Technical data

Brakes

Front brakes			
Brake master cylinder piston diameter	mm (in.)	23.81 (0.937)	25.4 (0.999)
Brake servo diameter	mm (in.)	254 (10)	254 (10)
Brake calipers		Teves	Double piston
Front brake disc diameter	mm (in.)	288 (11.34)	321 (12.64)
Front brake caliper piston diameter	mm (in.)	57 (2.24)	42.8 (1.69)
Thickness of internally ventilated brake disc	mm (in.)	25 (0.984)	30 (1.18)
Internally ventilated brake disc wear limit	mm (in.)	23 (0.906)	28 (1.10)
Thickness of unventilated brake disc	mm (in.)	15 (0.591)	-
Unventilated brake disc wear limit	mm (in.)	13 (0.039)	-
Brake pad thickness	mm (in.)	14 (0.551)	14 (0.551)

Rear brakes		
Rear brake calipers		Lucas
Rear brake caliper piston diameter	mm (in.)	38.1 (1.500)
Rear brake disc diameter	mm (in.)	245 (9.65)
Brake disc thickness	mm (in.)	10 (0.394)
Brake disc wear limit	mm (in.)	8 (0.315)
Brake pad thickness	mm (in.)	12 (0.47)
Brake pad wear limit	mm (in.)	2 (0.079)

00-1

Technical data

Suspension

Models	Front Wheel Drive (FWD) All Wheel Drive (AWD)			
	Standard suspension (1BA) Special suspension (1BC)		Sport suspension (1BE)	
	FWD	AWD	FWD	AWD
Wheelbase mm (in.)	2622 (103.23)	2607 (102.64)	2619 (103.11)	2607 (102.64)
Front track mm (in.)	1495 (58.86)	1495 (58.86)	1498 (58.98)	1498 (58.98)
Rear track mm (in.)	1479 (58.23)	1475 (58.07)	1479 (58.23)	1477 (58.15)

Models	Front Wheel Drive (FWD) All Wheel Drive (AWD)			
	Heavy duty suspension (1BB)		Heavy duty suspension (1BT)	
	FWD	AWD	FWD	AWD
Wheelbase mm (in.)	2624 (103.23)	2607 (102.64)	2623 (103.27)	2607 (102.64)
Front track mm (in.)	1489 (58.62)	1489 (58.62)	1493 (58.78)	1493 (58.78)
Rear track mm (in.)	1479 (58.23)	1469 (57.83)	1479 (58.23)	1473 (57.99)

Steering gear

Model	All
Steering	Power-assisted steering
Max. wheel angle	40°
Turning circle diameter m (ft)	11.1 (43.7)

On Board Diagnostic (OBD)

On Board Diagnostic (OBD), basic information

The control module of a system with OBD detects malfunctions during vehicle operation and stores them as Diagnostic Trouble Codes (DTCs) in a permanent memory. The DTCs remain intact in the memory if the power supply from the battery is interrupted.

The OBD function relates to the electrical and electronic parts of a system; in other words it only registers malfunctions which have an effect on the electric signals.

On Board Diagnostic (OBD) helps technicians perform a more targeted diagnostic troubleshooting. Use the VAG1551/1552 Scan Tools (ST) or the VAS5051 tester to achieve the potential offered by On Board Diagnostic (OBD). To do this, the scan tool and the respective control module must exchange data. They must communicate with each other.

The Data Link Connector (DLC) is the interface for communication between the control module and the scan tool.

Troubleshooting is started by connecting the scan tool to the Data Link Connector (DLC). This establishes a data link between the control

module and the affected system, ⇒ page 01-4

01-2

When the data link has been established, you can then select the required troubleshooting functions provided. The functions represent program sequences within On Board Diagnostic (OBD). Their application is described in the appropriate sections of this repair manual. After first checking the control module version, start the troubleshooting procedure with "Check DTC Memory" function 02.

Any DTCs which may be stored in DTC memory will be indicated on the display of the scan tool. Diagnostic information leads via DTC tables to possible causes and specific repair procedures. DTC tables are located in the appropriate sections of this repair manual.

The OBD distinguishes between "static" and "sporadic" malfunctions. If a malfunction which has been stored as "static" is no longer present when the ignition is switched on, it is converted to "sporadic".

Sporadically occurring malfunctions are indicated as such. "/SP" will appear at right on the tester display.

A sporadic malfunction is erased automatically if it no longer occurs after a certain number of driving cycles.

01-3

Static malfunctions remain stored until DTC memory is erased using the Scan Tool (ST).

Check control module version before replacing control module. This appears in the display of the scan tool together with the coding when communication is established between the control module and the scan tool.

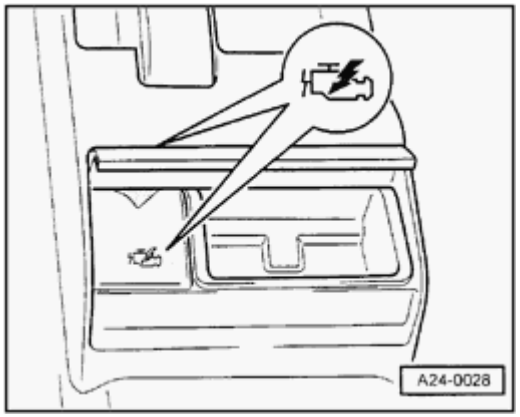
01-4

VAG1551, connecting and selecting address word

Note:

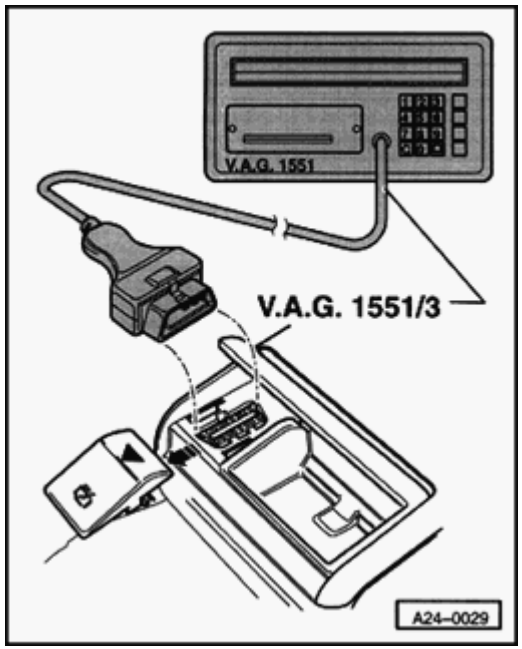
Either the VAG1552 mobile scan tool or the VAS5051 tester can be used instead of the VAG1551 Scan Tool (ST). The VAG1552 is not capable of printing out information, however.

- Observe the test requirements of each system.



- Open the vent-area ashtray.

01-5



- Remove cover for Data Link Connector (DLC).

- Connect scan tool to Data Link Connector (DLC) with the ignition off using VAG1551/3 adapter cable.

01-6

VAG - On Board Diagnostic	HELP
1 - Rapid data transfer1)	
2 - Blink code output1)	

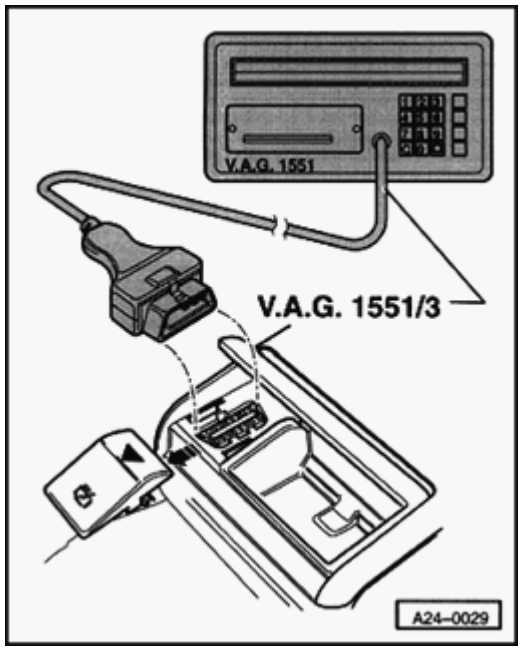
➢ Indicated on display:

1) Appear alternately on display

Notes:

- *If nothing is indicated on display, check diagnostic connection.*

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*



➢

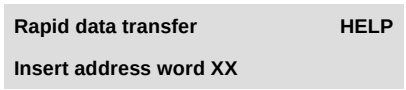
- *The PRINT button is used for switching on the printer. Indicator lamp in the button comes on when printer is switched on.*
- *Depending on the program, additional operating information can be printed out by pressing the HELP button of the VAG1551 scan tool.*

01-7

- Switch ignition on.

- Switch printer on by pressing PRINT button on scan tool.

- Press button -1- to select "Rapid data transfer" operating mode 1.



Indicated on display:

Note:

The address word selects the control module that you wish to test using the scan tool. The address word consists of two digits and is indcated in the relevant section of this repair manual.

01-8

Note:

*For example: Pressing buttons -0- and -3-
selects the "Brake Electronics" address word 03.*

Rapid data transfer Q
03 Brake electronics

Indicated on display:

- Press -Q- button to confirm input.

Rapid data transferScan tool sends address word 03

Indicated on display after entering address word 03:

Note:

If a malfunction occurs when establishing communication between the VAG1551 scan tool and the control module, refer to the four displays and instructions that follow.

Rapid data transfer HELP
Control module not responding!

Rapid data transfer HELP
K-wire not switching to Ground / B+

- Press the "HELP" button to print a list of possible causes of the malfunction.

Rapid data transfer HELP
No signal from control module

- Test cable connections for data link connector wire -K-.

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

- Test power supply and Ground (GND) connections for ABS control module (w/EDL) -J104-.

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

01-9

Rapid data transfer	**HELP**
Error in communication link	

If displayed:

- Repair the malfunction.

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

- After repairing the malfunction, once again enter "Brake Electronics" address word 03 and press -Q- button to confirm.

01-10

XXX XXX XXX YYY YYY YY YY YY ZZZ → **Coding VVVVV WSC WWWWW**	➢ If the data link between the scan tool and the control module is established and works properly, the display will now show the control module identification (X), the system identification (Y), the hardware and software versions (Z), and the dealership number (W). ***Notes:*** ♦ *The → button is used for advancing through the program sequence.* ♦ *The various On Board Diagnostic (OBD) systems to be tested are described in more detail in the relevant sections of this Repair Manual booklet.* ♦ *The control module index can only be changed by replacing the control module.* ⇒ *Parts catalog* ♦ *If the control module identification number does not appear in the display, check the diagnostic wiring.* ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations* - Press → button.
Rapid data transfer HELP **Select function XX**	➢ Indicated on display:

01-11

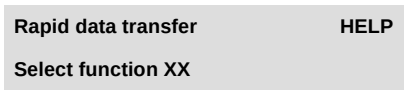
Erase DTC Memory (function 05), End Output (function 06)

Requirements

- DTC memory was checked

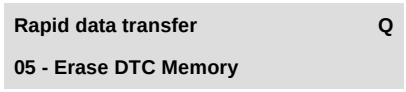
1. Erase DTC Memory (function 05)

- Press → button.



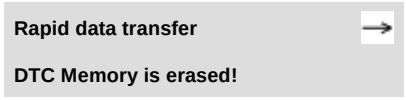
Indicated on display:(Function selection screen)

- Press buttons -0- and -5- to select "Erase DTC Memory", function 05.



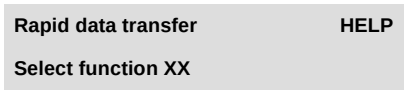
Indicated on display:

- Press -Q- button to confirm input.



Indicated on display:

- Press → button.



Indicated on display:(Function selection screen)

01-12

Notes:

Attention!
DTC memory is not interrogated

- *If this is displayed, the check sequence has not been been carried out.*
- *Follow test sequence exactly: First check DTC memory, then erase it.*

2. End Output (function 06)

- Press buttons -0- and -6- to end output.

Rapid data transfer **Q**
06 - End Output

Indicated on display:

- Press -Q- button to confirm input.

Rapid data transfer **Help**
Insert address word XX

Indicated on display:

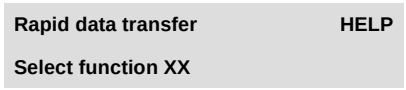
- Switch off ignition.
- Disconnect harness connector for the VAG1551 scan tool
- Switch on ignition

ABS warning light -K47- must go out after approx. 2 seconds.

01-13

Selecting functions

The communication link was established. The control module version has been checked and the → button was pressed.



Indicated on display:(function selection, for example 02 "Check DTC Memory")

It is now possible to select one of the functions listed below. Start the troubleshooting procedure using the "Check DTC Memory" function (02).

01 - Check Control Module Version

02 - Check DTC Memory

03 - Output Diagnostic Test Mode (DTM)

04 - Basic Setting

05 - Erase DTC Memory

06 - End Output

07 - Code Control Module

08 - Read Measuring Value Block

10 - Adaptation

11 - Login Procedure

01-14

Comprehensive descriptions of how to use the functions "Erase DTC Memory" and "End Output" are found in the next section.

Descriptions of how to use the other functions are found in the relevant sections of this Repair Manual.

When a function has been completed, press the → button to return to the beginning of the troubleshooting procedure ("Selecting function").

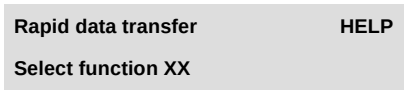
01-15

Erase DTC Memory (function 05)

Requirements

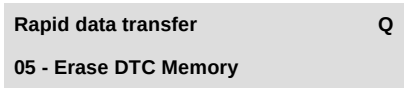
- DTC memory was checked

- Press → button.



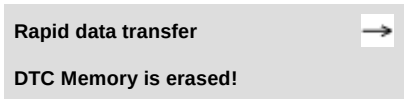
Indicated on display:

- Press buttons -0- and -5- to select "Erase DTC Memory" function 05.



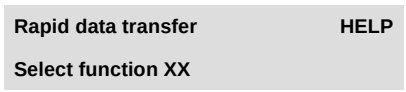
Indicated on display:

- Press -Q- button to confirm input.



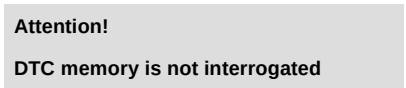
Indicated on display:

- Press → button.



Indicated on display:

Notes:



- *If this is displayed, the check sequence has not been been carried out.*
- *Observe test sequence exactly. Check DTC memory first and erase it within the same diagnostic cycle.*

01-16

End Output (function 06)

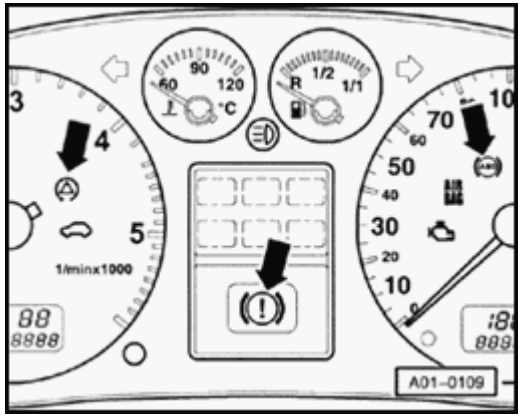
Rapid data transfer **HELP** **Select function XX**	Indicated on display: - Press buttons -0- and -6- to select "End Output" function 06.
Rapid data transfer **Q** **06 - End Output**	Indicated on display: - Press -Q- button to confirm input.
Rapid data transfer **HELP** **Enter address word XX**	Indicated on display: - Switch ignition off. - Disconnect scan tool.

01-17

Safety precautions and troubleshooting basics

- ABS/EDL/ASR and ESP are vehicle safety systems; working on these systems requires specific system knowledge.

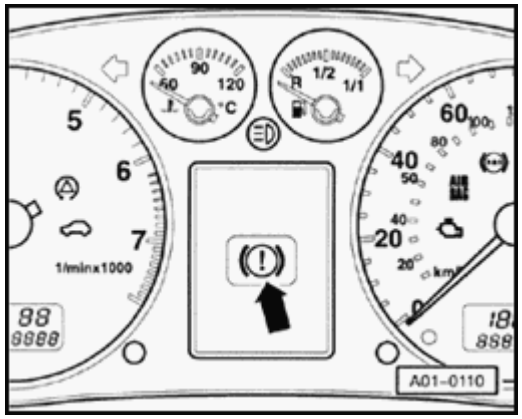
- There are two different versions of instrument cluster: with or without Driver Information System (DIS).



Instrument cluster without DIS

- If On Board Diagnostic (OBD) has detected a malfunction in the system, it indicates the malfunction by lighting up warning lamps when ignition is switched on. The warning lamps are located in the instrument cluster. This appears in both versions, with or without DIS. The instrument cluster without DIS displays the ABS warning light -K47- (right arrow), the warning light for brake system -K118- (center arrow, red symbol for "brake system malfunction") and the traction control indicator light -K86- (left arrow). For additional information, see the section titled "Overview of indicator lamp functions".

01-18



Instrument cluster with DIS

- For DIS, the warning light for brake system -K118- "brake system malfunction" appears in the display.
- If the ABS warning light -K47 and the red symbol for "Brake system malfunction" are not lit, but the brake system is not functioning properly, check for malfunctions in the mechanical/hydraulic brake system components.

⇒ *Repair manual, Brake System, Repair Group 45; ESP component overview*

Corrective actions

If a malfunction or problem has been detected or reported, perform guided troubleshooting:

- First switch on the ignition, and note whether the indicator lamps light up. The table in the section "Overview of indicator lamp functions" for the relevant system facilitates an initial diagnosis.

- Fulfill test requirements.

- Connect the VAG1551 Scan Tool (ST) and select the address word 03 "Brake Electronics".

- Check the control module version ⇒ Parts Catalog and press the →button.

- Check DTC memory. If a DTC is stored: Note the DTC and erase DTC memory ⇒ page 01-15 .

- End data transfer using the "End Output" function ⇒ page 01-16 .

- Repair the malfunction with the help of the DTC table. Select again the address word 03 "Brake Electronics". Check and erase DTC memory.

- End data transfer using the "End Output" function. Disconnect VAG1551 Scan Tool (ST).

- Make sure all harness connectors are connected and engaged. Perform a road test. The indicator lamps must not light up during the drive. If the indicator lamps light up during the road test, repeat the troubleshooting procedure.

Note:

If the control module connector is disconnected during the drive, an unfounded DTC may be stored in the memory of another control module. The brake system will only be partially functional. Because brake pressure at the rear wheels is no longer regulated vie Electronic Brake Distribution (EBD), the rear wheels tend to brake excessively. This causes the rear of the vehicle to break loose. Driving the vehicle presents the risk of accident.

- Always switch off ignition before carrying out installation or repair work.

01-21

- Only replace a malfunctioning component if you are certain that all electrical wires to this component are functioning properly. The lines must work properly and be capable of carrying all signals without any problems. Check the lines for the following:

  - Corrosion or loose connections in the connectors or Ground straps. If there are bent, broken, or corroded contacts on the connectors, replace the contacts using VAS1978 wiring harness repair kit.

  - Open circuit in wiring

  - Short circuits to B+ or Ground (GND)

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

- Welding work performed with electrical welding equipment can affect the ABS/ESP system.

01-22

Test requirements

- Vehicle equipped with approved wheel and tire sizes, which must be the same on all four wheels. All tire inflation pressures checked according to specification.
- The mechanical/hydraulic components of the brake system are OK. Hydraulic connections and lines are sealed properly (visual check at hydraulic unit, brake calipers, wheel cylinders, tandem master brake cylinder).
- Wheel bearings and wheel bearing play OK
- Wheel speed sensors installed correctly

⇒ *Repair manual, Brake System, Repair Group 45*

- Supply voltage OK (at least 10.0 volts).
- Harness connector is properly connected at ABS control module -J104-, locking mechanism is engaged.

- The OBD sequence can only be started with the vehicle stationary and the ignition switched on (or with the engine running). It is not possible to initiate On Board Diagnostic (OBD) once wheel speed has reached 2.75 km/h.

01-23

- While testing the ESP system, make sure that the vehicle's electrical system is not subjected to electromagnetic interference; keep the vehicle away from equipment with a high current draw such as electric welding units.

WARNING!

The diagnostic will not terminate at a speed of v = > 20 km/h. Risk of accident!

Technical information required

- Valid wiring diagram

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

- Installation locations of electrical components.

⇒ *Repair manual, Brake System, Repair Group 45*

- Brake mechanical information

⇒ *Repair manual, Brake System, Repair Group 46*

- Brake hydraulic information

⇒ *Repair manual, Brake System, Repair Group 47*

CAN-bus

CAN-bus, function

Bus:

The term bus refers to a system that transports and distributes data.

CAN:

The Controller Area Network is a bus system that uses two wires. These are called bus wires. Data is transferred to the connected control modules serially (one after the other) across the bus wires.

Data is transferred via the CAN-bus. For information and test procedure, see ⇒ page 01-27 . The CAN-bus only contains two lines. These are called bus wires. These transfer all required data. Two bus wires are used so that malfunctions in the wires can be recognized.

01-26

The CAN-bus terminates in a resistor. It prevents the transmitted data from returning as an echo from the ends and corrupting data.

The terminal resistances of the CAN-bus have a value of 120 Ω and are located in the ABS control module (w/EDL) -J104- and the Engine Control Module (ECM) -item 3-. This results in an overall terminal resistance of approx. 60 Ω.

The steering angle sensor -G85- transmits its data to the control module via the CAN-bus. It does not have a terminal resistance.

As of implementation of control module 8D0 907 389 D/E, the CAN-bus is connected centrally in the Engine Control Module (ECM) with a resistance of approximately 66 Ω. All other control modules connected to the CAN system (for example the ABS control module -J104-) are connected with a high ohm resistance of 2.6 kΩ.

01-27

CAN-bus system, checking

The DTC table indicated you needed to check the bus:

- Using the relevant wiring diagram, determine how many control modules are connected to the CAN-bus.

- Check that the multiple connectors of the control modules are properly connected (unobstructed).

- Connect the VAG1551 (or VAG1552) scan tool and press the -0- button twice to select the "Automatic Check" function 00.

- Before checking the bus wires, make sure that none of the control modules connected have a function malfunction.

Note:

In this context, a function malfunction means a malfunction that doesn't directly affect the bus system, but that interrupts the functioning of a system. This could be a malfunctioning sensor, for example. A malfunctioning sensor would mean that the sensor signal could no longer be used for data transfer in the bus system. This type of malfunction indirectly affects the bus system. Communication to the control modules

that use the relevant sensor signal is interrupted.

01-28

Is there is a function malfunction?

- Fix the malfunction before proceeding.

- Note DTCs and erase DTC memory in all control modules ⇒ page 01-15 .

- Press buttons -0- and -6- to select "End Output" function 06. Press -Q- button to confirm input.

- End Scan Tool (ST) output using the "End Output" function ⇒ page 01-16 .

- Refer to the DTC table in the relevant repair manual for help in fixing the malfunction.

You have fixed all malfunctions:

- Check bus wires if communication to the control modules is still malfunctioning.

While checking the bus wires, make a distinction between the following two situations:

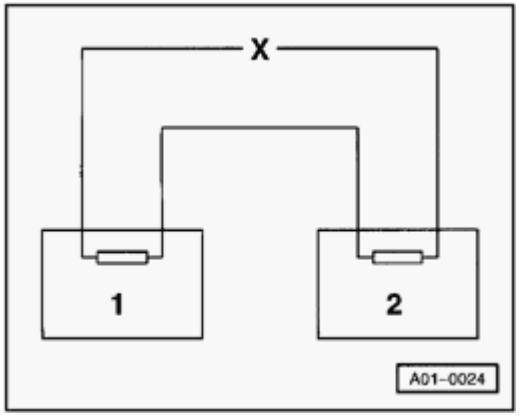
- Two control modules communicate via a "two-line bus system"

- Three or more control modules communicate via a "two-line bus system"

01-29

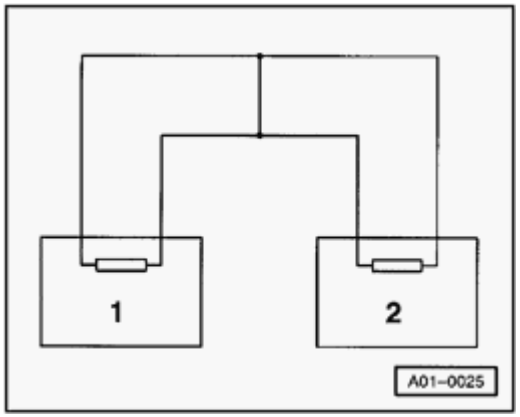
Two control modules communicate via a "two-line bus system".

- Switch ignition off.



- Disconnect both control modules.
- Check the bus wires for an open circuit.

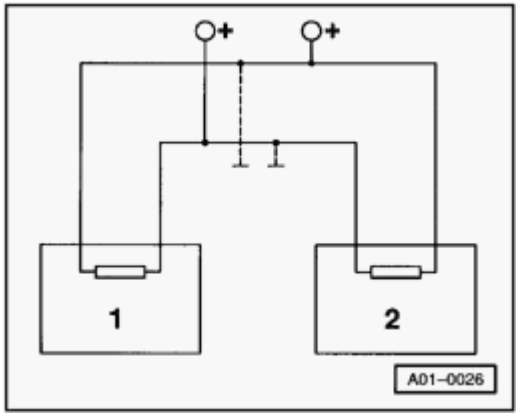
⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*



- Check whether there is a short circuit between the bus wires.

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

01-30



- Check the bus wires for a short circuit to B+ or Ground (GND).

If no malfunctions could be found in the bus wires:

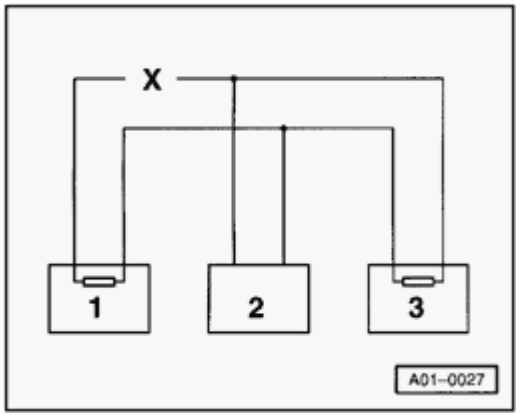
- As a test, replace one of the control modules. Select a control module that will take the least amount of time, and cost the least amount of money to replace.
- If communication between the control modules across the bus is still interrupted, replace the second control module.

01-31

Three or more control modules are communicating across a "two-line bus system".

- Analyze the DTCs stored in the memories of the control modules.

Example 1:



From the DTCs stored in the memories, you have determined that control module 1 is not communicating with control modules 2 and 3.

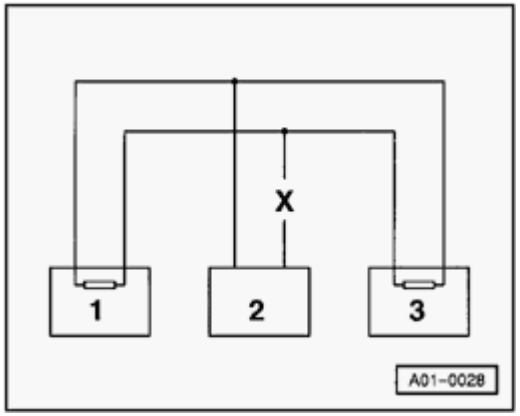
Control module	DTCs stored in DTC memories:
1	♦ Missing signal from control module 2 ♦ Missing signal from control module 3
2	♦ Missing signal from control module 1
3	♦ Missing signal from control module 1

- Switch ignition off.
- Disconnect the control modules connected across the bus wires and check the bus wires for an open circuit.

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

- Replace control module 1 if no malfunctions can be found in the bus wires.

01-32



Example 2:

From the DTCs stored in the memories, you have determined that control module 2 is not communicating with control modules 1 and 3.

Control module	DTCs stored in DTC memories:
1	♦ Missing signal from control module 2
2	♦ Missing signal from control module 1 ♦ Missing signal from control module 3
3	♦ Missing signal from control module 2

- Switch ignition off.
- Disconnect the control modules connected across the bus wires and check the bus wires for an open circuit.

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

- Replace control module 2 if no malfunctions can be found in the bus wires.

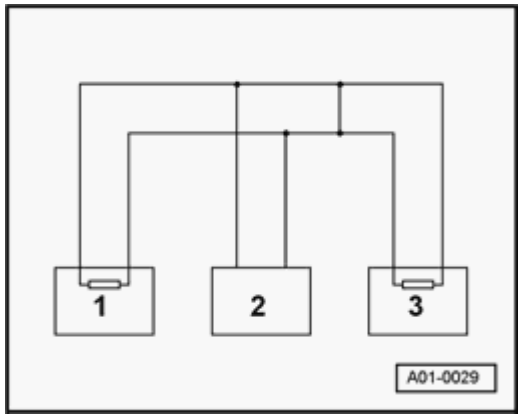
01-33

Example 3:

Using the DTCs stored in the memories, you have determined that none of the control modules are sending or receiving signals.

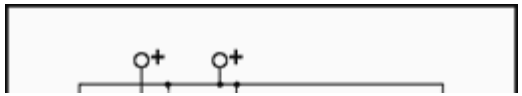
Control module	DTCs stored in DTC memories:
1	♦ Hardware malfunctioning
2	♦ Hardware malfunctioning
3	♦ Hardware malfunctioning

- Switch ignition off.



- Disconnect the control modules connected across the bus wires and check for a short circuit between the bus wires.

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*



- Check the bus wires for short circuit to B+ or Ground (GND).

01-34

- If you cannot determine a cause for the DTC "Hardware malfunction", check whether the DTC is caused by one of the control modules.

All control modules that use the CAN-bus are still disconnected. The ignition is switched off.

- Connect one of the control modules.

- Connect the VAG1551 Scant Tool (ST) or the VAG1552 mobile scan tool. Switch ignition on, and erase the DTC memory of the control module you just connected. End scan tool output using the "End Output" function 06.

- Switch ignition off and then on.

- Leave ignition on for 10 seconds. Then, read the DTC memory of the control module you just connected.

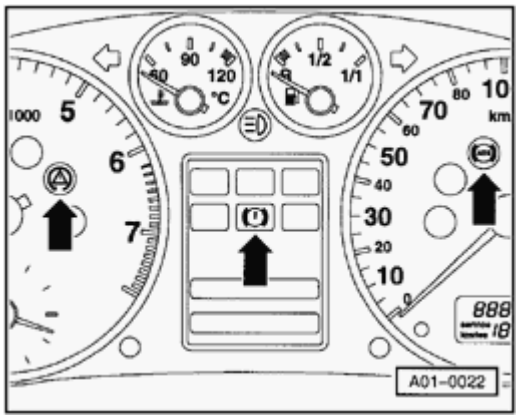
- If the DTC "Hardware malfunction" is displayed, replace the control module you just connected.

- If the DTC "Hardware malfunction" is not displayed, connect the next control module and repeat the procedure.

ABS/EDL Bosch 5.0

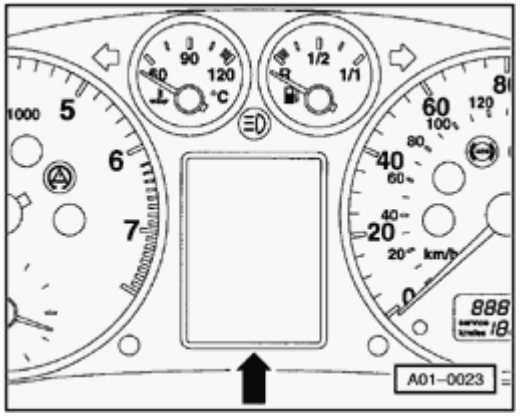
Warning lights, functional overview

- If On Board Diagnostic (OBD) has detected a malfunction in the system, it indicates the malfunction by lighting up warning lamps when ignition is switched on. The warning lamps are located in the instrument cluster.



Instrument cluster without DIS

- The illustration shows the ABS/EDL warning light -K47- (right arrow), the warning light for brake system -K118- (center arrow, red symbol for "brake system malfunction") and the traction control indicator light -K86- (left arrow).



Instrument cluster with DIS

- For DIS, there is no warning light for brake system -K118-. The red "brake system malfunction" symbol appears in the display.
- If the ABS/EDL warning light -K47 and the red symbol for "Brake system malfunction" are not lit, but the brake system is not functioning properly, check for malfunctions in the mechanical/hydraulic brake system components.

⇒ *Repair manual, Brake System, Repair Group 46*

⇒ *Repair manual, Brake System, Repair Group 47*

01-47

ABS - K47-	Brake system	ASR - K86- 1)	Possible reasons why the indicator lamps light up
			If an irregularity occurs during the self test after ignition is switched on, and the warning lamps -K47- and -K86- do not light up for 2 seconds, check the warning lamps; "Electrical test" ⇒ page 01-68 , carry out test steps 19 and 21. The possible causes are as follows: ♦ The battery voltage is insufficient. None of the lamps in the instrument cluster light up. Check the battery. ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations* ⇒ *Repair Manual, Electrical Equipment, Repair Group 90; Instrument cluster*
		X 1)	♦ The ABS warning light does not light up during the self-test. There is a short to Ground (GND) in the wiring that controls the ABS warning light between terminal 32 of the ABS control module -J104- and the instrument cluster. This malfunction does not affect activation of the ABS warning light. For vehicles equipped with ASR, the traction control indicator lamp lights up during the self-test; "Electrical test" ⇒ page 01-68 , carry out test step 19.
X			♦ The vehicle is equipped with ASR. The ABS warning light lights up during the self-test. The traction control indicator light does not light up during the self-test "Electrical test" ⇒ page 01-68 , carry out test step 21.

1) The traction control indicator light is only available in vehicles equipped with ASR.

ABS -K47-	Brake system	ASR -K86- 1)	Possible reasons why the indicator lamps light up
X		X[1)]	♦ If activation of the lamps and the voltage supply are OK, the warning lamps light up for 2 seconds during the self-test after ignition is switched on. ♦ The vehicle is either equipped with or without ASR, warning lamps do not switch off after self-test. However, the red "brake system malfunction" symbol did not go on. Carry out the "Electrical test", ⇒ page 01-68 , test step 20 and observe the next example of lighting warning lamps.

1) The traction control indicator light is only available in vehicles equipped with ASR.

ABS - K47-	Brake system	ASR - K86- 1)	Possible reasons why the indicator lamps light up
X	X	X[1)]	The vehicle can be equipped either with or without ASR. The ABS/EDL lamp remains constantly lit after ignition is switched on and the the red "brake system malfunction" symbol also lights up 3 seconds after ignition is switched on. **WARNING!** **Driving the vehicle presents the risk of accident! The brake system will only be partially functional. Because brake pressure at the rear wheels is no longer regulated vie Electronic Brake Distribution (EBD), the rear wheels tend to brake excessively. This causes the rear of the vehicle to break loose.** The possible causes are as follows: ♦ Voltage supply between 6.5 and 10.5 volts and vehicle speed is above 6 km/h; carry out "Electrical test", test step 23 ⇒ page 01-68 . Once the voltage supply is adjusted to above 10.5 volts, warning lamps will switch off again. ♦ There is a malfunction that affects the ABS system. Check DTC memory ⇒ page 01-97 . ♦ The VAG1551 Scan Tool (ST) is connected and the data link to the ABS control module (w/EDL) -J104- was established. For vehicles with automatic transmission and high-line instrument cluster, the red "brake system malfunction" symbol does not appear immediately after the ignition is switched on. Instead, the note "Depress brake pedal before engaging gear" appears in the display. Press the brake pedal and select a gear. The red brake warning light appears, if the light control is working properly.

1) The traction control indicator light is only available in vehicles equipped with ASR.

ABS -K47-	Brake system	ASR -K86- 1)	Possible reasons why the indicator lamps light up
		X[1)]	**The vehicle is equipped with ASR:** ♦ There is a malfunction that affects only the ASR system. The ABS and EDL systems are not deactivated. Check DTC memory ⇒ page 01-97 . ♦ ASR is switched off via the traction control button. If the traction control indicator light does not light up in this case, check the switch and the indicator light, carry out the "Electrical test", steps 21 and 22 ⇒ page 01-68 . ♦ ASR is in adjustment mode. The traction control indicator light blinks 3 times per second. ♦ Short circuit to B+ in the traction control button: The traction control indicator light switches off five minutes after ignition is switched on. ♦ The lamp remains constantly lit after ignition is switched on, but none of the above mentioned conditions are true. There is a short to Ground (GND) in the wiring that controls the traction control indicator light between terminal 31 of the ABS control module -J104- and the instrument cluster.
			There is an irregularity present or a complaint has been made. The indicator lamps go on during the self-test and then go out. The possible causes are as follows: ♦ The DTC 00526 "Brake light switch -F-" is stored in DTC memory , check DTC memory ⇒ page 01-97 . ♦ The DTC 00668 "Vehicle voltage terminal 30" is stored in DTC memory , check DTC memory

			⇒ page 01-97 . ♦ The onset of EDL was temporarily shut-off to avoid an overheating in the brake system.

1) The traction control indicator light is only available in vehicles equipped with ASR.

ABS - K47-	Brake system	ASR -K86- 1)	Possible reasons why the indicator lamps light up
X	X		**The vehicle can be equipped either with or without ASR. No DTCs are stored in DTC memory. The ABS lamp remains constantly lit after ignition is switched on and the the red "brake system malfunction" symbol also lights up 3 seconds after ignition is switched on. The traction control indicator lamp does not light up even for vehicles equipped with ASR.** ♦ Voltage supply for control module less than 6.5 volts; carry out "Electrical test" step 23 ⇒ page 01-68 . ♦ There is an open circuit or short circuit to B+ in the wire that controls the ABS warning lamp between terminal 32 of the ABS control module -J104- and the instrument cluster; carry out "Electrical test" step 19 ⇒ page 01-68 .
	X		**No DTCs are stored in DTC memory. The red "brake system malfunction" symbol remains lit after ignition is switched on.** ♦ The brake fluid level is too low ♦ Malfunction in instrument cluster: Carry out "Electrical test" step 20, page ⇒ Page 01-68 .

1) The traction control indicator light is only available in vehicles equipped with ASR.

01-52

Check Control Module Version (function 01)

- Connect the VAG1551 Scan Tool (ST) and select "Brake Electronics" via address word 03
  ⇒ page 01-4

- Advance through program sequence by pressing the → button.

Rapid data transfer	**HELP**
Select function XX	

Indicated on display:

- Press buttons -0- and -1- to select "Check Control Module Version" 01. Press -Q- button to confirm input.

Note:

- *The control module version can only be changed by replacing the control module.*
- *For allocation of ABS control module -J104-, also refer to parts catalog.*

4D0 907 379 1)	**2) 3)**
Coding 00000	**WSCXXXXX**

Indicated on display:

The coding is only indicated for vehicles with Anti-Slip Regulation (ASR).

The workshop code, WSC XXXXX, indicates the workshop where the control module was last coded.

1) Control module index

2) System identification

3) Hardware and software version

Control module versions

System identification	Prod. No.: 1)	Control module part no.:	Index	Coding	Data transmission via:	Notes:
Front Wheel Drive (FWD); ABS Bosch 5.0	1AC	4D0 907 379	D	coding not possible	single wires	
Front Wheel Drive (FWD); ABS/EDL Bosch 5.0	1AH	4D0 907 379	G	coding not possible	single wires	EDL throttle valve regulation; control module with rough terrain info for On Board Diagnostic - OBD- (USA)
Front Wheel Drive (FWD); ABS/EDL/ASR Bosch 5.0	1AJ	4D0 907 379	M	coding possible ⇒ page 01-56	single wires	EDL throttle valve regulation
		4D0 907 379	N	coding possible ⇒ page 01-56	single wires	EDL throttle valve regulation

1) This letter code is the production number allocated to each equipment version. The production number can be derived from the vehicle data plate. The vehicle data plate is attached to the vehicle in the spare tire well.

System identification	Prod. No.: 1)	Control module part no.:	Index	Coding	Data transmission via:	Notes:
All Wheel Drive (AWD); ABS/EDL Bosch 5.0	1AH	4D0 907 379	J	coding not possible	single wires	EDL pressure regulation (ABS); with wheel speed sensor outputs for automatic transmission and rough terrain info for On Board Diagnostic (OBD).
		4D0 907 379	F	coding not possible	single wires	EDL pressure regulation (ABS)
		4D0 907 379	K	coding not possible	single wires	EDL throttle valve regulation
		4D0 907 379	L	coding not possible	single wires	EDL throttle valve regulation; with wheel speed sensor outputs for automatic transmission and rough terrain info for On Board Diagnostic (OBD)

1) This letter code is the production number allocated to each equipment version. The production number can be derived from the vehicle data plate. The vehicle data plate is attached to the vehicle in the spare tire well.

01-55

- Press → button.

Rapid data transfer	**HELP**
Select function	**XX**

Indicated on display:

Code Control Module (function 07)

Has an ASR control module just been replaced or is the following DTC stored in DTC memory of the control module?

- "ABS/EDL transmission electrical connection"

If so, control module must be coded according to engine and transmission type.

Note:

- *Coding is only possible if a workshop number is stored in the VAG1551 Scan Tool (ST).*

⇒ *Operating instructions for VAG1551*

- *The ABS/EDL/ASR control module with index "N" was implemented in 05.95 along with implementation of the automatic transmission 01V for vehicles equipped with ASR. The coding versions of this control module were expanded to include automatic transmission 01V.*

- *Control modules with index "N" can replace previous control modules with index "M" as*

necessary.

- *For vehicles prior to 05.95, control modules with index "M" will no longer be available after current supplies are exhausted.*

01-57

- Connect the VAG1551 Scan Tool (ST) and select "Brake Electronics" via address word 03 ⇒ page 01-4 .

- Check the control module version ⇒ page 01-52 and press the →button.

Notes:

- *During control module identification, a 3 or 5-digit code must always be indicated.*

- *If control module does not indicate coding corresponding to vehicle, or if control module has been replaced, code it as follows.*

Rapid data transfer	**HELP**
Select function XX	

Indicated on display:

- Press buttons -0- and -7- to select "Code control module" function 03.

Rapid data transfer	**Q**
07 - Code control module	

Indicated on display:

- Press -Q- button to confirm input.

Code control module	**Q**
Enter code number	**XXXXX**

Indicated on display:

- Enter the appropriate code number and press -Q- button to confirm input.

01-58

Coding table

Engine	Transmission		Data transmission via:	Control module part number with index		Code number	Note:
2.6 Liter 6 Cyl. 2V	Manual transmission	012	single wires	4D0 907 379	M; N	00000	Terminal 45 at ABS control module (w/EDL) - J104- not occupied.
	Automatic transmission	01V	single wires	4D0 907 379	N	00003	Terminal 45 at ABS control module (w/EDL) - J104- occupied with 12V.
2.8 Liter 6 Cyl. 2V	Manual transmission	012	single wires	4D0 907 379	M; N	00000	Terminal 45 at ABS control module (w/EDL) - J104- not occupied.
	Automatic transmission	01V	single wires	4D0 907 379	N	00003	Terminal 45 at ABS control module (w/EDL) - J104- occupied with 12V.

01-59

Engine	Transmission	Data transmission via:	Control module part number with index		Code number	Note:
2.8 Liter 6 Cyl. 5V	Manual transmission 012	single wires	4D0 907 379	N	00000	Terminal 45 at ABS control module (w/EDL) - J104- not occupied.
	Automatic transmission 01V	single wires	4D0 907 379	N	00003	Terminal 45 at ABS control module (w/EDL) - J104- occupied with 12V.

01-60

4D0 907 379 X Syst. ident. Software ver.
Coding 00000 WSCXXXXX

- Display will indicate the control module identification and the coding entered (e.g. 00000).

- Press → button.

Rapid data transfer HELP
Select function XX

- Indicated on display:

- Press buttons -0- and -6- to select "End Output" function 06. Press -Q- button to confirm input.

Read Measuring Value Block (function 08)

The control module can transmit measured values to the VAG1551 Scan Tool (ST). These measured values provide information about the operational status of the system and the sensors connected to it. In many cases the data supplied can be used to troubleshoot and repair malfunctions. The measured values from the Bosch 5.0 series are contained in three display groups, which can be accessed via their display group numbers.

- Connect the VAG1551 Scan Tool (ST) and select "Brake Electronics" via address word 03 ⇒ page 01-4 .

Notes:

- *When the printer is switched on, the contents of the display will be printed out on the scan tool log.*

- *When reading the measuring value block, also check wiring and connectors for loose terminals.*

- Check the control module version ⇒ page 01-52 and press the →button.

01-62

Rapid data transfer	**HELP**
Select function XX	

Indicated on display:

- Press buttons -0- and -8- to select "Read measuring value block" function 08.

Rapid data transfer	**Q**
08 - Read measuring value block	

Indicated on display:

- Press -Q- button to confirm input.

Read measuring value block	**HELP**
Input display group number	**XXX**

Indicated on display:

- Press buttons -0-, -0- and -1-.
- Press -Q- button to confirm input.

01-63

Test table: display group 1

Notes:

- *Display fields 1 through 4 show the current wheel circumference speeds in km/h. These are calculated by the ABS control module -J104- on the basis of the signals received from the wheel speed sensors. If one of the display fields shows no reading, proceed as for DTCs 00283, 00285, 00287, 00290 "ABS Wheel Speed Sensor" DTC table ⇒ page 01-98 .*

- *In order to check whether wheel speed sensors are properly allocated to each wheel, the vehicle must be raised. On vehicles with manual transmission put the gear shift lever in neutral. On vehicles with automatic transmission move the selector lever to position "N". Turn appropriate wheel by hand. Remaining drive wheels must be secured against turning.*

- *When a vehicle is accelerated uniformly on a dry surface, the displayed value will increase continuously by whole numbers; e.g. 6 km/h, 7 km/h, 8 km/h ... . The difference between displayed values 1 to 4 should not be more than ± 1 km/h (error from out-of-round wheels). If the values jump, for instance from ...6km/h, 7 km/h, to 12 km/h...or if the difference between the displayed values is greater than ± 1 km/h, then check the installation of the wheel speed sensors and rotors.*

⇒ *Repair Manual, Suspension, Wheels, Steering, Repair Group 40*

⇒ *Repair Manual, Suspension, Wheels, Steering, Repair Group 42*

Read measuring value block			1 →	◀ Indicated on display
1 to 19 [1)] km/h	1 to 19 [1)] km/h	1 to 19 [1)] km/h	1 to 19 [1)] km/h	
			Rear right wheel circumference speed	
		Rear left wheel circumference speed		

	Front right wheel circumference speed
Front left wheel circumference speed	

1) On Board Diagnostic (OBD) is terminated by the ABS control module -J104- if road speed exceeds 19 km/h.

01-64

Note:

The display group numbers can be selected in sequence by pressing buttons <-1 and 3-> on the VAG1551 scan tool, or the arrow buttons ↑ and ↓ on the VAG1552 mobile scan tool.

- Press -C- button to input display group number manually.

Read measuring value block

Enter display group number XXX



Indicated on display:

- Press buttons -0-, -0- and -2-.
- Press -Q- button to confirm input.

01-65

Test table: display group 2

Read measuring value block			2 →	◀ Indicated on display
0 or 1	0 or 1	0 or 1	0 or 1	
			ABS solenoid valve relay: For vehicles with Front Wheel Drive (FWD), the display shifts one field toward left. ♦ 0 → not permitted during "Read measuring value block", the relay was not activated during "ignition on". - Carry out "Electrical test", step 11 ⇒ page 01-68 . ♦ 1 → specified value, relay was activated by ABS control module -J104- during ignition on.	
		Voltage at motor for ABS return flow pump: For vehicles with Front Wheel Drive (FWD), the display shifts one field toward left. ♦ 0 → specified value, there is no voltage at the motor for the ABS return flow pump. ♦ 1 → not permitted during "Read measuring value block", there is voltage at the motor for the ABS return flow pump. - Carry out "Electrical test", step 12 ⇒ page 01-68 .			
	Brake light switch: Additional signal only for All Wheel Drive (AWD):			

	♦ 0 → Brake pedal not operated ♦ 1 → Brake pedal operated	- Check brake light switch if there are deviations. ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*
Brake light switch: Signal for Front and All Wheel Drive:		
	♦ 0 → Brake pedal not operated ♦ 1 → Brake pedal operated	- Check brake light switch if there are deviations. ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

01-66

Note:

The display group numbers can be selected in sequence by pressing buttons <-1 and 3-> on the VAG1551 scan tool, or the arrow buttons ↑ and ↓ on the VAG1552 mobile scan tool.

- Press -C- button to input display group number manually.

Read measuring value block

Enter display group number XXX

➢ Indicated on display:

Note:

For display group 3 (005):

- *To read the display fields for engine speed and current engine torque with the engine running, communication between the scan tool and the control module must be terminated via the "End Output" function ⇒ page 01-16 . Start the engine and reinitiate communication between the scan tool and the control module.*

- Press buttons -0- and -8- to select "Read measuring value block" function 08.
- Press -Q- button to confirm input.
- Press buttons -0-, -0- and -3-.
- Press -Q- button to confirm input.

01-67

Test table: display group 3

Read measuring value block			3 →	◀ Indicated on display
60 to 8000 1 RPM	0 to 100 %	0 or 1	---	

Traction control (ASR) button: (Only for vehicles equipped with ASR)

- ♦ 0 → Traction control button not operated.
- ♦ 1 → The traction control button is operated, operational condition of ASR alternates, i.e. "ASR OFF" and "ASR ON".
- ♦ When ASR is switched off via the traction control button, the warning lamp for ASR lights up.

- Check traction control button if there are deviations. Carry out "Electrical test", step 22 ⇒ page 01-68 .

Actual engine torque (AET): (Only for vehicles equipped with ASR)

- ♦ 0% → vehicle is in deceleration mode.
- ♦ 20% - 30% → represents engine idle.
- ♦ 100% → engine is offering its maximum torque.

- If no indication is displayed, proceed according to DTC 00647 "ABS-ASR engine electrical connection 2". DTC table ⇒ page 01-98 .

Engine speed: (Only for vehicles equipped with ASR)

- ♦ Engine speed is displayed in increments of 60 RPM, starting at 60 RPM.

- If no indication is displayed, proceed according to DTC 00529 "Wheel speed information missing. No signal". DTC table ⇒ page 01-98 .

01-68

Electrical testing

- If the On Board Diagnostic (OBD) sequence does not provide any indication of the source of the malfunction, work through all of the electrical test steps.

- If the OBD sequence identifies the source of the malfunction, only carry out the test steps recommended in the DTC table (specific testing).

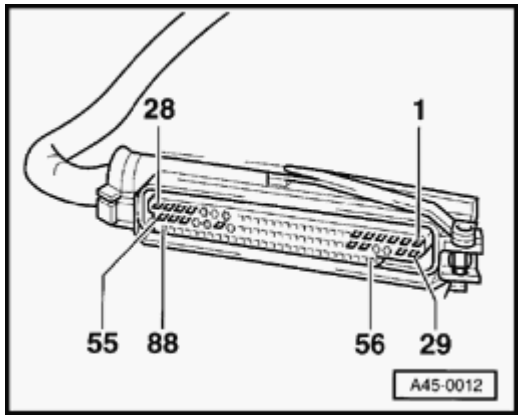
Test requirements

- The "Automatic Test Sequence" was carried out and it was determined that the Transmission Control Module (TCM) and Engine Control Module (ECM) only contain DTCs relating to ABS.

  - Connect the VAG1551 Scan Tool (ST) and select the address word 00 with ignition switched on;

  - After completing electrical test, check and erase DTC memories of Transmission Control Module (TCM) and Engine Control Module (ECM).

01-69



- Multi-pin harness connector for ABS control module -J104- in proper condition, with no bent, broken or corroded terminals. Replace any damaged terminals using VAS1978 wiring repair kit.

Note:

The operation manual for the VAS1978 wiring harness repair kit generally forbids the repair of any lines in the ABS or related systems. This rule only pertains to the shielded lines in these systems.

- Ignition and electrical consumers switched off before beginning testing (headlights, lighting, fan, etc.).
- For steps 13 through 16, raise the vehicle until the wheels rotate freely. On vehicles with manual transmission put the gear shift lever in neutral. On vehicles with automatic transmission move the selector lever to position "N".

01-70

Required special tools and test equipment:

- VAG1598/20 test box
- VAG1594 connector test kit
- VAG1526 Multimeter
- VAG1310A Pressure gauge

01-71

Connecting the VAG1598/20 test box and checking the ABS, ABS/EDL or ASR system

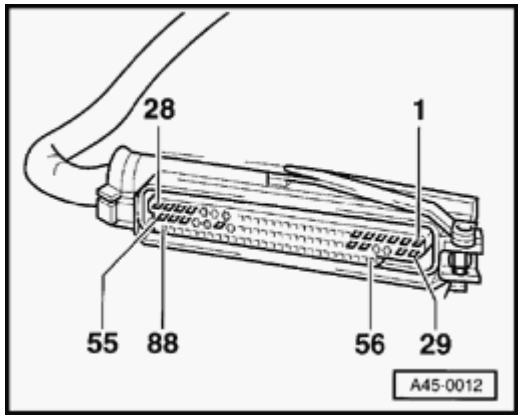
- Switch ignition off.

- Remove ABS control module -J104-.

⇒ *Repair manual, Brake System, Repair Group 45*

- Disconnect multi-pin connector from ABS control module -J104-.

- Check multi-pin connector between harness connector and ABS control module -J104-.



The socket designations on the VAG1598/20 test box are identical to the terminal designations on the ABS control module -J104- and on the wiring harness connector.

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

- Connect VAG1598/20 test box to multi-pin connector of ABS wiring harness.

01-72

Terminal assignment of multi-pin connector for wiring harness / ABS control module (w/EDL) -J104-

Terminal	Wire connection to component ...
1	**Voltage supply, terminal 15**
2	**Hydraulic unit; activation of ABS return flow pump relay -J105-**
3	**Hydraulic unit; left front traction control switch-over valve -N168- (secondary piston circuit)**
4	**Hydraulic unit; left front traction control outlet valve -N169- (secondary piston circuit)**
5	**Hydraulic unit; left front ABS inlet valve -N101-**
6	**Hydraulic unit; right rear ABS inlet valve -N133-**
7	**Hydraulic unit; activation of ABS return flow pump relay -J105-**
9	**Left front ABS wheel speed sensor -G47-** ♦ for vehicles with Front Wheel Drive (FWD) and ABS/EDL ♦ for vehicles with Front Wheel Drive (FWD) and ABS/EDL/ASR
10	**Left front ABS wheel speed sensor -G47-**
11	**Right rear ABS wheel speed sensor -G44-**
12	**Left rear ABS wheel speed sensor -G46-**
13	**Left rear ABS wheel speed sensor -G46-**
14	**Right front ABS wheel speed sensor -G45-**
15	**Right front ABS wheel speed sensor -G45-** ♦ for vehicles with Front Wheel Drive (FWD) and ABS

	♦ for vehicles with Front Wheel Drive (FWD) and ABS/EDL ♦ for vehicles with Front Wheel Drive (FWD) and ABS/EDL (ABS pressure regulation)

01-73

Terminal	Wire connection to component ...
18	**Engine Control Module (ECM); MMD signal (Masked Misfire Diagnostic)** ♦ for vehicles with Front Wheel Drive (FWD) and ABS/EDL/ASR, the SET signal (Specified Engine Torque) is also transmitted via this wiring harness.
19	**Hydraulic unit; control wire for ABS return flow pump -V39-**
20	**Engine Control Module (ECM); Engine RPM** ♦ for vehicles with Front Wheel Drive (FWD) and ABS/EDL/ASR
25	**Hydraulic unit; Left rear ABS outlet valve -N136-**
26	**Hydraulic unit; Right front ABS outlet valve -N100-**
27	**Hydraulic unit; right front traction control outlet valve -N167- (primary piston circuit)**
28	**Ground (GND) terminal 31 (ABS control module -J104-)**
29	**Ground (GND) terminal 31 (ABS control module -J104-)**
31	**Instrument cluster; activation of traction control indicator light** ♦ for vehicles with Front Wheel Drive (FWD) and ABS/EDL/ASR
32	**Instrument cluster; ABS/EDL warning light activation (active)**
33	**Hydraulic unit; Left front ABS outlet valve -N102-**
34	**Hydraulic unit; Right rear ABS outlet valve -N135-**
35	**Left front ABS wheel speed sensor -G47-** ♦ for vehicles with All Wheel Drive (AWD) and ABS/EDL

36	**Left front ABS wheel speed sensor -G47-** ♦ for vehicles with Front Wheel Drive (FWD) and ABS

01-74

Terminal	Wire connection to component ...
37	**Hydraulic unit; activation of ABS solenoid valve relay -J106-**
38	**Right rear ABS wheel speed sensor -G44-**
42	**Right front ABS wheel speed sensor -G45-** ♦ for vehicles with Front Wheel Drive (FWD) and ABS/EDL/ASR ♦ for vehicles with All Wheel Drive (AWD) and ABS/EDL (throttle valve regulation)
44	**Traction control (ASR) button** ♦ for vehicles with Front Wheel Drive (FWD) and ABS/EDL/ASR
45	**TI (Transmission Influence)** ♦ for vehicles with Front Wheel Drive (FWD) and ABS/EDL/ASR
46	**K-wire**
47	**Engine Control Module (ECM); AET (Actual Engine Torque)** ♦ for vehicles with Front Wheel Drive (FWD) and ABS/EDL/ASR
47	**Brake light switch -F-** ♦ for vehicles with All Wheel Drive (AWD) and ABS/EDL
48	**Brake light switch -F-**
50	**Battery + (terminal 30)**
53	**Hydraulic unit; left rear ABS inlet valve -N134-**

54	**Hydraulic unit; right front ABS inlet valve -N99-**
55	**Hydraulic unit; right front traction control switch-over valve -N166- (primary piston circuit)**

01-75

Notes:

For test table:

- *The socket designations of the VAG1598 test box are identical to the terminal designations of the ABS control module (w/EDL) -J104- in the wiring diagram. Incorrect test procedures can cause damage to the system. Do not bridge any terminals other than those listed in the table.*

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

- *Specified values refer to readings on the VAG1526 and are not necessarily applicable for other test units.*

- *If the measured values do not match specifications, carry out the corrective actions listed on the right side of the table.*

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

- *If values are obtained, also check wiring for intermittent loose terminals and short circuit to B+ and Ground (GND). This applies especially to sporadic malfunctions.*

- *Use the VAG1594 connector test kit for checking continuity (bridges).*

- *If the measured values only differ slightly from the specifications, clean the sockets and harness connectors of the testers and adapter leads (using contact spray G 000 700 04) and repeat the test. Before replacing actual components, check wiring and connections once more. This is especially important if the specification for a resistance test is under 10 Ω.*

01-76

Resistance measurement: Select measurement range on VAG1526 (200 Ω)					
Test step	**VAG 1598/20 sockets**	**Test of**	• Test requirements - Additional work steps	**Specified value**	**Corrective action**
1	5 + 33	Left front ABS inlet valve -N101-, left front ABS outlet valve -N102-	• Electrical wiring between control module and hydraulic unit OK	9 Ω ÷ 22 Ω	- Check electrical wiring between control module and hydraulic unit for short circuit to Ground (GND) or B+ ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations* - If the electrical wiring is OK, replace the hydraulic unit.
2	54 + 26	Right front ABS inlet valve -N99-, right front ABS outlet valve -N100-			
3	53 + 25	Inlet valve -N134-, outlet valve -N136- left-rear			
4	6 + 34	Inlet valve -N133-, outlet valve -N135- right-rear			

01-77

Resistance measurement: Select measurement range on VAG1526 (200 Ω)					
Test step	**VAG 1598/20 sockets**	**Test of**	• Test requirements - Additional work steps	**Specified value**	**Corrective action**
5 Note: Only for vehicles with ABS/EDL or ASR	3 + 55	Left front traction control switch-over valve -N168- (secondary piston circuit) Right front traction control switch-over valve -N166- (primary piston circuit)	• Electrical wiring between control module and hydraulic unit OK	12 Ω ÷ 28 Ω	- Check electrical wiring between control module and hydraulic unit for short circuit to Ground (GND) or B+. ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations* - If the electrical wiring is OK, replace the hydraulic unit.
6 Note: Only for vehicles with ABS/EDL or ASR	4 + 27	Left front traction control outlet valve -N169- (secondary piston circuit) Right front traction control outlet valve -N167- (primary piston circuit)	• Electrical wiring between control module and hydraulic unit OK	12 Ω ÷ 28 Ω	- Check electrical wiring between control module and hydraulic unit for short circuit to Ground (GND) or B+. ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations* - If the electrical wiring is OK, replace the hydraulic unit.

Resistance measurement: Select measurement range on VAG1526 (2kΩ or 20 kΩ)					
Test step	**VAG 1598/20 sockets**	**Test of**	• Test requirements - Additional work steps	**Specified value**	**Corrective action**
7	9 + 10 [1] [2] 35 + 10 [3] [5] 36 + 10 [4]	Left front ABS wheel speed sensor -G47-	• Electrical wiring between control module and wheel speed sensor OK	400Ω ÷ 2300Ω	- Check electrical wiring between control module and wheel speed sensor for short circuit to Ground (GND) or B+ ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations* - If the electrical wiring is OK, replace the relevant ABS wheel speed sensor.
8	15 + 14 [1] [3] [4] 42 + 14 [2] [5]	Right front ABS wheel speed sensor -G45-			
9	13 + 12	Left rear ABS wheel speed sensor -G46-			
10	11 + 38	Right rear ABS wheel speed sensor -G44-			

♦ Outlets on ABS control module -J104- differ depending on installed equipment

1) Only for vehicles with Front Wheel Drive (FWD) and ABS/EDL Bosch 5

2) Only for vehicles with Front Wheel Drive (FWD) and ABS/ASR Bosch 5

3) Only for vehicles with All Wheel Drive (AWD) and ABS/EDL Bosch 5, (ABS) pressure regulation

4) Only for vehicles with Front Wheel Drive (FWD) and ABS Bosch 5

5) Only for vehicles with All Wheel Drive (AWD) and ABS/EDL Bosch 5, throttle valve regulation

Resistance measurement: Select measurement range on VAG1526 (200 Ω)					
Test step	**VAG 1598/20 sockets**	**Test of**	• Test requirements - Additional work steps	**Specified value**	**Corrective action**
11	2 + 37	ABS solenoid valve relay -J106-	• Electrical wiring between control module and hydraulic unit OK	30 Ω ÷ 80 Ω	- Check electrical wiring between control module and hydraulic unit for short circuit to Ground (GND) or B+. ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations* - If electrical wiring is OK, replace the relay.
12	2 + 7	ABS return flow pump relay -J105-	• Electrical wiring between control module and hydraulic unit OK	30 Ω ÷ 80 Ω	- Check electrical wiring between control module and hydraulic unit for short circuit to Ground (GND) or B+. ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations* - If electrical wiring is OK, replace the relay.

Function test					
Test step	**VAG 1598/20 sockets**	**Test of**	• Test requirements - Additional work steps	**Specified value**	**Corrective action**
13 [1)]	Bridge 1 + 2, 28 + 37	Inlet valve - N101 and front left brake line connection	• Ignition on - for vehicles with automatic transmission, engage neutral position "N" - Bridge terminals 5 + 28 - Depress brake pedal and hold. - Remove bridge 5 + 28.	♦ Left front wheel can be rotated by hand ♦ The left-front wheel remains	- If the wheel does not rotate, check the other wheels for free rotation. If yes, then hydraulic brake lines are mixed-up (switched). Check brake line connections and coupling pieces. Make sure every component is OK. Repeat test step 13. - If all wheels are blocked, inlet valve is malfunctioning DTC table ⇒ page 01-98 , DTC 00257.

			- Release brake pedal.	locked.	

1) This test step requires two technicians.

Function test					
Test step	**VAG 1598/20 sockets**	**Test of**	• Test requirements - Additional work steps	**Specified value**	**Corrective action**
14 [1)]	Bridge 1 + 2, 28 + 37	Inlet valve -N99- and front right brake line connection	• Ignition on - for vehicles with automatic transmission, engage neutral position "N" - Bridge terminals 54 + 28 - Depress brake pedal and hold. - Remove bridge 54 + 28.	♦ Right front wheel can be rotated by hand ♦ The right-front wheel remains	- If the wheel does not rotate, check the other wheels for free rotation. If yes, then hydraulic brake lines are mixed-up (switched). Check brake line connections and coupling pieces. Make sure every component is OK. Repeat test step 14. - If all wheels are blocked, inlet valve is malfunctioning DTC table ⇒ page 01-98 , DTC 00259.

			- Release brake pedal.	locked.	

1) This test step requires two technicians.

Function test					
Test step	**VAG 1598/20 sockets**	**Test of**	• Test requirements - Additional work steps	**Specified value**	**Corrective action**
15 [1)]	Bridge 1 + 2, 28 + 37	Inlet valve - N134- and rear left brake line connection	• Ignition on - for vehicles with automatic transmission, engage neutral position "N" - Bridge terminals 53 + 28 - Depress brake pedal and hold. - Remove bridge 53 + 28.	♦ Left rear wheel can be rotated by hand ♦ The left-rear wheel remains	- If the wheel does not rotate, check the other wheels for free rotation. If yes, then hydraulic brake lines are mixed-up (switched). Check brake line connections and coupling pieces. Make sure every component is OK. Repeat test step 15. - If all wheels are blocked, inlet valve is malfunctioning DTC table ⇒ page 01-98 , DTC 00274.

			- Release brake pedal.	locked.	

1) This test step requires two technicians.

01-83

Test step	**VAG 1598/20 sockets**	Test of	• Test requirements - Additional work steps	**Specified value**	**Corrective action**
16 [1)]	Bridge 1 + 2, 28 + 37	Inlet valve - N133- and rear right brake line connection	• Ignition on - for vehicles with automatic transmission, engage neutral position "N" - Bridge terminals 6 + 28 - Depress brake pedal and hold. - Remove bridge 6 + 28.	♦ Right rear wheel can be rotated by hand ♦ The right-rear wheel remains locked.	- If the wheel does not rotate, check the other wheels for free rotation. If yes, then hydraulic brake lines are mixed-up (switched). Check brake line connections and coupling pieces. Make sure every component is OK. Repeat test step 16. - If all wheels are blocked, inlet valve is malfunctioning DTC table ⇒ page 01-98 , DTC 00273.

			- Release brake pedal.		

1) This test step requires two technicians.

01-84

Function test and check for proper seal					
Test step	**VAG 1598/20 sockets**	**Test of**	• Test requirements - Additional work steps	**Specified value**	**Corrective action**
17	Bridge 1 + 2, 7 + 37, 37 + 28	♦ ABS return flow pump -V39- ♦ Left front traction control switch-over valve -N168- ♦ Left front traction control outlet valve -N169-	- Connect VAG1310A pressure gauge to front left brake caliper and bleed. ⇒ *Repair Manual, Brake System, Repair Group 47* - Bridge terminals 3 + 28		- ABS return flow pump malfunctioning, replace ABS hydraulic unit -N55- ⇒ *Repair Manual, Brake System, Repair Group 45*
		♦ Pressure relief valve in ABS hydraulic unit -N55- ♦ Left front ABS outlet valve -N102-	- Switch on ignition for max. 10 seconds and switch off again.	♦ Left front traction control switch-over valve -N168- switched ♦ ABS return flow pump -V39- runs ♦ Pressure on pressure	- Check left front traction control switch-over valve -N168- and left front traction control outlet valve -N169- via resistance test ⇒ test steps 5 + 6. Replace ABS hydraulic unit -N55- if malfunctioning.

				gauge max. 5 bar	
Test step 17: Continued on next page.					

Function test and check for proper seal					
Test step	**VAG 1598/20 sockets**	**Test of**	• Test requirements - Additional work steps	**Specified value**	**Corrective action**
17 Continuation:		♦ Right rear ABS outlet valve -N135-	- Bridge terminals 4 + 28 - Switch on ignition for max. 10 seconds and switch off again. - Remove VAG1310A pressure gauge and bleed brakes	♦ Left front traction control outlet valve -N169- switched ♦ Pressure increases on pressure gauge: Front Wheel Drive (FWD): 170 ± 25 bar All-Wheel Drive (AWD), pressure regulation (ABS): 90 ± 25 bar All Wheel Drive (AWD), throttle valve regulation: 170 ± 25 bar	- Pressure relief valve and/or left front ABS outlet valve -N102- and/or right rear ABS outlet valve -N135- malfunctioning. Replace ABS hydraulic unit -N55-.

			⇒ *Repair Manual, Brake System, Repair Group 47*		

Function test and check for proper seal					
Test step	**VAG 1598/20 sockets**	**Test of**	• Test requirements - Additional work steps	**Specified value**	**Corrective action**
18	Bridge 1 + 2, 7 + 37, 37 + 28	♦ ABS return flow pump -V39- ♦ Right front traction control switch-over valve -N166- ♦ Right front traction control outlet valve -N167-	- Connect VAG1310A pressure gauge to front RIGHT brake caliper and bleed. ⇒ *Repair Manual, Brake System, Repair Group 47* - Bridge terminals 55 + 28		- ABS return flow pump malfunctioning, replace ABS hydraulic unit -N55- ⇒ *Repair Manual, Brake System, Repair Group 45*
		♦ Pressure relief valve in ABS hydraulic unit -N55- ♦ Right front ABS outlet valve -N100-	- Switch on ignition for max. 10 seconds and switch off again.	♦ Right front traction control switch-over valve -N166- switched ♦ ABS return flow pump -V39- runs ♦ Pressure on pressure	- Check right front traction control switch-over valve -N166- and right front traction control outlet valve -N167- via resistance test ⇒ test steps 5 + 6. Replace ABS hydraulic unit -N55- if malfunctioning.

				gauge max. 5 bar	
Test step 18: Continued on next page.					

Function test and check for proper seal					
Test step	**VAG 1598/20 sockets**	**Test of**	• Test requirements - Additional work steps	**Specified value**	**Corrective action**
18 Continuation:		♦ Left rear ABS outlet valve -N136-	- Bridge terminals 27 + 28 - Switch on ignition for max. 10 seconds and switch off again. - Remove VAG1310A pressure gauge and bleed brakes	♦ Right front traction control outlet valve -N167- switched ♦ Pressure increases on pressure gauge: Front Wheel Drive (FWD): 170 ± 25 bar All-Wheel Drive (AWD), pressure regulation (ABS): 90 ± 25 bar All Wheel Drive (AWD), throttle valve regulation: 170 ± 25 bar	- Pressure relief valve and/or right front ABS outlet valve -N100- and/or left rear ABS outlet valve -N136- malfunctioning. Replace ABS hydraulic unit -N55-.

			⇒ *Repair Manual, Brake System, Repair Group 47*		

01-88

Function test: ABS warning light -K47-					
Test step	**VAG 1598/20 sockets**	**Test of**	• Test requirements - Additional work steps	**Specified value**	**Corrective action**
19	-	Function of ABS warning light -K47-	• DTC memory checked and no DTC present in DTC memory of ABS control module -J104-. • Ignition switched off • Multi-pin connector connected to ABS control module -J104- and retainer catch engaged.		
				Test step 19: Continued on next page.	

01-89

Function test: ABS warning light -K47-					
Test step	**VAG 1598/20 sockets**	**Test of**	• Test requirements - Additional work steps	**Specified value**	**Corrective action**
19 Continuation:	-	Function of ABS warning light -K47-	- Switch on ignition	ABS warning light -K47- lights up for two (2) seconds and then goes out.	- If ABS warning light does not come on, check voltage of electrical system and test wiring from terminal 32 of ABS control module -J104- to instrument cluster for short circuit to Ground (GND). - The ABS warning lamp does not switch off after 2 seconds. The red "brake system malfunction" symbol lights up after 2 seconds. Check wire from terminal 32 of ABS control module -J104- to instrument cluster for short circuit to B+ and open circuit. ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations* - Are both the vehicle voltage and the wiring from terminal 32 of ABS control module -J104- to the instrument cluster OK? ⇒ Malfunction in instrument cluster. ⇒ *Repair Manual, Electrical Equipment, Repair Group 90; Instrument cluster*

Function test: Red brake warning symbol					
Test step	**VAG 1598/20 sockets**	**Test of**	• Test requirements - Additional work steps	**Specified value**	**Corrective action**
20	-	Function of red "brake system malfunction" symbol	• Brake fluid level is OK ⇒ *Repair Manual, Brake System, Repair Group 47* • Function of ABS warning light -K47- already checked in step 19. • Multi-pin connector connected to ABS control module -J104- and retainer catch engaged. • Switch on ignition		
				Test step 20: Continued on next page.	

01-91

Function test: Red brake warning symbol					
Test step	**VAG 1598/20 sockets**	**Test of**	• Test requirements - Additional work steps	**Specified value**	**Corrective action**
20 Continuation:		Function of red "brake system malfunction" symbol	- For vehicles with automatic transmission and high-line instrument cluster, depress the brake pedal and select a driving gear.	The ABS/EDL indicator lamp and the red "brake system malfunction" symbol light up. If the traction control indicator light is installed and OK, it also lights up.	- Malfunction in instrument cluster ⇒ *Repair Manual, Electrical Equipment, Repair Group 90; Instrument cluster*

01-92

Function test: Traction control indicator light -K86-. This is only installed if vehicle is equipped with ASR.					
Test step	**VAG 1598/20 sockets**	**Test of**	• Test requirements - Additional work steps	**Specified value**	**Corrective action**
21	-	Function of traction control indicator light -K86-	• DTC memory checked and no DTC present in DTC memory of ABS control module -J104-. • Ignition switched off • Multi-pin connector connected to ABS control module -J104- and retainer catch engaged.		
				Test step 21: Continued on next page.	

01-93

Function test: Traction control indicator light -K86-. This is only installed if vehicle is equipped with ASR.					
Test step	**VAG 1598/20 sockets**	**Test of**	• Test requirements - Additional work steps	**Specified value**	**Corrective action**
21 Continuation:	-	Function of traction control indicator light -K86-	- Switch on ignition	Traction control indicator light -K86- comes on for two (2) seconds and then goes out.	- If traction control indicator light does not light up, check vehicle voltage and wire from terminal 31 of ABS control module -J104- to instrument cluster for short circuit to B+ and open circuit. - If traction control indicator lamp remains continuously lit, check wire from terminal 31 of ABS control module -J104- to instrument cluster for short circuit to Ground (GND). ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations* - Are both the vehicle voltage and the wiring from terminal 31 of ABS control module -J104- to the instrument cluster OK? ⇒ Malfunction in instrument cluster. ⇒ *Repair Manual, Electrical Equipment, Repair Group 90; Instrument cluster*

01-94

Function test: Traction control button; set measurement range on VAG1526: 20 V =					
Test step	**VAG 1598/20 sockets**	**Test of**	• Test requirements - Additional work steps	**Specified value**	**Corrective action**
22	-	Function of traction control button	• Ignition switched off • Function of traction control indicator light -K86- was already checked in step 21. • Multi-pin connector connected to ABS control module -J104- and retainer catch engaged. - Switch on ignition		
			- Press traction control button	Traction control indicator light -K86- lights up	- Switch off ignition. - Detach multi-pin connector from ABS control module -J104- and remove.
			- Press traction control button again	Traction control indicator light -K86- goes out.	- Connect VAG1598/20 test box.
					Test step 22: Continued on next page.

01-95

Function test: Traction control button; set measurement range on VAG1526: 20 V =					
Test step	**VAG** **1598/20 sockets**	**Test of**	• Test requirements - Additional work steps	**Specified value**	**Corrective action**
22 Continuation:	28 + 44	Function of traction control button	• Ignition switched on. - Traction control button not pressed - Traction control button pressed	0.0 to 0.5 V 10.0 to 14.5 V	- Check wire from terminal 28 to Ground (GND). - Check wire from terminal 44 to traction control button, terminal 6. - Check voltage supply from terminal 5 of traction control button to terminal 15. ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations* - If no malfunctions can be found using the procedures in these steps, replace the traction control button.

01-96

Voltage measurement; set measurement range on VAG1526: 20 V =					
Test step	**VAG 1598/20 sockets**	**Test of**	• Test requirements - Additional work steps	**Specified value**	**Corrective action**
23	1 + 28 1 + 29	Voltage supply to ABS control module -J104- via terminal 15	• Ignition switched on.	10.5 to 14.5 V	- Check wiring from terminals 28 and 29 to Ground (GND). - Check wire from terminal 1 to terminal 15. ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

01-97

Diagnostic Trouble Code (DTC) table

Notes:

- *Connect the VAG1551 Scan Tool (ST) and select address word 03 "Brake Electronics".*
- *Check the control module version ⇒ page 01-52 and press the → button.*
- *Press buttons -0- and -2- to select "Check DTC Memory" function 02. Press -Q- button to confirm input.*

Notes:

- *Each malfunction is assigned a 5-digit Diagnostic Trouble Code (DTC). The DTC is located in the left column of the DTC table. If you have switched the printer on by pressing the "PRINT" button, the VAG1551 scan tool (ST) prints the message identifying the malfunction and the DTC. Otherwise, DTCs are not displayed by the VAG1551 scan tool.*
- *The contents of DTC memory remain stored until memory is erased, ⇒ page 01-15 .*
- *Sporadically occurring malfunctions are identified via indication of "/SP" on the right-hand side of the display.*
- *Static malfunctions that cannot be detected when the vehicle is stationary are also identified with "/SP" if the ignition has been switched off and then on again.*
- *The following DTC table includes all the DTCs that can be stored by the ABS control module -J104- and displayed and printed out by the VAS5051 tester or VAG1551 scan tool. Malfunctions are listed by DTC number.*

01-98

Diagnostic Trouble Code (DTC) table

Output on printer of VAG1551 Scan Tool (ST)	Possible cause	Corrective action
DTC		
00000 No malfunction recognized! If this display appears, process is concluded. No DTCs are stored in DTC memory. If corresponding warning lamps light up anyway, check the following points:	♦ Voltage supply for ABS control module -J104- below 10.5 volts at a vehicle speed less than 6 km/h. ♦ Open circuit in activation wire for ABS warning light -K47- between ABS control module (w/EDL) -J104- and instrument cluster combination processor -J218-. If no malfunction can be found, and there is still a problem, there may be a mechanical malfunction (e.g. solenoid valve sticking).	- See section "Overview of indicator lamp functions" - Expand troubleshooting to include "Electrical test", function test ⇒ page 01-68 .

01-99

Output on printer of VAG1551 Scan Tool (ST) DTC	Possible cause	Corrective action
00257 Left front ABS inlet valve -N101-	♦ Open circuit, short circuit to B+ or Ground (GND) in wiring between ABS hydraulic unit -N55- and ABS control module -J104-. ♦ Left front ABS inlet valve -N101- malfunctioning	- Carry out "electrical test", steps 1 + 13 ⇒ page 01-68 . - If the electrical test does not reveal any malfunctions, check all wiring and connectors for loose contacts. - If no problems are found after implementing the specified steps, replace the control module.
00259 Right front ABS inlet valve -N99-	♦ Open circuit, short circuit to B+ or Ground (GND) in wiring between ABS hydraulic unit and ABS control module -J104-. ♦ Right front ABS inlet valve -N99- malfunctioning.	- Carry out "electrical test", steps 2 +14 ⇒ page 01-68 . - If the electrical test does not reveal any malfunctions, check all wiring and connectors for loose contacts. - If no problems are found after implementing the specified steps, replace the control module.

01-100

Output on printer of VAG1551 Scan Tool (ST) DTC	Possible cause	Corrective action
00265 Left front ABS outlet valve -N102-	♦ Open circuit, short circuit to B+ or Ground (GND) in wiring between ABS hydraulic unit and ABS control module -J104-. ♦ Left front ABS outlet valve -N102- malfunctioning.	- Carry out "Electrical test", step 1 ⇒ page 01-68 . - If the electrical test does not reveal any malfunctions, check all wiring and connectors for loose contacts. - If no problems are found after implementing the specified steps, replace the control module.
00267 Right front ABS outlet valve -N100-	♦ Open circuit, short circuit to B+ or Ground (GND) in wiring between ABS hydraulic unit and ABS control module -J104-. ♦ Right front ABS outlet valve -N100- malfunctioning	- Carry out "Electrical test", step 2 ⇒ page 01-68 . - If the electrical test does not reveal any malfunctions, check all wiring and connectors for loose contacts. - If no problems are found after implementing the specified steps, replace the control module.

Output on printer of VAG1551 Scan Tool (ST) DTC	Possible cause	Corrective action
00273 Right rear ABS inlet valve -N133-	♦ Open circuit, short circuit to B+ or Ground (GND) in wiring between ABS hydraulic unit and ABS control module -J104-. ♦ Right rear ABS inlet valve -N133- malfunctioning	- Carry out "electrical test", steps 4 +16 ⇒ page 01-68 . - If the electrical test does not reveal any malfunctions, check all wiring and connectors for loose contacts. - If no problems are found after implementing the specified steps, replace the control module.
00274 Left rear ABS inlet valve -N134-	♦ Open circuit, short circuit to B+ or Ground (GND) in wiring between ABS hydraulic unit and ABS control module -J104-. ♦ Left rear ABS inlet valve -N134- malfunctioning	- Carry out "electrical test", steps 3 +15 ⇒ page 01-68 . - If the electrical test does not reveal any malfunctions, check all wiring and connectors for loose contacts. - If no problems are found after implementing the specified steps, replace the control module.

01-102

Output on printer of VAG1551 Scan Tool (ST) DTC	Possible cause	Corrective action
00275 Right rear ABS outlet valve -N135-	♦ Open circuit, short circuit to B+ or Ground (GND) in wiring between ABS hydraulic unit and ABS control module -J104-. ♦ Right rear ABS outlet valve -N135- malfunctioning.	- Carry out "Electrical test", step 4 ⇒ page 01-68 . - If the electrical test does not reveal any malfunctions, check all wiring and connectors for loose contacts. - If no problems are found after implementing the specified steps, replace the control module.
00276 Left rear ABS outlet valve -N136-	♦ Open circuit, short circuit to B+ or Ground (GND) in wiring between ABS hydraulic unit and ABS control module -J104-. ♦ Left rear ABS outlet valve -N136- malfunctioning	- Carry out "Electrical test", step 3 ⇒ page 01-68 . - If the electrical test does not reveal any malfunctions, check all wiring and connectors for loose contacts. - If no problems are found after implementing the specified steps, replace the control module.

01-103

Output on printer of VAG1551 Scan Tool (ST) DTC	Possible cause	Corrective action
00283 Left front ABS wheel speed sensor -G47- or:	♦ ABS wheel speed sensor rotor dirty or damaged. ♦ Excessive wheel bearing play. ♦ Left rear ABS wheel speed sensor -G47- installed incorrectly. ♦ ABS wheel speed sensor -G47- malfunctioning. ♦ Short circuit to Ground (GND).	- Check rotor, clean or replace ⇒ *Repair Manual, Brake System, Repair Group 45* - Replace wheel bearing ⇒ *Repair Manual, Suspension, Wheels, Steering, Repair Group 40* - Check installation of ABS wheel speed sensor. ⇒ *Repair Manual, Brake System, Repair Group 45* - "Read measuring value block" display group 1 ⇒ page 01-63 . - Carry out "Electrical test", step 7 ⇒ page 01-68 . - If neither the "Read measuring value block" function nor the "electrical test" reveal any malfunctions, check all wiring and harness connectors for loose contacts.
Left front ABS wheel speed sensor -G47-	♦ Incorrect control module version.	- Check control module version ⇒ page 01-52 .

Open circuit/short circuit to B+	♦ Open circuit or short circuit to B+ in wiring between ABS wheel speed sensor -G47- and ABS control module -J104-.	- If no problems are found after implementing the specified steps, replace the control module.

01-104

Output on printer of VAG1551 Scan Tool (ST) **DTC**	Possible cause	Corrective action
00285 Right front ABS wheel speed sensor -G45- or:	♦ ABS wheel speed sensor rotor dirty or damaged. ♦ Excessive wheel bearing play. ♦ Left rear ABS wheel speed sensor -G45- installed incorrectly. ♦ ABS wheel speed sensor -G45- malfunctioning. ♦ Short circuit to Ground (GND).	- Check rotor, clean or replace ⇒ *Repair Manual, Brake System, Repair Group 45* - Replace wheel bearing ⇒ *Repair Manual, Suspension, Wheels, Steering, Repair Group 40* - Check installation of ABS wheel speed sensor. ⇒ *Repair Manual, Brake System, Repair Group 45* - "Read measuring value block", display group 1 ⇒ page 01-63 . - Carry out "Electrical test", step 8 ⇒ page 01-68 . - If neither the "Read measuring value block" function nor the "electrical test" reveal any malfunctions, check all wiring and harness connectors for loose contacts.
Right front ABS wheel speed sensor -	♦ Incorrect control module version.	- Check control module version ⇒ page 01-52 .

G45- Open circuit/short circuit to B+	◆ Open circuit or short circuit to B+ in wiring between ABS wheel speed sensor -G45- and ABS control module -J104-.	- If no problems are found after implementing the specified steps, replace the control module.

01-105

Output on printer of VAG1551 Scan Tool (ST) **DTC**	Possible cause	Corrective action
00287 Right rear ABS wheel speed sensor -G44- or:	♦ ABS wheel speed sensor rotor dirty or damaged. ♦ Excessive wheel bearing play. ♦ Left rear ABS wheel speed sensor -G44- installed incorrectly. ♦ ABS wheel speed sensor -G44- malfunctioning. ♦ Short circuit to Ground (GND).	- Check rotor, clean or replace ⇒ *Repair Manual, Brake System, Repair Group 45* - Replace wheel bearing ⇒ *Repair Manual, Suspension, Wheels, Steering, Repair Group 42* - Check installation of ABS wheel speed sensor. ⇒ *Repair Manual, Brake System, Repair Group 45* - "Read measuring value block", display group 1 ⇒ page 01-63 . - Carry out "Electrical test", step 10 ⇒ page 01-68 .
Right rear ABS wheel speed sensor -G44- Open circuit/short circuit to B+	♦ Open circuit or short circuit to B+ in wiring between ABS wheel speed sensor -G44- and ABS control module -J104-.	- If neither the "Read measuring value block" function nor the "electrical test" reveal any malfunctions, check all wiring and harness connectors for loose contacts. - If no problems are found after implementing the

		specified steps, replace the control module.

Output on printer of VAG1551 Scan Tool (ST) DTC	Possible cause	Corrective action
00290 Left rear ABS wheel speed sensor -G46- or:	♦ ABS wheel speed sensor rotor dirty or damaged. ♦ Excessive wheel bearing play. ♦ Left rear ABS wheel speed sensor -G46- installed incorrectly. ♦ ABS wheel speed sensor -G46- malfunctioning. ♦ Short circuit to Ground (GND).	- Check rotor, clean or replace ⇒ *Repair Manual, Brake System, Repair Group 45* - Replace wheel bearing ⇒ *Repair Manual, Suspension, Wheels, Steering, Repair Group 42* - Check installation of ABS wheel speed sensor. ⇒ *Repair Manual, Brake System, Repair Group 45* - "Read measuring value block", display group 1 ⇒ page 01-63 . - Carry out "Electrical test", step 9 ⇒ page 01-68 .
Left rear ABS wheel speed sensor -G46- Open circuit/short circuit to B+	♦ Open circuit or short circuit to B+ in wiring between ABS wheel speed sensor -G46- and ABS control module -J104-.	- If neither the "Read measuring value block" function nor the "electrical test" reveal any malfunctions, check all wiring and harness connectors for loose contacts. - If no problems are found after implementing the

		specified steps, replace the control module.

01-107

Output on printer of VAG1551 Scan Tool (ST) DTC	Possible cause	Corrective action
00301 ABS return flow pump -V39 -	♦ Open circuit in wire or contact resistance in Ground (GND) connection or voltage supply to ABS return flow pump -V39-. ♦ Open circuit or short circuit to B+ or Ground (GND) in wiring between ABS return flow pump relay -J105- and the ABS control module -J104-. ♦ ABS return flow pump relay -J105-, ABS return flow pump -V39- or hydraulic unit malfunctioning.	- Locate and repair open circuit or contact resistance. ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations* - Locate and repair open circuit or short circuit. ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations* - Check ABS return flow pump relay -J105-, ABS return flow pump -V39- and ABS hydraulic unit -N55-, carry out "electrical test", step 12+17 ⇒ page 01-68 , "Read measuring value block", display group 2 ⇒ page 01-65 .

Output on printer of VAG1551 Scan Tool (ST) DTC	Possible cause	Corrective action
00302 ABS solenoid valve relay -J106-	♦ Faulty wire connection or excessively large contact resistance in Ground (GND) connection to ABS solenoid valve relay -J106-. ♦ Open circuit or short circuit to B+ or Ground (GND) in wiring between ABS solenoid valve relay -J106- and the ABS control module -J104-. ♦ ABS solenoid valve relay -J106- or ABS hydraulic unit -N55- malfunctioning.	- Check Ground (GND) connection for contact resistance and faulty wiring. ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations* - Locate and repair open circuit or short circuit. ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations* - Check ABS solenoid valve relay -J106- and ABS hydraulic unit, carry out "electrical test", step 11 ⇒ page 01-68 , "Read measuring value block", display group 2 ⇒ page 01-65 .

01-109

Output on printer of VAG1551 Scan Tool (ST) DTC	Possible cause	Corrective action
00526 Brake light switch -F- FWD: Open circuit	♦ Both brake lights -M9- (left) and -M10- (right) malfunctioning or ABS control module -J104- malfunctioning. ♦ Wire from brake lights to control module faulty.	- Locate and repair open circuit or short circuit. ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations* - Replace bulbs. - Check brake light switch, "Read measuring value block", display group 2 ⇒ page 01-65 .
AWD: Implausible signal	♦ Open circuit or short circuit to B+ or Ground (GND) in wiring between brake light switch and the bulbs for brake lights -M9- (left), -M10- (right) or ABS control module -J104-. ♦ Bulb for left brake light -M9- or right brake light -M10- malfunctioning. ♦ Brake light switch malfunctioning.	

01-110

Output on printer of VAG1551 Scan Tool (ST) DTC	Possible cause	Corrective action
00529 Wheel speed information missing No signal ♦ This malfunction only occurs if vehicle is equipped with ASR.	♦ Open circuit or short circuit to B+ or Ground (GND) in wiring between ABS control module -J104- and Engine Control Module (ECM).	- "Read measuring value block", display group 3 ⇒ page 01-67 . - Locate and repair open circuit or short circuit. ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*
	♦ Engine Control Module (ECM) malfunctioning.	- If the tachometer in the instrument cluster is malfunctioning and no malfunctions can be found in the wiring, the Engine Control Module (ECM) is malfunctioning and must be replaced.
	♦ ABS control module -J104- malfunctioning	- If the tachometer in the instrument cluster functions properly and no malfunctions can be found in the wiring, the ABS control module (w/EDL) -J104- is malfunctioning and must be replaced.

Output on printer of VAG1551 Scan Tool (ST) DTC	Possible cause	Corrective action
00532 Voltage supply Signal too small Notes: ♦ This malfunction affects the voltage supply of the control module. ♦ This DTC is only stored, if the malfunction occurs at a vehicle speed above 6 km/h. ♦ As soon as vehicle voltage is within the valid voltage range again, the ABS, ABS/EDL or ASR system is switched back on and the warning lights turn off.	♦ Open circuit or resistance too high between voltage supply of terminal 15 and ABS control module -J104- (terminal 1). ♦ Voltage jumps in vehicle system. ♦ Battery malfunctioning.	- Carry out "Electrical test", step 23 ⇒ page 01-68 . - Locate and repair open circuit or contact resistance. - Check Generator (GEN.) and Voltage Regulator (VR). ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations* - Check battery ⇒ *Repair Manual, Electrical Equipment, Repair Group 90; Instrument cluster*

01-112

Output on printer of VAG1551 Scan Tool (ST) DTC	Possible cause	Corrective action
00597 Varying wheel speed impulse	♦ ABS wheel speed sensor rotor dirty or damaged.	- Check rotor. ⇒ *Repair Manual, Brake System, Repair Group 45*
	♦ Excessive wheel bearing play.	- Check wheel bearing ⇒ *Repair Manual, Brake System, Repair Group 45*
	♦ ABS wheel speed sensors -G44-, -G45-, -G46-, and -G47- installed incorrectly. ♦ ABS wheel speed sensors -G44-, -G45-, -G46-, and -G47- malfunctioning	- Check ABS wheel speed sensors. ⇒ *Repair Manual, Brake System, Repair Group 45* - Carry out "electrical test", steps 7 through 10 ⇒ page 01-68 .
	♦ Wheel or tire sizes not the same on all four wheels.	- Check wheel and tire sizes.

01-113

Output on printer of VAG1551 Scan Tool (ST) DTC	Possible cause	Corrective action
00623 ABS / transmission electrical connection ♦ This malfunction only occurs if vehicle is equipped with ASR.	**Manual transmission:** ♦ ABS/EDL/ASR control module -J104- incorrectly coded. ♦ Short circuit to B+ at terminal 45 **Automatic transmission:** ♦ Open circuit or short circuit to Ground (GND) in wiring between ABS/EDL/ASR control module -J104- and Transmission Control Module (TCM) -J217-. ♦ ABS/EDL/ASR control module -J104- incorrectly coded.	- Check coding of ABS/EDL/ASR control module -J104- ⇒ page 01-56 . - Locate and repair short circuit. ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations* - Check coding of ABS/EDL/ASR control module -J104- ⇒ page 01-56 . - Locate and repair open circuit or short circuit. ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

Output on printer of VAG1551 Scan Tool (ST) DTC	Possible cause	Corrective action
00642 Right front traction control switch-over valve -N166-	♦ Open circuit, short circuit to B+ or Ground (GND) in wiring between ABS hydraulic unit -N55- and ABS control module -J104-. ♦ Right front traction control switch-over valve -N166- malfunctioning.	- Carry out "electrical test", steps 5 +18 ⇒ page 01-68 . - If the electrical test does not reveal any malfunctions, check all wiring and connectors for loose contacts. - If no problems are found after implementing the specified steps, replace the control module.
00643 Right front traction control outlet valve -N167-	♦ Open circuit, short circuit to B+ or Ground (GND) in wiring between ABS hydraulic unit -N55- and ABS control module -J104-. ♦ Right front traction control outlet valve -N167- malfunctioning.	- Carry out "electrical test", steps 6 +18 ⇒ page 01-68 . - If the electrical test does not reveal any malfunctions, check all wiring and connectors for loose contacts. - If no problems are found after implementing the specified steps, replace the control module.

Output on printer of VAG1551 Scan Tool (ST) DTC	Possible cause	Corrective action
00644 Left front traction control switch-over valve -N168-	♦ Open circuit, short circuit to B+ or Ground (GND) in wiring between ABS hydraulic unit -N55- and ABS control module -J104-. ♦ Left front traction control switch-over valve -N168- malfunctioning.	- Carry out "electrical test", steps 5 +17 ⇒ page 01-68 . - If the electrical test does not reveal any malfunctions, check all wiring and connectors for loose contacts. - If no problems are found after implementing the specified steps, replace the control module.
00645 Left front traction control outlet valve -N169-	♦ Open circuit, short circuit to B+ or Ground (GND) in wiring between ABS hydraulic unit -N55- and ABS control module -J104-. ♦ Left front traction control outlet valve -N169- malfunctioning.	- Carry out "electrical test", steps 6 +17 ⇒ page 01-68 . - If the electrical test does not reveal any malfunctions, check all wiring and connectors for loose contacts. - If no problems are found after implementing the specified steps, replace the control module.

01-116

Output on printer of VAG1551 Scan Tool (ST) DTC	Possible cause	Corrective action
00646 ABS-ASR motor electrical connection 1	♦ Open circuit or short circuit to B+ or Ground (GND) in wiring between ABS control module -J104- terminal 18 and Engine Control Module (ECM).	- Locate and repair open circuit or short circuit. ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*
Note: The following signals are sent from the ABS control module (w/EDL) -J104- to the Engine Control Module (ECM) via this connection: ♦ MMD signal (Masked Misfire Diagnostic) for On Board Diagnostic (OBD) ♦ SET signal (Specified Engine Torque)	♦ ABS control module -J104- malfunctioning	- Replace ABS control module (w/EDL) -J104-.
	♦ Engine Control Module (ECM) malfunctioning.	- Replace Engine Control Module (ECM).

01-117

Output on printer of VAG1551 Scan Tool (ST) DTC	Possible cause	Corrective action
00647 ABS-ASR motor electrical connection 2	♦ Open circuit or short circuit to B+ or Ground (GND) in wiring between ABS control module -J104- terminal 47 and Engine Control Module (ECM).	- "Read measuring value block", display group 3 ⇒ page 01-67 . - Locate and repair open circuit or short circuit. ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*
Note: The following signal is sent from the Engine Control Module (ECM) to the ABS control module (w/EDL) -J104- via this connection: ♦ AET signal (Actual Engine Torque)	♦ Engine Control Module (ECM) malfunctioning.	- Replace Engine Control Module (ECM).

	◆ ABS/EDL/ASR control module -J104- malfunctioning.	- Replace ABS/EDL/ASR control module -J104-.

01-118

Output on printer of VAG1551 Scan Tool (ST) DTC	Possible cause	Corrective action
00668 Vehicle voltage terminal 30, open circuit ♦ When equipped with EDL, the ABS control module -J104- requires this voltage supply after ignition is switched off in order to calculate the drop in brake temperature; ⇒ page 01-39 .	♦ Voltage supply to ABS control module (w/EDL) -J104- (terminal 50) has an open circuit or short circuit to Ground (GND).	- Check wire connection. ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

01-119

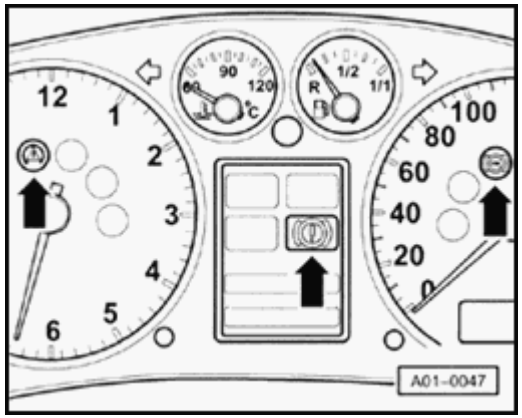
Output on printer of VAG1551 Scan Tool (ST) **DTC**	**Possible cause**	**Corrective action**
00761 DTC stored in Engine Control Module (ECM) ♦ This malfunction only occurs if vehicle is equipped with ASR.	♦ A DTC was stored in the Engine Control Module (ECM). The Engine Control Module (ECM) is not able to reduce engine torque.	- Repair the engine management malfunction using the appropriate engine repair manual and erase DTC memory of the Engine Control Module (ECM).
65535 Control module malfunctioning	♦ ABS control module -J104- malfunctioning	- Replace ABS control module (w/EDL) -J104-. Note: Do not erase DTC memory in this case. The data stored in the DTC memory provides information about the cause of the malfunction. This information helps to continually improve the product.

01-120

ABS/EDL/ASR Bosch 5.3

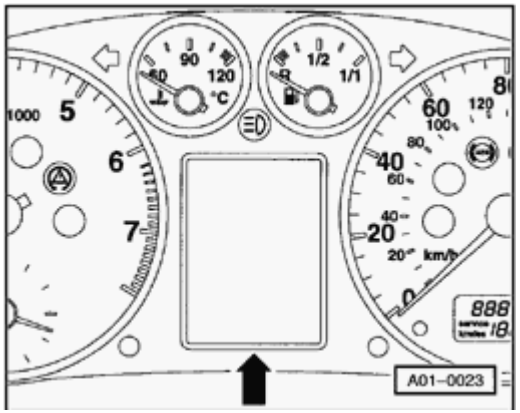
Warning light, functional overview

- If On Board Diagnostic (OBD) has detected a malfunction in the system, it indicates the malfunction by lighting up warning lamps when ignition is switched on. The warning lamps are located in the instrument cluster.



Instrument cluster without DIS

- The illustration shows the ABS/EDL warning light -K47- (right arrow), the warning light for brake system -K118- (center arrow, red symbol for "brake system malfunction") and the traction control indicator light -K86- (left arrow).



Instrument cluster with DIS

- For DIS, there is no warning light for brake system -K118-. The red "brake system malfunction" symbol appears in the display.
- If the ABS/EDL warning light -K47 and the red symbol for "Brake system malfunction" are not lit, but the brake system is not functioning properly, check for malfunctions in the mechanical/hydraulic brake system components.

⇒ *Repair manual, Brake System, Repair Group 46*

⇒ *Repair manual, Brake System, Repair Group 47*

ABS/EDL -K47-	Brake system	ASR -K86- 1)	Reasons why the indicator lamps light up
			If an irregularity occurs during the self test after ignition is switched on, and the warning lamps -K47- and -K86- do not light up for 2 seconds, check the warning lamps; "Electrical test" ⇒ page 01-166 , carry out test steps 8 and 10. The possible causes are as follows: ♦ The battery voltage is insufficient. None of the lamps in the instrument cluster light up. Check the battery. ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations* ⇒ *Repair Manual, Electrical Equipment, Repair Group 27, Battery*
		X 1)	♦ The ABS/EDL warning light does not light up during the self-test. There is a short to Ground (GND) in the wiring that controls the ABS/EDL warning light between terminal 21 of the ABS control module -J104- and the instrument cluster. This malfunction does not affect activation of the ABS warning light. For vehicles equipped with ASR, the traction control indicator lamp lights up during the self-test; "Electrical test" ⇒ page 01-166 , carry out test step 8.
X			♦ The vehicle is equipped with ASR. The ABS/EDL warning light lights up during the self-test. The traction control indicator light does not light up during the self-test "Electrical test" ⇒ page 01-166 , carry out test step 10.

1) The traction control indicator light is only available in vehicles equipped with ASR.

ABS/EDL -K47-	Brake system	ASR -K86- 1)	Reasons why the indicator lamps light up
X		X 1)	**For all vehicles:** ♦ If activation of both the ABS warning light -K47- and traction control indicator light -K86- is OK and the voltage supply is OK, the warning lamps light up for 2 seconds during the self-test after ignition is switched on. ♦ Check the voltage supply for the red "brake system malfunction" symbol. Carry out "Electrical test" step 9, ⇒ page 01-166 . If the control is malfunctioning, see the next example for lighted indicator lights. ♦ For DTCs stored in DTC memory that are no longer detected during the self-test when ignition is switched on or when a specific vehicle speed is reached and are found to be OK when checked, the red "brake system malfunction" symbol does not light up. For example:If there was a dynamic malfunction of the wheel speed sensor during the last driving period, the warning lamps automatically switch off after vehicle is restarted if wheel speed sensor is tested as OK once a vehicle speed of 2.75 km/h is reached. **For vehicles with control modules that do not provide EBD emergency mode:** - These vehicles can be identified by checking the note column under "Check control module version"; ⇒ page 01-128 . ♦ Voltage supply for the ABS control module -J104- is between 7 and 10 volts and the vehicle speed is ≤ 12 km/h. If the vehicle speed exceeds 6 km/h, a DTC entry will be made in DTC memory. At a vehicle speed of > 12 km/h, the red "brake system malfunction" symbol lights up; ⇒ "Check DTC memory" ⇒ page 01-187

1) The traction control indicator light is only available in vehicles equipped with ASR.

ABS/EDL -K47-	Brake system	ASR -K86- 1)	Possible reasons why the indicator lamps light up
X		X[1)]	**For vehicles with control modules that provide EBD emergency mode:** - These vehicles can be identified by checking the note column under "Check control module version"; ⇒ page 01-128 . ♦ A DTC is stored in the DTC memory the first time the vehicle exceeds 6 km/h, if the voltage supply to the ABS control module -J104- is between 7 and 10 volts and the indicator lights go on. If the voltage supply of the ABS control module -J104- exceeds 10 volts while driving, the indicator lights switch off. The DTC remains in the memory. If the voltage supply value drops below 10 volts again during the same driving cycle, the indicator lamps light up again. "Check DTC memory" ⇒ page 01-187 ♦ The indicator lights do not switch off after the self-test. However, the red "brake system malfunction" symbol did not go on. On Board Diagnostic (OBD) recognized a malfunction that did not deactivate the Electronic Brake Distribution (EBD) system. "Check DTC memory" ⇒ page 01-187

1) The traction control indicator light is only available in vehicles equipped with ASR.

ABS/EDL -K47-	Brake system	ASR -K86- 1)	Reasons why the indicator lamps light up
X	X	X[1)]	The vehicle can be equipped either with or without ASR. The ABS/EDL lamp remains constantly lit after ignition is switched on and the the red "brake system malfunction" symbol also lights up 3 seconds after ignition is switched on. **WARNING!** **Driving the vehicle presents the risk of accident! The brake system will only be partially functional. Because brake pressure at the rear wheels is no longer regulated vie Electronic Brake Distribution (EBD), the rear wheels tend to brake excessively. This causes the rear of the vehicle to break loose.** **For all vehicles:** ♦ The VAG1551 Scan Tool (ST) is connected and the data link to the ABS control module (w/EDL) -J104- was established. For vehicles with automatic transmission and high-line instrument cluster, the red "brake system malfunction" symbol does not appear immediately after the ignition is switched on. Instead, the note "Depress brake pedal before engaging gear" appears in the display. Press the brake pedal and select a gear. The red brake warning light appears, if the light control is working properly. ♦ On Board Diagnostic (OBD) recognized a malfunction that led to deactivation of Electronic Brake Distribution (EBD), ABS, EDL or ASR. "Check DTC memory" ⇒ page 01-187

1) The traction control indicator light is only available in vehicles equipped with ASR.

ABS/EDL -K47-	Brake system	ASR -K86- 1)	Possible reasons why the indicator lamps light up
X	X	X[1)]	**Additional information for vehicles with control modules that do not provide EBD emergency mode:** - These vehicles can be identified by checking the note column under "Check control module version"; ⇒ page 01-128 . ♦ Voltage supply for the ABS control module -J104- is between 7 and 10 volts and the vehicle speed is > 12 km/h. A DTC will be entered in DTC memory once vehicle reaches a speed > 6 km/h. "Check DTC memory" ⇒ page 01-187

1) The traction control indicator light is only available in vehicles equipped with ASR.

ABS/EDL -K47-	Brake system	ASR -K86- 1)	Reasons why the indicator lamps light up
		X 1)	**The vehicle is equipped with ASR:** ♦ There is a malfunction that affects only the ASR system. The ABS and EDL systems are not deactivated. Check DTC memory ⇒ page 01-187 ♦ ASR is switched off via the traction control button. If the traction control indicator light does not light up in this case, check the switch and the indicator light, carry out the "Electrical test", steps 10 and 11 ⇒ page 01-166 . ♦ ASR is in adjustment mode. The traction control indicator light blinks 3 times per second. ♦ Short circuit to B+ in the traction control button: The traction control indicator light switches off five minutes after ignition is switched on. ♦ The lamp remains constantly lit after ignition is switched on, but none of the above mentioned conditions are true. There is a short to Ground (GND) in the wiring that controls the traction control indicator light between terminal 20 of the ABS control module -J104- and the instrument cluster.
			There is an irregularity present or a complaint has been made. The indicator lamps go on during the self-test and then go out. The possible causes are as follows: ♦ The DTC "Brake light switch -F-" is stored in DTC memory , check DTC memory ⇒ page 01-187 . ♦ The DTC "ABS/instrument cluster electrical connection" is stored in DTC memory , check DTC memory ⇒ page 01-187 .

			♦ The onset of EDL was shut-off to avoid an overheating in the brake system, read measuring value block ⇒ page 01-140 .

1) The traction control indicator light is only available in vehicles equipped with ASR.

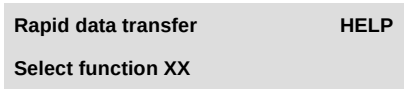
ABS/EDL -K47-	Brake system	ASR -K86- 1)	Reasons why the indicator lamps light up
X	X		**The vehicle can be equipped either with or without ASR. No DTCs are stored in DTC memory. The ABS/EDL lamp remains constantly lit after ignition is switched on and the the red "brake system malfunction" symbol also lights up 3 seconds after ignition is switched on. The traction control indicator lamp does not light up even for vehicles equipped with ASR.** ♦ There is an open circuit or short circuit to B+ in the wire that controls the ABS/EDL warning lamp between terminal 21 of the ABS control module -J104- and the instrument cluster; carry out "Electrical test" step 8 ⇒ page 01-166 . ♦ Voltage supply for control module less than 6 volts; carry out "Electrical test" step 1 ⇒ page 01-166 .
	X		**No DTCs are stored in DTC memory. The red "brake system malfunction" symbol remains lit after the ignition is switched on.** ♦ The brake fluid level is too low. ♦ Malfunction in instrument cluster: Carry out "Electrical test" step 9, ⇒ page 01-166 .

1) The traction control indicator light is only available in vehicles equipped with ASR.

Check Control Module Version (function 01)

- Connect the VAG1551 Scan Tool (ST) and select address word 03 "Brake Electronics".

- Advance through program sequence by pressing the → button.



Indicated on display:

- Press buttons -0- and -1- to select "Check Control Module Version" 01. Press -Q- button to confirm input.

Notes:

- *The control module version can only be changed by replacing the control module.*
- *Allocation of the ABS control module -J104-, see also parts catalog.*

8E0 614 111 1)	2) 3)
Coding 00000	WSCXXXXX

Indicated on display:

The coding is only indicated for vehicles with Anti-Slip Regulation (ASR), coding control module ⇒ page 01-135 .

The workshop code, WSC XXXXX, indicates the workshop where the control module was last coded.

IndeX 1): Indicates control module index.

Index 2): Indicates system identification.

Index 3): Indicates hardware and software status

- Press → button.

Rapid data transfer	HELP
Select function XX	

Indicated on display:

ABS control module versions without CAN bus

System identification	Prod. No.: 1)	Control module part no.:	Index	Coding	Data transmission via:	Notes:
Front Wheel Drive (FWD)/ABS Bosch 5.3	1AC	8E0 614 111	-	coding not possible	single wires	Not pre-bled hydraulic control unit for production.
		8E0 614 111	AB	coding not possible	single wires	Not pre-bled hydraulic control unit for production. With EBD emergency mode.
		8E0 614 111	AD	coding not possible	single wires	Not pre-bled hydraulic control unit for production. With EBD emergency mode and wheel speed sensor outputs at rear left and rear right for navigation.
		8E0 614 111	D	coding not possible	single wires	Pre-bled hydraulic control unit for customer service.
		8E0 614 111	AC	coding not possible	single wires	Pre-bled hydraulic control unit for customer service. With EBD emergency mode.
		8E0 614 111	AE	coding not possible	single wires	Pre-bled hydraulic control unit for customer service. With EBD emergency mode and wheel speed sensor outputs at rear left and rear right for navigation.

1) This letter code is the production number allocated to each equipment version. The production number can be derived from the vehicle data plate. The vehicle data plate is attached to the vehicle in the spare tire well.

ABS, EDL control module versions without CAN bus

System identification	Prod. No.: 1)	Control module part no.:	Index	Coding	Data transmission via:	Notes:
Front Wheel Drive (FWD)/ABS/EDL Bosch 5.3	1AH	8E0 614 111	P	coding not possible	single wires	Unbled hydraulic control unit for production.
		8E0 614 111	B	coding not possible	single wires	Unbled hydraulic control unit for production. With integrated suction damper and EBD emergency mode.
		8E0 614 111	Q	coding not possible	single wires	Pre-bled hydraulic control unit for customer service.
		8E0 614 111	F	coding not possible	single wires	Pre-bled hydraulic control unit for customer service. With integrated suction damper and EBD emergency mode.

1) This letter code is the production number allocated to each equipment version. The production number can be derived from the vehicle data plate. The vehicle data plate is attached to the vehicle in the spare tire well.

System identification	Prod. No.: 1)	Control module part no.:	Index	Coding	Data transmission via:	Notes:
All Wheel Drive (AWD)/ABS/EDL Bosch 5.3	1AH	8E0 614 111	M	coding not possible	single wires	Unbled hydraulic control unit for production.
		8E0 614 111	A	coding not possible	single wires	Unbled hydraulic control unit for production. With integrated suction damper and EBD emergency mode.
		8E0 614 111	N	coding not possible	single wires	Pre-bled hydraulic control unit for customer service.
		8E0 614 111	E	coding not possible	single wires	Pre-bled hydraulic control unit for customer service. With integrated suction damper and EBD emergency mode.

1) This letter code is the production number allocated to each equipment version. The production number can be derived from the vehicle data plate. The vehicle data plate is attached to the vehicle in the spare tire well.

ASR control module versions Bosch 5.3 without CAN bus

System identification	Prod. No.: 1)	Control module part no.:	Index	Coding	Data transmission via:	Notes:
Front Wheel Drive (FWD)/ABS/ASR Bosch 5.3	1AJ	8E0 614 111	R	coding possible ⇒ page 01-135	single wires	Unbled hydraulic control unit for production.
		8E0 614 111	C	coding possible ⇒ page 01-135	single wires	Unbled hydraulic control unit for production. With integrated suction damper and EBD emergency mode.
		8E0 614 111	S	coding possible ⇒ page 01-135	single wires	Pre-bled hydraulic control unit for customer service.
		8E0 614 111	G	coding possible ⇒ page 01-135	single wires	Pre-bled hydraulic control unit for customer service. With integrated suction damper and EBD emergency mode.

1) This letter code is the production number allocated to each equipment version. The production number can be derived from the vehicle data plate. The vehicle data plate is attached to the vehicle in the spare tire well.

ASR control module versions Bosch 5.3 with CAN bus

System identification	Prod. No.: 1)	Control module part no.:	Index	Coding	Data transmission via:	Notes:
Front Wheel Drive (FWD)/ABS/ASR Bosch 5.3	1AJ	4D0 614,111	H	coding not possible	CAN-bus	Unbled hydraulic control unit for production.
		4D0 614,111	J	coding not possible	CAN-bus	Pre-bled hydraulic control unit for customer service.
		8E0 614 111	H	coding possible ⇒ page 01-135	CAN-bus	Unbled hydraulic control unit for production. With integrated suction damper and EBD emergency mode.
		8E0 614 111	J	coding possible ⇒ page 01-135	CAN-bus	Pre-bled hydraulic control unit for customer service. With integrated suction damper and EBD emergency mode.
		8E0 614 111	AH	Can be coded	CAN-bus	120 Ω
		8E0 614 111	AJ	Can be coded	CAN-bus	120 Ω
		8E0 614 111	AQ	Can be coded	CAN-bus	1120 Ω
		3B0 614 111		Can be coded	CAN-bus	1120 Ω

[1)] This letter code is the production number allocated to each equipment version. The production number can be derived from the vehicle data plate. The vehicle data plate is attached to the vehicle in the spare tire well.

01-135

Code Control Module (function 07)

Has an ASR control module just been replaced or is one of the following DTCs stored in DTC memory of the control module?

- "ABS/EDL transmission electrical connection"
- "Control module incorrectly coded"
- "CAN-bus missing signal from Transmission Control Module (TCM)"

If so, control module must be coded according to engine and transmission type.

Notes:

- *Coding is only possible if a workshop number is stored in the VAG1551 Scan Tool (ST).*

⇒ *Operating instructions for VAG1551*

- *During control module identification the 5-digit code will be indicated.*

01-136

- Connect the VAG1551 Scan Tool (ST) and select address word 03 "Brake Electronics".

- Check the control module version ⇒ page 01-128 and press the →button.

- Press → button.

Rapid data transfer	**HELP**
Select function XX	

Indicated on display:

- Press buttons -0- and -7- to select "Code control module" function 03.

Rapid data transfer	**Q**
07 - Code control module	

Indicated on display:

- Press -Q- button to confirm input.

Code control module	**Q**
Enter code number	**XXXXX**

Indicated on display:

- Enter the appropriate code number and press -Q- button to confirm input.

01-137

Coding table ABS/EDL/ASR with CAN

Engine	Transmission		Data transmission via:	Control module part number with index		Code number
1.8 T1) 4 Cyl. 5V	Manual transmission	01E	CAN-bus	8E0 614 111	AH; AJ;AQ	00022
	Automatic transmission	01V	CAN-bus	8E0 614 111	AH; AJ;AQ	00021
2.4 Liter 6 Cyl. 5V 2.7 Liter 5V 6 2.8 Liter Cyl. 5V 6 Cyl.	Manual transmission	01E	CAN-bus	8E0 614 111	AH; AJ;AQ	00032
2.4 Liter 6 Cyl. 5V 2.7 Liter 5V 6 2.8 Liter Cyl. 5V 6 Cyl.	Automatic transmission	01V	CAN-bus	8E0 614 111	AH; AJ; AQ	00031
2.5 Liter 6 Cyl. 4V TDI 1.9 TDI PD2) 4 Cyl. 4V	Manual transmission	01E	CAN-bus	8E0 614 111	AH; AJ; AQ H; J;	00012

2.5 Liter	6 Cyl.	4V	TDI	Automatic transmission	01V	CAN-bus	8E0 614 111	AH; AJ; AQ
1.9 PD2)	4 Cyl.	4V	TDI					H; J;

00011	

1) 1.8 T means 1.8 Liter Turbo engine

2) 1.9 PD means 1.9 Liter injection Pump Diesel engine

01-138

Engine	Transmission	Data transmission via:	Control module part number with index		Code number	Note:
2.4 Liter 6 Cyl. 5V	Manual transmission 012	single wires	8E0 614 111	R; S C; G	00000	Terminal 28 at ABS control module (w/EDL) - J104- not occupied.
	Automatic transmission 01V	single wires	8E0 614 111	R; S C; G	00003	Terminal 28 at ABS control module (w/EDL) - J104- occupied with 12V.
2.8 Liter 6 Cyl. 5V	Manual transmission 012	single wires	8E0 614 111	R; S C; G	00000	Terminal 28 at ABS control module (w/EDL) - J104- not occupied.
	Automatic transmission 01V	single wires	8E0 614 111	R; S C; G	00003	Terminal 28 at ABS control module (w/EDL) - J104- occupied with 12V.

01-139

4D0 907 379 X Syst. ident. Software ver.
Coding 00000 WSCXXXXX

- Display will indicate the control module identification and the coding entered (e.g. 00000).

- Press → button.

Rapid data transfer HELP
Select function XX

- Indicated on display:

- Press buttons -0- and -6- to select "End Output" function 06. Press -Q- button to confirm input.

Read Measuring Value Block (function 08)

The control module can transmit measured values. These measured values provide information about the operational status of the system and the sensors connected to it. In many cases the data supplied can be used to troubleshoot and repair malfunctions. The measured values from the ABS/EDL Bosch 5.3 series are contained in four display groups, which can be accessed via their display group numbers.

- Observe safety precautions that apply to road tests.

- Connect the VAG1551 Scan Tool (ST) and select address word 03 "Brake Electronics".

Notes:

- *When the printer is switched on, the contents of the display will be printed out on the scan tool log.*

- *When reading the measuring value block, also check wiring and connectors for loose terminals.*

- Check the control module version ⇒ page 01-128 and press the →button.

01-141

Rapid data transfer	**HELP**
Select function XX	

Indicated on display:

- Press buttons -0- and -8- to select "Read measuring value block" function 08.

Rapid data transfer	**Q**
08 - Read measuring value block	

Indicated on display:

- Press -Q- button to confirm input.

Read measuring value block	**HELP**
Input display group number	**XXX**

Indicated on display:

- Press buttons -0-, -0- and -1-.
- Press -Q- button to confirm input.

01-142

Test table: display group 1

Notes:

- *Display fields 1 through 4 show the current wheel circumference speeds in km/h. These are calculated by the ABS control module -J104- on the basis of the signals received from the wheel speed sensors. If one of the display fields shows no reading, proceed as for DTCs 00283, 00285, 00287, 00290 "ABS Wheel Speed Sensor" Diagnostic Trouble Code (DTC) table*

- *In order to check whether wheel speed sensors are properly allocated to each wheel, the vehicle must be raised. On vehicles with manual transmission put the gear shift lever in neutral. On vehicles with automatic transmission move the selector lever to position "N". Turn appropriate wheel by hand. Remaining drive wheels must be secured against turning.*

- *When a vehicle is accelerated uniformly on a dry surface, the displayed value will increase continuously by whole numbers; e.g. 6 km/h, 7 km/h, 8 km/h ... . The difference between displayed values 1-4 should not be more than ± 1 km/h (error from out-of-round wheels). If the values jump, for instance from ...6km/h, 7 km/h, to 12 km/h...or if the difference between the displayed values is greater than ± 1 km/h, then check the installation of the wheel speed sensors and rotors.*

⇒ *Repair Manual, Brake System, Repair Group 45*

Read measuring value block			1 →	◀ Indicated on display
1 to 19 [1)] km/h	1 to 19 [1)] km/h	1 to 19 [1)] km/h	1 to 19 [1)] km/h	
			Right rear ABS wheel speed sensor	
		Left rear ABS wheel speed sensor		
	Right front ABS wheel speed sensor			

Left front ABS wheel speed sensor

1) On Board Diagnostic (OBD) is terminated by the ABS control module -J104- if road speed exceeds 19 km/h.

01-143

Note:

The display group numbers can be selected in sequence by pressing buttons <-1 and 3-> on the VAG1551 scan tool, or the arrow buttons ↑ and ↓ on the VAG1552 mobile scan tool.

- Press -C- button to input display group number manually.

Read Measuring Value Block

Enter display group number XXX



Indicated on display:

- Press buttons -0-, -0- and -2-.
- Press -Q- button to confirm input.

01-144

Test table: display group 2

Read measuring value block			2 →	◀ Indicated on display
0 or 1	0 or 1	0 or 1	---	

ABS solenoid valve relay:

♦ 0 → not permitted during "Read measuring value block", the relay was not activated during "ignition on".

- Electrical test, steps 1 and 2, check voltage supply ⇒ page 01-166 . If no malfunction can be found here, replace hydraulic control unit.

♦ 1 → specified value, relay was activated by ABS control module -J104- during ignition on.

Voltage at motor for ABS return flow pump:

♦ 0 → specified value, there is no voltage at the motor for the ABS return flow pump.

♦ 1 → not permitted during "Read measuring value block", there is voltage at the motor for the ABS return flow pump. Replace hydraulic control unit.

Brake light switch:

♦ 0 → Brake pedal not operated

♦ 1 → Brake pedal operated

- Check brake light switch if there are deviations. Carry out "Electrical test", step 3 ⇒ page 01-166 .

01-145

Note:

The display group numbers can be selected in sequence by pressing buttons <-1 and 3-> on the VAG1551 scan tool, or the arrow buttons ↑ and ↓ on the VAG1552 mobile scan tool.

- Press -C- button to input display group number manually.

Read Measuring Value Block

Enter display group number XXX

➢ Indicated on display:

Note:

For display group 3 (005):

- *To read the display fields for engine speed and current engine torque with the engine running, communication between the scan tool and the control module must be terminated via the "End Output" function ⇒ page 01-16 . Start the engine and reinitiate communication between the scan tool and the control module.*

- Press buttons -0- and -8- to select "Read measuring value block" function 08.
- Press -Q- button to confirm input.
- Press buttons -0-, -0- and -3-.
- Press -Q- button to confirm input.

01-146

Test table: display group 3

Read measuring value block			3 →	◀ Indicated on display
60 to 8000 1 RPM	0 to 100 %	0 or 1	---	

Traction control (ASR) button: (Only for vehicles equipped with ASR)

♦ 0 → Traction control button not operated.

♦ 1 → The traction control button is operated, operational condition of ASR alternates, i.e. "ASR OFF" and "ASR ON".

- Check traction control button if there are deviations. Carry out "Electrical test", step 11 ⇒ page 01-166 .

Actual engine torque (AET): (Only for vehicles equipped with ASR)

♦ 0% → vehicle is in deceleration mode.

♦ 20% - 30% → represents engine idle.

♦ 100% → engine is offering its maximum torque.

- If no indication is displayed, proceed according to DTC 00647 "ABS-ASR engine electrical connection 2". Diagnostic Trouble Code (DTC) table

Engine speed: (Only for vehicles equipped with ASR)

♦ Engine speed is displayed in increments of 60 RPM, starting at 60 RPM.

- If no indication is displayed, proceed according to DTC 00529 "Wheel speed information missing. No signal". Diagnostic

Trouble Code (DTC) table

01-147

Note:

The display group numbers can be selected in sequence by pressing buttons <-1 and 3-> on the VAG1551 scan tool, or the arrow buttons ↑ and ↓ on the VAG1552 mobile scan tool.

- Press -C- button to input display group number manually.

Read Measuring Value Block

Enter display group number XXX



Indicated on display:

- Press buttons -0-, -0- and -4-.
- Press -Q- button to confirm input.

01-148

Test table: display group 4

Read measuring value block			4 →	◀ Indicated on display
Std:min or too large or ERROR or invalid	0 or 1	0 or 1	---	

EDL/ASR shut-off: (Only for vehicles equipped with EDL or ASR)

- This possibility is only provided for development purposes.
- 0 → EDL/ASR available
- 1 → EDL/ASR not available

EDL shut-off due to excessive brake temperature: (Only for vehicles with EDL)

- 0 → EDL was not shut off during the last 20x "ignition switched on and off".
- 1 → EDL was shut off during the last 20x "ignition switched on and off".

Standing time: (Only for vehicles equipped with EDL)

- too large: A standing time larger than 255 hours and 59 minutes is not indicated on the display.
- ERROR: Two valid and matching time transmissions from the instrument cluster to the ABS control module (w/EDL) - J104- did not occur after ignition was switched on and engine was started. Check whether the DTC 01203 "ABS/instrument cluster electrical connection" is stored in DTC memory.

- Invalid: Standing time could not be obtained during this ignition cycle. Standing time calculation must be activated for at least 20 seconds when the first component is operated for the first time when ignition is switched on after the instrument cluster or the hydraulic control module have been replaced. The standing time will be indicated the next time ignition is switched on.

Output Diagnostic Test Mode (DTM) (function 03)

Output Diagnostic Test Mode (DTM) is used to check the function of actuators. Actuators are also called actors. These are components that the control module activates when it reacts to the signals sent by sensors.

"Function of actuators" includes all functions and properties of an actuator under operating conditions. This means, for example:

- An electrically operated hydraulic valves that opens and closes when activated by the control module.

- The relay of an electrical motor when activated by the control module. The motor switches on and carry outs the task.

Before initiating the output Diagnostic Test Mode (DTM), make sure there are no electrical malfunctions in the system you wish to test. This will enable you to recognize any mechanical problems. Perform a guided troubleshooting before starting output Diagnostic Test Mode (DTM) ⇒ page 01-19 .

Are you sure there are no electrical malfunctions in the system? If you have made sure that there are no electrical malfunctions in the system, you

will be able to identify any mechanical malfunctions in the individual actuators if the results of the output DTM are not as specified here. Replace the relevant part.

01-150

For Bosch 5.3 ABS/EDL, output Diagnostic Test Mode (DTM) enables you to check the electrically actuated hydraulic valves and the pump motor in the hydraulic module. Also check whether the brake lines are connected to the proper brakes.

Notes:

- *The vehicle must be raised until all wheels are free to turn. Ask a colleague to help. The colleague will have to check the wheels to determine whether they turn freely.*

- *You can stop the test sequence at any time by pressing the -C- button. If you wish to perform output Diagnostic Test Mode (DTM) again after this, communication must be interrupted via the "End Output" function ⇒ page 01-16 , and then be re-established.*

01-151

Notes:

- *To avoid overloading the components being checked, they are actuated during the test sequence for a period of 60 (or 90) seconds. The actuator test will be terminated if the "→ button" is not pressed within this period.*
- *The ABS warning light and the red "brake system malfunction" symbol blink during the test.*
- *Pressing the brake pedal repeatedly this relieves the vacuum in the brake booster. For this reason, the brake pedal must be pressed harder in order to achieve the same braking effect. Your work will be easier if you run the engine briefly. This will build up vacuum in the brake booster again.*

01-152

During the test, the individual test steps are shown in the second line of the VAG1551 scan tool display. The following abbreviations are used.

IV = Inlet valve

OV = Outlet valve

LF = Left Front

RF = Right Front

LR = Left Rear

RR = Right Rear

B+ = Battery Positive Voltage (B+) at valve

0V = 0 volts; No voltage at valve

Locked/free = Wheel condition; must be checked by second technician

Hydr-P = Hydraulic pump

- Connect the VAG1551 Scan Tool (ST) and select address word 03 "Brake Electronics".

- Check the control module version ⇒ page 01-128 and press the →button.

Rapid data transfer **HELP**	
Select function XX	

Indicated on display:

- Press buttons -0- and -3- to select "Output Diagnostic Test Mode (DTM)" function 03.

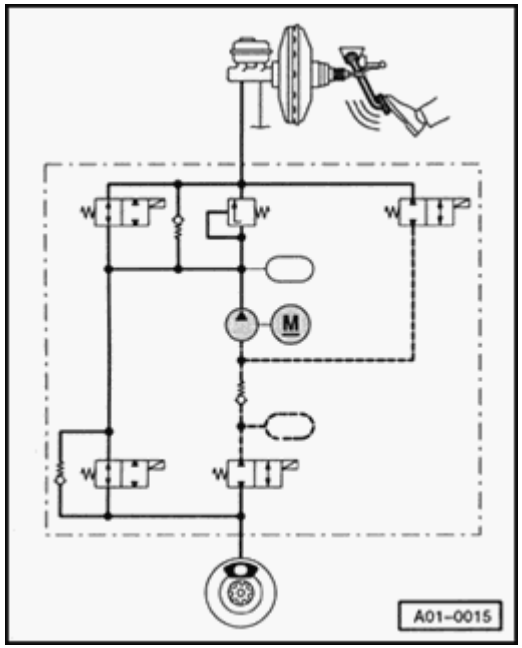
Rapid data transfer **Q**	
03 - Output Diagnostic Test Mode (DTM)	

Indicated on display:

- Press -Q- button to confirm input.

01-154

Output Diagnostic Test Mode (DTM) → ABS hydraulic pump -V64-



Indicated on display:

ABS/EDL hydraulic pump -V64- must start running. This is audible.

When you put your foot on the brake pedal you can feel it vibrating. The brake pedal vibrates because the hydraulic pump generates pressure pulses in the brake lines. The pressure pulses generate oscillations. These are directed to the brake pedal and make it vibrate.

The pressure pulses in the brake lines are not sufficient to lock the wheels.

The hydraulic circuit diagram shows a systematic representation of an ABS/EDL system. This will give a better understanding of the various test steps in the output Diagnostic Test Mode (DTM).

- shaded components are in action.
- Thin solid lines represent hydraulic lines or hoses that are not under pressure.
- Thick broken lines represent hydraulic lines or hoses working as suction lines.
- Thick solid lines represent hydraulic lines or hoses that are under pressure.

- Press → button.

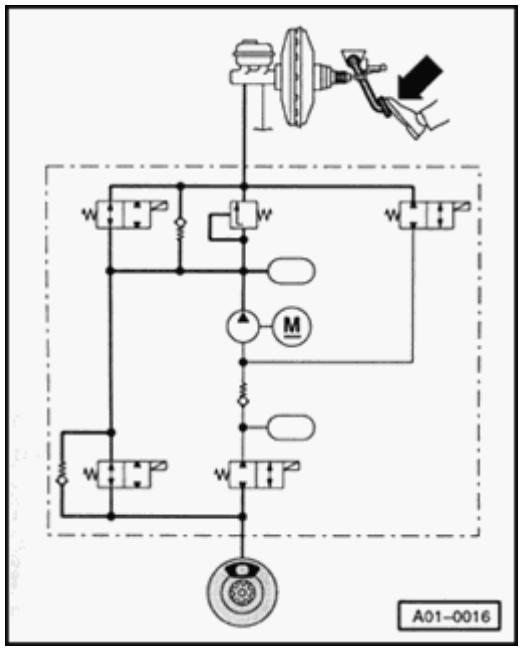
01-155

Output Diagnostic Test Mode (DTM) - →

Operate brake

Output Diagnostic Test Mode (DTM) - →

lfl: 0V Ofl: 0V fl wheel locked



➢ Indicated on display:

- Press → button.

➢ Indicated on display:

➢ When you press the brake pedal, brake fluid pressure will be built up in all four calipers. All four wheels lock.

Requirement for this: mechanical/hydraulic components of the brake system must be fully functional. This means that the master brake cylinder is able to build up pressure in all wheel cylinders and the hydraulic connections and lines are all sealed properly. If the wheels do not lock, visually inspect brake fluid reservoir, master brake cylinder, hydraulic unit, and calipers.

Concentrate on the left-front wheel first. The function of the control elements for this wheel is tested first.

Note:

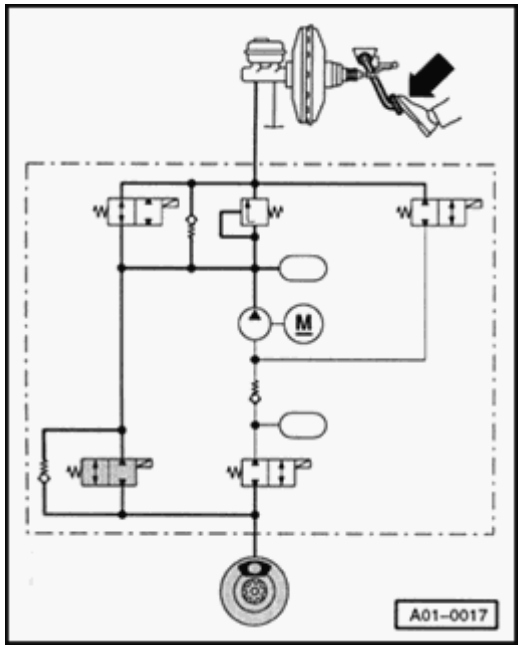
This test step in the output diagnostic test mode corresponds to the "pressure build-up" phase during ABS-controlled braking.

01-156

- Press → button.

Output Diagnostic Test Mode (DTM) _ →

Ifl: B+ Ofl: 0V fl wheel locked



➢ Indicated on display:

Keep pressing brake pedal.

➢ Inlet valve is activated. It interrupts the brake line. However, fluid pressure is still maintained in the wheel cylinder. The left-front wheel remains locked.

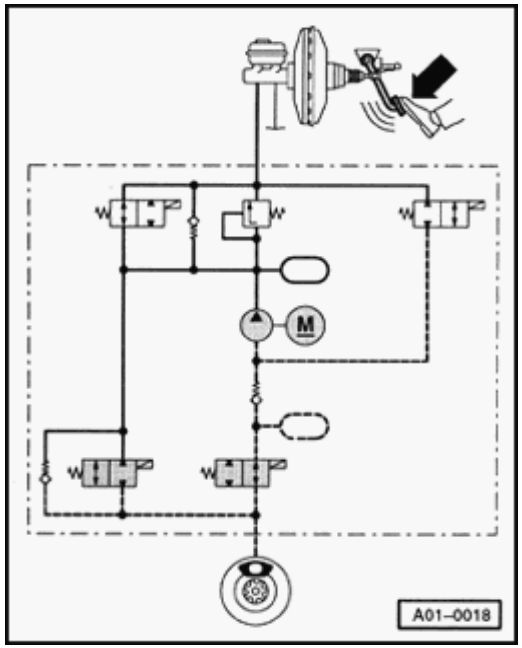
Note:

This test step in the output diagnostic test mode corresponds to the "maintain pressure" phase during ABS-controlled braking.

- Press → button.

01-157

Output Diagnostic Test Mode (DTM) _ →		
Ifl: B+	Ofl: B+	fl wheel free



➢ Indicated on display:

Keep pressing brake pedal.

The inlet valve and the outlet valve for the left-front wheel are activated. The hydraulic pump starts running and reduces the fluid pressure in the caliper via the open outlet valve.

➢ The brake pedal must not give, and should press harder against your foot.

You should now be able to turn the left-front wheel.

If you cannot turn the wheel, check whether the brake line for the left-front wheels is connected correctly. If yes, this indicates a mechanical malfunction in one of the valves, providing there is no electrical malfunction in the system. Replace hydraulic control unit.

If the pedal gives under your foot, this means that the inlet valve or the check valve activated in parallel to the inlet valve is leaking. Replace hydraulic control unit.

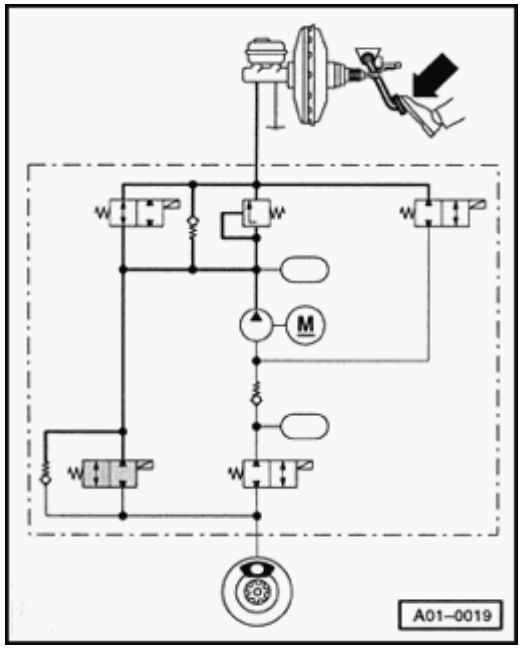
Note:

This test step in the output diagnostic test mode corresponds to the "pressure reduction" phase during ABS-controlled braking.

- Press → button.

01-158

Output Diagnostic Test Mode (DTM) _ →		
Ifl: B+	Ofl: 0V	fl wheel free



➢ Indicated on display:

ABS/EDL hydraulic pump -V64- will stop running.

➢ Keep pressing brake pedal. Only the inlet valve is still activated and interrupts the brake line. If the inlet valve is not leaking, you should be able to turn the left-front wheel.

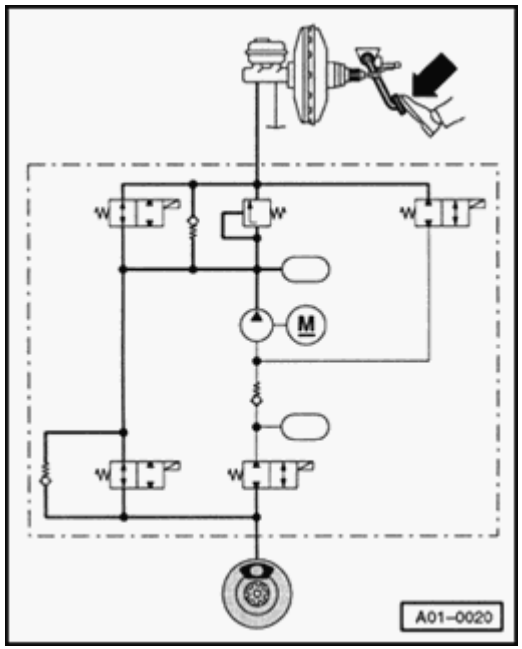
If you cannot turn the wheel, this means that the inlet valve or the check valve activated in parallel to the inlet valve is leaking. Replace hydraulic control unit.

- Press → button.

01-159

Output Diagnostic Test Mode (DTM) - →

Ifl: 0V Ofl: 0V fl wheel locked



- Indicated on display:

- Keep pressing brake pedal. Inlet valve is no longer being activated. It is no longer interrupting the brake line. The brake pedal will give perceptibly under your foot. Fluid pressure is built again in the left-front caliper. The wheel will be locked.

  - Press → button.

Output Diagnostic Test Mode (DTM) - →

Release brake

- Indicated on display:

  - Press → button.

01-160

Continue output Diagnostic Test Mode (DTM) in order to check the front right, rear left, and rear right wheels in sequence. The test steps indicate the procedure for the front left wheel. They will therefore not be repeated in detail.

Output Diagnostic Test Mode (DTM) _ →

Operate brake

Indicated on display:

- Press → button.

Output Diagnostic Test Mode (DTM) _ →

Ifr: 0V Ofr: 0V fr wheel locked

Indicated on display:

- Press → button.

Output Diagnostic Test Mode (DTM) _ →

Ifr: B+ Ofr: 0V fr wheel locked

Indicated on display:

- Press → button.

ABS/EDL hydraulic pump -V64- must start running.

The brake pedal must not give.

Output Diagnostic Test Mode (DTM) _ →

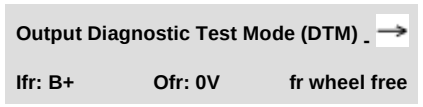
Ifr: B+ Ofr: B+ fr wheel free

Indicated on display:

- Press → button.

ABS/EDL hydraulic pump -V64- will stop running.

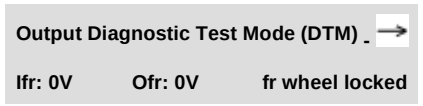
01-161



Indicated on display:

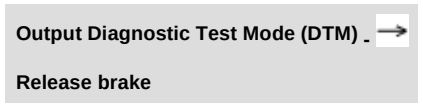
- Press → button.

Brake pedal must give noticeably.



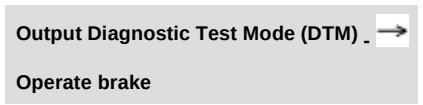
Indicated on display:

- Press → button.



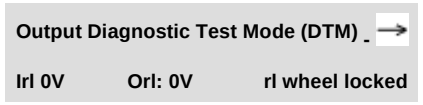
Indicated on display:

- Press → button.



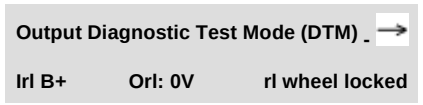
Indicated on display:

- Press → button.



Indicated on display:

- Press → button.



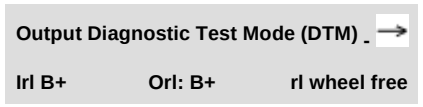
Indicated on display:

- Press → button.

ABS/EDL hydraulic pump -V64- must start running.

The brake pedal must not give.

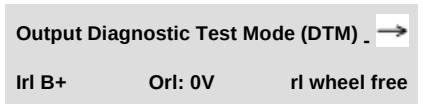
01-162



Indicated on display:

- Press → button.

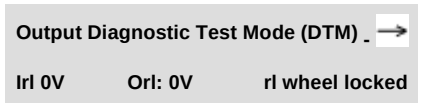
ABS hydraulic pump -V64- will stop running.



Indicated on display:

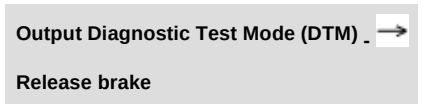
- Press → button.

Brake pedal must give noticeably.



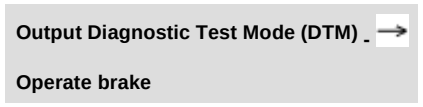
Indicated on display:

- Press → button.



Indicated on display:

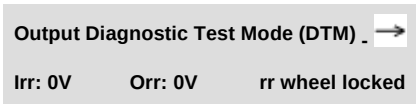
- Press → button.



Indicated on display:

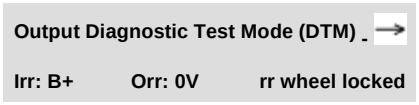
- Press → button.

01-163



Indicated on display:

- Press → button.

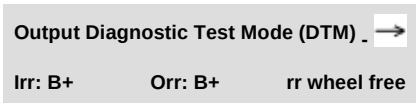


Indicated on display:

- Press → button.

ABS/EDL hydraulic pump -V64- must start running.

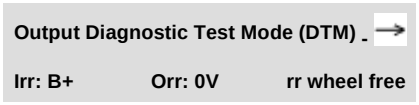
The brake pedal must not give.



Indicated on display:

- Press → button.

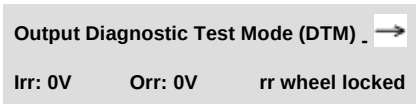
ABS/EDL hydraulic pump -V64- will stop running.



Indicated on display:

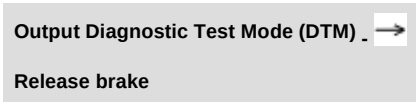
- Press → button.

Brake pedal must give noticeably.



Indicated on display:

- Press → button.



Indicated on display:

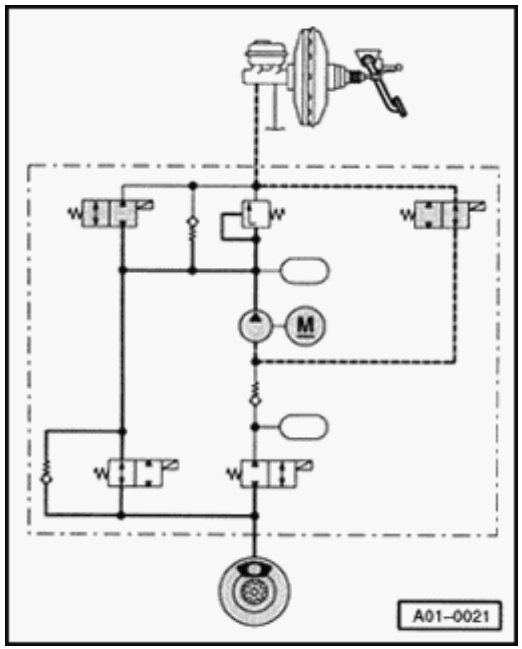
- Press → button.

01-164

Output Diagnostic Test Mode (DTM) → EDL valves/ Hydr-P : B+ Wheel fl/fr lock

Indicated on display: Only significant for troubleshooting on vehicles with EDL, starting with production deadline of calendar week 21/1997. For these vehicles, the test step was modified in parallel to implementation of EBD emergency mode. Prior to production deadline of calendar week 21/1997, the hydraulic pump is not activated. This test step does not apply to vehicles without EDL.

The vehicle version, as relates to EBD, can be recognized by checking the note column under "Check control module version"; ⇒ page 01-128 .



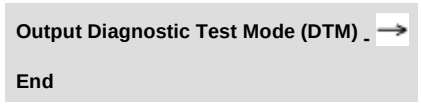
The EDL change-over valve (left) and the EDL inlet valve are activated. ABS return flow pump -V39- runs for one second. It draws brake fluid from the brake fluid expansion tank via the EDL inlet valve. The hydraulic pump builds brake fluid pressure in the EDL regulated wheel cylinders. These wheels will then be locked.

If not, this indicates a mechanical malfunction in one of the valves, providing there is no electrical malfunction in the system. Replace hydraulic control unit.

This test step cannot be performed on vehicles that are not equipped with EDL. These vehicles lack the EDL valves and the pressure relief valve.

01-165

- Press → button.

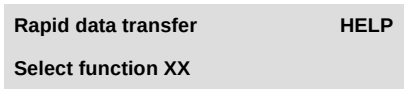


Indicated on display:

Note:

The output diagnostic test mode is completed. The ABS/EDL warning light and the red warning symbol for brake system go out.

- Press → button.



Indicated on display:

Note:

- *If the ABS/EDL warning light does not go out, this indicates a malfunction in the system. Observe test sequence exactly ⇒ page 01-17 .*

- Press buttons -0- and -6- to select "End Output" function 06. Press -Q- button to confirm input.

01-166

Electrical testing

- If the On Board Diagnostic (OBD) sequence does not provide any indication of the source of the malfunction, work through all of the electrical test steps.

- If the OBD sequence identifies the source of the malfunction, only carry out the test steps recommended in the DTC table (specific testing).

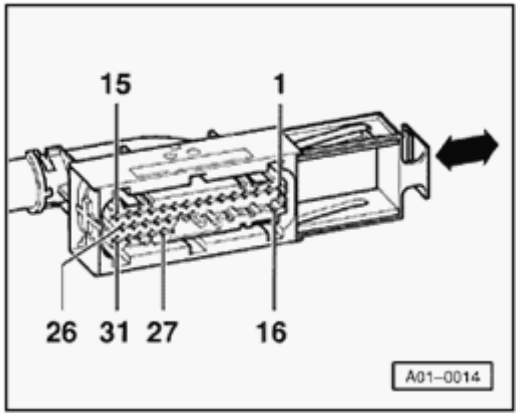
Test requirements

- The "Automatic Test Sequence" was carried out and it was determined that the Transmission Control Module (TCM) and Engine Control Module (ECM) only contain DTCs relating to ABS/EDL.

  - Connect the VAG1551 Scan Tool (ST) and select the address word 00 with ignition switched on;

  - After completing electrical test, check and erase DTC memories of Transmission Control Module (TCM) and Engine Control Module (ECM).

01-167



- Multi-pin harness connector for ABS control module -J104- in proper condition, with no bent, broken or corroded terminals. Replace any damaged terminals using VAS1978 wiring repair kit.

Note:

The operation manual for the VAS1978 wiring harness repair kit generally forbids the repair of any lines in the ABS or related systems. This rule only pertains to the shielded lines in these systems.

- Ignition and electrical consumers switched off before beginning testing (headlights, lighting, fan, etc.).

01-168

Required special tools and test equipment:

- VAG1598 test box
- VAG1598/27 adapter
- VAG1594 connector test kit
- VAG1526 Multimeter

01-169

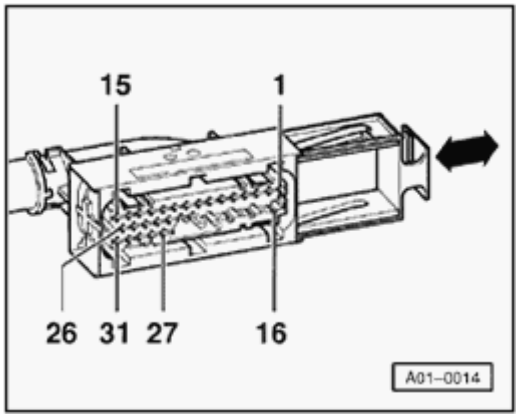
Connect VAG1598 test box using VAG1598/27 adapter.

- Switch ignition off.

- Connect VAG1598/27 adapter and VAG1598 test box. Disconnect multi-pin connector from ABS control module -J104-. Connect VAG1598/27 adapter and VAG1598 test box to connector of ABS/EDL wiring harness.

The socket designations on the VAG1598 test box are identical to the terminal designations on the ABS control module -J104- and on the wiring harness connector.

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*



Terminal assignment of multi-pin connector at wiring harness / ABS control module (w/EDL) -J104-

Note:

All terminals omitted here are not occupied at the moment and must not be connected to other components!

01-170

Terminal	Wire connection to component ...
1	**Right rear ABS wheel speed sensor -G44-**
2	**Right rear ABS wheel speed sensor -G44-** ♦ for vehicles with Front Wheel Drive (FWD) and ABS/EDL/ASR ♦ for vehicles with All Wheel Drive (AWD) and ABS/EDL
3	**Right rear ABS wheel speed sensor -G44-** ♦ for vehicles with Front Wheel Drive (FWD) and ABS/EDL
3	**Right front ABS wheel speed sensor -G45-** ♦ for vehicles with Front Wheel Drive (FWD) and ABS/EDL/ASR
4	**Right front ABS wheel speed sensor -G45-** ♦ for vehicles with Front Wheel Drive (FWD) and ABS/EDL ♦ for vehicles with All Wheel Drive (AWD) and ABS/EDL
5	**Right front ABS wheel speed sensor -G45-**
6	**Left front ABS wheel speed sensor -G47-**
7	**Left front ABS wheel speed sensor -G47-**
8	**Left rear ABS wheel speed sensor -G46-**
9	**Left rear ABS wheel speed sensor -G46-**

01-171

Terminal	Wire connection to component ...
10	**Electrical connection to instrument cluster** ♦ Only for vehicles equipped with EDL. The time signals used to calculate standing time are transmitted via this harness connector
11	**K-wire**
13	**MMD signal (Masked Misfire Diagnostic)** ♦ For vehicles equipped with ASR, the SET signal (Specified Engine Torque) is also transmitted via this wiring harness.
14	**Brake light switch -F-**
15	**Voltage supply, terminal 15**
16	**Ground (GND) terminal 31 (ABS hydraulic pump -V64-)**
17	**Battery + (terminal 30)**
18	**Battery + (terminal 30)**
19	**Ground (GND) terminal 31 (ABS control module -J104-)**
20	**Traction control (ASR) indicator light activation** ♦ Only for vehicles equipped with ASR.
21	**ABS/EDL warning light activation**
23	**Speed sensor output rear left** ♦ For vehicles with navigation system

24	**Speed sensor output rear right** ♦ For vehicles with navigation system

01-172

Terminal	Wire connection to component ...
27	**AET (Actual Engine Torque)** ♦ Only for vehicles equipped with ASR.
28	**TI (Transmission Influence)** ♦ Only for vehicles equipped with ASR.
29	**CAN-bus low** ♦ The CAN-bus wires transmit the following signals to the appropriate control modules: AET (Actual Engine Torque), SET (Specified Engine Torque), TI (Transmission Influence) and engine speed.
30	**CAN-bus high** ♦ The CAN-bus wires transmit the following signals to the appropriate control modules: AET (Actual Engine Torque), SET (Specified Engine Torque), TI (Transmission Influence) and engine speed.
30	**Engine speed (RPM)** ♦ Only for vehicles equipped with ASR.
31	**Traction control (ASR) button** ♦ Only for vehicles equipped with ASR.

01-173

Notes:

For test table:

- *The socket designations of the VAG1598 test box are identical to the terminal designations of the ABS control module (w/EDL) -J104- in the wiring diagram. Incorrect test procedures can cause damage to the system. Do not bridge any terminals other than those listed in the table.*

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

- *Specified values refer to readings on the VAG1526 and are not necessarily applicable for other test units.*

- *If the measured values do not match specifications, carry out the corrective actions listed on the right side of the table.*

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

- *If values are obtained, also check wiring for intermittent loose terminals and short circuit to B+ and Ground (GND). This applies especially to sporadic malfunctions.*

- *Use only the VAG1594 connector test kit for checking continuity (bridges).*

- *If the measured values only differ slightly from the specifications, clean the sockets and harness connectors of the testers and adapter leads (using contact spray G 000 700 04) and repeat the test. Before replacing actual components, check wiring and connections once more. This is especially important if the specification for a resistance test is under 10 Ω.*

01-174

Test table

Set measurement range: **voltage test (20 V =)**					
Test step	**VAG** **1598 sockets**	**Test of**	• Test requirements - Additional work steps	**Specified value**	**Corrective action**
1	19 + 15	Voltage supply to ABS control module -J104- via terminal 15	• Ignition switched on.	10.0 - 14.5 V	- Check wire from terminal 19 to Ground (GND). - Check wire from terminal 15 to terminal 15. ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

01-175

Set measurement range: **voltage test (20 V =)**					
Test step	**VAG** **1598 sockets**	**Test of**	• Test requirements - Additional work steps	**Specified value**	**Corrective action**
2	16 + 17	Voltage supply of ABS hydraulic unit -N55- and motor for ABS hydraulic pump -V64- via terminal 30 at ABS control module (w/EDL) -J104-	• Ignition switched on.	10.0 - 14.5 V	- Check wire from terminal 16 to Ground (GND).
	16 + 18			10.0 - 14.5 V	- Check wiring from terminals 17 and 18 to B+ (terminal 30) via fuse (60A). ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

01-176

Set measurement range: **voltage test (20 V =)**					
Test step	**VAG** **1598 sockets**	**Test of**	• Test requirements - Additional work steps	**Specified value**	**Corrective action**
3	19 + 14	Function of brake light switch -F-	• Ignition switched off • Brake pedal not depressed - Operate brake pedal.	0.0 -0.5 V 10.0 - 14.5 V	- Check wire from terminal 19 to Ground (GND). - Check wiring from terminal 14 to terminal 30 via fuse (10A). - Check brake light switch -F- ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations* - Adjust brake light switch -F-. ⇒ *Repair Manual, Brake System, Repair Group 45*

01-177

Set measurement range: **Resistance measurement (2 kΩ)**					
Test step	**VAG 1598 sockets**	**Test of**	• Test requirements - Additional work steps	**Specified value**	**Corrective action**
4	4 + 5 [1) 2)] 3 + 5 [3)]	Resistance of right front ABS wheel speed sensor -G45-	• Ignition switched off	400 Ω ÷ 2300 Ω	- Check electrical wiring between control module and wheel speed sensor for open circuit and for short circuit to Ground (GND) or B+ - Check harness connectors. - Move wire during test (loose contact). ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations* - Replace the relevant ABS wheel speed sensor if specified value is not obtained and the electrical wiring is OK.
5	6 + 7 (all versions)	Resistance of left front ABS wheel speed sensor -G47-			

1) Assignment of wheel speed sensor terminals for vehicles with Front Wheel Drive (FWD) and equipped with EDL.

2) Assignment of wheel speed sensor terminals for vehicles with All Wheel Drive (AWD) and equipped with EDL.

3) Assignment of wheel speed sensor terminals for vehicles with Front Wheel Drive (FWD) and equipped with ASR.

01-178

Set measurement range: **Resistance measurement (2 kΩ)**					
Test step	**VAG 1598 sockets**	**Test of**	• Test requirements - Additional work steps	**Specified value**	**Corrective action**
6	1 + 3 [1)] 1 + 2 [2) 3)]	Resistance of right rear ABS wheel speed sensor -G44-	• Ignition switched off	400 Ω ÷ 2300 Ω	- Check electrical wiring between control module and wheel speed sensor for open circuits and for short circuit to Ground (GND) or B+ - Check harness connectors. - Move wire during test (loose contact). ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations* - Replace the relevant ABS wheel speed sensor if specified value is not obtained and the electrical wiring is OK.
7	8 + 9 (all versions)	Resistance of left rear ABS wheel speed sensor -G46-			

[1)] Assignment of wheel speed sensor terminals for vehicles with Front Wheel Drive (FWD) and equipped with EDL.

[2)] Assignment of wheel speed sensor terminals for vehicles with All Wheel Drive (AWD) and equipped with EDL.

[3)] Assignment of wheel speed sensor terminals for vehicles with Front Wheel Drive (FWD) and equipped with ASR.

01-179

Function test: ABS/EDL warning light -K47-					
Test step	**VAG 1598 sockets**	**Test of**	• Test requirements - Additional work steps	**Specified value**	**Corrective action**
8	-	Function of ABS/EDL warning light -K47-.	• DTC memory checked and no DTC present in DTC memory of ABS control module -J104-. • Ignition switched off • Multi-pin connector connected to ABS control module -J104- and retainer catch engaged.		
				Test step 8: Continued on next page.	

01-180

Function test: ABS/EDL warning light -K47-					
Test step	**VAG** **1598 sockets**	**Test of**	• Test requirements - Additional work steps	**Specified value**	**Corrective action**
8 Continuation:	-	Function of ABS/EDL warning light -K47-.	- Switch on ignition	ABS warning light -K47- lights up for two (2) seconds and then goes out.	- If ABS/EDL warning light does not come on, check voltage of electrical system and test wiring from terminal 21 of ABS control module -J104- to instrument cluster for short circuit to Ground (GND). - The ABS/EDL warning lamp does not switch off after 2 seconds. The red "brake system malfunction" symbol lights up after 2 seconds. Check wire from terminal 21 of ABS control module -J104- to instrument cluster for short circuit to B+ and open circuit. ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations* - If vehicle voltage and wire from terminal 21 of ABS control module -J104- to instrument cluster are OK ⇒ there is a malfunction in instrument cluster, LED or bulb malfunctioning. ⇒ *Repair Manual, Electrical Equipment, Repair Group 90.*

01-181

Function test: Red brake warning symbol					
Test step	**VAG 1598 sockets**	**Test of**	• Test requirements - Additional work steps	**Specified value**	**Corrective action**
9	-	Function of red "brake system malfunction" symbol	• Brake fluid level is OK ⇒ *Repair Manual, Brake System, Repair Group 47* • Function of ABS warning light -K47- already checked in step 8. • Multi-pin connector connected to ABS control module -J104- and retainer catch engaged. • Switch on ignition		
				Test step 9: Continued on next page.	

01-182

Function test: Red brake warning symbol					
Test step	**VAG** **1598/20 sockets**	**Test of**	• Test requirements - Additional work steps	**Specified value**	**Corrective action**
9 Continuation:		Function of red "brake system malfunction" symbol	- Connect VAG1551 scan tool and select address word 03 - For vehicles with automatic transmission and high-line instrument cluster, depress the brake pedal and select a driving gear.	The ABS indicator lamp and the red "brake system malfunction" symbol light up. If the traction control indicator light is installed and OK, it also lights up.	- Malfunction in instrument cluster ⇒ *Repair Manual, Electrical Equipment, Repair Group 90; instrument cluster.*

01-183

Function test: Traction control indicator light -K86-, only installed on vehicles equipped with ASR					
Test step	**VAG 1598 sockets**	**Test of**	• Test requirements - Additional work steps	**Specified value**	**Corrective action**
10	-	Function of traction control indicator light -K86-	• DTC memory checked and no DTC present in DTC memory of ABS control module -J104-. • Ignition switched off • Multi-pin connector connected to ABS control module -J104- and retainer catch engaged.		
				Test step 10: Continued on next page.	

01-184

Function test: Traction control indicator light -K86-, only installed on vehicles equipped with ASR					
Test step	**VAG 1598 sockets**	**Test of**	• Test requirements - Additional work steps	**Specified value**	**Corrective action**
10 Continuation:	-	Function of traction control indicator light -K86-	- Switch on ignition	Traction control indicator light -K86- comes on for two (2) seconds and then goes out.	- If traction control indicator light does not light up, check vehicle voltage and wire from terminal 20 of ABS control module -J104- to instrument cluster for short circuit to B+ and open circuit. - If traction control indicator lights continuously, test wire from terminal 20 of ABS control module -J104- to instrument cluster for short circuit to Ground (GND). ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations* - If vehicle voltage and wire from terminal 20 of ABS control module -J104- to instrument cluster are OK ⇒ there is a malfunction in instrument cluster, LED or bulb malfunctioning. ⇒ *Repair Manual, Electrical Equipment, Repair Group 90; instrument cluster.*

01-185

Function test: Traction control button; set measurement range on VAG1526: 20 V =					
Test step	**VAG 1598 sockets**	**Test of**	• Test requirements - Additional work steps	**Specified value**	**Corrective action**
11	-	Function of traction control button	• Ignition switched off • Function of traction control indicator light -K86- was already checked in step 10. • Multi-pin connector connected to ABS control module -J104- and retainer catch engaged. - Switch on ignition		
			- Press traction control button	Traction control indicator light -K86- lights up	- Switch off ignition. - Detach multi-pin connector from ABS control module -J104- and remove.
			- Press traction control button again	Traction control indicator light -K86- goes out.	- Connect VAG1598 test box using VAG1598/27 adapter.
					Test step 11: Continued on next page.

01-186

Function test: Traction control button; set measurement range on VAG1526: 20 V =					
Test step	**VAG** **1598 sockets**	**Test of**	• Test requirements - Additional work steps	**Specified value**	**Corrective action**
11 Continuation:	19 + 31	Function of traction control button	• Ignition switched on. - Traction control button not pressed - Traction control button pressed	0.0 -0.5 V 10.0 - 14.5 V	- Check wire from terminal 19 to Ground (GND). - Check wire from terminal 31 to traction control button, terminal 6. - Check voltage supply from terminal 5 of traction control button to terminal 15. ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations* - If no malfunctions can be found using the procedures in these steps, replace the traction control button.

01-187

Diagnostic Trouble Code (DTC) table

Notes:

- *Fulfill test requirements ⇒ page 01-22 .*
- *Connect the VAG1551 Scan Tool (ST) and select "Brake Electronics" via address word 03 ⇒ page 01-4 .*
- *Check the control module version ⇒ page 01-128 and press the → button.*
- *Press buttons -0- and -2- to select "Check DTC Memory" function 02. Press -Q- button to confirm input.*

Notes:

- *Each malfunction is assigned a 5-digit Diagnostic Trouble Code (DTC). The DTC is located in the left column of the DTC table. If you have switched the printer on by pressing the "PRINT" button, the VAG1551 scan tool (ST) prints the message identifying the malfunction and the DTC. Otherwise, DTCs are not displayed by the VAG1551 scan tool.*
- *The contents of DTC memory remain stored until memory is erased, ⇒ page 01-15 .*
- *Sporadically occurring malfunctions are identified via indication of "/SP" on the right-hand side of the display.*
- *Static malfunctions that cannot be detected when the vehicle is stationary are also identified with "/SP" if the ignition has been switched off and then on again.*
- *The following DTC table includes all the DTCs that can be stored by the ABS control module -J104- and displayed and printed out by the VAS5051 tester or VAG1551 scan tool. Malfunctions are listed by DTC number.*

01-188

DTC **Printed output from VAG1551 Scan Tool (ST)**	Possible cause	Corrective action
00000 No malfunction recognized! If this display appears, process is concluded. No DTCs are stored in DTC memory. If corresponding warning lamps light up anyway, check the following points:	♦ Voltage supply for ABS control module -J104- below 10.0 volts at a vehicle speed less than 6 km/h. ♦ Open circuit in activation wire for ABS warning light -K47- between ABS control module (w/EDL) -J104- and instrument cluster combination processor -J218-. If no malfunction can be found, and there is still a problem, there may be a mechanical malfunction (e.g. solenoid valve sticking).	- See section "Overview of indicator lamp functions" ⇒ page 01-120 . - Expand troubleshooting to include output Diagnostic Test Mode (DTM) ⇒ page 01-149 and the "Electrical test" ⇒ page 01-166 .

DTC Printed output from VAG1551 Scan Tool (ST)	Possible cause	Corrective action
00283 Left front ABS wheel speed sensor -G47- 1) Mechanical malfunction or:	♦ Left rear ABS wheel speed sensor -G47- installed incorrectly. ♦ ABS wheel speed sensor rotor dirty or damaged. ♦ Excessive wheel bearing play. ♦ ABS wheel speed sensor -G47- malfunctioning. ♦ Short circuit to Ground (GND).	- Check installation of ABS wheel speed sensor. ⇒ *Repair Manual, Brake System, Repair Group 45* - Check rotor, clean or replace ⇒ *Repair Manual, Brake System, Repair Group 45* - Replace wheel bearing ⇒ *Repair Manual, Suspension, Wheels, Steering, Repair Group 40* - "Read measuring value block" display group 1 ⇒ page 01-140 . - Carry out "Electrical test", step 5 ⇒ page 01-166 .
Left front ABS wheel speed sensor -G47- Open circuit/short circuit to B+	♦ Open circuit or short circuit to B+ in wiring between ABS wheel speed sensor -G47- and ABS control module -J104-.	- If nothing is displayed during "Read measuring value block", and no malfunction could be determined in the wiring or the ABS wheel speed sensor, replace the hydraulic control unit.

1) This malfunction can only be detected when the vehicle is moving

DTC Printed output from VAG1551 Scan Tool (ST)	Possible cause	Corrective action
00285 Right front ABS wheel speed sensor -G45-[1)] Mechanical malfunction or:	♦ Left rear ABS wheel speed sensor -G45- installed incorrectly. ♦ ABS wheel speed sensor rotor dirty or damaged. ♦ Excessive wheel bearing play. ♦ ABS wheel speed sensor -G45- malfunctioning. ♦ Short circuit to Ground (GND).	- Check installation of ABS wheel speed sensor. ⇒ *Repair Manual, Brake System, Repair Group 45* - Check rotor, clean or replace ⇒ *Repair Manual, Brake System, Repair Group 45* - Replace wheel bearing ⇒ *Repair Manual, Suspension, Wheels, Steering, Repair Group 40* - "Read measuring value block" display group 1 ⇒ page 01-140 . - Carry out "Electrical test", step 4 ⇒ page 01-166 .
Right front ABS wheel speed sensor -G45- Open circuit/short circuit to B+	♦ Incorrect control module version. ♦ Open circuit or short circuit to B+ in wiring between ABS wheel speed sensor -G45- and ABS control module -J104-.	- Check control module version ⇒ page 01-128 . - If nothing is displayed during "Read measuring value block", and no malfunction could be determined in the wiring or the ABS wheel speed sensor, replace the hydraulic control unit.

1) This malfunction can only be detected when the vehicle is moving

01-191

DTC **Printed output from VAG1551 Scan Tool (ST)**	Possible cause	Corrective action
00287 Right rear ABS wheel speed sensor -G44-[1)] Mechanical malfunction or:	♦ Left rear ABS wheel speed sensor -G44- installed incorrectly. ♦ ABS wheel speed sensor rotor dirty or damaged. ♦ Excessive wheel bearing play. ♦ ABS wheel speed sensor -G44- malfunctioning. ♦ Short circuit to Ground (GND).	- Check installation of ABS wheel speed sensor. ⇒ *Repair Manual, Brake System, Repair Group 45* - Check rotor, clean or replace ⇒ *Repair Manual, Brake System, Repair Group 45* - Replace wheel bearing ⇒ *Repair Manual, Suspension, Wheels, Steering, Repair Group 42* - "Read measuring value block" display group 1 ⇒ page 01-140 . - Carry out "Electrical test", step 6 ⇒ page 01-166 .
Right rear ABS wheel speed sensor -G44- Open circuit/short circuit to B+	♦ Incorrect control module version. ♦ Open circuit or short circuit to B+ in wiring between ABS wheel speed sensor -G44- and ABS control module -J104-.	- Check control module version ⇒ page 01-128 . - If nothing is displayed during "Read measuring value block", and no malfunction could be determined in the wiring or the ABS wheel speed sensor, replace the hydraulic control unit.

1) This malfunction can only be detected when the vehicle is moving

01-192

DTC Printed output from VAG1551 Scan Tool (ST)	Possible cause	Corrective action
00290 Left rear ABS wheel speed sensor -G46-1) Mechanical malfunction or:	♦ Left rear ABS wheel speed sensor -G46- installed incorrectly. ♦ ABS wheel speed sensor rotor dirty or damaged. ♦ Excessive wheel bearing play. ♦ ABS wheel speed sensor -G46- malfunctioning. ♦ Short circuit to Ground (GND).	- Check installation of ABS wheel speed sensor. ⇒ *Repair Manual, Brake System, Repair Group 45* - Check rotor, clean or replace ⇒ *Repair Manual, Brake System, Repair Group 45* - Replace wheel bearing ⇒ *Repair Manual, Suspension, Wheels, Steering, Repair Group 42* - "Read measuring value block" display group 1 ⇒ page 01-140 . - Carry out "Electrical test", step 7 ⇒ page 01-166 .
Left rear ABS wheel speed sensor -G46- Open circuit/short circuit to B+	♦ Open circuit or short circuit to B+ in wiring between ABS wheel speed sensor -G46- and ABS control module -J104-.	- If nothing is displayed during "Read measuring value block", and no malfunction could be determined in the wiring or the ABS wheel speed sensor, replace the hydraulic control unit.

1) This malfunction can only be detected when the vehicle is moving

01-193

DTC **Printed output from VAG1551 Scan Tool (ST)**	Possible cause	Corrective action
00301 ABS return flow pump -V39 -	♦ Malfunction in hydraulic control unit	- Erase DTC memory ⇒ page 01-15 - End Output ⇒ page 01-16 . - Switch off ignition. - Switch on ignition - If malfunction occurs again, replace hydraulic control unit.

01-194

DTC **Printed output from VAG1551 Scan Tool (ST)**	Possible cause	Corrective action
00526 Brake light switch -F- Open circuit	♦ Both brake lights -M9- (left) and -M10- (right) malfunctioning. ♦ Wire from brake lights to control module faulty. ♦ ABS control module -J104- malfunctioning	- Check brake light switch, "Read measuring value block", display group 2 ⇒ page 01-140 . - Locate and repair open circuit or short circuit. - Replace bulbs. ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

01-195

DTC **Printed output from VAG1551 Scan Tool (ST)**	Possible cause	Corrective action
00529 Wheel speed information missing ♦ This malfunction only occurs if vehicle is equipped with ASR. See continuation on next page	**Data is transferred between the ABS control module -J104- and the Engine Control Module (ECM) via a single wire.**	For more information, see the section "Systems related to ASR" ⇒ page 01-42 and the table "Control module versions" ⇒ page 01-134 .
	♦ Open circuit or short circuit to B+ or Ground (GND) in wire between ABS control module -J104- and Engine Control Module (ECM).	- Locate and repair open circuit or short circuit. ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*
	♦ Engine Control Module (ECM) malfunctioning.	- If the tachometer in the instrument cluster is malfunctioning and no malfunctions can be found in the wiring, the Engine Control Module (ECM) is malfunctioning.
	♦ ABS control module -J104- malfunctioning	- If the tachometer in the instrument cluster functions properly and no malfunctions can be found in the wiring, the ABS control module

		(w/EDL) -J104- is malfunctioning.

DTC Printed output from VAG1551 Scan Tool (ST)	Possible cause	Corrective action
00529 Wheel speed information missing Continuation: ♦ This malfunction only occurs if vehicle is equipped with ASR.	**Data is transferred between ABS control module -J104- and Engine Control Module (ECM) via the CAN-bus.**	For more information, see the section "Systems related to ASR" ⇒ page 01-42 and the table "Control module versions" ⇒ page 01-134 .
	♦ The Engine Control Module (ECM) is not able to provide the engine speed (RPM) signal for the CAN-bus.	- Check DTC memory of Engine Control Module (ECM). If there is a malfunction, fix it according to the appropriate engine Repair Manual and erase DTC memory of the Engine Control Module (ECM). - If there are no DTCs stored in the Engine Control Module (ECM), replace the Engine Control Module (ECM) as a test.
	♦ The ABS control module (w/EDL) -J104- is not able to evaluate the engine speed (RPM) signal for the CAN-bus.	- If the steps listed above do not repair the malfunction, replace the ABS control module -J104-.

DTC Printed output from VAG1551 Scan Tool (ST)	Possible cause	Corrective action
00532 Voltage supply Signal too small Notes: ♦ This malfunction affects the voltage supply of the control module. ♦ This DTC is only stored, if the malfunction occurs at a vehicle speed above 6 km/h. ♦ As soon as vehicle voltage is within the valid voltage range again, the ABS/EDL or ASR system is switched back on and the warning lights turn off.	♦ Open circuit or contact resistance too high between voltage supply from terminal 15 hydraulic control unit, terminal 15. ♦ Voltage jumps in vehicle system. ♦ Malfunction in hydraulic control unit	- Carry out "Electrical test", step 1 ⇒ page 01-166 . - Locate and repair open circuit in voltage supply. ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations* - Check Generator (GEN) and Voltage Regulator (VR). ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations* - Check battery ⇒ *Repair Manual, Electrical Equipment, Repair Group 27.* - If no malfunctions can be found in the voltage supply, replace hydraulic control unit.

DTC Printed output from VAG1551 Scan Tool (ST)	Possible cause	Corrective action
00597 Varying wheel speed impulse	♦ Wheel or tire sizes not the same on all four wheels.	- Check wheel and tire sizes.
	♦ ABS wheel speed sensor rotor dirty or damaged.	- Check rotor. ⇒ *Repair Manual, Brake System, Repair Group 45*
	♦ Excessive wheel bearing play.	- Check wheel bearing ⇒ *Repair Manual, Suspension, Wheels, Steering, Repair Group 40* ⇒ *Repair Manual, Suspension, Wheels, Steering, Repair Group 42*
	♦ ABS wheel speed sensors -G44-, -G45-, -G46-, and -G47- installed incorrectly. ♦ ABS wheel speed sensors -G44-, -G45-, -G46-, and -G47- malfunctioning	- Check ABS wheel speed sensors. ⇒ *Repair Manual, Brake System, Repair Group 45* - Carry out "electrical test", steps 4 through 7 ⇒ page 01-166 .

DTC Printed output from VAG1551 Scan Tool (ST)	Possible cause	Corrective action
00623 ABS / transmission electrical connection ♦ This malfunction only occurs if vehicle is equipped with ASR.	**Data is transferred between the ABS control module -J104- and the Transmission Control Module (TCM) via a single wire.**	For more information, see the section "Systems related to ASR" ⇒ page 01-42 and the table "Control module versions" ⇒ page 01-134 .
	Manual transmission	
	♦ ABS/EDL/ASR control module -J104- incorrectly coded.	- Check coding of ABS/EDL/ASR control module -J104- ⇒ page 01-135 .
	♦ Short circuit to B+	- Locate and repair short circuit. ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*
	Automatic transmission	
	♦ ABS/EDL/ASR control module -J104- incorrectly coded.	- Check coding of ABS/EDL/ASR control module -J104- ⇒ page 01-135 .
	♦ Open circuit or short circuit to Ground (GND) in wiring between ABS/EDL/ASR control module -J104- and Transmission Control Module (TCM) -J217-.	- Locate and repair open circuit or short circuit. ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

DTC Printed output from VAG1551 Scan Tool (ST)	Possible cause	Corrective action
00646 ABS-ASR motor electrical connection 1	**Data is transferred between the ABS control module -J104- and the Engine Control Module (ECM) via a single wire.**	For more information, see the section "Systems related to ASR" ⇒ page 01-42 and the table "Control module versions" ⇒ page 01-134 .
Note: The following signals are sent from the ABS control module (w/EDL) -J104- to the Engine Control Module (ECM) via this connection: ♦ MMD signal (Masked Misfire Diagnostic) for On Board Diagnostic (OBD) ♦ SET signal (Specified Engine Torque)	♦ Open circuit or short circuit to B+ or Ground (GND) in wiring between ABS control module -J104- terminal 13 and Engine Control Module (ECM). ♦ ABS/EDL/ASR control module -J104- malfunctioning.	- Locate and repair open circuit or short circuit. ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations* - Replace ABS/EDL/ASR hydraulic control unit.
♦ ETR signal (Engine Torque Reduction signal)	♦ Engine Control Module (ECM) malfunctioning.	- Replace Engine Control Module (ECM).

