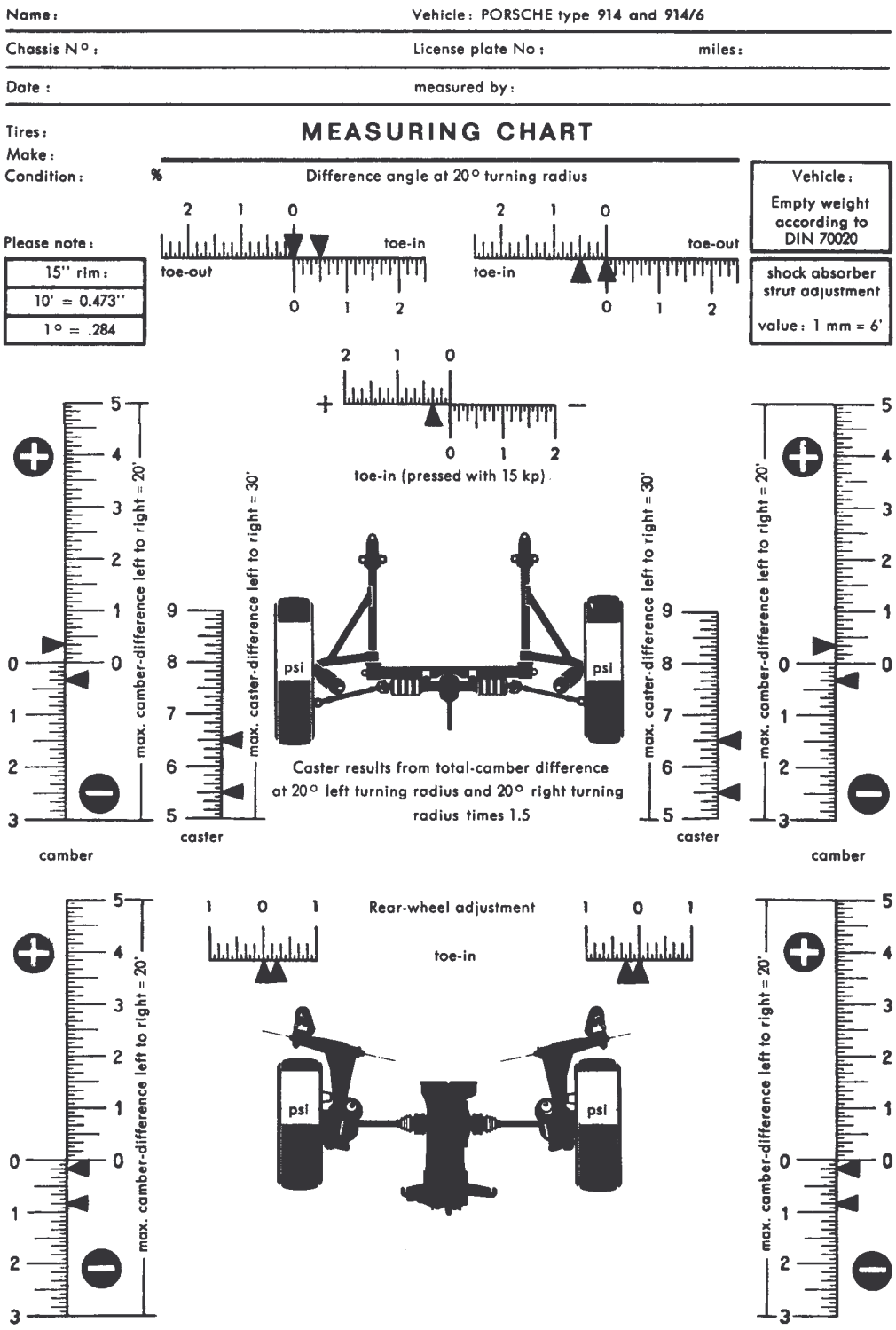
The caster of the front wheels is the result of the angular position of the shock absorber strut at the top and toward the rear. As a result, the extension of the center line through the shock absorber strut will intersect the road ahead of the tire contact points. Caster will cause the wheels to be pulled, together with a trend of moving automatically into straight-ahead position and maintain that position while driving.



γ = Caster

SAMPLE MEASURING CARD

Small triangles in the measuring card are marking the permissible adjusting values for a quick checkup and evaluation of the measuring results.



HEIGHT ADJUSTMENT OF FRONT AXLE

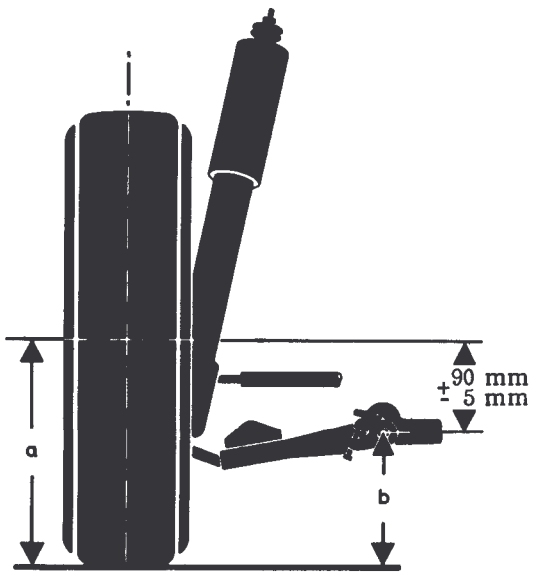
General

The accurate height adjustment of the front axle is the basis for measuring the vehicle.

Caution!
Prior to making adjustments, see that vehicle has proper dead weight acc. to DIN (vehicle ready for driving with fuel tank filled and spare wheel).
Check tire pressure.
Drive vehicle on measuring platform or level ground. (Vehicle resting on its wheels.)

Adjustment

1. Mark center on front wheel hub caps.
2. Push vehicle down several times at front on shock absorber and permit to rise at its own strength.
3. Measure from a level surface of measuring platform or from level ground vertically upwards to center of front wheel (dimension "a").
4. Dimension "a" less 90 mm (3.54") is dimension "b".



4. Dimension "a" less 90 mm (3.54") is dimension "b". This dimension "b" may be set on a height gauge for favorable measuring of adjusting lever for torsion bar on closing cover.
5. Clean closing cover on adjusting lever of torsion bar so that the marking for center of closing cover is easily seen.
6. Loosen or tighten adjusting screw of torsion bar until the dimension "b" on the marking for the center of the closing cover is obtained.
7. Push vehicle down in front, permit to rise under its own strength and check dimension "b" again on both sides and correct, if required.

Caution!
Though the tolerance of ± 5 mm (.2") for dimension "b" may be exploited, the difference between the lefthand and righthand end may not exceed max. 5 mm.

Example:

Dimension a = 315 mm (12.4")
- 90 mm (3.54")

Dimension b = 225 mm (8.9") ± 5 mm (.2")
= perm. dimension "b"
220 mm (8.7") - 230 mm (9.1")

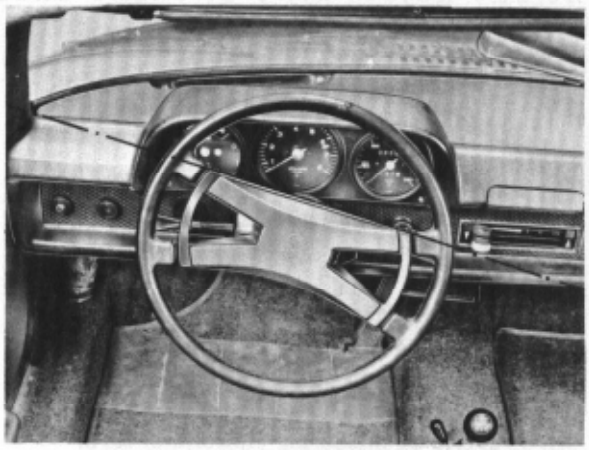
Adjusting example:

Lefthand side	Dimension b = 220 mm (8.7")
Righthand side	Dimension b 220 - 225 mm (8.7 - 8.9") permissible
Lefthand side	Dimension b = 230 mm (9.1")
Righthand side	Dimension b 230 - 225 mm (9.1 - 8.9") permissible

ADJUSTMENT OF TOE-IN

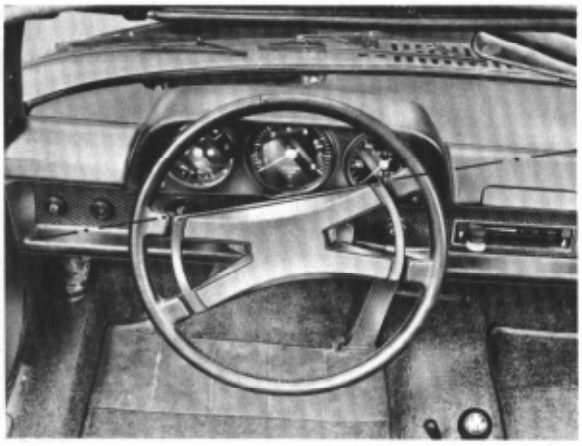
Note

The toe-in must be set with the steering gear in center position, since otherwise the total wheel lock left and right will vary, which in turn will result in varying turning circle.



1. Turn steering wheel to full lock on one side. (Use some pressure, so that the lock position is felt on the steering gear.)

2. Hold steering wheel in this position and estimate position of bottom steering wheel spokes in relation to horizontal.



3. Turn steering wheel toward the other end up to full lock and also estimate position of bottom steering wheel spokes.

4. If the position of the bottom steering wheel spokes is different at lefthand and righthand lock, the steering wheel must be loosened and pertinently adjusted.

5. Turn steering wheel to center position (straight ahead) and adjust lefthand and righthand track rod by means of an optical axle measuring device in such a manner that each wheel has the specified toe-in. (Wheels loaded with 15 kp).

Caution!
The vehicle weight should correspond to dead weight acc. to DIN (completely fueled with spare wheel and tools).

NOTE
Coat the threaded part of the tie rod with an anti-corrosion compound upon completion of front axle adjusting work.

Track Differential Angle

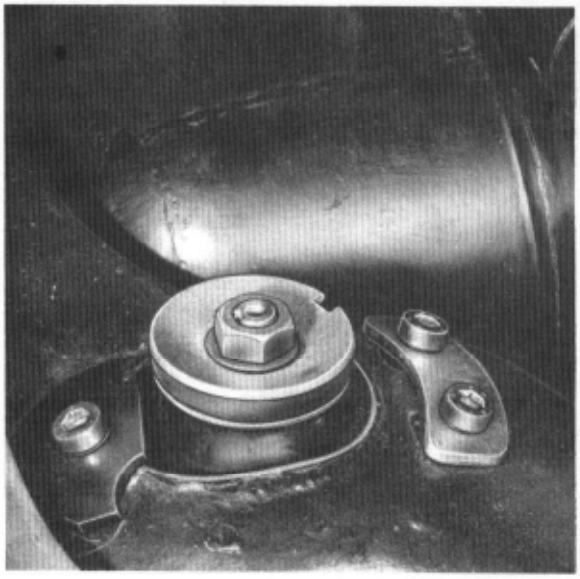
A faulty track differential angle cannot be compensated by adjusting the track rods. Faults up to the tolerance drawn in dimensional chart are permissible. If the differential angle faults are higher, the steering arm, the track rod or the king pin king pin on the shock absorber strut are distorted.

ADJUSTMENT OF CAMBER AND CASTER

Adjustment of Camber

1. Fold back front end covering.

2. Remove sealing compound on pressure plates and supporting bearing. (Scratch off and wipe remainder with gasoline-soaked rag).



3. Mark position of single-hole and double-hole pressure plate and loosen cheesehead screws.

4. Shift supporting bearing with shock absorber strut in accordance with desired adjusting values for camber crosswise to vehicle lenght. One mm travel on supporting bearing, responds to to 6' angle change on shock absorber strut.

Caution!

Shifting the supporting bearing with shock absorber struts in vehicle lengthwise direction will change the caster adjustment.

5. Tighten cheesehead screws to specified tightening torque.

6. Seal plates, as well as supporting bearing anew with permanently elastic sealing compound such as "National Glue 670".

Adjusting the Caster

Complete pertinent steps as described under "Adjusting the Camber".

Caution!

Shift supporting bearing with shock absorber strut in vehicle lengthwise direction. Any shifting in vehicle crosswise direction will change the camber adjustment.

Note

On optical measuring instruments on which the caster cannot be directly read, (for example the Exacta instrument) the caster can be determined from the total camber difference at 20^{o} lefthand lock and 20^{o} righthand lock x 1.5.

Example:

Lefthand wheel

Camber at 20^{o} lefthand lock = $+ 3^{o}$
Camber at righthand lock = $- 2^{o}$ (20^{o} lock set on righthand wheel)

Total camber difference = 5^{0}

Total camber difference 5^{o} x 1.5 = 7.5^{o} caster

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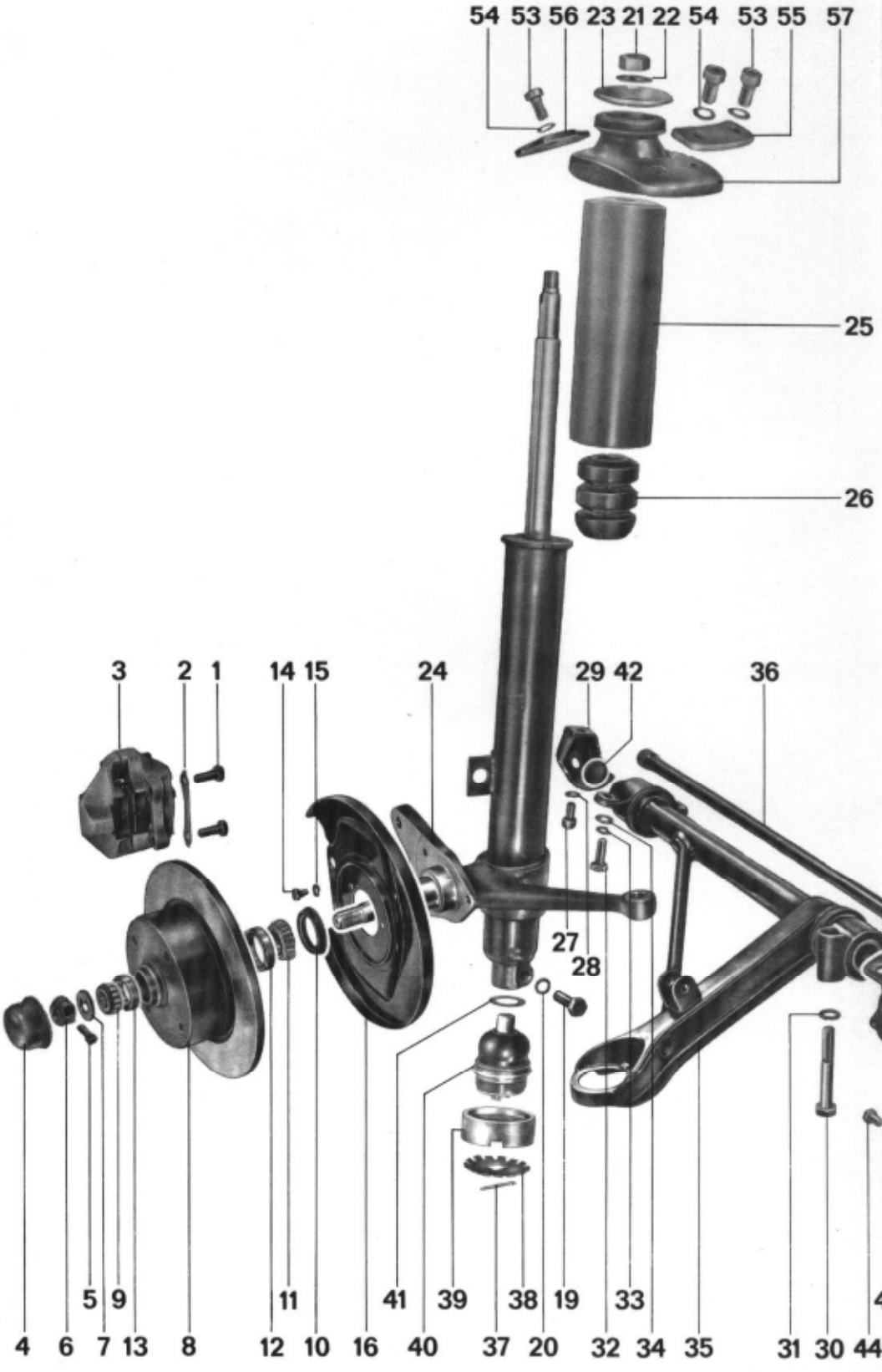
54 53 56 23 21 22 54 53 55 57
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3 2 1 14 15 24 29 42 36
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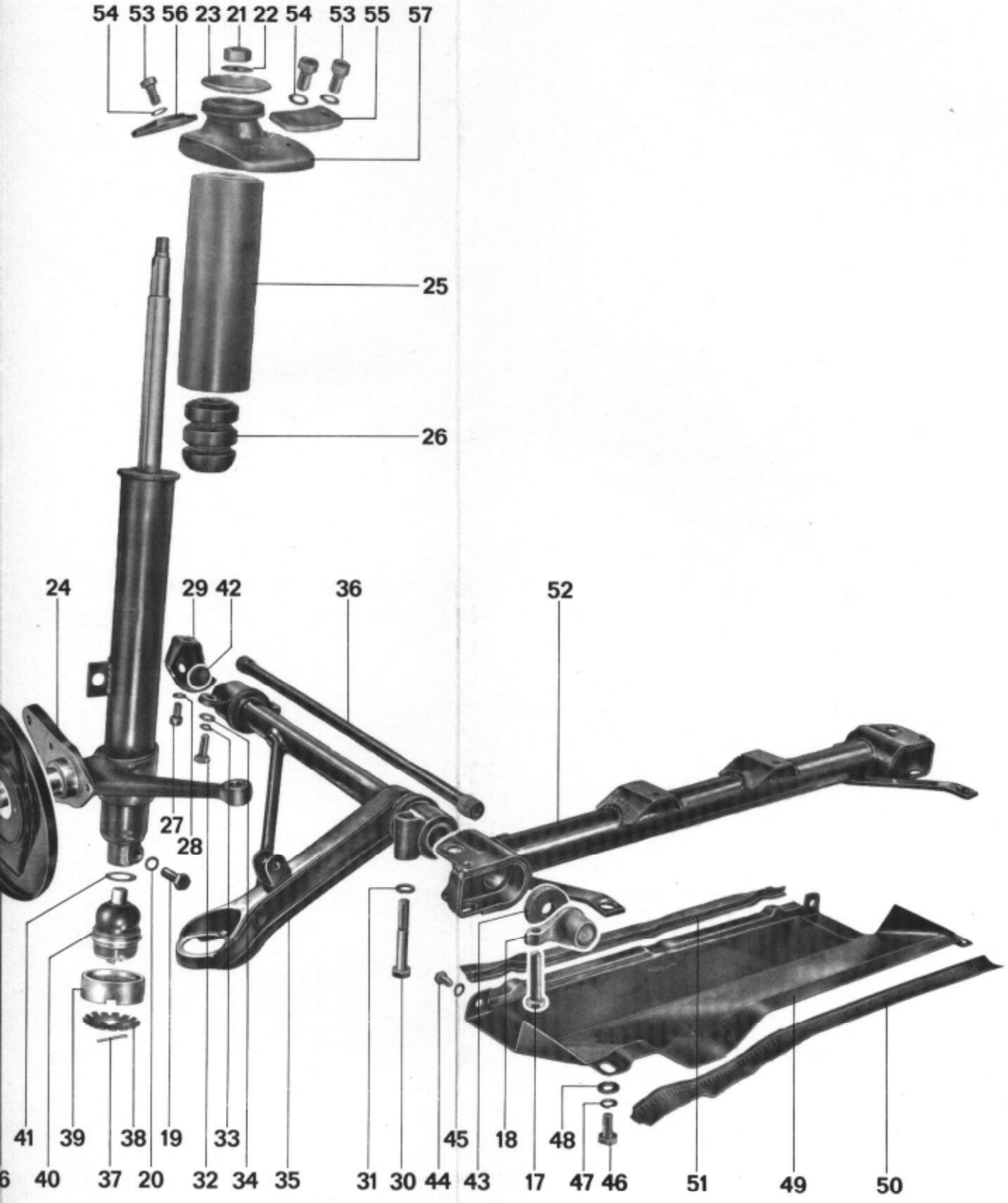
5 9 11 41 39 38 19 33
4 6 7 13 8 12 10 16 40 37 20 32 34 35 31 30 44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41 39 38 19 33 45 18 48
6 40 37 20 32 34 35 31 30 44 43 17 47 46 51 49 50

No.	Designation	Each	Observe during: Removal	Observe during: Installation	Special Instr.
1	Hex. bolt	2		Tighten to spec. torque	
2	Locking plate (914 only)	1		Replace	
3	Caliper	1	Only at ambient temperature		
4	Hub cap	1	Push off alternately with special tool VW 637/2		2.1-2/1
5	Cheesehead screw	1		Tighten to spec. torque	
6	Clamping nut	1			
7	Nose washer	1		Should just move when pushed with screw driver	2.1-2/1
8	Brake disk	1		Clean, check for wear and damage; fill hub with approx. 40 grams lithium grease. Coat bearings well with grease	914/6 refer 2.1-3/5
9	Tapered roller bearing	1		Clean, check and replace, if requ.	
10	Sealing ring	1		Replace, if requ.	914/6 refer to 2.1-3/5
11	Tapered roller bearing	1		Clean, check and replace, if requ.	
12	Bearing outer race	1	Knock out with copper mandrel		914/6 refer to 2.1-3/3
13	Bearing outer race	1	Knock out with copper mandrel		914/6 refer to 2.1-3/3
14	Hex. bolt	3		Tighten to spec. torque	

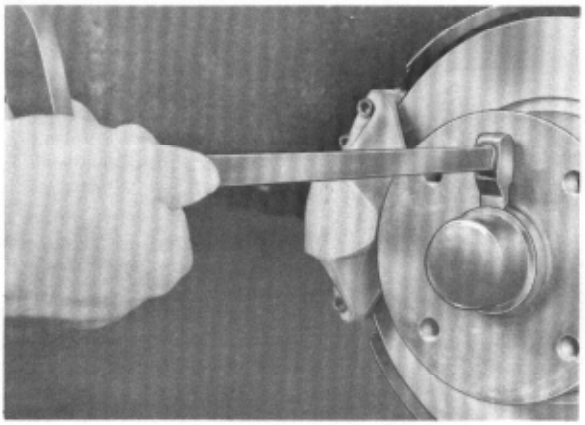
No.	Designation	Each	Observe during: Removal	Observe during: Installation	Special Instr.
15	Spring ring	3		Replace, if requ.	
16	Guard plate	1			
17	Adjusting screw	1		Coat with MoS_2 paste. Repeat height adjustment	1.1-1/5
18	Adjusting lever	1		Insert correctly	2.1-4/8
19	Hex. bolt	1		Tighten to spec. torque	
20	Lock washer	1		Replace	
21	Hex. nut	1		Tighten to spec. torque	
22	Locking plate	1		Replace, tab should point upwards	
23	Tab washer	1			
24	Shock absorber strut	1		Check and replace, if required	2.1-4/5 914/6 2.1-4/7
25	Protective tube	1			
26	Hollow rubber spring	1		No lubricant required	
27	Cheesehead screw	1		Tighten to spec. torque	
28	Spring ring	1		Replace, if requ.	
29	Guard clip	1			
30	Hex. bolt	1		Tighten to spec. torque	
31	Spring ring	1		Replace, if requ.	

