Test of brake light switch -F- and of ESP brake recognition switch -F83-

Display group number 003

- Press keys 0, 0 and 3 and confirm the entry with the key Q.

Read measured value block 3 →
→ 1 → 2 → 3 → 4

◄ - The measured value block is always composed of 4 display blocks -arrows-. Refer to the test table below for the explanation of the readouts 1 to 4 in the individual display blocks.

Read measured value block 3 →
Not oper. Not oper.

◄ Readout in display (vehicle stationary):

Read measured value block 3 →				**Display group number: 003**
Not oper.	Not oper.			◄ Readout in display
			Not assigned	
		Not assigned		
	ESP brake recognition switch:[1)] ♦ Not oper. → brake pedal not operated ♦ Operated → brake pedal operated If variations exist ⇒ page 45-133, Electrical Test, test step 25			
Brake light switch: ♦ Not oper. → brake pedal not operated ♦ Operated → brake pedal operated If the readout in the display of V.A.G 1552 is -Not oper.- although the footbrake is operated, or is -Operated- although the footbrake is not operated, carry out test step 4 of the Electrical Test ⇒ page 45-133. It is also possible that the brake light switch is not correctly set ⇒ page 45-69, Setting brake light switch.				

1) ESP brake recognition switch -F83- is identical with brake pressure solenoid release switch -F84-.

The next lower display group number can be selected consecutively in turn with the ↓ key, and the next higher number 002 with the ↑ key.

Press key C for entering the next display group number.

If the → key is pressed, it is necessary in this case to once again press the keys 0 and 8 in order to re-enter the procedure „Reading measured value block“.

Test of steering angle sensor -G85-, of lateral acceleration sensor -G200- and of yaw rate sensor -G202-

Display group number 004

- Press keys 0, 0 and 4 and confirm entry with the key Q.

Read measured value block 4 →			
→ 1	→ 2	→ 3	→ 4

◄ - The measured value block is always composed of 4 display blocks -arrows-. Refer to the test table below for the explanation of the readouts 1 to 4 in the individual display blocks.

Read measured value block 4 →		
-3.0°	0,0 m/s²	0.17°/s

◄ Readout in display (vehicle stationary):

Pay attention to the following aspects regarding display group number 004:
When driving forward through a left-hand curve, all three readouts must be positive (without sign).
When reversing through a right-hand curve, all three readouts must be negative (-).

Read measured value block 4 →			**Display group number: 004**
-3.0°	0.0 m/s²	0.17°/s	◄ Readout in display (example)
			Not assigned
			Yaw rate sensor -G202-: ♦ Specification when vehicle stationary: ± 2.5°/s ♦ Conduct Electrical Test, test step 21 ⇒ page 45-133.
			Lateral acceleration sensor -G200-: ♦ Specification when vehicle stationary: ± 0.5 m/s² ♦ Specification when steering at full lock and at a speed of 20 km/h in a left-hand curve: The readout rises constantly with a positive sign (no sign). ♦ Specification when steering at full lock and at a speed of 20 km/h in a right-hand curve: The readout rises constantly with a negative sign (-). ♦ Conduct Electrical Test, test step 20 ⇒ page 45-133.
			Steering angle sensor -G85-: ♦ If the steering angle sensor -G85- is tested during straightahead running, it is also necessary to conduct a zeroing.[1)] ♦ Specification when driving straightahead ± 4.5° - Basic setting ⇒ page 45-124, display group number 060 ♦ Conduct Electrical Test, test step 19 ⇒ page 45-133.

1) No ABS or ESP control is performed during a road test with vehicle system tester V.A.G 1552 connected and in the diagnosis or reading measured value block mode. The ABS or ESP warning lights do not come on in this case. Self-diagnosis of control unit -J104- is ended if vehicle speed exceeds 20 km/h.

The next higher display group number 005 can be selected with the ↑ key.

Press key C for entering the next display group number.

If the → key is pressed, it is necessary in this case to once again press the keys 0 and 8 in order to re-enter the procedure „Reading measured value block“.

Test of brake pressure sensor -G201- and -G214-

Display group number 005

- Press keys 0, 0 and 5 and confirm the entry with the key Q.

Read measured value block 5 →
→ 1 → 2 → 3 → 4

◄- The measured value block is always composed of 4 display blocks -arrows-. Refer to the test table below for the explanation of the readouts 1 to 4 in the individual display blocks.

Read measured value block 5 →
- 1.27 bar - 1.48 bar

◄ Readout in display (vehicle stationary):

Read measured value block 5 →				Display group number: 005
-1.27 bar	-1.48 bar			◄ Readout in display (example)
			Not assigned	
		Not assigned		
	Brake pressure sensors -G201- and -G214- ♦ Specification when brake not depressed: ± 7 bar ♦ Conduct Electrical Test, test steps 22 and 23 ⇒ page 45-133.			
Brake pressure sensors -G201- and -G214- ♦ Specification when brake not depressed: ± 7 bar ♦ Conduct Electrical Test, test steps 22 and 23 ⇒ page 45-133.				

The next lower display group number can be selected consecutively in turn with the ↓ key.

Press key C for entering the next display group number.

If the → key is pressed, it is necessary in this case to once again press the keys 0 and 8 in order to re-enter the procedure „Reading measured value block“.

Checking the data-bus line

Display group number 125

- Enter 125 and confirm the entry with Q

Read the measuring value block 125 → →1 → 2 → 3 → 4	◄ - There are always four display fields which appear in the measuring value block -arrows- Itemisation of the values 1 to 4 in the individual display fields can be found in the following test table.
Read the measuring value block 125 → Engine 1 Steering sh.1 4-wheel drive 1 Gearbox 1	◄ Readout shown on the display (with the vehicle stationary)

Read the measuring value block			125 →	**Display group number 125**
Engine 1	Steering sh.1	4-wheel drive 1	Gearbox 1	◄ Readout shown on the display (an example)
				CAN-BUS for the transmission[1)] ♦ 1 → the data-bus connection is available ♦ 0 → the data-bus connection is not available[2)]
				Data-BUS for the control unit for the four-wheel drive[3)] ♦ 1 → the data-bus connection is available ♦ 0 → the data-bus connection is not available[2)]
				Data-BUS for the steering angle ♦ 1 → the data-bus connection is available ♦ 0 → the data-bus connection is not available[2)]
				Data-BUS for the engine ♦ 1 → the data-bus connection is available ♦ 0 → the data-bus connection is not available[2)]

[1)] Only for vehicles with an automatic gearbox

♦ A wrong transmission control unit or wrong coding in the transmission control unit.

♦ The transmission control unit is defect

⇒ Rep. Gr. 01 of the corresponding transmission identification code

[2)] The data-bus connection was interrupted or the data-bus line has been changed around

⇒ File „Current flow plans, Fault Detection on Electrics and Installed Locations“

[3)] Only for vehicles with four-wheel drive

Comment:

If a control unit is not connected to data-bus lines or not installed then the corresponding display field will remain blank.

Press the C-button to enter the next display group number.

Once the → button has been pressed one should then enter the function 08 „Read measuring value block“.

Initiating basic setting

Special tools, testers and aids required

- Vehicle system tester V.A.G 1552
- Diagnostic cable V.A.G 1551/3 to V.A.G 1551/3 A

Tasks of function 04 „Initiating basic setting“

Function 04 „Initiating basic setting“ in the case of ESP performs several tasks:

- -1- Display group number 001 is required for bleeding the hydraulic unit.
- -2- Display group number 031 is used to perform the operational check of the brake pressure solenoid and of the ESP brake recognition switch.
- -3- Display group numbers 060, 063 and 066 are required for the zeroing of the steering angle sensor, lateral acceleration sensor and of the brake pressure sensors.

-1- Display group number 001 is selected on vehicles fitted with the ESP system to bleed the hydraulic unit. Initiate basic setting ⇒ page 45-36.

Basic setting 04, display group number 001, is only required if at least one chamber of the brake fluid reservoir has been completely emptied.

Initiating the basic setting should also be carried out after completing repairs involving leaks in the brake system.

Function 11 „Login procedure“ is not required in this case.

-2- Display group number 031 is selected to perform an operational check of the brake pressure solenoid -N247- and of the ESP brake recognition switch -F83- ⇒ **page 45-126.**

This is necessary if:

- the brake servo unit has been replaced.
- this is requested in the fault memory.

Function 11 „Login procedure“ is not required in this case.

-3- Display group numbers 060, 063 and 066 are selected in order to perform a zeroing.

- Display group number 060 is selected to perform the zeroing of the steering angle sensor -G85- ⇒ page 45-127.
- Display group number 063 is selected to perform the zeroing of the lateral acceleration sensor -G200- ⇒ page 45-129.
- Display group number 066 is selected to perform the zeroing of the brake pressure sensors -G201- and -G214- ⇒ page 45-130.

Conducting the zeroing of display group numbers 060, 063 and 066 requires that function 11 „Login procedure“ has first of all been successfully completed with the aid of the vehicle system tester ⇒ page 45-131.

Zeroing is necessary if:

- the control unit -J104-, or the steering column has been replaced,
- the steering angle sensor -G85- has been replaced,
- settings at the running gear has been changed as part of a check of chassis alignment,
- the lateral acceleration sensor -G200- has been replaced,
- the brake pressure sensors -G201- and/or -G214- have been replaced,

- if, when dealing with a fault entry in the fault memory of control unit -J104-, an instruction is contained in the fault table to carry out zeroing,
- the steering wheel has been taken off.

Display group number 031: test of brake pressure solenoid -N247- and of the ESP brake recognition switch -F83-.

- Connect vehicle system tester V.A.G 1552 and select brake electronics control unit (address word 03); ignition is switched on for this step ⇒ page 45-97.

Test of vehicle systems HELP Select function XX	◄ Readout in display:

- Start the engine.
- Press keys 0 and 4 for the function „Basic setting“ and confirm the entry with the key Q.

Basic setting HELP Enter display group number XXX	◄ Readout in display:

- Press keys 0, 3 and 1 and confirm the entry with the key Q.

ABS warning light -K47- flashes.

System in basic setting 31 Solenoid activated	◄ Readout in display:

- Press ↑ key.

System in basic setting 31 5.95 bar 6.16 bar not oper.	◄ Readout in display: *Do not depress brake pedal.*

- Press ↑ key.

System in basic setting 33 Operate pedal and hold...	◄ Readout in display:

- Depress brake pedal with firm foot pressure and hold.

Brake lights come on.

If the brake lights do not come on:

- ♦ Brake light suppression relay -J508- faulty.
  ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations binder
- ♦ ESP brake recognition switch -F83- or brake pressure solenoid -N247- faulty.
- Perform electrical test ⇒ page 45-133, test step 25.
- Press ↑ key.

System in basic setting 34 18.06 bar 19.12 bar operated	◄ Readout in display:

- Press ↑ key.

System in basic setting 35 Release pedal	◄ Readout in display:

- Take foot off brake pedal.
- Press ↑ key.

System in basic setting 36 0.85 bar 1.27 bar not oper.	◄ Readout in display:

- Press ↑ key.

System in basic setting 37 Solenoid test ended	◄ Readout in display:

- Press → key.

Test of vehicle systems HELP Select function XX	◄ Readout in display:

- End output (function 06) ⇒ page 45-114.

Display group number 060: zeroing of steering angle sensor -G85.

- Start the engine.
- Conduct a short road test on a flat surface. Drive straightahead and not faster than 20 km/h; pay attention to the following two points.
  - If the steering wheel is not in the middle position when driving straightahead, correct the position of the steering wheel as part of a check of chassis alignment.
  - Carry out the zeroing.

- If the steering wheel is in the middle position during the road test, keep the vehicle out of straightahead running.

Ensure that the position of the steering wheel is no longer altered. Switch the ignition off!

- Carry out the zeroing by selecting function 08 „Read measured value block“ ⇒ page 45-116, display group number 004.

- First of all, successfully carry out function 11 „Login procedure“ with vehicle system tester V.A.G 1552 ⇒ page 45-131.

Test of vehicle systems HELP Select function XX	◄ Readout in display:

- Press keys 0 and 4 for the function „Basic setting“ and confirm the entry with the key Q.

Basic setting HELP Enter display group number XXX	◄ Readout in display:

- Press keys 0, 6 and 0 and confirm the entry with the key Q.

ABS warning light -K47- flashes.

Function is unknown or cannot be carried out at the moment - →	◄ If this readout appears in the display, the login procedure has not been successfully performed.
System in basic setting 60 Zeroing o.k. 0.0°	◄ Readout in display:

The readout in the display changes to 0.0° after successful zeroing.

or:

System in basic setting 60 Zeroing n. possible 12.0°	◄ If this readout appears in the display, the measured values are not within the range of ± 10° which is permitted for the zeroing.

1. Interrogate fault memory (function 02)

2. Erase fault memory (function 05)

3. End output (function 06)

4. Switch the ignition off.

5. Switch the ignition on.

6. Once again carry out zeroing.

- Press → key.

Test of vehicle systems HELP Select function XX

◄ Readout in display:

- End output (function 06) ⇒ page 45-114.

ABS warning light -K47- and ESP warning light -K155- come on for about 2 seconds.

Display group number 063: zero adjustment of lateral acceleration sender -G200-

- Vehicle is standing on level ground.
- Select function 08 “Read measured value block” and check the measured values ⇒ page 45-116, display group number 004.
- First of all, successfully complete function 11 “Login procedure” with vehicle system tester V.A.G 1552 ⇒ page 45-131.

Test of vehicle systems HELP Select function XX

◄ Readout in display:

- Press keys 0 and 4 for the function “Basic setting” and confirm the entry with the key Q.

Basic setting Enter display group number XXX

◄ Readout in display:

- Press keys 0, 6 and 3 and confirm the entry with the key Q.

ABS warning light -K47- flashes.

Function is not known or cannot be carried out at the moment - →

◄ If this readout appears in the display, the login procedure has not been successfully completed.

System in basic setting 63 Adjustment o.k. 0.6m/s^2

◄ Readout in display:

After successful zero adjustment, the readout in the display does not return to 0.0 m/s^2.

or:

System in basic setting 63 Adjustment n. possible 5.0m/s^2

◄ If this readout appears in the display, the measured values are not within the tolerance range of ± 2.5 m/s^2.

1. Interrogate fault memory (function 02)
2. Erase fault memory (function 05)
3. End output (function 06)
4. Switch ignition off.

5. Switch ignition on.

6. Repeat the zero adjustment.

- Press → key.

Test of vehicle systems Select function XX	HELP

◄ Readout in display:

- End output (function 06) ⇒ page 45-114.

ABS warning light -K47- and ESP warning light -K155- come on for about 2 seconds.

Display group number 066: zero adjustment of brake pressure senders -G201- and -G214-

- Brake pedal not operated.

- Select function 08 “Read measured value block” to check the measured values ⇒ page 45-116, display group number 005.

- First of all, successfully perform the function 11 “Login procedure” with the vehicle system tester V.A.G 1552 ⇒ page 45-131.

Test of vehicle systems Select function XX	HELP

◄ Readout in display:

- Press keys 0 and 4 for the function “Basic setting” and confirm the entry with the key Q.

Basic setting Enter display group number XXX

◄ Readout in display:

- Press keys 0, 6 and 6 and confirm the entry with the key Q.

ABS warning light -K47- flashes.

Function is not known or cannot be carried out at the moment	- →

◄ If this readout appears in the display, the login procedure has not been successfully performed.

System in basic setting Adjustment o.k.	-0.85bar	-2.12bar	66

◄ Readout in display:

After successful zero adjustment, the readout in the display does not return to 0.00 bar.

or:

System in basic setting Zeroing -10.85bar -12.12bar n. possible	66

◄ If this readout appears in the display, the measured values are not within the range of -2 bar to 8 bar which is permitted for the zeroing.

1. Interrogate fault memory (function 02)

2. Erase fault memory (function 05)

3. End output (function 06)

4. Switch the ignition off.

5. Switch the ignition on.

6. Once again carry out zeroing.

- Press → key.

Test of vehicle systems Select function XX	HELP

◄ Readout in display:

- End output (function 06) ⇒ page 45-114.

ABS warning light -K47- and ESP warning light -K155- come on for about 2 seconds.

Login procedure

Special tools, testers and aids required

♦ Vehicle system tester V.A.G 1552

♦ Diagnostic cable V.A.G 1551/3 or V.A.G 1551/3 A

Coding is only possible if the workshop code (WSC) is entered in the vehicle system tester V.A.G 1552.

Test procedure

- Connect vehicle system tester V.A.G 1552 and select brake electronics control unit (address word 03) ⇒ page 45-97; ignition is switched on for this step.

Test of vehicle systems Select function XX	HELP

◄ Readout in display:

- Press key 1 twice for the function „Login procedure“ and confirm the entry with the key Q.

Login procedure	HELP
Enter code number	40168

◄ Readout in display:

- Enter the code number 40168 and confirm the entry with the key Q.

Test of vehicle systems	HELP
Select function XX	

◄ Readout in display:

Electrical test of ABS/EDL/ ESP ITT Mark 20 IE

Special tools, testers and aids required

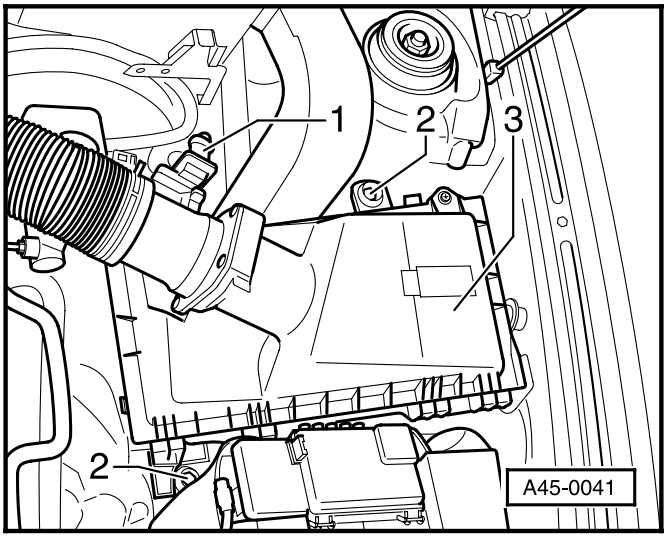
- Hand-held multimeter, e.g. V.A.G 1526 A
- Adapter cable set 1594/A
- Test box V.A.G 1598/A
- Adapter V.A.G 1598/33

Test steps ⇒ from page 45-138 apply only to vehicles fitted with ABS/EDL/ESP

- on which self-diagnosis does not provide any indication of the source of the fault. In this case, work through the complete electrical test.
- on which self-diagnosis provides a direct indication of the source of the fault. In this case, work through only the test step recommended in the fault table (specific fault finding).

Test requirements

- Before commencing the test, switch off ignition and electrical components (headlights, lighting, fan...).
- Fuses S13, S15, S162, S163 must be in proper order.
  ⇒ „Current Flow Diagrams, Electrical Fault Finding and Fitting Locations“ binder
  As a check, remove fuse from the fuse holder on the battery and on the left fuse holder on the dash panel.



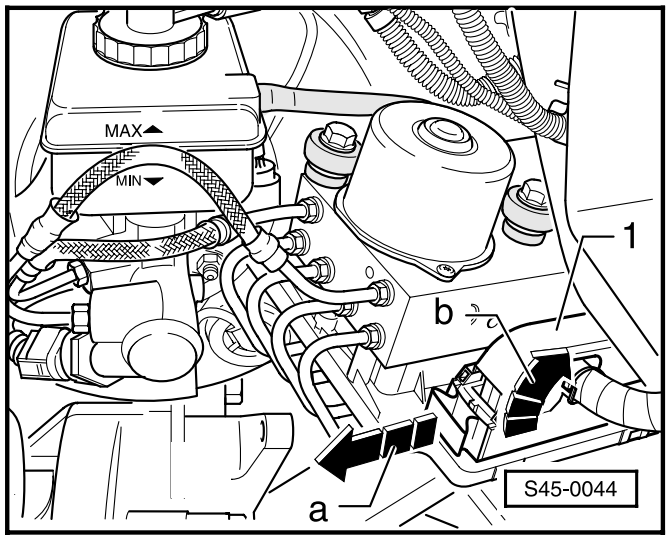
Note:

The following 2 steps do not apply to the 1.6-ltr./55 kW engine.

Removing air filter

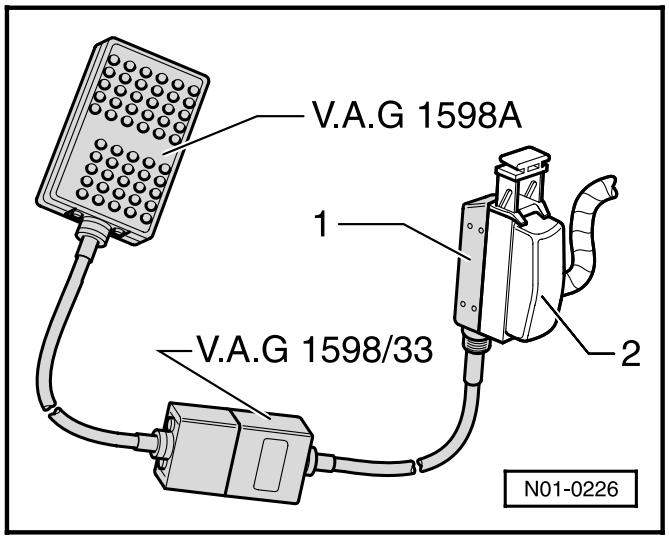
◄ - Unplug the connector of air mass meter -1- from the air guide pipe of the air filter.

- Remove screw -2- at air filter -3- and place filter down to the side.



Connecting test box V.A.G 1598 A with adapter V.A.G 1598/33

◄- Unlock multipin connector -1- (arrow a) and unplug from control unit (arrow b).



◄- Connect test box V.A.G 1598 A with adapter V.A.G 1598/33 -1- to the connector of the wiring loom -2-.

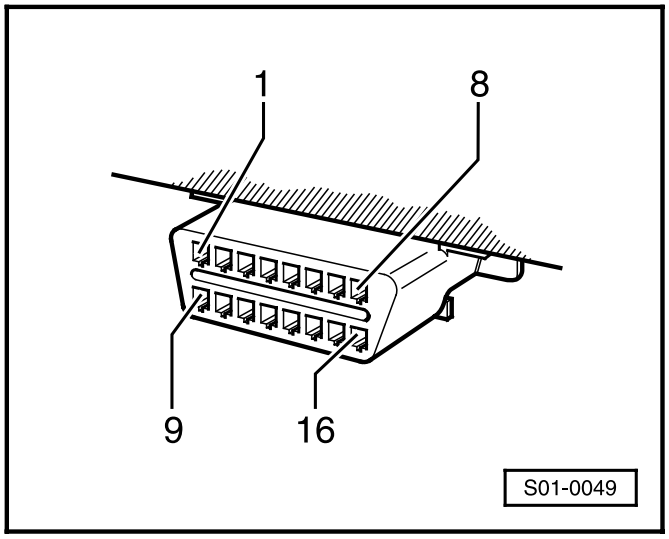
Note:

The specifications are matched to hand-held multimeter V.A.G 1526 A and do not necessarily apply to other test equipment.

Multipin connectors with contact assignment

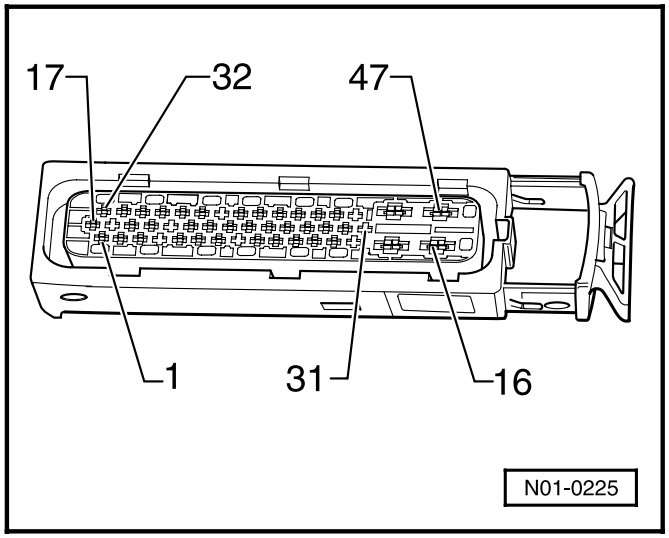
Note:

Not all the contacts listed are presently assigned and must on no account be connected to other components!



◄ **Contact assignment of plug connection T16a (diagnosis socket) with vehicle system tester V.A.G 1552**

Contact 4	=	Earth (terminal 31)
Contact 16	=	Positive (terminal 30) to S12
Contact 7	=	K wire through diagnostic cable connection to control unit -J104- contact 39



◄ **Contact assignment of plug connection T47a wiring loom/control unit -J104**

Contact	Cable connection to component...
1	⇒ Brake pressure solenoid -N247-
2	⇒ Earth point below battery on left
3	⇒ Front right wheel speed sensor -G45-
4	⇒ Front right wheel speed sensor -G45-
5	⇒ Control unit with display unit for radio and navigation (only with navigation system)
6	⇒ Rear right wheel speed sensor -G44-
7	⇒ Rear right wheel speed sensor -G44-
8	⇒ Coding bridge to contact 18
9	⇒ Lateral acceleration sensor -G200- (earth cable)
10	⇒ Brake pressure sensor 2 -G214-
11	⇒ Yaw rate sensor -G202 (earth cable)
12	⇒ Brake pressure sensor 1 -G201-
13	⇒ ESP brake recognition switch -F83-[1)]
14	⇒ Not assigned
15	⇒ Earth point below battery on left
16	⇒ Voltage supply of battery + (through S162)
17	⇒ Brake pressure solenoid -N247-
18	⇒ Coding bridge for contact 8
19	⇒ Databus line ⇒ „Current Flow Diagrams, Electrical Fault Finding and Fitting Locations“ binder
20	⇒ Databus line ⇒ „Current Flow Diagrams, Electrical Fault Finding and Fitting Locations“ binder
21	⇒ Not assigned
22	⇒ ABS warning light -K47-

Contact	Cable connection to component...
23	⇒ Stop light switch -F-
24	⇒ ESP pushbutton -E256-/voltage supply relay for warning light -K155-
25	⇒ Lateral acceleration sensor -G200- (voltage cable)
26	⇒ Brake pressure sensor 2 -G214-
27	⇒ Yaw rate sensor -G202- (voltage cable)
28	⇒ Brake pressure sensor 1 -G201-
29	⇒ ESP brake recognition switch -F83-[1)]
30	⇒ Not assigned
31	⇒ Brake light suppression relay -J508-
32	⇒ ESP brake recognition switch - F83-[1)]
33	⇒ Left front wheel speed sensor -G47-
34	⇒ Left front wheel speed sensor -G47-
35	⇒ Control unit with display unit for radio and navigation (only with navigation system)
36	⇒ Rear left wheel speed sensor -G46-
37	⇒ Rear left wheel speed sensor -G46-
38	⇒ Not assigned
39	⇒ Plug connection T16a/7, K wire
40	⇒ Lateral acceleration sensor -G200- (signal cable)
41	⇒ Brake pressure sensor 2 -G214-
42	⇒ Yaw rate sensor -G202- (signal cable)
43	⇒ Brake pressure sensor 1 -G201-
44	⇒ Voltage supply terminal 15 through S 13
45	⇒ Not assigned
46	⇒ Earth point below battery on left
47	⇒ Voltage supply of battery + (through S163)

1) ESP brake recognition switch -F83- is identical with release switch for brake pressure solenoid -F84-.

List of test steps

Component to be tested	
Voltage supply of ABS hydraulic pump -V64-	- Perform test step 1
Voltage supply of valves in hydraulic unit	- Perform test step 2
Voltage supply of control unit -J104	- Perform test step 3
Operation of brake light switch -F	- Perform test step 4
Brake light suppression relay -J508-	- Perform test step 5
Coding bridge	- Perform test step 6
Resistance of front right wheel speed sensor -G45	- Perform test step 7
Resistance of front left wheel speed sensor -G47	- Perform test step 8
Resistance of rear right wheel speed sensor -G44	- Perform test step 9
Resistance of rear left wheel speed sensor -G46	- Perform test step 10
Voltage signal of front right wheel speed sensor -G45	- Perform test step 11
Voltage signal of front left wheel speed sensor -G47	- Perform test step 12
Voltage signal of rear right wheel speed sensor -G44	- Perform test step 13
Voltage signal of rear left wheel speed sensor -G46	- Perform test step 14
Operation of ABS warning light -K47	- Perform test step 15
Operation of handbrake/brake fluid level warning light -K14/33	- Perform test step 16
Operation of ESP stability programme warning light -K155	- Perform test step 17
Operation of ESP pushbutton -E256	- Perform test step 18
Actuation of steering angle sender -G85	- Perform test step 19
Actuation of lateral acceleration sender -G200	- Perform test step 20
Actuation of yaw rate sender -G202	- Perform test step 21
Actuation of brake pressure sender -1- -G201	- Perform test step 22
Actuation of brake pressure sender -2- -G214	- Perform test step 23
Actuation of brake pressure solenoid -N247	- Perform test step 24
Actuation of brake recognition switch -F83 [1)]	- Perform test step 25
Test of databus cable	- Perform test step 26
Voltage supply of V.A.G 1551, plug connection T16a	- Perform test step 27
Resistance of K wire for self-diagnosis, plug connection T16a	- Perform test step 28

1) Brake recognition switch -F83- is identical with brake pressure solenoid release switch -F84-.

Test table

Notes on test table

- *The socket designations of test box V.A.G 1598 A with adapter V.A.G 1598/33 are identical to the contact designations of the control unit -J104- in the current flow diagram.*

⇒ “Current Flow Diagrams, Electrical Fault Finding and Fitting Locations” binder

- *If the measurements obtained differ from the specifications, carry out the measures indicated in the right-hand part of the table for rectifying the fault.*

⇒ “Current Flow Diagrams, Electrical Fault Finding and Fitting Locations” binder

- *Conduct continuity tests with adapter cable set V.A.G 1594 A (bridges).*
- *If the measurements obtained differ only slightly from the specifications, then clean the sockets and connectors of the testers and test cables (with contact spray G 000 700 04) and repeat the test. Before replacing the particular components, inspect the cables and connections and also repeat the resistance measurement at the component, particularly if the specifications are less than 10 Ω.*

Test steps 1 - 20

Test steps 21 - 28 ⇒ page 45-148

Switch on measuring range: Voltage measurement (20 V =)					
Test step	**V.A.G 1598 A Sockets**	**Test of**	• **Test conditions** - **Additional operations**	**Specification**	**Measures if readout differs from specification**
1	15 + 47	Voltage supply for hydraulic pump -V64- (terminal 30) at control unit -J104-	• Ignition switched off	10.0 - 14.5 V	- Test cable from contact T47a/47 through fuse S163 to battery +. - Test cable from contact T47a/15 to earth. ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations
2	46 + 16	Voltage supply for valves in hydraulic unit -N55- (terminal 30) at control unit -J104-	• Ignition switched off	10.0 - 14.5 V	- Test cable from contact T47a/16 through fuse S162 to battery +. - Test cable from contact T47a/46 to earth. ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations
3	44 + 46	Voltage supply (terminal 15) of control unit -J104-	• Ignition switched on	10.0 - 14.5 V	- Test cable from contact T47a/44 through fuse S13, and ignition/starter switch. - Test cable from contact T47a/46 to earth. ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations

Switch on measuring range:
Voltage measurement (20 V =) in test step 4, resistance measurement (200 Ω)/(20 MΩ) in test step 4a

Test step	V.A.G 1598 A Sockets	Test of	• Test conditions - Additional operations	Specification	Measures if readout differs from specification
4	23 + 46	Brake light switch -F-	• Ignition switched off • Brake pedal not operated	0.0 - 0.5 V	- Set brake light switch, if necessary ⇒ page 45-69. - Replace brake light switch ⇒ page 45-69.
			- Brake pedal operated	10.0 - 14.5 V	- Test contact 1 from brake light switch -F- to fuse S13.
4a		Brake light switch -F-	• Set measuring range 200 Ω - Unplug multipin connector T47a from control unit -J104. - Unplug multipin connector of brake light/ brake pedal switch. - Test cables for open circuit. - Test cable from contact 23 (control unit) to contact 1 (brake light switch).	max. 1.5 Ω	- Test cables for open circuit. - Repair cable connections according to CFD. ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations
			• Set measuring range 20 MΩ - Remove fuse S13. - Test cables for short circuit to positive or to earth.	∞ Ω	

Switch on measuring range: **Voltage** measurement (20 V =)					
Test step	**V.A.G 1598 A Sockets**	**Test of**	• **Test conditions** - **Additional operations**	**Specification**	**Measures if readout differs from specification**
5	23 + 46	Brake light suppression relay -J508-	• Ignition switched on • Brake pedal operated	10.0 - 14.5 V	- Replace brake light suppression relay -J508-.
	31 + 15		- Bridge sockets 31 and 15	0.0 - 0.5 V	- Test cables for open circuit and short circuit according to CFD. ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations

Switch on measuring range: **Resistance** measurement (20 Ω)/(20MΩ)					
Test step	**V.A.G 1598 A Sockets**	**Test of**	• **Test conditions** - **Additional operations**	**Specification**	**Measures if readout differs from specification**
6	8 + 18	Coding bridge	• Ignition switched off - Unplug multipin connector T47a - Connect test box V.A.G 1598/A with adapter V.A.G 1598/33 - Test cable for open circuit	max. 1.5 Ω	- Test cable from contact 8 to contact 18 for open circuit.

Switch on measuring range: Resistance measurement (2 kΩ)					
Test step	**V.A.G 1598 A Sockets**	**Test of**	**• Test conditions - Additional operations**	**Specification**	**Measures if readout differs from specification**
7	3 + 4	Resistance of front right wheel speed sensor -G45-	• Ignition switched off	1.0...1.3 kΩ	- Separate plug connection at wheel speed sensor. - Test wiring according to CFD. - Move cables during test. ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations If no fault is found in the wiring: - Replace wheel speed sensor -G45- ⇒ page 45-60.
8	33 + 34	Resistance of front left wheel speed sensor -G47-	• Ignition switched off	1.0...1.3 kΩ	- Separate plug connection at wheel speed sensor. - Test wiring according to CFD. - Move cables during test. ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations If no fault is found in the wiring: - Replace wheel speed sensor -G47- ⇒ page 45-60.
9	7 + 6	Resistance of rear right wheel speed sensor -G44-	• Ignition switched off	1.0...1.3 kΩ	- Separate plug connection at wheel speed sensor. - Test wiring according to CFD. - Move cables during test. ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations If no fault is found in the wiring: - Replace wheel speed sensor -G44- ⇒ page 45-65.

Switch on measuring range: Resistance measurement (2 kΩ)					
Test step	**V.A.G 1598 A Sockets**	**Test of**	**• Test conditions - Additional operations**	**Specification**	**Measures if readout differs from specification**
10	37 + 36	Resistance of rear left wheel speed sensor -G46-	• Ignition switched off	1.0...1.3 kΩ	- Separate plug connection at wheel speed sensor. - Test wiring according to CFD. - Move cables during test. ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations If no fault is found in the wiring: - Replace wheel speed sensor -G46- ⇒ page 45-65.

Switch on measuring range: Voltage measurement (2 V ~)					
Test step	**V.A.G 1598 A Sockets**	**Test of**	**• Test conditions - Additional operations**	**Specification**	**Measures if readout differs from specification**
11	3 + 4	Voltage signal of front right wheel speed sensor -G45-	• Vehicle raised • Ignition switched off - Rotate front right wheel at approx. 1 rev/sec.	min. 65 mV alternating voltage	- Check installation of wheel speed sensor and of pulse rotor. - Check correct connection of wheel speed sensor -G45- and read measured value block ⇒ page 45-116, display group number 001.
12	33 + 34	Voltage signal of front left wheel speed sensor -G47-	• Vehicle raised • Ignition switched off - Rotate front left wheel at approx. 1 rev/sec.	min. 65 mV alternating voltage	- Check installation of wheel speed sensor and of pulse rotor. - Check correct connection of wheel speed sensor -G47- and read measured value block ⇒ page 45-116, display group number 001.
13	7 + 6	Voltage signal of rear right wheel speed sensor -G44-	• Vehicle raised • Ignition switched off - Rotate rear right wheel at approx. 1 rev/sec.	min. 190 mV alternating voltage	- Check installation of wheel speed sensor and of pulse rotor. - Check correct connection of wheel speed sensor -G44- and read measured value block ⇒ page 45-116, display group number 001.

Switch on measuring range: Voltage measurement (20 V ≈)					
Test step	**V.A.G 1598 A Sockets**	**Test of**	• **Test conditions** - **Additional operations**	**Specification**	**Measures if readout differs from specification**
14	36 + 37	Voltage signal of rear left wheel speed sensor -G46-	• Vehicle raised • Ignition switched off - Rotate rear left wheel at approx. 1 rev/sec.	min. 190 mV alternating voltage	- Check installation of wheel speed sensor and of pulse rotor. - Check correct connection of wheel speed sensor -G46- and read measured value block ⇒ page 45-116, display group number 001.

Operational test: ABS warning light -K47-					
Test step	**V.A.G 1598 A Sockets**	**Test of**	• **Test conditions** - **Additional operations**	**Specification**	**Measures if readout differs from specification**
15	-	Operation of ABS warning light -K47	• Fault memory was interrogated and no fault stored in fault memory of control unit -J104. • Ignition switched off • Multipin connector plugged in at control unit -J104 and locked. - Switch ignition on	Warning light -K47- comes on for 2 s and goes out again.	If ABS warning light does not come on: - Test cable from contact T47a/22 (control unit) to contact T32a/19 (dash panel insert) for short circuit to earth. ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations - Test dash panel insert, fault in dash panel insert. ⇒ Electrical System; Repair Group 90; Dash Panel Insert

Operational test: Handbrake/brake fluid level warning light -K14/33-					
Test step	**V.A.G 1598 A Sockets**	**Test of**	• **Test conditions** - **Additional operations**	**Specification**	**Measures if readout differs from specification**
16	-	Operation of hand-brake/brake fluid level warning light -K14/33-	• Brake fluid at correct level • Ignition switched off • Multipin connector plugged in at control unit -J104 and locked. - Switch ignition on.	Warning light -K14/33- comes on for 2 s and goes out again.	- Test brake fluid level warning contact -F34- in cap of brake fluid reservoir. - Test cable from contact T32a/29 (dash panel insert) to brake fluid warning contact for short to earth. ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations - Test dash panel insert, fault in dash panel insert. ⇒ Electrical System; Repair Group 90; Dash Panel Insert

Operational test: Electronic stability programme warning light -K155-					
Test step	**V.A.G 1598 A Sockets**	**Test of**	• **Test conditions** - **Additional operations**	**Specification**	**Measures if readout differs from specification**
17	-	Operation of ESP warning light -K155-	• Ignition switched off • Multipin connector plugged into control unit -J104 and locked. - Switch ignition on.	Warning light -K155- comes on for 2 s and goes out again.	- Test cable from contact T47a/22 (control unit) through voltage supply relay -J535- to contact T32b/14 (dash panel insert) for open circuit and short to positive. If warning light -K155- comes on and remains on: - Test cable from contact T47a/22 (control unit) through voltage supply relay -J535- to contact T32b/14 (dash panel insert) for short to earth. ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations - Test dash panel insert, fault in dash panel insert. - Test ESP button -E256-. ⇒ Electrical System; Repair Group 90; Dash Panel Insert - Test voltage supply relay for warning light -K155-. ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations

Operational test: Warning light for ESP pushbutton -E256- in test step 18; voltage supply (20 V=) in test step 18a

Test step	V.A.G 1598 A Sockets	Test of	• Test conditions - Additional operations	Specification	Measures if readout differs from specification
18	-	Operation of ESP pushbutton -E256-	• Ignition switched off • Operation of ESP stability programme warning light -K155- was tested in test step 17. • Multipin connector is plugged in at control unit -J104- and locked. - Switch ignition on.	Warning light -K155- comes on for 2 s and goes out again	
			- Operate ESP pushbutton.	Warning light -K155- comes on	- Perform test step 18a
			- Operate ESP pushbutton once again.	Warning light -K155- goes out	
18a	15 + 24	Operation of ESP pushbutton -E256-	- Switch ignition off. - Unplug multipin connector from control unit -J104-. - Connect test box V.A.G 1598 A with adapter V.A.G 1598/33. - Switch ignition on.		- Test cable from contact T47a/15 (control unit) to earth. - Test cable from contact T47a/24 (control unit) to contact T4f/2 (ESP pushbutton) for open circuit and short circuit to positive or to earth.
			- Pushbutton of -E256- not pressed and warning light -K155- comes on.	3.5 - 5.0 V	- Test cable from contact T47a/24 (control unit) to contact T32b/14 (dash panel) for open circuit and for short circuit to positive or to earth.
			- Hold pushbutton of -E256- pressed and warning light -K155- comes on.	8.0 - 14.5 V	- Test voltage supply of contact T4f/1 (ESP pushbutton) through fuse S13 for open circuit. ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations - Replace ESP pushbutton. ⇒ Body Fitting Work; Repair Group 70; Dash Panel

Switch on measuring range:
Voltage measurement (20 V =) in test step 19, resistance measurement (200 Ω/20 MΩ) in test step 19a

Test step	V.A.G 1598 A Sockets	Test of	• Test conditions - Additional operations	Specification	Measures if readout differs from specification
19	-	Earth and voltage supply of steering angle sensor -G85	• Ignition switched off - Unplug multipin connector T47a from control unit -J104-. - Separate plug connection of steering angle sensor. - Test voltage supply of steering angle sensor at plug connection T6w. - Test cable between contact T6w/4 and contact T6w/1.	10.0 - 14.5 V	- Test cable from contact T6w/4 (steering angle sensor) to fuse S15 for open circuit. - Repair cable connections according to CFD. ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations
			• Ignition switched on - Test cable between contact T6w/5 and contact T6w/1.	10.0 - 14.5 V	- Test cable from contact T6w/5 (steering angle sensor) to fuse S13 for open circuit. ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations
19a	-	Cables of steering angle sensor -G85	• Measuring range 200 Ω set - Connect test box V.A.G 1598 A with adapter V.A.G 1598/33. - Test the following cables for open circuit: - Cable from contact T6w/3 (steering angle sensor) to contact T47a/19 (control unit). - Cable from contact T6w/2 (steering angle sensor) to contact T47a/20 (control unit). - Cable from contact T6w/1 to earth.	max. 1.5 Ω	- Test cables for open circuit. - Repair cable connections according to CFD. ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations
			• Measuring range 20 MΩ set - Remove fuse S13. - Test cables for short circuit to positive or to earth.	∞ Ω	

Switch on measuring range: **Resistance measurement (200 Ω/20 MΩ)**					
Test step	**V.A.G 1598 A Sockets**	**Test of**	• **Test conditions** - **Additional operations**	**Specification**	**Measures if readout differs from specification**
20	-	Cables of lateral acceleration sensor -G200	• Ignition switched off • Measuring range 200 Ω set - Remove fuse S13. - Unplug multipin connector T47a from control unit -J104-. - Connect test box V.A.G 1598 A with adapter V.A.G 1598/33. - Separate plug connection T3n of lateral acceleration sensor.		
			- Test cables for open circuit: - Cable from contact T3n/1 (lateral acceleration sensor) to contact T47a/40 (control unit).	max. 1.5 Ω	- Test cables for open circuit. - Repair cable connections according to CFD. ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations
			- Cable from contact T3n/2 (lateral acceleration sensor) to contact T47a/9 (control unit).		
			- Cable from contact T3n/3 (lateral acceleration sensor) to contact T47a/25 (control unit).	max. 1.5 Ω	
			• Measuring range 20 MΩ set - Remove fuse S13. - Test cables for short circuit to positive or to earth.	∞ Ω	

Test steps 21 - 28

Switch on measuring range: Resistance measurement (200 Ω/20 MΩ)					
Test step	**V.A.G 1598 A Sockets**	**Test of**	• **Test conditions** - **Additional operations**	**Specification**	**Measures if readout differs from specification**
21	-	Cables of yaw rate sensor -G202-	• Ignition switched off • Measuring range 200 Ω set - Unplug multipin connector T47a from control unit -J104-. - Connect test box V.A.G 1598 A with adapter V.A.G 1598/33. - Separate plug connection T3m from yaw rate sensor -G202-. - Test cables for open circuit: - Cable from contact T3m/1 (yaw rate sensor) to contact T47a/42 (control unit). - Cable from contact T3m/2 (yaw rate sensor) to contact T47a/11 (control unit). - Cable from contact T3m/3 (yaw rate sensor) to contact T47a/27 (control unit).	max. 1.5 Ω	- Test cables for open circuit. - Repair cable connections according to CFD. ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations
			• Measuring range 20 MΩ set - Remove fuse S13. - Test cables for short circuit to positive or to earth.	∞ Ω	

Switch on measuring range: Resistance measurement (200 Ω/20 MΩ)					
Test step	**V.A.G 1598 A Sockets**	**Test of**	**• Test conditions - Additional operations**	**Specification**	**Measures if readout differs from specification**
22	-	Cables of brake pressure sensor -1- -G201	• Ignition switched off • Measuring range 200 Ω set - Unplug multipin connector T47a from control unit -J104-. - Connect test box V.A.G 1598 A with adapter V.A.G 1598/33. - Separate plug connection T30 from brake pressure sensor -1- -G201. - Test cables for open circuit: - Cable from contact T30/1 (brake pressure sensor) through plug connection T14c/1 to contact T47a/28 (control unit). - Cable from contact T30/2 (brake pressure sensor) through plug connection T14c/2 to contact T47a/12 (control unit). - Cable from contact T30/3 (brake pressure sensor) through plug connection T14c/3 to contact T47a/43 (control unit).	max. 1.5 Ω	- Test cables for open circuit. - Repair cable connections according to CFD. ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations
			• Measuring range 20 MΩ set - Remove fuse S13. - Test cables for short circuit to positive or to earth.	∞ Ω	

Switch on measuring range: Resistance measurement (200 Ω/20 MΩ)					
Test step	**V.A.G 1598 A Sockets**	**Test of**	• **Test conditions** - **Additional operations**	**Specification**	**Measures if readout differs from specification**
23	-	Cables of brake pressure sensor -2- -G214	• Ignition switched off • Measuring range 200 Ω set - Unplug multipin connector T47a from control unit -J104-. - Connect test box V.A.G 1598 A with adapter V.A.G 1598/33. - Separate plug connection T3p from brake pressure sensor -2- -G201. - Test cables for open circuit: - Cable from contact T3p/1 (brake pressure sensor -2-) through plug connection T14c/12 to contact T47a/26 (control unit). - Cable from contact T3p/2 (brake pressure sensor -2-) through plug connection T14c/13 to contact T47a/10 (control unit). - Cable from contact T3p/3 (brake pressure sensor -2-) through plug connection T14c/14 to contact T47a/41 (control unit).	max. 1.5 Ω	- Test cables for open circuit. - Repair cable connections according to CFD. ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations
			• Measuring range 20 MΩ set - Remove fuse S13. - Test cables for short circuit to positive or to earth.	∞ Ω	

Switch on measuring range: **Resistance measurement (200 Ω/20 MΩ)**					
Test step	**V.A.G 1598 A Sockets**	**Test of**	• **Test conditions** - **Additional operations**	**Specification**	**Measures if readout differs from specification**
24	-	Cables of brake pressure solenoid in brake servo unit -N247-	• Ignition switched off • Measuring range 200 Ω set - Unplug multipin connector T47a from control unit -J104-. - Connect test box V.A.G 1598 A with adapter V.A.G 1598/33. - Separate plug connection T6x at brake servo unit. - Test cables for open circuit: - Cable from contact T6x/4 (brake pressure solenoid -N247-) through plug connection T14c/7 to contact T47a/17 (control unit). - Cable from contact T6x/3 (brake pressure solenoid -N247-) through plug connection T14c/8 to contact T47a/1 (control unit -J104-).	max. 1.5 Ω	- Test cables for open circuit. - Repair cable connections according to CFD. ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations
			• Measuring range 20 MΩ set - Remove fuse S13. - Test cables for short circuit to positive or to earth.	∞ Ω	
			• Measuring range 200 Ω set - Separate multipin connector T14c. - Test contacts -7- and -8- in plug connection T14c to brake pressure solenoid -N247-.	1.0...2.0 kΩ	- If specification is not achieved, replace brake servo unit ⇒ page 47-32.

