Steering

Repairs and maintenance

Section	Group
6	64

Steering
1975-
240/260

VOLVO

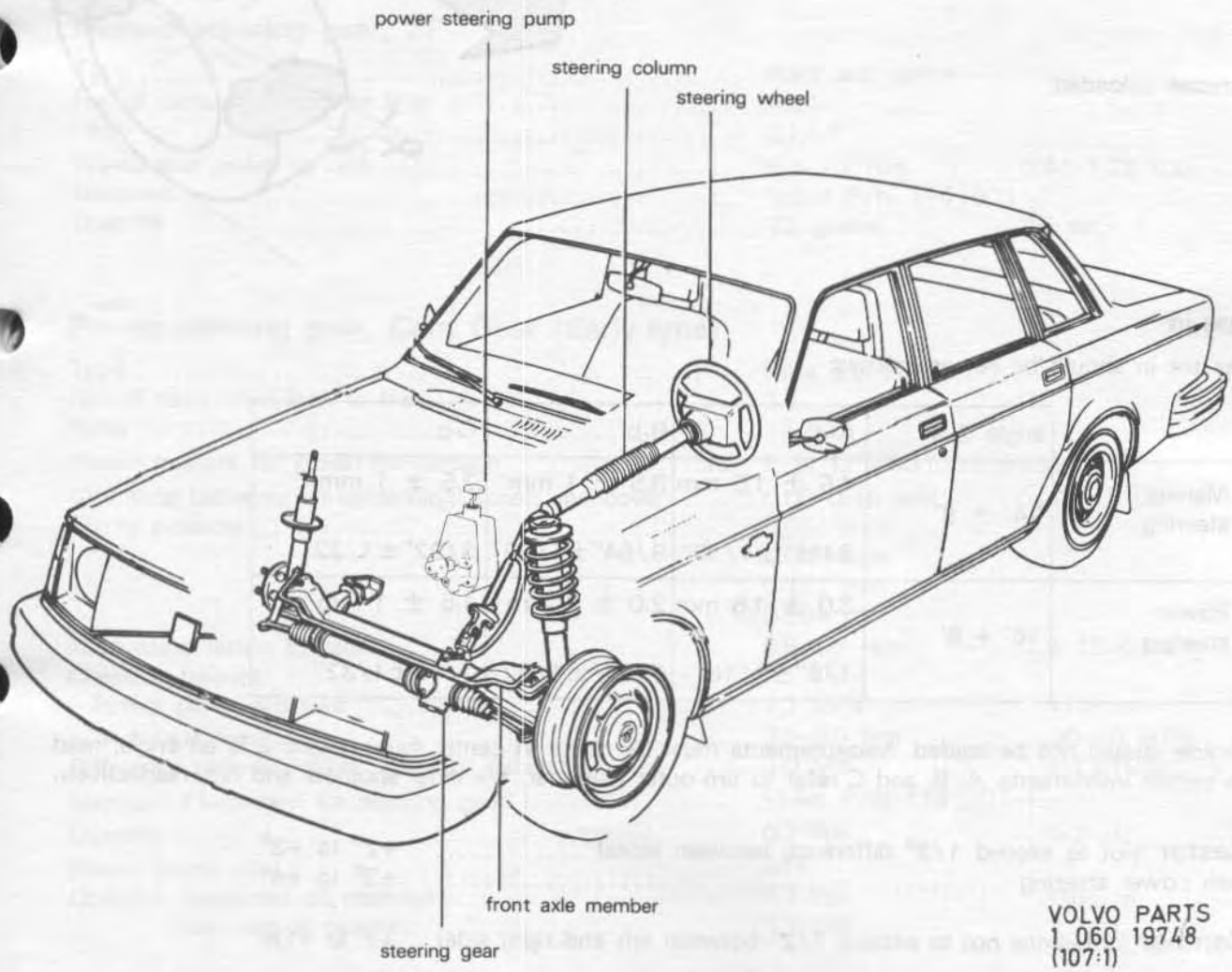
Contents

TP 30001/3
4500.8.84
Printed in U.S.A.

Group 64

Steering

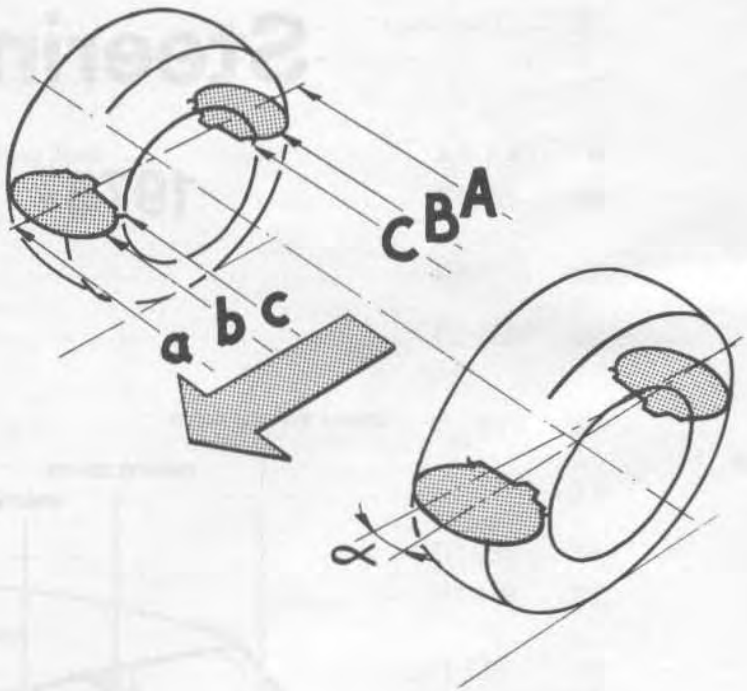
1975-



VOLVO PARTS
1 060 19748
(107:1)

Specifications

Front end alignment



129581

Vehicles unloaded

Toe-in

The toe-in should be set as follows:

	angle 2 *a*	A-a	B-b	C-c
Manual steering	24' ± 8'	4.5 ± 1.6 mm 3/16"±1/16"	3.5 ± 1 mm 9/64"±1/32"	2.5 ± 1 mm 3/32"±1/32"
Power steering	16' + 8'	3.0 ± 1.5 mm 1/8"±1/16"	2.0 ± 1 mm 5/64"±1/32"	1.5 ± 1 mm 1/16±1/32"

Vehicle should not be loaded. Measurements must be made at center (hub) height. *a* is an angle, read on certain instruments. A, B, and C refer to tire outer diameter, tire inner shoulder and rim, respectively.

Caster (not to exceed 1/2° difference between sides) ..... +2° to +3°
with power steering ..... +3° to +4°

Camber (difference not to exceed 1/2° between left and right side) +1° to +1½°

Manual steering gear, Cam Gear

Type	Rack and pinion	
No of turns from lock to lock	4.34	
Ratio	21.4:1	
Pinion: pre-tension	0,1 mm	0.004"
shims available	0.127 mm	
	0.191 mm	
	0.254 mm	
Clearance between pre-tensioning piston and cover	0.002–0.15 mm	0.0008–0.006"
Shims available	0.127 mm	
	0.254 mm	
	0.381 mm	
	0.508 mm	
Pre-tension pinion to rack	0.6–1.7 nm	0.44–1.25 ft.lb.
Lubricant (grease)	Volvo P/N 1161001	
Quantity	75 grams	2.5 oz.

Manual steering gear, ZF

Type	Rack and pinion	
No. of turns from lock to lock	4.34	
Ratio	21.4:1	
Pre-tension pinion to rack	0.6–1.7 Nm	0.44–1.25 ft.lb.
Lubricant	Volvo P/N 1161001	
Quantity	75 grams	2.5 oz.

Power steering gear, Cam Gear (Early type)

Type	Rack and pinion	
No. of turns from lock to lock	3.5	
Ratio	17.2:1	
Pinion: gaskets for pinion pre-tension	P/N 1206931, 1206934	
Clearance between pre-tensioning piston and cover	0.05–0.15 mm	0.002–0.006"
Shims available	0.051 mm	
	0.089 mm	
	0.127 mm	
	0.254 mm	
Pre-tension pinion to rack	0.9–1.7 Nm	8–15 in.lbs.
Checking balance:		
– Power pump pressure	1.2 MPa	170 psi
– at torque reading	3.5–5.0 Nm	30–40 in.lbs.
Difference between sides must not exceed	1.0 Nm	0.73 ft.lb.
Lubricant ("Lubricant for steering gear")	Volvo P/N 1161001-1	
Quantity	0.2 liter	0.2 qt.
Power pump oil	ATF	
Quantity: integrated oil reservoir	0.7 liter	0.65 qt.
separate oil reservoir	1.2 liter	1.1 qt.

Power steering gear, ZF (Fixed Valve Housing)

Checking balance:		
– Power pump pressure	2.0 MPa	285 psi
– at torque reading	4–5.5 Nm	35–40 in.lb.
Difference between sides must not exceed	0.5 Nm	4.4 in.lb.

Power steering pump, ZF

Type	Vane pump	
Max. pressure, early prod.	7.5 MPa	1070 psi
late prod.	5.8 MPa	820 psi
Theoretical capacity at 500 rpm	6.65 liter/min	6.24 qt/min
Drive	Belt drive	
Drive ratio, engine to pump	1:1	

Power steering pump, Saginaw

Type	Vane pump	
Max. pressure	5.5–7 MPa	780–995 psi
Theoretical capacity at 500 rpm	5 liter/min	5.3 qt/min
Drive	Belt drive	
Drive ratio, engine to pump	1:0.9	

Torques

Steering	**Nm**	**ft.lb.**
Steering wheel center nut	60±15	44±11
Screws, steering column attachment	20±5	14±4
Screws, steering shaft rubber coupling	20±5	14±4
Screws, steering shaft joint	23±5	17±4
Screws and nuts, steering gear to front axle	20±5	14±4
Nut, tie rod to ball joint	70±10	51±7

Manual steering gear, ZF

Pinion nut	24±2	17±1.5

Manual steering gear, Cam Gear

Screws, pinion cover	19±2	14±1.5
Screws, pre-tensioning device cover	19±2	14±1.5

Power steering gear, Cam Gear

Screws, pre-tensioning device cover	19±2	14±1.5
Screws, upper pinion cover	19±2	14±1.5
Screws, lower pinion cover	19±2	14±1.5
Lock screws, outer tube to housing	19±2	14±1.5
Lock nut, pinion	14±1	10±0.75
Fittings, pressure hoses and return hoses	42±7	30±5

Special tools

When ordering tools, put 999 in front of 4-digit tool number.

1801 **Standard handle**

1819 **Bearing puller**

2263 **Steering wheel puller**

2520 **Work stand**

2734 **Drift**
installing seal

2863 **Drift**
installing seal

2993 **Drift**
installing rack bushing Cam Gear manual steering gear

4078 **Puller**
rack bushing

5043 **Puller**
tie rod end

5046 **Fixture**
steering gear overhaul

5047 **Puller**
for bearing

5048 **Drift**
installing bearing

5049 **Sleeve**
adjusting balance

5051 **Puller**
bearing and seal

5052 **Drift**
installing bearing

5053 **Adapter**
checking pinion torque

5054 **Cover**
adjusting balance

5055 **Pressure gauge**
balance and oil pressure

5056 **Sleeve**
installing seal

5119 **Wrench**
lock nut, pinion upper bearing, ZF steering gear

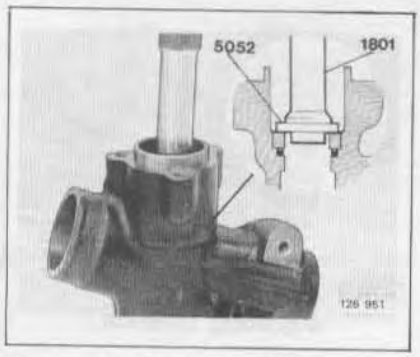
5175 **Nipple**
checking balance

5176 **Nipple**
checking balance

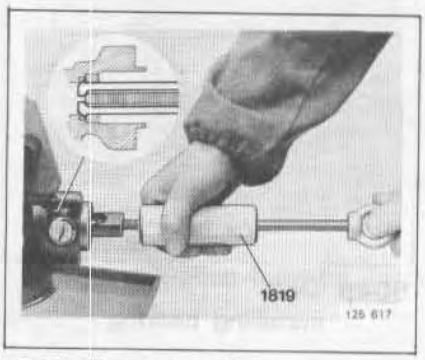
5179 **Adapter**
checking balance

5182 **Adapter**
installing cover

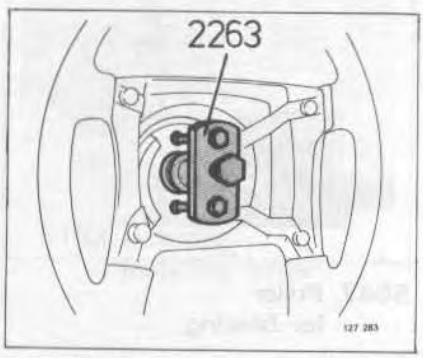
9177 **Torque gauge**



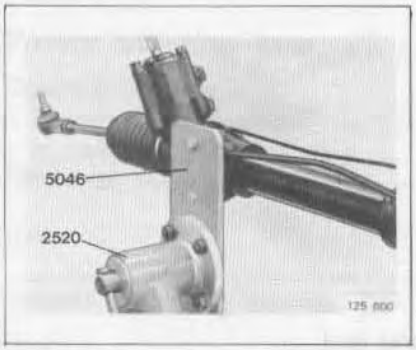
1810 Standard handle



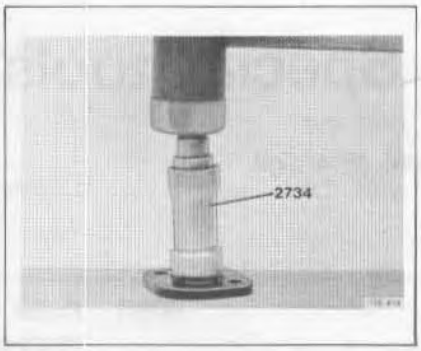
1819 Bearing puller



2263 Steering wheel puller

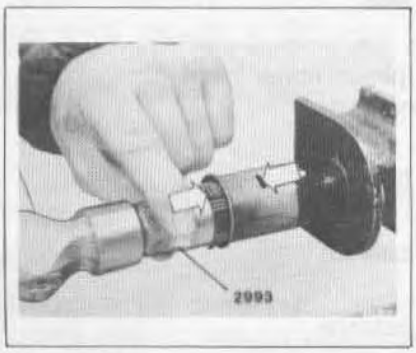


2520 Work stand
5046 Fixture
steering gear overhaul

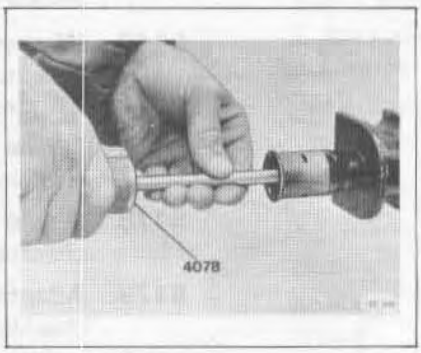


2734 Drift
installing seal

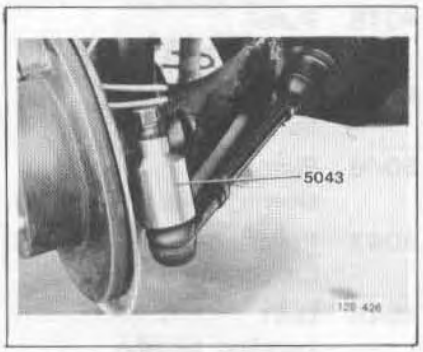
2863 Drift
installing seal



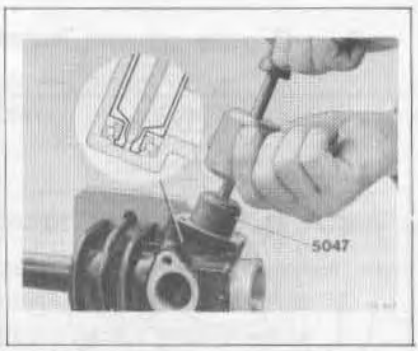
2993 Drift
installing rack bushing,
Cam Gear



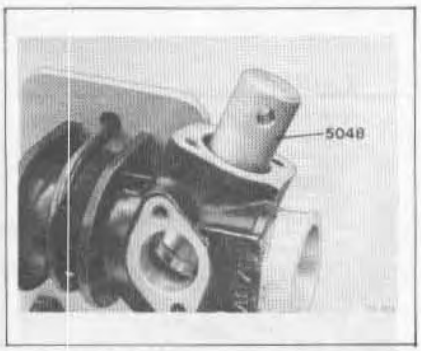
4078 Puller
rack bushing



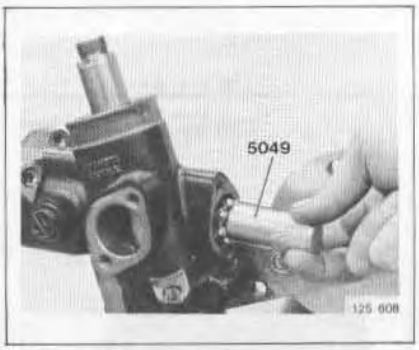
5043 Puller
tie rod end



5047 Puller
for bearing

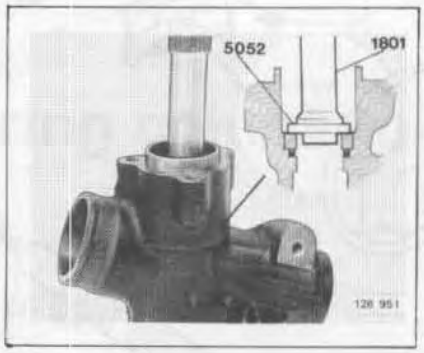


5048 Drift
installing bearing

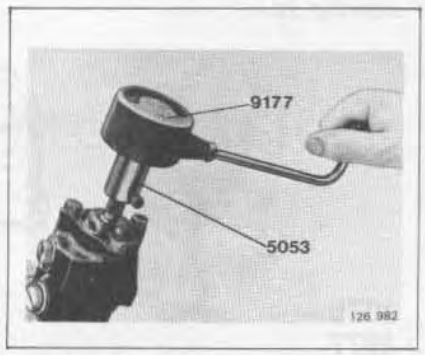


5049 Sleeve
adjusting balance

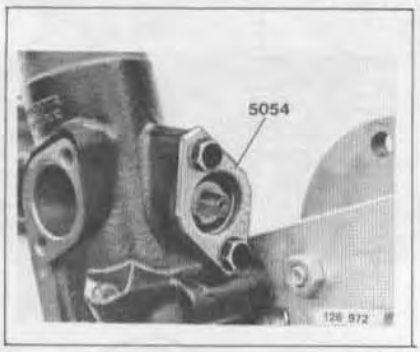
5051 Puller
bearing and seal



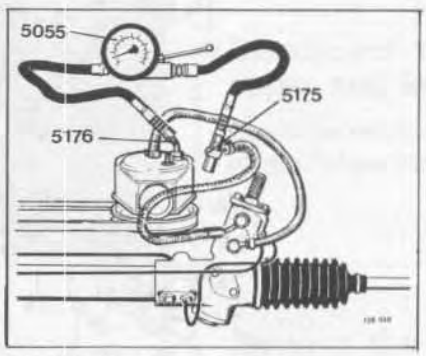
5052 Drift
installing bearing



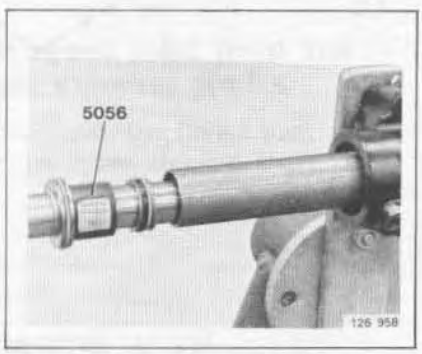
5053 Adapter
checking pinion torque
9177 Torque gauge



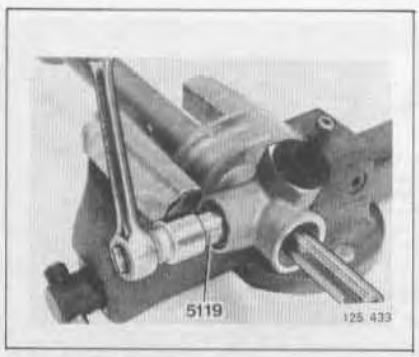
5054 Cover
adjusting balance



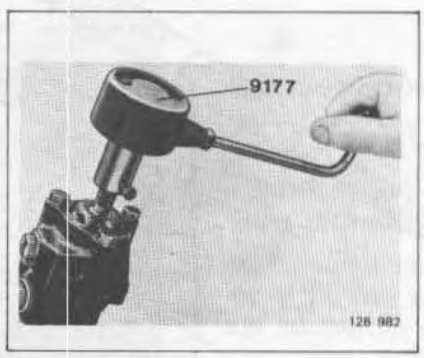
5055 Pressure gauge
balance and oil pressure
5175 5176 Nipples
checking balance



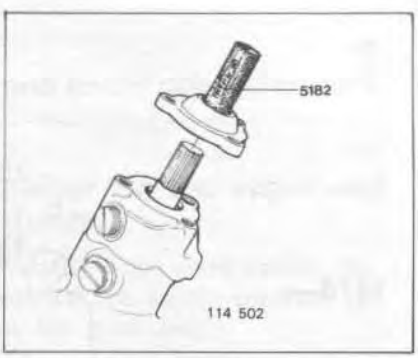
5056 Sleeve
installing seal



5119 Wrench
lock nut, pinion upper
bearing, ZF



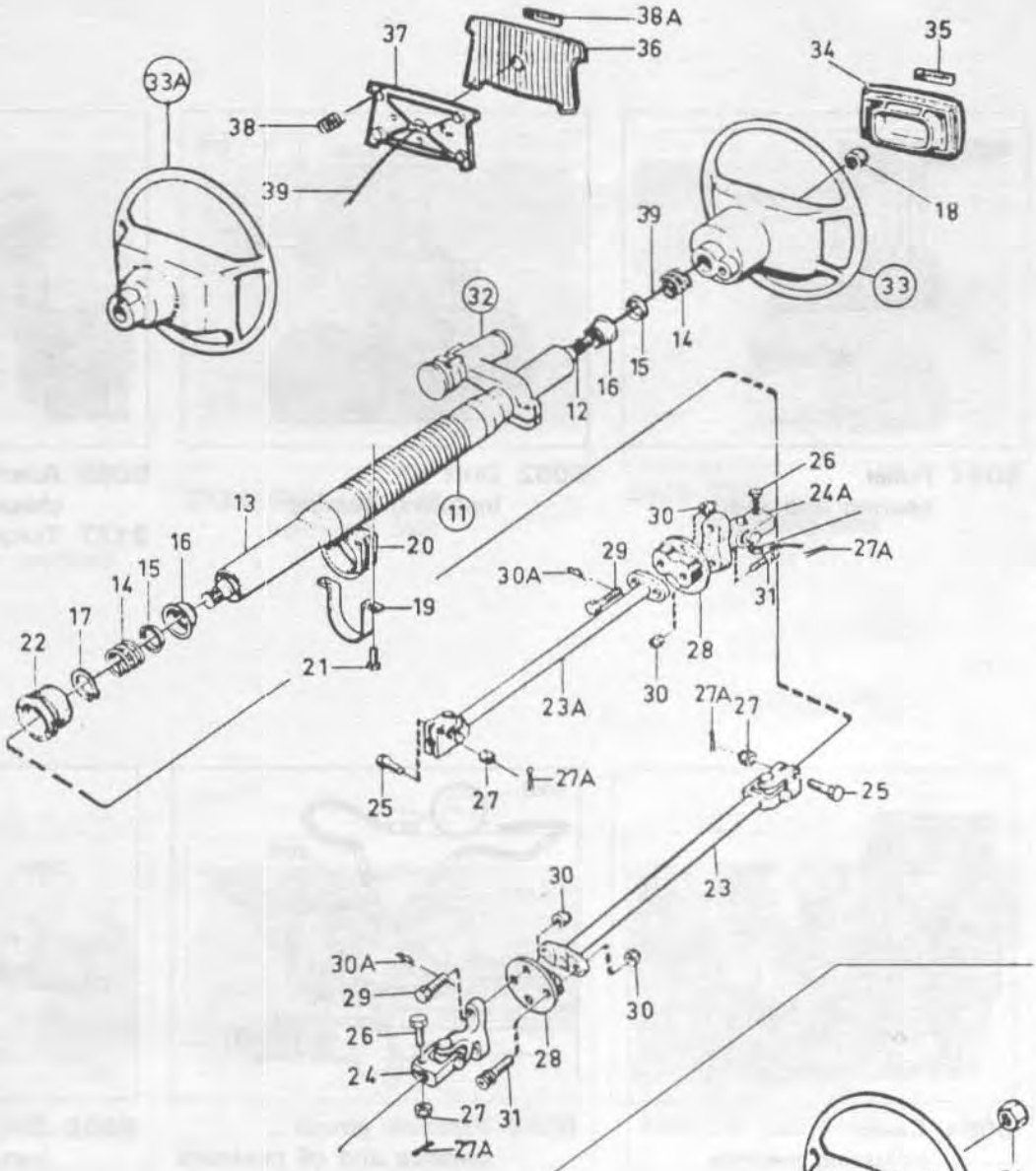
5179 Adapter
checking balance



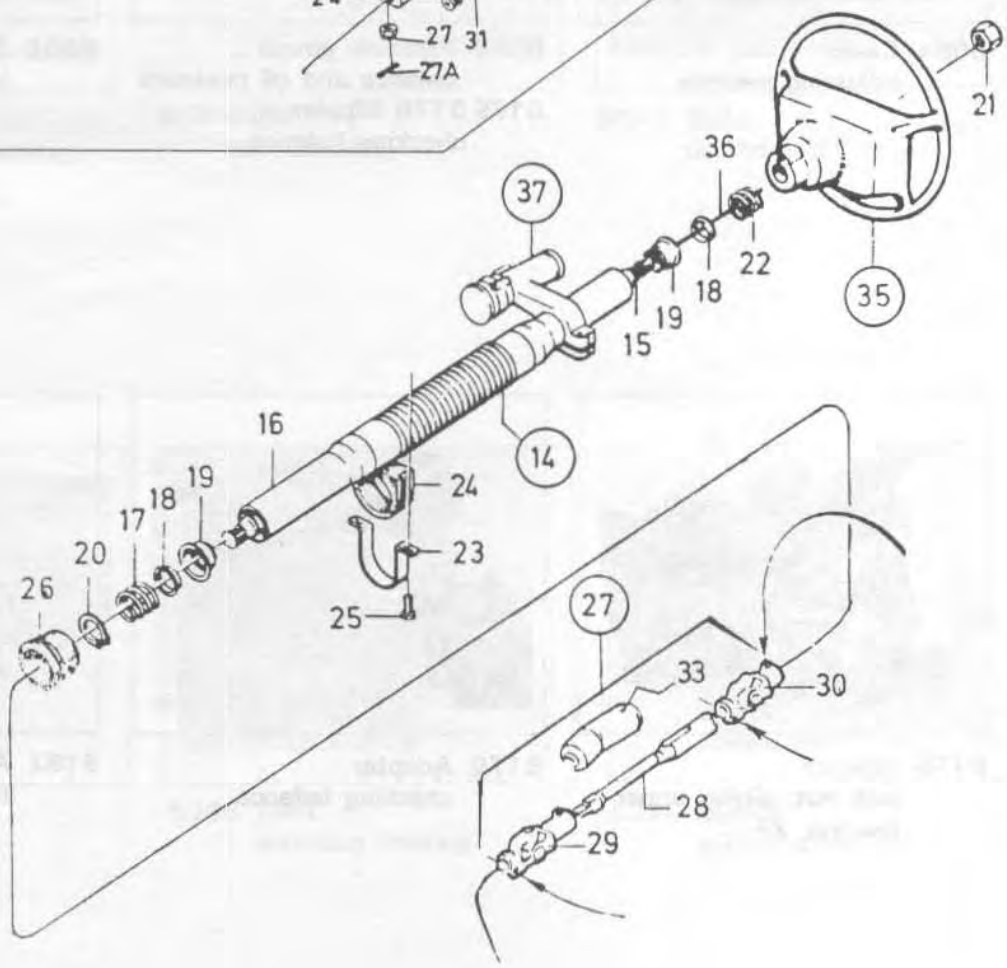
5182 Adapter
installing cover

Steering column, steering lock

1976—1977



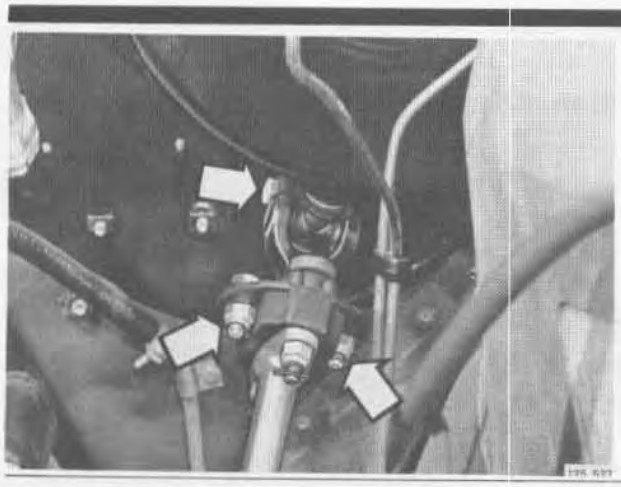
1978—



Replacing steering column or steering lock

Special tools:

2263 Steering wheel puller (1976–1978)
Deep thin wall socket (1979–)



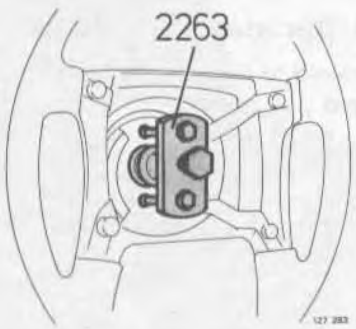
A1

Disconnect the battery ground cable.

A2

Disconnect the upper joint from the upper and lower steering shafts.

Use a screwdriver to open the flange joint so it comes loose from the upper steering shaft.



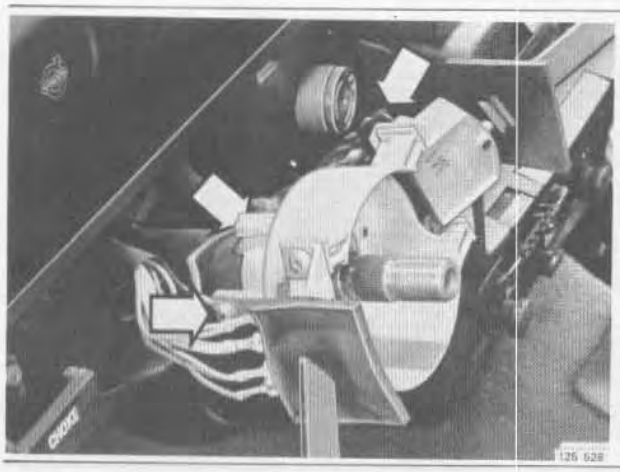
A3

Remove the steering wheel.

Use a screwdriver to pry loose the steering wheel pad.

Use steering wheel puller 2263 to remove the steering wheel. Do not knock on the steering wheel or puller as this may deform the crumple-zone unit in the upper section of the steering shaft.

Note: from 1979 year Model no puller is needed. Use a deep thin wall socket to remove the steering wheel nut and pull the steering wheel UP.



A4

Remove upper and lower column covers.

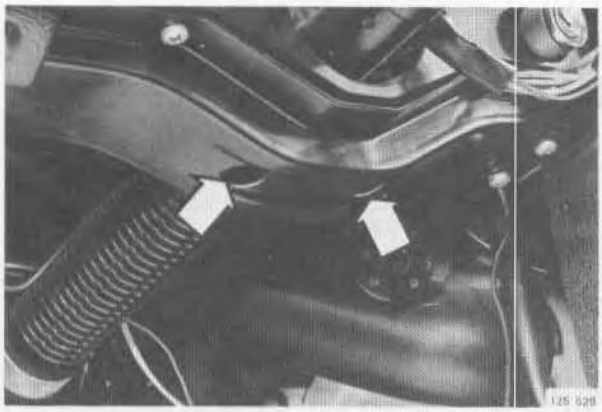
A5

Remove the retainer for the wiper and turn signal switches.

Disconnect the connector for the wiper switch. Remove the two screws for the switch retainer. Lift the retainer up over the shaft end.

A6

Remove the panel under the instrument panel. Remove the side panel at the center console.



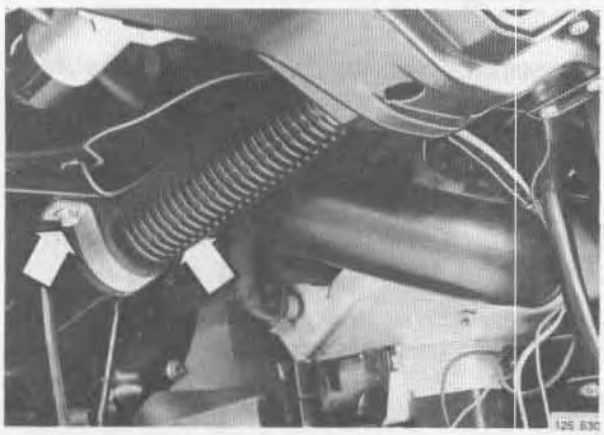
A7

Disconnect the connector at the steering lock.

A8

Remove the steering lock retaining screws.

Drill holes in the screw centers. Use fitting screw extractor to remove the screws.



A9

Remove the defroster hose.

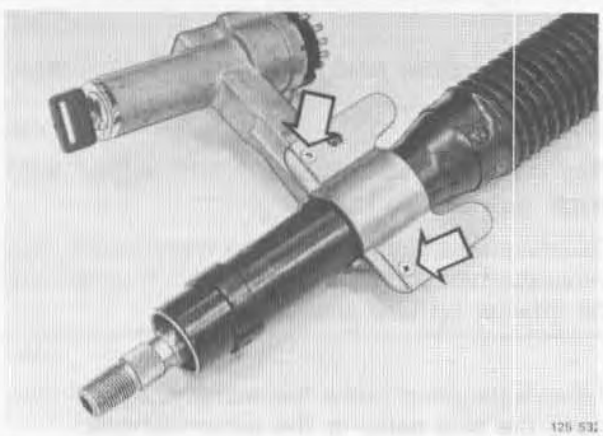
A10

Remove the lower retainer bracket for the steering column.

A11

Remove the steering column.

