Workshop Manual
Audi 80 1992 ▸

Booklet 4WD Running gear

Edition 11.95

Service.

List of Workshop Manual Repair Groups

Audi 80 1992 ▸

Heft 4WD Running gear
Edition 11.95

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Technical Information should always be available to all foremen and mechanics, because their com- pliance with the instructions given is essential to ensure vehicle roadworthiness and safety. In the normal safety precautions to be observed when working on motor vehicles are also applicable.

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Contents

Self-diagnosis (SD); Anti-lock braking system (ABS)

Note:

As of model year 1993, the control unit for ABS features self-diagnosis capability. This control unit is fitted with a fault memory which can be interrogated using the fault reader -V.A.G 1551-. The ABS switch -E83-, the longitudinal acceleration switch and the combi relay for the anti-lock braking system have also been discontinued.

Function

- The term "self-diagnosis" refers to the electrical/electronic part of the anti-lock braking system, i.e. only faults affecting electrical signals are detected.
- The first test step should always be to interrogate the contents of the fault memory.
- The control unit for ABS -J104 is equipped with a fault memory. If the monitored sensors or components malfunction, this is stored in the fault memory.

Notes:

- Switching of the relay can be heard when switching on the ignition, and the start-up of the return flow pump of the hydraulic modulator (self-check) is audible on driving off (at 5 – 6 km/h). The self-check is also apparent from slight vibration at the brake pedal. The hydraulic modulator is not to be replaced if a complaint is received about such noise.
- If a fault is detected, the ABS is automatically switched off and the ABS Attention lamp -K47 (in the dash insert) lights up. The conventional vehicle braking system remains fully operational. Except in the case of a fault in the supply voltage (when the ABS is reactivated as soon as the vehicle voltage regains a permissible level) the ABS remains switched off for the rest of this driving period.
- If a fault (possibly established and stored during the last driving period) is no longer present after switching the ignition off and on, or if it cannot be detected with the vehicle stationary (certain faults are only recognised after exceeding a minimum speed of 12 km/h), the ABS Attention lamp -K47 goes out shortly (approx. 2s) after switching on the ignition (as soon as self-test of ABS by control unit -J104 has been completed and no fault has been found).

- If there is no longer a fault present, the static fault stored in the fault memory is switched to a sporadic fault after switching the ignition off and on.
- If a sporadic fault no longer occurs over the course of a certain number of driving periods (switch-off and switch-on of ignition), it is cancelled automatically.
- "Sporadic faults" are additionally identified by "/SP" on the right-hand side of the display (of V.A.G 1551).
- The control unit for ABS -J104 distinguishes (following evaluation of information) between 13 different fault sources (=> Fault Table, Page 01-17) and stores these until the fault memory is erased (after fault memory interrogation) by the fault reader V.A.G 1551.
- The possibilities offered by self-diagnosis can only be utilised in conjunction with the fault reader V.A.G 1551, mode 1, "Rapid data transfer".

- In the case of ABS, self-diagnosis is not restricted to the storage, interrogation and cancelling of faults. Additional usage possibilities are provided with the control unit identification and measured value block reading. Mode 2 "Flashing code output" is not envisaged for the control unit ABS -J104. Further V.A.G 1551 modes are described in the appropriate operating instructions.
- Output of the (self-diagnosis) data by way of the fault reader V.A.G 1551 is only possible with the ignition switched on or the engine running.
- Entry into self-diagnosis is only possible with the vehicle stationary (the control unit -J104 no longer responds at vehicle speeds above 2.5 km/h).
- Interrogating and erasing of the fault memory, control unit identification and readout of the measured value block can only be performed at vehicle speeds of up to 20 km/h (self-diagnosis is terminated above this speed).

Technical data of self-diagnosis

- Fault memory
  - Non-erasable memory, contents are retained even after disconnecting supply voltage.
- Data output
  - Rapid data transfer (mode 1)
  - ABS light in instrument panel lights up if ABS has been deactivated.
  - Flashing code output is not envisaged.
- Functions
  - 01 – Interrogating control unit version
  - 02 – Interrogating fault memory =>Page 01-10
  - 05 – Erasing fault memory => Page 01-15
  - 06 – End of output => Page 01-15
  - 08 – Reading measured value block => Page 01-30

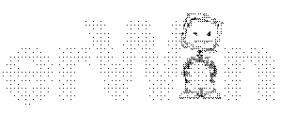
Notes:

- Control function cannot be implemented (ABS Attention light - K47 lights up) during self-diagnosis. Self-diagnosis is thus terminated as soon as the vehicle speed exceeds 20 km/h.
- The "Final control diagnosis" function cannot be implemented during self-diagnosis. The corresponding tests must be performed with the ABS tester -V.A.G 1710- in line with fault finding instructions.

=> Power train, running gear and Bosch ABS fault finding binder

- Component locations => Page 45-1

=> "Current Flow Diagrams, Electrical Fault Finding and Fitting Locations" binder



Safety precautions and basic fault finding information

General notes on fault finding

- ABS is a vehicle safety system. Work on the system presupposes detailed system knowledge.
- Always interrogate fault memory before working on ABS.
- Never drive vehicle with the plug disconnected from ABS control unit.
- Always switch off ignition before detaching or attaching connectors of ABS system components.
- Hydraulic modulator bolts must never be loosened. Exception: cover bolt, when replacing the relays for the return flow pump and the solenoid valves.
- Observe the relevant safety precautions regarding the handling of brake fluid; =>Page 47-80.

- ABS faults are indicated by the ABS lamp lighting up. Certain faults are not recognised until the vehicle is moving at more than a minimum speed of 12 km/h (perform test drive).
- Notes on elimination of current faults

=> Service manual

Test requirements

- Permissible and identical wheels and tyre size Correct tyre pressure at all wheels.
- Conventional brake system with brake light switch and brake lights OK
- Hydraulic connections and pipes are not leaking (visual check of hydraulic unit, brake cylinders etc.).
- Wheel bearings and bearing clearance OK.
- Earth connection for return flow pump -V39 at hydraulic modulator OK.

- ABS return flow pump relay -J105 and ABS solenoid valve relay -J106 properly connected
- Connector properly attached to control unit -J 104, catch engaged.
- When working with fault reader -V.A.G 1551-, test box -V.A.G 1598- must not be connected to control unit for ABS -J104-.
- Function of engageable differential lock OK (rear differential Attention lamp -K46 lights up after engagement and goes out completely following deactivation).
- Differential lock not engaged
- All fuses OK "Current Flow Diagrams, Electrical Fault Finding and Fitting Locations" binder
- Supply voltage OK (at least 10.5 V)

Technical publications required

- "ABS" current flow diagrams

=> "Current Flow Diagrams, Electrical Fault Finding and Fitting Locations" binder

- ABS fault finding instructions with ABS tester -V.A.G 1710-

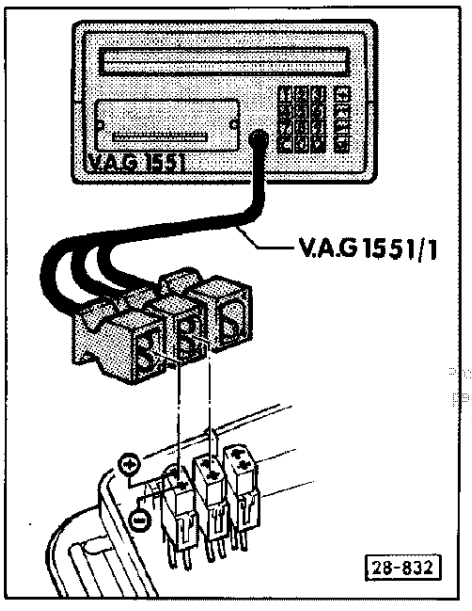
=> Power train, running gear and Bosch ABS fault finding, ABS tester -V.A.G 1710-

Connecting fault reader V.A.G 1551, interrogating and erasing fault memory, ending output

Notes:

- The fault memory cannot be erased until it has been interrogated.
- During self-diagnosis, the main program of the control unit for ABS is shut down. There is no control function.

Interrogating fault memory



Test prerequisites => Page 01-8 satisfied.

– Connect fault reader V.A.G 1551 with diagnosis cable V.A.G 1551/1 to diagnosis connector at relay socket 1 on left of plenum chamber.

– Attach black connector to black diagnosis connector

Note:

If there is no display, check voltage supply for black diagnosis connector => Page 01-37

V.A.G self-diagnosis HELP 1 – Rapid data transfer 1) 2 – Flashing code output 1)

Reading on display:

1) displayed alternately

– Attach white connector to white diagnosis connector

Note:

The blue connector is not required.

– Switch on ignition.

Notes:

- Additional user information can be printed out by pressing the HELP key on V.A.G 1551.
- The =>key switches to the next step in the program sequence.

– Switch on printer by pressing PRINT key, indicator lamp in key comes on.

– Press key 1 for "Rapid data transfer" mode.

Rapid data transfer HELP Enter address word XX

Reading on display:

– Press keys 0 and 3; 03 enters the address word "Brake electronics".

Rapid data transfer Q 03 – Brake electronics

Reading on display:

– Confirm entry with Q key.

4A0 907 379 X Brake electronics

The control unit identification is shown in the display

Index X	Allocation
None	Control unit with no wheel speed outputs
D	Control unit with wheel speed outputs

Notes:

- Refer also to Parts List for assignment of control unit for ABS - J104.
- Information on wheel speed outputs, e.g. on vehicles with automatic gearbox 01F.

=> "Current Flow Diagrams, Electrical Fault Finding and Fitting Locations" binder

No reply from control unit

If adjacent display appears:

– Press the HELP key to obtain a printout of the possible causes of fault.

or

K – wire not switching to earth/positive HELP

– Check wiring of diagnosis lines "L" and "K" => Page 01-37

or

No signal from control unit

– Check voltage supply and earth connection to control unit -J 104.

=> "Current Flow Diagrams, Electrical Fault Finding and Fitting Locations" binder

– After eliminating the possible causes of the fault, once again enter address word 03 for brake electronics and confirm with the Q key.

Communication problem

If adjacent display appears:

– Fault elimination => Page 01-39

– Press => key

Rapid data transfer	HELP
Select function	XX

Reading on display:

– Press keys 0 and 2. 02 selects the function "Interrogate fault memory".

Rapid data transfer	Q
02 – Interrogate fault memory	

Reading on display:

– Confirm entry with Q key.

X	Fault detected

The display shows the number of stored faults or "No fault detected".

– Press =>key

The stored faults are displayed consecutively and printed out =>Fault table, Page 01-17.

Press => key after the last fault is displayed and printed.

Notes:

- If faults are detected: End output with function 06, switch off ignition, eliminate faults, interrogate and erase fault memory.
- In the event of a complaint that is not detected by the self-diagnosis: Perform fault finding with ABS tester -V.A.G 1710- in line with fault finding instructions.

Erasing fault memory and ending output

Rapid data transfer HELP Select function XX

Reading on display:

– Press keys 0 and 5. 05 erases the fault memory.

Rapid data transfer Q 05 – Erase fault memory

Reading on display:

– Confirm entry with Q key.

Attention Fault memory not interrogated

If adjacent display appears:

Notes:

- The fault memory cannot be erased until it has been interrogated.
- The fault memory is not erased if, for example, the ignition was switched off or the vehicle was driven at more than 20 km/h between fault memory interrogation and "Erase fault memory".

Rapid data transfer Fault memory erased

Reading on display:

– Press => key

Rapid data transfer HELP Select function XX

Reading on display:

– Press keys 0 and 6. 06 ends output.

Rapid data transfer Q 06 – End output

Anzeige am Display:

– Confirm entry with Q key.

Rapid data transfer HELP End of output

Reading on display:

– Switch off ignition.

– Disconnect fault reader V.A.G 1551.

– Switch on ignition. The ABS Attention lamp -K47- should go out after a brief period (approx. 2 seconds).

– Perform test drive, increasing vehicle speed at least once to more than 30 km/h (ABS Attention lamp -K47- must not come on again).

Fault table

All faults which can be detected by the control unit for ABS -J 104, displayed on V.A.G 1551 and printed out, are listed in the following on the basis of the fault codes.

Notes:

- The content of the fault memory is retained until it is erased => Page 01-15.
- Before renewing components, always check corresponding positive and earth connections using the current flow diagram as well as all associated plug contacts.
- After renewing an ABS component, always check ABS following the fault finding instructions using ABS tester -V.A.G 1710-.

=> "Power train, running gear and Bosch ABS fault finding" binder

- After renewing a component of the ABS system always interrogate and erase the fault memory => Page 01-10. Perform a test drive. Drive the vehicle at a speed of at least 30 km/h for at least 30 seconds. The ABS Attention lamp -K47- must not come on.
- The 07.92 supplement to the Bosch ABS fault finding instructions using the ABS tester -V.A.G 1710- lists all the modifications to these instructions necessary for performing fault finding on vehicles equipped with ABS.

- Use test box -V.A.G 1598- with adapter cable -V.A.G 1598/3- to check electrical connections to control unit for ABS -J104- in line with "Current Flow Diagrams, Electrical Fault Finding and Fitting Locations" binder.
- Sporadic faults are additionally indicated by "/SP" on the right-hand side of the display.
- In the case of sporadic faults, move the wiring leading to the component when checking (loose contact).
- Static faults, which cannot be detected with the vehicle stationary, are also marked "/SP" after switching the ignition off and on =>Page 01-1.
- The fault code (5-digit) is not displayed; it merely appears on the print-out.
- The "Fault rectification" column in the following tables makes reference to individual test steps in the fault finding instructions "Bosch ABS, ABS tester -V.A.G 1710-". Fault finding using -V.A.G 1710- is however always to be performed in full and in the prescribed sequence.

V.A.G 1551 print-out Fault code	Possible causes of fault	Fault rectification
00000 No fault detected	This display means that the self-diagnosis is finished. If there is a problem with the vehicle despite no faults having been detected by the control unit -J104: Perform fault finding with ABS tester -V.A.G 1710-. => Power train, running gear and Bosch ABS fault finding with ABS tester -V.A.G 1710-.	
00277 ABS inlet/outlet valve, front left -N137-	♦ Open circuit, short to positive or to earth in wiring between ABS hydraulic modulator -N55- and control unit -J104-. ♦ ABS inlet/outlet valve -N137- defective	♦ Locate and eliminate open circuit or short circuit in line with current flow diagram for all ABS inlet/outlet valves (-N137-, -N138-, -N160-) ♦ Check hydraulic modulator, perform functional test with -V.A.G 1710- (test steps 1 and 5) => Power train, running gear and Bosch ABS fault finding with ABS tester -V.A.G 1710-

V.A.G 1551 print-out Fault code	Possible causes of fault	Fault rectification
00283 Front left speed sensor -G47- Note: May mistakenly be displayed as sporadic fault if individual wheels turn at more than 6 km/h with ignition switched on.	♦ Open circuit, short to positive or to earth in wiring between speed sensor -N55- and control unit -J104-. ♦ Rotor dirty or damaged ♦ Excessive play in wheel bearing ♦ Speed sensor -G47- not properly installed. ♦ Speed sensor -G47- defective	♦ Locate and eliminate open circuit or short circuit ♦ Check, clean or replace rotor ♦ Renew wheel bearing =>Page 40-3 ♦ Check fitting location of speed sensor => Page 45-13 ♦ Check speed sensor -G47-, perform electrical testing with ABS tester -V.A.G 1710- (test step 6) => Power train, running gear and Bosch ABS fault finding with ABS tester -V.A.G 1710- binder
00284 ABS inlet/outlet valve, front right -N138-	♦ Open circuit, short to positive or to earth in wiring between ABS hydraulic modulator -N55- and control unit -J104- ♦ ABS inlet/outlet valve -N138- defective	♦ Locate and eliminate open circuit or short circuit in line with current flow diagram for all ABS inlet/outlet valves (-N137-, -N138-, -N160-) ♦ Check hydraulic modulator, perform functional test with -V.A.G 1710- (test steps 1 and 5) => Power train, running gear and Bosch ABS fault finding with ABS tester -V.A.G 1710-

V.A.G 1551 print-out Fault code	Possible causes of fault	Fault rectification
00285 Front right speed sensor -G45- Note: May mistakenly be displayed as sporadic fault if individual wheels turn at more than 6 km/h with ignition switched on.	♦ Open circuit, short to positive or to earth in wiring between speed sensor -G45- and control unit -J104- ♦ Rotor dirty or damaged ♦ Excessive play in wheel bearing ♦ Speed sensor -G45- not properly installed ♦ Speed sensor -G45- defective	♦ Use current flow diagram to locate and rectify open circuit or short circuit ♦ Check, clean or replace rotor ♦ Renew wheel bearing =>Page 40-3 ♦ Check fitting location of speed sensor => Page 45-13 ♦ Check speed sensor -G45-, perform electrical testing with ABS tester -V.A.G 1710- (test step 6) => Power train, running gear and Bosch ABS fault finding with ABS tester -V.A.G 1710- binder

V.A.G 1551 print-out Fault code	Possible causes of fault	Fault rectification
00287 Rear right speed sensor -G44- Note: May mistakenly be displayed as sporadic fault if individual wheels turn at more than 6 km/h with ignition switched on.	♦ Open circuit, short to positive or to earth in wiring between speed sensor -G44- and control unit -J104- ♦ Rotor dirty or damaged ♦ Excessive play in wheel bearing ♦ Speed sensor -G44- not properly installed ♦ Speed sensor -G44- defective	♦ Use current flow diagram to locate and rectify open circuit or short circuit ♦ Check, clean or replace rotor ♦ Service wheel bearing housing => Page 42-48 ♦ Check fitting location of speed sensor => Page 45-13 ♦ Check speed sensor -G44-, perform functional test with -V.A.G 1710- (test step 6) => Power train, running gear and Bosch ABS fault finding with ABS tester -V.A.G 1710-

V.A.G 1551 print-out Fault code	Possible causes of fault	Fault rectification
00290 Rear left speed sensor -G46- Note: May mistakenly be displayed as sporadic fault if individual wheels turn at more than 6 km/h with ignition switched on.	♦ Open circuit, short to positive or to earth in wiring between speed sensor -G46- and control unit -J104- ♦ Rotor dirty or damaged ♦ Excessive play in wheel bearing ♦ Speed sensor -G46- not properly installed ♦ Speed sensor -G46- defective	♦ Use current flow diagram to locate and rectify open circuit or short circuit ♦ Check, clean or replace rotor ♦ Service wheel bearing housing => Page 42-48 ♦ Check fitting location of speed sensor => Page 45-13 ♦ Check speed sensor -G46-, perform electrical testing with ABS tester -V.A.G 1710- (test step 6) => Power train, running gear and Bosch ABS fault finding with ABS tester -V.A.G 1710-

V.A.G 1551 print-out Fault code	Possible causes of fault	Fault rectification
00301 ABS return flow pump -V39-	♦ Open circuit or contact resistance in earth connection or voltage supply to return flow pump -V39- ♦ Open circuit or short to positive in wiring between relay -J105- and control unit -J104- ♦ ABS return flow pump relay -J105-, return flow pump -V39- or hydraulic modulator defective	♦ Use current flow diagram to locate and eliminate open circuit or contact resistance. ♦ Use current flow diagram to locate and eliminate open circuit or short circuit ♦ Check relay -J105-, return flow pump -V39- and hydraulic modulator -N55-, perform functional test with V.A.G 1710 (test step 3) => Power train, running gear and Bosch ABS fault finding with ABS tester -V.A.G 1710- binder

V.A.G 1551 print-out Fault code	Possible causes of fault	Fault rectification
00302 ABS solenoid valve relay -J106- Note: If this fault is displayed, additionally check ABS inlet/outlet valve -N160-, fault code 00649.	♦ Open circuit or contact resistance in earth connection or voltage supply to relay -J106- ♦ Open circuit, short to positive or to earth in wiring between relay -J106- and control unit -J104-.	♦ Use current flow diagram to locate and eliminate open circuit or contact resistance. ♦ Use current flow diagram to locate and eliminate short circuit or open circuit
	♦ Solenoid valve relay -J106 or hydraulic modulator -N55 defective	♦ Check relay -J106- and hydraulic modulator -N55-, perform functional test with V.A.G 1710 (test step 1) => Power train, running gear and Bosch ABS fault finding with ABS tester -V.A.G 1710-

V.A.G 1551 print-out Fault code	Possible causes of fault	Fault rectification
00526 Brake light switch -F-	♦ Open circuit or short to positive in wiring between brake light switch and brake light bulbs -M9-, -M10- or control unit -J104-.	♦ Use current flow diagram to locate and eliminate open circuit or short circuit
	♦ Brake light bulbs -M9 or -M10 defective ♦ Brake light switch defective	♦ Replace bulbs ♦ Check brake light switch Read measured value block => Page 01-30 or perform functional test with -V.A.G 1710- (test step 2) => Power train, running gear and Bosch ABS fault finding with ABS tester -V.A.G 1710- binder

V.A.G 1551 print-out Fault code	Possible causes of fault	Fault rectification
00532 Supply voltage	♦ Open circuit or contact resistance in voltage supply to control unit -J104- (contact 1) or in earth connection to control unit -J104-	♦ Use current flow diagram to locate and eliminate open circuit or contact resistance. Perform functional test with -V.A.G 1710- (test step 1) => Power train, running gear and Bosch ABS fault finding with ABS tester -V.A.G 1710- binder
	♦ Voltage dips or overvoltage in vehicle electrical system Notes: ♦ As soon as vehicle voltage returns to permissible range, ABS is reactivated and ABS Attention lamp -K47 goes out. ♦ This fault is only stored if it occurs when vehicle speed is more than 6 km/h.	♦ Check alternator and voltage regulator. => Current Flow Diagrams, Electrical Fault-finding and Fitting Locations binder ♦ Perform functional test with -V.A.G 1710- (test steps 1 and 5) => Power train, running gear and Bosch ABS fault finding with ABS tester -V.A.G 1710-

V.A.G 1551 print-out Fault code	Possible causes of fault	Fault rectification
00597 Differing wheel speed pulses Note: May mistakenly be displayed as sporadic fault if individual wheels turn at more than 6 km/h with ignition switched on.	♦ Rotor with wrong number of teeth fitted ♦ Rotor dirty or damaged	♦ Check all rotors =>Page 45-13 and read measured value block => Page 01-30 ♦ Check all rotors. Clean or replace faulty component. ♦ Check fitting location of all speed sensors => Page 45-13
	♦ Speed sensor not properly installed ♦ Excessive wheel bearing clearance or wheel bearing defective	♦ Check all wheel bearings =>Page 40-1 and 42-48
	♦ Speed sensor defective	♦ Check all speed sensors, perform functional test with -V.A.G 1710- (test step 6) => Power train, running gear and Bosch ABS fault finding with ABS tester -V.A.G 1710- binder

V.A.G 1551 print-out Fault code	Possible causes of fault	Fault rectification
00649 BS inlet/outlet valve, rear -N160-	♦ Open circuit, short to positive or to earth in wiring between ABS hydraulic modulator -N55- and control unit -J104-. ♦ ABS inlet/outlet valve -N160- defective	♦ Locate and eliminate open circuit or short circuit in line with current flow diagram for all ABS inlet/outlet valves (-N137-, -N138-, -N160-) ♦ Check hydraulic modulator, perform functional test with V.A.G 1710 (test steps 1 and 5) => Power train, running gear and Bosch ABS fault finding with ABS tester -V.A.G 1710-
65535 Control unit faulty Note: If fault "ABS return flow pump -V39-" is displayed at same time, first eliminate the cause of this fault.	♦ Open circuit or contact resistance in earth connection or voltage supply to ABS control unit -J104- ♦ Control unit -J104- defective	♦ Use current flow diagram to locate and eliminate open circuit or contact resistance. ♦ Replace control unit -J104-

Reading measured value block

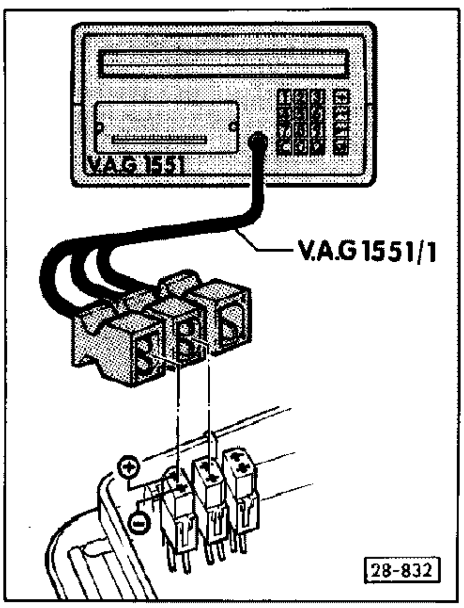
Test prerequisites => Page 01-8 satisfied.

♦ Fault memory has been interrogated and any displayed faults have been located and eliminated.

Notes:

♦ A display group with 8 measured values is provided

♦ If the printer is switched on, the display will be printed out on the record slip.



– Connect fault reader V.A.G 1551 with diagnosis cable V.A.G 1551/1 to diagnosis connector at relay socket 1 on left of plenum chamber.

– Attach black connector to black diagnosis connector

Note:

If there is no display, check voltage supply for black diagnosis connector => Page 01-37

V.A.G self-diagnosis HELP 1 – Rapid data transfer 1) 2 – Flashing code output 1)

Reading on display:

1) displayed alternately

– Attach white connector to white diagnosis connector

Note:

The blue connector is not required.

– Switch on ignition or start engine.

Notes:

- Additional user information can be printed out by pressing the HELP key on V.A.G 1551.
- The => key switches to the next step in the program sequence.

– Switch on printer by pressing PRINT key, indicator lamp in key comes on.

– Press key 1 for "Rapid data transfer" mode.

Rapid data transfer HELP Enter address word XX

Reading on display:

– Press keys 0 and 3; 03 enters the address word "Brake electronics".

Rapid data transfer Q 03 – Brake electronics

Reading on display:

– Confirm entry with Q key.

4A0 907 379 X Brake electronics

The control unit identification is shown in the display

Index X	Allocation
None	Control unit with no wheel speed outputs
D	Control unit with wheel speed outputs

Notes:

- Refer also to Parts List for assignment of control unit for ABS - J104.
- Information on wheel speed outputs, e.g. on vehicles with automatic gearbox 01F.

=> "Current Flow Diagrams, Electrical Fault Finding and Fitting Locations" binder

No reply from control unit

If adjacent display appears:

– Press the HELP key to obtain a printout of the possible causes of fault.

or

K -wire not switching to earth/positive HELP

– Check wiring of diagnosis lines "L" and "K" => Page 01-37

or

No signal from control unit

- Check voltage supply and earth connection to control unit - J104.

=> "Current Flow Diagrams, Electrical Fault Finding and Fitting Locations" binder

- After eliminating the possible causes of the fault, once again enter address word 03 for brake electronics and confirm with the Q key.

Communication problem

If adjacent display appears:

- Fault elimination => Page 01-39
- Press => key

Rapid data transfer	HELP
Select function	XX

Reading on display:

- Press keys 0 and 8, 08 selects function "Read measured value block"

Rapid data transfer	Q
08 – Read measured value block	

Reading on display:

- Confirm entry with Q key.

Read measured value block	HELP
Enter display group number	XX

Reading on display:

- Press key 0 twice.
- Confirm entry with Q key.

Reading measured value block							
1	2	3	4	5	6	7	8

Reading on display:

Notes:

- Display fields 1 to 4 indicate the wheel speed in km/h. This is calculated by the control unit -J104 on the basis of the incoming wheel speed sensor pulses. If a vehicle is evenly accelerated/moved on a dry surface, the maximum permissible difference between the display values 1 to 4 is ± 1 km/h (rounding error). If deviations exceed the above figure, check wheel speed sensors and rotors => Pages 45-13 and 45-17
- To check whether wheel speed sensors have been mixed up, turn wheels by hand whilst securing the other driven wheels to prevent them turning.
- If the measured values indicate a fault, test function with ABS tester -V.A.G 1710- in line with fault finding instructions.

=> Power train, running gear and Bosch ABS fault finding binder

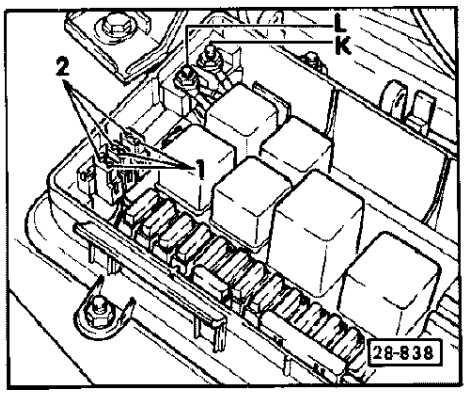
Test table: Reading measured value block

Display field	Designation	Test conditions	Reading on -V.A.G 1551-
1	Wheel speed front left (km/h)		1 (vehicle stationary) to 19 [1])
2	Wheel speed front right (km/h)		1 (vehicle stationary) to 19 [1])
3	Wheel speed rear left (km/h)		1 (vehicle stationary) to 19 [1])
4	Wheel speed rear right (km/h)		1 (vehicle stationary) to 19 [1])
5	Brake light switch -F- (contact 25 on -J104-)	♦ Brake pedal not depressed	0
		♦ Brake pedal depressed	1
6	Voltage at ABS return flow pump -V39-		0 Note: If reading is 1 (not permissible – return flow pump running) perform functional test with -V.A.G 1710- (test steps 3 and 5) => Power train, running gear and Bosch ABS fault finding binder

[1]) Control unit -J104- terminates self-diagnosis if vehicle speed exceeds 19 km/h

Display field	Designation	Test conditions	Reading on -V.A.G 1551-
7	ABS solenoid valve relay -J106- (contact 32 on -J104-)	ABS switched on	1 Note: If reading is 0 (not permissible – relay -J106- not energised) perform functional test with -V.A.G 1710- (test steps 1 and 5) => Power train, running gear and Bosch ABS fault finding binder
8	Rear final drive differential lock switch -F100- (contact 13 on -J104-)	♦ Differential lock not engaged	0
		♦ Differential lock engaged	1

Checking wiring of diagnosis connectors



Notes:

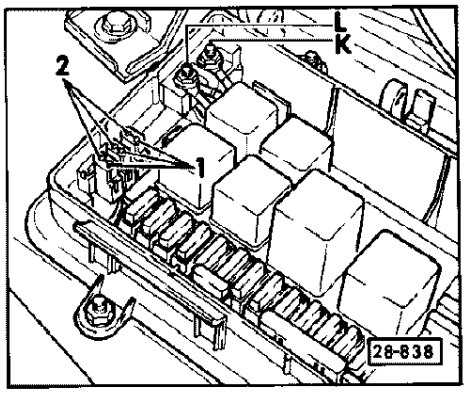
- The diagnosis connectors and the adapters "K" and "L" of all vehicle systems featuring self-diagnosis are located in relay station 1 (on left of plenum chamber)
- Wiring colours and other vehicle systems connected to "white" diagnosis connector

=> "Current Flow Diagrams, Electrical Fault Finding and Fitting Locations" binder

- For testing, use hand-held multimeter V.A.G 1526, adapter cable set V.A.G 1594 and test box V.A.G 1598 with adapter cable V.A.G 1593/3.
- Switch off ignition before checking wiring.

Black diagnosis connector, voltage supply

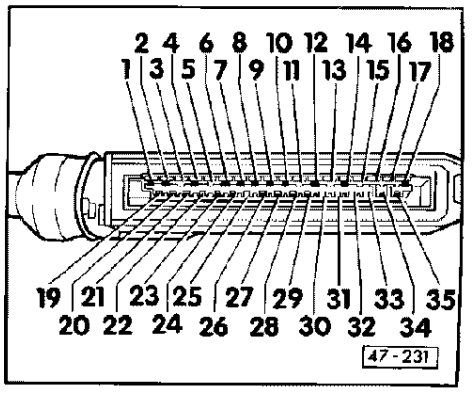
- Contact 1 connected to earth
- Contact 2 positive (via fuse 21 to terminal 30)



White diagnosis connector, data transfer

- Contact 1
  - Not required for brake electronics
- Contact 2
  - Data line for "Rapid data transfer". Wiring from diagnosis connector is routed via adapter "K" to control unit for ABS -J104- (contact 31).

=> "Current Flow Diagrams, Electrical Fault Finding and Fitting Locations" binder



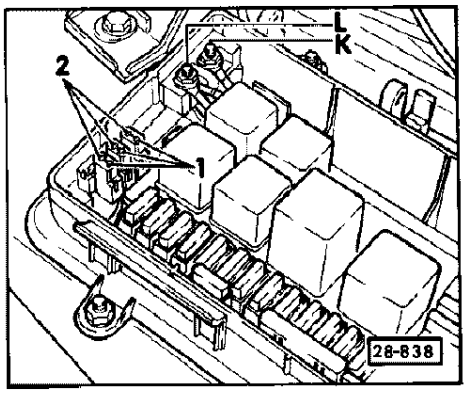
Notes:

- Pull plug off ABS control unit -J104- => Page 45-10, connect test box -V.A.G 1598- with adapter cable -V.A.G 1598/3- and measure at appropriate test box sockets

=> "Current Flow Diagrams, Electrical Fault Finding and Fitting Locations" binder

- Use -V.A.G 1526- to check wiring for open circuit, short to positive or short to earth.

Checking wiring when "Communication problem" is displayed on V.A.G 1551



- Consecutively disconnect wiring between other vehicle systems featuring self-diagnosis "Rapid data transfer" and "white" diagnosis connector, contact 2 (in relay station 1) at adapter "K".

Note:

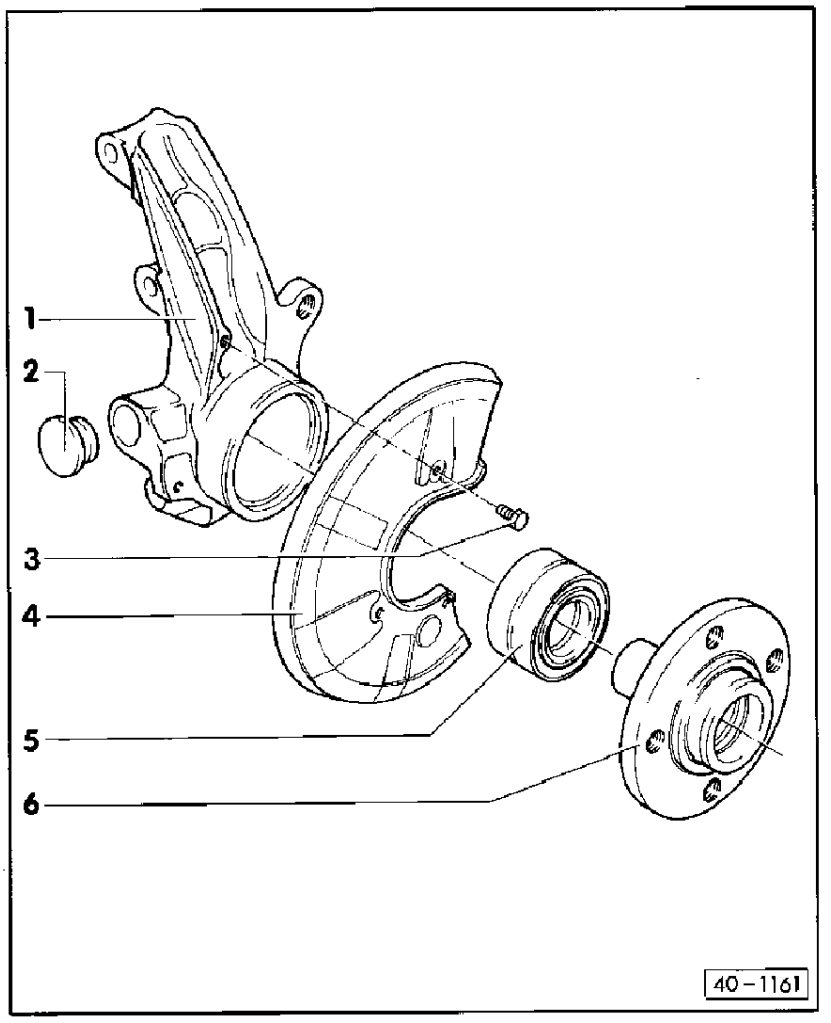
Other systems featuring self-diagnosis

=> "Current Flow Diagrams, Electrical Fault Finding and Fitting Locations" binder

- After disconnecting the wiring to the respective vehicle system, enter address word "03" again in "Rapid data transfer" mode.
- If control unit identification is then displayed, check wiring to last control unit disconnected in line with current flow diagram.
- If no fault is found, renew last control unit disconnected and re-establish all wiring connections.

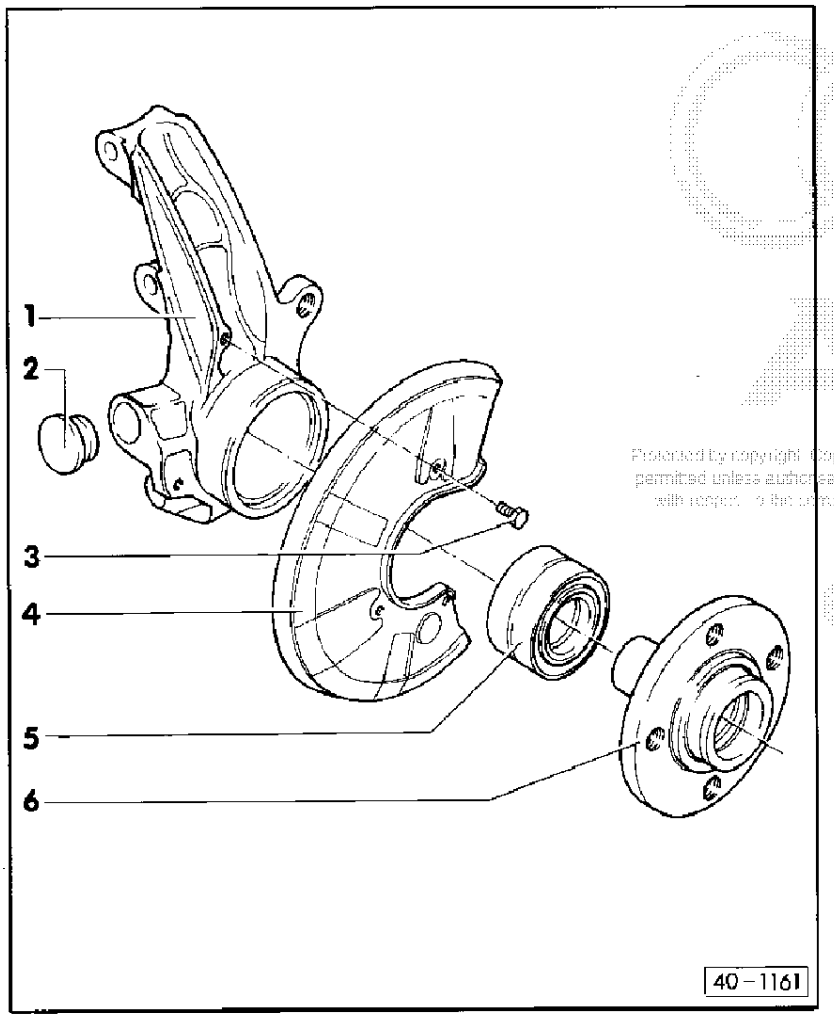
Note:

If "No reply from control unit" is displayed, this indicates that the wiring to the ABS control unit -J104- has been disconnected at some point.



Replacing wheel bearing housing

1 – **Wheel bearing housing**
- ♦ With 75 mm diameter bearing bore for vehicles with engines up to 101 kW
- ♦ With 82 mm diameter bearing bore for vehicles with engines from 110 kW
- ♦ Do not grease bearing seat in wheel bearing housing before pressing in wheel bearing
- ♦ Never widen slot in wheel bearing housing (seat for joint pin) to press out joint pin
- ♦ Perform front axle wheel alignment after removing/installing or replacing wheel bearing housing
- ♦ Note different types of wheel bearing housing => Fig. 11

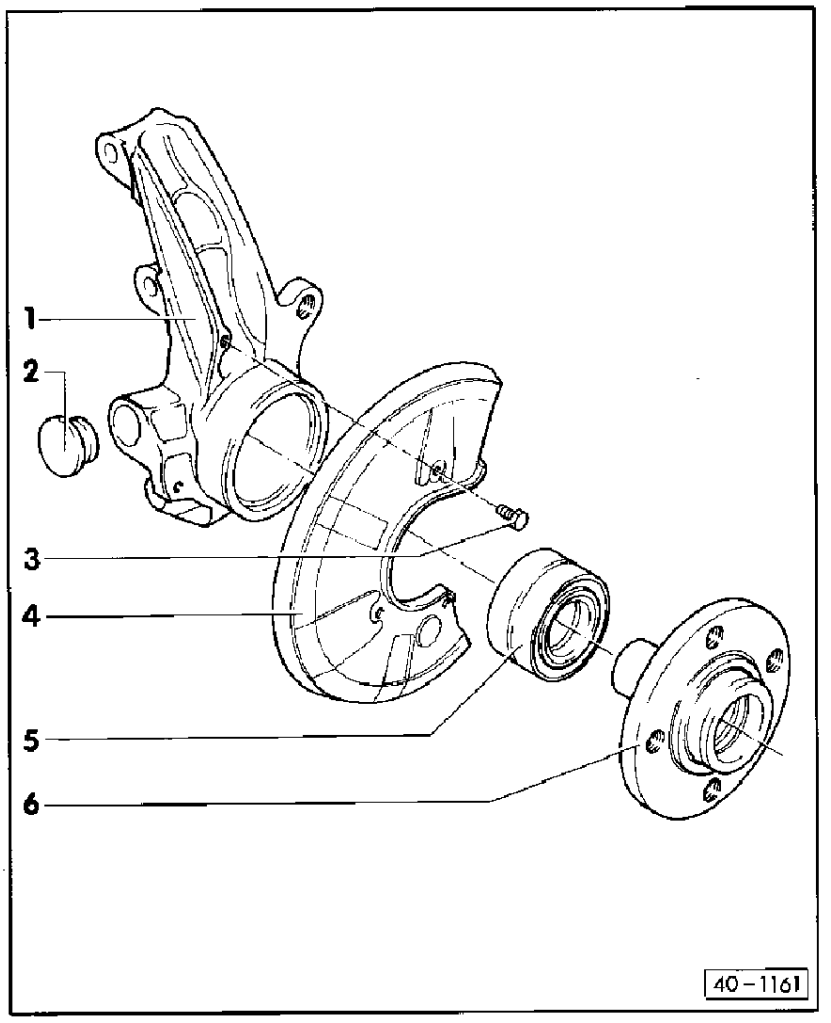


2 – **Plug**
- ♦ Vehicles with ABS feature a spring sleeve for the wheel speed sensor instead of the plug

3 – **Hexagon bolt, 10 Nm**

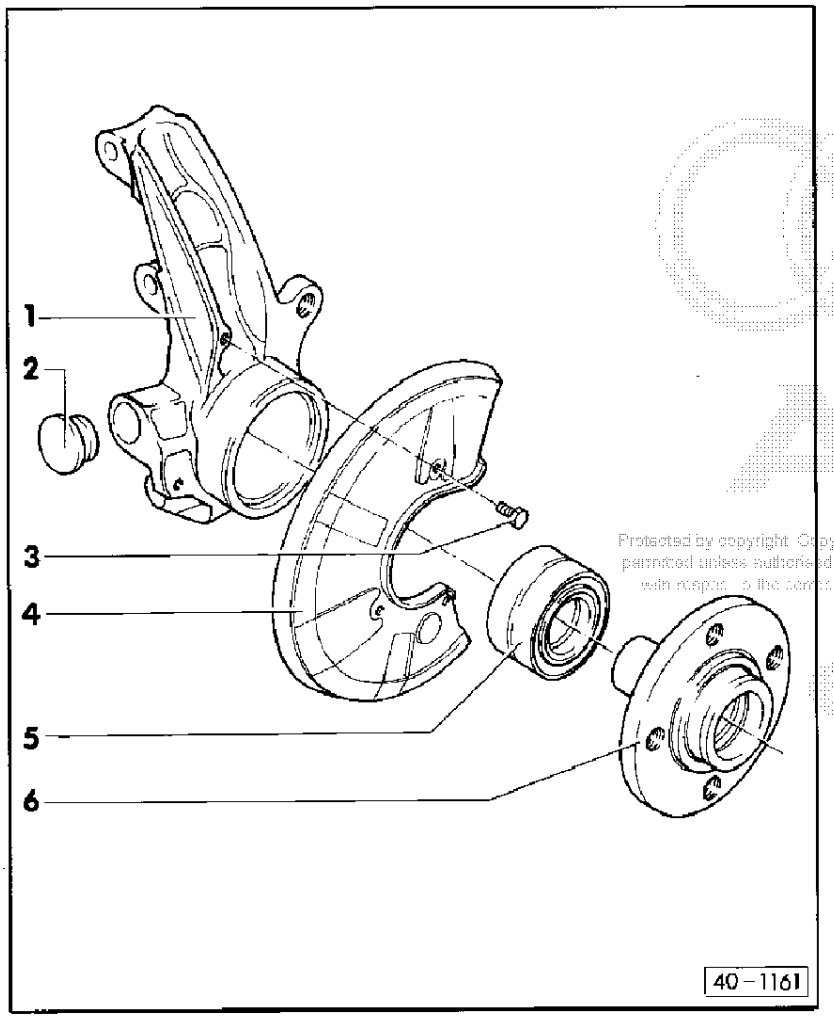
4 – **Brake cover plate**

Note:
Vehicles with cast and forged wheel bearing housings have different cover plates.



5 – Wheel bearing

- With 75 mm diameter for vehicles with engines up to 101 kW
- With 82 mm diameter for vehicles with engines from 110 kW
- Stepped internal diameter
- Note correct installation position: Large internal diameter of wheel bearing points to wheel hub.
- Pressing out destroys the bearing
- Pressing out ø 75 => Fig. 3
- Pressing in ø75 => Fig. 4
- Pressing out ø 82 => Fig. 5
- Pressing in ø82 => Fig. 6



6 – Wheel hub

- Note different versions: 33 teeth up to 101 kW engine, 38 teeth as of 110 kW engine
- Pressing out ø75 => Fig. 1
- Pressing out ø82 => Fig. 2
- Pressing in ø75 => Fig. 7
- Pressing in ø82 => Fig. 8
- Pulling off bearing inner race => Fig. 9 and 10

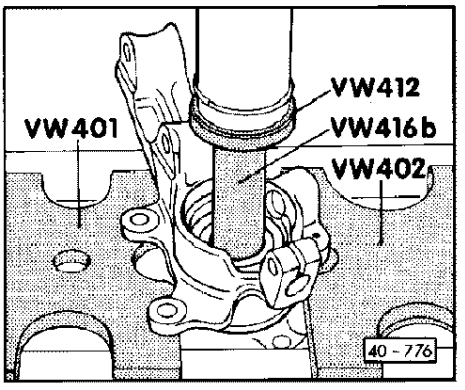


Fig.1 Pressing wheel hub out of 75 mm diameter wheel bearing

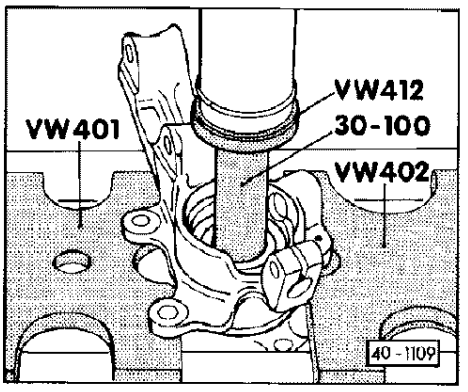


Fig.2 Pressing wheel hub out of 82 mm diameter wheel bearing

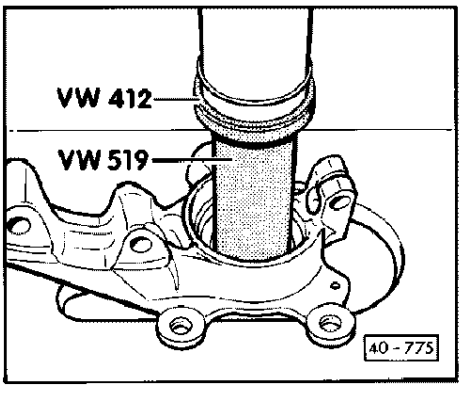


Fig.3 Pressing out 75 mm diameter wheel bearing

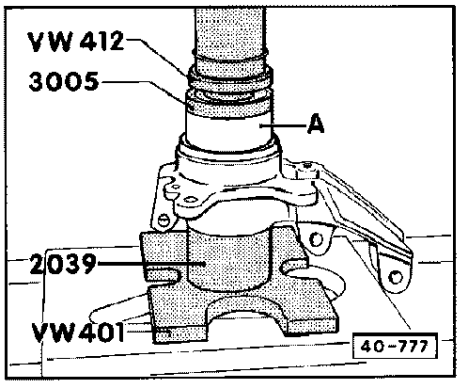


Fig.4 Pressing home 75 mm diameter wheel bearing -A-

Note:

Large internal diameter of wheel bearing points to wheel hub.

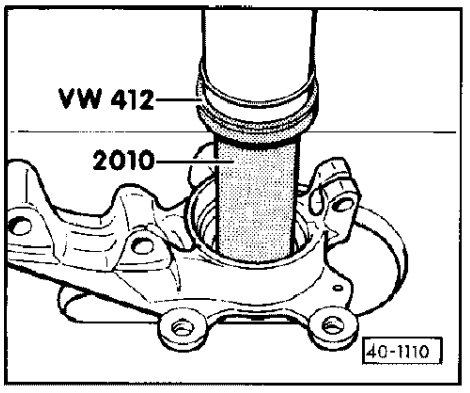


Fig.5 Pressing out 82 mm diameter wheel bearing

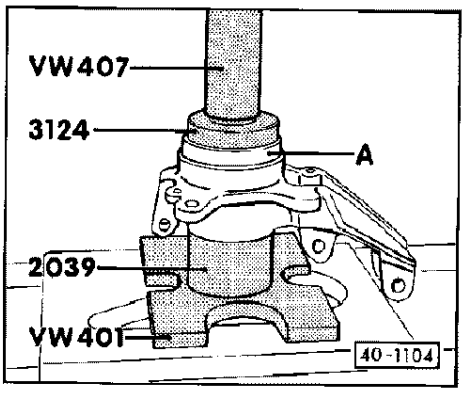


Fig.6 Pressing home 82 mm diameter wheel bearing -A-

Note:

Large internal diameter of wheel bearing points to wheel hub.

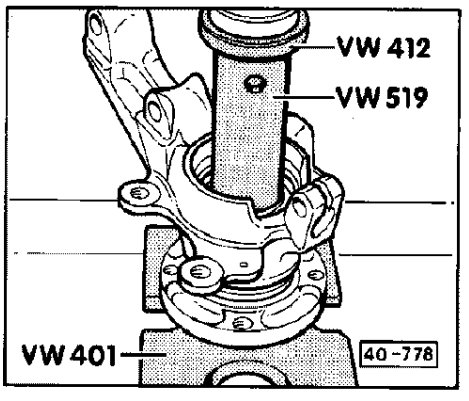


Fig.7 Pressing wheel hub into 75 mm diameter wheel bearing

- When pressing in, thrust piece -VW519- must only make contact with inner race.

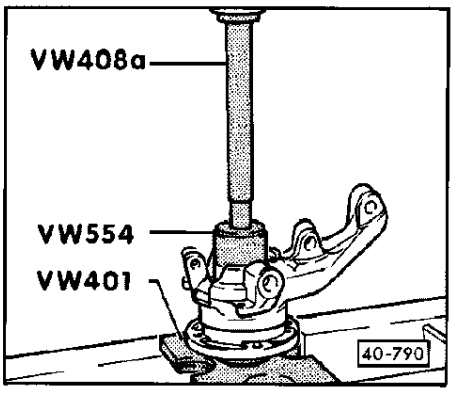


Fig.8 Pressing wheel hub into 82 mm diameter wheel bearing

- When pressing in, thrust piece -VW455- must only make contact with the bearing inner race.

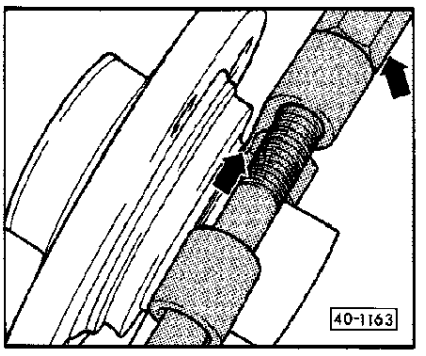


Fig.9 Inserting separating device

– Insert separating device into annular groove of bearing inner race and pre-tension with spindle.

Note:

Use commercially available separating device e.g. 15-17 from Kukko.

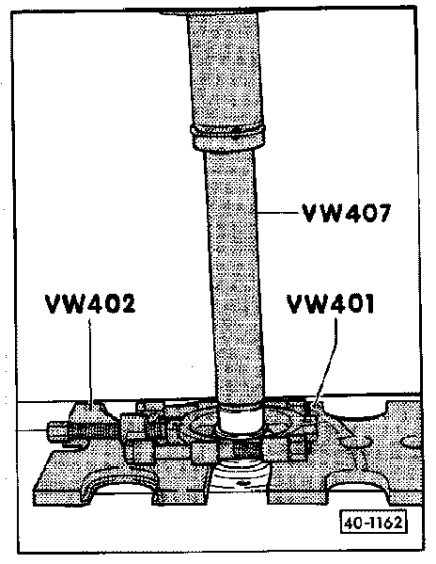


Fig.10 Pressing bearing inner race off wheel hub

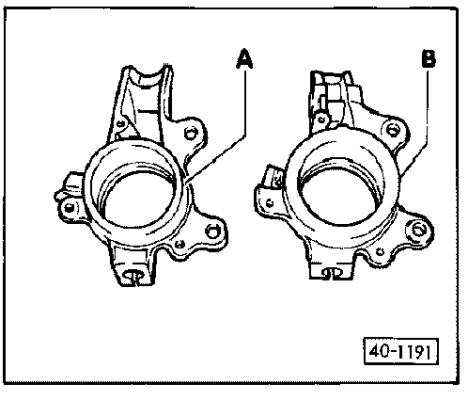


Fig.11 Forged and cast wheel bearing housings

_ A = Forged version

_ B = Cast version

Note:

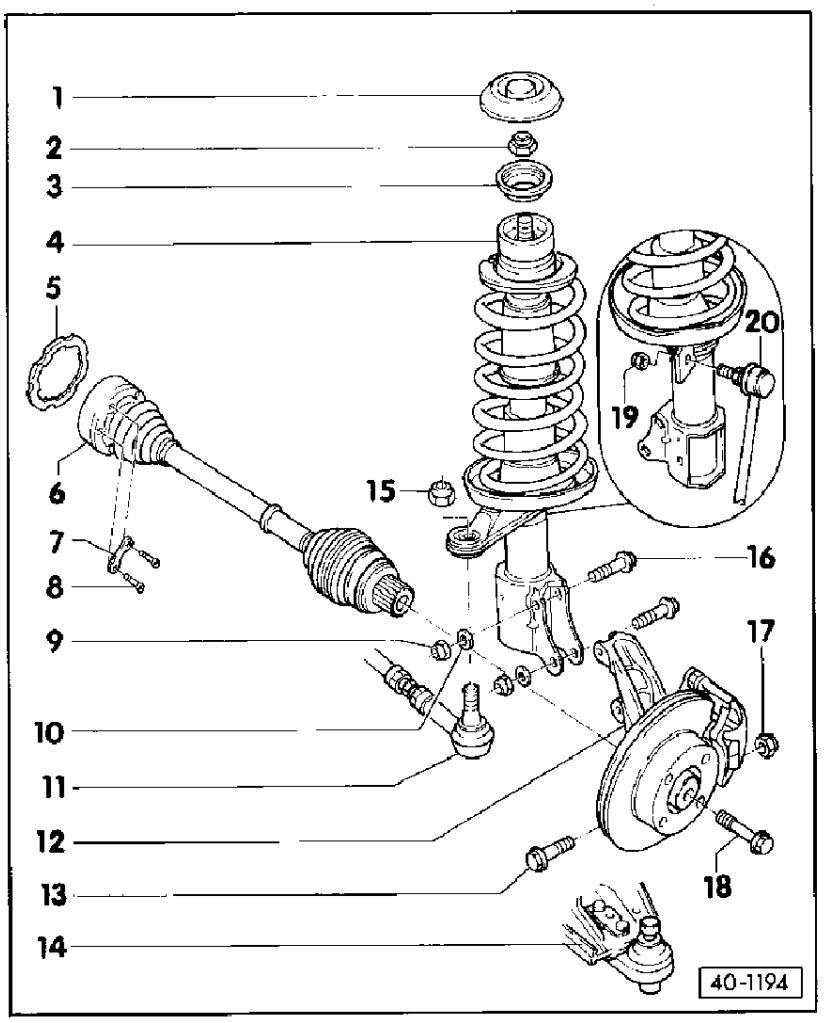
Forged wheel bearing housings are installed with 75 and 82 mm bearing diameter. Cast versions are only fitted with 75 mm bearing diameter. From a technical point of view there are no reservations about installing different types of wheel bearing housing on the same axle.

Attention

If cast wheel bearing housings are fitted when performing repairs, then the modified cover plates and the corresponding ball joints should also be installed.

Part no. 8A0 407 365 – left

Part no. 8A0 407.366 – right

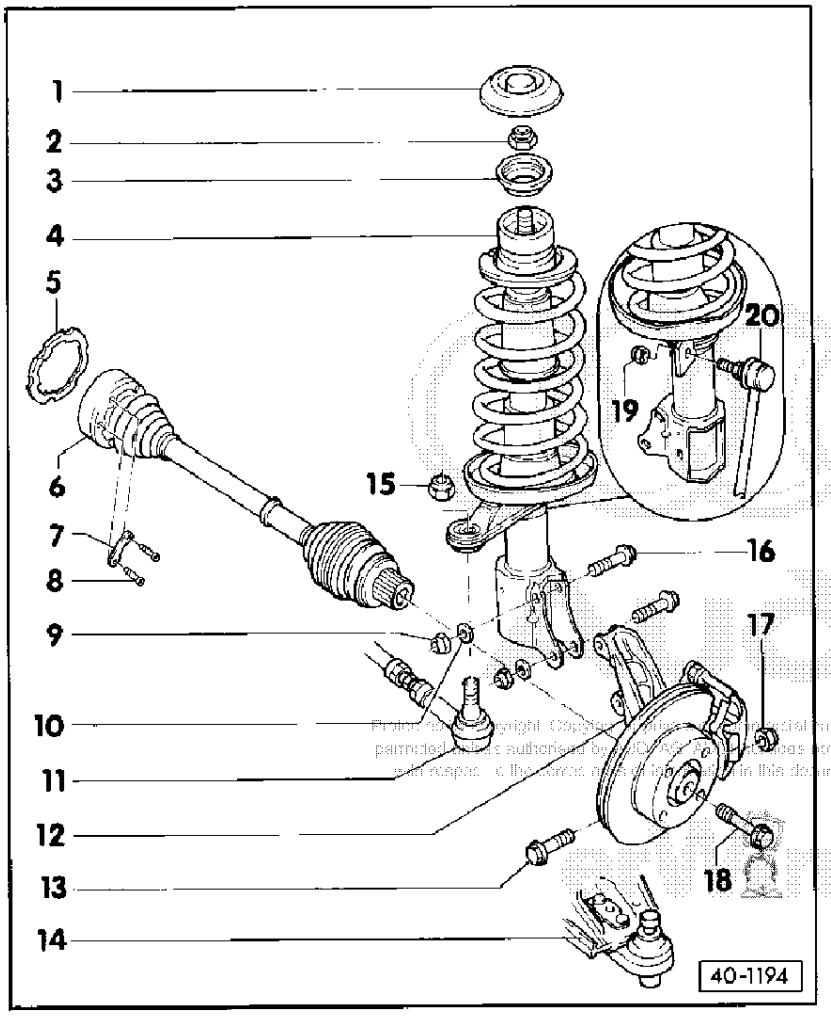


Removing and installing suspension strut and drive shaft

1 – **Cap**
- ♦ Note different versions
- ♦ Bolt to wheel housing on vehicles with 6-cylinder engine

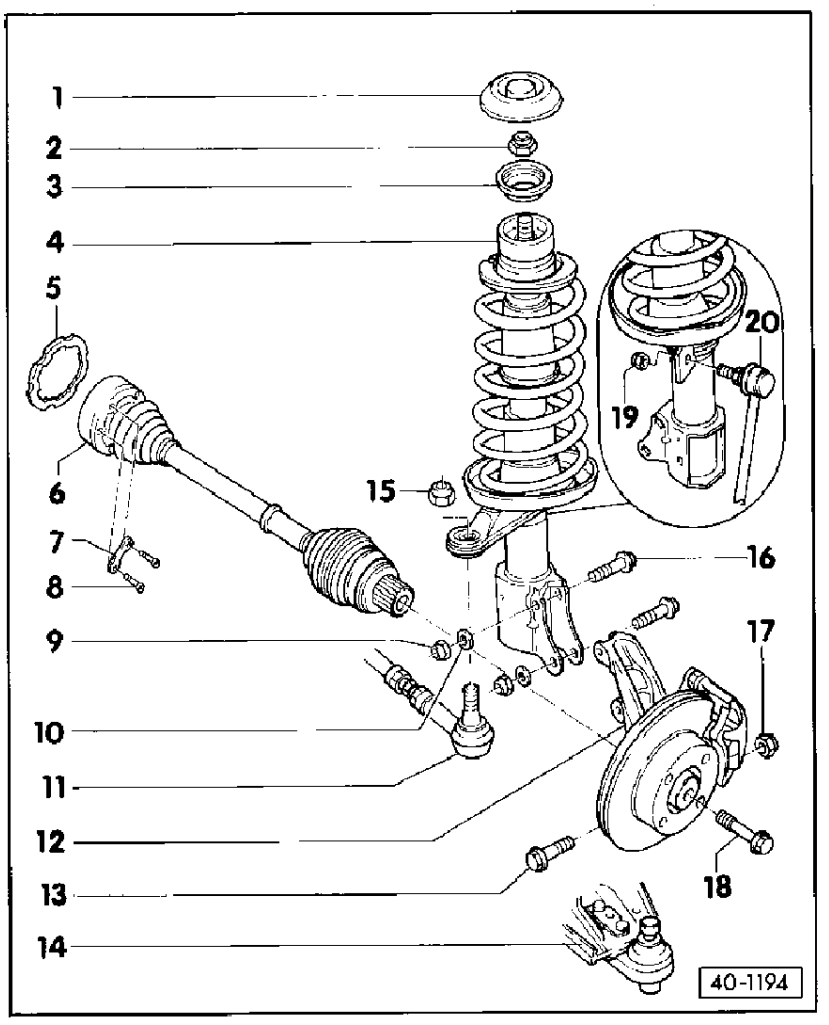
2 – **Self-locking nut, 60 Nm**
- ♦ Always replace
- ♦ Tightening with torque wrench => Fig. 2

3 – **Stop shell**



4 – **Suspension strut**
- ♦ Do not unscrew from wheel bearing housing to replace shock absorber, coil spring and wheel bearing; remove and install as a complete unit (camber setting)
- ♦ Do not remove drive shaft
- ♦ Servicing => Page 40-19

5 – **Seal**
- ♦ Always replace
- ♦ Pull off protective sheet and bond into joint

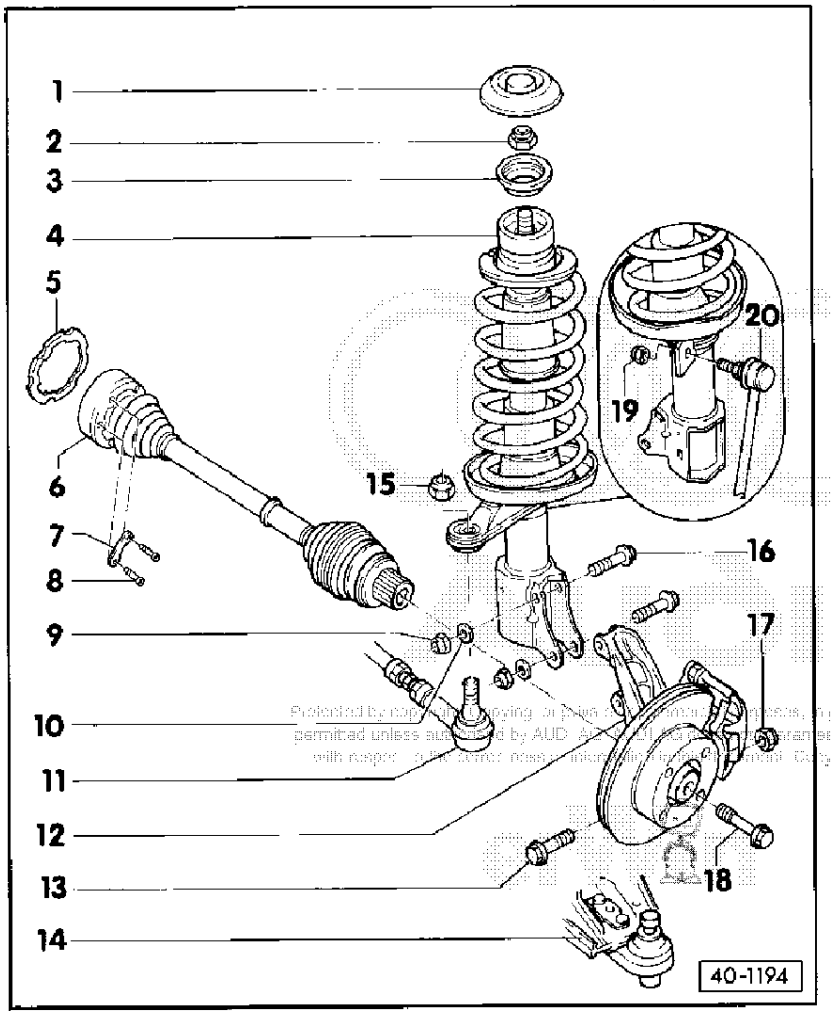


6 – Drive shaft

Note:

If vehicles on which the drive shaft has been taken out are to be moved, then an outer joint should be fitted beforehand in place of the drive shaft so as not to damage the wheel bearing.

- ♦ Installed in all vehicles with 4-, 5- and 6-cylinder engine wit manual gearbox
- ♦ To remove, unscrew connecting links on both sides from strut and push anti-roll bar upwards, unscrew from flanged shaft and unscrew hexagon combi bolt



- ♦ To remove, set appropriate wheel angle
- ♦ Servicing => Page 40-32
- ♦ Different lengths on left and right
- ♦ Note different versions (joints) depending on engine power
- ♦ On vehicles with ABS, slightly pull back wheel speed sensor prior to removal and press home on installation

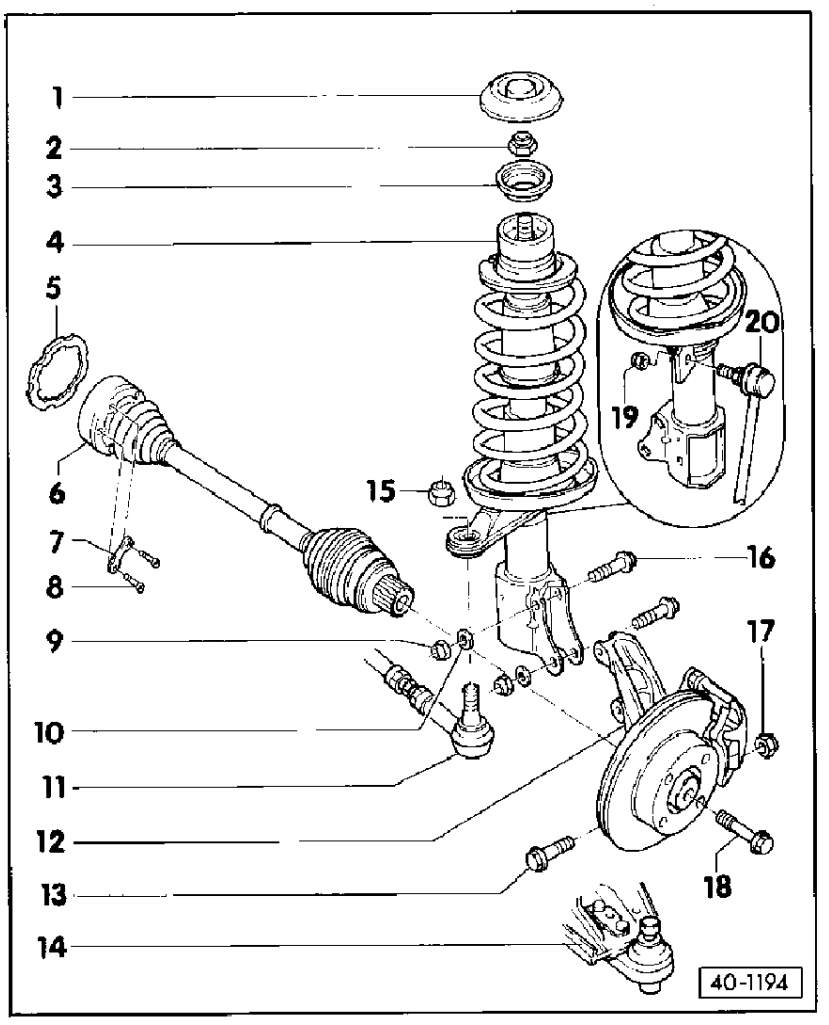
7 – Packing plate

8 – Cheese-head bolt

- ♦ M8 = 45 Nm
- ♦ M10 = 80 Nm

9 – Self-locking nut

- ♦ Always replace
- ♦ Tighten to 110 Nm, then tighten a further 90o

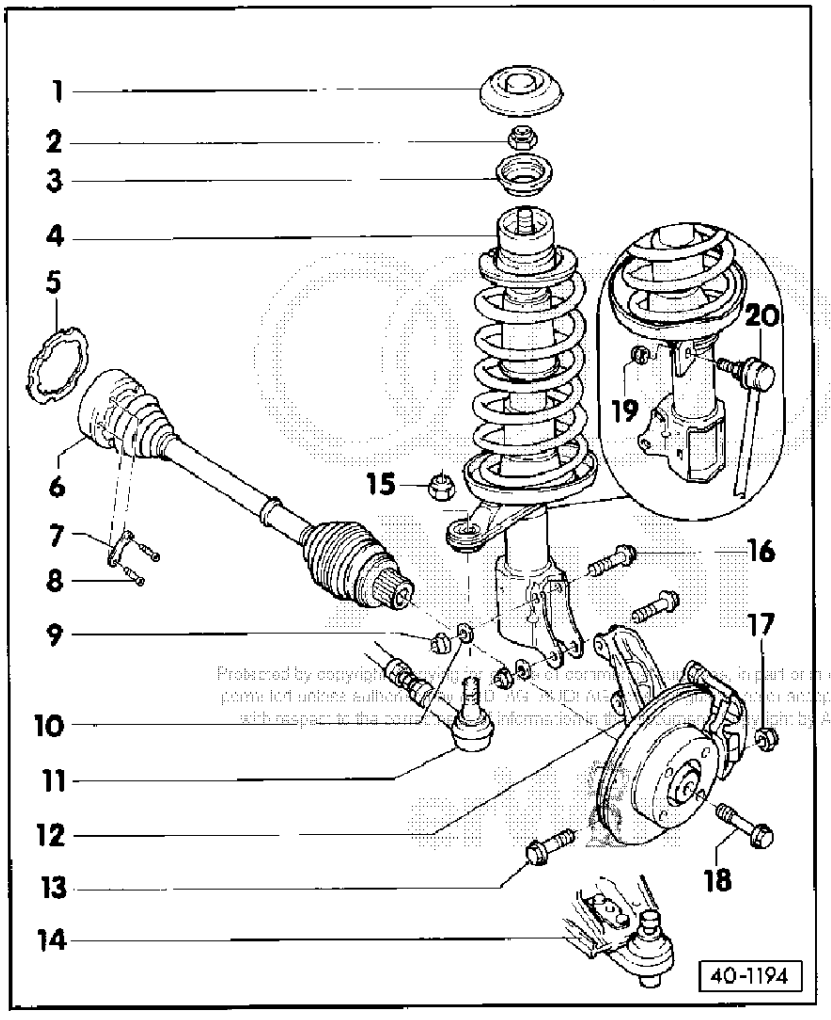


10 – **Shim**

11 – **Track rod**
- ♦ Press off steering arm using two-legged puller => Fig. 1

12 – **Wheel bearing housing with wheel hub**
- ♦ Never widen slot in wheel bearing housing (seat for joint pin) to press out joint pin
- ♦ Perform wheel alignment of front axle after installation
- ♦ Note different types of wheel bearing housing => Page 40-10, Fig. 11

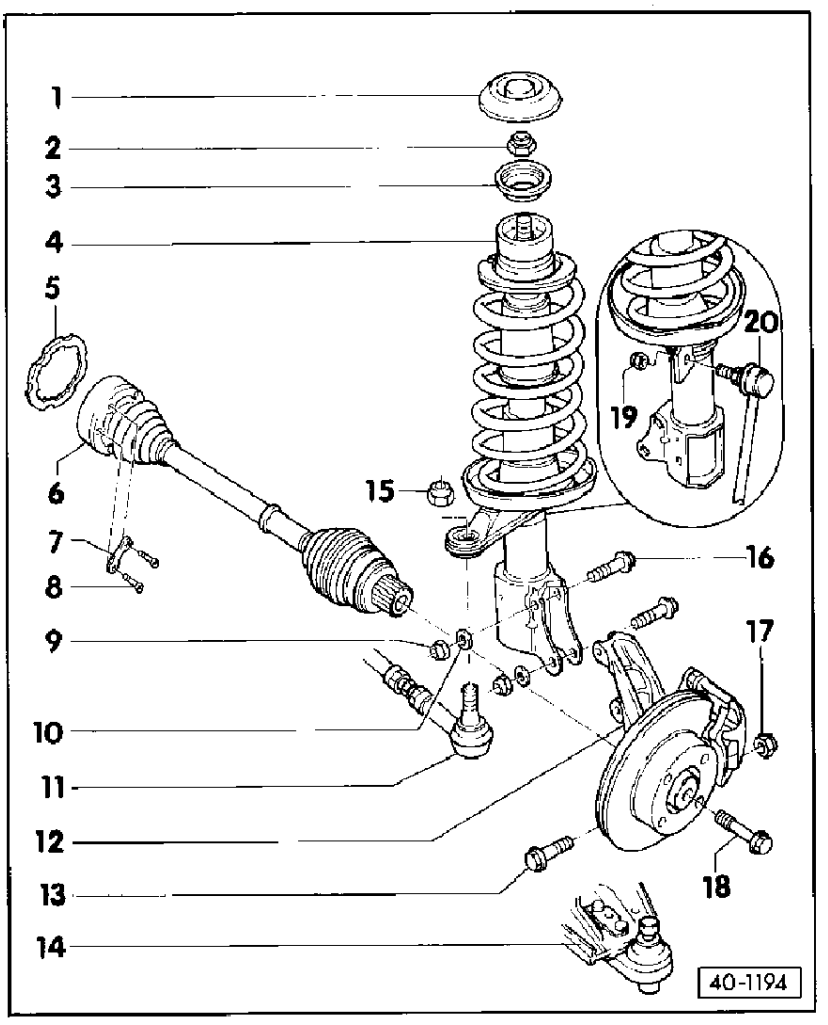
13 – **Hexagon bolt**
- ♦ Always replace
- ♦ Head of bolt points in direction of travel.



14 – **Transverse link with ball joint**
- ♦ Do not widen slot in wheel bearing housing when removing from wheel bearing housing
- ♦ Joint pin diameter of ball joint 19.0 mm
- ♦ Sheet-steel and forged versions differ

15 – **Self-locking nut, 30 Nm**
- ♦ Always replace

16 – **Hexagon flange bolt/hexagon bolt**
- ♦ Always replace
- ♦ Fit hexagon bolt instead of hexagon flange bolt
- ♦ When using hexagon bolt always fit washer between shock absorber housing and head of bolt

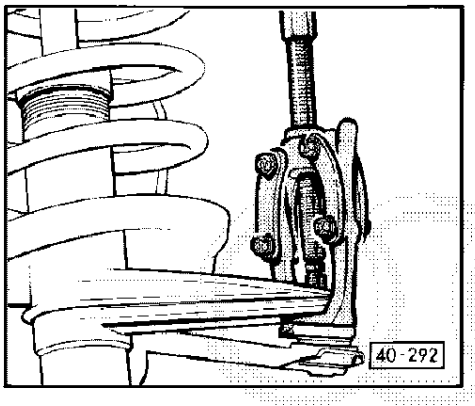


17 – **Self-locking nut, 50 Nm**
- ♦ Always replace

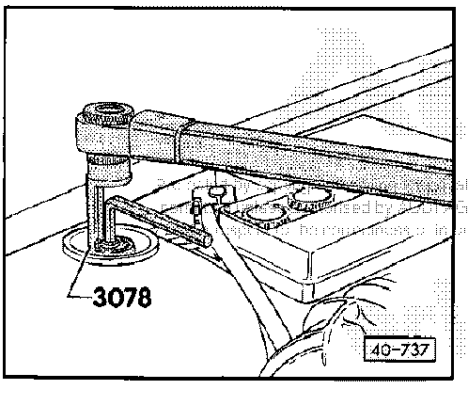
18 – **Hexagon combi bolt/flange bolt**
- ♦ Always replace
- ♦ Tighten M16 x 1.5 to 200 Nm and then give a further 90o turn
- ♦ Tighten M14 x 1.5 to 120 Nm and then give a further 90o turn
- ♦ Vehicle must be standing on its wheels when loosening and tightening (risk of accident).

19 – **Self-locking nut, 40 Nm**
- ♦ Always replace

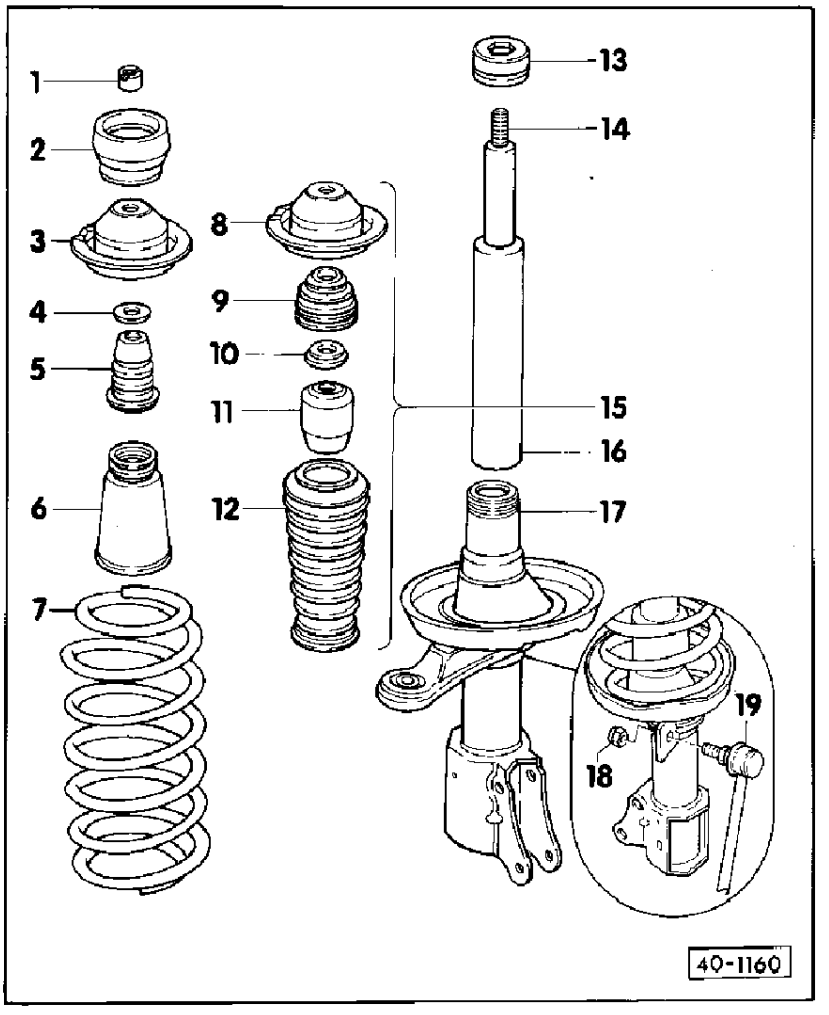
20 – **Connecting link**



◀ **Fig.1 Pressing off track rod joint**



◀ **Fig.2 Tightening nut with torque wrench**
– To do this counterhold the piston rod with an Allen key.



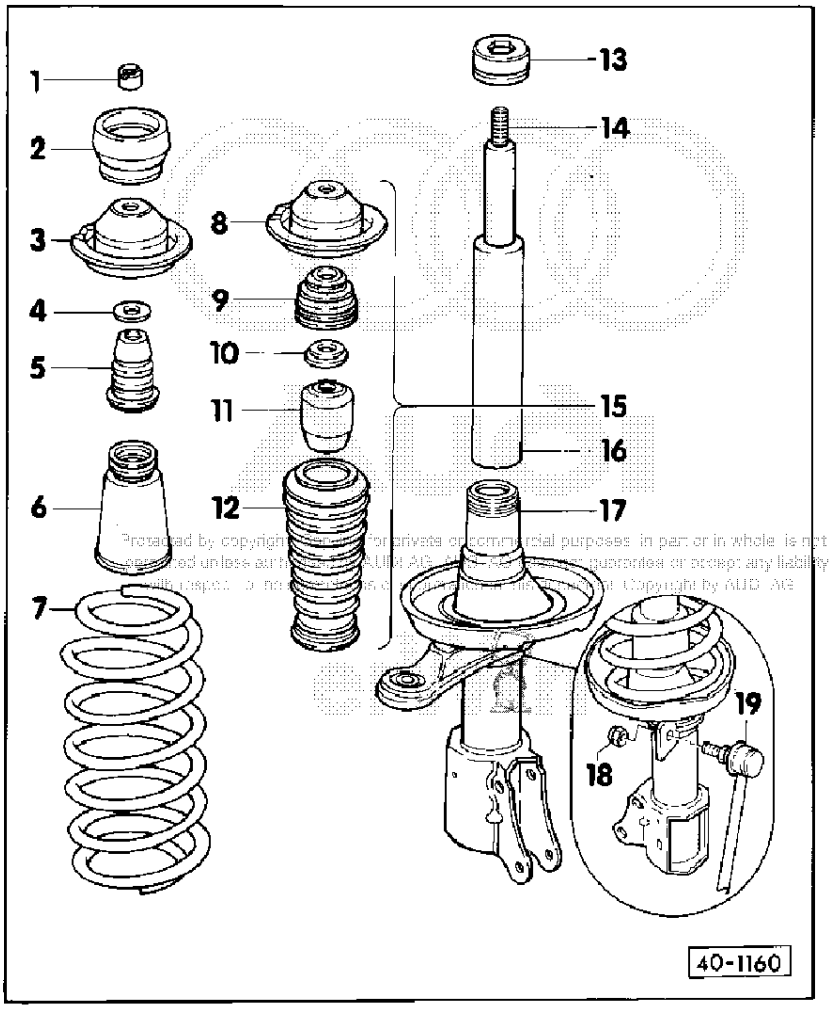
Servicing suspension strut

1 – **Slotted nut, 50 Nm**
- ♦ Tensioning coil spring => Fig. 1
- ♦ Unfastening and tightening => Fig. 2
- ♦ Tightening with torque wrench => Fig. 3

2 – **Suspension strut mounting**
- ♦ Replacement part supplied with integrated ball bearing

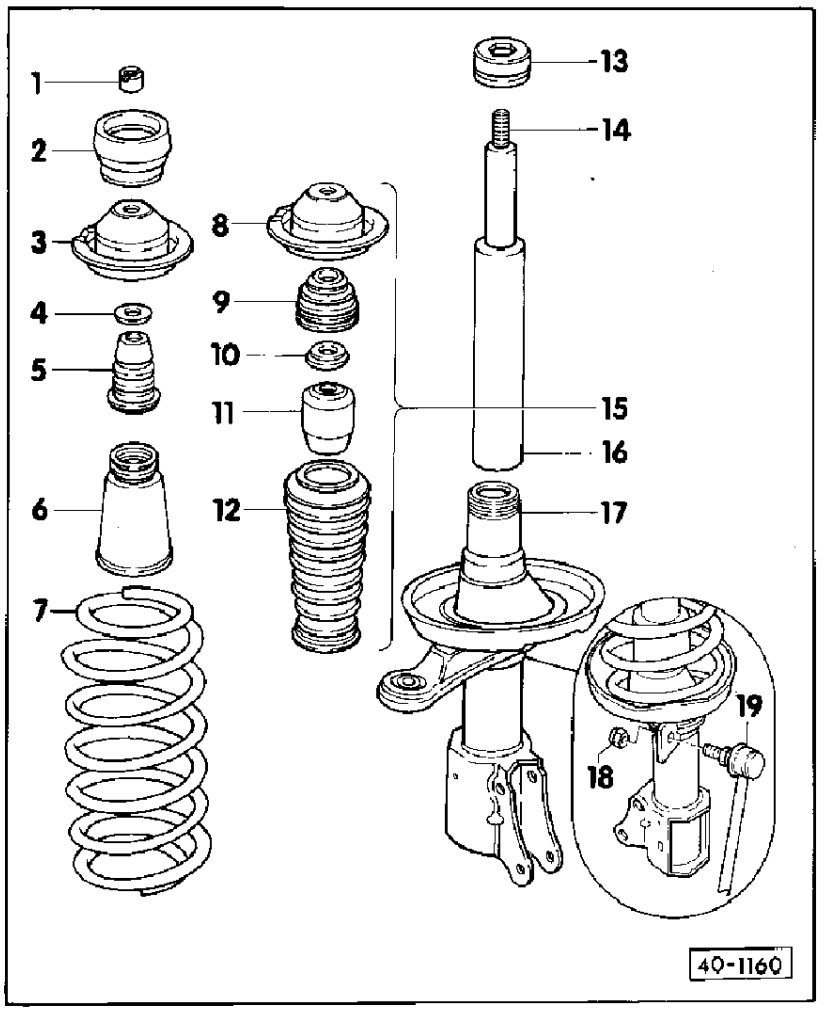
3 – **Spring plate**

4 – **Shim**



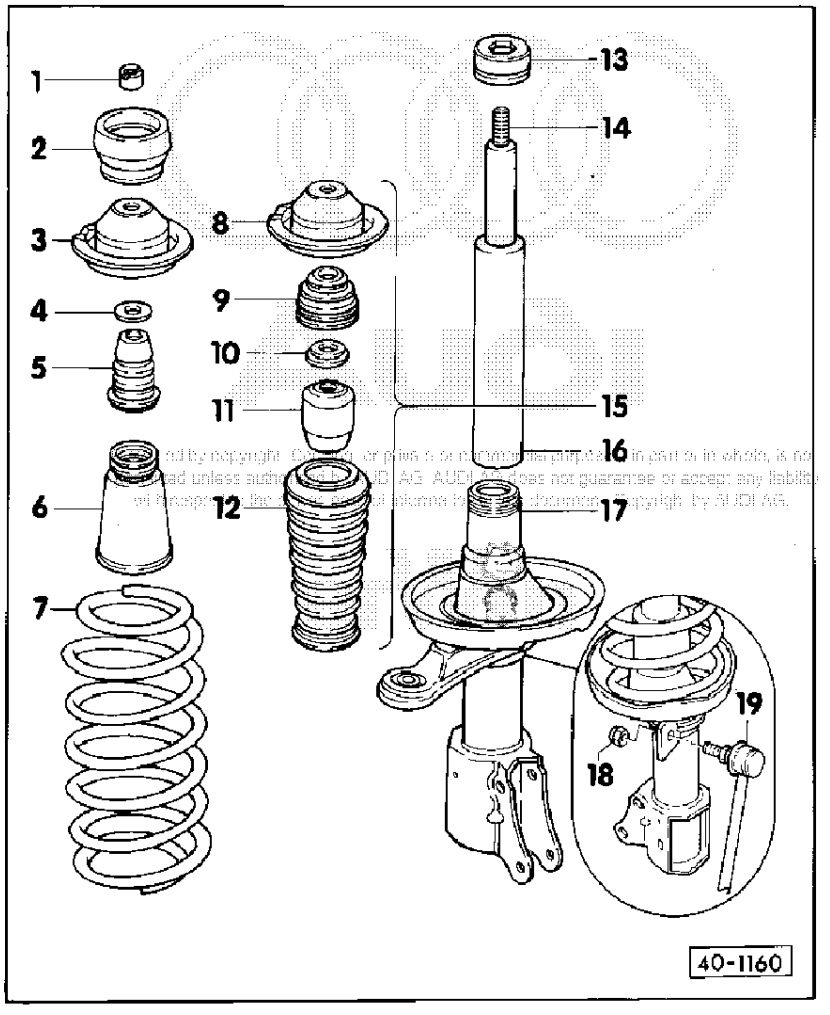
5 – **Stop buffer**
- ♦ Note different versions depending on running gear design
- ♦ The codes on the data sticker stand for:
  - 1BA = Standard version
  - 1BE = Sports version
  - 1BB = Heavy duty version

6 – **Protective sleeve**



7 – Coil spring

- ♦ Refer to Parts List
- ♦ Prior to replacement, consult vehicle data sticker as that is the only way to establish spring version
- ♦ The codes on the data sticker stand for:
  - 1BA = Standard version
  - 1BE = Sports version
  - 1BB = Heavy duty version
- ♦ Refer to notes under item - 16– shock absorber
- ♦ Replacing => Fig. 1 to 3
- ♦ Installation position: Colour code on spring points downwards towards shock absorber housing



8 – Spring plate

- ♦ With vent holes

9 – Bellows cover

10 – Shim

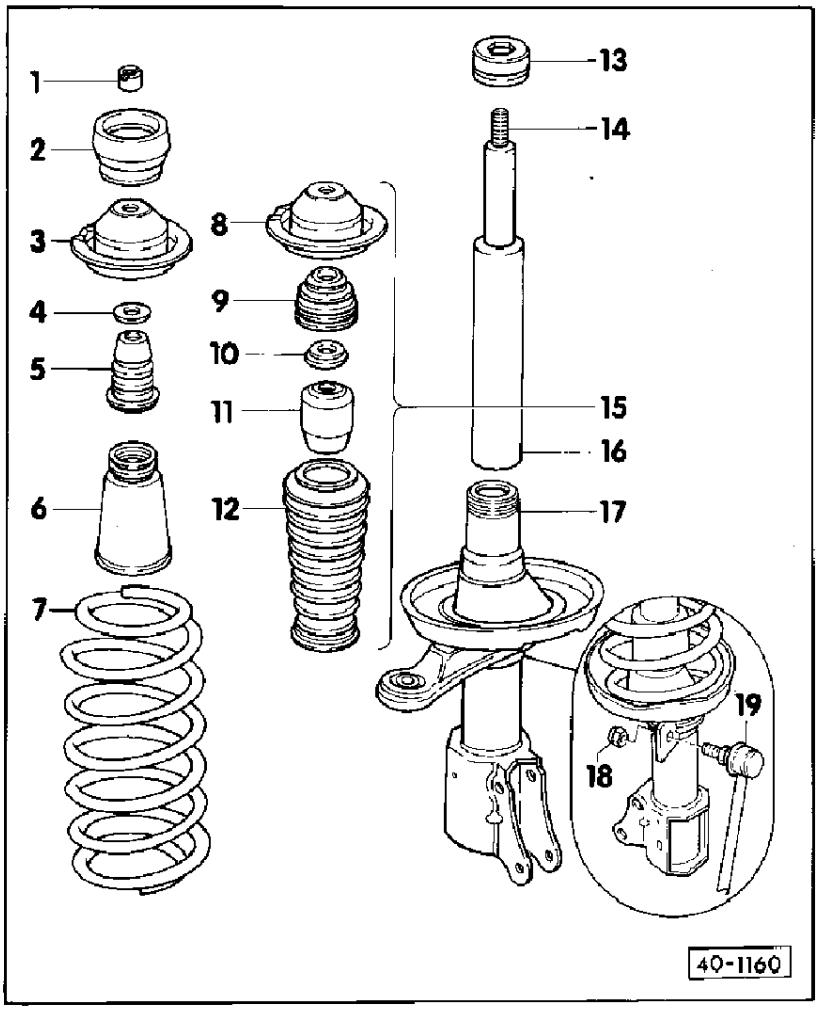
11 – Stop buffer

12 – Bellows

- ♦ Top: Fasten in position in cover
- ♦ Bottom: Pull over screw cap

13 – Screw cap, 180 Nm

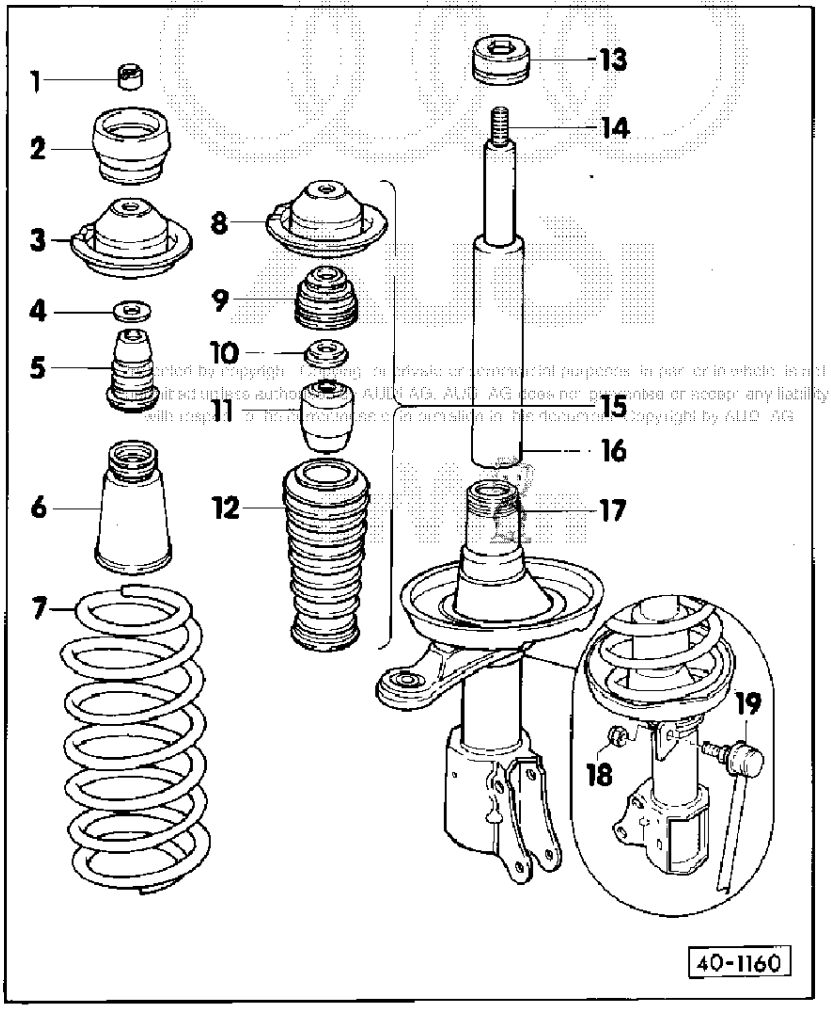
- ♦ Unscrewing and screwing on => Fig. 4
- ♦ 220 Nm on Audi S2 => Fig. 5



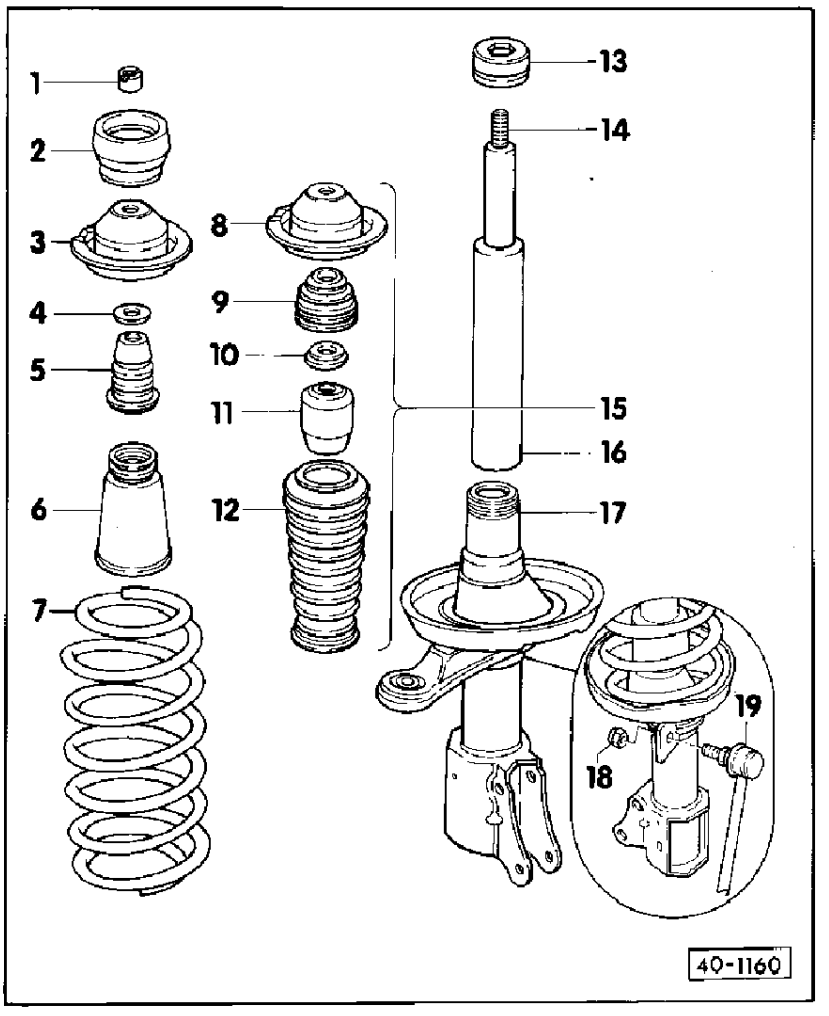
14 – **Piston rod**
- ♦ Counterhold with Allen key when loosening and tightening slotted nut => Fig. 2

15 – **For vehicles with heavy duty version only**

16 – **Shock absorber**
- ♦ Refer to Parts List
- ♦ Prior to replacement, consult vehicle data sticker as that is the only way to establish spring version
- ♦ The codes on the data sticker stand for:
  - 1BA = Standard version
  - 1BE = Sports version
  - 1BB = Heavy duty version
- ♦ Can be replaced individually



Notes:
- ♦ Up to chassis no. 8C NA 015 724 there is no running gear information on the data sticker. In such cases, all vehicles are to be adjusted as indicated in the specified value table for vehicles with standard and sports version when performing wheel alignment. When replacing shock absorbers or coil springs, determine running gear version by way of part no. of rear shock absorbers in combination with parts list.
- ♦ As of chassis no. 8C NA 015 725 the data sticker is provided with the above identification.



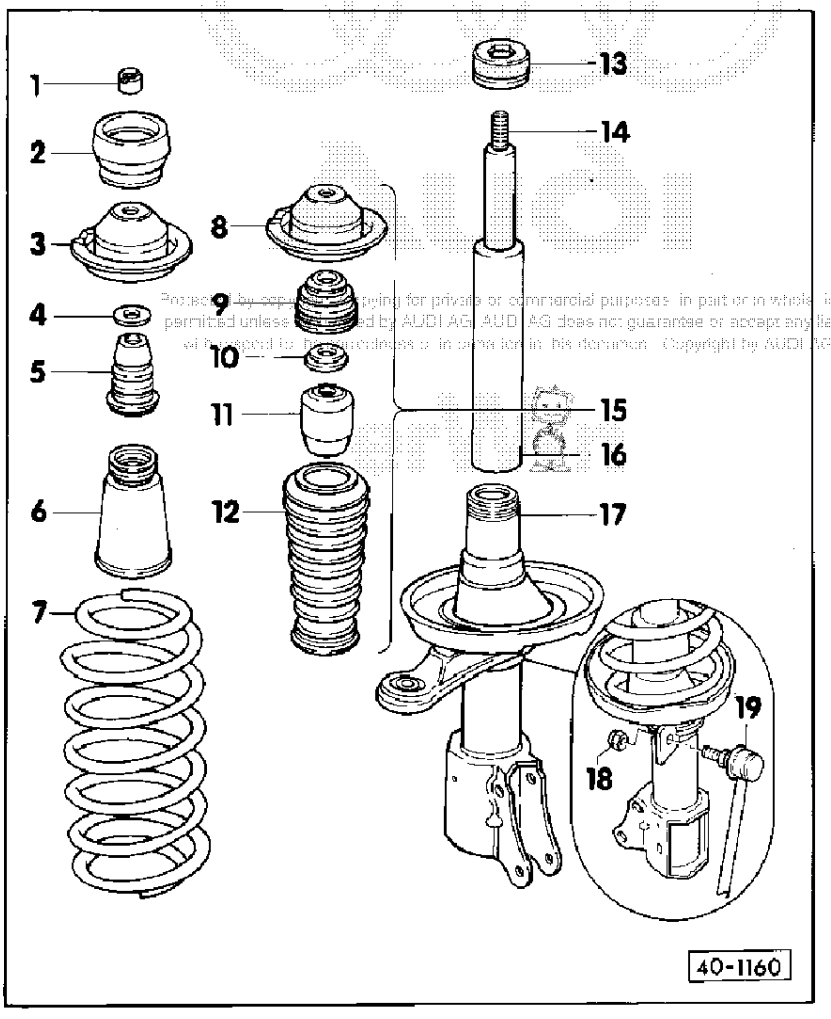
- ♦ Defective shock absorbers must always be properly prepared before being scrapped.

=> Special Information No. 2; edition 03. 90

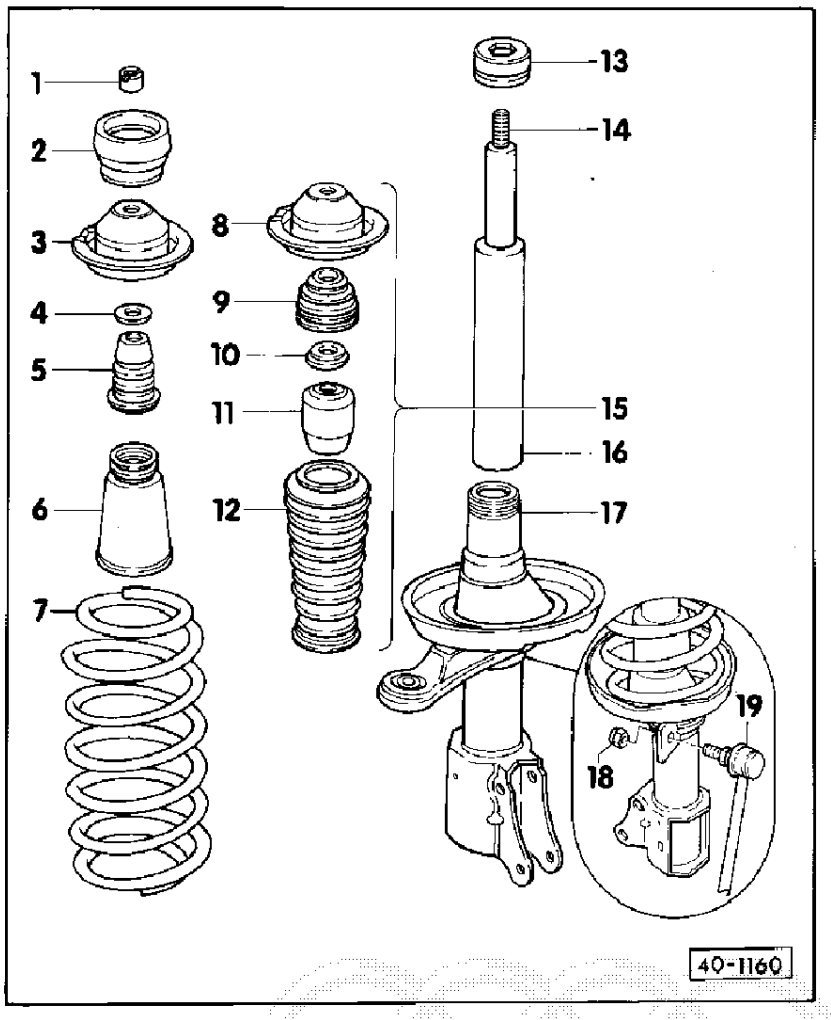
- ♦ Wet-type shock absorbers are fitted as standard
- ♦ Remove piston and piston rod when performing repairs
- ♦ Drain and dispose of oil fill from housing
- ♦ Install shock absorber cartridges

Notes:

- ♦ Heavy duty version vehicles are equipped with shock absorber cartridges.
- ♦ Sports-version vehicles are fitted with shock absorber cartridges or gas-filled shock absorbers.

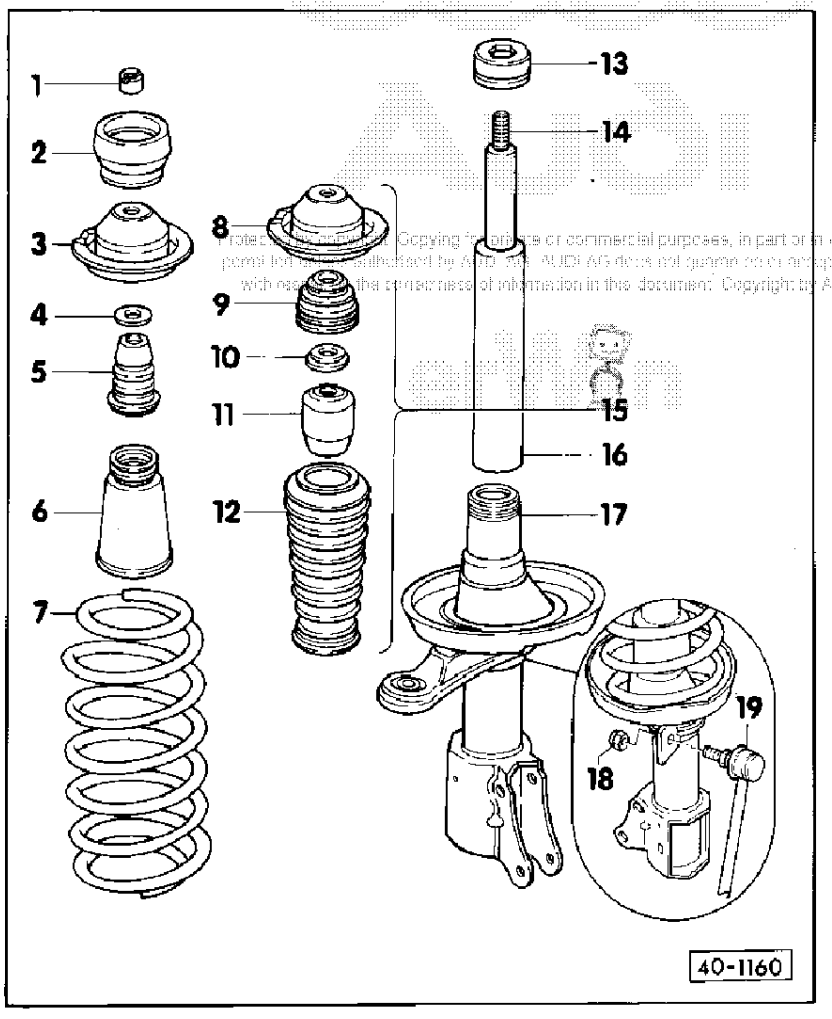


- ♦ Checking (removed) shock absorber: Check shock absorber by hand (hold in installation position) by extending and compressing it. Shock absorber must move evenly and smoothly over entire stroke. Shock absorbers that have been stored for a lengthy period may have to be pumped several times. Defective shock absorbers make a "banging" noise whilst driving. If they are functioning properly, slight traces of shock absorber oil do not signify that replacement is necessary. Considerable loss of oil will result in deficiencies in the expansion and compression stages.



♦ Checking gas-filled shock absorber: Compress shock absorber by hand. The piston rod must move evenly and smoothly over the entire stroke. Release piston rod. If shock absorbers have sufficient gas pressure, piston rod returns automatically to initial position. If this is not the case, the shock absorber need not always be replaced. As long as there has not been a major loss of oil, the mode of operation corresponds to that of a conventional shock absorber.

=> "Special Service Information" binder: Running Gear No. 17



17 – Shock absorber housing

♦ Drain and dispose of oil fill from housing

18 – Self-locking nut, 40 Nm

♦ Always replace

19 – Connecting link

♦ Unscrew at shock absorber housing to remove suspension strut

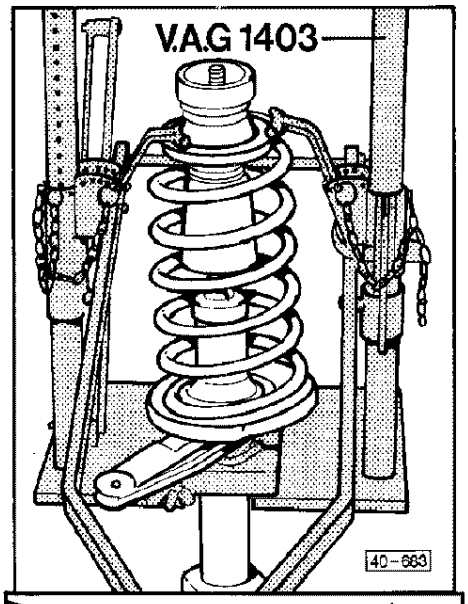


Fig.1 Tensioning coil spring

– Jaws engage on spring plate

Note:

The coil springs can also be replaced using spring tensioner -V.A.G 1752/1- in conjunction with strut mounting -V.A.G 1752/2-.

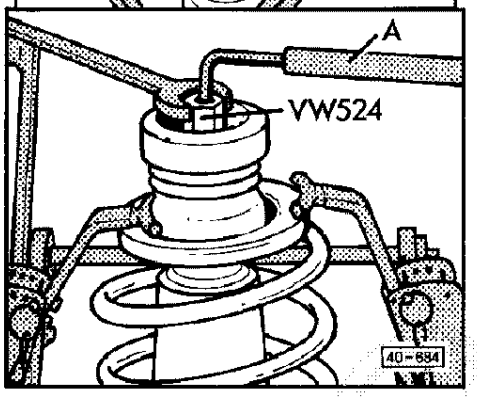


Fig.2 Loosening and tightening slotted nut

– Slacken spring

– To move the piston rod up and down, the tubular end of the wrench can be screwed to the piston rod.

A = Wrench

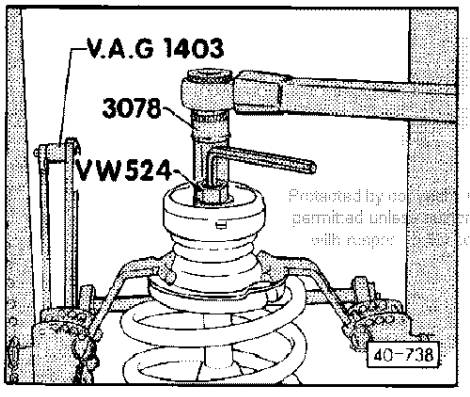


Fig.3 Tightening slotted nut with torque wrench

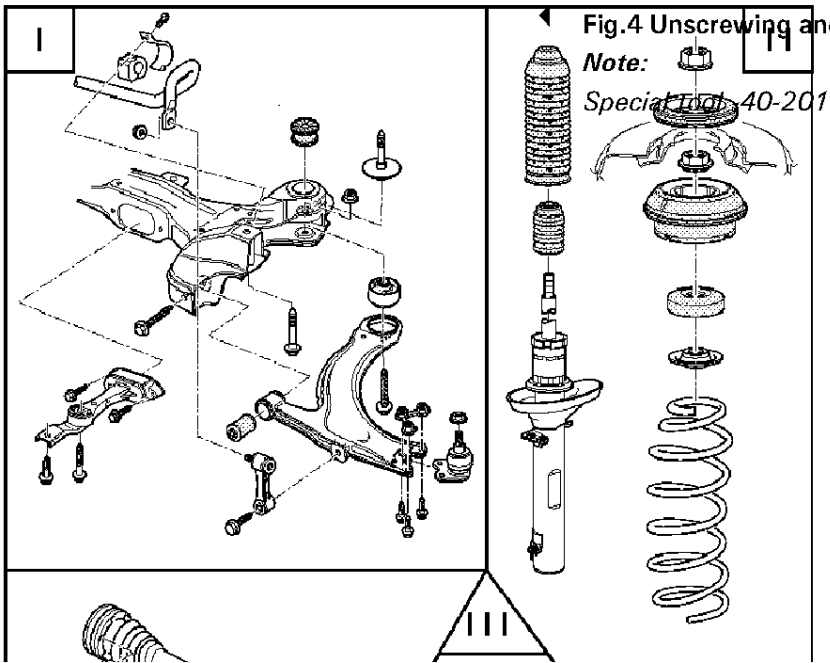


Fig.4 Unscrewing and screwing on screw cap

Note:

Special tool -40-201 A- is replaced by tool -40-201 B-.

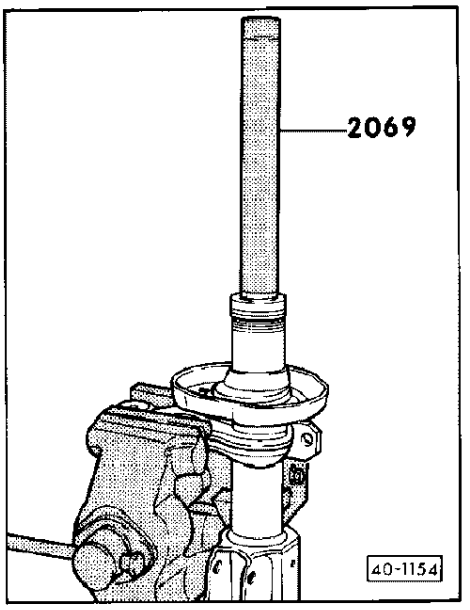
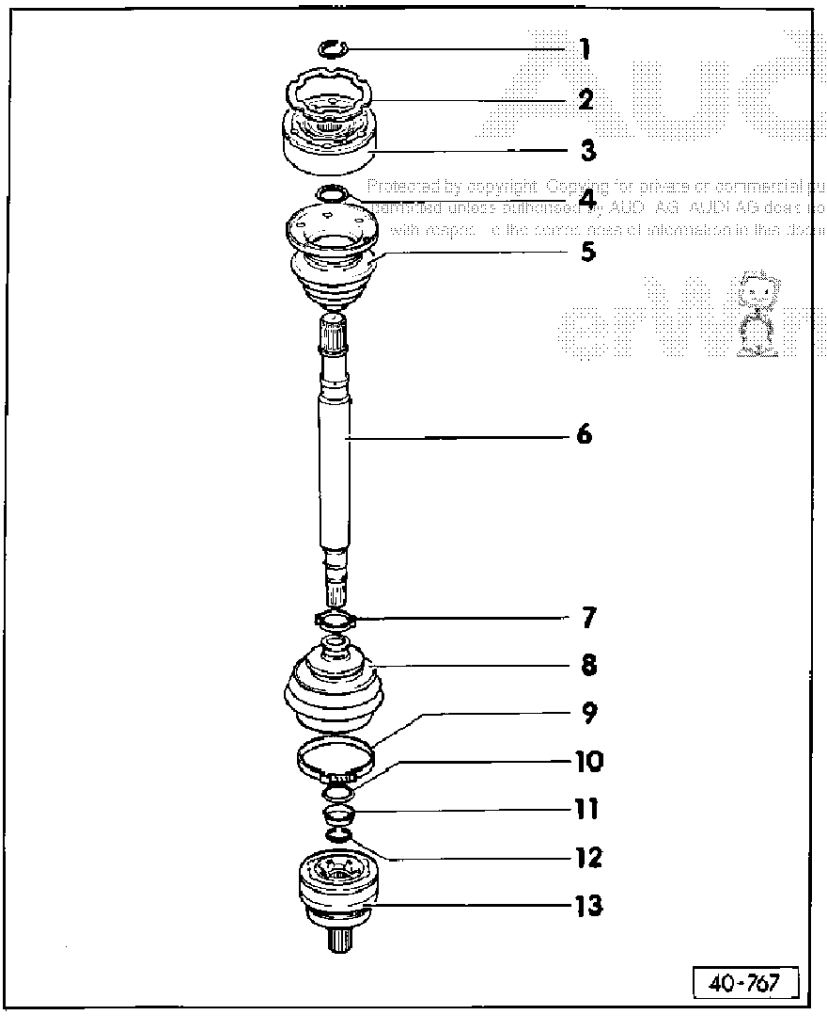


Fig.5 Unscrewing and screwing on screw cap



Servicing drive shaft with constant velocity joint

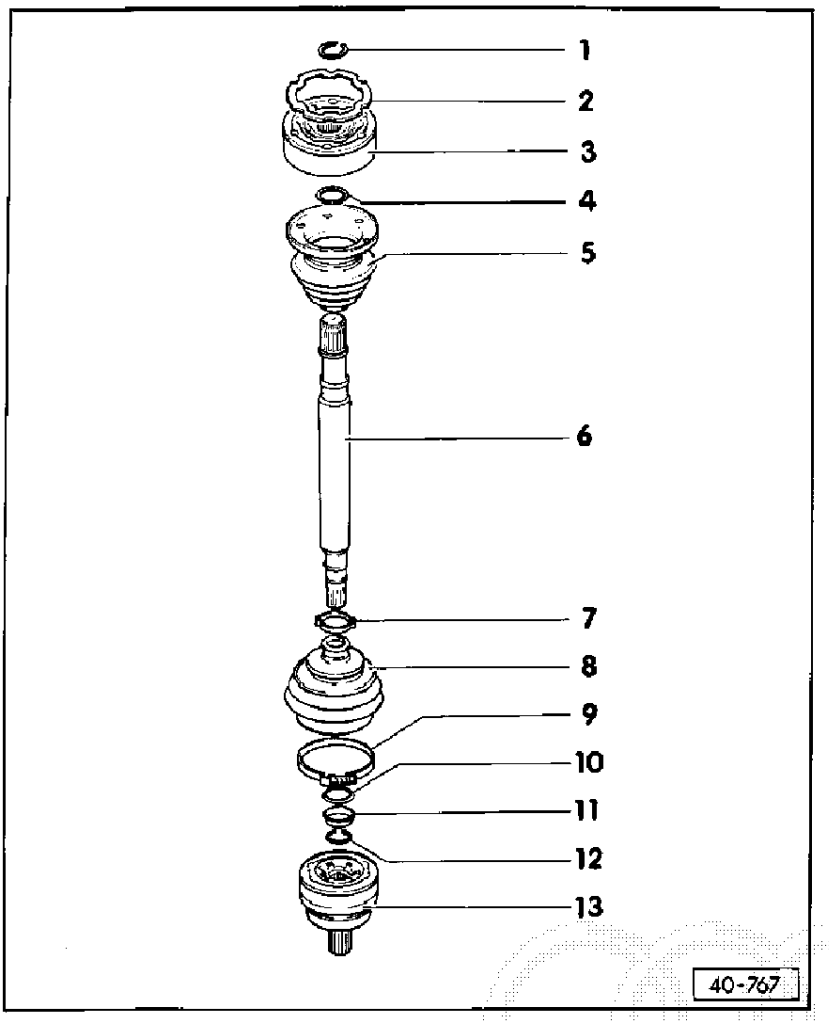
All vehicles with 4-, 5- and 6-cylinder engine and manual gearbox.

Note:

Outer constant velocity joints are packed with grease G-6:

Outer joint	Grease Total quantity	of which in: Joint	Bellows
ø mm	[g]	[g]	[g]
88	90	40	50
98	120	80	40
Inner joint			
ø mm			
100	90	40	50
108	120	35	85

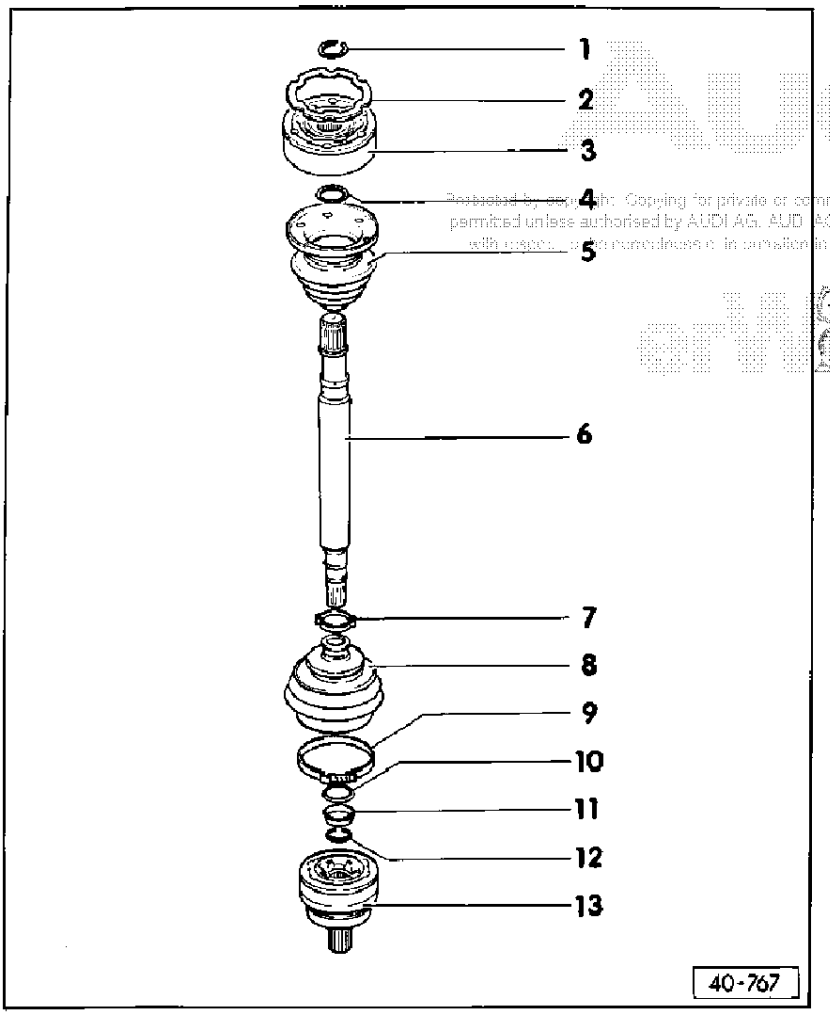
Top up fill in joint if necessary when renewing the protective bellows.



1 – **Circlip**
- ♦ Always replace
- ♦ Depending on version, remove and fit with commercially available circlip pliers or with - VW 161 a-, => Fig. 3

2 – **Seal**
- ♦ Replace; pull off protective sheet and bond into joint.

3 – **Inner constant velocity joint**
- ♦ Note different joint diameters
- ♦ Outer diameter for engines up to 128 kW: 100 mm
- ♦ Outer diameter for engines up to 169 kW: 108 mm
- ♦ Only replace as complete unit
- ♦ Pressing off ø100 mm => Fig. 4
- ♦ Pressing off ø108 mm => Fig. 5



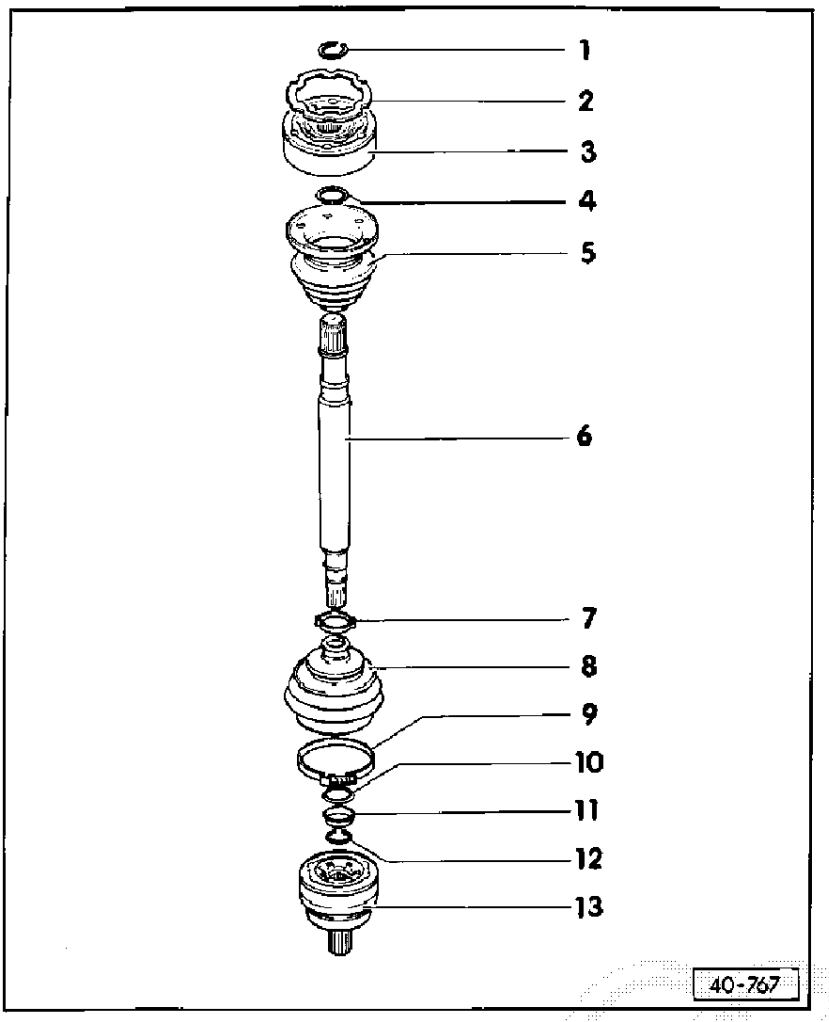
- ♦ Pressing on => Fig. 6
- ♦ Greasing => Notes Page 40-32

4 – **Dished washer**
- ♦ Installation position => Fig. 7
- ♦ Not fitted as of 169 kW engine

5 – **Joint bellows with cap**
- ♦ Check for cracks and abrasion
- ♦ Drive off with drift
- ♦ Seal end face with D-3 before fitting on constant velocity joint

6 – **Profiled shaft**
- ♦ Different lengths on left and right

7 – **Hose clamp**
- ♦ Always replace
- ♦ Tensioning => Fig. 1



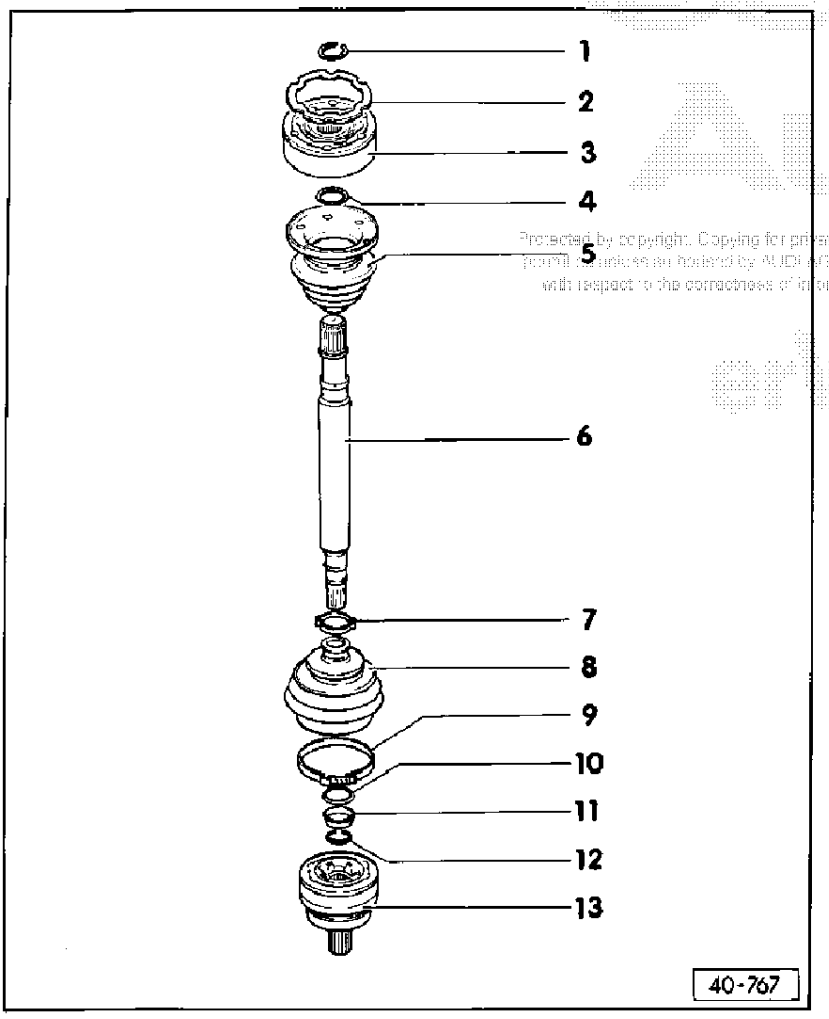
8 – Protective bellows
- ♦ Check for cracks and abrasion
- ♦ Before tensioning small hose clamp briefly vent joint bellows => Fig. 2

9 – Hose clamp
- ♦ Always replace
- ♦ Tensioning => Fig. 1

10 – Dished washer
- ♦ Installation position => Fig. 9

11 – Spacer
- ♦ Installation position => Fig. 9

12 – Circlip
- ♦ Always replace
- ♦ Installation position => Fig. 9
- ♦ Fit into annular groove on shaft when installing (no longer visible once joint is installed)



13 – Outer constant velocity joint
- ♦ Only replace as complete unit
- ♦ Note different joint diameters:
- ♦ Outer diameter for engines up to 128 kW: 88 mm
- ♦ Outer diameter for 169 kW engines: 98 mm
- ♦ Pressing off => Fig. 8
- ♦ Installing: Drive joint onto shaft with plastic hammer until circlip engages in annular groove in profiled shaft
- ♦ Greasing => Notes Page 40-32
- ♦ Thread in joint pin:
- – M16 x 1.5 for ø 82 mm wheel bearing
- – M14 x 1.5 for ø 75 mm wheel bearing

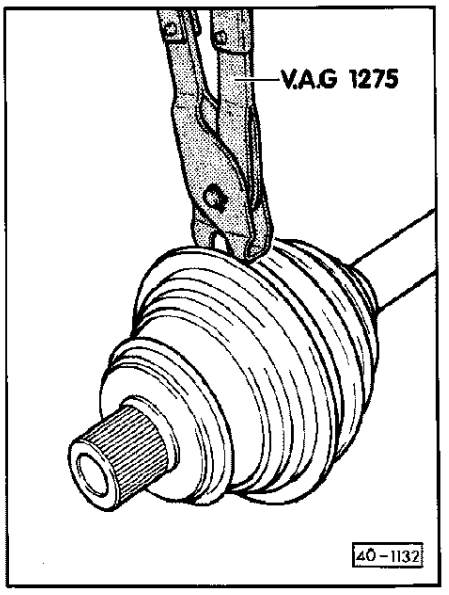


Fig.1 Tensioning hose clamp/clip

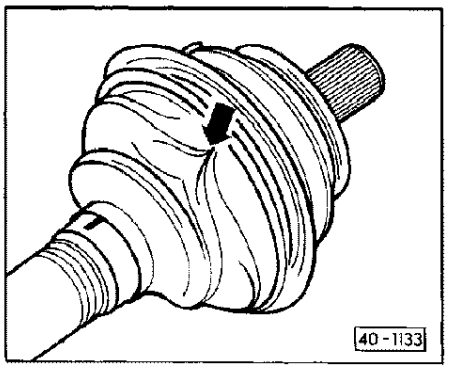


Fig.2 Venting joint bellows

- The bellows are often squashed when installing them on the housing. This produces a vacuum in the bellows which causes an inward fold when driving -arrow-. Therefore, briefly vent the bellows at the small diameter end after fitting to equalise pressure.