01-201

DTC Printed output from VAG1551 Scan Tool (ST)	Possible cause	Corrective action
00647 ABS-ASR motor electrical connection 2 Note: The following signal is sent from the Engine Control Module (ECM) to the ABS control module (w/EDL) -J104- via this connection: ♦ AET signal (Actual Engine Torque)	**Data is transferred between the ABS control module -J104- and the Engine Control Module (ECM) via a single wire.** ♦ Open circuit or short circuit to B+ or Ground (GND) in wiring between ABS control module -J104- terminal 27 and Engine Control Module (ECM). ♦ Engine Control Module (ECM) malfunctioning. ♦ ABS/EDL/ASR control module -J104- malfunctioning.	For more information, see the section "Systems related to ASR" ⇒ page 01-42 and the table "Control module versions" ⇒ page 01-134 . - Locate and repair open circuit or short circuit. ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations* - Replace Engine Control Module (ECM). - Replace ABS/EDL/ASR hydraulic control unit.

DTC Printed output from VAG1551 Scan Tool (ST)	Possible cause	Corrective action
00761 DTC stored in Engine Control Module (ECM) ♦ This malfunction only occurs if vehicle is equipped with ASR.	**Data is transferred between ABS control module -J104- and Engine Control Module (ECM) via a single wire or via the CAN-bus.** ♦ A DTC was stored in the Engine Control Module (ECM). The Engine Control Module (ECM) is not able to reduce engine torque.	For more information, see the section "Systems related to ASR" ⇒ page 01-42 and the table "Control module versions" ⇒ page 01-134 . - Check DTC memory of Engine Control Module (ECM). Repair the malfunction according to the appropriate engine Repair Manual and erase DTC memory of the Engine Control Module (ECM).

01-203

DTC **Printed output from VAG1551 Scan Tool (ST)**	Possible cause	Corrective action
01044 Control module incorrectly coded ♦ This malfunction only occurs if vehicle is equipped with ASR.	**Data is transferred between the ABS control module -J104- and the Transmission Control Module (TCM) via the CAN-bus.**	For more information, see the section "Systems related to ASR" ⇒ page 01-42 and the table "Control module versions" ⇒ page 01-134 .
	♦ The ABS control module (w/EDL) -J104- is coded for a vehicle with manual transmission. The vehicle is equipped with automatic transmission.	- Code the ABS control module (w/EDL) -J104- for the correct transmission ⇒ page 01-135 .
01130 ABS operation Implausible signal		- Replace the ABS control module (w/EDL) -J104- after conferring with the product department of your distributor or with the responsible importer.

DTC Printed output from VAG1551 Scan Tool (ST)	Possible cause	Corrective action
01200 Supply voltage for ABS valves Note: This malfunction affects the voltage supply of the ABS hydraulic unit -N55- and the motor for the ABS hydraulic pump -V64-.	♦ Open circuit or contact resistance too high between voltage supply from terminal 30 hydraulic control unit, terminals 17 and 18. ♦ Voltage jumps in vehicle system. ♦ Malfunction in hydraulic control unit	- Carry out "Electrical test", step 2 ⇒ page 01-166 . - Locate and repair open circuit in voltage supply. ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations* - Check Generator (GEN) and Voltage Regulator (VR). ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations* - Check battery ⇒ *Repair Manual, Electrical Equipment, Repair Group 27.* - If no malfunctions can be found in the voltage supply, replace hydraulic control unit.

01-205

DTC **Printed output from VAG1551 Scan Tool (ST)**	Possible cause	Corrective action
01201 Supply voltage for ABS pump Note: This malfunction affects the Ground (GND) supply of the motor for the ABS hydraulic pump -V64-.	♦ Open circuit or contact resistance too high in Ground (GND) supply to hydraulic control unit, terminal 16. ♦ Malfunction in hydraulic control unit	- Carry out "Electrical test", step 2 ⇒ page 01-166 . Check contact resistance in the Ground (GND) supply. - Locate and repair open circuit in Ground (GND) supply. ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations* - If no malfunctions can be found in the voltage supply, replace hydraulic control unit.

01-206

DTC **Printed output from VAG1551 Scan Tool (ST)**	Possible cause	Corrective action
01203 ABS / instrument cluster electrical connection Open circuit/short circuit to Ground (GND)	♦ Short circuit to Ground (GND) or open circuit in wire between instrument cluster and hydraulic control unit, terminal 10.	- Check the wire for short circuit to Ground (GND) and for open circuit. ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

01-217

Electronic Stabilization Program (ESP) Bosch 5.3

The Electronic Stabilization Program (ESP) is a driving dynamics regulation system. It stabilizes the vehicle both in understeer and oversteer situations.

ESP is an additional extension of the well-known driving safety systems ABS/EDL and ABS/EDL/ASR.

ESP increases the ability to control the vehicle during critical driving situations. It reduces the likelihood of skidding relative to the well-known safety systems and improves steering control.

It can only function within physical limits.

01-218

ESP system sensors and components, description

Control module for ABS with EDL/ASR/ESP -J104-

The control module is combined with the hydraulic unit as one unit. It controls the ESP, ABS, EDL, ASR, EBD and ETR (Engine Torque Reduction) functions. When ignition is switched on, the control module performs a self-test. All electrical connections are monitored constantly and the solenoid valves are periodically checked for function. If the control module fails entirely, only the normal brake system will be available.

Steering angle sensor -G85-

The steering angle sensor is housed together with the airbag spiral spring/return spring with slip ring. It is located on the steering column between the steering column switch and steering wheel. It transmits the steering wheel's steering angle to the ABS control module -J104 for ABS/ASR/ESP via the CAN-bus. After replacing the control module or the sensor, a zeroing must be performed. For malfunctioning sensor, the ESP function is not available.

Sensor for transverse acceleration -G200-

The sensor for transverse acceleration transmits the values of lateral acceleration (cornering force) to the ABS control module -J104 for ABS/ASR/ESP. After replacing the control module or the sensor, a zeroing must be performed. For malfunctioning sensor, the ESP function is not available.

Sender for rotation rate -G202-

The sender for rotation rate collects data, so-called yaw moments or rotation rates, that attempt to spin the vehicle on the vertical axis and it sends these to control module -J104- for ABS/ASR/ESP. For malfunctioning sensor, the ESP function is not available.

Sender 1 for brake booster -G201-

The brake pedal position sensor recognizes the current brake pressure in the brake circuit and sends this data to the ABS control module (w/EDL) -J104-. From this, the control module calculates the wheel braking powers and therefore the vertical forces affecting the vehicle. If the sensor fails, the ESP function is not available.

ASR/ESP button -E256-

The button enables the driver to switch off the ESP function. By operating the brake pedal or by pressing the button again, it is switched back on. If re-activation is forgotten, the system automatically reactivates itself once the vehicle is restarted. The system cannot be switched off when ESP is actively engaged and above a specific speed.

Brake recognition switch (ESP) -F83-

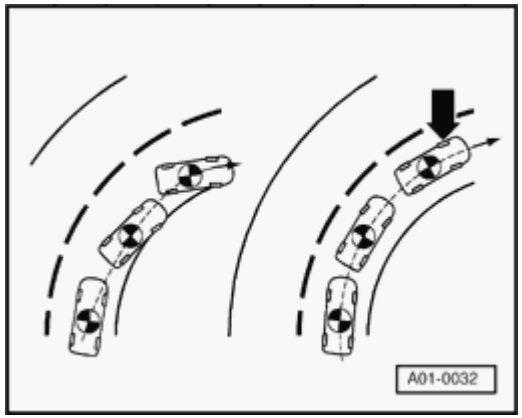
The brake recognition switch (ESP) is also identified as a release switch and it functions like a pole-changing switch. When the driver brakes, the switch changes from signal terminal 1 to signal terminal 2. Since only one signal terminal is ever closed, the system easily recognizes the current condition and the release switch thereby offers a high degree of personal safety.

Hydraulic pump for traction control -V156-

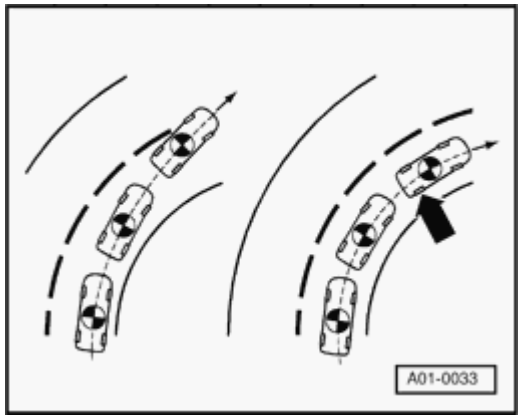
In order to generate the required admission pressure on the intake side of the return flow pump, an additional hydraulic pump is necessary. Boost pressure is limited via a throttle in the main cylinder, the hydraulic pump for traction control -V156- itself is not regulated.

01-221

Examples:



- During oversteering, the rear of the vehicle breaks out toward the outside of the curve. The vehicle rotates more on its vertical axis than required to maneuver through the curve. Braking the outside front wheel counters the oversteering effect.



- In understeering, it is the front of the vehicle that does not follow the curve. The front of the vehicle breaks out. The vehicle rotates less on its vertical axis than is required to maneuver through the curve. By braking the rear inside wheel, the braking force generated intensifies the rotational movement of the vehicle.

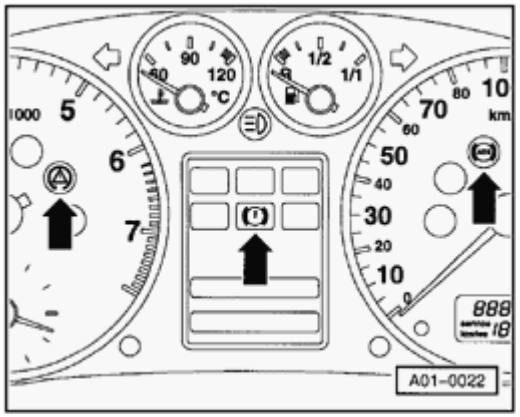
Component locations (except for new components) are the same as for the Bosch 5.3 components. The procedures for removal and installation of the components are found in:

⇒ *Repair manual, Brake System, Repair Group 45*

01-222

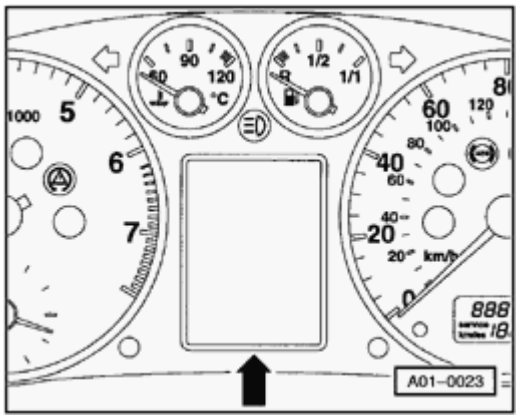
Warning light functions, overview

- If On Board Diagnostic (OBD) has detected a malfunction in the system, it indicates the malfunction by lighting up warning lamps when ignition is switched on. The warning lamps are located in the instrument cluster.



Instrument cluster without DIS

- The illustration shows the ABS/EDL warning light -K47- (right arrow), the warning light for brake system -K118- (center arrow, red symbol for "brake system malfunction") and the traction control indicator light -K86- (left arrow).



Instrument cluster with DIS

- For DIS, there is no warning light for brake system -K118-. The red "brake system malfunction" symbol appears in the display.
- If the ABS/EDL warning light -K47 and the red symbol for "Brake system malfunction" are not lit, but the brake system is not functioning properly, check for malfunctions in the mechanical/hydraulic brake system components.

⇒ *Repair manual, Brake System, Repair Group 46*

⇒ *Repair manual, Brake System, Repair Group 47*

01-223

"Brake malfunction" symbol	ABS/EDL warning light -K47-	Traction control indicator light -K86-	Possible reasons why the indicator lamps light up
off	off	off	♦ All indicator lights go out after the self-test (approximately three seconds after the ignition is switched on). All systems are OK. Pay attention to the notes on the next page
off	off	blinking	♦ ASR/ESP is in adjustment mode. The ASR/ESP indicator light blinks approximately 3 times per second.

01-224

"Brake malfunction" symbol	ABS/EDL warning light -K47-	Traction control indicator light -K86-	Possible reasons why the indicator lamps light up
off	on	on	**A self-test is performed after the ignition is switched on. If all systems are OK, warning lights, the ABS warning light -K47- and traction control indicator light -K86- go out after approximately three seconds. If the indicator lamps do not light up, check the relevant lamps ⇒ carry out "Electrical Test", steps 17 and 19. The possible causes are as follows:** ♦ The battery voltage is insufficient. None of the lamps in the instrument cluster light up. Check the battery. ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations* ⇒ *Repair Manual, Electrical Equipment, Repair Group 90.* ♦ The ABS warning light -K47- does not light up during the self-test. There is a short to Ground (GND) in the wiring that controls the ABS/EDL warning light between terminal 32 of the ABS control module -J104- and the instrument cluster. This malfunction does NOT influence the control of the traction control indicator light.

			♦ The traction control indicator light -K86- does not light up during the self-test; ⇒ carry out "Electrical test", step 19.This malfunction does NOT influence the control of the ABS warning light.

01-225

"Brake malfunction" symbol	ABS/EDL warning light -K47-	Traction control indicator light -K86-	Possible reasons why the indicator lamps light up
off	off	off	♦ There is an irregularity. The indicator lamps go on during the self-test and then go out. The possible causes are as follows: ♦ The voltage supply for the ABS control module -J104- is between 7 and 10 volts and the vehicle speed is < 6 km/h. Carry out "Electrical test", step 21. ♦ The DTC "01119 gear recognition signal" is stored in the DTC memory. Check DTC memory ⇒ page 01-356 . ♦ The signal indicating whether the parking brake is set or released is not being sent to the ABS control module -J104-. "Read measuring value block" function 08 ⇒ page 01-256 , display group 2 ⇒ page 01-261 . ♦ Check the brake light switch -F-. "Read measuring value block" function 08 ⇒ page 01-256 , display group 2 ⇒ page 01-261 . ♦ Check the zero position of the steering angle sensor -G85-. "Read measuring value block" function 08 ⇒ page 01-256 , display group 5 ⇒ page 01-270 .

01-226

"Brake malfunction" symbol	ABS/EDL warning light -K47-	Traction control indicator light -K86-	Possible reasons why the indicator lamps light up
off	on	on	♦ The indicator lights did not go out after the self-test. However, the red "brake system malfunction" symbol did not go on. The On Board Diagnostic recognized a malfunction, which deactivated the ABS/EDL/ASR/ESP. However, the "Electronic Brake Distribution" (EBD) remained activated. Check DTC memory ⇒ page 01-356 . ♦ The ESP driving test may have been activated ⇒ page 01-250 ♦ Check the voltage supply for the red "brake system malfunction" symbol. Carry out "Electrical test", step 18. If the control is malfunctioning, see the next example for lighted indicator lights. ♦ During the last drive, a dynamic malfunction of the wheel speed sensor occurred or a malfunction in the ABS return flow pump -V39- occurred. In this case, the indicator lights automatically go off after the vehicle is started, and has exceeded a speed of 2.75 km/h or a check of the return flow pump indicated it is OK. **Also observe notes on the next page.**

01-227

"Brake malfunction" symbol	ABS/EDL warning light -K47-	Traction control indicator light -K86-	Possible reasons why the indicator lamps light up
off	on	on	**Continuation from preceding page.** ♦ A DTC is stored in the DTC memory the first time the vehicle exceeds 6 km/h, if the voltage supply to the ABS control module -J104- is between 7 and 10 volts and the indicator lights go on. If during the drive, the voltage supply to the ABS control module -J104- exceeds 10 volts, the indicator light go out. The DTC remains in the memory. "Check DTC memory" ⇒ page 01-356 .
off	on	off	♦ The ESP driving test was not completed; ⇒ page 01-250

01-228

"Brake malfunction" symbol	ABS/EDL warning light -K47-	Traction control indicator light -K86-	Possible reasons why the indicator lamps light up
on	on	on	The ABS and traction control indicator lights go on, and three seconds after the ignition is switched on the red "brake system malfunction" symbol goes on. ♦ A malfunction deactivated the ABS/EDL, ASR/ESP and the "Electronic Brake Distribution" (EBD).Check DTC memory ⇒ page 01-356 . **WARNING!** **The brake system is only partially functional. Because brake pressure at the rear wheels is no longer regulated vie Electronic Brake Distribution (EBD), the rear wheels can lock even during light braking (excessive braking at rear axle). This can cause the rear of the vehicle to break loose and thereby cause and accident.** Note: For vehicles with automatic transmission, the red "brake system malfunction" symbol does not appear immediately after the ignition is switched on. Instead, the note "Depress brake pedal before engaging gear" appears in the display. Press the brake pedal and select a gear. The red brake warning light appears, if the light control is working properly.

01-229

"Brake malfunction" symbol	ABS/EDL warning light -K47-	Traction control indicator light -K86-	Possible reasons why the indicator lamps light up
off	off	on	**The traction control indicator light does not turn off after the self-test.** ♦ There is a malfunction that only affects the traction control. The ABS/EDL and EBD systems are not deactivated. Check DTC memory ⇒ page 01-356 . ♦ Traction control has been switched off using the traction control button. If the traction control indicator light does not light up in this case, check the switch and the indicator light, carry out the "Electrical test", steps 19 and 20. ♦ Short circuit to B+ in the ASR/ESP button: The traction control indicator light goes out five minutes after the ignition is switched on. Carry out "electrical test", step 20. ♦ There is a short to Ground (GND) in the wiring that controls the traction control indicator light between terminal 31 of the ABS control module -J104- and the instrument cluster. Carry out "electrical test", step 19.

01-230

"Brake malfunction" symbol	ABS/EDL warning light -K47-	Traction control indicator light -K86-	Possible reasons why the indicator lamps light up
on	on	off	♦ No DTCs are stored in DTC memory. The ABS and traction control warning lights do not go out after the self-test, and three seconds after the ignition is switched on the red "brake system malfunction" symbol goes on. ♦ There is an open circuit or short circuit to B+ in the wiring that controls the traction control indicator light between terminal 32 of the ABS control module -J104- and the instrument cluster; ⇒ carry out "Electrical test" step 17. ♦ Voltage supply for control module less than 7 volts; ⇒ carry out "Electrical test" step 21.
on	off	off	**No DTCs are stored in DTC memory. The red "brake system malfunction" symbol remains lit after the ignition is switched on.** ♦ The brake fluid level is too low ♦ Malfunction in instrument cluster: Carry out "Electrical test", step 18.

01-231

Check Control Module Version (function 01)

- Connect VAS5051 tester or VAG1551 scan tool and select the address word 03 "Brake Electronics".

Note:

The following explanation of how to perform On Board Diagnostic (OBD) is based on use of the VAG1551 scan tool. Performing On Board Diagnostic (OBD) using the VAS5051 tester is similar.

- Advance through program sequence by pressing the → button.

01-232

Rapid data transfer	**HELP**
Select function XX	

Indicated on display:

- Press buttons -0- and -1- to select "Check Control Module Version" 01. Press -Q- button to confirm input.

Note:

- *For allocation of ABS control module -J104-, also refer to parts catalog.*

8D0 907 389E 1) ABS/ESP AWD 2) D01 3)	
Coding 06397	**WSC xxxxx**

Indicated on display:

Index 1): ABS control module Part. No. including control module index

Index 2): Indicates system identification.

Index 3): Indicates hardware and software status

01-233

Control module versions

System identification	Prod. No.: 1)	Control module part no.:	Index	Coding	Data transmission via:	CAN terminal resistance in control module:
All Wheel Drive (AWD); ABS/ESP	1AT:	4B0 907 389	-	coding not possible	CAN-bus	120 Ω
Front Wheel Drive (FWD); ABS/ESP	1AT:	8D0 907 389	-	Can be coded	CAN-bus	120 Ω
All Wheel Drive (AWD); ABS/ESP	1AT:	8D0 907 389	A	Can be coded	CAN-bus	120 Ω
Front Wheel Drive (FWD); ABS/ESP	1AT:	8D0 907 389	D	Can be coded	CAN-bus	2600 Ω
All Wheel Drive (AWD); ABS/ESP	1AT:	8D0 907 389	E	Can be coded	CAN-bus	2600 Ω

1) This letter code is the production number allocated to each equipment version. The production number can be derived from the vehicle data plate. The vehicle data plate is attached to the vehicle in the spare tire well.

01-234

Code Control Module (function 07)

After installing a new ABS control module (w/EDL) -J104- or a new steering angle sensor -G85-, the ESP system must be coded again. After the coding, the steering angle sensor must be calibrated.

The coding of the ESP control module is used for adaptation of the control module to the vehicle.

Coding is only possible if a dealership number is stored in the VAG1551 scan tool.

Note:

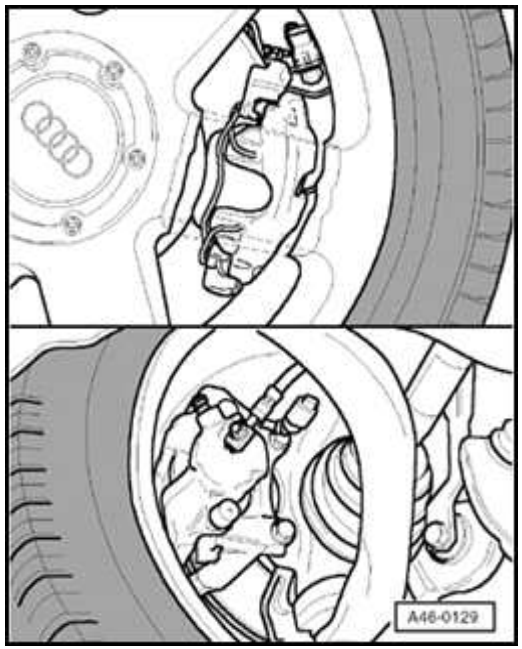
If the control module is coded with code 00000 or with a code that does not match the vehicle, the ABS warning light -K47- and the traction control indicator light -K86- remain continuously lit, and the DTC 01044 - Control module incorrectly coded - is stored in DTC memory of the control module.

Before the control module can be coded, "Login Procedure" function 11 must be successfully carried out using the VAG1551/1552 scan tool.

01-235

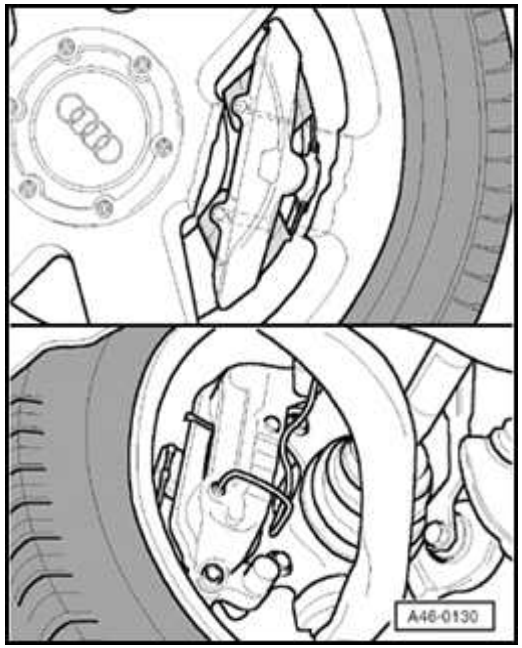
To perform the login procedure and the coding, the brake caliper type must be determined (see the following illustrations).

Front brake caliper type



- Illustration shows the brake type FN3 made by Teves/Ate (recognized by: clip on brake pad carrier).

01-236



- Illustration shows the brake type HP2 made by Lucas (recognized by: dual piston housing).

01-237

Performing login

- Connect VAS5051 tester or VAG1551 scan tool and select the address word 03 "Brake Electronics".

Rapid data transfer	**HELP**
Select function XX	

Indicated on display:

- Press the -1- button twice to select the function "login procedure".

Rapid data transfer	**Q**
11 - Login procedure	

Indicated on display:

- Press -Q- button to confirm input.

Login procedure	**Q**
Enter code numbers XXXXX	

Indicated on display:

- Enter code according to the following table and press -Q- button to confirm input.

01-238

Login code table ESP

Engine type	Transmission type	Brake caliper type (front)	Login code
4 cylinder gas engine	Manual transmission	Lucas C54	09675
4 cylinder gas engine	Manual transmission	FN3 Teves/ATE	09575
4 cylinder gas engine	Automatic transmission	Lucas C54	09677
4 cylinder gas engine	Automatic transmission	FN3 Teves/ATE	09577
6 cylinder gas engine	Manual transmission	FN3 Teves/ATE	09595
6 cylinder gas engine	Manual transmission	FN 2/ HP2 dual-piston brake caliper	09495
6 cylinder gas engine	Automatic transmission	FN3 Teves/ATE	09597
6 cylinder gas engine	Automatic transmission	HP2 double-piston brake caliper	09497
4 cylinder diesel engine	Manual transmission	Lucas C54	09655
4/6 cylinder diesel engine	Manual transmission	FN3 Teves/ATE	09555
4 cylinder diesel engine	Automatic transmission	Lucas C54	09677
4/6 cylinder diesel engine	Automatic transmission	FN3 Teves/ATE	09557

01-239

Code control module

- Check the control module version and press the → button.

Rapid data transfer	**HELP**
Select function XX	

Indicated on display:

- Press buttons -0- and -7- to select "Code control module" function 03.

Rapid data transfer	**Q**
07 - Code control module	

Indicated on display:

- Press -Q- button to confirm input.

Code control module	**Q**
Enter code number	**XXXXX**

Indicated on display:

- Enter code according to the following table and press -Q- button to confirm input.

01-240

Code table ESP

Engine type	Transmission type	Brake caliper type (front)	Code
4 cylinder gas engine	Manual transmission	Lucas C54	04175
4 cylinder gas engine	Manual transmission	FN3 Teves/ATE	04275
4 cylinder gas engine	Automatic transmission	Lucas C54	04177
4 cylinder gas engine	Automatic transmission	FN3 Teves/ATE	04277
6 cylinder gas engine	Manual transmission	FN3 Teves/ATE	04295
6 cylinder gas engine	Manual transmission	FN 2/ HP2 dual-piston brake caliper	04395
6 cylinder gas engine	Automatic transmission	FN3 Teves/ATE	04297
6 cylinder gas engine	Automatic transmission	HP2 double-piston brake caliper	04397
4 cylinder diesel engine	Manual transmission	Lucas C54	04155
4/6 cylinder diesel engine	Manual transmission	FN3 Teves/ATE	04255
4 cylinder diesel engine	Automatic transmission	Lucas C54	04177
4/6 cylinder diesel engine	Automatic transmission	FN3 Teves/ATE	04257

01-241

8D0 407 389D ABS/ESP front D16 →

Coding 06255 WSC XXXXX

VAG1551 scan tool display indicates control module coding, e.g.: 8D0 407 389D ABS/ESP front.

- Press → button.

Basic setting (scan tool function 04)

Initiating "Basic Setting" function 04 does the following for ESP:

The steering angle sensor -G85- is zeroed using display group 001 ⇒ **page 01-243**

Before you can zero the sensor, you must have successfully carried out the "Login Procedure" function 11 using the VAG1551/1552 scan tool and the ABS control module -J104- must be coded ⇒ page 01-234 .

The hydraulic pump for traction control -V156- is activated using display group 002

Activation of the hydraulic pump for traction control -V156- does not require any preparations. It is used to bleed the hydraulic system ⇒ page 01-248 .

The ESP driving test is activated using display group 003

The ESP driving test is used to test the plausibility of the signals from the sensor for transverse acceleration, yaw sensor and pressure sensor ⇒ page 01-250 .

01-243

Steering angle sensor -G85-, zeroing procedure

- Now it is necessary to perform the zeroing procedure on the steering angle sensor -G85-.

- To initialize the steering angle sensor, turn the steering angle at least 10 degrees in either direction

- Move steering to zero position, maximum tolerance is ± 5 degrees.

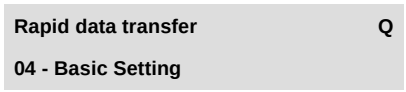
01-244

Note:

The diagnostic must not be exited and ignition must not be switched off between the procedures "Code control module" and "Steering angle sensor calibration". Otherwise, the entire procedure must be repeated.

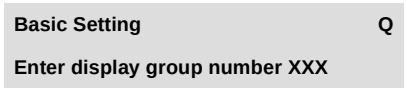
Rapid data transfer HELP **Select function XX**	Indicated on display: - Press the -1- button twice to select the function "login procedure".
Rapid data transfer Q **11 - Login procedure**	Indicated on display: - Press -Q- button to confirm input.
Login procedure Q **Enter code numbers XXXXX**	Indicated on display: - Select code number 40168. Press -Q- button to confirm input.
Rapid data transfer HELP **Select function XX**	Indicated on display: - Press buttons -0- and -4- to select function 04 "Basic Setting"

01-245



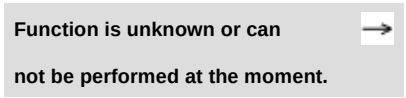
Indicated on display:

- Press -Q- button to confirm input.

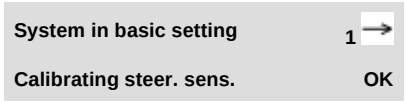


Indicated on display:

- Press buttons -0-, -0-, and -1-. Press -Q- button to confirm input.



If this appears in display, you have not successfully carried out the "Login Procedure".



Indicated on display:

- Check the zero position using "Read measuring value block" function 08, display group 5.

or:

01-246

System in basic setting	**1** →
Calibrating steer. sens.	**not OK**

Indicated on display:

- Check DTC Memory
- Erase DTC Memory
- Switch ignition off.
- Switch ignition on.
- Then repeat zeroing.
- Advance through program sequence by pressing the → button.

Rapid data transfer	**HELP**
Select function XX	

Indicated on display:

or:

01-247

System in basic setting	**1** →
Calibrating steer. sens.	**locked**

Indicated on display:

Steering wheel was not initialized, i.e. the steering wheel must be turned at least 10 degrees in either direction.

- Switch ignition off.
- Switch ignition on.
- Then repeat zeroing.
- Advance through program sequence by pressing the → button.

Rapid data transfer	**HELP**
Select function XX	

Indicated on display:

01-248

Hydraulic system, bleeding

The hydraulic pump for traction control -V156- is activated to bleed the hydraulic system.

⇒ *Repair manual, Brake System, Repair Group 47*

- Connect VAS5051 tester or VAG1551 scan tool and select the address word 03 "Brake Electronics".

Rapid data transfer **HELP**	
Select function XX	

Indicated on display:

- Press buttons -0- and -4- to select function 04 "Basic Setting"

Rapid data transfer **Q**	
04 - Basic Setting	

Indicated on display:

- Press -Q- button to confirm input.

01-249

Basic Setting	**Q**
Enter display group number XXX	

Indicated on display:

- Press buttons -0-, -0-, and -2-. Press -Q- button to confirm input.

System in basic setting	**2** →
Vent system	**OK**

Indicated on display:

Note:

The hydraulic pump for traction control -V156- is activated for ten (10) seconds.

- Press the → button to end the function.

Rapid data transfer	**HELP**
Select function XX	

Indicated on display:

01-250

ESP driving and system test

The ESP driving test is used to test the plausibility of the signals from the sensor for transverse acceleration, yaw sensor, and pressure sensor.

Road test vehicle

Some DTCs are only recognized by the On Board Diagnostic (OBD)while the vehicle is moving. You can check the entire system during a road test. During road test, drive at a speed of at least 60 km/h for 30 seconds. Check traffic conditions and perform an ABS regulated braking when appropriate. You will feel a pulsing in the brake pedal indicating the system is active.

Note:

Once the ESP driving test has been initiated, it cannot be aborted and must be performed completely. After exiting the diagnostic, the ABS/EDL and ASR/ESP lamps remain switched on in order to indicate that the test is active and that system function is not available yet. Warning, ABS and ESP not functioning!

01-251

WARNING!

While system is in diagnostic, the ABS/ESP/EBD is not active. Driving the vehicle after On Board Diagnostic (OBD) has detected a malfunction presents the risk of accident. The brake system will only be partially functional. Because brake pressure at the rear wheels is no longer regulated vie Electronic Brake Distribution (EBD), the rear wheels tend to brake excessively. This causes the rear of the vehicle to break loose.

When the use of test equipment is required during road tests, test equipment must always be secured to the rear seat and operated from there by a second person. If test and measuring equipment is operated from the passenger seat, the person seated there could be injured in the event of an accident involving deployment of the passenger-side airbag.

01-252

- Connect VAS5051 tester or VAG1551 scan tool and select the address word 03 "Brake Electronics" ⇒ page 01-4

Rapid data transfer **HELP**	
Select function XX	

Indicated on display:

- Press buttons -0- and -4- to select function 04 "Basic Setting"

Rapid data transfer **Q**	
04 - Basic Setting	

Indicated on display:

- Press -Q- button to confirm input.

Basic Setting **Q**	
Enter display group number XXX	

Indicated on display:

- Press buttons -0-, -0-, and -3-. Press -Q- button to confirm input.

System in basic setting **3** →	
System test activated **OK**	

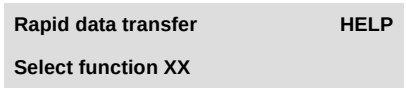
Indicated on display:

The ESP driving test is activated.

The ABS warning light -K47- and the traction control indicator light -K86- go on.

01-253

- Press buttons -0- and -6- to select "End Output" function 06. Press -Q- button to confirm input.



Indicated on display:

- Disconnect VAG 1551 scan tool.
- Start engine.
- Press the brake pedal hard (brake pressure higher than 35 bar) until the traction control indicator light -K86- turns off.

Note:

This completes the adjustment with the engine not running

- Perform the following road test:

WARNING!

Always follow the rules of the road and pay attention to traffic conditions as your first priority.

01-254

- Make a right or left turn. Then reverse the direction and continue driving until the ABS/EDL lamp turns off.

Note:

While driving around the curves, a yaw rate of around 10 °/sec must be obtained. A curve with a radius of 10 to 12 m and a speed of 15 to 20 km/h for around 4 sec. fulfills this requirement.

The ABS warning light -K47- must go out. This completes the ESP driving test and the system is OK.

If the ABS/ESP warning light -K47- remains lit, the test is not OK (system locked). Check DTC memory.

01-255

If the ABS warning light -K47- does not go out, the ESP driving test was not performed properly.

If the ABS warning light -K47- does not go out, and the traction control indicator light -K86- lights up again, there are malfunctions in the system; Check DTC memory ⇒ page 01-356

Note:

If the ESP driving test was interrupted, e.g.: by switching off the ignition, the entire test must be repeated.

01-256

Read Measuring Value Block (function 08)

The control module can transmit measured values to the VAS5051 tester and VAG1551 Scan Tool (ST). These measured values provide information about the operational status of the system and the sensors connected to it. In many cases the data supplied can be used to troubleshoot and repair malfunctions. The measured values provided by ESP are contained in six display groups, which can be accessed via their display group numbers.

- Connect the VAS5051 tester or VAG1551 Scan Tool (ST) and select the address word 03 "Brake Electronics".

01-257

Notes:

- *When the printer is switched on, the contents of the display will be printed out on the scan tool log.*
- *When reading the measuring value block, also check wiring and connectors for loose terminals.*

- Check the control module version ⇒ page 01-231 and press the →button.

Rapid data transfer	**HELP**
Select function XX	

Indicated on display:

- Press buttons -0- and -8- to select "Read measuring value block" function 08.

Rapid data transfer	**Q**
08 - Read measuring value block	

Indicated on display:

- Press -Q- button to confirm input.

Read measuring value block	**HELP**
Input display group number	**XXX**

Indicated on display:

- Press buttons -0-, -0- and -1-.
- Press -Q- button to confirm input.

01-258

Test table: display group 1

Notes:

- *Display fields 1 through 4 show the current wheel circumference speeds in km/h. These are calculated by the ABS control module -J104- on the basis of the signals received from the wheel speed sensors. If one of the display fields shows no reading, proceed as for DTCs 00283, 00285, 00287, 00290 "ABS Wheel Speed Sensor" DTC table ⇒ page 01-357 .*

- *In order to check whether wheel speed sensors are properly allocated to each wheel, the vehicle must be raised. On vehicles with manual transmission put the gear shift lever in neutral. On vehicles with automatic transmission move the selector lever to position "N". Turn appropriate wheel by hand. Remaining drive wheels must be secured against turning.*

- *When a vehicle is accelerated uniformly on a dry surface, the displayed value will increase continuously by whole numbers; e.g. 6 km/h, 7 km/h, 8 km/h ... . The difference between displayed values 1-4 should not be more than ± 1 km/h (error from out-of-round wheels). If the values jump, for instance from ...6km/h, 7 km/h, to 12 km/h...or if the difference between the displayed values is greater than ± 1 km/h, then check the installation of the wheel speed sensors and rotors.*

⇒ *Repair Manual, Brake System, Repair Group 45*

01-259

Test table: display group 1

Read measuring value block			1 →	◀ Indicated on display
1 to 19 [1)] km/h	1 to 19 [1)] km/h	1 to 19 [1)] km/h	1 to 19 [1)] km/h	
			Rear right wheel circumference speed	
		Rear left wheel circumference speed		
	Front right wheel circumference speed			
Front left wheel circumference speed				

[1)] OBD is terminated by ABS control module -J104- if road speed exceeds 19 km/h (12 mph). 1 km/h is the minimum speed that can be displayed (at 0 km/h, for example, the tester displays 1 km/h).

01-260

Note:

The display group numbers can be selected in sequence by pressing buttons <-1 and 3-> on the VAG1551 scan tool, or the arrow buttons ↑ and ↓ on the VAG1552 mobile scan tool or the arrow buttons ↑ and ↓ on the screen of the VAS5051 tester.

- Press -C- button to input display group number manually.

Read measuring value block

Enter display group number XXX



Indicated on display:

- Press buttons -0-, -0- and -2-.
- Press -Q- button to confirm input.

01-261

Test table: display group 2

<table>
<tr><td colspan="3">Read measuring value block</td><td>2 →</td><td>◀ Indicated on display</td></tr>
<tr><td>0 or operated</td><td>0 or operated</td><td>0 or operated</td><td>0 or operated</td><td></td></tr>
<tr><td></td><td></td><td></td><td colspan="2">Traction control button

♦ 0 → Traction control button not operated
♦ Traction control switch operated
- Check traction control button if there are deviations. Carry out "Electrical test", step 20.</td></tr>
<tr><td></td><td></td><td colspan="2">Parking brake

♦ 0 → Parking brake not engaged
♦ Parking brake engaged</td><td>- Check parking brake warning light switch -F9- if there are deviations. Carry out "Electrical test", step 27.</td></tr>
<tr><td></td><td colspan="3">Brake light switch:

♦ 0 → Brake pedal not depressed
♦ Brake pedal depressed</td><td>- Check brake light switch if there are deviations. DTC table ⇒ page 01-356 ; DTC "Brake light switch -F-"; DTC 00526.</td></tr>
<tr><td colspan="3">Brake test switch:

♦ 0 → Brake pedal not depressed
♦ Brake pedal depressed</td><td colspan="2">- The brake test signal precedes the brake light signal. Check brake light switch if there are deviations:DTC table ⇒ page 01-356 ; DTC "Brake light switch -F-"; DTC 00526.</td></tr>
</table>

01-262

Note:

The display group numbers can be selected in sequence by pressing buttons <-1 and 3-> on the VAG1551 scan tool, or the arrow buttons ↑ and ↓ on the VAG1552 mobile scan tool or the arrow buttons ↑ and ↓ on the screen of the VAS5051 tester.

- Press -C- button to input display group number manually.

Read measuring value block

Enter display group number XXX



Indicated on display:

- Press buttons -0-, -0- and -3-.
- Press -Q- button to confirm input.

01-263

Note:

For display group 3 (005):

- *To read the display fields for engine speed and current engine torque with the engine running, communication between the scan tool and the control module must be terminated via the "End Output" function ⇒ page 01-16 . Start the engine and reinitiate communication between the scan tool and the control module.*

Rapid data transfer Q **08 - Read measuring value block**	Indicated on display: - Press buttons -0- and -8- to select "Read measuring value block" function 08. - Press -Q- button to confirm input.
Read measuring value block **Enter display group number XXX**	Indicated on display: - Press buttons -0-, -0- and -3-. - Press -Q- button to confirm input.

01-264

Test table: display group 3

Read measuring value block			3 →	◀ Indicated on display
60 to 8000 1 RPM	0 to 630 Nm	0 to 630 Nm	0 to 100 %	

Throttle valve angle:

- If nothing is displayed, press -C- button, select function 02 and check DTC memory. Repair the malfunction with the help of the DTC table ⇒ page 01-356 .

Dissipation torque:

- If nothing is displayed, press -C- button, select function 02 and check DTC memory. Repair the malfunction with the help of the DTC table ⇒ page 01-356 .

Engine torque:

- If nothing is displayed, press -C- button, select function 02 and check DTC memory. Repair the malfunction with the help of the DTC table ⇒ page 01-356 .

Engine speed:

♦ Engine speed is displayed in increments of 60 RPM, starting at 60 RPM.

- If nothing is displayed, press -C- button, select function 02 and check DTC memory. Repair the malfunction with the help of the DTC table ⇒ page 01-356 .

Notes:

- *On Board Diagnostic (OBD) will be terminated by the ABS control module -J104- if road speed exceeds 19 km/h.*
- *The actual engine speed (MMI) is calculated by subtracting the dissipation torque from the engine torque.*

01-265

Note:

The display group numbers can be selected in sequence by pressing buttons <-1 and 3-> on the VAG1551 scan tool, or the arrow buttons ↑ and ↓ on the VAG1552 mobile scan tool or the arrow buttons ↑ and ↓ on the screen of the VAS5051 tester.

- Press -C- button to input display group number manually.

Read measuring value block

Enter display group number XXX



Indicated on display:

- Press buttons -0-, -0- and -4-.
- Press -Q- button to confirm input.

01-266

Note:

For test table display group 4:

- *Display group 4 is not occupied for control modules with no. 4B0 907 389 without index and cannot be selected for these control modules by pressing buttons <-1 and 3-> on the VAG1551 or by pressing the arrow buttons ↑ and ↓ on the VAG1552 or via manual input.*

If an attempt is made to select display group number 4:

Function is unknown or can →

not be performed at the moment.

Indicated on display:

- Press → button.

Rapid data transfer HELP

Select function XX

Indicated on display:

Bypass display group number 4 or you will be forced to exit the "Read measuring value block" function. Press the C-button to do this and then select display group number 3 or 5 directly.

01-267

Test table: display group 4

Read measuring value block			4 →	◀ Indicated on display
00:00 h or invalid	Off/on	not used	not used	

EDL shut-off

♦ Electronic Differential Lock (EDL) is deactivated at excessive brake temperature (only EDL).

Standing time (TIM):

♦ The standing time (TIM) is used to calculate how much the brakes have cooled while the ignition is off. The ABS control module -J104- receives the standing time signal from the instrument cluster.

- If nothing is displayed, press -C- button, select function 02 and check DTC memory. Repair the malfunction with the help of the DTC table ⇒ page 01-356 .

Invalid:

♦ Battery disconnected or completely discharged

♦ Open circuit in wire from ABS control module (w/EDL) -J104- to instrument cluster

Note:

On Board Diagnostic (OBD) will be terminated by the ABS control module -J104- if road speed exceeds 19 km/h.

01-268

Note:

The display group numbers can be selected in sequence by pressing buttons <-1 and 3-> on the VAG1551 scan tool, or the arrow buttons ↑ and ↓ on the VAG1552 mobile scan tool or the arrow buttons ↑ and ↓ on the screen of the VAS5051 tester.

- Press -C- button to input display group number manually.

Read measuring value block

Enter display group number XXX



Indicated on display:

- Press buttons -0-, -0- and -5-.
- Press -Q- button to confirm input.

01-269

Note:

For display group 5 (005):

- *To read the display fields for yaw rate and transverse acceleration while driving, communication between the scan tool and the control module must be terminated via the "End Output" function ⇒ page 01-16 . Start the engine and reinitiate communication between the scan tool and the control module.*

Rapid data transfer Q
08 - Read measuring value block

Indicated on display:

- Press buttons -0- and -8- to select "Read measuring value block" function 08.
- Press -Q- button to confirm input.

Read measuring value block
Enter display group number XXX

Indicated on display:

- Press buttons -0-, -0- and -5-.
- Press -Q- button to confirm input.

01-270

Test table: display group 5

Read measuring value block			5 →	◀ Indicated on display
- 720 ° ... +720 °	- 69 °/s ... + 69 °/s	- 41 bar ... +292 bar	- 25 m/s2 ... + 25 m/s2	

Transverse acceleration:

- Specification with vehicle at standstill: ± 0....0.7 m/s2
- Specification with steering wheel fully turned at a speed of 20 km/h: max. ± 6.0 m/s2; the value of the measured value increases steadily.
- Another test for the sensor is located ⇒ page 01-271 ; Fig. ⇒ 1 .

Brake pressure:

- Specification with brake pedal not depressed: ± 0....5 bar

Rotation rate:

- Specification with vehicle at standstill: ± 3 °/s
- Specification with steering wheel fully turned at a vehicle speed of 20 km/h: max. ± 65 °/s; the value of the measured value increases steadily.

Steering angle:

-

Specified value when driving straight ahead (steering wheel in straight-ahead position) ± 5°.[1)]

[1)] If the steering angle sensor is OK, there will be an indication, even if the zeroing procedure was not performed.

Note:

On Board Diagnostic (OBD) will be terminated by the ABS control module -J104- if road speed exceeds 19 km/h.

If nothing is displayed, press -C- button, select function 02 and check DTC memory. Repair the malfunction with the help of the DTC table ⇒ page 01-356 .

01-271

Note:

The transverse acceleration sensor is very impact-sensitive, as is the combined sensor for yaw rate and transverse acceleration. If one of these sensors is dropped, do not reinstall it in vehicle under ANY circumstances. Instead, use a new sensor.

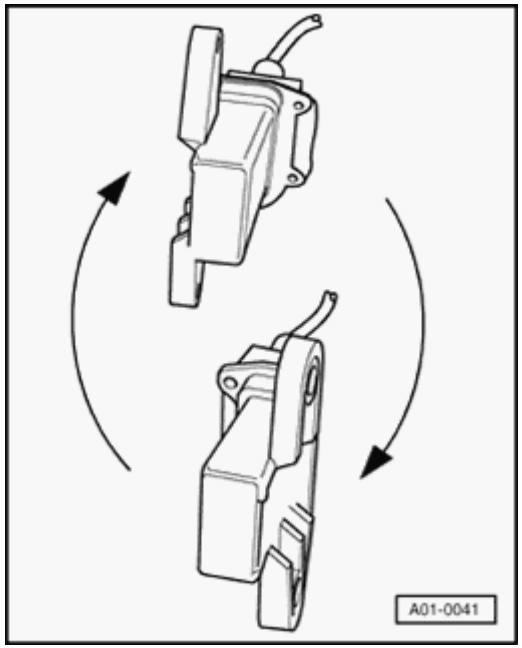


Fig. 1 Sensor for transverse acceleration -G200-

In order to test the sensor, or the combined sensor for yaw rate and transverse acceleration, the sensor must be removed. Remove rear seat bench. Unscrew control module for ultra-sound sensors -J347- and then the sensor. Leave the sensor connected and turn it 90° relative to installation position along its longitudinal axis.

01-272

After this, a value of either - 9,8 ± 1 m/s2 or + 9,8 ± 1 m/s2 will be indicated on the scan tool display in display group 5 (use the "Read measuring value block" function).

A plus in front of the number indicates the affect on the sensor while driving around a left-hand curve.

A minus in front of the number indicates the affect on the sensor while driving around a right-hand curve.

After reinstalling the sensor for transverse acceleration -G200- or the combined sensor for yaw rate and transverse acceleration, tighten the mounting bolts to 5 Nm. Tighten the mounting bolts for the control module for ultra-sound sensors -J347- to 2 Nm.

Note:

Due to an error in the test card 8.0 for the VAG1551 scan tool and the test card 5.0 for the VAG1552 scan tool, the display for Measuring Value Block 5, display group 4 is offset by one decimal point. This means, for example, that a transverse acceleration value of 9.81m/s2 is displayed simply as 0.98 m/s2 .

01-273

Note:

The display group numbers can be selected in sequence by pressing buttons <-1 and 3-> on the VAG1551 scan tool, or the arrow buttons ↑ and ↓ on the VAG1552 mobile scan tool or the arrow buttons ↑ and ↓ on the screen of the VAS5051 tester.

- Press -C- button to input display group number manually.

Read measuring value block

Enter display group number XXX



Indicated on display:

- Press buttons -0-, -0- and -6-.
- Press -Q- button to confirm input.

01-274

Test table: display group 6

Read measuring value block			6 →	◀ Indicated on display
0 volts to 18 volts	on or off	on or off	0 ... 131071	

Workshop code:

- The workshop code indicates the last workshop that executed the "Login Procedure" (function 11) under address word 03, "Brake electronics" ⇒ page 01-237 .
- If no code is displayed, the "Login Procedure" under address word 03 "Brake Electronics" has not been carried out yet.

Voltage at motor for ABS return flow pump:

- off → specified value, there is no voltage at the motor for the ABS return flow pump.
- on→ not permitted during "Read measuring value block", there is voltage at the motor for the ABS return flow pump.

- Carry out "Electrical test", steps 12, 23 and 24.

ABS solenoid valve relay:

- on → specified value, relay was activated by ABS control module -J104- during ignition on.
- off → not permitted during "Read measuring value block", the relay was not activated during "ignition on".

- Carry out "Electrical test", steps 11 and 22.

Supply voltage for ABS control module -J104- at terminal 1:

♦ Specification: 10.5 - 14.5 V

- If specified value is not obtained, carry out "Electrical test", step 21.

01-275

Note:

The display group numbers can be selected in sequence by pressing buttons <-1 and 3-> on the VAG1551 scan tool, or the arrow buttons ↑ and ↓ on the VAG1552 mobile scan tool or the arrow buttons ↑ and ↓ on the screen of the VAS5051 tester.

- Press -C- button to input display group number manually.

Read measuring value block

Enter display group number XXX



Indicated on display:

- Press buttons 1-, 2- and -5-.
- Press -Q- button to confirm input.

01-276

Note:

- *For test table display group 125:*
- *Display group 125 is not occupied for control modules with no. 4B0 907 389 and cannot be selected for these control modules by pressing buttons <-1 and 3-> on the VAG1551 or by pressing the arrow buttons ↑ and ↓ on the VAG1552 or via manual input.*

If an attempt is made to select display group number 125 despite this:

Function is unknown or can →

not be performed at the moment.

Indicated on display:

- Press → button.

Rapid data transfer HELP

Select function XX

Indicated on display:

01-277

Test table: display group 125

Read measuring value block			125 →	◀ Indicated on display
Steering angle 0 or 1	Engine 0 or 1	Transmission 0 or 1	not used	
		Transmission Control Module (TCM): (only for vehicles with automatic transmission) ♦ 0: No information received from the Transmission Control Module (TCM) via the CAN-bus. ♦ 1: Information is being received from the Transmission Control Module (TCM) via the CAN-bus.		
	Engine Control Module (ECM): ♦ 0: No information received from the Engine Control Module (ECM) via the CAN-bus. ♦ 1: Information is being received from the Engine Control Module (ECM) via the CAN-bus.			
Steering angle sensor: ♦ 0: No information received from the steering angle sensor via the CAN-bus.[1)] ♦ 1: Information is being received from the steering angle sensor via the CAN-bus.				

[1)] If the steering angle sensor is OK, it sends information, even if the zeroing procedure was not performed.

Note:

On Board Diagnostic (OBD) will be terminated by the ABS control module -J104- if road speed exceeds 19 km/h.

01-278

Output Diagnostic Test Mode (DTM) (function 03)

Output Diagnostic Test Mode (DTM) is used to check the function of actuators. Actuators are also called actors. These are components that the control module activates when it reacts to the signals sent by sensors, e.g. solenoid valves, relays and pump motors.

Note:

- *Output Diagnostic Test Mode (DTM) only functions on vehicles containing control modules with no. 8D0 407 389 A/D/E.*
- *For control modules with no. 4B0 907 389, output Diagnostic Test Mode (DTM) is not possible.*

Output Diagnostic Test Mode (DTM) can and must only be selected once after the ignition is switched on.

01-279

"Function of actuators" includes all functions and properties of an actuator under operating conditions. This means, for example:

An electrically operated hydraulic valves that opens and closes when activated by the control module.

The relay of an electrical motor when activated by the control module. The motor switches on and carry outs the task.

Before initiating the output Diagnostic Test Mode (DTM), make sure there are no electrical malfunctions in the system you wish to test. This will enable you to recognize any mechanical problems. Perform a guided troubleshooting before starting output Diagnostic Test Mode (DTM) ⇒ page 01-19 .

01-280

Are you sure there are no electrical malfunctions in the system? If you have made sure that there are no electrical malfunctions in the system, you will be able to identify any mechanical malfunctions in the individual actuators if the results of the output DTM are not as specified here. Replace the relevant part.

With the Bosch 5.3 ABS/ESP the output Diagnostic Test Mode (DTM) enables you to check the electrically actuated hydraulic valves and the pump motor in the hydraulic module. You can also check that the brake lines going to the four wheels are connected correctly.

01-281

Notes:

- *The vehicle must be raised until all wheels are free to turn. Ask a colleague to help. The colleague will have to check the wheels to determine whether they turn freely.*
- *You can stop the test sequence at any time by pressing the -C- button.*
- *To avoid overloading the components being checked, they are actuated during the test sequence for a period of 60 (or 90) seconds. The actuator test will be terminated if the "→ button" is not pressed within this period.*
- *The ABS warning light and the red "brake system malfunction" symbol blink during the test.*
- *Pressing the brake pedal repeatedly this relieves the vacuum in the brake booster. For this reason, the brake pedal must be pressed harder in order to achieve the same braking effect. Your work will be easier if you run the engine briefly. This will build up vacuum in the brake booster again.*

01-282

During the test, the individual test steps are shown in the second line of the VAG1551 scan tool display. The following abbreviations are used.

IV = Inlet valve

OV = Outlet valve

LF = Left Front

RF = Right Front

LR = Left Rear

RR = Right Rear

B+ = Battery Positive Voltage (B+) at valve

0V = 0 volts; No voltage at valve

Locked/free = Wheel condition; must be checked by second technician

Hydr-P = Hydraulic pump

01-283

- Connect VAS5051 tester or VAG1551 scan tool and select the address word 03 "Brake Electronics".

- Check the control module version ⇒ page 01-128 and press the →button.

Rapid data transfer **HELP**	
Select function XX	

Indicated on display:

- Press buttons -0- and -3- to select "Output Diagnostic Test Mode (DTM)" function 03.

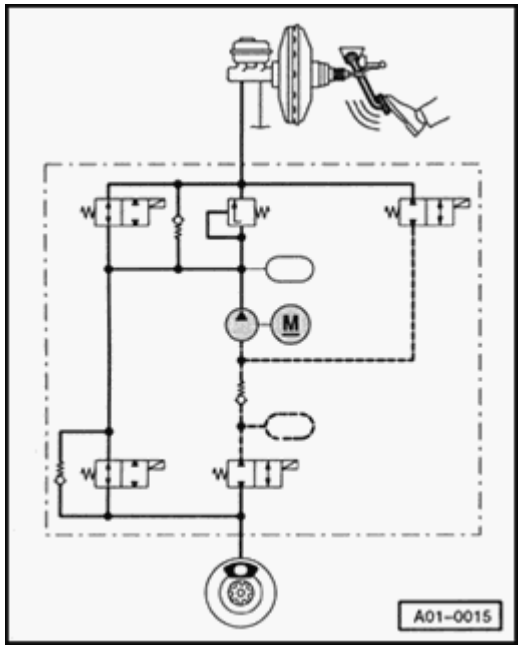
Rapid data transfer **Q**	
03 - Output Diagnostic Test Mode (DTM)	

Indicated on display:

- Press -Q- button to confirm input.

01-284

Output Diagnostic Test Mode (DTM) → ABS hydraulic pump -V64-



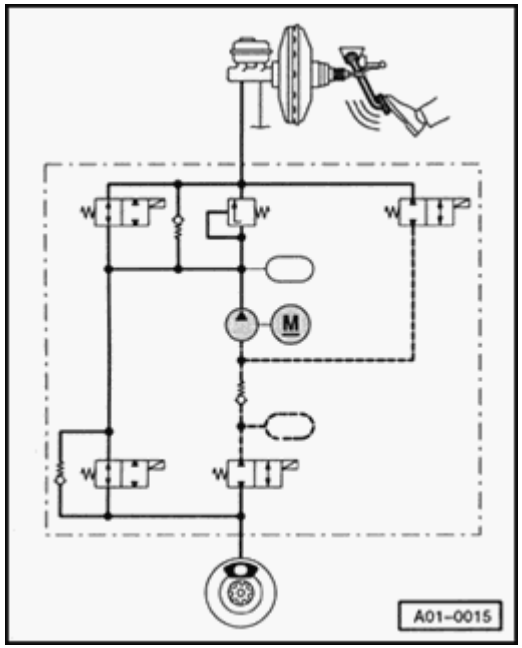
- Indicated on display:

  ABS hydraulic pump -V64- must start running. This is audible.

- When you put your foot on the brake pedal you can feel it vibrating. The brake pedal vibrates because the hydraulic pump generates pressure pulses in the brake lines. The pressure pulses generate oscillations. These are directed to the brake pedal and make it vibrate.

  The pressure pulses in the brake lines are not sufficient to lock the wheels.

01-285



The hydraulic circuit diagram shows a systematic representation of an ABS/EDL system. This will give a better understanding of the various test steps in the output Diagnostic Test Mode (DTM).

- shaded components are in action.
- Thin solid lines represent hydraulic lines or hoses that are not under pressure.
- Thick broken lines represent hydraulic lines or hoses working as suction lines.
- Thick solid lines represent hydraulic lines or hoses that are under pressure.

- Press → button.

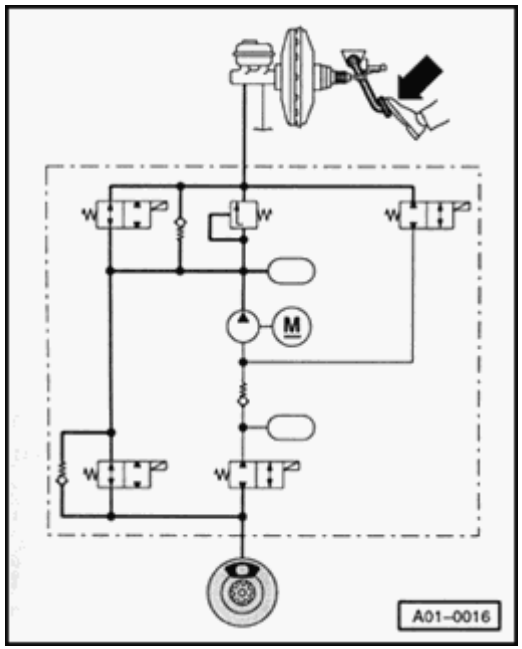
01-286

Output Diagnostic Test Mode (DTM) _ →

Operate brake

Output Diagnostic Test Mode (DTM) _ →

lfl: 0V Ofl: 0V fl wheel locked



➢ Indicated on display:

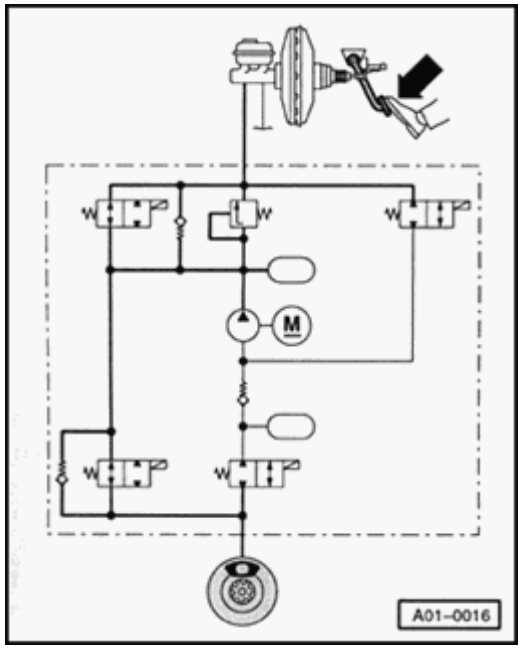
- Press → button.

➢ Indicated on display:

➢ When you press the brake pedal, brake fluid pressure will be built up in all four calipers. All four wheels lock.

Requirement for this: mechanical/hydraulic components of the brake system must be fully functional. This means that the master brake cylinder is able to build up pressure in all wheel cylinders and the hydraulic connections and lines are all sealed properly.

01-287



- If the wheels do not lock, visually inspect brake fluid reservoir, master brake cylinder, hydraulic unit, and calipers.

Concentrate on the left-front wheel first. The function of the control elements for this wheel is tested first.

Note:

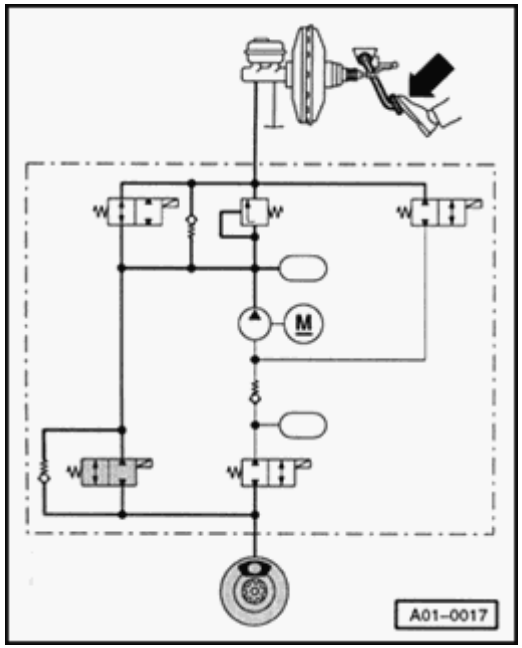
This test step in the output diagnostic test mode corresponds to the "pressure build-up" phase during ABS-controlled braking.

- Press → button.

01-288

Output Diagnostic Test Mode (DTM) _ →

Ifl: B+ Ofl: 0V fl wheel locked



➢ Indicated on display:

- Keep pressing brake pedal.

➢ Inlet valve is activated. It interrupts the brake line. However, fluid pressure is still maintained in the wheel cylinder. The left-front wheel remains locked.

Note:

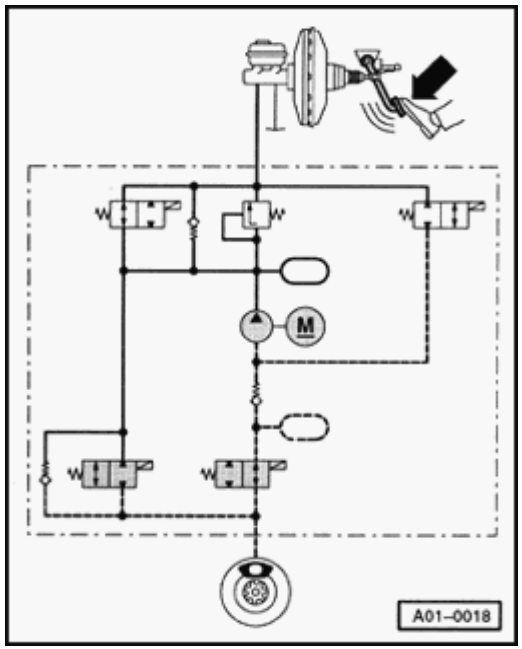
This test step in the output diagnostic test mode corresponds to the "maintain pressure" phase during ABS-controlled braking.

- Press → button.

01-289

Output Diagnostic Test Mode (DTM) _ →

lfl: B+ Ofl: B+ fl wheel free



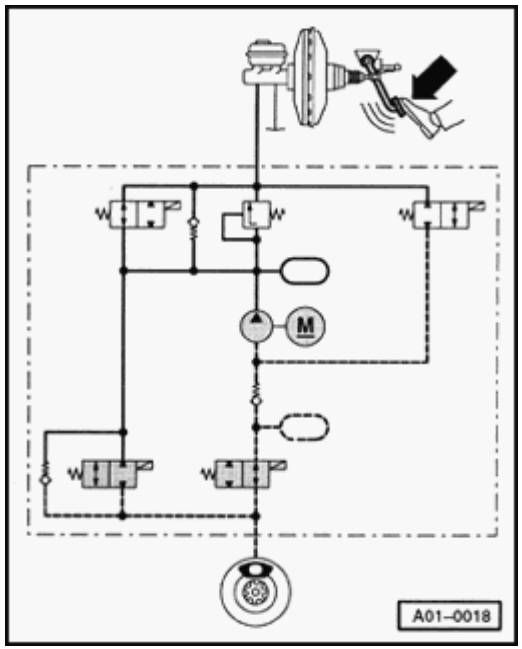
➢ Indicated on display:

➢ Keep pressing brake pedal. The inlet valve and the outlet valve for the left-front wheel are activated. The hydraulic pump starts running and reduces the fluid pressure in the caliper via the open outlet valve.

The brake pedal must not give, and should press harder against your foot.

You should now be able to turn the left-front wheel.

01-290



If you cannot turn the wheel, check whether the brake line for the left-front wheels is connected correctly.

If yes, this indicates a mechanical malfunction in one of the valves, providing there is no electrical malfunction in the system. Replace hydraulic control unit.

If the pedal gives under your foot, this means that the inlet valve or the check valve activated in parallel to the inlet valve is leaking. Replace hydraulic unit.

Note:

This test step in the output diagnostic test mode corresponds to the "pressure reduction" phase during ABS-controlled braking.

- Press → button.

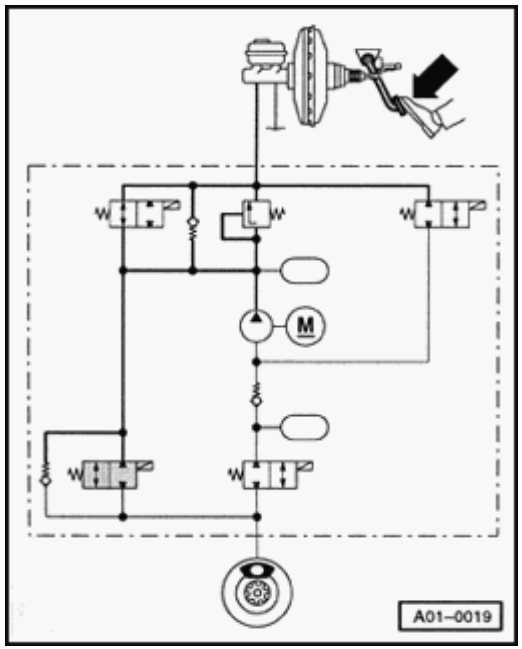
01-291

Output Diagnostic Test Mode (DTM) _ →		
Ifl: B+	Ofl: 0V	fl wheel free

➢ Indicated on display:

ABS hydraulic pump -V64- will stop running.

- Keep pressing brake pedal. Only the inlet valve is still activated and interrupts the brake line. If the inlet valve is not leaking, you should be able to turn the left-front wheel.



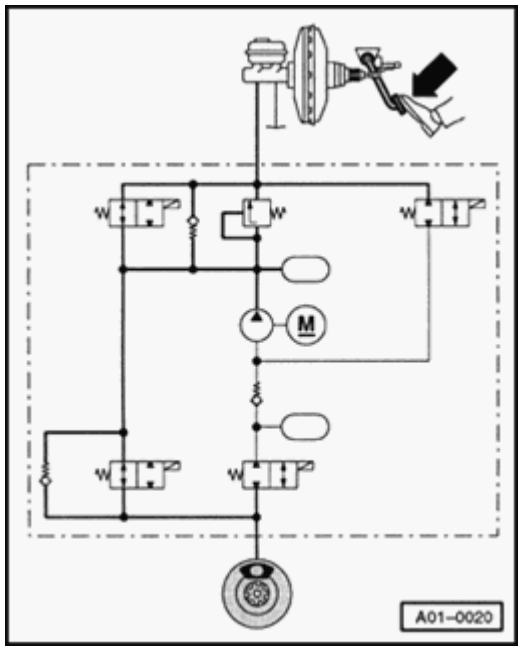
➢ If you cannot turn the wheel, this means that the inlet valve or the check valve activated in parallel to the inlet valve is leaking. Replace hydraulic control unit.

- Press → button.

01-292

Output Diagnostic Test Mode (DTM) _ →

Ifl: 0V Ofl: 0V fl wheel locked



➢ Indicated on display:

➢
- Keep pressing brake pedal. Inlet valve is no longer being activated. It is no longer interrupting the brake line. The brake pedal will give perceptibly under your foot. Fluid pressure is built again in the left-front caliper. The wheel will be locked.
- Press → button.

01-293

Output Diagnostic Test Mode (DTM) - →

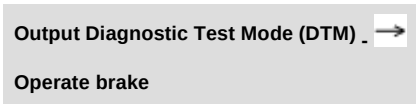
Release brake

Indicated on display:

- Press → button.

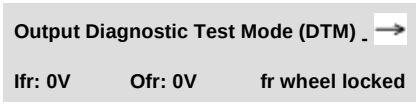
Continue output Diagnostic Test Mode (DTM) in order to check the front right, rear left, and rear right wheels in sequence. The test steps indicate the procedure for the front left wheel. They will therefore not be repeated in detail.

01-294



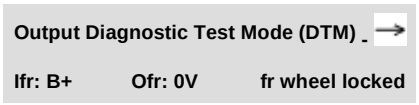
➢ Indicated on display:

- Press → button.



➢ Indicated on display:

- Press → button.

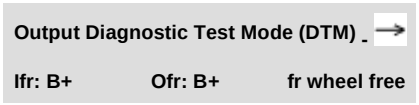


➢ Indicated on display:

- Press → button.

ABS hydraulic pump -V64- must start running.

The brake pedal must not give.

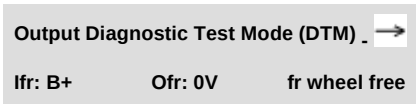


➢ Indicated on display:

- Press → button.

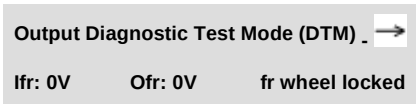
ABS hydraulic pump -V64- will stop running.

01-295

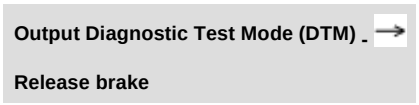


- Indicated on display:
- Press → button.

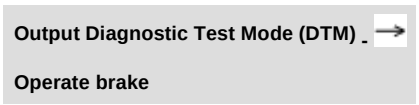
Brake pedal must give noticeably.



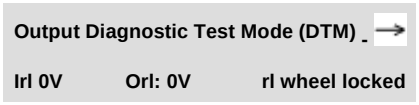
- Indicated on display:
- Press → button.



- Indicated on display:
- Press → button.

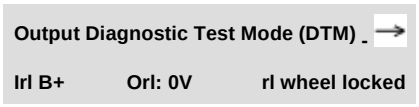


- Indicated on display:
- Press → button.



- Indicated on display:
- Press → button.

01-296

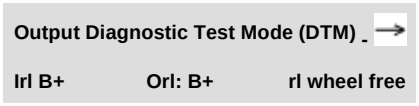


Indicated on display:

- Press → button.

ABS hydraulic pump -V64- must start running.

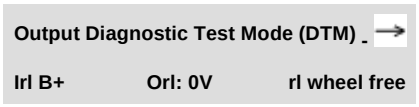
The brake pedal must not give.



Indicated on display:

- Press → button.

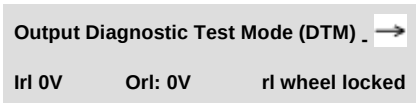
ABS hydraulic pump -V64- will stop running.



Indicated on display:

- Press → button.

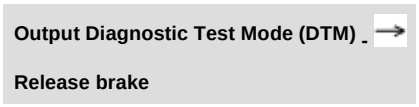
Brake pedal must give noticeably.



Indicated on display:

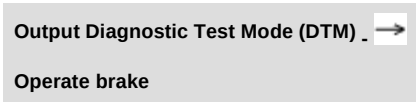
- Press → button.

01-297



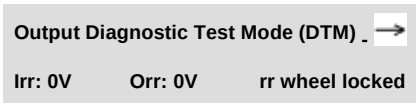
Indicated on display:

- Press → button.



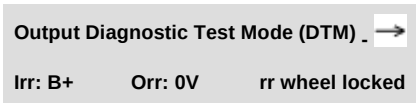
Indicated on display:

- Press → button.



Indicated on display:

- Press → button.



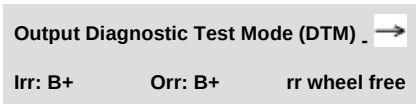
Indicated on display:

- Press → button.

ABS hydraulic pump -V64- must start running.

The brake pedal must not give.

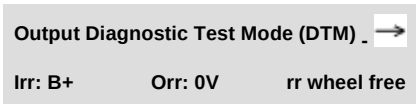
01-298



- Indicated on display:

- Press → button.

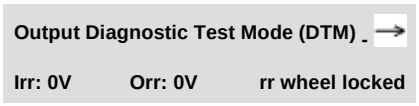
ABS hydraulic pump -V64- will stop running.



- Indicated on display:

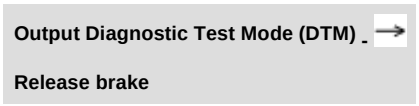
- Press → button.

Brake pedal must give noticeably.



- Indicated on display:

- Press → button.



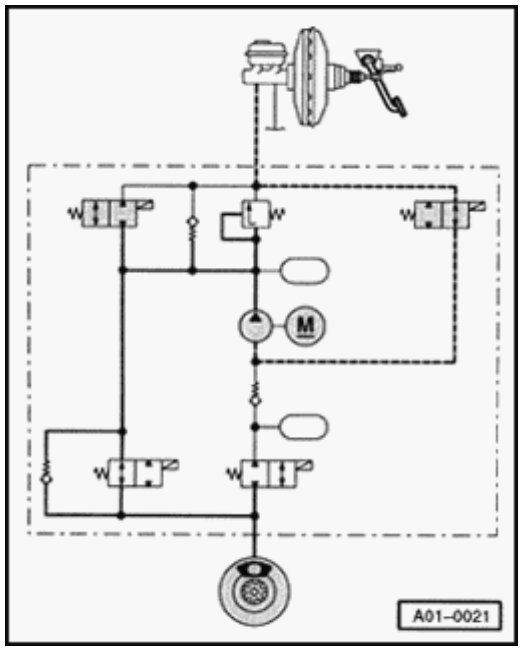
- Indicated on display:

- Press → button.

01-299

Output Diagnostic Test Mode (DTM) _ →

lrr: B+ Orr: B+ rr wheel free



➢ Indicated on display:

➢ The EDL change-over valve (left) and the EDL inlet valve are activated. ABS return flow pump -V39- runs for one second. It draws brake fluid from the brake fluid expansion tank via the EDL inlet valve. The hydraulic pump builds brake fluid pressure in the EDL regulated wheel cylinders. These wheels will then be locked.

If not, this indicates a mechanical malfunction in one of the valves, providing there is no electrical malfunction in the system. Replace hydraulic control unit.

- Press → button.

01-300

Output Diagnostic Test Mode (DTM) _ →

End

Indicated on display:

Note:

The output diagnostic test mode is completed. The ABS/EDL warning light and the red warning symbol for brake system go out.

- Press → button.

Rapid data transfer HELP

Select function XX

Indicated on display:

Note:

- *If the ABS/EDL warning light does not go out, this indicates a malfunction in the system. Observe test sequence exactly ⇒ page 01-17 .*

- Press buttons -0- and -6- to select "End Output" function 06. Press -Q- button to confirm input.

01-301

Electronic Stabilization Program (ESP), electrical testing

- If the On Board Diagnostic (OBD) sequence does not provide any indication of the source of the malfunction, work through all of the electrical test steps.

- If the OBD sequence identifies the source of the malfunction, only carry out the test steps recommended in the DTC table (specific testing).

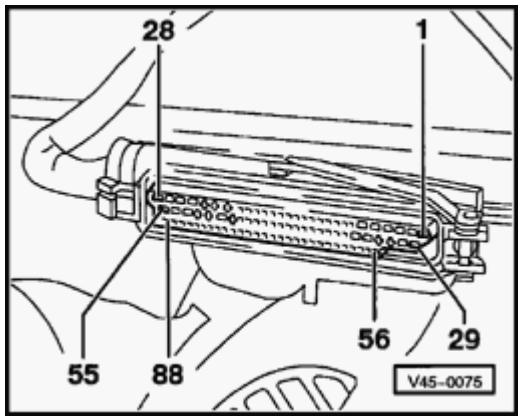
01-302

Test requirements

- The "Automatic Test Sequence" was carried out and it was determined that the Transmission Control Module (TCM) and Engine Control Module (ECM) only contain DTCs relating to ABS.

- Connect the VAG1551 Scan Tool (ST) and select the address word 00 with ignition switched on;

- After completing electrical test, check and erase DTC memories of Transmission Control Module (TCM) and Engine Control Module (ECM).



- Multi-pin harness connector for ABS control module -J104- in proper condition, with no bent, broken or corroded terminals. Replace any damaged terminals using VAS1978 wiring repair kit.

01-303

Note:

The operation manual for the VAS1978 wiring harness repair kit generally forbids the repair of any lines in the ABS or related systems. This rule only pertains to the shielded lines in these systems.

- Ignition and electrical consumers switched off before beginning testing (headlights, lighting, fan, etc.).

- For steps 13 through 16, raise the vehicle until the wheels rotate freely. On vehicles with manual transmission put the gear shift lever in neutral. On vehicles with automatic transmission move the selector lever to position "N".

01-304

Required special tools and test equipment:

- VAG1551 Scan Tool (ST) or VAG1552 mobile scan tool
- VAG1598/20 test box
- VAG1594 connector test kit
- VAG1526 Multimeter
- VAG1310A Pressure gauge

01-305

Connecting VAG1598/20 test box and checking ESP system

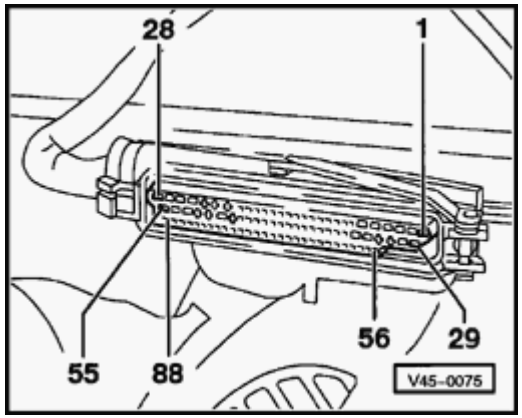
- Switch ignition off.

- Remove ABS control module -J104-.

⇒ *Repair manual, Brake System, Repair Group 45*

- Disconnect multi-pin connector from ABS control module -J104-.

- Check multi-pin connector between harness connector and ABS control module -J104-.



The socket designations on the VAG1598/20 test box are identical to the terminal designations on the ABS control module -J104- and on the wiring harness connector.

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

- Connect VAG1598/20 test box to multi-pin connector of wiring harness.

01-306

Terminal allocation, ABS control module -J104-

Multi-pin connector at ABS control module (w/EDL) -J104-			
Terminal	**Connected to...**		**Terminal**
1	⇒	**Voltage supply, terminal 15** **Traction control switch**	- 5
2	⇒	**ABS return flow pump relay -J105- (B+)** **ABS solenoid valve relay -J106- (B+)** **Voltage supply for steering angle sensor -G85- via terminal 15**	86 86 5
3	⇒	**Hydraulic unit; activation of left front ABS outlet valve -N102-**	15
4	⇒	**Hydraulic unit; activation of right rear ABS outlet valve -N135-**	12
5	⇒	**Hydraulic unit; activation of left front ABS inlet valve -N101-**	8
6	⇒	**Hydraulic unit; activation of right rear ABS inlet valve -N133-**	2
7	⇒	**ABS return flow pump relay -J105- (GND)**	85
8	⇒	**Left front ABS wheel speed sensor -G47-** ♦ For vehicles with all-wheel-drive:	-

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

01-307

Multi-pin connector at ABS control module (w/EDL) - J104-			
Terminal	**Connected to...**		**Terminal**
9	⇒	**Left front ABS wheel speed sensor -G47-** ♦ For vehicles with front-wheel-drive:	-
10	⇒	**Left front ABS wheel speed sensor -G47- (GND)**	-
11	⇒	**Right rear ABS wheel speed sensor -G44-**	-
12	⇒	**Right rear ABS wheel speed sensor -G44- (GND)**	-
13	⇒	**Left rear ABS wheel speed sensor -G46-**	
14	⇒	**Left rear ABS wheel speed sensor -G46- (GND)**	-
15	⇒	**Right front ABS wheel speed sensor -G45-**	-
16	⇒	**Right front ABS wheel speed sensor -G45- (GND)**	-
17	⇒	Not assigned	-

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

01-308

Multi-pin connector at ABS control module (w/EDL) -J104-			
Terminal	**Connected to...**		**Terminal**
18	⇒	**Sensor for transverse acceleration -G200-; signal wire (control module 4B0 907 389)**	2
18	⇒	**Sensor for transverse acceleration -G200-; signal wire (combined sensor for rotation rate and transverse acceleration) (control module 8D0 907 389/A/D/E)**	4
19	⇒	**Sensor for transverse acceleration -G200-; (Ground -GND-) (control module 4B0 907 389)**	1
19	⇒	**not occupied; (control module 8D0 907 389/A/D/E)**	-
19	⇒	**not occupied; (control module 8D0 907 389A)**	-
20	⇒	**ABS return flow pump relay -J105-** **Hydraulic unit; control wire for ABS return flow pump -V39-**	87 14
21	⇒	Not assigned	-
22	⇒	**Hydraulic pump for traction control -V156-; voltage supply**	2
23	⇒	Not assigned	-
24	⇒	**Hydraulic pump for traction control -V156-; (GND)**	1

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

Multi-pin connector at ABS control module (w/EDL) -J104-			
Terminal	**Connected to...**		**Terminal**
25	⇒	**Hydraulic unit; activation of left rear ABS outlet valve -N136-**	11
26	⇒	**Hydraulic unit; activation of right front ABS inlet valve -N99-**	5
27	⇒	Not assigned	-
28	⇒	**Ground (GND) supply, terminal 31**	-
29	⇒	**Ground (GND) supply, terminal 31**	-
30	⇒	Not assigned	-
31	⇒	**Instrument cluster; activation of traction control indicator light; (control module 4B0 907 389)**	15
31	⇒	**Rear left wheel speed sensor output; (control module 8D0 907 389/A/D/E)**	-
32	⇒	**Instrument cluster; ABS/EDL warning light activation**	26
33	⇒	Not assigned	-

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

01-310

Multi-pin connector at ABS control module (w/EDL) -J104-			
Terminal	**Connected to...**		**Terminal**
34	⇒	**Sender for rotation rate -G202-; voltage supply; (control module 4B0 907 389)**	2
34	⇒	**Sender for rotation rate -G202-; voltage supply (combined sensor for rotation rate and transverse acceleration) (control module 8D0 907 389/A/D/E)**	1
35	⇒	Not assigned	-
36	⇒	not occupied; (control module 4B0 907 389)	-
36	⇒	**ABS solenoid valve relay -J106- (GND); (control module 8D0 907 389/A/D/E)**	85
37	⇒	**ABS solenoid valve relay -J106- (GND); (control module 4B0 907 389/A/D/E)**	85
37	⇒	not occupied; (control module 8D0 907 389/A/D/E)	-
38	⇒	Not assigned	-
39	⇒	Not assigned	-

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

Multi-pin connector at ABS control module (w/EDL) -J104-			
Terminal	**Connected to...**		**Terminal**
40	⇒	Not assigned	-
41	⇒	Not assigned	-
42	⇒	**Brake light switch -F; brake test switch**	4
43	⇒	Not assigned	-
44	⇒	**Traction control switch**	6
45	⇒	Not assigned	-
46	⇒	**Diagnostic connector; K-wire**	7
47	⇒	Not assigned	-
48	⇒	**Brake light switch -F-; brake light switch**	2
49	⇒	**ABS hydraulic unit -N55-; activation of pilot valve -1- traction control -N225-**	7
50	⇒	**ABS hydraulic unit -N55-; activation of pilot valve -2- traction control -N226-**	6
51	⇒	**Voltage supply; terminal 30 for hydraulic pump for traction control -V156-;**	-

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

01-312

Multi-pin connector at ABS control module (w/EDL) -J104-			
Terminal	**Connected to...**		**Terminal**
52	⇒	**ABS hydraulic unit -N55-; activation of high pressure switch valve -2- traction control -N228-**	4
53	⇒	**ABS hydraulic unit -N55-; activation of left rear ABS inlet valve -N134-**	3
54	⇒	**ABS hydraulic unit -N55-; activation of high pressure switch valve -1- traction control -N227-**	1
55	⇒	**ABS hydraulic unit -N55-; activation of right front ABS outlet valve -N100-**	9
56	⇒	not used	-
57	⇒	not used	-
58	⇒	not used	-
59	⇒	not used	-
60	⇒	not used	-
61	⇒	**Not assigned**	-
62	⇒	Not assigned	-
63	⇒	**Not assigned**	-

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

01-313

Multi-pin connector at ABS control module (w/EDL) -J104-			
Terminal	**Connected to...**		**Terminal**
64	⇒	**CAN-bus; (Engine Control Module (ECM); Transmission Control Module (TCM), steering angle sensor -G85-)**	⇒ *EWD* **2**
65	⇒	not occupied; (control module 4B0 907 389)	-
65	⇒	CAN-bus shielding; (control module 8D0 907 389/A/D/E)	-
66	⇒	**CAN-bus; (Engine Control Module (ECM); Transmission Control Module (TCM), steering angle sensor -G85-)**	⇒ *EWD* **3**
67	⇒	**Sender 1 for brake booster -G201-; (GND) (control module 4B0 907 389)**	1
67	⇒	**Sender 1 for brake booster -G201-; voltage supply (control module 8D0 907 389/A/D/E)**	1
68	⇒	**Sensor for brake pressure -G201-; signal wire**	2
69	⇒	**Sender 1 for brake booster -G201-; voltage supply (control module 4B0 907 389)**	3
69	⇒	**Sender 1 for brake booster -G201-; (GND) (control module 8D0 907 389/A/D/E)**	3

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

01-314

Multi-pin connector at ABS control module (w/EDL) -J104-			
Terminal	**Connected to...**		**Terminal**
70	⇒	**Left-rear wheel speed sensor output; (control module 4B0 907 389)**	⇒ *EWD*
70	⇒	**Instrument cluster; activation of traction control indicator light (control module 8D0 907 389/A/D/E)**	15
71	⇒	**Speed sensor output rear right**	⇒ *EWD*
72	⇒	not occupied; (control module 4B0 907 389)	-
72	⇒	**Front left wheel speed sensor output; (control module 8D0 907 389/A/D/E)**	⇒ *EWD*
73	⇒	not occupied; (control module 4B0 907 389)	-
73	⇒	**Front right wheel speed sensor output; (control module 8D0 907 389/A/D/E)**	⇒ *EWD*
74	⇒	Not assigned	-
75	⇒	**Sensor for transverse acceleration -G200-; voltage supply; (control module 4B0 907 389)**	3
75	⇒	not occupied; (control module 8D0 907 389/A/D/E)	-
76	⇒	**Parking brake warning light switch -F9-**	⇒ *EWD*

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

01-315

Multi-pin connector at ABS control module (w/EDL) -J104-			
Terminal	**Connected to...**		**Terminal**
77	⇒	**Sender for rotation rate -G202-; test signal; (control module 4B0 907 389)**	5
77	⇒	**Sender for rotation rate -G202-; test signal (combined sensor for rotation rate and transverse acceleration); (control module 8D0 907 389/A/D/E)**	3
78	⇒	**Sender for rotation rate -G202-; reference signal; (control module 4B0 907 389)**	4
78	⇒	**Sender for rotation rate -G202-; reference signal (combined sensor for rotation rate and transverse acceleration); (control module 8D0 907 389/A/D/E)**	5
79	⇒	**Sender for rotation rate -G202-; signal wire; (control module 4B0 907 389)**	3
79	⇒	**Sender for rotation rate -G202-; signal wire (combined sensor for rotation rate and transverse acceleration); (control module 8D0 907 389/A/D/E)**	6
80	⇒	**Sender for rotation rate -G202-; (GND); (control module 4B0 907 389)**	1
80	⇒	**Sender for rotation rate -G202-; (GND) (combined sensor for rotation rate and transverse acceleration); (control module 8D0 907 389/A/D/E)**	2

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

01-316

Multi-pin connector at ABS control module (w/EDL) -J104-			
Terminal	**Connected to...**		**Terminal**
81	⇒	Not assigned	-
82	⇒	Not assigned	-
83	⇒	Not assigned	-
84	⇒	Not assigned	-
85	⇒	Not assigned	-
86	⇒	not occupied; (control module 4B0 907 389)	-
86	⇒	Instrument cluster; standing time signal; (control module 8D0 907 389/A/D/E)	11
87	⇒	Not assigned	-
88	⇒	Not assigned	-

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

01-317

Notes:

For test table

- *The socket designations of the VAG1598 test box are identical to the terminal designations of the ABS control module (w/EDL) -J104- in the wiring diagram. Incorrect test procedures can cause damage to the system. Do not bridge any terminals other than those listed in the table.*

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

- *Specified values refer to readings on the VAG1526 and are not necessarily applicable for other test units.*

- *If the measured values do not match specifications, carry out the corrective actions listed on the right side of the table.*

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

- *If values are obtained, also check wiring for intermittent loose terminals and short circuit to B+ and Ground (GND). This applies especially to sporadic malfunctions.*

- *Use the VAG1594 connector test kit for checking continuity (bridges).*

- *If the measured values only differ slightly from the specifications, clean the sockets and harness connectors of the testers and adapter leads (using contact spray G 000 700 04) and repeat the test. Before replacing actual components, check wiring and connections once more. This is especially important if the specification for a resistance test is under 10 Ω.*

01-318

Electrical test; steps 1-12

Resistance measurement: Select measurement range on VAG1526 (200 Ω)					
Test step	**VAG 1598/20 sockets**	**Test of**	• Test requirements - Additional work steps	**Specified value**	**Corrective action**
1	5 + 3	Left front ABS inlet valve -N101-, left front ABS outlet valve -N102-		9 Ω ÷ 22 Ω	- An infinitely high resistance indicates an open circuit. Check for this. - A resistance less than the specified value indicates a short circuit between both lines. Check for this. - Check electrical wiring for short circuit to Ground (GND) or B+.
2	55 + 26	Right front ABS inlet valve -N99-, right front ABS outlet valve -N100-			
3	53 + 25	Inlet valve -N134-, outlet valve -N136- left-rear			

01-319

Resistance measurement: Select measurement range on VAG1526 (200 Ω)					
Test step	**VAG 1598/20 sockets**	**Test of**	• Test requirements - Additional work steps	**Specified value**	**Corrective action**
4	6 + 4	Inlet valve -N133-, outlet valve -N135- right-rear		9 Ω ÷ 22 Ω	⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations* - If the electrical wiring is OK, replace the hydraulic unit.
5	49 + 50	♦ Pilot valve -1- traction control - N225- ♦ Pilot valve -2- traction control - N226-		12 Ω ÷ 28 Ω	- An infinitely high resistance indicates an open circuit. Check for this. - A resistance less than the specified value indicates a short circuit between both lines. Check for this.

01-320

Resistance measurement: Select measurement range on VAG1526 (200 Ω)					
Test step	**VAG 1598/20 sockets**	**Test of**	• Test requirements - Additional work steps	**Specified value**	**Corrective action**
6	52 + 54	♦ High pressure switch valve -1- traction control -N227-		6 W ÷ 16 Ω	- Check electrical wiring for short circuit to Ground (GND) or B+. ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations* - If the electrical wiring is OK, replace the hydraulic unit.
		♦ High pressure switch valve -2- traction control -N228-			
7	8 + 10 1) 9 + 10 2)	Left front ABS wheel speed sensor -G47-		400 Ω ÷ 2300 Ω	- An infinitely high resistance indicates an open circuit. Check for this.

♦ Outlets on ABS control module -J104- differ depending on installed equipment

1) Vehicles with all-wheel-drive

2) Vehicles with front-wheel-drive

01-321

Resistance measurement: Select measurement range on VAG1526 (2kΩ or 20 kΩ)					
Test step	**VAG 1598/20 sockets**	**Test of**	• Test requirements - Additional work steps	**Specified value**	**Corrective action**
8	15 + 16	Right front ABS wheel speed sensor -G45-		400Ω ÷ 2300Ω	- A resistance less than the specified value indicates a short circuit between both lines. Check for this. - Check electrical wiring for short circuit to Ground (GND) or B+. ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations* - If the electrical wiring is OK, replace the relevant ABS wheel speed sensor.
9	13 + 14	Left rear ABS wheel speed sensor -G46-			
10	11 + 12	Right rear ABS wheel speed sensor -G44-			

01-322

Resistance measurement: Select measurement range on VAG1526 (200 Ω)					
Test step	**VAG 1598/20 sockets**	**Test of**	• Test requirements - Additional work steps	**Specified value**	**Corrective action**
11	2 + 37 [1)] 2 + 36 [2)]	Activation of ABS solenoid valve relay -J106-		5 0W ÷ 70 Ω	- An infinitely high resistance indicates an open circuit. - A resistance less than the specified value indicates a short circuit between both lines. - Check electrical wiring for short circuit to Ground (GND) or B+. ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations* - If the electrical wiring is OK, replace the relay.
12	2 + 7	Activation of ABS return flow pump relay -J105-			

♦ Outlets on ABS control module -J104- differ depending on installed equipment

1) Vehicles with control module 4B0 907 389

2) Vehicles with control module 8D0 907 389/A/D/E

01-323

Electrical test; steps 13-27

Function test					
Test step	**VAG 1598/20 sockets**	**Test of**	• Test requirements - Additional work steps	**Specified value**	**Corrective action**
13 [1]	Bridge 1 + 2, 28+37 [2] 28+36 [3]	Inlet valve -N101 and front left brake line connection	• Ignition on - for vehicles with automatic transmission, engage neutral position "N" - Bridge terminals 5 + 28 - Depress brake pedal and hold.	♦ Left front wheel can be rotated by hand	- If the wheel does not rotate, check the other wheels for free rotation. If yes, then hydraulic brake lines are mixed-up (switched). Check brake line connections and coupling pieces. Make sure every component is OK.
		See continuation on next page			

♦ Outlets on ABS control module -J104- differ depending on installed equipment

[1] This test step requires two technicians.

2) Vehicles with control module 4B0 907 389

3) Vehicles with control module 8D0 907 389/A/D/E

01-324

Continuation:

Function test					
Test step	**VAG 1598/20 sockets**	**Test of**	• Test requirements - Additional work steps	**Specified value**	**Corrective action**
13 1)	Bridge 1 + 2, 28+37 2) 28+36 3)	Inlet valve -N101 and front left brake line connection	- Remove bridge - Release brake pedal.	♦ The left-front wheel remains locked.	- If all wheels are blocked, inlet valve is malfunctioning ⇒ DTC table, DTC 00257.

♦ Outlets on ABS control module -J104- differ depending on installed equipment

1) This test step requires two technicians.

2) Vehicles with control module 4B0 907 389

3) Vehicles with control module 8D0 907 389/A/D/E

01-325

Function test					
Test step	**VAG 1598/20 sockets**	**Test of**	• Test requirements - Additional work steps	**Specified value**	**Corrective action**
14 [1]	Bridge 1 + 2, 28+37 [2] 28+36 [3]	Inlet valve -N99- and front right brake line connection	• Ignition on - for vehicles with automatic transmission, engage neutral position "N" - Bridge terminals 26 + 28 - Depress brake pedal and hold.	♦ Right front wheel can be rotated by hand	- If the wheel does not rotate, check the other wheels for free rotation. If yes, then hydraulic brake lines are mixed-up (switched). Check brake line connections and coupling pieces. Make sure every component is OK.
		See continuation on next page			

♦ Outlets on ABS control module -J104- differ depending on installed equipment

[1] This test step requires two technicians.

[2] Vehicles with control module 4B0 907 389

3) Vehicles with control module 8D0 907 389/A/D/E

01-326

Continuation:

Function test					
Test step	**VAG 1598/20 sockets**	**Test of**	• Test requirements - Additional work steps	**Specified value**	**Corrective action**
14 1)	Bridge 1 + 2, 28+37 2) 28+36 3)	Inlet valve -N99- and front right brake line connection	- Remove bridge - Release brake pedal.	♦ The right-front wheel remains locked.	- If all wheels are blocked, inlet valve is malfunctioning ⇒ DTC table, DTC 00259.

♦ Outlets on ABS control module -J104- differ depending on installed equipment

1) This test step requires two technicians.

2) Vehicles with control module 4B0 907 389

3) Vehicles with control module 8D0 907 389/A/D/E

01-327

Function test					
Test step	**VAG 1598/20 sockets**	**Test of**	• Test requirements - Additional work steps	**Specified value**	**Corrective action**
15 [1]	Bridge 1 + 2, 28+37 [2] 28+36 [3]	Inlet valve - N134- and rear left brake line connection	• Ignition on - for vehicles with automatic transmission, engage neutral position "N" - Bridge terminals 53 + 28 - Depress brake pedal and hold.	♦ Left rear wheel can be rotated by hand	- If the wheel does not rotate, check the other wheels for free rotation. If yes, then hydraulic brake lines are mixed-up (switched). Check brake line connections and coupling pieces. Make sure every component is OK.
		See continuation on next page			

♦ Outlets on ABS control module -J104- differ depending on installed equipment

[1] This test step requires two technicians.

[2] Vehicles with control module 4B0 907 389

3) Vehicles with control module 8D0 907 389/A/D/E

01-328

Continuation:

Function test					
Test step	**VAG 1598/20 sockets**	**Test of**	• Test requirements - Additional work steps	**Specified value**	**Corrective action**
15 1)	Bridge 1 + 2, 28+37 2) 28+36 3)	Inlet valve -N134- and rear left brake line connection	- Remove bridge - Release brake pedal.	♦ The left-rear wheel remains locked.	- If all wheels are blocked, inlet valve is malfunctioning ⇒ DTC table, DTC 00274.

♦ Outlets on ABS control module -J104- differ depending on installed equipment

1) This test step requires two technicians.

2) Vehicles with control module 4B0 907 389

3) Vehicles with control module 8D0 907 389/A/D/E

01-329

Function test					
Test step	**VAG 1598/20 sockets**	**Test of**	• Test requirements - Additional work steps	**Specified value**	**Corrective action**
16 [1]	Bridge 1 + 2, 28+37 [2] 28+36 [3]	Inlet valve - N133- and rear right brake line connection	• Ignition on - for vehicles with automatic transmission, engage neutral position "N" - Bridge terminals 6 + 28 - Depress brake pedal and hold.	♦ Right rear wheel can be rotated by hand	- If the wheel does not rotate, check the other wheels for free rotation. If yes, then hydraulic brake lines are mixed-up (switched). Check brake line connections and coupling pieces. Make sure every component is OK.
		See continuation on next page			

♦ Outlets on ABS control module -J104- differ depending on installed equipment

[1] This test step requires two technicians.

[2] Vehicles with control module 4B0 907 389

3) Vehicles with control module 8D0 907 389/A/D/E

01-330

Continuation:

Function test					
Test step	**VAG 1598/20 sockets**	**Test of**	• Test requirements - Additional work steps	**Specified value**	**Corrective action**
16 1)	Bridge 1 + 2, 28+37 2) 28+36 3)	Inlet valve -N133- and rear right brake line connection	- Remove bridge - Release brake pedal.	♦ The right-rear wheel remains locked.	- If all wheels are blocked, inlet valve is malfunctioning ⇒ DTC table, DTC 00273.

♦ Outlets on ABS control module -J104- differ depending on installed equipment

1) This test step requires two technicians.

2) Vehicles with control module 4B0 907 389

3) Vehicles with control module 8D0 907 389/A/D/E

01-331

Function test: ABS warning light -K47-					
Test step	**VAG 1598/20 sockets**	**Test of**	• Test requirements - Additional work steps	**Specified value**	**Corrective action**
17	-	Function of ABS warning light -K47-	• DTC memory checked and no DTC present in DTC memory of ABS control module -J104-. • Ignition switched off • Multi-pin connector connected to ABS control module -J104- and retainer catch engaged.		
		See continuation on next page			

01-332

Continuation:

Function test: ABS warning light -K47-					
Test step	**VAG 1598/20 sockets**	**Test of**	• Test requirements - Additional work steps	**Specified value**	**Corrective action**
17	-	Function of ABS warning light -K47- **See continuation on next page**	- Switch on ignition	ABS warning light -K47- lights up for two (2) seconds and then goes out.	- If ABS warning light does not come on, check voltage of electrical system and test wiring from terminal 32 of ABS control module -J104- to instrument cluster for short circuit to Ground (GND).

01-333

Continuation:

Function test: ABS warning light -K47-					
Test step	**VAG 1598/20 sockets**	**Test of**	• Test requirements - Additional work steps	**Specified value**	**Corrective action**
17	-	Function of ABS warning light -K47-			- The ABS warning lamp does not switch off after 2 seconds. The red "brake system malfunction" symbol lights up after 2 seconds. Check wire from terminal 32 of ABS control module -J104- to instrument cluster for short circuit to B+ or open circuit. ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations* - If voltage of electrical system is OK and wiring from terminal 32 of ABS control module -J104- to instrument cluster is intact ⇒ there is a malfunction in instrument cluster. ⇒ *Repair Manual, Electrical Equipment, Repair Group 90; Instrument cluster*

01-334

Function test: Red brake warning symbol					
Test step	**VAG 1598/20 sockets**	**Test of**	• Test requirements - Additional work steps	**Specified value**	**Corrective action**
18	-	Function of red "brake system malfunction" symbol **See continuation on next page**	• Brake fluid level is OK ⇒ *Repair Manual, Brake System, Repair Group 47* • Function of ABS warning light -K47- already checked in step 17. • Multi-pin connector connected to ABS control module -J104- and retainer catch engaged. • Switch on ignition		

01-335

Continuation:

Function test: Red brake warning symbol					
Test step	**VAG 1598/20 sockets**	**Test of**	• Test requirements - Additional work steps	**Specified value**	**Corrective action**
18	-	Function of red "brake system malfunction" symbol	- Connect VAG1551 scan tool and select address word 03 - For vehicles with automatic transmission and instrument cluster with DIS, depress the brake pedal and select a driving gear.	The ABS/EDL indicator lamp and the red "brake system malfunction" symbol light up. If the traction control indicator light is OK, it lights up as well.	- Malfunction in instrument cluster ⇒ *Repair Manual, Electrical Equipment, Repair Group 90; Instrument cluster*

01-336

Function test: Traction control indicator light -K86-					
Test step	**VAG 1598/20 sockets**	**Test of**	• Test requirements - Additional work steps	**Specified value**	**Corrective action**
19	-	Function of traction control indicator light -K86- **See continuation on next page**	• DTC memory checked and no DTC present in DTC memory of ABS control module -J104-. • Ignition switched off • Multi-pin connector connected to ABS control module -J104- and retainer catch engaged.		

01-337

Continuation:

Function test: Traction control indicator light -K86-					
Test step	**VAG 1598/20 sockets**	**Test of**	• Test requirements - Additional work steps	**Specified value**	**Corrective action**
19 Continuation:	-	Function of traction control indicator light -K86-	- Switch on ignition	Traction control indicator light -K86- comes on for two (2) seconds and then goes out.	- If traction control indicator light does not light up, check vehicle voltage and wire from terminal 31 of ABS control module -J104- to instrument cluster for short circuit to B+ and open circuit. - If traction control indicator lights continuously, test wiring from terminal 31 of ABS control module -J104- to instrument cluster for short circuit to Ground (GND). ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*
		See continuation on next page			

01-338

Continuation:

Function test: Traction control indicator light -K86-					
Test step	**VAG 1598/20 sockets**	**Test of**	• Test requirements - Additional work steps	**Specified value**	**Corrective action**
19	-	Function of traction control indicator light -K86-			- Are voltage of electrical system OK and wiring from terminal 31 of ABS control module -J104- to instrument cluster intact? ⇒ malfunction in instrument cluster ⇒ *Repair Manual, Electrical Equipment, Repair Group 90; Instrument cluster*

01-339

Function test: Traction control button; set measurement range on VAG1526: 20 V =					
Test step	**VAG 1598/20 sockets**	**Test of**	• Test requirements - Additional work steps	**Specified value**	**Corrective action**
20	-	Function of ASR/ESP button **See continuation on next page**	• Ignition switched off • Function of traction control indicator light - K86- already checked in step 19. • Multi-pin connector connected to ABS control module -J104- and retainer catch engaged.		

01-340

Continuation:

Function test: Traction control button; set measurement range on VAG1526: 20 V =					
Test step	**VAG 1598/20 sockets**	**Test of**	• Test requirements - Additional work steps	**Specified value**	**Corrective action**
20	-	Function of ASR/ESP button	- Switch on ignition		
			- Press ASR/ESP button	Traction control indicator light -K86- lights up	- Switch off ignition. - Detach multi-pin connector from ABS control module -J104- and remove.
			- Press ASR/ESP button again	Traction control indicator light -K86- goes out	- Connect VAG1598/20 test box.
		See continuation on next page			

01-341

Continuation:

Function test: Traction control button; set measurement range on VAG1526: 20 V =					
Test step	**VAG 1598/20 sockets**	**Test of**	• Test requirements - Additional work steps	**Specified value**	**Corrective action**
20	28 + 44	Function of ASR/ESP button	• Ignition switched on. - ASR/ESP button not pressed	0.0 to 1.0 V	- Check wire from terminal 28 to Ground (GND). - Check wiring from terminal 44 to traction control button, terminal 6. - Check voltage supply from terminal 5 of ASR/ESP button to terminal 15. ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*
		See continuation on next page			

01-342

Continuation:

Function test: Traction control button; set measurement range on VAG1526: 20 V =					
Test step	**VAG 1598/20 sockets**	**Test of**	• Test requirements - Additional work steps	**Specified value**	**Corrective action**
20	28 + 44	Function of ASR/ESP button	- ASR/ESP button pressed	10.0 to 14.5 V	- Check wire from terminal 28 to Ground (GND). - Check wiring from terminal 44 to traction control button, terminal 6. - Check voltage supply from terminal 5 of ASR/ESP button to terminal 15. ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations* - If no malfunctions can be found using the procedures in these steps, replace the ASR/ESP button.

01-343

Voltage measurement; set measurement range on VAG1526: 20 V =					
Test step	**VAG 1598/20 sockets**	**Test of**	• Test requirements - Additional work steps	**Specified value**	**Corrective action**
21	1 + 28 1 + 29	Voltage supply to ABS control module -J104- via terminal 15	• Ignition switched on.	10.5 to 14.5 V	- Check wiring from terminals 28 and 29 to Ground (GND). - Check wiring from terminal 1 to terminal 15 via fuse (10A). ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

01-344

Voltage measurement; set measurement range on VAG1526: 20 V =					
Test step	**VAG 1598/20 sockets**	**Test of**	• Test requirements - Additional work steps	**Specified value**	**Corrective action**
22	-	Voltage supply of solenoid valves via ABS solenoid valve relay -J106-.	- Remove ABS solenoid valve relay -J106-. ⇒ *Repair Manual, Brake System, Repair Group 45* - Check voltage supply for ABS solenoid valve relay -J106- at terminal 30 for open circuit or short circuit to B+ or Ground (GND).	10.5 to 14.5 V	- Check the relevant fuse, 25A, and repair the wiring problem. ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*
		See continuation on next page			

01-345

Continuation:

Voltage measurement; set measurement range on VAG1526: 20 V =					
Test step	**VAG 1598/20 sockets**	**Test of**	• Test requirements - Additional work steps	**Specified value**	**Corrective action**
22	-	Voltage supply of solenoid valves via ABS solenoid valve relay -J106- .	- Check wiring from ABS solenoid valve relay -J106- (terminal 87) to ABS hydraulic unit -N55- (terminal 10) for open circuit or short circuit to B+ or Ground (GND).		- Fix the wiring problem. - If the power supply lines are OK, replace the relay. - If the original malfunction "ABS solenoid valve relay -J106-" is still not fixed, replace the ABS hydraulic unit.

01-346

Voltage measurement; set measurement range on VAG1526: 20 V =					
Test step	**VAG 1598/20 sockets**	**Test of**	• Test requirements - Additional work steps	**Specified value**	**Corrective action**
23	-	Voltage supply for ABS return flow pump relay -J105- via terminal 30	- Remove ABS return flow pump relay -J105-. ⇒ *Repair Manual, Brake System, Repair Group 45* - Check voltage supply for ABS return flow pump relay -J105- at terminal 30 for open circuit or short circuit to Ground (GND).	10.5 to 14.5 V	- Check the relevant fuse, 60A, and repair wire damage. ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

01-347

Voltage measurement; set measurement range on VAG1526: 20 V =					
Test step	**VAG 1598/20 sockets**	**Test of**	• Test requirements - Additional work steps	**Specified value**	**Corrective action**
24	-	♦ Ground (GND) supply and voltage supply for ABS return flow pump -V39- **See continuation on next page**	- Remove ABS return flow pump relay -J105-. ⇒ *Repair Manual, Brake System, Repair Group 45*		

01-348

Continuation:

Voltage measurement; set measurement range on VAG1526: 20 V =					
Test step	**VAG 1598/20 sockets**	**Test of**	• Test requirements - Additional work steps	**Specified value**	**Corrective action**
24	-	♦ Ground (GND) supply and voltage supply for ABS return flow pump -V39-	- Check wiring from ABS return flow pump relay -J105- (terminal 87) to ABS control module -J104- (terminal 20) and to ABS hydraulic unit -N55- (terminal 14) for open circuit or short circuit to B+ or Ground (GND).		- Fix the wiring problem.
		See continuation on next page			

01-349

Continuation:

Voltage measurement; set measurement range on VAG1526: 20 V =					
Test step	**VAG 1598/20 sockets**	**Test of**	• Test requirements - Additional work steps	**Specified value**	**Corrective action**
24	-	♦ Ground (GND) supply and voltage supply for ABS return flow pump - V39-	- Check the Ground (GND) for ABS return flow pump at ABS hydraulic unit (terminal 13).		- Fix the open circuit or short circuit to B+ in Ground (GND).
		See continuation on next page			

01-350

Continuation:

Voltage measurement; set measurement range on VAG1526: 20 V =					
Test step	**VAG 1598/20 sockets**	**Test of**	• Test requirements - Additional work steps	**Specified value**	**Corrective action**
24	Bridge 7 + 28, 1 + 2	♦ Function of ABS return flow pump relay -J105-.	• ABS return flow pump relay -J105- installed		
			- Use VAG1598/20 to measure voltage between terminals 20 and 29.	♦ Voltage should be between 10.5 to 14.5 V between terminals 20 and 29.	
			- Switch on ignition for max. 10 seconds and switch off again.	♦ ABS return flow pump -V39- runs	- If you do not measure any voltage between terminals 20 and 29, replace the relay. - If you measure voltage between terminals 20 and 29, the ABS return flow pump is malfunctioning. Replace ABS hydraulic unit -N55-.

01-351

Voltage measurement; set measurement range on VAG1526: 20 V =					
Test step	**VAG 1598/20 sockets**	**Test of**	• Test requirements - Additional work steps	**Specified value**	**Corrective action**
25	51 + 28	ABS control module -J104- is supplied with power at terminal 51 from terminal 30. The ABS control module -J104- uses this voltage supply as a voltage supply for the hydraulic pump for traction control -V156.	- Check the wiring from ABS control module -J104- (terminal 51) to terminal 30 for open circuit and short circuit to Ground (GND).	10.5 to 14.5 V	- Check the relevant fuse, 25A, and repair the wiring problem. ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

01-352

Voltage measurement; set measurement range on VAG1526: 20 V =					
Test step	**VAG 1598/20 sockets**	**Test of**	• Test requirements - Additional work steps	**Specified value**	**Corrective action**
26	28 + 48	Function of brake light switch -F-	• Ignition switched off • Brake pedal not depressed - Operate brake pedal.	0.0 to 1.0 V 10.0 to 14.5 V	- Check wire from terminal 28 to Ground (GND). - Check wiring from terminal 48 to terminal 30 via fuse (10A). ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations* - Adjust brake light switch -F-. ⇒ *Repair Manual, Brake System, Repair Group 45*
		See continuation on next page			

01-353

Continuation:

Voltage measurement; set measurement range on VAG1526: 20 V =					
Test step	**VAG 1598/20 sockets**	**Test of**	• Test requirements - Additional work steps	**Specified value**	**Corrective action**
26	28 + 42	Function of brake light switch -F-(Brake test switch)	• Brake pedal not depressed - Operate brake pedal.	10.0 to 14.5 V 0.0 to 1.0 V	- Check wiring from terminal 42 to terminal 15 via fuse (10A). ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations* - Adjust brake light switch -F-. ⇒ *Repair Manual, Brake System, Repair Group 45*

01-354

Voltage measurement; set measurement range on VAG1526: 20 V =					
Test step	**VAG 1598/20 sockets**	**Test of**	• Test requirements - Additional work steps	**Specified value**	**Corrective action**
27	1 + 76	Function of parking brake warning light switch -F9-	• Ignition switched on. • Parking brake not engaged - Set parking brake	0.0 to 1.0 V 10.0 to 14.5 V	- Check wiring from terminal 1 to terminal 15 via fuse (10A). - Check wiring from terminal 76 to parking brake warning light switch -F9- for open circuit or short circuit to B+. ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*
		See continuation on next page			

01-355

Continuation:

Voltage measurement; set measurement range on VAG1526: 20 V =					
Test step	**VAG 1598/20 sockets**	**Test of**	• Test requirements - Additional work steps	**Specified value**	**Corrective action**
27	1 + 76	Function of parking brake warning light switch -F9-	• Parking brake not engaged - Set parking brake	0.0 to 1.0 V 10.0 to 14.5 V	- Check Ground (GND) to parking brake warning light switch -F9-. ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations* - If no malfunction could be determined using the procedures in these steps, replace the parking brake warning light switch -F9-.

01-356

Electronic Stabilization Program (ESP) DTC table

Notes:

- *Fulfill test requirements ⇒ page 01-22 .*
- *Connect the VAG1551 Scan Tool (ST) and select "Brake Electronics" via address word 03 ⇒ page 01-4*
- *Check the control module version ⇒ page 01-231 and press the → button.*
- *Press buttons -0- and -2- to select "Check DTC Memory" function 02. Press -Q- button to confirm input.*
- *Each malfunction is assigned a 5-digit Diagnostic Trouble Code (DTC). The DTC is located in the left column of the DTC table. If you have switched the printer on by pressing the "PRINT" button, the VAG1551 scan tool (ST) prints the message identifying the malfunction and the DTC. Otherwise, DTCs are not displayed by the VAG1551 scan tool.*
- *The contents of DTC memory remain stored until memory is erased, ⇒ page 01-15 .*
- *Sporadically occurring malfunctions are identified via indication of "/SP" on the right-hand side of the display.*
- *Static malfunctions that cannot be detected when the vehicle is stationary are also identified with "/SP" if the ignition has been switched off and then on again.*
- *The following DTC table includes all the DTCs that can be stored by the ABS control module -J104- and displayed and printed out by the VAS5051 tester or VAG1551 scan tool. Malfunctions are listed by DTC number.*

01-357

DTC table; DTCs from 00000 to 00526

Printed output from VAG1551 Scan Tool (ST)	Possible cause	Corrective action
DTC		
00000 No malfunction recognized! If this display appears, process is concluded. No DTCs are stored in DTC memory. If there are still problems or malfunctions anyway, check the following points: **See continuation on next page**	♦ If one or more indicator lamps light up anyway, one of the wires that activates the indicator lamps may be malfunctioning. ♦ Missing signal from parking brake warning light switch -F9-. (parking brake set or released). ♦ Missing signal from brake light switch -F.	- See section "Overview of indicator lamp functions" ⇒ page 01-222 . ♦ Check the parking brake warning light switch -F9-. - "Read measuring value block" function 08 ⇒ page 01-256 , display group 2. ♦ Check the brake light switch -F. - "Read measuring value block" function 08 ⇒ page 01-256 , display group 2.

Printed output from VAG1551 Scan Tool (ST) DTC	Possible cause	Corrective action
00000 No malfunction recognized! **Continuation:**	♦ The zero position learned by the steering angle sensor -G85- during straight-ahead driving in the zeroing procedure has become misadjusted.	♦ Check the zero position of the steering angle sensor -G85-. - "Read measuring value block" function 08 ⇒ page 01-256 , display group 2, 5
	If no malfunction can be found, and there is still a problem, there may be a mechanical malfunction (e.g. solenoid valve sticking).	- Expand troubleshooting to include the "Electrical test" ⇒ page 01-301 .
00257 Left front ABS inlet valve -N101-	♦ Open circuit, short circuit to B+ or Ground (GND) in wiring between ABS hydraulic unit -N55- and ABS control module -J104-. ♦ Left front ABS inlet valve -N101- malfunctioning ♦ ABS control module -J104- malfunctioning	- Carry out "electrical test", steps 1 + 13 ⇒ page 01-318 , and ⇒ page 01-323 - If the electrical test does not reveal any malfunctions, check all wiring and connectors for loose contacts. - If no problems are found after implementing the specified steps, replace the control module.

01-359

Printed output from VAG1551 Scan Tool (ST) DTC	Possible cause	Corrective action
00259 Right front ABS inlet valve -N99-	♦ Open circuit, short circuit to B+ or Ground (GND) in wiring between ABS hydraulic unit and ABS control module -J104-. ♦ Right front ABS inlet valve -N99- malfunctioning. ♦ ABS control module -J104- malfunctioning	- Carry out "electrical test", steps 2 +14 ⇒ page 01-318 and ⇒ page 01-323 - If the electrical test does not reveal any malfunctions, check all wiring and connectors for loose contacts. - If no problems are found after implementing the specified steps, replace the control module.
00265 Left front ABS outlet valve -N102-	♦ Open circuit, short circuit to B+ or Ground (GND) in wiring between ABS hydraulic unit and ABS control module -J104-. ♦ Left front ABS outlet valve -N102- malfunctioning. ♦ ABS control module -J104- malfunctioning	- Carry out "Electrical test", step 1 ⇒ page 01-318 . - If the electrical test does not reveal any malfunctions, check all wiring and connectors for loose contacts. - If no problems are found after implementing the specified steps, replace the control module.

01-360

Printed output from VAG1551 Scan Tool (ST) DTC	Possible cause	Corrective action
00267 Right front ABS outlet valve -N100-	♦ Open circuit, short circuit to B+ or Ground (GND) in wiring between ABS hydraulic unit and ABS control module -J104-. ♦ Right front ABS outlet valve -N100- malfunctioning ♦ ABS control module -J104- malfunctioning	- Carry out "Electrical test", step 2 ⇒ page 01-318 . - If the electrical test does not reveal any malfunctions, check all wiring and connectors for loose contacts. - If no problems are found after implementing the specified steps, replace the control module.
00273 Right rear ABS inlet valve -N133-	♦ Open circuit, short circuit to B+ or Ground (GND) in wiring between ABS hydraulic unit and ABS control module -J104-. ♦ Right rear ABS inlet valve -N133- malfunctioning ♦ ABS control module -J104- malfunctioning	- Carry out "electrical test", steps 4 +16 ⇒ page 01-318 and ⇒ page 01-323 - If the electrical test does not reveal any malfunctions, check all wiring and connectors for loose contacts. - If no problems are found after implementing the specified steps, replace the control module.

01-361

Printed output from VAG1551 Scan Tool (ST) DTC	Possible cause	Corrective action
00274 Left rear ABS inlet valve -N134-	♦ Open circuit, short circuit to B+ or Ground (GND) in wiring between ABS hydraulic unit and ABS control module -J104-. ♦ Left rear ABS inlet valve -N134- malfunctioning ♦ ABS control module -J104- malfunctioning	- Carry out "electrical test", steps 3 +15 ⇒ page 01-318 and ⇒ page 01-323 - If the electrical test does not reveal any malfunctions, check all wiring and connectors for loose contacts. - If no problems are found after implementing the specified steps, replace the control module.
00275 Right rear ABS outlet valve -N135-	♦ Open circuit, short circuit to B+ or Ground (GND) in wiring between ABS hydraulic unit and ABS control module -J104-. ♦ Right rear ABS outlet valve -N135- malfunctioning. ♦ ABS control module -J104- malfunctioning	- Carry out "Electrical test", step 4 ⇒ page 01-318 . - If the electrical test does not reveal any malfunctions, check all wiring and connectors for loose contacts. - If no problems are found after implementing the specified steps, replace the control module.

01-362

Printed output from VAG1551 Scan Tool (ST) DTC	Possible cause	Corrective action
00276 Left rear ABS outlet valve -N136-	♦ Open circuit, short circuit to B+ or Ground (GND) in wiring between ABS hydraulic unit and ABS control module -J104-. ♦ Left rear ABS outlet valve -N136- malfunctioning ♦ ABS control module -J104- malfunctioning	- Carry out "Electrical test", step 3 ⇒ page 01-318 . - If the electrical test does not reveal any malfunctions, check all wiring and connectors for loose contacts. - If no problems are found after implementing the specified steps, replace the control module.

01-363

Printed output from VAG1551 Scan Tool (ST) DTC	Possible cause	Corrective action
00283 Left front ABS wheel speed sensor -G47- Implausible signal	♦ Left rear ABS wheel speed sensor -G47- installed incorrectly. ♦ ABS wheel speed sensor rotor dirty or damaged. ♦ Excessive wheel bearing play. ♦ ABS wheel speed sensor -G47- malfunctioning. ♦ Short circuit to Ground (GND).	- Check installation of ABS wheel speed sensor. ⇒ *Repair Manual, Brake System, Repair Group 45* - Check rotor, clean or replace ⇒ *Repair Manual, Brake System, Repair Group 45* - Replace wheel bearing ⇒ *Repair Manual, Suspension, Wheels, Steering, Repair Group 40* - "Read measuring value block" display group 1 ⇒ page 01-256 . - Carry out "Electrical test", step 7 ⇒ page 01-318 .
00283 Left front ABS wheel speed sensor -G47-	♦ Incorrect control module ♦ Open circuit or short circuit to B+ in	- Check control module identification ⇒ page 01-231 . - If nothing is displayed during "Read measuring value

Open circuit/short circuit to B+	wiring between ABS wheel speed sensor -G47- and ABS control module -J104-.	block", and no malfunction could be determined in the wiring or the ABS wheel speed sensor, replace the ABS control module -J104-.

01-364

Printed output from VAG1551 Scan Tool (ST) DTC	Possible cause	Corrective action
00285 Right front ABS wheel speed sensor -G45- Implausible signal or: Right front ABS wheel speed sensor -G45- Open circuit/short circuit to B+	♦ Left rear ABS wheel speed sensor -G45- installed incorrectly. ♦ ABS wheel speed sensor rotor dirty or damaged. ♦ Excessive wheel bearing play. ♦ ABS wheel speed sensor -G45- malfunctioning. ♦ Short circuit to Ground (GND). ♦ Incorrect control module ♦ Open circuit or short circuit to B+ in wiring between ABS wheel speed sensor -G45- and ABS control module -J104-.	- Check installation of ABS wheel speed sensor. ⇒ *Repair Manual, Brake System, Repair Group 45* - Check rotor, clean or replace ⇒ *Repair Manual, Brake System, Repair Group 45* - Replace wheel bearing ⇒ *Repair Manual, Suspension, Wheels, Steering, Repair Group 40* - "Read measuring value block", display group 1 ⇒ page 01-256 . - Carry out "Electrical test", step 8 ⇒ page 01-318 - Check control module version ⇒ page 01-231 . - If nothing is displayed during "Read measuring value block", and no malfunction could be determined in the wiring or the ABS wheel speed sensor, replace the ABS control module -J104-.

01-365

Printed output from VAG1551 Scan Tool (ST) DTC	Possible cause	Corrective action
00287 Right rear ABS wheel speed sensor -G44- Implausible signal or:	♦ Left rear ABS wheel speed sensor -G44- installed incorrectly. ♦ ABS wheel speed sensor rotor dirty or damaged. ♦ Excessive wheel bearing play. ♦ ABS wheel speed sensor -G44- malfunctioning. ♦ Short circuit to Ground (GND).	- Check installation of ABS wheel speed sensor. ⇒ *Repair Manual, Brake System, Repair Group 45* - Check rotor, clean or replace ⇒ *Repair Manual, Brake System, Repair Group 45* - Replace wheel bearing ⇒ *Repair Manual, Suspension, Wheels, Steering, Repair Group 42* - "Read measuring value block", display group 1 ⇒ page 01-256 . - Carry out "Electrical test", step 10 ⇒ page 01-318
Right rear ABS wheel speed sensor -G44- Open circuit/short circuit to B+	♦ Open circuit or short circuit to B+ in wiring between ABS wheel speed sensor -G44- and ABS control module -J104-.	- If nothing is displayed during "Read measuring value block", and no malfunction could be determined in the wiring or the ABS wheel speed sensor, replace the ABS control module -J104-.

01-366

Printed output from VAG1551 Scan Tool (ST) DTC	Possible cause	Corrective action
00290 Left rear ABS wheel speed sensor -G46- Implausible signal or:	♦ Left rear ABS wheel speed sensor -G46- installed incorrectly. ♦ ABS wheel speed sensor rotor dirty or damaged. ♦ Excessive wheel bearing play. ♦ ABS wheel speed sensor -G46- malfunctioning. ♦ Short circuit to Ground (GND).	- Check installation of ABS wheel speed sensor. ⇒ *Repair Manual, Brake System, Repair Group 45* - Check rotor, clean or replace ⇒ *Repair Manual, Brake System, Repair Group 45* - Replace wheel bearing ⇒ *Repair Manual, Suspension, Wheels, Steering, Repair Group 42* - "Read measuring value block", display group 1 ⇒ page 01-256 . - Carry out "Electrical test", step 9 ⇒ page 01-318
Left rear ABS wheel speed sensor -G46- Open circuit/short circuit to B+	♦ Open circuit or short circuit to B+ in wiring between ABS wheel speed sensor -G46- and ABS control module -J104-.	- If nothing is displayed during "Read measuring value block", and no malfunction could be determined in the wiring or the ABS wheel speed sensor, replace the ABS control module -J104-.

01-367

Printed output from VAG1551 Scan Tool (ST) DTC	Possible cause	Corrective action
00301 ABS return flow pump - V39 - **See continuation on next page**	♦ Open circuit or resistance too high in Ground (GND) supply from ABS return flow pump relay - J105 - (terminal 85) to ABS control module -J104- (terminal 7). ♦ Open circuit or resistance too high in voltage supply from ABS return flow pump relay - J105 - (terminal 86) to ABS control module -J104- (terminal 2).	- "Read measuring value block", display group 6 ⇒ page 01-256 - Carry out "Electrical test", step 12 ⇒ page 01-318 .

01-368

Printed output from VAG1551 Scan Tool (ST) **DTC**	Possible cause	Corrective action
00301 ABS return flow pump -V39 -	♦ Short circuit to B+ or Ground (GND) in one of the activation wires.	
Continuation:	♦ Voltage supply for ABS return flow pump relay -J105-, terminal 30. ♦ ABS return flow pump relay -J105- or ABS hydraulic unit -N55- malfunctioning.	- Carry out "Electrical test", step 23 ⇒ page 01-323 . - Carry out "Electrical test", step 24 ⇒ page 01-323 .
See continuation on next page		

01-369

Printed output from VAG1551 Scan Tool (ST) **DTC**	Possible cause	Corrective action
00301 **Continuation:** ABS return flow pump -V39 - Implausible signal	♦ Open circuit or short circuit to Ground (GND) from ABS return flow pump relay -J105- (terminal 87) to the ABS control module -J104- (terminal 20) and the ABS hydraulic unit -N55- (terminal 14). ♦ Open circuit or short circuit to B+ in the Ground (GND) supply of the ABS return flow pump.	- Carry out "Electrical test", step 24 ⇒ page 01-323 . - Fix the wiring problem. ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

01-370

Printed output from VAG1551 Scan Tool (ST) DTC	Possible cause	Corrective action
00302 ABS solenoid valve relay -J106-	♦ Open circuit or resistance too high between Ground (GND) of ABS solenoid valve relay - J106 - (terminal 85) and ABS control module -J104- (terminal 37).	- "Read measuring value block", display group 6 ⇒ page 01-256 - Carry out "Electrical test", step 11 ⇒ page 01-318 .
	♦ Open circuit or resistance too high between voltage supply of ABS solenoid valve relay - J106 - (terminal 86) and ABS control module -J104- (terminal 2).	
	♦ Short circuit to B+ or Ground (GND) in one of the activation wires.	
See continuation on next page	♦ Incorrect control module	- Check control module version ⇒ page 01-231 .

01-371

Printed output from VAG1551 Scan Tool (ST) DTC	Possible cause	Corrective action
00302 ABS solenoid valve relay -J106-	♦ Voltage supply too low for ABS solenoid valve relay -J106- (terminal 30).	- Carry out "Electrical test", step 22 ⇒ page 01-323 .
Continuation:	♦ ABS solenoid valve relay -J106- or ABS hydraulic unit -N55- malfunctioning.	

Printed output from VAG1551 Scan Tool (ST) DTC	Possible cause	Corrective action
00526 Brake light switch -F- Open circuit **See continuation on next page**	♦ Left brake light -M9- or right brake light -M10- malfunctioning. ♦ Open circuit in wiring between brake lights and the ABS control module -J104-. ♦ ABS control module -J104- malfunctioning	- Check the wiring. Carry out "Electrical test", step 26 ⇒ page 01-323 . ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations* - Replace bulbs. - If the malfunction cannot be fixed, replace the ABS control module -J104-. ⇒ *Repair Manual, Brake System, Repair Group 45*

01-373

Printed output from VAG1551 Scan Tool (ST)	Possible cause	Corrective action
DTC		
00526 **Continuation:** Brake light switch -F- Implausible signal **See continuation on next page**	♦ The brake light switch is not adjusted correctly. ♦ Open circuit/short circuit to B+ or Ground (GND) in wiring between brake light switch -F- and the ABS control module -J104-. ♦ Brake light switch malfunctioning.	- Check brake light switch, "Read measuring value block", display group 2 ⇒ page 01-256 **Note: The brake light switch must be adjusted exactly.** - Check wiring between brake light switch -F- and the ABS control module -J104-. Carry out "Electrical test", step 26 ⇒ page 01-323 . - If the malfunction cannot be fixed. replace the brake light switch. ⇒ *Repair Manual, Brake System, Repair Group 46*

01-374

Printed output from VAG1551 Scan Tool (ST) **DTC**	Possible cause	Corrective action
00526 Brake light switch -F- Implausible signal Continuation:	♦ ABS control module -J104- malfunctioning	- If the malfunction cannot be fixed, replace the ABS control module -J104-. ⇒ *Repair Manual, Brake System, Repair Group 45*
	♦ Master brake cylinder malfunctioning.	- Check the master brake cylinder, and replace if necessary. ⇒ *Repair Manual, Suspension, Wheels, Steering, Repair Group 47*
	♦ Brake booster malfunctioning	- Check the brake booster, and replace if necessary. ⇒ *Repair Manual, Suspension, Wheels, Steering, Repair Group 47*

01-375

DTC table; DTCs from 00532 to 01421

Printed output from VAG1551 Scan Tool (ST) DTC	Possible cause	Corrective action
00532 Voltage supply ♦ This malfunction affects the voltage supply of the control module. ♦ This DTC is only stored, if it occurs the first time the vehicle exceeds 6 km/h. ♦ As soon as the supply voltage is again within the valid voltage range, the system is switched back on and the warning lights turn off. **See continuation on next page**	♦ Open circuit or resistance too high between voltage supply of terminal 15 and ABS control module -J104- (terminal 1). ♦ Open circuit or resistance too high in the Ground (GND) supply to ABS control module -J104- (terminals 28 and 29). ♦ Voltage jumps in vehicle system.	- "Read measuring value block" function 08 ⇒ page 01-256 , display group 6. - Carry out "Electrical test", step 21 ⇒ page 01-323 ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations* - Check Generator (GEN) and Voltage Regulator (VR). ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations* - Check battery ⇒ *Repair Manual, Electrical Equipment, Repair Group 27, Battery*

01-376

Printed output from VAG1551 Scan Tool (ST)	Possible cause	Corrective action
DTC		
00532 **Continuation:** Voltage supply Signal too small ♦ This malfunction affects the voltage supply of the control module. ♦ This DTC is only stored, if it occurs the first time the vehicle exceeds 6 km/h. ♦ As soon as the supply voltage is again within the valid voltage range, the system is switched back on and the warning lights turn off.	♦ Open circuit or resistance too high between voltage supply of terminal 15 and ABS control module -J104- (terminal 1). ♦ Open circuit or resistance too high in the Ground (GND) supply to ABS control module -J104- (terminals 28 and 29). ♦ Voltage jumps in vehicle system.	- "Read measuring value block" function 08 ⇒ page 01-256 , display group 6. - Carry out "Electrical test", step 21 ⇒ page 01-323 ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations* - Check Generator (GEN) and Voltage Regulator (VR). ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations* - Check battery ⇒ *Repair Manual, Electrical Equipment, Repair Group 27, Battery*

01-377

Printed output from VAG1551 Scan Tool (ST) **DTC**	Possible cause	Corrective action
00597 Varying wheel speed impulse	♦ Wheel or tire sizes not the same on all four wheels.	- Check wheel and tire sizes.
	♦ ABS wheel speed sensor rotor dirty or damaged.	- Check rotor. ⇒ *Repair Manual, Brake System, Repair Group 45*
	♦ Excessive wheel bearing play.	- Check wheel bearing ⇒ *Repair Manual, Suspension, Wheels, Steering, Repair Group 40* ⇒ *Repair Manual, Suspension, Wheels, Steering, Repair Group 42*
	♦ ABS wheel speed sensors -G44-, -G45-, -G46-, and -G47- installed incorrectly. ♦ ABS wheel speed sensors -G44-, -G45-, -G46-, and -G47- malfunctioning	- Check ABS wheel speed sensors. ⇒ *Repair Manual, Brake System, Repair Group 45* - Carry out "electrical test", steps 7 through 10 ⇒ page 01-318 .

01-378

Printed output from VAG1551 Scan Tool (ST)	Possible cause	Corrective action
00778 Steering angle sensor -G85- no communication	♦ Open circuit or loose contact in data-BUS wires between steering angle sensor -G85- and ABS control module (w/EDL) -J104- Check specified values of: ♦ Steering angle sensor -G85- ♦ Steering angle sensor -G85- malfunctioning	- Check fuses, wires and harness connectors as well as voltage supply to the control module: ⇒ test step no. 13 ⇒ page 01-323 - Read measuring value block, function 08 ⇒ page 01-256 , display group number 004 - Replace steering angle sensor. ⇒ *Repair Manual, Brake System, Repair Group 45* - Code the ABS control module (w/EDL) -J104- ⇒ page 01-234 - Then perform zeroing procedure ⇒ page 01-243

01-379

Printed output from VAG1551 Scan Tool (ST)	Possible cause	Corrective action
00778 Steering angle sensor -G85- Not adjusted or incorrectly adjusted	♦ Steering angle sensor -G85- is not sending adjustment values or is sending incorrect values	- Zero the steering angle sensor ⇒ page 01-243
00778 Steering angle sensor -G85- Mechanical malfunction	♦ The steering angle sensor -G85- is not installed correctly.	- Check installed position of the steering angle sensor ⇒ *Repair Manual, Brake System, Repair Group 45*
	♦ Vehicle alignment is not OK	- Perform vehicle alignment. ⇒ *Repair Manual, Suspension, Wheels, Steering, Repair Group 44; Vehicle alignment*
	♦ Steering wheel was removed and zeroing was not performed afterward.	- Then perform zeroing procedure ⇒ page 01-243

Printed output from VAG1551 Scan Tool (ST)	Possible cause	Corrective action
00778 Steering angle sensor -G85- Implausible signal	♦ The steering angle sensor -G85- is not installed correctly. ♦ Zero position calibration is not OK ♦ Vehicle alignment is not OK	- Check installed position of steering angle sensor -G85- ⇒ *Repair Manual, Brake System, Repair Group 45* - Perform vehicle alignment. ⇒ *Repair Manual, Suspension, Wheels, Steering, Repair Group 44; Vehicle alignment* - Then perform zeroing procedure ⇒ page 01-243
00778 Steering angle sensor -G85- malfunctioning	♦ Steering angle sensor -G85- is malfunctioning	- Replace steering angle sensor. ⇒ *Repair Manual, Brake System, Repair Group 45* - Then perform zeroing procedure ⇒ page 01-243

01-381

Printed output from VAG1551 Scan Tool (ST) DTC	Possible cause	Corrective action
01044 Control module incorrectly coded	♦ The ABS control module (w/EDL) -J104- is either not coded or incorrectly coded.	- Code the ABS control module (w/EDL) -J104- ⇒ page 01-234
01119 Gear recognition signal	**Data is transferred between the ABS control module -J104- and the Transmission Control Module (TCM) via the CAN-bus.** ♦ A DTC was stored in the Transmission Control Module (TCM).	For more information, see the section titled "CAN-bus" ⇒ page 01-25 . - Check DTC memory of Transmission Control Module (TCM). Fix the malfunction according to the appropriate Repair Manual and erase the DTC memory of the Transmission Control Module (TCM).

01-382

Printed output from VAG1551 Scan Tool (ST) DTC	Possible cause	Corrective action
01203 ABS / instrument cluster electrical connection Open circuit/short circuit to Ground (GND) **See continuation on next page**	♦ Open circuit in wire from instrument cluster combination processor -J218- to ABS control module -J104- ♦ Short circuit to Ground (GND) in wire from instrument cluster combination processor -J218- to ABS control module -J104-	- Check wires between instrument cluster combination processor -J218- (green connector, terminal 11) and the ABS control module -J104- (terminal 32). ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

01-383

Printed output from VAG1551 Scan Tool (ST) DTC	Possible cause	Corrective action
01203 ABS / instrument cluster electrical connection Open circuit/short circuit to Ground (GND)	♦ ABS control module -J104- malfunctioning. Note: Only replace the control module as a last resort.	- For vehicles with automatic climate control: if wiring is OK, check the TIM signal (standing time signal) with the ABS control module connected and disconnected using the measuring value blocks for the A/C control module -J301-. If the signal is recognized by the A/C control module -J301-, replace the ABS control module -J104-. ⇒ *Repair Manual, Heating & Air Conditioning, Repair Group 01*
Continuation: **See continuation on next page**	♦ Instrument cluster combinator processor -J218- malfunctioning. Note: Only replace the control module as a last resort.	- If the ABS control module -J104- still does not recognize the TIM signal, replace the instrument cluster combination processor -J218-.

01-384

Printed output from VAG1551 Scan Tool (ST) DTC	Possible cause	Corrective action
01203 ABS / instrument cluster electrical connection Open circuit/short circuit to Ground (GND) **Continuation:** **See continuation on next page**	♦ A/C control module -J301- malfunctioning. Note: Only replace the control module as a last resort.	- If the TIM signal is also not recognized by the A/C control module -J301-, disconnect the A/C control module -J301- and check the TIM signal by reading the measuring value blocks for the ABS control module. - "Read measuring value block" function 08 ⇒ page 01-256 - If the signal is recognized by the ABS control module -J104- now, replace the A/C control module -J301-.

01-385

Printed output from VAG1551 Scan Tool (ST) **DTC**	Possible cause	Corrective action
01203 **Continuation:** ABS / instrument cluster electrical connection No signal **See continuation on next page**	♦ Short circuit to B+ in wire from instrument cluster combination processor -J218- to ABS control module -J104- ♦ ABS control module -J104- malfunctioning. Note: Only replace the control module as a last resort.	- Check wires between instrument cluster combination processor -J218- (green connector, terminal 11) and the ABS control module -J104- (terminal 32). ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations* - For vehicles with automatic climate control: if wiring is OK, check the TIM signal (standing time signal) with the ABS control module connected and disconnected using the measuring value blocks for the A/C control module -J301-. If the signal is recognized by the A/C control module -J301-, replace the ABS control module -J104-. ⇒ *Repair Manual, Heating & Air Conditioning, Repair Group 01*

01-386

Printed output from VAG1551 Scan Tool (ST) **DTC**	Possible cause	Corrective action
01203 ABS / instrument cluster electrical connection No signal **Continuation:**	♦ A/C control module -J301- malfunctioning. Note: Only replace the control module as a last resort.	- If the TIM signal is also not recognized by the A/C control module -J301-, disconnect the A/C control module -J301- and check the TIM signal by reading the measuring value blocks for the ABS control module. - "Read measuring value block" function 08 ⇒ page 01-256 - If the signal is recognized by the ABS control module -J104- now, replace the A/C control module -J301-.
	♦ Instrument cluster combinator processor -J218- malfunctioning. Note: Only replace the control module as a last resort.	- If the ABS control module -J104- still does not recognize the TIM signal, replace the instrument cluster combination processor -J218-.

01-387

Printed output from VAG1551 Scan Tool (ST) DTC	Possible cause	Corrective action
01314 Engine Control Module (ECM) Control difference	♦ The Engine Control Module (ECM) is not able to reduce engine torque.	- Replace the ABS/ESP control module -J104- after conferring with the product department of your distributor or with the responsible importer.
01316 Brake control module Control difference	♦ It took longer than 5 seconds for an ESP adjustment.	- Replace the ABS/ESP control module -J104- after conferring with the product department of your distributor or with the responsible importer.

01-388

Printed output from VAG1551 Scan Tool (ST) DTC	Possible cause	Corrective action
01418 Pilot valve -1- traction control -N225-	♦ Open circuit, short circuit to B+ or Ground (GND) in wiring between ABS hydraulic unit -N55- and ABS control module -J104-. ♦ Pilot valve -1- traction control -N225- malfunctioning.	- Carry out "electrical test", step 5 ⇒ page 01-318 . - If the electrical test does not reveal any malfunctions, check all wiring and connectors for loose contacts. - If the suggested steps do not lead to a localization of the malfunction, replace the ABS control module (w/EDL) -J104-. ⇒ *Repair Manual, Brake System, Repair Group 45*
01419 Pilot valve -2- traction control -N226-	♦ Open circuit, short circuit to B+ or Ground (GND) in wiring between ABS hydraulic unit -N55- and ABS control module -J104-. ♦ Pilot valve -2- traction control -N226- malfunctioning.	- Carry out "electrical test", step 5 ⇒ page 01-318 . - If the electrical test does not reveal any malfunctions, check all wiring and connectors for loose contacts. - If the suggested steps do not lead to a localization of the malfunction, replace the ABS control module (w/EDL) -J104-.

		⇒ *Repair Manual, Brake System, Repair Group 45*

01-389

Printed output from VAG1551 Scan Tool (ST) DTC	Possible cause	Corrective action
01420 High pressure switch valve -1- traction control -N227-	♦ Open circuit, short circuit to B+ or Ground (GND) in wiring between ABS hydraulic unit -N55- and ABS control module -J104-. ♦ High pressure switch valve -1- traction control -N227- malfunctioning.	- Carry out "electrical test", step 6 ⇒ page 01-318 . - If the electrical test does not reveal any malfunctions, check all wiring and connectors for loose contacts. - If the suggested steps do not lead to a localization of the malfunction, replace the ABS control module (w/EDL) -J104-. ⇒ *Repair Manual, Brake System, Repair Group 45*
01421 High pressure switch valve -2- traction control -N228-	♦ Open circuit, short circuit to B+ or Ground (GND) in wiring between ABS hydraulic unit -N55- and ABS control module -J104-. ♦ High pressure switch valve -2- traction control -N228- malfunctioning.	- Carry out "electrical test", step 6 ⇒ page 01-318 . - If the electrical test does not reveal any malfunctions, check all wiring and connectors for loose contacts. - If the suggested steps do not lead to a localization of the malfunction, replace the ABS control module (w/EDL) -J104-.

		⇒ *Repair Manual, Brake System, Repair Group 45*

01-390

DTC table; DTCs from 01422 to 01425

Printed output from VAG1551 Scan Tool (ST) DTC	Possible cause	Corrective action
01422 Hydraulic pump for traction control -V156-	♦ Insufficient voltage supply to hydraulic pump for traction control -V156-.	- Carry out "electrical test", step 25 ⇒ page 01-323 .
	♦ Short circuit to Ground (GND) in wiring between hydraulic pump for traction control -V156- and ABS control module -J104-.	- Check wiring between hydraulic pump for traction control -V156- and ABS control module -J104- for short to Ground (GND).
	♦ Open circuit in voltage supply to ABS control module -J104-.	- Check the voltage supply lines to ABS control module -J104-. ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*
	♦ Fuse malfunctioning.	- Replace fuse 42. ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*
See continuation on next page		

01-391

Printed output from VAG1551 Scan Tool (ST) DTC	Possible cause	Corrective action
01422 Hydraulic pump for traction control -V156-	♦ Short circuit to Ground (GND) in hydraulic pump for traction control -V156-.	- If you do not find a problem in wiring between hydraulic pump for traction control -V156- and ABS control module -J104-, replace hydraulic pump for traction control -V156-. ⇒ *Repair Manual, Brake System, Repair Group 45*
Continuation:	♦ ABS control module -J104- malfunctioning	- If the malfunction cannot be fixed, replace the ABS control module -J104-.
See continuation on next page	Note: Only replace the control module as a last resort.	⇒ *Repair Manual, Brake System, Repair Group 45*

01-392

Printed output from VAG1551 Scan Tool (ST) **DTC**	Possible cause	Corrective action
01422 **Continuation:** Hydraulic pump for traction control -V156- Short circuit to B+ **See continuation on next page**	♦ Open circuit in wiring between hydraulic pump for traction control -V156- and ABS control module -J104-. ♦ Short circuit to B+ in wiring between hydraulic pump for traction control -V156- and ABS control module -J104-.	- Check wiring between hydraulic pump for traction control -V156- and ABS control module -J104- for open circuit. - Check wiring between hydraulic pump for traction control -V156- and ABS control module -J104- for short to B+. ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

01-393

Printed output from VAG1551 Scan Tool (ST) **DTC**	**Possible cause**	**Corrective action**
01422 Hydraulic pump for traction control -V156- Short circuit to B+	♦ Open circuit or short circuit to B+ in hydraulic pump for traction control -V156-.	- If you do not find a problem in wiring between hydraulic pump for traction control -V156- and ABS control module -J104-, replace hydraulic pump for traction control -V156-. ⇒ *Repair Manual, Brake System, Repair Group 45*
Continuation:	♦ ABS control module -J104- malfunctioning	- If the malfunction cannot be fixed, replace the ABS control module -J104-.
See continuation on next page	Note: Only replace the control module as a last resort.	⇒ *Repair Manual, Brake System, Repair Group 45*

01-394

Printed output from VAG1551 Scan Tool (ST) DTC	Possible cause	Corrective action
01422 **Continuation:** Hydraulic pump for traction control -V156- Open circuit/short circuit to Ground (GND)	♦ Short circuit to Ground (GND) in wiring between hydraulic pump for traction control -V156- and ABS control module -J104-.	- Check wiring between hydraulic pump for traction control -V156- and ABS control module -J104- for short to Ground (GND). ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*
	♦ Short circuit to Ground (GND) in hydraulic pump for traction control -V156-.	- If you do not find a problem in wiring between hydraulic pump for traction control -V156- and ABS control module -J104-, replace hydraulic pump for traction control -V156-. ⇒ *Repair Manual, Brake System, Repair Group 45*
	♦ ABS control module -J104- malfunctioning Note: Only replace the control module as a last resort.	- If the malfunction cannot be fixed, replace the ABS control module -J104-. ⇒ *Repair Manual, Brake System, Repair Group 45*

01-395

Printed output from VAG1551 Scan Tool (ST)	Possible cause	Corrective action
DTC	**WARNING!** **This is only valid for control modules with no.: 4B0 907 389**	
01423 Sensor for transverse acceleration -G200- **See continuation on next page**	♦ Sensor for transverse acceleration -G200- not installed correctly. ♦ There is an open circuit in one of the supply wires for the sensor for transverse acceleration -G200-.	- Check the installation position of the sensor for transverse acceleration -G200-. ⇒ *Repair Manual, Brake System, Repair Group 45* - Check Ground (GND) between sensor for transverse acceleration -G200 (terminal 1) and ABS control module -J104- (terminal 19). - Check voltage supply between sensor for transverse acceleration -G200 (terminal 3) and -J104- ABS control module (terminal 75). ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

01-396

Printed output from VAG1551 Scan Tool (ST)	Possible cause	Corrective action
DTC	**WARNING!** **This is only valid for control modules with no.: 4B0 907 389**	
01423 Sensor for transverse acceleration -G200- **Continuation:**	♦ Open circuit in signal line to sensor for transverse acceleration -G200-. ♦ Short circuit to B+ or Ground (GND) in signal line to sensor for transverse acceleration -G200-. ♦ Sensor for transverse acceleration -G200- malfunctioning. ♦ ABS control module -J104- malfunctioning Note: Only replace the control module as a last resort.	- Check signal line between sensor for transverse acceleration -G200 (terminal 2) and ABS control module -J104- (terminal 18). ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations* - If none of the causes listed are causing the malfunction, replace sensor for transverse acceleration -G200-. ⇒ *Repair Manual, Brake System, Repair Group 45* - If the malfunction cannot be fixed, replace the ABS control module -J104-. ⇒ *Repair Manual, Brake System, Repair Group 45*
See continuation on next page		

01-397

Printed output from VAG1551 Scan Tool (ST)	Possible cause	Corrective action
DTC	**WARNING!** **This is only valid for control modules with no.: 8D0 907 389, 8D0 907 389A, 8D0 907 389D and 8D0 907 389E.**	
01423 Sensor for transverse acceleration -G200- **See continuation on next page**	♦ Sensor for transverse acceleration -G200- not installed correctly. ♦ There is an open circuit in one of the supply wires for the sensor for transverse acceleration -G200-.	- Check the installation position of the sensor for transverse acceleration -G200-. ⇒ *Repair Manual, Brake System, Repair Group 45* - Check Ground (GND) between sensor for transverse acceleration -G200 (terminal 1) and ABS control module -J104- (terminal 69). - Check voltage supply between sensor for transverse acceleration -G200 (terminal 3) and -J104- ABS control module (terminal 67). ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

01-398

Printed output from VAG1551 Scan Tool (ST)	Possible cause	Corrective action
DTC	**WARNING!** **This is only valid for control modules with no.: 8D0 907 389, 8D0 907 389A, 8D0 907 389D and 8D0 907 389E.**	
01423 Sensor for transverse acceleration -G200- **Continuation:**	♦ Open circuit in signal line to sensor for transverse acceleration -G200-. ♦ Short circuit to B+ or Ground (GND) in signal line to sensor for transverse acceleration -G200-.	- Check signal line between sensor for transverse acceleration -G200 (terminal 2) and ABS control module -J104- (terminal 18). ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*
	♦ Sensor for transverse acceleration -G200- malfunctioning.	- If none of the causes listed are causing the malfunction, replace sensor for transverse acceleration -G200-. ⇒ *Repair Manual, Brake System, Repair Group 45*
See continuation on next page	♦ ABS control module -J104- malfunctioning Note: Only replace the control module as a last resort.	- If the malfunction cannot be fixed, replace the ABS control module -J104-. ⇒ *Repair Manual, Brake System, Repair Group 45*

01-399

Printed output from VAG1551 Scan Tool (ST)	Possible cause	Corrective action
DTC	**WARNING!** **This is only valid for control modules with no.: 4B0 907 389**	
01423 Sensor for transverse acceleration -G200- Failure in electrical circuit **Continuation:** **See continuation on next page**	♦ Open circuit in signal line to sensor for transverse acceleration -G200-. ♦ Short circuit to B+ or Ground (GND) in signal line to sensor for transverse acceleration -G200-. ♦ Sensor for transverse acceleration -G200- malfunctioning.	- Check signal line between sensor for transverse acceleration -G200 (terminal 2) and ABS control module -J104- (terminal 18). ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations* - If none of the causes listed are causing the malfunction, replace sensor for transverse acceleration -G200-. ⇒ *Repair Manual, Brake System, Repair Group 45*

01-400

Printed output from VAG1551 Scan Tool (ST)	Possible cause	Corrective action
DTC	**WARNING!** **This is only valid for control modules with no.: 4B0 907 389**	
01423 **Continuation:** Sensor for transverse acceleration -G200- Failure in electrical circuit **See continuation on next page**	♦ There is an open circuit in one of the supply wires for the sensor for transverse acceleration -G200-.	- Check Ground (GND) between sensor for transverse acceleration -G200 (terminal 1) and ABS control module -J104- (terminal 19). - Check voltage supply between sensor for transverse acceleration -G200 (terminal 3) and -J104- ABS control module (terminal 75). ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*
	♦ ABS control module -J104- malfunctioning Note: Only replace the control module as a last resort.	- If the malfunction cannot be fixed, replace the ABS control module -J104-. ⇒ *Repair Manual, Brake System, Repair Group 45*

01-401

Printed output from VAG1551 Scan Tool (ST)	Possible cause	Corrective action
DTC	**WARNING!** **This is only valid for control modules with no.: 8D0 907 389, 8D0 907 389A, 8D0 907 389D and 8D0 907 389E.**	
01423 Sensor for transverse acceleration -G200- Failure in electrical circuit **Continuation:** **See continuation on next page**	♦ Open circuit in signal line to sensor for transverse acceleration -G200-. ♦ Short circuit to B+ or Ground (GND) in signal line to sensor for transverse acceleration -G200-. ♦ Sensor for transverse acceleration -G200- malfunctioning.	- Check signal line between sensor for transverse acceleration -G200 (terminal 2) and ABS control module -J104- (terminal 18). ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations* - If none of the causes listed are causing the malfunction, replace sensor for transverse acceleration -G200-. ⇒ *Repair Manual, Brake System, Repair Group 45*

01-402

Printed output from VAG1551 Scan Tool (ST)	Possible cause	Corrective action
DTC	**WARNING!** **This is only valid for control modules with no.: 8D0 907 389, 8D0 907 389A, 8D0 907 389D and 8D0 907 389E.**	
01423 Sensor for transverse acceleration -G200- Failure in electrical circuit **Continuation:**	♦ There is an open circuit in one of the supply wires for the sensor for transverse acceleration -G200-.	- Check Ground (GND) between sensor for transverse acceleration -G200 (terminal 1) and ABS control module -J104- (terminal 69). - Check voltage supply between sensor for transverse acceleration -G200 (terminal 3) and -J104- ABS control module (terminal 67). ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*
	♦ ABS control module -J104- malfunctioning Note: Only replace the control module as a last resort.	- If the malfunction cannot be fixed, replace the ABS control module -J104-. ⇒ *Repair Manual, Brake System, Repair Group 45*
See continuation on next page		

01-403

Printed output from VAG1551 Scan Tool (ST) DTC	Possible cause	Corrective action
01423 **Continuation:** Sensor for transverse acceleration -G200- Implausible signal See continuation on next page	**Note:** The input signals received by ABS control module -J104- are analyzed by computing programs and checked for plausibility. If the sensor for transverse acceleration -G200- fails, the relevant computing program relies primarily on the steering angle sensor -G85-. If you think there is a problem with the sensor for transverse acceleration -G200-, check whether the steering angle sensor -G85- is OK. The steering angle sensor must also be checked. - While driving straight ahead (v < 20 km/h), check the zero position of the steering angle sensor -G85-, by selecting "Read measuring value block", function 08 ⇒ page 01-256 , display group 5 ⇒ page 01-270 . - Check the sensor for transverse acceleration -G200- as described in the instructions for "Read measuring value block" function 08 ⇒ page 01-270 , display group 5, ⇒ page 01-270 . **There are four possibilities:**	

01-404

Printed output from VAG1551 Scan Tool (ST) **DTC**	Possible cause	Corrective action
01423 Sensor for transverse acceleration -G200- Implausible signal **Continuation:**	**First:** The zero position of steering angle sensor -G85- is not within the specified range, and the zero position of sensor for transverse acceleration -G200- is within the specified range:	
		- Then perform zeroing procedure ⇒ page 01-243 - Erase DTC memory ⇒ page 01-15 - End Output ⇒ page 01-16 . - Road test vehicle ⇒ page 01-250 - If the malfunction occurs again, follow the procedure for the second case.
See continuation on next page		

01-405

Printed output from VAG1551 Scan Tool (ST)	Possible cause	Corrective action
DTC	**WARNING!** **This is only valid for control modules with no.: 4B0 907 389**	
01423 Sensor for transverse acceleration -G200- Implausible signal **Continuation:**	**Second:** The zero position of steering angle sensor -G85- is within the specified range, and the zero position of sensor for transverse acceleration -G200- is not within the specified range:	
See continuation on next page	♦ Open circuit in signal line to sensor for transverse acceleration -G200-. ♦ Short circuit to B+ or Ground (GND) in signal line to sensor for transverse acceleration -G200-. ♦ ABS control module -J104- malfunctioning Note: Only replace the control module as a last resort.	- Check signal line between sensor for transverse acceleration -G200 (terminal 2) and ABS control module -J104- (terminal 18). ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations* - If the malfunction cannot be fixed, replace the ABS control module -J104-. ⇒ *Repair Manual, Brake System, Repair Group 45*

01-406

Printed output from VAG1551 Scan Tool (ST)	Possible cause	Corrective action
DTC	**WARNING!** **This is only valid for control modules with no.: 4B0 907 389**	
01423 Sensor for transverse acceleration -G200- Implausible signal **Continuation: (Second)** **See continuation on**	♦ There is an open circuit in one of the supply wires for the sensor for transverse acceleration -G200-. ♦ Sensor for transverse acceleration -G200- malfunctioning.	- Check Ground (GND) between sensor for transverse acceleration -G200 (terminal 1) and ABS control module -J104- (terminal 19). - Check voltage supply between sensor for transverse acceleration -G200 (terminal 3) and -J104- ABS control module (terminal 75). ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations* If none of the causes fit: - Erase DTC memory ⇒ page 01-15 - End Output ⇒ page 01-16 . - Road test vehicle ⇒ page 01-250 - If malfunction occurs again, replace sensor for transverse acceleration -G200-. ⇒ *Repair Manual, Brake System, Repair Group 45*

next page		

01-407

Printed output from VAG1551 Scan Tool (ST)	Possible cause	Corrective action
DTC	**WARNING!** **This is only valid for control modules with no.: 8D0 907 389, 8D0 907 389A, 8D0 907 389D and 8D0 907 389E.**	
01423 Sensor for transverse acceleration -G200- Implausible signal **Continuation:**	**Second:** The zero position of steering angle sensor -G85- is within the specified range, and the zero position of sensor for transverse acceleration -G200- is not within the specified range:	
See continuation on	♦ There is an open circuit in one of the signal wires for the combined sensor for rotation rate and transverse acceleration. ♦ There is short circuit to B+ or Ground (GND) in one of the signal wires for the combined sensor for rotation rate and transverse acceleration. ♦ ABS control module -J104- malfunctioning Note: Only replace the control module as a last resort.	- Check the signal wire for the combined sensor for rotation rate and transverse acceleration, terminal 4, to the ABS control module -J104- (terminal 18). ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations* - If the malfunction cannot be fixed, replace the ABS control module -J104-. ⇒ *Repair Manual, Brake System, Repair Group 45*

next page		

01-408

Printed output from VAG1551 Scan Tool (ST)	Possible cause	Corrective action
DTC	**WARNING!** **This is only valid for control modules with no.: 8D0 907 389, 8D0 907 389A, 8D0 907 389D and 8D0 907 389E.**	
01423 Sensor for transverse acceleration -G200- Implausible signal **Continuation: (Second)**	♦ There is an open circuit in one of the supply wires for the sensor for transverse acceleration -G200-. ♦ Sensor for transverse acceleration -G200- malfunctioning.	- Check Ground (GND) between sensor for transverse acceleration -G200 (terminal 1) and ABS control module -J104- (terminal 69). - Check voltage supply between sensor for transverse acceleration -G200 (terminal 3) and -J104- ABS control module (terminal 67). ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations* If none of the causes fit: - Erase DTC memory ⇒ page 01-15 - End Output ⇒ page 01-16 . - Road test vehicle ⇒ page 01-250 - If malfunction occurs again, replace sensor for transverse acceleration -G200-. ⇒ *Repair Manual, Brake System, Repair Group 45*

See continuation on next page		

01-409

Printed output from VAG1551 Scan Tool (ST)	Possible cause	Corrective action
DTC		
01423 Sensor for transverse acceleration -G200- Implausible signal **Continuation:** **See continuation on next page**	**Third:** The zero position of steering angle sensor -G85- is not within the specified range, and the zero position of sensor for transverse acceleration -G200- is not within the specified range: - Follow the procedures from the first and second cases.	

01-410

Printed output from VAG1551 Scan Tool (ST) **DTC**	Possible cause	Corrective action
01423 Sensor for transverse acceleration -G200- Implausible signal **Continuation:**	**Fourth:** The zero position of steering angle sensor -G85- is within the specified range, and the zero position of sensor for transverse acceleration -G200- is within the specified range:	
	♦ Sensor for transverse acceleration -G200- malfunctioning.	- Erase DTC memory ⇒ page 01-15 - End Output ⇒ page 01-16 . - Road test vehicle ⇒ page 01-250 - If malfunction occurs again, replace sensor for transverse acceleration -G200-. ⇒ *Repair Manual, Brake System, Repair Group 45*
	♦ ABS control module -J104- malfunctioning Note: Only replace the control module as a last resort.	- If the malfunction cannot be fixed, replace the ABS control module -J104-. ⇒ *Repair Manual, Brake System, Repair Group 45*

01-411

Printed output from VAG1551 Scan Tool (ST)	Possible cause	Corrective action
DTC	**WARNING!** **This is only valid for control modules with no.: 4B0 907 389**	
01424 Sender for rotation rate -G202-, signal wire Failure in electrical circuit **See continuation on next page**	For control modules 4B0 907 389, the VAG1551 scan tool with test card 7 and the VAG1552 scan tool with test card 4 display the following incorrect text: "Sender for rotation rate -G202-, reference wire".	
	♦ Open circuit in signal wire of sender for rotation rate -G202-.	- Check signal line between yaw sensor -G202- (terminal 3) and ABS control module -J104- (terminal 79). ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*
	♦ Short circuit to B+ or Ground (GND) in signal wire to sender for rotation rate -G202-.	
	♦ Sender for rotation rate -G202- malfunctioning.	- If none of the causes listed are causing the malfunction, replace yaw sensor -G202-. ⇒ *Repair Manual, Brake System, Repair Group 45*

01-412

Printed output from VAG1551 Scan Tool (ST)	Possible cause	Corrective action
DTC	**WARNING!** **This is only valid for control modules with no.: 4B0 907 389**	
01424 Sender for rotation rate -G202-, signal wire Failure in electrical circuit **Continuation:**	For control modules 4B0 907 389, the VAG1551 scan tool with test card 7 and the VAG1552 scan tool with test card 4 display the following incorrect text: "Sender for rotation rate -G202-, reference wire".	
	♦ Open circuit in supply line to yaw sensor -G202-.	- Check Ground (GND) between yaw sensor -G202- (terminal 1) and ABS control module -J104- (terminal 80). - Check voltage supply between yaw sensor -G202- (terminal 2) and ABS control module -J104- (terminal 34). ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*
	♦ ABS control module -J104- malfunctioning Note: Only replace the control module as a last resort.	- If the malfunction cannot be fixed, replace the ABS control module -J104-. ⇒ *Repair Manual, Brake System, Repair Group 45*

01-413

Printed output from VAG1551 Scan Tool (ST)	Possible cause	Corrective action
DTC	**WARNING!** **This is only valid for control modules with no.: 8D0 907 389, 8D0 907 389A, 8D0 907 389D and 8D0 907 389E.**	
Continuation: 01424 Yaw sensor -G202-, reference line Failure in electrical circuit	For control modules 8D0 907 389/A/D/E, the VAG1551 scan tool with test card 8 and the VAG1552 scan tool with test card 5 display the following incorrect text: "Sender for rotation rate -G202-, signal wire". ♦ Open circuit in reference wire of sender for rotation rate -G202-. ♦ Short circuit to B+ or Ground (GND) in reference line to yaw sensor -G202-. ***Note:*** *The reference line of yaw sensor -G202- carries the reference signal. The reference signal corresponds to the signal the sensor sends to the ABS control module -J104- when the vehicle is traveling straight ahead.*	- Check reference line between yaw sensor -G202- (terminal 4) and ABS control module -J104- (terminal 78). ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

01-414

Printed output from VAG1551 Scan Tool (ST)	Possible cause	Corrective action
DTC	**WARNING!** **This is only valid for control modules with no.: 4B0 907 389**	
01425 Yaw sensor -G202-, reference line Failure in electrical circuit	**For control modules 4B0 907 389, the VAG1551 scan tool with test card 7 and the VAG1552 scan tool with test card 4 display the following incorrect text: "Sender for rotation rate -G202-, signal wire".** ♦ Open circuit in reference wire of sender for rotation rate -G202-. ♦ Short circuit to B+ or Ground (GND) in reference line to yaw sensor -G202-.	- Check reference line between yaw sensor -G202- (terminal 4) and ABS control module -J104- (terminal 78). ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*
	Note: *The reference line of yaw sensor -G202- carries the reference signal. The reference signal corresponds to the signal the sensor sends to the ABS control module -J104- when the vehicle is traveling straight ahead.*	

01-415

Printed output from VAG1551 Scan Tool (ST)	Possible cause	Corrective action
DTC	**WARNING!** **This is only valid for control modules with no.: 8D0 907 389, 8D0 907 389A, 8D0 907 389D and 8D0 907 389E.**	
Continuation: 01425 Sender for rotation rate -G202-, signal wire Failure in electrical circuit **See continuation on next page**	For control modules 8D0 907 389/A/D/E, the VAG1551 scan tool with test card 8 and the VAG1552 scan tool with test card 5 display the following incorrect text: "Sender for rotation rate -G202-, reference wire". ♦ There is an open circuit in one of the signal wires for the combined sensor for rotation rate and transverse acceleration. ♦ There is short circuit to B+ or Ground (GND) in one of the signal wires for the combined sensor for rotation rate and transverse acceleration. ♦ Sender for rotation rate -G202- malfunctioning.	- Check the signal wire for the combined sensor for rotation rate and transverse acceleration, terminal 6, to the ABS control module -J104- (terminal 79). ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations* - If none of the causes listed are causing the malfunction, replace yaw sensor -G202-. ⇒ *Repair Manual, Brake System, Repair Group 45*

01-416

Printed output from VAG1551 Scan Tool (ST)	Possible cause	Corrective action
DTC	**WARNING!** **This is only valid for control modules with no.: 8D0 907 389, 8D0 907 389A, 8D0 907 389D and 8D0 907 389E.**	
01425 Sender for rotation rate -G202-, signal wire Failure in electrical circuit **Continuation:**	For control modules 8D0 907 389/A/D/E, the VAG1551 scan tool with test card 8 and the VAG1552 scan tool with test card 5 display the following incorrect text: "Sender for rotation rate -G202-, reference wire".	
	♦ Open circuit in supply line to yaw sensor -G202-.	- Check Ground (GND) between yaw sensor -G202- (terminal 1) and ABS control module -J104- (terminal 80). - Check voltage supply between yaw sensor -G202- (terminal 2) and ABS control module -J104- (terminal 34). ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*
	♦ ABS control module -J104- malfunctioning Note: Only replace the control module as a last resort.	- If the malfunction cannot be fixed, replace the ABS control module -J104-. ⇒ *Repair Manual, Brake System, Repair Group 45*

01-417

DTC table; DTCs from 01435 to 01542

Printed output from VAG1551 Scan Tool (ST) DTC	Possible cause	Corrective action
01435 Sender 1 for brake booster -G201- **See continuation on next page**	♦ The brake light switch is not adjusted correctly or is not installed correctly. ♦ Open circuit in signal wire of sender 1 for brake booster -G201-. ♦ Short circuit to B+ or Ground (GND) in signal wire to sender 1 for brake booster -G201-.	- Check the installation position of the brake light switch. ⇒ *Repair Manual, Brake System, Repair Group 45* - Check brake light switch -F-, "Read measuring value block" function 08 ⇒ page 01-256 , display group 2 - Check sensor for brake pressure -G201-, "Read measuring value block" function 08 ⇒ page 01-256 , display group 5 - Check signal line between sensor for brake pressure -G201- (terminal 2) and ABS control module -J104- (terminal 68). ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

01-418

Printed output from VAG1551 Scan Tool (ST) DTC	Possible cause	Corrective action
01435 Sender 1 for brake booster -G201- **Continuation:** **See continuation on next page**	♦ Sensor for brake pressure -G201- malfunctioning.	- If none of the causes listed are causing the malfunction, replace hydraulic pump for traction control V-156- and sensor for brake pressure -G201-. ⇒ *Repair Manual, Brake System, Repair Group 45* - Bleed brake system. ⇒ *Repair Manual, Brake System, Repair Group 47*
	♦ Open circuit in one of the voltage supply wires to sensor for brake pressure -G201-.	- Check Ground (GND) between sensor for brake pressure -G201- (terminal 1) and ABS control module -J104- (terminal 67). - Check voltage supply between sensor for brake pressure -G201- (terminal 3) and ABS control module -J104- (terminal 69). ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

01-419

Printed output from VAG1551 Scan Tool (ST) DTC	Possible cause	Corrective action
01435 Sender 1 for brake booster - G201- **Continuation:** **See continuation on next page**	♦ ABS control module -J104- malfunctioning Note: Only replace the control module as a last resort.	- If the malfunction cannot be fixed, replace the ABS control module -J104-. ⇒ *Repair Manual, Brake System, Repair Group 45*

01-420

Printed output from VAG1551 Scan Tool (ST) DTC	Possible cause	Corrective action
01435 **Continuation:** Sender 1 for brake booster -G201- Failure in electrical circuit **See continuation on next page**	♦ Open circuit in signal wire of sender 1 for brake booster -G201-. ♦ Short circuit to B+ or Ground (GND) in signal wire to sender 1 for brake booster -G201-. ♦ Open circuit in one of the voltage supply wires to sensor for brake pressure -G201-.	- Check signal line between sensor for brake pressure -G201- (terminal 2) and ABS control module -J104- (terminal 68). ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations* - Check Ground (GND) between sensor for brake pressure -G201- (terminal 1) and ABS control module -J104- (terminal 67). - Check voltage supply between sensor for brake pressure -G201- (terminal 3) and ABS control module -J104- (terminal 69). ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

01-421

Printed output from VAG1551 Scan Tool (ST) **DTC**	Possible cause	Corrective action
01435 Sender 1 for brake booster -G201- Failure in electrical circuit **Continuation:**	♦ Sensor for brake pressure -G201- malfunctioning.	- If none of the causes listed are causing the malfunction, replace hydraulic pump for traction control V-156- and sensor for brake pressure -G201-. ⇒ *Repair Manual, Brake System, Repair Group 45* - Bleed brake system. ⇒ *Repair Manual, Brake System, Repair Group 47*
	♦ ABS control module -J104- malfunctioning Note: Only replace the control module as a last resort.	- If the malfunction cannot be fixed, replace the ABS control module -J104-. ⇒ *Repair Manual, Brake System, Repair Group 45*
See continuation on next page		

01-422

Printed output from VAG1551 Scan Tool (ST) **DTC**	Possible cause	Corrective action
01435 **Continuation:** Sender 1 for brake booster -G201- Implausible signal	♦ The hydraulic pump for traction control -V156- was switched on but is not producing more than 2 bar and less than 30 bar of pressure in the master brake cylinder.	- Erase DTC memory ⇒ page 01-15 - End Output ⇒ page 01-16 . - Road test vehicle ⇒ page 01-250 - If malfunction occurs again, replace hydraulic pump for traction control -V156- and sensor for transverse acceleration -G201-. ⇒ *Repair Manual, Brake System, Repair Group 45* - Bleed brake system. ⇒ *Repair Manual, Brake System, Repair Group 47*
01435 Sender 1 for brake	♦ Master brake cylinder malfunctioning.	- Check the master brake cylinder, and

booster -G201- Implausible signal		replace if necessary. ⇒ *Repair Manual, Brake System, Repair Group 47*
	♦ Brake booster malfunctioning	- Check the brake booster, and replace if necessary. ⇒ *Repair Manual, Brake System, Repair Group 47*

01-423

Printed output from VAG1551 Scan Tool (ST) **DTC**	Possible cause	Corrective action
01435 **Continuation:** Sender 1 for brake booster -G201- - voltage supply	♦ Voltage supply has a short circuit to B+. ♦ Voltage supply has a short circuit to Ground (GND). ♦ Open circuit in one of the voltage supply wires to sensor for brake pressure -G201-.	- Check Ground (GND) between sensor for brake pressure -G201- (terminal 1) and ABS control module -J104- (terminal 67). - Check voltage supply between sensor for brake pressure -G201- (terminal 3) and ABS control module -J104- (terminal 69). ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

01-424

Printed output from VAG1551 Scan Tool (ST) DTC	Possible cause	Corrective action
01464 Brake pressure sensor/lateral acceleration sensor Voltage supply	If this malfunction is recognized by On Board Diagnostic (OBD), then the voltage supply of sender 1 for brake booster -G201- was not distinguished from the voltage supply for the sensor for transverse acceleration -G200-. Check both components and their wiring.	
	♦ Insufficient voltage supply for sender 1 for brake booster -G201-.	- Check the voltage supply lines from the sensor for brake pressure -G201- (terminal 3) to the ABS control module -J104- (terminal 69) for a short circuit to Ground (GND) or B+.
	♦ Insufficient voltage supply to sensor for transverse acceleration -G200-.	- Check the voltage supply lines from the sensor for transverse acceleration -G200- (terminal 3) to the ABS control module -J104- (terminal 75) for a short circuit to Ground (GND) or B+.
See continuation on next page		

01-425

Printed output from VAG1551 Scan Tool (ST) **DTC**	Possible cause	Corrective action
01464 Brake pressure sensor/lateral acceleration sensor Voltage supply **Continuation:**	If this malfunction is recognized by On Board Diagnostic (OBD), then the voltage supply of sender 1 for brake booster -G201- was not distinguished from the voltage supply for the sensor for transverse acceleration -G200-. Check both components and their wiring.	
	♦ One of the two sensors is malfunctioning.	If you do not find any malfunctions in the voltage supply lines, then: - Erase DTC memory ⇒ page 01-15 - End Output ⇒ page 01-16 . - Ignition off - Disconnect one sensor and then the other. - Replace the sensor for which the DTC is no longer recognized after the ignition is switched on. ⇒ *Repair Manual, Brake System, Repair Group 45*
	♦ ABS control module -J104- malfunctioning Note: Only replace the control module as a last resort.	- If the malfunction cannot be fixed, replace the ABS control module -J104-. ⇒ *Repair Manual, Brake System, Repair Group 45*

01-426

Printed output from VAG1551 Scan Tool (ST)	Possible cause	Corrective action
DTC	**WARNING!** **This DTC is not included in the VAG1551/1552 scan tools**	
01486 System function test activated	♦ The ESP driving test was activated	- Perform entire ESP driving and system test ⇒ page 01-250

01-427

Printed output from VAG1551 Scan Tool (ST)	Possible cause	Corrective action
DTC		
01542 Sender for rotation rate - G202- Implausible signal See continuation on next page	The input signals received by ABS control module -J104- are analyzed by computing programs and checked for plausibility. If the sender for rotation rate -G202- fails, the relevant computing program relies primarily on the steering angle sensor -G85- and the sensor for transverse acceleration -G200-. If you think there is a problem with the sender for rotation rate -G202-, check whether the steering angle sensor -G85- and sensor for transverse acceleration -G200- are OK. These must also be checked. - While driving straight ahead (v < 20 km/h), check the zero position of the steering angle sensor -G85-, by selecting display group 5 in "Read measuring value block", function 08 ⇒ page 01-256 . - Check the sensor for transverse acceleration -G200- as described in the instructions for "Read measuring value block" function 08 ⇒ page 01-270 , display group 5. **There are four possibilities:**	

01-428

Printed output from VAG1551 Scan Tool (ST)	Possible cause	Corrective action
DTC		
01542 Sender for rotation rate -G202- Implausible signal **Continuation:**	**First: (Also note the fourth possibility)** The zero position of steering angle sensor -G85- is not within the specified range, and the zero position of yaw sensor -G202- is within the specified range:	
		- Perform zeroing. ⇒ page 01-243 - Erase DTC memory ⇒ page 01-15 - End Output ⇒ page 01-16 . - Road test vehicle ⇒ page 01-250 - If the malfunction occurs again, follow the procedure for the second case.
See continuation on next page		

01-429

Printed output from VAG1551 Scan Tool (ST)	Possible cause	Corrective action
DTC	**WARNING!** **This is only valid for control modules with no.: 4B0 907 389**	
01542 Sender for rotation rate - G202- Implausible signal		
	Second: (Also note the fourth possibility) The zero position of steering angle sensor -G85- is within the specified range, and the zero position of yaw sensor -G202- is not within the specified range:	
Continuation:	♦ Open circuit in signal wire of sender for rotation rate -G202-. ♦ Short circuit to B+ or Ground (GND) in signal wire to sender for rotation rate -G202-.	- Check signal line between yaw sensor -G202- (terminal 3) and ABS control module -J104- (terminal 79). ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*
See continuation on next page		

01-430

Printed output from VAG1551 Scan Tool (ST)	Possible cause	Corrective action
DTC	**WARNING!** **This is only valid for control modules with no.: 4B0 907 389**	
01542 Sender for rotation rate - G202- Implausible signal **Continuation: (Second)** **See continuation on next page**	♦ Open circuit in supply line to yaw sensor -G202-.	- Check Ground (GND) between yaw sensor -G202- (terminal 1) and ABS control module -J104- (terminal 80). - Check voltage supply between yaw sensor -G202- (terminal 2) and ABS control module -J104- (terminal 34). ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

01-431

Printed output from VAG1551 Scan Tool (ST) DTC	Possible cause	Corrective action
01542 Sender for rotation rate -G202- Implausible signal **Continuation: (Second)** **See continuation on next page**	♦ Sender for rotation rate -G202- malfunctioning. ♦ ABS control module -J104- malfunctioning Note: Only replace the control module as a last resort.	If none of the causes fit: - Erase DTC memory ⇒ page 01-15 - End Output ⇒ page 01-16 . - Road test vehicle ⇒ page 01-250 - If malfunction occurs again, replace yaw sensor -G202-. ⇒ *Repair Manual, Brake System, Repair Group 45* - If the malfunction cannot be fixed, replace the ABS control module -J104-. ⇒ *Repair Manual, Brake System, Repair Group 45*

01-432

Printed output from VAG1551 Scan Tool (ST)	Possible cause	Corrective action
DTC	**WARNING!** **This is only valid for control modules with no.: 8D0 907 389, 8D0 907 389A, 8D0 907 389D and 8D0 907 389E.**	
01542 Sender for rotation rate -G202- Implausible signal **Continuation:**	**Second: (Also note the fourth possibility)** The zero position of steering angle sensor -G85- is within the specified range, and the zero position of the sensor for transverse acceleration -G200-, or the combined sensor for rotation rate and transverse acceleration, is not within the specified range:	
	♦ There is an open circuit in one of the signal wires for the combined sensor for rotation rate and transverse acceleration. ♦ There is short circuit to B+ or Ground (GND) in one of the signal wires for the combined sensor for rotation rate and transverse acceleration.	- Check the signal wire for the combined sensor for rotation rate and transverse acceleration, terminal 4, to the ABS control module -J104- (terminal 18). ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

01-433

Printed output from VAG1551 Scan Tool (ST)	Possible cause	Corrective action
DTC	**WARNING!** **This is only valid for control modules with no.: 8D0 907 389, 8D0 907 389A, 8D0 907 389D and 8D0 907 389E.**	
01542 Sender for rotation rate -G202- Implausible signal **Continuation: (Second)** **See continuation on next page**	♦ There is an open circuit in one of the voltage supply wires for the combined sensor for rotation rate and transverse acceleration.	- Check the Ground (GND) supply for the combined sensor for rotation rate and transverse acceleration, terminal 2, to the ABS control module -J104- (terminal 80). - Check the voltage supply of the combined sensor for rotation rate and transverse acceleration, terminal 1, to the ABS control module -J104- (terminal 34). ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

01-434

Printed output from VAG1551 Scan Tool (ST)	Possible cause	Corrective action
DTC	**WARNING!** **This is only valid for control modules with no.: 8D0 907 389, 8D0 907 389A, 8D0 907 389D and 8D0 907 389E.**	
01542 Sender for rotation rate - G202- Implausible signal **Continuation: (Second)**	♦ The combined sensor for rotation rate and transverse acceleration is malfunctioning.	If none of the causes fit: - Erase DTC memory ⇒ page 01-15 - End Output ⇒ page 01-16 . - Road test vehicle ⇒ page 01-250 - If malfunction occurs again, replace combined sensor for rotation rate and transverse acceleration. ⇒ *Repair Manual, Brake System, Repair Group 45*
	♦ ABS control module -J104- malfunctioning	- If the malfunction cannot be fixed, replace the ABS control module -J104-.
See continuation on next page	Note: Only replace the control module as a last resort.	⇒ *Repair Manual, Brake System, Repair Group 45*

01-435

Printed output from VAG1551 Scan Tool (ST) **DTC**	**Possible cause**	**Corrective action**
01542 Sender for rotation rate - G202- Implausible signal **Continuation:** **See continuation on next page**	**Third: (Also note the fourth possibility)** The zero position of steering angle sensor -G85- is not within the specified range, and the zero position of the sensor for transverse acceleration -G200-, or the combined sensor for rotation rate and transverse acceleration, is not within the specified range: - Follow the procedures from the first and second possibilities.	