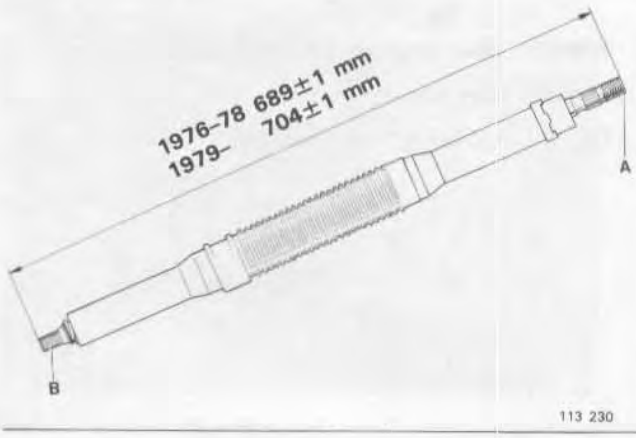
Push it forward to disconnect the rubber seal. Then lower it and pull it out.



A12

Remove the steering lock.

Use the key to unlock the lock. Remove the retaining screws.



113 230

A13

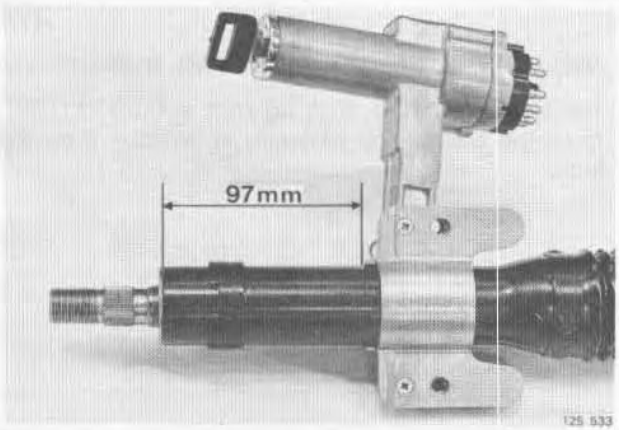
Check the steering column.

Check that the upper crumple zone is intact. Its upper end (A) should not move axially in relation to the lower end (B).

The overall length of the steering column should be:

Models:
1976–1978 689±1 mm = 27.126"±0.04"

1979– 704±1 mm = 27.717"=0.04"

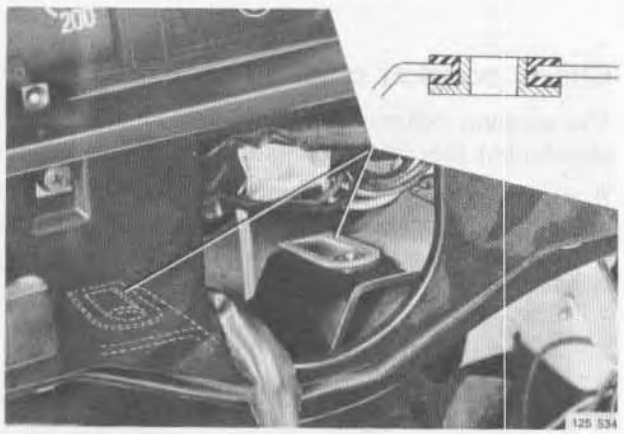


125 533

A14

Install the steering lock.

Position the lock so that the distance between the lock upper part and the end of the tube is 97 mm = 3.82".

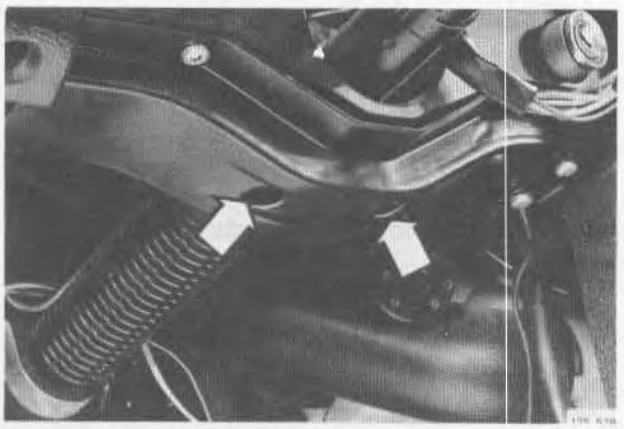


125 534

A15

Check the two plastic guides.

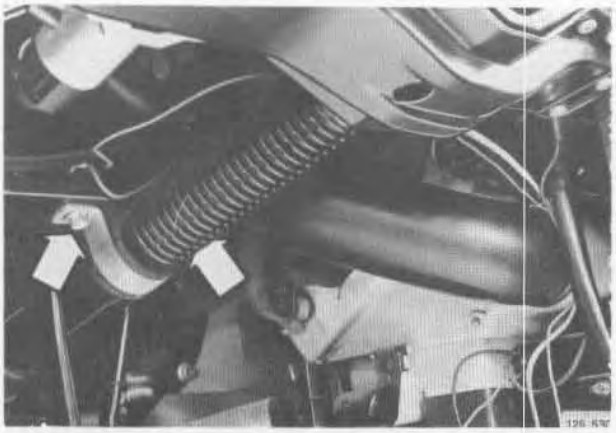
They must be provided with spacers and turned so that the washers are DOWN.



A16

Position the steering column.

Screw in the shearing bolts but do not tighten.

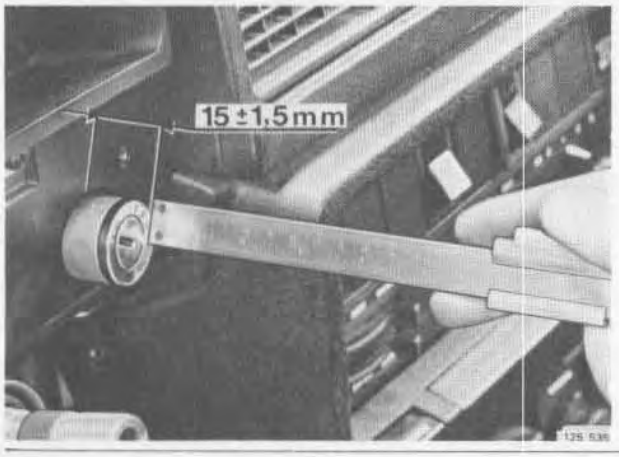


A17

Install the lower attachment.

First fit the rubber spacer and then the clamp.

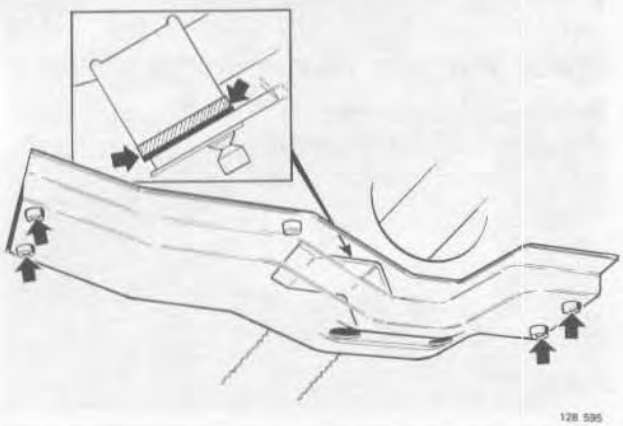
Do not tighten the screws fully.



A18

Adjust the steering column position.

The lock should be 15±1.5 mm = 0.59"±0.06" from the dashboard. Measure at position II on the lock.

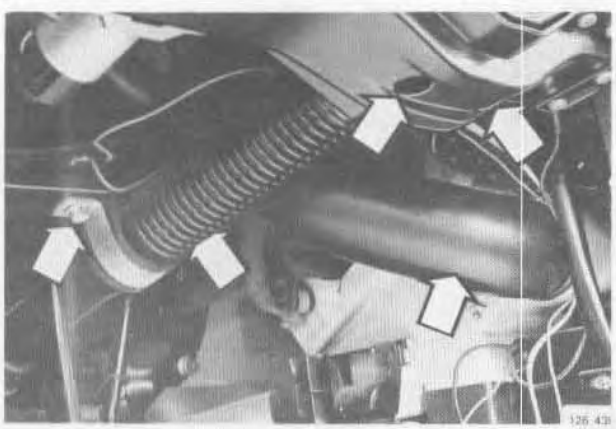


A19

Check position of steering column.

The steering column must not contact the upper attachment plastic guides as this can cause noise.

If the steering column is incorrectly positioned, adjust the dashboard beam location. Release the beam retaining screws, adjust the beam to correct position and tighten the retaining screws again.



A20

Tighten the upper attachment.

DO NOT shear the shearing bolts at this moment.

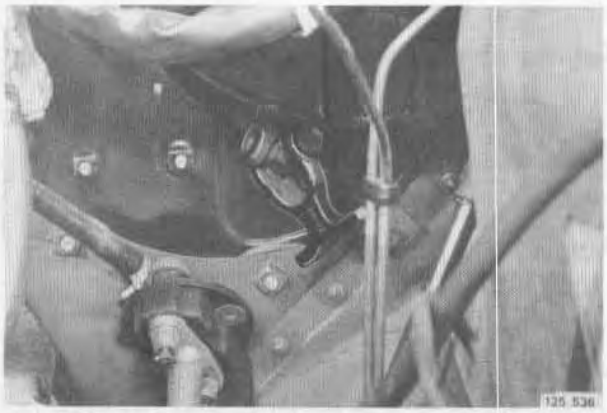
A21

Tighten the lower attachment.

Torque 20±5 Nm = 14±4 ft.lbs.

A22

Position the defroster hose.



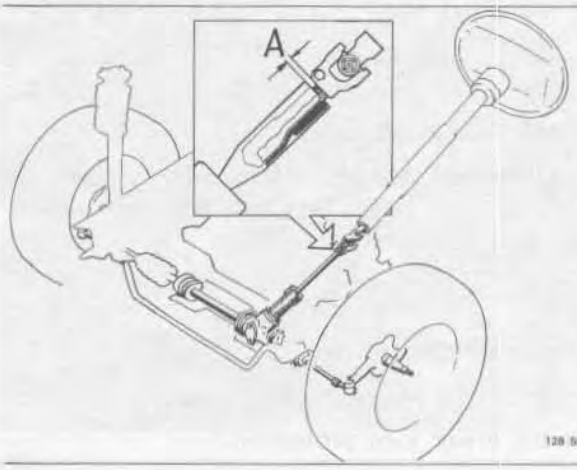
A23

Position the rubber seal on the dashboard. Loosely fit the upper joint on the upper steering shaft.

A24

Attach the lower steering shaft flange to the upper joint.

Torque: 23±5 Nm = 17±4 ft.lbs.



A25

For 1979 and later Models
and for 1978 Models equipped with ZF power steering gear:

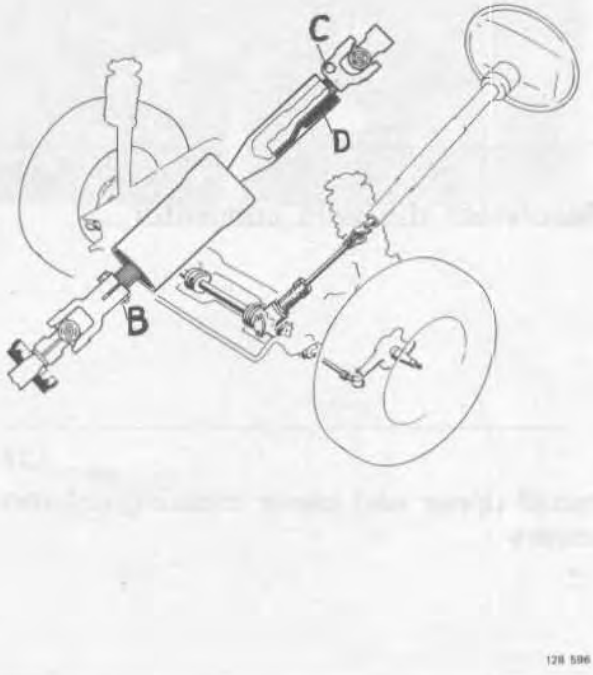
Check steering shaft.

Following any repair to the steering shaft.

The distance A between the upper joint and the shoulder on the lower steering shaft should be:

when checking 10–19 mm = 0.40–0.75"
15 mm = 0.60"

If incorrect, the distance should be adjusted as follows:



A26

Pull up the protection for the lower joint.

(Not power steering equipped.)

A27

Loosen the joints.

Loosen the screws B at the lower joint and C at the upper joint just so much that the screw head comes free from the joint.

A28

Adjust the distance A.

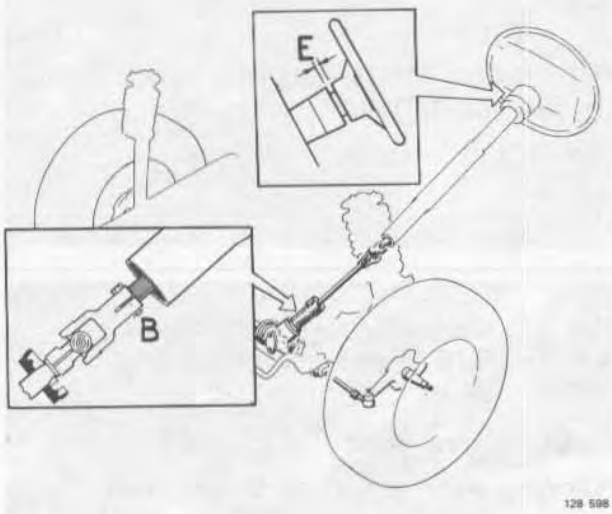
Move lower shaft up or down. Be careful not to change the position of the upper steering shaft as it will influence the distance between the steering wheel and the covers.

A29

Retighten the joints.

Torque: 23±5 Nm = 17±4 ft.lbs.

Refit the lower joint protection (not vehicles with power steering).



128 598

A30

Adjust distance between steering wheel and steering wheel cover.

Operations A25–A29 must be completed.

A31

Pull up the protection for the lower joint.

A32

Loosen lower joint.

Loosen the screw B at the lower joint just so much that the screw head comes free from the joint.

A33

Adjust distance E.

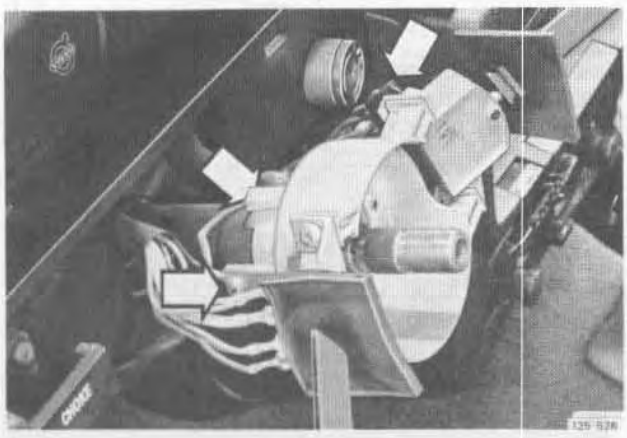
Move the lower steering shaft to obtain a clearance of 1–2 mm = 0.04–0.08" between the steering wheel and the covers.

A34

Retighten the joint.

Torque: 23±5 Nm = 17±4 ft.lbs.

Refit the lower joint protection.



135 528

A35

Attach the switch retainer. Reconnect the wires.

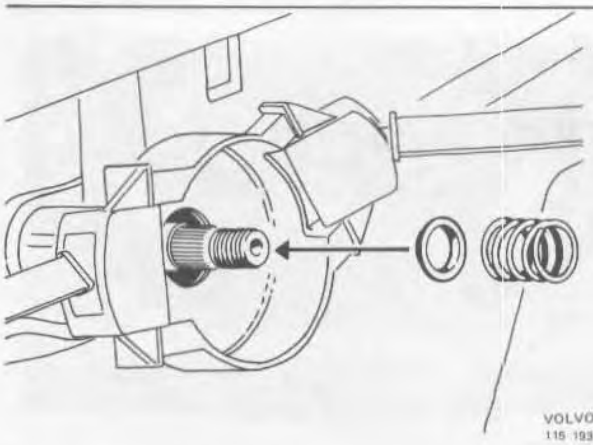
Use one of the retaining screws to attach the ground wire.

A36

Reconnect the wire connector.

A37

Install upper and lower steering column covers.

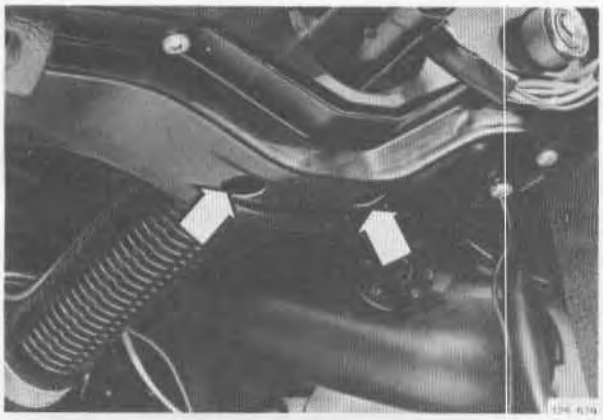


A38

Position spring seat and spring. Install the steering wheel.

Observe correct steering wheel spoke position.

Torque 60 ± 15 Nm = 44 ± 11 ft. lbs.

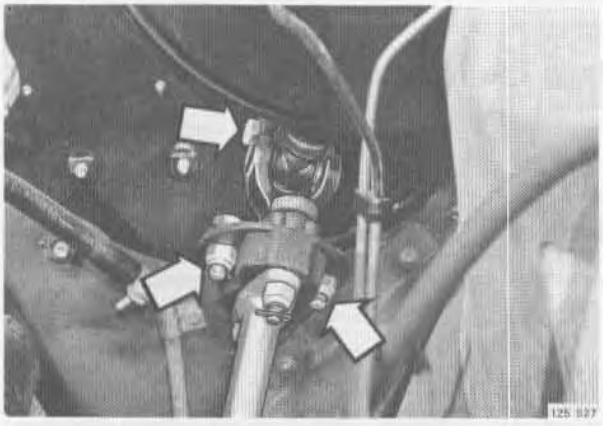


A39

Shear the shearing bolts.

A40

Install side panel and panel under the instrument panel



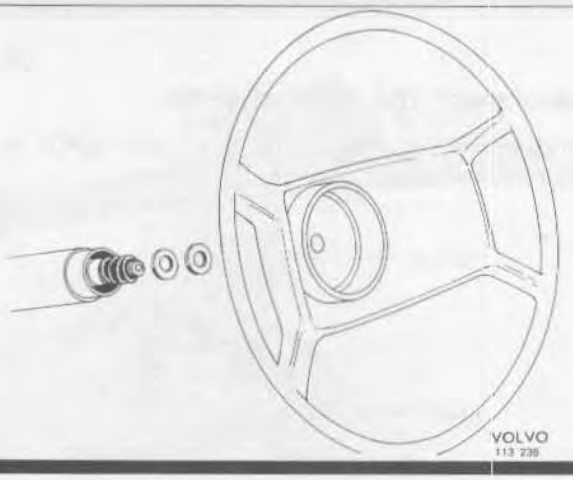
A41

Tighten the screw for the upper joint flange.

Torque: 25±5 Nm = 18±4 ft.lbs.

A42

Reconnect the battery ground cable. Test operation.



A43

Remedy in case of rattle at the steering shaft bearings.

The bearing pre-tension should be increased by installing one (in severe cases two) washer on top of the spring.

Use steering wheel puller 2263 for 1976–1978 Models.

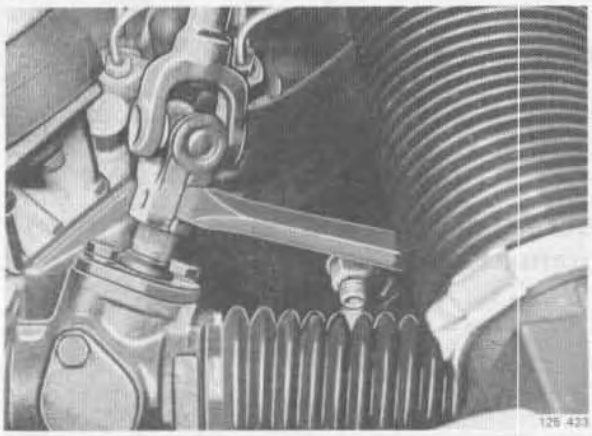
For 1979 Models and on a deep thin wall socket is used to remove the steering wheel nut. The steering wheel can be removed without steering wheel puller.

Manual steering gear

Removal

Special tool:

5043 Tie rod end puller



B1

Disconnect the steering shaft flange at the steering gear.

Remove the clamp screw. Use a screwdriver to open the flange.

Late versions have a plastic protection cover for the joint. Push it up to gain access to the lower joint.

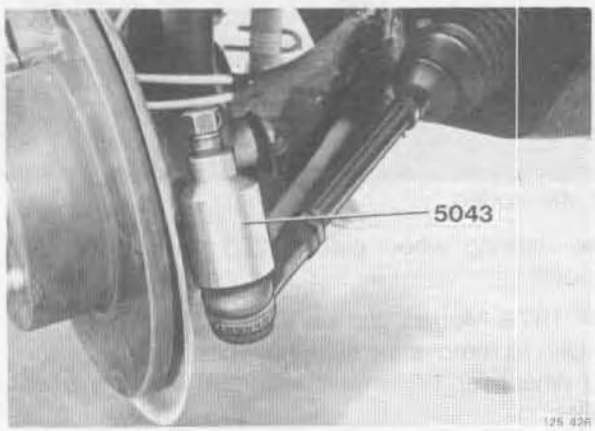
B2

Place the front end on stands.

B3

Mark and remove the front wheels.

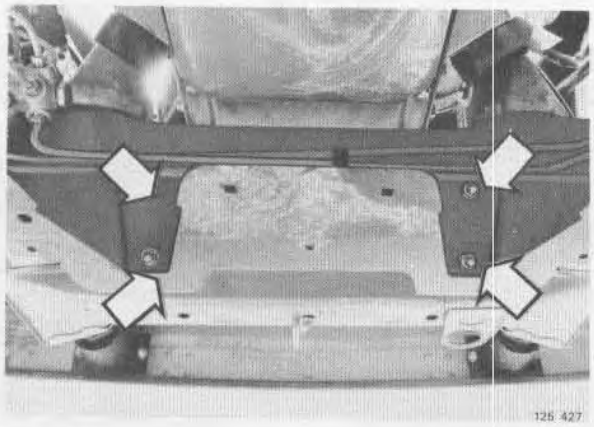
Mark the rim relative to the screws to avoid re-balancing.



B4

Disconnect the tie rod ends.

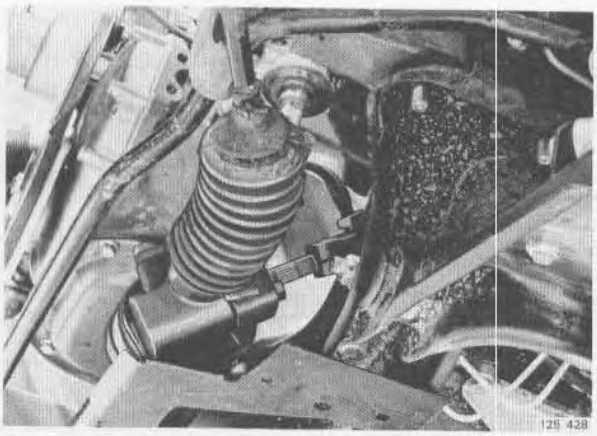
Remove the retaining nuts. Use tool 5043 to disconnect the tie rod ends.



B5

Disconnect the steering gear at the front axle beam.

First remove the splash shield under the engine. Save rubber spacers and plates.



B6

Disconnect the steering gear at the steering shaft flange. Remove the steering gear.

Save the dowel pins.

Steering gear type Cam Gear

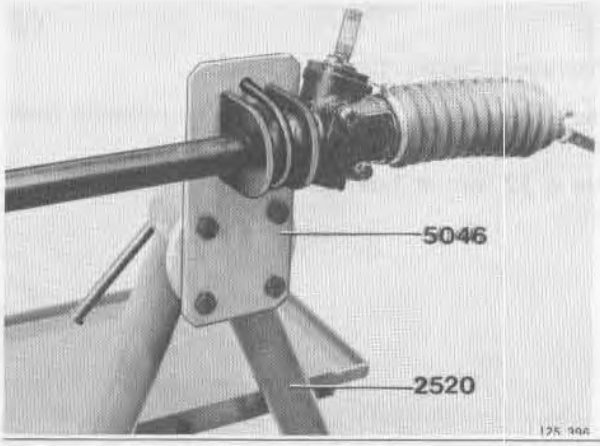
Disassembly

Special tools:
2520 Work stand
2734 Drift
4078 Puller
5046 Fixture
5047 Drift

Cleanliness

CAUTION

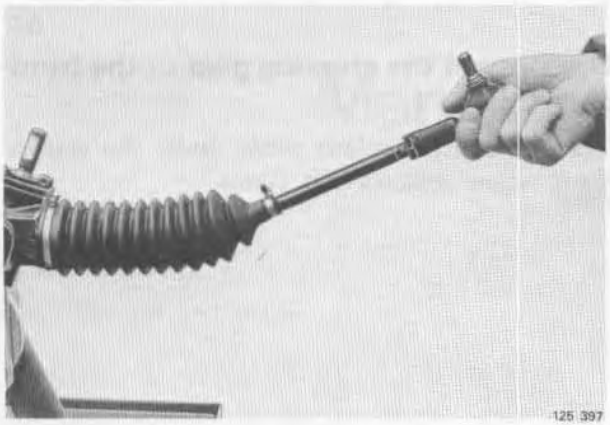
Do not allow dirt or foreign matter to come in contact with power steering components. Contamination will cause malfunction of the system or leaks causing unnecessary repairs.
Repairs to the power steeing system should be accomplished in a dirt and dust free area. Clean components thoroughly before disassembly.



C1

Install the steering gear on a stand.

Use stand 2520 and fixture 5046. Use the U-bolt from the vehicle.



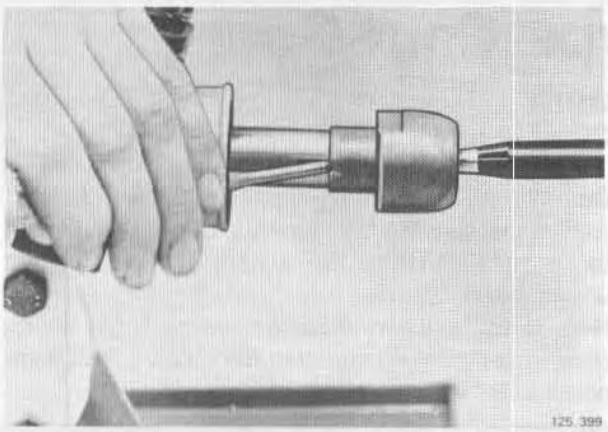
C2

Clean the exterior of the steering gear. Check inner and outer joints for wear.

C3

Disconnect the rubber bellows at the steering gear housing.

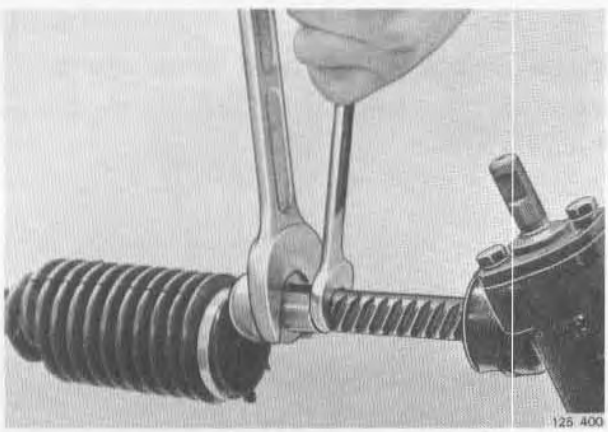
Early type steering gears: collect the oil in a pan.



C4

Bend up locked portion of ball joints.

Use a narrow chisel.

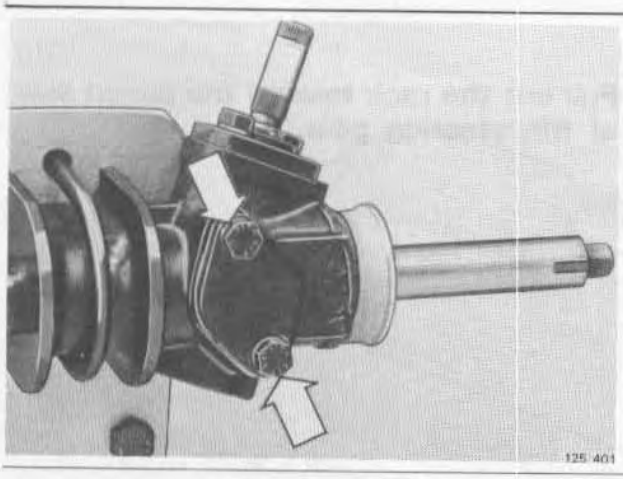


C5

Remove both tie rod ends.

Use a 18 mm = 23/32" wrench to hold the rack on the outermost tooth.

Use a 32 mm = 1-9/32" wrench to turn the ball joint.



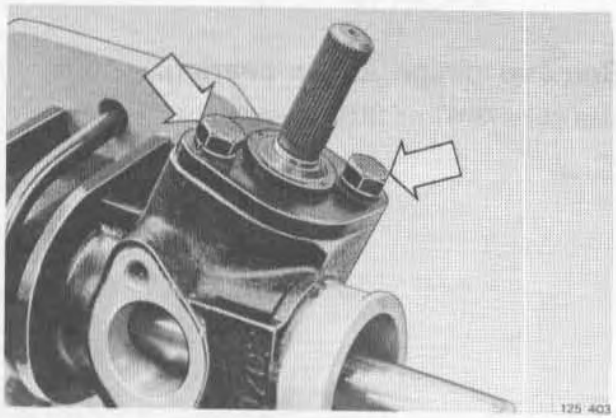
C6

Remove the cover for the pre-tensioning device.

C7

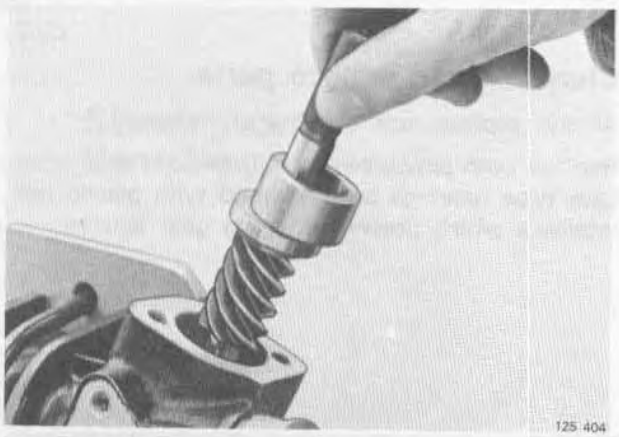
Remove spring, piston and O-ring.

No O-ring on steering gear lubricated with grease.



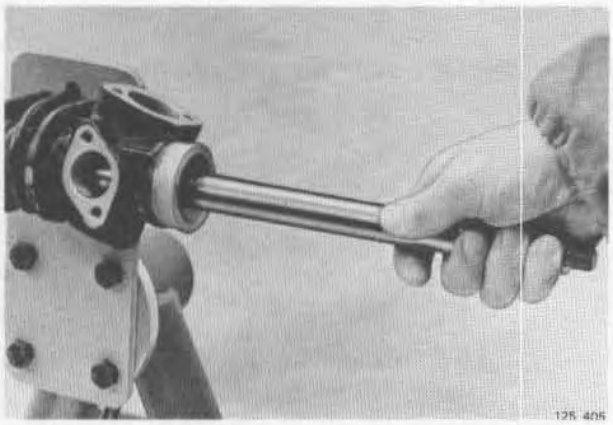
C8

Remove pinion cover.



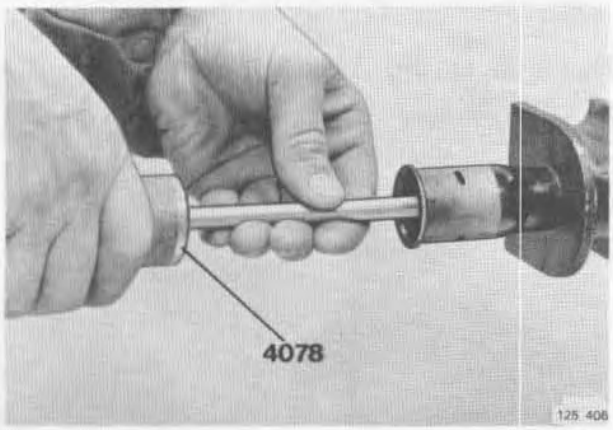
C9

Remove pinion and spacer sleeve.



C10

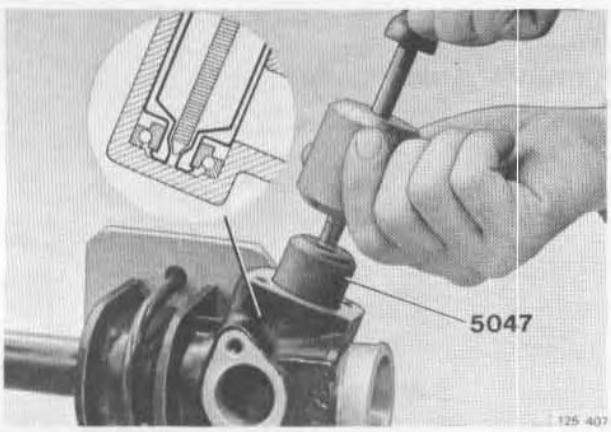
Pull out the rack toward the pinion side of the steering gear.



C11

Remove rack bushing.

Use puller 4078.



Remove pinion lower bearing.