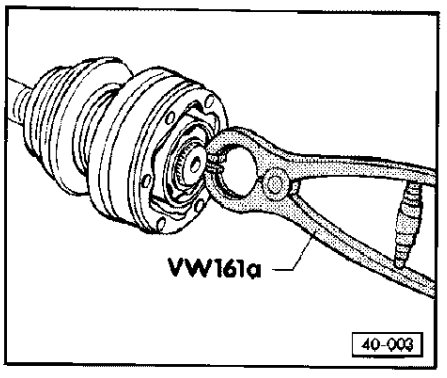


Fig.3 Removing and installing circlip

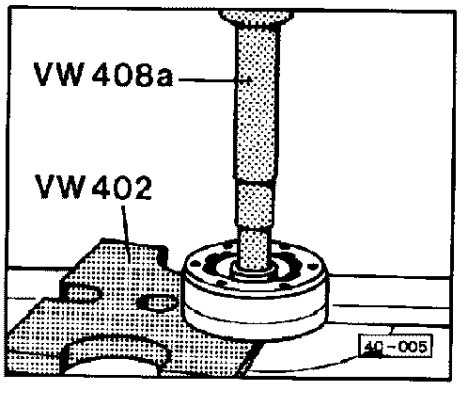


Fig.4 Pressing off inner joint

- Support ball hub whilst doing so.

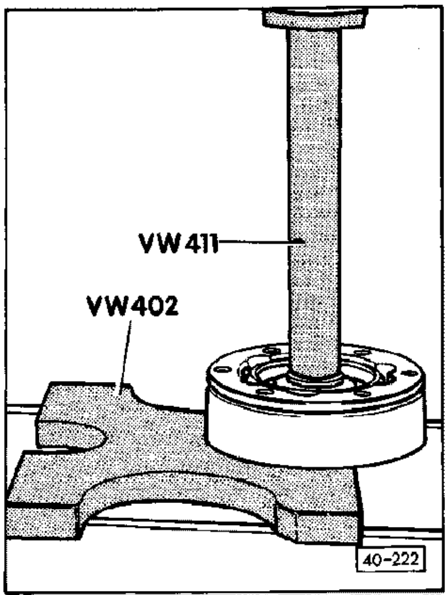


Fig.5 Pressing off inner joint

- Support ball hub whilst doing so.

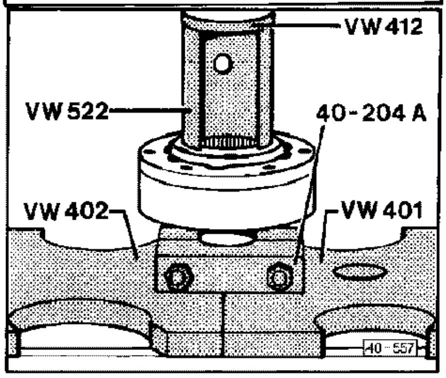


Fig.6 Pressing on inner joint

- Press joint home, install circlip.

Note:

Chamfer on inner diameter of ball hub (splines) must face locating collar of drive shaft.

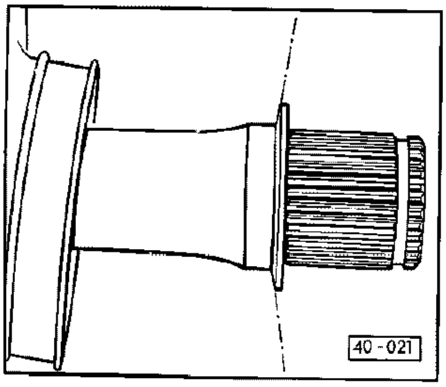


Fig.7 Correct positioning of dished washer

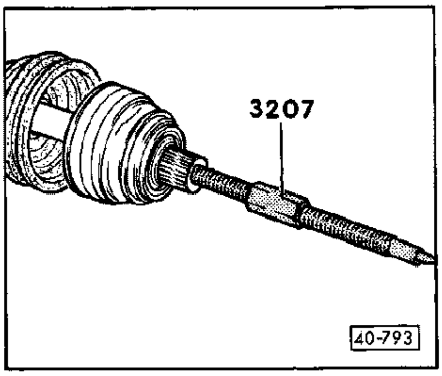


Fig.8 Pressing off outer constant velocity joint

- Clamp drive shaft in vice using soft jaws.
- Remove clamp.
- Fold back bellows.
- Screw in special tool -3207- with M14 or M16 threaded end depending on thread of joint pin until constant velocity joint is pressed off profiled shaft.

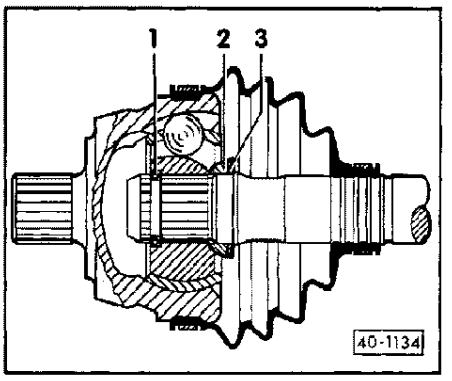
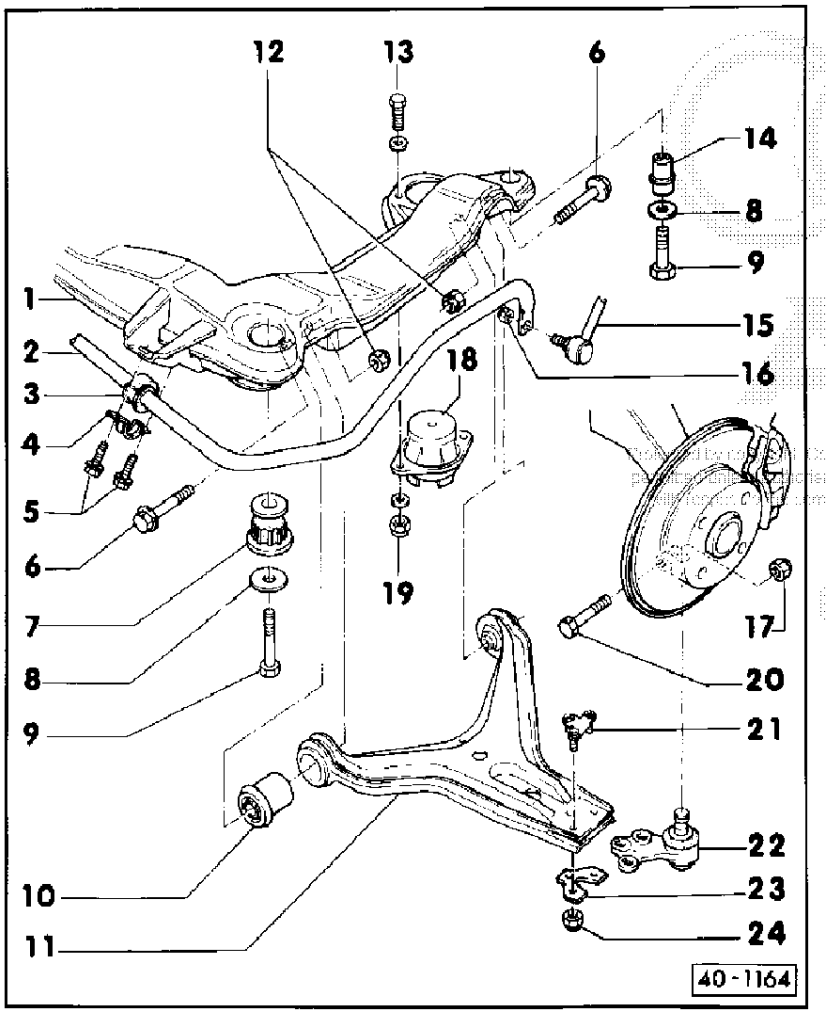


Fig.9 Installation position of dished washer, spacer and circlip

-1 -Circlip

-2- Spacer

-3- Dished washer

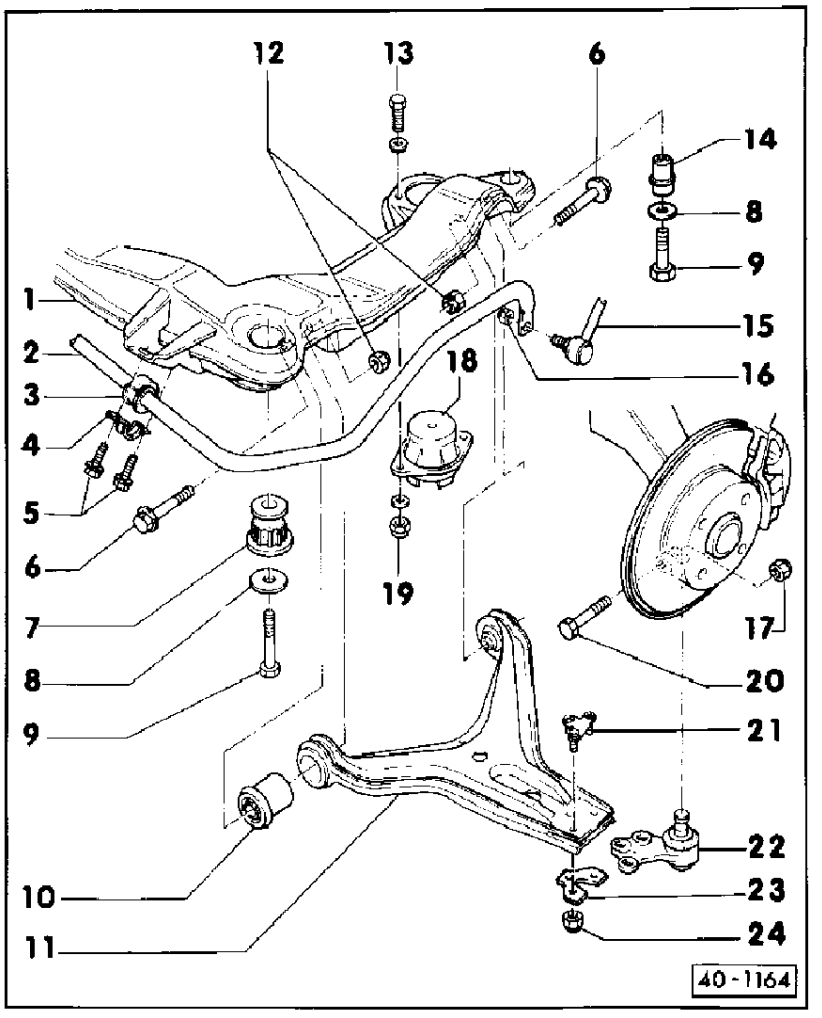


Servicing suspension

Note:
Welding and straightening operations are not permitted on load-bearing elements or components that locate the wheels.

1 – **Subframe**

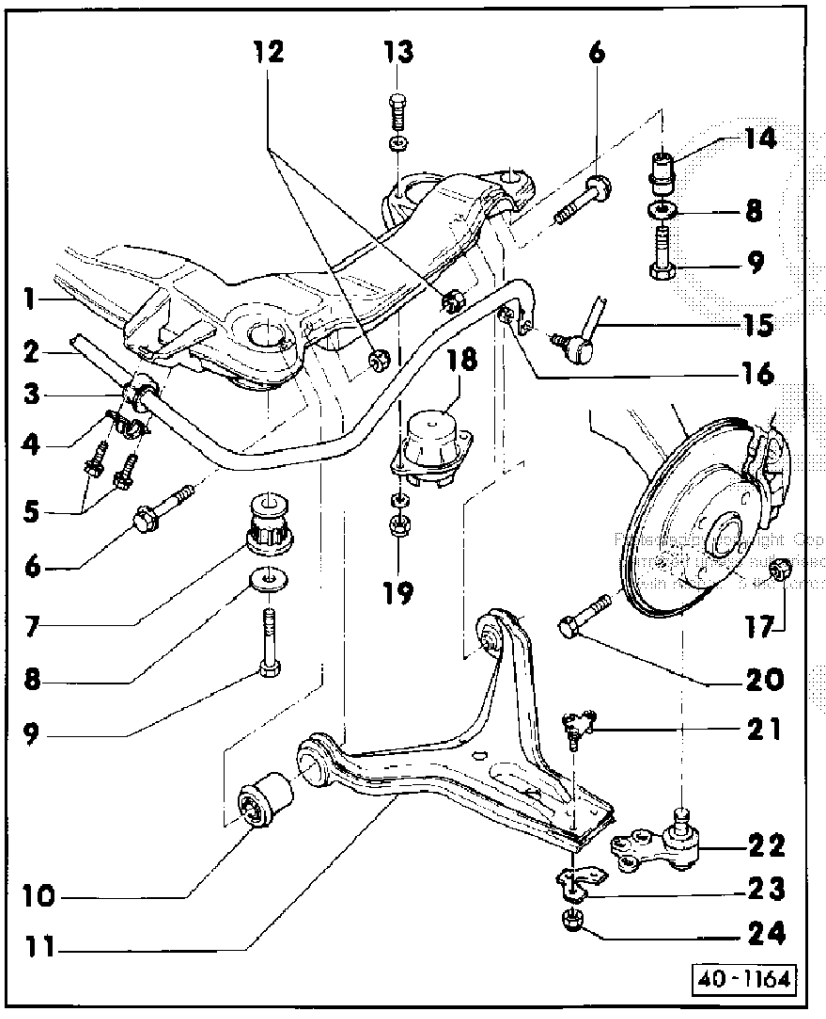
- ♦ Different versions for vehicles with 4-, 5- and 6-cylinder engines
- ♦ Perform alignment of front axle every time after removal and installation
- ♦ Tighten fastening bolts on bodywork in following order: Viewed in direction of travel:
  - 1. Rear left
  - 2. Rear right
  - 3. Front left
  - 4. Front right



2 – **Anti-roll bar**
- ♦ Drive vehicle onto platform to facilitate assembly
- ♦ Before bolting to bracket, make sure distance from sub-frame is same on both sides
- ♦ ø 25 mm on vehicles with 4-cylinder engine, ø 26 mm on vehicles with 5- and with 6-cylinder engine as well as on vehicles with 4-cylinder 4-valve engine and Avant

3 – **Bearing**
- ♦ Apply talc before fitting
- ♦ Note different internal diameters

4 – **Clip**
- ♦ Pay attention to proper seating of anti-roll bar bearing during attachment

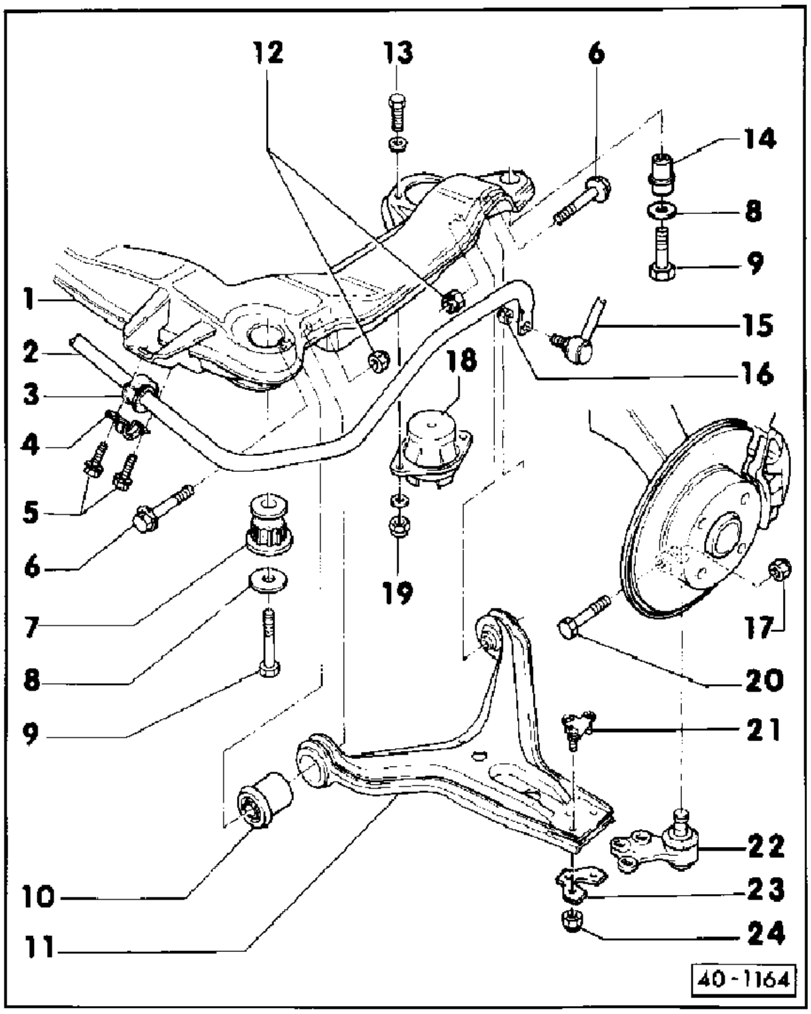


5 – **Self locking bolts, 35 Nm**
- ♦ Always replace

6 – **Combi bolt**
- ♦ Always replace

7 – **Front bearings for subframe**
- ♦ Removing front mounting => Fig. 3
- ♦ Fitting front mounting => Fig. 4
- ♦ Apply anti-friction assembly oil G 294 421 A1 beforehand
- ♦ Note different versions depending on engine

8 – **Washer**
- ♦ Always replace

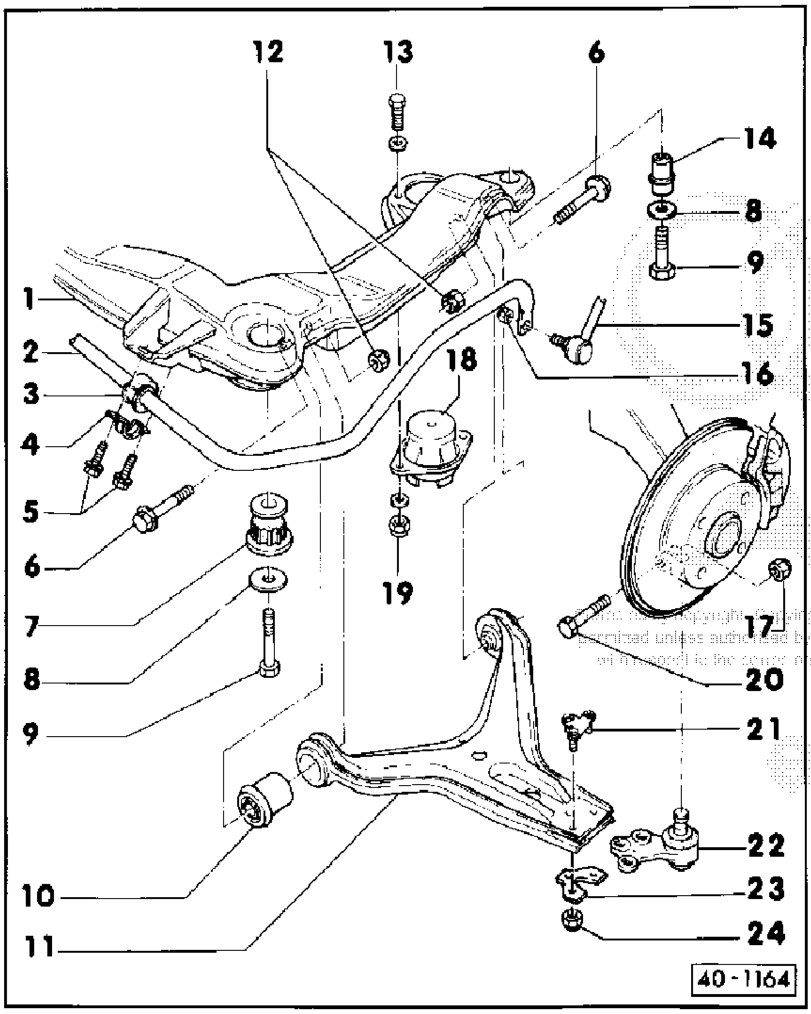


9 – Hexagon bolt

- ♦ Always replace
- ♦ Tighten M10 bolts to 35 Nm and then tighten a further 90o
- ♦ Tighten M12 bolts to 70 Nm and then tighten a further 90o
- ♦ Drill out sheared-off M10 bolts and repair using KNM 10 x 1.5 mm thread insert; drill out sheared-off M12 bolts and repair using KNM 12 x 1.5 mm thread insert

=> Special Information, Running Gear, No. 3, Edition 01.91

- ♦ Fit new genuine bolt



10 – Bearing for transverse link

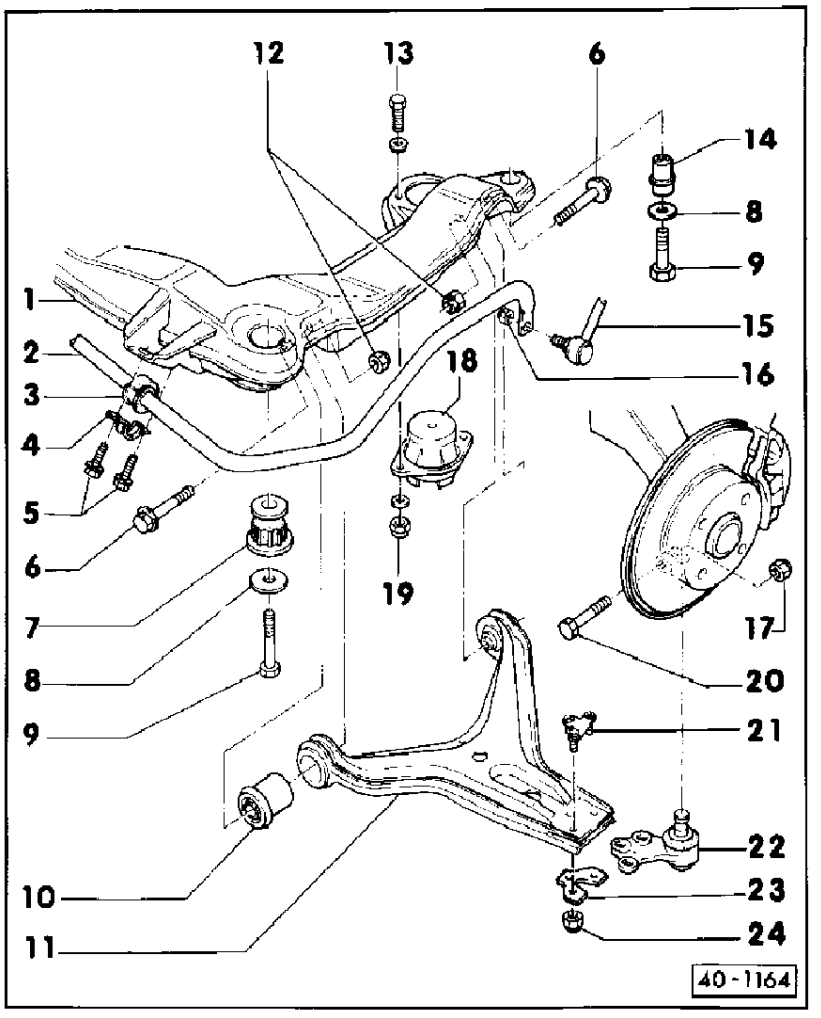
- ♦ Pressing out => Fig. 1
- ♦ Pressing in => Fig. 2
- ♦ Sheet-steel and forged transverse links have different bearings

11 – Sheet-steel transverse link

- ♦ Forged transverse link => Page 40-54
- ♦ Different versions on left and right

12 – Self-locking nut

- ♦ Always replace
- ♦ Tighten to 40 Nm, then tighten a further 180o
- ♦ Vehicle must be standing on wheels when tightening.



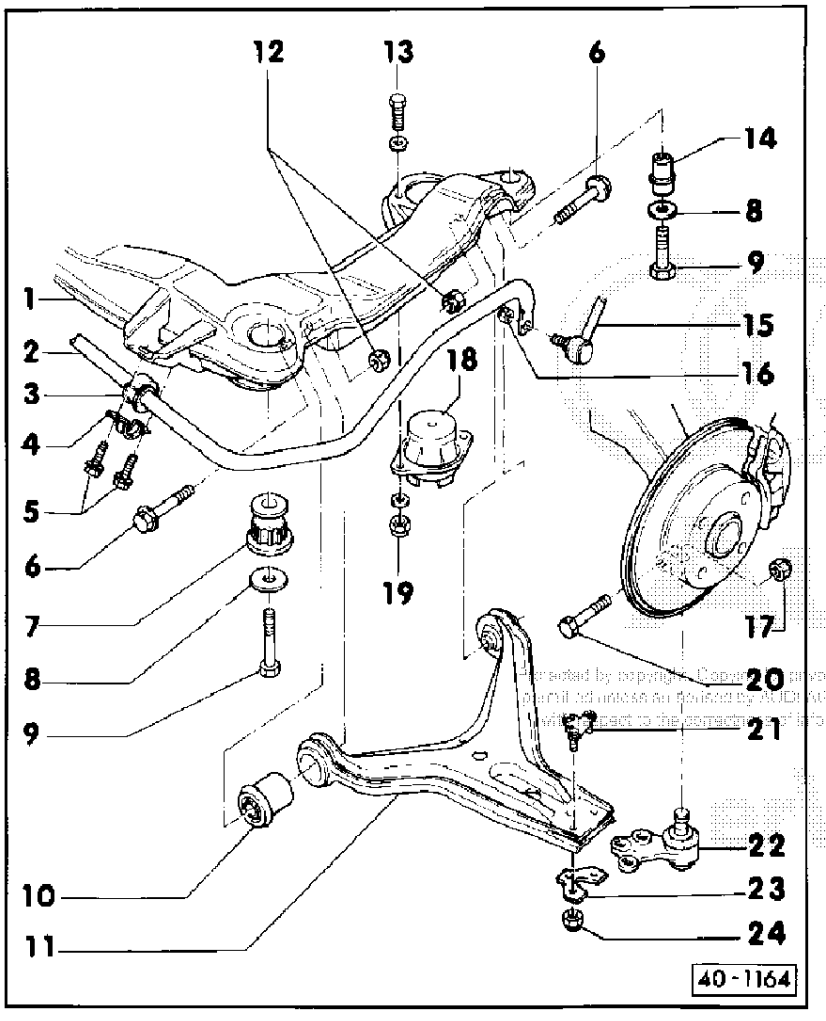
13 – **Hexagon bolt**

14 – **Rear bearings for subframe**
- ♦ Note different versions depending on engine
- ♦ Removing rear bearing => Fig. 5
- ♦ Fitting rear bearing => Fig. 6

15 – **Connecting link**
- ♦ Attach to anti-roll bar

16 – **Self-locking nut, 40 Nm**
- ♦ Always replace

17 – **Self-locking nut, 50 Nm**
- ♦ Always replace

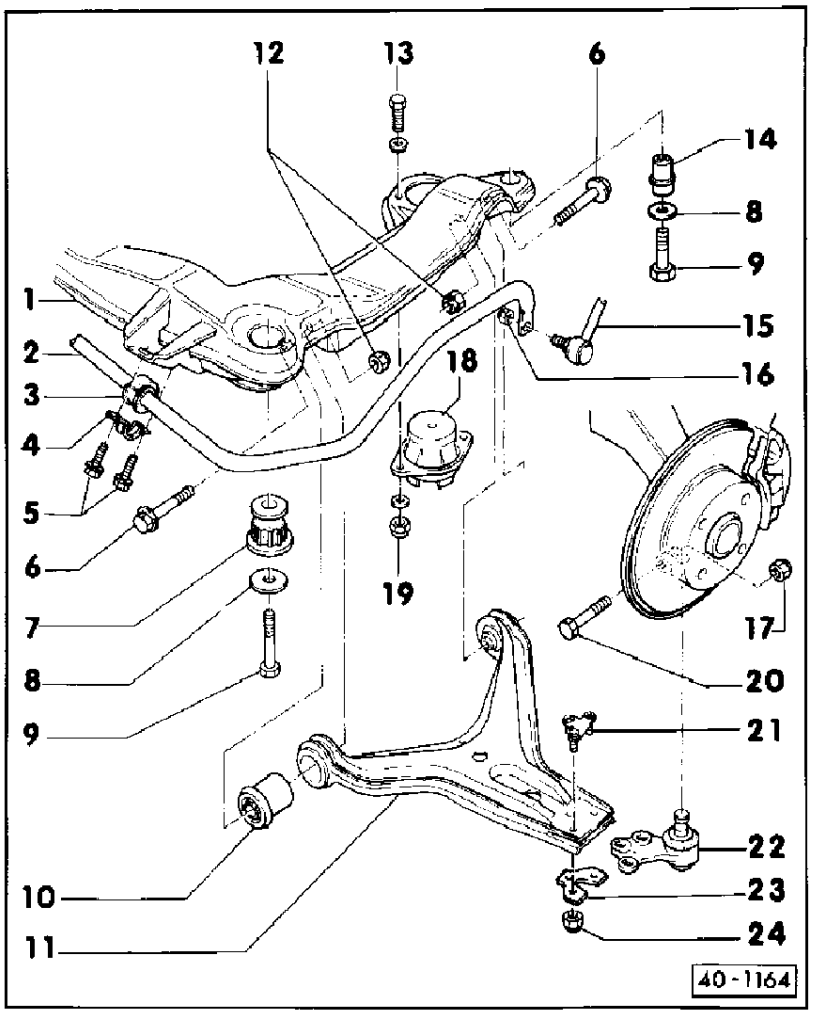


18 – **Bonded rubber bush**
- ♦ Attach to bracket of subframe
- ♦ Note different versions

19 – **Self-locking nut, 25 Nm**
- ♦ Always replace

20 – **Hexagon bolt**
- ♦ Always replace
- ♦ Head of bolt points in direction of travel.

21 – **Tab washer**
- ♦ Supplied as replacement part with bolt



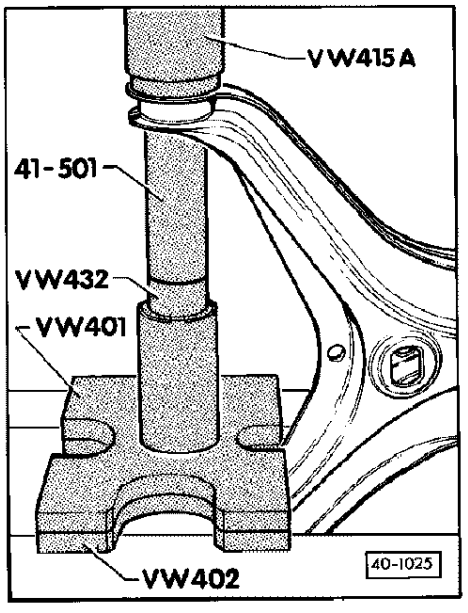
22 – Ball joint

- ♦ Ball joint must correspond to transverse link (sheet steel or forged)
- ♦ Do not widen slot at wheel bearing housing during disassembly
- ♦ Different versions on left and right
- ♦ Install joint with odd part no. on left and joint with even part no. on right
- ♦ Joint pin diameter 19 mm
- ♦ Perform wheel alignment of front axle after replacement
- ♦ Adjusting camber => Page 44-21

23 – Packing plate

24 – Self-locking nut, 65 Nm

- ♦ Always replace



◀ **Fig.1 Pressing out bearing for transverse link**

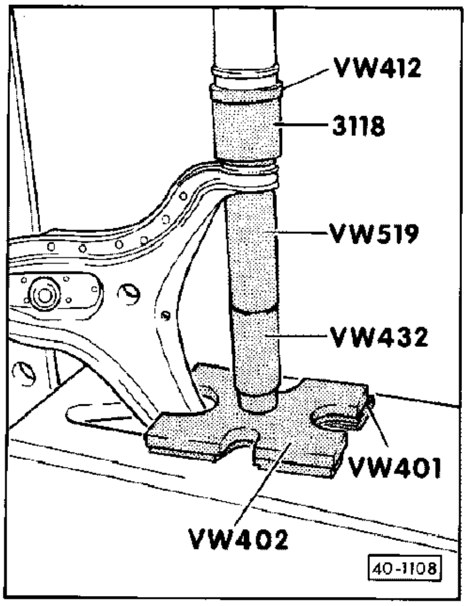


Fig.2 Pressing in bearing for transverse link

– Press mounting in to stop.

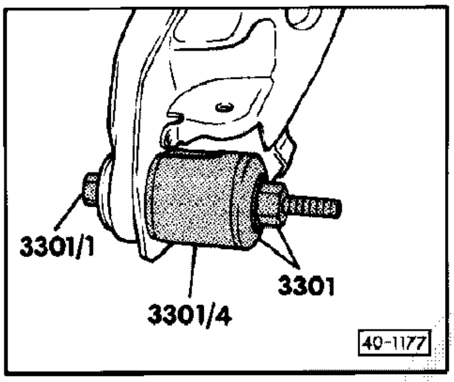


Fig.3 Removing front subframe bearing

Note:

Turn pipe -3301/4- so that large recess is at bracket for transverse link attachment

Attention:

On removal, bearing and tool may suddenly jump out of subframe (risk of injury)

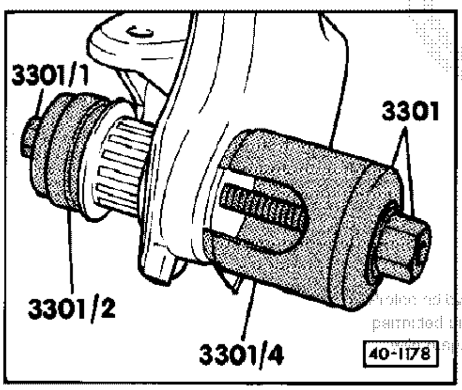


Fig.4 Drawing front subframe bearing home

Apply anti-friction assembly oil G-294 421 A1 beforehand

Note:

Large collar of thrust piece -3301/2- faces bearing

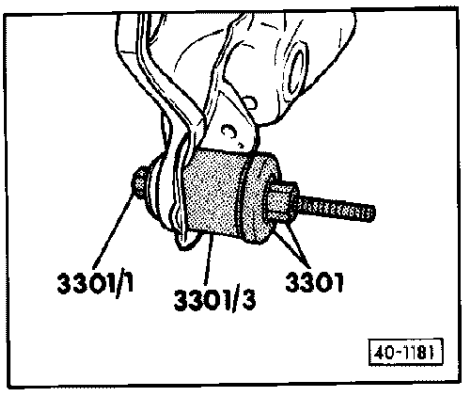


Fig.5 Removing rear subframe bearing

Note:

Turn pipe -3301/3- so that recess is at bracket for transverse link attachment

Attention:

On removal, bearing and tool may suddenly jump out of subframe (risk of injury)

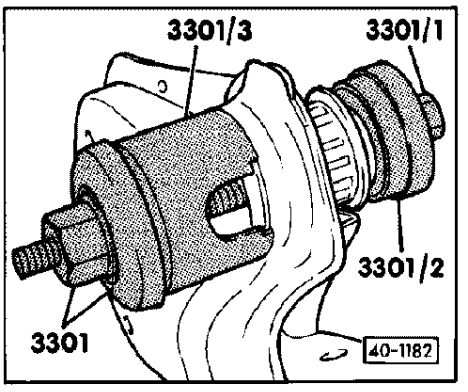
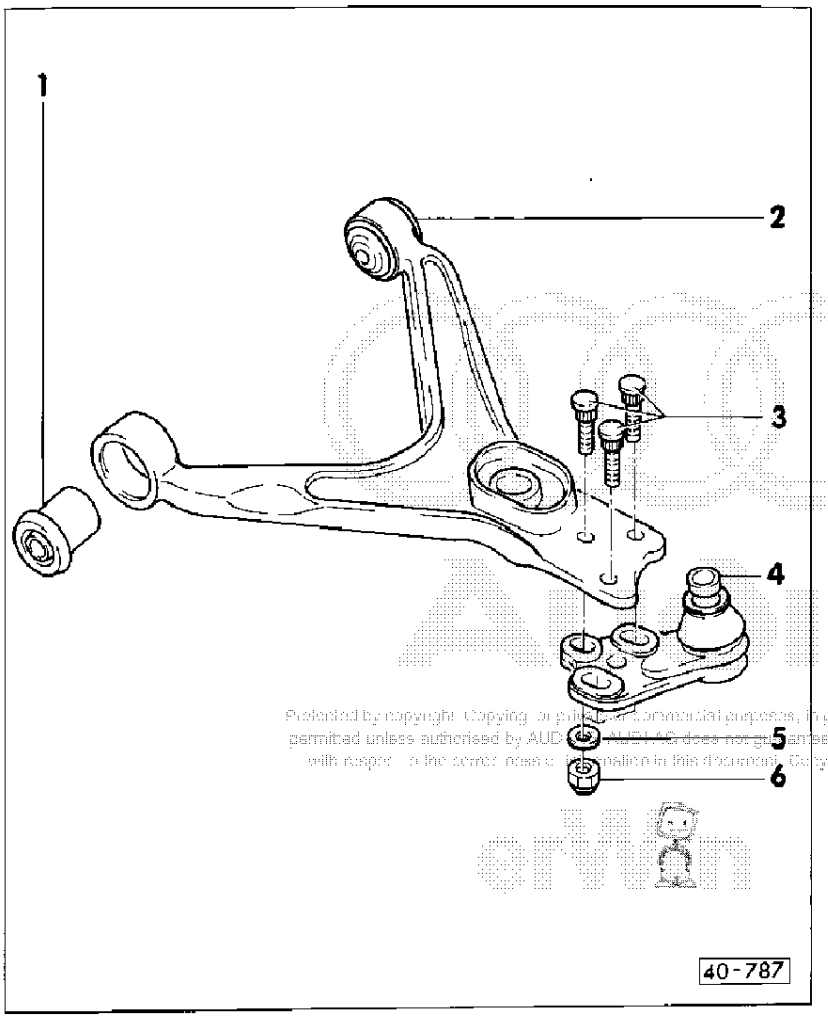


Fig.6 Drawing rear subframe bearing home

Apply anti-friction assembly oil G 294 421 A1 beforehand

Note:

Small collar of thrust piece -3301/2- faces bearing

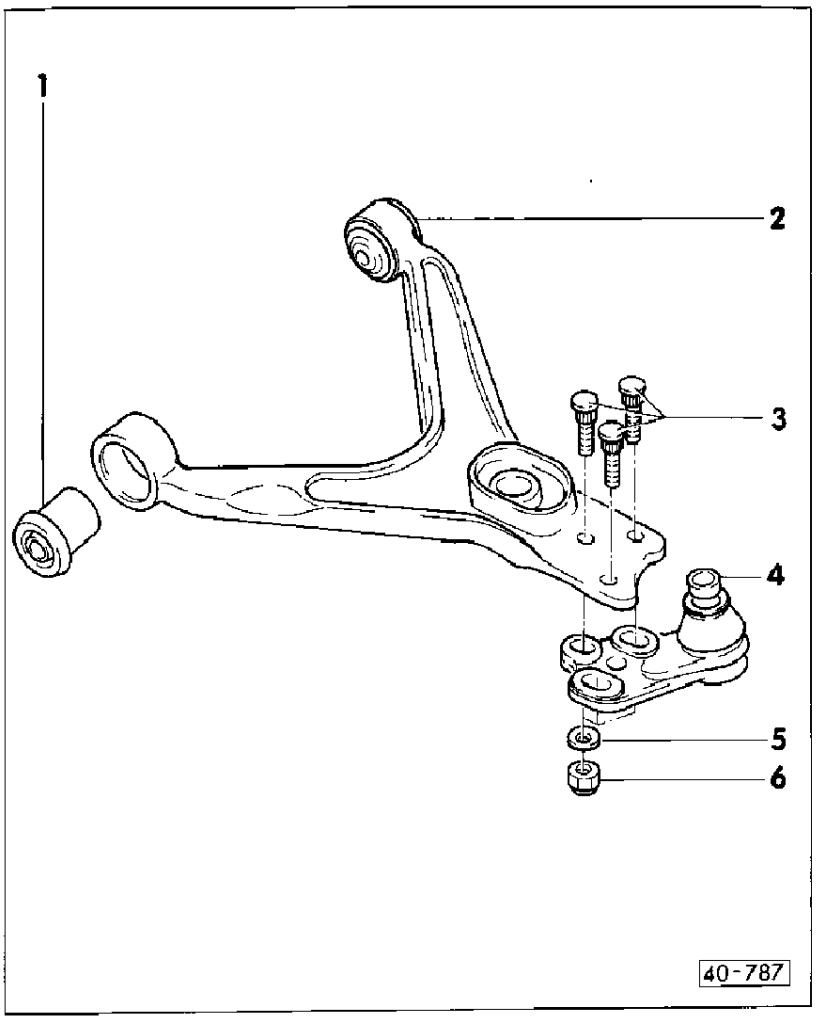


Servicing forged transverse link

1 – Bearing for transverse link
- ♦ Driving out => Fig. 1
- ♦ Pressing in => Fig. 2

2 – Transverse link
- ♦ Different versions on left and right

3 – Threaded pin
- ♦ Press home in transverse link

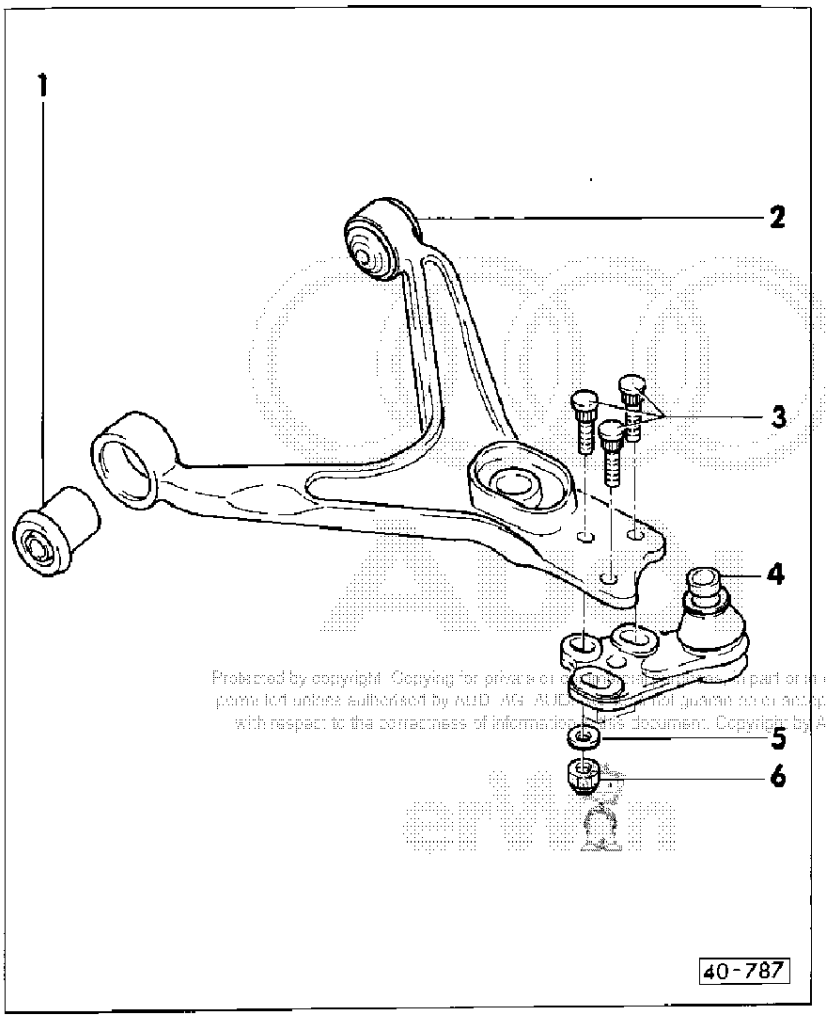


4 – Ball joint

- ♦ Do not widen slot at wheel bearing housing during disassembly
- ♦ Different versions on left and right
- ♦ Install joint with odd part no. on left and joint with even part no. on right
- ♦ Joint pin diameter 19.0 mm
- ♦ Perform wheel alignment of front axle after replacement

5 – Washer

- ♦ Discontinued with introduction of ribbed nut, i.e. when using a ribbed nut for repairs the washer no longer needs to be installed



6 – Self-locking nut, 65 Nm

- ♦ Always replace

Notes:

- ♦ The self-locking nut has been discontinued and is being replaced by a self-locking ribbed nut.
- ♦ The tightening torque of the ribbed nut is 85 Nm. When unscrewing the ball joint from the transverse link the ribbed nuts should also be renewed. To adjust camber, only loosen ribbed nuts and then retighten to 85 Nm.

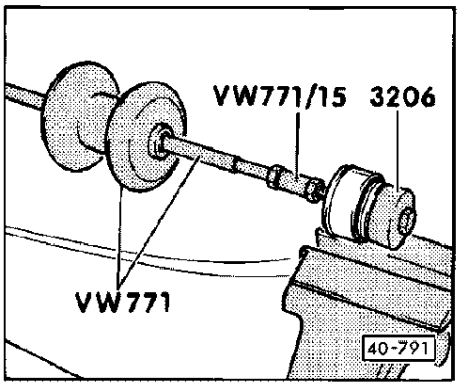


Fig.1 Driving out bearing for transverse link

- Clamp transverse link in vice using soft jaws.
- Insert hexagon bolt M10 x 80 and driver -3206- in transverse link. Screw on with special tool as shown.
- Tighten lock nuts.

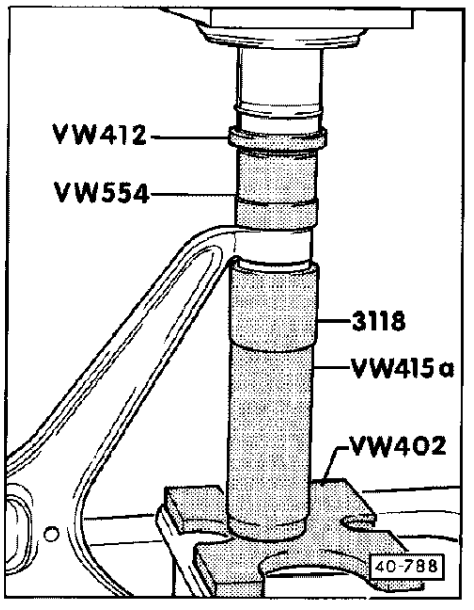
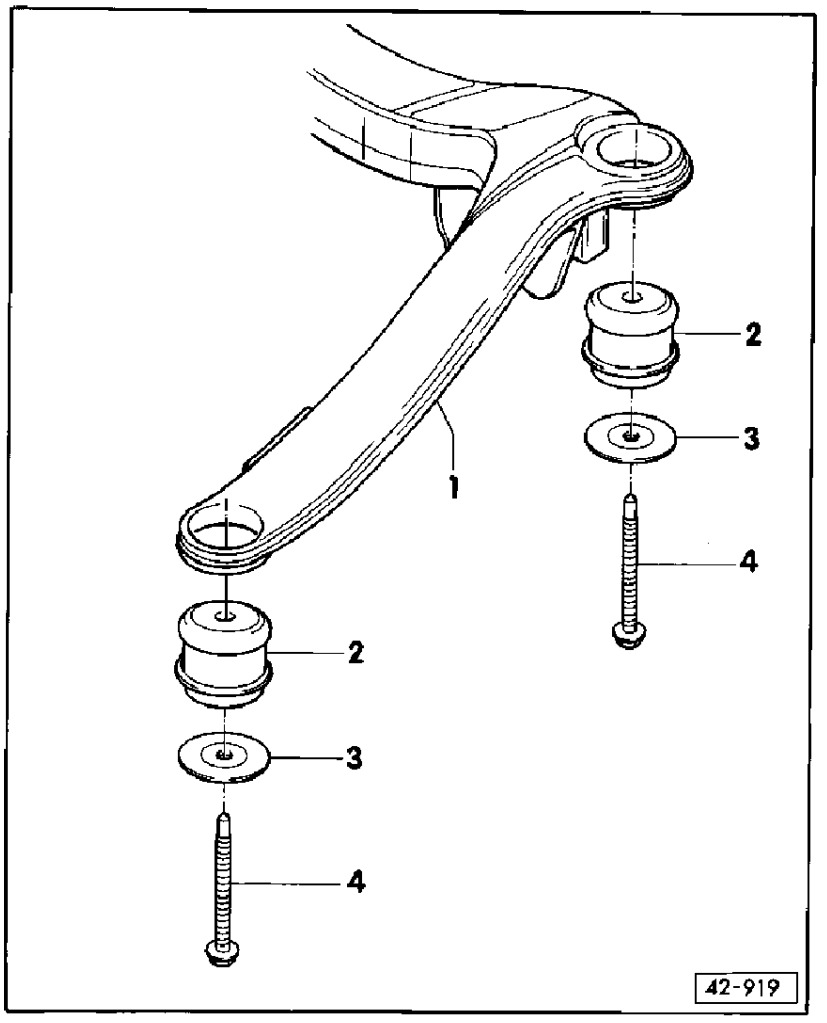


Fig.2 Pressing in bearing for transverse link

- Press mounting in to stop.

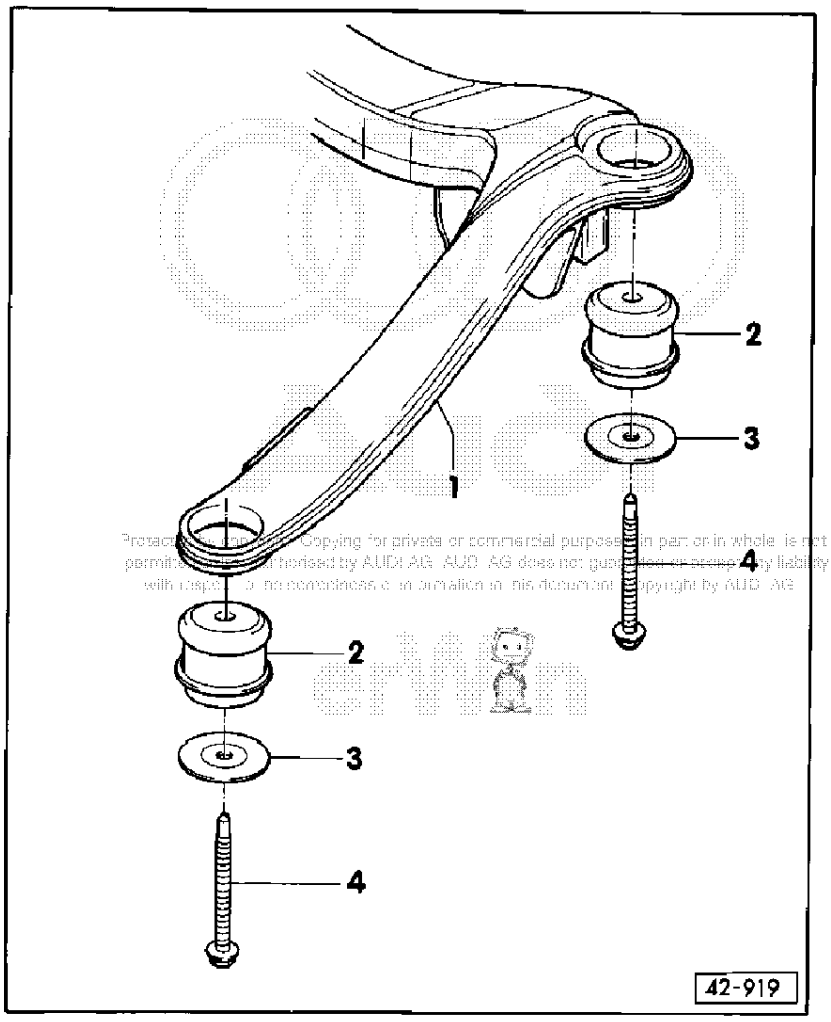


Servicing subframe

1 – **Subframe**
- ♦ Welding and straightening work must not be carried out on the subframe.
- ♦ Perform rear axle wheel alignment after removing/installing => Page 44-11

2 – **Subframe bushes**
- ♦ Removing front bush => Fig. 1
- ♦ Fitting front bush => Fig. 2
- ♦ Removing rear bush =>Fig. 3
- ♦ Fitting rear bush => Fig. 4
- ♦ Installation position of bushes in subframe => Fig. 5

Note:
Before fitting, apply assembly lubricant G 294 421 A1 to bonded rubber bushes.



3 – **Washer**
- ♦ Always replace
- ♦ Ribbed side faces upwards

4 – **Hexagon combi bolt**
- ♦ Always replace
- ♦ Tighten to 110 Nm, then tighten a further 90o
- ♦ Tightening sequence:
- – 1. Rear right
- – 2. Rear left
- – 3. Front right
- – 4. front left

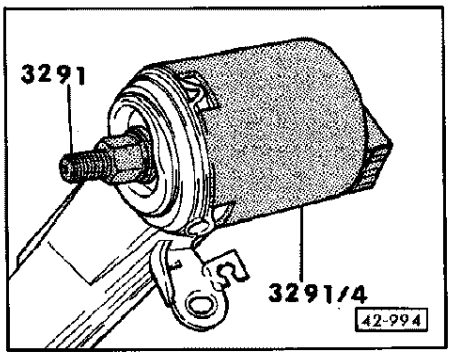


Fig.1 Removing front bonded rubber bush from subframe

- Attach tube -3291/4- (note recesses) with threaded spindle -3291- at right angles to subframe.
- Attach the two brass washers with the annular grooves next to one another to the threaded spindle -3291-. Attach washer and screw on hexagon nut. Remove bonded rubber bush by turning the hexagon nut.

Note:

Insert hexagon head of threaded spindle -3291- into recess in tube -3291/4-. Apply grease to annular grooves of brass washers and threaded spindle.

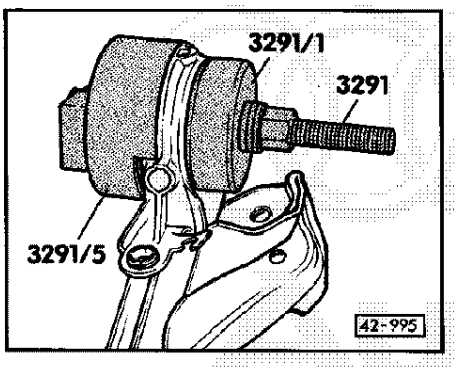


Fig.2 Pulling front bonded rubber bush into subframe

Note:

Before fitting, apply assembly lubricant G 294 421 A1 to bonded rubber bushes.

- Attach thrust piece -3291/1- to bonded rubber bush and insert at right angles in bore of subframe using tube -3291/5- (note recesses) and threaded spindle -3291-.
- Attach the two brass washers to the threaded spindle with the annular grooves facing each other-3291-.
- Attach washer and screw on hexagon nut.
- Pull in bonded rubber bush as far as it will go by turning hexagon nut. Whilst doing so, hold thrust piece -3291/1- and bonded rubber bush by hand to stop them turning.

Note:

Insert hexagon head of threaded spindle -3291- into recess in tube -3291/5-. Apply grease to annular grooves of brass washers and threaded spindle.

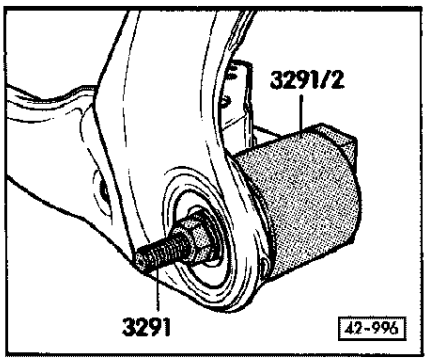


Fig.3 Removing rear bonded rubber bush from subframe

- Attach tube -3291/2- with threaded spindle -3291- at right angles to subframe. Attach the two brass washers with the annular grooves next to one another to the threaded spindle -3291-. Attach washers and screw on hexagon nut. Remove bonded rubber bush by turning the hexagon nut.

Note:

Insert hexagon head of threaded spindle -3291- into recess in tube -3291/2-. Apply grease to annular grooves of brass washers and threaded spindle.

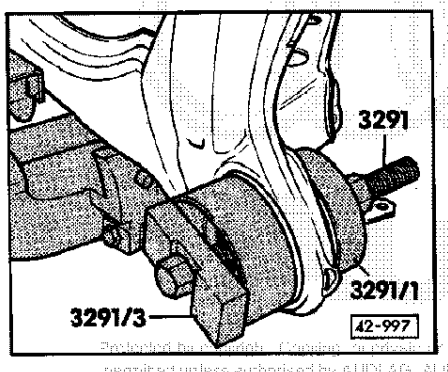


Fig.4 Pulling rear bonded rubber bush into subframe

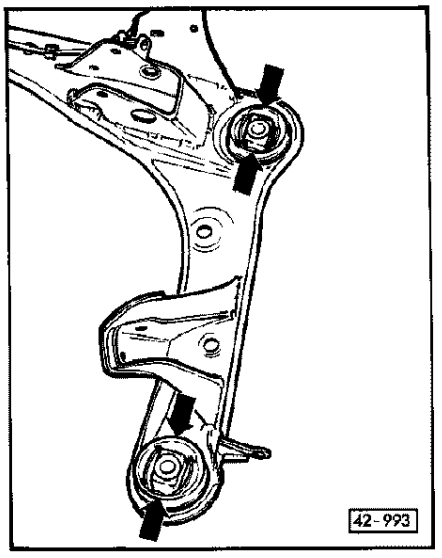
Note:

Before fitting, apply assembly lubricant G 294 421 A1 to bonded rubber bushes.

- Attach thrust piece -3291/1- to bonded rubber bush and insert at right angles in bore of subframe using tube -3291/3- (note recesses) and threaded spindle -3291-.
- Attach the two brass washers to the threaded spindle with the annular grooves facing each other -3291-.
- Attach washer and screw on hexagon nut.
- Pull in bonded rubber bush as far as it will go by turning hexagon nut. Whilst doing so, hold thrust piece -3291/1- and bonded rubber bush by hand to stop them turning.

Note:

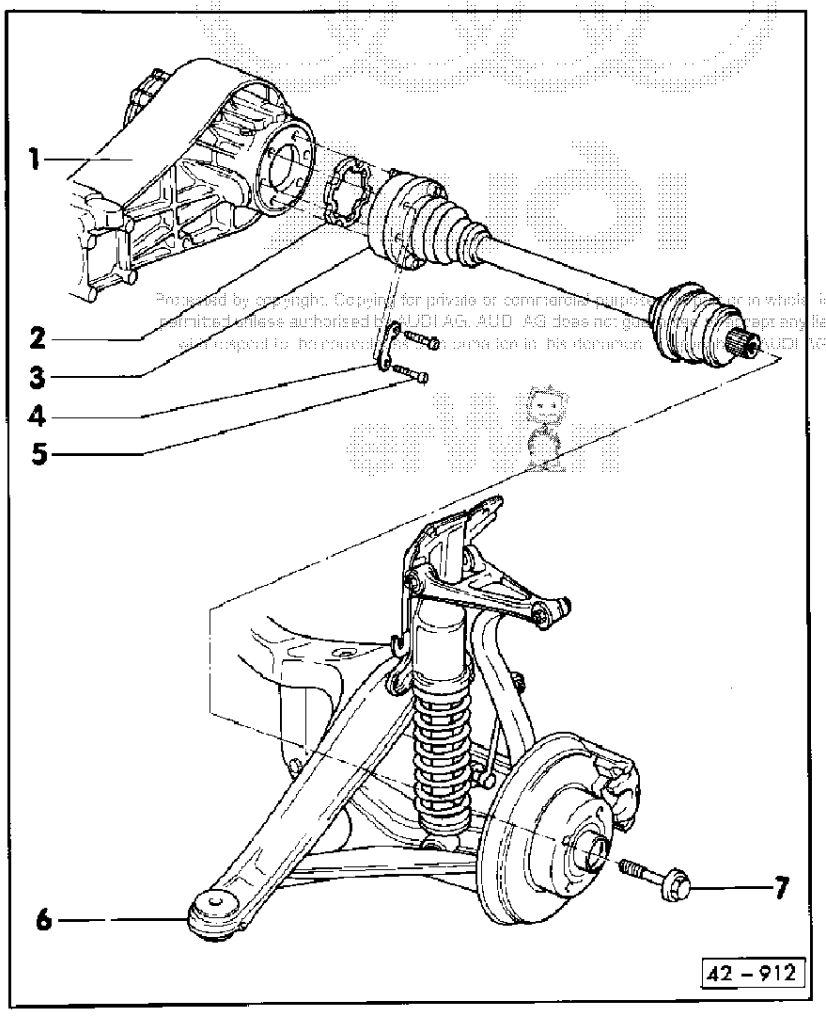
Insert hexagon head of threaded spindle -3291- into recess in tube -3291/3-. Apply grease to annular grooves of brass washers -3291/1- and threaded spindle.



◀ **Fig.5 Installation position of bonded rubber bushes in rear subframe.**

Note:

The kidney-shaped recesses (arrows) must be in the direction of the longitudinal axis of the vehicle. Deviations up to max. 10o to left or right are permitted.



Removing and installing drive shaft

1 – Differential

2 – Seal

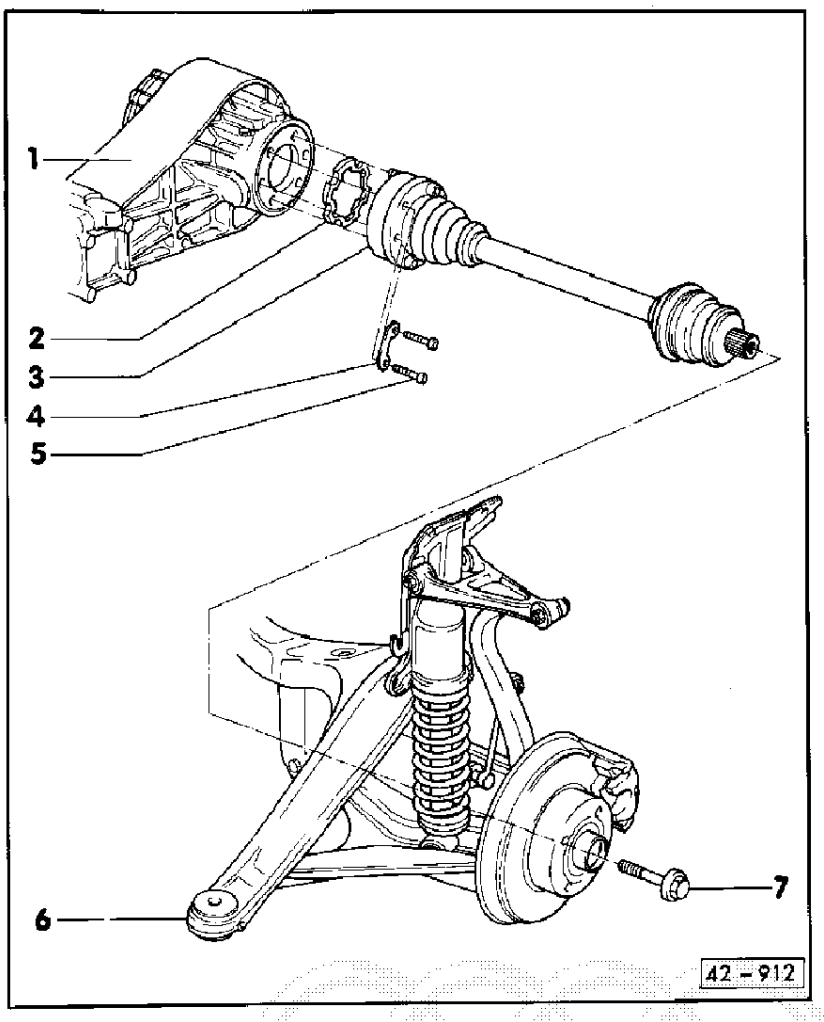
- ♦ Pull off protective sheet and bond into joint
- ♦ Only fitted on vehicles with 5- and 6-cylinder engine

3 – Drive shaft

- ♦ Servicing.
- – Audi 80 Saloon => Page 42-13
- – Audi 80 Avant and vehicles with 169 kW engine => Page 42-18

Note:

If vehicles on which the drive shaft has been taken out are to be moved, then an outer joint should be fitted beforehand in place of the drive shaft so as not to damage the wheel bearing.

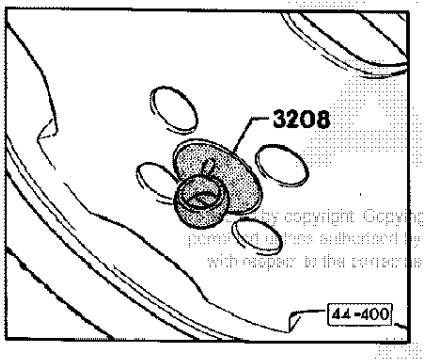


4 – **Packing plate**

5 – **Cheese-head bolt**
- ♦ M8 = 45 Nm
- ♦ M10 = 80 Nm

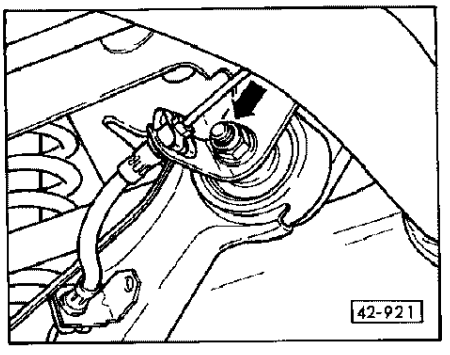
6 – **Subframe**

7 – **Hexagon combi bolt/flange bolt**
- ♦ Always replace
- ♦ Tighten M16 x 1.5 to 200 Nm and then give a further 90o turn
- ♦ Tighten M14 x 1.5 to 120 Nm and then give a further 90o turn
- ♦ Vehicle must be standing on its wheels when loosening and tightening (risk of accident).

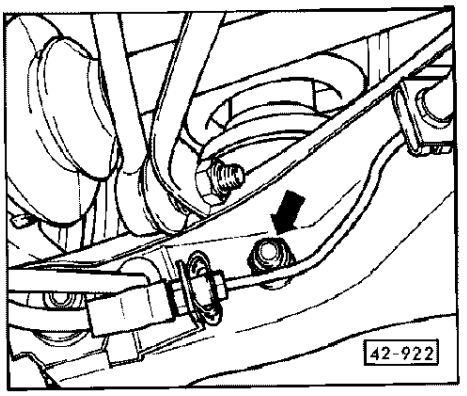


Removing:

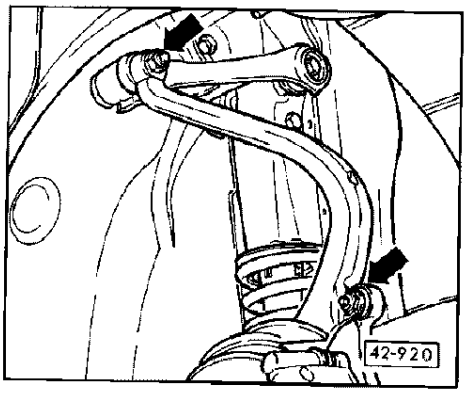
- Remove wheel cap or, on vehicles with light alloy disc wheels, use special tool -3208- to pull cover off disc wheel.
- Unscrew hexagon combi bolt, c.f. => Page 42-9, Item 7
- Loosen wheel bolts.
- Unbolt drive shaft from flange shaft.
- Remove wheel.
- Slightly pull out ABS speed sensor from wheel bearing housing.



- Unfasten the two subframe/lower transverse link securing bolts (one bolt not visible in illustration).



- Remove suspension strut/lower transverse link securing bolts

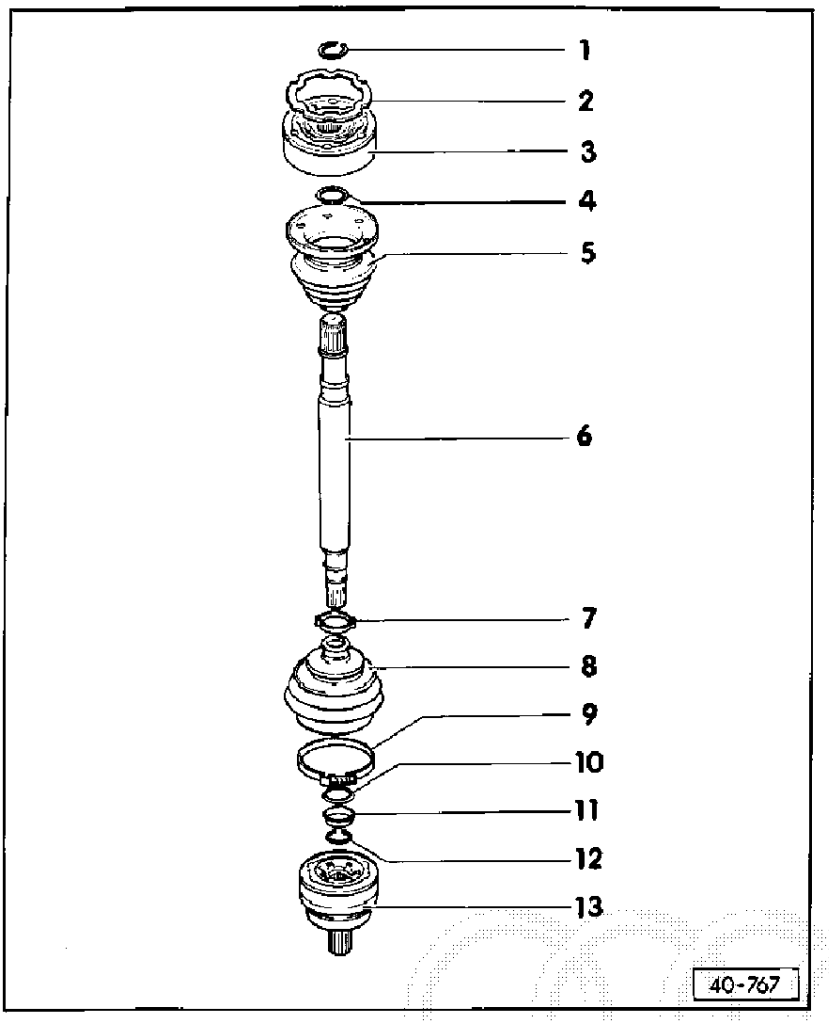


- Remove connecting link/wheel bearing housing securing bolts
- Remove wheel bearing housing/upper transverse link securing bolt
- Press down firmly on wheel bearing housing and remove drive shaft (second mechanic required)

Installing:

The following points should be noted when installing:

- Insert drive shaft into wheel hub (second mechanic required) and then attach to flanged shaft.
- Press home wheel speed sensor in wheel bearing housing



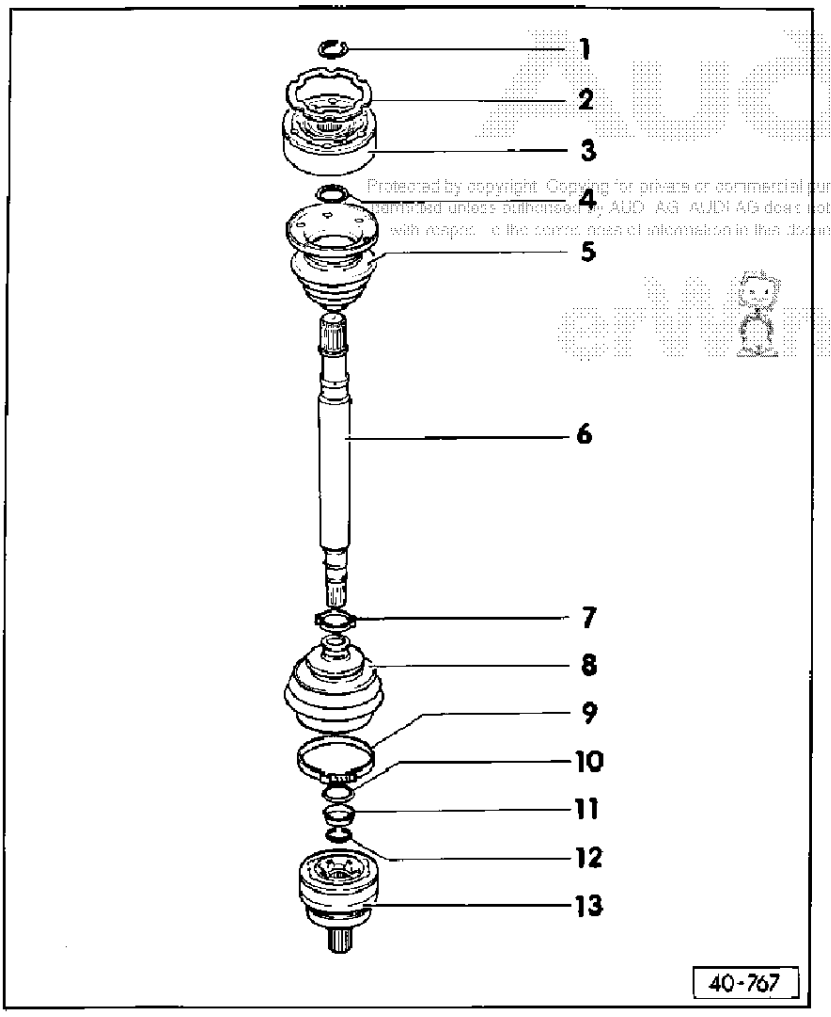
Servicing drive shaft with constant velocity joint

Audi 80 Saloon

Note:
Constant velocity joints are packed with grease G-6:

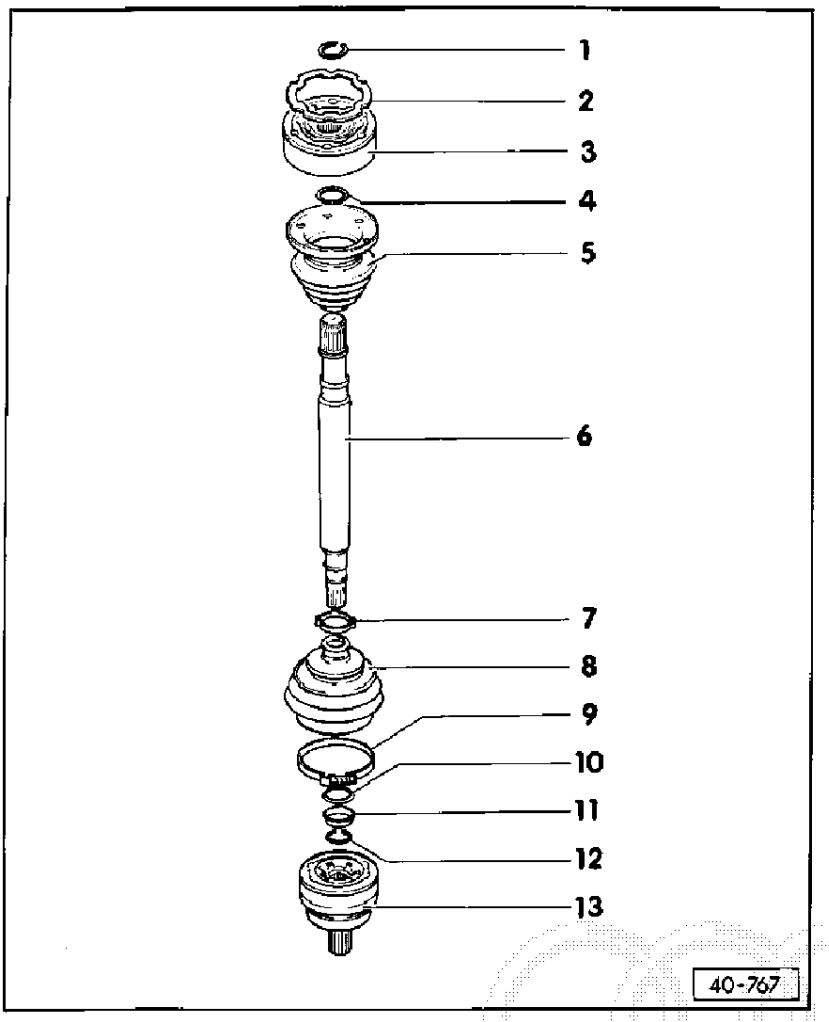
Outer joint	Grease Total quantity	of which in: Joint	Bellows
ø mm	[g]	[g]	[g]
81/89	90	40	50
Inner joint			
ø mm			
90/100	90	40	50

Top up fill in joint if necessary when renewing the protective bellows.



1 – **Circlip**
- ♦ Always replace
- ♦ Depending on version, remove and fit with commercially available circlip pliers or with - VW 161 a-, => Fig. 6

2 – **Seal**
- ♦ Replace; pull off protective sheet and bond into joint.
- ♦ Only fitted on vehicles with 5- and 6-cylinder engine

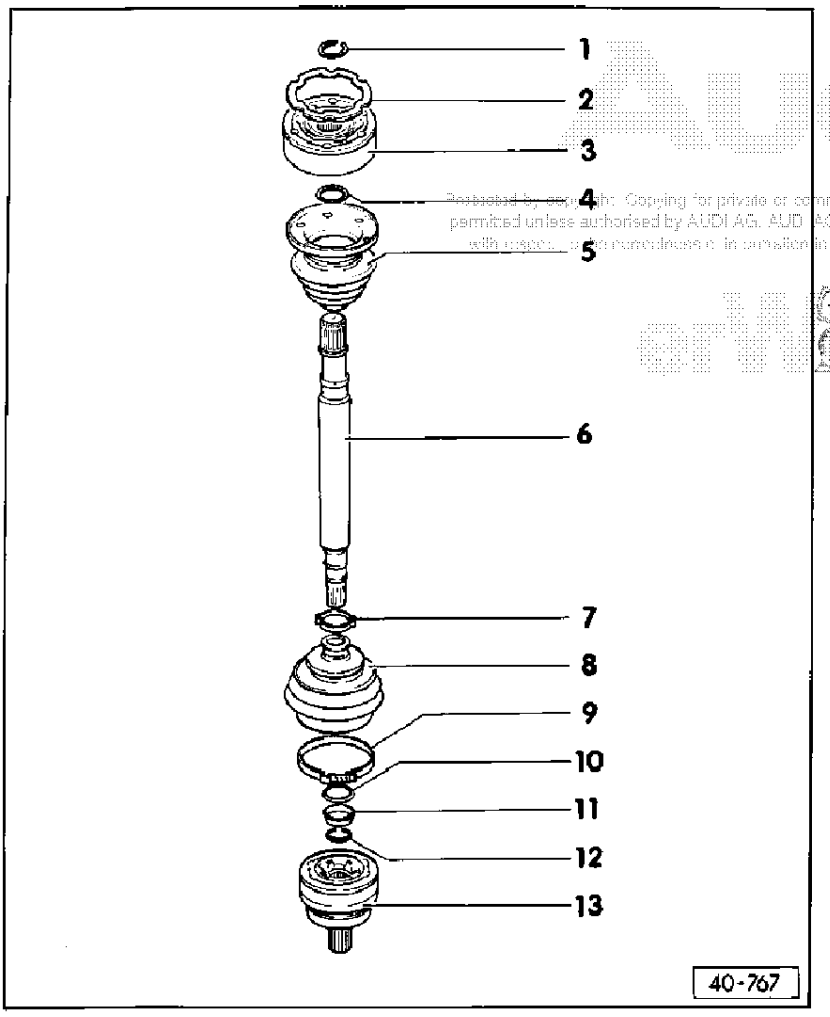


3 – Inner constant velocity joint
- ♦ Outer diameter:
  - – 4- and 5-cylinder engine: 90 mm
  - – 6-cylinder engine: 100 mm
- ♦ Only replace as complete unit
- ♦ Pressing off => Fig. 3
- ♦ Greasing => Notes Page 42-13

4 – Dished washer
- ♦ Installation position => Fig. 8

5 – Joint bellows with cap
- ♦ Check for cracks and abrasion
- ♦ Drive off with drift
- ♦ Seal end face with D-3 before fitting on constant velocity joint

6 – Profiled shaft
- ♦ Same length on left and right



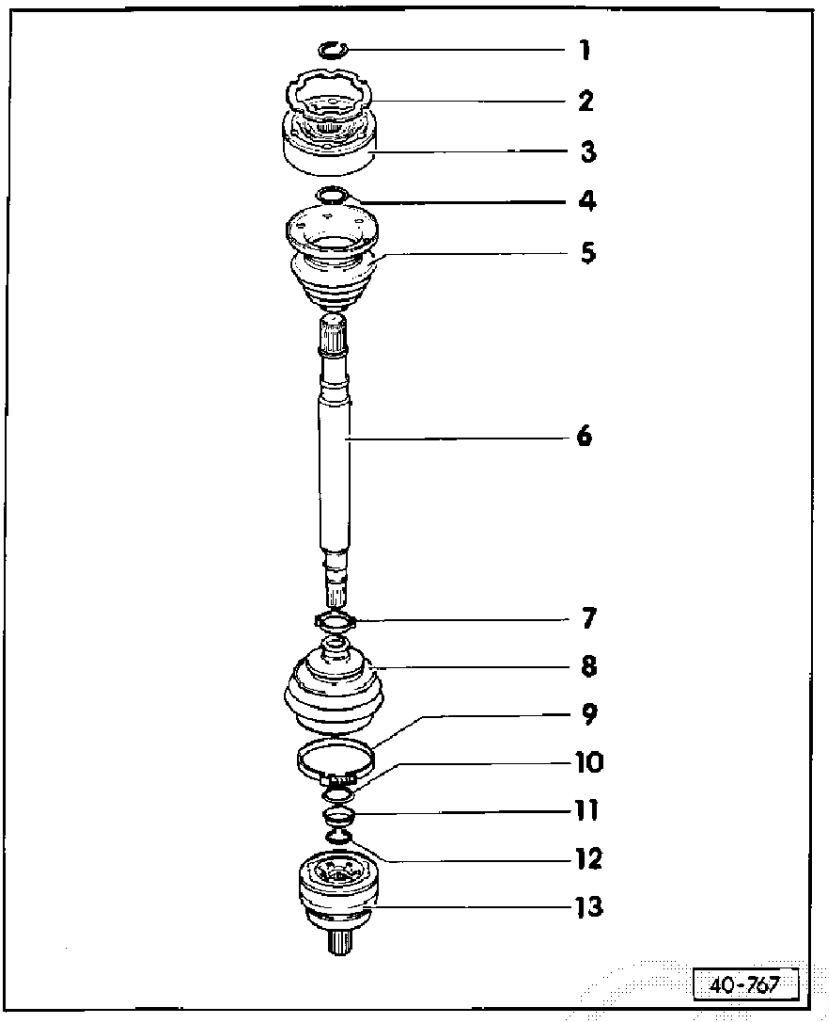
7 – Hose clamp
- ♦ Always replace
- ♦ Tensioning => Fig. 1
- ♦ Not used on vehicles with 6-cylinder engine

8 – Protective bellows
- ♦ Check for cracks and abrasion
- ♦ Before tensioning small hose clamp briefly vent joint bellows => Fig. 2

9 – Hose clamp
- ♦ Always replace
- ♦ Tensioning => Fig. 1

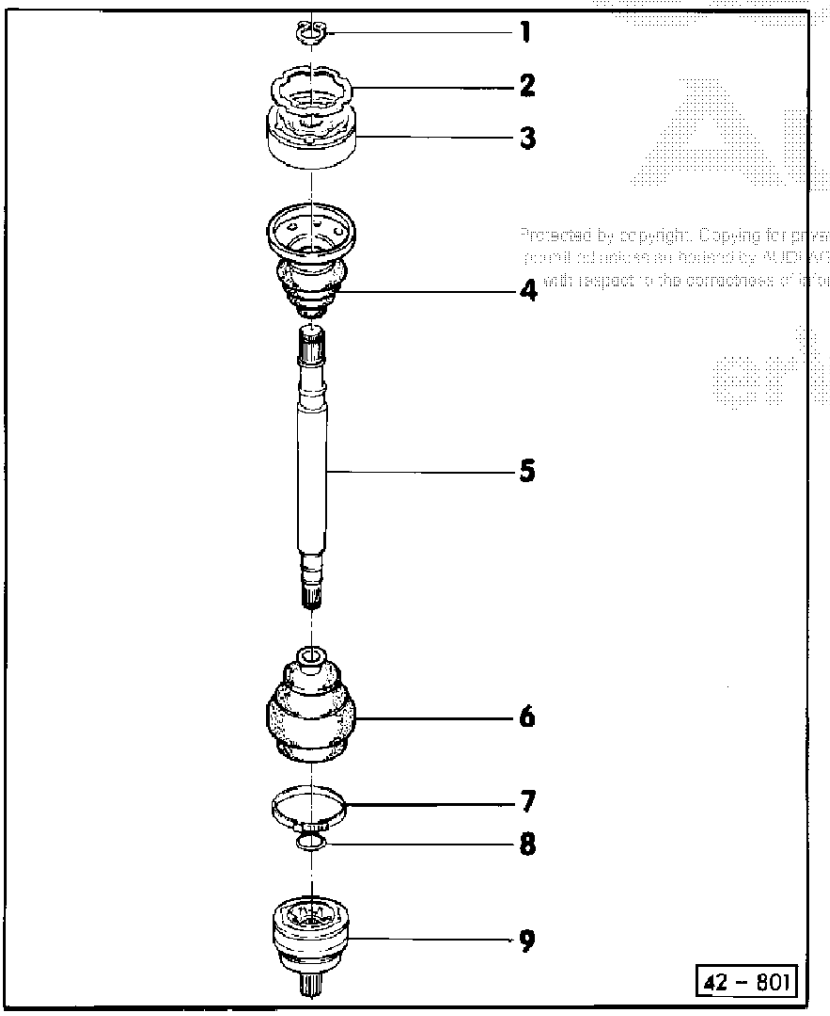
10 – Dished washer
- ♦ Installation position => Fig. 7

11 – Spacer
- ♦ Installation position => Fig. 7



12 – **Circlip**
- ♦ Always replace
- ♦ Installation position => Fig. 7
- ♦ Fit into annular groove on shaft when installing (no longer visible once joint is installed)

13 – **Outer constant velocity joint**
- ♦ Only replace as complete unit
- ♦ Pressing off =>Fig. 9
- ♦ Installing: Drive joint onto shaft with plastic hammer until circlip engages in annular groove in profiled shaft
- ♦ Greasing => Notes Page 42-13
- ♦ Outer diameter:
  - 4- and 5-cylinder engine: 81 mm
  - 6-cylinder engine: 89 mm

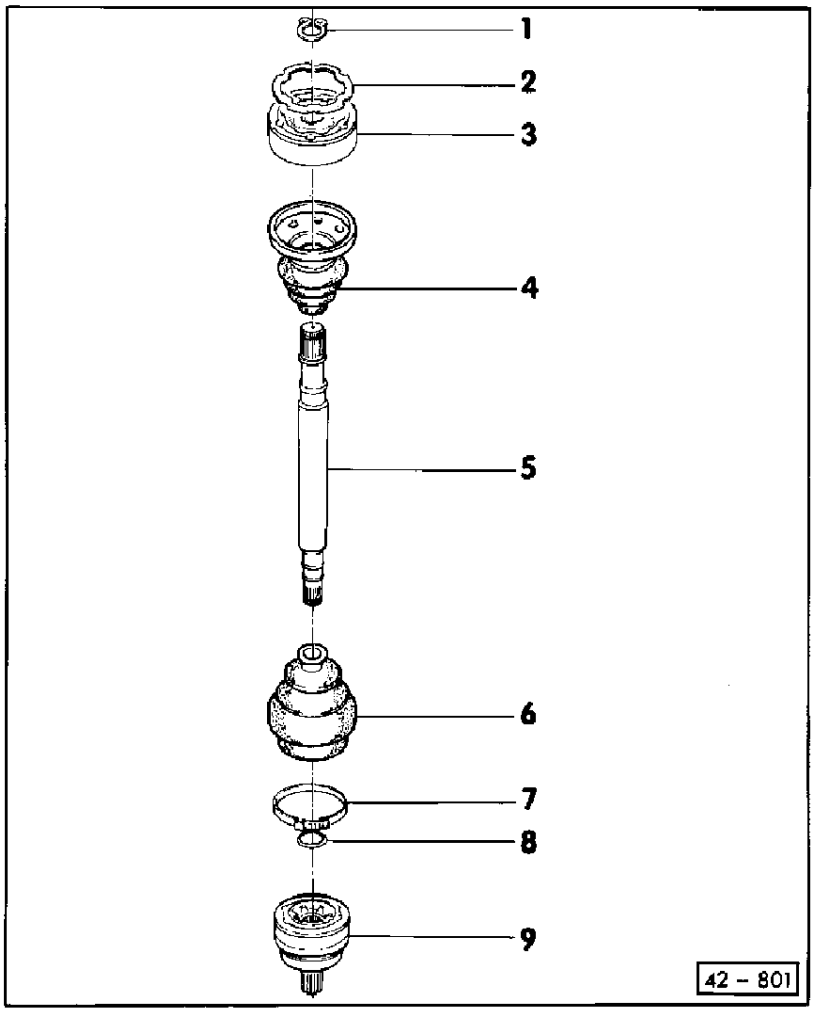


Audi 80 Avant and vehicles with 169 kW engine

Note:
Constant velocity joints are packed with grease G-6:

Outer joint	Grease Total quantity	of which in: Joint	Bellows
ø mm	[g]	[g]	[g]
89	90	40	50
Inner joint			
ø mm			
100	80	30	50
108	120	35	85

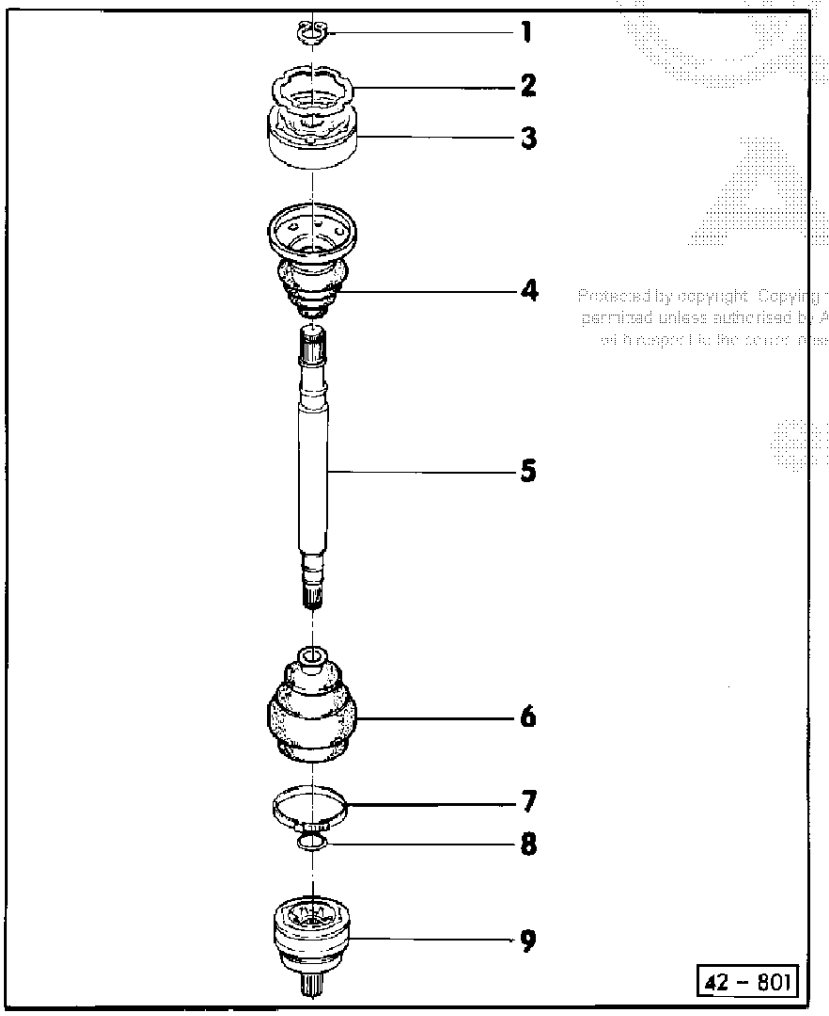
Top up fill in joint if necessary when renewing the protective bellows.



1 – **Circlip**
- ♦ Remove and install using commercially available circlip pliers

2 – **Seal**
- ♦ Replace; pull off protective sheet and bond into joint.

3 – **Inner constant velocity joint**
- ♦ Outer diameter:
  - Audi 80 Avant: 100 mm
  - Vehicles with 169 kW engine: 108 mm
- ♦ Only replace as complete unit
- ♦ Pressing off => Fig. 3
- ♦ Pressing on => Fig. 4
- ♦ Greasing => Notes Page 42-18

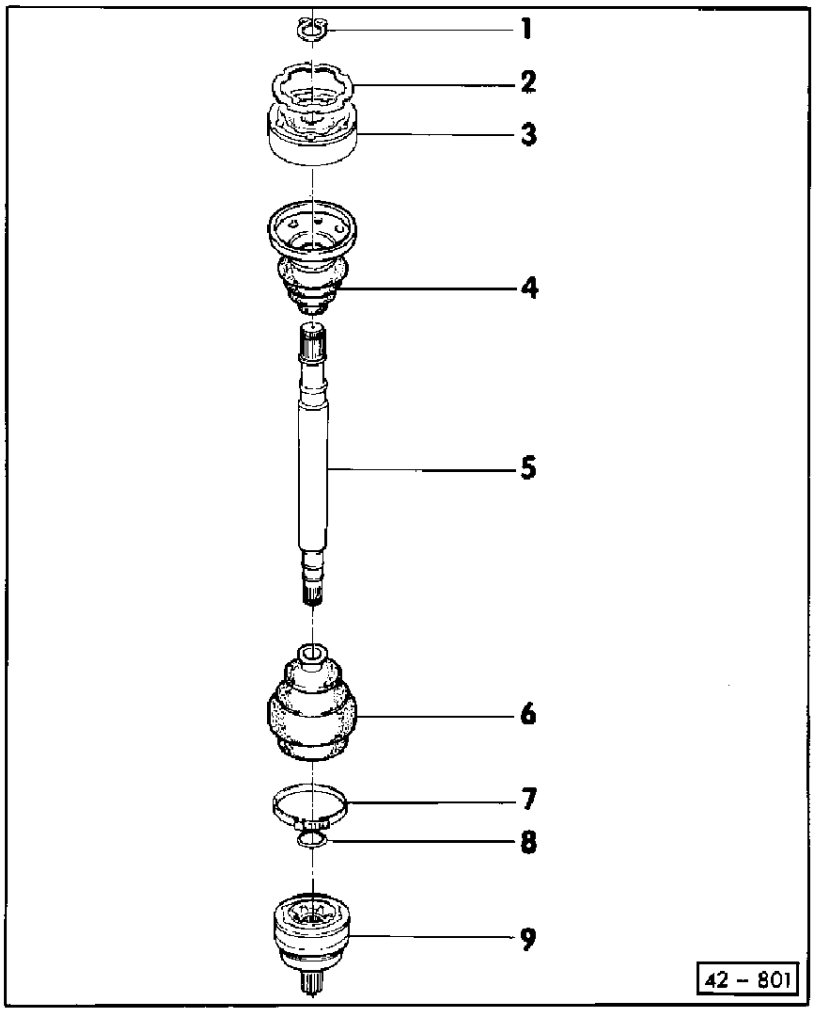


4 – **Joint bellows with cap**
- ♦ Check for cracks and abrasion
- ♦ Drive off with drift
- ♦ Seal end face with D-3 before fitting on constant velocity joint

5 – **Profiled shaft**
- ♦ Different lengths on left and right

6 – **Protective bellows**
- ♦ Check for cracks and abrasion

7 – **Hose clamp**
- ♦ Always replace
- ♦ Tensioning => Fig. 1

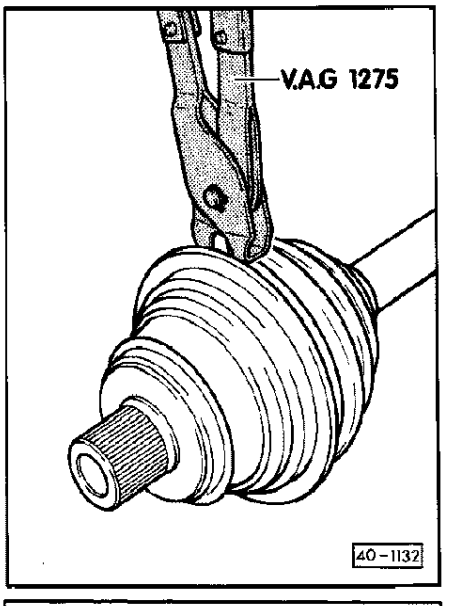


8 – Circlip

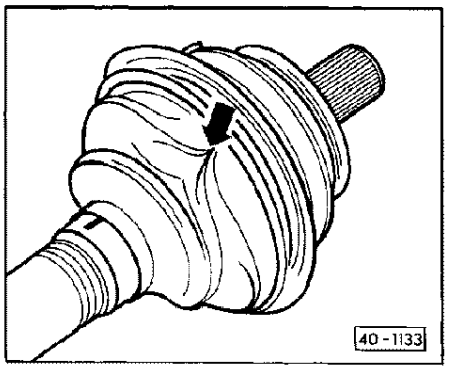
- ♦ Always replace
- ♦ Fit into annular groove on shaft when installing (no longer visible once joint is installed)

9 – Outer constant velocity joint

- ♦ Outer diameter: 89 mm
- ♦ Only replace as complete unit
- ♦ M16 x 1.5 mm thread in joint pin
- ♦ Pressing off =>Fig. 5
- ♦ Installing: Drive joint onto shaft with plastic hammer until circlip engages in annular groove in profiled shaft
- ♦ Greasing => Notes Page 42-18



◀ **Fig.1 Tensioning hose clamp/clip**



◀ **Fig.2 Venting joint bellows**

– The bellows are often squashed when installing them on the housing. This produces a vacuum in the bellows which causes an inward fold when driving -arrow-. Therefore, briefly vent the bellows at the small diameter end after fitting to equalise pressure.

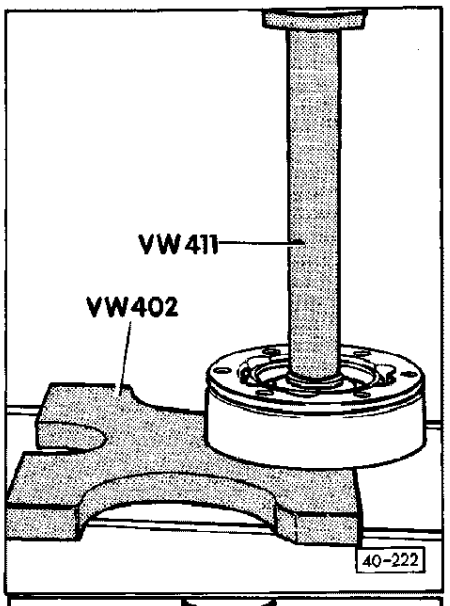


Fig.3 Pressing off inner joint

- Support ball hub whilst doing so.

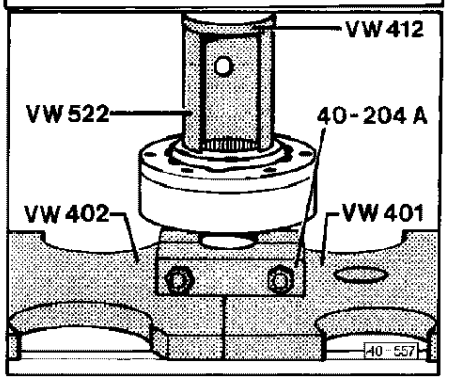


Fig.4 Pressing on inner joint

- Press joint home, install circlip.

Note:

Chamfer on inner diameter of ball hub (splines) must face locating collar of drive shaft.

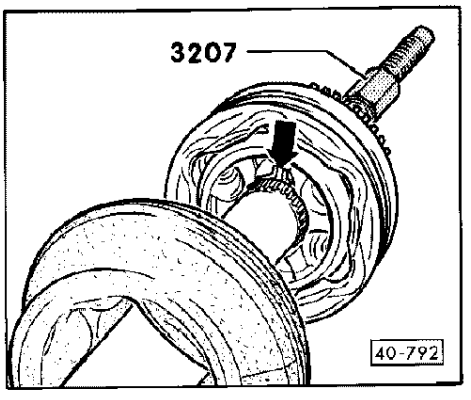


Fig.5 Pressing off outer constant velocity joint

- Clamp drive shaft in vice using soft jaws.
- Remove clamp.
- Fold back bellows.
- Spread circlip (see arrow) and at the same time screw in M16 threaded end of special tool -3207- until constant velocity joint is pressed off profiled shaft.

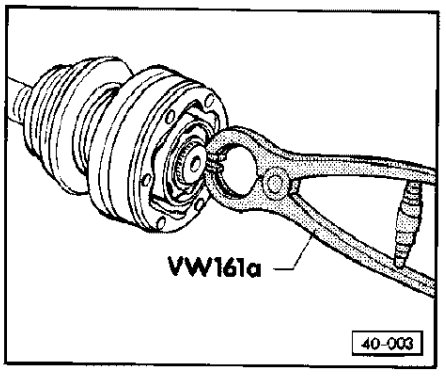


Fig.6 Removing and installing circlip

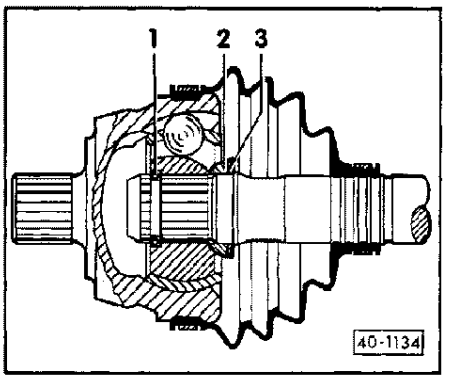


Fig.7 Installation position of dished washer, spacer and circlip

-1 -Circlip

-2- Spacer

-3- Dished washer

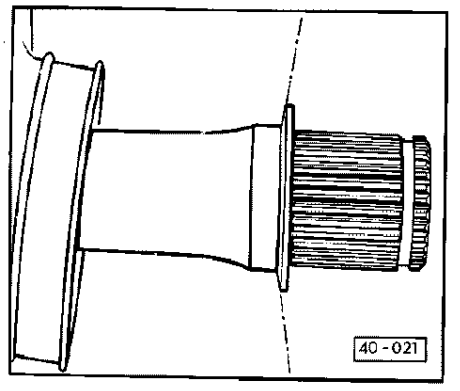


Fig.8 Correct positioning of dished washer

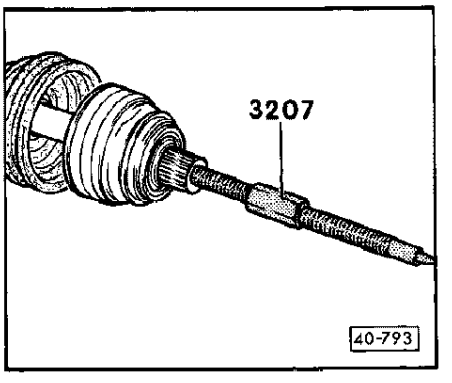
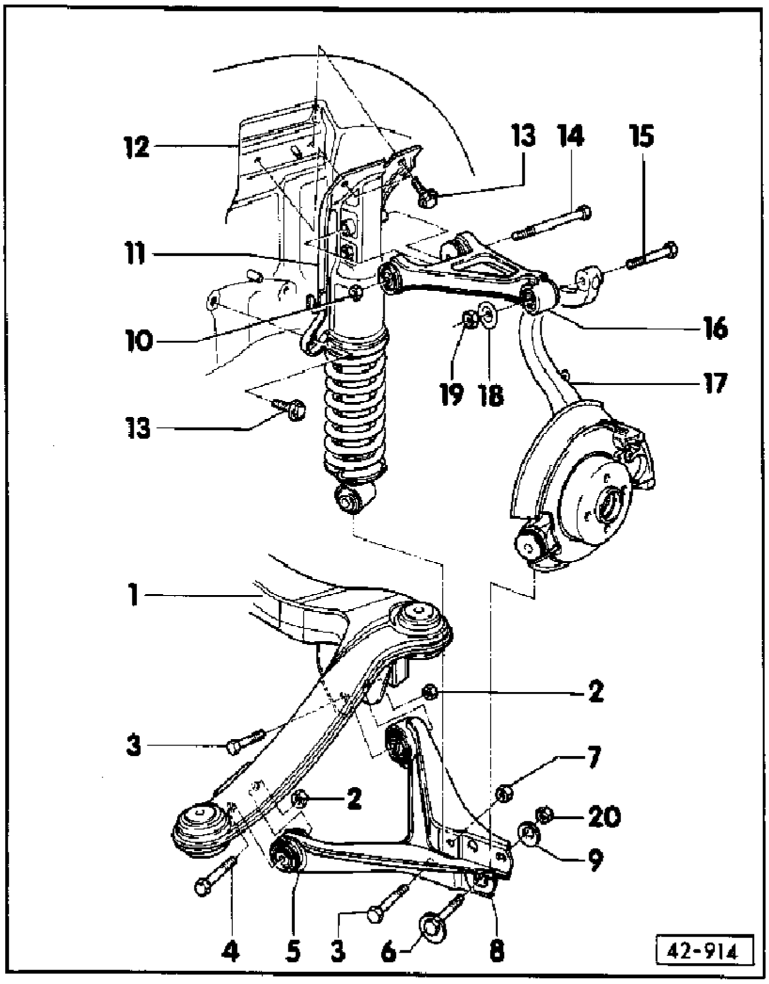


Fig.9 Pressing off outer constant velocity joint

- Clamp drive shaft in vice using soft jaws.
- Remove clamp.
- Fold back bellows.
- Screw in special tool -3207- with M14 threaded end until constant velocity joint is pressed off profiled shaft.

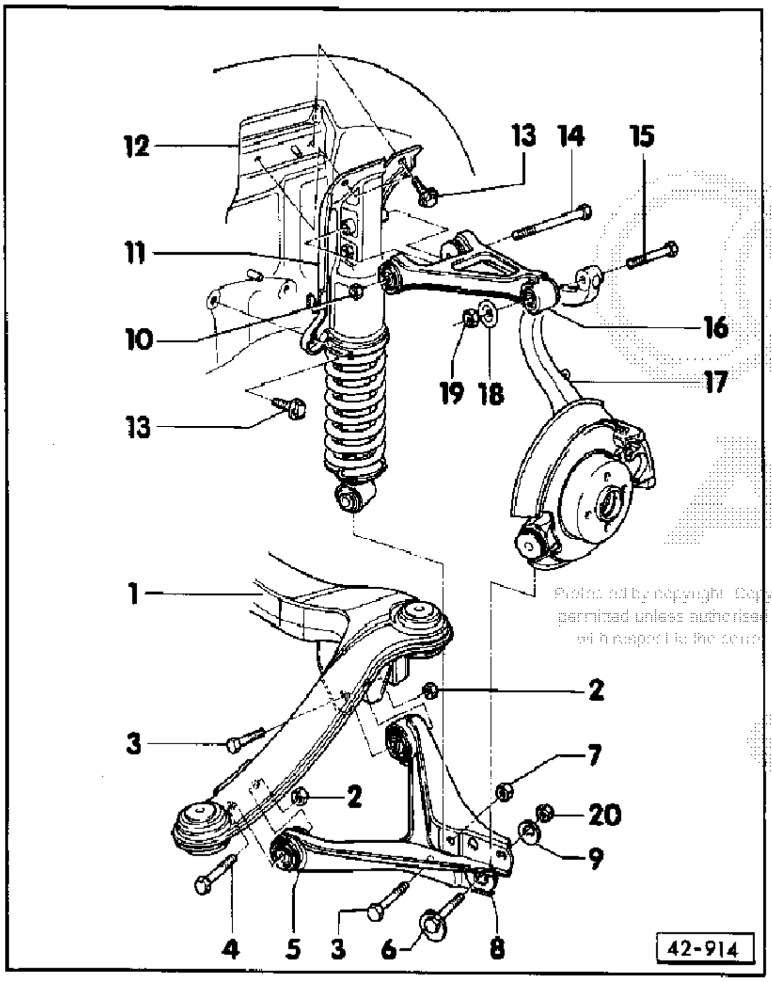


Removing, installing and servicing rear axle

Note:
Welding and straightening operations are not permitted on load-bearing elements or components that locate the wheels.

1 – **Rear subframe**
- ♦ Perform rear axle wheel alignment after removing/installing => Page 44-11
- ♦ Servicing => Page 42-1

2 – **Self-locking nut**
- ♦ Always renew
- ♦ Tighten to 70 Nm, then tighten a further 90o
- ♦ Vehicle must be standing on the ground when tightening.



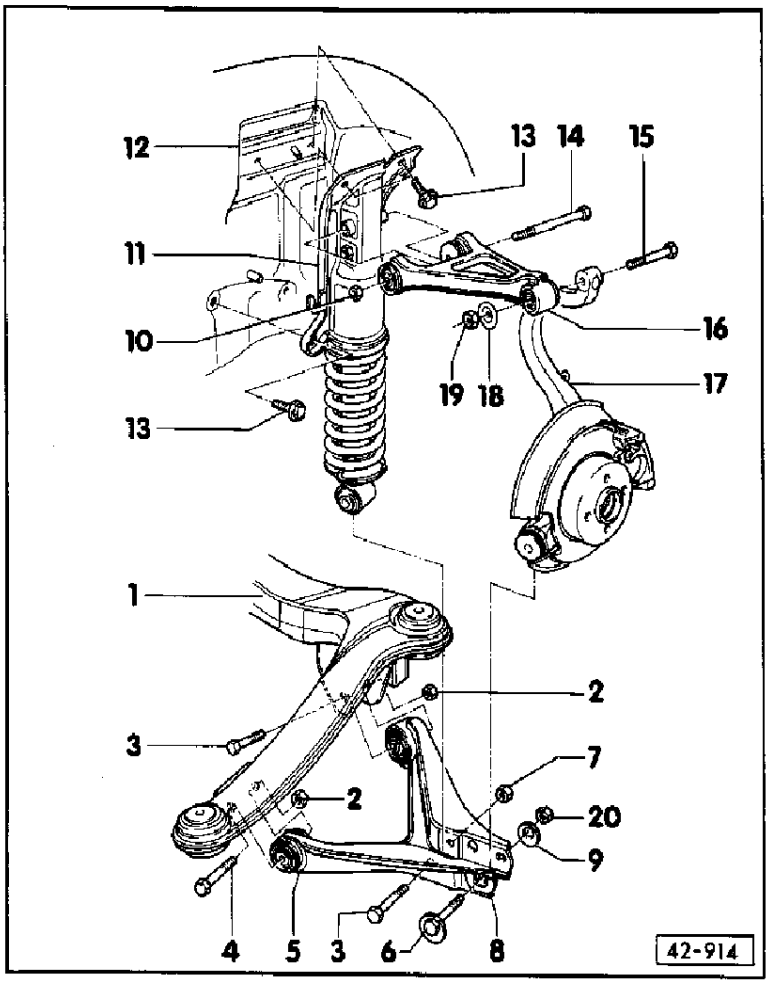
3 – **Hexagon bolt**
- ♦ Always renew

4 – **Hexagon bolt**
- ♦ Always renew

5 – **Lower transverse link**
- ♦ Servicing => Page 42-44

6 – **Eccentric bolt**
- ♦ Adjusting camber => Page 44-11
- ♦ Do not turn more than 90o to left or right from centre position (min. – max. adjustment).

7 – **Self-locking nut**
- ♦ Always renew
- ♦ Tighten to 70 Nm, then tighten a further 90o
- ♦ Vehicle must be standing on the ground when tightening.



8 – Support bracket for adjusting camber

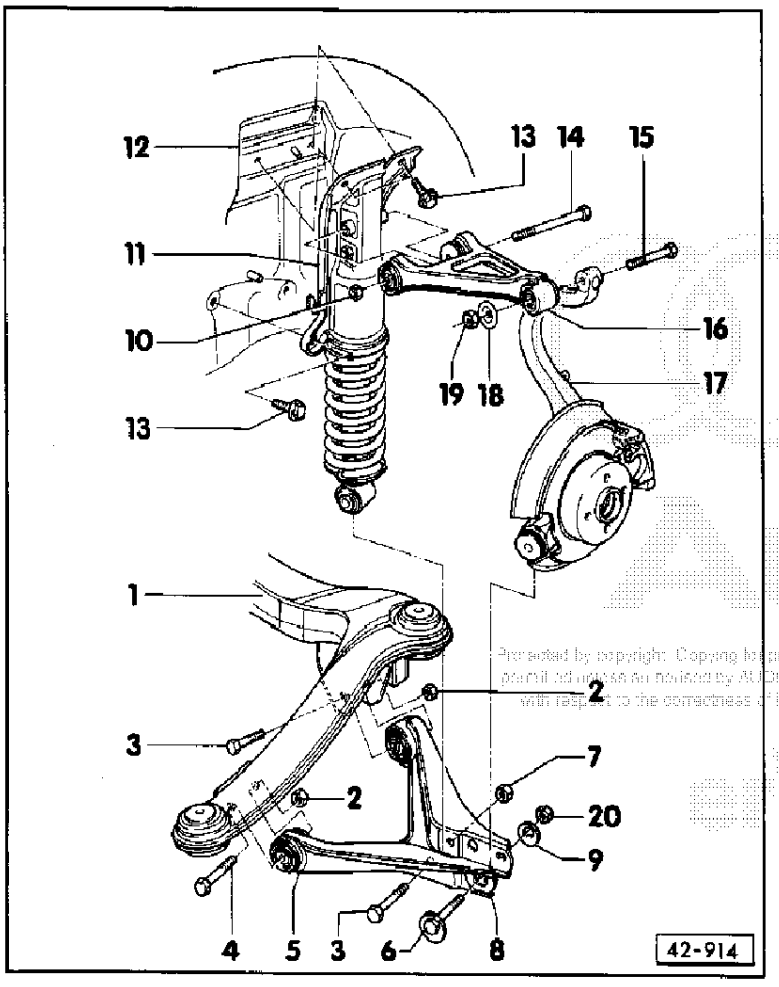
- ♦ Welded to transverse link on both sides.
- ♦ Ensure correct seating of eccentric bolt and washer.

9 – Eccentric washer

- ♦ Inner hole with lug

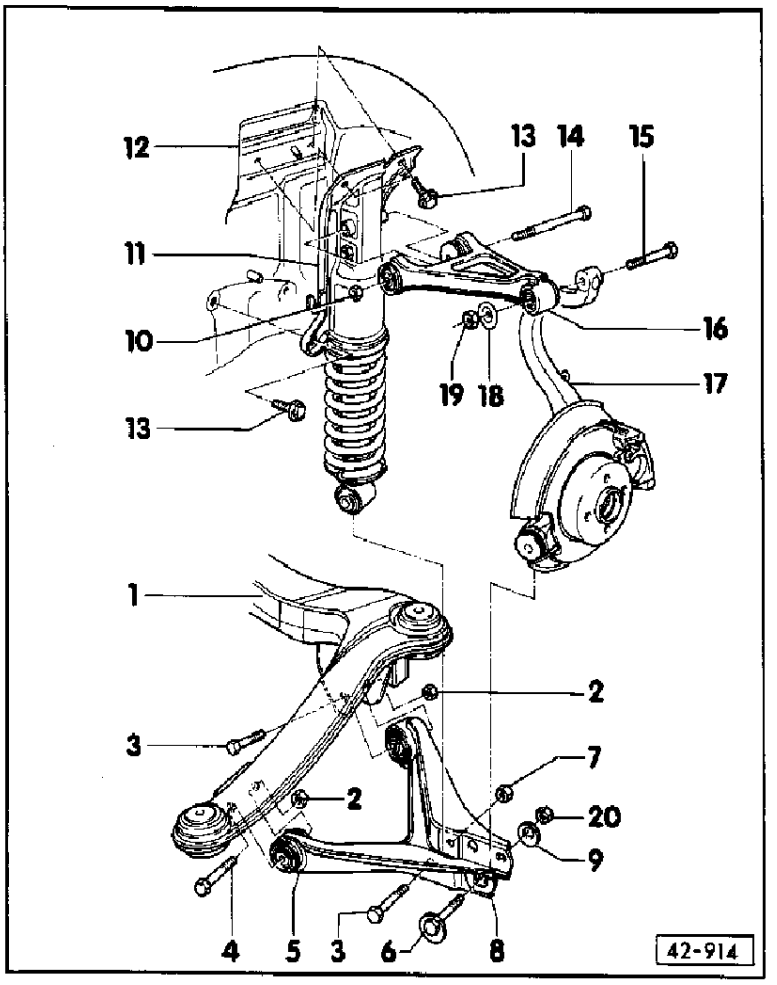
10 – Self-locking nut

- ♦ Always renew
- ♦ Tighten to 50 Nm and then give a further 90oturn.
- ♦ Hold upper transverse link horizontal whilst tightening.



11 – Suspension strut

- ♦ Removing:
  - – Remove wheel.
  - – Remove suspension strut/lower transverse link securing bolt
  - – Remove suspension strut/wheel housing securing bolts
  - – Remove suspension strut/upper transverse link securing bolt
  - – Take out suspension strut
- ♦ Servicing => Page 42-56
- ♦ Dismantling and assembling =>Page 42-63



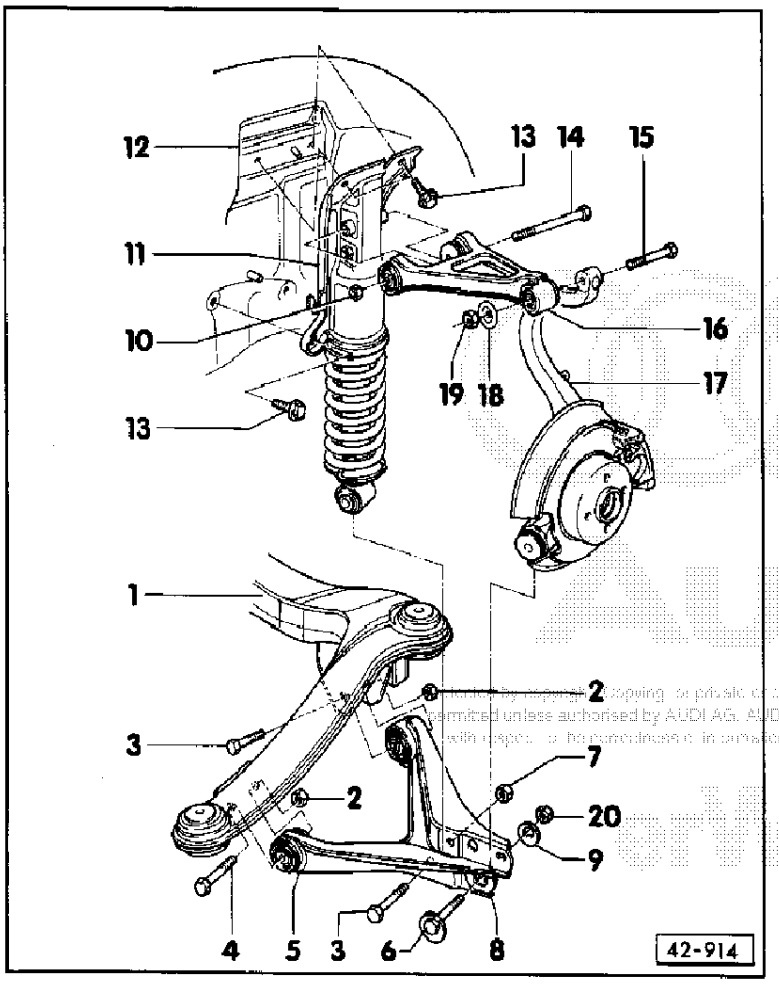
12 – **Wheel housing**

13 – **Hexagon combi bolt, 55 Nm**

14 – **Hexagon bolt**
♦ Always renew

15 – **Hexagon bolt**
♦ Always renew

16 – **Upper transverse link**
♦ Servicing =>Page 42-36

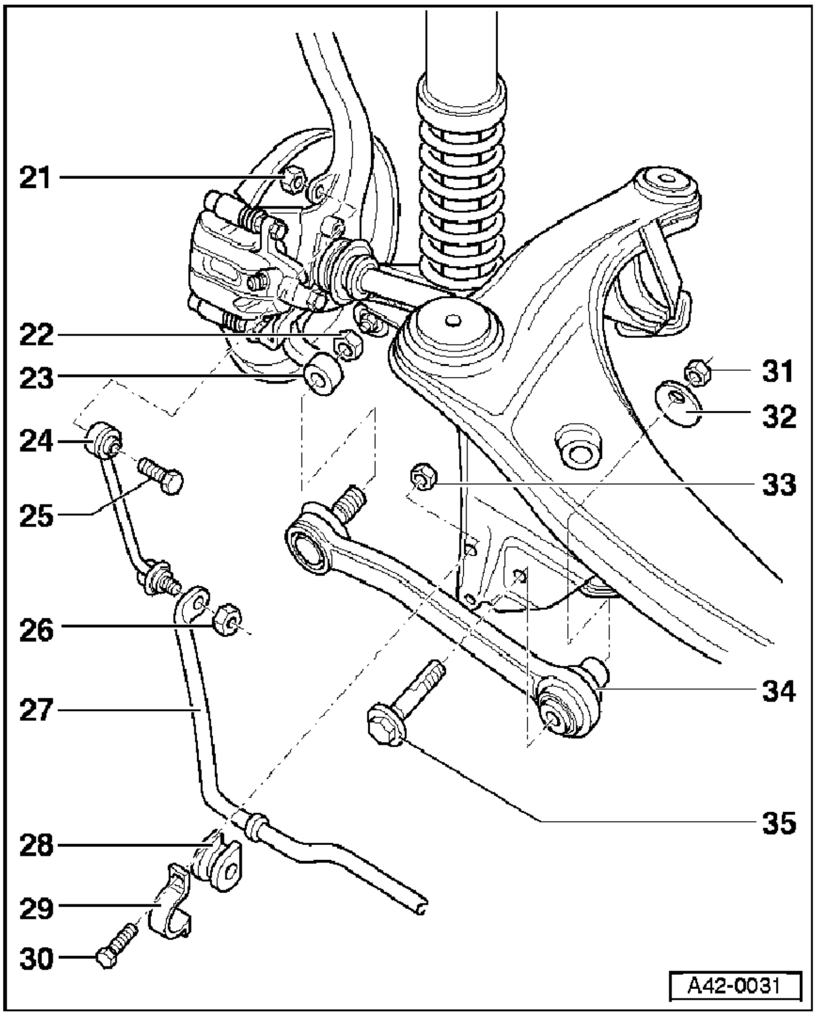


17 – **Wheel bearing housing**
♦ Servicing =>Page 42-48

18 – **Washer**
♦ Always renew

19 – **Self-locking nut**
♦ Always renew
♦ Tighten to 50 Nm and then give a further 90oturn

20 – **Self-locking nut, 95 Nm**
♦ Always renew
♦ Vehicle must be standing on the ground when tightening.



21 – **Self-locking nut, 50 Nm**
- ♦ Always renew

22 – **Self-locking nut, 50 Nm**
- ♦ Always renew

23 – **Wheel bearing housing**
- ♦ Servicing =>Page 42-48

24 – **Connecting link**

25 – **Hexagon bolt**

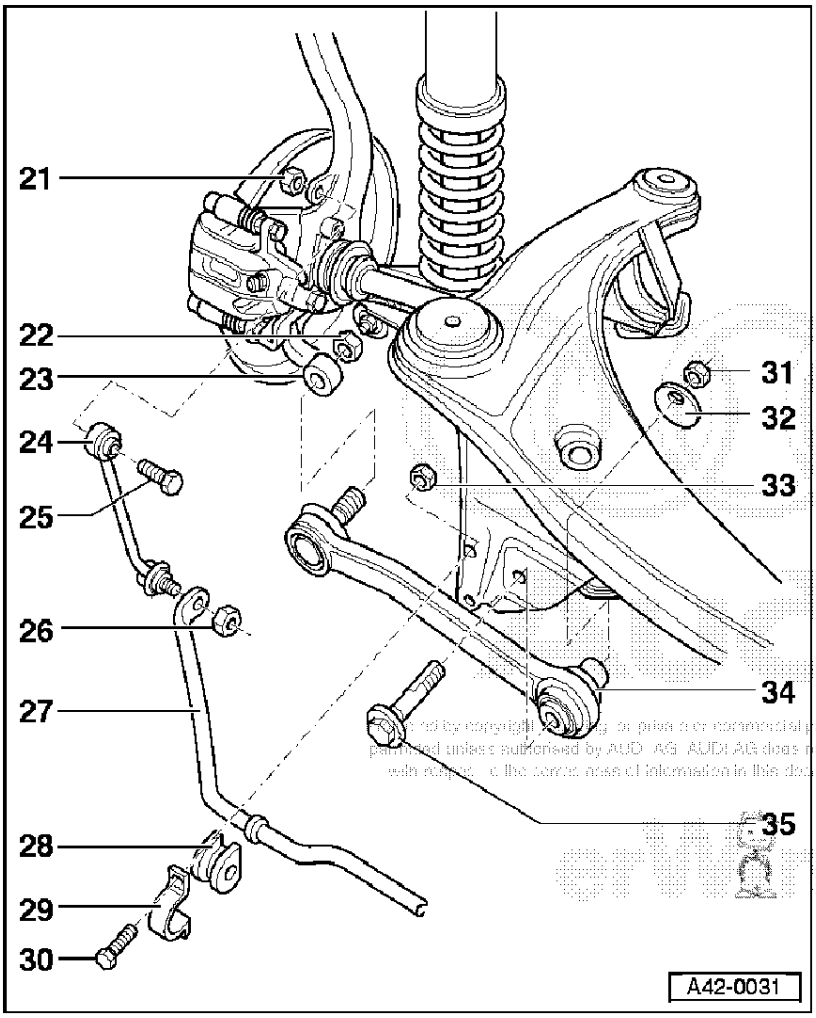
26 – **Self-locking nut, 40 Nm**
- ♦ Always renew

27 – **Anti-roll bar**

28 – **Mounting**

29 – **Clip**

30 – **Hexagon bolt, 25 Nm**



31 – **Self-locking nut, 85 Nm**
- ♦ Always renew
- ♦ Vehicle must be standing on wheels when tightening.

32 – **Eccentric washer**
- ♦ Inner hole with lug

33 – **Self-locking nut**
- ♦ Always renew

34 – **Track rod**
- ♦ Pressing off =>Fig. 1

35 – **Eccentric bolt for adjusting toe**
- ♦ Adjusting toe => Page 44-11
- ♦ Do not turn more than 90o to left or right from centre position (min. – max. adjustment).

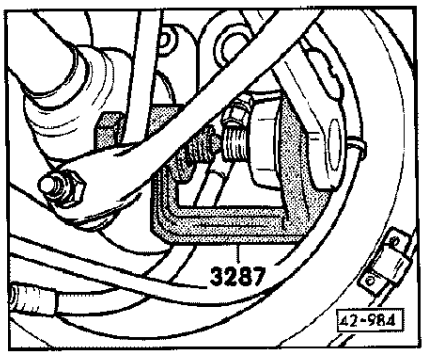
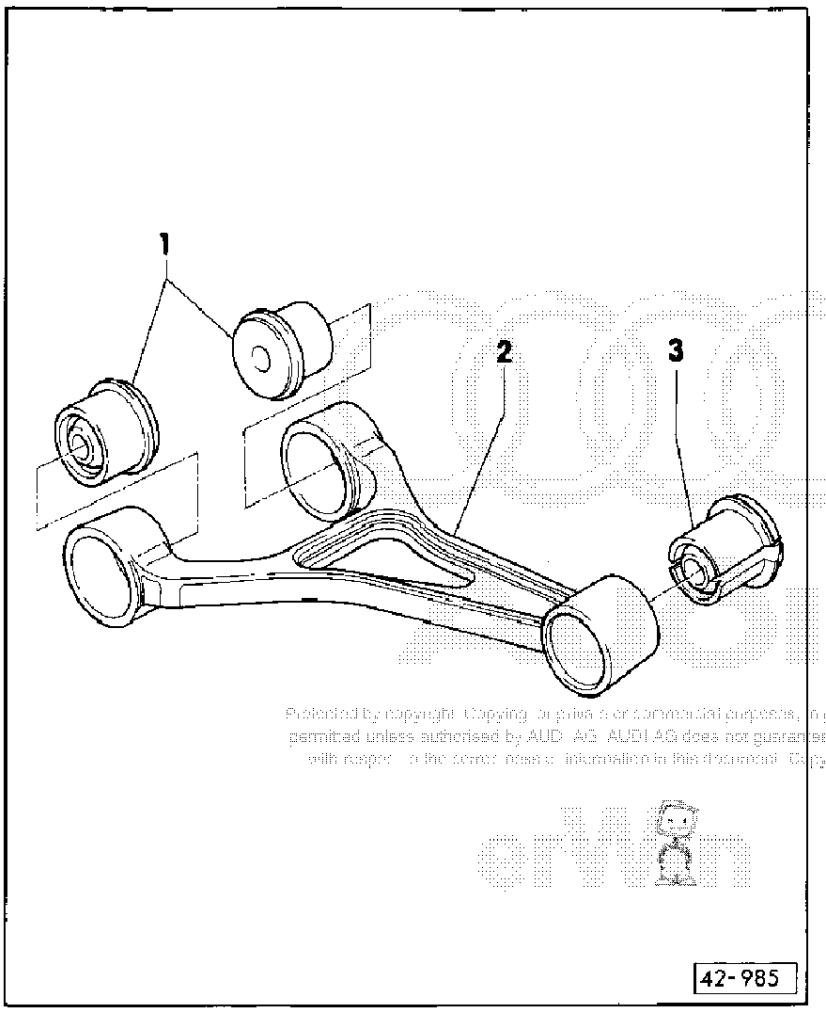


Fig.1 Pressing track rod off rear axle steering arm
- Unscrew self-locking nut beforehand
- Take out eccentric bolt for removal



Servicing upper transverse link

Servicing forged transverse link

1 – **Bonded rubber bush**
- ♦ Replacing =>Fig. 1 to 4

2 – **Upper transverse link**
- ♦ Replacement part supplied with bonded rubber bushes installed
- ♦ Identical part on left and right

3 – **Bonded rubber bush**
- ♦ Replacing =>Fig. 5 to 8
- ♦ No installation position is envisaged for mounting with slot in outer casing

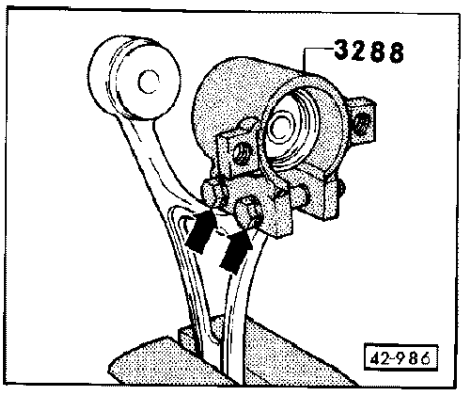


Fig.1 Inserting assembly tool in transverse link

- Insert assembly tool -3288- as shown in transverse link and firmly tighten both securing bolts.

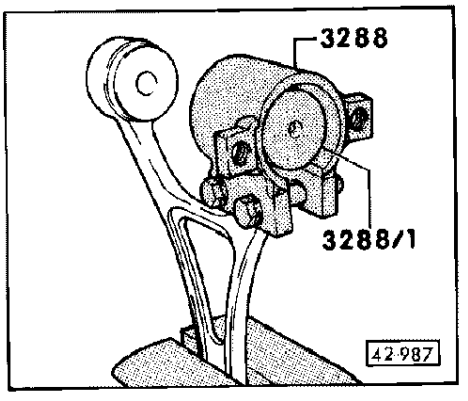


Fig.2 Inserting thrust piece in transverse link

Note:

Make sure thrust piece -3288/1- is correctly positioned. Otherwise eye of transverse link will be damaged.

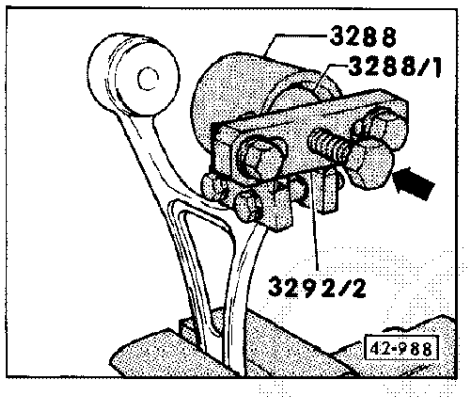


Fig.3 Inserting cross piece in assembly tool

- Align cross piece -3292/2- with assembly tool -3288- and screw on
- Screw spindle into cross piece and, pressing bonded rubber bush out of transverse link with thrust piece -3288/1-.

