Output Diagnostic Test Mode (DTM) (function 03)

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

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

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

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

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

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

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

01-150

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

Notes:

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

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

01-151

Notes:

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

01-152

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

IV = Inlet valve

OV = Outlet valve

LF = Left Front

RF = Right Front

LR = Left Rear

RR = Right Rear

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

0V = 0 volts; No voltage at valve

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

Hydr-P = Hydraulic pump

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

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

Rapid data transfer **HELP**	
Select function XX	

Indicated on display:

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

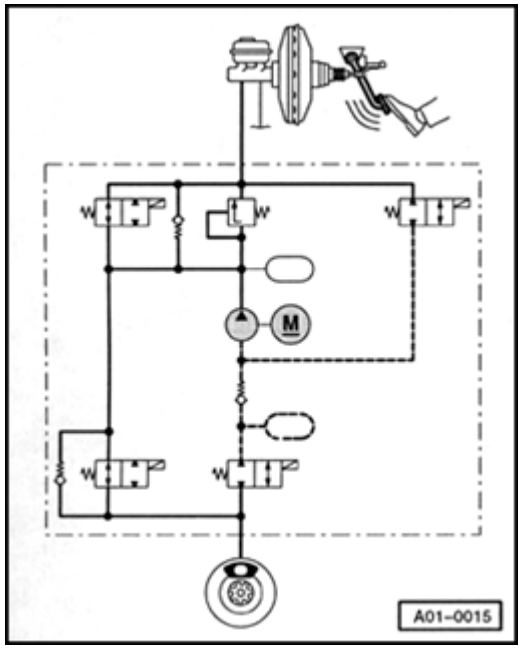
Rapid data transfer **Q**	
03 - Output Diagnostic Test Mode (DTM)	

Indicated on display:

- Press -Q- button to confirm input.

01-154

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



Indicated on display:

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

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

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

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

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

- Press → button.

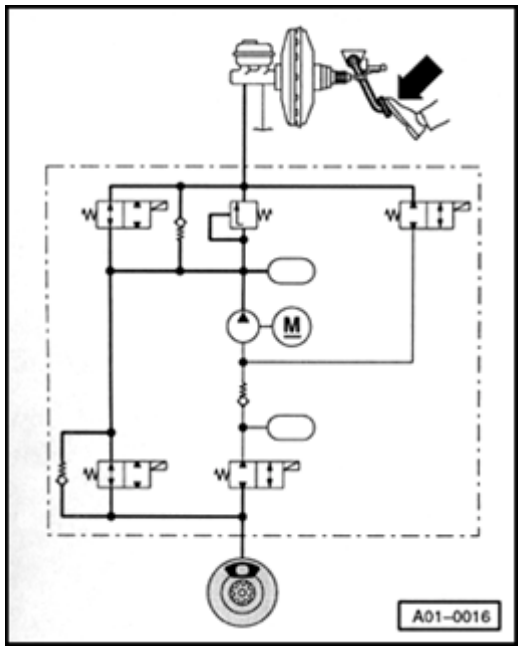
01-155

Output Diagnostic Test Mode (DTM) - →

Operate brake

Output Diagnostic Test Mode (DTM) - →

lfl: 0V Ofl: 0V fl wheel locked



➢ Indicated on display:

- Press → button.

➢ Indicated on display:

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

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

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

Note:

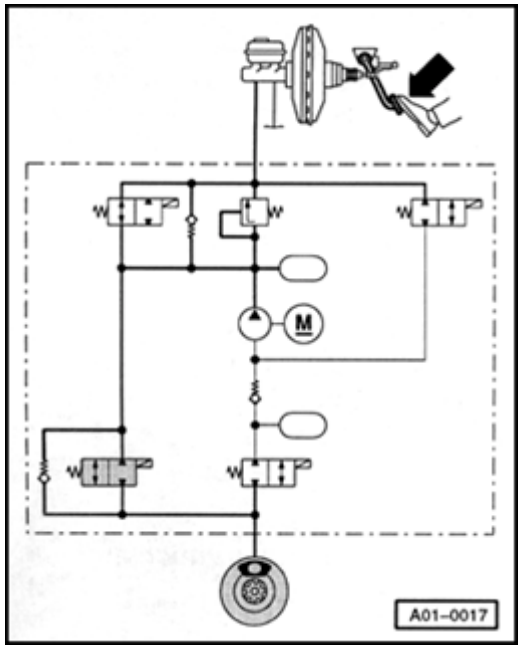
This test step in the output diagnostic test mode corresponds to the "pressure build-up" phase during ABS-controlled braking.