Switch on measuring range: **Resistance measurement (200 Ω/20 MΩ)**					
Test step	**V.A.G 1598 A Sockets**	**Test of**	• **Test conditions** - **Additional operations**	**Specification**	**Measures if readout differs from specification**
25	-	Cables of ESP brake recognition switch -F83-	• Ignition switched off • Measuring range 200 Ω set - Unplug multipin connector T47a from control unit -J104-. - Connect test box V.A.G 1598 A with adapter V.A.G 1598/33. - Separate plug connection T6x at brake servo unit. - Test cables for open circuit: - Cable from contact T6x/1 (brake recognition switch -F83-) through plug connection T14c/5 to contact T47a/13 (control unit -J104-). - Cable from contact T6x/2 (brake recognition switch -F83-) through plug connection T14c/6 to contact T47a/29 (control unit -J104-). - Cable from contact T6x/5 (brake recognition switch -F83-) through plug connection T14c/9 to contact T47a/32 (control unit -J104-).	max. 1.5 Ω	- Test cables for open circuit. - Repair cable connections according to CFD. ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations
			• Measuring range 20 MΩ set - Remove fuse S13. - Test cables for short circuit to positive or to earth.	∞ Ω	

Switch on measuring range: **Resistance measurement (200 Ω/20 MΩ)**					
Test step	**V.A.G 1598 A Sockets**	**Test of**	• **Test conditions** - **Additional operations**	**Specification**	**Measures if readout differs from specification**
26	19 + 20	Databus lines	• Ignition switched off • Measuring range 200 Ω set - Separate multipin connectors from the control units connected to databus (connection in dash panel wiring loom -A122- and -A121-). - Connect test box V.A.G 1598 A with adapter V.A.G 1598/33. - Test cables for open circuit: - to steering angle sensor - to engine control unit - to automatic gearbox control unit[1]. - Cable from contact T47a/19 (control unit) through connection A121 to contact T6w/3 (steering angle sensor -G85-). - On through connection A121 to the connected control units. - Cable from contact T47a/20 (control unit) through connection A122 to contact T6w/2 (steering angle sensor -G85-). - On through connection A122 to the connected control units.	max. 1.5 Ω	- Test cables for open circuit. - Repair cable connections according to CFD. ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations
			• Measuring range 20 MΩ set - Remove fuse S13. - Test cables for short circuit to positive or to earth.	∞ Ω	

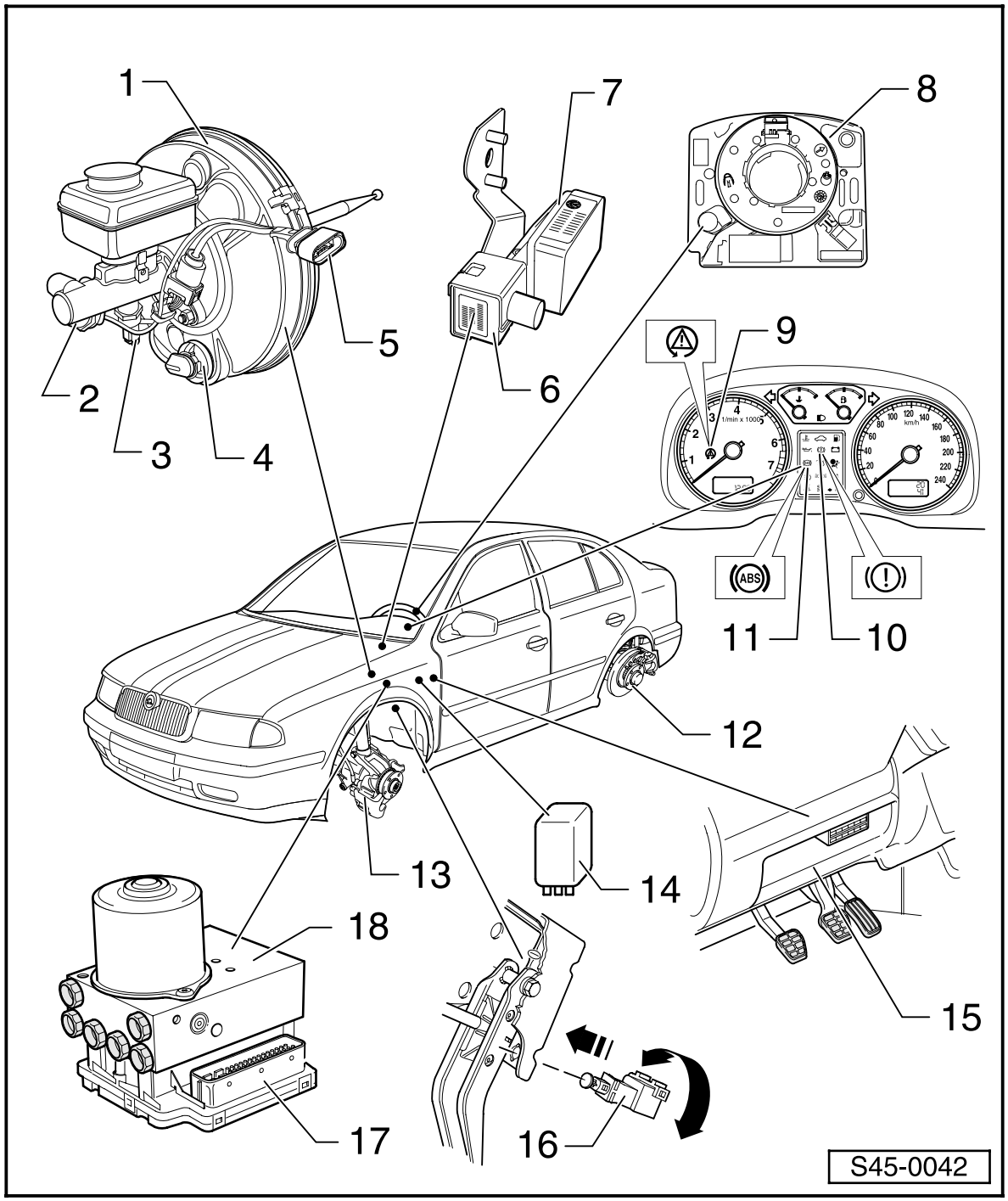
[1] Only on vehicles fitted with automatic gearbox.

Switch on measuring range: Voltage measurement (20 V =)					
Test step	**V.A.G 1598 A Sockets**	**Test of**	• **Test conditions** - **Additional operations**	**Specification**	**Measures if readout differs from specification**
27	-	Voltage supply of vehicle system tester V.A.G 1552, plug connection T16a	• Ignition switched off - Connect hand-held multimeter, e.g. V.A.G 1526 A with adapter cable set V.A.G 1594 A to T16a[1]: - Test cable between contact T16a/4 and contact T16a/1	10.0 - 14.5 V	- Test cable from T16a/4 to earth. - Test cable from T16a/1 through fuse S5. - Repair cable connections according to CFD. ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations

[1] Contact assignment of plug connection for voltage supply and self-diagnosis with vehicle system tester V.A.G 1552 ⇒ page 45-134.

Switch on measuring range: Resistance measurement (200 Ω)					
Test step	**V.A.G 1598 A Sockets**	**Test of**	• **Test conditions** - **Additional operations**	**Specification**	**Measures if readout differs from specification**
28	-	Resistance of K wire for self-diagnosis, plug connection T16a	• Ignition switched off • Measuring range 200 Ω set - Remove fuse S13. - Separate multipin connector T47a from control unit -J104-. - Connect test box V.A.G 1598 A with adapter V.A.G 1598/33. - Test cable between contact T16a/7 and contact T47a/39.	max. 1.5 Ω	- Test cable from T16a/7 to contact T47a/39. - Repair cable connections according to CFD. ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations
			• Measuring range 20 MΩ set - Remove fuse S13. - Test cables for short circuit to positive or to earth.	∞ Ω	- Repair cable connections according to CFD. ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations

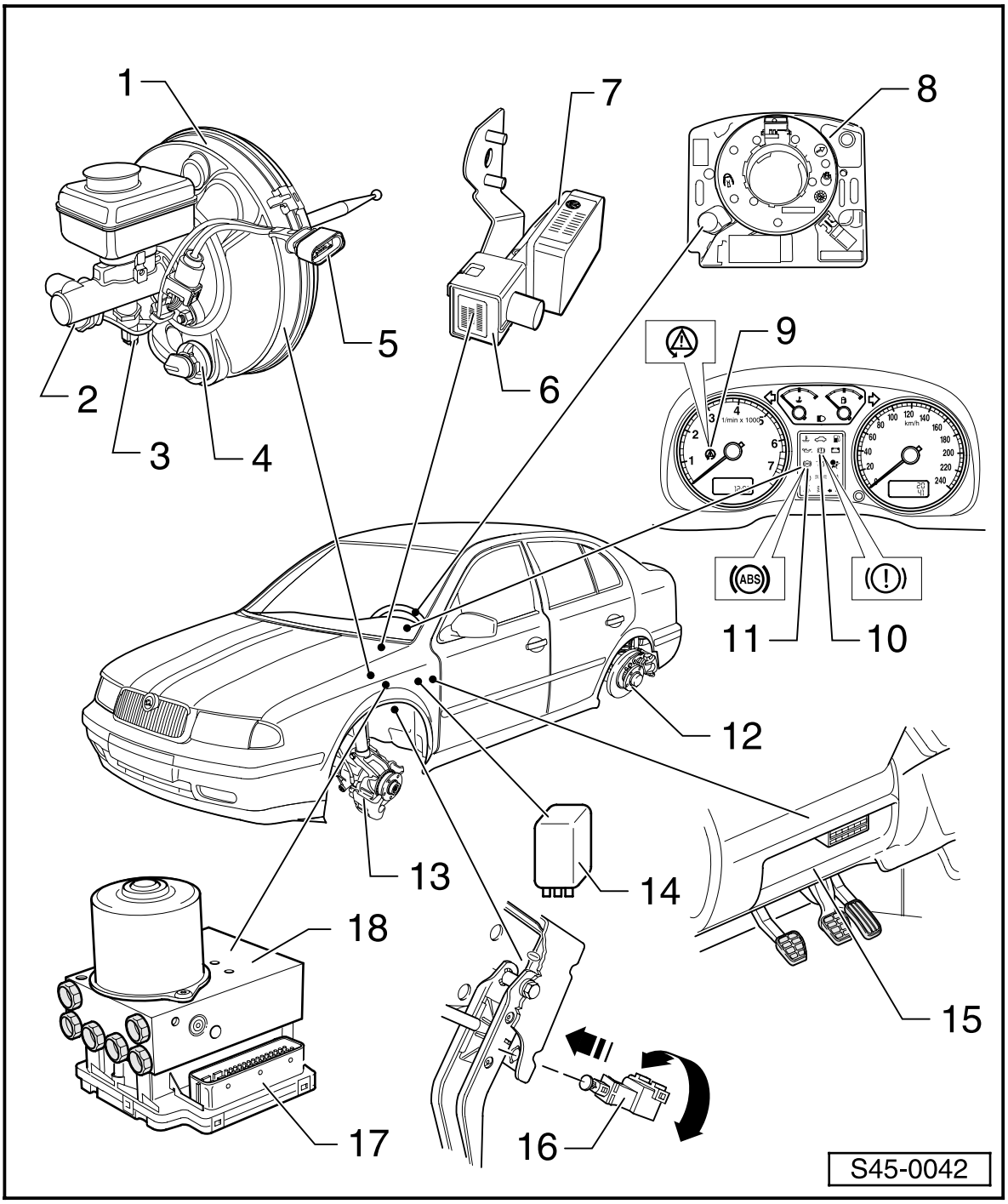
Electrical/electronic components and fitting locations ABS/EDL/ESP Mark 20



1 - Brake servo unit with brake master cylinder and brake fluid reservoir

The brake servo unit includes the following components:

- release switch for brake pressure solenoid -F84-. This switch is identical with the ESP brake recognition switch -F83-.
- ESP brake recognition switch -F83- is tested by self-diagnosis
- brake pressure solenoid in brake servo unit -N247-
- brake pressure solenoid in brake servo unit -N247- is tested by self-diagnosis



2 - Brake pressure sensor -1- -G201-

- Is tested by self-diagnosis
- Brake pressure sensor -1- and brake pressure sensor -2- are identical components
- Brake pressure sensor -1- can also be fitted at the same location as brake pressure sensor -2-, item 3
- Removing and installing ⇒ page 47-28

3 - Brake pressure sensor -2- -G214-

- Is tested by self-diagnosis
- Brake pressure sensor -2- and brake pressure sensor -1- are identical components
- Brake pressure sensor -2- can also be fitted at the same location as brake pressure sensor -1-, item 2
- Removing and installing ⇒ page 47-28

4 - Cable opening

- ESP brake recognition switch -F83-
- Brake pressure solenoid -N247-

5 - Plug connection T14c
- ♦ Brake recognition switch -F83-
- ♦ Brake pressure solenoid in brake servo unit -N247-
- ♦ Sender -1- for brake pressure -G201-
- ♦ Sender -2- for brake pressure -G214-

6 - Lateral acceleration sender -G200-
- ♦ Fitting location: next to steering column below dash panel
- ♦ Is tested by self-diagnosis

7 - Yaw rate sender -G202-
- ♦ Fitting location: next to steering column below dash panel
- ♦ Is tested by self-diagnosis

8 - Steering angle sender -G85-
- ♦ Fitting location: on steering column between steering wheel and steering column switch
- ♦ Is tested by self-diagnosis

9 - Electronic stability programme warning light -K155-
- ♦ Fitting location: in dash panel insert
- ♦ Operation ⇒ page 45-92

10 - Handbrake/brake fluid level warning light -K14/33-
- ♦ Fitting location: in dash panel insert
- ♦ Operation ⇒ page 45-92

11 - ABS warning light
- ♦ Fitting location: in dash panel insert
- ♦ Operation ⇒ page 45-92

12 - Parts of ABS system at rear suspension

(Fig. shows only disc brakes)
- ♦ Rear right and left wheel speed sensors -G44/G46-
- ♦ Is tested by self-diagnosis
- - Removing and installing ⇒ page 45-65
- - Installing wheel speed sensor cables ⇒ page 45-67
- ♦ Pulse rotor for rear right and left wheel speed sensors
- - Testing ⇒ page 45-66
- - Removing and installing: pulse rotor is replaced together with wheel hub ⇒ page 42-23 and 42-28.

13 - Parts of ABS system at front suspension
- ♦ Front right and left wheel speed sensors -G45/G47 [1)]
- - Removing and installing ⇒ page 45-60
- - Installing wheel speed sensor cables ⇒ page 45-62
- ♦ Pulse rotor for front right and left wheel speed sensors
- - Testing ⇒ page 45-61
- - Removing and installing: pulse rotor is replaced together with wheel hub ⇒ page 40-13.

14 - Voltage relay for warning light K155 -J535-
- ♦ Fitting location: additional relay holder, position 7

15 - Diagnostic connection
- ♦ Fitting location: in storage compartment driver side

16 - Brake light switch -F-
- ♦ Open in off position
- - Setting ⇒ page 45-69
- - Remove by turning 90° to the left ⇒ page 45-69
- - Install by turning 90° to the right ⇒ page 45-69
- ♦ Must be tested in measured value block ⇒ page 45-116

17 - ABS/EDL/ESP control unit -J104-
- ♦ Fitting location: at hydraulic unit in left of engine compartment
- ♦ Is tested by self-diagnosis
- ♦ Test of multipin connection to control unit ⇒ page 45-134
- ♦ Do not unplug multipin plug connection before completing self-diagnosis. Switch ignition off before separating plug connection.

18 - Hydraulic control unit for ABS/EDL/ESP -N55-
- ♦ Fitting location: in left of engine compartment
- ♦ Hydraulic unit -N55- consists of hydraulic pump -V64- and valve block with inlet and outlet valves
- ♦ Is tested by self-diagnosis
- ♦ If hydraulic unit is replaced, it is essential to seal old part with plugs from installation parts kit; Part No. ⇒ Parts List
- ♦ Removing and installing hydraulic control unit (hydraulic unit -N55- with control unit -J104-) ⇒ page 45-158
- ♦ Hydraulic pump -V64- and valve block must not be separated
- ♦ Servicing hydraulic control unit ⇒ page 45-163

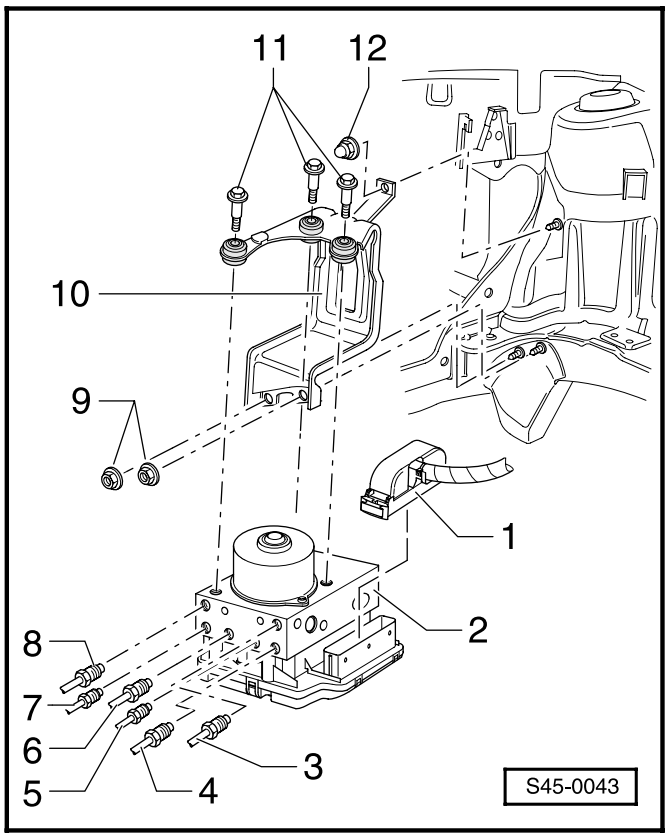
Removing and installing ABS/EDL/ ESP hydraulic control unit and bracket

Note:

As a general rule, always ensure that no brake fluid gets into the connector housing of the control unit.
This can result in corrosion to the contacts and thus in a failure of the system.
If the plug housing is soiled, it should be carefully cleaned with compressed air.

Special tools, testers and aids required

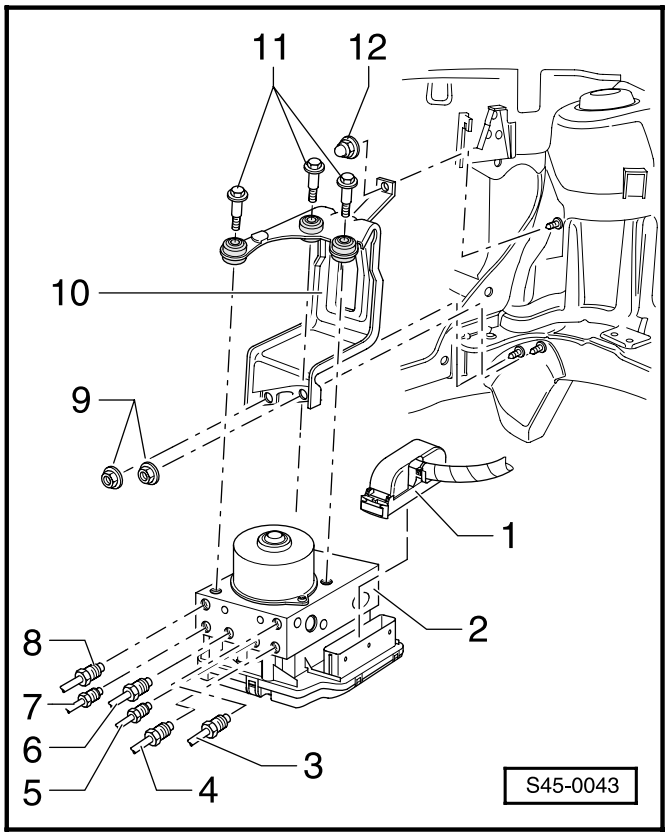
- Vehicle system tester V.A.G 1552
- Diagnostic cable V.A.G 1551/3 or V.A.G 1551/3A
- Brake pedal depresser, e.g. V.A.G 1238/B or V.A.G 1869/2
- Installation parts kit, Part No. ⇒ Parts List
  Installation parts kit consists of plugs and protective cap
- Brake filling and bleeding appliance, e.g. ROMESS S15
- Bleeder bottle (commercially available)
- Brake fluid ⇒ page 00-8



1 - Multipin connector of control unit
- 47-pin
- Do not separate plug connection before self-diagnosis is completed. Switch off ignition before separating the plug connection.

2 - Hydraulic control unit
- The hydraulic pump -V64-, the hydraulic unit -N55- and the control unit -J104- together form the hydraulic control unit.
- The hydraulic control unit should be removed and installed as a complete unit ⇒ page 45-159.
- Servicing ⇒ page 45-163

3 - Brake line, 14 Nm
- Between brake master cylinder/floating piston circuit and hydraulic unit



4 - Brake line, 14 Nm
- Hydraulic unit to front left brake caliper

5 - Brake line, 14 Nm
- Hydraulic unit to rear right wheel cylinder/brake caliper

6 - Brake line, 14 Nm
- Hydraulic unit to rear left wheel cylinder/brake caliper

7 - Brake line, 14 Nm
- Hydraulic unit to front right brake caliper

8 - Brake line, 14 Nm
- Between brake master cylinder/push-rod piston circuit and hydraulic unit

9 - Hexagon nut, self-locking, 20 Nm

10 - Bracket

11 - Fit bolt, 8 Nm

12 - Cap nut, 25 Nm

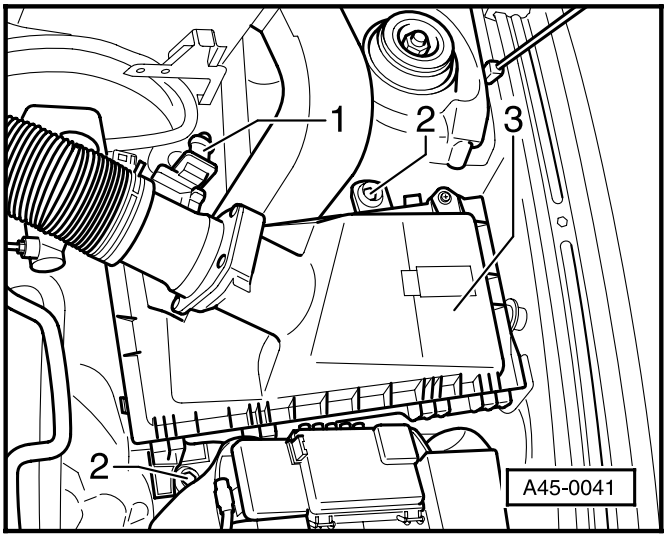
Removing hydraulic control unit

Notes:

- *Before disconnecting the battery, determine the code of radio set fitted with anti-theft coding.*
- *When the battery is re-connected, please check the vehicle equipment:*
  - Enter radio code
  - Re-set clock
  - Initialise power windows.

⇒ Inspection and Maintenance

- Disconnect battery.



Note:

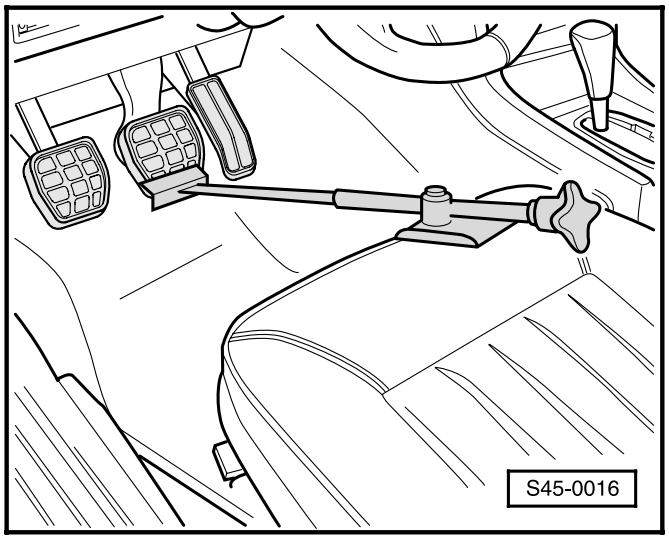
The following 2 steps do not apply to the 1.6-ltr./55 kW engine:

◄- Unplug the connector -1- of the air mass meter at the air guide pipe of the air filter.

- Take out the bolts -2- at the air filter -3- and place filter to the side.

- On diesel engines, remove relay carrier above brake servo unit.

- Extract as much brake fluid as possible from the brake fluid reservoir with a bleeder bottle.

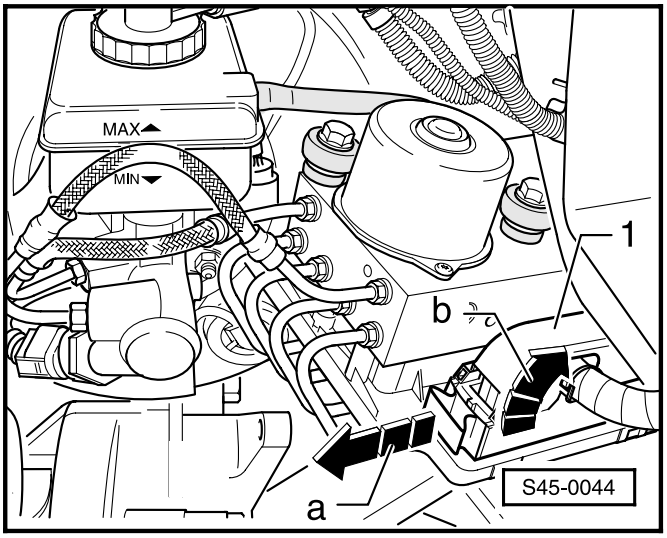


◄- Depress brake pedal and lock in position with brake pedal depresser, e.g. V.A.G 1238/B or V.A.G 1869/2.

- Fit the bleeder hose of the bleeder bottle onto the bleeder screw of the front left brake caliper and open bleeder screw.

- After brake fluid has flowed out, close bleeder screw.

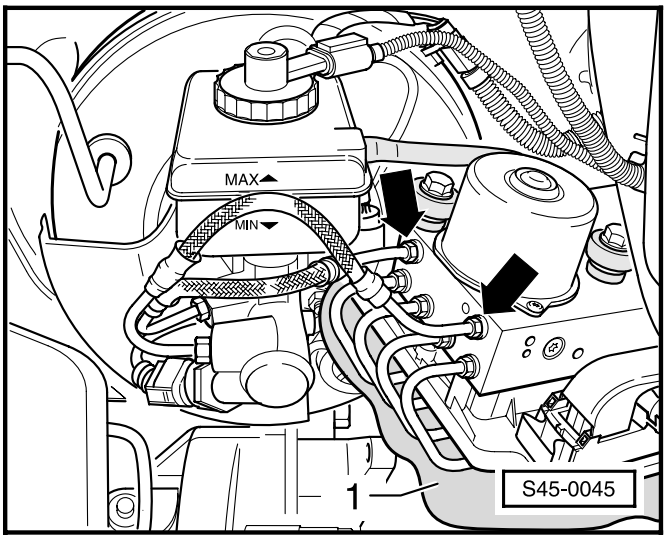
- Detach bleeder hose from the bleeder screw.



◄- Unlock multipin connector -1- -arrow a- and unplug from control unit -arrow b-.

Note:

Ensure that no brake fluid gets onto the contacts.

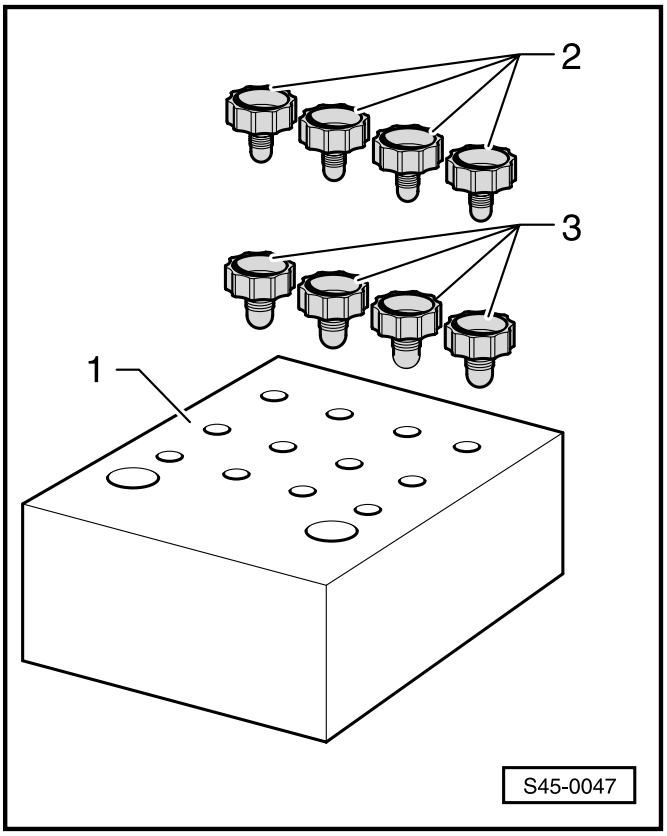


◄- Place an absorbent mat below the hydraulic control unit -1- in order to absorb the brake fluid.

Note:

Brake lines in the area of the hydraulic unit must not be bent.

- Detach the brake lines from the brake master cylinder to hydraulic unit, see arrows, and fit on plugs from installation parts kit to protect them from dirt.



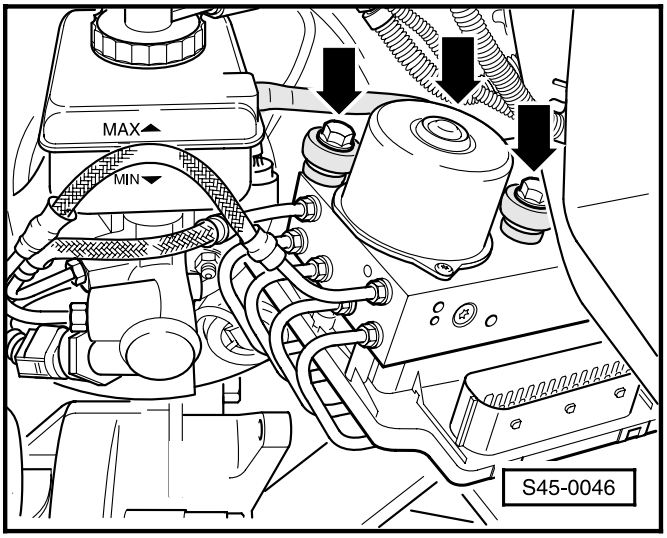
- On models with left-hand steering, tie up the detached brake lines with a welding wire as high up as possible so that the ends of the lines project above the fluid level in the brake fluid reservoir -arrows-.

- Detach the remaining brake lines from the hydraulic unit.

◄- Seal the connections of the hydraulic lines at the hydraulic unit with the from the installation parts kit.

-Item 1- Protective cap for valve domes (foam)

Plugs -item 2- and 3- as well as protective cap -item 1- are included with the „Installation parts kit".
Part No. for „Installation parts kit" ⇒ Parts List



◄- Remove bolts -arrows- at the bracket of the hydraulic control unit.

Note:

Third bolt attaching hydraulic control unit is concealed by hydraulic pump -V64-.

- Take out hydraulic control unit.

Installing hydraulic control unit

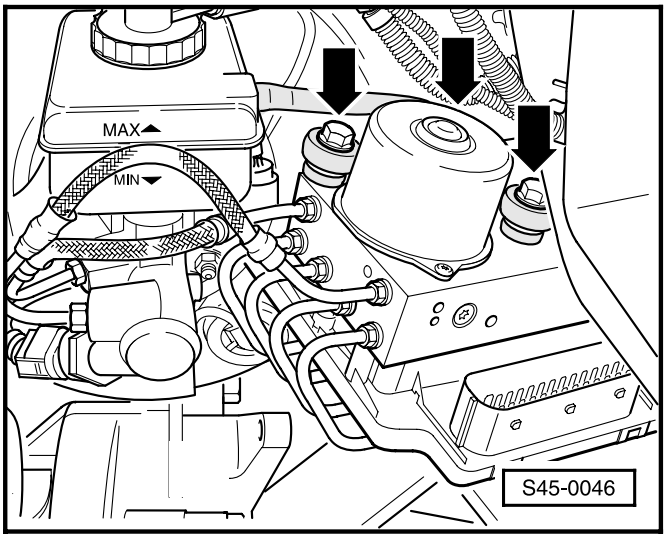
Notes:

- *Do not remove plugs at the hydraulic unit until the appropriate brake line is fitted on.*
- *If the plugs are removed sooner from the hydraulic unit, brake fluid may flow out with the result that the system is no longer properly filled and bled.*

- Bolt hydraulic control unit onto bracket.

Note:

Do not fully tighten bolts. This makes it easier to connect the individual brake lines to the hydraulic control unit.



- Attach brake lines to the hydraulic unit and tighten fully ⇒ page 45-158.

◄ - Bolt hydraulic control unit tight -arrows-.

Note:

Third bolt attaching hydraulic control unit is concealed by hydraulic pump -V64-.

- Plug multipin connector into the control unit and lock.

The remaining installation is carried out in the reverse order.

- Connect battery ⇒ page 45-159.
- Code control unit ⇒ page 45-114.
- Bleed brake system ⇒ page 47-18.

If the control unit -J104- was replaced when carrying out repairs to the hydraulic control unit, it is then necessary to perform a zeroing for the following components:

- Steering angle sensor -G85-
- Lateral acceleration sensor -G200-
- Brake pressure sensor -1- -G201-
- Brake pressure sensor -2- -G214-

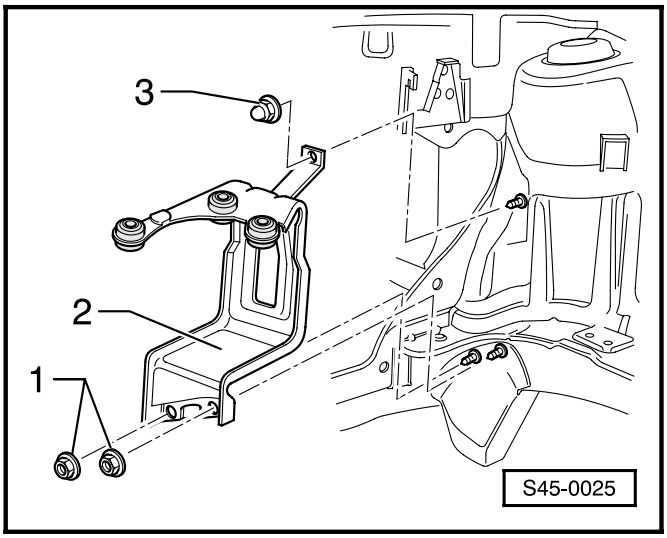
- Initiate basic setting and carry out zeroing ⇒ page 45-124.

- Interrogate fault memory ⇒ page 45-101.
- Erase fault memory ⇒ page 45-113.

Removing and installing bracket

Removing

- Remove hydraulic control unit ⇒ page 45-159.



◄ - Unscrew hexagon nuts -1- and cap nut -3-.

- Take off bracket -2-.

Installing

Installation is carried out in the reverse order.

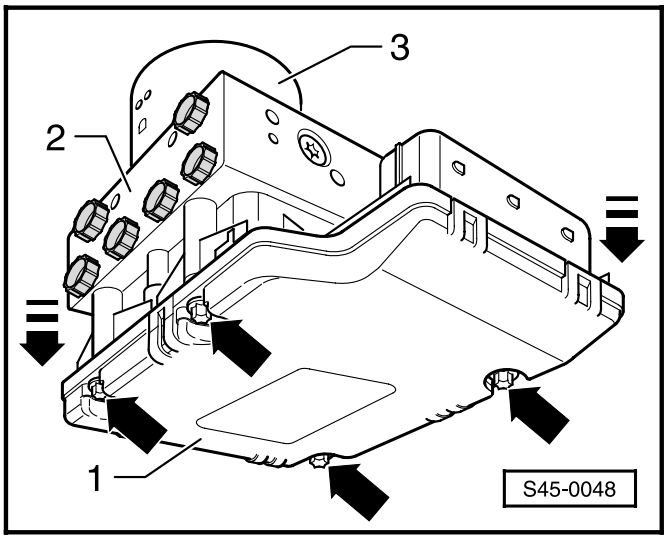
Tightening torques:

Hexagon nuts to body **Always fit new nuts!**	20 Nm
Cap nut to body	25 Nm

Servicing ABS/EDL/ESP hydraulic control unit

Special tools, testers and aids required

♦ Installation parts kit, Part No. ⇒ Parts List
Installation parts kit consists of plugs and protective cap

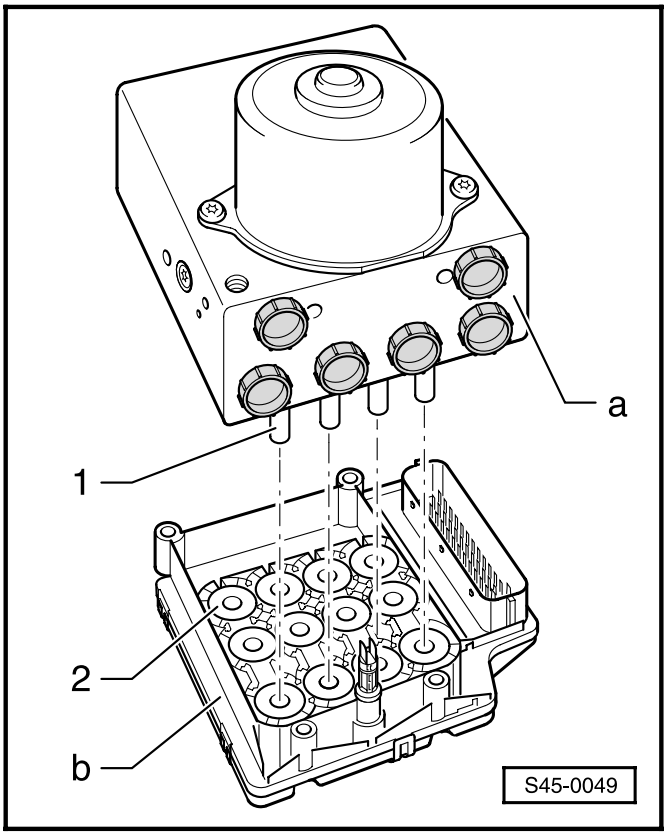


Disassembling hydraulic control unit

◄ The hydraulic control unit is serviced by separating the control unit (J104) -1- from the hydraulic unit (N55) -2-, which is connected to the hydraulic pump (V64) -3-.

It is only possible to replace the control unit (J104) -1- or the hydraulic unit (N55) -2- with hydraulic pump (V64) -3-.
Hydraulic unit and hydraulic pump must not be separated and therefore cannot be replaced separately.

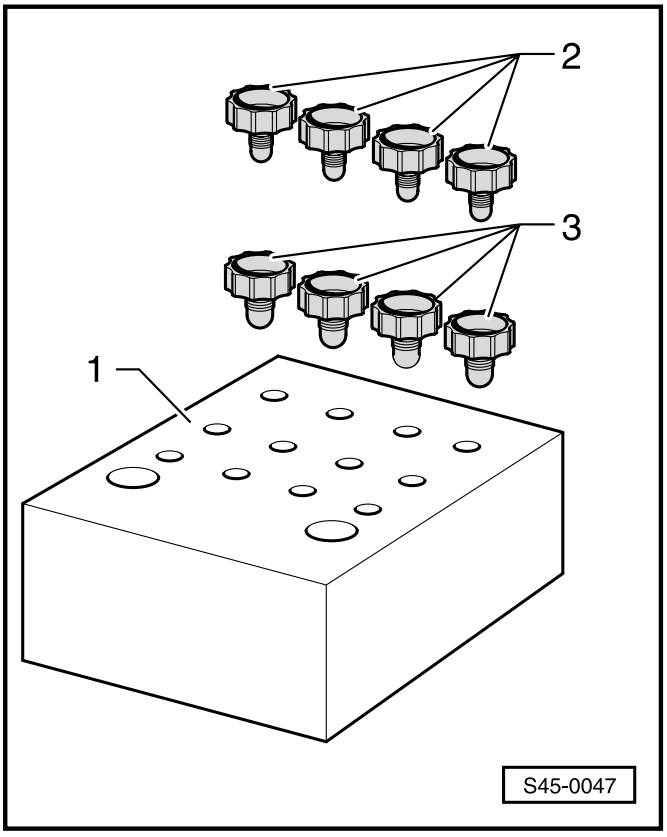
- Unscrew bolts from control unit -arrows- and pull control unit off the hydraulic unit.



Note:

◄ *When pulling off the control unit -b-, ensure that the valve domes of the hydraulic unit -a- are not twisted with the solenoids of the control unit.*

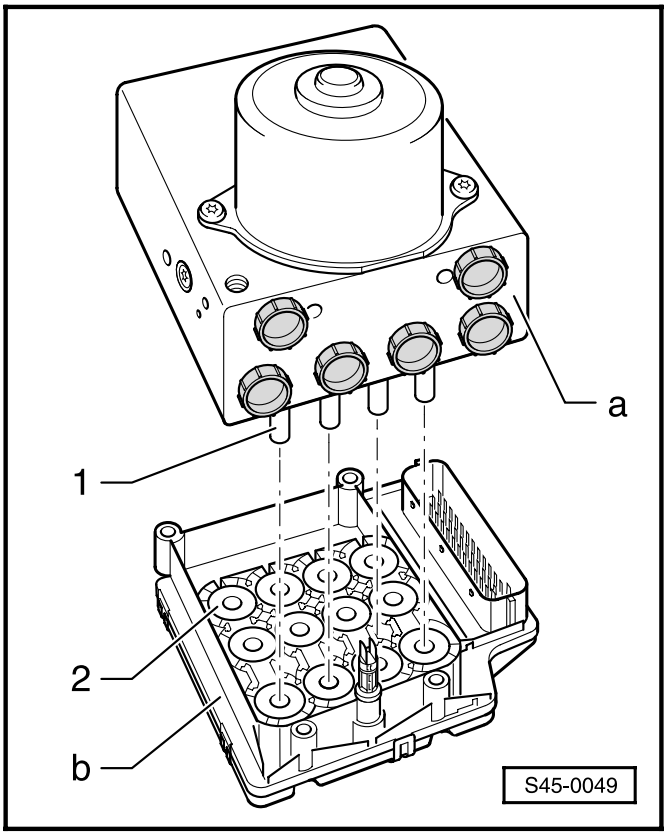
- Cover over solenoids of control unit with non-fluffing cloths.



◄ - After separating the hydraulic unit from the control unit, fit protective cap -1- onto the valve domes of the hydraulic unit.

Notes:

- *Protective cap -1- and plugs -2 and 3- are included in the „Installation parts kit“.*
- *It is also possible to use the same parts from the new hydraulic units fitted in place of the plugs and protective cap supplied with the „Installation parts kit“.*



◄ ***Hydraulic unit (N55) and hydraulic pump (V64) -a-:***

- *Hydraulic unit: The valve block contains the control valves.*
- *Hydraulic pump -V64- and hydraulic unit -N55- must not be separated from each other.*
- *If the hydraulic unit is replaced, fit the protective cap for valve domes (⇒ page 45-164, Fig. S45-0047, item 1) onto the old part and seal the old part with the plugs (⇒ Fig. S45-0047, items 2 and 3). This is a condition for any warranty claims.*

1 - Valve domes of hydraulic unit

2 - Solenoids of control unit

ABS control unit (J104) -b-:

If the control unit -J104- was replaced when carrying out repairs to the hydraulic control unit, it is then necessary to perform a zeroing for the following components:

- Steering angle sensor -G85-
- Lateral acceleration sensor -G200-
- Brake pressure sensor -1- -G201-
- Brake pressure sensor -2- -G214-

- Initiate basic setting and carry out zeroing ⇒ page 45-124.

⇒ page 45-134, Contact assignment

⇒ page 45-133, Test requirements

Assembling hydraulic control unit

Notes:

- *It is essential that the area of the control unit-valve block is clean.*
- *When assembling control unit and hydraulic unit, ensure that the valve domes of the hydraulic unit are not tilted with the solenoids of the control unit.*

- Attach control unit to the hydraulic unit. Max. tightening torque 4 Nm (always use the bolts supplied).