01-436

Printed output from VAG1551 Scan Tool (ST)	Possible cause	Corrective action
DTC	**WARNING!** **This is only valid for control modules with no.: 4B0 907 389**	
01542 Sender for rotation rate -G202- Implausible signal	**Fourth:** The zero position of steering angle sensor -G85- is within the specified range, and the zero position of sensor for transverse acceleration -G200- is within the specified range:	
Continuation:	- Check the sender for rotation rate -G202- by selecting the "Read measuring value block" function 08 ⇒ page 01-256 , display group 5,	
	♦ The yaw sensor -G202- is loose.	- Check bolts for yaw sensor -G202-. ⇒ *Repair Manual, Brake System, Repair Group 45*
	♦ Open circuit in signal wire of sender for rotation rate -G202-. ♦ Short circuit to B+ or Ground (GND) in signal wire to sender for rotation rate -G202-.	- Check signal line between yaw sensor -G202- (terminal 3) and ABS control module -J104- (terminal 79). ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*
See continuation on next		

page		

01-437

Printed output from VAG1551 Scan Tool (ST)	Possible cause	Corrective action
DTC	**WARNING!** **This is only valid for control modules with no.: 4B0 907 389**	
01542 Sender for rotation rate -G202- Implausible signal **Continuation: (Fourth)** **See continuation on next page**	♦ Open circuit in supply line to yaw sensor -G202-. ♦ Open circuit in test lead of sender for rotation rate -G202-. ♦ Short circuit to B+ or Ground (GND) in test lead of sender for rotation rate -G202-.	- Check Ground (GND) between yaw sensor -G202- (terminal 1) and ABS control module -J104- (terminal 80). - Check voltage supply between yaw sensor -G202- (terminal 2) and ABS control module -J104- (terminal 34). Electrical Wiring Diagrams, Troubleshooting & Component Locations - Check test line between yaw sensor -G202- (terminal 5) and ABS control module -J104- (terminal 77). ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

01-438

Printed output from VAG1551 Scan Tool (ST)	Possible cause	Corrective action
DTC	**WARNING!** **This is only valid for control modules with no.: 4B0 907 389**	
01542 Sender for rotation rate -G202- Implausible signal **Continuation: (Fourth)**	♦ Sender for rotation rate -G202- malfunctioning.	If none of the causes fit: - Erase DTC memory ⇒ page 01-15 - End Output ⇒ page 01-16 . - Road test vehicle ⇒ page 01-250 - If malfunction occurs again, replace yaw sensor -G202-. ⇒ *Repair Manual, Brake System, Repair Group 45*
	♦ ABS control module -J104- malfunctioning	- If the malfunction cannot be fixed, replace the ABS control module -J104-.
See continuation on next page	Note: Only replace the control module as a last resort.	⇒ *Repair Manual, Brake System, Repair Group 45*

01-439

Printed output from VAG1551 Scan Tool (ST)	Possible cause	Corrective action
DTC	**WARNING!** **This is only valid for control modules with no.: 8D0 907 389, 8D0 907 389A, 8D0 907 389D and 8D0 907 389E.**	
01542 Sender for rotation rate - G202- Implausible signal **Continuation:**	**Fourth:** The zero position of steering angle sensor -G85- is within the specified range, and the zero position of the combined sensor for rotation rate and transverse acceleration is within the specified range:	
See continuation on next page	- Check the combined sensor for rotation rate and transverse acceleration by selecting "Read measuring value block" function 08 ⇒ page 01-256 , display group 5	
	♦ The combined sensor for rotation rate and transverse acceleration is loose.	- Check bolts for combined sensor for rotation rate and transverse acceleration. ⇒ *Repair Manual, Brake System, Repair Group 45*

01-440

Printed output from VAG1551 Scan Tool (ST)	Possible cause	Corrective action
DTC	**WARNING!** **This is only valid for control modules with no.: 8D0 907 389, 8D0 907 389A, 8D0 907 389D and 8D0 907 389E.**	
01542 Sender for rotation rate -G202- Implausible signal **Continuation: (Fourth)** **See continuation on next page**	♦ There is an open circuit in one of the voltage supply wires for the combined sensor for rotation rate and transverse acceleration.	- Check the Ground (GND) supply for the combined sensor for rotation rate and transverse acceleration, terminal 2, to the ABS control module -J104- (terminal 80). - Check the voltage supply of the combined sensor for rotation rate and transverse acceleration, terminal 1, to the ABS control module -J104- (terminal 34). ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

01-441

Printed output from VAG1551 Scan Tool (ST)	Possible cause	Corrective action
DTC	**WARNING!** **This is only valid for control modules with no.: 8D0 907 389, 8D0 907 389A, 8D0 907 389D and 8D0 907 389E.**	
01542 Sender for rotation rate -G202- Implausible signal **Continuation: (Fourth)**	♦ There is an open circuit in one of the signal wires for the combined sensor for rotation rate and transverse acceleration. ♦ There is short circuit to B+ or Ground (GND) in one of the signal wires for the combined sensor for rotation rate and transverse acceleration.	- Check the signal wire for the combined sensor for rotation rate and transverse acceleration, terminal 6, to the ABS control module -J104- (terminal 79). ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*
	♦ There is an open circuit in the test lead of the combined sensor for rotation rate and transverse acceleration. ♦ There is short circuit to B+ or Ground (GND) in the test lead of the combined sensor for rotation rate and transverse acceleration.	- Check the test lead of the combined sensor for rotation rate and transverse acceleration, terminal 3, to the ABS control module -J104- (terminal 77). ⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*
See continuation on		

next page		

01-442

Printed output from VAG1551 Scan Tool (ST)	Possible cause	Corrective action
DTC	**WARNING!** **This is only valid for control modules with no.: 8D0 907 389, 8D0 907 389A, 8D0 907 389D and 8D0 907 389E.**	
01542		

Description of systems

The individual components have the following functions:

ABS

Anti-lock Brake System

ABS prevents the wheel from locking up during hard braking initiated by the driver. Despite high brake effectiveness, lane stability and steering capacity are maintained.

01-36

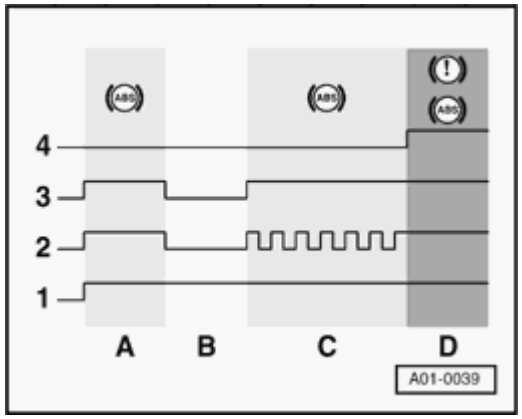
EBD

Electronic Brake Distribution

Specialized software stored in the ABS control module -J104-, called Electronic Brake Distribution (EBD), assumes the function of the brake pressure regulator.

The signal sent to the instrument cluster when ABS fails is pulsed if the EBD function remains operational in emergency mode. The instrument cluster distinguishes between no signal, a pulsed signal, and a steady signal. The ABS/EDL indicator lamp and the red symbol for "Brake system malfunction" will light up accordingly.

01-37



1 - Terminal 15

2 - Signal for controlling the ABS/EDL indicator lamp and the red "brake system malfunction" symbol.

3 - Voltage supply for the ABS/EDL indicator lamp.

4 - Voltage supply for the red "brake system malfunction" symbol.

A - In interval "A" (with "ignition on") a self-test of the ABS/EDL indicator lamp is carry outed for two seconds using signal "2" (lamp lights up). During this interval, the instrument cluster suppresses the red "brake system malfunction" symbol.

B - Signal "2" is not available in interval "B". The ABS/EDL indicator lamp and the red "brake system malfunction" symbol do not light.

C - In interval "C", the On Board Diagnostic recognized a DTC, which did not deactivate the EBD. Signal "2" is pulsed. Only the ABS/EDL indicator lamp comes on.

D - In interval "D", the On Board Diagnostic recognized a DTC, which did deactivate the EBD. Signal "2" is steady. Both the ABS/EDL indicator lamp and the red "brake system malfunction" symbol light up.

01-38

The red "brake system malfunction" symbol indicates the EBD is deactivated. The vehicle is only allowed to be driven under restricted conditions; "Road test vehicle".

For additional information about EBD indicator lamp control, see: "Overview of warning lamp functions"; The vehicle version as relates to EBD can be recognized by checking the note column under "Check control module version".

01-39

EDL

Electronic Differential Lock

The Electronic Differential Lock (EDL) is a traction control aid for driving away from a standstill. An electronically-controlled brake application at the wheel that is spinning provides a torque reaction point for the differential. This enables the wheel with better traction to make use of the engine power. EDL is effective in both forward and reverse.

EDL is part of the basic configuration of vehicles with All Wheel Drive (AWD). Although EDL only regulates the front wheels on vehicles with Front Wheel Drive (FWD), EDL regulates all four wheels on vehicles with All Wheel Drive (AWD). This makes it possible to eliminate the driver operated mechanical differential lock.

Onset of EDL regulation is permitted up to a speed of 40 km/h. The upper switch-off barrier for already active EDL is 40 km/h for vehicles with Front Wheel Drive (FWD), but 80 km/h for vehicles with All Wheel Drive (AWD).

The hydraulic unit is equipped with suction dampers. They improve pressure build-up in the appropriate brake cylinders during EDL regulation. The functional range of the pressure relief valve in the hydraulic unit is 170 ± 25 bar.

To reduce the risk of brake overheating, EDL regulation is not permitted above a specific brake temperature. The temperature limit is defined in the ABS control module (w/EDL) -J104-. The control module determines the actual brake temperature via an algorithm. If the algorithm determines that the brakes have reached a temperature below the temperature limit, the EDL system becomes effective again. Function of the vehicle brake system and ABS are not affected by intervention in this system.

01-41

When ignition is switched off, the temperature calculated for the hot brakes is stored until ignition is switched on again. When ignition is switched on, the instrument cluster transmits a time signal so that the ABS control module (w/EDL) -J104- can calculate the standing time. This standing time is required by the temperature algorithm for calculation of the new brake temperature. If the indicated standing time exceeds one hour, the brake temperature is automatically set to the lowest temperature in the temperature algorithm.

EDL shut-off for temperature reasons is indicated in the measuring value block for a period of 20 ignition cycles.

01-42

ASR

Anti-Slip Regulation (ASR)

The ASR option is only available on Front Wheel Drive (FWD) vehicles. Observe control module coding for these vehicles. The function of ASR requires an exchange of signals between the ABS control module -J104-, the Engine Control Module (ECM) and the Transmission Control Module (TCM). The control modules communicate with each other.

There are two communication systems at work:

- Data is transferred via several single wires.
- Data is transferred via the CAN-bus. The CAN-bus only contains two lines. These transfer all required data.

To determine which communication system is transferring data, use the "Check control module version" function and check the table "Control module versions".

01-43

ASR prevents the wheels being powered from spinning during acceleration by reducing engine load. It is active throughout the entire speed range. The EDL and ASR functions work in combination during vehicle acceleration.

ASR can be switched on and off by pressing the traction control button in the center of the center console. ASR is re-activated on its own when the ignition is switched on. When the traction control button is operated, the ASR indicator lamp lights up in the instrument cluster. During adjustment mode, the indicator lamp blinks three times per second.

ESP

Electronic Stabilization Program (ESP)

The Electronic Stabilization Program (ESP) is a driving dynamics regulation system. It stabilizes the vehicle both in understeer and oversteer situations. ESP regulation includes the functions of EBD, ABS, EDL and ASR. A special function of ESP is that it can brake individual wheels.

ESP includes the functions of EBD, ABS, EDL and ASR. The individual components have the following functions:

The ASR and ESP functions can be switched on and off using the ASR/ESP switch on the center console. If the driver steps on the brake pedal, the status of the ESP switch is ignored. When braking, ESP is always active. When the ignition is switched on, the ASR and ESP functions are activated.

When switched off, the ASR/ESP indicator light is lit up in the instrument cluster. During adjustment mode, the indicator lamp blinks three times per second.

40-1

Front axle components, locations

WARNING!

- ***Do not re-use any fasteners that are worn or deformed in normal use.***

- ***Some fasteners are designed to be used only once, and are unreliable and may fail if used a second time. This includes, but is not limited to, nuts, bolts, washers, circlips and cotter pins. Always follow the recommendations in this manual-replace these fasteners with new parts where indicated, and any other time it is deemed necessary by inspection.***

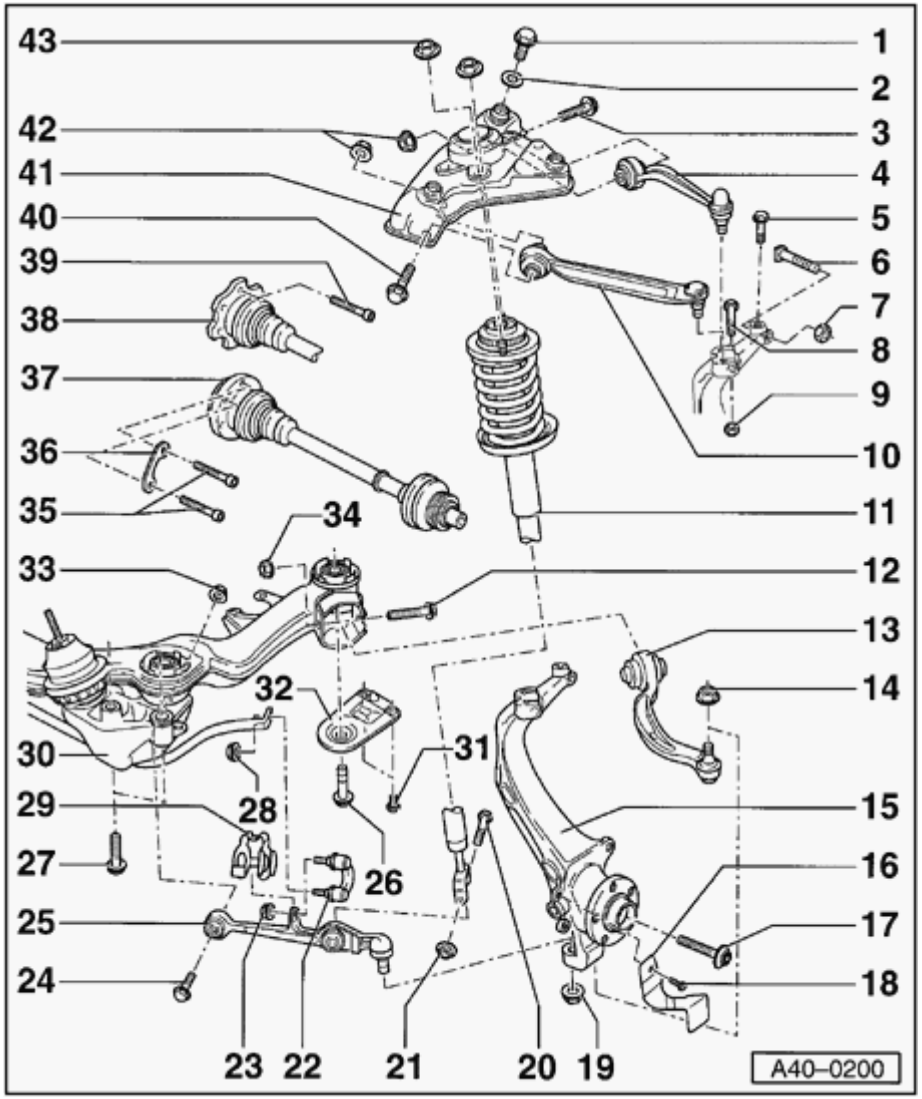
CAUTION!

- ***Do not attempt to weld or straighten the load-bearing components or parts of the suspension.***

- ***Do not attempt to move a vehicle from which the drive axle has been removed. Otherwise wheel bearing damage will result. If the vehicle does have to be moved, install an outer CV joint in place of the drive axle and tighten to 50 Nm (37 ft lb).***

- ***The bonded rubber bushings can only be turned to a limited extent. The bolted connections on the suspension links should therefore only be tightened when the vehicle is standing on the ground.***

40-2



1 - Bolt

- ♦ 75 Nm (55 ft lb)

2 - Washer

3 - Bolt

- ♦ Always replace

Note different lengths:

- ♦ With steel mounting bracket: M10 x 60
- ♦ With aluminum mounting bracket: M10 x 62

4 - Upper link, rear

- ♦ Note different versions: with and without buffer stop ⇒ Figs. 1 and ⇒ 2
- ♦ Replacing bushing ⇒ page 40-75

5 - Bolt

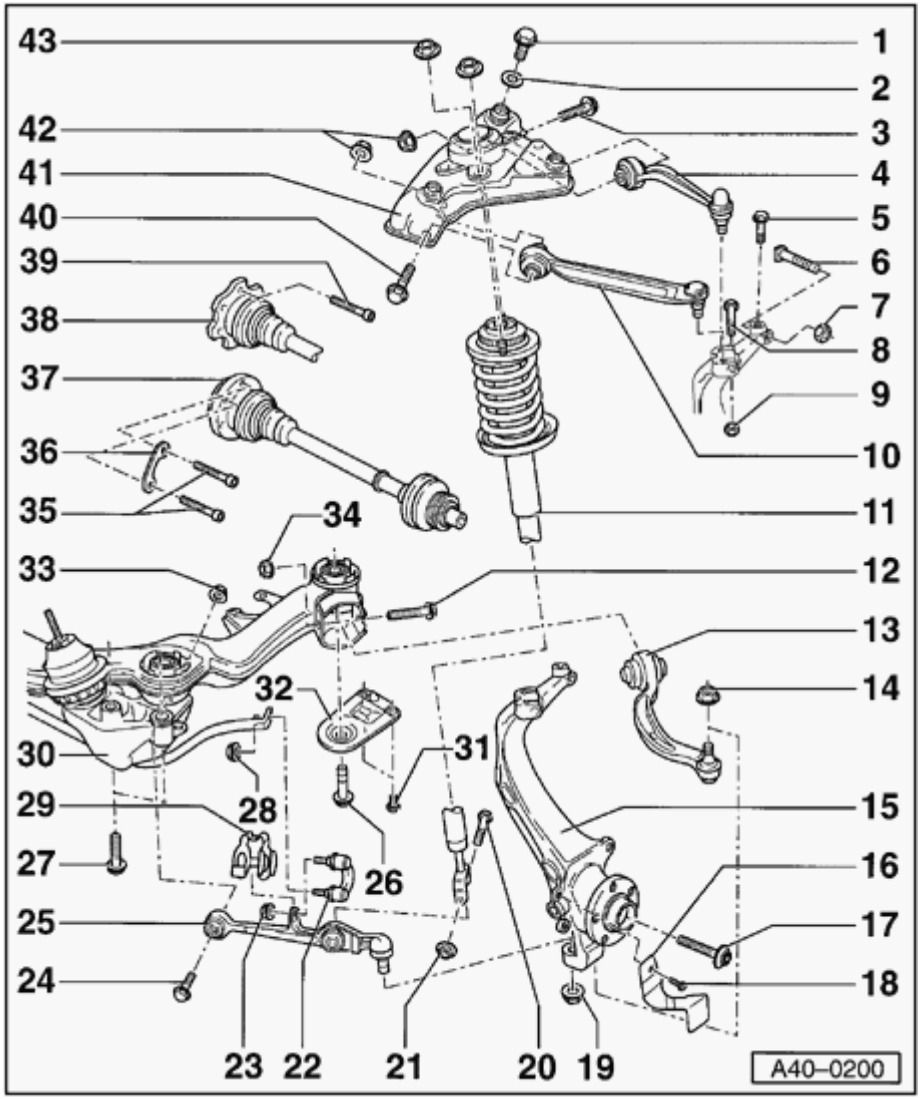
- ♦ 7 Nm (62 in. lb)
- ♦ Tighten until firm contact is made

6 - Bolt

7 - Self-locking nut

- ♦ Always replace
- ♦ 50 Nm (37 ft lb)

40-3



8 - Bolt M10 x 100

9 - Self-locking nut

- Always replace
- 40 Nm (30 ft lb)

10 - Upper link, front

- Remove together with mounting bracket
- Removing and installing mounting bracket ⇒ page 40-68
- Replacing bushing ⇒ page 40-75

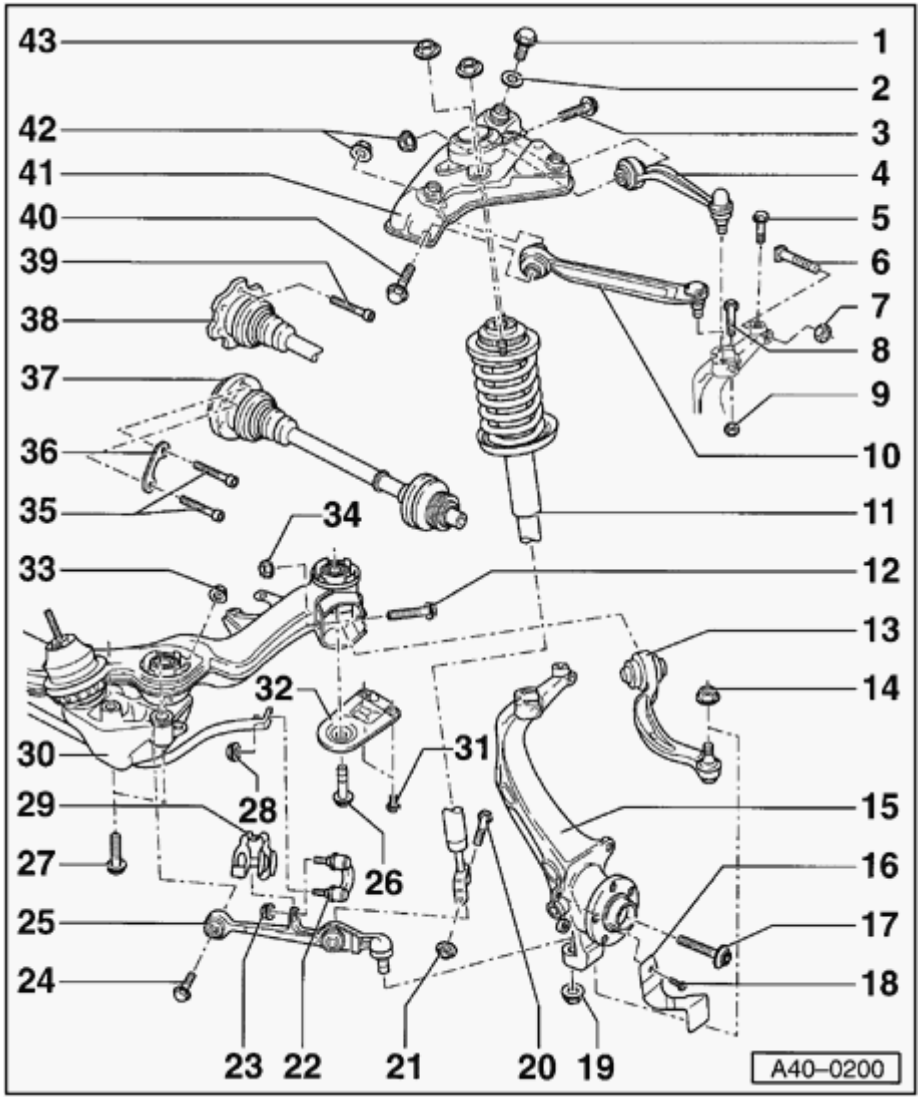
11 - Suspension strut

- Note different spring/shock absorber versions ⇒ vehicle data label, page 40-46
- Removing and installing ⇒ page 40-39
- Servicing ⇒ page 40-44

12 - Bolt w/washer M12 x 1.5 x 120

- Always replace

40-4



13 - Guide link with hydraulic bushing

- Removing and installing ⇒ page 40-97
- Replace hydraulic bushing if leaking ⇒ page 40-99

14 - Self-locking nut

- Always replace
- 100 Nm (74 ft lb)

15 - Wheel bearing housing

- Removing and installing on vehicles with headlight range control ⇒ page 40-14
- Removing and installing ⇒ page 40-54
- Servicing ⇒ page 40-60

16 - Splash shield

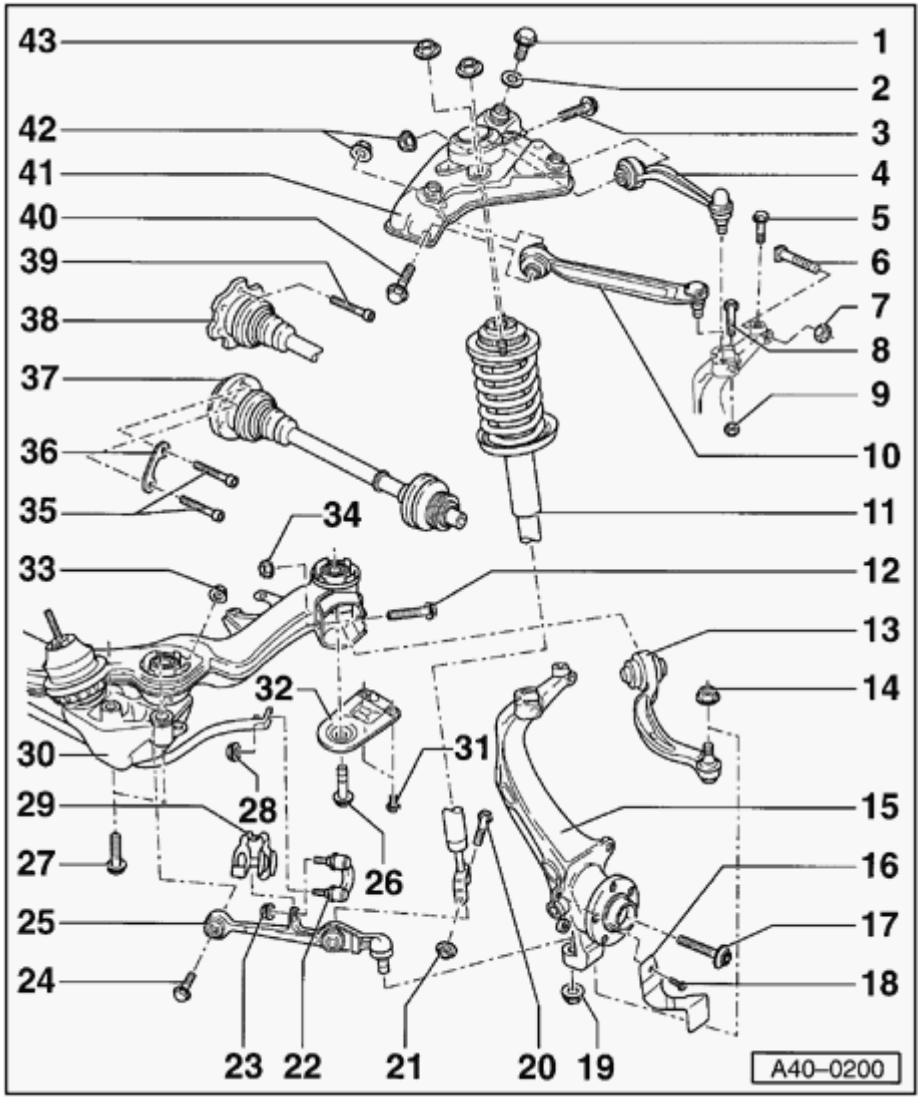
17 - Collar bolt

- Always replace
- When tightening, vehicle must be standing on its wheels

Tightening torques:

- M14: 115 Nm (85 ft lb) + 1/2-turn (180°)
- M16: 190 Nm (140 ft lb) + 1/2-turn (180°)

40-5



18 - Bolt

- 10 Nm (7 ft lb)

19 - Self-locking nut

- Always replace
- 100 Nm (74 ft lb)

20 - Bolt M12 x 1.5 x 85

21 - Self-locking nut

- Always replace
- 90 Nm (66 ft lb)

22 - Connecting link

- Arrow faces direction of travel

23 - Self-locking nut

- Always replace
- 40 Nm (52 ft lb) + 1/4-turn (90°)
- Underside of nut is ribbed
- Replace only with exact same type of special nut

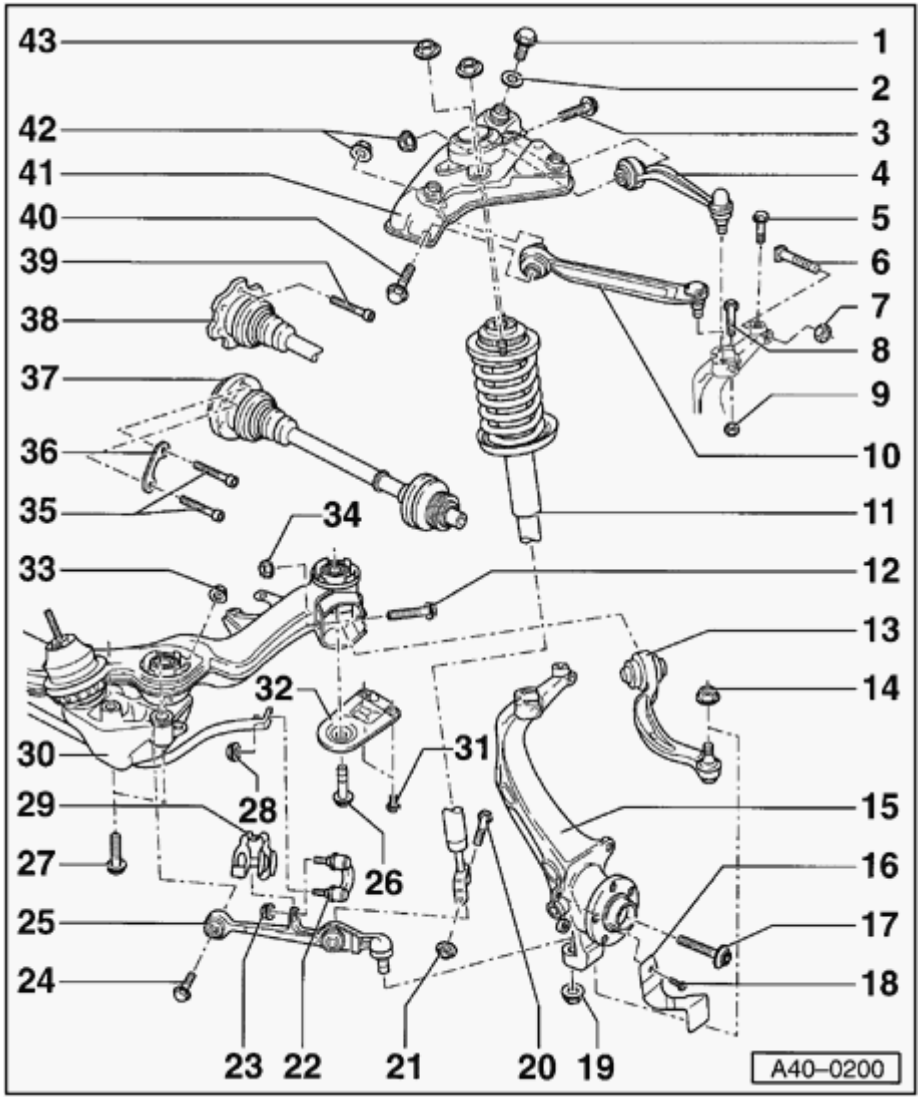
24 - Bolt M12 x 1.5 x 100

- Always replace

25 - Lower track control link

- Removing and installing on vehicles with headlight range control ⇒ page 40-14
- Replacing bushing ⇒ page 40-94

40-6



26 - Bolt M12 x 1.5 x 110

- Always replace
- 110 Nm (81 ft lb) + 1/4-turn (90°)

27 - Bolt M10 x 70

- Always replace
- 75 Nm (55 ft lb)

28 - Self-locking nut

- Always replace
- 100 Nm (74 ft lb)
- Replace only with exact same type of special nut

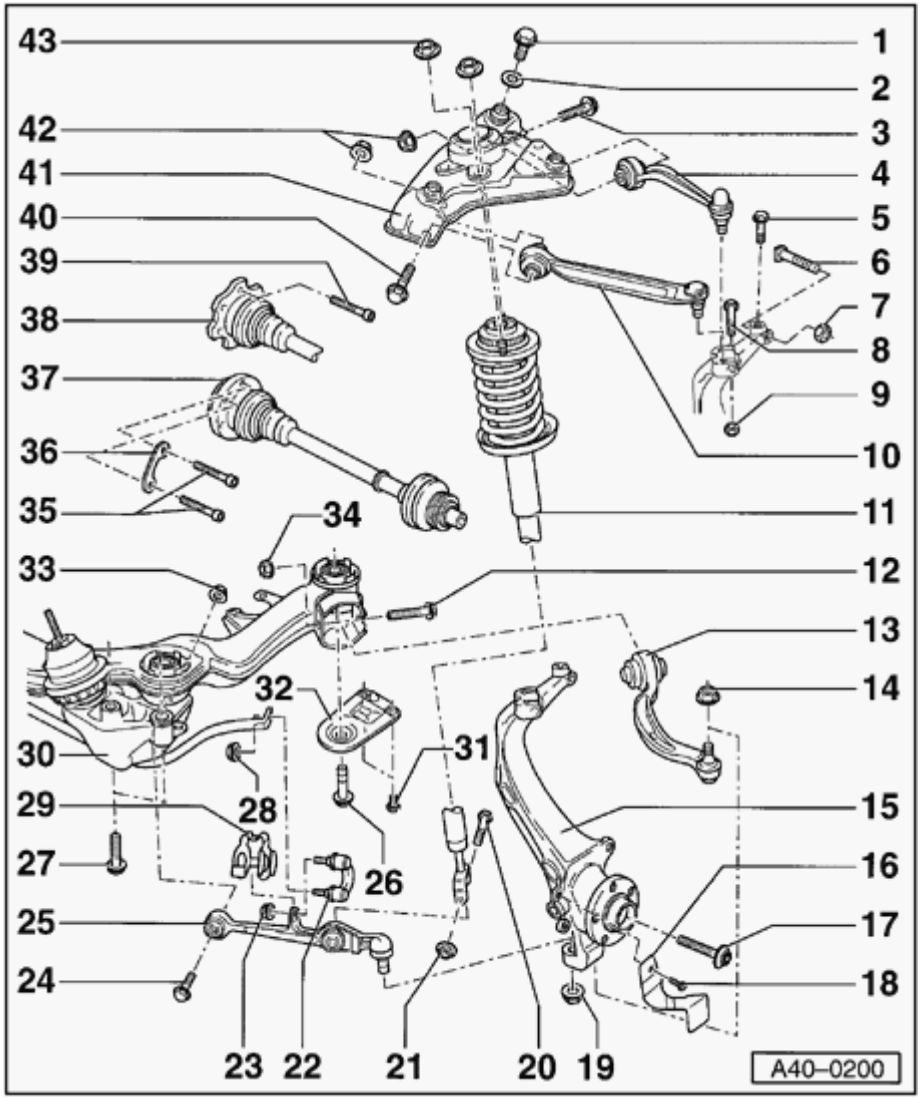
29 - Clamp

- Always replace
- Attached onto lower track control link - 25 -

30 - Subframe

- Removing and installing on vehicles with headlight range control ⇒ page 40-14
- Removing and installing ⇒ page 40-77
- Replacing bushing ⇒ page 40-86

40-7



31 - Bolt M8 x 25

Note different tightening torques ⇒ Fig. 3 :

- 25 Nm (18 ft lb)
- 75 Nm (55 ft lb)

32 - Support for subframe

33 - Self-locking nut

- Always replace
- 80 Nm (59 ft lb) + 1/4-turn (90°)

34 - Self-locking nut

- Always replace
- 90 Nm (66 ft lb) + 1/4-turn (90°)

35 - Socket-head bolts

- M8 x 48: 40 Nm (30 ft lb)
- M10 x 48: 80 Nm (59 ft lb)

36 - Spacer plate

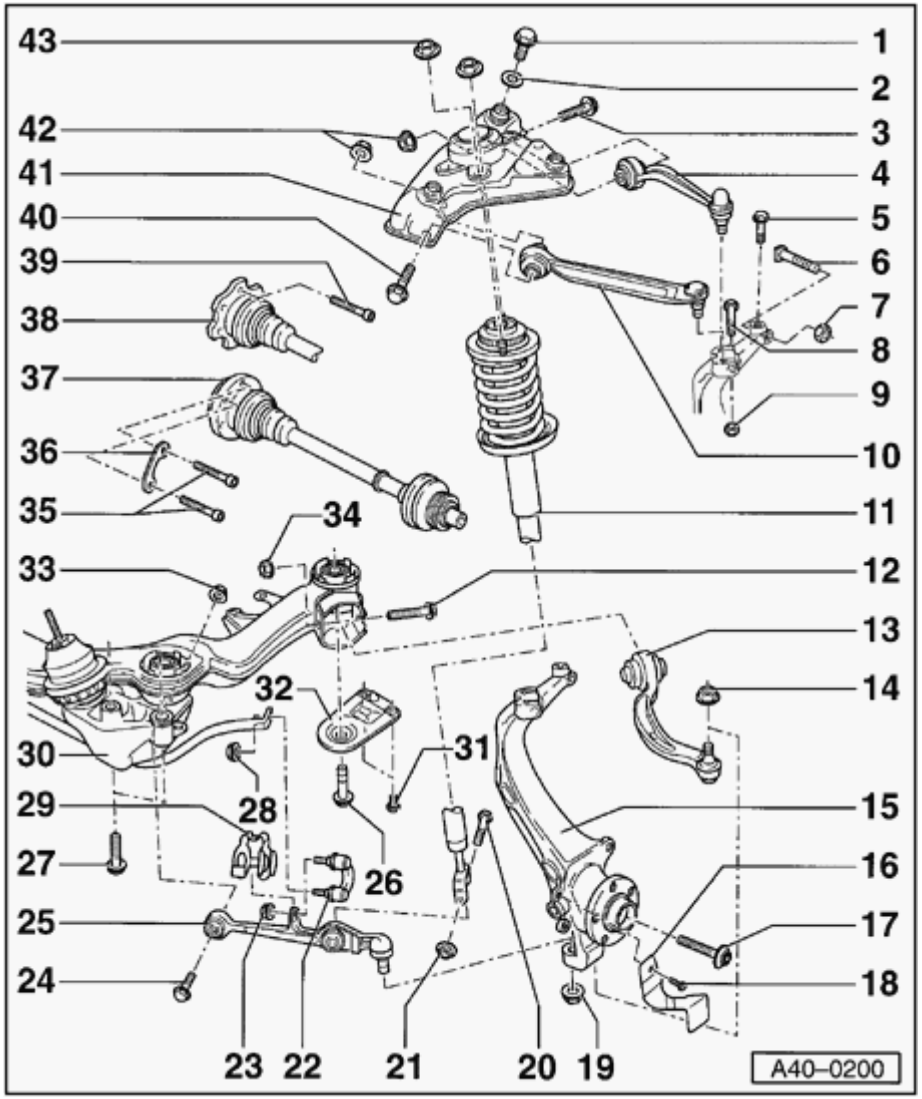
37 - Drive axle with Constant Velocity (CV) joint

- Removing and installing ⇒ page 40-17
- Servicing ⇒ page 40-20

38 - Drive axle with triple-rotor joint

♦ Servicing ⇒ page 40-29

40-8



39 - 12-point socket-head bolt M10 x 20

- 80 Nm (59 ft lb)
- For vehicles with triple-rotor joint

40 - Bolt

- Always replace

Note different lengths:

- With steel mounting bracket: M10 x 60
- With aluminum mounting bracket: M10 x 62

41 - Mounting bracket

- Removing and installing ⇒ page 40-68
- Aluminum bracket m.y. 1998 ➢
- Note changes to wheel alignment ⇒ pages 44-15 and ⇒ Page 44-16
- Do not mix steel and aluminum brackets

42 - Self-locking nut

- Always replace
- 50 Nm (37 ft lb) + 1/4-turn (90°)

43 - Self-locking flanged nut

- Always replace
- 20 Nm (15 ft lb)

40-9

As of chassis number 8DTA 321 912, stop plates were installed as end stops for vehicles with sport suspension.

Note:

Do not remove the stop plates.

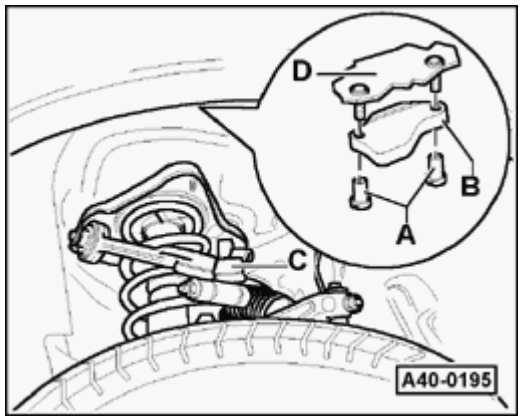


Fig. 1 Stop plates

A - Caps

B - Stop plate

C - Rear upper link

D - Bodywork

From m.y. 1997 ➢, buffer stops are installed at the rear upper links.

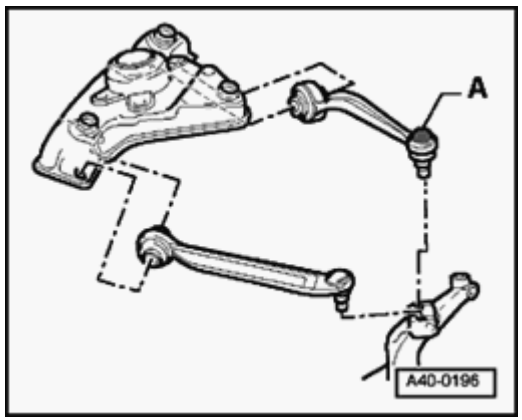


Fig. 2 Buffer stop

Rear upper link with buffer stop -A-

Note:

When replacing a rear upper link on a vehicle without a stop plate, always install the new version of the link.

CAUTION!

- ***Upper links without buffer stops are installed on vehicles with stop plates.***
- ***Do not remove the stop plate.***

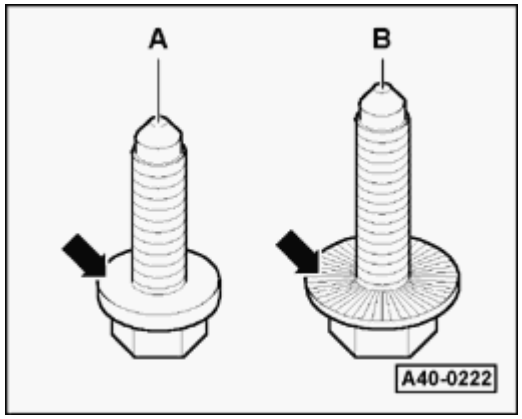
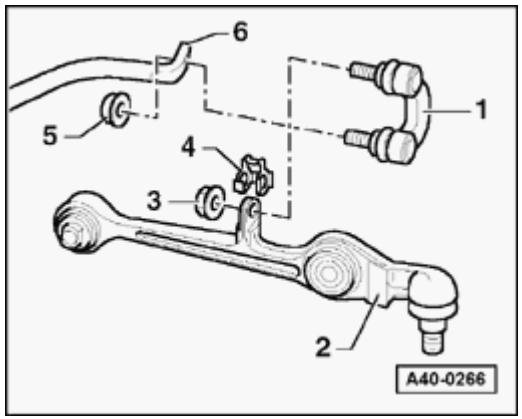


Fig. 3 Note different tightening torques

Only ribbed bolts are installed from m.y. 1998 ➢; this bolt can also be installed on older models.

- Bolt -A- not ribbed (arrow) tightening torque: 25 Nm (18 ft lb)
- Bolt -B- ribbed (arrow) tightening torque: 75 Nm (55 ft lb)

Running change from connecting link with ball joint to connecting link with rubber bushing (m.y. 1999 ➢)



➢ Connecting link with ball joint

1 - Connecting link with ball joint

2 - Lower track control link

3 - Self-locking hex nut

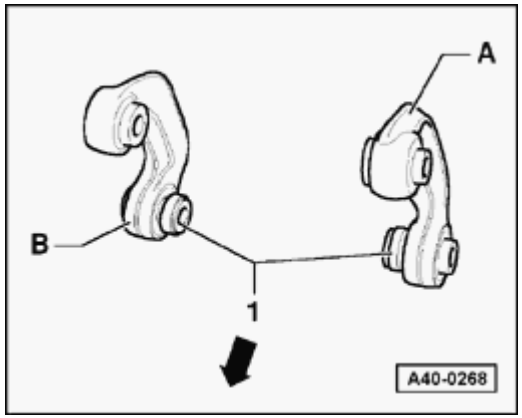
40 Nm (30 ft lb) + 90°

4 - Clip

5 - Self-locking nut

100 Nm (74 ft lb)

6 - Stabilzer bar



Connecting link with rubber bushing

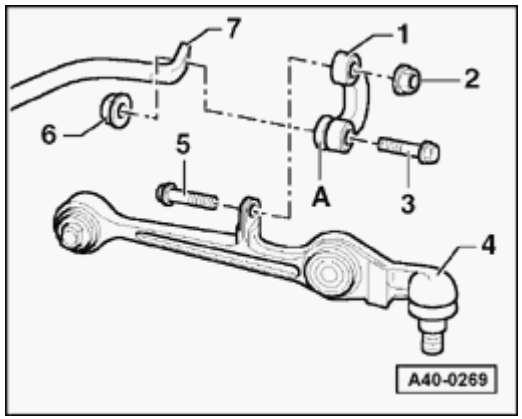
Connecting link -A- for left side of vehicle.

- Arrow on connecting link points in direction of travel

Permanently installed spacer -1- at connecting link must be installed at stabilizer bar.

Connecting link -B- for right side of vehicle.

- Arrow on connecting link points in direction of travel
- Arrow points in direction of travel



Bonded rubber bushings can only be turned a limited amount. Therefore only tighten bolted connections at the suspension links when the vehicle is standing on the ground.

1 - Connecting link with rubber bushing

2 - Self-locking hex nut

40 Nm + 90°

3 - Hex bolt

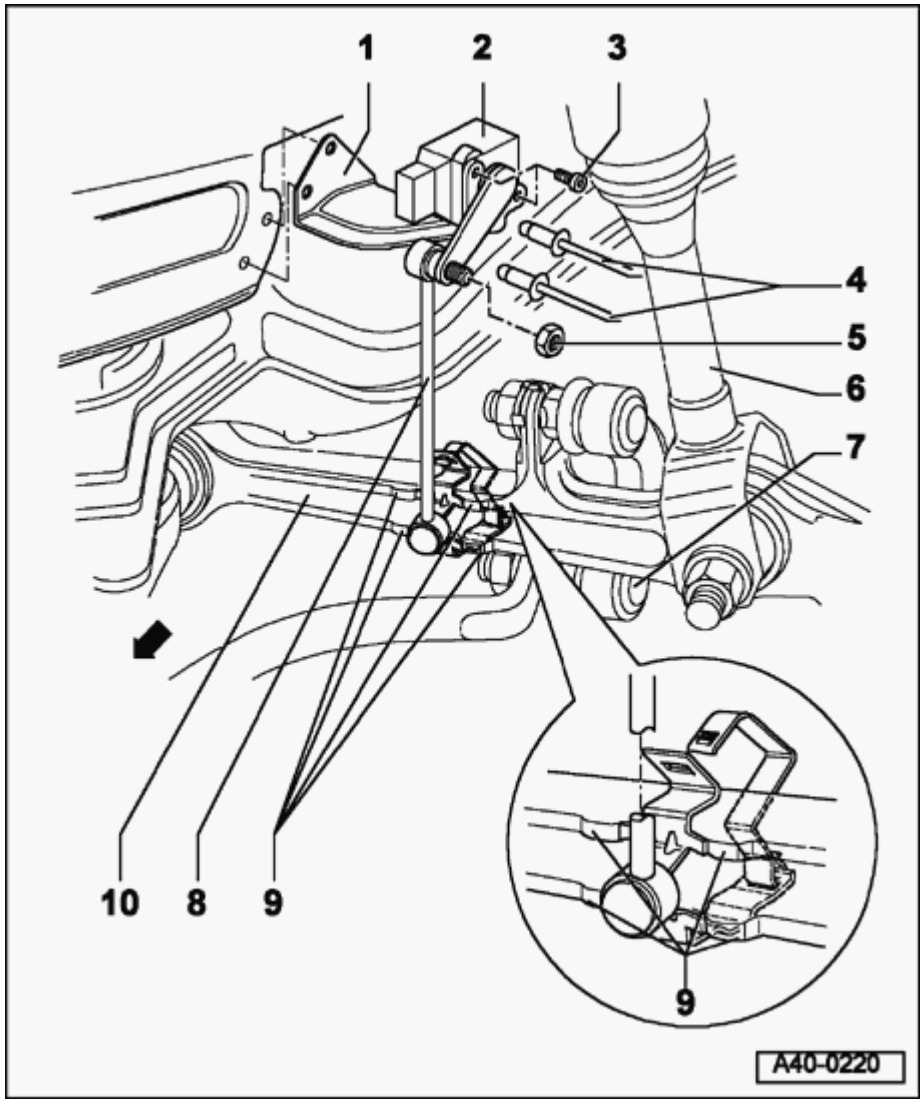
4 - Lower track control link

5 - Hex bolt

6 - Self-locking hex nut

40 Nm (30 ft lb) + 90°

7 - Stabilizer bar



Headlight range adjuster, removing and installing

Through m.y. 1998 on vehicles with xenon headlights, a headlight range adjuster may be installed in the left headlight.

Arrow points in direction of travel.

1 - Mounting plate

2 - Level sensor

3 - Bolts

- 4 Nm +1/-0 Nm (35 in. lb +9/-0 in. lb)

4 - Pop rivets (2x steel)

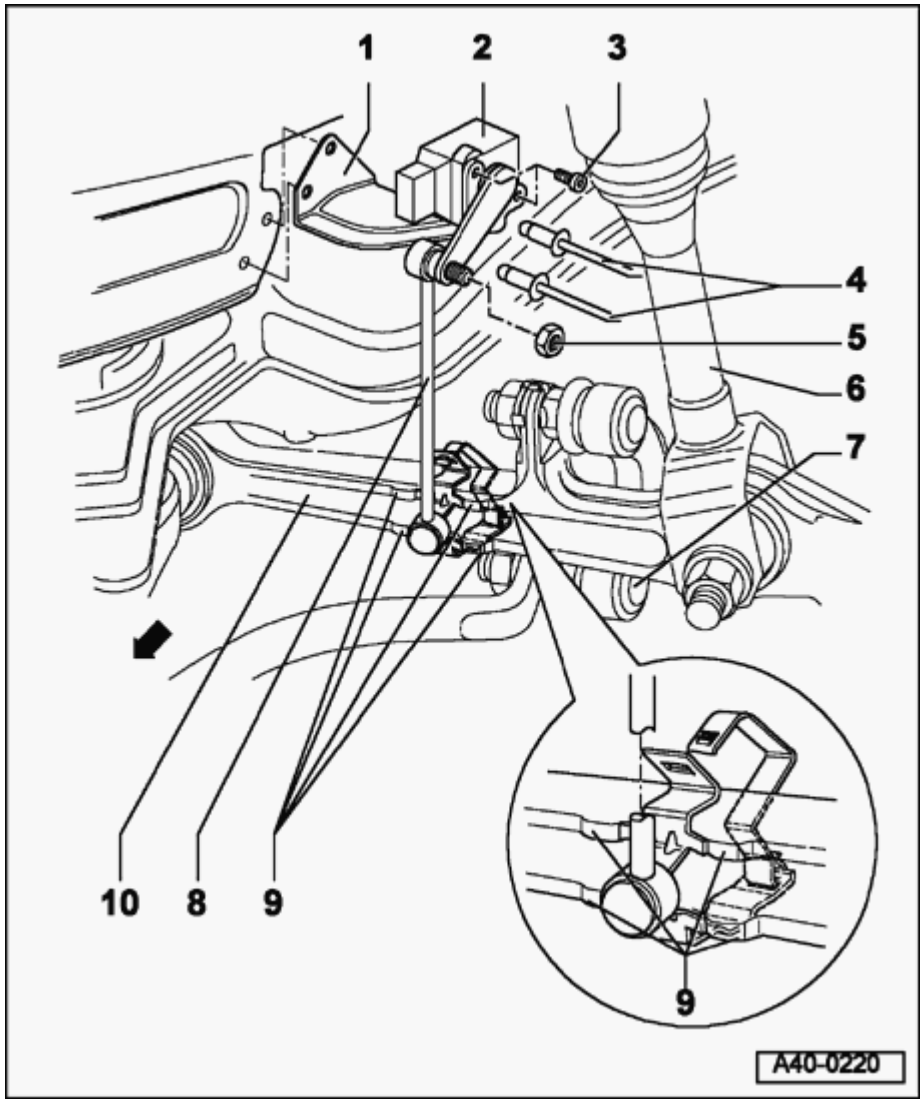
- 4.8 mm diameter

5 - Nut

- 3 Nm +1/-0 Nm (27 in. lb +9/-0 in. lb)
- ⇒ Note, page 40-16

6 - Shock absorber

7 - Connecting link



8 - Rod for headlight range adjuster

9 - Protrusions

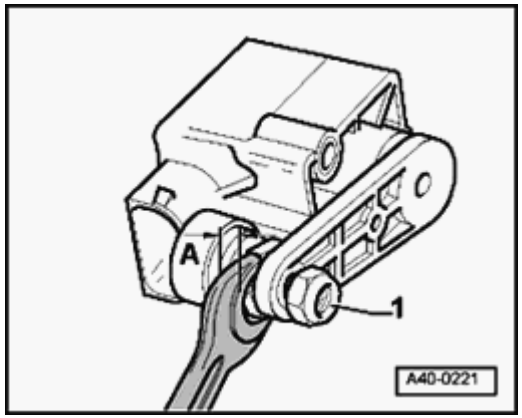
- Position clamp between two protrusions

10 - Lower track control link

When removing and installing the lower track control link, the clamp must be removed

Note:

Attach the rod for headlight range adjuster to the level sensor, using a 10 mm open end wrench no thicker than dimension -A- to prevent damaging the seal.



- Dimension -A-: 4 mm (0.157 in.)
- Nut -1- tightening torque: 3 Nm +1/-0 Nm (27 in. lb +9/-0 in. lb)

- Using pliers, secure rod for headlight range adjuster to lower track control link between two protrusions

When installing the headlight range adjuster, make sure that the arm for the level sensor and the rod for the headlight range adjuster are correctly aligned to each other.

Notes:

- *Rod for headlight range adjuster must be vertical.*
- *Level sensor arm must point downward and forward.*

Front drive axles, removing and installing

WARNING!

- ***Do not re-use any fasteners that are worn or deformed in normal use.***

- ***Some fasteners are designed to be used only once, and are unreliable and may fail if used a second time. This includes, but is not limited to, nuts, bolts, washers, circlips and cotter pins. Always follow the recommendations in this manual-replace these fasteners with new parts where indicated, and any other time it is deemed necessary by inspection.***

Removing

- Remove wheel trim.

  On light-alloy wheels use puller in vehicle tool kit to remove trim cap

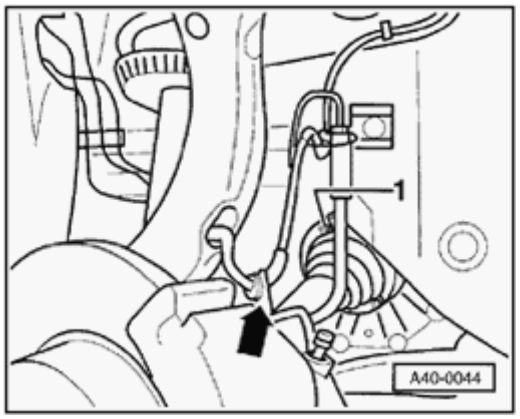
- Remove collar bolt for drive axle.

WARNING!

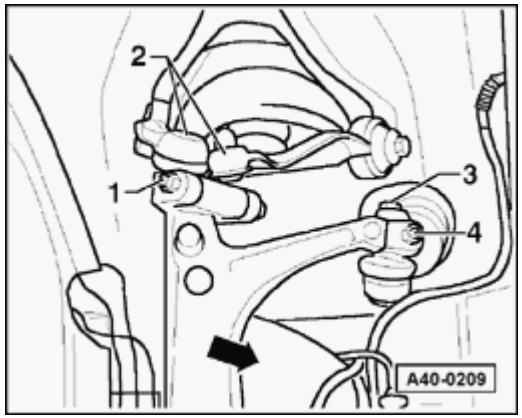
The vehicle must be standing on its wheels

when loosening or tightening the collar bolt for the drive axle (item - 17 -, page ⇒ Page 40-4). Otherwise the risk of an accident exists.

- Remove wheel.



- Remove socket-head bolts -1- and disconnect drive axle from drive flange on transmission.
- Remove ABS wheel speed sensor wiring from retainer on brake caliper (arrow).
- Pull ABS wheel speed sensor out from wheel bearing housing slightly.



- Remove nut -1-, remove bolt and disconnect both links -2- upward.

CAUTION!

- ***Do not use a chisel (or similar) to widen the slots in the wheel bearing housing.***
- ***Do not loosen bolts -3- and -4-. Otherwise, the wheel alignment must be checked.***

- Swing wheel bearing housing aside in direction of arrow.
- Remove drive axle.

Installing

- Install drive axle into wheel bearing housing and bolt it to drive flange on transmission.

- Install both upper links and tighten nut to 40 Nm (30 ft lb).

  When tightening, press upper links downward as far as possible

- Fully tighten bolts connecting drive axle to drive flange on transmission.

  - M8 bolts: 40 Nm (30 ft lb)

  - M10 bolts: 80 Nm (59 ft lb)

- Push ABS wheel speed sensor into wheel bearing housing up to stop and insert sensor wiring into retainer on brake caliper.

- Install wheel.

- Install and tighten new bolt for drive axle.

  - M14 bolt: 115 Nm (85 ft lb) + 1/2-turn (180

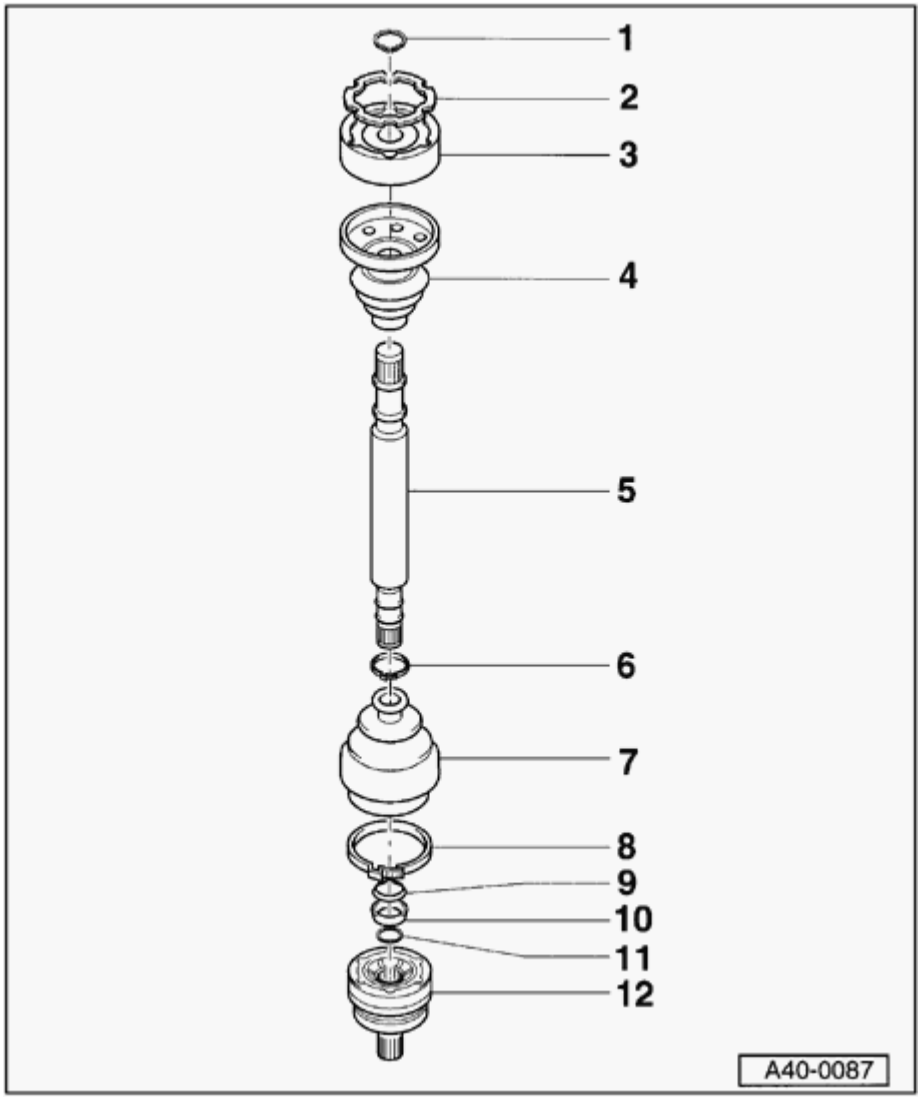
(180 °)

- M16 bolt: 190 Nm (140 ft lb) + 1/2-turn (180 °)

WARNING!

The vehicle must be standing on its wheels when loosening or tightening the collar bolt for the drive axle (item - 17 -, page ⇒ Page 40-4). Otherwise the risk of an accident exists.

40-20



Drive axle with inner Constant Velocity (CV) joint, servicing

Constant velocity (CV) joints are packed with grease G 000 603.

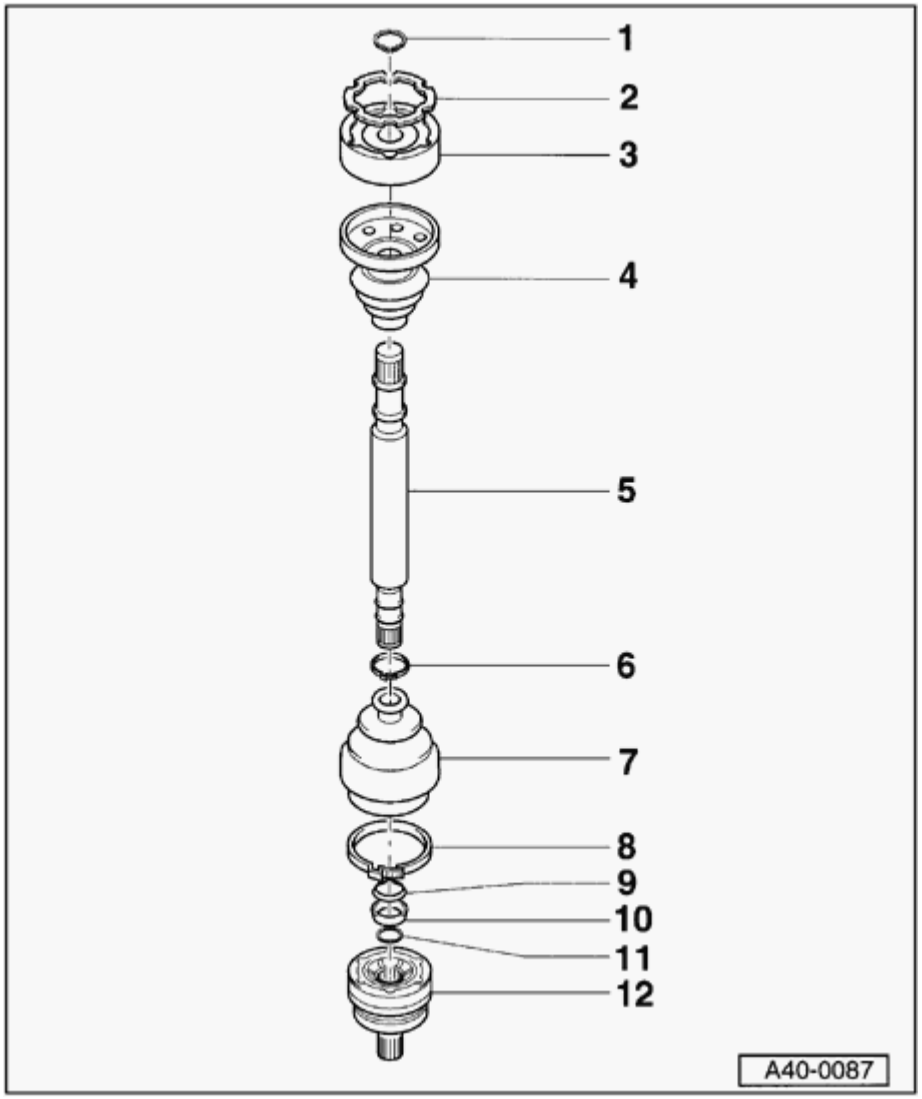
Outer CV joints

Outer joint dia.	Total grease required	Proportions:	
		Joint	Boot
88 mm (3.5 in.)	100 g (3.5 oz.)	50 g (1.8 oz)	50 g (1.8 oz)
98 mm (3.9 in.)	120 g (4.2 oz.)	80 g (2.8 oz.)	40 g (1.4 oz.)

Inner CV joints

Inner joint dia.	Total grease required	Proportions:	
		Joint	Boot
100 mm (3.9 in.)	110 g (3.8 oz.)	55 g (1.9 oz)	55 g (1.9 oz)
108 mm (4.3 in.)	120 g (4.2 oz.)	35 g (1.2 oz.)	85 g (3.0 oz.)
Re-grease the joint, if necessary, when replacing the CV joint boot.			

40-21



1 - Circlip

- Always replace
- Use VW161a circlip pliers for removing and installing

2 - Gasket

- To replace, remove protective backing and stick onto joint

3 - Inner CV joint

- Outer diameter 100 or 108 mm (3.9 or 4.3 in.), depending on engine/transmission application
- Replace only complete joint
- Pressing off ⇒ page 40-26
- Pressing on ⇒ page 40-27
- Greasing ⇒ page 40-20

4 - CV joint boot with cap

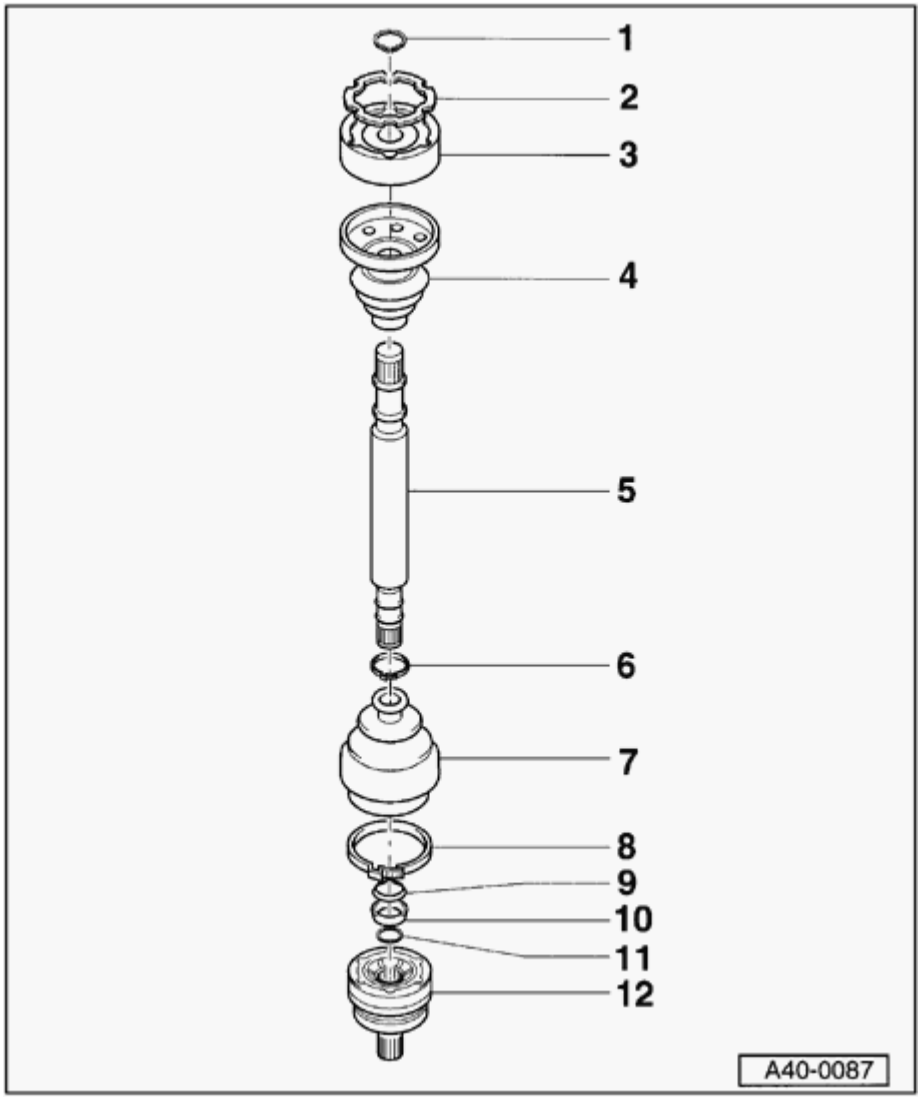
- With vent hole
- Check for splits and abrasions
- Use arbor to drive off
- Seal cap end with D-3 before attaching to CV joint

5 - Axle shaft (tubular shaft)

6 - Clamp

- Always replace

40-22



7 - CV joint boot

- Check for splits and abrasions
- Ventilate joint boot before tightening small clamp ⇒ page 40-28
- As of chassis no. 8DTA 279 794 revised boots are installed on 88 mm outer joint ⇒ page 40-25

8 - Clamp

- Always replace
- Tightening ⇒ pages 40-25 and ⇒ Page 40-28

9 - Spring washer

- Larger dia. (concave side) contacts spacer washer
- Installation position ⇒ page 40-27

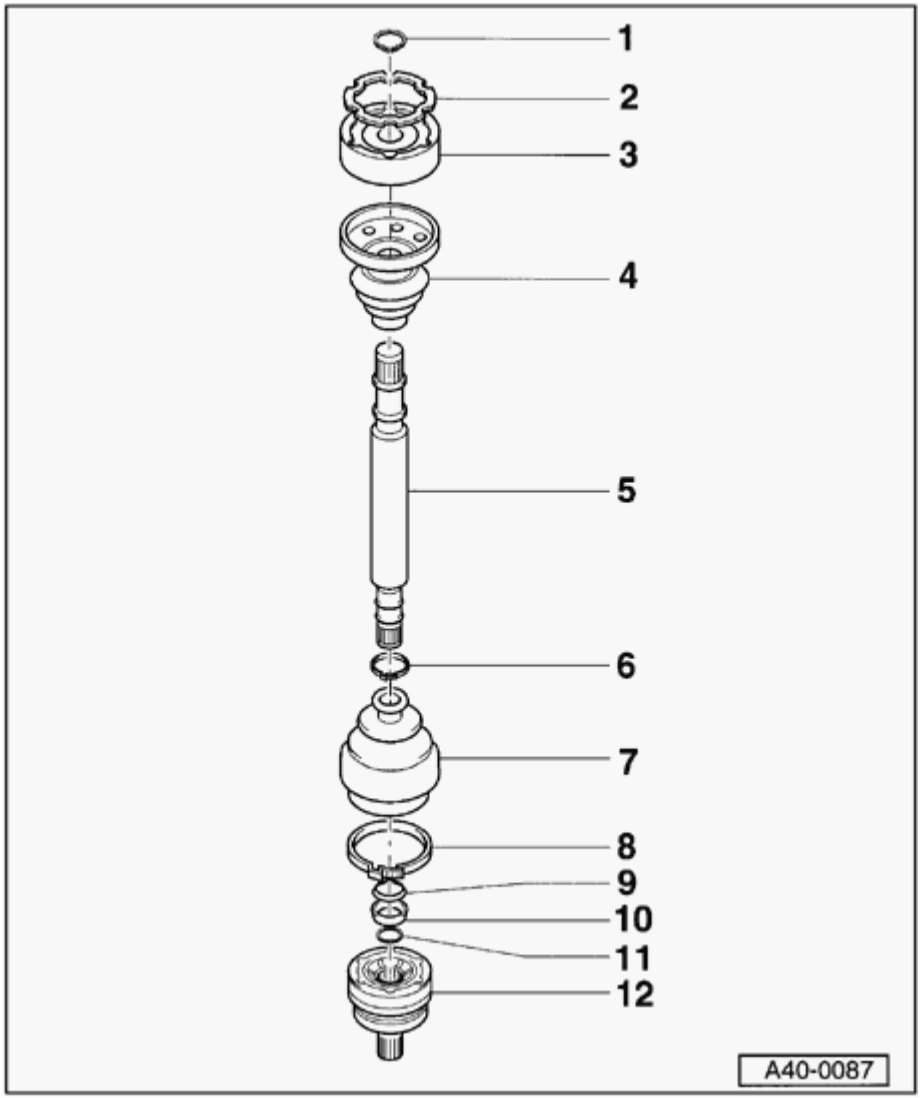
10 - Spacer washer

- Installation position ⇒ page 40-27

11 - Circlip

- Always replace
- Insert into groove in shaft

40-23



12 - Outer CV joint

- Outer diameter 88 or 98 mm (3.5 or 3.9 in.), depending on engine/transmission application
- Replace only complete joint
- Pressing off ⇒ page 40-26
- Installing: Using plastic hammer, drive joint onto shaft until circlip locks in place in annular groove of CV joint
- Greasing ⇒ page 40-20

Plastic CV joint boots

Special tools, test equipment and auxiliary items

VAG1275	3207	VW411
VW401/402	VW412	VW522
40-204 A	VAG1682	3340

On the Audi A4, new plastic CV joint boots are installed on the 88 mm outer joint (wheel end) of the front axle.

The plastic boots can be identified because they are made out of a harder material than the rubber boots.

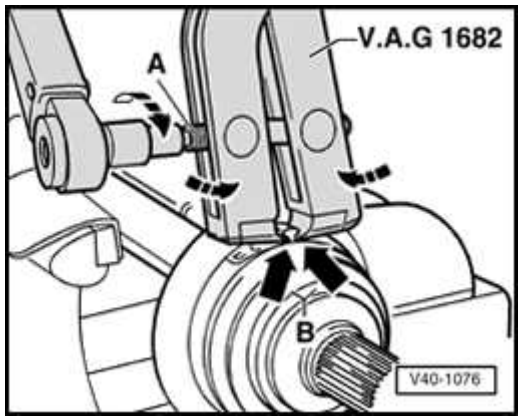
The harder plastic boots necessitates the use of stainless steel clamps for attaching the boots.

40-25

Clamps used on rubber joint boots are tightened using VAG1275 pliers.

The following instructions are only for stainless steel clamps

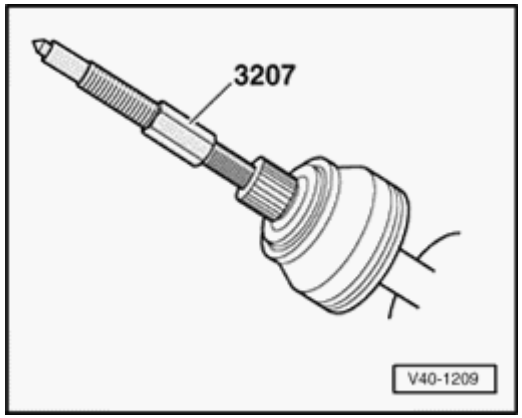
Tightening clamp on outer CV joint



- Position VAG1682 pliers as shown in illustration. Make sure jaws of pliers seat in grooves of clamp (arrows -B-).
- Using torque wrench, turn spindle -A- and tighten clamp.
  - Do not cant pliers
  - Tightening torque: 20 Nm (15 ft lb)

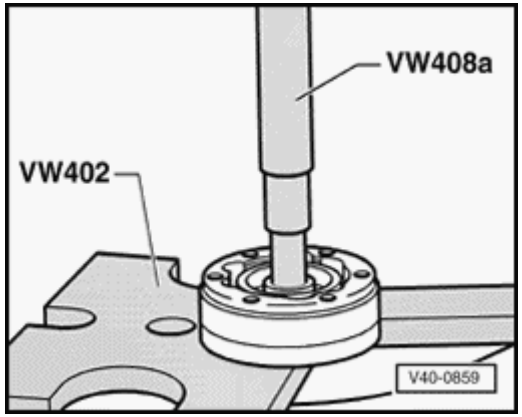
Notes:

- *Use a torque wrench with a range of 5-50 Nm (approx. 4-40 ft lb) (e.g. VAG1331).*
- *Make sure spindle -A- turns freely. If necessary lubricate the spindle threads with MOS2 grease.*
- *If the spindle does not turn freely (e.g. spindle is dirty), the clamping force required on the clamp will not be achieved even though the correct tightening torque is indicated.*



Pressing off outer constant velocity joint

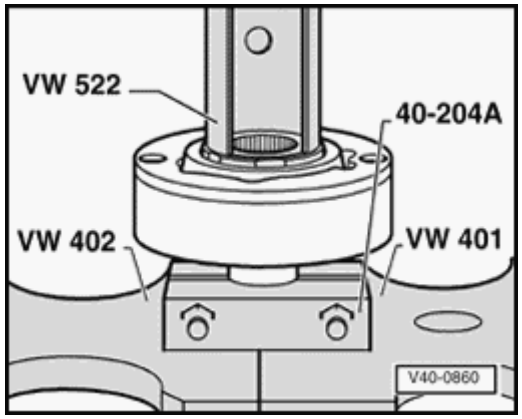
- Clamp drive axle in vise using protective jaw covers.
- Remove clamp and slide back boot.
- Thread 3207 pressure spindle (with M16 and M14 threaded sections) into end of constant velocity joint until joint is pressed off of axle shaft.



Pressing off inner constant velocity joint

Notes:

- *First use a drift to drive off the boot.*
- *Support the ball hub.*

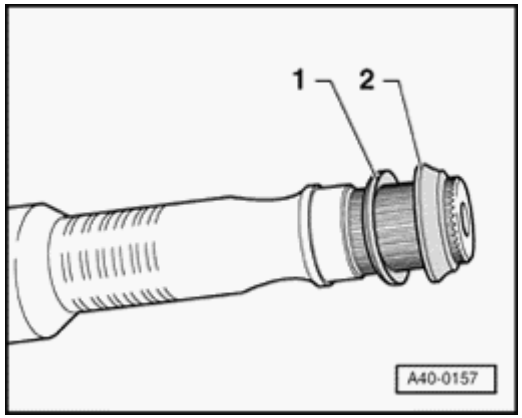


Pressing on inner constant velocity joint

- Press joint on up to stop.
- Install circlip.

Note:

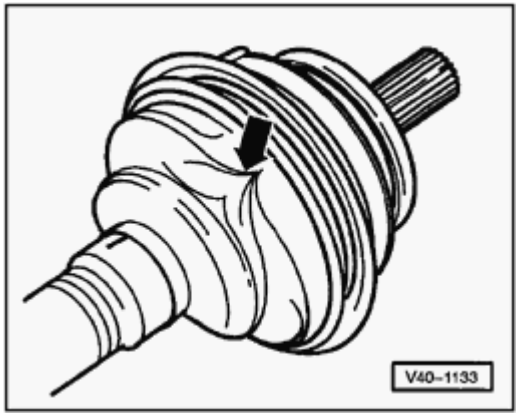
The chamfer on the inner diameter of the ball hub (splines) must face the contact shoulder on the drive axle.



Installation positions of spacer washer and spring washer (outer CV joint end)

1 - Spring washer

2 - Spacer washer (plastic)

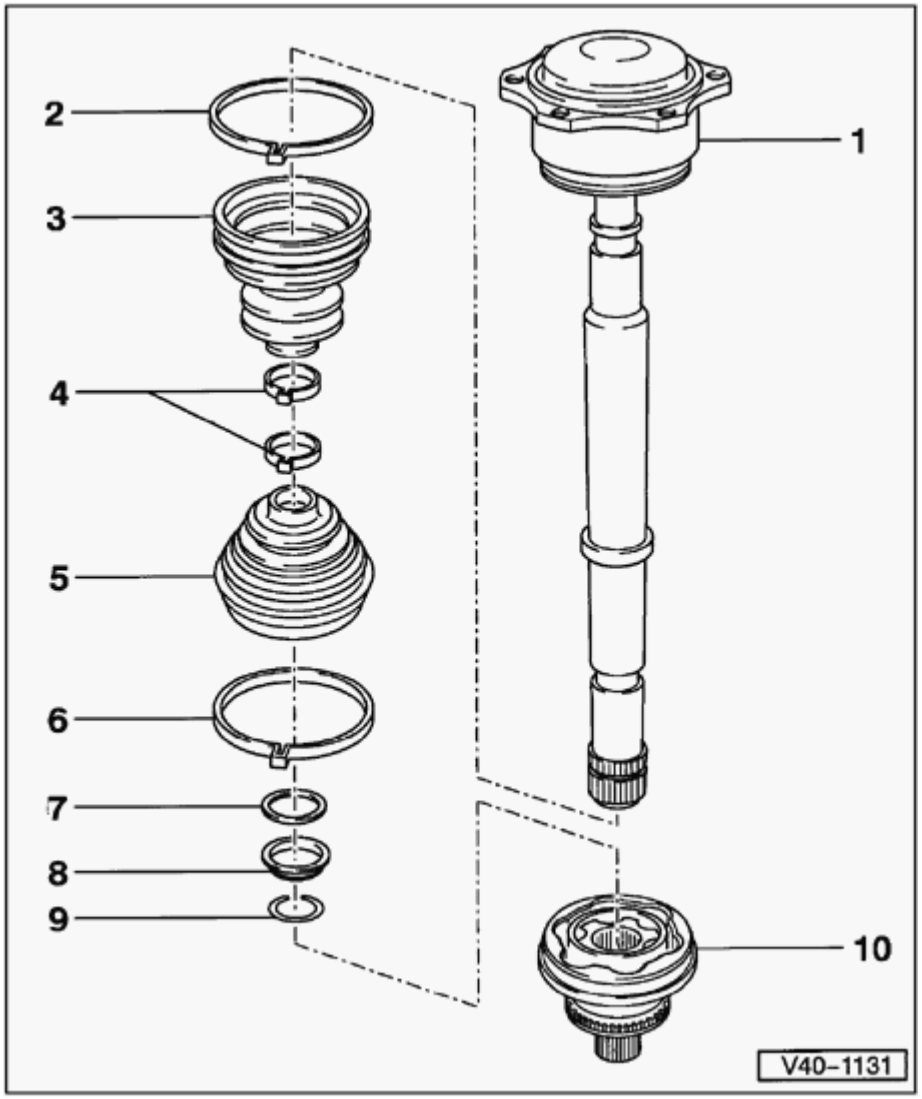


Ventilating joint boot

Only for rubber joint boot.

The joint boot is often pressed in while being installed on the body of the joint. This creates a vacuum inside the boot which draws it inward with a fold (arrow) while driving. Therefore after installing, lift the boot at the small diameter end to equalize pressure.

40-29



Drive axle with triple-rotor joint, servicing

Grease quantity and type

Note:

Pack the outer constant velocity joints with the following greases:

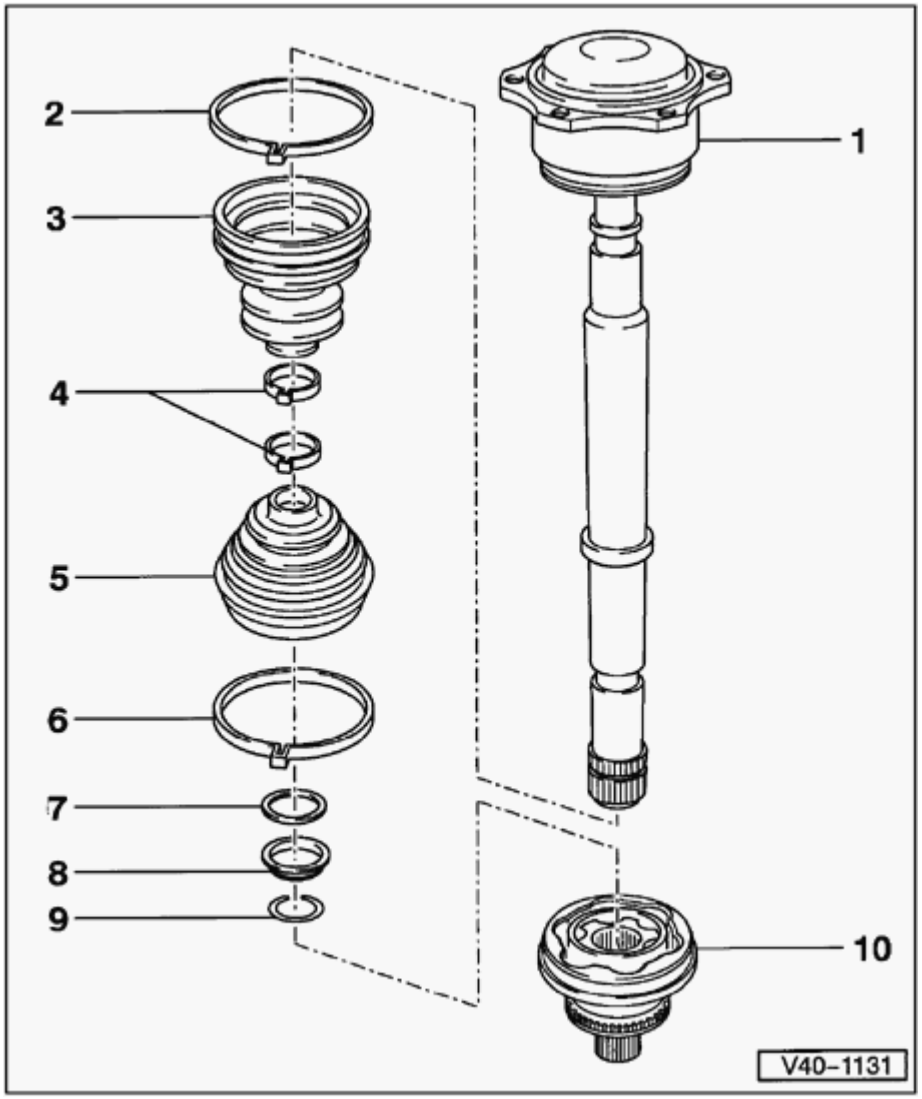
- *88 mm joint diameter: G 000 603*
- *98 mm joint diameter: G 000 633*

CAUTION!

Part numbers are listed here for reference only. Always check with your Parts department for the latest information.

Outer joint dia.	Total amt. of grease	Proportions	
		Joint	Boot
88 mm (3.5 in.)	100 g (3.5 oz.)	50 g (1.8 oz.)	50 g (1.8 oz.)
98 mm (3.9 in.)	120 g (4.2 oz.)	80 g (2.8 oz.)	40 g (1.4 oz.)

40-30



1 - Drive axle with triple-rotor joint

- Replacement part supplied with boot and filled with grease

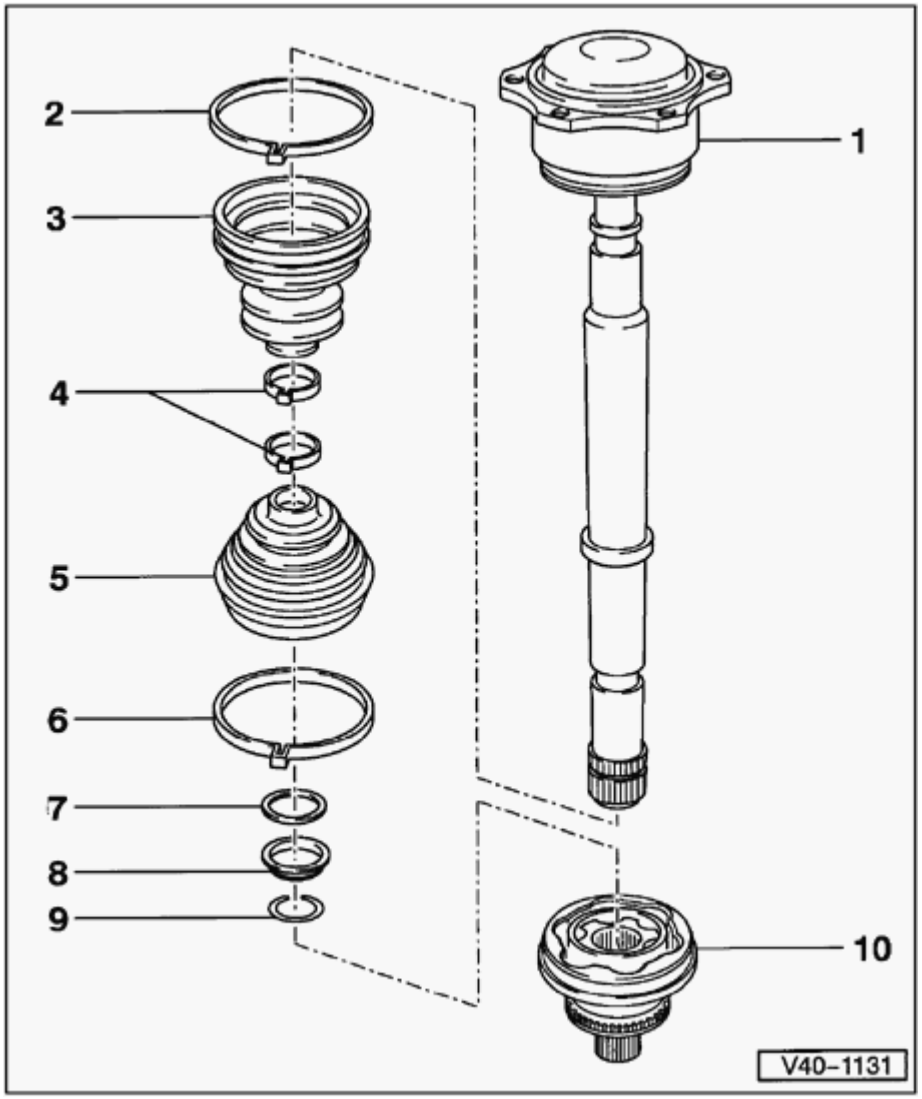
2 - Clamp

- Always replace
- Tightening ⇒ Fig.1

3 - Boot for inner triple-rotor joint

- Check for splits and abrasions
- Only 32 mm diameter shafts have replaceable inner boots
- To replace, drive off outer constant velocity joint
- When slipping onto profiled shaft, apply small quantity of grease to bead on profiled shaft and use VAG1474/5 wedge (part of VAG1474) to carefully position boot ⇒ Fig. 4

40-31



4 - Clamps

- Always replace
- Tightening ⇒ Fig.1

5 - Boot for outer constant velocity joint

- Check for splits and abrasions
- Before tightening clamp, briefly lift end of boot to equalize pressure (ventilate) ⇒ Fig. 3
- As of chassis no. 8DTA 279 794, new boots were introduced for 88 mm outer joint (wheel end) ⇒ Fig. 1

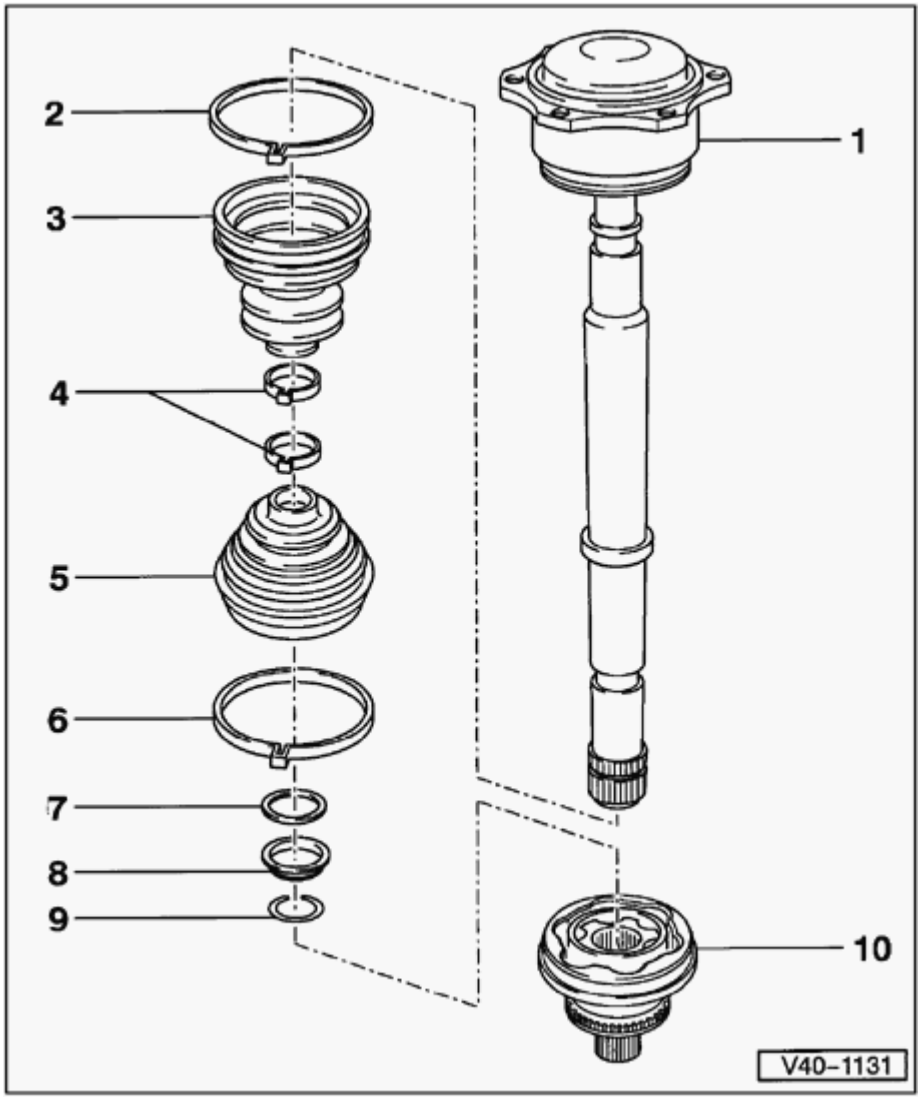
6 - Clamp

- Always replace
- Tightening ⇒ Fig. 1

7 - Spring washer

- Installation position ⇒ Fig. 5

40-32



8 - Spacer washer (plastic)

- Installation position ⇒ Fig. 5

9 - Circlip

- Always replace
- Install into circular groove on axle shaft before installing joint
- Not visible with joint installed

10 - Outer constant velocity joint

- Outer diameter 88 or 98 mm, depending on engine/transmission combination
- Replace as complete part only
- Pressing off ⇒ Fig. 2 (with hollow shaft ⇒ page 40-36)
- Installing: use plastic hammer to drive onto axle shaft until circlip engages
- Greasing ⇒ page 40-29

40-33

Clamps used on rubber joint boots are tightened using VAG1275 pliers

Instructions in Fig. ⇒ 1 are only for stainless steel clamps

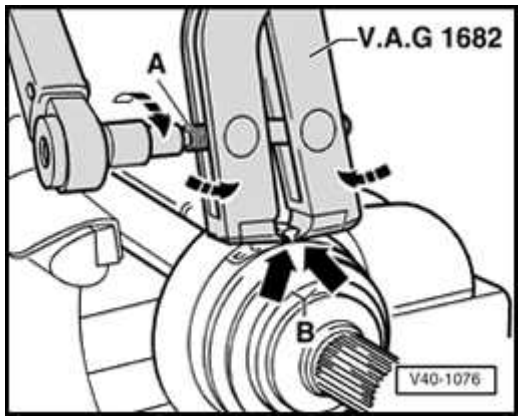


Fig. 1 Tightening clamp on outer CV joint

- Position VAG1682 pliers as shown in illustration. Make sure jaws of pliers seat in grooves of clamp (arrows -B-).
- Using torque wrench, turn spindle -A- and tighten clamp.
  - Do not cant pliers
  - Tightening torque: 20 Nm (15 ft lb)

Notes:

- *Use a torque wrench with a range of 5-50 Nm (approx. 4-40 ft lb) (e.g. VAG1331).*
- *Make sure spindle -A- turns freely. If necessary lubricate the spindle threads with MOS2 grease.*
- *If the spindle does not turn freely (e.g. spindle is dirty), the clamping force required on the clamp will not be achieved even though the correct tightening torque is indicated.*

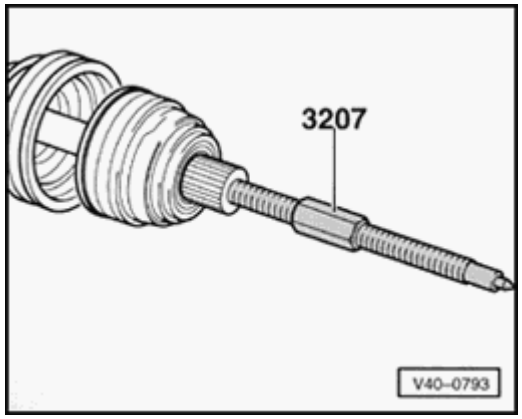


Fig. 2 Pressing off outer constant velocity joint

- Clamp drive axle in vise using protective jaw covers.
- Remove large clamp and slide back boot.
- Thread special tool into end of constant velocity joint until joint is pressed off of axle shaft.

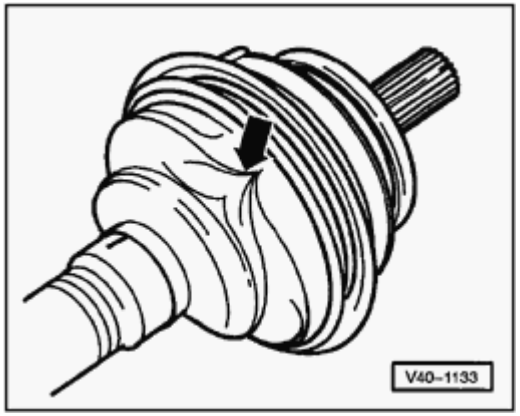


Fig. 3 Ventilating joint boot

Only for rubber joint boot

The joint boot is often pressed in while being installed on the body of the joint. This creates a vacuum inside the boot which draws it inward with a fold (arrow) while driving. Therefore after installing, lift the boot at the small diameter end to equalize pressure.

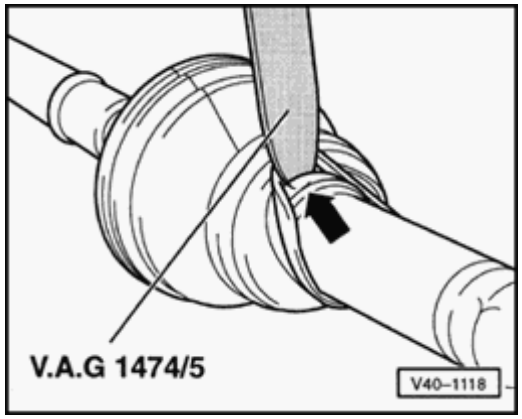


Fig. 4 Positioning boot over bead of profiled shaft

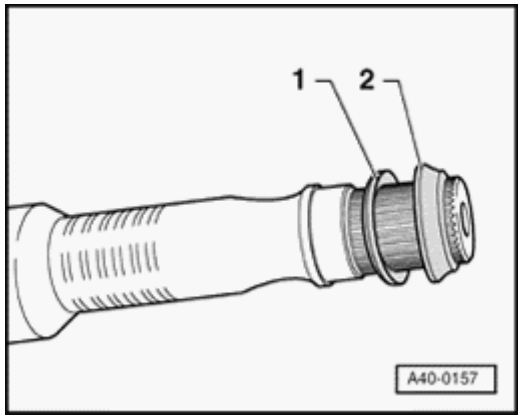


Fig. 5 Installation positions of spacer washer and spring washer (outer CV joint end)

1 - Spring washer

2 - Spacer washer (plastic)

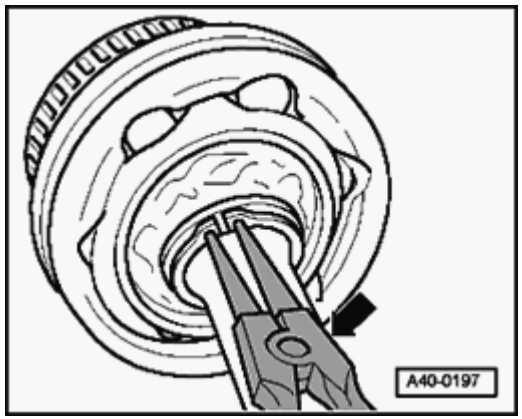
Axle shaft (hollow shaft), servicing

The axle shaft can be identified by a circlip on the axle shaft at the outer joint

Removing outer joint

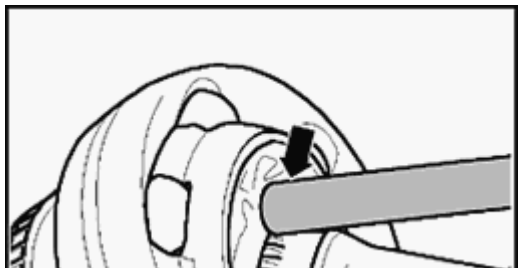
- Clamp drive axle in vise using protective jaw covers.

- Remove clamps (large and small) and slide back boot.



- Remove circlip using pointed pliers (arrow) and push back spring washer and spacer washer.

Driving off outer joint

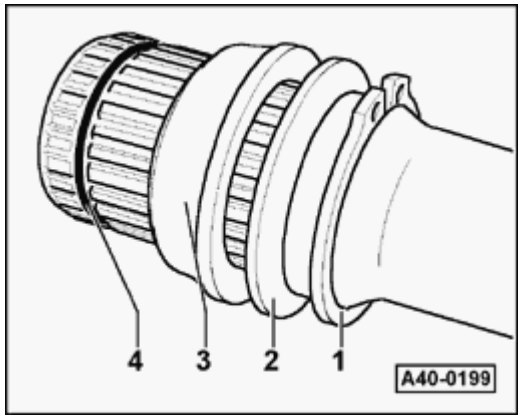


- Only drive off using drift (brass or copper) at ball hub (arrow).

40-37

Assembly

- When slipping boot onto profiled shaft, apply small quantity of grease to bead on profiled shaft and carefully position boot.



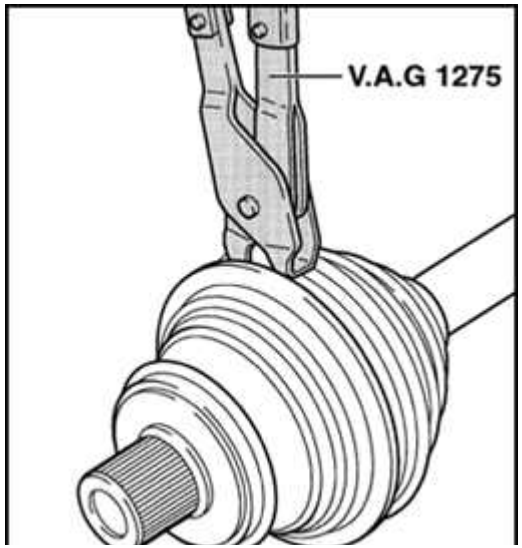
1 - Circlip

2 - Dished washer

3 - Spacer washer (plastic)

4 - Circlip (snap ring)

- Use plastic headed hammer to drive joint onto shaft until circlip engages.



Tightening clamp

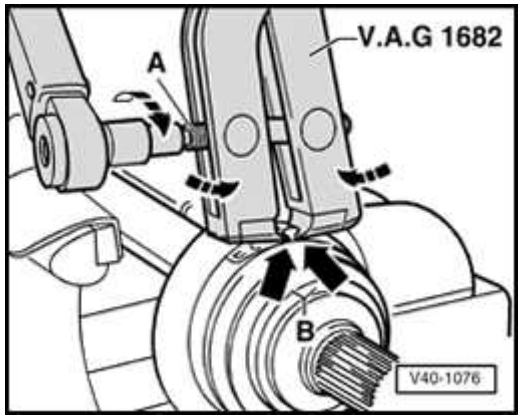
Plastic CV joint boots

On the Audi A4, new plastic CV joint boots are installed on the 88 mm outer joint (wheel end) of the front axle.

The plastic boots can be identified because they are made out of a harder material than the rubber boots.

The harder plastic boots necessitates the use of stainless steel clamps for attaching the boots.

Instructions for stainless steel clamps only



Tightening clamp on outer CV joint

- Position VAG1682 pliers as shown in illustration. Make sure jaws of pliers seat in grooves of clamp (arrows -B-).
- Using torque wrench, turn spindle -A- and tighten clamp.
  - Do not cant pliers
  - Tightening torque: 20 Nm (15 ft lb)

Notes:

- *Use a torque wrench with a range of 5-50 Nm (approx. 4-40 ft lb) (e.g. VAG1331).*
- *Make sure spindle -A- turns freely. If necessary lubricate the spindle threads with MOS2 grease.*
- *If the spindle does not turn freely (e.g. spindle is dirty), the clamping*

force required on the clamp will not be achieved even though the correct tightening torque is indicated.

40-39

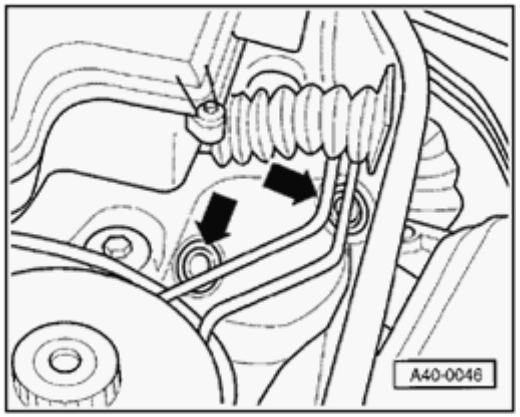
Suspension strut, removing and installing

Removing

- Remove wheel trim.

  On light alloy wheels use puller in vehicle tool kit to remove trim cap.

- Remove wheels.



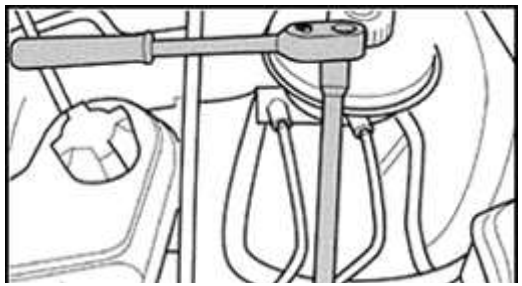
- Remove rubber grommets in plenum chamber (arrows).

Note:

For vehicles with headlight range control ⇒ page 40-14 .

CAUTION!

To prevent damage to the joint of the lower links from excessive rebound, support using VAG1383-A (engine and transmission lifter).

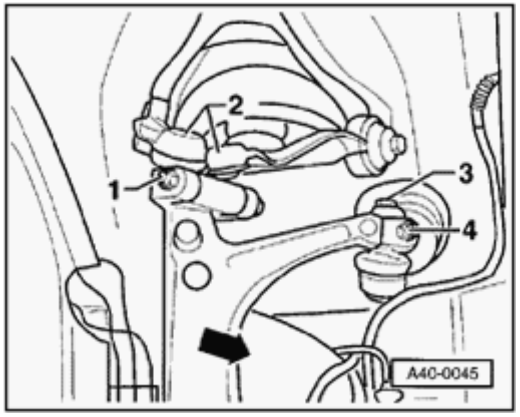


- Remove suspension strut nuts -1- from body.
- Detach ABS wheel speed sensor wire from bracket at brake caliper.

CAUTION!

Be careful not to damage the surface of the brake lines.

40-40



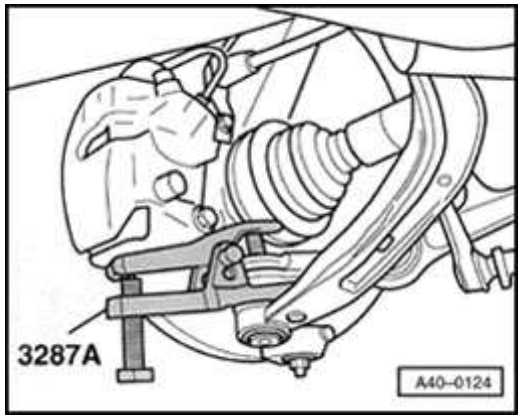
- Remove nut -1- and bolt, then pull both links -2- upward and out.
- Swivel wheel bearing housing aside in direction of arrow.

CAUTION!

- ***Do not use a chisel (or similar) to widen the slots in the wheel bearing housing.***
- ***Do not loosen bolts -3- and -4-. Otherwise, the wheel alignment must be checked.***

The guide link must be removed from the wheel bearing housing in order to be able to remove the bolt mounting the suspension strut to the track control link.

- If necessary, counterhold ball joint using 4 mm hex wrench.

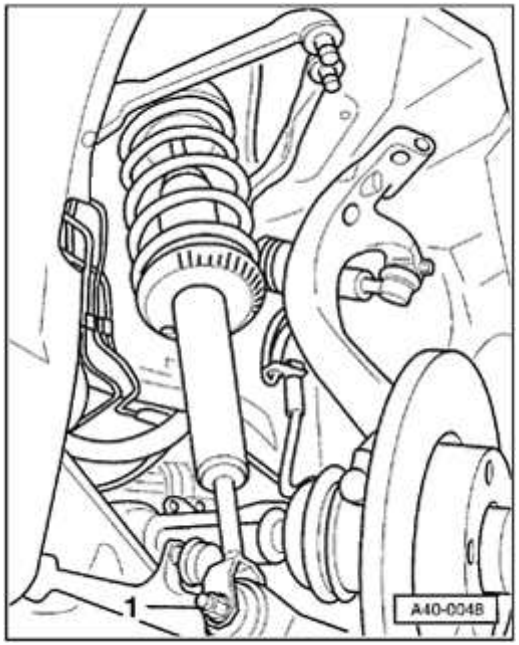


- Unscrew nut for guide link ball joint and press out ball joint.

Note:

Be careful not to damage the boot.

40-41

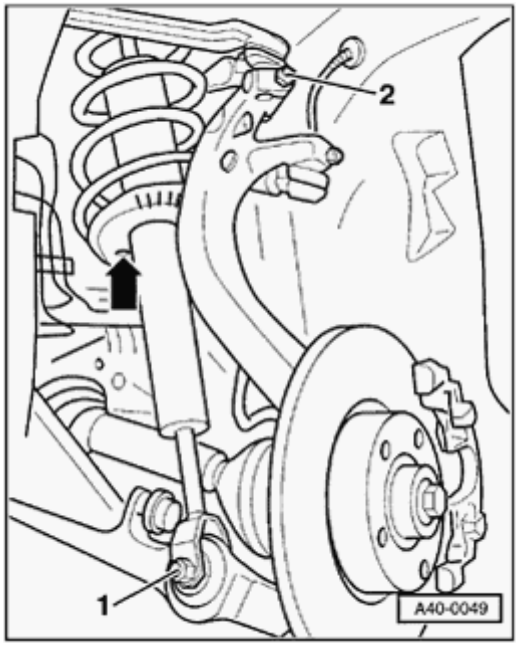


- Remove bolt -1- mounting suspension strut to lower track control link.
- Remove suspension strut downward.

Notes:

- *When removing the suspension strut, make sure that the CV joint boot is not damaged.*
- *Servicing suspension strut* ⇒ *page 40-44* .

40-42



Installing

- Install suspension strut.

- Hole in spring plate (arrow) faces toward middle of vehicle.

CAUTION!

The bonded rubber bushings can only be turned to a limited extent. The bolted connections between the suspension strut and the lower track control links should therefore only be tightened when the vehicle is standing on the ground.

- Bolt suspension strut to track control link and tighten new nut -1-.

  Tightening torque: 90 Nm (66 ft lb)

- Insert both upper control links into wheel bearing housing and tighten new nut -2-.
  - Tightening torque: 40 Nm (30 ft lb)
  - Upper link joint with collar must be pushed onto wheel bearing housing as far as possible when installing.
- Tighten nut at ball joint.
  - Tightening torque: 100 Nm (74 ft lb)
  - If necessary, counterhold ball joint using 4 mm hex wrench

- Insert ABS wheel speed sensor wire into holder at brake caliper.

- Install new nuts for both suspension struts and tighten to 20 Nm (15 ft lb).

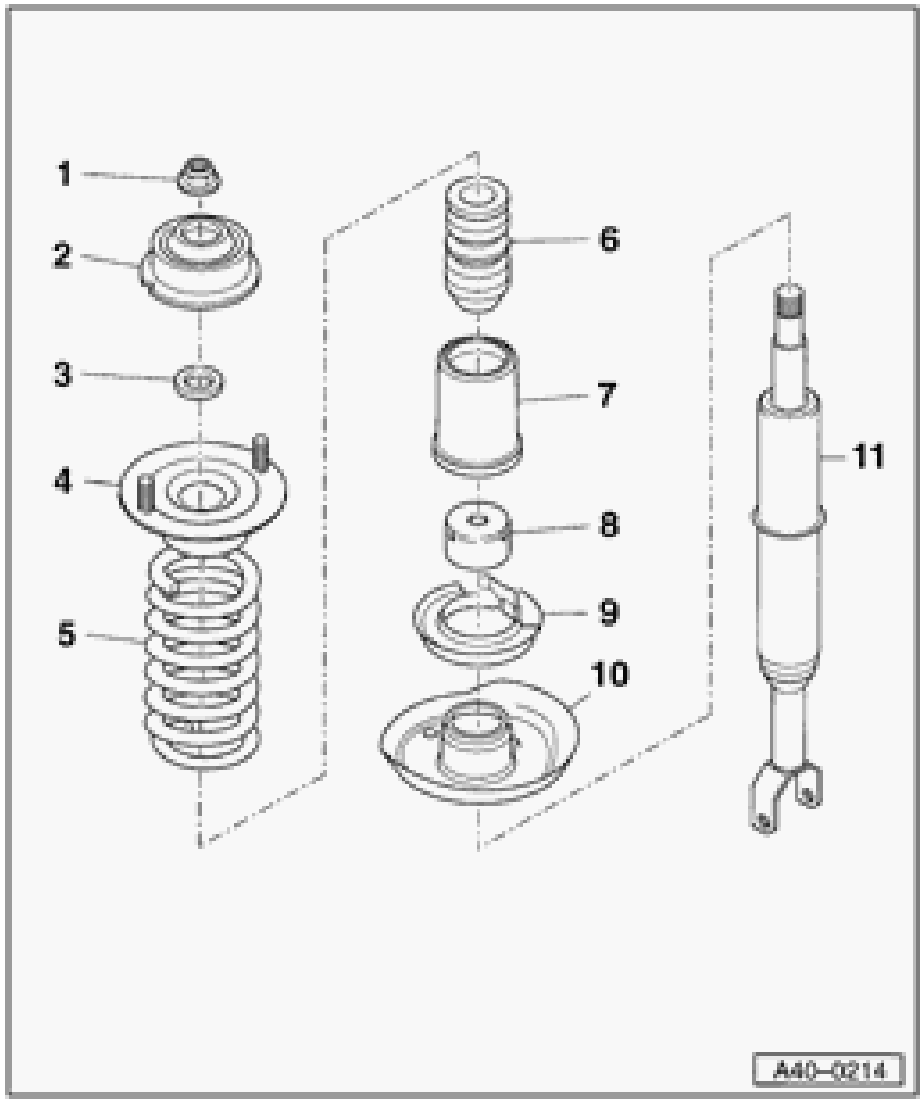
CAUTION!

Be careful not to damage the surface of the brake lines.

- Re-install rubber grommets into plenum chamber.

- Install wheel and tighten bolts to 120 Nm (89 ft lb).

40-44



Suspension strut, servicing

1 - Nut

- Always replace
- 60 Nm (44 ft lb)

2 - Suspension strut mount

3 - Washer

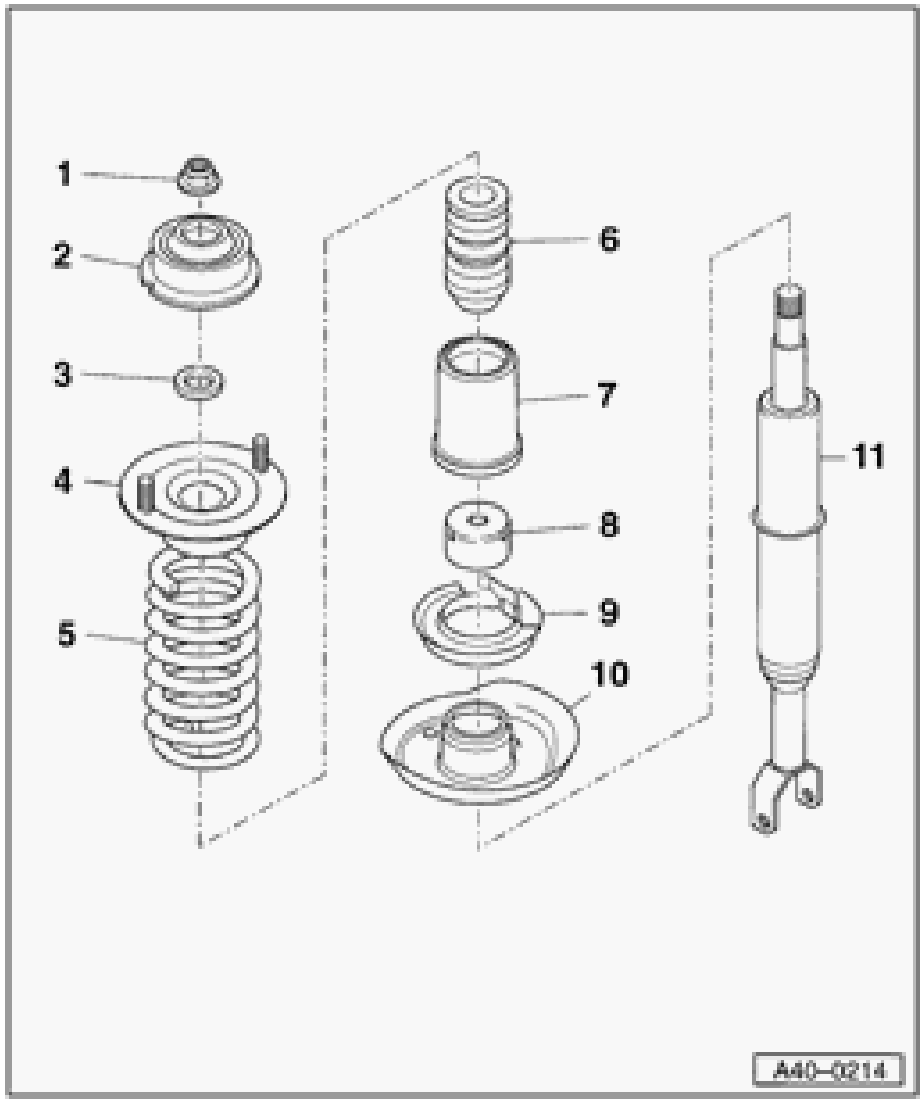
4 - Upper spring plate

- Installation position ⇒ Fig. 8
- Installing ⇒ Fig. 7
- Both steel and aluminium versions
- Do not mix steel and aluminium versions

5 - Coil spring

- Be careful not to damage surface of coil spring
- Observe color coding
- Removing ⇒ Figs. 1 , ⇒ 2 and ⇒ 3
- Installing ⇒ Figs. 6 and ⇒ 9
- Observe different versions, refer to vehicle data label ⇒ page 40-46

40-45



6 - Stop buffer

- Insert into upper spring plate

7 - Protective sleeve

8 - Protective cap

9 - Lower spring base

- Fixed with recess in bead at spring plate

10 - Lower spring plate

- Installation position ⇒ Fig. 5

11 - Shock absorber

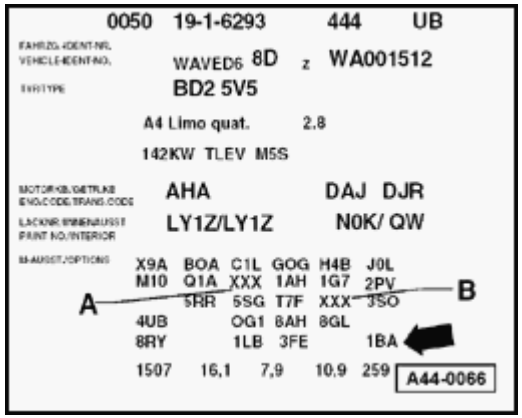
- Replacing ⇒ Fig. 4
- Allocation ⇒ parts catalog microfiche
- Checking shock absorber for leaks and noises ⇒ Special Information, binder

40-46

Information on weight codes (code number)

From model year 1998 ➢, spring/shock assemblies will be classified according to weight codes (code number) so that suspension components can be matched easily.

The spring/shock assemblies installed in the vehicle is indicated by the weight code on the vehicle data label.



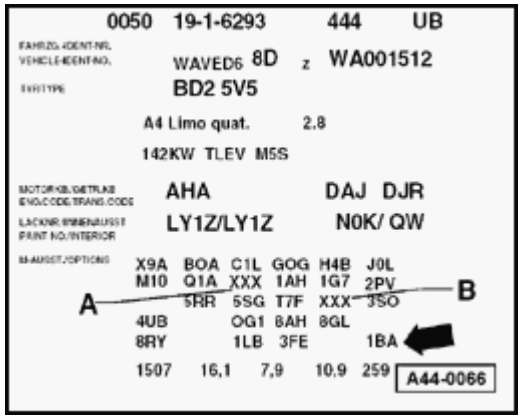
➢ **Example of vehicle data label**

A - Weight code for front suspension

B - Weight code for rear suspension

The vehicle data label is located in the spare wheel well and in the vehicle Maintenance booklet.

The weight codes can be used to identify the correct spring/shock assemblies on the parts catalog microfiche.



The weight code for the different suspension versions is indicated by the arrow in the illustration.

- 1BA: Standard suspension
- 1BE: Sport suspension
- 1BB: Heavy duty suspension (approx. 20 mm or 0.79 in. higher)
- 1BC: Special purpose vehicles
- 1BD: Sport suspension, Audi S4
- 1BH: USA
- 1BT: Heavy duty suspension (approx. 7 mm or 0.28 in. higher)
- 1BP: Heavy duty suspension (ride height same as 1BA but with limited bump)

Special tools, test equipment and auxiliary items

VAG1752/1	VAG1752/2	VAG1752/7
VAG1752/28	3353	

40-48

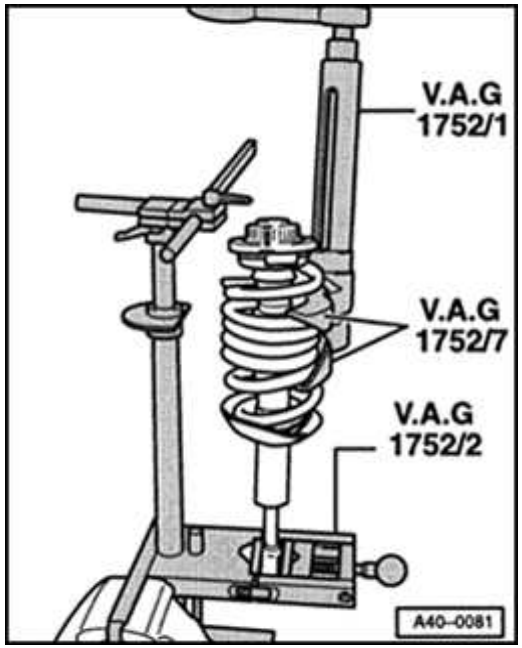


Fig. 1 Removing coil spring

- Clamp VAG1752/2 spring mounting tool in vise.
- Clamp forked end of suspension strut in VAG1752/2 spring mounting tool.

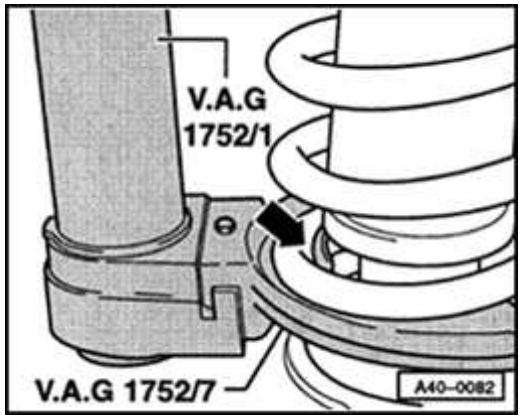


Fig. 2 Removing coil spring, continued

- Using VAG1752/1 tensioning device, compress coil spring until upper spring plate is free.

WARNING!

Make sure coil spring is properly seated in VAG1752/7 spring holder (arrow).

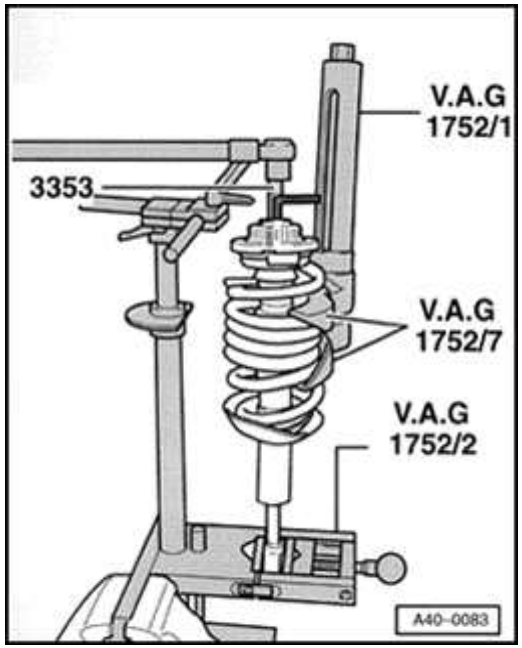


Fig. 3 Removing coil spring, continued

- Remove nut from piston rod (counter-hold with hex wrench).
- Using VAG1752/1 tensioning device, remove components of suspension strut and compressed coil spring.

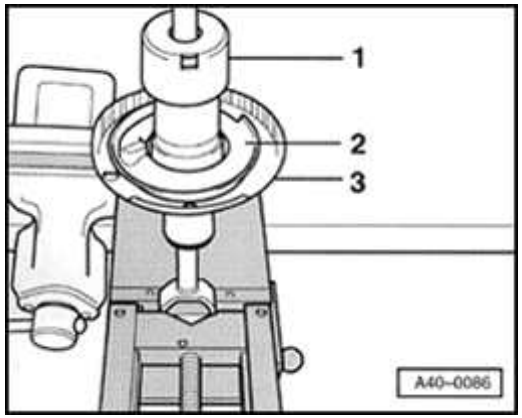


Fig. 4 Replacing shock absorber

The following steps are required to remove the shock absorber:

- Remove protective cap -1- and lower spring base -2-.
- Using plastic hammer, loosen and remove lower spring plate -3-.

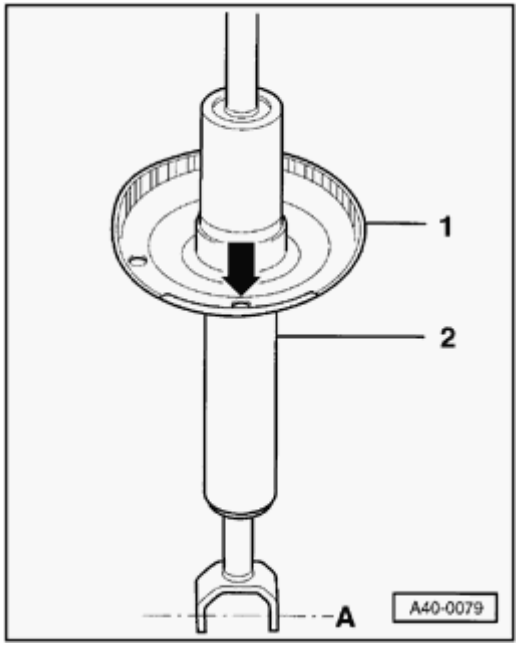


Fig. 5 Installation position of lower spring plate

- Make sure lower spring plate is correctly positioned before installing coil spring:
  - ♦ Hole (arrow) in spring plate -1- should be perpendicular (90 °) to bolt axis -A- of shock absorber -2-
  - ♦ Allowable deviation: ± 2 °

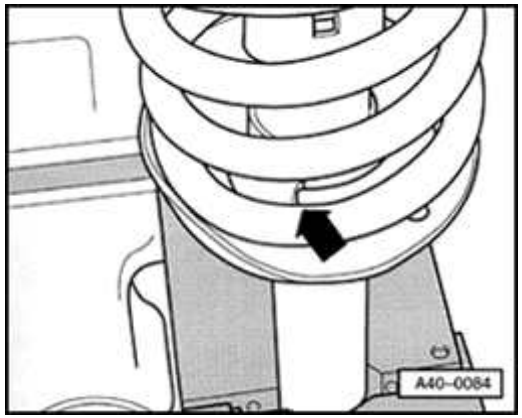


Fig. 6 Installing coil spring

The lower spring support is located by a recess in the spring plate.

- Install protective cap and stop buffer.
- Install coil spring onto lower spring base using VAG1752/1 tensioning device.
  - • End of coil spring must lie against stop (arrow)

40-51

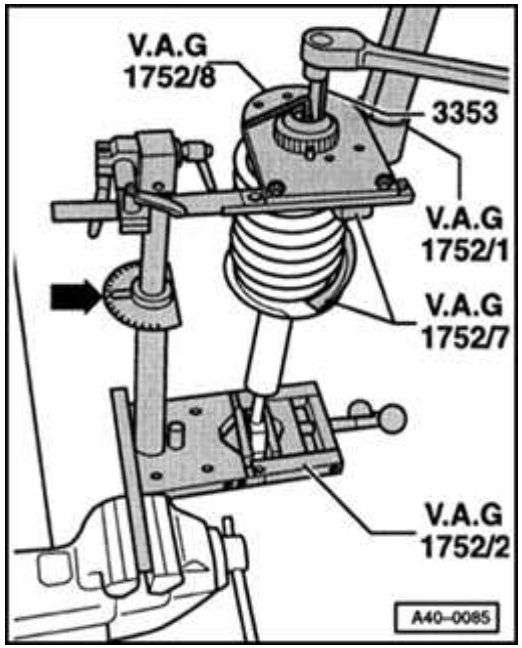


Fig. 7 Installing upper spring plate

- Set angle scale (arrow) on VAG1752/2 spring mounting tool to 0°.
- Install upper spring plate, washer and suspension strut mount.
- Using VAG1752/8 adjustment gauge for struts, position upper spring plate to 11°.

  The 11° position on the adjustment gauge is indicated by "left-front" or "right-front"

The 11° positions on the spring plates are always mirror images on the left and right-hand sides.

Installation position of upper spring plate ⇒ Fig. 8 .

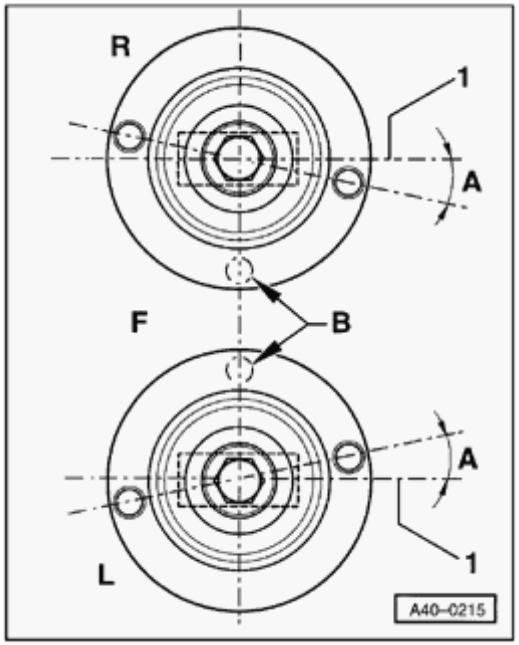


Fig. 8 Installation position of upper spring plate

A - 11° ± 2°

F - Direction of travel

L - Spring plate on left-hand side

R - Spring plate on right-hand side

The studs in upper spring plate are offset 11° to the bolt axis -1- of the forked end of the shock absorber.

Holes -B- in the lower spring plates face the center of the vehicle.

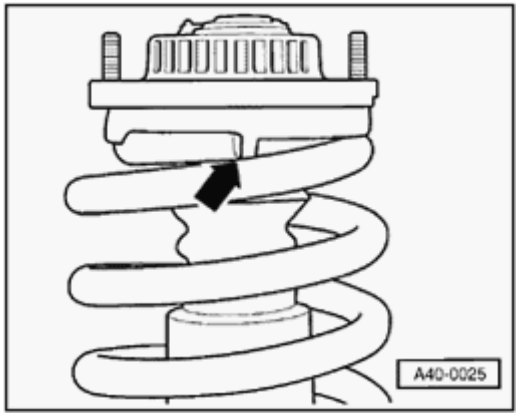


Fig. 9 Installing coil spring

- End of spring must lie against stop on upper spring plate (arrow)

- Install new nut using 3353 specialty socket wrench.

  Tightening torque: 60 Nm (44 ft lb)

- Relieve tension on coil spring.
- Remove VAG1752/8 adjustment gauge for struts.

When installed correctly, the upper and lower spring plates should be parallel to each other.

Wheel bearing housing, removing and installing

Removing

- Remove wheel trim.

  On light alloy wheels use puller in vehicle tool kit to remove trim cap.

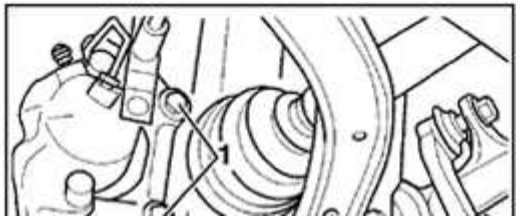
- Remove bolt for drive axle.

WARNING!

The vehicle must be standing on it's wheels when loosening or tightening the bolt for the drive axle. Otherwise the risk of an accident exists.

- Remove wheel and secure brake disc using wheel bolt.

- Detach ABS wheel speed sensor wire from bracket on brake caliper.



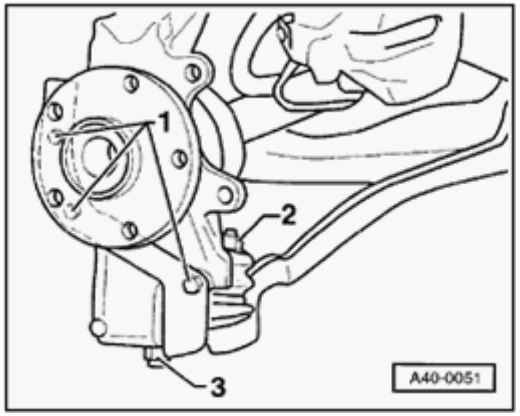
- Remove bolts -1- for brake caliper and remove caliper.

CAUTION!

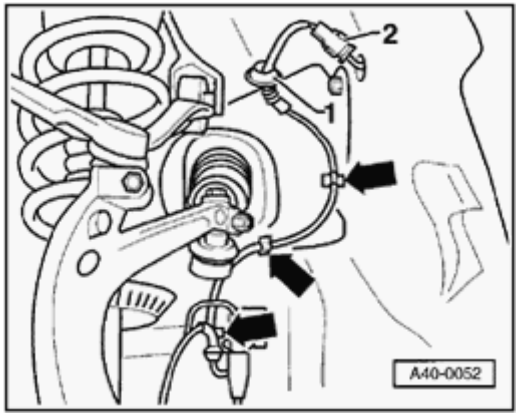
- ***Suspend the brake caliper using a piece of wire. Do not allow the caliper to hang by the brake hose. The unsupported weight can stretch and damage the hose.***
- ***Do not loosen brake hoses or lines.***

- Remove brake disc.

40-55



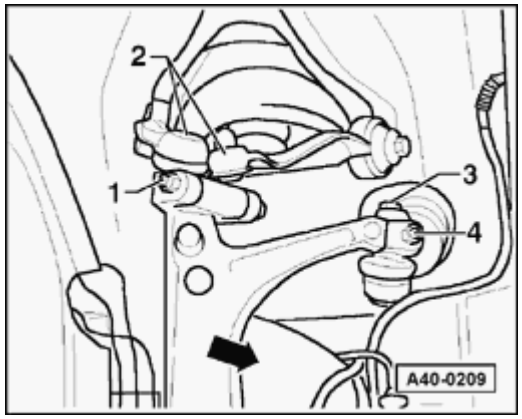
- Remove bolts -1- for brake splash guard.
- Pull ABS wheel speed sensor out of wheel bearing housing.
- Loosen nuts -2- and -3-.



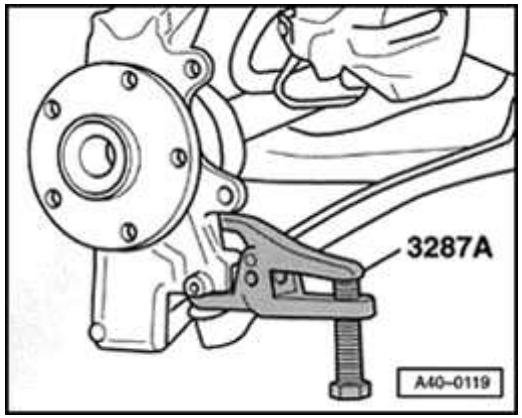
- Pull out rubber grommet -1- and disconnect harness connector -2-.
- Detach ABS wheel speed sensor wiring from retainers (arrows).
- Guide wiring through opening in wheel bearing housing and remove.

  Be careful not to damage the rubber grommet.

40-56



- Remove bolt -3- and nut -4-.
- Disconnect tie rod end.
- Loosen nut from ball joint
  - If necessary, counterhold ball joint using 4 mm hex wrench.



- Press lower guide link ball joint from tapered seat.

  Be careful not to damage the joint boot.

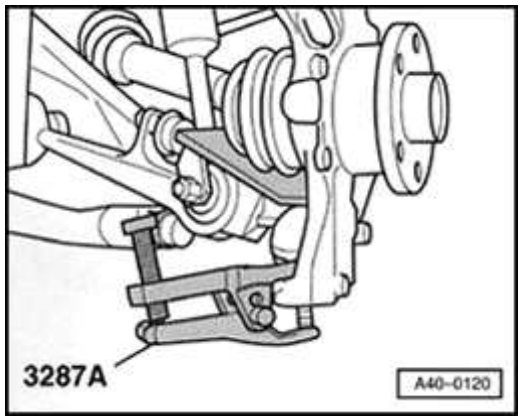
Note:

For vehicles with headlight range control ⇒ page 40-14 .

40-57

Note:

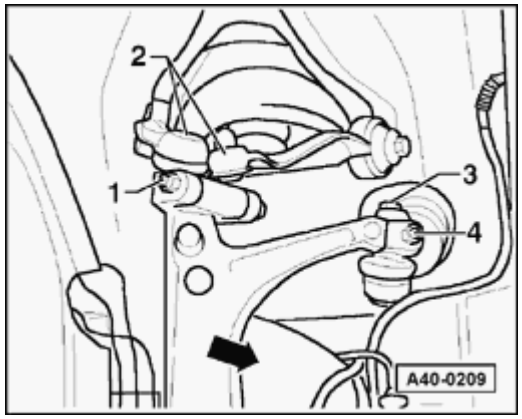
Cover the CV joint boot (e.g. by inserting a piece of leather) to protect it from damage.



- Press lower track control link ball joint from tapered seat.

CAUTION!

For safety reasons, reinstall the flanged nut onto the lower track control link ball joint (approx. 4 turns).



- Remove nut -1- and bolt and remove both links -2- upward.

CAUTION!

Do not use a chisel (or similar) to widen the slots in the wheel bearing housing.

- Swing wheel bearing housing aside in direction of arrow and remove outer CV joint from wheel hub.
- Remove nut from lower track control link ball joint.
- Remove wheel bearing housing.

40-58

Installing

- Install wheel bearing housing.

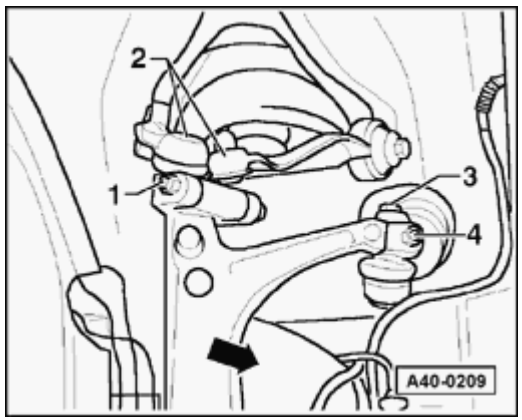
- Slide drive axle outer CV joint into wheel hub and tighten new bolt hand tight.

- Install ball joints for lower track control link and and guide link in wheel bearing housing.

- Install new self-locking nuts and tighten to: 100 Nm (74 ft lb).

  - If necessary, counterhold ball joint using 4 mm hex wrench.

- Install both upper link ball joints into wheel bearing housing.



- Install new self-locking nut -1- and tighten to 40 Nm (30 ft lb).

  - Press upper links downward as far as possible when tightening.

- Install tie rod end and new self locking nut -4-.

  Tightening torque: 50 Nm (37 ft lb)

- Tighten bolt -3-.

  Max tightening torque: 5 Nm (44 in. lb)

- Install ABS wheel speed sensor.

- Attach linkage for headlight range control ⇒ page 40-14 .

- Bolt on brake splash guard.

  Tightening torque: 10 Nm (7 ft lb)

- Install brake disc.

- Install brake caliper and tighten bolts to 120 Nm (89 ft lb).

- Install wheels and tighten wheel lugs to 120 Nm (89 ft lb).

- Install new bolt for drive axle.

  Tightening torques:

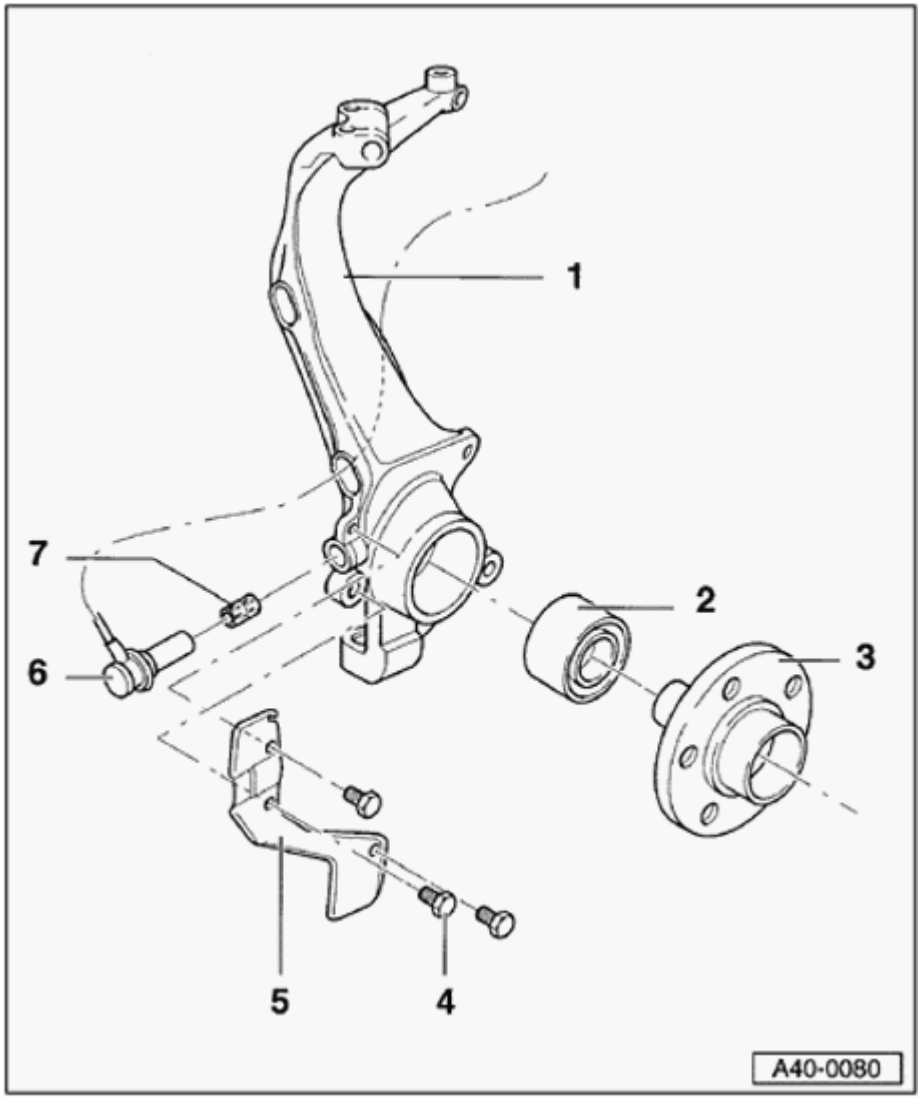
  - M14: 115 Nm (85 ft lb) + 1/2-turn (180°)
  - M16: 190 Nm (140 ft lb) + 1/2-turn (180°)

WARNING!

The vehicle must be standing on it's wheels when loosening or tightening the bolt for the drive axle. Otherwise the risk of an accident exists.

- Check front suspension alignment and, if necessary, adjust using VW/Audi approved alignment equipment.

40-60



Wheel bearing housing, servicing

1 - Wheel bearing housing

- Note different versions of suspension ⇒ parts catalog microfiche
- Removing and installing ⇒ page 40-54

2 - Wheel bearing

- Shoulder on inner diameter
- Installation position: side of wheel bearing with larger inner diameter faces wheel hub
- Removing bearing inner race from hub ⇒ Fig. 5 and Fig. ⇒ 6

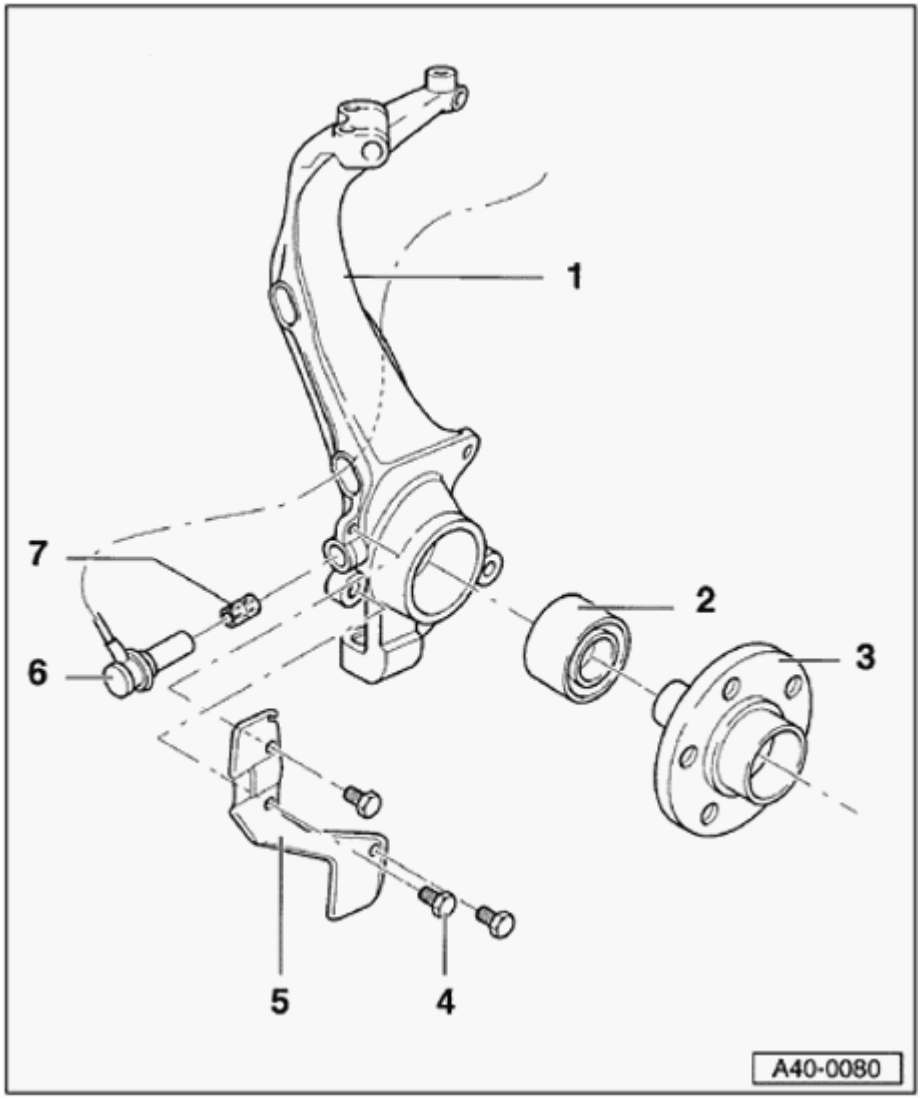
With 75 mm diameter wheel bearing housing:

- Pressing bearing out ⇒ Fig. 3
- Pressing bearing in ⇒ Fig. 7

With 82 or 85 mm diameter wheel bearing housing:

- Pressing bearing out ⇒ Fig. 4
- Pressing bearing in ⇒ Fig. 8

40-61



3 - Wheel hub

- Shouldered

With 75 mm diameter wheel bearing housing:

- Pressing hub out ⇒ Fig. 1
- Pressing hub in ⇒ Fig. 9

With 82 or 85 mm diameter wheel bearing housing:

- Pressing hub out ⇒ Fig. 2
- Pressing hub in ⇒ Fig. 10

4 - Bolt

- 10 Nm (7 ft lb)

5 - Brake splash guard

6 - ABS wheel speed sensor

- Pull out to remove
- Install drive axle before installing speed sensor
- Press into clamping sleeve up to stop
- Routing wiring ⇒ page 40-55

7 - Clamping sleeve

- Always replace

- Left and right sides identical
- Before installing, lubricate hole in wheel bearing housing with brake cylinder paste
- Press into wheel bearing housing up to stop

40-62

Special tools, test equipment and auxiliary items

VW401	VW402	VW412
VW416B	VW519	VW407
VW432	VW447I	3291/2
3124	3345	30-100
Separating device Kukko 15-17		3005

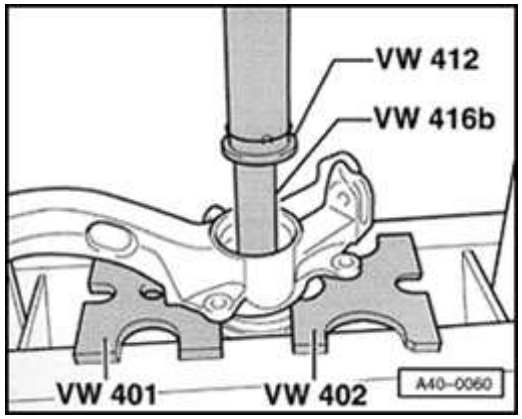


Fig. 1 Pressing wheel hub out of 75 mm diameter wheel bearing housing

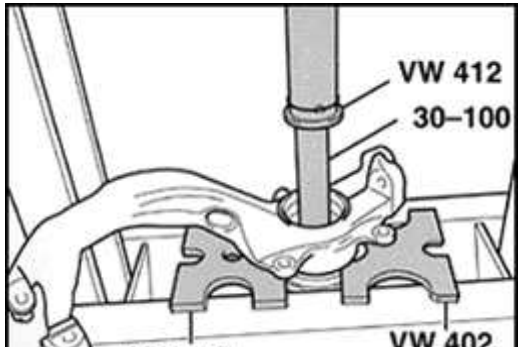


Fig. 2 Pressing wheel hub out of 85 mm diameter wheel bearing housing

40-63

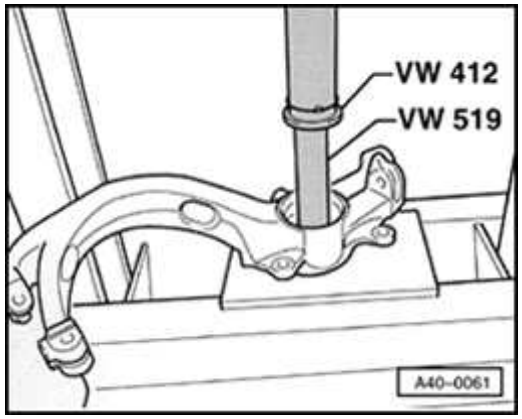


Fig. 3 Pressing wheel bearing out of 75 mm diameter wheel bearing housing

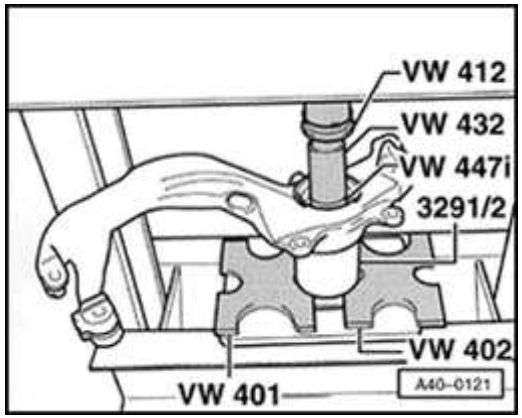


Fig. 4 Pressing wheel bearing out of 85 mm diameter wheel bearing housing

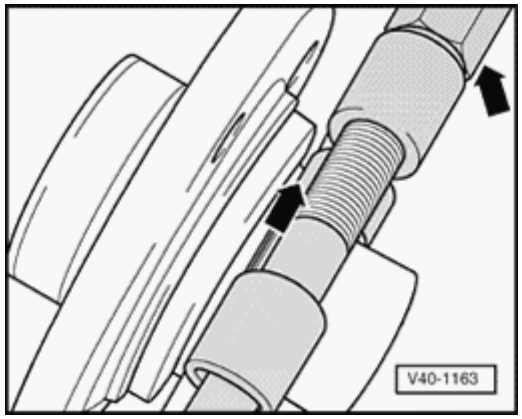


Fig. 5 Installing separating device

- Install separating device into bearing inner race circumferential groove (left arrow) and tighten spindle (right arrow).

Note:

Use a standard, commercially available bearing separator (i.e. Kukko 15-17).

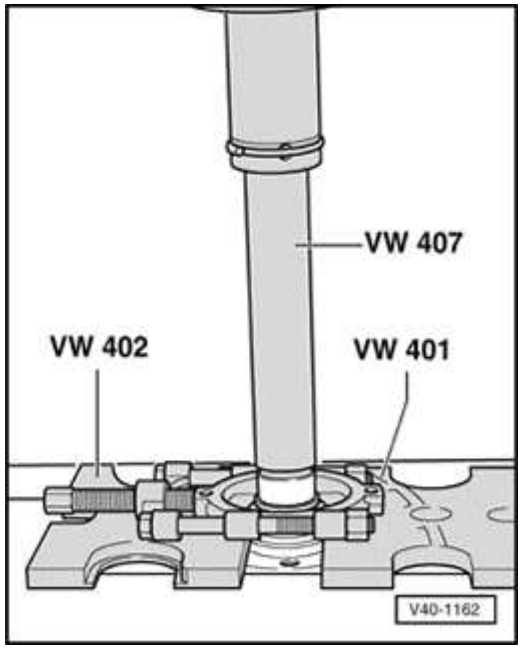


Fig. 6 Pressing inner bearing race off of wheel hub

40-65

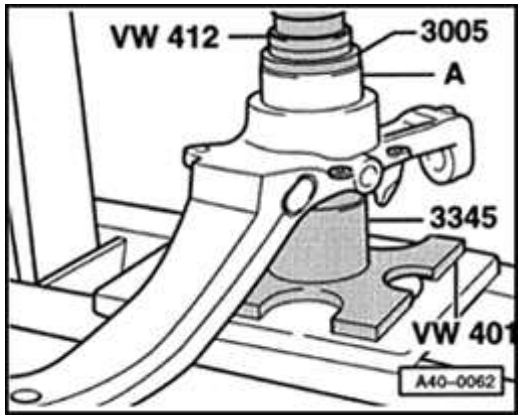


Fig. 7 Pressing wheel bearing into 75 mm diameter wheel bearing housing

Note:

Large inner diameter of wheel bearing faces toward wheel hub.

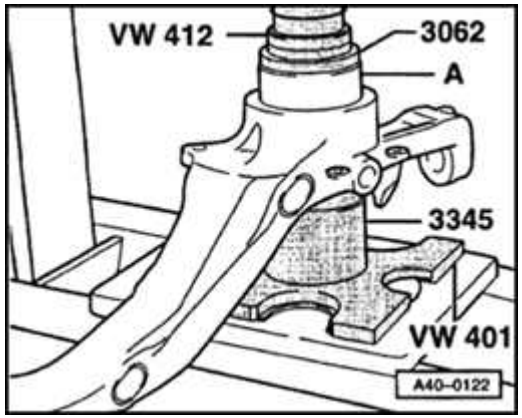


Fig. 8 Pressing wheel bearing into 85 mm diameter wheel bearing housing

Note:

Large inner diameter of wheel bearing faces toward wheel hub.

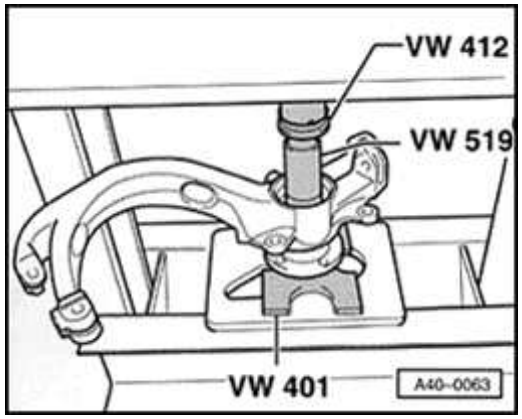


Fig. 9 Pressing wheel hub into 75 mm diameter wheel bearing

CAUTION!

- ***When installing, VW519 sleeve must exert force only against the bearing inner race.***
- ***Make sure that the wheel bearing housing does not exert force against the wheel hub. Otherwise there is the risk of damaging the wheel bearing.***
- ***The wheel bearing housing must remain as horizontal as possible when pressing in the hub. Otherwise the wheel hub will cant in the wheel bearing, which will lead to early wheel bearing damage.***

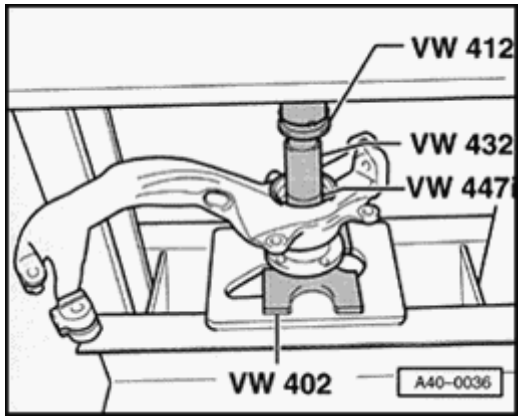


Fig. 10 Pressing wheel hub into 85 mm wheel bearing

CAUTION!

- ***When installing, VW447i thrust pad must only exert force only against the bearing inner race.***
- ***Make sure that the wheel bearing housing does not exert force against the wheel hub. Otherwise there is the risk of damaging the wheel bearing.***
- ***The wheel bearing housing must remain as horizontal as possible when pressing in the hub. Otherwise the wheel hub will cant in the wheel bearing, which will lead to early wheel bearing damage.***

Wheel bearing housing, servicing with VAG1459 B

There is an alternative to using the VAG1290 A workshop press to service the wheel bearing housing. VAG1459 B hydraulic wheel bearing and wheel hub removal and installation tool together with the VAG1459 B/2 accessory can be used instead.

Advantages:

- Wheel bearing housing does not need to be completely disassembled.
- Tie rod end remains in wheel bearing housing and therefore wheel alignment does not need to be carried out.

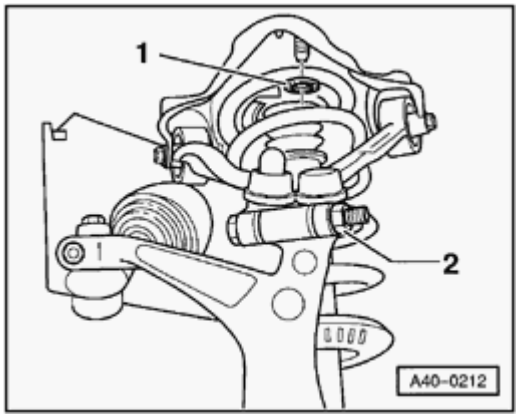
Mounting bracket, removing and installing

Removing

- Remove wheel trim.

  On light alloy wheels use puller in vehicle tool kit to remove trim cap.

- Remove wheel.



- Use pliers to remove clip -1-.

Note:

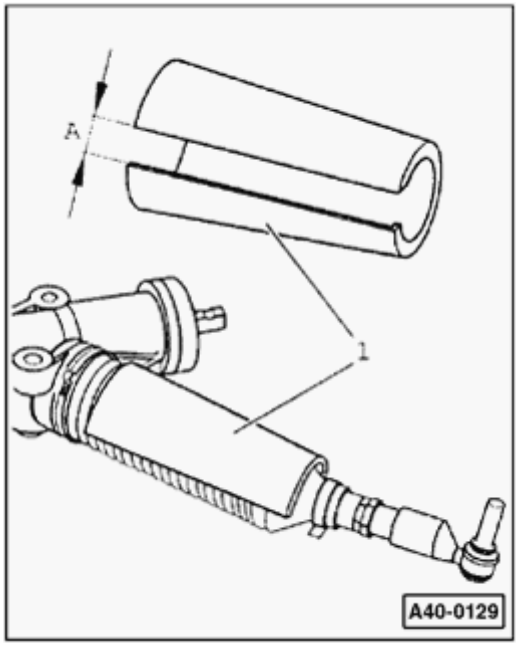
The clip does not need to be reinstalled.

- Remove nut -2- and bolt.
- Pull both control arms upward and out.

CAUTION!

Do not use a chisel (or similar) to widen the slots in the wheel bearing housing.

40-69



- Cover steering gear boot to protect from damage.

Note:

- *The illustration shows the steering gear removed for clarity.*
- *Protective sleeve -1- can be ordered (Part No. 893 512 137).*

CAUTION!

Part numbers are listed here for reference only. Always check with your Parts department for the latest information.

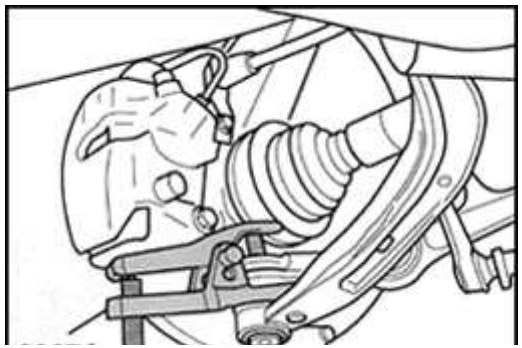
- Cut out part of sleeve -1- and de-burr cut edges.

  Width -A- = 20-25 mm (approx. 7/8 to 1 in.)

- Slide protective sleeve over steering gear boot.

  • Open side of sleeve must face downward

To remove the bolt mounting the suspension strut to the lower track control link, the lower guide link must first be disconnected from the wheel bearing housing.



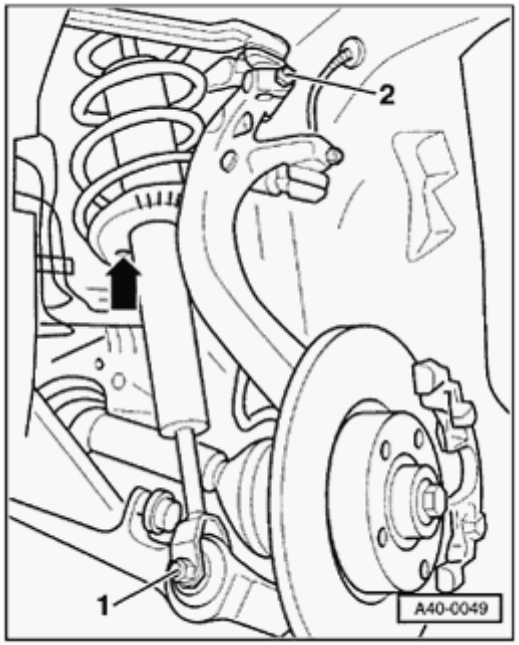
- Remove nut from guide link ball joint and press off ball joint.
  - If necessary, counter-hold ball joint using 4 mm hex wrench.
  - Be careful not to damage boot.

40-70

- Detach ABS wheel speed sensor wire from bracket on brake caliper.

CAUTION!

Install a support device (e.g. VAG1383A transmission jack) to prevent damage to the lower link joints resulting from excessive rebound travel in the suspension.

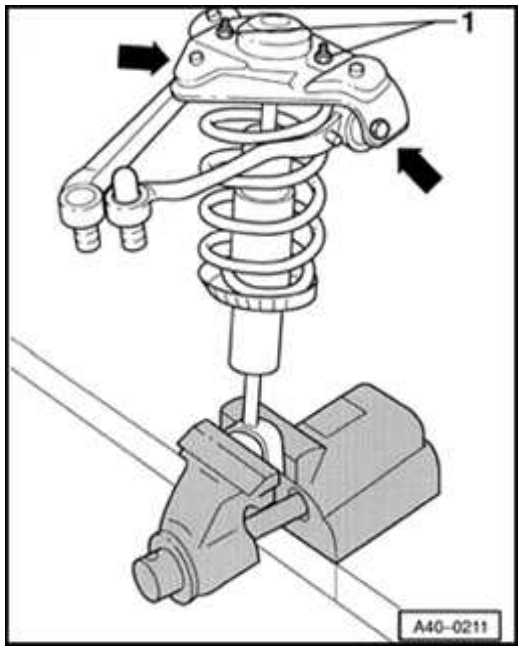


- Remove bolt -1- attaching suspension strut to lower track control link.
- Swing wheel bearing housing aside.



- Remove bolts -1- in plenum chamber.
- Remove suspension strut together with mounting bracket.

Be careful not to damage boot.

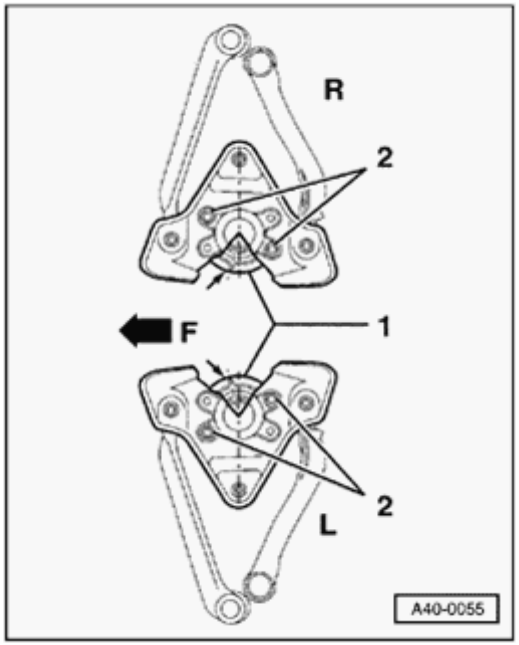


Removing upper links from mounting bracket

- Clamp suspension strut in vise (use protective jaw covers).
- Remove bolts and detach both links (arrows).
- Remove nuts -1- and remove mounting bracket.

40-72

Installing



F - Forward

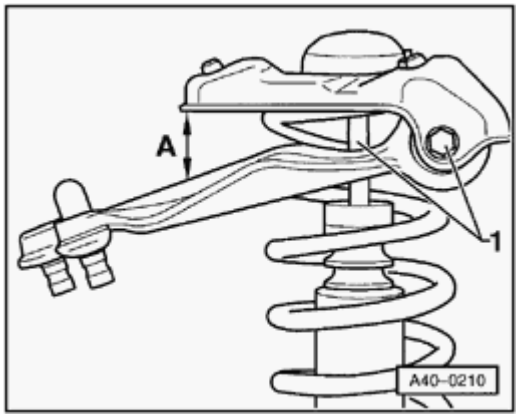
L - Left-side mounting bracket

R - Right-side mounting bracket

- Holes in suspension strut spring plate (small arrows) must face centerline of vehicle.

- Tighten nuts -2- to 20 Nm (15 ft lb).

Installing upper links to mounting bracket



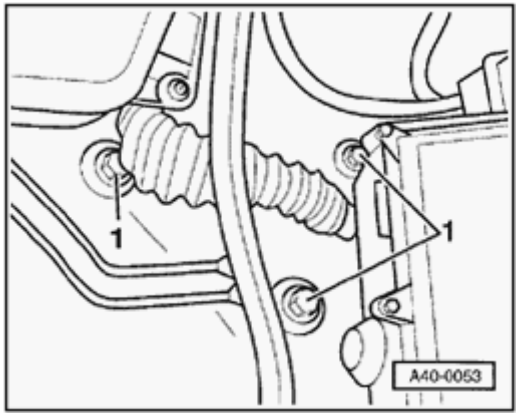
- Align upper link.

  Dimension -A-: 47 mm ± 2 mm (1.85 in. ± 0.08 in.)

- Always replace nuts and bolts.

- Tighten bolts -1- for both links.

  Tightening torque: 50 Nm (37 ft lb) + 1/4-turn (90°)



- Install suspension strut together with mounting bracket into suspension strut tower and tighten bolts -1-.

  Tightening torque: 75 Nm (48 ft lb)

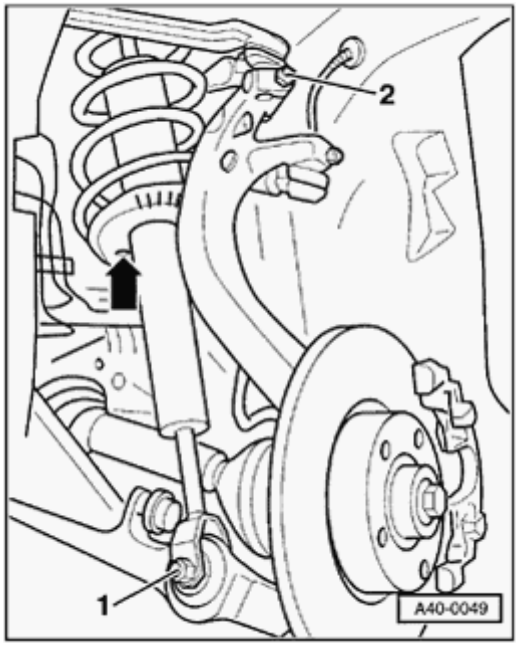
Note:

Make sure the washers are correctly positioned.

40-74

CAUTION!

The bonded rubber bushings can only be turned to a limited extent. The bolted connections on the suspension links should therefore only be tightened when the vehicle is standing on the ground.