01-156

- Press → button.

Output Diagnostic Test Mode (DTM) _ →

Ifl: B+ Ofl: 0V fl wheel locked



➢ Indicated on display:

Keep pressing brake pedal.

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

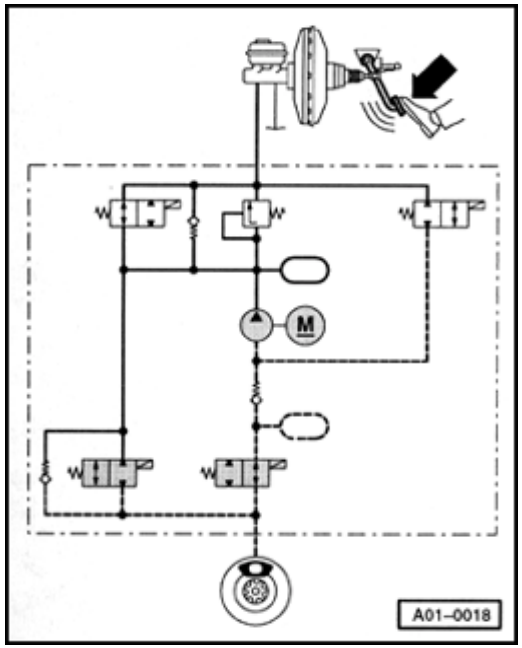
Note:

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

- Press → button.

01-157

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



➢ Indicated on display:

Keep pressing brake pedal.

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

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

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

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

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

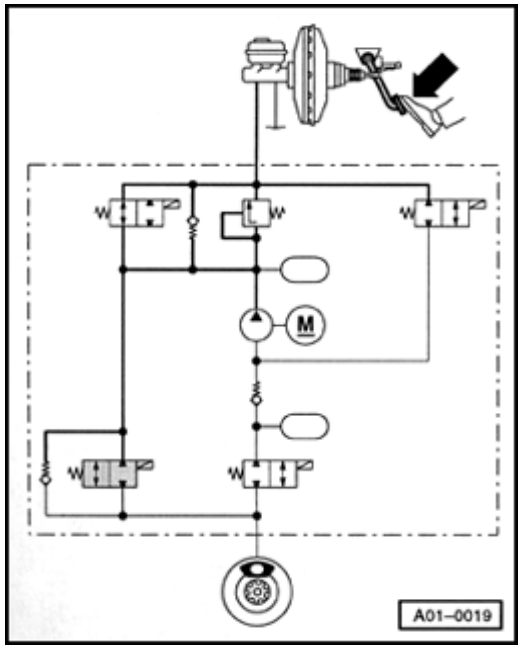
Note:

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

- Press → button.

01-158

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



➢ Indicated on display:

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

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

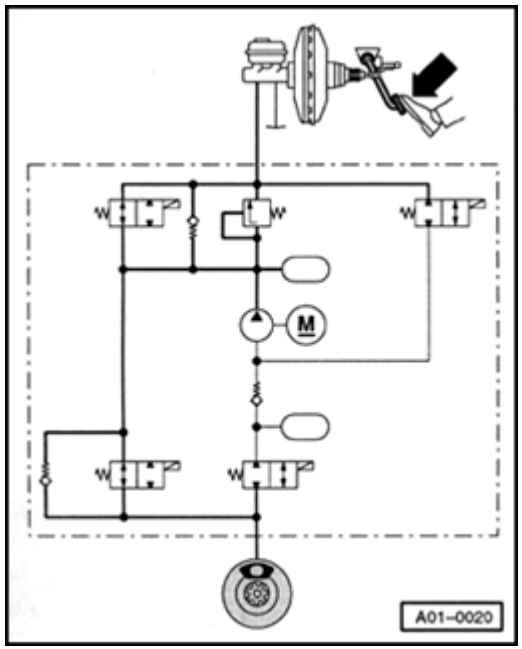
If you cannot turn the wheel, this means that the inlet valve or the check valve activated in parallel to the inlet valve is leaking. Replace hydraulic control unit.

- Press → button.

01-159

Output Diagnostic Test Mode (DTM) - →

Ifl: 0V Ofl: 0V fl wheel locked



Indicated on display:

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

- Press → button.

Output Diagnostic Test Mode (DTM) - →

Release brake

Indicated on display:

- Press → button.

