Brake
Hydraulic Components
Regulator
Booster

Quick Data

WARNING

Friction materials such as brake and clutch linings or brake pads may contain asbestos fibers.

Do not create dust by grinding, sanding or by cleaning with compressed air.

Avoid breathing asbestos fibers and asbestos dust.

Breathing asbestos may result in serious diseases, such as asbestosis or cancer.

Breathing asbestos may cause severe injury and death.

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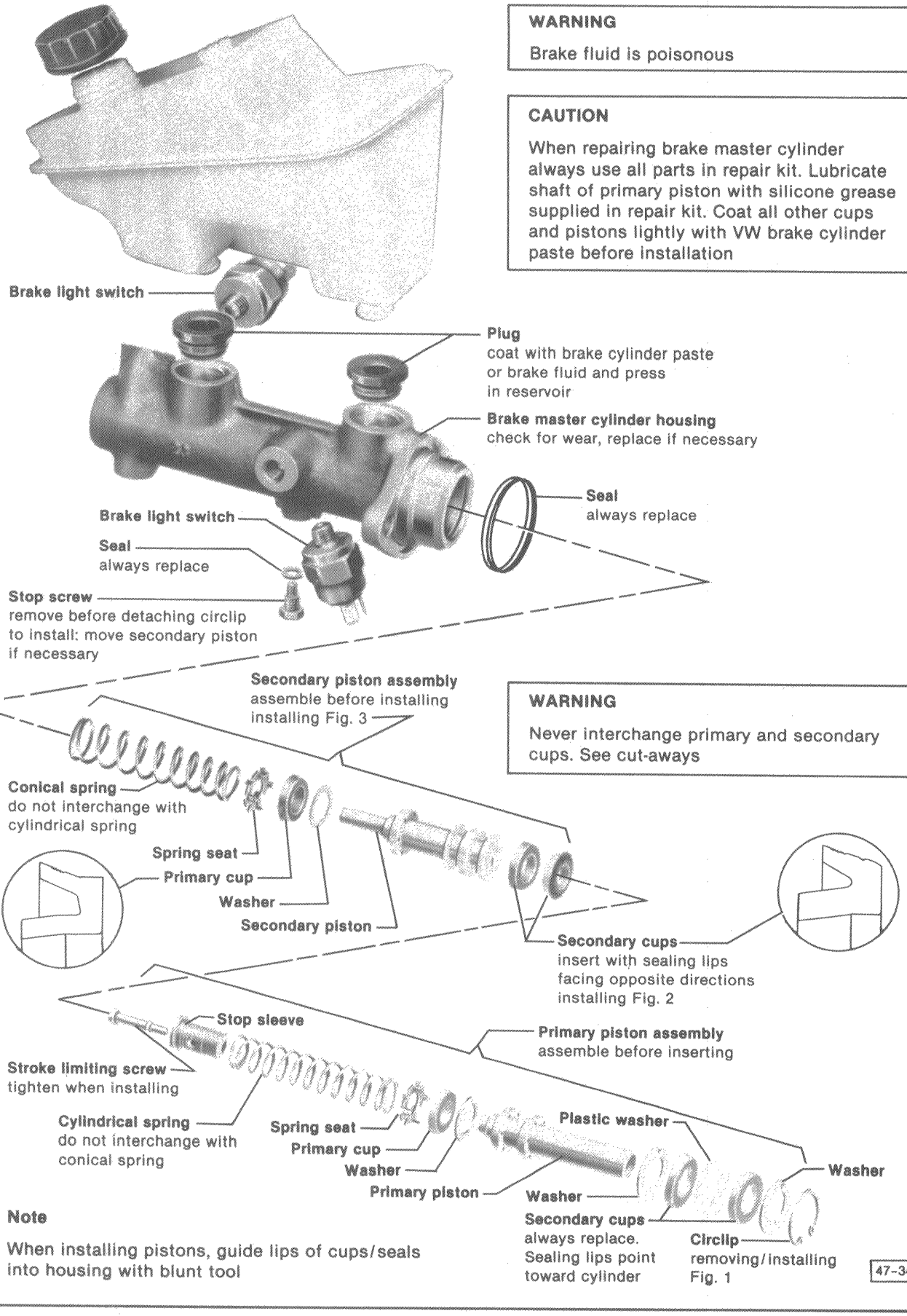
WARNING

Brake fluid is poisonous

CAUTION

When repairing brake master cylinder always use all parts in repair kit. Lubricate shaft of primary piston with silicone grease supplied in repair kit. Coat all other cups and pistons lightly with VW brake cylinder paste before installation



WARNING

Never interchange primary and secondary cups. See cut-aways

Note

When installing pistons, guide lips of cups/seals into housing with blunt tool

Note

DOT 4 brake fluid is now used in all production vehicles. The new fluid is recommended for all Volkswagen brake systems and is completely compatible with the previous DOT 3 fluid.

DOT 4 brake fluid has been phased into the spare parts program effective June, 1984.

The previous DOT 3 version brake fluid, Part No. ZVW 247 101, has been superseded to the new DOT 4 version, Part No. ZVW 239 102.

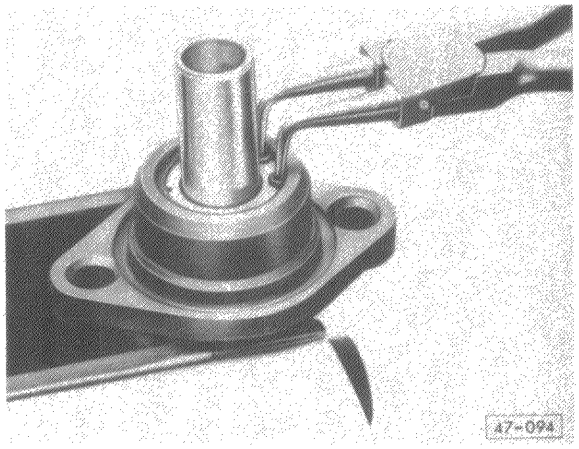


Fig. 1 Circlip, removing/installing

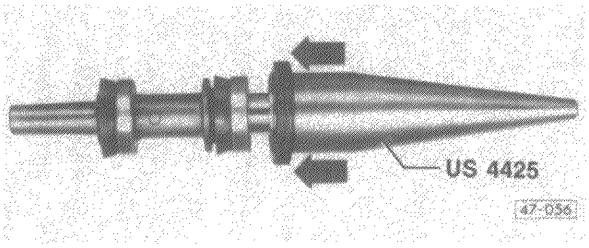


Fig. 2 Secondary cups, installing
- always use fitting sleeve US 4425

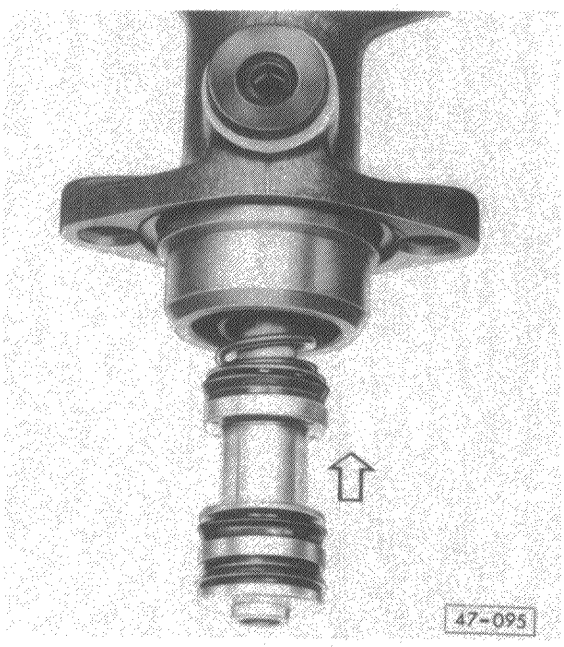


Fig. 3 Secondary piston, installing
— hold brake master cylinder with opening facing down
— guide lips of cups in carefully with blunt tool

Note

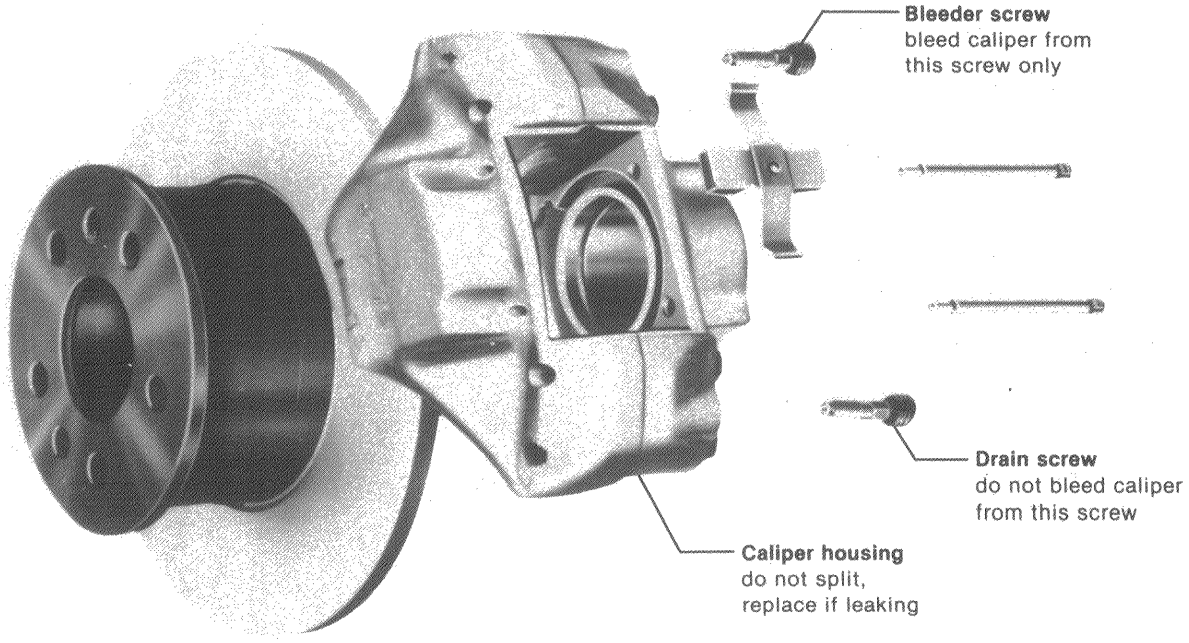
After installing brake master cylinder bleed brake system (see page 47.8)

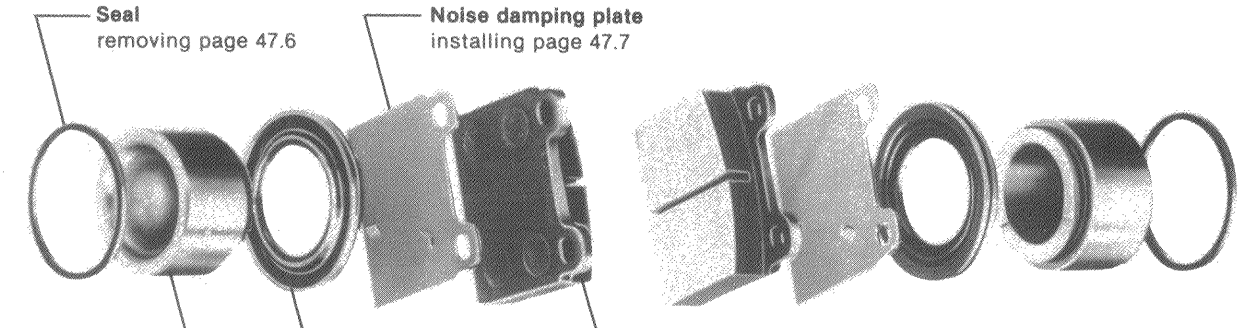
WARNING

Brake fluid is poisonous

CAUTION

Use all parts in repair kit. Coat seals and pistons lightly with VW brake cylinder paste or equivalent before installing