Testing/removing and installing parts of ABS system at front wheels

Special tools, testers and aids required

- Wiring loom repair kit, e.g. Škoda Service Case, order No. S 504 500 V
- Solid lubricating paste G 000 650

Removing and installing wheel speed sensors

⇒ page 45-60

Testing pulse rotor/removing and installing

⇒ page 45-61

Inspecting lateral runout of pulse rotor

⇒ page 45-61

Removing and installing front wheel speed sensor cables

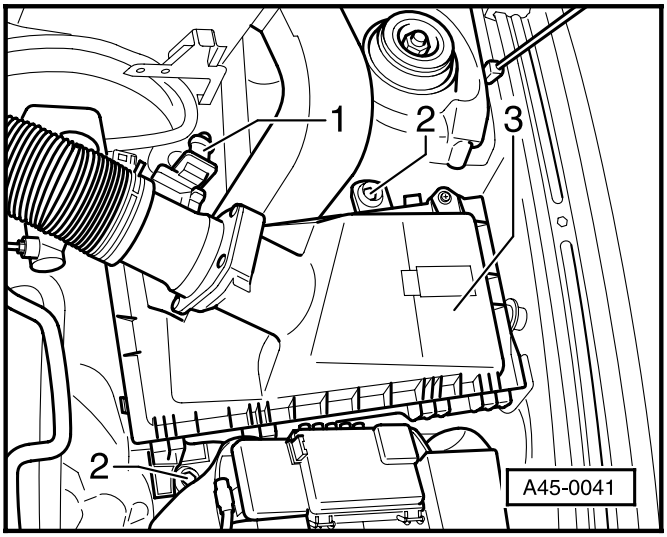
Notes:

- *It is prohibited to carry out repairs to screened cables of the ABS system.*
- *Before disconnecting the battery, determine the code of radio sets fitted with anti-theft coding.*
- *When the battery is re-connected, please check the vehicle equipment:*
  - Enter radio code
  - Re-set clock
  - Initialise power windows.

⇒ Inspection and Maintenance

Removing

- Disconnect battery.

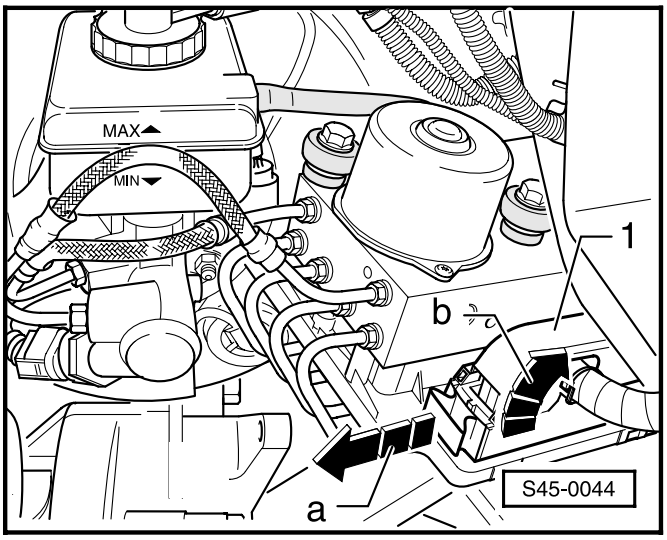


Note:

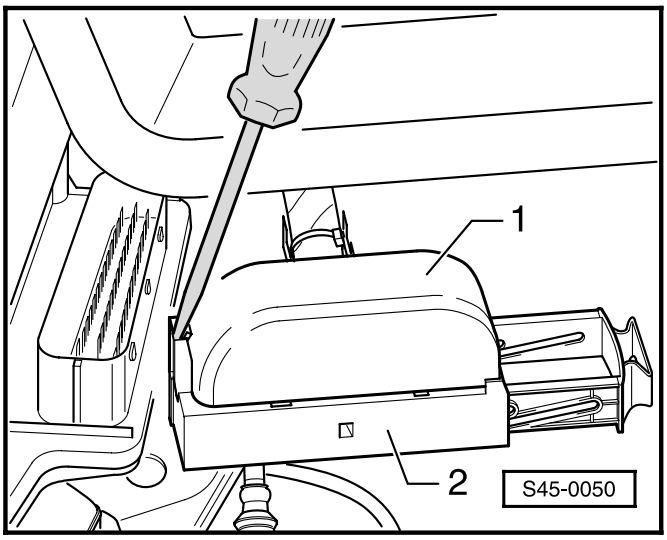
The following 2 steps do not apply to the 1.6-ltr./55 kW engine:

◄- Unplug connector of the air mass meter -1- from the air guide pipe of the air filter.

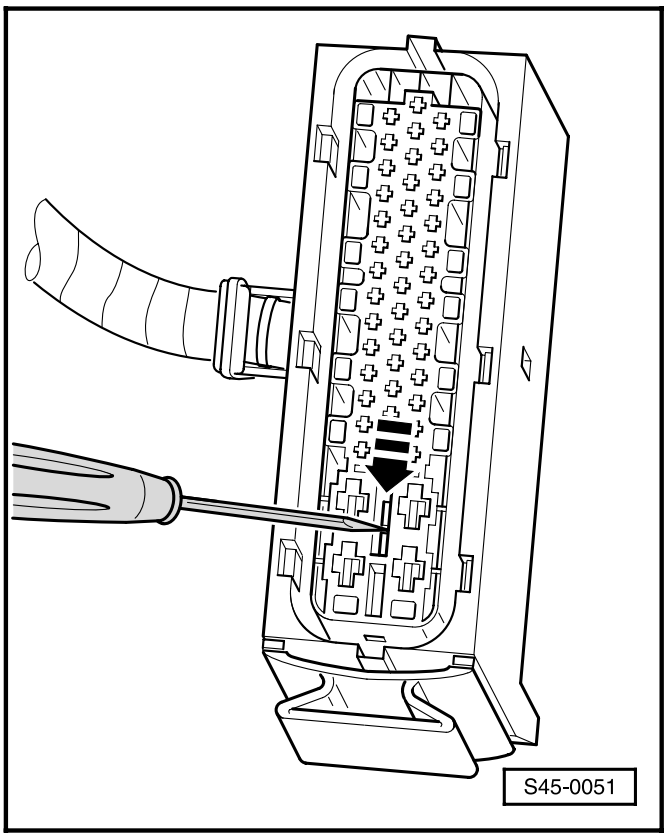
- Remove screws -2- at the air filter -3- and place filter to the side.
- On diesel engines, remove relay carrier above brake servo unit.



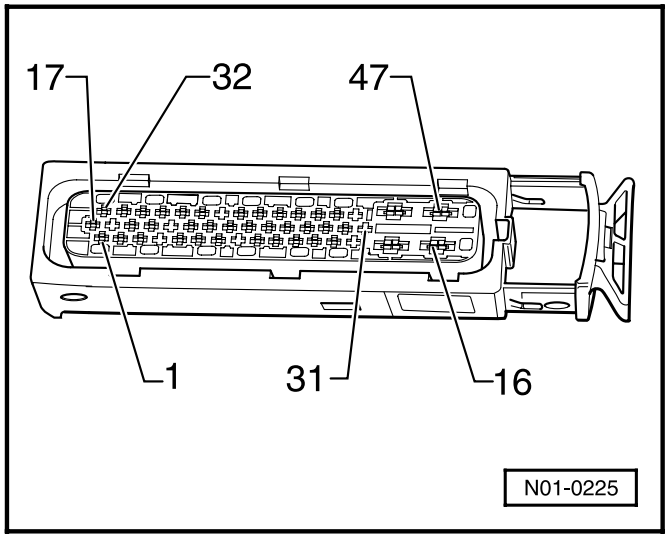
◄- Release multipin connector -1- (arrow -a-) and unplug from control unit -arrow b-.



◄- Use a screwdriver to detach cap -1- of multipin connector -2- and take off.

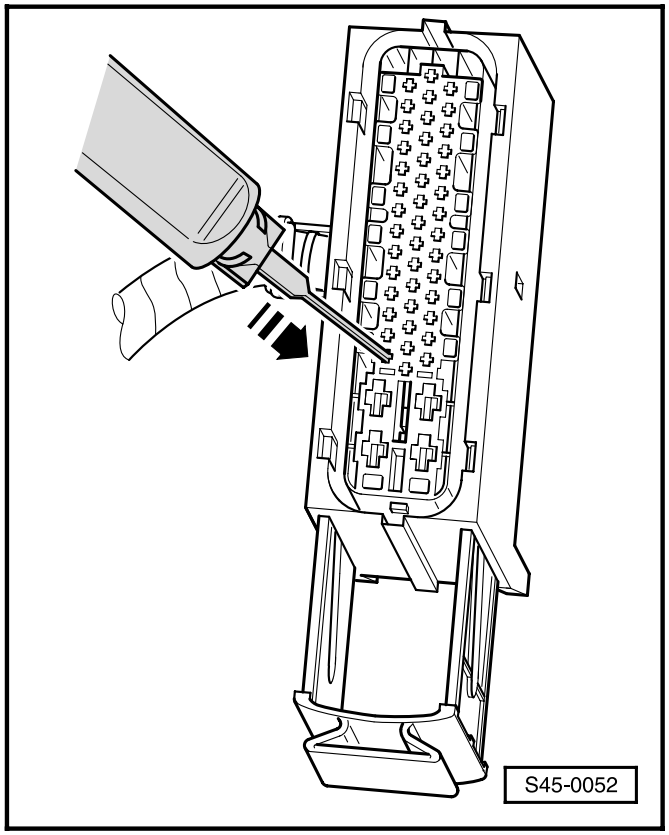


◄- Use a small screwdriver to release secondary lock (purple) in direction of arrow.



◄ **Contact assignment of plug connection T47a of wiring loom/control unit -J104-**

Contact	Cable connection to component...
3 + 4	Front right wheel speed sensor -G45
33 + 34	Front left wheel speed sensor -G47
6 + 7	Rear right wheel speed sensor -G44
36 + 37	Rear left wheel speed sensor -G46

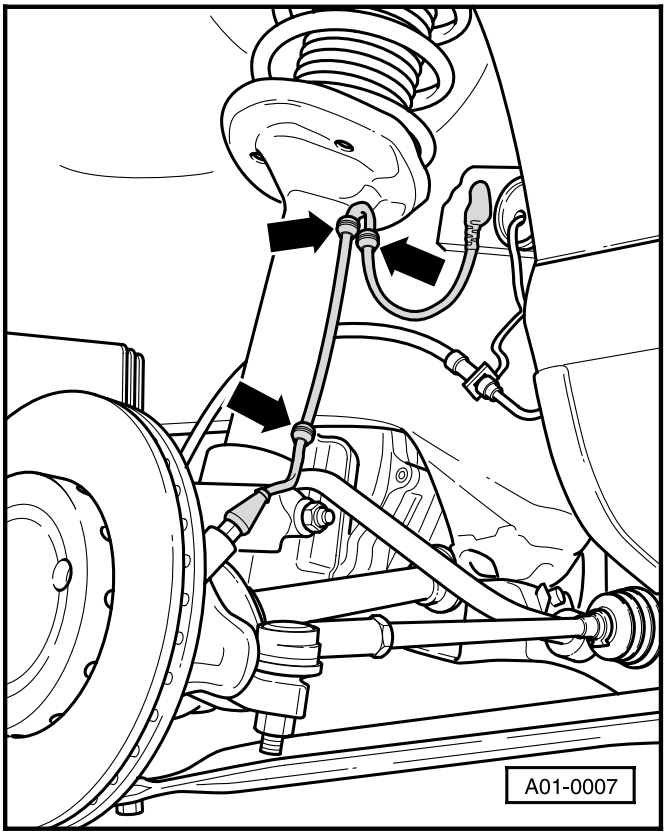


◄ - Use a suitable ejection tool from the wiring loom repair kit to knock out the appropriate contacts.

- Release connector at wheel speed sensor and separate plug connection.
- Remove faulty wheel speed sensor cable.

Installing

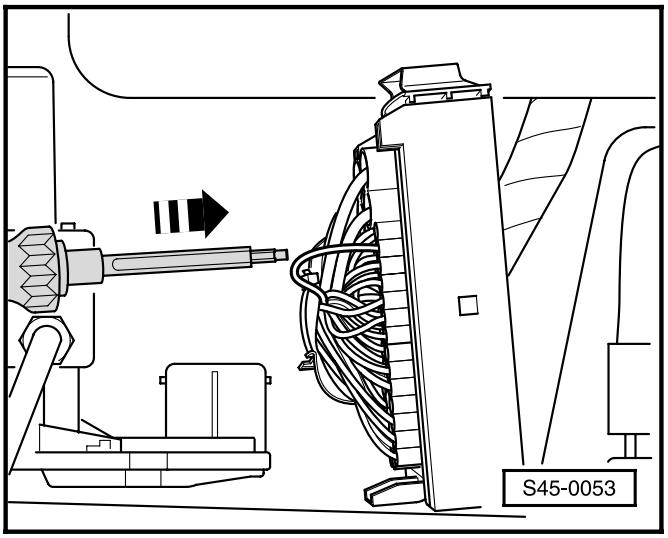
- Pull in new wheel speed sensor cable.
- Connect wheel speed sensor cable to wheel speed sensor.



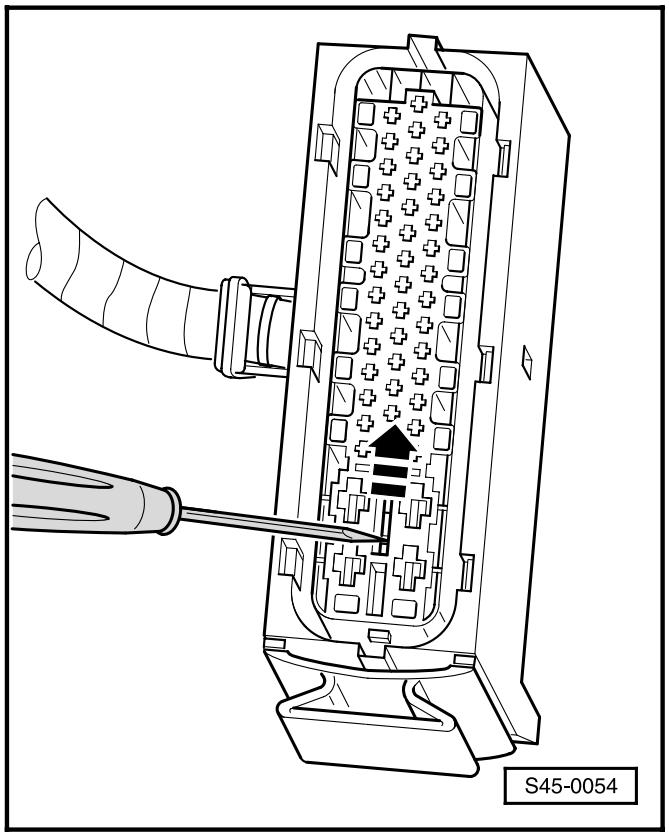
◄- Clip wheel speed sensor cable in place -arrows-.

Note:

When installing the wheel speed sensor cable, ensure that it is fitted free of twisting in the wheelhouse.



◄- Insert contact into the plug housing and use a suitable insertion tool from the wiring loom repair kit to push in the single-wire seal as far as the stop.



◄- Secure contacts with the secondary lock (purple).

- Use a small screwdriver to push and lock secondary lock (purple) in direction of arrow.

- Fit cap onto the multipin connector.

- Plug multipin connector into control unit -J104- and lock.

- Connect battery ⇒ page 45-166.

- Interrogate fault memory ⇒ page 45-101.

- Erase fault memory ⇒ page 45-113.

Testing/removing and installing parts of the ABS system at rear wheels (disc and drum brakes) - front-wheel drive models

⇒ page 45-65

Removing and installing parts of the ESP system

You can find a description of the design and operation of the ESP system in the Self Study Programme No. 28.

♦ Removing and installing yaw rate sensor -G202- and lateral acceleration sensor -G200- ⇒ page 45-171

♦ Removing and installing steering angle sensor -G85- ⇒ page 45-174

Special tools, testers and aids required

♦ Torque wrench 5...50 Nm, e.g. V.A.G 1331

♦ Vehicle system tester V.A.G 1552

♦ Diagnostic cable V.A.G 1551/3 or V.A.G 1551/3A

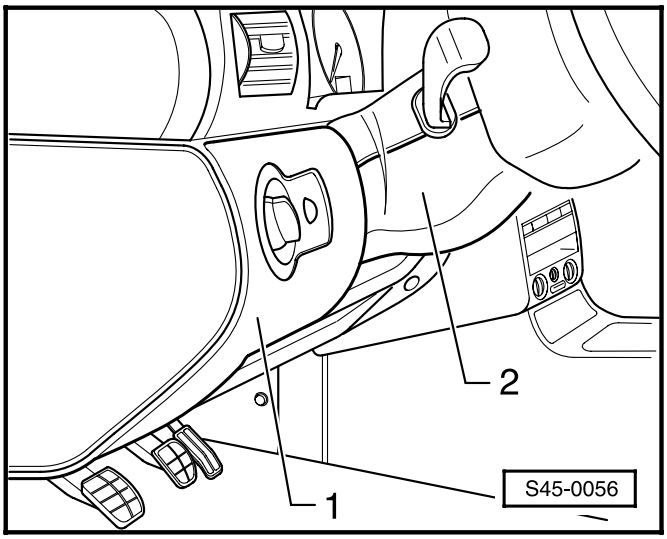
Removing and installing yaw rate sensor -G202- and lateral acceleration sensor -G200-

The procedure for removal and installation of the yaw rate sensor -G202- and of the lateral acceleration sensor -G200- is identical with the exception of the particular sensor to be replaced.

Notes:

- *Before disconnecting the battery, determine the code of radio sets fitted with anti-theft coding.*
- *When the battery is re-connected, please check the vehicle equipment:*
  - Enter radio code
  - Re-set clock
  - Initialise power windows.

⇒ Inspection and Maintenance



Removing

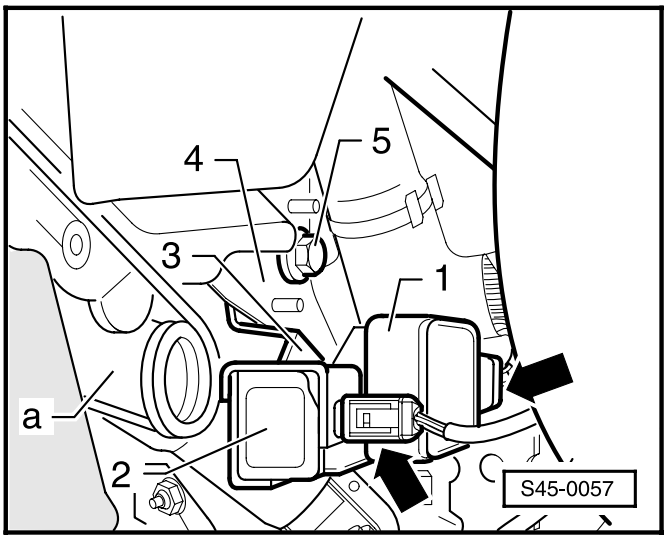
- Disconnect battery.

◄ - Remove bottom part of dash panel -1-.

⇒ Body Fitting Work; Repair Group 70; Dash Panel

- Remove bottom part of steering column trim -2-.

⇒ Body Fitting Work; Repair Group 70; Dash Panel



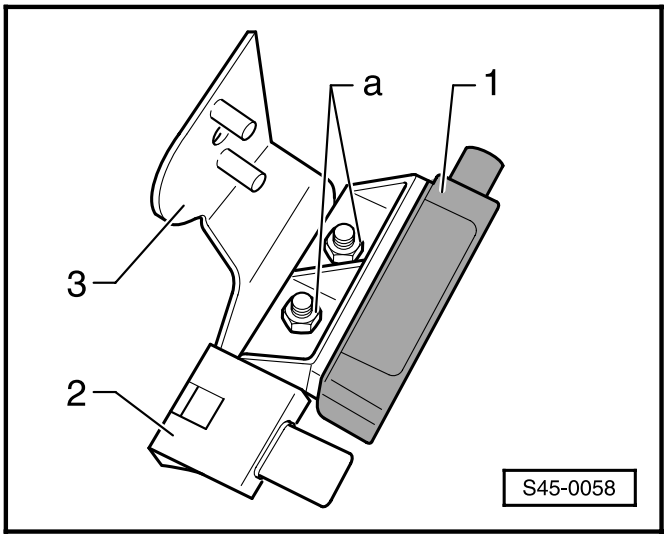
◄ The yaw rate sensor (G202) -1- and the lateral acceleration sensor (G200) -2- are attached by means of a common bracket -3- to the bearing bracket -4- of the steering column -a-.

Note:

Because of the common bracket, it is not possible to remove the sensors individually. After removing the bracket, the yaw rate sensor -G202- and the acceleration sensor -G200- can be replaced separately.

- Unplug the connectors -arrows- of the yaw rate sensor -G202- and of the lateral acceleration sensor -G200-.

- Remove hexagon bolt -5- and take out bracket -3- together with yaw rate sensor -G202- and lateral acceleration sensor -G200-.



Replacing yaw rate sensor -G202-

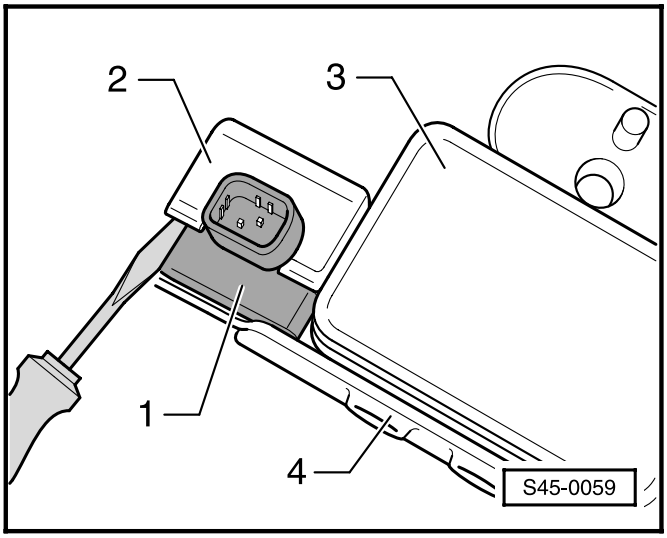
◄ - Unscrew the nuts -a- of the yaw rate sensor (G202) -1-.

- Take yaw rate sensor (G202) -1- off the bracket -3-.

2 - Lateral acceleration sensor -G200-

- Insert new yaw rate sensor (G202) -1- into the bracket -3- and align.

- Screw on nuts -a- and tighten fully.

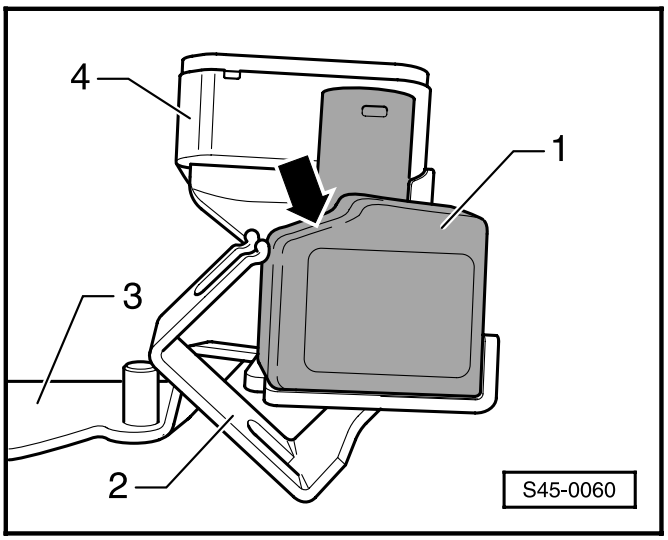


Replacing lateral acceleration sensor -G200-

◄ - Use a screwdriver to lever the fixture -2- off the lateral acceleration sensor (G200) -1-.

- Take lateral acceleration sensor (G200) -1- off the bracket -4-.

3 - Yaw rate sensor -G202-



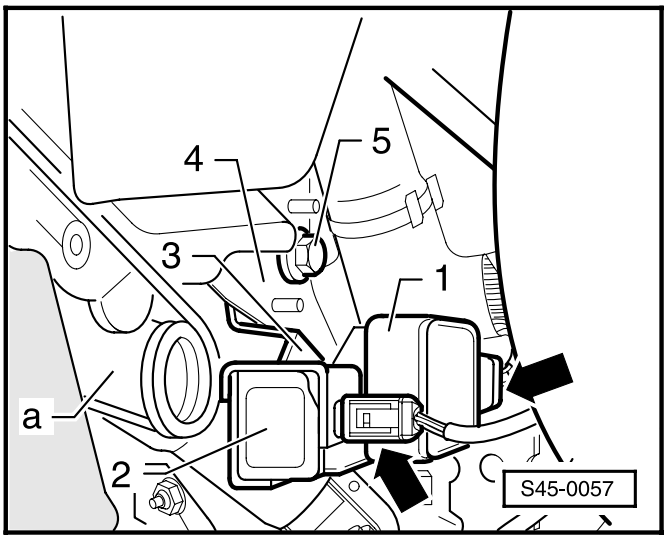
◄ - Insert new lateral acceleration sensor (G200) -1- into the bracket -3-.

4 - Yaw rate sensor -G202-

Note:

The angled side -arrow- of the lateral acceleration sensor (G200) -1- must be pointing toward the fixture -2-.

- Push fixture -2- over the lateral acceleration sensor (G200) -1- and lock in position.



Installing

◄ - Install bracket -3- together with lateral acceleration sensor (G200) -2- and yaw rate sensor (G202) -1- at the bearing bracket -4- of steering column -a-.

- Screw in hexagon bolt -5- and tighten fully.

- Plug in connector of yaw rate sensor (G202) -1- and connector of lateral acceleration sensor (G200) -2- -arrows-.

- Install bottom part of steering column trim.
⇒ Body Fitting Work; Repair Group 70; Dash Panel

- Install bottom part of dash panel.
⇒ Body Fitting Work; Repair Group 70; Dash Panel

- Re-connect battery ⇒ page 45-171.

- Carry out basic setting ⇒ page 45-124.

- Interrogate fault memory ⇒ page 45-101.

- Erase fault memory ⇒ page 45-113.

Tightening torques:

Yaw rate sensor (G202)	9 Nm
Bracket to bearing bracket of steering column	20 Nm

Removing and installing steering angle sensor -G85-

Special tools, testers and aids required

- Vehicle system tester V.A.G 1552
- Diagnostic cable V.A.G 1551/3 or V.A.G 1551/3A

Notes:

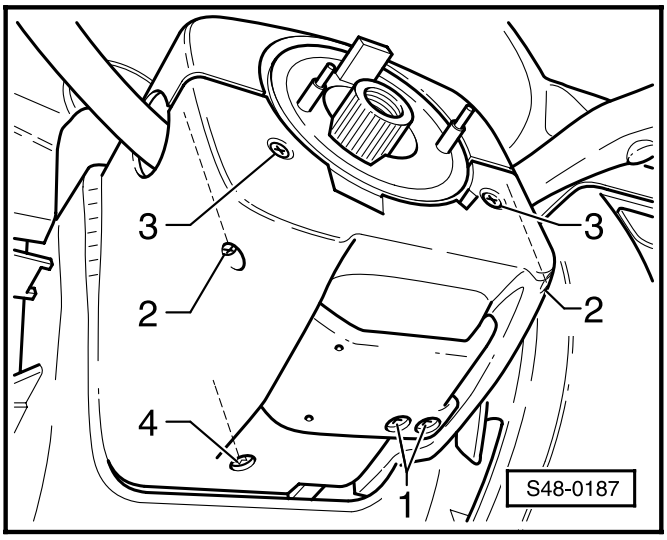
- *Before disconnecting the battery, determine the code of radio sets fitted with anti-theft coding.*
- *When the battery is re-connected, please check the vehicle equipment:*
  - Enter radio code
  - Re-set clock
  - Initialise power windows.

⇒ Inspection and Maintenance

Removing

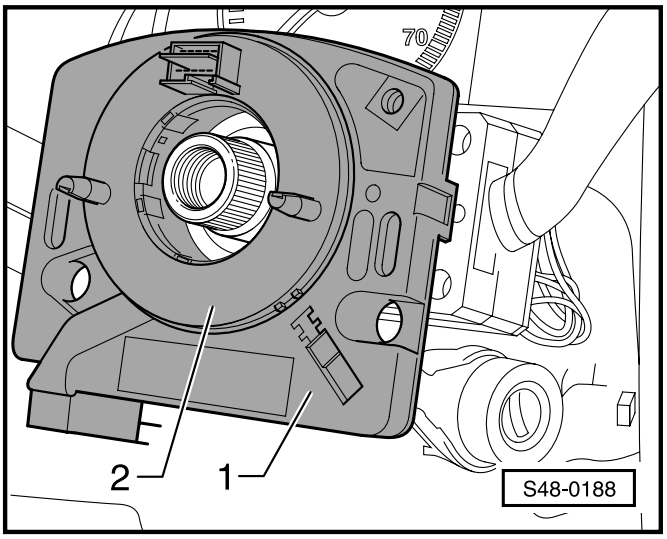
- Disconnect battery.
- Move front wheels into straightahead position.
- Remove steering wheel.

⇒ Body Fitting Work; Repair Group 69; Airbag System

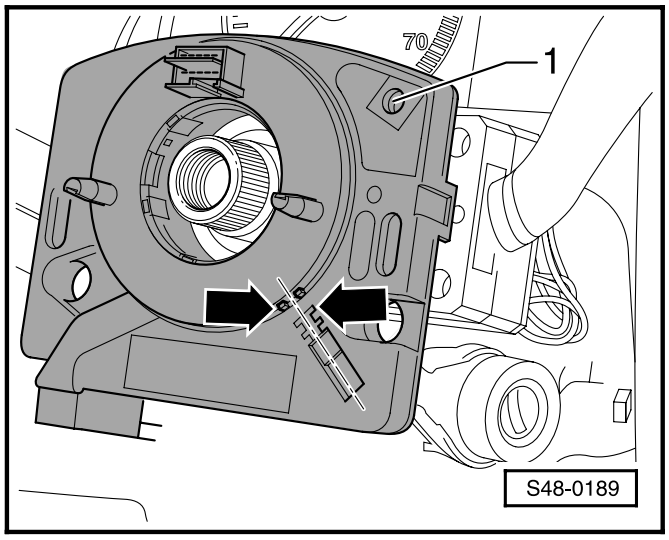


◄ - Remove screws -1-, -2-, -3- and -4-.

- Take off steering column adjustment handle as well as top and bottom parts of steering column trim.
- **Check whether the front wheels are in a straightahead position.**
- Fit on steering wheel, if necessary, and move front wheels into straightahead position.
- Take off steering wheel.



◄ The steering angle sensor -G85- is installed together with the airbag clock spring contact -2- in housing -1-.



Note:

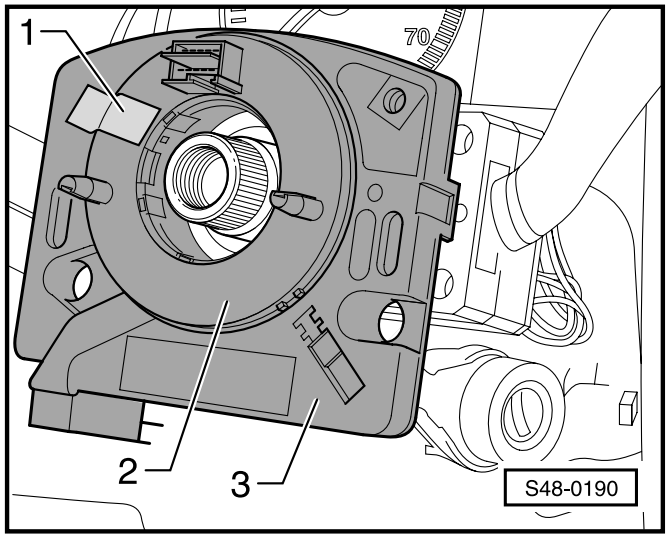
The following two steps only need to be carried out if the same housing with airbag clock spring contact is subsequently re-installed.

◄- Position the steering angle sensor in the middle position:

Yellow dot must be visible in the window -1-.

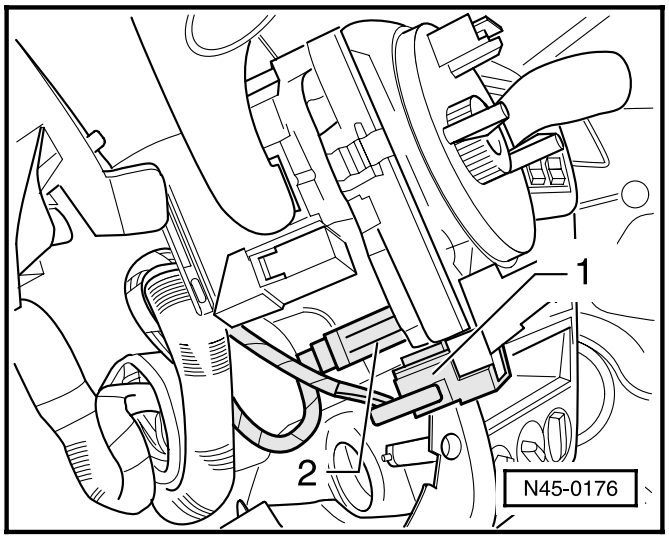
The markings -arrows- must be aligned.

Ensure that this position is maintained.

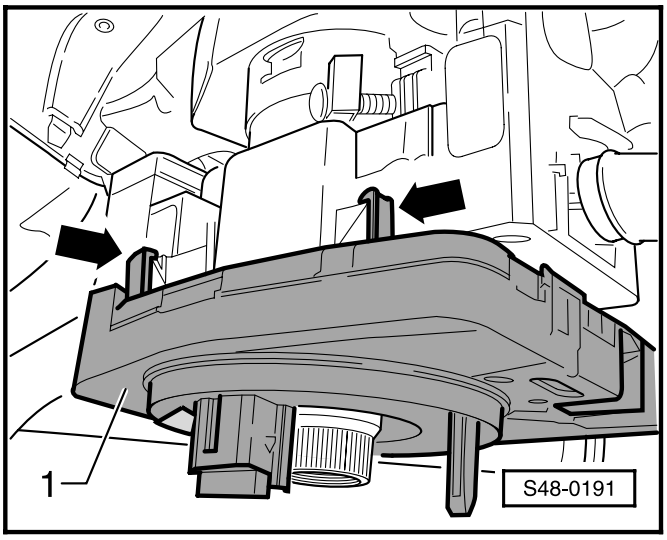


◄- Secure clock spring contact -2- from turning unintentionally by fixing it in place with adhesive tape -1-.

3 - Housing



◄- Unplug connectors -1- and -2-.



◄- Carefully release lock hook -arrows- and pull off housing -1- together with steering angle sensor -G85- and airbag clock spring contact.

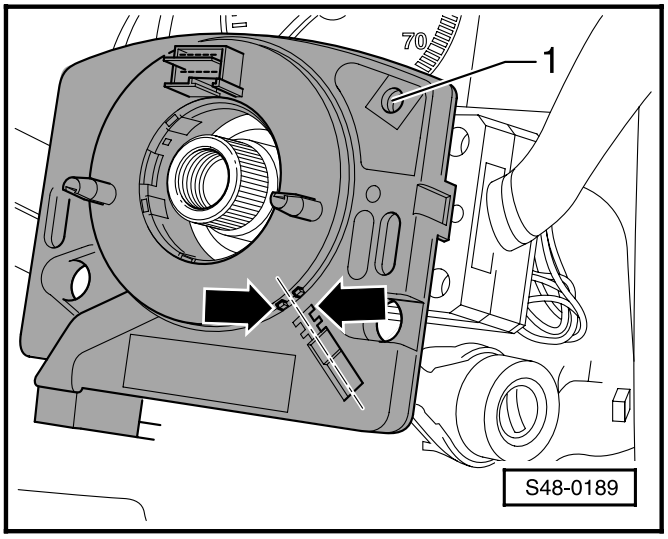
Installing

- Push housing -1- together with steering angle sensor -G85- and clock spring contact onto the steering column and lock in position with steering column switch -arrows-.

- Plug in both connectors.

Note:

After removing the transport protection or the adhesive tape, respectively, do not turn clock spring contact; it is only permissible to position the steering angle sensor -G85- in the middle position.



- Remove transport protection or adhesive tape, respectively.

◄- Position the steering angle sensor in the middle position:

Yellow dot must be visible in window -1-.

The markings -arrows- must be aligned.

Ensure that this position is maintained.

- Install top and bottom parts of steering column trim as well as handle of steering column adjustment.

- Install steering wheel.

⇒ Body Fitting Work; Repair Group 69; Airbag System

- Re-connect battery ⇒ page 45-174.

- Carry out basic setting of steering angle sensor -G85- ⇒ page 45-124.

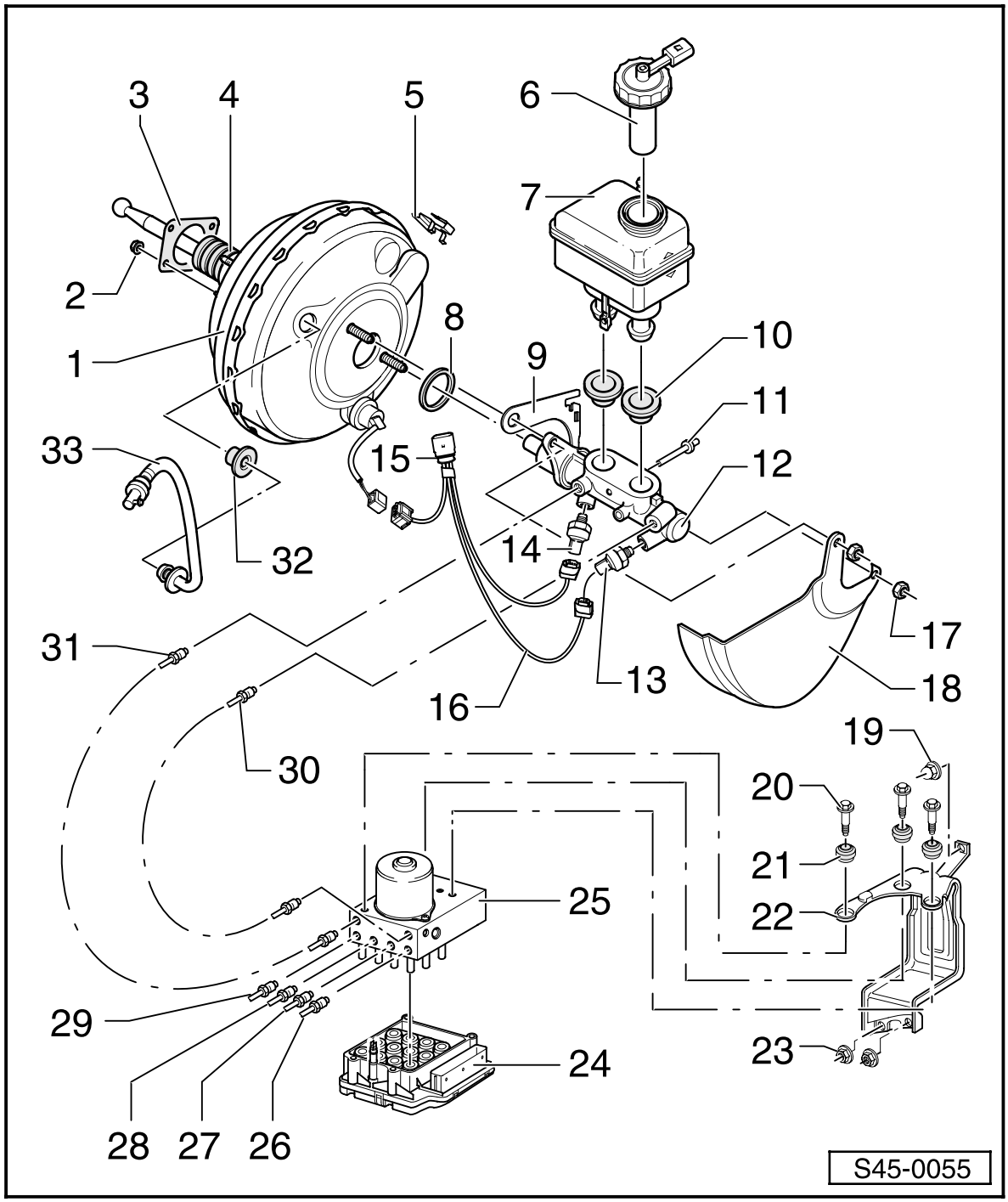
- Interrogate fault memory ⇒ page 45-101.

- Erase fault memory ⇒ page 45-113.

Removing and installing as well as setting brake light switch

⇒ page 45-69.

Assembly overview of hydraulic control unit, brake servo unit/brake master cylinder for models with ABS/EDL/ESP Mark 20



Notes:

- *The hydraulic unit should be removed and installed complete ⇒ page 45-158.*
- *Servicing ⇒ from page 45-163.*
- *Connections of brake lines should be tightened as a general rule to a torque of 14 Nm.*
- *Complete brake master cylinders and brake servo units can be replaced separately from each other.*

1 - Brake servo unit

- operational check ⇒ page 47-4
- removing and installing ⇒ page 47-32

2 - Self-locking hexagon nut, 28 Nm

3 - Gasket

- for brake servo unit

4 - Boot
- Ensure correctly installed; risk of suction noises

5 - Fixture
- Is attached to the edge of the brake servo unit
- Is used for mounting connector -item 15-

6 - Cap
- With integrated brake fluid level warning contact -F34-

7 - Brake fluid reservoir

8 - Seal
- Replace

9 - Retaining plate
- For fixing position of wiring loom -item 16-

10 - Sealing plug
- Moisten with brake fluid and press in expansion reservoir

11 - Retaining pin
- Insert through brake master cylinder

12 - Brake master cylinder
- Must not be repaired; replace complete if fault exists
- Removing and installing
  ⇒ page 47-30

13 - Brake pressure sensor -1- -G201-
- In floating piston circuit
- Removing and installing
  ⇒ page 47-28

14 - Brake pressure sensor -2- -G214-
- In pushrod piston circuit
- Removing and installing
  ⇒ page 47-28

15 - Connector
- Connects wiring loom of dash panel/ engine compartment

16 - Wiring loom

17 - Hexagon nut, self-locking, 20 Nm

18 - Heat shield
- Only on vehicles with 110 kW engines

19 - Cap nut, 25 Nm

20 - Fit bolt, 8 Nm

21 - Rubber shock absorber

22 - Bracket

23 - Hexagon nut, self-locking, 20 Nm

24 - ABS/EDL/ESP control unit

25 - ABS/EDL/ESP hydraulic unit

26 - Connection for brake line, 14 Nm
- Hydraulic unit to front left brake caliper

27 - Connection for brake line, 14 Nm
- Hydraulic unit to rear right wheel cylinder/brake caliper

28 - Connection for brake line, 14 Nm
- Hydraulic unit to rear left wheel cylinder/brake caliper

29 - Connection for brake line, 14 Nm
- Hydraulic unit to front right brake caliper

30 - Brake line, 14 Nm
- Brake master cylinder/floating piston circuit to hydraulic unit

31 - Brake line, 14 Nm
- Brake master cylinder/pushrod piston circuit to hydraulic unit

32 - Sealing plug

33 - Vacuum hose
- With non-return valve
- Insert into brake servo unit

Antilock brake system (ABS) MK 60

Safety precautions, basic information regarding fault finding and repairs to ABS and ABS/TCS/EDL MK 60

⇒ page 45-1, Antilock brake system (ABS) ITT Mark 20 IE.

Information on repair operations to ABS and ABS/TCS/EDL MK 60

⇒ page 45-1, Antilock brake system (ABS) ITT Mark 20 IE.

Technical information required

- „Current Flow Diagrams, Electrical Fault Finding and Fitting Locations“ binder
- ABS Self-Study Programme
- Technical Service Handbook

General information

⇒ page 45-4.

ABS and ABS/TCS/EDL

There is no exterior distinction between the ABS and ABS/TCS/EDL systems.

- *Control unit identification*
  The control unit version appears in the display of V.A.G 1552. Select function 01 for this „Interrogate control unit version“⇒ page 45-182.

⇒ Parts List

- *List of available functions ⇒ page 45-182.*

Fitting location of ABS or ABS/TCS/EDL MK 60

⇒ page 45-195, Electrical/electronic components and fitting locations.

Self-diagnosis

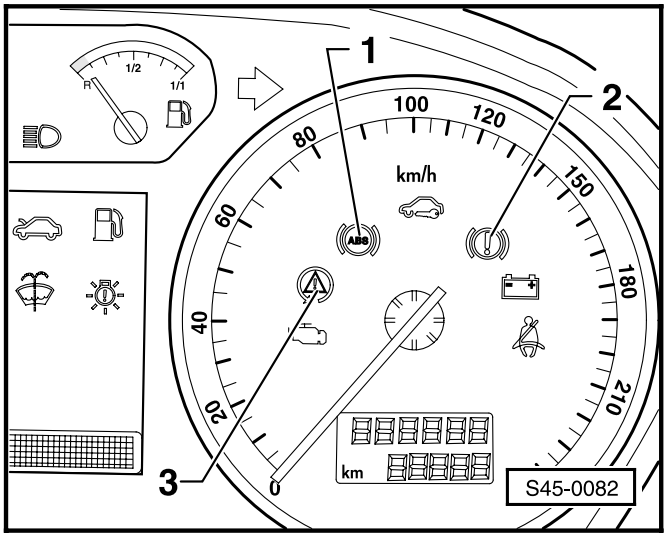
Function of self-diagnosis

⇒ page 45-6

Note:

The MK60 is equipped with a 47-pin control unit.

Indication of faults by means of the warning lights K47 and K14/33



◄ ♦ If the ABS warning light (K47) -1- does not go out after the ignition is switched on and after completion of the test sequence, the causes of the fault may be:

a - voltage supply is less than 11 V

b - an ABS fault is present
If an ABS fault is present, the anti-lock brake system remains switched off while the conventional brake system remains fully operational.

c - a fault existed at a wheel speed sensor after last vehicle start (sporadic fault).
If a fault exists at a wheel speed sensor, the ABS warning light goes out automatically after restarting the vehicle and speed increased to more than 20 km/h.

d - there is an interruption in the link from the dash panel insert to control unit -J104-.