01-160

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

Output Diagnostic Test Mode (DTM) _ →

Operate brake

Indicated on display:

- Press → button.

Output Diagnostic Test Mode (DTM) _ →

Ifr: 0V Ofr: 0V fr wheel locked

Indicated on display:

- Press → button.

Output Diagnostic Test Mode (DTM) _ →

Ifr: B+ Ofr: 0V fr wheel locked

Indicated on display:

- Press → button.

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

The brake pedal must not give.

Output Diagnostic Test Mode (DTM) _ →

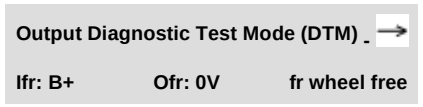
Ifr: B+ Ofr: B+ fr wheel free

Indicated on display:

- Press → button.

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

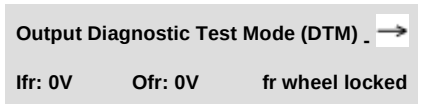
01-161



Indicated on display:

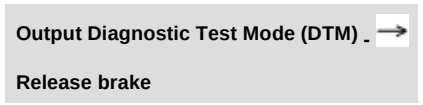
- Press → button.

Brake pedal must give noticeably.



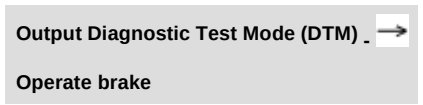
Indicated on display:

- Press → button.



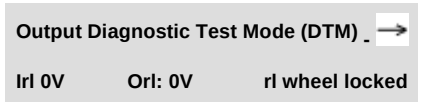
Indicated on display:

- Press → button.



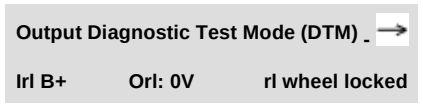
Indicated on display:

- Press → button.



Indicated on display:

- Press → button.



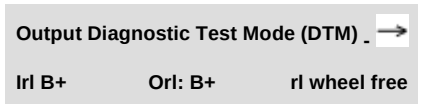
Indicated on display:

- Press → button.

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

The brake pedal must not give.

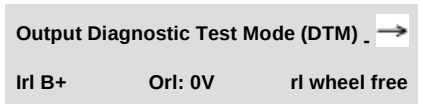
01-162



Indicated on display:

- Press → button.

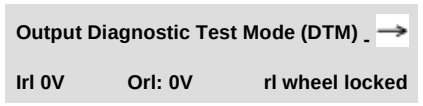
ABS hydraulic pump -V64- will stop running.



Indicated on display:

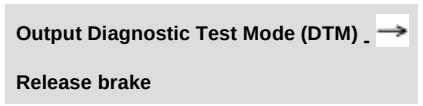
- Press → button.

Brake pedal must give noticeably.



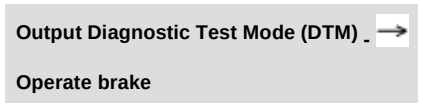
Indicated on display:

- Press → button.



Indicated on display:

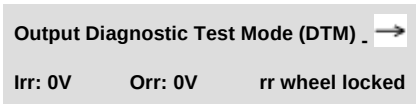
- Press → button.



Indicated on display:

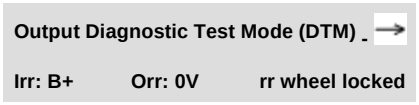
- Press → button.

01-163



Indicated on display:

- Press → button.

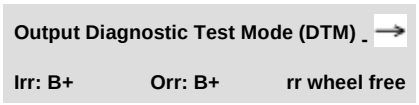


Indicated on display:

- Press → button.

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

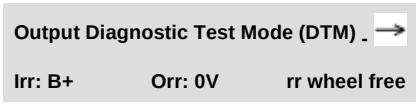
The brake pedal must not give.



Indicated on display:

- Press → button.

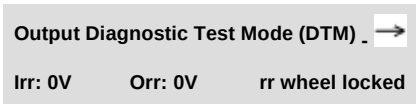
ABS/EDL hydraulic pump -V64- will stop running.



Indicated on display:

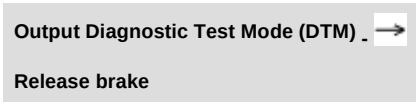
- Press → button.

Brake pedal must give noticeably.



Indicated on display:

- Press → button.



Indicated on display:

- Press → button.