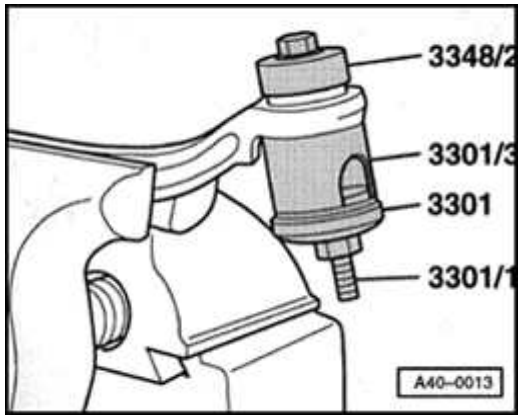
- Attach lower end of suspension strut to lower track control link with bolt and new nut and tighten nut -1- to 90 Nm (66 ft lb).
- Remove any residue from threads of ball joint.
- Tighten nut on ball joint to 100 Nm (74 ft lb).
- Install both upper links and tighten nut -2-.
  - Tightening torque: 40 Nm (30 ft lb)
  - When tightening, press upper links downward as far as possible
- Attach ABS wiring to retainer on brake caliper.
- Install wheel.
- Check front suspension alignment and, if necessary, adjust using VW/Audi-approved wheel alignment equipment.

Front and rear upper link bushings, replacing

The mounting bracket must be removed to replace the upper links or bushings ⇒ page 40-68 .

Special tools, test equipment and auxiliary items

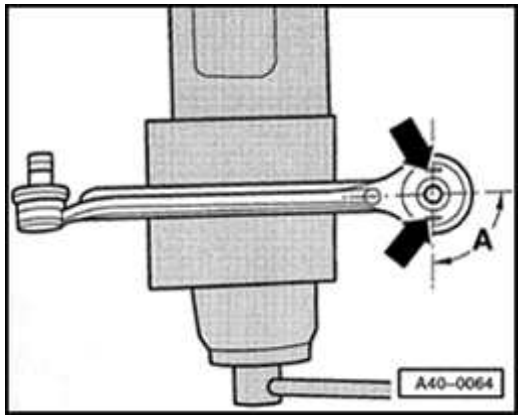
3348/2	3301	3301/3
3301/1	3348/3	



Pulling out bonded rubber bushing

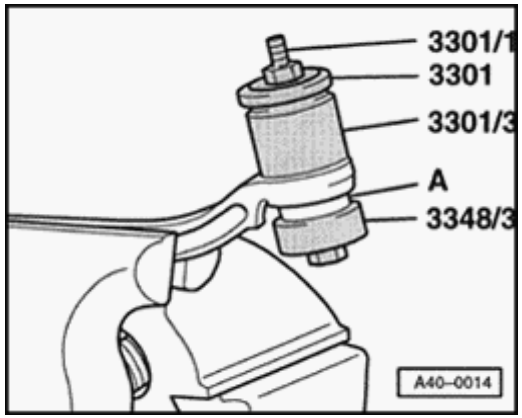
Note:

Always use protective jaw covers when clamping an aluminium link in a vise.



Installation position

Angle -A-: 90° ± 5°



Installing bonded rubber bushing

Subframe, removing and installing

WARNING!

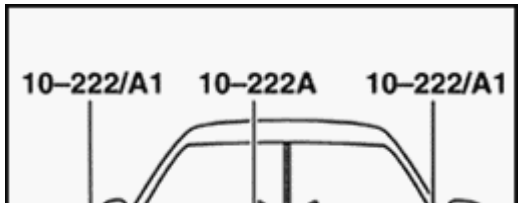
- ***Do not re-use any fasteners that are worn or deformed in normal use.***

- ***Some fasteners are designed to be used only once, and are unreliable and may fail if used a second time. This includes, but is not limited to, nuts, bolts, washers, circlips and cotter pins. Always follow the recommendations in this manual-replace these fasteners with new parts where indicated, and any other time it is deemed necessary by inspection.***

Special tools, test equipment and auxiliary items

10-222A Engine support bridge		10-222/1
3393		

Removing

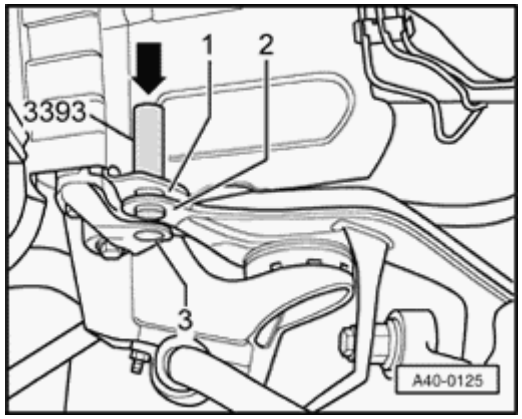


- Support engine using engine support bridge.
- Remove wheel trim.

  On light alloy wheels use puller in vehicle tool kit to remove trim cap.

- Remove wheels.
- Remove noise insulation panel.

40-78



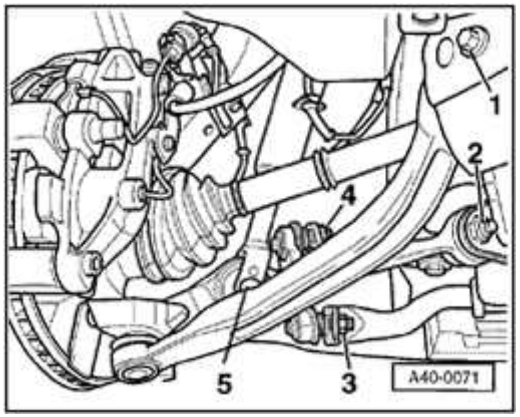
- Before loosening subframe, use 3393 testing mandrel to make sure that holes -1- and -2- are aligned.

- If holes -1- and -2- are not aligned, carry out wheel alignment after installing subframe.

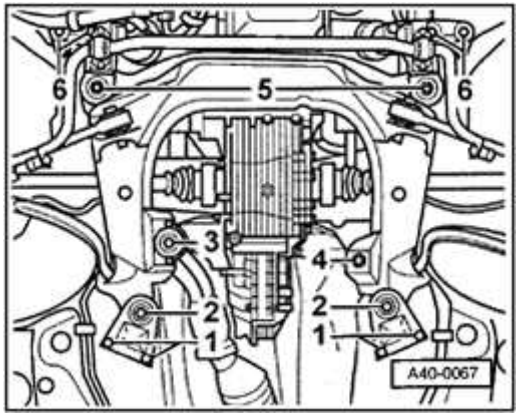
40-79

CAUTION!

Install a support device (e.g. VAG1383A transmission jack) to prevent damage to the lower link joints resulting from excessive rebound travel in the suspension.



- Remove nuts -3-.
- Loosen bolts -1- (attaching lower guide links to subframe).



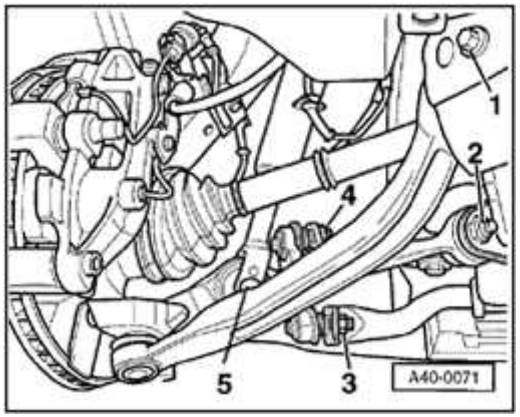
- Remove bolts -1-.
- Remove bolts -2- and lower subframe at rear.

Note:

To prevent the outer joints on the lower track control link and guide link from being bent too far, secure the links to the car body using a piece of wire or similar.

- Remove bolts for lower guide links.

- Remove lower guide links from subframe.

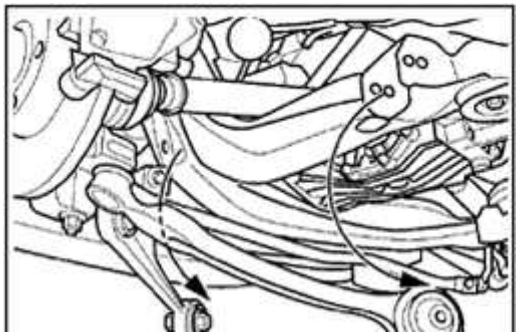


- Remove bolts -5-.

Note:

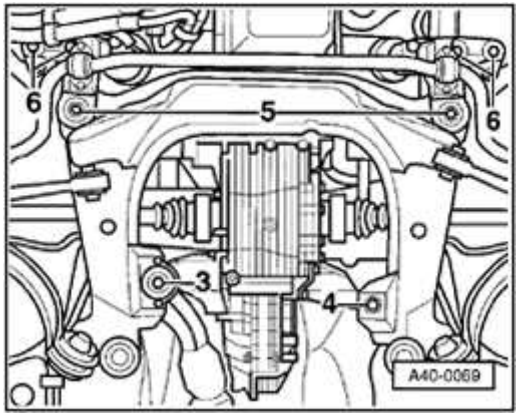
For vehicles with headlight range control ⇒ *page 40-14* .

- Remove nuts -2- (attaching lower track control links to subframe) and remove bolts.
- Disconnect ABS wheel speed sensor wiring from retainers on brake calipers.



- Remove lower track control links from subframe.

40-81

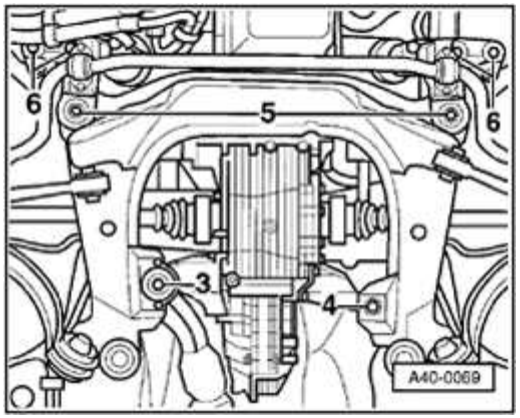


- Remove nuts -3- and -4-.
- Remove bolts -5-.
- Loosen bolts -6- until subframe can be removed.

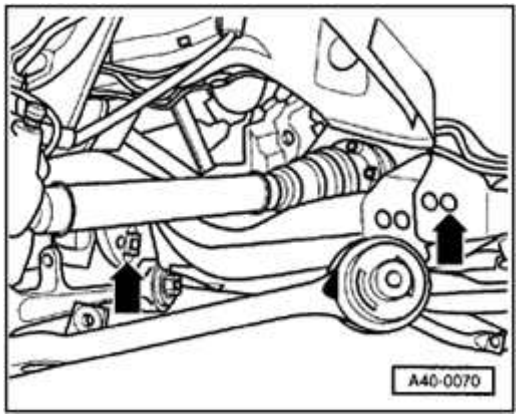
40-82

Installing

- All nuts and bolts must be replaced



- Install subframe; install bolts -5- and -6- hand-tight.
- Install bolts securing suspension struts to lower track control links.



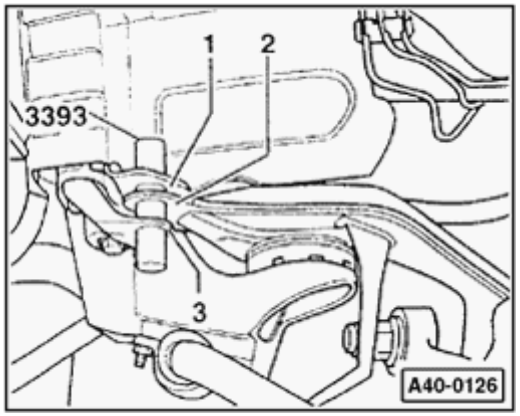
- Install lower track control links and lower guide links in subframe.
  - Install bolts in inner holes (arrows).

Note:

For vehicles with headlight range control ⇒ page 40-14 .

40-83

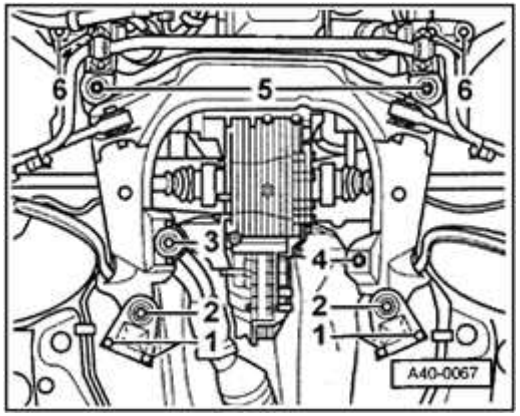
- Before tightening, 3393 testing mandrel must be installed to align subframe to body



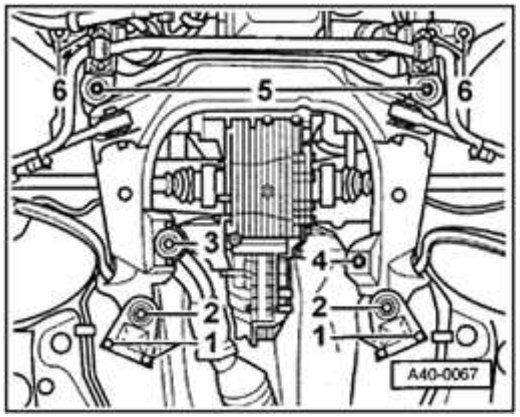
- Hole -1-, subframe hole -2- and aluminium bracket hole -3- must align on both sides

Notes:

- *When installing the complete subframe, the 3393 testing mandrel can be used to align the subframe to the body only if holes -1- and -2- were aligned before the repairs were made.*
- *If the 3393 testing mandrel is not used when installing the subframe or if holes -1- and -2- did not align before repairs were made a wheel alignment will need to be carried out.*



- Loosely install bolts -1- and -2-.
- Loosely install bolts -3- and -4-.
- Carry out corrosion protection measures, as needed, to holes used for 3393 testing mandrel.



Tightening sequence

CAUTION!

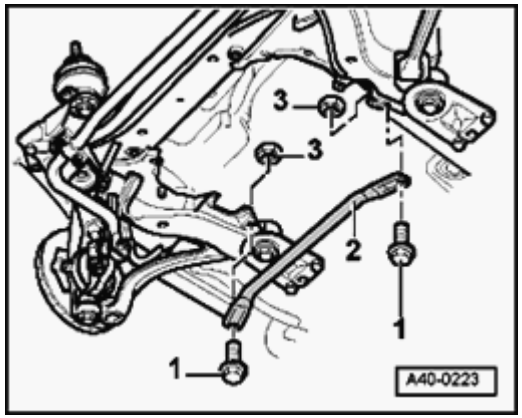
The bonded rubber bushings can only be turned to a limited extent. The bolted connections on the suspension links should therefore only be tightened when the vehicle is standing on the ground.

- Tighten bolts -2- and -5- to 110 Nm (81 ft lb) + 1/4-turn (90 °).
- Tighten bolts -6- to 75 Nm (55 ft lb).
- Tighten bolts -1- to 23 Nm (17 ft lb).
- Tighten nuts -3- and -4- to 40 Nm (30 ft lb).
- Tighten bolts for lower track control link to 80 Nm (59 ft lb) + 1/4-turn (90 °).
- Tighten guide link bolts to 90 Nm (66 ft lb) + 1/4-turn (90 °).
- Attach coupling link to stabilizer bar using new ribbed nuts and tighten to 100 Nm (74 ft lb).
- Attach suspension strut to lower track control link.

  Tightening torque: 90 Nm (66 ft lb)
- Install ABS wheel speed sensor wiring into retainer on brake caliper.
- Install wheels.

Lower cross member, removing and installing

From m.y. 1998 ➢, various subframes (⇒ parts catalog microfiche) are equipped with a lower cross member.



➢

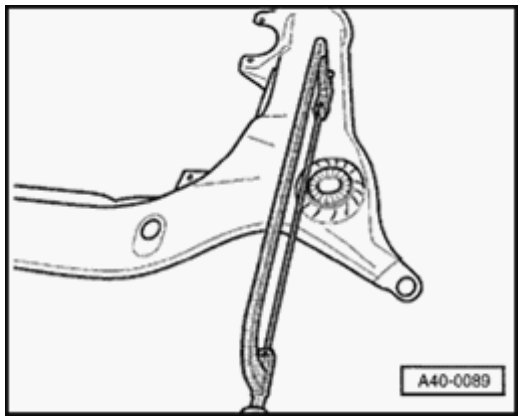
1 - Bolts M10 x 22

Tightening torque: 40 Nm (30 ft lb) +1/4-turn (90°)

2 - Cross member

3 - Nuts

Subframe bushings, replacing

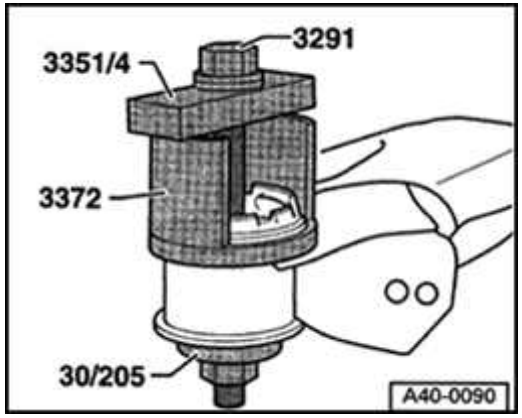


Removing bonded rubber mounts

- Saw or cut off rubber bead on subframe up to outer mounting bushing.

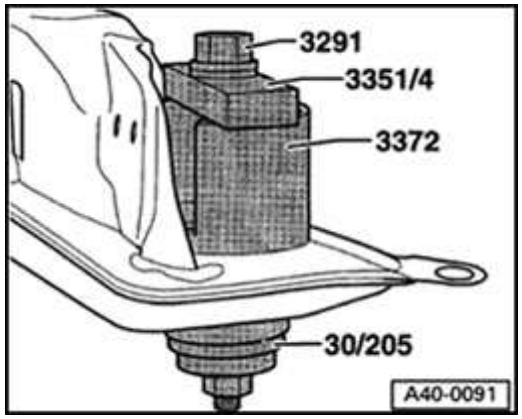
Note:

If the paint on the surface of the subframe is damaged, carry out corrosion protection measures.



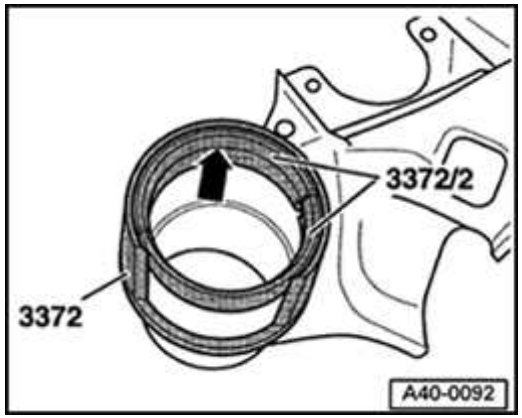
Pulling out rear bonded rubber mounts

- Make sure that 3372 installation device is properly positioned and cannot tilt.



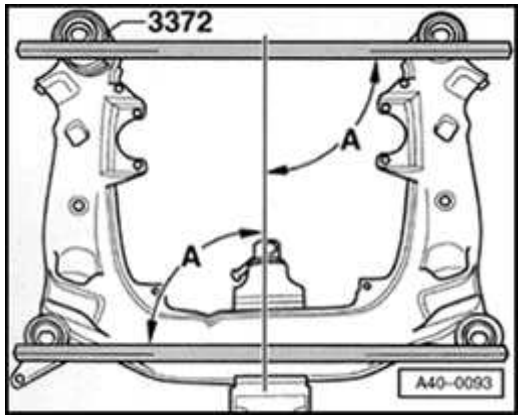
Pulling out bonded rubber mounts

All of the bonded rubber subframe mounts are pulled out using the same tool.



Assembly preparations for pulling in subframe bonded rubber mounts

- Install installation device and insert 3372/2 thrust pieces.



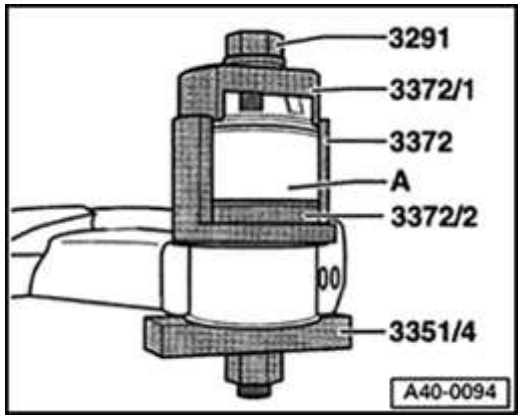
Aligning bonded rubber mounts

- Bonded rubber mounts must be aligned using a long rectangular tube or a straight-edge.

Angle -A-: 90° + 5°

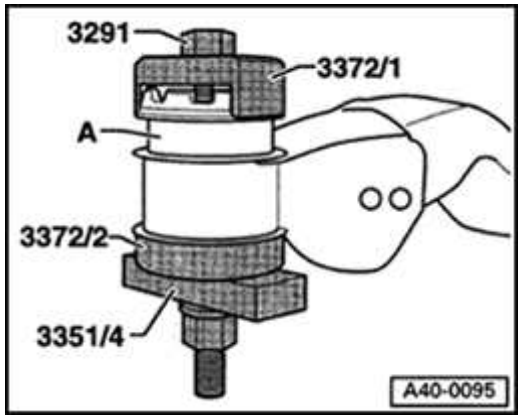
Note:

Always use protective jaws when clamping the subframe in a vise.



Pulling in rear bonded rubber mounts

- Use G 294 421 A1 lubricating oil when pulling in bonded rubber mounts.
- Pull in mount -A- until 3372/1 thrust piece aligns with upper edge of 3372 installation device.
- Remove 3372 installation device and 3372/2 thrust pieces upward.

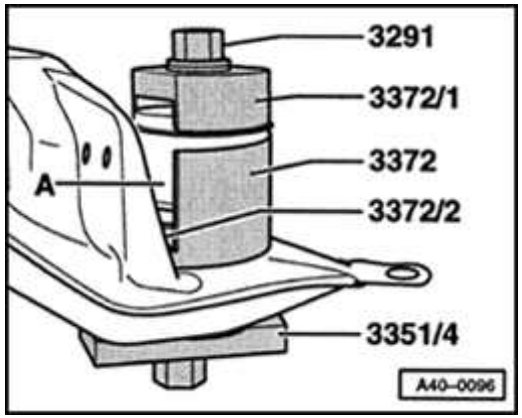


Pulling in rear bonded rubber mounts

- Install 3372/2 thrust pieces between 3351/4 bridge and subframe.
- Pull bonded rubber mount in up to stop.

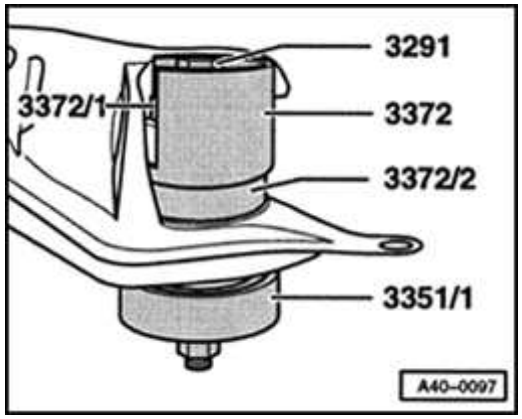
Note:

If the paint on the surface of the subframe is damaged, carry out corrosion protection measures.



Pulling in front bonded rubber mount

- Use G 294 421 A1 lubricating oil when pulling in bonded rubber mounts.
- Install 3372/2 thrust pieces into 3372 installation device.
- Pull in bushing -A- until 3372/1 press tool is flush with upper edge of 3372 installation device.



Pulling in front bonded rubber mounts

- Lift 3372 installation device and remove 3372/2 thrust pieces.
- Replace 3351/4 bridge with 3351/1 thrust piece and then pull bonded rubber mount in up to stop.

Note:

If the paint on the surface of the subframe is damaged, carry out corrosion protection measures.

40-91

Lower track control link, removing and installing

Removing

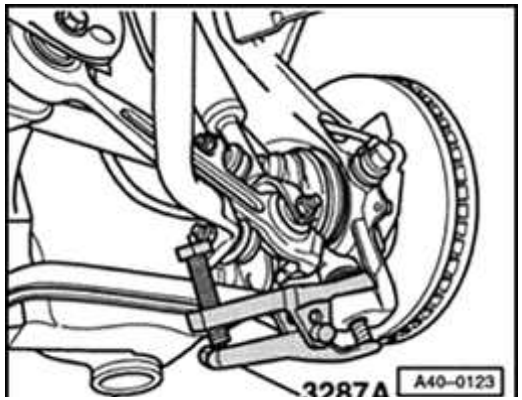
- Remove wheel trim.

  On light alloy wheels use puller in vehicle tool kit to remove trim cap.

- Remove wheel.

Notes:

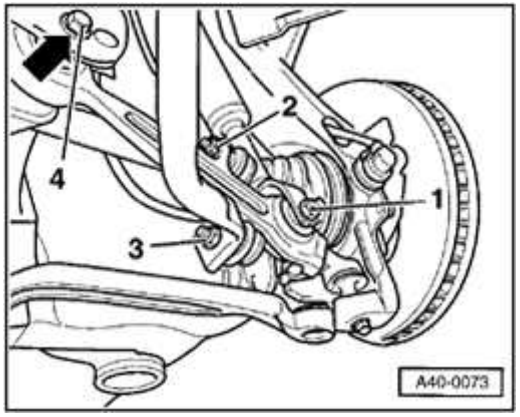
- *Cover the CV joint boot (e.g. by inserting a piece of leather) to protect it from damage.*
- *For vehicles with headlight range control* ⇒ *page 40-14* .



- Remove nut from ball joint of lower track control link, then press ball joint from tapered seat.
  - If necessary counterhold ball joint using 4 mm hex wrench.

Be careful not to damage the boot.

40-92



- Remove bolt -1-.
- Remove ribbed nuts -2- and -3-, then remove connecting link.

CAUTION!

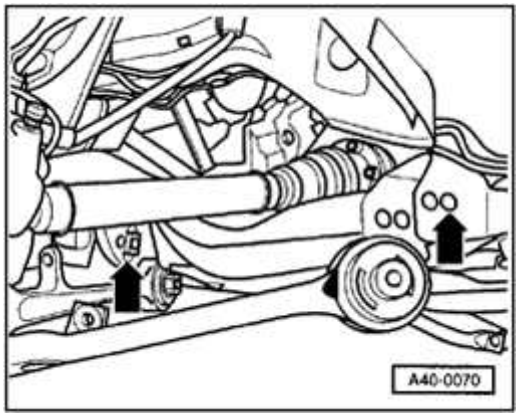
Install a support device (e.g. VAG1383A transmission jack) to prevent damage to the upper link joints resulting from excessive rebound travel in the suspension.

- Remove bolt -4-.
- Remove lower track control link.

Installing

- All nuts and bolts must be replaced

Notes:

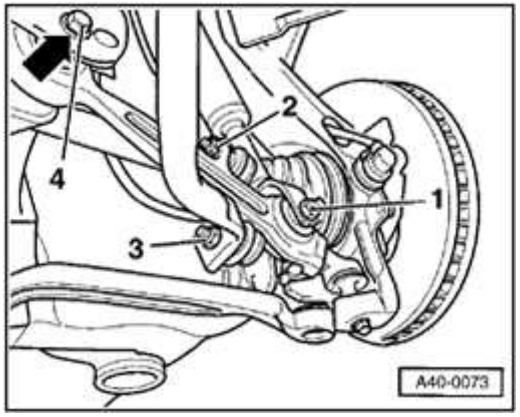


- *Only use inner holes (arrows).*
- *Remove any residue from threads of ball joint.*

CAUTION!

The bonded rubber bushings can only be turned to a limited extent. The bolted connections on the suspension links should therefore only be tightened when the vehicle is standing on the ground.

40-93



- Install new bolt -4- and new nut.

  Tightening torque: 80 Nm (59 ft lb) + 1/4-turn (90°)

- Tighten nuts at ball joints (lower guide and track control links) to 100 Nm (74 ft lb).
- Tighten nut -1- to 90 Nm (66 ft lb).
- For vehicles with headlight range control, install linkage ⇒ page 40-14 .

Arrow on the connecting link points in the direction of travel.

- Tighten nut -2- to 40 Nm (30 ft lb) + 1/4-turn (90°).
- Tighten nut -3- to 100 Nm (74 ft lb).

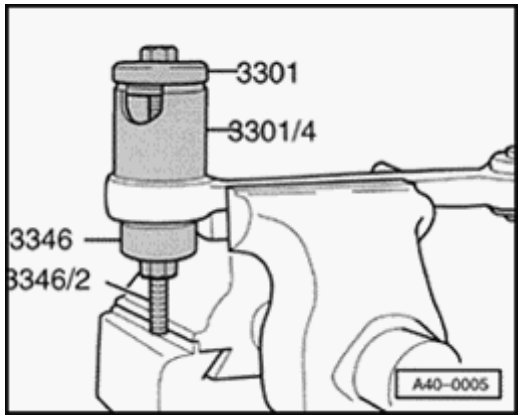
Lower track control link bushings, replacing

Special tools, test equipment and auxiliary items

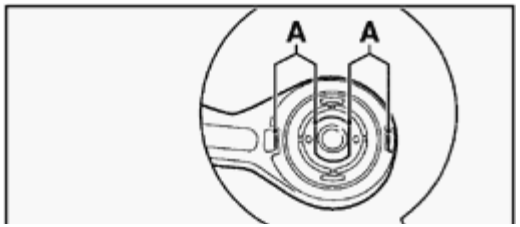
3301	3301/4	3346
3346/2	3346/3	3350/1

Note:

Always use protective jaw covers when clamping an aluminium link in a vise.

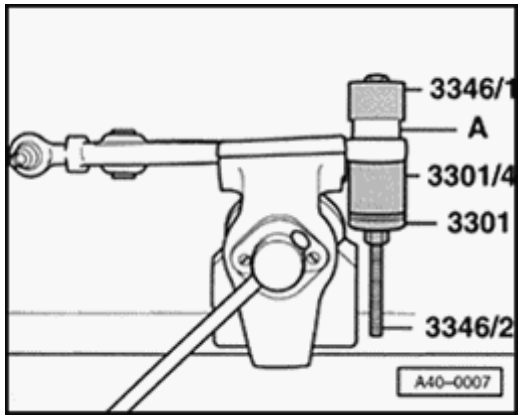


Pulling out inner bushing



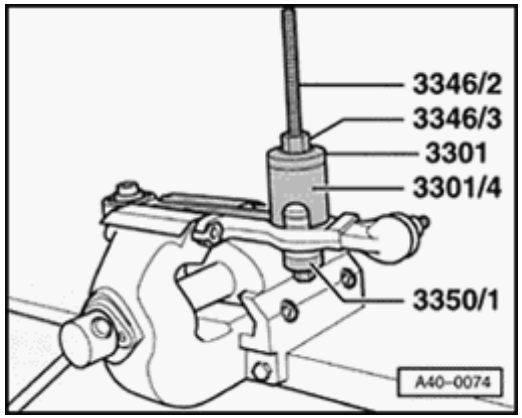
Installation position of bushing

The markings on the lower track control link and on the side of the bushing should be parallel.

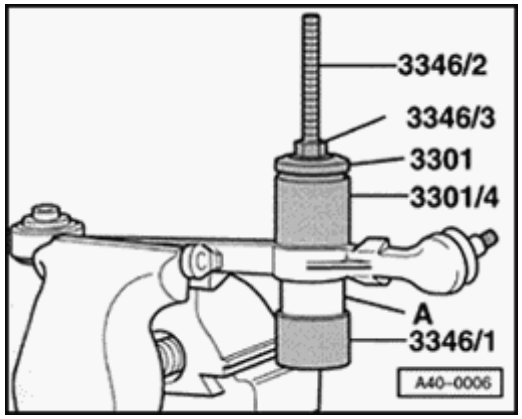


Pulling in inner bushing

- Insert bushing -A- 3.2 mm (1/8 in.) into recess of 3346/1 thrust piece.
- Pull bushing in up to stop.



Pulling out outer bushing



Pulling in outer bushing

- Insert bushing -A- 8 mm (5/16 in.) into recess of 3346/1 thrust piece.
- Pull bushing in up to stop.

40-97

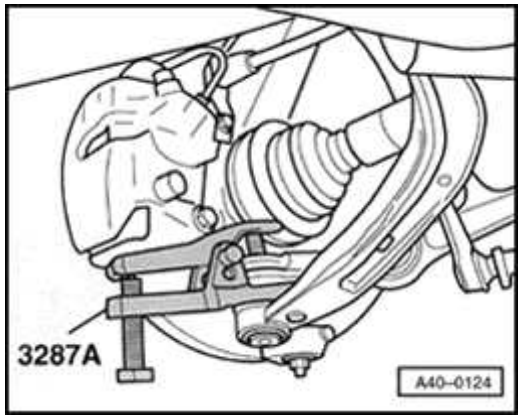
Lower guide link, removing and installing

Removing

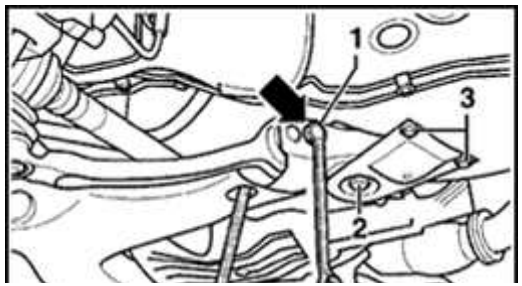
- Remove wheel trim.

  On light alloy wheels use puller in vehicle tool kit to remove trim cap.

- Remove wheel.



- Remove nut from lower guide link ball joint and press off ball joint.
  - If necessary counterhold ball joint using 4 mm hex wrench.



- Loosen bolt -1-.

CAUTION!

Be careful not to damage the undercoating or the surfaces of the brake lines.

Subframe must be lowered at rear to remove bolt -1-.

- Loosen support plate bolts -3- and subframe bolts -2-.
- Remove guide link.

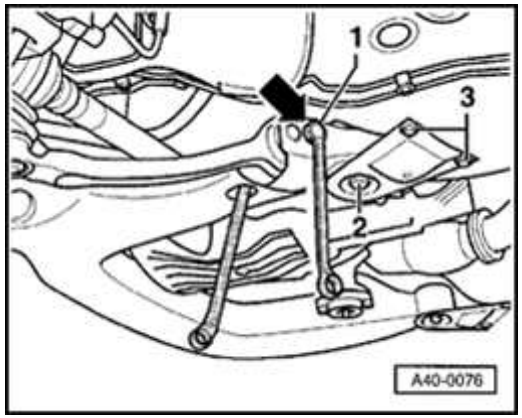
Installing

CAUTION!

The bonded rubber bushings can only be turned to a limited extent. The bolted connections on the suspension links should therefore only be tightened when the vehicle is standing on the ground.

- All nuts and bolts must be replaced

When installing pay particular attention to the following points:



- Tighten nut at ball joint to 100 Nm (74 ft lb).

Notes:

- *Remove any residue from the ball joint threads.*
- *Use only the inner holes (arrow above).*
- *Press the guide link inward when tightening.*

- Install new bolt -1- and new nut.

  Tightening torque: 90 Nm (66 ft lb) + 1/4-turn (90°)

- Tighten bolts -3- ⇒ page 40-10 , Fig. 3:
  - Ribbed bolt tightening torque: 75 Nm (55 ft lb)
  - Non-ribbed bolt tightening torque: 25 Nm (18 ft lb)

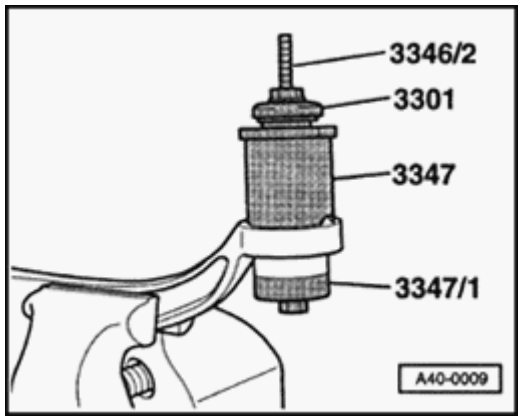
- Install new subframe bolts -2- and tighten to 110 Nm (81 ft lb) + 1/4-turn (90°)

40-99

Lower guide link hydraulic bushings, replacing

Special tools, test equipment and auxiliary items

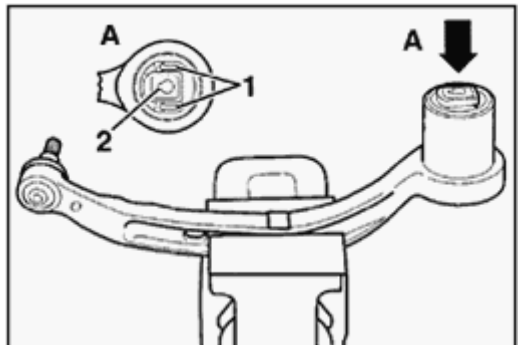
3346/2	3301	3347
3347/1	3346/2	3347/2
3346/3		



Pulling hydraulic bushing out of link

Note:

Always use protective jaw covers when clamping an aluminium link in a vise.

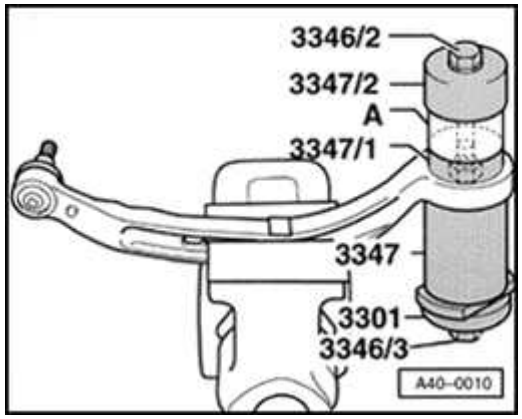


Hydraulic bushing installation position

The arrows on hydraulic bushing -1- and groove -2- point toward the ball joint.

The maximum permissible deviation is ± 5°.

40-100



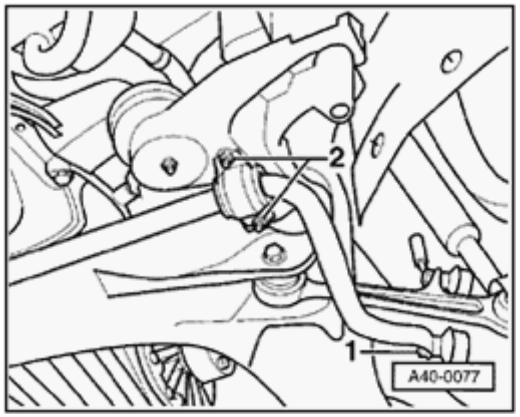
Pulling in hydraulic bushing

- Insert hydraulic bushing -A- into 3347/2 special tool.
- Tighten 3347/1 sleeve, 3346/2 spindle and nut together.
- Pull hydraulic bushing -A- in up to stop.

40-101

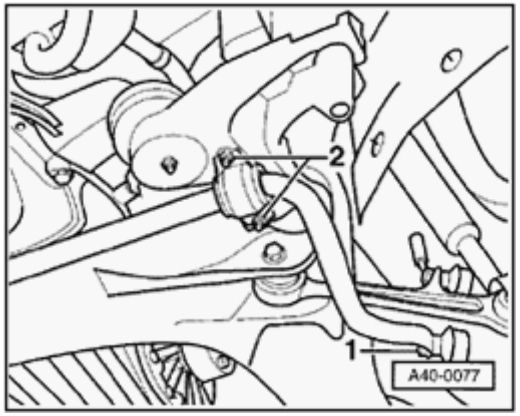
Stabilizer bar, removing and installing

Removing



- Remove noise insulation panel.

- Remove nuts -1-.
- Remove connecting links from stabilizer bar.
- Remove nuts -2-.



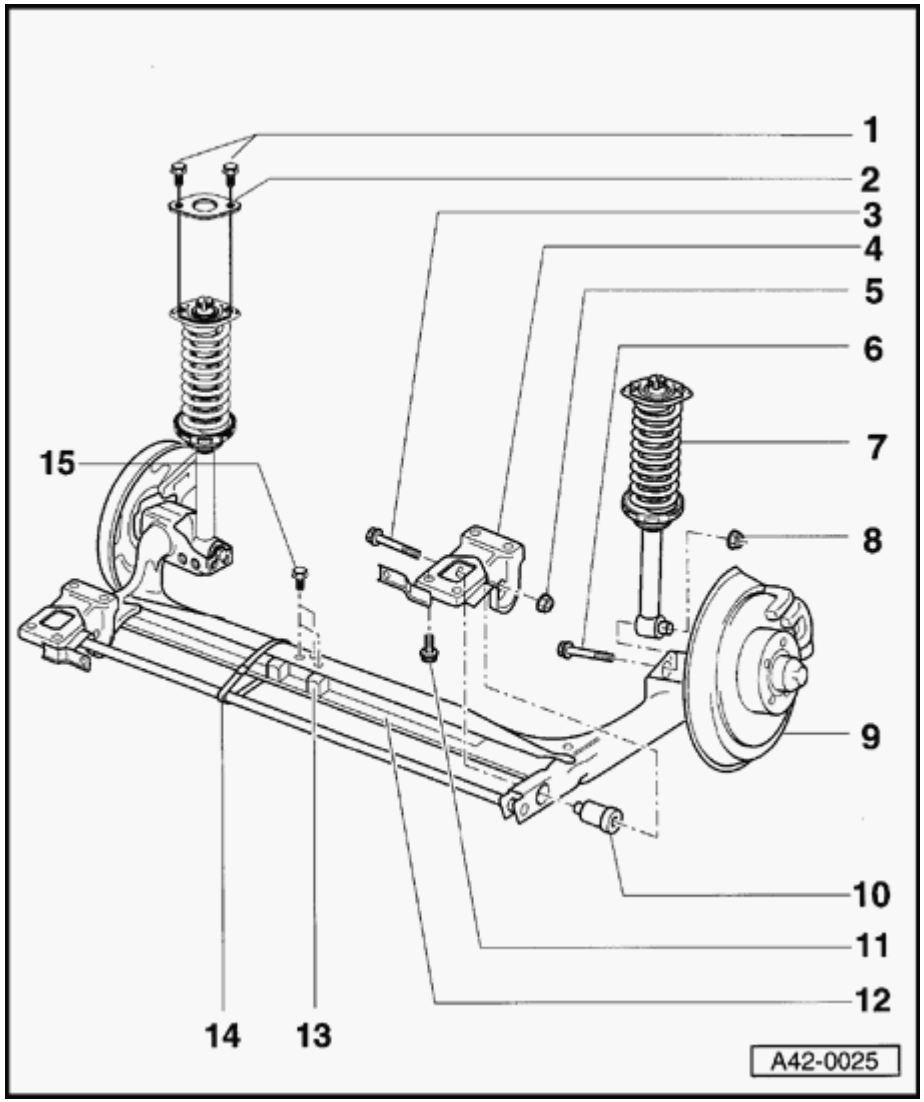
Installing

- Install bushings and stabilizer bar.
  - Do not apply grease
  - Arrows on connecting links point in direction of travel
- If replacing stabilizer bar, check which suspension version vehicle is equipped with.

Tightening torques:

- Connecting link to stabilizer bar: 100 Nm (74 ft lb) (always use new ribbed nuts)
- Nuts -2-: 25 Nm (18 ft lb) (always replace)

42-1



Rear axle, servicing (front-wheel-drive vehicles)

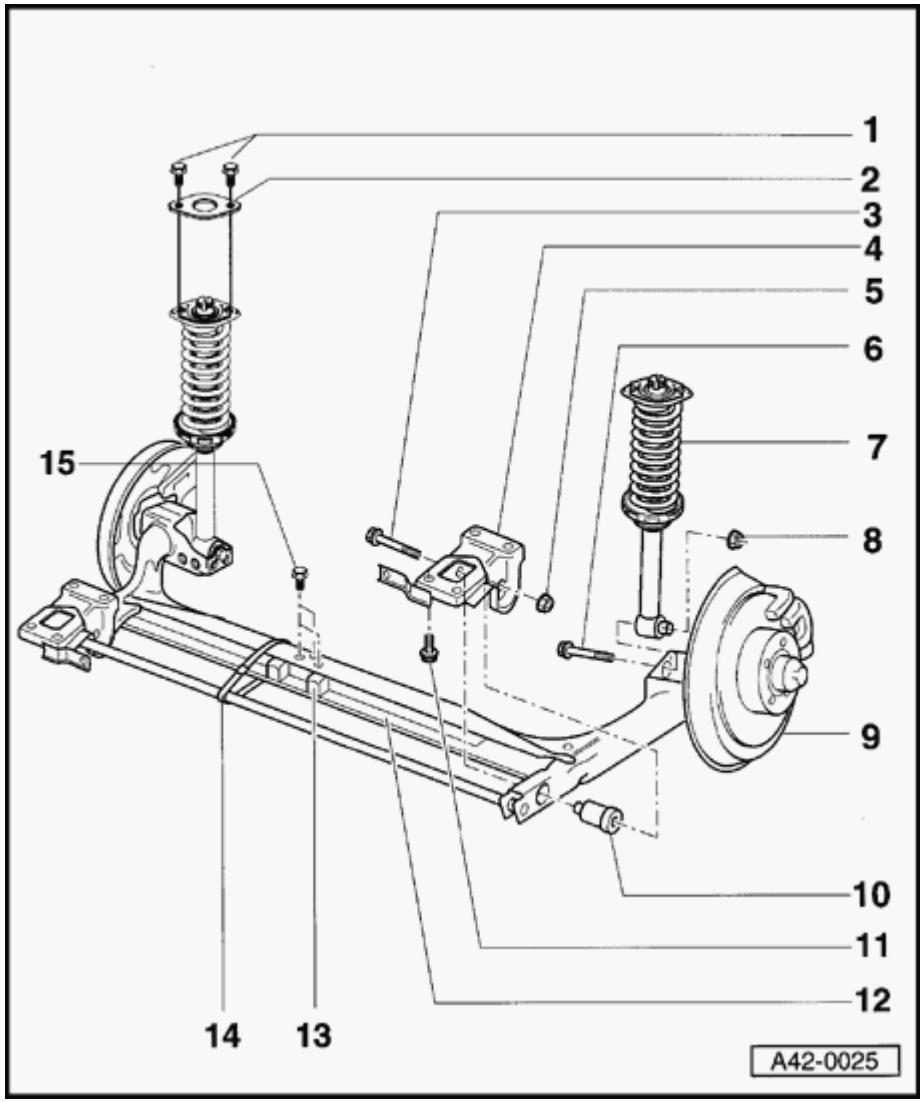
WARNING!

- ***Do not attempt to weld and/or straighten the axle beam.***
- ***Do not re-use fasteners that are worn or deformed in normal use.***
- ***Some fasteners are designed to be used only once, and are unreliable and may fail if used a second time. This includes, but is not limited to, nuts, bolts, washers, circlips and cotter pins. Always follow recommendations in this manual-replace these fasteners with new parts where indicated, and any other time it is deemed necessary by inspection.***

CAUTION!

If using power tools (pneumatic or electric), do not tighten the bolted connections more than hand-tight. Otherwise, the specified tightening torques could be exceeded.

42-2



1 - Bolts

- 25 Nm (18 ft lb)

2 - Gasket

- Always replace

3 - Bolt

- Always replace

4 - Mounting bracket

- Do not remove in order to remove rear axle
- Be careful when installing bolts

Notes:

- *If mounting bracket - 4 - is removed, carry out a rough alignment of the rear axle after installation ⇒ Fig. 1 .*
- *After all installation work is completed, check and if necessary adjust the wheel alignment ⇒ page 44-13 .*

5 - Nut

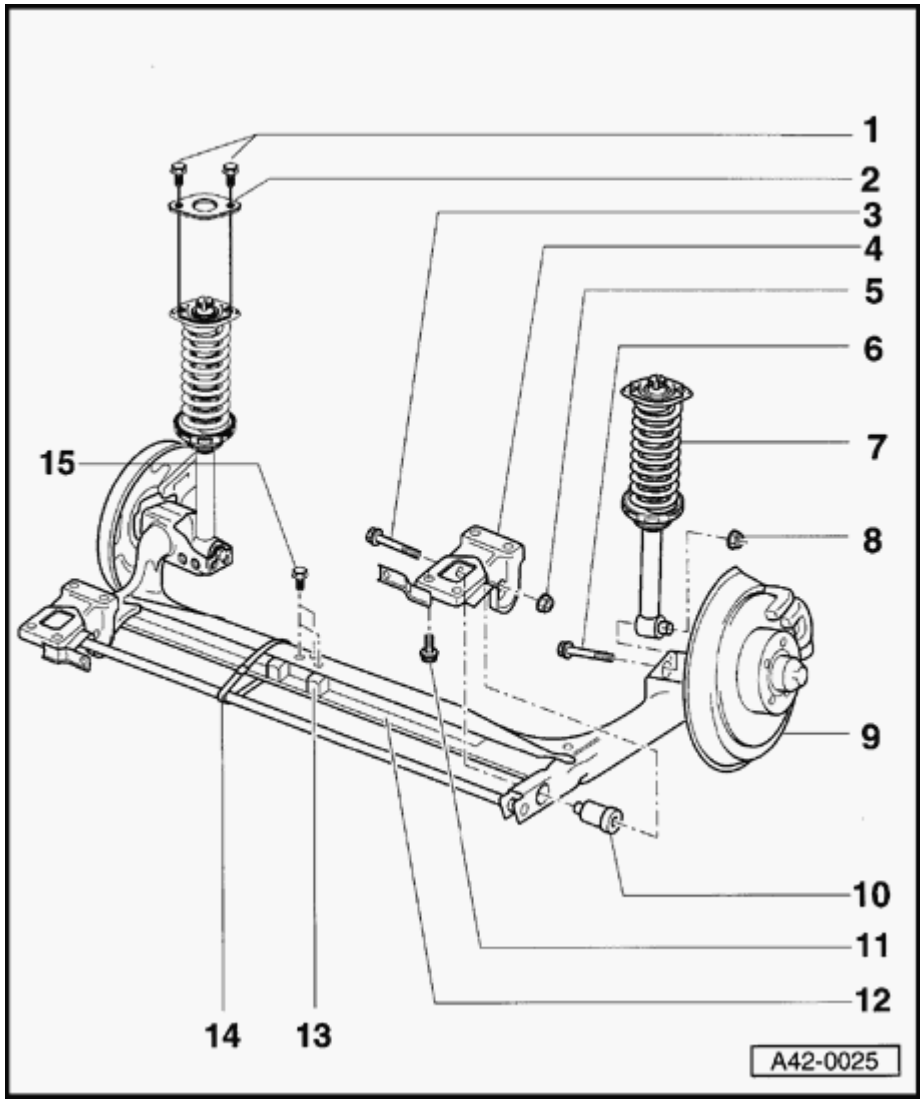
- Always replace
- 80 Nm (59 ft lb) + 1/4-turn (90 °)

6 - Bolt

- Always replace

♦ 50 Nm (37 ft lb) + 1/4-turn (90°)

42-3



7 - Suspension strut

- Different versions ⇒ vehicle data label, page 42-5
- Do not mix different versions
- Identical part for left and right-sides
- Removing and installing ⇒ page 42-24
- Servicing ⇒ page 42-26

8 - Nut

- Always replace

9 - Wheel bearing and wheel hub

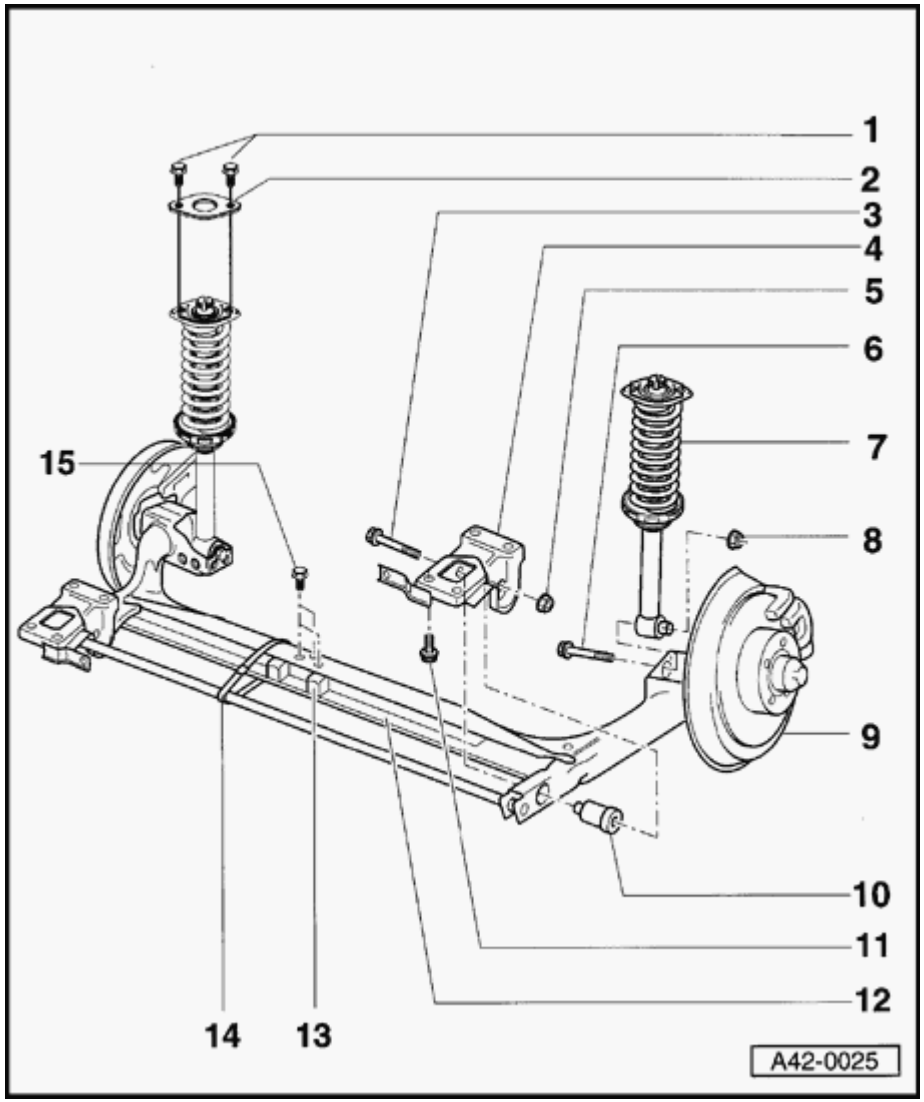
- Servicing ⇒ page 42-16

10 - Guide bushing

- Removing and installing ⇒ page 42-14

11 - Bolt

- Always replace
- 75 Nm (55 ft lb)



12 - Axle beam

- Removing and installing ⇒ page 42-8

  Through m.y. 1998 on vehicles with xenon headlights a headlight range adjuster is installed

- If equipped with headlight range control ⇒ page 42-8
- Refer to Note ⇒ page 42-49
- Contact surfaces for wheel bearing/wheel hub and threaded holes must be free of paint or dirt
- After installing, check and if necessary adjust wheel alignment

13 - Balance weights

Note:

A new guide bushing has been introduced for the A4 Avant and sedan which replaces the old guide bushing and balance weights.

14 - Retaining strap

- Installing ⇒ Figs. 2 and ⇒ 3

15 - Bolt

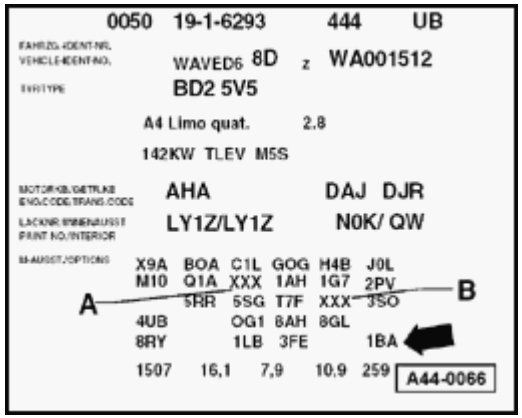
- 20 Nm (15 ft lb)

42-5

Information on weight codes (code number)

From m.y. 1998 ➢, spring/shock assemblies will be classified according to weight codes (code number) so that suspension components can be matched easily.

The spring/shock assembly installed in the vehicle is indicated by the weight code on the vehicle data label.



➢ **Example of vehicle data label**

A - Weight code for front suspension

B - Weight code for rear suspension

The vehicle data label is located in the spare wheel well and in the vehicle Maintenance booklet.

The weight codes can be used to identify the correct spring/shock assemblies on the parts catalog microfiche.

The weight code for the different suspension versions is indicated by the arrow in the illustration.

- 1BA: Standard suspension
- 1BE: Sport suspension
- 1BB: Heavy duty suspension (approx. 20 mm (3/4 in.) higher)
- 1BC: Special purpose suspension

- 1BD: Sport suspension, Audi S4
- 1BH: USA

- 1BT: Heavy duty suspension (approx. 7 mm or 1/4 in. higher)

- 1BP: Heavy duty suspension (same ride height as 1BA but with limited bump)

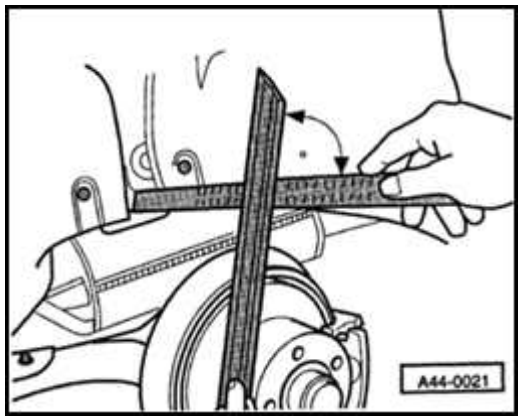


Fig. 1 Rough alignment of rear axle

- With mounting bolts loosened, push rear axle fully forward (direction of travel) and then center it from side-to-side using two rulers.

Checking wheel alignment ⇒ page 44-6 .

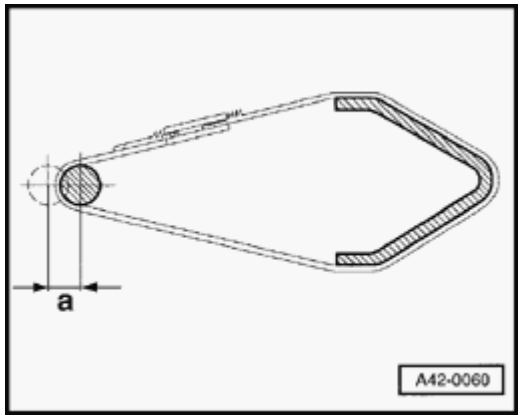


Fig. 2 Installing retaining strap

- Press center of stabilizer bar toward axle beam.

  Dimension -a-: approx. 8 mm (5/16 in.)

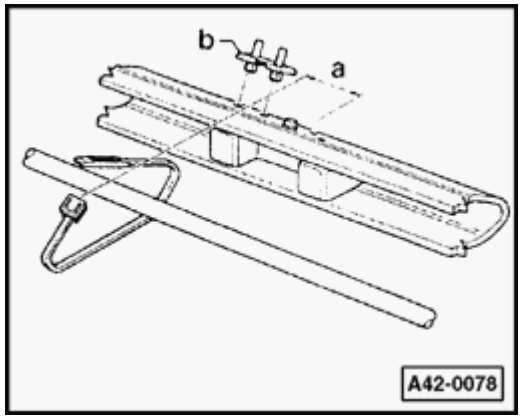


Fig. 3 Installing retaining strap (continued)

- Press stabilizer bar 8 mm (5/16 in.) toward axle beam, then install retaining strap off-set to right.

  Dimension -a-: 100 mm (3.94 in.)

- Make sure retaining strap contacts both axle beam and stabilizer bar then fasten strap (lock facing upward).

Note:

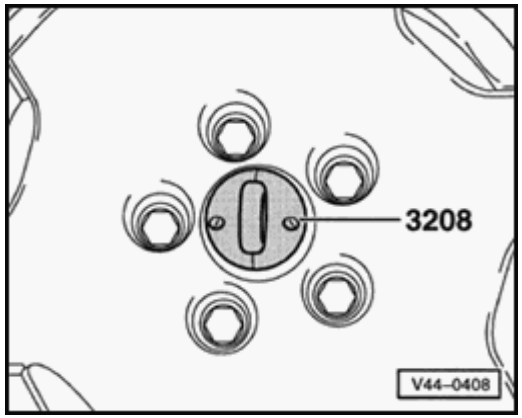
If the axle beam is supplied with pre-drilled holes for mounting retaining strap guide -b-, the guide must be used. Guide -b- correctly positions the retaining strap and dimension -a- can then be ignored.

42-8

Rear axle, removing and installing

Removing

- Vehicle must be standing on its wheels above vehicle lift

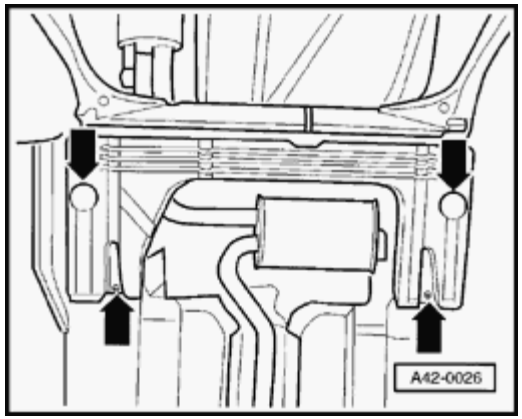


- Remove wheel trim.

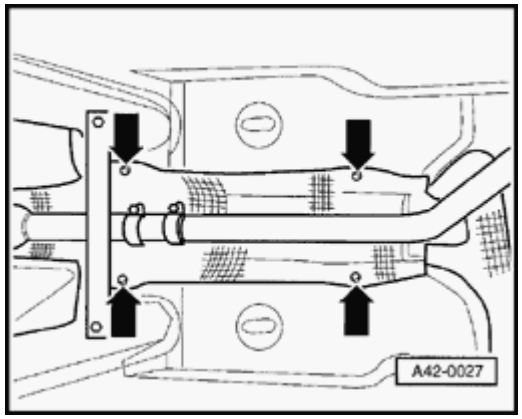
  On light alloy wheels use puller in vehicle tool kit to remove trim cap
- Raise vehicle.
- Extract brake fluid from reservoir:

⇒ *Repair Manual, Brake System, Repair Group 47*

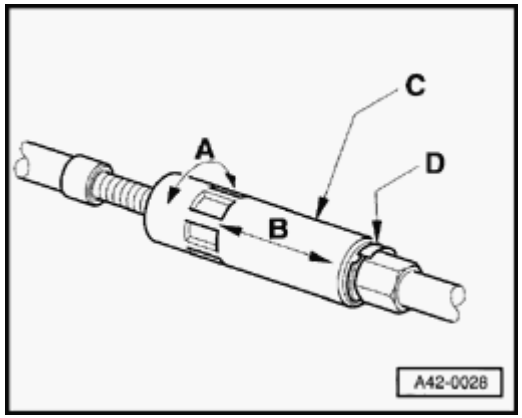
- Remove wheels.



- Remove cover (arrows).

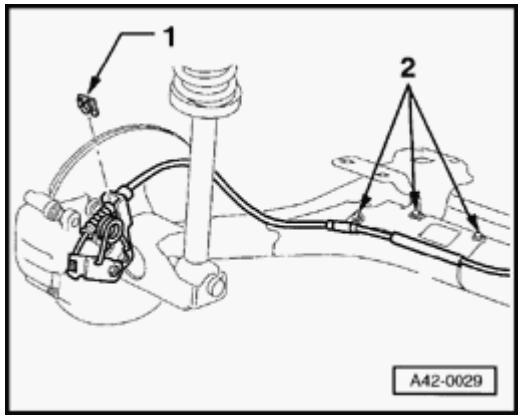


- Unbolt heat shield cover (arrows indicate bolted connections) and push forward until parking brake cable adjuster becomes accessible.

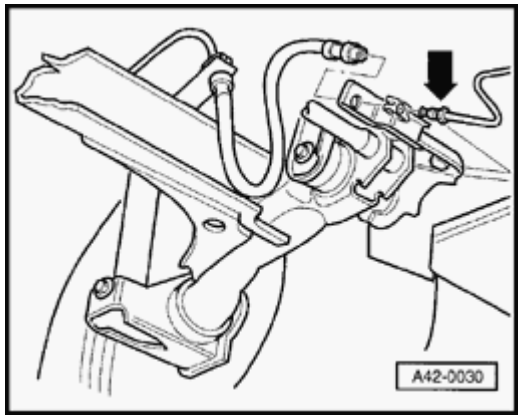


- Loosen both cable adjusters as follows:
  - Remove locking clip -D-.
  - Screw in adjusting nut -C- up to stop.
  - Push adjuster together.

42-10



- Remove locking plates -1- on left and right-sides, slightly loosen bolts -2- for cable retaining plate, and remove cables from axle beam.



- Disconnect brake lines at rear axle (arrow) on both sides.

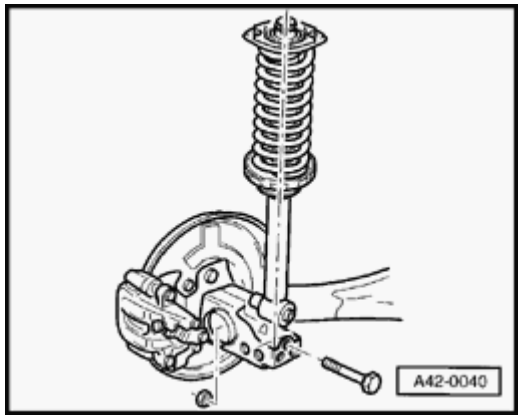
- Pull ABS wheel speed sensors out of mounting holes on both sides.

- Detach ABS wheel speed sensor wiring from rear axle.

- On vehicles with headlight range control remove linkage from axle beam.

Note:

Use VAG1383 gearbox lifter together with 1359/2 attachment for removing and installing the axle beam.



- Unbolt and remove suspension strut from axle beam.
- Remove bolts from guide bushings (⇒ page 42-2 , items -3- and -5-) and remove axle beam.

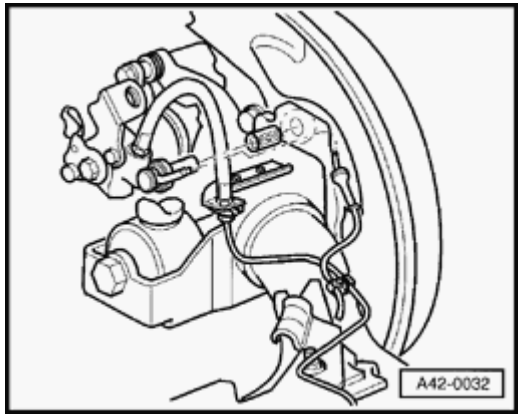
42-12

Installing

- Install axle together with guide bushings into mounting brackets and install bolts hand-tight.

- Install suspension struts and hand-tighten suspension strut to axle beam bolts.

- Coat O-ring for ABS wheel speed sensor with brake cylinder paste.



- Push ABS wheel speed sensors into wheel bearing housings up to stop.
- Install locking plates for ABS wheel speed sensors.
- Route parking brake cables and attach to brake calipers.
- Connect brake lines.
- Adjust parking brake:

⇒ *Repair Manual, Brake System, Repair Group 46*

- Install heat shield.
- Bleed brakes:

⇒ *Repair Manual, Brake System, Repair Group 47*

42-13

CAUTION!

Vehicle must be standing on its wheels when tightening guide bushing to rear axle bolts. Otherwise bonded rubber bushings will be subjected to torsion resulting in shortened service life

- Tighten guide bushing bolts (⇒ page 42-2 , items -3- and -5-).

  Tightening torque: 80 Nm (59 ft lb) + 1/4-turn (90 °)

CAUTION!

Vehicle must be standing on its wheels when tightening suspension strut to rear axle bolts. Otherwise bonded rubber bushings will be subjected to torsion resulting in shortened service life

- Tighten suspension strut to axle beam bolts (⇒ page 42-2 , items -6- and -8-).

  Tightening torque: 50 Nm (37 ft lb) + 1/4-turn (90 °)

- On vehicles with headlight range control, tighten bolted connection between headlight range

control linkage to axle beam.

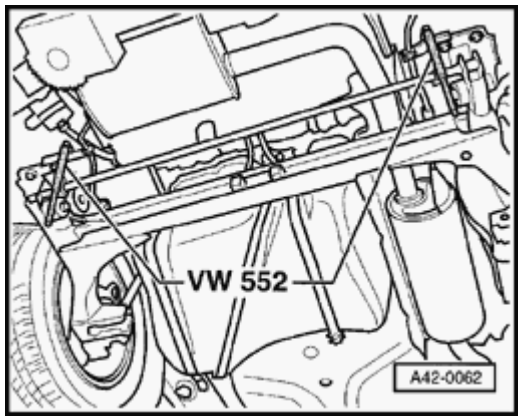
Tightening torque: 3 Nm +1/-0 Nm (27 in. lb +9/-0 in. lb)

- Install cover below rear axle.

- Check wheel alignment and adjust if necessary ⇒ page 44-6 .

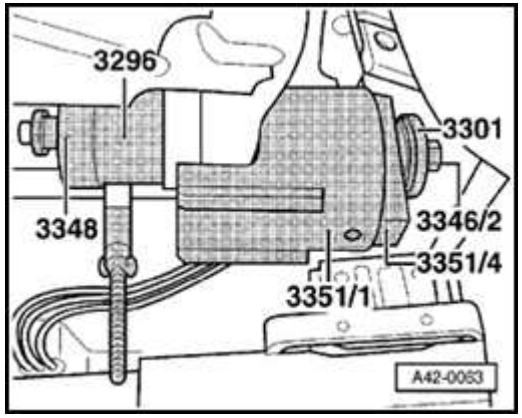
42-14

Guide bushings, removing and installing



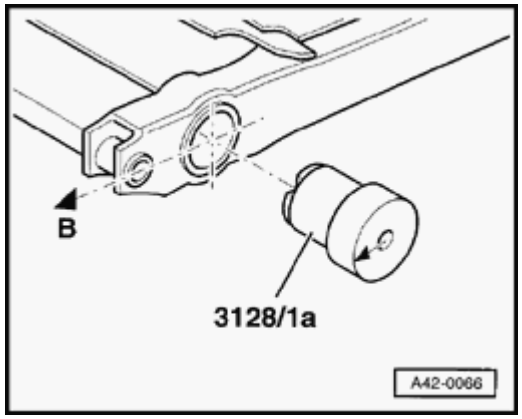
Lowering rear axle

- On vehicles with headlight range control remove linkage from axle beam.
- Remove bolts from guide bushing mount and lower axle.
- Position VW552 guide piece to prevent brake lines from becoming stressed.



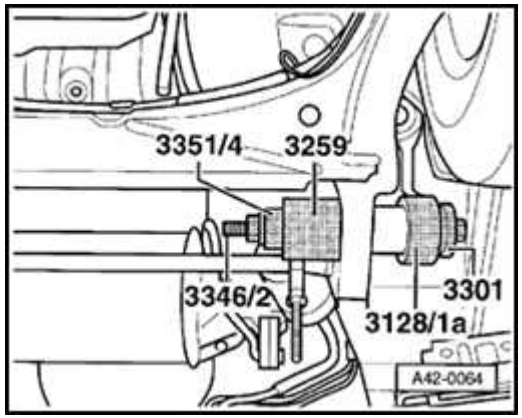
Removing guide bushing

42-15



Guide bushing installation position

The guide bushing must be pulled into the rear axle with the arrow on the 3128/1a installation piece pointing in direction -B-.



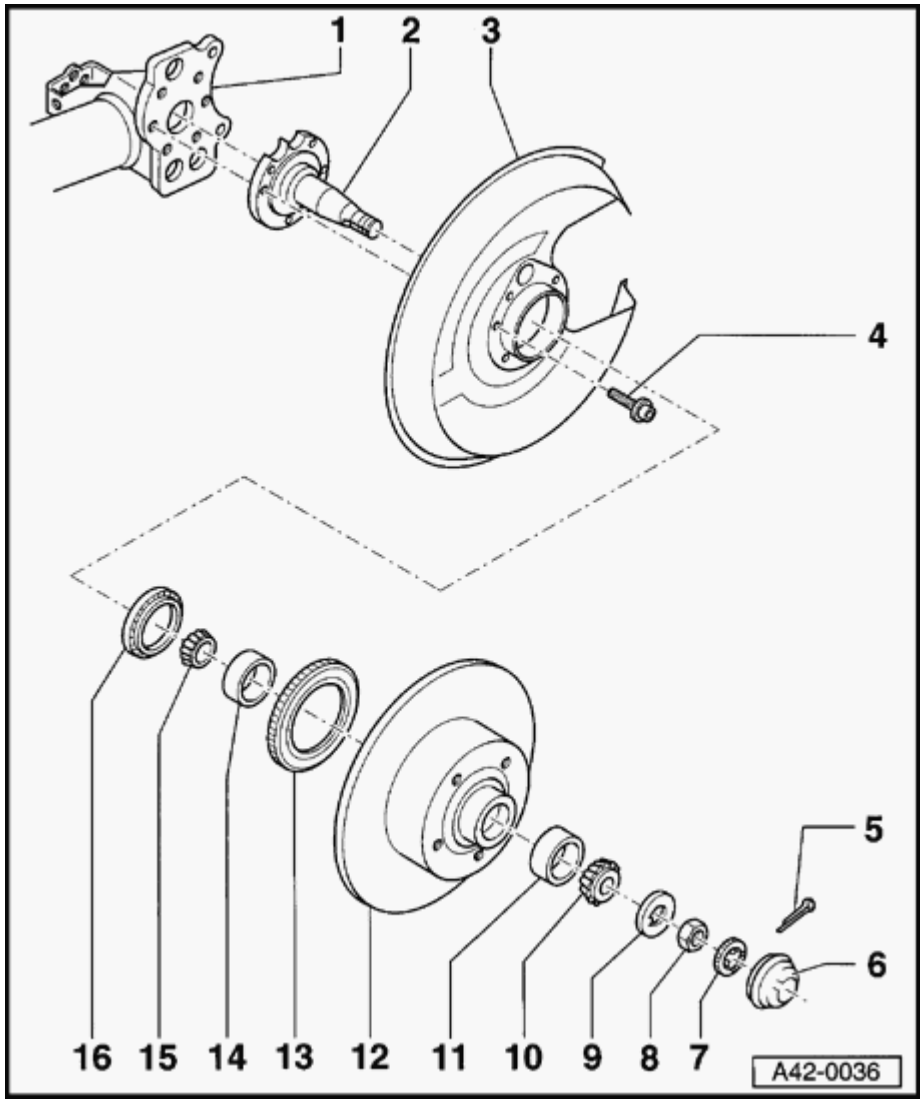
Pulling in guide bushing

The remainder of the installation is the reverse of removal.

CAUTION!

Vehicle must be standing on its wheels when tightening guide bushing to rear axle bolts. Otherwise bonded rubber bushings will be subjected to torsion resulting in shortened service life

42-16



Rear wheel bearing and wheel hub, servicing

Before carrying out work on the wheel bearings or wheel hub the wheel and brake caliper must be removed:

⇒ *Repair Manual, Brake System, Repair Group 46*

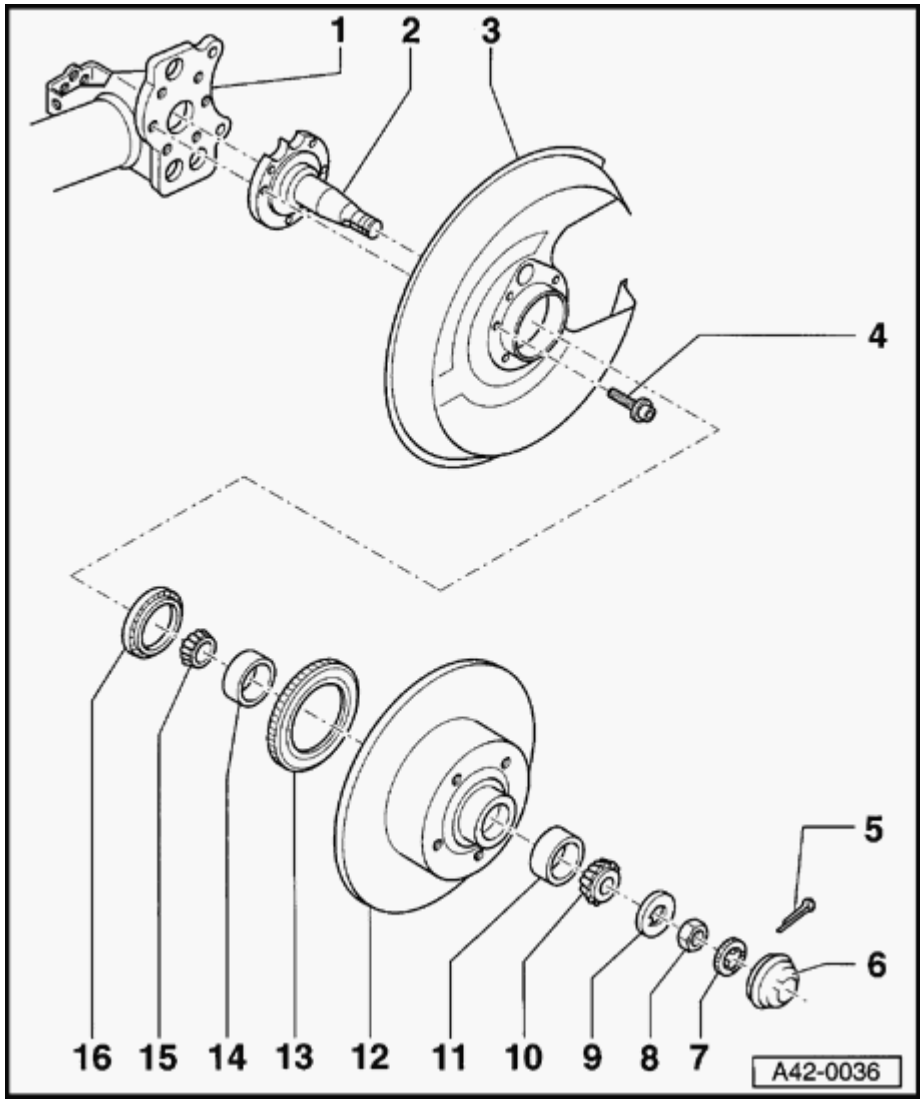
CAUTION!

- ***Suspend the brake caliper using a piece of wire.***
- ***Do not allow the caliper to hang by the brake hose. The unsupported weight can stretch and damage the brake hose.***
- ***Do not attempt to weld or straighten the load bearing components or parts of the suspension***

Notes:

- *Only re-install clean bearings; do not wash out bearings.*
- *Make sure wheel bearing clearance is set carefully.*

42-17



1 - Axle beam

- Contact surface for stub axle must be free of dirt

2 - Stub axle

- Different versions ⇒ parts catalog microfiche

3 - Splash shield

4 - Combi-bolt

- 30 Nm (22 ft lb)

5 - Cotter pin

- Always replace

6 - Grease cap

- Always replace
- Forcing off ⇒ Fig. 1
- Driving in ⇒ Fig. 2

7 - Slotted ring

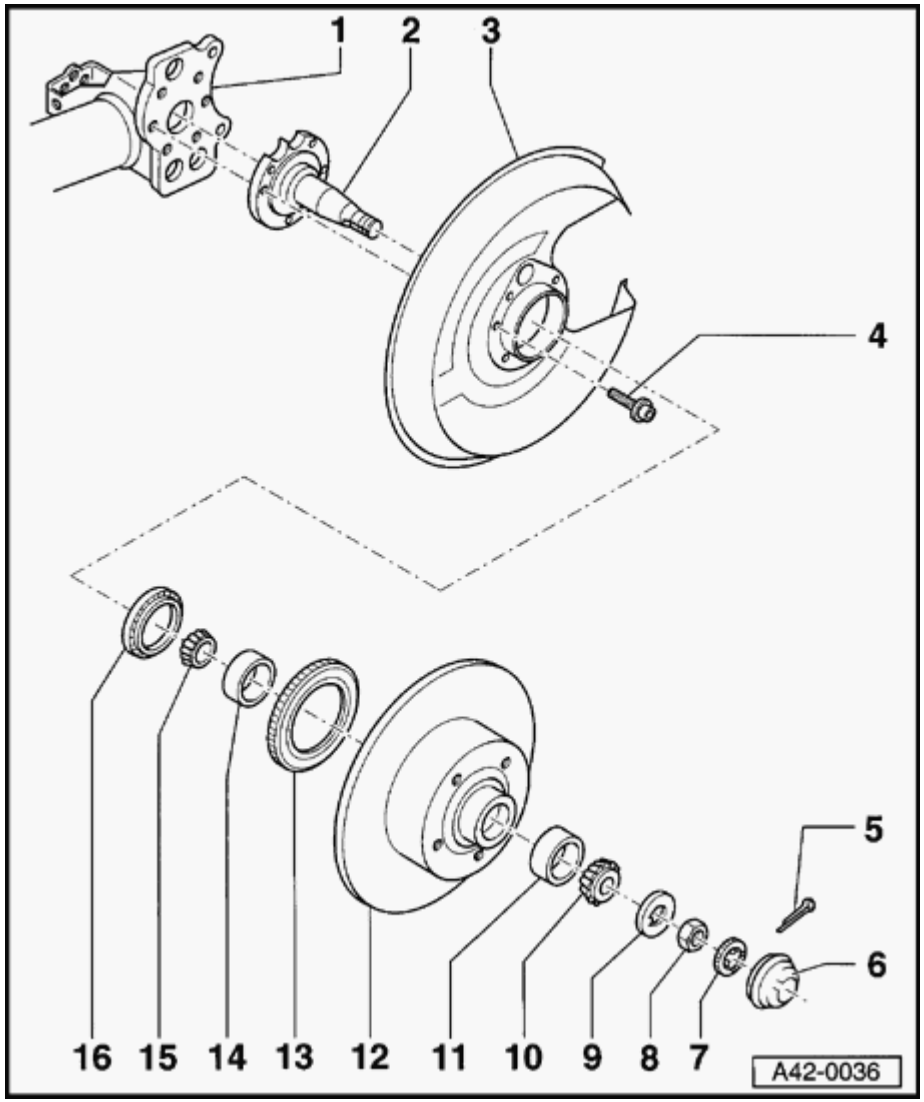
- Install over nut - 8 -

8 - Nut

- Setting wheel bearing clearance ⇒ Fig. 3

9 - Thrust washer

42-18



10 - Outer wheel bearing

- Do not wash out if bearing is to be re-used

11 - Outer wheel bearing outer race

- Use copper arbor to drive out
- Pressing in ⇒ Fig. 4
- Apply small quantity of wheel bearing grease to wheel bearing seat before pressing in bearing race

12 - Brake disc with wheel hub

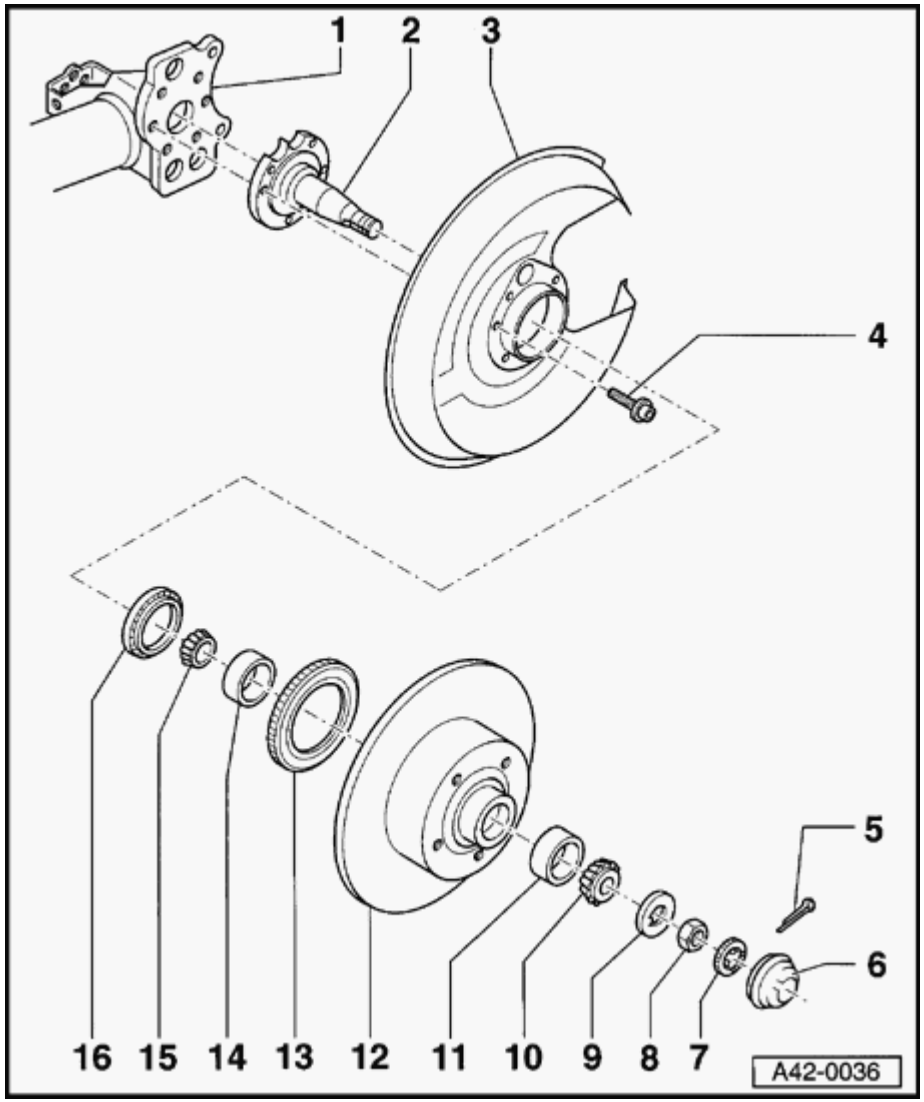
13 - ABS wheel speed sensor rotor

- Drive off evenly using copper arbor through tapped holes in wheel hub
- Pressing in ⇒ Fig. 5

14 - Inner wheel bearing outer race

- Use copper arbor to drive out outer race
- Apply small quantity of wheel bearing grease to wheel bearing seat before pressing in bearing race

42-19



15 - Inner wheel bearing

- Do not wash out if bearing is to be re-used

16 - Seal

- Always replace
- Different versions ⇒ parts catalog microfiche
- Fill area between sealing lips with multi-purpose grease ⇒ Fig. 7

42-20

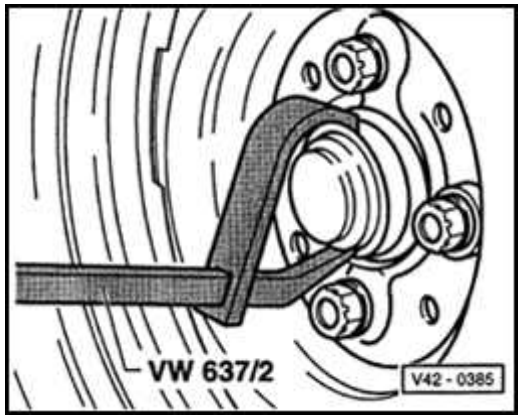


Fig. 1 Removing grease cap

- Remove grease cap from seat by tapping gently on claw of tool.

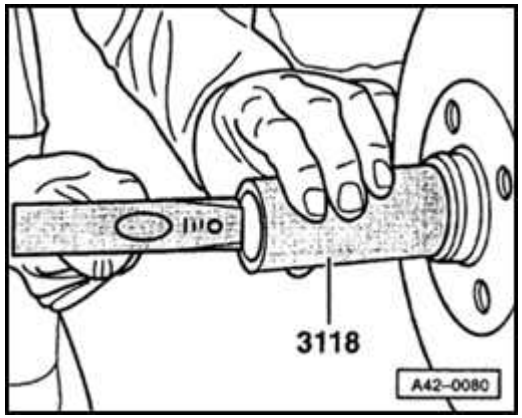


Fig. 2 Driving on grease cap

Notes:

- *Damaged (dented/buckled) grease caps permit the penetration of moisture and must always be replaced.*
- *When installing a grease cap always use the tool shown to prevent damage.*

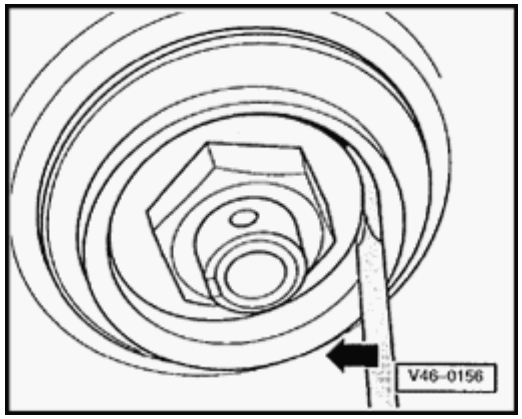


Fig. 3 Setting wheel bearing clearance

Note:

Wheel bearing play is correct when the thrust washer can just be moved using a screwdriver simply by applying pressure, without having to apply force.

- Secure with slotted ring and new cotter pin.

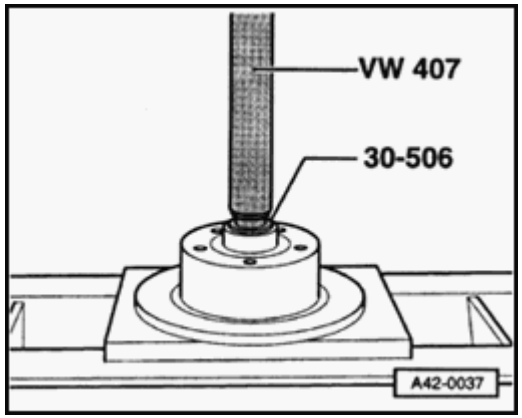


Fig. 4 Pressing in outer race for outer wheel bearing

- Apply small quantity of wheel bearing grease to wheel bearing seat before pressing in bearing race.

42-22

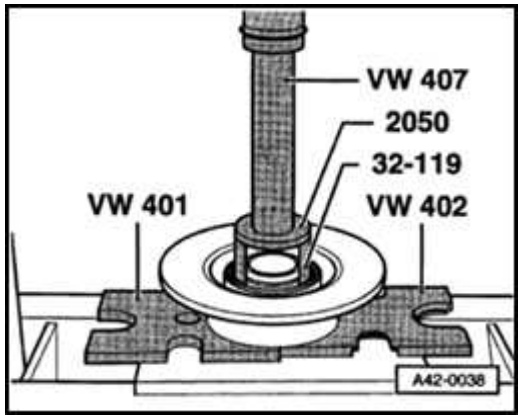


Fig. 5 Pressing in ABS wheel speed sensor rotor

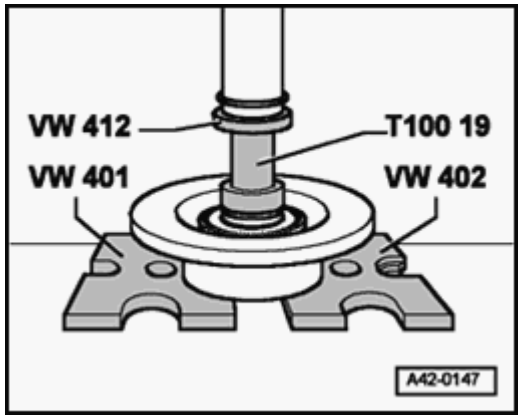


Fig. 6 Pressing in outer race for inner wheel bearing

- Apply small quantity of wheel bearing grease to wheel bearing seat before pressing in bearing race.

42-23

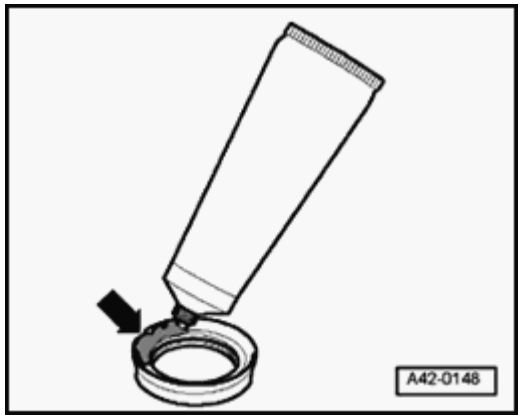


Fig. 7 Fill groove (arrow) with grease

From m.y. 1998 ➢, revised stub axles and dust lips will be installed ⇒parts catalog microfiche.

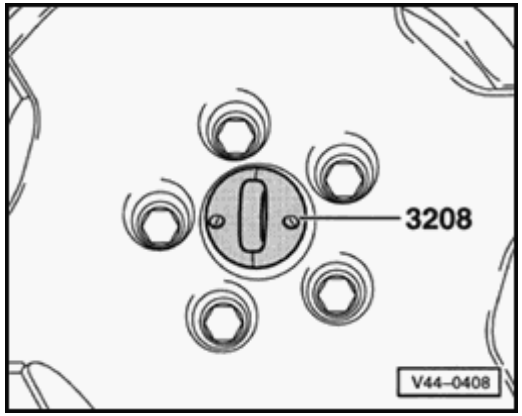
Note:

For greater clarity, the seal is shown removed.

Suspension strut, removing and installing

Removing

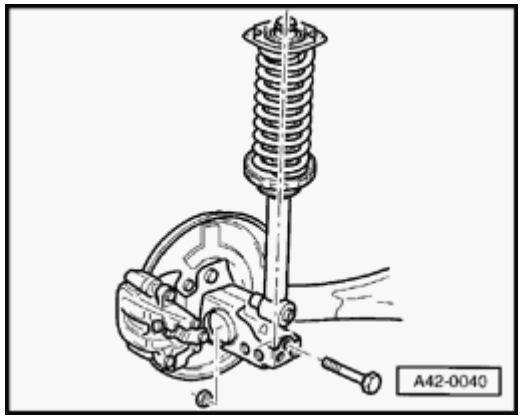
- Vehicle must be standing on its wheels above vehicle lift



- Remove wheel trim.

  On light alloy wheels use puller in vehicle tool kit to remove trim cap

- Raise vehicle.
- Remove wheel.



- Unbolt suspension strut from axle beam ⇒ page 42-2 , items -6- and -8-.
- Remove rear seat backrest side bolster cover or backrest:

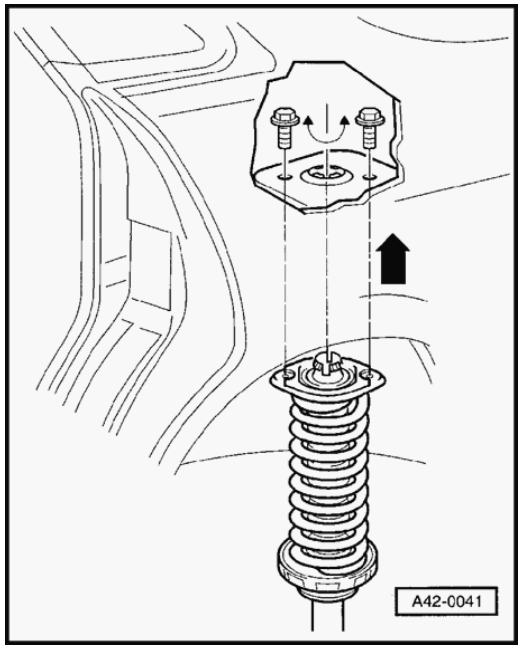
⇒ *Repair Manual, Body Interior, Repair Group 72*

- Unbolt upper suspension strut mount ⇒ page 42-2 .

Note:

In addition to the bolted connection, the suspension strut is also attached to the body by four retaining lugs.

42-25



- Turn suspension strut until retaining lugs are positioned above recesses.
- Pull suspension strut downward out of its mount.

Installing

- Install in reverse order of removal.
- Replace gasket on upper spring plate. Thoroughly clean all sealing surfaces

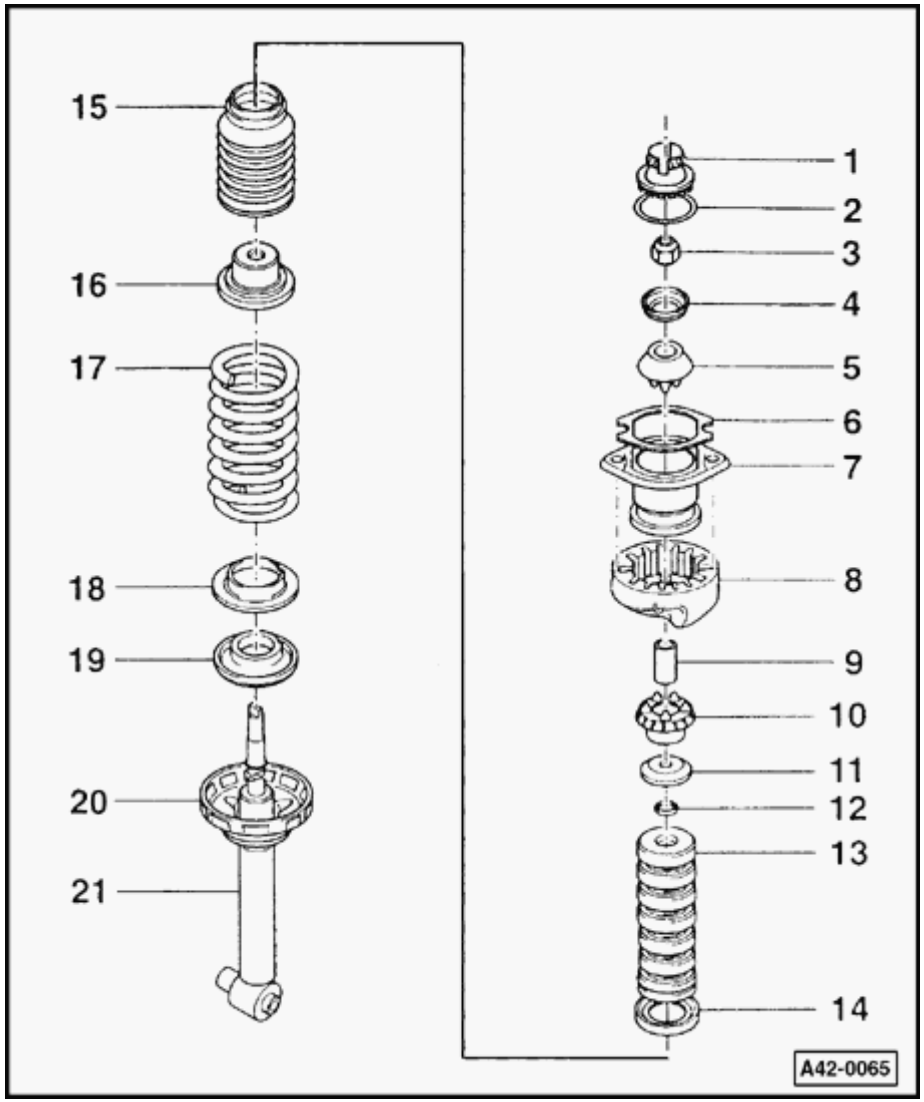
Note:

When installing, make sure that the retaining lugs engage properly.

CAUTION!

The bonded rubber bushings can only be turned to a limited extent. The bolted connections between the shock absorbers and the rear axle should therefore only be tightened when the vehicle is standing on the ground. Otherwise the bonded rubber bushings will be subjected to a torsional stress resulting in shortened service life

42-26



Suspension strut, servicing

Component locations

1 - Cap

2 - O-ring

- Coat with silicone grease, Part No. G 000 405 A2

CAUTION!

Part numbers are listed here for reference only. Always check with your Parts department for the latest information.

3 - Self-locking nut

- Always replace
- 25 Nm (18 ft lb)

4 - Dished washer

5 - Mounting ring

- Make sure installation position is correct when installing

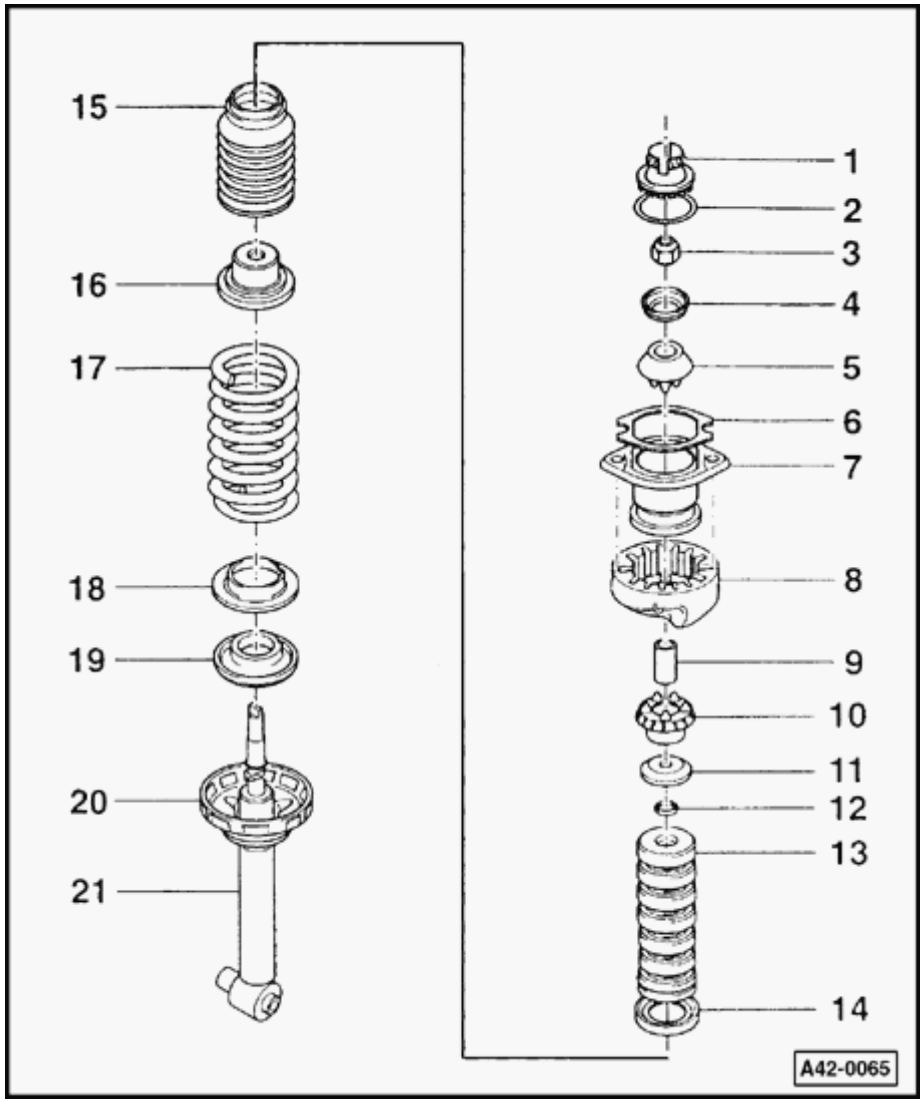
6 - Gasket (foam)

- Always replace

7 - Upper spring retainer

8 - Upper spring mount

42-27



9 - Spacer tube

10 - Mounting ring

- Make sure installation position is correct when installing

11 - Lower washer or cup

- Suspension versions 1BA, 1BP and 1BE have lower washer
- Suspension version 1BB has cup

12 - Ring

- Suspension version 1BB has different version

13 - Auxiliary spring

14 - Boot mounting ring

15 - Boot

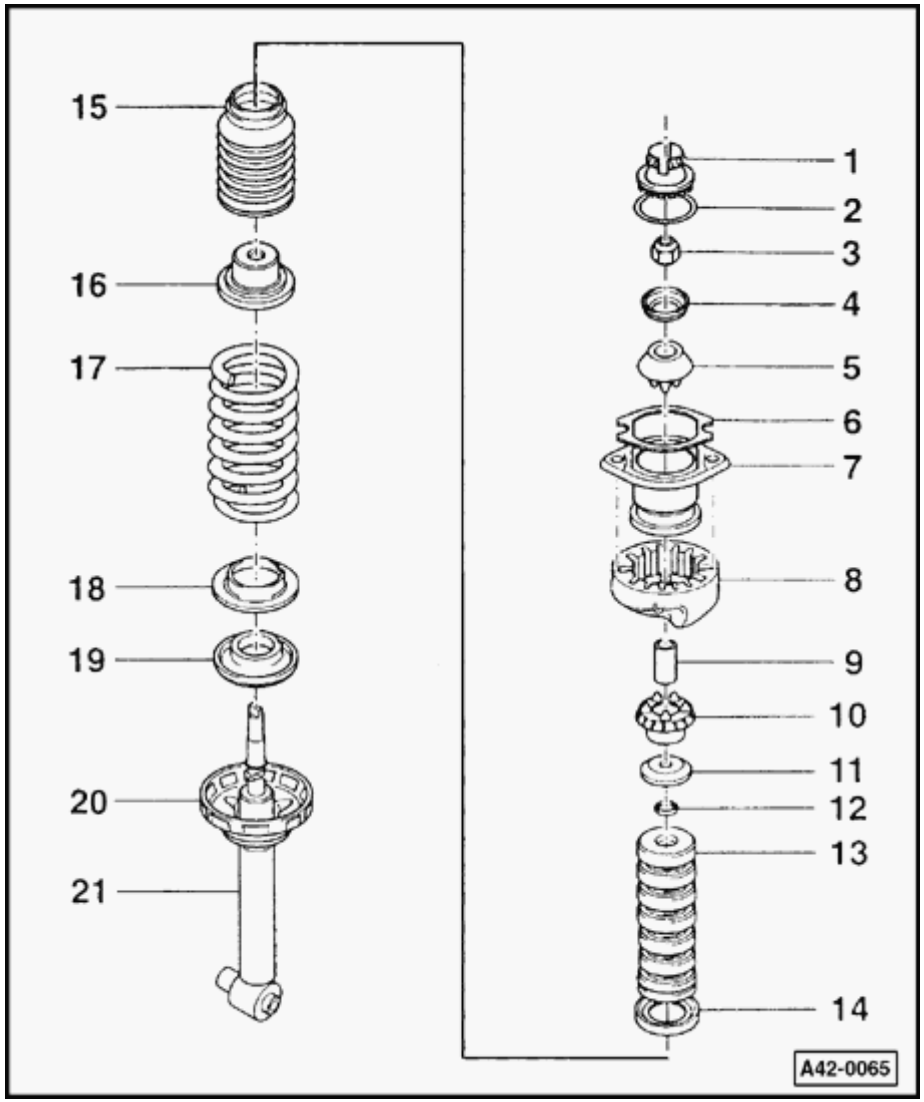
16 - Protective cap

- Suspension version 1BB has different version

17 - Spring

- Different versions depending on suspension version ⇒ vehicle data label, page 42-5
- Always replace springs in pairs
- Install with color marking at bottom

42-28



18 - Spring retainer

19 - Lower spring base

20 - Lower spring seat

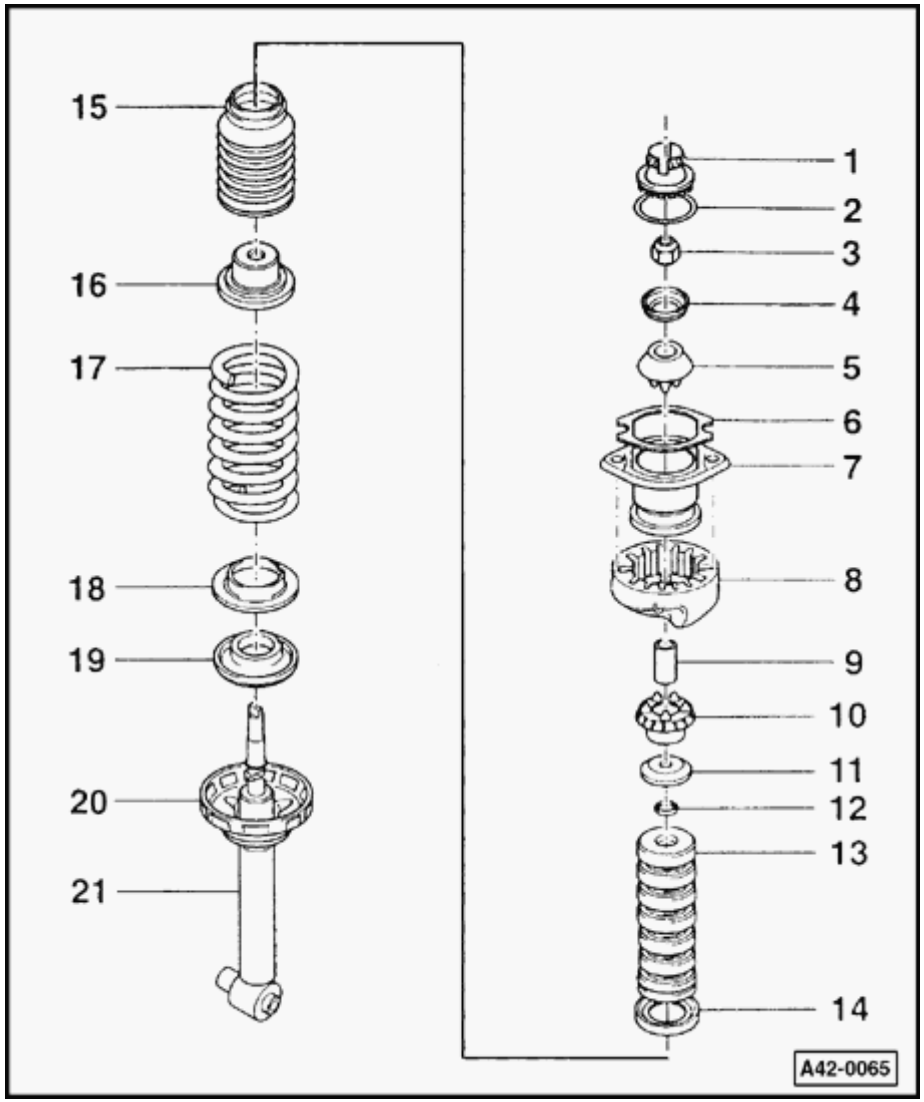
CAUTION!

Do not damage the surface of the spring when driving on the lower spring base - 19 - and the spring retainer - 18 - during assembly.

21 - Gas shock absorber

- Different versions ⇒ parts catalog microfiche
- Can be replaced individually
- Supplied as replacement part with lower spring retainer pressed on
- Different versions depending on suspension version ⇒ vehicle data label, page 42-5
- Malfunctioning shock absorbers must be disposed of properly

42-29



Checking:

- Compress shock absorber by hand. Do not press piston rod with excessive force against end stop otherwise valves could be damaged.

- Piston rod must move evenly and smoothly over entire stroke

- Release piston rod.

- Piston rod returns automatically back to starting position if gas charge is adequate

- Visually inspect shock absorber mount for settling and position of circlip on shock absorber piston rod should be checked ⇒ Special Information binder

42-30

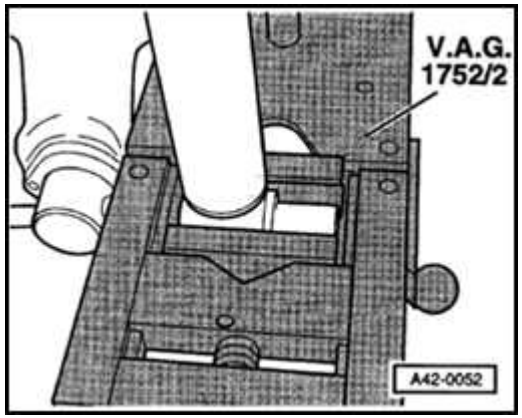
Disassembling and assembling suspension strut

Note:

Pay attention to the different components used in the various suspension versions (e.g. "Standard", "Sport" and "Heavy Duty" suspensions).

Disassembling

- Clamp VAG1752/2 spring mounting tool in vise.



- Install shock absorber into VAG1752/2 spring mounting tool.
- Use screwdriver to pry out cap ⇒ page 42-26 , item -1-.

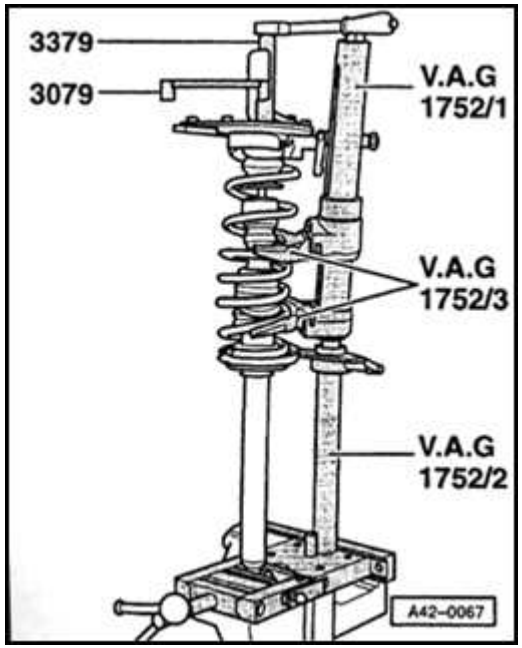


- Place VAG1752/1 spring compressor onto coil spring.

WARNING!

Make sure the coil spring is seated correctly in the VAG1752/3

adapter (arrow).

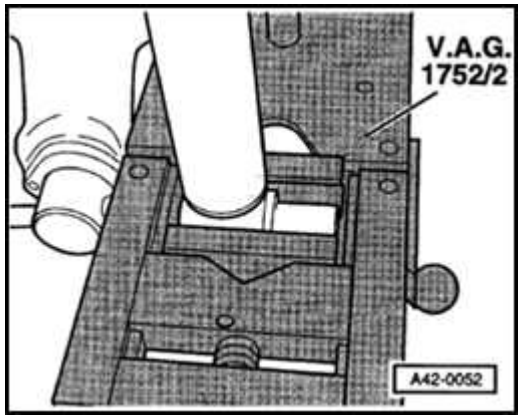


- Compress coil spring using VAG1752/1 spring compressor until upper spring retainer is free.
- Remove self-locking nut from piston rod (counter hold using hex wrench).
- Remove appropriate components.

Assembling

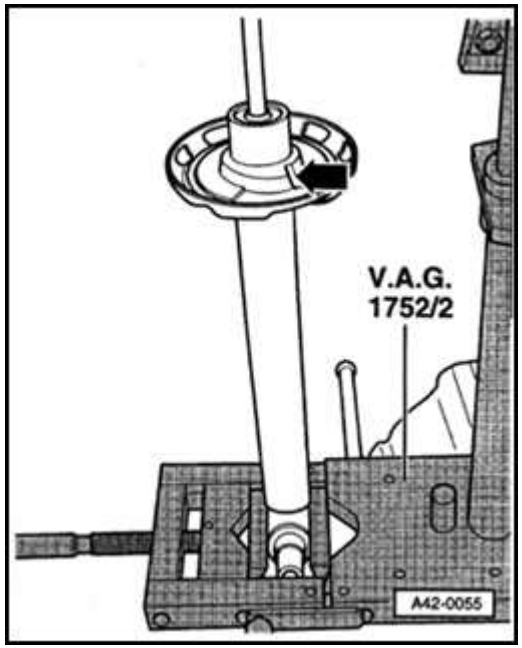
Note:

The left and right-side suspension struts are identical parts.

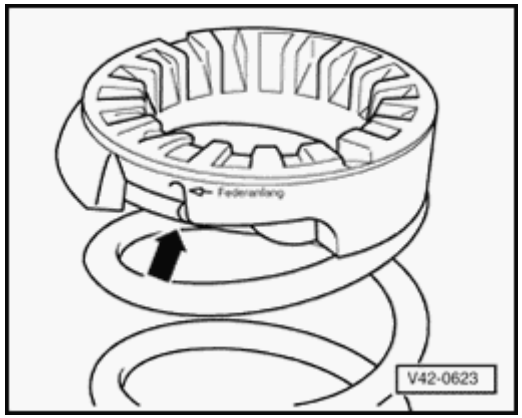


Clamp shock absorber in VAG1752/2 spring mounting tool.

42-32



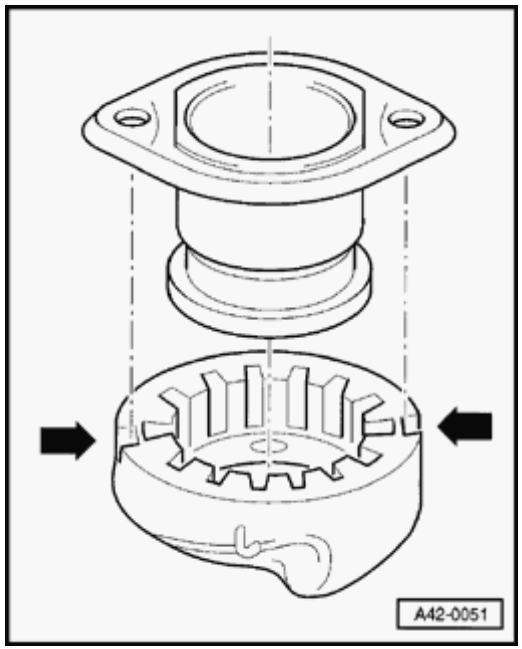
- Align lower spring base and spring retainer in direction of shock absorber eye, as illustrated.
- Install compressed coil spring.
  - End of spring coil must lie against stop on spring retainer (arrow).
- Install protective cap, boot, boot mounting ring, auxiliary spring, ring, mounting ring and spacer tube.
- Install upper spring base.



- End of coil spring ("Federanfang") must lie against recess of upper spring base (arrow).

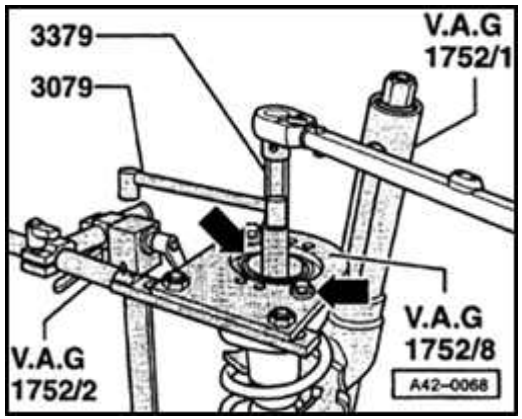
42-33

- Install upper spring retainer.



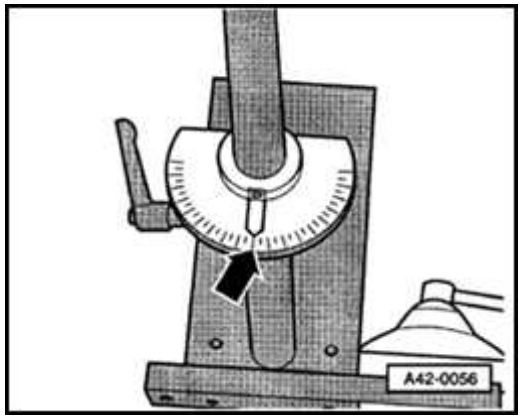
- Stamped nuts of spring retainer (arrows) must be located in recesses of spring base.

- Install mounting ring, dished washer and self-lock-nut.
- Mount VAG1752/8 adjustment gauge for struts onto VAG1752/2 spring mounting tool.

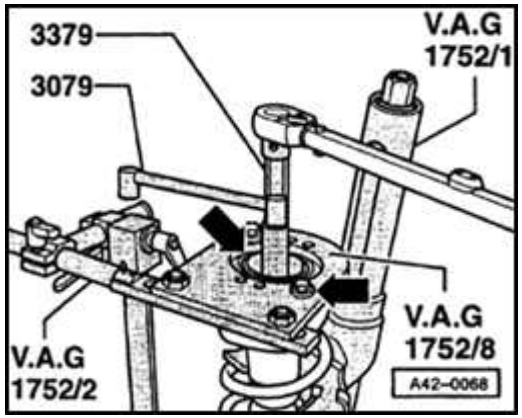


- Mount VAG1752/8 gauge onto upper spring retainer and tighten bolts.
- Lock VAG1752/2 spring mounting tool upper levers into position.

42-34



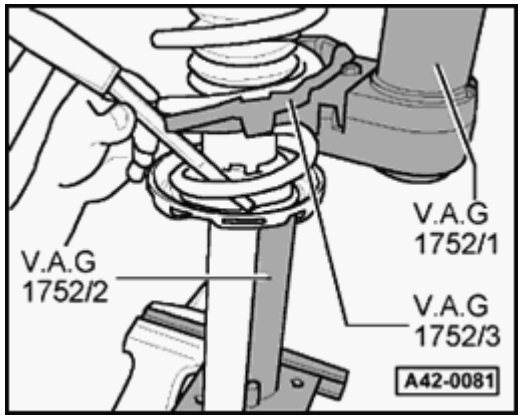
- Loosen lower locking lever and turn upper spring retainer until scale of VAG1752/2 spring mounting tool is positioned at 0° .
- Make sure that ends of springs lie against stops.
- Secure locking lever in position.



- Tighten self-locking nut using 3379 socket wrench insert and 3079 counter holder.

  Tightening torque: 25 Nm (18 ft lb)

42-35



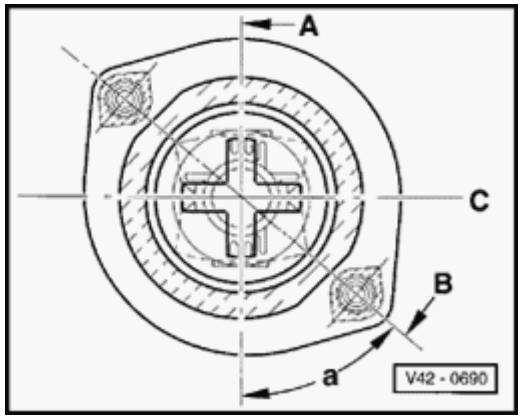
- Turn lower spring base and spring retainer (⇒ page 42-28 , items - 18 - and - 19 -) as necessary so that end of spring contacts stop.

CAUTION!

Do not damage the surface of the spring when driving on the lower spring base - 19 - and the spring retainer - 18 -.

- Carefully release compressed coil spring.
  - Make sure that coil spring and upper and lower spring retainers are correctly positioned.
- Remove VAG1752/1 spring compressor after it is free.
- Unbolt VAG1752/8 adjustment gauge for struts and remove.
- Remove suspension strut from VAG1752/2 spring mounting tool.

42-36



➢ Axis -C- of cap is offset 90° from axis -A- of shock absorber eye.

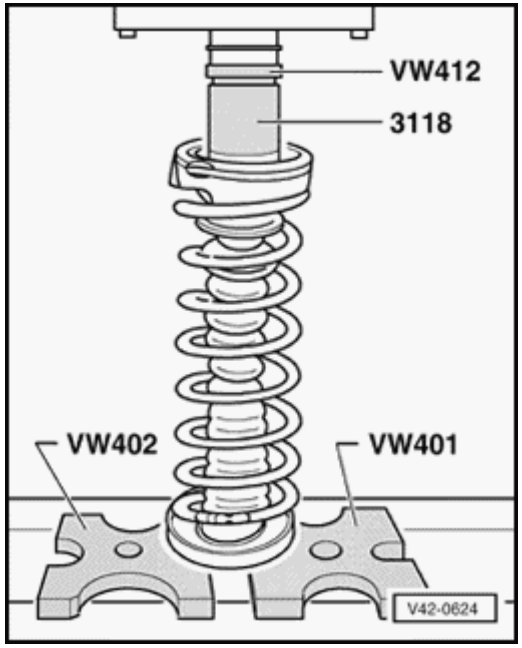
- Install cap onto upper spring retainer.

Note:

Lubricate O-ring with grease G 000 405 A2 before installing cap.

CAUTION!

Part numbers are listed here for reference only. Always check with your Parts department for the latest information.

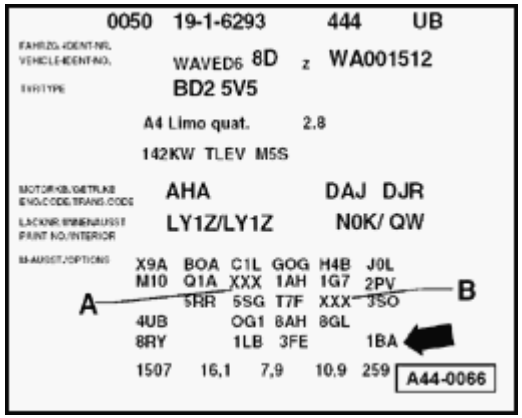


➢ - Use special tools to press in cap.

Information on weight codes (code number)

Spring/shock assemblies will be classified according to weight codes (code number) so that suspension components can be matched easily.

The spring/shock assembly installed in the vehicle is indicated by the weight code on the vehicle data label.



Example of vehicle data label

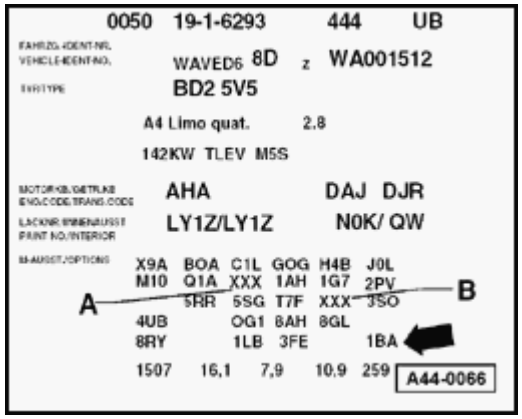
A - Weight code for front suspension

B - Weight code for rear suspension

The vehicle data label is located in the spare wheel well and in the vehicle Maintenance booklet.

The weight codes can be used to identify the correct spring/shock assemblies on the parts catalog microfiche.

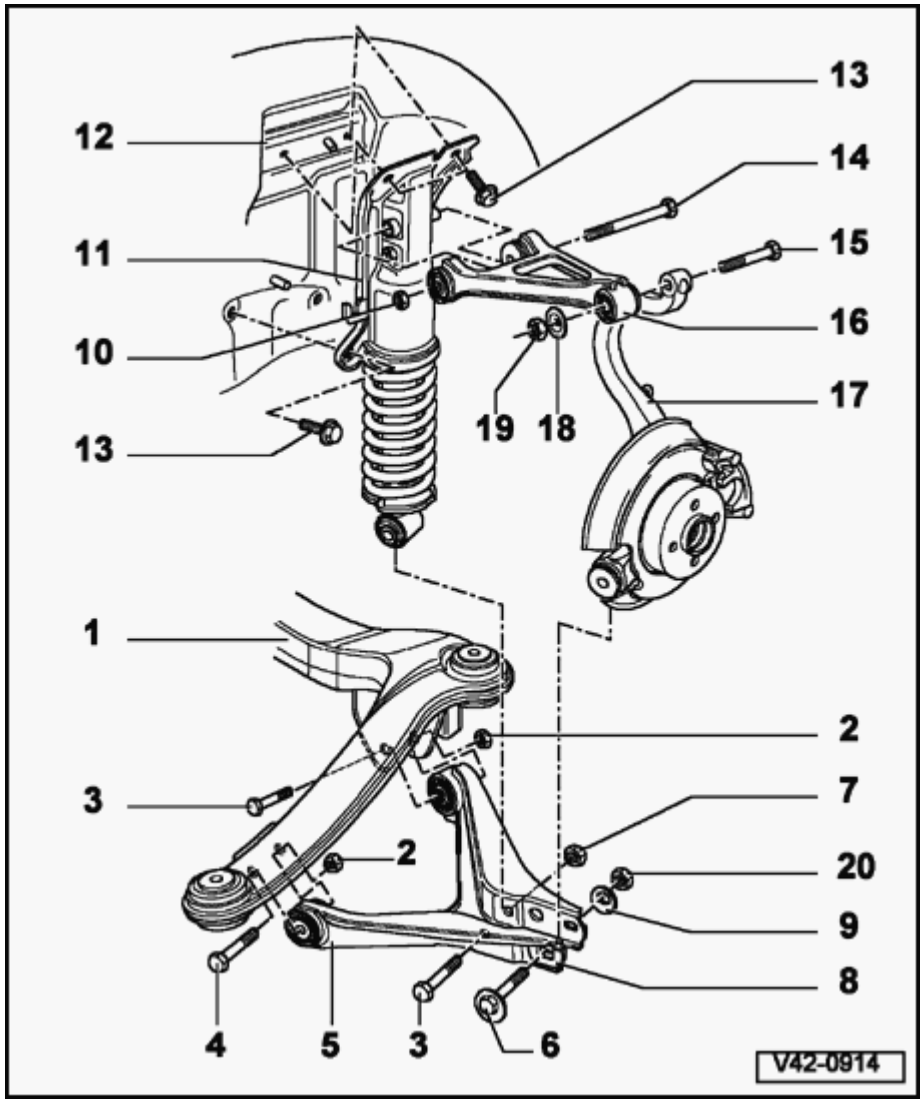
42-38



The weight code for the different suspension versions is indicated by the arrow in the illustration.

- 1BA: Standard suspension
- 1BB: Heavy duty suspension (approx. 20 mm (3/4 in.) higher)
- 1BC: Special purpose suspension
- 1BD: Sport suspension, Audi S4
- 1BE: Sport suspension
- 1BH: USA
- 1BT: Heavy duty suspension (approx. 7 mm or 1/4 in. higher)
- 1BP: Heavy duty suspension (same ride height as 1BA but with limited bump)

42-39



Rear axle, servicing (all-wheel-drive vehicles)

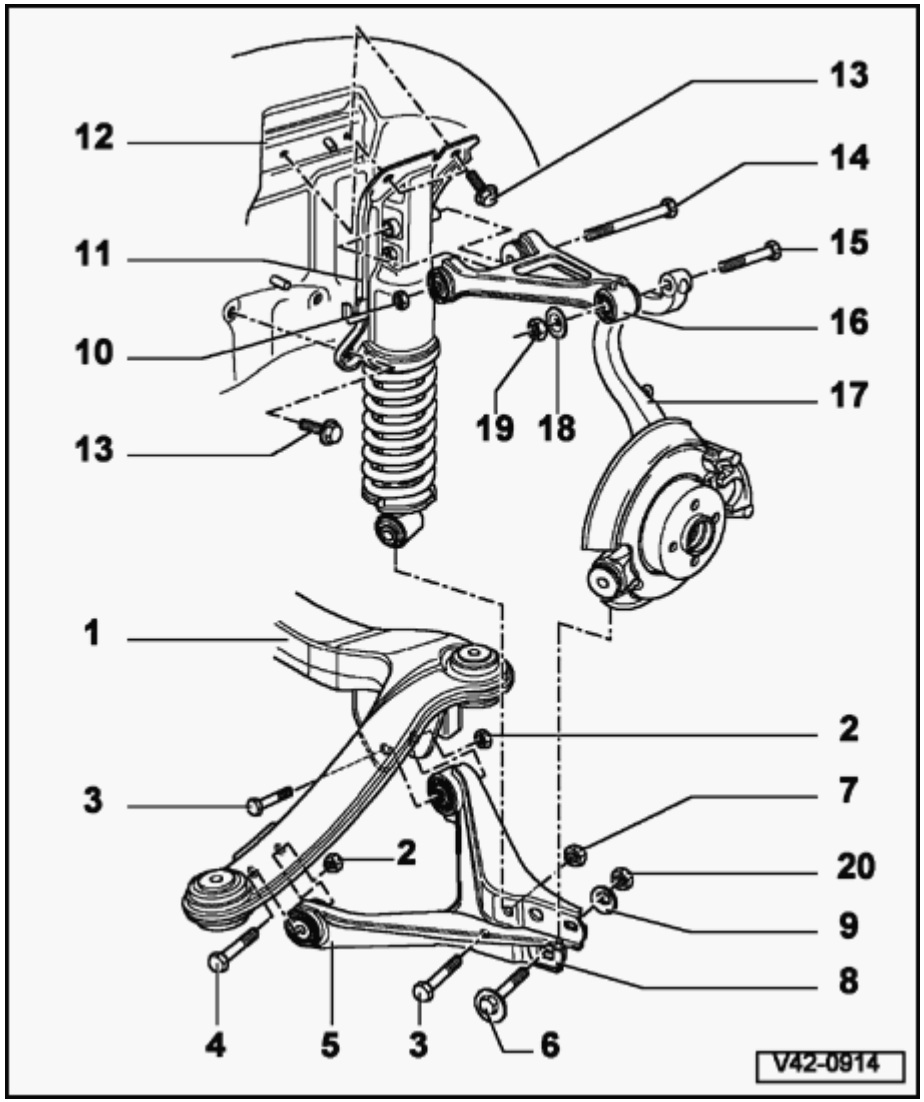
WARNING!

- ***Do not attempt to weld or straighten the load-bearing or wheel locating components of the rear suspension.***
- ***Do not re-use fasteners that are worn or deformed in normal use.***
- ***Some fasteners are designed to be used only once, and are unreliable and may fail if used a second time. This includes, but is not limited to, nuts, bolts, washers, circlips and cotter pins. Always follow recommendations in this manual-replace these fasteners with new parts where indicated, and any other time it is deemed necessary by inspection.***

CAUTION!

Do not attempt to move a vehicle from which the drive axle has been removed. Otherwise wheel bearing damage will result. If the vehicle must be moved, install an outer CV joint in place of the drive axle.

42-40



1 - Rear subframe

- After removing and installing, check wheel alignment and adjust if necessary ⇒ page 44-6
- Servicing ⇒ page 42-50
- Pay attention to removing and installing on vehicles with headlight range control ⇒ page 42-48

2 - Self-locking nut

- Always replace
- 70 Nm (52 ft lb) + 1/4-turn (90°)
- Vehicle must be standing on its wheels when tightening nut

3 - Bolt

- Always replace

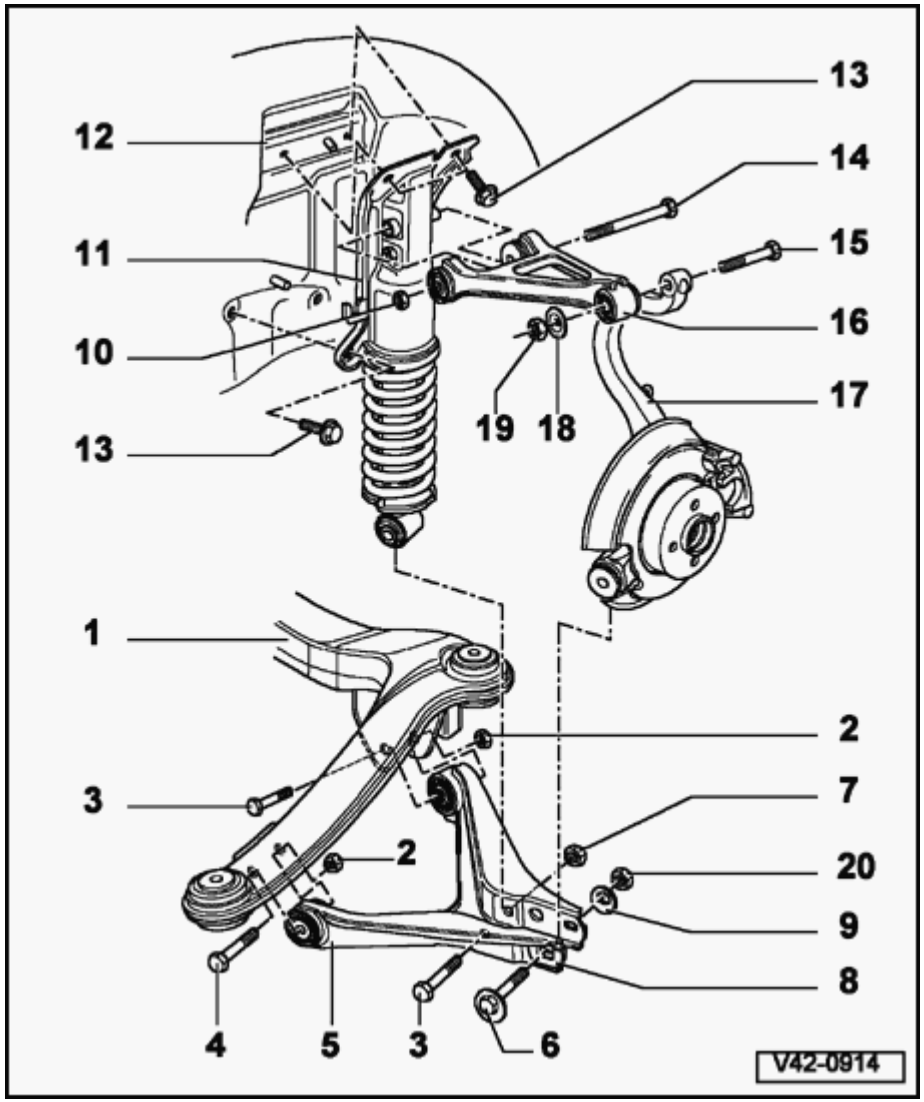
4 - Bolt

- Always replace

5 - Lower control arm

- Pay attention to removing and installing on vehicles with headlight range control ⇒ page 42-48
- Removing and installing ⇒ page 42-84
- Servicing ⇒ page 42-89

42-41



6 - Eccentric bolt

- Adjusting axle camber ⇒ page 44-22
- Do not turn more than 90° from left or right of center position (90° is minimum or maximum adjustment)

7 - Self-locking nut

- Always replace
- 70 Nm (52 ft lb) + 1/4-turn (90°)
- Vehicle must be standing on its wheels when tightening nut

8 - Support for adjusting camber

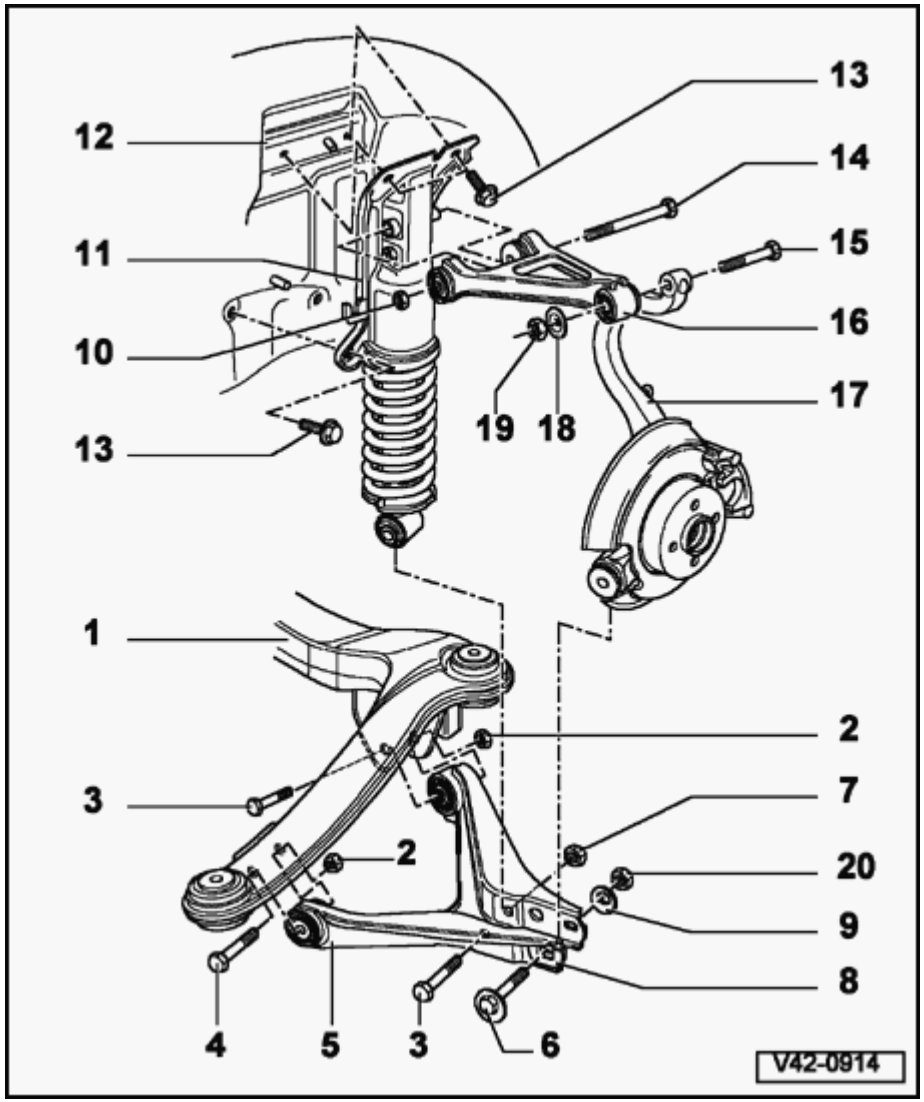
- Welded to control arm on both sides
- Make sure that eccentric bolt and washer are correctly located

9 - Eccentric washer

10 - Self-locking nut

- Always replace
- 50 Nm (37 ft lb) + 1/4-turn (90°)
- When tightening, hold upper control arm horizontal
- Vehicle must be standing on its wheels when tightening nut

42-42



11 - Suspension strut

- Removing and installing ⇒ page 42-65
- Servicing ⇒ page 42-68

12 - Wheelhousing

13 - Bolt + washer

- 55 Nm (41 ft lb)

14 - Bolt

- Always replace

15 - Bolt

- Always replace

16 - Upper control arm

- Removing and installing ⇒ page 42-65
- Servicing ⇒ page 42-81

17 - Wheel bearing housing

18 - Washer

- Always replace

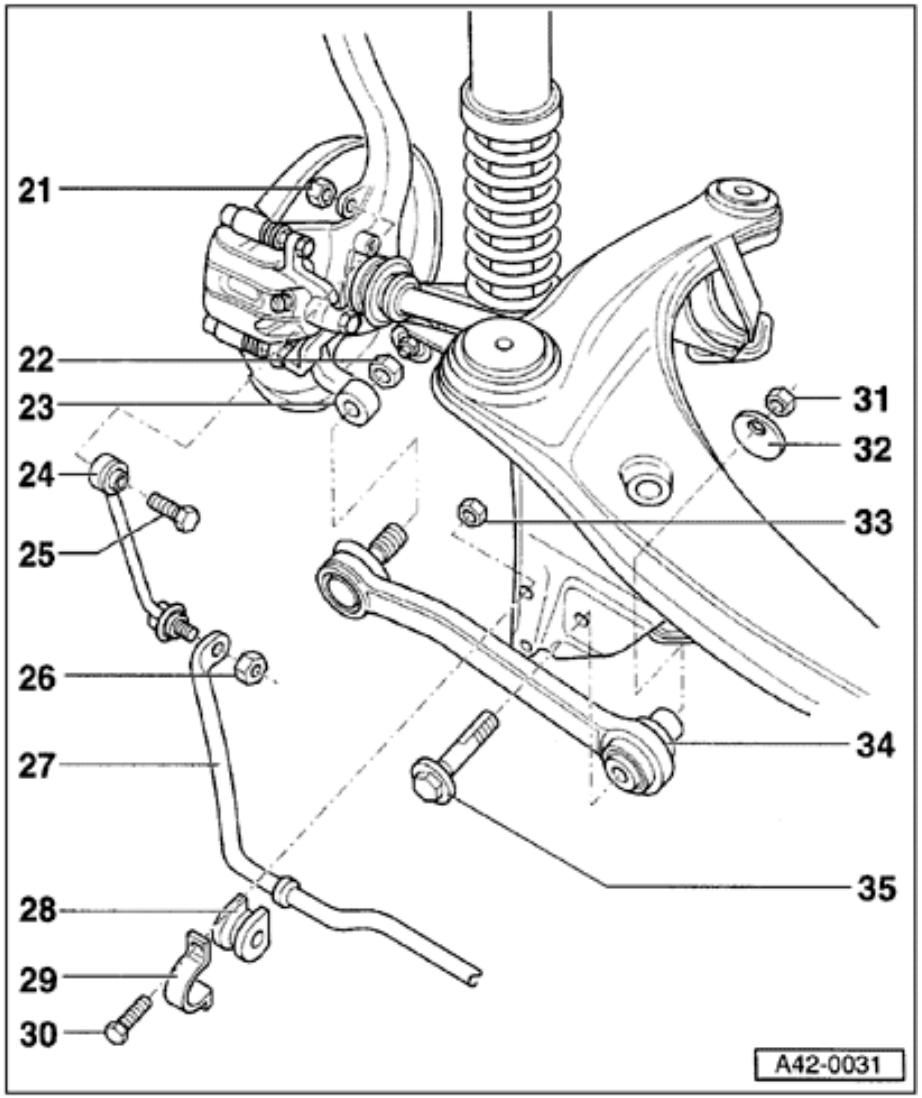
19 - Self-locking nut

- Always replace
- 50 Nm (37 ft lb) + 1/4-turn (90°)

20 - Self-locking nut

- Always replace
- 95 Nm (70 ft lb)

42-43



21 - Self-locking nut

- Always replace
- 50 Nm (37 ft lb)

22 - Self-locking nut

- Always replace
- 50 Nm (37 ft lb)
- Vehicle must be standing on its wheels when tightening nut

23 - Wheel bearing housing

- Removing and installing ⇒ page 42-106
- Servicing ⇒ page 42-110

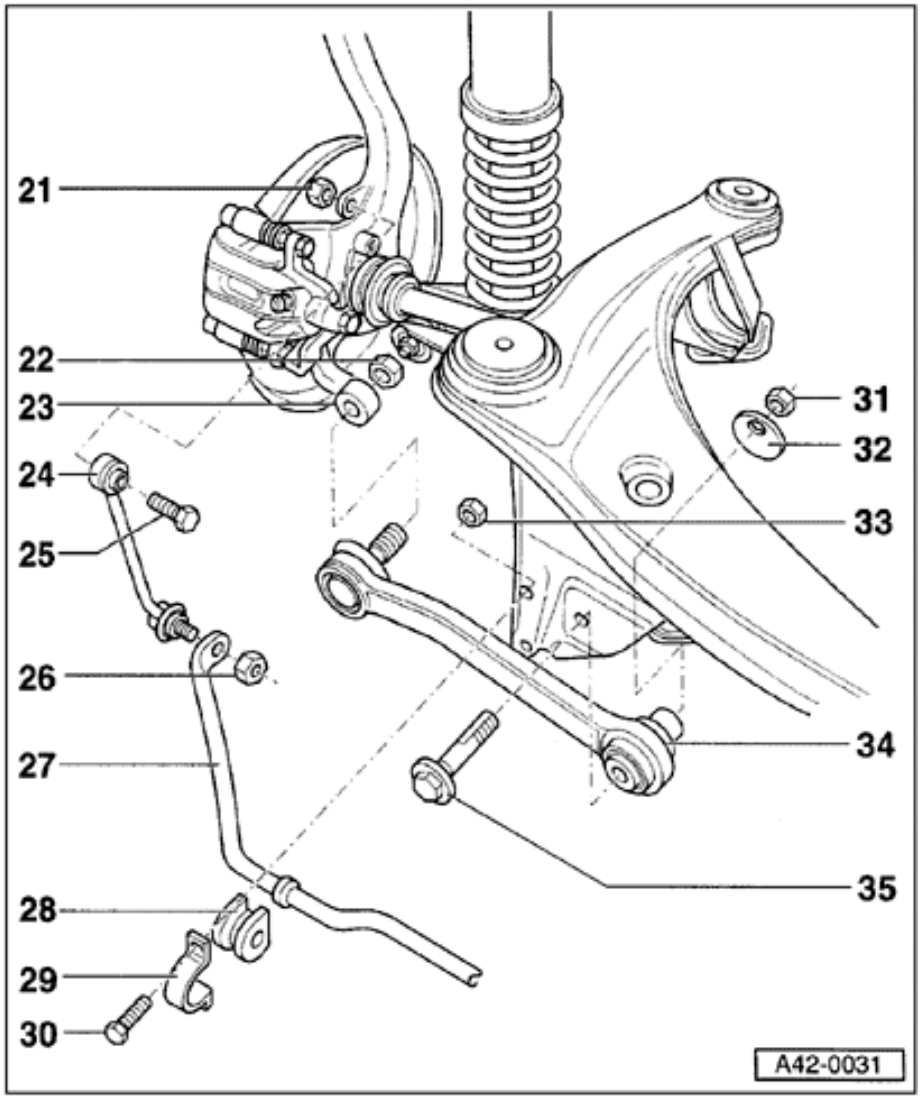
24 - Connecting link

25 - Bolt

26 - Self-locking nut

- Always replace
- 40 Nm (30 ft lb)

42-44



27 - Stabilizer bar

- Different versions depending on suspension version
- Before replacing, refer to vehicle data label to determine correct version ⇒ page 42-37

Suspension codes on data label:

- 1BA = Standard suspension
- 1BC = Special purpose suspension
- 1BP = Heavy duty suspension
- 1BE = Sports suspension
- 1BB = Heavy duty suspension
- 1BD = Audi S4
- 1BT = Heavy duty suspension

28 - Bushing

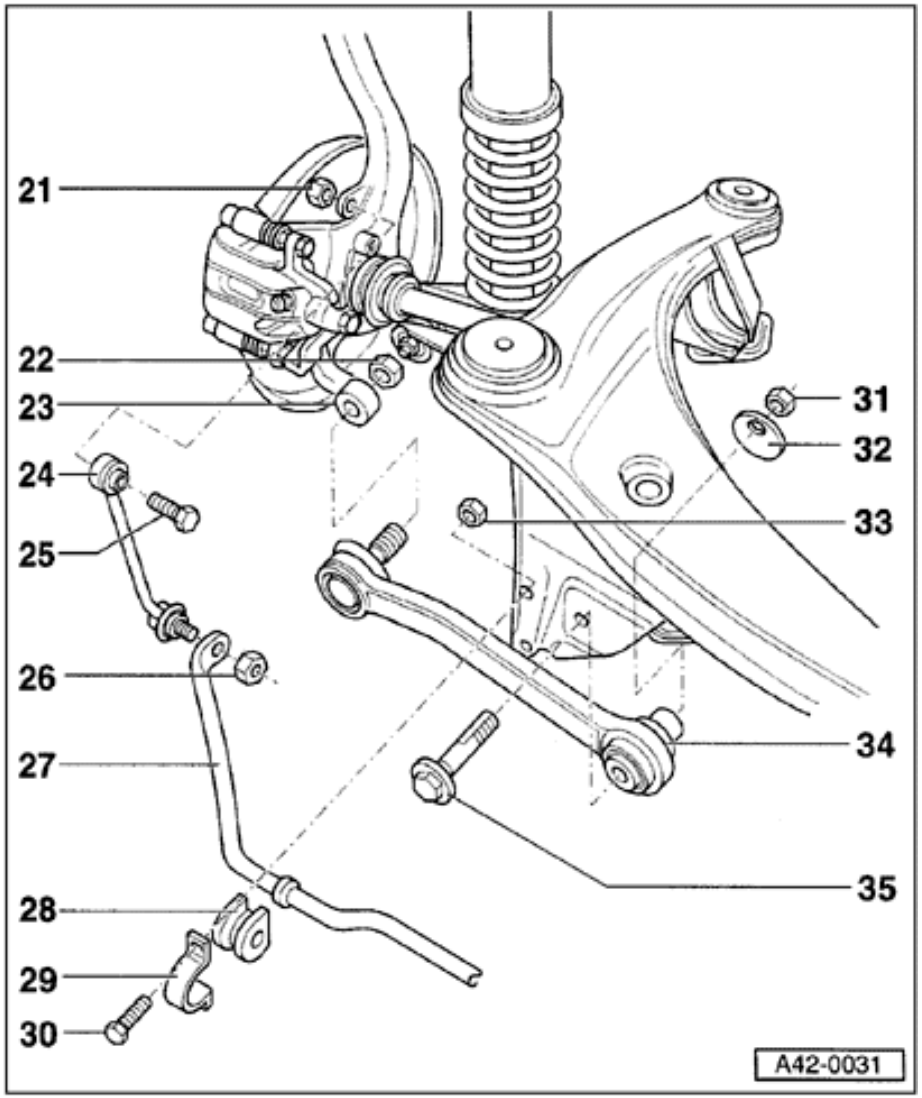
- Different versions depending on suspension version
- Before replacing, refer to vehicle data label to determine correct version ⇒ page 42-37

Suspension codes on vehicle data label:

- 1BA = Standard suspension
- 1BC = Special purpose suspension

- 1BP = Heavy duty suspension
- 1BE = Sports suspension
- 1BB = Heavy duty suspension
- 1BD = Audi S4
- 1BT = Heavy duty suspension

42-45



29 - Bracket

30 - Bolt

- 25 Nm (18 ft lb)

31 - Self-locking nut

- Always replace
- 90 Nm (66 ft lb)
- Vehicle must be standing on its wheels when tightening nut

32 - Eccentric washer

33 - Self-locking nut

- Always replace

34 - Track rod

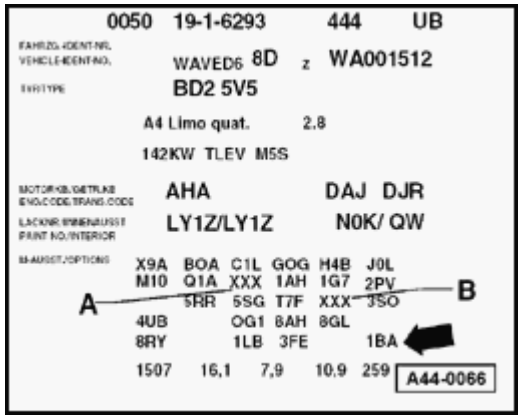
35 - Eccentric bolt for adjusting wheel toe

- Adjusting axle toe ⇒ page 44-23
- Do not turn more than 90° from left or right of center position (90° is minimum or maximum adjustment)

Information on weight codes (code number)

From model year 1998 ➢, spring/shock assemblies will be classified according to weight codes (code number) so that suspension components can be matched easily.

The spring/shock assembly installed in the vehicle is indicated by the weight code on the vehicle data label.



➢ **Example of vehicle data label**

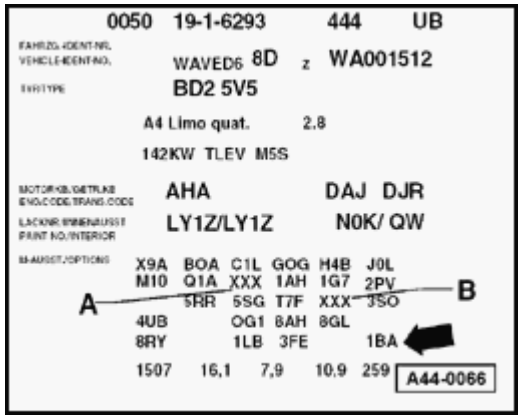
A - Weight code for front suspension

B - Weight code for rear suspension

The vehicle data label is located in the spare wheel well and in the vehicle Maintenance booklet.

The weight codes can be used to identify the correct spring/shock assemblies on the parts catalog microfiche.

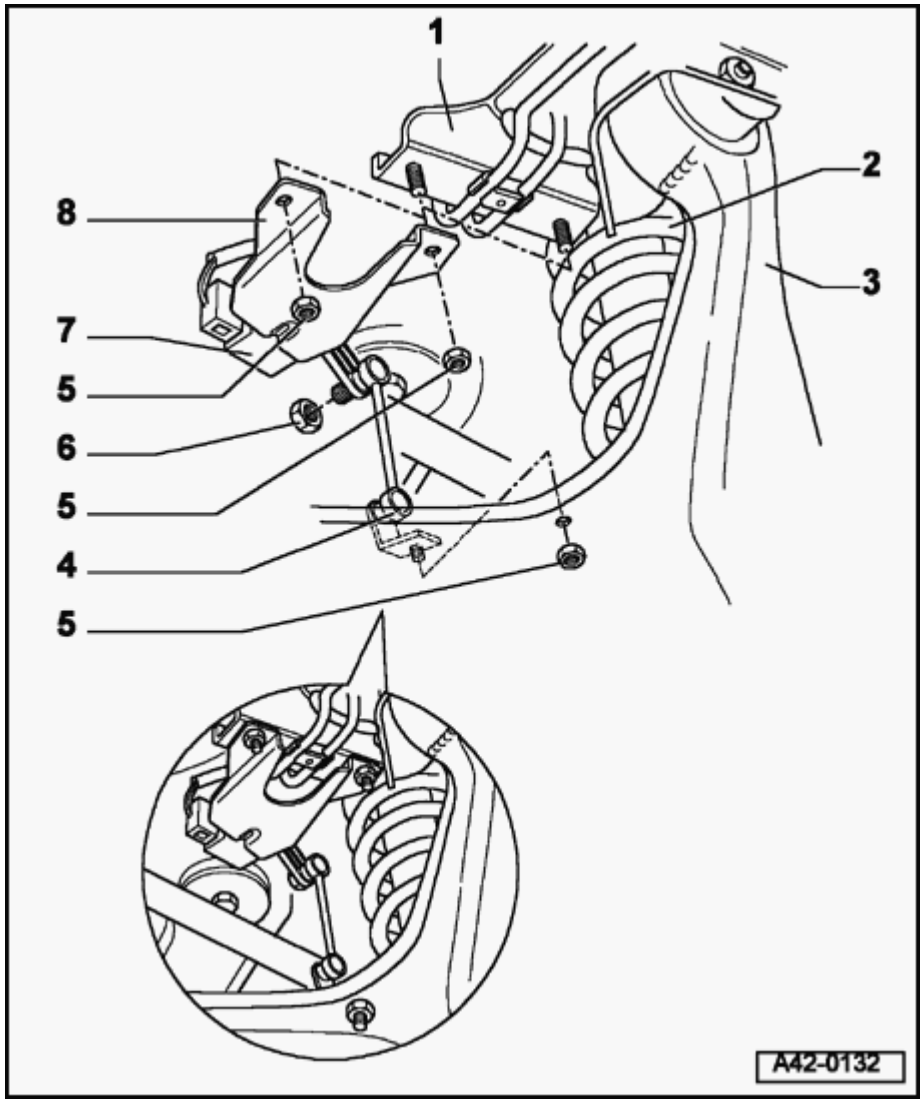
42-47



The weight code for the different suspension versions is indicated by the arrow in the illustration.

- 1BA: Standard suspension
- 1BB: Heavy duty suspension (approx. 20 mm (3/4 in.) higher)
- 1BC: Special purpose vehicles
- 1BD: Sport suspension, Audi S4
- 1BE: Sport suspension
- 1BH: USA
- 1BT: Heavy duty suspension (approx. 7 mm or 1/4 in. higher)
- 1BP: Heavy duty suspension (same ride height as 1BA but with limited bump)

42-48



Headlight range control, removing and installing

As a running change in m.y. 1998 ➢ vehicles with xenon headlights may have a connection for the headlight range control installed in the left-rear of the headlight.

1 - Subframe

2 - Suspension strut

3 - Lower control arm

4 - Linkage for headlight range control

5 - Self-locking nuts

- 10 Nm (7 ft lb)

6 - Nut

- 3 Nm +1/-0 Nm (27 in. lb +9/-0 in. lb)
- Observe Note ⇒ page 42-49

7 - Sensor for headlight range control

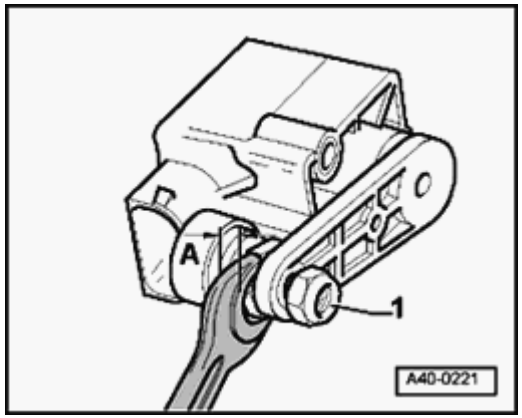
8 - Mounting bracket

42-49

When removing the rear axle or lower control arm It is essential to loosen the linkage for the headlight range control at lower control arm.

Note:

For mounting linkage to sensor for headlight range control use a 10 mm open end wrench with a thickness of distance -A-) to avoid damage to the seal

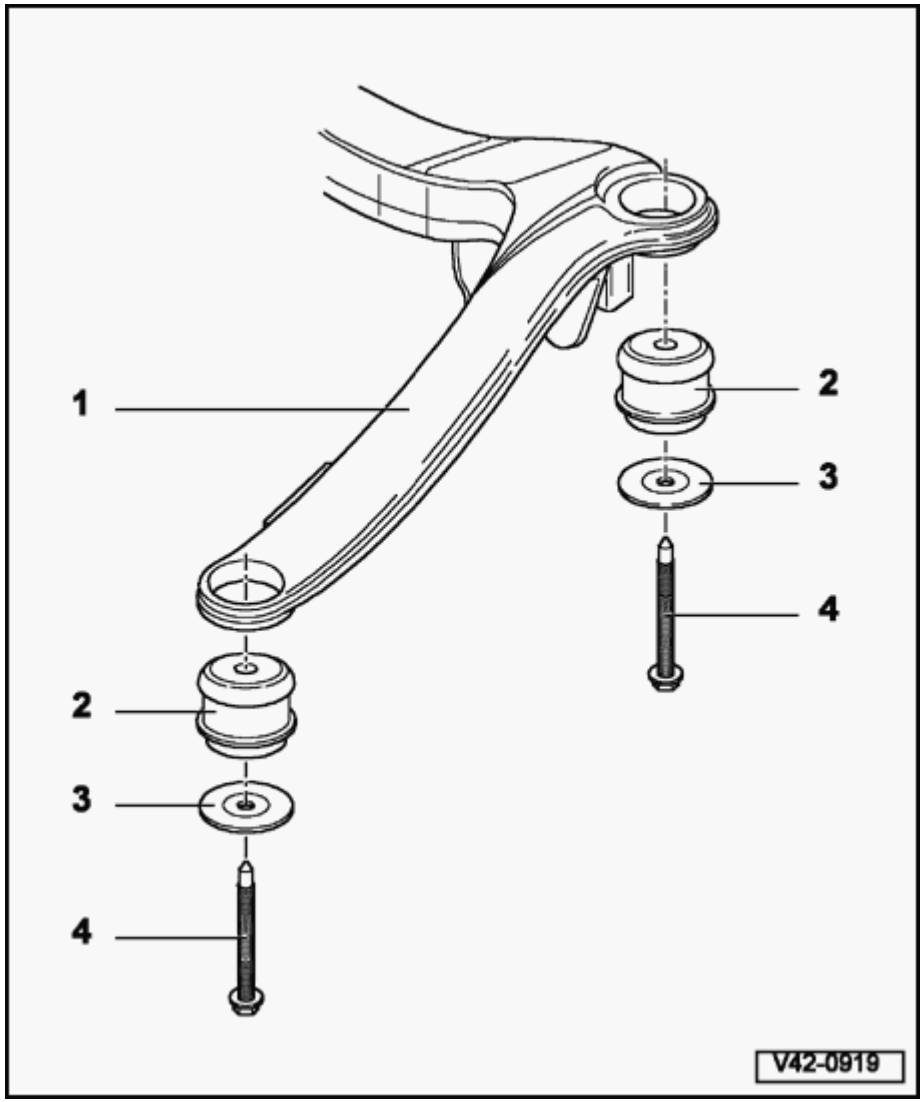


- Distance -A-: 4 mm (0.157 in.)
- Position -1- tightening torque: 3 Nm +1/-0 Nm (27 in. lb +9/-0 in. lb)
- Make sure sensor arm is properly aligned to linkage when installing headlight range control

Notes:

- *The linkage must be aligned vertically.*
- *The sensor arm must point outward and downward.*

42-50



Subframe, servicing

WARNING!

Do not attempt to weld and/or straighten the axle beam.

CAUTION!

If using power tools (pneumatic or electric), do not tighten the bolted connections more than hand-tight. Otherwise, the specified tightening torques could be exceeded.

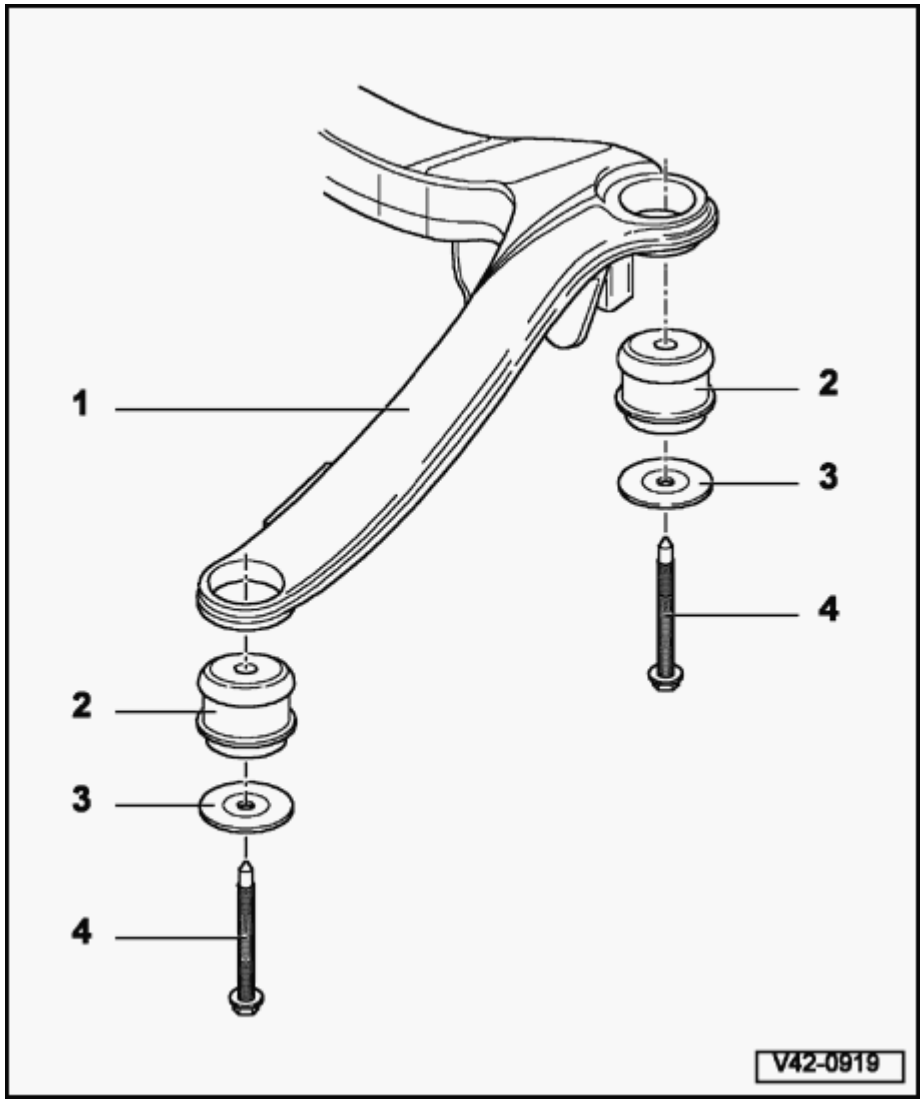
1 - Subframe

Tightening sequence (item - 4 -):

- 1. Right-rear
- 2. Left-rear
- 3. Right-front
- 4. Left-front

- Align rear axle after removal and installation ⇒ page 44-13
- Check and if necessary adjust wheel alignment after installing ⇒ page 44-13

42-51



2 - Bonded rubber bushings

- Installation positions ⇒ Fig. 5

Front bushings:

- Pulling out ⇒ Fig. 1
- Pressing in ⇒ Fig. 2

Rear bushings:

- Pulling out ⇒ Fig. 3
- Pressing in ⇒ Fig. 4

Note:

Apply assembly lubricant G 294 421 A1 before installing.

CAUTION!

Part numbers are listed here for reference only. Always check with your Parts department for the latest information.

3 - Washer

- Always replace
- Ribbed side faces upward

4 - Combi-bolt

- Always replace

♦ 110 Nm (81 ft lb) + 1/4-turn (90°)

42-52

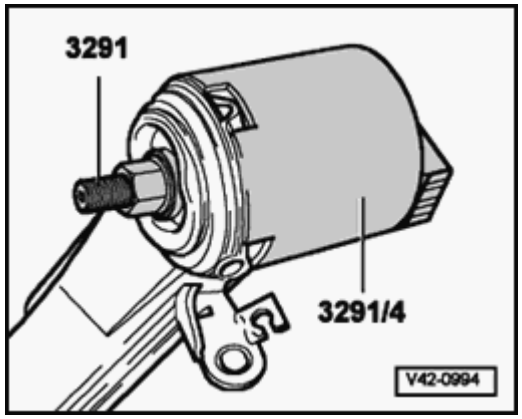


Fig. 1 Pulling out front bonded rubber bushing from subframe

- Assemble 3291/4 tubular section (pay attention to recesses) together with 3291 assembly device at right angle to subframe.
- Attach two brass washers in such a way that annular grooves are next to one another (3291 assembly device). Install washer and screw on nut.
- Pull out bonded rubber bushing by turning nut.

Note:

Insert hex head of 3291 assembly device into the recess in the 3291/4 tubular section. Apply grease to the annular grooves of the brass washers and to the threaded stem.

42-53

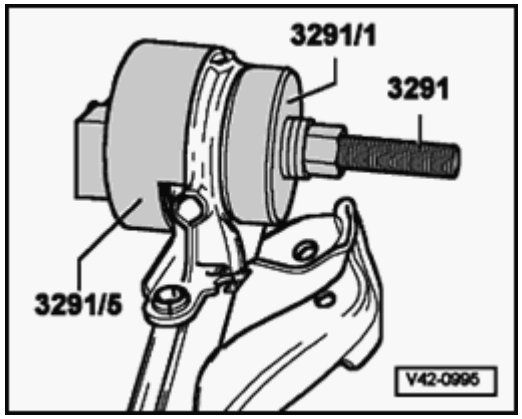


Fig. 2 Pressing in front bonded rubber bushing in subframe

- Apply lubricant (e.g. G 294 421 A1) when pressing in bonded rubber bushings.
- Assemble 3291/1 thrust piece to bonded rubber bushing and insert at right angle into hole in subframe using 3291/5 tubular section (pay attention to recesses) and 3291 assembly device.
- Attach two brass washers with annular grooves facing one another and to 3291 assembly device.
- Install washer and screw on nut.
- Press in bonded rubber bushing fully by turning nut.
  - While pulling in, hold 3291/1 thrust piece or bonded rubber bushing by hand to prevent turning.

Note:

Insert hex head of 3291 assembly device into the recess of 3291/5 tubular section. Apply grease to the annular grooves of the brass washers and to the assembly device.

42-54

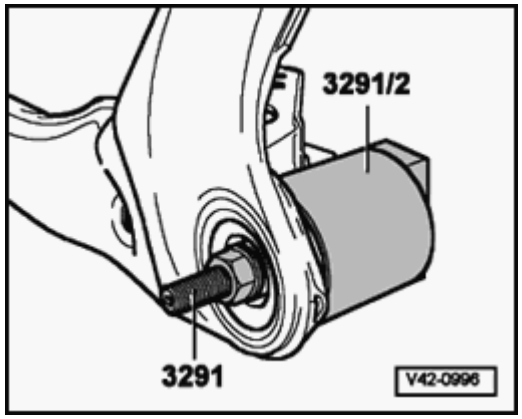


Fig. 3 Pulling out rear bonded rubber bushing from subframe

- Assemble 3291/2 tubular section together with 3291 assembly device at right angle to subframe.
- Attach two brass washers with annular grooves next to one another and to 3291 assembly device. Install washers and screw on nut.
- Pull out bonded rubber bushing by turning nut.

Note:

Insert hex nut of 3291 assembly device into recess in 3291/2 tubular section. Apply grease to the annular grooves of the brass washers and to the assembly device.

42-55

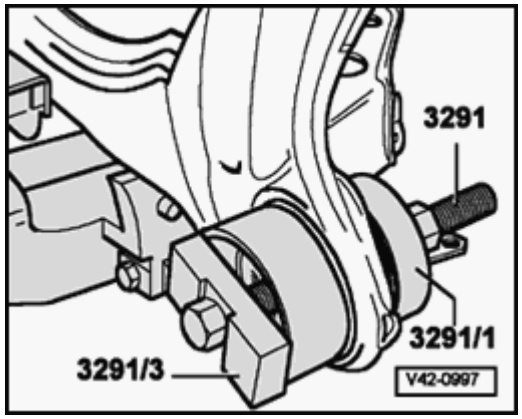


Fig. 4 Pressing in rear bonded rubber bushing in subframe

- Apply lubricant (e.g. G 294 421 A1) when pressing in bonded rubber bushings.
- Attach 3291/1 thrust piece to bonded rubber bushing and insert at right angle into hole in subframe using 3291/3 tubular section and 3291 assembly device.
- Attach two brass washers with annular grooves next to one another and to 3291 assembly device.
- Install washer and screw on nut.
- Press in bonded rubber bushing fully by turning nut.
  - While pulling in, hold 3291/1 thrust piece or bonded rubber bushing by hand to prevent turning.

Note:

Insert hex nut of 3291 assembly device into recess in 3291/3 tubular section. Apply grease to the annular grooves of the brass washers and to the assembly device.

42-56

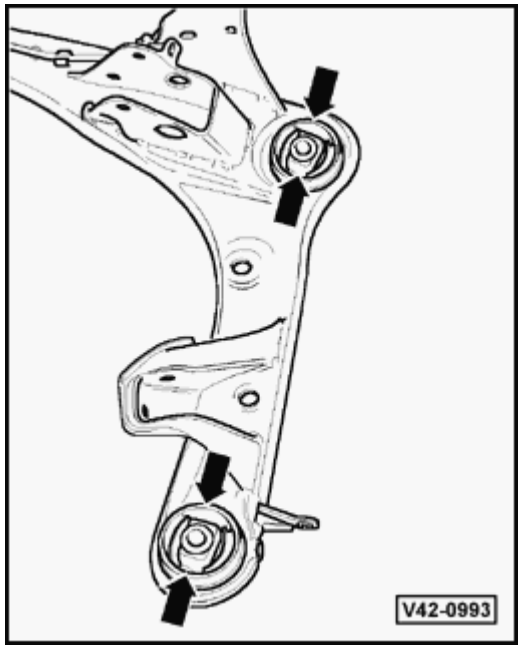


Fig. 5 Installation positions of bonded rubber bushings in rear subframe

Note:

The kidney-shaped recesses (arrows) must be parallel to the center line of the vehicle. Max. deviation of 10° to left or right is permissible.

42-57

Rear axle, removing and installing (all-wheel-drive vehicles)

Special tools, test equipment and auxiliary items

- VAG1752/1 spring compressor
- VAG1752/3 adaptor with protective linings
- VAG1383A engine/transmission lifter
- VAG1359/2 universal mount

Removing

- Remove rear center console:

⇒ *Repair Manual, Body Interior, Repair Group 70*

- Remove both rear wheels.
- Disconnect exhaust system at clamp and remove rear section of exhaust system.

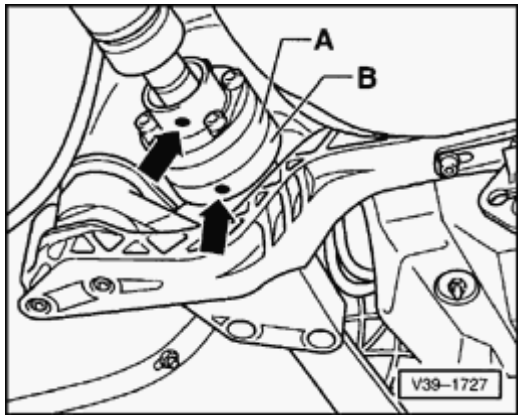
CAUTION!

Do not deflect the isolating element at the front exhaust pipe more than 10° otherwise it could become damaged.

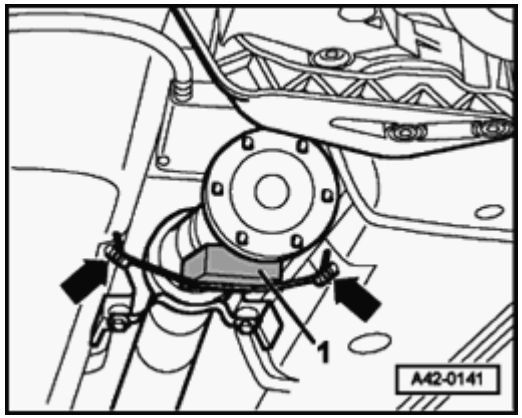
- Remove rear heat shield for driveshaft.

- If applicable, suspend exhaust pipe together with three-way catalytic converter from driveshaft center bearing.

42-58



- Check for factory markings (colored dots -arrows-) for aligning drive flange on driveshaft -A- to drive flange on rear final drive -B-. If necessary, apply colored dots (arrows).
- Remove bolts from drive flange.