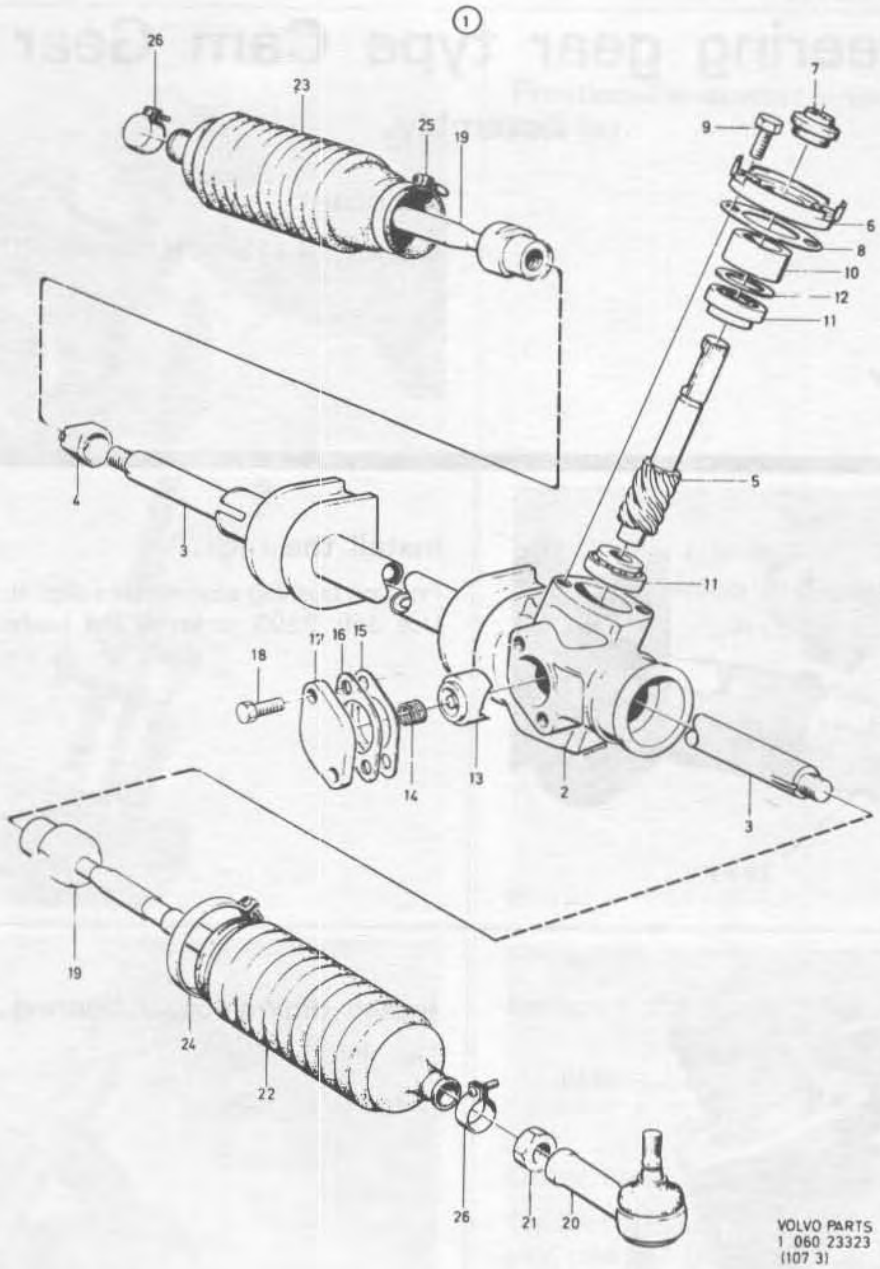
Use puller 5047 or 1819 as applicable.

C13

Clean, check, replace parts.

Always replace rack bushing and seals.

Replace both pinion bearings if they are early type. Late type bearings are equipped with plastic ball retainers which prevent steering gear seizure.



Steering gear
Cam Gear

Steering gear type Cam Gear

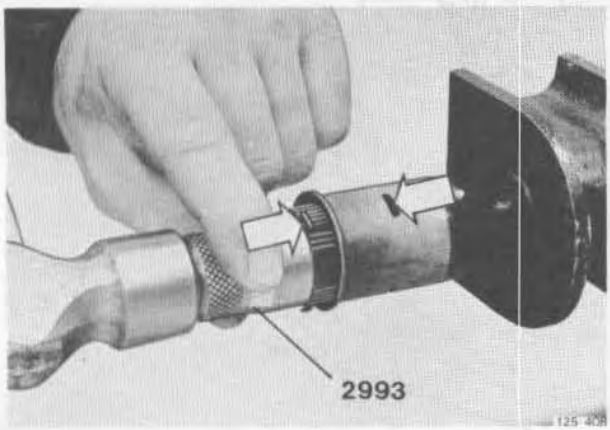
Assembly

Special tools:

2734 Drift
2993 Drift
5048 Drift
5053 Adapter
9177 Torque meter

Lubricant:

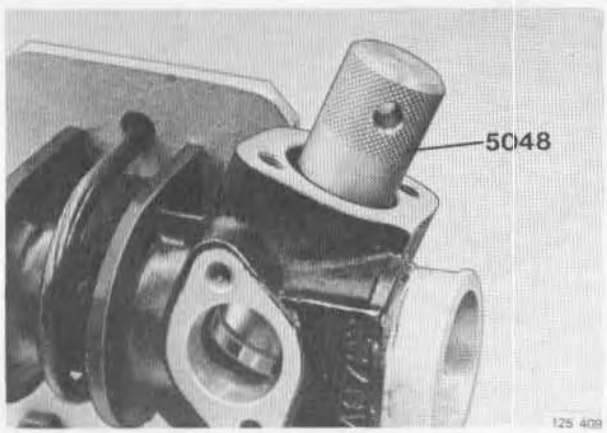
Grease P/N 1161001-1 (approx. 100 grams = 3.5 oz.)



D1

Install the rack.

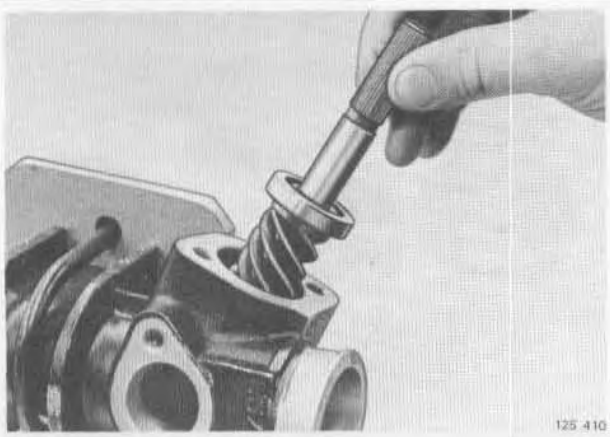
Position bushing so that locks align to housing slots. Use drift 2993 to install the bushing.



D2

Install pinion lower bearing.

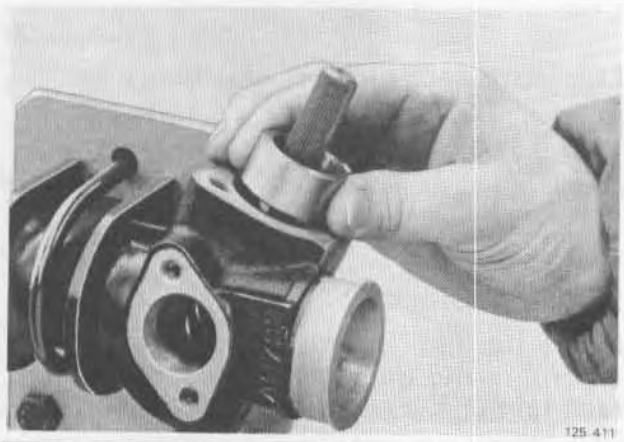
Use drift 5048.



D3

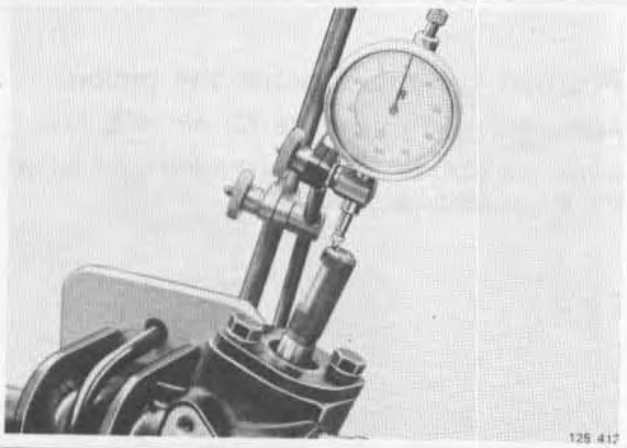
Position pinion and upper bearing assembly in the housing.

Note: no shims on the upper bearing.



D4

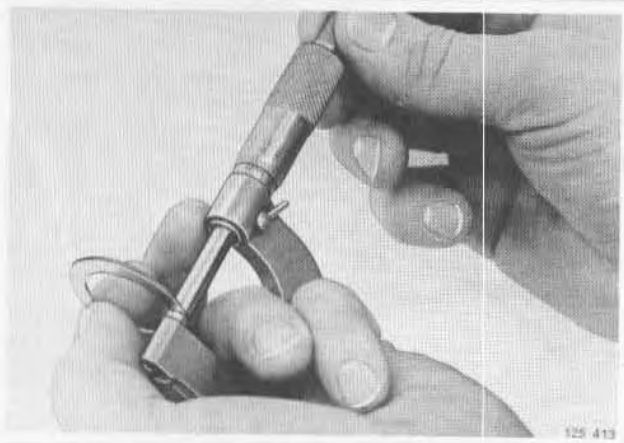
Position the spacer sleeve on top of the bearing.



D5

Install the cover. Use dial gauge to measure pinion end play.

The cover should be installed **with** gasket and **without** seal.



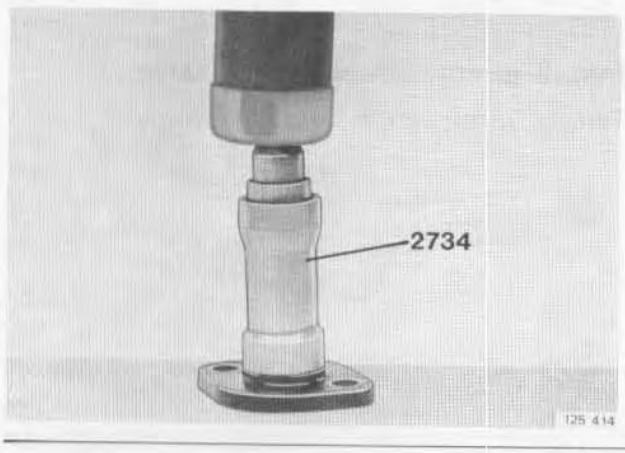
D6

Remove the cover. Remove the pinion.

D7

Determine amount of shims.

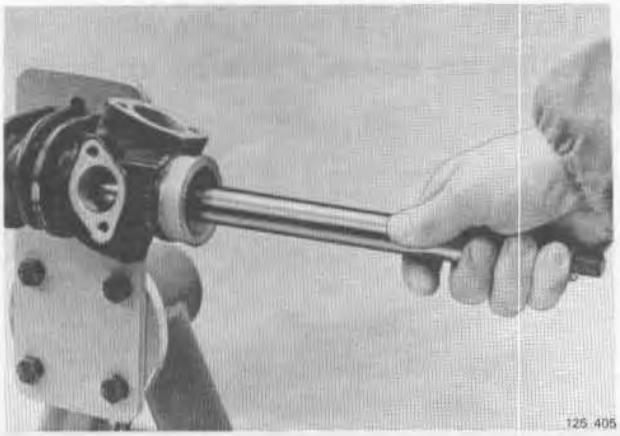
The shim thickness should equal the measured end play, plus 0.1–0.0025 mm for pre-tensioning.



D8

Install pinion cover seal.

Use drift 2734.



D9

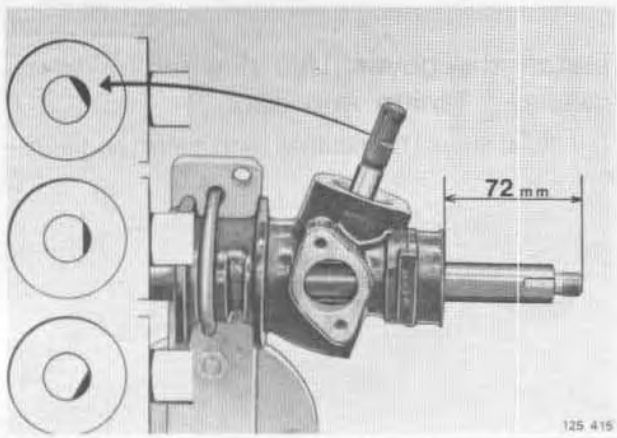
Lubricate rack, pinion and bearings.

Use approx. 75 grams = 2.5 ozs. of Volvo P/N 1161001. Lubricate the parts carefully. Fill excess grease in the rubber bellow.

D10

Install the rack.

Insert the rack from the pinion side. Be careful not to damage the bushing by the rack teeth.



D11

Position the rack. Install the pinion.

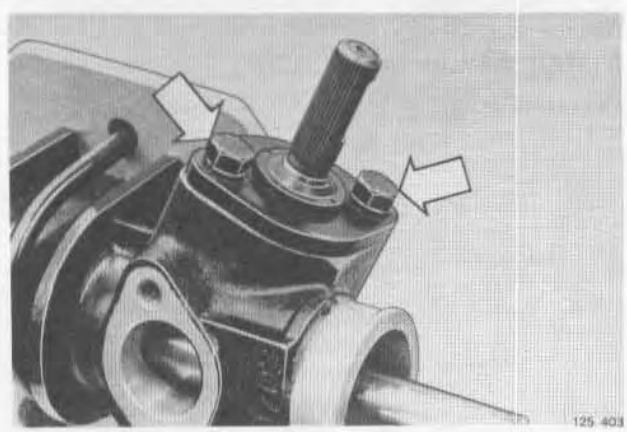
Adjust the rack to protrude 72 mm = 2-7/8".

Install the pinion. The pinion should have one of the three positions shown.

D12

Install shims and spacer sleeve.

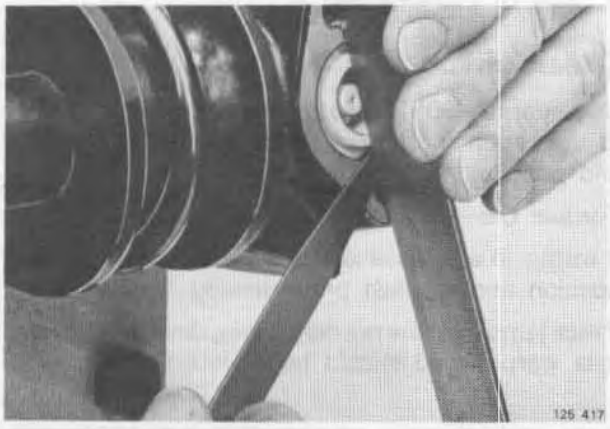
The shims should be located between the upper bearing and the spacer sleeve.



D13

Install pinion cover with gasket.

Torque: 19±2 Nm = 14±1.5 ft.lbs.

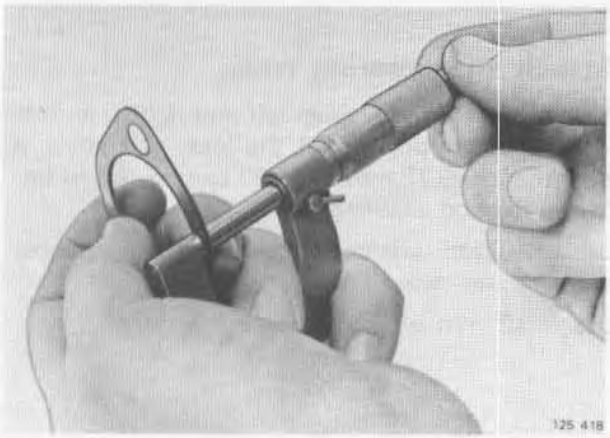


D14

Install the pre-tensioning piston in the housing and determine clearance.

The piston should be without O-ring and spring. Use feeler gauge and ruler to determine the clearance from the piston end to the housing surface.

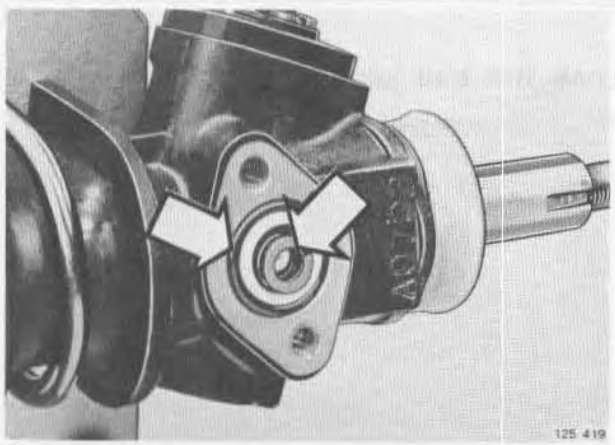
Move the rack from end to end and measure at the position where the largest clearance is obtained.



D15

Determine shims and gasket.

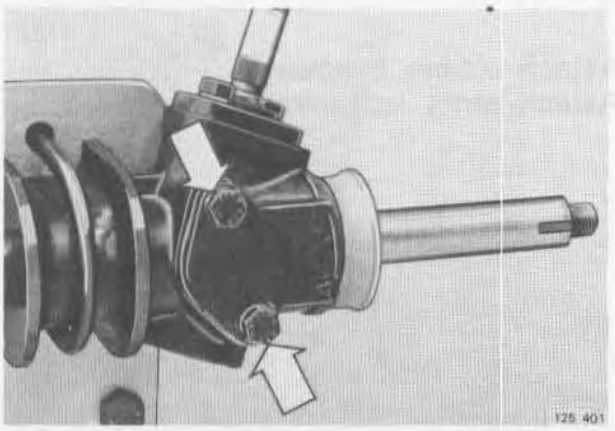
Shims and gasket should together equal determined clearance plus 0.05—0.15 mm = 0.002—0.006."



D16

Install spring and O-ring in the piston.

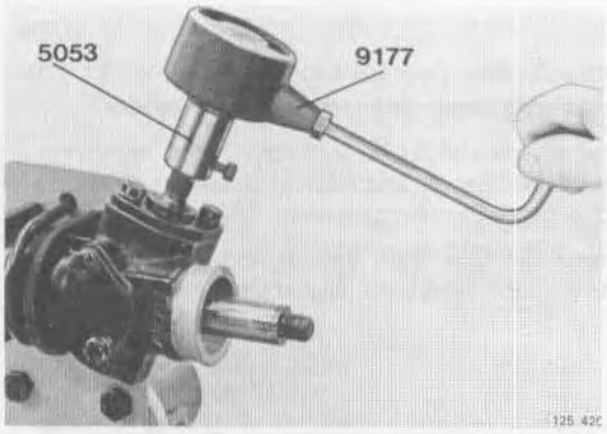
No O-ring on steering gear lubricated with grease.



D17

Install cover with shims and gasket.

Torque: 19±2 Nm = 14–1.5 ft.lbs.



D18

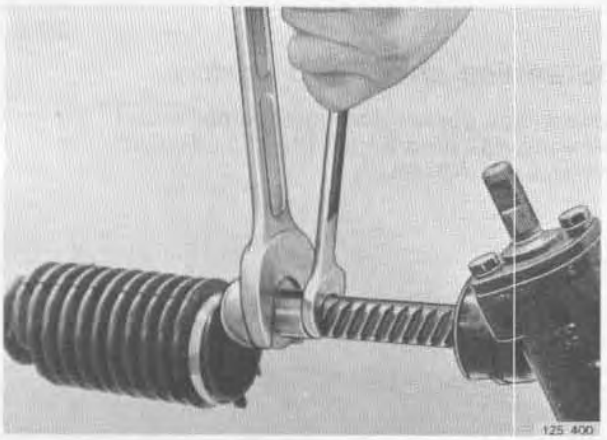
Check pinion torque.

Use adapter 5053 to attach torque meter 9117 to the pinion shaft. Crank back and forth between end positions.

Torque: 0.6–1.7 Nm = 5–15 in.lb.

If torque in any place is excessive, stop rack in that position and readjust pretensioning device.

If rack jams with the pre-tensioning device removed, it is warped and should be replaced.



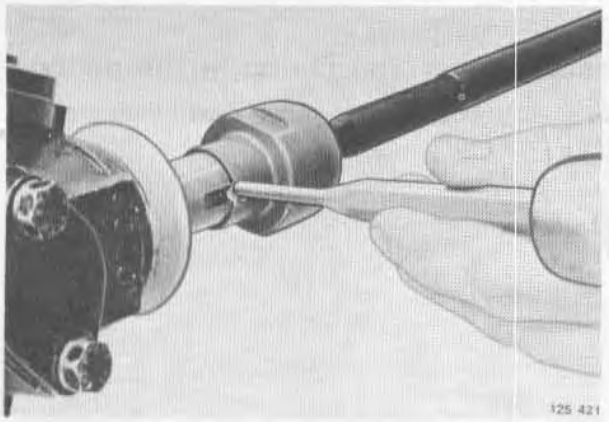
D19

Attach the steering rods.

If using the old rods, swap left and right side rods to obtain new position of the lock. alternately, a washer max. 0.25 mm = 0.01" can be placed between the rod and the rack.

Use a 18 mm wrench to hold on the outermost tooth of the rack.

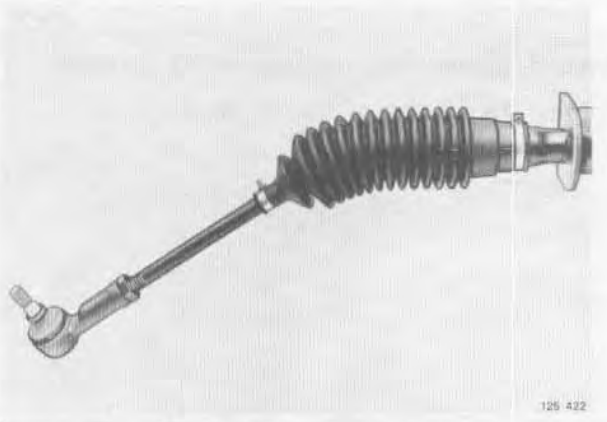
Use a 32 mm wrench to turn the nut.



D20

Lock the ball joint.

Punch the ball joint edge into the rack groove.



D21

Attach rubber bellows.
Attach outer ball joints (if removed).

Steering gear type ZF

Disassembly

Special tool:

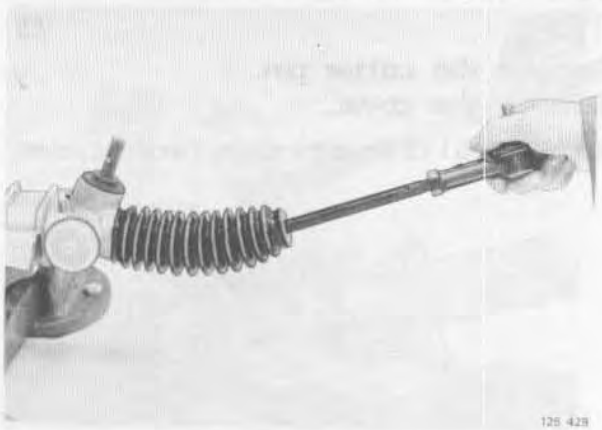
5119 Wrench

Cleanliness

CAUTION

Do not allow dirt or foreign matter to come in contact with power steering components. Contamination will cause malfunction of the system or leaks causing unnecessary repairs.

Repairs to the power steering system should be accomplished in a dirt and dust free area. Clean components thoroughly before disassembly.

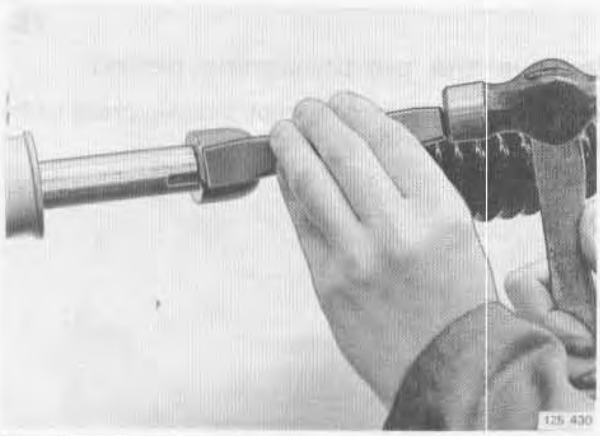


125 429

E1

Clean the steering gear exterior. Install the steering gear in a vise. Check the ball joints.

Use a vise with soft jaws.
Check inner and outer ball joints for wear.

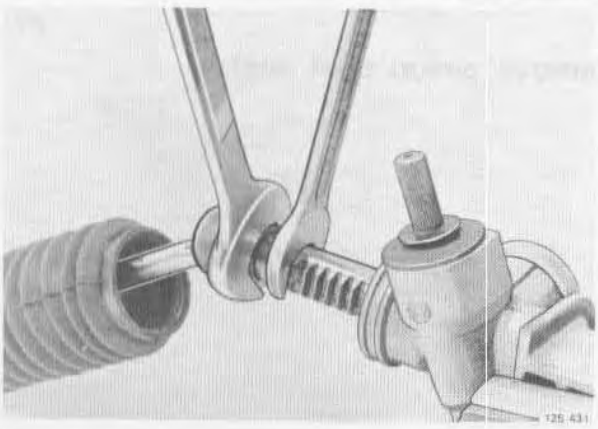


125 430

E2

Remove the rubber bellows. Bend up the steering rod locks.

The rubber bellows are held in place by flanges. Use hands to pull them loose.



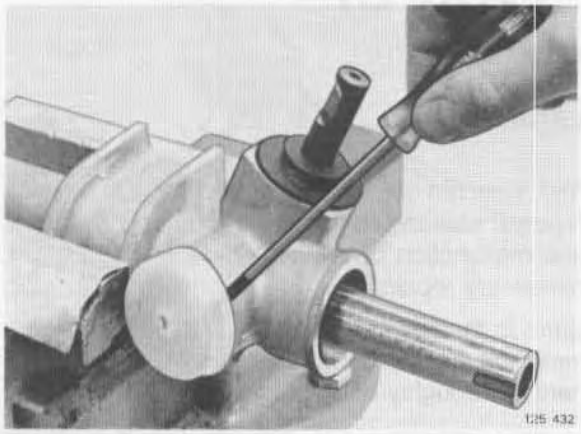
125 431

E3

Remove the steering rods.

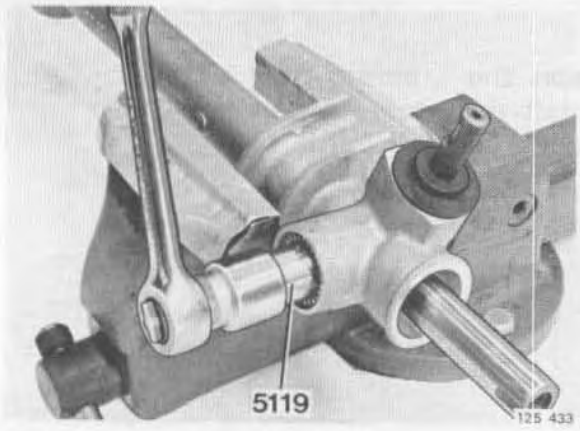
Use a 22 mm = 7/8" wrench to hold on the outermost tooth of the rack.

Use a 27 mm = 1-1/16" wrench to unscrew the joint.



E4

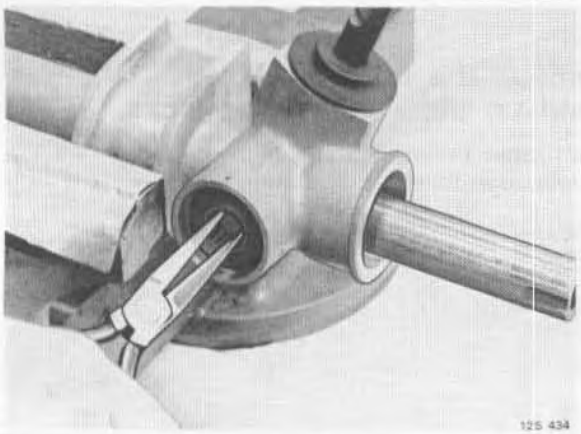
Remove the dust seal over the pre-tensioning device.



E5

Remove the cotter pin.
Remove the cover.

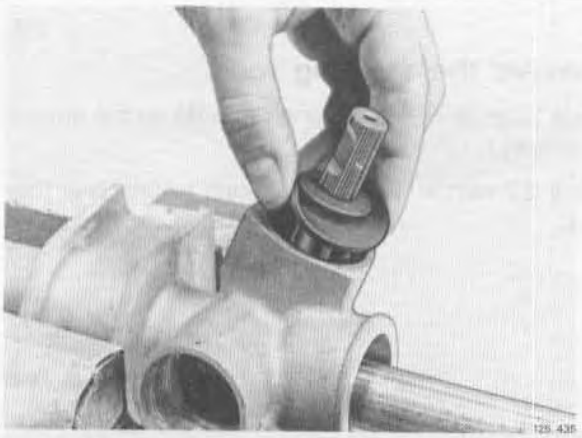
Use wrench 5119. Save the spring inside the cover.



E6

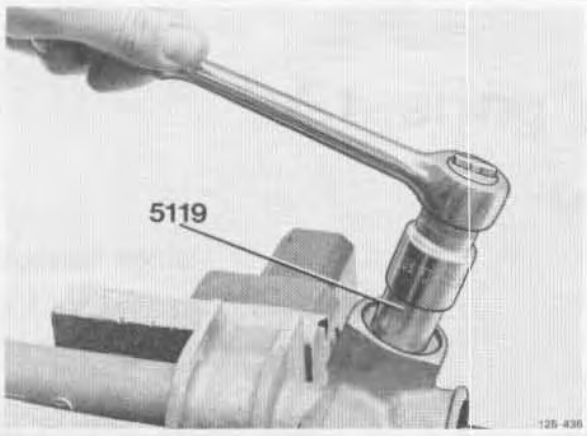
Remove the pre-tensioning piston.

Removal might be facilitated by knocking rack with palm.



E7

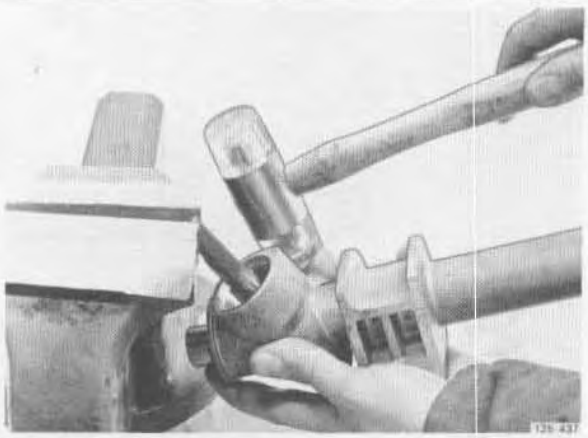
Remove pinion dust seal.



E8

Remove the pinion nut.

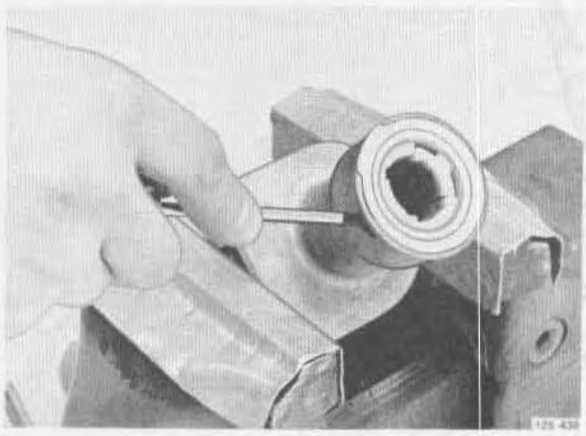
Use wrench 5119.
First remove any lock installed.



E9

Remove the pinion.

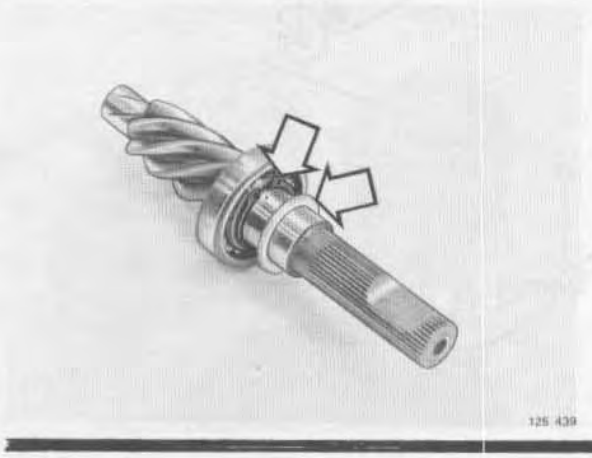
Clamp the pinion shaft in a vise with soft jaws. Tap lightly on the housing with a plastic-tip mallet.



E10

Remove the rack.
Remove the rack bushing.

Press in the locking tabs. Use a narrow screwdriver to pry out the bushing.



E11

To replace the pinion bearing:

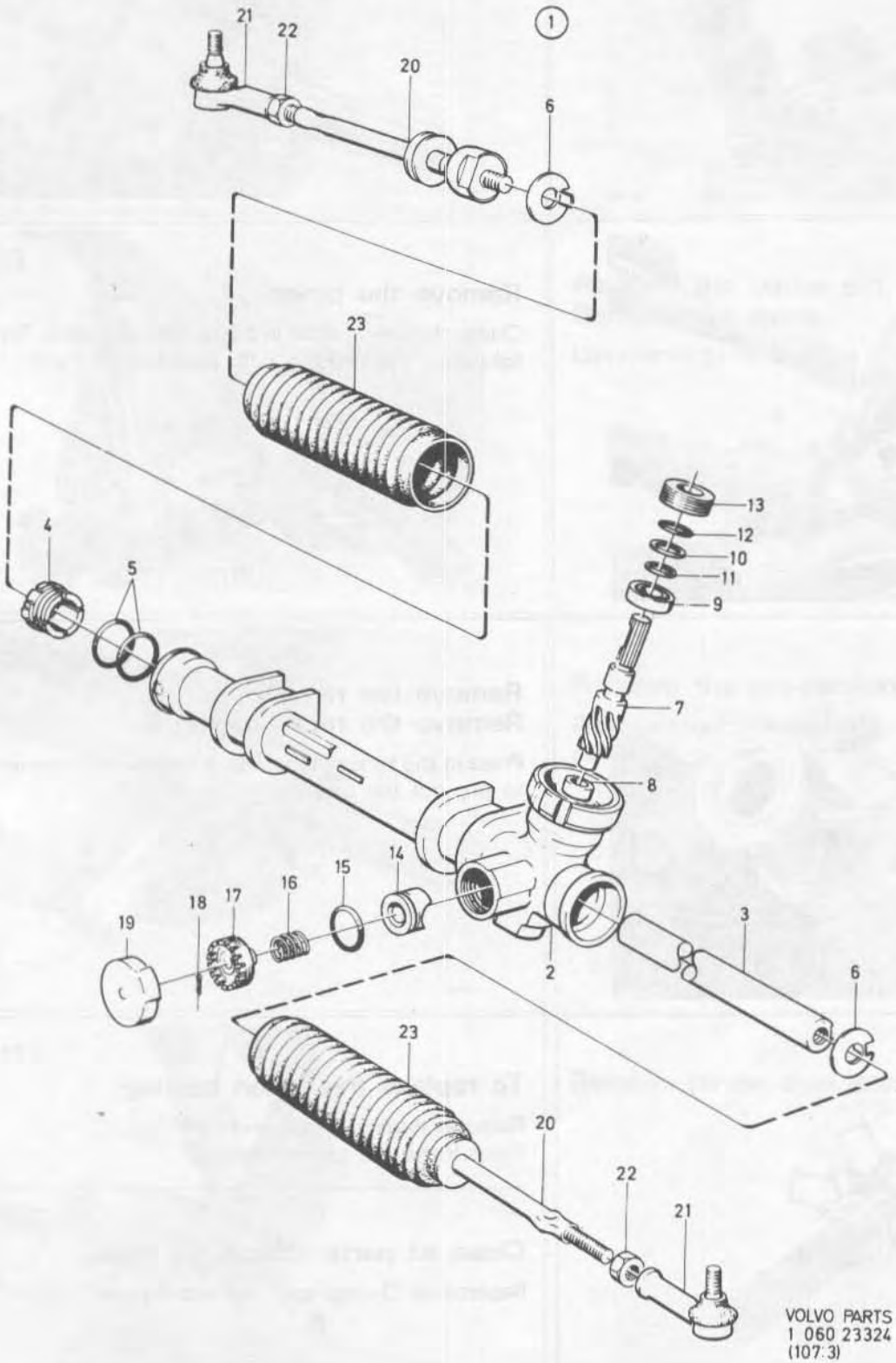
Remove thrust washer and lock ring.
Press loose the pinion bearing.