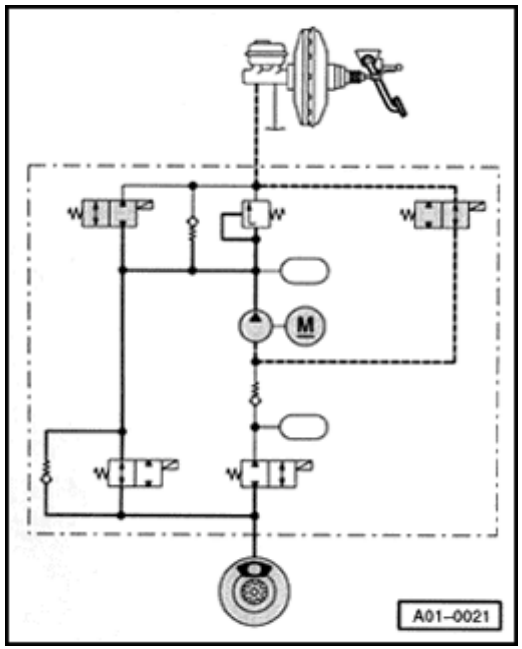
01-164

Output Diagnostic Test Mode (DTM) _ →

EDL valves/ Hydr-P : B+ Wheel fl/fr lock

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

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



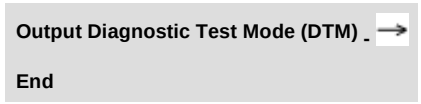
The EDL change-over valve (left) and the EDL inlet valve are activated. ABS return flow pump -V39- runs for one second. It draws brake fluid from the brake fluid expansion tank via the EDL inlet valve. The hydraulic pump builds brake fluid pressure in the EDL regulated wheel cylinders. These wheels will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

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

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

01-165

- Press → button.

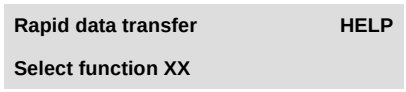


Indicated on display:

Note:

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

- Press → button.



Indicated on display:

Note:

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

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

01-166

Electrical testing

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

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

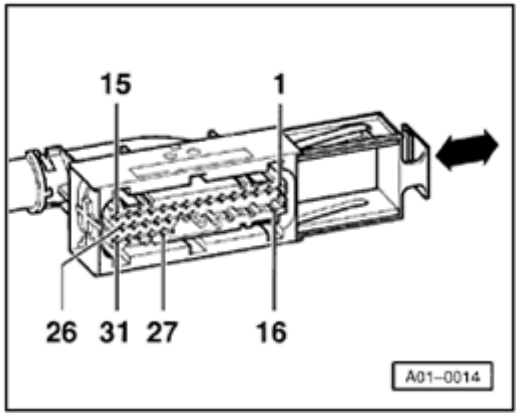
Test requirements

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

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

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

01-167



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

Note:

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

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

01-168

Required special tools and test equipment:

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

01-169

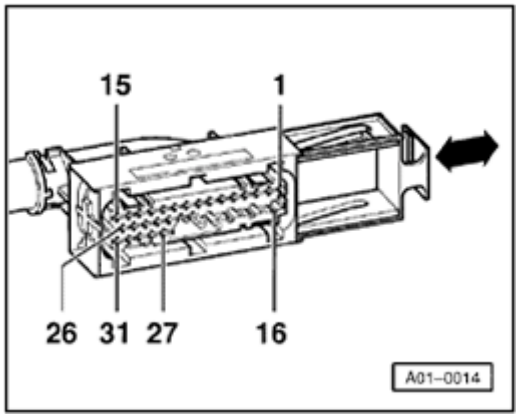
Connect VAG1598 test box using VAG1598/27 adapter.

- Switch ignition off.

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

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

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*



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

Note:

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

01-170

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

01-171

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

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

01-172

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

01-173

Notes:

For test table:

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

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

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

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

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

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

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

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

01-174

Test table

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

01-175

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

01-176

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

01-177

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

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

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

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

01-178

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

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

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

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

01-179

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

01-180

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

01-181

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

01-182

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

01-183

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

01-184

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

01-185

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

01-186

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

01-187

Diagnostic Trouble Code (DTC) table

Notes:

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

Notes:

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

01-188

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

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

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

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

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

01-191

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

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

01-192

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

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

01-193

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

01-194

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

01-195

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

		(w/EDL) -J104- is malfunctioning.

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

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

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

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

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

01-201

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

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

01-203

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

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

01-205

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

01-206

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