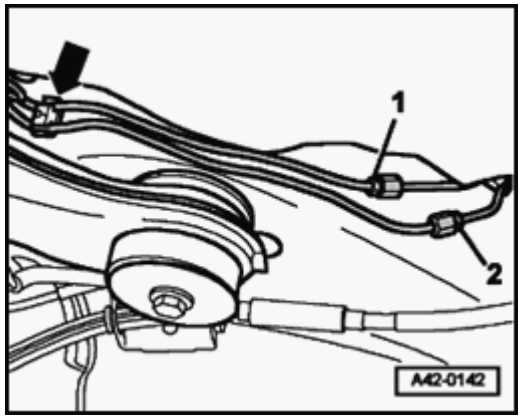
- Support driveshaft using wire attached to underside of vehicle (arrows) and place wooden block -1- below driveshaft.
- Remove parking brake cables:

⇒ *Repair Manual, Brake System, Repair Group 46*

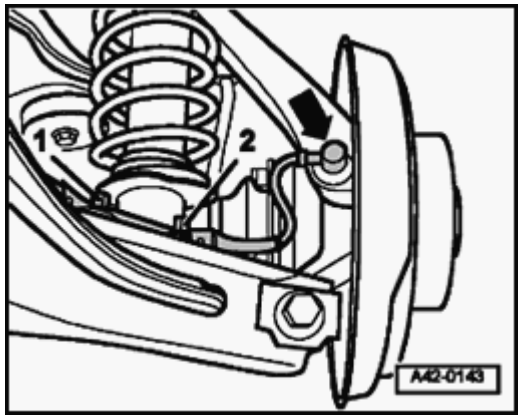
Note:

If the same rear axle is to be re-installed, only disconnect the parking brake cables at the parking brake lever, underbody and at the fuel tank. Leave the parking brake cables in position at the rear axle and at the brake calipers.

42-59

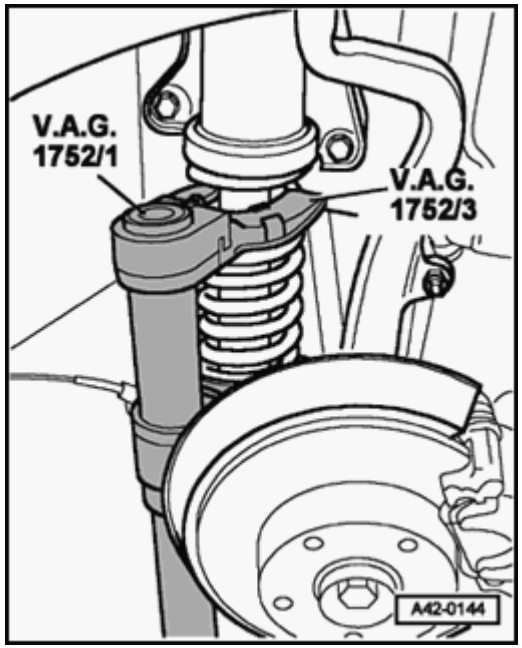


- Disconnect brake lines at fittings -1- and -2- at left-rear below vehicle.
- Unclip brake lines from holder (arrow) below vehicle.



- Remove holders -1- and -2- for wiring to ABS wheel speed sensors -G44- and -G46- at lower control arm.
- Pull ABS wheel speed sensors -G44- and -G46- (arrow) out of wheel bearing housing.
- Unhook wiring for wheel speed sensors at front of subframe.

42-60

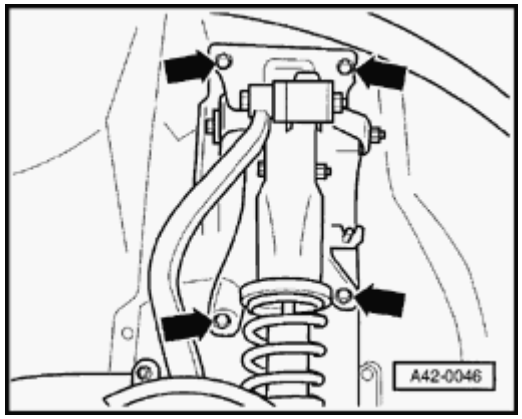


- Attach VAG1752/1 spring compressor and spring holder with VAG1752/3 adaptor and protective linings at second and next to last coils of coil spring.
- Compress coil spring.

Note:

On vehicles with headlight range control, the linkage for the headlight range control must be disconnected to remove the rear axle or lower control arm ⇒ *page 42-48* *.*

42-61

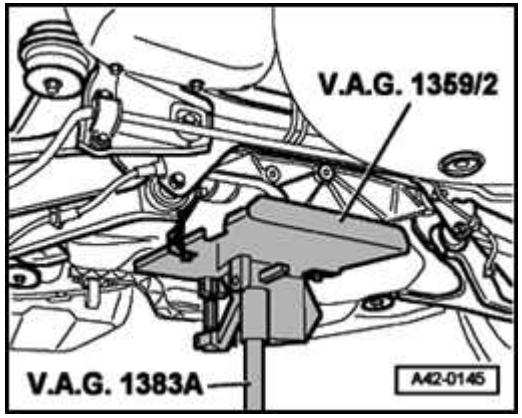


- While coil spring is still compressed, remove bolts (arrows) from suspension strut mounting bracket.
- Swivel suspension strut outward at top and relieve coil spring tension.

CAUTION!

Be careful not to damage the edge of the wheelhousing.

- Using above procedure, remove suspension strut from opposite side.
- Remove exhaust system bracket from rear final drive.

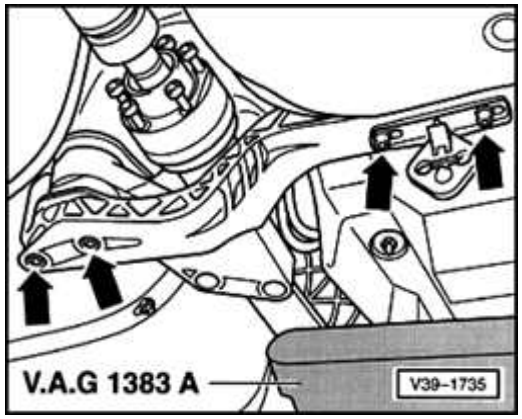


- Support final drive using VAG1383A engine/transmission lifter and VAG1359/2 universal mount.
- Secure rear final drive with strap.

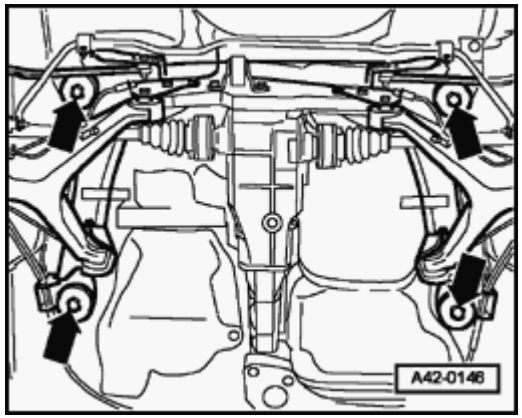
CAUTION!

Be careful not to damage the fuel tank.

42-62



- Remove bolts (arrows) at front cross member for rear final drive.



- Remove four subframe bolts (arrows).
- Slowly lower subframe together with rear final drive.

CAUTION!

Be careful not to damage the edge of the wheelhousing.

42-63

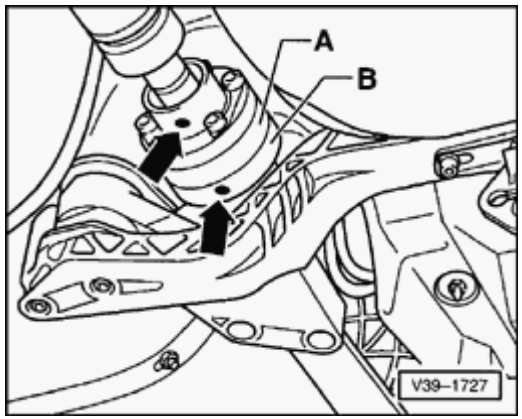
Installing

Installation is the reverse of removal. Observe the following:

CAUTION!

Any residual paint, residual adhesive and/or corrosion in the threads/splines must be removed.

Note:



To prevent imbalance, drive flange -A- on driveshaft and drive flange -B- on rear final drive must be installed with colored markings aligned (arrows).

- Replace gasket between driveshaft and rear final drive drive flanges.
  - Peel off protective backing and bond gasket to drive flange.
    - Bonding surface must be free of grease
- Replace driveshaft bolts (self-locking).
- Bleed brake system:

⇒ *Repair Manual, Brake System, Repair Group 47*

- Adjust parking brake:

⇒ *Repair Manual, Brake System, Repair Group 46*

- Adjust toe and camber at rear axle ⇒ page 44-6 .

- Align exhaust system free of stress:

Repair Manual, Engine Mechanical, Repair Group 26

- Replace four subframe bolts and washers.

  Installation position of washers: ribbed side facing upward

Tightening torques

Component/location		Tightening torque
Subframe to body		110 Nm (81 ft lb) + 1/4-turn (90°)1)
Suspension strut mounting bracket to body		55 Nm (41 ft lb)
Drive shaft to rear final drive	M8	55 Nm (41 ft lb)
Rear final drive front crossmember to body	M10	40 Nm (30 ft lb)
Rear final drive front crossmember (with exhaust system bracket) to body	M8	20 Nm (15 ft lb)

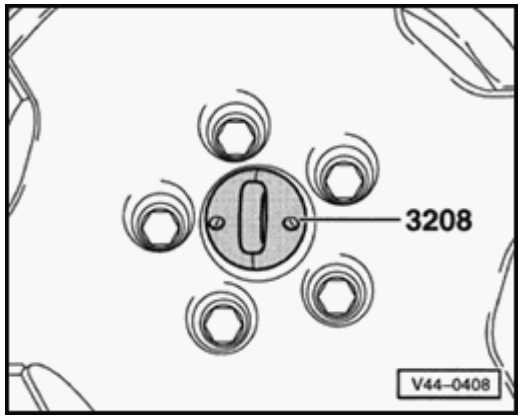
Drive axle to rear final drive	M8	40 Nm (30 ft lb)
	M10	80 Nm (59 ft lb)
1) Always replace bolt		

42-65

Suspension strut and upper control arm, removing and installing

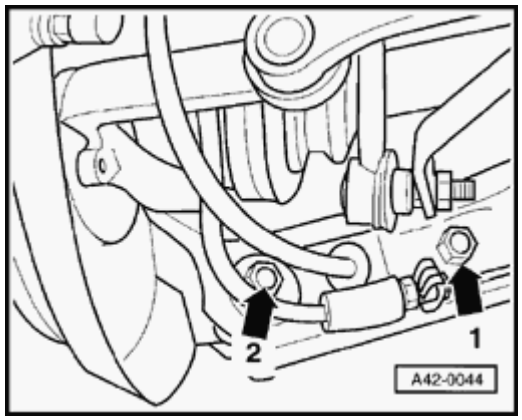
Removing

- Vehicle must be standing on its wheels above vehicle lift



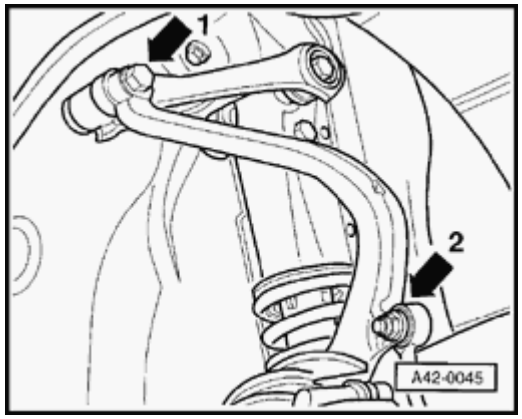
- Remove wheel trim.

  On light alloy wheels use puller in vehicle tool kit to remove trim cap
- Loosen wheel bolts.
- Raise vehicle on lift.
- Remove wheel.

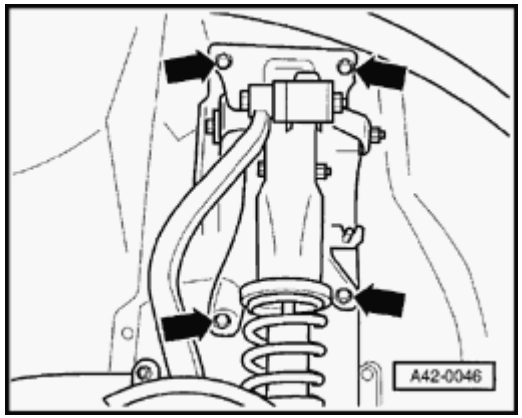


- Loosen bolted connection of lower control arm to suspension strut (arrow -1-) ⇒ page 42-40 .

42-66



- Loosen bolts from wheel bearing housing to upper control arm (arrow -1-) ⇒ page 42-42 .



- Remove suspension strut mounting bracket bolts (arrows), push wheel bearing housing down and remove suspension strut along with control arm.
- Remove bolts from shock absorber to upper control arm (⇒ page 42-42), and remove control arm.

42-67

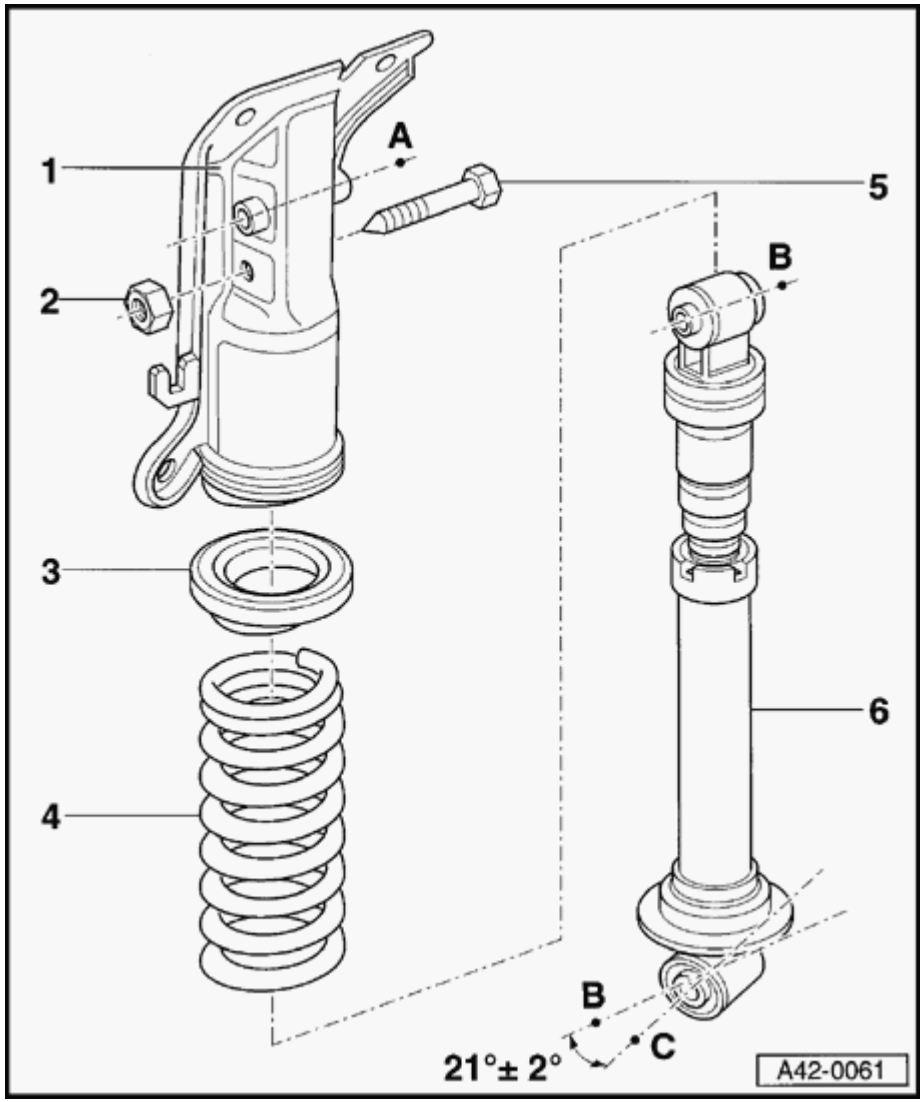
Installing

- Install in reverse order of removal.

CAUTION!

Bonded rubber bushings can only be turned to a limited extent. The bolted connection between the wheel bearing housing to upper control arm and the connection between the shock absorber to lower control arm must only be tightened when the vehicle is standing on the ground. Otherwise the bonded rubber bushings will be subjected to a torsional stress resulting in shortened service life

42-68



Suspension strut, servicing

Disassembling and assembling suspension strut ⇒ page 42-71

1 - Suspension strut mounting bracket

- Different versions on left and right-sides

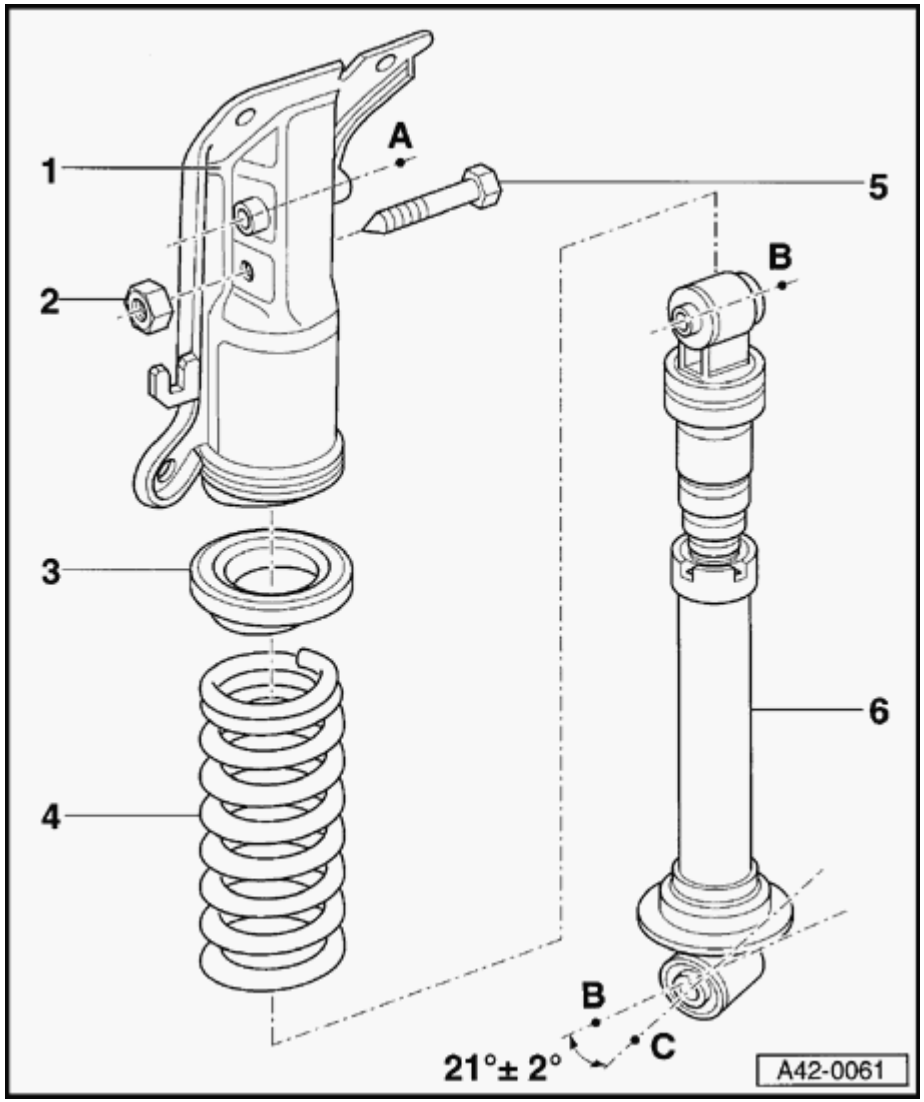
2 - Self-locking nut

- Always replace
- 70 Nm (52 ft lb) + 1/4-turn (90°)

3 - Damper ring

- Install with stop resting against end of spring

42-69



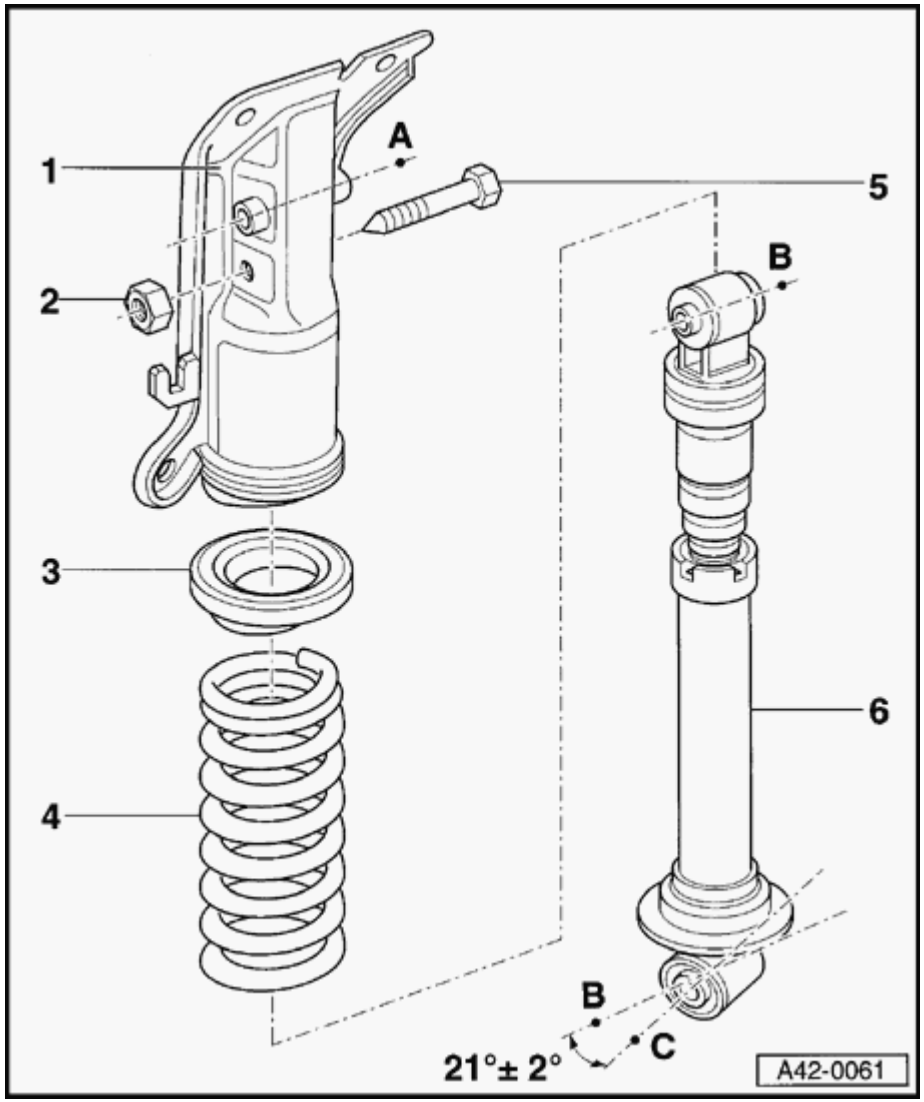
4 - Coil spring

- Always replace on both sides
- Different versions depending on suspension version ⇒ vehicle data label, page 42-46 to determine correct spring version
- Install on shock absorber and turn so that end of spring coil is resting against stop of lower spring retainer
- Installation position: colored marking on spring faces down toward spring retainer
- If suspension strut is correctly installed, bottom end of spring on left side faces toward rear; bottom end on right-side faces toward front

5 - Bolt

- Always replace

42-70



6 - Gas shock absorber

- Different versions ⇒ parts catalog microfiche
- Supplied as replacement part with lower spring retainer pressed on
- Different versions depending on suspension version ⇒ vehicle data label, page ⇒ Page 42-46
- Malfunctioning shock absorbers must be disposed of properly
- Checking for leaks and noises ⇒Special Information binder

Installation position:

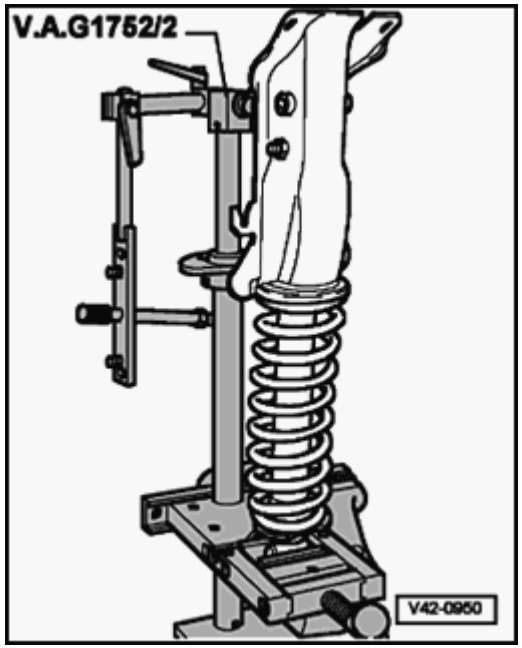
- Angle between suspension strut mounting bracket axis -A- and shock absorber axis -B- = 0°
- Angle between axis -B- and axis -C- = 21° ± 2°; Pay attention to this when assembling

42-71

Disassembling and assembling suspension strut

Disassembling

- Remove suspension strut ⇒ page 42-65 .

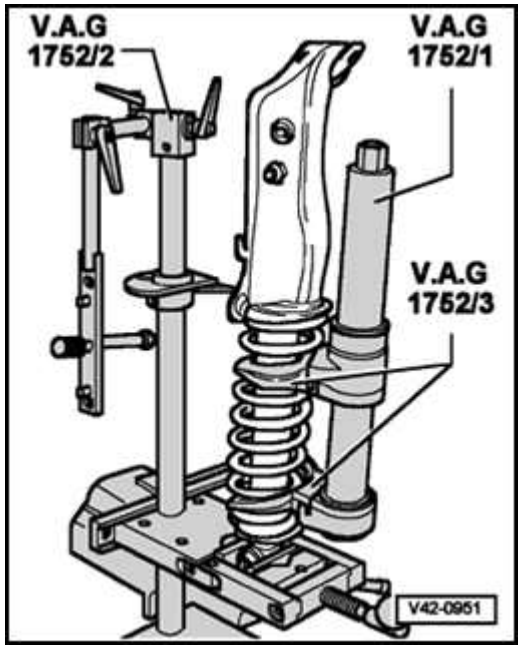


- Install suspension strut into VAG1752 spring tensioner.

Note:

Illustration shows left-hand suspension strut.

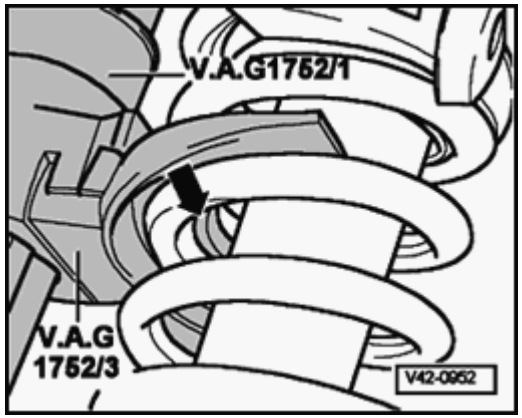
42-72



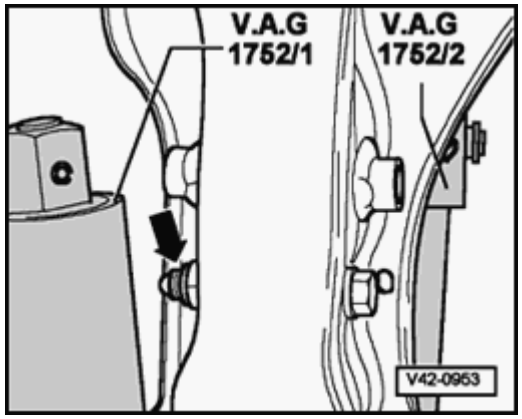
- Insert VAG1752/1 spring compressor.

WARNING!

Make sure the coil spring is seated correctly in the VAG1752/3 adapter (arrow).

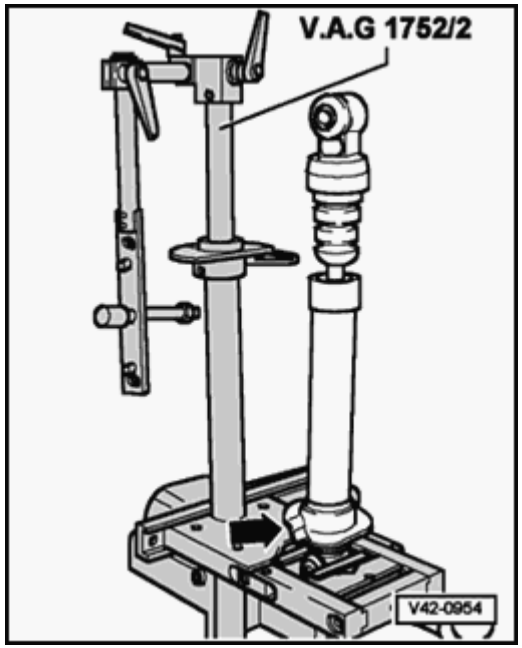


- Compress coil spring using VAG1752/1 spring compressor until upper shock absorber mount is free.



- Remove nut (arrow) and bolt.
- Remove suspension strut mounting bracket and damper ring.
- Remove compressed spring together with VAG1752/1 spring compressor.
- Remove faulty shock absorber from VAG1752 suspension strut tensioner and dispose of properly.

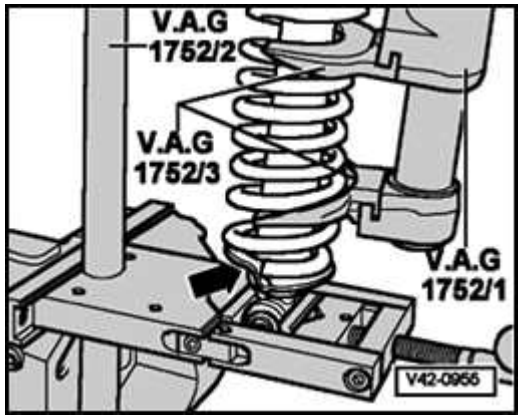
Assembling



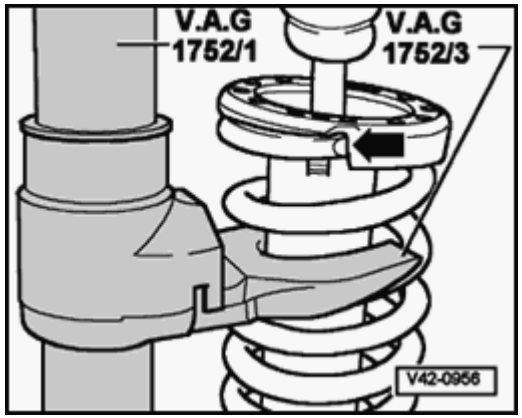
- Clamp new shock absorber into VAG1752 suspension strut tensioner, as shown.

Note:

Pay attention to the position of the step on the lower spring retainer (arrow).



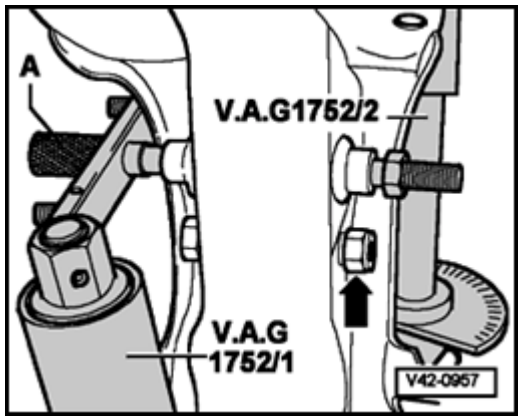
- Compress new coil spring using VAG1752/1 spring compressor.
- Fit compressed coil spring onto shock absorber.
  - Colored marking on coil spring must be facing down toward spring retainer
  - End of spring coil should be resting against stop of spring retainer (arrow)



- Install damper ring so that end of spring coil is resting against stop of damper ring (arrow).

42-75

- Install suspension strut mounting bracket.

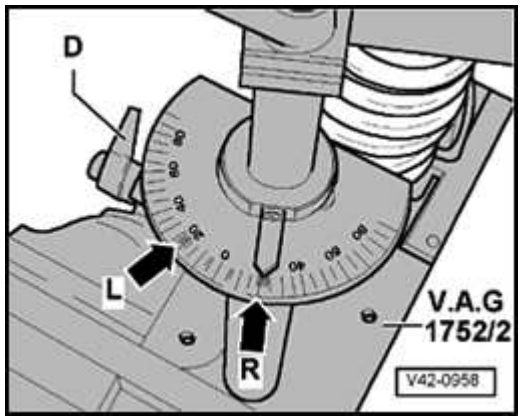


- Install securing bolt into suspension strut mounting bracket and screw on nut (arrow) loosely.

Note:

Nut faces in direction of travel!

- Install locating bolt -A- into suspension strut mounting bracket and secure loosely with nut.



- Turn suspension strut mounting bracket until pointer on degree scale (on VAG1752 suspension strut tensioner) is pointing to 21° ± 2° (with locking bolt -D- loose) and ...

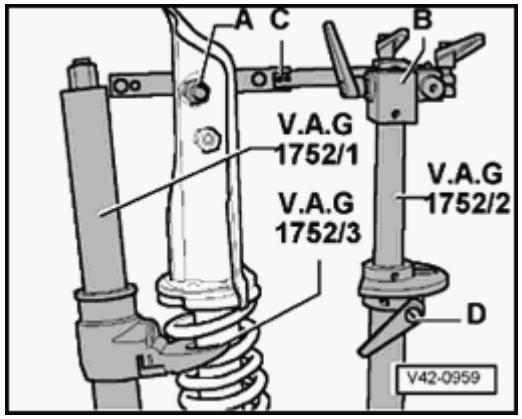
L - left-hand suspension strut

R - right-hand suspension strut

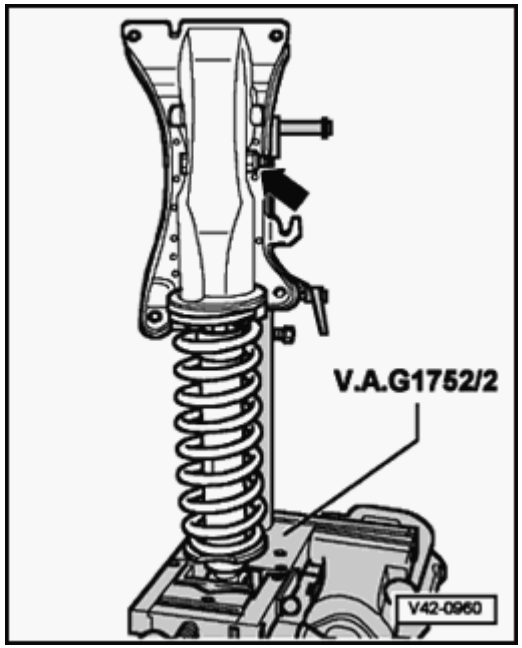
Note:

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

42-76



- ... move lever arm -C- with locating bolt -A- perpendicular to height adjuster -B-.
- Tighten locking bolt -D-.
- Relieve tension from compressed coil spring and remove VAG1752/1 spring compressor.
- Remove locating bolt -A- from suspension strut mounting bracket.



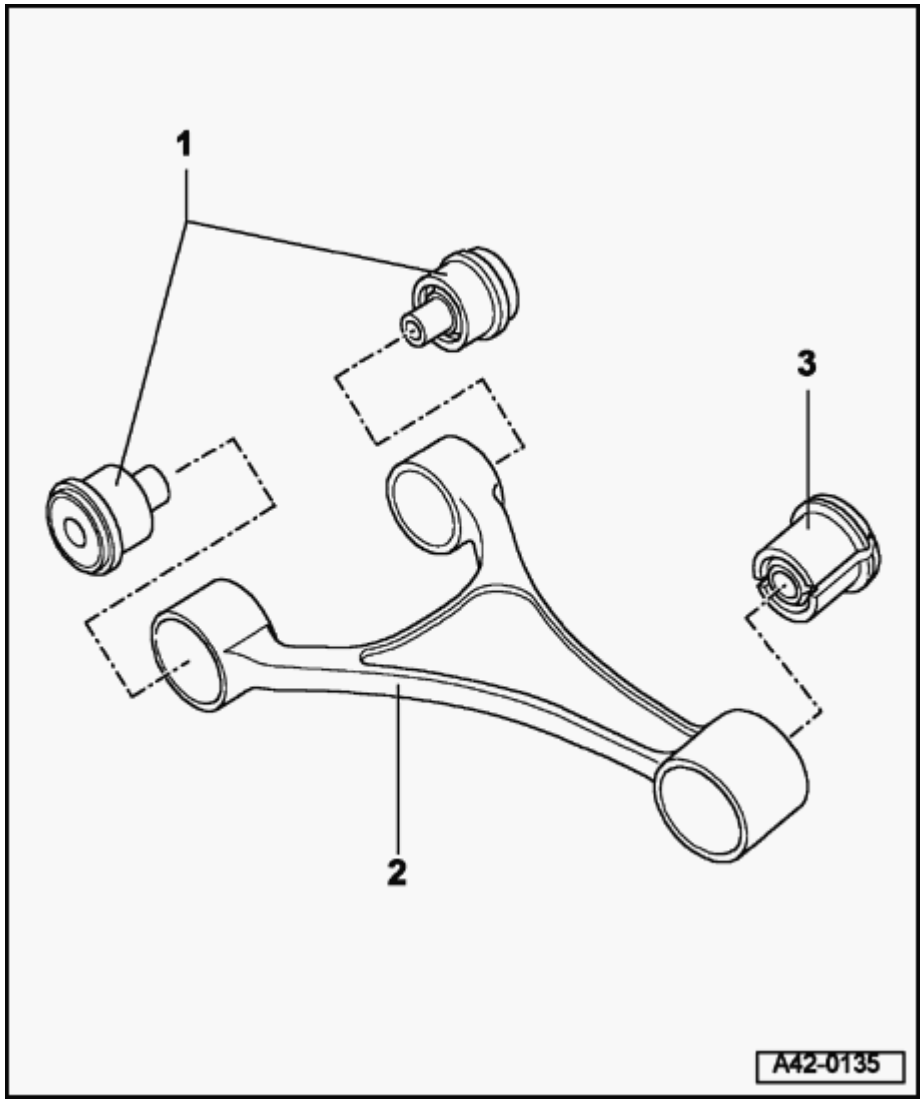
- Tighten nut (arrow).

  Tightening torque: 70 Nm (52 ft lb) + 1/4-turn (90°)
- Remove suspension strut from VAG1752 suspension strut tensioner.

Note:

Illustration shows right-hand suspension strut.

42-77



Upper control arm

Forged upper control arm, servicing

1 - Bonded rubber bushings

- Pressing out ⇒ Figs. 1 and ⇒ 2
- Pressing in ⇒ Fig. 4

2 - Upper control arm

- Replacement part has bonded rubber bushings installed
- Left and right-sides are identical

3 - Bonded rubber bushing

- Pressing out ⇒ Fig. 3
- Pressing in ⇒ Fig. 5
- Bushing can be installed with slit in outer cover in any installed position

42-78

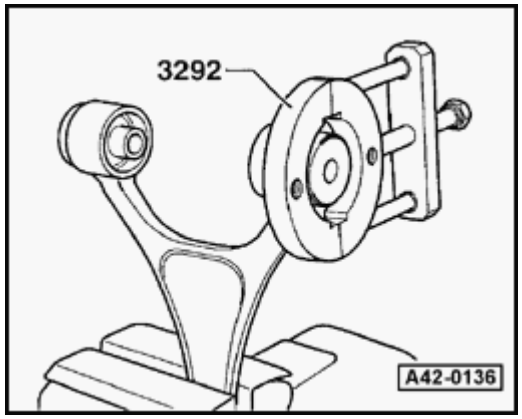


Fig. 1 Attaching assembly device to control arm

Be careful not to damage the surface of the control arm

- Attach 3292 assembly device with both sides of tool jaws between bearing and control arm.
- Screw in spindle up to stop so that tool compresses rubber metal bushing against eye in control arm eye.

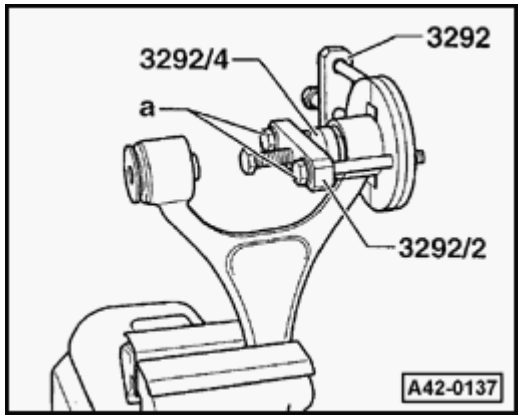


Fig. 2 Attaching pressure piece to control arm and pressing out bonded rubber bushing

- Secure 3292/2 to 3292 using bolts -a- (M10 x 80).
- Attach 3292/4
- Screw spindle into 3292 until bonded rubber bushing is pressed out.

42-79

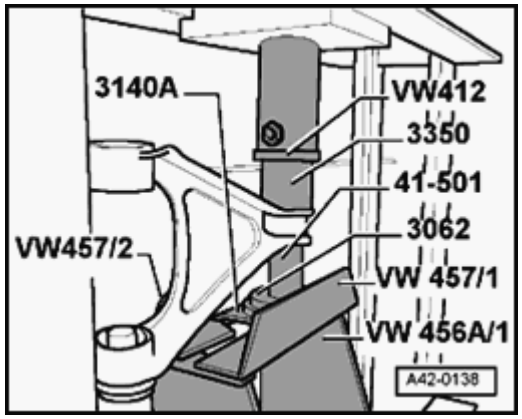


Fig. 3 Pressing bonded rubber bushing out from control arm

Note:

Make sure to install 41-501 lower pipe piece exactly correct.

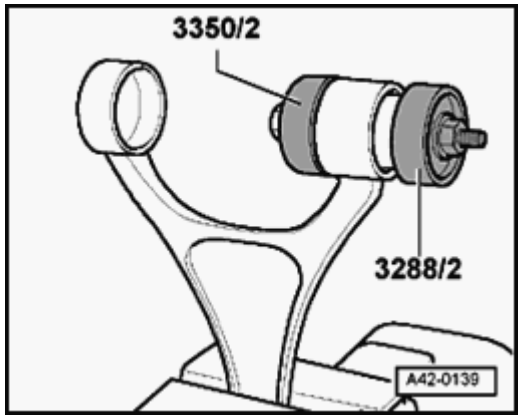


Fig. 4 Pressing bonded rubber bushing into control arm

- Install bonded rubber bushing at right angle to control arm.
- Install 3288/2 and 3350/2 pressure pieces as shown together with bolts and press in bushing up to stop in control arm eye.

42-80

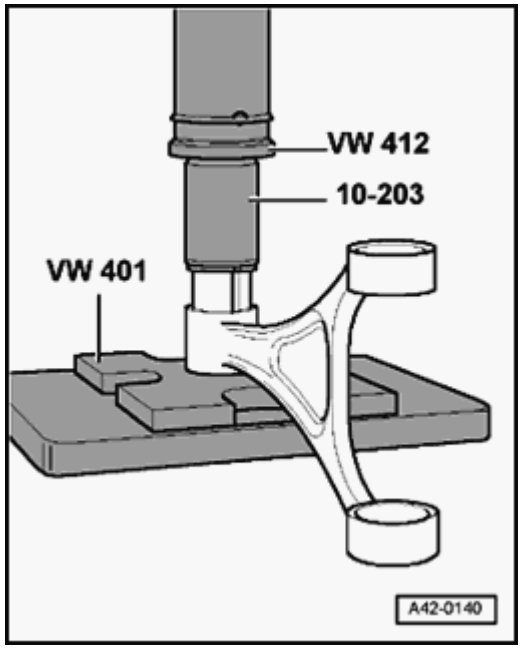
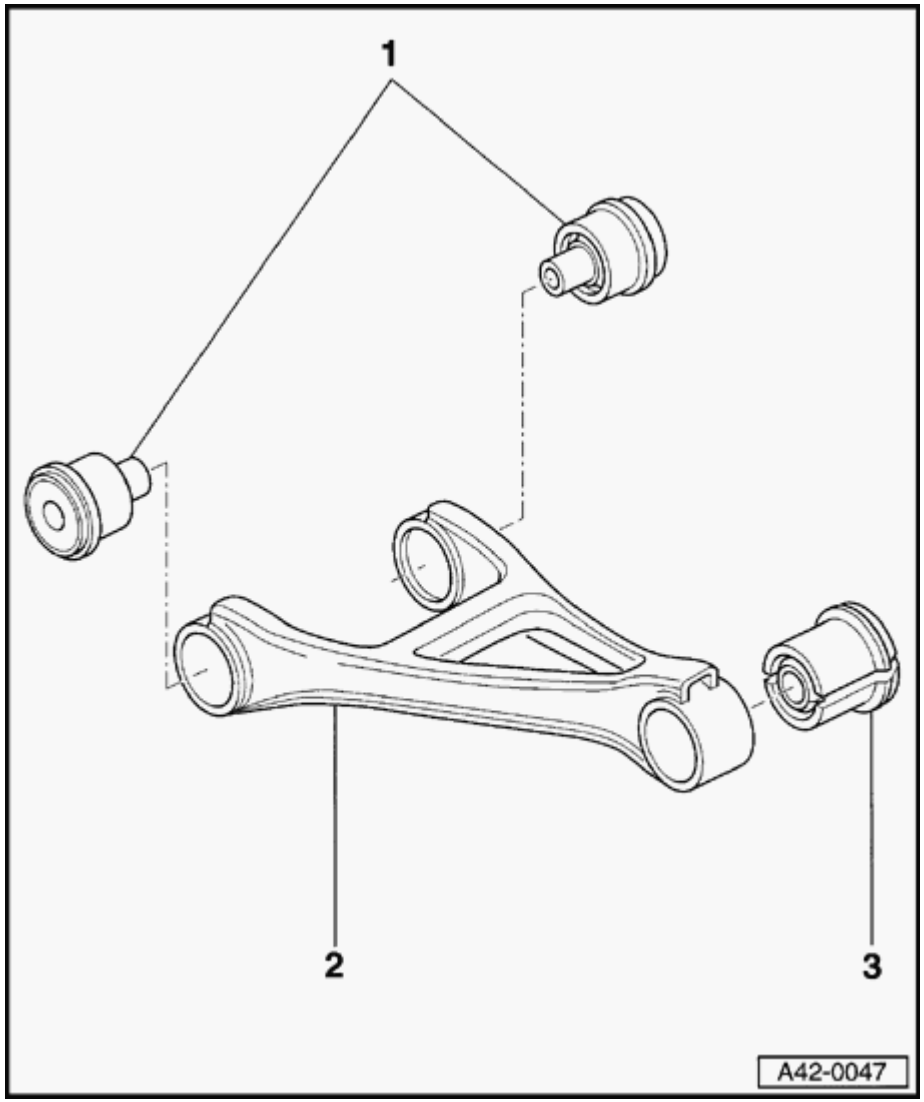


Fig. 5 Pressing bonded rubber bushing into control arm

- Press in bushing up to stop.

42-81



Sheet steel upper control arm, servicing

1 - Bonded rubber bushings

- Pressing out ⇒ Fig. 1
- Pressing in ⇒ Fig. 3

2 - Upper control arm

- Replacement part supplied with bonded rubber bushings installed
- Left and right-side components are identical

3 - Bonded rubber bushing

- Pressing out ⇒ Fig. 2
- Pressing in ⇒ Fig. 4
- Bushing may be installed with slots in bushing aligned in any direction

42-82

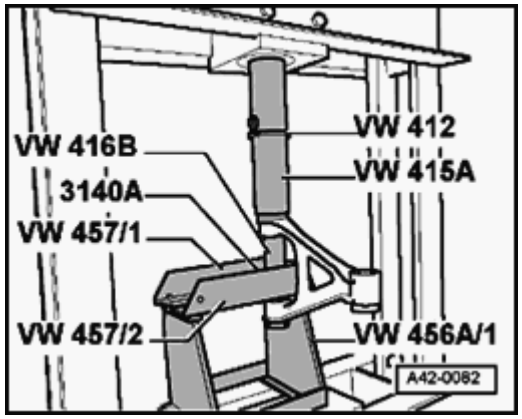


Fig. 1 Pressing bonded rubber bushings out of upper control arm

If VW416B tube, 37 mm dia. becomes canted while pressing out, relieve pressure and start over.

CAUTION!

Be careful not to damage the surface of the upper control arm.

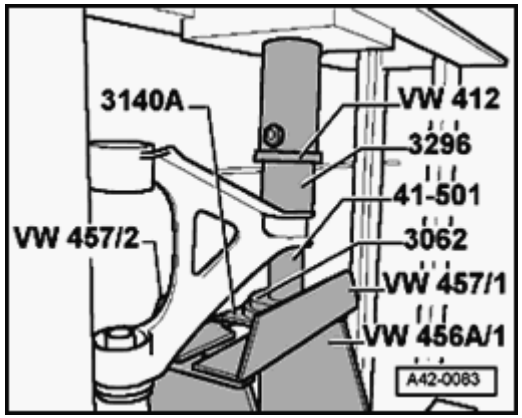


Fig. 2 Pressing bonded rubber bushing out of upper control arm

Note:

41-501 tubular section must be exactly in the correct position.

42-83

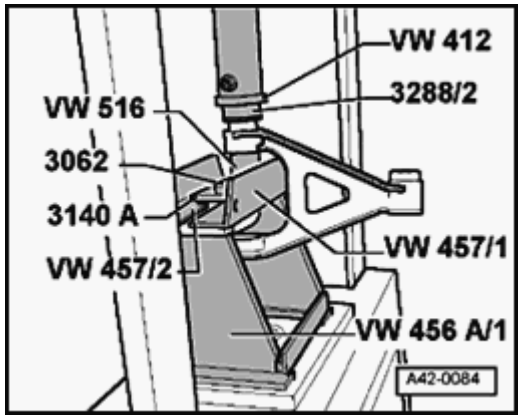


Fig. 3 Pressing bonded rubber bushings into upper control arm

- Position bonded rubber bushing perpendicular to upper control arm.
- Press bushing fully in up to stop.

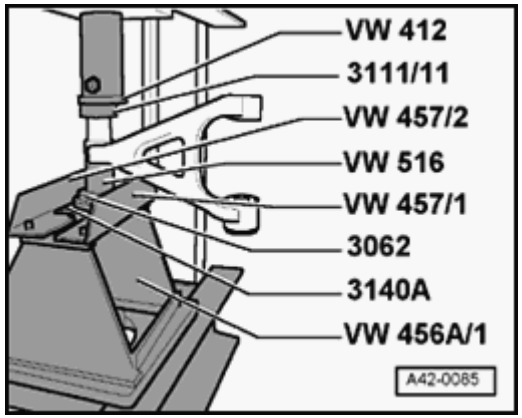


Fig. 4 Pressing bonded rubber bushing into upper control arm

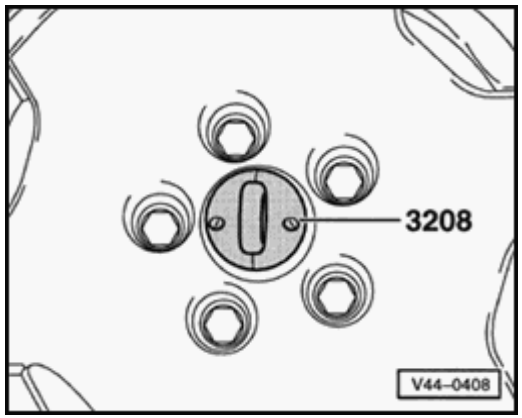
- Press bushing fully in up to stop.

42-84

Lower control arm, removing and installing

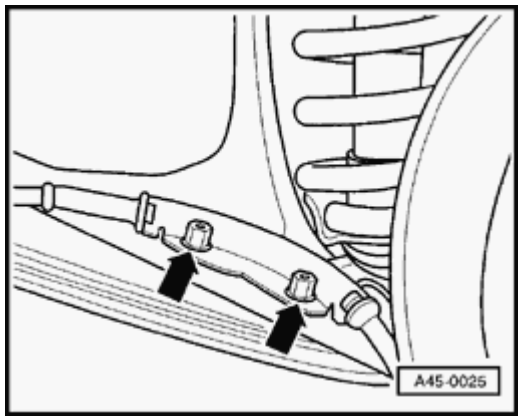
Removing

- Vehicle must be standing on its wheels above vehicle lift



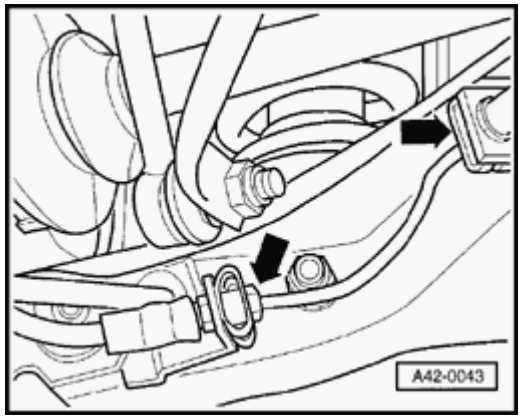
- Remove wheel trim.

  On light alloy wheels use puller in vehicle tool kit to remove trim cap
- Loosen wheel bolts.
- Raise vehicle on lift.
- Remove wheel.



- Remove bracket for ABS wheel speed sensor cable.
- Extract brake fluid from reservoir:

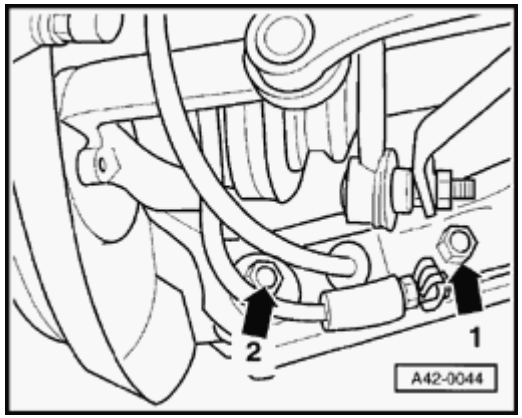
⇒ *Repair Manual, Brake System, Repair Group 47*



- Disconnect brake line at points indicated.

Note:

On vehicles with headlight range control, the linkage for the headlight range control must be disconnected to remove the rear axle or lower control arm ⇒ *page 42-48* .

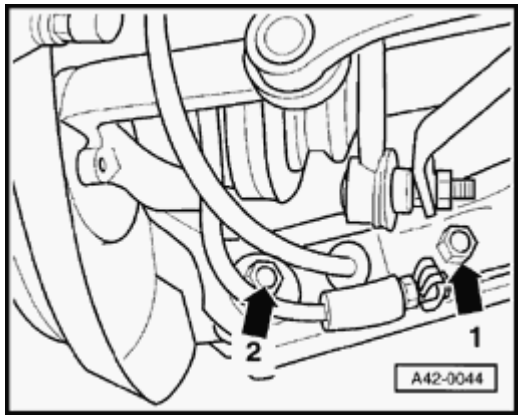


- Remove self-locking nut and bolt mounting lower control arm to suspension strut (arrow -1-) ⇒ page 42-40 .

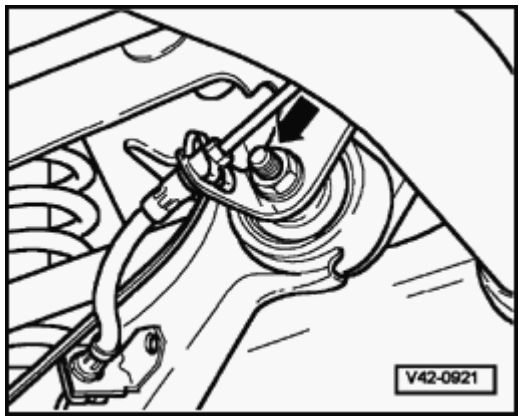
42-86

- Remove parking brake cable:

⇒ *Repair Manual, Brake System, Repair Group 46*



- Remove eccentric bolt for wheel bearing housing to lower control arm (arrow -2-) ⇒ page 42-41 .



- Remove both mounting bolts for subframe to lower control arm (arrow) ⇒ page 42-40 .

Note:

Only one bolt is shown to simplify the illustration.

- Remove control arm.

42-87

Installing

WARNING!

- ***Do not re-use any fasteners that are worn or deformed in normal use.***

- ***Some fasteners are designed to be used only once, and are unreliable and may fail if used a second time. This includes, but is not limited to, nuts, bolts, washers, circlips and cotter pins. Always follow the recommendations in this manual-replace these fasteners with new parts where indicated, and any other time it is deemed necessary by inspection.***

CAUTION!

Bonded rubber bushings can only be turned to a limited extent. The bolted connection between the wheel bearing housing to lower control arm and the connection between the shock absorber to lower control arm must only be tightened when the vehicle is standing on the ground. Otherwise the bonded rubber bushings will be subjected to a torsional stress resulting in shortened service life

- Install in reverse order of removal.

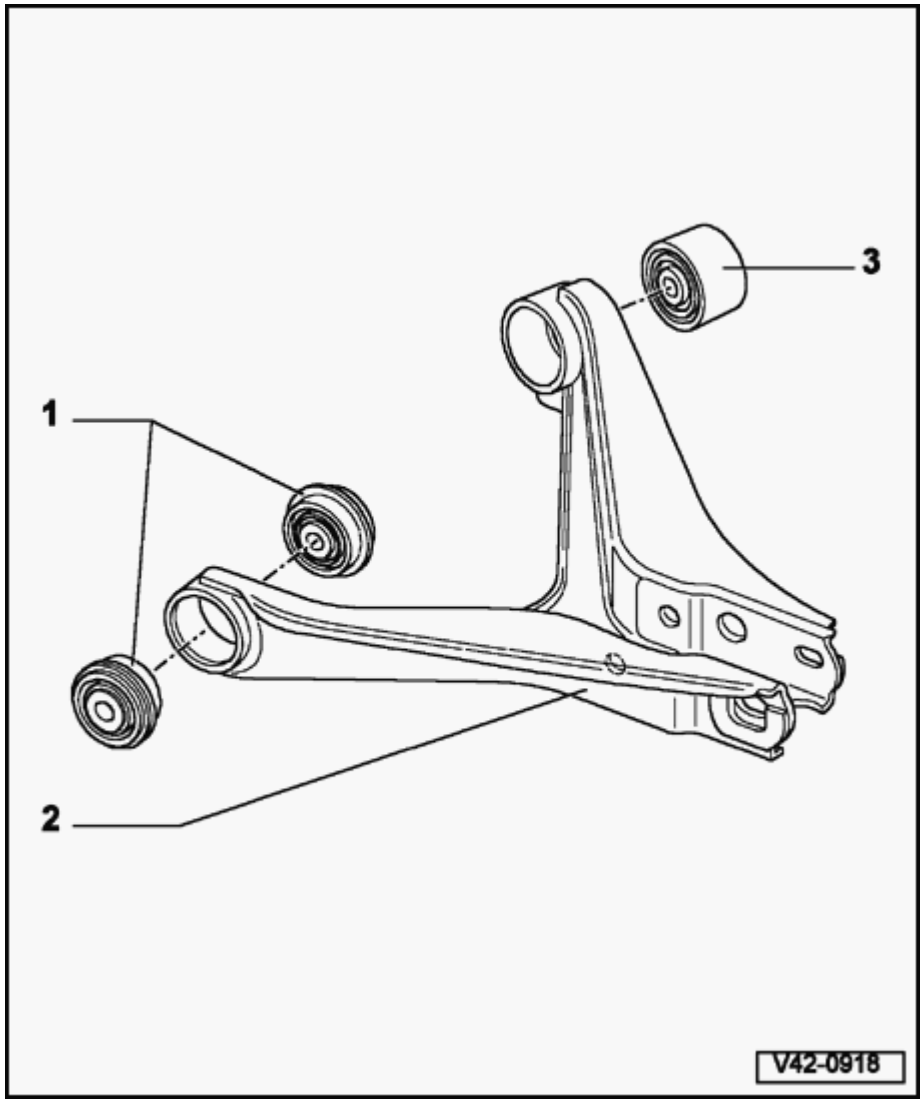
- Always replace bolts and nuts.

- Bleed brake system:

⇒ *Repair Manual, Brake System, Repair Group 47*

- Check wheel alignment and adjust if necessary ⇒ page 44-6 .

42-89



Lower control arm, servicing

1 - Rear bonded rubber bushing

- Replacing ⇒ Figs. 1 and ⇒ 4
- Always replace both halves

2 - Lower control arm

- Replacement part supplied with bonded rubber bushings installed

3 - Front bonded rubber bushing

- Replacing ⇒ Fig. 5

42-90

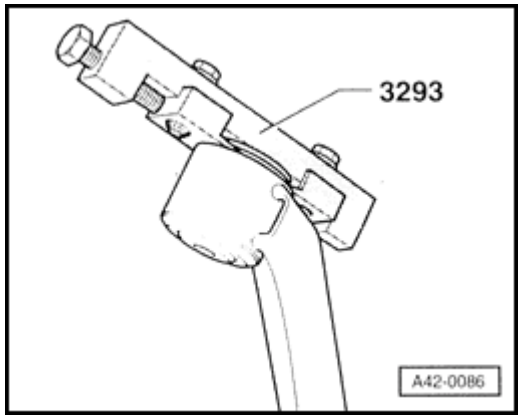


Fig. 1 Attaching 3293 lower control arm assembly device to lower control arm

Notes:

- *The two collars of the bonded rubber bushings must be flanged slightly before installing into lower control arm assembly device.*
- *Be careful when attaching lower control arm assembly device.*

- Attach 3293 lower control arm assembly device to bushing with jaws of tool positioned between lip of bushing and lower control arm.
- Screw in threaded stem to force bushing slightly from lower control arm.

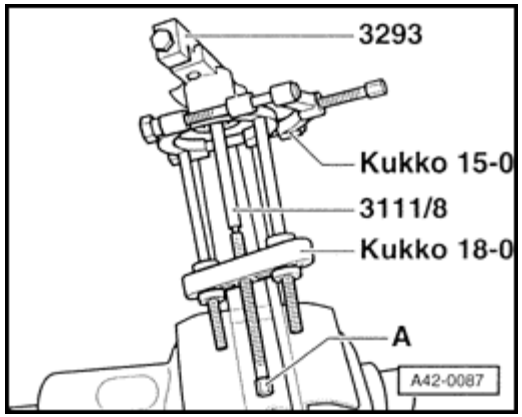


Fig. 2 Attaching puller into lower control arm

- Attach commercially available puller (e.g. Kukko 15-0) to lower control arm.
- Insert 3118/8 adapter into hole in bonded rubber bushing.
- Screw Kukko 18-0 into Kukko 15-0 and centrally align.
- Screw in threaded stem -A- until bonded rubber bushing is pulled out.

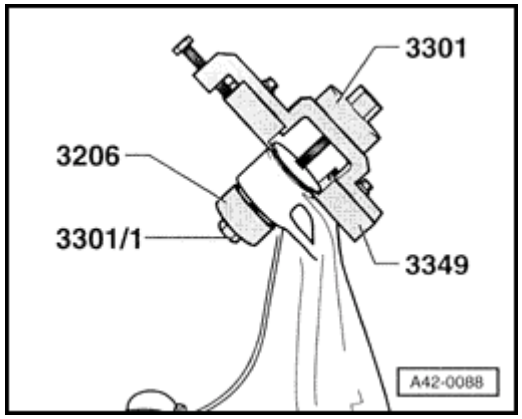


Fig. 3 Pulling second half of bonded rubber bushing into lower control arm

- Attach 3349 puller to lower control arm.
- Screw in threaded stem of 3301/1 until second half of bushing is fully removed.

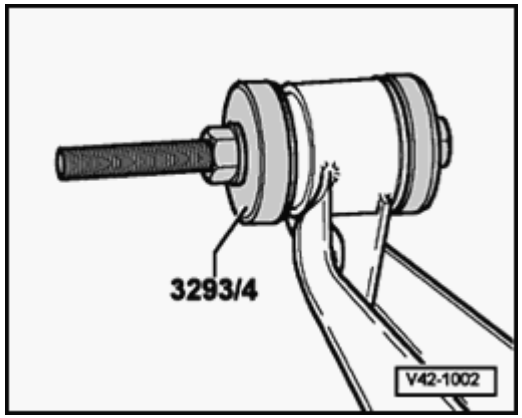


Fig. 4 Installing bonded rubber bushing into lower control arm

- Insert two halves of bonded rubber bushing together with 3293/4 thrust pieces and threaded stem into lower control arm art right angles.
- Turn threaded stem until bonded rubber bushing is pulled fully in up to stop.

42-92

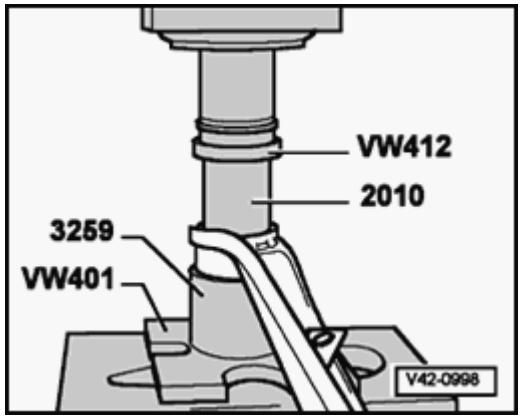


Fig. 5 Pressing bonded rubber bushing in and out of lower control arm

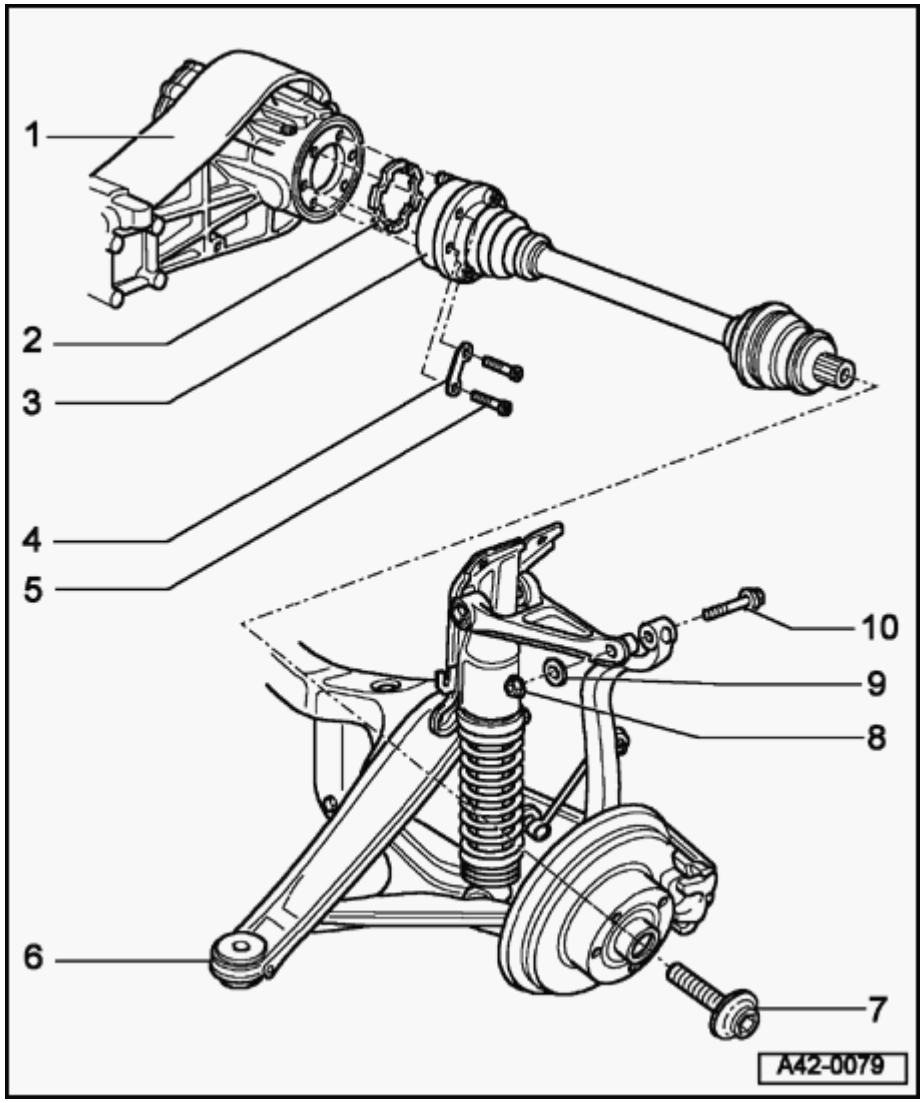
- Press bushing in until flush.

Note:

When pressing out, make sure that the bonded rubber bushing does not rest on the end face of 3259 tube.

- Collar of 3259 tube faces VW401 thrust plate

42-93



Rear drive axle, removing and installing

1 - Rear final drive

2 - Gasket

- Always replace
- Remove protective backing and stick onto joint

3 - Drive axle

- Servicing ⇒ page 42-99

CAUTION!

Do not attempt to move a vehicle from which the drive axle has been removed. Otherwise wheel bearing damage will result. If the vehicle must be moved, install an outer CV joint in place of the drive axle.

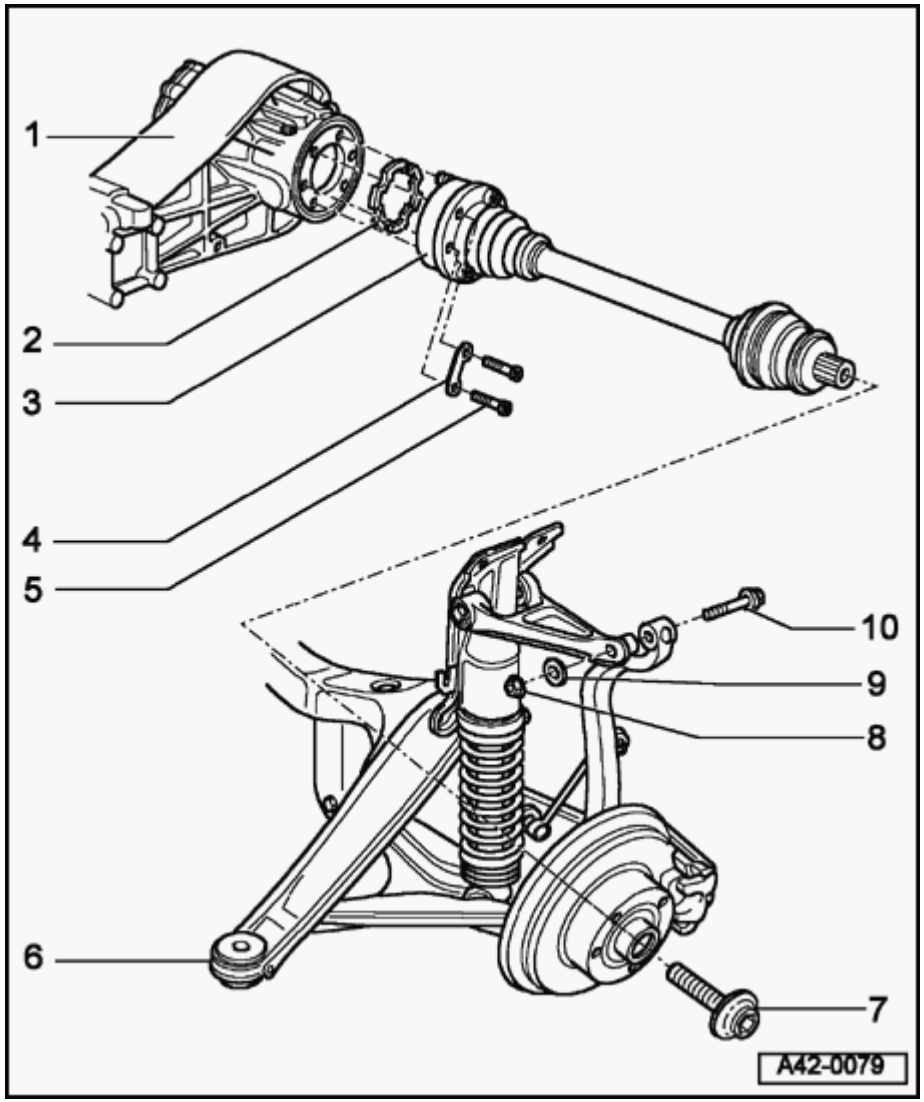
4 - Spacer plate

5 - Bolts

- 40 Nm (30 ft lb)

6 - Subframe

42-94



7 - Collar bolt

- Always replace
- Switching from or mixing old and new bolts is permissible
- M14 bolt: 115 Nm (85 ft lb) + 1/2-turn (180 °)

WARNING!

The vehicle must be standing on its wheels when loosening or tightening. Otherwise the risk of an accident exists.

8 - Self-locking nut

- Always replace
- 70 Nm (52 ft lb) + 1/4-turn (90 °)

9 - Washer

- Always replace

10 - Bolt

- Always replace

42-95

Removing and installing drive axle (left-hand side)

- Vehicle must be standing on its wheels above vehicle lift

- Remove wheel trim.

  On light alloy wheels use puller in vehicle tool kit to remove trim cap

- Loosen collar bolt.

WARNING!

The vehicle must be standing on its wheels when loosening or tightening the collar bolt for the drive axle. Otherwise the risk of an accident exists.

- Loosen wheel bolts.

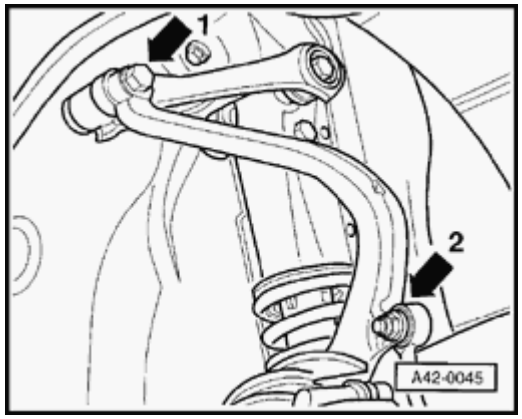
- Raise vehicle on lift.

- Remove wheel.

- Pull ABS wheel speed sensor slightly out of wheel bearing housing.

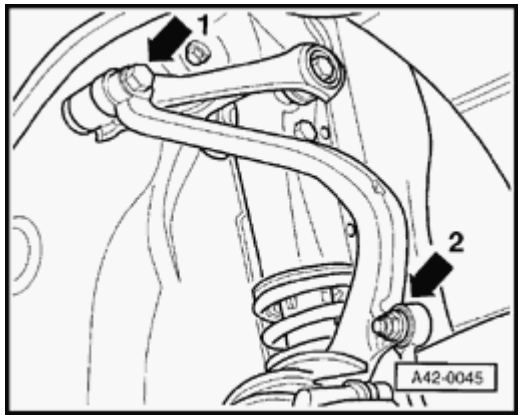
- Remove collar bolt.

- Remove bolts from inner CV joint to rear final drive.



- Remove nut and bolt for connecting link to wheel bearing housing (arrow -2-) ⇒ page 42-43 .

  Tightening torque: 50 Nm (37 ft lb)



- Remove bolted connection from upper control arm to wheel bearing housing (arrow -1-) ⇒ page 42-94 .
- Remove exhaust system, rear silencer and center silencer:

Repair Manual, Engine Mechanical, Repair Group 26

- Lower drive axle on inside at rear final drive and remove from wheel bearing housing.

Installation is the reverse of removal.

CAUTION!

Bonded rubber bushings can only be turned to a limited extent. The bolted connection must only be tightened when the vehicle is standing on the ground. Otherwise the bonded rubber bushings will be subjected to a torsional stress resulting in shortened service life

42-97

Removing and installing drive axle (right-hand side)

- Vehicle must be standing on its wheels above vehicle lift

- Remove wheel trim.

  On light alloy wheels use puller in vehicle tool kit to remove trim cap

- Loosen collar bolt.

WARNING!

The vehicle must be standing on its wheels when loosening or tightening the collar bolt for the drive axle. Otherwise the risk of an accident exists.

- Loosen wheel bolts.

- Raise vehicle on lift.

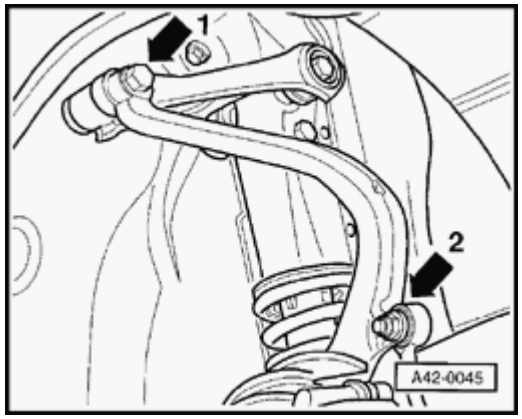
- Remove wheel.

- Pull ABS wheel speed sensor slightly out of wheel bearing housing.

- Remove collar bolt.

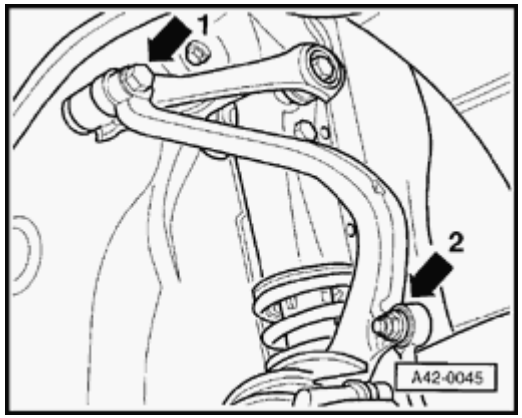
- Remove bolts from inner CV joint to rear final drive.

42-98



- Remove nut and bolt for connecting link to wheel bearing housing (arrow -2-) ⇒ page 42-43 .

  Tightening torque: 50 Nm (37 ft lb)



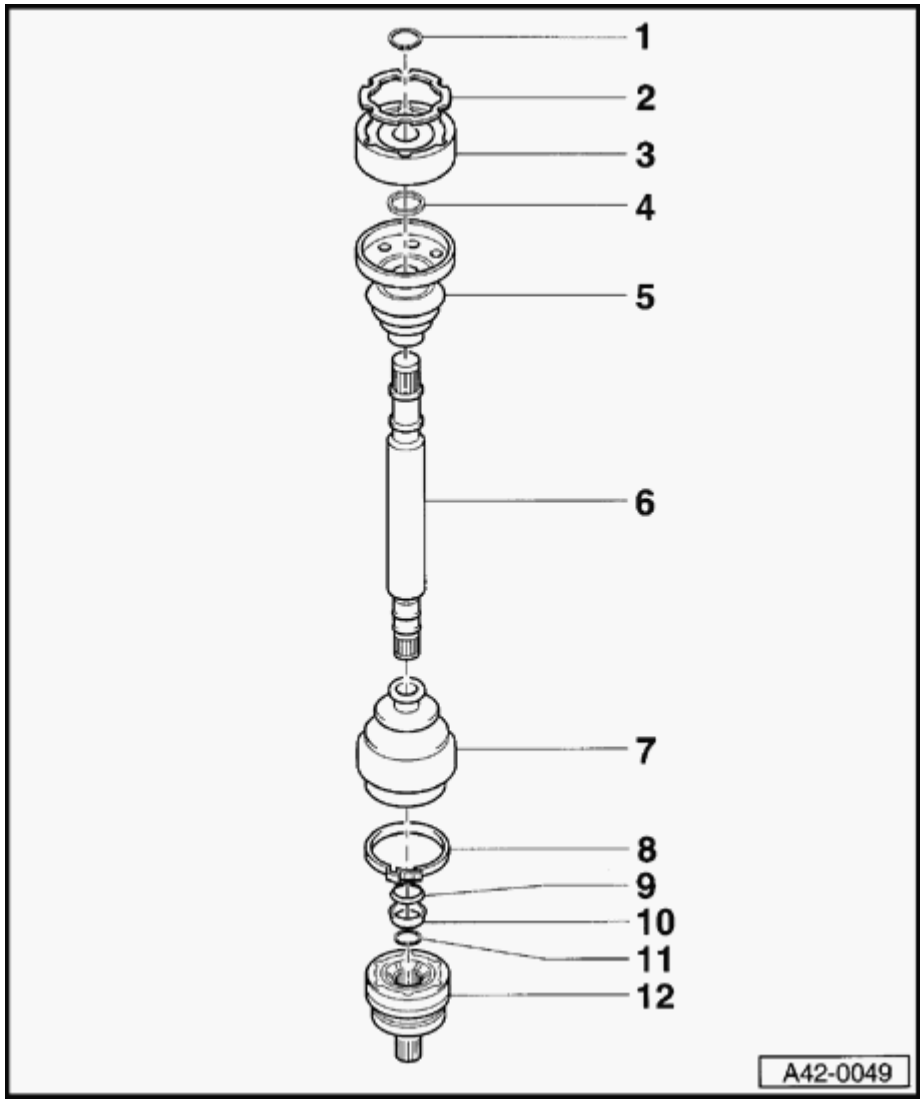
- Remove bolted connection of upper control arm to wheel bearing housing (arrow -1-) ⇒ page 42-94 .
- Lower drive axle on inside at rear final drive and remove from wheel bearing housing.

Installation is the reverse of removal.

CAUTION!

Bonded rubber bushings can only be turned to a limited extent. The bolted connection must only be tightened when the vehicle is standing on the ground. Otherwise the bonded rubber bushings will be subjected to a torsional stress resulting in shortened service life

42-99



Rear drive axle, servicing

Note:

Constant Velocity (CV) joints are packed with grease G-6.

Outer joint dia.	Total grease required	Proportions:	
		Joint	Boot
89 mm (3.5 in.)	90 g (3.2 oz.)	40 g (1.4 oz)	50 g (1.8 oz)
Inner			
100 mm (3.9 in.)	80 g (2.8 oz.)	30 g (1.1 oz)	50 g (1.8 oz)

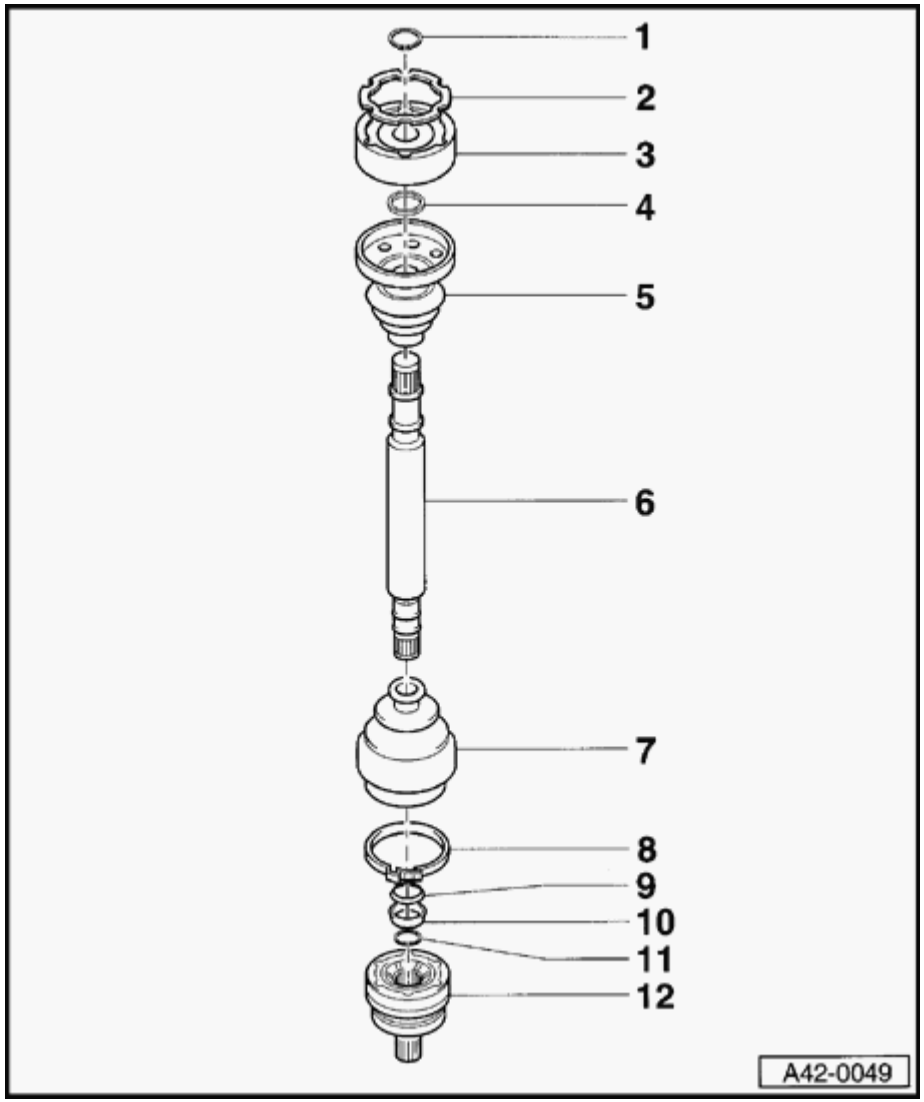
Note:

Re-grease the joint, if necessary, when replacing the CV joint boot.

1 - Circlip

- Always replace
- Use VW161a circlip pliers to remove and install ⇒ Fig. 5

42-100



2 - Gasket

- Always replace; remove protective backing and stick onto joint

3 - Inner CV joint

- O.D.: 100 mm (3.9 in.)
- Replace only as complete joint
- Removing ⇒ Fig. 3
- Pressing on ⇒ Fig. 4
- Greasing ⇒ Note, page 42-99

4 - Dished washer

- Installation position ⇒ Fig. 7

5 - Inner CV joint boot with cap

- Examine for splits and signs of chafing
- Use drift to remove
- Coat sealing surface of CV joint with D-3 before attaching to CV joint

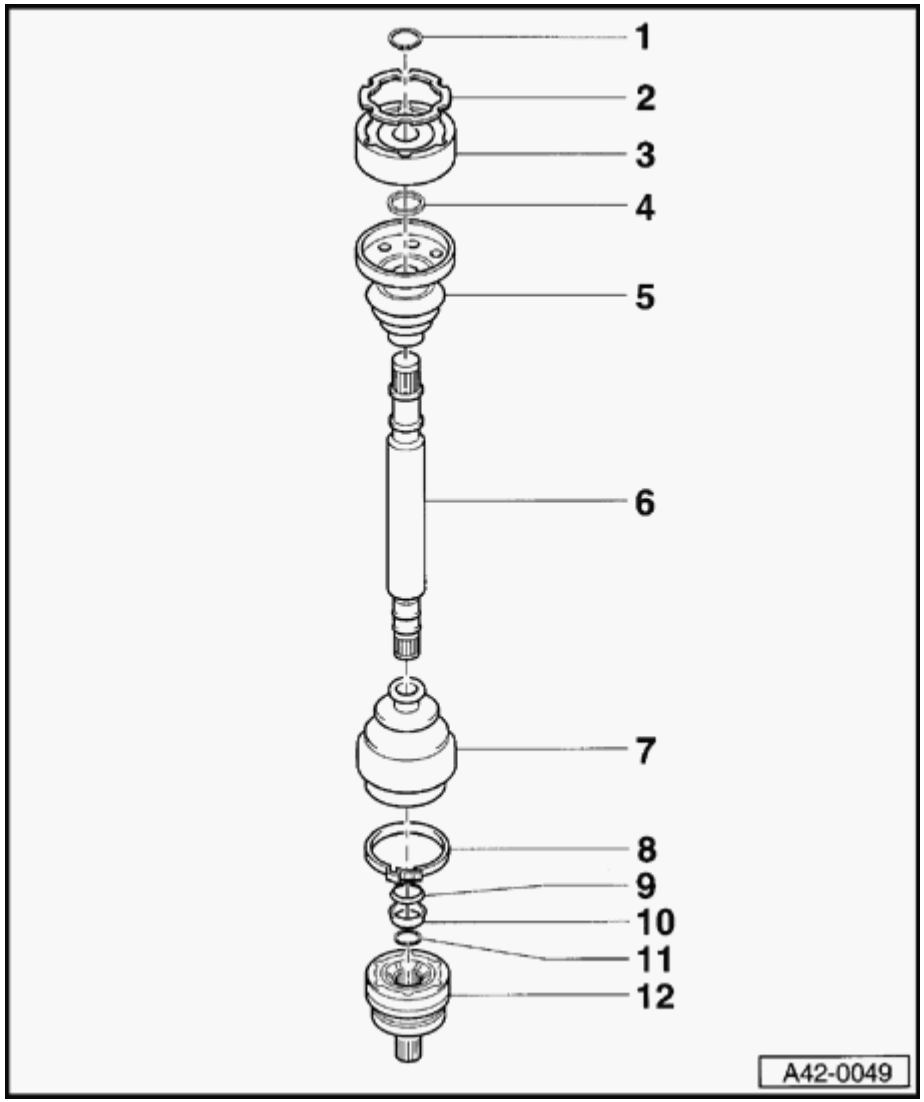
6 - Axle shaft

- Identical length on left and right-sides

7 - Outer CV joint boot

- Examine for splits and signs of chafing
- Ventilate before tightening clamp ⇒ Fig. 2

42-101



8 - Clamp

- Always replace
- Tightening ⇒ Fig. 1

9 - Dished washer

- Larger diameter (concave side) contacts thrust ring
- Installation position ⇒ Fig. 6

10 - Spacer ring

- Installation position ⇒ Fig. 6

11 - Circlip

- Always replace
- Insert into annular groove of shaft when installing; not visible when joint installed

12 - Outer CV joint

- O.D.: 89 mm (3.5 in.)
- Replace only complete joint
- Removing ⇒ Fig. 8
- Installing: drive joint onto shaft using plastic-headed hammer until circlip engages in groove
- Greasing ⇒ Note, page 42-99

42-102

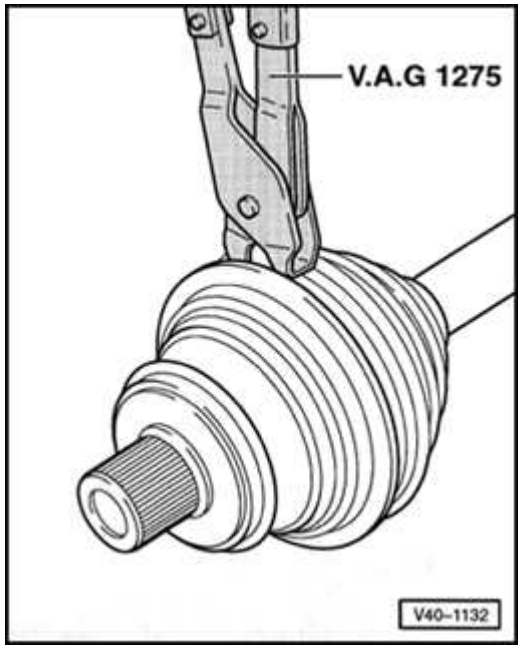


Fig. 1 Tightening clamp

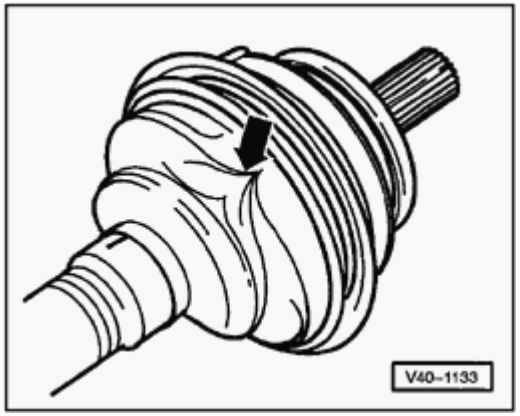


Fig. 2 Venting CV joint boot

Attaching the CV joint boot onto the outer body of the joint frequently requires compressing or squeezing the boot. This produces a vacuum in the joint boot, which may cause a crease to the inside when driving (arrow).

For this reason, after installing the joint boot, vent it briefly by letting some air in at the small diameter to balance the pressure and restore the correct boot shape.

42-103

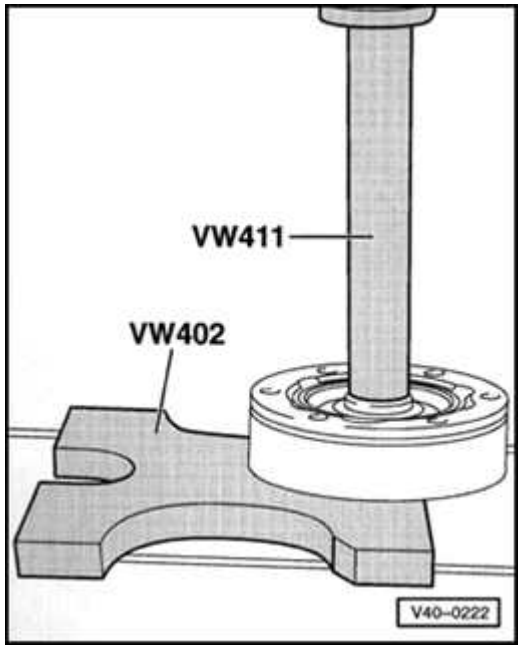


Fig. 3 Removing inner CV joint

Notes:

- *Use arbor to drive off boot first.*
- *Support ball hub.*

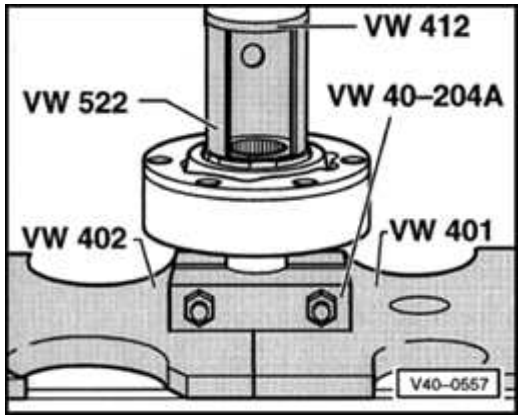


Fig. 4 Pressing on inner CV joint

Note:

Chamfer on the inner diameter of the ball hub (splines) must be facing toward the shoulder of the drive axle.

- Press joint on up to stop.
- Install circlip.

42-104

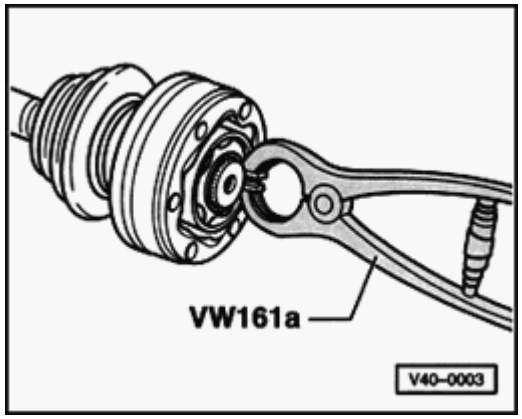


Fig. 5 Removing and installing circlip

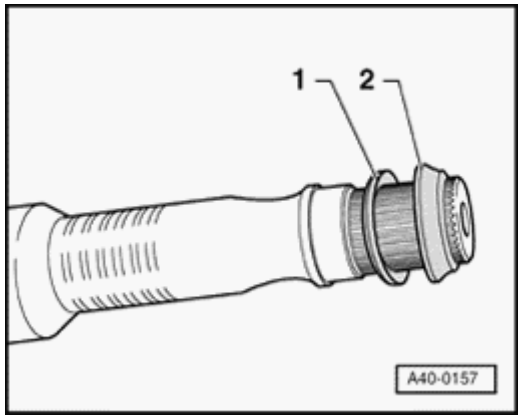


Fig. 6 Installation position of dished washer and spacer ring

1 - Dished washer

2 - Spacer ring (plastic)

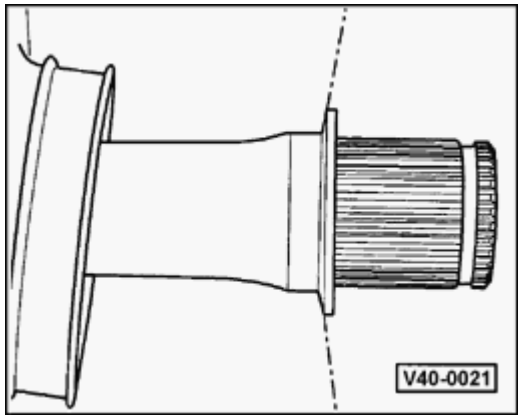


Fig. 7 Installing dished washer in correct position

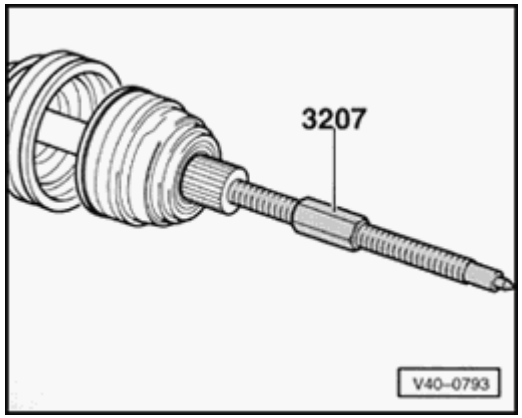


Fig. 8 Pressing off outer CV joint

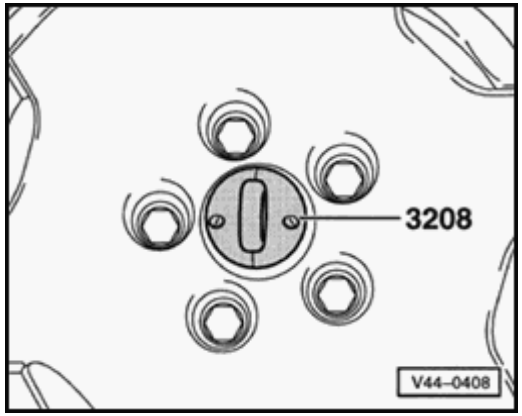
- Clamp drive axle in vise using protective jaws.
- Remove clamp and push back boot.
- Screw in 3207 pressure spindle with M14-thread end into joint until CV joint is pressed off splined shaft.

42-106

Wheel bearing housing, removing and installing

Removing

- Vehicle must be standing on its wheels above vehicle lift



- Remove wheel trim.

  On light alloy wheels use puller in vehicle tool kit to remove trim cap

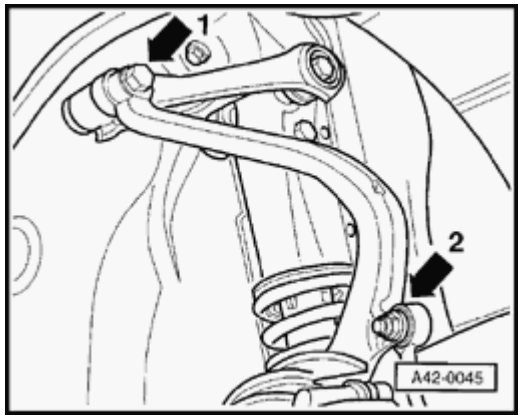
- Loosen collar bolt ⇒ page 42-94 , item - 7 -.

WARNING!

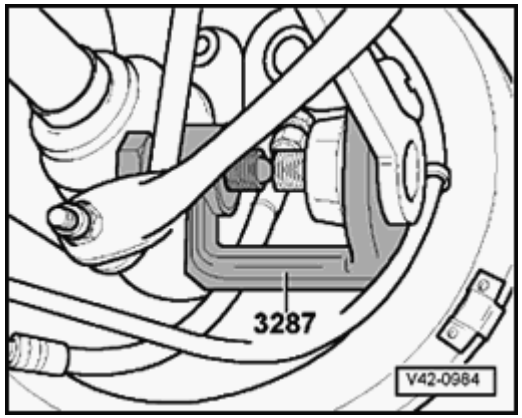
The vehicle must be standing on its wheels when loosening or tightening the collar bolt for the drive axle. Otherwise the risk of an accident exists.

- Loosen wheel bolts.
- Raise vehicle on lift.
- Remove wheel.
- Pull ABS wheel speed sensor from wheel bearing housing.
- Remove collar bolt ⇒ page 42-94 , item - 7 -.

42-107



- Remove bolt for connecting link to wheel bearing housing (arrow -2-).
- Remove track rod from wheel bearing housing ⇒ page 42-43 .



- Using 3287 ejection device for steering rod, press track rod off wheel bearing housing.

- Remove bolts mounting brake caliper to wheel bearing housing.

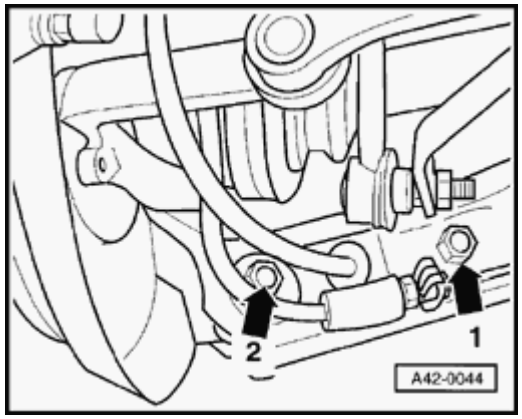
- Remove brake caliper and hang from body.

CAUTION!

- ***Do not allow caliper to hang by brake hose. The unsupported weight can stretch and damage the hose***

- ***Do not loosen brake hose or lines.***

- Remove brake disc.



- Mark installation position of eccentric washer for bolt (arrow -2-) for wheel bearing housing to lower control arm (⇒ page 42-41) and remove.



- Remove wheel bearing housing to upper control arm bolt (arrow -1-).

- Remove wheel bearing housing from drive axle and remove.

Installing

- Install in reverse order of removal.

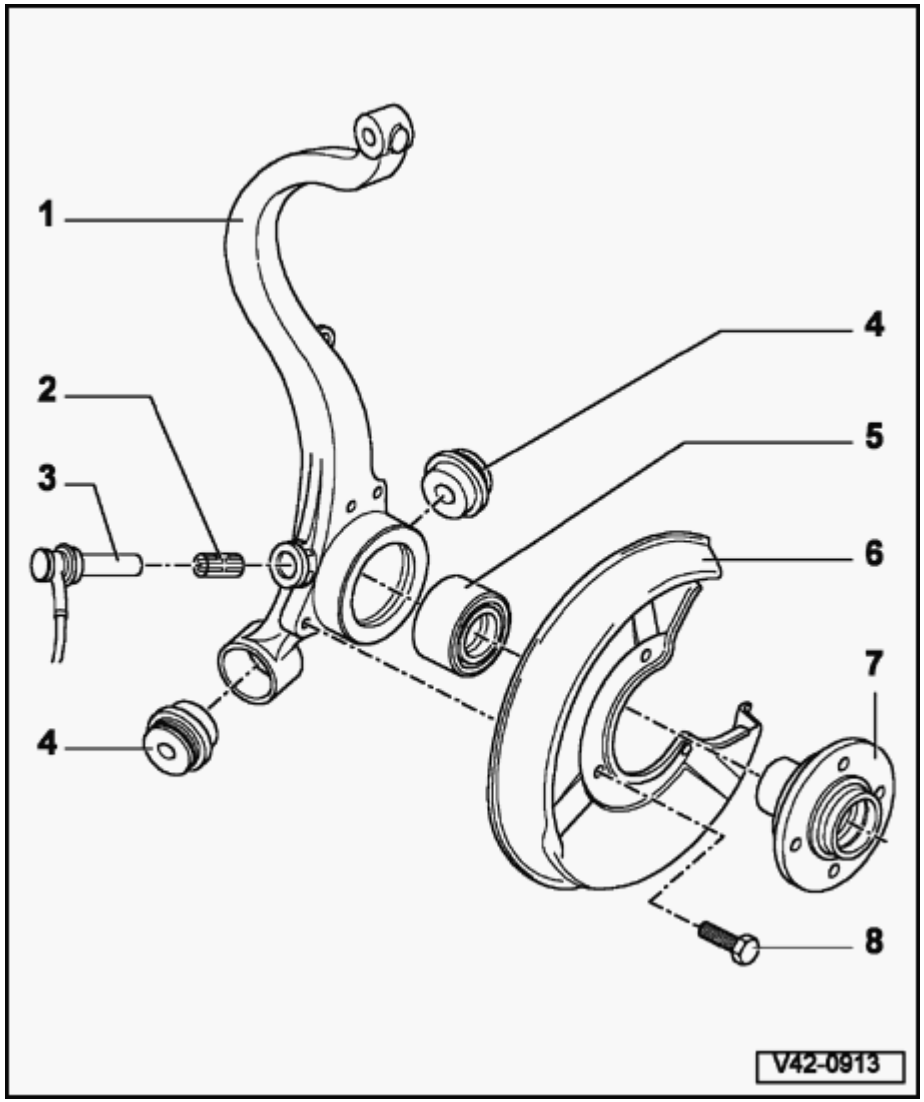
CAUTION!

- ***Some fasteners are designed to be used only once, and are unreliable and may fail if used a second time. This includes, but is not limited to, nuts, bolts, washers, circlips and cotter pins. Always follow recommendations in this manual-replace these fasteners with new parts where indicated, and any other time it is deemed necessary by inspection.***

- ***Bonded rubber bushings can only be turned to a limited extent. The bolted connection between the wheel bearing housing and the upper control arm must only be tightened when the vehicle is standing on the ground. Otherwise the bonded rubber bushings will be subjected to a torsional stress resulting in shortened service life***

- Check wheel alignment and adjust if necessary ⇒ page 44-6 .

42-110



Wheel bearing housing, servicing

1 - Wheel bearing housing

- Do not grease bearing seat in wheel bearing housing before pressing in wheel bearing
- After replacing, check and if necessary adjust wheel alignment

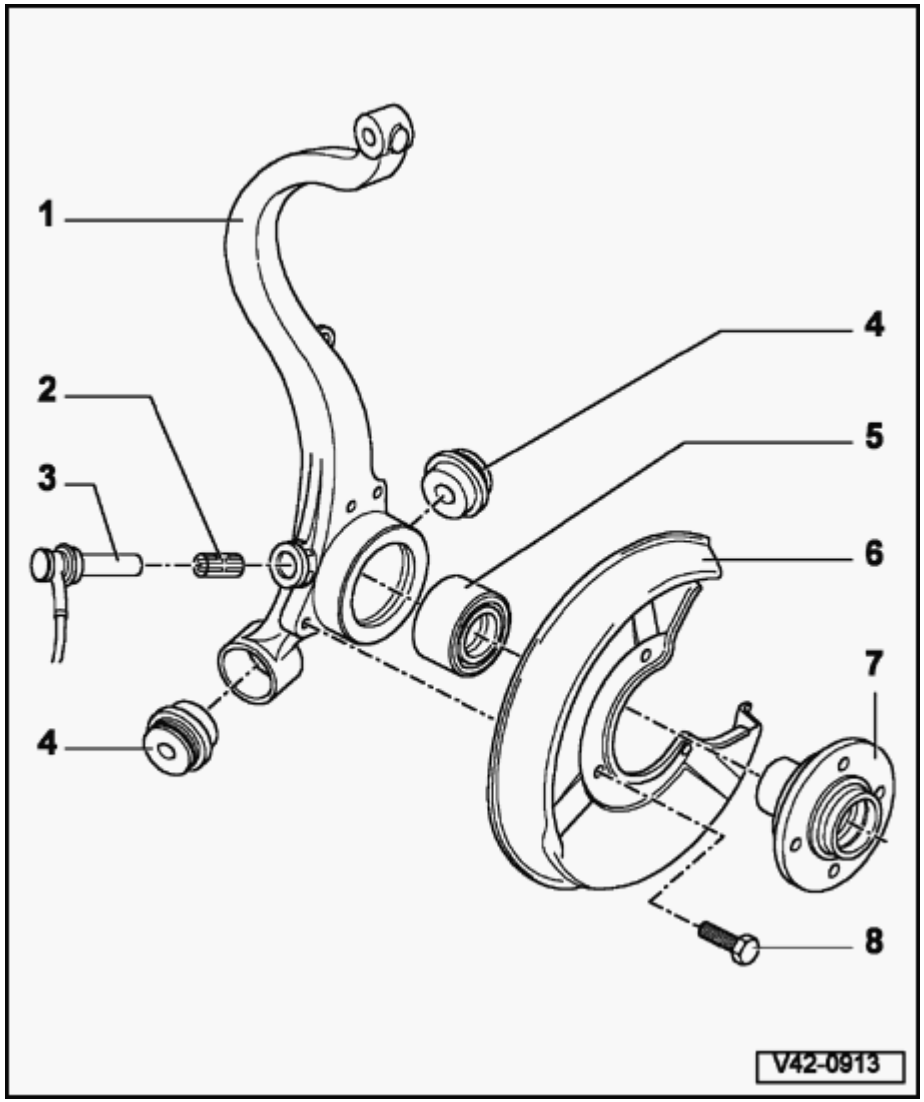
2 - Clamping sleeve

- Always replace
- Left and right-sides identical
- Grease all around with brake cylinder paste before inserting into wheel bearing housing
- Press into wheel bearing housing until fully seated

3 - ABS wheel speed sensor

- To remove, pull out
- Do not install until drive axle has been installed
- To install, press in by hand until fully seated

42-111



4 - Bonded rubber bushing

- Replacing ⇒ Figs. 1 , ⇒ 2 and ⇒ 3
- Always replace both bushing halves

5 - Wheel bearing

- Stepped design
- Installation position: larger inner diameter of wheel bearing faces wheel hub - 7 -
- Removing ⇒ Fig. 4
- Installing ⇒ Fig. 5

6 - Splash shield

- Bolt to wheel bearing housing

7 - Wheel hub

- Removing ⇒ Fig. 6
- Installing ⇒ Fig. 7
- Pressing off bearing inner race ⇒ Figs. 8 and ⇒ 9

8 - Bolt

- 10 Nm (7 ft lb)

42-112

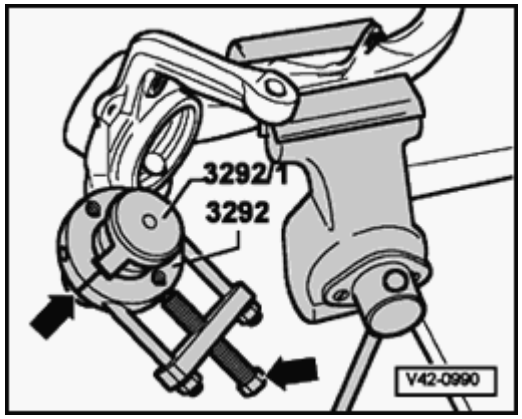


Fig. 1 Inserting assembly device into wheel bearing housing

- Position 3292/1 support onto bonded rubber bushing.
- Push 3292 assembly device over 3292/1 support and move into position.
- Tighten threaded spindle up to stop so that both jaws of 3292 assembly device are located in annular groove between bonded rubber bushing and wheel bearing housing.

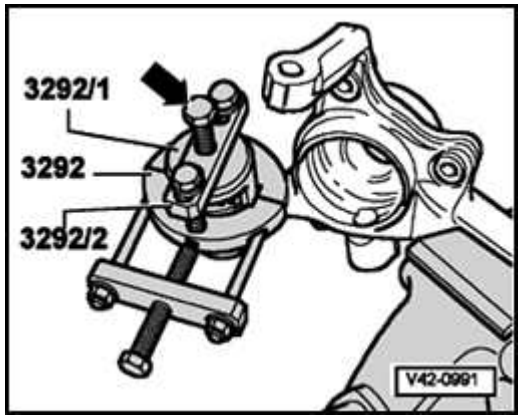


Fig. 2 Bolting cross bar onto assembly device

- Center 3292/2 cross bar and move fully up against 3292/1 support by tightening both bolts.
- Screw in spindle of 3292/2 cross bar until bushing is drawn out.

42-113

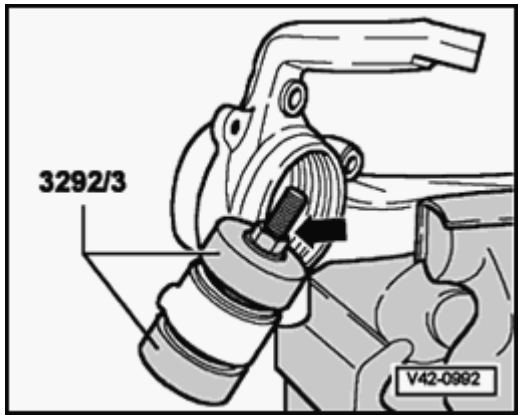


Fig. 3 Installing bonded rubber bushing

- Install bonded rubber bushing on both sides and perpendicular to hole in wheel bearing housing.
- Position one 3293/3 thrust piece each onto two bushings and use threaded spindle to draw in bushing up to stop.

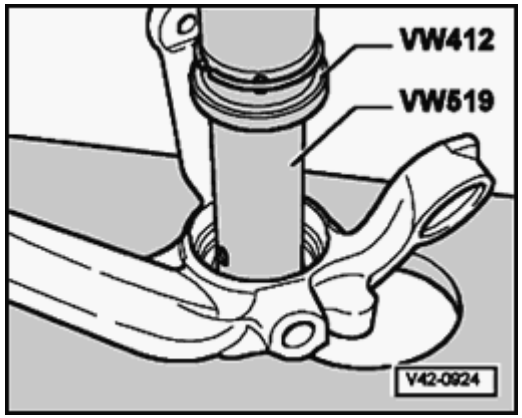


Fig. 4 Removing wheel bearing from wheel bearing housing

42-114

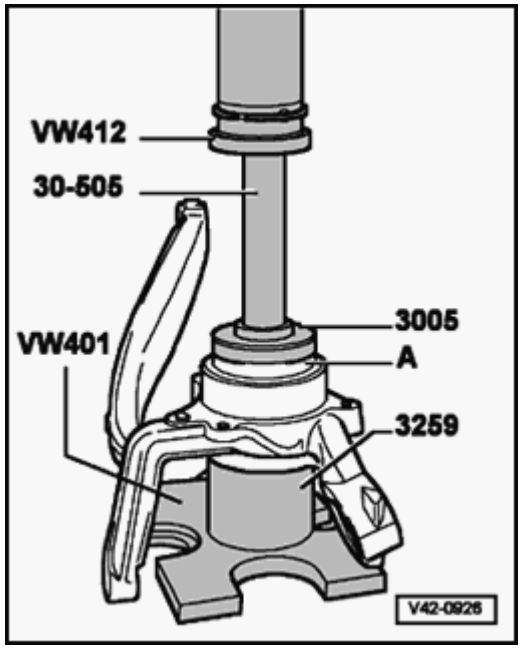


Fig. 5 Installing wheel bearing

- If necessary, remove any corrosion/dirt from hole in wheel bearing housing.
- Press in bearing -A- until fully seated.

  Larger inner diameter of wheel bearing faces wheel hub

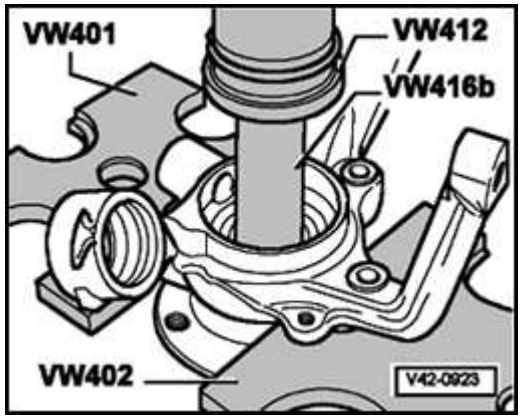


Fig. 6 Removing wheel hub from wheel bearing housing

42-115

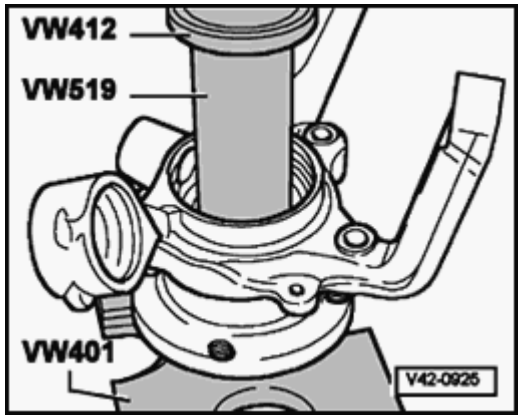


Fig. 7 Installing wheel hub

CAUTION!

VW519 sleeve must only contact the bearing inner race when pressing in the wheel hub.

- Press fully home.

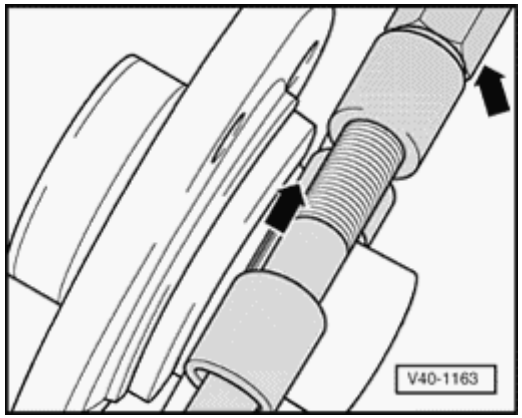


Fig. 8 Installing separating device

- Install separating device into annular groove of bearing inner race and preload with spindle.

Note:

Use commercially available separating device, e.g. KUKKO 15-17.

42-116

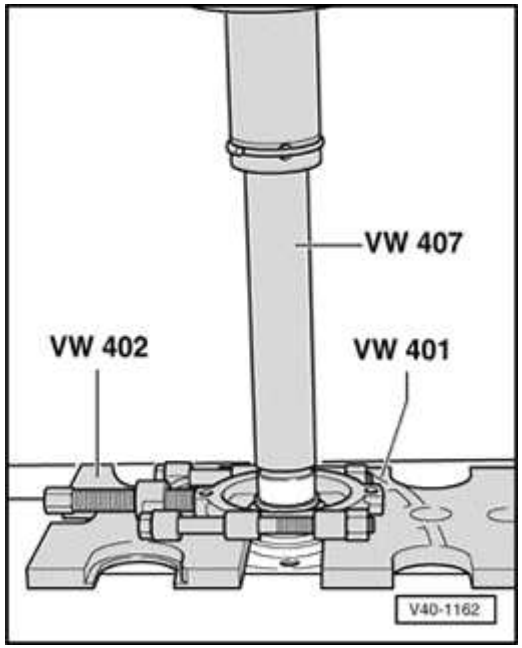


Fig. 9 Pressing bearing inner race off wheel hub

42-117

Wheel bearing housing, servicing using VAG1459B

Instead of using the VAG1290 workshop press, the VAG1459B hydraulic wheel bearing and wheel hub removal and installation tool together with the VAG1459B/2 accessory can instead be used to service the wheel bearing housing.

Advantages:

- Wheel bearing housing does not need to be completely disassembled
- Track rod and lower control arm remain in position at wheel bearing housing; therefore wheel alignment does not need to be checked

44-1

Wheels and tires

WARNING!

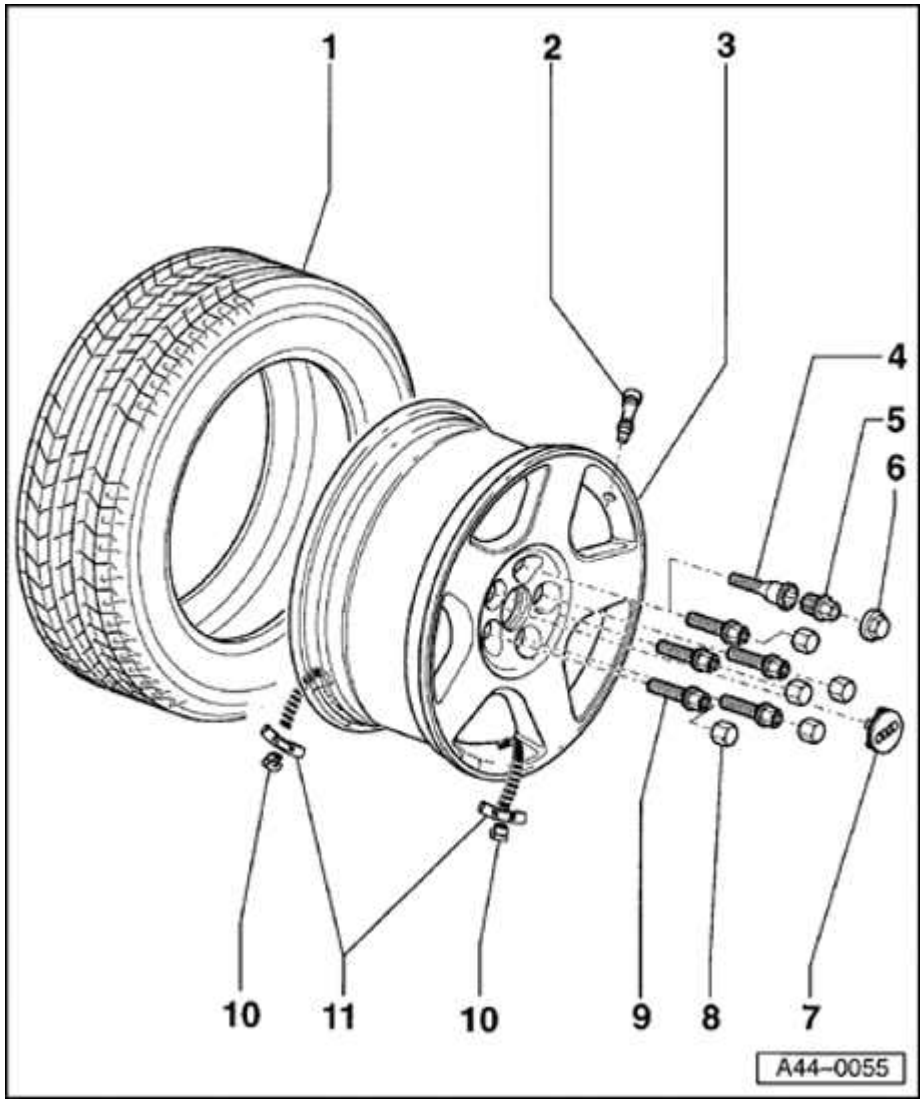
- ***Do not re-use any fasteners that are worn or deformed in normal use.***
- ***Some fasteners are designed to be used only once, and are unreliable and may fail if used a second time. This includes, but is not limited to, nuts, bolts, washers, circlips and cotter pins. Always follow the recommendations in this manual-replace these fasteners with new parts where indicated, and any other time it is deemed necessary by inspection.***

Notes:

- *The approved wheel/tire combinations had not been finalized at the time of printing of this Repair Manual.*
- *For safety reasons, the tires should be replaced in pairs for one axle at a time or for both axles together; not individually.*
- *Always install tires with the deepest tread on the front axle.*

- *It is recommended to use tires of the same make, design and tread pattern on all four wheels.*
- *Install a new valve stem when installing a new wheel or tire.*
- *If using tires with a directional tread pattern, the spare tire should be mounted on the wheel with the tread pattern facing the same way as the tires on the right-side of the vehicle.*

44-2



Light-alloy wheel

1 - Tire

2 - Valve

- Always replace
- Use only correct valves as specified in parts catalog microfiche

3 - Wheel

- Bolt hole circle diameter: 112 mm (4.409 in.)

4 - Anti-theft wheel bolt M14 x 1.5 x 27.5

- 120 Nm (89 ft lb)

5 - Adapter for anti-theft wheel bolt

6 - Protective cap

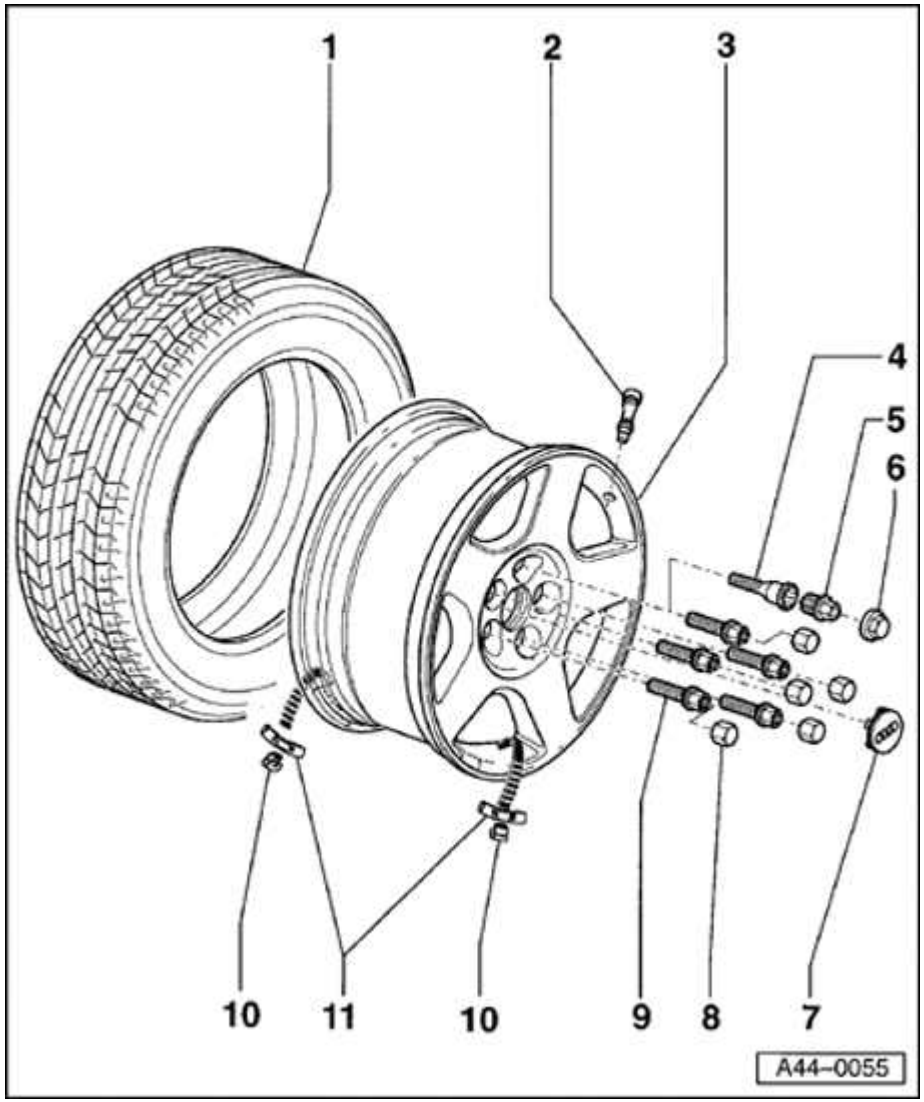
- Install onto anti-theft wheel bolt

7 - Center cap

8 - Protective caps

- Install onto wheel bolts

44-3



9 - Wheel bolts M14 x 1.5 x 27.5

- 120 Nm (89 ft lb)

10 - Retainer springs for balancing weights

11 - Balancing weights

- Maximum allowable weight: 60g (2.1 oz.) per rim flange

44-4

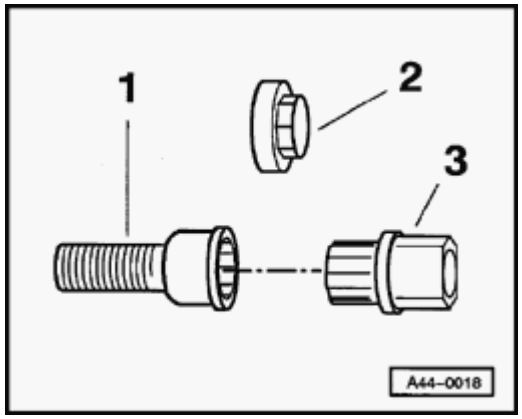


Fig. 1 Anti-theft wheel bolt

1 - Anti-theft wheel bolt

2 - Protective cap

3 - Wheel bolt adapter

44-5

Wheels, balancing on vehicle

Always deactivate the traction control system (ASR) before balancing the wheels.

Notes:

- *Incorrectly balanced wheels cause steering wheel vibration and shuddering at the front of the vehicle.*
- *Where applicable, position the vehicle on the sensor platforms (front axle only for front wheel drive, both axles for all wheel drive) in order to carry out wheel balancing.*
- *Observe the wheel balancing equipment manufacturer's operating instructions.*

Wheel alignment

WARNING!

- ***Do not re-use any fasteners that are worn or deformed in normal use.***

- ***Some fasteners are designed to be used only once, and are unreliable and may fail if used a second time. This includes, but is not limited to, nuts, bolts, washers, circlips and cotter pins. Always follow the recommendations in this manual-replace these fasteners with new parts where indicated, and any other time it is deemed necessary by inspection.***

The wheel alignment should be measured using VW/Audi approved wheel alignment equipment.

Wheel alignment checks must always include both the front and the rear axles. Otherwise the proper running characteristics of the vehicle cannot be ensured.

Notes:

- *The wheel alignment should not be checked before the vehicle has completed 1000-2000 km (600-1200 miles) so that the coil springs have time to settle.*

- *When making adjustments, the relevant specifications should be adhered to as closely as possible.*

Suspension codes, checking requirements

Information on weight codes (code number)

From m.y. 1998 ➢, spring/shock assemblies will be classified according to weight codes (code number) so that suspension components can be matched easily.

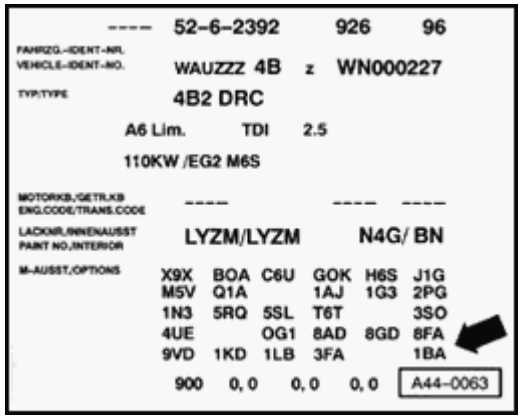
The spring/shock assembly installed in the vehicle is indicated by the weight code on the vehicle data label.

Specified values for wheel alignment

1BA = Standard suspension

1BC = Special purpose suspension

Special purpose vehicles suspension -1BC- have the same specified values for wheel alignment as the standard suspension -1BA-.



Example of vehicle data label

In this example the vehicle is installed with the standard suspension, version 1BA (arrow).

The vehicle data label is located in the spare wheel recess and in the vehicle Maintenance booklet.

Factory codes for the suspension:

- 1BA: Standard suspension
- 1BE: Sport suspension
- 1BB: Heavy duty suspension (approx. 20 mm (3/4 in.) higher)
- 1BC: Special purpose suspension
- 1BD: Sport suspension, Audi S4
- 1BH: USA
- 1BT: Heavy duty suspension (approx. 7 mm or 1/4 in. higher)
- 1BP: Heavy duty suspension (same ride height as 1BA but with limited bump)

44-9

Requirements

- Test equipment must be properly adjusted and attached to vehicle (refer to equipment manufacturer's instructions)
- Equal tread depth for both tires on each axle, with difference between two not more than 2 mm (0.079 in.)
- Tires inflated to correct pressure
- Sliding plates and turntables not positioned against any stop when checking wheel alignment
- Vehicle at correct curb weight 1)
- Vehicle accurately positioned, suspension bounced and rocked several times and allowed to settle
- Suspension, steering and steering linkage in proper condition with no damage or excessive play
- Carry out axial wheel run-out compensation. Since some wheel run-out is allowable,

checking alignment without first compensating for axial wheel run out may indicate that the toe-in tolerance is already exceeded. If this is the case it is not possible to set toe-in without first compensating for wheel run-out

1) Curb weight is defined as: the weight of the vehicle ready for the road (fuel tank completely full, spare wheel, vehicle tool kit and vehicle jack all in specified positions).

44-10

Wheel alignment must be checked if

- There are problems with vehicle performance.
- There is accident damage.
- Tires are worn on one side.
- Axle components have been removed ⇒ table below.

Front axle component removed or replaced	Alignment check required		S-point adjustment required		Rear axle component removed or replaced	Alignment check required	
	Yes	No	Yes	No		Yes	No
Rear upper link		X		X	Shock absorber		X
Front upper link	X		X				
Guide link with hydraulic-bushing		X		X	Coil spring		X
Suspension strut		X		X			
Track control link		X		X	Upper control arm 1)	X	
Mounting bracket	X		X		Lower control arm 1)	X	
Wheel bearing housing	X		X		Wheel bearing housing1)	X	
Tie rod	X		X		Track rod 1)	X	
Steering gear	X		X		Subframe 1)	X	

Subframe	X		X		Torsion beam axle assembly (FWD)	X	
Stabilizer bar		X			Stabilizer bar		X

1) Only affects vehicles with all wheel drive

44-11

Wheel alignment specifications (front-wheel-drive vehicles)

- Specifications valid for all engine versions

Front axle	Standard suspension (1BA) Special suspension (1BC) Heavy duty suspension (1BP)	Sport suspension (1BE)	Heavy duty suspension (1BB), (1BT1))
Camber	-25′ ± 25′	-40′ ± 25′	-15′ ± 25′ -30′ ± 25′ 1)
Maximum allowable difference in camber between two sides	30′	30′	30′
Toe setting for each wheel (curb weight)	+10′ ± 2′	+10′ ± 2′	+10′ ± 2′
Toe check value for each wheel (curb weight)	+10′ ± 5′	+10′ ± 5′	+10′ ± 5′
Toe constant for each wheel (setting value)	+7′ ± 2′	+7′ ± 2′	+7′ ± 2′
Toe constant for each wheel (check value)	+7′ ± 7′	+7′ ± 7′	+7′ ± 7′
Toe-out on turns at 20°	-1° 20′ ± 30′	-1° 20′ ± 30′	-1° 20′ ± 30′
1) Applies only to vehicles with heavy duty suspension (1BT)			

44-12

Rear axle	Standard suspension (1BA) Special suspension (1BC) Heavy duty suspension (1BP)	Sport suspension (1BE)	Heavy duty suspension (1BB), (1BT1))
Camber	-1° 30′ ± 20′	-1° 30′ ± 20′	-1° 30′ ± 20′
Maximum allowable difference in camber between two sides	30′	30′	30′
Overall toe	+20′ +15′/-10′	+28′ +15′/-10′	+14′ +15′/-10′ +17′ +15′/-10′ 1)
Maximum allowable difference in direction of travel relative to longitudinal vehicle center line (thrust angle)	± 15′	± 15′	± 15′
1) Applies only to vehicles with heavy duty suspension (1BT)			

44-13

Wheel alignment specifications (all-wheel-drive vehicles)

- Specifications valid for all engine versions

Front axle	Standard suspension (1BA) Special suspension (1BC) Heavy duty suspension (1BP)	Sport suspension (1BE)	Heavy duty suspension (1BB), (1BT1))
Camber	-25 ′ ± 25 ′	-40 ′ ± 25 ′	-15 ′ ± 25 ′ -30 ′ ± 25 ′
Maximum allowable difference in camber between two sides	30 ′	30 ′	30 ′
Toe setting for each wheel (curb weight)	+10 ′ ± 2 ′	+10 ′ ± 2 ′	+10 ′ ± 2 ′
Toe check value for each wheel (curb weight)	+10 ′ ± 5 ′	+10 ′ ± 5 ′	+10 ′ ± 5 ′
Toe constant for each wheel (setting value)	+7 ′ ± 2 ′	+7 ′ ± 2 ′	+7 ′ ± 2 ′
Toe constant for each wheel (check value)	+7 ′ ± 7 ′	+7 ′ ± 7 ′	+7 ′ ± 7 ′
Toe-out on turns at 20°	-1° 20 ′ ± 30 ′	-1° 20 ′ ± 30 ′	-1° 20 ′ ± 30 ′
1) Applies only to vehicles with heavy duty suspension (1BT)			

44-14

Rear axle	Standard suspension (1BA) Special suspension (1BC) Heavy duty suspension (1BP)	Sport suspension (1BE)	Heavy duty suspension (1BB), (1BT1))
Camber	-40 ′ ± 30 ′	-40 ′ ± 30 ′	-40 ′ ± 30 ′
Maximum allowable difference in camber between two sides	30 ′	30 ′	30 ′
Overall toe	+8 ′ ± 5 ′	+8 ′ ± 5 ′	+8 ′ ± 5 ′
Maximum allowable difference in direction of travel relative to longitudinal vehicle center line (thrust angle)	± 10 ′	± 10 ′	± 10 ′
1) Applies only to vehicles with heavy duty suspension (1BT)			

44-15

Wheel alignment specifications (front-wheel-drive vehicles with aluminium mounting bracket)

- Specifications valid for all engine versions

Front axle	Standard suspension (1BA) Special suspension (1BC) Heavy duty suspension (1BP)	Sport suspension (1BE)	Heavy duty suspension (1BB), (1BT1))
Camber	-35 ′ ± 25 ′	-50 ′ ± 25 ′	-20 ′ ± 25 ′ -30 ′ ± 25 ′
Maximum allowable difference in camber between two sides	30 ′	30 ′	30 ′
Toe setting for each wheel (curb weight)	+10 ′ ± 2 ′	+10 ′ ± 2 ′	+10 ′ ± 2 ′
Toe check value for each wheel (curb weight)	+10 ′ ± 5 ′	+10 ′ ± 5 ′	+10 ′ ± 5 ′
Toe constant for each wheel (setting value)	+9 ′ ± 2 ′	+9 ′ ± 2 ′	+9 ′ ± 2 ′
Toe constant for each wheel (check value)	+9 ′ ± 7 ′	+9 ′ ± 7 ′	+9 ′ ± 7 ′
Toe-out on turns at 20°	-1° 20 ′ ± 30 ′	-1° 20 ′ ± 30 ′	-1° 20 ′ ± 30 ′
1) Applies only to vehicles with heavy duty suspension (1BT)			

44-16

Wheel alignment specifications (all-wheel-drive vehicles with aluminium mounting bracket)

- Specifications valid for all engine versions

Front axle	Standard suspension (1BA) Special suspension (1BC) Heavy duty suspension (1BP)	Sport suspension (1BE)	Heavy duty suspension (1BB), (1BT1))
Camber	-35 ′ ± 25 ′	-50 ′ ± 25 ′	-20 ′ ± 25 ′ -30 ′ ± 25 ′
Maximum allowable difference in camber between two sides	30 ′	30 ′	30 ′
Toe setting for each wheel (curb weight)	+10 ′ ± 2 ′	+10 ′ ± 2 ′	+10 ′ ± 2 ′
Toe check value for each wheel (curb weight)	+10 ′ ± 5 ′	+10 ′ ± 5 ′	+10 ′ ± 5 ′
Toe constant for each wheel (setting value)	+9 ′ ± 2 ′	+9 ′ ± 2 ′	+9 ′ ± 2 ′
Toe constant for each wheel (check value)	+9 ′ ± 7 ′	+9 ′ ± 7 ′	+9 ′ ± 7 ′
Toe-out on turns at 20°	-1° 20 ′ ± 30 ′	-1° 20 ′ ± 30 ′	-1° 20 ′ ± 30 ′
1) Applies only to vehicles with heavy duty suspension (1BT)			

44-17

Wheel alignment specifications, sport suspension (1BD)

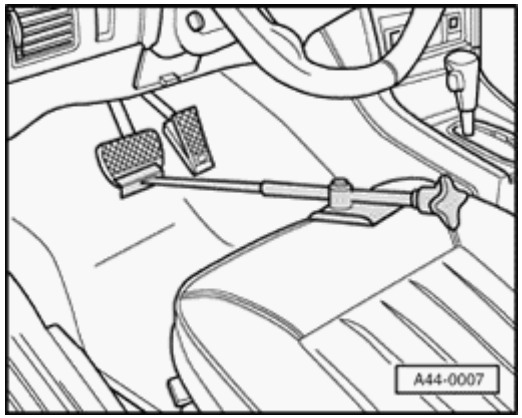
Front axle	**Sport suspension (1BD)**
Camber	-50′ ± 25′
Maximum allowable difference in camber between two sides	30′
Toe setting for each wheel (curb weight)	+10′ ± 2′
Toe check value for each wheel (curb weight)	+10′ ± 5′
Toe constant for each wheel (setting value)	+7′ ± 2′
Toe constant for each wheel (check value)	+7′ ± 7′
Toe-out on turns at 20°	-1° 30′ ± 30′
Rear axle	**Sport suspension (1BD)**
Camber	-55′ ± 15′
Maximum allowable difference in camber between two sides	30′
Overall toe	+8′ ± 5′
Maximum allowable difference in direction of travel relative to longitudinal vehicle center line (thrust angle)	± 10′

Wheel alignment, preparations for checking

Special tools, test requirements and auxiliary items

VAG1907	VAG1941	VAG1925
VAG1925/3	VAG1925/4	VAG1925/6
Electronic alignment unit; e.g. VAG1813		

- Carry out wheel run-out compensation.



- Install brake pedal depressor.

Note:

On accident damaged vehicles, use special tool VAG1907 to make certain that the rack is in the center position.

Wheel alignment, mandatory sequence of operations for checking

Overview of sequence of operations for measuring wheel alignment

- Vehicle must only be measured at curb weight

Note:

Exception: when measuring the toe-in curve as described in the alignment program instructions.

The following work sequences must be adhered to

1 - Check front axle camber centering and adjust if necessary ⇒ page 44-24 .

2 - Check rear axle camber and adjust if necessary:

FWD vehicles ⇒ page 44-20

AWD vehicles ⇒ page 44-22

3 - Check rear axle and adjust if necessary:

FWD vehicles ⇒ page 44-21

AWD vehicles ⇒ page 44-23

4 - If necessary, check toe-in curve on front axle.

To determine if the toe-in curve or toe constant "S" needs adjusting ⇒ table on page 44-10 and also page ⇒ Page 44-27 .

5 - Check front axle toe with vehicle at curb weight and adjust if necessary ⇒ page 44-38 .

Rear axle camber (front-wheel-drive vehicles), checking

Wheel alignment specifications ⇒ page 44-11 .

The rear axle camber can be checked but not adjusted on vehicles with front wheel drive.

If the readings are outside the allowable tolerances the axle beam must be checked for damage and replaced if necessary.

Rear axle toe (front-wheel-drive vehicles), centering

Individual toe settings on the rear axle cannot be adjusted.

By moving the rear axle within the elongated holes it is possible to center the individual toe settings.

- Loosen securing bolts on mounting brackets.

- Center individual toe settings by moving axle beam within elongated holes at mounting brackets.

If the overall toe setting is outside the allowable tolerance, or if it is not possible to center the individual settings, the axle beam must be checked for damage and replaced if necessary.

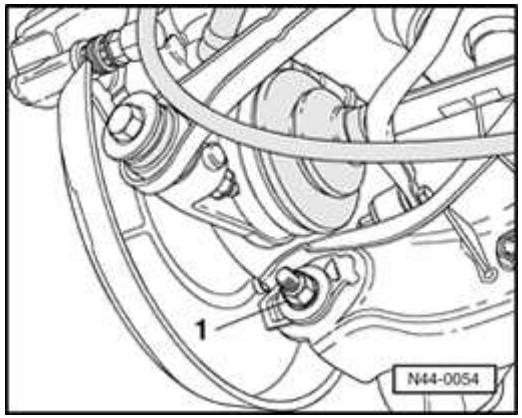
The body alignment must also be checked/measured in the area of the rear axle mounting points and serviced as necessary.

⇒ Repair Manual, Body Collision Repair

44-22

Rear axle camber (all-wheel-drive vehicles), adjusting

Wheel alignment specifications ⇒ page 44-13



- Loosen mounting nuts -1-.
- Adjust camber by turning eccentric bolt.

Note:

The maximum adjustment range is 90° to the left or right of the center position.

- Tighten mounting nut, check camber again and if necessary re-adjust.

44-23

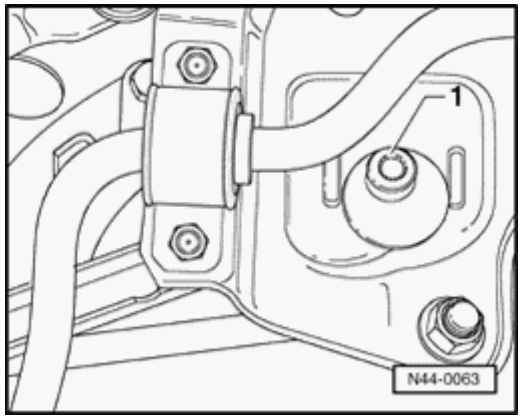
Rear axle toe (all-wheel-drive vehicles), setting

Wheel alignment specifications ⇒ page 44-13

- Loosen mounting nut -1-.

Notes:

- *The maximum adjustment range is 90° to the left or right of the center position.*
- *Adjusting the individual toe settings automatically alters the thrust angle of the axle.*



- Adjust individual toe settings as necessary by turning eccentric bolt.
- Tighten mounting nut, check settings again and if necessary re-adjust.

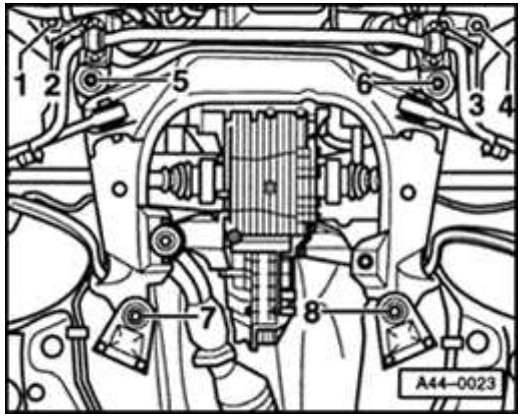
44-24

Front axle camber, adjusting

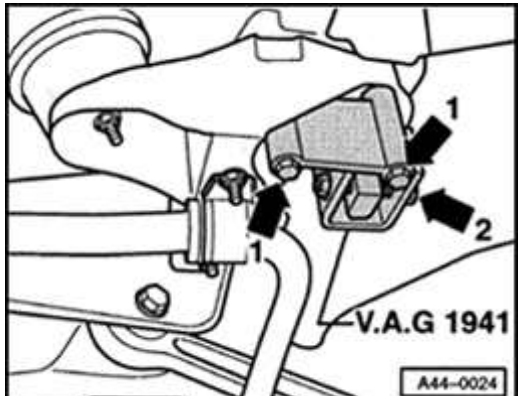
The camber cannot be adjusted.

By moving the subframe it is possible to center the camber uniformly within the specified tolerance range.

- Remove noise insulation panel.



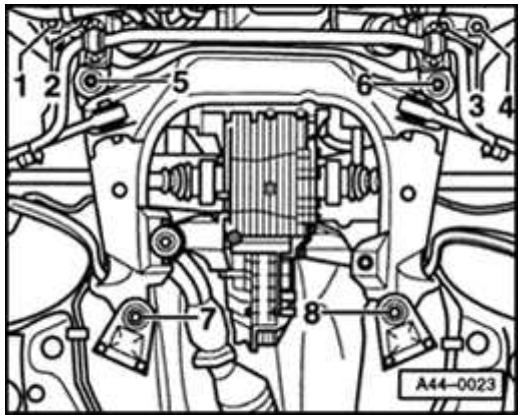
- Remove bolts -3- and -4-.



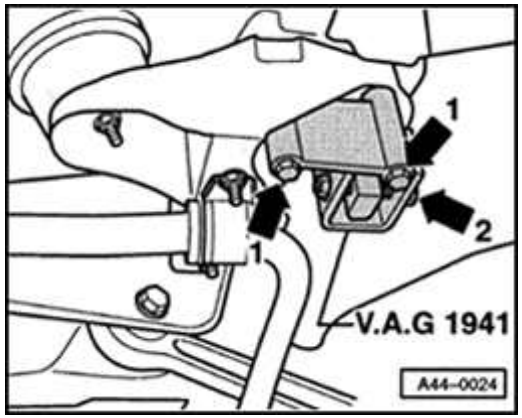
- Install VAG1941 camber adjustment tool.

  Tightening torque of bolts -1-: 10 Nm (7 ft lb)

44-25



- Loosen bolts -1-, -2-, -5-, -6-, -7- and -8-.



- Turn bolt -2- until specifications are achieved.

Wheel alignment specifications ⇒ page 44-13 .

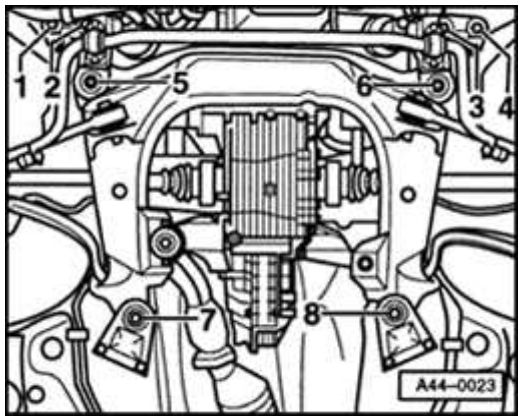
- Relieve tension on bolt -2- and check readings obtained. If necessary, correct camber again.

44-26

Removing VAG1941 camber adjustment tool

- At least two bolts must always be tightened so that the position of the subframe does not change.

- Bolts -5-, -6-, -7- and -8- must always be replaced.



- Tighten bolts -7- and -8-.

  Tightening torque: 110 Nm (81 ft lb) + 1/4-turn (90°)

- Remove VAG1941 camber adjustment tool.

- Tighten both forward bolts -5- and -6-.

  Tightening torque: 110 Nm (81 ft lb) + 1/4-turn (90°)

- Tighten bolts -1-, -2-, -3- and -4-.

  Tightening torque: 60 Nm (44 ft lb)

CAUTION!

Whenever the camber is adjusted, all wheel alignment settings must be re-checked.

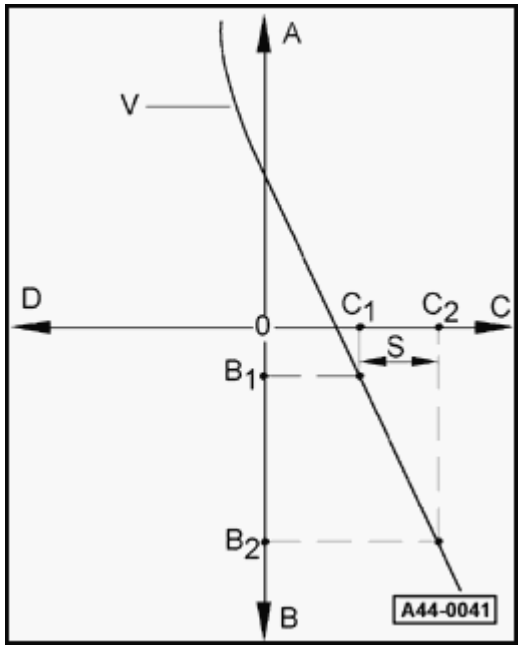
44-27

Front axle toe-in curve, adjusting

General

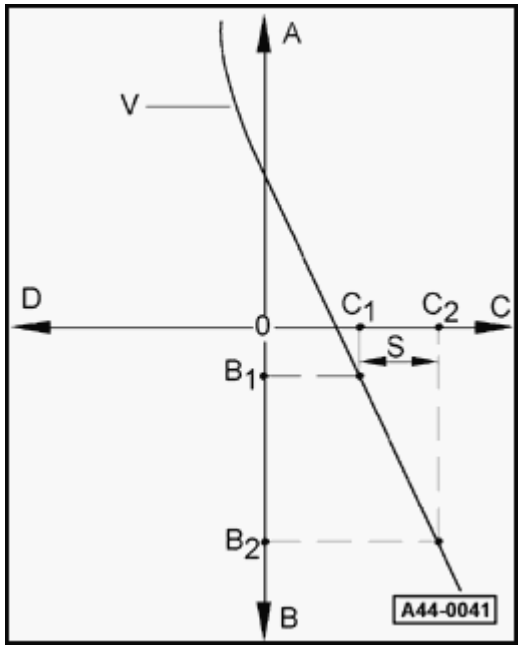
Toe-in curve

Notes:



Explanation of the term "toe-in curve":

- *When the suspension is compressed (bumped) or extended (rebounded) the toe of the wheel changes relative to the amount of compression or extension.*
- *The resulting toe values can be plotted on a graph to obtain the toe-in curve.*
- *The shape of this curve is determined by toe value C1 (measured with the wheel in a defined starting position B1) and by toe value C2 measured at a rebound, or extension, of 40 mm or 1.57 in. (for heavy duty suspension 1BB) or of 60 mm or 2.36 in. (for all other suspensions) relative to starting position B1).*
- *The resulting change in toe-in, (C2 - C1) is defined as "toe constant S."*



Sport suspension 1BE

A Spring compression

B Spring extension (rebound)

B1 Defined starting position (vehicle at curb weight)

On vehicles with sport suspension, suspension must be extended 20 mm (0.78 in.) to this position.

B2 Vehicle suspension extended 60 mm (2.36 in.) compared to position B1 ⇒ page 44-31

C Toe-in

C1 Toe-in measured in position B1

C2 Toe-in measured in position B2

D Toe-out

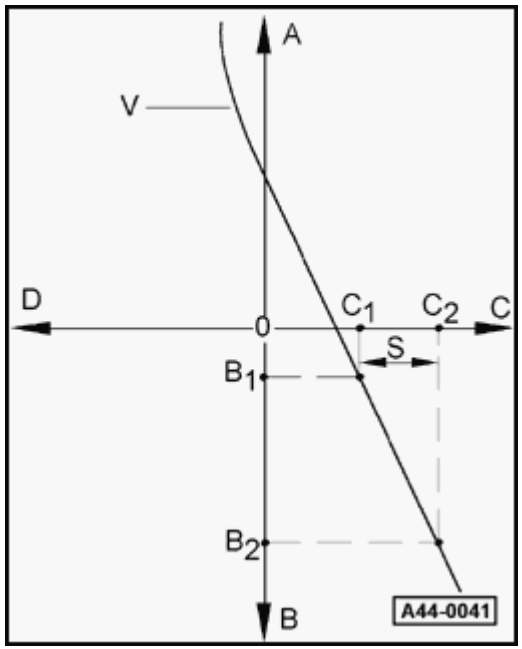
V Toe-in curve

S Toe constant, C2 - C1

Notes:

The toe-in curve must also be checked in the following cases (in addition to those specified in table ⇒ page 44-10):

- *If the vehicle has been in an accident or sustained damage to the suspension components and/or bodywork.*
- *If the vehicle does not maintain direction of travel over bumps and when braking or accelerating.*



Standard suspension 1BA, special suspension (1BC) and heavy duty suspension 1BP

On vehicles with standard running gear, the toe-in measurement C1 is measured in the defined starting position (vehicle at curb weight) B1 ⇒ page 44-30 .

B2 Vehicle suspension extended 60 mm (2.36 in.) compared to position B1

C2 Toe-in measured in position B2

Heavy duty suspension 1BB (vehicle ride height 20 mm higher)

On vehicles with heavy duty suspension 1BB:

C1 Toe-in measured in position B1 (defined starting position) ⇒ page 44-32

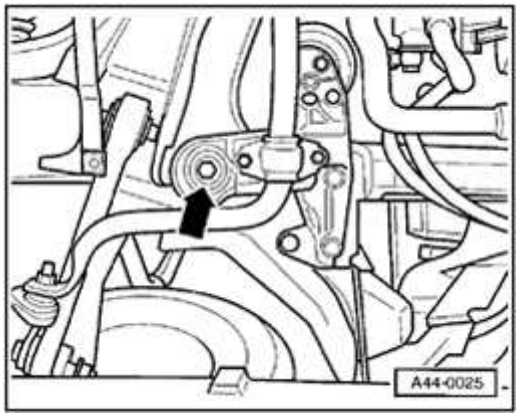
C2 Toe-in measured in position B2

44-30

Setting suspension to starting position B1 (⇒ page 44-27) on vehicles with standard suspension (1BA), special suspension (1BC) and heavy duty suspension (1BP)

Note:

Depending on the type of wheel alignment equipment used, it may be necessary to raise the front of the vehicle in order to position the VAG1925 spacer. After lowering the vehicle again the suspension must be bounced.



- Insert VAG1925 spacer together with VAG1925/4 adapters and screw both threaded spindles out until they just rest against front subframe bolts (arrow).

Do not raise the vehicle using the above procedure

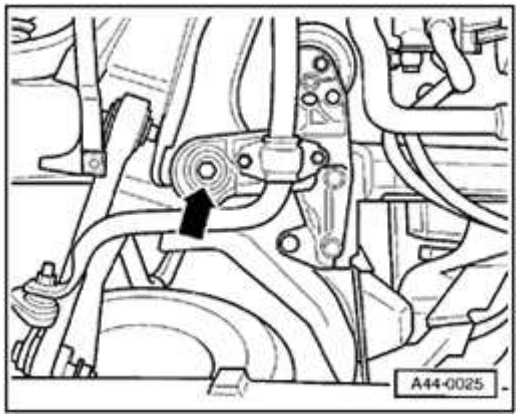
The vehicle is now in the defined starting position B1 (for vehicles with standard suspension (1BA), special suspension (1BC) and heavy duty suspension (1BP).

44-31

Setting suspension to starting position B1 (⇒ page 44-27) on vehicles with sport suspension

Note:

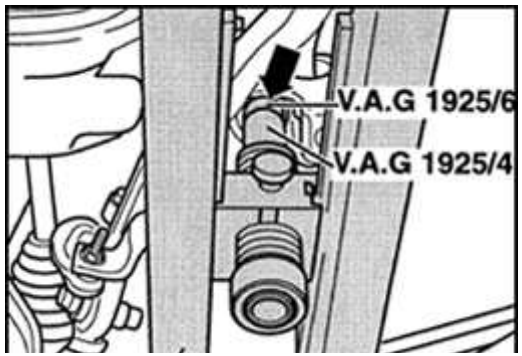
Depending on the type of wheel alignment equipment used, it may be necessary to raise the front of the vehicle in order to position the VAG1925 spacer. After lowering the vehicle again the suspension must be bounced.



- Insert VAG1925 spacer together with VAG1925/4 adapters and screw both threaded spindles out until they just rest against front subframe bolts (arrow).

Make sure vehicle is not raised using the above procedure

- Raise vehicle at front lifting points.



- Insert VAG1925/6 adapter onto VAG1925/4 adapter for spacer gauge.
- Lower vehicle onto adapters.

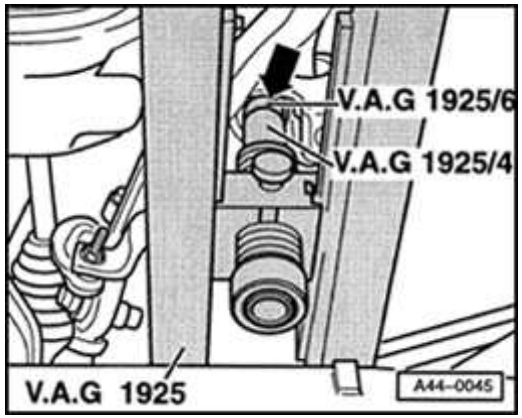
The vehicle is now in defined starting position B1 (for vehicles with sport suspension).

44-32

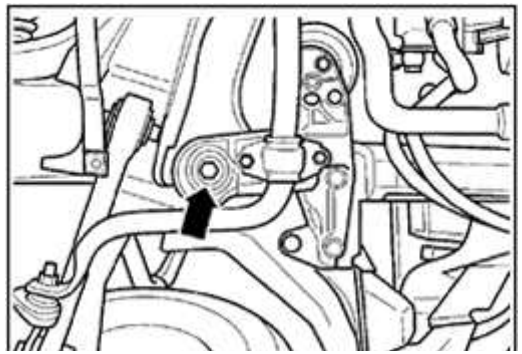
Bring vehicles with heavy duty suspension 1BB (vehicle ride height 20 mm higher) into defined starting position B1 ⇒ page 44-28

Note:

Depending on the type of wheel alignment equipment used, it may be necessary to raise the front of the vehicle in order to position the VAG1925 spacer. After lowering the vehicle again the suspension must be bounced.



- Insert VAG1925 spacer together with VAG1925/4 adapters and screw both threaded spindles out...



- ...until they just rest against front subframe bolts (arrow).

Make sure vehicle is not raised using the above procedure

- Vehicle with heavy duty suspension 1BB is now in defined starting position B1

44-33

Notes:

For all suspension versions (1BA, 1BC, 1BE, 1BP and 1BB):

- *The defined starting position B1 is the position the springs must be in when using the wheel alignment program to check the actual toe-in setting C1 for each wheel (⇒ page 44-27). Setting C1 should match the specification + 10` ± 30` (rough pre-adjustment). If necessary, the toe-in must be corrected by adjusting the tie rod length.*

- *Wheel alignment specifications ⇒ page 44-11 .*

- *If the settings need to be corrected, this will be indicated by the wheel alignment program.*

CAUTION!

- ***Make sure that the wheels do not loose contact with the turntables during the lifting operation.***

- ***If wheels do loose contact, do not move the turntables. Otherwise incorrect measurements will result.***

44-34

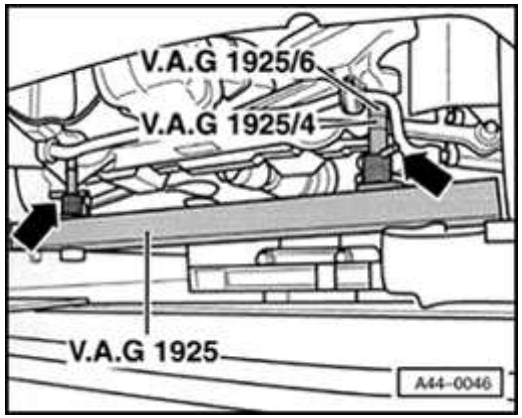
Extending the springs (standard, sport and heavy duty (1BP) suspensions

CAUTION!

- ***Make sure that the wheels do not lose contact with the turntables during the lifting operation.***

- ***If wheels do lose contact, do not move the turntables. Otherwise incorrect measurements will result.***

- Raise vehicle at front jacking points.



- Lift cylinders out of threaded spindles and secure in position using locking pins.
  - Make sure locking pins (arrows) are correctly positioned.
- Lower vehicle down onto spacer gauge.

Vehicle is now in position B2 ⇒ page 44-27

44-35

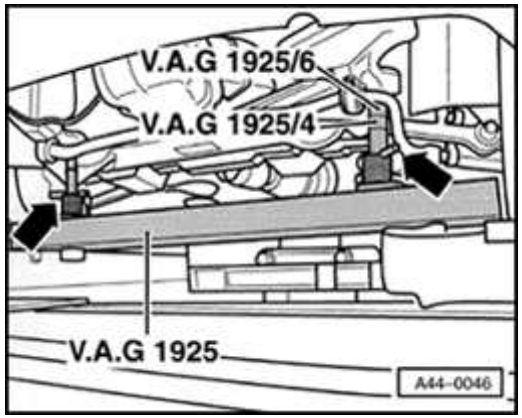
Extending the springs (heavy duty suspension (1BB)

CAUTION!

- ***Make sure that the wheels do not lose contact with the turntables during the lifting operation.***

- ***If wheels do lose contact, do not move the turntables. Otherwise incorrect measurements will result.***

- Raise vehicle at front jacking points.



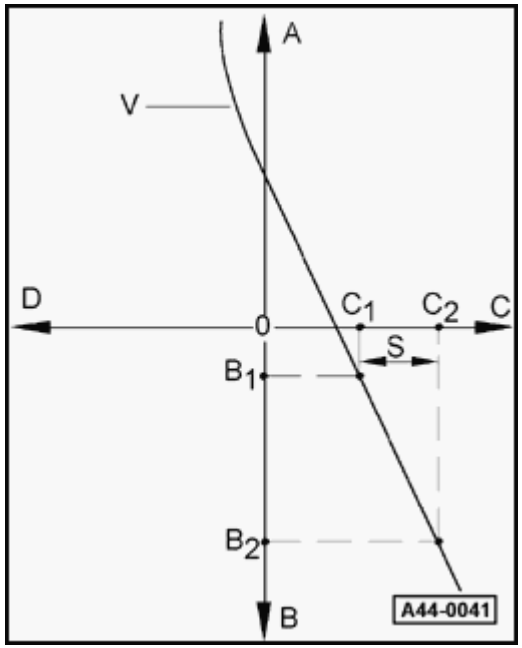
- Lift cylinders out of threaded spindles and secure in position using locking pins.
  - Make sure locking pins (arrows) are correctly positioned.
- Remove VAG1925/6 adapter.
- Lower vehicle down onto spacer gauge.

Vehicle is now in position B2 ⇒ page 44-27

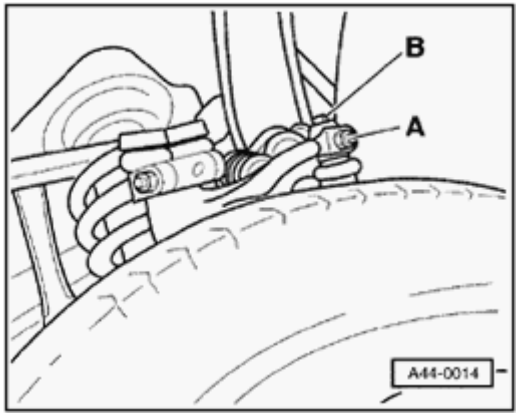
44-36

Note:

The wheel alignment program determines the current right and left toe constant (actual values of C2 - C1 ⇒ page 44-27). The program checks whether the current toe constant (actual value) lies within the tolerance (control value) ⇒ vehicle alignment specifications tables, pages 44-11 and ⇒ Page 44-13 .



- If toe constant actual value lies outside control value tolerance, adjust toe value constant within adjusting value tolerance.
  - Front-wheel-drive vehicles ⇒ page 44-11
  - All-wheel-drive vehicles ⇒ page 44-13



Adjusting toe constant "S"

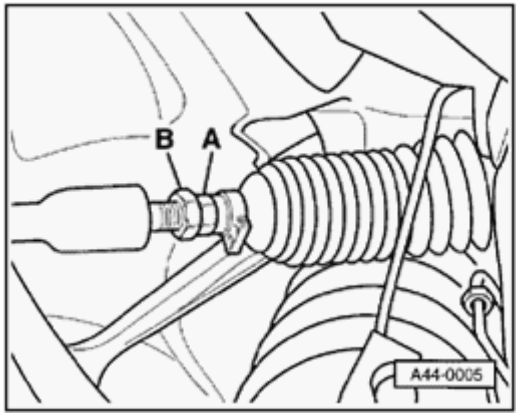
- Loosen nut -A-.
- Back out bolt -B- approx. 4 mm (1/8 in.).
- Push tie rod end downward onto stop.
- Turn in adjusting bolt -B- until exact specifications are achieved.
- Tighten nut -A- to 45 Nm (33 ft lb) and check values.
- Tighten bolt -B- to 7 Nm (62 in. lb).
- Lower vehicle to defined starting position B1.
- Screw threaded spindle down.
- On vehicles with standard suspension, bounce suspension several times.

Checking toe constant after adjusting

The alignment unit checks the toe constant again.

- If the second check shows that the values are within the check value tolerance, the setting is OK.
- If the values are outside the check value tolerance, the setting must be adjusted again in position B2.
- Position B2: + 60 mm (2.36 in.).

Front axle toe-in, setting



- Loosen lock nut -B-.

- Adjust toe on left and right at hex -A-.

Make sure that the boots are not twisted after turning the tie rods

Note:

Twisted boots will wear out quickly.

- Tighten lock nut -B- and check toe-in again.

  Tightening torque: 40 Nm (30 ft lb)

After tightening lock nut -B- it is possible that the toe value may deviate slightly.

If the measured toe lies within the tolerances, the adjustment is correct.

45-1

General information on the Anti-lock Brake System (ABS)

Information for repair work on ABS

WARNING!

Brake fluid is poisonous.

- ***It must NEVER be removed by siphoning with your mouth.***
- ***If brake fluid contacts skin or eyes, flush or wash adequately to prevent irritation. Get medical attention immediately if necessary.***
- ***Brake fluid must be disposed of properly in compliance with environmental regulations.***

CAUTION!

- ***The anti-lock brake system is basically maintenance-free.***
- ***Specialist knowledge is required for performing any work on this system.***
- ***Failure to observe the instructions presented in this Repair Manual may result in damage***

to the system and to loss of vehicle safety.

45-2

CAUTION!

- ***Brake fluid must never be brought into contact with liquids containing mineral oils (e.g. oil, fuel, cleaning agents). Mineral oils damage the plugs and seals in the brake system.***
- ***Brake fluid must not be allowed to come into contact with paintwork because of its caustic effect.***
- ***Brake fluid is hygroscopic (i.e. it absorbs moisture from the surrounding air) and should therefore always be stored in airtight containers.***
- ***Always dispose of used brake fluid properly.***
- ***Make sure that brake fluid does not enter the electrical harness connectors.***
- ***During painting operations, the electronic control module can be exposed to a max. temperature of 95° C (203° F) for only a short period, and to a maximum of 85° C (186° F) for longer periods (approx. 2 hours).***

- ***Before carrying out work using electric welding equipment, refer to safety precautions ⇒ Repair Manual, "Body-Collision Repair."***

- ***Thoroughly clean all unions and the adjacent areas before loosening. Do not use aggressive cleaning agents such as brake cleaner, fuel, thinners or similar chemicals.***

- ***Place removed components on a clean surface and cover.***

45-3

CAUTION! (continued)

- ***Carefully cover or seal open parts if repairs cannot be carried out immediately (use sealing plugs from repair kit 1H0 698 311 A). Part numbers are listed here for reference only. Always check with your Parts department for the latest information.***
- ***Do not use fluffy cloths.***
- ***Only remove replacement parts from packaging immediately prior to installation.***
- ***When the system is open do not work with compressed air and do not move the vehicle.***

- Before carrying out repairs to the ABS, determine the cause of the malfunction using On Board Diagnostic (OBD).

⇒ Repair Manual, ABS/EDL/ASR On Board Diagnostic (OBD), Repair Group 01

- Always check the control module coding when installing a new hydraulic control unit.

⇒ Repair Manual, ABS/EDL/ASR On Board Diagnostic (OBD), Repair Group 01

- Always switch the ignition off and disconnect the battery Ground (GND) strap before carrying out installation or repair work.

CAUTION!

Before disconnecting the battery, determine the correct coding for the anti-theft radio.

- After finishing any work that requires opening the brake hydraulic system, bleed the brake system ⇒ page 47-23 . In addition, carry out a high and low-pressure test of the brake system ⇒ page 45-5 .

- Use only packaged genuine Audi replacement parts.

- During the final road test, at least one ABS-controlled braking operation must be performed (normal pulsations must be felt at the brake pedal).

⇒ Repair Manual, ABS/EDL/ASR On Board Diagnostic (OBD), Repair Group 01

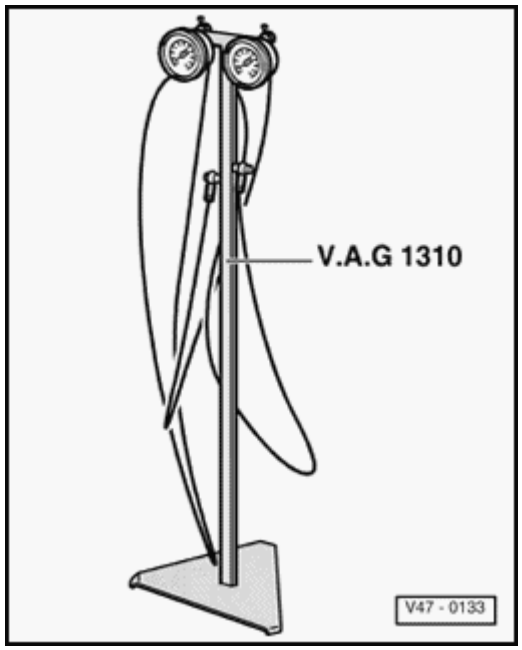
45-5

High- and low-pressure test

Requirement

- The conventional brake system (brake master cylinder, brake hoses, brake lines and brake calipers) are in proper order and free of leaks.

High-pressure test



- Remove bleeder screw at front brake caliper. Connect pressure gauge VAG1310 or VAG1310A and bleed.
- Insert brake pedal depressor between brake pedal and driver's seat. Apply pressure to brake pedal until gauge indicates pressure of 50 bar (725 psi).
  - Pressure must not drop by more than 4 bar (58 psi) during the test period of 45 seconds.
- If pressure drop is greater, replace ABS hydraulic unit.

Low-pressure test

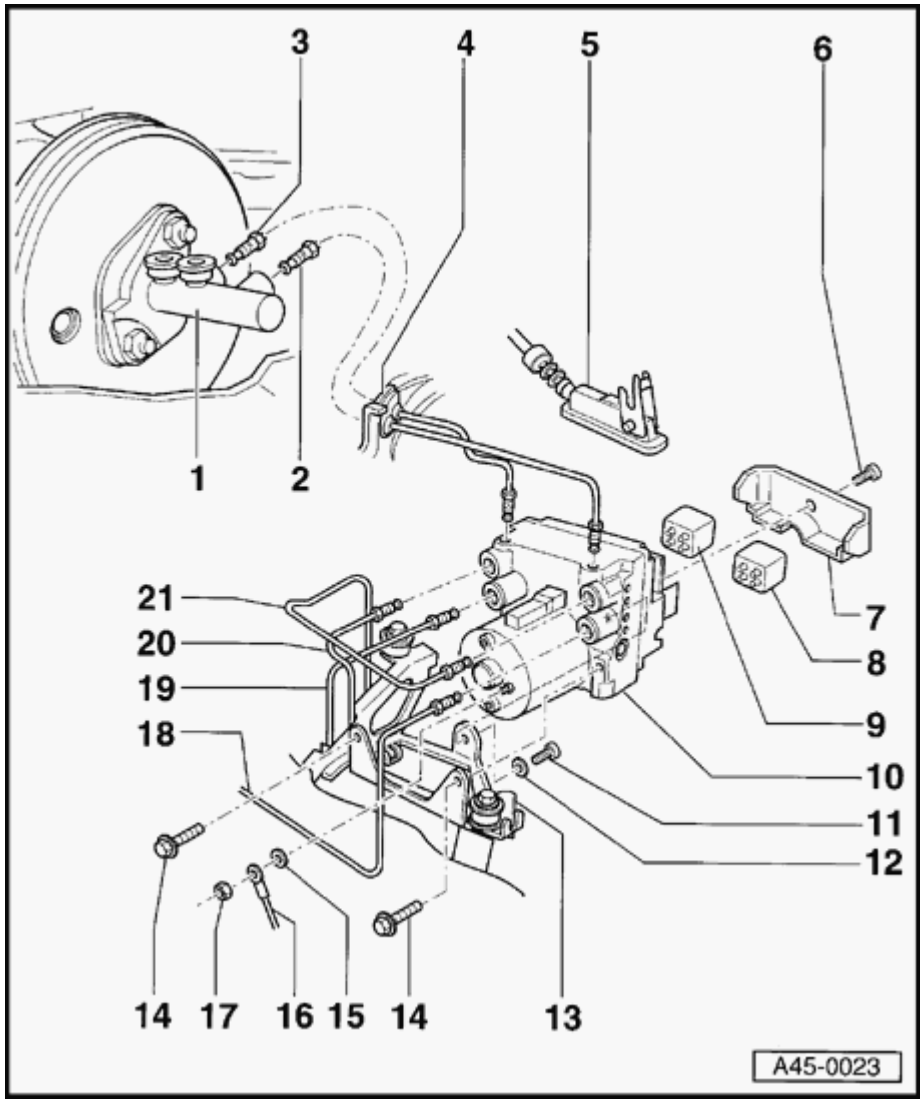
- Turn back brake pedal depressor until pressure gauge indicates system pressure of 6 bar (87 psi).
  - Pressure must not drop by more than 1 bar (14 psi) during test period of 3 minutes.
- If pressure drop is greater, replace ABS hydraulic unit.

Anti-lock Brake System (ABS), Bosch 5.0

CAUTION!

- ***The anti-lock brake system is basically maintenance-free.***
- ***Specialist knowledge is required for performing any work on this system.***
- ***Failure to observe the instructions presented in this Repair Manual may result in damage to the system and to loss of vehicle safety.***

45-7



ABS hydraulic unit and brake lines

The tightening torque for all brake lines on the Audi A4 is 15 Nm (11 ft lb).