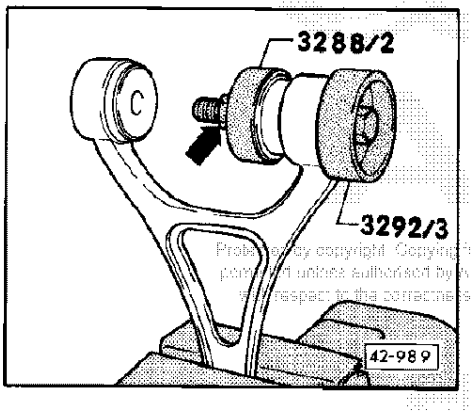


Fig.4 Pulling bonded rubber bush into transverse link

- Attach bonded rubber bush at right angles to transverse link.
- Screw thrust pieces -3288/3- and -3292/2- together as shown with hexagon bolts, thereby drawing mounting into transverse link eye to stop.

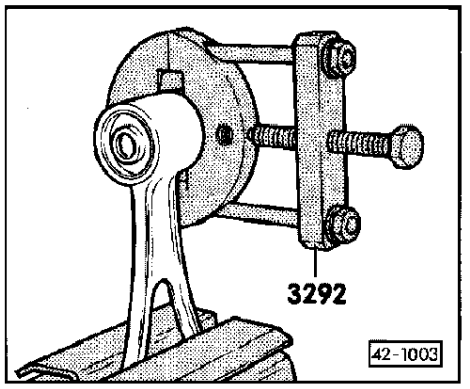


Fig.5 Inserting assembly tool in transverse link

- Insert assembly tool -3292- in such a way that the radii of the two jaws of the special tool are positioned between mounting and transverse link eye.
- Screw in threaded spindle to stop so that the bonded rubber bush is slightly pressed off transverse link eye.

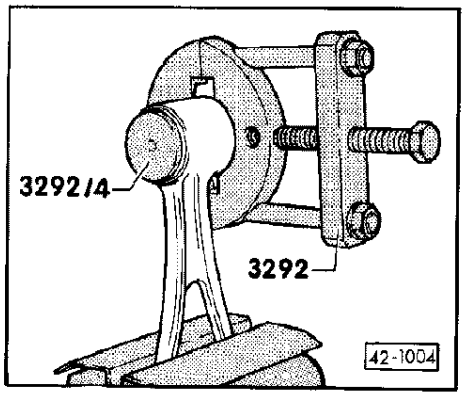


Fig.6 Inserting thrust piece in transverse link

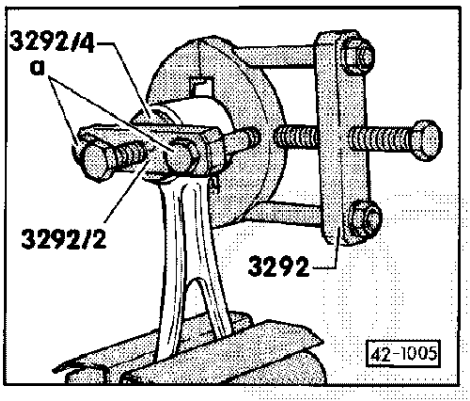


Fig.7 Pressing bonded rubber bush out of transverse link

- Fasten cross piece -3292/2- with the hexagon bolts -a- (M10 x 80) provided to assembly tool -3292-.
- Centre cross piece with respect to thrust piece -3292/4-.
- Screw spindle into cross piece until bonded rubber bush is pressed out.

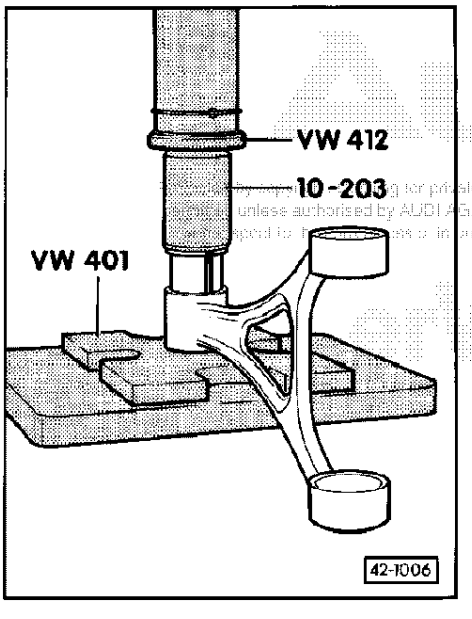
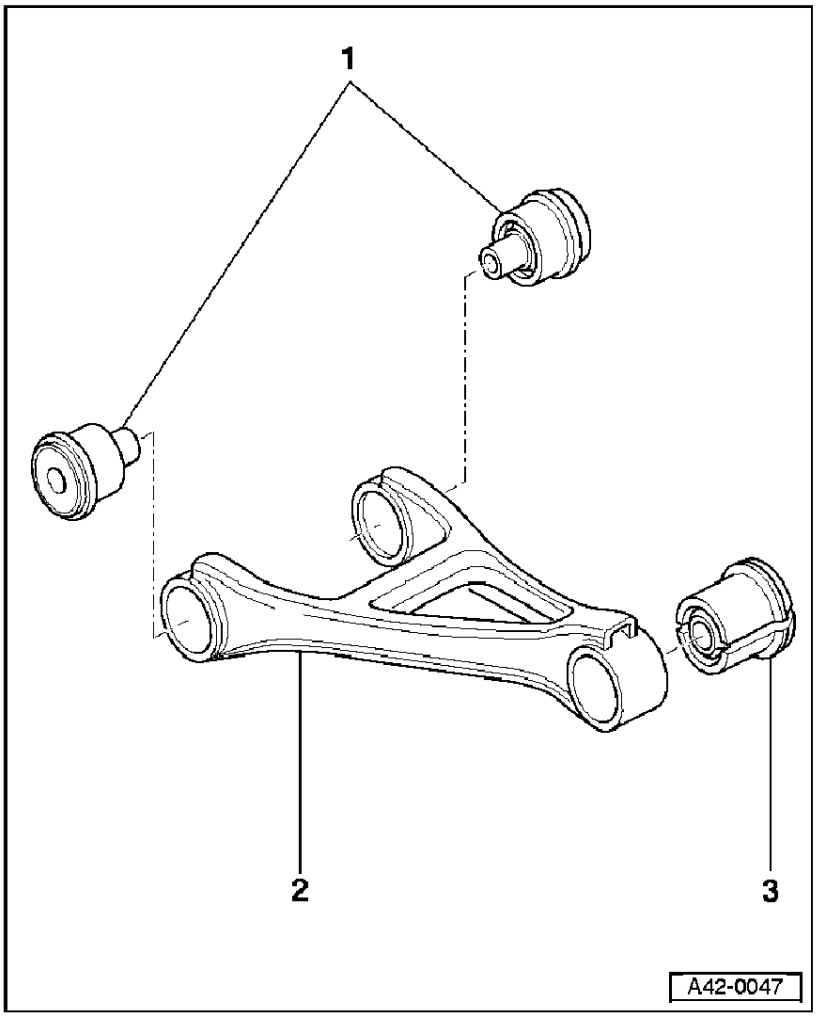


Fig.8 Pressing bonded rubber bush into transverse link

- Press bush home.



Servicing sheet-steel transverse link

1 – **Bonded rubber bush**
- ♦ Pressing out => Fig. 9
- ♦ Pressing in => Fig. 11

2 – **Upper transverse link**
- ♦ Replacement part supplied with bonded rubber bushes installed
- ♦ Identical part on left and right

3 – **Bonded rubber bush**
- ♦ Pressing out => Fig. 10
- ♦ Pressing in => Fig. 12
- ♦ No installation position is envisaged for mounting with slot in outer casing

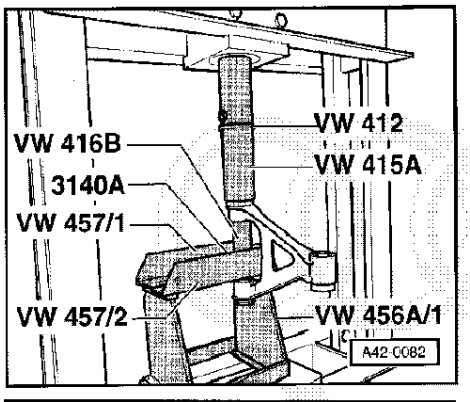


Fig.9 Pressing bonded rubber bush out of transverse link
- If tube -VW 416B- tilts when pressing out, relieve pressure and start again.
- If surface protection of transverse link is damaged, treat accordingly to prevent corrosion.

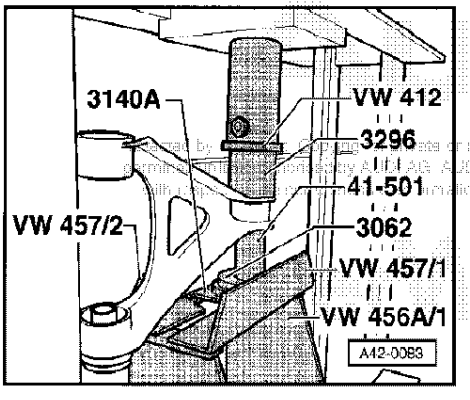


Fig.10 Pressing bonded rubber bush out of transverse link

Note:

Ensure exact positioning of lower tube section -41-501-.

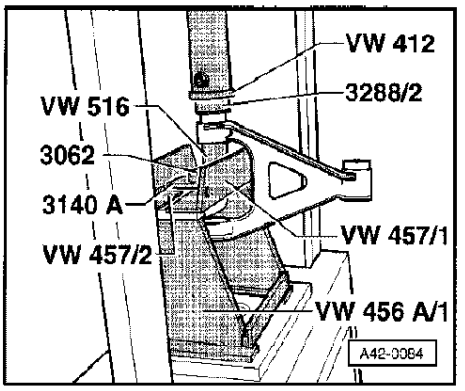


Fig.11 Pressing bonded rubber bush into transverse link
- Attach bonded rubber bush at right angles to transverse link.
- Press bush in to stop.

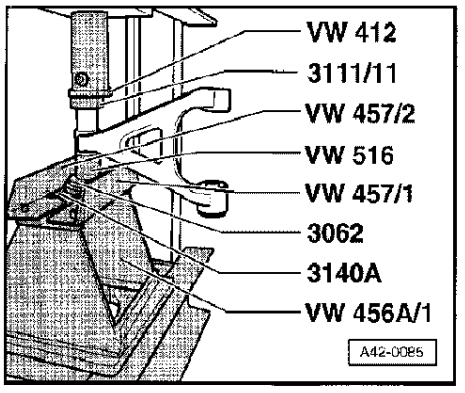
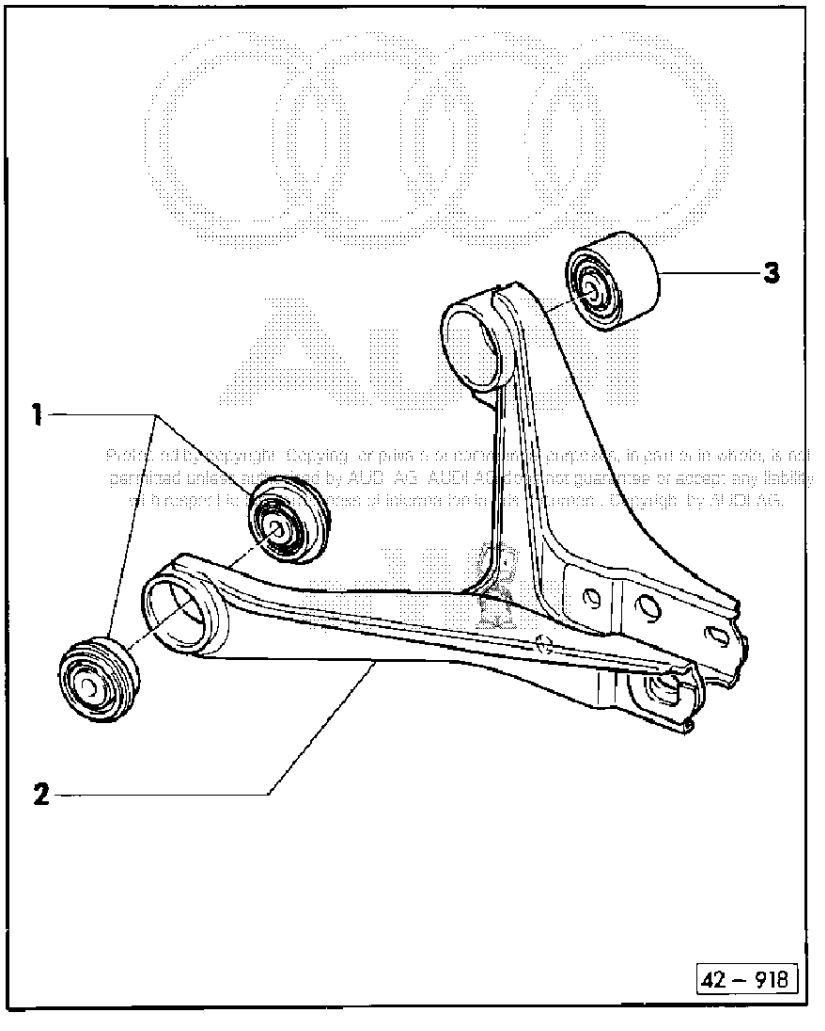


Fig.12 Pressing bonded rubber bush into transverse link
- Press bush in to stop.



Servicing lower transverse link

1 – Rear bonded rubber bush
- ♦ Replacing =>Fig. 1 to 4
- ♦ Always replace both halves of bush

2 – Lower transverse link
- ♦ Replacement part is supplied with bonded rubber bushes installed

3 – Front bonded rubber bush
- ♦ Replacing =>Fig. 5

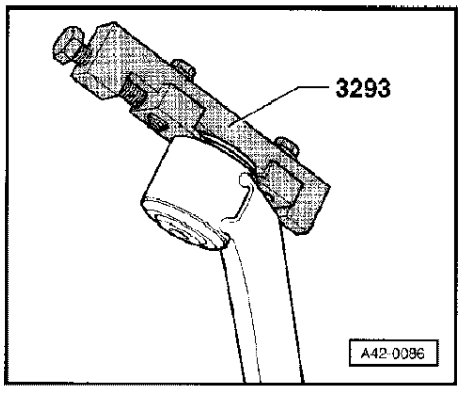


Fig.1 Inserting assembly tool in transverse link

Notes:

- ♦ The two collars of the bonded rubber bushes must be flanged slightly before inserting the special tool.
- ♦ Insert the special tool very carefully.
- – Insert assembly tool -3293- in such a way that the radii of both jaws of the special tool are positioned between mounting and transverse link eye.
- – Screw in threaded spindle to stop so that the bonded rubber bush is slightly pressed off transverse link eye.

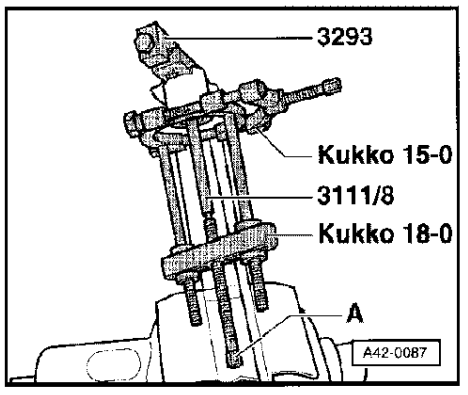


Fig.2 Inserting puller in transverse link

- – Insert the commercially available Kukko puller -15-0- in the transverse link.
- – Insert the drift and special tool -3111/8- in bore of bonded rubber bush.
- – Next, screw Kukko -18-0 -into -Kukko -15-0- and centrally align.
- – Then screw in threaded spindle -A- until the bonded rubber bush is pulled out.

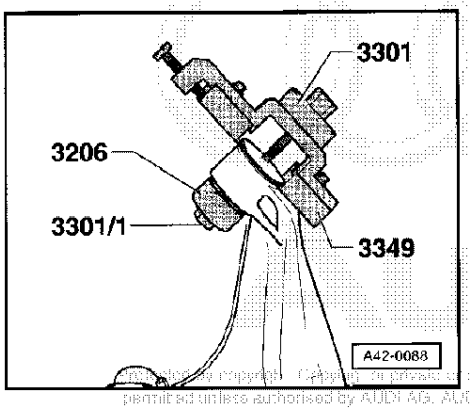


Fig.3 Pulling second half of bonded rubber bush out of transverse link

- – Insert the special tool -3349- in transverse link.
- – Then remove second half of bush by screwing in spindle -3301/1-.

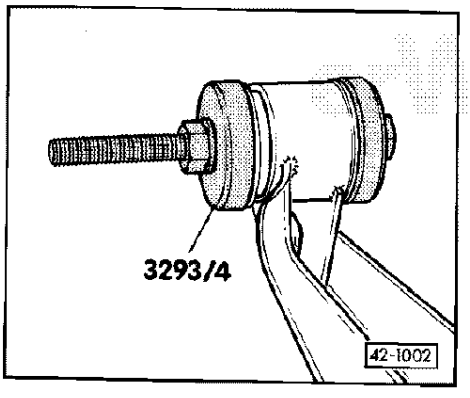
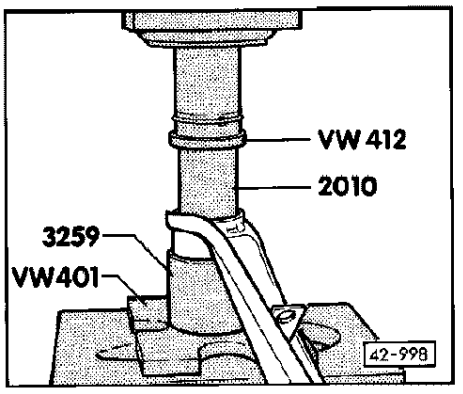


Fig.4 Pulling bonded rubber bush into transverse link

- – Insert both halves of the bonded rubber bush with the thrust pieces -3293/4- and the threaded spindle at right angles into the transverse link.
- – Draw in mounting to stop by tightening threaded spindle -A-.



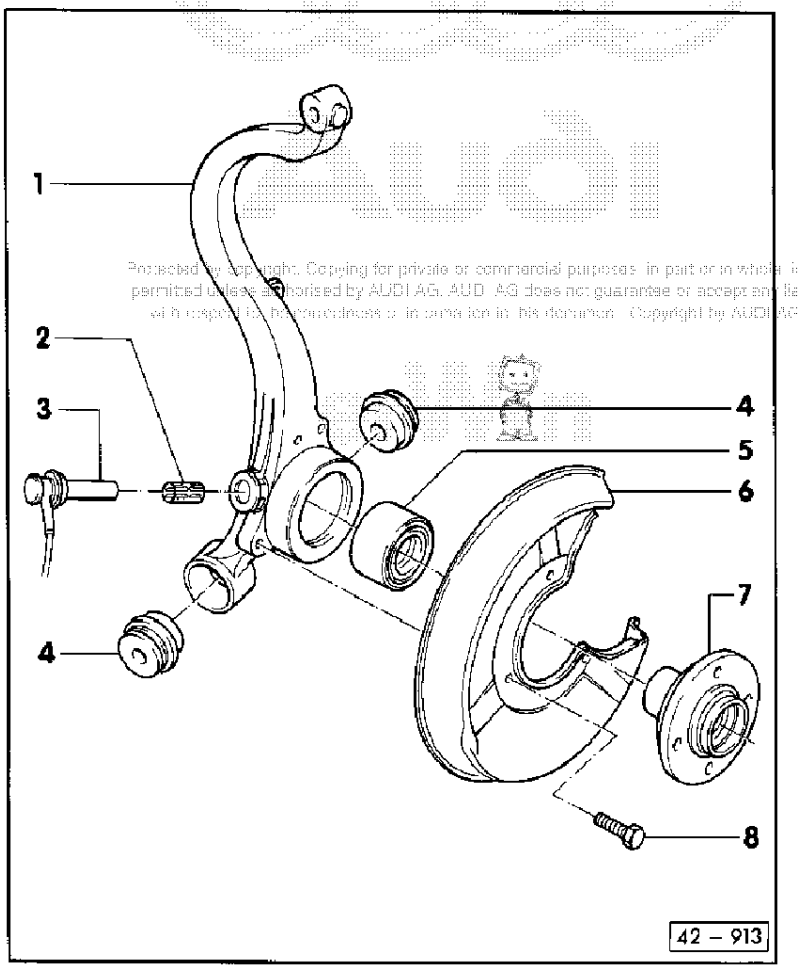
◀ **Fig.5 Pulling out/pressing in bonded rubber bush for lower transverse link**

– Press bush in flush.

Note:

When pressing out, ensure that the bonded rubber bush does not rest on front of special tool -3259-.

– Collar of special tool -3259- points to special tool -VW 401-.



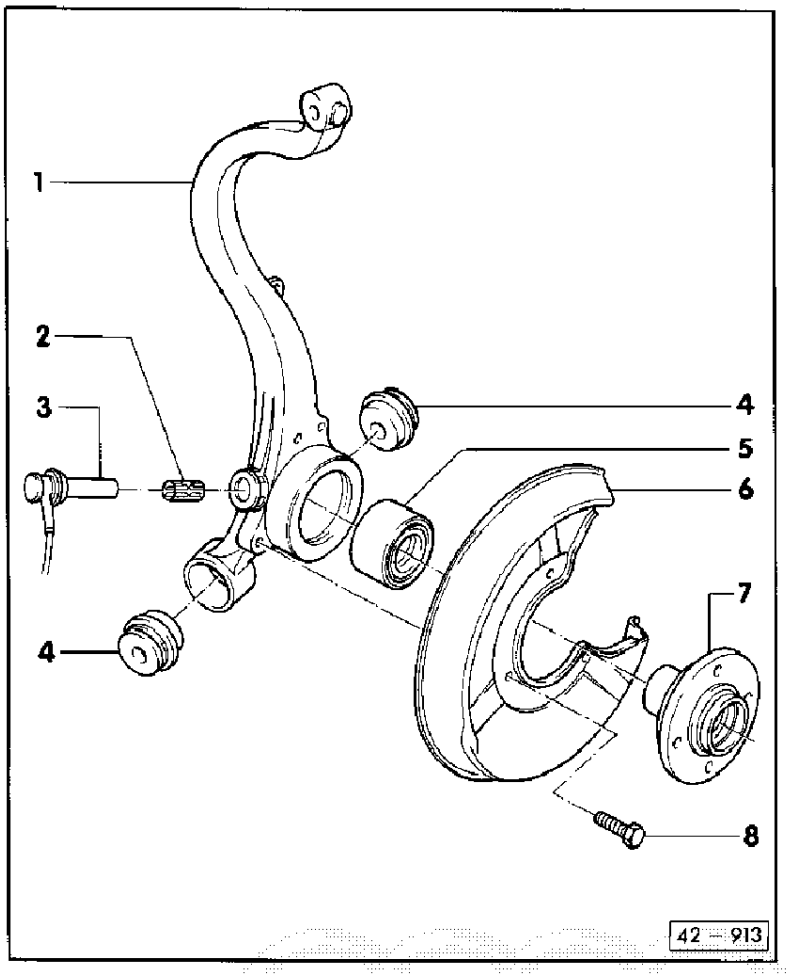
Servicing wheel bearing housing

1 – **Wheel bearing housing**

- ♦ Do not grease bearing seat in wheel bearing housing before pressing in wheel bearing
- ♦ After replacing wheel bearing housing, perform rear axle wheel alignment => Page 44-11
- ♦ Supplied as replacement part with hole for accommodating clamping sleeve/wheel speed sensor

2 – **Clamping sleeve**

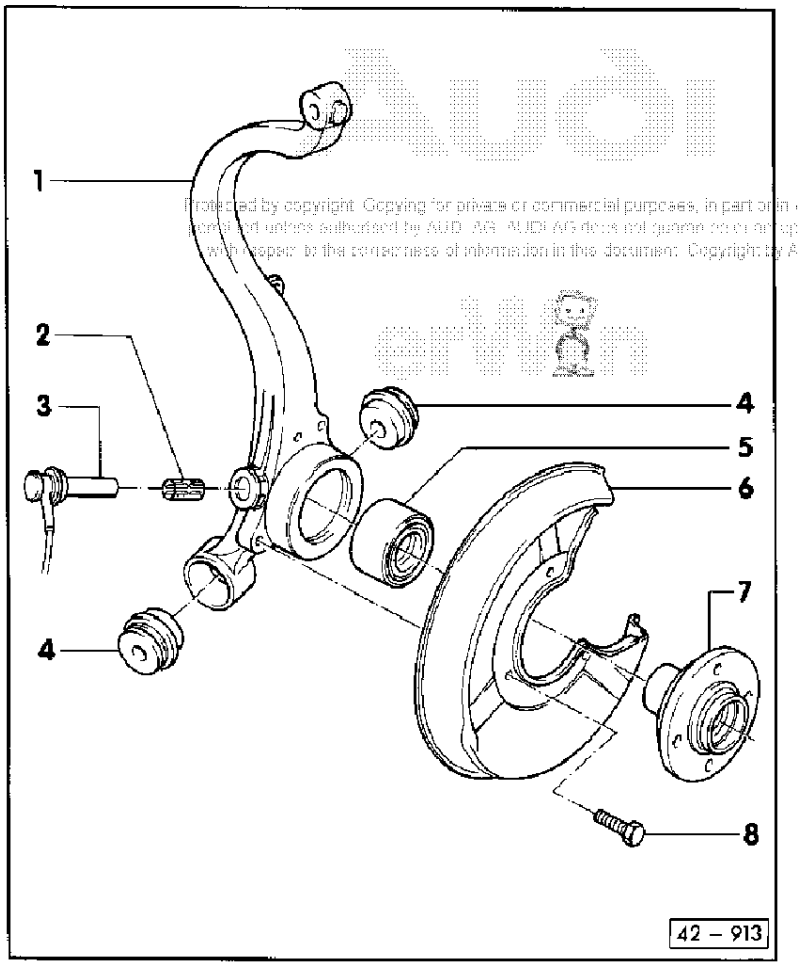
- ♦ Grease all round with brake cylinder paste before inserting in wheel bearing housing
- ♦ Press home in wheel bearing housing.



3 – Wheel speed sensor
- ♦ Pull out to remove
- ♦ Press home by hand to install

4 – Bonded rubber bush
- ♦ Replacing => Fig. 8 to 10
- ♦ Always replace both halves of bush

5 – Wheel bearing
- ♦ Stepped internal diameter
- ♦ Note correct installation position: Large internal diameter of wheel bearing points to wheel hub.
- ♦ Pressing out destroys the bearing
- ♦ Pressing out =>Fig. 2
- ♦ Pressing in ø75=>Fig. 4
- ♦ Pressing out ø 82 => Fig. 5



6 – Cover plate
- ♦ Bolt to wheel bearing housing

7 – Wheel hub
- ♦ Pressing out =>Fig. 1
- ♦ Pressing in =>Fig. 3
- ♦ Pressing off bearing inner race =>Fig. 6 and 7
- ♦ Vehicles with 169 kW engine and vehicles with 16" running gear feature 5-hole wheel hub

8 – Hexagon bolt, 10 Nm

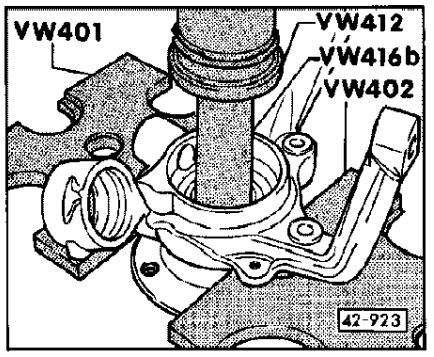


Fig.1 Pressing out wheel hub

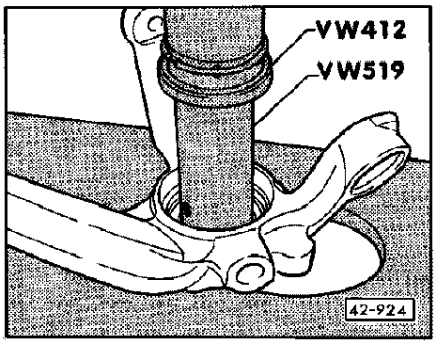


Fig.2 Pressing out wheel bearing.

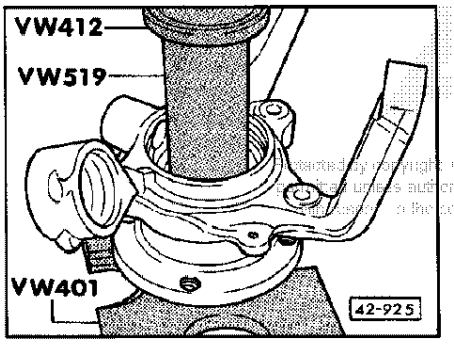


Fig.3 Pressing in wheel hub

Note:

When pressing in, tool VW 519 must only rest on inner race.

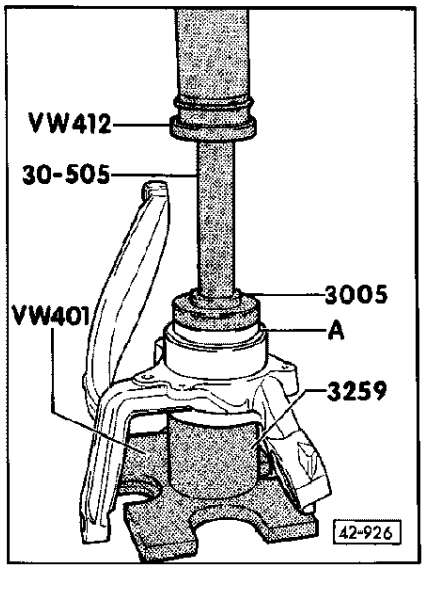


Fig.4 Pressing home wheel bearing -A-, ø 75 mm

– Large internal diameter of wheel bearing points to wheel hub.

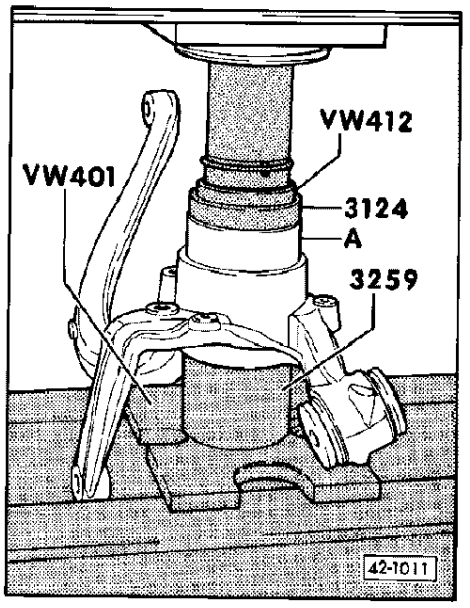


Fig.5 Pressing home wheel bearing -A-, ø 82 mm

- Large internal diameter of wheel bearing points to wheel hub.

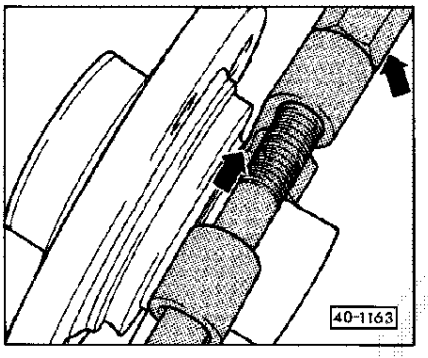


Fig.6 Inserting separating device

- Insert separating device into annular groove of bearing inner race and pre-tension with spindle.

Note:

Use commercially available separating device e.g. 15-17 from Kukko.

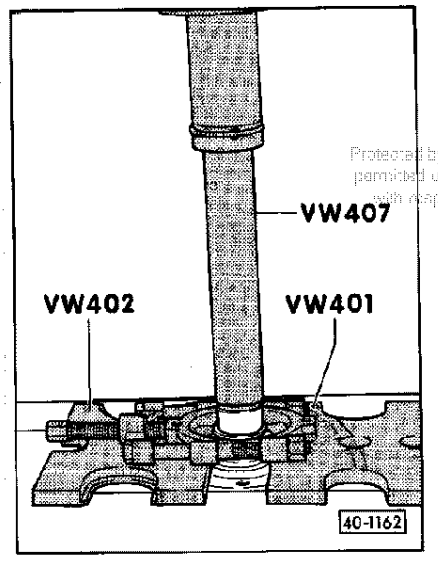


Fig.7 Pressing bearing inner race off wheel hub

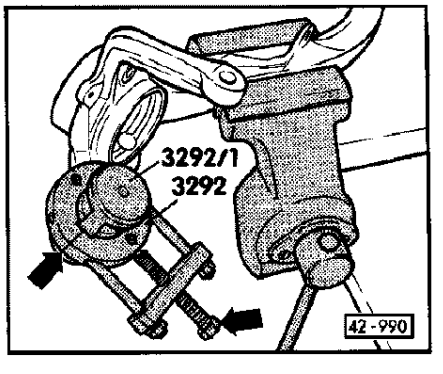


Fig.8 Inserting assembly tool in wheel bearing housing

- Position support 3292/1 on bonded rubber bush.
- Push assembly tool -3292- over support -3292/1- until contact is made.
- Tighten threaded spindle up to stop so that the two jaws of the assembly tool -3292- are positioned in the annular groove between the bonded rubber bush and wheel bearing housing.

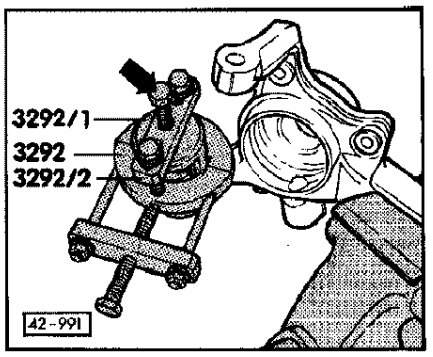


Fig.9 Screwing cross piece to assembly tool

- Centre cross piece 3292/2 and position it in full contact with support 3292/1 by tightening the two hexagon bolts.
- Screw in spindle of cross piece 3292/2 until the mounting is pulled out.

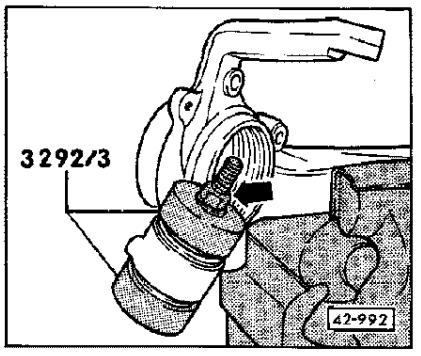
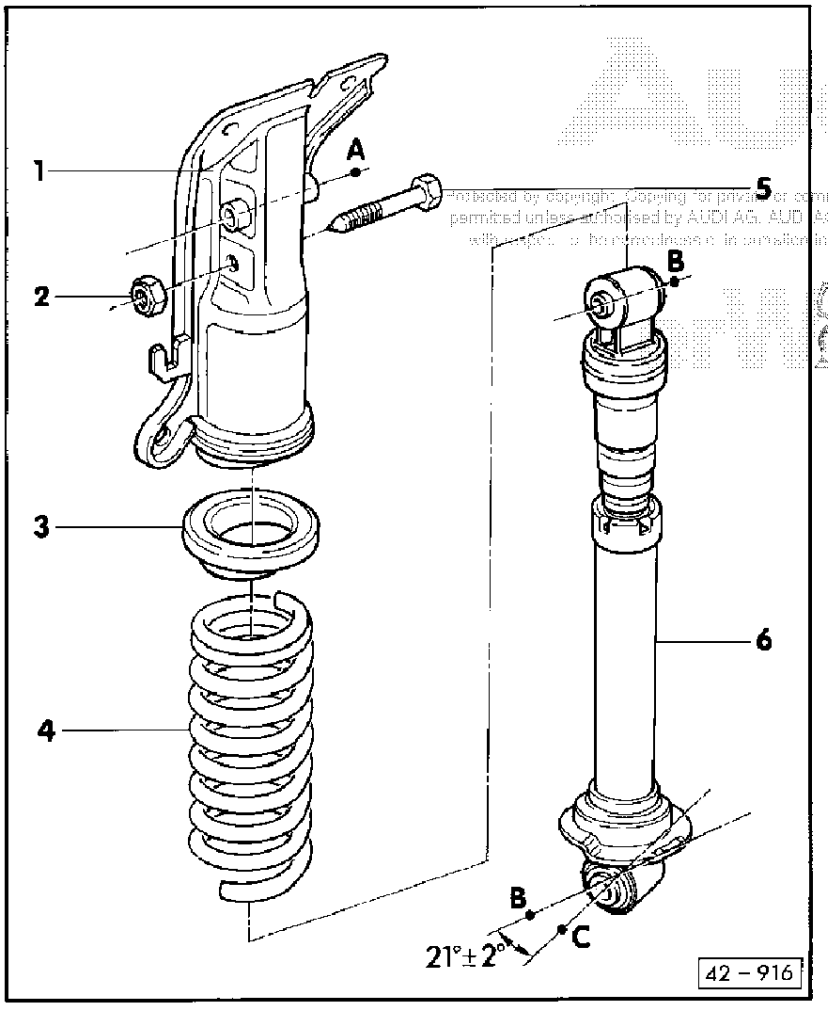


Fig.10 Pulling bonded rubber bush into wheel bearing housing

- Insert bonded rubber bush on both sides at right angles in hole in wheel bearing housing.
- Position a thrust piece 3293/3 on both mountings and draw in threaded spindle to stop.



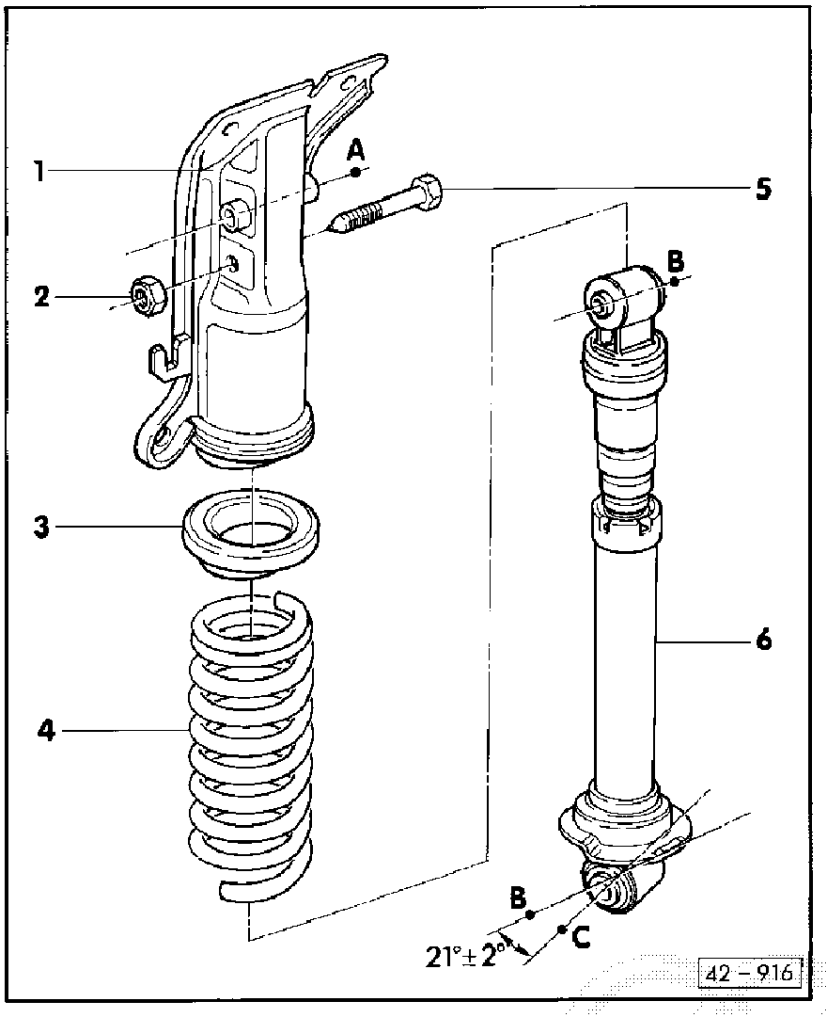
Servicing suspension strut

Dismantling and assembling suspension strut =>Page 42-63

1 – Adapter
- ♦ Different versions on left and right
- ♦ Axes -A- and -B- are parallel.

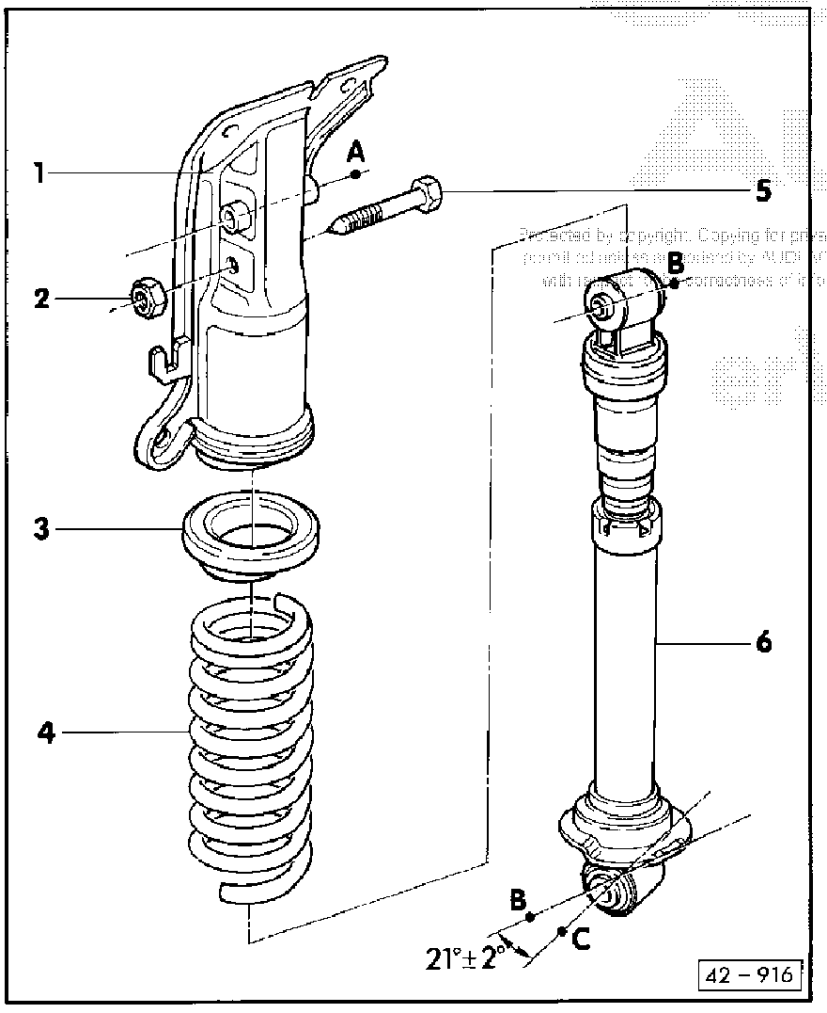
2 – Self-locking nut
- ♦ Always renew
- ♦ Tighten to 95 Nm and then give a further 90o turn.

3 – Damping ring
- ♦ Apply talc before fitting
- ♦ Attach to coil spring so that it touches the stop on the end of the spring



4 – Coil spring

- ♦ Refer to Parts List
- ♦ Prior to replacement, consult vehicle data sticker as that is the only way to establish spring version
- ♦ The codes on the data sticker stand for:
  - 1BA = Standard version
  - 1BE = Sports version
  - 1BB = Heavy duty version
- ♦ Attach to shock absorber and turn in such a way that the end of the spring coil touches the stop of the lower spring plate
- ♦ Installation position: Colour code on spring points downwards to spring plate
- ♦ If suspension strut has been installed properly, lower end of spring faces rear on left and front on right

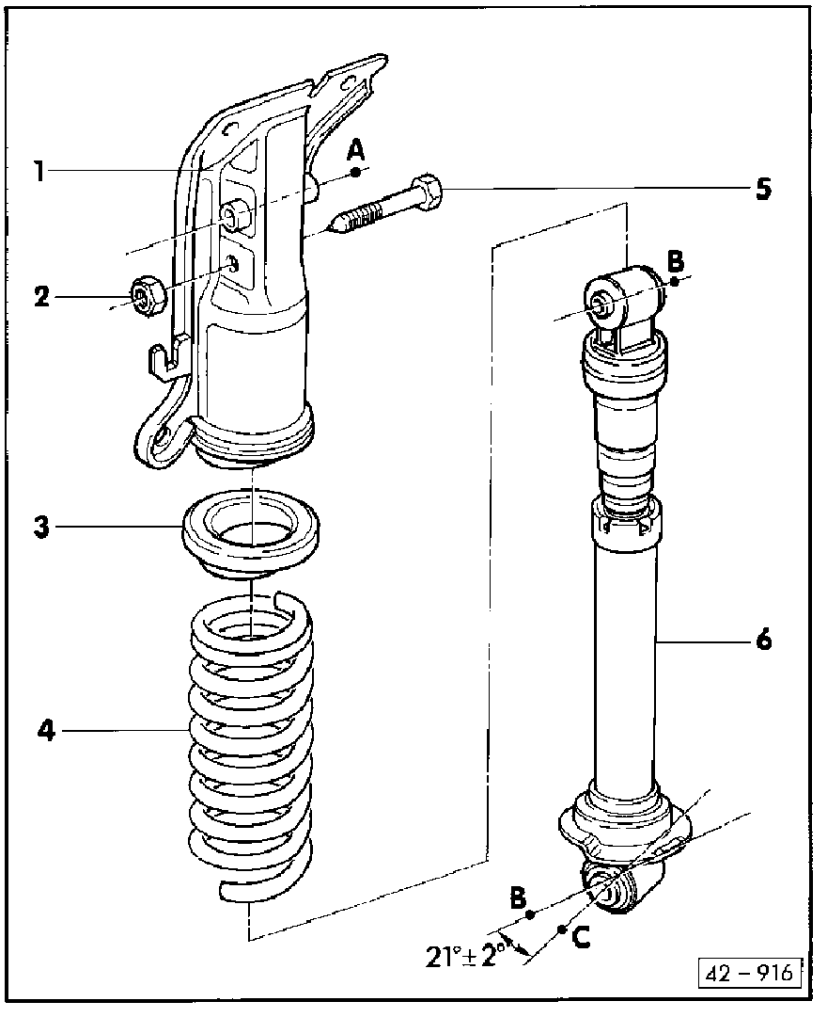


Notes:

- ♦ Up to chassis no. 8C NA 015 724 there is no running gear information on the data sticker. In such cases, all vehicles are to be adjusted as indicated in the specified value table for vehicles with standard and sports version when performing wheel alignment. When replacing shock absorbers or coil springs, determine running gear version by way of part no. of rear shock absorbers in combination with parts list.
- ♦ As of chassis no. 8C NA 015 725 the data sticker is provided with the above identification.

5 – Hexagon bolt

- ♦ Always replace

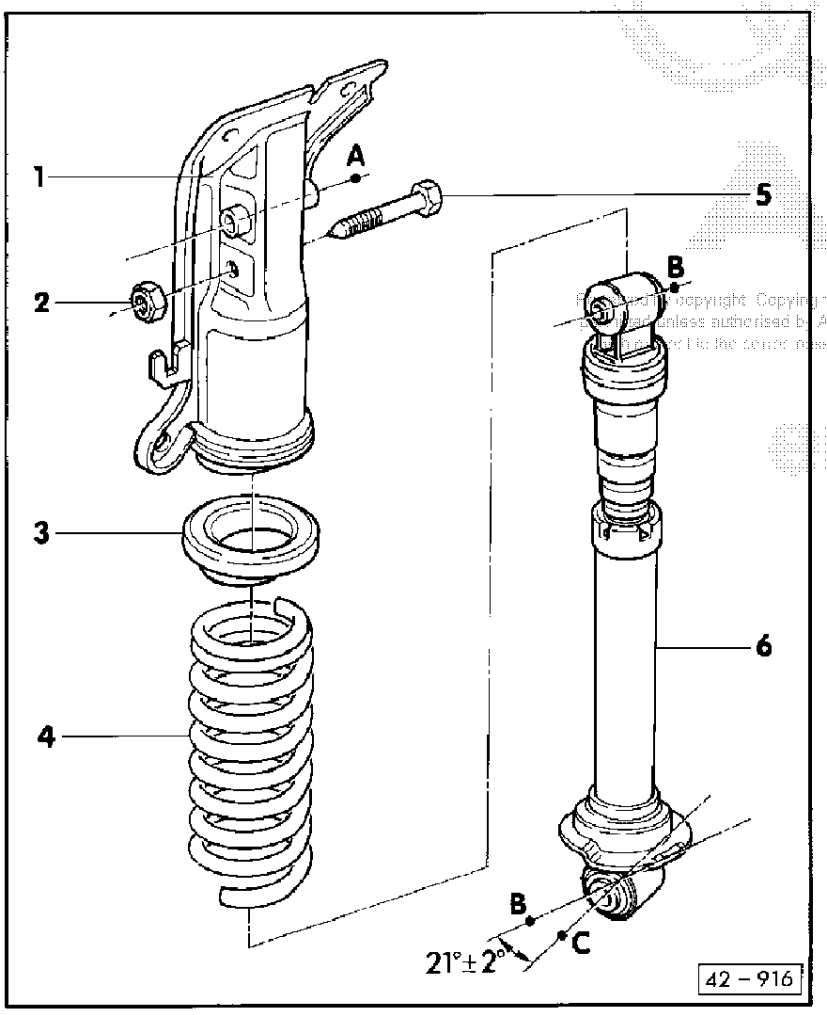


6 – Shock absorber

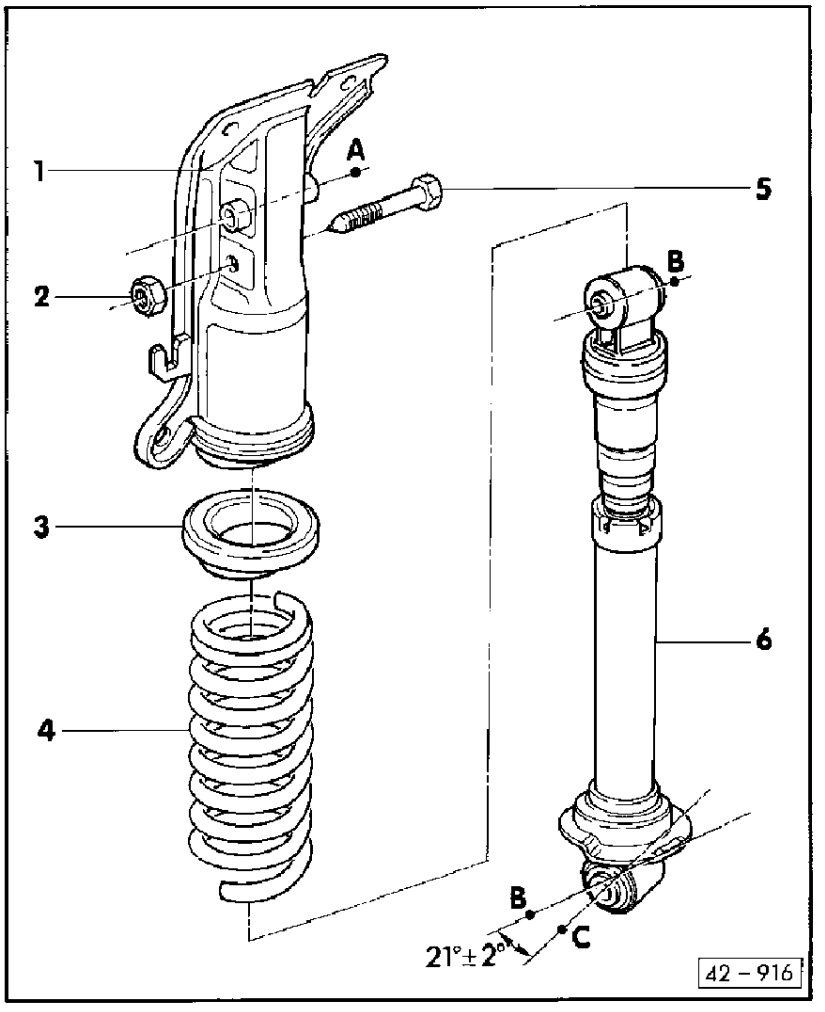
- ♦ Defective shock absorbers must always be properly prepared before being scrapped.

=> "Special Service Information" binder: Running gear no. 2; edition 03.90

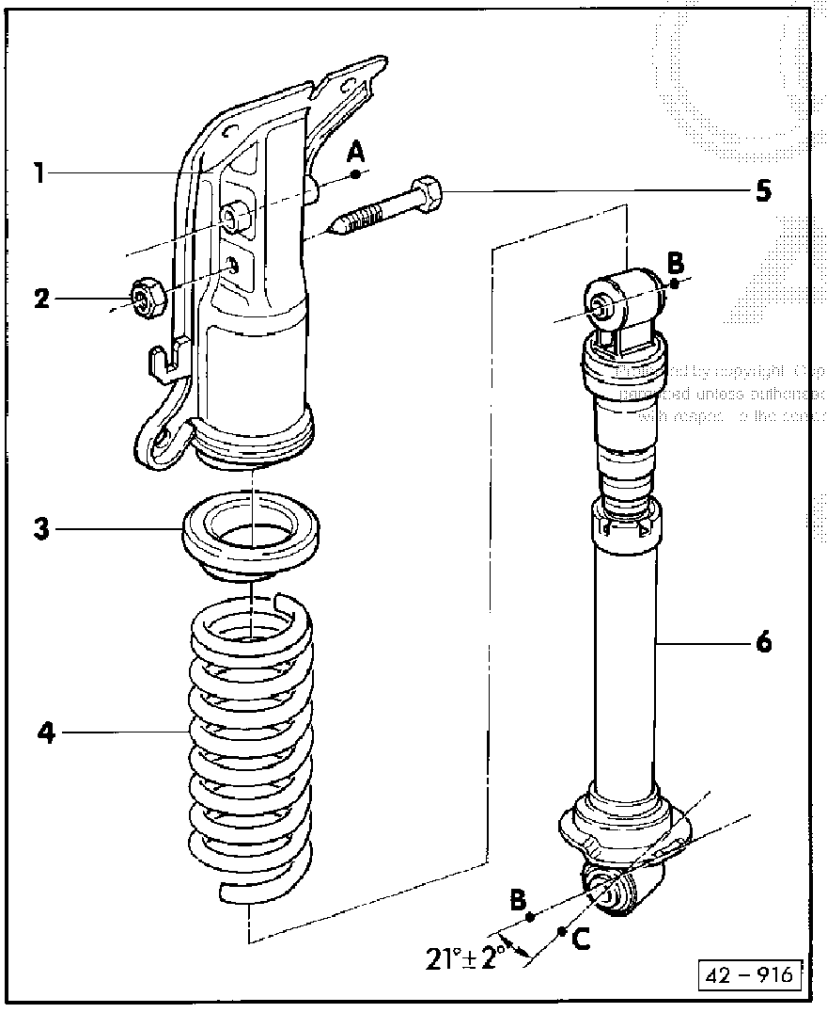
- ♦ Refer to Parts List
- ♦ Prior to replacement, consult vehicle data sticker as that is the only way to establish spring version
- ♦ The codes on the data sticker stand for:
  - 1BA = Standard version
  - 1BE = Sports version
  - 1BB = Heavy duty version
- ♦ => Notes on -Item 4-
- ♦ Can be replaced individually



- ♦ Replacement part supplied with lower spring plate pressed on
- ♦ Vehicles with sports running gear are equipped with gas-filled shock absorbers.
- ♦ Axes -A- and -B- are parallel.
- ♦ On assembly note angle between axis -B- and axis -C- of 21o ± 2o



♦ Checking (removed) shock absorber: Check shock absorber by hand (hold in installation position) by extending and compressing it. Shock absorber must move evenly and smoothly over entire stroke. Shock absorbers that have been stored for a lengthy period may have to be pumped several times. Defective shock absorbers make a "banging" noise whilst driving. If they are functioning properly, slight traces of shock absorber oil do not signify that replacement is necessary. Considerable loss of oil will result in deficiencies in the expansion and compression stages.



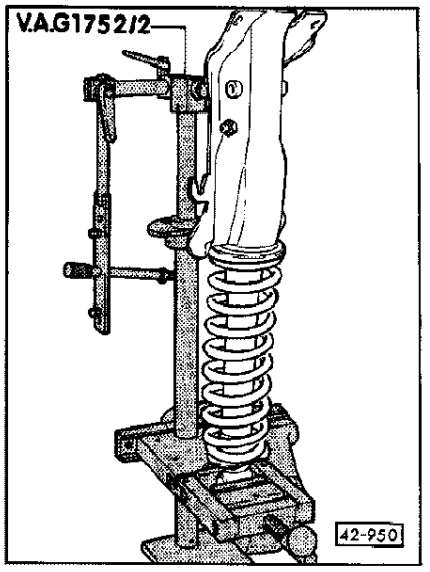
♦ Checking gas-filled shock absorber: Compress shock absorber by hand. The piston rod must move evenly and smoothly over the entire stroke. Release piston rod. If shock absorbers have sufficient gas pressure, piston rod returns automatically to initial position. If this is not the case, the shock absorber need not always be replaced. As long as there has not been a major loss of oil, the mode of operation corresponds to that of a conventional shock absorber.

=> "Special service information" binder: Running Gear No. 17

Dismantling and assembling suspension strut

Dismantling:

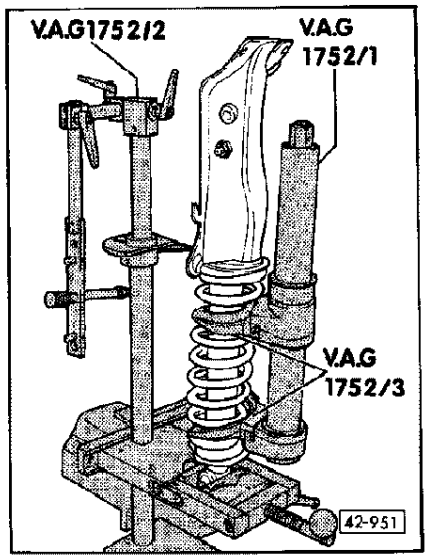
- Remove suspension strut – refer to Servicing Rear Axle, Page 42-30, -Item 11-.



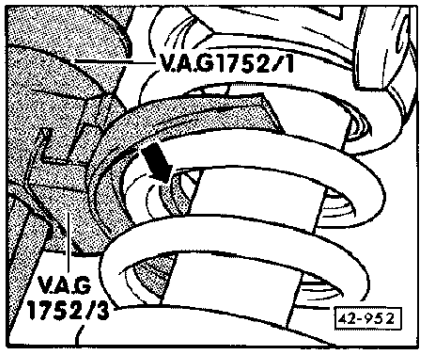
- Suspension strut in spring tensioner V.A.G 1752.

Note:

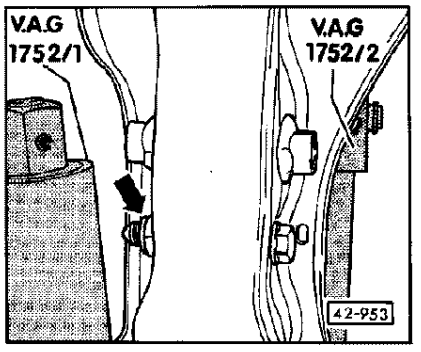
Illustration shows left suspension strut.



- Pretension coil spring with tensioner V.A.G 1752/1 ...



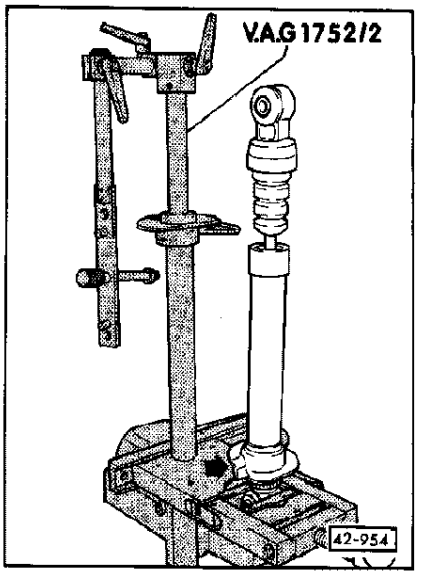
- ... taking care to ensure that the coil spring is seated correctly in adapter V.A.G 1752/2 -arrow-.



- Unscrew nut -arrow- and remove bolt.
- Remove adapter and damping ring.
- Remove pretensioned spring with tensioner V.A.G 1752/1.
- Remove defective shock absorber from spring tensioner V.A.G 1752 and treat appropriately prior to scrapping.

=> "Special Service Information" binder: Running gear no. 2; edition 03.90

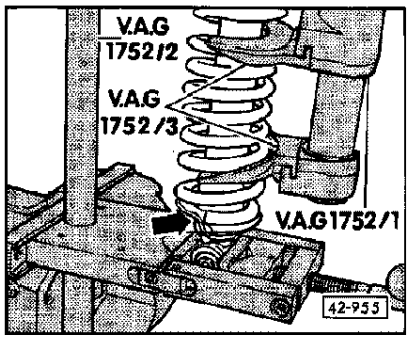
Assembly:



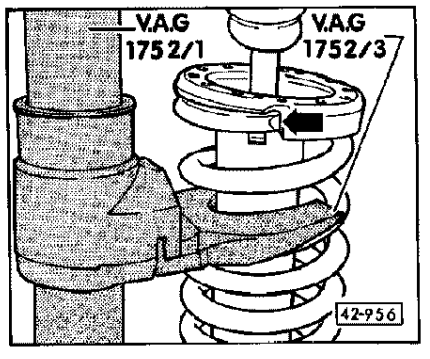
- New shock absorber as shown in spring tensioner V.A.G 1752.

Note:

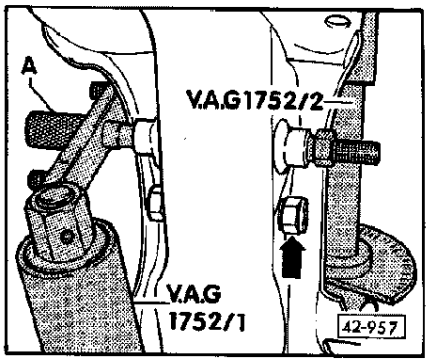
Note position of notch on lower spring plate -arrow-.



- Pretension new coil spring with tensioner V.A.G 1752/1.
- Position pretensioned coil spring on shock absorber. Colour code on coil spring must point downwards towards spring plate and end of spring coil must touch stop of spring plate -arrow-.



- Attach damping ring in such a way that the end of the spring coil touches the stop of the damping ring -arrow-.

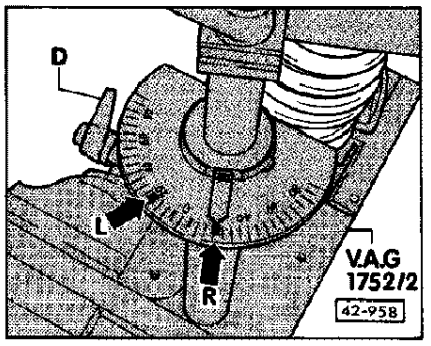


- Fit adapter.
- Insert fastening bolt in adapter and loosely screw on nut -arrow-.

Note:

Nut points in direction of travel.

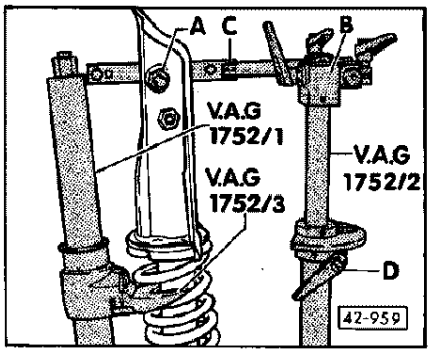
- Insert locating pin -A- in adapter and secure loosely with nut.



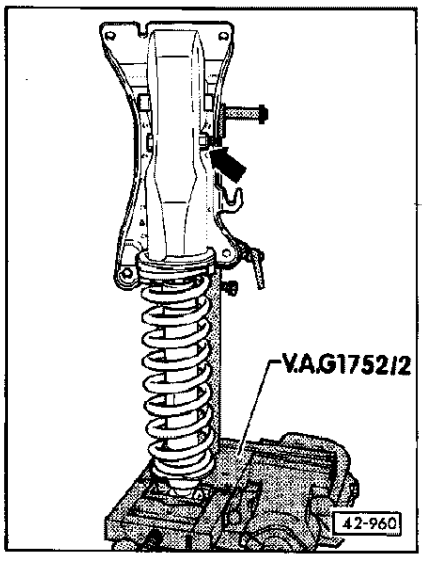
- Turn adapter accordingly until pointer on scale of spring tensioner V.A.G 1752 points to 21o ± 2o (lock bolt -D- slack) and ...
  - L = left suspension strut
  - R = right suspension strut

Note:

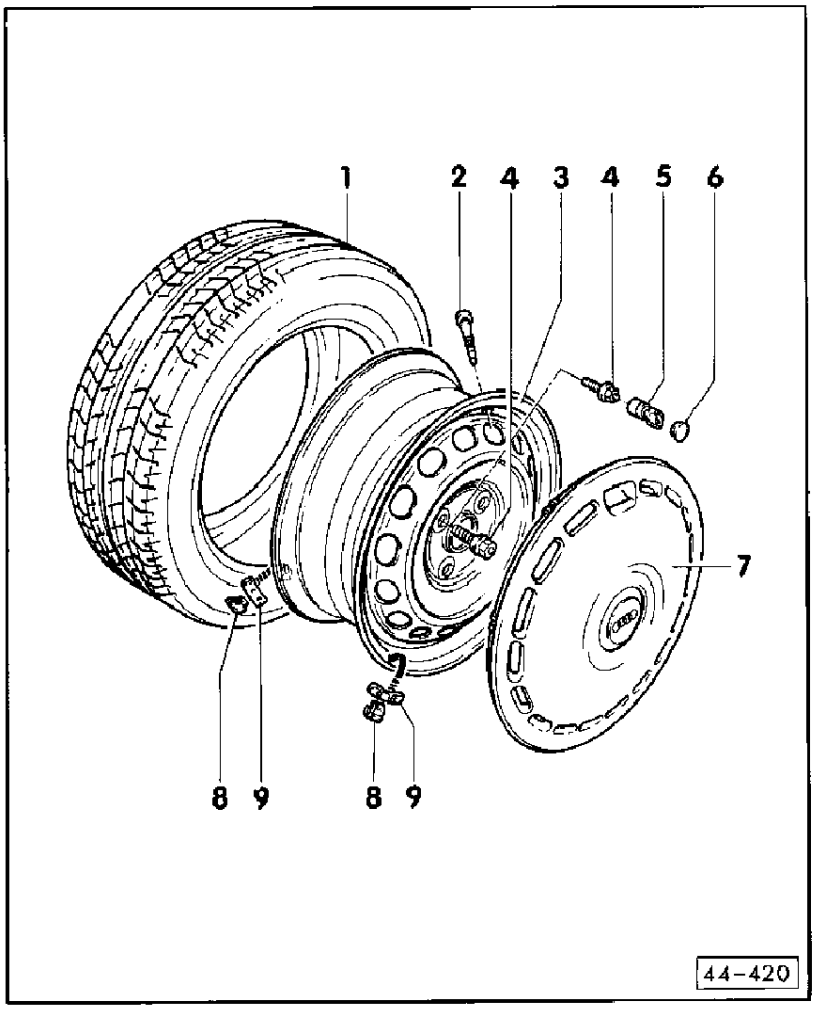
Illustration shows position of scale when assembling the right suspension strut.



- ... move lever arm -C- with locating pin -A- such that it is horizontal with respect to height adjuster -B-.
- Tighten lock bolt -D-.
- Slacken off coil spring and remove tensioner V.A.G 1752/1.
- Remove locating pin -A- from adapter on suspension strut.



- Secure nut -arrow- tightening torque: 95 Nm, then turn a further 90o.
- Remove suspension strut from spring tensioner V.A.G -1752/2-.

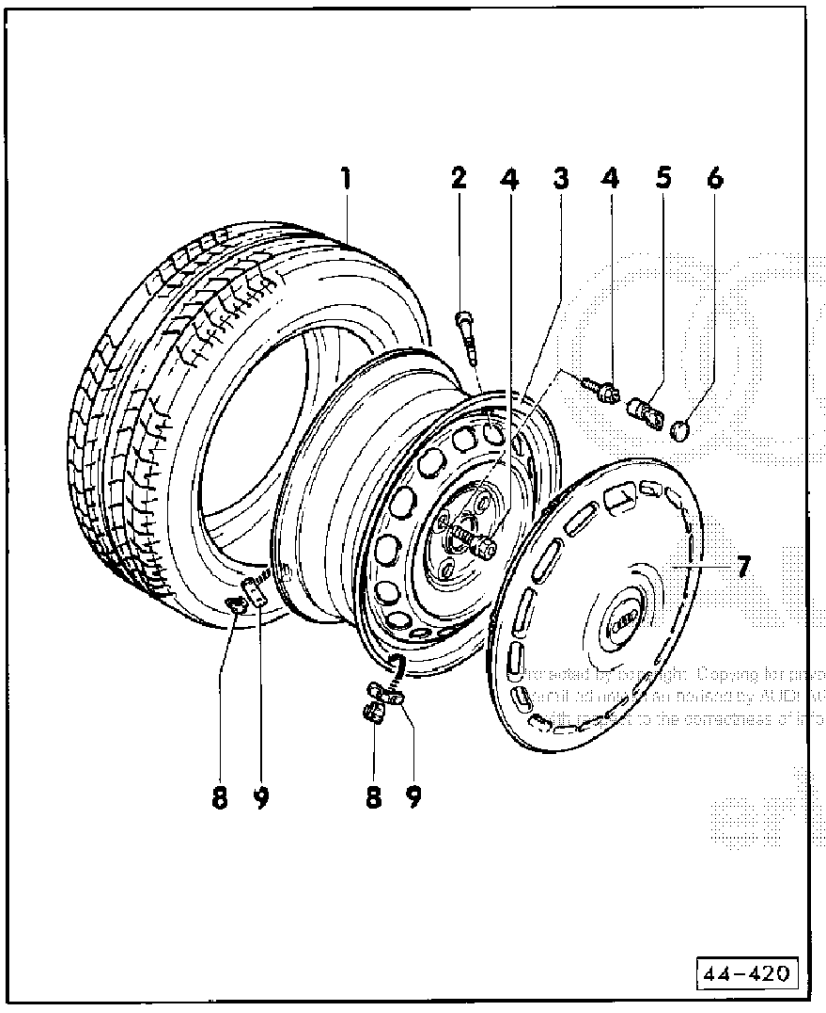


Wheels and tyres

The valid wheel/tyre combinations can be found in the
=> Fault finding binder, Wheels/tyres

Steel disc wheel

1 – **Tyre**
- ♦ For reasons of safety, tyres should not be replaced individually but at least for a whole axle.
- ♦ The tyres with the deeper tread should always be fitted to the front wheels.
- ♦ It is advisable to use tyres of the same make, design and tread pattern on all wheels.



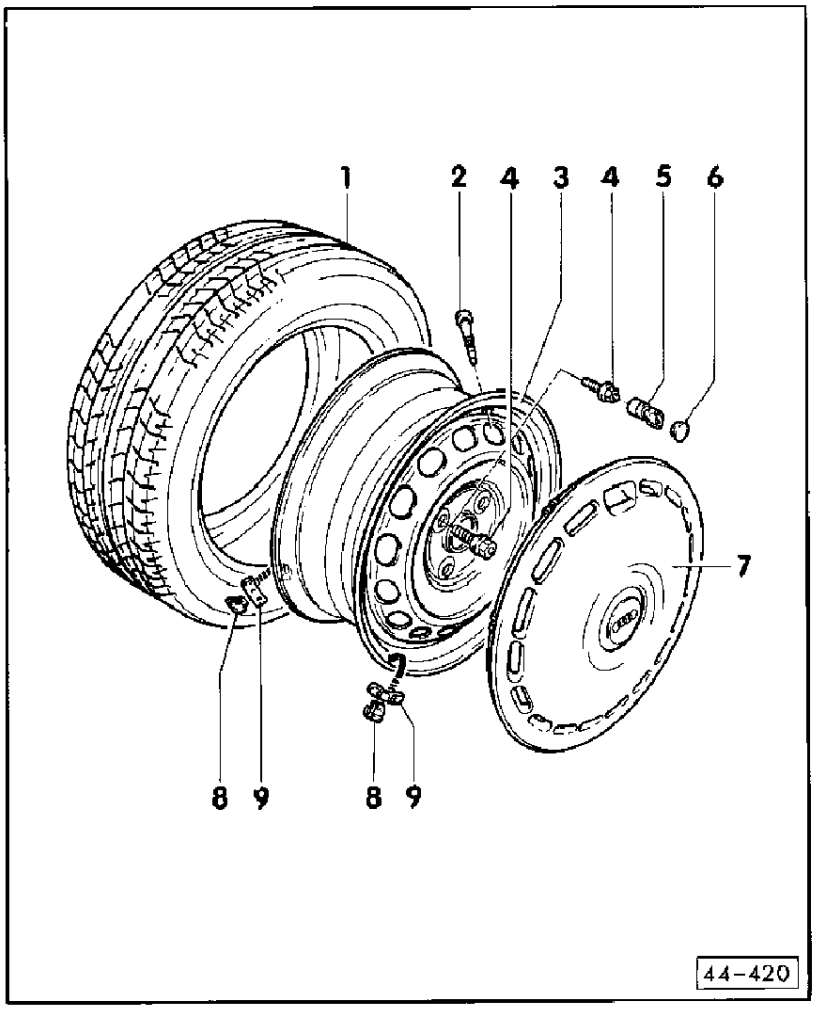
2 – **Valve**
- ♦ Always replace when renewing disc wheel or tyre
- ♦ Only fit valve as per parts list

3 – **Steel disc wheel**
- ♦ 6J x15, ET 37

4 – **Wheel bolt, 110 Nm**
- ♦ M14 x 1.5 x 27.5mm

5 – **Lock cylinder**
- ♦ Attach to wheel bolt and lock

6 – **Cap**
- ♦ Attach to lock cylinder



7 – Full diameter hub cap

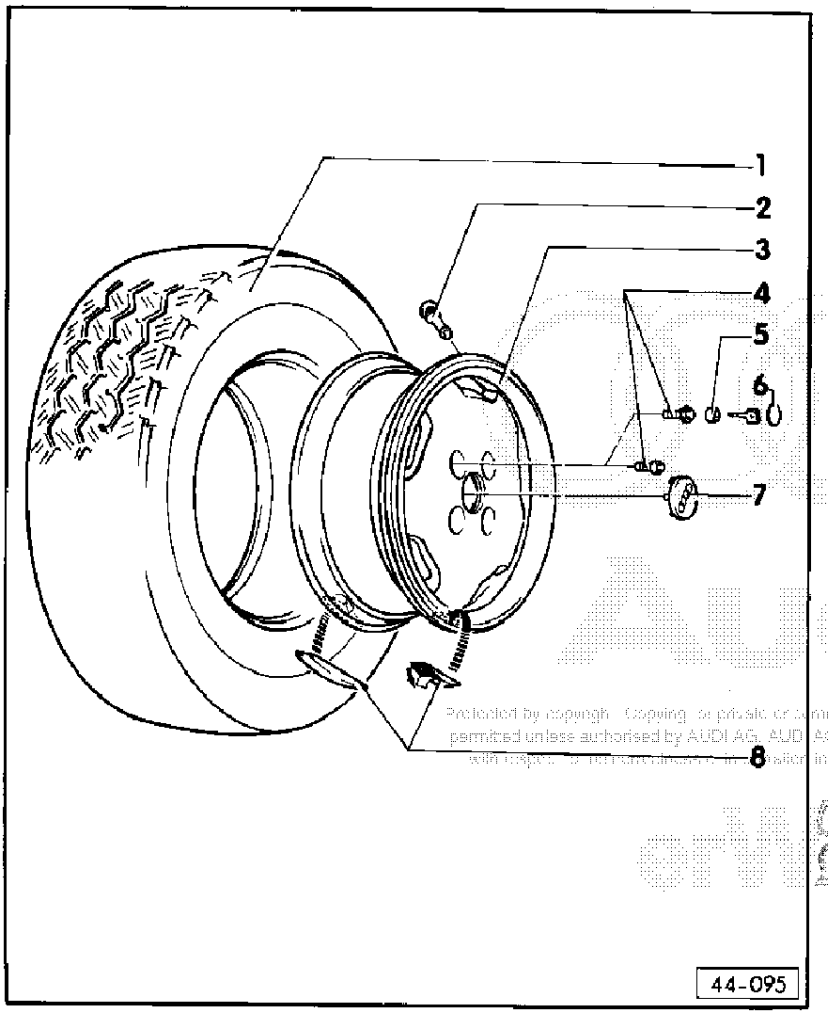
Note:

Place full diameter hub cap with enlarged hole (marked on back with tyre valve symbol) over valve and then press onto disc wheel to ensure proper fit

8 – Retainer spring for balancing weights

9 – Balancing weights

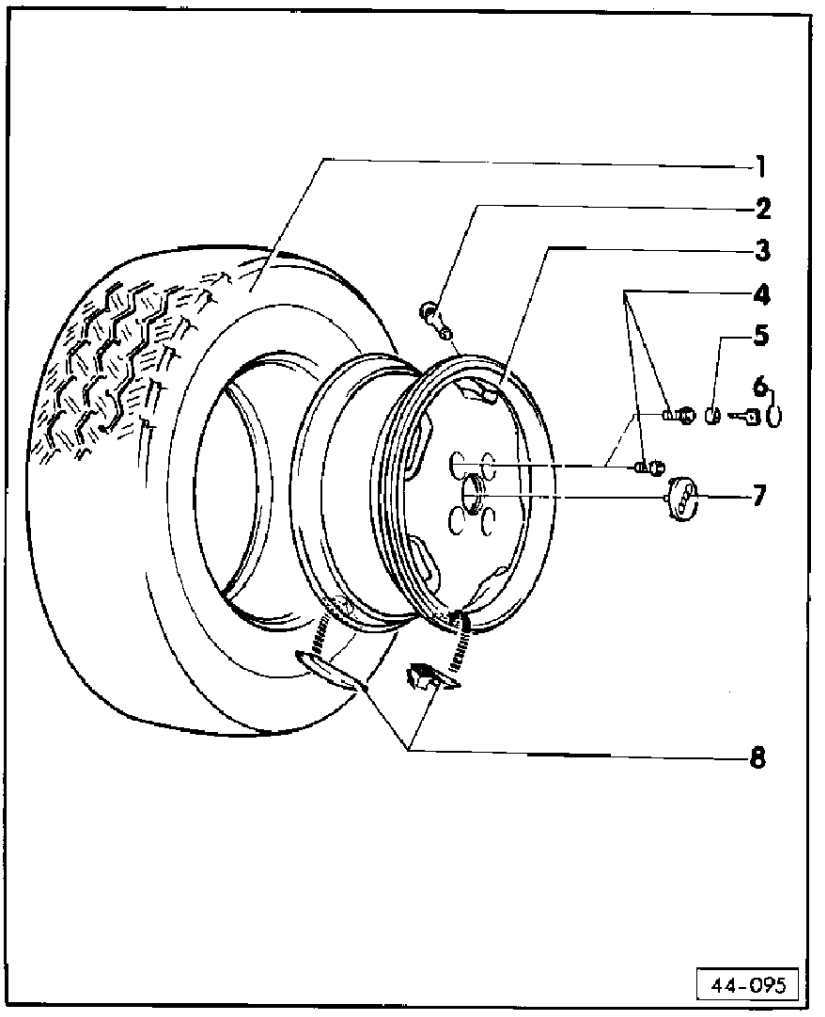
- Max 60 g permitted per rim flange



Light-alloy disc wheel, Aero design

1 – Tyre

- For reasons of safety, tyres should not be replaced individually but at least for a whole axle.
- The tyres with the deeper tread should always be fitted to the front wheels.
- It is advisable to use tyres of the same make, design and tread pattern on all wheels.



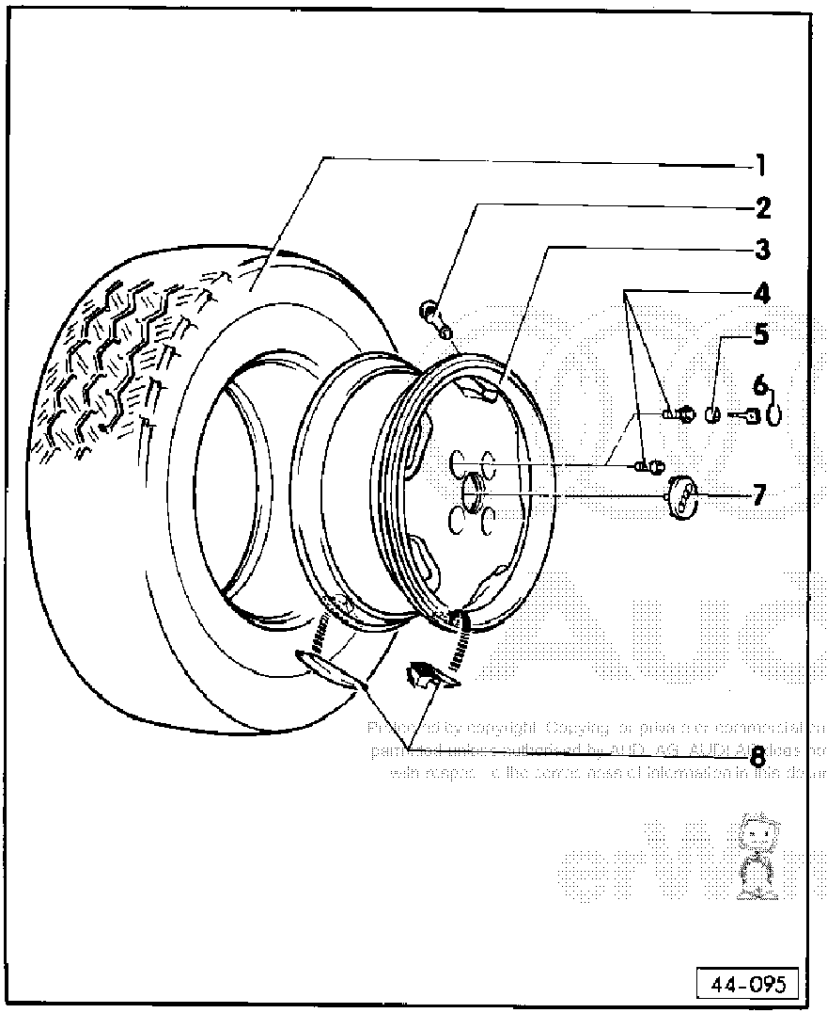
2 – Valve
- ♦ Always replace when renewing disc wheel or tyre
- ♦ Only fit valve as per parts list

3 – Light-alloy disc wheel
- ♦ 6J x15, ET 37
- ♦ 7J x15, ET 37

4 – Wheel bolt, 110 Nm
- ♦ M14 x 1.5 x 27.5 mm

5 – Lock cylinder
- ♦ Attach to wheel bolt and lock

6 – Cap
- ♦ Attach to lock cylinder



7 – Cap
- ♦ Pulling off => Fig. 1

8 – Adhesive balancing weights
- ♦ Max 60 g permitted per rim flange
- ♦ Clean disc wheel
- ♦ Pull off protective sheet.
- ♦ Bond on balancing weight at designated locations

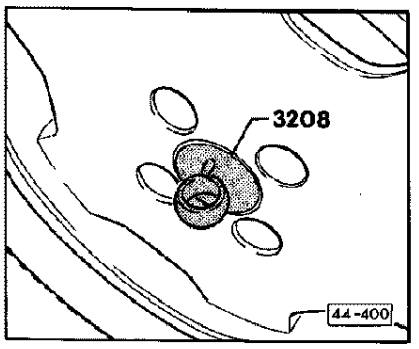
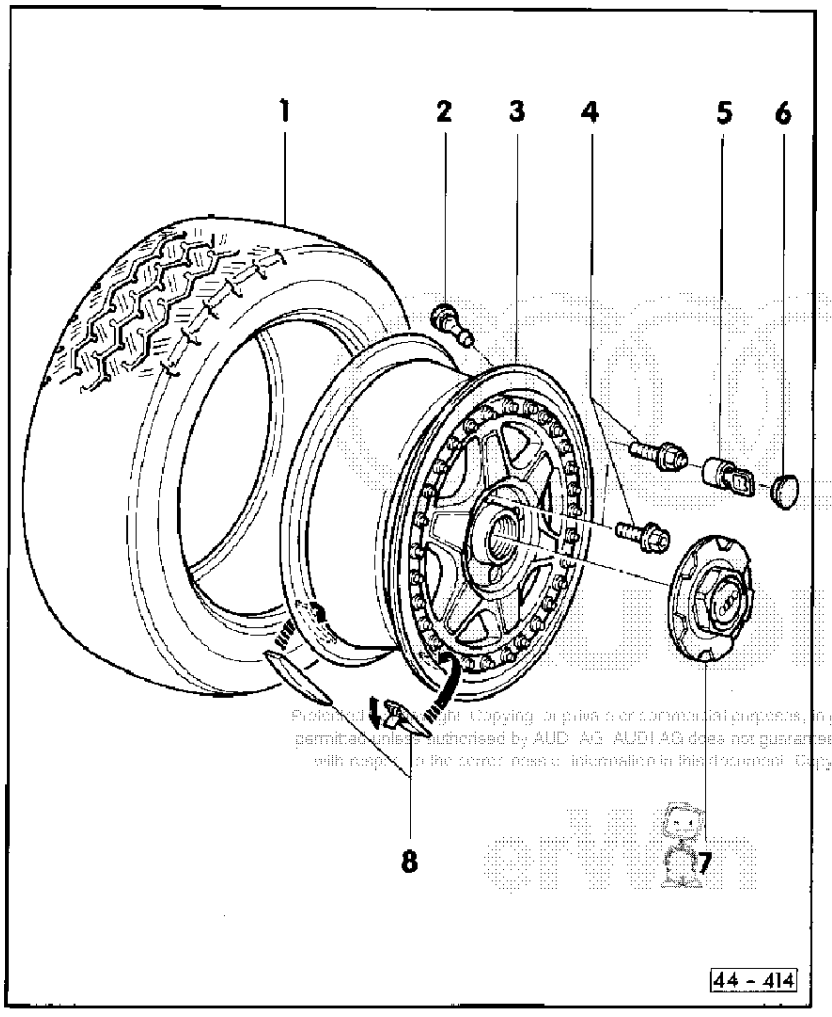


Fig.1 Pulling off trim cap

- Clean trim cap with wet sponge
- Attach special tool to cap and press on.
- Pull off cap.
- Remove special tool from cap by moving the two rubber nipples to the side.



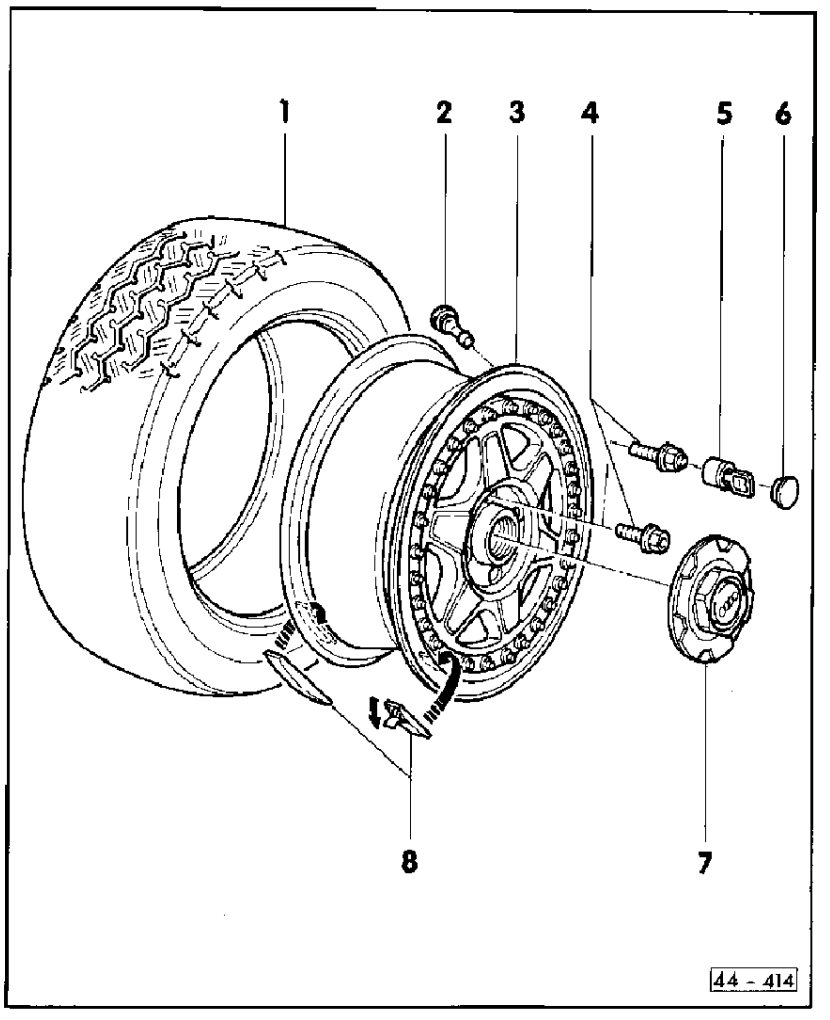
Light-alloy disc wheel, Speedline design

1 – **Tyre**

- ♦ For reasons of safety, tyres should not be replaced individually but at least for a whole axle.
- ♦ The tyres with the deeper tread should always be fitted to the front wheels.
- ♦ It is advisable to use tyres of the same make, design and tread pattern on all wheels.

2 – **Valve**

- ♦ Always replace when renewing disc wheel or tyre
- ♦ Only fit valve as per parts list



3 – Light-alloy disc wheel
♦ 7J x15, ET 37

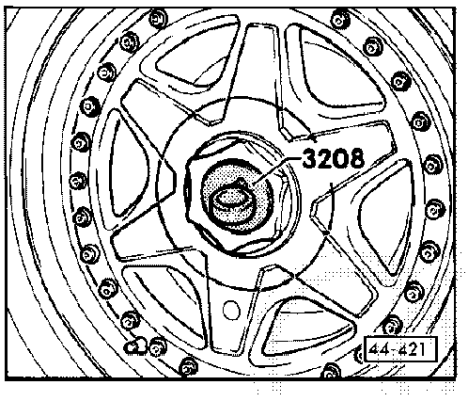
4 – Wheel bolt, 110 Nm
♦ M14 x 1.5 x 27.5 mm

5 – Lock cylinder
♦ Attach to wheel bolt and lock

6 – Cap
♦ Attach to lock cylinder

7 – Cap
♦ Pulling off => Fig. 2

8 – Adhesive balancing weights
♦ Max 60 g permitted per rim flange
♦ Clean disc wheel
♦ Pull off protective sheet.
♦ Bond on balancing weight at designated locations



◀ **Fig.2 Pulling off trim cap**
- Clean trim cap with wet sponge
- Attach special tool to cap and press on.
- Pull off cap.
- Remove special tool from cap by moving the two rubber nipples to the side.

Wheel alignment

An appropriate means of performing wheel alignment is to use an optical axle measuring unit. If no optical equipment is available, the camber can also be checked with the protractor -3021-.

Test prerequisites

- Establish running-gear version (1BA, 1BE or 1BB)
- Measuring device properly adjusted and attached
- Vehicle unladen (kerb weight)
- Same tread depth on an axle (max. 2 mm difference)
- Tyres inflated to specified pressure.
- Vehicle accurately aligned, bounced several times and allowed to settle
- No unpermitted play or damage to suspension, steering and steering linkage.

Notes:

- Kerb weight means: the weight of the vehicle ready for the road (fuel tank completely filled, spare wheel, vehicle tools and vehicle jack in specified positions).
- During adjustment operations, the relevant specifications are to be adhered to as closely as possible.
- In the event of a complaint, it is only appropriate to carry out wheel alignment after the vehicle has driven approx. 1000 – 2000 km, as beforehand the vehicle is still subject to settling.
- Following suspension repairs, perform test drive with laden vehicle prior to wheel alignment. Vibrations can also be caused by excessive residual imbalance and/or vertical wheel runout. Attention should therefore be paid to fault finding instructions if such complaints are received.

=> Fault finding instructions, running gear/front end judder and steering wheel vibration

Specified values for wheel alignment

Valid for all engines

Front axle

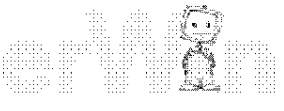
	Standard/sports running gear (1BA and 1BE)	Heavy duty running gear (1BB)
Overall toe (without load)	+15´ ±10´	+25´ ±10´
Camber (straight-ahead position) Maximum permissible difference between the two sides	-45´ ±30´ max. 30´	-25´ ±30´ max. 30´
Toe difference angle with 20o steering angle from left to right	-1o ± 30´	-1o ± 30´
Castor (non-adjustable) Maximum permissible difference between the two sides	+2o 10´ ± 30´ max. 30´	+2o 10´ ±30´ max. 30´

Rear axle

	Standard/sports running gear (1BA and 1BE)	Heavy duty running gear (1BB)
Camber Maximum permissible difference between the two sides	-40´ ± 20´ max. 30´	-40´ ± 20´ max. 30´
Toe per wheel	+5´ ±5´	+5´ ±5´
Overall toe	+10´ ±10´	+10´ ±10

Notes:

- Up to chassis no. 8C NA 015 724 there is no running gear information on the data sticker. In such cases, all vehicles are to be adjusted as indicated in the specified value table for vehicles with standard and sports version when performing wheel alignment.
- As of chassis no. 8C NA 015 725 the data sticker is provided with the above identification.



Adjusting front axle toe

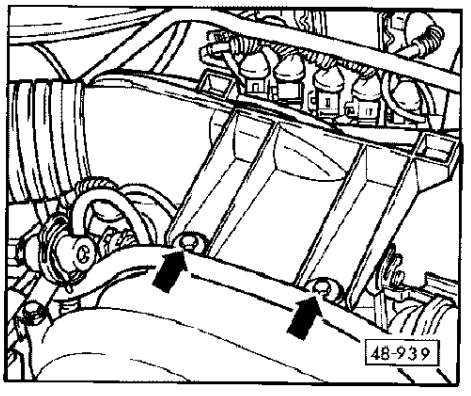
Only with optical axle measuring equipment and special tool -3279- or -3075-.

Attention: **Special tool -3279- is only for use on LHD vehicles.** **The existing special tool -3075- should still be used for RHD vehicles.**

Note:

The following work only needs to be performed for vehicles with 6-cylinder engine.

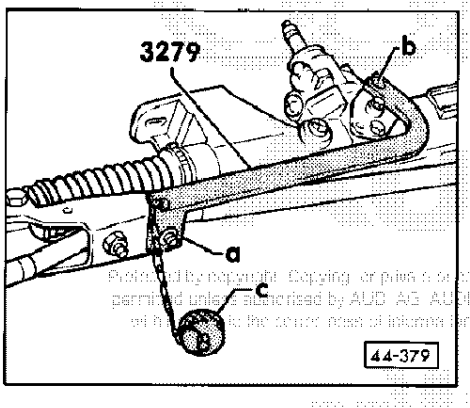
– Use screwdriver to lever off cover from sound absorber



– Unscrew both securing bolts for sound absorber
– Unscrew air guide hose at air mass meter
– Squeeze the two quick-release couplings for the crankcase breather hoses together at the largest diameter and pull them off the valve covers.

– Press sound absorber to rear and at the same time lift it up.
– Pull vacuum hose off throttle housing and take out sound absorber.

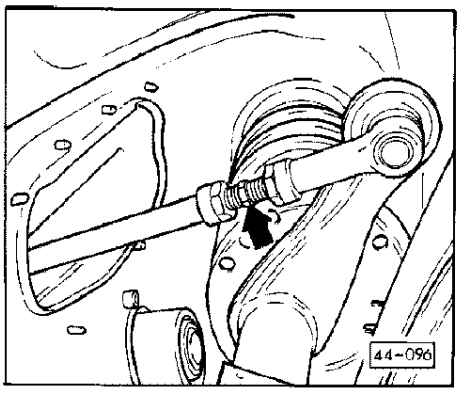
Setting toe on LHD vehicles



– Move wheels to straight-ahead position.
– Attach special tool -3279- to left securing nut of track rod using hole -a- and secure with knurled nut -c- on chain
– Position special tool on rear securing bolt of thrust piece cover using hole -b- by moving steering wheel backwards and forwards (second mechanic required)
– Check whether steering wheel spoke is horizontal; if necessary, re-position steering wheel and set straight.

Note:

For ease of illustration special tool -3279- is shown with the steering box removed.



- Halve specified value for total toe and set to this position at left and right track rod.
- Secure track rod
- Remove special tool -3279-
- Perform test drive; steering wheel spoke must be horizontal.

Note:

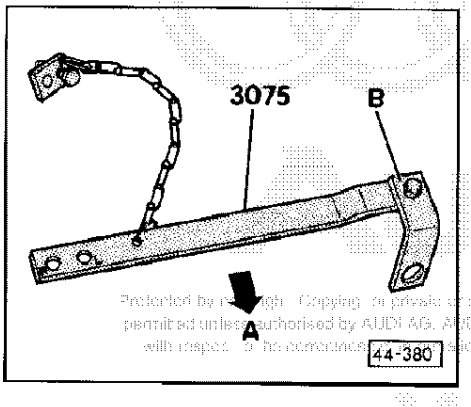
If slight steering wheel is slightly out of line following test drive, it can be corrected by way of even adjustment of the track rods on both sides.

Example:

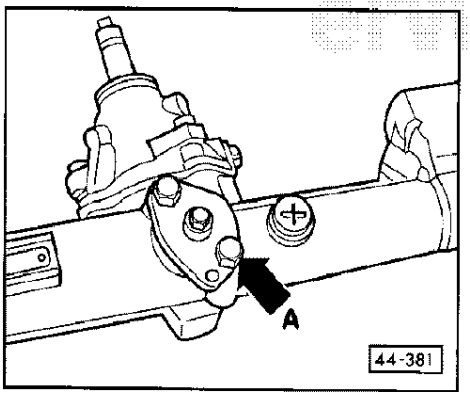
If steering wheel spoke hangs slightly to the right, lengthen right track rod slightly and shorten left track rod by same amount.

Check toe again if necessary.

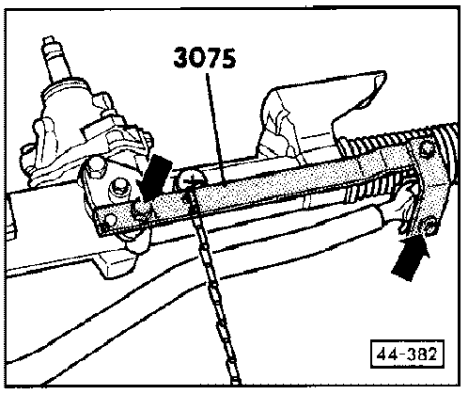
Setting toe on RHD vehicles



- Use special tool -3075- as described below:
- Unfasten bracket -B- of special tool, turn through 180o and secure as shown
- Arrow A = direction of travel



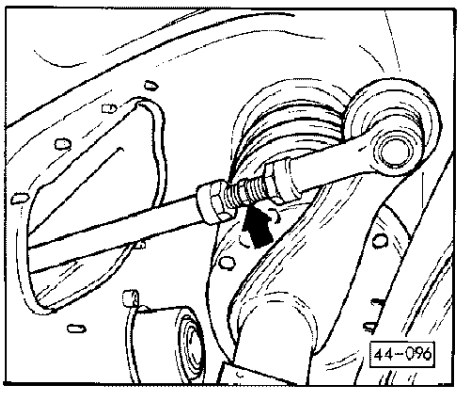
- Move steering box to centre position.
- Unscrew bolt -A-.
- Unscrew bolt from spacer on chain



- Attach special tool to securing nut of right track rod and fasten to steering box at hole marked -L- using the bolt previously screwed out of the spacer (second mechanic required).
- Check whether steering wheel spoke is horizontal; if necessary, re-position steering wheel and set straight.

Note:

For ease of illustration special tool -3075- is shown with the steering box removed.



- Halve specified value for total toe and set to this position at left and right track rod.
- Secure track rod
- Remove special tool -3075-
- Test drive vehicle
- Steering wheel spoke must be horizontal

Note:

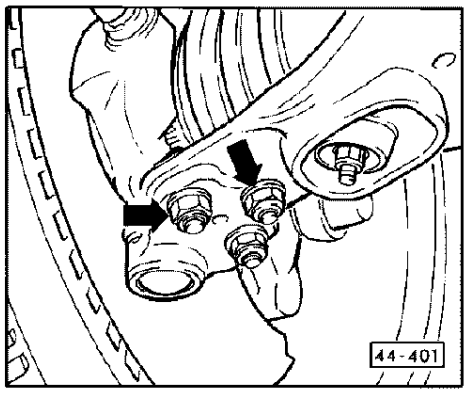
If slight steering wheel is slightly out of line following test drive, it can be corrected by way of even adjustment of the track rods on both sides.

Example:

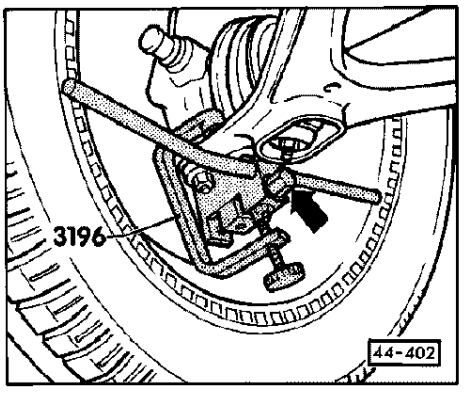
If steering wheel spoke hangs slightly to the right, lengthen right track rod slightly and shorten left track rod by same amount.

Check toe again if necessary.

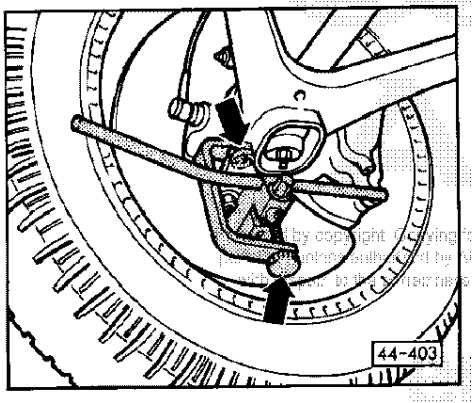
Adjusting front axle camber



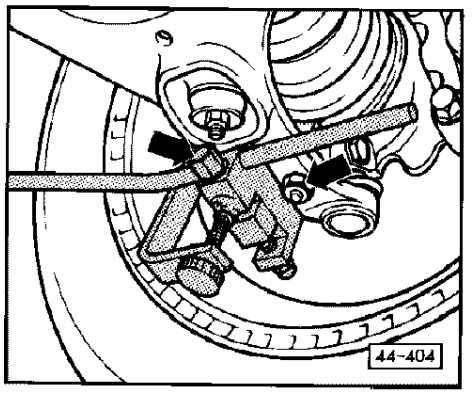
- Loosen front and centre securing nuts such that shim can just be moved after loosening rear nut.



- Use hole in special tool to attach it to centre securing nut.
- Turn spindle such that knurled pin of special tool engages in hole in lower ball joint and is thus supported by it.



- Then use retaining bracket to attach special tool to lower ball joint.
- Position tubular section of retaining bracket on head of centre threaded pin and establish contact between bracket and knurled screw.

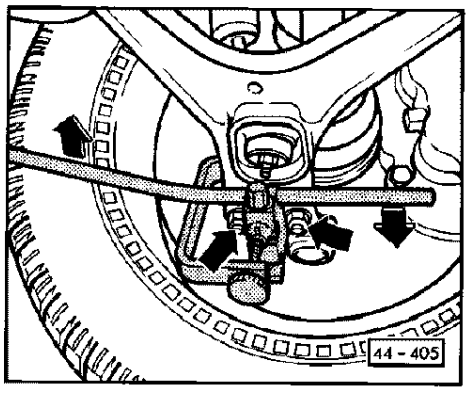


- Loosen rear nut until shim can just be moved.
- Turn spindle until desired camber angle is attained.

Note:

The front wheels must be standing on loose plates.

Should jamming of the lower ball joint in the transverse link become apparent on turning the spindle (no slight changes on the camber scale) then use the lever to move the special tool vigorously to the left and right several times.

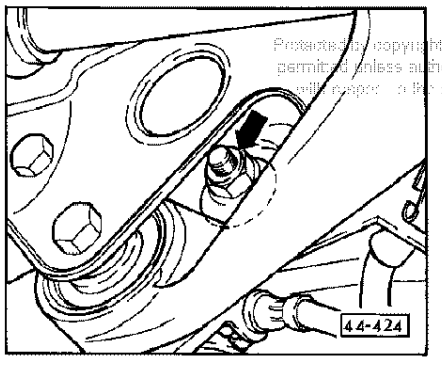


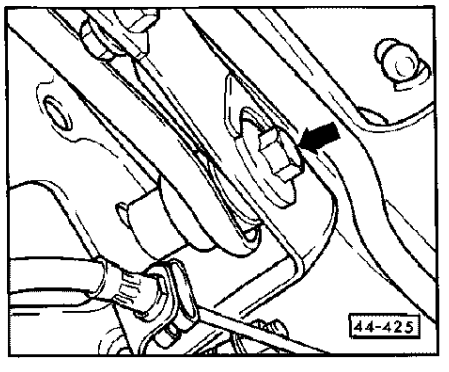
- Pull front of special tool lever vigorously inwards as far as it will go and press rear of lever vigorously outwards as far as its stop.
- Tighten the two outer securing nuts in this position (second mechanic required)
- Remove special tool
- Tighten centre securing nut
- Tighten all securing nuts
- Check and if necessary adjust toe

Adjusting rear axle toe

(Check left and right adjustment with optical measuring unit)

- Slacken securing nut -arrow-.





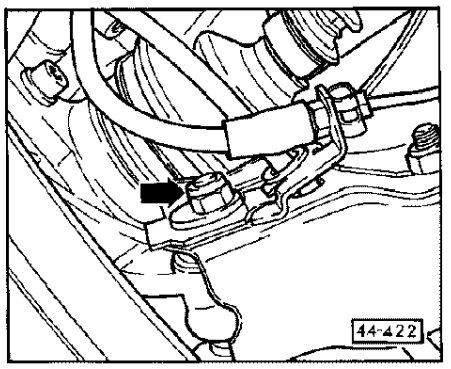
- Adjust toe accordingly by turning eccentric bolt -arrow-.

Note:

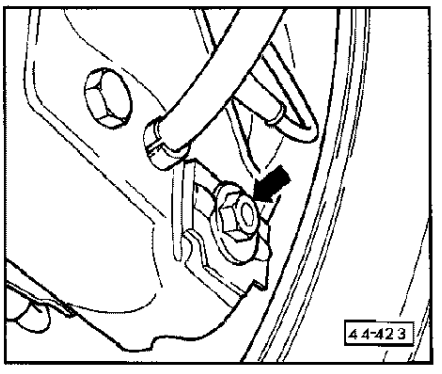
Do not turn more than 90o to left or right (min. – max. adjustment).

- Tighten securing nut, re-check toe value and re-adjust, if necessary.

Setting rear axle camber



- Slacken securing nut -arrow-.



- Adjust camber accordingly by turning eccentric bolt -arrow-.

Note:

Do not turn more than 90o to left or right (min. – max. adjustment).

- Tighten fastening nut, check camber again and re-adjust, if necessary.
- Check and if necessary adjust toe.

Rebalancing/balancing wheels on vehicle

Information about wheel balancing and the procedure involved is contained in

=> Fault finding binder, Running gear, -Item 10-

Use of the Torsen differential has led to the following changes in the procedure to be employed.

- Jack up both axles of vehicle and fit stands beneath vehicle (follow operating instructions of balancing equipment manufacturer)

Attention:
Release handbrake

- Wheels must be driven by engine so that wheels run synchronously.
- Then balance axles one after another.

Note:

If the above procedure is not observed, the Torsen central differential is likely to be damaged.

General repair information

ABS fault finding instructions

=> Fault finding binder, ABS

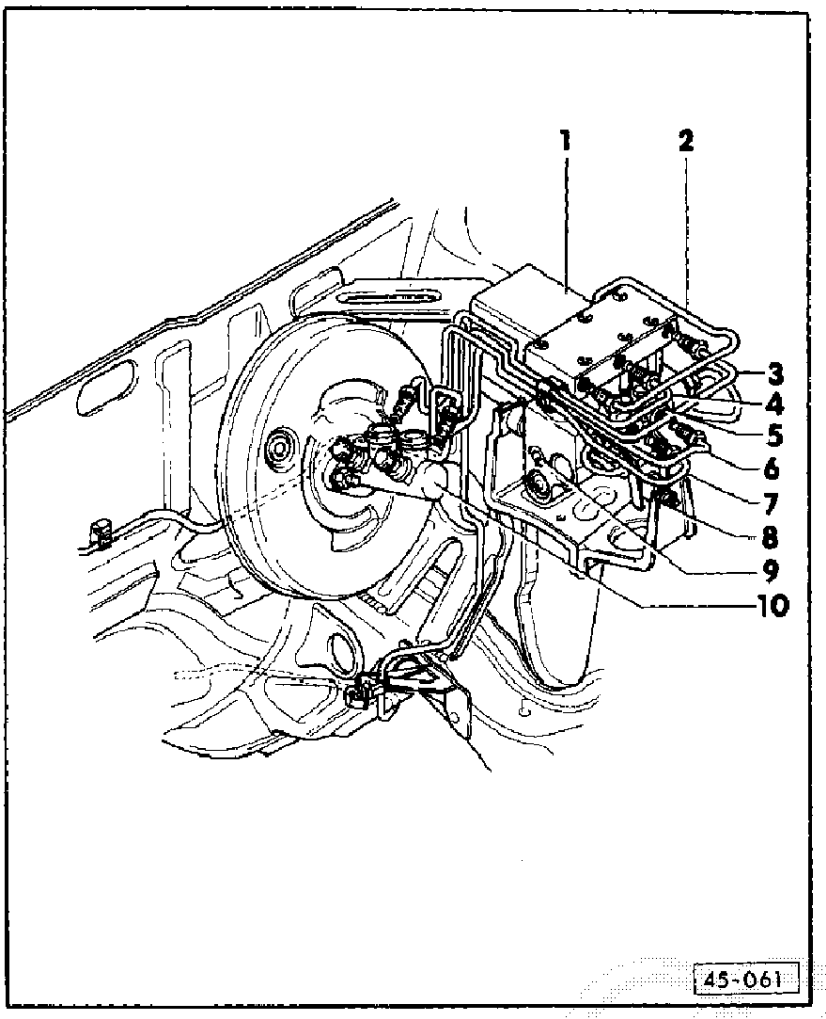
Note:

The ABS switch -E83- and the combi relay for ABS -J156- were discontinued as of model year 1993.

Attention:
The ABS system is basically maintenance free. Work on such a system requires specialist knowledge. Failure to observe the points described in this Workshop Manual may result in damage to the system and could make the vehicle unsafe.

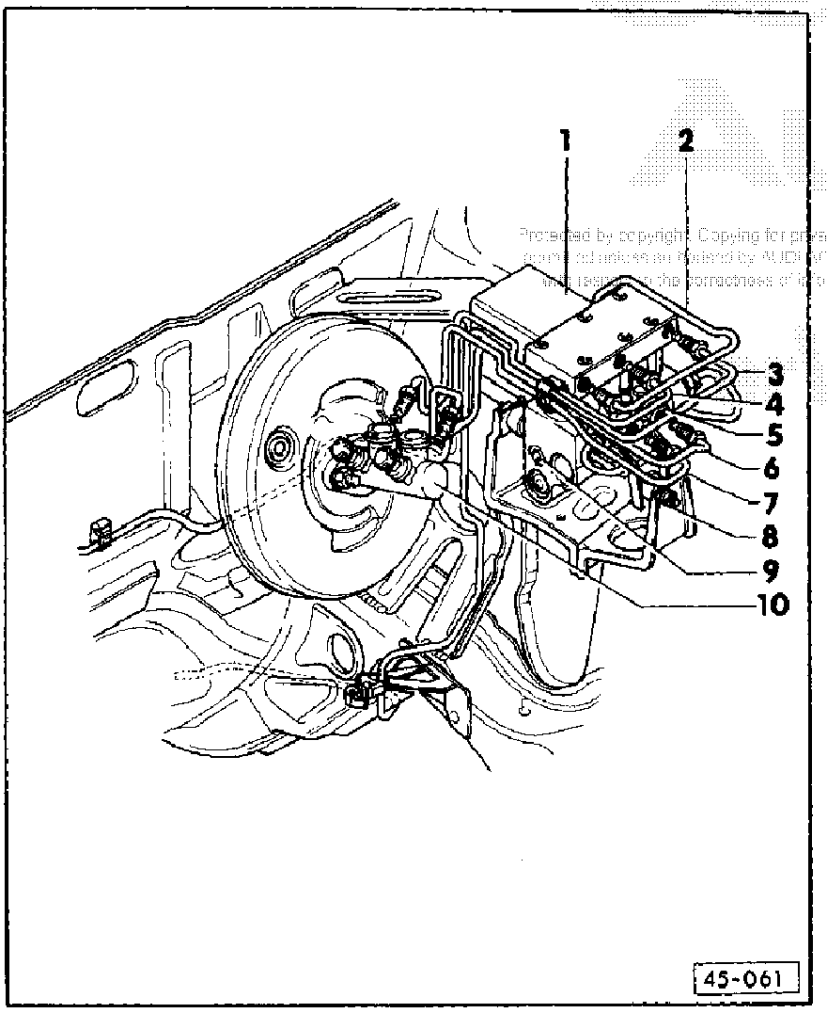
- Pull plug off electronic control unit before performing electric welding.
- The electronic control unit must not be exposed to temperatures in excess of 90oCwhen carrying out painting work.
- If the battery has been removed, the battery terminals must be properly retightened after reinstallation.
- Disconnect battery negative terminal before removing hydraulic modulator.

- Never drive with tester connected up.
- Whenever work has been carried out on the braking system which does not directly affect parts of the ABS, it is sufficient to perform a simple functional check. In other words, the Attention lamp in the dash panel must not light on exceeding a vehicle speed of 6 km/h if the ABS is intact. Such work includes the replacement or renewal of brake linings, brake hoses, brake discs, brake master cylinder, brake cables and handbrake components.
- If work is performed on the hydraulic modulator, the electronic control unit, the wheel speed sensors and the wiring harness or if assemblies are replaced (for example brake lines after a vehicle has been involved in an accident) a check is to be performed on the entire ABS. Carry out the self-diagnosis described in Repair Group 01 => Page 01-1.
- In the course of a subsequent test drive, make sure that ABS-controlled braking is implemented at least once.



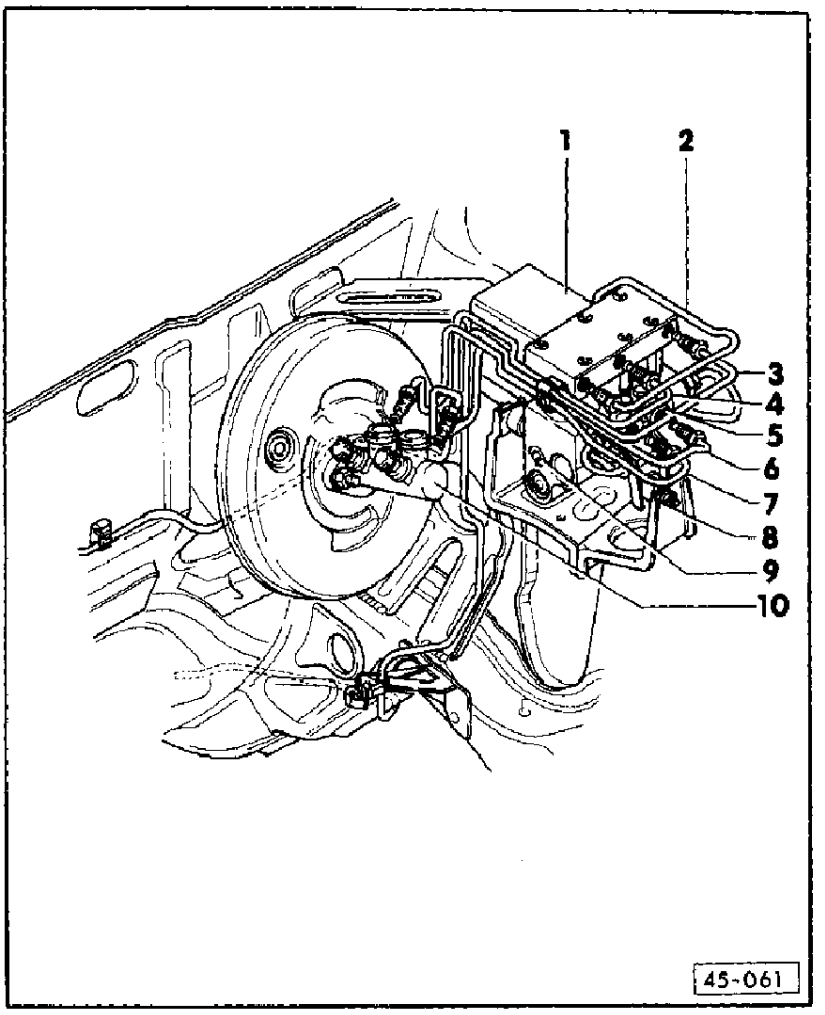
Removing and installing hydraulic modulator

- Disconnect battery earthing strap.
- Unscrew coolant expansion tank and set it aside.
- Unscrew/remove brake lines.
- Unscrew hydraulic modulator from bracket.



Attention

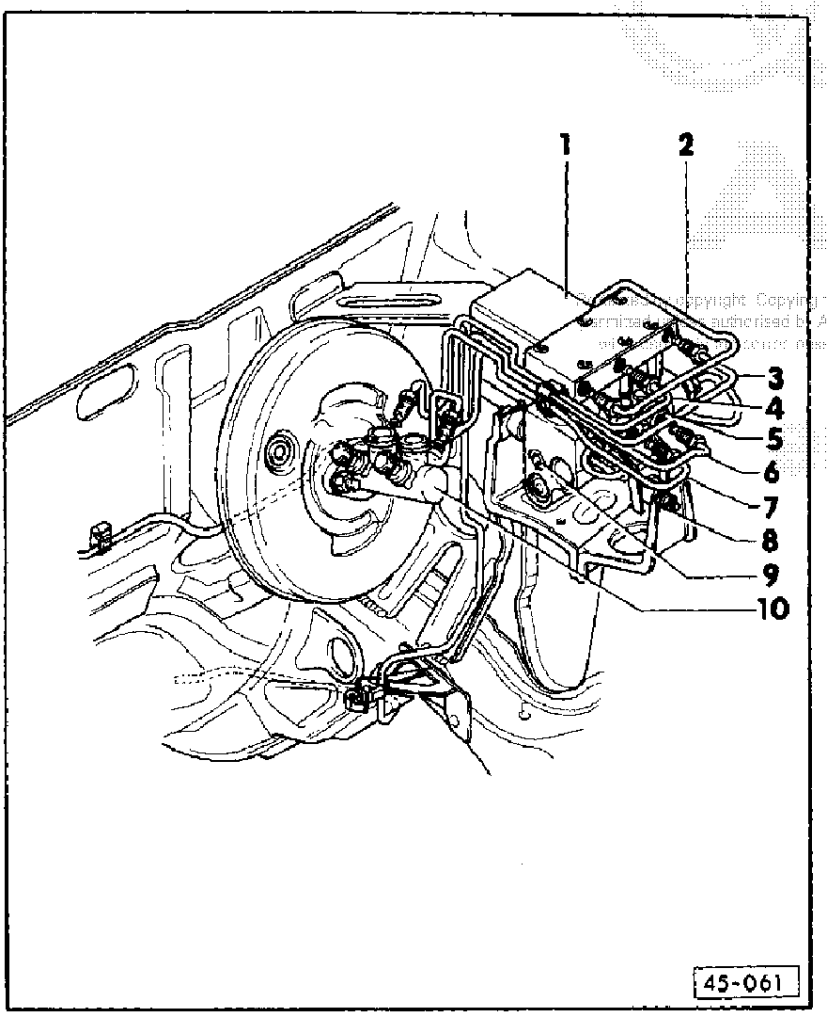
When removing and installing brake lines, make sure that lines are marked/installed in accordance with designations on hydraulic modulator. Where necessary, only fit genuine brake lines (not lines sold by the metre). Seal the brake lines and connections immediately with dummy plugs. Tightening torque for brake lines: 15 Nm. If the performance of the work involves opening the hydraulic system, bleed the braking system using the brake filling and bleeding unit VW 1238-B. In addition, a high- and low-pressure test should be carried out on the brake system
Page



Note:
If no specially shaped brake lines are available, they should be produced from lines sold by the metre.

1 – **Cover**
- ♦ Unscrew from hydraulic unit so as to provide access to relay for return flow pump and valve relay => Page 45-8, Fig. 1

2 – **Brake pipe**
- ♦ Hydraulic unit to front left brake calliper
- ♦ Marked "VL" on hydraulic modulator

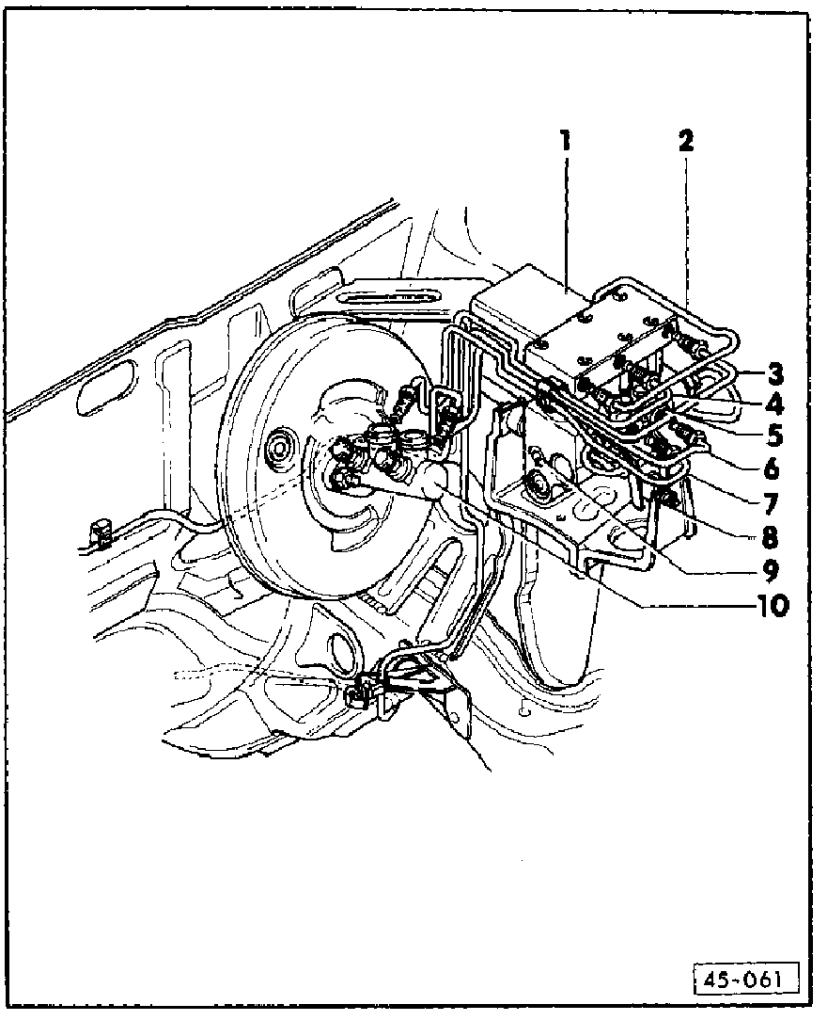


3 – **Brake pipe**
- ♦ Hydraulic modulator to rear axle
- ♦ Marked "HA" on hydraulic modulator

4 – **Brake pipe**
- ♦ Hydraulic unit to front right brake calliper
- ♦ Marked "VR" on hydraulic modulator

5 – **Brake pressure regulator**
- ♦ Replace only if defective

6 – **Brake pipe**
- ♦ Brake master cylinder to brake pressure regulator
- ♦ Floating piston circuit, rear axle



7 – Brake pipe

- ♦ Hydraulic modulator to brake pressure regulator
- ♦ Pushrod piston circuit, front axle

8 – Hexagon nut, 10 Nm

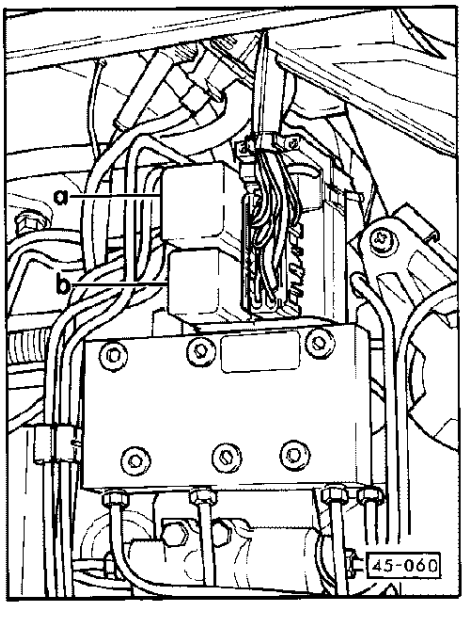
- ♦ Insert hydraulic modulator in bracket and secure

9 – Hydraulic modulator

Attention

- ♦ **The hydraulic modulator is not to be serviced in any way with the exception of pump and valve relay replacement. Never loosen screw connections.**
- ♦ **Where necessary, replace only as a complete unit. High- and low-pressure testing Page**

10 – Brake master cylinder with servo unit



◀ **Fig.1 Relay locations**

a = Relay for return pump

b = Valve relay

High- and low pressure testing

Test requirements:

- Conventional braking system (brake master cylinder, brake hoses, brake lines and brake callipers) functioning properly and not leaking.

Remove bleeder screw at one of the front brake callipers. Connect pressure gauge -VW 1310- and bleed.

Insert brake pedal depressor between brake pedal and driver's seat. Apply pressure to brake pedal until the gauge indicates a pressure of 50 bar.The pressure must not drop by more than 4 bar during the test period of 45 seconds. Replace hydraulic unit if drop in pressure exceeds the above figure.

Adjust brake pedal depressor until pressure gauge indicates a line pressure of6 bar. The pressure must not drop by more than 1 barduring the test duration of 3 minutes. Replace hydraulic unit if drop in pressure exceeds the above figure.

Removing and installing parts of electronic control system

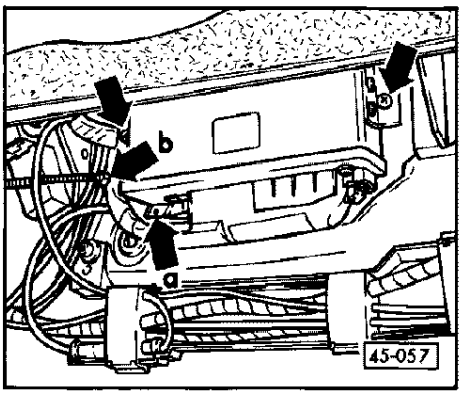


Fig.1 Removing and installing electronic control unit

Location:

On left below rear seat bench

Notes:

- Switch off ignition for removal and installation
- Prior to removal on vehicles as of model year 1993, interrogate fault memory with fault reader -V.A.G 1551-

– Cut off cable tie -b-. Always attach new cable tie after installing control unit.

– Remove connector from control unit by pressing spring -a-. Unscrew both fastening screws.

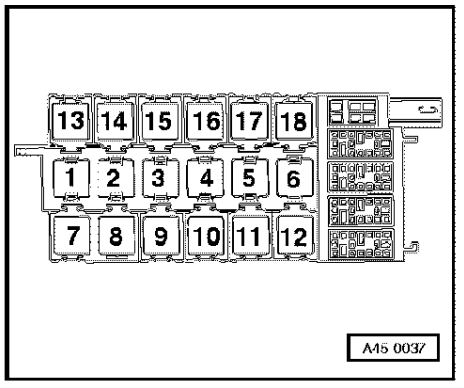


Fig.2 Removing and installing combi relay

Location:

Front left, beneath instrument panel in auxiliary relay holder

=> Current Flow Diagrams, Electrical Fault Finding and Fitting Locations

Note:

Switch off ignition for removal and installation Not applicable as of model year 1993.

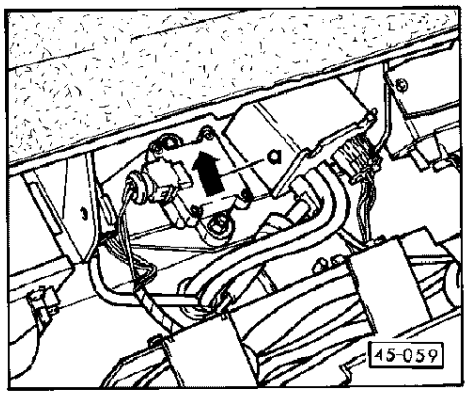


Fig.3 Removing and installing longitudinal acceleration switch

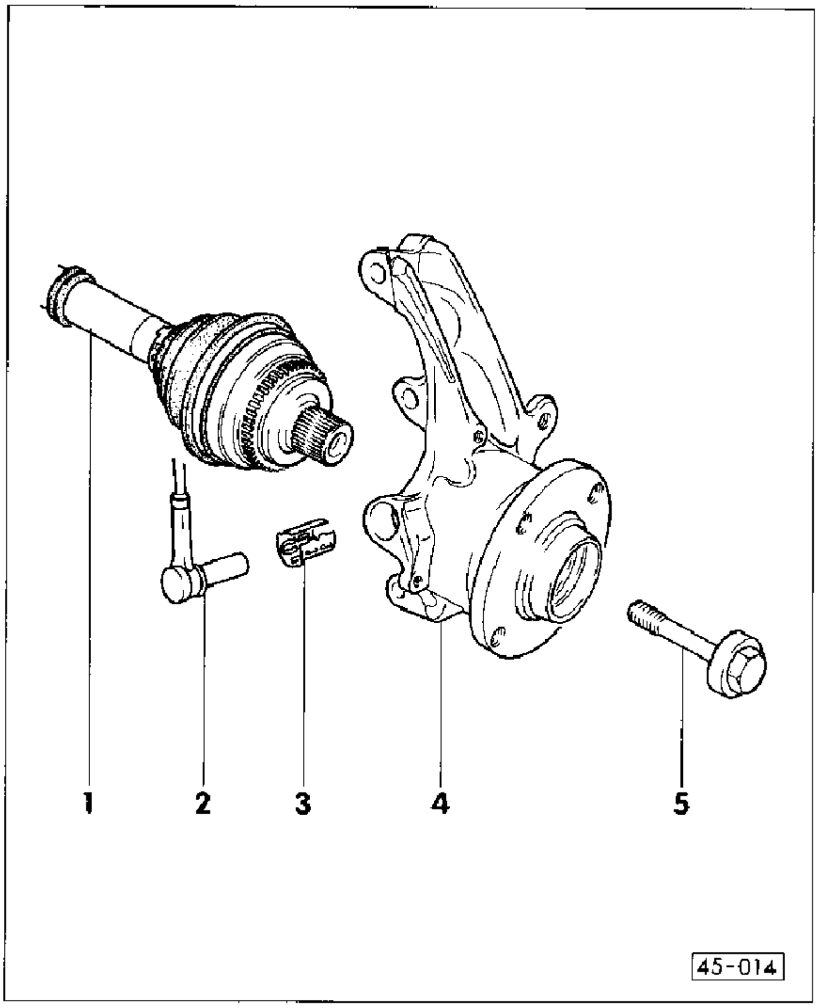
Location:

On left below rear seat bench

– Arrow -a- on switch points in direction of travel.