47-096

Note

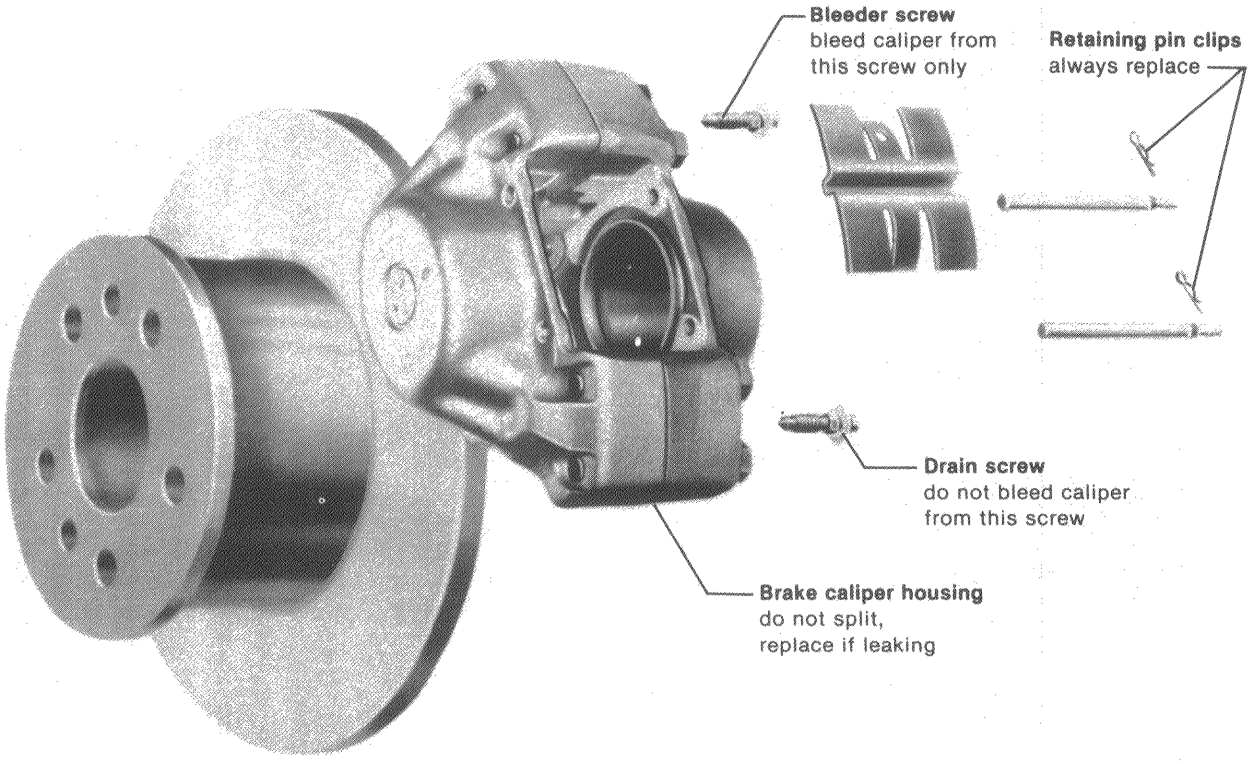
Cars may have either Teves or Girling calipers

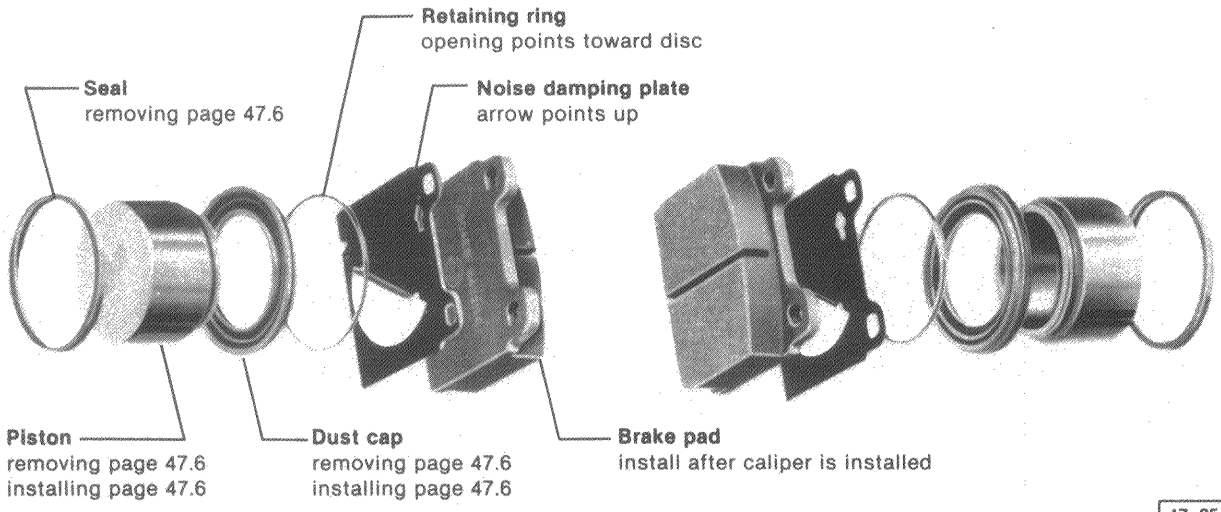
CAUTION

Use all parts in repair kit. Coat seals and pistons lightly with VW brake cylinder paste or equivalent before installing

WARNING

Brake fluid is poisonous



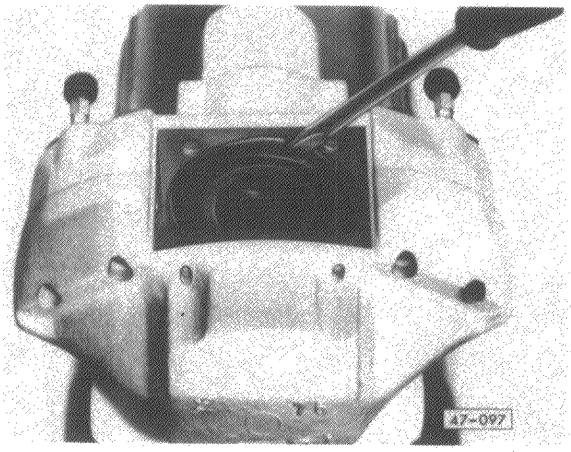


Note

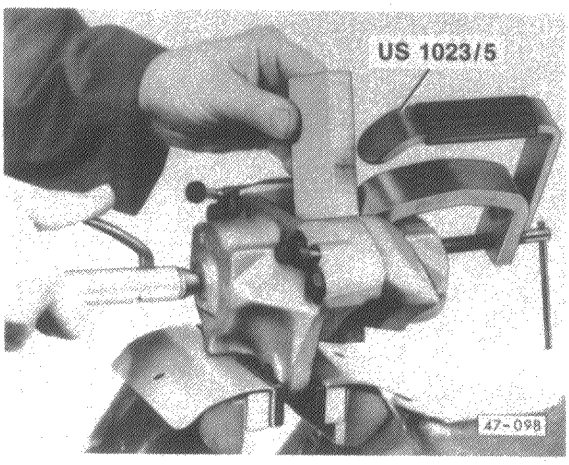
Cars may have either Girling or Teves calipers

Brake caliper, disassembling

Work sequence



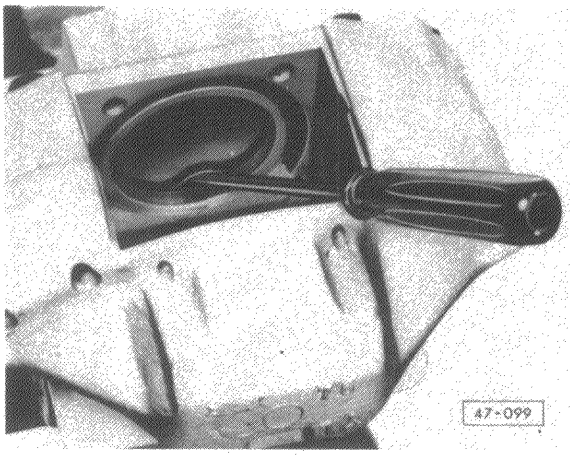
— pry dust cap out without scratching piston



— blow out piston with compressed air

Note

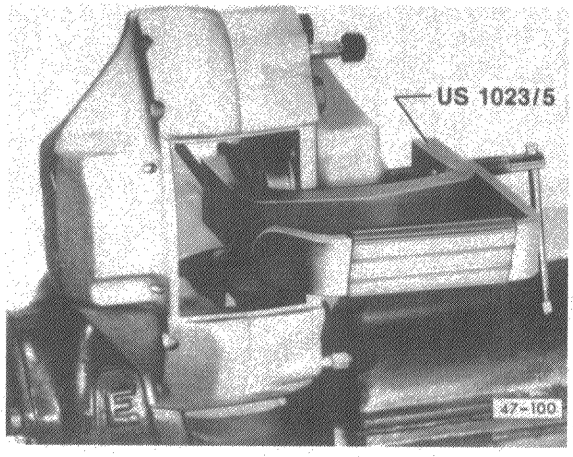
Hold other piston with clamp US 1023/5. Place wooden block in caliper to prevent damage to piston



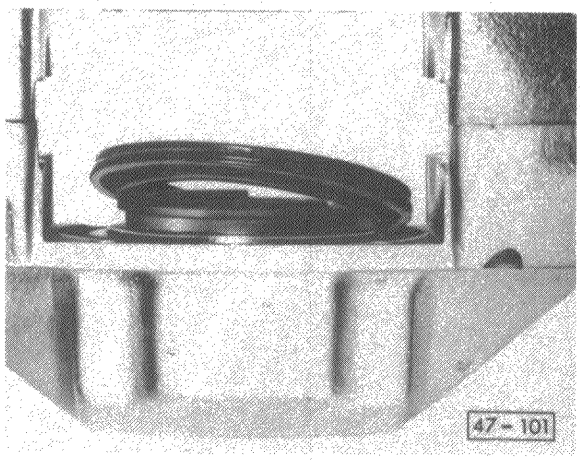
— remove seal without scratching cylinder

Brake caliper, assembling

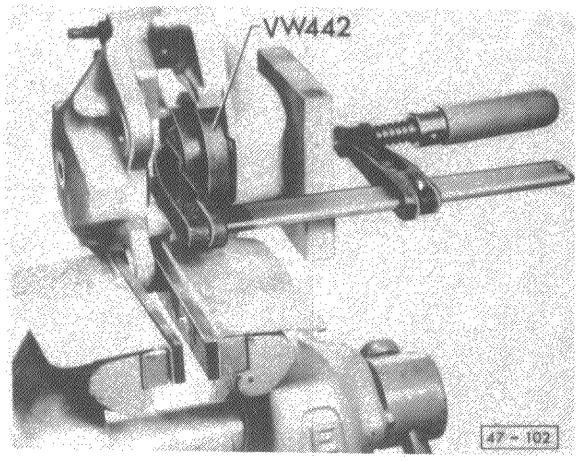
Work sequence



— install seal
— lubricate piston and cylinder bore lightly with brake cylinder paste
— press in piston with installing clamp



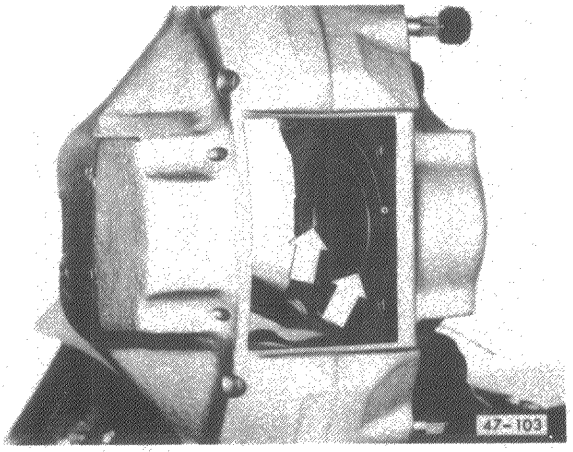
— install dust cap by hand



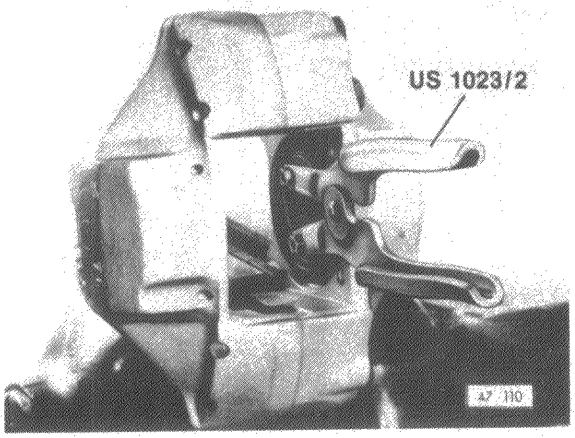
— press dust cap with VW 442 against recess
• piston is now fully seated
— Teves caliper, continue on next page

Noise damping plates, installing
(Teves caliper)