No.	Designation	Each	Observe during: Removal	Observe during: Installation	Spec. Instr.
32	Hex. bolt	2		Tighten to spec. torque	
33	Spring ring	2		Replace, if requ.	
34	Washer	2			
35	Transverse control arm	1		Check	2.1-5/4
36	Torsion bar	1		Check and replace, if required, observe installation marks	2.1-6/1
37	Cotter pin	1		Replace	
38	Lock washer	1		Replace, if requ.	
39	Grooved nut	1	Loosen with special tool P 280b	Tighten to spec. torque	2.1-5/5
40	Ball joint	1		Check and replace, if required	2.1-5/4
41	Washer	1			
42	Cover	1	Knock out with suitable tubing	Check for correct seat	
43	Sealing ring	1		Replace, if requ.	
44	Hex. bolt	2		Tighten to spec. torque	
45	Spring ring	2		Replace, if requ.	
46	Hex. bolt	2		Tighten to spec. torque	
47	Spring ring	2		Replace, if requ.	
48	Washer	2			
49	Underfloor protection	1			
50	Profiled rubber	1		Check and replace, if requ.	

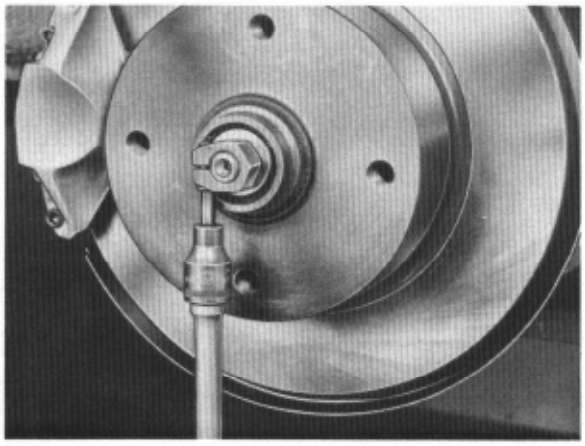
No.	Designation	Each	Observe during: Removal	Observe during: Installation	Special Instr.
51	Profiled rubber	1		Check and replace, if requ.	
52	Auxiliary support	1		Check and replace, if requ.	2.1-7/2
53	Cheesehead screw	3		Tighten to spec. torque	
54	Lock washer	3		Replace	
55	Two-hole pressure plate	1	Mark position for reinstall.		
56	Single-hole pressure plate	1	Mark position f. reinstallation		
57	Supporting bearing	1		Check and replace, if required	2.1-8/1

ADJUSTMENT OF FRONT WHEEL BEARINGS

1. Push off cap for front wheel hub alternately with VW 637/2.



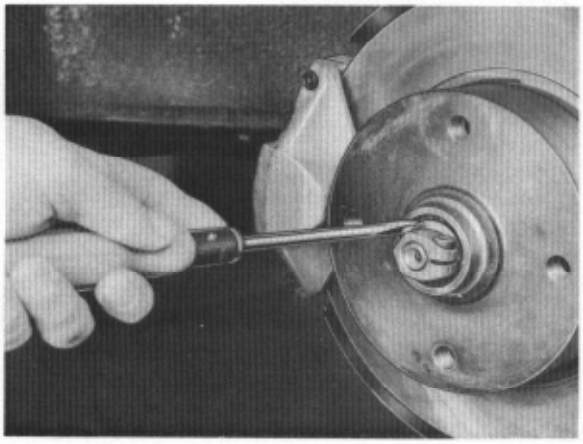
2. Loosen cheesehead screw of clamping nut.



3. Tighten clamping nut slightly (approx. 1.5 mkp = 10.8 ft.lbs) while turning the wheel or hub, so that the taper rollers will be positioned correctly against bearing races.

4. Loosen clamping nut until the tab washer can just be pushed easily and laterally be means of a screw driver, so that no perceptible bearing play is felt when the wheel hub is moving axially.

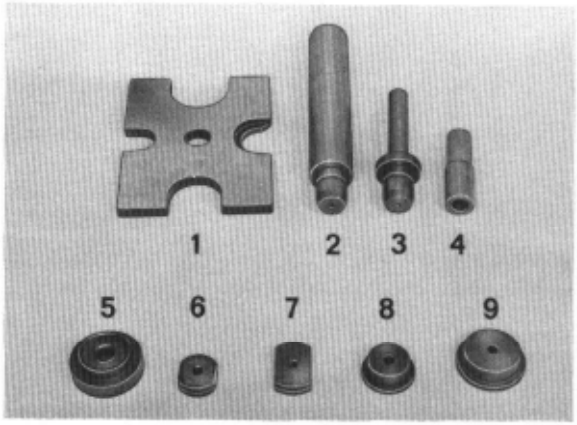
Caution!
Do not support screw driver against hub but hold freely in hand.



5. Tighten cheesehead screw of clamping nut to specified torque without turning the clamping nut and check adjustment once again by moving tab washer and correct, if required.
Caution!
The slot width of the clamping nut should be 2.5 + 0.5 mm (0.1 + 0.02"), so that perfect clamping is obtained even under unfavorable tolerance overlaps.

6. Coat clamping nut and tab washer lightly with lithium grease and fit cap without grease by means of a plastic hammer or the like.

TOOLS



No.	Designation	Special Tool	Explanations
1	Pressure plate	VW 401	
2	Pressure die	VW 407	
3	Pressure die	VW 410	
4	Pipe tool 28 mm dia.	VW 421	
5	Pressure piece	VW 433	
6	Pressure plate	VW 447f	
7	Pressure plate	VW 447g	
8	Pressure plate	VW 447h	
9	Pressure plate	VW 447i	

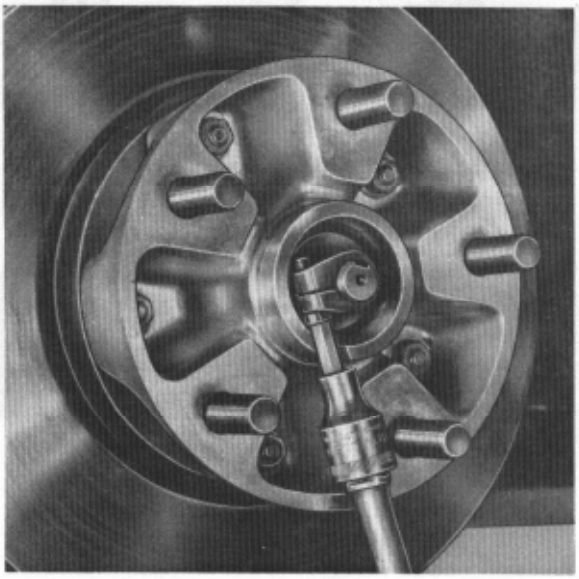
REMOVAL AND INSTALLATION OF FRONT WHEEL BEARING

Vehicle Type 914/6:

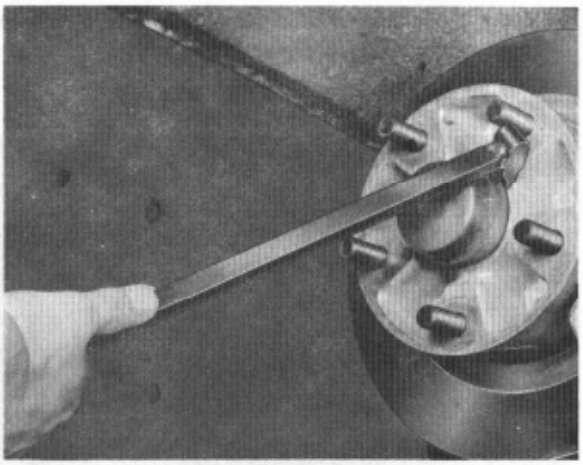
Removal

1. Loosen hollow screw of brake line on caliper (first push brake pedal with pedal support slightly down, so that the brake fluid will not run out of refill tank).

2. Loosen fastening bolts for caliper and completely remove caliper.



3. Push off cap of front wheel hub alternately with VW 637/2.



4. Loosen cheesehead screw of clamping nut for wheel bearing, screw clamping nut out and remove tab washer.

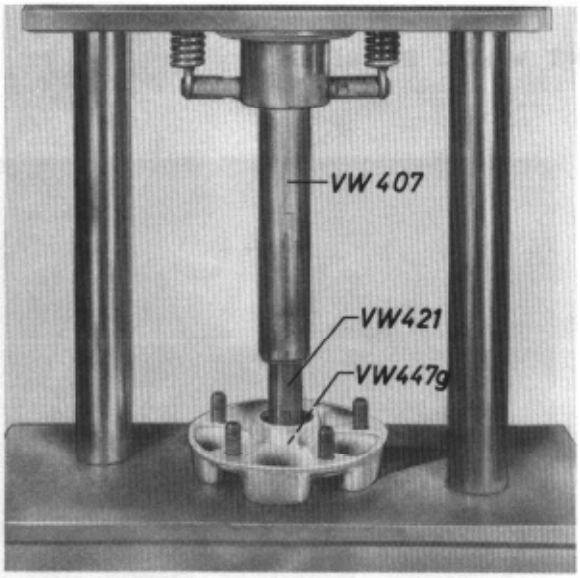
5. Remove front wheel hub with brake disk and and bearing.

6. Press front wheel bearing out on a shop press. (The brake disk may have to be removed, depending on type of shop press).

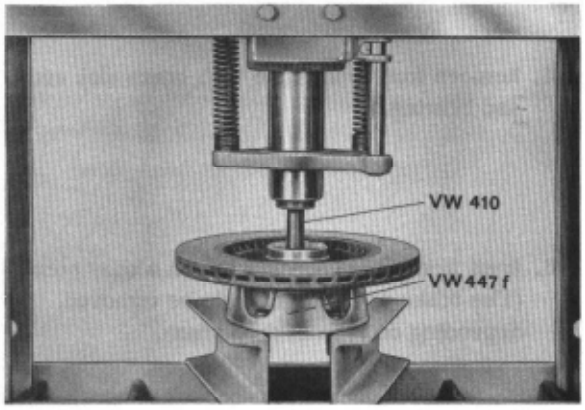
a. Mark brake disk and hub, loosen screws on brake disk and remove hub.

b. Heat hub to 120 to 150°C (248 to 302°F).

c. Press out internal tapered roller bearing with sealing ring in combination with special tools VW 407, VW 421 and VW 447g.



d. Press out outer race of outer tapered roller bearing in combination with special tools VW 410 and VW 447f.



Installation

General

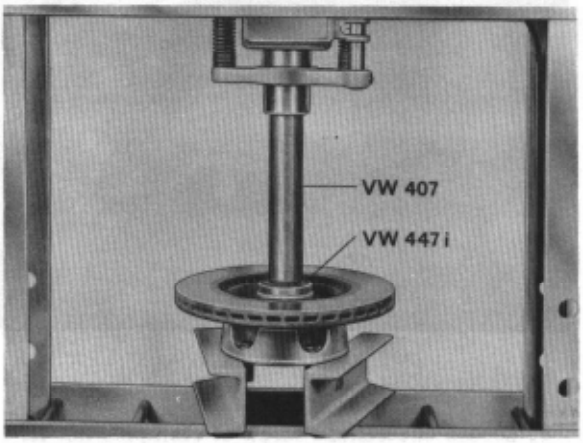
Tapered roller bearings of various makes (SKF, FAG and Timken) are installed as standard equipment.

New bearing parts (bearing outer race and bearing inner race with taper rollers) can be interchanged for the same make, be sure that a complete bearing consists of parts of one and the same make.

1. Clean both tapered roller bearings carefully and check for wear and damage; replace, if required.

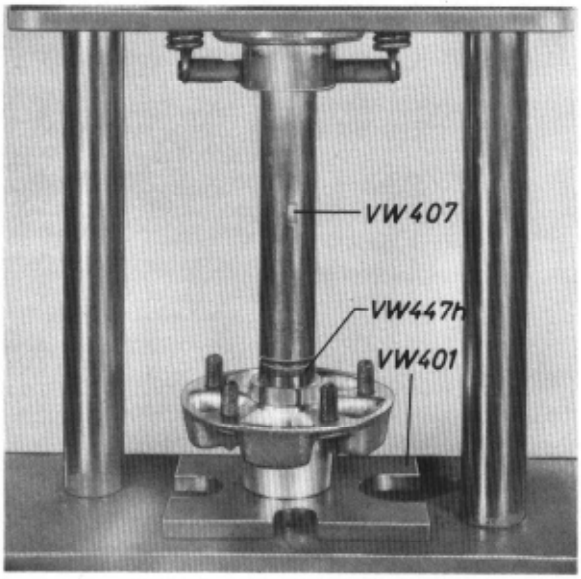
2. Heat hub to 120 - 150°C (248 to 302°F).

3. Press in outer race of inner tapered roller bearing in combination with special tools VW 407 and VW 447i.



4. Insert inner race of inner tapered roller bearing and press in sealing ring in combination with special tools VW 410 and VW 433 until sealing ring is flush with hub.

5. Press in outer race of outer tapered roller bearing in combination with special tools VW 407, VW 447h and VW 401.



6. Position brake disk on hub in such a manner that the marks are in alignment.

7. Tighten hex. bolts of hub brake disk to specified torque. Be sure that the bolts are mounted from inside out, so that the screw head comes to rest against the brake disk. Fit new spring washers under nuts.

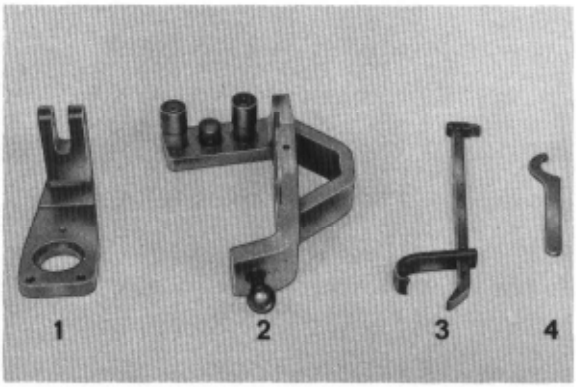
8. Fill hub with approx. 65 cc or 60 grams of lithium grease (multi-purpose grease), coating the bearings well with grease. The space between the sealing lips of the sealing ring should also be filled with grease, so that the outer sealing lip will not run dry.

9. Adjust front wheel bearings.

10. Tighten hex. bolts for caliper together with spring washers to specified torque.

11. Tighten hollow screw of brake line on caliper to specified torque.

TOOLS

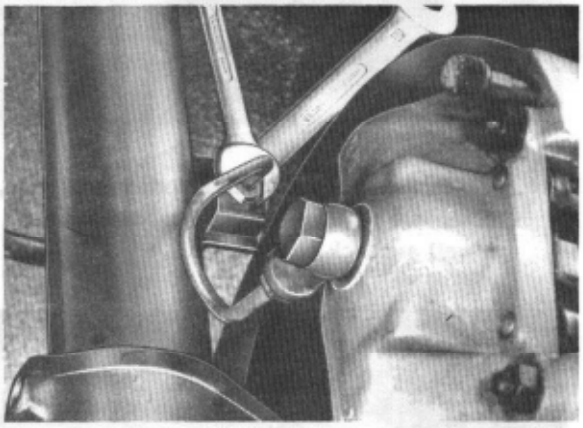


No.	Designation	Special Tools	Explanations
1	Test fixture for steering arm	P 284c	
1	Test fixture for steering arm	P 284b	For vehicle Type 914/6
2	Test fixture for steering knuckle and shock absorber strut	P 286c	
2	Test fixture for steering knuckle and shock absorber strut	P 286b	For vehicle Type 914/6
3	Hub cap puller	VW 637/2	
4	Hook spanner 62 mm dia.		commercial

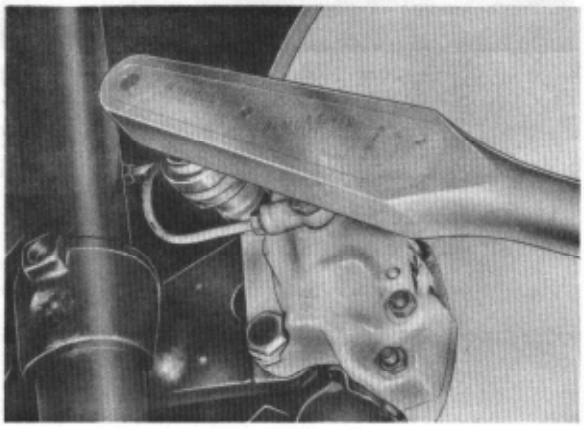
REMOVAL AND INSTALLATION OF SHOCK ABSORBER STRUT

Removal

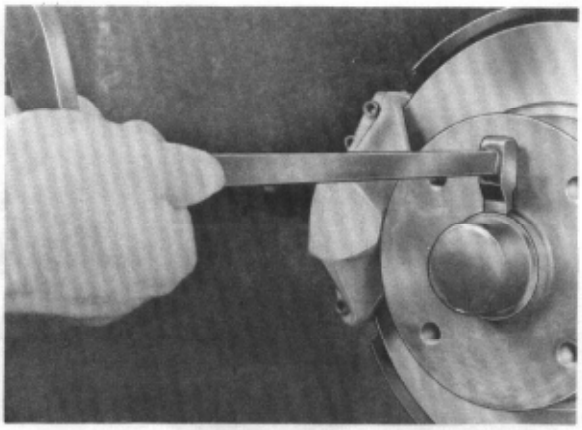
1. Loosen brake line on holder of spring strut (first push brake pedal with pedal support slightly downwards, so that the brake fluid cannot run out of refilling tank.



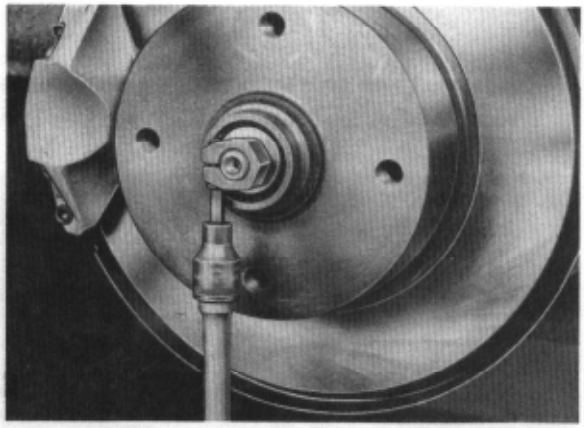
2. Loosen fastening bolts for caliper and remove complete caliper.



3. Push off front wheel hub cap alternately with VW 637/2.

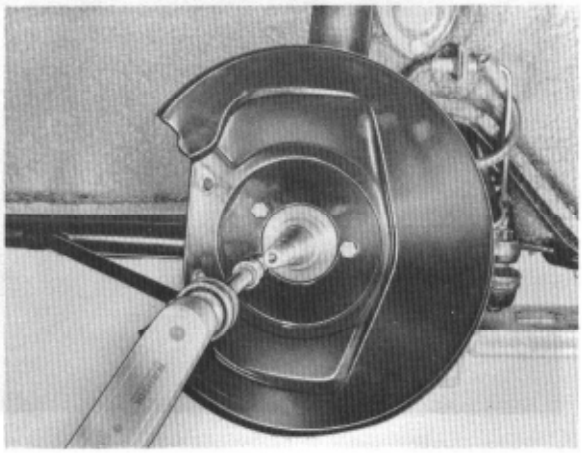


4. Loosen cheesehead screw of wheel bearing clamping nut, screw out clamping nut and remove tap washer.



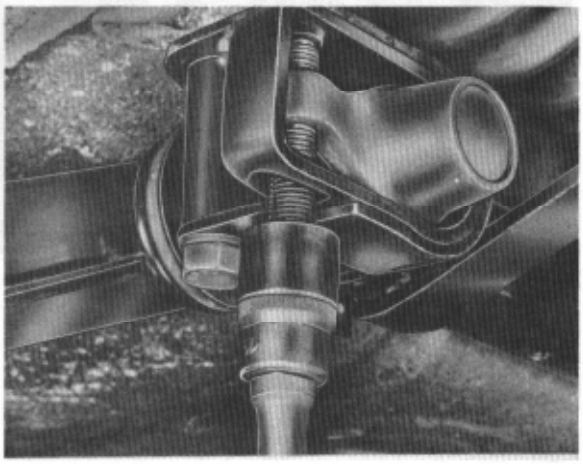
5. Remove brake disk and bearing.

6. Loosen hex. bolt for guard plate and remove guard plate.

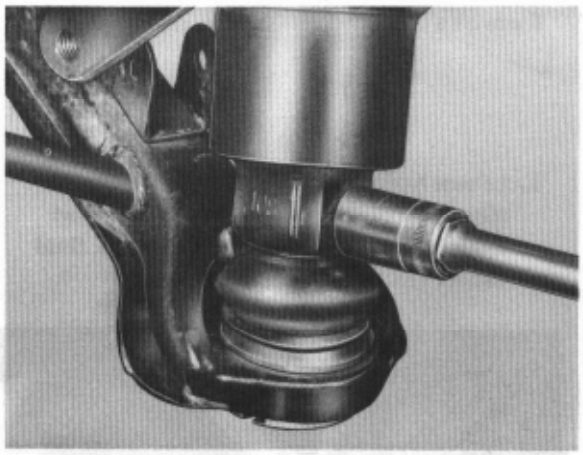


7. Unlock castle nut of track rod joint and pull off ball joint with a puller.

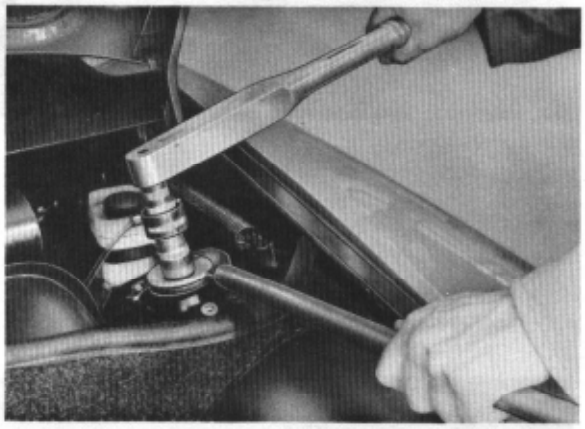
8. Screw out adjusting screw of torsion bar and remove adjusting lever.