Notes:

- Switch off ignition for removal and installation
- The acceleration switch is a liquid-level switch (mercury) which operates as a function deceleration. During controlled braking by the ABS, it intervenes in the control cycle, thus affording additional stabilisation when braking the vehicle.

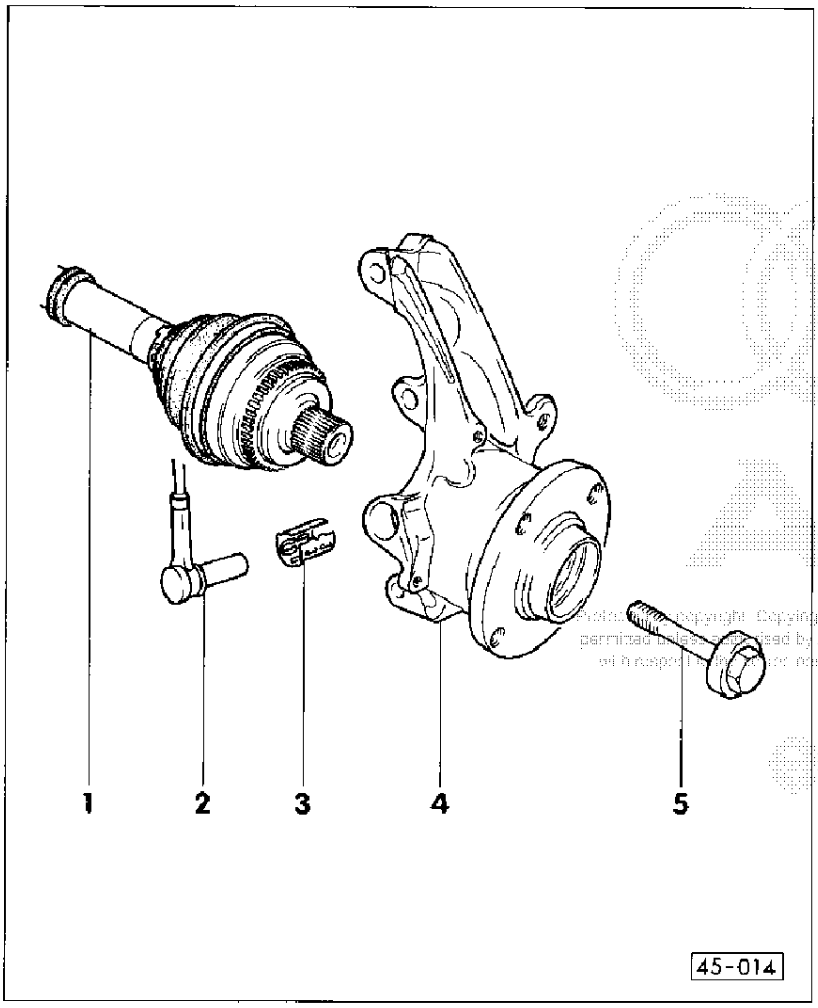


Removing and installing components of ABS system

Front axle

1 – **Drive shaft with rotor**
- ♦ Outer CV joint is supplied as replacement part with rotor
- ♦ Pull wheel speed sensor back slightly before removing
- ♦ After installation, press home sensor by hand

2 – **Wheel speed sensor**
- ♦ Identical part on left and right
- ♦ To remove, pull out of wheel bearing housing
- ♦ Press home by hand to install
- ♦ Detaching connector for sensor, front left => Fig. 1, front right => Fig. 2
- ♦ Pipe routing => Fig. 3 and 4



3 – **Clamping sleeve**
- ♦ Always replace
- ♦ Identical part on left and right
- ♦ Grease all round with brake cylinder paste before inserting in wheel bearing housing
- ♦ Press home in wheel bearing housing.

4 – **Wheel bearing housing**
- ♦ Supplied as replacement part with hole for accommodating clamping sleeve/wheel speed sensor

5 – **Hexagon combi bolt/flange bolt**
- ♦ Always replace
- ♦ Tighten M16 x 1.5 to 200 Nm and then give a further 90o turn
- ♦ Tighten M14 x 1.5 to 120 Nm and then give a further 90o turn
- ♦ Vehicle must be standing on its wheels when loosening and tightening (risk of accident).

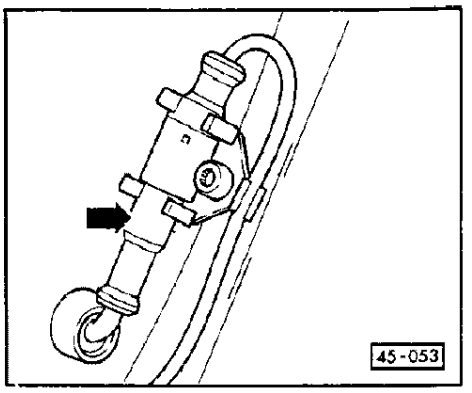


Fig.1 Connector for front left wheel speed sensor

- Remove coolant system expansion tank and lay to one side.
- Disengage connector from holder and then detach

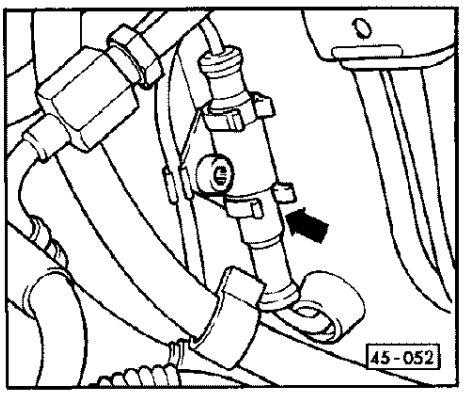


Fig.2 Connector for front right wheel speed sensor

- Disengage connector from holder and then detach

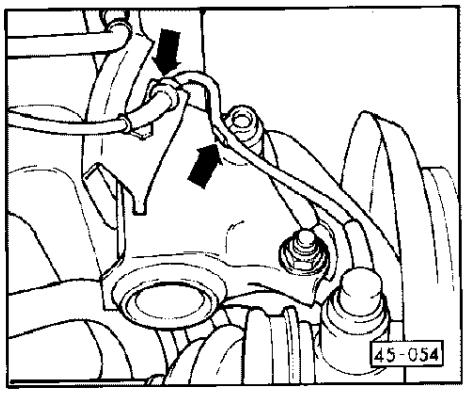


Fig.3 Wiring for wheel speed sensor at suspension strut

- Insert lead with rubber grommet in retaining bracket at strut.
- Clip lead into holder.

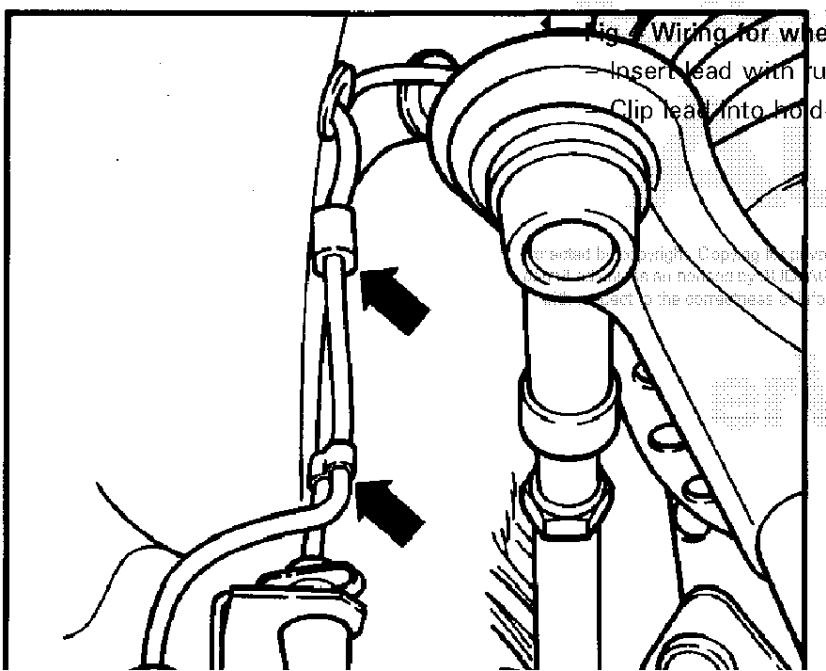
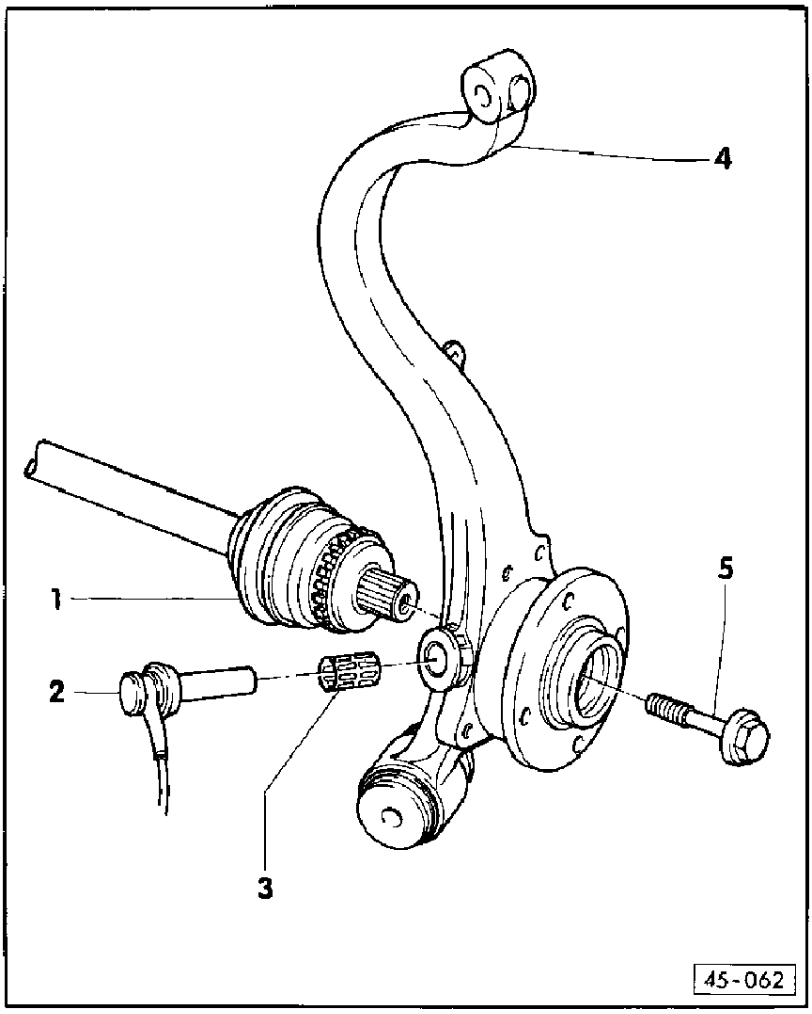


Fig.4 Wiring for wheel speed sensor at wheel housing

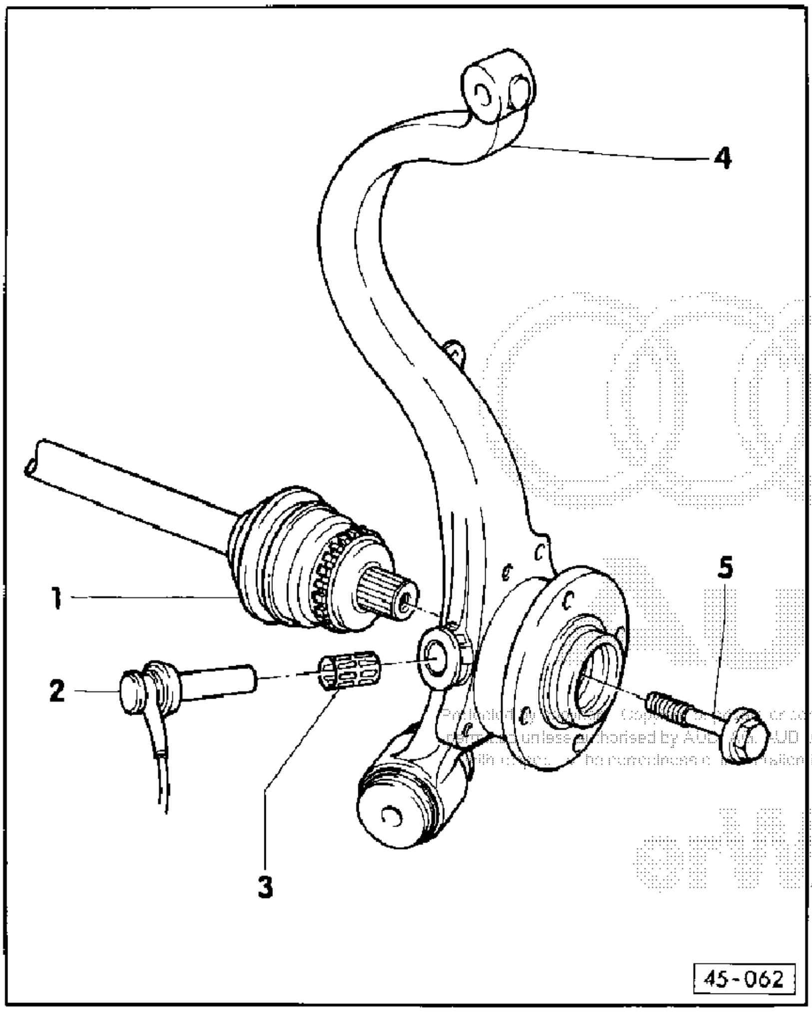
- Insert lead with rubber grommet in retaining bracket at strut.
- Clip lead into holders along brake line.



Rear axle

1 – **Drive shaft with rotor**
- ♦ Outer CV joint is supplied as replacement part with rotor
- ♦ Pull wheel speed sensor back slightly before removing
- ♦ After installation, press home sensor by hand

2 – **Wheel speed sensor**
- ♦ Identical part on left and right
- ♦ To remove, pull out of wheel bearing housing
- ♦ Press home by hand to install
- ♦ Wiring routing =>Fig. 1 and 2



3 – **Clamping sleeve**
- ♦ Always replace
- ♦ Identical part on left and right
- ♦ Grease all round with brake cylinder paste before inserting in wheel bearing housing
- ♦ Press home in axle beam

4 – **Wheel bearing housing**
- ♦ Supplied as replacement part with hole for accommodating clamping sleeve/wheel speed sensor

5 – **Hexagon combi bolt/flange bolt**
- ♦ Always replace
- ♦ Tighten M16 x 1.5 to 200 Nm and then give a further 90o turn
- ♦ Tighten M14 x 1.5 to 120 Nm and then give a further 90o turn
- ♦ Vehicle must be standing on its wheels when loosening and tightening (risk of accident).

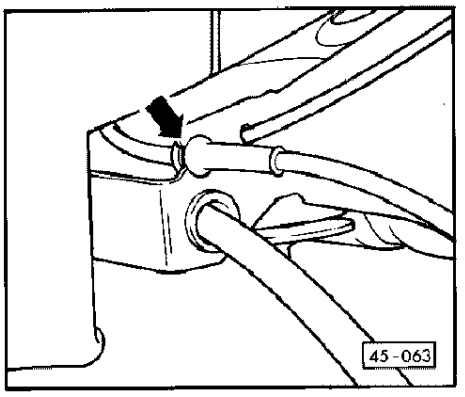


Fig.1 Wiring routing for wheel speed sensor

– Insert lead with rubber grommets in holders provided at rear axle and on floor group.

Note:

The two connectors for the rear wheel speed sensors are beneath the rear bench seat.

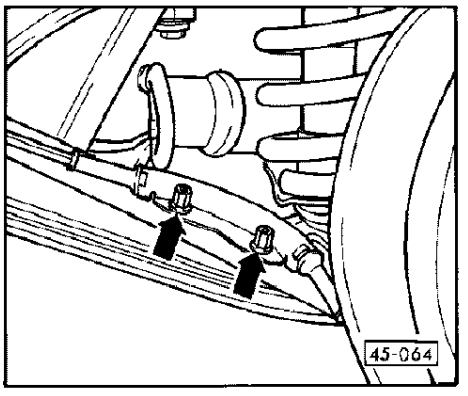
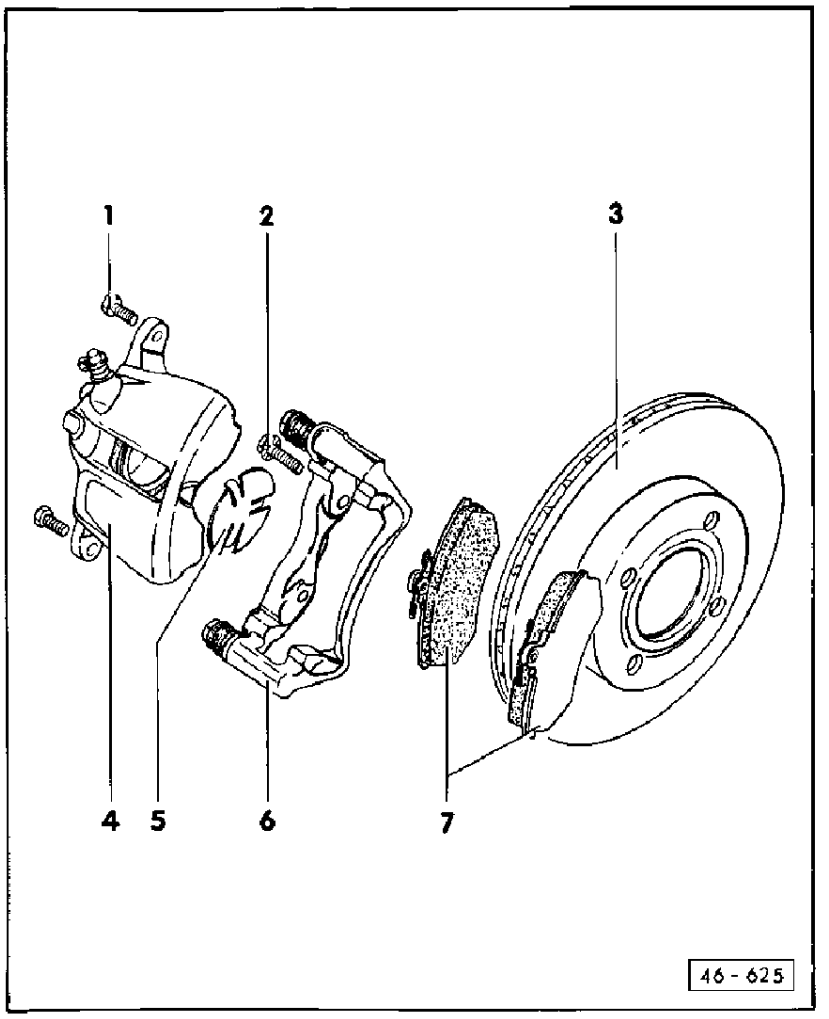


Fig.2 Wiring routing for wheel speed sensor at subframe

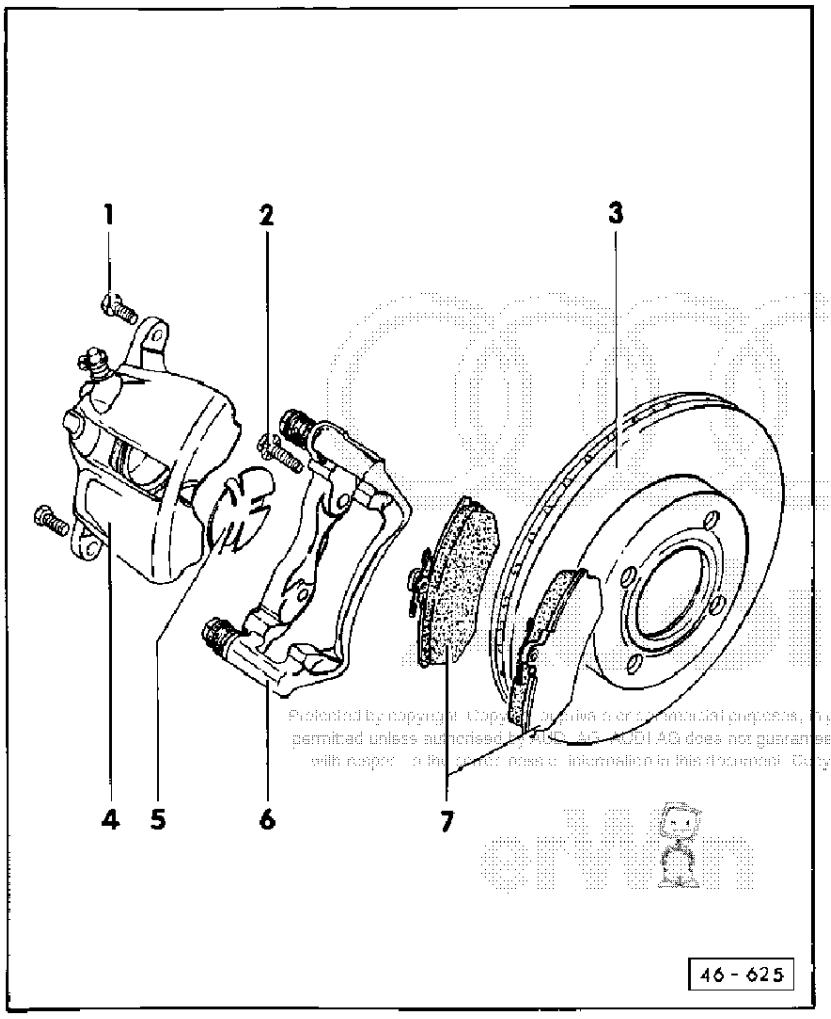
– Screw lead with retainer to subframe.



Servicing front brakes, Girling

Notes:

- ♦ Always install the complete repair kit.
- ♦ Brakes can be checked on all commercially available brake test stands, provided that the driving speed of the two driving rollers of the test stand does not exceed 5.5 km/h.
- ♦ Brake linings for vehicles with ventilated and non-ventilated brake discs have the same dimensions, but the brake callipers differ.



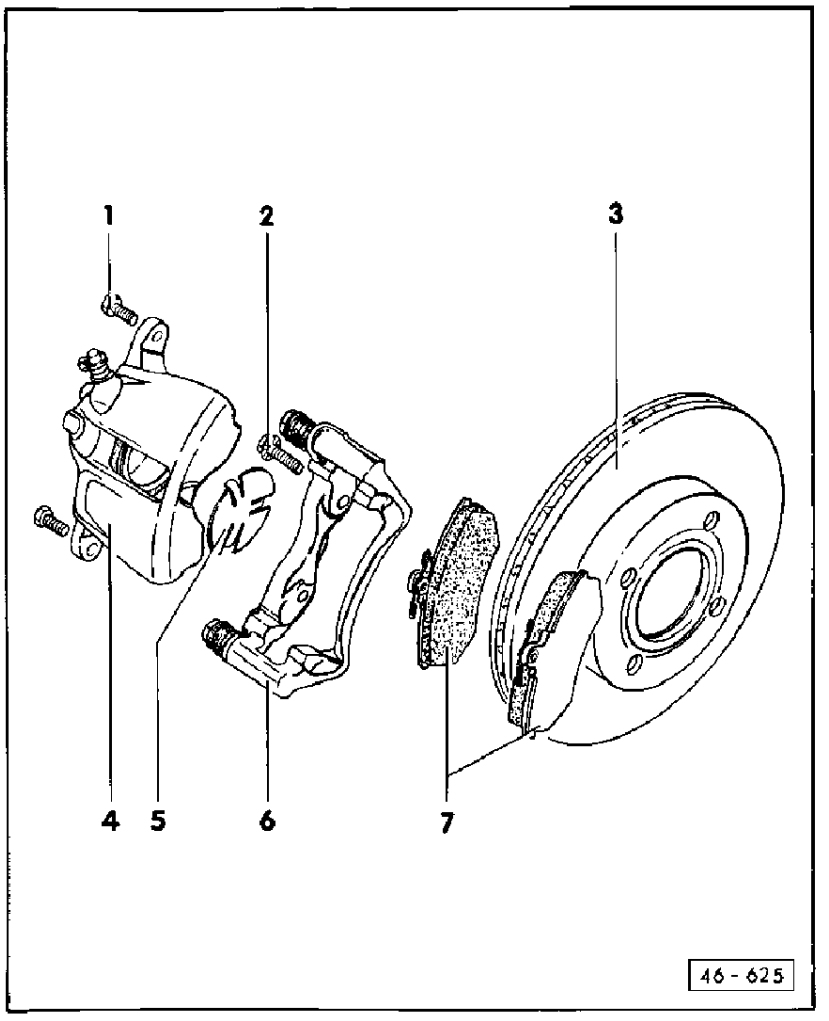
1 – **Self locking bolt, 35 Nm**
- ♦ Always replace
- ♦ When loosening and tightening counter hold on guide pin

2 – **Ribbed bolt, 125 Nm**
- ♦ Clean ribbing if reusing

3 – **Brake disc**
- ♦ Replace on axle basis; to remove, unscrew brake calliper beforehand
- ♦ Always dress evenly, on both sides, starting from thickness when new
- ♦ Ensure adequate wear reserve
- ♦ Brake disc diameter: 256 mm

Note:

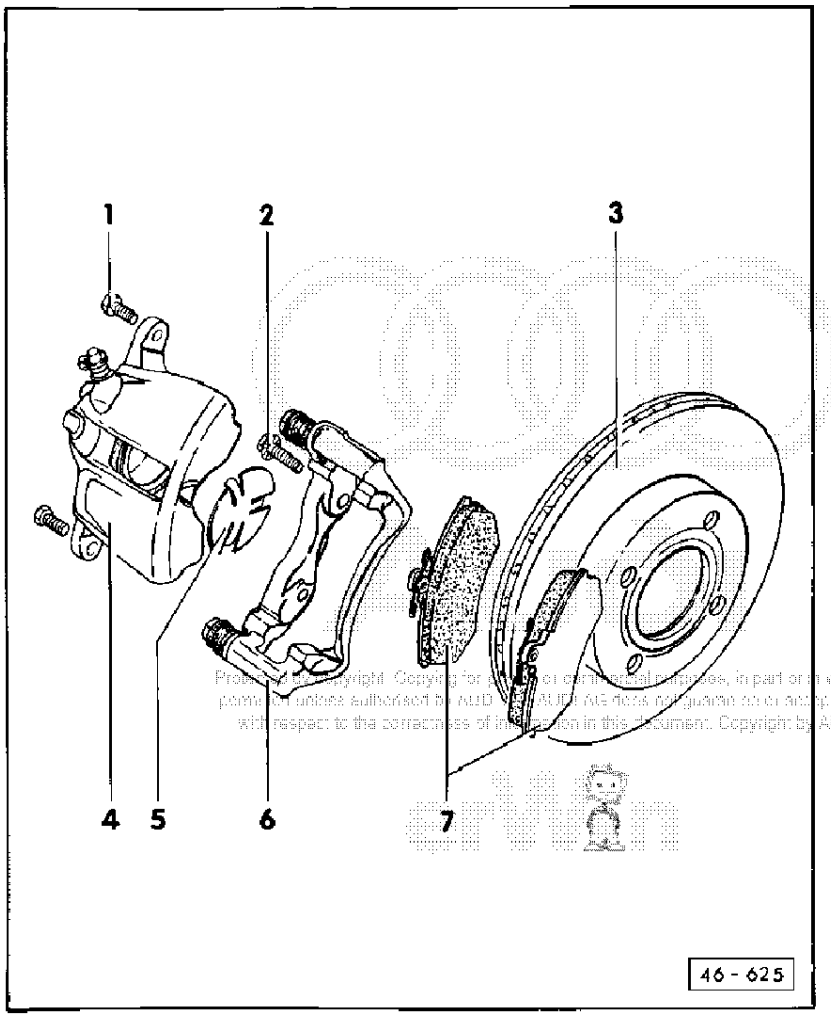
As of model year 1993, the brake disc diameter is 280 mm.



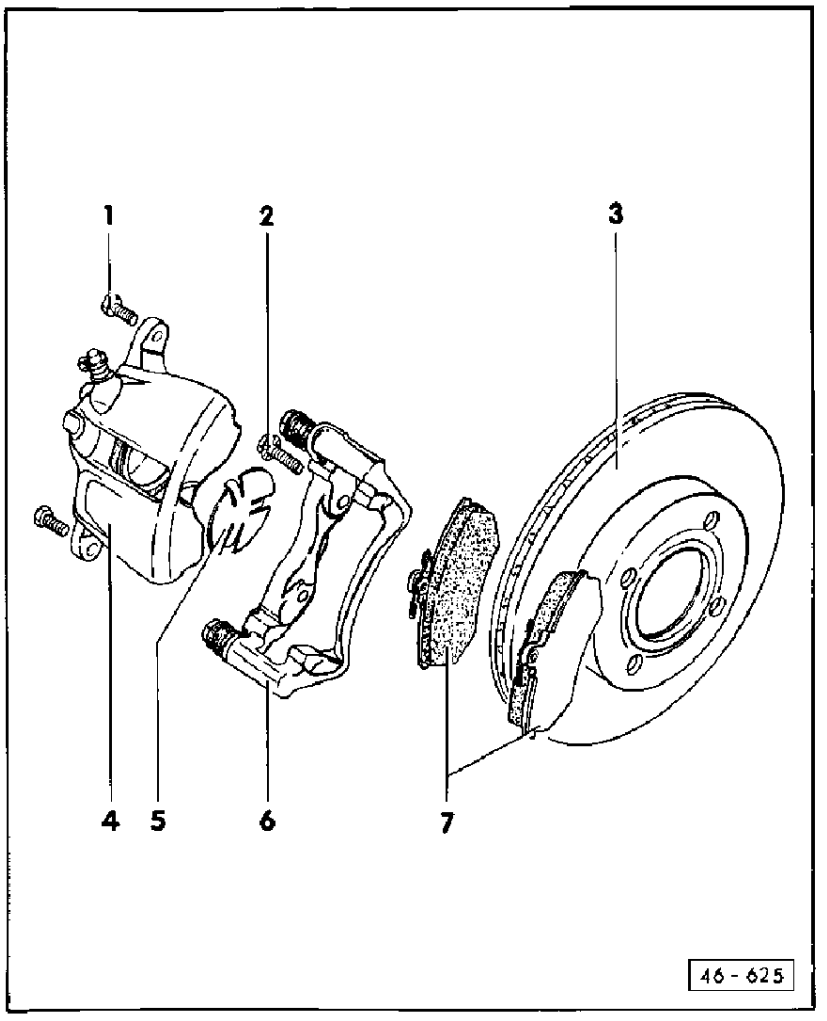
♦ Brake disc thickness:
– Ventilated disc 22 mm
– Non-ventilated disc 13 mm
♦ Wear limit:
– Ventilated brake disc 20 mm
– Non-ventilated brake disc 11 mm

4 – **Brake calliper housing**
♦ Do not disconnect brake hose when changing brake linings

5 – **Heat shield**
♦ Insert into piston



6 – **Brake carrier with guide pin and protective cap**
♦ Supplied as replacement part, assembled with sufficient grease on guide pins
♦ If protective caps are damaged install repair kit
♦ Use grease sachet supplied to lubricate guide pins
♦ Note different versions in relation to respective brake disc diameter.



7 – Brake linings

- ♦ Replace on axle basis => Page 46-6
- ♦ Brake lining thickness when new 14 mm
- ♦ Brake lining wear limit 2 mm
- ♦ Checking brake lining thickness => Page 46-6
- ♦ If the pad thickness is down to 7 mm (including backing plate), the brake linings have reached the wear limit and must be replaced.

Checking brake lining thickness

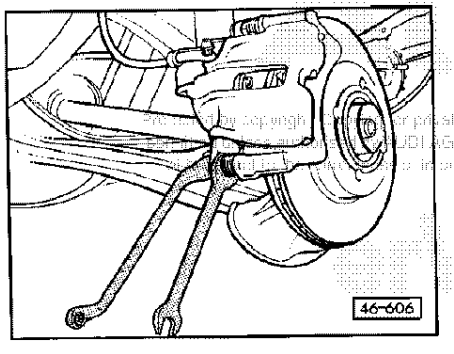
- Determine thickness of outer pads by checking visually (with help of flashlight) through cut-out in wheel.
- If the pad thickness is down to 7 mm (including backing plate), the brake linings have reached the wear limit and must be replaced.

Replacing brake linings (Girling)

Note:

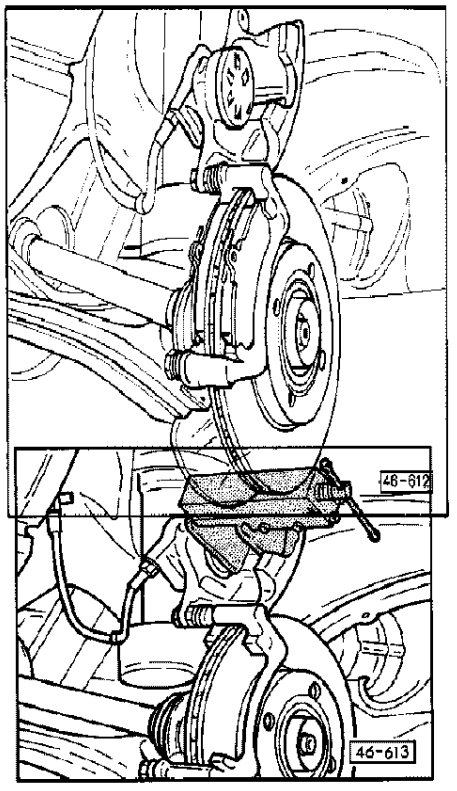
Mark brake linings to be reused on removal. Reinstall in their original position to prevent uneven braking.

- Remove wheels.



- Unscrew lower securing bolt for brake calliper housing. Counterhold at guide pin.

- Brake calliper housing up and take out brake linings.



- Press back pistons into brake calliper housing.

Note:

Before pressing back the pistons, draw off some of the brake fluid from the reservoir. Otherwise brake fluid which was used to top up the brake fluid reservoir may run out and cause damage. Use a bleeder bottle or a plastic bottle, which is only used for brake fluid.

Attention:

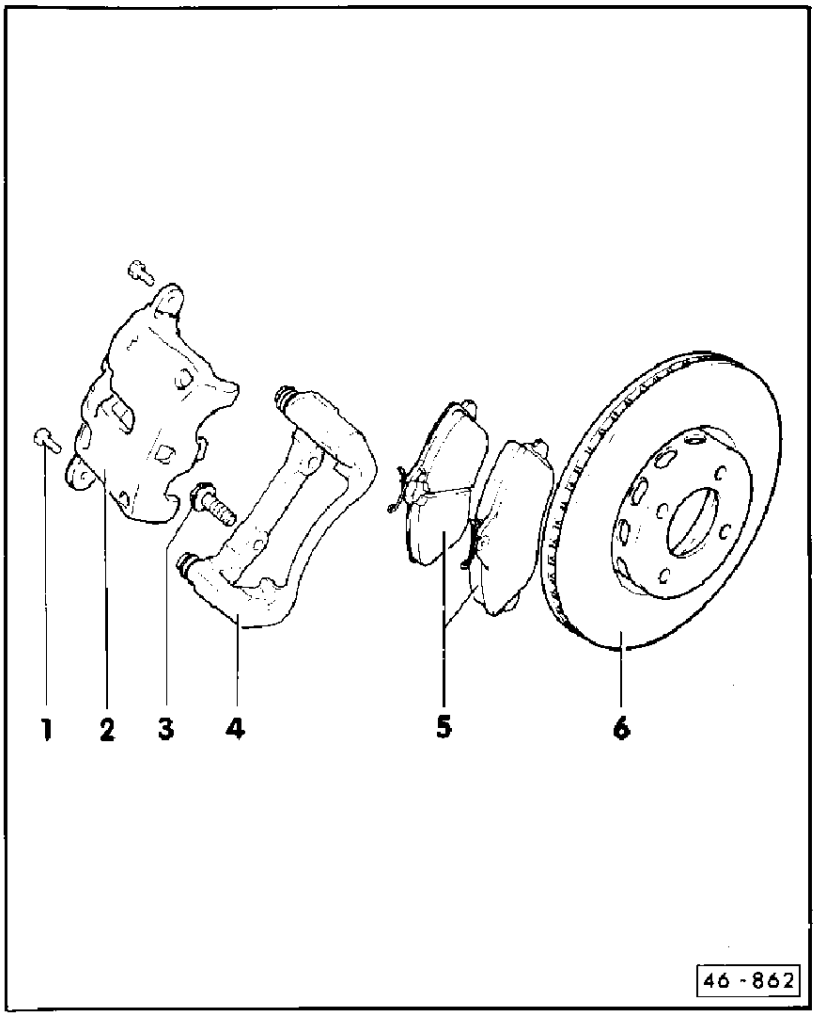
Brake fluid is poisonous and must on no account be siphoned orally through a hose.

- Insert brake linings.
- Swivel brake calliper housing down and tighten bolts to 35 Nm.
- Fit wheels.

Notes:

- The repair kit includes two self locking hexagon bolts which must be installed in all cases.
- Firmly depress brake pedal several times with vehicle stationary, so that the brake linings are properly seated in their normal operating position.

- Check brake fluid level and top up if necessary.

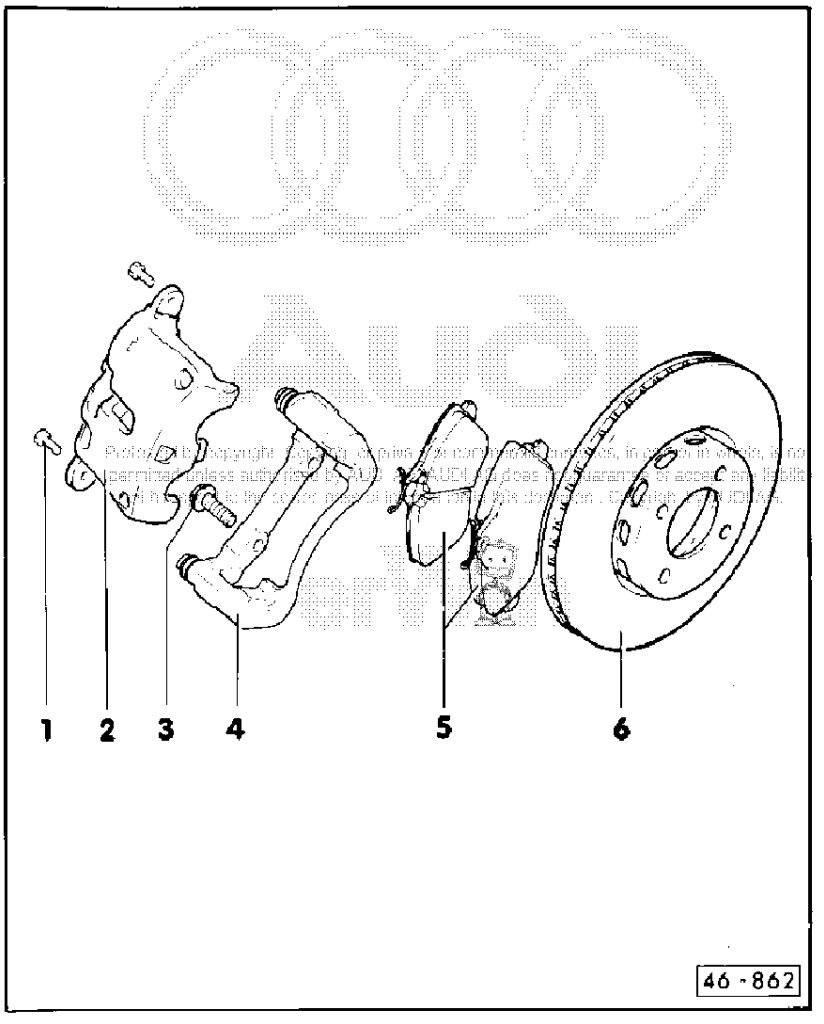


Servicing front brakes, dual-piston version

Notes:

- ♦ Always install the complete repair kit.
- ♦ Brakes can be checked on all commercially available brake test stands, provided that the driving speed of the two driving rollers of the test stand does not exceed 5.5 km/h.

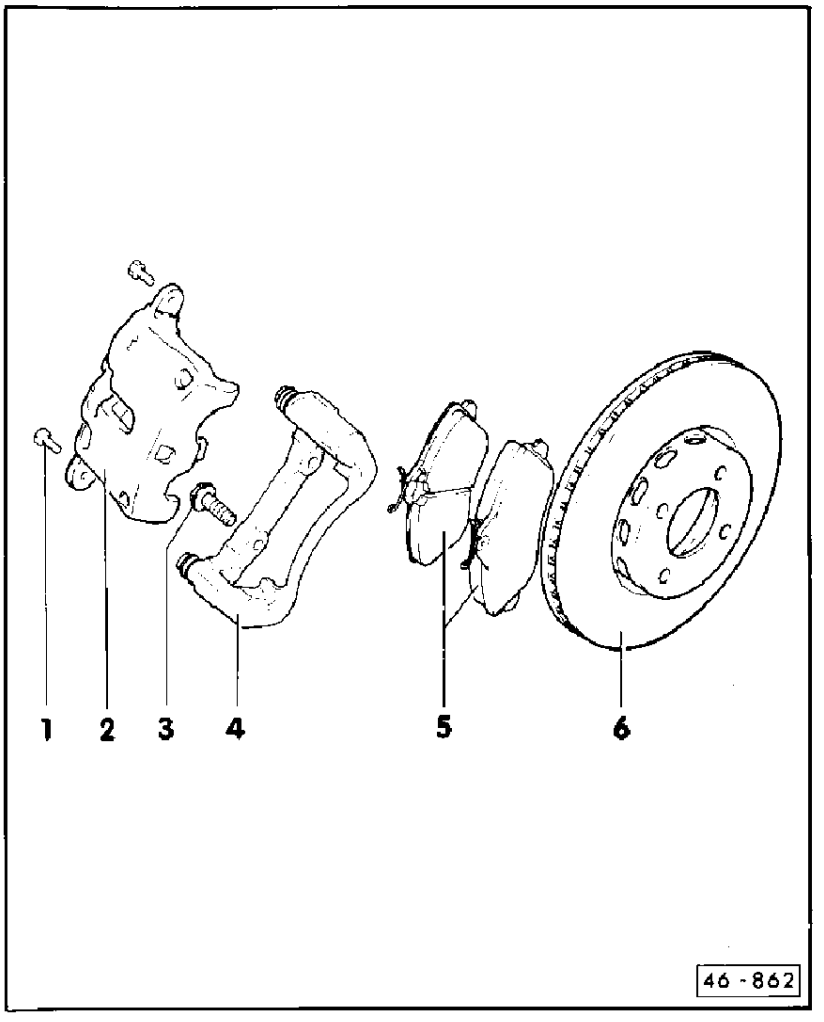
1 – **Self locking bolt, 35 Nm**
- ♦ Always replace
- ♦ When loosening and tightening counter hold on guide pin



2 – **Brake calliper housing**
- ♦ Do not disconnect brake hose when changing brake linings

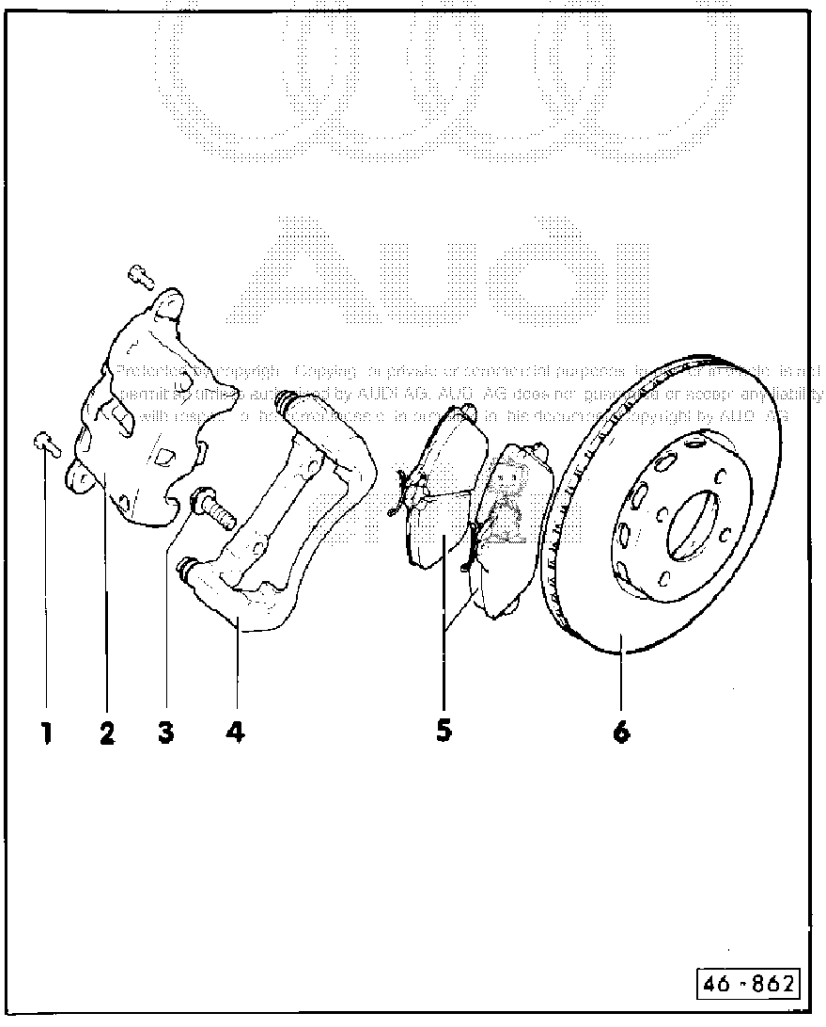
3 – **Ribbed bolt, 125 Nm**
- ♦ Clean ribbing if reusing

4 – **Brake carrier with guide pin and protective cap**
- ♦ Supplied as replacement part, assembled with sufficient grease on guide pins
- ♦ If protective caps are damaged install repair kit
- ♦ Use grease sachet supplied to lubricate guide pins



5 – Brake linings

- ♦ Replace on axle basis => Page 46-13
- ♦ Brake lining thickness when new 13 mm
- ♦ Brake lining wear limit 2 mm
- ♦ Checking brake lining thickness => Page 46-13
- ♦ If the pad thickness is down to 7 mm (including backing plate), the brake linings have reached the wear limit and must be replaced.



6 – Brake disc

- ♦ Replace on axle basis; to remove, unscrew brake calliper beforehand
- ♦ Always dress evenly, on both sides, starting from thickness when new
- ♦ Ensure adequate wear reserve
- ♦ Brake disc diameter: 276 mm
- ♦ Brake disc thickness: 25 mm
- ♦ Wear limit: 23 mm

Checking brake lining thickness

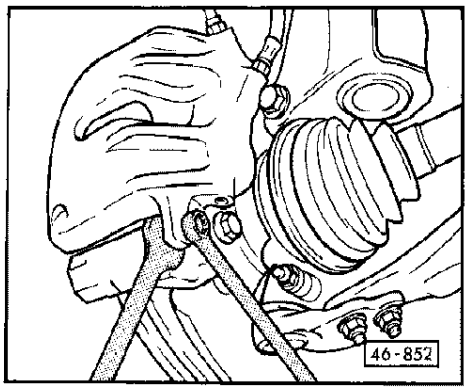
- Determine thickness of outer pads by checking visually (with help of flashlight) through cut-out in wheel.
- If the pad thickness is down to 7 mm (including backing plate), the brake linings have reached the wear limit and must be replaced.

Replacing brake linings (dual-piston)

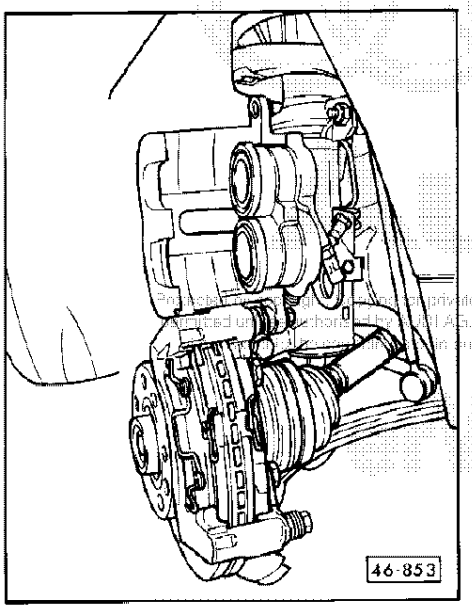
Note:

Mark brake linings to be reused on removal. Reinstall in their original position to prevent uneven braking!

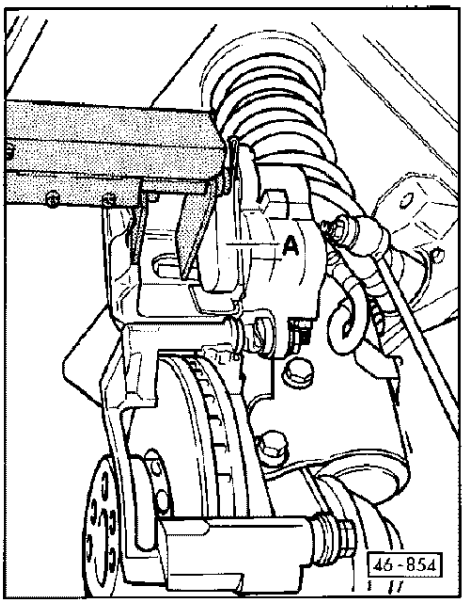
- Remove wheels.



- Unscrew lower securing bolt for brake calliper housing. Counterhold at guide pin.



- Swivel brake calliper housing up and take out brake linings.



◀ – Press back pistons into brake calliper housing

– A = old, removed brake lining

Note:

Before pressing back the pistons, draw off some of the brake fluid from the reservoir. Otherwise brake fluid which was used to top up the brake fluid reservoir may run out and cause damage. Use a bleeder bottle or a plastic bottle, which is only used for brake fluid.

Attention:
Brake fluid is poisonous and must on no account be siphoned orally through a hose.

– Insert brake linings.

– Swivel brake calliper housing down and tighten bolts to 35 Nm.

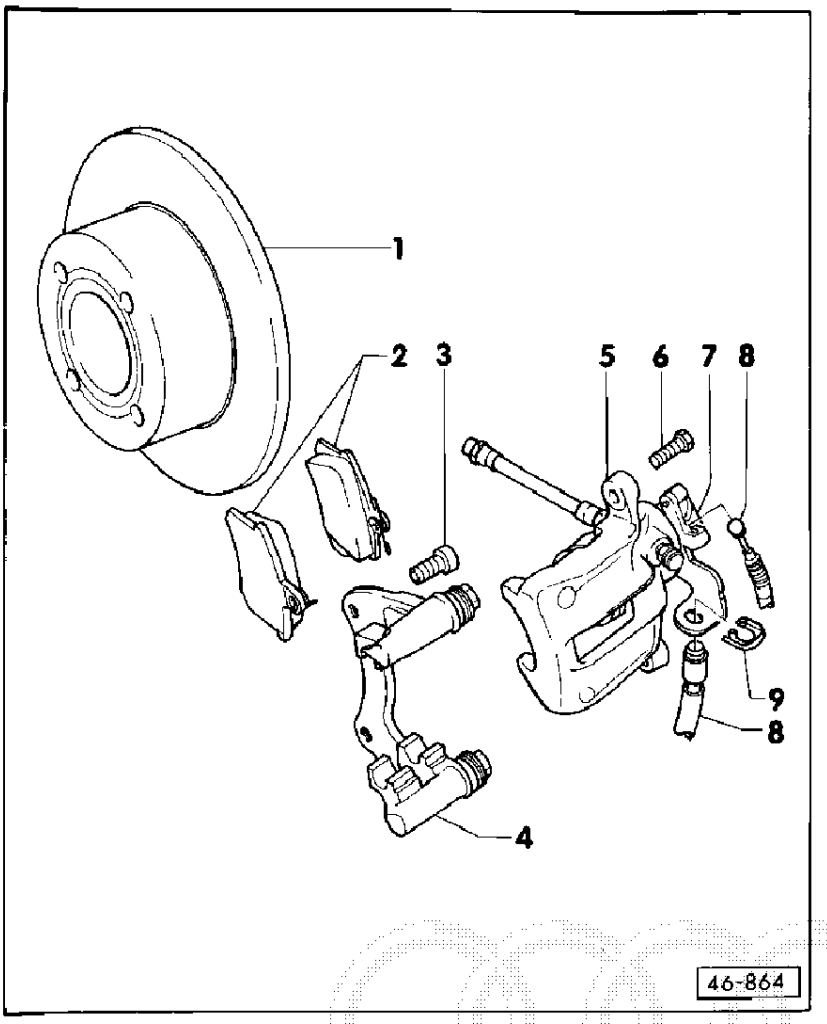
– Fit wheels.

Notes:

♦ The repair kit includes two self locking hexagon bolts which must be installed in all cases.

♦ Firmly depress brake pedal several times with vehicle stationary, so that the brake linings are properly seated in their normal operating position.

– Check brake fluid level and top up if necessary.

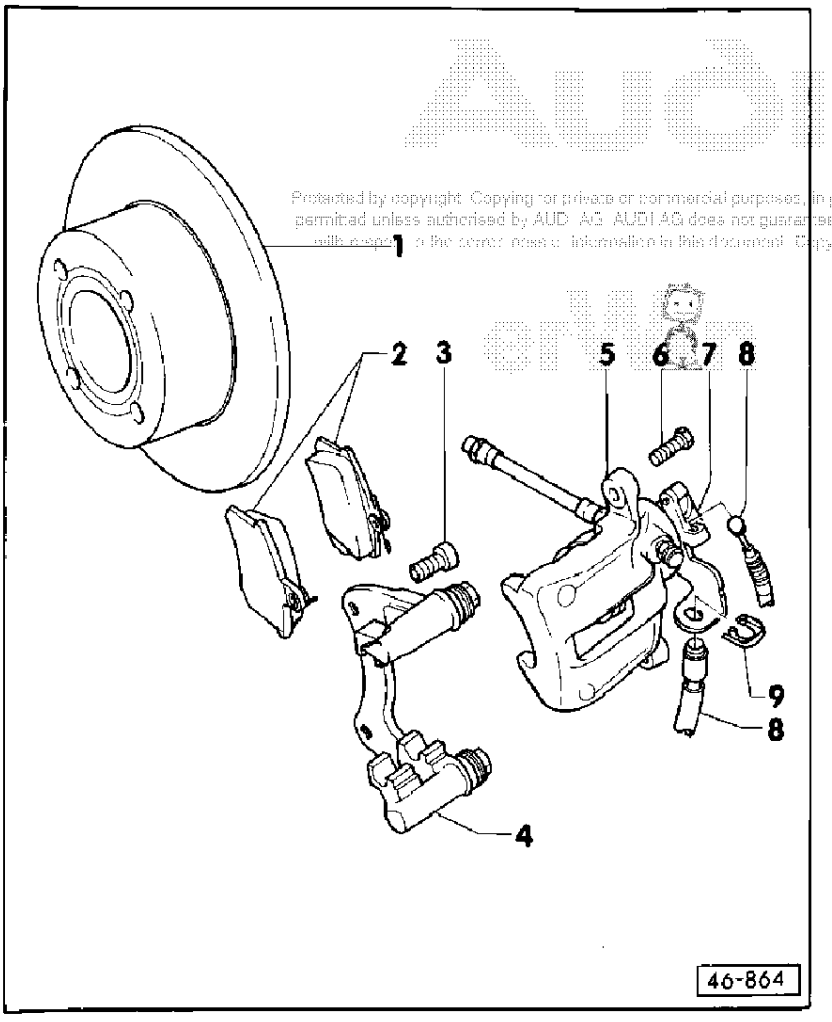


Servicing rear brake, disc brake

Rear brakes with automatic adjustment

Notes:

- ♦ Always install the complete repair kit.
- ♦ Brakes can be checked on all commercially available brake test stands, provided that the driving speed of the two driving rollers of the test stand does not exceed 5.5 km/h.

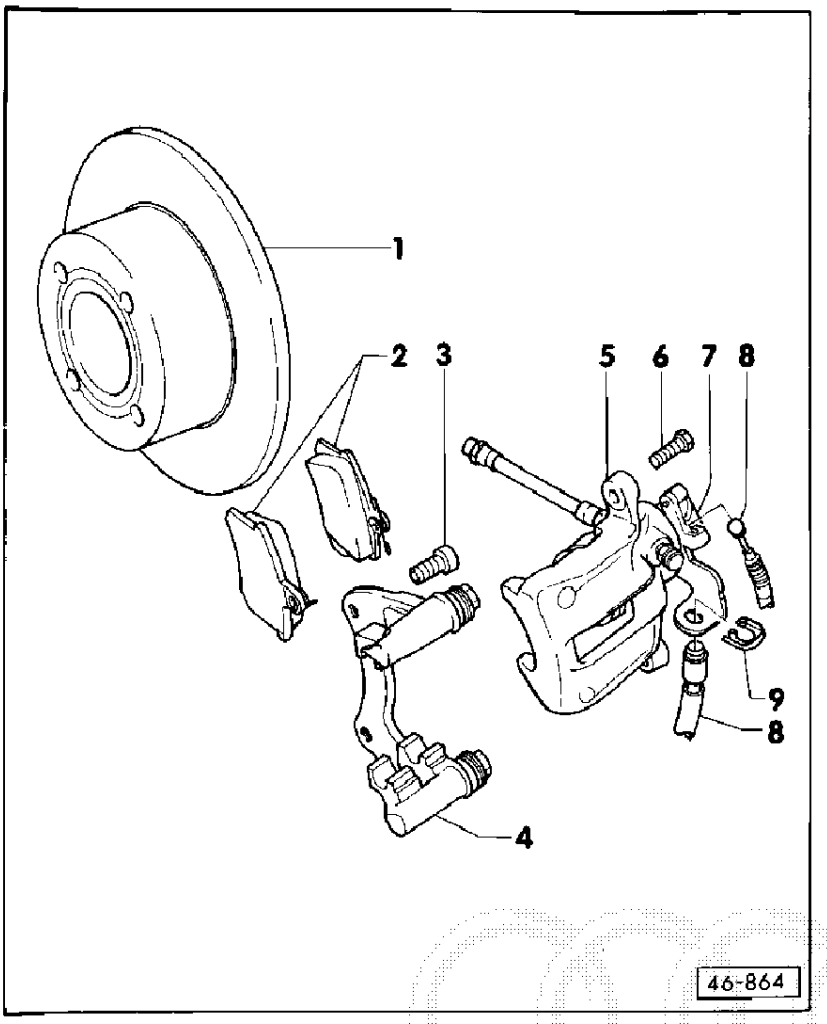


1 – Brake disc

- ♦ Replace on axle basis; to remove, unscrew brake calliper beforehand
- ♦ Always dress evenly, on both sides, starting from thickness when new
- ♦ Ensure adequate wear reserve
- ♦ Brake disc diameter: 245 mm
- ♦ Brake disc thickness: 10 mm
- ♦ Wear limit: 8 mm

2 – Brake linings

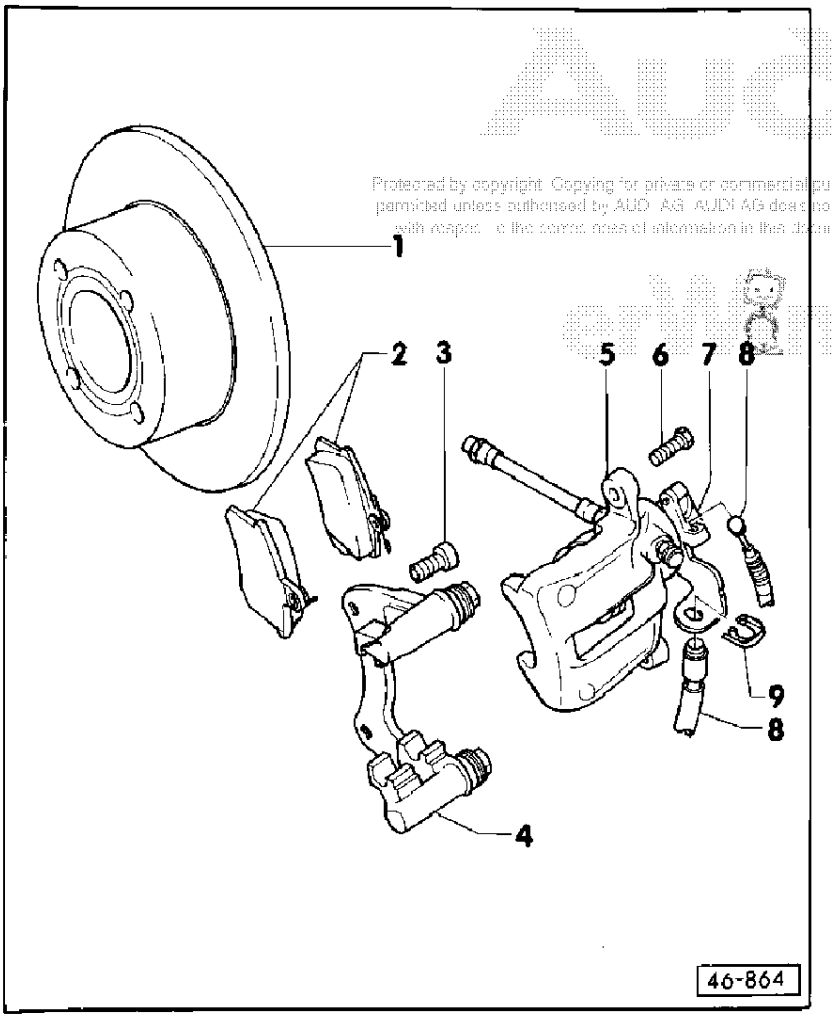
- ♦ Replace on axle basis => Page 46-21
- ♦ Brake lining thickness when new 12 mm
- ♦ Brake lining wear limit 2 mm



- ♦ Checking brake lining thickness => Page 46-21
- ♦ If the pad thickness is down to 7 mm (including backing plate), the brake linings have reached the wear limit and must be replaced.

3 – Cheese-head bolt, 60 Nm
- ♦ Cheese-head flange ribbed bolt, 80 Nm

4 – Brake carrier with guide pin and protective cap
- ♦ Supplied as replacement part, assembled with sufficient grease on guide pins
- ♦ If protective caps are damaged install repair kit
- ♦ Use grease sachet supplied to lubricate guide pins



5 – Brake calliper housing
- ♦ Unscrew from brake carrier to replace brake linings
- ♦ Do not unscrew brake hose

6 – Self locking bolt, 35 Nm
- ♦ Always replace
- ♦ When loosening and tightening counter hold on guide pin

7 – Lever for handbrake cable
- ♦ Insert handbrake cable

8 – Handbrake cable
- ♦ Adjusting handbrake => Page 46-30.

9 – Locking clip
- ♦ Attach handbrake cable to support bracket

Checking brake lining thickness

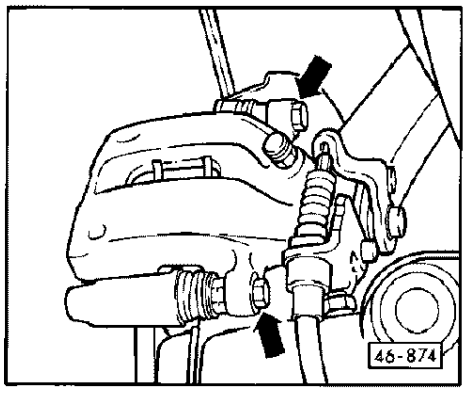
- Determine thickness of outer pads by checking visually (with help of flashlight) through cut-out in wheel.
- If the pad thickness is down to 7 mm (including backing plate), the brake linings have reached the wear limit and must be replaced.

Replacing rear brake linings

Note:

Mark brake linings to be reused on removal. Reinstall in their original position to prevent uneven braking.

- Remove wheels.



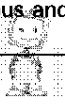
- Unscrew brake calliper housing.
- Remove brake linings.

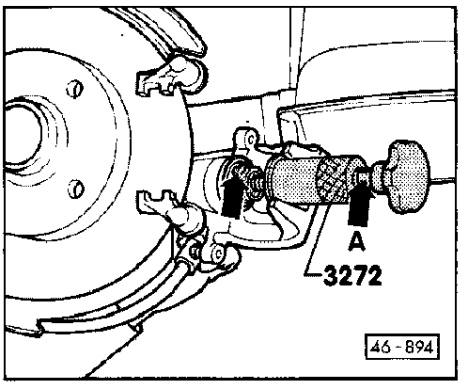
Notes:

Before pressing back the pistons, draw off some of the brake fluid from the reservoir. Otherwise brake fluid which was used to top up the brake fluid reservoir may run out and cause damage. Use a bleeder bottle or a plastic bottle, which is only used for brake fluid.

Attention:

Brake fluid is poisonous and must on no account be siphoned orally through a hose.

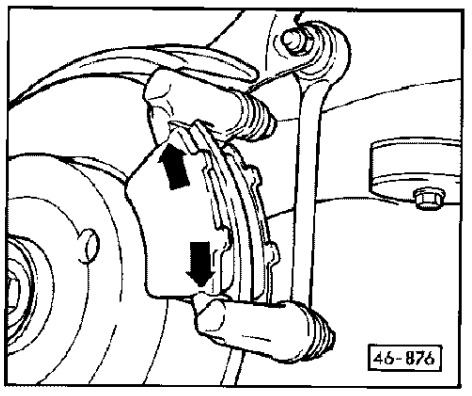




- Screw in piston by turning the threaded spindle clockwise and the knurled section anticlockwise as far as the stop.

Note:

- If piston is difficult to move, use a 13 mm AF open jaw spanner on the flats (arrow A) provided for this purpose.
- Insert special tool -3272- so that the collar is positioned in front of the piston.

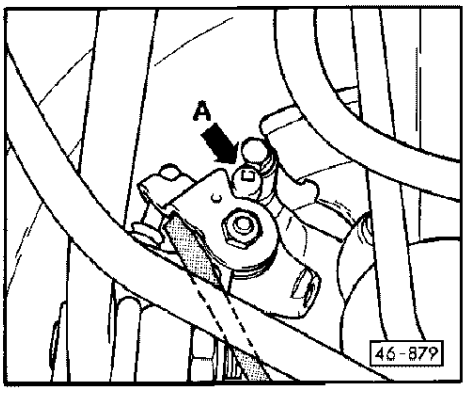


- Insert brake linings.
- Screw on brake calliper housing, 35 Nm.
- Check brake fluid level and top up if necessary.

Notes:

- The repair kit includes two self locking hexagon bolts which must be installed in all cases.
- Firmly depress brake pedal several times with vehicle stationary, so that the brake linings are properly seated in their normal operating position.
- Always perform basic setting of rear brakes whenever brake linings have been replaced =>Page 46-24

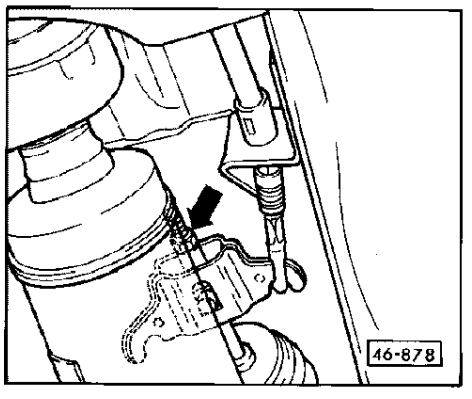
Basic setting of rear brakes



Handbrake cable must not be pretensioned when performing basic setting (handbrake off).

Check:

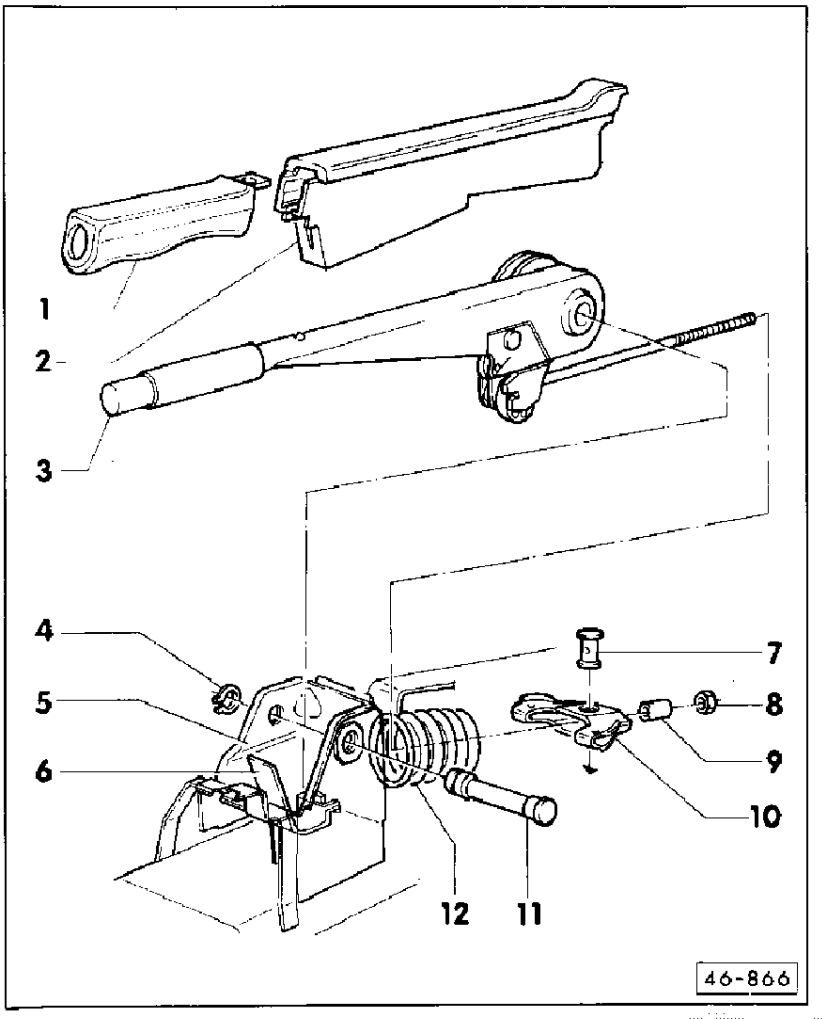
- Alternately press handbrake cable levers against stop -A- with a screwdriver.
- If lever at opposite brake calliper in each case is pulled off stop, handbrake cable has been excessively pretensioned.
- Remove rear exhaust system guard plate



Note:

The illustration shows the adjusting nut with the guard plate for the exhaust system removed. To adjust, use 10 mm long socket wrench with flexible extension and ratchet.

- Appropriately loosen adjusting nut for handbrake cable -arrow- until both levers make contact with stop.
- Position vehicle on its wheels and press brake pedal several times with engine stopped.
- Jack up vehicle and check whether both wheels turn freely

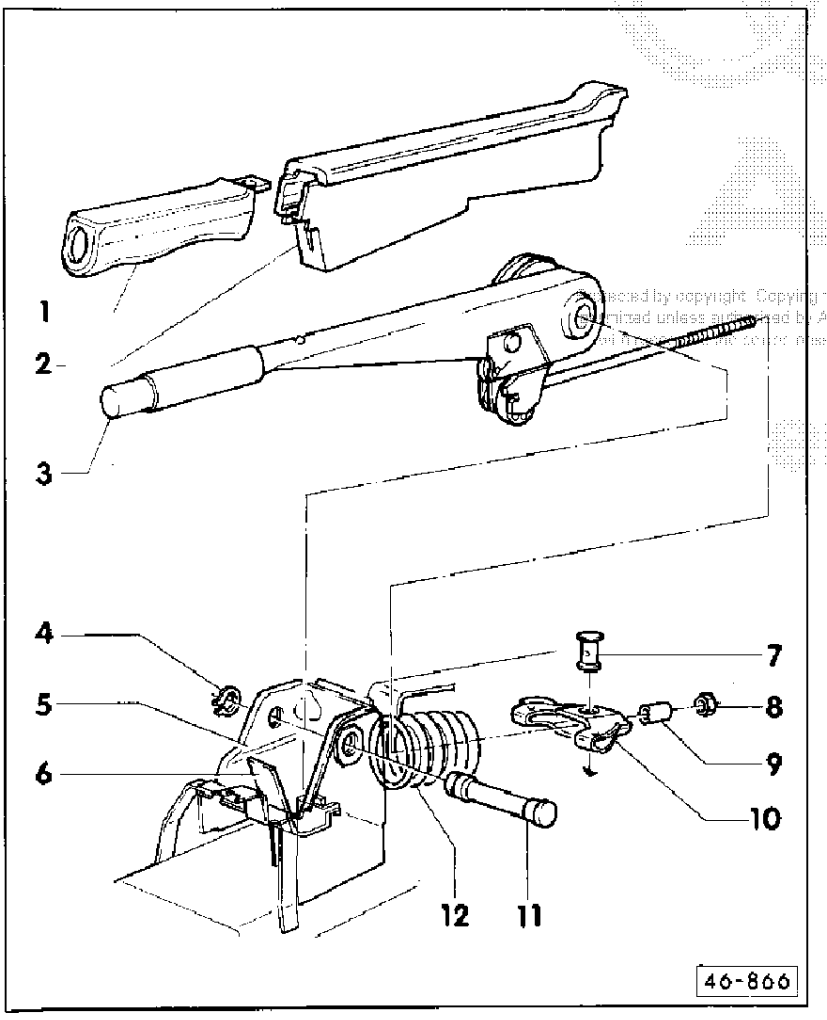


Servicing handbrake

Note:
Grease all bearings prior to assembly with white solid lubricating paste, part no. AOS 126 000 05.

1 – **Handle**
- ♦ Slide onto handbrake lever until lug on lever engages in tab on handle.

2 – **Cover for handbrake lever**
- ♦ Slip onto handbrake lever



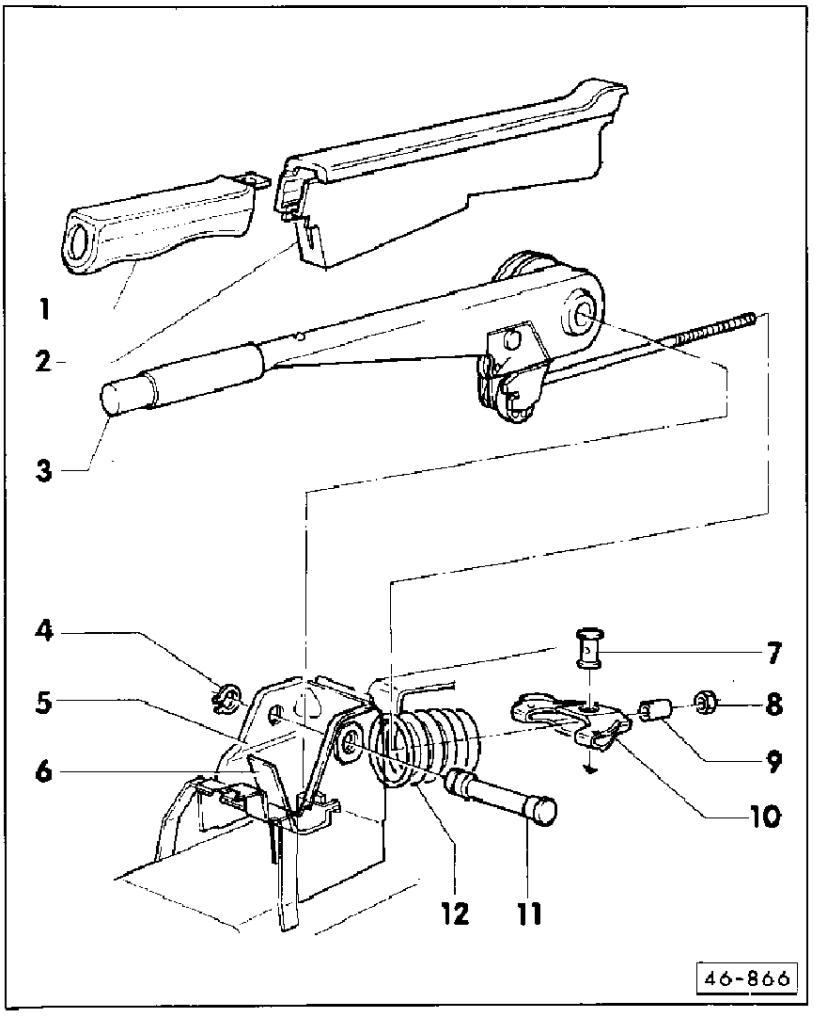
3 – **Handbrake lever**
- ♦ Available as an assembled component with pull rod, lokking pawl, pushrod, pushbutton, pressure spring and ratchet
- ♦ Removing and installing
=>Page 46-28

4 – **Circlip**
- ♦ Always replace
- ♦ Ensure correct positioning

5 – **Mounting for handbrake lever**

6 – **Leaf spring**
- ♦ Insert in bracket

7 – **Pin**
- ♦ Insert in compensator bar
- ♦ Insert pull rod in hole in pin



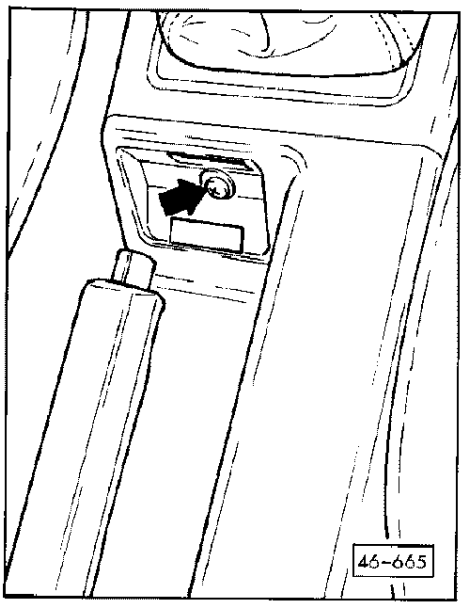
8 – Adjusting nut, self-locking
♦ Adjusting hand brake:
– Disc brake => Page 46-30

9 – Bushing
♦ Slip onto pull rod

10 – Compensator bar

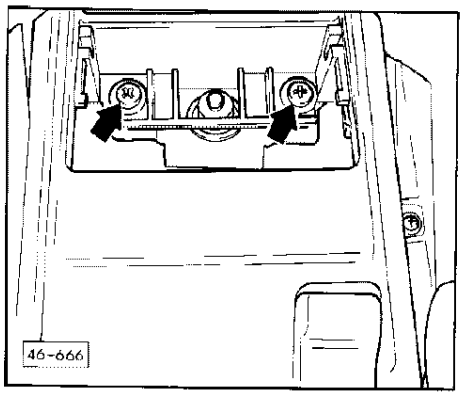
11 – Fulcrum pin

12 – Bellows
♦ Ensure correct positioning

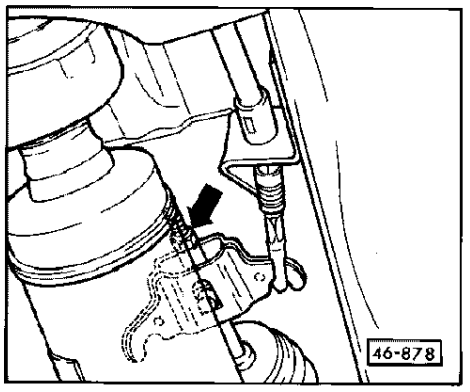


Removing and installing handbrake lever

◀ – Use screwdriver to unclip cover
– Remove screw



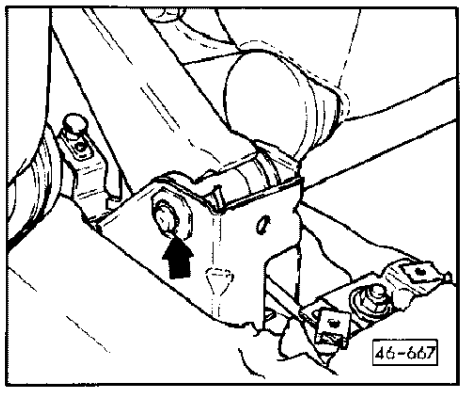
◀ – Remove ashtray for rear compartment.
=> General body repairs; Repair Group 70=>
– Remove both screws
– Remove rear section of centre console
=> General body repairs; Repair Group 70=>
– Remove rear guard plate for exhaust system



Note:

To adjust, use 10 mm long socket wrench with flexible extension and ratchet.

- Unscrew adjusting nut
- Remove compensator bar
- Remove bellows



- Unfasten circlip
- Press out support pin
- Push handbrake lever slightly to rear and then remove

Note:

After installing handbrake lever adjust handbrake => Page 46-30.

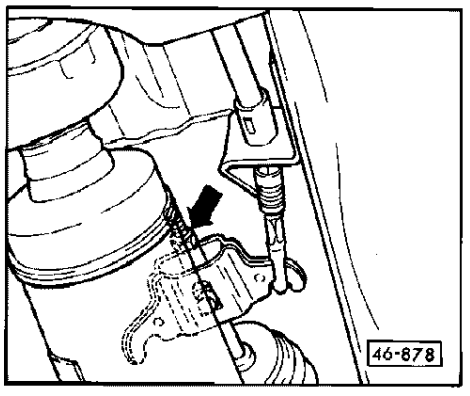
Adjusting handbrake (vehicles with disc brake)

Note:

Due to the automatic rear wheel brake adjustment there is normally no requirement to adjust the handbrake. Adjustment is only necessary if the handbrake cables, brake callipers, brake discs and brake linings are renewed.

Attention:

Always perform basic setting of rear wheel brake first Page

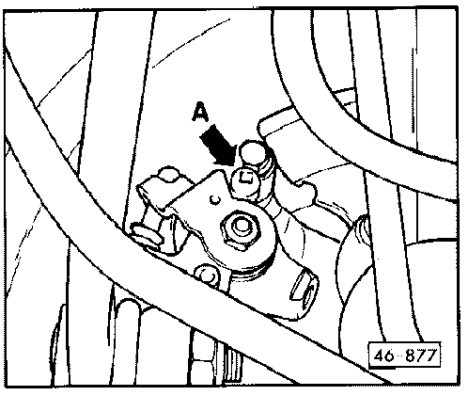


- Remove rear exhaust system guard plate

Note:

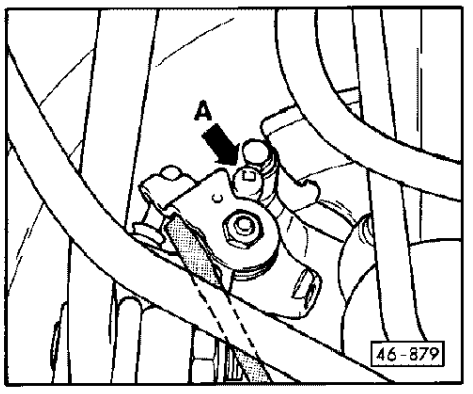
The illustration shows the adjusting nut with the guard plate for the exhaust system removed. To adjust, use 10 mm long socket wrench with flexible extension and ratchet.

- Turn adjusting nut for handbrake

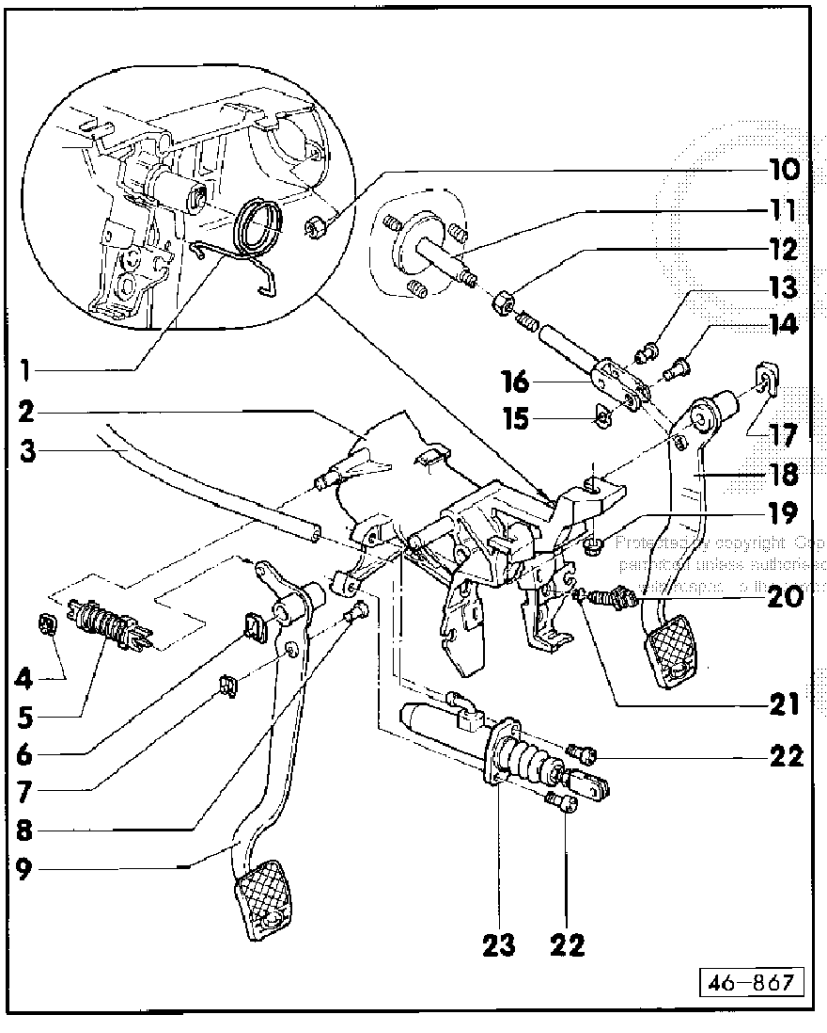


- ... until both levers just lift off stop -A- (second mechanic required)
- Turn back adjusting nut two turns

Check:



- Alternately press handbrake cable levers against stop -A- with a screwdriver.
- If lever at opposite brake calliper in each case is pulled off stop, handbrake cable has been excessively pretensioned.
- Appropriately loosen adjusting nut for handbrake cable until both levers make contact with stop.
- Apply handbrake and then release it again.
- Check whether both wheels turn freely; if applicable check freedom of movement of handbrake mechanism.



Removing, installing and servicing pedal cluster

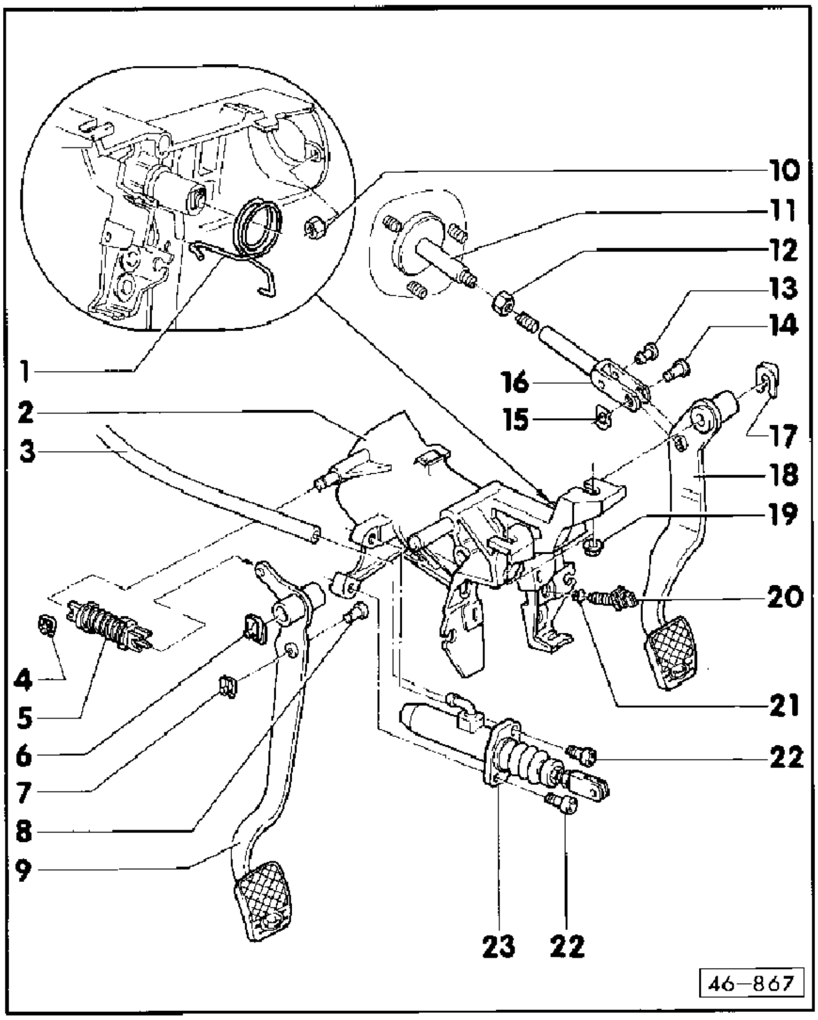
Attention:

The brake pedal travel must not be shortened by additional floor coverings.

Note:

Grease all bearings prior to assembly with solid lubricating paste, part no. G 052 142 A2

1 – **Coil spring**
- ♦ Insert U-shaped end in pedal bracket
- ♦ Insert other end in grommet inserted in clevis

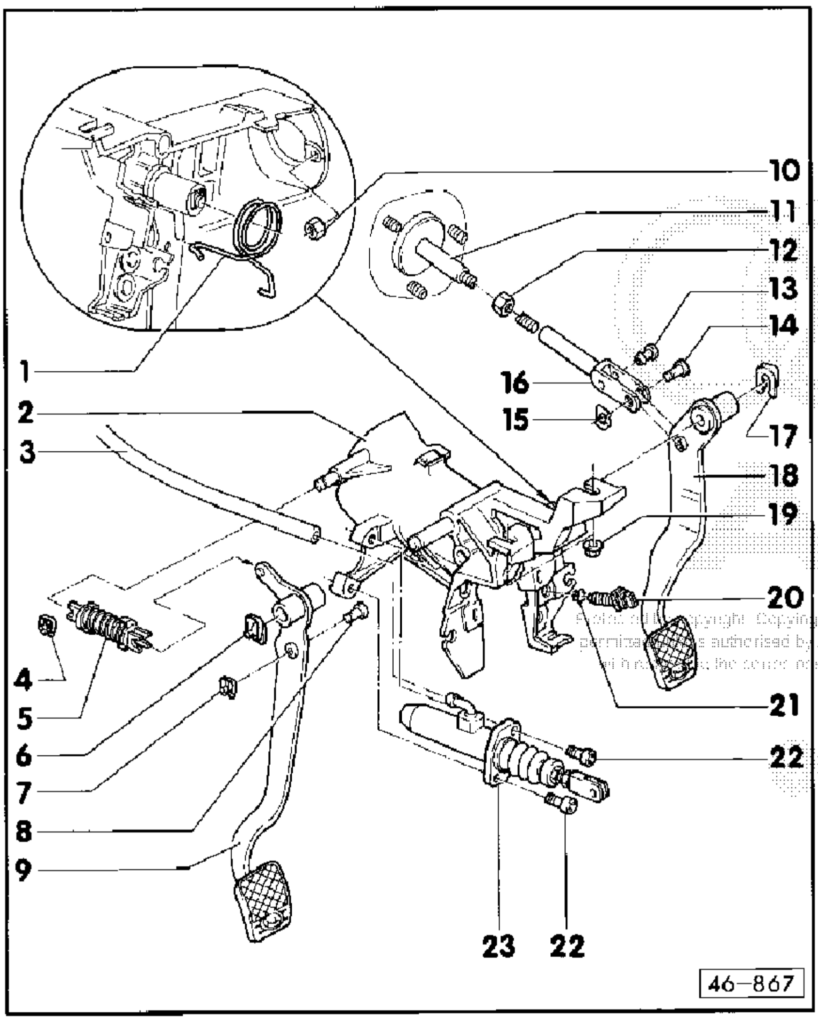


2 – Pedal bracket
- Do not take out to remove brake or clutch pedal

3 – Supply hose
- From brake fluid reservoir to clutch master cylinder

4 – Circlip
- Replace, attach to shaft of pedal bracket

5 – Over-centre spring
- Do not grease spring
- Only grease bearings on pedal/pedal bracket
- Removing and installing => Fig. 2
- Different versions on 4-, 5- and 6-cylinder engines.

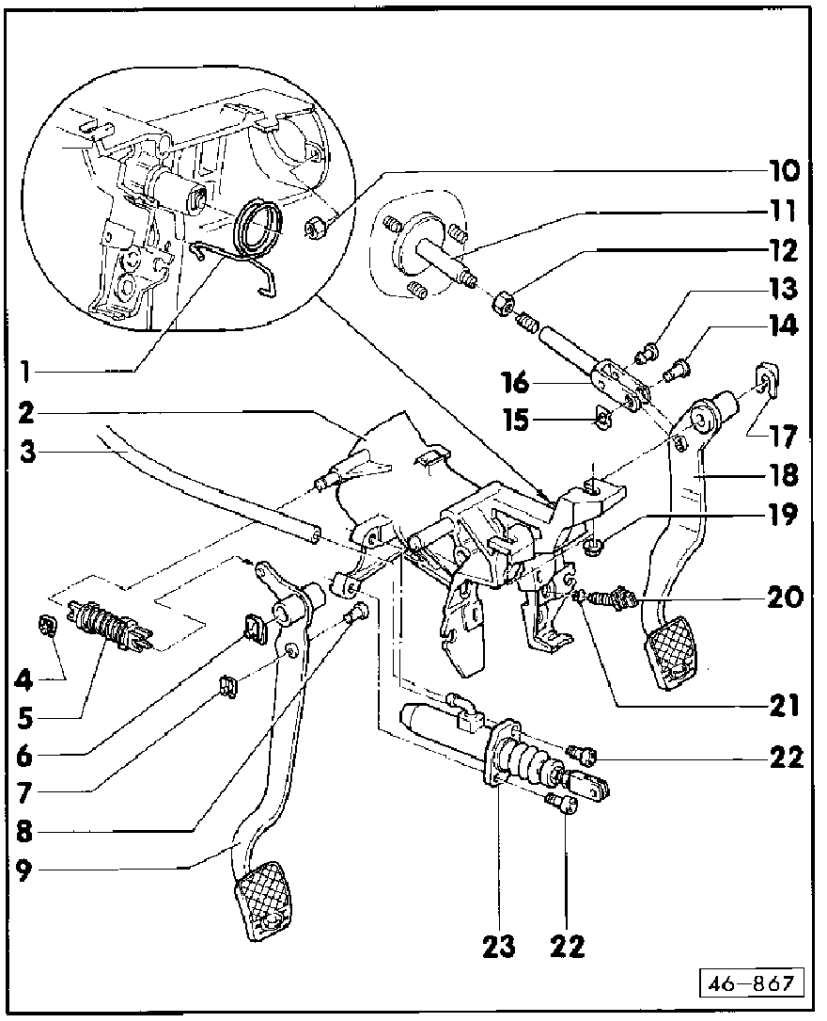


6 – Circlip
- Replace, attach to shaft of pedal bracket

7 – Circlip
- Always replace
- Fit onto pin

8 – Pin
- Insert in clevis and clutch pedal

9 – Clutch pedal
- Fixed in position by setting of clevis
- Attach to shaft of pedal bracket
- Can be removed and installed without taking out pedal bracket.
- Available as replacement part with moulded bushing; bushing cannot be replaced



10 – **Self-locking nut, 25 Nm**
- ♦ Always replace
- ♦ Bolt pedal bracket to bulkhead/connector plate

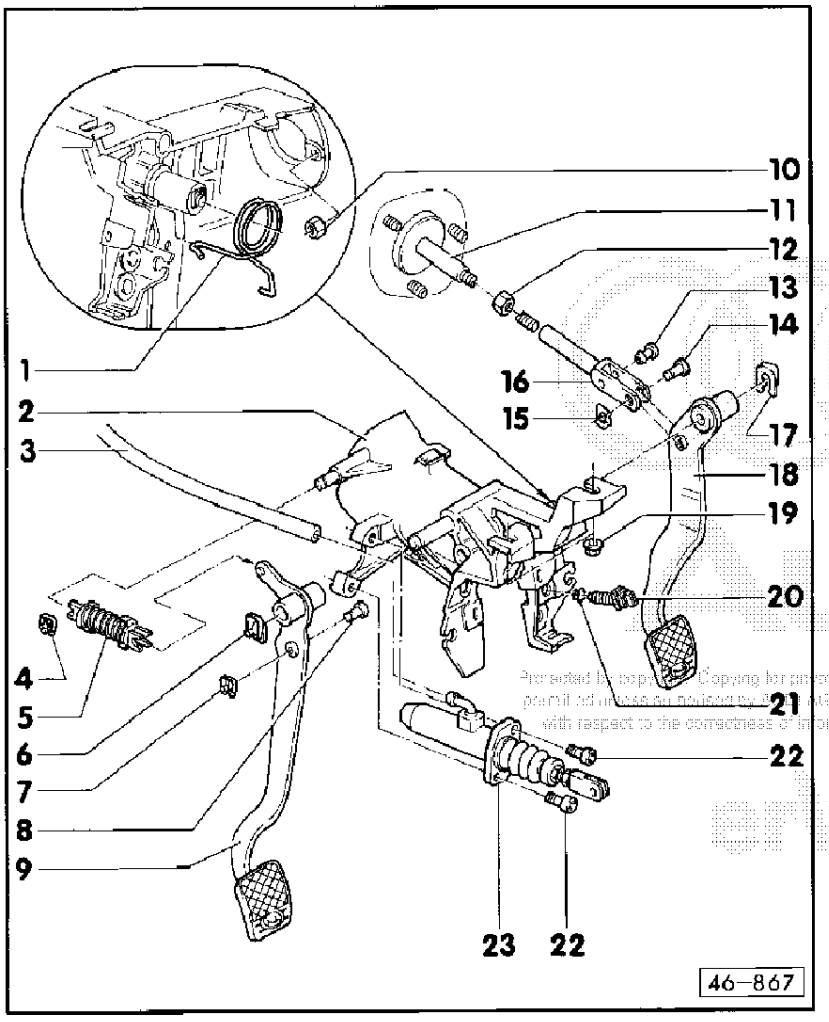
11 – **Brake servo**
- ♦ If faulty renew complete.

12 – **Lock nut**
- ♦ Tighten after adjusting clevis

13 – **Grommet**
- ♦ Insert in clevis

14 – **Pin**
- ♦ Insert in clevis and brake pedal

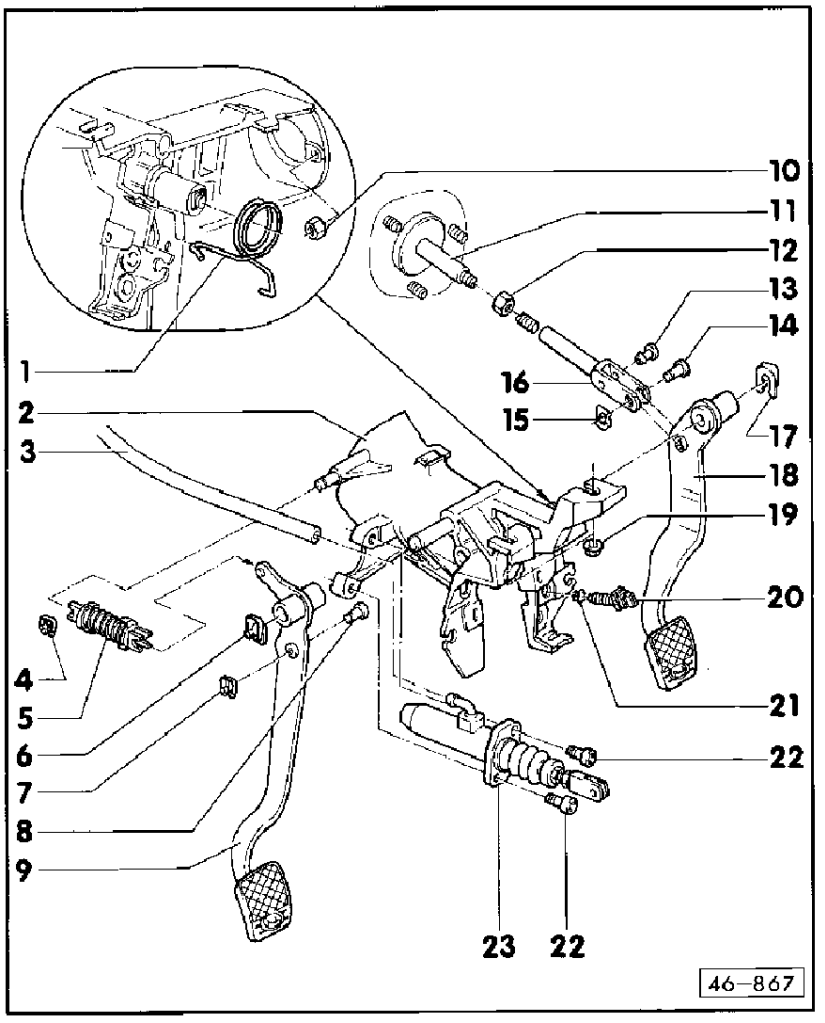
15 – **Circlip**
- ♦ Always replace
- ♦ Fit onto pin



16 – **Clevis of brake servo**
- ♦ Adjusting:
- – Vehicles with pneumatic brake servo => Page 47-43, Fig. 1
- – Vehicles with hydraulic brake servo =>Page 47-44, Fig. 2

17 – **Circlip**
- ♦ Always replace
- ♦ Attach to shaft of pedal bracket

18 – **Brake pedal**
- ♦ Attach to shaft of pedal bracket
- ♦ Can be removed and installed without taking out pedal bracket.
- ♦ Available as replacement part with moulded bushing; bushing cannot be replaced



19 – **Self-locking nut, 25 Nm**
♦ Always replace

20 – **Brake light switch**
♦ Adjusting:
– Brake pedal operated
– Press in brake light switch as far as it will go
– Pull back brake pedal by hand as far as stop

21 – **Clip**
♦ Press home in pedal bracket

22 – **Cheese-head bolt, 20 Nm**
♦ Screw master cylinder to pedal bracket

23 – **Clutch master cylinder**
♦ Replace if leaking
♦ Adjusting clevis =>Fig. 1.

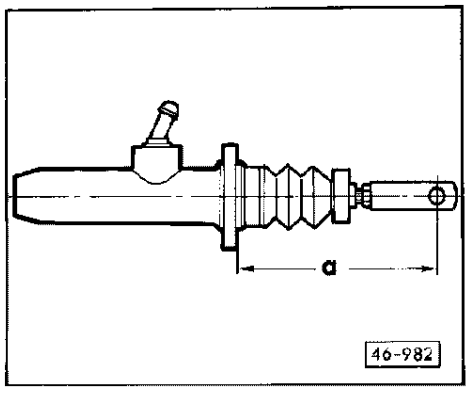


Fig.1 Adjusting clevis of clutch master cylinder

a = 109.5 ± 0.5 mm

– To adjust, turn clevis accordingly

Notes:

♦ When measuring, the clevis should be aligned at right angles to the surface of the clutch master cylinder.

♦ If clutch pedal does not return automatically with clevis set correctly:
– Ther may be air in the hydraulics
– The pedal may not be moving freely in the mount

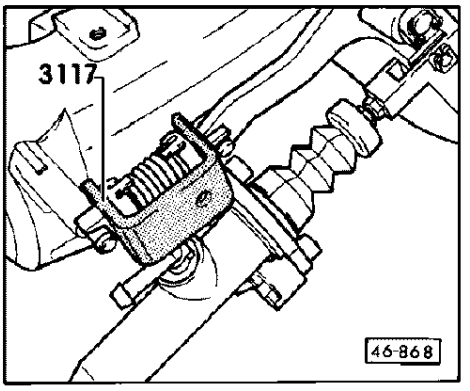
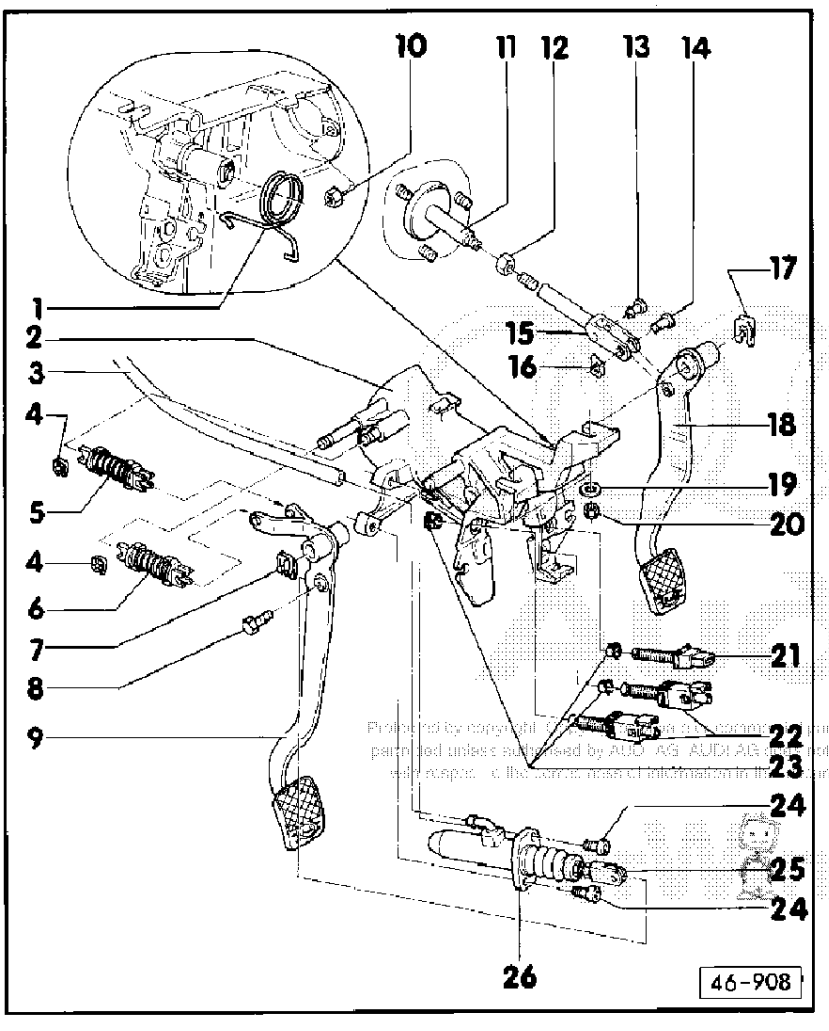


Fig.2 Removing and installing over-centre spring

- Remove retainer from support pin
- Insert clamp -3117- as shown, press clutch pedal and while doing so remove over-centre spring from pedal bracket/clutch pedal.

Note:

The illustration shows the clamp with the pedal bracket removed.



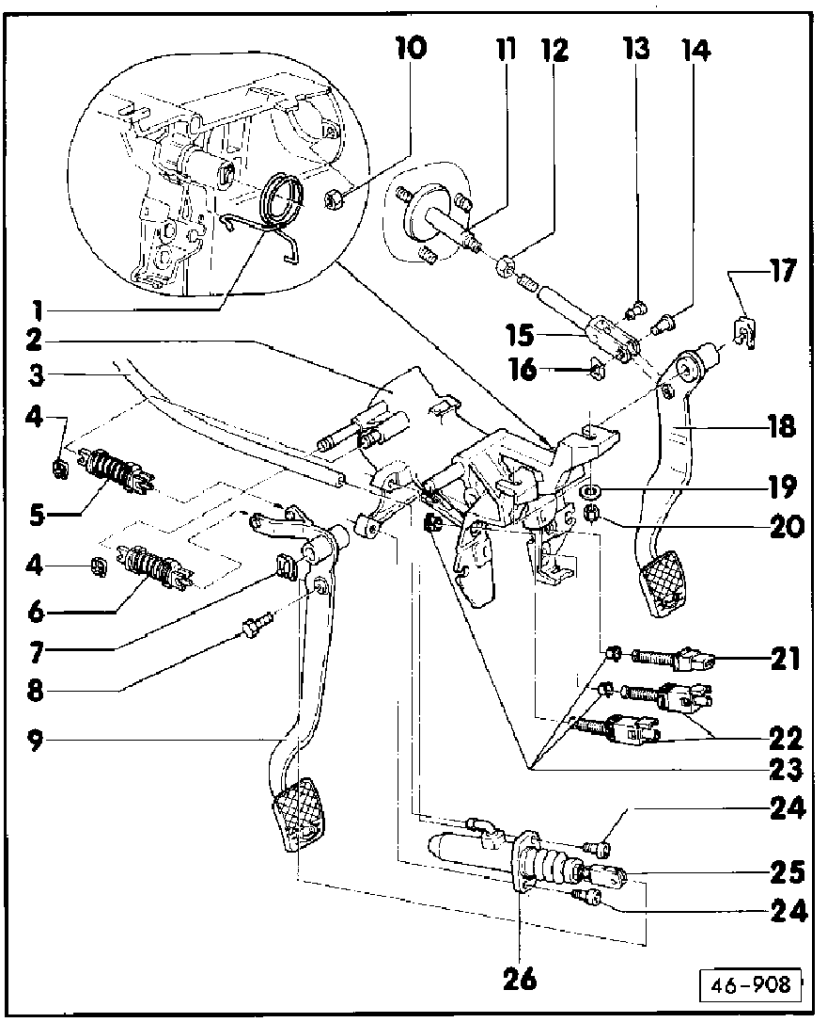
Removing, installing and servicing pedal cluster for vehicles with 169 kW engine

Attention

The brake pedal travel must not be shortened by additional floor coverings.

Note:

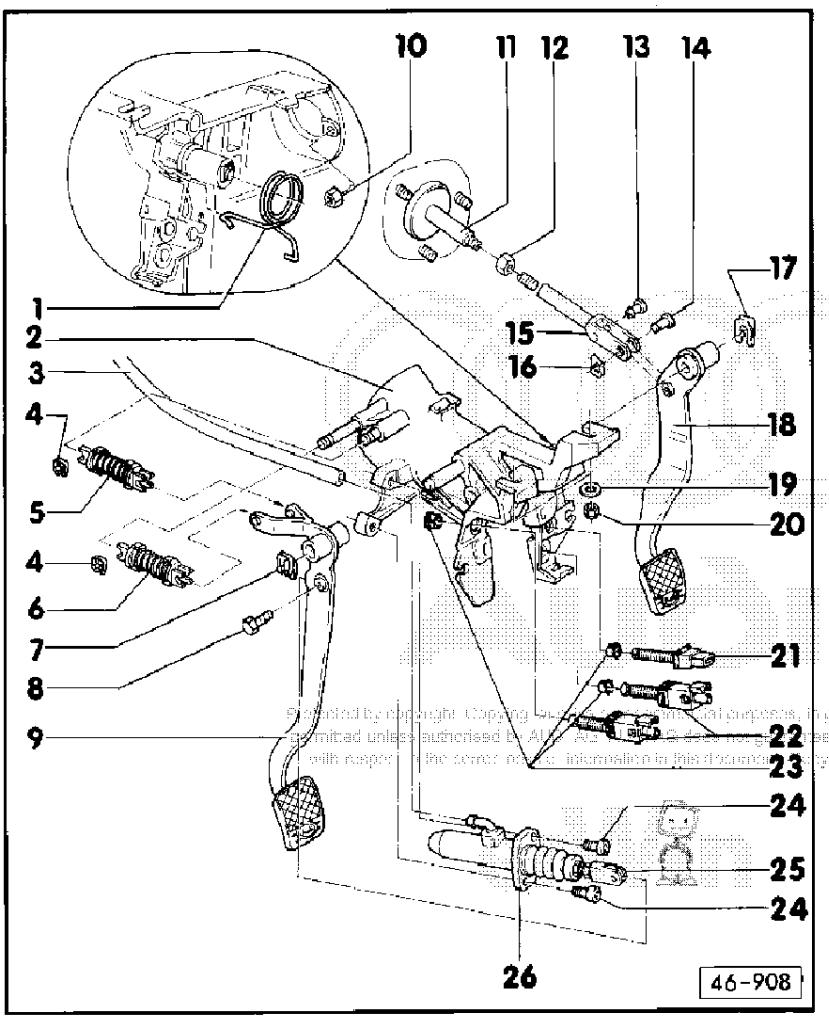
Grease all bearings prior to assembly with solid lubricating paste, part no. G 052 142 A2



1 – **Coil spring**
- ♦ Insert U-shaped end in pedal bracket
- ♦ Insert other end in grommet inserted in clevis

2 – **Pedal bracket**
- ♦ Do not take out to remove brake or clutch pedal

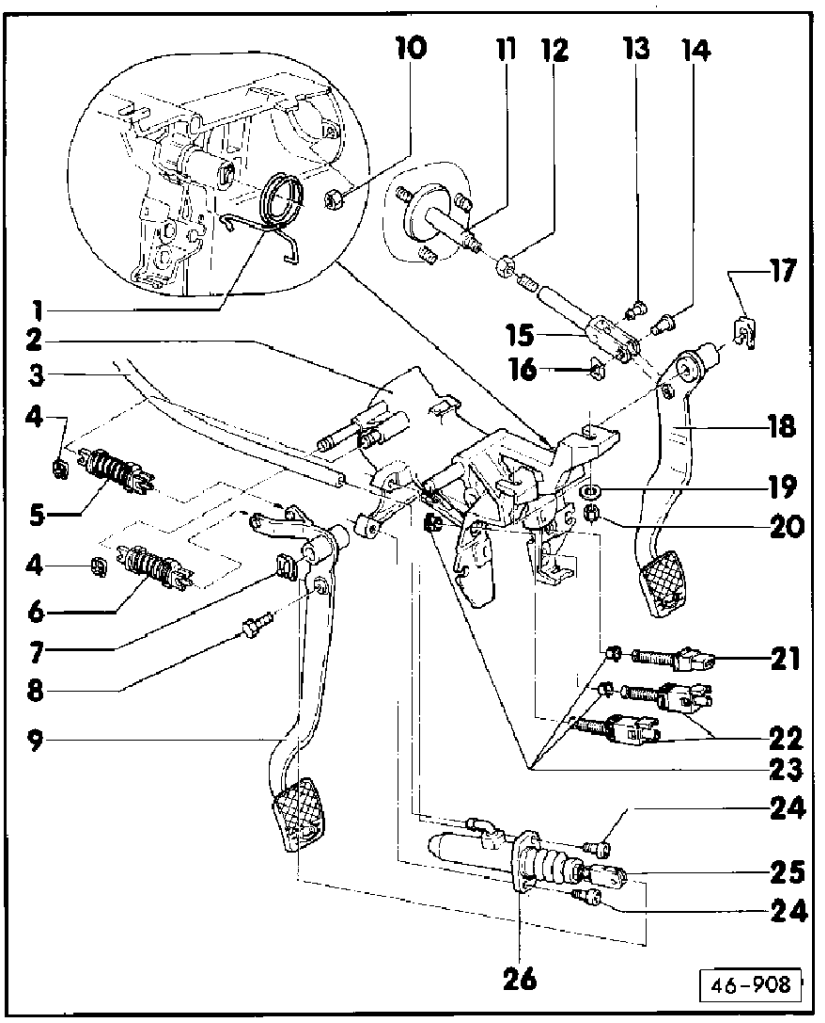
3 – **Supply hose**
- ♦ From brake fluid reservoir to clutch master cylinder



4 – **Circlip**
- ♦ Replace, attach to shaft of pedal bracket

5 – **Support spring**
- ♦ Brown mark
- ♦ Do not grease spring
- ♦ Only grease bearings on pedal/pedal bracket
- ♦ Removing and installing => Fig. 3

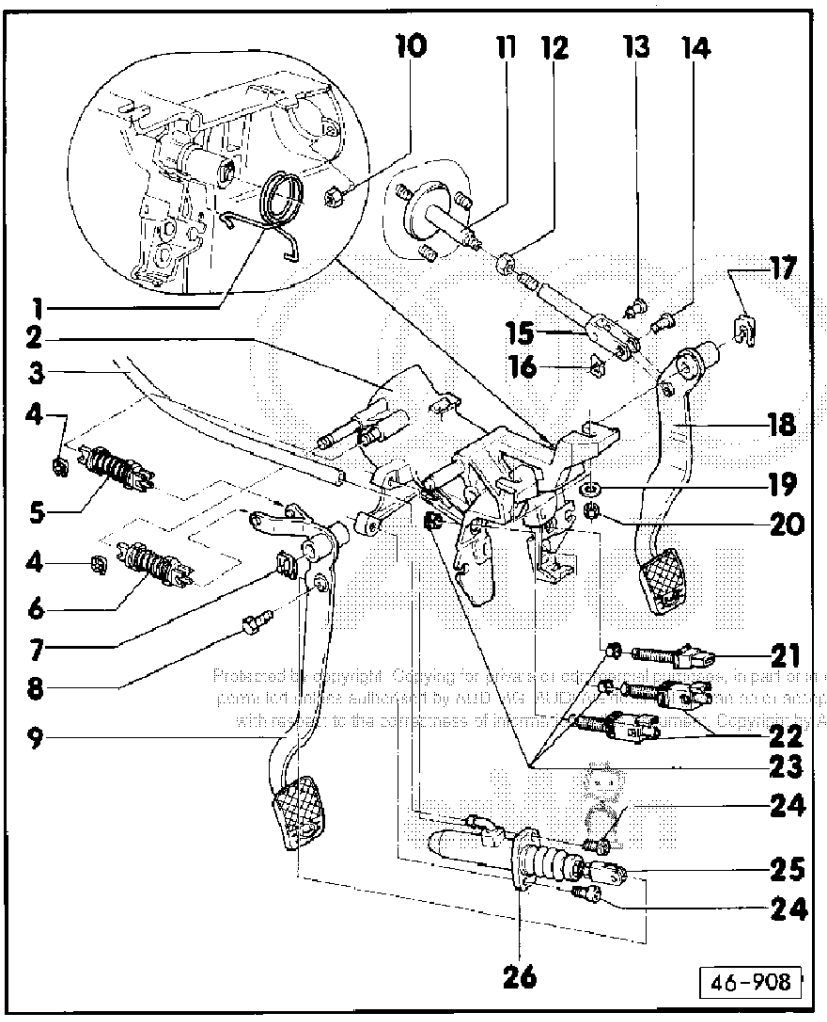
6 – **Over-centre spring**
- ♦ Red mark
- ♦ Do not grease spring
- ♦ Only grease bearings on pedal/pedal bracket
- ♦ Removing and installing => Fig. 4



7 – **Circlip**
- ♦ Replace, attach to shaft of pedal bracket

8 – **Hexagon bolt, 25 Nm**
- ♦ Insert in clevis and bolt to clutch pedal

9 – **Clutch pedal with swing support**
- ♦ Fixed in position by setting of clevis
- ♦ Attach to shaft of pedal brakket
- ♦ Can be removed and installed without taking out pedal brakket.
- ♦ Available as replacement part with moulded bushing; bushing cannot be replaced



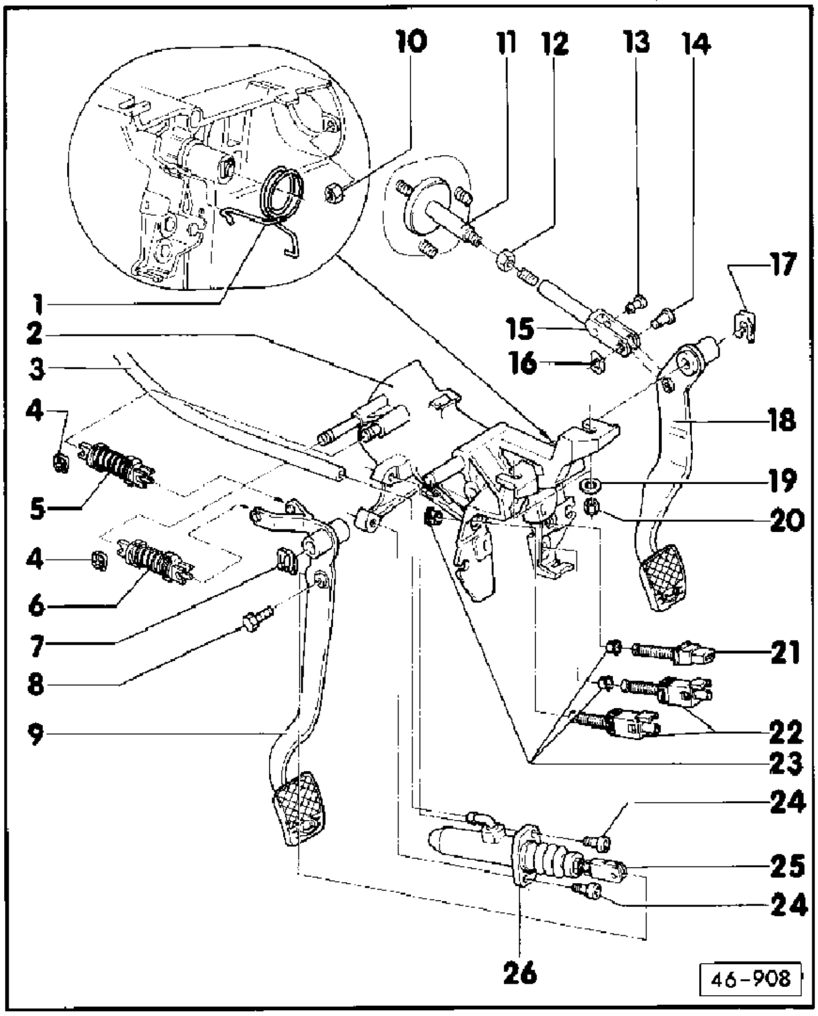
10 – **Self-locking nut, 25 Nm**
- ♦ Always replace
- ♦ Bolt pedal bracket to bulkhead/connector plate

11 – **Pushrod for servo unit**

12 – **Lock nut**
- ♦ Tighten after adjusting clevis

13 – **Grommet**
- ♦ Insert in clevis

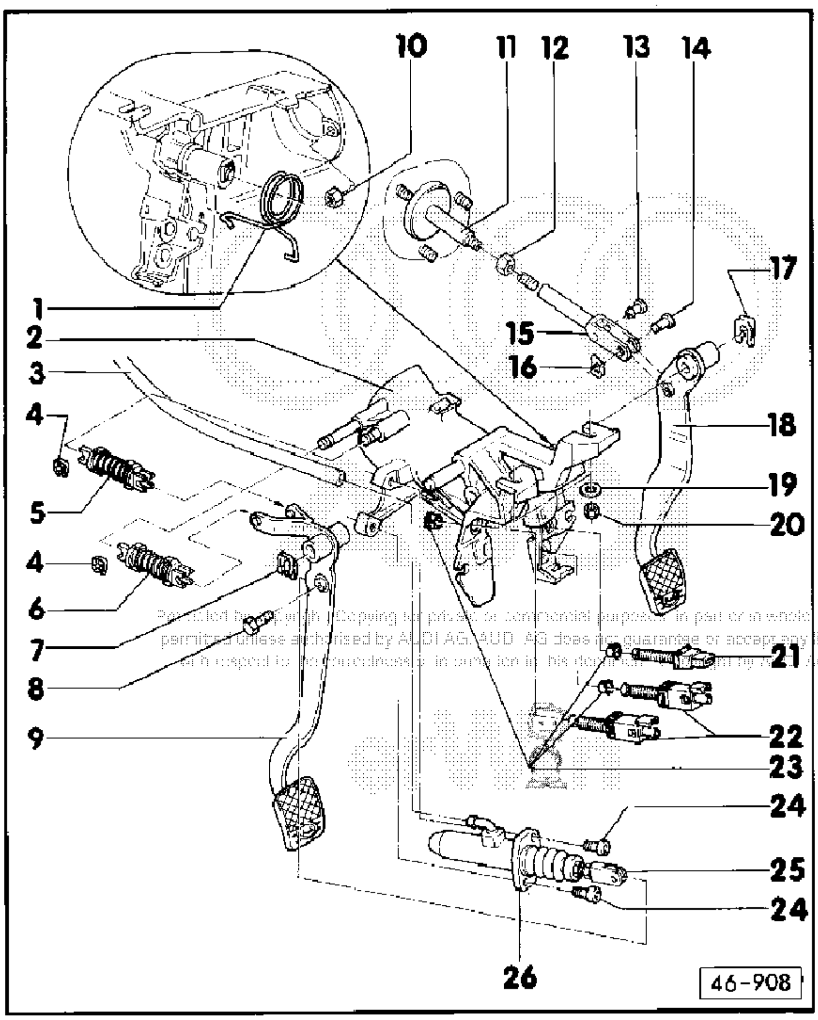
14 – **Pin**
- ♦ Insert in clevis and brake pedal



15 – **Clevis of brake servo**
- ♦ Adjusting:
  - – Vehicles with pneumatic brake servo => Page 47-43, Fig. 1
  - – Vehicles with hydraulic brake servo =>Page 47-44, Fig. 2

16 – **Circlip**
- ♦ Always replace
- ♦ Fit onto pin

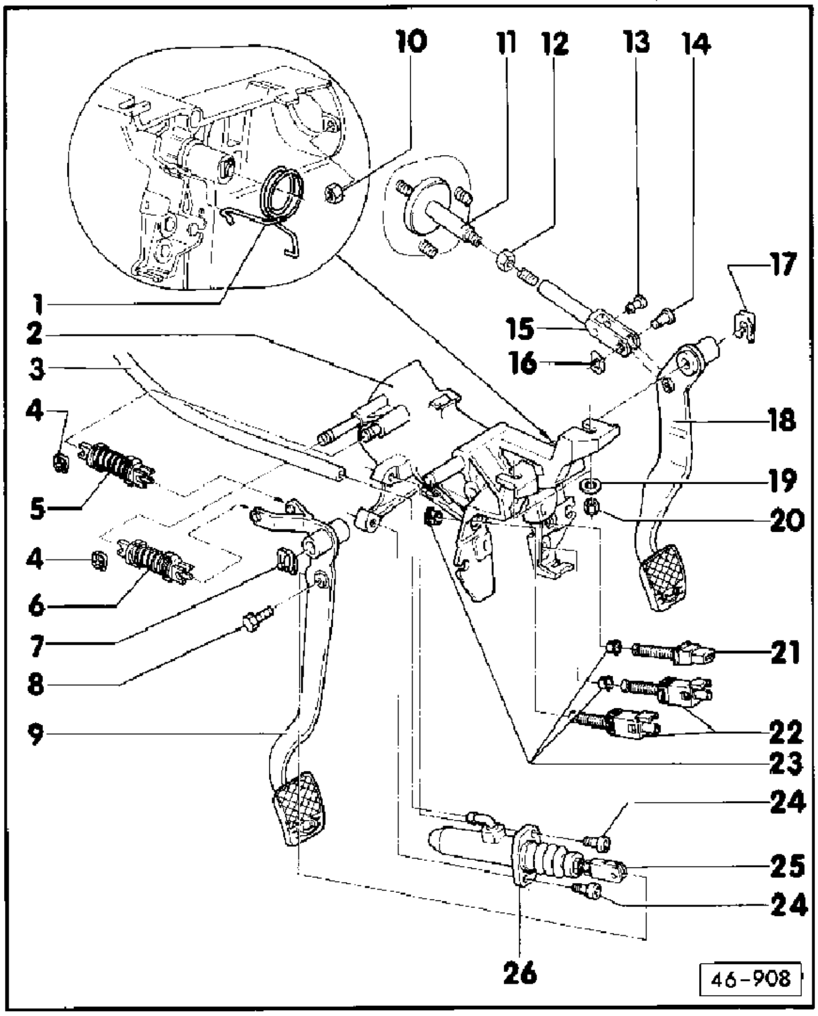
17 – **Circlip**
- ♦ Replace, attach to shaft of pedal bracket



18 – **Brake pedal**
- ♦ Attach to shaft of pedal brakket
- ♦ Can be removed and installed without taking out pedal brakket.
- ♦ Available as replacement part with moulded bushing; bushing cannot be replaced

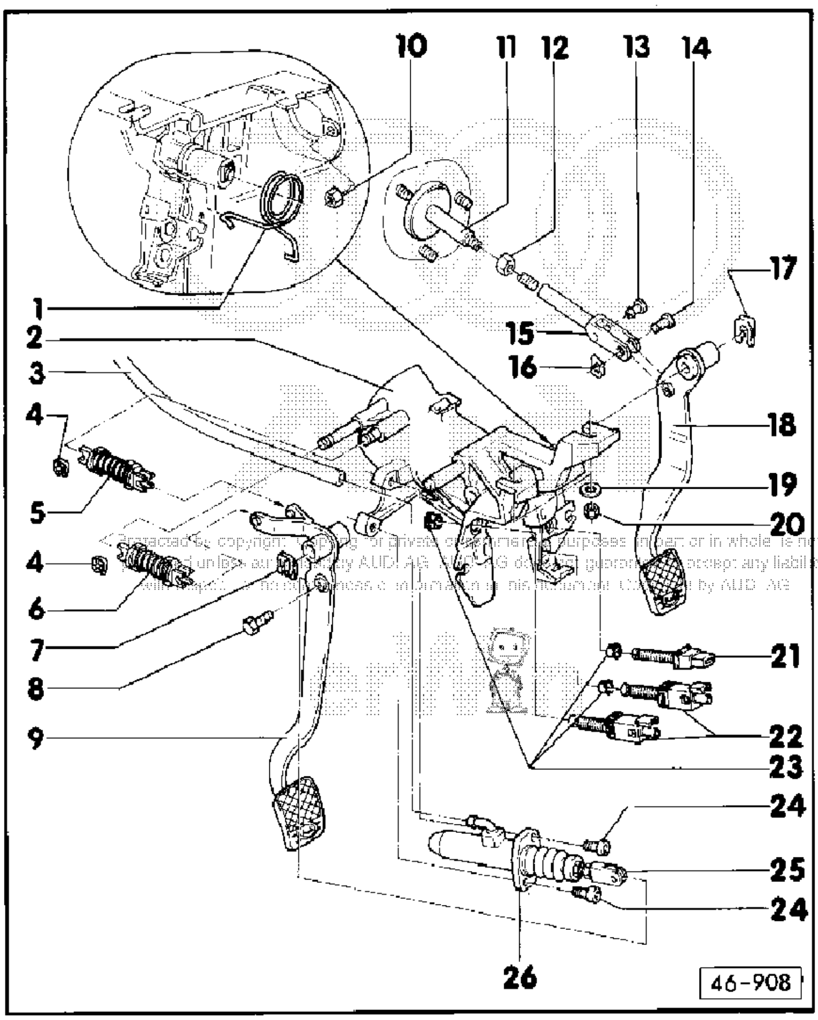
19 – **Shim**

20 – **Self-locking nut, 25 Nm**
- ♦ Always replace



21 – **Brake light switch**
- ♦ Adjusting:
- – Press brake pedal
- – Press in brake light switch as far as it will go
- – Pull back brake pedal by hand as far as stop

22 – **Bleeder valves**
- ♦ Adjust with clevis in position
- – Press brake/clutch pedal
- – Press in bleeder valve as far as it will go
- – Pull back brake/clutch pedal by hand as far as stop



23 – **Clip**
- ♦ Press home in pedal bracket

24 – **Cheese-head bolt, 20 Nm**
- ♦ Screw master cylinder to pedal bracket

25 – **Clevis**
- ♦ With welded-on nut, thread: M8
- ♦ Adjusting clevis => Page 46-38, Fig. 1

26 – **Clutch master cylinder**
- ♦ Replace if leaking

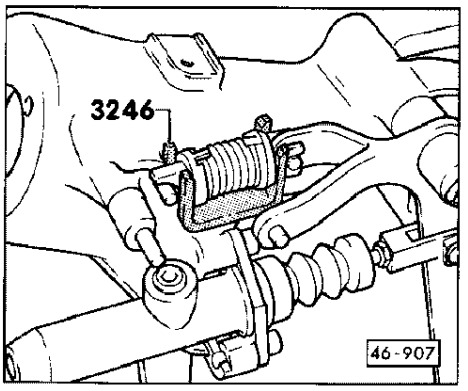


Fig.3 Inner support spring (brown)

- Remove retainer from support pin
- Insert clamp -3117- downwards as shown by gently pressing clutch pedal, then actuate clutch pedal accordingly and while doing so remove over-centre spring from support pin/clutch pedal

Note:

The inner support spring can only be removed after taking out the outer over-centre spring.