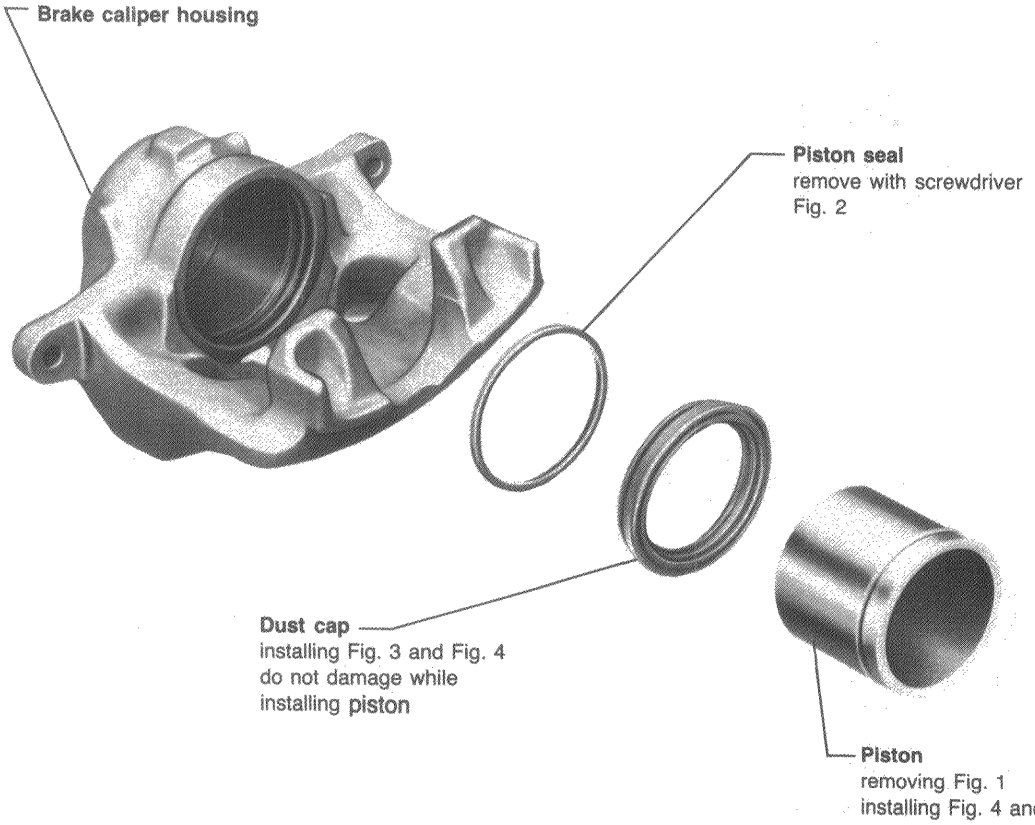
Work sequence



— insert noise damping plates and check position of piston
- recess in piston (arrows) point against direction of brake disc rotation when moving forward. Lugs on noise damping plates engage in recess on piston



— if necessary readjust position of piston by using turning pliers US 1023/2



CAUTION

Use all parts in repair kit. Coat seals and pistons lightly with VW brake cylinder paste or equivalent before installing.

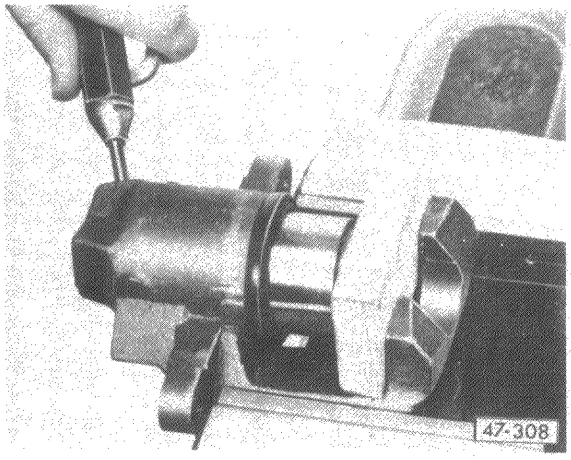


Fig. 1 Caliper piston, removing with compressed air

Note

Place a wooden block in caliper to prevent damage to piston.

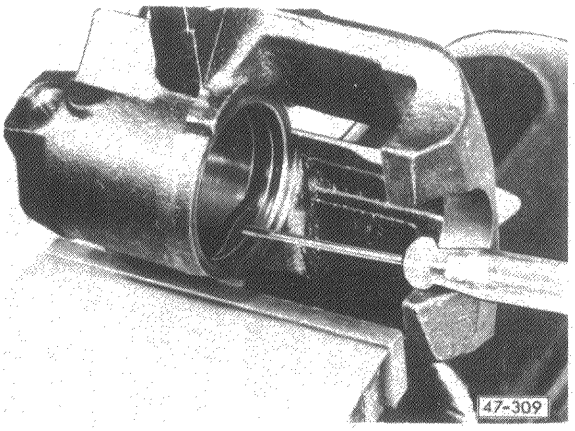


Fig. 2 Piston seal, removing

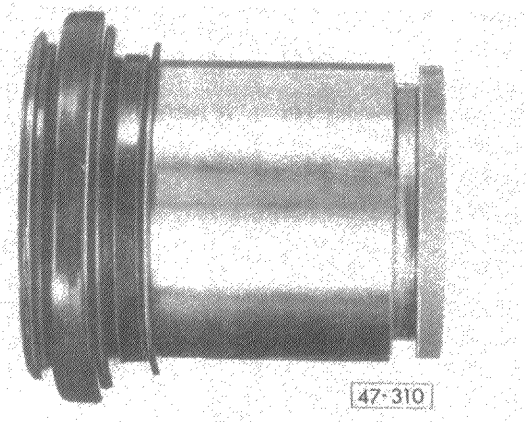


Fig. 3 Dust cap, installing

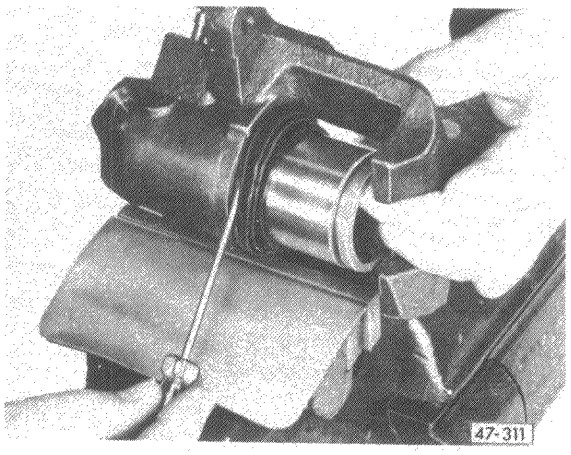


Fig. 4 Piston and dust cap, installing

— insert inner lip of cap into groove in cylinder while holding piston

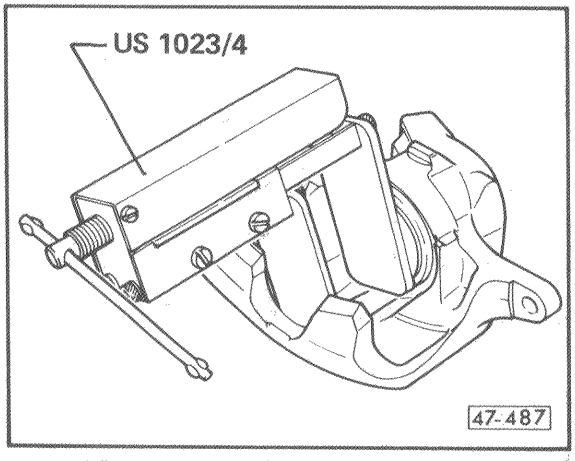


Fig. 5 Piston, installing

— press piston as far as it will go

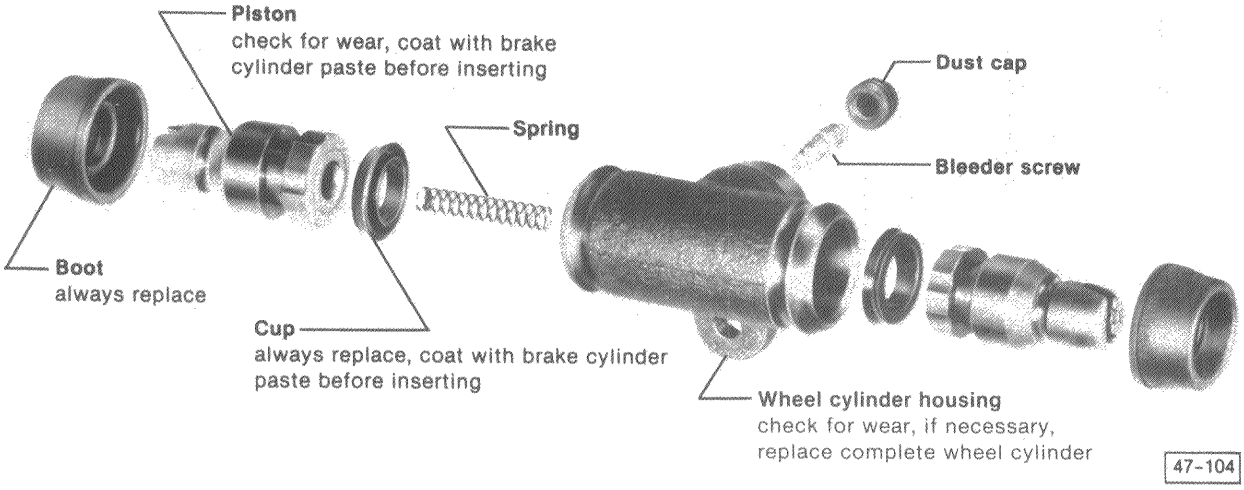
CAUTION

Outer lip of dust cap must slip into groove in piston.

Rear wheel cylinder, disassembling/assembling

CAUTION

When repairing wheel cylinders always use all parts of repair kit



Brake system bleeding

WARNING

Brake fluid is poisonous

Bleeding sequence

1 — Right rear wheel cylinder
2 — Left rear wheel cylinder
3 — Right front caliper (upper screw)
4 — Left front caliper (upper screw)

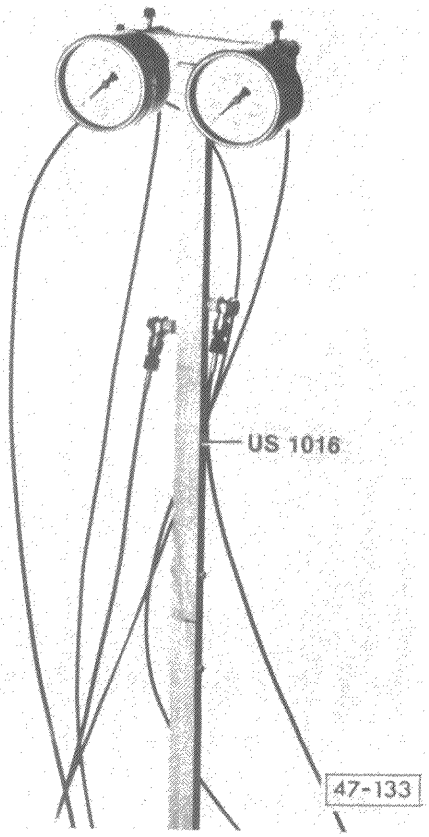
— after bleeding, fill reservoir to maximum mark

CAUTION

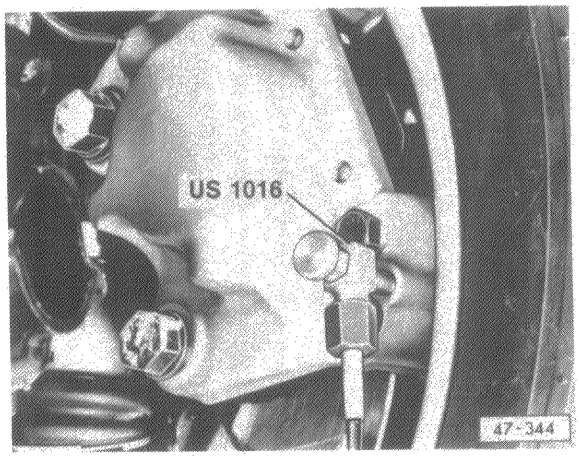
Brake fluid must not come into contact with paint
Brake fluid absorbs moisture from air and must be replaced every 2 years.
Only use new DOT 3 or DOT 4 brake fluid according to SAE recommendation J 1703 and conforming to MOTOR VEHICLE SAFETY STANDARD 116. Do not add or mix DOT 5 silicone type brake fluid with brake fluid in car as severe component corrosion may result. Such corrosion could lead to brake system failure