9. Loosen hex. screw for ball joint of shock absorber strut. Push transverse control arm downwards and pull ball joint out of shock absorber strut.

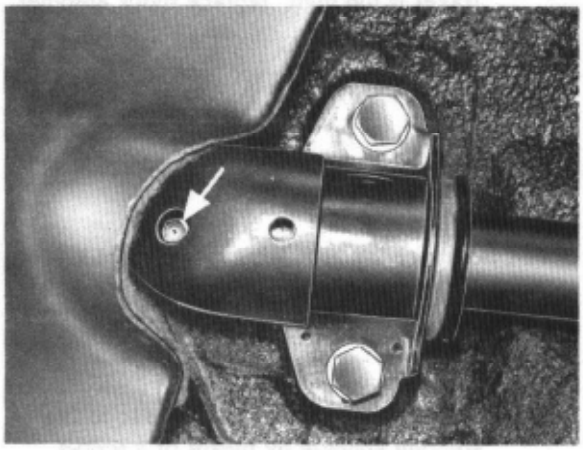


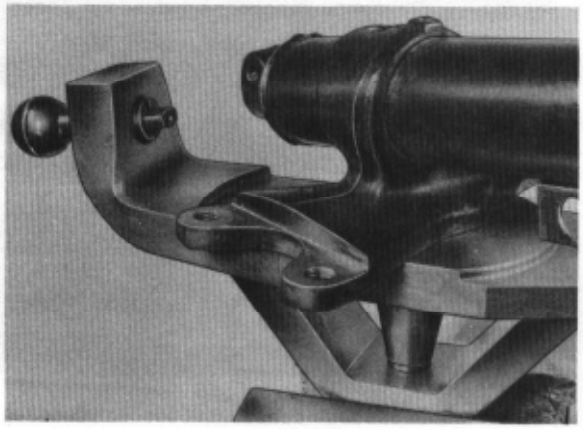
10. Unlock hex. nut on shock absorber strut (top), loosen and remove lock washer, tab washer as well as shock absorber strut.



11. On vehicle Type 914/6, pull spacing ring off with claw puller, if required.

12. Loosen cheesehead screw for guard clip on front transverse control arm bearing and remove guard clip.





If the bearing pin cannot be pushed in up to stop against flange section, the bearing pin is bent and the shock absorber strut must be replaced.

Inspection of Components

1. Check shock absorber strut with steering knuckle using special tool P 286c.

Caution!
Prepare special tool P 286c as follows:

Shock absorber strut - "BOGE" (outer tube dia. 52 mm • 2.0")
Attach sleeves and cap.

a. Clamp special tool P 286c in vise and slide bearing pins of shock absorber strut into test holes of special tool P 286c.

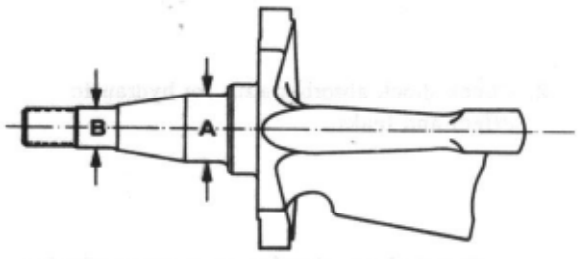
b. Checking seats of front wheel bearings for seizing marks and dimensions:

Seat A for inner tapered roller bearing =
29.00 mm dia.
28.98 mm dia.

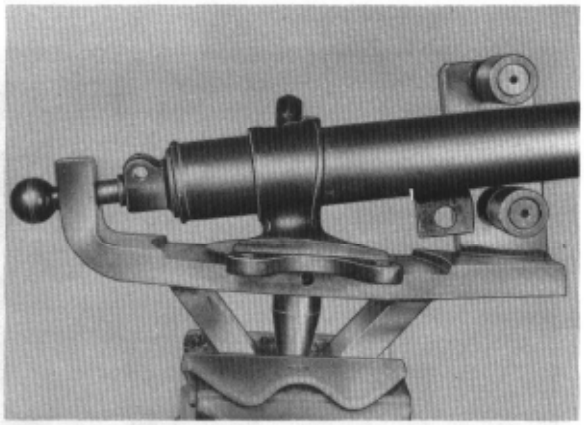
Tapered roller bearing, ID =
29.01 mm dia.
29.00 mm dia.

Seat B for outer tapered roller bearing =
17.46 mm dia.
17.45 mm dia.

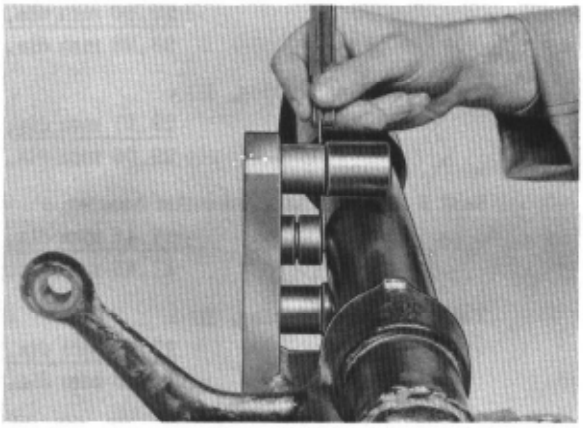
Tapered roller bearing, ID =
17.47 mm dia.
17.46 mm dia.



c. Rotate shock absorber strut between measuring pin and locate with holding pin.



If the shock absorber strut cannot be rotated between the two measuring pins, replace shock absorber strut. In addition, only a distance of max. 2.2 mm (.087") is permissible between the shock absorber strut outer tube and the face-end measuring surface of the measuring pin. If this dimension is exceeded, the shock absorber strut should also be replaced.



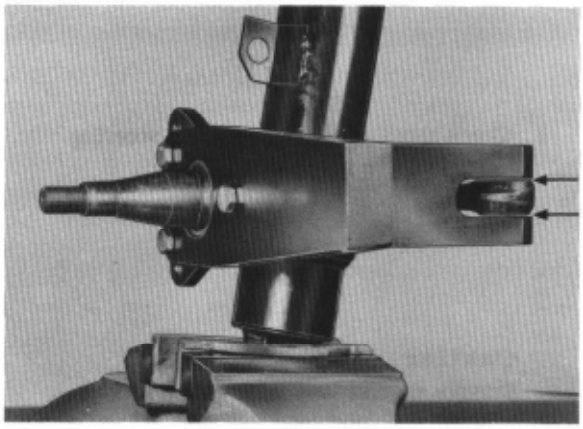
2. Check shock absorber strut for hydraulic effect and leaks.

a. Check shock absorber strut externally for oil contamination. If the entire shock absorber absorber tube is covered with soiled oil, replace entire shock absorber strut.

b. Clamp shock absorber strut vertically into vise, with piston rod up.
Push shock absorber down several times, so that the oil moves in between its cylinder and determine idle travel of shock absorbers by a short counter movement. If the idle travel is too high, replace shock absorber strut.

3. Check steering arm using special tool P 284c.

a. Screwing the special tool P 284c to the steering knuckle by means of 3 screws (M 8x25) should be readily effected in such a manner, that the steering arm is between the inspection holes.



b. The large bore dia. for the track rod joint in the steering arm should not be outside the inspection hole of special tool P 284c. (Sight test)

Replace shock absorber strut if deviations exceed permissible dimensions.

Vehicle Type 914/6:

1. Check shock absorber strut with steering knuckle using special tool P 286b.

Caution!
Prepare special tool P 286b as follows:

Fit shock absorber strut - "BOGE" (external tube dia. 52 mm = 2.05") - thick sleeves and thick cap.

a. Complete test step similar to type 914. (With spacer ring mounted on bearing pin).

b. Check seat for front wheel bearings for seizure and dimensional accuracy:
Seat A for inner tapered roller bearing =
31.75 mm dia.
31.73 mm dia.

Seat B for outer tapered roller bearing =
19.05 mm dia.
19.03 mm dia.

2. Check steering arm using special tool P 284b. Repeat test step similar to type 914.

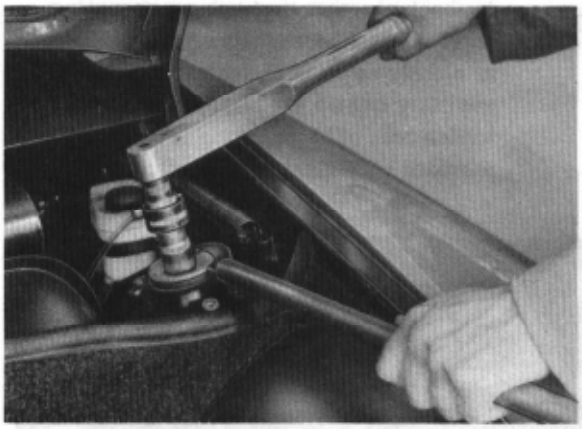
Installation

1. Mount spacer ring on vehicle type 914/6, if required. Heat ring to approx. 150°C (302°F) and fit.

Caution!
Fit round cord ring (OR 25.3x2.4) between spacer ring and steering knuckle to prevent the formation of rust.

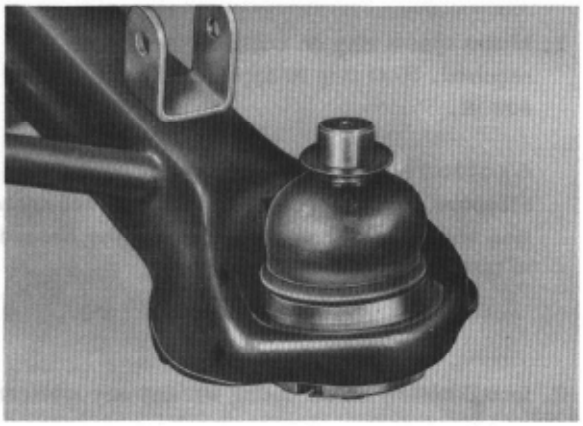
2. Install hollow rubber spring without any lubricant.

3. Tighten hex. nut on shock absorber strut to specified torque. Use new lock washer and be sure that the tab of the lock washer points upwards when fitted.



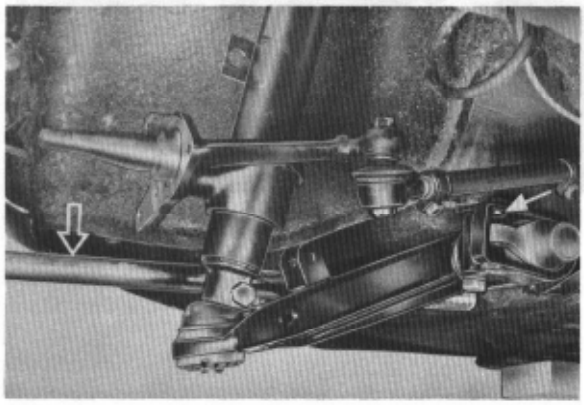
4. Tighten hex. bolt (M 10x30 - 10K) for ball joint to specified torque. Use new Schnorr lock.

Caution!
Be sure to fit steel washer between sealing bellows of ball joint and shock absorber strut.



5. Mount adjusting lever to torsion bar as described below.

   a. Push transverse control arm with shock absorber strut connected down against stop in shock absorber strut using a mounting lever ot the like and slide adjusting lever as closely as possible against stop of auxiliary carrier for adjusting screw on torsion bar. (The adjusting lever must be provided with a closing cover).



   b. Grease threads of adjusting screw with MoS_2 paste and tighten adjusting screw slightly.

   c. Check for correct seat of closing cover in transverse control arm since inadequate assembly of adjusting lever may force the torsion bar out of the teeth of the transverse control arm at the front.

6. Screw down protective nember for transverse control arm.

7. Tighten castle nut of track rod joint to specified torque.

8. Tighten hex. bolts for guard plate to specified torque.

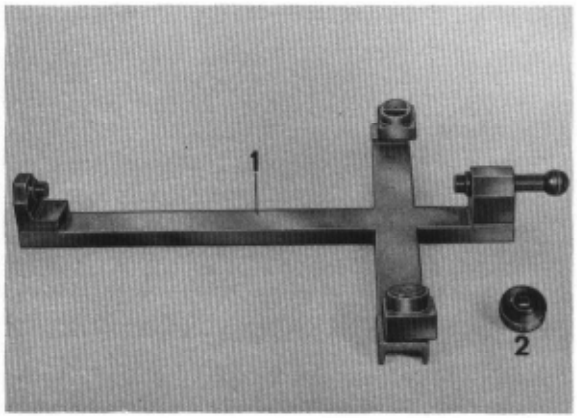
9. Install front wheel bearing and adjust.

10. Tighten hex. bolts for caliper to specified torque. Use new lock washer, or spring washers for type 914/6.

11. Bleed brake system and test for leaks.

12. Measure vehicle optically.

TOOLS

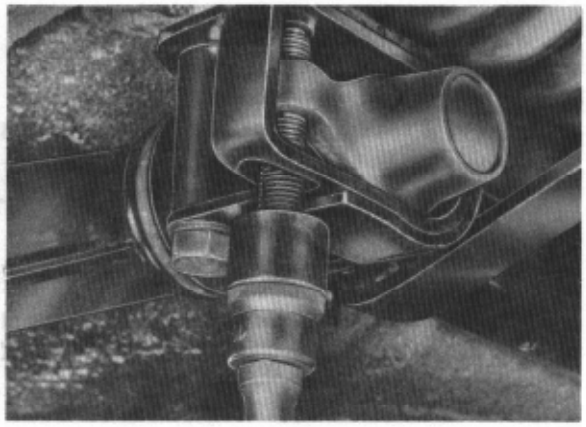


No.	Designation	Special Tools	Explanations
1	Testing fixture for transverse control arm	P 288b	
2	Spanner	P 280b	

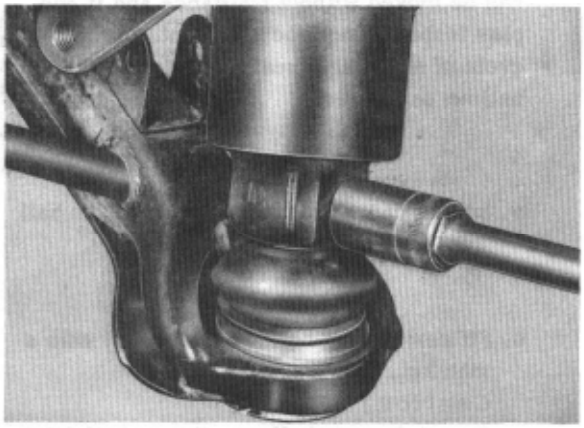
REMOVAL AND INSTALLATION OF TRANSVERSE CROSS ARM

Removal

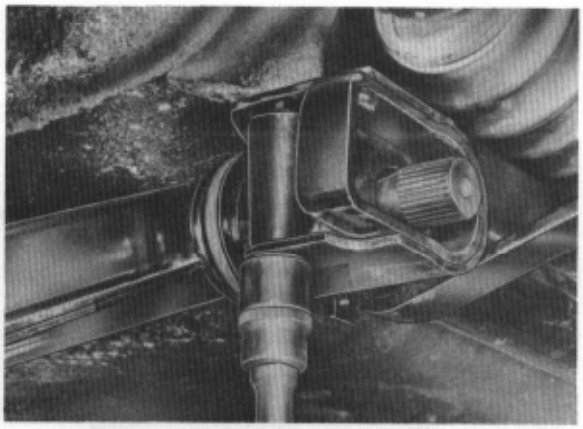
1. Unscrew adjusting screw of torsion bar, pull adjusting lever from torsion bar and remove seal.



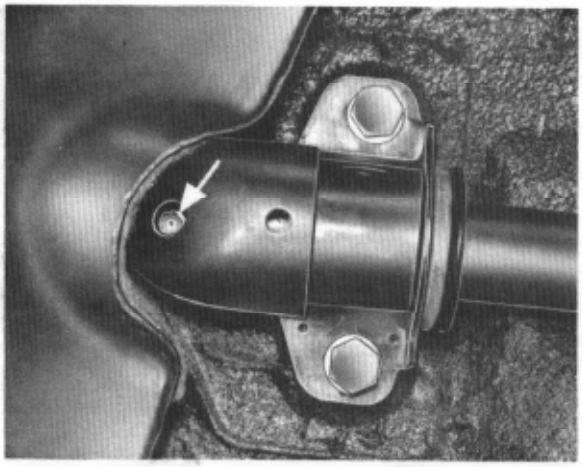
2. Loosen hex. bolt for ball joints of shock absorber strut, push transverse control arm downwards and pull ball joints out of shock absorber strut.



3. Loosen hex. bolt for transverse control arm and auxiliary carrier.



4. Loosen cheesehead screw for protective nember on front transverse control arm bearing and remove remove protective nember.

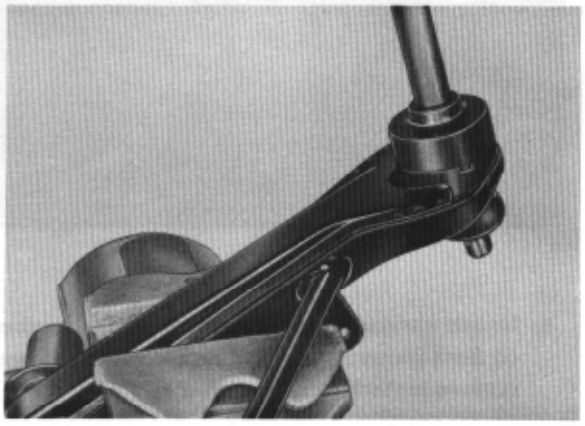


5. Unscrew hex. bolts on front transverse cross arm bearing.

6. Push transverse control arm together with torsion bar out of auxiliary carrier and remove.

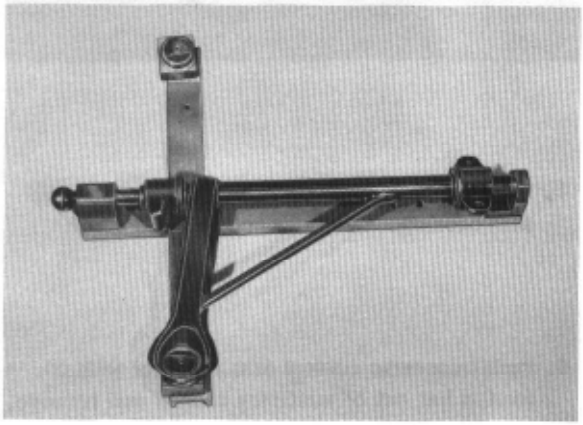
Caution!
If both transverse control arms must be removed, first remove one arm and tighten hex. screw for transverse control arm and auxiliary carrier again slightly so that the auxiliary carrier is supported.

7. Clamp transverse control arm into vise (use soft jaws), unlock grooved nut of ball joint and loosen using special tool P 280b.



Checking the Individual Parts

1. Check transverse control arm with special tool P 288b.



a. Force closing cover for torsion bar toothing with suitable pipe tool out of transverse control arm.

b. Hold transverse control arm in special tool P 288b.

c. The transverse control arm should turn easily when mounted with its ball joint supporting hole on test pin of special tool P 288b, with the ball joint seat resting well against test pin flange all around. Replace distorted or damaged transverse cross arms.

d. Mount closing cover into transverse control arm with its spherical end facing outwards and knock closing cover in with a mandrel.

e. Check rubber bearing of transverse control arm for visible wear. Replace transverse control arm, if rubber bearings are defective.

2. Check ball joint. Some friction torque should be felt when moving ball pin. If the ball pin can be moved without resistance and if end play is shown, replace ball joint. In the event of a damaged sealing bellows, replace bellows as follows:

a. Loosen damaged sealing bellows from ball joint with a flat chisel.

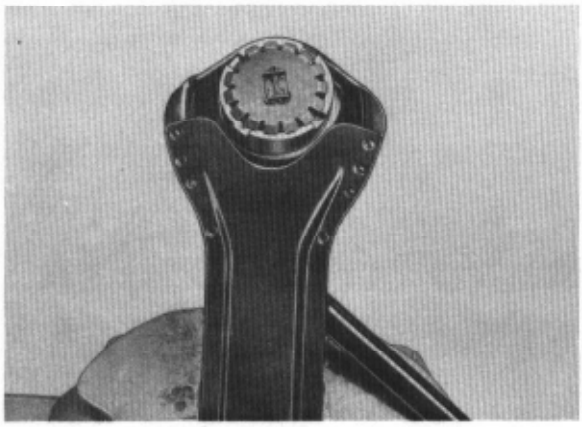
b. Fit new sealing bellows alternately with a mandrel.
Caution!
Do not damage bellows. Grease ball joint with multi-purpose grease (MoS_2) if required.

3. Check torsion bar for damage of serrations and paintwork, particularly for evidence of rust. Replace, if required.

Installation

Observe the following:

1. Tighten grooved nut for ball joints to specified torque and secure by bending a pertinent tab of lock washer.



2. Coat torsion bar lightly with lithium grease, grease serrations particularly well and insert torsion bar into transverse control arm. (Do not push closing cover out of transverse control arm).

   Introduce transverse control arm with torsion bar into auxiliary carrier.

   Caution!
   The torsion bars are pretensioned during production. Never interchange righthand and lefthand torsion bar. Lefthand torsion bars are identified by an "L", and righthand torsion bars by a "R" on face of bar. (Refer to illustration.)