E12

Clean all parts. Check for wear.

Replace all O-rings and any worn parts.

Steering gear ZF



Steering gear type ZF

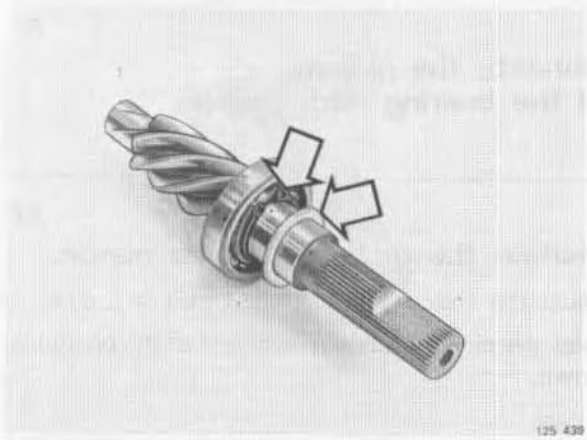
Assembly

Special tools:

5053 Adapter
5119 Wrench
9177 Torque meter

Lubricant:

Grease P/N 1161001-1

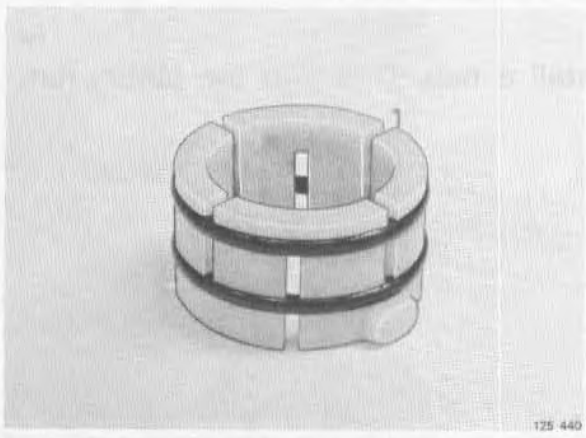


F1

Press the bearing onto the pinion.

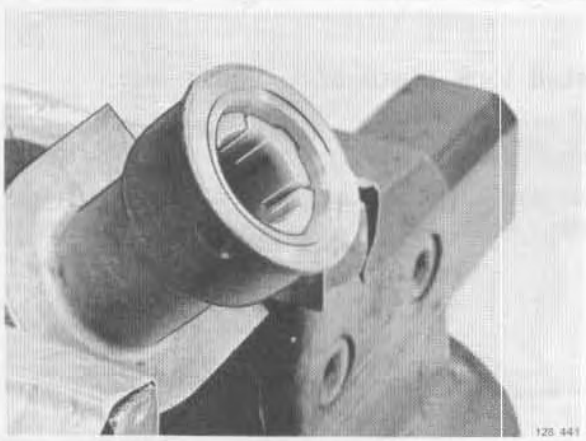
F2

Install lock ring and thrust washer.



F3

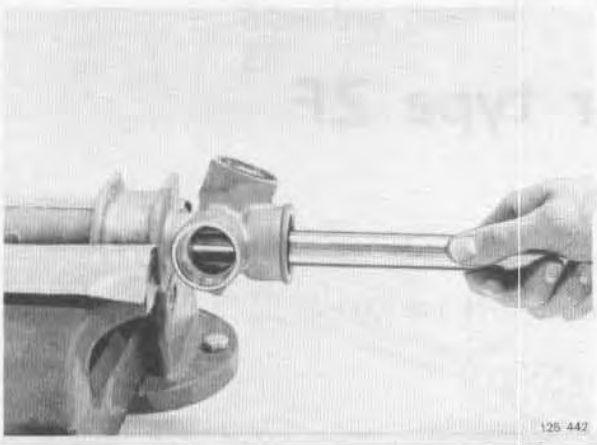
Install new O-rings on the rack bushing.



F4

Install the rack bushing.

Make sure the locking tabs of the bushing fit correctly in the housing recesses.

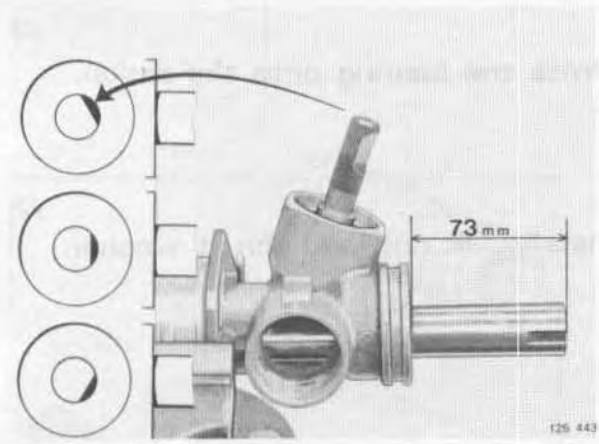


F5

Lubricate and install the rack.

Use grease P/N 1161001.

Insert rack in pinion side of housing. Be careful not to damage the bushing with the rack teeth.



F6

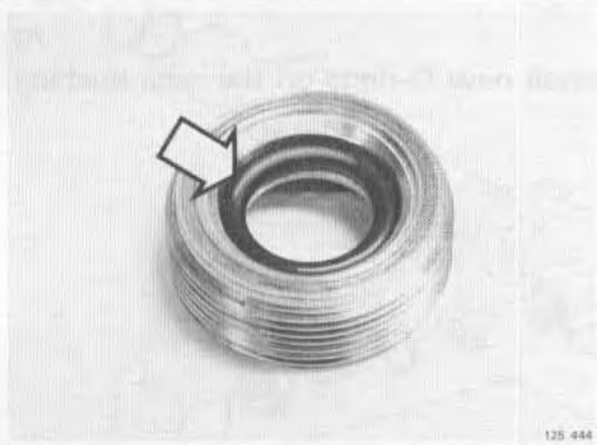
Lubricate the pinion.
Fill the bearing with grease.

F7

Position the rack. Install the piston.

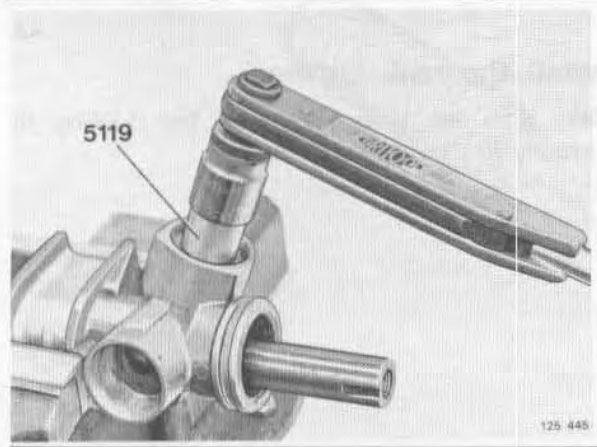
Adjust the rack to protrude 73 mm = 2.874".

Install the pinion. It should have one of the positions shown.



F8

Install a new O-ring in the pinion nut.

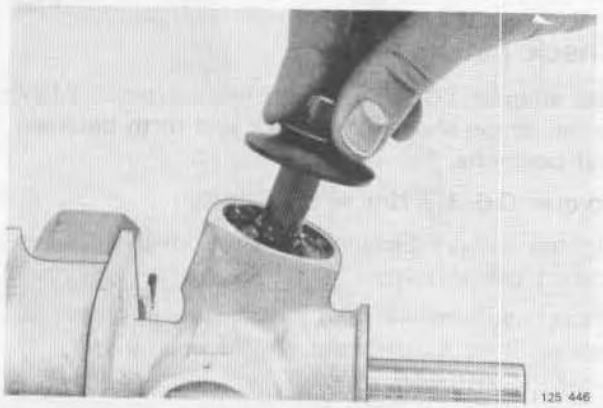


F9

Install lock plate and pinion nut.

Use wrench 5119.
Torque: 24±2 Nm = 17±1.5 ft.lbs.

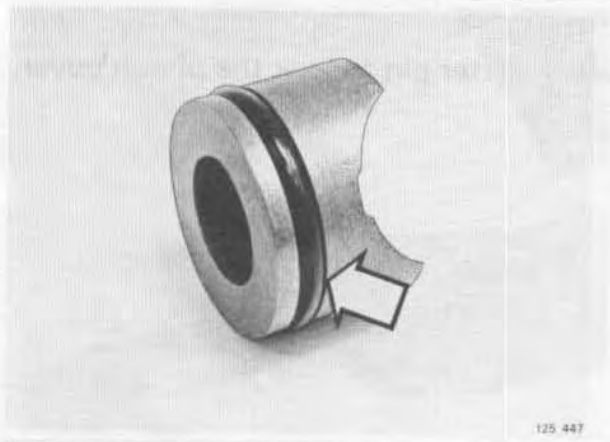
Lock plate should always be used, also if it was missing at disassembly. Lock the lock plate tab.



F10

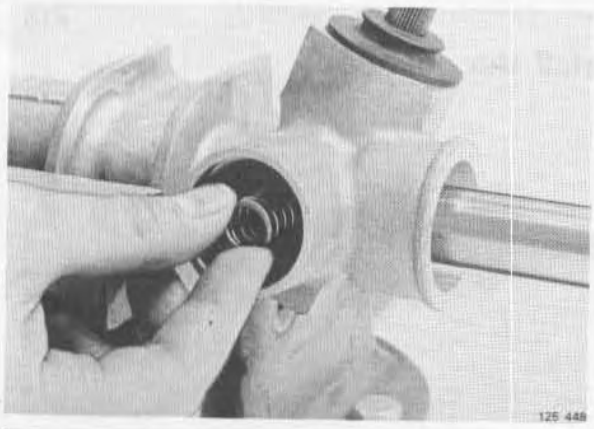
Fill grease and install the dust seal.

Fill the space on top of the nut with the grease, P/N 1161001. Install the dust seal.



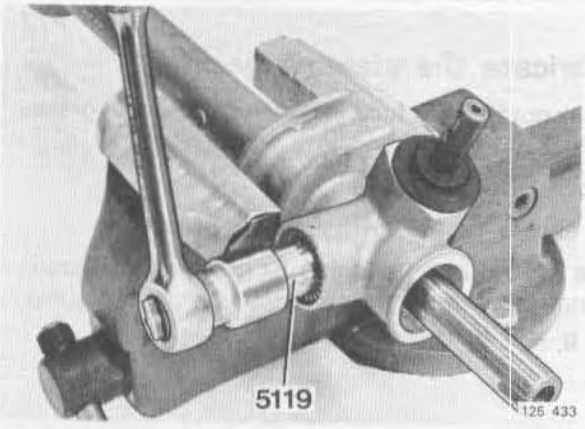
F11

Install a new O-ring on the pre-tensioning piston.



F12

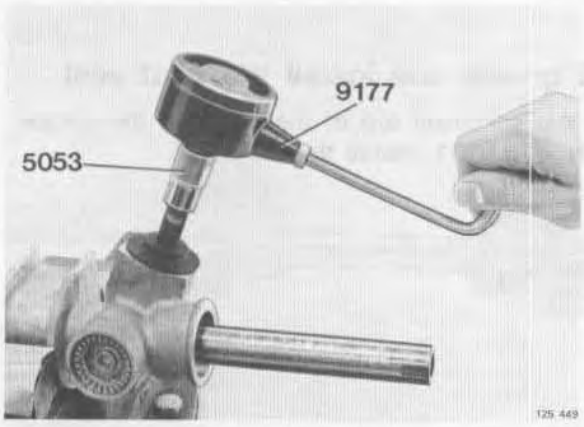
Lubricate the pre-tensioning piston. Install piston and spring.



F13

Install the cover for the pre-tensioning piston.

Use wrench 5119. Do not tighten the cover fully.



F14

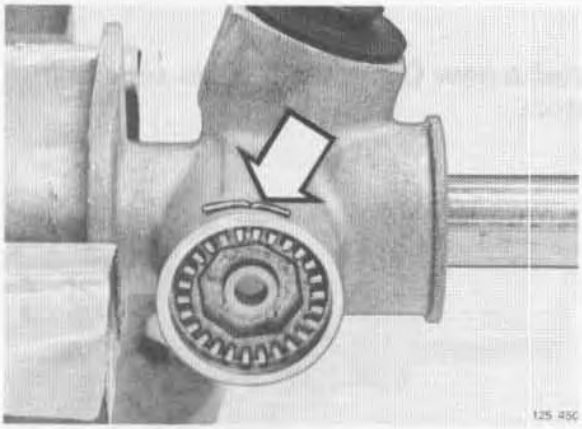
Check pinion torque.

Use adapter 5053 to attach torque meter 9117 to the pinion shaft. Crank back and forth between end positions.

Torque: 0.6–1.7 Nm = 5–15 in.lb.

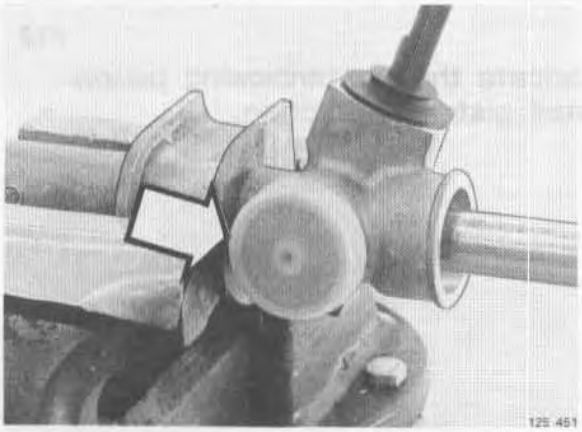
Tighten the pre-tensioning piston cover to obtain correct pinion torque.

If the rack jams with the pre-tensioning piston removed, it is warped and should be replaced.



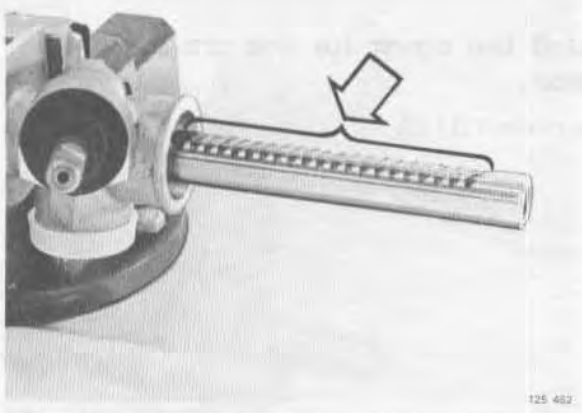
F15

Use a cotter pin to lock the piston cover.



F16

Install the dust seal.



F17

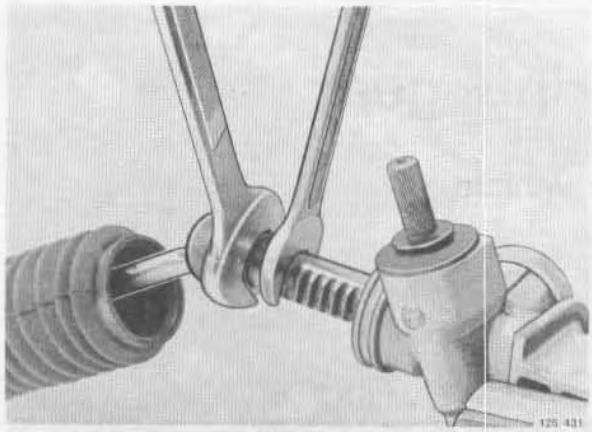
Lubricate the steering gear.

Crank out the rack fully. Fill teeth spaces with grease P/N 1161001. Crank in the rack.

Repeat this procedure.

Fill excess grease in the rubber bellow.

This procedure in addition to previous lubrication of parts will result in a grease charge of approx. 75 g = 2.5 ozs.

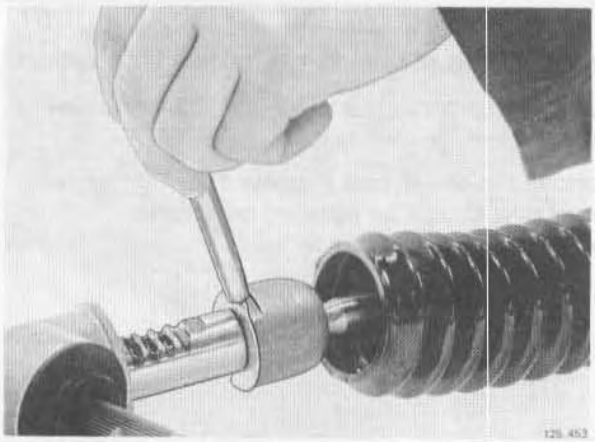


F18

Install steering rods.

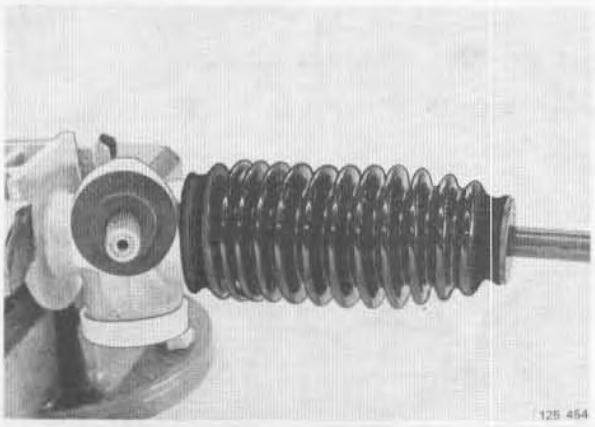
Use new lock washers. Use a 22 mm = 7/8" wrench to hold on the outermost tooth of the rack.

Use a 27 mm = 1–1/16" wrench to tighten the joint.



F19

Lock the washers.



F20

Install the rubber bellows.

Manual steering gear

Installation on vehicle

G1

Prepare the steering gear for installation.

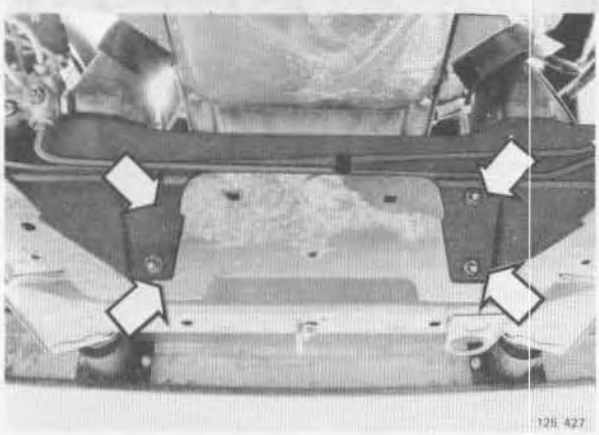
Install the rubber spacers and plates at the steering gear attachment points.

Remove the dowel pins if a new steering gear with dowel pins should be installed on a vehicle without holes for the dowel pins.

G2

Position the steering gear.

Guide the pinion shaft in.

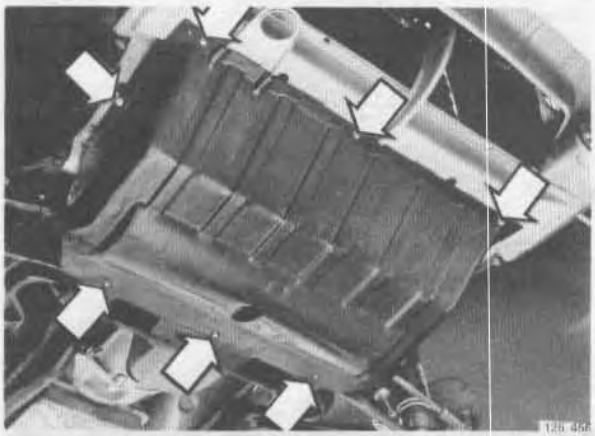


G3

Attach the steering gear to the front axle member.

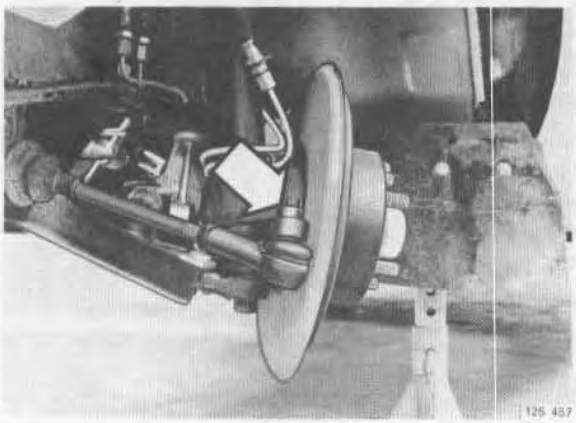
Make sure the U-bolts are aligned in the plate slots. Install flat washers and nuts.

Torque: 20±5 Nm = 14±4 ft.lbs.



G4

Install the splash shield under the engine.



G6

Attach the steering rods to the steering arms.

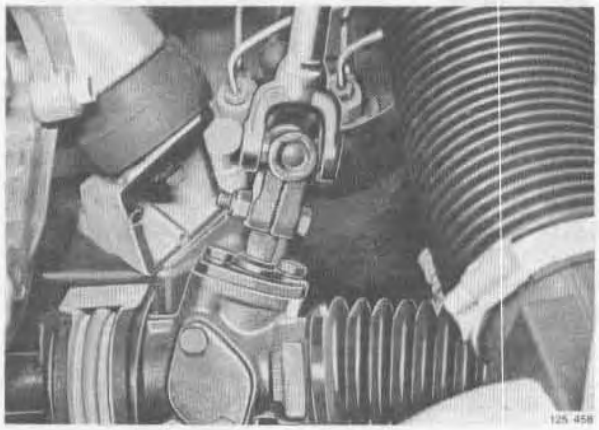
Torque: 60±10 Nm = 44±7 ft.lbs.

G6

Install front wheels, lower vehicle.

Use the marks to install the wheels on previous locations.

Torque: 120±20 Nm = 88±15 ft.lbs.



G7

Tighten the steering shaft joint.

Torque: 25±5 Nm = ft.lbs.

Check/adjust the steering gear according to instructions in op. A25–A34, this manual.

G8

Check/adjust toe-in.

Use rust protective oil to protect the steering rod threads.

Lock nut torque:

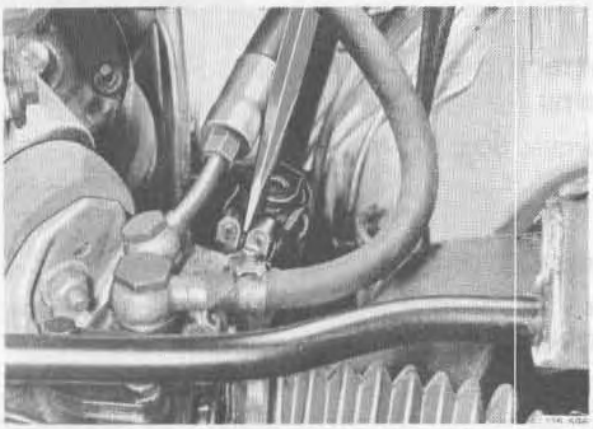
70±10 Nm = ft.lbs.

Power steering gear

Removal

Special tool:

5043 tie rod end puller



H1

Disconnect the steering shaft flange at the steering gear.

Remove the clamp screw. Use a screwdriver to open the flange.

H2

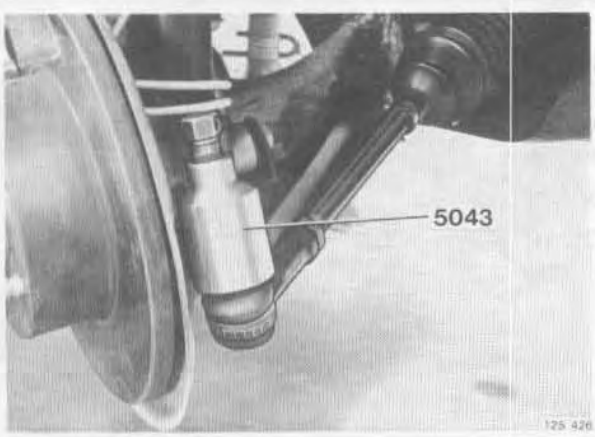
Place the front end on stands.

Use the front jack supports.

H3

Mark and remove the front wheels.

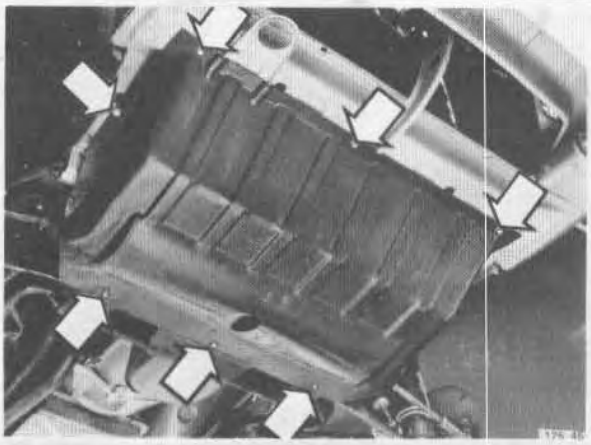
Mark the rim relative to the screws to avoid re-balancing.



H4

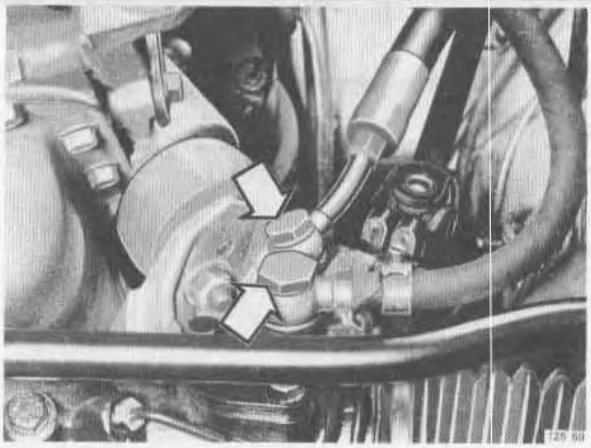
Disconnect the tie rod ends.

Remove the retaining nuts. Use tool 5043 to disconnect the tie rod ends.



H5

Remove the front guard plate.

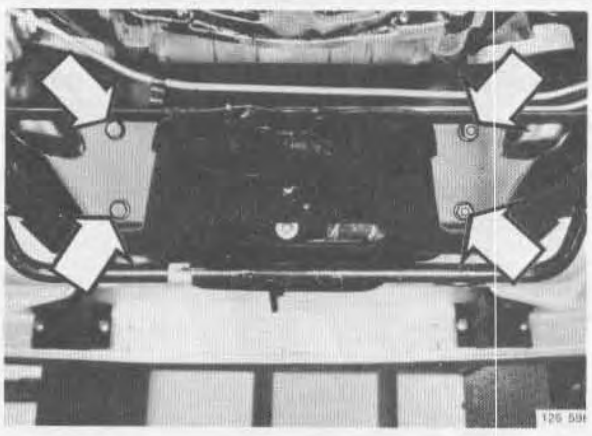


H6

Disconnect the hydraulic hoses at the steering gear.

On 260 late production, the clamp retaining the pressure hose at the front axle member must be removed.

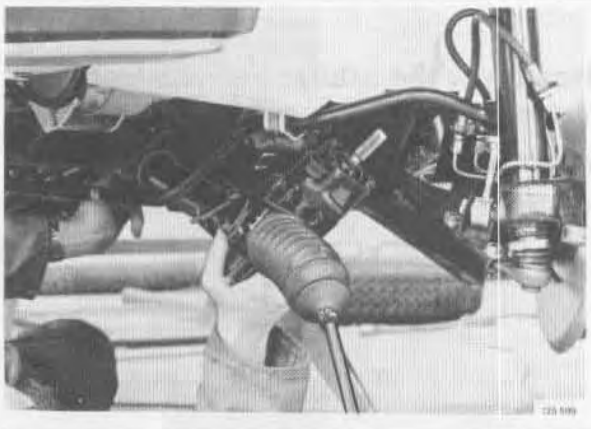
Install protection plugs in the hose connections.



H7

Remove the steering gear.

Remove the retaining screws. Remove the steering gear. Save the spacers.



H8

Take out the steering gear.

Pull the steering gear down until free from the steering shaft joint. Then take it out on the left side.

Save the dowel pins.

Power steering gear type Cam Gear.

Disassembly

Special tools:

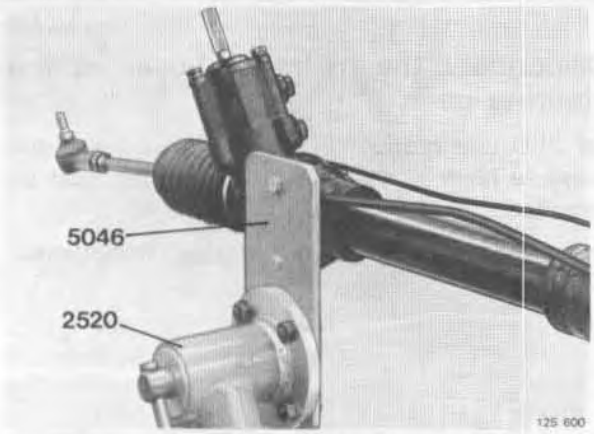
1801 Pull hammer
2520 Work stand
5046 Fixture
5049 Sleeve

Cleanliness

CAUTION

Do not allow dirt or foreign matter to come in contact with power steering components. Contamination will cause malfunction of the system or leaks causing unnecessary repairs.

Repairs to the power steering system should be accomplished in a dirt and dust free area. Clean components thoroughly before disassembly.

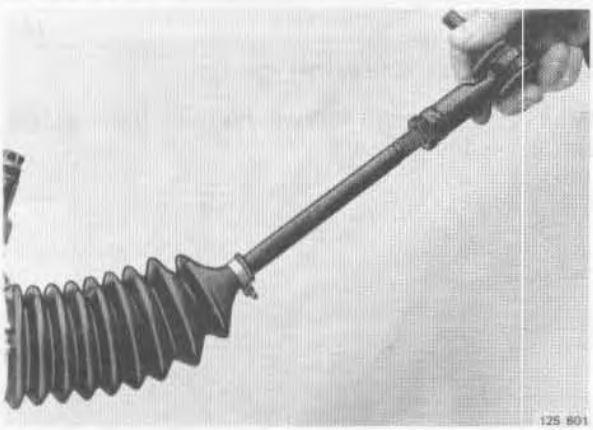


I1

Install the steering gear on a stand.

Use work stand 2520 and fixture 5046.

Use a U-bolt from the vehicle.



I2

Clean the exterior of the steering gear.

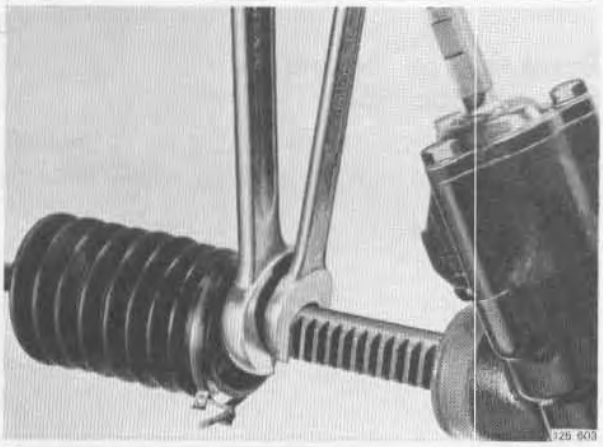
Check inner and outer joints for wear

I3

Disconnect the rubber bellows from the steering gear.

Drain the lubricant.

Early type steering gears: collect the oil in a pan.

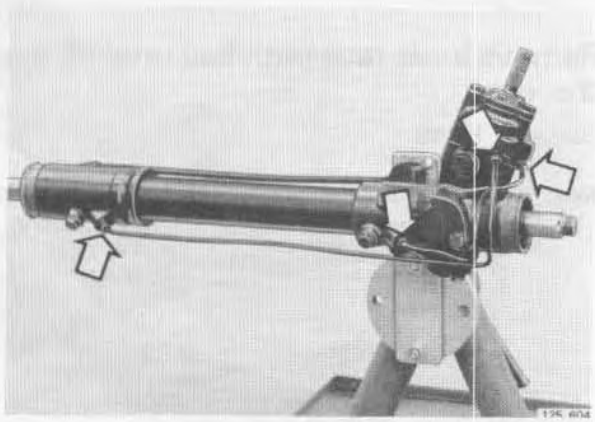


I4

Remove the tie rods.

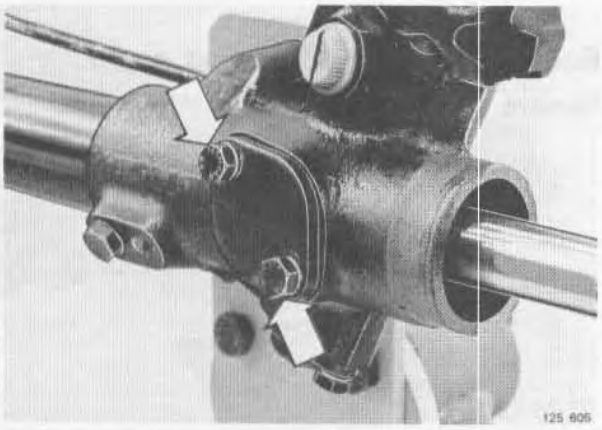
Use a 7/8" wrench to hold the rack on the outermost tooth.

Use a 30 mm 1–3/16" wrench to turn the joint.