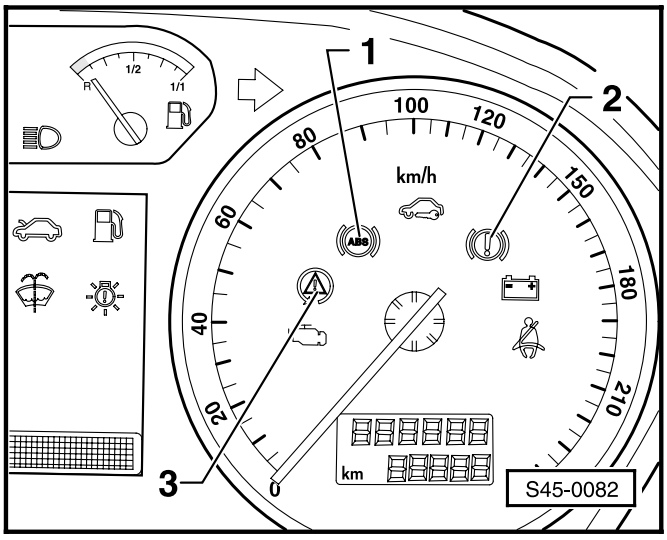
⇒ “Current Flow Diagrams, Electrical Fault Finding and Fitting Locations” binder

e - the dash panel insert is faulty.

f - the ABS control unit is incorrectly coded.

The ABS warning light (K47) -1- flashes at a rate of about 1 Hz if the ABS control unit is not coded.

The ABS warning light (K47) -1- and the handbrake/brake fluid level warning light (K14/33) -2- flash while self-diagnosis is being performed.



◄♦ If the ABS warning light goes out, but the handbrake/brake fluid level warning light (K14/33) -2- remains on, the causes of the fault may be:

a - the handbrake is still applied

b - the brake fluid level is too low

c - there is a fault in the wiring

⇒ “Current Flow Diagrams, Electrical Fault Finding and Fitting Locations” binder

♦ If the ABS warning light -1- and the handbrake/brake fluid level warning light -2- do **not** go out, the ABS and EBD (electronic brake pressure distribution) systems have then failed.

In this case, you have to expect a change in the braking characteristics of the vehicle as the brake pressure at the rear wheels is no longer regulated.

d - switch -F9- for the warning light -K14/33- is faulty or incorrectly set.

Performing self-diagnosis

Test requirements

⇒ page 45-9

Connecting vehicle system tester V.A.G 1552 and selecting function

⇒ page 45-9

List of available functions

		Page
00 -	Automatic test sequence	45-13
01 -	Interrogating control unit version	45-10
02 -	Interrogating fault memory	45-12
03 -	Final control diagnosis	45-29
04 -	Initiating basic setting [1)]	45-36
05 -	Erasing fault memory	45-21
06 -	Ending output	45-22
07 -	Coding control unit	45-190
08 -	Reading measured value block	45-192

1) is required only for models fitted with EDL

Fault table

Notes:

- *In view of the fact that the control units are interconnected by a databus line, it is always necessary to initiate the "Automatic test sequence" with function 00 at all the control units fitted to the vehicle. When this is done, the control units fitted to the vehicle together with the possible faults they contain are interrogated.*
- *After this, all the possible faults which can be detected by the ABS control unit (J104) and displayed by V.A.G 1552, are listed according to the 5-digit fault code.*
- *In addition, a fault type may also appear in the fault table.*
- *Reference is made to individual test steps of the electrical test in the column „Rectifying fault".*
- *Before replacing components which have been displayed as faulty, inspect all the corresponding plug connections, cables and earth connections according to the current flow diagram.*

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

- *After completing the repairs, always once again interrogate the fault memory with the vehicle system tester V.A.G 1552 and erase it, and also conduct a test at more than 20 km/h.*
- *After the road test, once again interrogate the fault memory.*

Readout in display of V.A.G 1552	Possible cause of fault	Rectifying fault
No fault recognized	If after completing the repairs „no fault recognized" appears, the self-diagnosis is ended. If the ABS does not operate properly despite the readout „no fault recognized", then proceed as follows: 1. Conduct a road test at more than 20 km/h. 2. Once again interrogate the fault memory; if there is still no fault stored. 3. Continue fault finding without self-diagnosis and carry out the electrical test in full ⇒ page 45-205.	
00003	♦ Open circuit or loose contact in the wiring to control unit -J104-	- Test wiring and plug connections according to current flow diagram ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations binder - Conduct a road test at a speed of more than 20 km/h
	♦ ABS control unit -J104- faulty	If the fault occurs once again: - Replace control unit -J104- ⇒ page 45-196

Readout in display of V.A.G 1552	Possible cause of fault	Rectifying fault
00283 Front left wheel speed sensor -G47- Implausible signal	♦ Open circuit, short circuit to positive or to earth or loose contact in wiring between wheel speed sensor -G47- and control unit -J104-	- Test wiring and plug connections according to current flow diagram ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations binder - Conduct electrical test ⇒ from page 45-205
	♦ Pulse rotor or wheel speed sensor -G47- damaged ♦ Wheel speed sensor -G47- faulty	- Inspect wheel speed sensor -G47- and pulse rotor for damage - Replace pulse rotor and, if necessary, wheel speed sensor -G47- ⇒ page 45-60
	♦ ABS control unit -J104- faulty	If the fault occurs once again: - Replace control unit -J104- ⇒ page 45-196
00283 Front left wheel speed sensor -G47- Electrical fault in circuit	♦ Open circuit, short circuit to positive or to earth or loose contact in wiring between wheel speed sensor -G47- and control unit -J104-	- Test wiring and plug connections according to current flow diagram ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations binder - Conduct electrical test ⇒ from page 45-205
	♦ Electrical interference as a result of external sources (high-frequency radiation, e.g. ignition cables not insulated)	- Read data block ⇒ page 45-192, display group number 001 - Replace wheel speed sensor -G47- ⇒ page 45-60
00283 Front left wheel speed sensor -G47- Mechanical fault[1)]	♦ Excessive gap between wheel speed sensor -G47- and pulse rotor (signal not o.k.)	- Inspect installation of wheel speed sensor -G47- and pulse rotor ⇒ page 45-60 - Read data block ⇒ page 45-192, display group number 002 - Conduct final control diagnosis ⇒ page 45-60
	♦ Outlet valves in hydraulic unit -N55- faulty	If the fault occurs once again: - Replace hydraulic unit -N55- ⇒ page 45-196

1) Fault can only be detected from a speed of 20 km/h (conduct road test).

Readout in display of V.A.G 1552	Possible cause of fault	Rectifying fault
00285 Front right wheel speed sensor -G45 Implausible signal	♦ Open circuit, short circuit to positive or to earth or loose contact in wiring between wheel speed sensor -G45- and control unit -J104	- Test wiring and plug connections according to current flow diagram ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations binder - Perform electrical test ⇒ from page 45-205
	♦ Damage to pulse rotor or speed sensor -G45 ♦ Coil of speed sensor -G45- faulty	- Inspect speed sensor -G45- and pulse rotor for damage - Replace pulse rotor/speed sensor -G45- ⇒ page 45-60
	♦ ABS control unit -J104- faulty	If the fault occurs once again: - Replace control unit -J104- ⇒ page 45-196
00285 Front right wheel speed sensor -G45 Electrical fault in circuit	♦ Open circuit, short circuit to positive or to earth or loose contact in wiring between wheel speed sensor -G45- and control unit -J104	- Test wiring and plug connections according to current flow diagram ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations binder - Perform electrical test ⇒ from page 45-205
	♦ Electrical interference because of external sources (high-frequency interference, e.g. ignition cable not insulated)	- Read measured value block ⇒ page 45-192, display group number 001 - Replace speed sensor -G45- ⇒ page 45-60
00285 Front right wheel speed sensor -G45 Mechanical fault[1)]	♦ Air gap between speed sensor -G45- and pulse rotor too large (signal not o.k.)	- Inspect installation of speed sensor -G45- and pulse rotor ⇒ page 45-60 - Read measured value block ⇒ page 45-192, display group number 002 - Perform final control diagnosis ⇒ page 45-194
	♦ Outlet valves in hydraulic unit -N55- faulty	If the fault occurs once again: - Replace hydraulic unit -N55- ⇒ page 45-196

1) Fault type cannot be detected until speed more than 20 km/h (conduct road test).

Readout in display of V.A.G 1552	Possible cause of fault	Rectifying fault
00287 Rear right wheel speed sensor -G44 Implausible signal	♦ Open circuit, short circuit to positive or to earth or loose contact in wiring between wheel speed sensor -G44- and control unit -J104	- Test wiring and plug connections according to current flow diagram ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations binder - Perform electrical test ⇒ from page 45-205
	♦ Damage to pulse rotor or speed sensor -G44 ♦ Coil of speed sensor -G44- faulty	- Inspect speed sensor -G44- and pulse rotor for damage - Replace pulse rotor/speed sensor -G44- ⇒ page 45-65
	♦ ABS control unit -J104- faulty	If the fault occurs once again: - Replace control unit -J104- ⇒ page 45-196
00287 Rear right wheel speed sensor -G44 Electrical fault in circuit	♦ Open circuit, short circuit to positive or to earth or loose contact in wiring between wheel speed sensor -G44- and control unit -J104	- Test wiring and plug connections according to current flow diagram ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations binder - Perform electrical test ⇒ from page 45-205
	♦ Electrical interference because of external sources (high-frequency interference, e.g. ignition cable not insulated)	- Read measured value block ⇒ page 45-192, display group number 001 - Replace speed sensor -G44- ⇒ page 45-65
00287 Rear right wheel speed sensor -G44 Mechanical fault[1)]	♦ Air gap between speed sensor -G44- and pulse rotor too large (signal not o.k.)	- Inspect installation of speed sensor -G44- and pulse rotor ⇒ page 45-65 - Read measured value block ⇒ page 45-192, display group number 002 - Perform final control diagnosis ⇒ page 45-194
	♦ Outlet valves in hydraulic unit -N55- faulty	If the fault occurs once again: - Replace hydraulic unit -N55- ⇒ page 45-196

1) Fault type cannot be detected until speed more than 20 km/h (conduct road test).

Readout in display of V.A.G 1552	Possible cause of fault	Rectifying fault
00290 Rear left wheel speed sensor -G46 Implausible signal	♦ Open circuit, short circuit to positive or to earth or loose contact in wiring between wheel speed sensor -G46- and control unit -J104	- Test wiring and plug connections according to current flow diagram ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations binder - Perform electrical test ⇒ from page 45-205
	♦ Damage to pulse rotor or speed sensor -G46 ♦ Coil of speed sensor -G46- faulty	- Inspect speed sensor -G46- and pulse rotor for damage - Replace pulse rotor/speed sensor -G46- ⇒ page 45-65
	♦ ABS control unit -J104- faulty	If the fault occurs once again: - Replace control unit -J104- ⇒ page 45-196
00290 Rear left wheel speed sensor -G46 Electrical fault in circuit	♦ Open circuit, short circuit to positive or to earth or loose contact in wiring between wheel speed sensor -G46- and control unit -J104	- Test wiring and plug connections according to current flow diagram ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations binder - Perform electrical test ⇒ from page 45-205
	♦ Electrical interference because of external sources (high-frequency interference, e.g. ignition cable not insulated)	- Read measured value block ⇒ page 45-192, display group number 001 - Replace speed sensor -G46- ⇒ page 45-65
00290 Rear left wheel speed sensor -G46 Mechanical fault[1)]	♦ Air gap between speed sensor -G46- and pulse rotor too large (signal not o.k.)	- Inspect installation of speed sensor -G46- and pulse rotor ⇒ page 45-65 - Read measured value block ⇒ page 45-192, display group number 002 - Perform final control diagnosis ⇒ page 45-194
	♦ Outlet valves in hydraulic unit -N55- faulty	If the fault occurs once again: - Replace hydraulic unit -N55- ⇒ page 45-196
00668 System voltage terminal 30 Implausible signal	♦ Open circuit, short circuit to positive or to earth in wiring	- Test wiring and plug connections according to current flow diagram ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations binder - Perform electrical test ⇒ from page 45-205

[1)] Fault type cannot be detected until speed more than 20 km/h (conduct road test).

Readout in display of V.A.G 1552	Possible cause of fault	Rectifying fault
01044 Control unit incorrectly coded	♦ Control unit -J104- incorrectly coded ♦ Bridge in multipin connector to control unit -J104- from contact 3 to contact 14 open circuit or short circuit	- Check coding of control unit -J104- ⇒ page 45-190 - Test wiring and plug connections according to current flow diagram ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations binder - Perform electrical test ⇒ from page 45-205
01130 ABS operation Implausible signal	♦ Electrical interference caused by external sources (high-frequency interference, e.g. ignition cables not insulated) ♦ Open circuit, short circuit to positive or to earth in wiring ♦ ABS control unit -J104- faulty	- Erase fault memory - Conduct road test at more than 20 km/h - Once again interrogate fault memory - Test wiring and plug connections according to current flow diagram ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations binder - Perform electrical test ⇒ from page 45-205 If the fault occurs once again: - Replace control unit -J104- ⇒ page 45-196
01276 ABS hydraulic pump -V64 Implausible signal	♦ Open circuit, short circuit to positive or to earth in wiring ♦ Hydraulic pump -V64- faulty ♦ ABS control unit -J104- faulty	- Perform final control diagnosis ⇒ page 45-194 - Test wiring and plug connections according to current flow diagram ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations binder - Perform electrical test ⇒ from page 45-205 - Replace hydraulic unit -N55- ⇒ page 45-196

Readout in display of V.A.G 1552	Possible cause of fault	Rectifying fault
01312 Databus drive defective[1)] or:	♦ ABS control unit -J104- incorrectly coded ♦ Engine control unit incorrectly coded ♦ Open circuit, short circuit to positive or to earth in wiring	- Check coding of control unit -J104- ⇒ page 45-190 - Check coding of engine control unit ⇒ Repair Group 01 of relevant engine - Test wiring and plug connections according to current flow diagram ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations binder - Perform electrical test ⇒ from page 45-205
Databus drive defective[1)] sporadically	♦ Ignition/starter switch rotates too slowly	- Erase fault memory ⇒ page 45-21 - No further measures necessary - Inform customer
01314 Engine control unit No communication Please read fault memory	♦ Open circuit, short circuit to positive or to earth in databus wiring	- Test wiring and plug connections of databus cables according to current flow diagram ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations binder - Perform electrical test ⇒ from page 45-205
01315 Gearbox control unit[2)] No communication	♦ Open circuit, short circuit to positive or to earth in databus wiring	- Test wiring and plug connections of databus cables according to current flow diagram ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations binder - Perform electrical test ⇒ from page 45-205

1) The fault “Databus drive defective” does not cause the ABS warning light -K47- or the handbrake/brake fluid level warning light -K14/33- to come on. The full ABS function is retained in this case.

2) Only on models fitted with automatic gearbox.

Coding the control unit

Required special tools, testing and measuring equipment as well as auxiliary devices and material

- Vehicle system tester V.A.G 1552
- Diagnostics line V.A.G 1551/3, 3A, 3B or 3C

The control unit which is installed in the vehicle is coded. New control units from the spare parts store are uncoded and must be newly coded before being installed.

Pre-requisites for coding

Coding is only possible when the workshop code (WSC) is entered into the V.A.G 1552.

Checking procedure

- Determine the engine identification code and the type of ABS hydraulic control unit which has been installed on the vehicle.
- Connect up the vehicle system tester V.A.G 1552 and select the address word 03 „Brake electronics“ with the ignition on ⇒ page 45-182.

Vehicle system test HELP Select function XX

◀ Read out on display:

- Enter 07 for the function „Code the control unit“ and confirm the entry with Q.

Code control unit Q Enter code number XXXXX (0-32767)

◀ Read out on display:

- Enter the appropriate code number for the vehicle and confirm entry with Q.

  Code table ⇒ page 45-191.

1C0907379 C ABS FRONT MK60 0102 → Coding 0001025 WSC XXXXX

◀ The display shows the control unit coding, e.g. 0001025.

- Press the → button.

Vehicle system test HELP Select function XX

◀ Read out on display:

- Enter function 06 „Stop output“ and confirm the entry with Q.

Notes:

- *If the control unit is incorrectly coded, the ABS warning light -K47- and the brake system warning light light up and remain lit.*
- *There is a simultaneous entry in the fault memory of the engine control unit ⇒ page 45-12, Interrogate fault memory 02.*
- *If the control unit is coded with an approved code, no fault entry is made in the fault memory and the ABS warning light does not flash.*
- *If the control unit is not coded (Code 00000), the ABS warning light -K47- flashes (once per second)*

Table of codes for vehicles with Anti-Lock Brake System Mark 60

Note:

Use E-gas on vehicles with MSR.

Engine	Engine code letters	ABS control unit number	Variant ABS	Brakes	Accelerator control with MSR	Chassis		Code number
						Standard	Rough road suspension	
1.4 l/44 kW	AMD	1C0907379K	TCS	FS-III	yes	yes	yes	13313
		1C0907379L	ABS	FS-III	no	yes	yes	04097
		1C0907379L	ABS	FS-III	yes	yes	yes	01025
		1C0907379M	ESP	FS-III	yes	yes	no	11266
		1C0907379M	ESP	FS-III	yes	no	yes	11394
		1C0907379C	ABS	FS-III	no	yes	yes	04097
		1C0907379C	ABS	FS-III	yes	yes	yes	01025
		1C0907379E	ESP	FS-III	yes	yes	no	11266
		1C0907379E	ESP	FS-III	yes	yes	yes	11394
		1C0907379J	ABS	FS-III	no	yes	yes	04097
		1C0907379G	ESP	FS-III	yes	yes	no	11266
		1C0907379G	ESP	FS-III	yes	no	yes	11394
1.4 l/55 kW 16V	AXP BCA	1C0907379L	ABS	FS-III	yes	yes	yes	01025
		1C0907379M	ESP	FS-III	yes	no	yes	11394
		1C0907379M	ESP	FS-III	yes	yes	no	11266
		1C0907379C	ABS	FS-III	yes	yes	yes	01025
		1C0907379C	ABS	FS-III	no	yes	yes	04097
		1C0907379D	TCS	FS-III	yes	yes	yes	13313
		1C0907379E	ESP	FS-III	yes	no	yes	11394
		1C0907379E	ESP	FS-III	yes	yes	no	11266
		1C0907379J	ABS	FS-III	yes	yes	yes	01025
		1C0907379K	TCS	FS-III	yes	yes	yes	13313
		1C0907379G	ESP	FS-III	yes	yes	no	11266
		1C0907379G	ESP	FS-III	yes	no	yes	11394

Engine	Engine code letters	ABS control unit number	Variant ABS	Brakes	Accelerator control with MSR	Chassis		Code number
						Standard	Rough road suspension	
1.6 l/55 kW	AEE	1C0907379L	ABS	FS-III	no	yes	yes	04097
		1C0907379L	ABS	FS-III	yes	yes	yes	01025
		1C0907379M	ESP	FS-III	yes	yes	no	11266
		1C0907379M	ESP	FS-III	yes	no	yes	11394
		1C0907379C	ABS	FS-III	no	yes	yes	04097
		1C0907379E	ESP	FS-III	yes	yes	no	11266
		1C0907379E	ESP	FS-III	yes	no	yes	11394
		1C0907379J	ABS	FS-III	no	yes	yes	04097
		1C0907379G	ESP	FS-III	yes	yes	no	11266
		1C0907379G	ESP	FS-III	yes	no	yes	11394
1.6 l/74 kW	AEH AKL	1C0907379L	ABS	FS-III	no	yes	yes	04097
		1C0907379L	ABS	FS-III	yes	yes	yes	01025
		1C0907379C	ABS	FS-III	no	yes	yes	04097
		1C0907379E	ESP	FS-III	yes	yes	no	11266
		1C0907379J	ABS	FS-III	no	yes	yes	04097
		1C0907379G	ESP	FS-III	yes	yes	no	11266
		1C0907379L	ABS	FS-III	no	yes	yes	04097
		1C0907379M	ESP	FS-III	yes	yes	no	11266
1.6 l/75 kW	AVU BFQ	1C0907379K	TCS	FS-III	yes	yes	yes	13313
		1C0907379L	ABS	FS-III	yes	yes	yes	01025
		1C0907379M	ESP	FS-III	yes	yes	yes	11266
		1C0907379M	ESP	FS-III	yes	no	yes	11394
		1C0907379C	ABS	FS-III	yes	yes	yes	01025
		1C0907379D	TCS	FS-III	yes	yes	yes	13313
		1C0907379E	ESP	FS-III	yes	yes	no	11266
		1C0907379E	ESP	FS-III	yes	no	yes	11394
		1C0907379J	ABS	FS-III	yes	yes	yes	01025
		1C0907379G	ESP	FS-III	yes	yes	no	11266
		1C0907379G	ESP	FS-III	yes	no	yes	11394

Engine	Engine code letters	ABS control unit number	Variant ABS	Brakes	Accelerator control with MSR	Chassis		Code number
						Standard	Rough road suspension	
1.8 l/92 kW	AGN	1C0907379K	TCS	FS-III	yes	yes	yes	13313
		1C0907379L	ABS	FS-III	yes	yes	yes	01025
		1C0907379M	ESP	FS-III	yes	yes	no	11266
		1C0907379M	ESP	FS-III	yes	no	yes	11394
		1C0907379N	ESP 4x4	FS-III	no	yes	no	14342
		1C0907379N	ESP 4x4	FS-III	no	no	yes	14470
		1C0907379C	ABS	FS-III	yes	yes	yes	01025
		1C0907379D	TCS	FS-III	yes	yes	yes	13313
		1C0907379E	ESP	FS-III	yes	yes	no	11266
		1C0907379E	ESP	FS-III	yes	no	yes	11394
		1C0907379F	ESP 4x4	FS-III	no	yes	no	14342
		1C0907379F	ESP 4x4	FS-III	no	no	yes	14470
		1C0907379J	ABS	FS-III	yes	yes	yes	01025
		1C0907379G	ESP	FS-III	yes	yes	no	11266
		1C0907379G	ESP	FS-III	yes	no	yes	11394
		1C0907379H	ESP 4x4	FS-III	no	yes	no	14342
		1C0907379H	ESP 4x4	FS-III	no	no	yes	14470
1.8 l/110 kW	AGU ARZ AUM ARX	1C0907379K	TCS	FS-III	yes	yes	yes	21505
1.8 l/132 kW	AUQ	1C0907379M	ESP	FN-3	yes	yes	no	19970
		1C0907379L	ABS	FN-3	yes	yes	yes	01025
		1C0907379L	ABS	FN-3	no	yes	yes	04097
		1C0907379M	ESP	FN-3	yes	no	yes	20098
		1C0907379N	ESP 4x4	FN-3	no	yes	no	23046
		1C0907379N	ESP 4x4	FN-3	no	no	yes	23174
		1C0907379C	ABS	FN-3	yes	yes	yes	01025
		1C0907379D	TCS	FN-3	yes	yes	yes	21505
		1C0907379E	ESP	FN-3	yes	yes	no	19970
		1C0907379E	ESP	FN-3	yes	no	yes	20098
		1C0907379F	ESP 4x4	FN-3	no	yes	no	23046
		1C0907379F	ESP 4x4	FN-3	no	no	yes	23174
		1C0907379C	ABS	FN-3	no	yes	yes	04097
		1C0907379J	ABS	FN-3	yes	yes	yes	01025
		1C0907379J	ABS	FN-3	no	yes	yes	04097
		1C0907379G	ESP	FN-3	yes	yes	no	19970
		1C0907379G	ESP	FN-3	yes	no	yes	20098
		1C0907379H	ESP 4x4	FN-3	no	yes	no	23046
		1C0907379H	ESP 4x4	FN-3	no	no	yes	23174

Engine	Engine code letters	ABS control unit number	Variant ABS	Brakes	Accelerator control with MSR	Chassis		Code number
						Standard	Rough road suspension	
2.0 l/85 kW	AQY APK AZH AZJ	1C0907379K	TCS	FS-III	yes	yes	yes	21505
		1C0907379L	ABS	FS-III	yes	yes	yes	01025
		1C0907379M	ESP	FS-III	yes	yes	no	19458
		1C0907379M	ESP	FS-III	yes	no	yes	19586
		1C0907379N	ESP	FS-III	no	yes	no	22534
		1C0907379N	ESP	FS-III	no	no	yes	22662
		1C0907379C	ABS	FS-III	yes	yes	yes	01025
		1C0907379D	ABS	FS-III	yes	yes	yes	21505
		1C0907379E	ESP	FS-III	yes	yes	no	19458
		1C0907379E	ESP	FS-III	yes	no	yes	19586
		1C0907379F	ESP 4x4	FS-III	no	yes	no	22534
		1C0907379F	ESP 4x4	FS-III	no	no	yes	22662
		1C0907379J	ABS	FS-III	yes	yes	yes	01025
		1C0907379G	ESP	FS-III	yes	yes	no	19458
		1C0907379G	ESP	FS-III	yes	no	yes	19586
		1C0907379H	ESP 4x4	FS-III	no	yes	no	22534
		1C0907379H	ESP 4x4	FS-III	no	no	yes	22662
2.0 l/82 kW	AEG	1C0907379L	ABS	FS-III	no	yes	yes	04097
		1C0907379M	ESP	FS-III	no	yes	no	22530
		1C0907379M	ESP	FS-III	no	no	yes	22658
		1C0907379C	ABS	FS-III	no	yes	yes	04097
		1C0907379E	ESP	FS-III	no	yes	no	22530
		1C0907379E	ESP	FS-III	no	no	yes	22658
		1C0907379J	ABS	FS-III	no	yes	yes	04097
		1C0907379G	ESP	FS-III	no	yes	no	22530
		1C0907379G	ESP	FS-III	no	no	yes	22658
1.9 l/50 kW (SDI)	AGM AQM	1C0907379K	TCS	FS-III	yes	yes	yes	21505
		1C0907379L	ABS	FS-III	yes	yes	yes	01025
		1C0907379M	ESP	FS-III	yes	yes	no	19458
		1C0907379M	ESP	FS-III	yes	no	yes	19586
		1C0907379C	ABS	FS-III	yes	yes	yes	01025
		1C0907379D	TCS	FS-III	yes	yes	yes	21505
		1C0907379E	ESP	FS-III	yes	yes	no	19458
		1C0907379E	ESP	FS-III	yes	no	yes	19586
		1C0907379J	ABS	FS-III	yes	yes	yes	01025
		1C0907379G	ESP	FS-III	yes	yes	no	19458
		1C0907379G	ESP	FS-III	yes	no	yes	19586

Engine	Engine code letters	ABS control unit number	Variant ABS	Brakes	Accelerator control with MSR	Chassis		Code number
						Standard	Rough road suspension	
1.9 l/66 kW	AGR ALH	1C0907379K	TCS	FS-III	yes	yes	yes	21505
		1C0907379L	ABS	FS-III	yes	yes	yes	01025
		1C0907379M	ESP	FS-III	yes	yes	no	19458
		1C0907379M	ESP	FS-III	yes	no	yes	19586
		1C0907379N	ESP 4x4	FS-III	no	yes	no	22534
		1C0907379N	ESP 4x4	FS-III	no	no	yes	22662
		1C0907379C	ABS	FS-III	yes	yes	yes	01025
		1C0907379D	TCS	FS-III	yes	yes	yes	21505
		1C0907379E	ESP	FS-III	yes	yes	no	19458
		1C0907379E	ESP	FS-III	yes	no	yes	19586
		1C0907379F	ESP 4x4	FS-III	no	yes	no	22534
		1C0907379F	ESP 4x4	FS-III	no	no	yes	22662
		1C0907379J	ABS	FS-III	yes	yes	yes	01025
		1C0907379K	TCS	FS-III	yes	yes	yes	21505
		1C0907379G	ESP	FS-III	yes	yes	no	19458
		1C0907379G	ESP	FS-III	yes	no	yes	19586
		1C0907379H	ESP 4x4	FS-III	no	yes	no	22534
		1C0907379H	ESP 4x4	FS-III	no	no	yes	22662
1.9 l/74 kW	ATD	1C0907379K	TCS	FS-III	yes	yes	yes	21505
		1C0907379L	ABS	FS-III	yes	yes	yes	01025
		1C0907379M	ESP	FS-III	yes	yes	no	19458
		1C0907379M	ESP	FS-III	yes	no	yes	19586
		1C0907379C	ABS	FS-III	yes	yes	yes	01025
		1C0907379D	TCS	FS-III	yes	yes	yes	21505
		1C0907379E	ESP	FS-III	yes	yes	no	19458
		1C0907379E	ESP	FS-III	yes	no	yes	19586
		1C0907379F	ESP 4x4	FS-III	no	yes	no	22534
		1C0907379F	ESP 4x4	FS-III	no	no	yes	22662
		1C0907379J	ABS	FS-III	yes	yes	yes	01025
		1C0907379G	ESP	FS-III	yes	yes	no	19458
		1C0907379G	ESP	FS-III	yes	no	yes	19586
		1C0907379N	ESP 4x4	FS-III	no	yes	no	22534
		1C0907379N	ESP 4x4	FS-III	no	no	yes	22662

Engine	Engine code letters	ABS control unit number	Variant ABS	Brakes	Accelerator control with MSR	Chassis		Code number
						Standard	Rough road suspension	
1.9 l/81 kW	AHF ASV	1C0907379K	TCS	FS-III	yes	yes	yes	21505
		1C0907379L	ABS	FS-III	yes	yes	yes	01025
		1C0907379M	ESP	FS-III	yes	yes	no	19458
		1C0907379M	ESP	FS-III	yes	no	yes	19586
		1C0907379C	ABS	FS-III	yes	yes	yes	01025
		1C0907379D	TCS	FS-III	yes	yes	yes	21505
		1C0907379E	ESP	FS-III	yes	yes	no	19458
		1C0907379E	ESP	FS-III	yes	no	yes	19586
		1C0907379J	ABS	FS-III	yes	yes	yes	01025
		1C0907379G	ESP	FS-III	yes	yes	no	19458
		1C0907379G	ESP	FS-III	yes	no	yes	19586
1.9 l/96 kW	ASZ	1C0907379K	TCS	FS-III	yes	yes	yes	21505
		1C0907379L	ABS	FS-III	yes	yes	yes	01025
		1C0907379M	ESP	FN-3	yes	yes	no	19970
		1C0907379M	ESP	FN-3	yes	no	yes	20098
		1C0907379N	ESP 4x4	FN-3	no	yes	no	23046
		1C0907379N	ESP 4x4	FN-3	no	no	yes	23174
		1C0907379C	ABS	FS-III	yes	yes	yes	01025
		1C0907379D	TCS	FS-III	yes	yes	yes	21505
		1C0907379E	ESP	FN-3	yes	yes	no	19970
		1C0907379E	ESP	FN-3	yes	no	yes	20098
		1C0907379F	ESP 4x4	FN-3	no	yes	no	23046
		1C0907379F	ESP 4x4	FN-3	no	no	yes	23174
		1C0907379J	ABS	FS-III	yes	yes	yes	01025
		1C0907379J	TCS	FS-III	yes	yes	yes	21505
		1C0907379G	ESP	FN-3	yes	yes	no	19970
		1C0907379G	ESP	FN-3	yes	no	yes	20098
		1C0907379H	ESP 4x4	FN-3	no	yes	no	23046
		1C0907379H	ESP 4x4	FN-3	no	no	yes	23174

Reading measured value block

Special tools, testers and aids required

⇒ page 45-24

Safety measures

⇒ page 45-25

Test sequence and test table with measured values

⇒ page 45-25

Testing wheel speed sensor assignment

Display group number 001:

⇒ page 45-25

Starting speed

Display group number 002:

⇒ page 45-26

Testing operation of brake light switch for ABS and ABS/EDL function and the warning lights for ABS (K47) and handbrake/brake fluid level (K14/33)

Display group number 003

Read measured value block Enter display group number XXX

◄ Readout in display:

- Press keys 0, 0 and 3 for the „Display group number 003“ and confirm the entry with the key Q.

Read measured value block 3 → → 1 → 2 → 3 → 4

◄ - The measured value block is always composed of 4 display blocks -arrows- 1 to 4.

Read measured value block 3 → not op. off off

◄ Readout in display:

Display block	Test conditions	Readout on V.A.G 1552
1	♦ Brake pedal not operated ♦ Brake pedal operated	not op. operated
2	K47	off/on
3	K14/33	off/on
4	Not assigned	—

The readout in display blocks 2 and 3 changes constantly from „off“ to „on“.

If the readout does not appear as described:

- Perform electrical test ⇒ from page 45-41.

Another possible cause of the fault may be that the brake light switch is not correctly set ⇒ page 45-96.

- Press the keys 0 and 6 for the function „End output“ and confirm the entry with the key Q.

Test of databus

Display group number 125:

Read measured value block Enter display group number XXX

◄ Readout in display:

- Press keys 1, 2 and 5 for „Display group number 125“ and confirm the entry with the key Q.

Read measured value block 3 → → 1 → 2 → 3 → 4

◄ - There are always 4 display blocks -arrows- 1 to 4 in the measured value block.

Read measured value block 3 → eng 1 gearb 1

◄ Readout in display:

Display block	Designation	Readout on V.A.G 1552
1	Engine control module at databus	eng 1
	Engine control module not at databus	eng 0
2	Not assigned	—
3	Not assigned	—
4	Gearbox control unit at databus[1)]	gearb 1
	Gearbox control unit not at databus[1)]	gearb 0

[1)] Only on models fitted with automatic gearbox

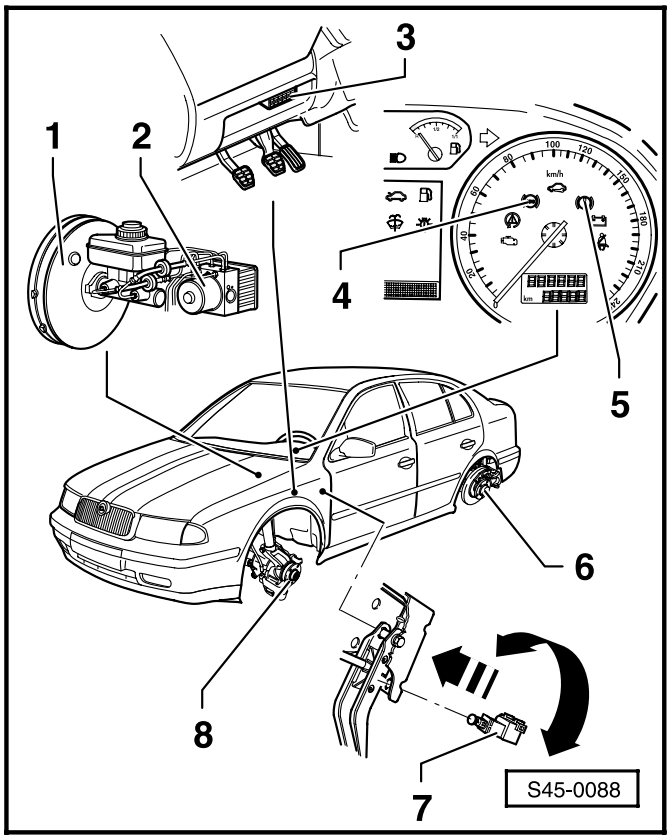
Final control diagnosis

⇒ Antilock Brake System (ABS) ITT Mark 20 IE, Self-Diagnosis ⇒ page 45-29.

Initiating basic setting

⇒ Antilock Brake System (ABS) ITT Mark 20 IE, Self-Diagnosis ⇒ page 45-36.

Electrical/electronic components and fitting locations ABS/EDL/TCS Mark 60



All the components marked with 1) are tested by the self-diagnosis.

1 - Brake servo unit with brake master cylinder and brake fluid reservoir
- ♦ assembly overview ⇒ page 47-36

2 - Hydraulic control unit 1)
- ♦ fitting location: in left of engine compartment
- ♦ removing and installing ⇒ page 45-196
- ♦ servicing ⇒ page 45-200

3 - Diagnostic connection
- ♦ fitting location: in stowage compartment driver side

4 - ABS warning light (K47)
- ♦ fitting location: in dash panel insert

Function:
- ♦ ABS warning light comes on:
- for about 2 seconds after ignition is switched on and/or engine start
- if fault is detected (e.g. open circuit to wheel speed sensor)

⇒ page 45-180

5 - Handbrake/brake fluid level warning light (K14/33)
- ♦ fitting location: in dash panel insert

Function:
- ♦ The handbrake/brake fluid warning light comes on:
- when handbrake applied
- if brake fluid level is low
- for about 2 seconds after ignition is switched on
- if the electronic brake force distribution fails, i.e. if the ABS warning light comes on

⇒ page 45-180

6 - Parts of ABS system at rear axle
(illustration shows only disc brakes)
- ♦ rear right and left wheel speed sensor -G44/G46 1)
- removing and installing ⇒ page 45-65
- installing wheel speed sensor cables ⇒ page 45-67
- ♦ rear right and left pulse rotor for wheel speed sensor
- testing ⇒ page 45-66
- removing and installing: the pulse rotor should be replaced together with the wheel hub ⇒ page 42-23 and 42-28

7 - Brake light switch -F-
- ♦ is open in off position
- adjusting ⇒ page 45-69
- remove by turning 90° to left ⇒ page 45-69
- install by turning 90° to right ⇒ page 45-69
- ♦ must be tested in measured value block ⇒ page 45-192

8 - Parts of ABS system at front axle
- ♦ front right and left wheel speed sensor -G45/G47 1)
- removing and installing ⇒ page 45-60
- installing wheel speed sensor cables ⇒ page 45-201
- ♦ front right and left pulse rotor for wheel speed sensor
- testing ⇒ page 45-61
- removing and installing: the pulse rotor should be replaced together with the wheel hub ⇒ page 40-13

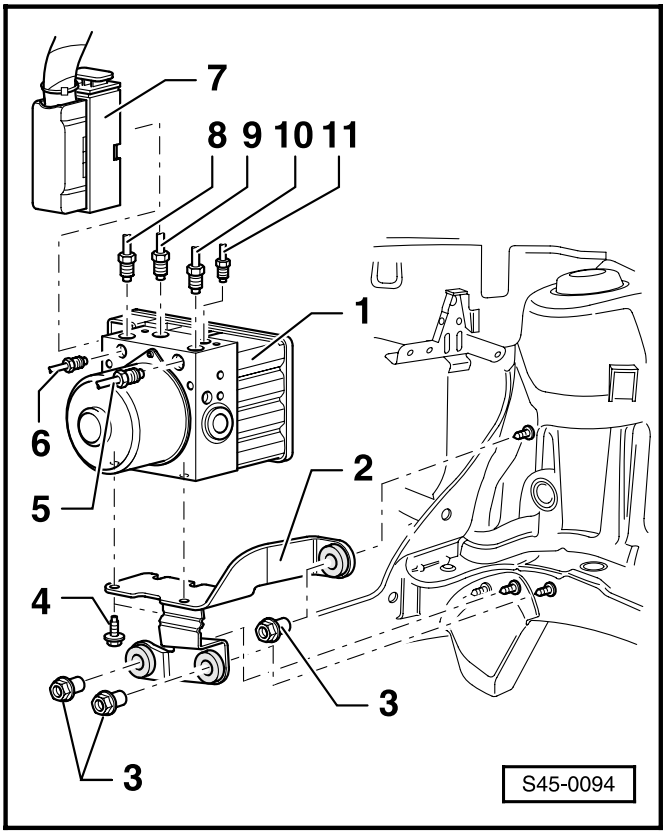
Removing and installing hydraulic control unit and bracket

Note:

As a general rule, always ensure that no brake fluid gets into the connector housing of the control unit.
This can result in corrosion to the contacts and thus in a failure of the system.
If the plug housing is soiled, it should be carefully cleaned with compressed air.

Special tools, testers and aids required

- Vehicle system tester V.A.G 1552
- Diagnostic cable V.A.G 1551/3
- Brake pedal depresser, e.g. V.A.G 1238/B
- Caps from repair kit Part No. 1HO 698 311 A
- Brake filling and bleeding appliance, e.g. ROMESS S15
- Bleeder bottle (commercially available)
- Brake fluid ⇒ page 00-8



1 - Hydraulic control unit
- The hydraulic pump -V64-, the hydraulic unit -N55- and the control unit -J104- together form the hydraulic control unit.
- The hydraulic control unit should be removed and installed as a complete unit ⇒ page 45-197.
- The connections of the brake lines are stamped on the hydraulic unit.
- Servicing ⇒ page 45-200

2 - Bracket

3 - Insert flange nut, 20 Nm

4 - Hexagon bolt, 8 Nm

5 - Brake line, 14 Nm
- Hydraulic unit to rear left wheel cylinder/brake caliper

6 - Brake line, 14 Nm
- Hydraulic unit to rear right wheel cylinder/brake caliper

7 - Multipin connector of control unit
- 47-pin
- Do not separate plug connection before self-diagnosis is completed. Switch off ignition before separating the plug connection.

8 - Brake line, 14 Nm
- Between brake master cylinder/push-rod piston circuit and hydraulic unit

9 - Brake line, 14 Nm
- Hydraulic unit to front left brake caliper

10 - Brake line, 14 Nm
- Between brake master cylinder/floating piston circuit and hydraulic unit

11 - Brake line, 14 Nm
- Hydraulic unit to front right brake caliper

Removing hydraulic control unit

Notes:

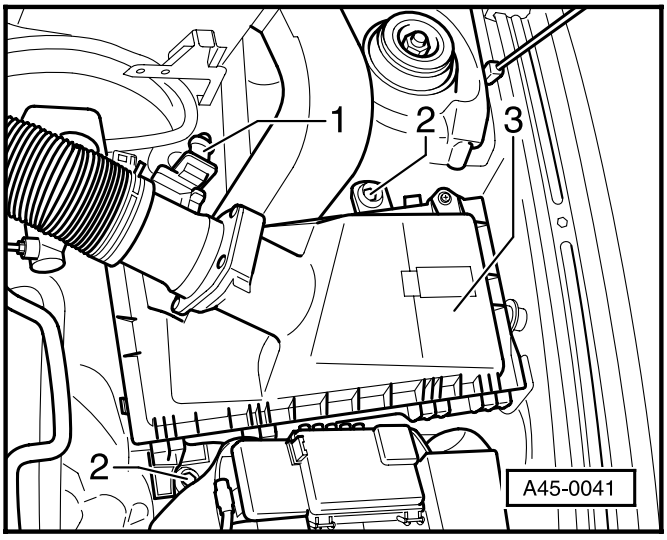
- *Before disconnecting the battery, determine the code of radio set fitted with anti-theft coding.*
- *When the battery is re-connected, please check the vehicle equipment:*
  - Enter radio code
  - Re-set clock
  - Initialise power windows.

⇒ Inspection and Maintenance

- Disconnect battery.

Note:

The following 2 steps do not apply to the 1.4-ltr./55 kW engine:

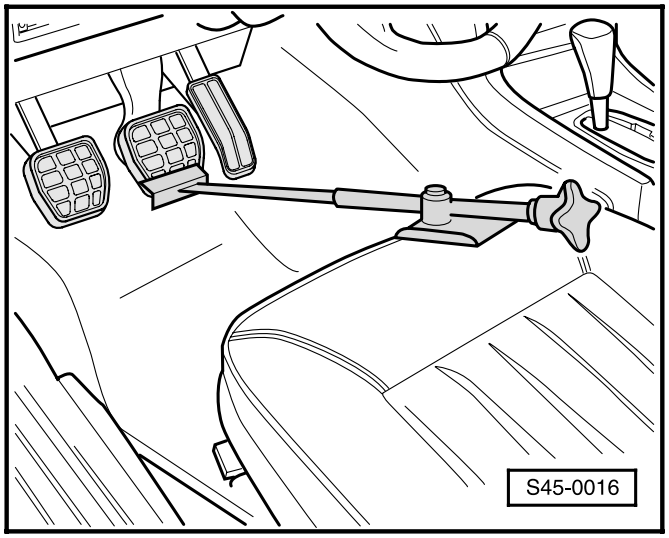


◄- Unplug the connector -1- of the air mass meter at the air guide pipe of the air filter.

- Take out the bolts -2- at the air filter -3- and place filter to the side.

- On diesel engines, remove relay carrier above brake servo unit.

- Extract as much brake fluid as possible from the brake fluid reservoir with a bleeder bottle.

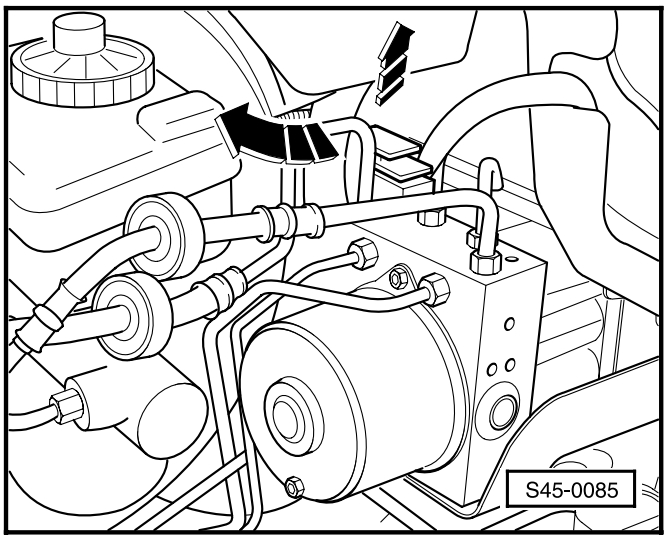


◄ - Depress brake pedal and lock in position with brake pedal depresser, e.g. V.A.G 1238/B.

- Fit the bleeder hose of the bleeder bottle onto the bleeder screw of the front left brake caliper and open bleeder screw.

- After brake fluid has flowed out, close bleeder screw.

- Detach bleeder hose from the bleeder screw.



◄ - Unlock multipin connector and unplug from control unit -arrows-.

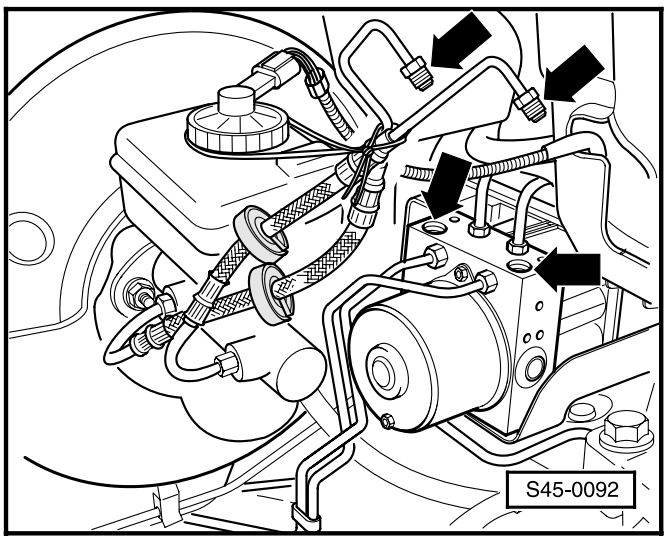
Note:

Ensure that no brake fluid gets onto the contacts.