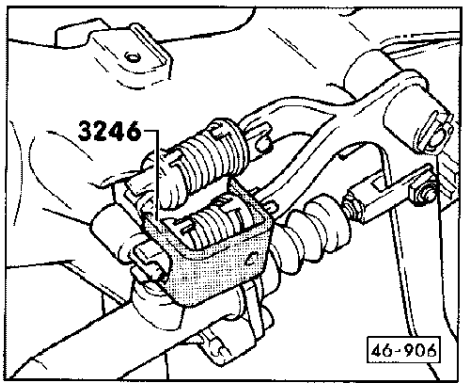
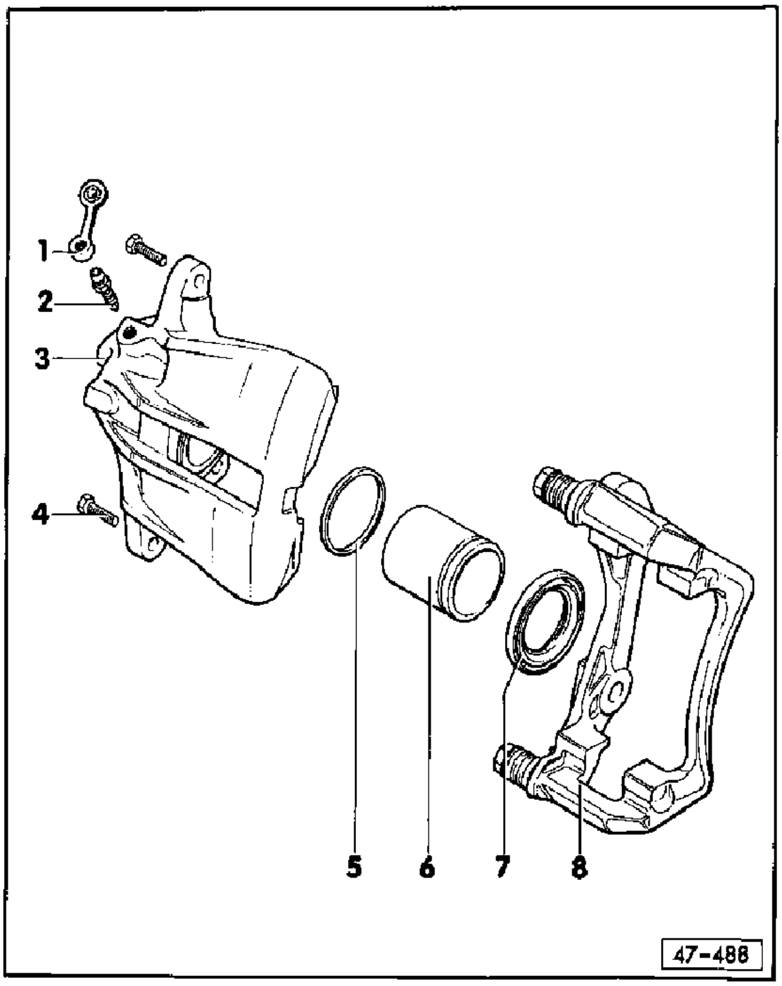


Fig.4 Outer over-centre spring (red)

Note:

The illustration shows the clamp with the pedal bracket removed.

- Remove retainer from support pin
- Insert clamp -3117- as shown, press clutch pedal and while doing so remove over-centre spring from pedal bracket/clutch pedal.



Servicing front brake calliper

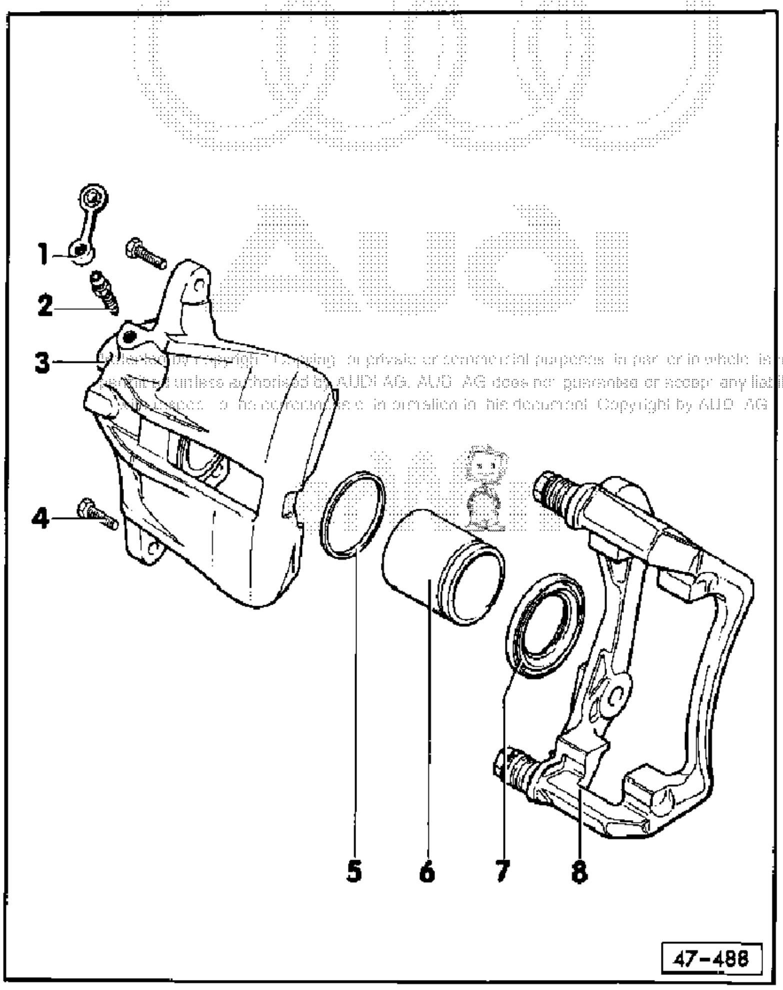
Girling brake calliper

Notes:

- ♦ When carrying out repairs install all parts supplied in repair kit.
- ♦ Apply thin coat of brake cylinder paste B 000 100 to brake cylinder, piston and seal.

1 – **Dust cap**
- ♦ Fit onto bleeder valve

2 – **Bleeder valve**
- ♦ Apply thin coat of brake cylinder paste before screwing in.



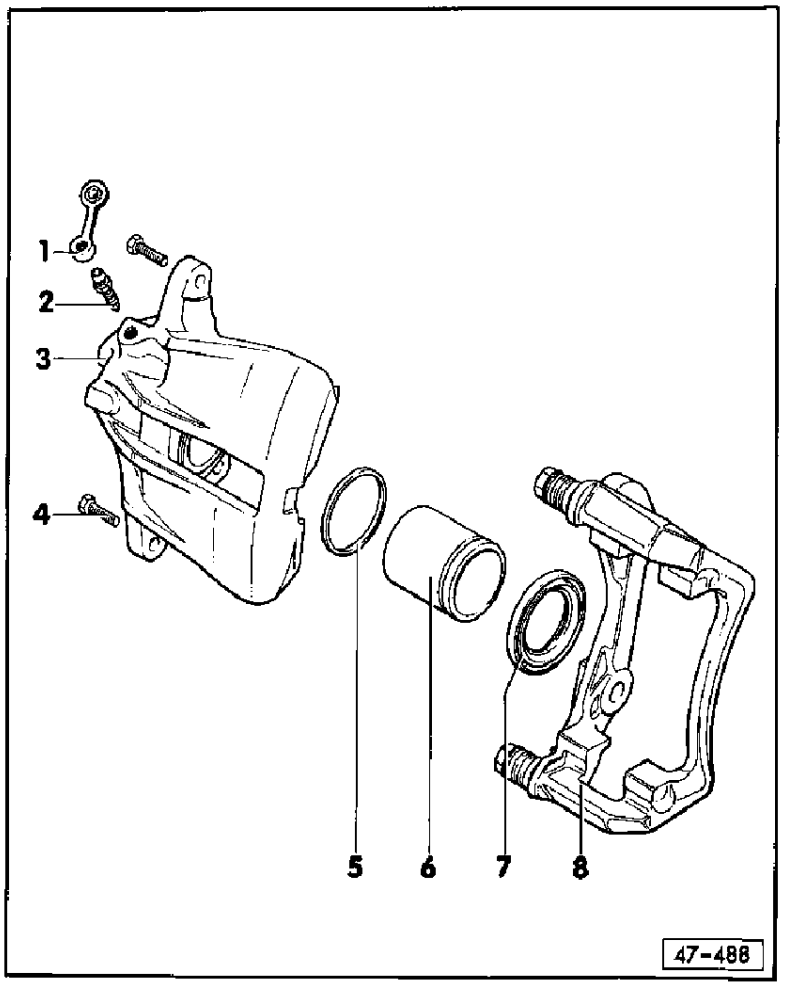
3 – **Brake calliper housing**

4 – **Self locking bolt, 35 Nm**
- ♦ Always replace
- ♦ When loosening and tightening counter hold on guide pin

5 – **Oil seal**
- ♦ Remove with a screwdriver => Fig. 2

6 – **Piston**
- ♦ Use compressed air to press out of brake calliper housing =>Fig. 1
- ♦ Piston diameter 54 mm

> **Attention**
>
> **Place a piece of wood in the recess to prevent damaging the piston.**



- ♦ Installing = > Fig. 3, 4 and 5
- ♦ First coat the piston lightly with brake cylinder paste.

7 – Protective cap

- ♦ Do not damage when inserting piston

8 – Brake carrier with guide pins and protective caps

- ♦ Supplied as replacement part, assembled with sufficient grease on guide pins
- ♦ If protective caps are damaged install repair kit
- ♦ Use grease sachet supplied to lubricate guide pins

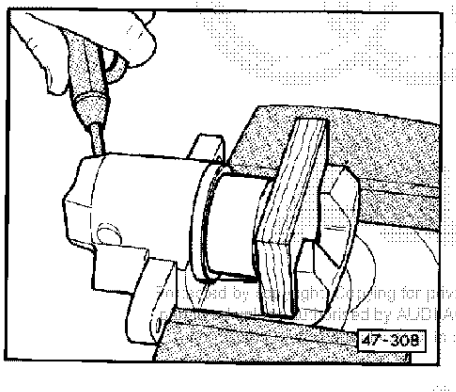


Fig.1 Using compressed air to press pistons individually out of brake calliper housing

Note:

Place a piece of wood in the recess to prevent damaging the piston.

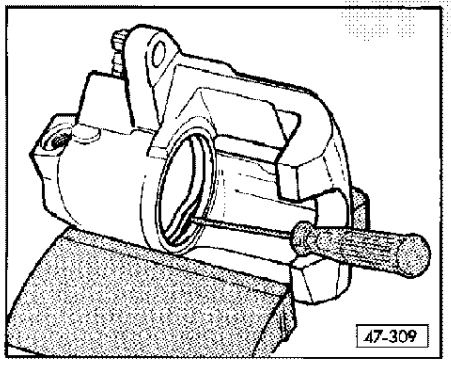


Fig. 2 Carefully removing seals with screwdriver

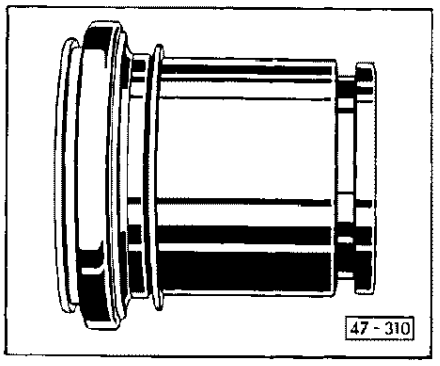


Fig.3 Attaching outer sealing lip of protective cap to piston

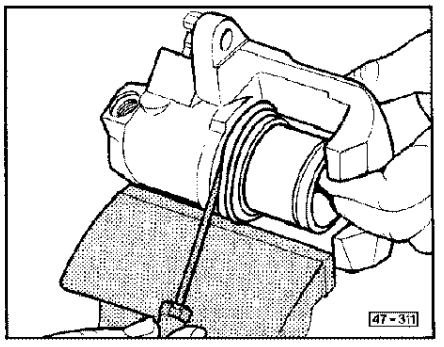


Fig. 4 Inserting inner sealing lip of protective cap into the calliper housing groove using a screwdriver

Note:

Hold piston in front of brake calliper housing.

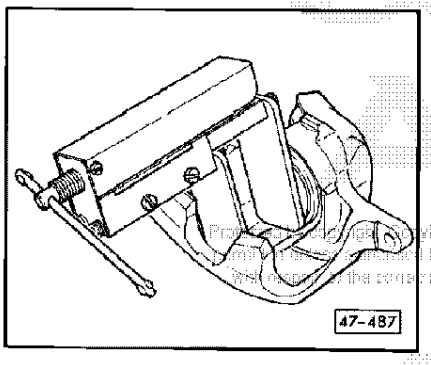
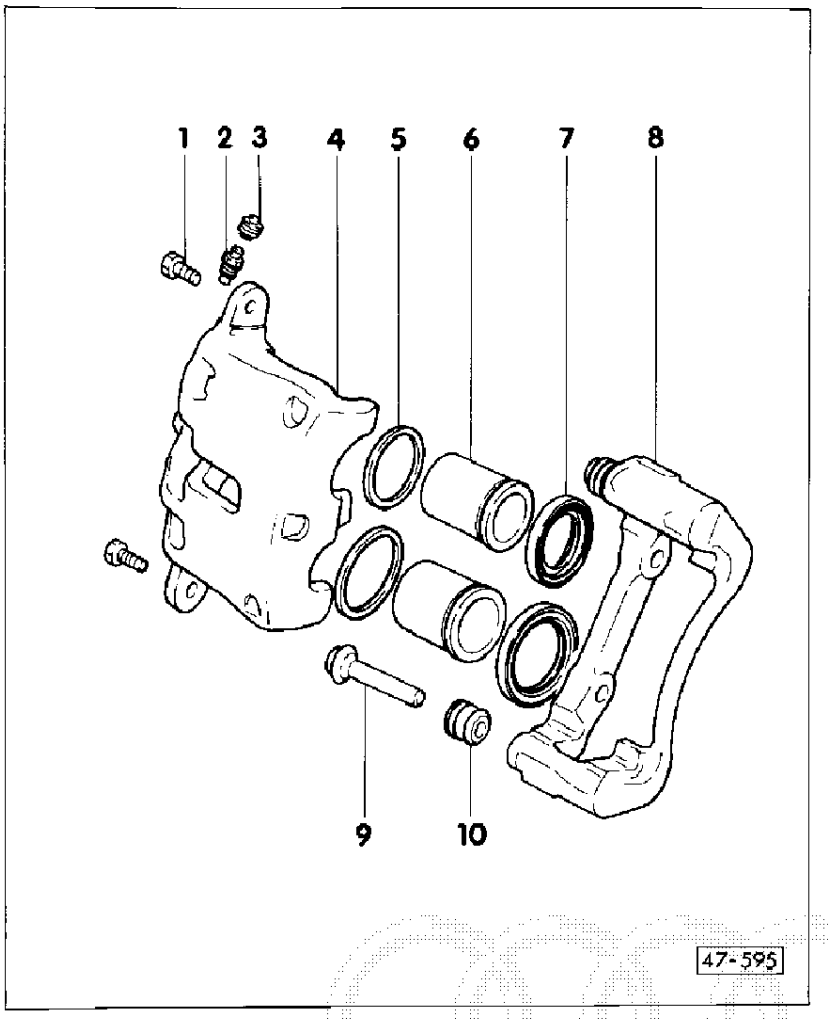


Fig. 5 Press the piston into the brake calliper housing using a piston resetting tool

Note:

When pressing in, outer sealing lip of protective cap jumps into groove in piston.

Dual-piston brake calliper



Notes:

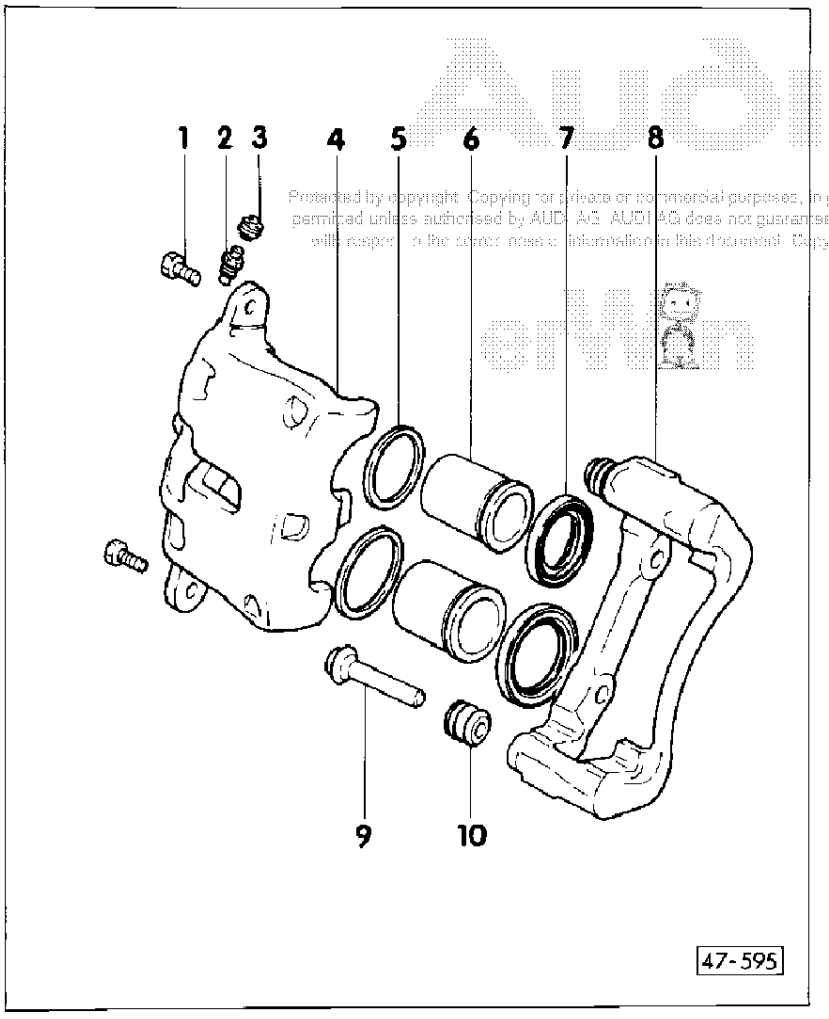
- ♦ When carrying out repairs install all parts supplied in repair kit.
- ♦ Apply thin coat of brake cylinder paste B 000 100 to brake cylinder, piston and seal.

1 – Self locking bolt, 35 Nm

- ♦ Always replace
- ♦ When loosening and tightening counter hold on guide pin

2 – Vent valve

- ♦ Apply thin coat of brake cylinder paste to thread before screwing in.



3 – Dust cap

- ♦ Fit onto bleeder valve

4 – Brake calliper housing

5 – Oil seal

- ♦ Remove with a screwdriver => Fig. 2

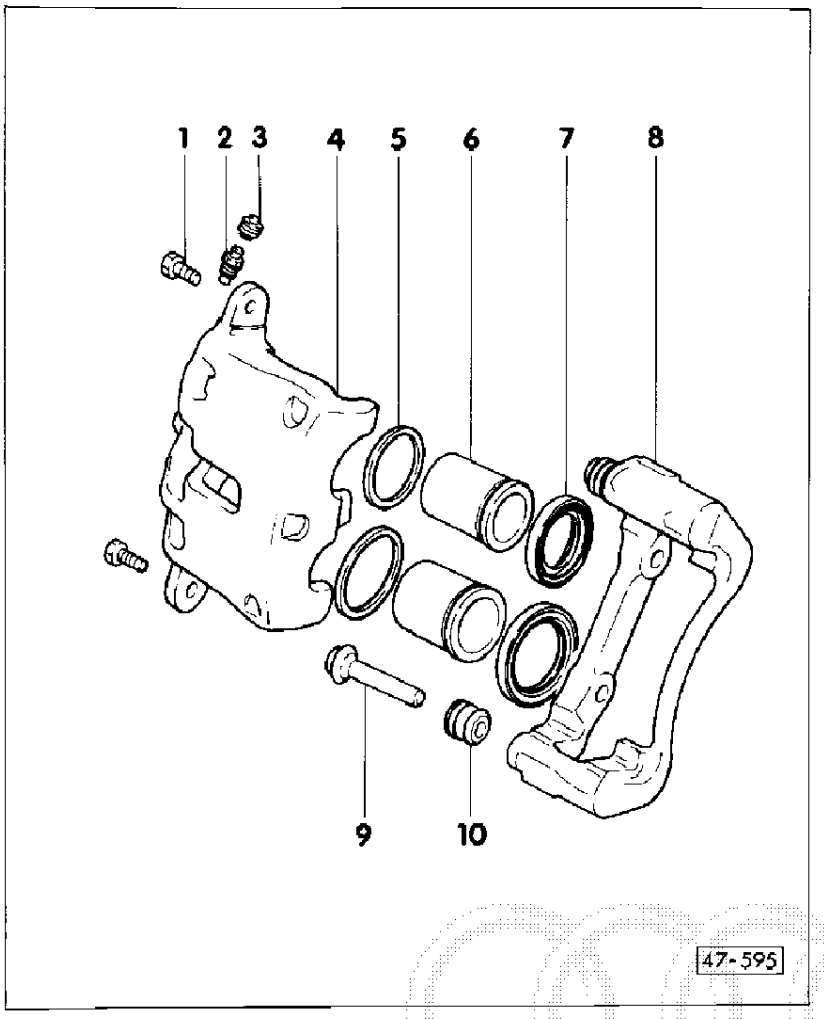
6 – Piston

- ♦ Use compressed air to press out of brake calliper housing =>Fig. 1

Attention

Place a piece of wood in the recess to prevent damaging the piston. Risk of accident!

- ♦ Piston diameter 40/45 mm
- ♦ Installing => Fig. 3, 4 and 5
- ♦ First coat the piston lightly with brake cylinder paste.

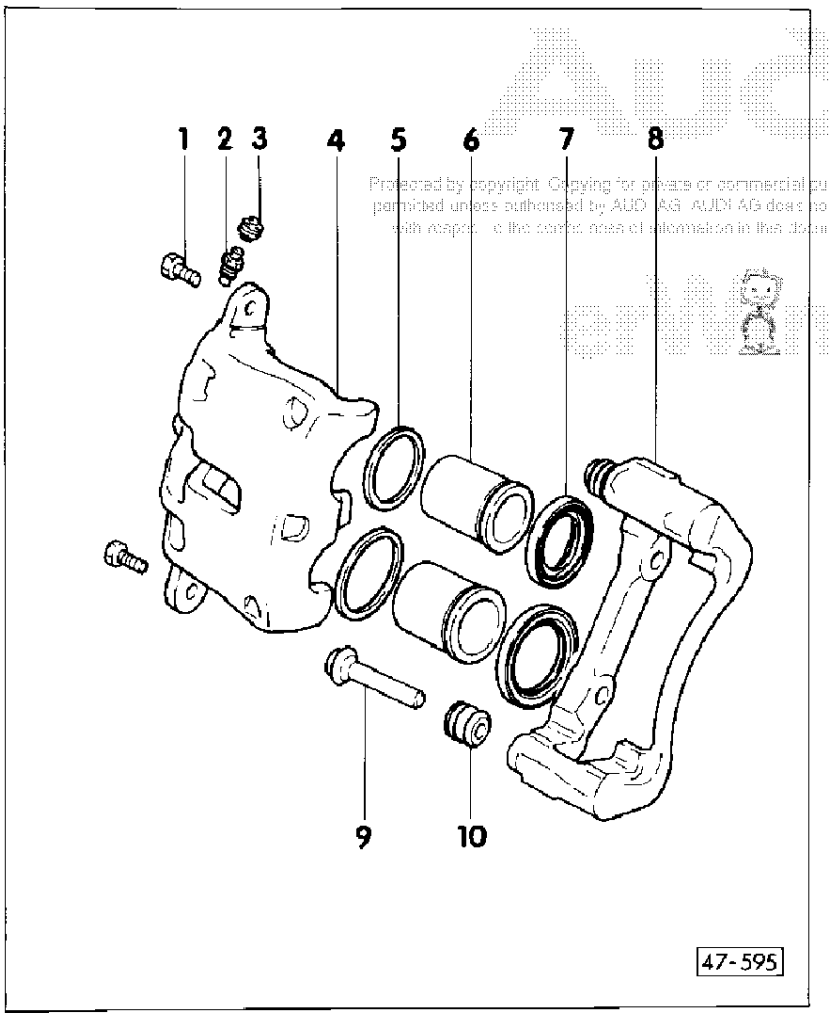


7 – Protective cap

- ♦ Fit onto piston with outer sealing lip => Fig. 3
- ♦ Insert with inner sealing lip in groove in brake calliper housing => Fig. 4

8 – Brake carrier with guide pins and protective caps

- ♦ Supplied as replacement part, assembled with sufficient grease on guide pins
- ♦ If protective caps are damaged install repair kit
- ♦ Use grease sachet supplied to lubricate guide pins



9 – Guide pin

- ♦ Grease before fitting protective caps

10 – Protective cap

- ♦ Pull onto brake carrier and guide pin

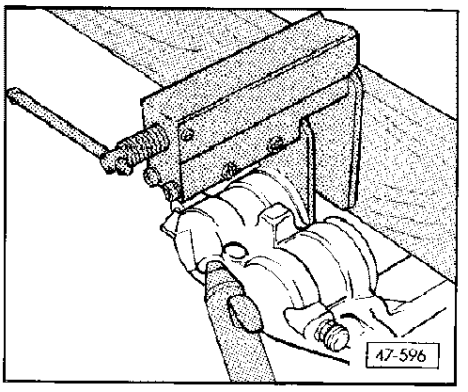


Fig.1 Using compressed air to press pistons individually out of brake calliper housing

Note:

Place a piece of wood in the recess to prevent damaging the piston.

Only one piston can be pressed out at a time, when doing so, hold other piston in position in brake calliper housing using piston resetting tool.

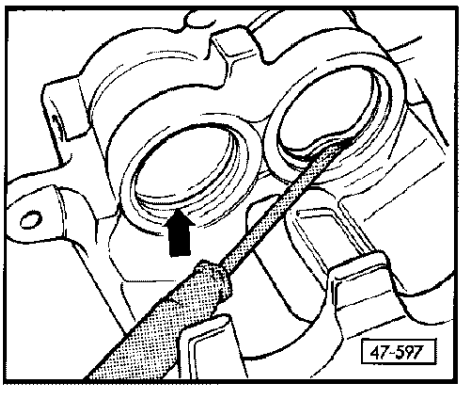


Fig. 2 Carefully removing seals with screwdriver

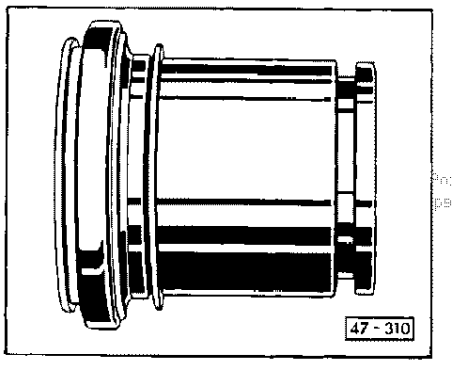


Fig.3 Attaching outer sealing lip of protective cap to piston

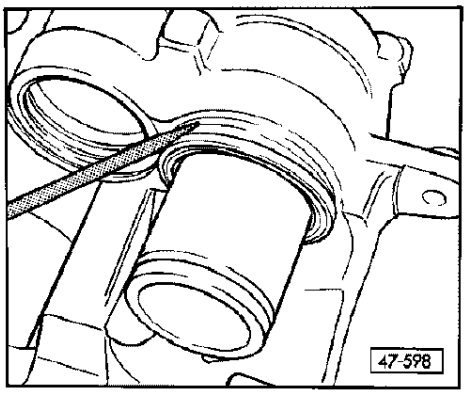
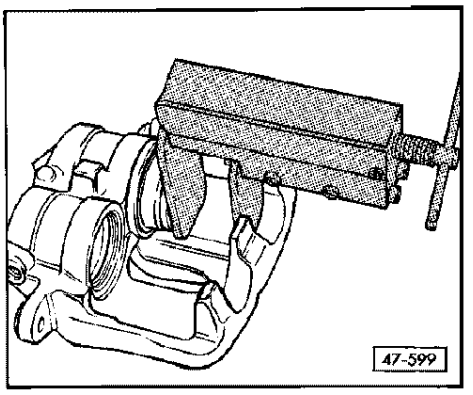


Fig. 4 Inserting inner sealing lip of protective cap into the calliper housing groove using a screwdriver

Note:

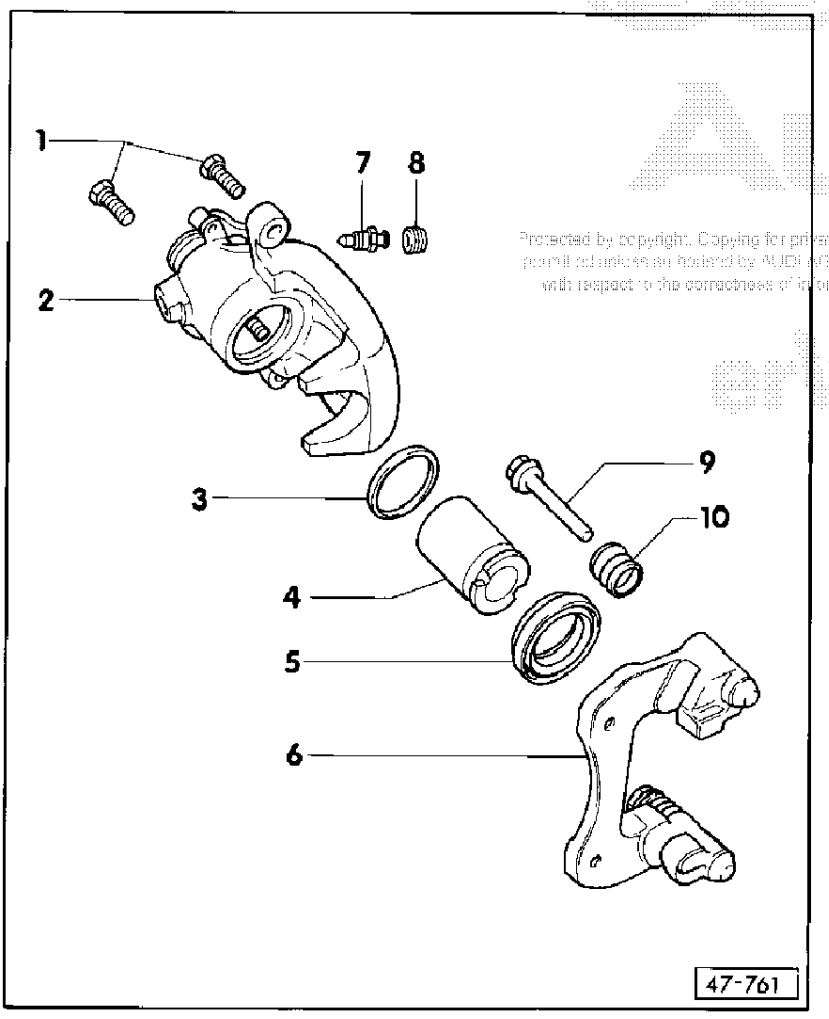
Hold piston in front of brake calliper housing.



◀ **Fig. 5 Press the piston into the brake calliper housing using a piston resetting tool**

Note:

When pressing in, outer sealing lip of protective cap jumps into groove in piston.

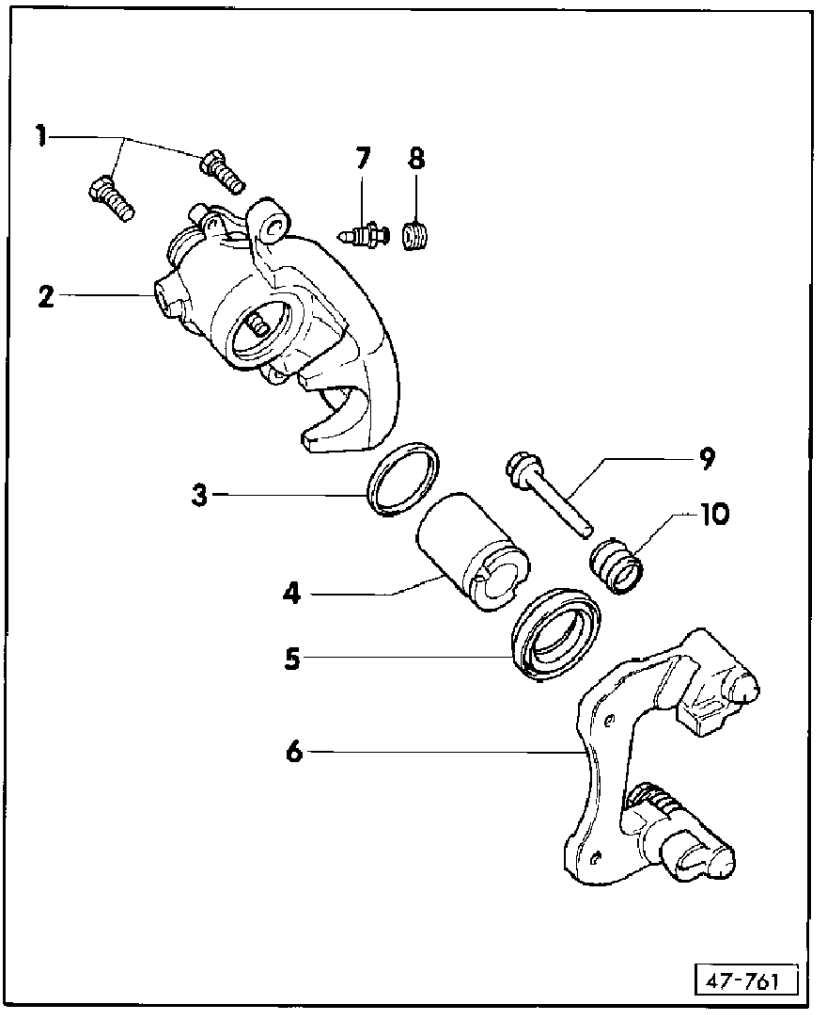


Servicing rear brake callipers

Notes:

- ♦ When carrying out repairs install all parts supplied in repair kit.
- ♦ Apply thin coat of brake cylinder paste B 000 100 to brake cylinder, piston and seals.

1 – **Self locking bolt, 35 Nm**
- ♦ Always replace
- ♦ When loosening and tightening counter hold on guide pin



2 – Brake calliper housing with handbrake cable lever

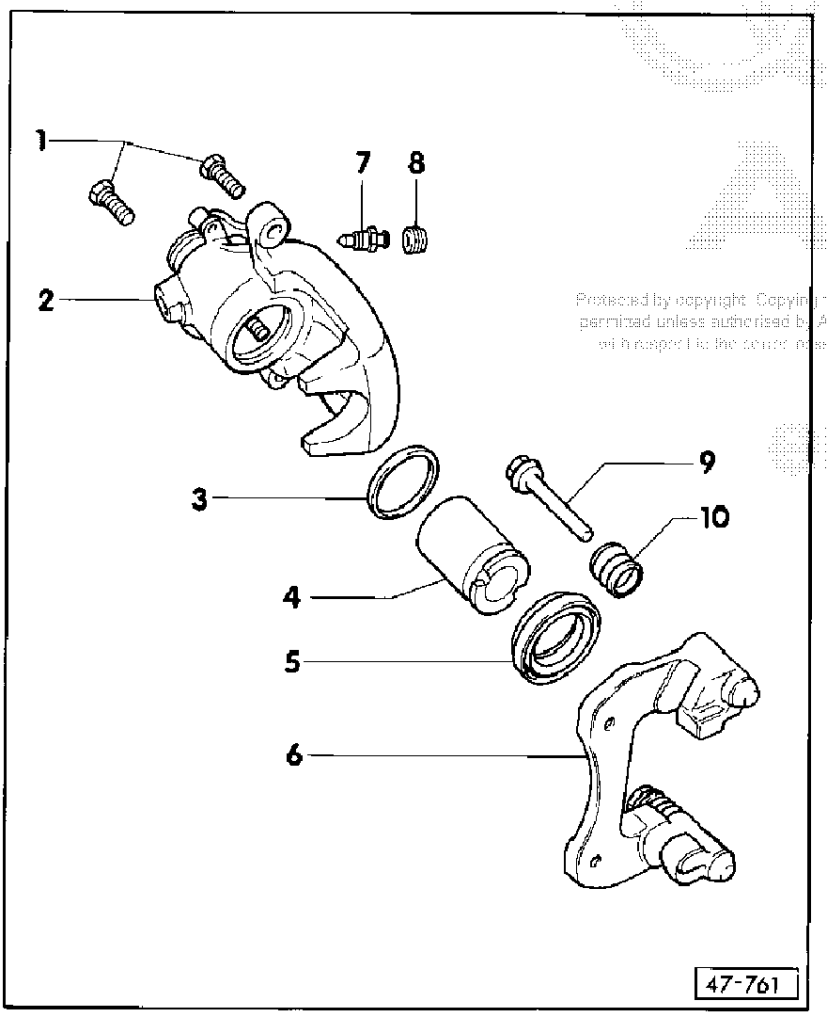
- ♦ Renew the brake calliper housing if there is a leak at the lever for the handbrake cable

3 – Oil seal

- ♦ Remove with a screwdriver => Fig. 3

4 – Piston with automatic adjustment

- ♦ Unscrewing from brake calliper housing =>Fig. 1
- ♦ Screwing into brake calliper housing =>Fig. 5
- ♦ Piston diameter 38 mm

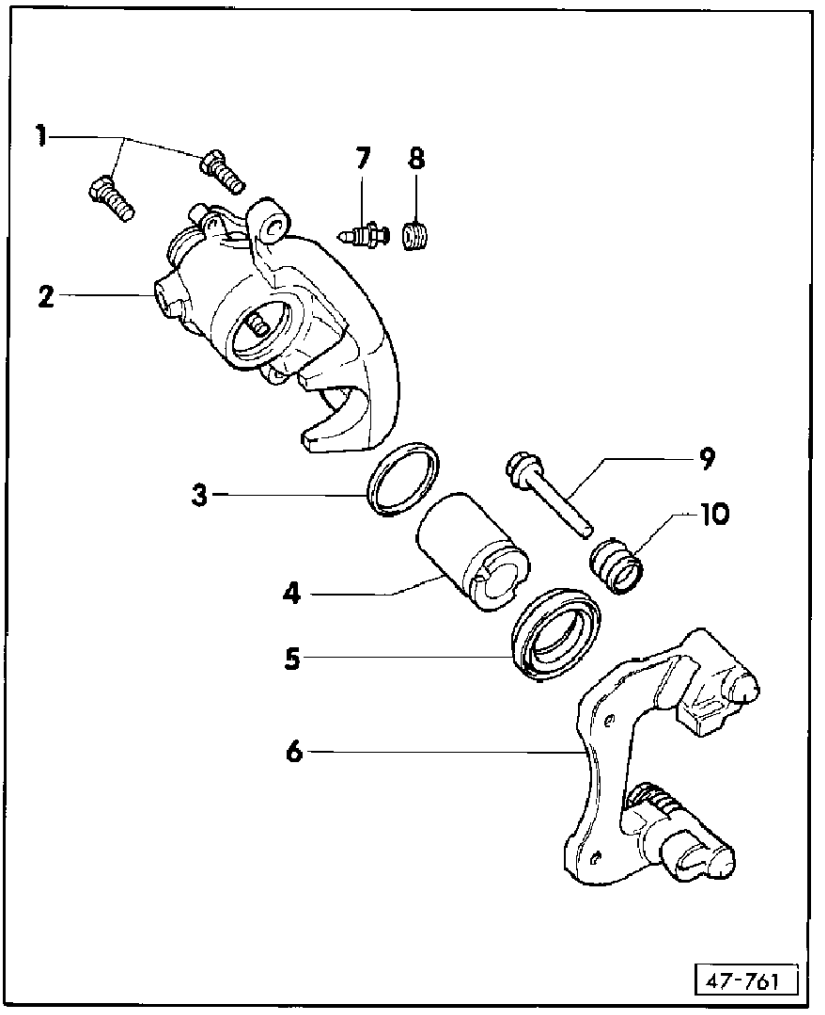


5 – Protective cap

- ♦ Fit onto piston with outer sealing lip =>Fig. 2
- ♦ Insert with inner sealing lip in groove in brake calliper housing => Fig. 4

6 – Brake carrier with guide pins and protective caps

- ♦ Supplied as replacement part, assembled with sufficient grease on guide pins
- ♦ If protective caps are damaged install repair kit
- ♦ Use grease sachet supplied to lubricate guide pins



7 – Bleeder valve
- ♦ Apply thin coat of brake cylinder paste to thread before screwing in

8 – Dust cap
- ♦ Fit onto bleeder valve

9 – Guide pin
- ♦ Grease before fitting protective cap

10 – Protective cap
- ♦ Pull onto brake carrier and guide pin

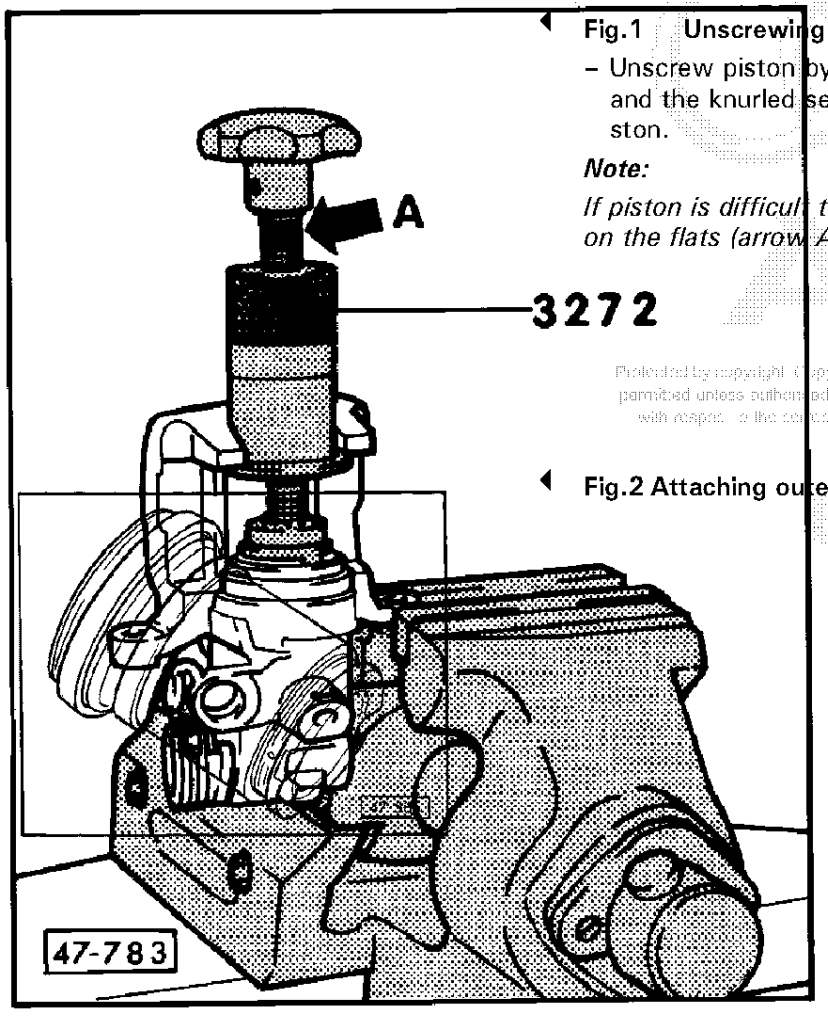


Fig.1 Unscrewing piston from brake calliper housing

– Unscrew piston by turning the threaded spindle anti-clockwise and the knurled section clockwise. Pull out sealing lip with piston.

Note:

If piston is difficult to move, use a 13 mm AF open jaw spanner on the flats (arrow A) provided for this purpose.

Fig.2 Attaching outer sealing lip of protective cap to piston

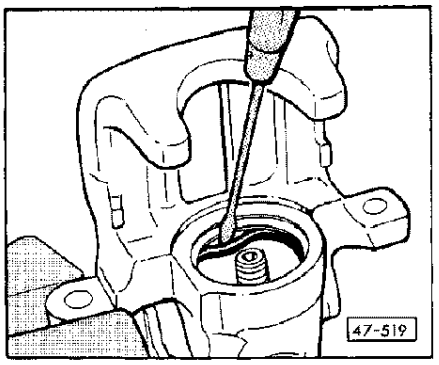


Fig. 3 Carefully removing seal with screwdriver

Note:

Ensure that the surface of the cylinder is not damaged during removal.

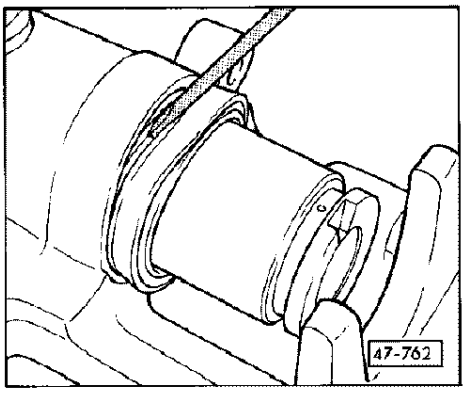


Fig. 4 Inserting inner sealing lip of protective cap into the calliper housing groove using a screwdriver

Note:

Hold piston in front of brake calliper housing.

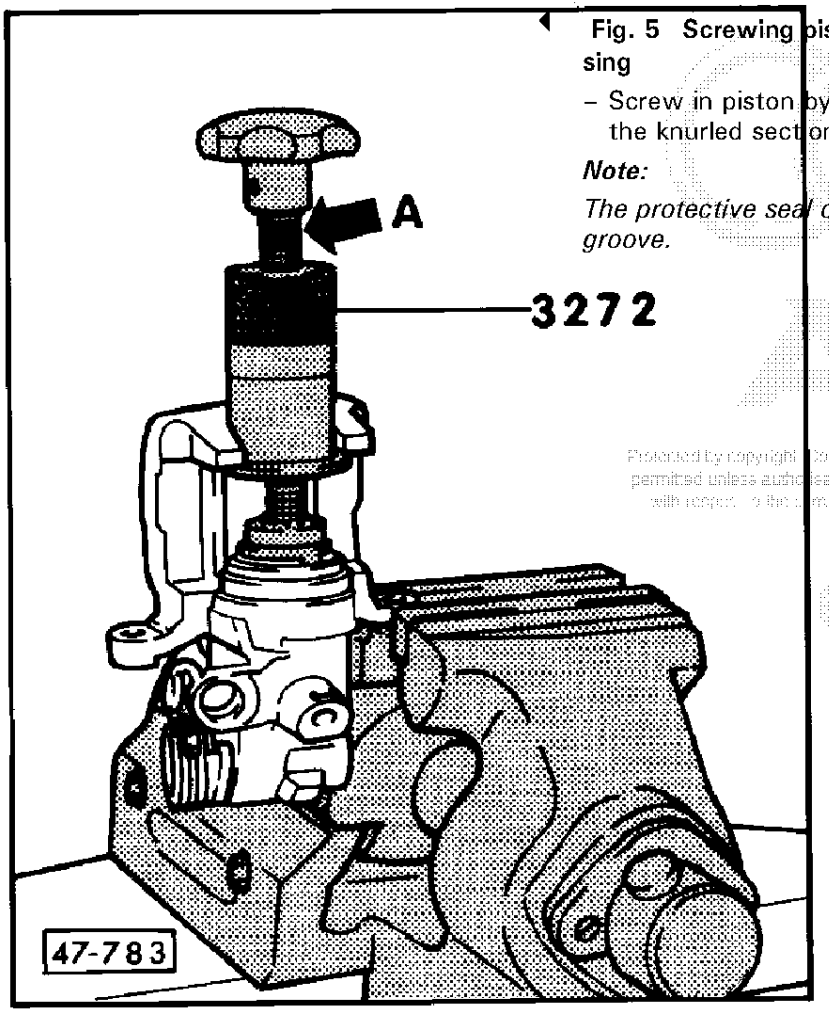
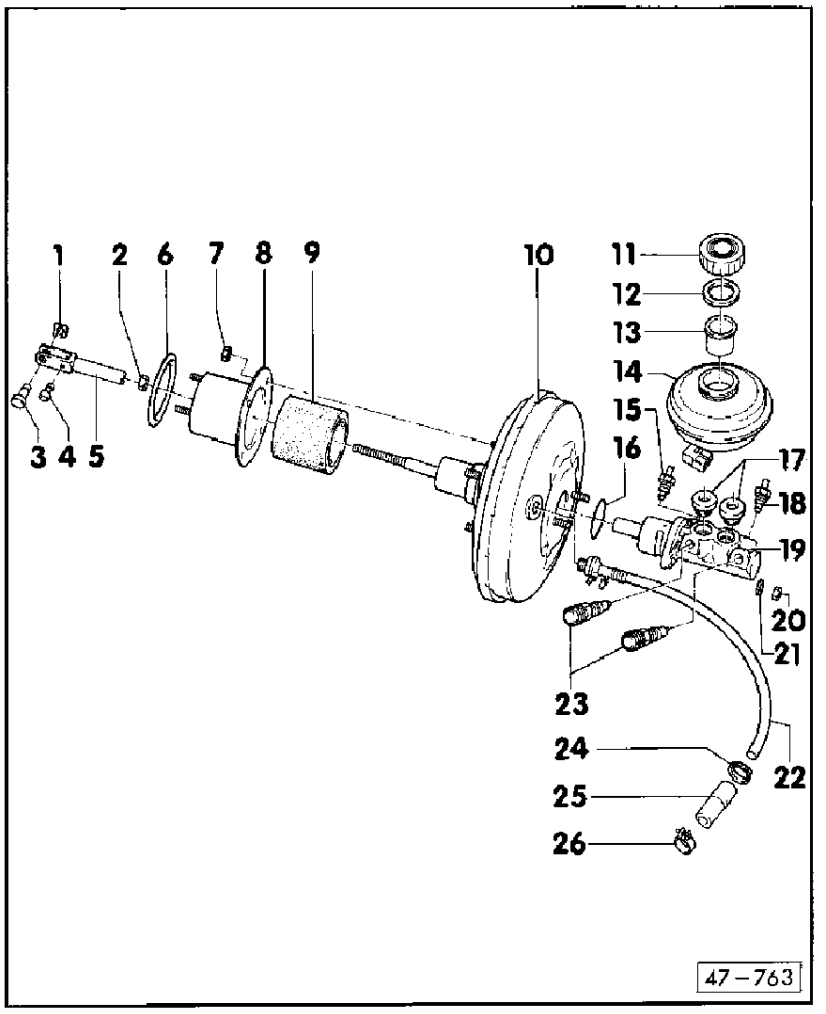


Fig. 5 Screwing piston as far as its stop into brake calliper housing

– Screw in piston by turning the threaded spindle clockwise and the knurled section anti-clockwise.

Note:

The protective seal outer sealing lip will then locate in the piston groove.



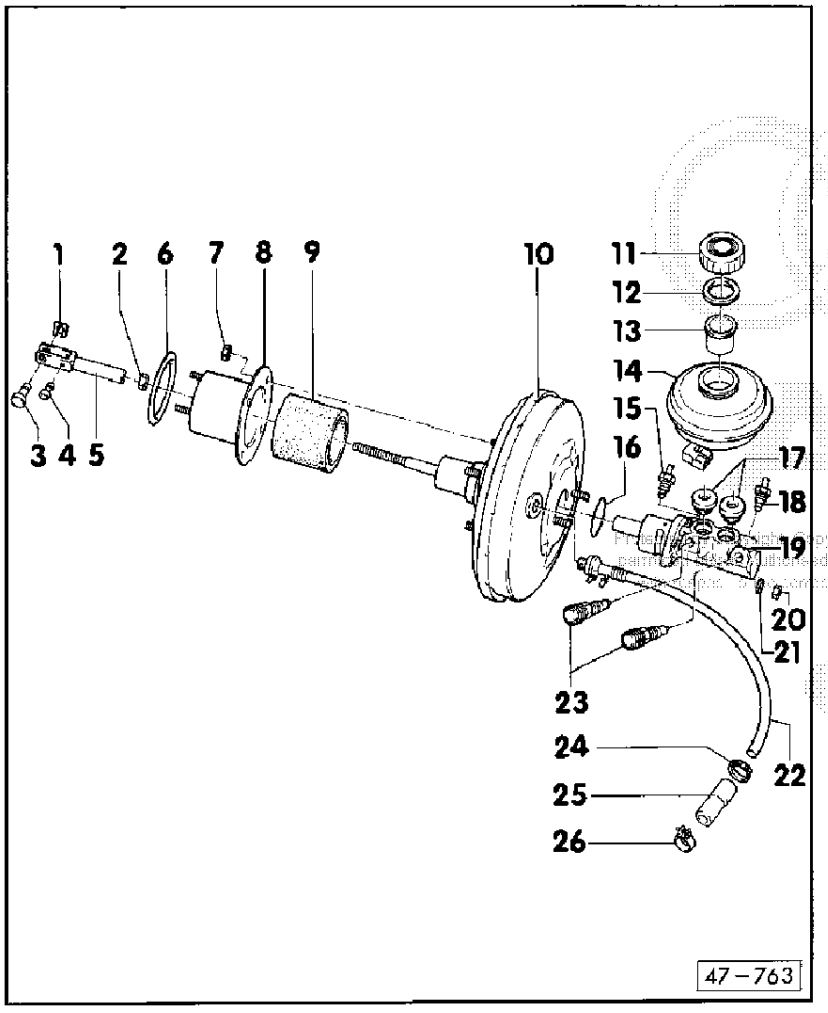
Servicing brake master cylinder/brake servo

Rear axle – front axle brake circuit configuration

The pushrod piston of the brake master cylinder is applied to the brake callipers at the front axle, the floating piston to the brake callipers at the rear axle.

Note:

♦ Use only fresh brake fluid. Refer to label on brake fluid reservoir.



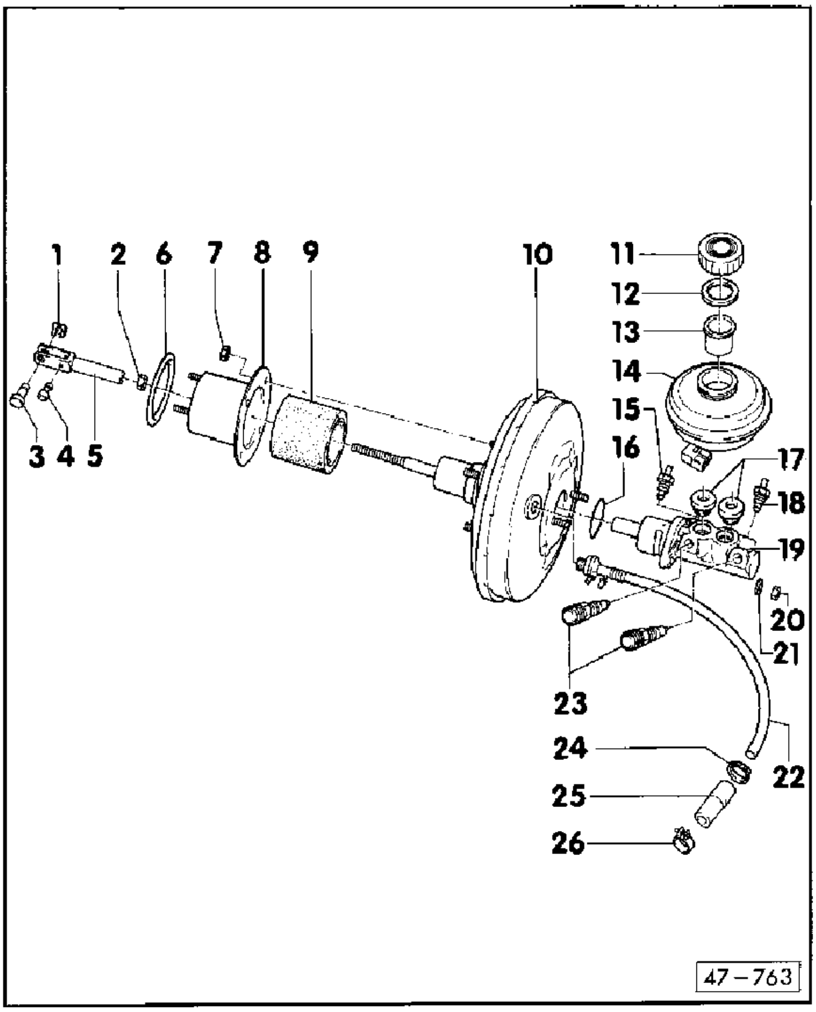
1 – **Lock washer**
- ♦ Always replace
- ♦ Fit onto pin

2 – **Lock nut**
- ♦ Tighten after adjusting clevis

3 – **Pin**
- ♦ Insert in clevis and brake pedal

4 – **Grommet**
- ♦ Insert in clevis
- ♦ Insert coil spring in grommet

5 – **Clevis**
- ♦ Adjusting:
  - Vehicles with pneumatic brake servo: => Fig. 1
  - Vehicles with hydraulic brake servo: => Fig. 2



6 – Oil seal

- Always replace
- Attach to adapter before installing servo unit
- Roll onto bulkhead after attaching servo unit

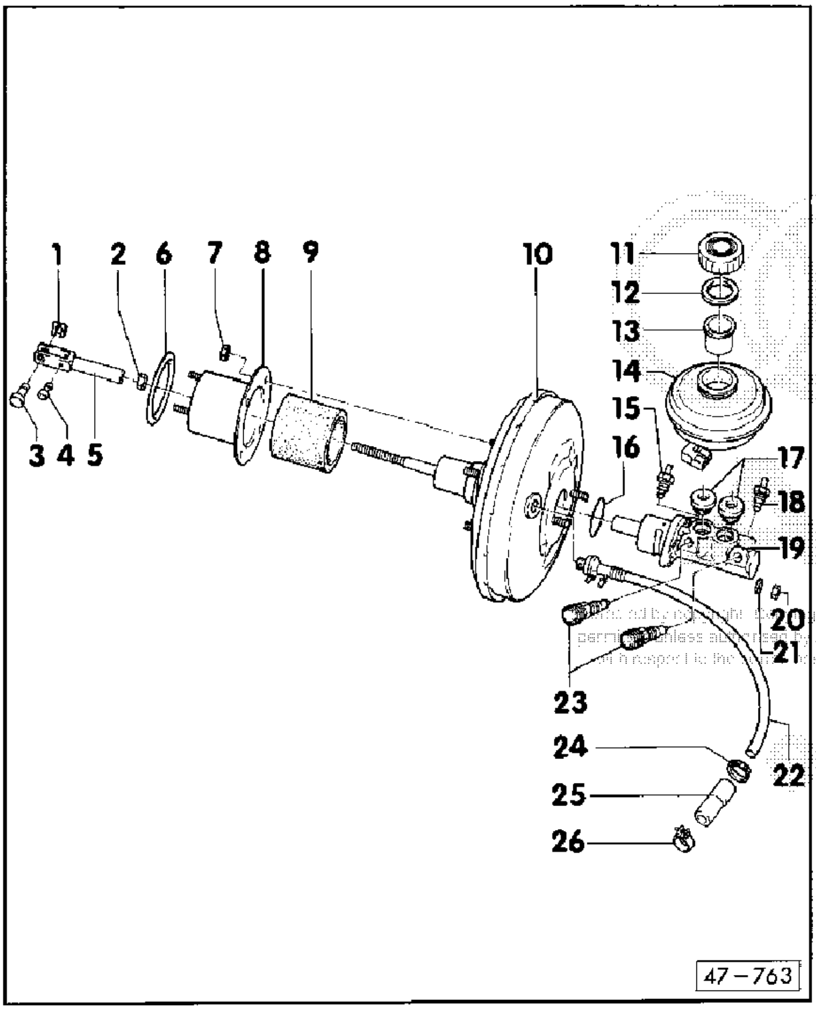
7 – Hexagon nut, 20 Nm

8 – Intermediate piece

- Long version for 9" servo units
- Short version for 10" servo units

9 – Oil seal

- Insert in adapter
- Note that there are different versions:



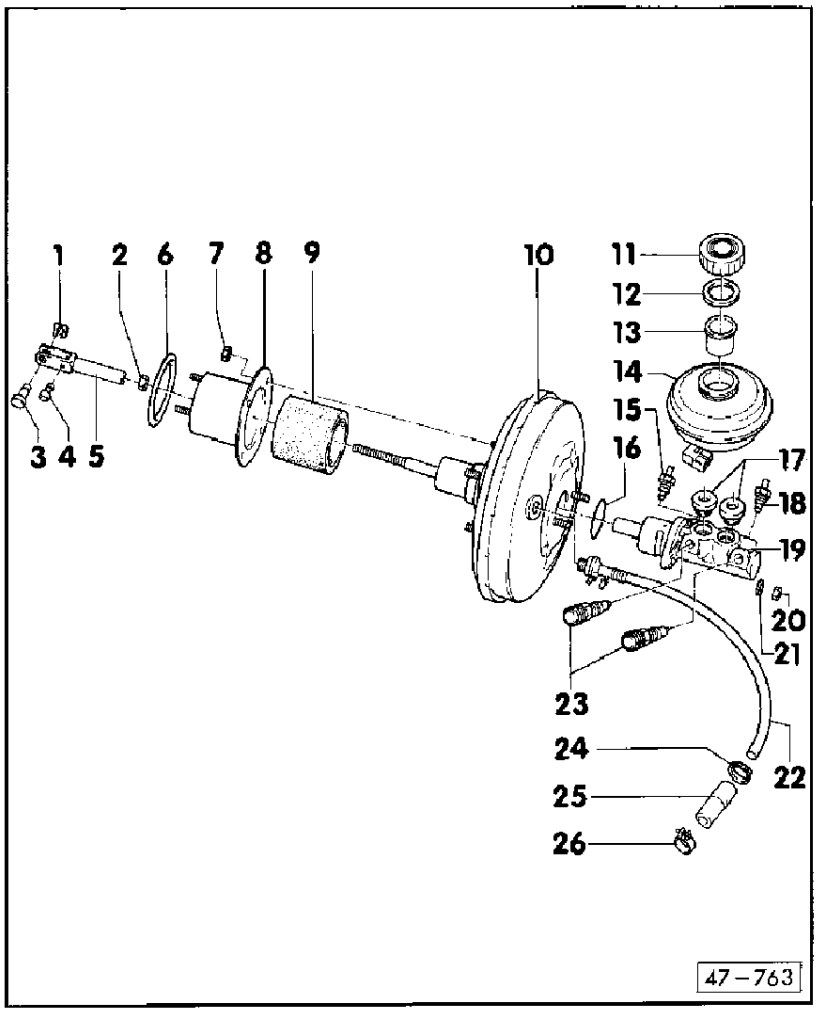
10 – Brake servo

- 9" diameter on vehicles with 4 and 5 cylinder engine
- 10" diameter on vehicles with 6 cylinder engine

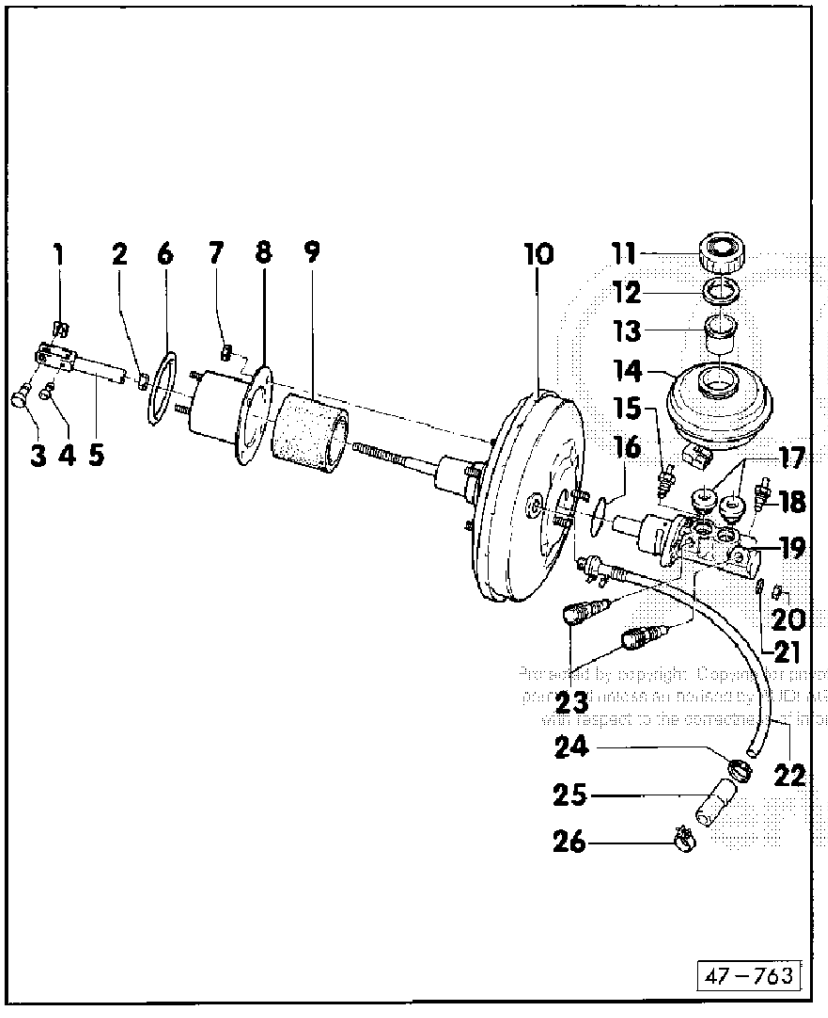
Note:

As of model year 1993, gradual introduction of 10" servo unit for all vehicles.

This modification does not apply to RHD vehicles.

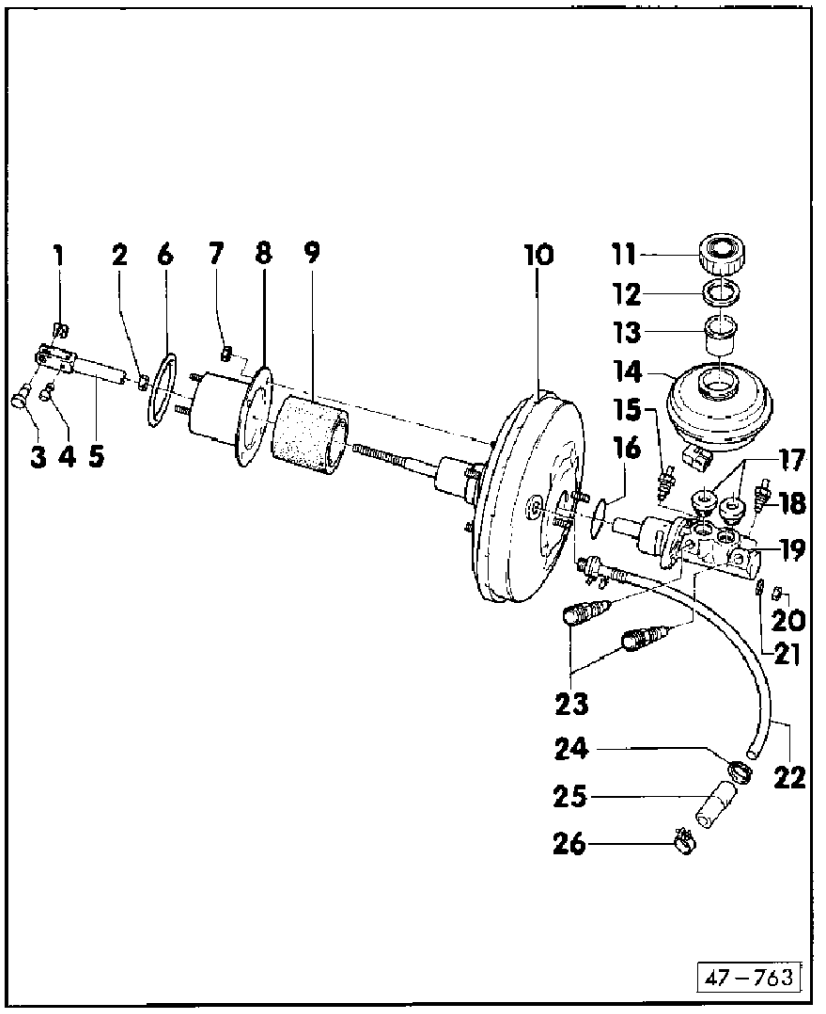


♦ Checking:
– Firmly depress brake pedal several times with engine stopped. This dissipates the vacuum in the unit. Now depress brake pedal with moderate force, hold and start engine.
– If the servo unit is working properly, the pedal will be felt to give slightly under foot (servo assistance becomes effective).



♦ If faulty renew complete.
♦ On 4-cylinder spark-ignition engines the vacuum is taken from the intake manifold
♦ On 5- and 6-cylinder engines vacuum is created by built-in vacuum pump.
♦ Boost factor:
– 9" brake servo: 3.0 : 1
– 10" brake servo: 3.85 : 1
♦ Functional check of vacuum pump:
– Pull vacuum hose off pump and with engine idling use finger to check for suction effect at hose connection

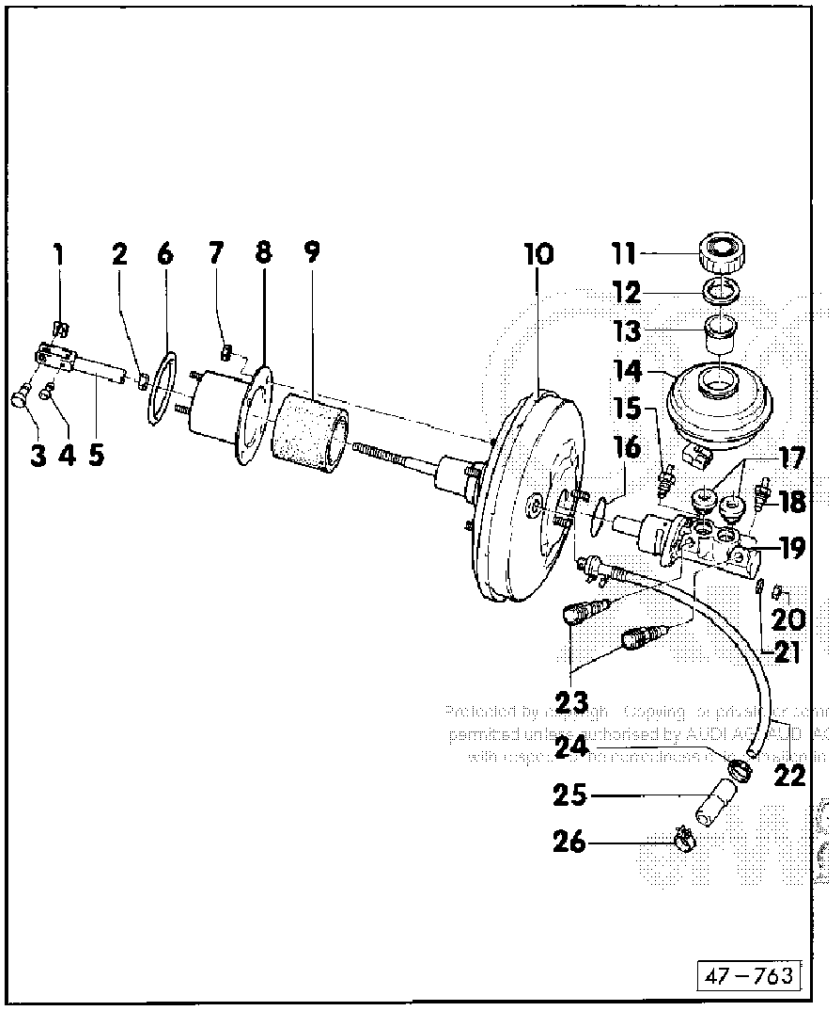
11 – Cap



12 – **Seal**
- ♦ Insert in cap

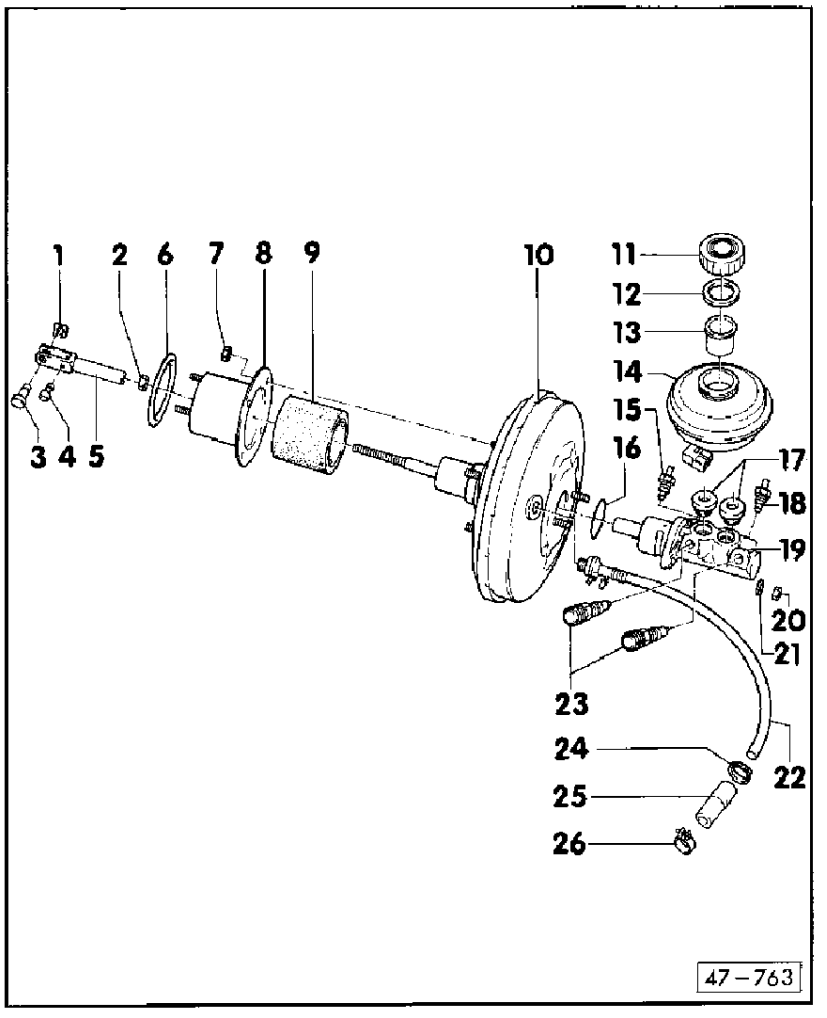
13 – **Strainer**

14 – **Brake fluid reservoir with float indicator**
- ♦ Fill up with brake fluid to "Max" mark
- ♦ Refer to label on reservoir before topping up brake fluid
- ♦ Brake fluid, total quantity approx. 0.6 l in braking system
- ♦ Connection for hydraulic coupling is located on side



- ♦ Functional check of indicator:
- With ignition on, press firmly on centre of cap (membrane). Warning lamp in instrument cluster lights and acoustic alarm sounds.
- ♦ Diaphragm was discontinued as of 07/92. To check indicator, unscrew yellow cap with brake symbol and press by hand on visible strainer with ignition switched on.

15 – **Brake pipe**

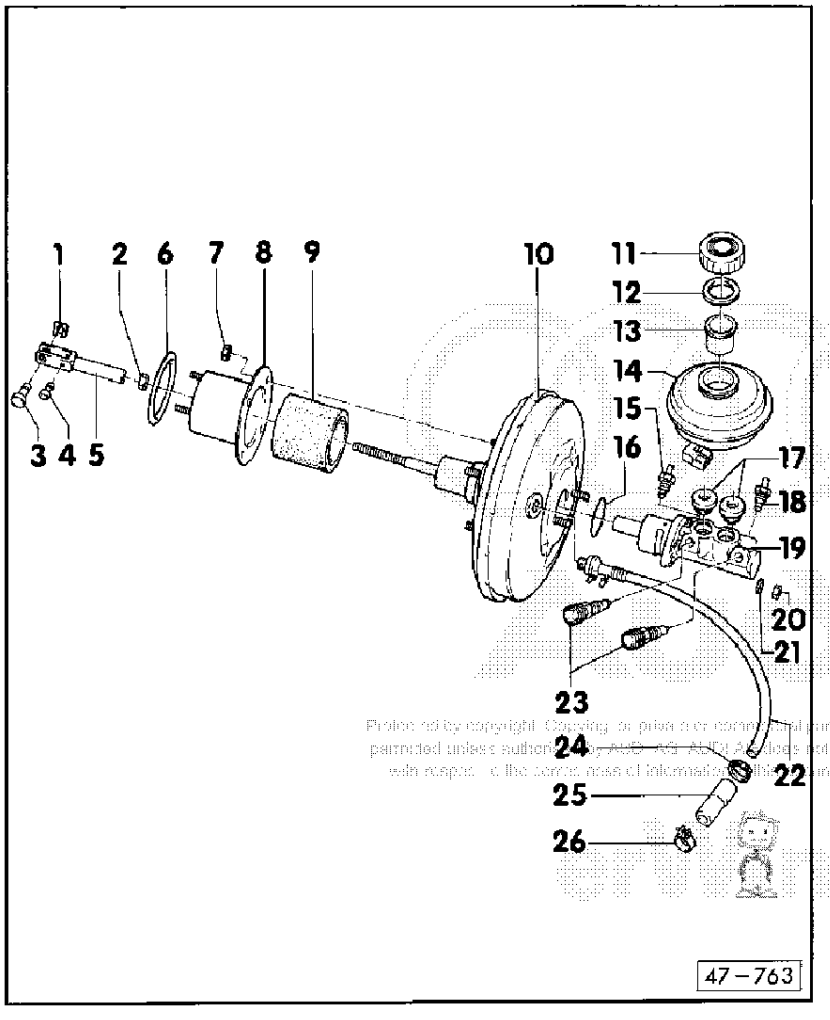


16 – **Oil seal**
- ♦ Replace after removing brake servo or master cylinder

17 – **Sealing plug**
- ♦ Moisten with brake fluid and insert into brake master cylinder
- ♦ Press brake fluid reservoir into sealing plugs

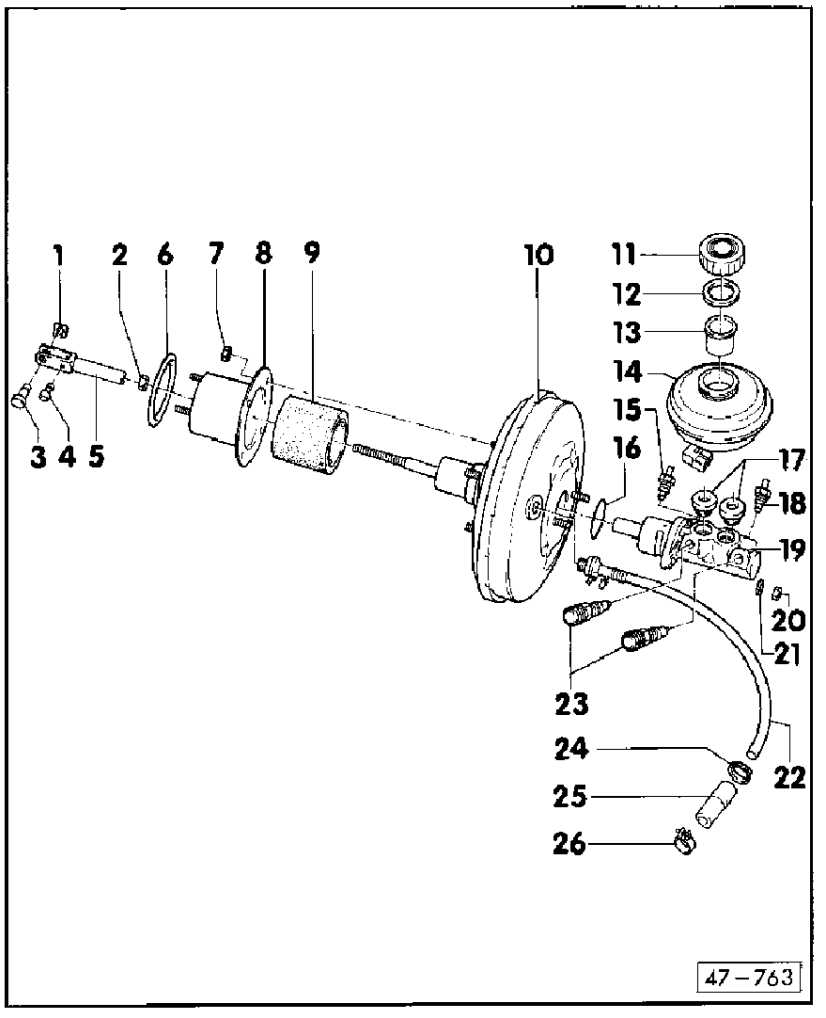
Note:
Replacing plug for pushrod circuit in all Girling steel brake master cylinders *=> Page 47-45*

18 – **Brake pipe**



19 – **Brake master cylinder**
- ♦ 22.2 mm diameter on vehicles with 4 and 5 cylinder engine
- ♦ 23.81 mm diameter on vehicles with 6 cylinder engine

Note:
All vehicles as of chassis no. 8C PA 036 950 feature brake master cylinders with 23.81 mm diameter instead of 22.2 mm
This modification does not apply to RHD vehicles.
- ♦ Pull vacuum unit (Item - 22-) off servo unit before removing
- ♦ Carefully remove from or insert in servo unit (do not tilt); non-compliance will result in servo unit damage.
- ♦ Replace as complete unit if necessary.

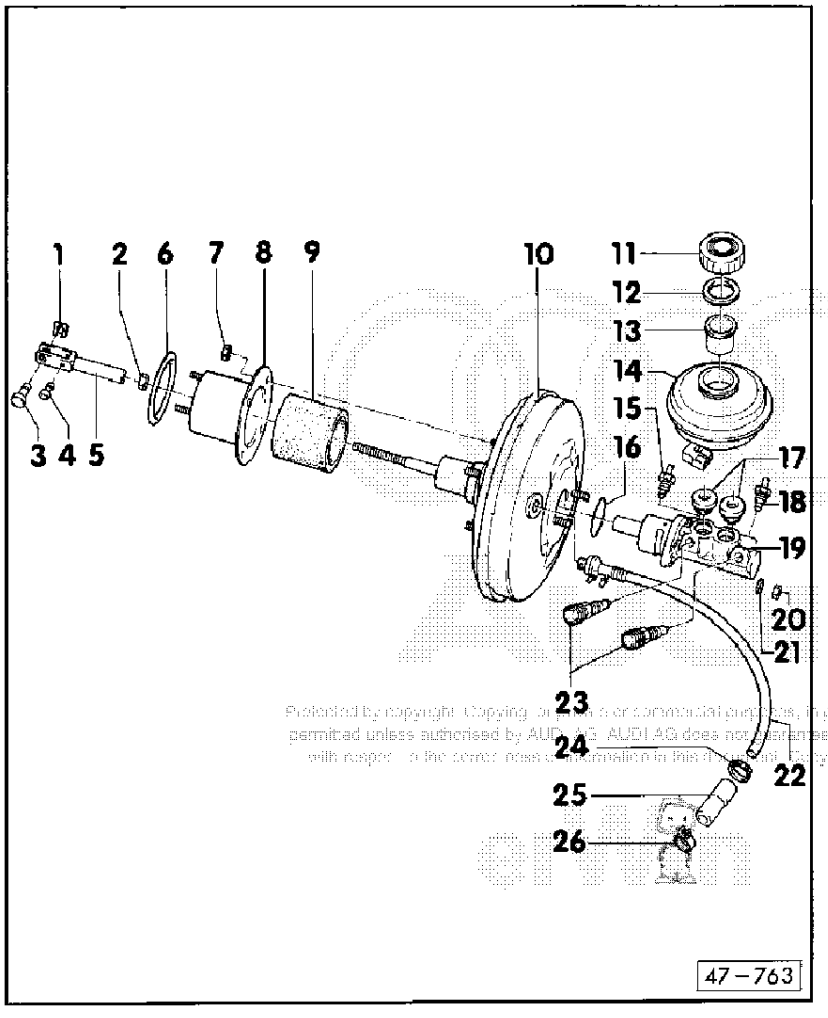


20 – Hexagon nut, 25 Nm

21 – Washer

22 – Vacuum line with non-return line

- ♦ To check function of non-return valve:
  - – It must be possible to blow air through valve in direction of arrow, but not in opposite direction.
- ♦ Insert into brake servo unit
- ♦ Note different versions depending on engine



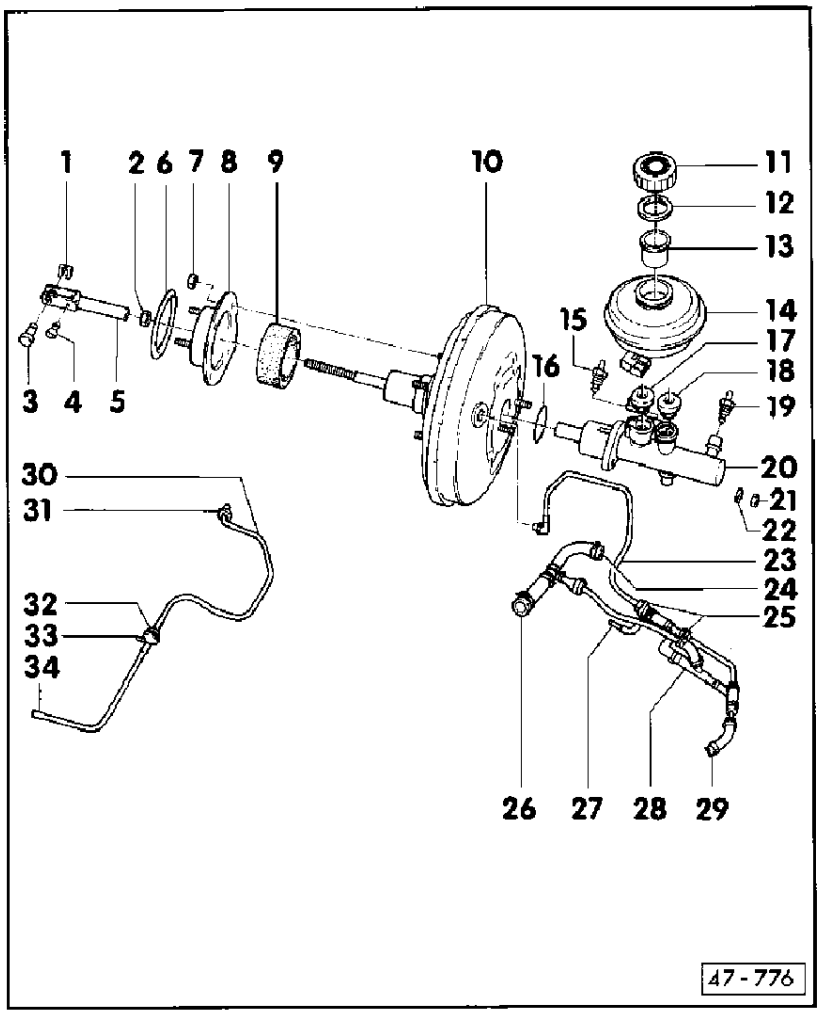
23 – Bleeder valves

- ♦ Brake master cylinder has one or two valves depending on braking system
- ♦ Always bleed when bleeding braking system

24 – Clip

25 – Vacuum hose

26 – Hose clamp



Vehicles with 6-cylinder engine as of chassis no. 8C NA 132 158

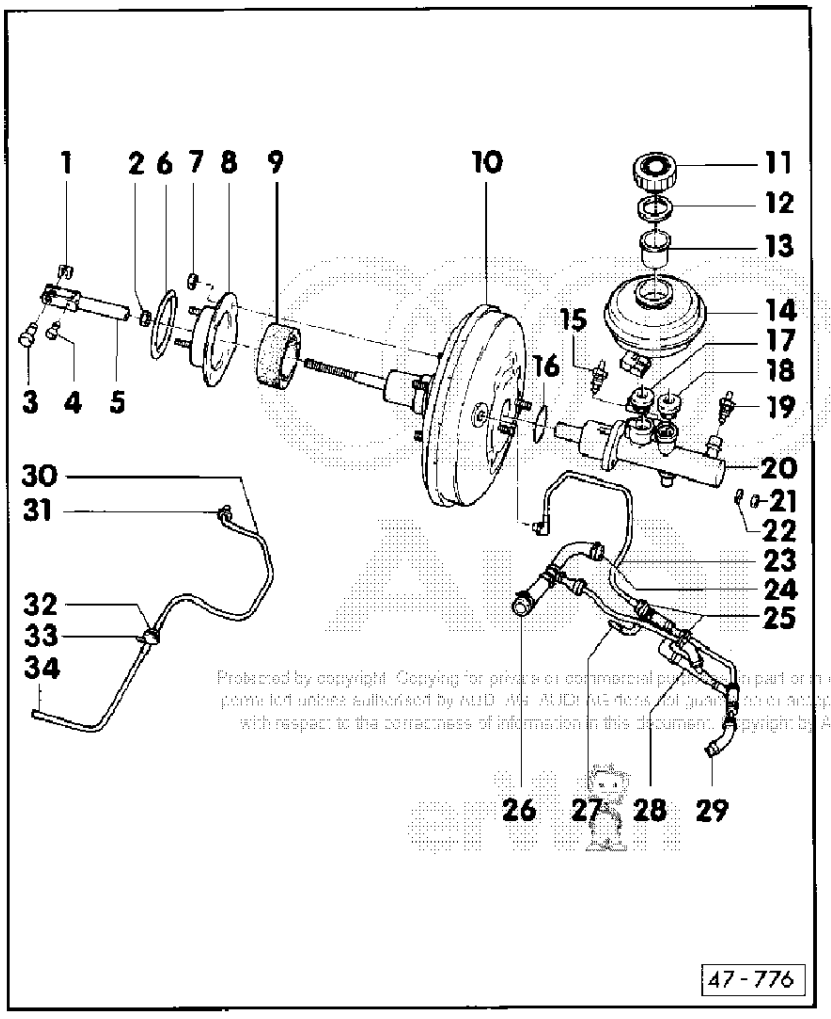
Notes = > See Page 47-21.

1 – **Lock washer**
- ♦ Always replace
- ♦ Fit onto pin

2 – **Lock nut**
- ♦ Tighten after adjusting clevis

3 – **Pin**
- ♦ Insert in clevis

4 – **Grommet**
- ♦ Insert in clevis
- ♦ Insert coil spring in grommet



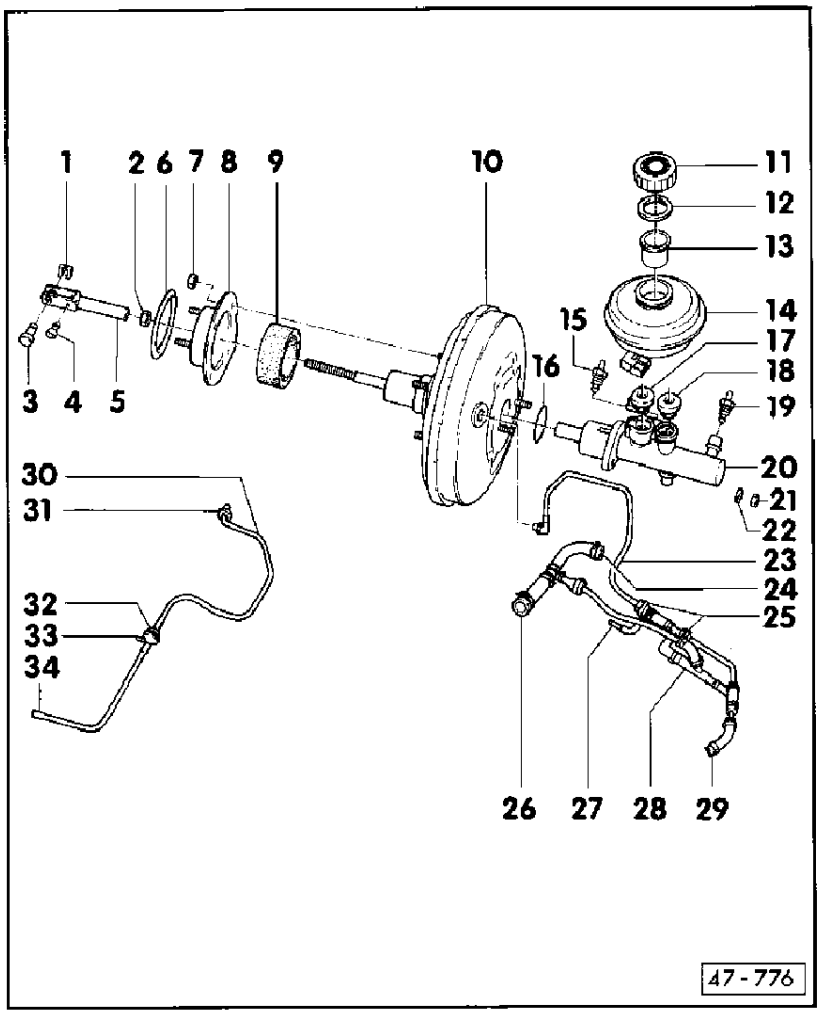
5 – **Clevis**
- ♦ Adjusting:
- – Vehicles with pneumatic brake servo: = > Fig. 1
- – Vehicles with hydraulic brake servo: = > Fig. 2

6 – **Oil seal**
- ♦ Always replace
- ♦ Attach to adapter before installing servo unit
- ♦ Roll onto bulkhead after attaching servo unit

7 – **Hexagon nut, 20 Nm**

8 – **Adapter**

9 – **Oil seal**
- ♦ Insert in adapter



10 – **Servo unit, diameter 10"**

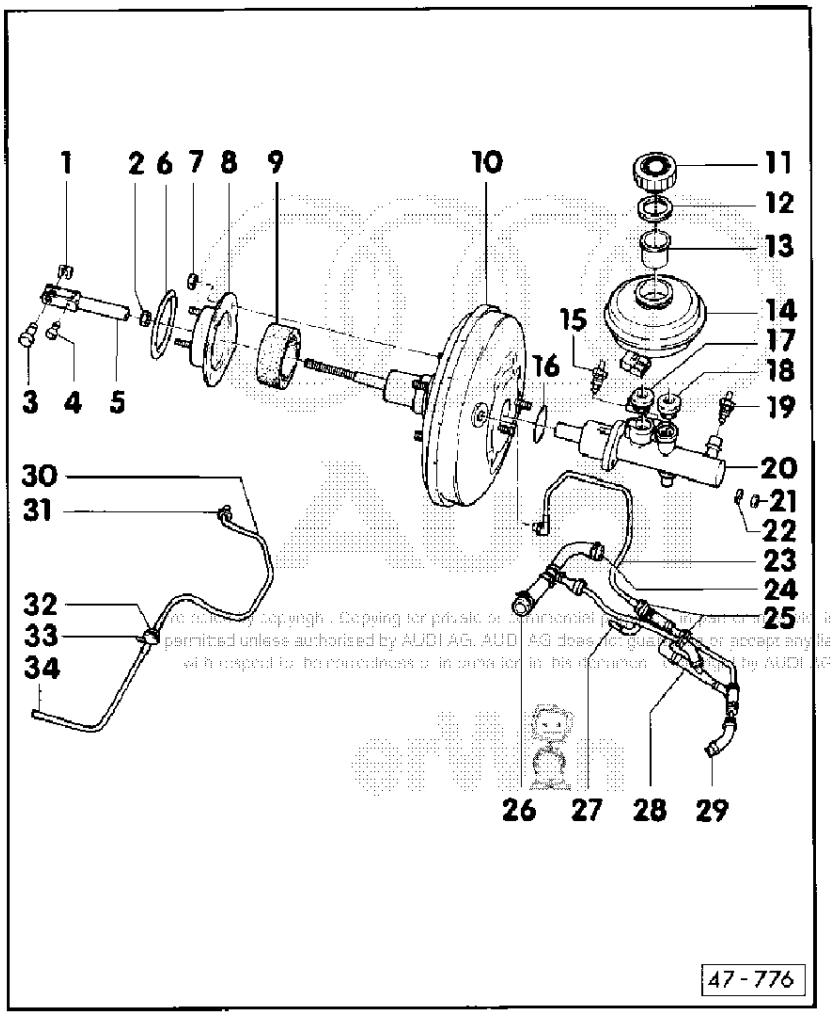
♦ Checking:

– Firmly depress brake pedal several times with engine stopped. This dissipates the vacuum in the unit. Now depress brake pedal with moderate force, hold and start engine.

– If the servo unit is working properly, the pedal will be felt to give slightly under foot (servo assistance becomes effective).

♦ If faulty renew complete.

♦ On vehicles with manual gearbox the vacuum is taken from the intake manifold



11 – **Cap**

12 – **Seal**

♦ Insert in cap

13 – **Strainer**

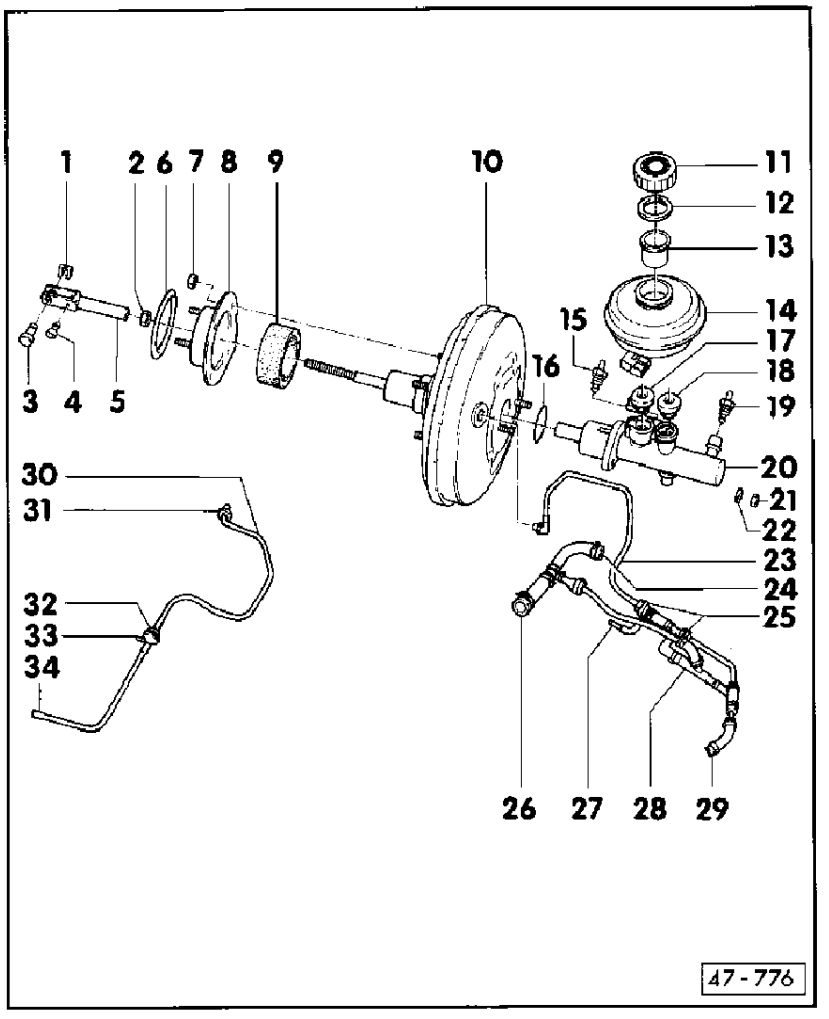
14 – **Brake fluid reservoir with float indicator**

♦ Fill up with brake fluid to "Max" mark

♦ Refer to label on reservoir before topping up brake fluid

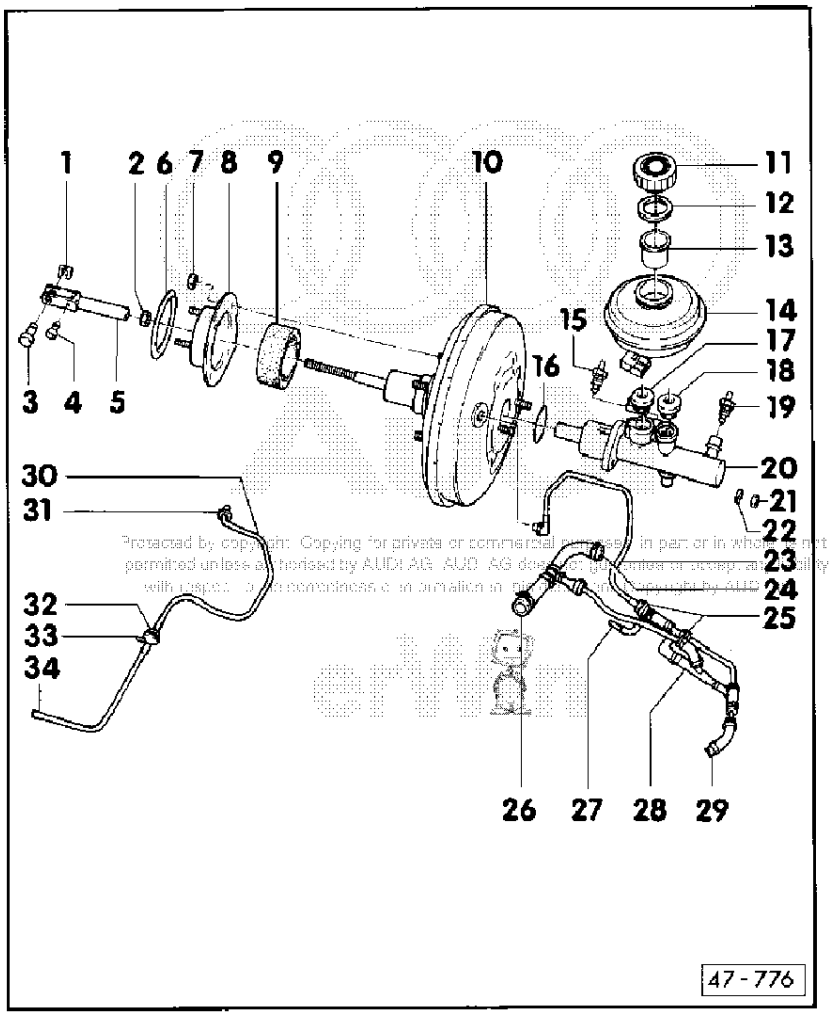
♦ Brake fluid, total quantity approx. 0.6 l in braking system

♦ Connection for hydraulic coupling is located on side



♦ Functional check of indicator:
– With ignition on, press firmly on centre of cap (membrane). Warning lamp in instrument cluster lights and acoustic alarm sounds.
♦ Diaphragm was discontinued as of 07/92. To check indicator, unscrew yellow cap with brake symbol and press by hand on visible strainer with ignition switched on.

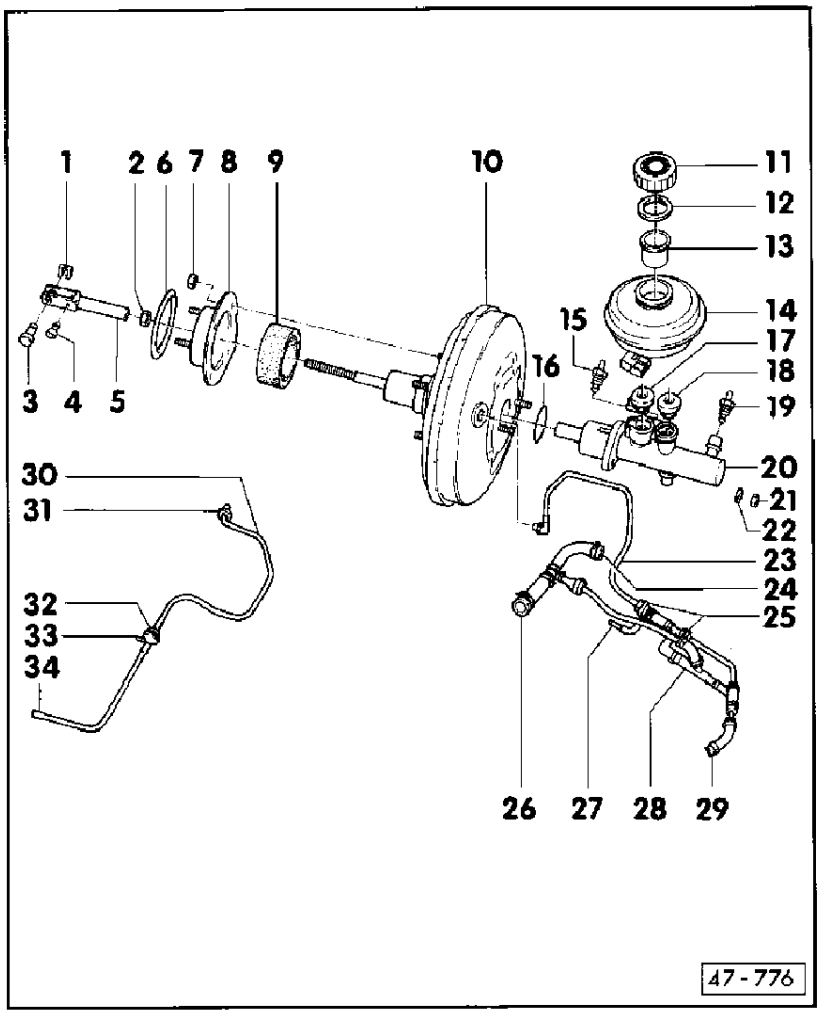
15 – Brake pipe



16 – Oil seal
♦ Replace after removing brake servo or master cylinder

17 – Sealing plug
♦ Moisten with brake fluid and insert into brake master cylinder
♦ Press brake fluid reservoir into sealing plugs

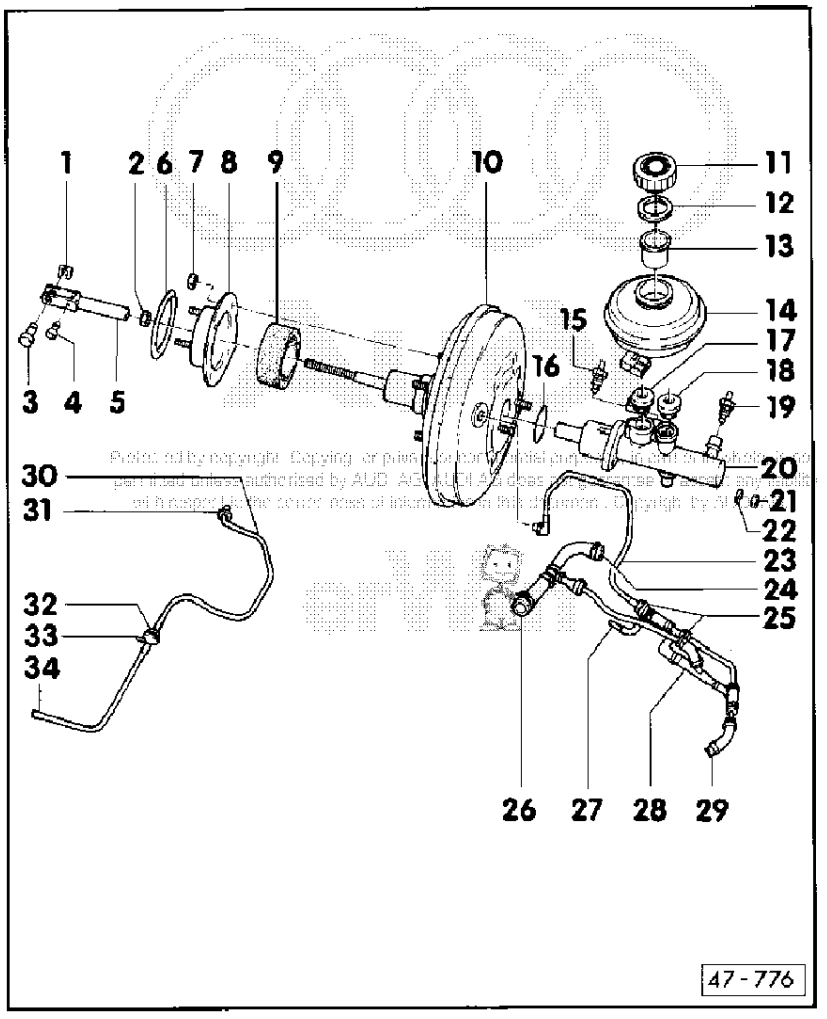
Note:
Replacing plug for pushrod circuit in all Girling steel brake master cylinders
=> Page 47-45



18 – **Sealing plug**
- ♦ Moisten with brake fluid and insert into brake master cylinder
- ♦ Press brake fluid reservoir into sealing plugs

19 – **Brake pipe**

20 – **Brake master cylinder, diameter 23.81 mm**
- ♦ Pull vacuum line (Item - 23– or - 31-) off servo unit before removing
- ♦ Carefully remove from or insert in servo unit (do not tilt); non-compliance will result in servo unit damage.
- ♦ Replace as complete unit if necessary.



21 – **Hexagon nut, 25 Nm**

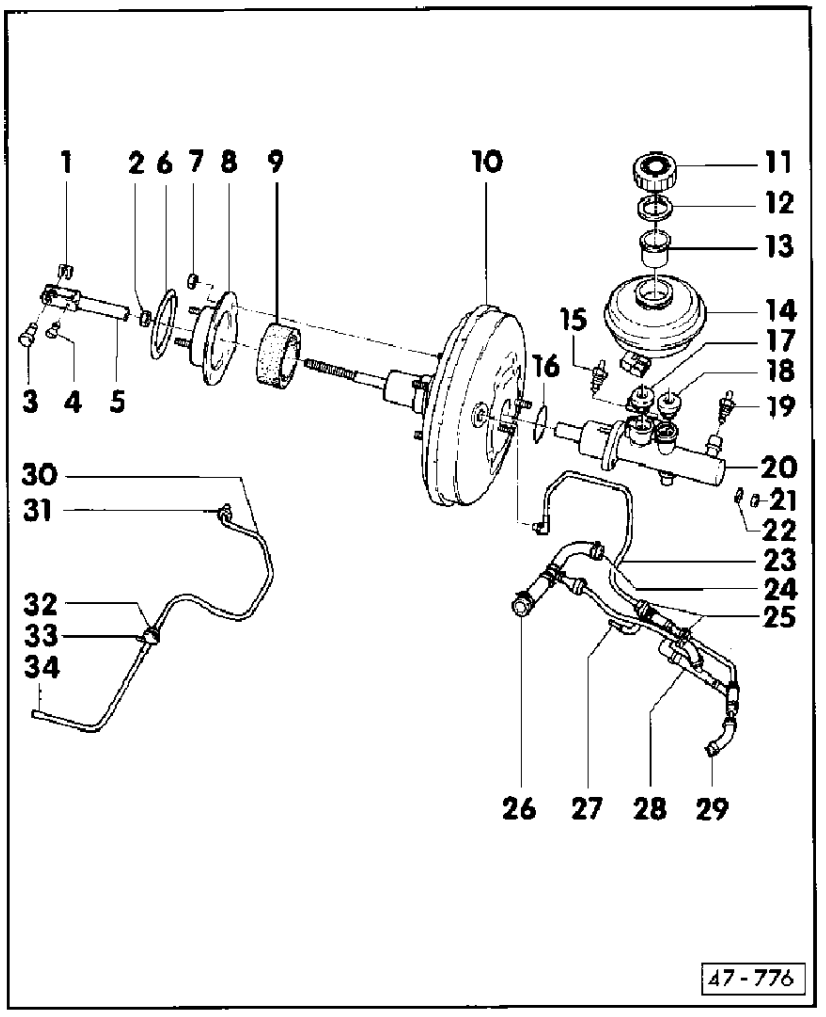
22 – **Washer**
Note:
Items - 23– to - 29– do not apply to 4WD vehicles

23 – **Vacuum line**

24 – **Vacuum line**

25 – **Non-return valves**

26 – **Vacuum line**



27 – **Vacuum connection for AC**

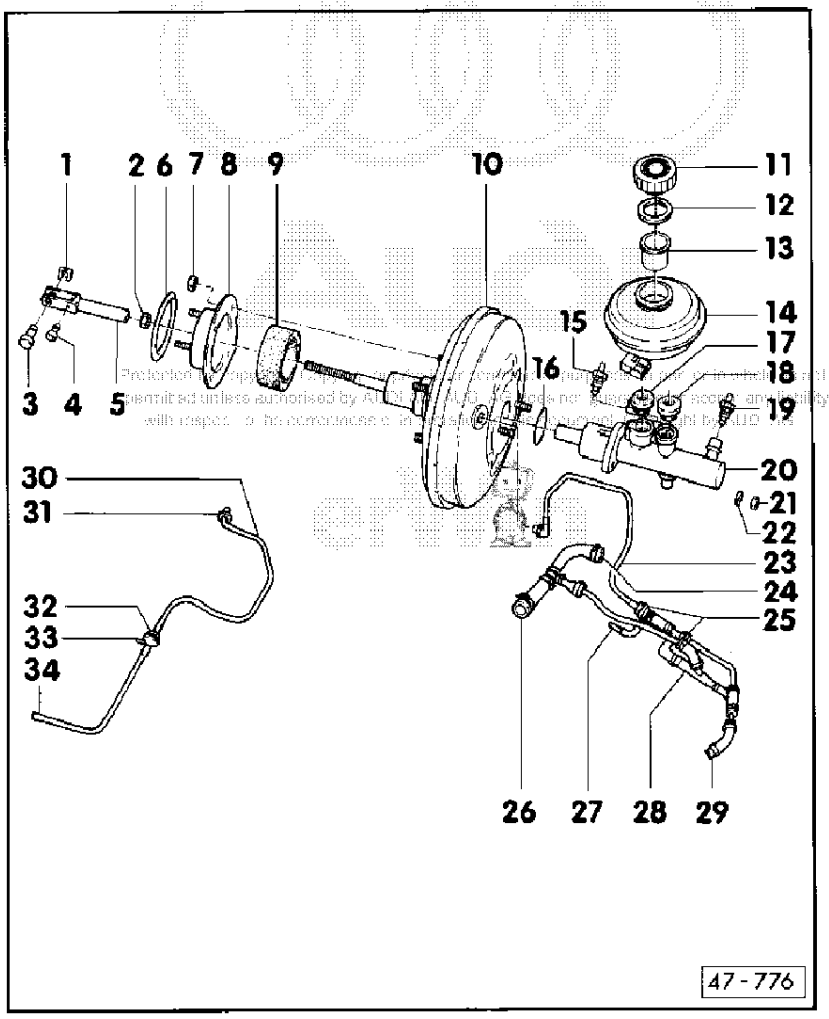
28 – **Suction jet pump**

29 – **Vacuum line**

30 – **Vacuum line**
♦ For vehicles with manual gearbox only

31 – **Vacuum line**
♦ Connection to servo unit

32 – **Non-return valve**
♦ It must be possible to blow air through valve in direction of arrow, but not in opposite direction.



33 – **Vacuum line**
♦ Connection for AC

34 – **Connection for vacuum line at intake manifold**

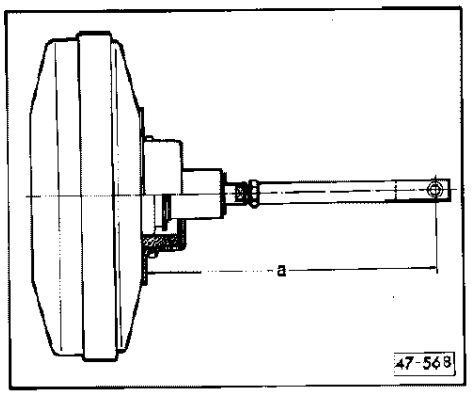


Fig.1 Adjusting clevis, vehicles with pneumatic brake servo

LHD vehicles:

With 9" servo unit, a = 269.0 ± 0.5 mm

With 10" servo unit, a = 223.0 ± 0.5 mm

RHD vehicles

With 9" servo unit only, a = 230.0 ± 0.5 mm

Notes:

- When measuring, the clevis should be aligned at right angles to the surface of the brake servo unit.
- Measured without gasket as far as clevis

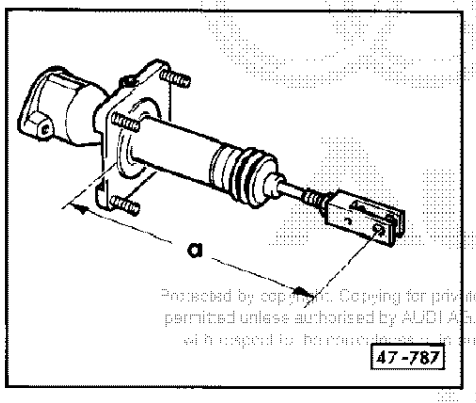


Fig.2 Adjusting clevis, vehicles with hydraulic brake servo

LHD vehicles:

a = 225.0 ± 0.5 mm

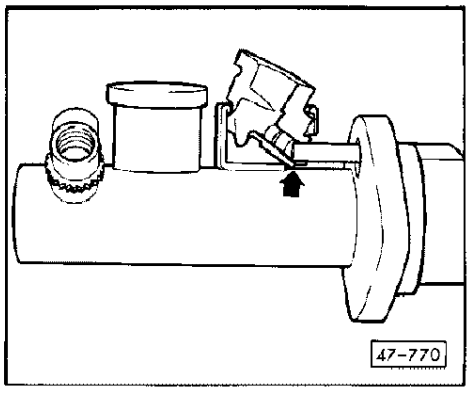
RHD vehicles

a = 202.0 ± 0.5 mm

Notes:

- Pull out of servo as far as stop prior to measurement
- When measuring, the ball head should be aligned at right angles to the surface of the brake servo unit.

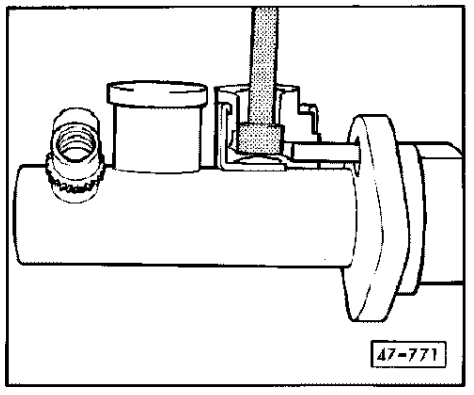
Replacing sealing plug (pushrod circuit)



Note:

For the sake of simplicity, this operation is illustrated on a cut-away model.

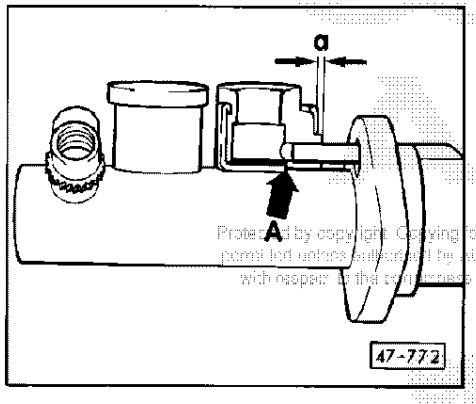
- Only moisten inside of sealing plug with brake fluid.
- Insert sealing plug.
- Make sure that bushing in sealing plug is slipped over tube of pushrod circuit (arrow).



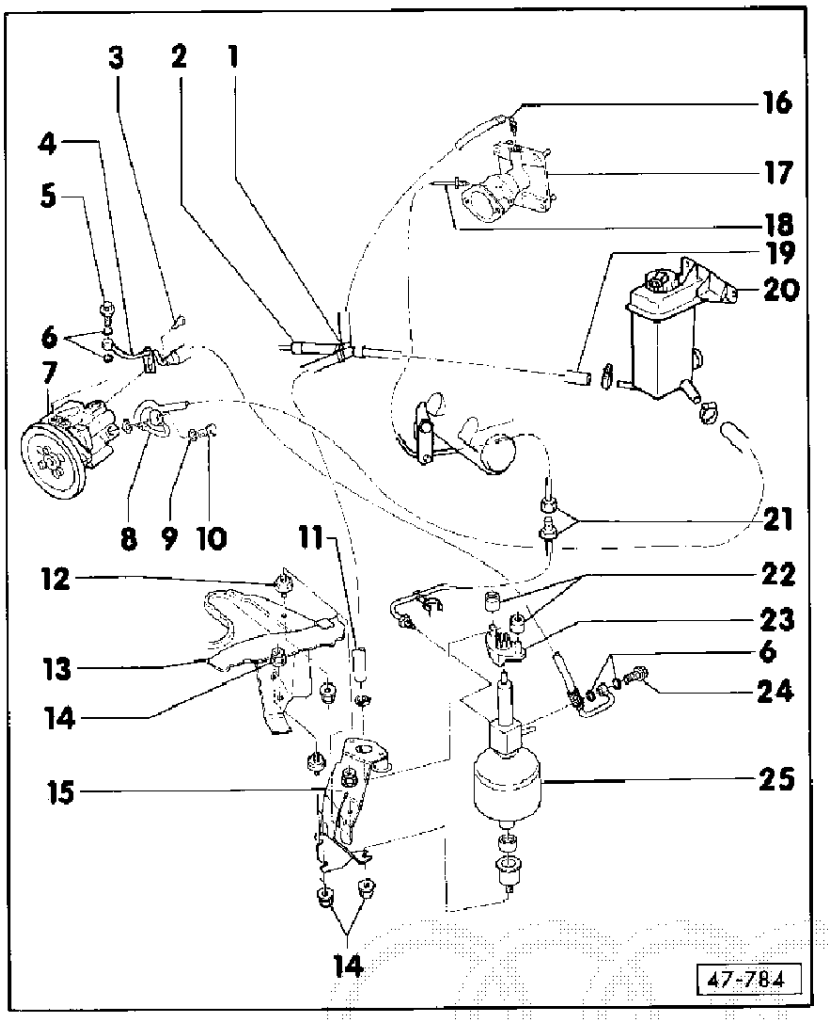
- Use rounded pins, screws or tools to press bushing of sealing plug onto tube.

Attention

Never use pointed objects, as otherwise there is a danger of the bottom of the sealing plug being pierced.



- The bushing of the sealing plug must protrude roughly 1 mm (dimension "a") out of the housing to ensure that shoulder -A- engages behind housing plate.



Components of hydraulic brake servo system

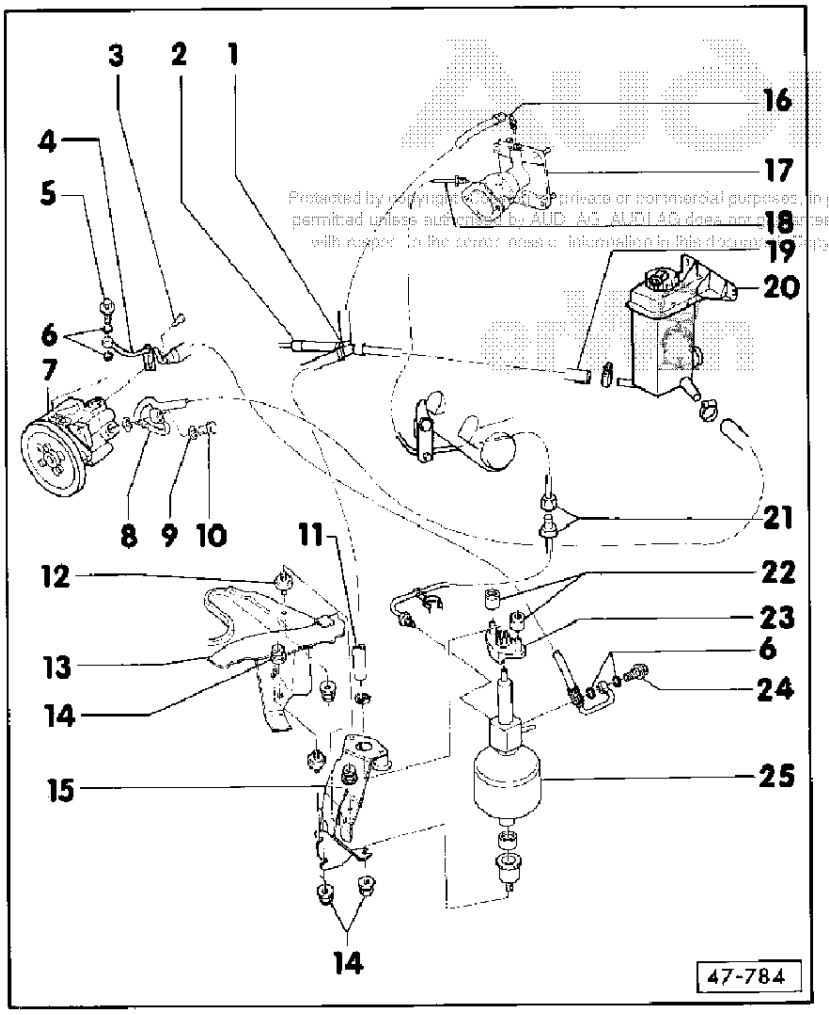
Notes:

- ♦ The hydraulic brake servo system is filled with hydraulic fluid, part no. G 002 000.
- ♦ Always replace seals between the line connections.