Brake pressure regulator, checking

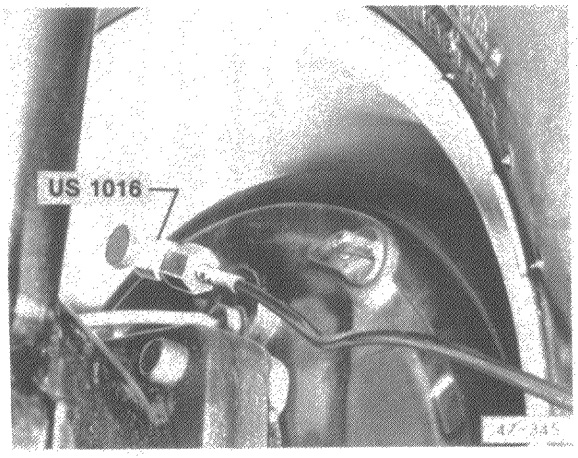
Work sequence



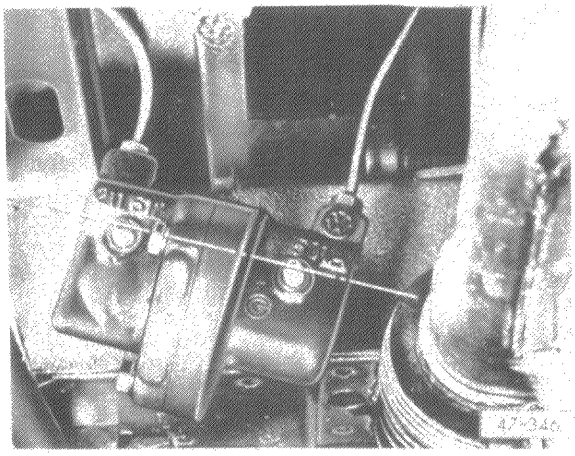
— lift vehicle with hoist
— go to next page



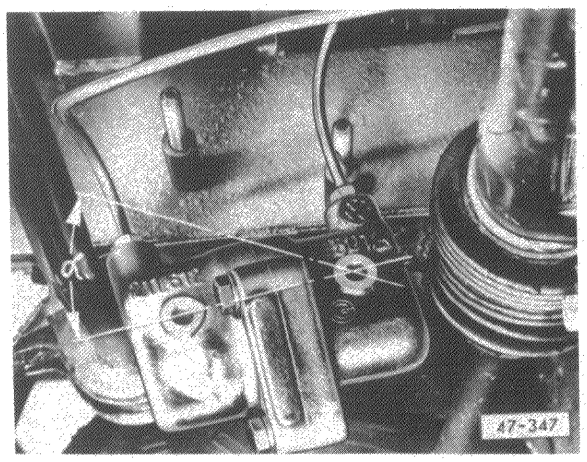
— connect gauge US 1016 to front brake caliper



— connect gauge US 1016 to rear wheel cylinder
— bleed both gauges
— depress brake pedal several times



— remove nuts holding regulator and remove regulator from studs
— press brake pedal until both gauges read 50 bar (725 psi)



— tilt regulator forward
• angle $\alpha = 30°$

CAUTION

Do not damage brake lines

— increase pressure on brake pedal until gauge connected to front brake caliper reads 100 bar (1450 psi)
• pressure at gauge connected to rear wheel cylinder must read 55-65 bar (798-943 psi)

if **NO**, replace brake pressure regulator

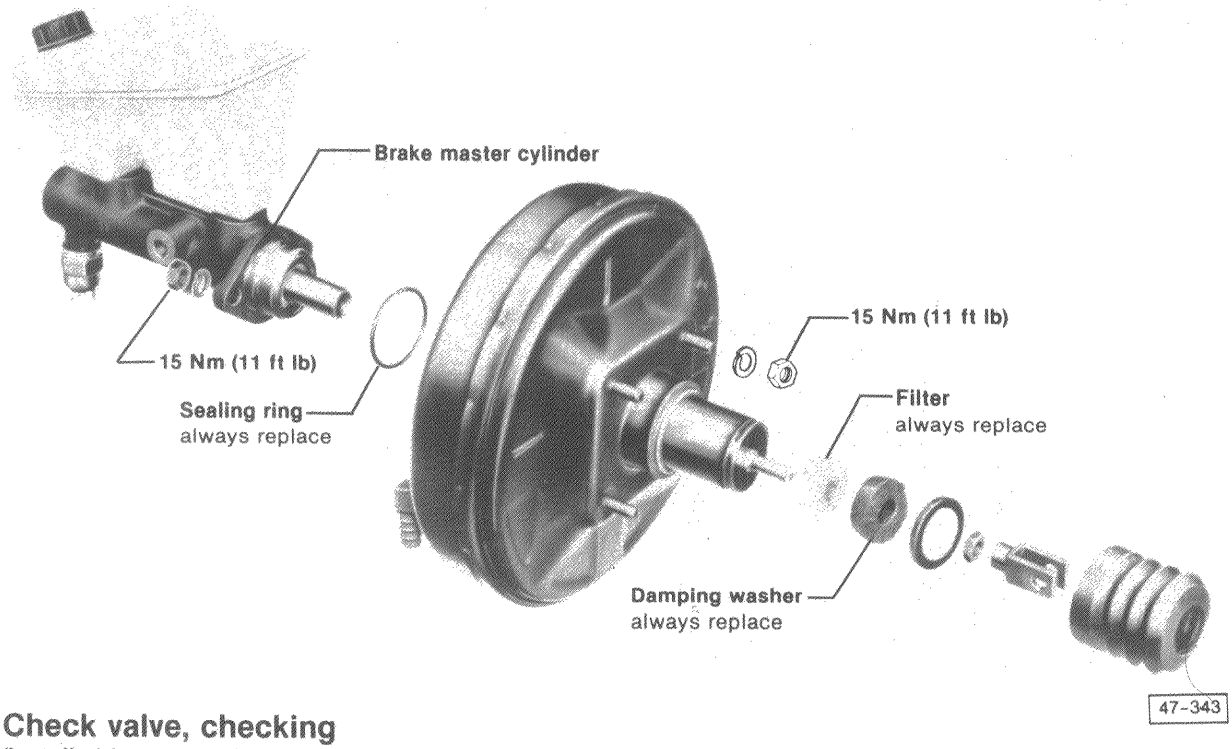
— reinstall regulator
— disconnect gauges
— bleed brakes

Brake booster, checking

— depress brake pedal firmly several times with engine off to exhaust vacuum in system
— depress pedal with medium pressure and hold
— start engine
  • if brake booster is working properly, pedal will fall slightly and then hold

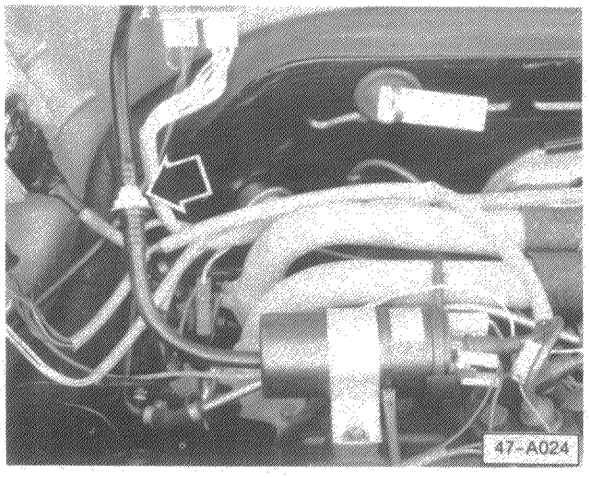
CAUTION

Do not repair brake booster.
If necessary, replace



Check valve, checking
(installed in vacuum hose)

Work sequence



— remove valve (arrow) from hose
— blow through valve in direction of arrow (on housing)
  • air must pass through valve
— blow through valve in opposite direction
  • no air must pass through valve

Quick Data

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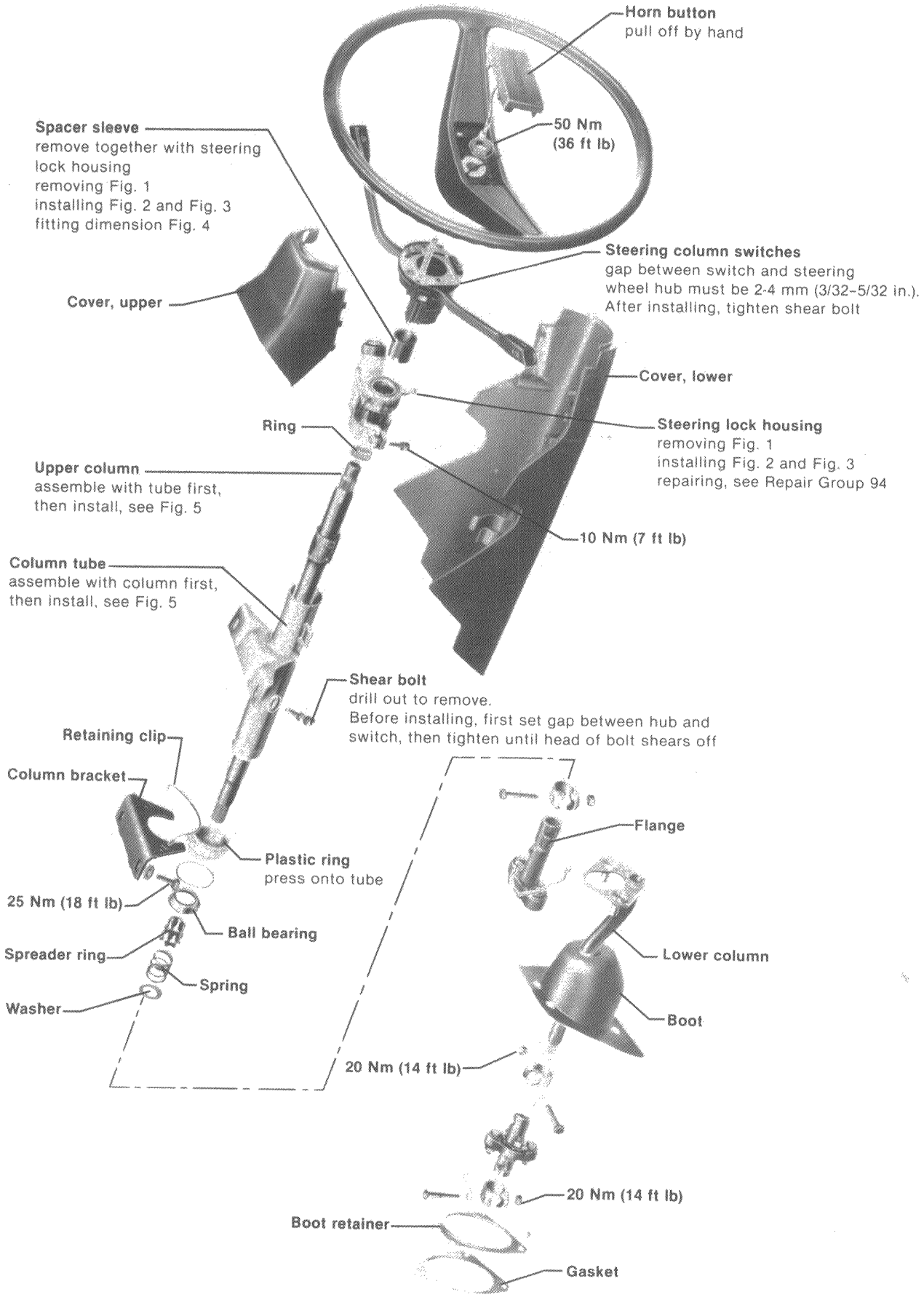

Horn button
pull off by hand
50 Nm
(36 ft lb)
Spacer sleeve
remove together with steering lock housing
removing Fig. 1
installing Fig. 2 and Fig. 3
fitting dimension Fig. 4
Steering column switches
gap between switch and steering wheel hub must be 2-4 mm (3/32-5/32 in.).
After installing, tighten shear bolt
Cover, upper
Cover, lower
Ring
Steering lock housing
removing Fig. 1
installing Fig. 2 and Fig. 3
repairing, see Repair Group 94
Upper column
assemble with tube first, then install, see Fig. 5
10 Nm (7 ft lb)
Column tube
assemble with column first, then install, see Fig. 5
Shear bolt
drill out to remove.
Before installing, first set gap between hub and switch, then tighten until head of bolt shears off
Retaining clip
Column bracket
Flange
Plastic ring
press onto tube
25 Nm (18 ft lb)
Ball bearing
Spreader ring
Lower column
Spring
Boot
Washer
20 Nm (14 ft lb)
20 Nm (14 ft lb)
Boot retainer
Gasket