I5

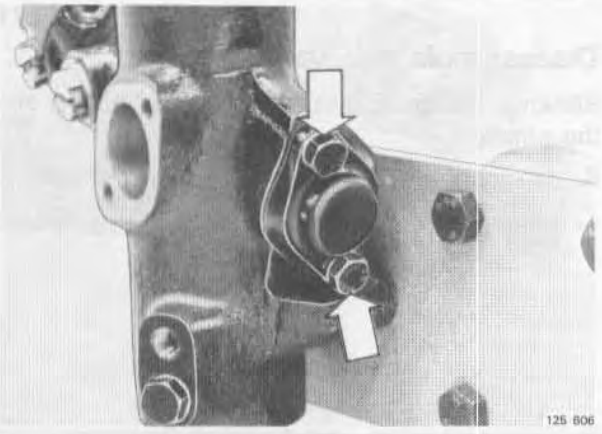
Remove the oil tubes.



I6

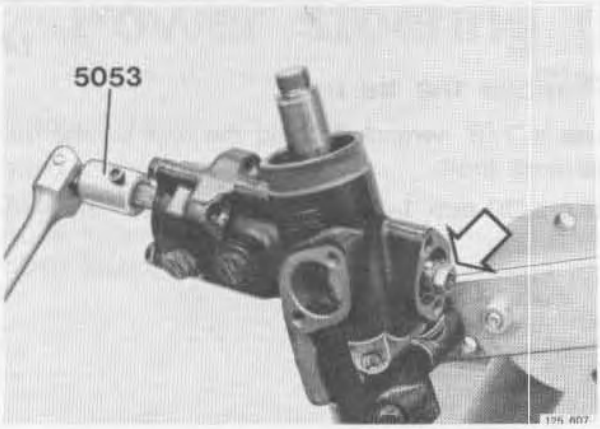
Remove the pre-tensioning device.

Remove cover, piston, O-ring and spring.



I7

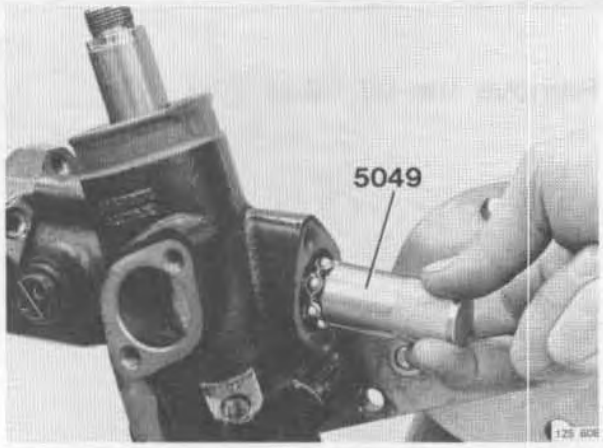
Remove the lower pinion cover.
Remove the spacer sleeve.



I8

Bend up the locking tab.
Remove the nut.

Use adapter 5053 to hold the outer end of the shaft. The valve should not move axially when removing the nut.

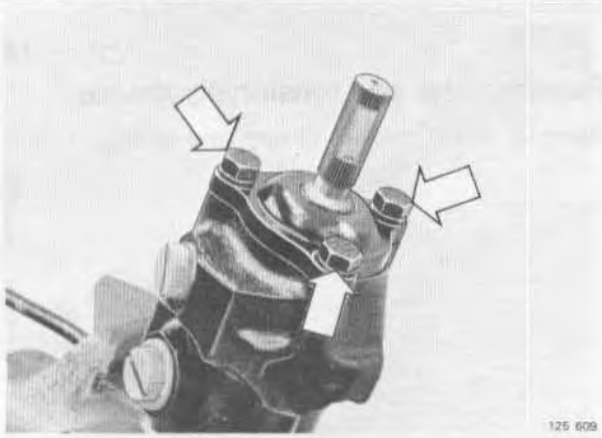


I9

Remove inner race with ball retainer and the cup.

Use tool 5049

Note: be sure to count the number of turns in order to obtain same pinion height when reinstalling.



I10

Remove the valve housing cover.

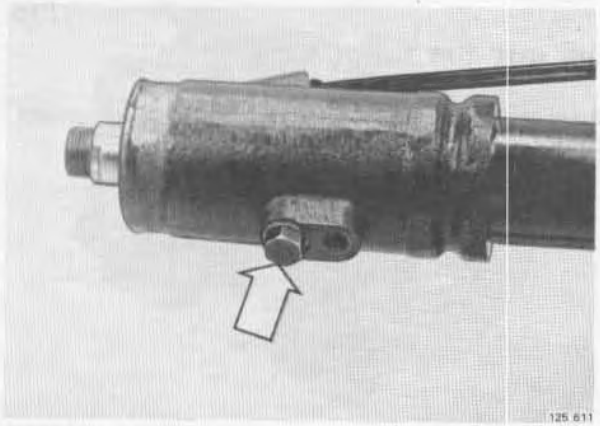
Remove the outer dust seal.

I11

Disassemble the valve housing.

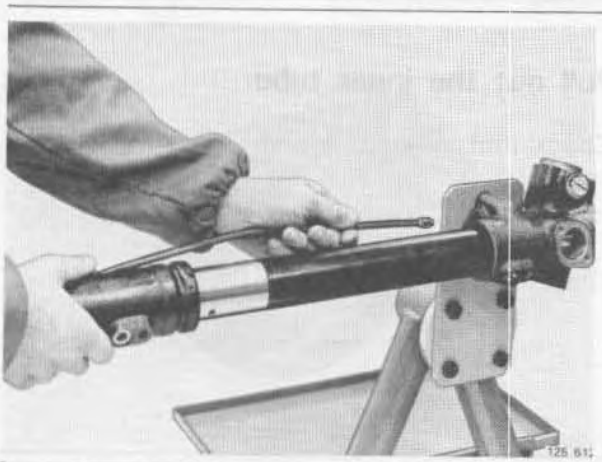
Remove the spring. Lift up the valve housing and the pinion.

Be careful not to damage valve and valve housing.



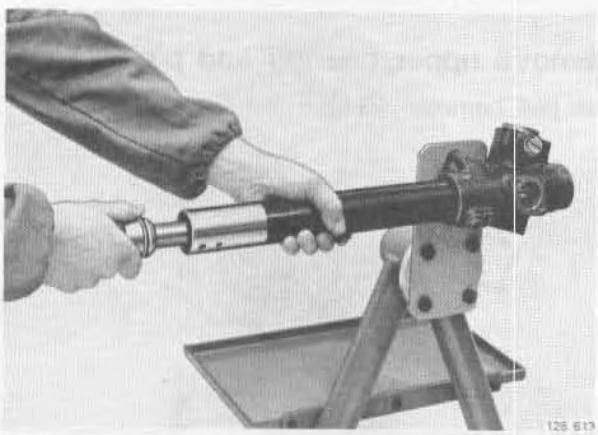
I12

Remove the lock screw for the right side housing. **(note aluminum spacer washer)**



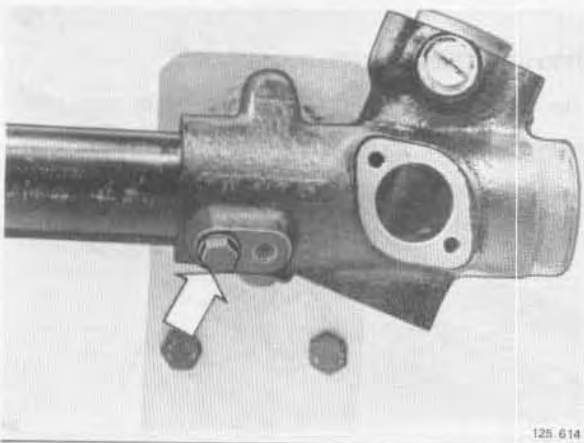
I13

Pull off right side housing and connecting tube.



I14

Pull out the rack and pinion sleeve.



I15

Remove the lock screw for the left side housing.

Note: special sealing washer with rubber insert.

I16

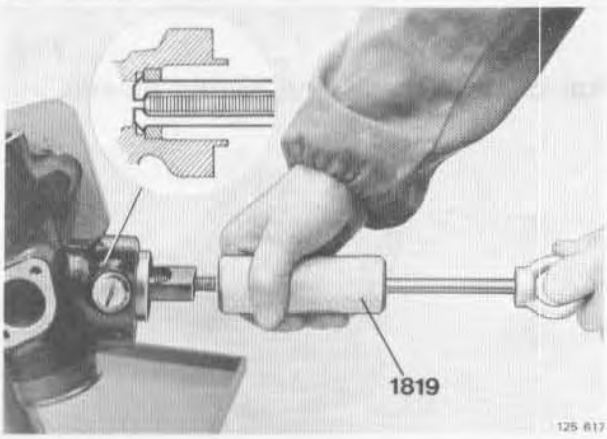
Pull out the outer tube.

Check that outer tube and O-ring make good contact. (Slight resistance when removing).

I17

Pull out the inner tube.

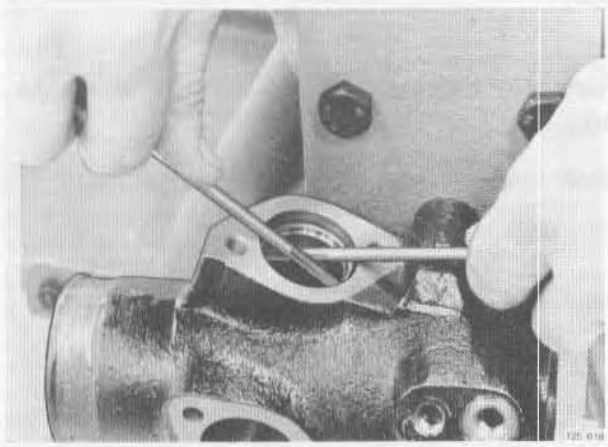
Check that inner tube and O-ring make good contact.



I18

Remove upper bearing and pinion seal.

Use pull hammer 1819.

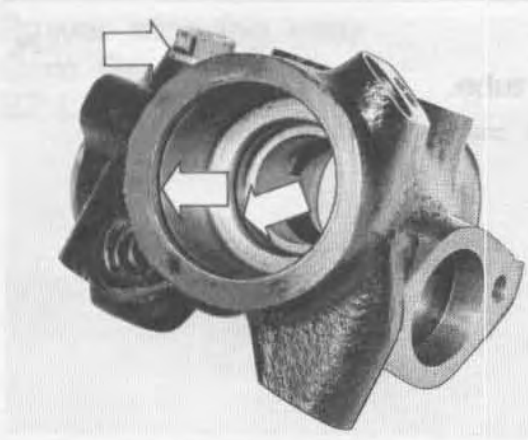


I19

Remove lower bearing race.

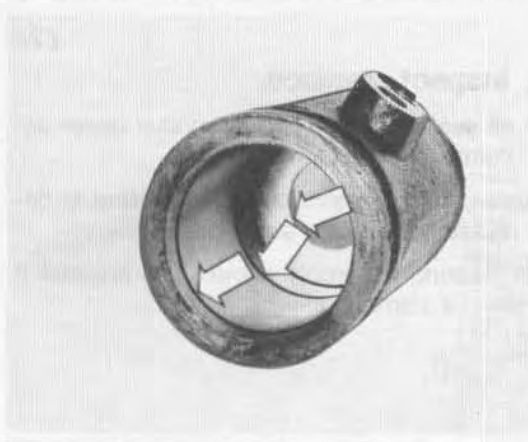
As necessary and only if the bearing is replaced.

Use two narrow screwdrivers to remove the race.



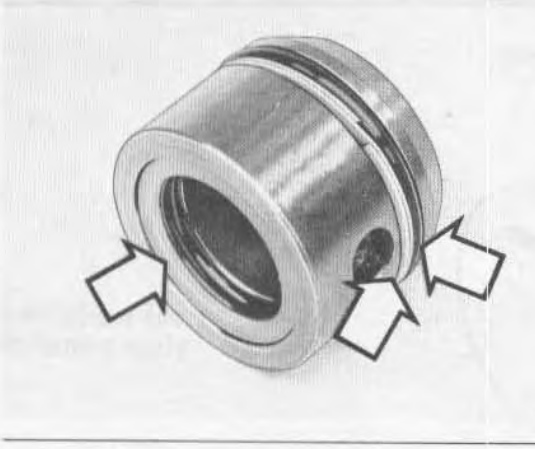
I 20

Remove the left housing from the fixture. Remove the O-rings and the protection plug.



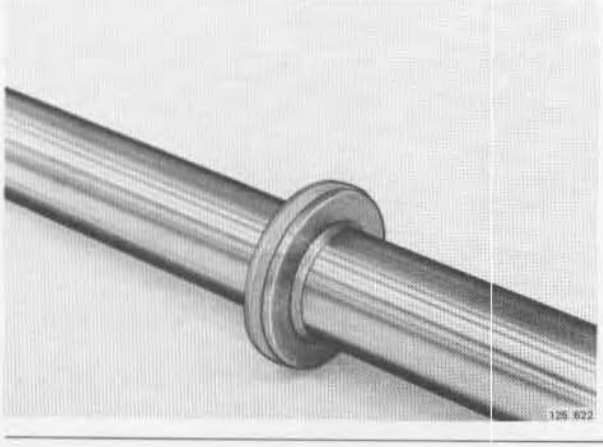
I 21

Right housing: remove O-rings and spacer sleeve.



I 22

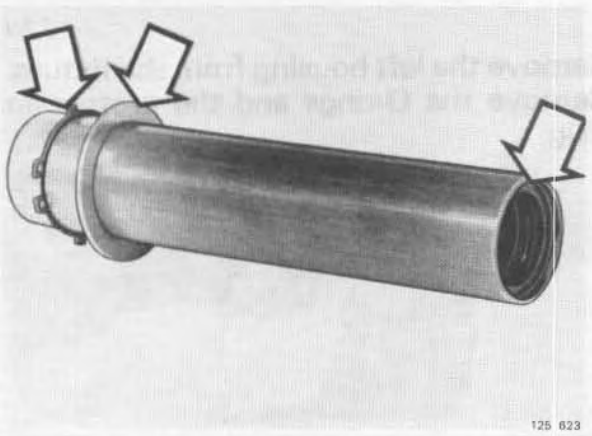
Bearing sleeve: remove inner and outer seals and O-rings.



I 23

Piston seal.

Replace if damaged or if the vehicle mileage exceeds 40,000 km (25,000 miles).



I24

Inner tube.

Remove snap ring, spacer washer and seal.

I25

Clean, inspect, replace.

Replace all seals, O-rings and the valve cover assembly. Piston seal: see step I23.

If the pinion, control valve or valve housing is damaged, replace the parts as an assembly.

The rack bearing assembly should be replaced if the bushing is damaged.

Power steering gear
Cam Gear
B21 1979–

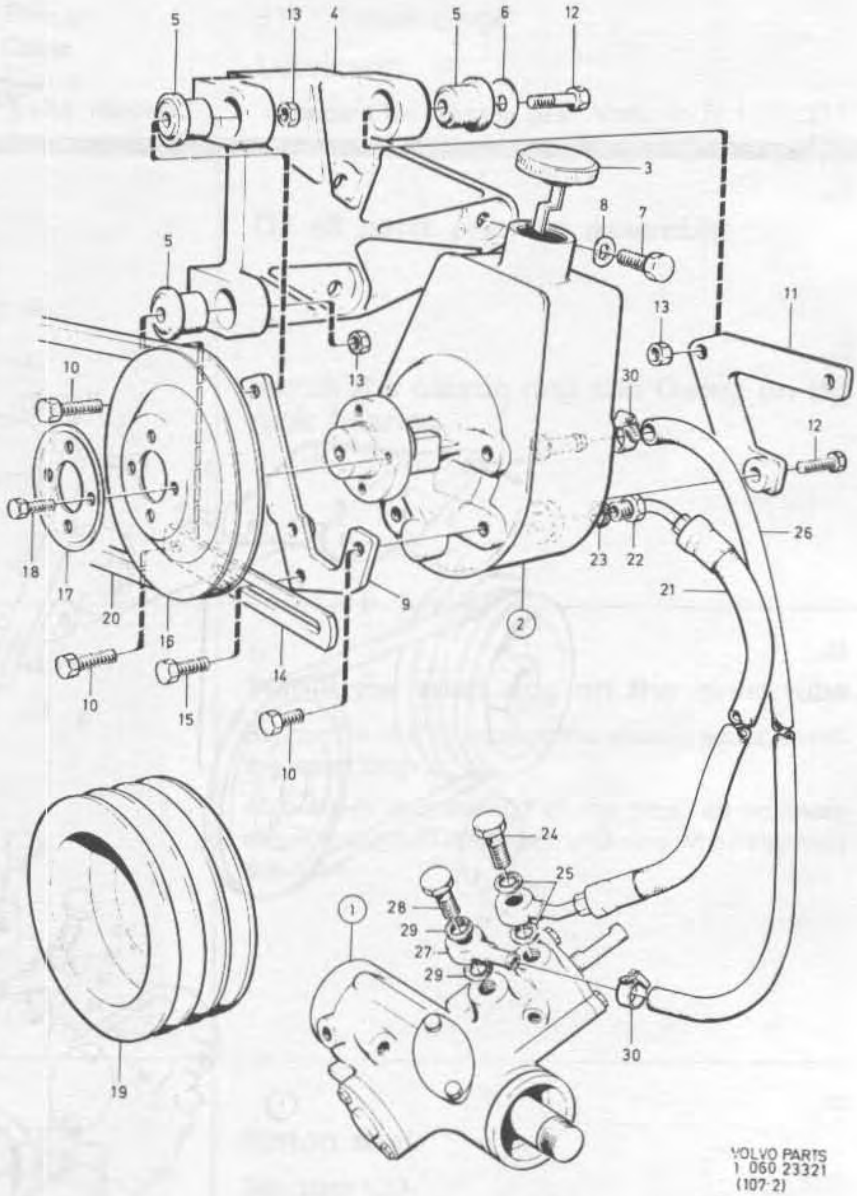


Illustration for reference only

Power steering gear
Cam Gear
B27 1979
B28 1980-

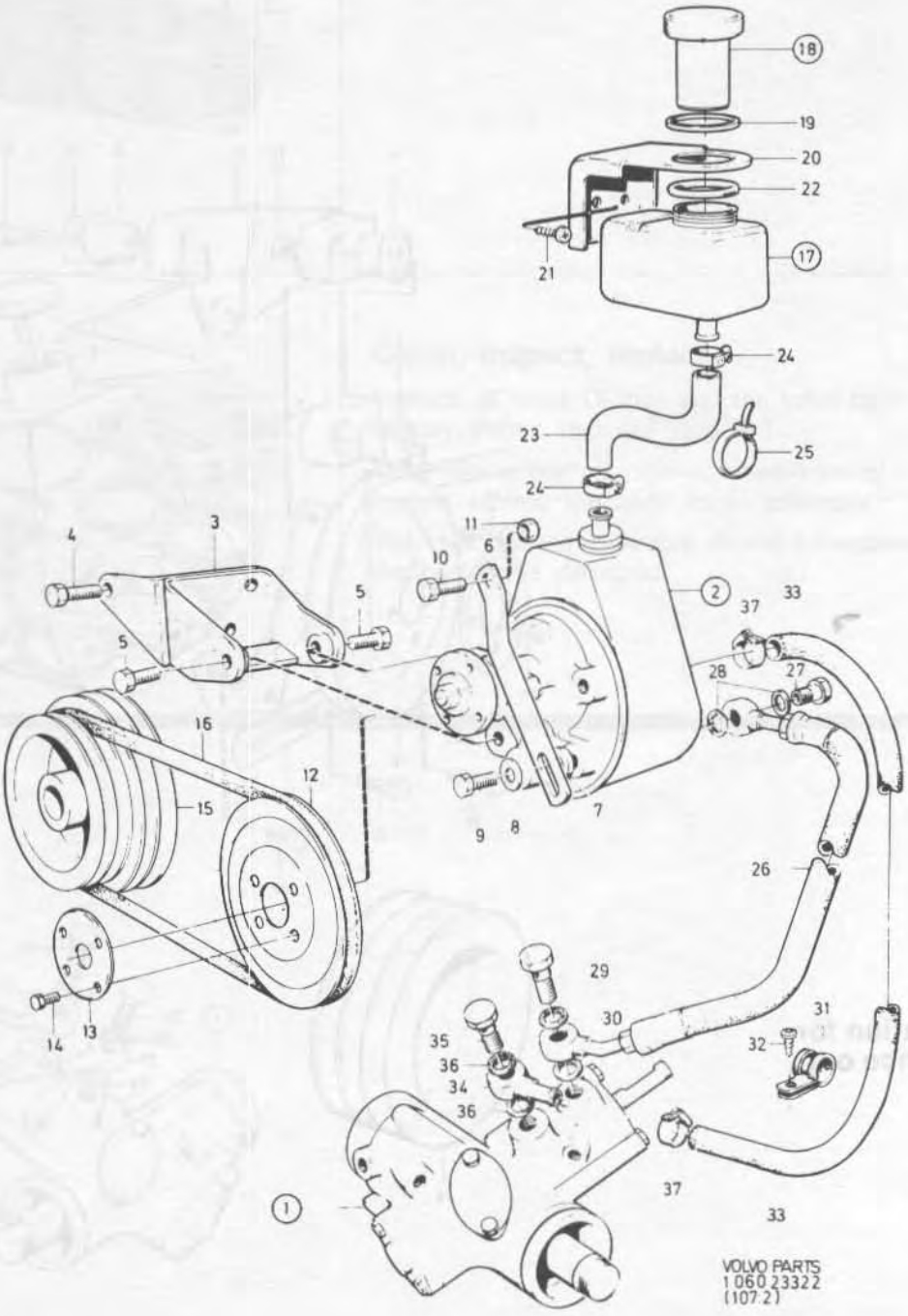


Illustration for reference only

Power steering gear type Cam Gear

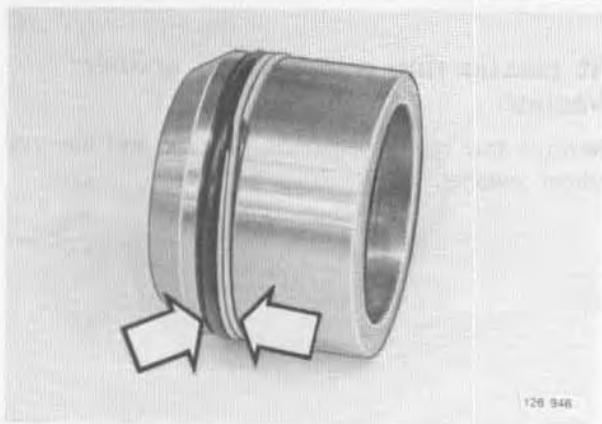
Assembly

Special tools:

1801 Standard handle
2520 Work stand
5046 Fixture
5049 Sleeve
5052 Drift
5053 Sleeve
5054 Cover
5056 Sleeve
5175, 5176 Nipples
5182 Guide
9177 Torque gauge

Lubricant:

"Lubricant for steering gear' Volvo P/N 1161001-1.

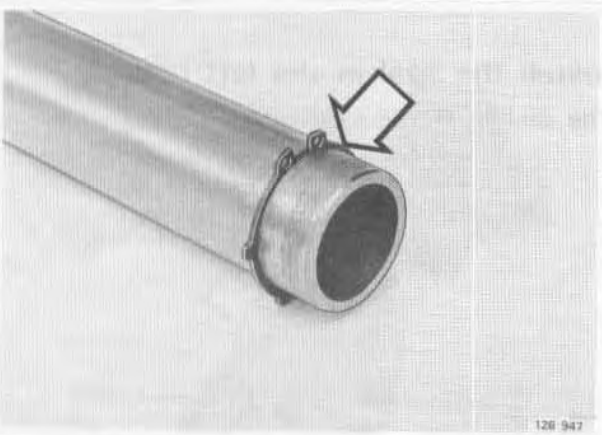


J1

Oil all parts prior to assembly.

J2

Install the plastic ring and O-ring on the rack bearing.

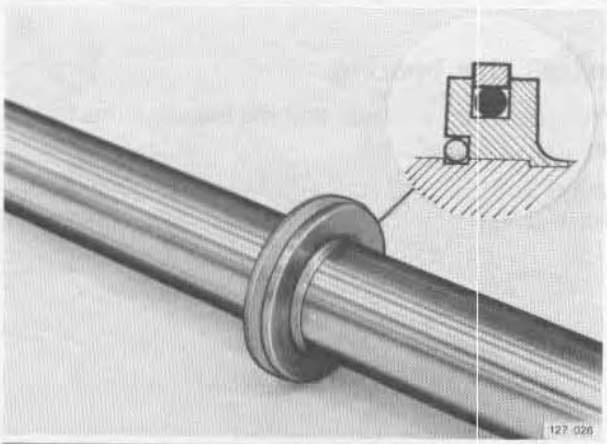


J3

Install the snap ring on the inner tube.

Be careful not to scratch the sealing surface with the snap ring.

Also check that the end of the tube has no sharp edges that could damage the O-ring when inserting the tube.



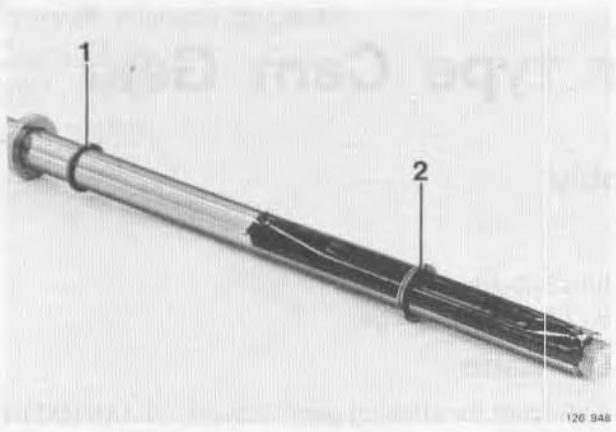
J4

Piston seal.

See step I 23.

First install the O-ring and then the plastic ring.

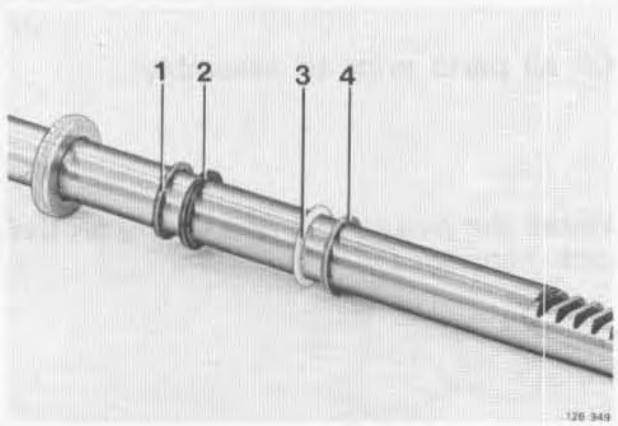
Use the fingers to install the plastic ring. If difficult, heat the ring to 40–50°C = 100–120°F.



J5

Fit spacer and oil seal.

First fit the spacer washer (1) from the rack toothed side. Then cover the rack teeth with tape and fit the oil seal (2).



J6

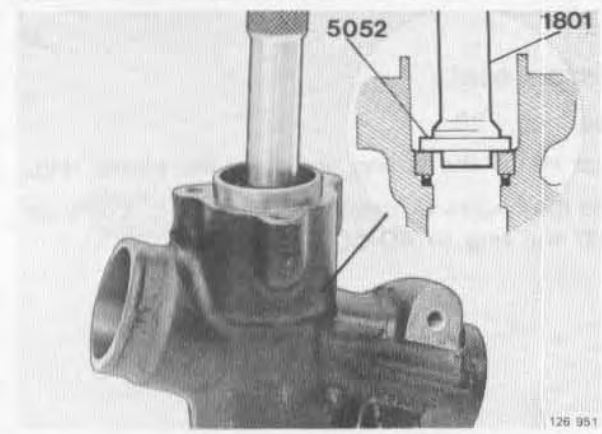
Fit plastic ring and second spacer washer.

Remove the tape. Fit plastic ring (3) and second spacer washer (4).

J7

Install the seal in the left housing.

The seal lip should face UP.



J8

Install the bearing.

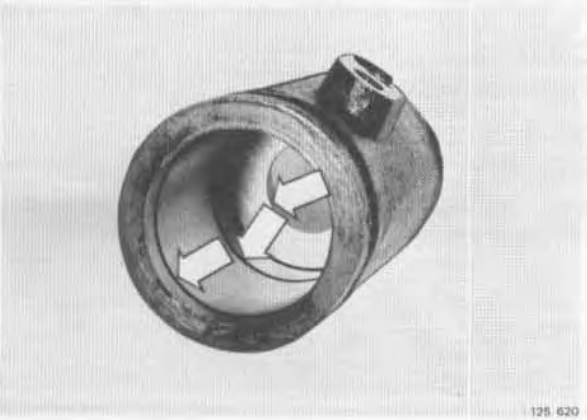
Prior to assembly, check that the bearing turns freely on the pinion shaft.

Use drift 5052 and standard handle 1801 to install the bearing.

J9

Install two O-rings in left side housing.

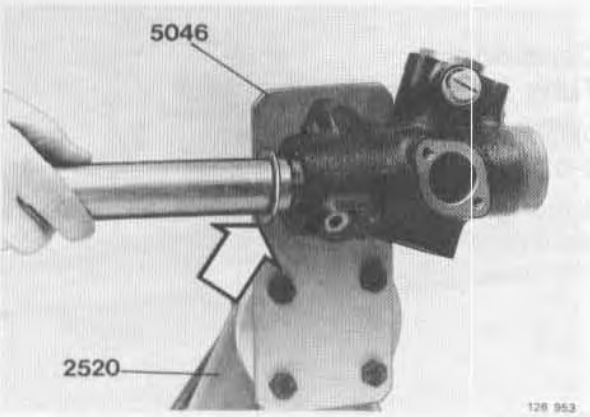
Make sure O-rings protrude above the groove. If not housing must be replaced.



J10

Install spacer washer and two O-rings in right side housing.

See note above.



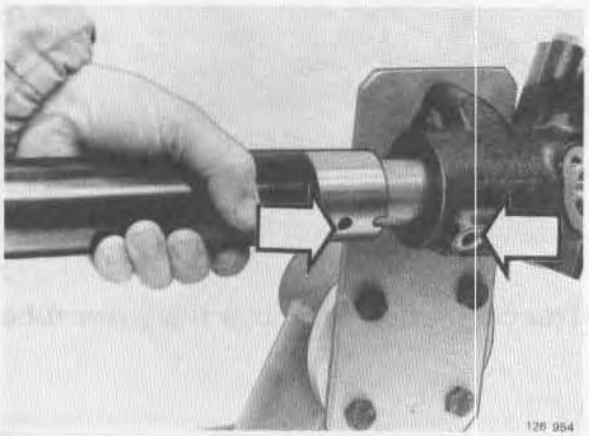
J11

Install the left side housing on the stand.

Use work stand 2520 and fixture 5046.

Install inner tube and spacer washer.

Lubricate the end of the inner tube so that it enters easily and install with spacer washer.

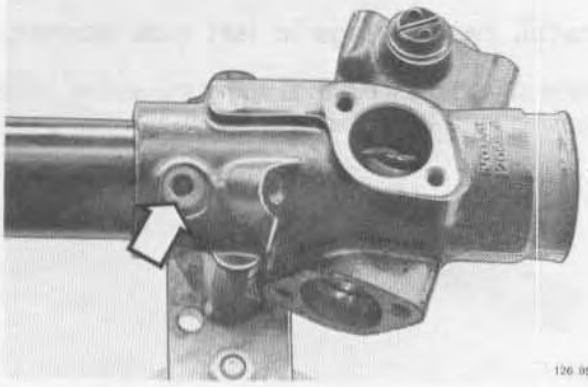


J12

Install outer tube.

Make sure the tube and the holes have well rounded edges so they do not damage the O-ring.

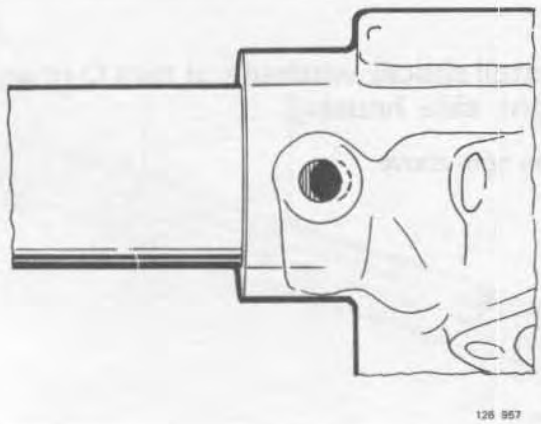
Align the tube so that the screw holes correspond.



J13

Check the position of the outer tube.

Check the alignment of the lock screw holes.

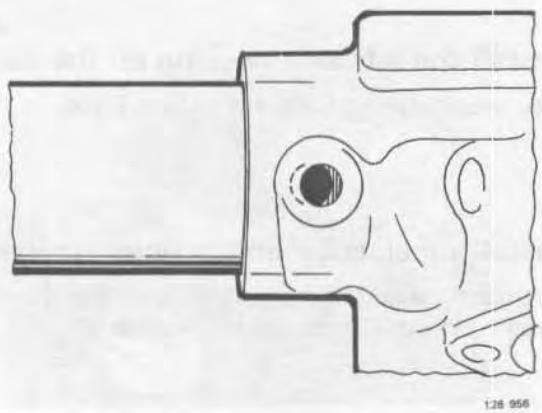


J14

Condition:
Tube hole too far in.

Difference permitted:
0–0.5 mm = 0–0.02".

Remove the tube and add spacer washers, see step J16.



J15

Condition:
Tube hole too far out.

Difference permitted:
0–0.5 mm = 0–0.02".

Remove the tube and try thinner spacer washers, see step J16.

P/N	Thickness
1206978	1.5 mm = 0.06"
84218	0.35 mm = 0.014"
84219	0.10 mm = 0.004"

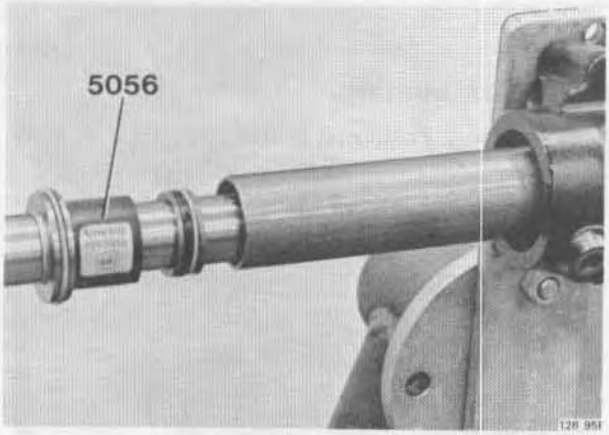
J16

Spacer washers available.

Note:
These spacer washers must be installed between the snap ring and the existing spacer washer.