1 – **Distribution piece**

2 – **Return pipe**
- ♦ Rotary slide valve housing – distribution piece
- ♦ Attach annular nipple with banjo bolt to rotary slide valve housing
- – Tightening torque: 40 Nm

3 – **Hexagon bolts, 20 Nm**

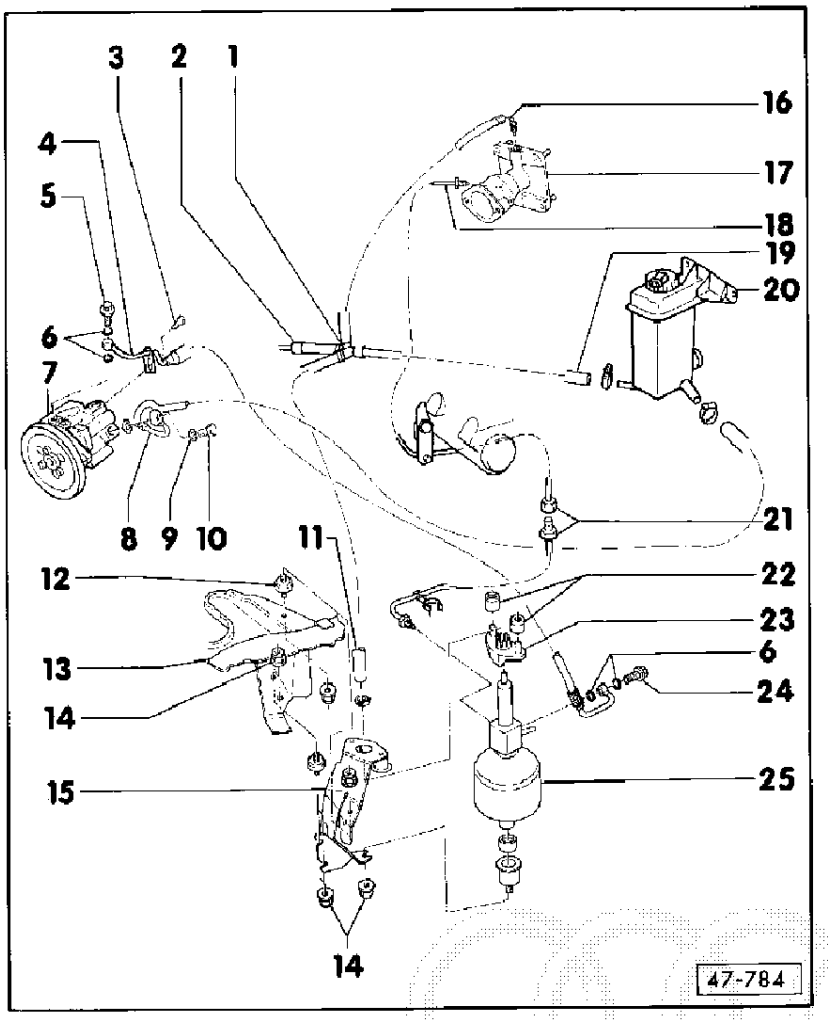


4 – **High-pressure hose**
- ♦ Hydraulic pump – pressure accumulator
- ♦ Check sealing surfaces of banjo union for damage

5 – **Banjo bolt, 25 Nm**
- ♦ Only use banjo bolt with strainer on end face

6 – **O-rings**
- ♦ Always replace

7 – **Tandem pump**
- ♦ Removing and installing =>Page 48-140
- ♦ Before installing, fill with hydraulic fluid at suction end and crank by hand until fluid comes out at pump outlet.
- ♦ Measuring piston pump delivery => Page 47-57
- ♦ Servicing not envisaged, fit exchange pump if necessary



8 – **Suction hose**
♦ Hydraulic pump – oil cooler

9 – **Seals**
♦ Always replace

10 – **Banjo bolt, 50 Nm**

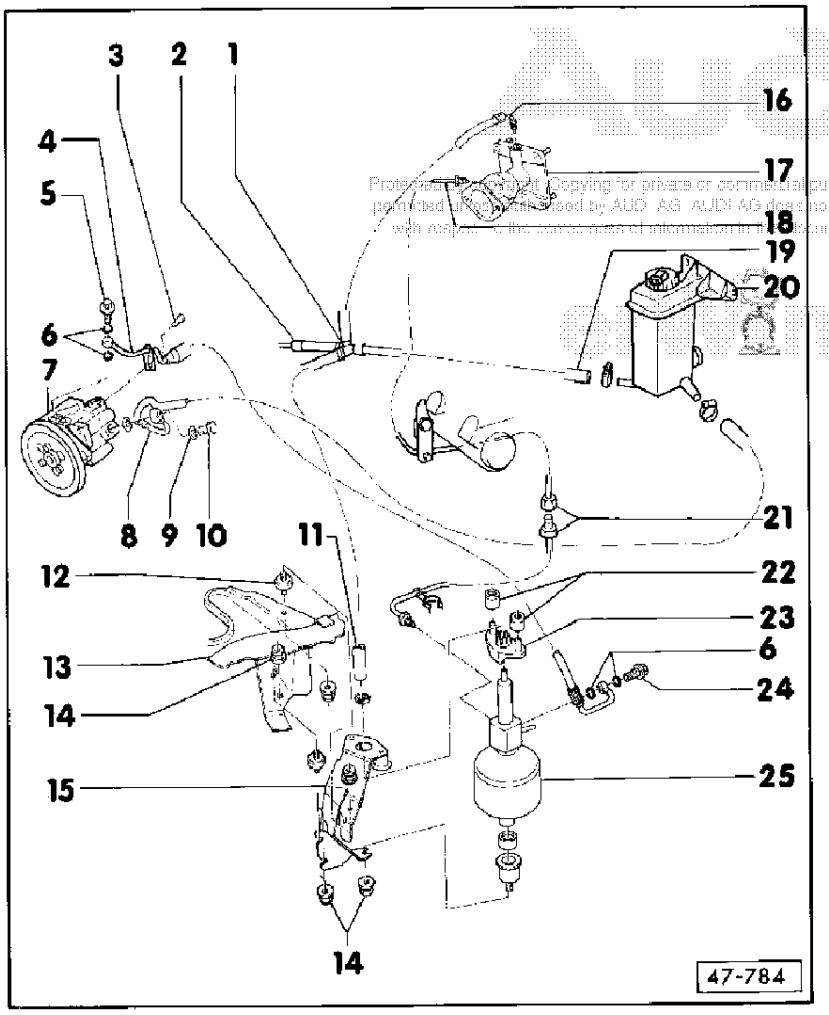
11 – **Return hose**
♦ Pressure accumulator – distribution piece – reservoir

12 – **Bonded rubber bush**

13 – **Longitudinal member**

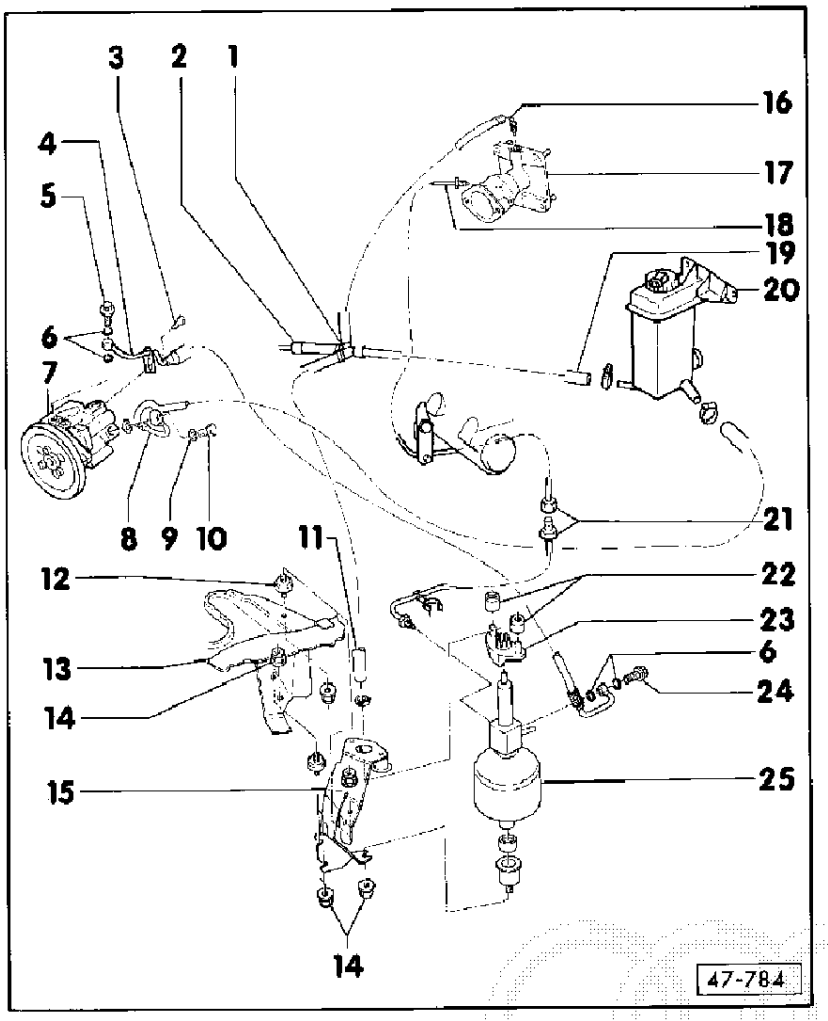
14 – **Collar nut 10 Nm**

15 – **Bracket for pressure accumulator**



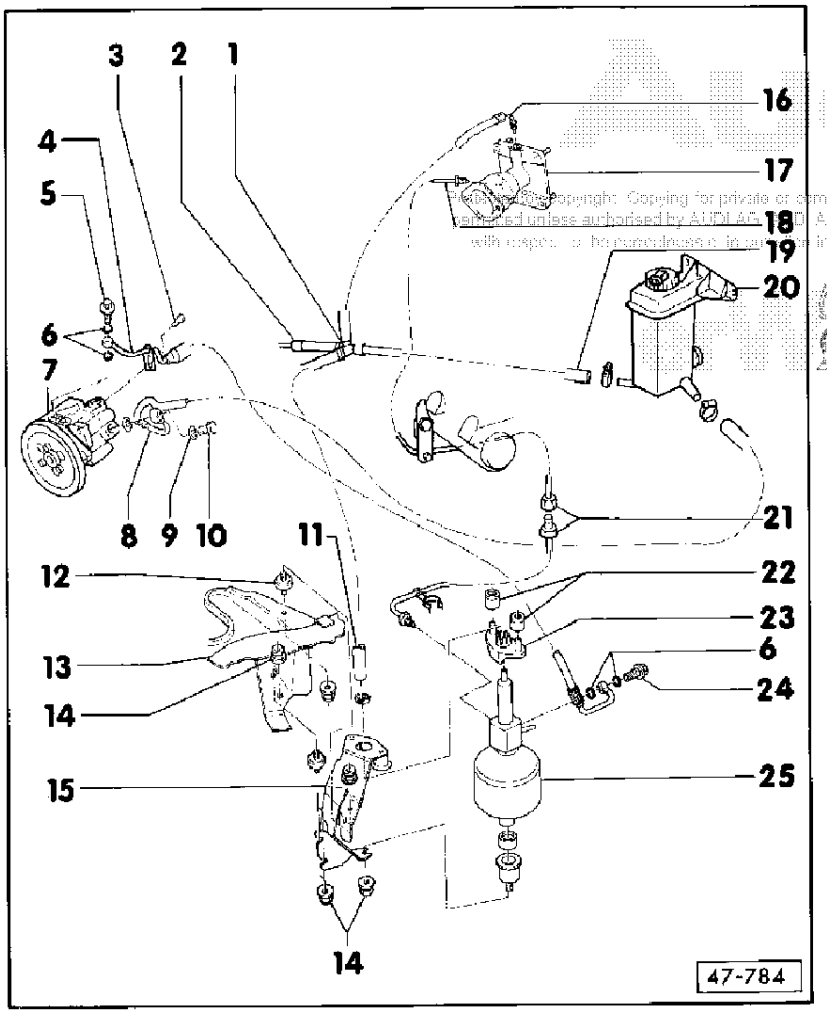
16 – **Return pipe**
♦ Servo unit – distribution piece, distribution piece – reservoir

17 – **Brake servo**
♦ Boost factor:
– LHD 3.8 : 1
– RHD 4.7 : 1
♦ Servicing not envisaged
♦ Checking operating pressure
=> Page 47-55
♦ Check for leaks:
– Unscrew return line - 16– with engine stopped; if servo unit is defective hydraulic fluid will emerge from connection hole; individual droplets have no significance

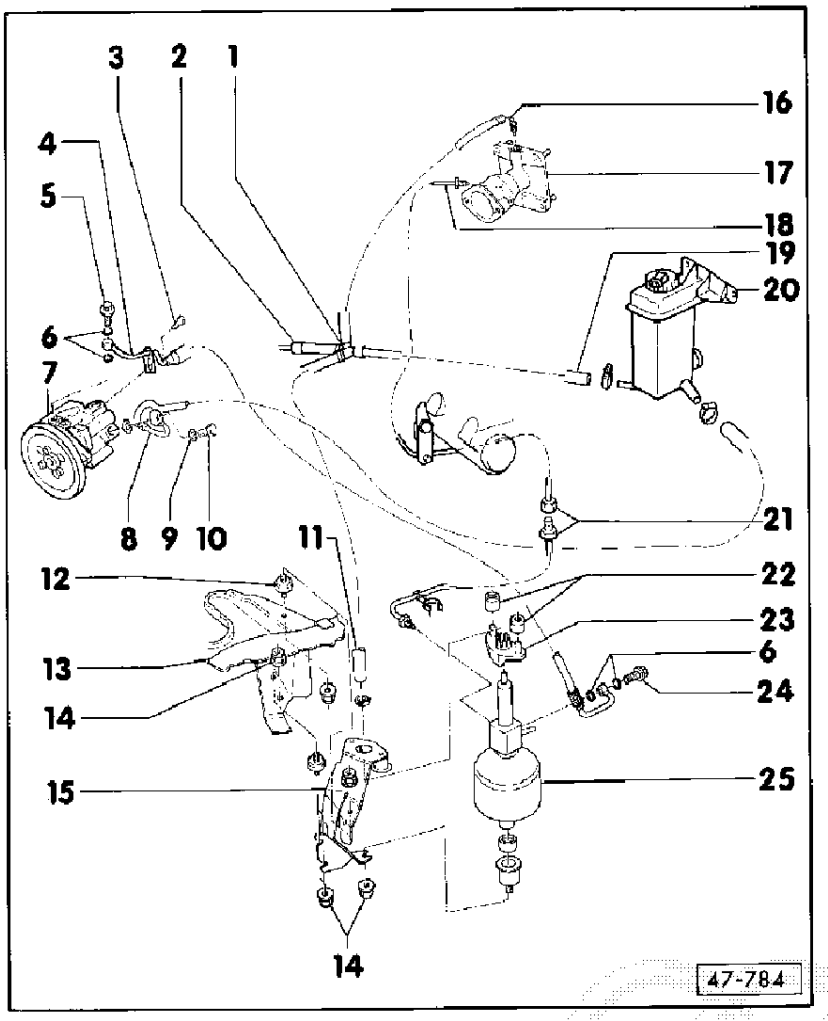


18 – **Pressure pipe**
- ♦ Pressure accumulator – servo unit
- ♦ Before removing, dissipate operating pressure by pressing brake pedal roughly 20 times with engine switched off

19 – **Return hose**
- ♦ Distribution piece – reservoir



20 – **Reservoir with float indicator**
- ♦ New hydraulic fluid fill approx. 1.05 l
- ♦ Checking hydraulic fluid level:
  - Start engine and let it idle for approx. 2 minutes with front wheels set to straight-ahead position.
  - Switch off engine and immediately check hydraulic fluid level, paying attention to marks on reservoir/dipstick; top up to "MAX" mark if necessary
- ♦ If hydraulic fluid level drops to "MIN" this is indicated by a warning lamp in the dash insert

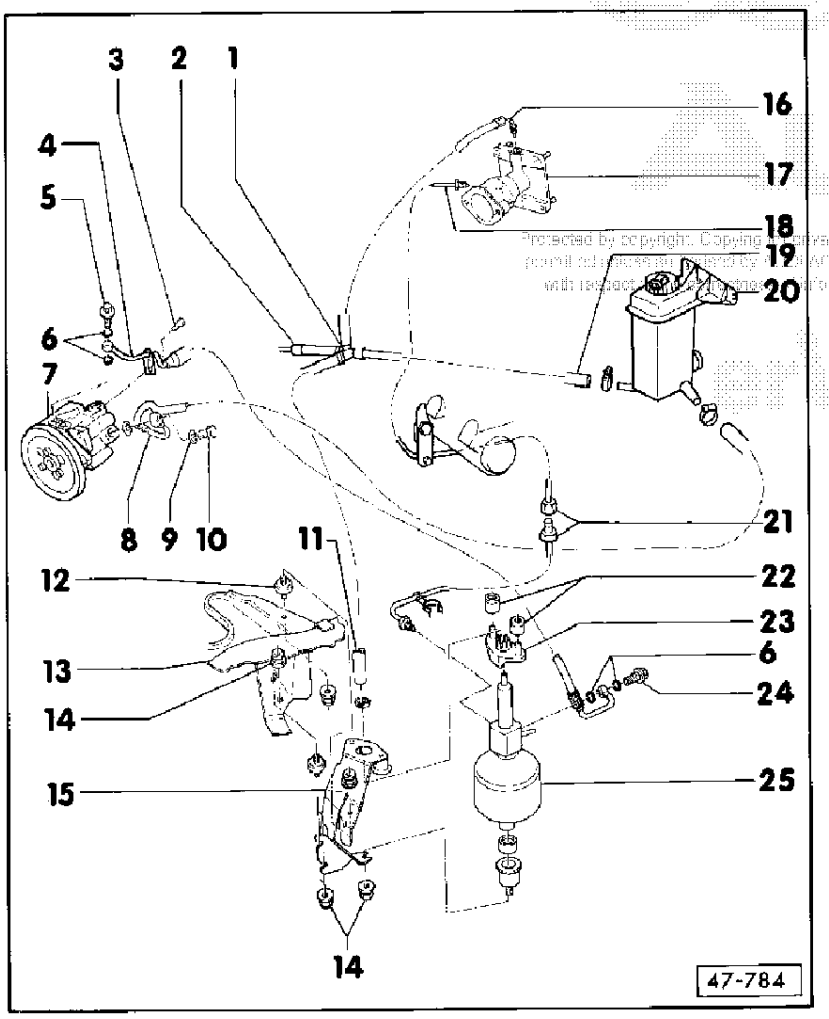


21 – **Line connector**

22 – **Buffer**
- ♦ Attach to mount for pressure accumulator and apply anti-friction assembly oil G 294 421 A1 to exterior

23 – **Mount for pressure accumulator**
- ♦ Attach with pre-assembled buffers to pressure accumulator

24 – **Banjo bolt, 25 Nm**
- ♦ Fitted with side strainer



25 – **Pressure accumulator**
- ♦ Thread in pressure accumulator M10 x 1
- ♦ As-new charging pressure 73-77 bar at 20 oC
- ♦ With integrated non-return valve and relief valve
- ♦ Checking charging pressure => Page 47-59
- ♦ Checking non-return valve => Page 47-63
- ♦ Checking relief valve => Page 47-61
- ♦ Before removing, dissipate operating pressure by pressing brake pedal roughly 20 times with engine switched off
- ♦ Disposal

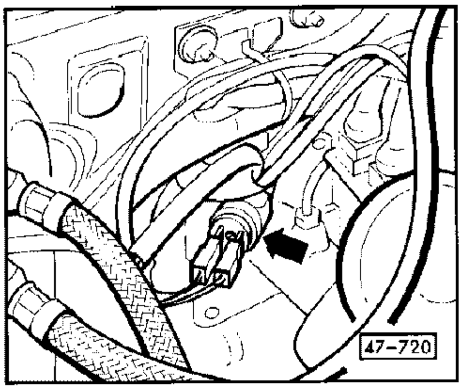
=> Special Information. No. 2; Edition 03.90

Checking operating pressure of hydraulic servo unit

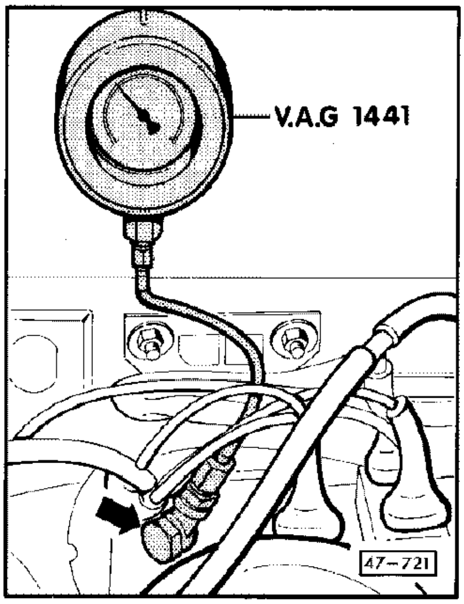
Test prerequisites

- V-belt tension OK, no leaks in servo system.

- Dissipate operating pressure, to do this press brake pedal approx. 20 times with engine switched off.



- Pull leads off warning switch
- Unscrew warning switch



- Screw hose of tester -V.A.G 1441- to servo unit using the banjo bolt and copper seals provided with the tester

Note:

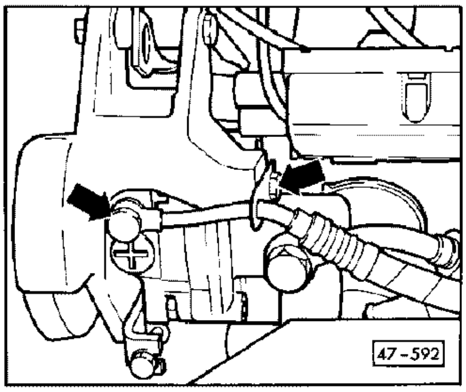
Fit thick seal between servo unit and banjo union

- Let engine idle until pointer on pressure gauge indicates operating pressure in excess of 140 bar.

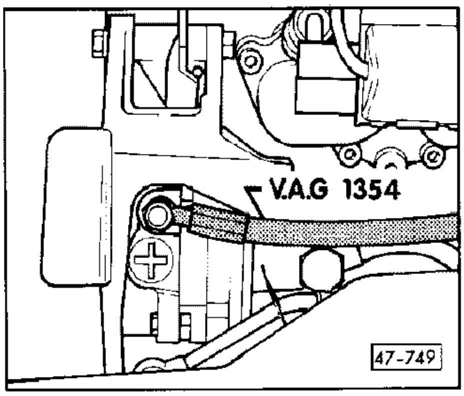
If this pressure level is not attained:

- Switch off engine and check piston pump delivery amount => Page 47-57.

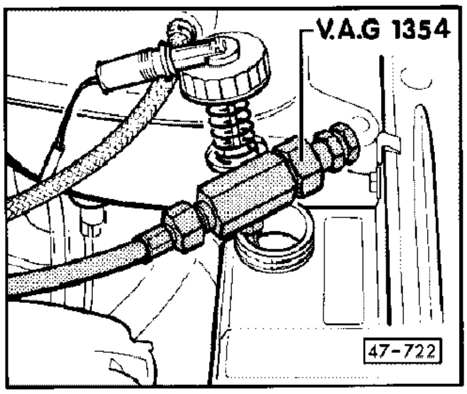
Measuring piston pump delivery



- Unscrew pressure line from pump and swivel bracket



- Screw hose of pressure limiter -V.A.G 1354- with genuine banjo bolt to pump, use new 10 mm diameter metal seals => Parts List.



- Unscrew reservoir cap.
- Insert pressure limiter -V.A.G 1354- in reservoir
- Leave engine idling until pipe has been bled.
- Stop engine.
- Hold the end of the pressure limiter pipe in a suitable measuring glass.
- Allow the engine to idle; specified delivery value: at least 0,25 l/min.

Note:

Renew tandem pump if specified value is not attained.

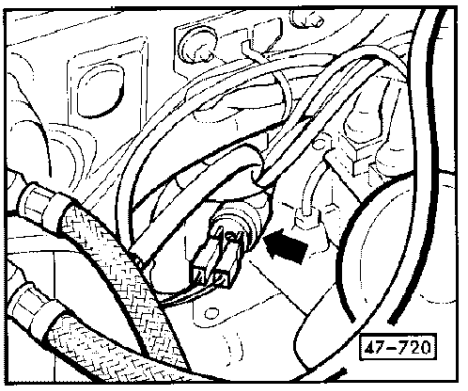
- Remove pressure limiter -V.A.G 1354-.
- Attach pressure pipe to pump and check for leaks
- Top up hydraulic fluid in reservoir.

Checking charging pressure of pressure accumulator

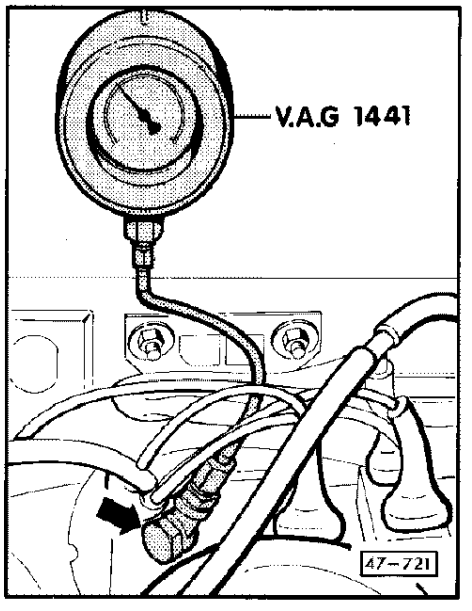
As-new charging pressure: 73-77 bar at 20 oC

Min. charging pressure: 30 bar at 20 oC

- Dissipate operating pressure, to do this press brake pedal approx. 20 times with engine switched off.



- Pull leads off warning switch
- Unscrew warning switch



- Screw hose of tester -V.A.G 1441- to servo unit using the banjo bolt and copper seals provided with the tester

Note:

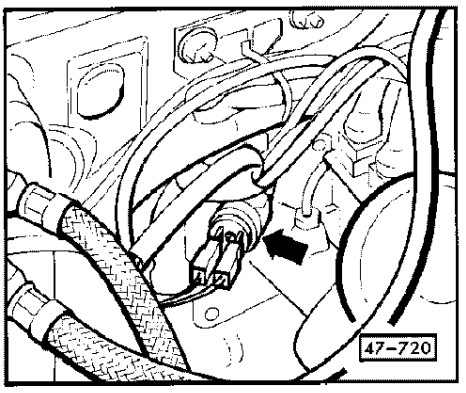
Fit thick seal between servo unit and banjo union; thin seal between banjo bolt and banjo union.

- Let engine idle until pointer on pressure gauge indicates operating pressure (approx.140 bar).
- Switch off ignition.
- Observe pressure gauge and pump with brake pedal until pressure gauge reading slowly starts to decrease
- The pressure at which the pointer stops dropping slowly and drops abruptly to 0 bar, is the charging pressure of the pressure accumulator.
- Replace the accumulator if this pressure is less than 30 bar.
- Remove tester -V.A.G 1441-.
- Install warning switch and check it for leaks.

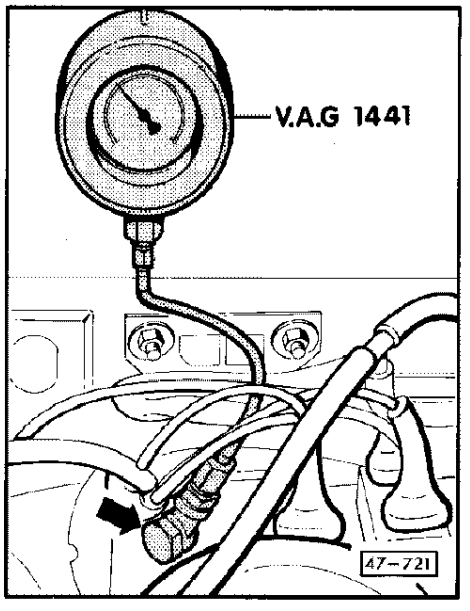
Checking relief valve in pressure accumulator

Test requirements

- Delivery of piston pump =>Page 47-57 (brake circuit) OK (when pressurised at least 0.25 l/min, with engine idling)



- Pull leads off warning switch
- Unscrew warning switch



- Screw hose of tester -V.A.G 1441- to servo unit using the banjo bolt and copper seals provided with the tester

Note:

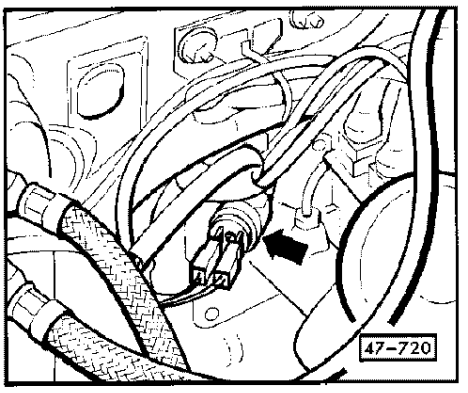
Fit thick seal between servo unit and banjo union

- At idling speed, operating pressure must be more than 140 bar.
- A low operating pressure indicates that the relief valve is defective.
- Renew pressure accumulator
- Measure operating pressure again as a check.
- Dissipate operating pressure by pumping with brake pedal.
- Remove tester -V.A.G 1441-.
- Install warning switch
- Check all screw connections for leaks

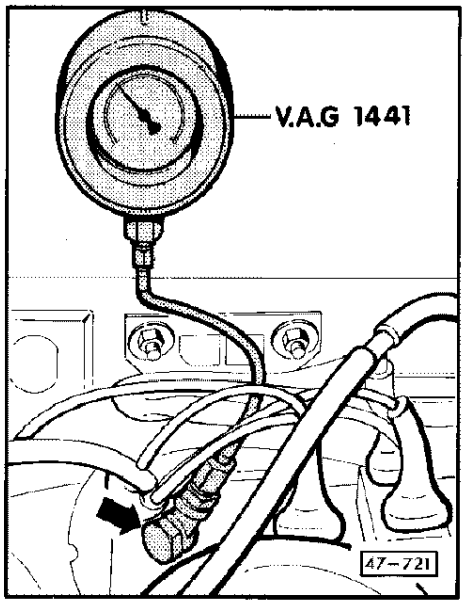
Checking non-return valve in pressure accumulator for leaks

Test requirements

- No leaks in servo unit



- Pull leads off warning switch
- Unscrew warning switch

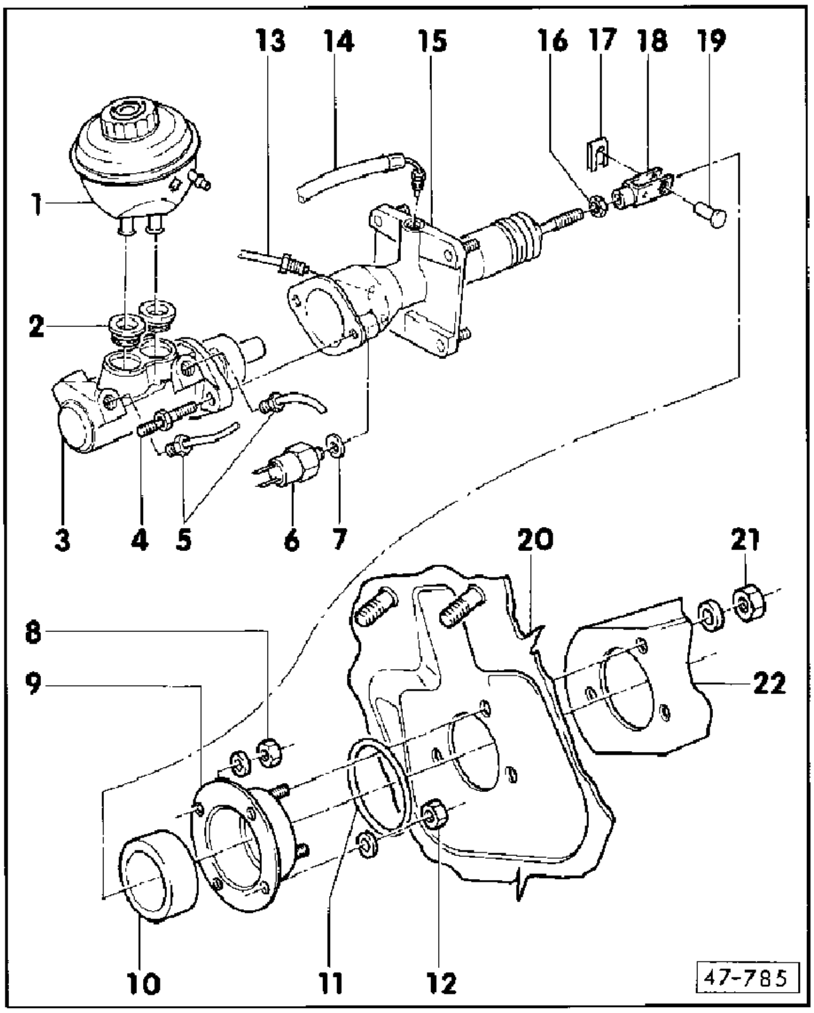


- Screw hose of tester -V.A.G 1441- to servo unit using the banjo bolt and copper seals provided with the tester

Note:

Fit thick seal between servo unit and banjo union

- Leave engine idling until max. pressure has built up.
- Switch off engine.
- Reduce pressure to approx. 135 bar by pressing brake pedal several times.
- After approx. 5 minutes the pressure must not have dropped below 130 bar.
- If the drop in pressure is greater then the non-return valve is leaking and the pressure accumulator should be renewed.
- Dissipate operating pressure by pumping with brake pedal.
- Remove tester -V.A.G 1441-.
- Install warning switch
- Check all screw connections for leaks



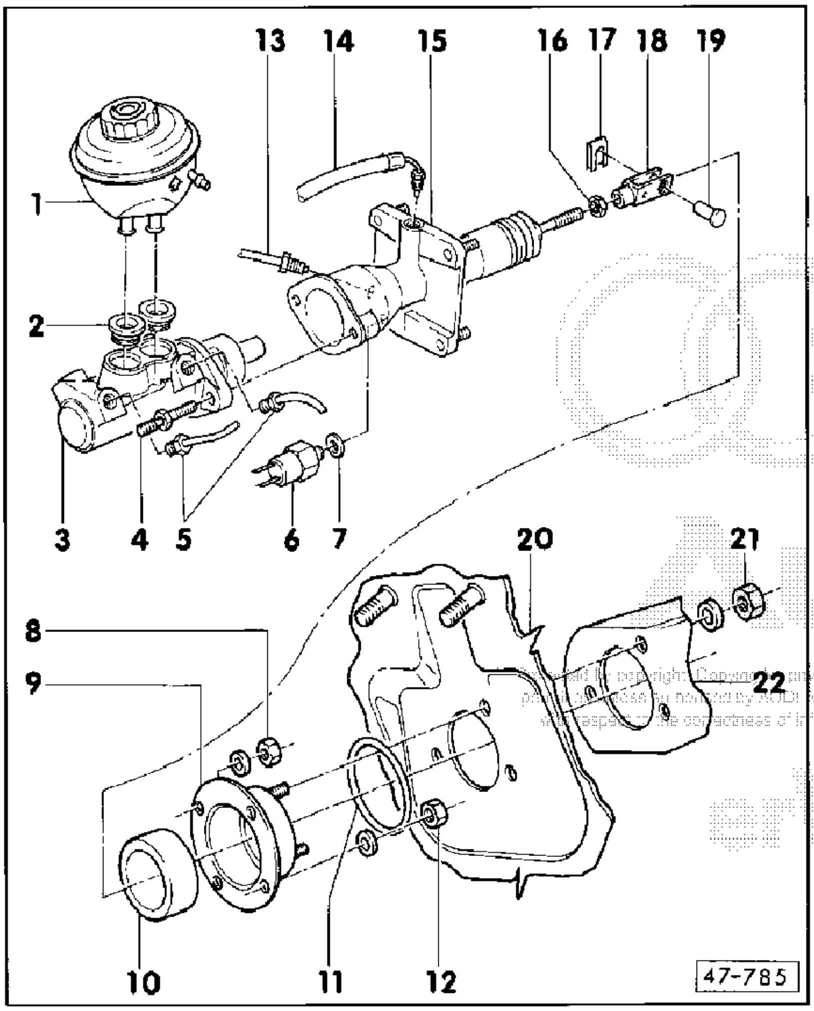
Removing and installing brake master cylinder/hydraulic servo unit

Notes:

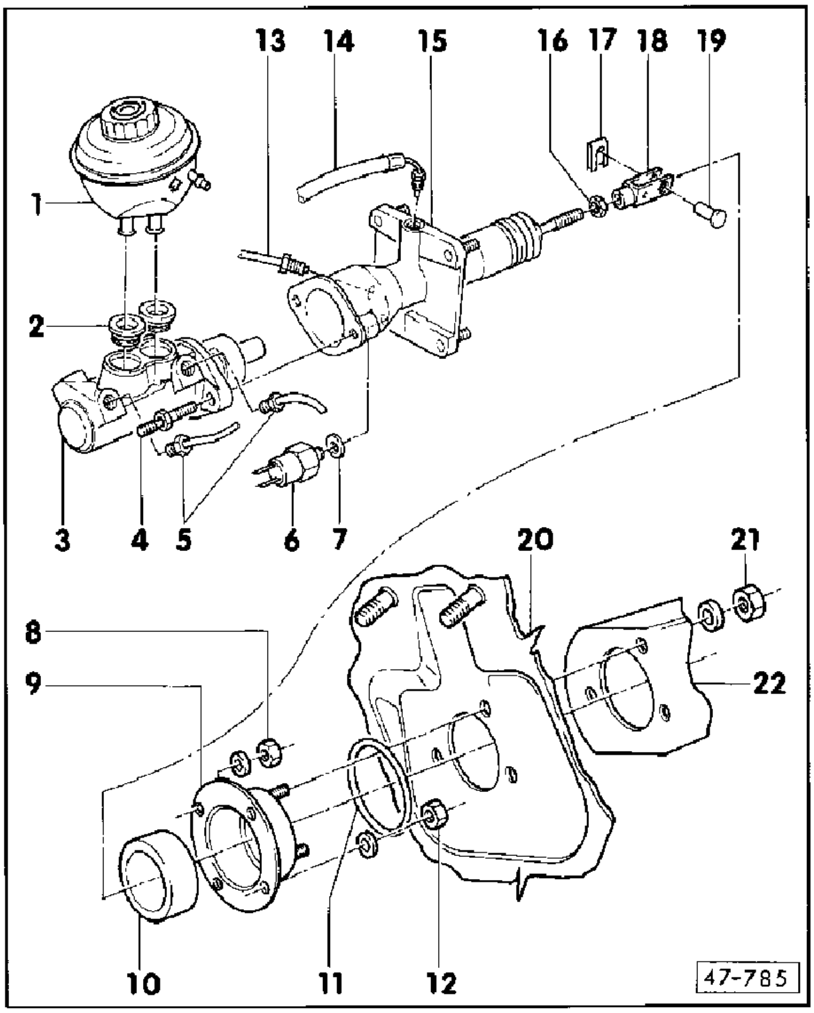
- ♦ Brake master cylinders cannot be dismantled any further, i.e. no provision is made for servicing.
- ♦ Use only fresh brake fluid. Refer to information on brake fluid reservoir.

1 – **Brake fluid reservoir with float indicator**

- ♦ Fill up with brake fluid to "Max" mark



- ♦ Functional check of indicator:
- – With ignition on, press firmly on centre of cap (membrane). Warning lamp in instrument cluster lights and acoustic alarm sounds.
- ♦ Diaphragm was discontinued as of 07/92. To check indicator, unscrew yellow cap with brake symbol and press by hand on visible strainer with ignition switched on.
- ♦ Connection for hydraulic coupling is located on side

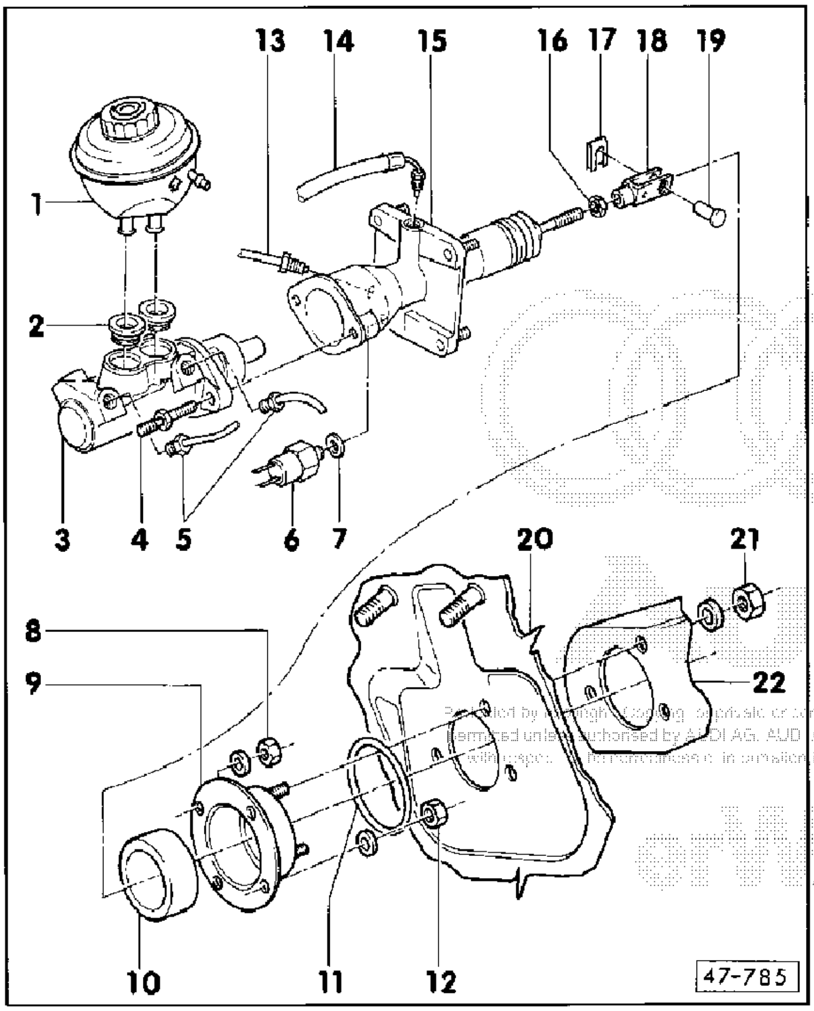


2 – **Sealing plug**
- ♦ Moisten with brake fluid and insert into brake master cylinder
- ♦ Press brake fluid reservoir into sealing plugs

3 – **Brake master cylinder**
- ♦ ø 25.4 mm
- ♦ Replace as complete unit if necessary.

4 – **Double-ended bolts, 25 Nm**
- ♦ For attachment of brake line bracket, screw M8 nut onto right end

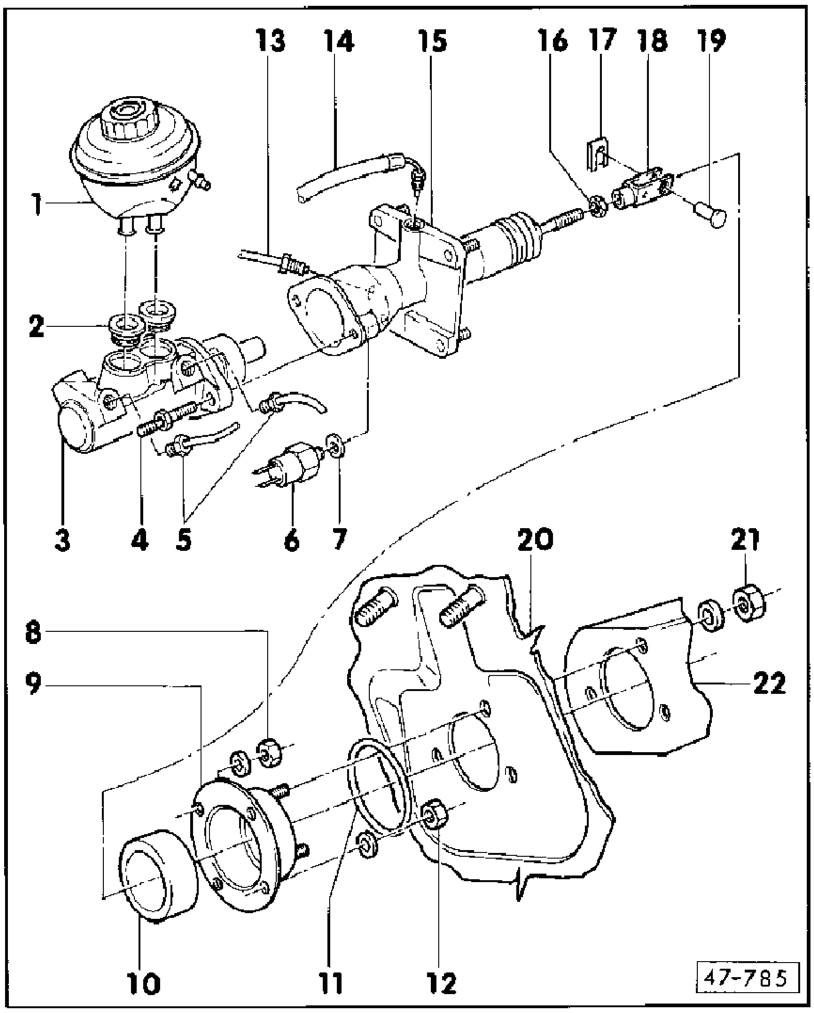
5 – **Brake lines**
- ♦ Unscrew



6 – **Warning switch, 20 Nm**
- ♦ For monitoring pressure of hydraulic servo unit; if pressure drops to a value between 127 and 87 bar, warning lamp in dash insert lights and buzzer sounds
- ♦ Screw into servo unit

7 – **Oil seal**
- ♦ Always replace

8 – **Hexagon nut, 20 Nm**



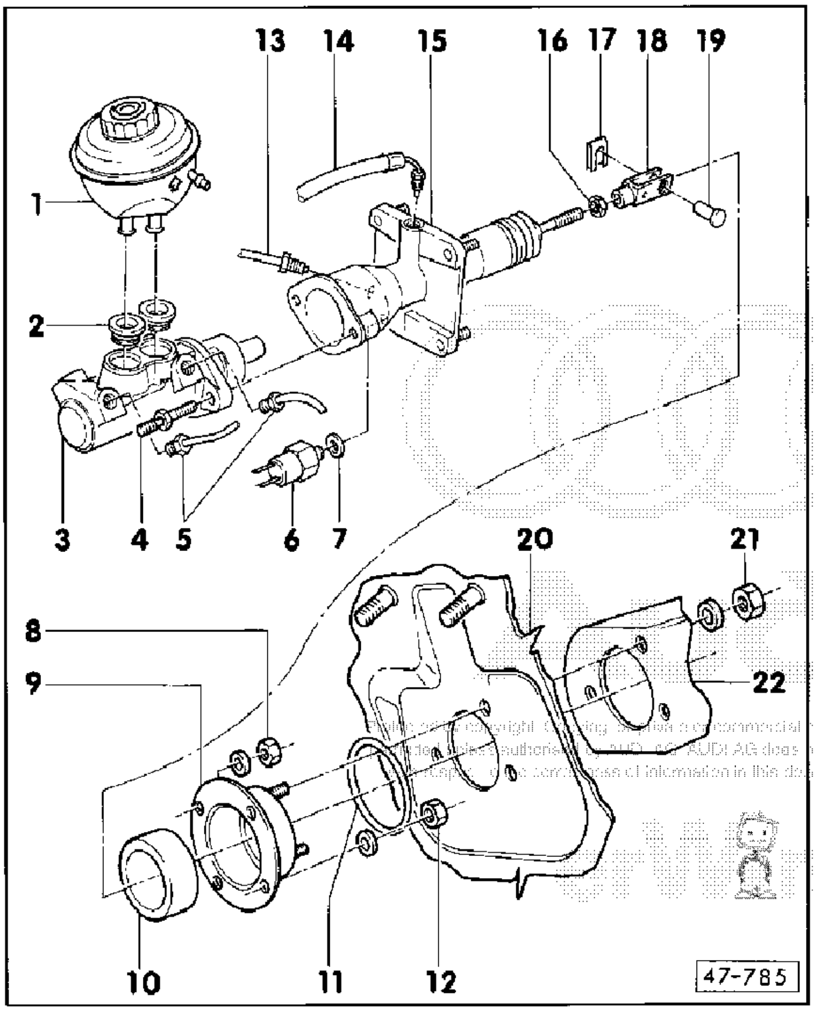
9 – **Mounting**

10 – **Oil seal**

11 – **Oil seal**
- ♦ Always replace
- ♦ Attach to adapter before installing servo unit
- ♦ Roll onto bulkhead after attaching servo unit

12 – **Hexagon nut, 20 Nm**

13 – **Pressure pipe**
- ♦ Pressure accumulator/servo unit
- – Before removing, dissipate operating pressure by pressing brake pedal roughly 20 times with engine switched off



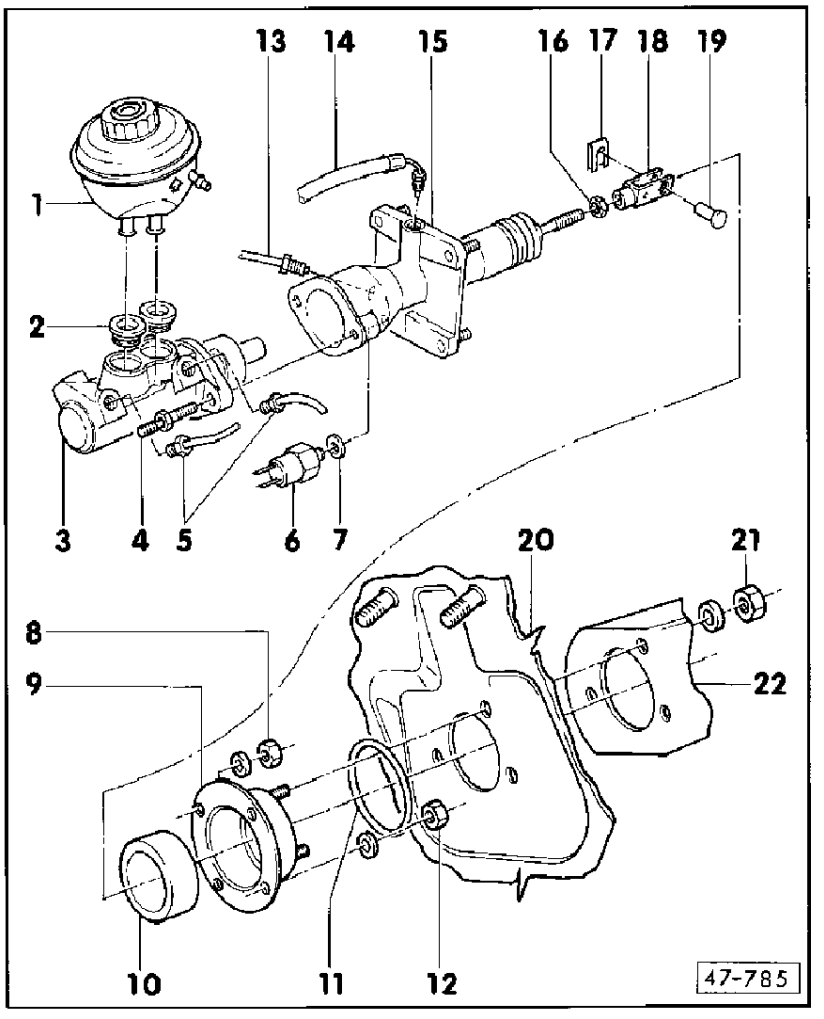
14 – **Return pipe**
- ♦ Servo unit – reservoir

15 – **Hydraulic servo unit**
- ♦ Do not press brake pedal with brake master cylinder removed

16 – **Lock nut**

17 – **Circlip**
- ♦ Always replace
- ♦ Fit onto pin

18 – **Clevis**
- ♦ Adjusting:
- – Vehicles with hydraulic brake servo: => Fig. 1

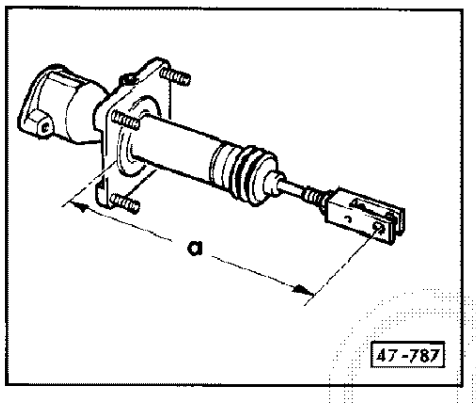


19 – **Pin**
♦ Grease slightly before inserting

20 – **Bulkhead**

21 – **Self-locking nut, 25 Nm**
♦ Always replace

22 – **Pedal bracket**



◀ **Fig.1 Adjusting clevis, vehicles with hydraulic brake servo**

LHD vehicles:

a = 225.0 ± 0.5 mm

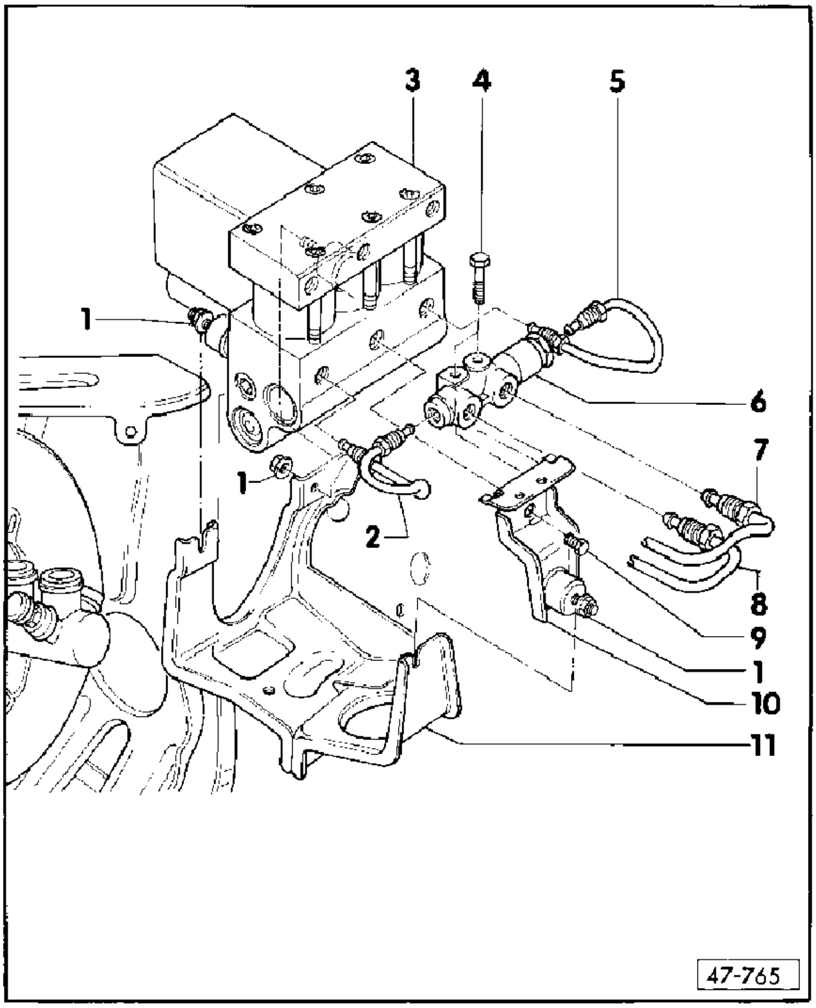
RHD vehicles

a = 202.0 ± 0.5 mm

Notes:

♦ Pull out of servo as far as stop prior to measurement

♦ When measuring, the ball head should be aligned at right angles to the surface of the brake servo unit.



Location of brake pressure regulator

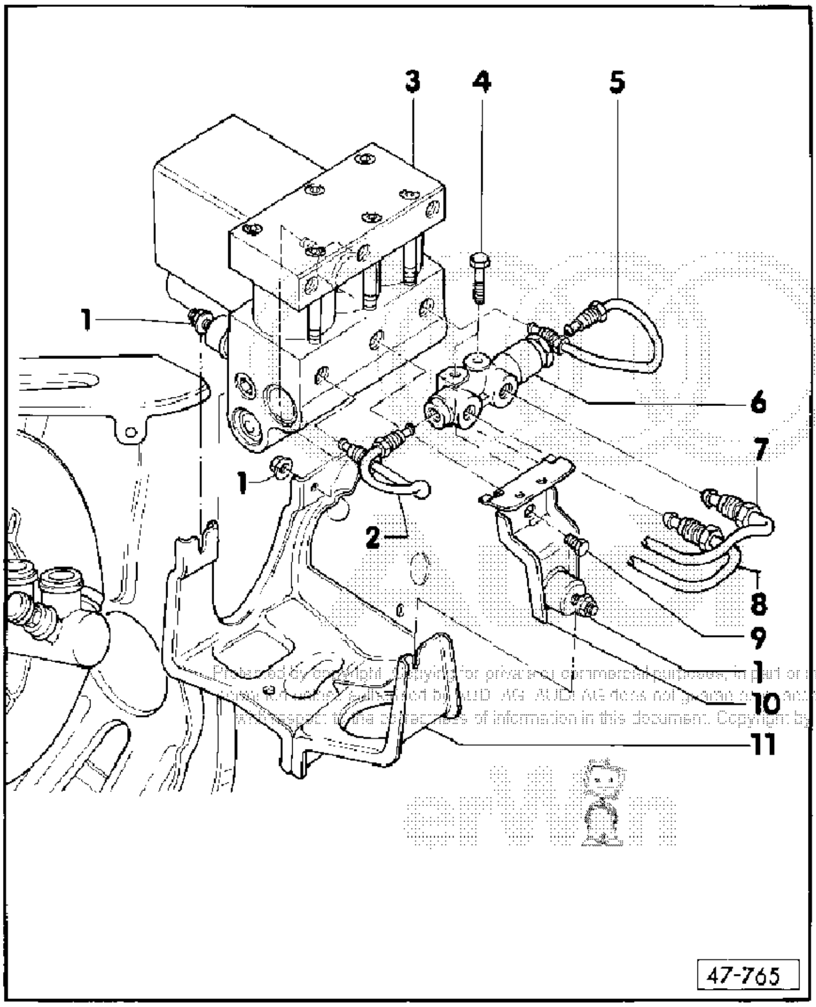
Note:
The tightening torque of the brake lines is 15 Nm.

1 – **Hexagon nut, 10 Nm**

2 – **Brake pipe**
- ♦ Hydraulic modulator

3 – **Hydraulic unit**
- ♦ Attach bracket for brake pressure regulator to hydraulic modulator using hexagon bolt -Item 9-.

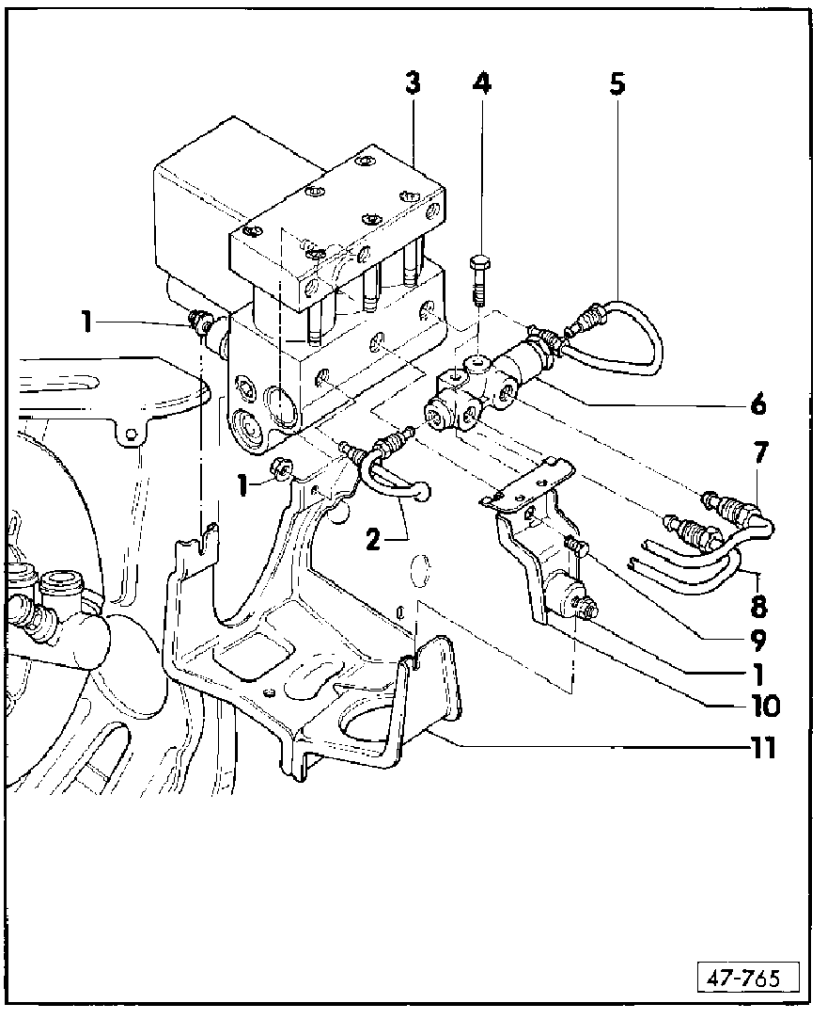
4 – **Hexagon bolt, 10 Nm**
- ♦ Attach brake pressure regulator to bracket



5 – **Brake pipe**
- ♦ Brake pressure regulator – hydraulic modulator

6 – **Brake pressure regulator**
- ♦ Non-adjustable
- ♦ Checking:
- – Vehicles up to model year 92 =>Page 47-76.
- – From model year `92 =>Page 47-78.

7 – **Brake pipe**
- ♦ Brake master cylinder to brake pressure regulator
- ♦ Floating piston circuit, rear axle
- ♦ Not to be interchanged with line, -Item 8-.



8 – **Brake pipe**
- ♦ Brake master cylinder to brake pressure regulator
- ♦ Pushrod piston circuit, front axle
- ♦ Not to be interchanged with line, -Item 7-.

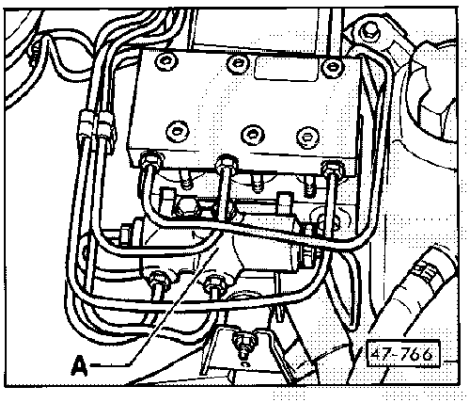
9 – **Hexagon bolt, 10 Nm**

10 – **Bracket for brake pressure regulator**

11 – **Bracket**
- ♦ Insert hydraulic modulator and secure.

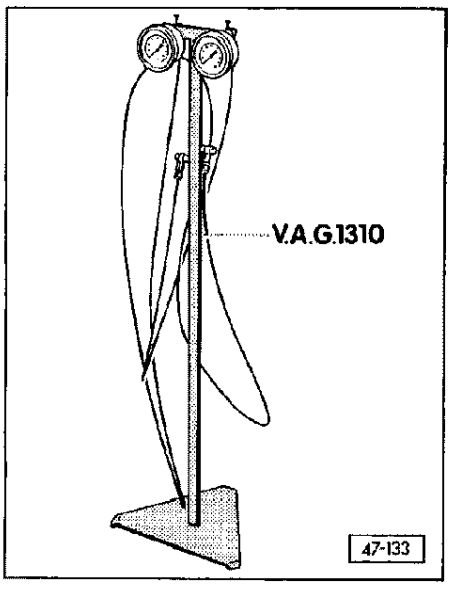
Checking brake pressure regulator, up to model year 1992

All vehicles up to chassis no. 8C NA 237 552



The pressure sensitive brake pressure regulator -A- with stop is located in front of the hydraulic modulator

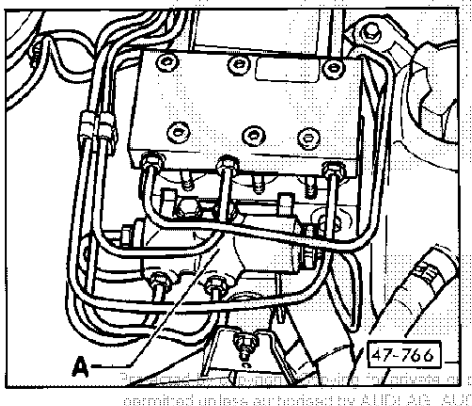
It reduces the brake pressure at the rear axle in a predetermined manner. Failure of the front axle brake circuit activates a stop piston which enables the entire brake pressure to be passed to the rear brake callipers.



- Jack up vehicle and connect pressure gauge -V.A.G 1310- to front left and rear left brake calliper
- Vent both pressure gauges
- Apply pressure to brake pedal and measure pressure at both axles
  - With 50 bar at front axle => rear axle 30-35 bar
  - With 100 bar at front axle => rear axle 45-50 bar
- Replace brake pressure regulator if test pressure is not within specified tolerance
- Remove pressure gauge and bleed braking system => Page 47-80

Checking brake pressure regulator, from model year 1992

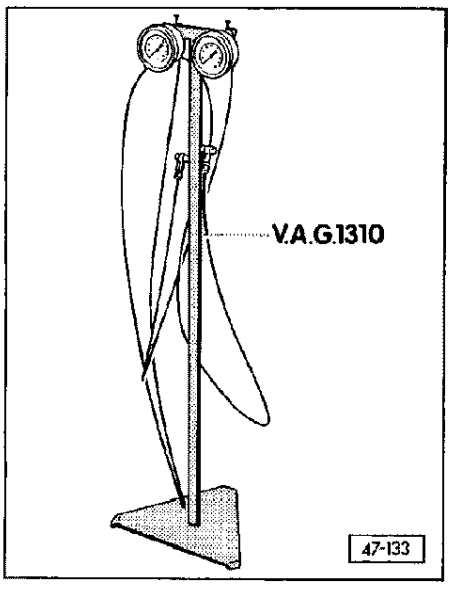
All vehicles from chassis no. 8C PA 000 001



The pressure sensitive brake pressure regulator -A- with stop is located in front of the hydraulic modulator

It reduces the brake pressure at the rear axle in a predetermined manner. Failure of the front axle brake circuit activates a stop piston which enables the entire brake pressure to be passed to the rear brake callipers.

For identification of the new controller it is marked with the number 35 on the end face. It also features a blue dot.



- Jack up vehicle and connect pressure gauge -V.A.G 1310- to front left and rear left brake calliper
- Vent both pressure gauges
- Apply pressure to brake pedal and measure pressure at both axles
  - With 50 bar at front axle => rear axle 37.5-41.5 bar
  - With 100 bar at front axle => rear axle 51.5-57.5 bar
- Replace brake pressure regulator if test pressure is not within specified tolerance
- Remove pressure gauge and bleed braking system => Page 47-80

Bleeding braking system and brake fluid replacement

Only use new genuine VW/Audi brake fluid according to US standard FMVSS 116 DOT 4.

Attention

- **Do not under any circumstances allow brake fluid to come into contact with liquids which contain mineral oils (e.g. oil, petrol, cleaning agents). Mineral oils damage the plugs and seals in the brake system.**
- **Brake fluid is poisonous and must on no account be siphoned orally through a hose. Because of its caustic properties it must also not come into contact with paintwork.**
- **Brake fluid is hygroscopic, i.e. it absorbs moisture from the surrounding air, and should therefore always be stored in airtight containers.**
- **Always observe the relevant environmental regulations for disposal.**

Ensure correct handling of brake fluid, brake components and brake tools.

=> Special information, Running Gear No. 21

Bleeding brake system

With brake filling and bleeding unit VW1238/B or V.A.G 1869

- Connect VW1238/B or V.A.G 1869
- Attach bleeder hose of collector to bleeder screw in line with specified sequence. Open bleeder screw until there are no bubbles in brake fluid emerging from brake calliper.
- Collect the old brake fluid in bleeder bottle forming part of the unit.
- Close bleeder screw.

Bleeding sequence

_ 1 - Brake master cylinder (if bleeder screw fitted)
_ 2 - Rear right wheel brake cylinder/calliper
_ 3 - Rear left wheel brake cylinder/calliper
_ 4 - Front right brake calliper
_ 5 - Front left brake calliper

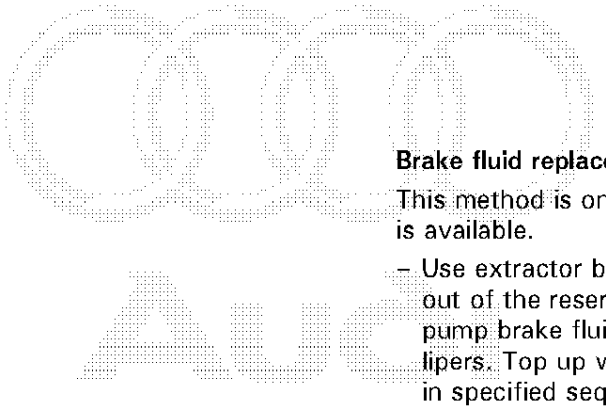
Bleeding without -VW 1238/B-

Build up pressure in braking system by pumping pedal Open bleeder screw with hose of bleeder bottle attached. Close bleeder screw with pedal depressed. Repeat procedure until no further air emerges. Bleeding sequence => Page 47-81.

Brake fluid replacement

– Connect VW 1238/B, open bleeder screws in line with information given in table below and allow appropriate amount of brake fluid to drain out. Pumping in new brake fluid flushes the used brake fluid out of the system.

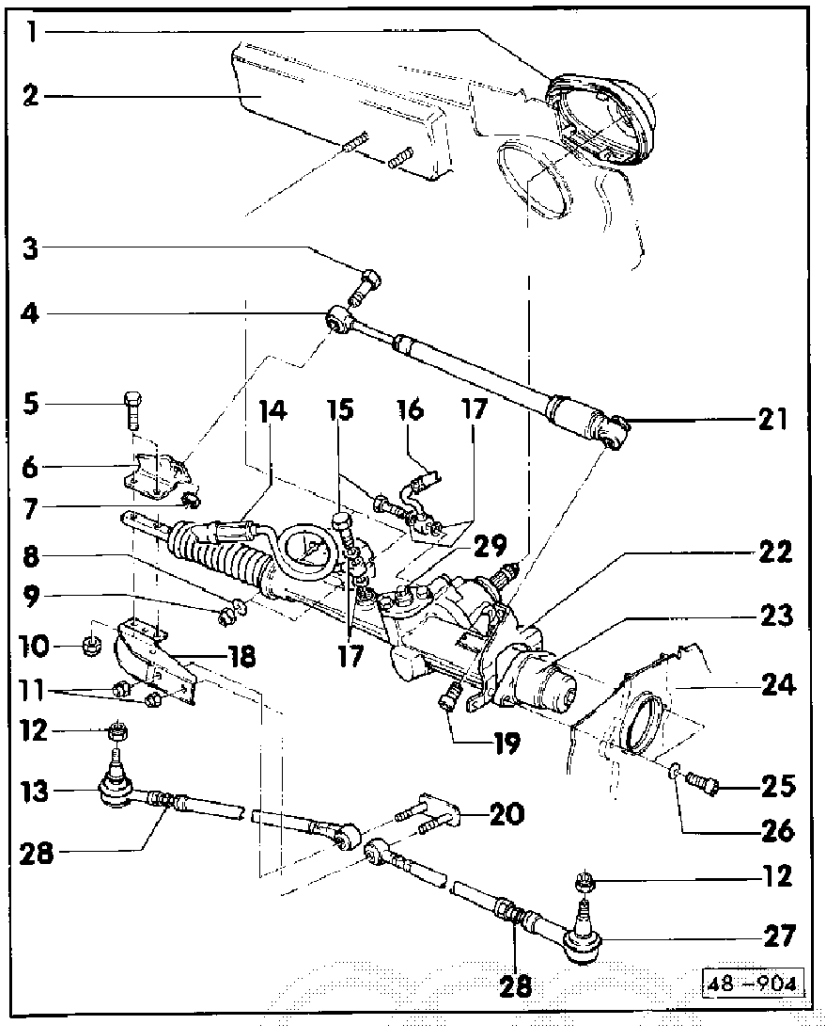
Sequence: **Brake master cyl.** **Wheel brake cyl.** **Brake callipers**	**Amount of brake fluid which must flow out of brake master cylinder, brake callipers or wheel brake cylinders:**
Brake master cyl.	250 cm3(per bleeder screw, if fitted)
Rear right	500 cm3
Rear left	500 cm3
Front right	500 cm3
front left	500 cm3



Brake fluid replacement without -VW 1238/B-

This method is only to be used if no brake filling and bleeding unit is available.

– Use extractor bottle to draw as much brake fluid as possible out of the reservoir. Pump pedal with bleeder screw open to pump brake fluid out of brake master cylinder and brake callipers. Top up with fresh brake fluid and bleed braking system in specified sequence =>Page 47-81,bleeding.



Steering box components

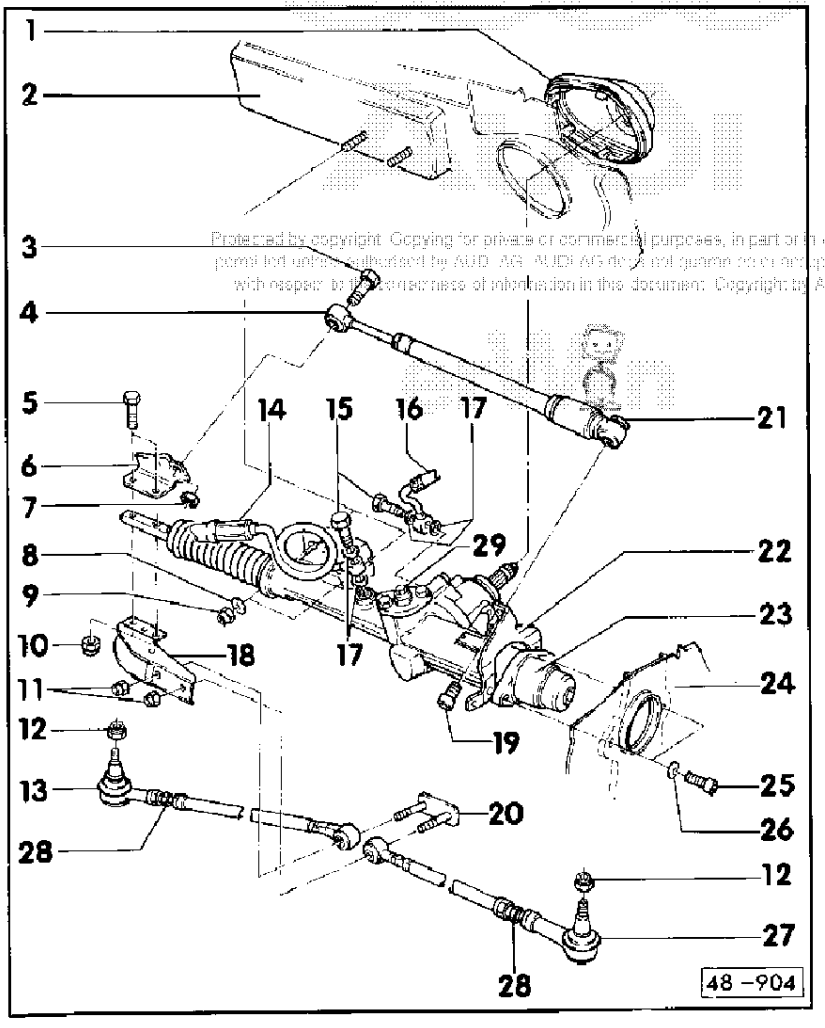
Notes:

- ♦ Welding and alignment works on the steering components are not permitted.
- ♦ Topping up hydraulic fluid – bleeding steering system => Page 48-151
- ♦ Check steering system for leaks =>Page 48-152

1 – **Bulkhead seal**
- ♦ Insert carefully into annular groove of rotary valve housing and into bulkhead

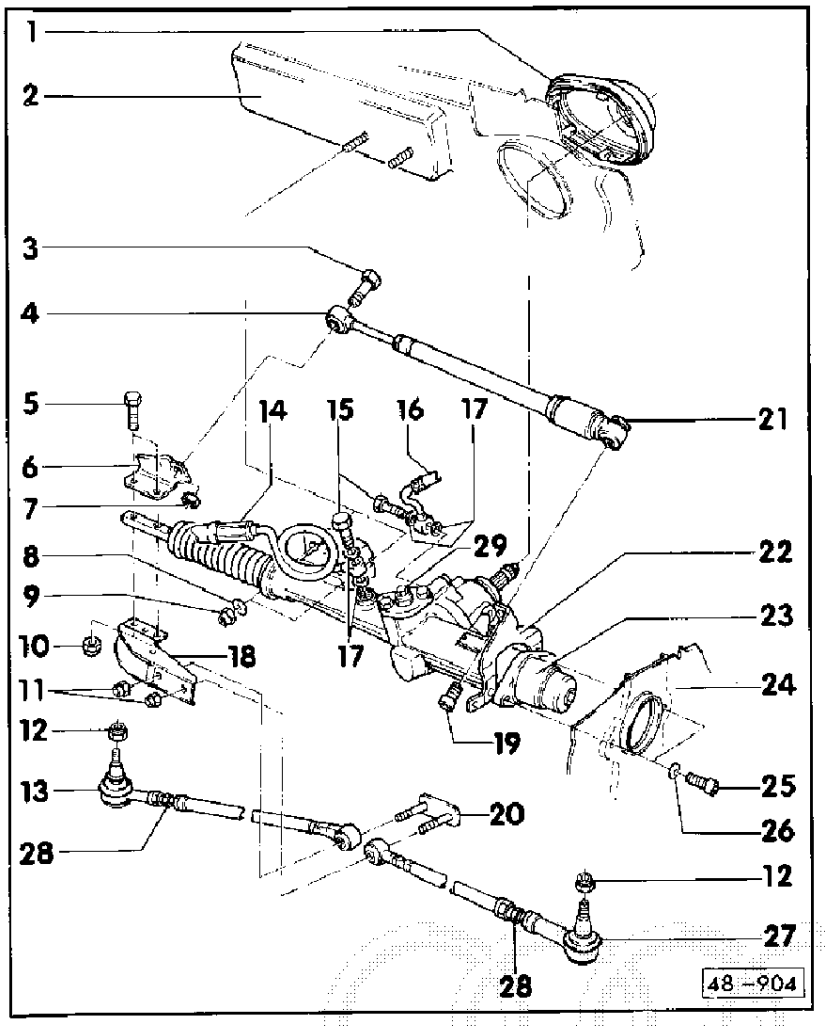
2 – **Bulkhead**

3 – **Hexagon bolt**



4 – **Steering damper**
- ♦ Only installed on vehicles with 4-cylinder engine and sports running gear as of model year 1993 as well as on vehicles with 6-cylinder engine
- ♦ Can be replaced without removing steering box, take out servo unit beforehand
- ♦ Remove with bracket before taking out steering box
- ♦ Unscrew from bracket to check
- ♦ Treat appropriately before scrapping

=> Special Information. No. 2; Edition 03.90



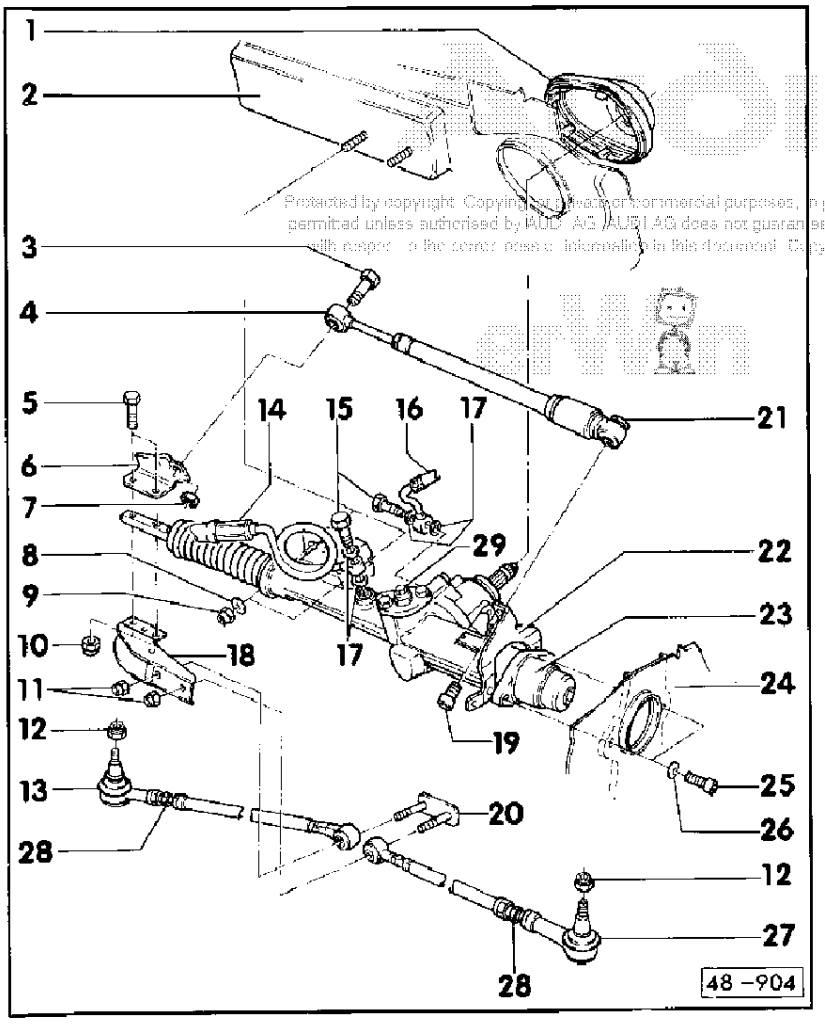
♦ Checking:
_ Piston rod must move uniformly and smoothly over entire stroke; if appropriate, compare with new damper (move damper several times over its entire stroke whilst holding it in installation position). If they are functioning properly, slight traces of shock absorber oil do not signify that replacement is necessary.

5 – **Hexagon bolt, 45 Nm**
♦ First tighten these bolts, then nuts - 10-
♦ See tightening sequence => Page 48-13

6 – **Steering damper bracket, rack end**

7 – **Hexagon nut, 35 Nm**

8 – **Washer**

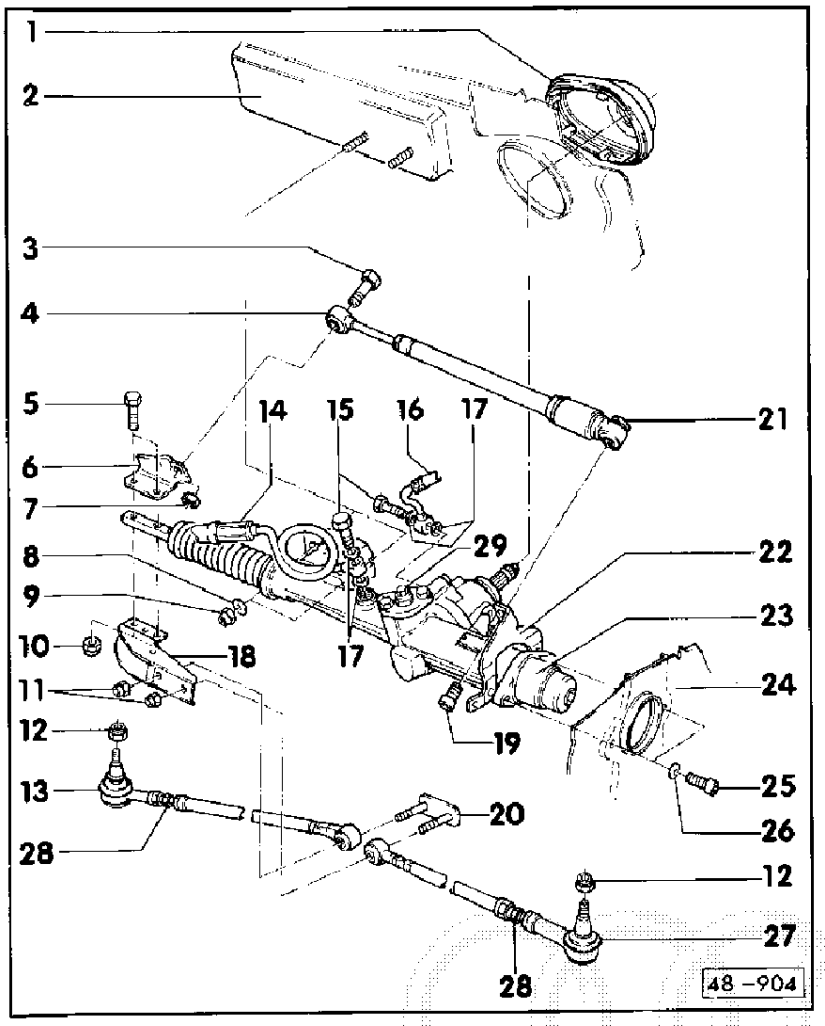


9 – **Self-locking nut, 45 Nm**
♦ Always replace
♦ Tighten cheese-head bolts at left wheel housing before fastening

10 – **Self-locking nut, 45 Nm**
♦ Always replace
♦ Tighten bolts - 5- first
♦ See tightening sequence => Page 48-13

11 – **Self-locking nut, 40 Nm**
♦ Always replace

12 – **Self-locking nut, 30 Nm**
♦ Always replace



13 – **Right-hand track rod**

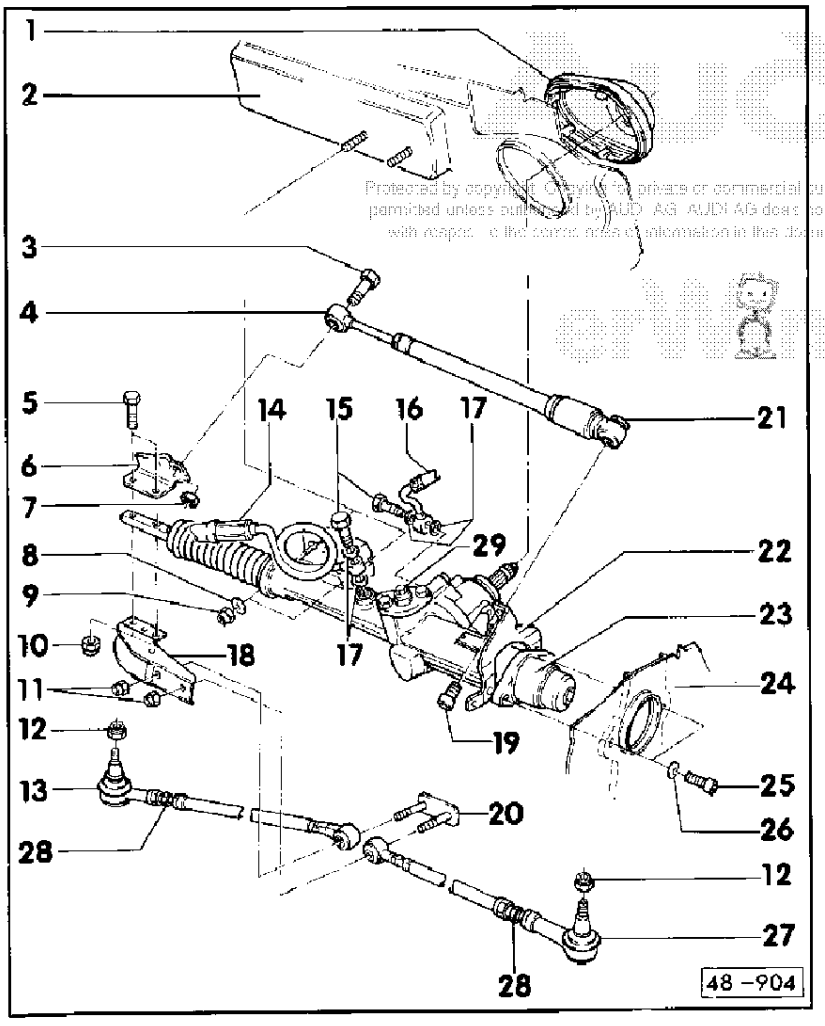
- ♦ Press off steering arm => Fig. 3

Note:

When fitting the two track rod joints, i.e. when adjusting the toe, make sure that the two swivel heads for the joint pins are neither tilting forwards nor backwards.

14 – **Expansion hose**

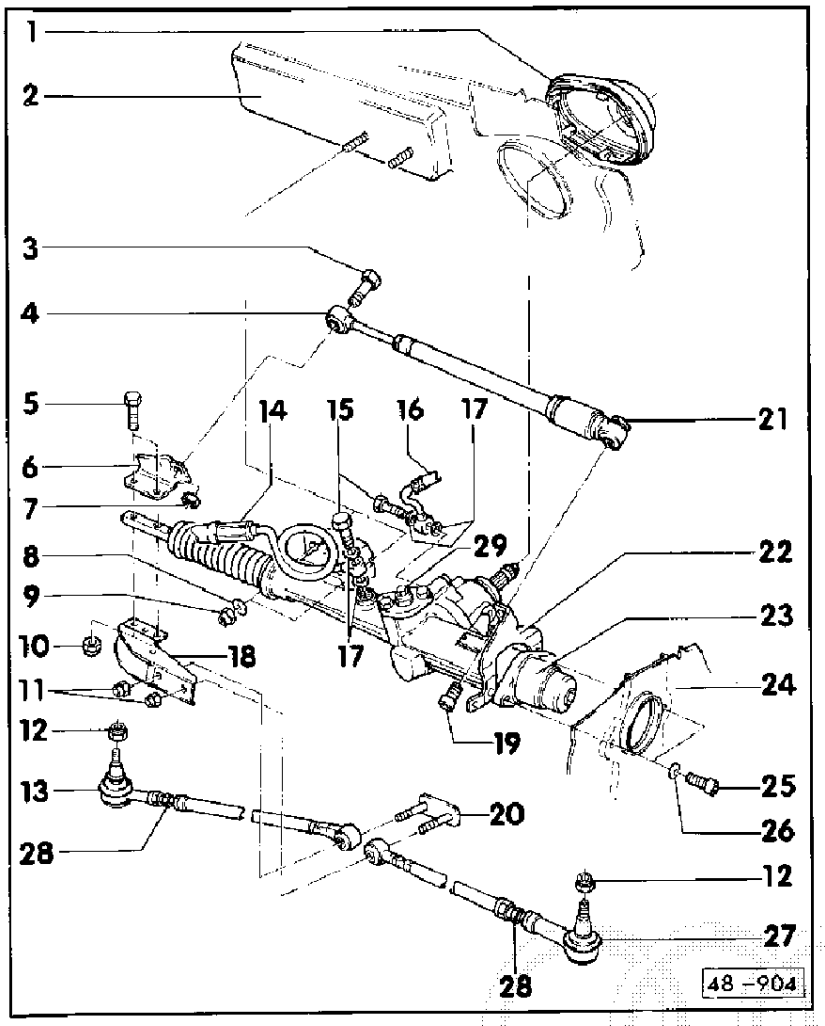
- ♦ Note that there are different versions:
- ♦ Routing at steering box differs depending on engine version => Figs. 1 and 2
- ♦ To unscrew at steering box, remove servo unit on vehicles with 6-cylinder engine



15 – **Banjo bolts, 40 Nm**

16 – **Return hose**

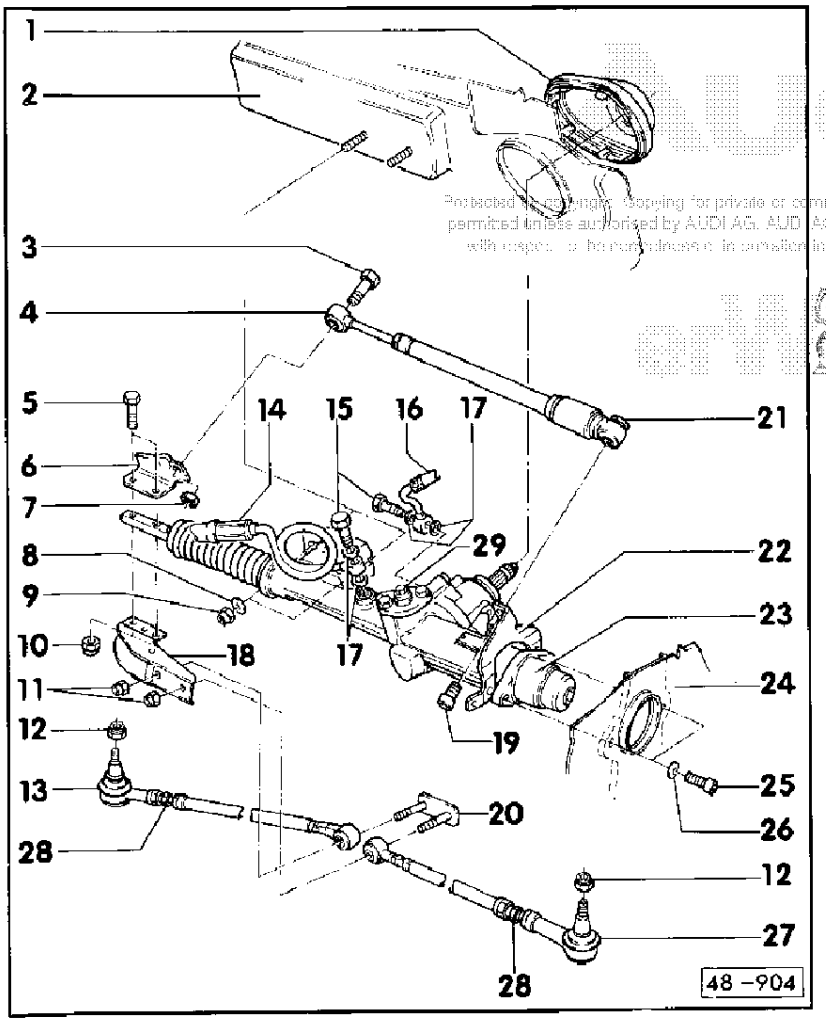
- ♦ Note that there are different versions:
- ♦ Routing at steering box => Figs. 1 and 2
- ♦ Before unscrewing banjo bolt -15- insert hose clamp -3094- in return hose
- ♦ To unscrew at rotary valve housing, remove servo unit on vehicles with 6-cylinder engine and unscrew steering damper at holder on wheel housing end and swivel upwards



17 – O-rings
- ♦ Always replace
- ♦ Insert in either end in banjo unions of return and expansion hose

18 – Driver
- ♦ Unscrew from rack
- ♦ Follow the tightening sequence during installation => Page 48-13
- ♦ Vehicle must be standing on wheels when securing track rods to driver
- ♦ After removing from rack, check and if necessary adjust toe

19 – Cheese-head bolt, 40 Nm
- ♦ Counterhold at hexagon of threaded bush when unscrewing and screwing in



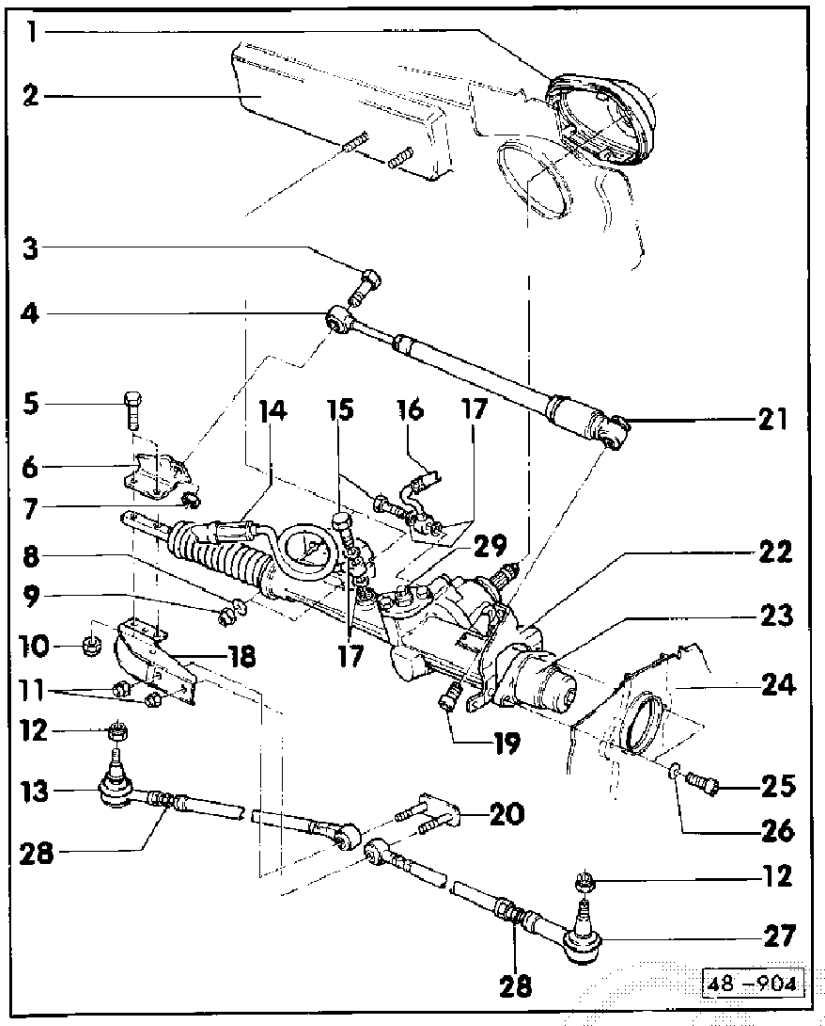
20 – Tab
- ♦ Inset in both track rods and screw to driver with vehicle standing on its wheels

21 – Threaded bushing
- ♦ Counterhold at hexagon when unscrewing and screwing in cheese-head bolt

22 – Holder for steering damper, wheel housing end

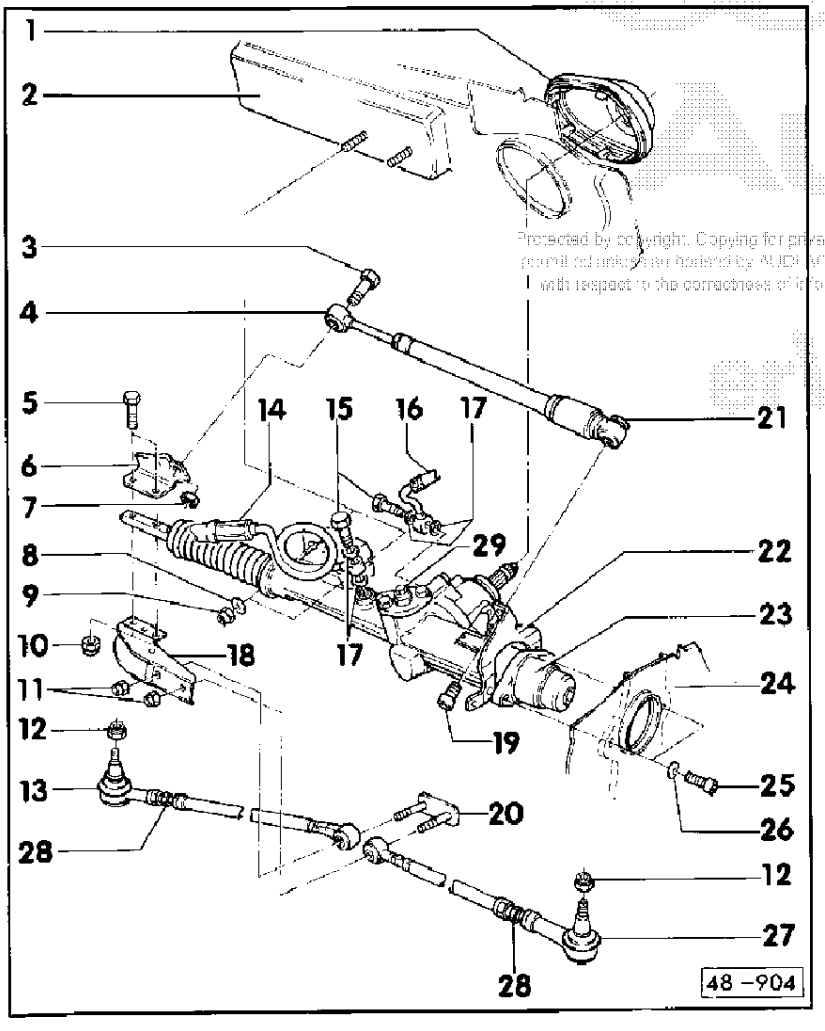
23 – Steering box
- ♦ Overall ratio 16.8 : 1
- – On 169 kW engine 14.6 : 1
- ♦ Removing and installing =>Page 48-17
- ♦ Treat appropriately before scrapping

=> Special Information. No. 2; Edition 03.90



Attention

Before removing steering box on vehicles with airbag, disconnect battery earth strap and 1-pin red connector for airbag voltage supply to ensure that subsequent assembly work does not result in accidental actuation of airbag system. Front wheels are then to be moved to the straight-ahead position and the steering wheel removed (this ensures that the coil spring in the steering wheel is not damaged).

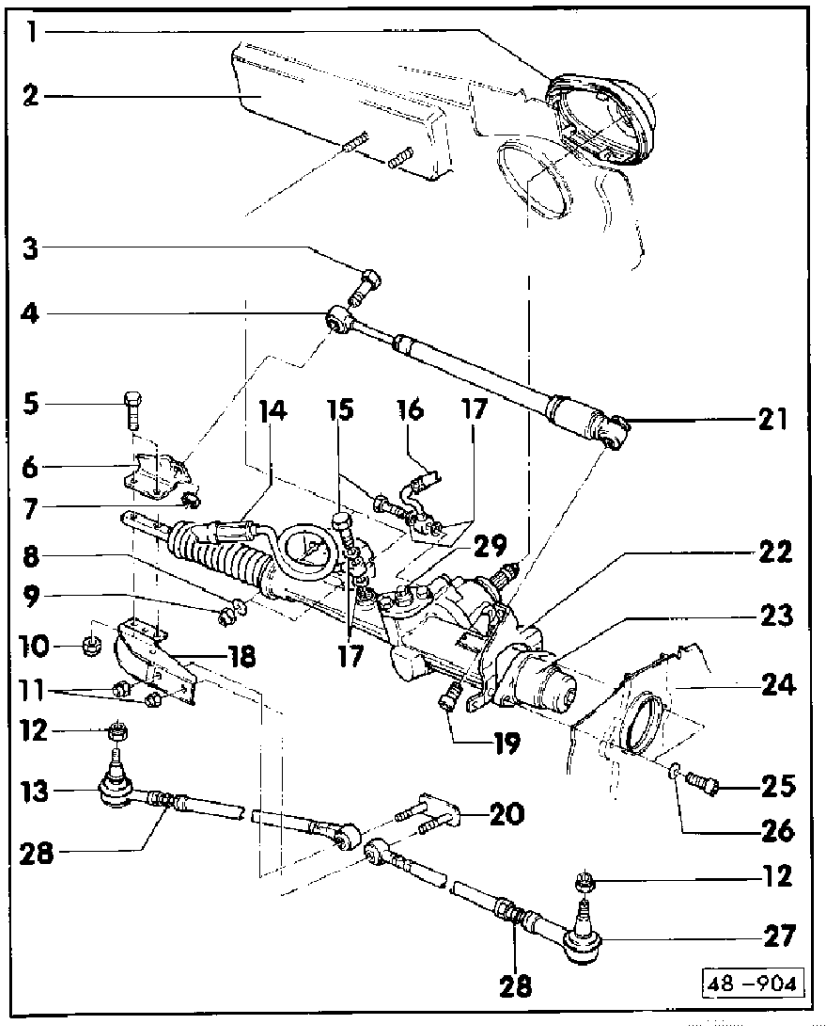


- ♦ Centre with steering column on installation
- ♦ Make sure there is no steering torsion on installation; move accordingly at securiing points if necessary
- ♦ After installation, move steering box to centre position and fit and attach steering wheel in correct position (spoke horizontal)
- ♦ Servicing =>Page 48-29
- ♦ Servicing with Servotronic =>Page 48-45
- ♦ Adjusting toe => Page 44-15
- ♦ Attach battery earthing strap

24 – **Left wheel housing**

25 – **Cheese-head bolt, 20 Nm**

- ♦ Tighten before fastening steering box to bulkhead



26 – Spring lock washer

♦ Always replace

Note:

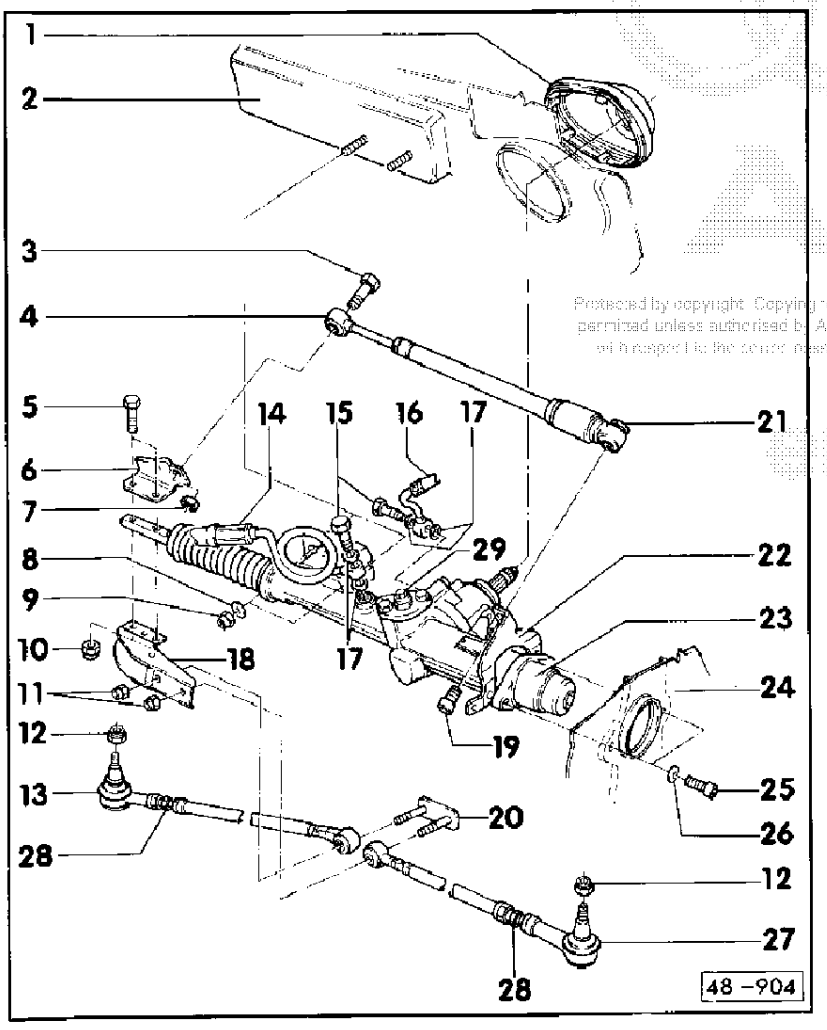
On vehicles with no steering damper, steering box is attached on wheel housing end with a self-locking nut (tightening torque 20 Nm). Always renew self locking nuts. Fit washer between steering box flange and self-locking nut.

27 – Left track rod

♦ Press off steering arm => Fig. 3

Note:

When fitting the two track rod joints, i.e. when adjusting the toe, make sure that the two swivel heads for the joint pins are neither tilting forwards nor backwards.

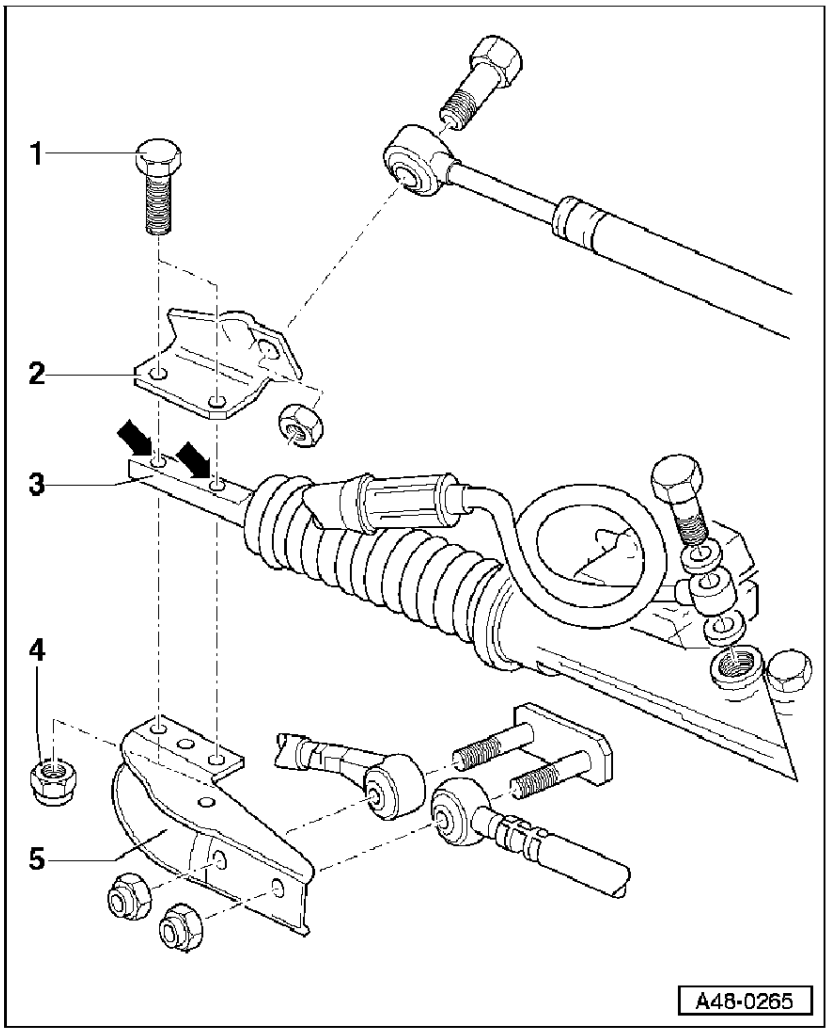


28 – Threaded piece

♦ Always adjust toe at both track rods => Page 44-15

29 – Adjusting screw

♦ Adjusting steering play => Page 48-56, Fig. 7



Tightening sequence for bolted connection between steering box and track rod driver

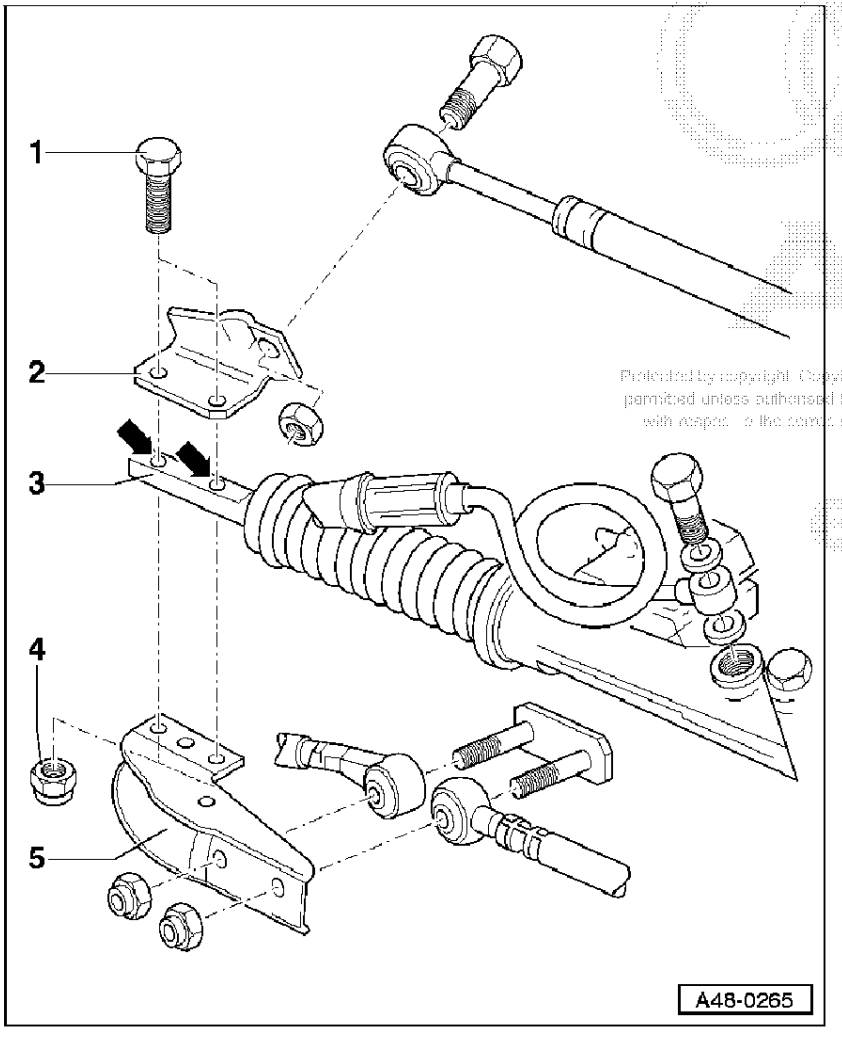
1 – **Hexagon bolts, 45 Nm**
- ♦ First tighten these bolts, then nuts -4-

2 – **Steering damper bracket, rack end**
- ♦ Only installed on vehicles with 4-cylinder engine and sports running gear as of model year 1993 as well as on vehicles with 6-cylinder engine

3 – **Rack**
- ♦ With internal threads M10 - arrows-.

4 – **Self-locking nuts, 45 Nm**
- ♦ Always replace

5 – **Driver for track rods**



Note the following when installing the driver:
- ♦ The threads of rack -3- and bolts -1- must not be damaged. They must be free of dirt, oil etc.
- ♦ Position driver -5- and first tighten the hexagon bolts -1-.
- ♦ Afterwards screw on new self-locking nuts -4- from underneath and tighten.

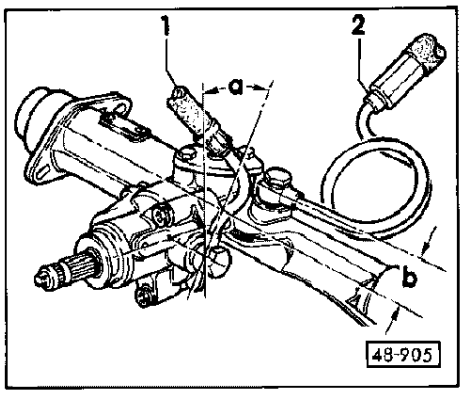


Fig.1 Routing at steering box

_ 1 - Return hose
_ 2 - Expansion hose
– Pay attention to specifications when attaching lines to steering box
  _ a = approx. 30o
  _ b = parallel

Vehicles with 6-cylinder engine

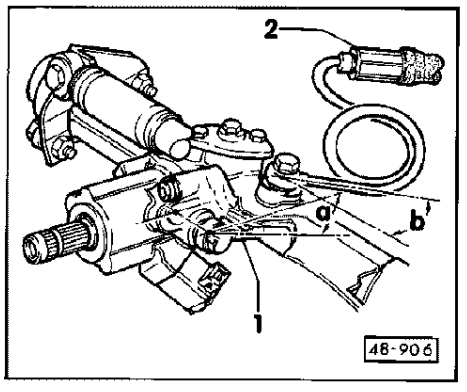


Fig.2 Routing at steering box

_ 1 - Return hose
_ 2 - Expansion hose
– Pay attention to specifications when attaching lines to steering box
  _ a = approx. 30o
  _ b = approx. 5o

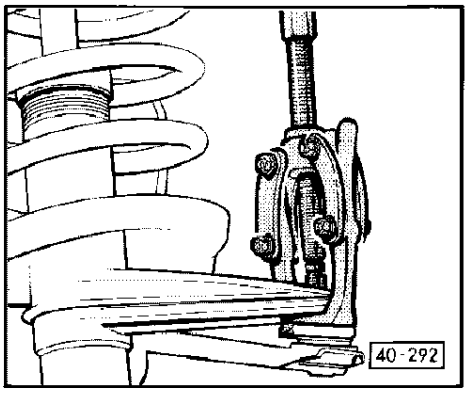


Fig.3 Pressing off track rod joint

Removing and installing steering box

Attention

Before removing steering box on vehicles with airbag, disconnect battery earth strap and 1-pin red connector for airbag voltage supply to ensure that subsequent assembly work does not result in accidental actuation of airbag system. Front wheels are then to be moved to the straight-ahead position and the steering wheel removed (this ensures that the coil spring in the steering wheel is not damaged).

Notes:

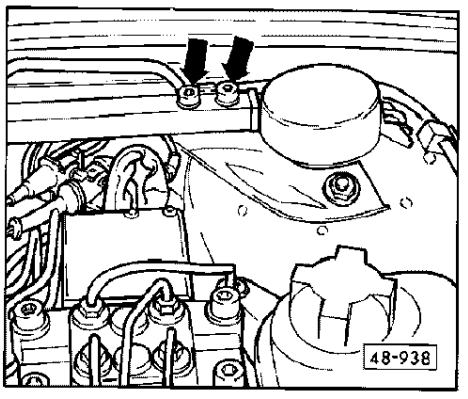
- As of the introduction of the 10" servo unit, this has to be taken out when removing and installing the steering box.
- Removing and installing the steering box is described for a vehicle with 6-cylinder engine and ABS, as this represents the greatest difficulties.

Assembly work listed below is only required on vehicles with 4- and 5-cylinder engine

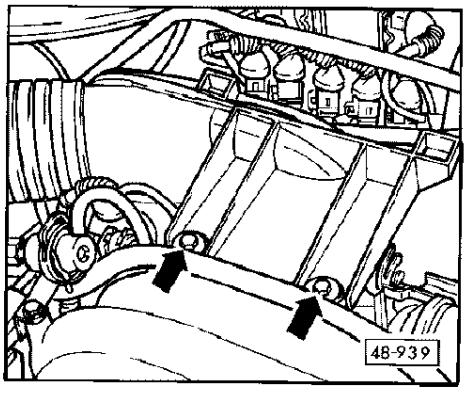
- Detach both front wheels
- Unscrew track rods on both sides from steering arm and remove together with driver
- After removing bulkhead seal, unscrew return hose at rotary valve housing from footwell
- Remove steering box through break-out (for track rod) in right wheel house

Removing:

- Disconnect battery earth strap

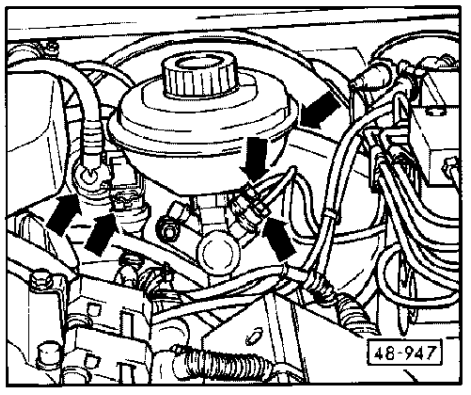


- Remove anti-roll bar -arrows-.
- Use screwdriver to lever off cover from intake silencer



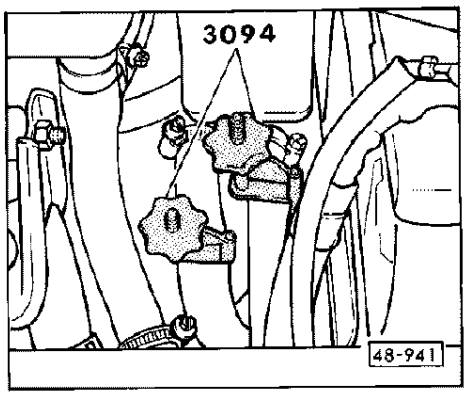
- Unscrew both securing bolts for intake silencer
- Unscrew air guide hose at air mass meter
- Squeeze the two quick-release couplings for the crankcase breather hoses together at the largest diameter and pull them off the valve covers.
- Press intake silencer to rear and at the same time lift it up.

- Pull vacuum hose off throttle housing and take out intake silencer.
- Draw off brake fluid, to do this remove strainer from brake fluid reservoir.

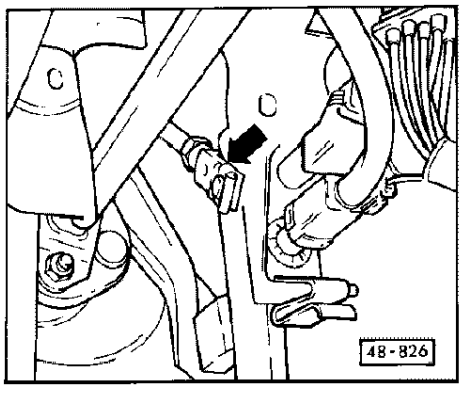


- Remove both brake lines from brake master cylinder to brake pressure regulator (attached to hydraulic modulator)
- Seal holes for brake lines at brake master cylinder and brake pressure regulator with bleeder screws.
- Pull connector for float indicator off brake fluid reservoir.
- Unscrew brake master cylinder from brake servo.
- Screw threaded pin out of valve cover for attaching crankcase breather.
- Pull off cruise control vacuum line.
- Unscrew cruise control diaphragm unit with holder from throttle housing.
- Unclip connectors for knock sensor, lambda probe heating and lambda probe from holder.

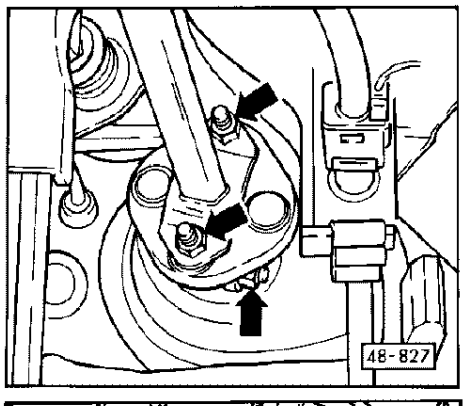
- Pull non-return valve with vacuum out of servo unit.
- Pull hose for clutch master cylinder off brake fluid reservoir



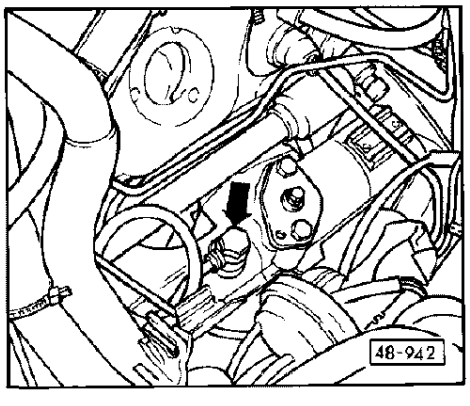
- Disconnect suction and return pipes with hose clamps -3094-.



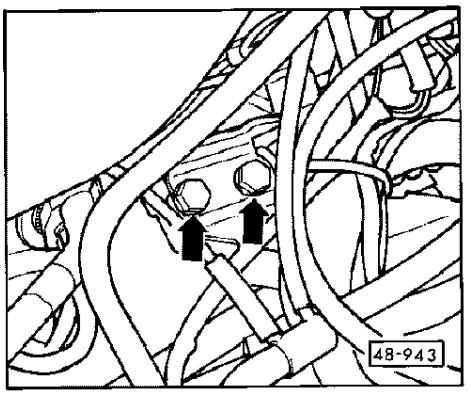
- Pull off connector for thermoswitch at rear coolant pipe
- Removing driver's side compartment.
- => General body repairs
- Remove fastener from pin
- Remove pin from clevis
- Detach coil spring at clevis



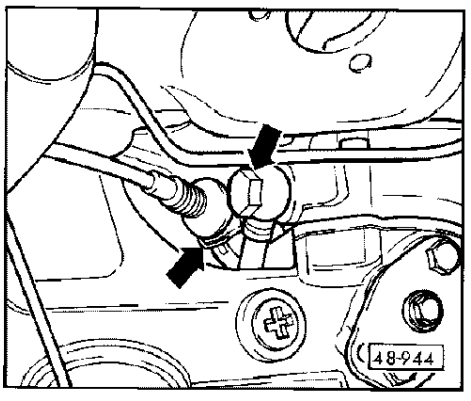
- Remove securing bolts for flanged tube with shackle at steering pinion and steering column
- Use screwdriver to press steering column off disc coupling
- Pull flanged tube with shackle off steering pinion, then press steering column slightly to the side
- Unscrew servo unit from pedal bracket
- Carefully remove servo unit



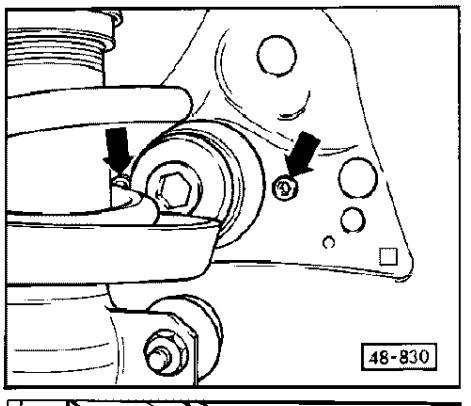
- Unscrew banjo bolt for expansion hose from steering box.
- Turn steering by moving wheels from stop to stop so that hydraulic fluid in steering can escape from connection hole for expansion hose.
- Seal hole in steering box with dummy plug.
- Unscrew self-locking nuts from driver – rack securing bolts.



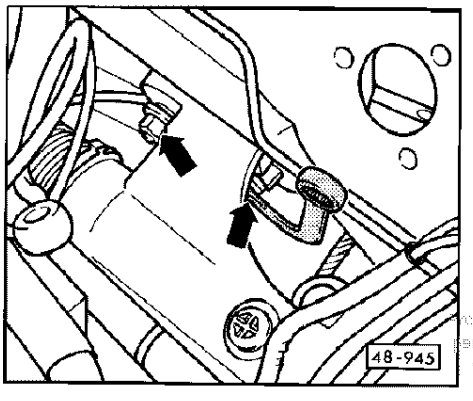
- Unscrew steering damper – damper holder securing bolts on wheel housing end.
- Unscrew both driver – rack securing bolts.
- Remove driver from rack.
- Remove steering damper with holder.



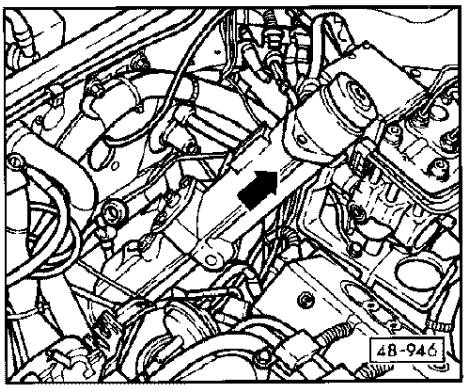
- Unscrew banjo bolt for return hose from steering box.
- Seal hole with dummy plug.
- On vehicles with Servotronic, disconnect plug from Servotronic valve.



- Unscrew securing bolts for steering box at left wheel housing.
- Remove holder for steering damper on wheel housing side, detaching brake line from retaining clip.



- Unclip bulkhead seal fasteners from bulkhead working from engine compartment.
- Remove bulkhead seal from footwell.
- Unscrew securing nuts for steering box from bulkhead with offset box spanner.
- Pull steering box slightly in direction of travel so that it comes free from bulkhead.



- Then lift steering box upwards by turning it appropriately and remove.

Installing:

Note:

Install in reverse order, paying particular attention to the following:

- Tightening sequence for bolted connection between steering box and track rod driver => Page 48-13.
- Insert steering box and screw to bulkhead by hand.
- Screw steering box to left wheel housing with holder for steering damper (second mechanic required).
- Screw steering box to bulkhead with offset box wrench.
- Carefully insert bulkhead seal.
- Insert brake line in retaining clip at holder for steering damper on wheel housing end.
- Attach return hose to rotary valve housing and expansion hose to steering box such that pipes have no contact => Page 48-15, Fig. 1 and 2
- Attach connector to Servotronic valve.

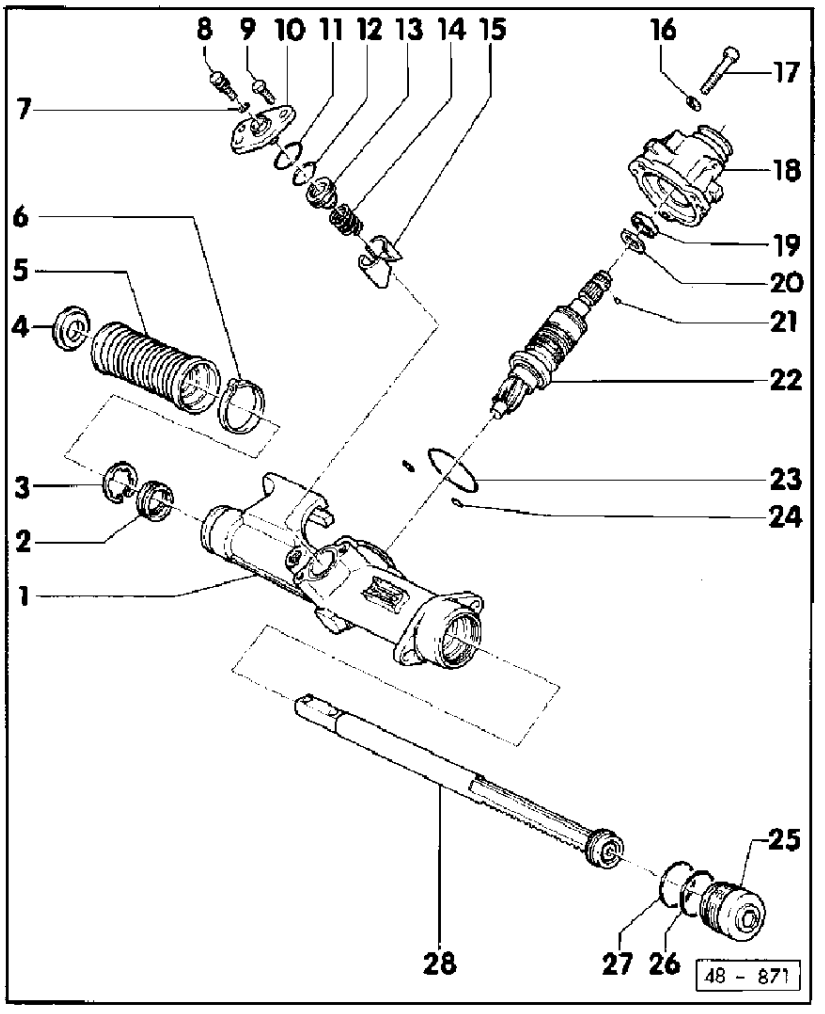
- Insert servo unit in bulkhead and screw on, then roll sealing ring for bulkhead seal onto bulkhead.
- Attach connector for thermoswitch at rear coolant pipe.
- Insert threaded pin.
- Screw cruise control diaphragm unit with holder to throttle housing.
- Attach cruise control vacuum line.
- Clip in connectors.
- Attach coil spring to clevis
- Insert pin in clevis/brake pedal and fit with new fastener.
- Attach connector for float indicator to brake fluid reservoir.
- Attach hose for clutch master cylinder to brake fluid reservoir.
- Remove hose clamps -3094- from suction and return hose.

- Attach vacuum hose to throttle housing.
- Attach both crankcase breather hoses to valve cover.
- Install anti-roll bar (tightening torque 20 Nm).
- With engine switched off, turn steering wheel several times from lock to lock to bleed steering box.

Note:

This process must be repeated if noise is heard during test drive.

- Bleed braking system and check for leaks
- Bleed slave cylinder for hydraulic clutch controls.
- Connect battery earth strap.
- Check hydraulic fluid level and top up if necessary. Check return hose at rotary valve housing for leaks.
- Check expansion hose at steering box for leaks.
- Adjust toe.



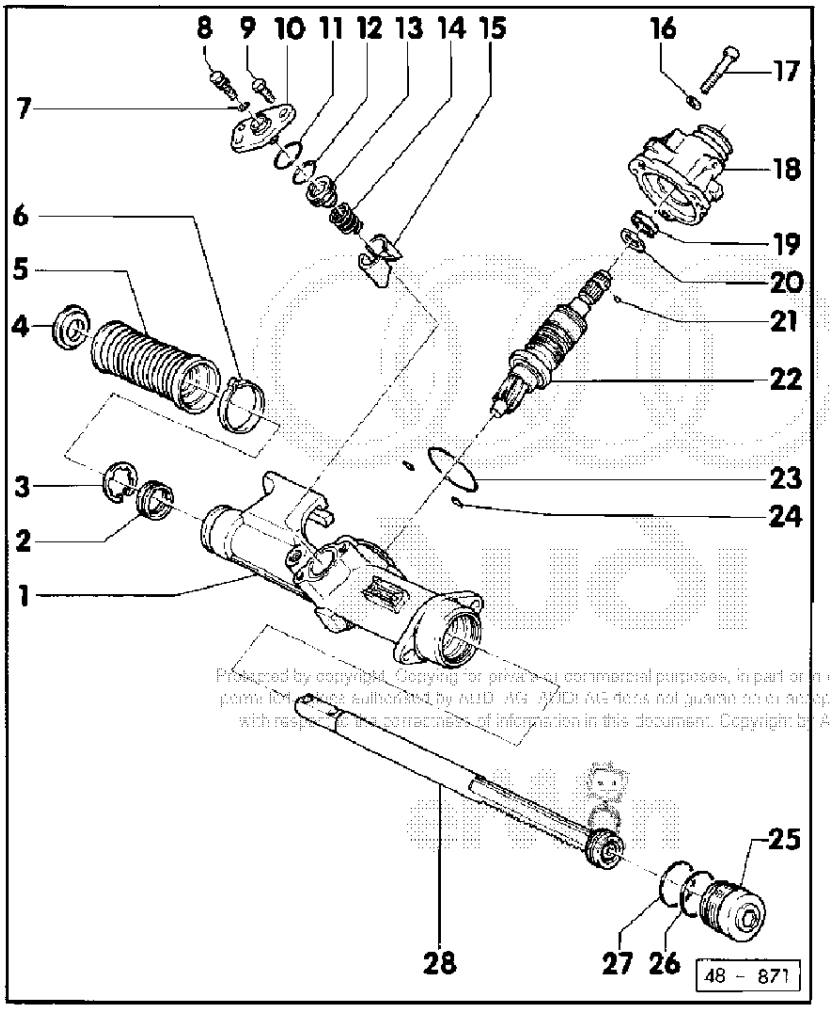
Servicing power-assisted steering

Attention

Keep workplace and components spotlessly clean

Notes:

- The power-assisted steering uses hydraulic fluid, part no. G 002 000.
- All parts marked with an asterisk are contained in the repair set and are to be replaced when servicing.
- Moisten all sealing elements with hydraulic fluid before installing.
- Welding and straightening repairs are not permitted on the steering components.
- Screw clamps can also be used in place of wing hose clamps.



1 – Steering box

- Removing and installing => Page 48-1
- Adjust toe after removing and installing
- Adjusting toe => Page 44-15
- Vehicles with 169 kW engine do not feature Servotronic

2 – Rack seal *

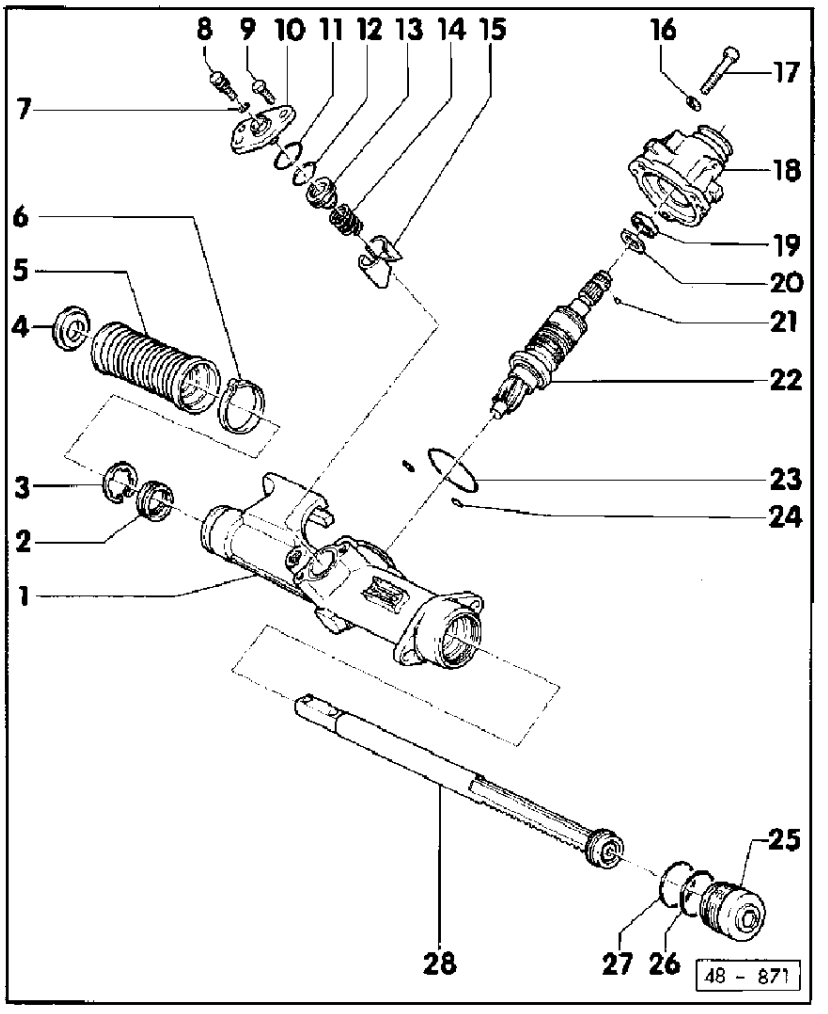
- Always replace
- Extracting => Figs. 1 and 2

3 – Circlip

- Can only be removed and fitted after taking out rack.

4 – Retaining ring

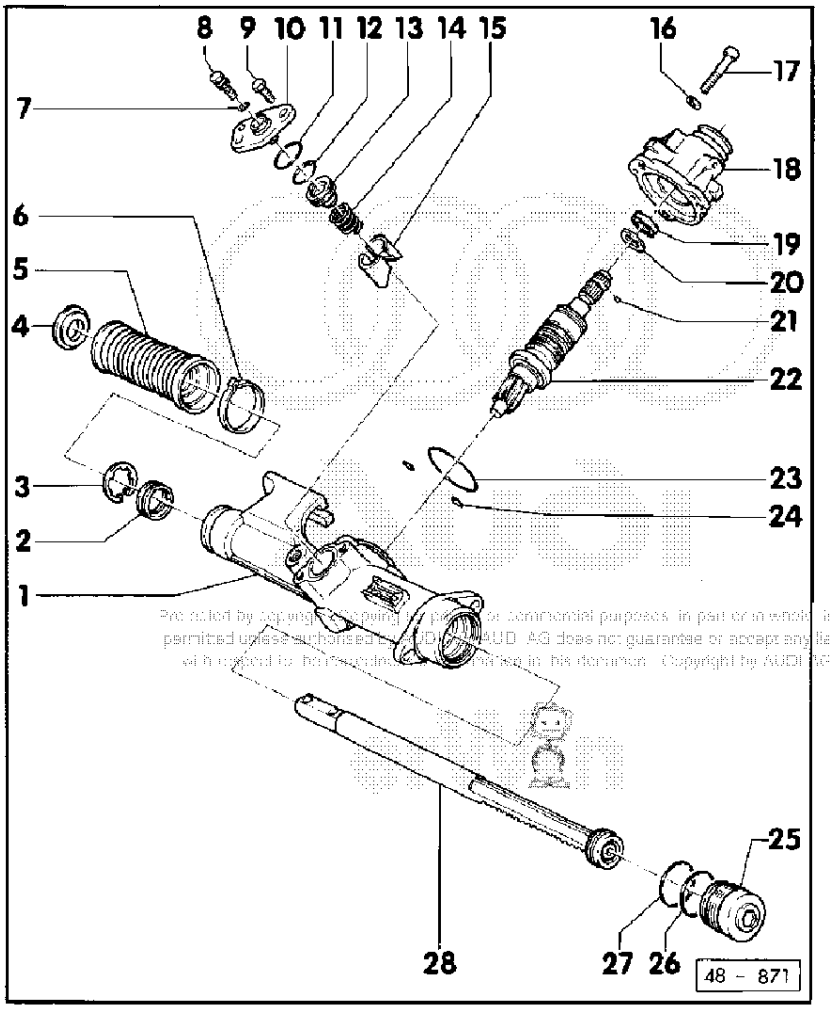
- Slip onto rack as far as it will go.
- Insert bellows in annular groove.