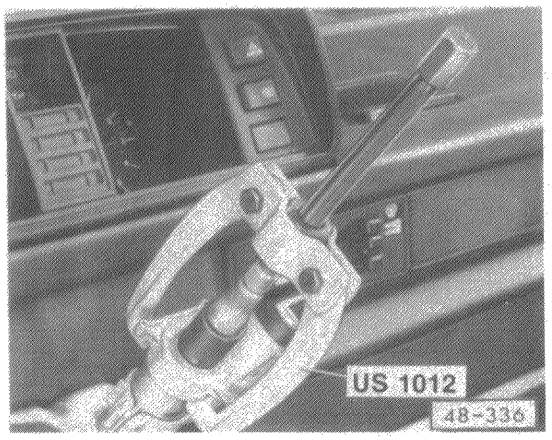


Fig. 1 **Steering lock housing, removing**

— pull off steering lock housing together with spacer sleeve

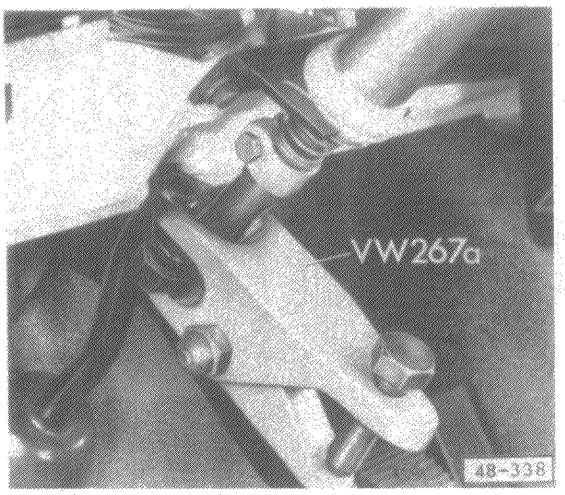


Fig. 2 **Steering lock housing / spacer sleeve, installing**

— when installing spacer sleeve, clamp steering column at top and bottom

Fig. 3 **Steering lock housing/spacer sleeve, installing**

— note dimension **a**, see Fig. 4

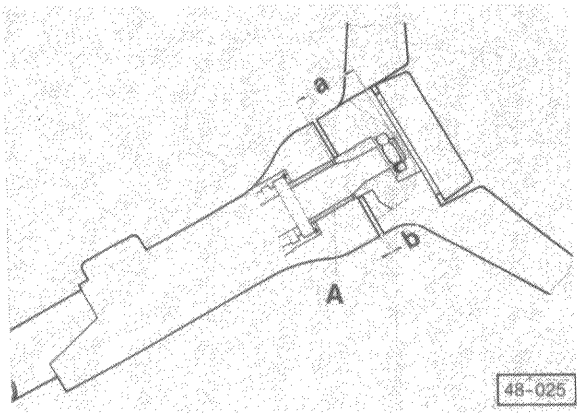


Fig. 4 **Spacer sleeve, installation dimension**

A = spacer sleeve
a = 41.5 mm (1.634 in.)
b = 2-4 mm (3/32-5/32 in.)

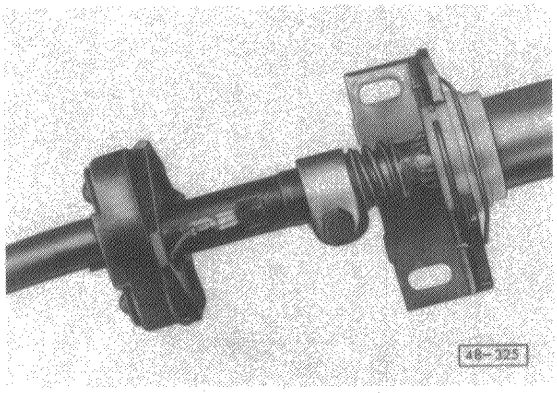


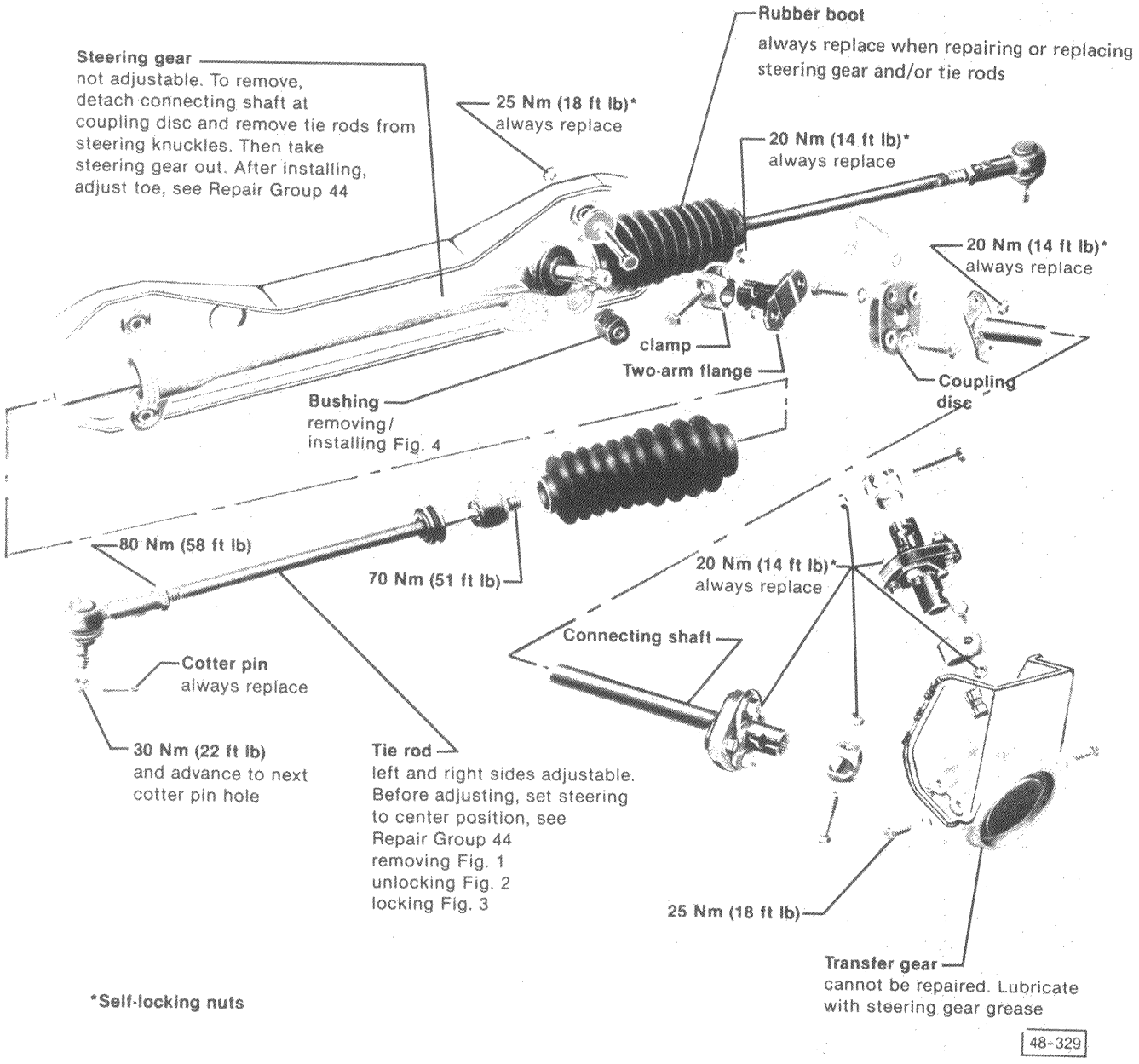
Fig. 5 **Upper steering column/column tube, assembling**

WARNING

Do not weld or straighten any steering components. Replace if damaged

CAUTION

Only use special steering gear grease Part No. AOF 063 000 04 to lubricate steering gear



*Self-locking nuts

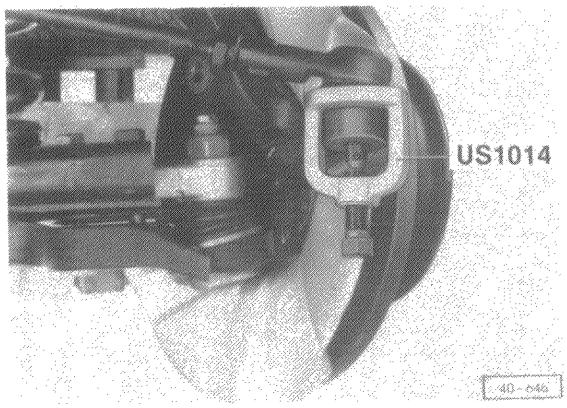


Fig. 1 Tie rod, removing

— press tie rod off steering knuckle

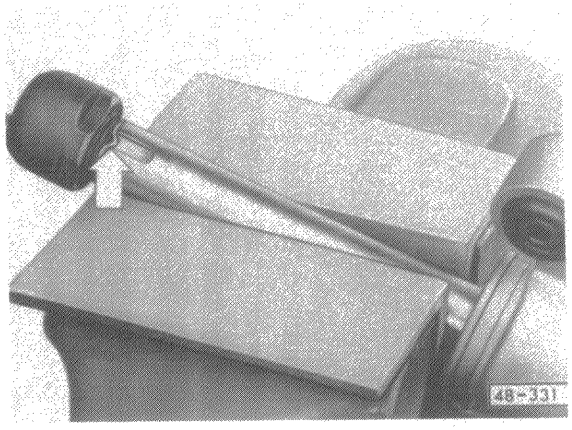


Fig. 2 Tie rod, unlocking

— unlock tie rod (arrow) from steering gear

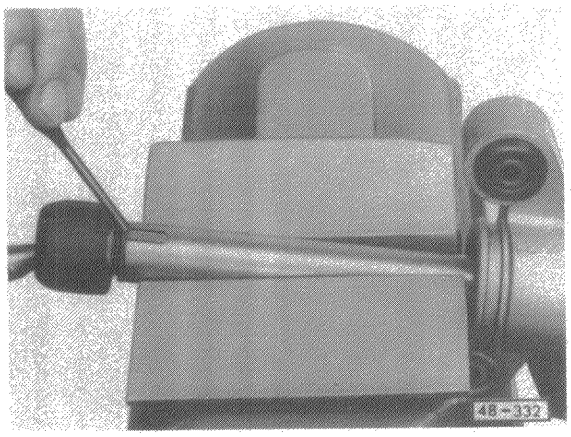


Fig. 3 Tie rod, locking

— tighten tie rod to 70 Nm (51 ft lb) and lock

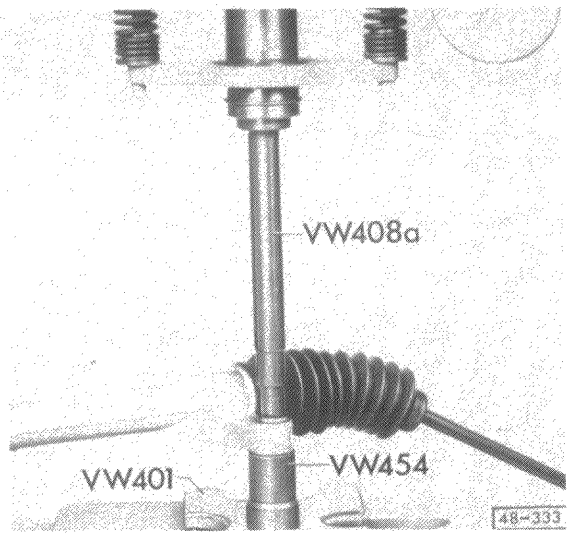


Fig. 4 Bushing, removing/installing

— press out or in as shown

- flat surface of bushings must be vertical when rack is installed in vehicle

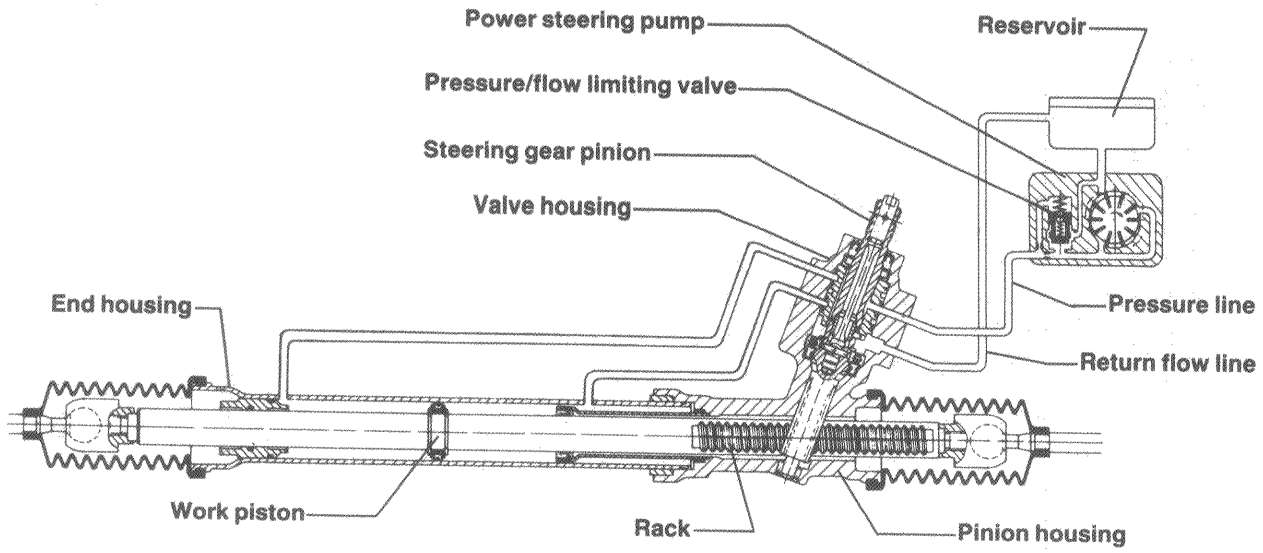
Suspension changes for power steering

- steering knuckles are different
- coupling disc (between steering gear pinion and transfer gear connecting shaft) has been replaced by universal joint