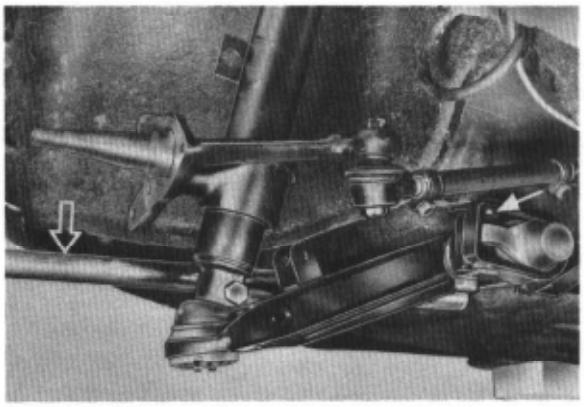
3. Tighten hex. bolts for transverse control arm (front) to specified tightening torque.

4. Tighten hex. bolt for transverse control arm and auxiliary carrier to specified torque.

5. Tighten hex. bolt for ball joint to specified torque.

6. Slide seal across torsion bar and mount adjusting lever for torsion bar on torsion bar as described below:

   a. Push transverse control arm with shock absorber strut connected down against stop in shock absorber strut, using a mounting lever or the like, and slide adjusting lever as closely as possible against stop of auxiliary carrier for adjusting screw on torsion bar. (The adjusting lever must be provided with a closing cover).



b. Grease threads of adjusting screw with MoS_2 paste and tighten adjusting screw slightly.

c. Check closing cover in transverse control arm for correct seat, since bad assembly of adjusting lever may force torsion bar out of serrations of transverse control arm at the front.

7. Screw down protective nember for transverse control arm.

8. Complete height adjustment of front axle.

9. Measure vehicle optically.

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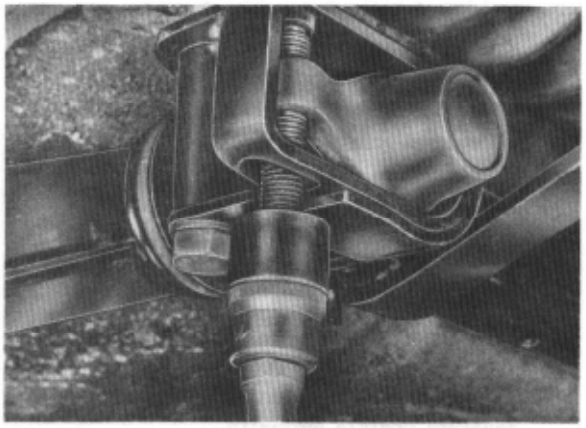
REMOVAL AND INSTALLATION OF TORSION BAR

Removal

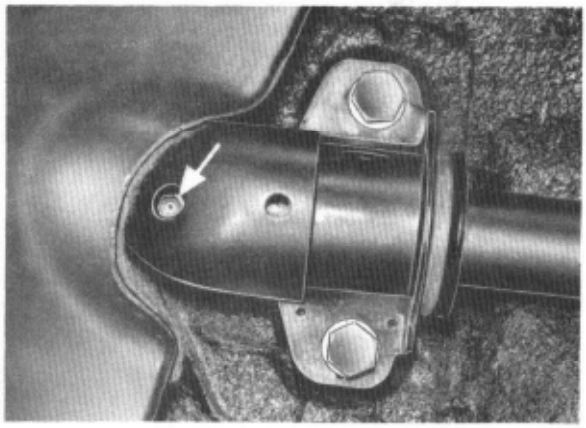
1. Unscrew adjusting screw of torsion bar.



2. Pull adjusting lever from torsion bar and remove seal.

3. Take torsion bar out toward the rear.

4. Loosen cheesehead screw for protective nember and remove protective nember.



Checking

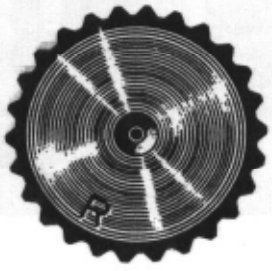
Check torsion bar for damage of serrations and paintwork, and in particular for evidence of rust and replace, if required.

Installation

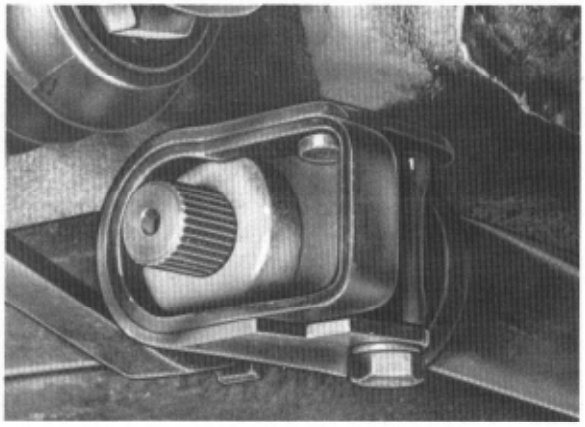
Observe the following during installation:

1. Coat torsion bar lightly with lithium grease, grease serrations particularly well and slide torsion bar into transverse control arm. Do not knock out closing cover in transverse control arm.

Caution!
Torsion bars are pretensioned during production. Never interchange righthand and lefthand torsion bar. Lefthand torsion bars are identified at face end with an "L" and righthand torsion bars with an "R" (refer to illustration).

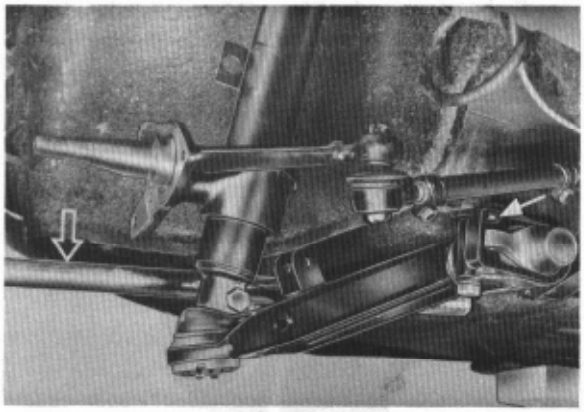


2. Slide seal on torsion bar.



3. Slide adjusting lever for torsion bar on torsion bar as described below:

a. Push transverse control arm with connected shock absorber strut down against stop in shock absorber strut using a mounting lever or the like, pushing adjusting lever as closely as possible against stop of auxiliary carrier for adjusting screw on torsion bar. (The adjusting lever must be provided with a closing cap).



b. Grease threads of adjusting screw with MoS_2 paste and tighten adjusting screw slightly.

c. Check for correct seat of closing cover in transverse control arm, since inadequate assembly of adjusting lever may force torsion bar out of serrations of transverse control arm at the front.

4. Screw on protective nember for transverse control arm.

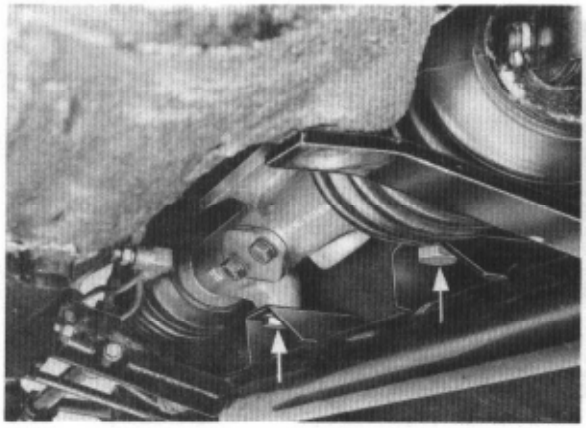
5. Complete height adjustment of front axle and measure vehicle optically.

REMOVAL AND INSTALLATION OF AUXILIARY CARRIER

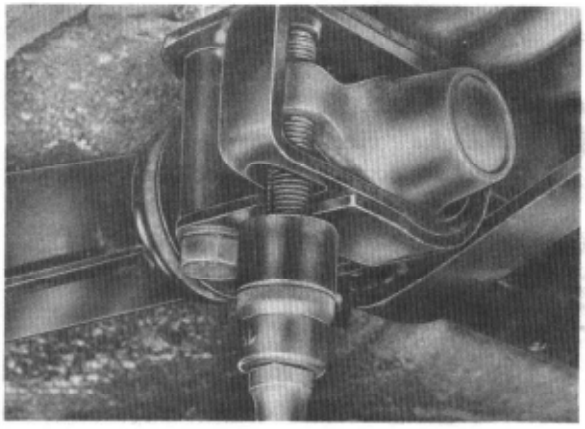
Removal

1. Remove underfloor protection of front axle.

2. Loosen hex. bolts for steering gear on auxiliary carrier.

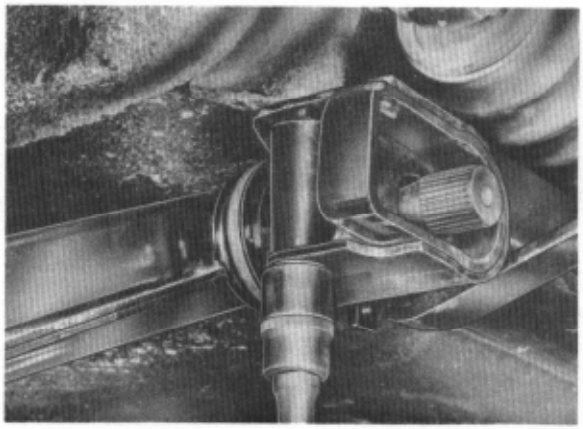


3. Unscrew adjusting screws of torsion bars.

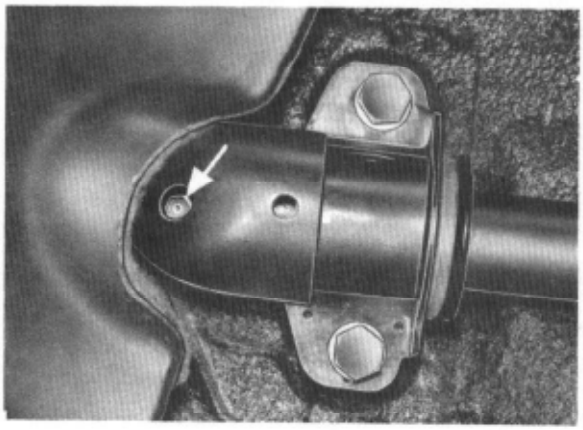


4. Pull adjusting lever from torsion bars and remove seals.

5. Unscrew hex. bolts for auxiliary carrier and transverse control arm and remove auxiliary carrier.



6. Loosen cheesehead screw for protective member and remove protective member.



Checking

1. Place auxiliary carrier on level surface (surface plate) and check for distortion. For reference dimensions refer to next page.
   In the event of distortions or unpermissible dimensional deviations, replace auxiliary carrier.

2. Check auxiliary carrier for cracks or visible damage and replace, if required.

Installation

1. Be sure that the auxiliary carrier is correctly located in fitted bolts of body.

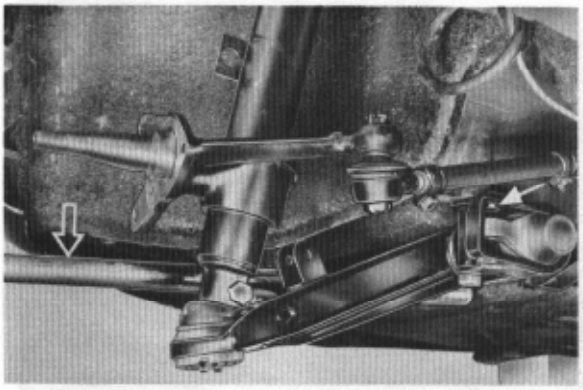
2. Tighten hex. bolts for auxiliary carrier and transverse control arm to specified torque.

3. Tighten hex. bolts for steering gear to specified torque, using new spring rings.

4. Slide seal on torsion bar.

5. Slide adjusting lever for torsion bar on torsion bar as described below.

   a. Push transverse control arm with shock absorber strut connected down against stop in shock absorber strut by means of a mounting lever or the like, sliding adjusting lever as closely as possible against stop of auxiliary carrier for adjusting screw on torsion bar. (The adjusting lever must be provided with a closing cap.)



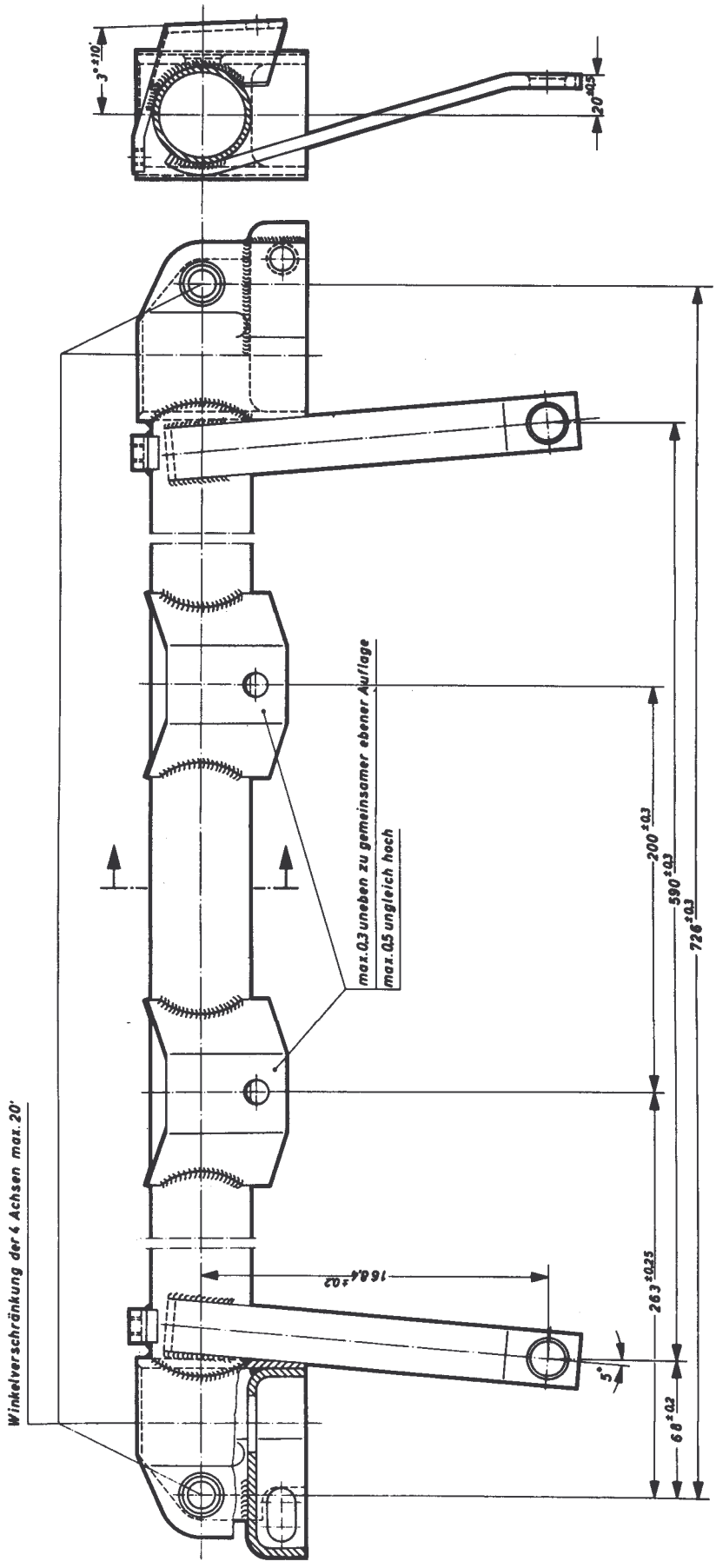
   b. Grease threads of adjusting screw with MoS_2 paste and tighten adjusting screw slightly.

   c. Check for correct seat of closing cover in transverse control arm, since inadequate assembly of adjusting lever may push torsion bar out of serrations of transverse control arm at the front.

6. Screw on protective member for transverse control arm.

7. Complete height adjustment of front axle and measure vehicle optically.

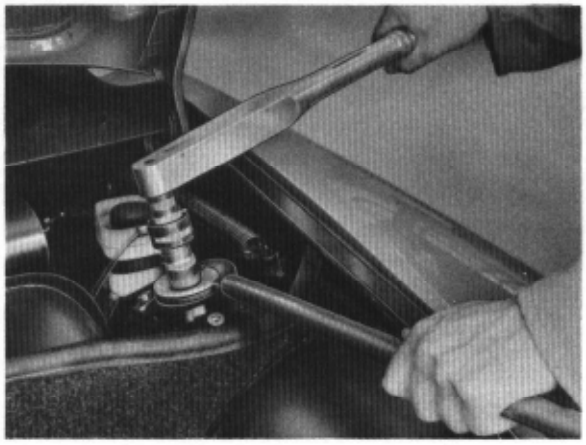
REFERENCE DIMENSIONS OF AUXILIARY CARRIER



REPLACEMENT OF SUPPORTING BEARING AND BEARING RUBBER

1. Fold back front end covering.

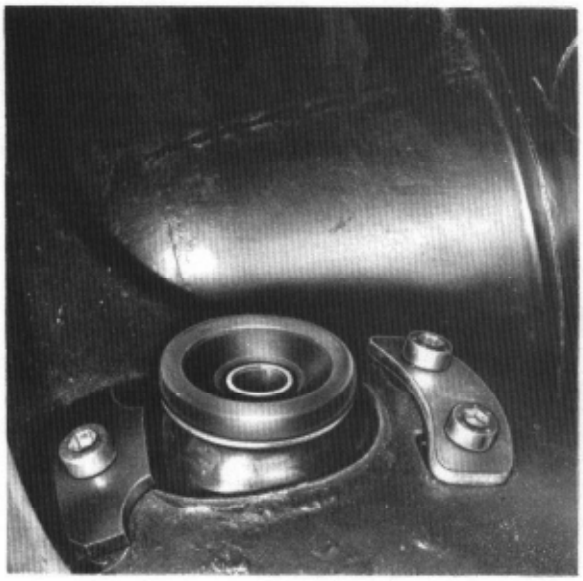
2. Unlock hex. nut on shock absorber strut (top), loosen and remove lock washer as well as tab washer.



3. Push transverse control arm with spring strut down and extend piston rod out of bearing rubber.

4. Remove sealing compound on pressure plate.

5. Mark position of single-hole and double-hole pressure plate, loosen cheesehead screws and remove supporting bearing with bearing rubber.



6. Install new supporting bearing with bearing rubber and tighten cheesehead screws to specified torque.

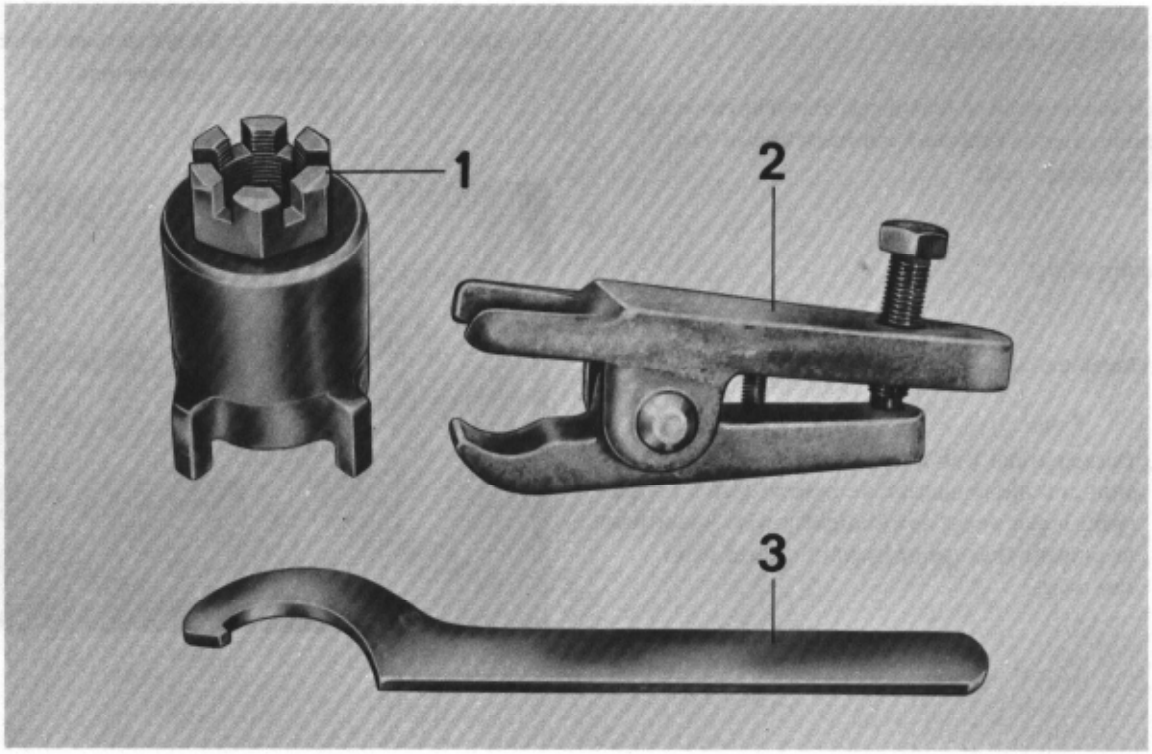
7. Tighten hex. nut on shock absorber strut to specified torque and lock. Use new lock washer and make sure that the tab of the lock washer is fitted facing upwards.

8. Measure vehicle optically.

9. Use new permanently elastic sealing compound such as "National Glue 670" for pressure plates as well as supporting bearing.

SHOCK ABSORBER STRUT REPLACEMENT KIT

TOOLS



Nr.	Description	Special Tool	Remarks
1	Combination wrench	US 8002	
2	Tie rod end puller	VW 266h	
3	Spanner wrench, 62 mm(1 7/16in.)	---	Local purchase

INSTALLING SHOCK ABSORBER REPLACEMENT KIT

General

Shock absorber replacement kits can be installed in Type 914/4 and 914/6 vehicles. The kit installation is fast and simple and does not require replacement of the complete shock absorber strut.

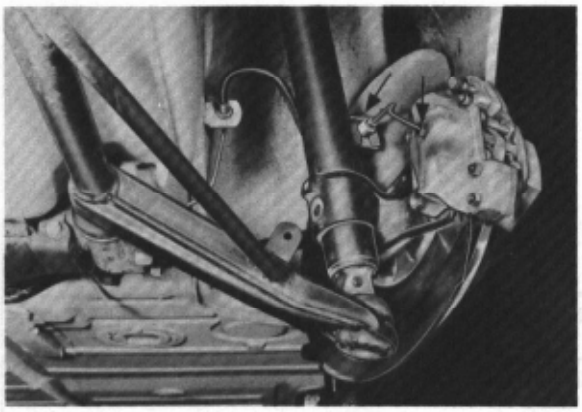
Work Procedure

It is recommended that shock absorber struts are removed from vehicle for installation of the replacement kits.