5 – Bellows
- ♦ Can be replaced without removing steering box
- ♦ Adjust toe after replacement
- ♦ Adjusting toe => Page 44-15

6 – Wing hose clamp
- ♦ Use screw clamps when performing repairs
- ♦ Screw connection faces bulkhead

7 – O-ring *
- ♦ Always replace

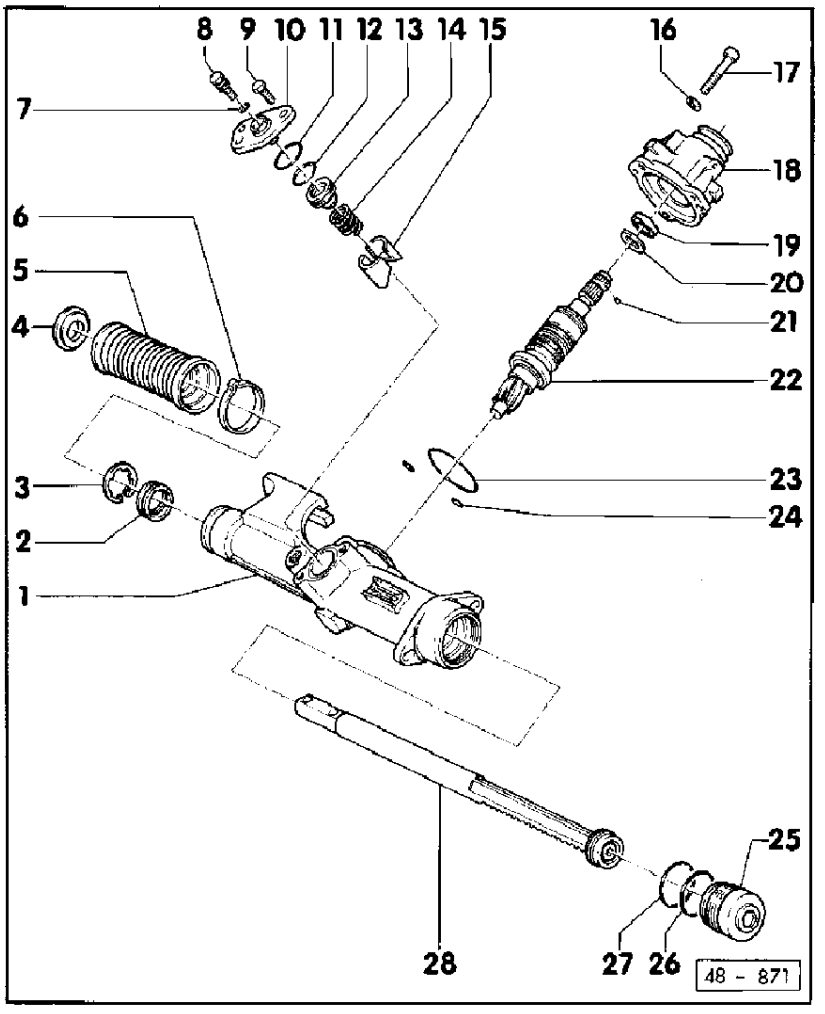


8 – Adjusting screw
- ♦ Adjusting steering play =>Fig. 5

9 – Hexagon bolt, 20 Nm

10 – Cover
- ♦ Screw onto steering box
- ♦ The two adjacent holes must face forwards when viewed in direction of travel.

11 – Sealing ring 35 x 2 mm *
- ♦ Always replace
- ♦ Insert in annular groove in steering box



12 – **Sealing ring 27 x 2,5 mm ***
- ♦ Always replace
- ♦ Insert in annular groove in gasket holder

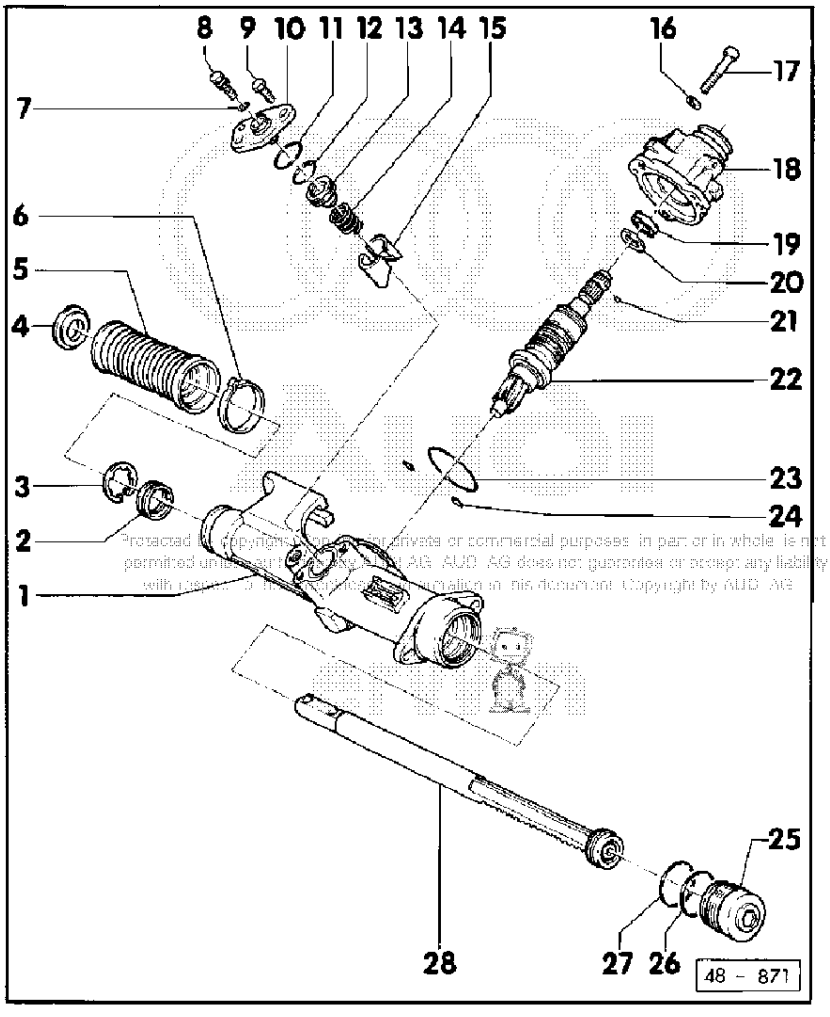
13 – **Gasket holder**
- ♦ Disassembling => Fig. 3

14 – **Spring**
- ♦ Insert in thrust piece

15 – **Thrust piece**

16 – **Washer**

17 – **Cheese-head bolt, 20 Nm**



18 – **Valve housing**

19 – **Seal ***
- ♦ Replacing =>Page 48-40

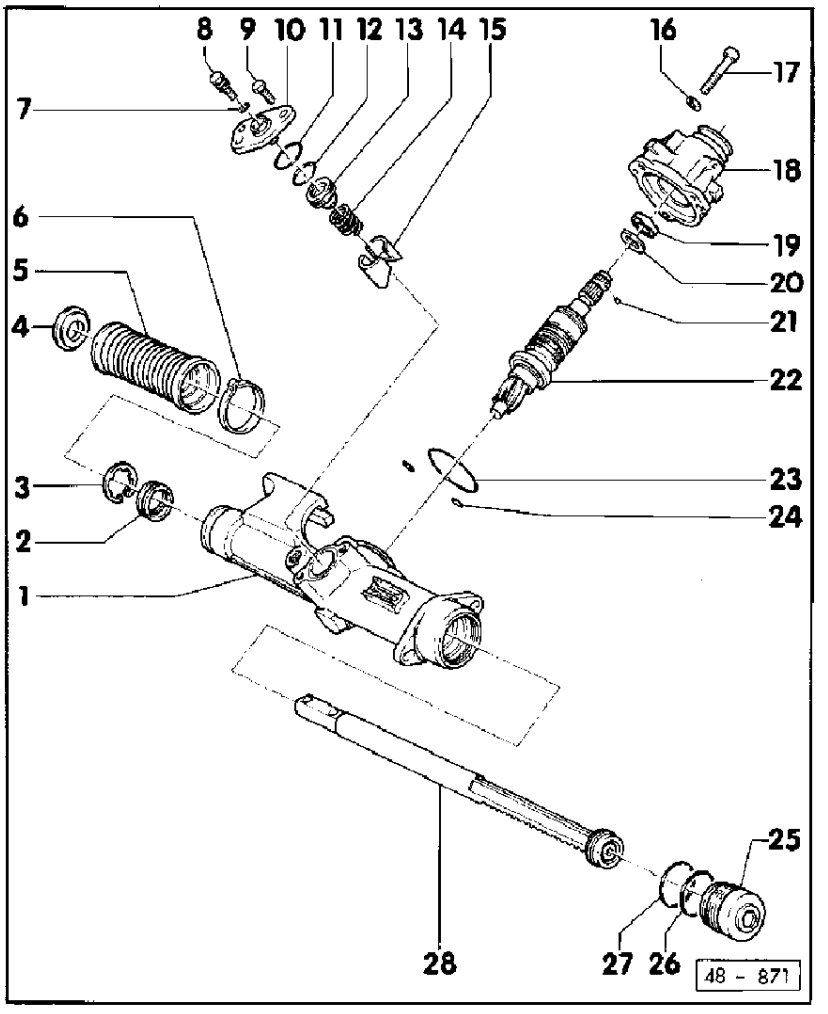
20 – **Backing ring**

21 – **Straight pin 2.5 x 6 mm ***
- ♦ Always replace
- ♦ Pull out with universal pliers before removing valve housing

22 – **Rotary valve/steering pinion**
- ♦ Knocking out of steering box => Fig. 4

23 – **Sealing ring 60 x 2 mm ***
- ♦ Always replace

24 – **Sealing ring 9 x 2 mm ***
- ♦ Always replace



25 – Cap, 50 Nm
- ♦ Secure with two centre punch marks offset by 180o

26 – Thrust ring *
- ♦ Always replace
- ♦ Attach to cap.
- ♦ Installation position = >Fig. 6

27 – Sealing ring 44 x 2.5 mm *
- ♦ Always replace
- ♦ Attach to cap.
- ♦ Installation position = >Fig. 6

28 – Rack
- ♦ Unscrew cap and push rack to left out of steering box.
- ♦ Watch for scoring around rack seal
- ♦ Fitting = >Page 48-42

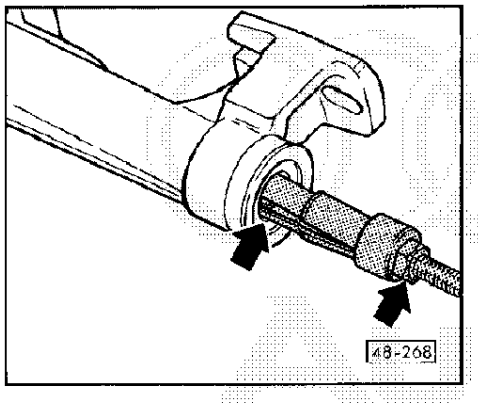


Fig.1 Pulling out rack seal

– Insert commercially available internal extractor (e.g. KUKKO 21/4) in sealing lip

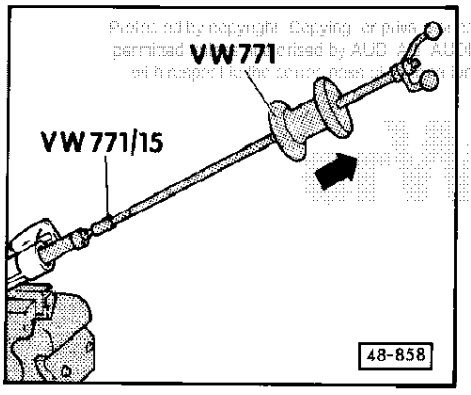


Fig.2 Screwing multi-purpose tool to internal extractor

– Clamp steering box in vice using soft jaws.

– Screw -VW 771- with -VW 771/15- to internal extractor and knock out rack seal

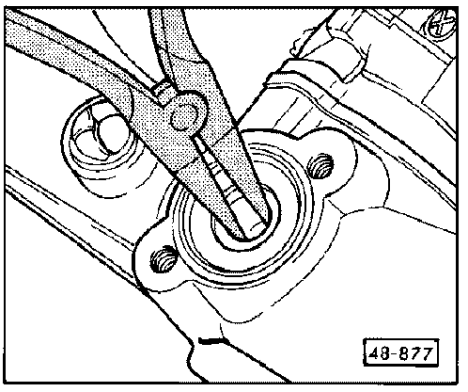


Fig.3 Disassembling gasket holder

– Pull out using commercially available external circlip pliers

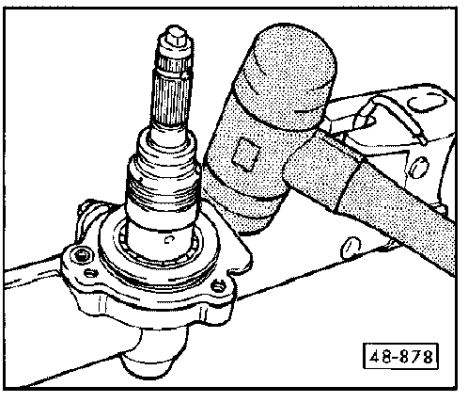


Fig.4 Driving out steering pinion

– Hold steering pinion by hand and knock out by hammering on steering box with commercially available rubber hammer.

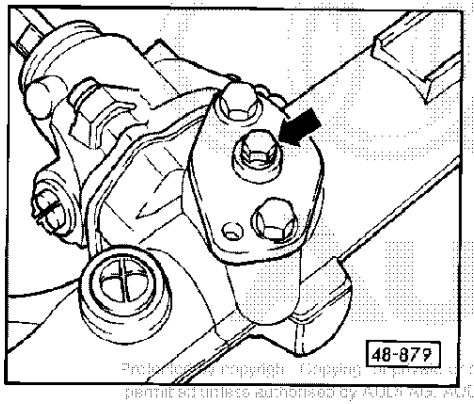


Fig.5 Adjusting steering play

Note:

Two mechanics are required to perform adjustment. Adjustment work is to be performed with the engine switched off and the vehicle standing on its wheels. For ease of illustration the steering box is shown removed.

– Move wheels to straight-ahead position.

– Turning the steering wheel back and forth (roughly 30oabout centre axis) produces a rattling and cracking noise.

– The second mechanic carefully screws in adjusting screw (arrow) into the cover until rattling and cracking noises can no longer be heard inside the vehicle.

– Perform test drive and correct adjustment of necessary.

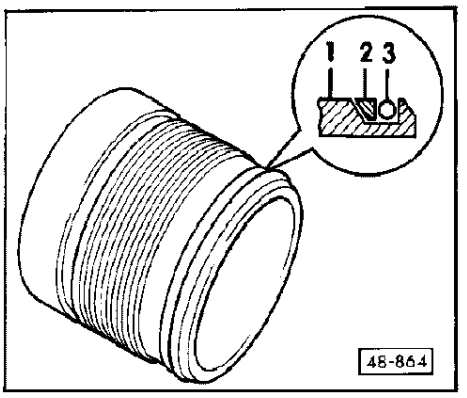
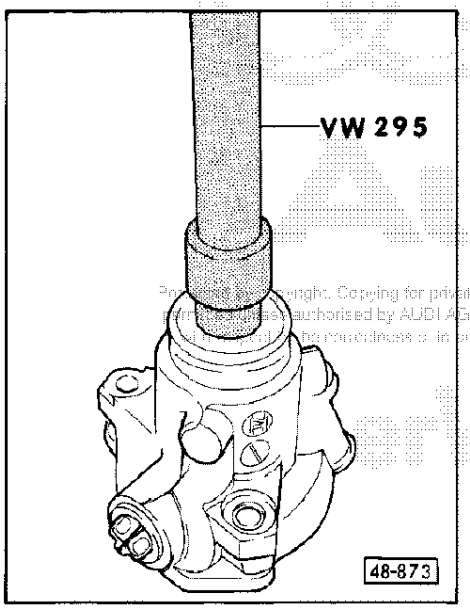


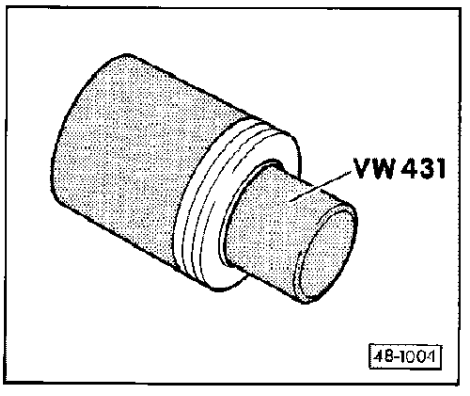
Fig.6 Installation position of thrust ring

- 1 - Screw cap
- 2 - Thrust ring
- 3 - O-ring

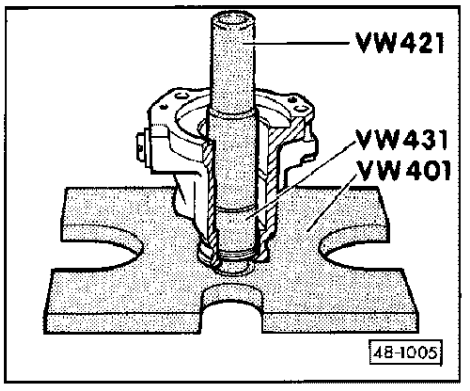
Replacing seal in valve housing



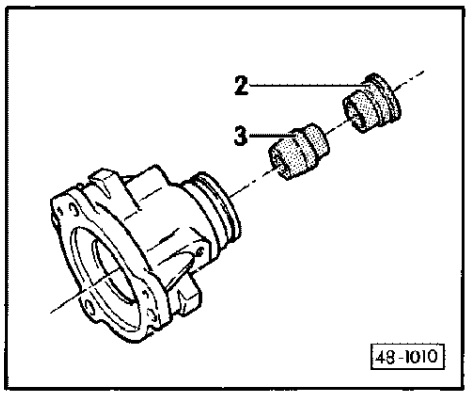
- Knock seal ring out of valve housing



- Attach new seal to special tool with sealing lip facing special tool -VW 431-.
- Insert special tool -VW 431- with seal in valve housing

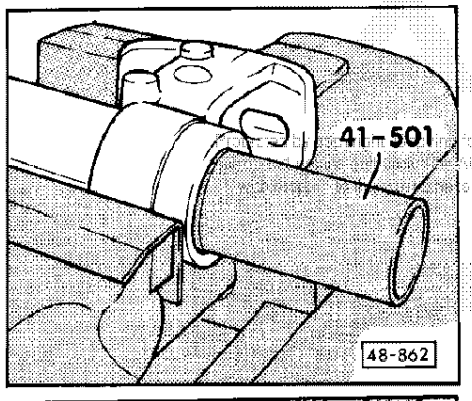


- Attach special tool -VW 421- to special tool -VW 431- and drive seal home
- Fill space between sealing and dust lips with multipurpose grease.



- Slip assembled positioning bush (contained in repair set and consisting of protective sleeve -2- and fitting sleeve -3-) into seal.
- Press fitting sleeve -3- out of protective sleeve.

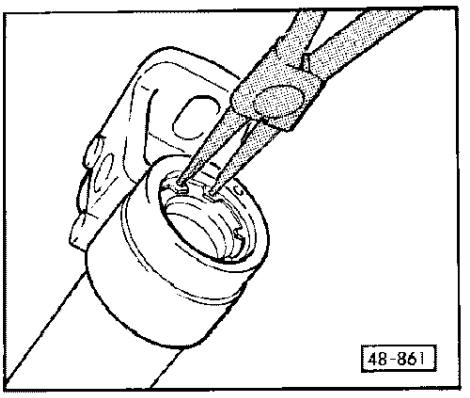
Fitting rack



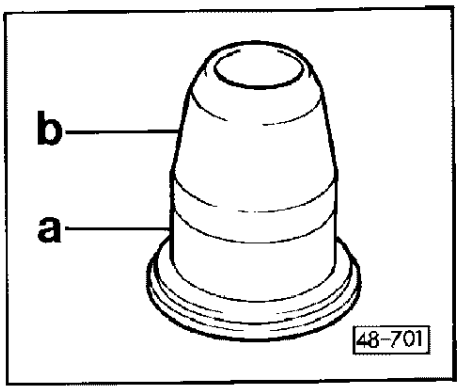
Note:

Before fitting rack, wash out steering box with white spirit, blow it out with compressed air and thoroughly clean rack. Prior to assembly, use hydraulic fluid to moisten parts of fitting sleeve, rack and rack seal. All new repair sets contain a fitting sleeve.

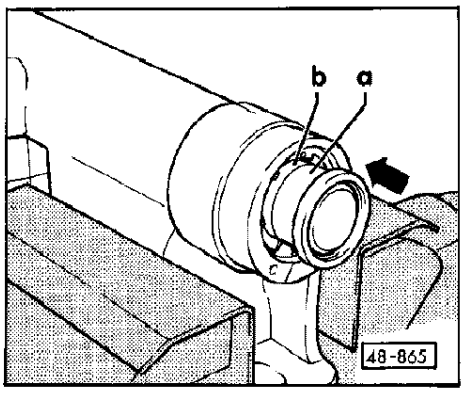
- Insert rack seal by hand in steering box and drive home.



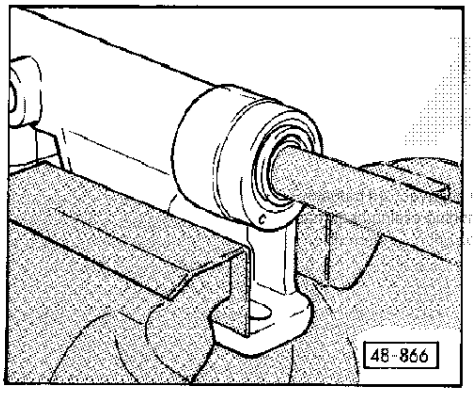
- Use commercially available circlip pliers to fit circlip.



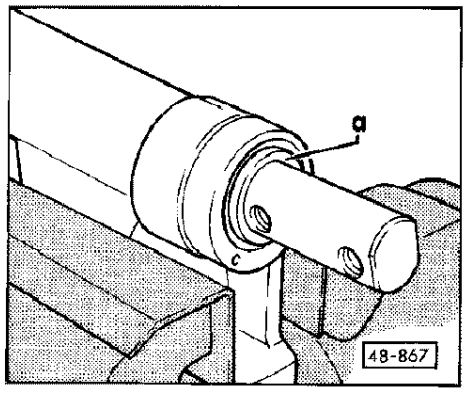
- Insert fitting sleeve -b- in fitting sleeve -a-, placing both parts on a flat surface as shown.



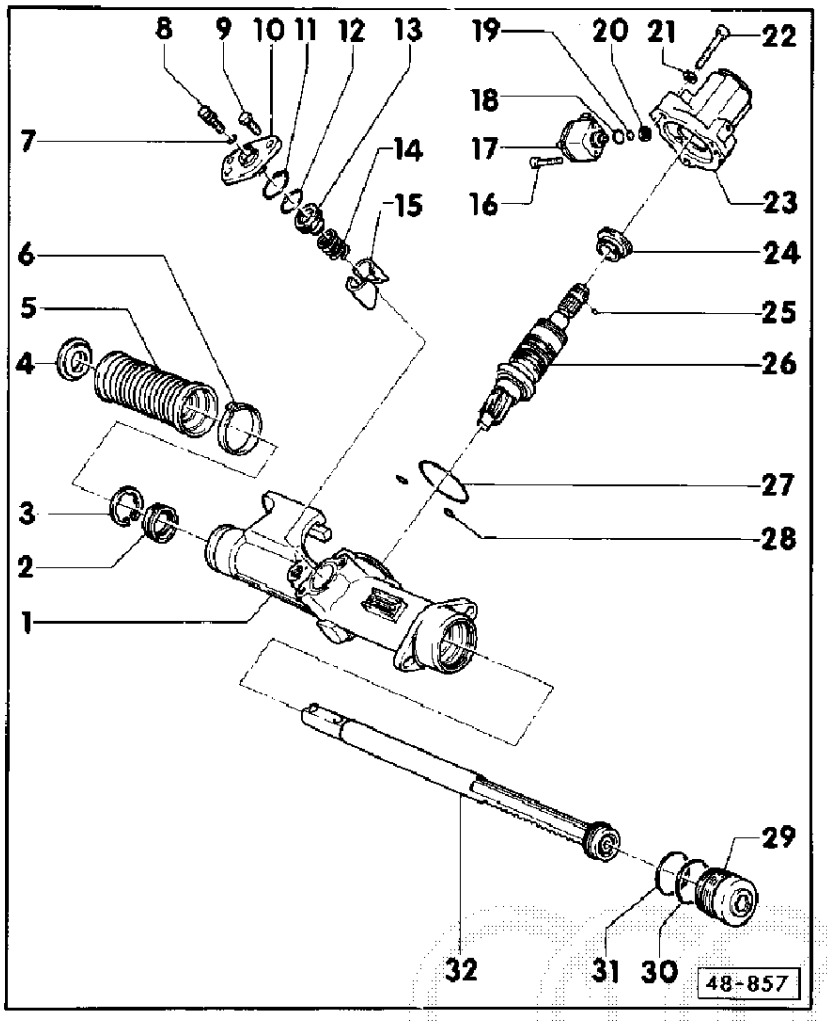
- Press home fitting sleeve -a- with fitting sleeve part -b- in steering box by hand.



- Use commercially available mandrel to drive fitting sleeve part into steering box and remove on opposite end.



- Push rack through steering box and fitting sleeve -a- from opposite end of fitting sleeve; counterhold fitting sleeve -a- by hand until flattened end of rack is past fitting sleeve -a-.
- Remove fitting sleeve -a- from rack.
- Screw on cap by hand so that rack can no longer fall out (seal could otherwise be damaged).



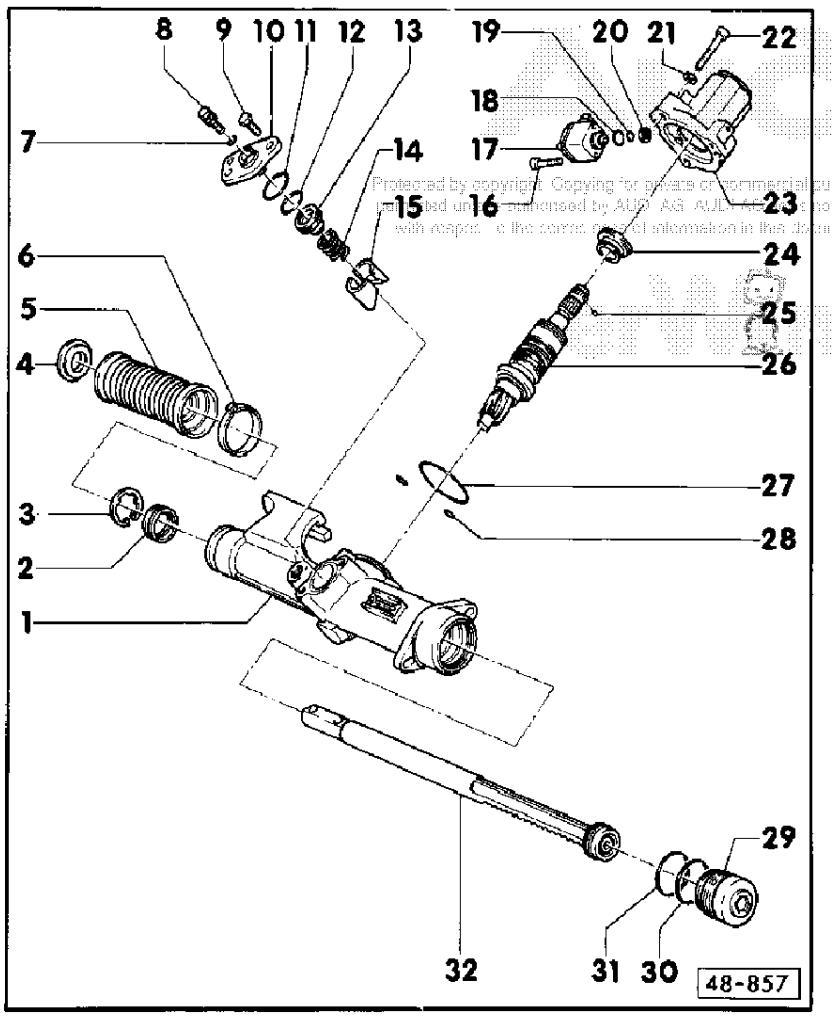
Servicing power-assisted steering with Servotronic

Attention

Keep workplace and components spotlessly clean

Notes:

- The power-assisted steering uses hydraulic fluid, part no. G 002 000.
- All parts marked with an asterisk are contained in the repair set and are to be replaced when servicing.
- Moisten all sealing elements with hydraulic fluid before installing.
- Welding and straightening repairs are not permitted on the steering components.
- Screw clamps can also be used in place of wing hose clamps.

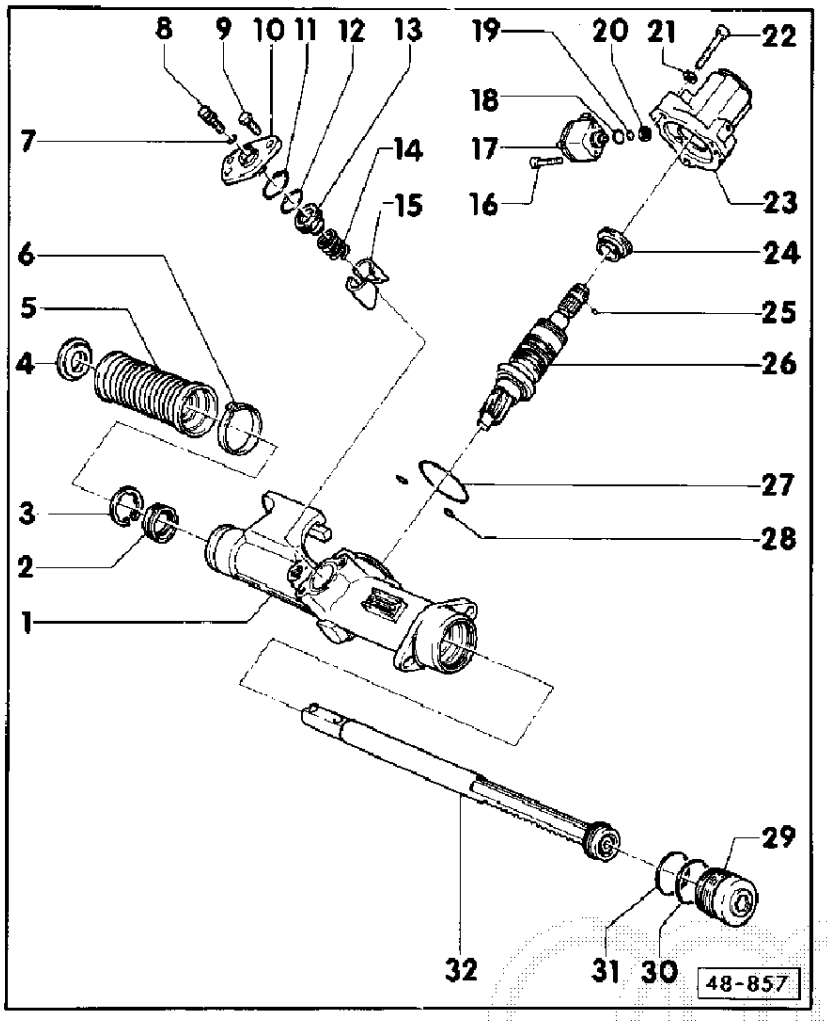


1 – **Steering box**
- Removing and installing => Page 48-1
- Adjust toe after removing and installing
- Adjusting toe => Page 44-15
- Vehicles with 169 kW engine do not feature Servotronic

2 – **Rack seal ***
- Always replace
- Extracting => Fig. 3 and 4

3 – **Circlip**
- Can only be removed and fitted after taking out rack.

4 – **Retaining ring**
- Slip onto rack as far as it will go.
- Insert bellows in annular groove.

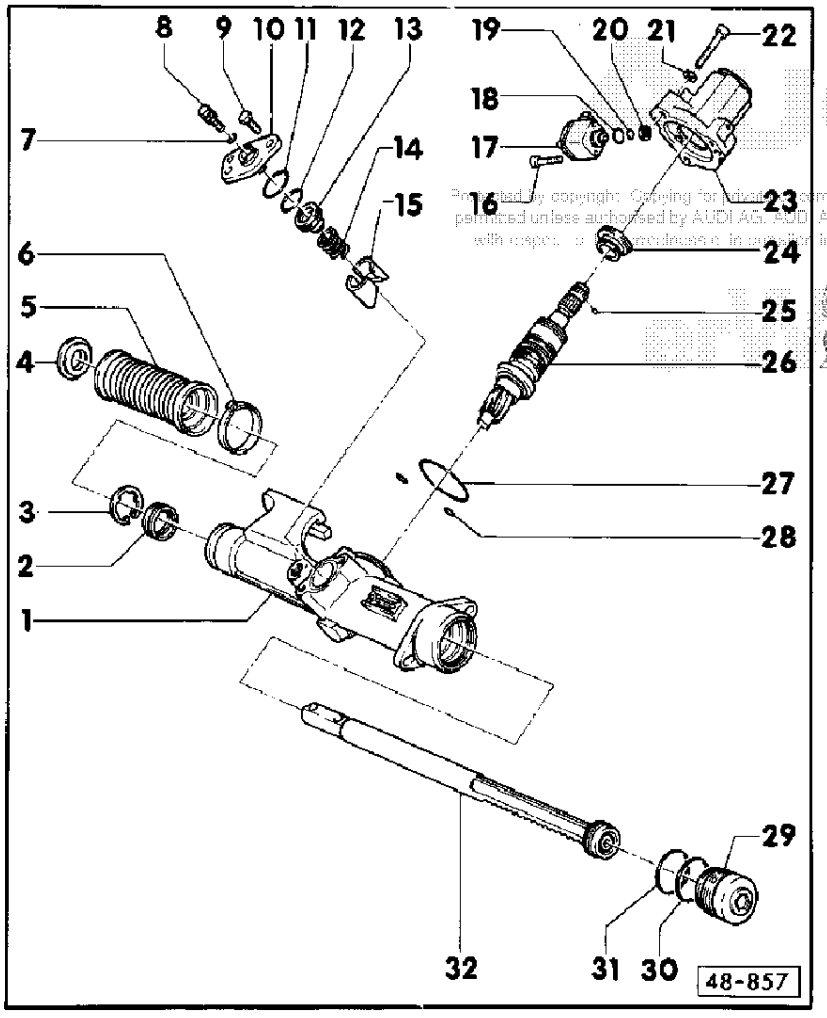


5 – Bellows
- ♦ Can only be replaced with steering box installed
- ♦ Adjust toe after replacement
- ♦ Adjusting toe => Page 44-15

6 – Clamp
- ♦ Use screw clamps when performing repairs
- ♦ Screw connection faces bulkhead

7 – O-ring *
- ♦ Always replace

8 – Adjusting screw
- ♦ Adjusting steering play =>Fig. 7

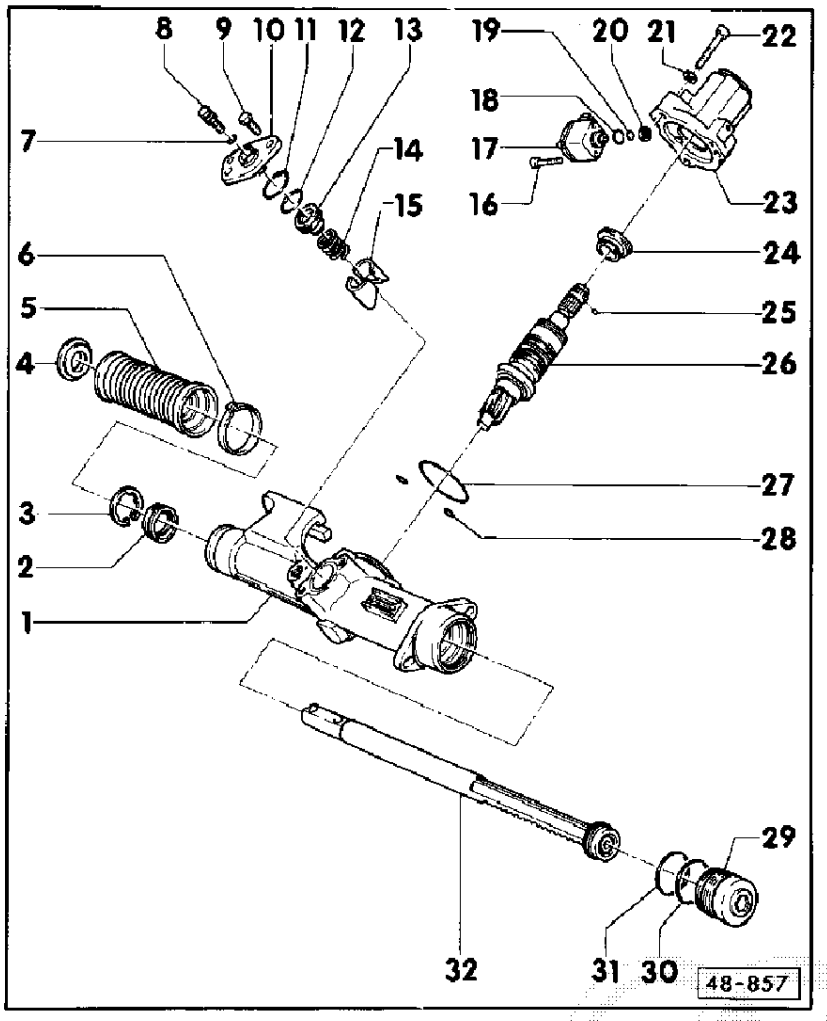


9 – Hexagon bolt, 20 Nm

10 – Cap
- ♦ Screw onto steering box
- ♦ The two adjacent holes must face forwards when viewed in direction of travel.

11 – Sealing ring 35 x 2 mm *
- ♦ Always replace
- ♦ Insert in annular groove in steering box

12 – Sealing ring 27 x 2.5 mm *
- ♦ Always replace
- ♦ Insert in annular groove in gasket holder



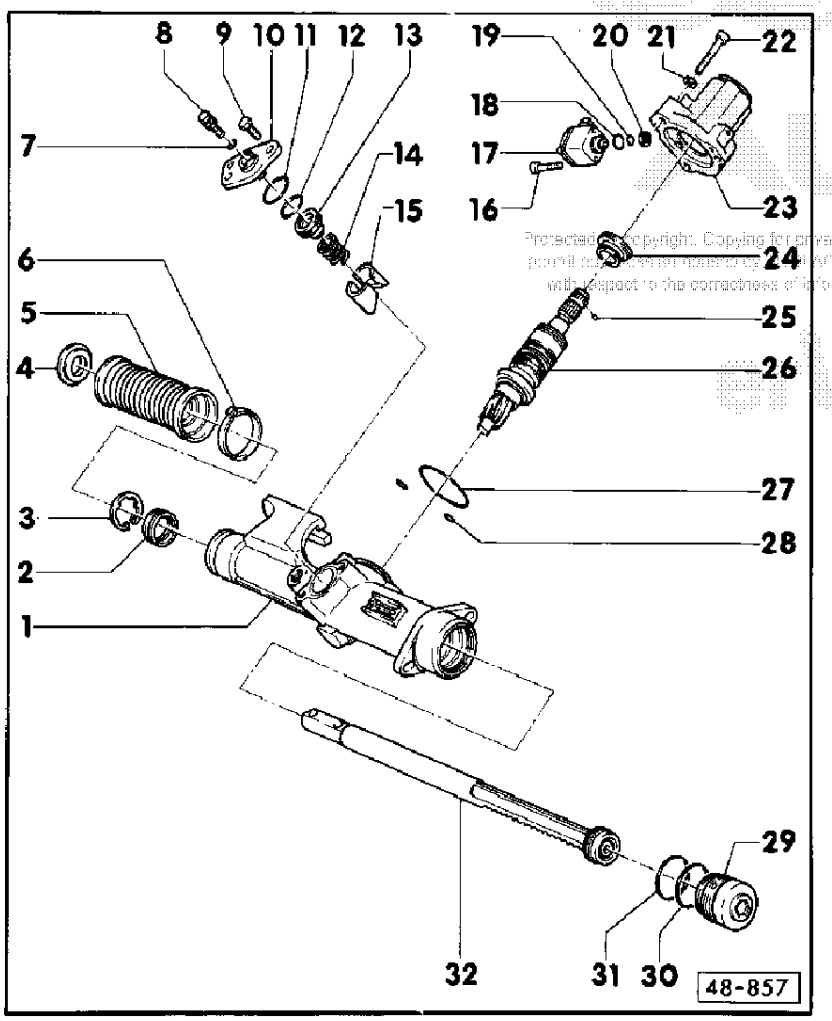
13 – **Gasket holder**
- ♦ Disassembling => Fig. 5

14 – **Spring**
- ♦ Insert in thrust piece

15 – **Thrust piece**

16 – **Cheese-head bolt, 3 Nm**
- ♦ For attaching Servotronic valve to valve housing
- ♦ Not marked with locking compound

17 – **Servotronic valve**
- ♦ Cannot be installed and removed with steering box in position



18 – **Sealing ring 12 x 1,5 mm ***
- ♦ Always replace

19 – **Sealing ring 7 x 1 mm ***
- ♦ Always replace

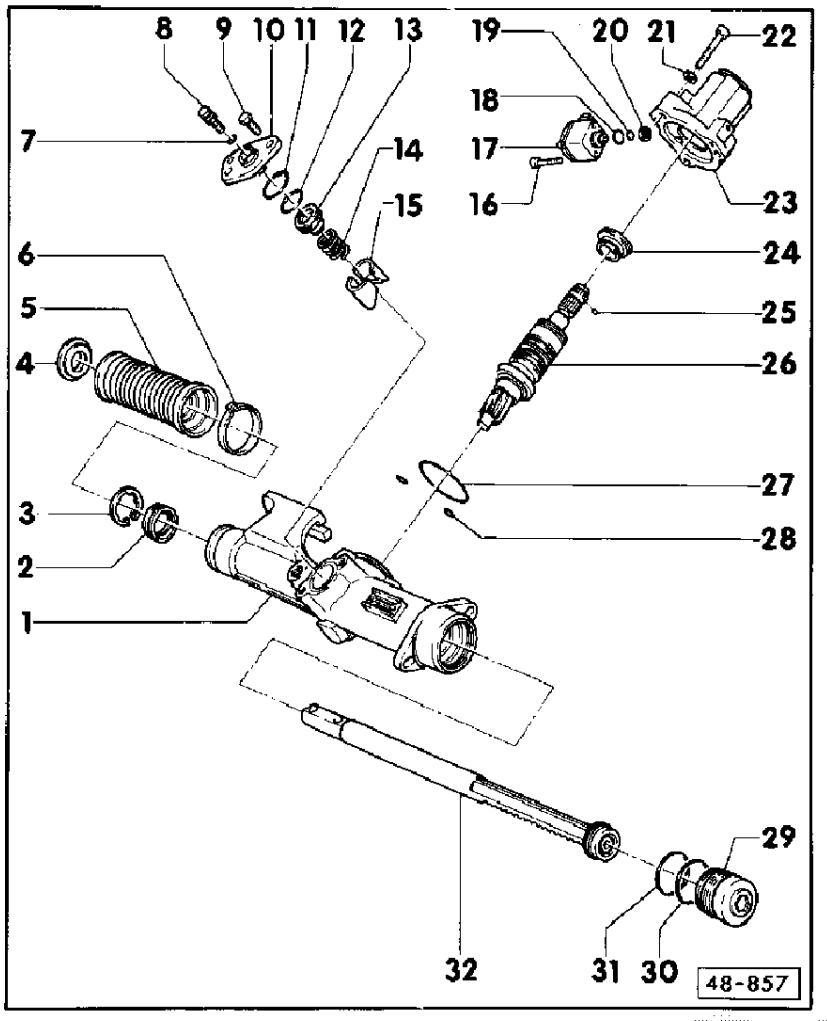
20 – **Strainer ***
- ♦ Always replace

21 – **Washer**

22 – **Cheese-head bolt, 20 Nm**

23 – **Valve housing**

24 – **Gasket holder ***
- ♦ Always replace
- ♦ Driving out => Fig. 1
- ♦ Pressing in => Fig. 2
- ♦ Fill space between sealing and dust lips with multipurpose grease.



25 – Straight pin 2.5 x 6 mm *
- ♦ Always replace
- ♦ Pull out with universal pliers before removing valve housing

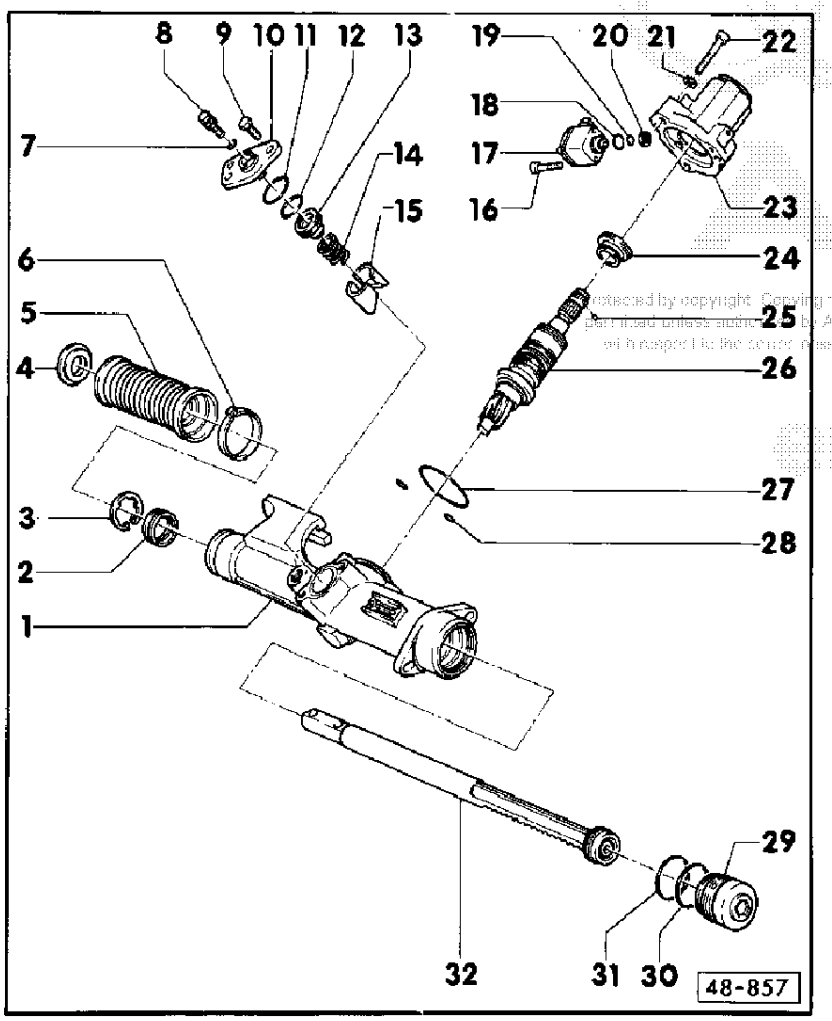
26 – Rotary valve/steering pinion
- ♦ Knocking out of steering box => Fig. 6

27 – Sealing ring 60 x 2 mm *
- ♦ Always replace

28 – Sealing ring 9 x 2 mm *
- ♦ Always replace

29 – Cap, 50 Nm
- ♦ Secure with two centre punch marks offset by 180o

30 – Thrust ring *
- ♦ Always replace
- ♦ Attach to cap.
- ♦ Installation position =>Fig. 8



31 – Sealing ring 44 x 2.5 mm *
- ♦ Always replace
- ♦ Attach to cap.

32 – Rack
- ♦ Unscrew cap and push rack to left out of steering box.
- ♦ Watch for scoring around rack seal
- ♦ Fitting =>Page 48-58

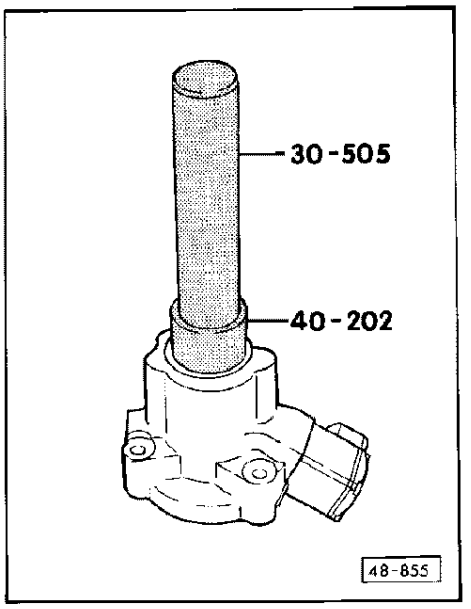


Fig.1 Driving out gasket holder, valve housing

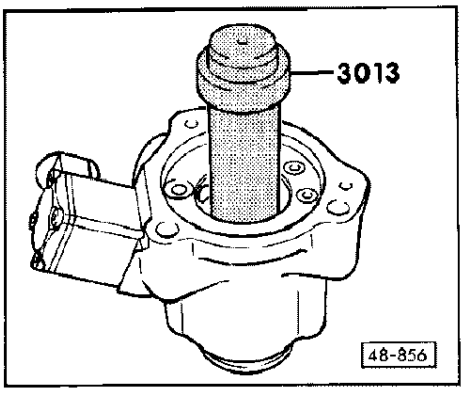


Fig.2 Driving home gasket holder, valve housing

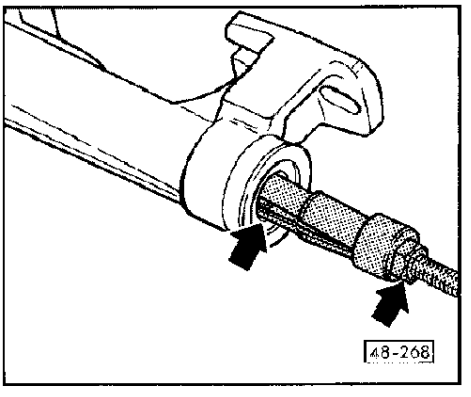


Fig.3 Pulling out rack seal

- Insert commercially available internal extractor (e.g. KUKKO 21/4) in sealing lip

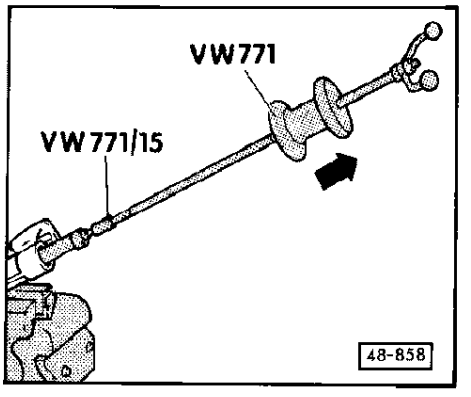


Fig.4 Screwing multi-purpose tool to internal extractor

- Clamp steering box in vice using soft jaws.
- Screw -VW 771- with -VW 771/15- to internal extractor and knock out rack seal

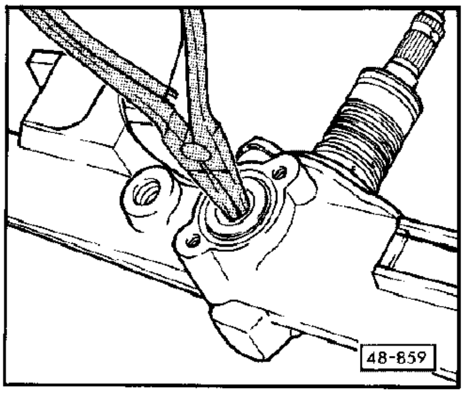


Fig.5 Disassembling gasket holder

- Pull out using commercially available external circlip pliers

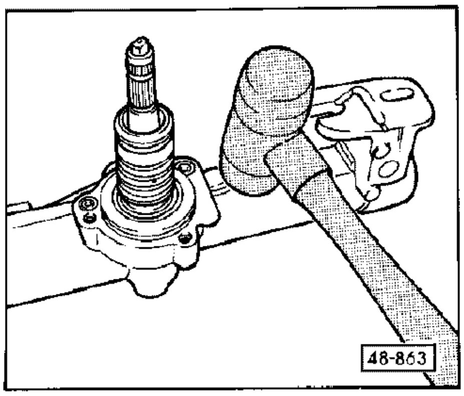


Fig.6 Driving out steering pinion

- Hold steering pinion by hand and knock out by hammering on steering box with commercially available rubber hammer.

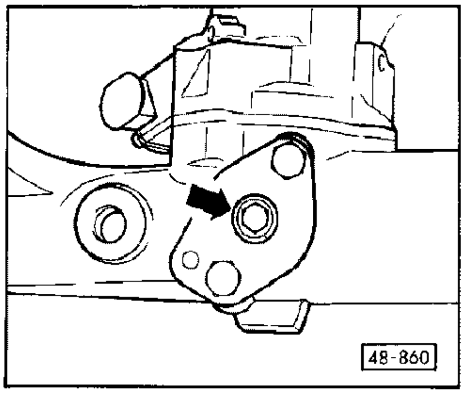


Fig.7 Adjusting steering play

Note:

Two mechanics are required to perform adjustment. Adjustment work is to be performed with the engine switched off and the vehicle standing on its wheels. For ease of illustration the steering box is shown removed.

- Move wheels to straight-ahead position.
- Turning the steering wheel back and forth (roughly 30oabout centre axis) produces a rattling and cracking noise.
- The second mechanic carefully screws in adjusting screw -arrow- into the cover until rattling and cracking noises can no longer be heard inside the vehicle.
- Perform test drive and correct adjustment of necessary.

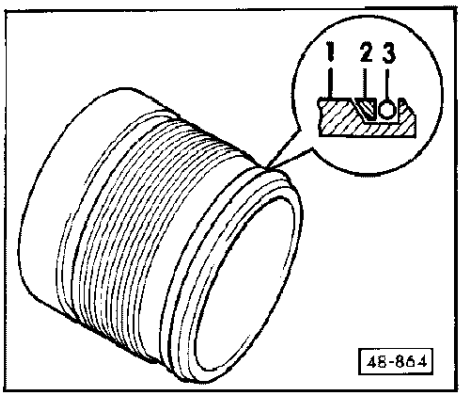
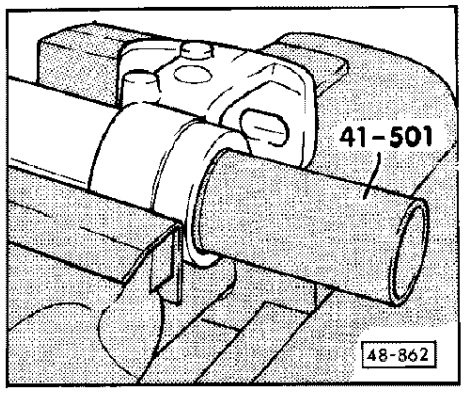
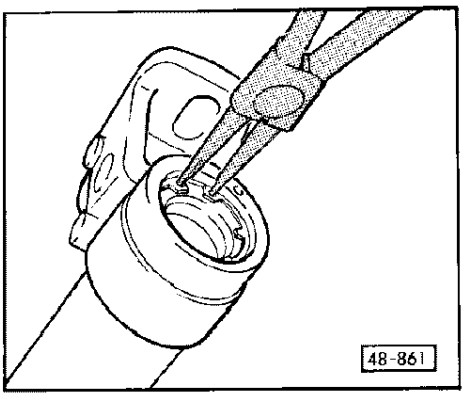


Fig.8 Installation position of thrust ring

- 1 - Screw cap
- 2 - Thrust ring
- 3 - O-ring

Fitting rack



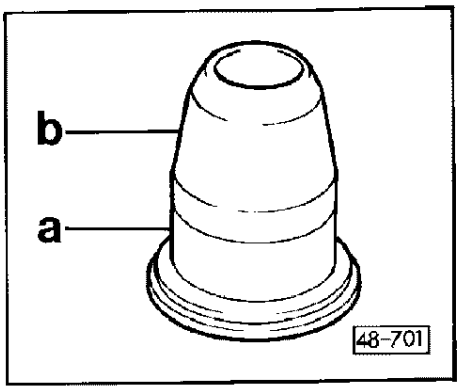


Note:

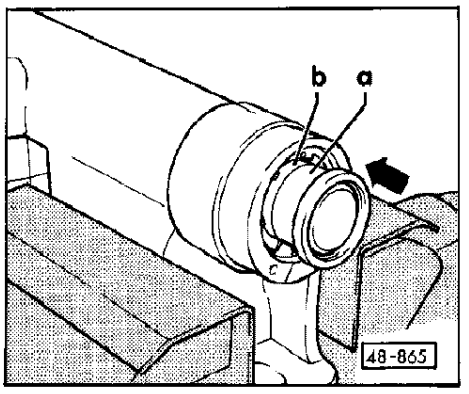
Before fitting rack, wash out steering box with white spirit, blow it out with compressed air and thoroughly clean rack. Prior to assembly, use hydraulic fluid to moisten parts of fitting sleeve, rack and rack seal. All new repair sets contain a fitting sleeve.

– Insert rack seal by hand in steering box and drive home.

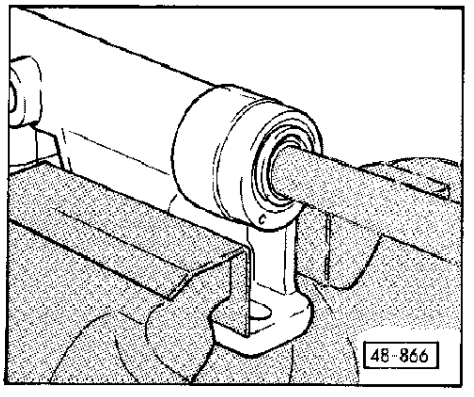
– Use commercially available circlip pliers to fit circlip.



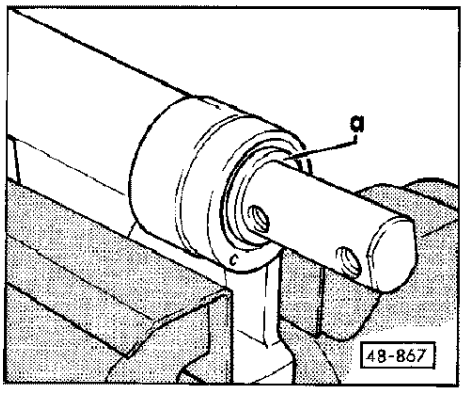
- Insert fitting sleeve -b- in fitting sleeve -a-, placing both parts on a flat surface as shown.



- Press home fitting sleeve -a- with fitting sleeve part -b- in steering box by hand.



- Use commercially available mandrel to drive fitting sleeve part into steering box and remove on opposite end.



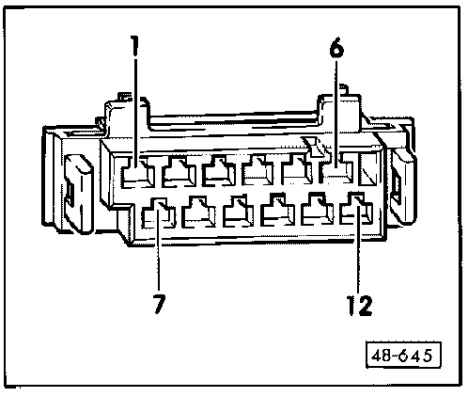
- Push rack through steering box and fitting sleeve -a- from opposite end of fitting sleeve; counterhold fitting sleeve -a- by hand until flattened end of rack is past fitting sleeve -a-.
- Remove fitting sleeve -a- from rack.
- Screw on cap by hand so that rack can no longer fall out (seal could otherwise be damaged).

Checking power supply for Servotronic control unit

Note:

The Servotronic control unit-J236- is installed on the right beneath the rear bench seat.

- Remove the rear bench seat.
- Pull off connector from Servotronic control unit -J236-.
- Switch on ignition.



- Set 20 V measuring range on digital multimeter -V.A.G 1526- and insert between contacts 2 and 7 or 3 and 7 at connector of Servotronic control unit -J236-. Specified value: approx. 12 V.
- If specified value is not attained, use current flow diagram to check for and if necessary eliminate open circuit.

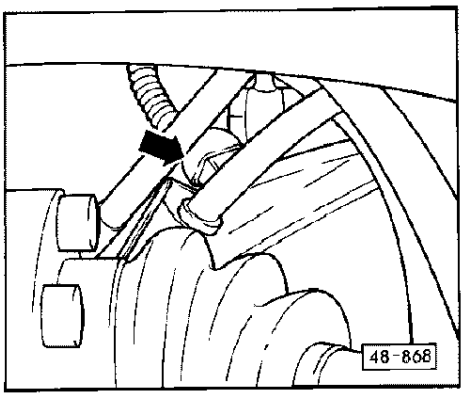
Checking wiring between plug at Servotronic control unit and plug at Servotronic valve

This test involves driving the vehicle onto a lifting platform, as the plug for the Servotronic solenoid valve -N119- is only accessible from underneath.

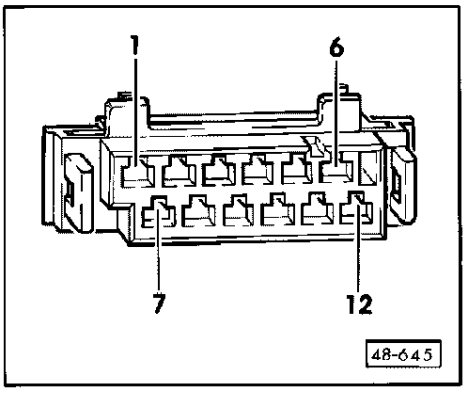
Note:

The Servotronic control unit -J236- is installed on the right beneath the rear bench seat.

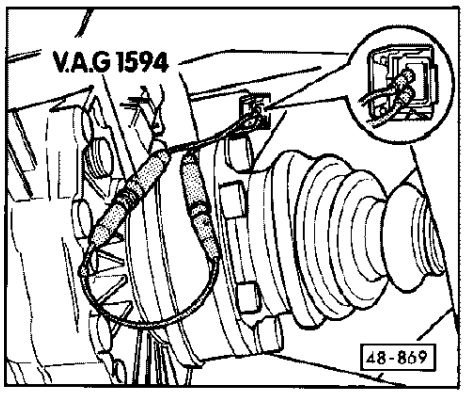
- Remove the rear bench seat.
- Pull off connector from Servotronic control unit -J236-.



- Disconnect plug for Servotronic solenoid valve -N119-.



- Set ohm range on digital multimeter -V.A.G 1526- and insert between contacts 8 and 11 at plug of Servotronic control unit -J236-. Specified value: ∞ Ohm
- If specified value is not attained, use current flow diagram to check for and if necessary eliminate short in wiring.

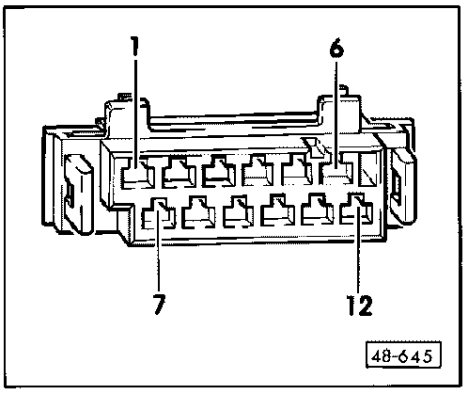


- If specified value is attained, jumper contact at plug of Servotronic solenoid valve -N119- using adapter cable set V.A.G 1594
- Specified value: > 0 Ohm
- If specified value is not attained, use current flow diagram to check for and if necessary eliminate short in wiring.

Checking Servotronic valve

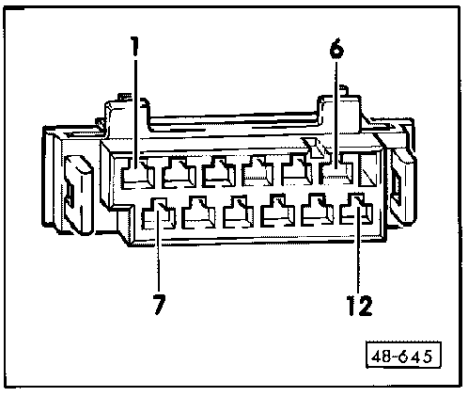
Note:

The Servotronic control unit -J236- is installed on the right beneath the rear bench seat.



- Remove the rear bench seat.
- Pull off connector from Servotronic control unit -J236-.
- Set ohm range on digital multimeter -V.A.G 1526- and insert between contacts 8 and 11 at plug of Servotronic control unit -J236-. Specified value: approx. 6-12 ohm.
- If desired value is not attained, replace Servotronic valve -N119-, to do this remove steering box => Page 48-17

Checking valve wiring for short to earth

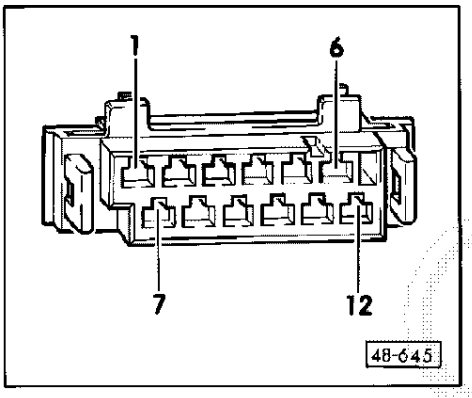


Note:

The Servotronic control unit -J236- is installed on the right beneath the rear bench seat.

- Remove the rear bench seat.
- Pull off connector from Servotronic control unit -J236-.
- Set ohm range on digital multimeter -V.A.G 1526- and insert between contacts -2- and -11-, -3- and -11-, -2- and -8- or -3- and -8- at plug of Servotronic control unit -J236-. Specified value: ∞ Ohm
- If specified value is not attained, check wiring and renew defective lead if necessary.

Checking valve wiring for short to positive



Note:

The Servotronic control unit -J236- is installed on the right beneath the rear bench seat.

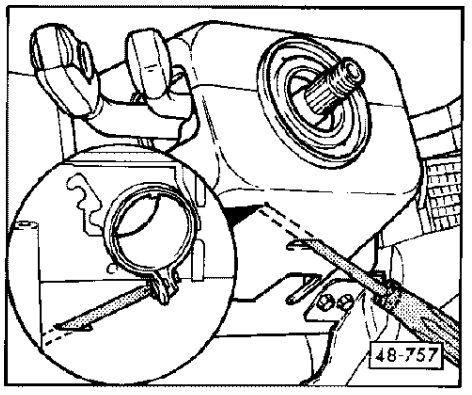
- Remove the rear bench seat.
- Pull off connector from Servotronic control unit -J236-.
- Set ohm range on digital multimeter -V.A.G 1526- and insert between contacts -7- and -8- or -7- and -11- at plug of Servotronic control unit -J236-. Specified value: ∞ Ohm
- If specified value is not attained, check wiring and renew defective lead if necessary.

Removing and installing steering column with column tube

Removing:

Vehicles with no airbag

- Disconnect battery earth strap
- Remove steering wheel =>Page 48-83 (tightening torques for hexagon nut: 40 Nm)

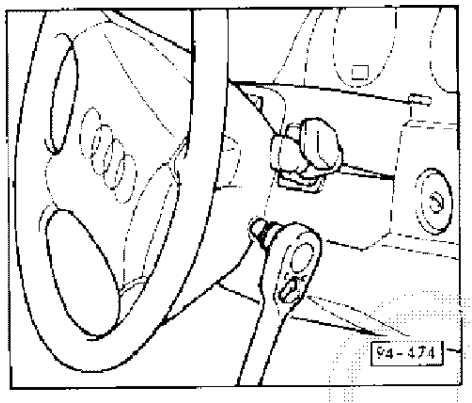


- Unfasten clamp of steering column switch.
- Removing steering column switch

Vehicles with airbag

Note:

Before performing any work on the airbag system, disconnect battery earth strap and 1-pin red connector for airbag voltage supply to ensure that subsequent assembly work does not result in accidental actuation of airbag system. Before removing steering column, move wheels to straight-ahead position, then remove steering wheel (this ensures that coil spring in steering wheel is not damaged).

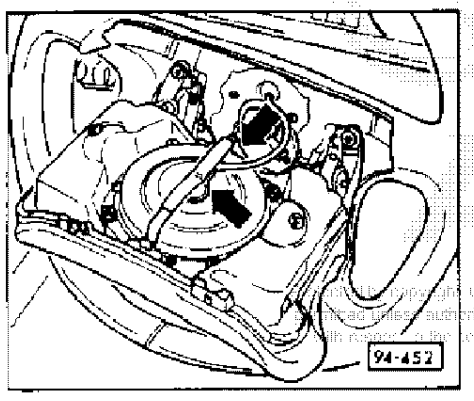


- Disconnect battery earth strap
- Unscrew airbag unit on left and right of steering wheel from behind using Torx socket (e.g. Hazet T 30 H).
- Fold airbag unit to rear.

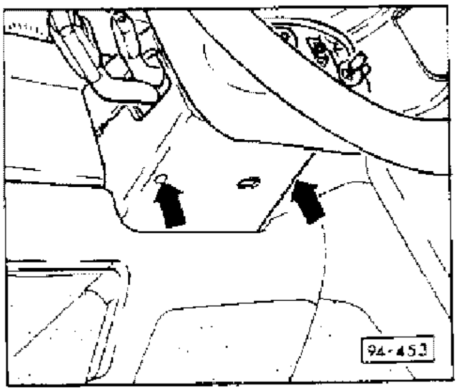
Installation note:

Screw in securing bolts for airbag unit by hand, then tighten right bolt to 6 Nm followed by left bolt to 6 Nm..

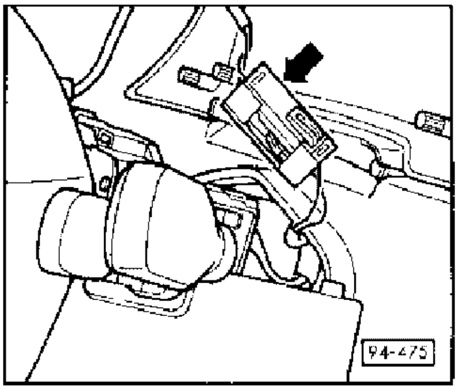
Attention
Make sure there is nobody in the vehicle when connecting battery earth strap.



- Detach fastener for plug of airbag unit.
- Pull connector off airbag unit.
- Set the airbag down with the Audi rings on the airbag still visible (safety specification).



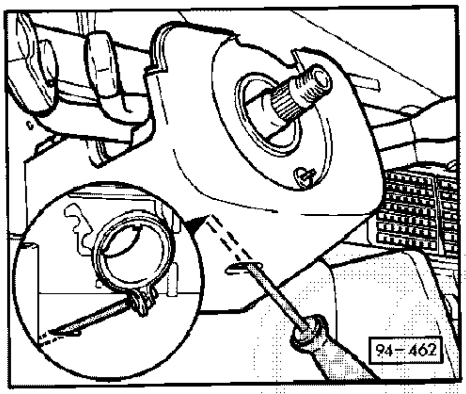
- Remove top part of trim for steering column switch.



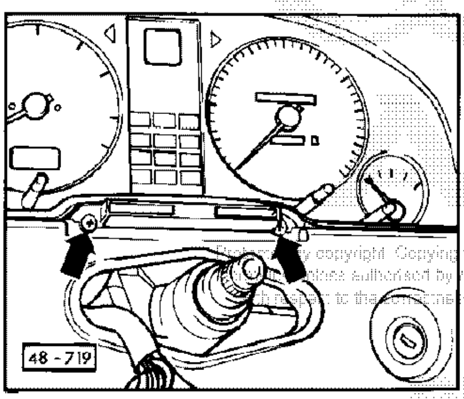
- Pull connector of lead for airbag unit out of bottom part of trim; to do this press in lug in centre of lower part of plug slightly using a screwdriver and pull out.
- Detach connector
- Remove steering wheel

Installation note:

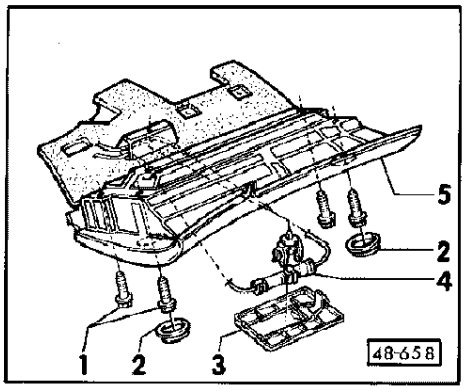
Move wheels to straight-ahead position before installing steering wheel. Steering wheel spoke must be horizontal with wheels in straight-ahead position.



- Unfasten clamp of steering column switch.
- Removing steering column switch



- Remove dash panel insert
- Pull off plug housing at ignition/starting lock.



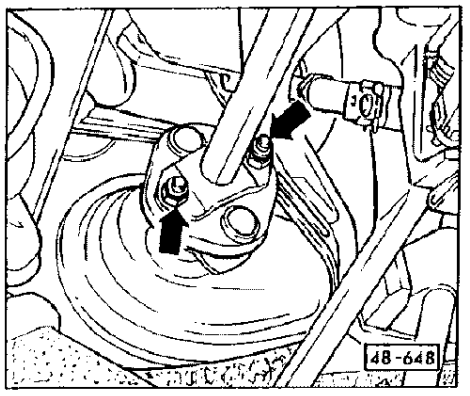
- Unscrew fastening screws for tray on driver's side.

Vehicles with airbag

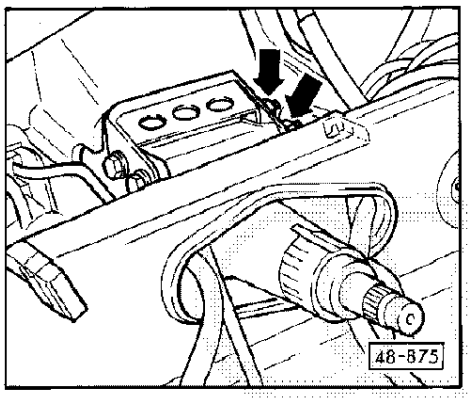
Lever cover -3- for airbag connector out of knee cushion and unclip and detach connector -4-.

Lever caps -2- out of knee cushion. Unscrew hexagon bolt -1-.

- Remove driver's side tray/knee cushion -5-.

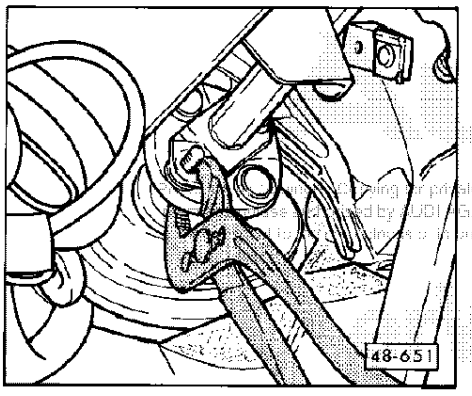


- Unscrew steering column from shackle.
- Use screwdriver to press steering column approx. 15 mm off disc coupling

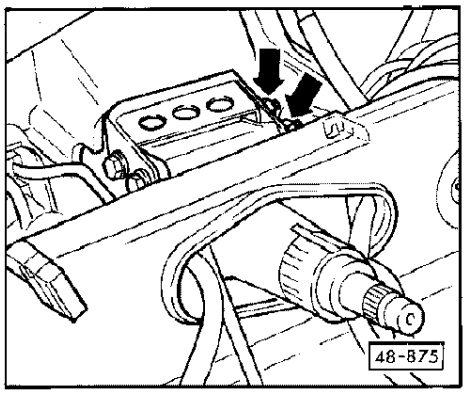


- Unscrew column tube from bracket.
- Remove screws from bracket.
- Push steering column with column tube downwards and turn appropriately to enable it to be removed beneath instrument panel.

Installing:



- Push steering column from underneath into cut-out in instrument panel.
- Insert column tube in bracket.
- Insert screws in bracket and column tube.
- Insert ignition key in steering lock.
- Release steering lock so that steering column can be turned as required.
- Use pipe wrench to press steering column onto disc coupling.
- Insert shackle in steering column and screw the two together.



- Insert cable in column tube
- By moving it upwards or downwards in the bracket, align column tube so that there is no disc coupling torsion when turning the steering wheel.
- Fasten column tube to bracket.
- Attach connector housing to ignition/starter switch.

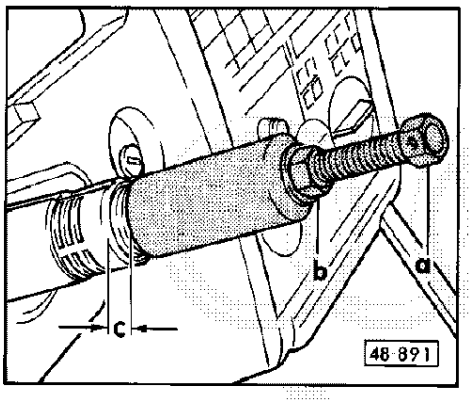
Attention

Should it not be possible to effect alignment as described above, loosen steering box at its attachment points and move appropriately until stress-free alignment of steering mechanism becomes possible.

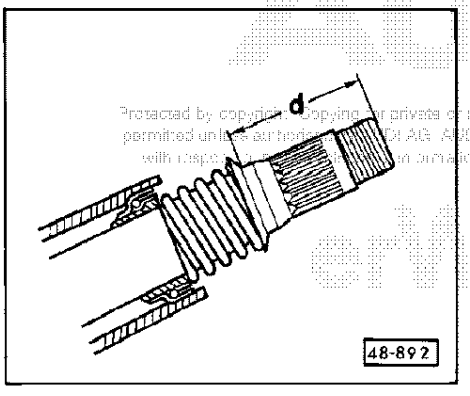
Note:

If steering column and column tube have been separated, fit spring on steering column with the two clamp washers as described below:

- Attach spring to steering column
- Attach clamp washers



- Screw special tool with spindle -a- onto steering column as far as it will go (screw back nut -b-).
- Counterhold spindle -a- Tighten hexagon nut -b- until dimension -c- between end face of column tube and end face of special tool is between 10 and 12 mm.
- Loosen nut -b-.
- Unscrew spindle -a- from steering column.



- Perform check measurement on dimension -d-.

_ d = 54.5 mm to 55.5 mm

Note:

If dimension -d- is not attained, reinstall fitting tool -3168- and correct dimension -d-

– Install dash panel insert.
– Install steering column switch.
– Install steering wheel => Page 48-83.

Note:

Vehicles with airbag: attach connector for airbag unit.

– Fit driver's tray.
– Fit self-diagnosis plug in tray.

Note:

Vehicles with airbag: connect 1-pin plug (labelled airbag) for power supply of airbag system.

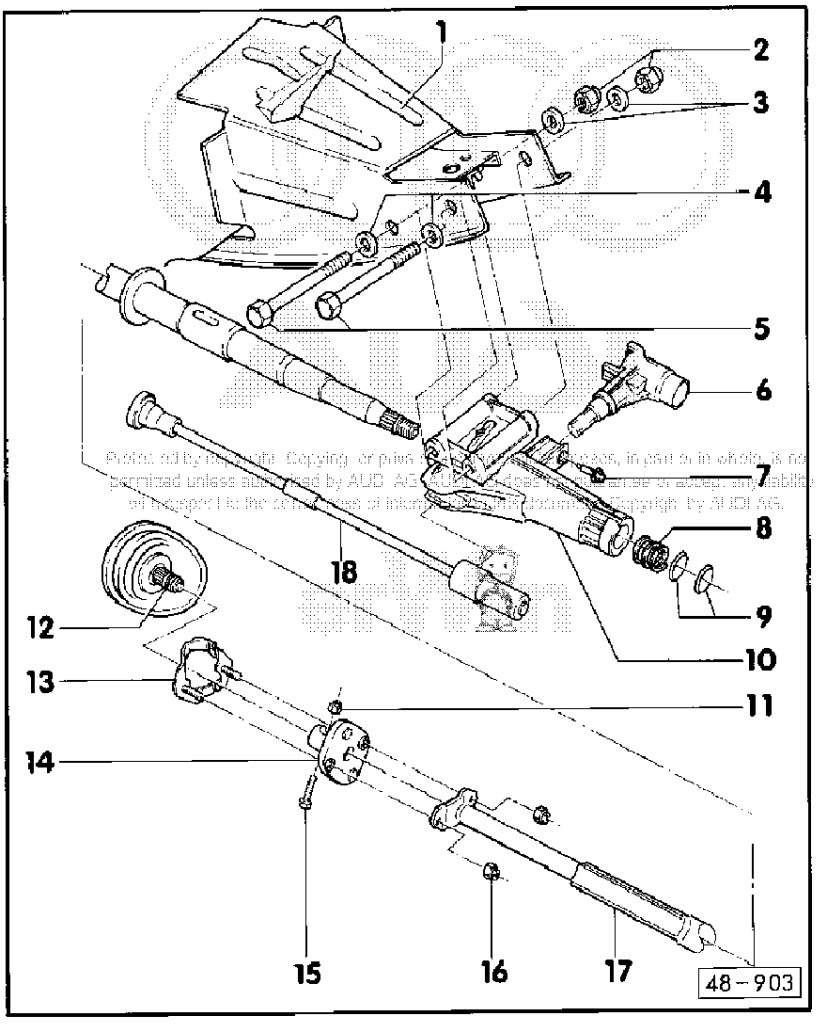
– Connect battery earth strap.

Attention
Make sure there is nobody in the vehicle when connecting battery earth strap.

– Check function of steering column switch.

Note:

Steering wheel spoke must be horizontal with wheels in straight-ahead position.



Servicing steering column with column tube

Note:

Procon cable routing
=> General body repairs; Repair Group 68 =>

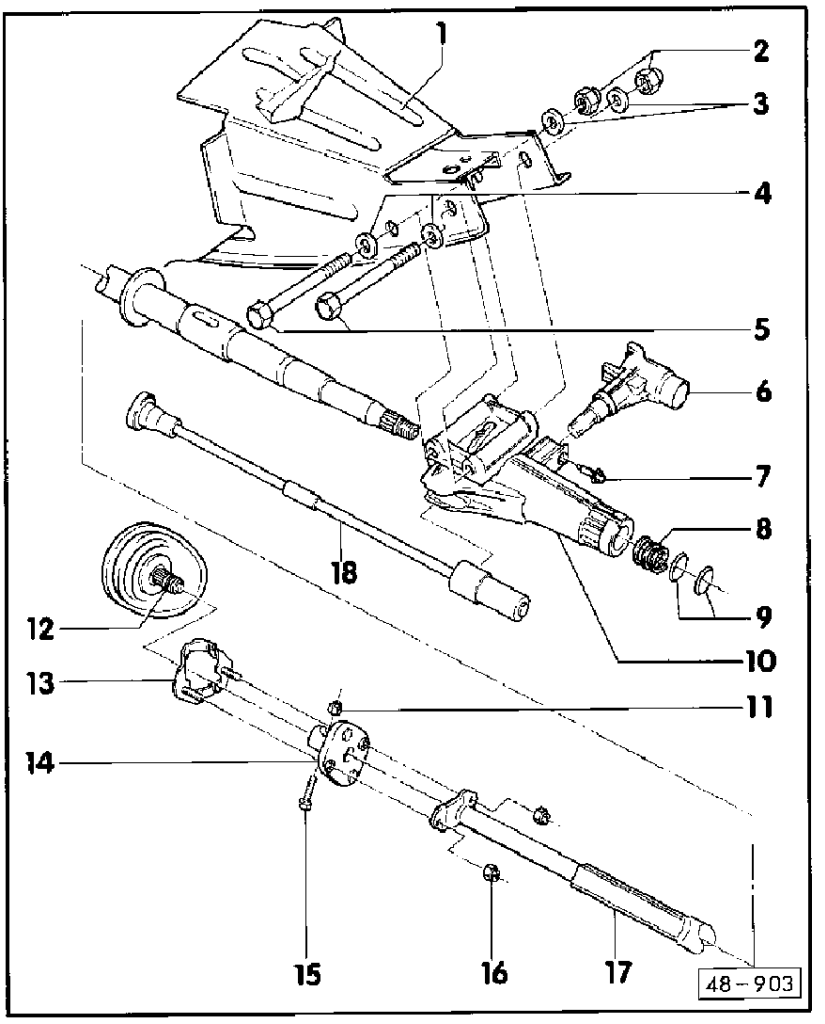
1 – Bracket

2 – Self-locking nut, 35 Nm
♦ Always replace

3 – Washer

4 – Washer

5 – Hexagon bolt



6 – Steering lock housing

- ♦ Insert in column tube and secure
- ♦ Attach connector housing for ignition/starter switch.

7 – Torx bolt, 7 Nm

- ♦ Remove and install using commercially available Torx insert with end-face hole (e.g. Hazet T 30 H)

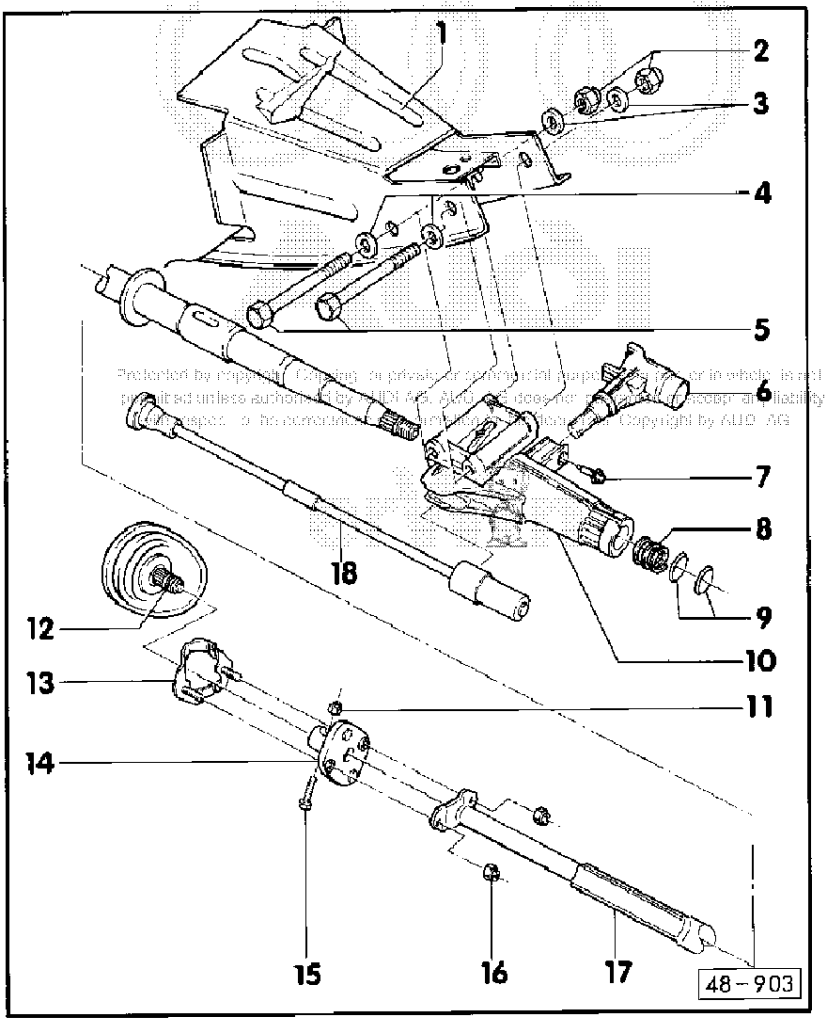
8 – Spring

- ♦ Attach to steering column

9 – Clamp washers

- ♦ Always replace
- ♦ Grind carefully with small parting-off wheel, then lever off with screwdriver

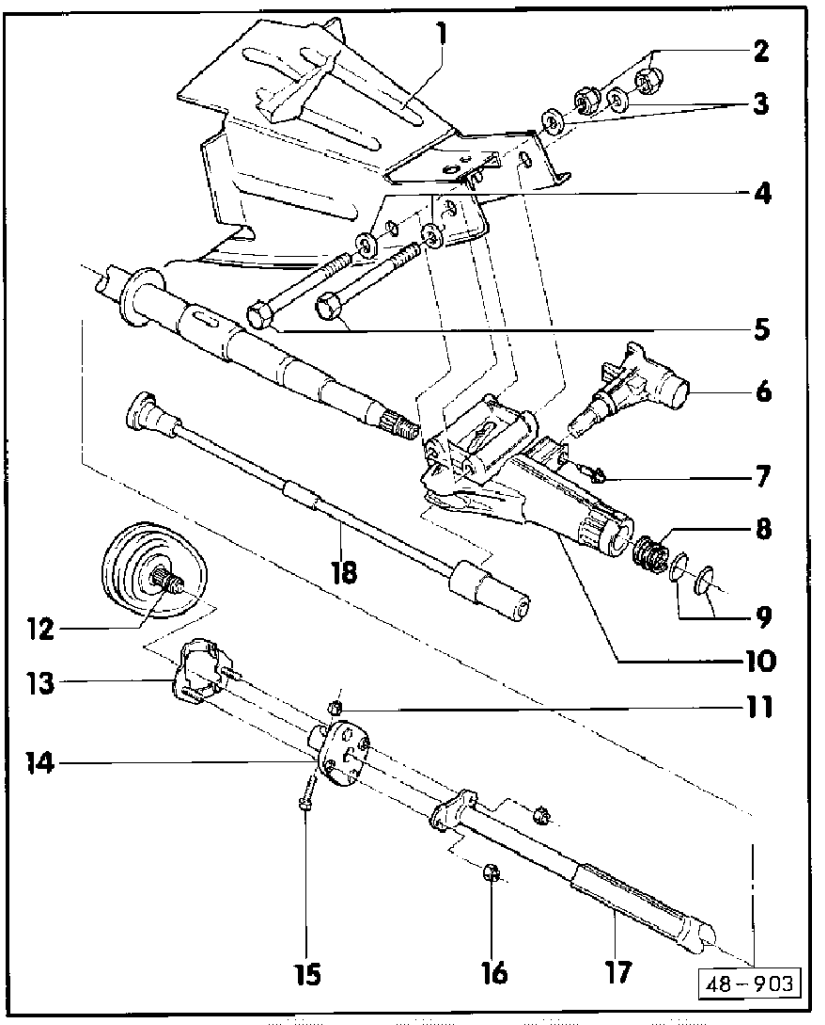
Attention
Washers are pre-tensioned.



- ♦ Caution: Sparks – if appropriate, cover instrument panel and windscreen
- ♦ Press on with special tool => Page 48-74

10 – Column tube

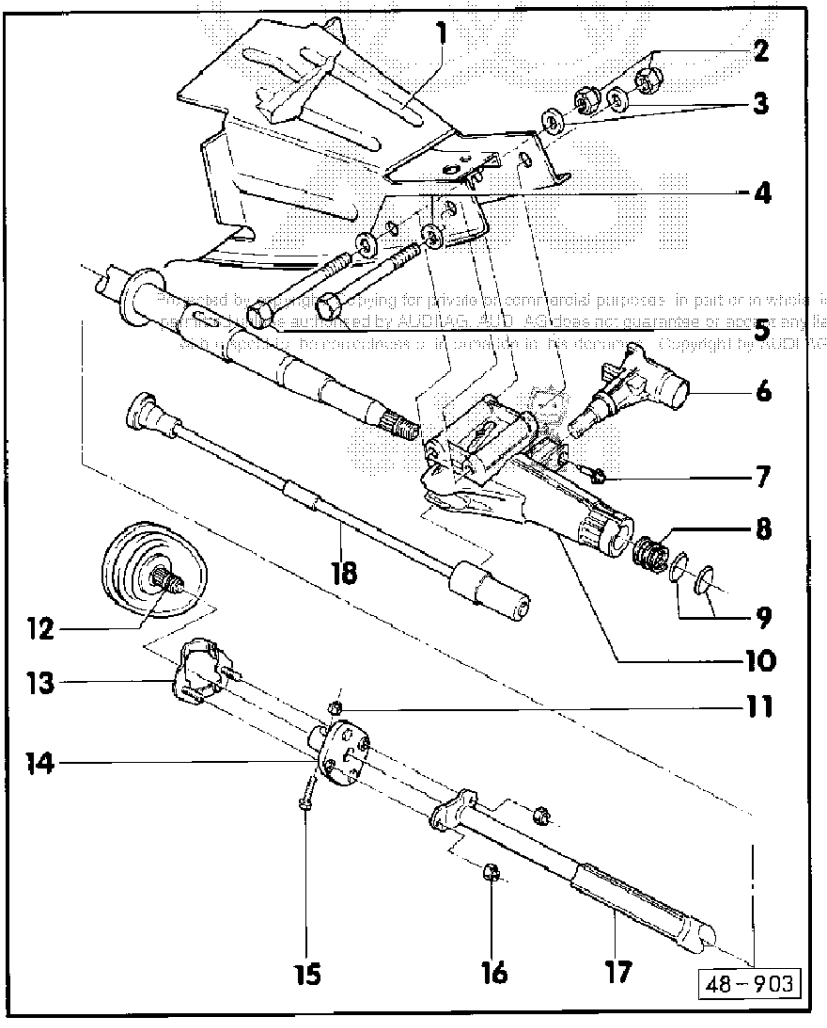
- ♦ Consists of top and bottom part
- ♦ Replacement part supplied with bearing
- ♦ Top and bottom section are lined with plastic
- ♦ Do not exert any radial or axial forces in the form of hammering on the steering column



- ♦ Avoid temperatures in excess of 100 oC (connection between top and bottom part may work loose)
- ♦ Never use cleaning agents (e.g. white spirit or similar)
- ♦ Never use lubricants or solvents (connection between top and bottom part may work loose).

Attention

If the slightest misalignment is found in an axial direction between the top and bottom section (accident) always replace column tube.

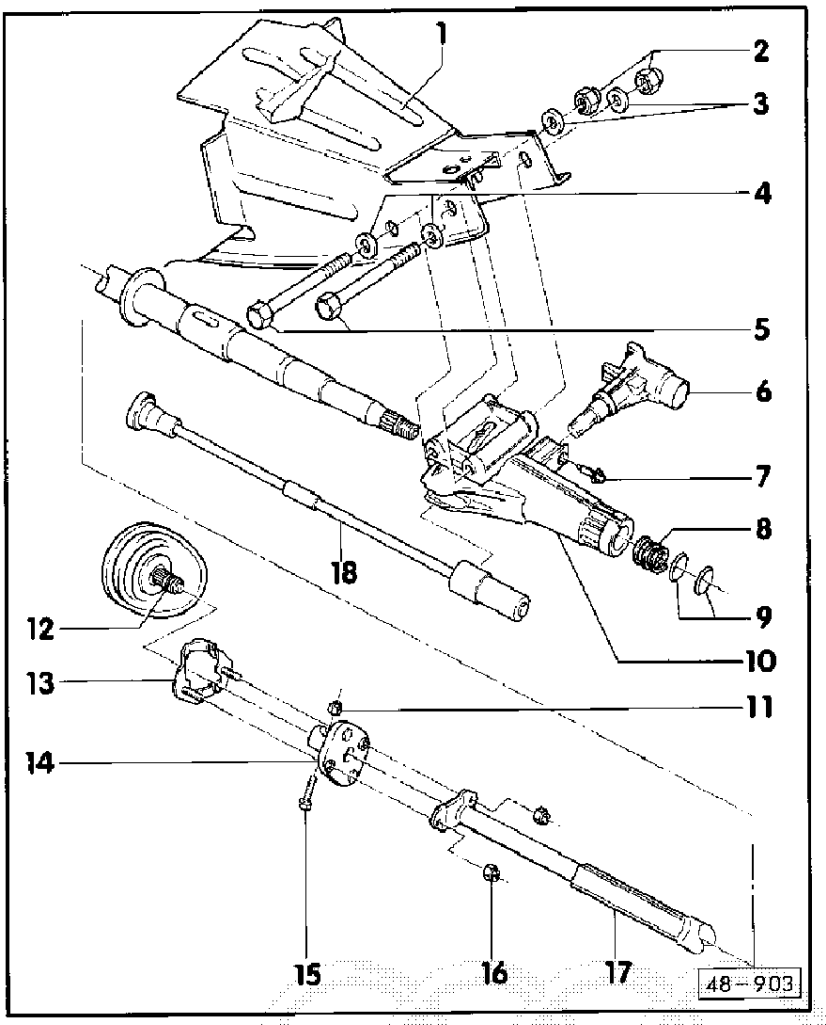


Note:
Top and bottom part of column tube have a red dot (sealing wax). Column tube should be replaced if this coloured dot has sheared off

11 – **Self-locking nut, 25 Nm**
- ♦ Always replace

12 – **Steering pinion**
- ♦ Attach flanged tube to steering pinion

13 – **Shackle**
- ♦ Screw to flanged tube and steering column

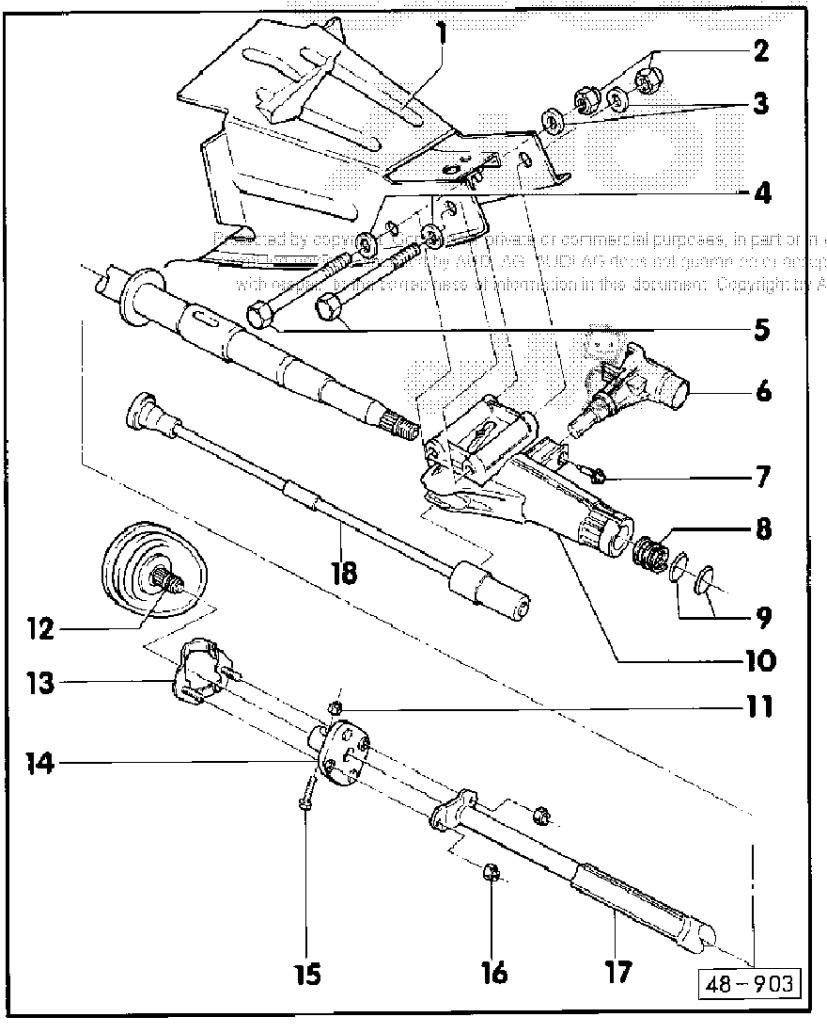


14 – **Flanged tube**
- ♦ Supplied as replacement part with riveted-on disc coupling
- ♦ Move appropriately on steering pinion; screw to steering column and shackle

15 – **Clamping bolt**
- ♦ Always replace

16 – **Self-locking nut, 25 Nm**
- ♦ Always replace

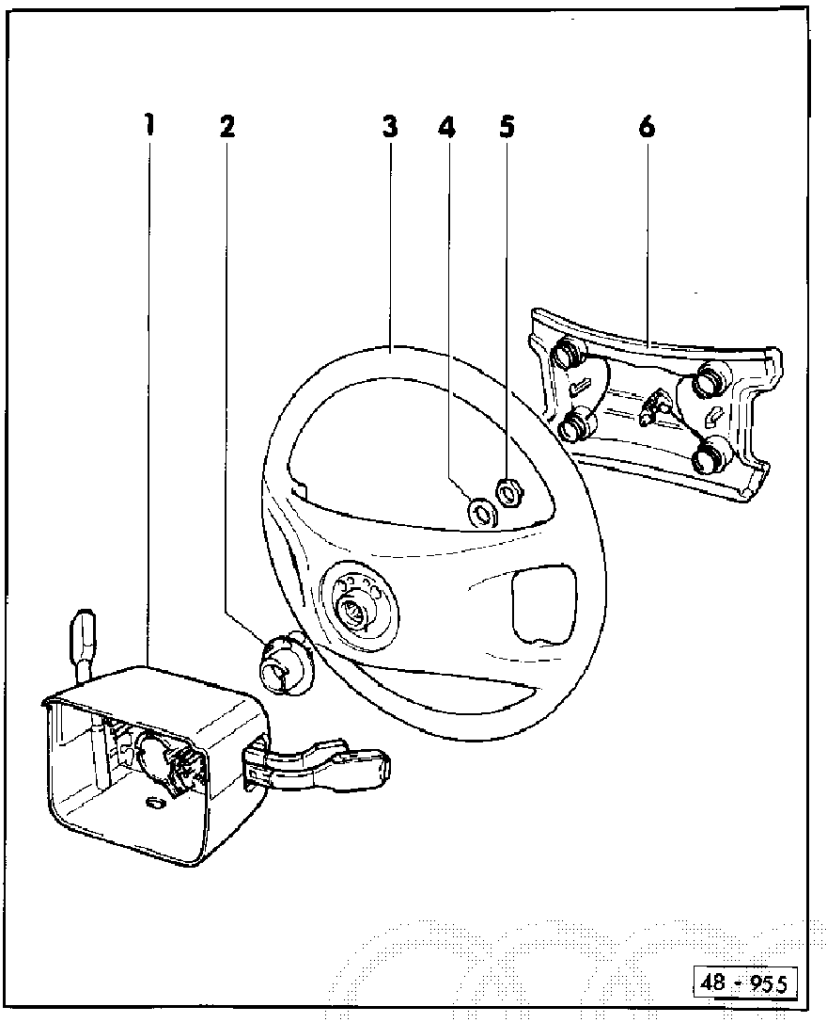
17 – **Steering column**
- ♦ Removing and installing => Page 48-67
- ♦ Insert in column tube as far as it will go
- ♦ Fit free of stress



18 – **Cable**
- ♦ Insert in column tube at top
- ♦ Insert with rubber grommet in bulkhead at bottom
- ♦ Further information on cable routing => General body repairs; Repair Group 68 =>

Attention

If the slightest misalignment (accident) is found between the top and the bottom parts of the column tube or if the coloured dot (sealing wax) on the column tube has sheared off, the cable is to be replaced.



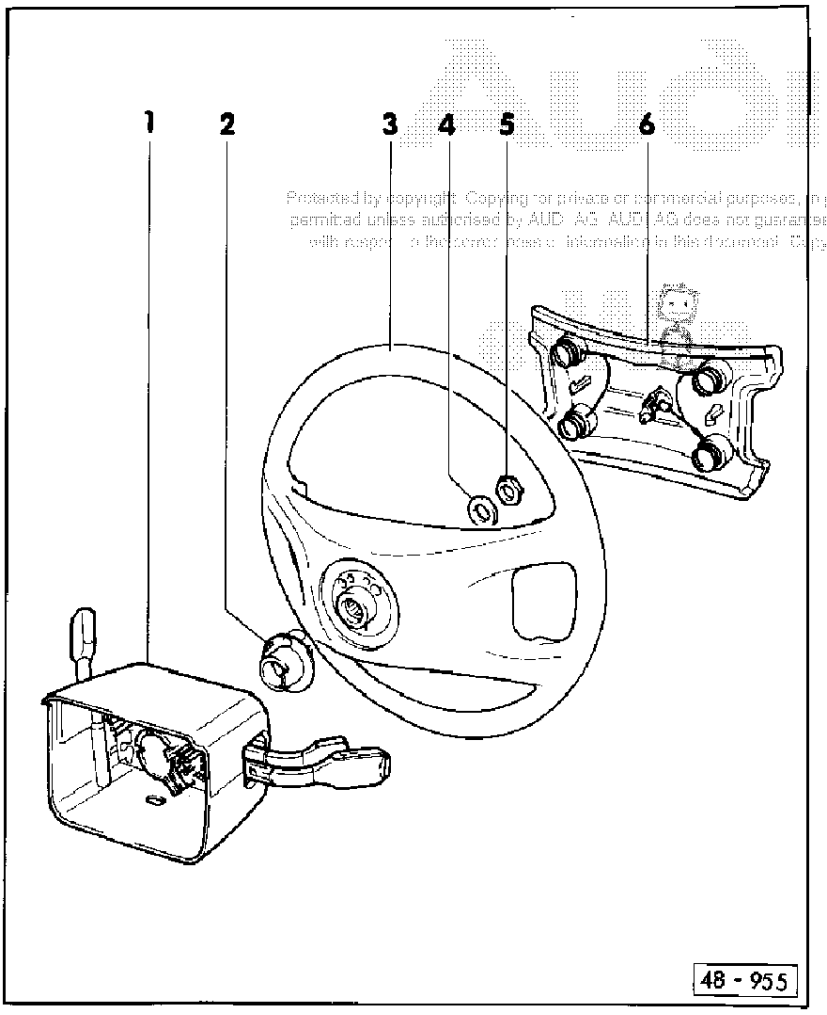
Removing and installing steering wheel

Standard version

1 – **Steering column switch with bracket**
- ♦ Apply small quantity of grease to slip ring

2 – **Driver with carbon brush**
- ♦ Insert in steering wheel
- ♦ Can be replaced separately if necessary

3 – **Steering wheel**
- ♦ Attach to steering column with wheels in straight-ahead position
- ♦ On attachment, turn signal indicator stalk must be in centre position
- ♦ Only install factory-approved steering wheels

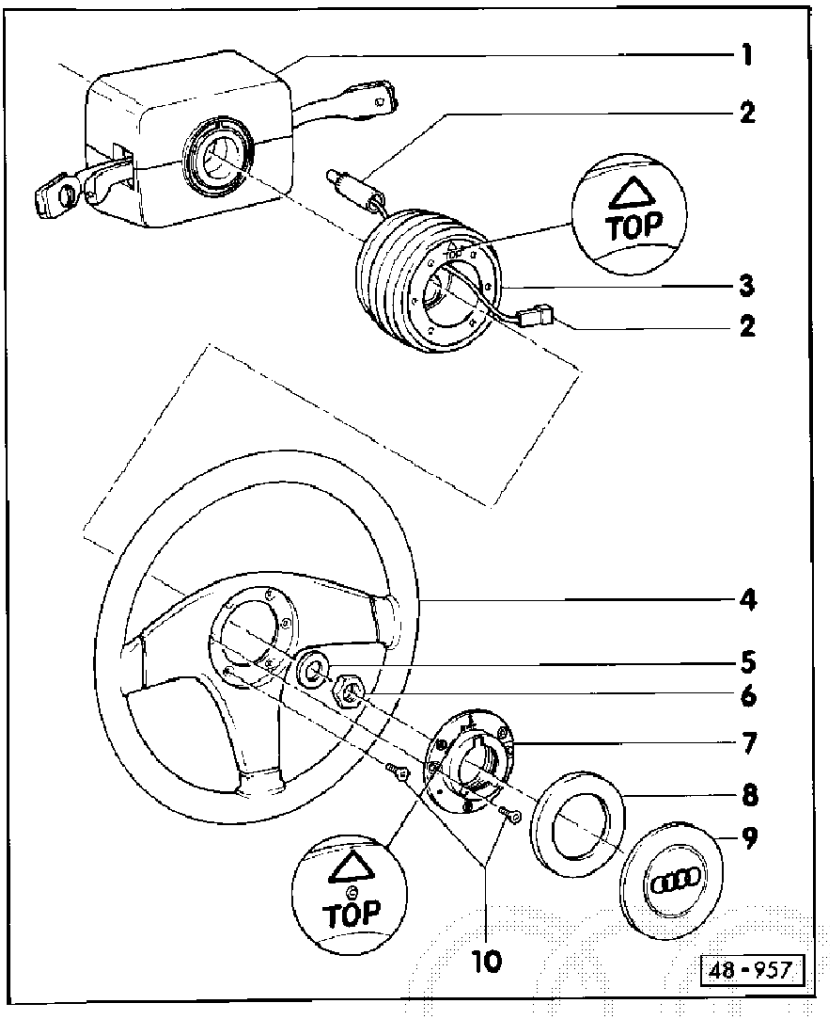


4 – **Spring lock washer**

5 – **Hexagon nut, 40 Nm**

6 – **Trim panel**
- ♦ Removing:
  - – Unfasten by pulling firmly but carefully by hand on upper half of trim panel
  - – Proceed in the same way with the lower half
  - – Then push panel to one side and detach.

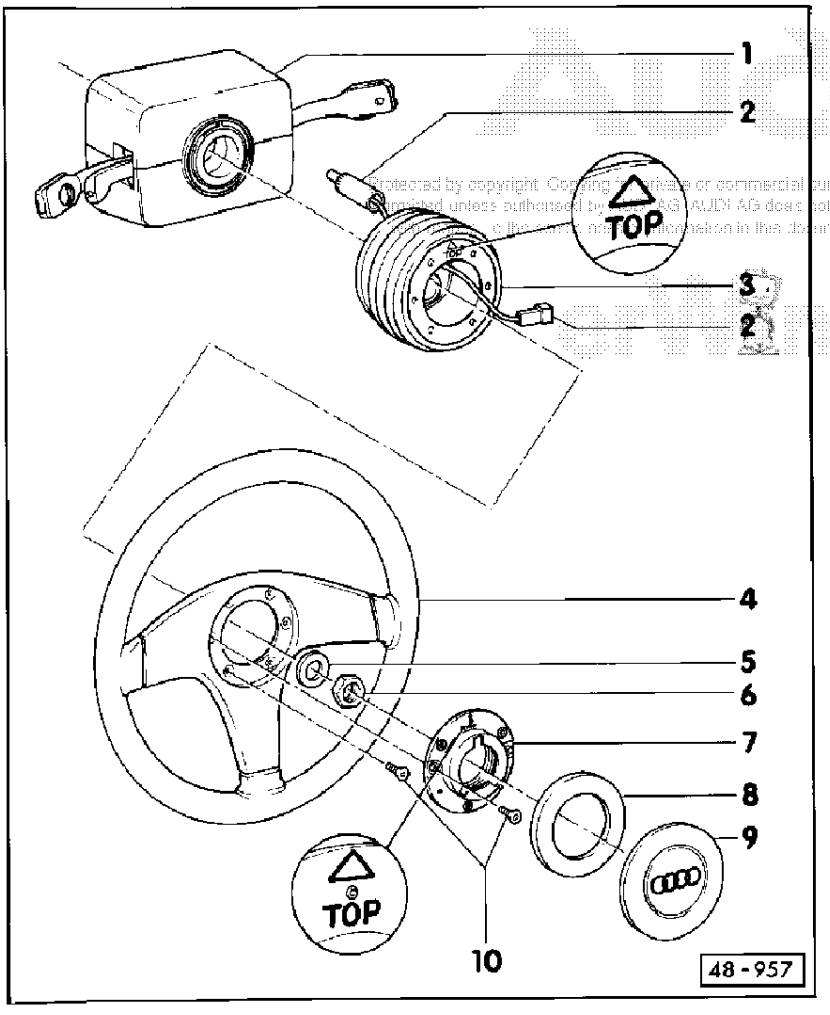
Note:
Non-compliance with the above will cause the fasteners to break on the trim panel.



Sports steering wheel

1 – **Steering column switch with bracket**
- ♦ Apply small quantity of grease to slip ring

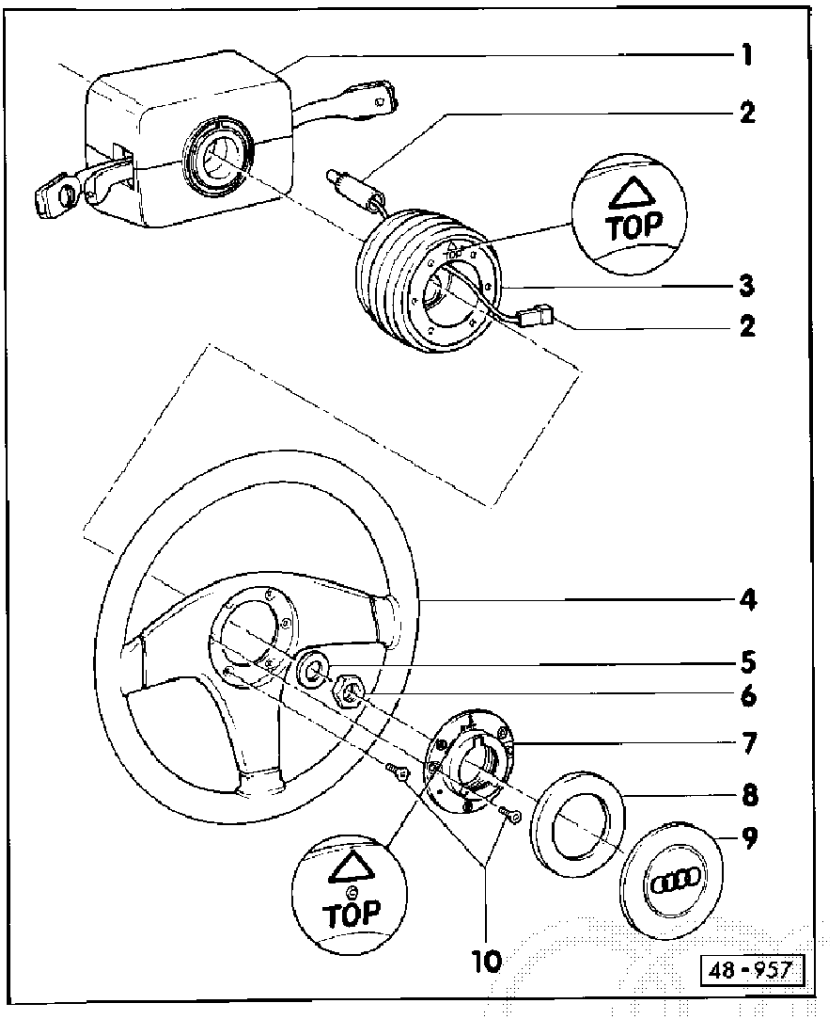
2 – **Carbon brush**
- ♦ Removing:
- – Pressing out of hub
- ♦ Installing:
- – Press home
- ♦ Attach flat connector to lug of horn actuator
- ♦ Can be replaced separately if necessary



3 – **Hub**
- ♦ Attached to steering wheel with countersunk bolts which are fitted with locking compound -D6-
- ♦ Can be replaced separately if necessary

Installation note:

The hub features an arrow and is labelled "TOP". On insertion in steering wheel, make sure that arrow on hub is facing upwards. Initially attach hub with the two upper and lower bolts. Then insert horn actuator in steering wheel in such a way that location marked with arrow and designated "TOP" is also pointing upwards and coincides with arrow on hub. Screw horn actuator to steering wheel and hub.



4 – Steering wheel

- ♦ Attach to steering column with wheels in straight-ahead position
- ♦ On attachment, turn signal indicator stalk must be in centre position
- ♦ Only install factory-approved steering wheels

5 – Spring lock washer

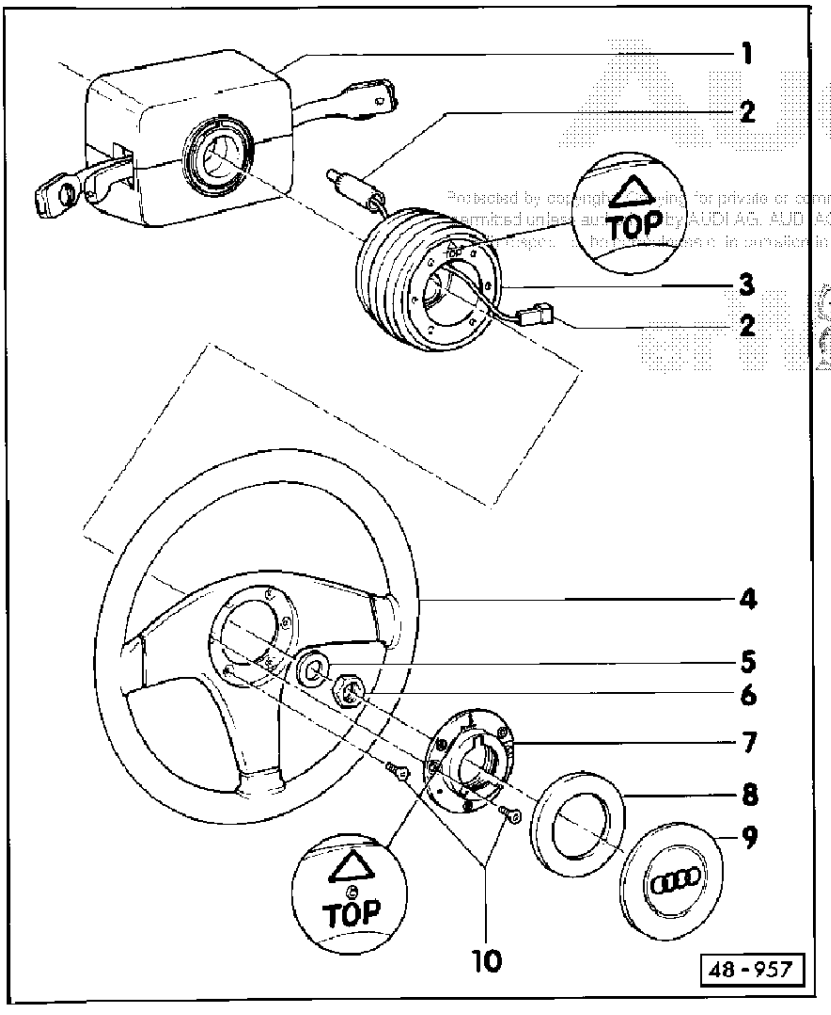
6 – Hexagon nut, 40 Nm

7 – Horn actuator

- ♦ Insert in steering wheel with location marked with arrow and designated "TOP" facing upwards and then screw to hub.

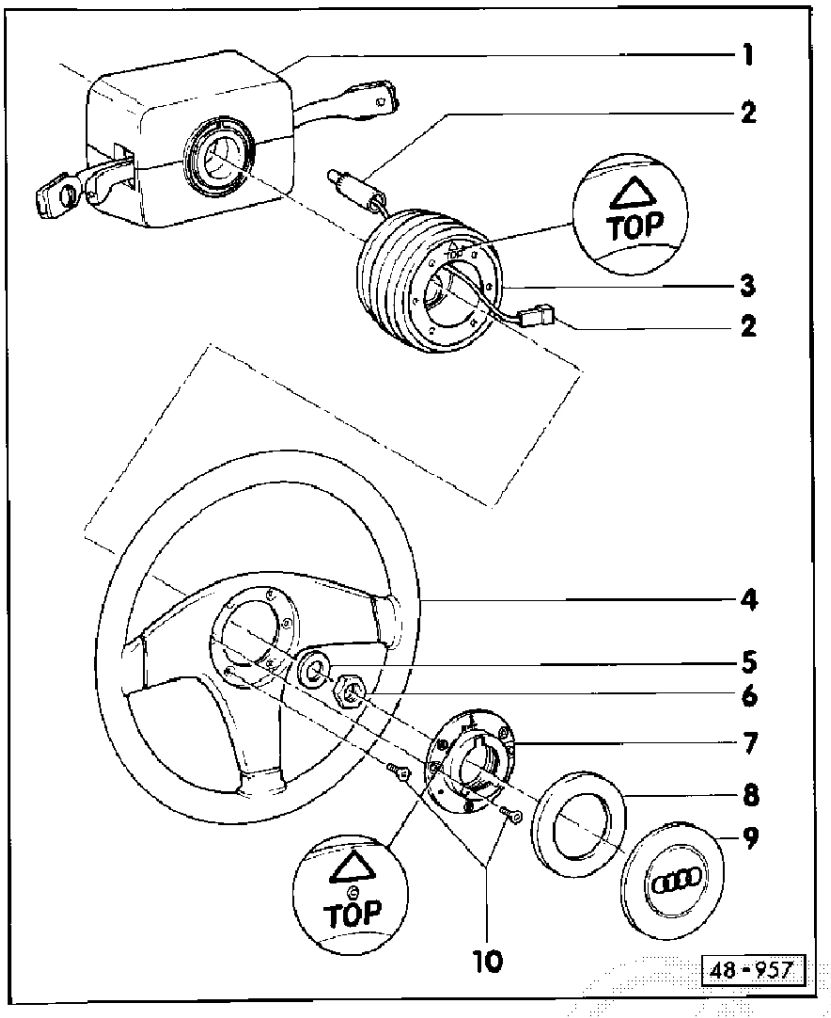
8 – Oil seal

- ♦ Insert in steering wheel



9 – Horn actuator trim

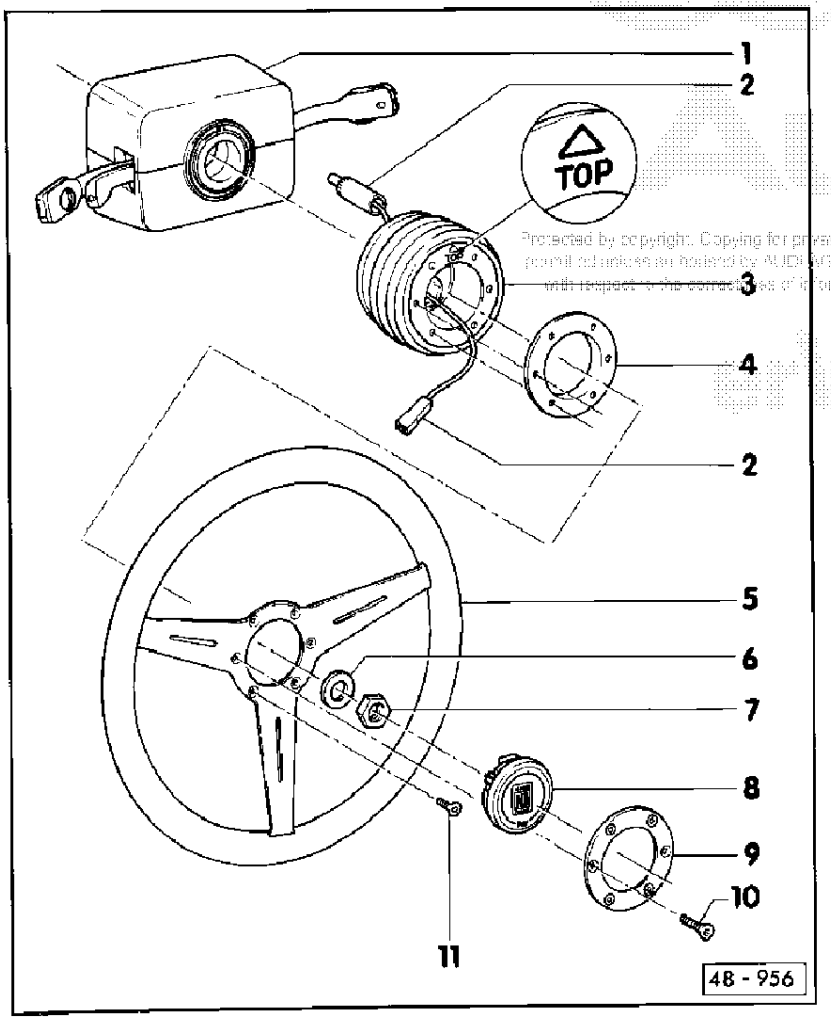
- ♦ Removing:
- – Press on horn actuator and turn anti-clockwise as far as stop (bayonet fit).
- – Remove horn actuator from steering wheel
- ♦ Installing:
- – Insert horn actuator with bracket into horn actuator recesses provided, press on and turn clockwise as far as stop.



10 – **Countersunk bolt, 7 Nm**
- ♦ Fitted with locking compound
- ♦ Apply -D6- before fitting
- ♦ Can be replaced separately if necessary

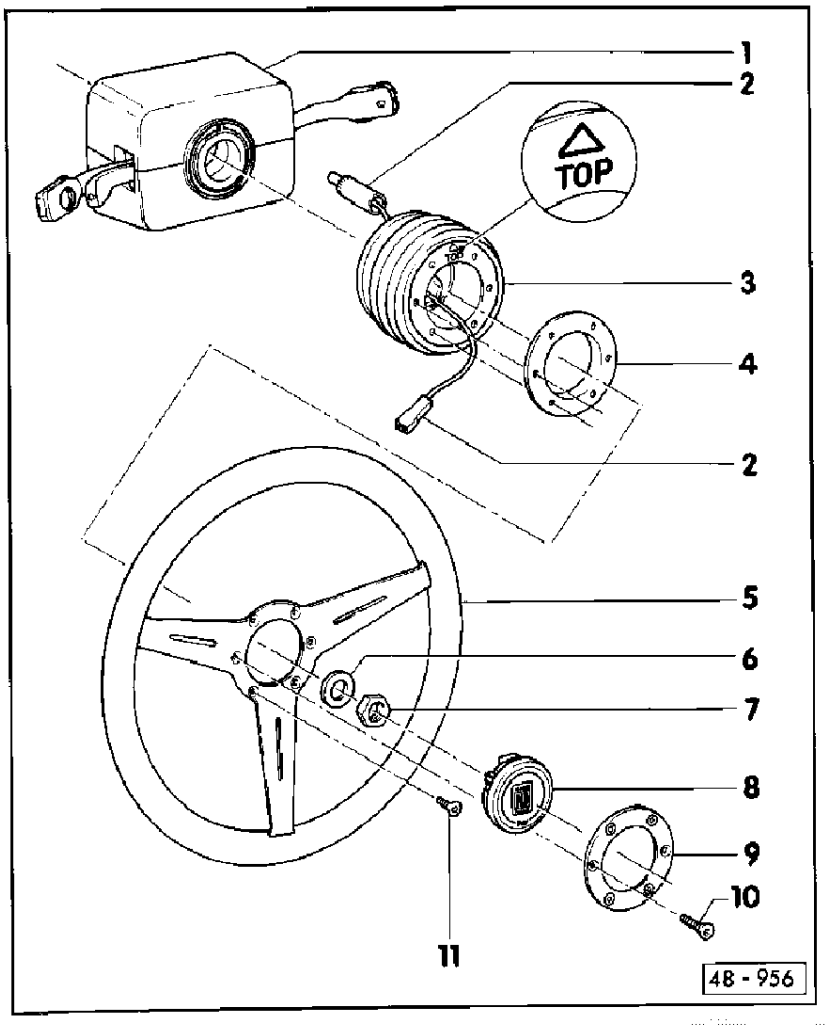
Note:
Due to the use of locking compound, the hexagon socket head of the bolts may be damaged when unscrewing them. If this is the case, carefully drill bolt heads taking care not to damage the countersunk holes in the steering wheel/horn actuator.

Solid-wood steering wheel



1 – **Steering column switch with bracket**
- ♦ Apply small quantity of grease to slip ring

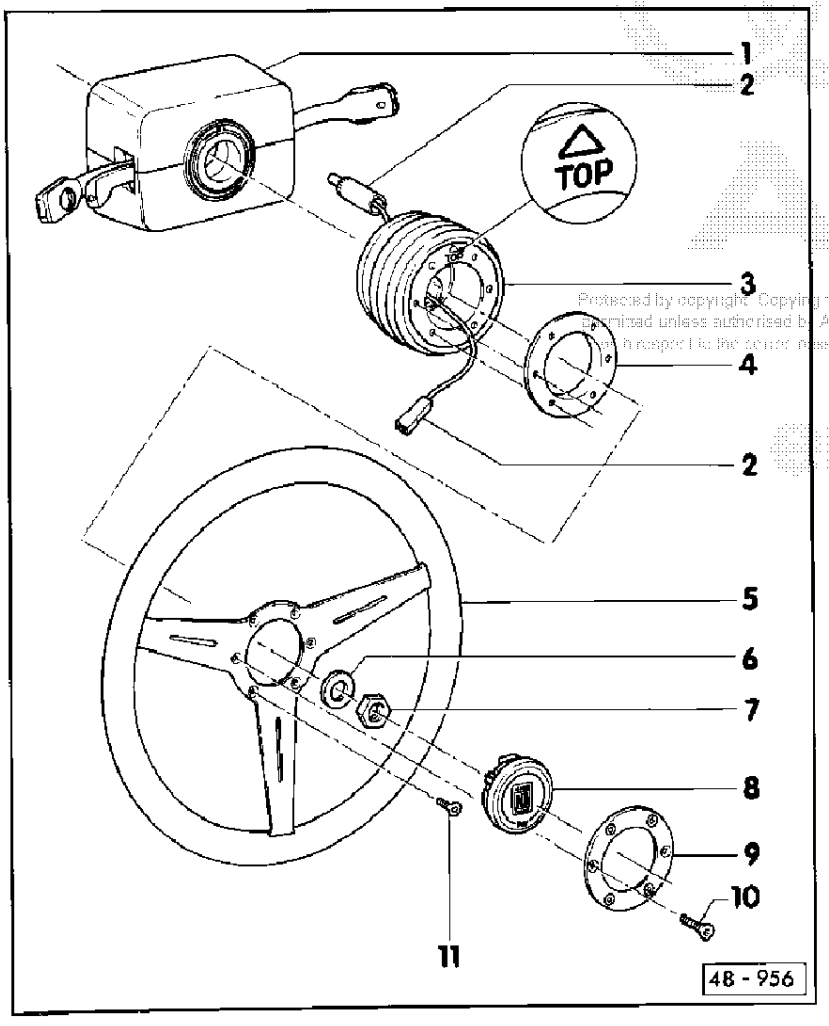
2 – **Carbon brush**
- ♦ Removing:
- – Press out of hub
- ♦ Installing:
- – Press home
- ♦ Attach flat connector to lug of horn actuator
- ♦ Can be replaced separately if necessary



3 – Hub
- ♦ Attached to steering wheel with countersunk bolts which are fitted with locking compound -D6-
- ♦ Can be replaced separately if necessary

Installation note:
The hub features an arrow and is labelled "TOP". On insertion in steering wheel, make sure that arrow on hub is facing upwards.

4 – Retaining ring
- ♦ On insertion, the two lugs on the retaining ring are centred with the arrow direction ("TOP" on hub)
- ♦ Initially attach hub to steering wheel with the two upper and lower bolts.