Technical data for power steering

Lubricant capacity	1.25L (1.3 US qt)
Type	ATF Dexron®
System pressure (at idle)	115-120 bar/1668-1740 psi

Power Steering System Layout

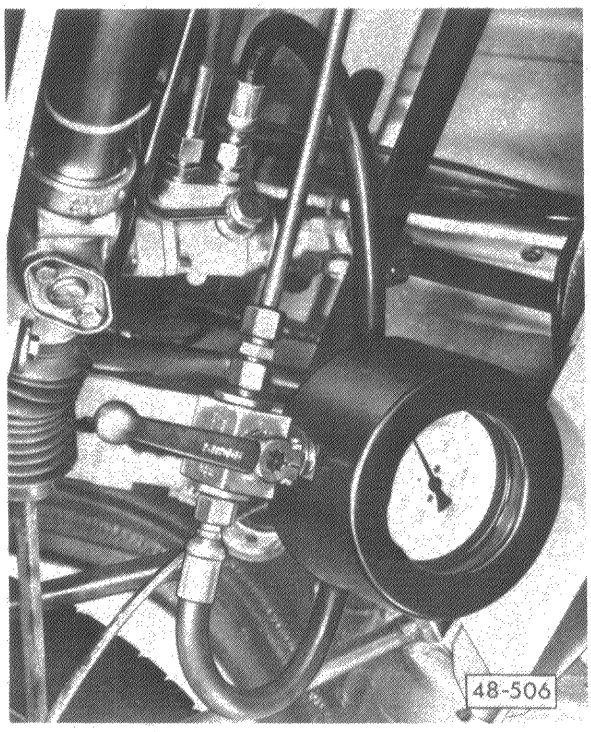


48—525

Steering System, checking for leaks (engine running)

— rotate steering wheel lock to lock and hold in position (no longer than 5 sec.)
— check all line connections and tighten if necessary
— if leak occurs at steering pinion, replace valve housing seal, pinion housing seal, and o-ring between valve housing and pinion housing
— if steering rack seals are leaking (pull boot off steering gear to check), disassemble steering gear and replace all sealing components (all parts marked with asterisk, see pages 48.10 and 48.11)
— check power steering pump for leaks

Power steering pump pressure, checking



— connect pressure gauge US 1074 B between pressure line and valve housing (valve in **open** position)

Note

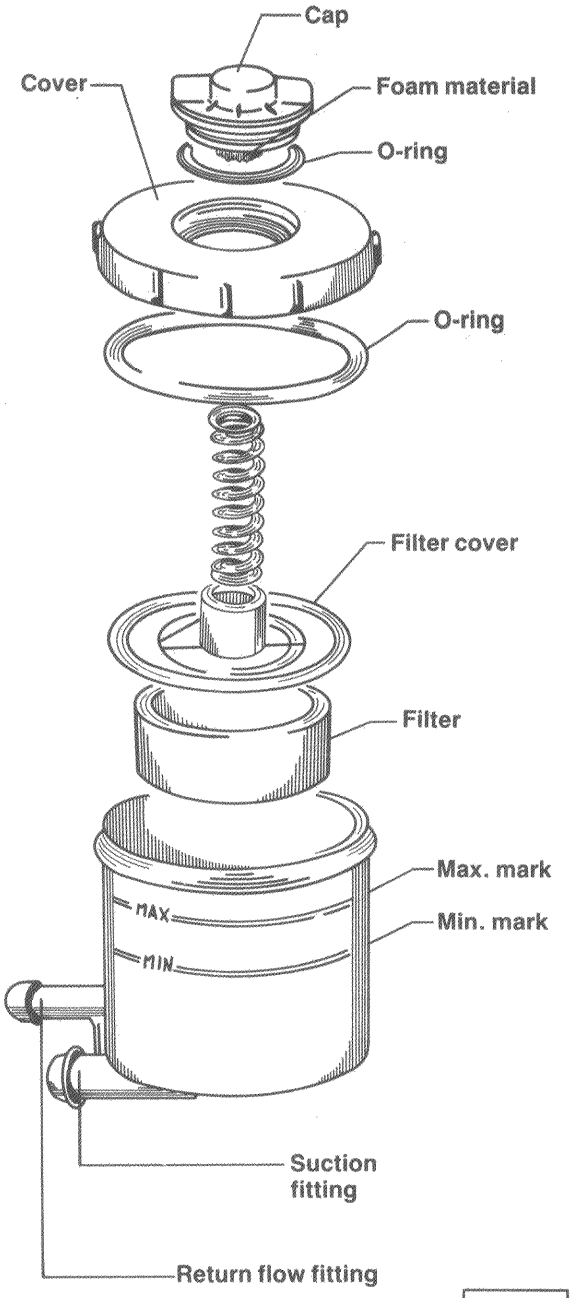
When installing gauge, turn it upwards as far as possible.

— start engine and run at idle
— top up ATF in reservoir if necessary
— close valve (no longer than 5 sec.)
— read pressure
  • 115-120 bar (1668-1740 psi)
— if pressure differs, check pressure/flow limiting valve, see page 48.17
— if pressure/flow limiting valve **OK**, replace power steering pump

Power steering system, filling/bleeding

CAUTION

If ATF level is too low, always check power steering system for leaks. Always fill and bleed power steering system with ATF after opening system for repair. Do **not** reuse fluid which has been drained. Always replace power steering filter in reservoir when changing ATF.



Power steering reservoir

— fill power steering reservoir to **MAX** with ATF
— lift front of vehicle
— with engine **off,** rotate steering wheel from lock to lock
— top up reservoir to **MAX** mark
— start engine briefly several times (switch **OFF** immediately after engine starts)
— add ATF until level is maintained at **MAX** mark

CAUTION

Do **not** allow reservoir to be pumped dry.

— when ATF level no longer drops, start and run engine
— rotate steering wheel lock to lock several times

Note

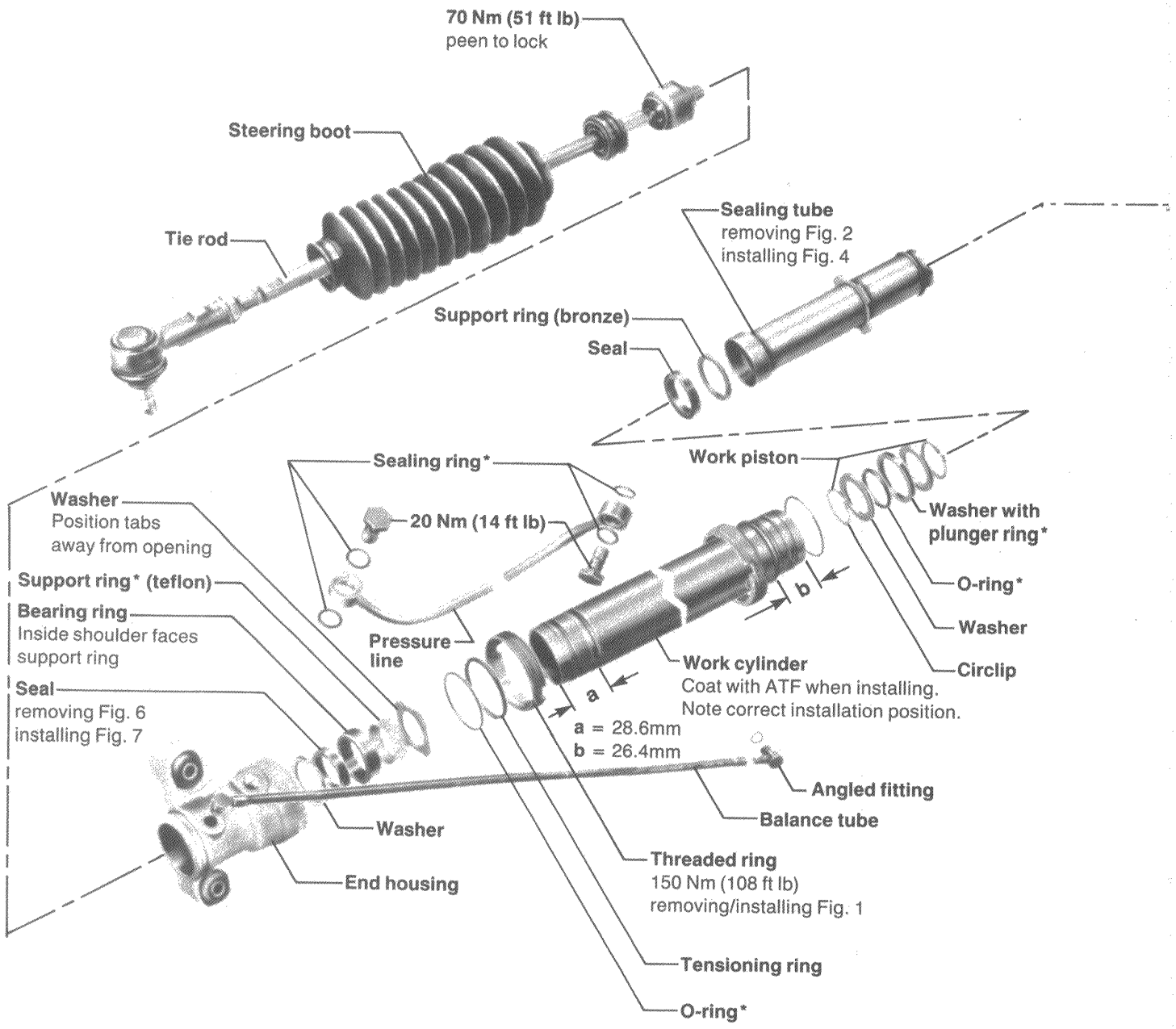
Do not use more force on steering wheel than necessary to turn wheel.