1 - Brake master cylinder with brake servo unit

- Brake master cylinder is shown without brake fluid reservoir

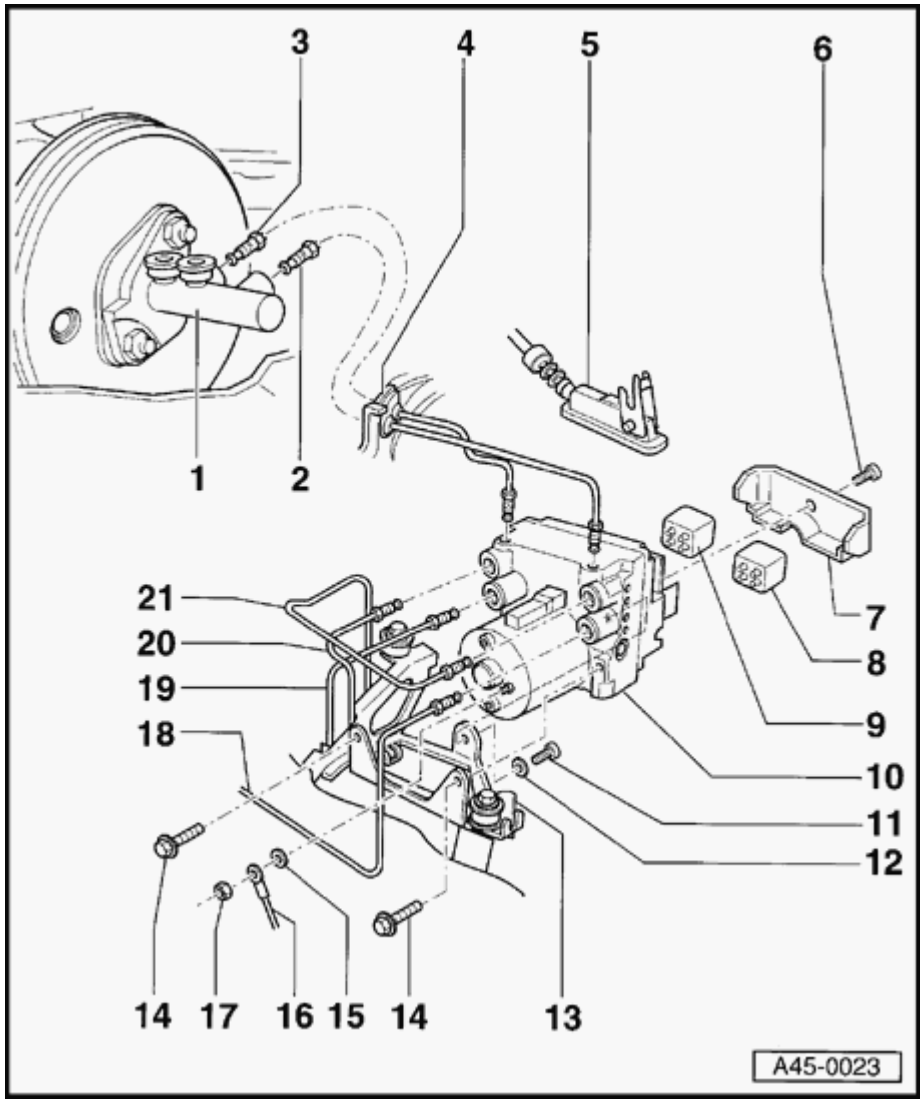
2 - Brake line

- Brake master cylinder/secondary piston circuit to hydraulic unit
- Bolted connection at brake master cylinder: M12x1
- Bolted connection at ABS hydraulic unit: M12x1

3 - Brake line

- Brake master cylinder/primary piston circuit to hydraulic unit
- Bolted connection at brake master cylinder: M12x1
- Bolted connection at ABS hydraulic unit: M12x1

45-8



4 - Rubber grommet

5 - ABS wiring harness connector

- Release and remove
- The connector is part of the ABS wiring harness. Be aware of different versions for FWD and AWD models
- Make sure connector is in the correct position and properly locked

6 - Screw

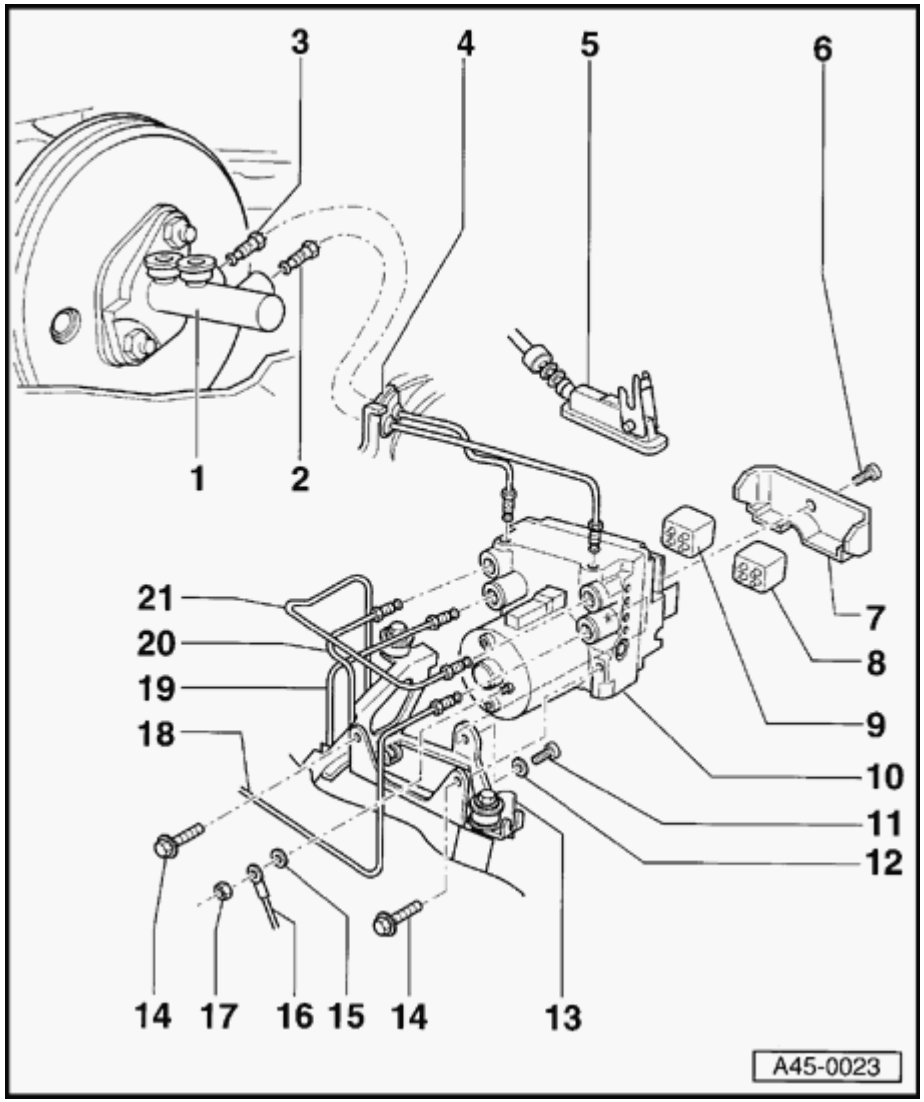
- 5 Nm (44 in lb)

7 - Cover panel

8 - ABS solenoid valve relay

9 - ABS return flow pump relay

45-9



10 - ABS hydraulic unit

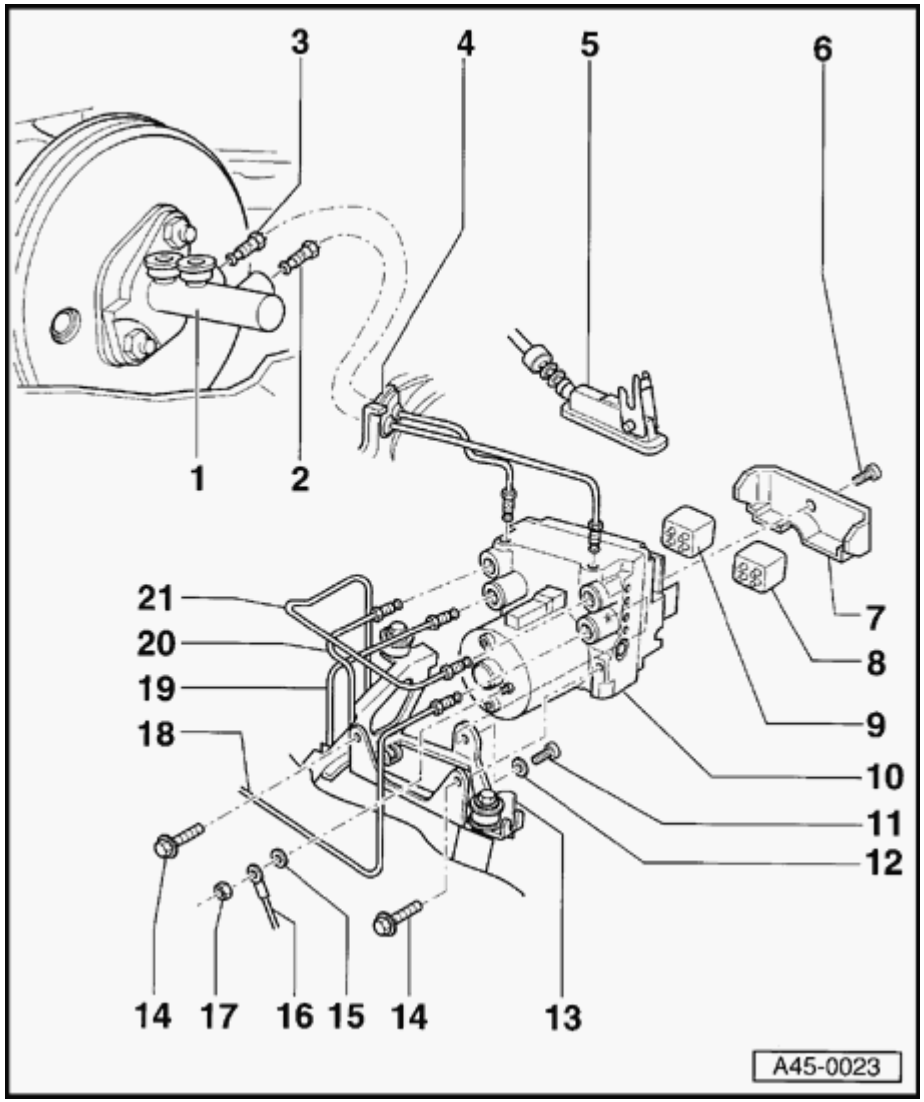
CAUTION!

Apart from replacing the two relays, repair work on the ABS hydraulic unit is not permitted. Do not loosen bolted connections.

Be aware of different versions:

- ABS FWD models
- ABS/EDL FWD models, ABS/EDL/ASR FWD models ⇒ Fig. 1
- ABS/EDL AWD models ➢ 05.95 ⇒ Fig. 2
- ABS/EDL AWD models 05.95 ➢ ⇒ Fig. 3
- Replace complete ABS hydraulic unit, if necessary.
- The ABS hydraulic unit is supplied as a replacement part that is pre-bled.

45-10



Removing and installing:

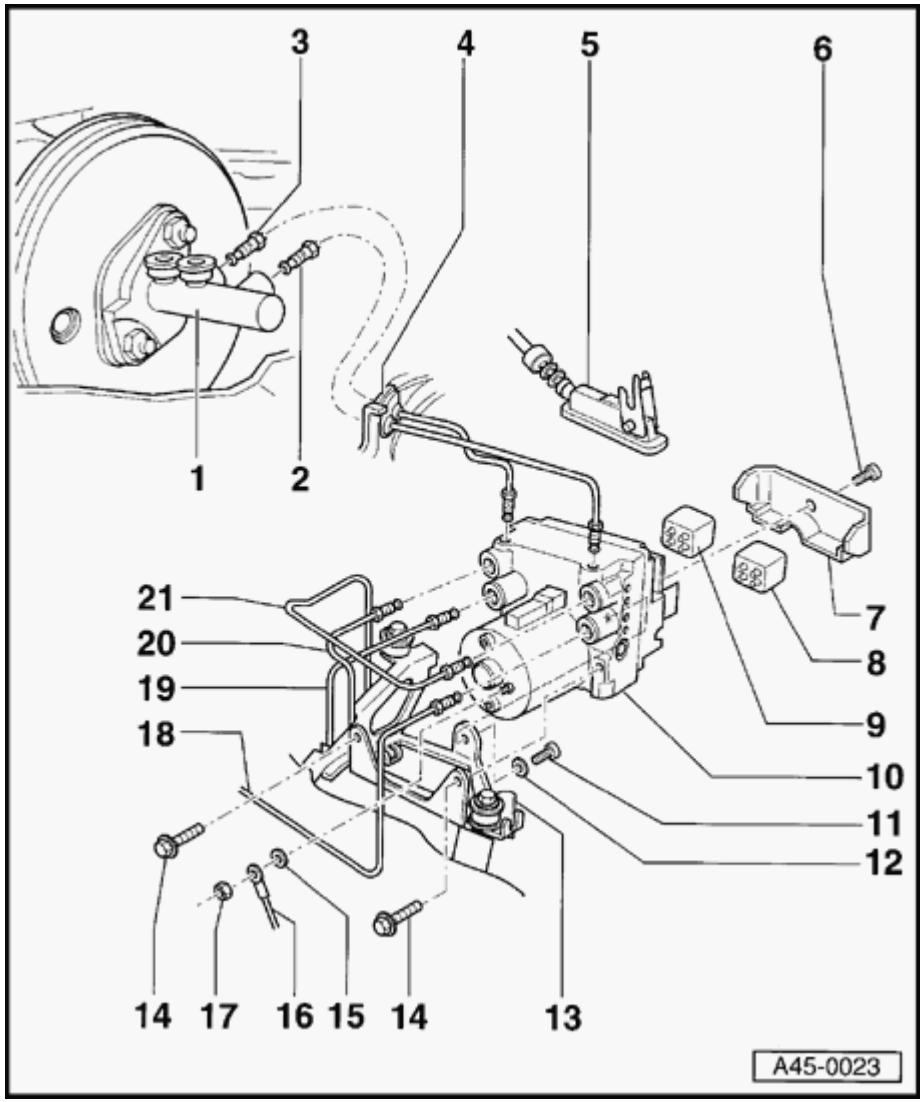
- Disconnect battery Ground (GND) strap.
- Seal brake lines and connections immediately with dummy plugs.
- Bolt new hydraulic control unit to bracket, item 13 . Remove dummy plugs from brake line connections. Brake lines should be connected in accordance with designations on hydraulic control unit.

♦ Brake line tightening torque: 15 Nm (11 ft lb)

- Bleed brake system ⇒ page 47-23 .
- Carry out high- and low-pressure test ⇒ page 45-5 .
- Carry out On board Diagnostic (OBD) ⇒ Repair Manual, ABS/EDL/ASR On Board Diagnostic (OBD), Repair Group 01.

11 - Screw

♦ 15 Nm (11 ft lb)



12 - Washer

13 - Bracket for ABS hydraulic unit

- Removing and installing ⇒ page 45-15

14 - Bolt and washer assembly

- 8 Nm (71 in lb)

15 - Serrated washer

16 - Ground (GND) cable

- Ensure good contact

17 - Hex nut

- 10 Nm (7 ft lb)

18 - Brake line

- ABS hydraulic unit to right-front brake caliper

19 - Brake line

- ABS hydraulic unit to left-front brake caliper

20 - Brake line

- ABS hydraulic unit to right-rear brake caliper

21 - Brake line

- ABS hydraulic unit to left-rear brake caliper

45-12

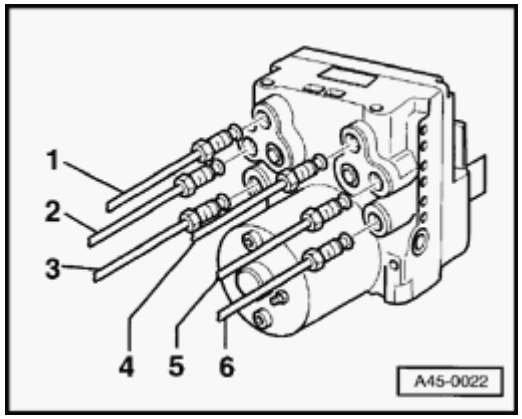


Fig. 1 Brake line connections at the hydraulic unit for ABS/EDL, front wheel drive and ABS/EDL/ASR front wheel drive

1 - Hydraulic unit to brake master cylinder (primary piston circuit)

2 - Hydraulic unit to right-rear brake caliper

3 - Hydraulic unit to left-front brake caliper

4 - Hydraulic unit to brake master cylinder (secondary piston circuit)

5 - Hydraulic unit to left-rear brake caliper

6 - Hydraulic unit to right-front brake caliper

Brake line connections: 15 Nm (11 ft lb)

Note:

- *Pressure dampers are not installed on models with all wheel drive and EDL suction control (from 05.95) ⇒ Fig. 2 .*
- *EDL suction control minimizes control noises.*
- *The working range of the pressure limiting valve in the hydraulic unit is raised from 90 ± 25 bar (1323 ± 368 psi) to 170 ± 25 bar (2499 ± 368 psi).*

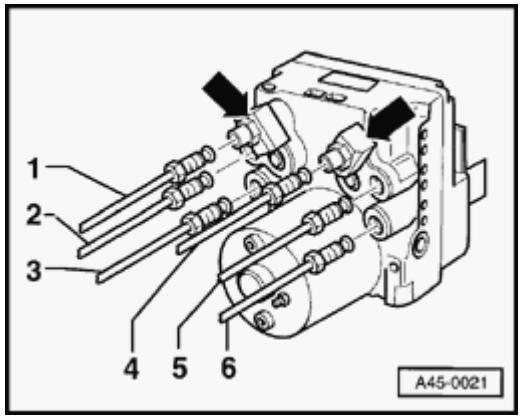


FIg. 2 Brake line connections at the hydraulic unit, all wheel drive and ABS/EDL pressure control (➢05.95)

- Two pressure dampers are threaded into the hydraulic unit (arrows) on models with all wheel drive and EDL pressure control (they smooth out pressure peaks in the brake lines and minimize control noises).
- Counter-hold at the hex on the pressure damper when loosening the brake line.

1 - Hydraulic unit to brake master cylinder (primary piston circuit)

2 - Hydraulic unit to right-rear brake caliper

3 - Hydraulic unit to left-front brake caliper

4 - Hydraulic unit to brake master cylinder (secondary piston circuit)

5 - Hydraulic unit to left-rear brake caliper

6 - Hydraulic unit to right-front brake caliper

45-14

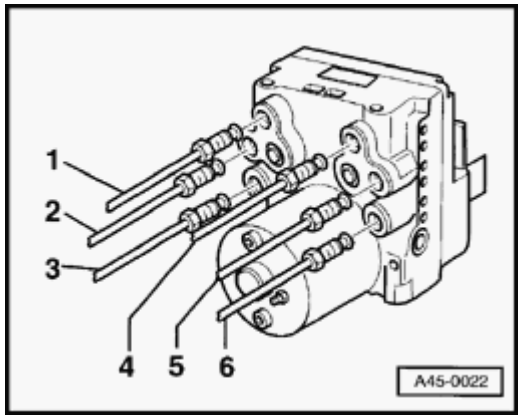


Fig. 3 Brake line connections at the hydraulic unit for ABS/EDL, all-wheel-drive models, suction control (05.95)

EDL suction control was introduced on models with all wheel drive from 05.95. This system reduces the control noises during an EDL control cycle.

The pressure dampers threaded into the hydraulic unit (⇒ Fig. 2 arrows) previously used to reduce working noises have been discontinued. The working range of the pressure limiting valve in the hydraulic unit is raised from 90 ± 25 bar (1323 ± 368 psi) to 170 ± 25 bar (2499 ± 368 psi).

Connector coding eliminates the risk of incorrectly connecting the hydraulic unit.

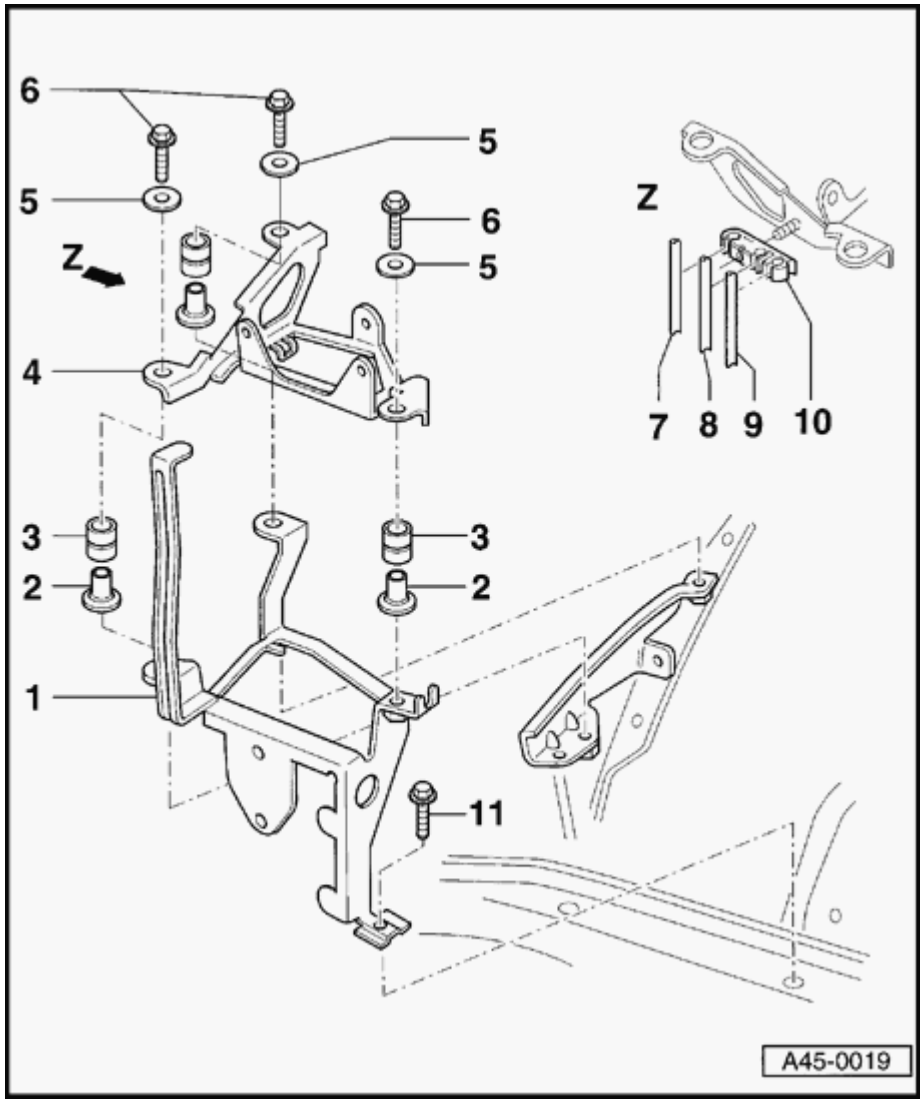
1 - Brake line tightening torque: 15 Nm (11 ft lb)

Pressure damper discontinued. The brake line is now the same length as for FWD.

4 - Brake line tightening torque: 15 Nm (11 ft lb)

Pressure damper discontinued. The brake line is now the same length as for FWD.

45-15



ABS hydraulic unit mounting bracket, removing and installing

1 - Angle bracket

2 - Bearing bushing

3 - Buffer

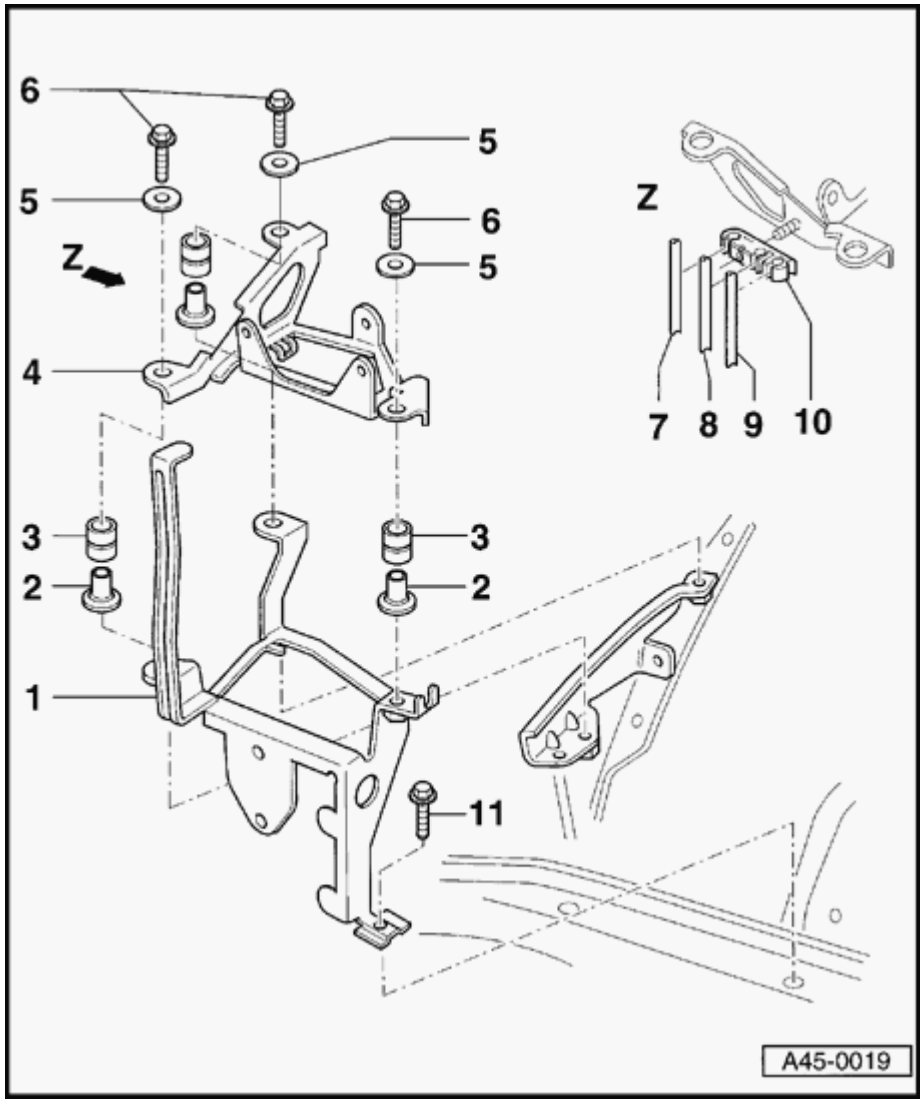
4 - Mounting bracket for ABS hydraulic unit

5 - Washer

6 - Bolt and washer assembly

- 10 Nm (7 ft lb)

45-16



7 - Brake line

- ABS hydraulic unit to left-rear brake caliper

8 - Brake line

- ABS hydraulic unit to right-rear brake caliper

9 - Brake line

- ABS hydraulic unit to left-front brake caliper

10 - Fixture

11 - Bolt and washer assembly

- 10 Nm (7 ft lb)

45-17

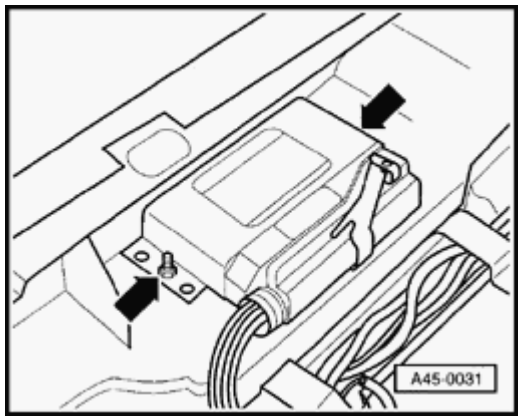
ABS control module (ABS/EDL or ASR), removing and installing

Location:

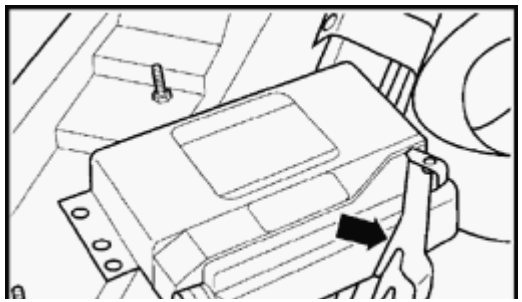
Under rear seat, left side

- Switch ignition off when removing and installing.

- Lift rear seat out of its fixtures.



- Remove both securing bolts (arrows).



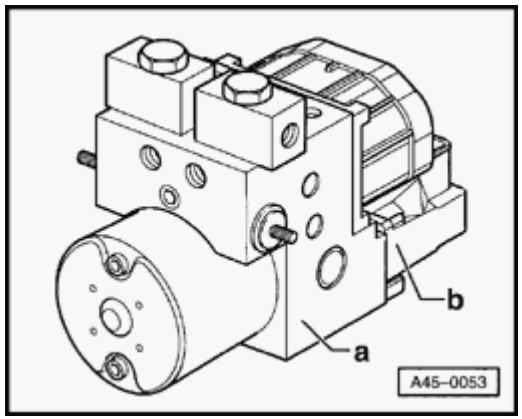
- Release harness connector (arrow) and separate from ABS control module -J104-.
- Install in reverse order of removal.

45-18

Anti-lock Brake System (ABS), Bosch 5.3

A traction control system (TCS/ASR) is available as optional equipment for front-wheel-drive models.

The brake system of the ABS is split diagonally. The brake servo assistance is provided pneumatically by a vacuum brake servo unit.



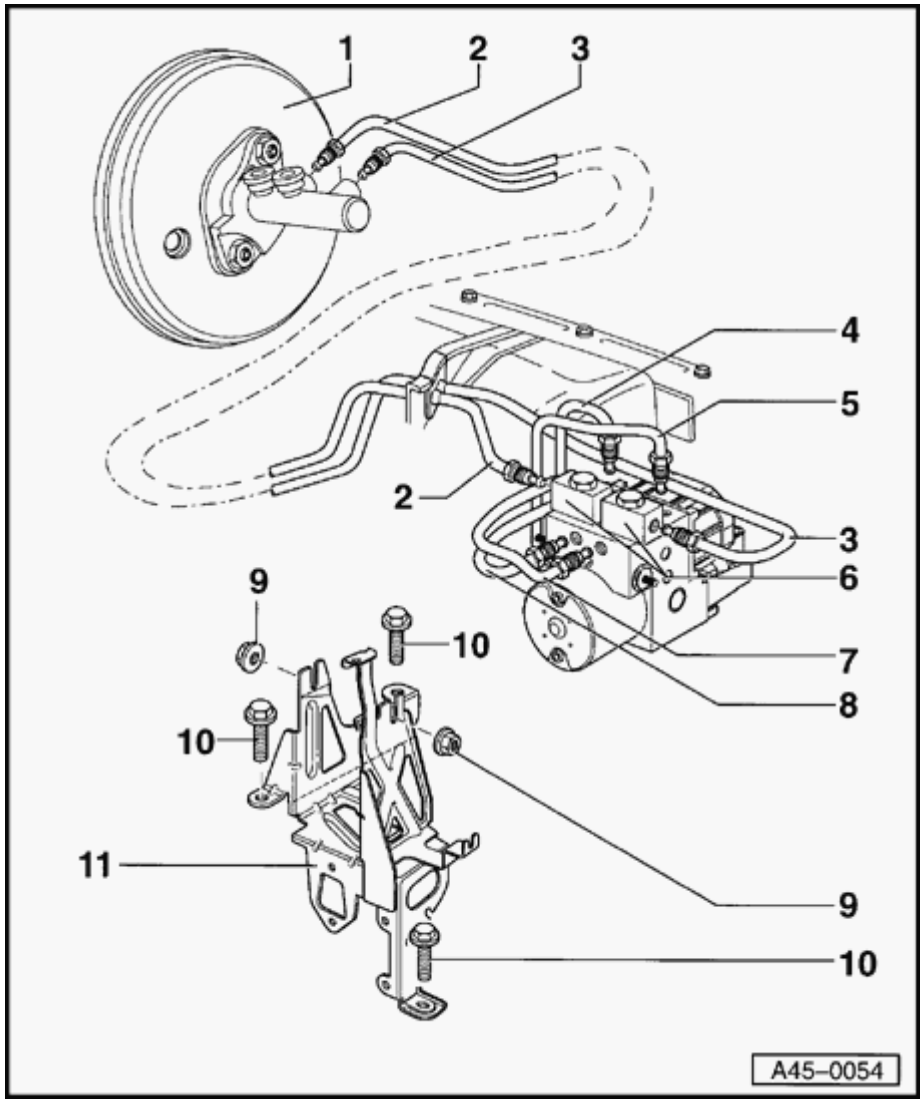
Hydraulic unit -a- and ABS control module -b- form a single unit. The combination of these two components is termed the hydraulic control unit.

Sources of malfunctions are reduced as a result of the direct link between the two components.

CAUTION!

- ***It is not possible to repair the hydraulic control unit. If faulty, it should be replaced.***
- ***The bolts which connect the individual components of the hydraulic control unit must not be loosened.***

45-19



ABS hydraulic control unit and brake lines

The tightening torque for all brake lines on the Audi A4 is 15 Nm (11 ft lb).

1 - Brake master cylinder and brake servo

2 - Brake line

- Brake master cylinder/primary piston circuit to hydraulic control unit

3 - Brake line

- Brake master cylinder/secondary piston circuit to hydraulic control unit

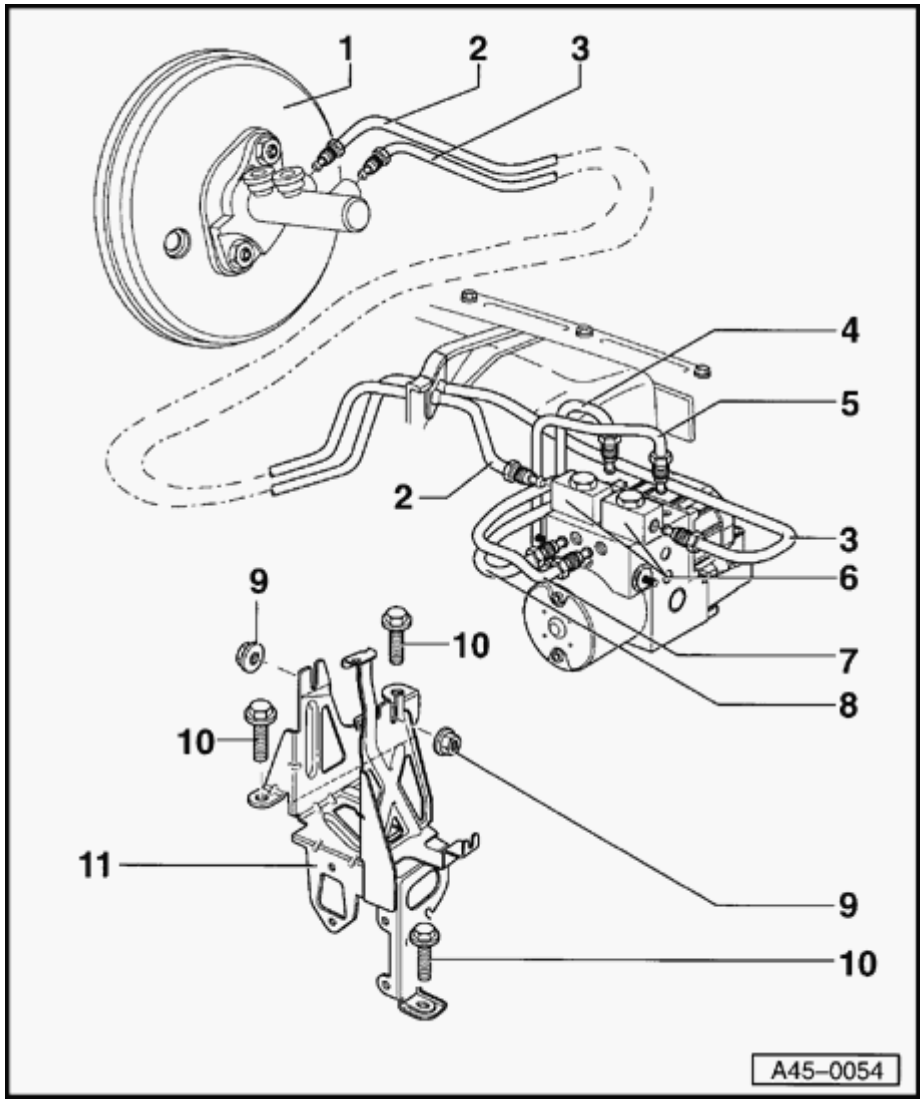
4 - Brake line

- Hydraulic control unit to left-front brake caliper

5 - Brake line

- Hydraulic control unit to right-front brake caliper

45-20



6 - Suction dampers

- Designed to improve pressure build-up during operation of EDL
- Discontinued; phased in integration into hydraulic control unit

7 - Brake line

- Hydraulic control unit to left-rear brake caliper

8 - Brake line

- Hydraulic control unit to right-rear brake caliper

9 - Nut

- 10 Nm (7 ft lb)

10 - Bolt

- 10 Nm (7 ft lb)

11 - Bracket

45-21

ABS hydraulic control unit, removing and installing

Note:

When working with brake fluid, observe the relevant safety precautions and notes ⇒ *Brake system, bleeding, page 47-23* .

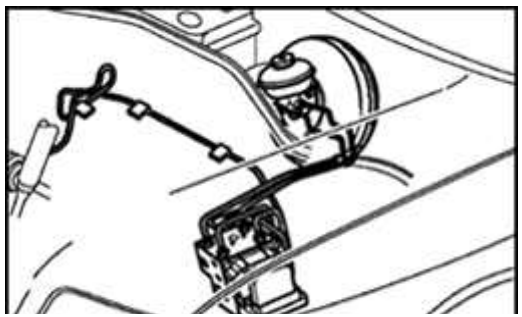
Special tools and equipment

- Sealing plugs from repair kit Part No. 1H0 698 311A
- Brake pedal depressor, e.g. from VAG1813

CAUTION!

Part numbers are listed here for reference only. Always check with your Parts department for the latest information.

Component location:



The hydraulic control unit is installed on the left side of the engine compartment.

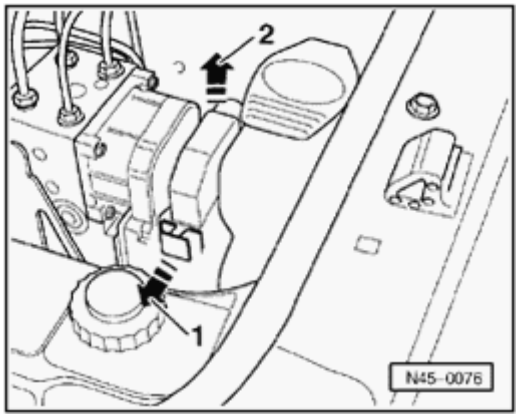
45-22

Removing

CAUTION!

- ***Do not bend the brake lines.***
- ***Before disconnecting the battery, determine the correct coding for the anti-theft radio.***

- Disconnect battery Ground (GND) strap.



- Release control unit connector (arrow -1-) and disconnect harness connector (arrow -2-).
- Connect bleeder bottle to bleeder screw on left-front brake caliper and open bleeder screw.
- Install brake pedal depressor between brake pedal and driver's seat. Depress brake pedal by at least 60 mm (2 3/8 in.).

Note:

The brake pedal depressor must remain in position until all of the brake lines have been reconnected to the hydraulic control unit.

- Close left-front bleeder screw.
- Cover engine compartment to make sure brake fluid does not flow into it.
- Disconnect brake line connections on hydraulic control unit.

- Seal brake lines and threaded holes using plugs from repair kit, Part No. 1H0 698 311 A.

- Remove nuts from ABS hydraulic control unit bracket.

- Remove ABS hydraulic control unit.

Installing

Note:

When installing, pay particular attention to the following points.

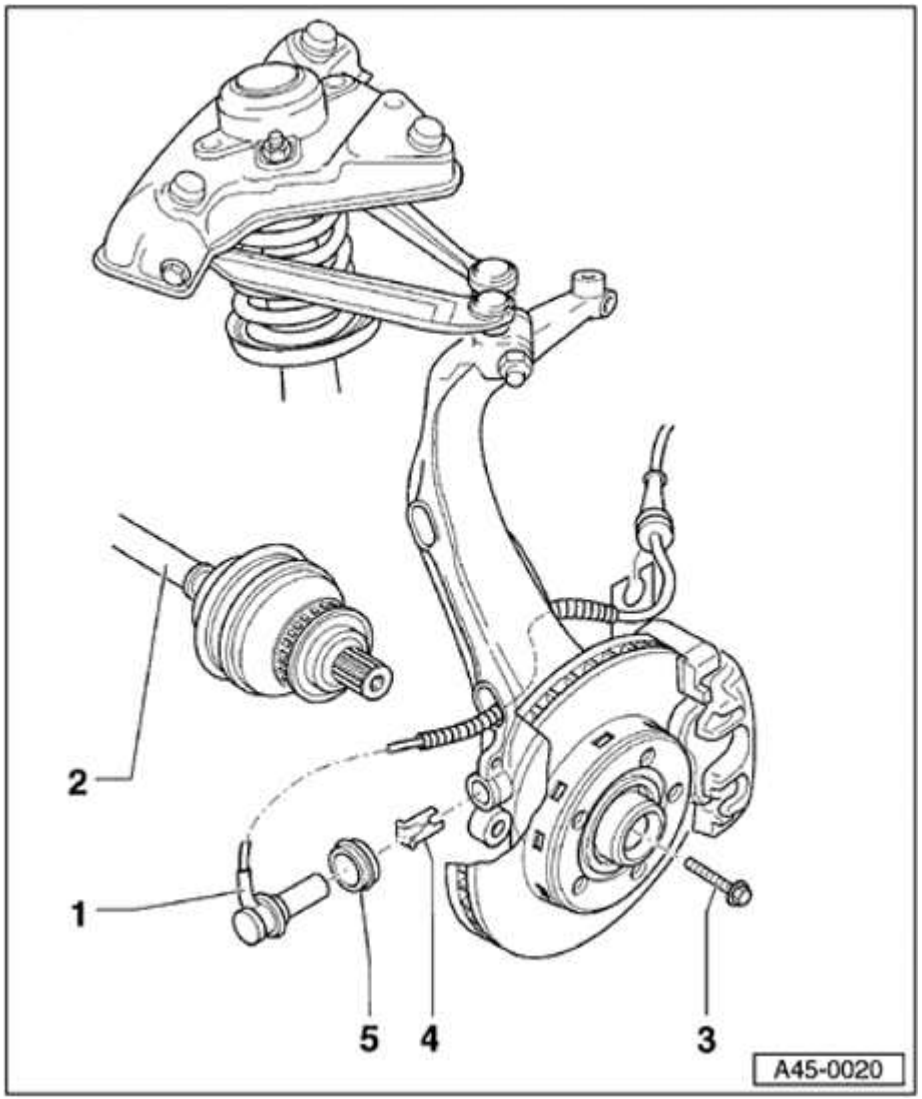
- *Only remove the sealing plugs on the new hydraulic control unit when the corresponding brake line is about to be installed.*

- *If the sealing plugs are removed too early the brake fluid can escape. If this occurs, the unit will no longer be sufficiently filled or adequately bled.*

- Bleed brake system ⇒ page 47-23 .

- Enter radio code.

45-24



Suspension mounted ABS components

Front suspension ABS components, removing and installing

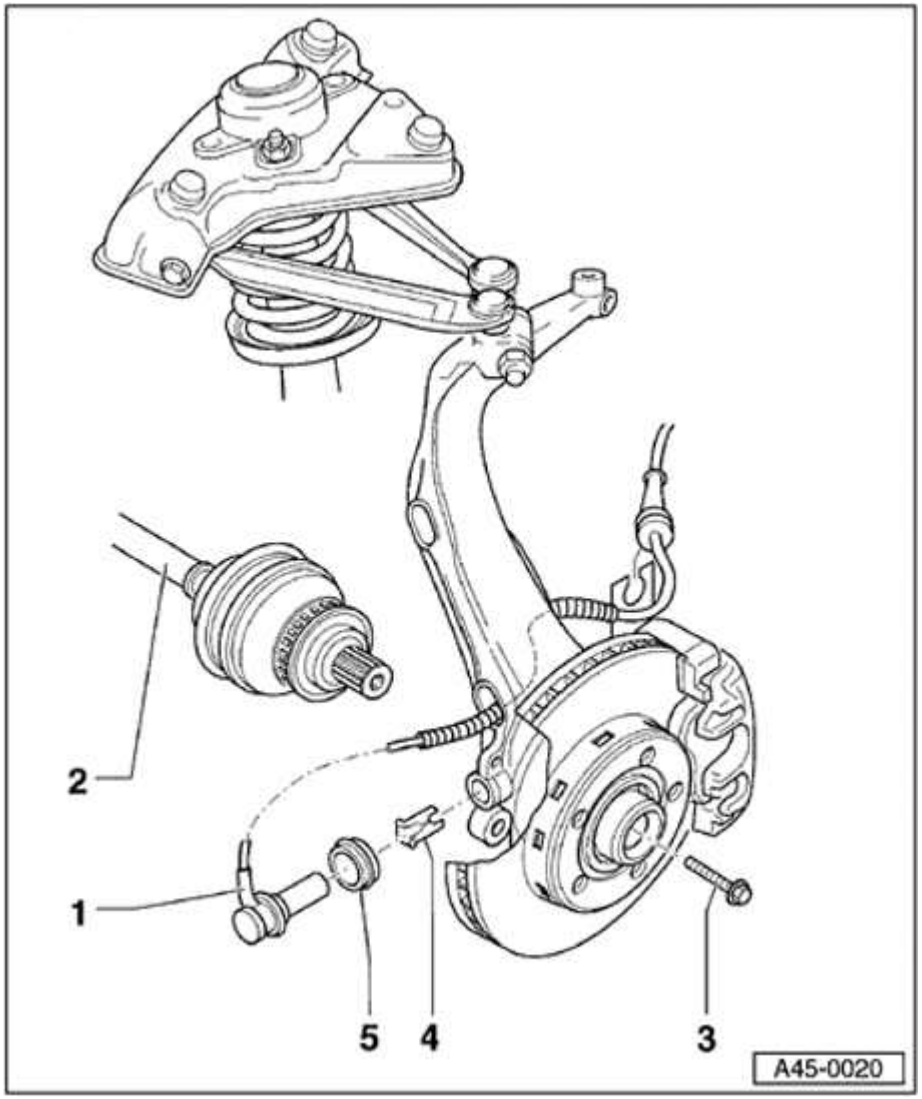
WARNING!

- ***Do not re-use any fasteners that are worn or deformed in normal use.***
- ***Some fasteners are designed to be used only once, and are unreliable and may fail if used a second time. This includes, but is not limited to, nuts, bolts, washers, circlips and cotter pins. Always follow the recommendations in this manual-replace these fasteners with new parts where indicated, and any other time it is deemed necessary by inspection.***

1 - ABS wheel speed sensor

- Identical part on left and right
- Removing and installing ⇒ page 45-27
- Harness connector for ABS wheel speed sensor ⇒ page 45-27

45-25



2 - Drive axle with ABS wheel speed sensor rotor

- Examine rotor for signs of dirt and damage ⇒ page 45-28
- If rotor is damaged, replace outer CV joint together with rotor ⇒ *Repair Manual, Suspension, Wheels, Steering, Repair Group 40*
- Outer CV joint is supplied as replacement part with ABS wheel speed sensor rotor

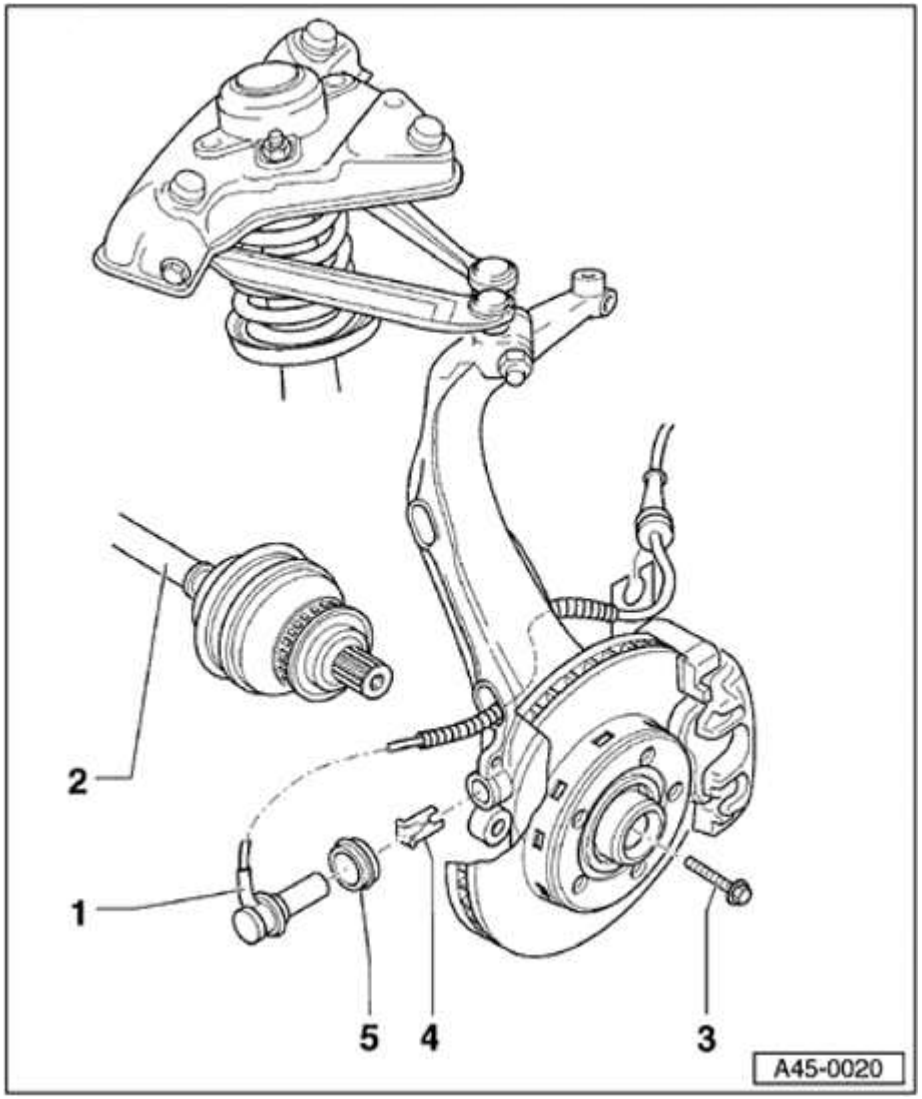
3 - Collar bolt

- Always replace
- Be aware of different versions
- M14 thread: tighten to 115 Nm (85 ft lb) plus additional 1/2-turn (180 °)
- M16 thread: tighten to 190 Nm (140 ft lb) plus additional 1/2-turn (180 °)

WARNING!

Do not loosen and tighten hex bolt - 3 - unless car is standing on its wheels-risk of accident.

45-26



4 - Clamping sleeve

- Always replace
- Identical part on left and right
- Grease all around with assembly paste before inserting into wheel bearing housing
- Press into wheel bearing housing until fully seated

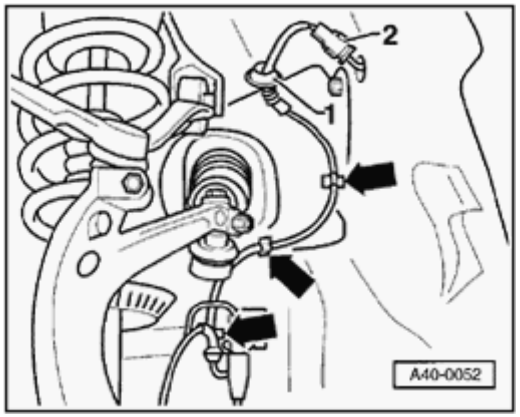
5 - Boot seal

45-27

ABS wheel speed sensor on front axle, removing and installing

Removing

- Loosen wheel bolts.
- Raise vehicle.
- Remove wheel.



- Detach boot -1- from wheel housing.
- Separate harness connector -2- from ABS wheel speed sensor harness.
- Pull harness out of brackets (arrows).
- Remove ABS wheel speed sensor from wheel bearing housing.

Installing

- Before inserting ABS wheel speed sensor, install boot seal and grease sensor all around with assembly paste.
- Press speed sensor in by hand until fully seated.
- Connect ABS wheel speed sensor cable harness connector and press boot into wheel housing.
- After routing ABS wheel speed sensor cable (arrows), install wheel and tighten wheel bolts to 120 Nm (89 ft lb).

- Turn steering to full left and full right lock and check clearance of ABS wheel speed sensor cable.

ABS wheel speed sensor rotor on front axle, examining

- Raise vehicle.

- Remove wheel.

- Pull ABS wheel speed sensor out of wheel bearing housing.

- Examine rotor for signs of dirt and damage, working through ABS wheel speed sensor mounting hole in wheel bearing housing.

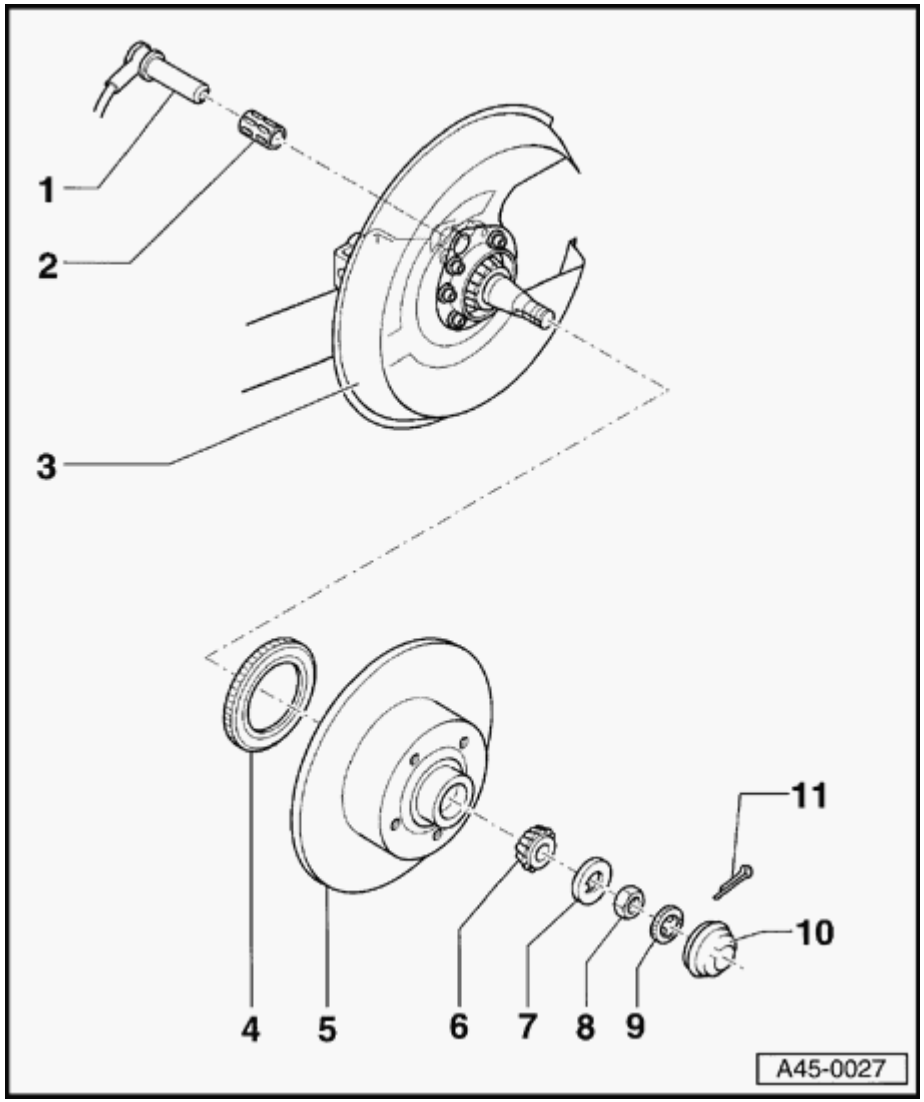
Note:

- *If the rotor is dirty or damaged, remove the drive axle. If the rotor is damaged, replace the outer CV joint along with the rotor.*

⇒ *Repair Manual, Suspension, Wheels, Steering, Repair Group 40*

- *The outer CV joint is supplied as a replacement part with the rotor.*

45-29



Rear suspension ABS components for FWD models, removing and installing

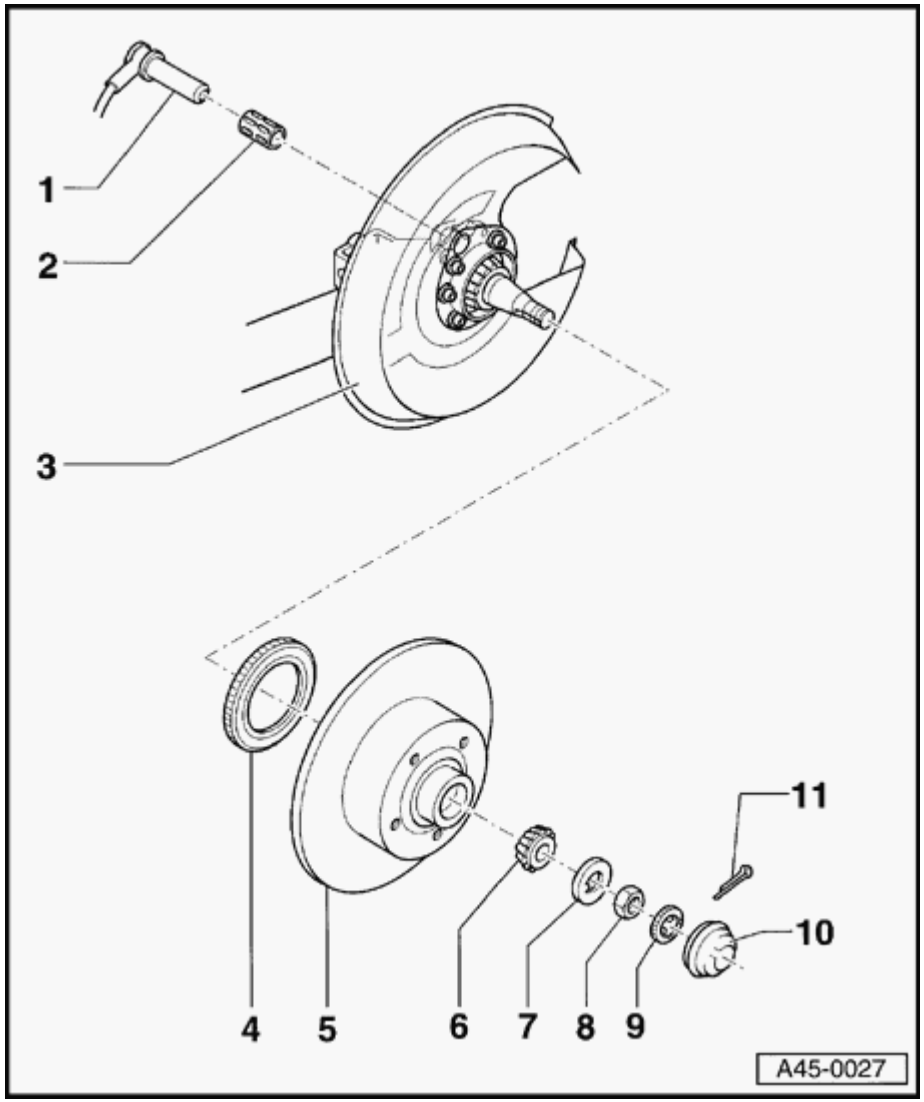
WARNING!

- ***Do not re-use any fasteners that are worn or deformed in normal use.***
- ***Some fasteners are designed to be used only once, and are unreliable and may fail if used a second time. This includes, but is not limited to, nuts, bolts, washers, circlips and cotter pins. Always follow the recommendations in this manual-replace these fasteners with new parts where indicated, and any other time it is deemed necessary by inspection.***

1 - ABS wheel speed sensor

- Identical part on left and right
- Removing and installing ⇒ page 45-31
- Release harness connector of ABS speed sensor cable and separate. Unclip speed sensor cable.

45-30



2 - Clamping sleeve

- Always replace
- Identical part on left and right
- Grease all around with assembly paste before inserting into wheel bearing housing
- Press into wheel bearing housing until fully seated

3 - Axle beam/rear axle with splash guard and stub axle

4 - ABS wheel speed sensor rotor

- Removing and installing ⇒ page 45-33

5 - Brake disc with wheel hub

6 - Outer wheel bearing

7 - Thrust washer

8 - Hex nut

- Adjusting ⇒ page 45-33

9 - Castellated lock

- Install onto hex nut

10 - Grease cap

- Replace

11 - Cotter pin

- Always replace

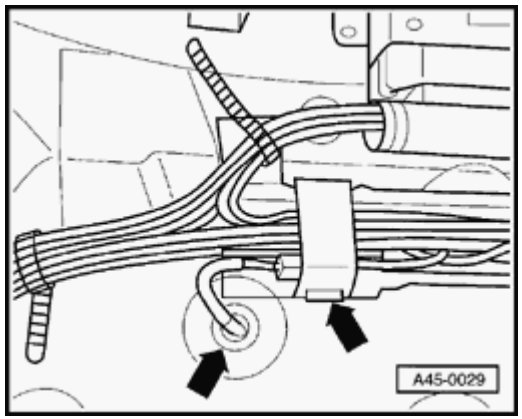
45-31

ABS wheel speed sensor on FWD rear axle, removing and installing

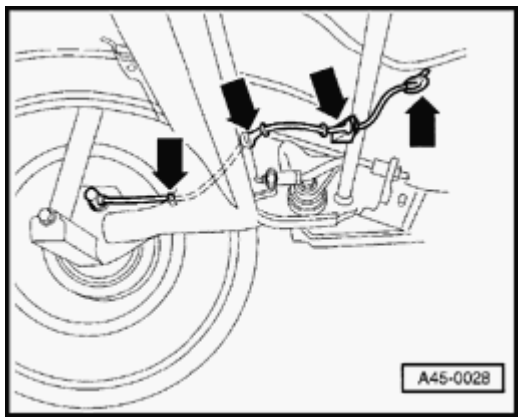
Removing

- Switch ignition off.

- Lift rear seat out of its brackets.



- Detach cable holder (right arrow), separate ABS wheel speed sensor harness connector and press out grommet (left arrow). Left and right sides are mirror images.
- Loosen wheel bolts.
- Raise vehicle.
- Remove wheel.



- Pull ABS wheel speed sensor cable out of brackets.
- Pull ABS wheel speed sensor out of axle beam.

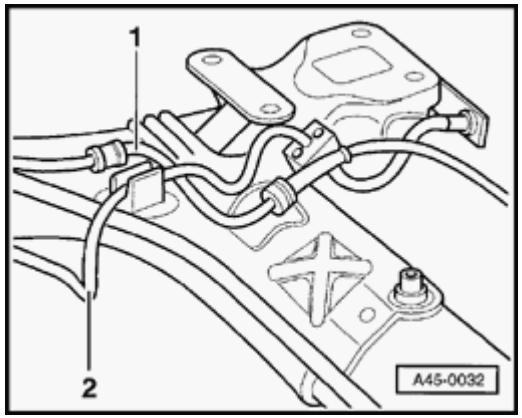
Installing

- Replace clamping sleeve ⇒ page 45-30 item - 2 -.

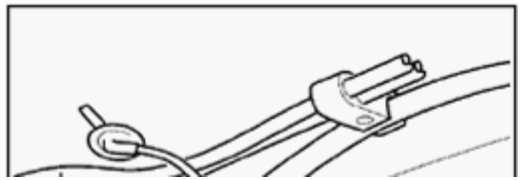
- Grease ABS wheel speed sensor all around with assembly paste before inserting. Then, press in by hand until fully seated.

- Reconnect ABS wheel speed sensor cable and route cable as when removed.

When routing the ABS wheel speed sensor cable, pay attention to the following points:



- Route ABS wheel speed sensor cable -1- below brake line -2- on left and right sides in area shown.
- On left side, maintain clearance of about 2 cm (3/4 in.) between heat shield for exhaust system, and ABS wheel speed sensor cable.



- On right side, route ABS wheel speed sensor cable -1- between fuel lines -2-.
- Install wheel and tighten wheel bolts to 120 Nm (89 ft lb).

45-33

ABS wheel speed sensor rotor on FWD rear axle, examining

- Raise vehicle.
- Remove wheel.
- Pull ABS wheel speed sensor out of wheel bearing housing.
- Examine rotor for signs of dirt and damage.

ABS wheel speed sensor rotor on rear axle, removing and installing

Removing

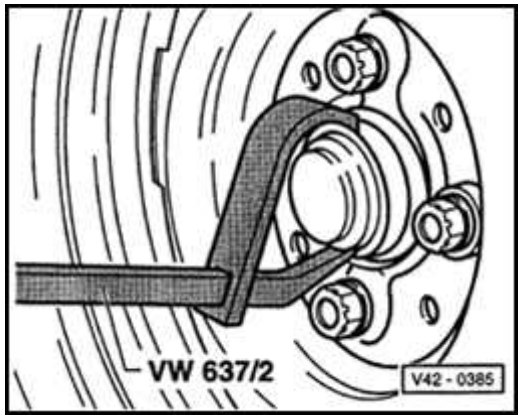
- Raise vehicle.
- Remove wheel.
- Unbolt brake caliper ⇒ page 46-20 .

CAUTION!

- ***Do not loosen brake hose or lines.***
- ***Secure the brake caliper with a piece of wire***

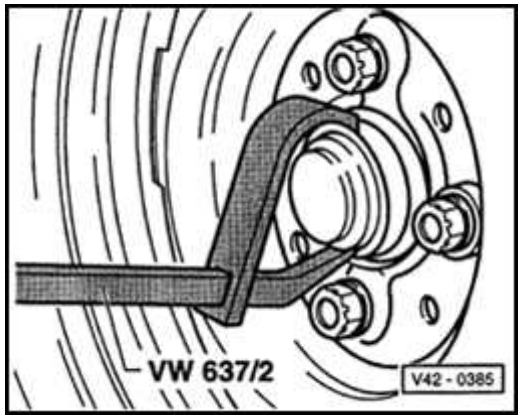
in order to relieve the stress on the brake hose.

- ***Do not allow caliper to hang by brake hose.***



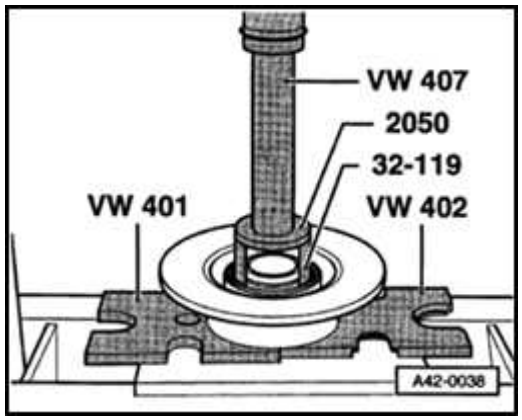
- Apply light blows with hammer to jaw of special tool in order to slightly knock grease cap loose from wheel hub ⇒ page 45-30 , item -10-.

45-34



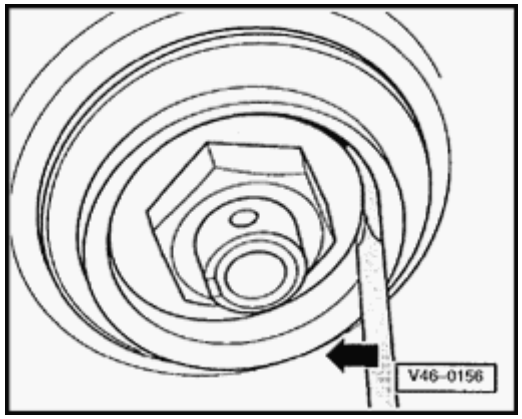
- Press grease cap off hub.
- Remove cotter pin ⇒ page 45-30 , item -11-.
- Remove castellated lock ⇒ page 45-30 , item -9-.
- Remove hex nut ⇒ page 45-30 , item -8-.
- Remove thrust washer, outer wheel bearing, and wheel hub ⇒ page 45-30 , items -5-, -6- and -7-.
- Use copper drift inserted through tapped holes to evenly drive rotor off wheel hub ⇒ page 45-30 , item -4-.

Installing



- Press ABS wheel speed sensor rotor onto wheel hub.
- Position wheel hub, outer wheel bearing and thrust washer on stub axle.
- Install hex nut ⇒ page 45-30 , item -8-.

45-35

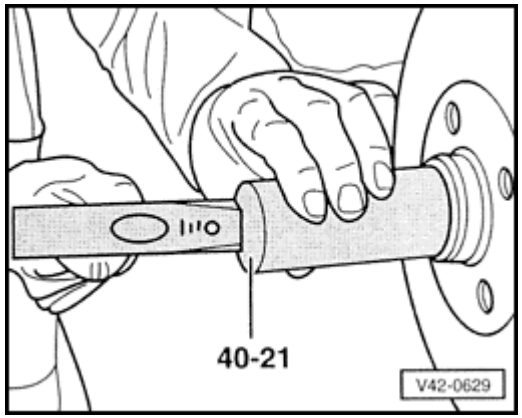


- Adjust wheel bearing play.

Note:

Wheel bearing play is correctly set if it is just possible to move the thrust washer with a screwdriver by applying finger pressure (without any prying).

- To adjust, tighten hex nut while rotating wheel in order to avoid stress on bearing.
- Secure hex nut with castellated lock and new cotter pin.



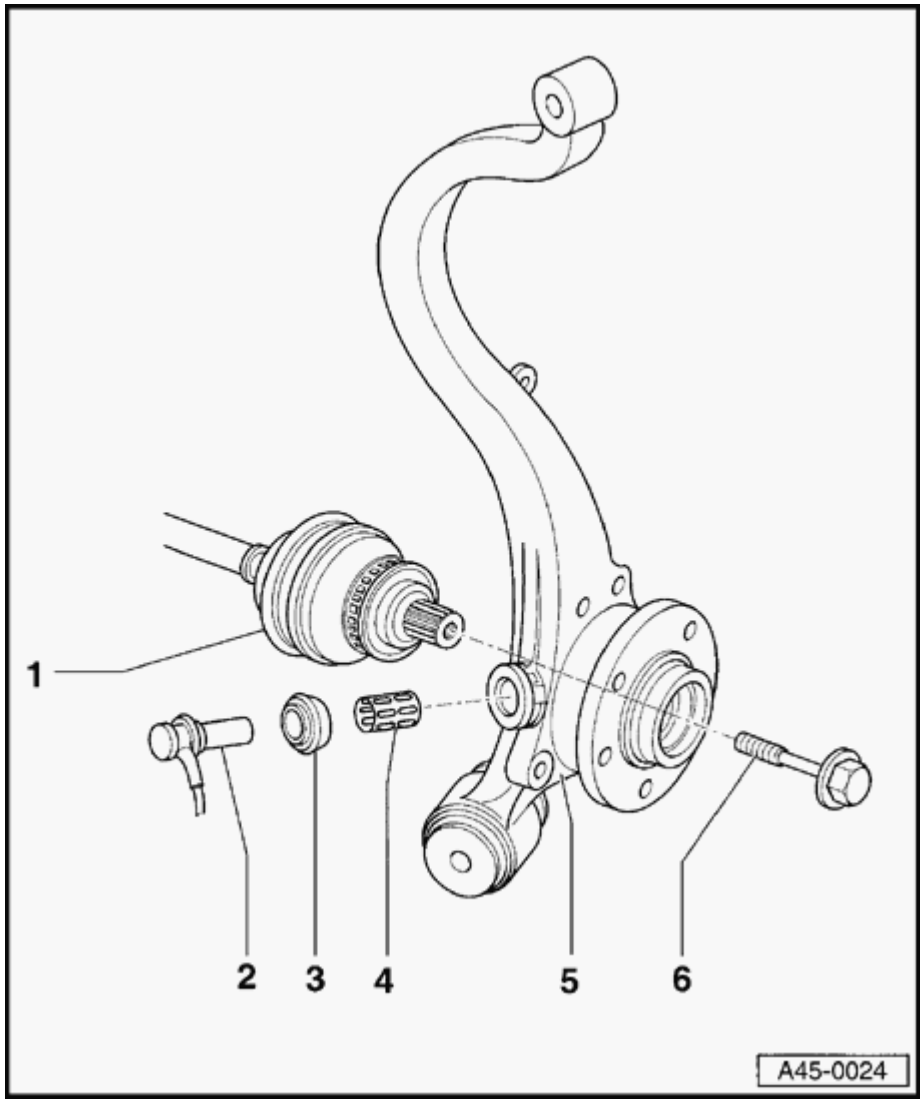
- Install grease cap.

CAUTION!

Always replace the grease cap. Any damage to the cap will allow moisture in, which can destroy the wheel bearing.

- Install brake caliper ⇒ page 46-20 .

45-36

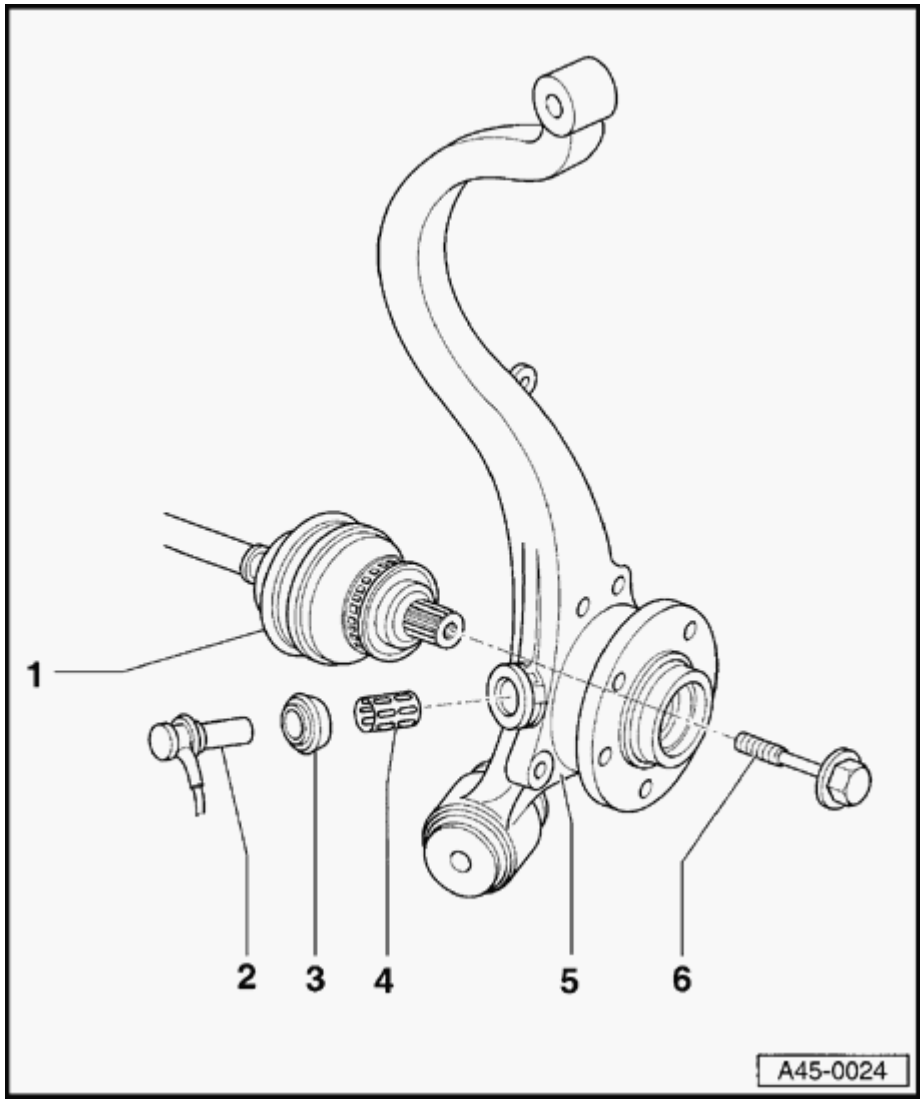


Rear suspension ABS components for AWD models, removing and installing

WARNING!

- ***Do not re-use any fasteners that are worn or deformed in normal use.***
- ***Some fasteners are designed to be used only once, and are unreliable and may fail if used a second time. This includes, but is not limited to, nuts, bolts, washers, circlips and cotter pins. Always follow the recommendations in this manual-replace these fasteners with new parts where indicated, and any other time it is deemed necessary by inspection.***

45-37



1 - Drive axle with ABS wheel speed sensor rotor

- Examine rotor for signs of dirt and damage ⇒ page 45-40
- If the rotor is damaged, replace outer CV joint along with rotor ⇒ *Repair Manual, Suspension, Wheels, Steering, Repair Group 42*
- Outer CV joint is supplied as replacement part with rotor

2 - ABS wheel speed sensor

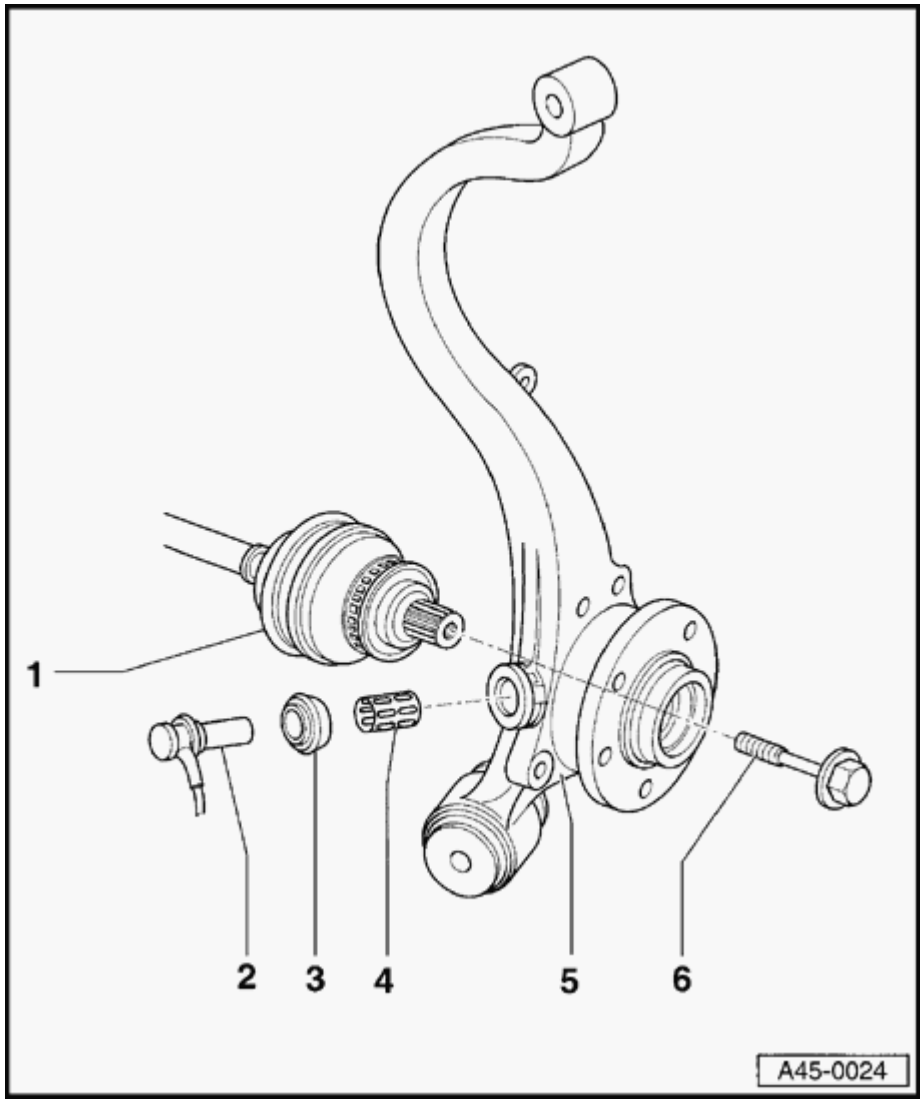
- Identical part on left and right
- Clean inside surface of hole before inserting sensor
- Replacing ⇒ page 45-39

3 - Boot seal

4 - Clamping sleeve

- Always replace
- Identical part on left and right
- Grease all around with assembly paste before inserting into wheel bearing housing
- Press into wheel bearing housing until fully seated

45-38



5 - Wheel bearing housing

6 - Hex bolt

- M14 thread: tighten to 115 Nm (85 ft lb) plus additional 1/2-turn (180 °)

WARNING!

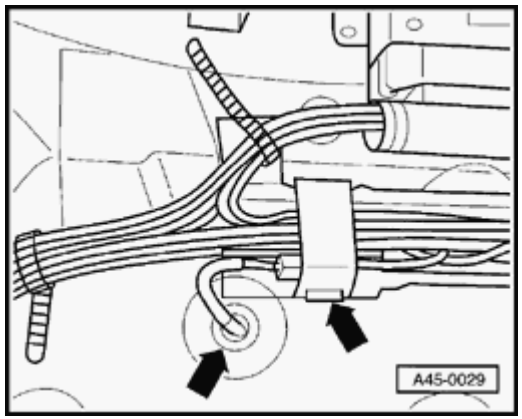
Do not loosen and tighten hex bolt - 6 - unless car is standing on its wheels-risk of accident.

45-39

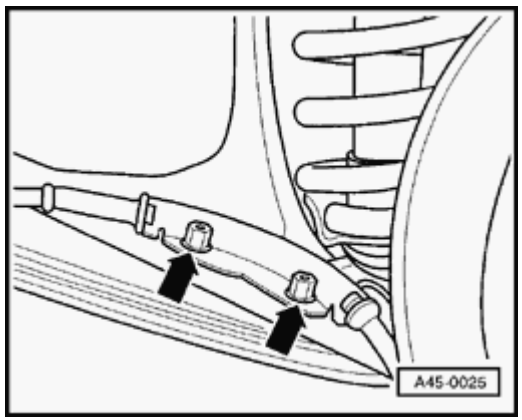
ABS wheel speed sensor on AWD rear axle, removing and installing

Removing

- Switch ignition off.
- Lift rear seat out of its brackets.

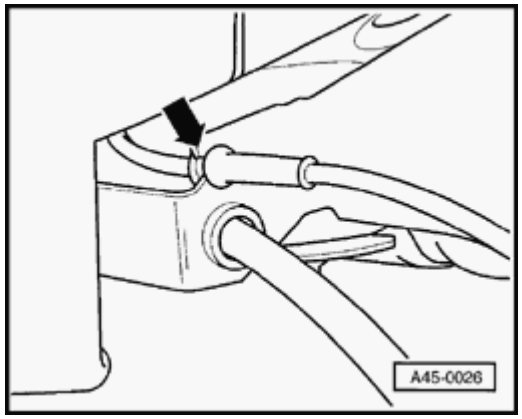


- Detach cable holder (right arrow), separate ABS wheel speed sensor harness connector and press out grommet (left arrow). Left and right sides are mirror images.
- Loosen wheel bolts.
- Raise vehicle.
- Remove wheel.



- Remove nuts (arrows) securing ABS wheel speed sensor harness retaining plate.

45-40



- Release ABS wheel speed sensor harness from holder (arrow).
- Pull ABS wheel speed sensor out of wheel bearing housing.

Installing

- Replace clamping sleeve ⇒ page 45-37 item - 4 -.
- Before inserting wheel speed sensor, install boot seal and grease sensor all around with assembly paste. Then, press in wheel speed sensor by hand until fully seated.
- Re-route sensor harness in reverse order of removal.

ABS wheel speed sensor rotor on AWD rear axle, examining

- Raise vehicle.
- Remove wheel.
- Pull ABS wheel speed sensor out of wheel bearing housing.
- Examine rotor for signs of dirt and damage.

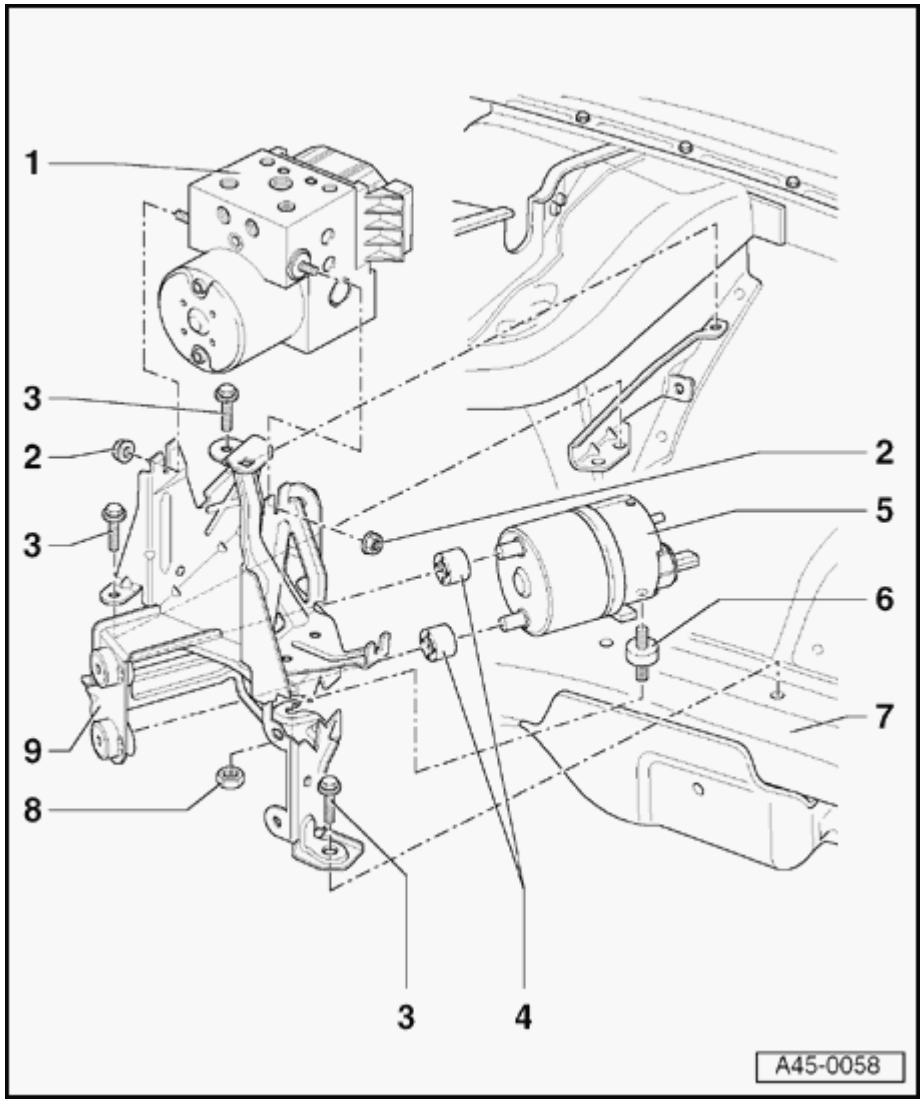
Note:

- *If the rotor is dirty or damaged, remove the drive axle. If the rotor is damaged, replace the outer CV joint together with the rotor.*

⇒ *Repair Manual, "Suspension, Wheels, Steering", Repair Group 42*

- *The outer CV joint is supplied as a replacement part with the rotor.*

45-41



Electronic Stability Program (ESP) hydraulic unit, servicing

The tightening torque for all brake lines on the Audi A4 is 15 Nm (11 ft lb).

1 - ESP hydraulic unit

- Always replace complete unit

2 - Nut

- 12 Nm (9 ft lb)

3 - Bolt and washer assembly

- 9 Nm (80 in lb)
- 3x

4 - Resilient bushing

- 2x

5 - ESP hydraulic pump -V156-

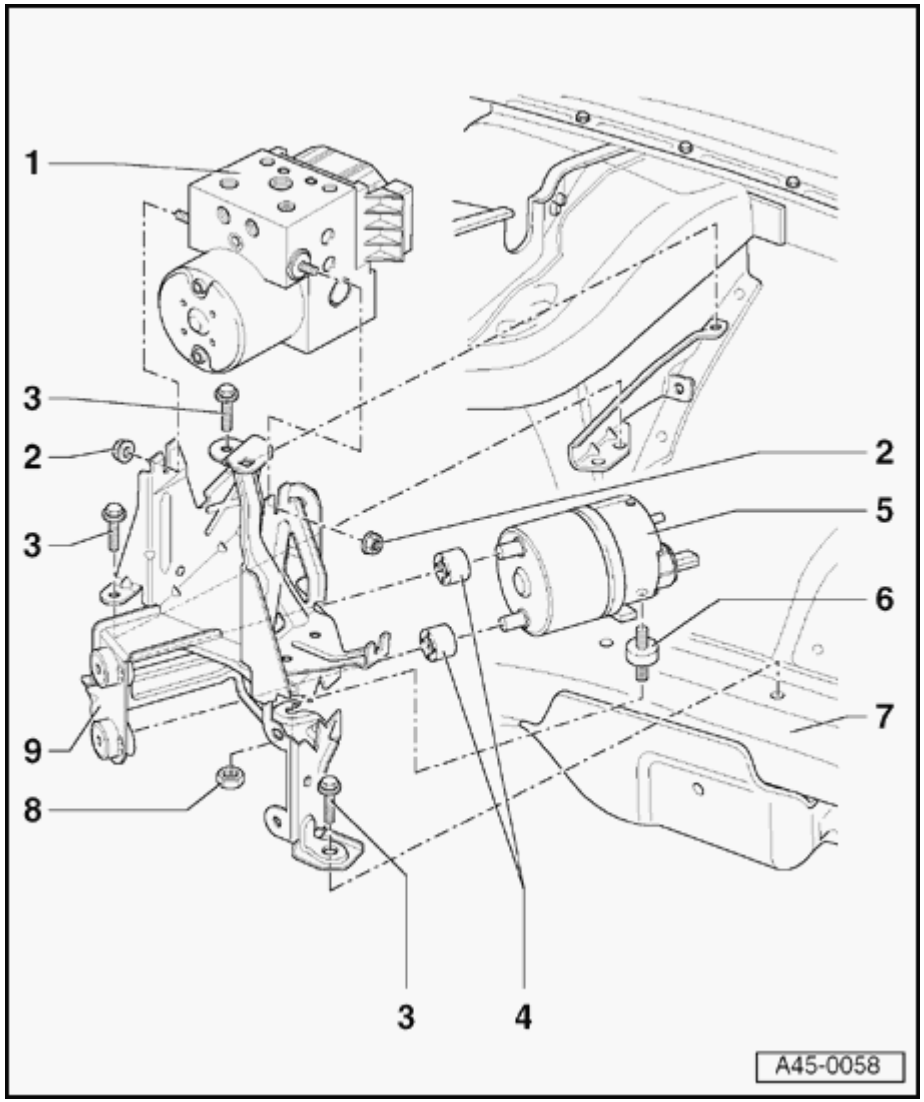
- Assembly includes brake pressure sensor

6 - Resilient pad

- Pad stud mount to hydraulic pump: 2 Nm (18 in lb)

7 - Vehicle body

45-42

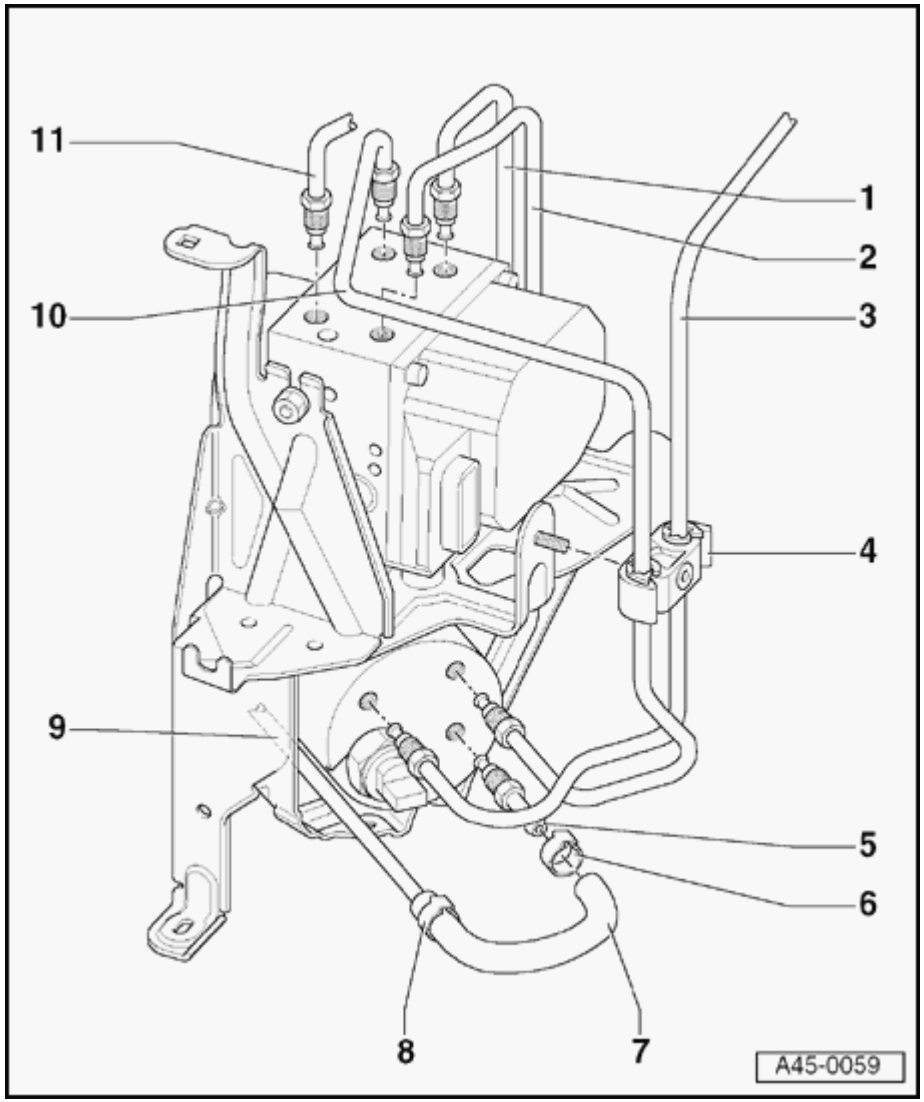


8 - Nut

- 9 Nm (80 in lb)

9 - Bracket

45-43



1 - Left-front brake line

2 - Right-front brake line

3 - Brake line

- ESP hydraulic pump to brake master cylinder primary piston circuit

4 - Fixture

5 - Connection fitting

6 - Hose clamp

7 - Hose

8 - Hose clamp

9 - Suction line

10 - Brake line

- To ESP hydraulic pump

11 - Brake line

- To brake master cylinder secondary piston circuit

45-44

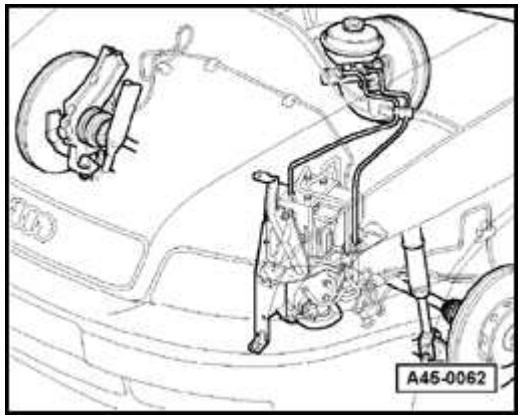
Electronic Stability Program (ESP) hydraulic pump, removing and installing

Special tools and equipment

- Sealing plugs from repair kit Part No. 1H0 698 311A
- VAG1551 or VAG1552 scan tool
- US1116 brake bleeder

CAUTION!

Part numbers are listed here for reference only. Always check with your Parts department for the latest information.



Component location

The ESP hydraulic pump is located on the left side of the engine compartment below the hydraulic control unit.

Removing

- Place vehicle on lift.

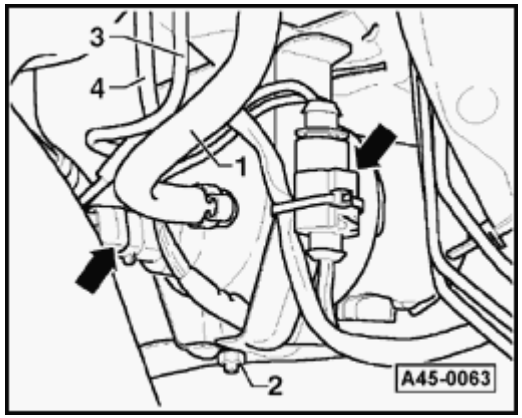
Note:

Switch off ignition before removal or installation work. If the vehicle is

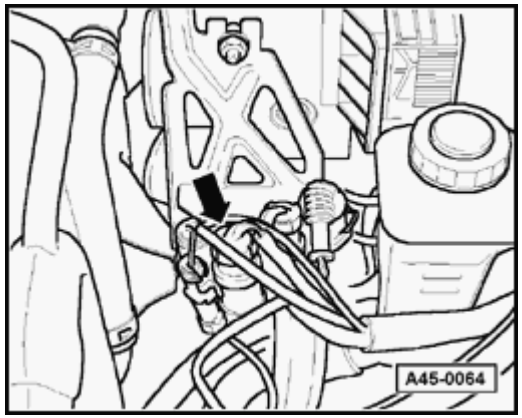
equipped with a coded radio determine the correct coding before disconnecting the battery.

45-45

- Raise vehicle.
- Remove left-front wheel.
- Remove left-front wheelhouse liner.

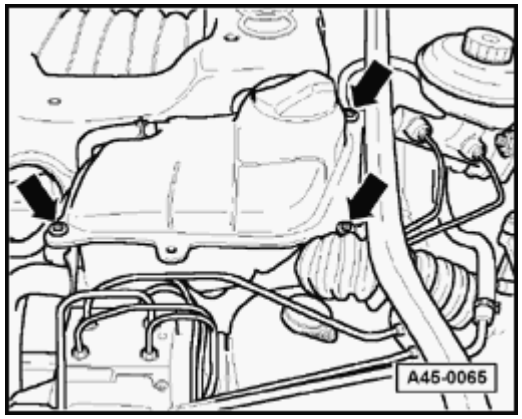


- Disconnect electrical harness connectors (arrows).
- Remove cover on hydraulic reservoir.



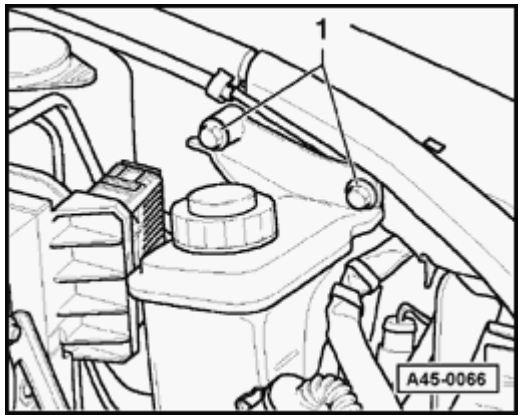
- Unclip attachment strip at bracket.

45-46



- Remove mounting screws (arrows) and swing coolant expansion tank to side.

  Tightening torque: 6 Nm (53 in lb)



- Remove bolts -1- for hydraulic fluid reservoir and swing to side.

  Tightening torque: 10 Nm (7 ft lb)

Pay attention to bottom mounting (rubber grommet) when installing.

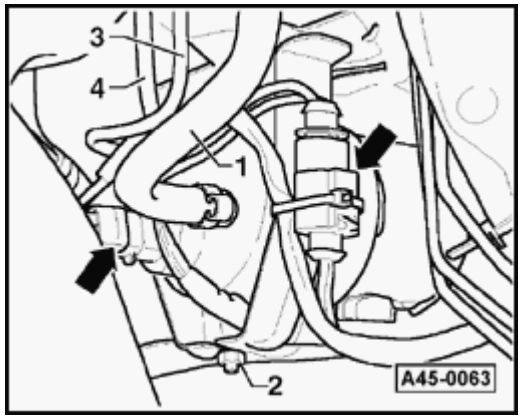
45-47

Note:

Protect the engine compartment from brake fluid which flows out.

CAUTION!

Brake fluid must not be allowed to come into contact with paintwork because of its caustic effect.



- Loosen hose clamp on suction hose -1- and detach.
- Disconnect brake lines -3- and -4-.
- Seal brake lines and threaded holes with plugs from repair kit Part No. 1H0 698 311A.
- Unclip brake lines from fixture.
- Remove nut -2-.
- Remove bolts for mounting bracket ⇒ page 45-41 , item 3 .
- Working from engine compartment, lift bracket together with hydraulic pump approx. 30 mm (1 3/16 in) and remove.

45-48

Installing

Note:

When installing, pay particular attention to the following points.

- *Only remove the sealing plugs on the new hydraulic control unit when the corresponding brake line is about to be installed.*
- *If the sealing plugs are removed too early the brake fluid can escape.*

- Bleed brake system ⇒ page 47-23 .

Bleeding brake system using US1116 brake bleeder

- Connect US1116 brake bleeder.
- Open bleeder screws in the following sequence and bleed brake calipers (assist with pedal pressure, if necessary).

Bleeding sequence

2 - Left-rear brake caliper

3 - Right-front brake caliper

1 - Right-rear brake caliper

4 - Left-front brake caliper

45-49

Basic Setting

Display group 2 (002): Actuation of Electronic Stability Program (ESP) hydraulic pump - V156-

Actuation of the ESP hydraulic pump -V156- is used to bleed the hydraulic system.

- Connect VAG1551 or VAG1552 Scan Tool (ST).

V.A.G - ON BOARD DIAGNOSTIC HELP
1 - Rapid data transfer
2 - Blink code output

≺ Indicated on display 1)

1) Operating modes 1 and 2 are displayed alternately

- Switch ignition on.
- Press "PRINT" button to switch printer on; indicator lamp in button comes on.
- Press button -1- to select "Rapid data transfer" operating mode 1.
- Press buttons -0- and -3- to insert "Brake Electronics" address word 03.
- Press → button.

Rapid data transfer HELP
Select function XX

≺ Indicated on display

45-50

- Press button -1- twice to select "Login procedure" function 11.

Login procedure **HELP** **Enter code number XXXXX**	Indicated on display

- Enter code number 40168 and press -Q- button to confirm input.

Rapid data transfer **HELP** **Select function XX**	Indicated on display

- Press buttons -0- and -4- to select "Basic Setting" function 04.

Rapid data transfer **Q** **04 - Basic Setting**	Indicated on display

- Press -Q- button to confirm input.

Basic Setting **Q** **Input display group number XXX**	Indicated on display

45-51

The left-front bleeder screw should be open when actuating the hydraulic pump.

- Press buttons -0-, -0- and -2- to input display group number 2 (002) and press -Q- button to confirm input.

  The Electronic Stability Program (ESP) hydraulic pump -V156- is actuated for 10 seconds.

System in Basic Setting	**2** →
Bleed system	**OK**

Indicated on display

- Close bleeder screw.
- Press → button to advance through program sequence.

Rapid data transfer	**HELP**
Select function XX	

Indicated on display

⇒ Repair Manual ABS/EDL/ASR On Board Diagnostic (OBD), Repair Group 01

- The remaining installation procedures are the reverse of removal.

45-52

Steering angle sensor, removing and installing

WARNING!

- ***Before working on any airbag, steering wheel or steering column components, first always disconnect the battery.***
- ***The wheels should be in a straight ahead position before removing the steering wheel.***
- ***Failing to observe these safety precautions may result in failure of the airbag system when the vehicle is driven.***

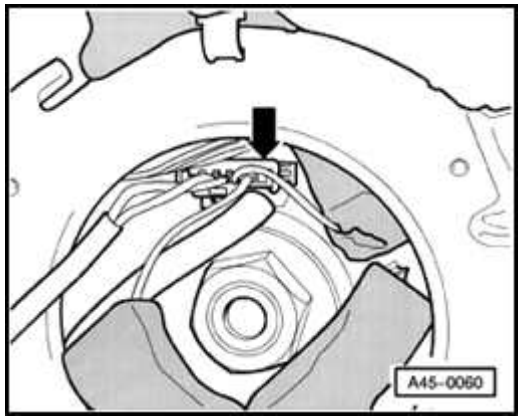
CAUTION!

Before disconnecting the battery, determine the correct coding for the anti-theft radio.

- Remove drivers side airbag from steering wheel.

⇒ *Repair Manual, Suspension, Wheels, Steering, Repair Group 48*

- Disconnect airbag harness connector.



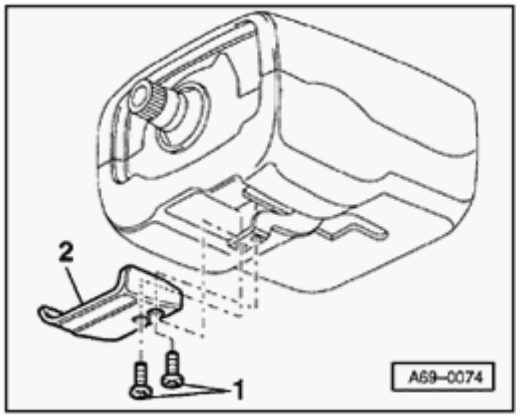
- Disconnect harness connector for steering angle sensor (arrow).
- Remove steering wheel.

⇒ *Repair Manual, Suspension, Wheels, Steering, Repair Group 48*

45-53

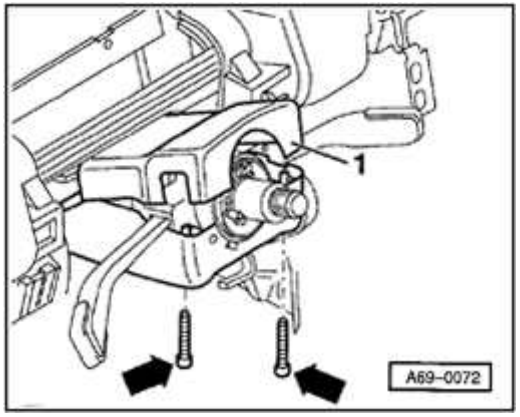
Removing steering column switch

- Unlock steering column adjustment.
- Pull steering column out to stop.



- Remove screw -1- (2x).

  Tightening torque: 3 Nm (27 in lb)
- Remove handle -2-.



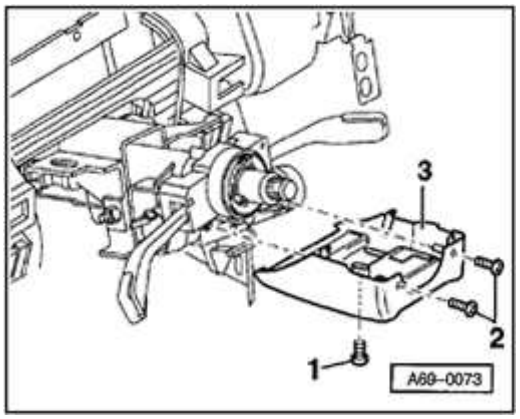
- Remove two Phillips head screws (arrows).

  Tightening torque: 0.6 Nm (5.4 in lb)
- Remove upper trim panel -1- for steering column switches.

Note:

When installing, the upper trim panel has to be inserted into the hooks of the lower trim panel, swiveled down and then screwed tight.

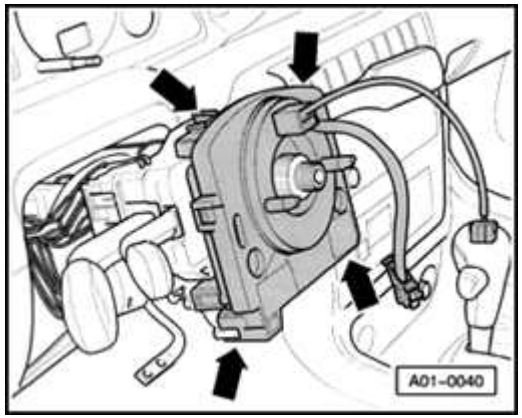
45-54



- Remove screws -2- (2x).

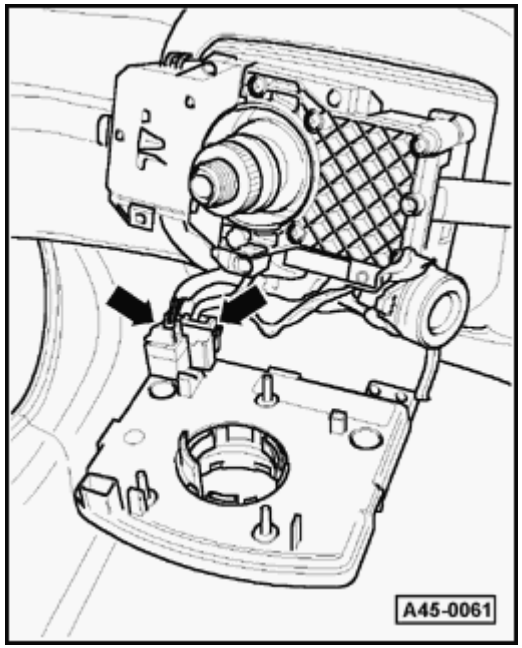
  Tightening torque: 0.6 Nm (5.4 in lb)
- Remove hex socket head screw -1-.

  Tightening torque: 0.6 Nm (5.4 in lb)
- Remove lower steering column trim panel -3-.



- Release steering angle sensor at catches (arrows).

45-55



- Disconnect harness connectors (arrows).

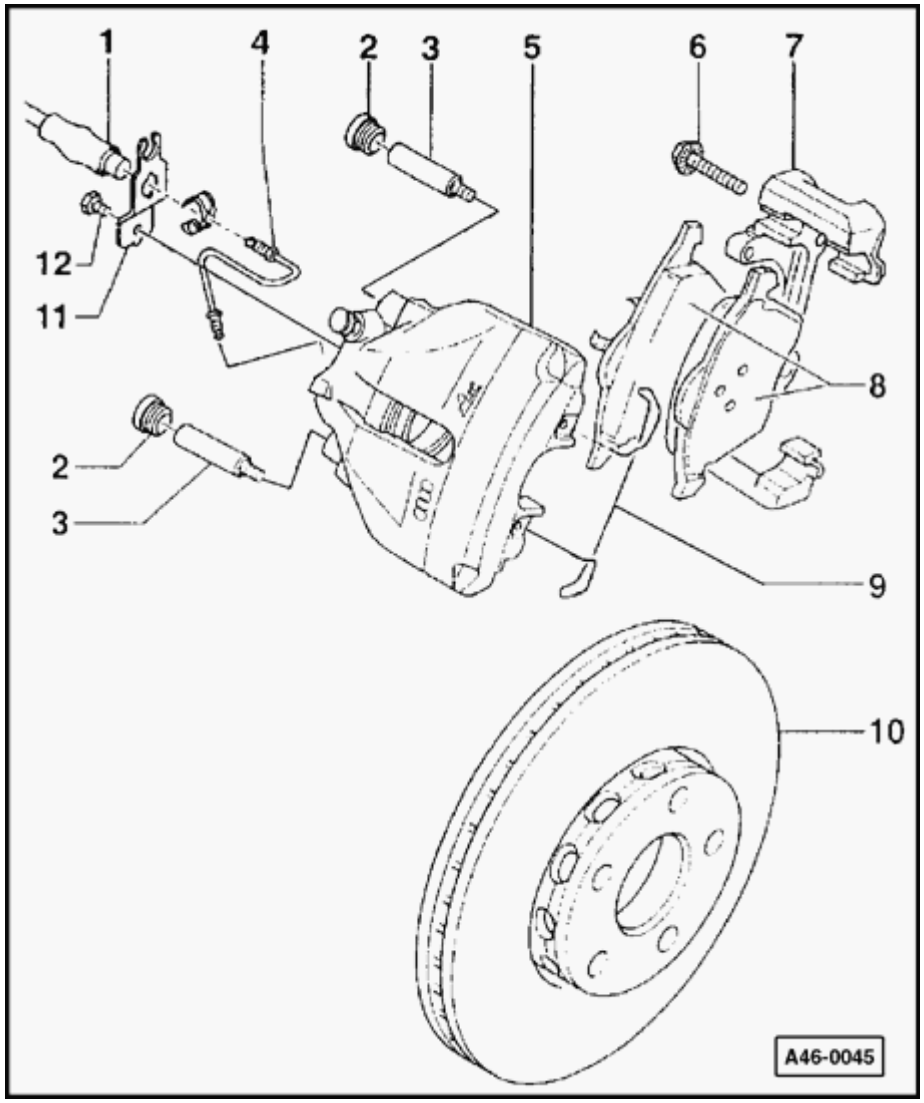
Installing

Installation is the reverse of removal.

- Carry out zero adjustment of steering angle sensor.

⇒ Repair Manual ABS/EDL/ASR On Board Diagnostic (OBD), Repair Group 01

46-1



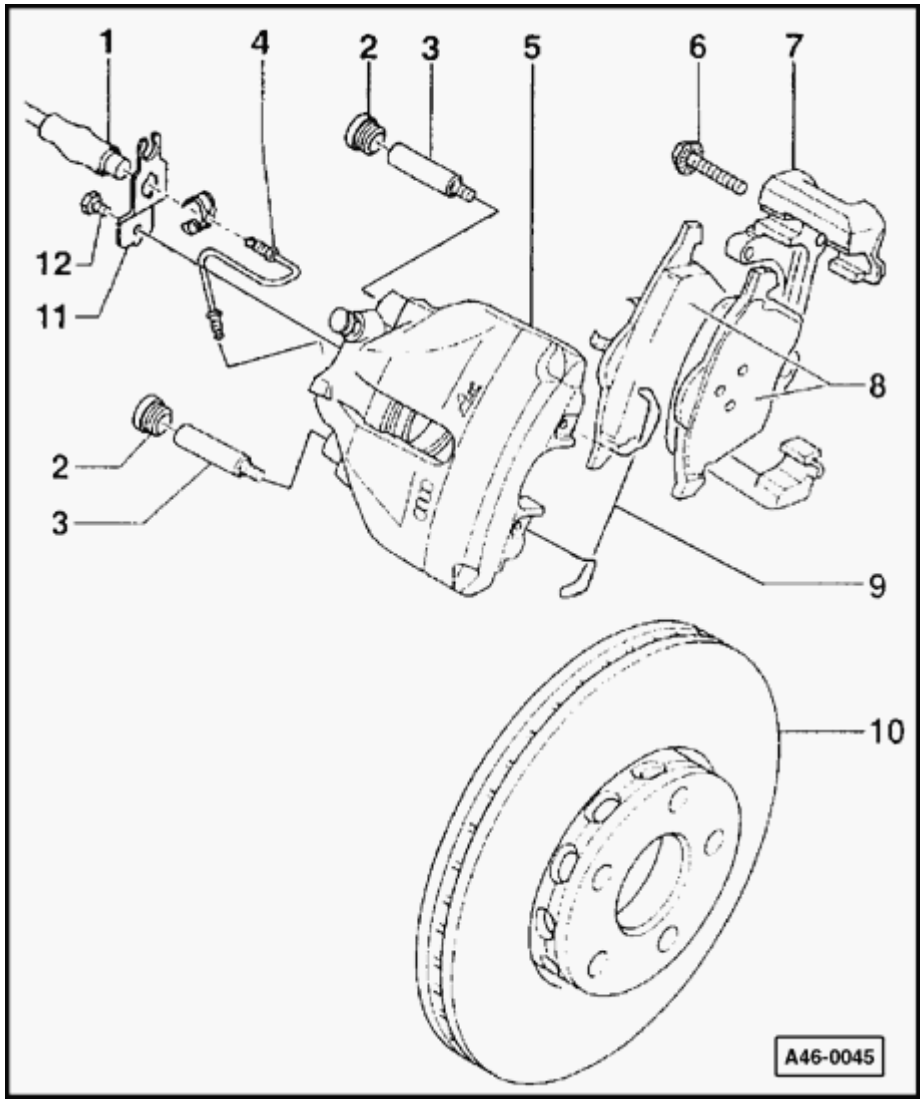
Front brakes, servicing

Teves/Ate front brakes

WARNING!

- ***Do not re-use fasteners that are worn or deformed in normal use.***
- ***Some fasteners are designed to be used only once, and are unreliable and may fail if used a second time. This includes, but is not limited to, nuts, bolts, washers, circlips and cotter pins. Always follow recommendations in this manual-replace these fasteners with new parts where indicated, and any other time it is deemed necessary by inspection.***
- ***To siphon brake fluid, always use a bleeder bottle which is only used to siphon brake fluid.***
- ***Brake fluid is poisonous and must NEVER be removed by siphoning with your mouth.***

46-2



Note:

- *Install complete repair kit.*
- *After installing the brake pads, depress the brake pedal firmly several times before moving the vehicle to properly seat the brake pads in their normal operating position.*
- *The brakes can be tested on a commercial brake dynamometer provided the speed of the two dynamometer drive rollers is not more than 5.5 km/h (3.3 mph).*
- *Tightening torque for the brake lines is 15 Nm (11 ft lb)*

1 - Brake hose

- Do not disconnect the brake hose from the caliper when replacing brake pads.

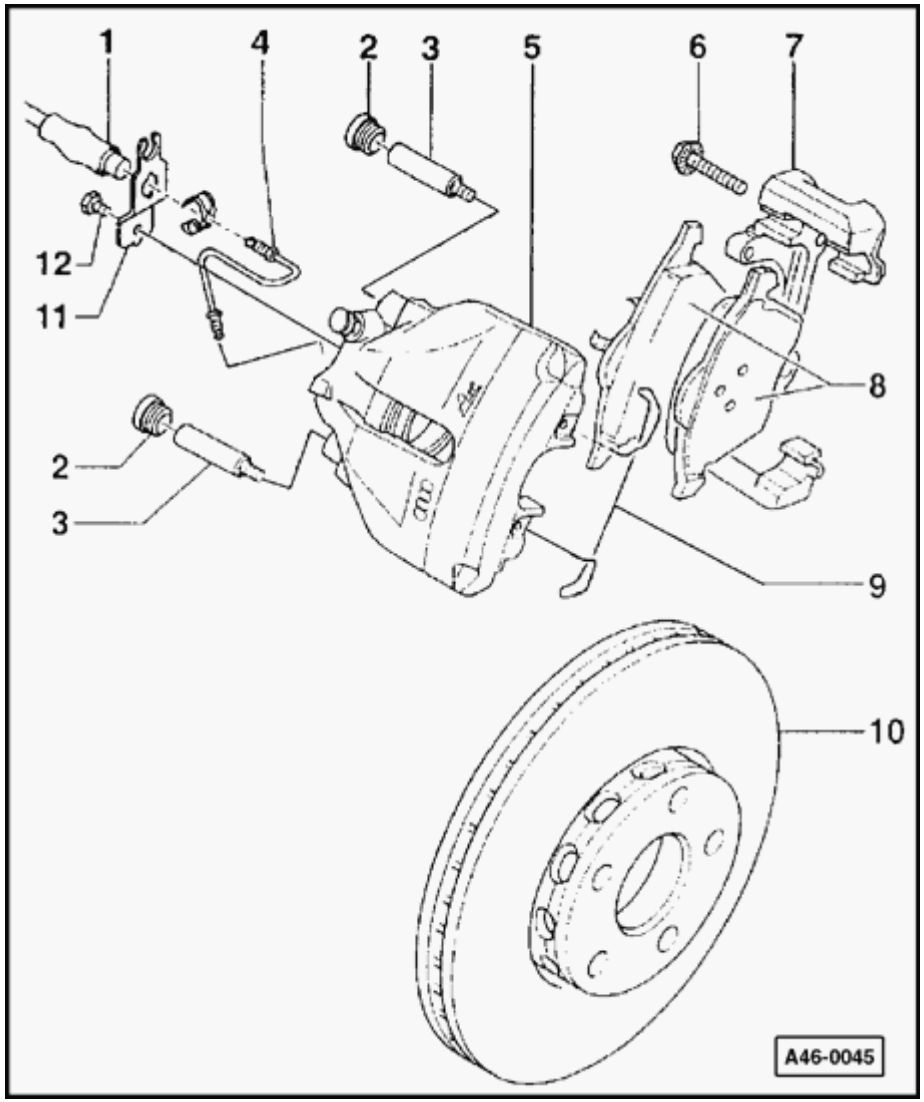
CAUTION!

Do not allow the caliper to hang by the brake hose. The unsupported weight can stretch and damage the hose.

2 - Caps

- Remove for access to guide pin

46-3



3 - Guide pin

- 25 Nm (18 ft lb)

4 - Brake line

- 15 Nm (11 ft lb)
- Install into caliper housing
- When tightening to brake hose, counter hold on brake hose hex
- Make sure lugs are properly seated in retainer grooves

5 - Brake caliper housing

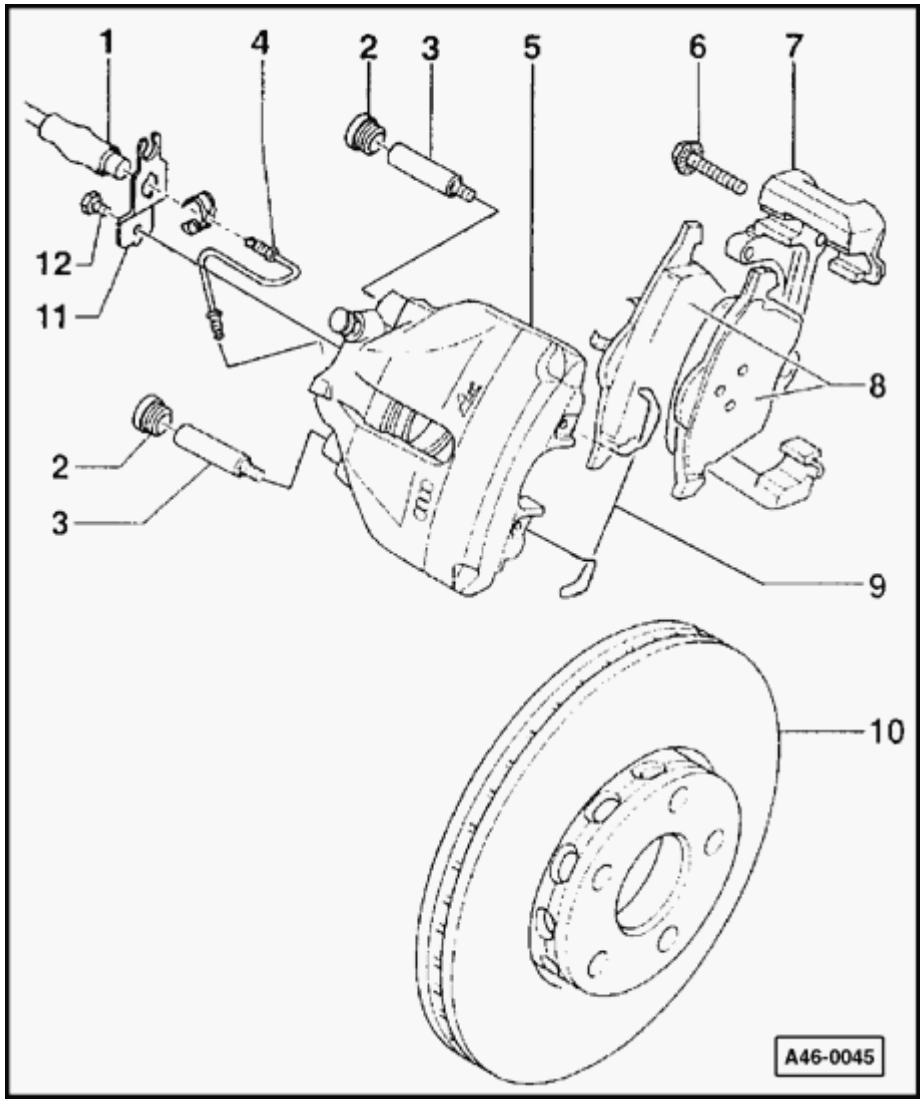
- Unbolt from brake carrier for replacing brake pads
- Servicing brake caliper ⇒ 47-2

6 - Ribbed bolt

- 125 Nm (92 ft lb)
- Clean ribbing if re-using

7 - Brake carrier

- Bolt to wheel bearing housing



8 - Brake pads

CAUTION!

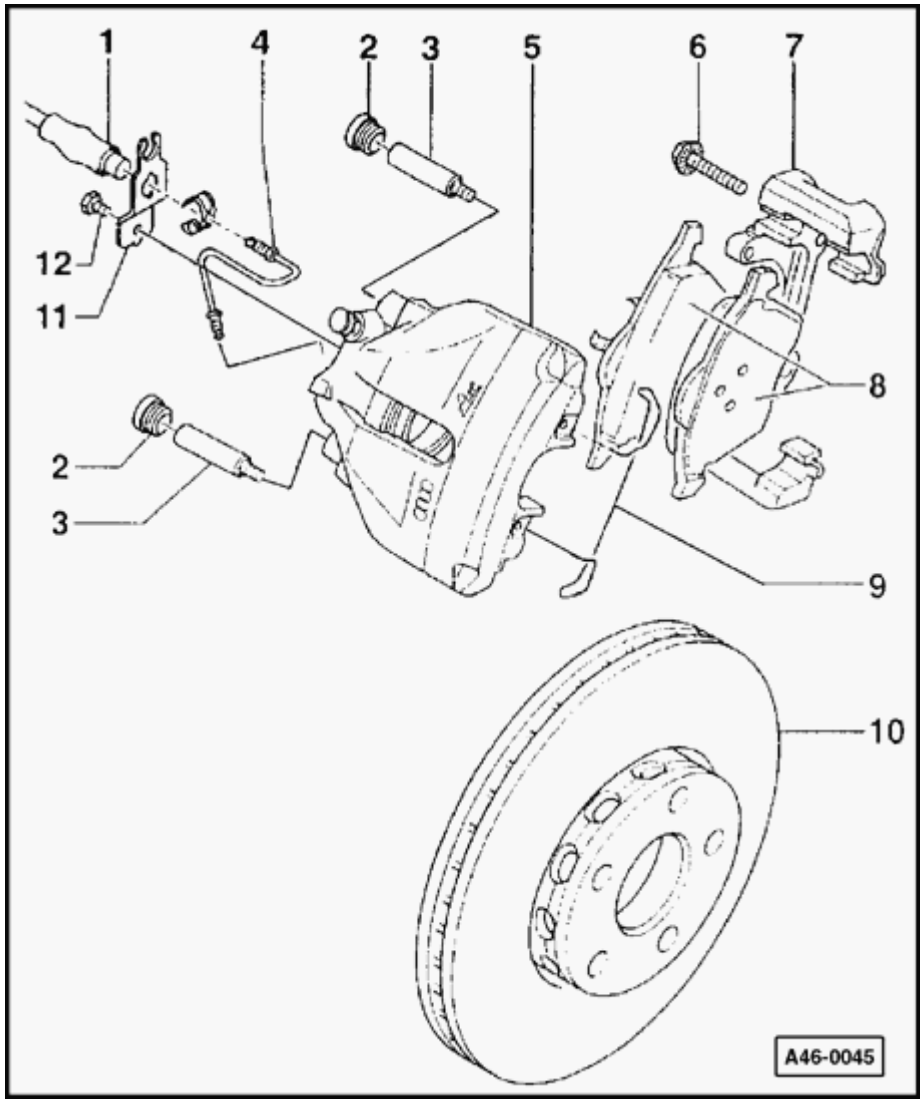
The inner brake pad (with expanding spring) is marked with an arrow that must point in the direction of rotor rotation when the vehicle is moving forward. Incorrect installation can result in excessive noise.

- Outer pads have an adhesive with a protective sheet on the backing plate; remove this sheet before installing
- Different versions ⇒ parts catalogue microfiche
- Always replace as a set on both wheels of an axle
- Removing and installing ⇒ page 46-7
- Brake pad wear limit (friction material): 2 mm (0.08 in.)
- Brake pad wear limit (including backing plate): 7 mm (0.28 in.)

Note:

Before installing new brake pads, thoroughly clean the brake calipers (free of grease). Pay particular attention to removing any adhesive residue from the outer brake pad contact surfaces.

46-5



9 - Retaining spring

- Insert into both holes in brake caliper housing
- Once spring ends are seated in holes, press retaining spring under brake carrier

CAUTION!

If the spring is not installed correctly, the outer brake pad alignment mechanism will not be able to compensate for wear, and increased pedal travel will result.

10 - Brake disc

- Always replace as a set on both wheels of an axle
- To remove, first unbolt caliper
- Resurface evenly on both sides starting from thickness when new

Internally ventilated brake disc:

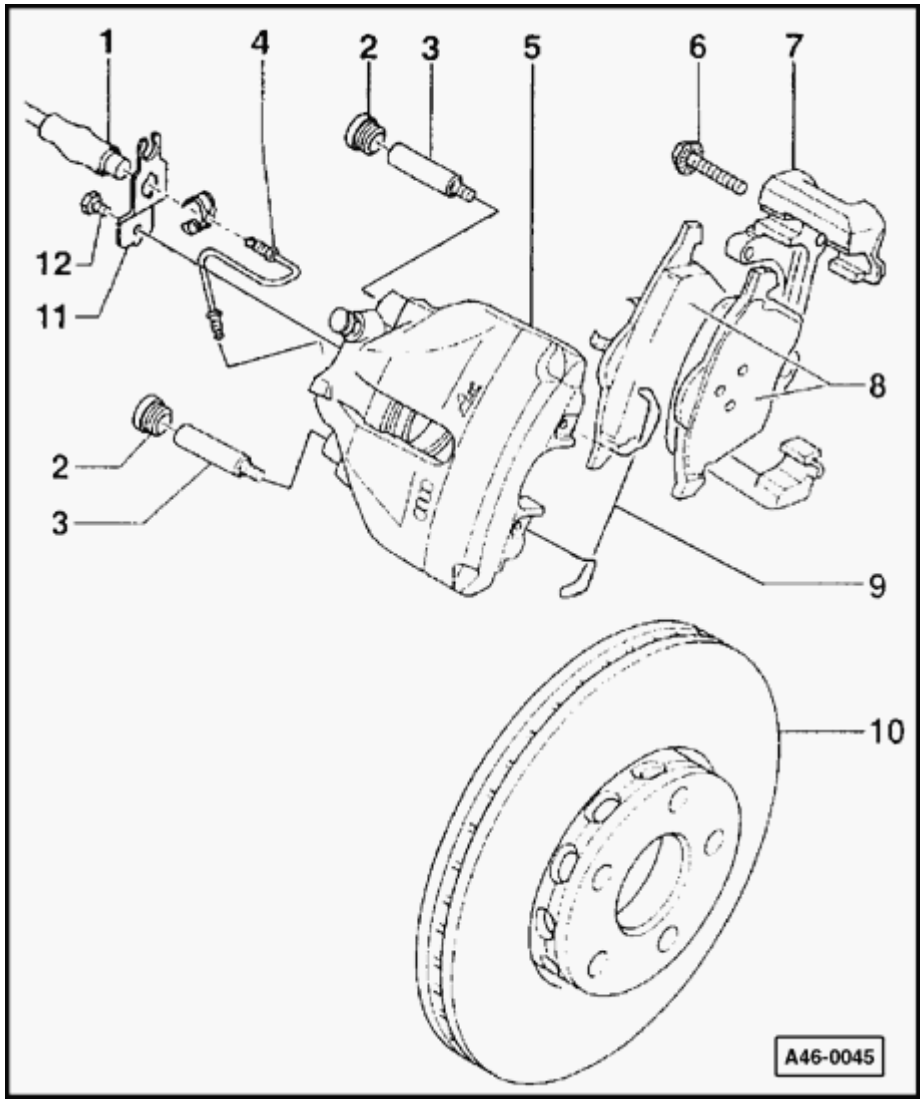
- Diameter: 288 mm (11.34 in.)
- Thickness: 25 mm (0.984 in.)
- Wear limit: 23 mm (0.906 in.)

Non-ventilated brake disc:

- Diameter: 288 mm (11.34 in.)

- Thickness: 15 mm (0.59 in.)
- Wear limit: 13 mm (0.51 in.)

46-6



11 - Bracket

- Bolt to brake caliper housing

12 - Hex bolt

- 10 Nm (7 ft lb)

Teves/Ate brake pads, removing and installing

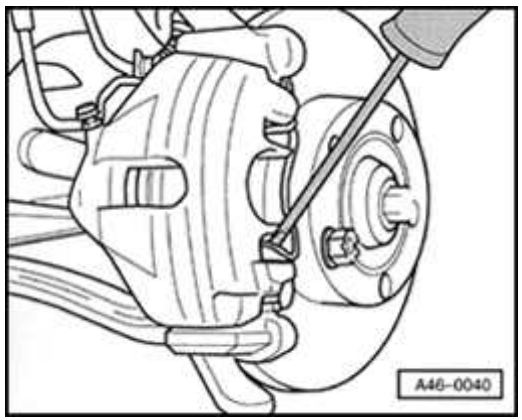
Removing

Note:

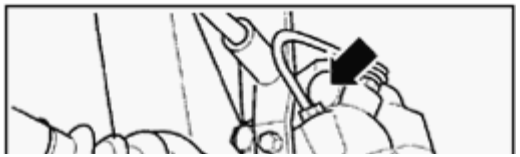
If brake pads are to be re-used, mark their installed positions when removing. Re-install in the same positions, otherwise the car may pull to one side!

- Raise vehicle.

- Remove wheels.

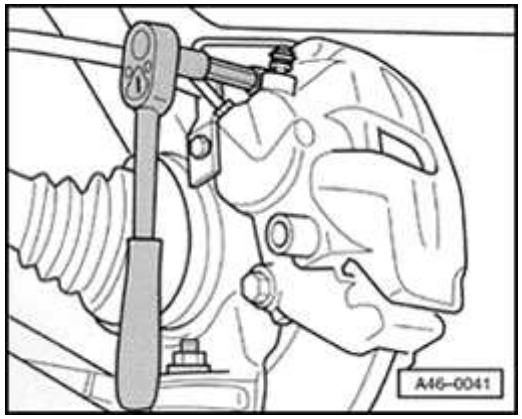


- Use screwdriver to pry brake pad retaining spring out of brake caliper housing, and remove spring.



- Remove top and bottom caps (arrows).

46-8



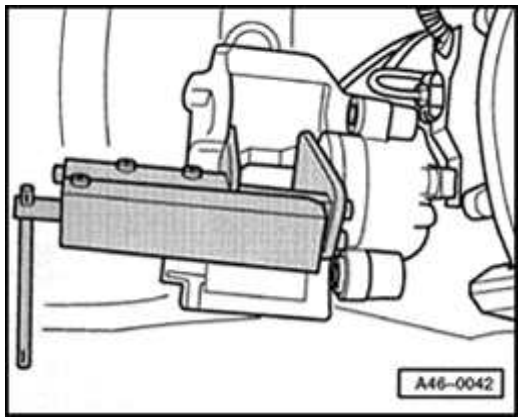
- Remove both guide pins from brake caliper.
- Remove brake caliper housing and secure to body.

CAUTION!

- ***Do not loosen brake hose or lines.***
- ***Secure the brake caliper with a piece of wire in order to relieve the stress on the brake hose.***
- ***Do not allow the caliper to hang by the brake hose.***

- Remove outer brake pad from brake carrier.
- Pull inner brake pad (with expanding spring) out of brake caliper piston.

Installing



- Push piston back into brake caliper housing.

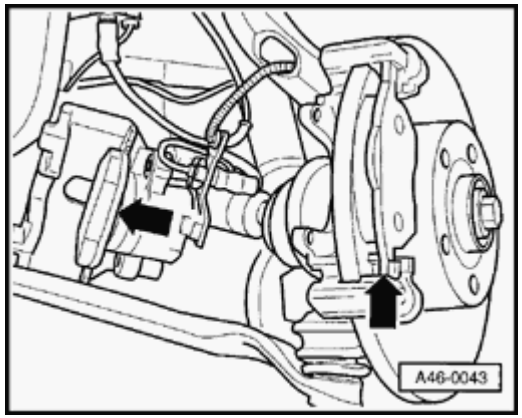
WARNING!

Brake fluid is poisonous and must never be removed by siphoning with your mouth.

46-9

CAUTION!

- ***Extract part of the brake fluid from the brake fluid reservoir before pushing back the pistons.***
- ***If this is not done, particularly if the brake fluid has been topped up in the meantime, brake fluid may flow out and cause damage. Use the bleeder bottle or a plastic bottle, which is used only for brake fluid, for extracting the fluid.***
- ***The inner brake pad (with expanding spring) is marked with an arrow that must point in the direction of rotor rotation when the vehicle is moving forward. Incorrect installation can result in excessive noise.***



- Install inner brake pad (with expanding spring) in brake caliper piston (left arrow). Arrow marked on pad must point in direction of rotor rotation when vehicle is moving forward.
- Remove protective sheet from backing plate for outer brake pad.
- Install outer brake pad into brake carrier (right arrow).
- Bolt brake caliper housing to brake carrier using two guide pins.

  Tightening torque: 25 Nm (18 ft lb)
- Install both caps.

- Insert retaining spring into brake caliper housing.

- Once spring ends are seated in holes, press retaining spring under brake carrier.

CAUTION!

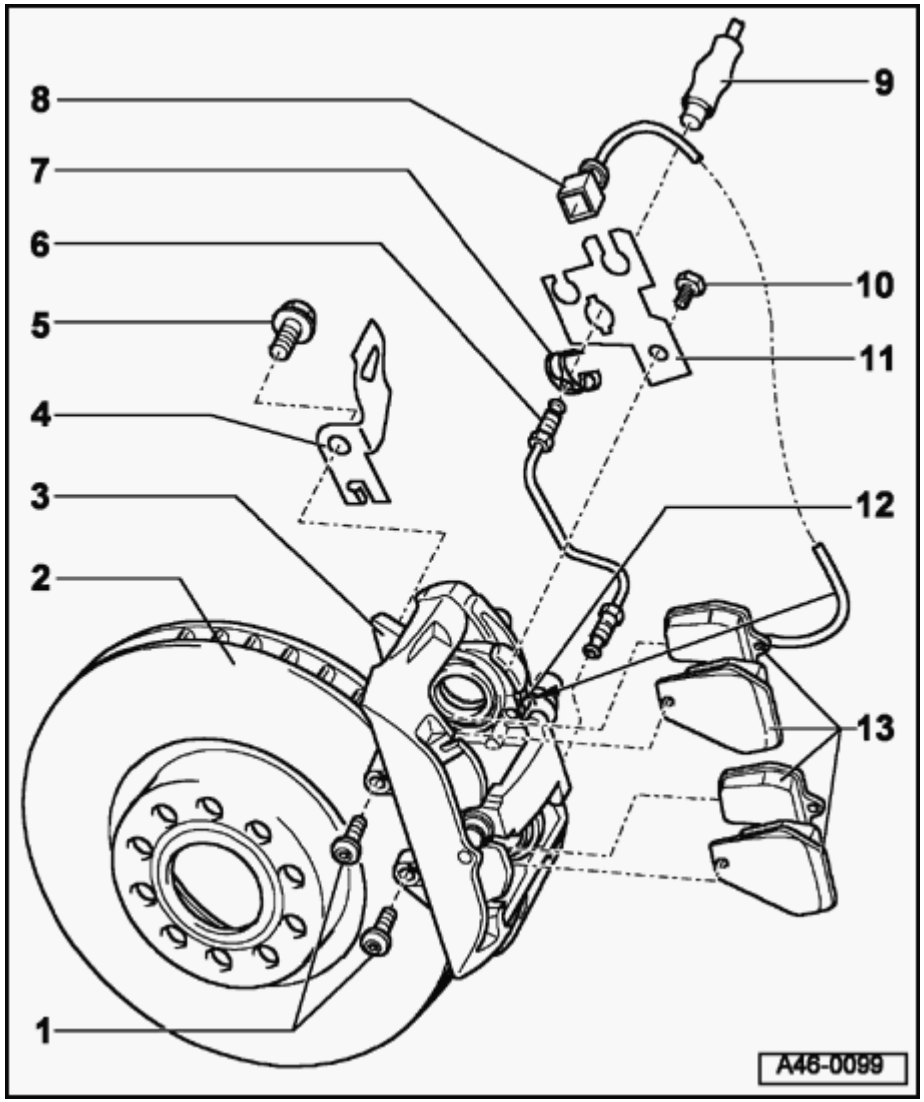
If the spring is not installed correctly, the outer brake pad alignment mechanism will not be able to compensate for wear, and increased brake pedal travel will result.

Note:

Depress the brake pedal firmly several times while the car is stationary so that the brake pads adjust to their normal operating positions.

- Check brake fluid level and top up if necessary.

46-11

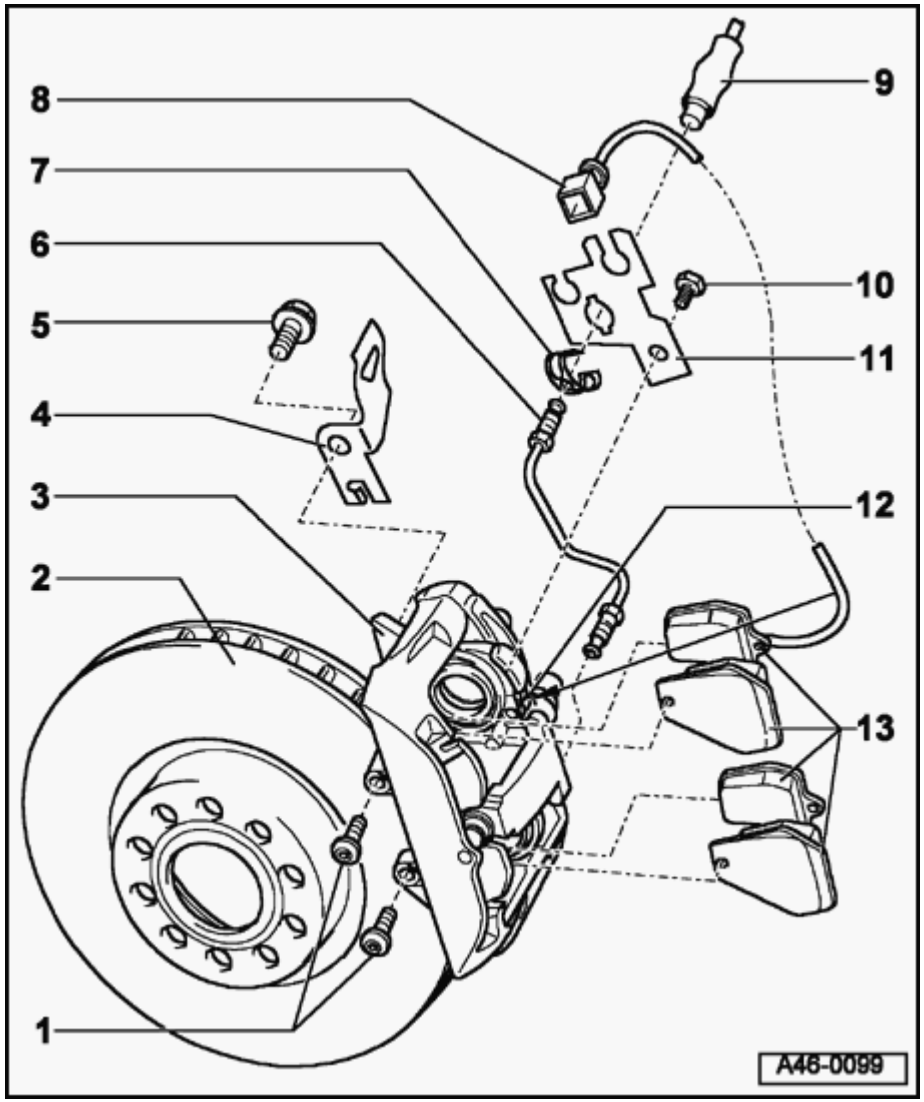


Double piston front brake calipers, servicing

WARNING!

- ***Do not re-use fasteners that are worn or deformed in normal use.***
- ***Some fasteners are designed to be used only once, and are unreliable and may fail if used a second time. This includes, but is not limited to, nuts, bolts, washers, circlips and cotter pins. Always follow recommendations in this manual-replace these fasteners with new parts where indicated, and any other time it is deemed necessary by inspection.***
- ***To siphon brake fluid, always use a bleeder bottle which is only used to siphon brake fluid.***
- ***Brake fluid is poisonous and must NEVER be removed by siphoning with your mouth.***

46-12



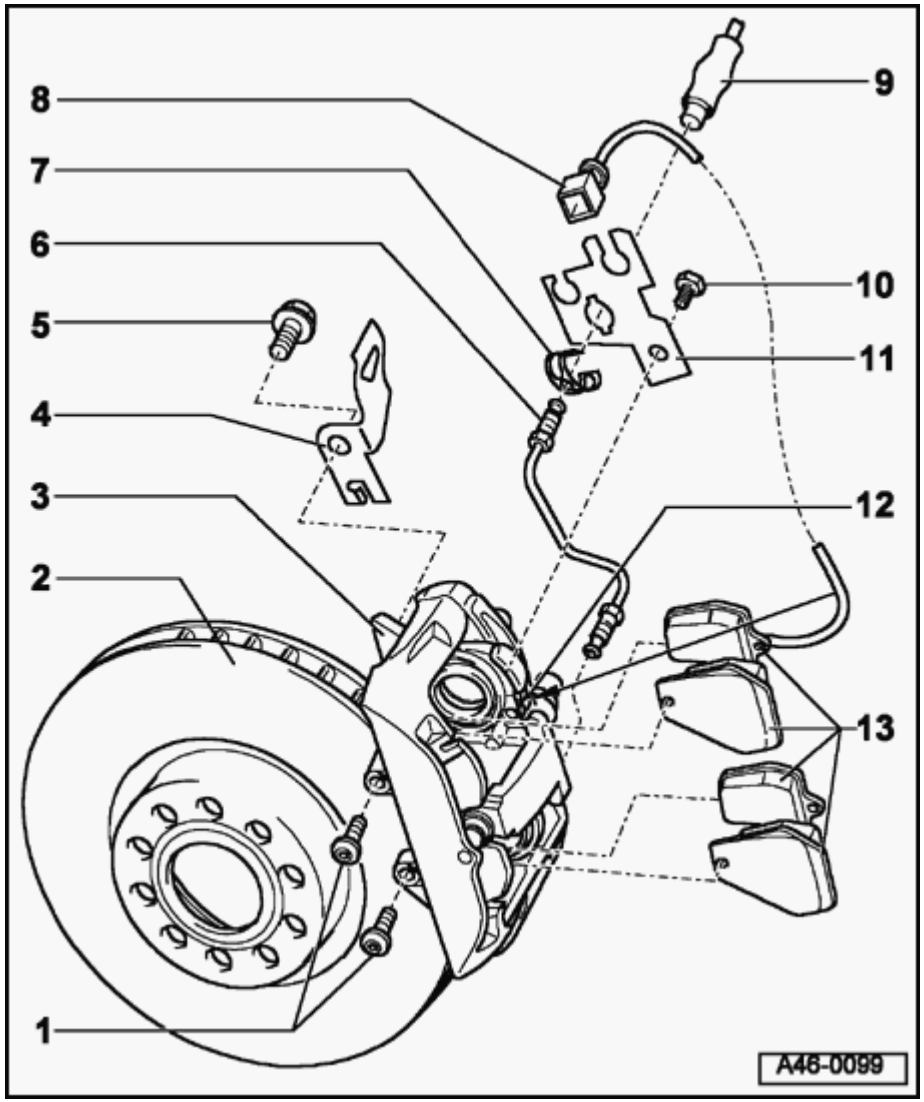
Note:

- *Install complete repair kit.*
- *After installing the brake pads, depress the brake pedal firmly several times before moving the vehicle to properly seat the brake pads in their normal operating position.*
- *The brakes can be tested on a commercial brake dynamometer provided the speed of the two dynamometer drive rollers is not more than 5.5 km/h (3.3 mph).*
- *Tightening torque for the brake lines is 15 Nm (11 ft lb).*

1 - Torx® bolt

- Always replace
- 25 Nm (18 ft lb)
- Remove and install using commercially available Torx® socket T40
- Bolts are included in the repair kit for the brake pads

46-13



2 - Brake disc

- Always replace as a set on both wheels of an axle
- Ensure adequate thickness
- To remove, first unbolt brake caliper

Internally ventilated brake disc

- Diameter: 245 mm (9.65 in.)
- Thickness: 30 mm (1.18 in.)
- Wear limit: 28 mm (1.10 in.)

3 - Brake caliper

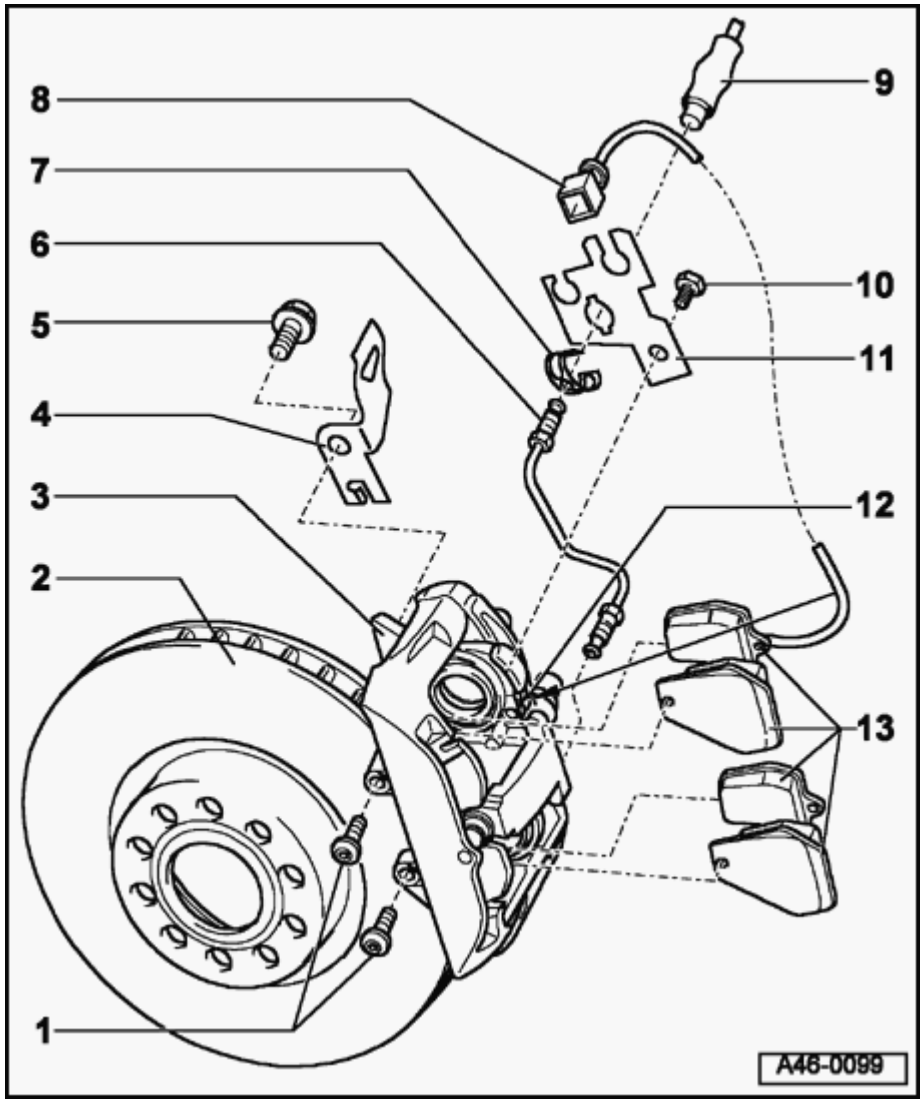
CAUTION!

- ***Do not allow the caliper to hang by the brake hose. The unsupported weight can stretch and damage the hose.***
- ***Secure the brake caliper with a piece of wire in order to relieve the stress on the brake hose.***

- With the exception of replacing brake pads ⇒ page 46-16 and servicing front brake calipers ⇒ page 46-11 , no further repairs may be performed to the brake caliper

4 - Clamping spring

46-14



5 - Ribbed bolt

- 200 Nm (148 ft lb)
- Clean ribbing if re-using

6 - Brake line

- 15 Nm (11 ft lb)

7 - Retaining spring

8 - Harness connector

- Only on models with wear indicators

9 - Brake hose

- Do not disconnect the brake hose from the caliper when replacing brake pads.

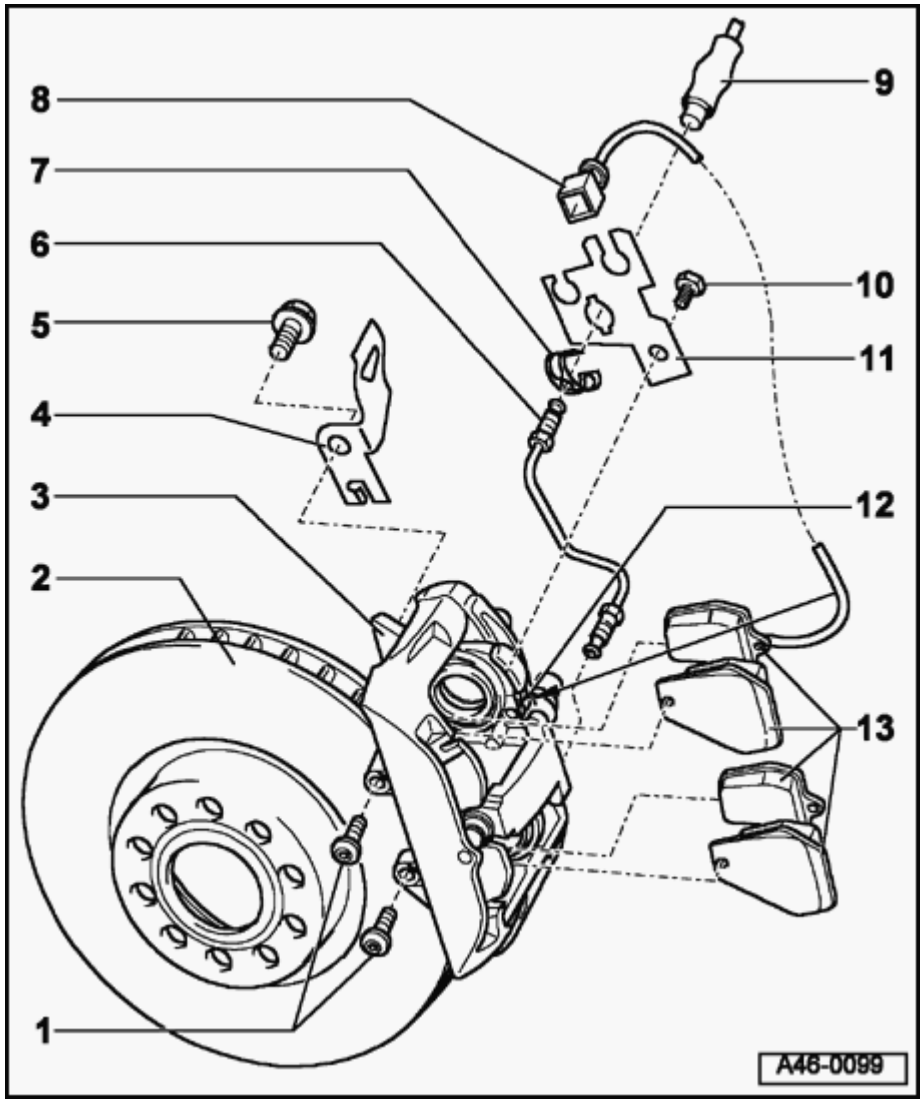
10 - Bolt

- 25 Nm (18 ft lb)

11 - Bracket

- Bolt to brake caliper housing
- Install harness connector for brake pad wear indicator

46-15



12 - Harness holder

- Only on models with wear indicators
- Install harness for brake pad wear indicator into harness holder

13 - Brake pads

- Always replace as a set on both wheels of an axle
- Different left and right sides
- Removing and installing ⇒ page 46-16

With wear indicator

- Once wear limit is reached (3 mm, 0.12 in.), warning light in instrument panel comes on
- Brake pad thickness: 14 mm (0.55 in.)
- Outer pads have an adhesive with a protective sheet on the backing plate; remove this sheet before installing

46-16

Double piston front caliper brake pads, removing and installing

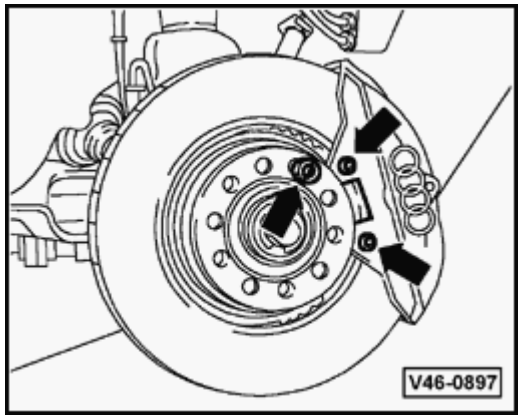
Removing

Note:

If brake pads are to be re-used, mark installed positions when removing. Re-install at the same point, otherwise the car may pull to one side!

- Raise vehicle.

- Remove wheels.



- Secure brake disc with wheel bolt (left arrow).
- Remove both Torx® bolts for outer brake pads (right arrows).

WARNING!

Brake fluid is poisonous and must never be removed by siphoning with your mouth.

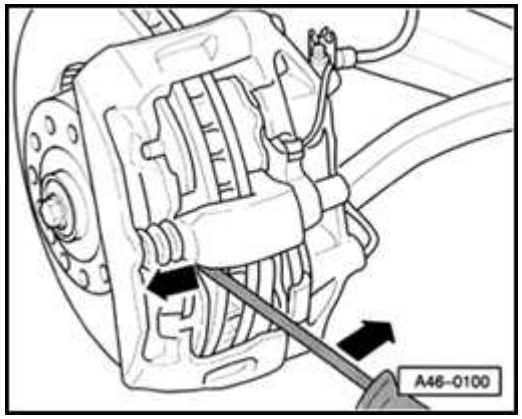
CAUTION!

- ***Extract part of the brake fluid from the brake fluid reservoir before pushing back the pistons.***
- ***If this is not done, particularly if the brake fluid has been topped up in the meantime, brake fluid may flow out and cause damage.***

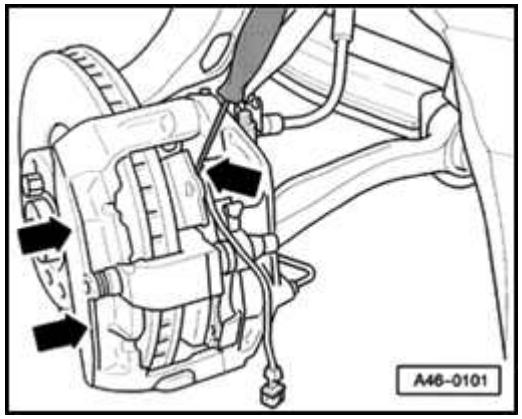
Use the bleeder bottle or a plastic bottle, which is used only for brake fluid, for extracting the fluid.

- ***The inner brake pad (with expanding spring) is marked with an arrow that must point in the direction of rotor rotation when the vehicle is moving forward. Incorrect installation can result in excessive noise.***

46-17



- Push piston back into brake caliper housing.
- To do this use screwdriver inserted into floating caliper frame and press frame outward.
- Remove outer brake pads first by pressing pads off brake caliper using screwdriver.

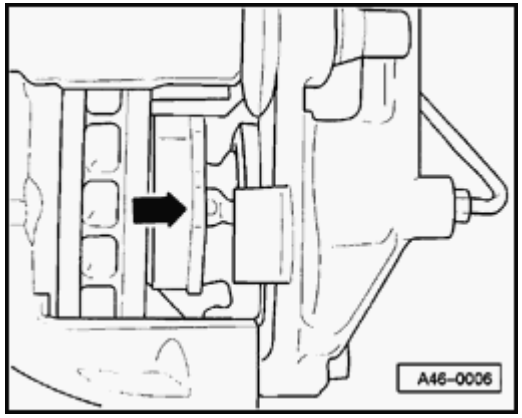


- Press floating frame in direction of left arrows as far as stop.
- Carefully press brake pads out of pistons using screwdriver (right arrow) and remove from caliper housing.

Note:

- *Thoroughly clean the brake caliper housing before installing the new brake pads.*
- *Pay particular attention to cleaning the residues left from the outer brake pad adhesive.*

Installing

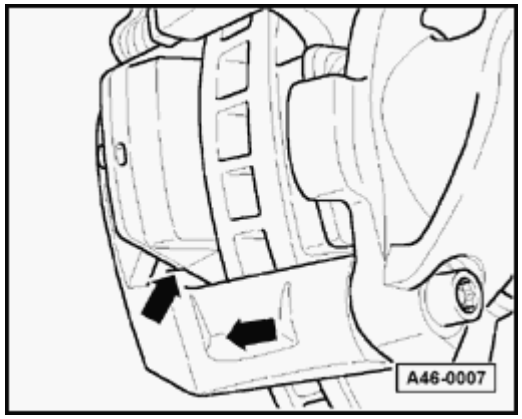


- Install bottom and top brake pads into pistons.

Note:

Do not damage the protective boots when installing the brake pads.

46-19



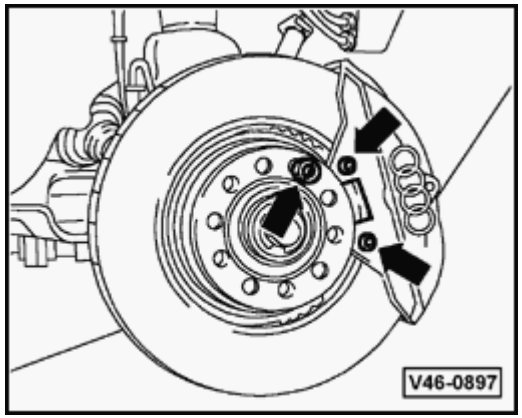
- Press floating frame out as far as stop.
- Remove protective sheet from back of outer brake pads.

CAUTION!

The repair kit contains four self-locking Torx® bolts which must always be installed.

Note:

After replacing brake pads depress the brake pedal firmly several times while the car is stationary so that the brake pads adjust to their normal operating positions.



- Install Torx® bolts (right arrows) from repair kit into floating frame to secure outer brake pads in position.

  Tightening torque: 25 Nm (18 ft lb)
- Remove wheel bolt from wheel hub.

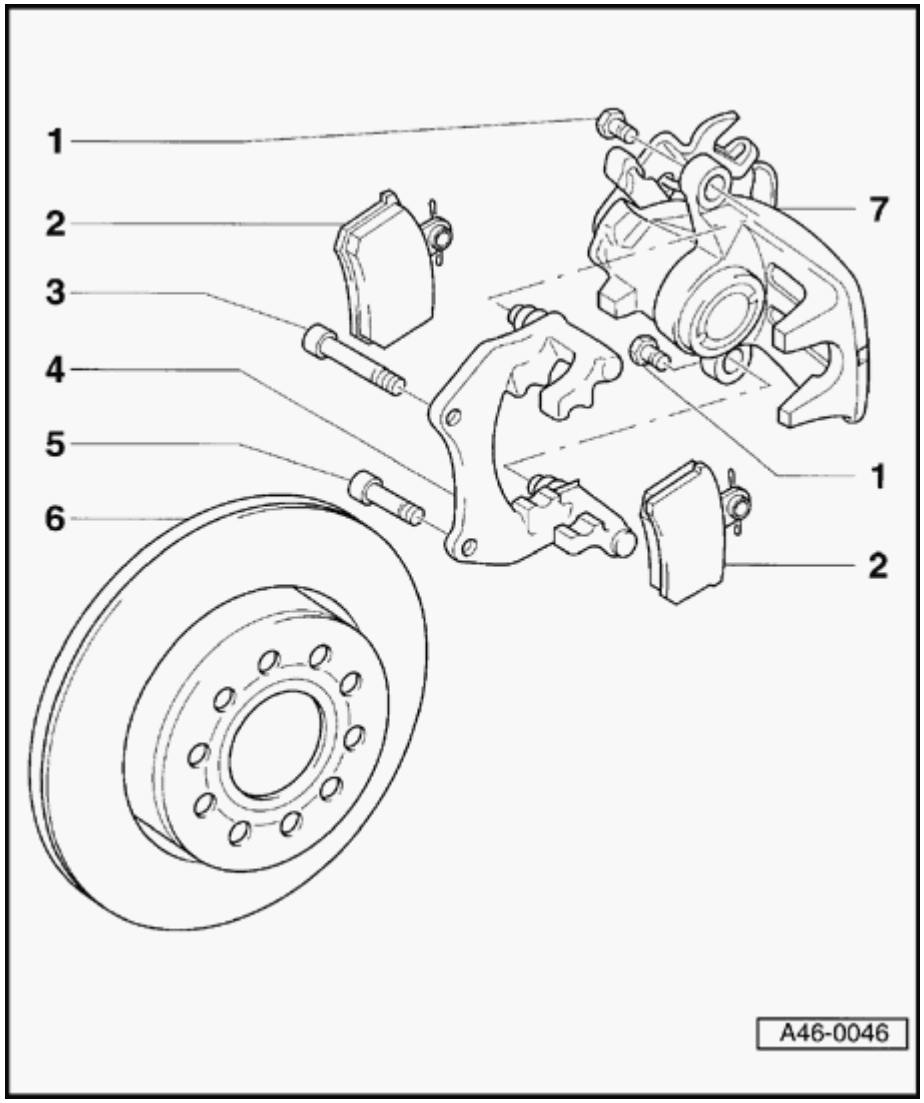
Note:

Make sure wheels do not hang on brake calipers when they are installed. The brake pads could be pushed out of the caliper frame.

- Install wheels and tighten wheel bolts.

  Tightening torque: 120 Nm (89 ft lb)
- Check brake fluid level and top up if necessary.

46-20



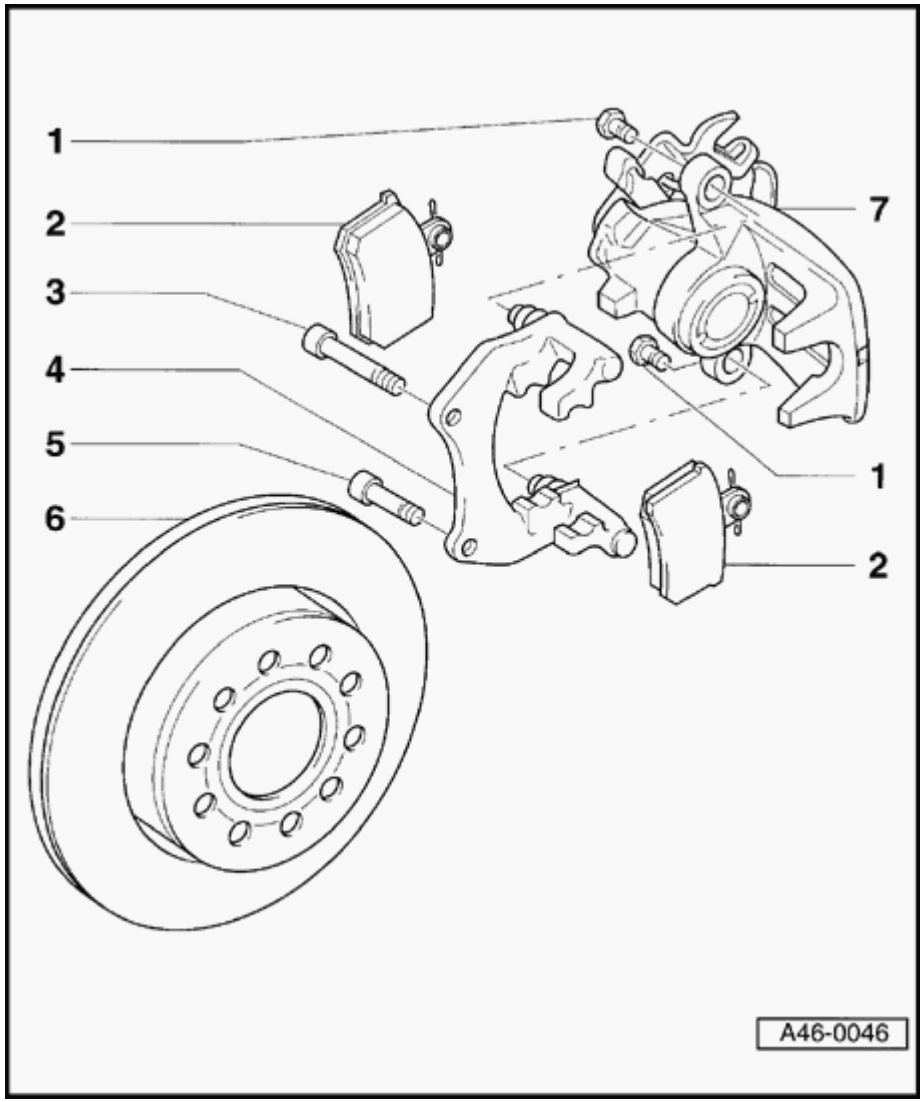
Rear brakes, servicing

Rear brakes with automatic parking brake adjusters

WARNING!

- ***Do not re-use fasteners that are worn or deformed in normal use.***
- ***Some fasteners are designed to be used only once, and are unreliable and may fail if used a second time. This includes, but is not limited to, nuts, bolts, washers, circlips and cotter pins. Always follow recommendations in this manual-replace these fasteners with new parts where indicated, and any other time it is deemed necessary by inspection.***
- ***To siphon brake fluid, always use a bleeder bottle which is only used to siphon brake fluid.***
- ***Brake fluid is poisonous and must NEVER be removed by siphoning with your mouth.***

46-21



Note:

- *Install only the complete repair kit.*
- *The brakes can be tested on a commercial brake dynamometer provided the speed of the two dynamometer drive rollers is not more than 5.5 km/h (3.3 mph).*

1 - Self-locking bolt

- Always replace
- 35 Nm (26 ft lb)
- Counter-hold guide pin when loosening and tightening

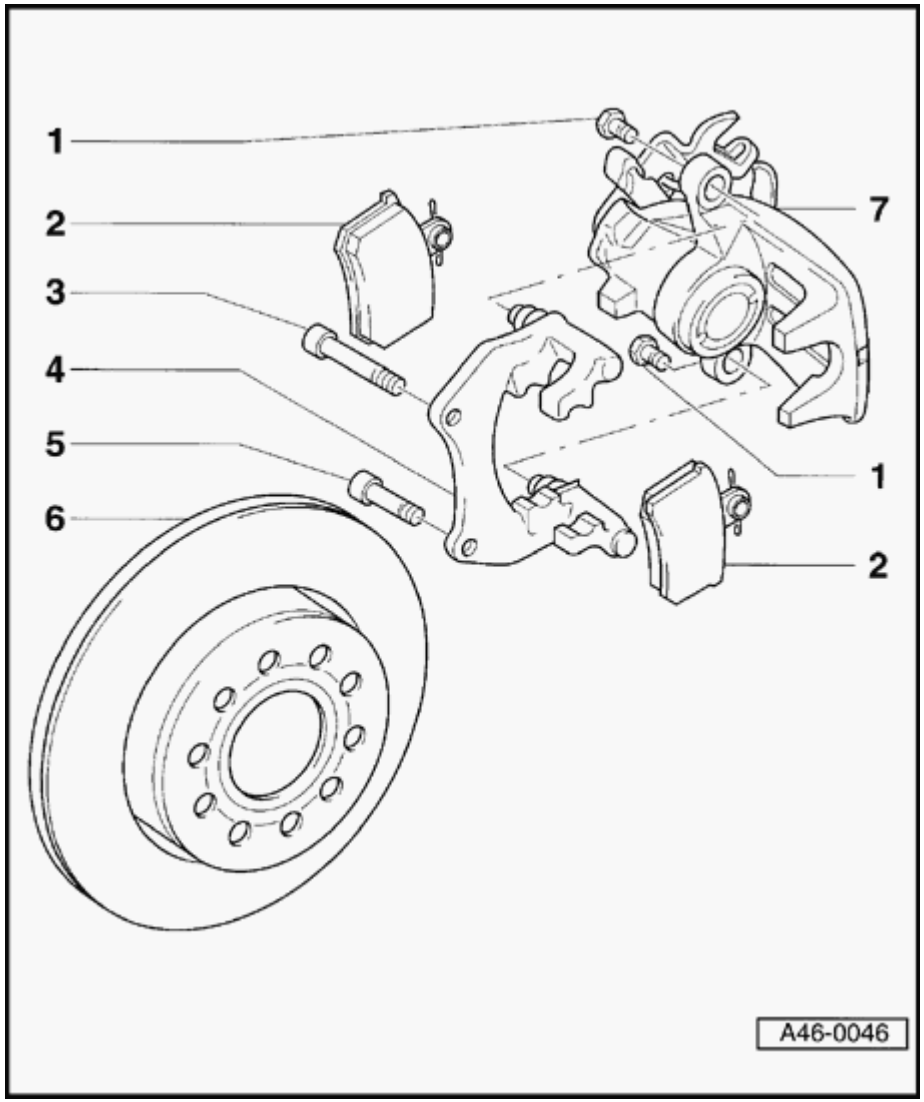
2 - Brake pads

- Always replace as a set on both wheels of an axle
- Removing and installing ⇒ page 46-24
- Brake pad thickness when new: 12 mm (0.47 in.)
- Brake pad wear limit (friction material): 2 mm (0.08 in.)
- Brake pad wear limit (including backing plate): 7 mm (0.28 in.)

3 - Ribbed bolt

- For vehicles with front wheel drive
- 95 Nm (70 ft lb)

46-22



Note:

Until changing over to ribbed bolts, the remaining socket-head bolts should be used. Tightening torque for the socket-head bolt is 60 Nm (44 ft lb).

3 - Socket-head bolt

- For vehicles with all wheel drive
- 60 Nm (44 ft lb)

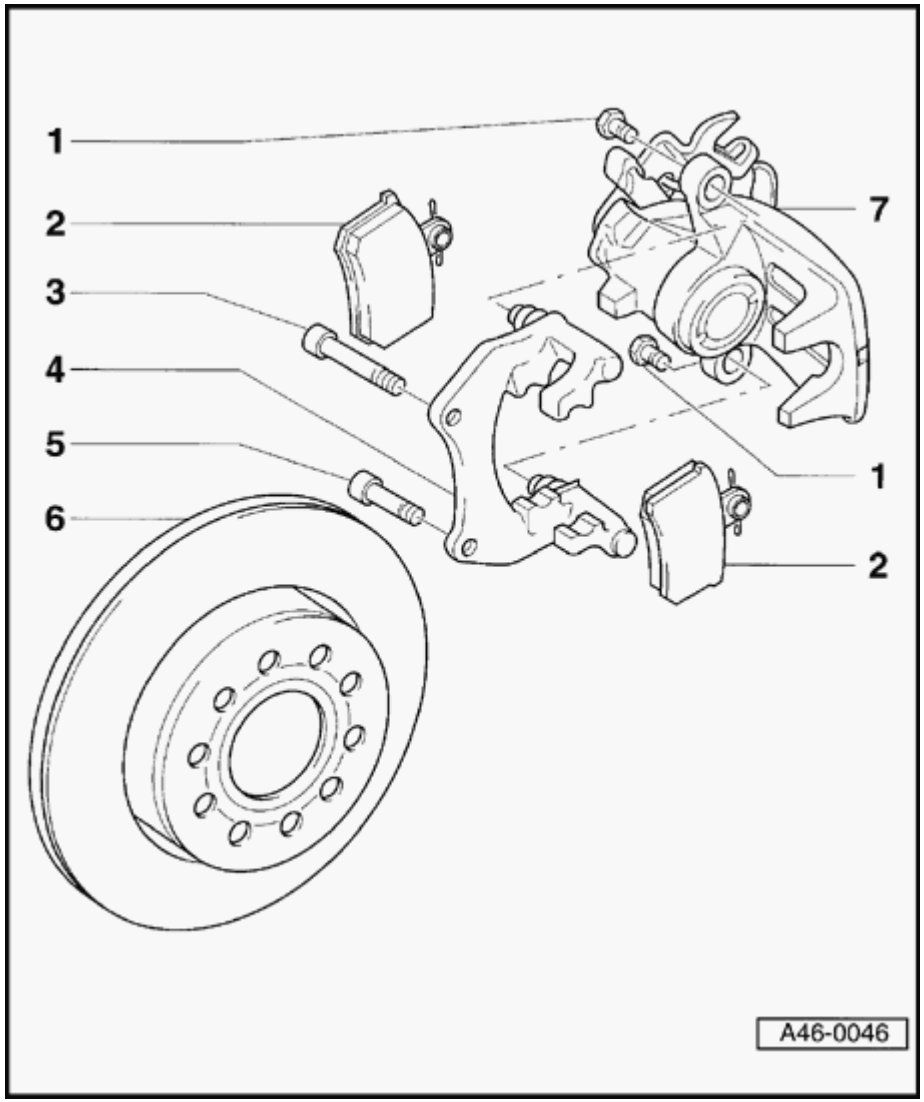
4 - Brake carrier with guide pins and protective caps

- Supplied as a pre-assembled replacement part with adequate amount of grease on guide pins
- If the caps or guide pins are damaged, install repair kit
- Use quantity of grease from repair kit for greasing guide pins

5 - Ribbed bolt

- For vehicles with front wheel drive
- 95 Nm (70 ft lb)

46-23



Note:

Until changing over to ribbed bolts, the remaining socket-head bolts should be used. Tightening torque for the socket-head bolt is 60 Nm (44 ft lb).