J17

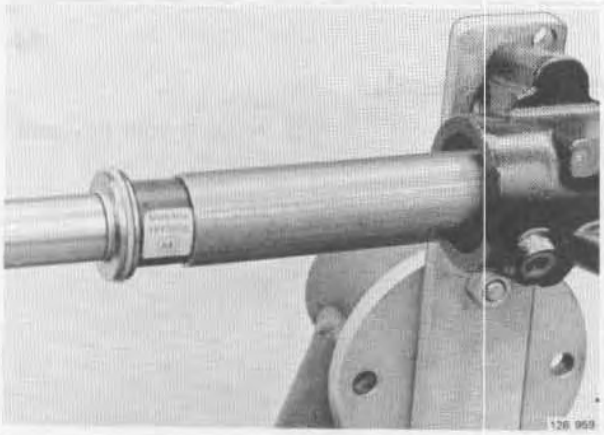
After corrections; remove the outer tube.



J18

Install rack.

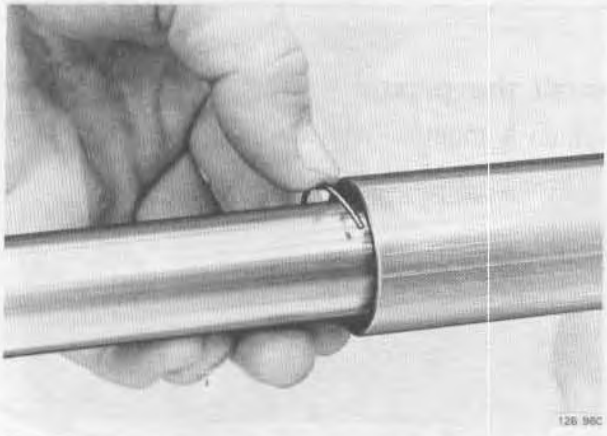
Install the rack with seals and spacers in the inner tube. Position sleeve 5056.



J19

Position seals and spacers.

Use the rack and sleeve 5056 to press in the sleeves and the spacers in the inner tube.



J20

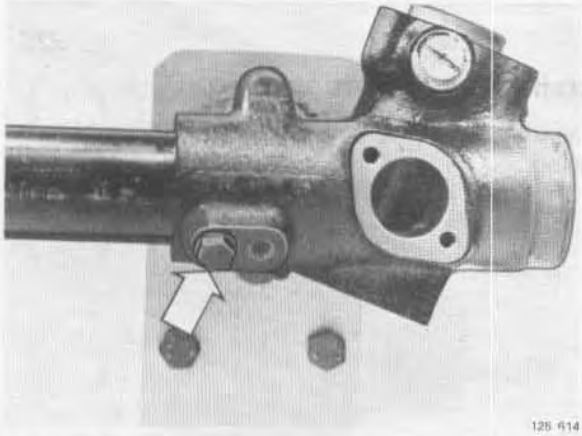
Remove the sleeve.

Pull out the rack a maximum of 100 mm = 4", no more as the rack teeth will damage the seal if pulled out too far.

Let the rack remain in this position.

J21

Install the snap ring for the seal.

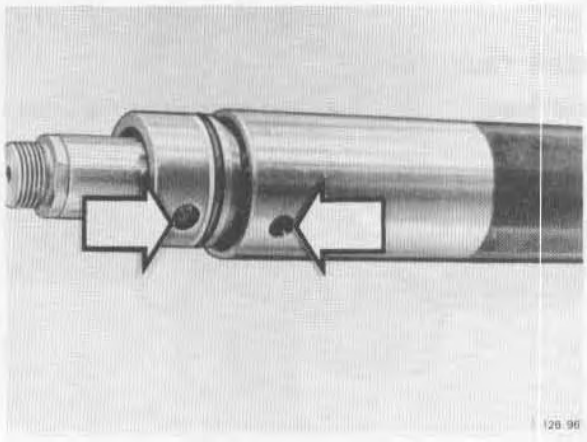


J22

Install the outer tube.

Use the stop screw with the special sealing washer.

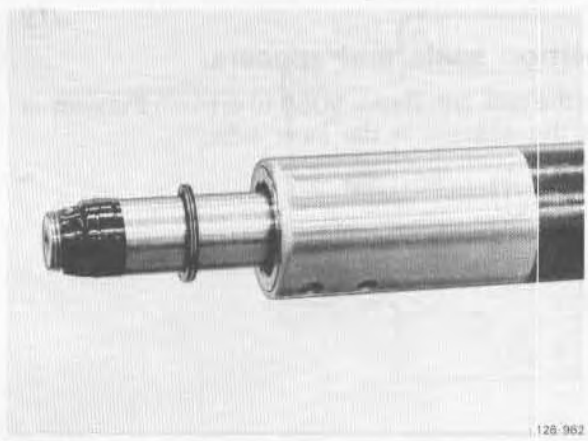
Torque: 19±2 Nm = 14±1.5 ft.lbs.



J23

Install the bearing.

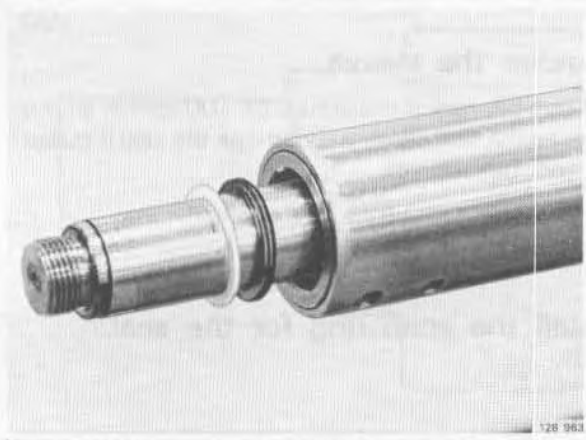
Oil the bearing. Position it in the outer tube so that the stop screw holes align



J24

Install the seal.

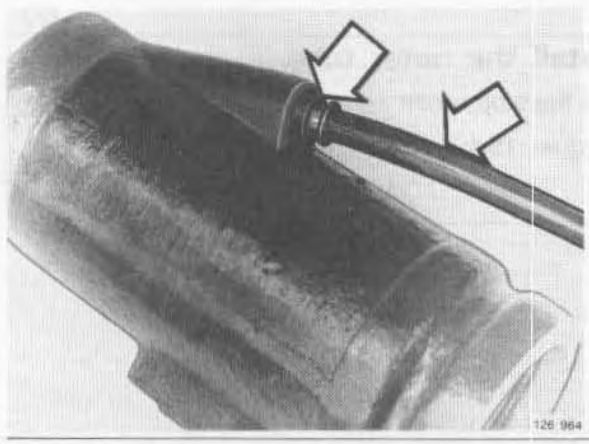
Wrap tape around the rack edge. Install the seal. Remove the tape.



J25

Install the plastic ring.

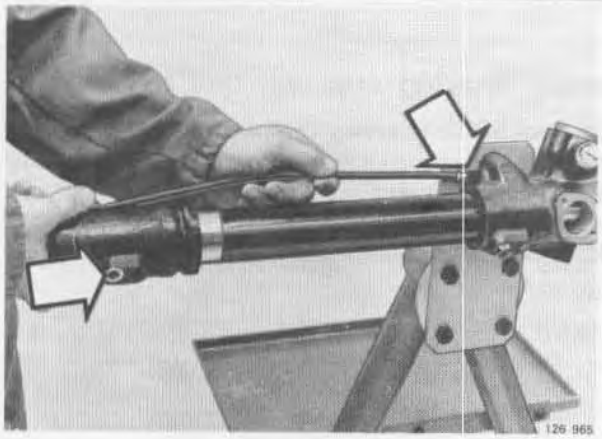
Position it together with the seal in the bearing.



J26

Install the connecting pipe.

Install the connecting pipe with seal in the right side housing.

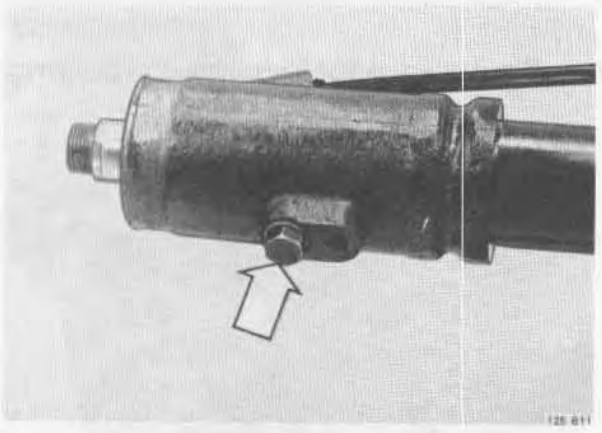


J27

Install right side housing.

Insert right side housing, with connecting pipe and rubber seal. Align hole in housing to correspond with hole for lock bolt.

Make sure edges of tube and stop screw hole are chamfered. Lubricate the end of the tube.



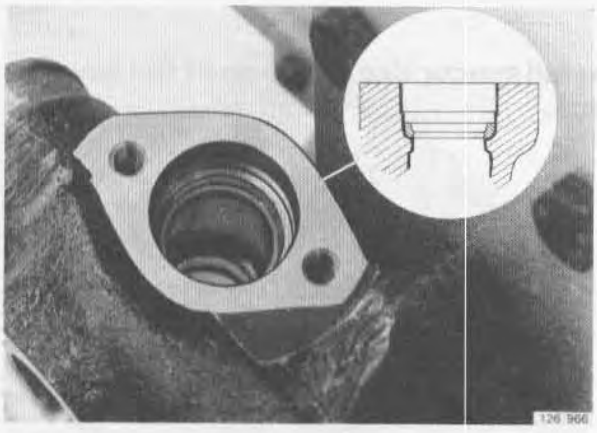
J28

Install the lock bolt.

Use an aluminum washer.

Torque: 19±2 Nm = 14±1.5 ft.lb.

Caution: do not overtighten as this will cause the rack to bind.



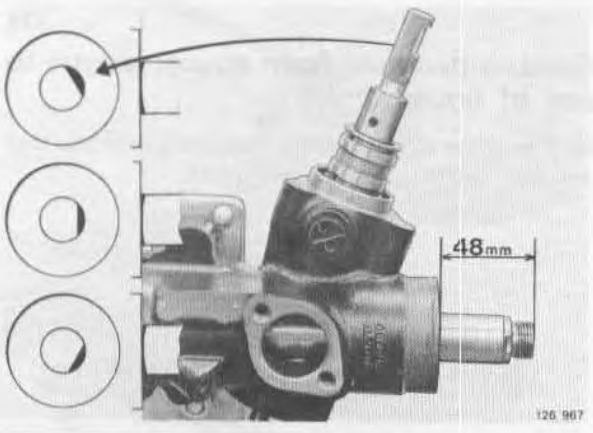
J29

Install outer race for pinion lower bearing.

Only if the bearing is replaced.

Lubricate pinion and rack.

Use grease 1161001-1.



J30

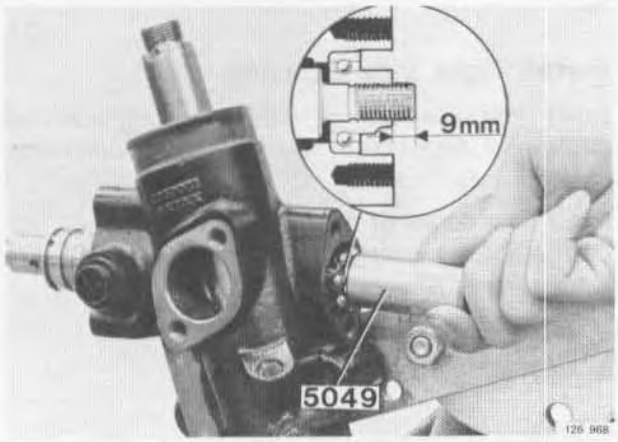
Install the pinion.

The rack should protrude 48 mm = 1.89" with the pinion in place. The pinion flat side should be toward the rack end.

Be careful when installing the pinion, not to damage the valve.

The flat portion for the lock bolt should be in one of the three positions shown.

Make sure rack and pinion engage properly.

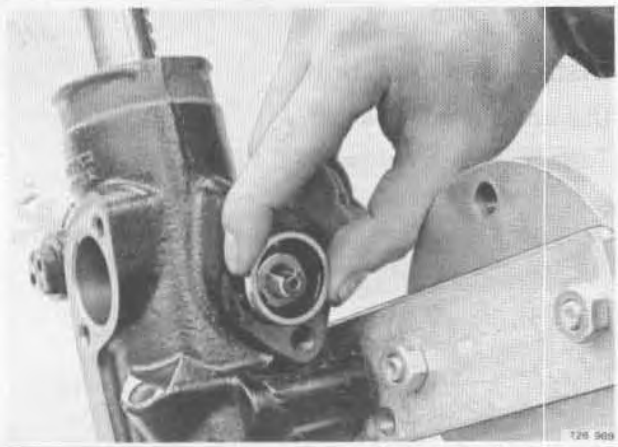


J31

Install bearing cup and ball retainer.

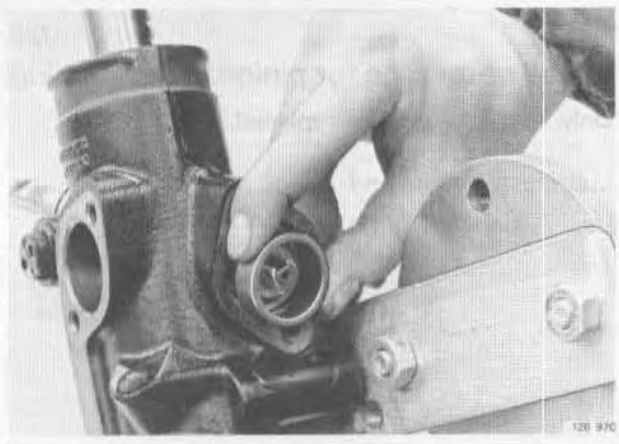
Use tool 5049 to screw on the cup. The shaft end should protrude approx. 9 mm = 23/64". It will facilitate adjustment later on.

Note: be sure to count the turns as per illustration I9.



J32

Install outer race for lower pinion bearing.



J33

Install spacer sleeve on top of the bearing race.

J34

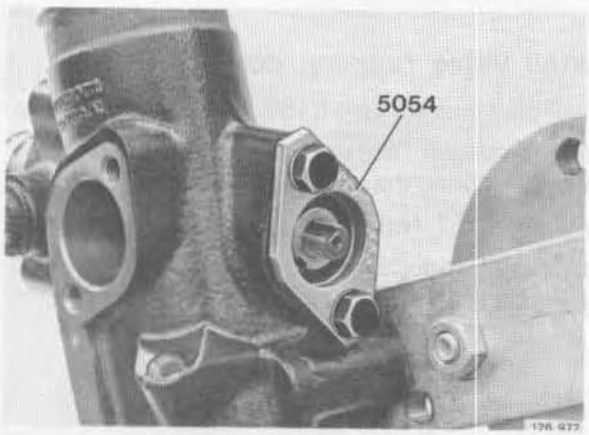
Measure distance from spacer sleeve to face of housing.

Make sure the spacer sleeve is seated correctly. Use ruler and feeler gauge to measure.

For feeler gauge mm	inch	Qty	Gasket P/N
0.20–0.25	0.008–0.010	1	1206931
0.25–0.35	0.010–0.014	1	1206934
0.35–0.45	0.014–0.018	2	1206931
0.45–0.60	0.018–0.024	1	1206931
		1	1206934
0.50–0.70	0.020–0.028	2	1206934

J35

Use chart to determine gasket of correct thickness.



J36

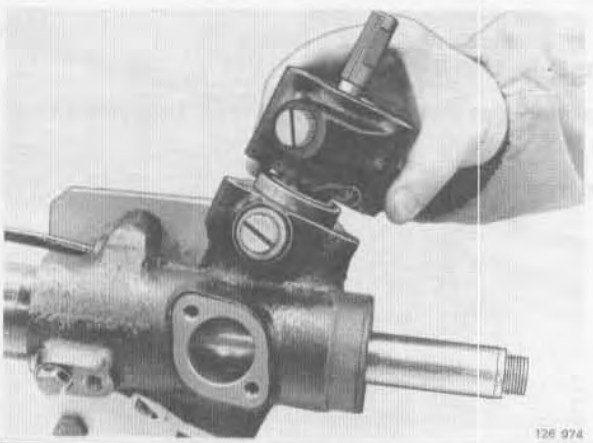
Install gasket.

Then install tool 5054.

This tool will then remain in place until adjusting balance procedures are finalized (at op. K28).

J37

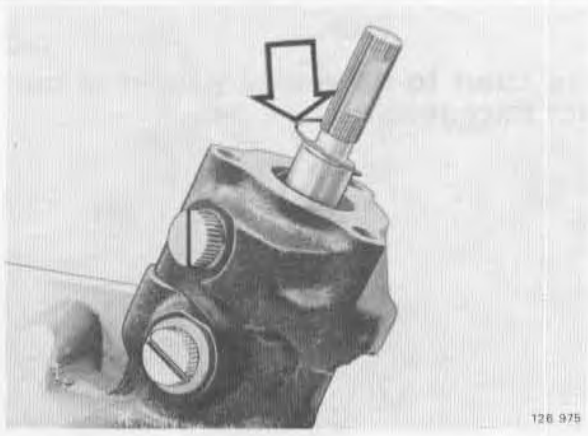
Install the O-ring.



J38

Install the valve housing.

Be careful, not to damage house or valve.



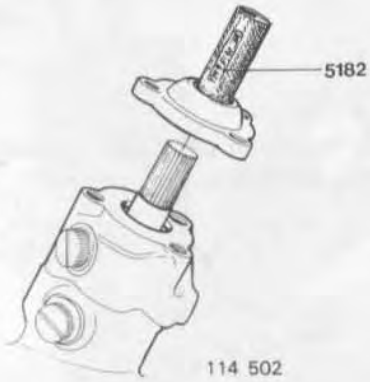
J39

Install coil spring.

Big end first in. Make sure the coil spring cannot get engaged in the uppermost groove of the valve housing.

In case this groove is visible, adjust the valve up by turning the lower bearing with tool 5049.

Note: spring tension is relative to rack noise.



J40

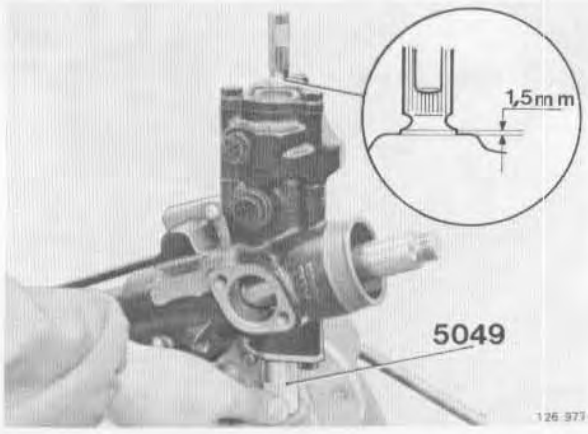
Install valve housing cover.

Install the cover on drift 5182. Install the assembly.

Make sure the coil spring does not become squeezed under the cover.

Torque: 19±2 Nm = 14±1.5 ft.lb.

Note: Late production steering gears are equipped with a dust shield.



J41

Adjust pinion shaft position.

Input shaft shoulder should be 1.5 mm = 0.06" above the cover face.

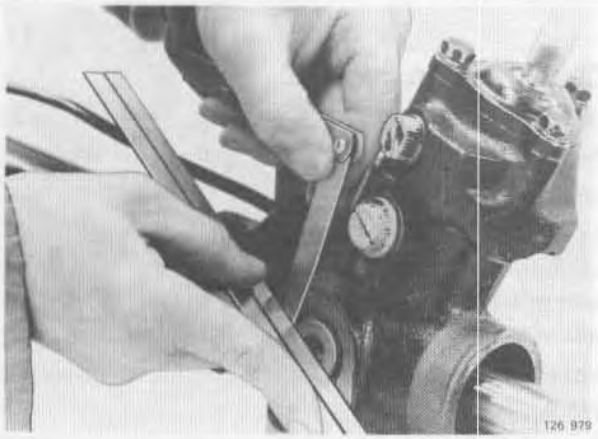
To adjust the position, turn the lower bearing with tool 5049.

J42

Install shaft nut.

Position the lock plate and the nut. Use tool 5033 to hold when tightening the nut.

Do not lock the lock plate.

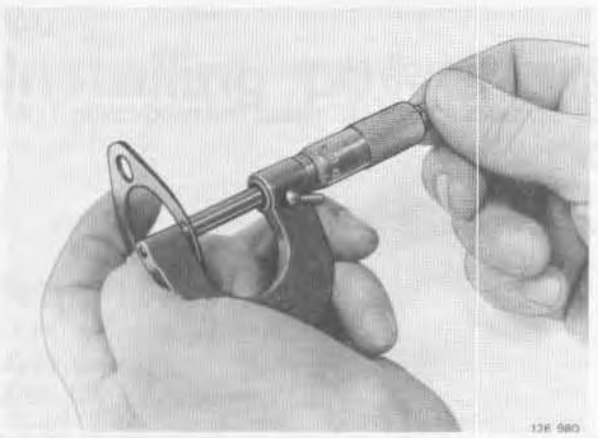


J43

Measure clearance.

Place the pre-tensioning piston, without O-ring, in the housing. Measure clearance between piston and housing.

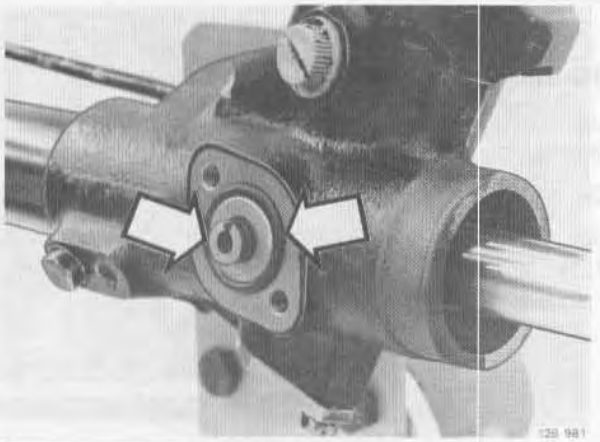
Use ruler and feeler gauge. Press the piston against the rack. Push the rack in and out to determine maximum clearance.



J44

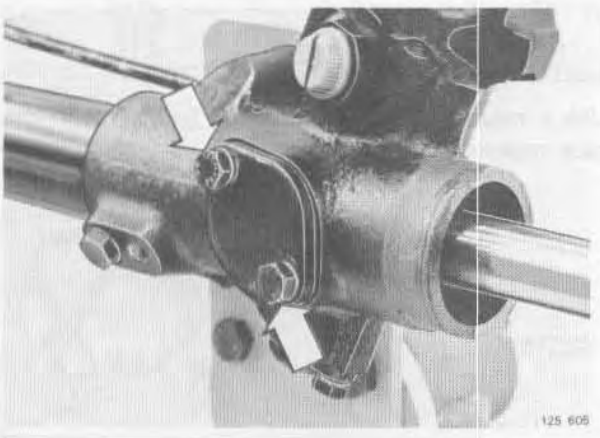
Measure shims.

The shims chosen should equal the clearance measured plus 0.05–0.15 mm = 0.002"–0.006" to obtain a correct play.



J45

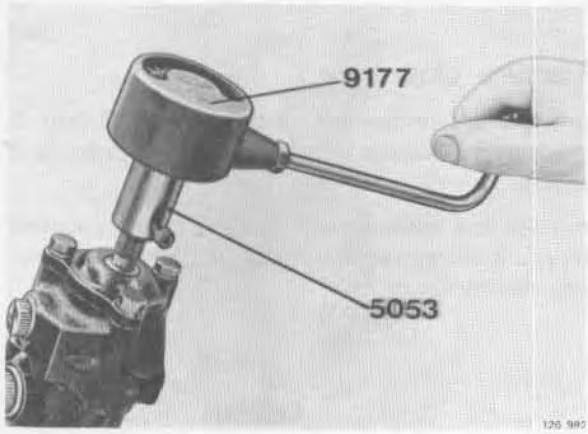
Install spring and O-ring.



J46

Install shims and cover.

Torque: 19±2 Nm = 14±1.5 ft.lb.



J47

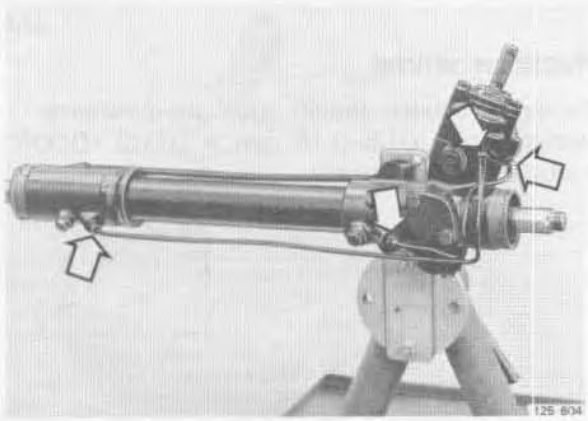
Check pinion torque.

Use torque gauge 9177 and adapter 5053 to crank the rack in and out between end positions.

Correct torque: 0.9–1.7 Nm = 8–15 in.lbs.

If torque in any place is excessive, stop rack in that position and readjust pretension. If the rack jams with pre-tensioning piston removed, rack is warped and should be replaced.

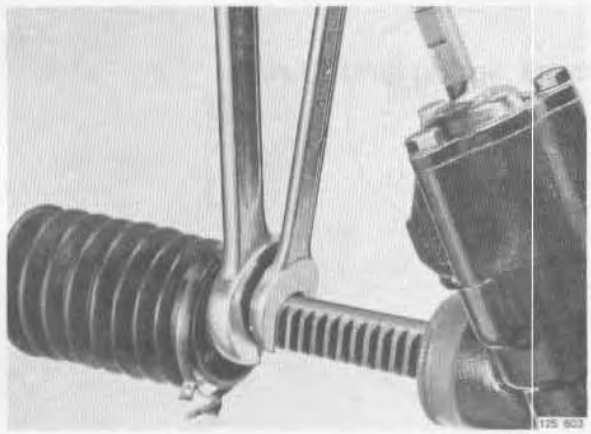
Note: use socket 5179 for late production steering gears.



J48

Attach the oil pipes.

Early production 3/16" pipes, late production 1/4" pipes.



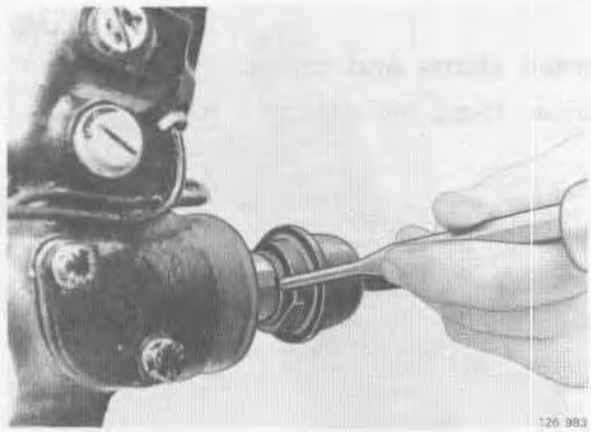
J49

Install the tie rods.

Left and right side tie rods can be swapped to obtain unused lock portion

Do not use a tie rod with broken lock.

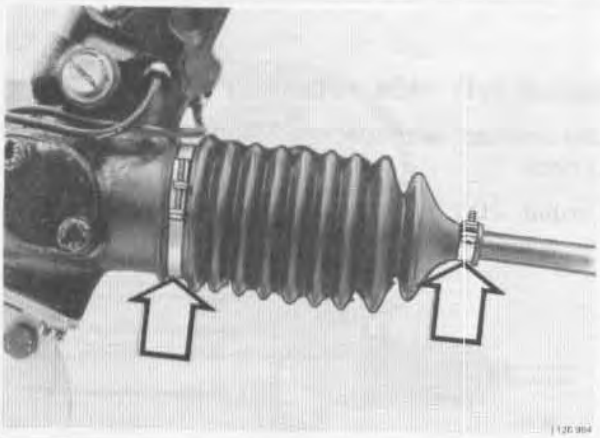
Use a 30 mm = 1–3/16" wrench to turn. Use a 7/8" wrench to hold on the outermost tooth.



J50

Lock the tie rods.

Use a narrow punch to lock the ball joints in the rack recesses.



J51

Install the rubber bellows and tighten the clamps.

J52

Adjusting valve and filling oil and "fluid grease" is made after the steering gear is installed.

Also see operation K31.

Installing power steering gear type Cam Gear

Including adjusting balance

Special tools

5175, 5176 Nipples
5049 Sleeve
5055 Oil pressure gauge

Lubricants:

"Lubricant for steering gear"
Volvo P/N 1161001-1

Automatic Transmission fluid (ATF)

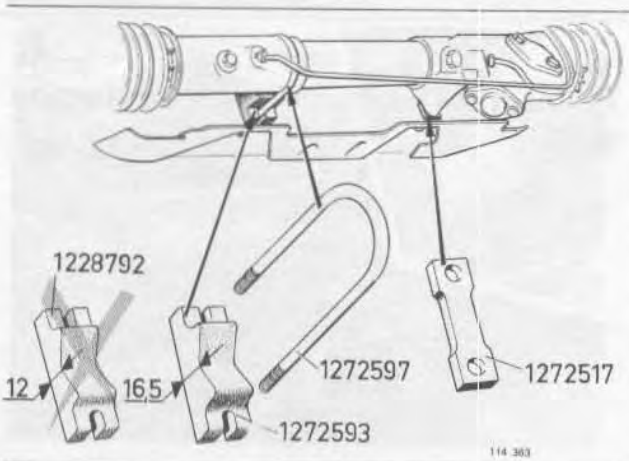
K1

Installing the steering gear.

Position the steering gear while attaching the pinion shaft to the steering shaft. Make sure the pinion shaft recess becomes correctly aligned for the lock bolt.

Note: the dowel pins must be removed if a new steering gear is installed in an older vehicle without dowel pin holes.

To adjust steering shaft, see operations A25–A34.

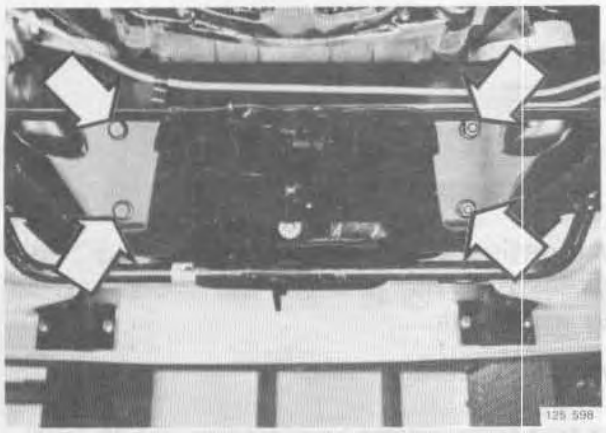


K2

Install right side U-bolt and spacer.

Do not tighten the nuts fully.

Note: spacer block, spacers and U-bolt must be used for late production installations.

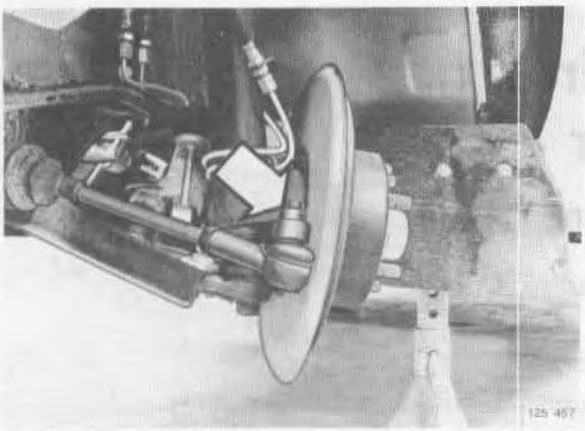


K3

Install left side retaining screws.

Use washers and spacers. Tighten all screws and U-bolts.

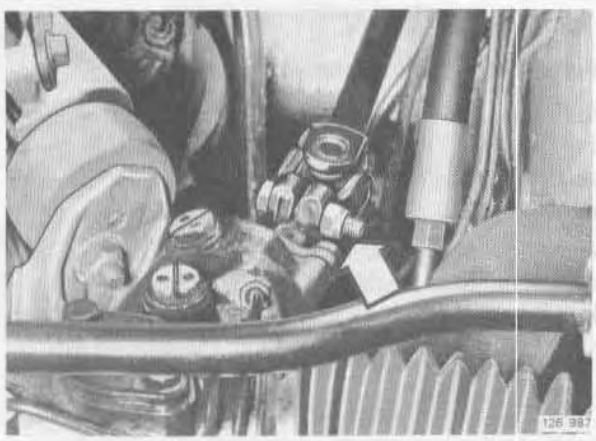
Torque: 20±5 Nm = 14±4 ft.lbs.



K4

Attach the tie rods to the steering arms.

Torque: 60±10 Nm = 44±7 ft.lbs.

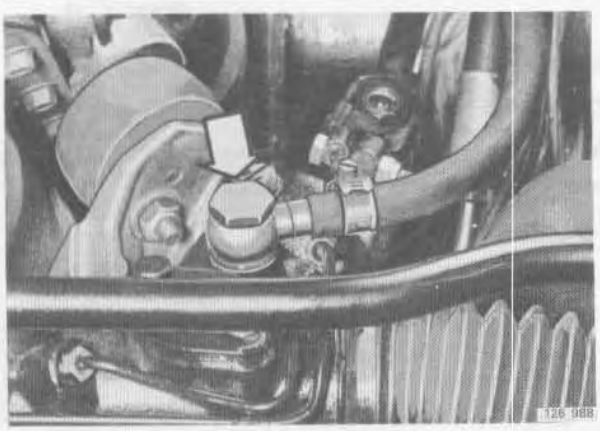


K5

Connect the steering shaft.

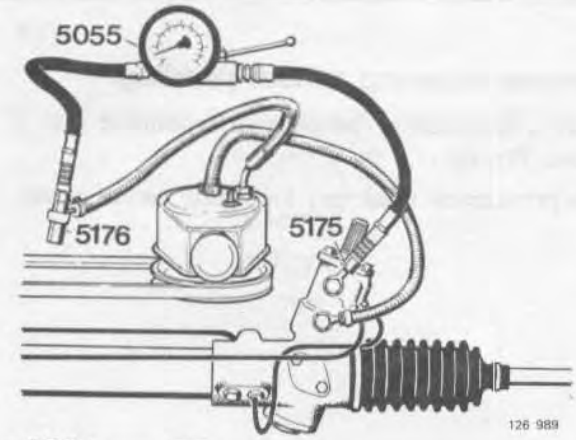
Install the lock bolt. Check that no tension remains in the steering shaft joints. Tighten the nut.

Torque: 25±5 Nm = 18±4 ft.lbs.