Removing

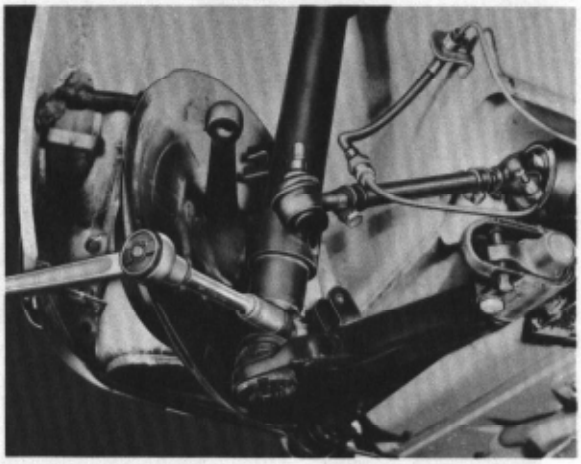
1. Raise car and remove both wheels.

2. Detach brake line holder from shock absorber strut and disconnect brake hose at brake caliper (push brake pedal down slightly with pedal prop to prevent leakage of hydraulic fluid from reservoir).

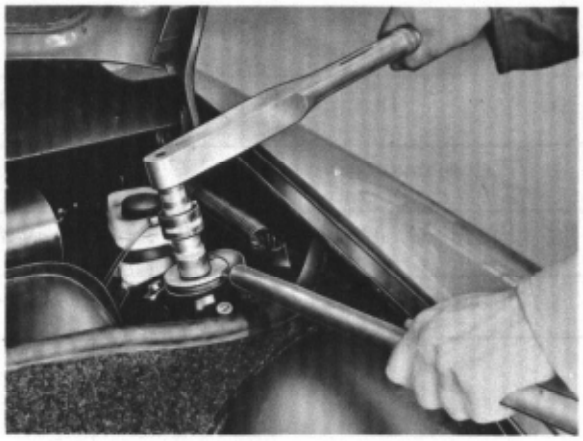


3. Unlock castellated nut in tie rod end and unscrew. Using a tie rod end puller, remove end.

4. Unlock castellated nut in tie rod end and unscrew. Using a tie rod end puller, remove end.



5. Unlock shock absorber strut top retaining nut, unscrew, and remove strut.

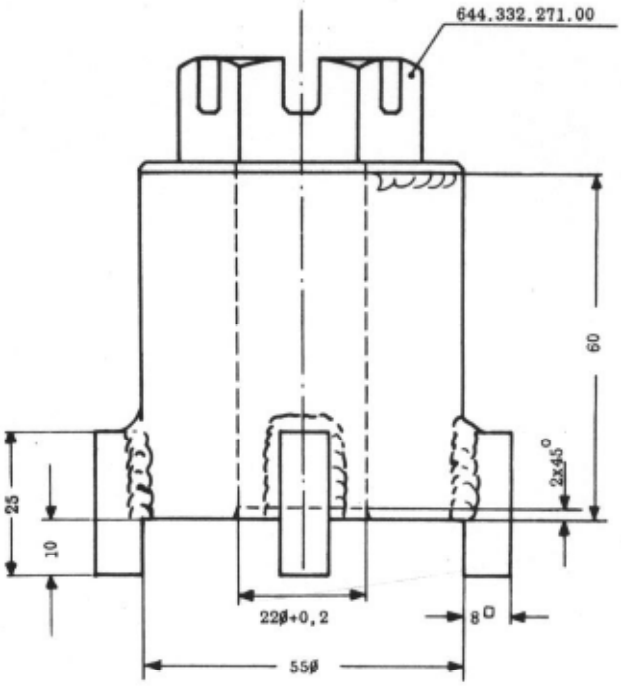


6. Mount shock absorber strut in a vise with jaw protectors. Remove cover tube and rubber buffer, unscrew with special tool US 8002, and pull old shock absorber insert out.

Installing

1. Install new shock absorber insert. Tighten cap screw to correct torque.

2. Install shock absorber strut in vehicle. Tighten nuts and bolts to torque.



3. Bleed brake system and check for leaks.

REMOVING AND INSTALLING STABILIZER

General

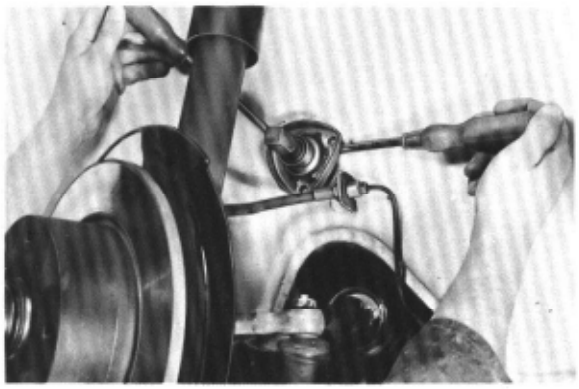
Beginning with the 1973 models, Type 914 cars can be optionally equipped with a front axle stabilizer of 15 mm diameter.

Removal

1. Remove stabilizer shackles.

2. Remove stabilizer lever retaining nuts and withdraw lever.

3. Remove stabilizer mounting cover retaining bolts, apply some adhesi solvent to the cover and rubber bushing, and pry the cover off with the aid of 2 large screwdrivers, also removing the rubber bushings.



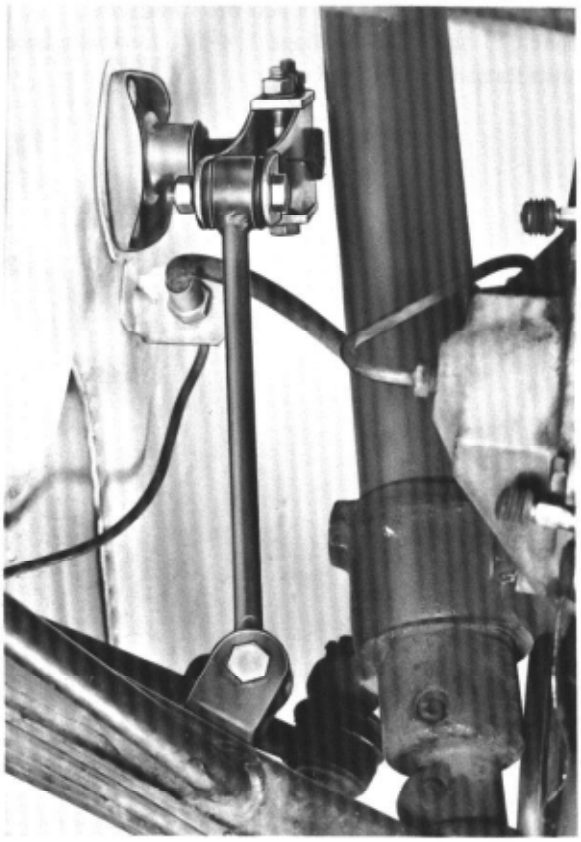
4. Check rubber bushings for signs of wear.

5. Pull stabilizer out.

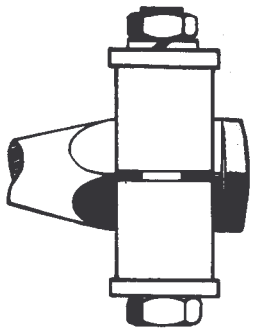
Installation

1. Coat rubber bushings with glycerine paste such as CONTI FIX.

2. Lightly tighten both mounting covers, center the stabilizer, then fully tighten the retaining bolts.



3. Push stabilizer lever onto the squared stabilizer section so that the stabilizer protrudes about 3 mm beyond the lever.



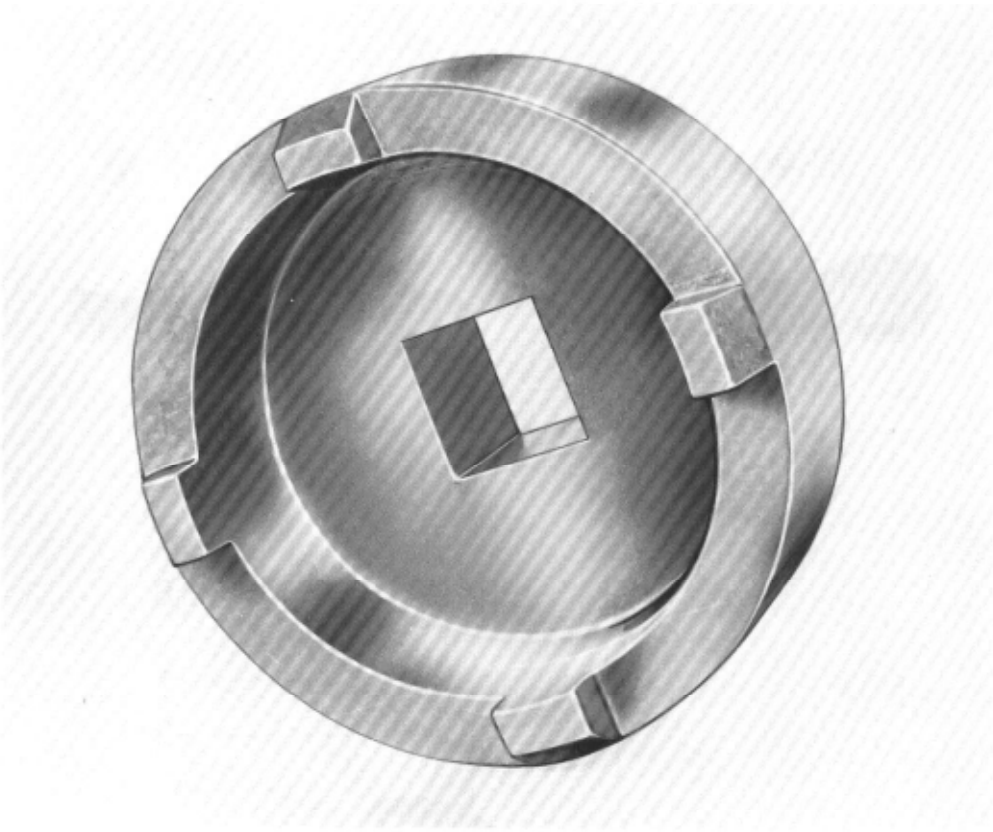
4. Tighten stabilizer lever retaining nuts to specified torque.

5. Install stabilizer shackles.

NOTE:
Make sure upon installation of the stabilizer that the brake hose does not touch the stabilizer shackle. See Group 6, Page 1.4-1/1 for brake hose installation instructions.

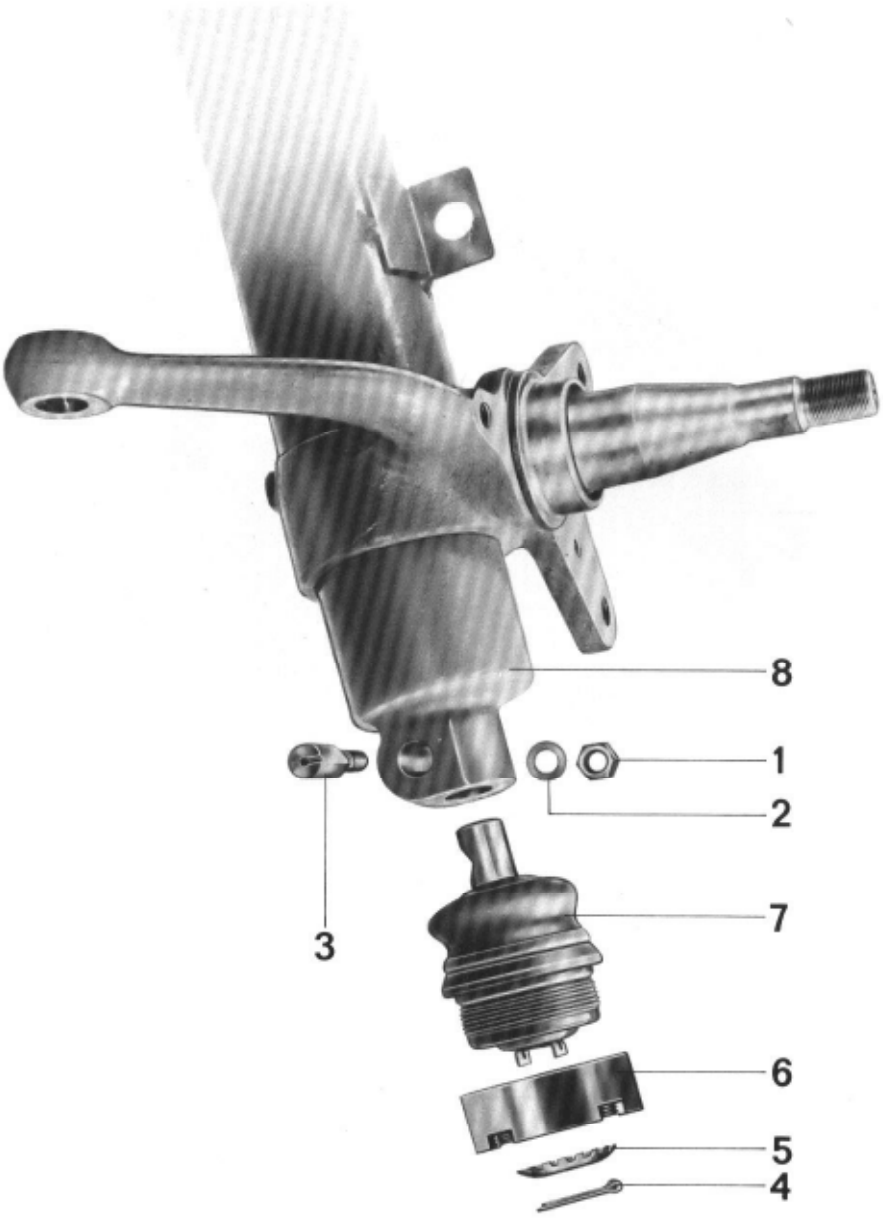
FRONT STRUT BALL JOINT

TOOLS



No.	Description	Special Tools	Remarks
1	Four-point socket (spanner)	P 280b	

REMOVAL AND INSTALLATION



No.	Description	Qty.	Note during removal	Note during installation	Remarks
1	Nut M8 self-locking	1		Torque to specification	2.1-11/4
2	Washer	1			
3	Stud, double taper	1	Drive out with appropriate punch	Replace. Grease with Lithium multipurpose grease for installation. Note proper location	2.1-11/4
4	Cotter pin	1		Replace	
5	Lock plate	1		Replace if necessary	
6	Four-point nut	1	Remove with special tool P 280b	Torque to specification	
7	Ball joint	1		Check for wear, replace if necessary	
8	Shock absorber strut	1		Check, replace if necessary	

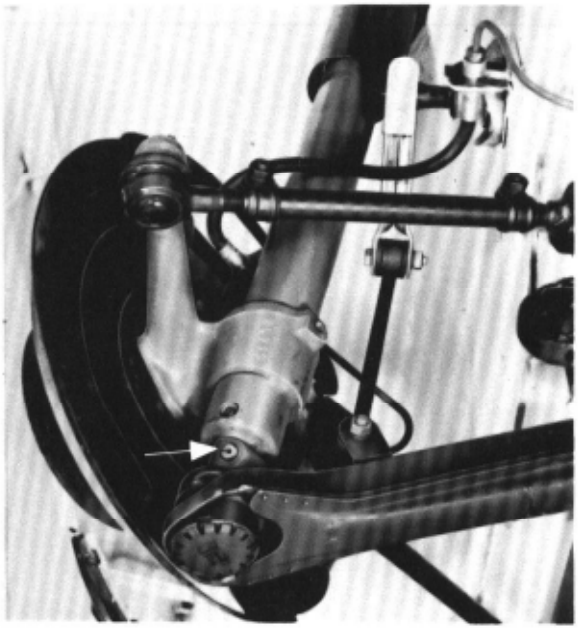
INSTRUCTIONS FOR DISASSELBLY AND REASSEMBLY

Disassembly

1. Drive out double taper stud with appropriate punch.

Reassembly

1. Coat double taper stud with multi-purpose grease and insert in proper position. Make sure that that the retaining nut is in front, as seen in driving direction, and the notch in the top of the stud points to the wheel spindle.



2. Seat the double taper stud with light hammer blows prior to tightening its retaining nut.

3. Torque the self-locking nut to 2.2 mkp.

REMOVAL AND INSTALLATION OF STEERING GEAR

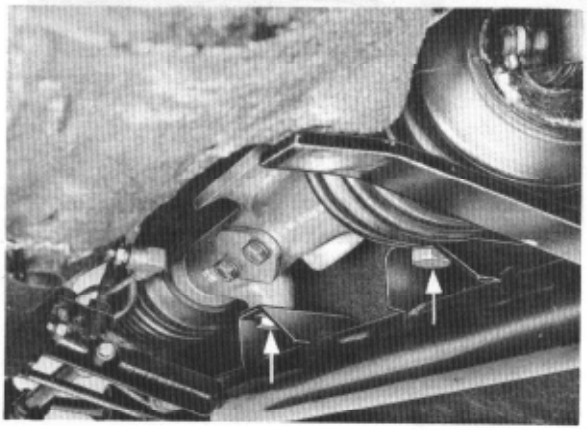
Removal

1. Loosen self-locking hex. nut of bottom hex. bolt on bottom universal joint and remove bolt.

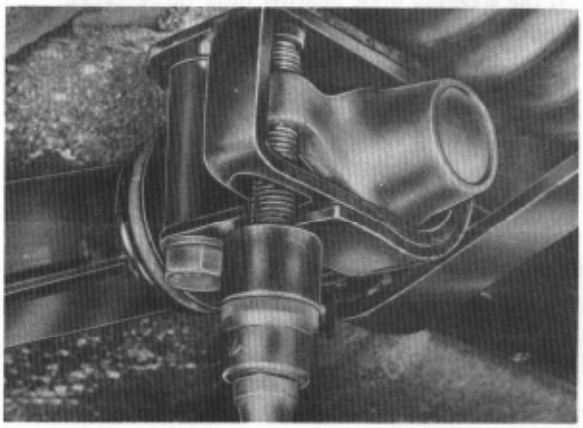
2. Unlock slotted nuts of track rod joints and pull off ball joints with track rod puller.

3. Remove underfloor protection of front axle.

4. Loosen hex. bolts for steering gear on auxiliary carrier.

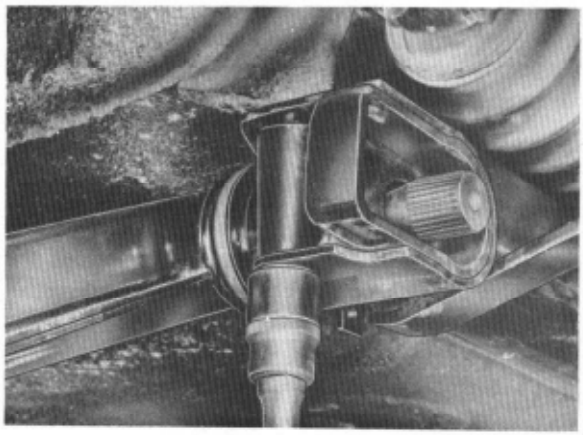


5. Unscrew adjusting screws of torsion bars.



6. Pull adjusting lever from torsion bars and remove seals.

7. Unscrew hex. bolts for transverse control arm and auxiliary carrier.



8. Remove auxiliary carrier.

9. Remove steering gear with track rods.

10. Unlock bolt on fork-type joint for track rods, loosen and remove.

Remark

If the steering shaft bearing must be replaced, remove fuel tank first.

Installation

1. Check track arms for damage, also check track rod ball joints.
   Moving the ball pin should produce a small friction torque. If the ball pin moves without resistance and end play is showing up, replace ball joint.

2. Install joint bolts with MoS_2 paste, tighten to specified torque and lock.

3. Slide sealing bellows upwards on bearing rubber. Watch out for correct seat of bellows.

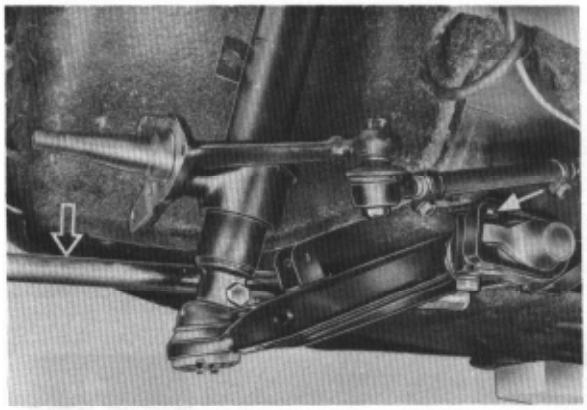
4. Grease running surface of needle bearing on steering shaft with some lithium grease and introduce steering gear upwards in such a manner that steering shaft is resting in needle bearing.

   Caution!
   When the steering gear is installed, the bottom universal joint in the passenger compartment must be mounted on splining of steering shaft in such a manner that the hex. screw can be fitted. The universal joint can no longer be fitted, when the steering gear is installed.

5. Install auxiliary carrier, be sure that the auxiliary carrier is properly located on fitted pins of body.

6. Use new spring rings for hex. bolts of steering gear and tighten to specified torque.

7. Push transverse control arm down against stop in shock absorber strut by means of a mounting lever, pushing adjusting lever as closely as possible against stop of auxiliary carrier for adjusting screw on torsion bar.