5 - Socket-head bolt

- For vehicles with all wheel drive
- 60 Nm (44 ft lb)

6 - Brake disc

- Always replace as a set on both wheels of an axle
- To remove, first unbolt brake caliper
- Resurface evenly on both sides starting from thickness when new
- Brake disc diameter: 245 mm (9.65 in.)
- Brake disc thickness: 10 mm (0.39 in.)
- Wear limit: 8 mm (0.31 in.)

7 - Brake caliper housing

- Do not disconnect brake hose when replacing brake pads
- Servicing caliper ⇒ 47-13

Rear brake pads, removing and installing

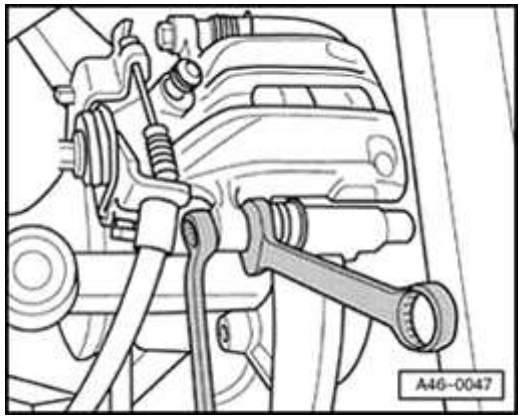
Removing

Note:

If brake pads are to be re-used, mark installed positions when removing. Re-install at the same point, otherwise the car may pull to one side!

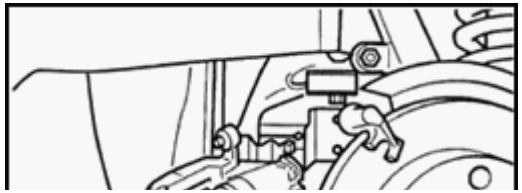
- Raise vehicle.

- Remove wheels.



- Unbolt brake caliper housing.
- Remove brake pads.

Installing



- Screw piston in by turning threaded spindle of special tool 3272 to right.

Note:

Insert special tool 3272 so that the collar is positioned ahead of the piston.

WARNING!

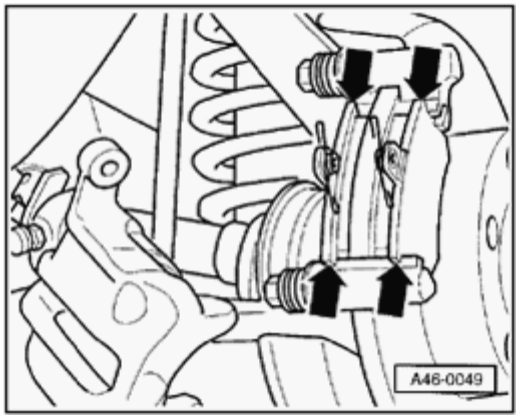
Brake fluid is poisonous and must NEVER be removed by siphoning with your mouth.

46-25

CAUTION!

- ***Extract part of the brake fluid from the brake fluid reservoir before pushing back the pistons.***

- ***If this is not done, particularly if the brake fluid has been topped up in the meantime, brake fluid may flow out and cause damage. Use the bleeder bottle or a plastic bottle, which is used only for brake fluid, for extracting the fluid.***



- Install brake pads in brake carrier (arrows).

CAUTION!

The repair kit contains four self-locking hex bolts which must always be installed.

- Bolt on brake caliper housing.

  Tightening torque: 35 Nm (26 ft lb)

Note:

Depress the brake pedal firmly several times while the car is stationary so that the brake pads adjust to their normal operating positions.

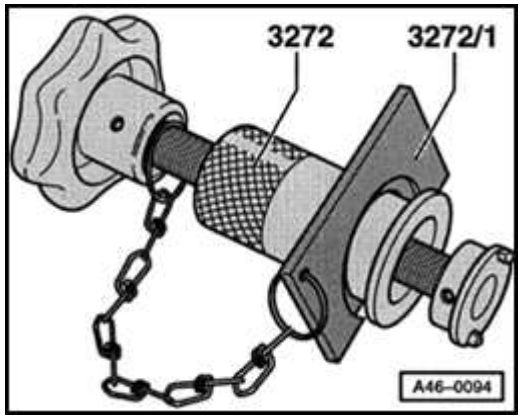
- Install wheels and tighten wheel bolts.

Tightening torque: 120 Nm (89 ft lb)

- Check brake fluid level and top up if necessary.

46-26

Rear brake pads on front-wheel-drive vehicles with aluminum rear brake calipers, removing and installing



Special tools and equipment

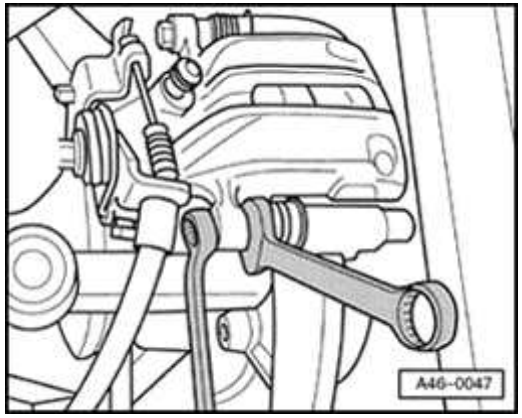
- 3272 reset and screwout tool
- 3272/1 support plate

Removing

Note:

If brake pads are to be re-used, mark installed positions when removing. Re-install at the same point, otherwise the car may pull to one side!

- Remove wheels.



- Counter-hold guide pins and remove self locking bolts from brake caliper housing.
- Remove brake pads.

Installing

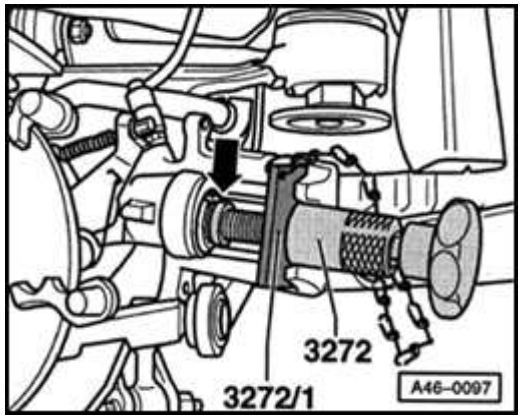
WARNING!

Brake fluid is poisonous and must NEVER be removed by siphoning with your mouth.

CAUTION!

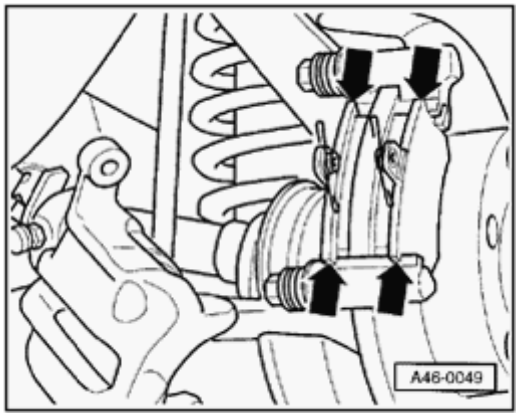
- ***Before pushing back the piston, siphon some of the brake fluid out of the brake fluid reservoir. Otherwise, particularly if reservoir has been topped off, fluid will overflow and cause damage.***

- ***To siphon brake fluid, always use a bleeder bottle which is only used to siphon brake fluid.***



- Screw piston inward as far as it will go by turning threaded spindle (arrow) clockwise and knurled section counterclockwise.

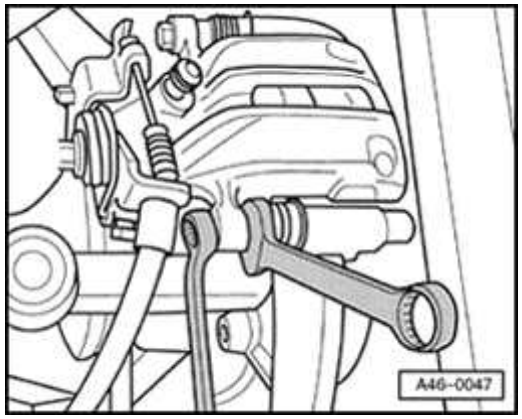
- Remove protective foil from brake pad backing plate.



- Install brake pads in brake carrier (arrows).

CAUTION!

The repair kit contains four self-locking hex bolts which must always be installed.



- Install brake caliper housing with new self-locking bolts and tighten.

  Tightening torque: 35 Nm (26 ft lb)

Note:

After installing the brake pads, depress the brake pedal firmly several times before moving the vehicle to properly seat the brake pads in their normal operating position.

- Install wheels and tighten wheel bolts.

  Tightening torque: 120 Nm (89 ft lb)

- Check brake fluid level and top up if necessary.

46-29

Parking brake cables for front-wheel-drive vehicles, removing and installing

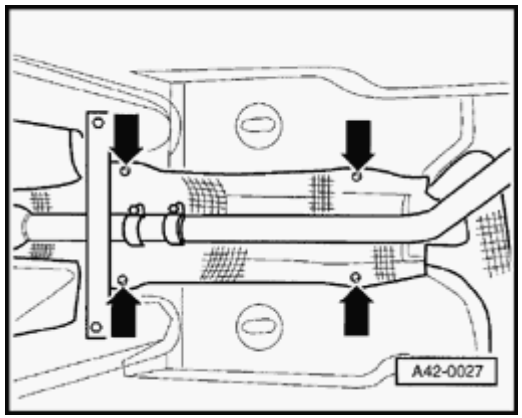
Additional information

Repair Manual, Body-Exterior

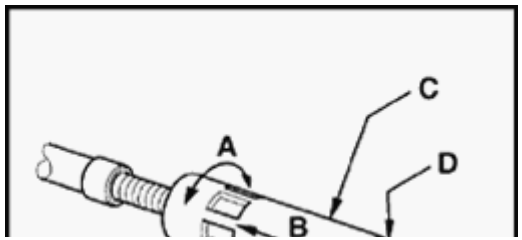
Repair Manual, Body-Interior

Removing

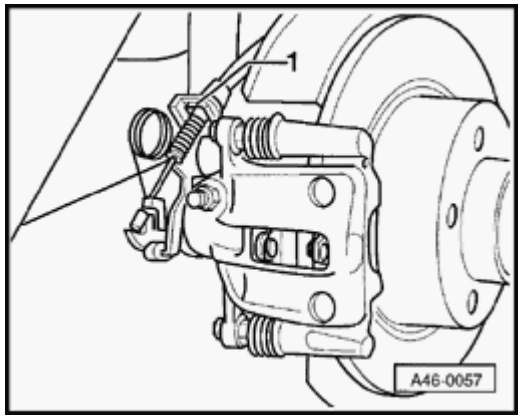
- Remove both rear wheels.



- Remove heat shield (arrows) in center tunnel.



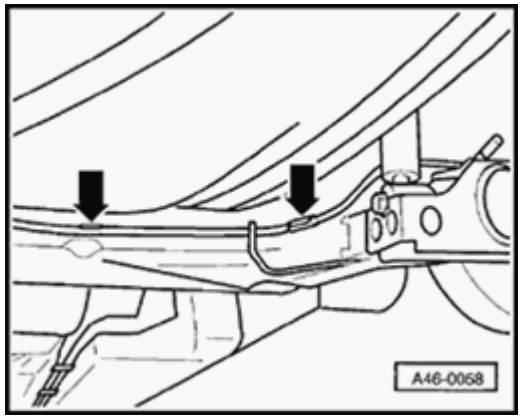
- Remove locking element -D-.
- Counter hold hex -E- using 13 mm open end wrench and turn adjusting nut -C- in to stop.
- Slide cable adjuster together (arrow -B-).



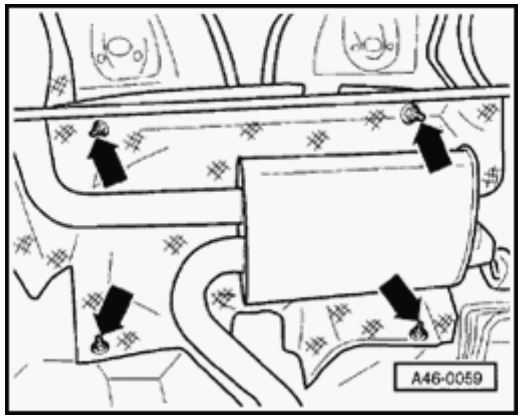
- Pull out locking clip -1-.
- Remove parking brake cables at brake caliper.

Note:

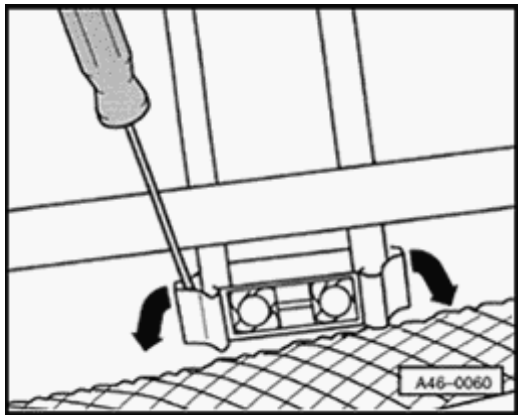
Do not damage the parking brake cable boot when removing and Installing.



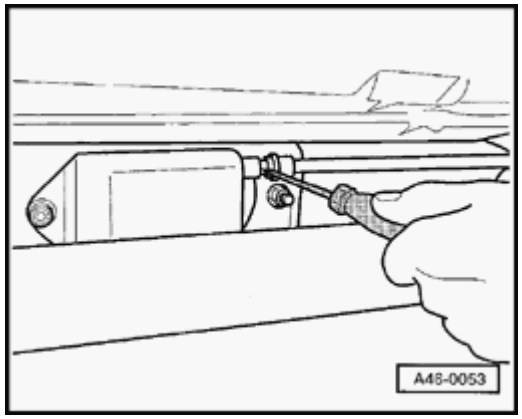
- Remove parking brake cables from brackets (arrows) at rear axle beam.



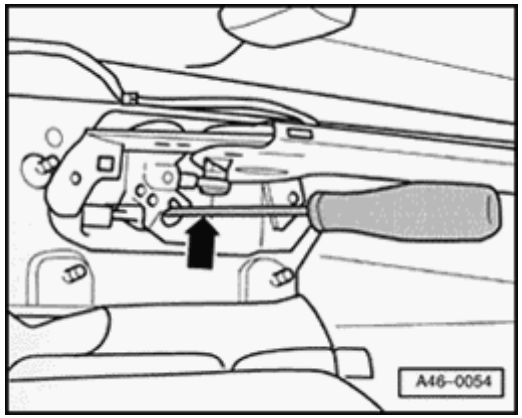
- Remove heat shield (arrows) at rear muffler and push to side.



- Open cable clamp (arrows) and remove parking brake cables.



- Use screwdriver to pry parking brake cable out of bracket.



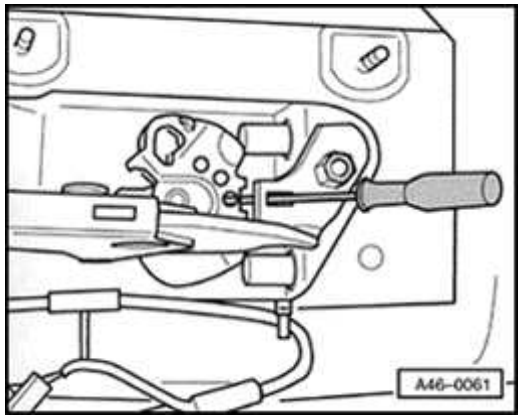
- Remove rear part of center console.

⇒ *Repair Manual, Body-Interior, Repair Group 68*

- Using screwdriver, push parking brake cables toward parking brake lever and press ball stud out of bracket.
- Remove parking brake cables.

Installing

- Remove any plastic parts at compensating bar; they do not need to be re-installed.



- Lock compensating bar to prevent it from turning (size 2 screwdriver).
- Insert cable ball stud through mounting in adjustment bracket.
  - Parking brake cable must lock into place in bracket.
- Install parking brake cables to rear axle beam.
- Adjust parking brake ⇒ page 46-39 .
- Install rear part of center console.

⇒ *Repair Manual, Body-Interior, Repair Group 68*

Parking brake cables for all-wheel-drive vehicles, removing and installing

Note:

The parking brake cable adjusting components are in front of the lower rear control arms.

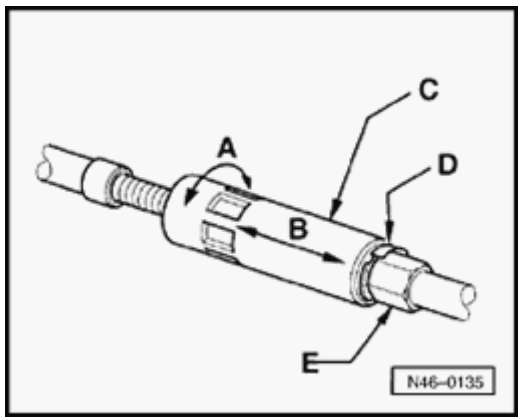
Additional information

Repair Manual, Body-Exterior

Repair Manual, Body-Interior

Removing

- Remove both rear wheels.



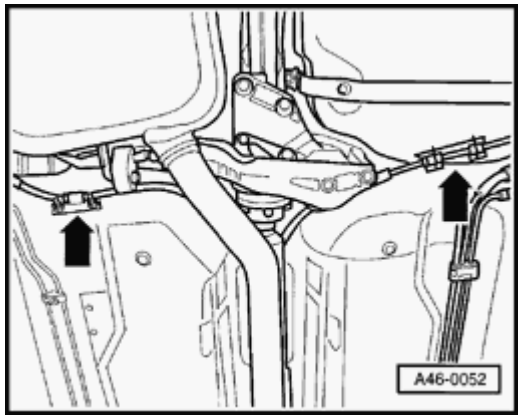
- Remove locking element -D-.
- Counter hold hex -E- using 13 mm open end wrench and turn adjusting nut -C- in to stop.
- Slide cable adjuster together (arrow -B-).



- Pull out locking plate -1-.
- Remove parking brake cables at brake caliper.

Note:

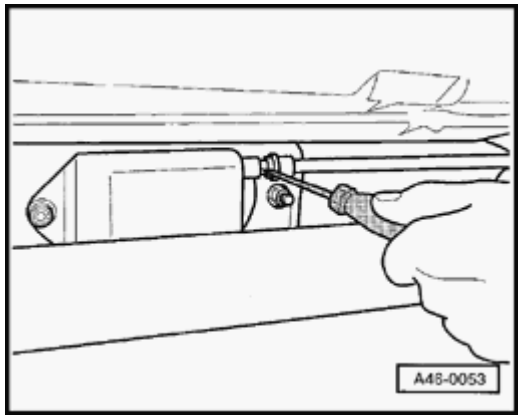
Do not damage the parking brake cable boot when removing and installing.



- Remove parking brake cables near underbody and fuel tank (arrows).

Note:

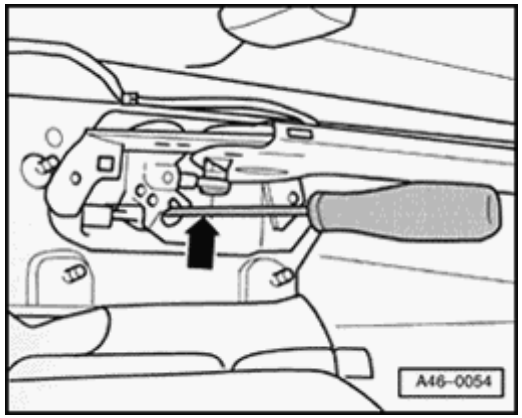
Assembly aid for parking brake cable may drop out. It does not need to be re-installed.



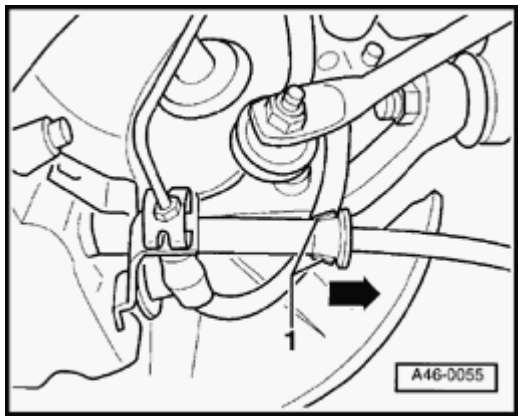
- Use screwdriver to pry parking brake cables out of bracket.

- Remove rear part of center console.

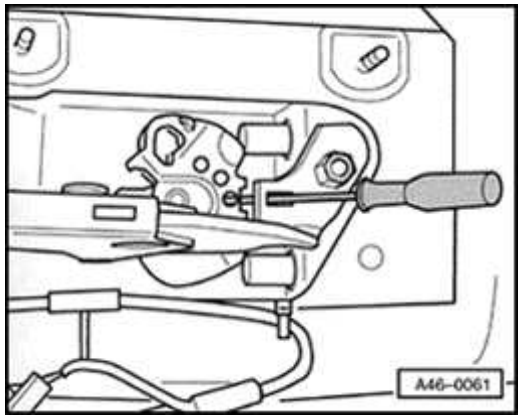
⇒ *Repair Manual, Body-Interior, Repair Group 68*



- Using screwdriver, push parking brake cables toward parking brake lever and press ball stud out of bracket.



- Press guide sleeve locking element -1- together and pull parking brake cables out toward rear in direction of arrow.



Installing

- Guide parking brake cables through lower rear control arm until guide sleeve locks into place.

- Remove any plastic parts at adjustment bracket; they do not need to be re-installed.
- Lock adjustment bracket to prevent it from turning (size 2 screwdriver).
- Insert cable ball stud through mounting in adjustment bracket.

Parking brake cable must lock into place in bracket.

- Install parking brake cables at underbody and fuel tank and insert into lever at brake caliper.
- Adjust parking brake ⇒ page 46-39 .
- Install rear part of center console.

⇒ *Repair Manual, Body-Interior, Repair Group 68*

46-38

Parking brake lever, removing and installing

Additional information

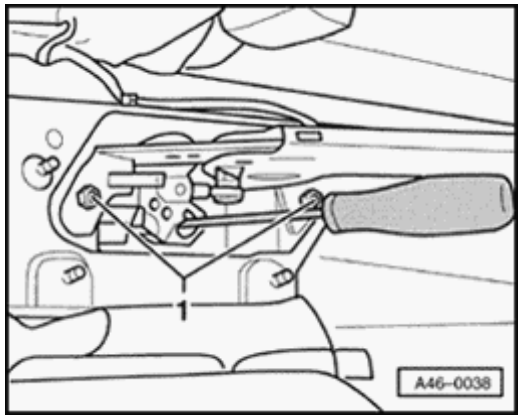
Repair Manual, Body-Exterior

Repair Manual, Body-Interior

Removing

- Remove rear part of center console.

⇒ *Repair Manual, Body-Interior, Repair Group 68*



- Remove hex nuts -1-.
- Use screwdriver to push parking brake cable inward, and remove parking brake lever.

Installing

- Install parking brake cable into adjustment bracket.



- Tighten hex nuts -1- to 25 Nm (18 ft lb).

- Adjust parking brake ⇒ page 46-39 .
- Install rear part of center console.

⇒ *Repair Manual, Body-Interior, Repair Group 68*

46-39

Parking brake, adjusting

Additional information

Repair Manual, Body-Exterior

Repair Manual, Body-Interior

Note:

- *Re-adjusting the parking brake is not generally necessary because of the automatic adjustment of the rear brakes. It is only necessary to re-set the parking brake when the cables or brake calipers have been replaced.*

- *The brake system must be bled and must be operating properly.*

- Depress brake pedal firmly at least once.

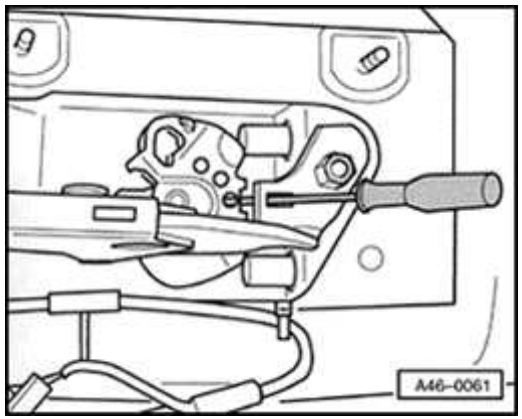
- Parking brake lever released (all the way down)

- Remove ashtray for rear passenger compartment.

⇒ *Repair Manual, Body-Interior, Repair Group*

68

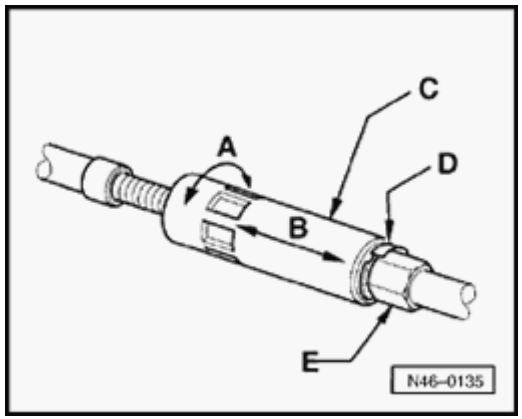
- Remove any plastic parts at compensating bar; they do not need to be re-installed.



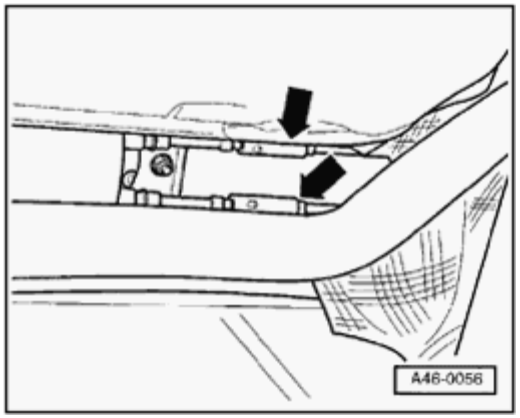
- Use size 2 screwdriver to lock compensating bar in place to prevent it from turning (shown without center console to simplify illustration).

Note:

- *On all-wheel-drive vehicles, the parking brake cable adjusting components are located in front of the lower rear control arms.*
- *On front-wheel-drive vehicles they are located in the tunnel on the underside of the vehicle.*

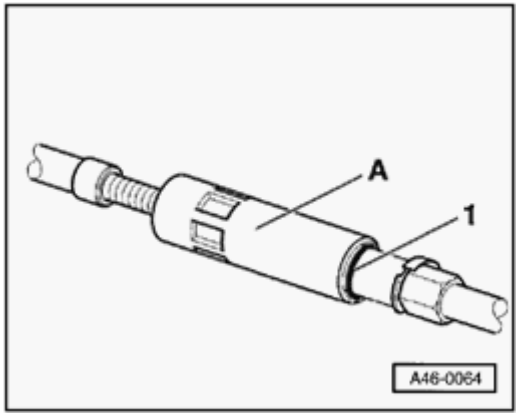


- Remove locking component -D-.
- Counter hold hex -E- using 13 mm open end wrench and turn adjusting nut -C- in to stop.
- Slide cable adjuster together (arrow -B-).
- Back off adjusting nut until slot for locking component is visible.
- Install locking component.



- Pull both cable sleeve adjusters apart evenly until cables are tensioned.

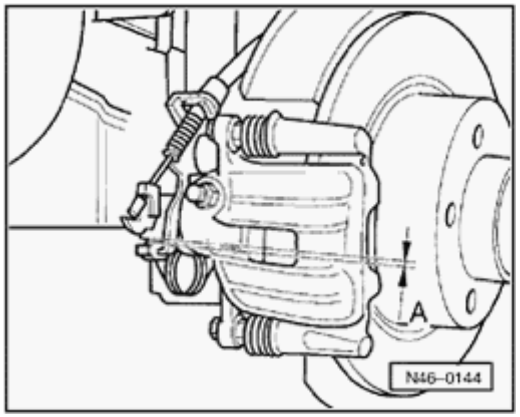
  While doing this, the lever must not lift off at the brake caliper.
- Remove screwdriver from compensator and apply parking brake firmly 3 times.



Note:

The colored O-ring -1- must not be visible. This ensures that the parking brake cable adjustment mechanism is sufficiently protected against dirt and water spray.

- Check parking brake tension and adjust fine adjustment -A- in or out if necessary.

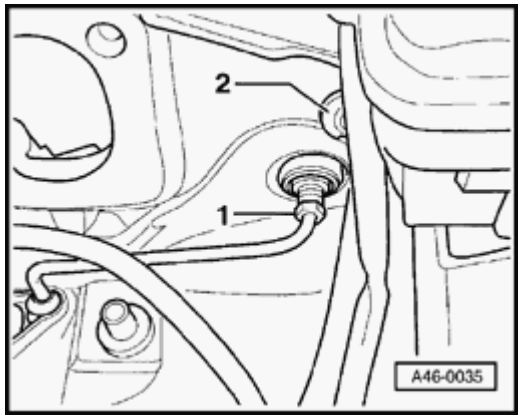


- Check distance -a-.
  - Lever should not contact brake caliper
  - Gap should be visible but no wider than 1.5 mm (0.059 in.)

46-46

Brake pedal, removing and installing

Removing and installing vacuum servo unit with brake master cylinder ⇒ page 47-34

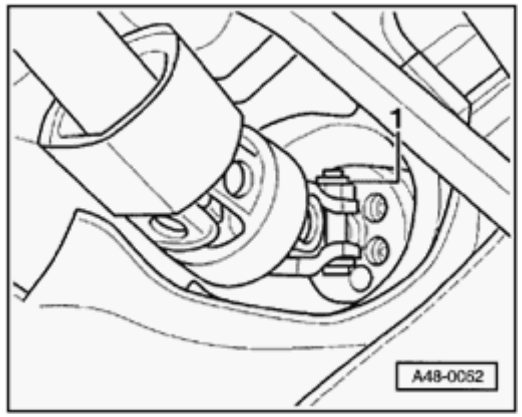


- Unbolt hydraulic line -1- for clutch master cylinder.

CAUTION!

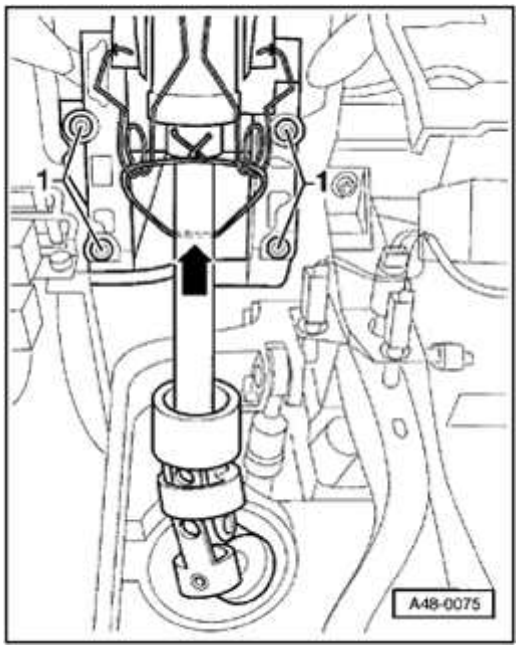
Before disconnecting the hydraulic line, protect the plenum chamber from brake fluid flowing out.

- Disconnect supply hose from elbow of master cylinder.



- Remove nut -1- at universal joint.
- Loosen eccentric by turning bolt (Torx® T50) clockwise, and remove bolt.

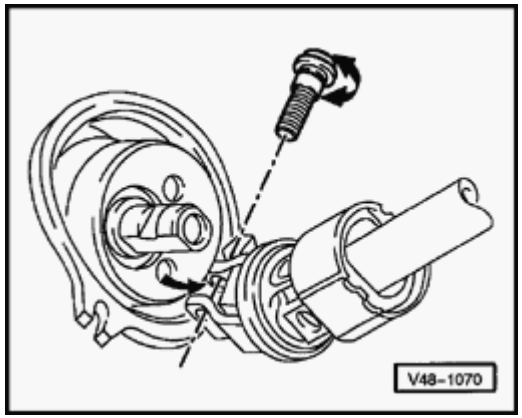
46-47



- Secure steering column with safety wire before removing steering column from steering gear pinion.

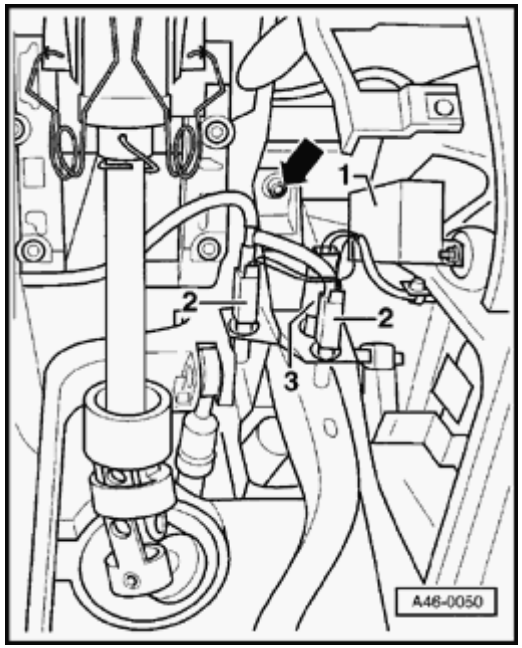
CAUTION!

- ***The splines between the top and bottom part of the steering column must not be separated during the removal and installation procedure.***
- ***Turn the steering wheel into center position and do not alter position during repairs, otherwise the airbag spiral spring may be damaged.***



- Move universal joint down out of the way.

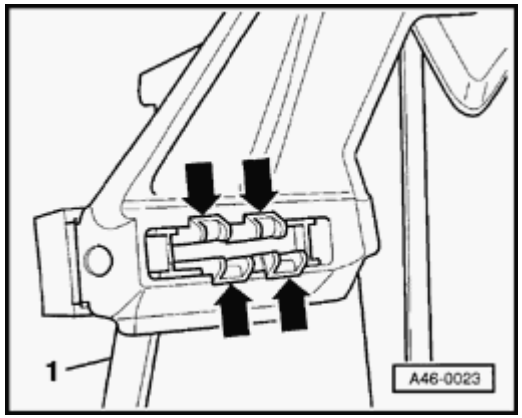
46-48



- Remove brake light switch -3- and CCS vent valves -2-.
- Remove hex socket-head bolt (arrow) for attaching pedal assembly to instrument panel member.
- Pull pedal assembly down and remove.

Note:

Do not damage control module -1- for immobilizer (where applicable) when removing pedal assembly.



- To remove accelerator pedal, press catch in direction shown (arrows) while pressing out accelerator pedal.

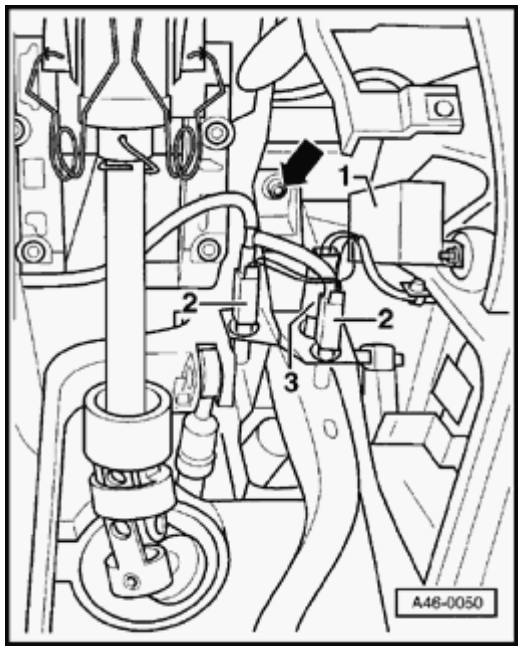
46-49

Installing

CAUTION!

Do not remove safety wire or other removal/installation aids from steering column until after the universal joint has been re-installed on the steering gear pinion.

- Install pedal assembly onto joint pin.



- Install hex socket-head bolt (arrow) for attaching pedal assembly to instrument panel member and tighten by hand.

Note:

Do not tighten hex socket-head bolt (arrow) for attaching pedal assembly to instrument panel member until after installing the brake servo unit.

- Attach accelerator pedal (AP) cable.
- Install brake servo unit ⇒ page 47-37 .

After installing:

- Bleed brakes ⇒ page 47-23 .
- Bleed clutch ⇒ Repair Manual, Manual Transmission 012 Front Wheel Drive or Manual Transmission 01A All Wheel Drive, Repair Group 30.
- Adjust brake light switch (⇒ page 46-50) and CCS vent valves (⇒

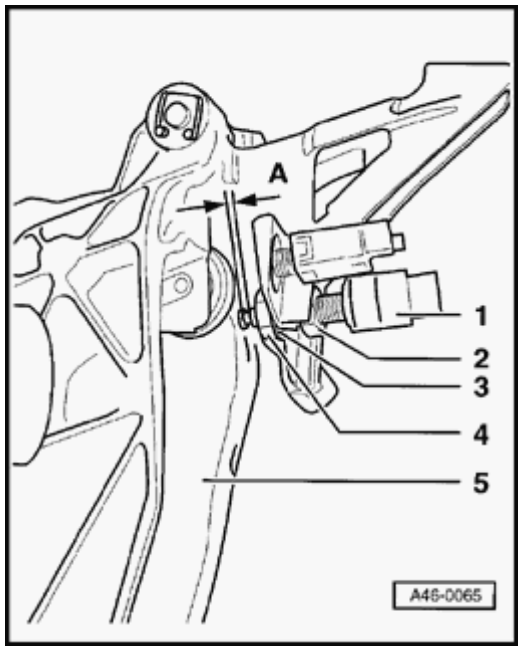
page 46-54).

46-50

Brake light switch -F-, adjusting

- The pedal assembly must be bolted tight to the brake servo and to the instrument panel member before carrying out the adjustment.

The following adjustments should be carried out in case of complaint:



Pedal bracket for brake light switch with retaining clip

1 - Brake light switch

2 - Hex nut, M12 x 1.5

Part No. N 011 162 9

3 - Spring washer, M12

Part No. N 012 232 3

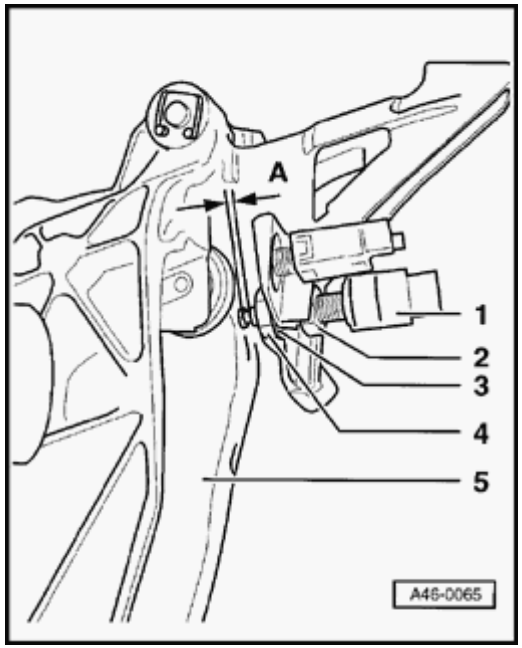
4 - Hex nut, M12 x 1.5

Part No. N 011 162 9

5 - Brake pedal

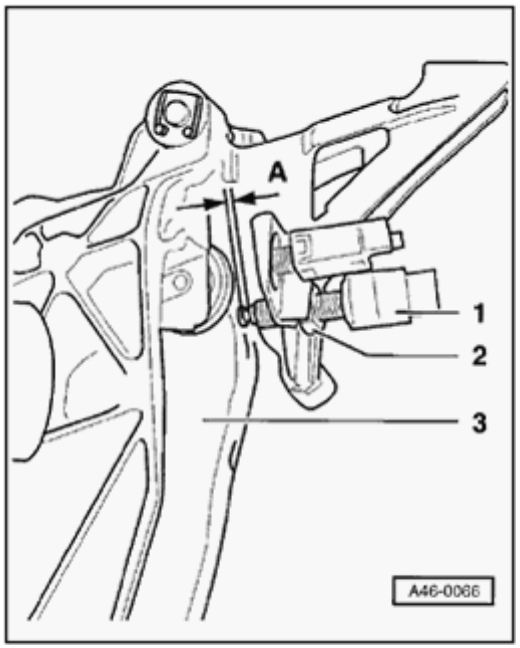
CAUTION!

Part numbers are listed here for reference only. Always check with your Parts department for the latest information.



- Pull brake light switch out of pedal bracket.
- Remove clip ⇒ page 46-45 , item - 20 -.
- Turn nut -2- on brake light switch.
- Install brake light switch in pedal bracket, insert spring washer -3- and nut -4-.
- Adjust clearance -A-, then tighten nut -4-.
  - Dimension -A- = 0.1 to 0.5 mm (0.004 to 0.020 in.)
  - Tightening torque: 4 Nm (35 in lb)

46-52



Pedal bracket with internal thread for brake light switch

1 - Brake light switch

2 - Hex nut, M12 x 1.5

Part No. N 011 020 8

3 - Brake pedal

Note:

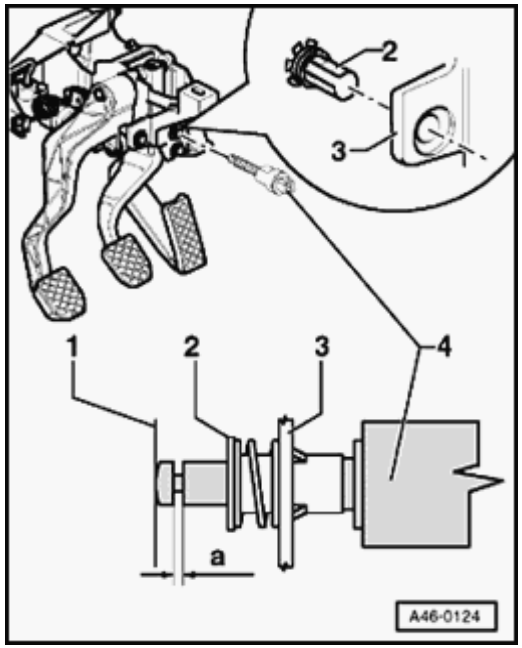
Between the nut and the pedal bracket there is a spring clip (not shown), Part No. N 012 042 4.

CAUTION!

Part numbers are listed here for reference only. Always check with your Parts department for the latest information.

- Install brake light switch in pedal bracket.
- Adjust clearance -A-, then tighten nut -2-.
  - Dimension -A- = 0.1 to 0.5 mm (0.004 to 0.020 in.)
  - Tightening torque: 4.5 Nm (39 in lb)

46-53



With spring clip for the brake light switch

1 - Stop surface of brake pedal

2 - Spring clip

Press into pedal cluster from behind

3 - Pedal cluster

4 - Brake light switch -F-

a - Clearance: max. 0.7 mm (0.028 in.)

Note:

The switch must be installed only once in order to assure that it is adequately tight.

Adjusting switch

- Insert switch -4- into installed clip -2- and press in to stop.

Note:

- *As a result of this step, the brake pedal must not be under preload.*
- *If necessary, turn switch back somewhat, noting clearance -a-.*

Cruise Control System (CCS) vent valve, adjusting

- Insert vent valve into clip and push through to stop.

- Push back valve by pulling back brake pedal or clutch pedal to stop.

Note:

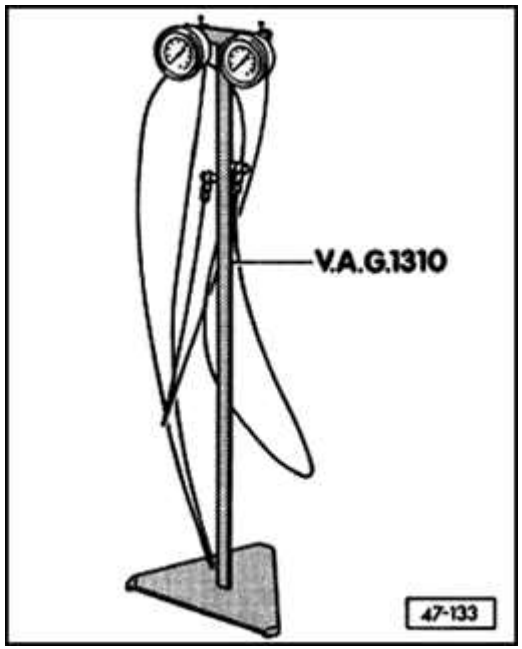
Only install the valve one time, otherwise an adequately tight fit cannot be assured.

Version with spring clip for the vent valve

- Same procedure as for the brake light switch ⇒ page 46-53 .

47-1

Leak test under pressure



Special tools and equipment

VAG1310 or VAG1310A brake pressure gauge

Requirement

- Brake system (hydraulic unit, brake hoses, brake lines and brake calipers) operating properly and free of leaks

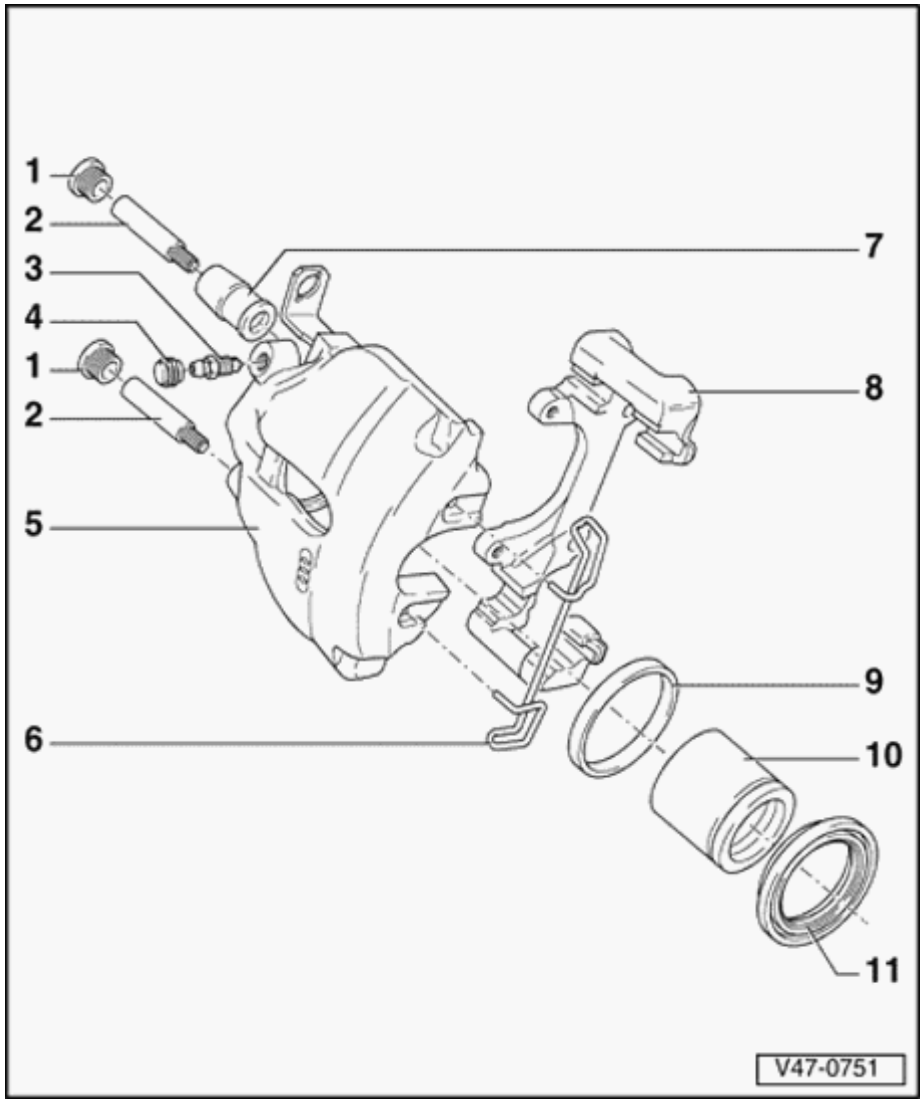
Testing

- Remove bleeder screw at one front brake caliper. Connect pressure gauge VAG1310 or VAG1310A and bleed.
- Insert brake pedal depressor between brake pedal and driver's seat. Apply pressure to brake pedal until gauge indicates pressure of 50 bar (725 psi).
- The pressure must drop by not more than 4 bar (58 psi) during the test period of 45 seconds

If the pressure drop is greater:

- Replace brake master cylinder.

47-2



Teves/Ate front brake calipers, servicing

Note:

- *Install only the complete repair kit when performing servicing work.*
- *New brake calipers are filled with brake fluid and pre-bled.*
- *Apply a thin coating of assembly paste to brake cylinders, pistons and seals.*

1 - Caps

- Insert into plastic bushing

2 - Guide pin

- 25 Nm (18 ft lb)

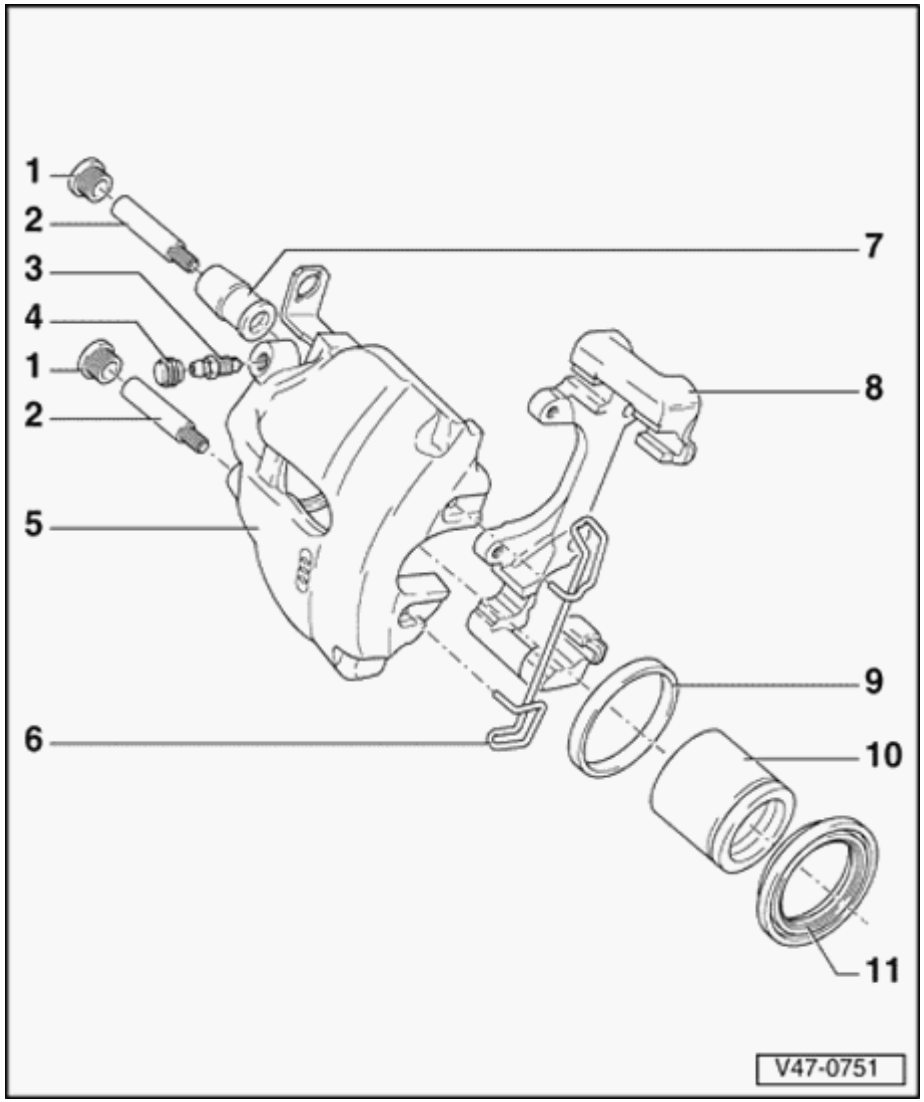
3 - Bleeder valve

- Apply a thin coating of assembly paste to the threads before installing

4 - Dust cap

- Install on bleeder valve

47-3



5 - Brake caliper housing

6 - Retaining spring

- Insert the two ends into the holes of the brake caliper housing

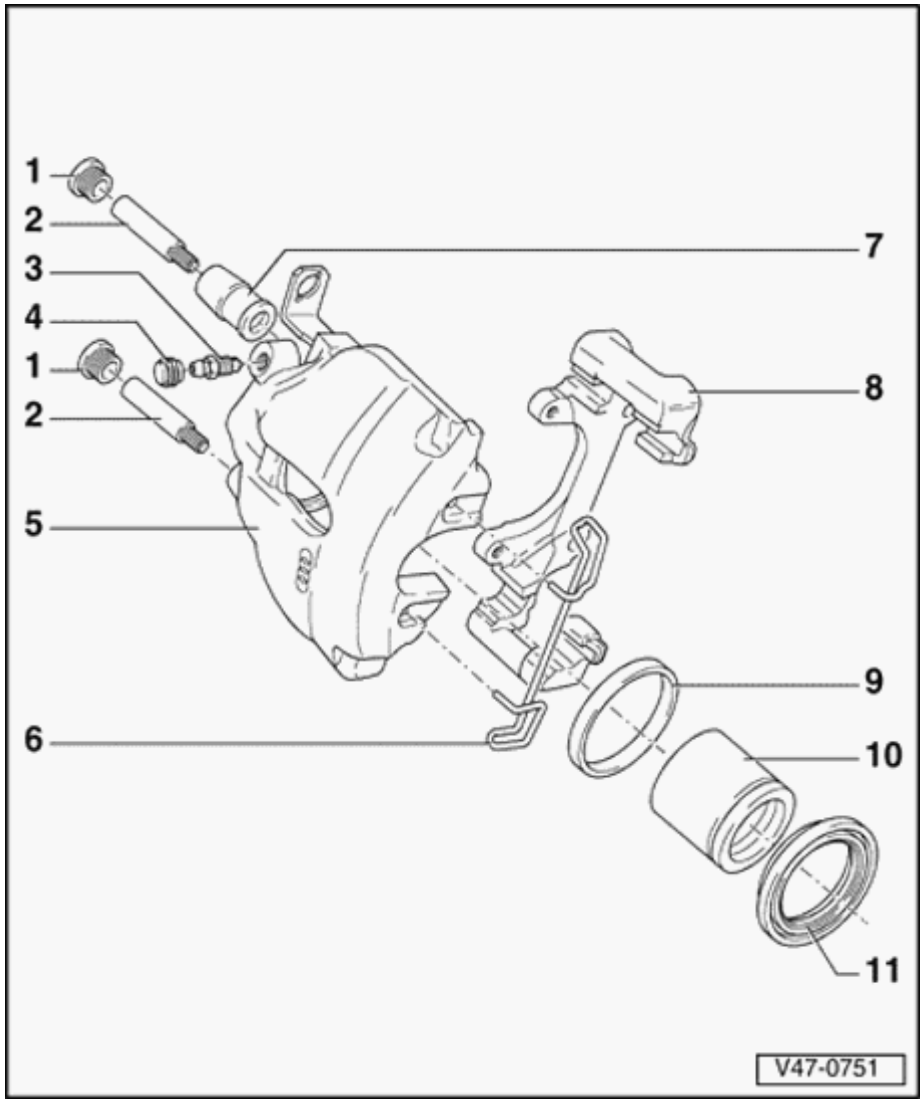
CAUTION!

- ***Once the spring ends are seated in the holes, press the retaining spring under the brake carrier.***
- ***If the spring is not installed correctly, the outer brake pad alignment mechanism will not be able to compensate for wear, and increased pedal travel will result.***

7 - Plastic bushing

- Insert into brake caliper housing

47-4



8 - Brake carrier

- Bolt to brake caliper housing

9 - Seal

10 - Piston

- Apply thin coat of assembly paste before installing
- Piston diameter: 57 mm (2.24 in.)

11 - Protective seal

- Do not damage when installing the piston

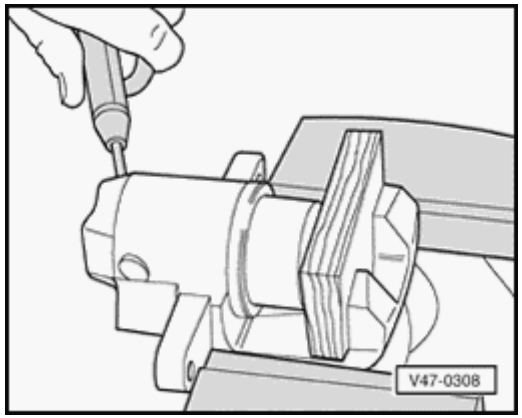
47-5

Teves/Ate front brake caliper piston, removing and installing

Special tools and equipment

3409 wedge

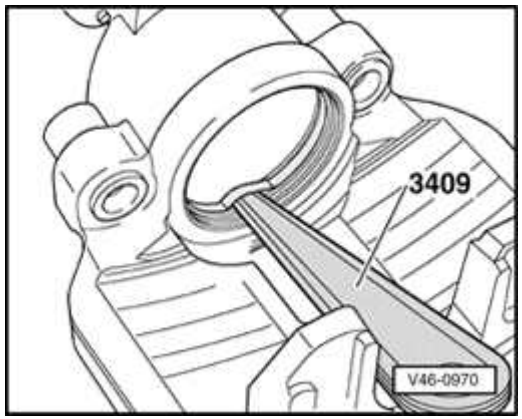
Removing



- Force piston out of brake caliper housing using compressed air.

WARNING!

- ***Risk of accident! Apply pressure gradually. Guard against the sudden release of the piston.***
- ***Place a wooden block into the recess of the caliper housing to catch the piston so it is not damaged.***
- ***Always wear safety glasses when carrying out this step.***

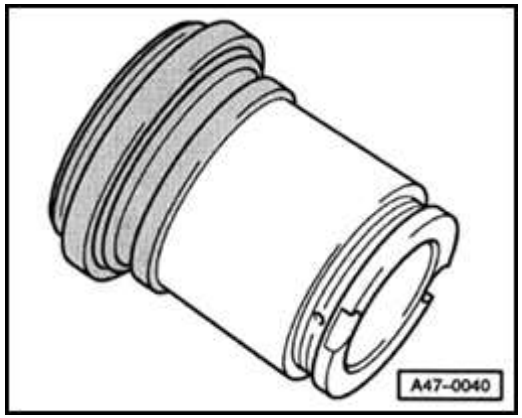


- Using 3409 wedge, remove seal.

Note:

When removing make sure that the surface of the cylinder is not damaged.

47-6

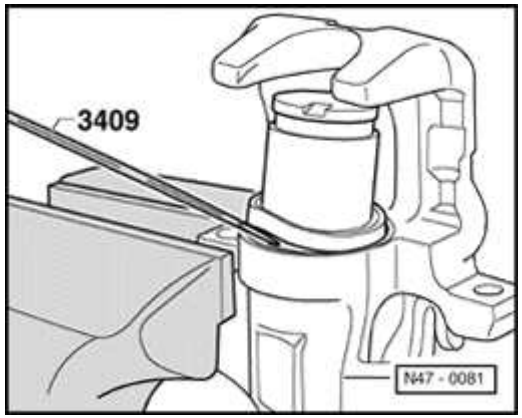


Installing

- Place protective seal with outer sealing lip on piston.
- Clean surfaces of piston and seal using methylated spirits only, then dry.
- Apply thin coat of assembly paste, part number G 052 150 A2 to piston and seal before installing.

CAUTION!

Part numbers are listed here for reference only. Always check with your Parts department for the latest information.

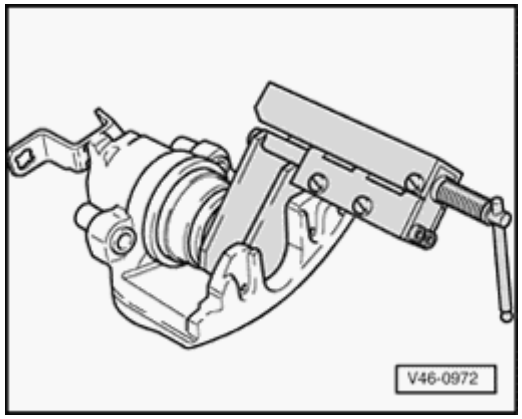


- Using 3409 wedge, insert inner sealing lip into cylinder groove.

Note:

Hold the piston in front of the caliper housing for this procedure.

47-7

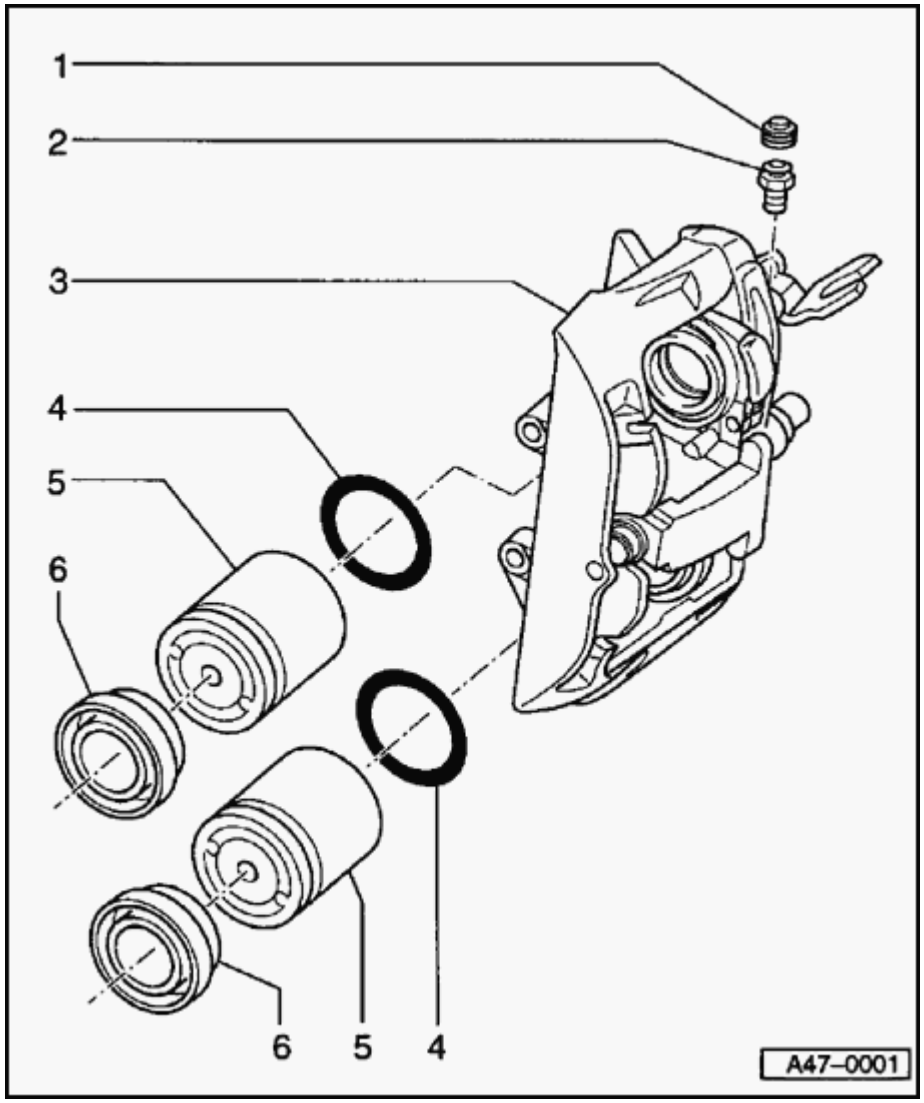


- Press piston into brake caliper housing using piston resetting tool.

Note:

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

47-8



Double piston front brake calipers, servicing

Note:

- *Install only the complete repair kit when performing servicing work.*
- *New brake calipers are filled with brake fluid and pre-bled.*
- *Apply a thin coating of assembly paste to brake cylinders, pistons and seals.*

1 - Dust cap

- Install on bleeder valve

2 - Bleeder valve

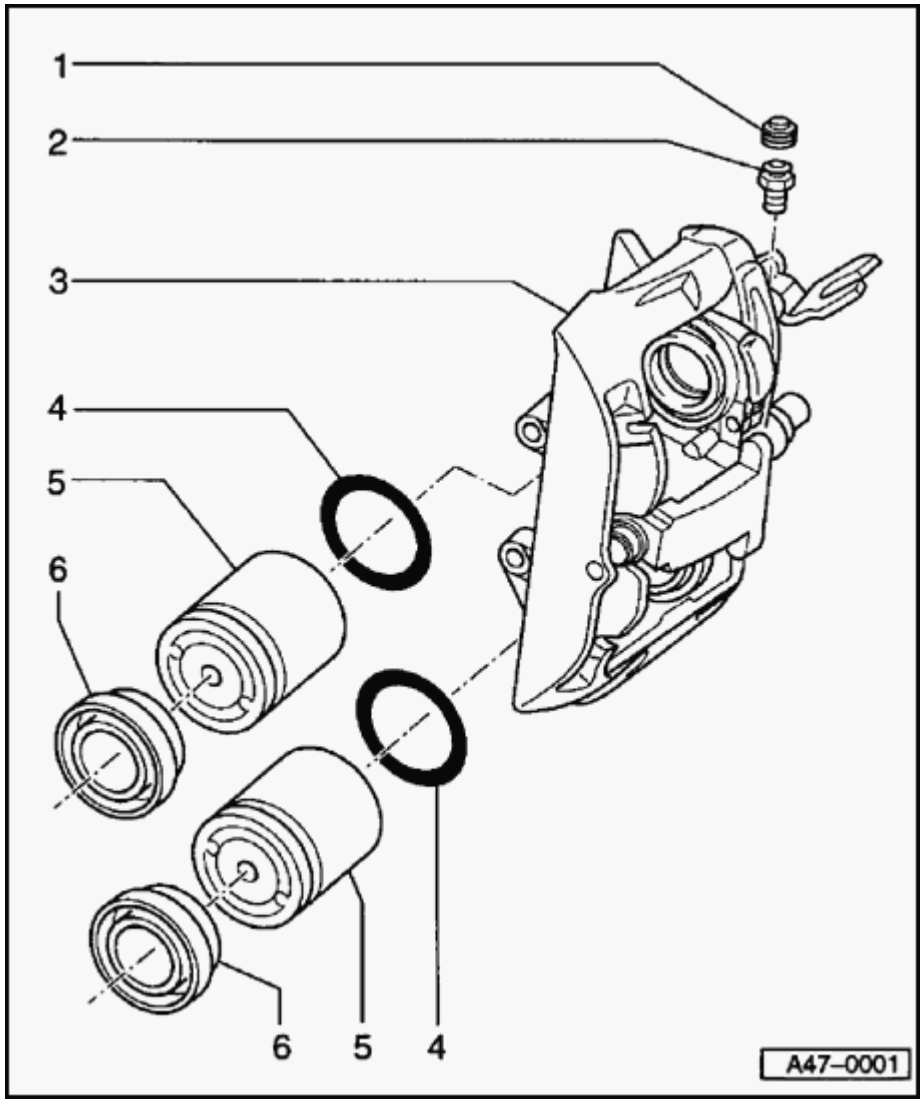
- Apply a thin coating of assembly paste to threads before installing

3 - Brake caliper housing

CAUTION!

- ***Do not separate caliper housing halves (internally serrated bolts).***
- ***If the protective boot for the guide pins is damaged, replace brake caliper.***

47-9



4 - Seals

- Use 3409 wedge to remove ⇒ Fig. 2
- Install carefully by hand

5 - Piston

- Piston diameter: 42.8 mm (1.69 in.)
- Use compressed air to remove from caliper housing ⇒ Fig. 1
- Apply a thin coating of assembly paste before installing
- Installing ⇒ Fig. 3 , ⇒ 4 and ⇒ 5

6 - Protective seal

- Do not damage when installing piston
- Install outer sealing lip onto piston ⇒ Fig. 3
- Install inner sealing lip into groove on brake caliper housing ⇒ Fig. 4

47-10

Double piston brake caliper pistons, removing and installing

Special tools and equipment

- 3409 wedge
- Piston resetting tool

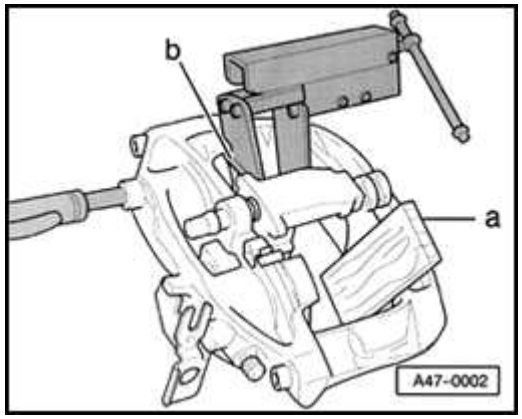


Fig. 1 Pressing pistons individually out of brake caliper housing using compressed air

WARNING!

- ***Risk of accident! Apply pressure gradually. Guard against the sudden release of the piston.***
- ***Always wear safety glasses when carrying out this step.***

Note:

- *Insert brake pad -b- into piston. Place wooden block -a- into the space so the pistons are not damaged.*
- *Only one piston can be pressed out at a time: hold the other piston tight using the piston resetting tool in the brake caliper housing during this step.*

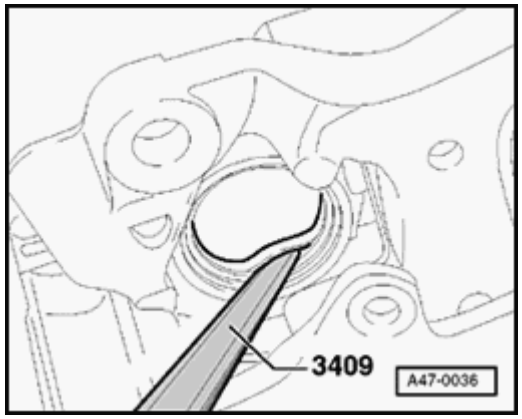


Fig. 2 Removing seals using 3409 wedge

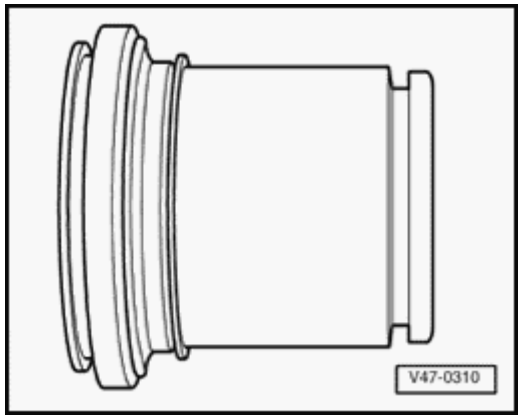


Fig. 3 Installing the outer sealing lip of the protective seal onto the piston

47-12

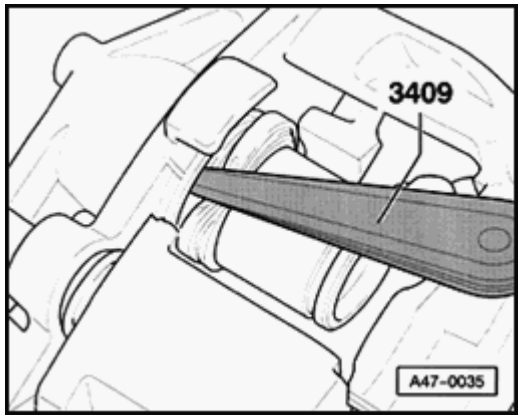


Fig. 4 Installing inner sealing lip of protective seal using 3409 wedge

Note:

Hold the piston in front of the caliper housing for this procedure.

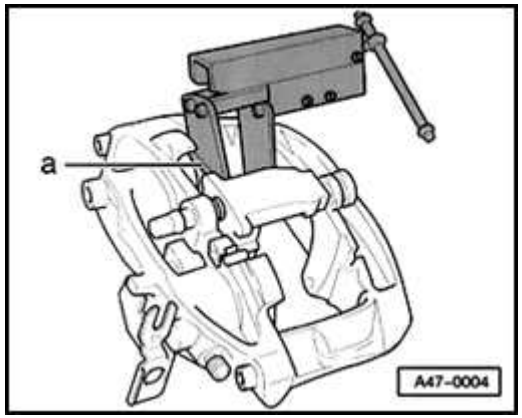
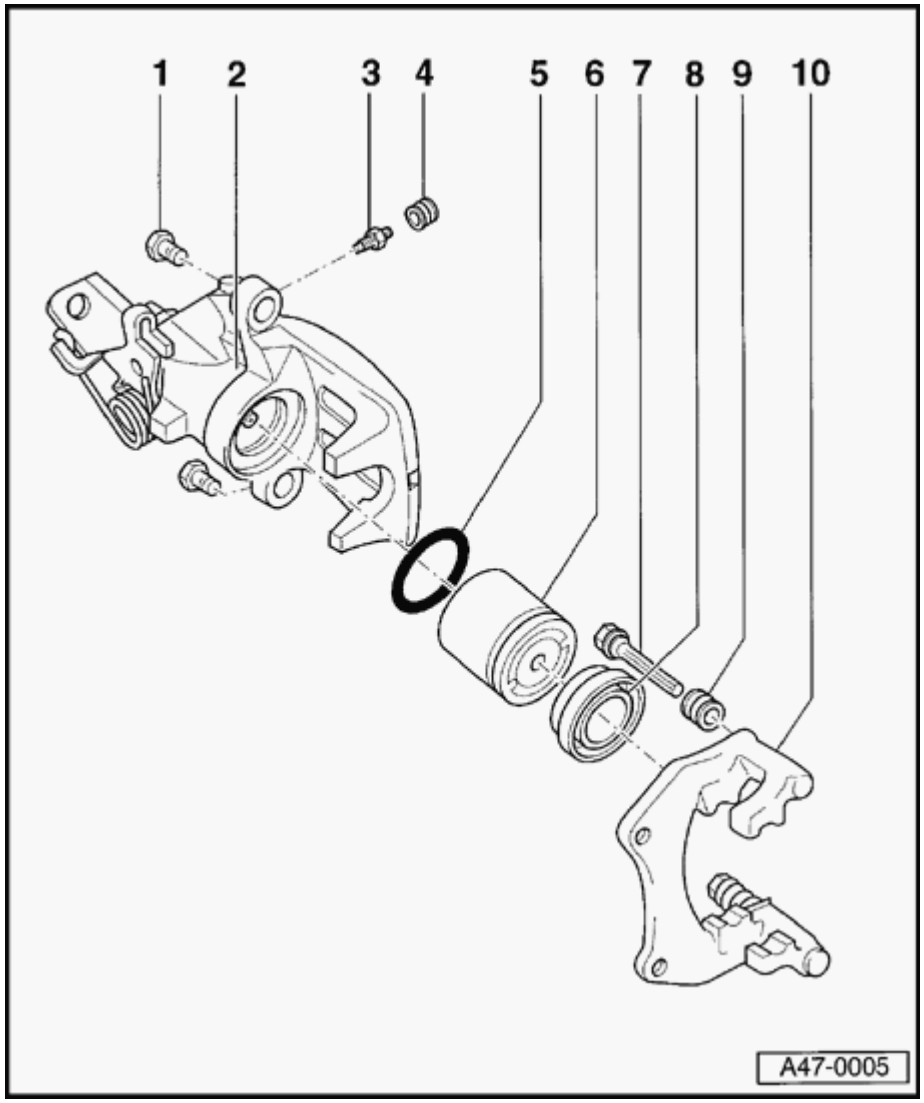


Fig. 5 Pressing piston into brake caliper housing using piston resetting tool

Note:

- *Install piston into the bore by hand and then install the brake pad -a- on the piston before pressing piston into the brake caliper housing.*
- *The outer sealing lip of the protective seal will then locate in the piston groove during this step.*

47-13



Rear brake calipers, servicing

WARNING!

- ***Do not re-use fasteners that are worn or deformed in normal use.***
- ***Some fasteners are designed to be used only once, and are unreliable and may fail if used a second time. This includes, but is not limited to, nuts, bolts, washers, circlips and cotter pins. Always follow recommendations in this manual-replace these fasteners with new parts where indicated, and any other time it is deemed necessary by inspection.***

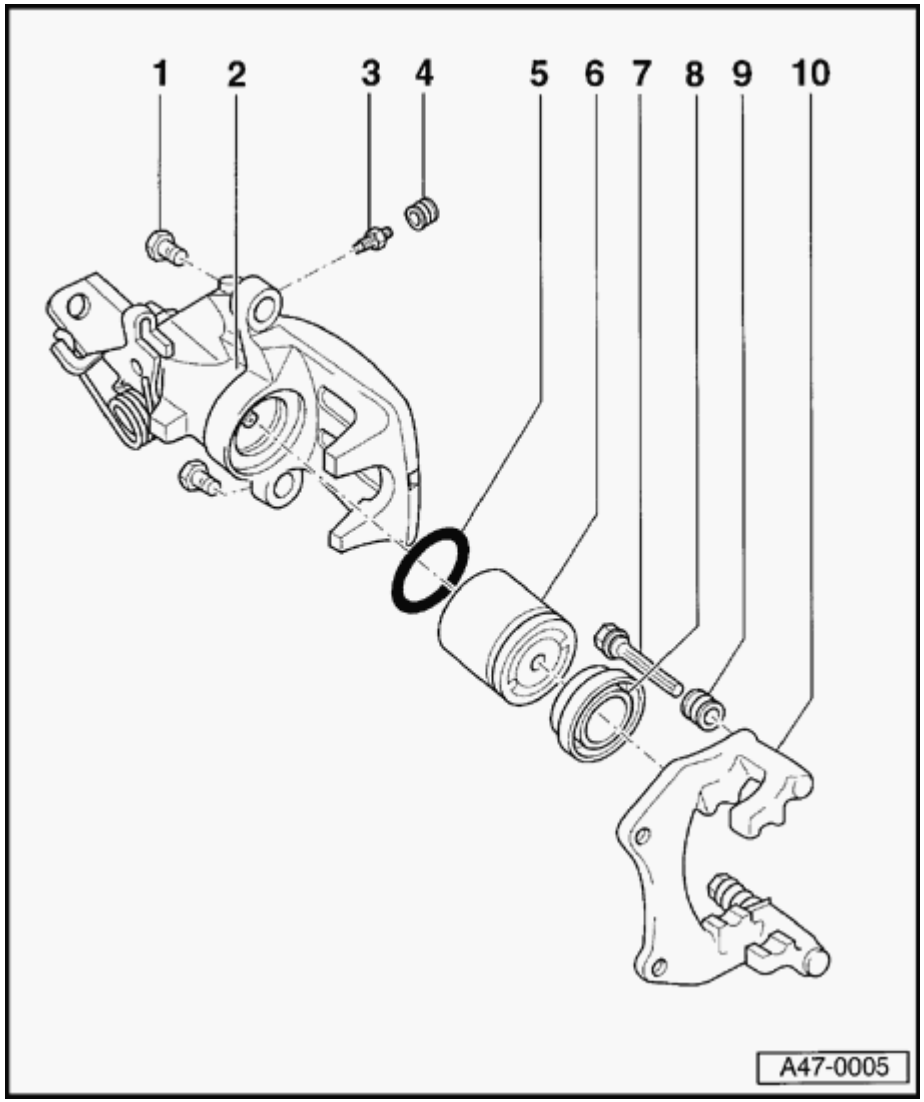
Note:

- *Install only the complete repair kit when performing servicing work.*
- *Apply a thin coat of assembly paste to brake cylinders, pistons and seals.*

1 - Self-locking bolt

- Always replace
- 35 Nm (26 ft lb)
- Counter-hold guide pin when loosening and tightening

47-14



2 - Brake caliper housing

- Replace caliper if leaks appear at lever for parking brake cable
- After servicing, pre-bleed brake caliper housing ⇒ Fig. 6
- 1997 ➢ aluminum brake calipers are installed
- Servicing aluminum brake calipers ⇒ page 47-19

3 - Bleeder valve

4 - Dust cap

- Install on bleeder valve

5 - Seal

- Use 3409 wedge to remove ⇒ Fig. 3

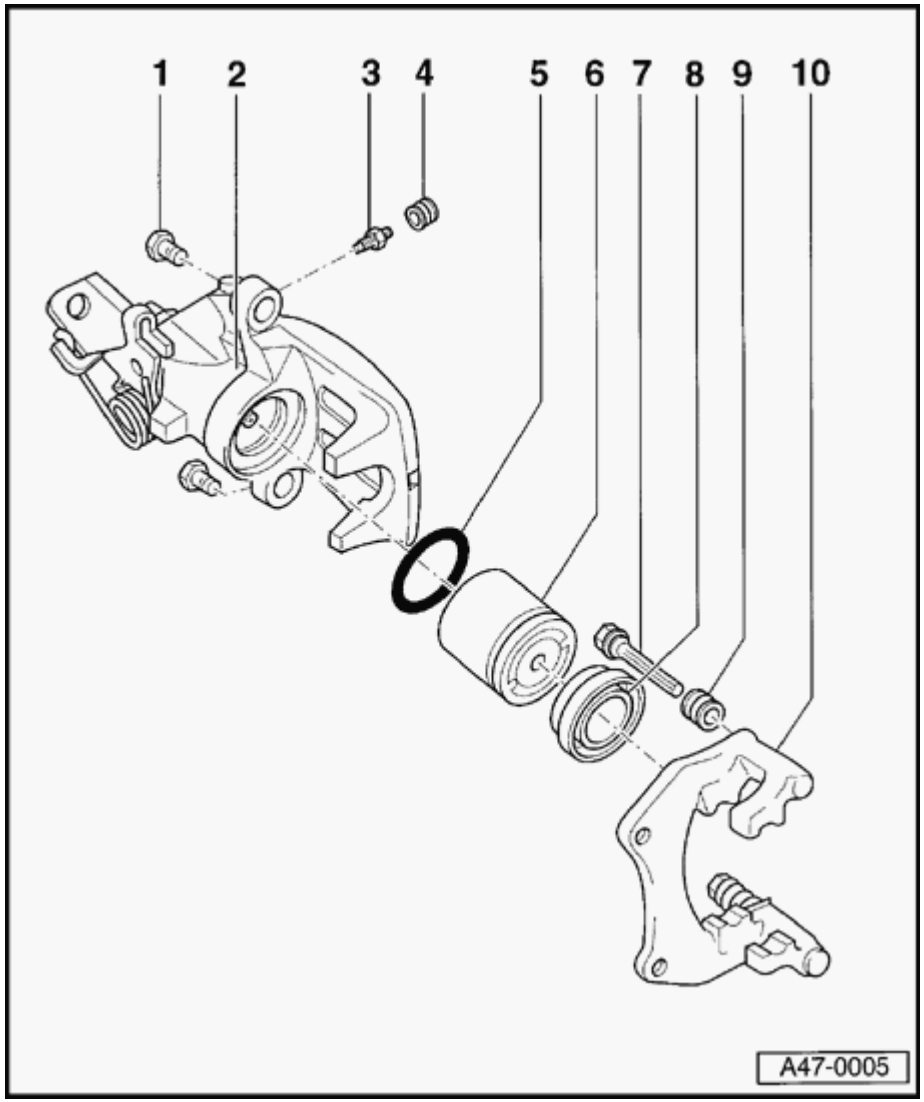
6 - Piston

- With automatic adjuster for parking brake
- Removing from brake caliper housing ⇒ Fig. 1
- Installing into brake caliper housing ⇒ Fig. 5
- Servicing aluminum brake calipers ⇒ page 47-19

7 - Guide pin

- Grease before installing the protective boot

47-15



8 - Protective seal

- Install with outer sealing lip on piston ⇒ Fig. 2
- Insert inner sealing lip into groove in brake caliper housing ⇒ Fig. 4

9 - Protective boot

- Install on brake carrier and guide pin

10 - Brake carrier

- With guide pins and protective boots
- Supplied as a pre-assembled replacement part with an adequate quantity of grease on the guide pins
- Install repair kit if protective boots are damaged
- Use grease supplied with repair kit for greasing the guide pins

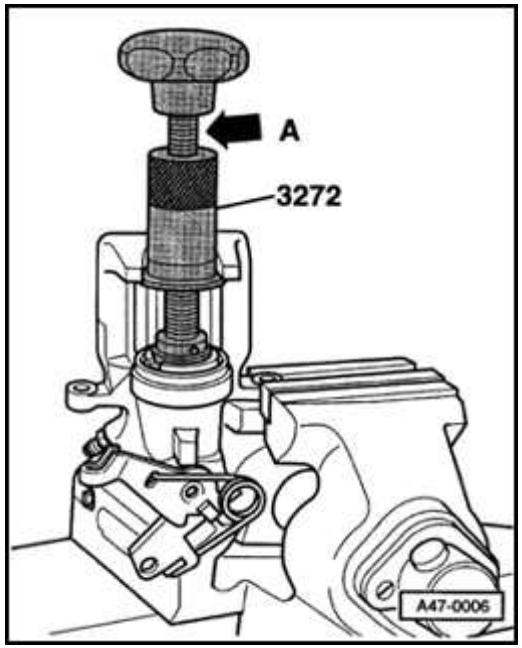


Fig. 1 Unscrewing piston from brake caliper housing using 3272 reset and screwout tool

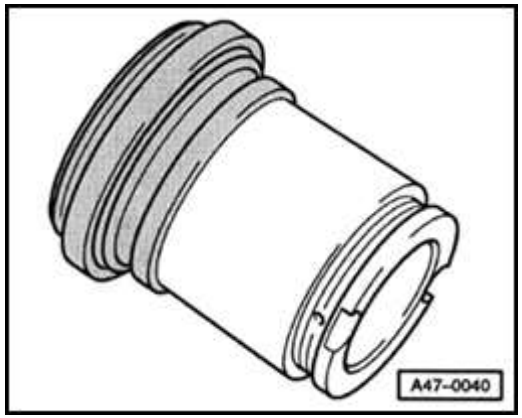


Fig. 2 Installing protective seal with outer sealing lip onto piston

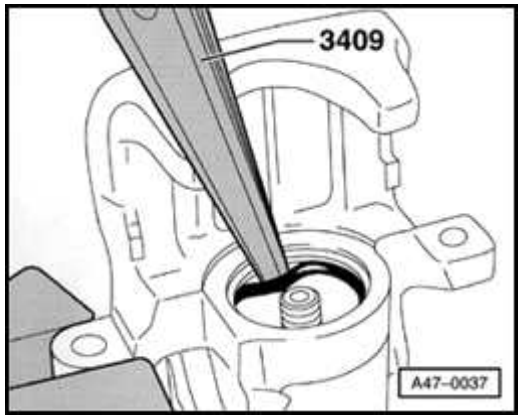


Fig. 3 Use 3409 wedge to remove seal

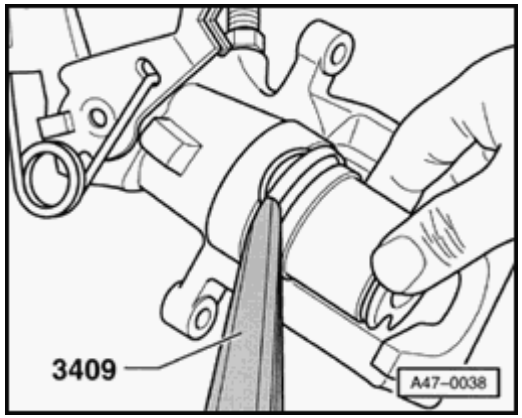


Fig. 4 Inserting inner sealing lip of protective seal into groove in brake caliper housing using 3409 wedge

Note:

Hold piston in front of the brake caliper housing when performing this step.

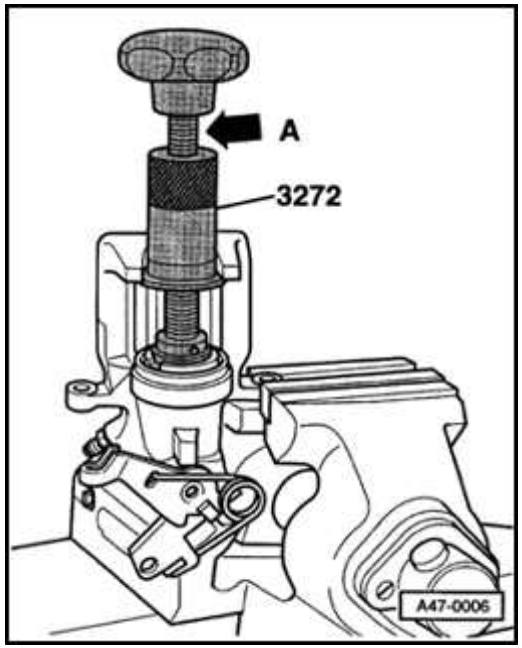


Fig. 5 Turning piston into brake caliper housing until fully seated

- When screwing in, press firmly on the piston.

Note:

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

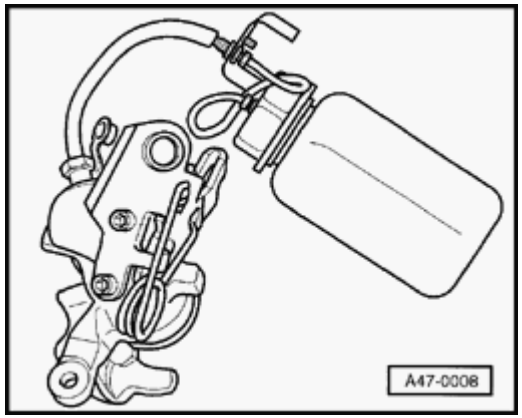


Fig. 6 Pre-bleeding brake caliper

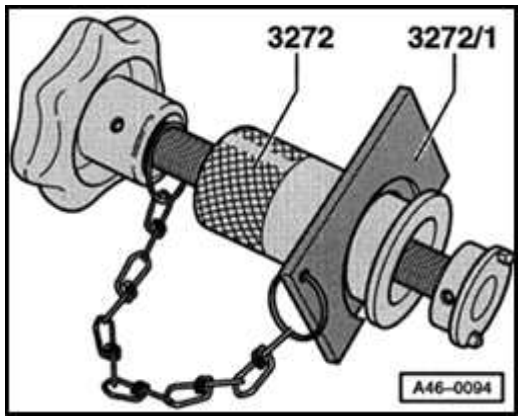
Note:

Position brake caliper upright for pre-bleeding, as shown.

- Open bleeder valve and fill with brake fluid, using commercially available bleeder bottle, until brake fluid flows out of threaded hole (brake hose connection) free of bubbles.
- Close bleeder valve.

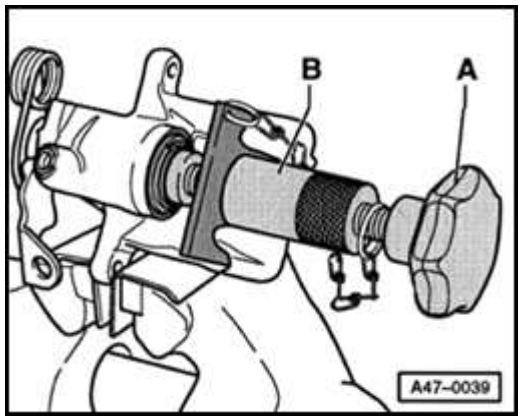
47-19

Aluminum rear brake caliper pistons, removing and installing



Special tools and equipment

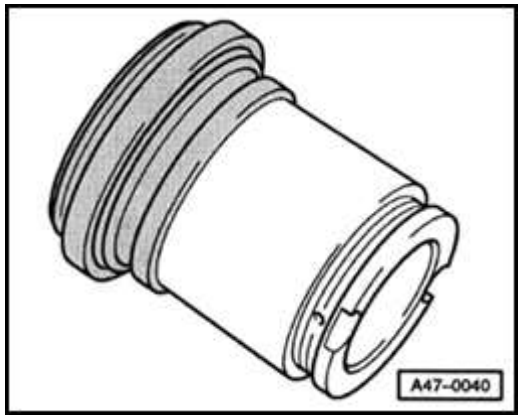
- 3409 wedge
- 3272 reset and screwout tool
- 3272/1 support plate



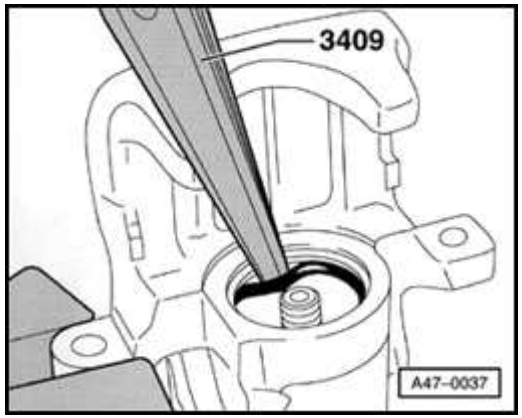
Unscrewing piston from the brake caliper housing

- Remove piston by turning threaded spindle -A- counterclockwise and knurled section -B- clockwise.

47-20

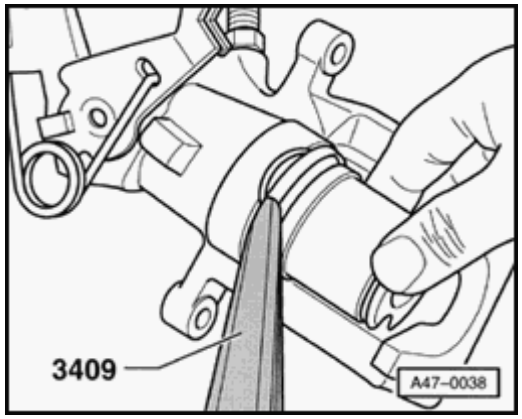


➢ **Installing protective seal with outer sealing lip over piston**



➢ **Removing seal using 3409 wedge**

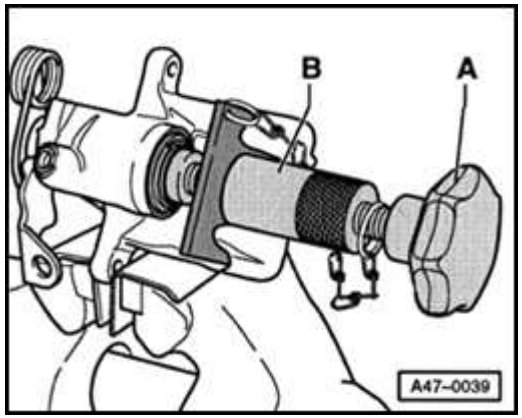
47-21



Installing inner sealing lip of protective seal using 3409 wedge

Note:

Hold the piston in front of the caliper housing for this procedure.



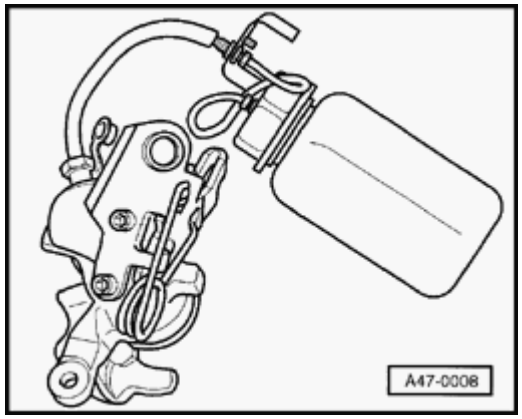
Turning piston into brake caliper housing to stop

- Turn piston in by turning threaded spindle -A- clockwise and knurled section -B- counterclockwise.

Note:

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

47-22



Pre-bleeding brake caliper

Note:

Position brake caliper upright for pre-bleeding, as shown.

- Open bleeder valve and fill with brake fluid, using commercially available bleeder bottle, until brake fluid flows out of threaded hole (brake hose connection) free of bubbles.
- Close bleeder valve.

Brake hydraulic system, bleeding and changing brake fluid

WARNING!

Brake fluid is poisonous.

- ***It must NEVER be removed by siphoning with your mouth.***
- ***If brake fluid contacts skin or eyes, flush or wash adequately to prevent irritation. Get medical attention immediately if necessary.***
- ***Brake fluid must be disposed of properly in compliance with environmental regulations.***

CAUTION!

- ***Do not allow brake fluid to mix with liquids that contain mineral oils (e.g. motor oil, cleaning agents). Mineral oils damage the plugs and seals in the brake hydraulic system.***
- ***Brake fluid must not be allowed to come into contact with paintwork due to its caustic effect.***

- ***Brake fluid is hygroscopic, in other words it absorbs moisture from the surrounding air, and must therefore always be stored in airtight containers.***

47-24

Note:

- *Only use new brake fluid conforming to US standard FMVSS 116 DOT 4.*
- *Genuine VW/Audi brake fluid conforms to this specification.*
- *Rinse off any spilled brake fluid using plenty of water.*
- *When the system is open do not work with compressed air and do not move the vehicle.*
- *During the final road test, make sure at least one ABS-controlled braking operation is carried out (normal pulsations must be felt at the brake pedal).*

Bleeding using US1116 brake bleeder

- Connect US1116 brake bleeder.
- Open bleeder screws in following sequence and bleed brake calipers.

Bleeding sequence

1 - Right-rear brake caliper

2 - Left-rear brake caliper

3 - Right-front brake caliper

4 - Left-front brake caliper

47-25

Brake fluid, changing (every two years)

WARNING!

Brake fluid is poisonous.

- ***It must NEVER be removed by siphoning with your mouth.***
- ***If brake fluid contacts skin or eyes, flush or wash adequately to prevent irritation. Get medical attention immediately if necessary.***
- ***Brake fluid must be disposed of properly in compliance with environmental regulations.***

CAUTION!

- ***Do not allow brake fluid to mix with liquids that contain mineral oils (e.g. motor oil, cleaning agents). Mineral oils damage the plugs and seals in the brake hydraulic system.***
- ***Brake fluid must not be allowed to come into contact with paintwork due to its caustic effect.***
- ***Brake fluid is hygroscopic, in other words it***

absorbs moisture from the surrounding air, and must therefore always be stored in airtight containers.

47-26

Note:

- *Only use new brake fluid conforming to US standard FMVSS 116 DOT 4.*
- *Genuine VW/Audi brake fluid conforms to this specification.*
- *Rinse off any spilled brake fluid using plenty of water.*
- *When the system is open do not work with compressed air and do not move the vehicle.*
- *During the final road test, make sure at least one ABS-controlled braking operation is carried out (normal pulsations must be felt at the brake pedal).*

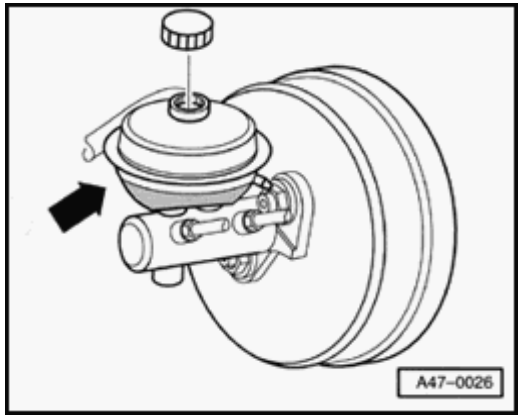
⇒ Repair Manual, "ABS/EDL/ASR On Board Diagnostic (OBD)," Repair Group 01

Changing brake fluid using US1116 brake bleeder

- Open brake fluid reservoir.

Note:

The brake fluid reservoir must be kept adequately filled to prevent air from entering the brake system through the reservoir.



- With engine running and bleeder screw on right-rear brake caliper open, use brake pedal to pump brake fluid out of reservoir until level goes down as far as opening for hydraulic clutch supply hose.
- Collect used brake fluid in suitable container, then close bleeder screw.

47-27

CAUTION!

Always dispose of used brake fluid properly.

- On vehicles with manual transmission, the clutch slave cylinder must also be flushed out with new brake fluid.

- On models with the electronic Stability Program (ESP), note that the hydraulic pump is actuated for 10 seconds using "Basic Settings" function 04, display group 002 ⇒ page 45-49 .

Note the following when bleeding clutch hydraulics:

- Connect US1116 but do not switch on yet.

- Open bleeder screw on clutch slave cylinder.

- Attach collector bottle hose.

- Switch on bleeder unit and allow approx. 100 cc (6 oz.) of brake fluid to flow out of clutch slave cylinder.

- Close bleeder screw.

The sequence described below must be followed for all four brake calipers.

1 - Right-rear brake caliper

2 - Left-rear brake caliper

3 - Right-front brake caliper

4 - Left-front brake caliper

- Attach bleeder hose from brake fluid collector to bleeder screw.

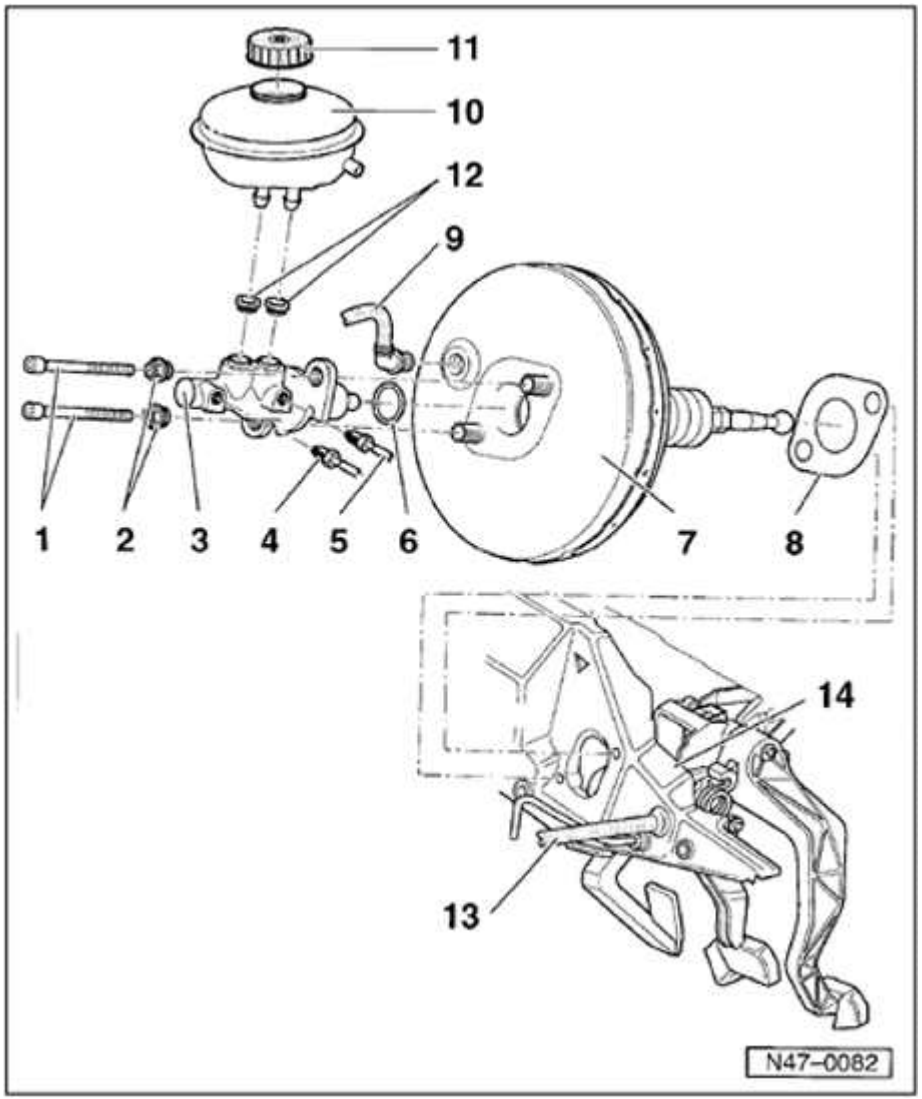
- Open bleeder screw and allow about 250 cc (15 oz.) of brake fluid to drain out.

The action of pumping in new brake fluid flushes the used brake fluid out of the system.

- Close bleeder screw.

- Check brake pedal pressure and pedal free play.

  Max. free play: 1/3 of pedal travel.



Brake master cylinder with 23.81 mm (0.937 in.) piston diameter and brake servo, component summary

Note:

- *Brake master cylinders and brake servos can be replaced separately.*
- *Brake master cylinders can no longer be disassembled, i.e. there is no provision for servicing.*
- *Use only fresh brake fluid. Pay attention to information on the brake fluid reservoir.*
- *Brake line connections to master cylinder, Bosch 5.0 ABS system (⇒ page 45-6), Bosch 5.3 system (⇒ page 45-18).*

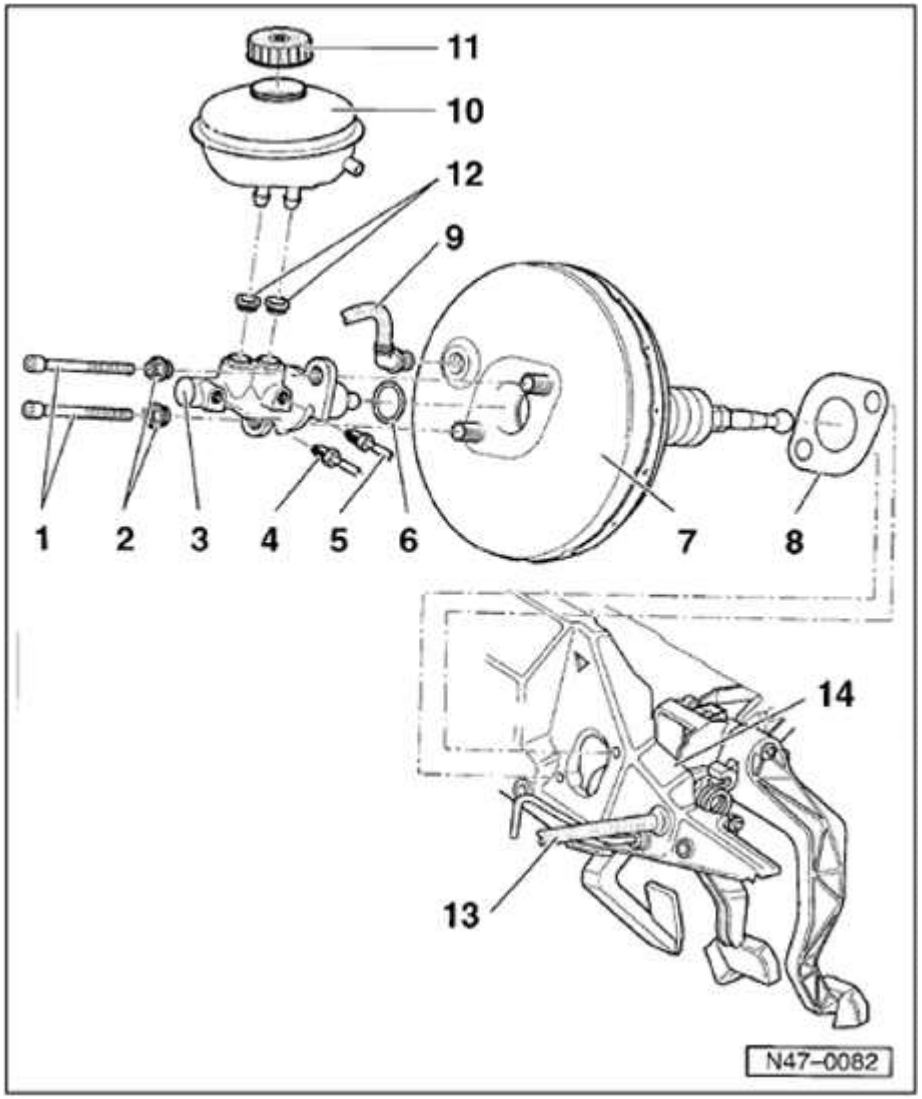
1 - T45 Torx®

- 25 Nm (18 ft lb)

2 - Self-locking nut

- 49 Nm (36 ft lb)

47-30



3 - Brake master cylinder

- Diameter: 23.81 mm (0.937 in.)
- Cannot be repaired. If malfunctioning, replace as complete unit only.
- Removing and installing ⇒ page 47-34

4 - Brake line

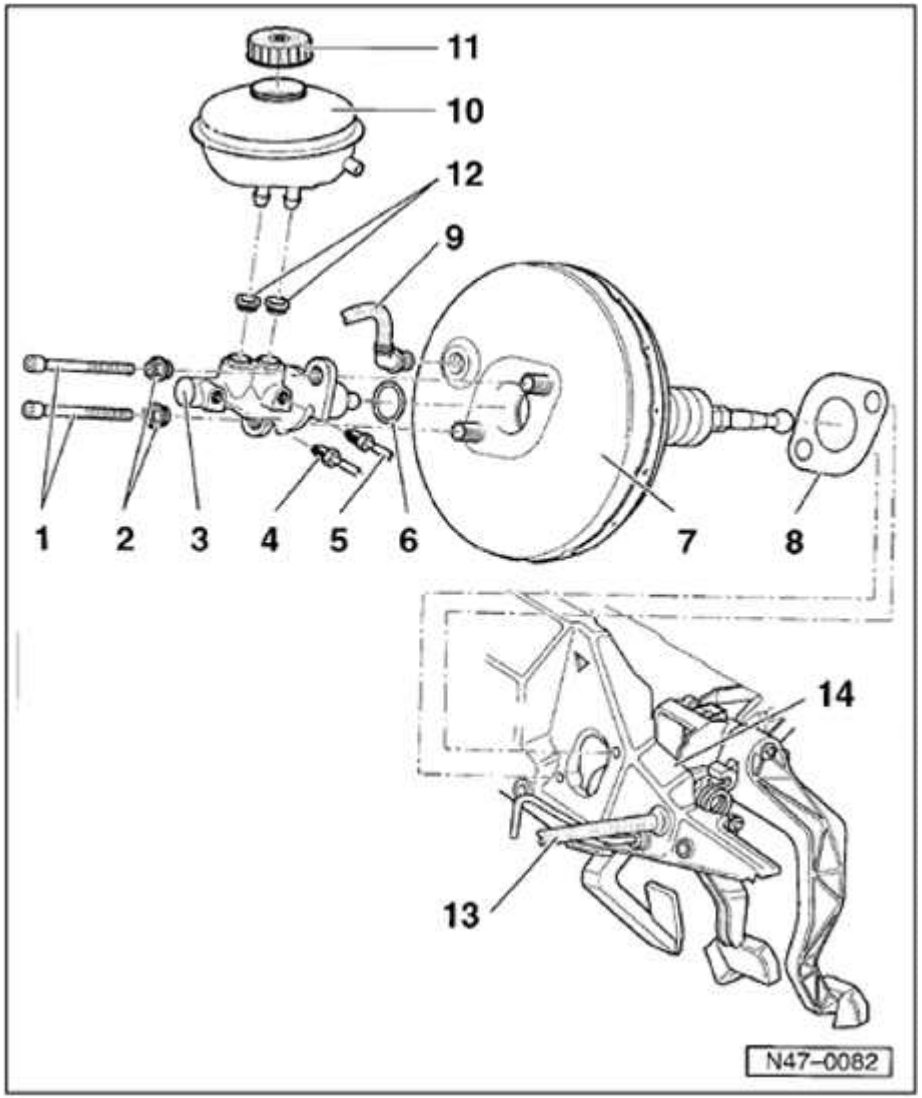
- 15 Nm (11 ft lb)
- Brake master cylinder/secondary piston circuit to hydraulic control unit

5 - Brake line

- 15 Nm (11 ft lb)
- Brake master cylinder/primary piston circuit to hydraulic control unit

6 - Seal

- Always replace



7 - Brake servo

- On gasoline engines vacuum is supplied from the intake manifold
- On Diesel engines vacuum is supplied from the vacuum pump

Functional check:

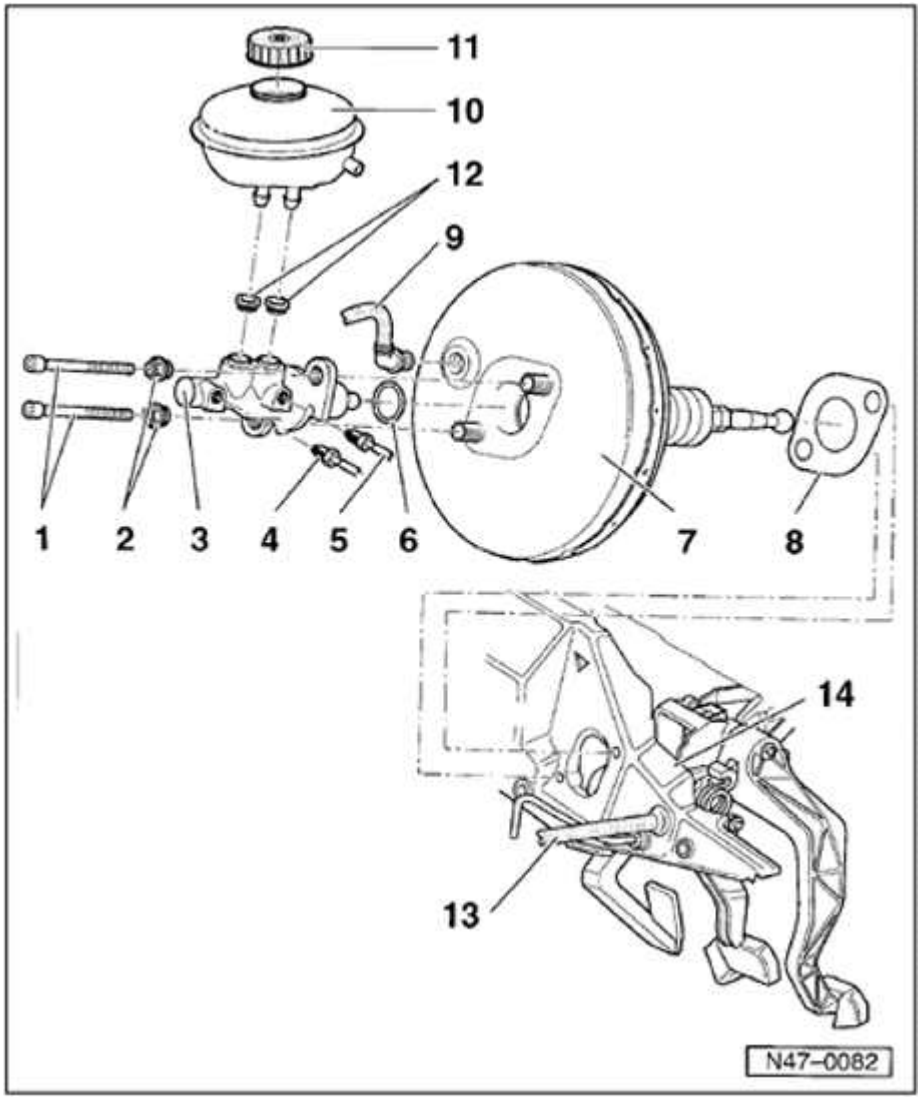
- With engine switched off, depress brake pedal firmly several times (to deplete vacuum in brake servo).
- Depress and hold brake pedal with average foot pressure and start engine. If servo is working properly, pedal will be felt to give slightly under foot (servo assistance becomes effective).

If malfunctioning:

- Replace as complete unit only.

- Check valve in vacuum hose - 9 -
- Removing and installing ⇒ page 47-37
- Adjusting ball head ⇒ Fig. 1

47-32



8 - Gasket

9 - Vacuum hose

- Insert into brake servo

10 - Brake fluid reservoir

11 - Fluid reservoir cap

12 - Sealing plugs

13 - Supply hose

- Where applicable
- From brake fluid reservoir to clutch master cylinder

14 - Bulkhead

47-33

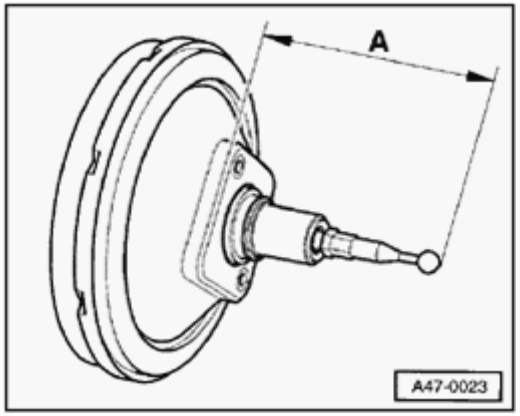


Fig. 1 Adjusting ball head

Dimension -A- = 159 ± 0.5 mm (6.26 ± 0.020 in.)

Note:

- *The ball head must be positioned at right angles to the mounting surface of the brake servo unit when measuring.*
- *Measure up to end of ball head with no gasket installed.*

Brake master cylinder with 23.81 mm (0.937 in.) diameter piston, removing and installing

Special tools and equipment

Sealing plugs from repair kit, Part No. 1H0 698 311A

CAUTION!

Part numbers are listed here for reference only. Always check with your Parts department for the latest information.

Removing

- Attach bleeder hose and bleeder bottle to left-front brake caliper bleeder screw and open bleeder screw.

- Operate brake pedal to pump out as much brake fluid as possible.

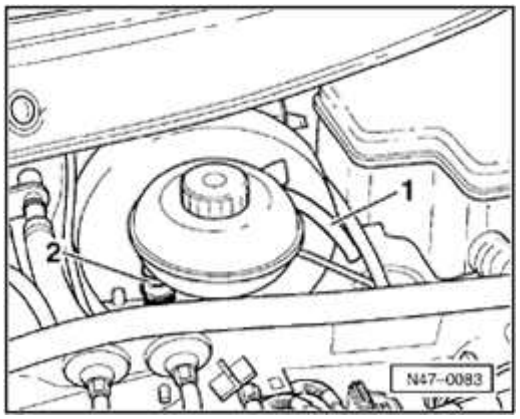
- Close left-front bleeder screw.

- Cover engine compartment to catch any spilled brake fluid.

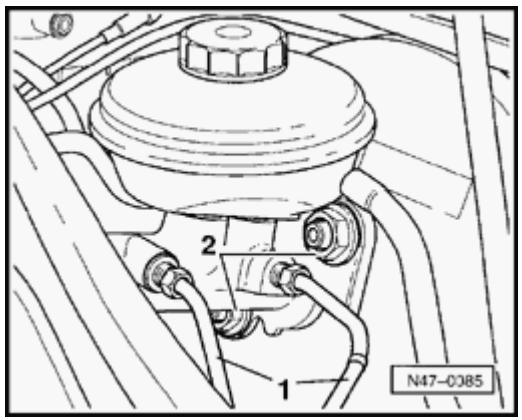
CAUTION!

Brake fluid must not be allowed to come into contact with paintwork because of its caustic effect.

47-35



- On vehicles with manual transmission, disconnect clutch master cylinder supply hose -1- and seal with plug.
- Disconnect harness connector from brake fluid level warning switch -2-.



- Disconnect brake lines -1- on brake master cylinder and seal brake lines and threaded holes using plugs from repair kit.
- Remove brake master cylinder mounting nuts -2-.
- Carefully remove brake master cylinder from brake servo.

Installing

When installing, note the following points:

- When installing brake master cylinder onto brake servo, make sure push rod is correctly located in brake master cylinder.

- Apply slight pressure to brake pedal to move push rod toward brake master cylinder; this makes it easier to guide brake master cylinder onto push rod.

Bleeding clutch hydraulics

- Connect US1116 brake bleeder but do not switch on yet.

- Open bleeder screw on clutch slave cylinder.

- Attach collector bottle hose.

- Switch on bleeder unit and allow approx. 100 cc (6 oz.) of brake fluid to flow out of clutch slave cylinder.

- Close bleeder screw.

- Bleed brake system ⇒ page 47-23 .

47-37

Brake servo for brake master cylinder with 23.81 mm (0.937 in.) diameter piston, removing and installing

Special tools and equipment

- Repair Manual, Body-Exterior
- Repair Manual, Body-Interior
- Sealing plugs from repair kit, Part No. 1H0 698 311A
- T10006 Brake pedal release tool

CAUTION!

Part numbers are listed here for reference only. Always check with your Parts department for the latest information.

Removing

- Remove driver's side storage compartment.

⇒ *Repair Manual, Body-Interior, Repair Group 68*

- Attach bleeder hose and bleeder bottle to left-front brake caliper bleeder screw and open bleeder screw.

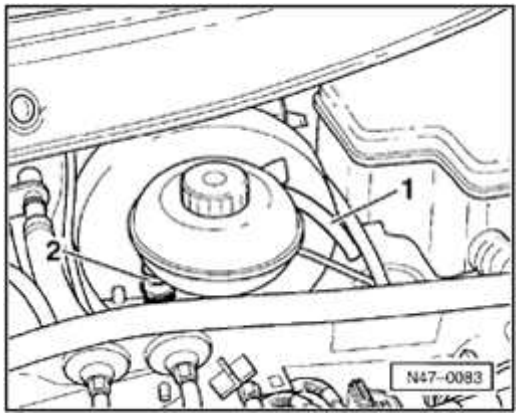
- Operate brake pedal to pump out as much brake fluid as possible.

- Close left-front bleeder screw.

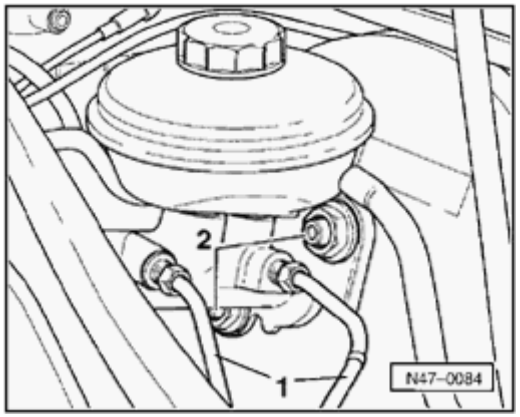
- Cover engine compartment to catch any spilled brake fluid.

CAUTION!

Brake fluid must not be allowed to come into contact with paintwork because of its caustic effect.

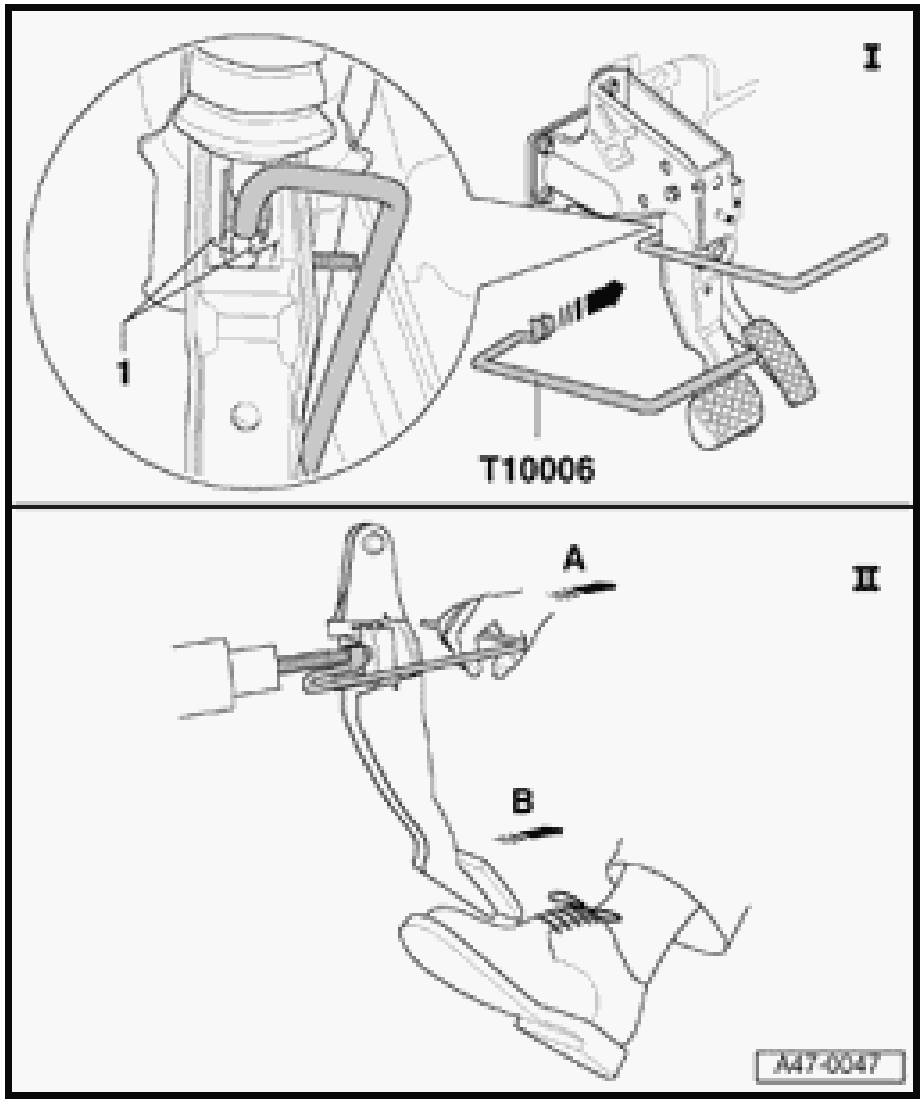


- On vehicles with manual transmissions, disconnect clutch master cylinder supply hose -1- and seal with plug.
- Disconnect harness connector from brake fluid level warning switch -2-.



- Disconnect brake lines -1- on brake master cylinder and seal brake lines and threaded holes using plugs from repair kit.
- Remove T45 Torx® bolts -2- from brake servo.
- Disconnect vacuum hose from brake servo.

47-39



Releasing brake pedal

- Remove brake light switch.

1 - Inserting T10006 brake pedal release tool

- ♦ Insert the tool from below

2 - Release procedures

- Tightly hold brake pedal.
- Lift catches off ball head using a slight pull on tool (arrow -A-).
- Tension tool so catches do not re-engage ball head.
- Pull brake pedal from ball head (arrow -B-).
- Remove brake servo from plenum chamber together with brake master cylinder.

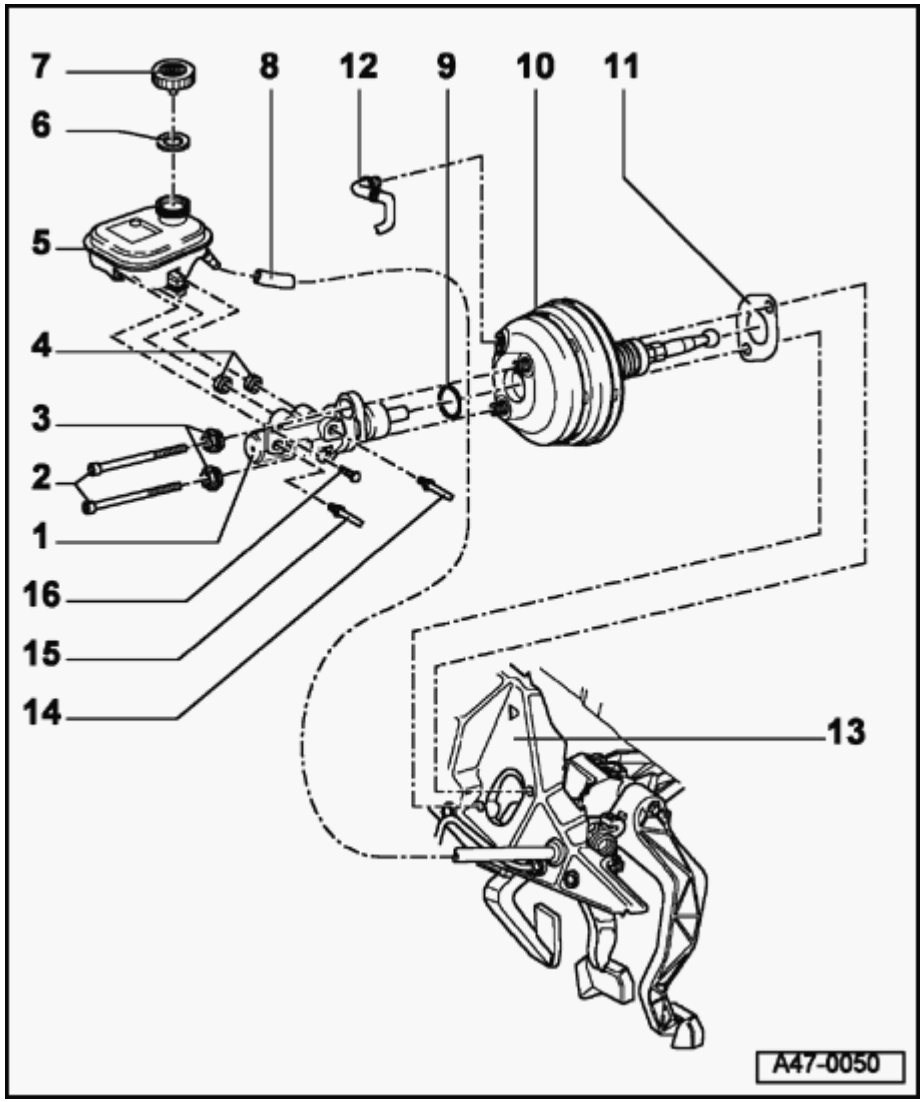
Installing

Note the following points:

- Adjust brake light switch ⇒ page 46-50 .
- Adjust vent valve for cruise control system ⇒ page 46-54 .

Bleeding clutch hydraulics

- Connect US1116 brake bleeder but do not switch on yet.
- Open bleeder screw on clutch slave cylinder.
- Attach collector bottle hose.
- Switch on bleeder unit and allow approx. 100 cc (6 oz.) of brake fluid to flow out of clutch slave cylinder.
- Close bleeder screw.
- Bleed brake system ⇒ page 47-23 .



Brake master cylinder with 25.4 mm (0.999 in.) diameter piston and brake servo, component summary

Note:

- *Brake master cylinders can no longer be disassembled, i.e. there is no provision for servicing.*
- *Use only fresh brake fluid. Pay attention to information on the brake fluid reservoir.*
- *Brake line connections to master cylinder, Bosch 5.0 ABS system (⇒ page 45-6), Bosch 5.3 system (⇒ page 45-18).*

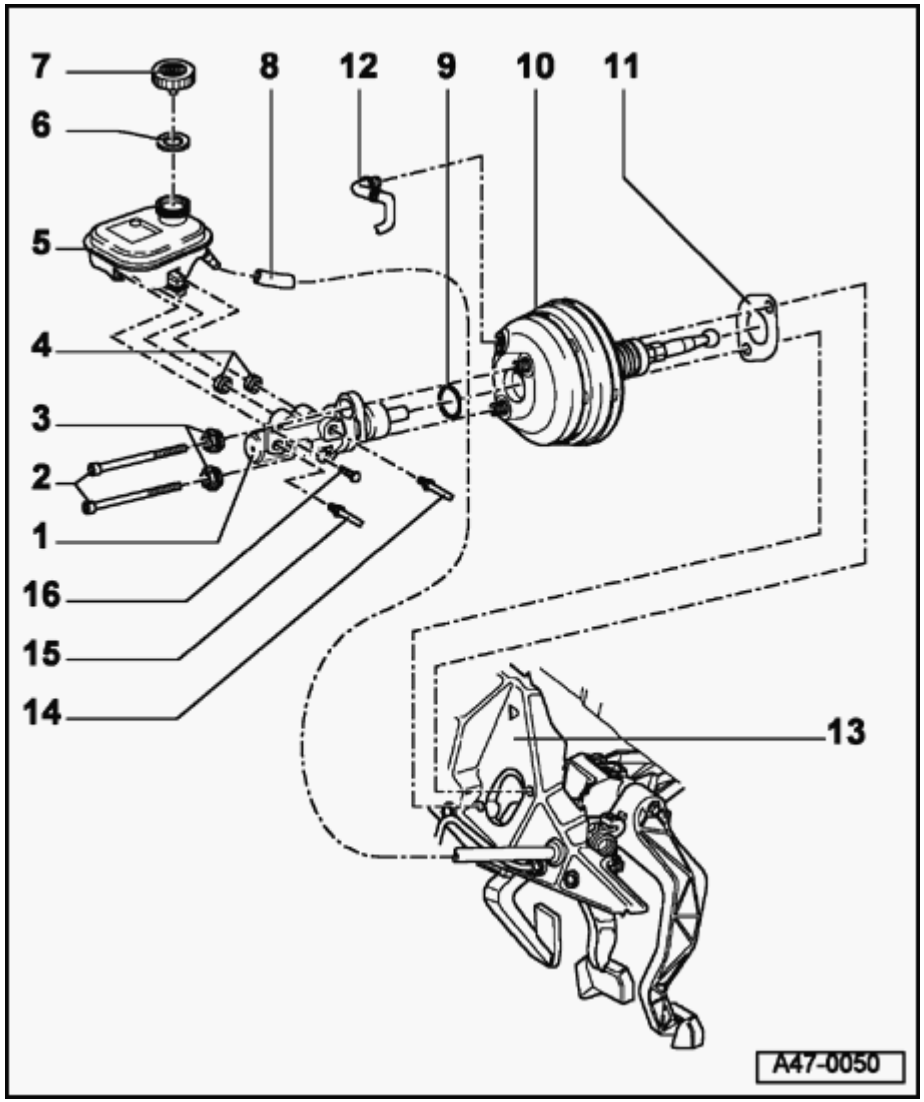
1 - Brake master cylinder

- Diameter: 25.4 mm (0.999 in.)
- Cannot be repaired. If malfunctioning, replace as complete unit only.
- Must be removed and installed together with the brake servo
- Removing and installing ⇒ page 47-46

2 - T45 Torx®

- 25 Nm (18 ft lb)

47-42



3 - Flange nut

- Always replace
- 50 Nm (37 ft lb)

4 - Sealing plug

- Moisten with brake fluid and insert into brake master cylinder
- Press brake fluid reservoir into sealing plugs

5 - Brake fluid reservoir with brake fluid level warning switch

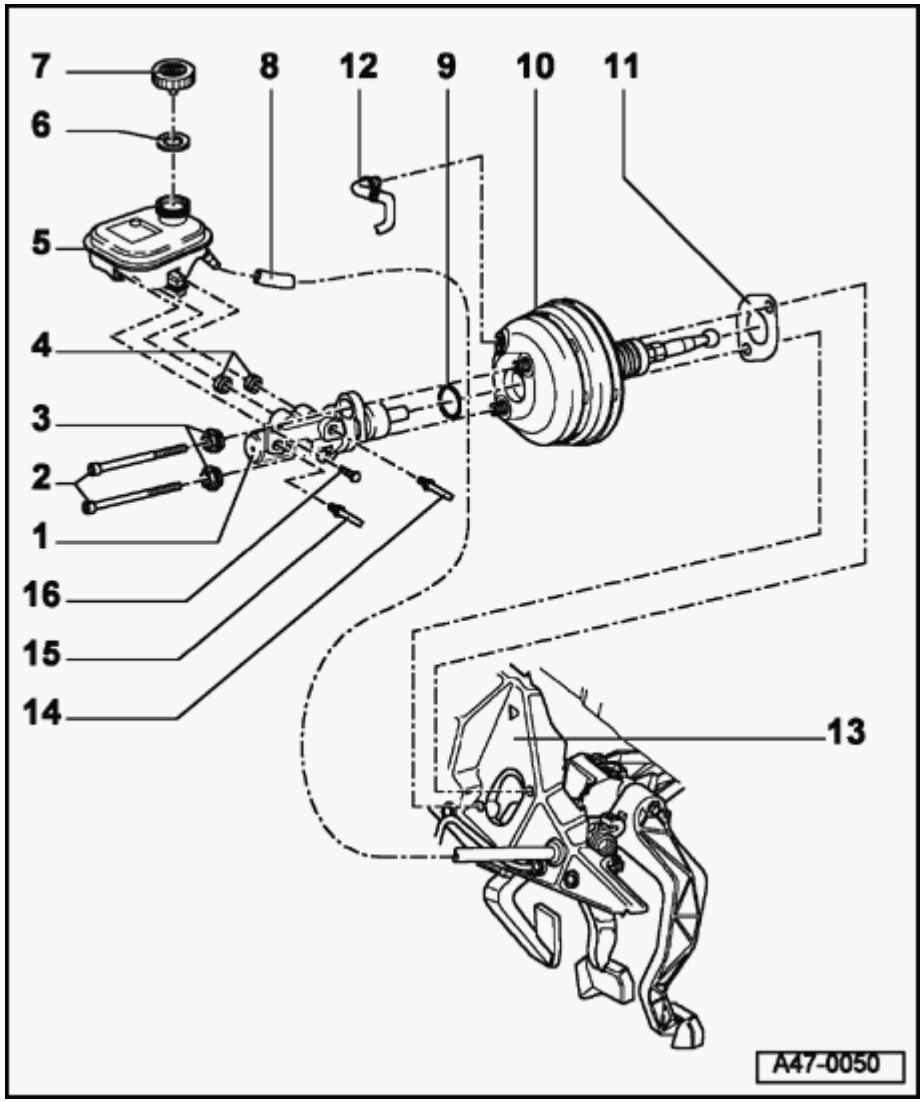
Functional check:

- Remove brake fluid reservoir cap and with the ignition switched on push on strainer in reservoir.
- The warning light in the instrument panel insert comes on and an audible warning signal sounds.

- Removing and installing ⇒ page 47-46
- Fluid couplings are on the side of the reservoir
- Pay attention to information found on the label on the reservoir before adding fluid

6 - Seal

47-43



7 - Brake fluid reservoir cap

8 - Fluid supply hose

- From brake fluid reservoir to clutch master cylinder

9 - Seal

- Install in groove in brake master cylinder
- Replace after removing brake master cylinder

10 - Brake servo

- Removing and installing ⇒ page 47-46
- Adjusting ball head ⇒ Fig. 1

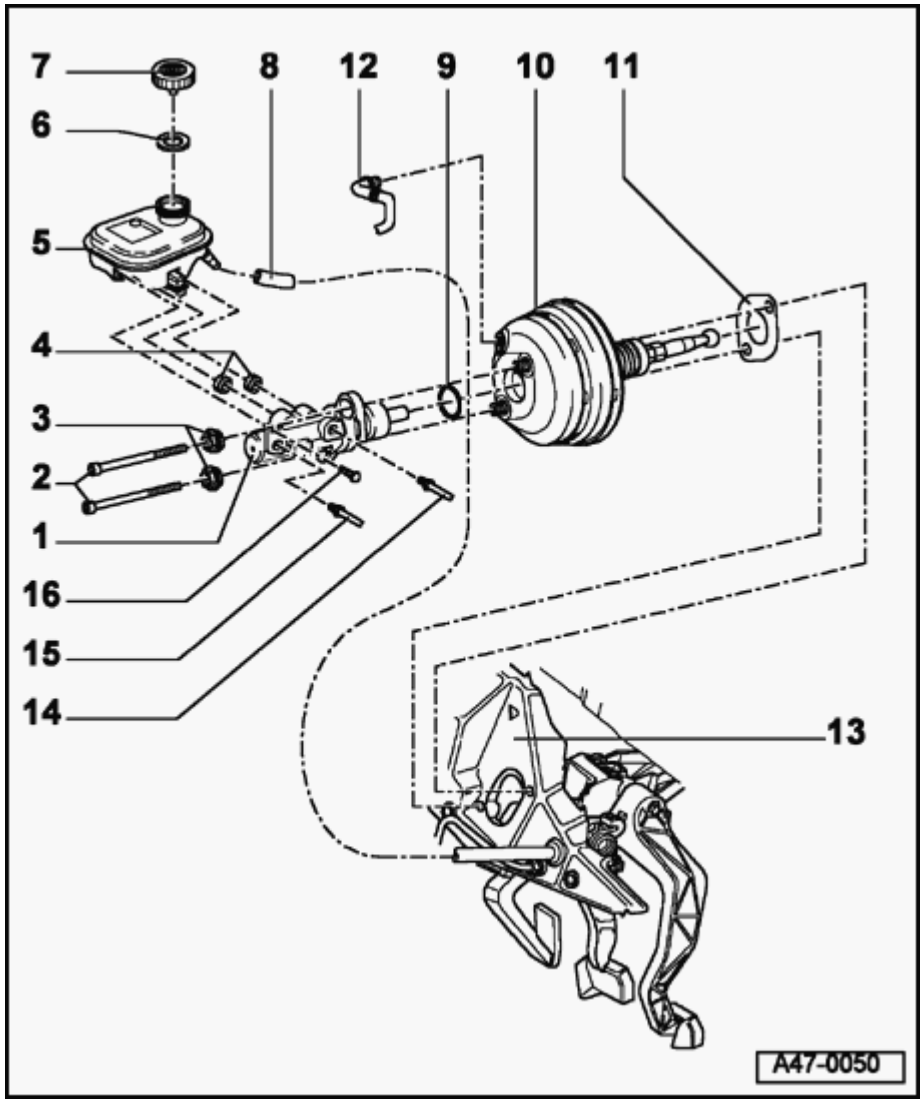
Functional check:

- With engine switched off, depress brake pedal firmly several times (to deplete vacuum in brake servo).
- Depress and hold brake pedal with average foot pressure and start engine. If servo unit is working properly, pedal will be felt to give slightly under foot (servo assistance becomes effective).

If malfunctioning:

- Replace as complete unit only.

47-44



11 - Gasket

- Brake servo supplied with gasket glued on
- Replace only if damaged

12 - Vacuum hose

- Install into brake servo
- On gasoline engines vacuum is supplied from intake manifold

13 - Bulkhead

14 - Brake line

- 15 Nm (11 ft lb)
- Brake master cylinder/primary piston circuit to hydraulic control unit

15 - Brake line

- 15 Nm (11 ft lb)
- Brake master cylinder/secondary piston circuit to hydraulic control unit

16 - Bolt

- Screw in as far as stop
- Attaches brake fluid reservoir

47-45

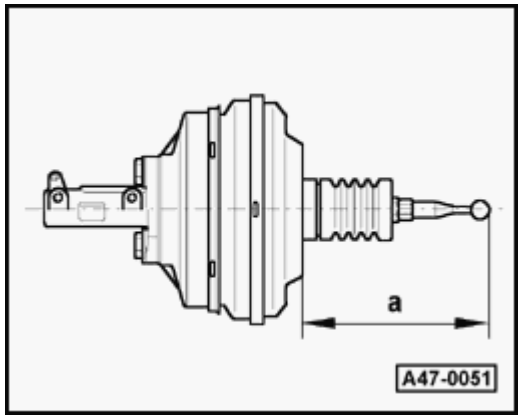


Fig. 1 Adjusting ball head

a = 159 mm ± 0.5 mm (6.26 in. ± 0.02 in.)

Note:

- *The ball head must be positioned at right angles to the mounting surface of the brake servo unit when measuring.*
- *Measure up to end of ball head with no gasket installed.*

47-46

Brake master cylinder with 25.4 mm (0.999 in.) diameter piston and brake servo, removing and installing as a unit

Special tools and equipment

- Repair Manual, Body-Exterior
- Repair Manual, Body-Interior
- Sealing plugs from repair kit, Part No. 1H0 698 311A
- T10006 Brake pedal release tool

CAUTION!

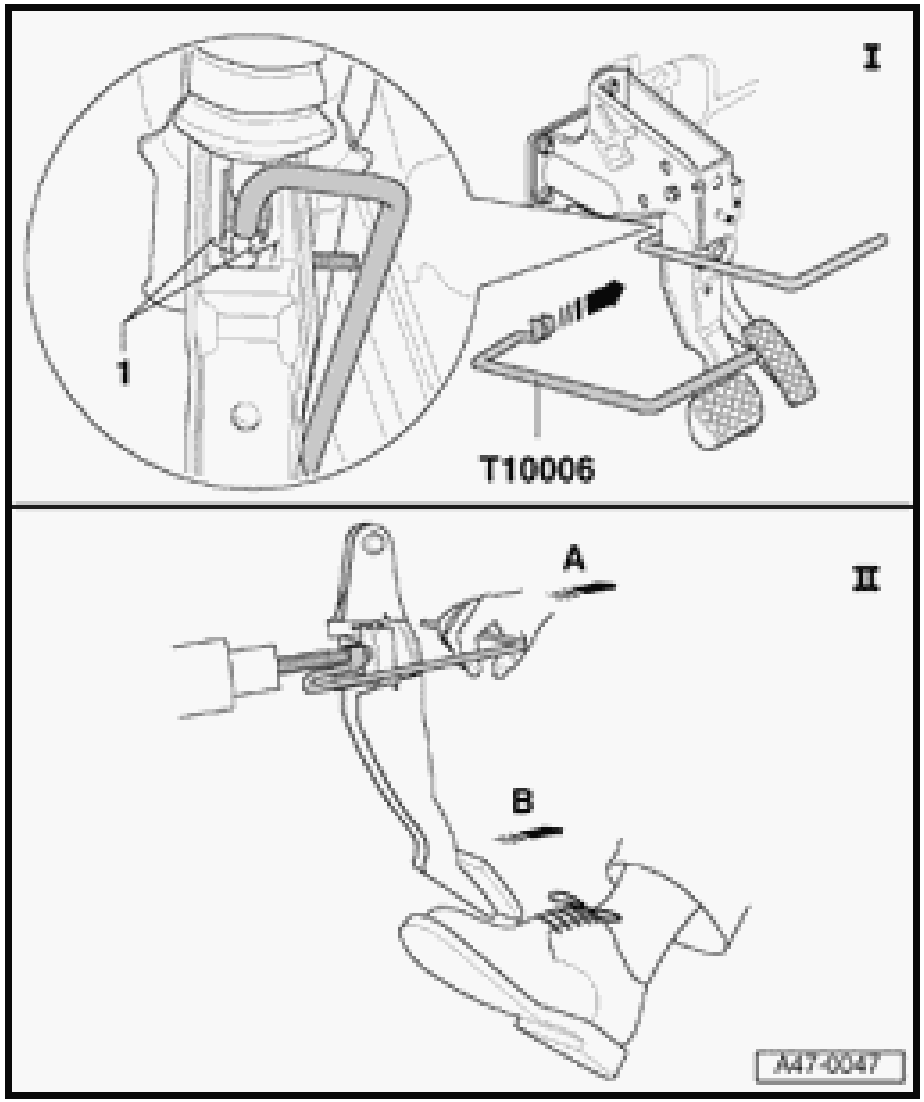
Part numbers are listed here for reference only. Always check with your Parts department for the latest information.

Removing

- Remove driver's side storage compartment.

⇒ *Repair Manual, Body-Interior, Repair Group 68*

47-47



Releasing brake pedal

- Remove brake light switch.

1 - Inserting T10006 brake pedal release tool

- ♦ Insert the tool from below

2 - Release procedures

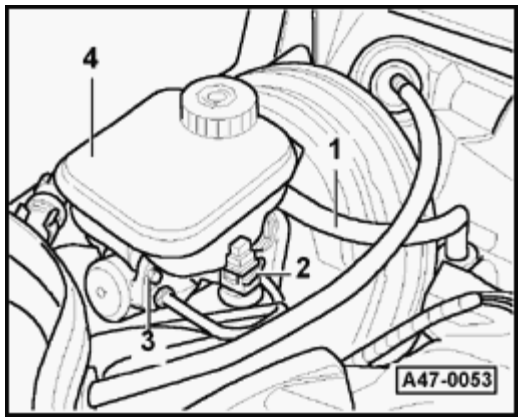
- Tightly hold brake pedal.
- Lift catches off ball head using a slight pull on tool (arrow -A-).
- Tension tool so catches do not re-engage ball head.
- Pull brake pedal from ball head (arrow -B-).

47-48

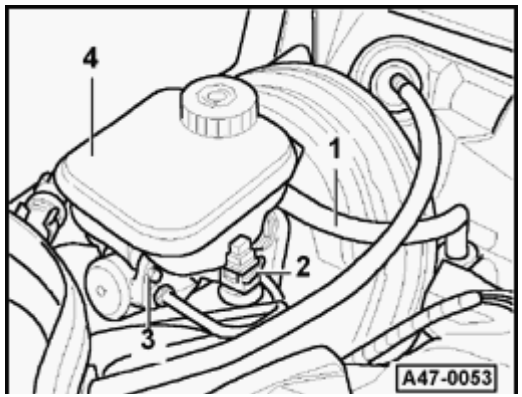
- Attach bleeder hose and bleeder bottle to left-front brake caliper bleeder screw and open bleeder screw.

- Operate brake pedal to pump out as much brake fluid as possible.

- Close left-front bleeder screw.



- Remove bolt -3- attaching brake fluid reservoir -4-.
- Disconnect harness connector -2- to brake fluid level warning switch.



- On vehicles with manual transmissions, disconnect clutch master cylinder supply hose -1- and seal with plug.

Note:

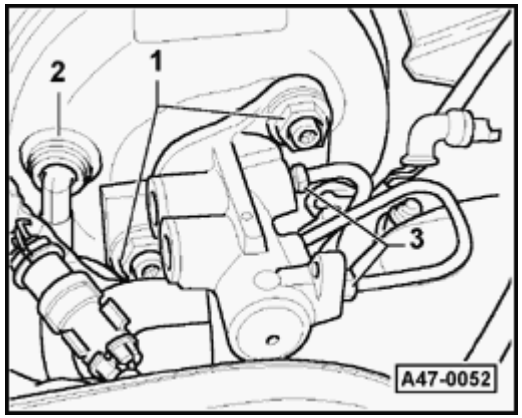
- *Cover plenum to catch any spilled brake fluid.*
- *The brake fluid reservoir is attached to the master cylinder on the bottom side.*

CAUTION!

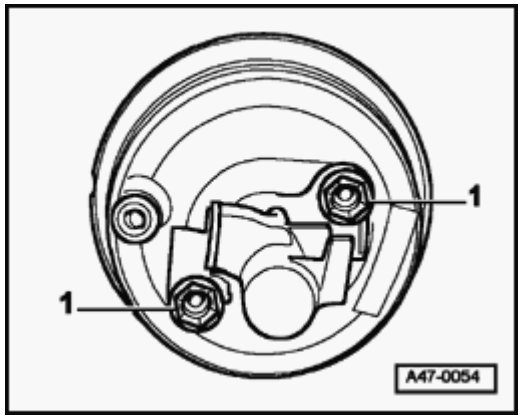
Brake fluid must not be allowed to come into contact with paintwork because of its caustic effect.

47-49

- Remove brake fluid reservoir by pressing locking catch down and pulling reservoir out of sealing plugs.



- Disconnect brake lines -3- on brake master cylinder and seal brake lines and threaded holes using plugs from repair kit.
- Disconnect vacuum hose -2- from brake servo.
- Remove T45 Torx® bolts -1- from brake servo.
- Remove brake servo together with brake master cylinder as a unit.



- Remove nuts -1- attaching brake master cylinder to brake servo.
- Carefully separate brake master cylinder from brake servo.

Note:

Pay particular attention to the following when installing:

- *Clean any spilled brake fluid from the plenum before installing brake servo and master cylinder.*
- *When bolting the brake master cylinder to the brake servo make sure pushrod is correctly located in the master cylinder.*

Installing

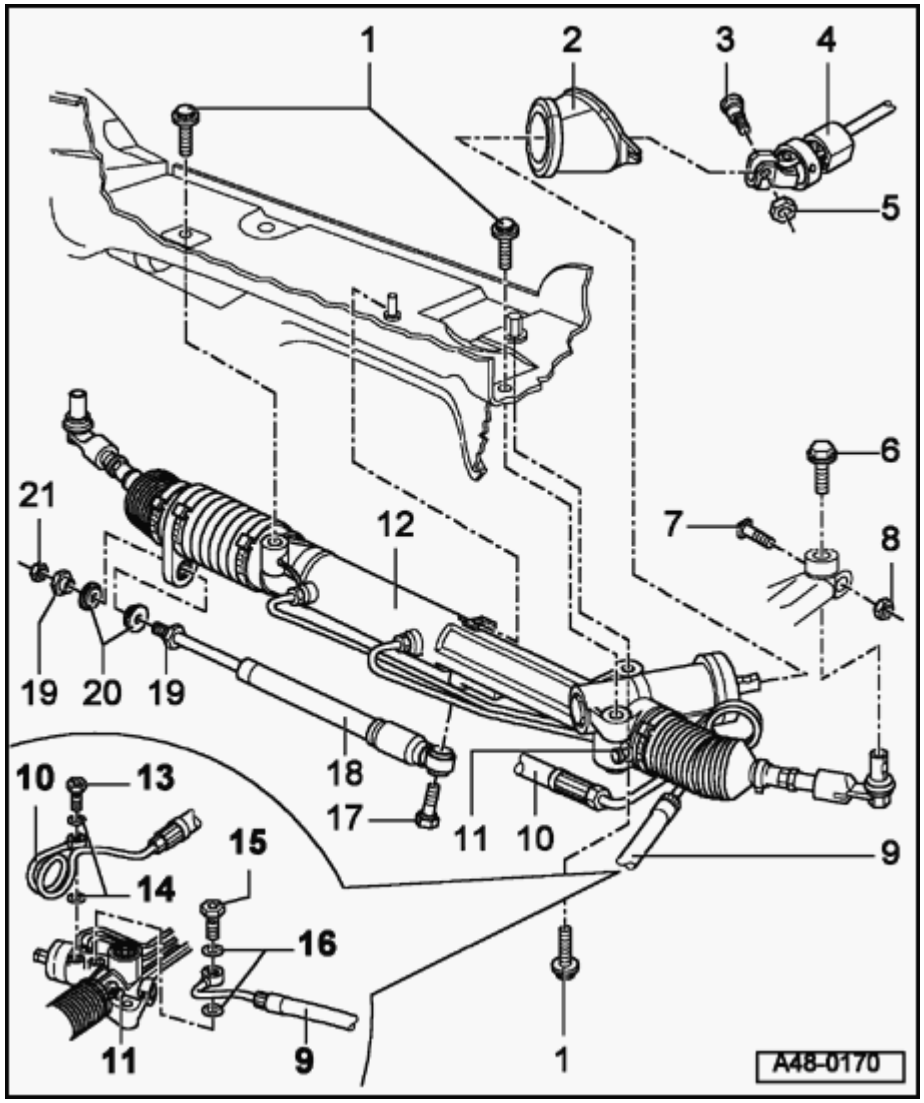
Note the following points:

- Adjust brake light switch ⇒ page 46-50 .
- Adjust vent valve for cruise control system ⇒ page 46-54 .

Bleeding clutch hydraulics

- Connect US1116 brake bleeder but do not switch on yet.
- Open bleeder screw on clutch slave cylinder.
- Attach collector bottle hose.
- Switch on bleeder unit and allow approx. 100 cc (6 oz.) of brake fluid to flow out of clutch slave cylinder.
- Close bleeder screw.
- Bleed brake system ⇒ page 47-23 .

48-1



Steering gear components

1 - Bolt and washer assembly

- 65 Nm (48 ft lb)

2 - Boot seal

- Check for cracks and abrasions

3 - Eccentric bolt

- Torx® T50
- Turn clockwise to disengage
- Turn counter-clockwise to engage

4 - Steering column

5 - Self-locking nut

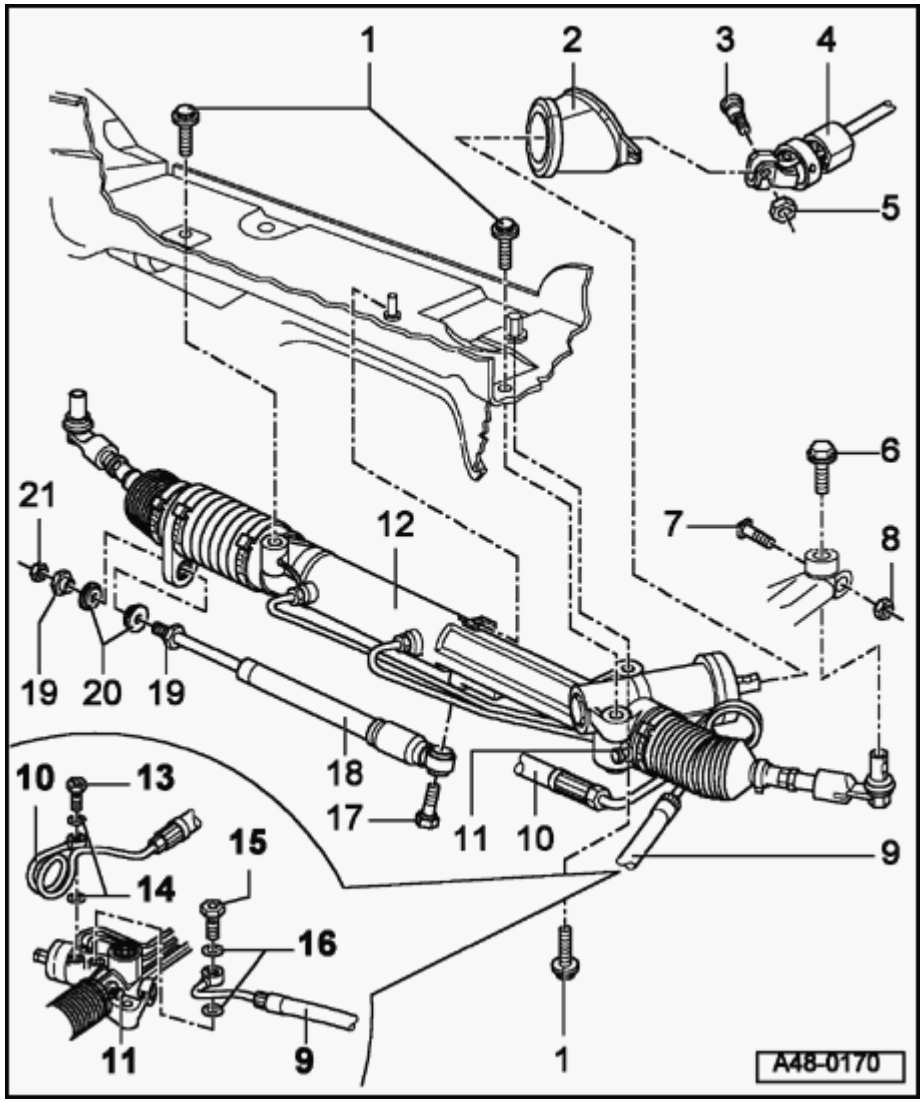
- Always replace
- 40 Nm (30 ft lb)

6 - Bolt w/washer assembly

- 7 Nm (62 in. lb)
- For adjusting toe-in curve

7 - Bolt

48-2



8 - Self-locking nut

- Always replace
- 45 Nm (33 ft lb)

9 - Return hose

10 - Flexible hose

11 - Screw plug

- 13 Nm (10 ft lb)
- For centering steering gear ⇒ Fig. 1

12 - Power steering gear with tie rods

- Removing and installing ⇒ page 48-5

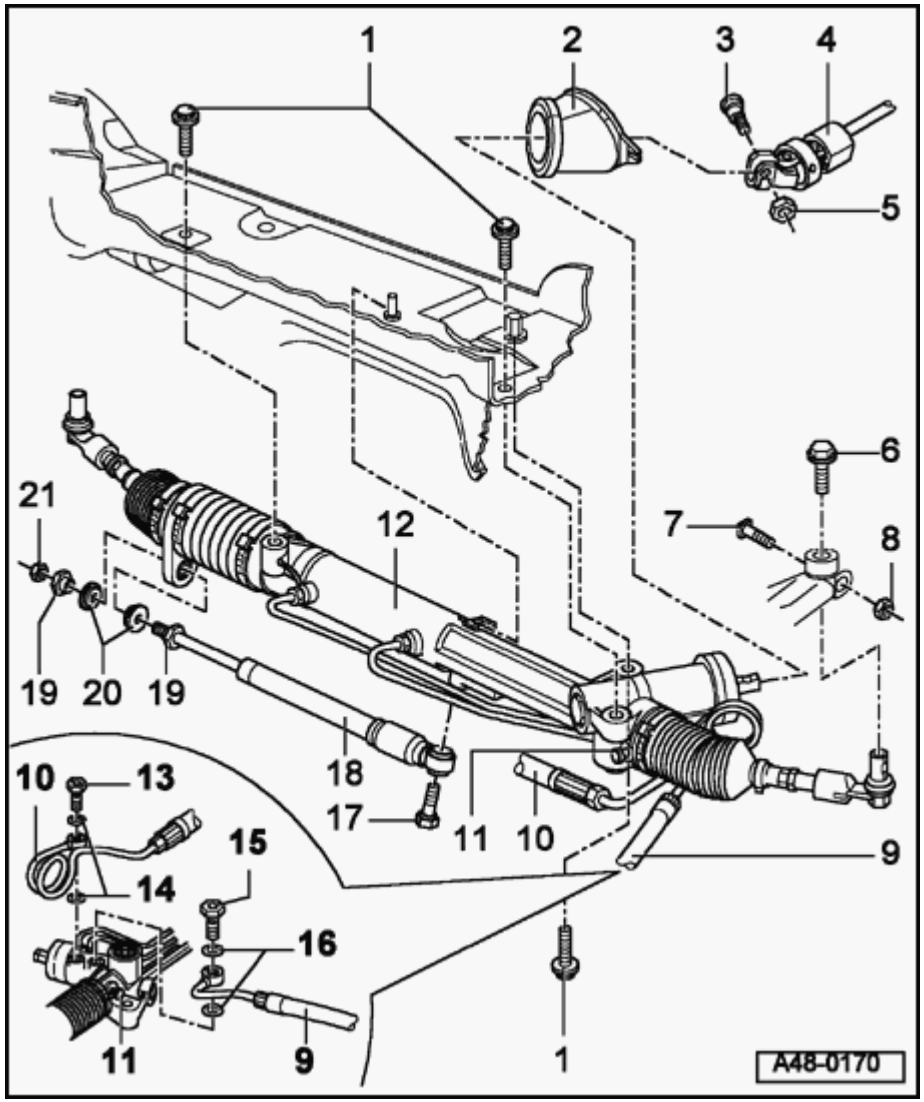
13 - Banjo bolt

- 40 Nm (30 ft lb)
- With integrated check valve

14 - Seal 14 x 20

- Always replace

48-3



15 - Banjo bolt

- 50 Nm (37 ft lb)

16 - Seal 16 x 22

- Always replace

17 - Bolt

- 35 Nm (26 ft lb)

18 - Steering damper

- 6-cyl. models
- 4-cyl models with 132 kW (177 Hp) m.y. 1998 ➢

19 - Bushing

20 - Rubber bushing

- Two-piece

21 - Nut

- 10 Nm (7 ft lb)
- Counter-hold at hex in piston rod of steering damper to loosen and tighten

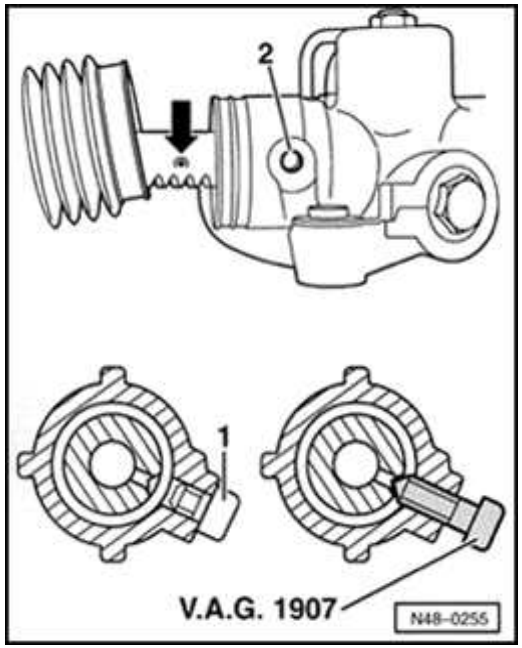


Fig. 1 Screw plug for centering steering gear

1 - Screw plug

2 - Threaded hole in steering gear

48-5

Steering gear, removing and installing

Special tools, test equipment and auxiliary items

- Repair Manual, Body Exterior and Repair Manual, Body Interior
- VAG1907 centering tool
- 3094 hose clamps

Removing

- Remove plenum chamber cover.
- Remove battery.

CAUTION!

Before disconnecting the battery, determine the correct coding for the anti-theft radio.

- Remove driver's side storage compartment:

⇒ *Repair Manual, Body Interior, Repair Group*

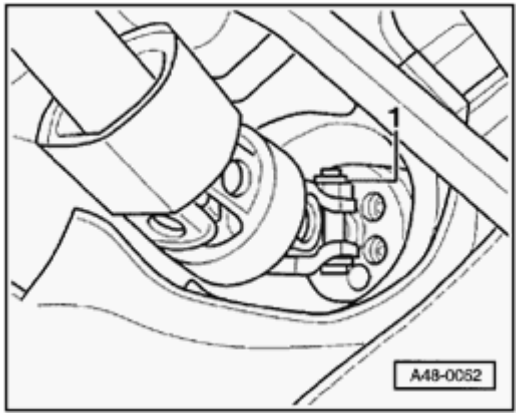
68

- Center steering wheel and remove ignition key.

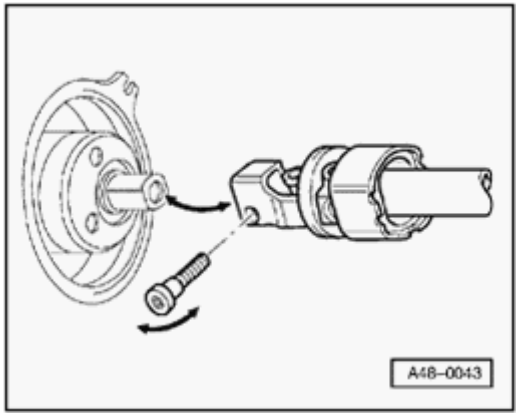
- Move steering wheel slightly so that steering lock engages.

CAUTION!

If the steering wheel is turned excessively with the steering gear removed, the spiral spring for the airbag system may be turned too far and damaged.

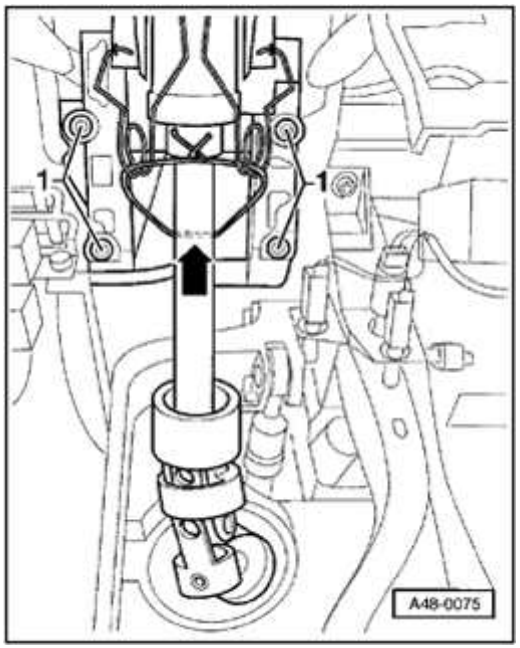


- Unscrew nut -1- at steering column universal joint.
- Release by turning eccentric bolt (Torx® T50) clockwise, and remove bolt.



- Swing universal joint clear.
- Pull bulkhead collar inward to remove.

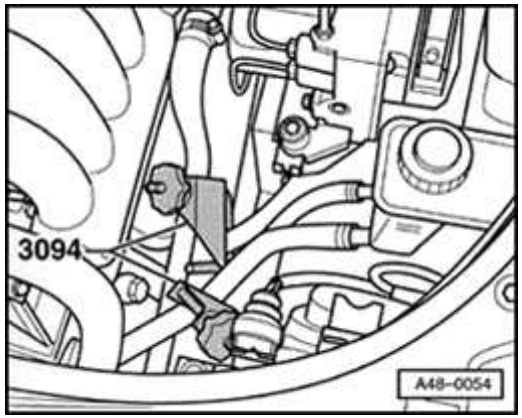
48-7



- Secure steering column with safety wire before removing steering column from steering gear pinion.

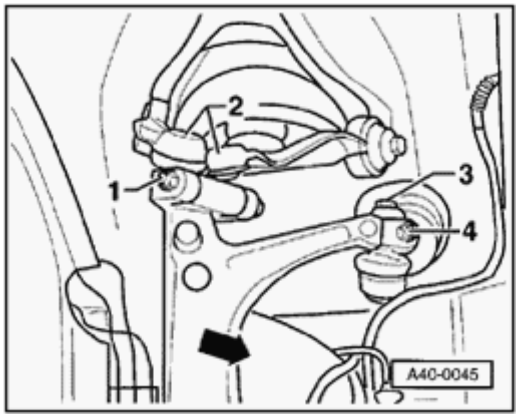
CAUTION!

- ***The splines between top and bottom parts of the steering column must not be separated during the removal and installation procedure.***
- ***Turn the steering wheel into center position and do not alter position during repairs, otherwise the airbag unit spiral spring may be damaged.***

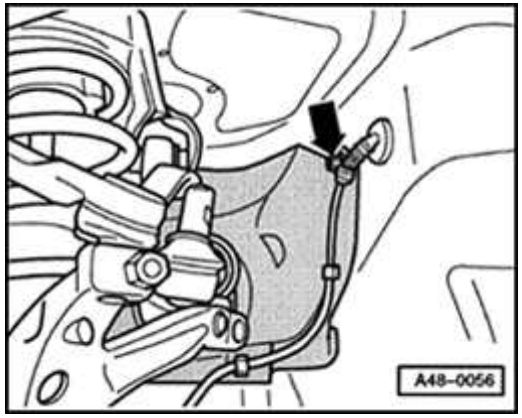


- Pinch off suction and return lines using 3094 hose clamps.

- Remove front wheels.

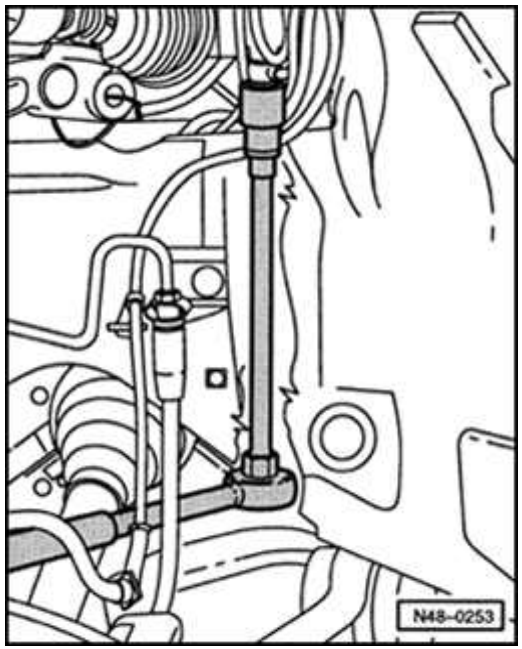


- Remove bolts -3- and -4-.
- Disconnect tie rod ends.



- Unscrew plastic nut (arrow).
- Pry out clips and remove cover (clips not visible in illustration).

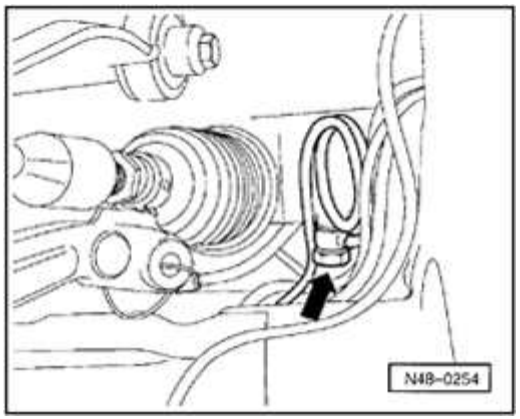
- Place drip tray underneath to catch hydraulic fluid.



- Remove 22 mm banjo bolts and disconnect return line from steering gear.

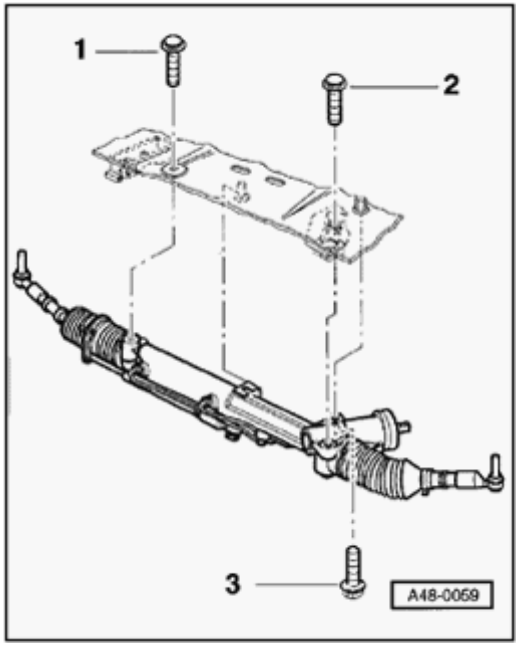
CAUTION!

Always dispose of used hydraulic fluid properly.



- Remove 19 mm banjo bolt and disconnect supply line from steering gear.

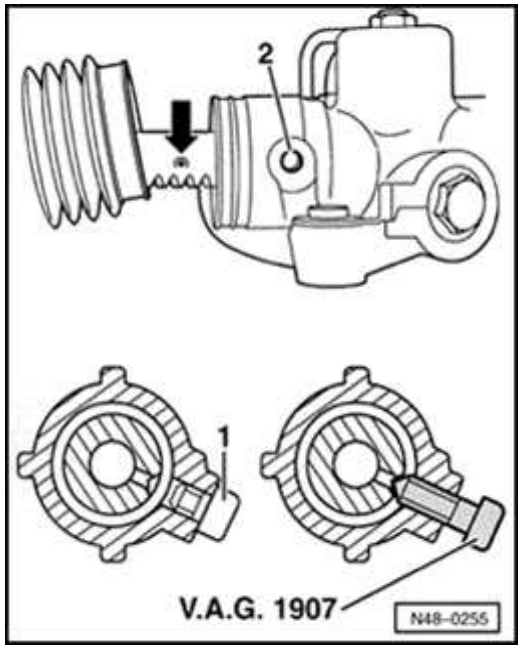
48-10



- Remove steering gear mounting bolts -1-, -2- and -3-.
- Remove steering gear through left-hand wheel housing (second technician required).

Note:

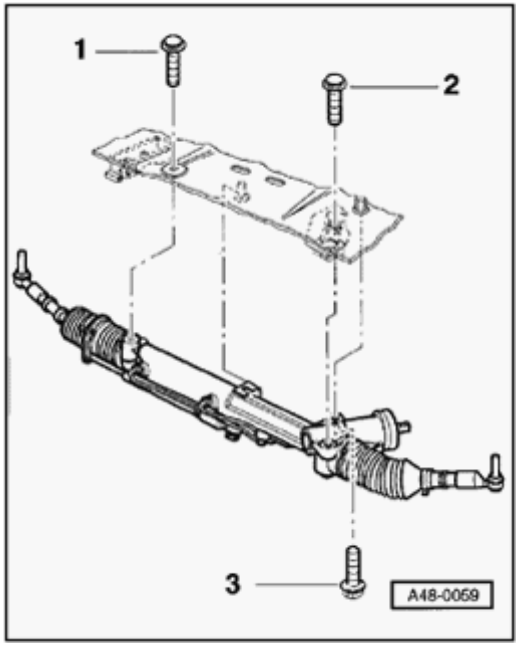
Make sure that the bulkhead seal is not damaged by the steering gear pinion.



Installing

With the steering gear removed, VAG1907 is used to hold the rack in the in the center position during installation:

- Remove bolt -1- from steering gear.
- Align center mark (arrow) in rack with threaded hole -2- in steering gear.
- Install special tool VAG1907 hand-tight.



- Position steering gear in plenum chamber.

Note:

Make sure threads and bolt contact surfaces are free of oil and grease.

- Install bolts -1- and -2- but do not tighten.
- Install bolt -3- and tighten to 65 Nm (48 ft lb).
- Tighten bolts -1- and -2- to 65 Nm (48 ft lb).
- Install return hose and tighten 22 mm banjo bolt.

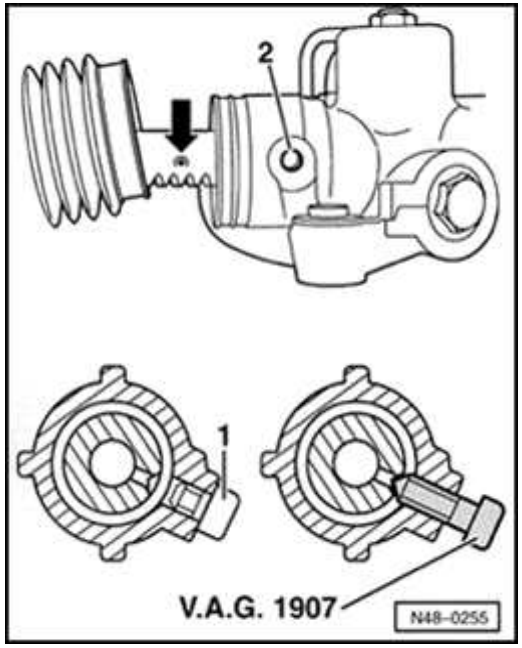
  Tightening torque: 50 Nm (37 ft lb)
- Install supply line and tighten 19 mm banjo bolt.

  Tightening torque: 40 Nm (30 ft lb)
- Re-install sealing boot.

Notes:

- *Damaged seals must be replaced.*
- *Make sure seals are properly seated.*

- Release steering column lock.
- Center steering wheel, then connect universal joint to steering pinion.