K6

Connect the oil return line to the steering gear.



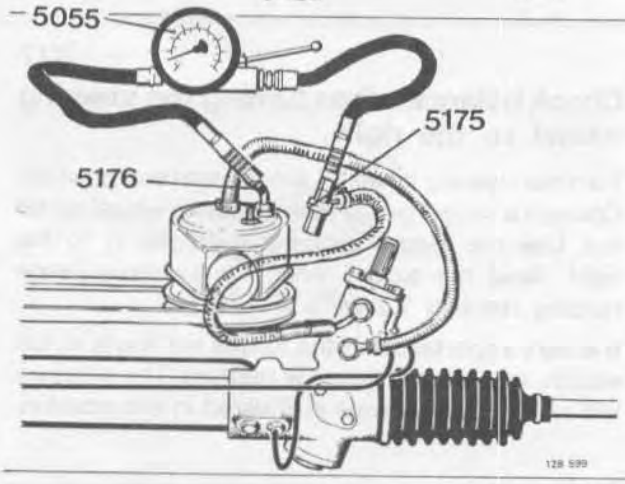
K7

Connect test instrument.

Use nipples 5175 and 5176 to connect test instrument 5055.

The hose from the instrument valve should be connected to the steering gear.

Nipples 5175 and 5176 are used instead of previous nipples 2865 and 2990.



6-cyl. Models:
Connect test instrument 5055 between the power pump and the oil pressure hose.

K8

Position the pressure gauge in front of the windshield.

Turn the dial so that it can be easily read from the driver's seat.

K9

Fill oil in power steering oil container.

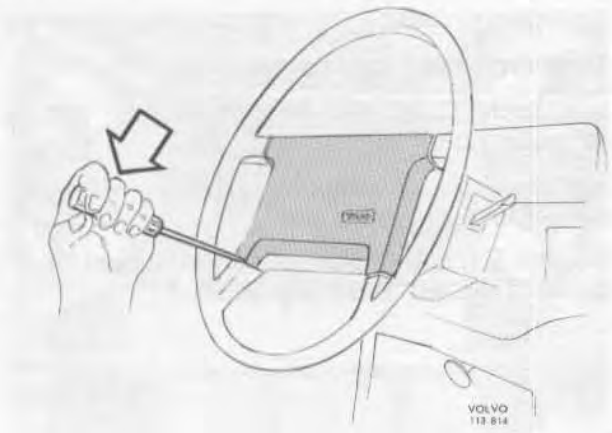
Fill ATF oil, start engine and idle. Fill until level has stabilized at correct level.

K10

Turn steering wheel slowly to right side and left side end positions.

Turn several times with slow motion to let the pump work with low pressure. Fill oil as necessary. Stop turning wheel when oil in container is almost free from bubbles.

Install the container cover.



K11

Remove steering wheel padding.

Insert a screwdriver between the padding and a spoke. Pry up.

Late production units: pry loose the center cover.

K12

Check balance when turning the steering wheel to the right.

Turn the steering wheel to almost right end position. Connect a torque gauge to the steering wheel center nut. Use the torque gauge to turn slowly to the right. Read the torque when the pressure gauge reading reaches 1.2 MPa = 170 psi.

It is very important that the torque reading is noted exactly when the pressure is reached. The pressure will remain if the torque is lowered in this position.

K13

Check balance when turning the steering wheel to the left.

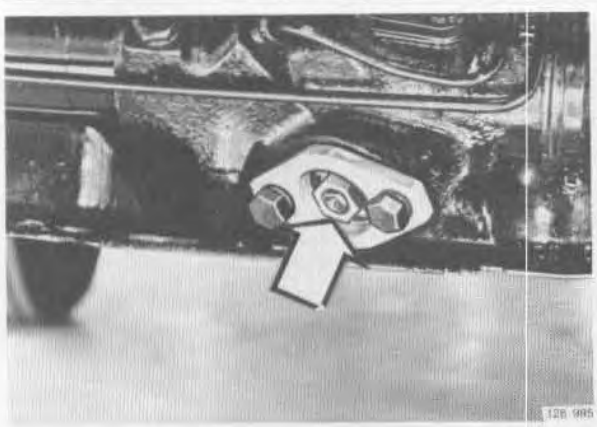
Turn the steering wheel to the left. Read the torque the same way as for right side.

K14

Torque reading.

Correct reading: 3.5–5.0 Nm = 30–40 in.lbs.

Incorrect reading may indicate incorrect pump pressure.



K15

Torque difference between sides.

Difference between sides must not exceed 1.0 Nm = 0.73 ft.lb. = 8.8 in.lb.

If difference is excessive, balance must be adjusted.

K16

Adjusting balance.

Stop the engine. Remove nut and lock washer from pinion lower bearing.

126 996

K17

Adjusting balance.

Turn the lower pinion bearing race.

Lock washer in original position provides 9 full adjustment steps, each giving a pressure difference of 1 Nm = 8.8 in.lbs.

Lock washer in reversed position gives 9 additional intermediate steps. The first one giving a pressure difference of 0.5 Nm = 4.4 in.lbs.

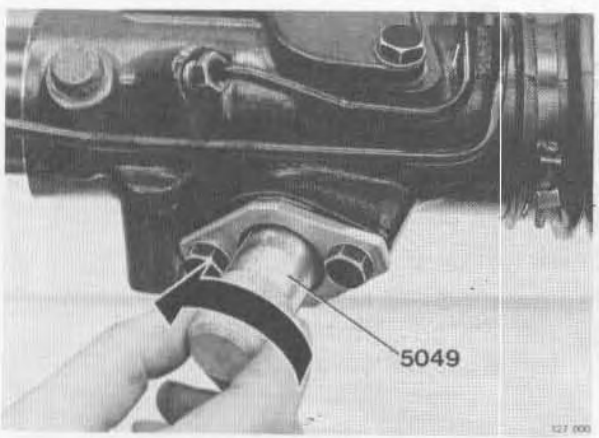
126 997

K18

Lower pressure reading when turning right.

Example: pressure difference is 1 Nm.

Unfold the lock washer tab. Bend in the next tab, to the left of the unfolded tab.



127 000

Turn the bearing race to the left.

Use tool 5049. Turn until the race recess fits the lock tab.

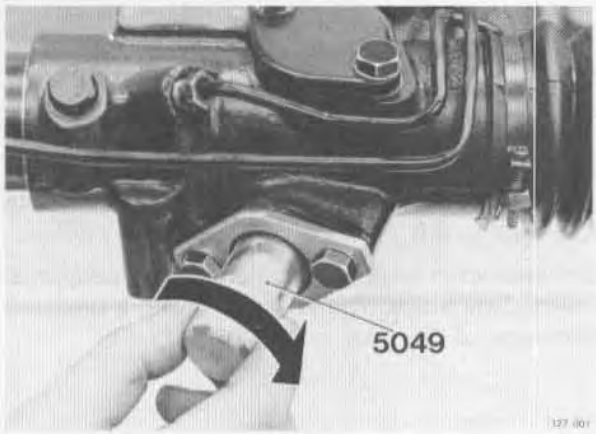
126 999

K19

Lower pressure reading when turning left.

Example: pressure difference is 1 Nm.

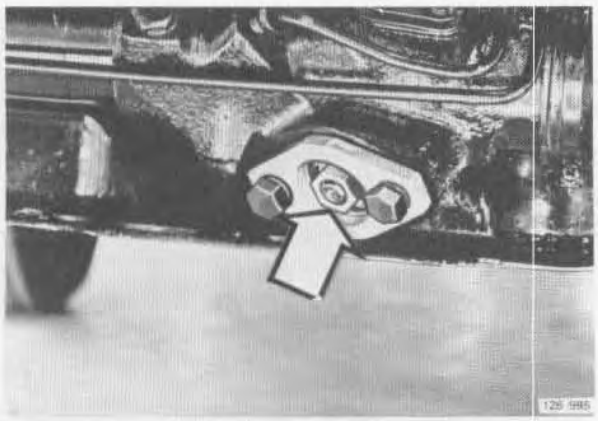
Unfold the lock washer tab. Bend in the next tab, to the right of the unfolded tab.



K19
(cont)

Turn the bearing race to the right.

Use tool 5049. Turn until the race recess fits the lock tab.



K20

Install lock washer and nut.

Tighten the nut but do not lock the washer.

K21

Check pump pressure at left side end position.

Start the engine. Turn the steering wheel fully to the left. Press to left end for max. 10 seconds while reading the gauge.

Correct pressure:

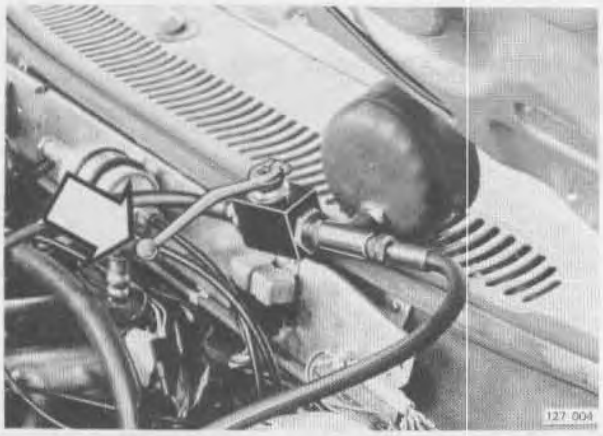
Saginaw: 5.5—7 MPa (780-1000 psi)
ZF, early prod.: 7.5 MPa (1005 psi).
ZF, late prod.: 5.8 MPa (825 psi).

K22

Check pump pressure at right side end position.

Turn the steering wheel fully to the right. Press to right end for max. 10 seconds while reading the gauge.

Pressures as in K21.



K23

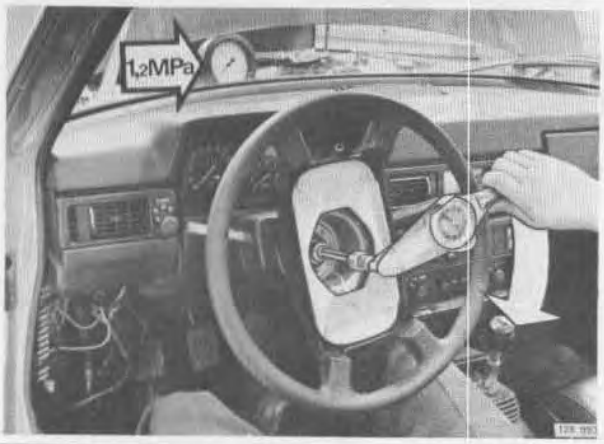
Incorrect pump pressure:

Check pump capacity.
Shut the gauge valve for max. 10 seconds. Pump pressure should reach correct reading, otherwise the pump is defective.

K24

After adjustments:

Recheck balance.



K25

Recheck of balance when turning the steering wheel to the right.

Turn the steering wheel to almost right end position. Connect a torque gauge to the steering wheel center nut. Use the torque gauge to turn slowly to the right. Read the torque when the pressure gauge reading reaches 1.2 MPa = 170 psi.

It is very important that the torque reading is noted exactly when the pressure is reached. The pressure will remain if the torque is lowered in this position.

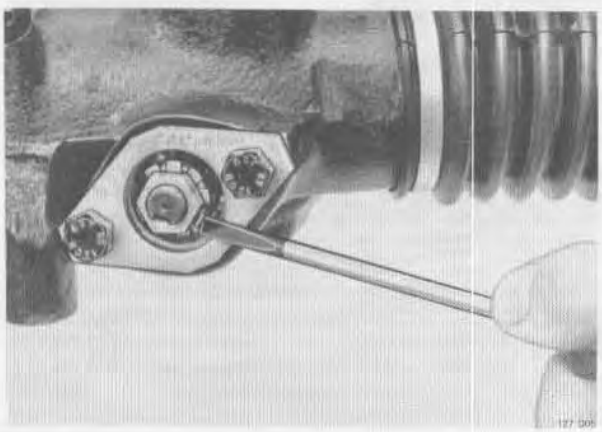
K26

Recheck of balance when turning the steering wheel to the left.

Turn the steering wheel to the left. Read the torque the same way as for right side.

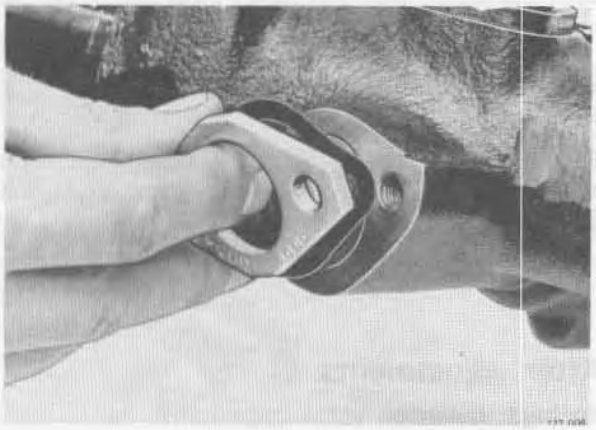
Correct reading: 3.5–5.0 Nm = 30–40 in.lbs.

Difference between sides must not exceed 1.0 Nm = 8.8 in.lbs.



K27

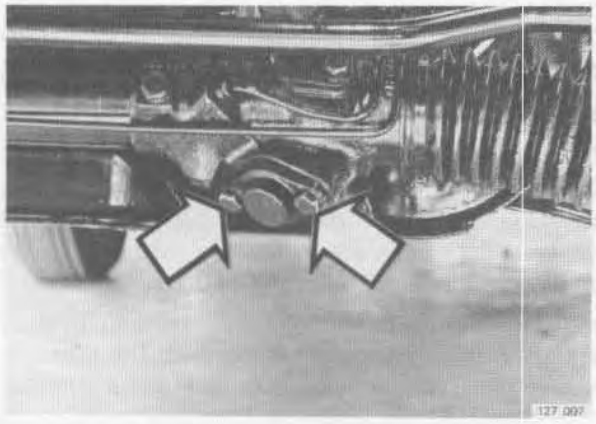
Stop engine. Lock the nut.



K28

Remove adjustment ring 5054.

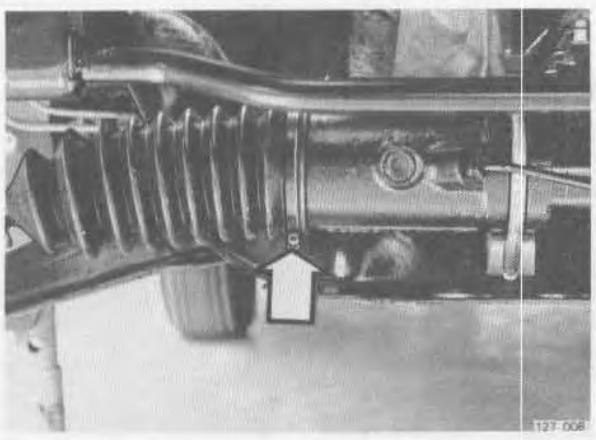
Recover the gasket.



K29

Install pinion cover and cover gasket.

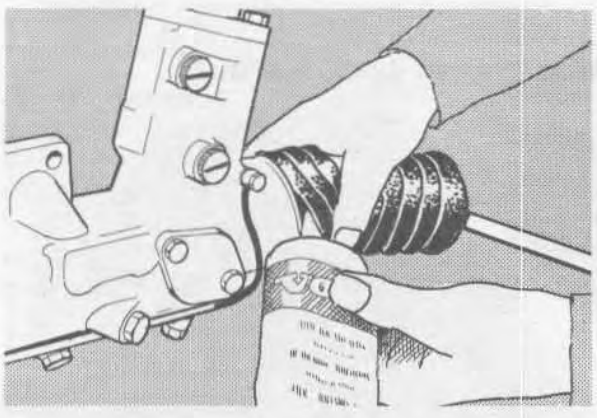
Torque: 19±2 Nm = 14±1.5 ft.lb.



K30

Filling lubricant:

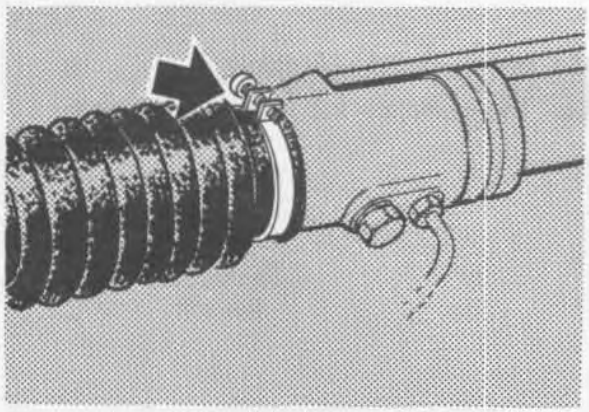
Remove inner clamps from rubber bellows.



K31

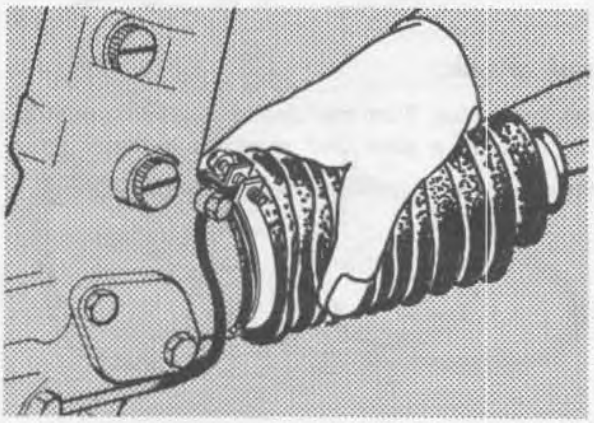
Inject "fluid grease"

Inject approx. 1/4 of the tube content in each rubber bellow.



K32

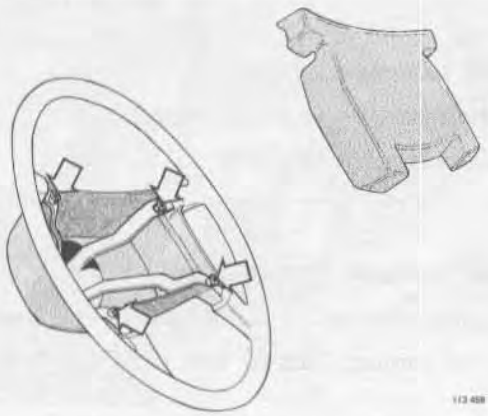
Install the clamps.



K33

Lubricate rack.

Squeeze the rubber bellows to lubricate the rack.

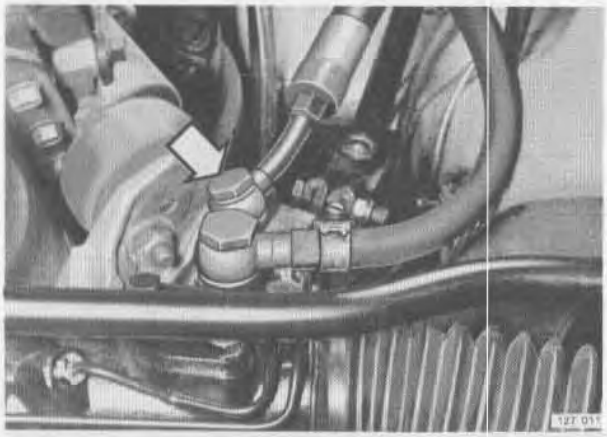


K34

Reinstall the steering wheel padding.

Use vaseline to lubricate the pins. Press padding into position.

Late prod. models: install center.



K35

Remove the test instrument.

Reconnect the pressure hose at the steering gear.

K36

Late prod. 6-cyl. Models:

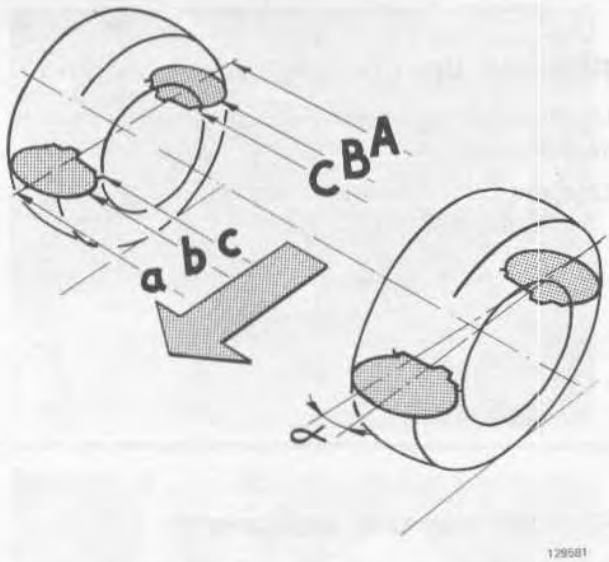
Attach the clamp on the front axle member.

K37

Final check.

Start the engine. Turn the steering wheel from stop to stop, with a slow and even movement.

Check fluid level, refill as necessary. (ATF).



K38

Install wheels.

Use the markings to avoid rebalancing.

Torque: 120±20 Nm = 90±15 ft.lbs.

K39

Check/adjust toe-in.

Use rust protective oil to seal the tie rod threads.

Lock nut torque: 70±10 Nm = 50±7 ft.lbs.

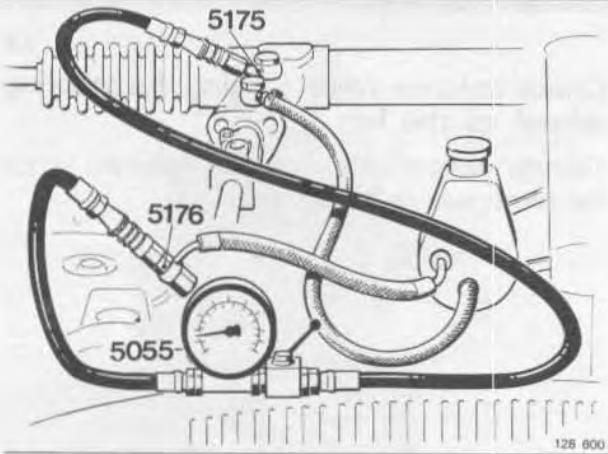
	angle 2 *a*	A-a	B-b	C-c
Manual steering	24'±8'	4.5±1.5 mm 3/16"±1/16"	3.5±1 mm 9/64"±1/32"	2.5±1 mm 3/32"±1/32
Power steering	16'+8'	3.0±1.5 mm 1/8"±1/16"	2.0±1 mm 5/64"±1/32"	1.5±1 mm 1/16"±1/32"

Power steering gear type ZF

Checking balance

Special tools:

5055 Oil pressure gauge
5175, 5176 Nipples



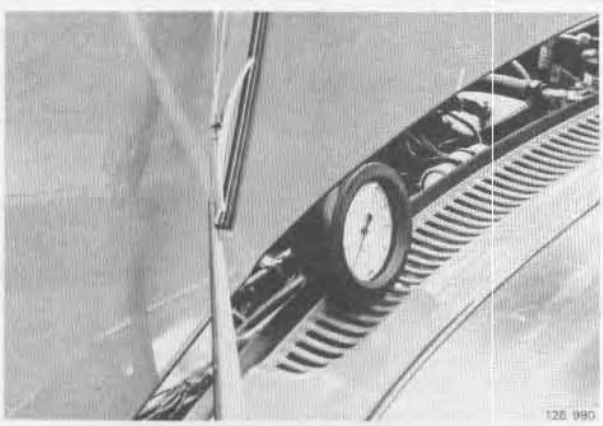
L1

Connect the test instrument.

Use nipples 5175 and 5176 to connect test instrument 5055.

The hose from the instrument valve should be connected to the steering gear.

Nipples 5175 and 5176 are used instead of previous nipples 2865 and 2990.



L2

Position the pressure gauge in front of the windshield.

Turn the dial so that it can be easily read from the driver's seat.

L3

Remove steering wheel padding.

Insert a screwdriver between the padding and a spoke. Pry up.

Late production units: pry loose the center cover.

L4

Check balance when turning the steering wheel to the right.

Start the engine.
Turn steering wheel to almost right end position. connect a torque gauge to the steering wheel center nut. Use the torque gauge to turn slowly to the right. Read the torque when the pressure gauge reading reaches 2.0 MPa = psi.

It is very important that the torque reading is noted exactly when the pressure is reached. The pressure will remain if the torque is lowered in this position.

L5

Check balance when turning the steering wheel to the left.

Turn the steering wheel to the left. Read the torque the same way as for right side.

L6

Torque reading.

Correct reading: 4–4.5 Nm = 35–40 in.lbs. Incorrect reading may indicate incorrect pump pressure.

Difference between sides must not exceed 0.5 Nm = 4.4 in.lbs.

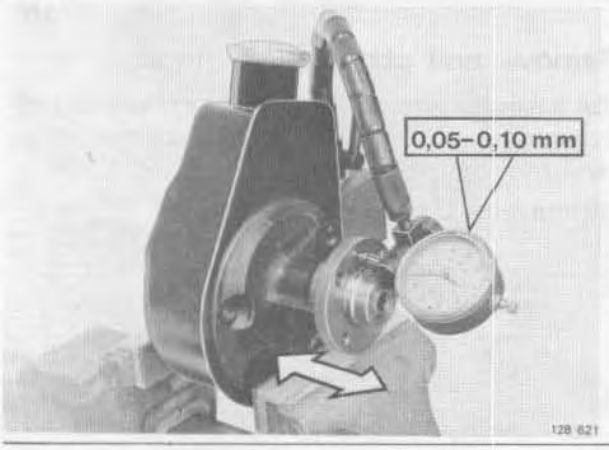
If difference is excessive, the steering gear should be replaced.

Power steering pump Saginaw

Disassembly

Special tools:

2863 Drift
5047 Puller
5051 Puller



M1

Determine end play.

Remove bracket and pulley. Use a dial gauge to measure end play (note it). Correct play: 0.05–0.10 mm = 0.002–0.004".

M2

Remove pressure hose fitting.

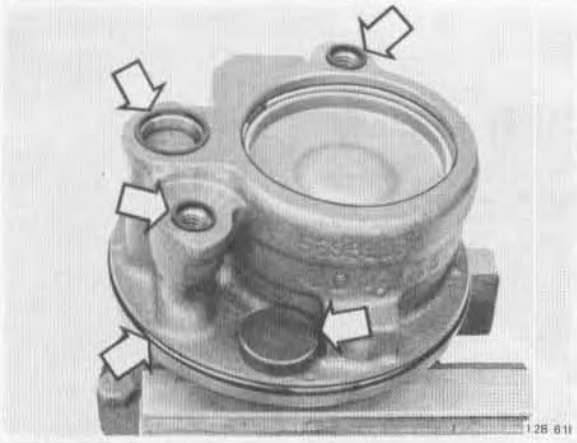
Put the pump in a vise. Remove the pressure hose fitting.

Wrench 25 mm.

M3

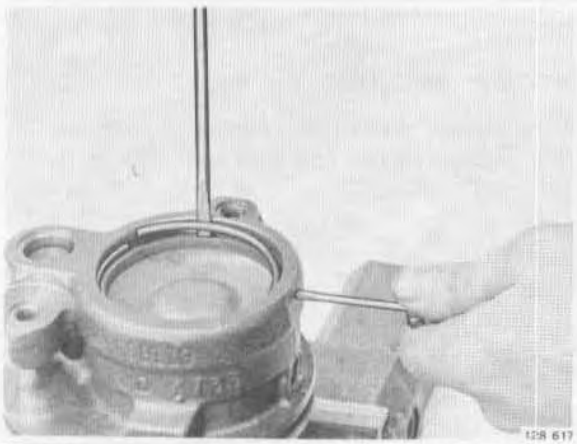
Remove oil reservoir.

Use a soft-tipped hammer. Tap lightly to remove the oil reservoir. Be careful not to damage the oil reservoir.



M4

Remove O-rings and magnet.

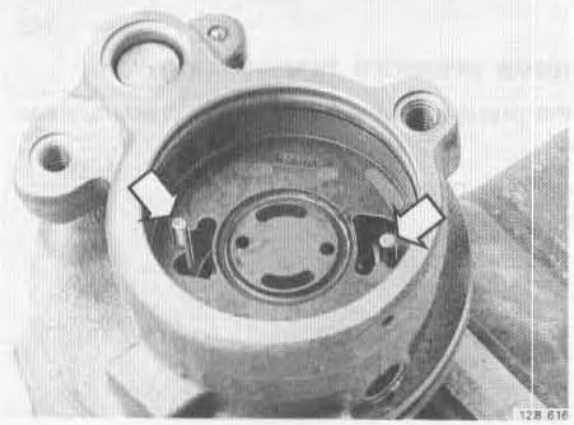


M5

Remove end plate and spring.

Use a narrow screwdriver to press in the lock ring through the side hole. Use another screwdriver to bend out the lock ring.

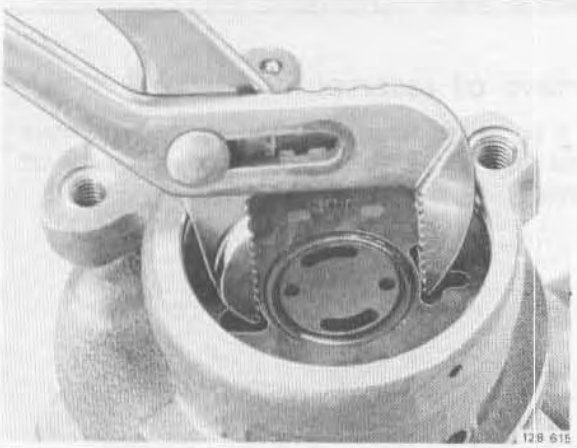
Lift out pressure plate and spring.



M6

Remove the dowel pins.

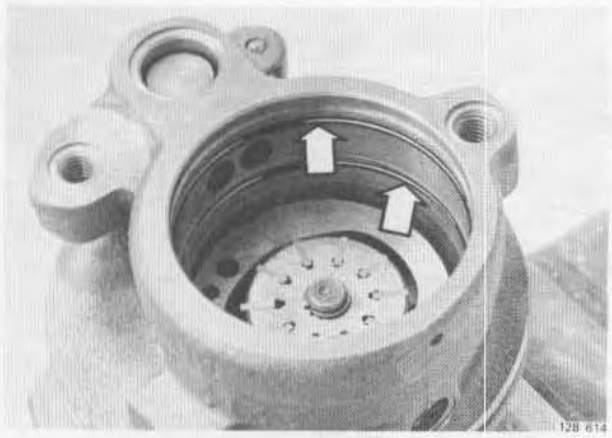
Use pliers.



M7

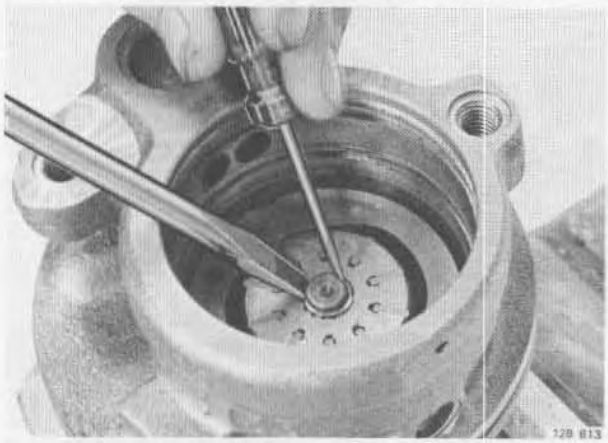
Remove pressure plate.

Use pliers.



M8

Remove the O-rings.

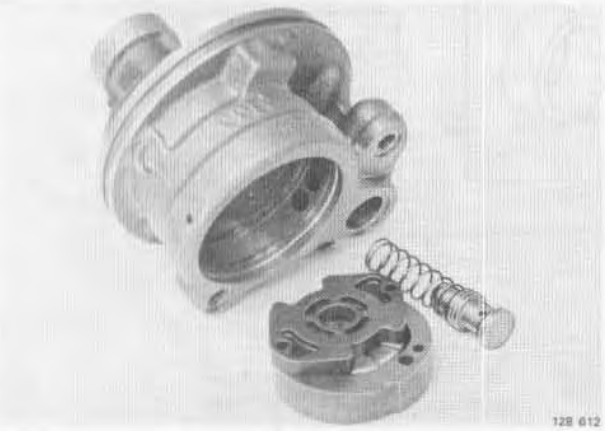


M9

Remove the shaft.

Hold the shaft. Use two screwdrivers to remove the snap ring.

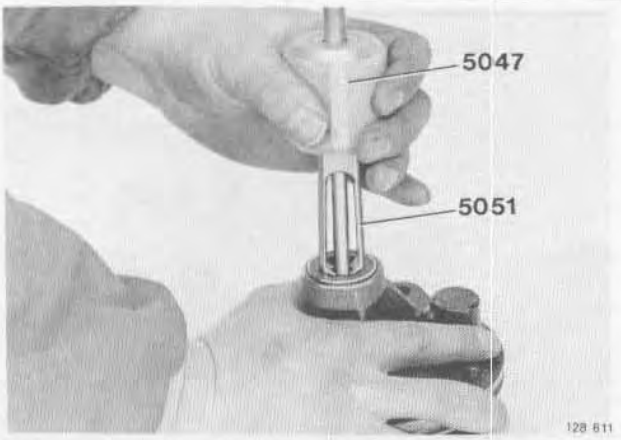
Remove the shaft.



M10

Remove rotor, pump ring, thrust plate and flow control valve.

Turn the housing upside down to remove the parts.

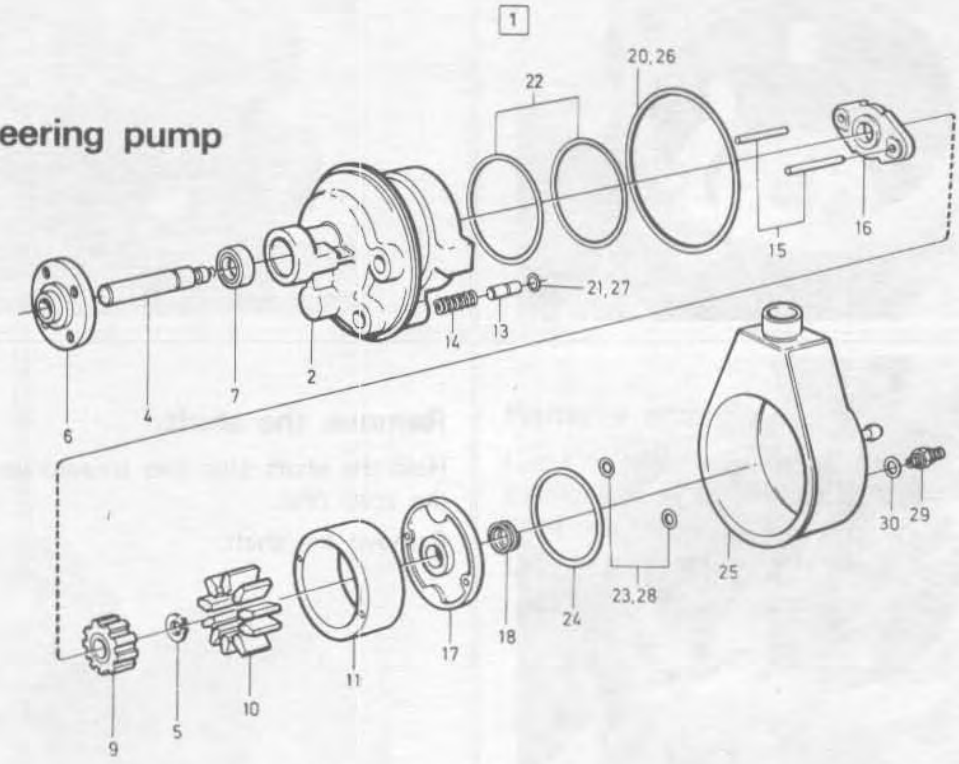


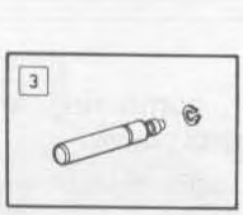
M11

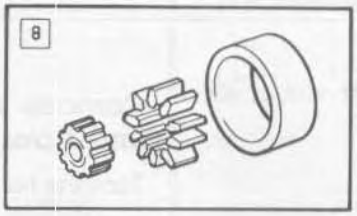
Remove shaft seal.