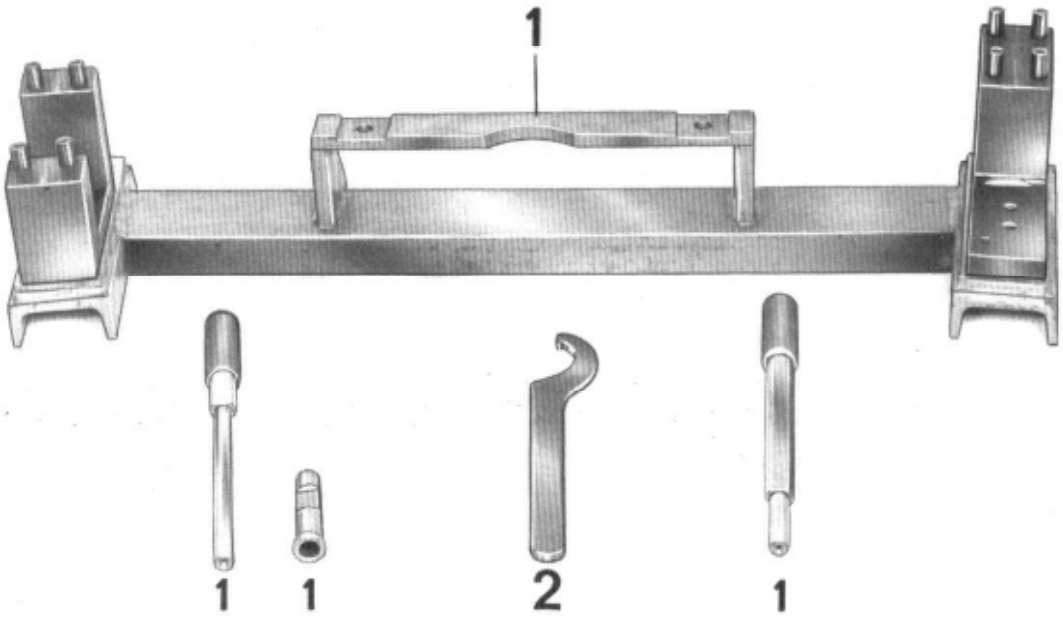


8. Screw bottom universal joint in passenger compartment down and make sure that the universal joints are not distorted. Use new self-locking hex. nut. Tighten hex. nut to specified torque.

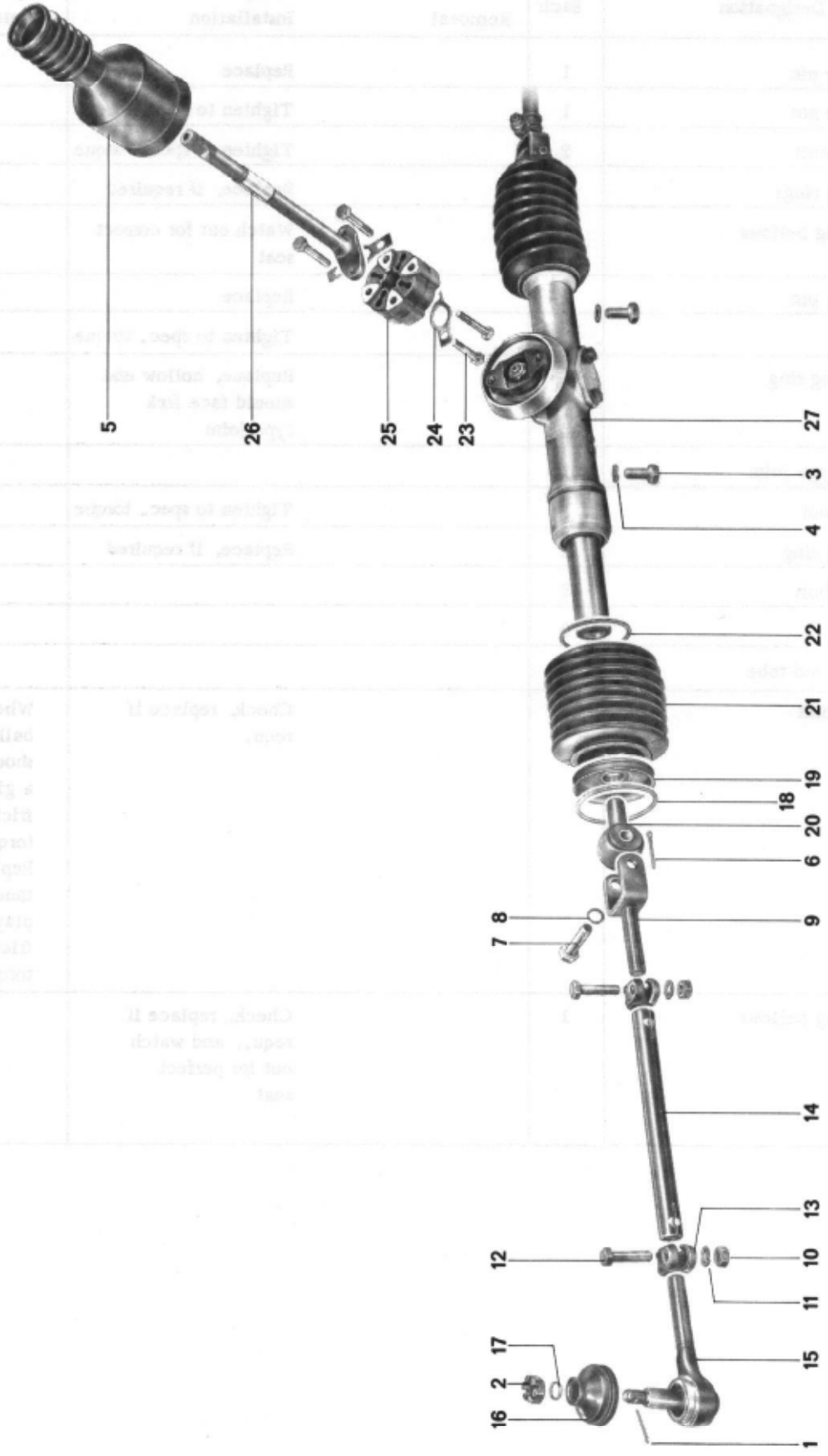
9. Unscrew protective member on front transverse control arm bearing and check for correct seat of closing cover in transverse control arm. Tighten cheesehead screws for protective member again to specified torque.

10. Complete height adjustment of front axle and measure vehicle optically.

TOOLS



No.	Designation	Special Tools	Explanations
1	Adjusting gauge for steering gear	P 285b	
2	Hook spanner 42 mm dia. (1.7")		commercial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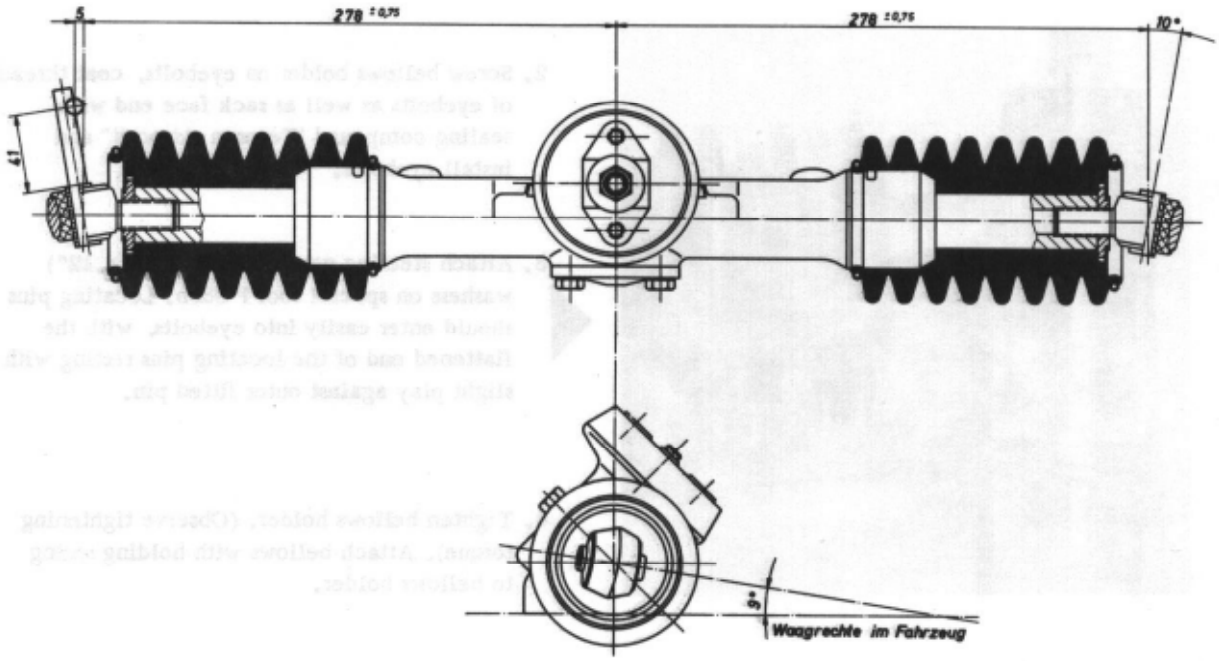
No.	Designation	Each	Observe during: Removal	Observe during: Installation	Special Instr.
1	Cotter pin	1		Replace	
2	Castle nut	1		Tighten to spec. torque	
3	Hex. bolt	2		Tighten to spec. torque	
4	Spring rings	2		Replace, if required	
5	Sealing bellows	1		Watch out for correct seat	
6	Cotter pin	1		Replace	
7	Bolt	1		Tighten to spec. torque	
8	Locking ring	1		Replace, hollow end should face fork type joint	
9	Fork type joint	1			
10	Hex. nut	2		Tighten to spec. torque	
11	Spring ring	2		Replace, if required	
12	Hex. bolt	2			
13	Clip	2			
14	Track rod tube	1			
15	Ball joint	1		Check, replace if requ.	When moved, ball joint should have a given friction torque. Replace, if there is end play or no friction torque.
16	Sealing bellows	1		Check, replace if requ., and watch out for perfect seat	

No.	Designation	Each	Observe during: Removal	Observe during: Installation	Spec. Instr.
17	Rubber ring	1		Replace, if requ.	
18	Holding spring	1		Check, replace, if required	
19	Bellows holder	1		Tighten to spec. torque	
20	Eyebolt	1		Check, replace if required Adjust installation position	3.1-2/7
21	Bellows	1		Check, replace if required	
22	Holding spring	1		Replace, if requ.	
23	Hex. bolt	4		Tighten to spec. torque	
24	Lock washer	2		Renew	
25	Steering coupling	1		Check, renew if required	
26	Steering shaft	1		Check, renew if required	
27	Rack and pinion steering gear	1		Check, renew if required, or repair	3.2-1/3

REMOVAL AND INSTALLATION OF EYEBOLTS

Caution!

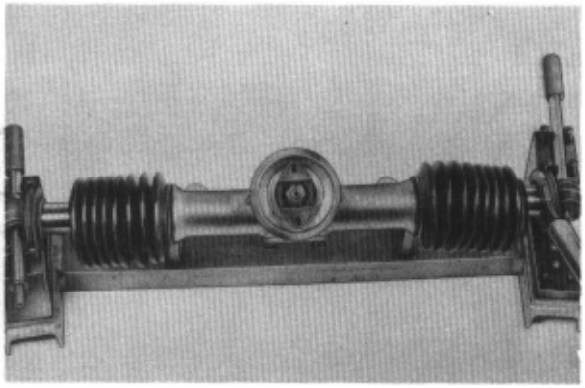
The eyebolts must be installed in a precise position to ensure free movement of the steering components and exact guiding of the track rod.



Removal

1. Clamp steering gear into special tool P 285b without 3 mm (.12") washers.

2. Remove holding spring on outside of bellows, pull bellows from bellows holder. Loosen bellows holder with hook spanner (42 mm = 1.7" dia.) and unscrew eyebolt together with bellows holder.



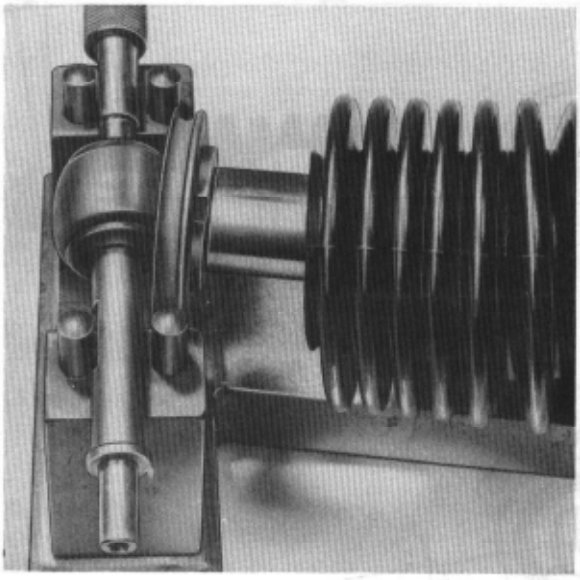
Checking Parts

1. Check eyebolt for visible wear, replace if required.

2. Check bellows for cracks and leaks, replace, if required.

3. Replace defective holding springs.

Installation



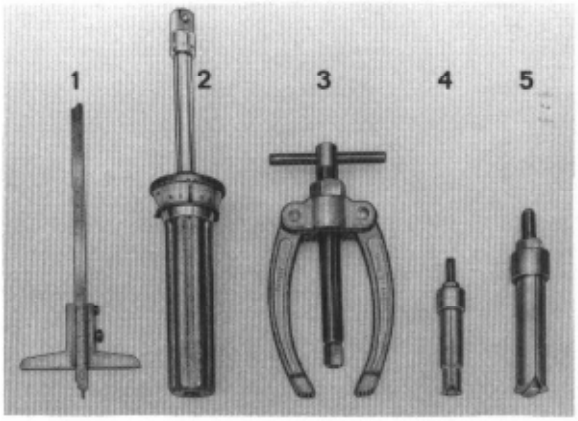
1. Mount both bellows on housing.

2. Screw bellows holder on eyebolts, coat threads of eyebolts as well as rack face end with sealing compound "Teroson-Atmosit" and install eyebolts.

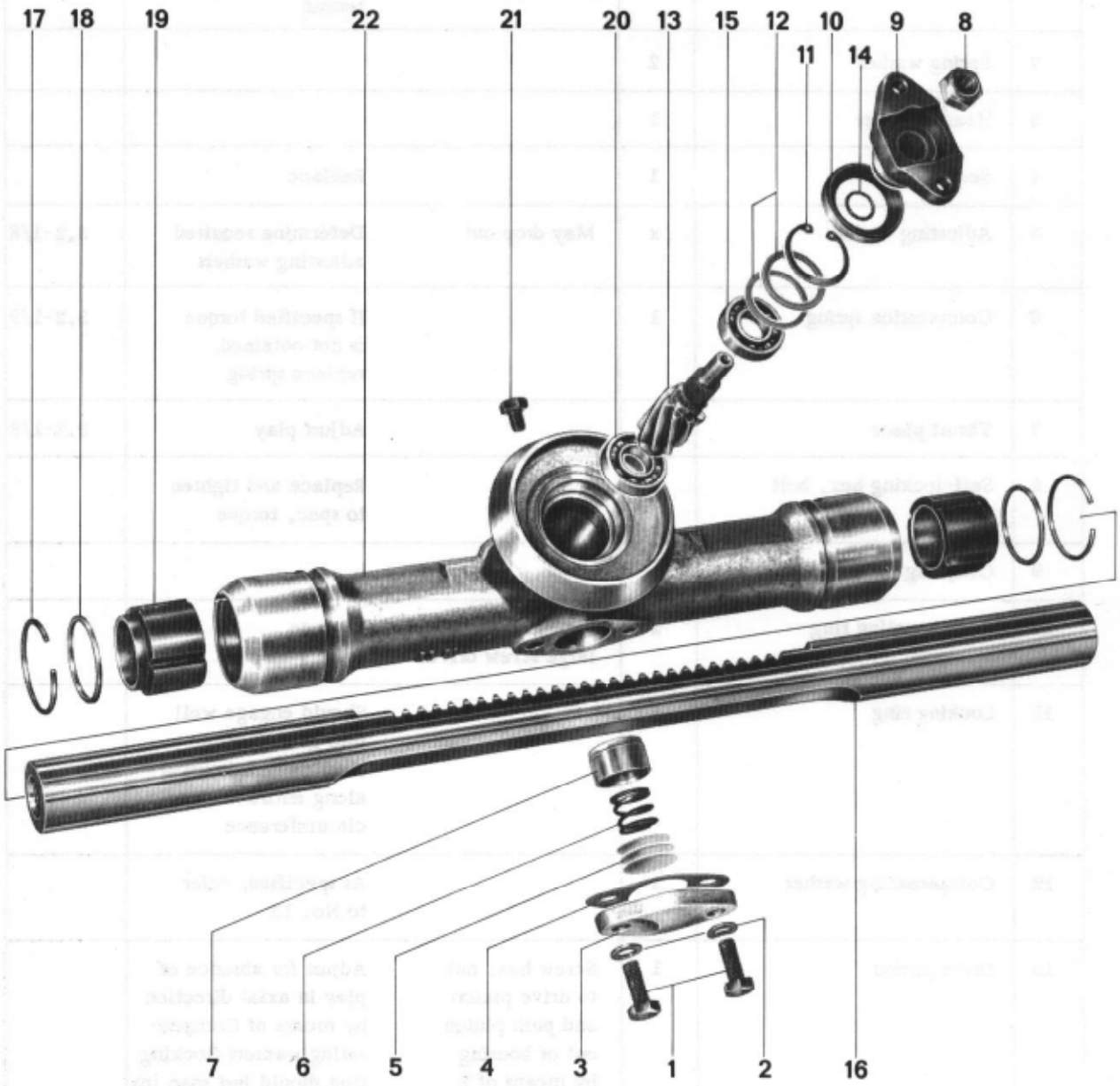
3. Attach steering gear without 3 mm (.12") washers on special tool P 285b. Locating pins should enter easily into eyebolts, with the flattened end of the locating pins resting with slight play against outer fitted pin.

4. Tighten bellows holder. (Observe tightening torque). Attach bellows with holding spring to bellows holder.

TOOLS



No.	Designation	Special Tool	Explanations
1	Depth Gauge		commercial
2	Torsiometer 0 - 25 cmkp		commercial
3	Kukko puller 22-1		commercial
4	Kukko internal puller No. 21/2		commercial
5	Kukko internal puller No. 21/4		commercial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No.	Designation	Each	Observe during: Removal	Observe during: Installation	Special Instr.
1	Hex. bolt M 8x18	2		Tighten to spec. torque	
2	Spring washer	2			
3	Housing cover	1			
4	Seal	1		Replace	
5	Adjusting washer	x	May drop out	Determine required adjusting washers	3.2-1/8
6	Compression spring	1		If specified torque is not obtained, replace spring	3.2-1/9
7	Thrust piece	1		Adjust play	3.2-1/8
8	Self-locking hex. bolt M 10	1		Replace and tighten to spec. torque	
9	Coupling flange	1			
10	Radial sealing ring	1	Push out with large screw driver	Replace	
11	Locking ring	1		Should engage well into groove of steering gear housing along entire circumference	
12	Compensating washer	x		As specified, refer to No. 13	
13	Drive pinion	1	Screw hex. nut to drive pinion and push pinion out of housing by means of 2 screw drivers	Adjust for absence of play in axial direction by means of Compensating washers (locking ring should just snap in)	
14	Round cord ring	1		Replace	

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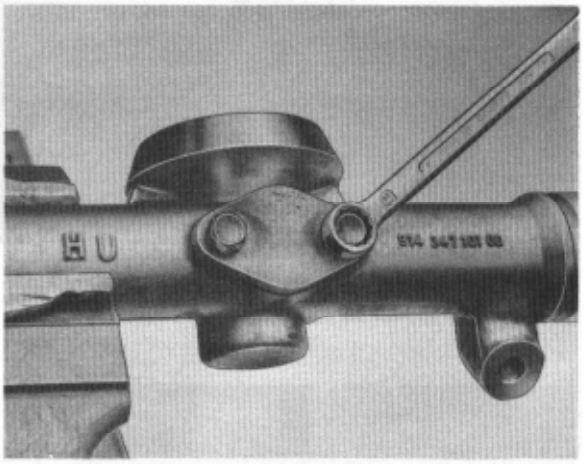
No.	Designation	Each	Observe during: Removal	Observe during: Installation	Special Instr.
15	Grooved ball bearing	1	Press off	Replace, if requ.	
16	Rack	1	Mark for reinstallation	Grease with multi-purpose grease LM-KFZ 3 or LM-47 L	3.2-1/8
17	Circlip	2		Observe correct seat	
18	Supporting ring	2			
19	Bearing bushing	2	Pull out	Replace, if requ.	3.2-1/7
20	Grooved ball bearing	1	Pull out with puller	Replace, if requ.	3.2-1/7
21	Hex. bolt (filler screw M 8x8)	1		Tighten to spec. torque	
22	Steering gear housing	1		Fill with 25 grams multi-purpose grease (grade LM-KFZ 3 or LM-47 L)	3.2-1/8

DISASSEMBLY AND ASSEMBLY OF RACK AND PINION STEERING GEAR

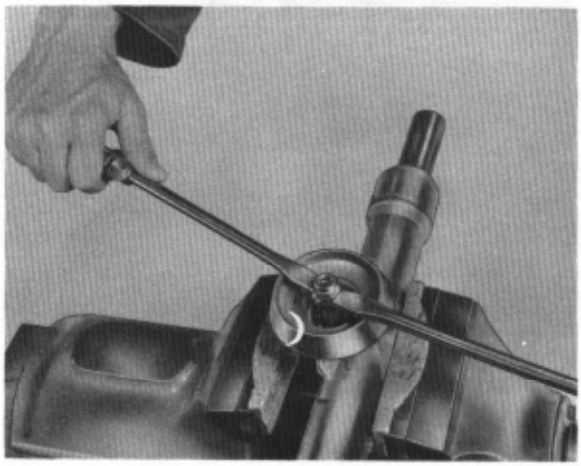
Disassembly

1. Clamp steering gear in vise (use soft jaws), loosen hex. bolts for housing cover and remove cover.
   Caution!
   Adjusting washers, if any, will fall out.

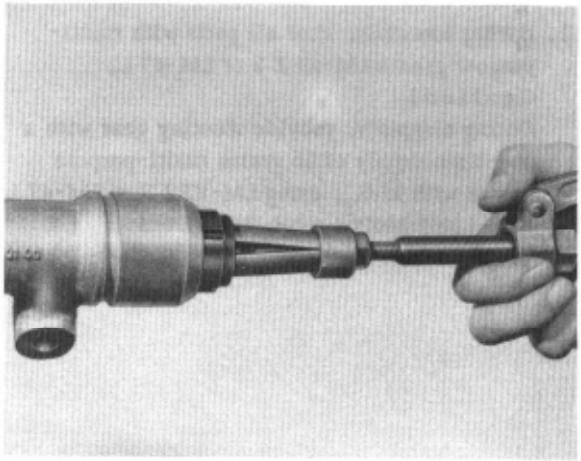


2. Remove locking ring and take off compensating washers.

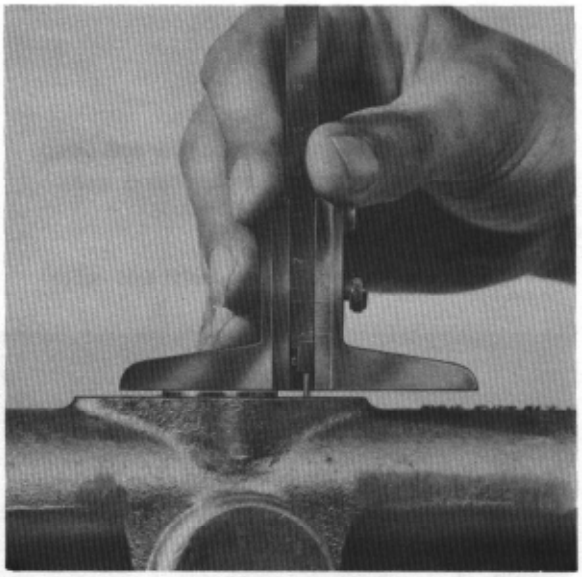
3. Screw hex. nut on drive pinion and push pinion out of housing by means of two heavy screw drivers.