- Install eccentric Torx® bolt, engage counterclockwise and tighten nut.

- Remove VAG1907 centering tool from steering gear.

1 - Socket-head bolt (screw plug)

2 - Threaded hole in steering gear

- Install socket-head bolt -1- to seal off steering gear.

  Tightening torque: 13 Nm (10 ft lb)

- Tighten nut on tensioning bolt.

  Tightening torque: 40 Nm (30 ft lb)

- Install driver's side storage compartment.
- Install wheel housing cover.
- After completely installing steering gear remove 3094 hose clamps.
- Install battery and enter code for radio if necessary.
- Check level of hydraulic fluid ⇒ page 48-22 .
- Bleed steering system ⇒ page 48-24 .
- Check steering system for leaks ⇒ page 48-25 .
- Check wheel alignment ⇒ page 44-6 .

Tie rods, removing and installing

WARNING!

- ***Do not re-use any fasteners that are worn or deformed in normal use.***

- ***Some fasteners are designed to be used only once, and are unreliable and may fail if used a second time. This includes, but is not limited to, nuts, bolts, washers, circlips and cotter pins. Always follow the recommendations in this manual-replace these fasteners with new parts where indicated, and any other time it is deemed necessary by inspection.***

Special tools, test equipment and auxiliary items

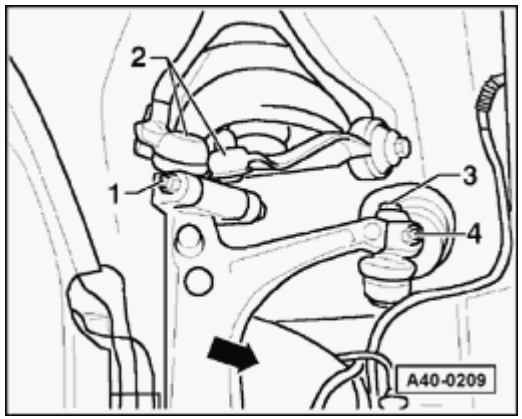
VAG1923

Notes:

- *Left and right-hand tie rods are identical.*

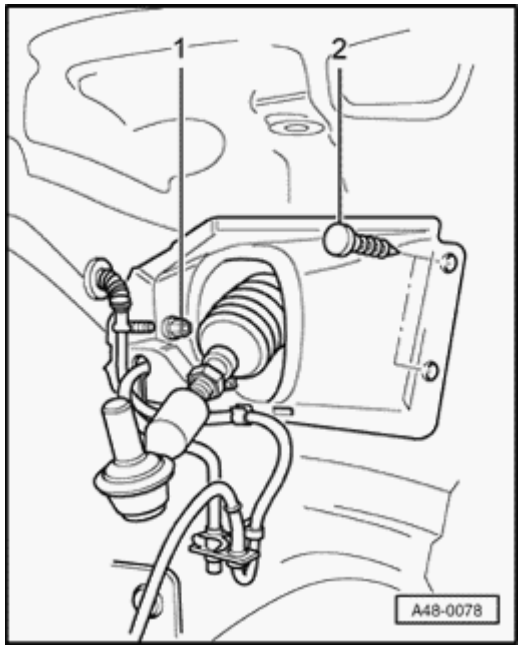
- *Tie rods can be removed and installed with the steering gear installed.*

Removing

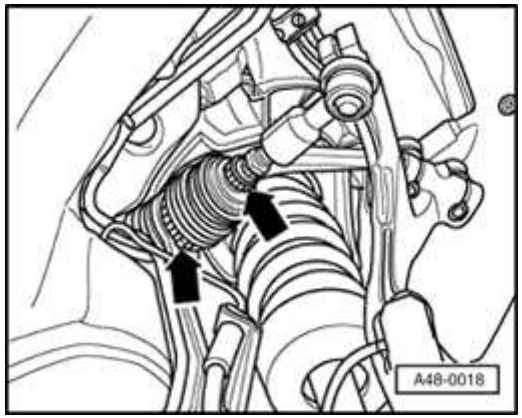


- Remove front wheel.

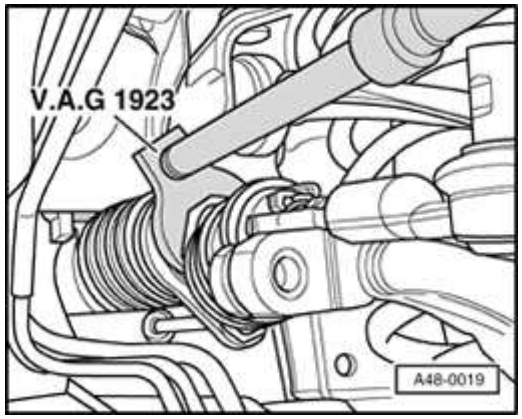
- Loosen bolts -3- and -4- and disconnect tie rod end downward.



- Remove plastic nut -1-.
- Pry out clips -2-.
- Remove cover for tie rod.



- Open clamps on boot.



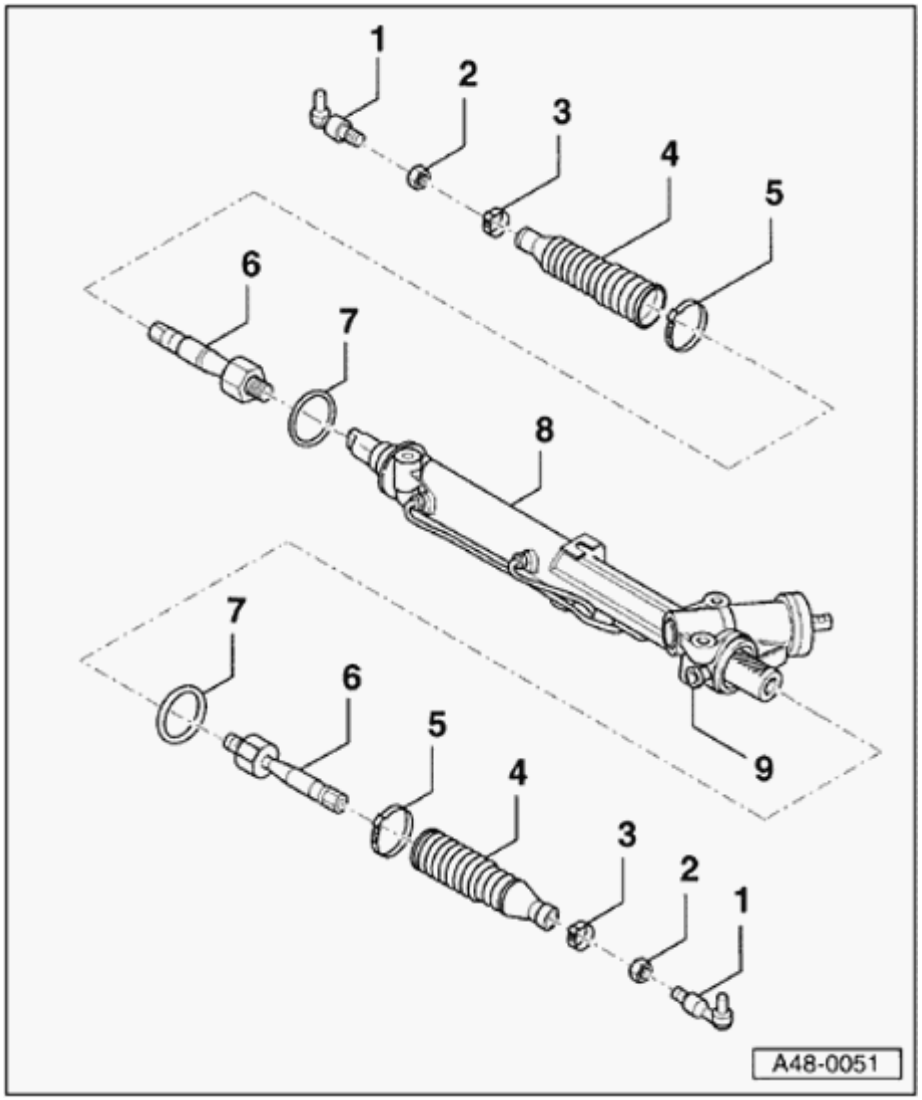
- Move boot outward as far as possible.
- Remove tie rod using VAG1923.

Installing

- Install tie rod.

  Tightening torque: 100 Nm (74 ft lb)
- When installing boot, make sure to check:
  - Smaller diameter of boot clips into groove on tie rod
  - Boot is not twisted
- Replace inner (large) clamp.
- Check wheel alignment ⇒ page 44-6 .

48-17



Steering gear

Steering gear without dampener (4-cyl. engine), disassembling and assembling

CAUTION!

Do not attempt to weld or straighten the steering gear components.

Notes:

- *Always replace self-locking nuts and bolts.*
- *Only grease the rack with steering gear grease Part No. AOF 063 000 04.*
- *Hydraulic fluid: Part No. G 002 000*

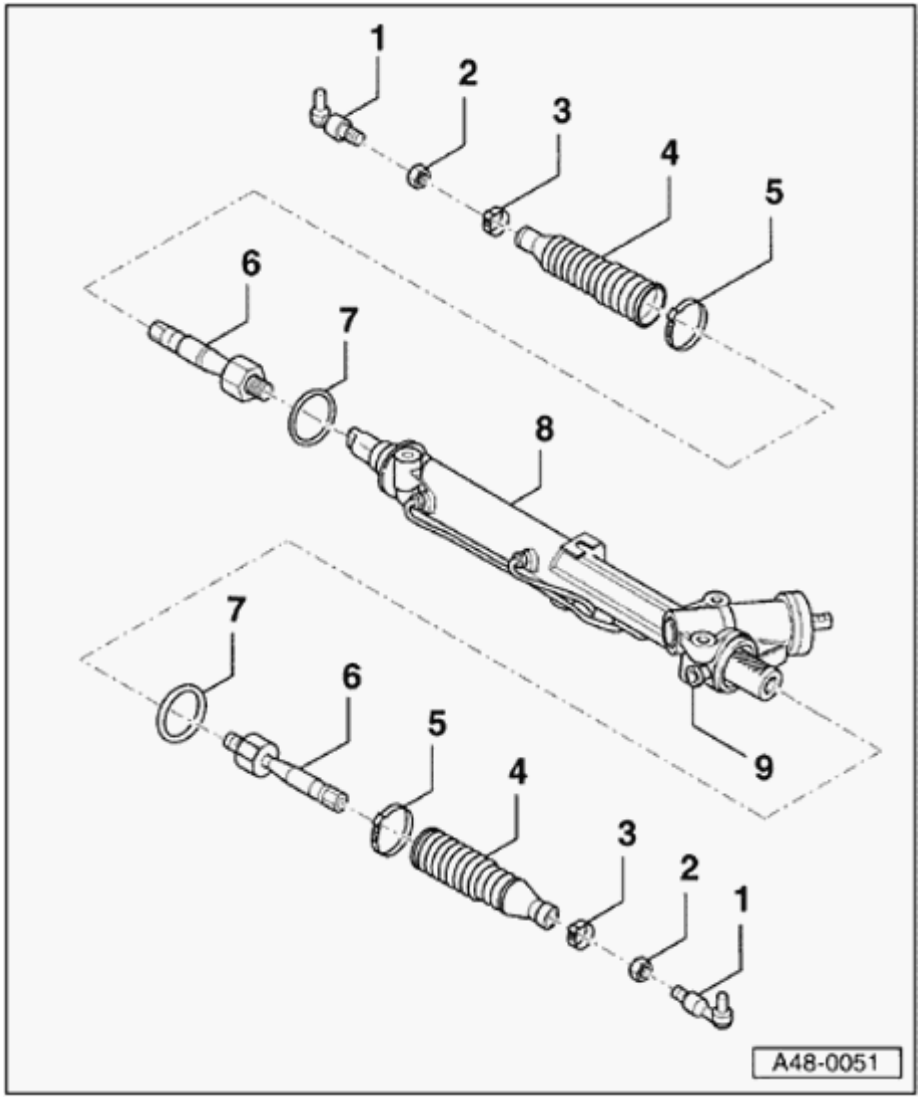
CAUTION!

Part numbers are listed here for reference only. Always check with your Parts department for the latest information.

1 - Tie rod end

- Make sure dust caps are seated correctly and not damaged

48-18



2 - Nut

- 40 Nm (30 ft lb)

3 - Clamp

- Always replace

4 - Boot

- Check for damage
- Can be replaced with steering gear installed
- Must not be twisted after adjusting rack

5 - Clamp

- Always replace
- Tighten using VAG1275

6 - Inner tie rod end

- 100 Nm (74 ft lb)
- Grease joint using steering gear grease A0F 063 000 04

7 - O-ring

- Always replace

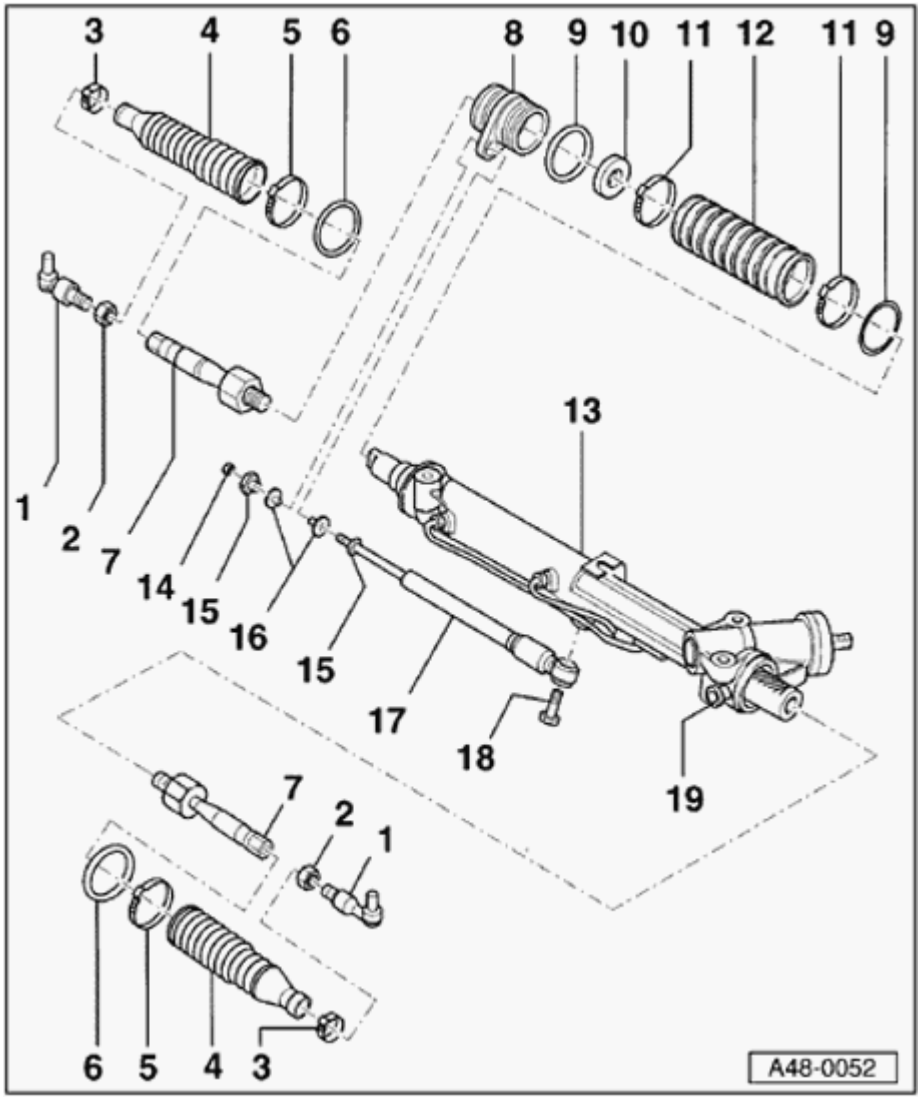
8 - Power steering gear

- Grease rack using steering gear grease A0F 063 000 04

9 - Screw plug

- 13 Nm (10 ft lb)
- For centering steering

48-19



Steering gear with dampener (6-cyl. engine), disassembling and assembling

CAUTION!

Do not attempt to weld or straighten the steering gear components.

Notes:

- *Always replace self-locking nuts and bolts.*
- *Only grease the rack with steering gear grease Part No. AOF 063 000 04.*
- *Hydraulic fluid: Part No. G 002 000*

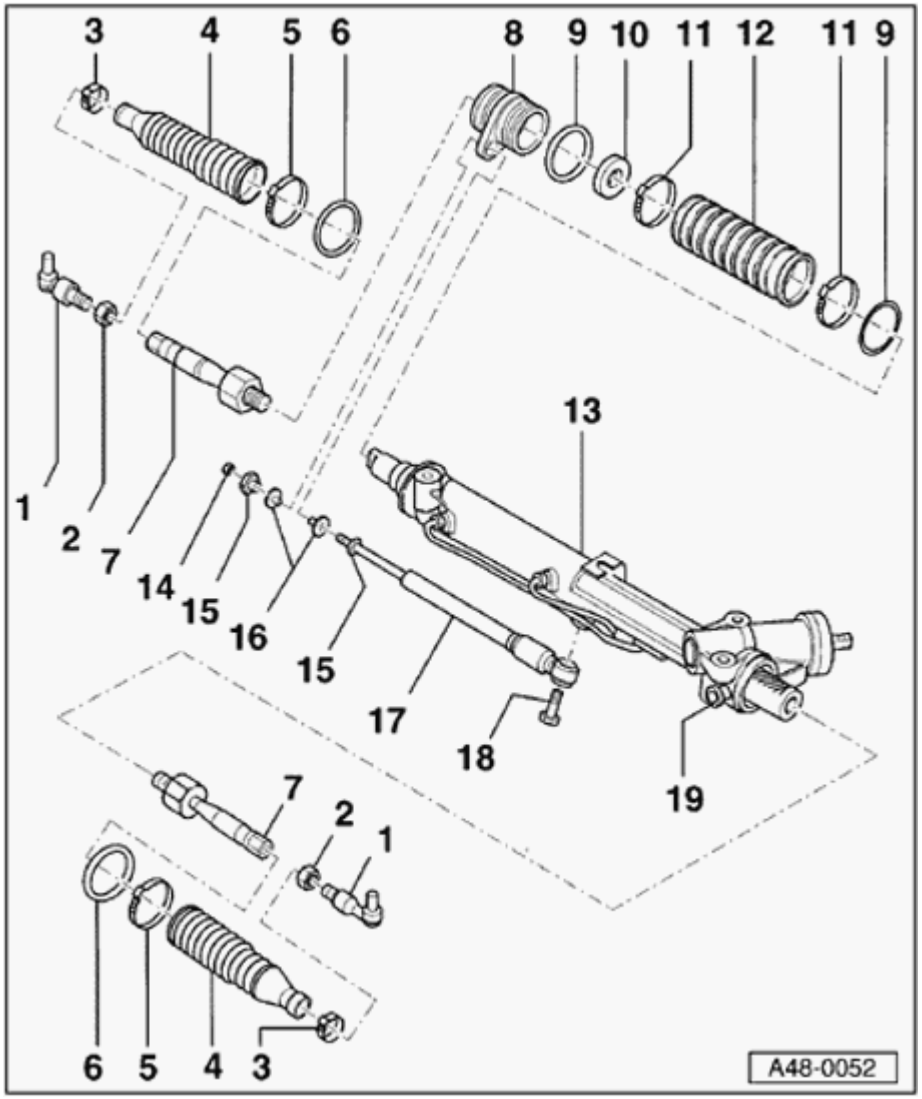
CAUTION!

Part numbers are listed here for reference only. Always check with your Parts department for the latest information.

1 - Tie rod end

- Make sure dust caps are seated correctly and not damaged

48-20



2 - Nut

- 40 Nm (30 ft lb)

3 - Clamp

- Always replace

4 - Boot

- Check for damage
- Can be replaced with steering gear installed
- Must not be twisted after adjusting rack

5 - Clamp

- Always replace
- Tighten using VAG1275

6 - O-ring

- Always replace

7 - Inner tie rod end

- 100 Nm (74 ft lb)
- Grease joint using steering gear grease A0F 063 000 04

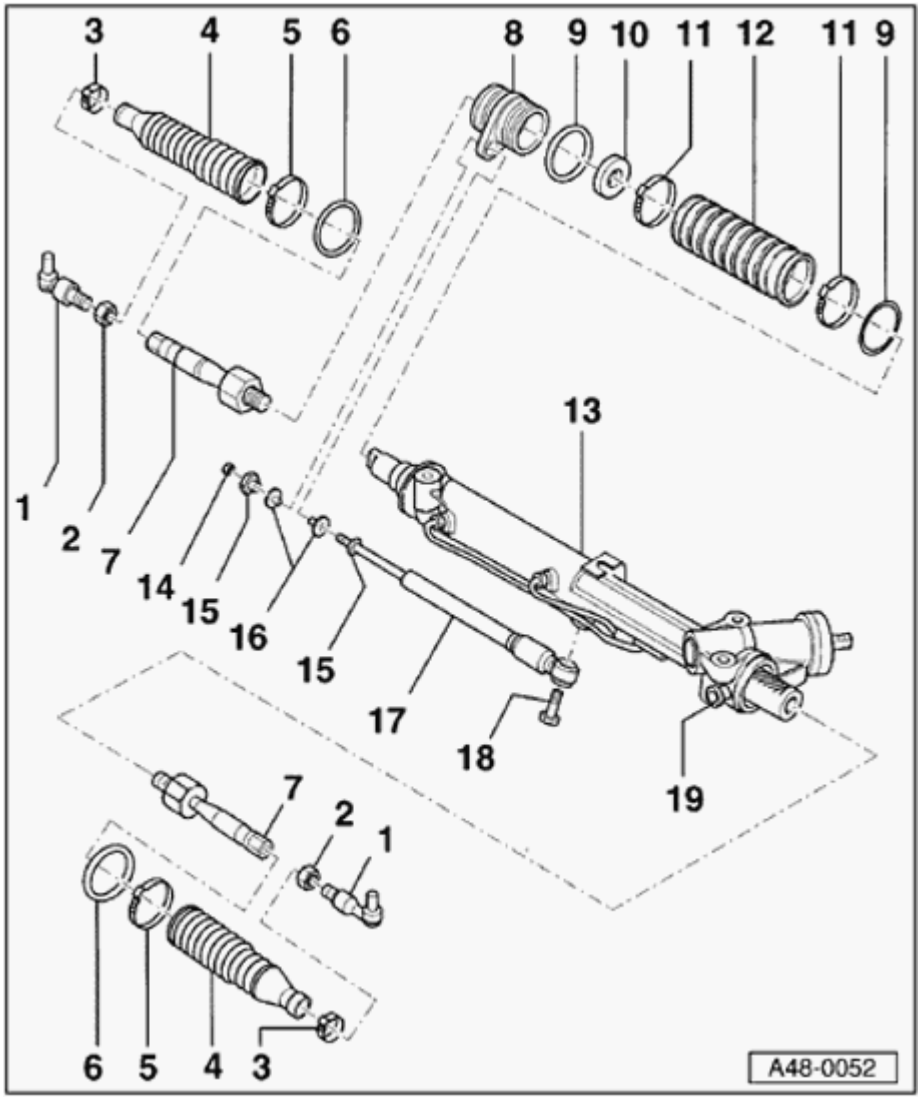
8 - Steering damper bracket

9 - O-ring

- Always replace

10 - Dished washer

48-21



11 - Clamp

- Always replace
- Tighten using VAG1275

12 - Boot

- Check for damage
- Can be replaced with steering gear installed

13 - Power steering gear

- Grease rack using steering gear grease A0F 063 000 04

14 - Nut

- 10 Nm (7 ft lb)
- To loosen and tighten, counter hold on steering damper piston rod hex

15 - Bushing

16 - Rubber bushing

- Two part

17 - Steering damper

18 - Bolt

- 35 Nm (26 ft lb)

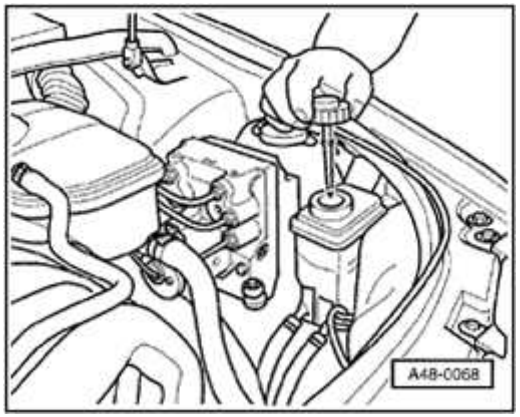
19 - Screw plug

- 13 Nm (10 ft lb)
- For centering steering

Hydraulic fluid level, checking; steering system, bleeding and checking for leaks

Hydraulic fluid level, checking

- With engine switched off, bring front wheels to straight-ahead position.

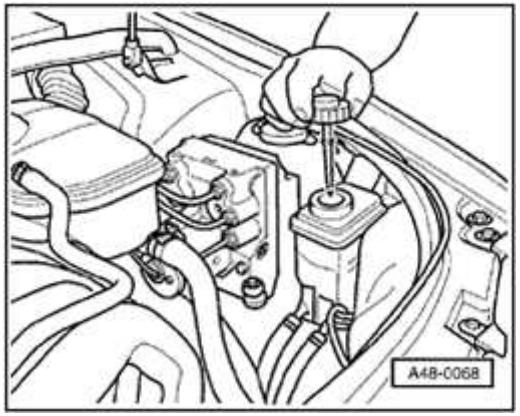


- Remove cap.
- Wipe dipstick using clean cloth.
- Re-install cap hand tight and remove again.

Note:

The cap must be screwed on fully to obtain an accurate fluid level reading.

48-23



Checking with fluid cold

- Fluid level must be in area of "MIN." marking (up to 2 mm (0.08 in.) above or below marking)

Checking with fluid at operating temperature

- Operating temperature: above approx. 50 ° C (122 ° F)
- Fluid level must be between "MIN." and "MAX." markings

Notes:

- *If there is too much fluid in the reservoir, fluid must be extracted.*
- *If there is not enough fluid, it is not sufficient to just top off the fluid; the hydraulic system must also be checked for leaks* ⇒ *page 48-25* .
- *Do not re-use hydraulic fluid that has been removed.*

Steering system, bleeding

- Check hydraulic fluid level and top off if necessary ⇒ page 48-22 .

- Raise vehicle until front wheels can move freely.

- With engine switched off, turn steering wheel from lock-to-lock 10 times.

- Check hydraulic fluid level and top off if necessary ⇒ page 48-22 .

- Lower vehicle.

- Start engine.

- Turn steering wheel from lock-to-lock 10 times.

- Check hydraulic fluid level and top off if necessary ⇒ page 48-22 .

Any remaining air in steering system will dissipate while driving over the next 10-20 km (6-12 miles).

48-25

Steering system, checking for leaks

- Start engine.

- Turn steering from lock-to-lock and hold briefly.

  This produces maximum possible pressure

CAUTION!

To avoid damaging the pump, do not allow the engine to run for more than 10 seconds (with steering at lock) when carrying out this test.

In this position the following components must be checked for leaks:

- Pinion seal on steering gear valve housing
- All line connections
- Rack seals

- Check rack seals with boots pushed back:

  - Open boot clamp.

- Push boot back.

- Steering gear must be replaced if fluid is visible in steering gear housing and/or in boot

48-26

Steering gear, adjusting

Note:

Two technicians are required for the adjustment.

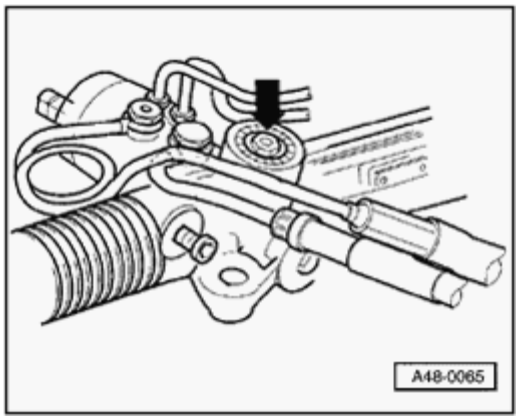
- Engine switched off

- Raise vehicle on hoist.

- Bring wheels to straight-ahead position.

- Turn steering wheel left and right (approx. 30° from center axis).

  Knocking noise will be heard if there is excessive play



- (Second technician) carefully turn adjustment screw (arrow) until knocking noise can no longer be heard from inside vehicle.
- Carry out road test.
- Steering must self-center when maneuvering or negotiating corners, without sticking; re-adjust if necessary.

Power steering pump, reservoir and hydraulic fluid circuit

Notes:

- *Power steering pumps cannot be repaired. If problems in the pump are suspected carry out pressure and leakage tests. Replace the pump if it is malfunctioning.*
- *Check steering system for leaks if the fluid level in the reservoir is low.*
- *If there are leaks at the line connections first tighten connections, wipe dry and then re-check for leaks.*
- *Checking the hydraulic fluid level* ⇒ *page 48-22* .
- *Bleeding the steering system* ⇒ *page 48-24* .
- *Checking the steering system for leaks* ⇒ *page 48-25* .
- *Type of hydraulic fluid: G 002 000*

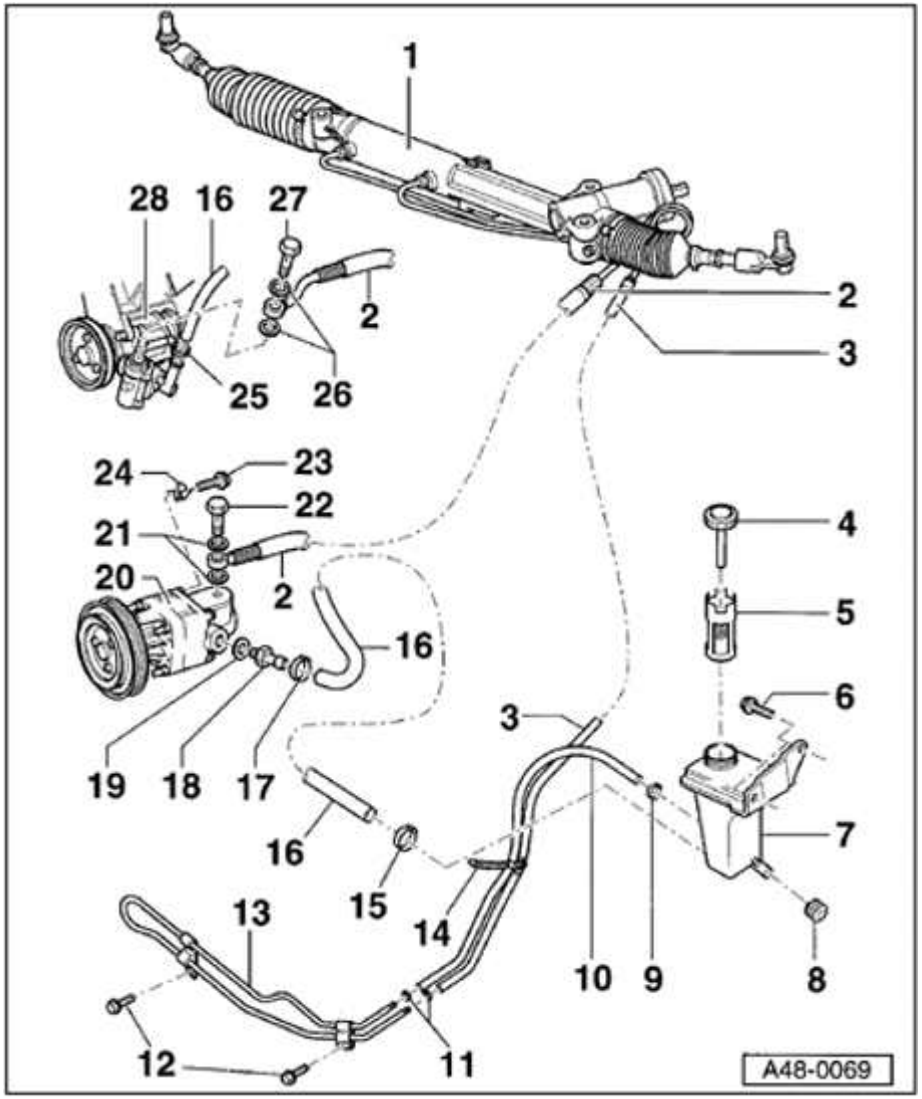
- *Hydraulic system fluid capacity: 0.7-0.9 Liters (12-15 oz.)*

CAUTION!

- ***Pumps supplied as replacement parts are not filled with fluid. Therefore it is essential to fill the pump with hydraulic fluid G 002 000 and to rotate pump several times by hand. Otherwise the pump may be damaged or be noisy during operation.***

- ***Part numbers are listed here for reference only. Always check with your Parts department for the latest information.***

48-28



Power steering hydraulic circuit (4-cyl. engine), overview

1 - Power steering gear

2 - Pressure line

3 - Return hose

4 - Cap with dipstick

- Checking fluid level ⇒ page 48-22

5 - Strainer

- Integrated into reservoir

6 - Bolt

- 9 Nm (80 in. lb)

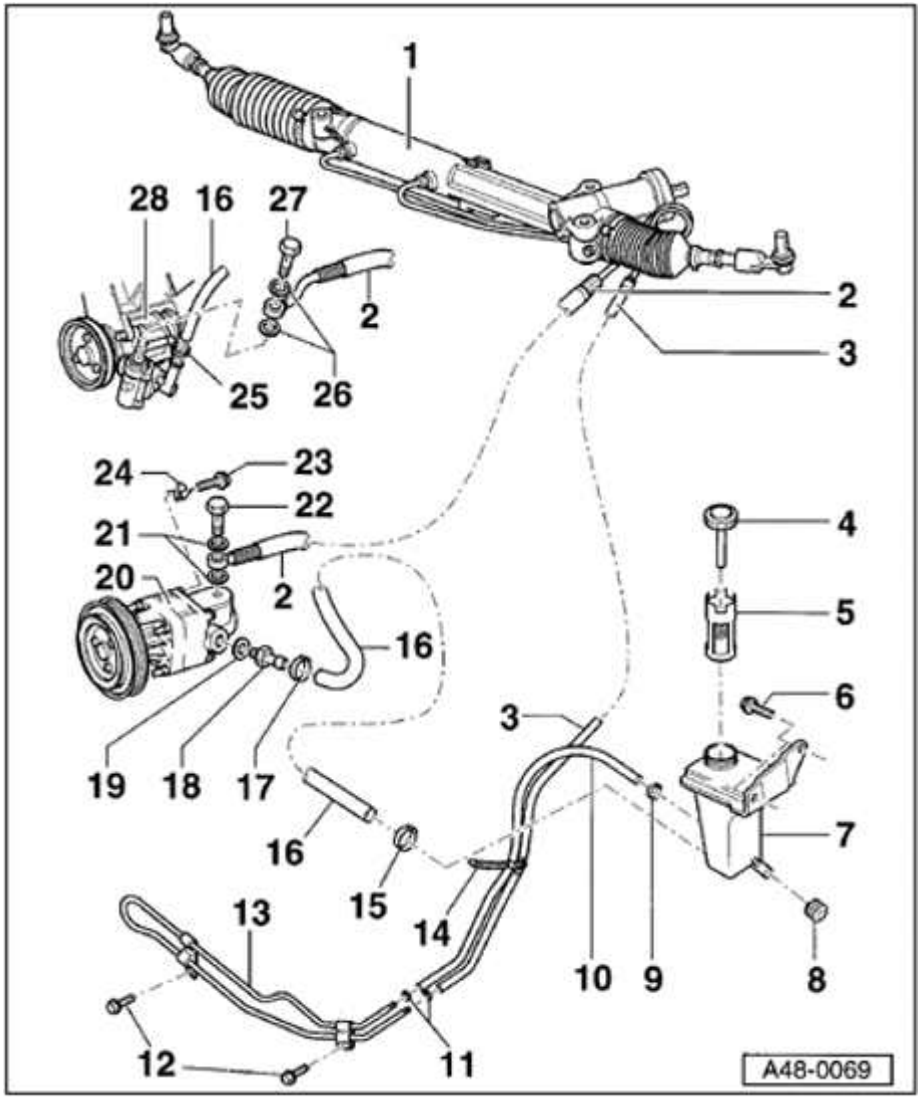
7 - Reservoir

8 - Rubber mount

9 - Clamp

- Use VAG1275 to tighten

48-29



10 - Return hose

- Between reservoir and cooling line
- Not on 4-cyl. TDI without towing hitch

11 - Clamps

- Use VAG1275 to tighten

12 - Bolts

- 10 Nm (7 ft lb)

13 - Cooling line

- Not on 4-cyl. TDI without towing hitch

14 - Cable strap

15 - Clamp

- Use VAG1275 to tighten

16 - Suction hose

17 - Clamp

- Use VAG1275 to tighten

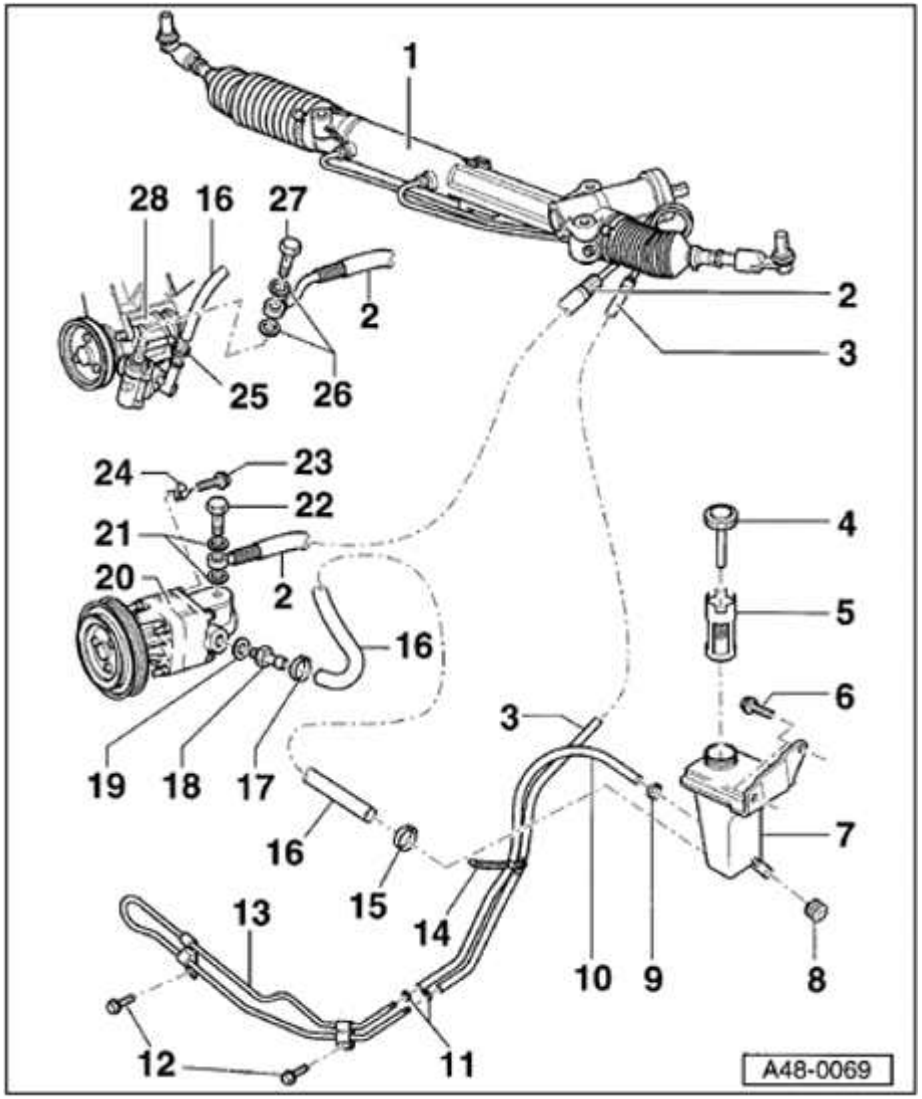
18 - Hose fitting

- 50 Nm (37 ft lb)

19 - Seals 18 x 24

- Always replace

48-30



20 - Power steering pump

- Fill with fluid before installing ⇒ CAUTION, page 48-27

21 - Seals 16 x 22

- Always replace

22 - Banjo bolt

- 50 Nm (37 ft lb)

23 - Bolt

- 18 Nm (13 ft lb)

24 - Fastener

25 - Clamp

- Always replace
- Use VAG1275 to tighten

26 - Seals 16 x 22

- Always replace

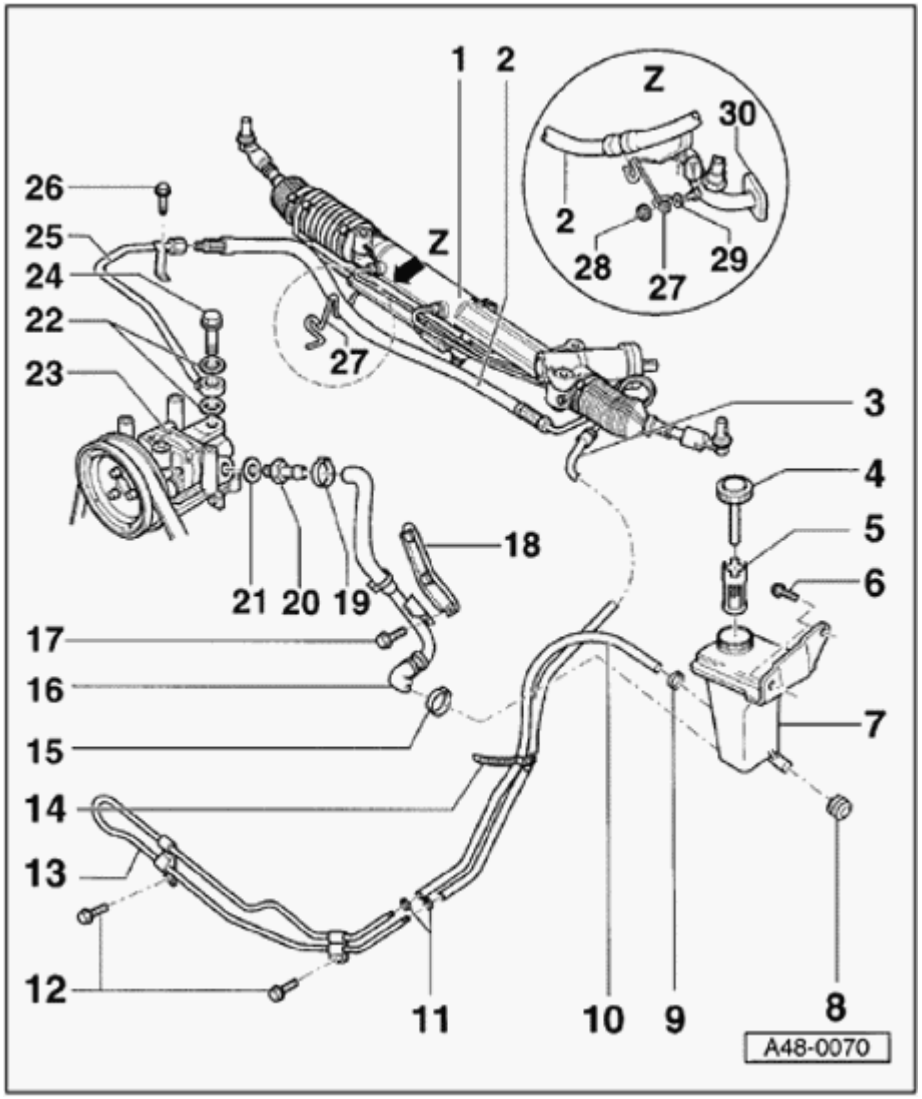
27 - Banjo bolt

- 50 Nm (37 ft lb)

28 - Power steering pump

- Fill with fluid before installing ⇒ CAUTION, page 48-27
- Installed on all 4-cyl. engines m.y. 98 ➢

48-31



Power steering hydraulic circuit (6-cyl. 2V engine), overview

1 - Power steering gear

2 - Flexible hose

3 - Return hose

4 - Cap with dipstick

- Checking hydraulic fluid level ⇒ page 48-22

5 - Strainer for expansion tank

- Integrated into reservoir

6 - Bolt

- 9 Nm (80 in. lb)

7 - Expansion tank

- Refill with hydraulic fluid, Part No. G 002 000
- Capacity: 0.7 liters (12 oz.)
- Checking hydraulic fluid level ⇒ page 48-22

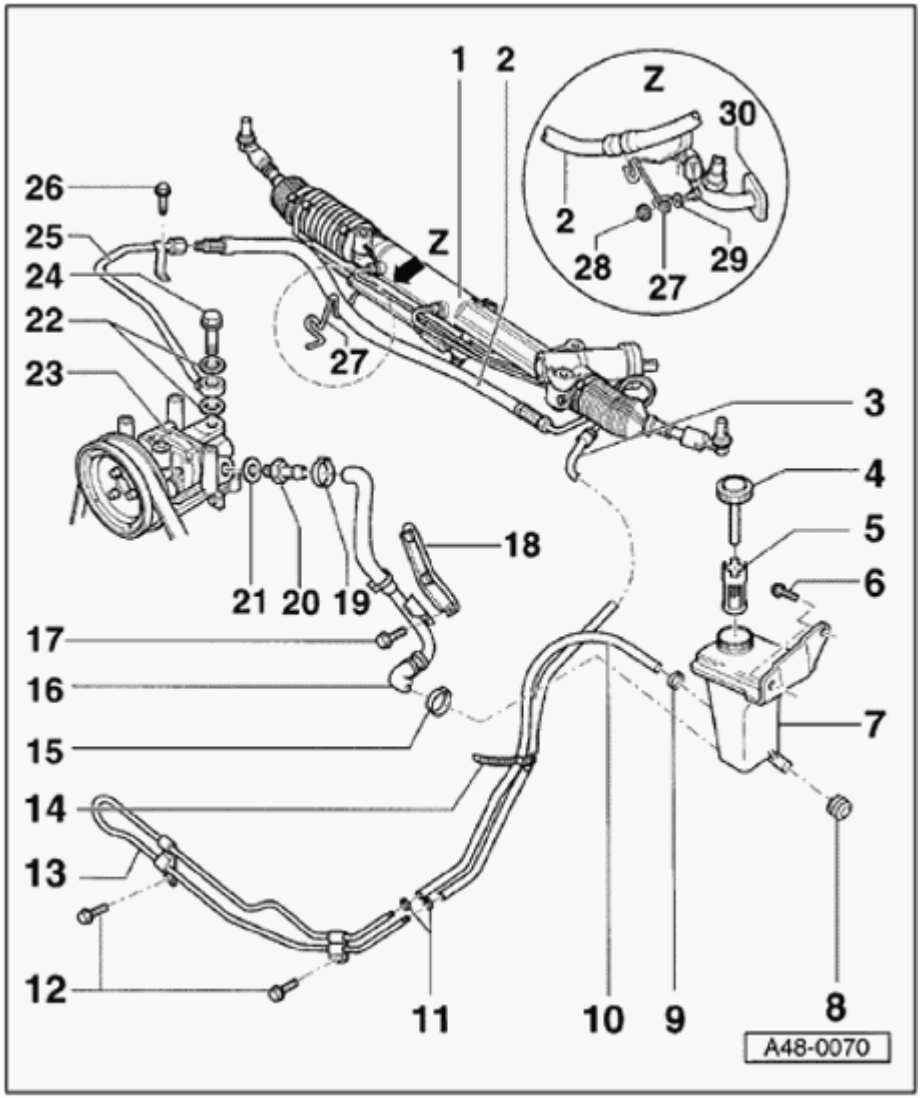
8 - Rubber mount

9 - Clamp

- Always replace

- Use VAG1275 to tighten

48-32



10 - Return hose

- Between expansion tank and oil cooler

11 - Clamps

- Always replace
- Use VAG1275 to tighten

12 - Bolt w/washer assembly

- 10 Nm (7 ft lb)

13 - Cooling line

14 - Cable strap

15 - Clamp

- Always replace
- Use VAG1275 to tighten

16 - Suction hose

17 - Bolt w/washer assembly

- 8 Nm (71 in. lb)

18 - Bracket

- Bolted to cylinder head

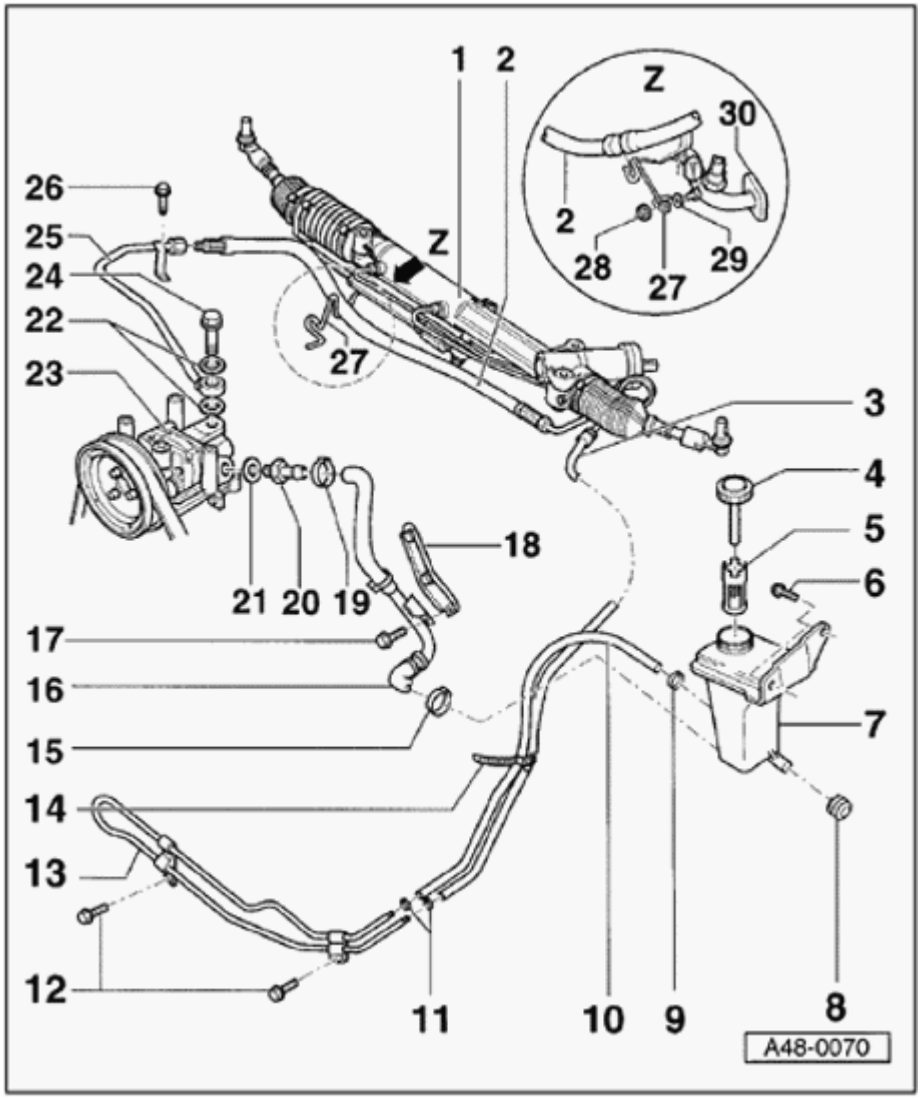
19 - Clamp

- Always replace
- Use VAG1275 to tighten

20 - Hose fitting

- 50 Nm (37 ft lb)

48-33



21 - Seal 18 x 24

- Always replace

22 - Seal 16 x 22

- Always replace

23 - Power steering pump

- Fill with fluid before installing ⇒ CAUTION, page 48-27

24 - Banjo bolt

- 50 Nm (37 ft lb)

25 - Supply line

- 40 Nm (30 ft lb)
- Counter-hold at hex on flexible hose when tightening fitting
- Mounted to intake manifold with bolt - 26 -

26 - Bolt

- 8 Nm (71 in. lb)

27 - Clip

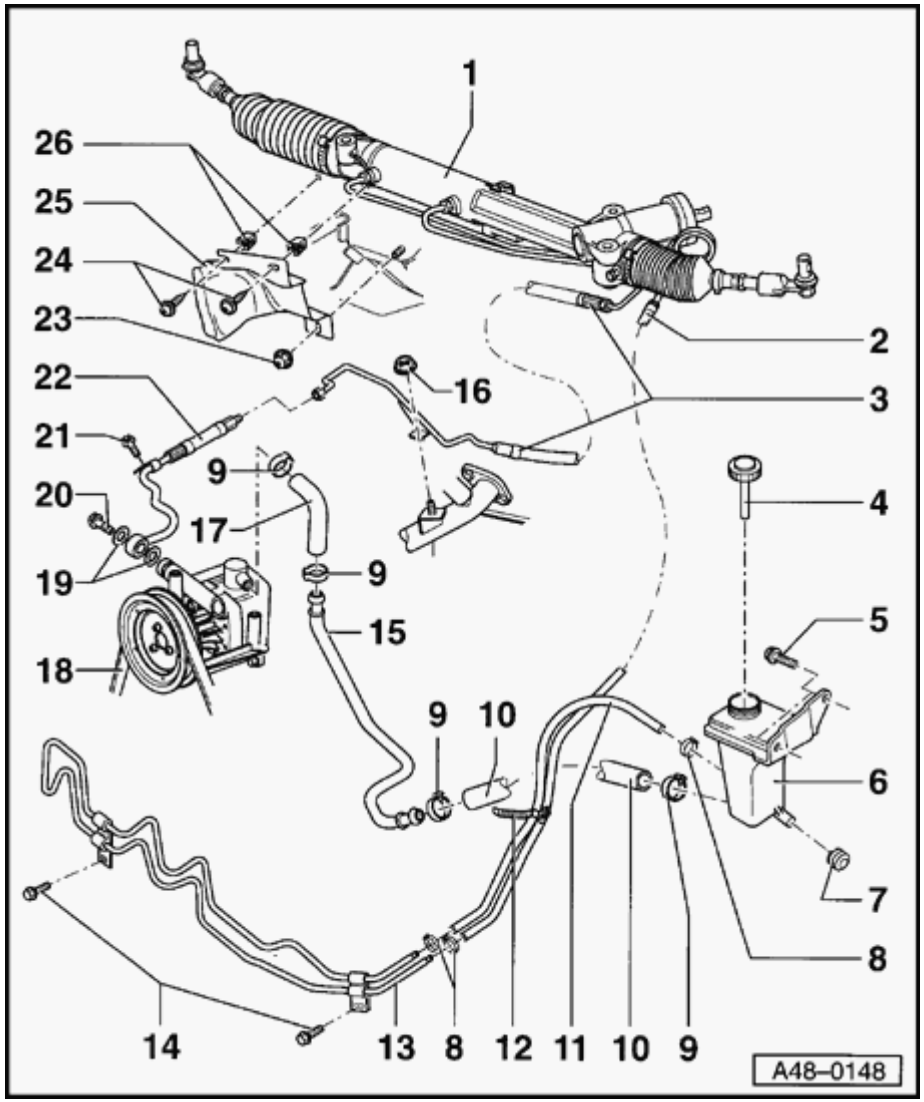
28 - Nut

- 20 Nm (15 ft lb)

29 - Washer

30 - Coolant line

48-34



Power steering hydraulic circuit (6-cyl. 5V engine), overview

Power steering pump model 4 (FP-4)

1 - Power steering gear

2 - Return hose

3 - Pressure hose

4 - Cap with dipstick

- Checking hydraulic fluid level ⇒ page 48-22

5 - Bolt

- 9 Nm (80 in. lb)

6 - Reservoir

7 - Rubber mount

8 - Clamp

- Use VAG1275 to tighten

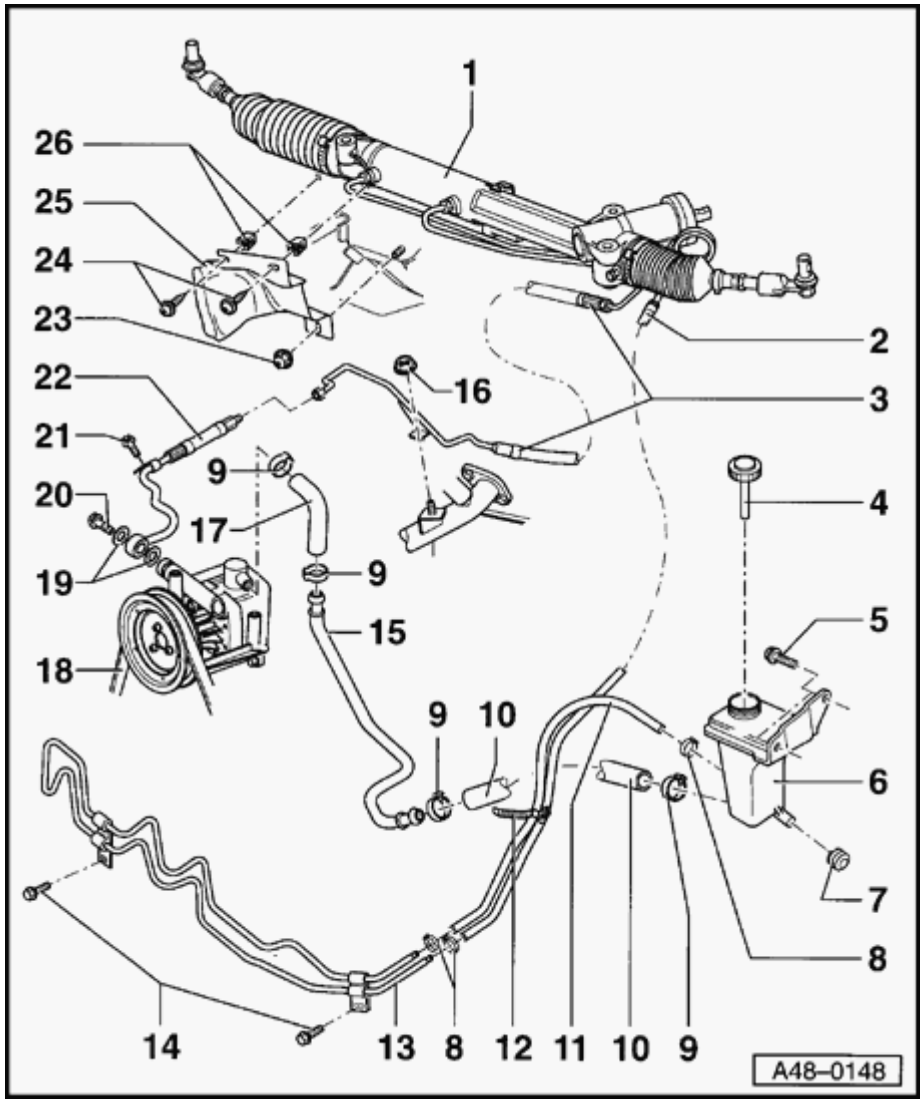
9 - Clamp

- Use VAG1275 to tighten

10 - Suction hose

- Fitting location ⇒ Fig. 2
- Marks must align

48-35



11 - Return hose

- Between reservoir and cooling line

12 - Cable strap

13 - Cooling line

14 - Torx® bolts (T-30)

- 9 Nm (80 in. lb)

15 - Line

- Marks must align with mark on suction hose

16 - Nut

- 20 Nm (15 ft lb)
- For attaching pressure hose to cooling line

17 - Suction hose

- Marking -P- faces pump

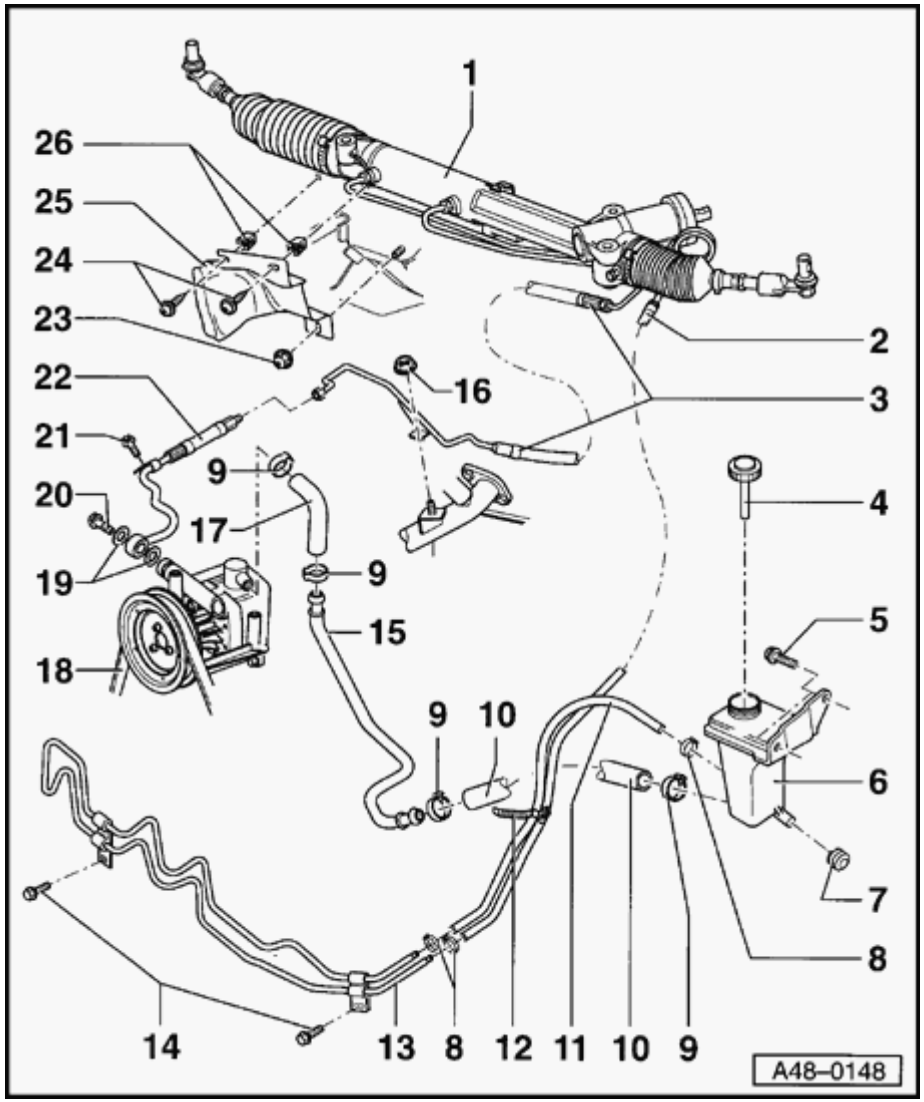
18 - Ribbed belt

- Mark running direction before removing

CAUTION!

Mark the running direction before removing. Reinstalling a used belt in reversed running direction could damage the belt.

48-36



19 - Seal 16 x 22

- Always replace

20 - Banjo bolt

- 50 Nm (37 ft lb)

21 - Bolt

- 6 Nm (53 in. lb)

22 - Pressure hose

23 - Speed nut

24 - Combi-bolt

25 - Guard plate

26 - Expanding nuts

48-37

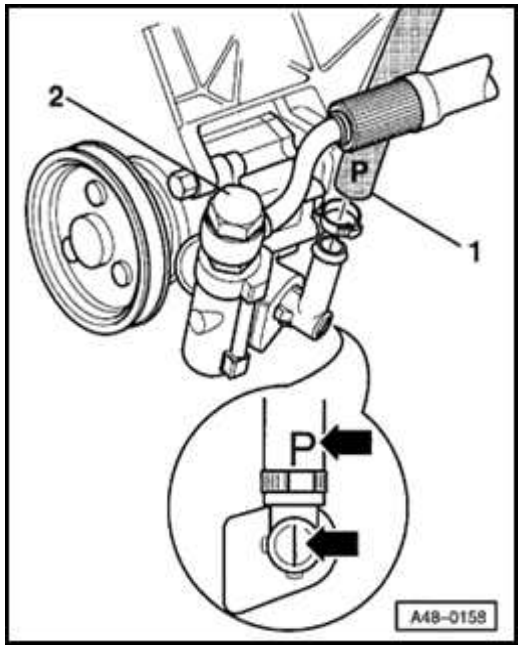


Fig. 1 Fitting location of suction hose at power steering pump (4-cyl. and V6 TDI engines)

- Mark -P- on suction hose must align with seam on pump

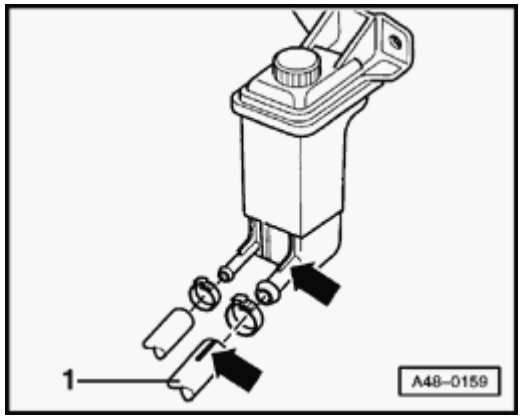


Fig. 2 Fitting location of suction hose at reservoir (all engines)

- Mark -1- on suction hose must align with seam on reservoir

Power steering pump, testing delivery

Power steering pump (4-cyl. engine), testing delivery

Special tools, test equipment and auxiliary items

- VAG1402
- VAG1402/3 adaptor
- 3094 hose clamps

Testing delivery

- Pinch off suction and return lines using 3094 hose clamps.
- Disconnect pressure line from power steering pump.
- Screw VAG1402/3 adapter into power steering pump in place of banjo bolt.
- Close pressure guage shutoff valve (lever set to left).

- Remove 3094 hose clamps.

- Start engine and top off fluid in reservoir (if necessary).

- Measure pressure reading at idle speed:

  - Do not measure for longer than 10 seconds

  - Specified value: 110-120 bar (1595-1740 psi)

If specified value is not attained:

- Replace power steering pump ⇒ page 48-56 .

  - Check hydraulic fluid level ⇒ page 48-22 .

  - Check steering system for leaks ⇒ page 48-25 .

  - Bleed steering system ⇒ page 48-24 .

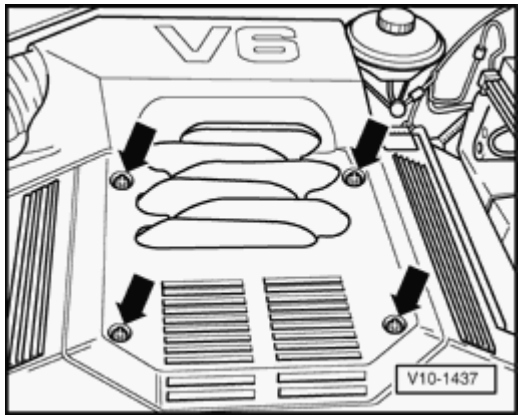
48-40

Power steering pump (6-cyl. engine), testing delivery

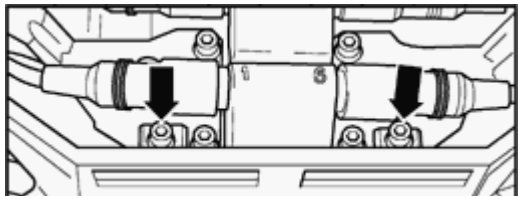
Special tools, test equipment and auxiliary items

- VAG1402
- VAG1402/3 adaptor
- 3094 hose clamp

Models with 6-cylinder engine



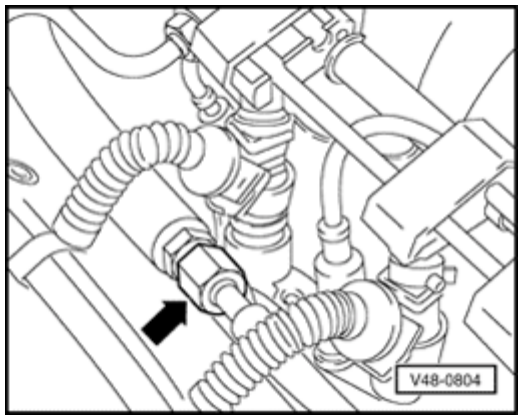
- Unclip top engine cover and remove.



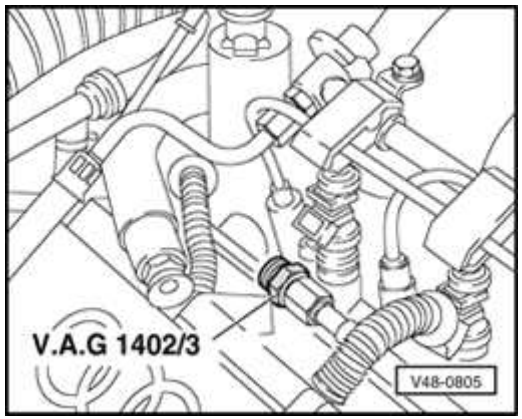
- Unbolt ribbed belt cover.

48-41

- Pinch off suction hose using 3094 hose clamp.

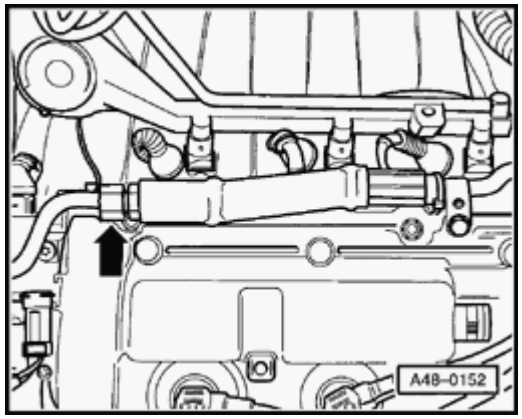


- Press spring clip and disconnect harness connector from fuel injector.
- Counter-hold at hex on flexible hose and remove supply line from flexible hose (arrow).

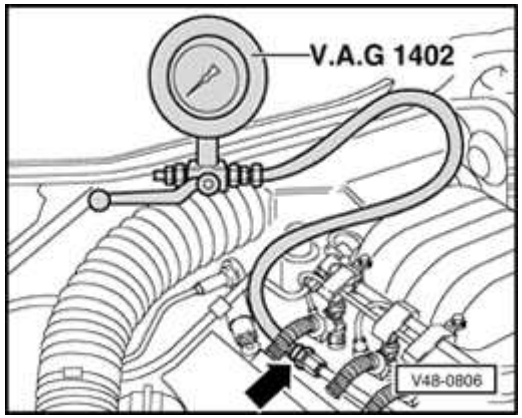


- On vehicles with V6 2V engine: screw VAG1402/3 adapter into power steering pump in place of flexible hose.

48-42



- On vehicles with V6 5V engine: counter-hold at hex on flexible hose and remove supply line from flexible hose (arrow).
- Screw VAG1402 pressure gauge hose to expansion hose.



- Screw VAG1402 pressure gauge hose to VAG1402/3 adapter.
- Close pressure gauge shut-off valve (lever positioned toward left).
- Reconnect fuel injector harness connector.
- Remove hose clamp from suction hose.
- Start engine and top off reservoir (if necessary).
- With engine idling, read power steering pump pressure on gauge.
  - Do not measure for longer than 10 seconds
  - Specified value: 110-120 bar (1595-1740 psi)

48-43

If specified value is not attained:

- Replace power steering pump ⇒ page 48-56 .

  - Check hydraulic fluid level ⇒ page 48-22 .

  - Check steering system for leaks ⇒ page 48-25 .

  - Bleed steering system ⇒ page 48-24 .

Power steering pump, removing and installing

Notes:

- *Power steering pumps cannot be repaired. If problems in the pump are suspected carry out pressure and leakage tests. Replace the pump if it is malfunctioning.*
- *Check steering system for leaks if the fluid level in the reservoir is low.*
- *If there are leaks at the line connections first tighten connections, wipe dry and then re-check for leaks.*
- *Checking the hydraulic fluid level* ⇒ *page 48-22* .
- *Bleeding the steering system* ⇒ *page 48-24* .
- *Checking the steering system for leaks* ⇒ *page 48-25* .
- *Type of hydraulic fluid: G 002 000*
- *Hydraulic system fluid capacity: 0.7-0.9 Liters*

(12-15 oz.)

CAUTION!

- ***Pumps supplied as replacement parts are not filled with fluid. Therefore it is essential to fill the pump with hydraulic fluid G 002 000 and to rotate pump several times by hand. Otherwise the pump may be damaged or be noisy during operation.***

- ***Part numbers are listed here for reference only. Always check with your Parts department for the latest information.***

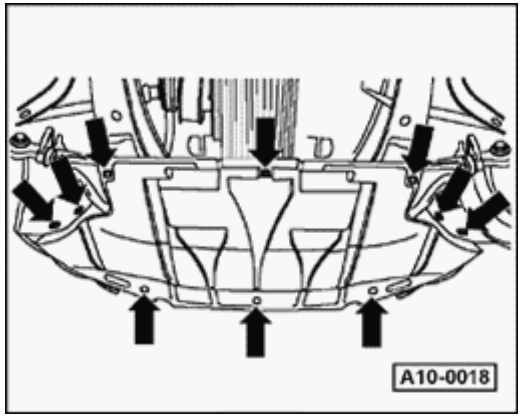
48-45

Power steering pump (4-cyl. engine), removing and installing

Special tools, test equipment and auxiliary items

3204	3369	3094
VAG1590		
Repair Manual, Body Exterior		
Repair Manual, Body Interior		
Repair Manual, Engine Mechanical		

Removing

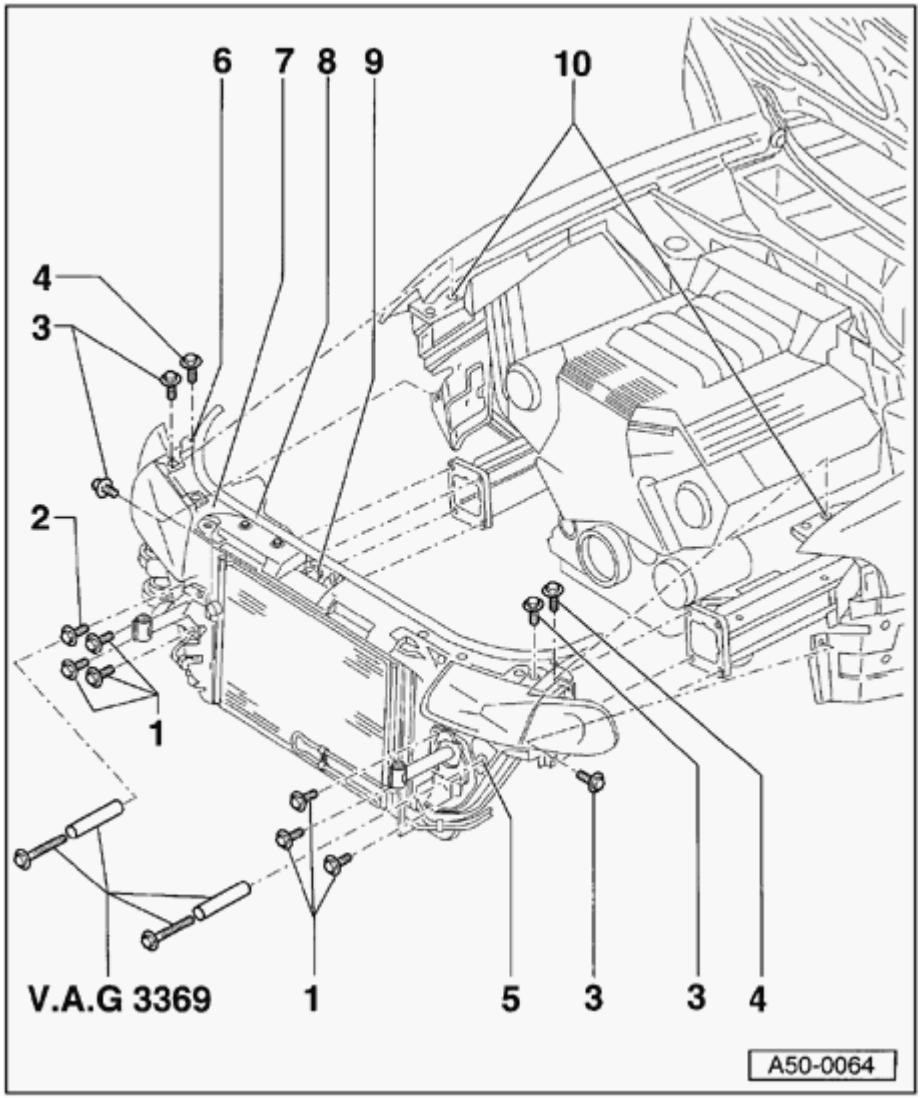


- Remove noise insulation panel.
- Remove front bumper:

⇒ *Repair Manual, Body Exterior, Repair Group 63*

- Move lock carrier to service position ⇒ page 48-46 .

48-46



Lock carrier, moving to service position

1 - Bolt (6x)

- 50 Nm (37 ft lb)

2 - Bolt

- 50 Nm (37 ft lb)

3 - Bolts (4x)

- 8 Nm (71 in. lb)

4 - Bolts (2x)

- 8 Nm (71 in. lb)

5 - Access hole for 3369 support tool

6 - Hole in front end

- For securing lock carrier in service position

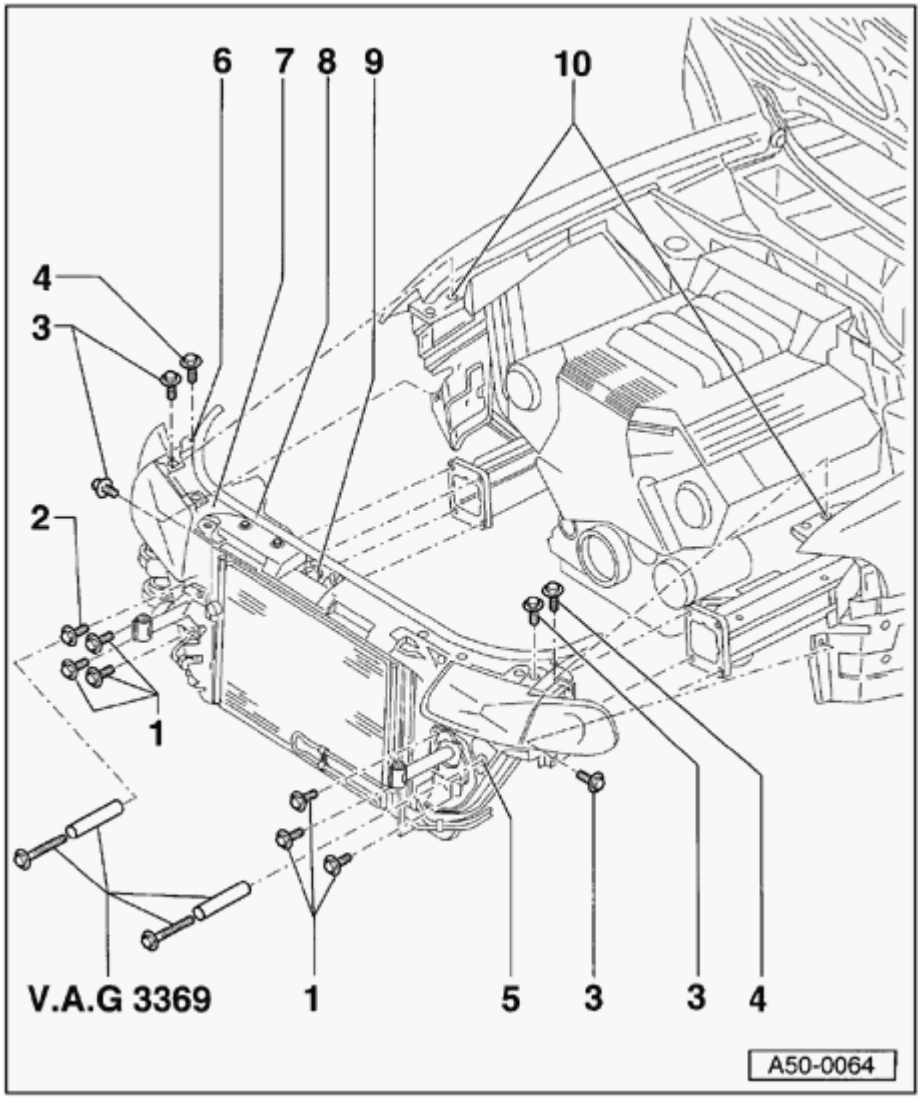
7 - Lock carrier

8 - Weather stripping for hood

9 - Bowden cable for hood

10 - Holes in side panel

48-47



Moving to service position

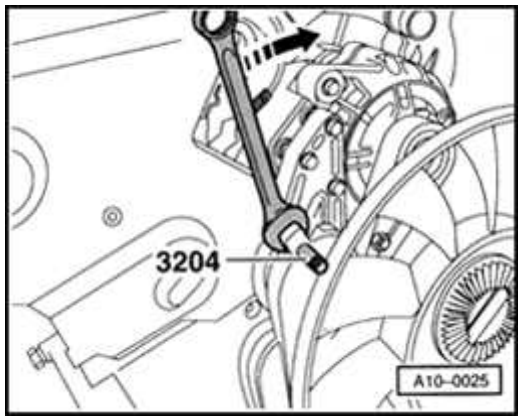
- Remove front bumper:

⇒ *Repair Manual, Body Exterior, Repair Group 63*

- Remove intake air duct located between lock carrier and air cleaner.
- Remove bolt - 2 - and install 3369 support tool on left and right-hand sides.
- Remove bolts - 1 -, - 3 - and - 4 - then pull lock carrier forward on 3369 support tool.

48-48

Removing ribbed belt on vehicles with 4-cyl. gasoline engine

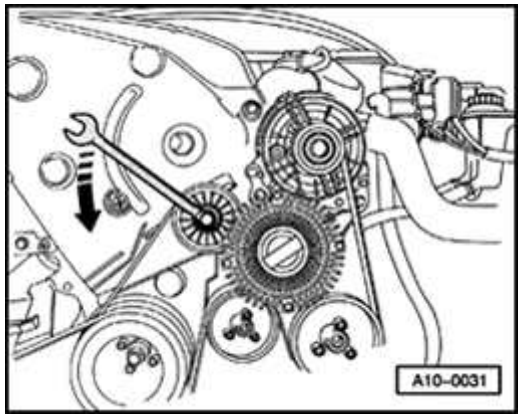


- Move tensioner in direction of arrow to loosen ribbed belt.
- Secure using 3204 drift.

CAUTION!

Mark the running direction before removing. Reinstalling a used belt in reversed running direction could damage the belt.

Removing ribbed belt on vehicles with 4-cyl. Diesel engine

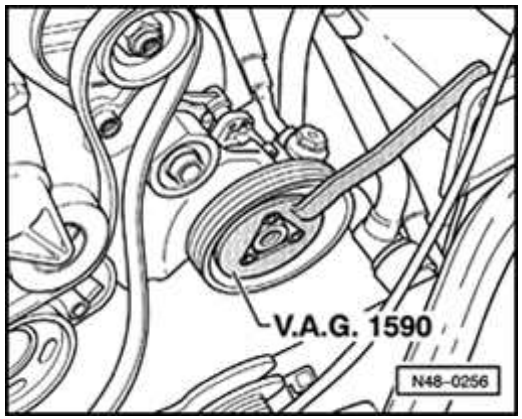


- Move tensioner in direction of arrow to loosen ribbed belt.

CAUTION!

Mark the running direction before removing. Reinstalling a used belt in reversed running direction could damage the belt.

48-49



Removing power steering pump pulley (vehicles with 4-cyl. gasoline engine)

- Remove coolant pump pulley.
- Remove ribbed belt.

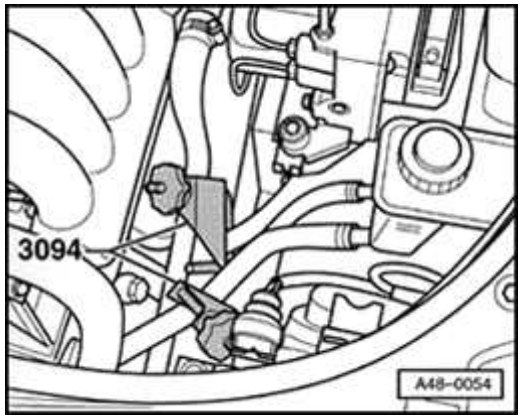
CAUTION!

Mark the running direction before removing. Reinstalling a used belt in reversed running direction could damage the belt.

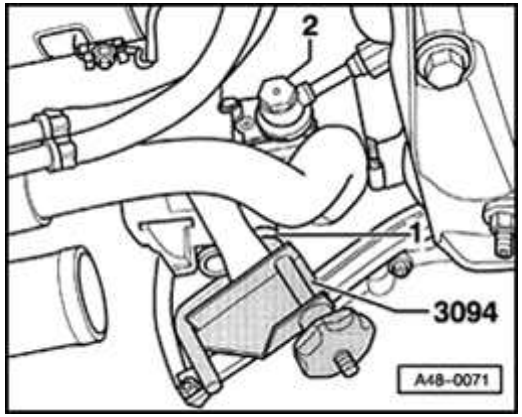
- Remove power steering pump pulley.
  - If necessary, file down corners of VAG1590 water pump wrench.

48-50

Removing power steering pump (all engines)



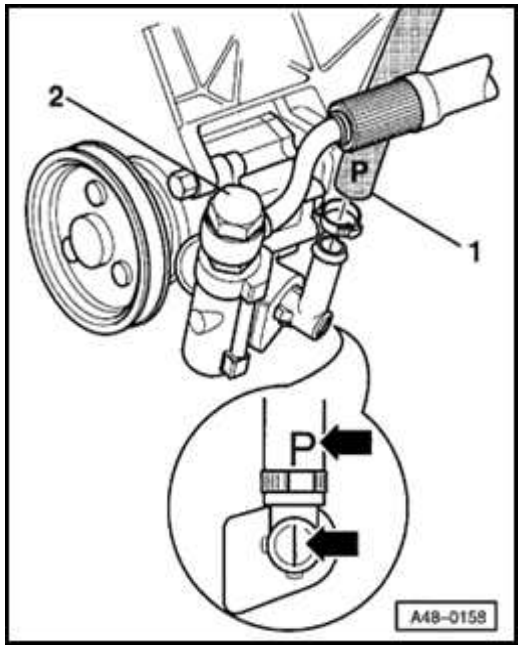
- Using 3094 hose clamps, pinch off suction and return hoses.
- Place oil catch pan in position.



- Remove hose clamp -1- from suction hose.
- Remove suction hose, press out of retainer and lay to side.
- Remove pressure line -2-.

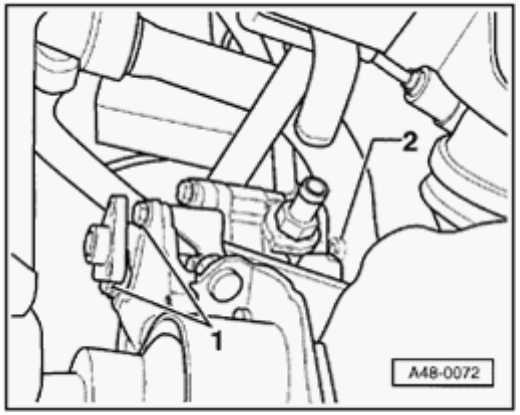
48-51

Removing power steering pump (power steering pump FP-4) m.y. 1997 >



<

- Remove hose clamp from suction hose -1-.
- Remove suction hose and lay to side.
- Remove expansion hose -2-.



<

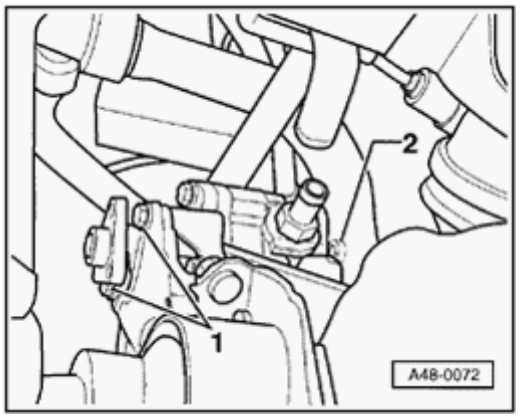
- Remove bolts -1- and socket-head bolt -2-.
- Remove pump.

48-52

Installing

Installation note:

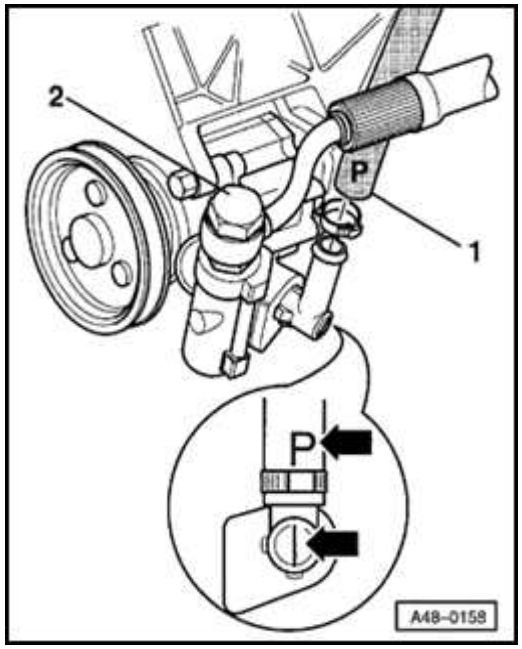
Before installing a new power steering pump, add hydraulic fluid to the suction end and turn the pump by hand until fluid emerges from the discharge end.



- Turn pump by hand until fluid emerges from discharge end.
- Tighten bolts -1- and -2-.

  Tightening torque: 20 Nm (15 ft lb)

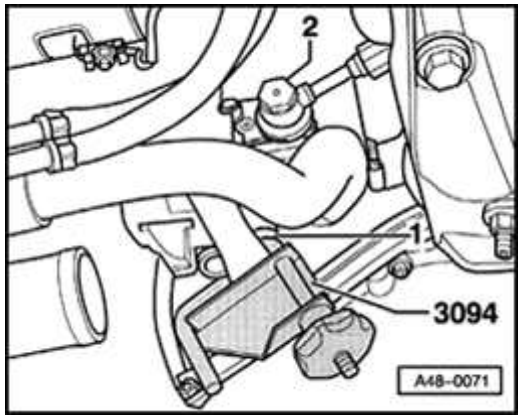
48-53



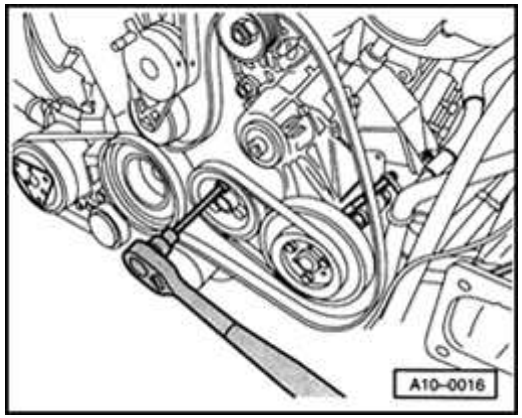
Installing power steering pump (power steering pump FP-4) m.y. 1997

- Install pressure line and tighten banjo bolt -2-.
  - Always replace seals
  - Tightening torque: 50 Nm (37 ft lb)
- Install suction hose -1-.
- Mark -P- (upper arrow) must align with seam on pump (lower arrow)
- Remove 3094 hose clamps.

48-54



- Install pressure line and tighten banjo bolt -2-.
  - Always replace seals
  - Tightening torque: 50 Nm (37 ft lb)
- Install suction hose -1-.

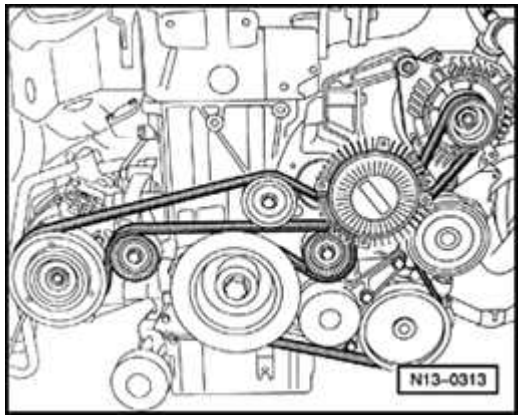


- Tighten socket-head bolts for coolant pump pulley.

  Tightening torque: 25 Nm (18 ft lb)
- Install fan at viscous coupling.

  Tightening torque: 10 Nm (7 ft lb)

48-55



- Install ribbed belt.

CAUTION!

- ***Mark the running direction before removing. Reinstalling a used belt in reversed running direction could damage the belt.***
- ***Make sure that the belt is correctly seated in the pulleys.***

Note:

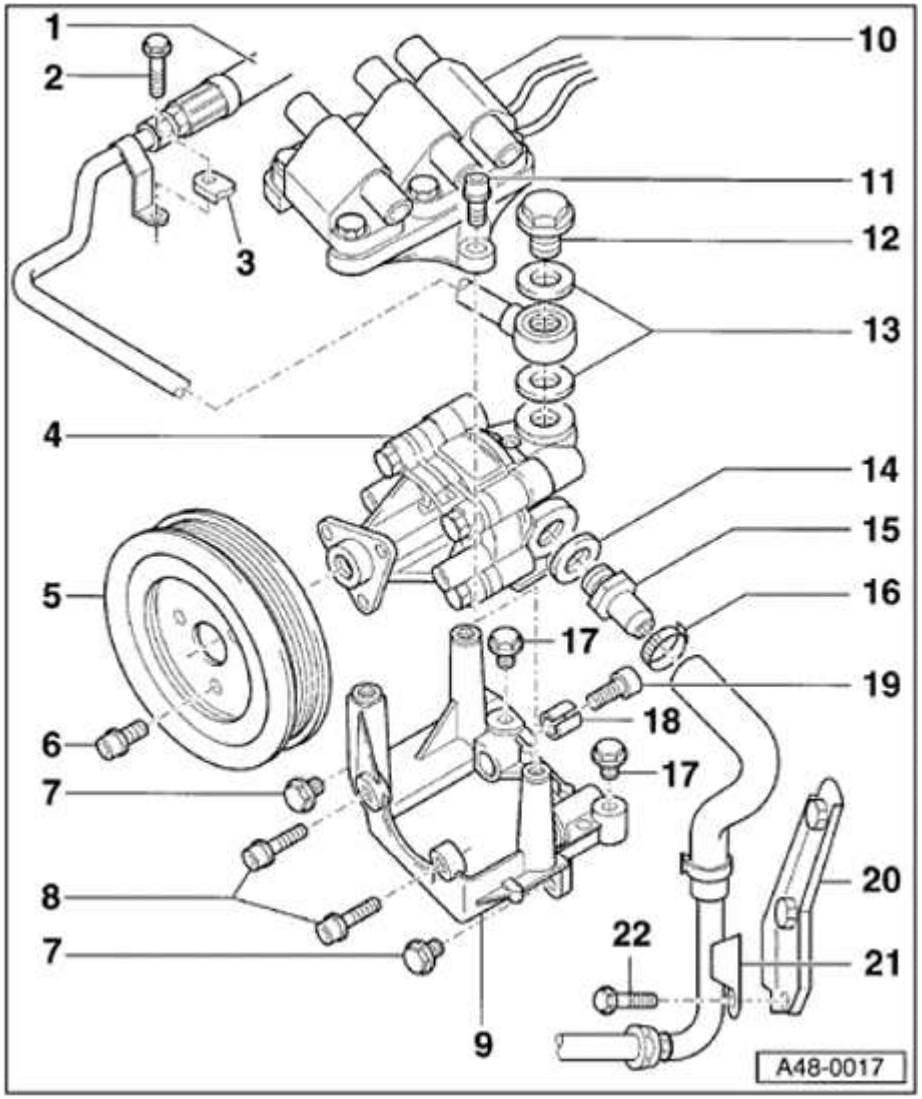
Illustration is shown without the lock carrier installed for greater clarity.

- Top off hydraulic fluid ⇒ page 48-22 .
- Install bumper:

⇒ *Repair Manual, Body Exterior, Repair Group 63*

- Start engine and make sure ribbed belt runs properly.
- Check hydraulic fluid level ⇒ page 48-22 .
- Bleed steering system ⇒ page 48-24 .
- Check steering system for leaks ⇒ page 48-25 .

48-56



Power steering pump (6-cyl. engine), removing and installing

Notes:

- *Always replace seals.*
- *Do not reuse hydraulic fluid.*
- *The power steering system uses hydraulic fluid, Part No. G 002 000.*
- *System hydraulic fluid capacity: approx. 1 liter (1 qt).*

1 - Pressure line with hose

2 - Bolt

- 8 Nm (71 in. lb)

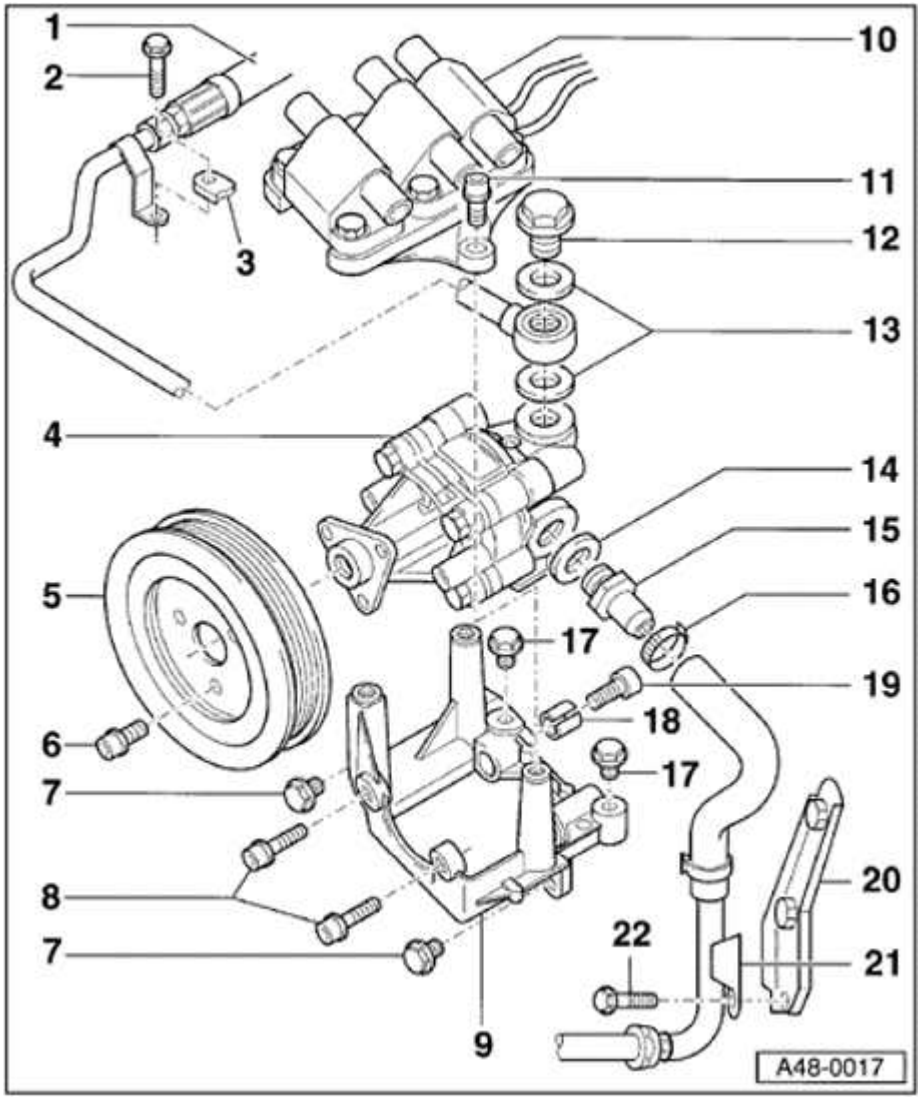
3 - Plate with mounting hole

- At intake manifold
- For mounting line - 1 -

4 - Power steering pump

- Fill with hydraulic fluid before installing ⇒ Notes, page 48-27

48-57



5 - Belt pulley

6 - Socket-head bolts

- 25 Nm (18 ft lb)
- Counterhold using VAG1590 (if applicable) while loosening and tightening

7 - Bolts

- 25 Nm (18 ft lb)

8 - Socket-head bolts

- 25 Nm (18 ft lb)

9 - Power steering pump bracket

10 - Ignition coils with bracket

11 - Socket-head bolt

- 25 Nm (18 ft lb)

12 - Banjo bolt

- 40 Nm (30 ft lb)

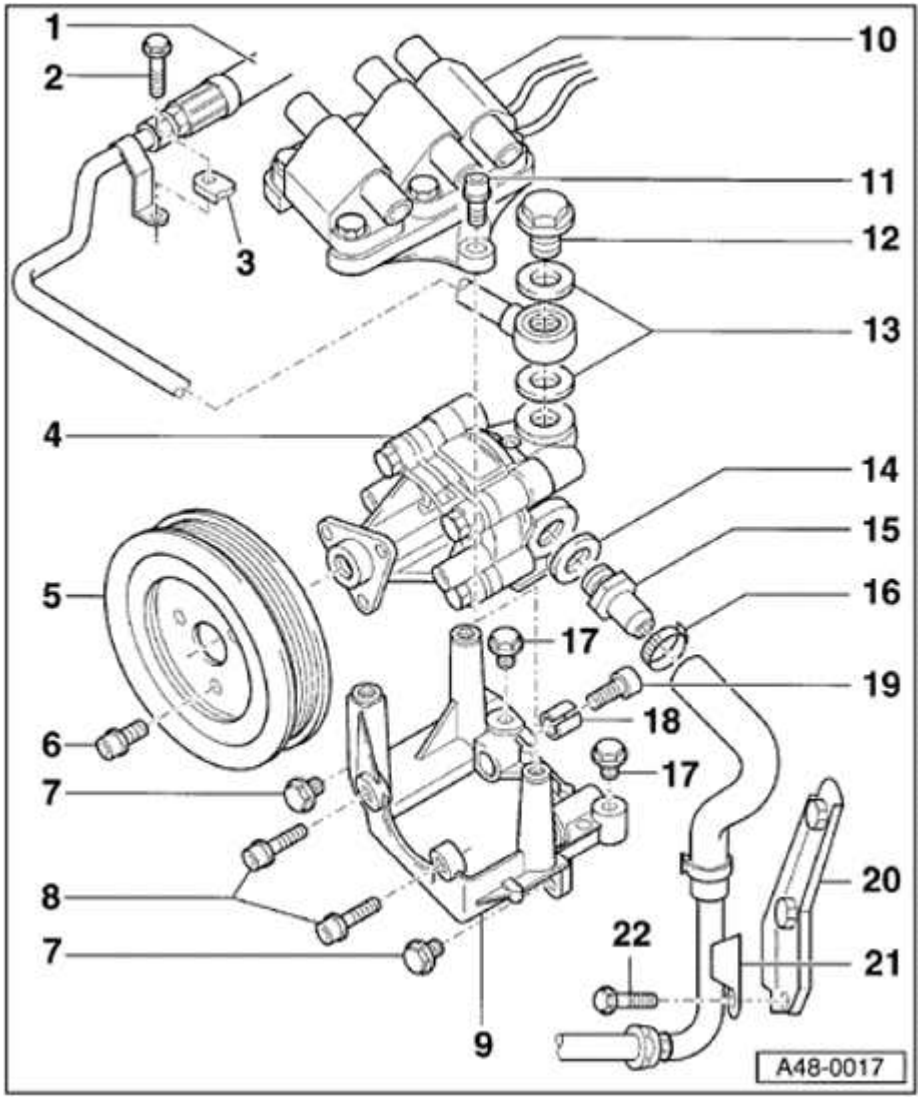
13 - Seals 16 x 22

- Always replace

14 - Seal 18 x 24

- Always replace
- 6 cyl. 2V gasoline engine only

48-58



15 - Line union

- 50 Nm (37 ft lb)
- Vehicles with V6 2V gasoline engine
- Vehicles with power steering pump: FP-3

16 - Clamp

- Always replace
- Use VAG1275 to tighten

17 - Bolts

- 25 Nm (18 ft lb)

18 - Slotted bushing

19 - Socket-head bolt

- 25 Nm (18 ft lb)

20 - Bracket

21 - Suction line with hose

22 - Bolt

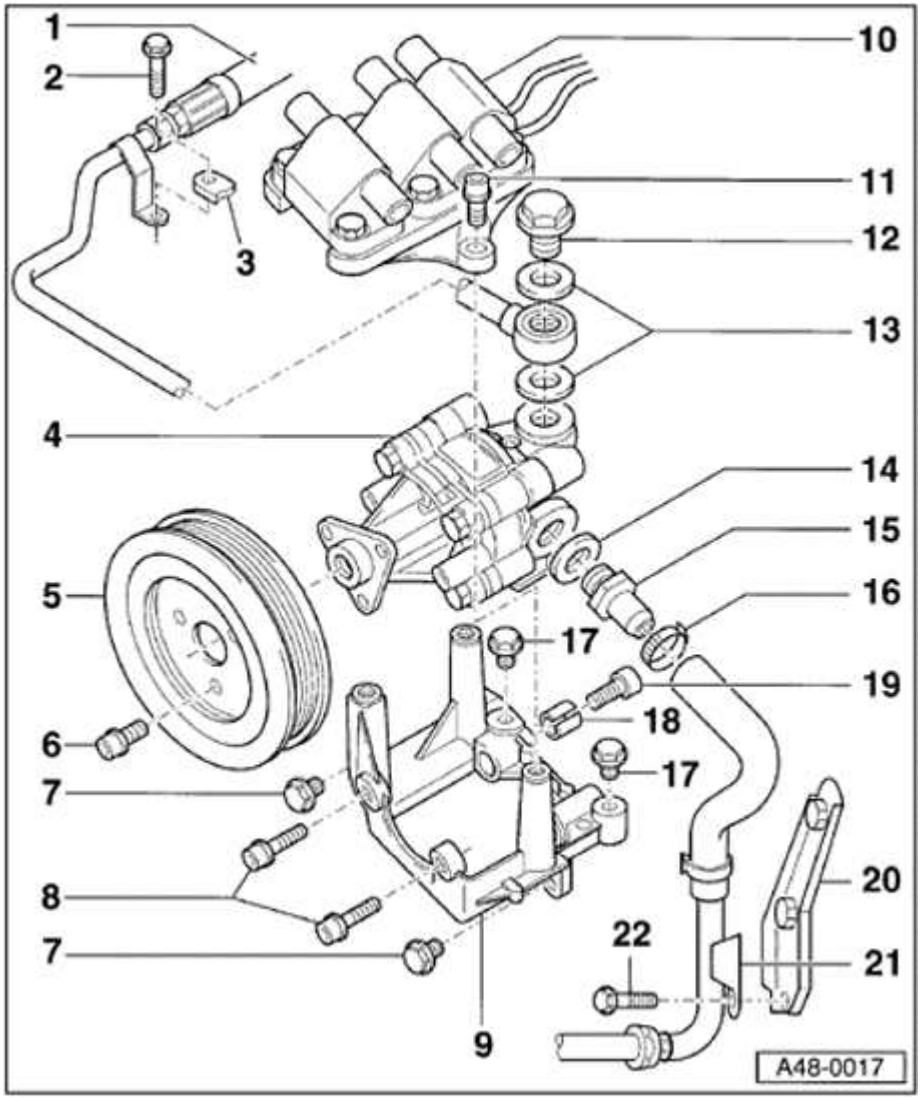
- 8 Nm (71 in. lb)

Removing

- Unclip and remove engine cover ⇒ Fig. 1 .
- Unbolt and remove cover for ribbed belt

⇒ Fig. 2 .

48-59



- Loosen and remove ribbed belt ⇒ Fig. 3 .
- Counterhold belt pulley - 5 - using VAG1590 (if applicable) and remove.
- Disconnect ignition wires from ignition coils - 10 - .
- Pinch off suction hose using 3094 hose clamp.
- Remove pressure and suction lines.
- Unbolt bracket - 9 - and remove together with pump - 4 -.
- Remove bolts mounting pump to bracket and remove pump.

Installing

- Install in reverse order of removal.

Note:

The ignition wires must be correctly reinstalled in the correct firing order ⇒ Fig. 4 .

48-60

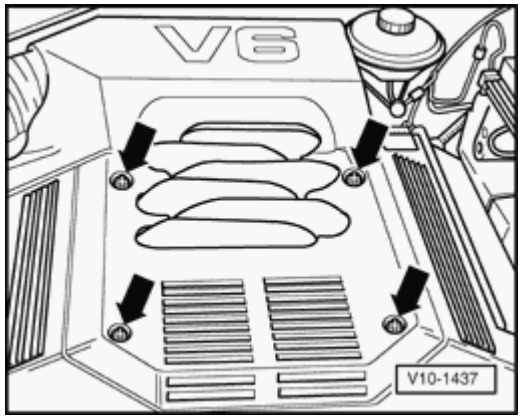


Fig. 1 Unclipping and removing top engine cover

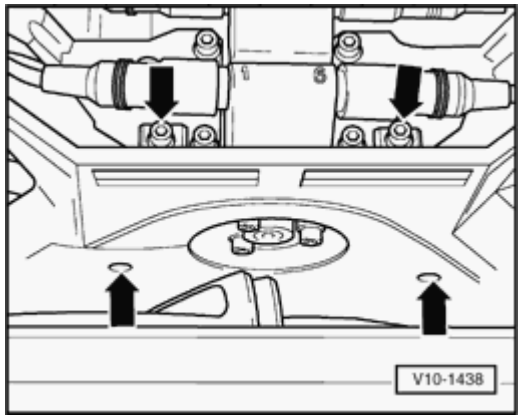


Fig. 2 Unbolting ribbed belt cover

48-61

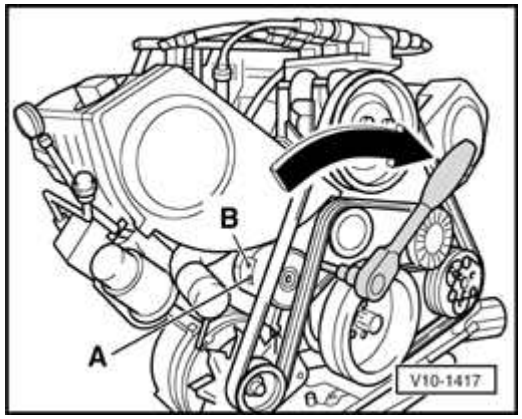


Fig. 3 Loosening and removing ribbed belt

- Using 17 mm hex wrench, turn clockwise (arrow) to loosen ribbed belt.
- Align holes -A- and -B-.
- Insert 3204 drift to lock tensioner in position.
- Remove ribbed belt from belt pulley.

CAUTION!

Mark the running direction before removing. Reinstalling a used belt in reversed running direction could damage the belt.

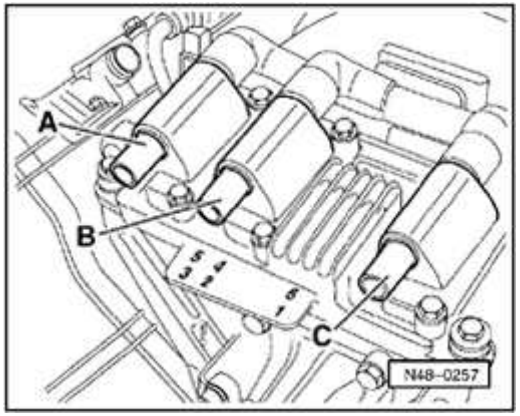


Fig. 4 Assignment of ignition wires to ignition coils

A - Ignition coil for cylinders 5 and 3

B - Ignition coil for cylinders 4 and 2

C - Ignition coil for cylinders 6 and 1

The ignition wires are numbered from 1 to 6:

- Connect ignition wires 5 and 3 to ignition coil -A-.
- Connect ignition wires 4 and 2 to ignition coil -B-.
- Connect ignition wires 6 and 1 to ignition coil -C-.

Airbag

Airbag system, safety precautions

WARNING!

- ***Airbag components must only be checked, removed, installed and/or repaired by qualified Service department personnel.***
- ***NEVER conduct tests on airbag system components with a test light or multimeter.***
- ***The airbag system must only be checked when installed in the vehicle, using the VAG1551 scan tool.***
- ***Before starting work on any part of the airbag system, disconnect the battery Ground (GND) strap. No waiting time is necessary after disconnecting the battery. When reconnecting the airbag system to a power supply source (i.e. reconnecting the Ground strap), the passenger compartment must NOT be occupied.***

CAUTION!

- ***Airbag units must be installed immediately after being removed from their packaging.***

- ***If the work is interrupted during the installation, return the airbag unit to its packaging.***

- ***DO NOT leave an airbag unit unattended.***

CAUTION!

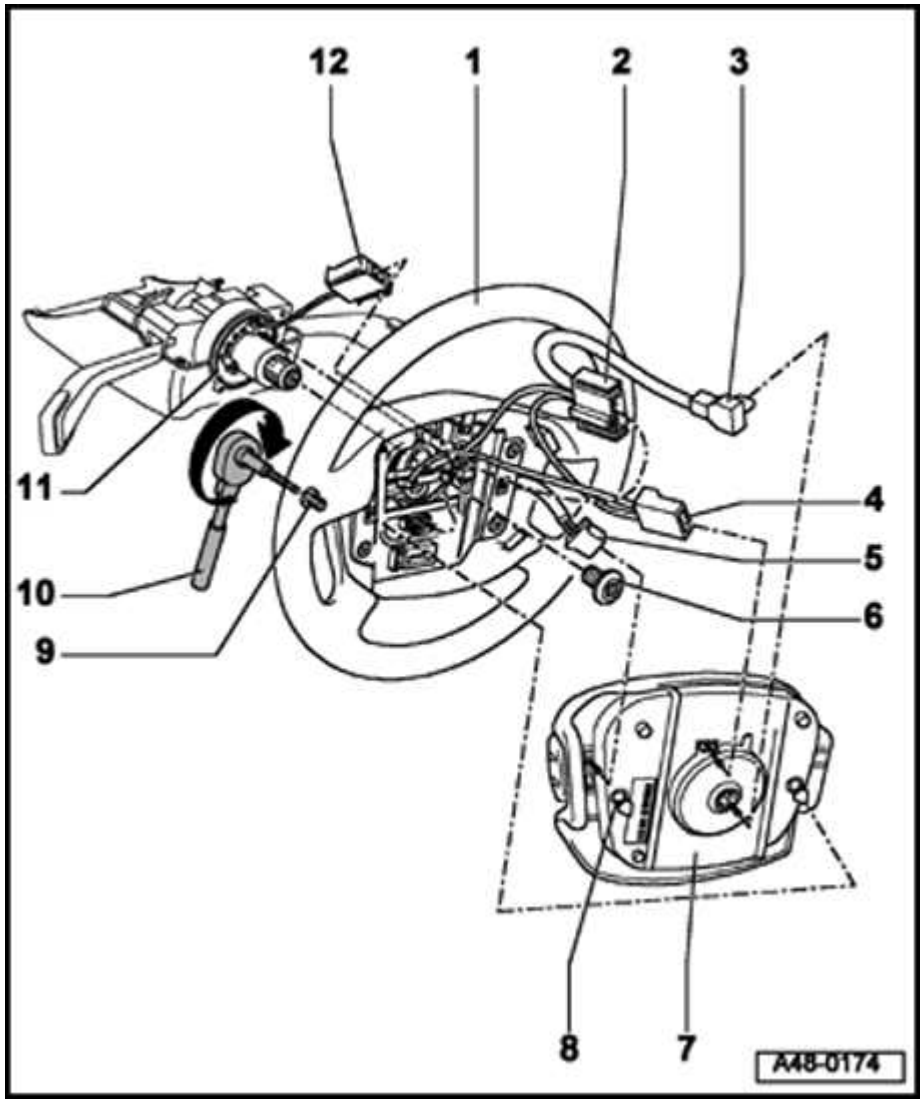
- ***After removal from the vehicle, ALWAYS set the airbag unit down with padded side facing upward.***
- ***Airbag system components must not be opened, disassembled or repaired. Always use new parts.***
- ***Airbag units which have dropped onto a hard surface or show signs of damage must not be installed in the vehicle.***
- ***Airbag units have a limited service life. Airbag units must be replaced after 14 years. On vehicles ➢ m.y. 1997, also replace sticker on B-pillar. On vehicles m.y. 1997 ➢ there is no longer a sticker on B-pillar, replacement info. must be recorded in the service record.***
- ***Airbag units which have not been activated should be placed in the airbag unit transport container, marked and returned to the Warranty Parts Test Center for proper disposal. DO NOT deploy airbag in the vehicle.***
- ***NEVER treat airbag units with grease,***

cleaners or similar materials.

- ***NEVER expose airbag units to temperatures above 100° C (212° F), even for short periods.***

Removing and installing airbag unit:

⇒ *Repair Manual, Body Interior, Repair Group 69*



Driver-side airbag unit, removing and installing

WARNING!

Observe all safety precautions before starting work on any part of the airbag system ⇒ ***page 48-62*** .

1 - Steering wheel

- Removing and installing ⇒ page 48-67
- Secure loose wiring

2 - Harness connector for spiral spring

3 - Harness connector for airbag unit

4 - Harness connector for electrostatic discharge

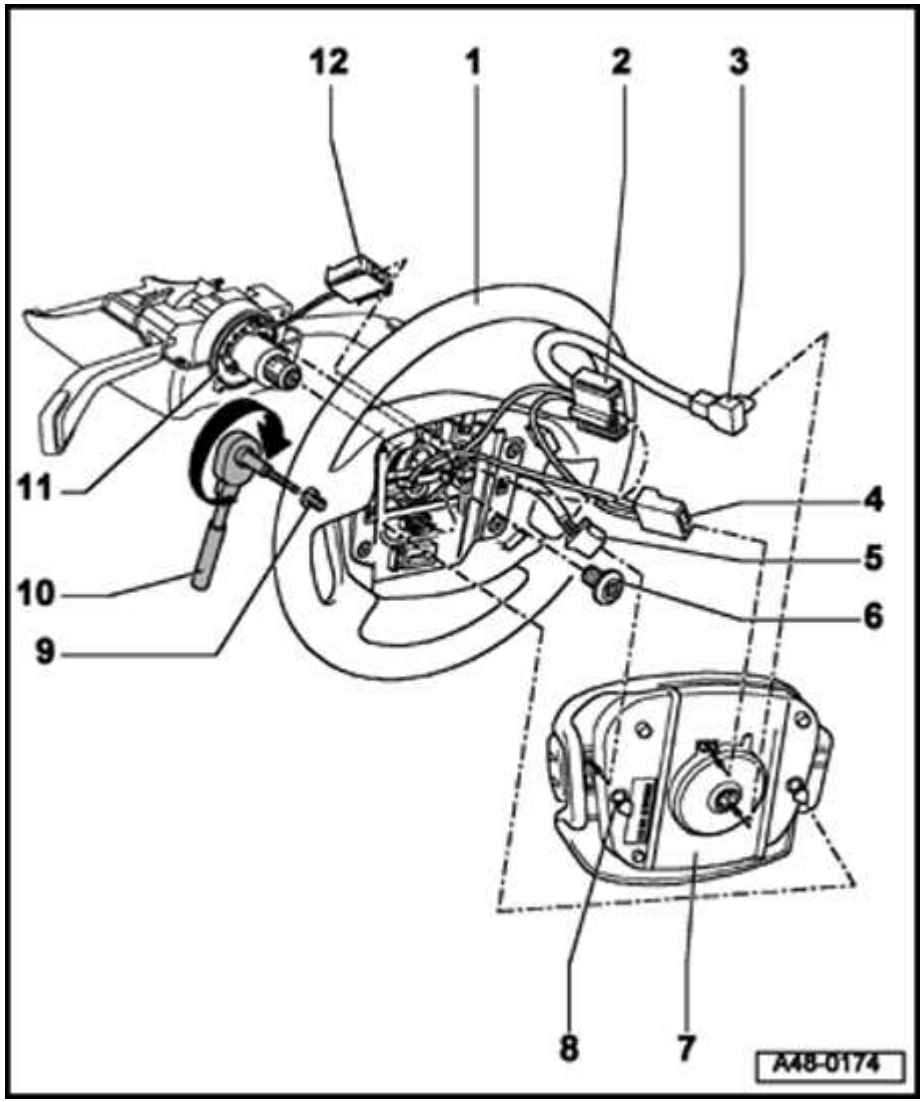
- ➢ 1998 m.y. only

5 - Multi-function harness connector

- Vehicles with multi-function feature only

6 - Multi-point socket head bolt

- Always replace
- 60 Nm (44 ft lb)



7 - Airbag unit

8 - Locking lugs

9 - Torx® screws

- 7 ± 1 Nm (62 ± 9 in. lb)
- M.y. 1998 ➢ locking lugs - 8 - replaced with Torx® screws

10 - Torx® bit socket (T30)

11 - Self-cancelling ring, spiral spring and slip ring

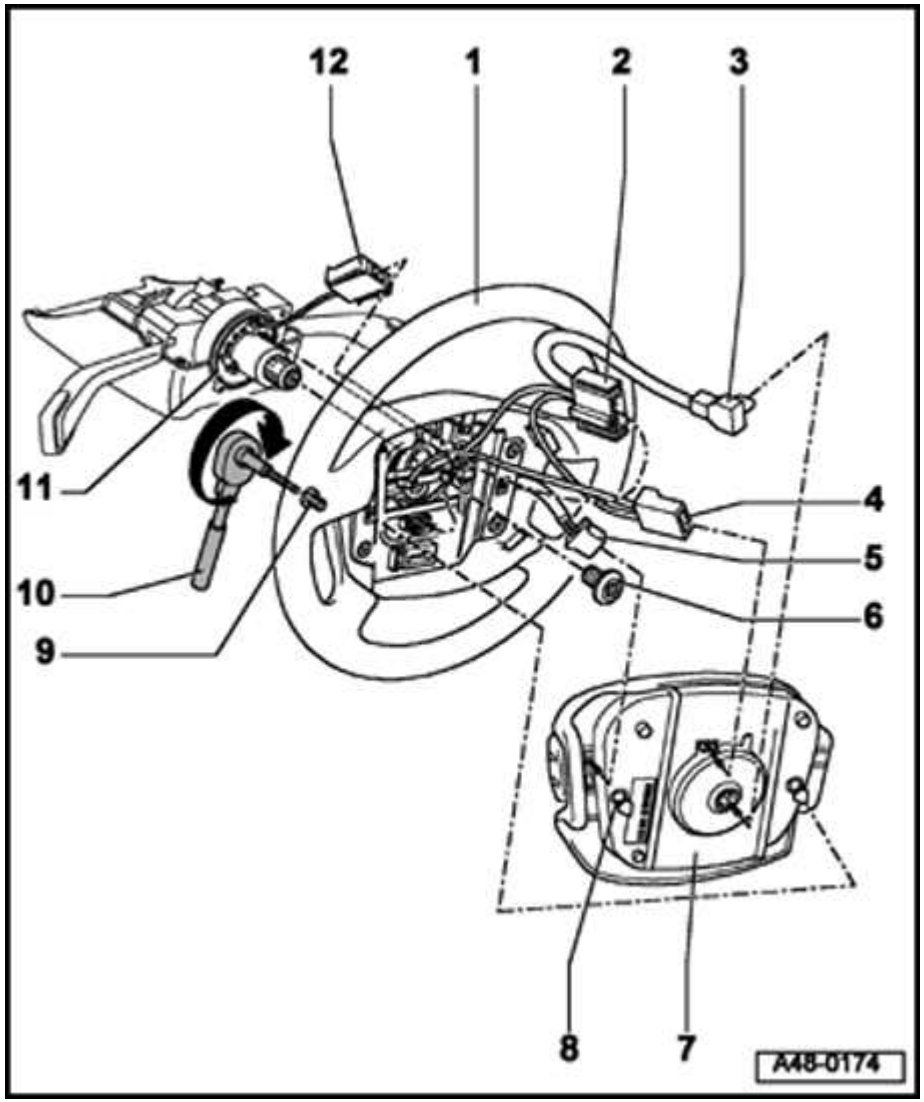
12 - Harness connector for heated steering wheel

Removing

WARNING!

Observe all safety precautions before starting work on any part of the airbag system ⇒ ***page 48-62*** .

- Release steering column adjustment mechanism.
- Pull steering wheel outward and upward as far as possible.
- Turn steering wheel so that hub and spokes are in vertical position.



- Unscrew Torx® screws (in direction indicated by arrow) and remove airbag unit.
- Disconnect harness connectors - 3 - and - 4 - from airbag unit.
- Place airbag unit down with padded side facing upward.

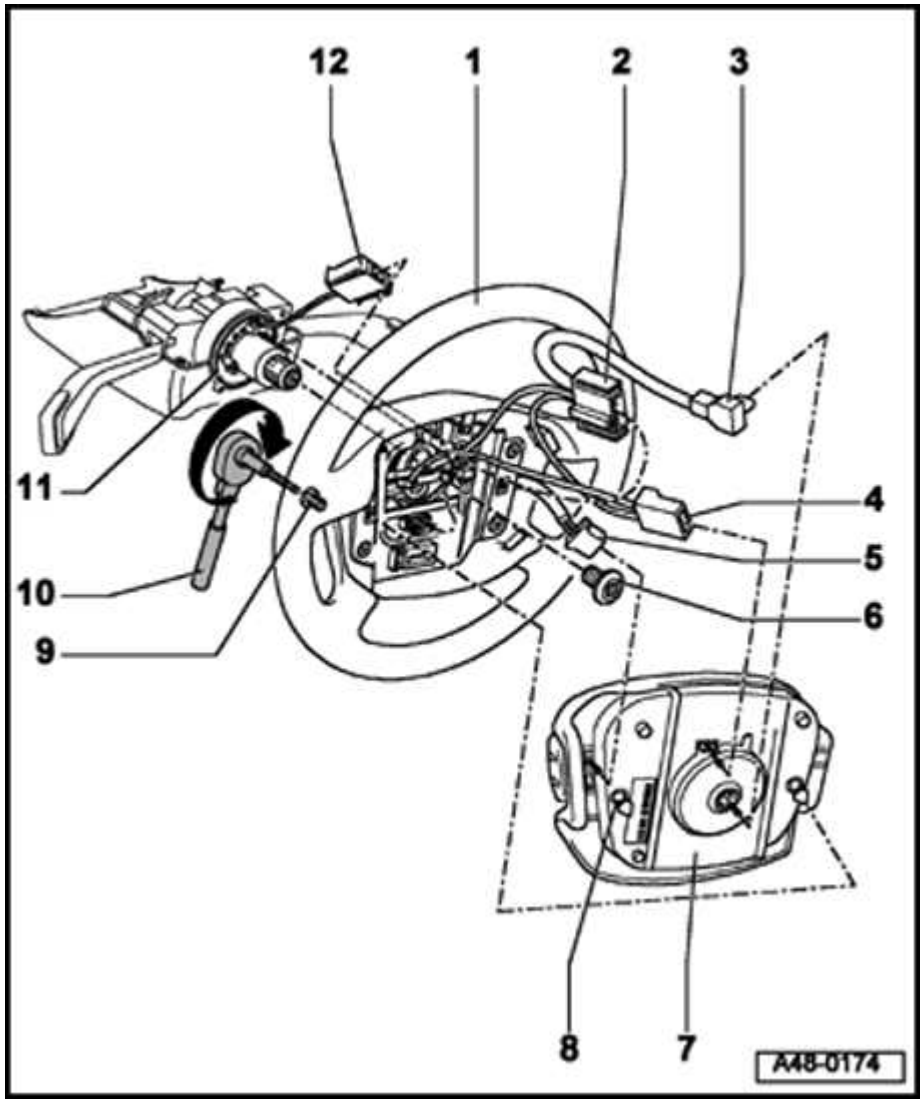
Installing

- Make sure harness connectors and airbag unit engage properly (with audible click).

WARNING!

Make sure the passenger compartment is not occupied before connecting the battery Ground (GND) strap.

- Switch ignition on then connect battery Ground (GND) strap.



Steering wheel, removing and installing

WARNING!

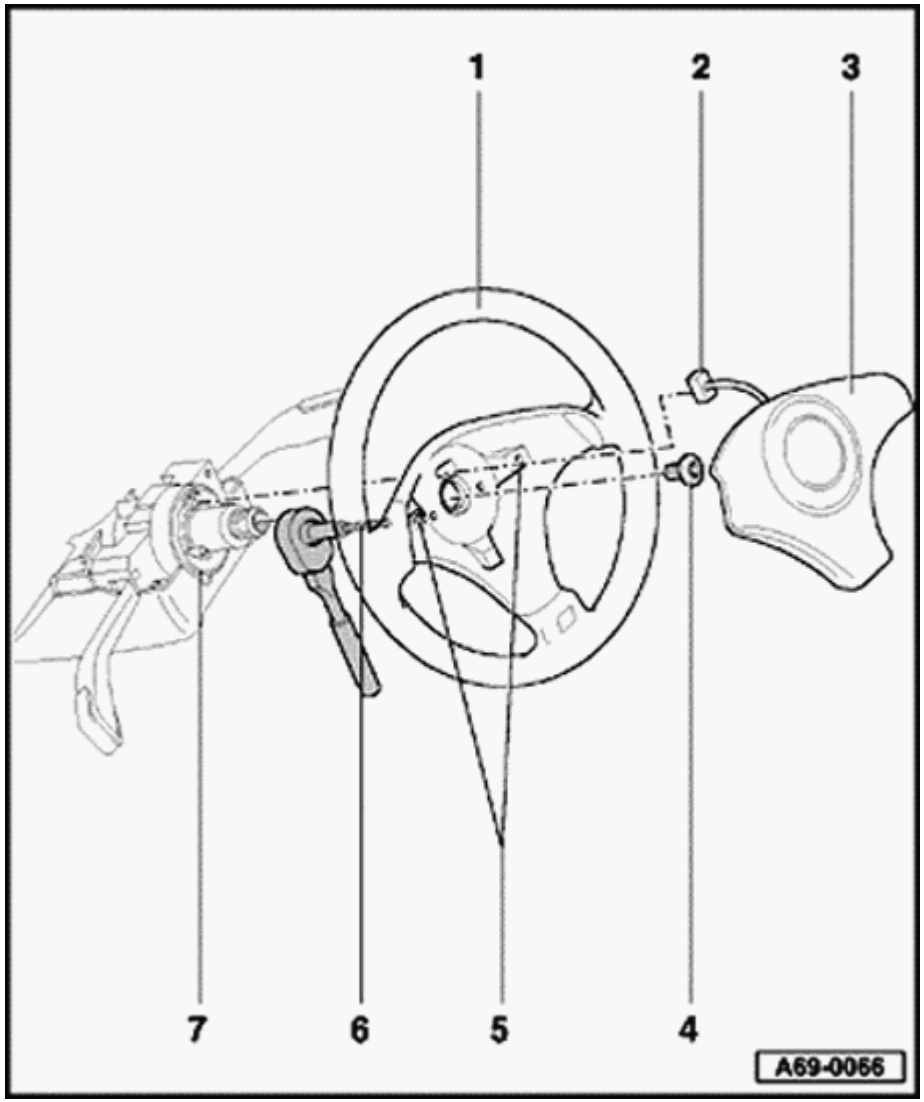
Observe all safety precautions before starting work on any part of the airbag system ⇒ page 48-62 .

Removing

- Remove airbag unit ⇒ page 48-64 .
- Turn steering wheel to center position (wheels straight-ahead).
- Remove bolt - 6 -.
- Disconnect harness connectors - 2 - and - 12 -.

Installing

- Install steering wheel in center position (wheels straight-ahead).
- Make sure harness connectors engage properly (with audible click).
- Install new bolt - 6 - and tighten to 60 Nm (44 ft lb).
- Install airbag unit ⇒ page ⇒ Page 48-64 .



Driver-side airbag unit (sport steering wheel), removing and installing

WARNING!

Observe all safety precautions before starting work on any part of the airbag system ⇒ ***page 48-62*** .

1 - Steering wheel

- Removing and installing ⇒ page 48-70

2 - Harness connector for spiral spring

3 - Airbag unit

4 - Multi-point socket-head bolt

- Always replace
- 60 Nm (44 ft lb)

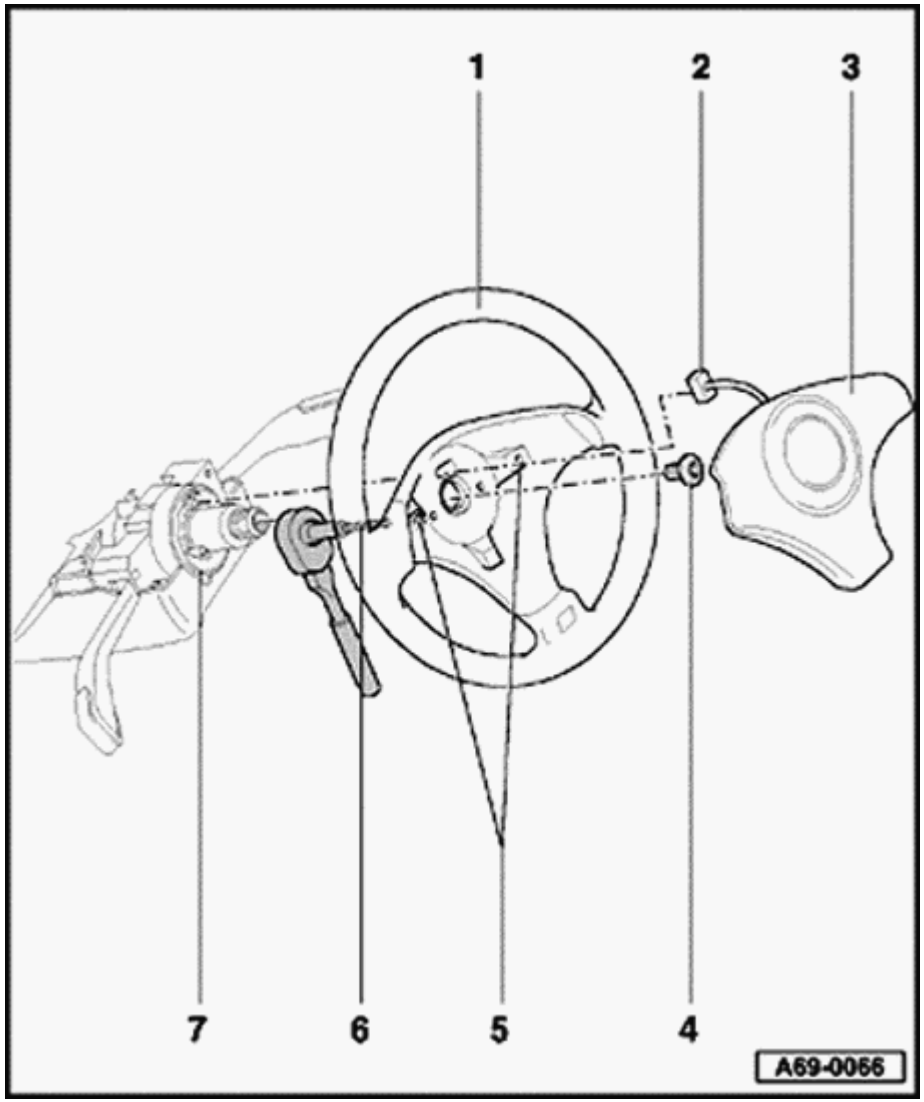
5 - Torx® bolts (T30)

- 7 Nm (62 in. lb)

6 - Torx® bit socket (T30)

7 - Self canceling ring, spiral spring and slip ring

48-69



Removing

- Using Torx® bit socket (T30) remove bolts mounting airbag unit.
- Disconnect harness connector - 2 -.
- Place airbag unit down with padded side facing upward.

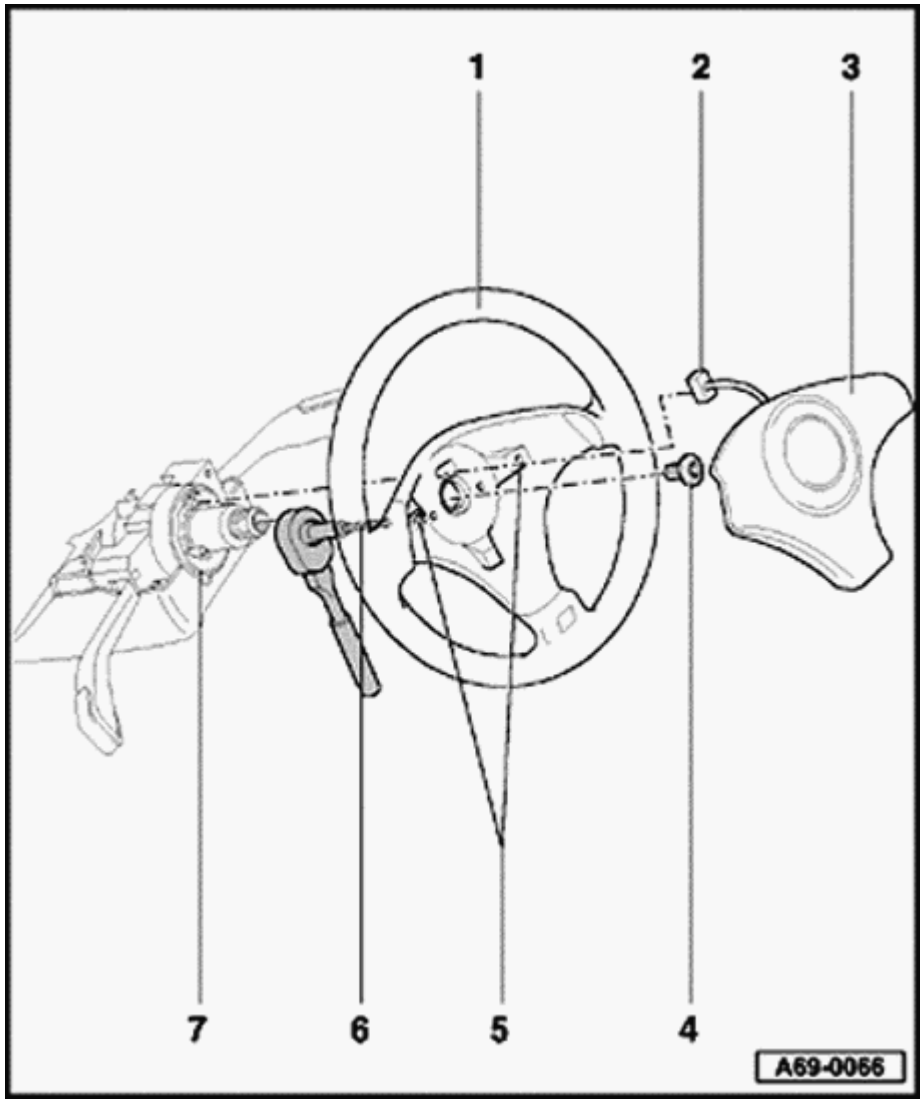
Installing

- Make sure harness connector - 2 - engages properly (with audible click).
- Install airbag unit and tighten bolts to 7 Nm (62 in. lb).

WARNING!

Make sure the passenger compartment is not occupied before connecting the battery Ground (GND) strap.

- Switch ignition on and connect battery Ground (GND) strap.



Sport steering wheel, removing and installing

WARNING!

Observe all safety precautions before starting work on any part of the airbag system ⇒ ***page 48-62*** .

Removing

- Remove airbag unit ⇒ page ⇒ Page 48-68 .
- Turn steering wheel to center position (wheels straight-ahead).
- Remove bolt - 4 -.

Installing

- Install steering wheel in center position (wheels straight-ahead).
- Replace bolt - 4 - and tighten to 60 Nm (44 ft lb).
- Install airbag unit ⇒ page ⇒ Page 48-68 .

48-71

Steering column, removing and installing

The steering column is supplied as an assembly through the Parts Department. The steering column is serviced by replacement only.

The ignition lock from the faulty steering column can be refitted ⇒ page 48-82 .

WARNING!

Before removing the steering wheel:

- ***Observe all safety precautions before starting work on any part of the airbag system ⇒ page 48-62 .***
- ***Disconnect the battery Ground (GND) strap.***
- ***With wheels in the straight-ahead position, unplug the single-pin connector for the airbag system power supply.***

Non compliance with the above can cause failure of the airbag system.

Notes:

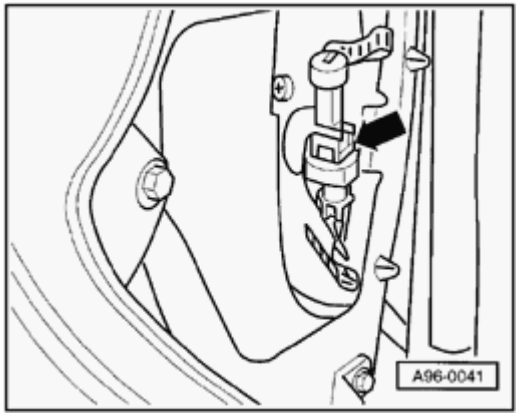
- *Removing and installing driver's-side airbag unit*

⇒ *page 48-64* *(for sport steering wheel* ⇒ *page 48-68* *).*

- *Check Diagnostic Trouble Code (DTC) memory for the airbag system before unplugging the single-pin connector:*

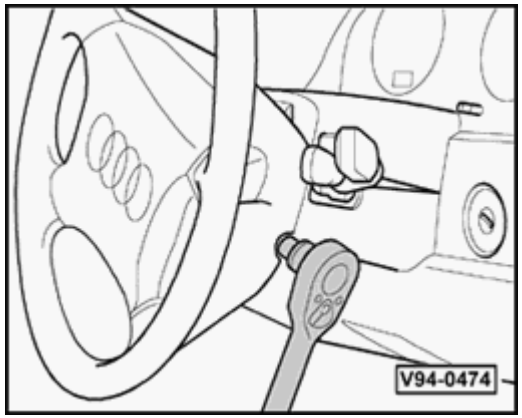
⇒ *Repair Manual, Body On Board Diagnostic (OBD), Repair Group 01*

48-72



The red single-pin connector for the airbag system power supply is located on the right behind the instrument panel cover.

- Open front passenger door, remove cover and disconnect single-pin connector.



- Unbolt airbag unit from behind at left and right sides of steering wheel using T30 Torx® bit.

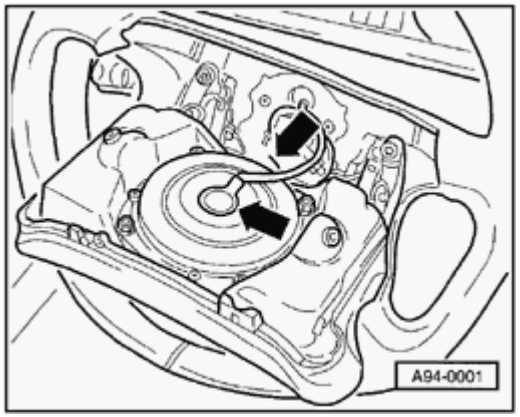
  Tightening torque: 7 Nm (62 in. lb)

WARNING!

Always observe the safety precautions for airbag systems when performing any work on the components of the airbag system ⇒ Repair Manual, "Body Interior," Repair Group 69 and ⇒ Repair Manual, "Body On Board Diagnostic (OBD), Repair Group 01.

48-73

- Carefully fold back airbag unit.

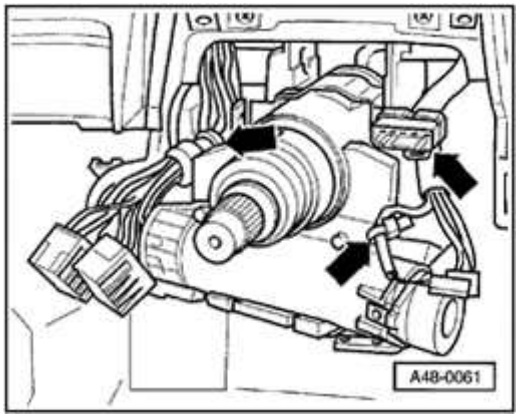


- Disconnect harness connector from airbag unit and place airbag unit aside.
- Unbolt steering wheel; when doing this, make sure that spiral spring is not twisted.
- Remove storage shelf on driver's side:

⇒ *Repair Manual, Body Interior, Repair Group 70*

- Remove steering column switch together with trim:

⇒ *Repair Manual, Electrical Equipment, Repair Group 94*

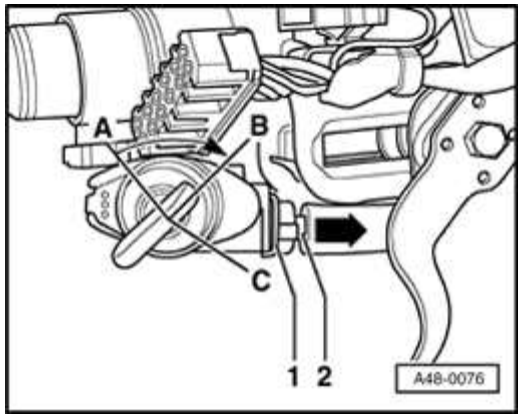


- Remove all tie wraps (arrows) and disconnect harness connectors.

Disengaging lock cable

On vehicles equipped with an automatic transmission, the lock cable must be disengaged:

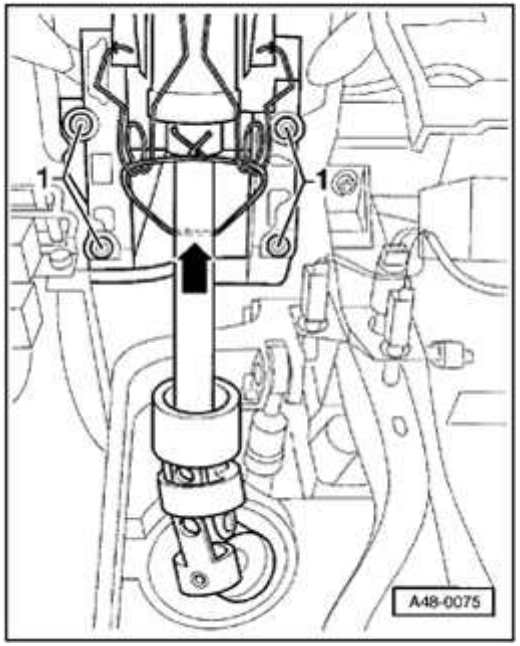
- Place transmission selector lever in Park position.



- Turn ignition key to position -B- (ignition ON).
- Lift locking clip -1- slightly and remove Bowden cable -2- from steering lock housing.

48-75

Securing steering column prior to removal

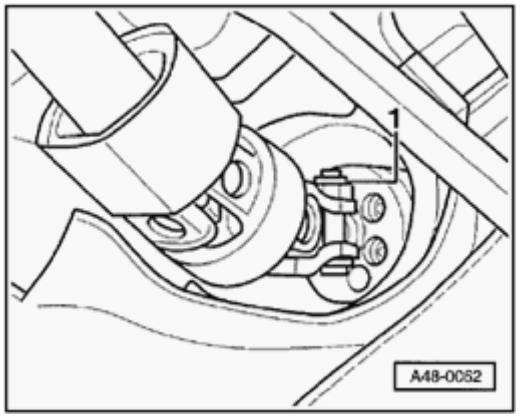


- Route safety wire through hole in bottom part of steering column (arrow) and spring to secure top and bottom parts of steering column before removing steering column from steering gear pinion.

The steering column can also be secured with a transportation safeguard ⇒ page 48-76 .

CAUTION!

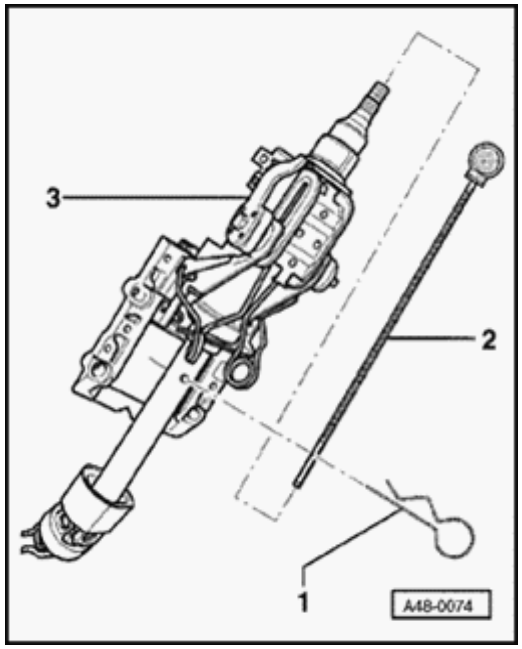
- ***The splines between the top and bottom parts of the steering column must not be separated. If the two halves are separated and reassembled with the splines no longer in their original installed positions a rattling noise may result.***
- ***Turn the steering wheel to the center position and do not alter position during repairs, otherwise the airbag unit spiral spring may be damaged.***



- Unscrew nut -1- at universal joint.
- To release eccentric, turn bolt (Torx® T50) clockwise and remove.
- Remove universal joint from steering gear pinion.
- Remove socket head bolts -1- (⇒ illustration A48-0075 above) and remove steering column.

Removing and installing steering lock housing ⇒ page 48-82 .

48-76



Installing

1 - Locking clip

2 - Plastic rod

3 - Steering column

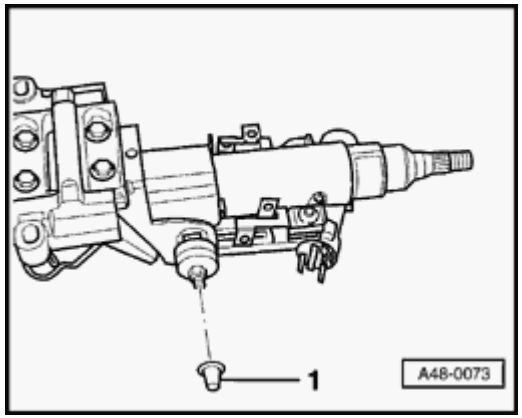
New replacement steering columns are supplied with a transportation safeguard installed. This safeguard must be removed after installing the steering column in the vehicle.

Note:

It is recommended to save the transportation safeguard components for subsequent steering column removals.

48-77

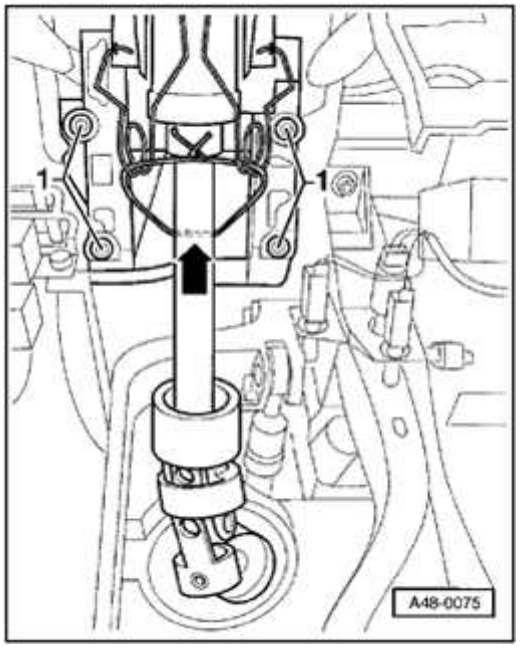
Installing



- When installing steering column, always make sure that cap -1- is installed.

CAUTION!

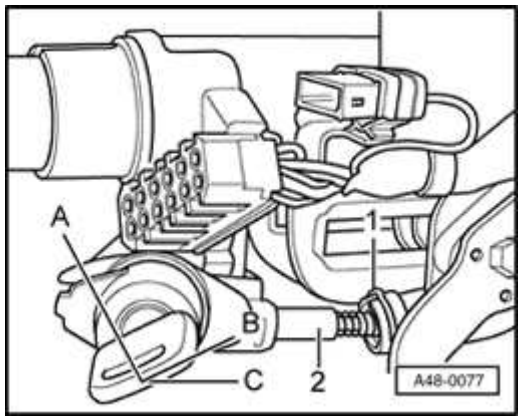
Cap -1- must always be reinstalled or retrofitted, otherwise the electrical wiring may become chafed.



- Mount steering column onto crossmember with four socket-head bolts -1-.
- Attach universal joint to steering gear pinion.
- Insert clamping bolt (Torx® T50) through bottom part and engage by turning counterclockwise. Install nut + washer and tighten to 40 Nm (30 ft lb).

CAUTION!

The splines between the top and bottom parts of the steering column must not be separated. If the two halves are separated and reassembled with the splines no longer in their original installed positions a rattling noise may result.

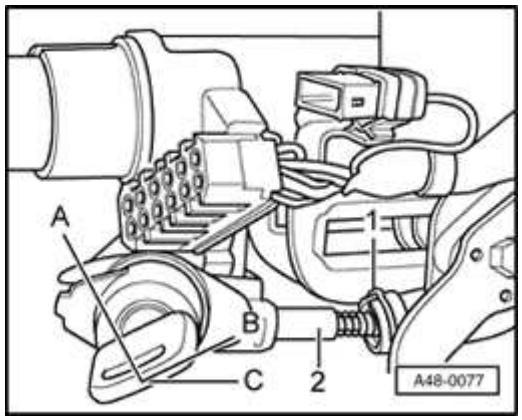


Engaging lock cable on vehicles with automatic transmission

- Ignition key must be in position -B- (ignition ON) to engage lock cable

- Move selector lever to park position.
- Insert lock cable -2- into steering lock housing.
  - Make sure locking clip -1- engages.

48-79



Checking function of lock cable

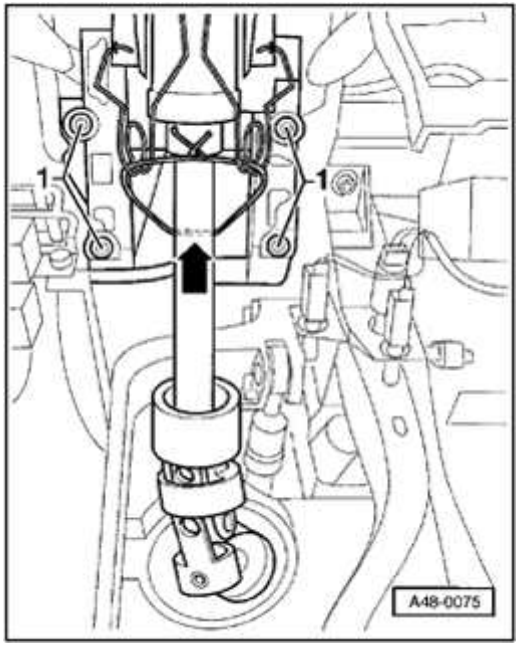
Applies only to vehicles with automatic transmission.

- Turn ignition key to position -B- (ignition ON).
  - ♦ It must be possible to move selector shift lever smoothly out of Park position
  - ♦ It must only be possible to remove ignition key with selector lever in Park position
- Move selector lever to park position.
  - ♦ Ignition lock must function smoothly
  - ♦ It must not be possible to move selector lever with ignition key in position -A- (ignition OFF). Ignition key can be removed

Lock cable, removing, installing and adjusting:

⇒ *Repair Manual, 5 Spd. Automatic Transmission 01V, Repair Group 37*

48-80



Installing, continued for all vehicles

- Remove safety wire between top and bottom parts of steering column.
- Install steering column switch with trim:

⇒ *Repair Manual, Electrical Equipment, Repair Group 94*

- Align steering column relative to trim and make sure joints (gaps) are even.
- Tighten socket-head bolts -1-.

  Tightening torque: 22.5 Nm (17 ft lb)
- Install storage shelf on driver's side:

⇒ *Repair Manual, Body Interior, Repair Group 70*

- Install steering wheel and airbag unit:

⇒ *Repair Manual, Body Interior, Repair Group 69*

WARNING!

- ***Make sure that no person is in the vehicle when re-connecting the battery Ground strap.***
- ***Observe all safety precautions (⇒ Repair Manual, Body Interior, Repair Group 69) whenever working on an airbag equipped vehicle.***

48-81

Steering column, checking for damage

Determining if steering column must be replaced following an accident:

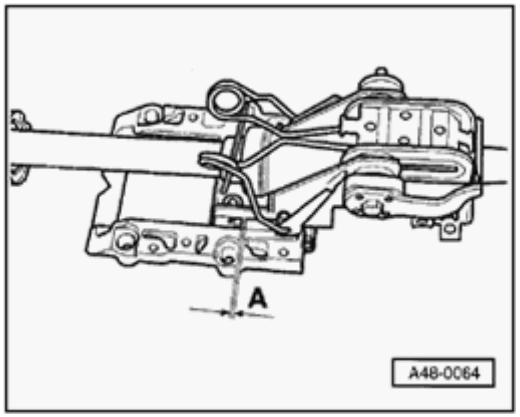
Visual check

- Check all steering column components for damage.

Functional check

- Make sure steering column turns easily without jerking.

- Make sure steering column can be adjusted for height and reach.



- Check gap (dimension -A-) between slide and mounting bracket.

  - If dimension -A- is larger than 0.5 mm (0.20 in.), steering column is damaged and must be replaced

48-82

Steering lock housing, removing and installing

WARNING!

- ***Before removing the steering column, make sure the wheels are in the straight-ahead position.***

- ***Observe the safety precautions for working on airbags ⇒ page 48-62 .***

Non compliance with the above can cause failure of the airbag system.

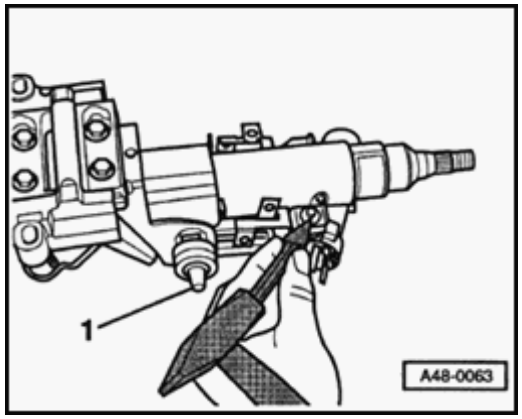
- Remove steering column ⇒ page 48-71 .

Notes:

- *The steering column must be removed and clamped in a vise to chisel off the shear bolts. If the shear bolts are chiseled off with the steering column installed the steering column mounting bracket will be damaged.*

- *Do not clamp the steering column in a vise at the mounting bracket otherwise the plastic coating will be damaged.*

48-83



Chiselling open shear bolts

Shear torque of new bolts is ≥ 20 Nm (15 ft lb).

- Make sure that cap -1- is installed to avoid risk of chafing electrical wiring when installing.
- Remove lock cylinder:

⇒ *Repair Manual, Electrical Equipment, Repair Group 94*

- On vehicles with automatic transmission, disengage lock cable ⇒ page 48-74 .

Installing

- Install new shear bolts.
- Tighten shear bolts until head shears off.
- On vehicles with automatic transmission, engage lock cable ⇒ page 48-78 .
- Check function of lock cable ⇒ page 48-79 .
- Install lock cylinder and ignition switch:

⇒ *Repair Manual, Electrical Equipment, Repair Group 94*

- Make sure turn signal lever is in neutral position (to avoid damaging reset cam of switch) and install steering wheel.
- Install airbag unit ⇒ page 48-64 .

Manually adjustable steering column, removing and installing

Removing

The manually adjustable steering column is supplied as an assembly through the Parts Department. The steering column is serviced by replacement only.

The ignition lock from the faulty steering column can be refitted ⇒ page 48-82 .

WARNING!

Before removing the steering wheel:

- ***The wheels must be in straight-ahead position before removing the steering wheel.***

- ***Observe all safety precautions before starting work on any part of the airbag system ⇒ page 48-62 .***

Non compliance with the above can cause failure of the airbag system.

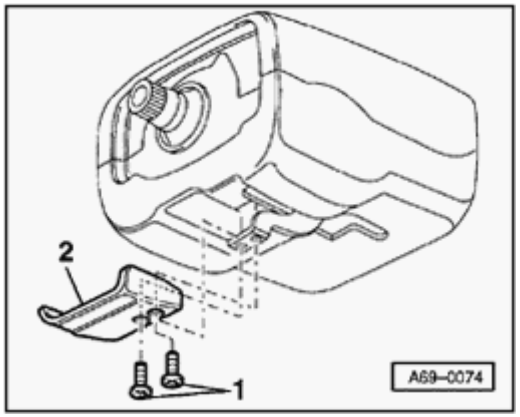
- Remove driver-side airbag unit ⇒ page 48-64 (for sport steering wheel ⇒ page 48-68).

- Remove steering wheel ⇒ page 48-67 (for sports steering wheel ⇒ page 48-70).

48-85

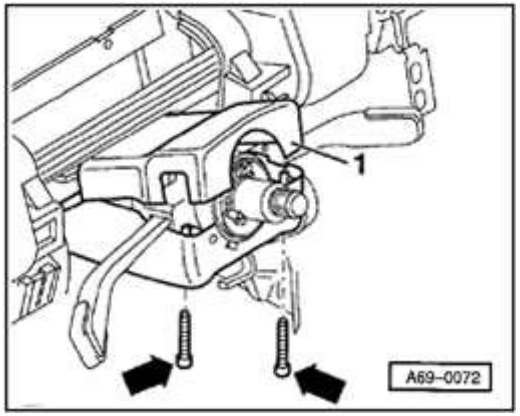
Removing steering column switch

- Release steering column adjuster.
- Pull steering column out fully (to end of adjustment range).



- Remove screws -1- (2x).

  Tightening torque: 3 Nm (27 in. lb)
- Remove handle -2-.

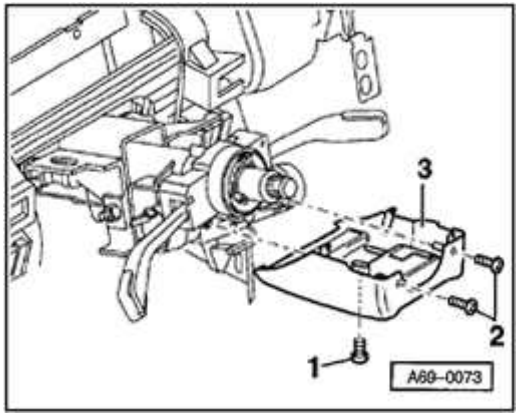


- Remove two screws (arrows).

  Tightening torque: 0.6 Nm (5 in. lb)
- Remove upper section of steering column switch trim -1-.

  When installing, insert upper section into hooks of lower section, swivel downward and install screws

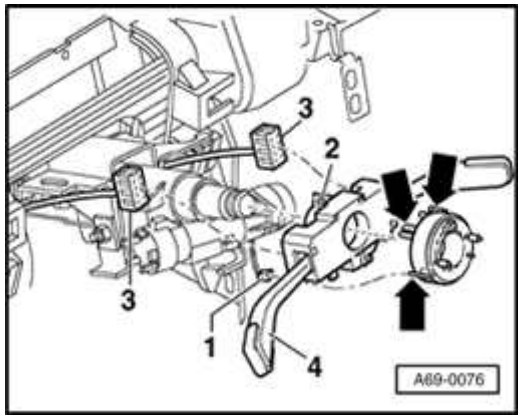
48-86



- Remove screws -2- (2x).

  Tightening torque: 0.6 Nm (5 in. lb)
- Remove socket-head bolt -1-.

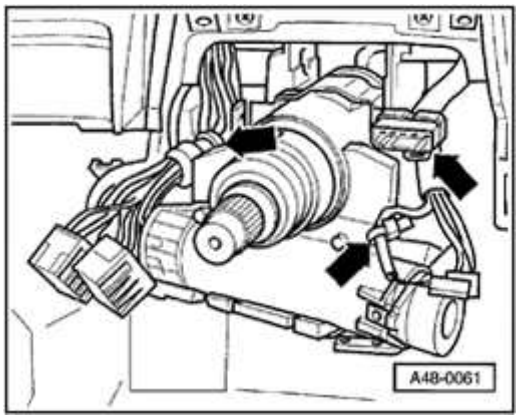
  Tightening torque: 0.6 Nm (5 in. lb)
- Remove lower steering column switch trim -3-.



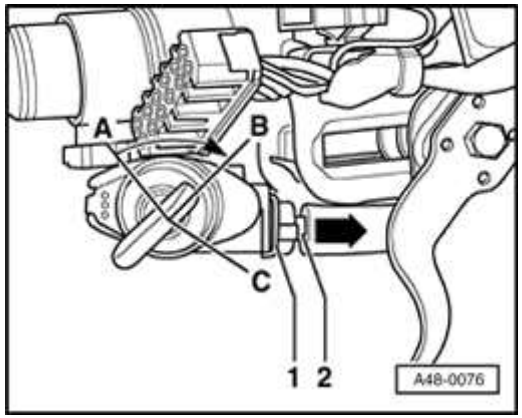
- Disconnect harness connector -1-.
- Remove screw -2-.

  Tightening torque: 3 Nm (27 in. lb)
- Disconnect harness connectors -3-.
- Remove steering column switch -4-.

48-87

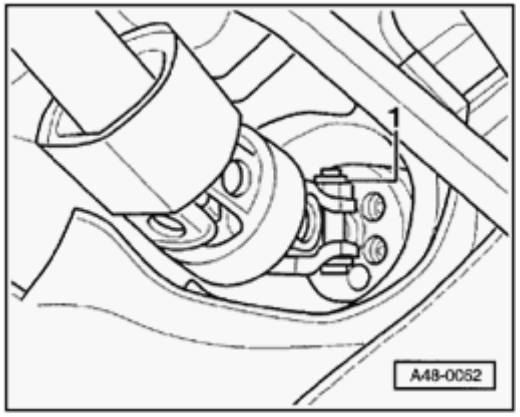


- Remove tie wraps and disconnect harness connectors on steering column.
  - Lock cable must be disengaged on vehicles with automatic transmission
- Move selector lever to "P" position.

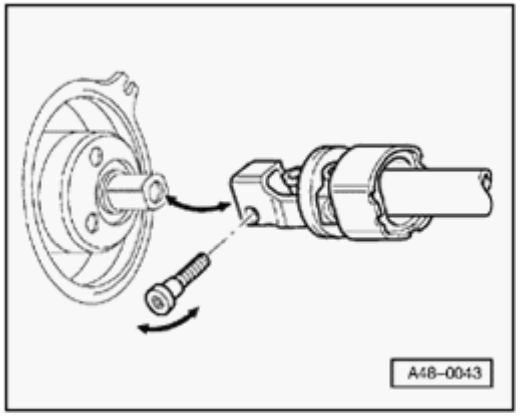


- Turn ignition key to position -B- (ignition ON).
- Lift locking clip -1- slightly and disconnect lock cable -2- from steering lock housing.

48-88

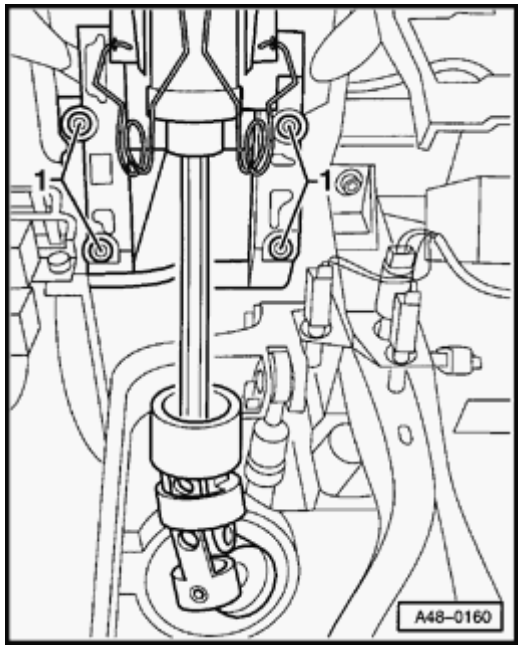


- Remove nut -1- on universal joint.
- Disengage by turning eccentric bolt (Torx® T50) clockwise and remove bolt.
- Release steering column adjuster.



- Swing universal joint clear.

48-89

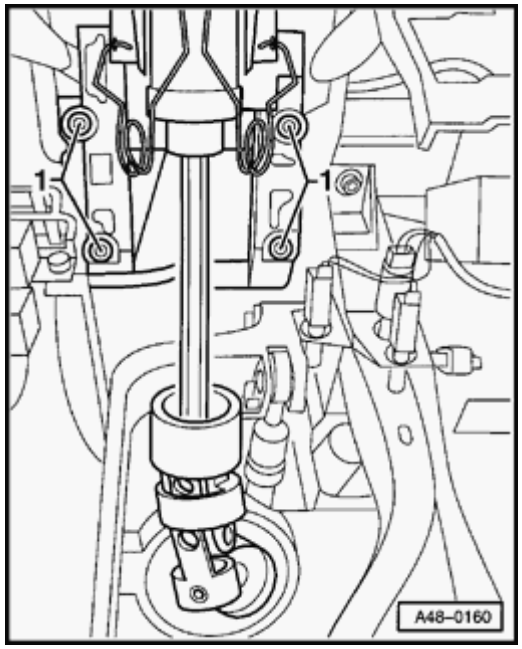


- Remove steering column socket-head bolts -1- and remove steering column.

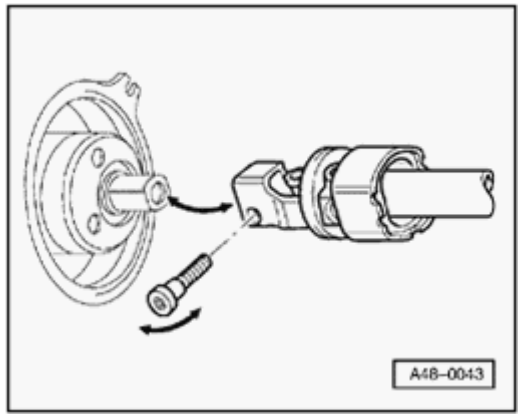
- Removing and installing steering lock housing ⇒ page 48-95
- Checking steering column for damage ⇒ page 48-94
- Removing and installing lock cylinder:

⇒ *Repair Manual, Electrical Equipment, Repair Group 94*

Installing



- Attach steering column to cross member by installing four socket-head bolts -1-.
- Release steering column adjuster.
- Install universal joint onto steering gear pinion.

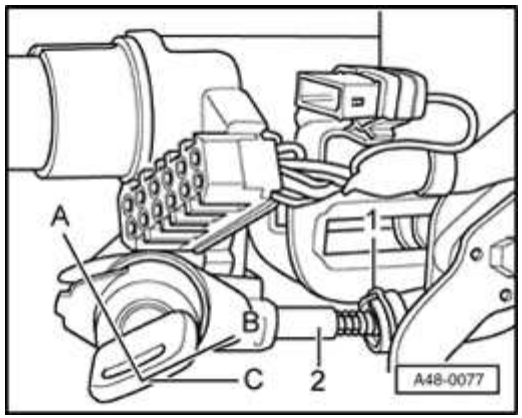


- Install eccentric bolt (Torx® T50) through lower part and tighten (engage) counterclockwise.
- Install nut and tighten.

  Tightening torque: 30 Nm (22 ft lb)

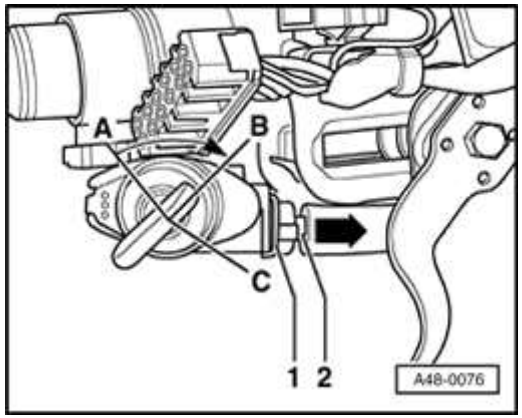
48-91

- On vehicles with automatic transmission, lock cable must be engaged



- To engage lock cable, first turn ignition key to position -B- (ignition ON).
- Move selector lever to park position.
- Install lock cable -2- in steering lock housing. Make sure locking clip -1- engages.

48-92



Functional check for lock cable

- Turn ignition key to position -B- (ignition ON).
  - ♦ It must be possible to move selector lever from park position without any resistance
  - ♦ It must only be possible to remove ignition key when selector lever is in park position and ignition key is in OFF position -A-
- Move selector lever to park position.
  - ♦ Ignition lock must operate freely
  - ♦ With ignition key in position -A- (ignition OFF) it should not be possible to move selector lever from park position. Ignition key can be removed

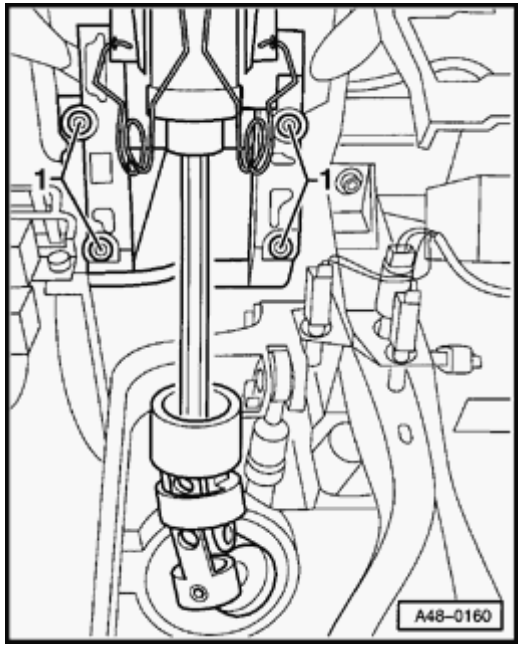
Basic adjustment and routing of lock cable:

⇒ *Repair Manual, 5 Spd. Automatic Transmission 01V, Repair Group 37*

Installing, continued for all vehicles

- Install steering column switches with trim.

- Align steering column so that gaps in trim are even.



- Tighten socket-head bolts -1- on steering column.

  Tightening torque: 22.5 Nm (17 ft lb)

- Install driver's side storage compartment.
- Install steering wheel ⇒ page 48-67 (for sports steering wheel ⇒ page 48-70).
- Install driver-side airbag unit ⇒ page 48-64 (for sport steering wheel ⇒ page 48-68).

Steering column, checking for damage

Determining if steering column must be replaced following an accident:

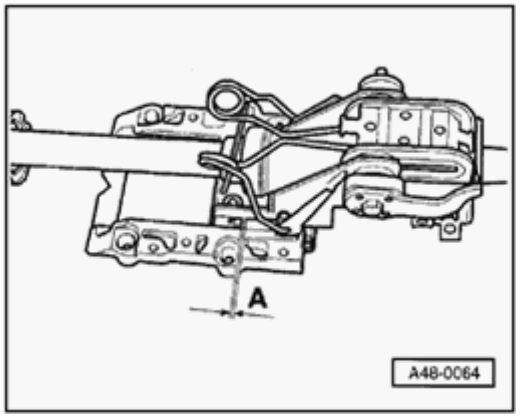
Visual check

- Check all steering column components for damage.

Functional check

- Make sure steering column turns easily without jerking.

- Make sure steering column can be adjusted for height and reach.



- Check gap (dimension -A-) between slide and mounting bracket.

  - If dimension -A- is larger than 0.5 mm (0.20 in.), steering column is damaged and must be replaced

Steering lock housing, removing and installing

Removing

WARNING!

- ***Before removing the steering column, make sure the wheels are in the straight-ahead position.***

- ***Observe the safety precautions for working on airbags ⇒ page 48-62 .***

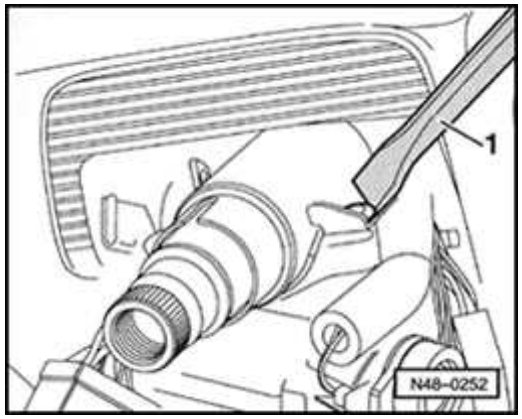
Non compliance with the above can cause failure of the airbag system.

- Remove driver-side airbag unit ⇒ page 48-64 (for sport steering wheel ⇒ page 48-68).

- Remove steering wheel ⇒ page 48-67 (for sports steering wheel ⇒ page 48-70).

- Remove steering column switch ⇒ page 48-85 .

- On vehicles with automatic transmission, disengage lock cable ⇒ page 48-85 .



- Drill out or chisel off shear bolts using suitable chisel -1-.

Removing and installing lock cylinder:

⇒ *Repair Manual, Electrical Equipment, Repair Group 94*

Installing

- Install new shear bolts.
- Tighten shear bolts until heads shear off.
- On vehicles with automatic transmission, engage lock cable ⇒ page 48-90 .
- Check function of lock cable ⇒ page 48-92 .
- Install steering column switch.
- Install steering wheel ⇒ page 48-67 (for sports steering wheel ⇒ page 48-70).
- Install driver-side airbag unit ⇒ page 48-64 (for sport steering wheel ⇒ page 48-68).