- Place an absorbent mat below the hydraulic control unit in order to absorb the brake fluid.

Note:

Brake lines in the area of the hydraulic unit must not be bent.

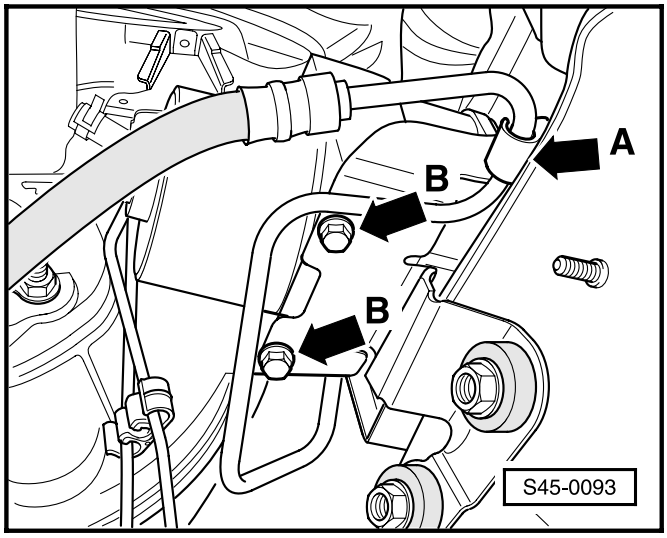


◄ - Detach the brake lines from the brake master cylinder to hydraulic unit, see arrows, and fit on plugs from installation parts kit to protect them from dirt.

- On models with left-hand steering, tie up the detached brake lines with a welding wire as high up as possible so that the ends of the lines project above the fluid level in the brake fluid reservoir -arrows-.

- Detach the remaining brake lines from the hydraulic unit.

- Seal the connections of the hydraulic lines at the hydraulic unit with the plugs from the installation parts kit.



◄- Unclip cable for clutch control -arrow A-.

- Remove bolts -arrows B- at the bracket of the hydraulic control unit.

- Take out hydraulic control unit.

Installing hydraulic control unit

Note:

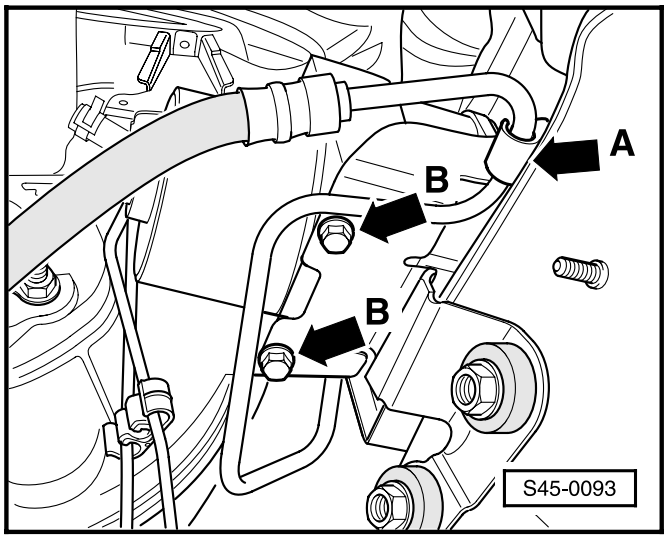
Do not remove plugs at the hydraulic unit until the appropriate brake line is fitted on.

- Bolt hydraulic control unit onto bracket.

Note:

Do not fully tighten bolts. This makes it easier to connect the individual brake lines to the hydraulic control unit.

- Attach brake lines to the hydraulic unit and tighten fully ⇒ page 45-196.



◄- Bolt hydraulic control unit tight -arrows B-.

- Clip cable for clutch control -arrow A- in place.

- Plug multipin connector into the control unit and lock.

The remaining installation is carried out in the reverse order.

- Connect battery.

- Bleed brake system ⇒ page 47-18.

- Code control unit ⇒ page 45-190.

- Interrogate fault memory ⇒ page 45-12.

- Erase fault memory ⇒ page 45-21.

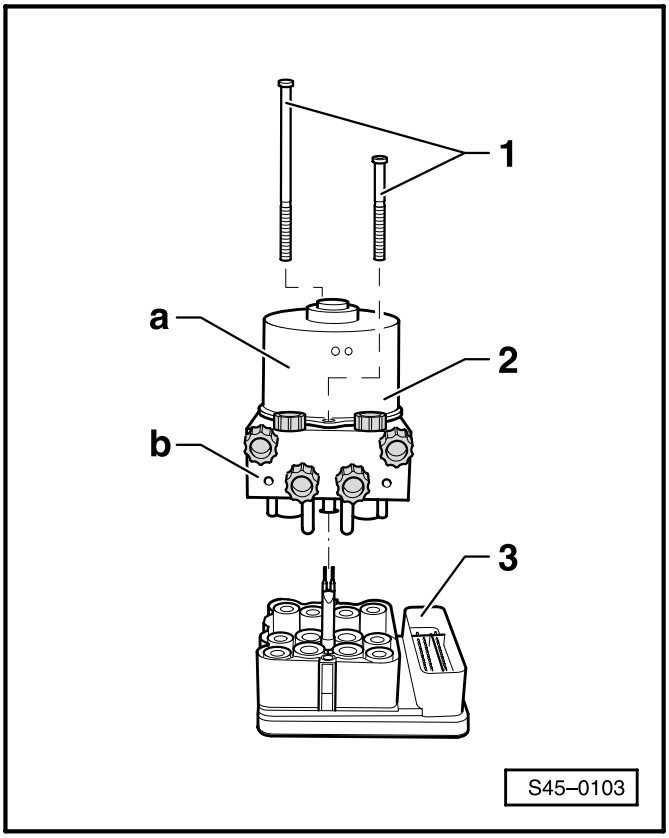
Servicing hydraulic control unit

Notes:

- *The components of the hydraulic control unit are plugged together and connected by means of 2 screws.*
- *Before removing the Torx screws, use adhesive tape to prevent hydraulic pump unintentionally separating from the hydraulic unit.*
- *Hydraulic pump and hydraulic unit are supplied as a single replacement part.*

Warning!

The hydraulic pump must not be separated from the hydraulic unit.



1 - Torx screw, 8 Nm

2 - Hydraulic unit
The hydraulic unit consists of:
a - Hydraulic pump -V64-
b - Hydraulic unit -N55-
- the valve block contains the control valves
- after separating from control unit, fit on transport protection for valve domes

3 - ABS or ABS/TCS/EDL control unit -J104-
- when detaching from hydraulic unit, the valve domes of the hydraulic unit must not be tilted with the solenoids of the control unit
- cover over solenoids with a non-fluffing cloth
- contact assignment ⇒ page 45-202
- test requirements ⇒ page 45-9

Assembling hydraulic unit

Notes:

- *There must not be any impurities in the area of the control unit-valve block.*
- *When assembling control unit and hydraulic unit, ensure that the valve domes of the hydraulic unit are not tilted with the solenoids of the control unit.*

Testing/removing and installing parts of ABS system at front wheels

⇒ Antilock Brake System (ABS) ITT Mark 20 IE, Self-Diagnosis ⇒ page 45-60.

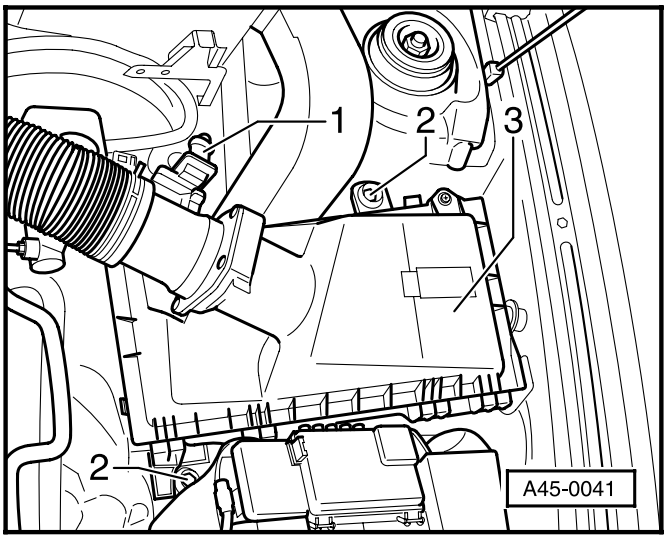
Removing and installing front wheel speed sensor cables

Removing

Notes:

- *It is prohibited to carry out repairs to screened cables of the ABS system.*
- *Before disconnecting the battery, determine the code of radio sets fitted with anti-theft coding.*
- *When the battery is re-connected, please check the vehicle equipment:*
  - Enter radio code
  - Re-set clock
  - Initialise power windows.

⇒ Inspection and Maintenance



- Disconnect battery.

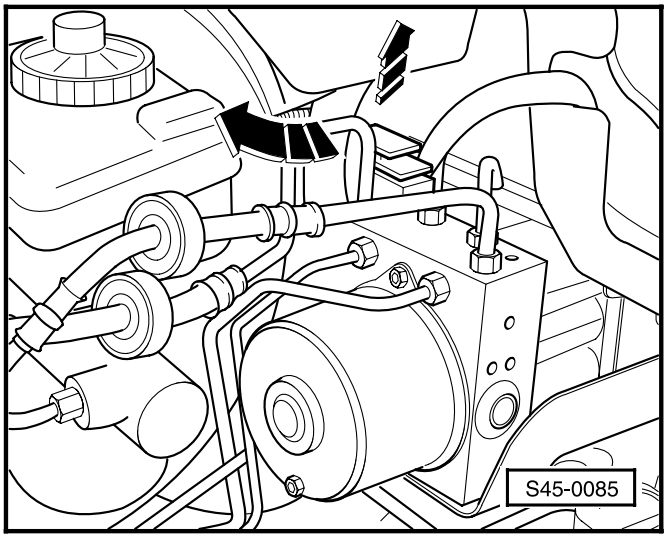
Note:

The following 2 steps do not apply to the 1.4-ltr./55 kW engine:

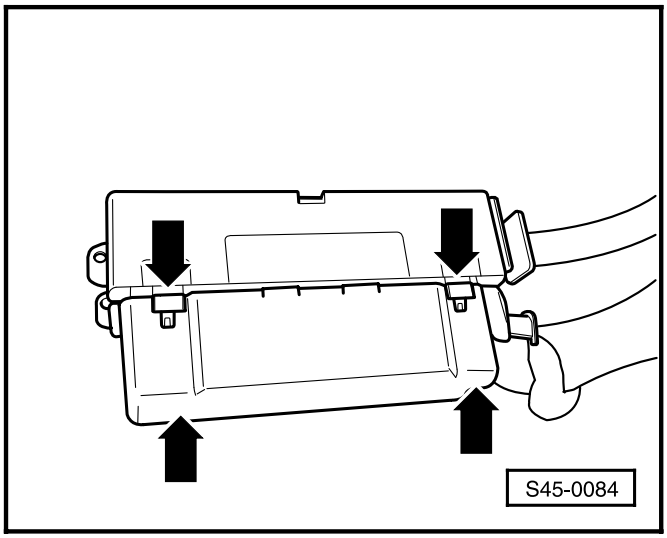
◄- Unplug connector of the air mass meter -1- from the air guide pipe of the air filter.

- Remove screws -2- at the air filter -3- and place filter to the side.

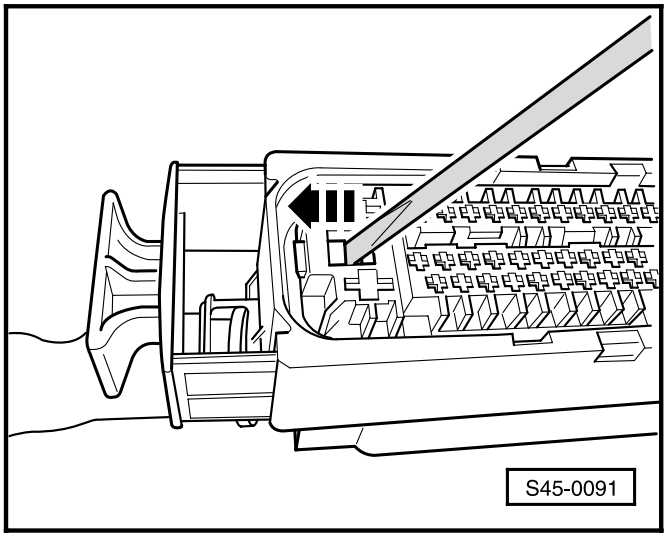
- On diesel engines, remove relay carrier above brake servo unit.



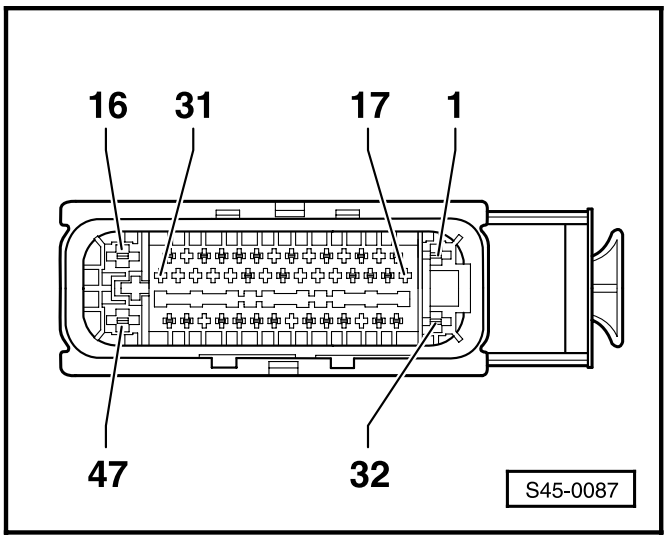
◄- Release multipin connector and unplug from control unit -arrows-.



◄ - Use a screwdriver to detach cap of multipin connector -arrows- and take off.



◄ - Use a screwdriver to release secondary lock (purple) in direction of arrow.



◄ **Contact assignment of plug connection of wiring loom/control unit -J104-**

Contact	Cable connection to component ...
33 + 34	Front right wheel speed sensor -G45-
45 + 46	Front left wheel speed sensor -G47-
42 + 43	Rear right wheel speed sensor -G44-
36 + 37	Rear left wheel speed sensor -G46-

- Use a suitable ejection tool from the wiring loom repair kit to knock out the appropriate contacts.

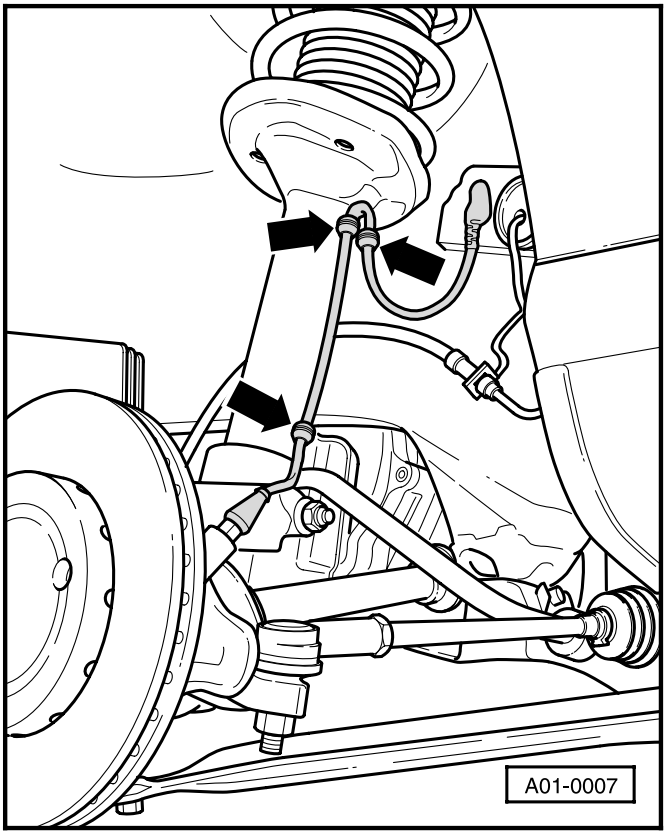
- Release connector at wheel speed sensor and separate plug connection.

- Remove faulty wheel speed sensor cable.

Installing

- Pull in new wheel speed sensor cable.

- Connect wheel speed sensor cable to wheel speed sensor.



◄ - Clip wheel speed sensor cable in place -arrows-.

Note:

When installing the wheel speed sensor cable, ensure that it is fitted free of twisting in the wheelhouse.

- Insert contact into the plug housing and use a suitable insertion tool from the wiring loom repair kit to push in the single-wire seal as far as the stop.

- Secure contacts with the secondary lock and fit the cap of the multipin connector onto this.

- Connect battery ⇒ page 45-197.

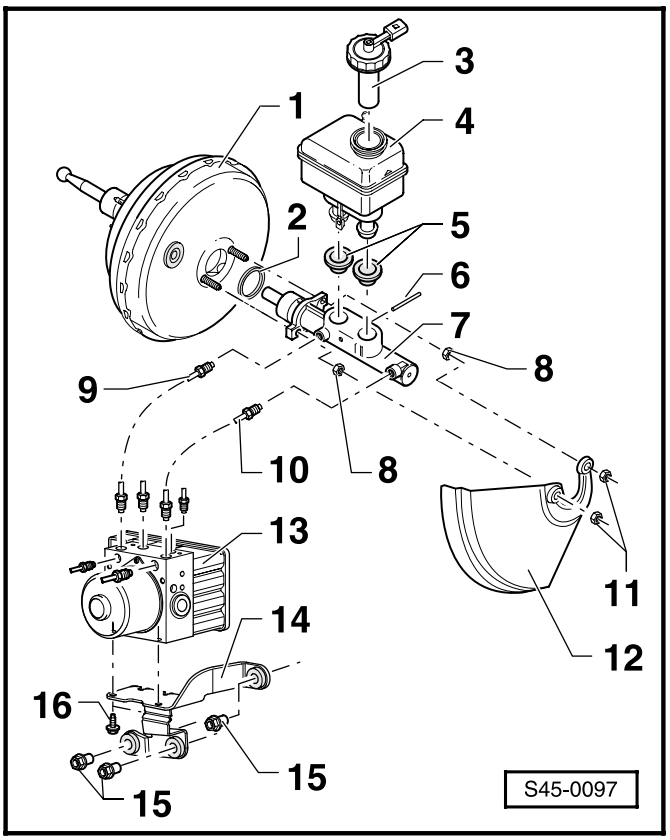
- Interrogate fault memory ⇒ page 45-12.

- Erase fault memory ⇒ page 45-21.

Testing/removing and installing parts of the ABS system at rear wheels (disc and drum brakes) - front-wheel drive models

⇒ Antilock Brake System (ABS) ITT Mark 20 IE, Self-Diagnosis ⇒ page 45-65.

Assembly overview of hydraulic control unit, brake servo unit/brake master cylinder ABS/EDL/TCS Mark 60



Notes:

- *The hydraulic control unit should be removed and installed complete ⇒ from page 45-196.*
- *Servicing ⇒ from page 45-200.*
- *Connections of brake lines should be tightened as a general rule to a torque of 14 Nm.*

1 - Brake servo unit
- operational check ⇒ page 47-4
- removing and installing ⇒ page 47-32

2 - Seal
- replace

3 - Cap
- with integrated brake fluid level warning contact -F34-

4 - Brake fluid reservoir

5 - Sealing plug
- moisten with brake fluid and press in expansion reservoir

6 - Retaining pin

7 - Brake master cylinder
- cannot be serviced; replace complete if fault exists
- removing and installing ⇒ page 47-2

8 - Self-locking hexagon nut, 20 Nm
- replace

9 - Brake line
- brake master cylinder/pushrod piston circuit to hydraulic unit

10 - Brake line
- brake master cylinder/floating piston circuit to hydraulic unit

11 - Self-locking hexagon nut, 20 Nm
- fitted only to certain models
- replace

12 - Heat shield
- fitted only to certain models

13 - Hydraulic control unit
- removing and installing ⇒ page 45-196
- servicing ⇒ page 45-200
- brake line connections ⇒ page 45-205

14 - Bracket
- with rubber shock absorber

15 - Insert flange nut, 20 Nm

16 - Hexagon bolt, 8 Nm

Electrical test of ABS/EDL/ TCS Mark 60

Special tools, testers and aids required

- Hand-held multimeter, e.g. V.A.G 1526 A
- Adapter cable set V.A.G 1594 A
- Test box V.A.G 1598 A
- Adapter V.A.G 1598/36

The test steps from page 45-207 apply only to models fitted with ABS/EDL/TCS

- Vehicles on which self-diagnosis does not provide any indication of the source of the fault. In this case, carry out the complete electrical test.
- Vehicles on which self-diagnosis provides a direct indication of the source of the fault. In this case, carry out only the test steps recommended in the fault table (specific testing).

Overview of all the test steps of the electrical test ⇒ page 45-207.

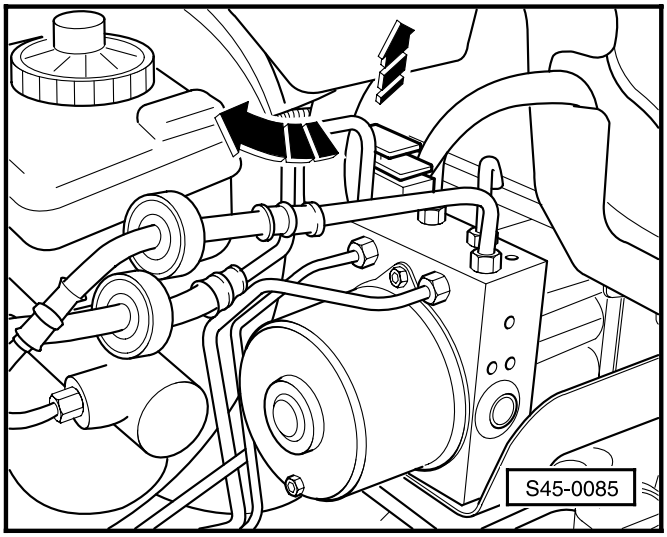
Test requirements

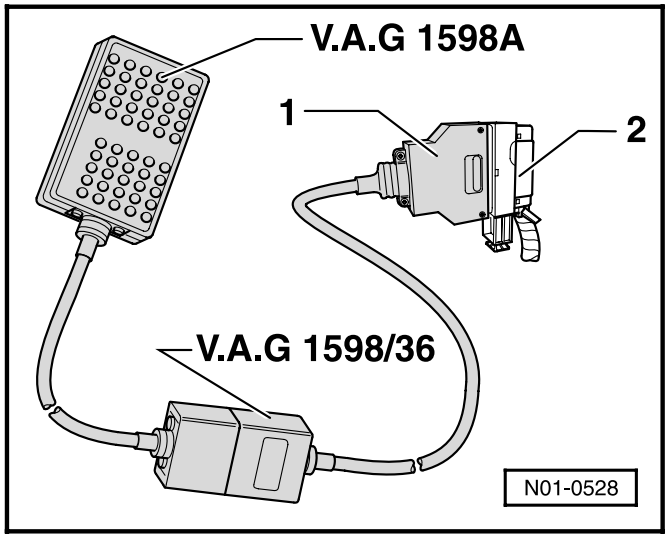
- Before commencing the test, switch off ignition and electrical components (headlights, lighting, fan ...).
- Fuses must be o.k. (as a check, remove fuses from fuse holder).

⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations binder

- Remove protective housing for relays from cable duct.

◄- Unlock connector -1- at control unit -J104- -arrow a- and unplug -arrow b-.





◄ - Connect test box V.A.G 1598 A with adapter V.A.G 1598/36 -1- to the multipin plug connection of the control unit -J104- -2-.

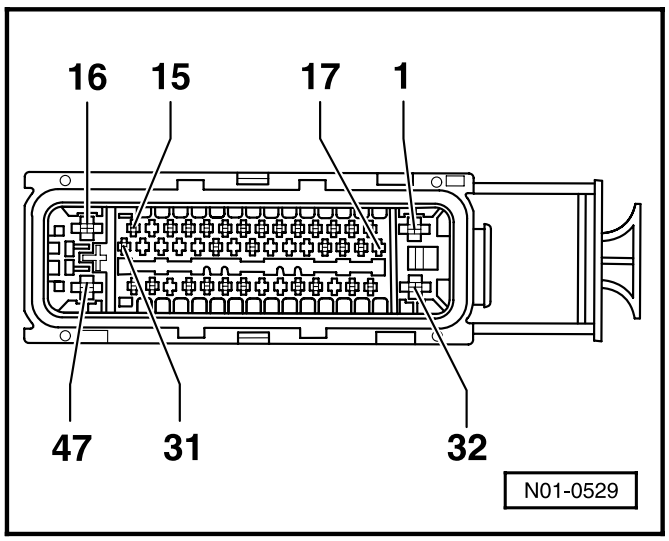
Note:

The specifications are matched to V.A.G 1526 A and do not necessarily apply to other testers.

Multipin plug connections with contact assignment for ABS, ABS/ EDL/TCS

Contact assignment of plug connection T16a of diagnosis socket

⇒ page 45-134



◄ **Contact assignment of plug connection T47a wiring loom/control unit -J104-**

Note:

Plug contacts not listed are not assigned.

1 - Voltage supply battery + (through S162)

2 - Plug connection T16a/7, K wire

4 - Terminal 15 through S9

8 - Only on models with Navigation system

10 - Only on models with Navigation system and gas discharge headlights

11 - Databus line
⇒ “Current Flow Diagrams, Electrical Fault Finding and Fitting Locations” binder

13 - TCS/ASR pushbutton -E132-

14 - Coding bridge to contact 38

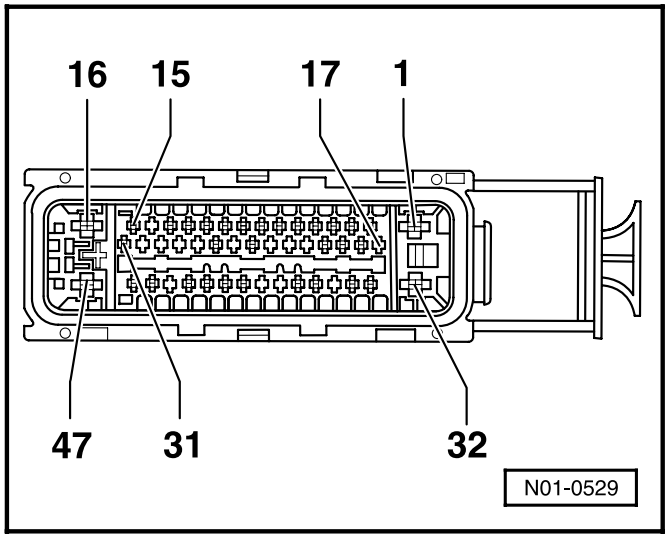
15 - Databus line
⇒ “Current Flow Diagrams, Electrical Fault Finding and Fitting Locations” binder

16 - Earth

32 - Voltage supply of battery + (through S163)

33 - Front right wheel speed sensor -G45-

34 - Front right wheel speed sensor -G45-



36 - Rear left wheel speed sensor -G46-
37 - Rear left wheel speed sensor -G46-
38 - Coding bridge to contact 14
41 - Brake light switch -F-
42 - Rear right wheel speed sensor -G44-
43 - Rear right wheel speed sensor -G44-
44 - Dash panel insert, only models fitted with ABS
45 - Front left wheel speed sensor -G47-
46 - Front left wheel speed sensor -G47-
47 - Earth

List of test steps

Component to be tested	
Voltage supply of hydraulic pump -V64- to control unit -J104	- Perform test step 1
Voltage supply of valves in hydraulic unit -N55- to control unit -J104	- Perform test step 2
Voltage supply (ignition/starter switch) to control unit -J104	- Perform test step 3
Operation of brake light switch -F	- Perform test step 4
Resistance of front right wheel speed sensor -G45	- Perform test step 5
Resistance of front left wheel speed sensor -G47	- Perform test step 6
Resistance of rear right wheel speed sensor -G44	- Perform test step 7
Resistance of rear left wheel speed sensor -G46	- Perform test step 8
Voltage signal of front right wheel speed sensor -G45	- Perform test step 9
Voltage signal of front left wheel speed sensor -G47	- Perform test step 10
Voltage signal of rear right wheel speed sensor -G44	- Perform test step 11
Voltage signal of rear left wheel speed sensor -G46	- Perform test step 12
Operation of ABS warning light -K47-	- Perform test step 13
Operation of handbrake/brake fluid level warning light -K14/33-	- Perform test step 14
Operation of TCS/ASR pushbutton -E132	- Perform test step 15
Test of databus line	- Perform test step 16
Voltage supply of V.A.G 1551, plug connection T16a	- Perform test step 17
Resistance of K wire for self-diagnosis, plug connection T16a	- Perform test step 18
Coding bridge	- Perform test step 19

Test table

Notes on test table

- *The socket designations of test box with adapter V.A.G 1598/36 are identical to the contact designations of the control unit -J104- in the current flow diagram.*

⇒ “Current Flow Diagrams, Electrical Fault Finding and Fitting Locations” binder

- *If the measurements obtained differ from the specifications, carry out the measures indicated in the right-hand part of the table for rectifying the fault.*

⇒ “Current Flow Diagrams, Electrical Fault Finding and Fitting Locations” binder

- *Conduct continuity tests with adapter cable set V.A.G 1594 A (bridges).*
- *If the measurements obtained differ only slightly from the specifications, then clean the sockets and connectors of the testers and test cables (with contact spray G 000 700 04) and repeat the test. Before replacing the particular components, inspect the cables and connections and also repeat the resistance measurement at the component, particularly if the specifications are less than 10 Ω.*

Switch on measuring range: Voltage measurement (20 V =)					
Test step	**V.A.G 1598 A Sockets**	**Test of**	**• Test conditions - Additional operations**	**Specification**	**Measures if readout differs from specification**
1	1 + 47	Voltage supply for hydraulic pump -V64- (terminal 30) at control unit -J104	• Ignition switched off	10.0 - 14.5 V	- Test wiring according to current flow diagram ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations binder
2	32 + 16	Voltage supply for valves in hydraulic unit -N55- (terminal 30) at control unit -J104	• Ignition switched off	10.0 - 14.5 V	- Test wiring according to current flow diagram ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations binder
3	4 + 47	Voltage supply (terminal 15) of control unit -J104	• Ignition switched on	10.0 - 14.5 V	- Test wiring according to current flow diagram ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations binder
4	47 + 41	Operation of brake light switch -F	• Ignition switched off • Brake pedal not operated - Operate brake pedal	0.0 - 0.5 V approx. battery voltage	- Test brake light switch -F- and read measured value block ⇒ page 45-192, display group number 003. - Test wiring according to current flow diagram ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations binder - Test brake light switch -F- ⇒ page 45-69.1.

Switch on measuring range: Resistance measurement (2 kΩ)					
Test step	**V.A.G 1598 A Sockets**	**Test of**	**• Test conditions - Additional operations**	**Specification**	**Measures if readout differs from specification**
5	33 + 34	Resistance of front right wheel speed sensor -G45	• Ignition switched off	1.0...1.3 kΩ	- Test wiring according to CFD. - Move cables during test. ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations binder If no fault is found in the wiring: - Replace wheel speed sensor -G45- ⇒ page 45-60.
6	45 + 46	Resistance of front left wheel speed sensor -G47	• Ignition switched off	1.0...1.3 kΩ	- Test wiring according to CFD. - Move cables during test. ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations binder If no fault is found in the wiring: - Replace wheel speed sensor -G47- ⇒ page 45-60.
7	42 + 43	Resistance of rear right wheel speed sensor -G44	• Ignition switched off	1.0...1.3 kΩ	- Test wiring according to CFD. - Move cables during test. ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations binder If no fault is found in the wiring: - Replace wheel speed sensor -G44- ⇒ page 45-65.
8	37 + 36	Resistance of rear left wheel speed sensor -G46	• Ignition switched off	1.0...1.3 kΩ	- Test wiring according to CFD. - Move cables during test. ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations binder If no fault is found in the wiring: - Replace wheel speed sensor -G46- ⇒ page 45-65.

Test step	V.A.G 1598 A bushes	Test of	• Test conditions - Additional work required	Nominal value	Measures to be taken when there is deviation from the nominal value
9	33 + 34	Voltage signal of the rotational speed sensor at the front on the right -G45	• Vehicle raised up • Ignition off - Turn the wheel at the front on the right at ca. 1 r.p.m.	 AC voltage of at least 65 mV	- Check installation of the rotational speed sensor -G45- and of the rotor - Check whether the rotational speed sensor -G45- has been swapped around and read the measuring value block ⇒ Page 45-192, indicator group number 001.
10	45 + 46	Voltage signal of the rotational speed sensor at the front on the left -G47	• Vehicle raised up • Ignition off - Turn the wheel at the front on the left at ca. 1 r.p.m.	 AC voltage of at least 190 mV	- Check installation of the rotational speed sensor -G47- and of the rotor - Check whether the rotational speed sensor -G47- has been swapped around and read the measuring value block ⇒ Page 45-192, indicator group number 001.
11	42 + 43	Voltage signal of the rotational speed sensor at the rear on the right -G44	• Vehicle raised up • Ignition off - Turn the wheel at the rear on the right at ca. 1 r.p.m.	 AC voltage of at least 190 mV	- Check installation of the rotational speed sensor -G44- and of the rotor - Check whether the rotational speed sensor -G44- has been swapped around and read the measuring value block ⇒ Page 45-192, indicator group number 001.
12	37 + 36	Voltage signal of the rotational speed sensor at the rear on the left -G46	• Vehicle raised up • Ignition off - Turn the wheel at the rear on the left at ca. 1 r.p.m.	 AC voltage of at least 190 mV	- Check installation of the rotational speed sensor -G46- and of the rotor - Check whether the rotational speed sensor -G46- has been swapped around and read the measuring value block ⇒ Page 45-192, indicator group number 001.

Operational test: ABS warning light -K47-					
Test step	**V.A.G 1598 A Sockets**	**Test of**	**• Test conditions - Additional operations**	**Specification**	**Measures if readout differs from specification**
13	-	Operation of ABS warning light -K47-	• Ignition switched off - Switch ignition on	Warning light -K47- comes on for about 2 s and goes out again.	- Test wiring according to CFD. ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations binder - Fault in dash panel insert. ⇒ Electrical System; Repair Group 90; Dash Panel Insert; Self-Diagnosis of Dash Panel Insert

Operational test: Handbrake/brake fluid level warning light -K14/33-					
Test step	**V.A.G 1598 A Sockets**	**Test of**	**• Test conditions - Additional operations**	**Specification**	**Measures if readout differs from specification**
14	-	Operation of handbrake/brake fluid level warning light -K14/33-	• Handbrake not applied • Brake fluid at correct level • Ignition switched on	Warning light -K14/33- does not come on.	- Test wiring according to CFD. ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations binder
			- Apply handbrake	Warning light -K14/33- comes on.	- Fault in dash panel insert. ⇒ Electrical System; Repair Group 90; Dash Panel Insert; Self-Diagnosis of Dash Panel Insert

Operational test: Operation of TCS/ASR pushbutton -E132-					
Test step	**V.A.G 1598 A Sockets**	**Test of**	**• Test conditions - Additional operations**	**Specification**	**Measures if readout differs from specification**
15	-	Operation of TCS pushbutton -E132-	• Ignition switched on	TCS warning light -K86- comes on for 2 seconds and goes out again.	
			- Operate TCS button -E132-.	TCS warning light -K86- comes on.	- Test wiring according to CFD ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations binder
			- Operate TCS button -E132- once again.	TCS warning light -K86- goes out.	- Replace TCS button -E132- ⇒ Body Fitting Work; Repair Group 70; Dash Panel; Removing and installing dash panel

Switch on measuring range: Resistance measurement (200 Ω/20 MΩ)					
Test step	**V.A.G 1598 A Sockets**	**Test of**	**• Test conditions - Additional operations**	**Specification**	**Measures if readout differs from specification**
16	11 or 15	Databus lines	• Ignition switched off • Measuring range 200 Ω set		
			- Separate multipin connections from the control units connected by means of a databus line: - Connect test box V.A.G 1598 A with adapter V.A.G 1598/36.		
			- Test databus lines for open circuit.	max. 1.5 Ω	- Test wiring according to CFD. ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations binder
			- Set measuring range 20 MΩ. - Remove fuse S9.		
			- Test wiring for short circuit to positive or to earth.	∞ Ω	- Test wiring according to CFD. ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations binder

Switch on measuring range: Voltage measurement (20 V =)					
Test step	**V.A.G 1598 A Sockets**	**Test of**	**• Test conditions - Additional operations**	**Specification**	**Measures if readout differs from specification**
17	-	Voltage supply for V.A.G 1552, plug connection T16a[1)]	• Ignition switched off - Connect hand-held multimeter V.A.G 1526 A with adapter cable set V.A.G 1594 to plug connection T16a [1)]:	10.0-14.5 V	- Test wiring according to CFD. ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations binder

1) Contact assignment of diagnostic connector ⇒ page 45-206.

Switch on measuring range: Resistance measurement (200 Ω)					
Test step	**V.A.G 1598 A Sockets**	**Test of**	**• Test conditions - Additional operations**	**Specification**	**Measures if readout differs from specification**
18	-	Resistance of K wire for V.A.G 1552 plug connection T16a[1)]	• Ignition switched off - Separate multipin connection from control unit -J104-. - Connect test box V.A.G 1598 A with adapter V.A.G 1598/36.		
			- Connect hand-held multimeter V.A.G 1526 with adapter cable set V.A.G 1594 to contacts T16a/7[1)] and T47a/2[2)] of multipin connection of control unit -J104-.	max. 1.5 Ω	- Test wiring according to CFD. ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations binder

1) Contact assignment of diagnostic connector ⇒ page 45-206.

2) Contact assignment of control unit connector ⇒ page 45-206.

Switch on measuring range: Resistance measurement (200 Ω)					
Test step	**V.A.G 1598 A Sockets**	**Test of**	**• Test conditions - Additional operations**	**Specification**	**Measures if readout differs from specification**
19	14 + 38	Coding bridge for ABS/EDL/TCS	• Ignition switched off	0.0 - 1.0 Ω	- Test wiring according to CFD. ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations binder

Antilock brake system ABS/ EDL/TCS/ESP Mark 60

Safety precautions, basic information on fault finding and servicing

⇒ Antilock Brake System ABS/EDL/ESP Mark 20IE ⇒ page 45-88

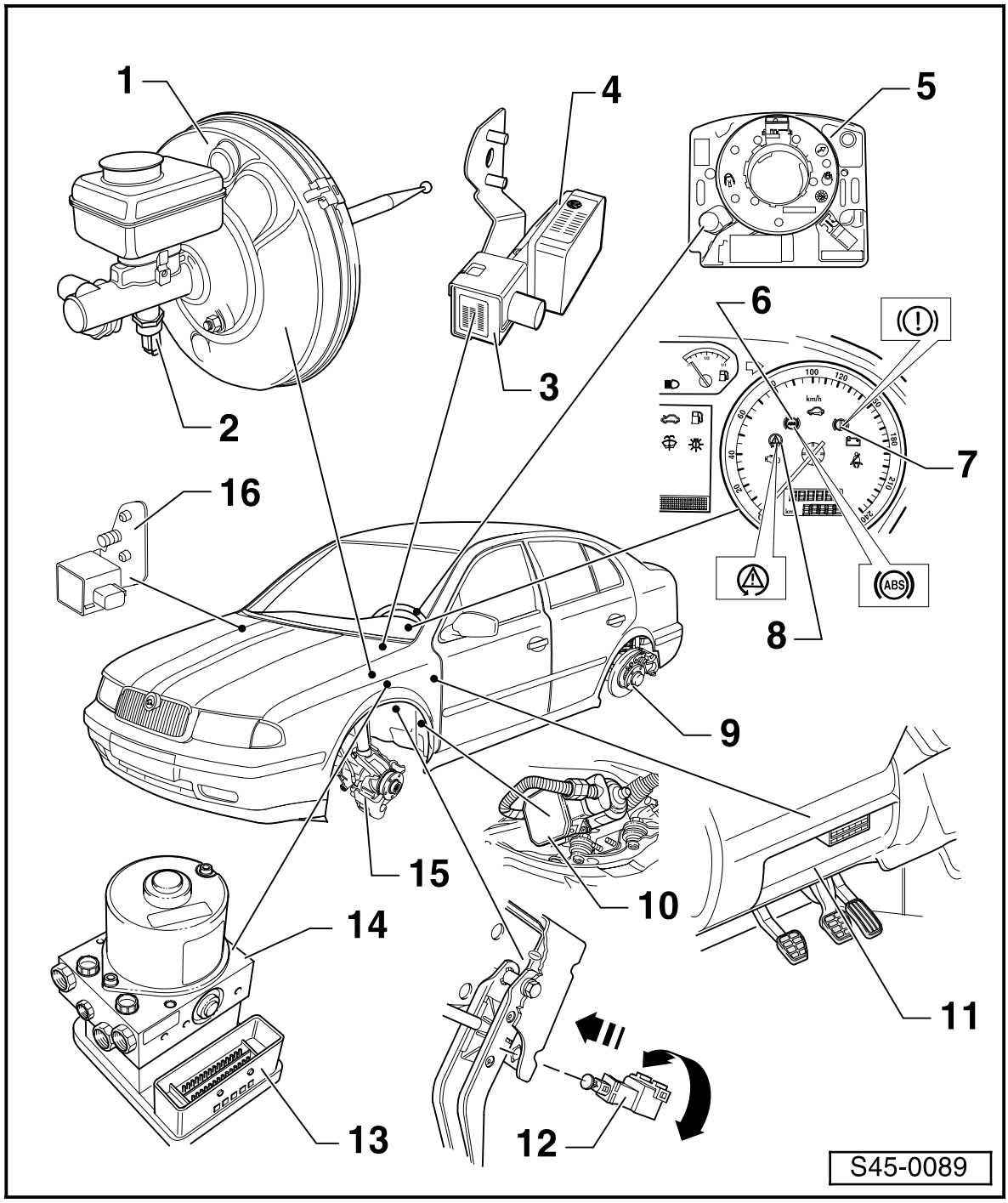
Information on repair operations to ABS/EDL/TCS/ESP Mark 60

⇒ Antilock Brake System ABS/EDL/ESP Mark 20IE ⇒ page 45-88

Technical information required

- „Current Flow Diagrams, Electrical Fault Finding and Fitting Locations“ binder
- Service Technical Handbook

Electrical/electronic components and installed location of the ABS/EDL/ASR/ ESP Mark 60 ➤ MJ 02



All components marked with 1) are detected by the self-diagnosis system.

1 - Brake booster

- With the master brake cylinder and brake fluid reservoir
- Removing and installing the brake booster ⇒ Page 47-32

2 - Sender -1- for the brake pressure -G201- 1)

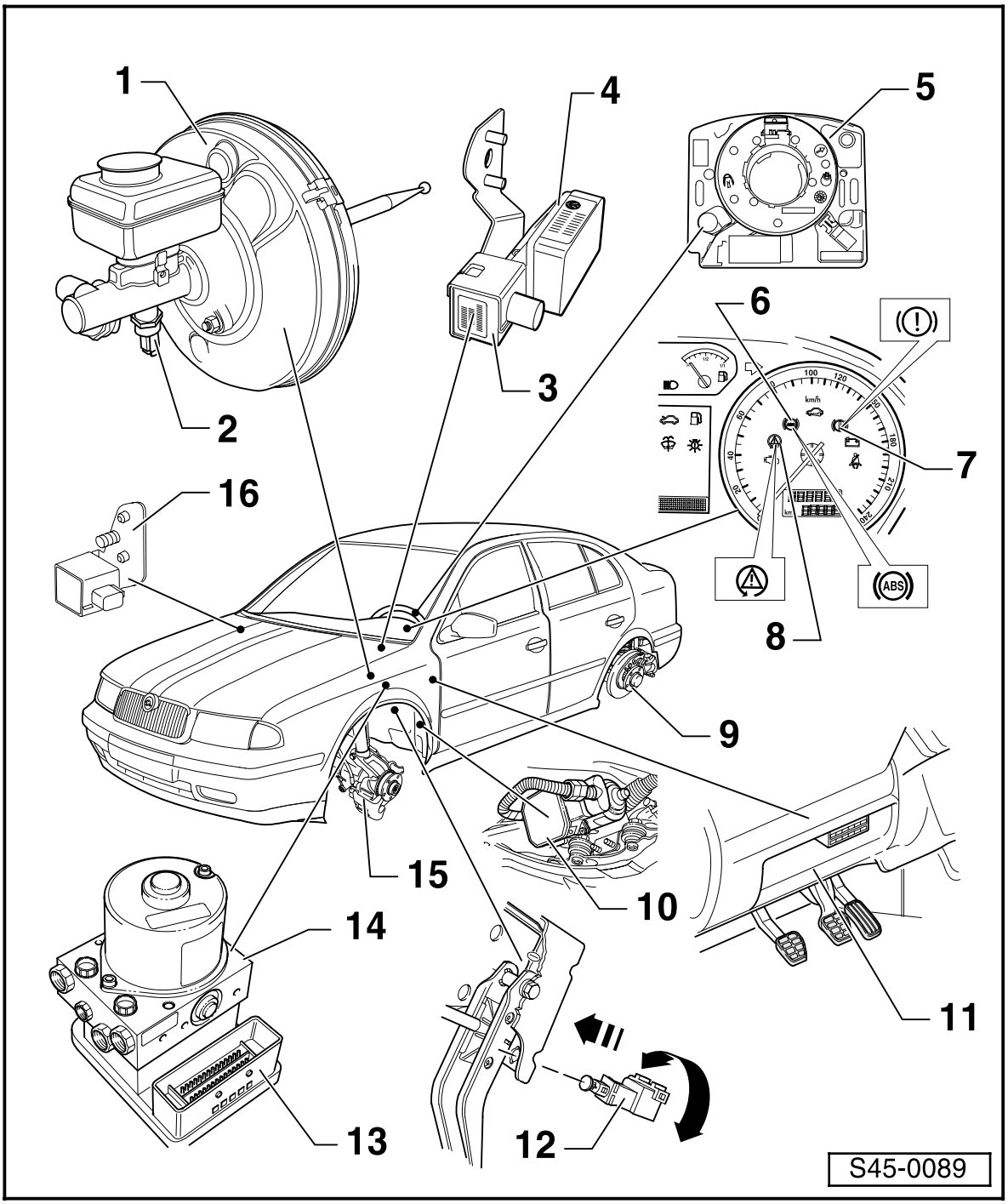
- Removing and installing ⇒ Page 47-28

3 - Sender for transverse acceleration -G200- 1)

- Installed location: next to the steering column under the dash panel

4 - Sender for the rotational speed -G202- 1)

- Installed location: next to the steering column under the dash panel



5 - Steering angle sender -G85- 1)
- Fitting location: on steering column between steering wheel and steering column switch

6 - ABS warning light -K47-
- Fitting location: in dash panel insert
- Operation ⇒ page 45-219

7 - Handbrake/brake fluid level warning light -K14/33-
- Fitting location: in dash panel insert
- Operation ⇒ page 45-219

8 - Electronic stability programme warning light -K155-
- Fitting location: in dash panel insert
- Operation ⇒ page 45-219

9 - Parts of ABS system at rear suspension

- ♦ Rear right and left wheel speed sensors -G44/G46- 1)
- - Removing and installing ⇒ page 45-65
- - Installing wheel speed sensor cables ⇒ page 45-67
- ♦ Pulse rotor for rear right and left wheel speed sensors
- - Testing ⇒ page 45-66
- - Removing and installing: pulse rotor is replaced together with wheel hub ⇒ page 42-23 and 42-28.