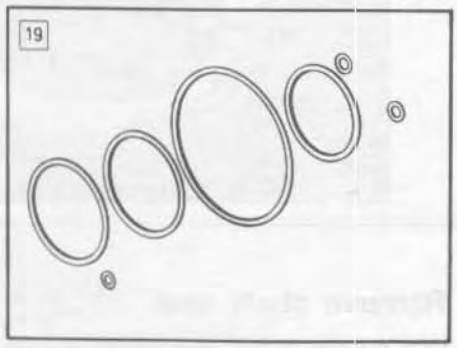
Use pullers 5051 and 5047.

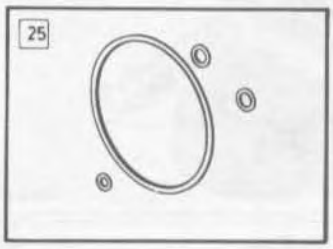
Power steering pump Saginaw











VOLVO PARTS
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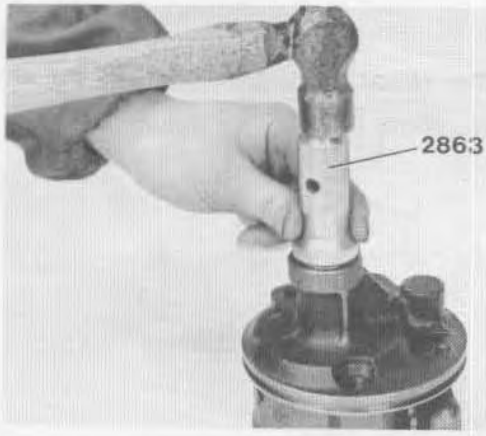
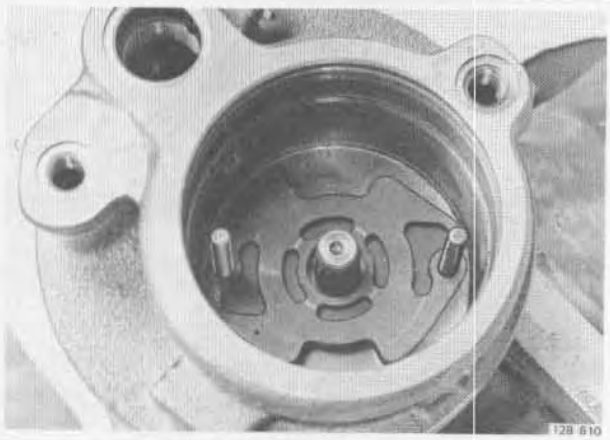


Assembling power steering pump Saginaw

N1

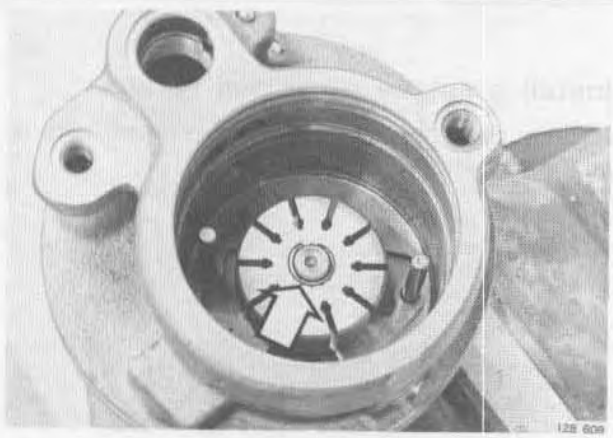
Press in the shaft seal.

Use drift 2863.



N2

Install thrust plate and dowel pins.



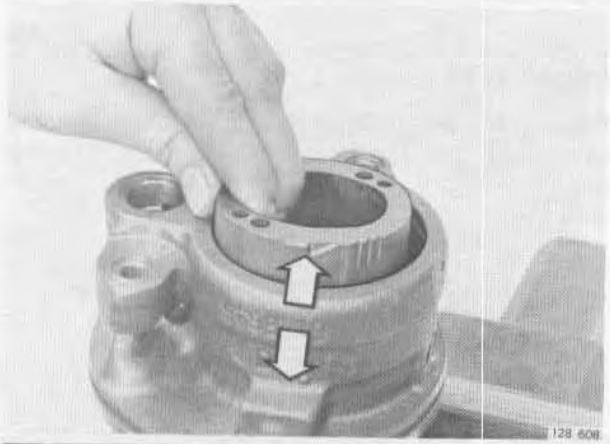
N3

Install rotor.

Install the rotor without vanes. Then install shims to equal the play noted in operation M1 minus 0.10 mm.
Shims available:

P/N	Thickness
1272 634	0.05 mm
1272 635	0.10 mm
1272 636	0.20 mm
1272 637	0.30 mm

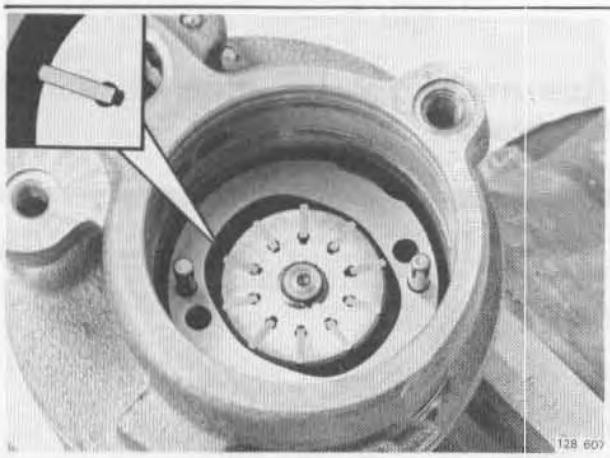
Install the snap ring, rounded edge **IN.**



N4

Install rotor ring.

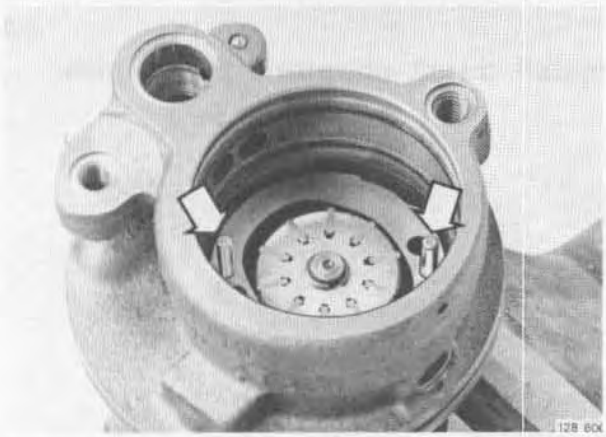
The ring marking **UP** and toward the boss on the housing.



N5

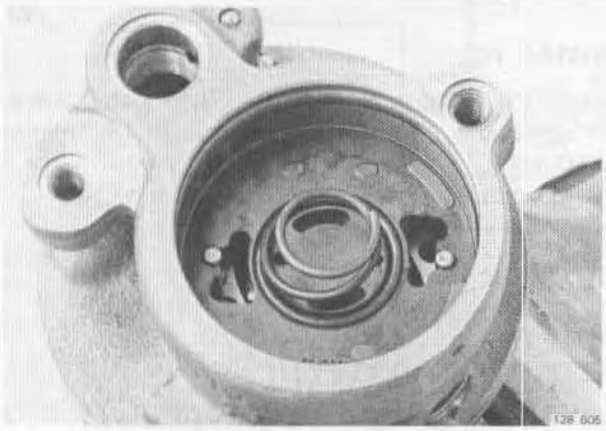
Install the rotor vanes.

The rounded edges of the vanes should face **OUT**.



N6

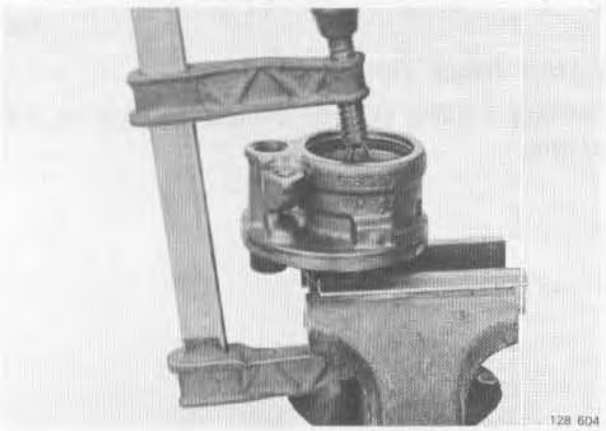
Install the two O-rings.



N7

Install pressure plate and spring.

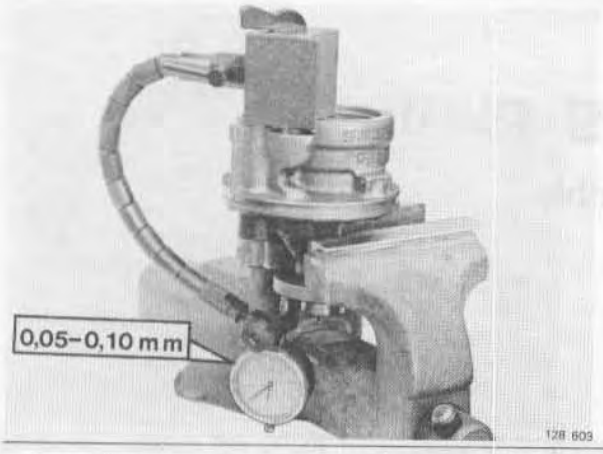
Position the pressure plate so the dowel pins fit in the recesses.



N8

Install end cover.

Position the pump housing in a vise. Use a clamp to press in the cover while installing the retaining ring.



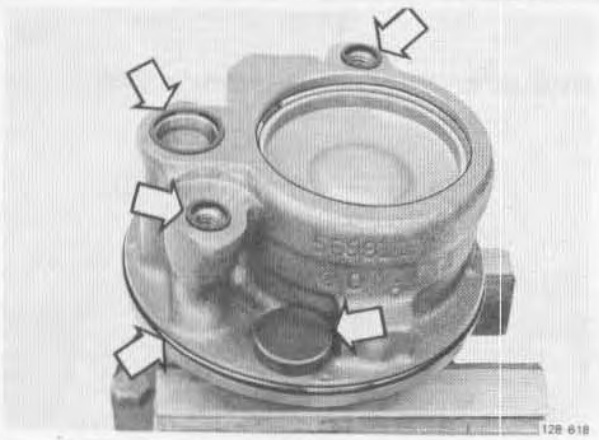
N9

Check end play.

Use dial gauge. Correct end play:
0.05–0.10 mm = 0.002–0.004".

N10

Install flow control valve and spring.



N11

Install O-rings and magnet.

The magnet will collect ferric particles which may be suspended in the oil.

N12

Install the oil reservoir.

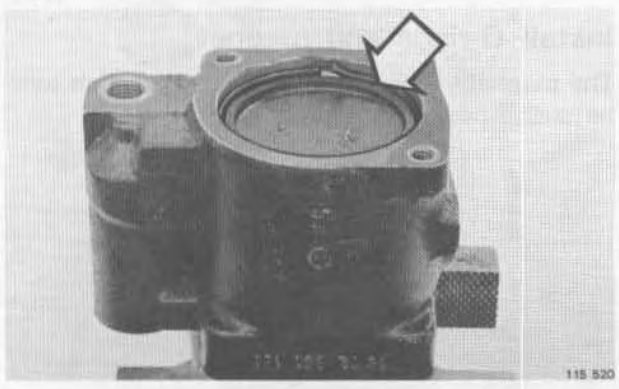
Oil the O-rings (ATF). Install the oil reservoir, with a new O-ring.

Power steering pump ZF

Disassembly

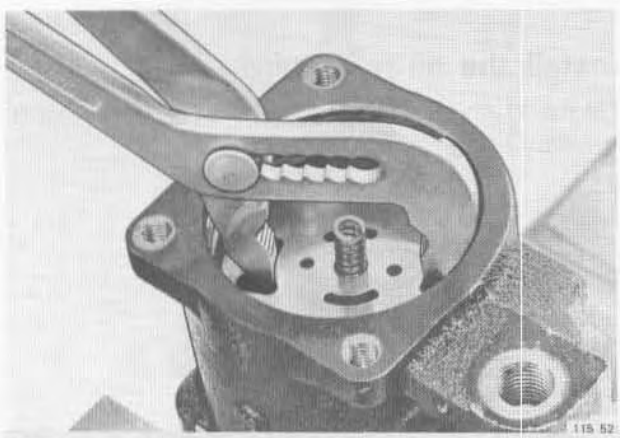
01

Remove front seal.



02

Remove snap ring and rear cover.



03

Remove spring and pressure plate.

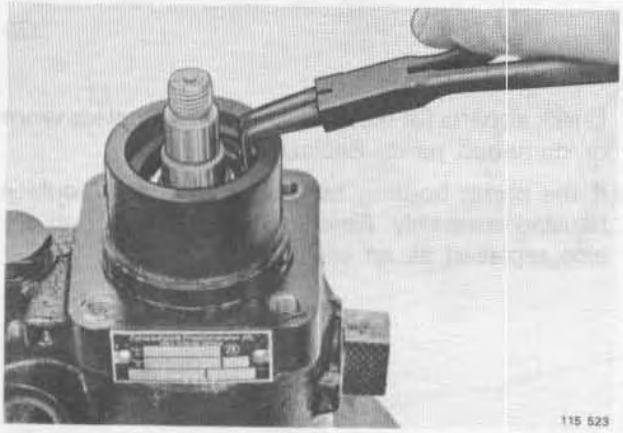
Use pliers to remove the pressure plate.

04

Remove rotor and cam ring.

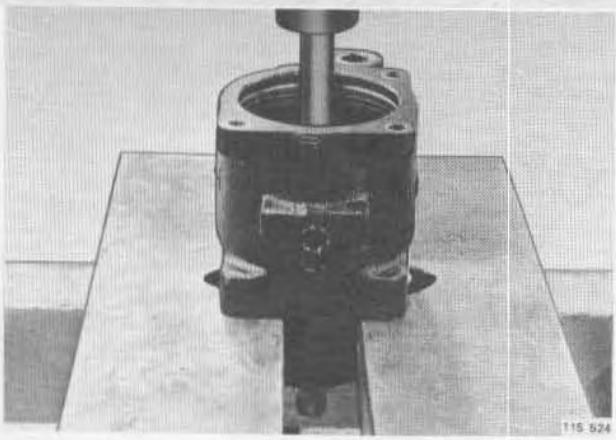
Turn pump over, tap lightly on end until parts fall free.

If the cam ring does not come loose, let it remain until later on.



05

Remove ball bearing retaining ring.



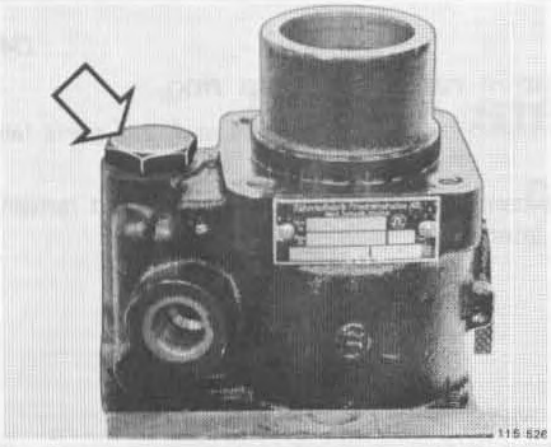
06

Press out the shaft.

07

Push out thrust ring.

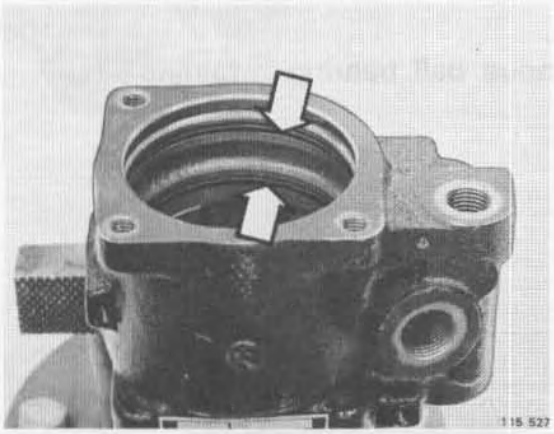
Also push out cam ring, if remaining.



08

Remove plug, control valve and spring.

Hex 27 mm.



09

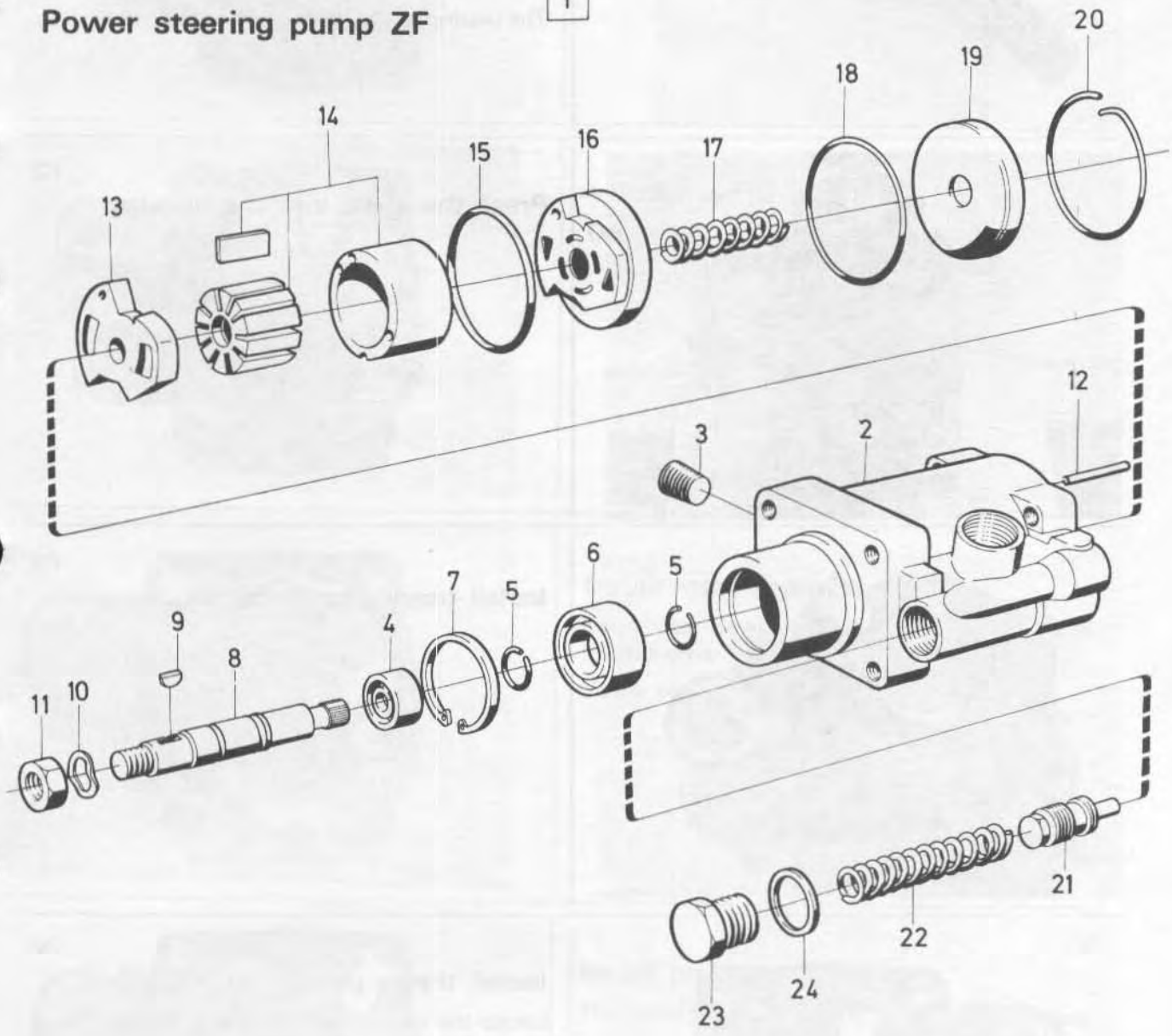
Remove O-rings.

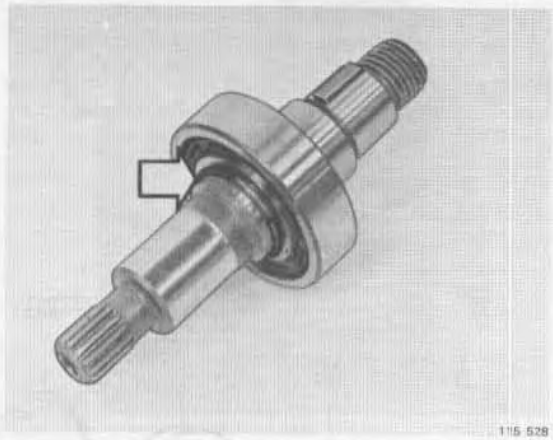
Check all parts for wear and scratches. Replace worn or damaged parts. Replace all O-rings.

If the pump housing bushing is defective, replace housing assembly. Rotor, vanes and cam ring are also replaced as an assembly.

Power steering pump ZF

1



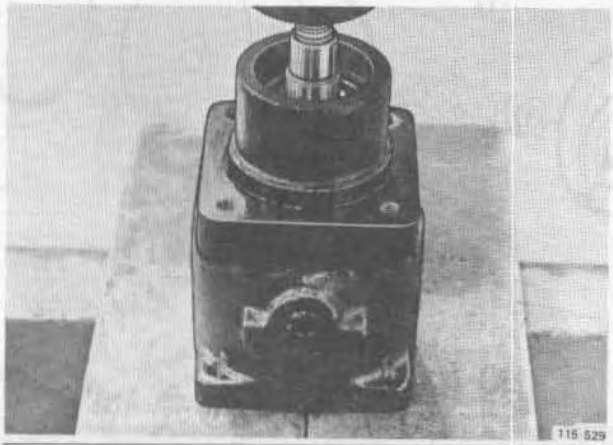


Assembling power steering pump ZF

P1

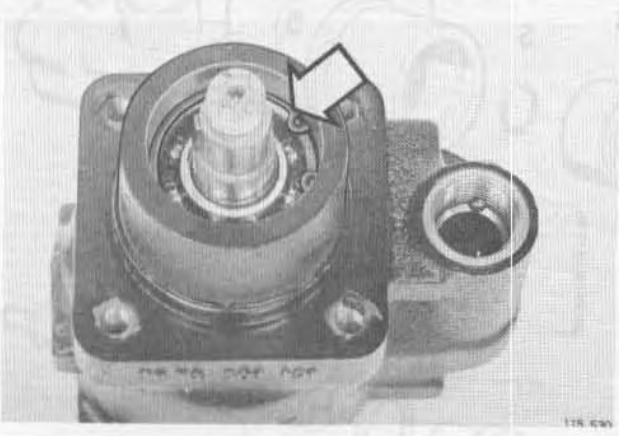
Install bearing on shaft.
(if replaced)

The bearing is retained by snap rings on both sides.



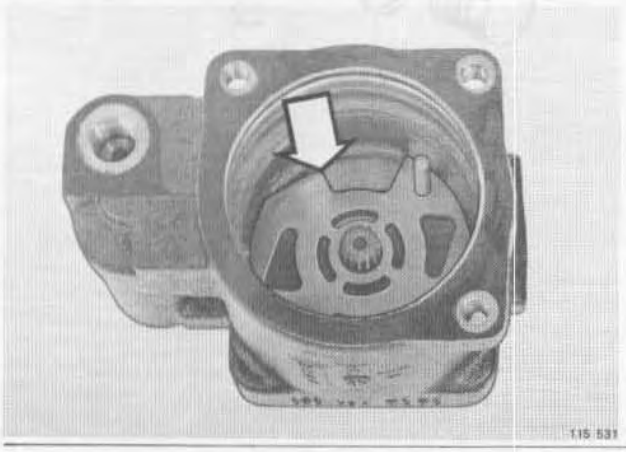
P2

Press the shaft into the housing.



P3

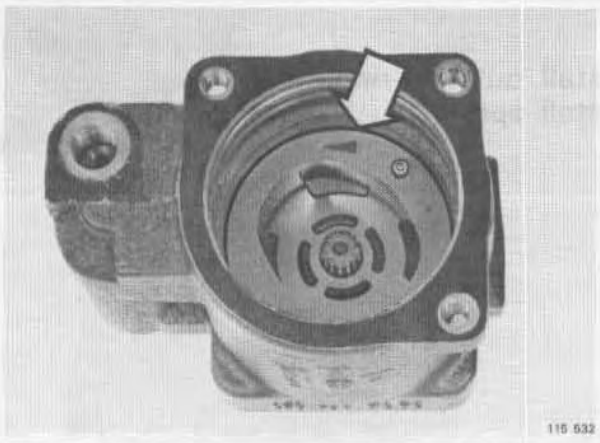
Install bearing retaining ring.



P4

Install thrust plate.

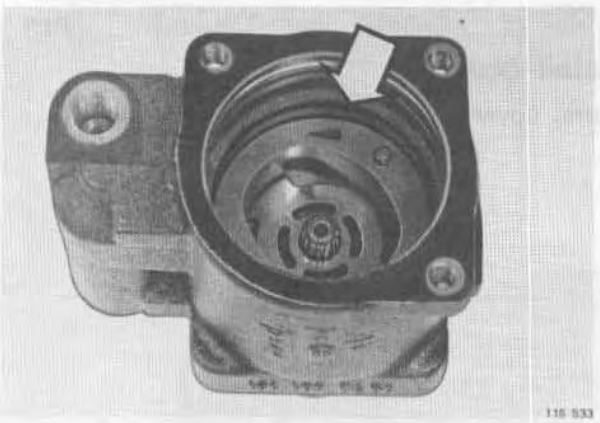
Locate the thrust plate with the dowel pin in one of the holes.



P5

Install the cam ring.

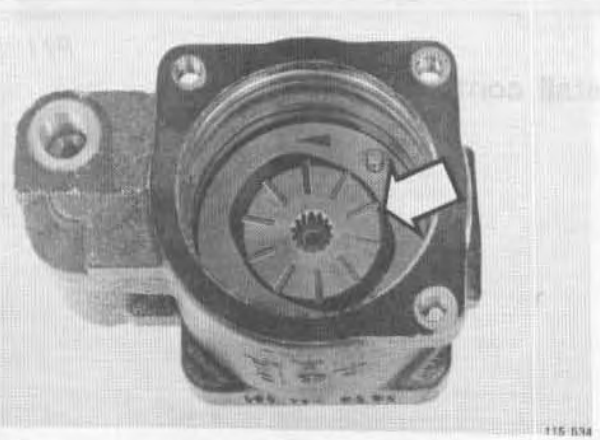
Install on dowel, arrow **UP**.



P6

Install inner O-ring.

One of the O-rings is smaller.

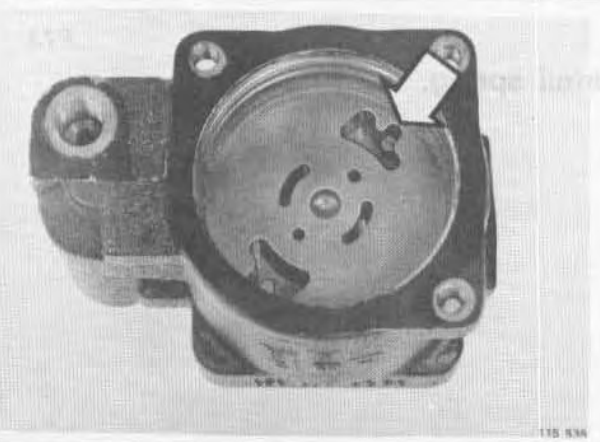


P7

Install rotor assembly.

Install with recessed round shaft hole **DOWN**, toward drive side.

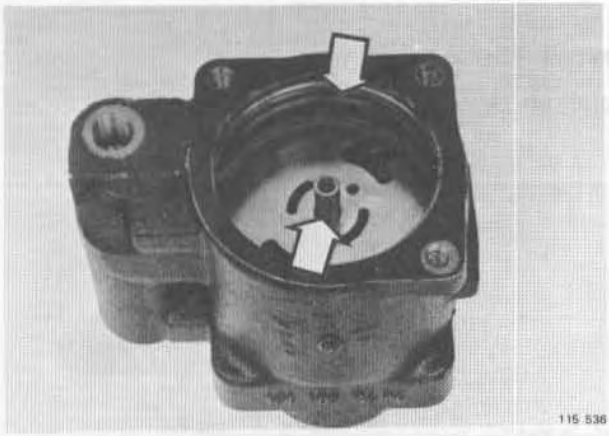
Vanes with rounded ends toward cam ring.



P8

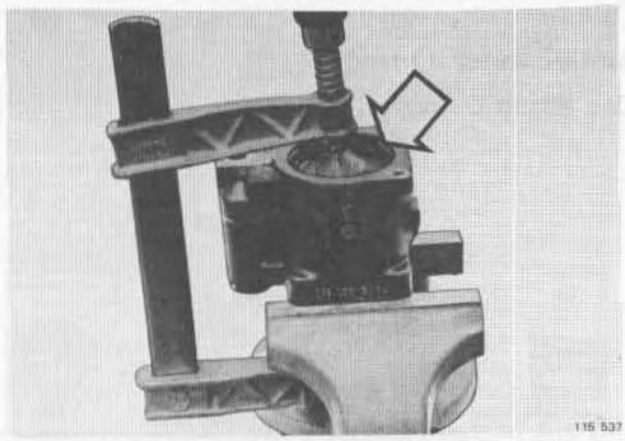
Install pressure plate.

The dowel pin should align in one of the outer holes.



P9

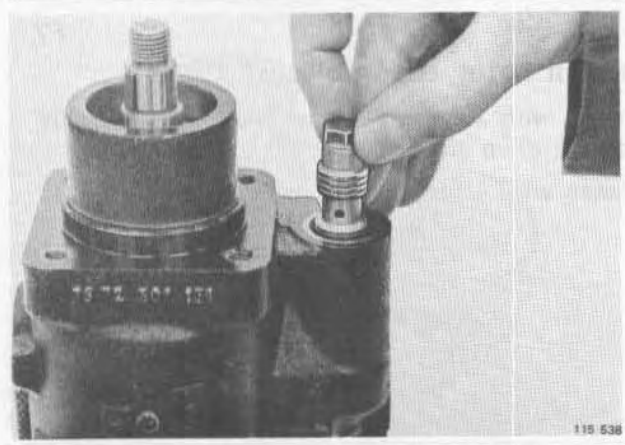
Install outer O-ring.
Install spring.



P10

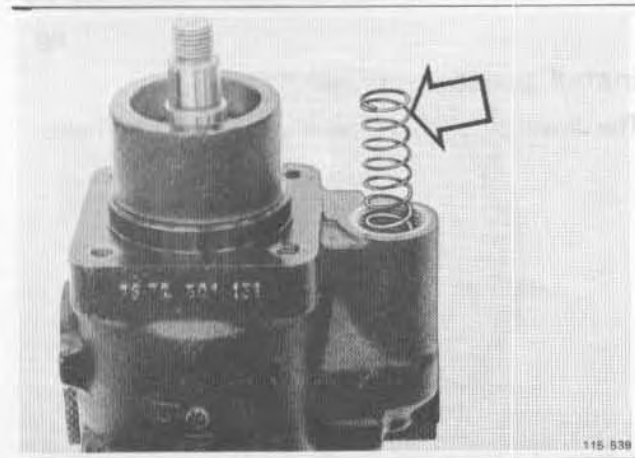
Install cover.

Clamp cover when installing retaining ring.



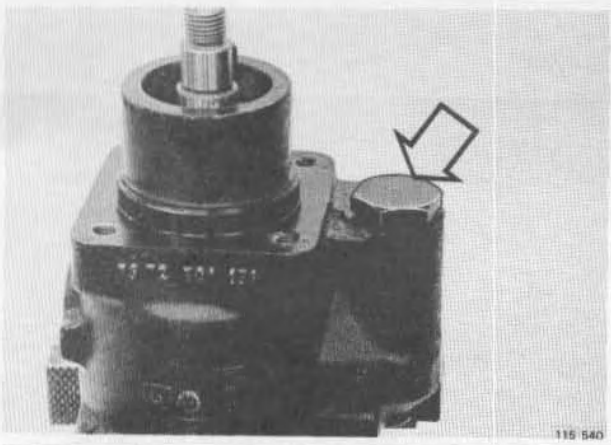
P11

Install control valve.



P12

Install spring.

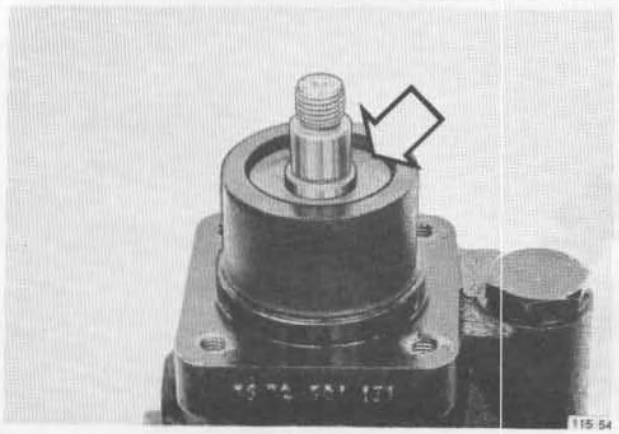


P13

Install the plug

Use a new copper seal.

Hex 27 mm.



P14

Install the shaft seal

Tap lightly until the seal is properly seated.

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