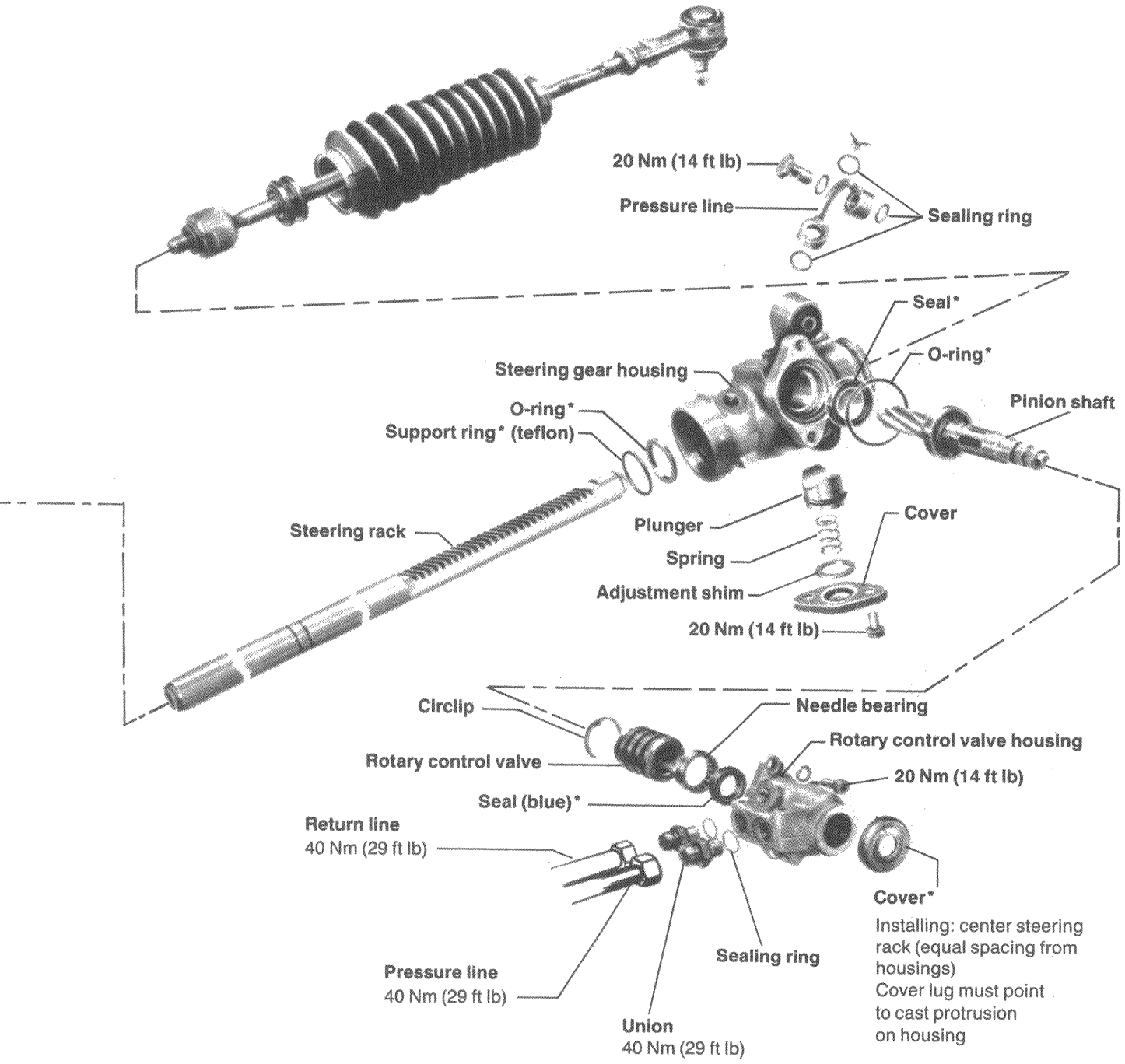
— add more ATF if level drops below **MAX** mark
— check that no bubbles appear in reservoir and level remains constant

Steering gear assembly, repairing

Note

When repairing, replace all components marked with an asterisk.
Coat all sealing components with ATF when installing





Note

When repairing, replace all components marked with an asterisk.
Coat all sealing components with ATF when installing

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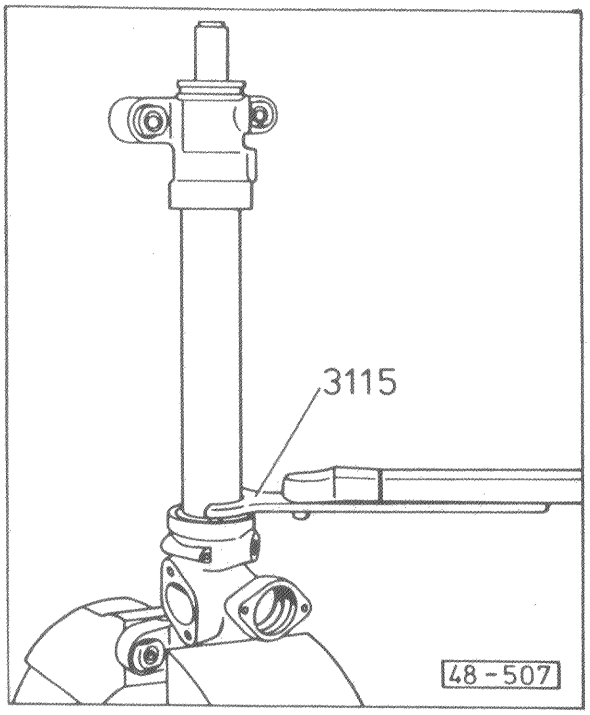


Fig. 1 Threaded rings, removing/installing

Note

Be sure to install work cylinder in proper position.
Check dimensions **a** and **b** (see page 6)
— after tightening to proper torque, peen ring in housing

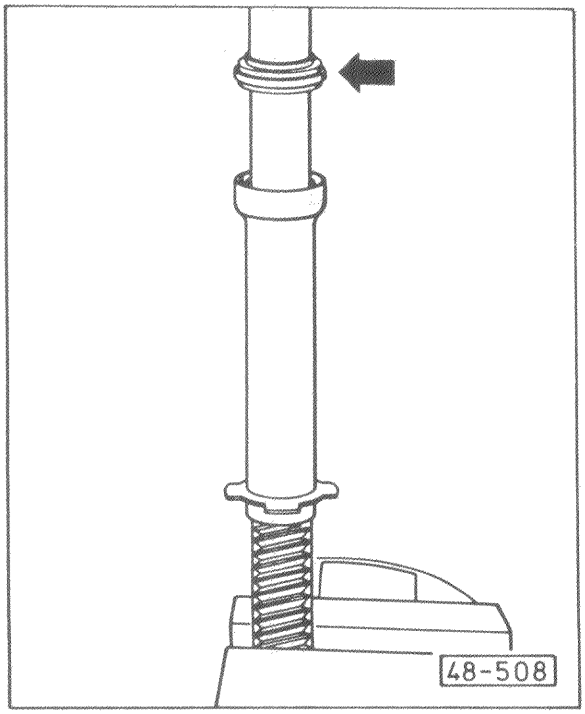


Fig. 2 Sealing tube, removing from rack

— clamp steering rack in vise using soft jaw covers to protect rack teeth
— remove work piston from rack

CAUTION

Do not damage rack surface while removing/installing circlips.

— remove tube from rack with swift motion
  • rack seal in tube will be ruined

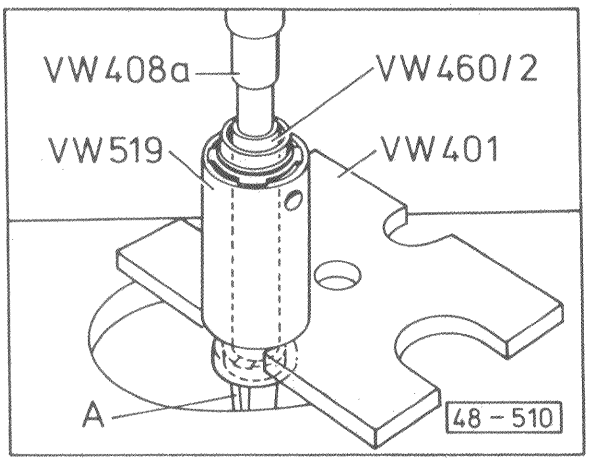


Fig. 3 Rack seal in tube, removing

• **A** = extractor Kukko No. 21/4

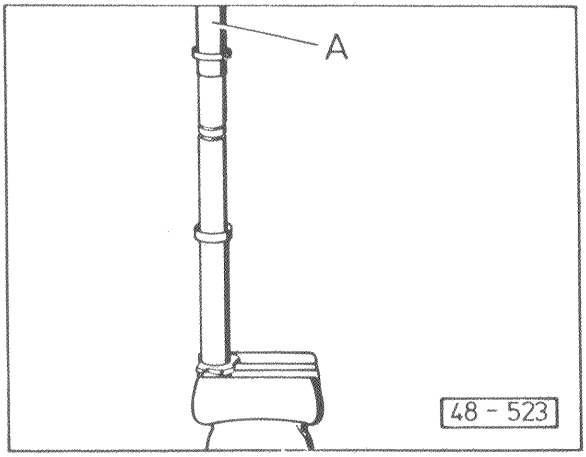


Fig. 4 Rack seal in tube, installing

— clamp steering rack in vise using soft jaw covers to protect rack teeth
— install sealing tube over rack
— install support ring in sealing tube
— slip seal onto rack using locally obtained seal protector **A** (thin plastic sheet, heavy paper)

Note

Open side of seal faces up.

— after seal and protector have been slid past circlip grooves of rack, remove seal protector

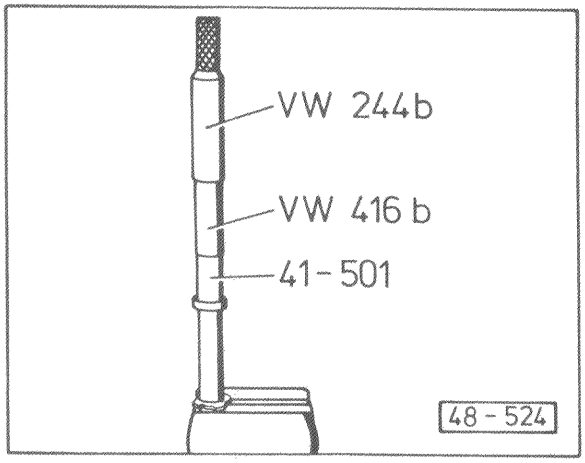


Fig. 5 Rack seal in tube, pressing in

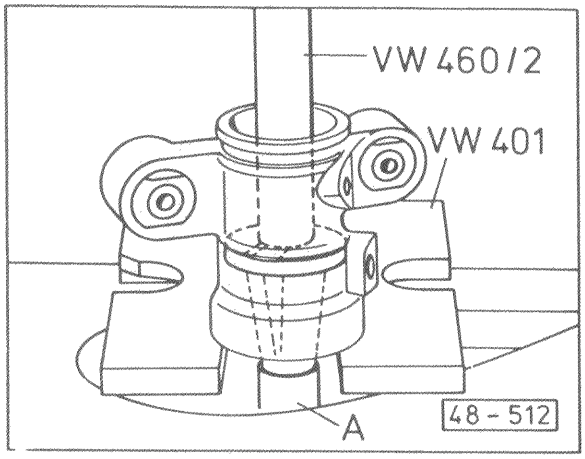


Fig. 6 Rack seal/bearing ring in end housing, removing

- A = extractor Kukko No. 21/4

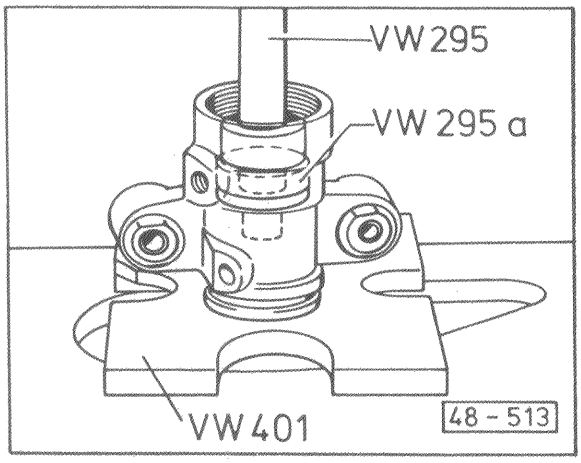


Fig. 7 Rack seal in end housing, pressing in

Note

Open side of seal faces tool.