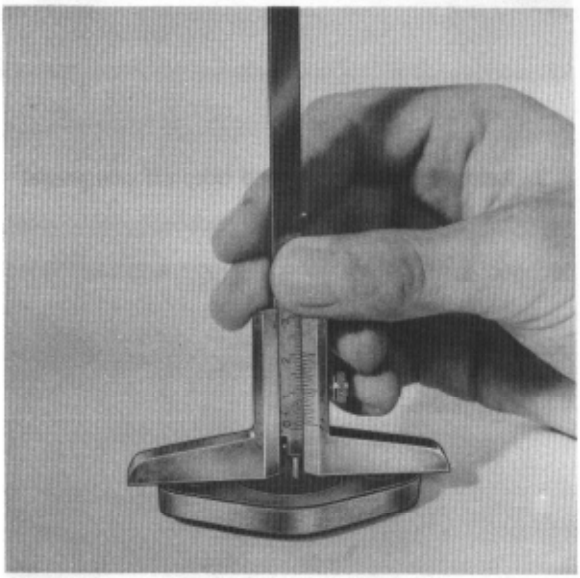
4. Pull bearing bushing.



5. Pull grooved ball bearing out of steering gear housing and remove laterally from housing.



3. Measure recess in housing cover.



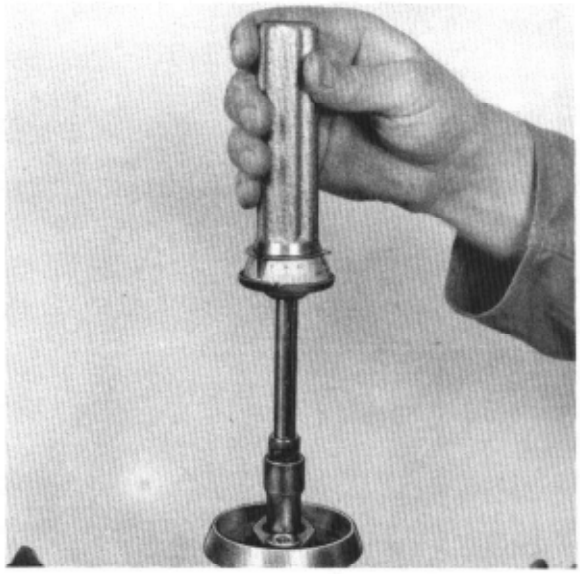
Assembly

1. During assembly, coat all parts with multi-purpose grease LM-KFZ 3 or LM-47 L.
   Caution!
   During assembly, provide steering gear with a one-time supply of 25 grams multi-purpose grease with MoS_2, using LM-KFZ 3 or LM-47 L from Liqui-Moly GmbH, Ulm/Donau.

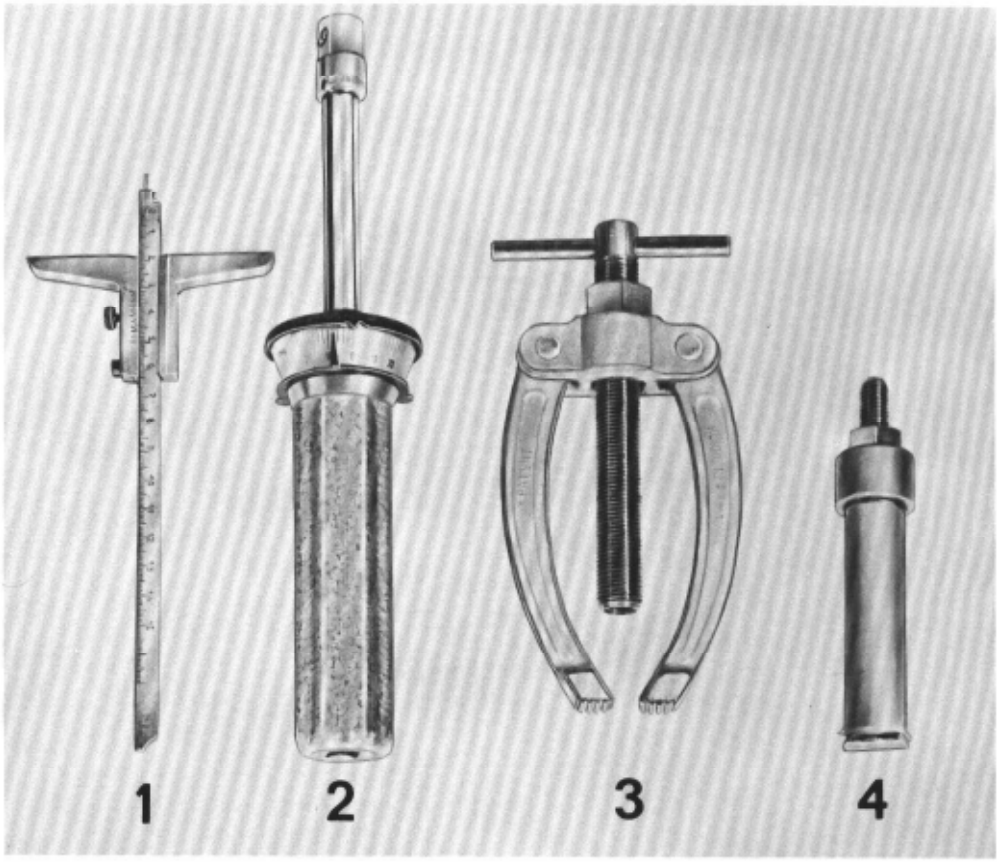
2. Adjust play of thrust piece. Measure distance of thrust piece up to supporting surface on housing.

4. The dimension of the recess in the housing cover with the seal must be 0.2 mm (.008") larger than the dimension measured acc. to Item 2. Compensate difference by means of adjusting washers.
   (Thrust piece should have 0.2 mm = .008" play with the housing cover attached).

5. Check torque of steering gear along entire turning range of steering system.
A torque of 6 - 8 cmkp should be obtained.

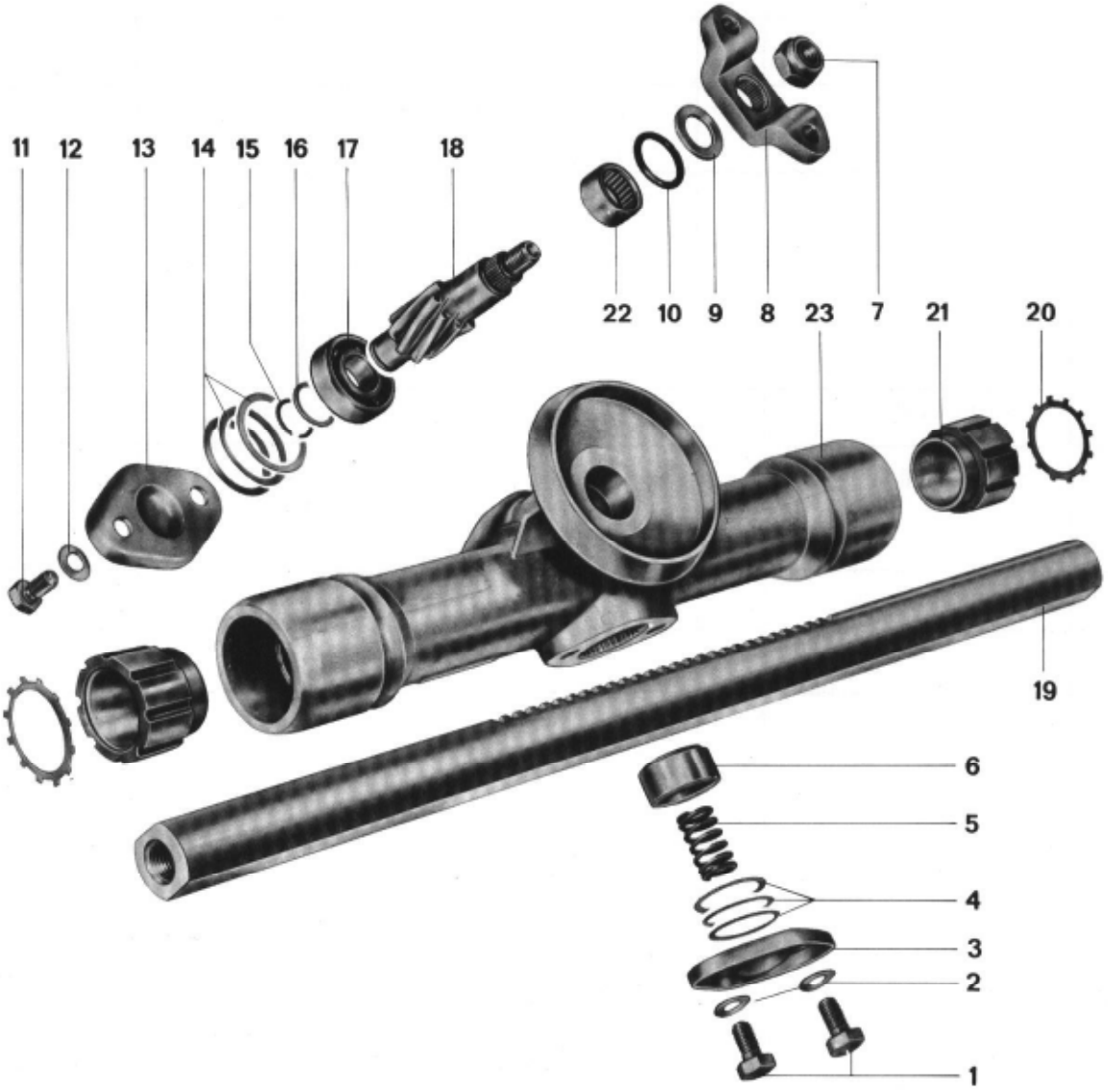


TOOLS



Nr.	Description	Special Tool	Remarks
1	Depth gauge		
2	Torque wrench 0 - 25 cmkp		
3	Puller		Kukko 22-1 or similar
4	Puller		Kukko 22-4 or similar

Modified ZF Rack and Pinion Steering



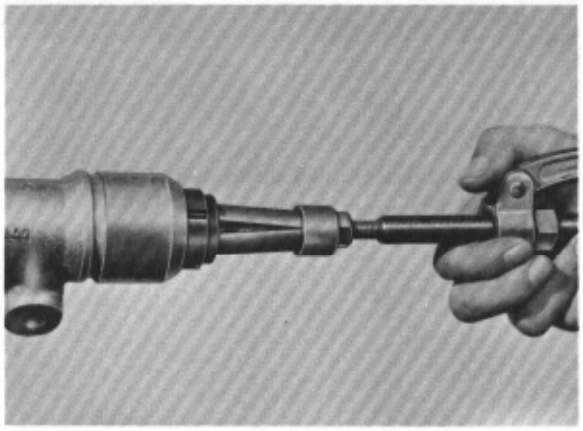
Nr.	Description	Qty.	Note when Removing	Note when Installing	Special instructions see
1	Bolt, M8	2		Torque to 1.5 mkp	
2	Spring washer	1		Replace if necessary	
3	Cover	1		Use gasket compound during installation	
4	Shim	X	Can fall out	Determine number shims required	3.3-1/8
5	Spring	1		Replace spring if specified drag cannot be attained	3.3-1/8
6	Pressure block	1		Adjust free play	3.3-1/8
7	Self-locking nut M10	1		Replace with new nut, torque to 4.7 mkp (33.9 ft. lbs.)	
8	Coupling flange	1			
9	Washer	1			
10	O-ring	1		Lubricate lightly	
11	Hex bolt, M 8 x 18	2		Torque to 1.5 mkp (10.8 ft. lbs.)	
12	Spring washer	2		Replace if necessary	
13	Cover	1		Use gasket compound during installation	
14	Shim	X	Can fall out	Determine number shims required	3.3-1/8
15	Snap ring	1		Must seat well in the groove in pinion	
16	Thrust washer	1			
17	Ball bearing	1	Press off	Replace if necessary	3.3-1/7

Nr.	Description	Qty.	Note when Removing	Note when Installing	Special instructions see
18	Steering pinion	1	Remove together with bearing	Replace if necessary	
19	Steering rack	1	Mark for reassembly	Grease with multi-purpose grease	
20	Lock ring	2		Watch for proper seating	
21	Bushing	2	Pull out	Replace if necessary	3.3-1/7
22	Needle bearing	1	Drive out with special tool P 362	Note installation dimensions	3.3-1/7
23	Steering housing	1		Fill with multi-purpose grease	

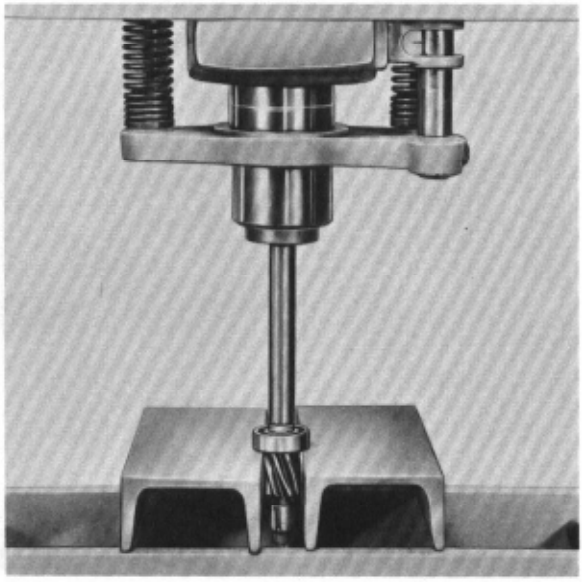
DISASSEMBLING AND ASSEMBLING MODIFIED ZF RACK AND PINION STEERING

Disassembling

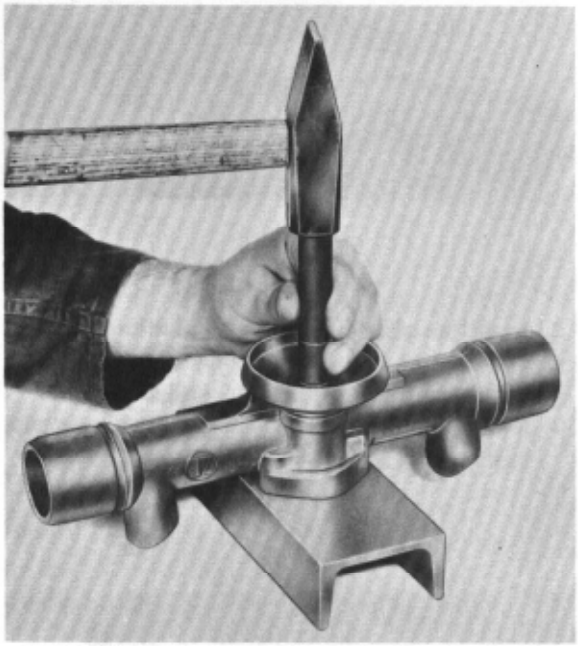
1. Pull rack bushing out of steering housing.



2. Remove snap ring and thrust washer from pinion and press off ball bearing.



3. Drive needle bearing out of the steering housing using special tool P 362.

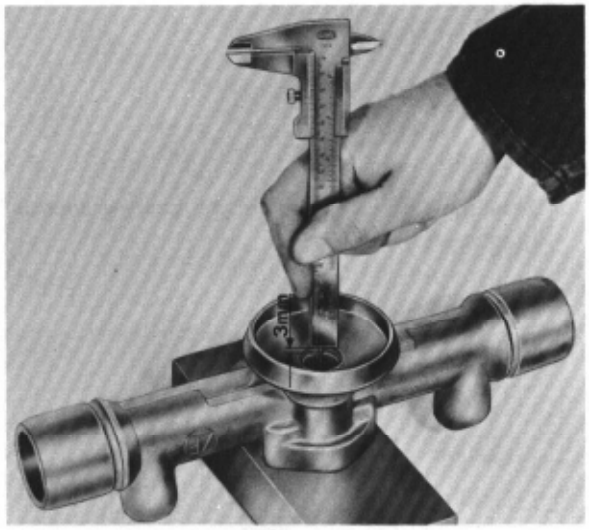


Assembling

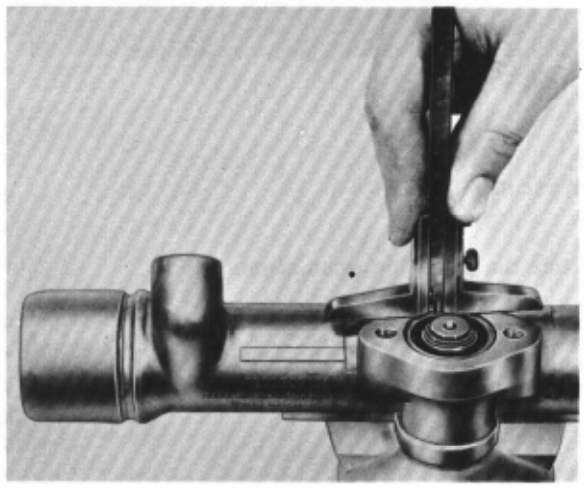
Note the following when assembling:

1. fill steering housing with multipurpose grease.

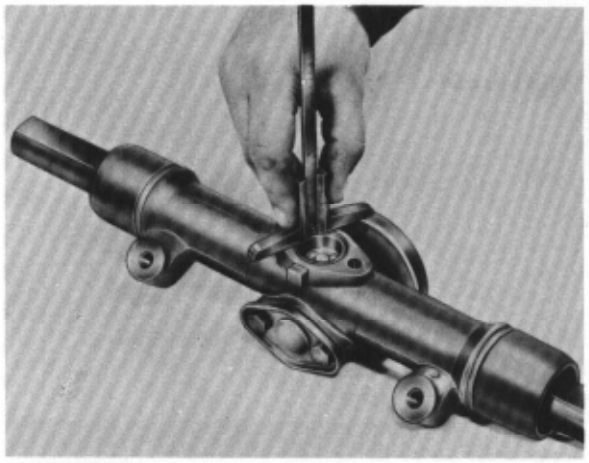
2. drive in needle bearing with special tool P 362 until the depth from top edge of steering housing to the top of the needle bearing is 3.0 mm (0.12 in.).



3. Install steering pinion. Measure distance from ball bearing to contact surface of housing. The clearance must be taken up with shims. Maximum free play between housing cover and ball bearing is 0.05 mm (0.002 in.).

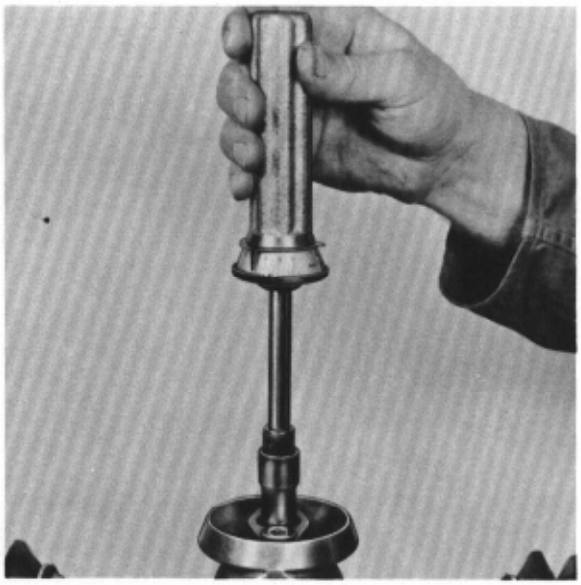


4. Measure distance between pressure block and contact surface of housing. Total thickness of all shims to be installed must be 0.2 mm (0.008 in.) less than this measurement.



5. Install the determined shims and check the free play. The correct free play with cover installed is 0.2 mm (0.008 in.).

6. Check steering gear drag over the entire working length of the steering rack. A drag of 6 - 8 cmkp (5 - 7 in. lbs.) must be attained.

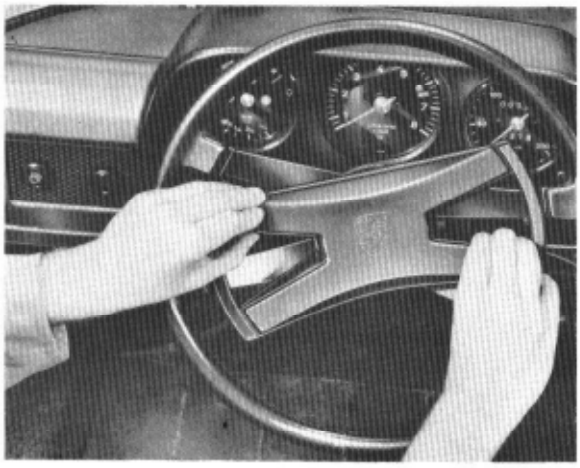


REMOVING AND INSTALLING STEERING WHEEL

Removing

1. Disconnect battery.

2. Turn the horn ring toward the left and remove.



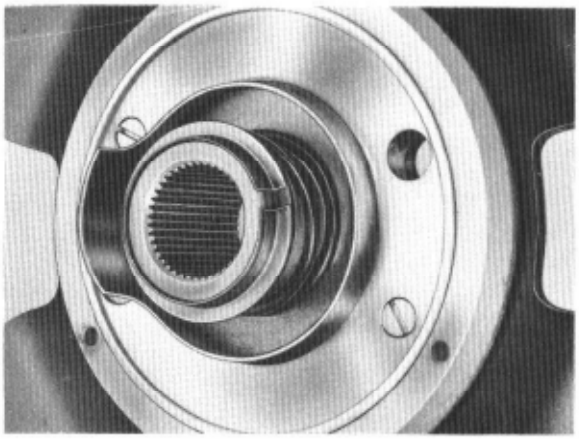
3. Pull out contact finger.

4. Loosen steering wheel retaining nut.

5. Mark position of steering wheel in relation to steering column. Remove the steering wheel watching out for supporting ring and compression spring of steering spindle bearing.