10 - Brake vacuum pump -V192-

- ♦ Only fitted to vehicles with automatic gearbox and in combination with EU-4 engines
- ♦ Fitting location: at left of subframe
- ♦ Is tested by self-diagnosis in engine control unit

⇒ Engine, Fuel Injection and Ignition System; Repair Group 01

- ♦ Removing and installing ⇒ page 47-38

11 - Diagnostic connection

- ♦ Fitting location: in storage compartment driver side

12 - Brake light switch -F- 1)

- ♦ Open in off position
- - Setting ⇒ page 45-69.1
- - Remove by turning 90° to the left ⇒ page 45-69.1
- - Install by turning 90° to the right ⇒ page 45-69.1
- ♦ Must be tested in measured value block 003 ⇒ page 45-238

13 - ABS/EDL/ESP control unit -J104-

- ♦ Fitting location: at hydraulic unit in left of engine compartment
- ♦ Is tested by self-diagnosis
- ♦ Test of multipin connection to control unit ⇒ page 45-251
- ♦ Do not unplug multipin plug connection before completing self-diagnosis. Switch ignition off before separating plug connection.

14 - Hydraulic control unit for ABS/EDL/ESP -N55- 1)

- ♦ Fitting location: in left of engine compartment
- ♦ Hydraulic unit -N55- consists of hydraulic pump -V64- and valve block with inlet and outlet valves
- ♦ If hydraulic unit is replaced, it is essential to seal old part with plugs from installation parts kit; Part No. ⇒ Parts List
- ♦ Removing and installing hydraulic control unit (hydraulic unit -N55- with control unit -J104-) ⇒ page 45-196
- ♦ Hydraulic pump -V64- and valve block must not be separated
- ♦ Servicing hydraulic control unit ⇒ page 45-200

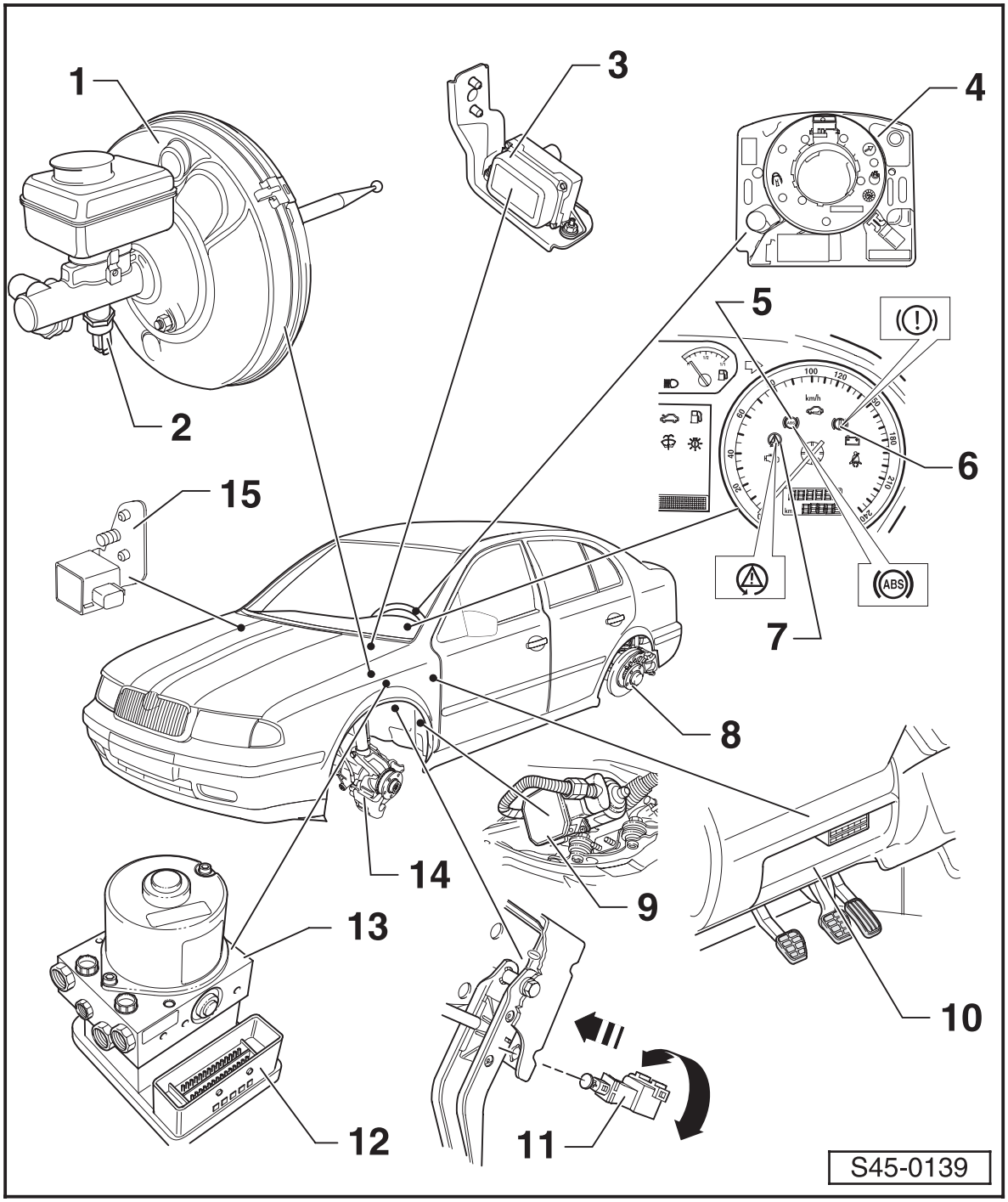
15 - Parts of ABS system at front suspension

- ♦ Front right and left wheel speed sensors -G45/G47- 1)
- - Removing and installing ⇒ page 45-60
- - Installing wheel speed sensor cables ⇒ page 45-201
- ♦ Pulse rotor for front right and left wheel speed sensors
- - Testing ⇒ page 45-61
- - Removing and installing: pulse rotor is replaced together with wheel hub ⇒ page 40-13.

16 - Longitudinal acceleration sender -G251- 1)

- ♦ Fitting location: at right of central tube, close to right A pillar
- ♦ Removing and installing ⇒ page 45-82

Electric/Electronic components and installation locations ABS/EDS/ASR/ESP Mark 60 MY 02 ➤



All the components marked[1)] with are detected by the self-diagnosis

1 - Brake booster
- ♦ with master brake cylinder and brake fluid reservoir
- ♦ removing and installing brake booster ⇒ page 47-32

2 - Brake pressure sender -1- -G201-[1)]
- ♦ removing and installing ⇒ page 47-28

3 - ESP -G419- sender unit
- ♦ 4 x 4 vehicles RHD without -G251-
- ♦ Installation location: next to the steering column below the dash panel

4 - Steering angle sender -G85-[1)]
- ♦ Installation location: on steering column between steering wheel and steering column switch

5 - Warning lamp for ABS -K47-
- ♦ Installed location: in the dash panel insert
- ♦ Function ⇒ Page 45-219

6 - Warning lamp for the handbrake and brake fluid level -K14/33-
- ♦ Installed location: in the dash panel insert
- ♦ Function ⇒ Page 45-219

7 - Warning lamp for the ESP -K155-
- ♦ Installed location: in the dash panel insert
- ♦ Function ⇒ Page 45-219

8 - Parts of the ABS system on the rear axle
- ♦ The rotational speed at the rear on the right and the left -G44/G46- 1)
- - Removing and installing ⇒ Page 45-65
- - Mounting of the rotational speed sensor lines ⇒ Page 45-67
- ♦ Impulse wheel for the rotational speed sensor at the rear on the right and the left
- - checking ⇒ Page 45-66
- - removing and installing: the impulse wheel should be changed along with the wheel hub ⇒ Page 42-23 and 42-28

9 - Vacuum pump for the brake -V192- 1)
- ♦ Only for vehicles with an automatic gearbox in connection with exhaust gas limit values according to EU-4
- ♦ Installed location: on the assembly carrier on the left
- ♦ Is checked by the self-diagnosis in the engine control unit

⇒ Engine, Injection and Ignition System; Rep. Gr. 01
- ♦ Removing and installing ⇒ Page 47-38

10 - Connection for diagnosis
- ♦ Installed location: in the storage compartment on the driver's side

11 - Brake light switch -F- 1)
- ♦ Is open in the idle state
- - adjusting ⇒ Page 45-69.1
- - remove by turning through 90° to the left ⇒ Page 45-69.1
- - remove by turning through 90° to the right ⇒ Page 45-69.1
- ♦ Testing: measuring value block 003 ⇒ Page 45-238

12 - Control unit for ABS/EDL/ESP -J104-
- ♦ Installed location: on the hydraulic unit in the engine compartment on the left
- ♦ Is checked by the self-diagnosis
- ♦ Check the multiple plug connection to the control unit ⇒ Page 45-251
- ♦ The ignition should be switched off before disconnecting the plug connection

13 - Hydraulic unit for ABS/EDL/ESP -N55- 1)
- ♦ Installed location: in the engine compartment on the left
- ♦ The hydraulic unit -N55- consists of the hydraulic pump -V64- and the valve block with the inlet and outlet valves
- ♦ When replacing an old part one must absolutely close it off with stops from the assembly set; spare part no. ⇒ spare parts catalogue
- ♦ The hydraulic control unit (hydraulic unit -N55- with control unit -J104- ⇒ Page 45-196
- ♦ The hydraulic pump -V64- and the valve block must be not be separated
- ♦ Repairing the hydraulic control unit ⇒ Page 45-200

14 - Parts of the ABS system on the front axle
- ♦ The rotational speed at the rear on the right and the left -G45/G47-1)
- - removing and installing ⇒ Page 45-60
- - mounting of the rotational speed sensor lines ⇒ Page 45-201
- ♦ Impulse wheel for the rotational speed sensor at the front on the right and the left
- - checking ⇒ Page 45-61
- - removing and installing: the impulse wheel should be changed along with the wheel hub ⇒ Page 40-13

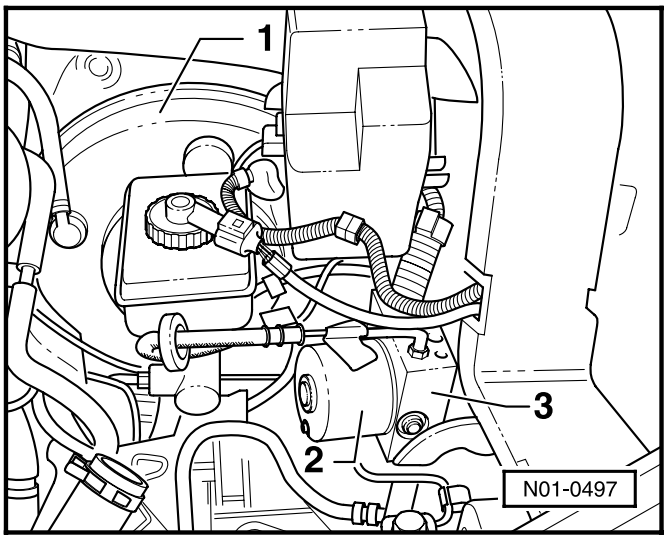
15 - Sender for the longitudinal acceleration -G251- 1)
- ♦ Installed location:
- - only for vehicles 4 x 4 RHD ⇒ on the central pipe on the right near the A column on the right

Distinguishing features of ABS/EDL/TCS Mark 60 and of ABS/EDL/TCS/ESP Mark 60

General information

⇒ page 45-89

Fitting location of ABS/EDL/TCS/ ESP Mark 60

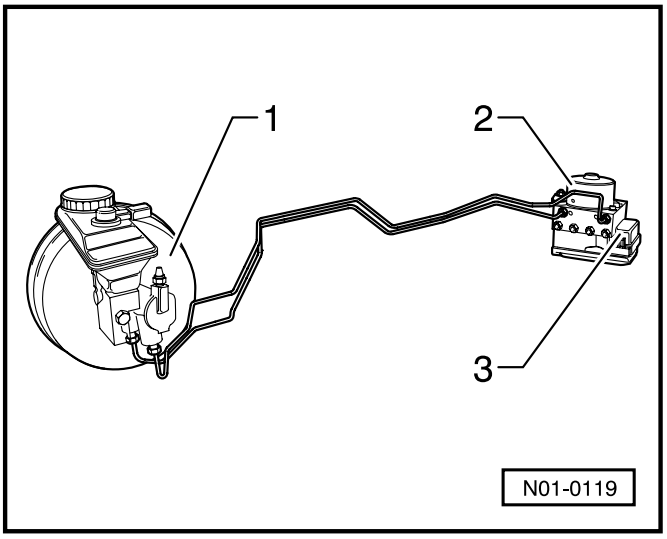


◄ **LHD models**

1 - Brake servo unit 10”

2 - Hydraulic unit

3 - Control unit, 47-pin, bolted to hydraulic unit



◄ **RHD models**

1 - Brake servo unit 9”/8”

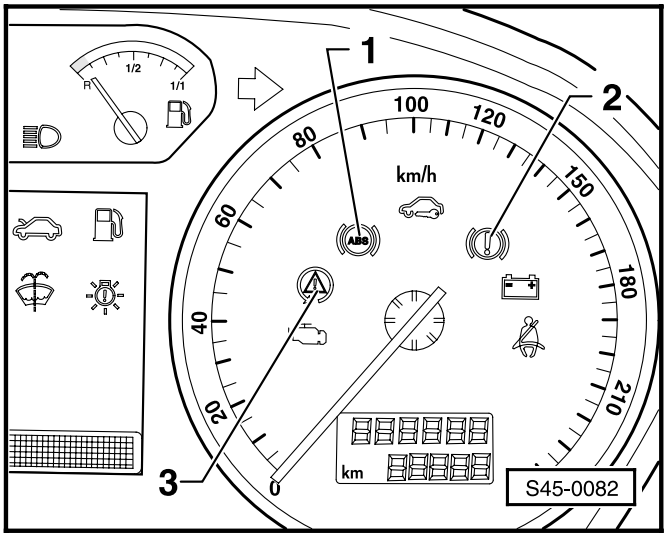
2 - Hydraulic unit

3 - Control unit, 47-pin, bolted to hydraulic unit

Self-diagnosis of the ABS/EDL/TCS/ESP Mark 60

Function

⇒ page 45-91



Indication of faults by warning lights K47, K14/33 and K155

◄ **Positioning of warning lights**

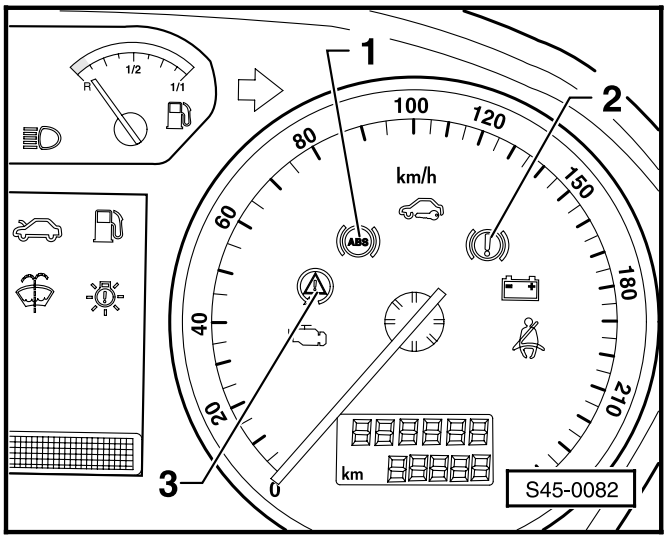
Item	Designation
1	ABS warning light -K47-
2	Handbrake/brake fluid level warning light -K14/33
3	Electronic stability programme warning light -K155-

Warning!

After the ABS warning light -K47- and the handbrake/brake fluid level warning light -K14/33- come on, the rear wheels may lock already during a slight brake application.

Overview

Explanation	ABS warning light -K47	Handbrake/brake fluid level warning light -K14/33-	Electronic stability programme warning light -K155-
Ignition on (if systems o.k., lights go out after about 3 s)	on	on	on
ESP failure or ESP deactivated by pushbutton; ABS, EDL and EBD active	off	off	on
Systems o.k.	off	off	off
ESP control cycle	off	off	flashes
ABS/EDL/ESP failure; EBD remains active (e.g. a wheel speed sensor faulty)	on	off	on
ABS/EDL/ESP/EBD failure; (e.g. a wheel speed sensor faulty)	on	on	on
Brake fluid level too low; all systems o.k.	off	on	off



◄ **ABS warning light -K47-**

- If the ABS warning light (K47) -1- does not go out after the ignition is switched on and after completion of the self-check, the causes of the fault may be the following:

  -a- voltage supply is less than 10 V

  -b- there is a fault in the ABS

  If there is a fault in the ABS -b-, the antilock brake system is switched off. The EBD (electronic brake force distribution) function remains active, and in this case the conventional brake system remains fully operational. Interrogate fault memory ⇒ page 45-101.

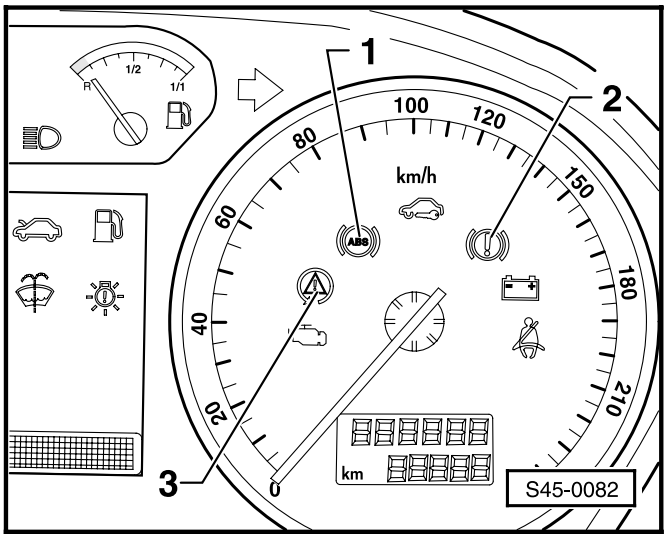
  -c- there was a sporadic wheel speed sensor fault after vehicle last started.

  If there was a wheel speed sensor fault -c-, the ABS warning light -K47- goes out automatically after vehicle is again started and a speed of more than 20 km/h is reached.

-d- open circuit in the link from the ABS control unit -J104- to the dash panel insert -J218-.

⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations binder

-e- the dash panel insert is faulty.



◄ **Warning light -K47- and -K14/33-**

♦ If the ABS warning light (K47) -1- goes out, but the handbrake/brake fluid level warning light (K14/33) -2- remains on, and 3 warning signals sound, the causes of the fault may be:

-a- the brake fluid level is too low.

-b- the handbrake is applied.

-c- the switch -F9- for the warning light -K14/33- is faulty or incorrectly set.

-d- there is a fault in the actuation of the handbrake/brake fluid level warning light -K14/33-.

⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations binder

♦ If the ABS warning light (K47) -1- and the handbrake/brake fluid level warning light (K14/33) -2- come on, the ABS system and the EBD (electronic brake force distribution) have failed.

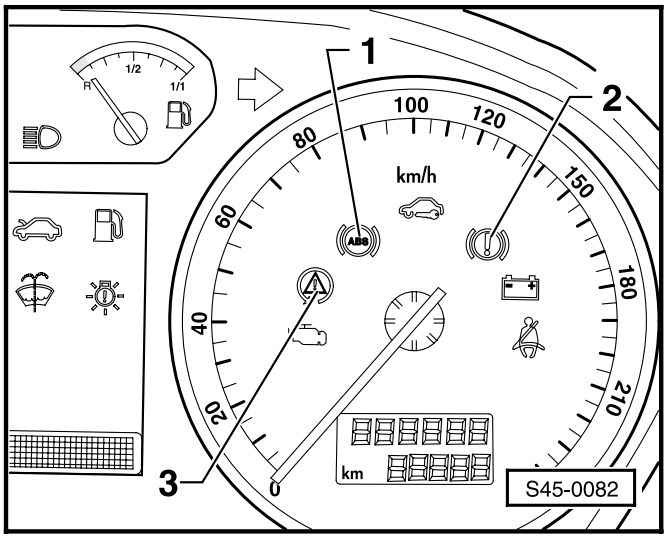
♦ If the ABS warning light (K47) -1- and the handbrake/brake fluid level warning light (K14/33) -2- come on and 3 warning signals sound, the ABS and the EBD (electronic brake force distribution) have failed.

Note:

The handbrake/brake fluid level warning light (K14/33) -2- does not come on until the vehicle has exceeded a speed of 10 km/h, or engine speed has exceeded 2000 rpm.

Warning!

After the ABS warning light -K47- and the handbrake/brake fluid level warning light -K14/33- come on, the rear wheels may lock already during a slight brake application.



◄ **Electronic stability programme warning light -K155-**

- If the electronic stability programme warning light (K155) -3- does not go out after the ignition is switched on and after completion of the self-check, the causes of the fault may be the following:

  There is a fault which affects only the ESP safety system. The ABS/EDL and EBD safety systems of the vehicle remain fully operational.
  Interrogate fault memory ⇒ page 45-12.

  -a- short to positive in ESP pushbutton -E256-.

  -b- short to earth in operation of electronic stability programme warning light -K155-.

  -c- open circuit in the link from the ABS control unit -J104- to the dash panel insert -J218-.
  ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations binder

  -d- the ESP system was switched off by the ESP pushbutton -E256-.

If the electronic stability programme warning light -K155- comes on for 100 milliseconds after the ignition is switched on, a coding without ESP control has been entered.

Code control unit ⇒ page 45-237.

If the electronic stability programme warning light -K155- flashes when driving, the ESP system is in the control mode.

Warning lights -K47-, -K14/33- and -K155-

- If the ABS warning light (K47) -1-, the handbrake/brake fluid level warning light (K14/33) -2- and the electronic stability programme warning light (K155) -3- flash continuously, the control unit is not yet coded.

Code control unit ⇒ page 45-237.

Performing self-diagnosis

Test requirements

⇒ page 45-9

Connecting vehicle system tester V.A.G 1552 and selecting function

Special tools, testers and aids required

⇒ page 45-9

Interrogating control unit version

Test of vehicle systems HELP Enter address word XX

◄ Readout in display:

- Press the keys 0 and 3 for the address word “Brake electronics” and confirm the entry with the key Q.

1C0907379E ESP FRONT MK60 0103 → Coding 19970 WSC XXXXX

◄ The following readout then appears (example):

What is displayed is:

- ♦ the control unit identification number, e.g. 1C0907379E
- ♦ the system designation, e.g. ESP FRONT MK60
- ♦ the version number, e.g. 0103
- ♦ the code No. of the control unit, e.g. 19970
- ♦ the workshop code (WSC)

⇒ Operating instructions of vehicle system tester V.A.G 1552

Assignment of control unit
⇒ Parts List

Coding control unit ⇒ page 45-237.

If the control unit identification number is not shown ⇒ page 45-224, List of available functions.

- Press → key.

List of available functions

1) Is required only for bleeding the hydraulic unit of vehicles fitted with EDL system.

2) Is required for the zero adjustment of the steering angle sender, lateral acceleration sender, brake pressure sender and of the longitudinal acceleration sender.

Fault table

Notes:

- *In view of the fact that the control units are interlinked over a databus line, always begin fault finding by initiating the "Automatic test sequence" with the key function 0 and 0 at all the control units installed in the vehicle. This ensures that the control units fitted to the vehicle are interrogated for any possible faults.*
- *All the possible faults which can be detected by the ABS control unit (J104) and displayed on V.A.G 1552, are listed below according to the 5-digit fault code.*
- *The fault type may also additionally appear in the fault table.*
- *Reference is made to individual test steps of the electrical test in the column "Rectifying fault".*
- *Before replacing any component which is shown as faulty, test all the corresponding plug connections, cables and earth connections according to the current flow diagram.*

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

- *After completing repairs, always once again interrogate the fault memory with the vehicle system tester V.A.G 1552 and erase it, and then conduct a road test at a speed of more than 20 km/h.*
- *After completing the road test, once again interrogate the fault memory.*

Read out on display of V.A.G 1552	Possible cause of fault	Rectifying fault
no fault detected	If after repair „No fault detected“ is displayed, the self-diagnosis is completed. If despite the display read-out „No fault detected“, the ABS does not operate without fault, proceed as follows: 1. Perform a test drive at a speed above 20 km/h. 2. Interrogate the fault memory again, if still no fault is stored. 3. Continue fault finding without self-diagnosis and completely run through the electrical test ⇒ page 45-205	
00003 (Info in the literature) no signal/no communication defective	♦ Line interruption, short-circuit to positive or earth or loose contact in the wiring to the ESP control unit ♦ ESP control unit defective	- Check wiring and plug connections according to the Current Flow Diagram. ⇒ Binder: Current Flow Diagrams, Electrical Fault Finding and Fitting locations - Replacing ESP control unit ⇒ page 45-196.
00283 Speed sensor vl -G47 implausible signal	♦ Line interruption, short-circuit to positive or earth or loose contact in the wiring between speed sensor -G47- and control unit -J104- ♦ Damage to impulse wheel or speed sensor -G47- ♦ Speed sensor -G47- defective ♦ Control unit for ABS -J104- defective	- Check wiring and plug connections according to the Current Flow Diagram. ⇒ Binder: Current Flow Diagrams, Electrical Fault Finding and Fitting locations - Perform electrical test ⇒ page 45-205. - Inspect speed sensor -G47- and impulse wheel for damage. - Replacing impulse wheel if necessary speed sensor -G47- ⇒ page 45-60. If the fault occurs again: - Replacing ESP control unit ⇒ page 45-196.
00283 Speed sensor vl -G47 electrical fault in the circuit	♦ Line interruption, short-circuit to positive or earth or loose contact in the wiring between speed sensor -G47- and control unit -J104- ♦ Electrical malfunctions due to external interference (high frequency irradiation e.g. non insulated ignition cable)	- Check wiring and plug connections according to the Current Flow Diagram. ⇒ Binder: Current Flow Diagrams, Electrical Fault Finding and Fitting Locations - Perform electrical test ⇒ page 45-205. - Reading measured value block ⇒ page 45-116, Display group number 001 - Replacing speed sensor -G47- ⇒ page 45-60.

Read out on display of V.A.G 1552	Possible cause of fault	Rectifying fault
00283 Speed sensor vl -G47 mechanical fault[1)]	♦ Air gap is too large between speed sensor -G47- and impulse wheel (signal not OK) ♦ Outlet valves in hydraulic unit -N55- defective	- Inspect installation of speed sensor -G47- and impulse wheel ⇒ page 45-60. - Reading measured value block ⇒ page 45-116, Display group number 002. - Perform actuator diagnosis ⇒ page 45-29. If the fault occurs again: - Replacing ESP control unit ⇒ page 45-196.
00285 Speed sensor vr -G45 implausible signal	♦ Line interruption, short-circuit to positive or earth or loose contact in the wiring between speed sensor -G45- and control unit -J104- ♦ Damage to impulse wheel or speed sensor -G45- ♦ Speed sensor coil -G45- defective ♦ Control unit for ABS -J104- defective	- Check wiring and plug connections according to the Current Flow Diagram. ⇒ Binder: Current Flow Diagrams, Electrical Fault Finding and Fitting Locations - Perform electrical test ⇒ page 45-205. - Inspect speed sensor -G45- and impulse wheel for damage. - Replacing impulse wheel if necessary speed sensor -G45- ⇒ page 45-60. If the fault occurs again: - Replacing ESP control unit ⇒ page 45-196.
00285 Speed sensor vr -G45 electrical fault in the circuit	♦ Line interruption, short-circuit to positive or earth or loose contact in the wiring between speed sensor -G45- and control unit -J104- ♦ Electrical malfunctions due to external interference (high frequency irradiation e.g. non-insulated ignition cable)	- Check wiring and plug connections according to the Current Flow Diagram. ⇒ Binder: Current Flow Diagrams, Electrical Fault Finding and Fitting Locations - Perform electrical test ⇒ page 45-205. - Reading measured value block ⇒ page 45-116, Display group number 001. - Replacing speed sensor -G45- ⇒ page 45-60.
00285 Speed sensor vr -G45 mechanical fault[1)]	♦ Air gap too large between speed sensor -G45- and impulse wheel (signal not OK) ♦ Outlet valves in hydraulic unit -N55- defective	- Inspect installation of speed sensor -G45- and impulse wheel ⇒ page 45-60. - Reading measured value block ⇒ page 45-116, Display group number 002. - Perform actuator diagnosis ⇒ page 45-29. If the fault occurs again: - Replacing ESP control unit ⇒ page 45-196.

1) Type of fault can only be detected as of 20 km/h (perform test drive).

Readout in display of V.A.G 1552	Possible cause of fault	Rectifying fault
00287 Rear right wheel speed sensor -G44 implausible signal	♦ Open circuit, short to positive or to earth or loose contact in wiring between wheel speed sensor -G44- and control unit -J104-	- Test wiring and plug connections according to current flow diagram ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations binder - Perform electrical test ⇒ from page 45-205
	♦ Pulse rotor or sensor -G44- damaged	- Inspect sensor -G44- and rotor for damage
	♦ Wheel speed sensor -G44- faulty	- Replace rotor/sensor -G44- ⇒ page 45-65
	♦ ABS control unit -J104- faulty	If the fault occurs once again: - Replace ESP unit ⇒ page 45-196
00287 Rear right wheel speed sensor -G44 electrical fault in circuit	♦ Open circuit, short to positive or to earth or loose contact in wiring between wheel speed sensor -G44- and control unit -J104	- Test wiring and plug connections according to current flow diagram ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations binder - Perform electrical test ⇒ from page 45-205
	♦ Electrical interference caused by external sources (high-frequency radiation, e.g. ignition cables not insulated)	- Read measured value block ⇒ page 45-116, display group number 001 - Replace wheel speed sensor -G44- ⇒ page 45-65
00287 Rear right wheel speed sensor -G44 Mechanical fault[1)]	♦ Excessive gap between wheel speed sensor -G44- and rotor (signal not o.k.)	- Inspect installation of sensor -G44- and of rotor ⇒ page 45-65 - Read measured value block ⇒ page 45-116, display group number 002 - Perform final control diagnosis ⇒ page 45-29
	♦ Outlet valves in hydraulic unit -N55- faulty	If the fault occurs once again: - Replace ESP unit ⇒ page 45-196

1) Fault type can only be detected from a speed of more than 20 km/h (conduct road test).

Read out on Display of V.A.G 1552	Possible cause of fault	Rectifying fault
00290 Speed sensor hl -G46 Implausible signal	♦ Line interruption, short-circuit to positive or earth or loose contact in the wiring between speed sensor - G46- and control unit -J104- ♦ Damage to impulse wheel or speed sensor -G46- ♦ Speed sensor coil -G46- defective ♦ Control unit for ABS -J104- defective	- Check wiring and plug connections according to the Current Flow Diagram. ⇒ Binder: Current Flow Diagrams, Electrical Fault Finding and Fitting Locations - Perform electrical test ⇒ page 45-205. - Inspecting speed sensor -G46- and impulse wheel for damage. - Replacing impulse wheel if necessary speed sensor -G46- ⇒ page 45-65. If fault occurs again: - Replacing ESP control unit ⇒ page 45-196.
00290 Speed sensor hl -G46 electrical fault in the circuit	♦ Line interruption, short-circuit to positive or earth or loose contact in the wiring between speed sensor -G46- and control unit -J104- ♦ Electrical malfunctions due to external interference (high frequency irradiation e.g. non-insulated ignition cable)	- Check wiring and plug connections according to the Current Flow Diagram. ⇒ Binder: Current Flow Diagrams. Electrical Fault Finding and Fitting Locations - Perform electrical test ⇒ as of page 45-205. - Reading measured value block ⇒ page 45-116, Display group number 001. - Replacing speed sensor -G46- ⇒ page 45-65.
00290 Speed sensor hl -G46 mechanical fault[1)]	♦ Air gap too large between speed sensor -G46- and impulse wheel (signal not OK) ♦ Outlet valves in hydraulic unit -N55- defective	- Inspect installation of speed sensor -G46- and impulse wheel ⇒ page 45-65. - Reading measured value block ⇒ page 45-116, Display group number 002. - Perform actuator diagnosis ⇒ page 45-29. If fault occurs again: - Replacing ESP control unit ⇒ page 45-196.
00474 (Info in the literature) no signal/no communication	♦ Line interruption, short-circuit to positive or earth or loose contact in the wiring between reading coil for immobilizer and dash panel insert	- Check wiring and plug connections according to the Current Flow Diagram. ⇒ Binder: Current Flow Diagrams, Electrical Fault Finding and Fitting Locations

[1)] Type of fault can only be detected as of 20 km/h (perform test drive).

Read out on display of V.A.G 1552	Possible cause of fault	Rectifying fault
00493 (Info in the literature) no signal/no communication	♦ Line interruption, short-circuit to positive or earth or loose contact in the wiring between ESP sender -G419- and control unit -J104- ♦ ESP sender -G419- defective	- Inspect installation of sender -G419-. - Check wiring and plug connections according to the Current Flow Diagram. ⇒ Binder: Current Flow Diagrams, Electrical Fault Finding and Fitting Locations. - Replacing ESP sender -G419-.
00494 (Info in the literature)	♦ Line interruption, short-circuit to positive or earth or loose contact in the wiring between ESP sender -G419- and control unit -J104- ♦ ESP sender -G419- defective	- Inspect installation of sender -G419-. - Check wiring and plug connections according to the Current Flow Diagram. ⇒ Binder: Current Flow Diagrams, Electrical Fault Finding and Fitting Locations - Replacing ESP sender -G419-.
00495 (Info in the literature) electrical fault in the circuit	♦ Line interruption, short-circuit to positive or earth or loose contact in the wiring between ESP sender -G419- and control unit -J104- ♦ ESP sender -G419- defective	- Inspect installation of sender -G419-. - Check wiring and plug connections according to the Current Flow Diagram. ⇒ Binder: Current Flow Diagram, Electrical Fault Finding and Fitting Locations - Replacing ESP sender -G419-.
00526 Brake light switch -F Implausible signal	♦ Line interruption, short-circuit to positive or earth ♦ Incorrect setting of the brake light switch ♦ Brake light switch defective	- Reading measured value block ⇒ page 45-116, Display group number 002. - Perform electrical test ⇒ page 45-250, Test step 4. - Adjust brake light switch ⇒ page 45-69.1.
00538 electrical fault in the circuit	♦ Short-circuit to positive ♦ Voltage supply is less than 5 V on: - Yaw rate sender -G202- - Lateral acceleration sensor -G200- - Brake pressure sender -1- -G201- - Longitudinal acceleration sender - G251-[1)]	- Check fuses, cables, plug connections as well as voltage supply to the control unit: - Perform electrical test ⇒ page 45-250, Test step 4.

1) Not for 4 Wheel Drive vehicles.

Read out on display of V.A.G 1552	Possible cause of fault	Rectifying fault
00668 El. syst. voltage tml. 30 implausible signal	♦ Line interruption, short-circuit to positive or earth in the wiring ♦ Fuses S162 and S163 defective	- Check fuses, cables, plug connections as well as voltage supply to the control unit: ⇒ Electrical test, page 45-250, Test steps 1 and 2
00778 Steering angle sender -G85 no communication[1)]	♦ Interruption or loose contact in the Data BUS cables between steering angle sender -G85- and control unit -J104- ♦ Incorrect specifications of sender for steering angle -G85- ♦ Steering angle sender -G85- defective	- Check fuses, cables, plug connections as well as voltage supply to the control unit: ⇒ Electrical test, page 45-250, Test step 19 - Reading measured value block ⇒ page 45-116, Display group number 004. - Replacing steering angle sender -G85- ⇒ page 45-174 - Perform null balance: ⇒ Basic setting, page 45-241, Display group number 060
00778 Steering angle sender -G85[1)] no setting or incorrect setting	♦ Steering angle sender -G85- sends no or incorrect setting values	- Perform null balance: ⇒ Basic setting, page 45-241, Display group number 060
00778 Steering angle sender -G85[1)] mechanical fault	♦ Fitting location of the steering angle sender -G85- is not OK ♦ Chassis geometry is not OK ♦ Steering wheel is removed and no null balance is performed	- Inspect fitting location of steering angle sender -G85- ⇒ page 45-174. - Perform vehicle measurement ⇒ Repair Group 44 - Perform null balance: ⇒ Basic setting, page 45-241, Display Group 060
00778 Steering angle sender -G85 implausible signal[1)]	♦ Fitting location of the steering angle sender -G85- is not OK ♦ Chassis geometry is not OK ♦ Non-permissible vibrations in the steering due to wear	- Inspect fitting location of steering angle sender -G86- ⇒ page 45-174. - Perform vehicle measurement ⇒ Repair Group 44 - Perform null balance: ⇒ Basic setting, page 45-241, Display group number 060

1) The data transfer between the control unit -J104- and the steering angle sender -G85- occurs with a data BUS.

Read out on display of V.A.G 1552	Possible cause of fault	Rectifying fault
00778 Steering angle sender -G85 defective[1)]	♦ Steering angle sender -G85- defective	- Replacing steering angle sender -G85- ⇒ page 45-174. - Perform null balance: ⇒ Basic setting, page 45-241, Display group number 060
01044 Control unit wrongly coded	♦ Incorrect or no coding of the control unit	- Check coding of the control unit ⇒ page 45-237.
01130 ABS operation implausible signal[2)]	♦ Electrical malfunctions due to external interference (high frequency irradiation, e.g. non insulated ignition cable ♦ Line interruption, short-circuit to positive or earth or loose contact ♦ Control unit for ABS -J104- defective	- Check all lines and plug connections for short-circuit to positive or earth. ⇒ Binder: Current Flow Diagrams, Electrical Fault Finding and Fitting Locations - Erasing fault memory. - Perform test drive with more than 20 km/h. - Interrogate fault memory again. If the fault occurs again: - Replacing ESP control unit ⇒ page 45-196.
01164 (Info in the literature) implausible signal	♦ Line interruption between sender -G419- and ESP control unit	- Check lines and plug connections to Current Flow Diagram. ⇒ Binder: Current Flow Diagram, Electrical Fault Finding and Fitting Locations
01276 ABS Hydraulic pump -V64 Signal outside the tolerance[2)] defective[2)] electrical fault in the circuit	♦ Internal connection E-engine to control unit ♦ Short-circuit to positive or earth or interruption ♦ ABS control unit defective ♦ Pump motor defective	- Check lines and plug connections as well as ground lines to Current Flow Diagram ⇒ Electrical test, page 45-250, Test step no. 1 - Perform functional test: ⇒ Actuator diagnosis, page 45-29 - If the hydraulic pump does not run during the actuator diagnosis, replace control unit for ABS -J104-. If the fault occurs again: - Replacing ESP control unit ⇒ page 45-196.

1) The data transfer between the control unit -J104- and the steering angle sender -G85- occurs with the data BUS.

2) Type of fault can only be detected as of 20 km/h (perform test drive).

Read out on display of V.A.G 1552	Possible cause of fault	Rectifying fault
01279 Longitudinal acceleration sender -G251-[1] electrical fault in the circuit	♦ Inspecting plug connections ♦ Voltage supply is less than 5 V ♦ Line interruption, short-circuit to positive or earth	- Reading measured value block ⇒ page 45-238, Display group number 006. - Check lines and plug connections according to Current Flow Diagram. - Perform electrical test ⇒ page 45-250.
	♦ Longitudinal acceleration sender -G251- defective	- Replacing longitudinal acceleration sender -G251- ⇒ page 45-82. - Perform null balance: ⇒ Basic setting, page 45-241, Display group number 069
01279 Longitudinal acceleration sender -G251-[2] Implausible signal		- Reading measured block value ⇒ page 45-238, Display group number 006.
	♦ The fitting location for the longitudinal acceleration sender -G251- is not OK	- Inspect fitting location of longitudinal acceleration sender -G251-.
	♦ Line interruption, short-circuit to positive or earth	- Check lines and plug connections according to Current Flow Diagram. - Perform electrical test ⇒ page 45-250.
	♦ Longitudinal acceleration sender -G251- defective	- Replacing longitudinal acceleration sender -G251- ⇒ page 45-82. - Perform null balance: ⇒ Basic setting, page 45-241, Display group number 069
01279 Longitudinal acceleration sender -G251-[2] no or incorrect basic setting/adaptation	♦ Longitudinal acceleration sender -G251- sends no setting values or incorrect setting values	- Perform null balance: ⇒ Basic setting, page 45-241, Display group number 069
01299 (Info in the literature) no signal/no communication	♦ Gateway data line defective	- Inspect Gateway data line ⇒ Electrical system; Repair Group 90.

1) Type of fault can only be detected as of 20km/h (perform test drive).

2) Only for 4 Wheel Drive vehicles.

Read out on display of V.A.G 1552	Possible cause of fault	Rectifying fault
01312 Data BUS drive defective[1)]	♦ Line interruption, short-circuit to positive or earth or loose contact in the Data BUS cable	- Inspecting Data BUS cable according to Current Flow Diagram for interruption or short-circuit. ⇒ Electrical system, page 45-253, Test step no. 23
01314 Engine control unit no communication please read out fault memory	♦ Line interruption, short-circuit to positive or earth in the Data BUS cable ♦ Error entry in the engine control unit	- Inspecting Data BUS cable according to Current Flow Diagram for interruption or short-circuit ⇒ Electrical test, page 45-253, Test step no. 23 - Read out fault memory ⇒ Engine, Injection and Ignition system, if necessary Glow plug system; Repair Group 01
01315 Gearbox control unit[2)] no communication	♦ Line interruption, short-circuit to positive or earth in the Data BUS cable	- Inspecting Data BUS cable according to Current Flow Diagram for interruption or short-circuit ⇒ Electrical test, page 45-253, Test step no. 23
01317 Control unit in dash panel insert -J285-	♦ Control unit -J285- wrongly coded	- Check coding of control unit -J285- ⇒ Electrical system; Repair Group 90; dash panel insert
01324 Control unit for 4 Wheel Drive -J492-[3)] no communication	♦ Line interruption, short-circuit to positive or earth or loose contact in the Data BUS cables	- Reading measured value block ⇒ page 45-238 Display group number 125. - Inspecting Data BUS cable according to Current Flow Diagram for interruption or short-circuit ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations

1) Occurs only on ESP together with a fault of the steering angle sender -G85- without communication.

2) Only on vehicles with automatic gearbox.

3) Only for 4 Wheel Drive.

Read out on display of V.A.G 1552	Possible cause of fault	Rectifying fault
01423 Lateral acceleration sensor -G200[1)] electrical fault in the circuit	♦ Line interruption, short-circuit to positive or earth or loose contact in the lines between lateral acceleration sensor -G200- and control unit for ABS -J104-	- Inspecting lateral acceleration sensor -G200-. - Reading measured value block ⇒ page 45-116, Display group number 004. - Inspecting lines, plug connections as well as ground lines according to Current Flow Diagram. ⇒ Electrical test, page 45-250, Test step no. 20
	♦ The fitting location of the lateral acceleration sensor -G200- is not OK	- Inspecting fitting location of lateral acceleration sensor -G200- ⇒ page 45-171.
	♦ Lateral acceleration sensor -G200- defective	- Replacing lateral acceleration sensor -G200- ⇒ page 45-172. - Perform null balance: ⇒ Basic setting, page 45-241, Display group number 063
01423 Lateral acceleration sensor -G200[1)] implausible signal	♦ The fitting location of the lateral acceleration sensor -G200- is not OK	- Inspecting lateral acceleration sensor -G200-. - Reading measured value block ⇒ page 45-116, Display group number 004. - Inspecting fitting location of lateral acceleration sensor -G200- ⇒ page 45-171.
	♦ Lateral acceleration sensor -G200- defective	- Replacing lateral acceleration sensor -G200- ⇒ page 45-172. - Perform null balance: ⇒ Basic setting, page 45-241, Display group number 063
01423 Lateral acceleration sensor -G200[1)] no or incorrect basic setting/adaptation	♦ The null balance is not at all or incorrectly performed	- Perform null balance: ⇒ Basic setting, page 45-241, Display group number 063

[1)] Only for 4 Wheel Drive vehicles.