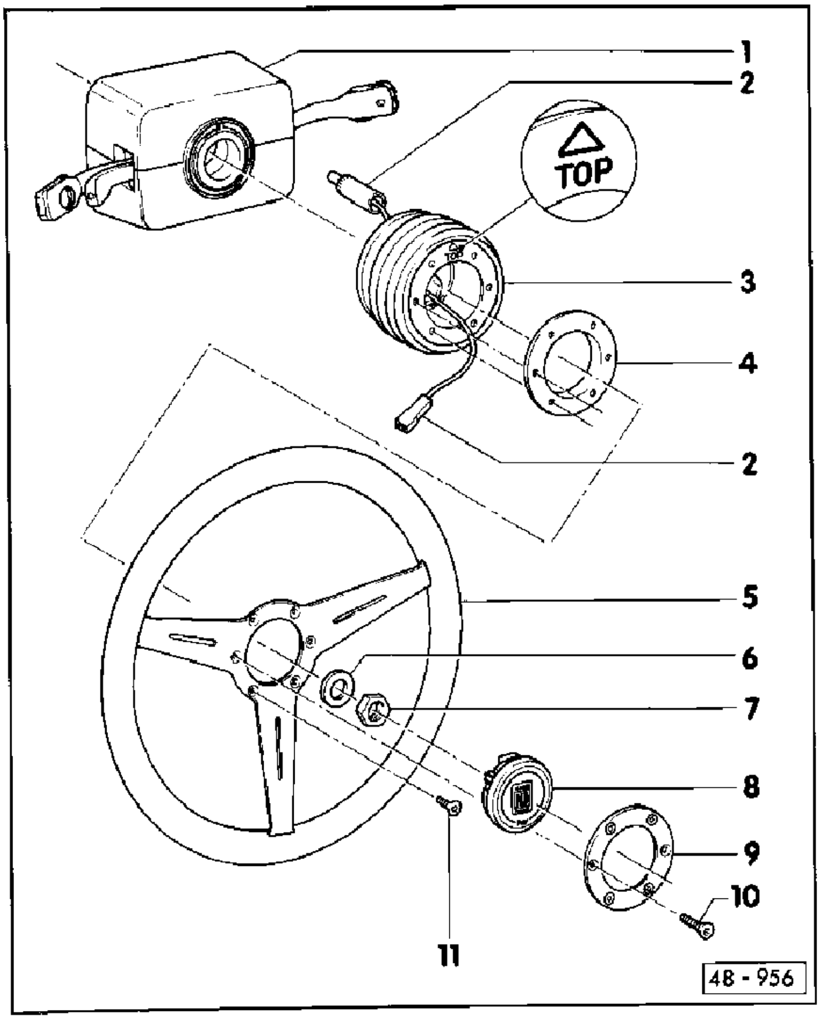
5 – Steering wheel
- ♦ Attach to steering column with wheels in straight-ahead position
- ♦ On attachment, turn signal indicator stalk must be in centre position
- ♦ Only install factory-approved steering wheels

6 – Spring lock washer

7 – Hexagon nut, 40 Nm

8 – Horn actuator

9 – Cover ring
- ♦ To unscrew, move wheels to straight-ahead position and screw in/screw out the bolts at the 3 and 9 o'clock positions.

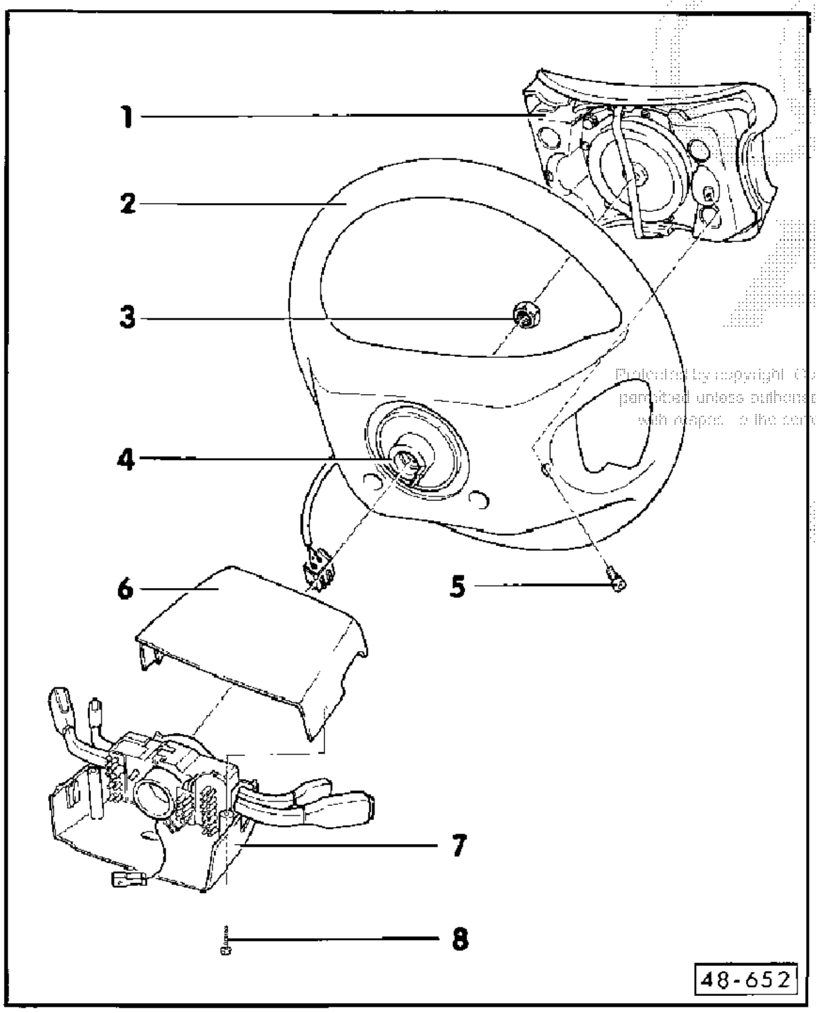


10 – **Countersunk bolt M5 x 17.7 Nm**
- ♦ Attach cover ring
- ♦ Can be replaced separately if necessary

11 – **Countersunk bolt M5 x 10.7 Nm**
- ♦ Fitted with locking compound
- ♦ Apply -D6- before fitting
- ♦ Can be replaced separately if necessary

Note:

Due to the use of locking compound, the hexagon socket head of the bolts may be damaged when unscrewing them. If this is the case, carefully drill bolt heads taking care not to damage the countersunk holes in the steering wheel/horn actuator.



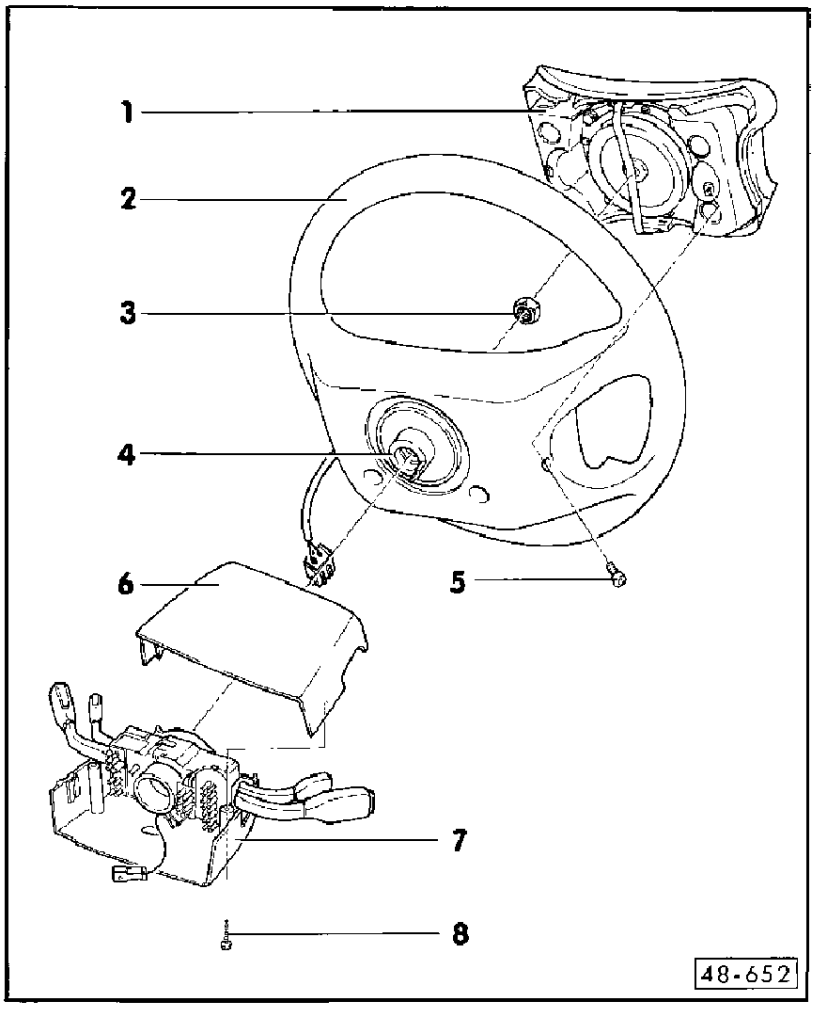
Airbag steering wheel

1 – **Airbag unit**

Note:

- ♦ Before performing any work on the airbag system, disconnect battery earth strap and 1-pin red connector for airbag voltage supply to ensure that subsequent assembly work does not result in accidental actuation of airbag system. Before removing steering column, move wheels to straight-ahead position, then remove steering wheel (this ensures that coil spring in steering wheel is not damaged).
- ♦ Observe the safety instructions

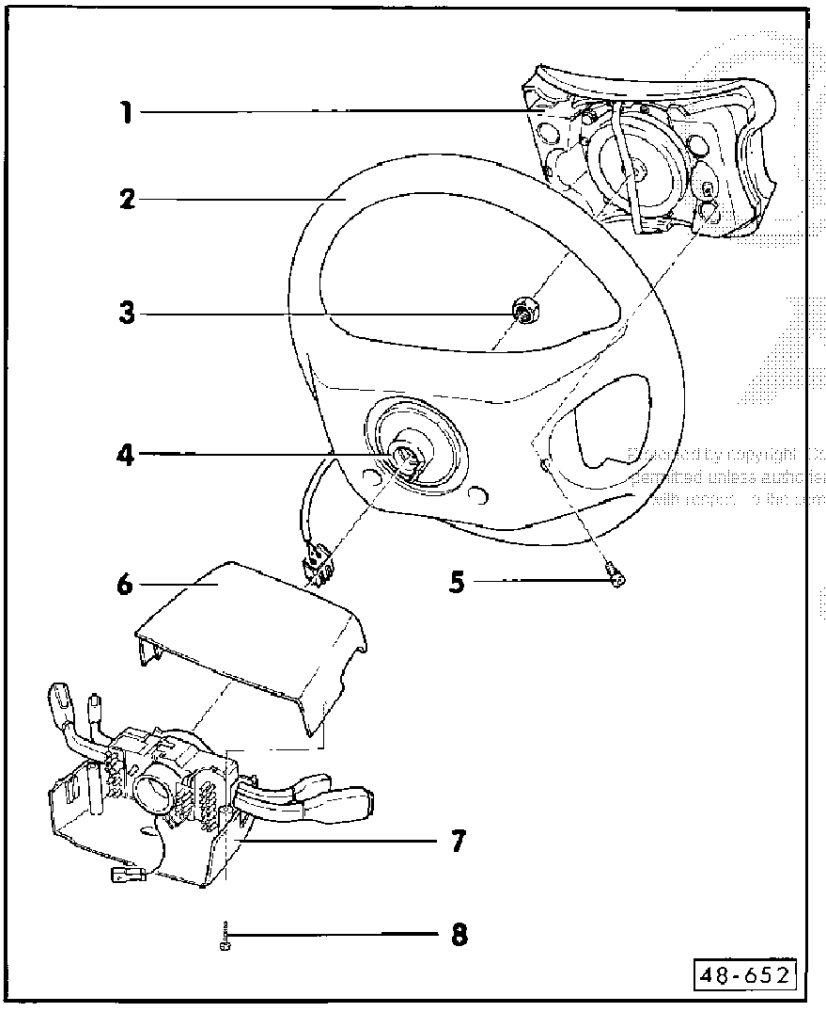
=> Electrical System; Repair Group 96; Servicing airbag, Safety precautions =>



2 – Steering wheel

- ♦ Removing and installing => Page 48-67
- ♦ Attach to steering column with wheels in straight-ahead position
- ♦ On attachment, turn signal indicator stalk must be in centre position
- ♦ Only install factory-approved steering wheels
- ♦ Replacement part supplied with self-centring ring and slip ring

3 – Hexagon nut, 40 Nm



4 – Self-centring ring with slip ring

- ♦ Available as replacement part
- ♦ Replace

=> Electrical System; Repair Group 96; Servicing airbag =>

5 – Securing bolt for airbag unit, 6 Nm

- ♦ Read installation note => Page 48-68.

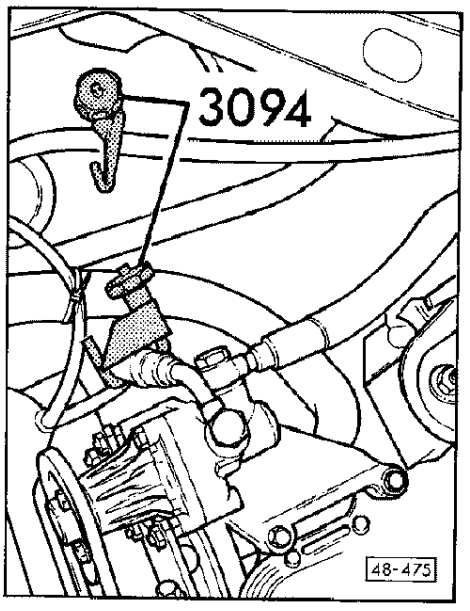
6 – Cover for steering column switch

7 – Steering column switch with bracket

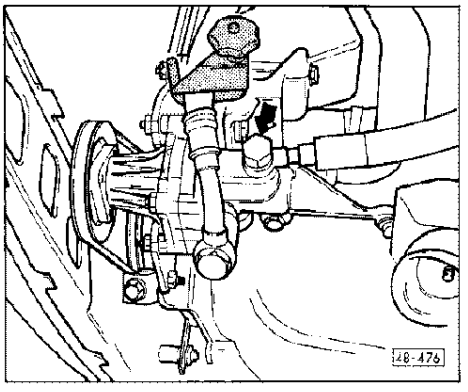
8 – Self-tapping screw

Checking delivery pressure of vane pump

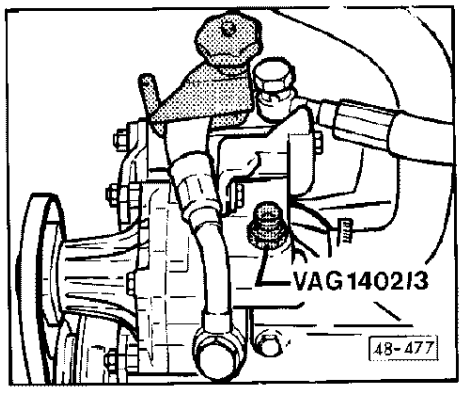
Vehicles with 4-cylinder engine



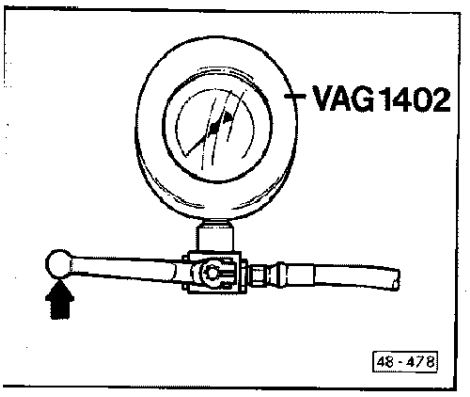
- Pinch off suction and return pipes with hose clamps -3094-.



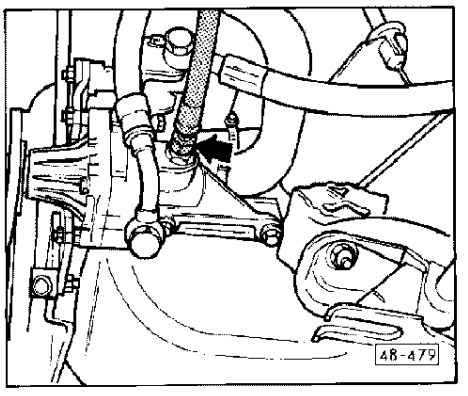
- Unscrew expansion hose -arrow- from vane cell pump.



- Remove copper seal from banjo bolt and attach to adapter -V.A.G 1402/3-.
- Screw adapter -V.A.G 1402/3- into vane pump in place of hollow bolt.



- Pressure gauge shutoff valve (lever set to left).
- Route hose of pressure gauge -V.A.G 1402- downwards to vane pump.

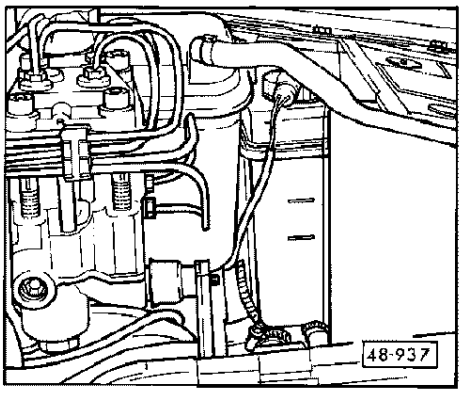


- Screw hose for pressure gauge -V.A.G. 1402- to adapter -V.A.G 1402/3-.
- Remove hose clamps and start engine.
- Take pump pressure reading from pressure gauge at idling speed (measurement not longer than 10 seconds). Specified value: 110 – 110 bar.
- Switch off engine.

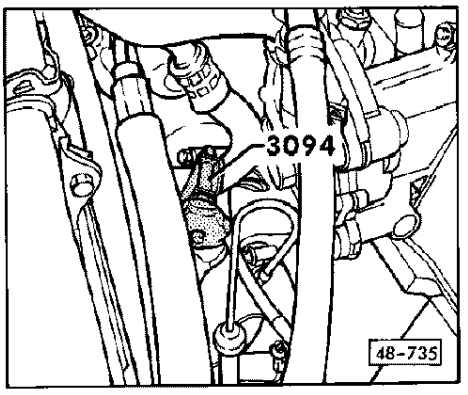
Note:

If specified value is not attained, check pressure and current limiting valve => Page 48-127.

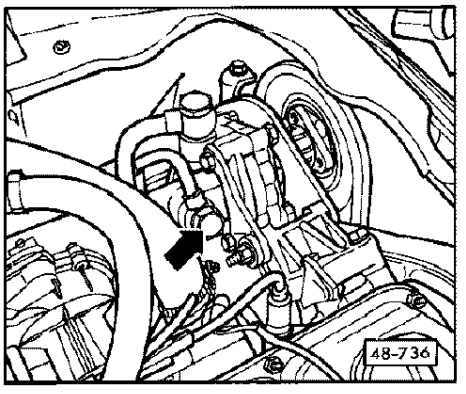
- Pinch off suction and return pipes with hose clamps -3094-.
- Unscrew hose for pressure gauge -V.A.G. 1402- from adapter -V.A.G 1402/3-.
- Unscrew adapter from pump
- Reattach expansion hose with banjo bolt and new seals to pump.
- Remove hose clamps and start engine.
- Start engine and let it idle for approx. 2 minutes with front wheels set to straight-ahead position.



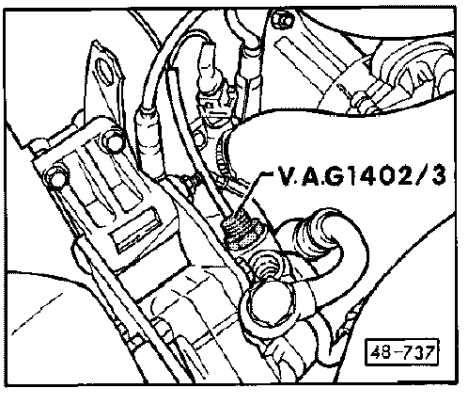
- Switch off engine and immediately check hydraulic fluid level, paying attention to marks on reservoir/dipstick; top up to "MAX" mark if necessary
- Check steering system for leaks



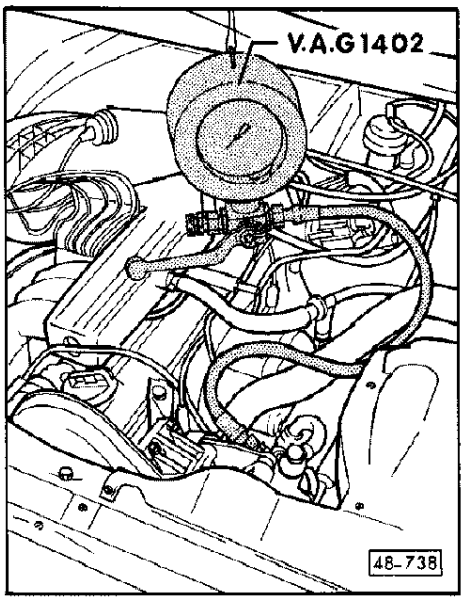
- Attach hose clamp -3094- to suction hose.



- Unscrew expansion hose -arrow- from vane cell pump.
- Remove copper seal from banjo bolt and attach to adapter - V.A.G 1402/3-.



- Screw adapter -V.A.G 1402/3- into vane pump in place of banjo bolt.

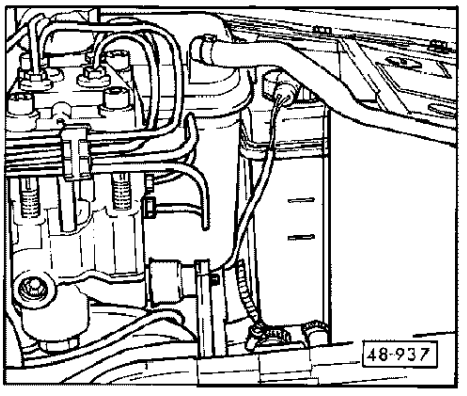


- Pressure gauge shutoff valve (lever set to left).
- Screw hose for pressure gauge -V.A.G. 1402- onto adapter - V.A.G 1402/3-.
- Remove hose clamp and start engine.
- Take pump pressure reading from pressure gauge at idling speed (measurement not longer than 10 seconds). Specified value: 110 – 110 bar.
- Switch off engine.

Note:

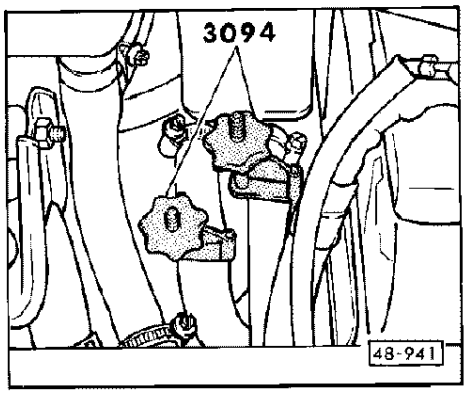
If specified value is not attained, check pressure and current limiting valve => Page 48-127.

- Pinch off suction hose with hose clamp -3094-.
- Unscrew hose for pressure gauge -V.A.G. 1402- from adapter -V.A.G 1402/3-.
- Unscrew adapter from pump
- Reattach expansion hose with banjo bolt and new seals to pump.
- Remove hose clamp and start engine.
- Start engine and let it idle for approx. 2 minutes with front wheels set to straight-ahead position.

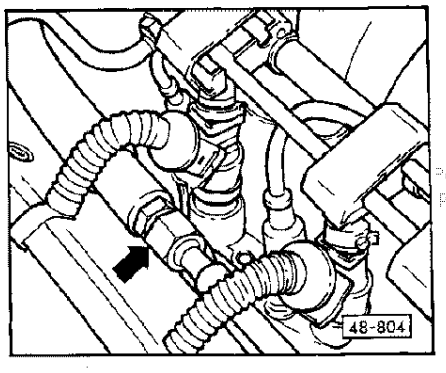


- Switch off engine and immediately check hydraulic fluid level, paying attention to marks on reservoir/dipstick; top up to "MAX" mark if necessary
- Check steering system for leaks

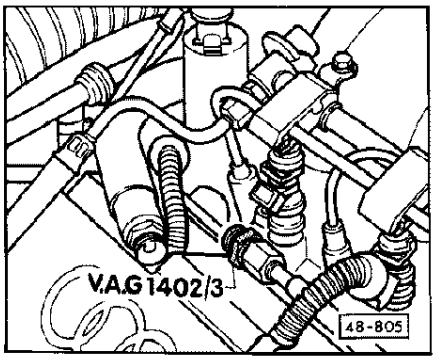
Vehicles with 6-cylinder engine



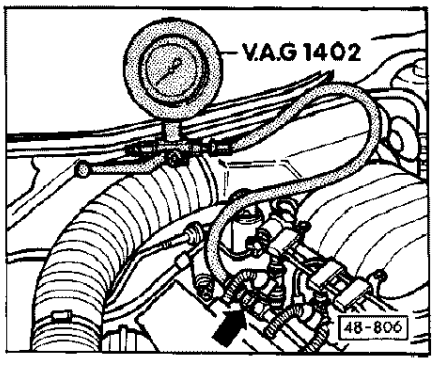
- Pinch off suction and return pipes with hose clamps -3094-.



- Press spring clip and remove plug from injector.
- Unscrew pipe from expansion hose (arrow); counterhold on hexagon of expansion hose.



- Screw adapter V.A.G 1402/3 into pipe in place of expansion hose.



- Screw hose of pressure gauge onto adapter V.A.G 1402/3.
- Close pressure gauge shutoff valve (lever set to left).
- Attach injector plug to injector.

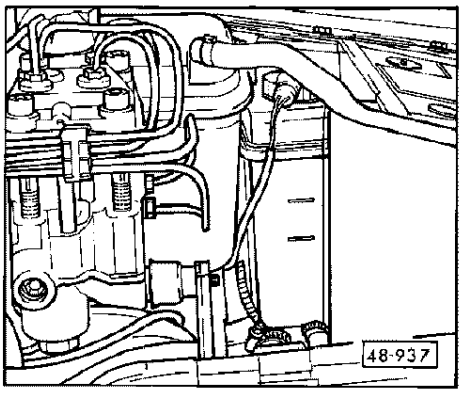
- Remove hose clamps and start engine.
- Take pump pressure reading from pressure gauge at idling speed (measurement not longer than 10 seconds). Specified value: 110 – 110 bar.
- Switch off engine.

Note:

Replace vane pump if specified value is not attained =>Page 48-133.

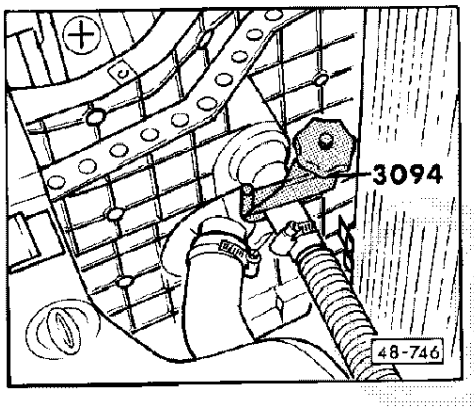
- Pinch off suction and return pipes with hose clamps -3094-.
- Press spring clip and remove plug from injector.
- Unscrew hose for pressure gauge -V.A.G. 1402- from adapter -V.A.G 1402/3-.
- Unscrew adapter from pipe.
- Srew pipe to expansion hose (arrow); for this purpose, counter-hold at hexagon of expansion hose.
- Attach injector plug to injector.

- Remove hose clamps and start engine.
- Start engine and let it idle for approx. 2 minutes with front wheels set to straight-ahead position.

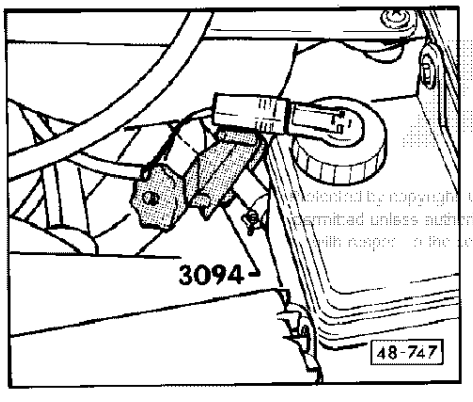


- Switch off engine and immediately check hydraulic fluid level, paying attention to marks on reservoir/dipstick; top up to "MAX" mark if necessary
- Check steering system for leaks

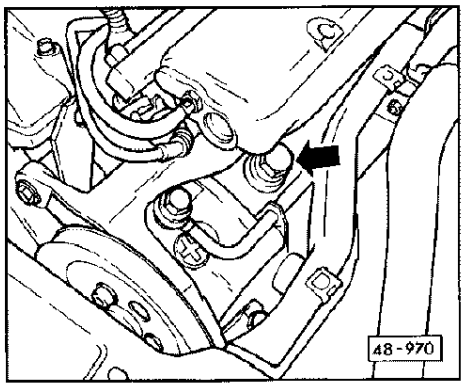
169 kW engine, tandem pump



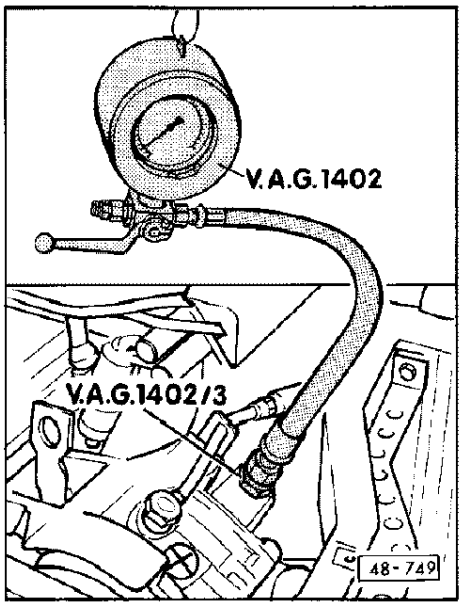
- Remove cover for air intake elbow.
- Attach hose clamp -3094- to suction hose.



- Attach hose clamp -3094- at return hose to reservoir



- Unscrew expansion hose -arrow- from vane cell pump.
- Remove copper seal from banjo bolt and attach to adapter - V.A.G 1402/3-.

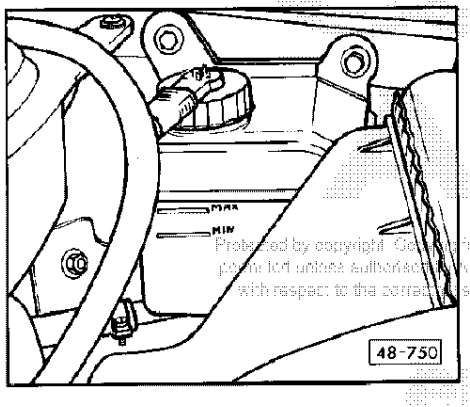


- Screw adapter -V.A.G 1402/3- into vane pump in place of hollow bolt.
- ressure gauge shutoff valve (lever set to left).
- Screw hose for pressure gauge -V.A.G. 1402- onto adapter - V.A.G 1402/3-.
- Remove hose clamps and start engine.
- Take pump pressure reading from pressure gauge at idling speed (measurement not longer than 10 seconds). Specified value: 110 – 110 bar.
- Switch off engine.

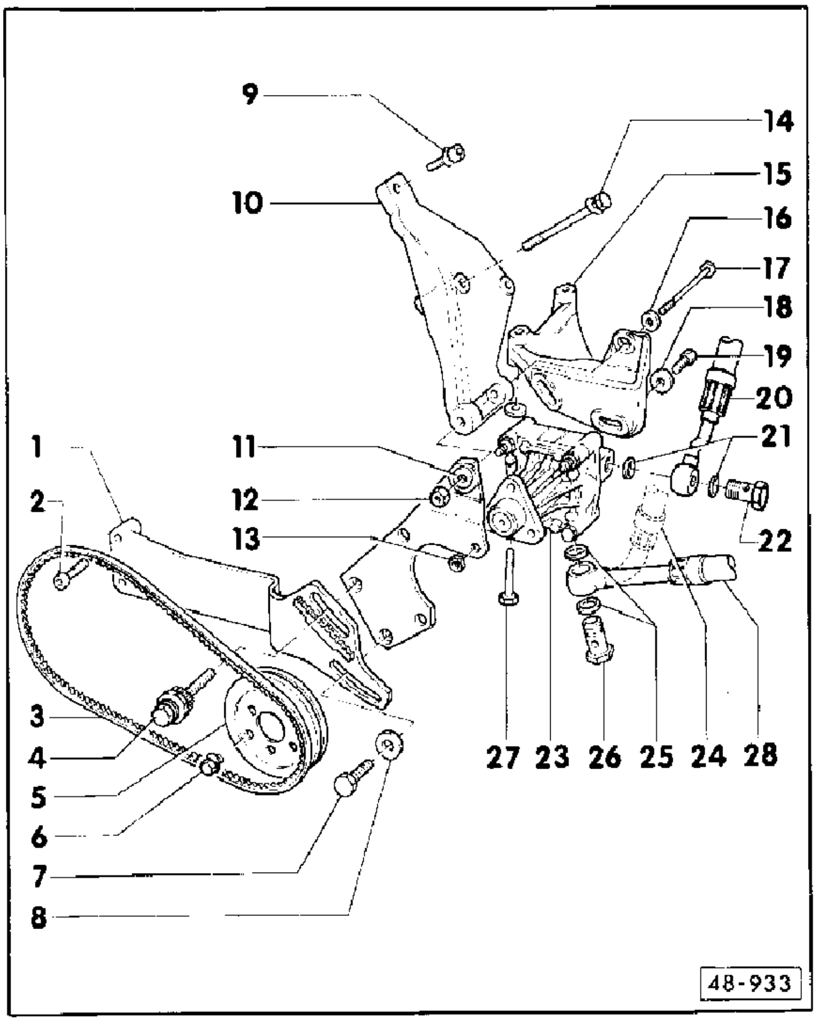
Note:

If specified value is not attained, replace tandem pump.

- Disconnect suction and return pipes with hose clamps -3094-.
- Unscrew hose for pressure gauge -V.A.G. 1402- from adapter - V.A.G 1402/3-.
- Unscrew adapter from pump
- Reattach expansion hose with banjo bolt and new seals to pump.
- Remove hose clamps and start engine.
- Start engine and let it idle for approx. 2 minutes with front wheels set to straight-ahead position.



- Switch off engine and immediately check hydraulic fluid level, paying attention to marks on reservoir/dipstick; top up to "MAX" mark if necessary
- Check steering system for leaks



Removing and installing vane pump, 4-cylinder engine

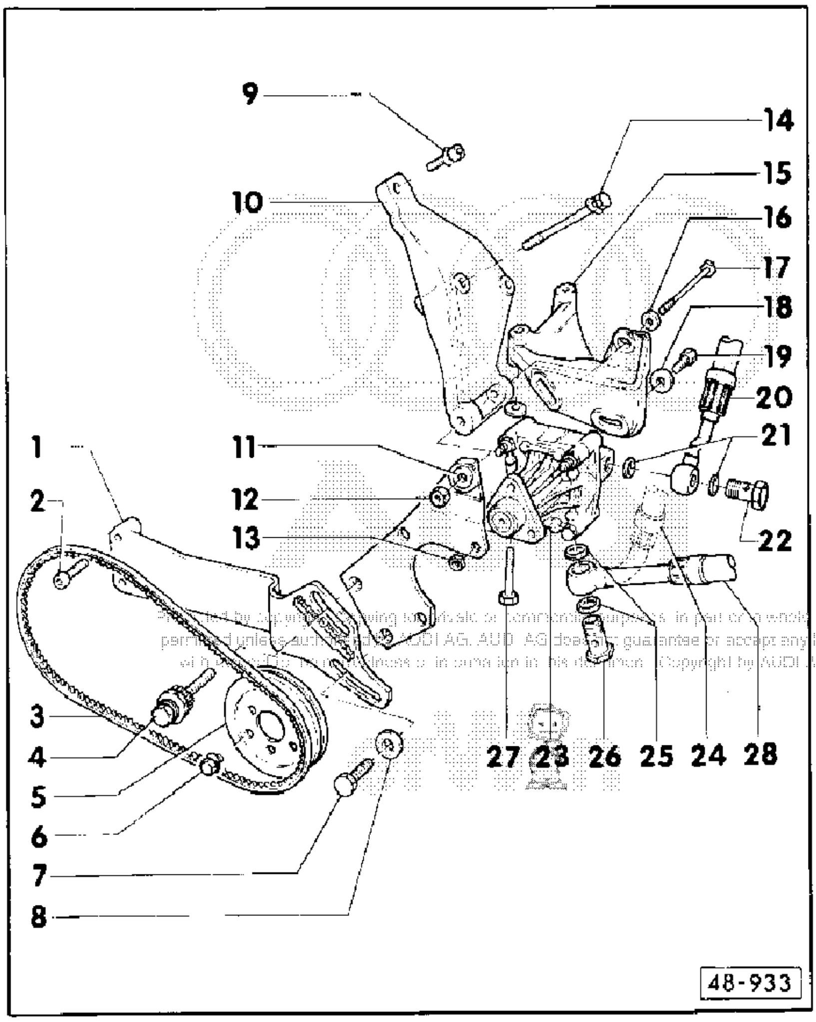
Note:
The power-assisted steering uses hydraulic fluid, part no. G 002 000.

1 – **Tensioning bracket**

2 – **Cheese-head bolt, 20 Nm**

3 – **V-belt**
- ♦ 2-valve spark-ignition engines: 9.5 x 910 mm
- ♦ 4-valve engines: 9.5 x 880 mm

4 – **Bolt with tensioning nut**
- ♦ Tensioning or replacing V-belt => Page 48-116



5 – **V-belt pulley**
- ♦ V-belt pulley of crankshaft and vane pump must line up.
- ♦ Different versions for vehicles with 2- and 4-valve engines

6 – **Hexagon bolt, 20 Nm**

7 – **Hexagon bolt, 25 Nm**

8 – **Washer**

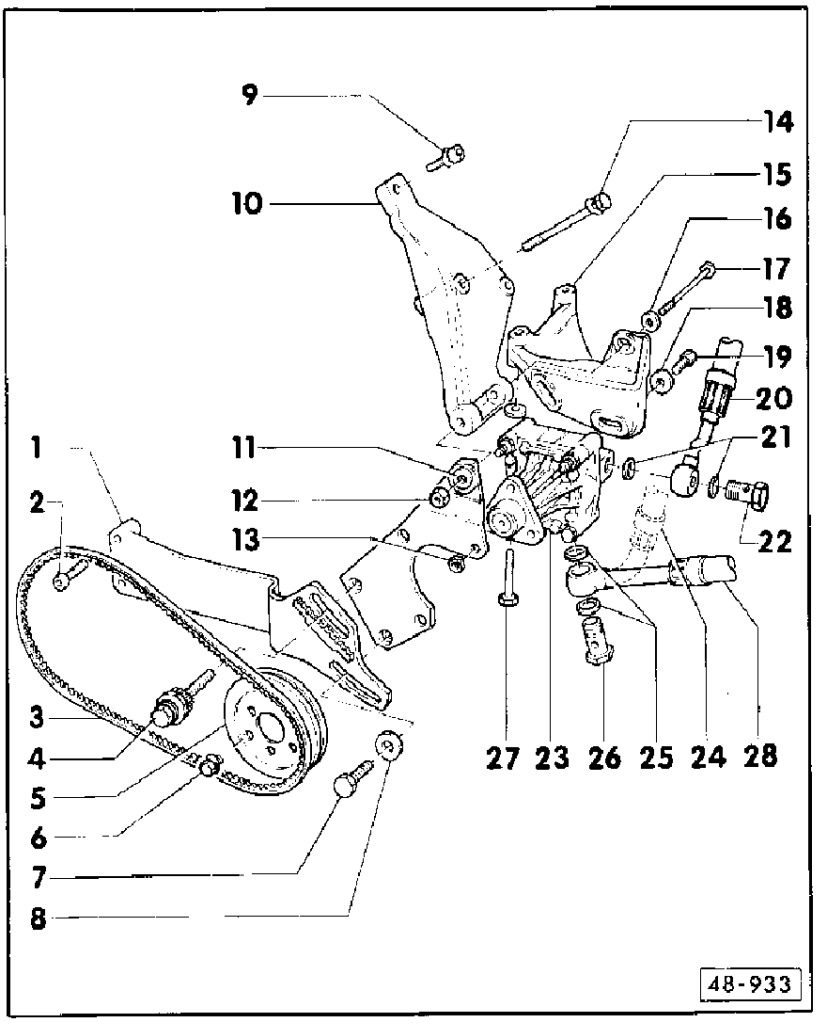
9 – **Cheese-head bolt, 20 Nm**

10 – **Bracket**

11 – **Front swivel bracket**

12 – **Self-locking nut, 20 Nm**
- ♦ Always replace

13 – **Hexagon nut, 20 Nm**



14 – **Hexagon bolt, 20 Nm**

15 – **Rear swivel bracket**

16 – **Washer**

17 – **Hexagon bolt**

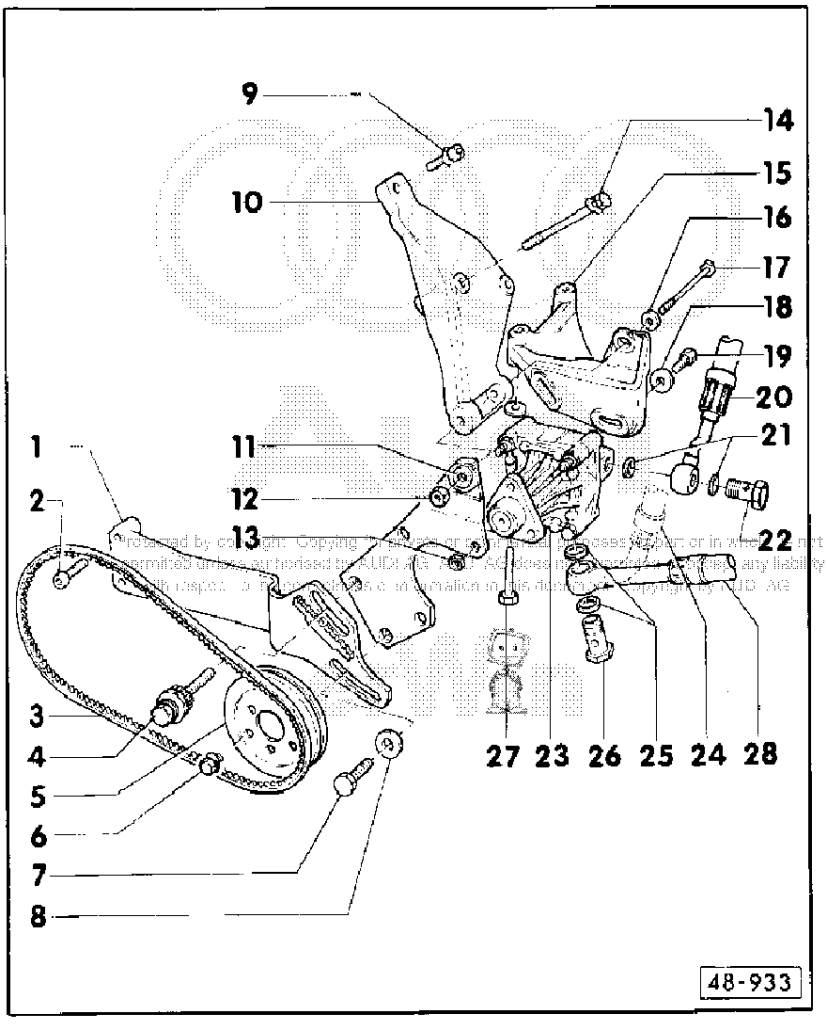
18 – **Washer**

19 – **Hexagon bolt**

20 – **Expansion hose**
- ♦ Note different versions for LHD and RHD vehicles

21 – **Oil seal**
- ♦ Always replace

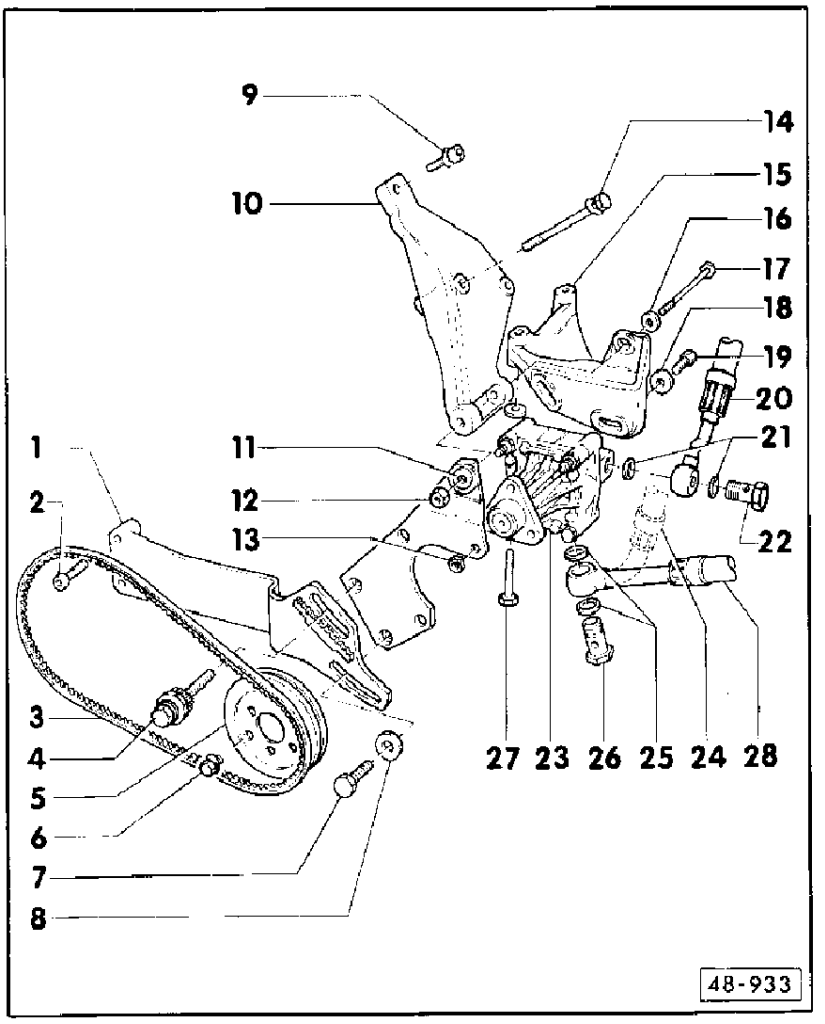
22 – **Banjo bolt, 50 Nm**



23 – **Vane cell pump**
- ♦ Checking delivery pressure => Page 48-97
- ♦ Servicing => Page 48-121
- ♦ Before installing, fill with hydraulic fluid at suction end and crank by hand until fluid comes out at pump outlet.

24 – **Suction hose**
- ♦ For vehicles with 2-valve engine

25 – **Oil seal**
- ♦ Always replace



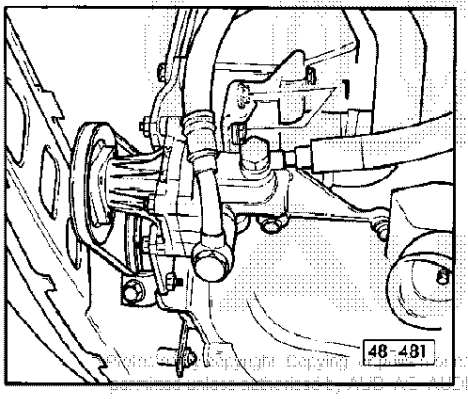
26 – Banjo bolt, 50 Nm

27 – Hexagon bolt, 20 Nm

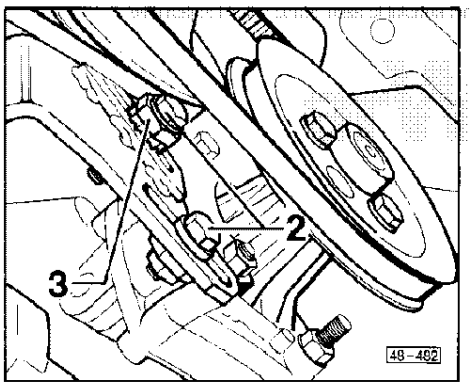
28 – Suction hose

- ♦ For vehicles with 4-valve engine
- ♦ If vane pump is provided with screw fitting, suction hose is secured by means of a hose clamp => Page 48-137, -Item 15- and => Page 48-138, -Item 16-.

Tensioning or replacing V-belt for vane pump



◆ – Loosen bolts -1- (second bolt not invisible)



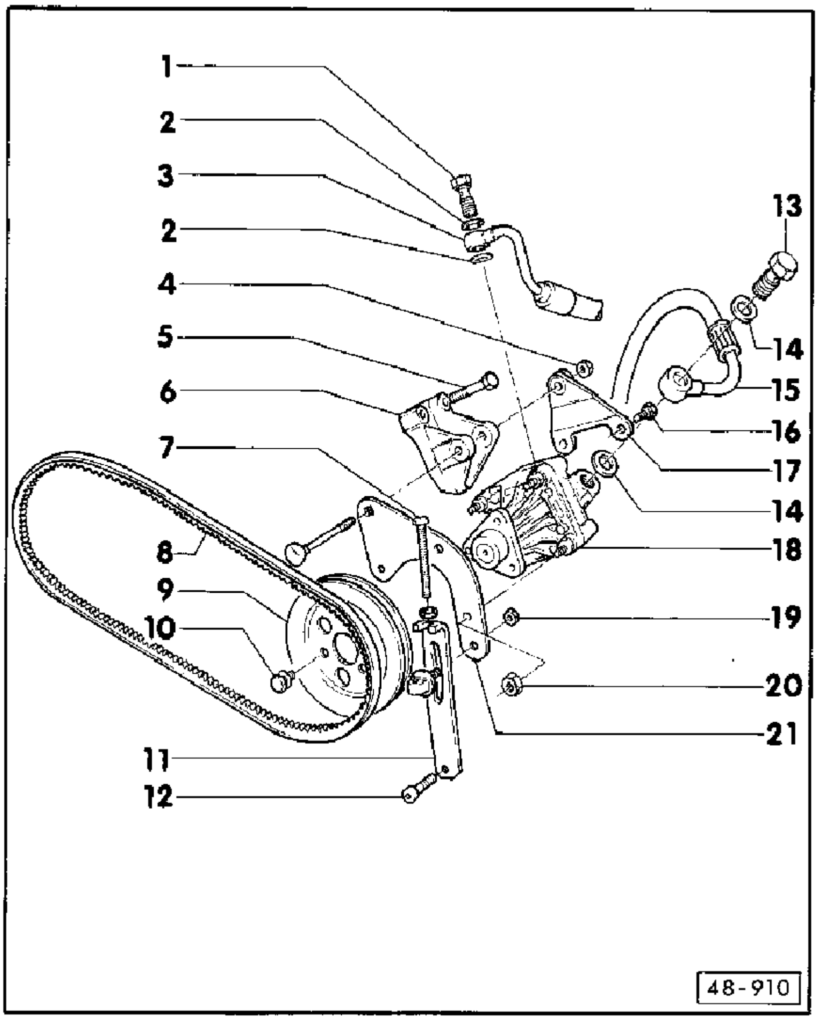
◆ – Undo bolt -2-.

– Turn tensioning nut -3- accordingly.

Note:

V-belt is properly tensioned if it can be deflected approx. 10 mm with thumb between the two pulleys.

– Retighten all the loosened bolts.



Removing and installing ZF vane pump, 5-cylinder engine

Note:
The power-assisted steering uses hydraulic fluid, part no. G 002 000.

1 – **Banjo bolt, 50 Nm**

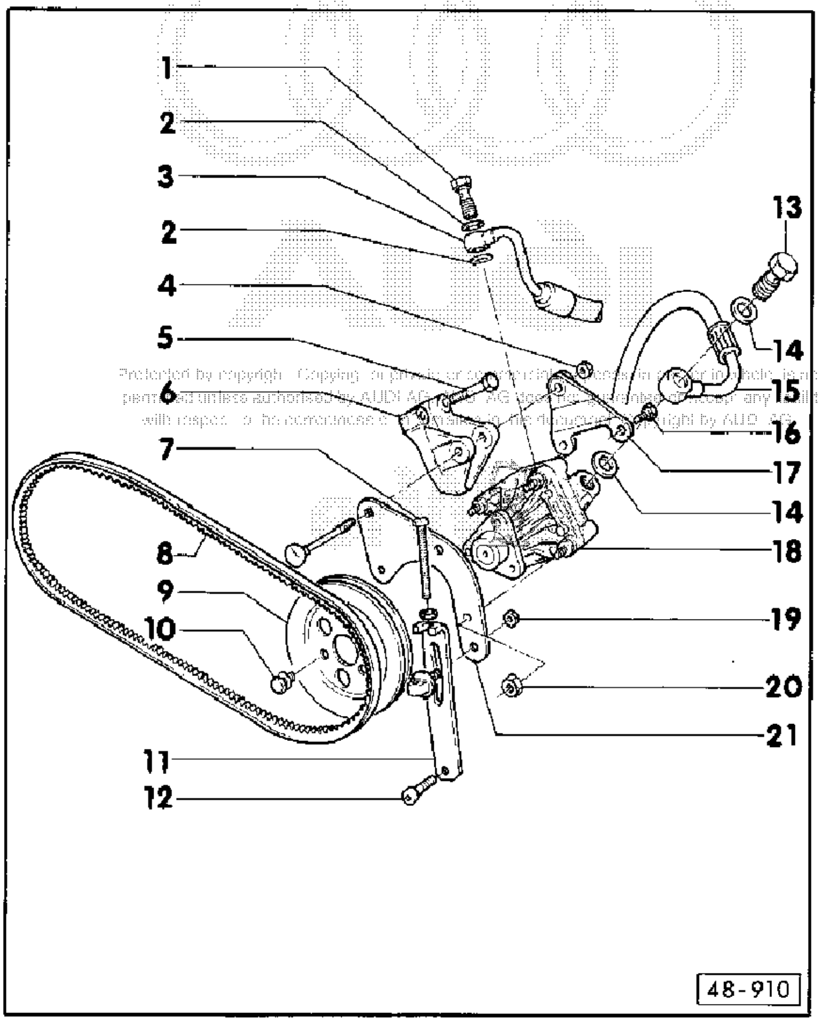
2 – **Oil seal**
- ♦ Always replace

3 – **Expansion hose**
- ♦ Note that there are different versions:

4 – **Self-locking nut, 20 Nm**
- ♦ Always replace

5 – **Hexagon bolt, 20 Nm**

6 – **Bracket**



7 – **Tensioning bolt**
- ♦ Tensioning or replacing V-belt => Page 48-120

8 – **V-belt**
- ♦ Size: 12.5 x 992 mm

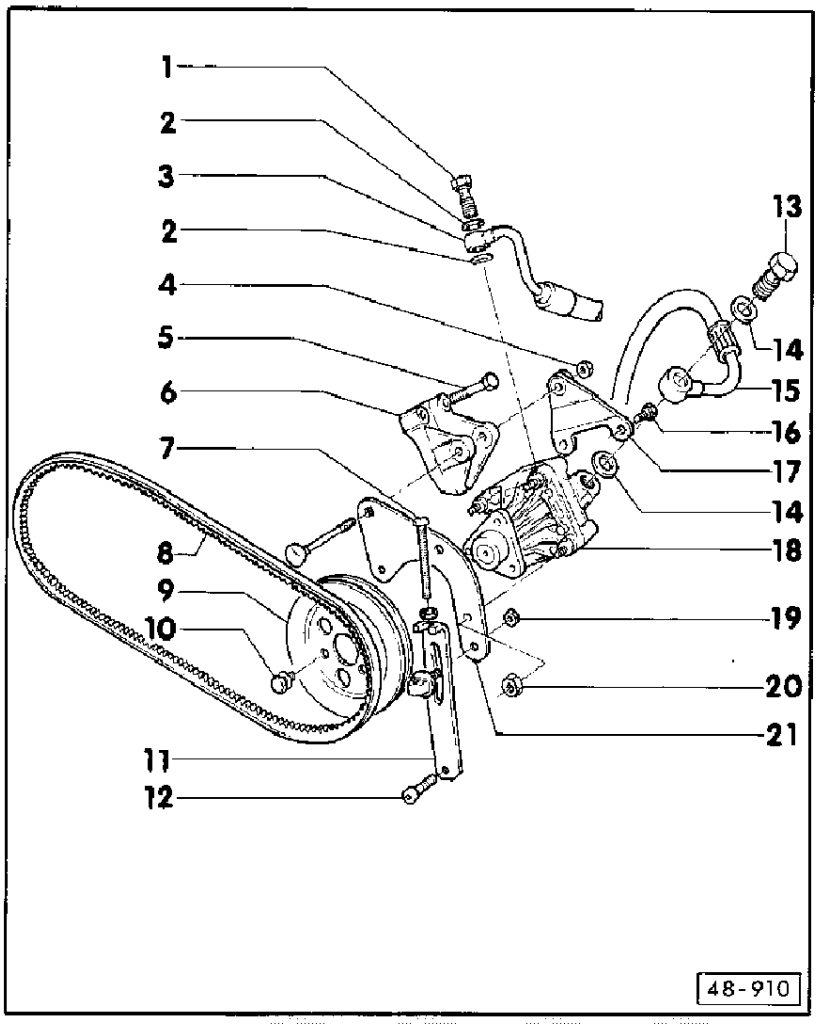
9 – **V-belt pulley**
- ♦ V-belt pulley of crankshaft and vane pump must line up.
- ♦ Installation position: With pulley fitted, "4Z" must be visible from front.

10 – **Hexagon bolt, 20 Nm**

11 – **Retainer**

12 – **Cheese-head bolt, 20 Nm**

13 – **Banjo bolt, 50 Nm**



14 – **Oil seal**
♦ Always replace

15 – **Suction hose**

16 – **Hexagon bolt, 20 Nm**

17 – **Rear swivel bracket**

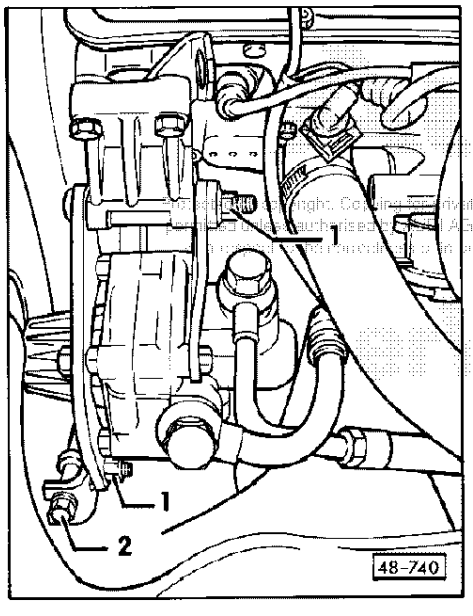
18 – **Vane cell pump**
♦ Checking delivery pressure => Page 48-101
♦ Servicing => Page 48-121
♦ Before installing, fill with hydraulic fluid at suction end and crank by hand until fluid comes out at pump outlet.

19 – **Self-locking nut, 20 Nm**
♦ Always replace

20 – **Hexagon nut, 20 Nm**

21 – **Front swivel bracket**

Tensioning or replacing V-belt for ZF vane pump



◀ – Undo nut -1-.

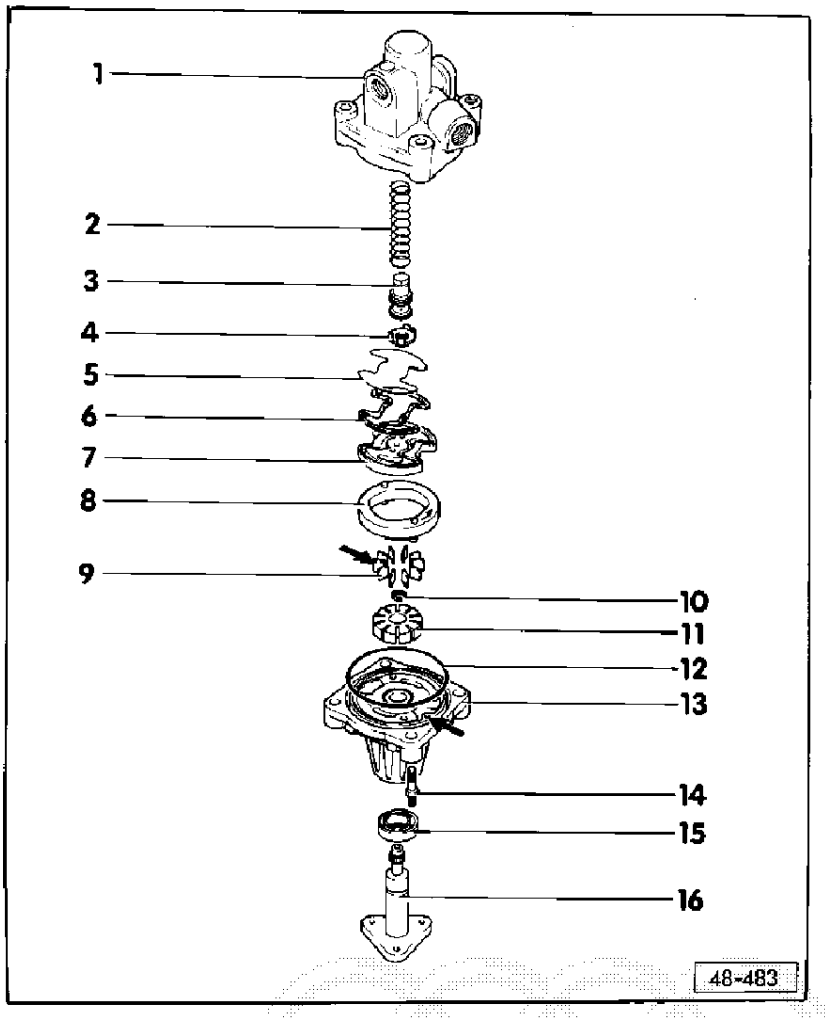
– Turn bolt -2- of tensioner appropriately.

Note:

V-belt is properly tensioned if it can be deflected approx. 10 mm with thumb between the two pulleys.

– Tighten nut -1-.

Servicing vane pump, ZF pump

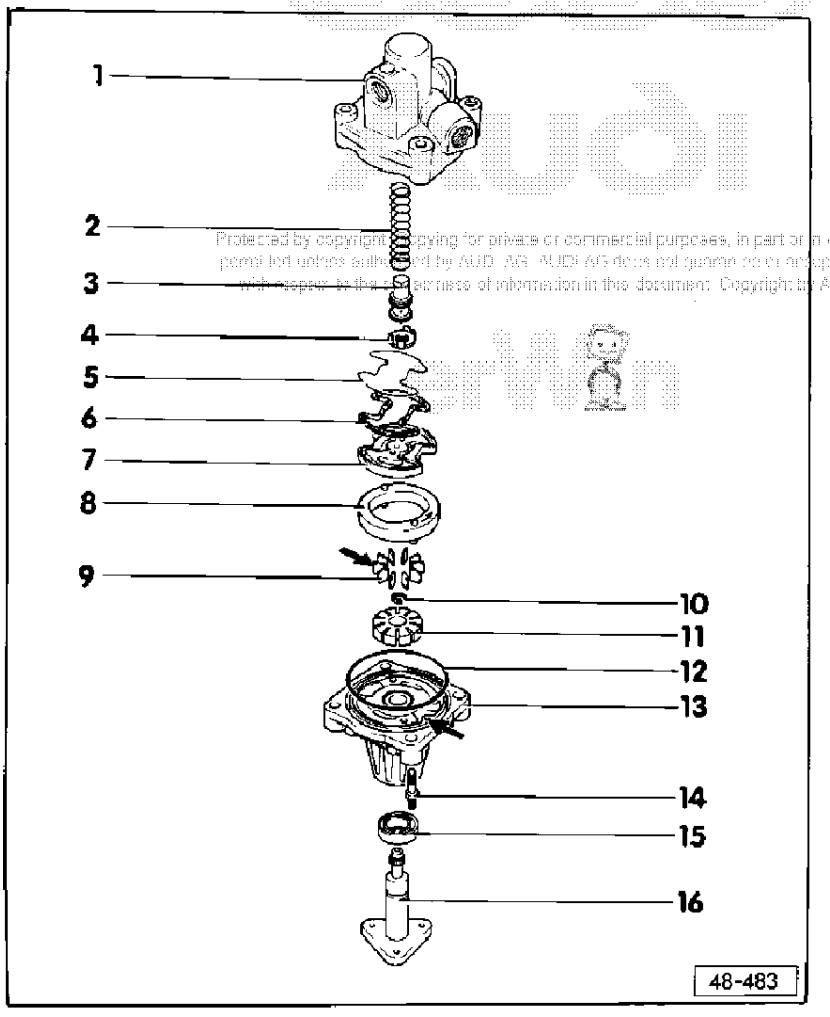


Notes:

- ♦ The vane pump uses hydraulic fluid, part no. G 002 000
- ♦ All parts marked with an asterisk are contained in the repair set and are to be replaced when servicing.
- ♦ Moisten all sealing elements with hydraulic fluid before installing.

1 – **Housing**
- ♦ Blow through ducts

2 – **Spring**



3 – **Pressure and current limiting valve**
- ♦ Insert in housing
- ♦ Checking => Page 48-127, do not disassemble

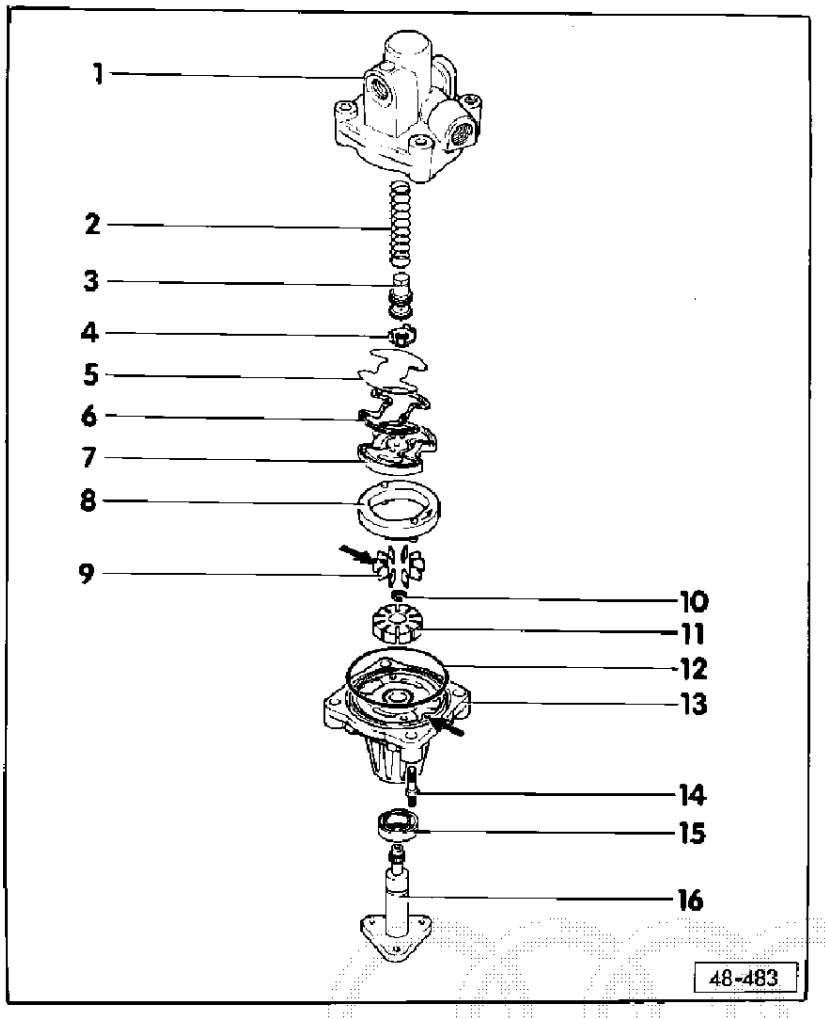
4 – **Assembly fastener for pressure and current limiting valve**
- ♦ Carefully prise out with a small screwdriver

Note:
Assembly fastener is pretensioned with pressure spring.
- ♦ Inserting =>Fig. 1

5 – **Moulded support for seal ***
- ♦ Position on seal

6 – **Seal ***

7 – **Transfer plate**



8 – Stator
- ♦ Installation position: Arrow on stator must be visible after assembly.

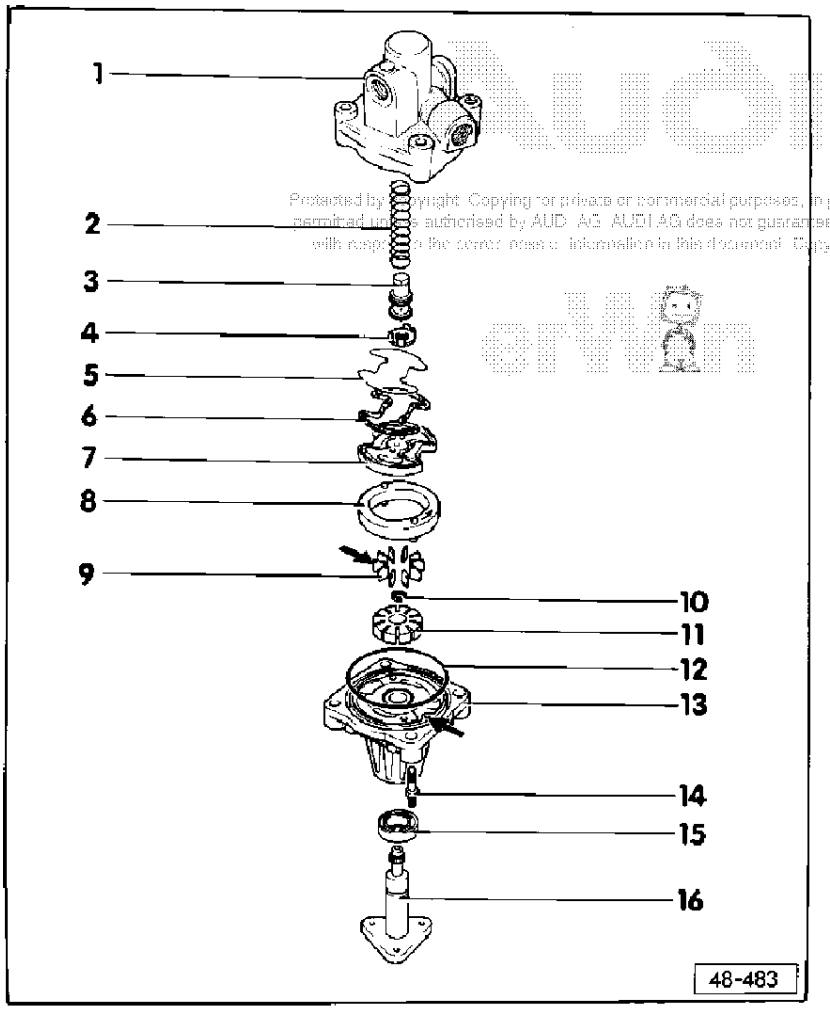
9 – Vane cells
- ♦ Ground (bright) end face - arrow- faces outwards

10 – Circlip *
- ♦ Removing and installing => Fig. 4

Note:
The repair set contains two different circlips. Always fit the same type of new circlip.

11 – Rotor
- ♦ Removing and installing => Fig. 4

12 – O-ring *



13 – Housing
- ♦ Fluid duct in both housing halves -arrow- must coincide on assembly

14 – Bolt, 15 Nm
- ♦ Apply -D6- when fitting, screw long end into pump housing

15 – Seal *
- ♦ Disassemble pump to replace
- ♦ Extracting => Fig. 2
- ♦ Driving home => Fig. 3

16 – Pump shaft with flange
- ♦ Check for scoring and running marks, replace entire pump if necessary
- ♦ Remove rotor and pump shaft to replace seal

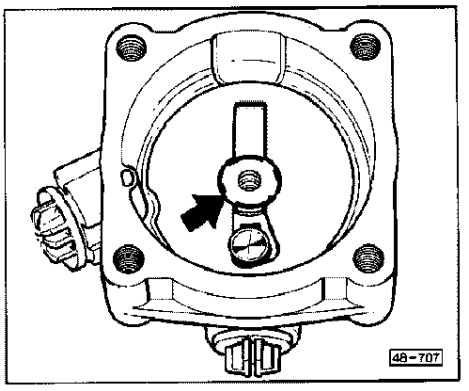


Fig.1 Inserting assembly fastener for pressure and current limiting valve in hole in housing

- The fastener holds the valve in position. Press in fastener flush with hole in housing.

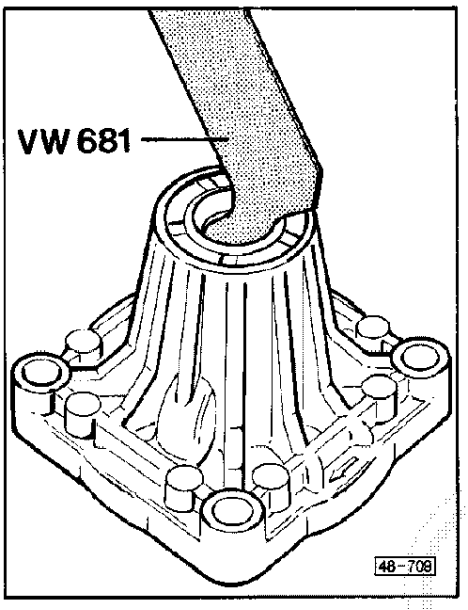


Fig.2 Pulling out seal

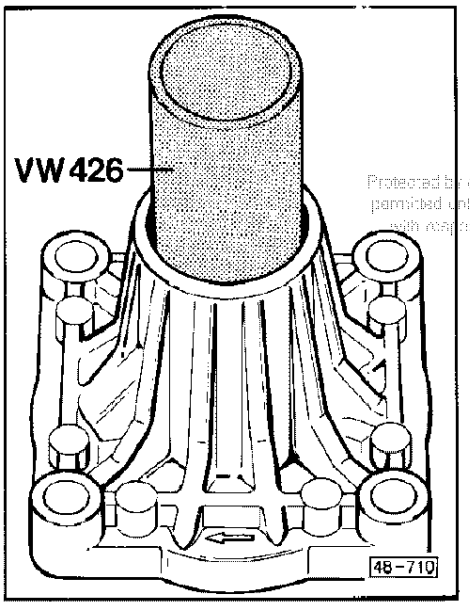


Fig.3 Driving seal home

- Fill space between sealing lips with multi-purpose grease.

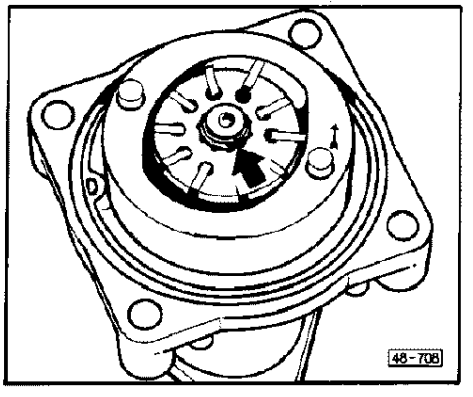


Fig.4 Removing and installing circlip

- Use pointed pliers to remove circlip -arrow- from groove; take off rotor.

Checking pressure and current limiting valve

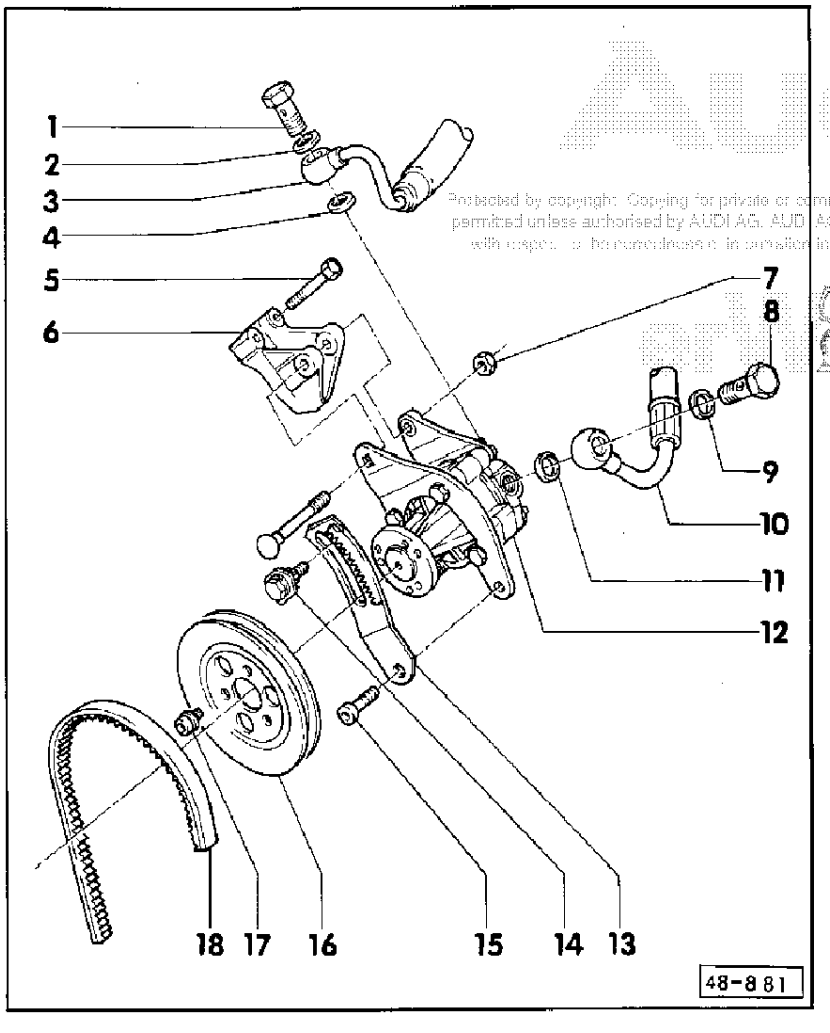
Attention
If the pressure and current limiting valve is not functioning properly, this will result in sporadic failure of the power steering.

– Check valve piston and hole in pump housing for wear.

Note:

There must not be any dirt in the holes in the valve piston. Furthermore, the piston must move freely in the hole in the housing.

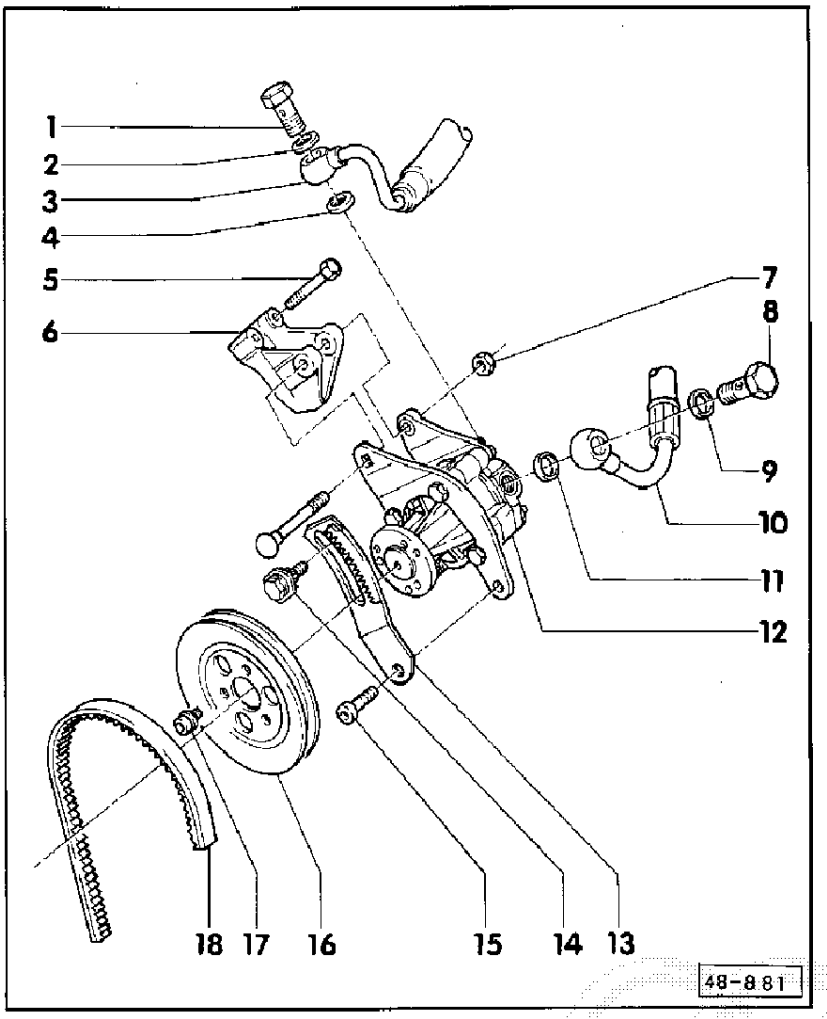
– Replace vane pump if maximum pump pressure is not attained after performing this check.



Removing and installing Vickers vane pump, 5-cylinder engine

Notes:

- The power-assisted steering uses hydraulic fluid, part no. G 002 000.
- The Vickers pump is supplied as replacement part complete with fitted V-belt pulley and front and rear swivel brackets. Vickers pump servicing is not envisaged. If a ZF pump is fitted instead of a Vickers pump, the front and rear swivel brackets must be ordered separately and fitted on the ZF pump. For cost reasons the same make should therefore always be fitted if at all possible when performing repairs.



1 – **Banjo bolt, 50 Nm**

2 – **Oil seal**
♦ Always replace

3 – **Expansion hose**
♦ Note that there are different versions:

4 – **Oil seal**
♦ Always replace

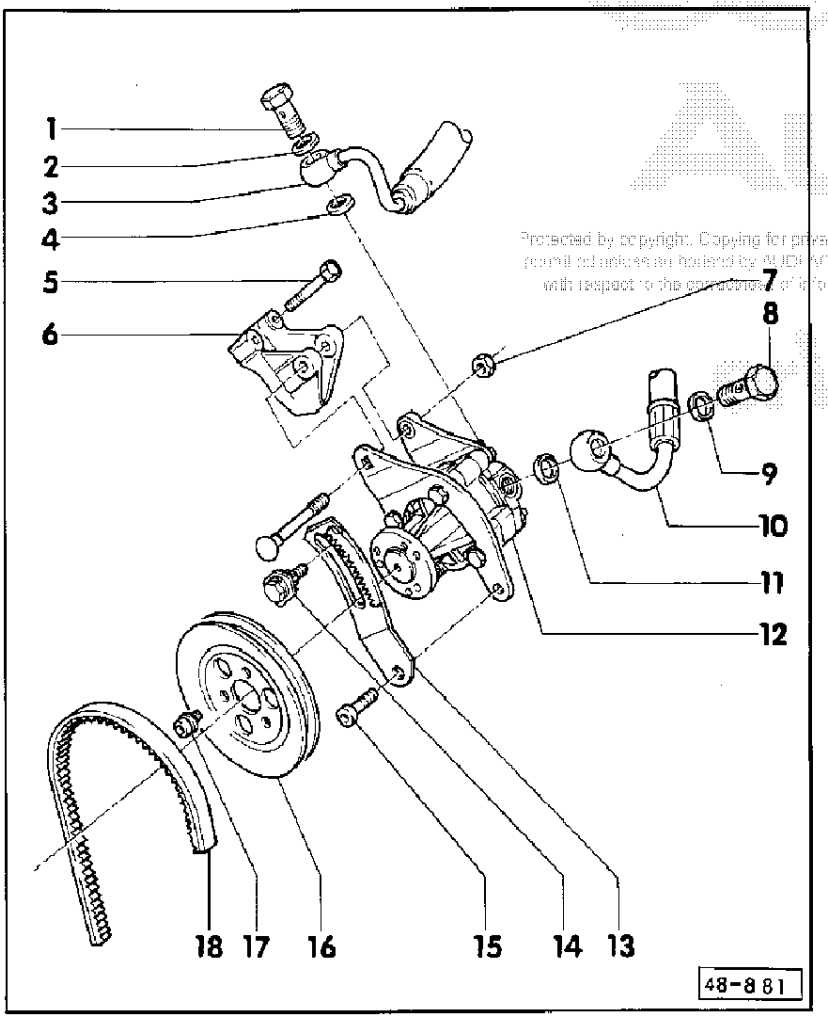
5 – **Hexagon bolt, 20 Nm**

6 – **Bracket**

7 – **Self-locking nut, 20 Nm**
♦ Always replace

8 – **Banjo bolt, 50 Nm**

9 – **Oil seal**
♦ Always replace



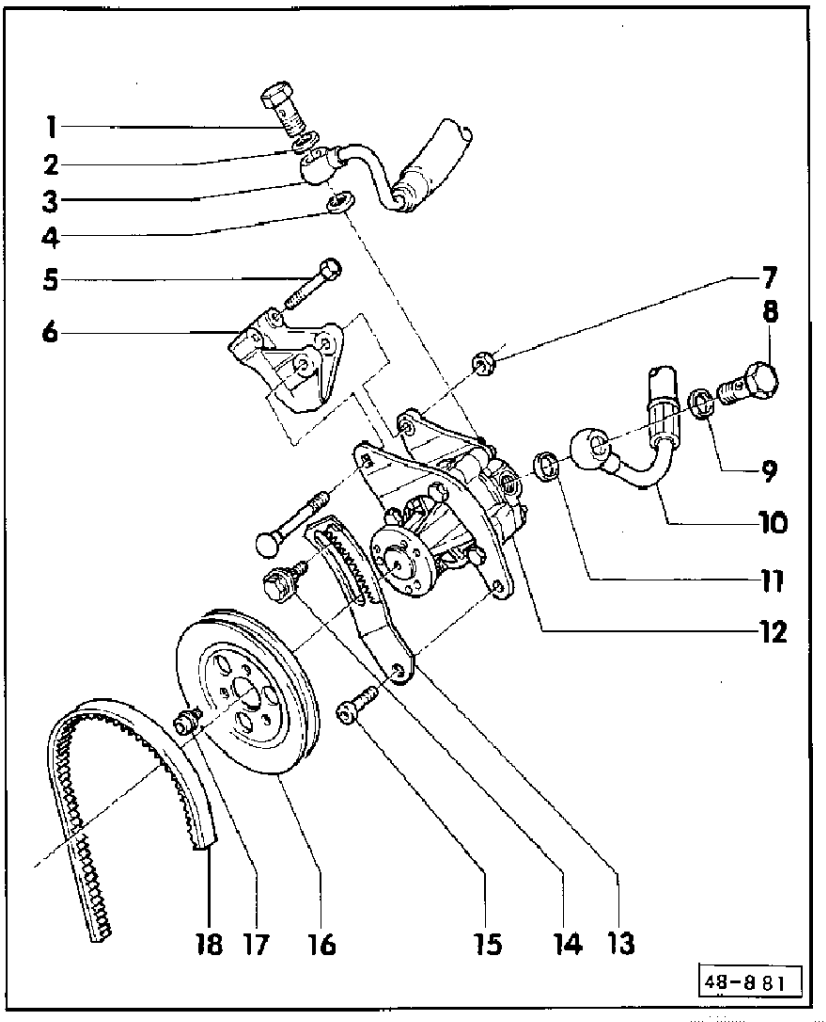
10 – **Suction hose**

11 – **Oil seal**
♦ Always replace

12 – **Vane cell pump**
♦ Supplied as replacement part with fitted V-belt pulley and front and rear swivel brackets.
♦ Checking delivery pressure
=> Page 48-101
♦ Before installing, fill with hydraulic fluid at suction end and crank by hand until fluid comes out at pump outlet.

13 – **Tensioning bracket**

14 – **Bolt with tensioning nut**
♦ Tensioning or replacing V-belt
=> Page 48-132



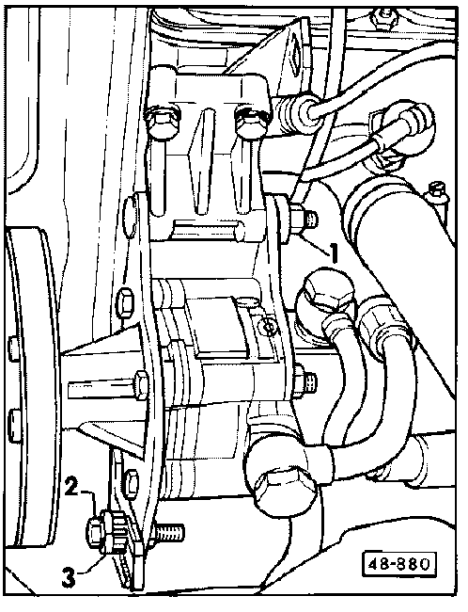
15 – **Cheese-head bolt, 20 Nm**

16 – **V-belt pulley**
- ♦ With pulley fitted, "4Z" must be visible from front.
- ♦ V-belt pulley of crankshaft and vane pump must line up.

17 – **Cheese-head bolt, 25 Nm**

18 – **V-belt**
- ♦ Size: 12.5 x 992 mm

Tensioning or replacing V-belt for Vickers vane pump

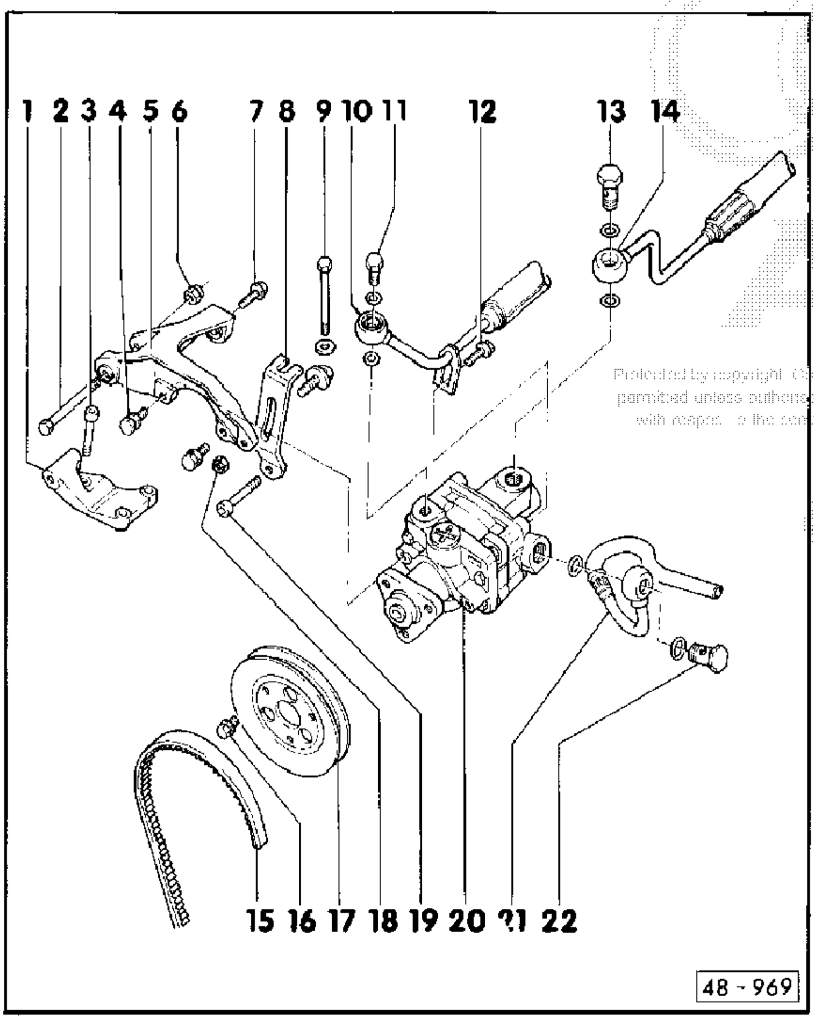


◀ – Loosen nut -1-.
– Loosen bolt -2-.
– Turn tensioning nut -3- accordingly.

Note:

V-belt is properly tensioned if it can be deflected approx. 10 mm with thumb between the two pulleys.

– Tighten bolt -2-.
– Tighten nut -1-.



Removing and installing tandem pump, vehicles with 169 kW engine

Notes:

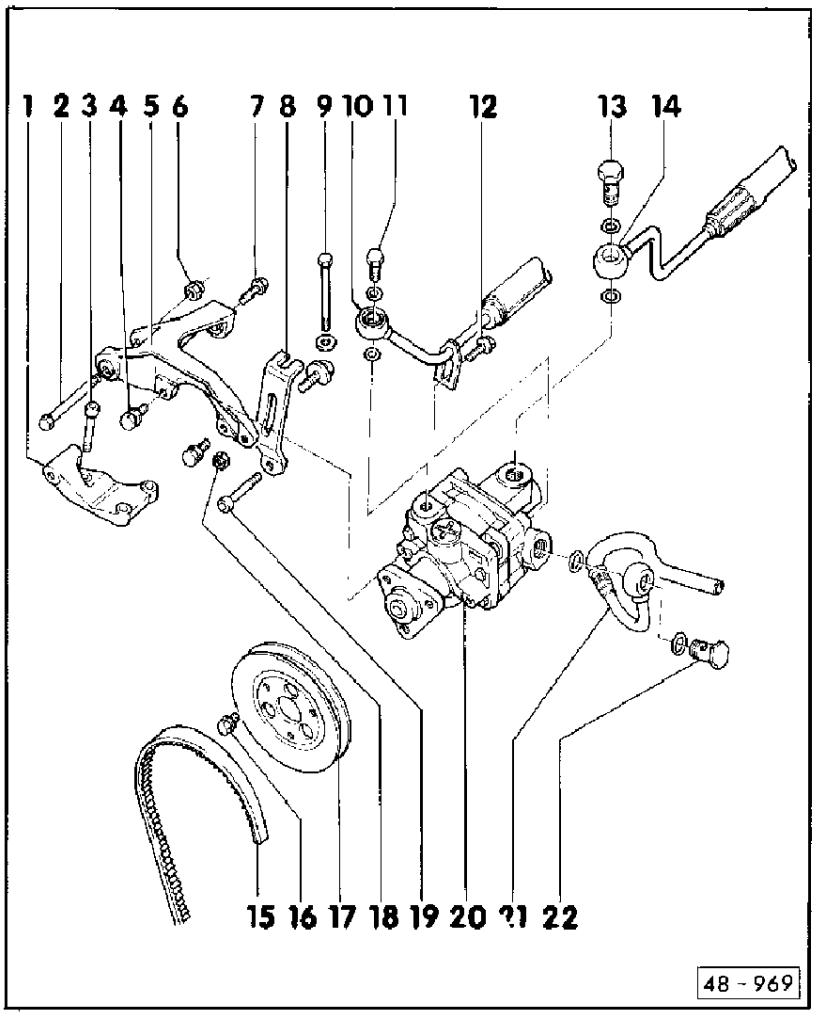
♦ The tandem pump uses hydraulic fluid, part no. G 002 000.

♦ Always replace seals between the line connections.

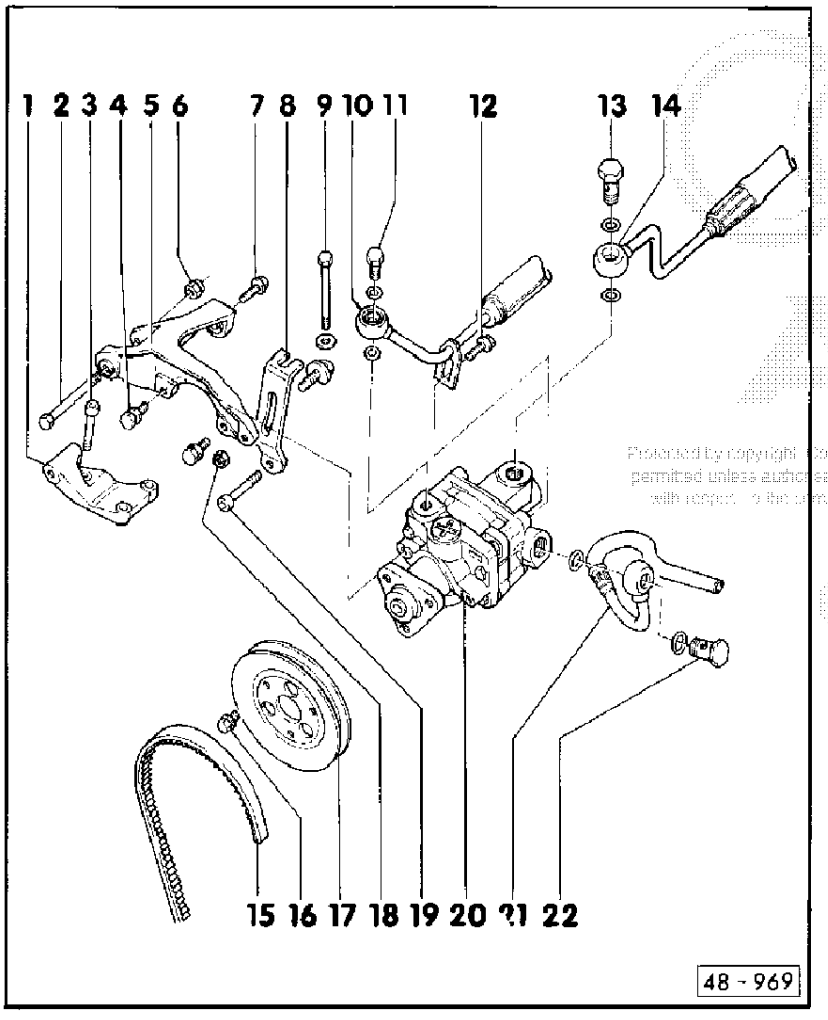
♦ Servicing of tandem pump is not envisaged

– Remove cover for air intake elbow

– Unscrew securing bracket for air intake elbow at cowl panel.



- Unfasten bolt securing swivel bracket to bracket
- Unscrew tensioning bracket from swivel bracket
- Remove V-belt
- Unscrew lines from tandem pump
- Unfasten centre section of lock plate
- Remove bolt securing swivel bracket to bracket and take out pump

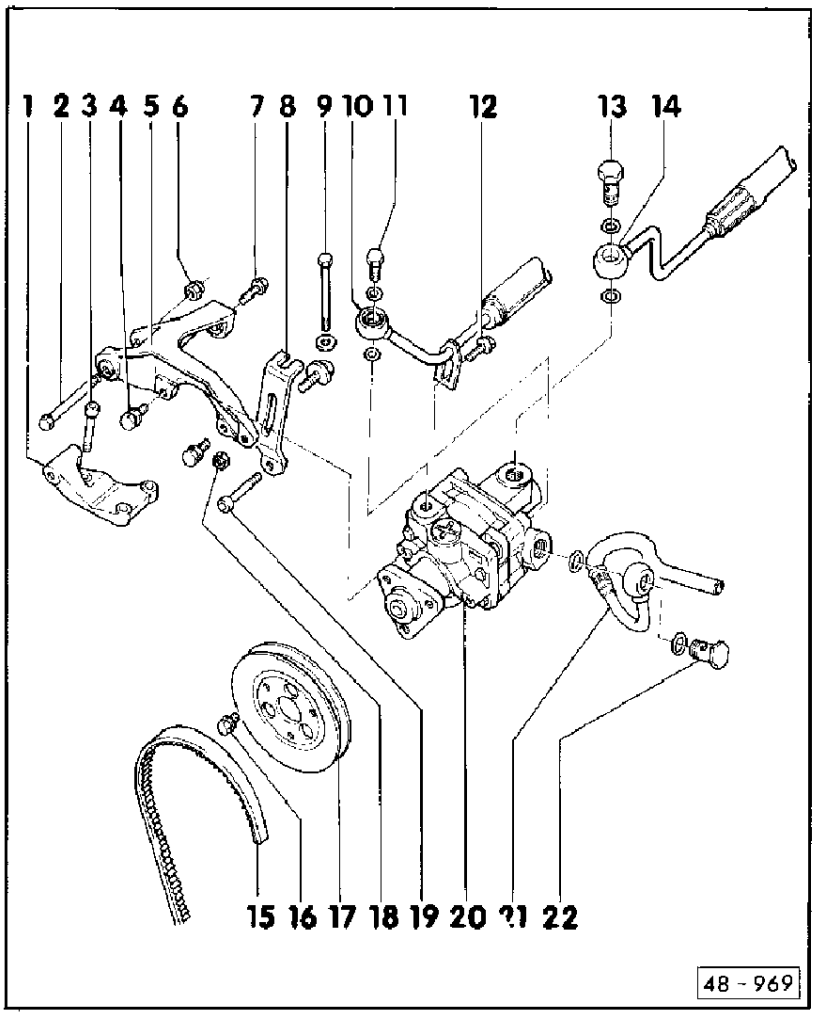


1 – Bracket

2 – Hexagon bolt, 20 Nm

3 – Cheese-head bolt, 20 Nm

4 – Self locking bolt, 30 Nm
♦ Always replace



5 – **Swivel bracket**

6 – **Collar nut**

7 – **Hexagon bolt, 20 Nm**

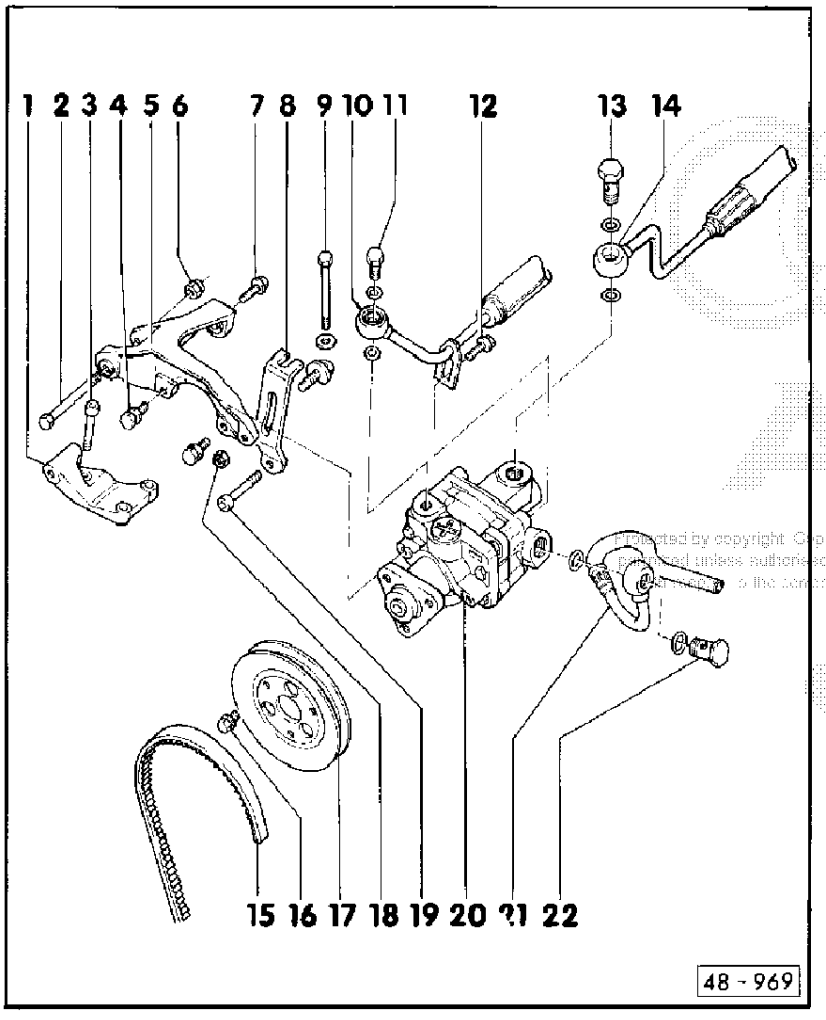
8 – **Retainer**

9 – **Hexagon bolt**
- ♦ Turn accordingly to tension V-belt

10 – **High-pressure hose**
- ♦ Hydraulic pump – pressure accumulator

11 – **Banjo bolt, 35 Nm**
- ♦ Only use banjo bolt with strainer on end face

12 – **Hexagon bolt, 20 Nm**



13 – **Banjo bolt, 50 Nm**

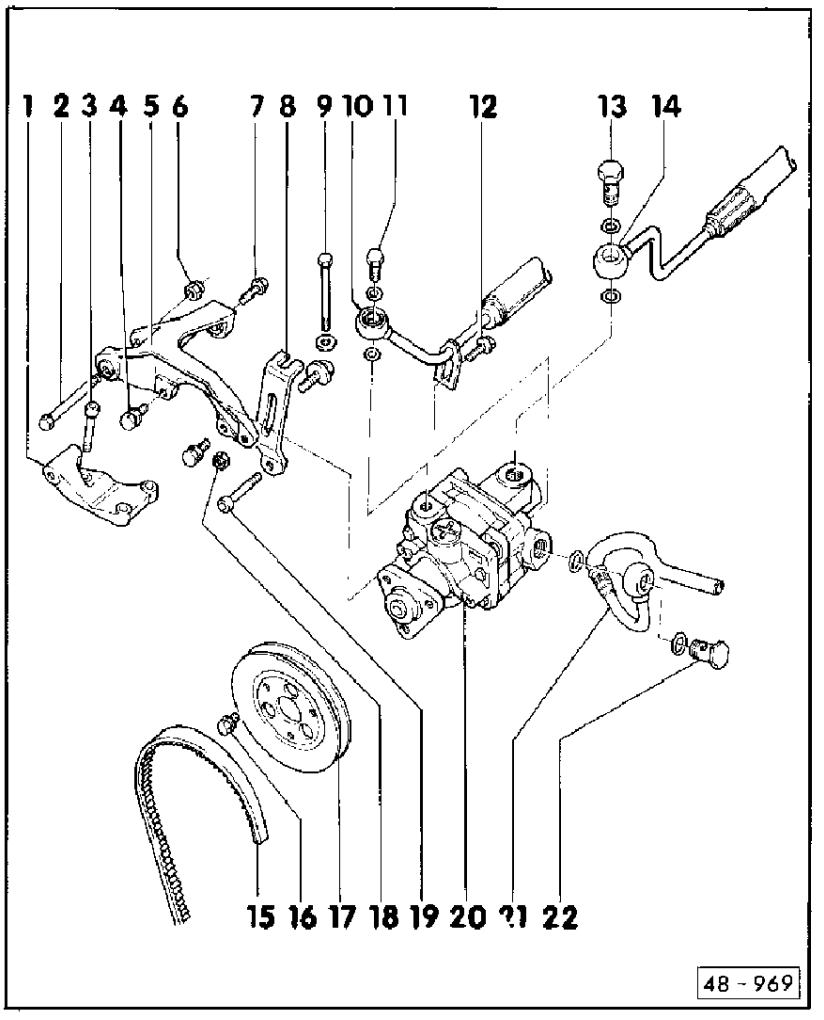
14 – **Expansion hose**

15 – **V-belt**
- ♦ Size: 12.5 x 1045 mm
- ♦ Tensioning and replacing => Page 48-146

16 – **Hexagon bolt, 20 Nm**

17 – **V-belt pulley**
- ♦ Installation position: With pulley fitted, "5Z" must be visible from front

18 – **Collar nut, 20 Nm**



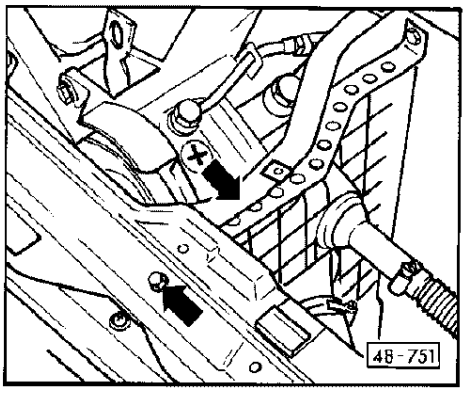
19 – **Cheese-head bolt, 20 Nm**

20 – **Tandem pump**
- ♦ Checking delivery pressure of vane pump => Page 48-108
- ♦ Before installing, crank suction end by hand until fluid comes out at pump outlet
- ♦ Measuring piston pump delivery => Page 47-57
- ♦ Servicing not envisaged, fit exchange pump if necessary

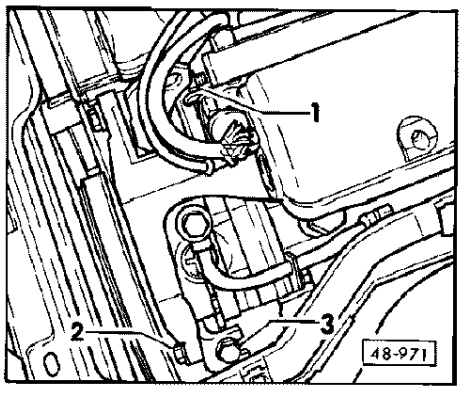
21 – **Suction hose**

22 – **Banjo bolt, 50 Nm**

Tensioning or replacing V-belt for tandem pump



- Remove cover for air intake elbow
- Unscrew securing bolt for holder of air intake elbow at cowl panel
- Press air intake elbow aside

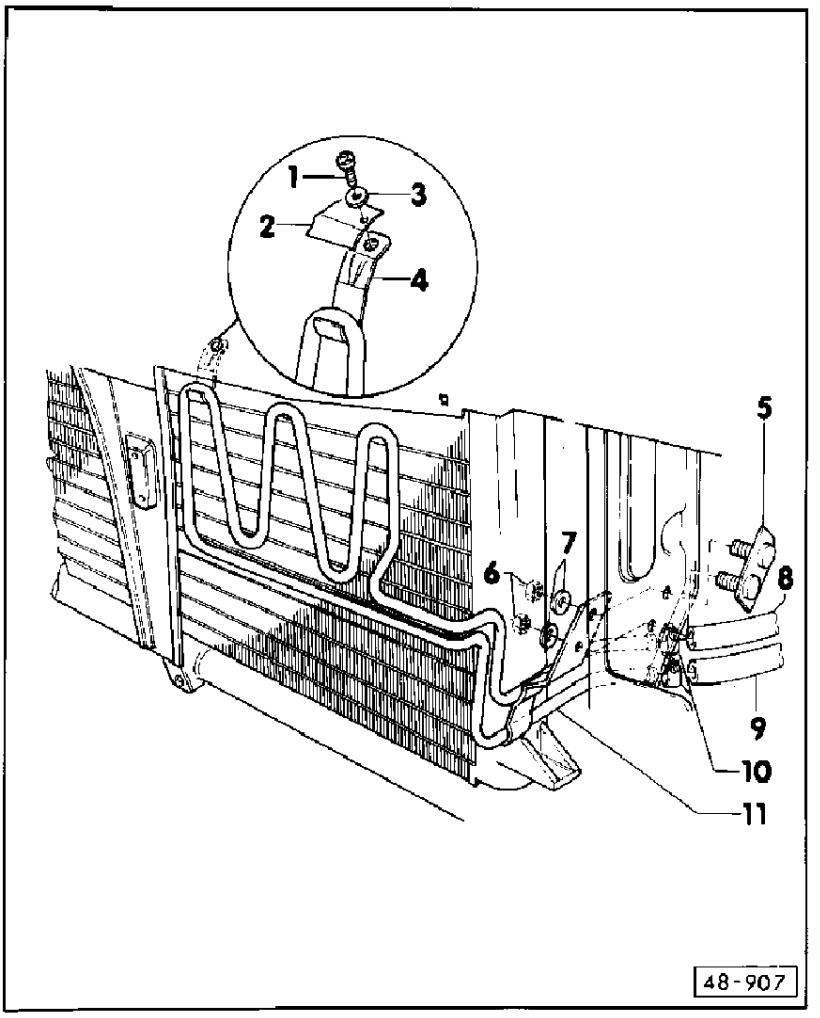


- Unfasten nuts -1- and -2-
- Turn bolt -3- of tensioner accordingly.

Note:

V-belt is properly tensioned if it can be deflected approx. 10 mm with thumb between the two pulleys.

- Tighten nuts -1- and -2-.



Removing and installing hydraulic fluid cooler for vane pump

Vehicles with 4-cylinder and 4-valve engine, vehicles with 6-cylinder engine

1 – Oval-head bolt, 10 Nm

2 – Lock carrier

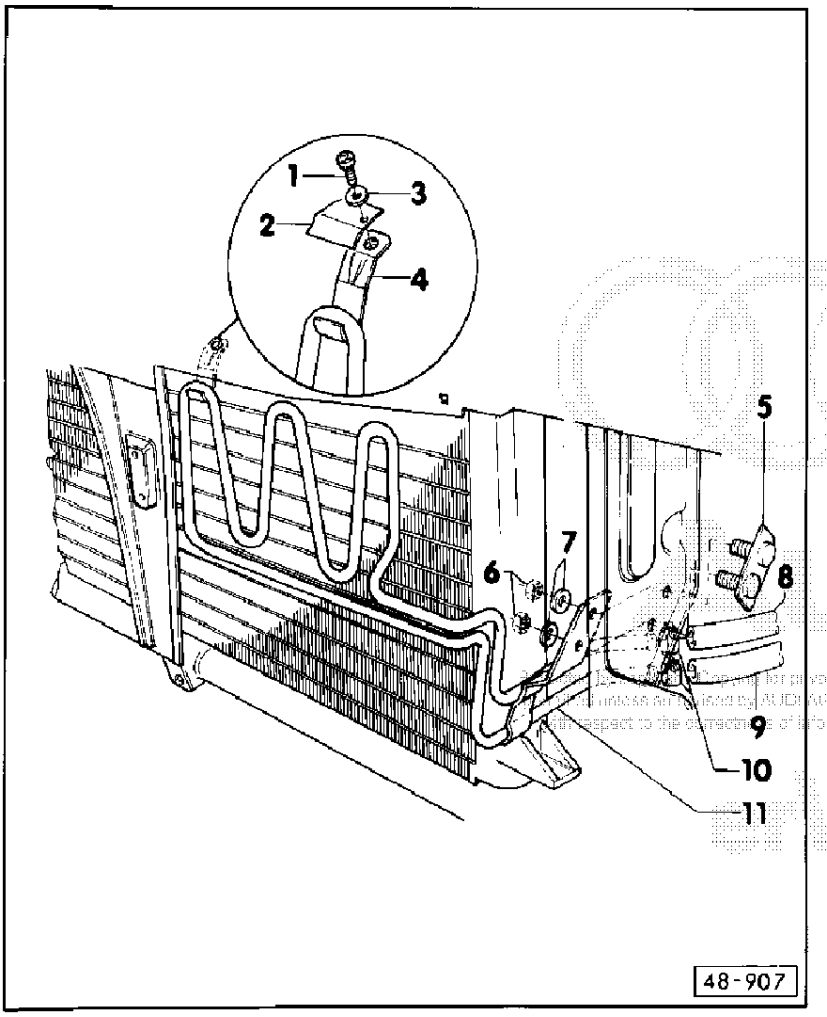
3 – Washer

4 – Bracket

5 – Tab

6 – Self-locking nut, 10 Nm
♦ Always replace

7 – Washer

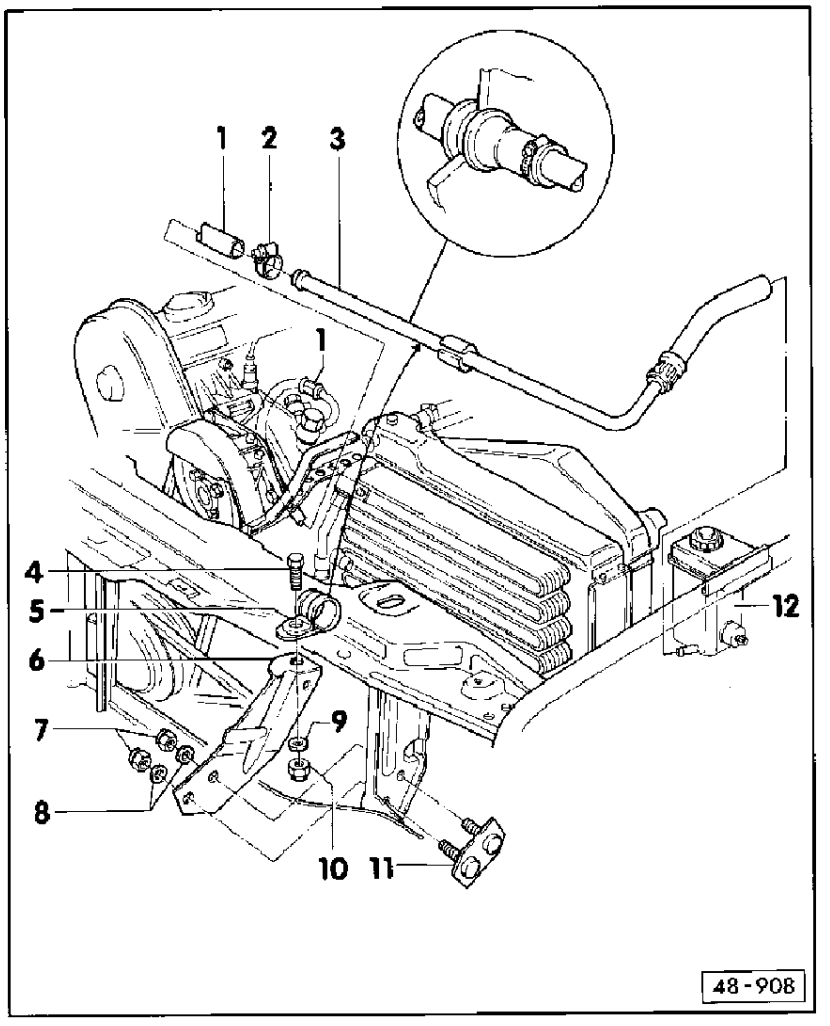


8 – Return hose
♦ Rotary valve housing – fluid cooler

9 – Return hose
♦ Fluid cooler – reservoir

10 – Wing hose clamp

11 – Hydraulic fluid cooler



Vehicles with 5-cylinder engine

1 – **Suction hose**
- ♦ Route so that it does not chafe

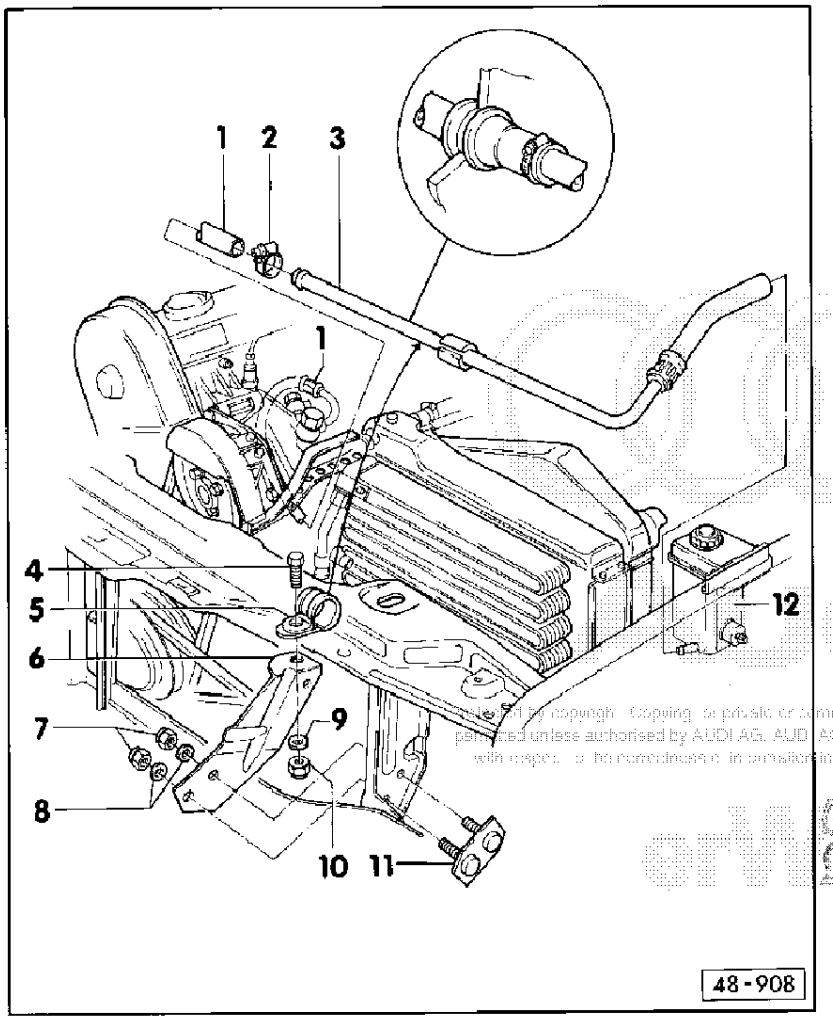
2 – **Wing hose clamp**

3 – **Hydraulic fluid cooler**
- ♦ Vehicles with 4-valve engine feature an oil cooler with cooling fins

4 – **Hexagon bolt**

5 – **Pipe clamp**

6 – **Bracket**
- ♦ Screw to lock carrier at top and lock support at bottom



7 – **Self-locking nut, 10 Nm**
- ♦ Always replace

8 – **Washer**

9 – **Washer**

10 – **Self-locking nut, 10 Nm**
- ♦ Always replace

11 – **Tab**

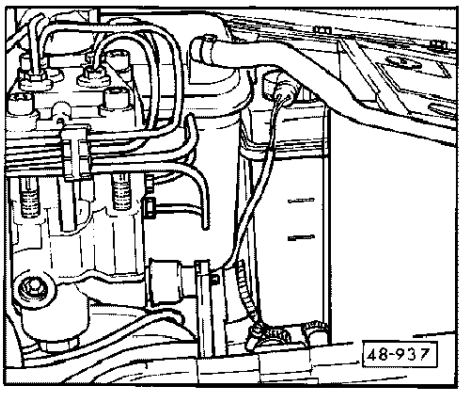
12 – **Reservoir**
- ♦ Checking hydraulic fluid level:
- – Start engine and let it idle for approx. 2 minutes with front wheels set to straight-ahead position.
- – Switch off engine and immediately check hydraulic fluid level, paying attention to marks on reservoir/dipstick; top up to "MAX" mark if necessary

Topping up hydraulic fluid – bleeding steering system

Notes:

- After performing assembly work or if there is a lack of hydraulic fluid in the reservoir, always check steering system for leakage => Page 48-152.
- Do not re-use hydraulic fluid which has been drained off.
- After removing and installing steering components or renewing hydraulic fluid, it must be ensured on starting the engine that the reservoir is not sucked completely empty.

When the engine is running, the steering system is automatically bled after a while.



- Top up with hydraulic fluid to "MAX" mark on dipstick
- Start engine and let it idle for approx. 2 minutes with front wheels set to straight-ahead position.
- Observe fluid level in reservoir during this process. As soon as there are no more bubbles rising in the reservoir, switch off engine and immediately top up hydraulic fluid, paying attention to mark on reservoir/dipstick

Check steering system for leaks

=> Fault finding binder, Running gear

With engine idling

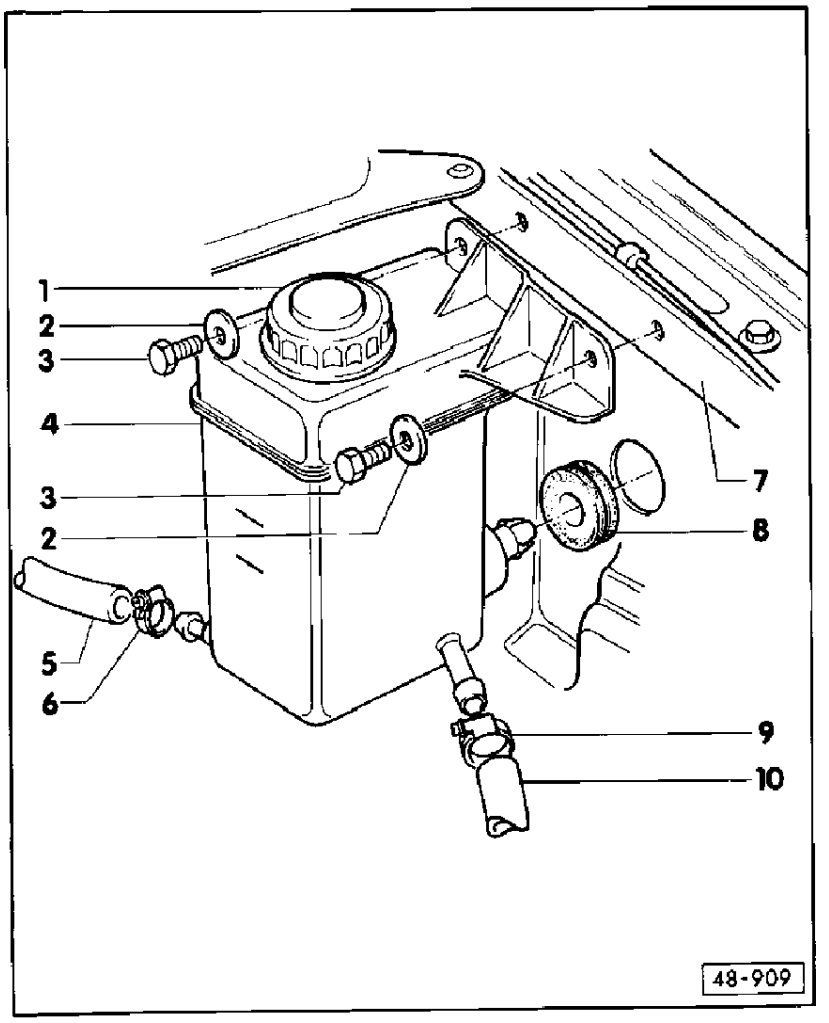
Attention
Always check steering system for leaks if there is a lack of fluid in the reservoir.

- Turn steering from lock to lock and hold briefly (max. 20 seconds). This builds up the maximum possible pressure.
- Perform the following visual inspections in this position:

Note:

Visual inspection -1- must be carried out in both positions.

- 1 - Rack seal (to do this loosen tie band of bellows and push bellows aside)
- 2 - Rotary valve housing
- 3 - Vane pump
- 4 - Line connections



Removing and installing fluid reservoir

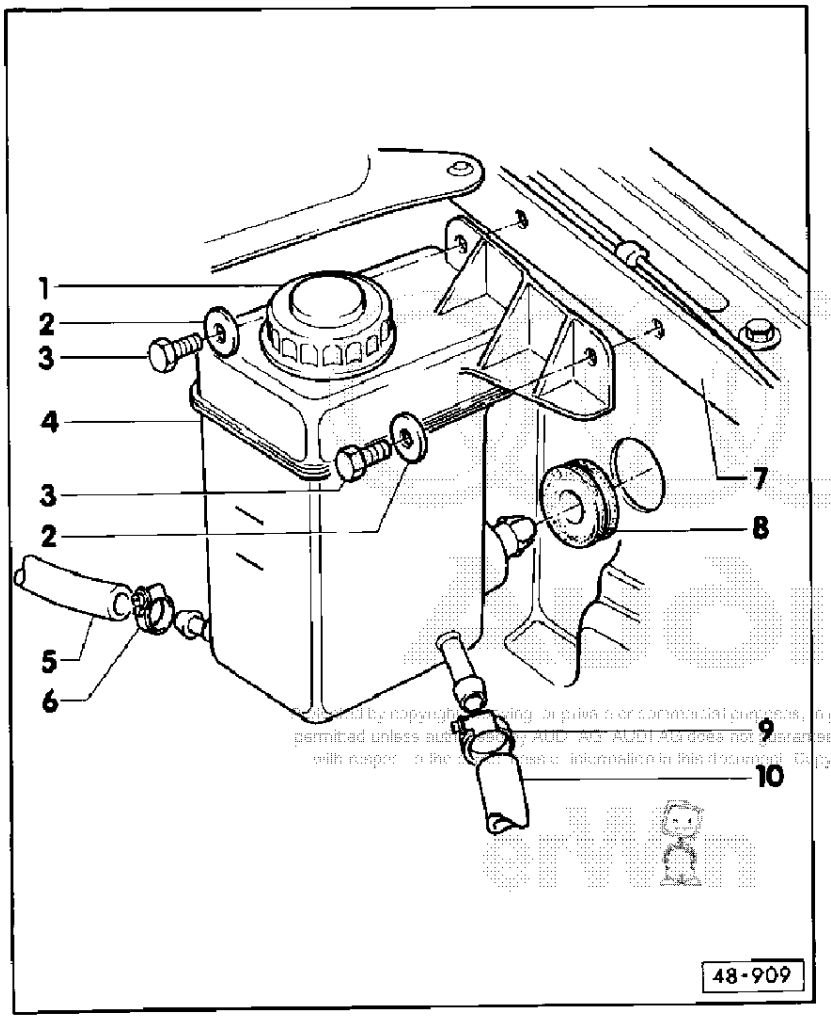
Note:
The power-assisted steering uses hydraulic fluid, part no. G 002 000.

1 – **Cap with dipstick and gasket**
- ♦ Tighten firmly by hand
- ♦ Observe "MAX" and "MIN" marks on dipstick

2 – **Washer**
- ♦ Not fitted when using combi bolt, item 3

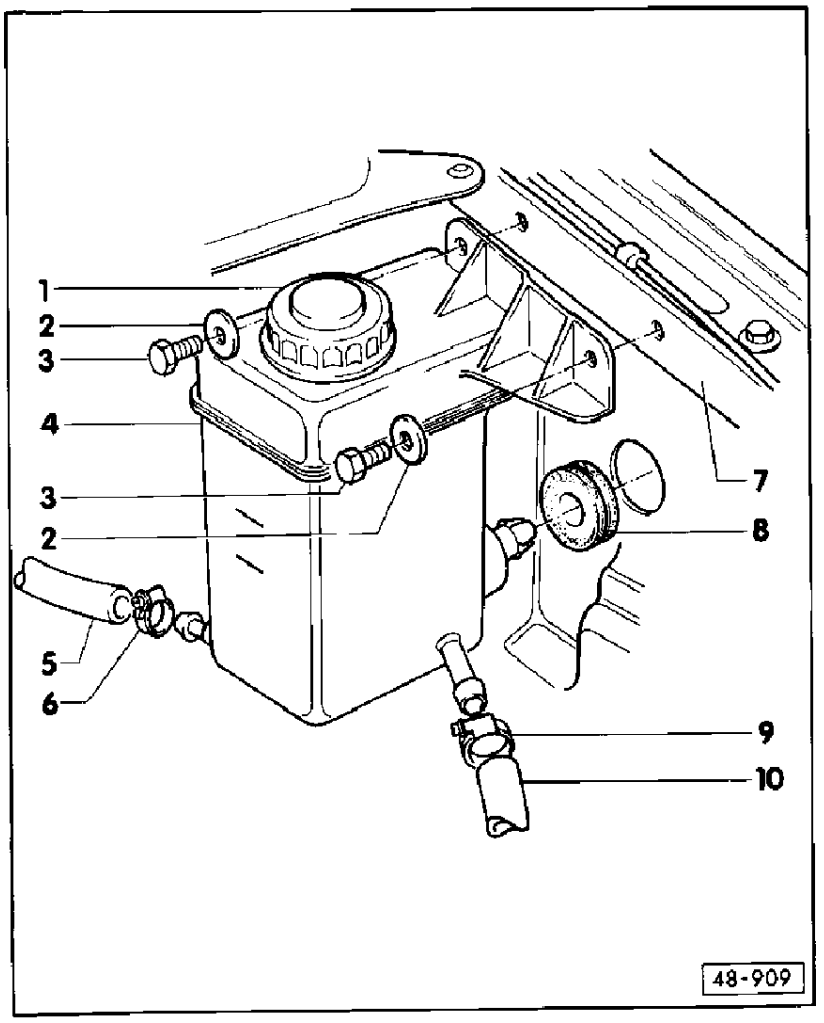
3 – **Hexagon bolt, 10 Nm; Combi Bolt, 10 Nm**

4 – **Reservoir**
- ♦ Capacity: approx. 0.85 l
- ♦ If necessary, clean strainer with white spirit



- ♦ Note different versions on vehicles with 4 and 5-cylinder engine and on vehicles with 4-cylinder/4-valve and 6-cylinder engine
- ♦ Checking hydraulic fluid level:
- – Start engine and let it idle for approx. 2 minutes with front wheels set to straight-ahead position.
- – Switch off engine and immediately check hydraulic fluid level, paying attention to marks on reservoir/dipstick; top up to "MAX" mark if necessary

5 – **Return hose**
- ♦ Note different versions depending on engine
- ♦ Remove servo unit to replace on vehicles with 6-cylinder engine



6 – Wing hose clamp

7 – Wheel housing

8 – Grommet
♦ Insert in wheel housing

9 – Wing hose clamp

10 – Suction hose
♦ Note different versions depending on engine