Installing

1. Position compression spring and supporting ring on steering wheel hub.



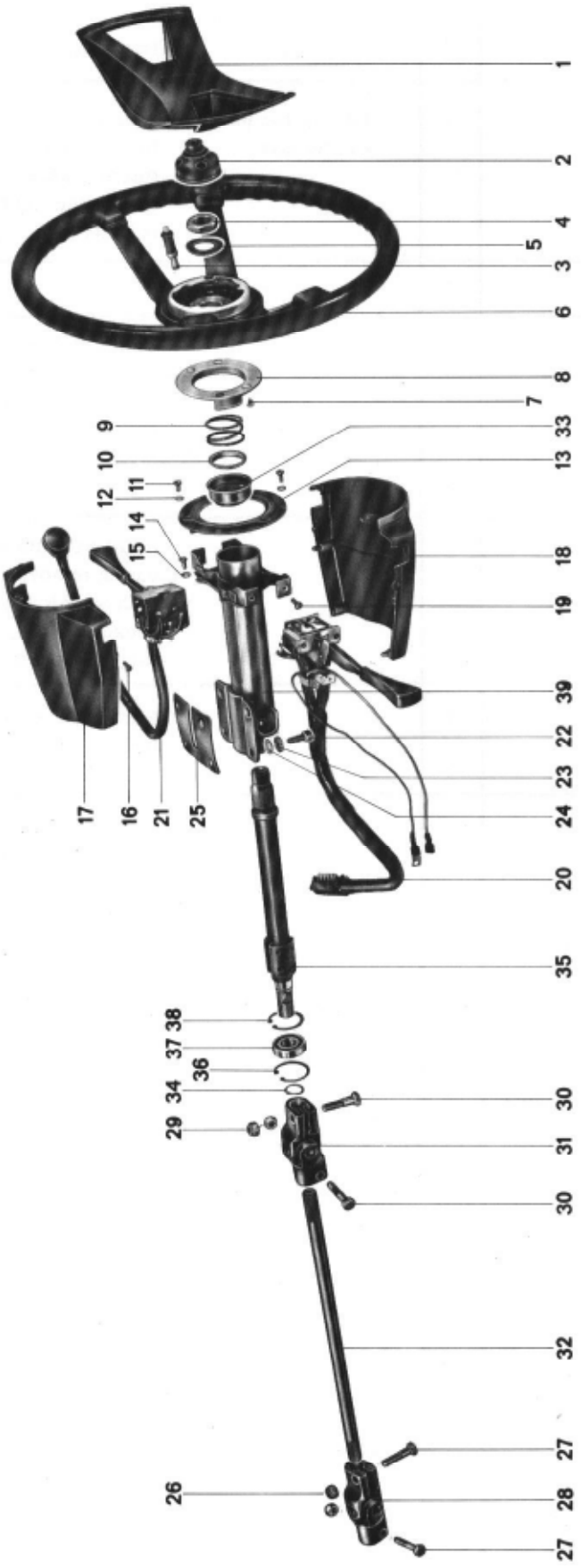
2. Lightly grease contact ring for signal horn. Use electrical contact grease.

3. Position steering wheel according to disassembly markings.

4. Place wave washer under steering wheel retaining nut. Tighten nut to correct torque.

5. Check the operation of the release ring (canceller).

6. Insert contact finger. Turn horn ring slightly to the left so that it aligns with the recesses in the steering wheel. Then press down and turn horn ring to the right until it locks.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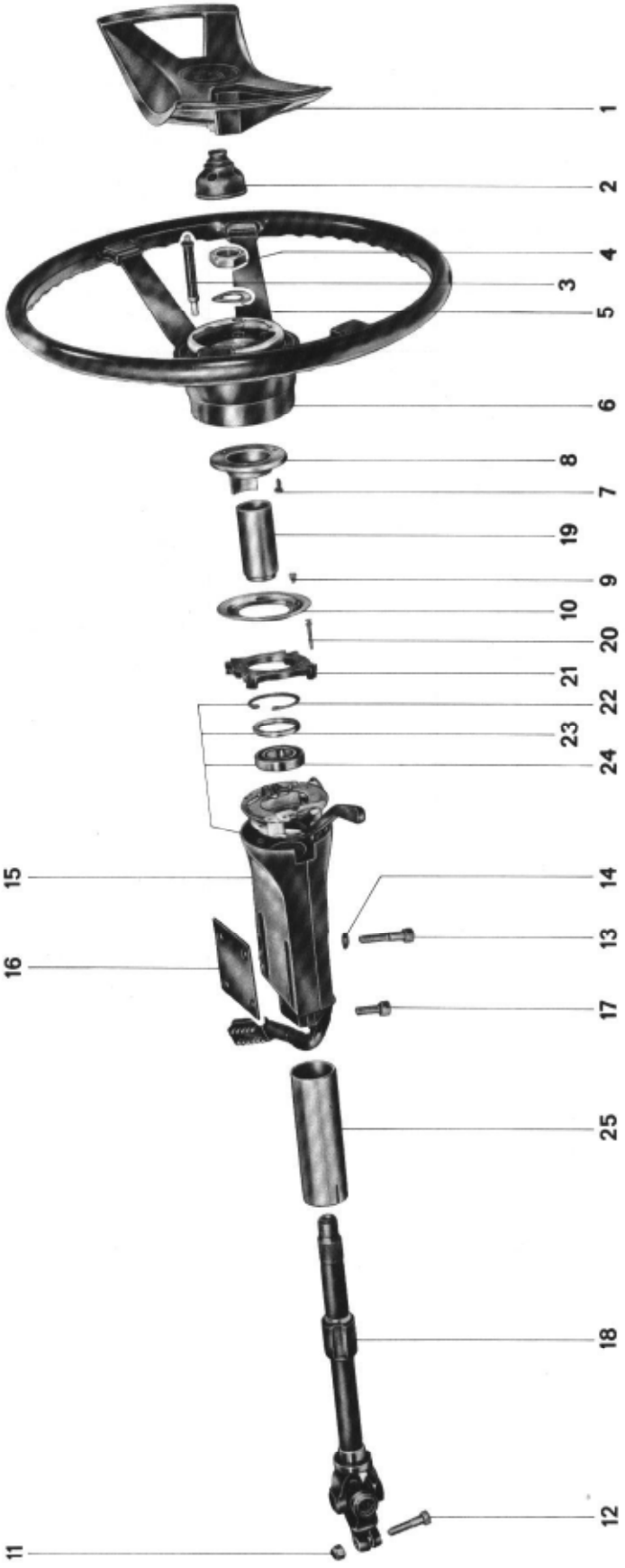
No.	Description	Qty.	Note when Removing	Note when Installing	Special instructions see
1	Horn ring	1	Turn to the left and remove	Turn slightly to the left, push against steering wheel and turn to the right until it locks	4.1-1/1
2	Rubber sleeve	1			
3	Contact finger	1		Grease lightly	
4	Nut	1		Tighten to correct torque	0.2-2/1
5	Wave washer	1			
6	Steering wheel	1		Align with marks made during removal. Mount with wheels in straight ahead position, release ring to the left	
7	Countersunk screw	2		Use liquid sealant, such as Loctite 73 and Activator	
8	Release ring	1		The lug of the release ring points to the left	
9	Compression spring	1			
10	Support ring	1			
11	Fillister head screw	2			
12	Star washer	2			
13	Contact ring	1		Grease contact surface lightly	4.1-1/1
14	Fillister head screw	4			
15	Lock washer	4			
16	Fillister head screw	2			
17	Switch housing top	1			
18	Switch housing bottom	1			
19	Fillister head screw	2			

No.	Description	Qty.	Note when Removing	Note when Installing	Spec. Instr.
20	Turnsignal-dimmer switch	1			
21	Windshield washer switch	1			
22	Fillister screw	4			
23	Lock washer	4			
24	Flat washer	4			
25	Shim	1			
26	Self-locking hex. nut	2		Replace, tighten to 2.5 mkp (18 ft. lbs.)	
27	Hex. head bolt	2			
28	Universal joint	1		Replace, if play is excessive	
29	Self-locking hex. nut	2		Replace, tighten to 2.5 mkp (18 ft. lbs.)	
30	Hex. head bolt	2			
31	Universal joint	1		Check, replace if necessary	
32	Intermediate steering shaft	1			
33	Steering spindle bearing	1	Pull off with small puller	Check, replace if necessary	
34	Circlip	1		Replace, if necessary	
35	Steering tube	1	Force out of steering jacket in upward direction		
36	Circlip	1		Replace, if necessary	
37	Grooved ball bearing	1		Check, replace if required, grease with lithium grease, mount with open end up	
38	Circlip	1		Replace, if necessary	
39	Steering shaft tube	1			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Nr.	Description	Qty.	Note when		Special instructions see
			Removing	Installing	
1	Horn ring	1	Turn left to remove	Turn slightly left, press against steering wheel, turn right to snap into position	4.1-1/1
2	Rubber sleeve	1			
3	Contact rod	1		Grease lightly	4.1-1/1
4	Nut	1		Torque to specification	0.2-2/2
5	Spring washer	1			
6	Steering wheel	1		Install with wheels in straight ahead position, the cancelling ring to left	
7	Sheetmetal screw	2		Use Loctite 73 or similar locking compound	
8	Canceling ring	1		Canceling tab of the ring must point to left	
9	Fillister head screw and lock washer	4 each		Use lower Fillister head screw to attach wire	
10	Contact ring	1		Lightly grease contact surface	4.1-1/1
11	Self-locking nut	1		Replace, torque to specification	0.2-2/2
12	Bolt	1			
13	Allen-head bolt	4		Torque to specification	0.2-2/2
14	Lock washer	4		Replace if necessary	
15	Switch cover	1			
16	Supporting plate	1			

Nr.	Description	Qty.	Note when Removing	Note when Installing	Special instructions see
17	Allen-head bolt	1		Torque to specification	0.2-2/2
18	Steering shaft, complete	1	Remove Allen-head bolt (17) and drive complete steering shaft out	Pack ball bearing with Lithium grease. Drive complete steering shaft all the way in to stop, torque Allen-head bolt (17) to specification	Replace only as a complete assembly with U-joint 0.2-2/2
19	Spacer bushing	1	Drive out with pipe section (24 mm/ 0.944 in. outer dia)	Drive in to stop at ball bearing	
20	Fillister head screw with washer	4			
21	Insulator	1			
22	Snap ring	1		Must seat fully in housing groove	
23	Spacer	1		Install ball bearing without axial play (lock ring should just snap in position)	
24	Ball bearing	1		Pack with Lithium grease, position with open side up, drive in to stop in housing	
25	Shaft cover tube	1		Push in to stop in housing	

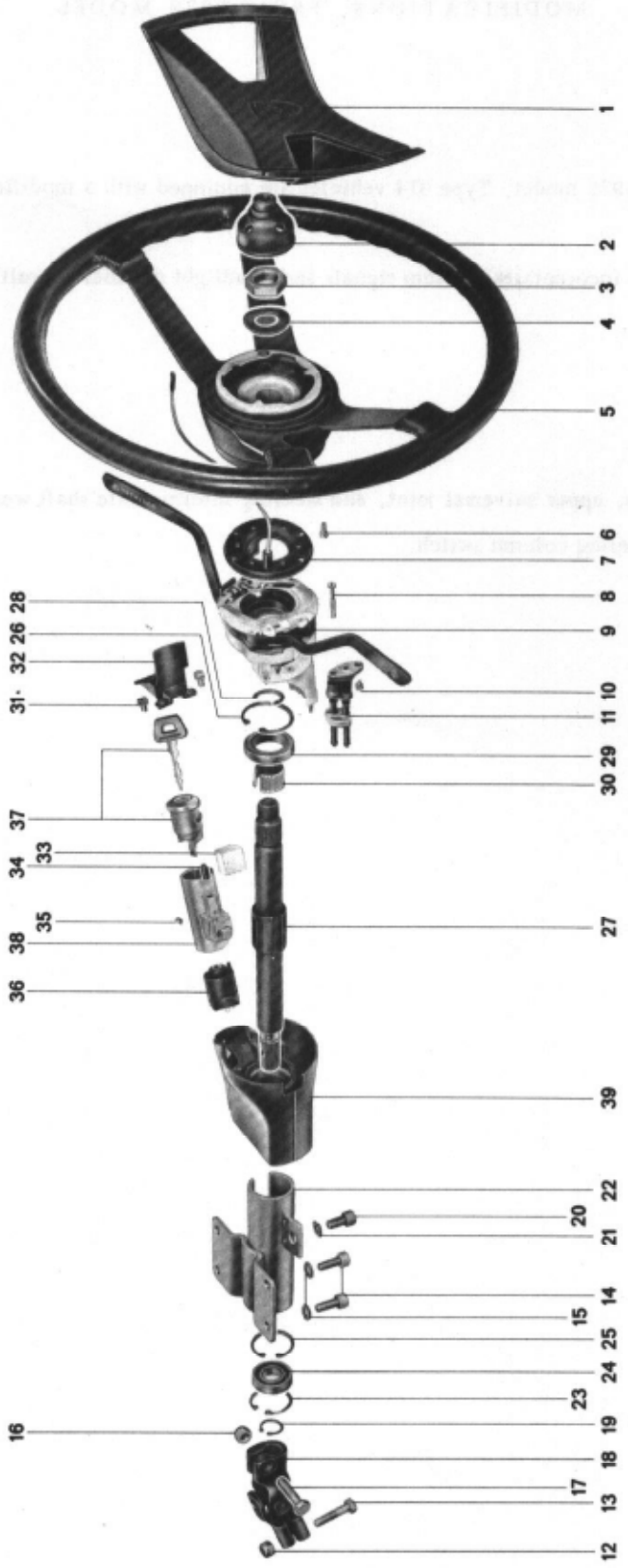
MODIFICATIONS, FROM 1972 MODEL

1. Beginning with the 1972 model, Type 914 vehicles are equipped with a modified steering column switch.

   The new switch unit incorporates the turn signals and headlight dimmer as well as the windshield wiper/washer switch.

2. The shaft cover tube, upper universal joint, and steering intermediate shaft were modified as a result of the new steering column switch.

DISASSEMBLING AND REASSEMBLING STEERING COLUMN



Nr.	Description	Qty	Note when removing	Note when installing	Special instructions see
1	Horn ring	1	Turn left to remove	Connect contact wire	4.1-1/1
2	Rubber sleeve	1			
3	Nut, SW 27	1		Torque to specification	0.2-2/2
4	Spring washer	1			
5	Steering wheel	1		Install with wheels in straight ahead position, cancelling ring to right	
6	Fillister head screw with lock washer	3 each			
7	Contact ring with contact wire	1		Lightly grease contact surface	
8	Fillister head screw	4			
9	Steering column switch	1	Pull out of switch housing		
10	Oval head screw with washer	2 each			
11	Windshield washer valve	1			
12	Self-locking nut, M8	1		Torque to specification	0.2-2/2

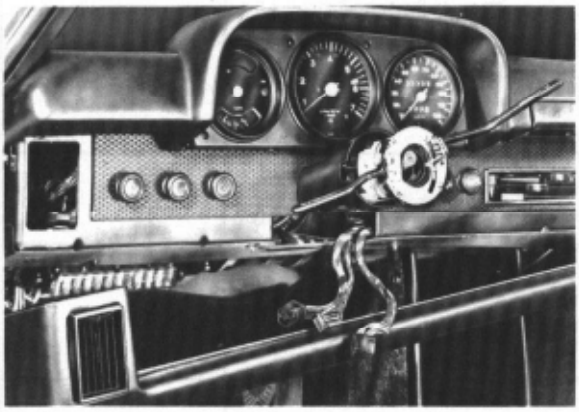
Nr.	Description	Qty	Note when removing	Note when installing	Special instructions see
13	Nut, M8	1			
14	Allen head bolt	4		Torque to specification	0.2-2/2
15	Lock washer	4			
16	Self-locking nut, M8	1		Torque to specification	9.2-2/2
17	Bolt, M8	1			
18	Universal joint	1		Check, replace if necessary.	
19	Snap ring	1		Replace if necessary	
20	Allen head bolt	1		Torque to specification	0.2-2/2
21	Spring washer	1			
22	Shaft cover tube	1			
23	Snap ring	1		Must seat fully in shaft cover tube	
24	Grooved ball bearing	1	Drive out of shaft cover tube	Check and replace, if necessary. Pack with lithium grease, position with open side up.	
25	Snap ring	1		Must seat fully in shaft cover tube.	

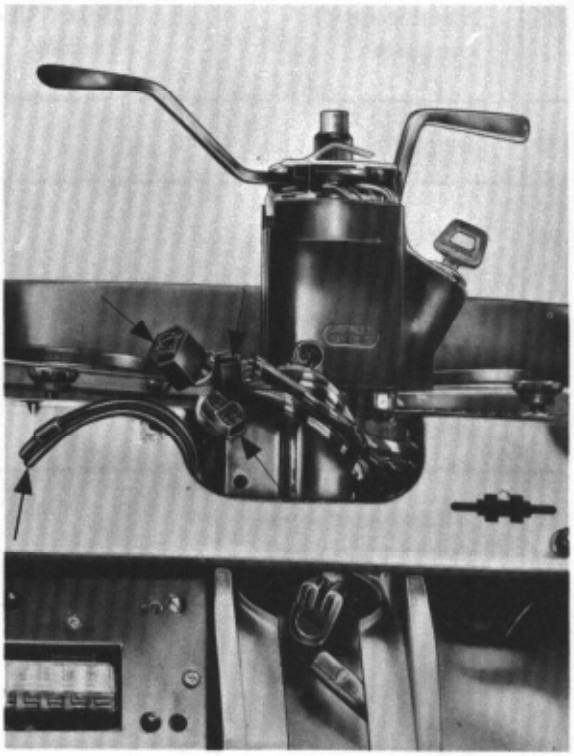
Nr.	Description	Qty	Note when removing	Note when installing	Special instructions see
26	Snap ring	1		Must seat fully in housing groove	
27	Steering shaft, complete	1	Drive out of switch housing		
28	Snap ring	1		Replace if necessary	
29	Grooved ball bearing	1		Check and replace, if necessary. Pack with lithium grease, position with open side up	
30	Spacer	1		Replace if necessary	
31	Fillister head screw with spring washer	2 each			
32	Steering lock support	1			
33	Gasket	1			
34	Rubber block	1			
35	Threaded stud	1			
36	Ignition/steering lock	1		Check proper location of threaded stud (item 35)	
37	Lock tumbler with key	1			
38	Steering lock	1			
39	Housing	1			

DISASSEMBLING AND ASSEMBLING STEERING COLUMN

Disassembling

1. Remove knee guard from instrument panel.





2. Disconnect plug-in connectors from steering column switch. Withdraw hose connections from windshield washer valve.

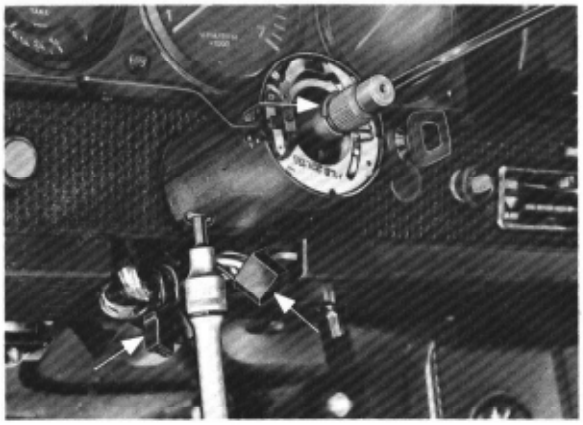
3. Remove retaining screws from shaft cover tube (4 Fillister head screws).

4. Detach steering intermediate shaft at upper universal joint and withdraw entire steering column switch assembly.

REMOVING AND INSTALLING IGNITION/STEERING LOCK(1975 Models)

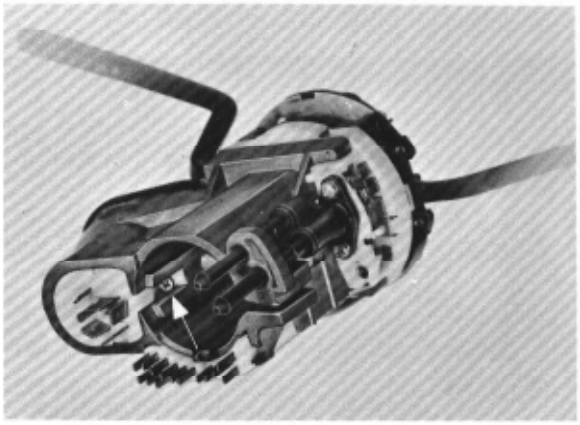
Removing

1. Take cap off of windshield washer tank.
2. Remove knee guard on instrument panel.
3. Remove steering wheel.
4. Remove allen head bolt for shaft cover tube. Disconnect plugs at steering column switch and take circlip off of steering shaft.



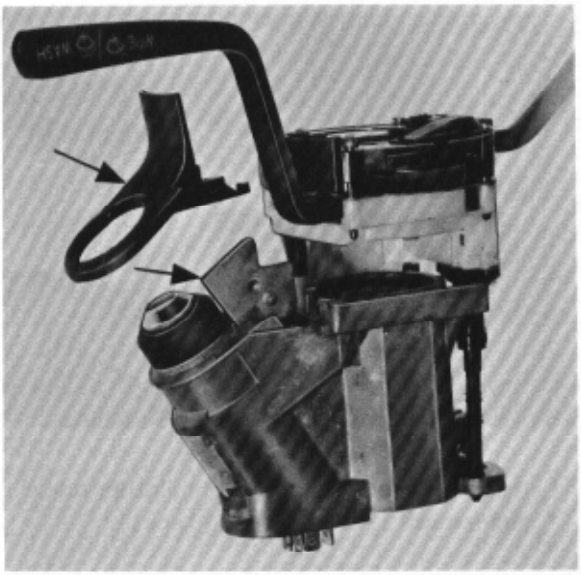
5. Unlock ignition lock and pull steering column switch off of steering shaft.
6. Slide back steering column switch cover and disconnect hoses of windshield washer.

7. Unscrew ignition/steering lock phillips screw and remove ignition/steering Lock.



8. Unscrew intermittent wiper/washer switch mounting screws and remove switch.

9. Remove lock cylinder cover.



10. Pull out lock cylinder safety holder.

11. Press in lock cylinder stop with an appropriate tool (scribe or small screwdriver) and remove lock cylinder.