Read out on display of V.A.G 1552	Possible cause of fault	Rectifying fault
01435 Brake pressure sender 1 -G201 electrical fault in the circuit	♦ Interruption or loose contact in the lines between brake pressure sender 1 -G201- control unit for ABS -J104-	- Inspecting brake pressure sender -1- -G201-. - Reading measure value block ⇒ page 45-238, Display group number 005. - Inspecting fuses, lines, plug connections as well as voltage supply to the control unit: ⇒ Electrical test, page 45-250, Test step no. 22
	♦ Brake pressure sender 1 - G201- defective	- Replacing brake pressure sender -1- -G201- ⇒ page 47-28. - Perform null balance: ⇒ Basic setting, page 45-241, Display group number 066
01435 Brake pressure sender 1 -G201 no or incorrect basic setting/adaptation	♦ The null balance was not performed or incorrectly performed	- Perform null balance: ⇒ Basic setting, page 45-241, Display group number 066
01435 Brake pressure sender 1 -G201 implausible signal	♦ Line interruption, short-circuit to positive or earth	- Reading measured value ⇒ page 45-238, Display group number 005. - Check lines and plug connections according to the Current Flow Diagram. - Perform electrical test, page 45-250, Test step no. 22.
	♦ Incorrect setting of the brake light switch ♦ Brake light defective	- Setting brake light switch ⇒ page 45-69.1.
	♦ Brake pressure sender -1- -G201- defective	- Replacing brake pressure sender 1 -G201- ⇒ page 47-28. - Perform null balance: ⇒ Basic setting, page 45-241, Display group number 066

Read out on display of V.A.G 1552	Possible cause of fault	Rectifying fault
01486 (Info in the literature)	♦ The ESP drive test has been activated	- Perform ESP drive test correctly and completely; the fault will then erase itself. - Initiate basic setting ⇒ page 45-241, Display group number 093.
01487 (Info in the literature)	♦ Overrun time of the ESP drive test	- Perform ESP drive test correctly and completely in the given time.
01542 yaw rate sender -G202 implausible signal	♦ Ground connection to yaw rate sender -G202- interrupted	- Inspect yaw rate sender -G202-. - Reading measured value block ⇒ page 45-116, Display group number 004. - Inspect lines, plug connections to control unit. ⇒ Electrical test, page 45-250, Test step no. 21
	♦ The fitting location of the yaw rate sender -G202- is not OK	- Inspect fitting location of the yaw rate sender ⇒ page 45-171.
	♦ Yaw rate sender -G202- defective	- Replacing yaw rate sender -G202- ⇒ page 45-172.
18055 Inspect coding/variants of the control units in the drive	♦ One or several control units wrongly coded	- Check the coding of all control units.
	♦ One or several incorrect control units used	- Check correctness of all used control units.
18056 Read out fault memory of the engine control unit	♦ Fault stored in the fault memory of the engine control unit	- Read out fault memory from engine control unit and after eliminating possible faults erase ⇒ corresponding engine; Injection and Ignition system; Repair Group 01.
	♦ Engine control unit defective	- Replacing engine control unit ⇒ Petrol engine; Injection and Ignition system; Repair Group 24; Diesel engine; Injection and Glow plug system; Repair Group 23.

Read out on Display of V.A.G 1552	Possible cause of fault	Rectifying fault
18258 Databus drive missing message from engine control unit	♦ Interruption of voltage supply, short-circuit to positive or earth or loose contact in the voltage supply to engine control unit ♦ Line interruption, short-circuit to positive or earth or loose contact in the Data BUS cables ♦ Engine control unit defective	- Inspect voltage supply to engine control unit for interruption or short-circuit. ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations - Reading measured value block ⇒ page 45-116, Display group number 125. - Inspect Data BUS cables for interruption or short-circuit. ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations - Replacing engine control unit ⇒ Petrol engine; Injection and Ignition system; Repair Group 24, Diesel engine; Injection and Glow Plug system; Repair Group 23.
18262 Databus drive Hardware defective	♦ One or several incorrect control units used	- Check the correctness of all used control units, if necessary replace incorrect control units.
65535 Control unit defective	♦ Control unit defective	- Replacing ESP control unit ⇒ page 45-196.

Coding the control unit

⇒ page 45-190

1C0907379E	ESP	FRONT	MK60	0103 →
Coding 19970				WSC XXXXX

◀ The control unit identification is shown on the display of the vehicle system tester V.A.G 1552, for example:

Table of codes
⇒ page 45-191

Reading a measuring value block

⇒ Page 45-116

An overview of the selectable display group numbers

Display group number	Display field	Designation
001	1 2 3 4	Wheel speed at the rotational speed sensor at the front on the left -G47- (km/h.) Wheel speed at the rotational speed sensor at the front on the right -G45- (km/h.) Wheel speed at the rotational speed sensor at the rear on the left -G46- (km/h.) Wheel speed at the rotational speed sensor at the rear on the right -G44- (km/h.)
002	1 2 3 4	Starting speed at the rotational speed sensor at the front on the left -G47- (km/h.) Starting speed at the rotational speed sensor at the front on the right -G45- (km/h.) Starting speed at the rotational speed sensor at the rear on the left -G46- (km/h.) Starting speed at the rotational speed sensor at the rear on the right -G44- (km/h.)
003	1 2 3 4	Brake light switch -F- Warning lamp for the handbrake/brake fluid level -K14/33- Warning lamp for the ABS -K47- Warning lamp for the ESP -K155-
004	1 2 3 4	Sender for the steering angle -G85- Sender for transverse acceleration -G200- Sender for the rotational speed -G202- Not used
005	1 2 3 4	Sender for the brake pressure -G201- Not used Not used Not used
006 [1)]	1 2 3 4	Sender for longitudinal acceleration [2)] Not used Not used Not used
125	1 2 3 4	Data-bus for the engine Data-bus for the steering angle Data-bus for the four-wheel drive[2)] Can-bus for the transmission[3)]

1) Not to be taken account of

2) Only for vehicles with four-wheel drive

3) Only for vehicles with an automatic transmission

Checking the allocation of the rotational speed -sensors -G44-, -G45-, -G46-, -G47- in the display group number 1

⇒ Page 45-118

Checking the rotational speed -sensors -G44-, -G45-, -G46-, -G47- in the display group number 002

⇒ Page 45-119

Checking the brake light switch -F- and the warning lamps -K47-, -K14/33-, -K155-

Display group number 003

- Enter 003 and confirm the entry with Q

Read the measuring value block 3 →
→ 1 → 2 → 3 → 4

◄ - There are always four display fields which appear in the measuring value block -arrows- Itemisation of the values 1 to 4 in the individual display fields can be found in the following test table.

Read the measuring value block 3 →
Unactuated Unactuated

◄ Readout shown on the display (with the vehicle stationary)

Read the measuring value block			3 →	**Display group number 003**
Unactuated	Off	Off	Off	Readout shown on the display
				Warning lamp for the ASR/ESP ♦ Off ♦ On
				Warning lamp for the ABS ♦ Off ♦ On
				Warning lamp for the handbrake/brake fluid level ♦ Off ♦ On
				Brake light switch ♦ Unactuated → brake pedal not actuated ♦ Actuated → brake pedal actuated If one can read „unactuated“ on the display screen of the V.A.G 1552 despite the fact that the brake pedal is actuated or „actuated“ despite the fact that the brake pedal is unactuated then undertake test step no. 4 of the electrical testing sequence, page 45-139. It is also possible that the brake light switch is not set up properly ⇒ Adjusting the brake light switch, page 45-69.1

A lower display group number can be selected by pressing the -↓- key while a higher display group number can be selected by pressing the -↑- key.

Press the C-button to enter the next display group number.

If the -→- button is pressed one should then enter 08 afterwards in order to again enter into the „Read measuring value block“ sequence.

Testing steering angle sender -G85-, lateral acceleration sender -G200- and yaw rate sender -G202- in display group number 004

⇒ page 45-121

Testing brake pressure sender -G201-

Display group number 005

- Press keys 0, 0 and 5 and confirm the entry with the key Q.

Read measured value block 5 →	◄ - There are always 4 display blocks -arrows- in the measured value block. Explanation of the readouts 1 to 4 in the individual display blocks are given in the test table below.
→ 1 → 2 → 3 → 4	

Read measured value block 5 →	◄ Readout in display (vehicle stationary):
-1.27 bar	

Read measured value block 5 →	**Display group number: 005**
-1.27 bar	◄ Readout in display (example)
	not assigned
	not assigned
	not assigned
	Brake pressure sender -G201- and -G214- ♦ Specification if brake not depressed: ± 7 bar ♦ ⇒ page 45-250, Electrical Test, test steps 22 and 23

It is possible to consecutively select in turn the next lower display group number with the -↓- key.

Press the key C in order to enter the next display group number.

If the → key is pressed, it is then necessary after this to re-enter function ”Read measured value block” by pressing keys 0 and 8.

Testing longitudinal acceleration sender -G251-

⇒ page 45-76

Testing databus line

⇒ page 45-123

Initiating basic setting

Special tools, testers and aids required

- Vehicle system tester V.A.G 1552
- Diagnostic cable V.A.G 1551/3, V.A.G 1551/3A, V.A.G 1551/3B or V.A.G 1551/3C

Tasks of function 04 „Initiating basic setting“

Function 04 „Initiating basic setting“ performs several tasks in the case of the ESP:

- -1- Display group number 001 is required for bleeding the hydraulic unit.
- -2- Display group number 040 is required for switching off the longitudinal acceleration sender -G251-, for example for checking the brake system on a chassis dynamometer ⇒ page 45-76.
- -3- Display group numbers 060, 063, 066 and 069 are required for the zero adjustment of the steering angle sender, lateral acceleration sender, brake pressure sender and longitudinal acceleration sender.
- -4- Display group number 093 is required for the driving test ⇒ page 45-247. It is designed to check the plausibility of the signals from the steering angle sender -G85-, lateral acceleration sender -G200-, yaw rate sender -G200- and the brake pressure sender -G201-.

-1- The hydraulic unit on vehicles fitted with the ESP system is bled by selecting the display group number 001. Initiate basic setting ⇒ page 45-36.

Basic setting 04, display group number 001, is only required if at least one chamber of the brake fluid replenishing reservoir has run completely empty.

Also initiate the basic setting after repairing any leaks in the brake system.

Function 11 „Login procedure“ is not required in this case.

-2- The longitudinal acceleration sender -G251- on 4x4 vehicles is switched off by means of display group number 040 ⇒ page 45-76.

Function 11 „Login procedure“ is not required in this case.

-3- A zero adjustment is performed using the display group numbers 060, 063, 066 and 069.

- The zero adjustment of the steering angle sender -G85- is performed using display group number 060 ⇒ page 45-243.
- The zero adjustment of the lateral acceleration sender -G200- is performed using display group number 063 ⇒ page 45-245.
- The zero adjustment of the brake pressure sender -G201- is performed using display group number 066 ⇒ page 45-246.
- The zero adjustment of the longitudinal acceleration sender -G251- is performed using display group number 069 ⇒ page 45-77.

Performing the zero adjustment of display group numbers 060, 063 and 066 necessitates that function 11 „Login procedure“ has been successfully carried out first of all with the vehicle system tester ⇒ page 45-249.

Note:

The „Login procedure“ should be carried out separately for each display group number before then initiating the basic setting.

Zero adjustment requires to be performed if:

- the control unit -J104- or the steering column is replaced,
- the steering angle sender -G85- is replaced,
- settings at the running gear are modified as part of a chassis alignment,
- the lateral acceleration sender -G200- is replaced,
- the brake pressure sender -G201- is replaced,

- the longitudinal acceleration sender -G251- is replaced,

- if the text in the fault table relating to a fault entry in the fault memory of control unit -J104-, instructs you to perform the zero adjustment,

- the steering wheel has been taken off.

-4- Display group number 093 is used for checking the plausibility of the signals supplied by the steering angle sender -G85-, lateral acceleration sender -G200-, yaw rate sender -G200- and the brake pressure sender -G201-.

Activation of the ESP driving test.

After replacing control unit -J104-, it is necessary to carry out a zero adjustment for the following components:

- Lateral acceleration sender -G200-

- Steering angle sender -G85-

- Brake pressure sender 1 -G201-

If individual senders are replaced, it is only necessary to carry out a zero adjustment for the component replaced.

Display group number 060: zero adjustment of steering angle sender -G85.

- Start the engine.

- Conduct a short road test on a flat road. Drive straightahead and not faster than 20 km/h; pay attention to the following point:

  - If the steering wheel is not in the centre position when driving straightahead, correct the position of the steering wheel as part of a chassis alignment and carry out the zero adjustment of the steering angle sender.

- If the steering wheel is properly centred during the road test, bring the vehicle to a stop from straightahead running.

Ensure that the position of the steering wheel is no longer altered. Do not switch off the ignition!

- Check zero adjustment with function 08 „Read data block“ ⇒ page 45-116, display group number 004.

- First of all, perform function 11 „Login procedure“ with vehicle system tester V.A.G 1552 ⇒ page 45-249.

Test of vehicle systems HELP Select function XX	◄ Readout in display:

- Press keys 0 and 4 for the function „Basic setting“ and confirm entry with the key Q.

Basic setting HELP Enter display group number XXX	◄ Readout in display:

- Press keys 0, 6 and 0 and confirm entry with the key Q.

ABS indicator lamp -K47- flashes.

Function is not known or cannot be carried out at the moment - →	◄ If this readout appears in the display, the login procedure has not been successfully performed.
Basic setting 60 OFF <4-ON> → Adjustment o.k. 0.0°	◄ Readout in display:

If zero adjustment is successfully set, the value 0.0° once again appears in the display.

or:

Basic setting 60 OFF <4-ON> → Adjustment n. possible 12.0°	◄ If this readout appears in the display, the measured values are not within the permitted range of ± 10° for the zero adjustment.

1. Interrogate fault memory (function 02)

2. Erase fault memory (function 05)

3. End output (function 06)

4. Switch ignition off.

5. Switch ignition on.

6. Once again perform zero adjustment.

- Press → key.

Test of vehicle systems HELP Select function XX	◄ Readout in display:

- End output (function 06) ⇒ page 45-22.

ABS indicator lamp -K47- and ESP indicator lamp -K155- light up for about 2 seconds.

- Switch engine off.

Display group number 063: zero adjustment of lateral acceleration sender -G200-

- Vehicle is parked on level ground.

- Switch ignition on.

- Check measured values with function 08 „Read data block“ ⇒ page 45-116, display group number 004.

- First of all, perform function 11 „Login procedure“ with vehicle system tester V.A.G 1552 ⇒ page 45-249.

Test of vehicle systems HELP Select function XX

◄ Readout in display:

- Press keys 0 and 4 for the function „Basic setting“ and confirm entry with the key Q.

Basic setting HELP Enter display group number XXX

◄ Readout in display:

- Press keys 0, 6 and 3 and confirm the entry with the key Q.

The ABS indicator lamp -K47- flashes.

Function is not known or cannot be carried out at the moment - →

◄ If this readout appears in the display, the login procedure has not been successfully performed.

Basic setting 63 OFF <4-ON> → Adjustment o.k. 0.6m/s2

◄ Readout in display:

If zero adjustment is successfully set, the value 0.0m/s² no longer appears in the display.

or:

Basic setting 63 OFF <4-ON> → Adjustment n. possible 5.0m/s2

◄ If this readout appears in the display, the measured values are not within the tolerance range of ± 2.5 m/s².

1. Interrogate fault memory (function 02)

2. Erase fault memory (function 05)

3. End output (function 06)

4. Switch ignition off.

5. Switch ignition on.

6. Once again perform zero adjustment.

- Press → key.

Test of vehicle systems HELP Select function XX

◄ Readout in display:

- End output (function 06) ⇒ page 45-22.
- ABS indicator lamp -K47- and ESP indicator lamp -K155- light up for about 2 seconds.

Display group number 066: zero adjustment of brake fluid pressure sender -G201-

- Brake pedal not depressed.
- Switch ignition on.
- Check measured values with function 08 „Read data block“ ⇒ page 45-240, display group number 005.
- First of all, perform function 11 „Login procedure“ with vehicle system tester V.A.G 1552 ⇒ page 45-249.

Test of vehicle systems HELP Select function XX

◄ Readout in display:

- Press keys 0 and 4 for the function „Basic setting“ and confirm entry with the key Q.

Basic setting HELP Enter display group number XXX

◄ Readout in display:

- Press keys 0, 6 and 6 and confirm entry with the key Q.

ABS indicator lamp -K47- flashes.

Function is not known or cannot be - → carried out at the moment

◄ If this readout appears in the display, the login procedure has not been successfully performed.

Basic setting 66 OFF <4-ON> → Adjustment o.k. -0.85bar

◄ Readout in display:

If zero adjustment is successfully set, the value 0.00 bar no longer appears in the display.

or:

Basic setting 66 OFF <4-ON> → Adjustment n. possible -10.85bar

◄ If this readout appears in the display, the measured values are not within the permitted range of -2 bar up to 8 bar for the zero adjustment.

1. Interrogate fault memory (function 02)
2. Erase fault memory (function 05)

3. End output (function 06)

4. Switch ignition off.

5. Switch ignition on.

6. Repeat the zero adjustment.

- Press → key.

Test of vehicle systems HELP Select function XX	◄ Readout in display:

- End output (function 06) ⇒ page 45-22.

ABS warning light -K47- and ESP warning light -K155- come on for about 2 seconds.

Display group number 093: activating the ESP driving test

The ESP driving test is used for checking the plausibility of the signals supplied by the lateral acceleration sender -G200-, the yaw rate sender -G202- and the brake pressure sender 1 -G201-.

The ESP driving test should be carried out each time parts of the ESP system are removed or replaced.

- Switch the ignition on.

Test of vehicle systems HELP Select function XX	◄ Readout in display:

- Press keys 0 and 4 for the function “Basic setting” and confirm the entry with the key Q.

Basic setting HELP Enter display group number XXX	◄ Readout in display:

- Press keys 0, 9 and 3 and confirm the entry with the key Q.

Basic setting 93 ON <8> → Syst. test activated	◄ Readout in display:

ABS warning light -K47- comes on.

- Press → key.

Test of vehicle systems HELP Select function XX	◄ Readout in display:

- End output (function 06) ⇒ page 45-22.

Note:

Warning light -K47- remains on.

- Separate diagnostic plug connection.

- Start engine.

- Depress brake firmly (brake pressure of more than 35 bar) until the ESP warning light -K155- flashes.

The stationary adjustment is thus completed.

- Now, conduct a road test lasting not more than 50 seconds at a speed of 15 km/h...30 km/h:

Warning:

Priority must always be given to observing the rules of the road and paying proper attention to traffic conditions.

  - The vehicle must be driven in such a way that no ABS, EDL, TCS or ESP control is necessary.

  - Drive a curve with a steering turn of at least 90°.

The ABS warning light -K47- and the ESP warning light -K155- go out, which indicates that the ESP driving test has been successfully completed.

If the ABS warning light -K47- does not go out, the ESP driving test has not been correctly performed.

- If the ABS warning light -K47- does not go out and the ESP warning light -K155- comes on again, interrogate fault memory ⇒ page 45-13.

Login procedure

Special tools, testers and aids required

- Vehicle system tester V.A.G 1552
- Diagnostic cable V.A.G 1551/3, V.A.G 1551/3A, V.A.G 1551/3B or V.A.G 1551/3C

Coding is only possible if the workshop code (WSC) has been entered in the vehicle system tester V.A.G 1552.

Procedure

- Connect vehicle system tester V.A.G 1552 and select brake electronics control unit (address word 03) ⇒ page 45-97; ignition is switched on for this step.

Test of vehicle systems HELP Select function XX	◄ Readout in display:

- Press key 1 twice for the function „Login procedure“ and confirm the entry with the key Q.

Coding 2 HELP Enter code number xxxxx	◄ Readout in display:

- Enter the code number 40168 and confirm the entry with the key Q.

Test of vehicle systems HELP Select function XX	◄ Readout in display:

Electrical test of ABS/EDL/ TCS/ESP Mark 60

Special tools, testers and aids required

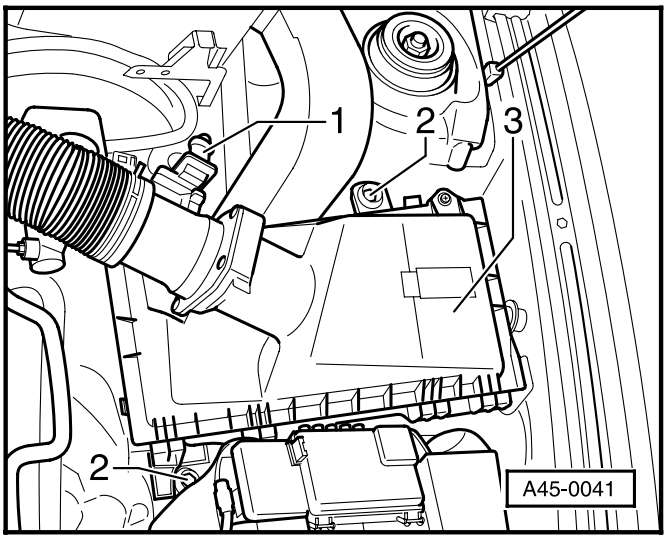
- Handheld multimeter, e.g. V.A.G 1526 A
- Adapter cable set V.A.G 1594/A
- Test box V.A.G 1598/A
- Adapter V.A.G 1598/36

The test steps ⇒ from page 45-253 apply only to models with ABS/EDL/TCS/ESP

- on which the self-diagnosis does not provide an indication of the source of the fault. In this case, perform the complete electrical test.
- on which the self-diagnosis provides a direct indication of the source of the fault. In this case, perform only the test step recommended in the fault table (specific testing).

Test requirements

⇒ page 45-133



Note:

The following 2 steps do not apply to the 1.6 l/ 55 kW engine.

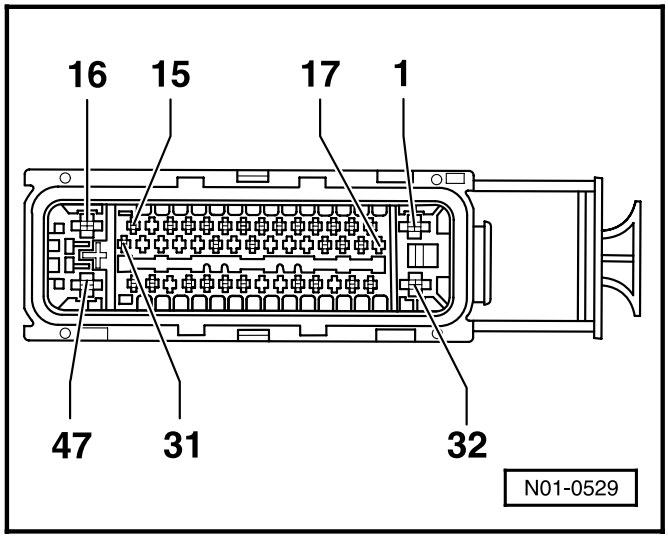
Removing air filter

◄ - Unplug connector of the air mass meter -1- from the air guide pipe of the air filter.

- Remove screws -2- at the air filter -3- and place this down to the side.

Connecting test box V.A.G 1598 A with adapter V.A.G 1598/36

⇒ page 45-134



Multipin plug connection with contact assignment

Contact assignment of plug connection T16a (diagnosis socket) to vehicle system tester V.A.G 1552

⇒ page 45-134

◄ **Contact assignment of plug connection T47a wiring loom/control unit -J104**

Note:

Plug contacts not listed are not assigned.

1 - Voltage supply of battery + (through S162)

2 - Plug connection T16a/7, K wire

3 - Signal wire of longitudinal acceleration sender -G251- 4x4 models

4 - Voltage supply terminal 15 (through S9)

5 - Earth cable of longitudinal acceleration sender -G251- 4x4 models

6 - Lateral acceleration sender -G200- (signal)

7 - Voltage supply of longitudinal acceleration sender -G251- 4x4 models

8 - Only models fitted with Navigation system

9 - Coding bridge to contact 12 4x4 models

10 - Only on models fitted with Navigation system and gas discharge headlights

11 - Databus line
⇒ „Current Flow Diagrams, Electrical Fault Finding and Fitting Locations“ binder

12 - Coding bridge to contact 38 FWD
Coding bridge to contact 9 4x4

13 - TCS/ESP pushbutton -E256-

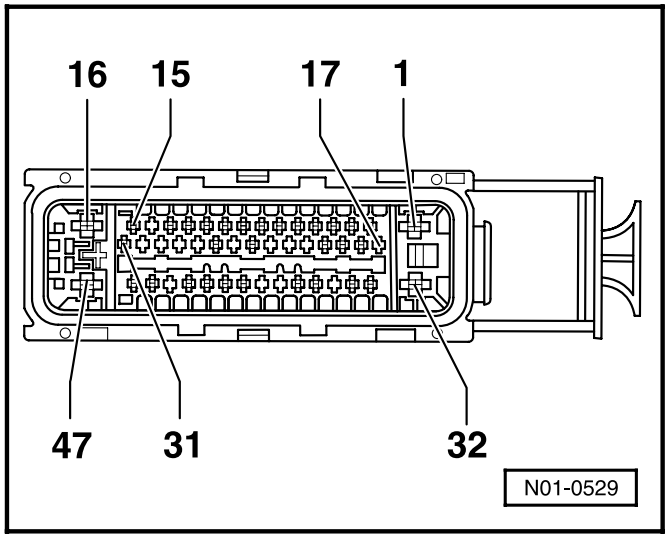
14 - Coding bridge to contact 38 only TCS

15 - Databus line
⇒ „Current Flow Diagrams, Electrical Fault Finding and Fitting Locations“ binder

16 - Earth

17 - Not assigned

18 - Voltage supply of brake pressure sender 1 -G201-



19 - Earth cable of brake pressure sender 1 -G201-

20 - Signal cable of brake pressure sender 1 -G201

20 - to 23 - not assigned

24 - Earth cable of lateral acceleration sender -G200- and of yaw rate sender -G202-

25 - not assigned

26 - Voltage supply of lateral acceleration sender -G200- and of yaw rate sender -G202-

27 to 30 - not assigned

32 - Voltage supply of battery + (through S163)

33 - Front right wheel speed sensor -G45-

34 - Front right wheel speed sensor -G45-

36 - Rear left wheel speed sensor -G46-

37 - Rear left wheel speed sensor -G46-

38 - Coding bridge to contact 12 FWD models and ESP
Coding bridge to contact 14 FWD models and TCS

39 and 40 - not assigned

41 - Brake light switch -F-

42 - Rear right wheel speed sensor -G44-

43 - Rear right wheel speed sensor -G44-

45 - Front left wheel speed sensor -G47-

46 - Front left wheel speed sensor -G47-

47 - Earth

List of test steps

Component to be tested	
Voltage supply of ABS hydraulic pump -V64	- Perform test step 1
Voltage supply of valves in hydraulic unit	- Perform test step 2
Voltage supply of control unit -J104	- Perform test step 3
Operation of brake light switch -F	- Perform test step 4
Coding bridges	- Perform test step 5
Resistance of front right wheel speed sensor -G45	- Perform test step 6
Resistance of front left wheel speed sensor -G47	- Perform test step 7
Resistance of rear right wheel speed sensor -G44	- Perform test step 8
Resistance of rear left wheel speed sensor -G46	- Perform test step 9
Voltage signal of front right wheel speed sensor -G45	- Perform test step 10
Voltage signal of front left wheel speed sensor -G47	- Perform test step 11
Voltage signal of rear right wheel speed sensor -G44	- Perform test step 12
Voltage signal of rear left wheel speed sensor -G46	- Perform test step 13
Operation of ABS warning light -K47	- Perform test step 14
Operation of handbrake/brake fluid level warning light -K14/33-	- Perform test step 15
Operation of ESP stability programme warning light -K155	- Perform test step 16
Operation of ESP pushbutton -E256	- Perform test step 17
Actuation of steering angle sender -G85	- Perform test step 18
Actuation of lateral acceleration sender -G200	- Perform test step 19
Actuation of yaw rate sender -G202	- Perform test step 20
Actuation of brake pressure sender -1- -G201	- Perform test step 21
Actuation of longitudinal acceleration sender -G251-	- Perform test step 22
Test of databus line	- Perform test step 23
Voltage supply of V.A.G 1552, plug connection T16a	- Perform test step 24
Resistance of K wire for self-diagnosis, plug connection T16a	- Perform test step 25

Test table

Notes on the test table

- *The socket designations of test box V.A.G 1598 A with adapter V.A.G 1598/36 are identical to the contact designations of control unit -J104- in the current flow diagram.*

⇒ ”Current Flow Diagrams, Electrical Fault Finding and Fitting Locations” binder

- *If the measurements obtained differ from the specifications, carry out the measures stated in the right-hand column of the table in order to rectify the faults.*

⇒ ”Current Flow Diagrams, Electrical Fault Finding and Fitting Locations” binder

- *Use adapter cable set V.A.G 1594 A to conduct continuity tests (bridges).*
- *If the measurements obtained differ only slightly from the specifications, then clean the sockets and connectors of the testers and the test cables (with contact spray G 000 700 04) and repeat the test. Before replacing the particular components, test the wiring and connections and repeat the resistance measurement at the component, particularly in the case of specifications of less than 10 Ω.*

Switch on measuring range: Voltage measurement (20 V =)					
Test step	**V.A.G 1598 A Sockets**	**Test of**	• **Test conditions** - **Additional operations**	**Specification**	**Measures if readout differs from specification**
1	1 + 47	Voltage supply for hydraulic pump -V64- (terminal 30) at control unit -J104	• Ignition switched off	10.0 - 14.5 V	- Test cable from contact T47a/1 through fuse S163 to battery +. - Test cable from contact T47a/47 to earth. ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations
2	32 + 16	Voltage supply for valves in hydraulic unit -N55- (terminal 30) at control unit -J104	• Ignition switched off	10.0 - 14.5 V	- Test cable from contact T47a/32 through fuse S162 to battery +. - Test cable from contact T47a/16 to earth. ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations
3	4 + 47	Voltage supply (terminal 15) of control unit -J104	• Ignition switched on	10.0 - 14.5 V	- Test cable from contact T47a/4 through fuse S13, and ignition/starter switch. - Test cable from contact T47a/47 to earth. ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations

Switch on measuring range: Voltage measurement (20 V =) in test step 4, resistance measurement (200 Ω)/(20 MΩ) in test step 4a					
Test step	**V.A.G 1598 A Sockets**	**Test of**	**• Test conditions - Additional operations**	**Specification**	**Measures if readout differs from specification**
4	41 + 47	Brake light switch -F-	• Ignition switched off • Brake pedal not operated	0.0 - 0.5 V	- Set brake light switch, if necessary ⇒ page 45-69.1. - Replace brake light switch ⇒ page 45-69.1. - Read measured value block ⇒ page 45-238, display group number 003.
			- Brake pedal operated	10.0 - 14.5 V	- Test contact 1 of brake light switch -F- to fuse S13.
4a		Brake light switch -F-	• Set measuring range 200 Ω - Unplug multipin connector T47a from control unit -J104. - Unplug multipin connector from brake light/ brake pedal switch. - Test wiring for open circuit. - Test cable from contact 41 (control unit) to contact 1 (brake light switch).	max. 1.5 Ω	- Test wiring for open circuit. - Repair cable connections according to current flow diagram. ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations
			• Set measuring range 20 MΩ - Remove fuse S13. - Test wiring for short to positive or to earth.	∞ Ω	

Switch on measuring range: Resistance measurement (20 Ω)/(20 MΩ)					
Test step	**V.A.G 1598 A Sockets**	**Test of**	**• Test conditions - Additional operations**	**Specification**	**Measures if readout differs from specification**
5	12 + 38 14 + 38 9 + 12	Coding bridge	• Ignition switched off - Unplug multipin connector T47a - Connect test box V.A.G 1598 A with adapter V.A.G 1598/36 - Test wiring for open circuit	max. 1.5 Ω	- Test cable from contact 9/12/14 to contact 12/38 for open circuit.

Switch on measuring range: Resistance measurement (2 kΩ)					
Test step	**V.A.G 1598 A Sockets**	**Test of**	**• Test conditions - Additional operations**	**Specification**	**Measures if readout differs from specification**
6	33 + 34	Resistance of front right wheel speed sensor -G45-	• Ignition switched off	1.0...1.3 kΩ	- Separate plug connection at wheel speed sensor. - Test wiring according to CFD. - Move cables during test. ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations binder If no fault is found in the wiring: - Replace wheel speed sensor -G45- ⇒ page 45-60.
7	45 + 46	Resistance of front left wheel speed sensor -G47-	• Ignition switched off	1.0...1.3 kΩ	- Separate plug connection at wheel speed sensor. - Test wiring according to CFD. - Move cables during test. ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations binder If no fault is found in the wiring: - Replace wheel speed sensor -G47- ⇒ page 45-60.

Switch on measuring range: Resistance measurement (2 kΩ)					
Test step	**V.A.G 1598 A Sockets**	**Test of**	**• Test conditions - Additional operations**	**Specification**	**Measures if readout differs from specification**
8	42 + 43	Resistance of rear right wheel speed sensor -G44-	• Ignition switched off	1.0...1.3 kΩ	- Separate plug connection at wheel speed sensor. - Test wiring according to CFD. - Move cables during test. ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations binder If no fault is found in the wiring: - Replace wheel speed sensor -G44- ⇒ page 45-65.
9	37 + 36	Resistance of rear left wheel speed sensor -G46-	• Ignition switched off	1.0...1.3 kΩ	- Separate plug connection at wheel speed sensor. - Test wiring according to CFD. - Move cables during test. ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations binder If no fault is found in the wiring: - Replace wheel speed sensor -G46- ⇒ page 45-65.

Switch on measuring range: Voltage measurement (2 V ~)					
Test step	**V.A.G 1598 A Sockets**	**Test of**	**• Test conditions - Additional operations**	**Specification**	**Measures if readout differs from specification**
10	33 + 34	Voltage signal of front right wheel speed sensor -G45	• Vehicle raised • Ignition switched off - Rotate front right wheel at approx. 1 rev/sec.	min. 65 mV alternating voltage	- Inspect installation of wheel speed sensor and of rotor. - Inspect wheel speed sensor -G45- for incorrect connection and read measured value block ⇒ page 45-116, display group number 001.
11	45 + 46	Voltage signal of front left wheel speed sensor -G47-	• Vehicle raised • Ignition switched off - Rotate front left wheel at approx. 1 rev/sec.	min. 65 mV alternating voltage	- Inspect installation of wheel speed sensor and of rotor. - Inspect wheel speed sensor -G47- for incorrect connection and read measured value block ⇒ page 45-116, display group number 001.
12	42 + 43	Voltage signal of rear right wheel speed sensor -G44-	• Vehicle raised • Ignition switched off - Rotate rear right wheel at approx. 1 rev/sec.	min. 190 mV alternating voltage	- Inspect installation of wheel speed sensor and of rotor. - Inspect wheel speed sensor -G44- for incorrect connection and read measured value block ⇒ page 45-116, display group number 001.
13	36 + 37	Voltage signal of rear left wheel speed sensor -G46-	• Vehicle raised • Ignition switched off - Rotate rear left wheel at approx. 1 rev/sec.	min. 190 mV alternating voltage	- Inspect installation of wheel speed sensor and of rotor. - Inspect wheel speed sensor -G46- for incorrect connection and read measured value block ⇒ page 45-116, display group number 001.

Operational test: ABS warning light -K47-					
Test step	**V.A.G 1598 A Sockets**	**Test of**	• **Test conditions** - **Additional operations**	**Specification**	**Measures if readout differs from specification**
14	-	Operation of ABS warning light -K47	• Fault memory interrogated and no fault present in fault memory of control unit -J104. • Ignition switched off • Multipin connector plugged into control unit -J104 and locked. - Switch ignition on.	Warning light -K47- comes on for 2 s and goes out again.	If the ABS warning light does not come on: - Test wiring according to CFD. ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations - Test dash panel insert, fault in dash panel insert. ⇒ Electrical System; Repair Group 90; Dash Panel Insert

Operational test: Handbrake/brake fluid level warning light -K14/33-					
Test step	**V.A.G 1598 A Sockets**	**Test of**	• **Test conditions** - **Additional operations**	**Specification**	**Measures if readout differs from specification**
15	-	Operation of handbrake/brake fluid level warning light -K14/33-	• Brake fluid at correct level • Ignition switched off • Multipin connector plugged into control unit -J104 and locked. - Switch ignition on.	Warning light -K14/33- comes on for 2 s and goes out again.	- Test brake fluid level warning contact -F34- in cap of brake fluid reservoir. - Test wiring according to CFD. ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations - Test dash panel insert, fault in dash panel insert. ⇒ Electrical System; Repair Group 90; Dash Panel Insert

Operational test: Electronic stability programme warning light -K155-					
Test step	**V.A.G 1598 A Sockets**	**Test of**	**• Test conditions - Additional operations**	**Specification**	**Measures if readout differs from specification**
16	-	Operation of ESP warning light -K155-	• Ignition switched off • Multipin connector plugged into control unit -J104 and locked. - Switch ignition on.	Warning light -K155- comes on for 2 s and goes out again.	- Test wiring for open circuit and short circuit to positive. If the warning light -K155- comes on and remains on: - Test cable at dash panel insert for short to earth. ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations - Test dash panel insert, fault in dash panel insert. - Test ESP button -E256-. - Test voltage supply relay for warning light -K155-. ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations

Operational test: Warning light K155 for operation of ESP pushbutton -E256- in test step 17; voltage supply (20 V=) in test step 17a					
Test step	**V.A.G 1598 A Sockets**	**Test of**	**• Test conditions - Additional operations**	**Specification**	**Measures if readout differs from specification**
17	-	Operation of TCS/ESP button -E256-	• Ignition switched off • Operation of ESP warning light -K155- was checked with test step 17. • Multipin connector plugged into control unit -J104- and locked. - Switch ignition on.	Warning light -K155- comes on for 2 s and goes out again	
			- Operate ESP pushbutton.	Warning light -K155- comes on	- Perform test step 18a
			- Once again operate ESP pushbutton.	Warning light -K155- goes out	
17a	16 + 13	Operation of ESP button -E256-	- Switch ignition off. - Unplug multipin connector from control unit -J104-. - Connect test box V.A.G 1598 A with adapter V.A.G 1598/36. - Switch ignition on.		- Test cable from contact T47a/16 (control unit) to earth. - Test cable from contact T47a/13 (control unit) to contact T4f/2 (ESP button) for open circuit and short to positive or to earth.
			- Button -E256- not pressed and warning light -K155- on.	3.5 - 5.0 V	- Test cable connection for open circuit and short to positive or to earth.
			- Hold button -E256- pressed and warning light -K155- on.	8.0 - 14.5 V	- Test voltage supply from contact T4f/1 (ESP button) through fuse S13 for open circuit. ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations - Replace ESP button. ⇒ Electrical System; Repair Group 96; Servicing dash panel

Switch on measuring range:
Voltage measurement (20 V =) in test step 18; resistance measurement (200 Ω/20 MΩ) in test step 18a

Test step	V.A.G 1598 A Sockets	Test of	• Test conditions - Additional operations	Specification	Measures if readout differs from specification
18	-	Earth and voltage supply of steering angle sender -G85	• Ignition switched off - Unplug multipin connector T47a from control unit -J104-. - Separate plug connection from steering angle sender. - Test voltage supply of steering angle sender at plug connection T6w. - Test cable between contact T6w/4 and contact T6w/1.	10.0 - 14.5 V	- Test cable from contact T6w/4 (steering angle sender) to fuse S15 for open circuit. - Repair cable connections according to CFD. ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations
			• Ignition switched on - Test cable between contact T6w/5 and contact T6w/1.	10.0 - 14.5 V	- Test cable from contact T6w/5 (steering angle sender) to fuse S13 for open circuit. ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations
18a	11 + 15	Wiring of steering angle sender -G85	• Measuring range 200 Ω set - Connect test box V.A.G 1598 A with adapter V.A.G 1598/36. - Test the following cables for open circuit: - Cable from contact T6w/3 (steering angle sender) to contact T47a/11 (control unit). - Cable from contact T6w/2 (steering angle sender) to contact T47a/15 (control unit). - Cable from contact T6w/1 to earth.	max. 1.5 Ω	- Test wiring for open circuit. - Repair cable connections according to CFD. ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations
			• Measuring range 20 MΩ set - Remove fuse S15. - Test wiring for short to positive or to earth.	∞ Ω	

Switch on measuring range: Resistance measurement (200 Ω/20 MΩ)					
Test step	**V.A.G 1598 A Sockets**	**Test of**	**• Test conditions - Additional operations**	**Specification**	**Measures if readout differs from specification**
19	-	Wiring of lateral acceleration sender -G200	• Ignition switched off • Measuring range 200 Ω set - Unplug multipin connector T47a from control unit -J104-. - Connect test box V.A.G 1598 A with adapter V.A.G 1598/36. - Separate plug connection T3n from lateral acceleration sender.		
			- Test cables for open circuit: - Cable from contact T3n/1 (lateral acceleration sender) to contact T47a/6 (control unit).	max. 1.5 Ω	- Test wiring for open circuit. - Repair cable connections according to CFD. ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations
			- Cable from contact T3n/2 (lateral acceleration sender) to contact T47a/24 (control unit).		
			- Cable from contact T3n/3 (lateral acceleration sender) to contact T47a/26 (control unit).	max. 1.5 Ω	
			• Measuring range 20 MΩ set - Test wiring for short to positive or to earth.	∞ Ω	

Switch on measuring range: resistance measurement (200 Ω/20 MΩ)					
Test step	**V.A.G 1598 A Sockets**	**Test of**	**• Test conditions - Additional operations**	**Specification**	**Measures if readout differs from specification**
20	-	Wiring of yaw rate sender -G202-	• Ignition switched off • Measuring range 200 Ω set - Unplug multipin connector T47a from control unit -J104-. - Connect test box V.A.G 1598 A with adapter V.A.G 1598/36. - Separate plug connection T3m from yaw rate sender -G202-. - Test wiring for open circuit: - Cable from contact T3m/1 (yaw rate sender) to contact T47a/40 (control unit). - Cable from contact T3m/2 (yaw rate sender) to contact T47a/24 (control unit). - Cable from contact T3m/3 (yaw rate sender) to contact T47a/26 (control unit).	max. 1.5 Ω	- Test wiring for open circuit. - Repair cable connections according to current flow diagram. ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations
			• Measuring range 20 MΩ set - Test wiring for short to positive or to earth.	∞ Ω	

Switch on measuring range: Resistance measurement (200 Ω/20 MΩ)					
Test step	**V.A.G 1598 A Sockets**	**Test of**	**• Test conditions - Additional operations**	**Specification**	**Measures if readout differs from specification**
21	-	Wiring of brake pressure sender 1 -G201	• Ignition switched off • Measuring range 200 Ω set - Unplug multipin connector T47a from control unit -J104-. - Connect test box V.A.G 1598 A with adapter V.A.G 1598/36. - Separate plug connection T30 from brake pressure sender -1- -G201. - Test cables for open circuit: - Cable from contact T30/1 (brake pressure sender) to contact T47a/19 (control unit). - Cable from contact T30/2 (brake pressure sender) to contact T47a/20 (control unit). - Cable from contact T30/3 (brake pressure sender) to contact T47a/18 (control unit).	max. 1.5 Ω	- Test wiring for open circuit. - Repair cable connections according to CFD. ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations
			• Measuring range 20 MΩ set - Test wiring for short to positive or to earth.	∞ Ω	

Switch on measuring range: **Resistance measurement (200 Ω/20 MΩ)**					
Test step	**V.A.G 1598 A Sockets**	**Test of**	• **Test conditions** - **Additional operations**	**Specification**	**Measures if readout differs from specification**
22	-	Wiring for longitudinal acceleration sender -G251-	• Ignition switched off • Set measuring range 200 Ω - Separate plug connection from longitudinal acceleration sender -G251-. - Unplug multipin connector T25a from control unit -J104-. - Connect test box V.A.G 1598/21.		
			- Test cables between multipin connector of longitudinal acceleration sender -G251- and multipin connector of control unit -J104- for open circuit.	max. 1.5 Ω	- Test wiring according to current flow diagram. ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations
			• Set measuring range 20 MΩ - Remove fuse S9. - Test wiring for short to positive or to earth.	∞ Ω	- Test wiring according to current flow diagram. ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations

Switch on measuring range: Resistance measurement (200 Ω/20 MΩ)					
Test step	**V.A.G 1598 A Sockets**	**Test of**	• **Test conditions** - **Additional operations**	**Specification**	**Measures if readout differs from specification**
23	11 + 15	Databus lines	• Ignition switched off • Measuring range 200 Ω set - Unplug multipin plug connections from the control units connected over the databus. - Connect test box V.A.G 1598 A with adapter V.A.G 1598/33. - Test wiring for open circuit: - to steering angle sender - to engine control unit - to automatic gearbox control unit[1]. - Cable from contact T47a/11 (control unit) to contact T6w/3 (steering angle sender -G85-). - On to the connected control units. - Cable from contact T47a/15 (control unit) to contact T6w/2 (steering angle sender -G85-). - On to the connected control units.	max. 1.5 Ω	- Test wiring for open circuit. - Repair cable connections according to CFD. ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations
			• Measuring range 20 MΩ set - Test wiring for short to positive or to earth.	∞ Ω	

[1] Only models fitted with automatic gearbox.

Switch on measuring range: Voltage measurement (20 V =)					
Test step	**V.A.G 1598 A Sockets**	**Test of**	**• Test conditions - Additional operations**	**Specification**	**Measures if readout differs from specification**
24	-	Voltage supply of vehicle system tester V.A.G 1552, plug connection T16a	• Ignition switched on - Connect hand-held multimeter, e.g. V.A.G 1526 A, with adapter cable set V.A.G 1594 A to T16a [1]: - Test cable between contact T16a/4 and contact T16a/1	10.0-14.5 V	- Test cable from T16a/4 to earth. - Test cable from T16a/1 through S5. - Repair cable connections according to CFD. ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations

[1] Contact assignment of plug connection for voltage supply and self-diagnosis with vehicle system tester V.A.G 1552 ⇒ page 45-251.