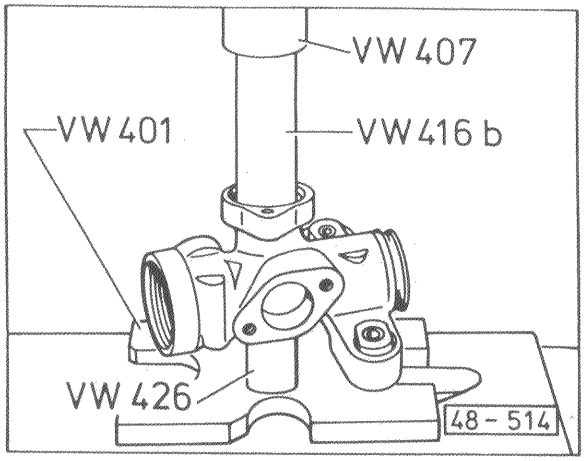


Fig. 8 Pinion housing seal, pressing in

Note

Open side of seal faces tool

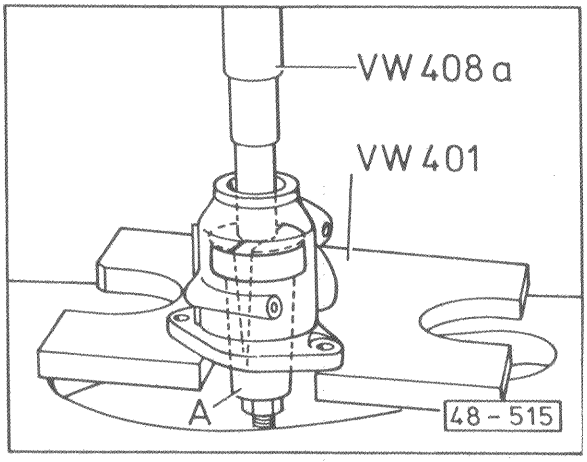


Fig. 9 Valve housing needle bearing, removing

- A = extractor US 1088

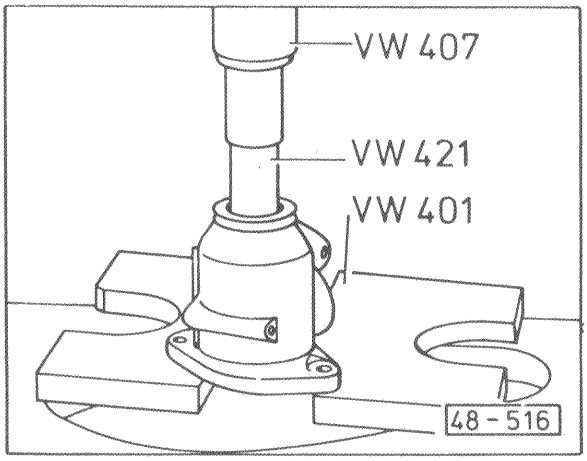


Fig. 10 Valve housing seal, pressing out

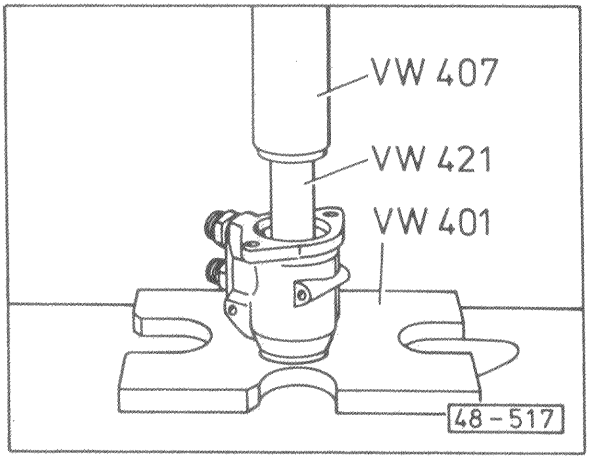
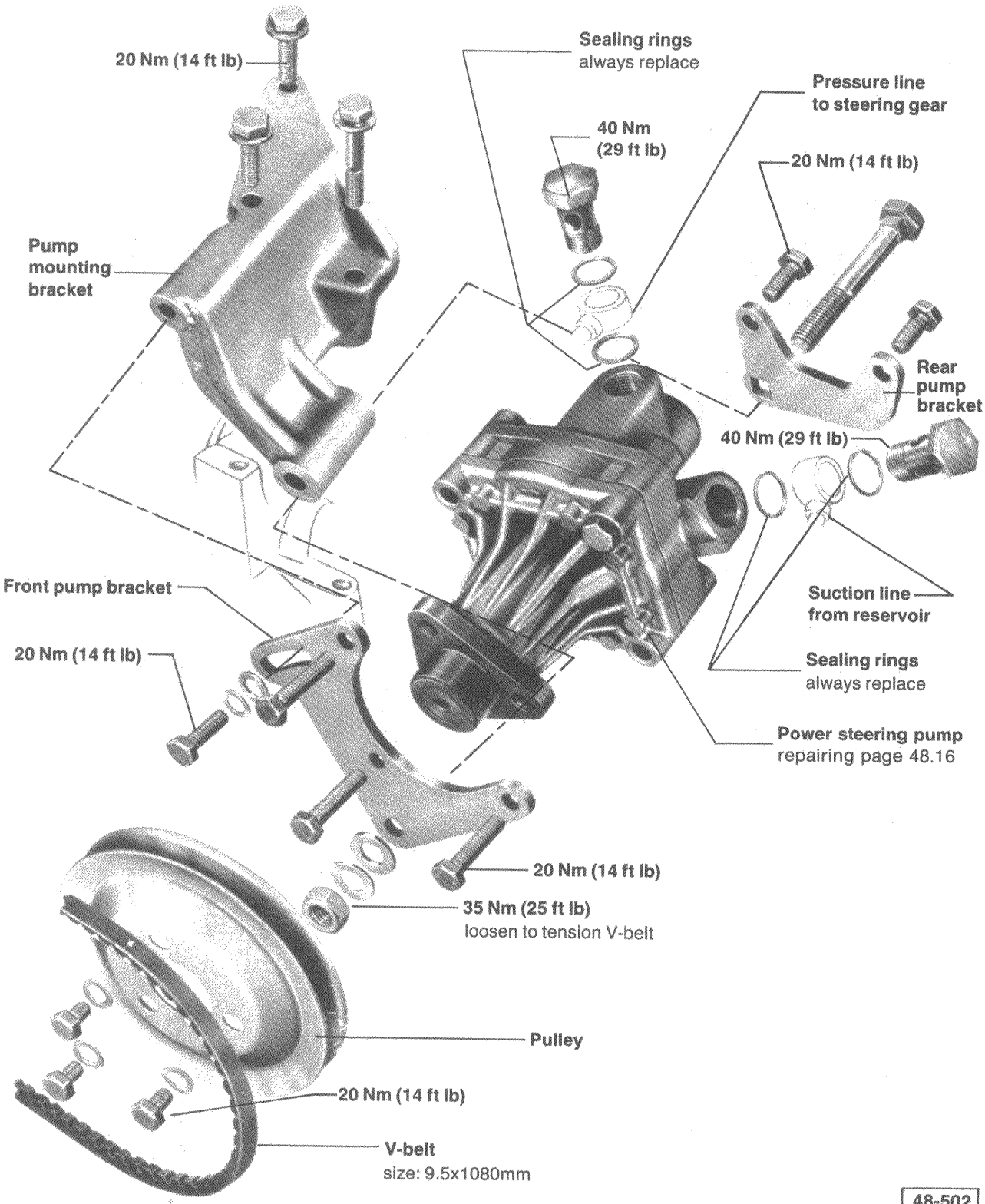


Fig. 11 Valve housing seal/needle bearing, pressing in

- imprinted side of needle bearing toward tool

Power steering pump, removing/installing



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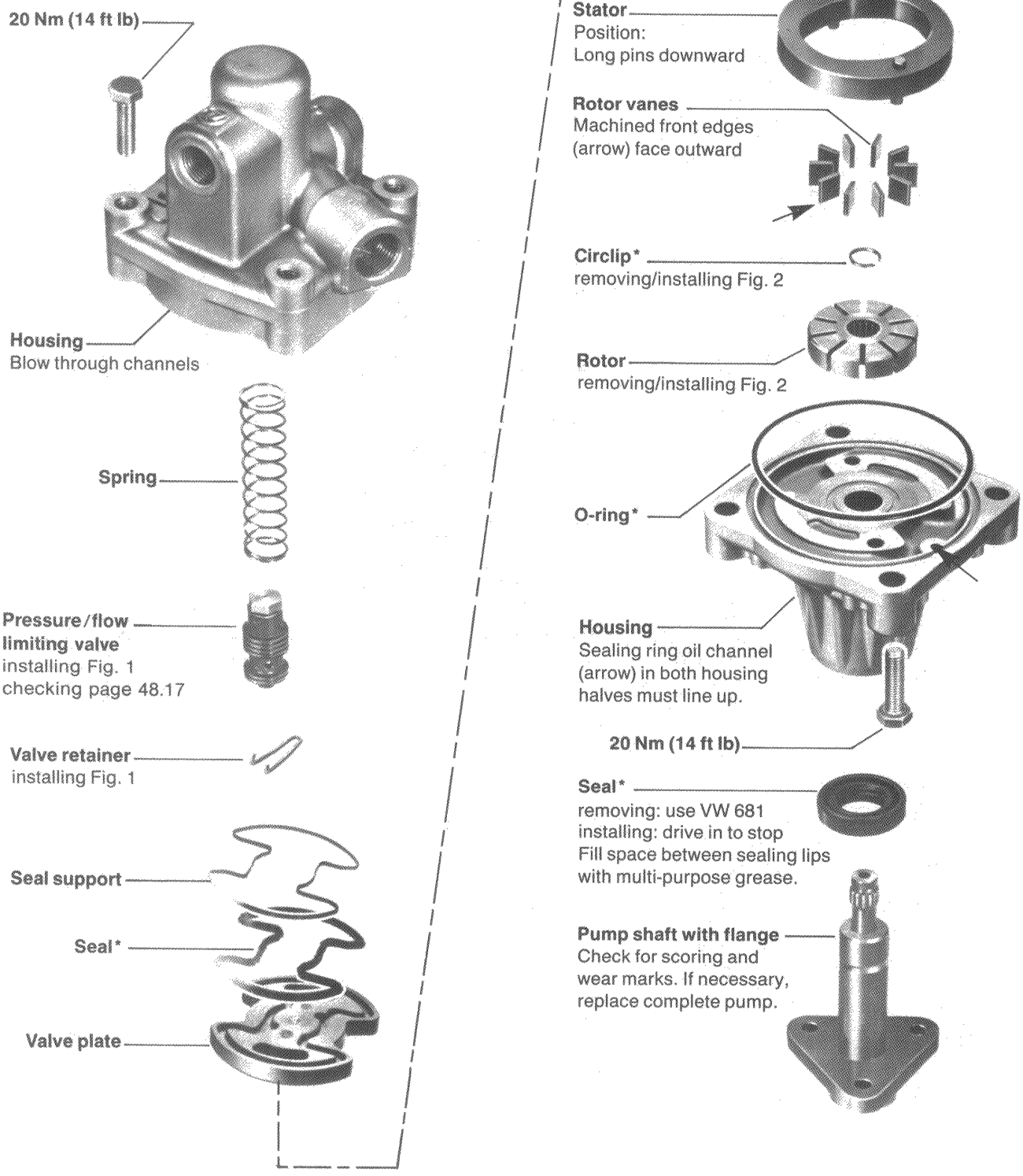
Power steering pump, repairing

Note

When repairing pump, replace all parts marked with an asterisk.
Coat all sealing components with ATF on installation.



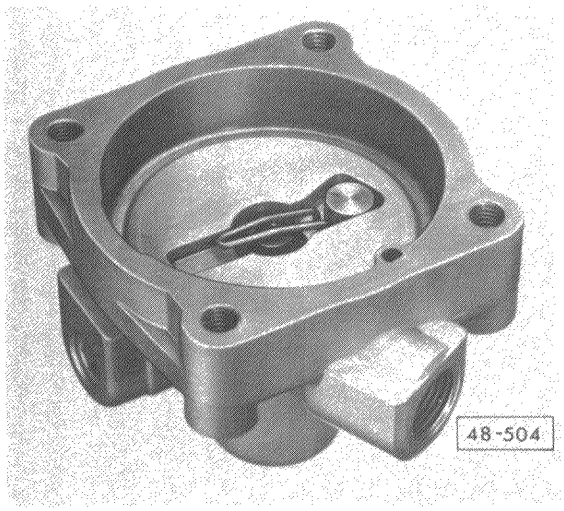


Fig. 1 Pressure/flow limiting valve retainer, installing

— install angled ends of retainer in housing slot
— press down angled ends with screwdriver

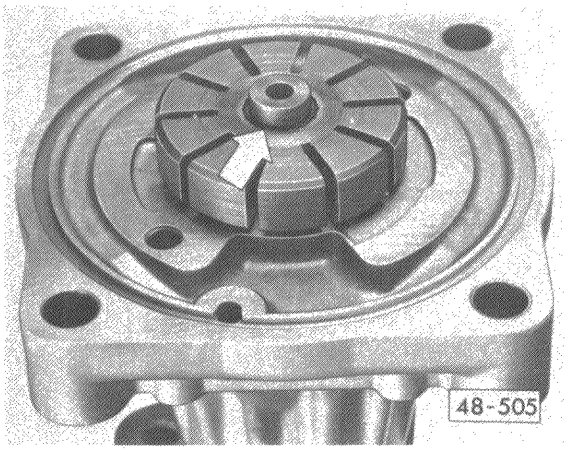


Fig. 2 Rotor and shaft, removing/installing

Note

Rotor and shaft must be removed from housing to replace pump shaft seal.

— press rotor down
— remove circlip from groove (arrow)
— after installing rotor and shaft, secure circlip by pulling rotor up

Note

Circlip must fit properly in groove and be secured by rotor.

Pressure/flow limiting valve, checking

Note

Incorrect functioning of pressure/flow limiting valve causes periodic lack of steering assistance.

— check valve and housing bore for wear
  - valve drillings must be completely clear of any dirt or restriction
  - valve must move freely in housing bore
— if maximum pump pressure is not obtained after checking pressure/flow limiting valve, replace complete power steering pump