Switch on measuring range: Resistance measurement (200 Ω)					
Test step	**V.A.G 1598 A Sockets**	**Test of**	**• Test conditions - Additional operations**	**Specification**	**Measures if readout differs from specification**
25	-	Resistance of K wire for self-diagnosis, plug connection T16a	• Ignition switched off • Measuring range 200 Ω set - Remove fuse S13. - Unplug multipin connector T47a from control unit -J104-. - Connect test box V.A.G 1598 A with adapter V.A.G 1598/33. - Test cable between contact T16a/7 and contact T47a/39.	max. 1.5 Ω	- Test cable from T16a/7 to contact T47a/39. - Repair cable connections according to CFD. ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations
			• Measuring range 20 MΩ set - Test wiring for short to positive or to earth.	∞ Ω	- Repair cable connections according to CFD. ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations

Servicing front brakes

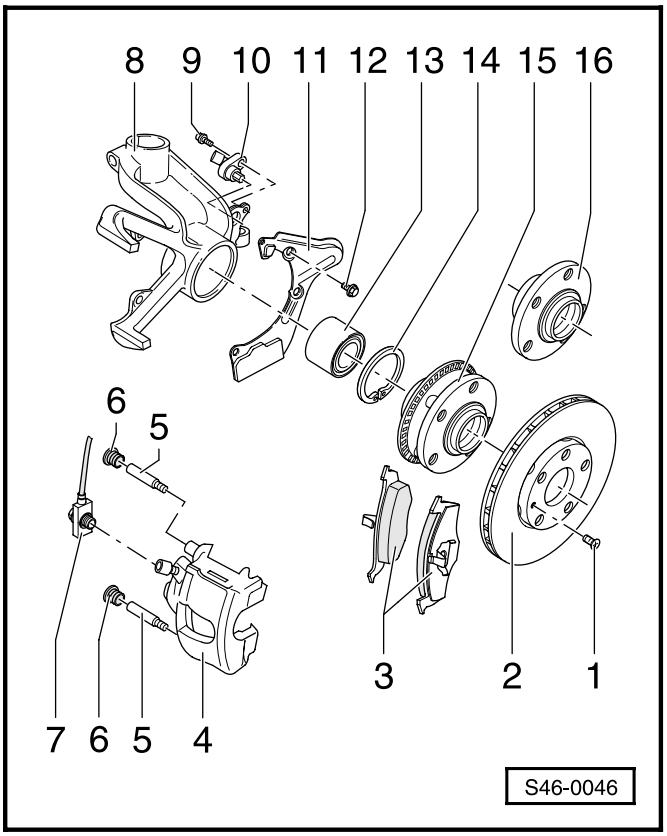
Servicing front brakes, brake caliper FS-III

Special tools, testers and aids required

- Piston resetting device MP 9-403
- Brake pedal depressor, e.g. V.A.G 1238/B
- Brake filling and bleeding appliance, e.g. ROMESS S15
- Bleeder bottle (commercially available)
- Brake fluid ⇒ page 00-8
- Solid lubricating paste G 000 650 (e.g. Wolfrakote Top Paste)

Notes:

- *After replacing brake pads, depress brake pedal firmly several times when vehicle stationary so that the brake pads adopt their seating corresponding to the position when driving.*
- *Insert the brake pedal depressor, e.g. V.A.G 1238/B, before removing a brake caliper or separating a brake hose from the brake caliper.*
- *Use a bleeder bottle which comes into contact only with brake fluid, for extracting brake fluid from the brake fluid reservoir. Brake fluid is toxic and must on no account be sucked out with your mouth through a hose!*
- *Do not re-use brake fluid which has been extracted.*
- *Tightening torque of wheel bolts: 120 Nm*



1 - Philips head screw, 4 Nm

2 - Brake discs
- ♦ thickness: 22 mm
- ♦ wear limit: 19 mm
- ♦ if worn always replace axle-wise
- ♦ before removing unscrew brake caliper
- ♦ do not use force to separate the brake discs from the wheel hub, if necessary use rust solvent as you could otherwise damage the brake dics
- ♦ Technical data ⇒ Brakes; page 00-6

3 - Brake pads
- ♦ with wear indicator
- - with a corresponding wear (limit: 2 to 3 mm) a warning lamp on the dash panel insert lights up
- ♦ thickness 19.5 mm including supporting plate
- ♦ wear limit: 7 mm including supporting plate
- ♦ inspecting thickness

⇒ Inspection and Maintenance
- ♦ always replace axle-wise
- ♦ removing and installing ⇒ page 46-3
- ♦ 05.98 ➤: do not interchange inside and outside brake pads ⇒ page 46-4

4 - Brake caliper
- ♦ removing:
- - removing brake pads -item 3- ⇒ page 46-3
- - fitting brake pedal arrester.
- - unscrew brake hose -item 7- from brake caliper
- ♦ installing:
- - installing brake pads -item 3- ⇒ page 46-3
- - screw brake hose -item 7- onto brake caliper
- - removing brake pedal arrester.
- - bleeding brake system ⇒ page 47-18
- ♦ repairing ⇒ page 47-8

5 - Guide bolts, 28 Nm
- ♦ removing and installing ⇒ page 46-3

6 - Cap

7 - Brake hose with ring fitting and hollow screw
- ♦ cannot be disassembled, must be replaced completely
- ♦ Tightening torque: 35 Nm

8 - Wheel bearing housing

9 - Allan screw, 8 Nm

10 - ABS speed sensor
- ♦ before inserting speed sensor, clean inside surface of hole and coat with solid lubricant paste G 000 650 (e.g. Wolfrakote-Top-Paste)

11 - Cover plate

12 - Screw, 10 Nm

13 - Wheel bearing
- ♦ replacing after each removal
- ♦ pressing out and in ⇒ page 40-16 and further

14 - Circlip

15 - Wheel bearing with pulse rotor
- ♦ only on vehicles with ABS
- ♦ pressing out and in ⇒ page 40-16 and further

16 - Wheel bearing without pulse rotor
- ♦ only on vehicles without ABS

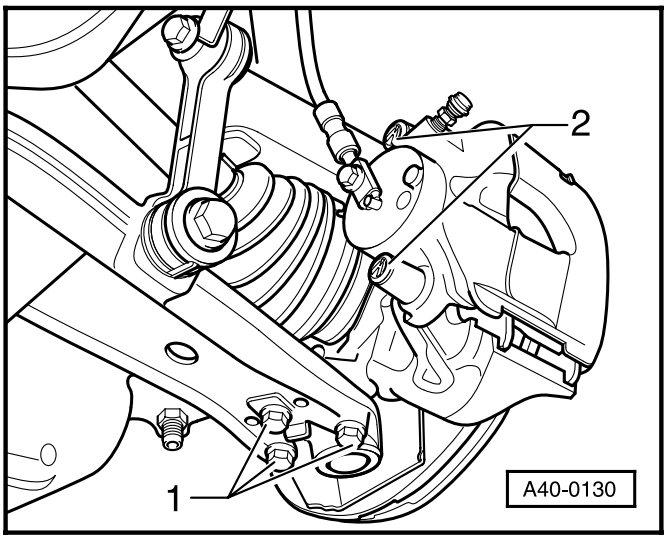
Removing and installing brake linings or the brake calliper (FS-III)

Required special tools, testing and measuring equipment as well auxiliary devices and material

- A piston resetting device MP 9-403
- A brake filling and ventilation device, e.g. ROMESS S 15
- A ventilating bottle (commercially available)
- Brake fluid ⇒ Page 00-8

Removal

- Removing wheels



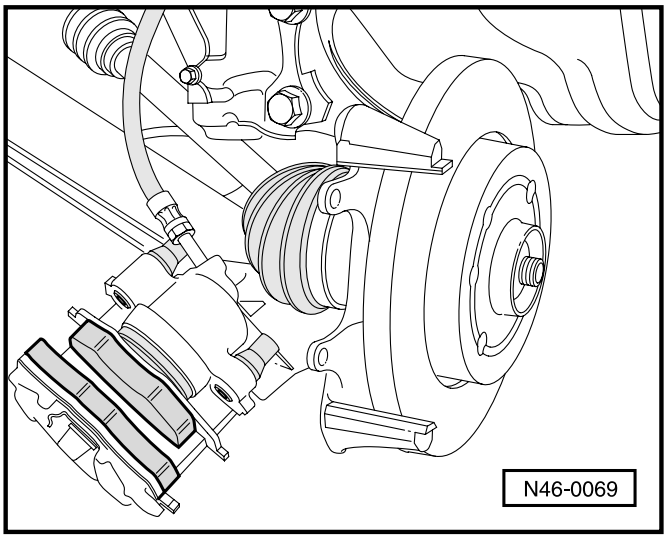
Comments:

- *Mark brake linings which are to be used again when removing. Install at the same location again otherwise uneven braking will result!*
- *Do not unscrew the brake hose to change brake linings.*

- Disconnect the plug connection for the brake lining wear indicator (when the vehicle is fitted with this).

◄- Remove the caps -2-

- Screw out both guide bolts from the brake calliper and remove.
- Remove the brake calliper housing and fix it with a wire in such a way that the weight of the brake calliper does not load down the brake hose or damage it.



◄- Remove the brake linings from the brake calliper housing.

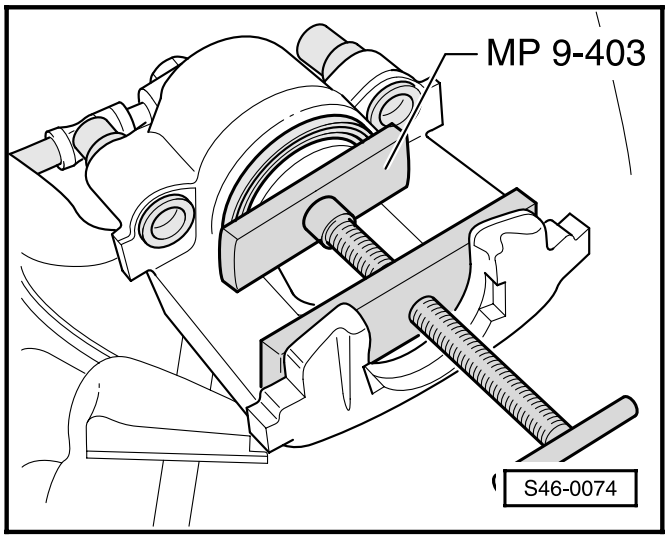
Installing

Comments:

Before inserting new brake linings press the piston into the cylinder using the piston resetting device. Remove some brake fluid from the brake fluid reservoir using a ventilatiion bottle before pressing in again.

Otherwise - if brake fluid has been topped up in the meantime - it may flow out and cause damage.

> ***Take note!***
>
> ***Brake fluid is poisonous and must not under any circumstances be sucked up over a hose by mouth.***



- Clean the brake calliper housing.

Comment:

One should exclusively use white spirits to clean the brake calliper housing.

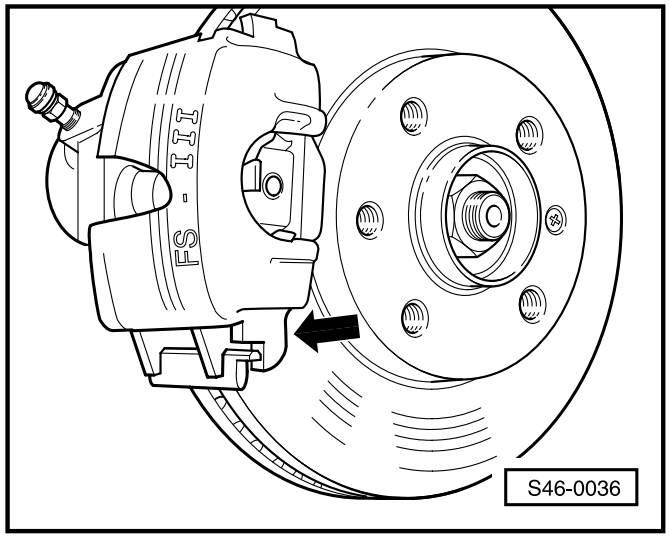
◄- Press back the piston using the piston resetting device MP 9-403.

- Insert the brake linings

  05.98 ➤: do not mix up the inner and outer brake linings

  Outer brake lining: a black coloured three finger clip

  Inner brake lining: white coloured on the piston side



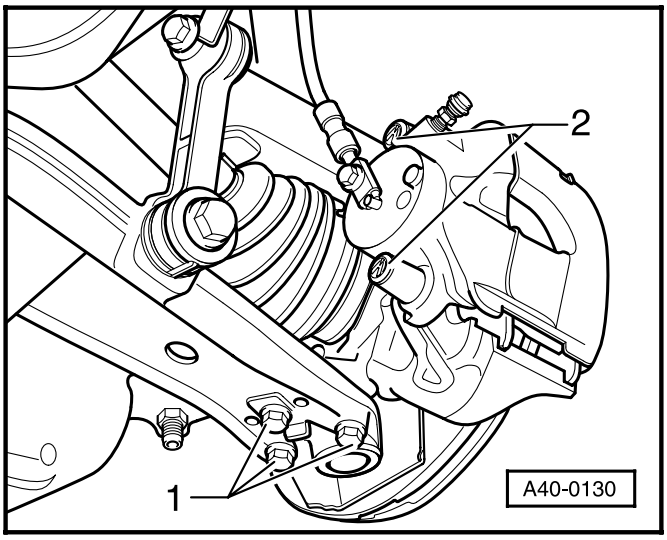
◄- First place the brake calliper housing below -arrow-.

- Mount the brake calliper housing with brake linings on the wheel bearing housing.

  The lugs of the brake calliper housing -arrow- must be behind the guide for the wheel bearing housing.

- Screw the guide bolts into the brake calliper housing and tighten to 28 Nm.

- Disconnect the plug connection for the brake lining wear indicator (when the vehicle is fitted with this).



◄- Fit the two protective caps -2-.

- Mount wheels.

Notes:

After each change of brake pads apply strong pressure repeatedly in standing position, to ensure the brake pads fit into their operating position.

Check the brake fluid level after changing the brake pads, if necessary top up brake fluid.

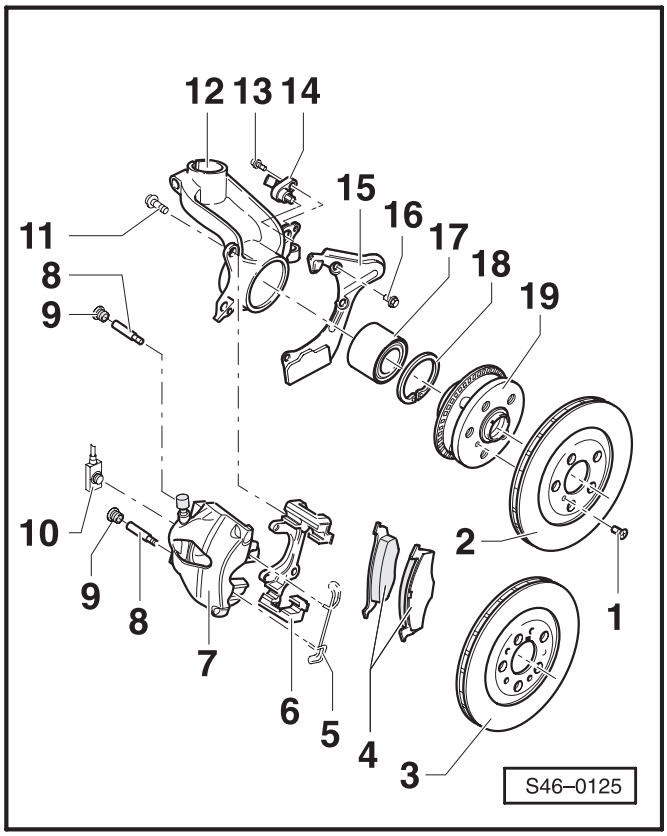
Servicing front brakes with FN-3 brake calliper

Special tools, testers and aids required

- Piston resetting device MP 9-403
- Brake pedal arrester, e.g. V.A.G 1238/B
- Brake filling and bleeding appliance, e.g. ROMESS S15
- Bleeder vessel (commercially available)
- Brake fluid ⇒ page 00-8
- Solid lubricating paste G 000 650 (e.g. Wolfrakote-Top-Paste)

Notes:

- *After each change of brake pads apply strong pressure repeatedly in standing position, to ensure the brake pads fit into their operating position.*
- *Before removing a brake calliper of before disconnecting a brake pipe from the brake calliper use brake pedal arrester (e.g. V.A.G 1238/B.)*
- *To bleed the brake fluid from the brake fluid reservoir use a bleeder vessel that only comes into contact with the brake fluid. Brake fluid is toxic and must under no circumstances be sucked out by mouth via a hose!*
- *Never re-use used brake fluid.*
- *Tightening torque of wheel bolts: 120 Nm.*



1 - Philips head screw, 4 Nm

2 - Brake discs
- ♦ without marking for maximum axial run-out
- ♦ combination of brake disc without marking and wheel hub with marking is permissible
- ♦ with a fixing hole for the wheel hub
- ♦ always replace axle-wise
- ♦ before removing unscrew brake caliper
- ♦ do not use force to separate the brake discs from the wheel hub, if necessary use rust solvent as you could otherwise damage the brake dics
- ♦ Technical data ⇒ Brakes; page 00-6
- ♦ assignment ⇒ Spare Part catalogue

3 - Brake discs
- ♦ with approx. 5 mm wide ink jet mark for marking maximum axial run-out
- ♦ combination of brake disc with marking and wheel hub without marking is permissible
- ♦ with 5 fixing holes for wheel hub
- ♦ always replace axle-wise
- ♦ before removing unscrew brake caliper
- ♦ do not use force to separate the brake discs from the wheel hub, if necessary use rust solvent as you could otherwise damage the brake dics
- ♦ Technical data ⇒ Brakes; page 00-6
- ♦ assignment ⇒ Spare Part catalogue
- ♦ removing and installing ⇒ page 46-5.7

4 - Brake pads
- ♦ with wear indicator
- \- with a corresponding wear (limit: 2 to 3 mm) a warning lamp on the dash panel insert lights up
- ♦ Technical data ⇒ page 00-6
- ♦ inspecting thickness

⇒ Inspection and Maintenance
- ♦ always replace axle-wise
- ♦ removing and installing ⇒ page 46-5.2

5 - Retaining spring
- ♦ insert in both holes of the brake caliper
- ♦ replace after each pad replacement

6 - Brake carrier
- ♦ is installed together with adequate quantity of grease on the guide bolts supplied as a spare part
- ♦ if protective caps or guide bolts are damaged, use the complete repair kit, use the enclosed grease packaging to grease the guide bolts

7 - Brake caliper
- ♦ removing:
- \- removing brake pads -item 4- ⇒ page 46-5.2
- \- fitting brake pedal arrester.
- \- unscrew brake hose -item 10- from brake caliper.
- ♦ installing:
- \- installing brake pads -item 4- ⇒ page 46-5.4
- \- screw brake hose -item 10- onto brake caliper.
- \- removing brake pedal arrester.
- \- bleeding brake system ⇒ page 47-18
- ♦ repairing ⇒ page 47-10.1

8 - Guide pin, 28 Nm
- removing and installing ⇒ page 46-5.2

9 - Cap

10 - Brake hose with union and banjo bolt
- must not be disassembled; always replace complete
- tightening torque 35 Nm

11 - Hexagon bolt with locking collar, 125 Nm
- clean ribbing on underside

12 - Wheel bearing housing

13 - Hexagon socket bolt, 8 Nm

14 - ABS wheel speed sensor
- clean inner surface of hole and coat with solid lubricating paste G 000 650 (e.g. Wolfrakote Top Paste) before inserting the sensor

15 - Splash guard

16 - Hexagon bolt, 10 Nm

17 - Wheel bearing
- replace each time removed
- removing and inserting ⇒ page 40-16

18 - Circlip

19 - Wheel hub with pulse rotor
- with and without marking for minimum runout
- combination of wheel hub without marking and brake disc with marking, or vice versa, is permitted. Reduction of total runout of brake FN-3 is then not effective
- only on models with ABS
- removing and inserting ⇒ page 40-16
- assignment ⇒ Parts List

Removing and installing brake pads/brake caliper (FN-3)

Special tools, testers and aids required

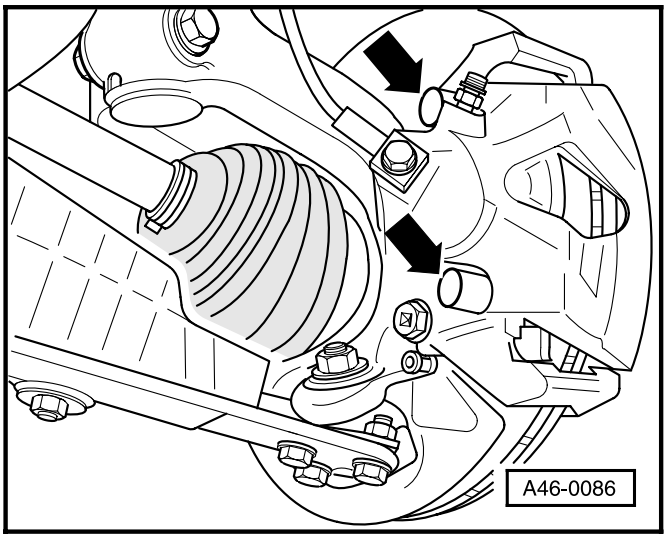
- Piston setback device MP 9-403
- Brake filling and bleeding appliance, e.g. ROMESS S15
- Bleeder bottle (commercially available)
- Brake fluid ⇒ page 00-8

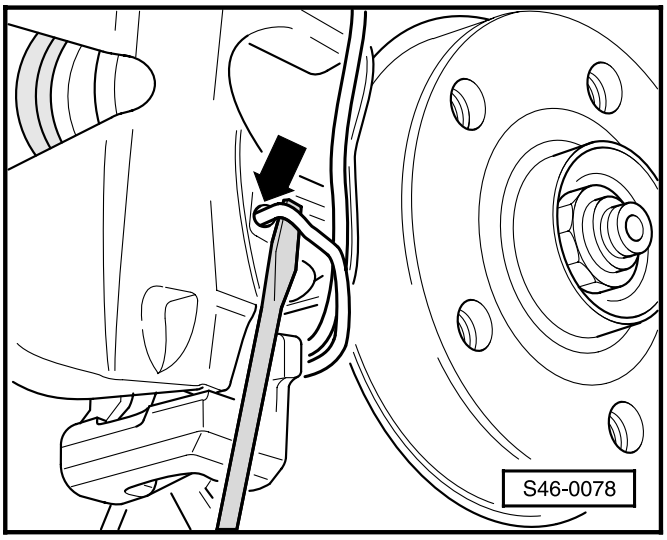
Removing

- Take off wheels.

Notes:
- *Mark brake pads which can be re-used when removing. Re-install at the same point otherwise braking action will be uneven!*
- *Do not disconnect brake hose for replacing pads.*

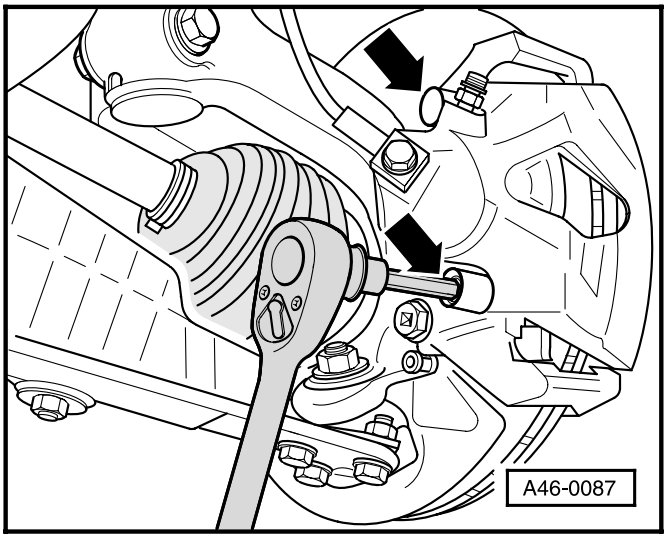
◄ - Take off caps -arrows-.





- Disconnect the plug connection for the brake lining wear indicator (when the vehicle is fitted with this).

◄- Lever out the holding spring for the brake lining from the brake calliper housing -arrow- using a screwdriver and remove it.



◄- Screw out both guide bolts from the brake calliper housing and remove.

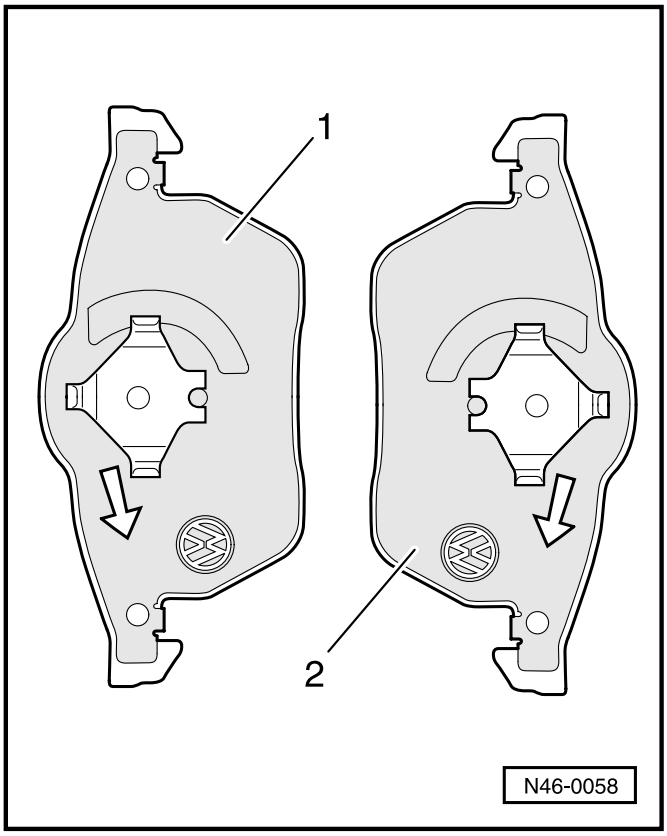
- Remove the brake calliper housing and fix it with a wire in such a way that the weight of the brake calliper does not load down the brake hose or damage it.

- Remove the brake linings from the brake calliper housing.

- Clean the brake calliper housing; one should particularly ensure that the glued contact surfaces for the brake linings are free of adhesive residues

Comment:

One should exclusively use white spirits to clean the brake calliper housing.



Installing

◄ **Directional brake pads**

1 - right piston-side brake pad

2 - left piston-side brake pad

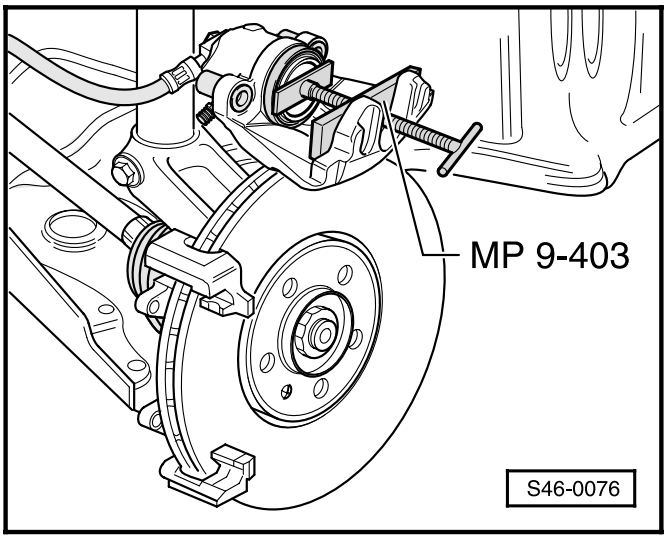
When installed, the arrow on the backplate of the brake pad should point downward. Please check!

Note:

Before inserting new brake pads, push piston into cylinder with piston resetting device. Before pushing back, suck out brake fluid from brake fluid reservoir using a bleeder vessel. Otherwise - if brake fluid has been topped up in the meantime - brake fluid may escape and thus cause damage.

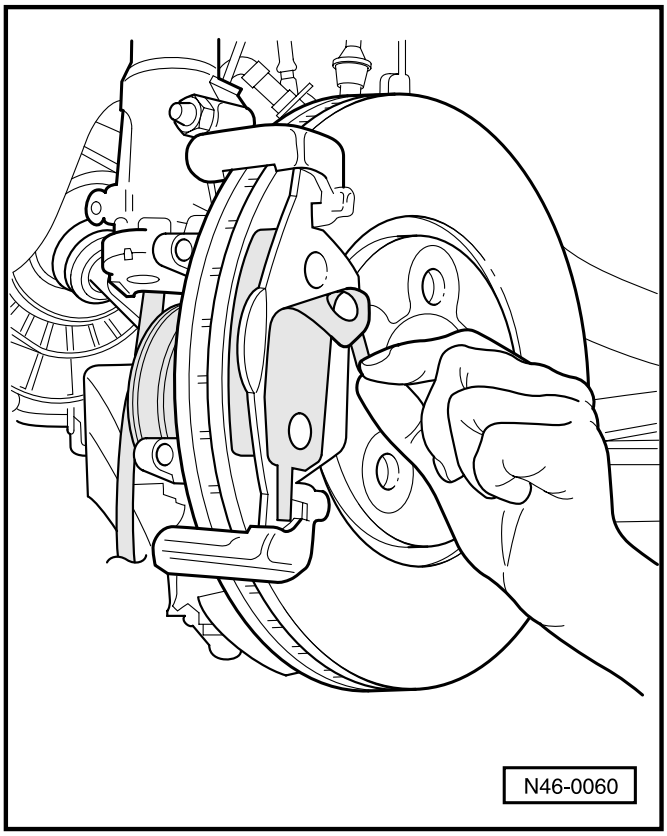
Caution!

Brake fluid is toxic and must under no circumstances be sucked out by mouth via a hose.



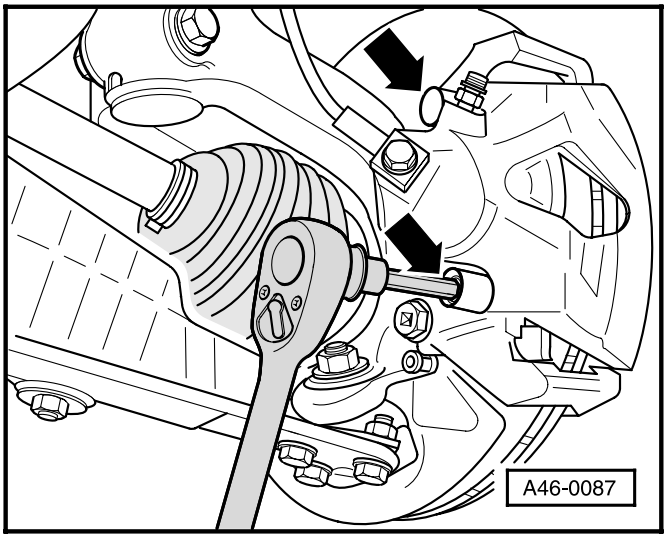
◄ - Push back piston.

- Insert inner brake pad.



◄- Insert the outer brake lining.

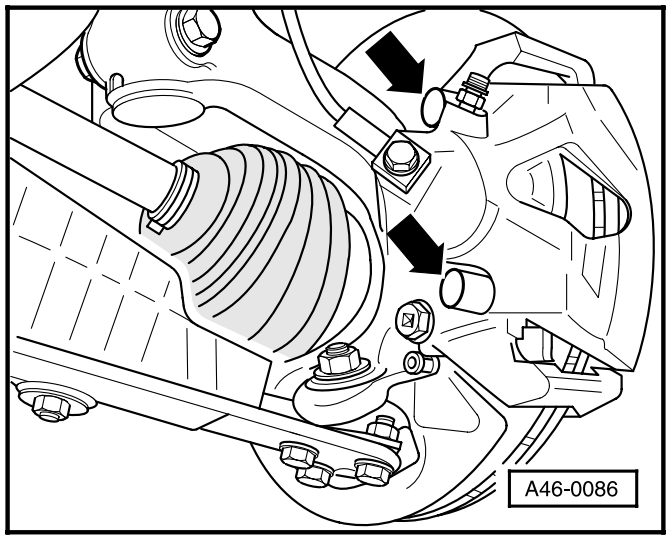
- Remove the protective foil from the back plate of the brake lining.



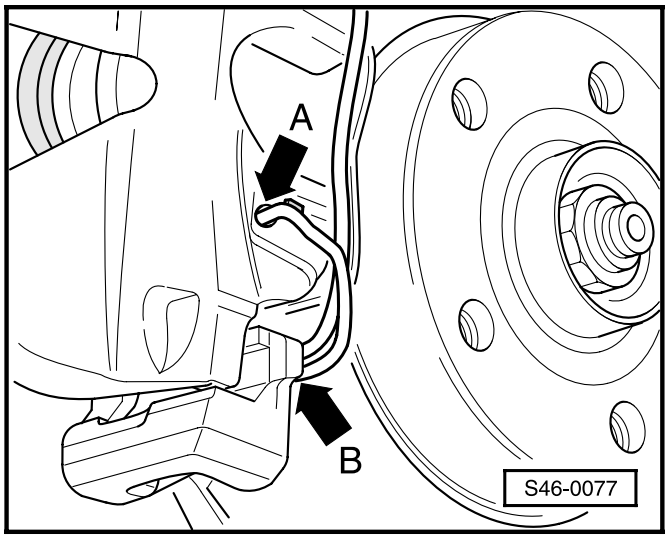
◄- Brake calliper housing with both guide bolts -arrows- on the brake carrier.

Tightening torque: 28 Nm.

- Disconnect the plug connection for the brake lining wear indicator (when the vehicle is fitted with this).



◄- Fit on both caps -arrows-.



◄- Insert the ends of retaining spring into the holes of brake caliper housing -arrow A- and then press spring behind the brake carrier -arrow B-.

- Fit on wheels.

Notes:

- *Each time after replacing brake pads, depress brake pedal firmly several times when car stationary so that the brake pads are properly seated in their normal operating position.*
- *Each time after replacing brake pads, check brake fluid level, and top up brake fluid if necessary.*

Removing and installing brake discs (FN-3)

Notes:

- *In the case of brake FN-3 brake judder, pulsing or steering wheel vibrations may occur. The cause of this is an excessive axial runout in the brake disc - wheel hub system.*
- *To reduce the axial total runout the maximum and minimum runout of the brake disc and the wheel hub are marked by ink jet marking.*
- *When dealing with complaints regarding excessive axial total runout, replace non-marked wheel hubs and brake discs with marked parts. Assignment*

⇒ Parts List

- *If used brake discs with marking and 5-hole attachment for wheel hub are to be re-installed, mark the position of the brake disc to the wheel hub before removing the parts.*
- *It is permitted to use the combination of marked brake disc/unmarked wheel hub, or unmarked brake disc and marked wheel hub.*
- *Also permissible is the combination on the left side of the vehicle of components without a marking, and on the right side of the vehicle components with a marking, or vice versa.*
- *Note that in the case of the combinations listed, the reduction of the total runout at the FN-3 brake is not effective.*
- *Always replace brake discs only on both sides.*
- *Do not use force to separate brake discs from the wheel hub; use rust release agents, if necessary; otherwise risk of damage to the brake discs.*

Removing

- Take off wheel.

Note:

Do not disconnect brake hose from the brake caliper.

- Remove brake carrier together with brake caliper and attach with wire so that the weight of the brake caliper is not pulling on the brake hose, or can damage it.

- Remove cross-head screw.

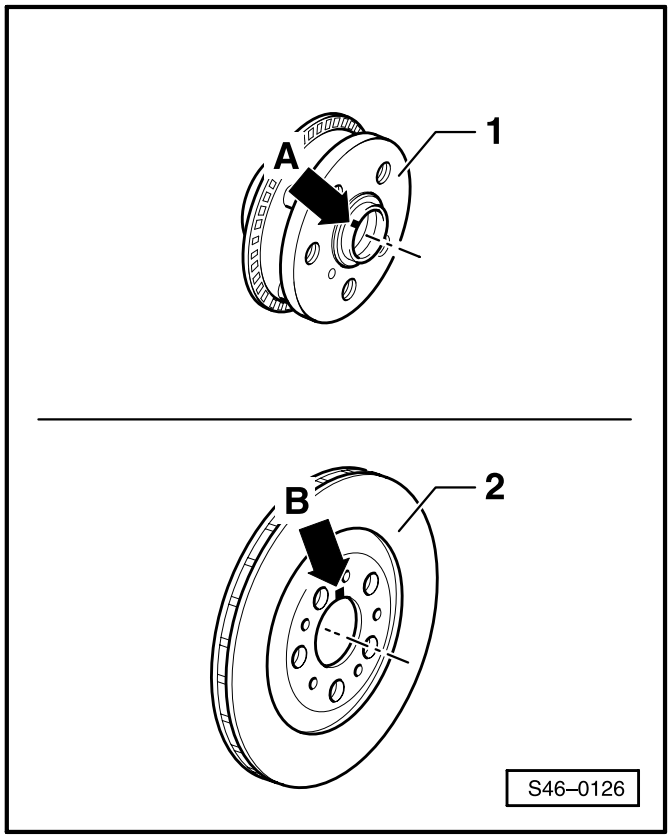
- Take off brake disc.

If dealing with a complaint of excessive axial total runout

- Remove wheel hub ⇒ page 40-16.

Installing

If dealing with a complaint of excessive axial total runout



◄ - Install new wheel hub -1- with ink jet marking about 3 mm wide aligned to marking of minimum runout -arrow A- in the wheel bearing housing ⇒ page 40-16.

- Install new brake disc -2- with 5 holes for attaching wheel hub and an ink jet marking about 5 mm wide aligned with the marking of the maximum runout -arrow B-.

Installation position:

Install brake disc on wheel hub so that the markings of the minimum runout (wheel hub) and of the maximum runout (brake disc) are positioned opposite.

Vehicles without complaint

♦ On vehicles which have already been driven, it is not possible to achieve a minimising of the axial runout after replacing the brake discs (old wheel hub/new brake disc).

♦ Brake discs can be installed without any special installation position.

- Install brake discs.

Continued for all models

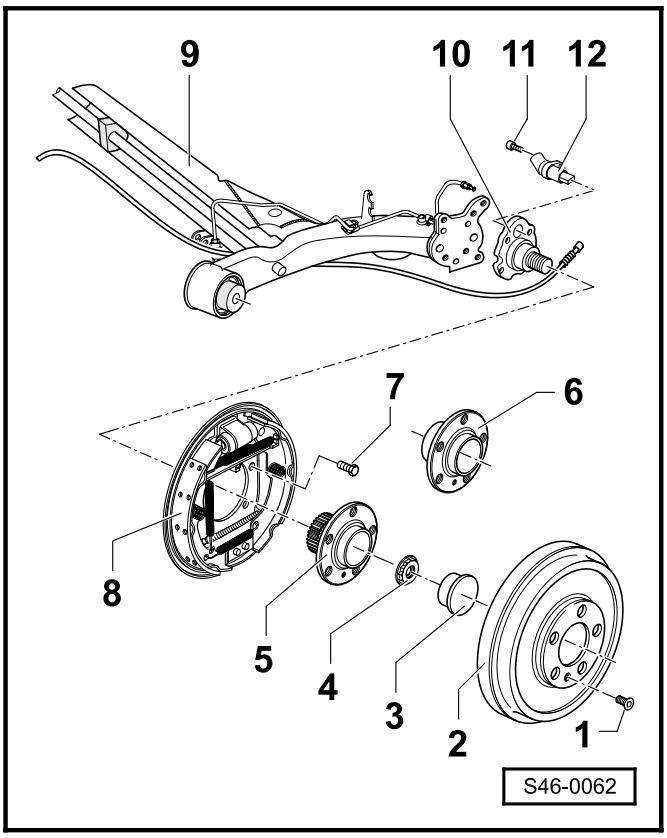
- The remaining installation is carried out in the reverse order.

Tightening torques:

Brake disc to wheel hub	4 Nm
Brake carrier with brake caliper to wheel bearing housing	125 Nm
Wheel bolt	120 Nm

Servicing rear brakes - FWD models/drum brakes

Removing and installing rear brake



Special tools, testers and aids required

- Measuring instrument for brake drum MP 5-407
- Dial gauge (range 0 - 10 mm)
- Bleeder bottle (commercially available)
- Brake filling and bleeding appliance, e.g. ROMESS S15
- Brake pedal depresser, e.g. V.A.G 1238/B
- Brake fluid ⇒ page 00-8
- Solid lubricating paste G 000 650 (e.g. Wolfrakote Top Paste)

Notes:

- *After replacing wheel brake cylinder, brake carrier and brake shoes, depress brake pedal firmly once when vehicle stationary so that the brake shoes are properly seated to match their operating position.*
- *Use a bleeder bottle which comes into contact only with brake fluid, to extract brake fluid from the brake fluid reservoir. Brake fluid is poisonous and must on no account be extracted by sucking it out through a hose with your mouth!*
- *Before removing a wheel brake cylinder, brake carrier or separating a brake pipe from the brake cylinder, insert the brake pedal depresser, e.g. V.A.G 1238/B.*
- *Brake fluid drained from the system must not be re-used.*
- *Tightening torque of wheel bolts: 120 Nm*

1 - Cross-head screw, 4 Nm

2 - Brake drum
- Brake drum diameter 230 mm
- Wear limit ∅ 231.0 mm
- Clean carefully, inspect for wear, damage, dimensional tolerance and proper braking surface
- Check out-of-roundness with special tool MP 5-407 and dial gauge (range 0 - 10 mm)

- Permissible out-of-roundness 0.03 mm; if measurement obtained is greater than 0.03 mm, replace brake drum.

⇒ Inspection and Maintenance

3 - Cap
- Pressing off ⇒ page 42-25
- Inserting ⇒ page 42-27

4 - Twelve-pointed nut, self-locking, 70 Nm + torque a further 40°
- Replace each time removed

5 - Wheel hub with wheel bearing and pulse rotor
- ♦ Only on models with ABS
- ♦ Replace each time removed
- ♦ Always replace complete
- ♦ Removing and inserting ⇒ from page 42-23

6 - Wheel hub with wheel bearing without pulse rotor
- ♦ Only on models without ABS
- ♦ Replace each time removed
- ♦ Always replace complete
- ♦ Removing and inserting ⇒ from page 42-23

7 - Bolt + washer, 50 Nm + torque a further 60°
- ♦ Replace each time removed

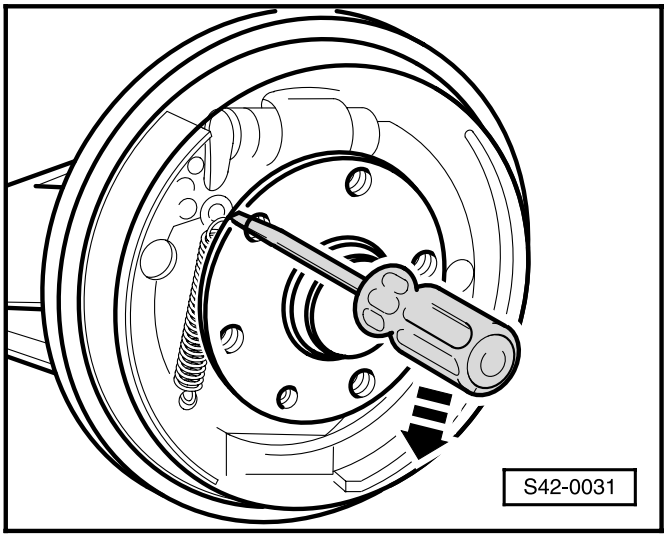
8 - Brake carrier with brake shoes
- ♦ Removing:
- Setting back brake ⇒ page 46-7
- Remove brake drum
- Insert brake pedal depresser
- Unbolt brake tube
- Remove brake carrier
- ♦ Installing:
- Install brake carrier
- Bolt on brake tube
- Remove brake pedal depresser
- Install brake drum
- Bleed brake system ⇒ page 47-18
- ♦ Servicing ⇒ page 46-8

9 - Axle beam

10 - Axle stub

11 - Hexagon socket bolt, 8 Nm

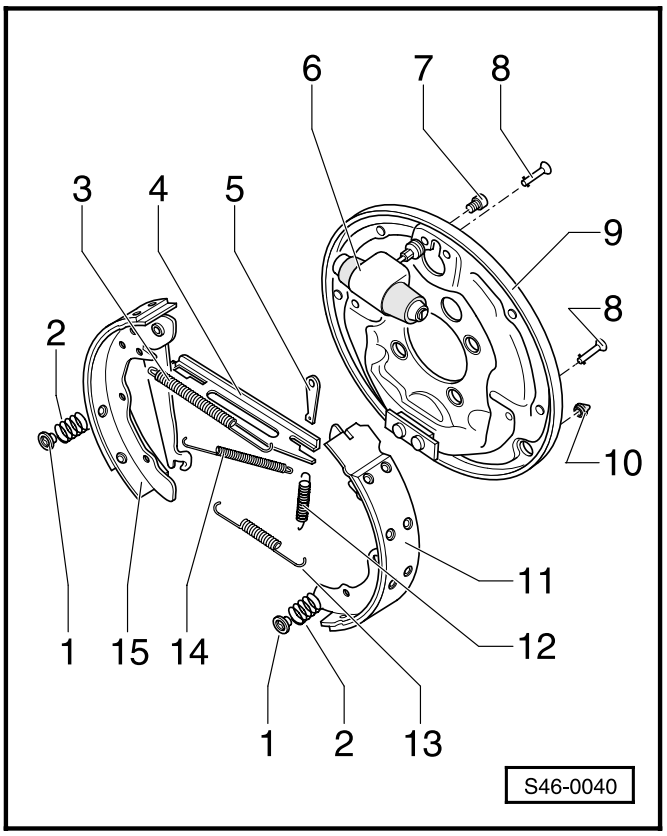
12 - ABS wheel speed sensor
- ♦ Only on vehicles with ABS
- ♦ Before inserting the sensor, clean inner surface of hole and coat with solid lubricating paste G 000 650 (e.g. Wolfrakote Top Paste)



Moving back brake

◄- Insert a screwdriver through a hole of the wheel bolts in the brake drum and push the wedge up.

Repairing rear wheel brake



Special tools, testers and aids required

- Hook (commercially available)
- Brake filling and ventilation device, e.g. ROMESS S 15
- Brake pedal arrester, e.g. V.A.G 1238/B or V.A.G 1869/2
- Plastic wedge 3409
- Brake fluid ⇒ page 00-8
- Solid lubricant paste G 000 650 (e.g. Wolfrakote top paste)

Note:

After working on the rear wheel brake

- *Release hand brake.*
- *Activate brake pedal forcefully once.*

1 - Spring cap
- to remove push against pressure spring and turn 90°

2 - Pressure spring

3 - Locating spring

4 - Pressure rod
- grease points of contact with solid lubricant paste G 000 650 (e.g. Wolfrakote-Top-Paste)

5 - Wedge
- when removing and installing the brake drum push up through a hole for the wheel bolt ⇒ page 46-7

6 - Wheel brake cylinder
- inspecting for leaks ⇒ Fig. 1
- repairing is not permissible
- removing:
  - fitting brake pedal arrester
  - unscrew brake pipe
  - removing wheel brake cylinder
- installing:
  - installing wheel brake cylinder
  - screw on brake pipe.
  - removing brake pedal arrester.
  - bleeding brake system ⇒ page 47-18

7 - Allan screw, 8 Nm

8 - Tensioning pin

9 - Brake carrier

10 - Cap
- for checking the removed brake pad thickness ⇒ Fig. 2

11 - Brake shoes
- removing and installing ⇒ page 46-10
- minimum pad thickness without supporting plate 2.5 mm
- inspecting thickness ⇒ Fig. 2, visual inspection through the inspection hole in the brake carrier as well as repair manual of Inspection and Maintenance

⇒ Inspection and Maintenance
- always replace brake pads axle-wise