

Automatic transmission 096

- [electrical components](#)
- [returning to basic setting](#)
- [self-diagnosis](#)
- [troubleshooting using electrical steps](#)

Fault code

- [troubleshooting chart](#)

Function 08

- [measuring value block, reading](#)

Function 09

- [individual measuring values, reading](#)

VAG 1551 Diagnostic Tester

- [connecting](#)
- [erasing Fault memory](#)
- [reading/erasing Fault memory](#)

Volkswagen B3 Passat

Diagnosis, Fault Memory - Passat

Automatic transmission 096, self diagnosis (Page D3-10-1)

Note

Look under **General** for information about the test equipment, how to hook it up and how to use it. To use the information in this manual you need the right wiring diagram. See wiring diagrams.

The ECU for the automatic transmission (**J 217**) has a permanent Fault memory. If problems occur at the monitored sensors or components of the transmission, the information is stored in the Fault memory.

Faults that occur only occasionally are stored as sporadic faults.

The automatic transmission ECU evaluates the data from 21 different messages and stores fault messages until the memory is read and its contents erased.

The self diagnosis must be initiated and the stored fault(s) read using the **VAG 1551**. The **VAG 1551** tester can access the Diagnostic Tester transmission ECU memory via remote diagnostic terminals beneath the center console in front of the shift lever.

Safety functions of the transmission ECU

If a critical failure relating to the transmission should occur during vehicle operation, the transmission will continue to operate, but only in the "limp home" mode. In the limp home mode the transmission will automatically engage 3rd gear hydraulically for any forward driving mode other than selector position 1. The vehicle can be operated in 1 and R while in the limp home mode.

During limp home mode operation, the transmission ECU will not actuate the cruise control system.

If failures that result in limp home mode operation are corrected, the transmission will remain in limp home mode until the ignition is switched **OFF**.

Failures that result in the limp home mode are usually open circuits or short circuits in wiring, defective ECU or solenoids.

Returning to basic setting

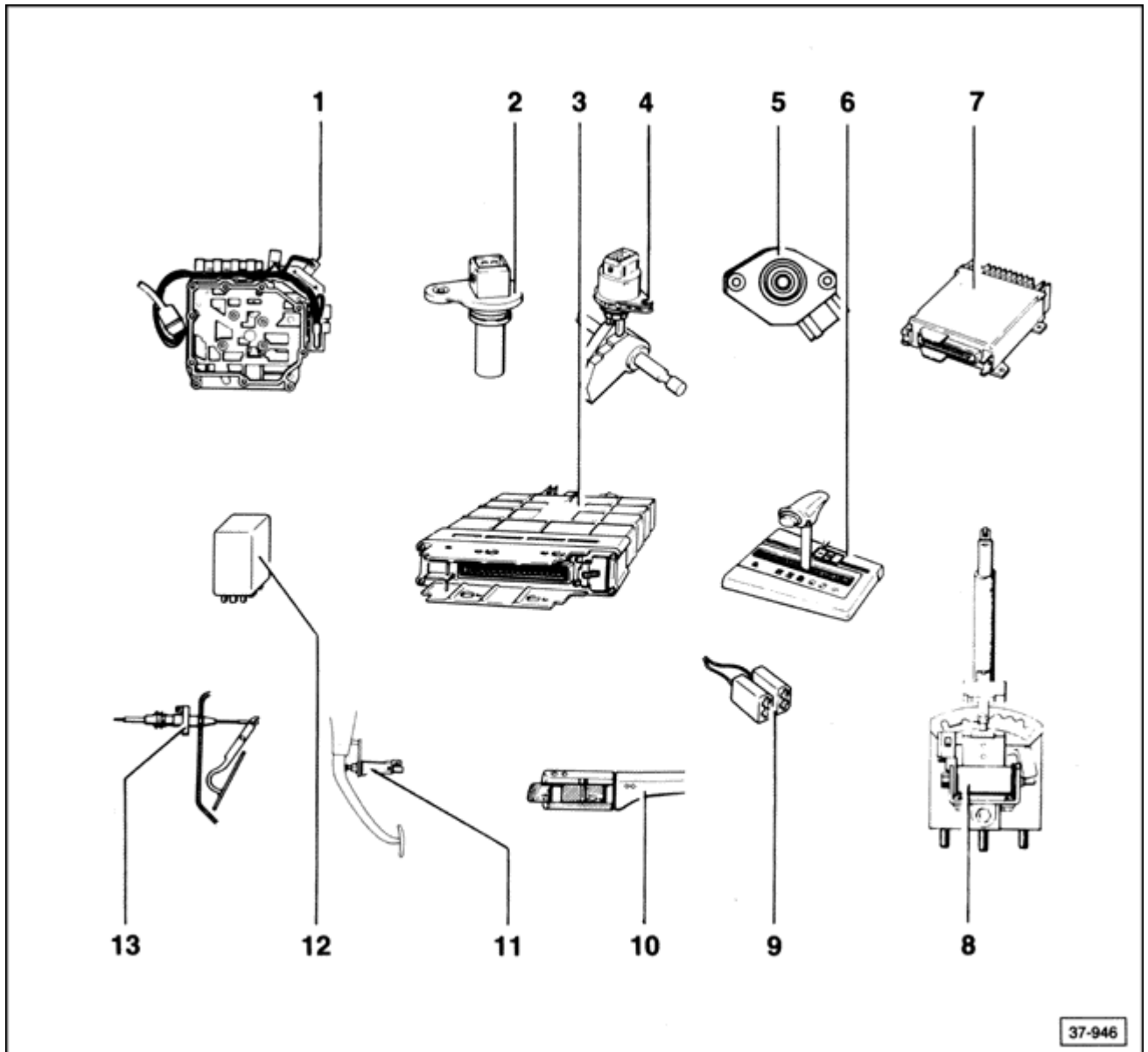
Return system to basic setting after the following:

- engine replacement
- throttle replacement or cable adjustment
- throttle valve potentiometer replacement or adjustment
- transmission control unit replacement

Volkswagen B3 Passat

Diagnosis, Fault Memory - Passat

Automatic transmission 096, electronic components (Page D3-20-1)



1 - Valve body

location: under oil pan

solenoids (**N 88, N 89, N 90, N 91, N 92, N 93, N 94**) and ATF temperature sensor (**G 93**) are mounted on valve body

2 - Vehicle speed sensor (G 68)

location: on top of transmission

3 - ECU (J 217)

for automatic transmission

location: at lower right "A" pillar area

4 - Multifunction switch (F 125)

location: at rear of transmission case

5 - Throttle valve potentiometer (G 69)

location: on engine fuel distributor

6 - Program switches (E 122)

location: in selector lever display on center console cover

7 - Engine Electronic Control Unit (ECU)

location: see [section D2-10](#), Repair Group D2

8 - Shift lock solenoid (N 110)

location: on selector lever mount

9 - Diagnostic terminals

location: under center console cover in front of shift lever

10 - Cruise control switch (F 44)

location: steering column switch

11 - Brake light switch (F)

location: on pedal cluster

12 - Relay for starter interlock and backup light (J 226)

location: relay panel (see wiring diagram)

13 - Kickdown switch (F8)

location: integrated with accelerator cable in engine compartment

Volkswagen B3 Passat

Diagnosis, Fault Memory - Passat

Transmission diagnosis (Page D3-25-1)

Repairs to the 096 4-speed automatic transmission must not be started until the following diagnosis procedure has been performed.

Remedy each problem found during the procedure and if repairs are made, road test the vehicle again before continuing to the next numbered diagnosis step.

1 Test drive vehicle

- test drive to verify customer complaints
(if possible let customer drive)

2 Check for leaks

- check vehicle for visible leakage of ATF from transmission and cooler lines or hypoid oil from differential

3 Check ATF level

- place vehicle on level surface
- apply parking brake
- put selector lever at **P** position
- start engine
- raise RPM (do not exceed 2000 RPM) until radiator fan cycles one time
- return engine to idle
- depress brake pedal
- move selector lever to any drive position for 2-3 seconds, then return to **P** position immediately
- check ATF level on dipstick and add or suction out fluid until level is between 36-40 mm from tip of dipstick

CAUTION!

Do not overfill transmission. Too much ATF will cause the transmission to malfunction. Always remove fluid if checking indicates the transmission is overfilled.

The **VAG 1551** tester shows the proper operating temperature for accurately checking the ATF level. Use program **09** channel **3** on vehicles equipped with E-prom level up to 0508; use program **08** channel **5** on vehicles equipped with E-prom level from 0509.

Volkswagen B3 Passat

Diagnosis, Fault Memory - Passat

Transmission diagnosis (Page D3-25-2)

Note

ATF in the 096 transmission is reddish in color when new but soon discolors to a dark brown/black. A dark brown/black color is normal.

After connecting the **VAG 1551**, note the Part Number for the Digimat (transmission) ECU, as well as the Part Number for the Motronic ECU.

4 Check for ATF contamination

If ATF is mixed with engine coolant or water it can have a milky appearance and be somewhat lighter in color. Causes for such fluid mixing can be due to leaks at the dipstick (water) or a faulty transmission ATF cooler (high ATF level combined with low coolant level).

5 Stall speed test

Perform stall speed test as follows:

- check that engine is at operating temperature
- connect **VAG 1367**
- start engine and hold vehicle firmly with parking brake and foot brake
- move selector lever to **D** position and briefly accelerate engine to full throttle
- check that engine runs at approximately 2700 RPM

CAUTION!

Do not continue the stall speed test longer than the time required to read the tachometer. The maximum stall speed test time is 5 seconds. If it is necessary to repeat the test, wait at least 20 seconds.

Note

Normal stall speed will drop 125 PRM per 3200 feet of altitude. Stall speed will also drop slightly at high ambient air temperatures.

- if stall speed is below 2500 RPM transmission problem is possibly related to poor engine performance
- if stall speed is above 2700 RPM, torque converter or internal transmission problems are likely and component must be repaired or replaced

6 Check engine performance

If the transmission complaint is:

A delayed shifting

or

B rough downshifting (mostly 4-3 shift)

often the ignition retard system or knock sensor system is not functioning properly. Refer to the Repair Manual for instructions on checking the ignition timing with **VAG 1367** and perform the additional steps below:

- check that operating temperature of engine is between 60-80°C (140°-176°F)
- check engine timing and adjust to $6 \pm 1^\circ$ BTDC

CAUTION!

Two mechanics are required to perform the following checks.

- drive vehicle and conduct 3 or 4 brief wide open throttle accelerations
- check that timing is between -1° and $+19^{\circ}$ during acceleration at 2000 RPM
- if timing is retarded more than -6° check knock sensor torque and connections and test again
- if OK, road test vehicle to determine if transmission problem has been eliminated

7 Check Motronic ECU

If transmission problem still exists, check if latest level Motronic ECU is installed; replace if necessary and road test vehicle.

- Motronic ECU: Part No. **893 907 404 Q**
(California)
Part No. **8A0 907 404**
(49 state)

CAUTION!

Part numbers are for reference only. Always check with your Parts Department for latest information.

8 Check fuel quality

9 Check Digimat ECU

Complaints of poor shift quality can possibly be eliminated by installing a later Digimat ECU. Refer to the current ECU Part No. and check with your Parts Department for the latest version. Replace the Digimat ECU if necessary.

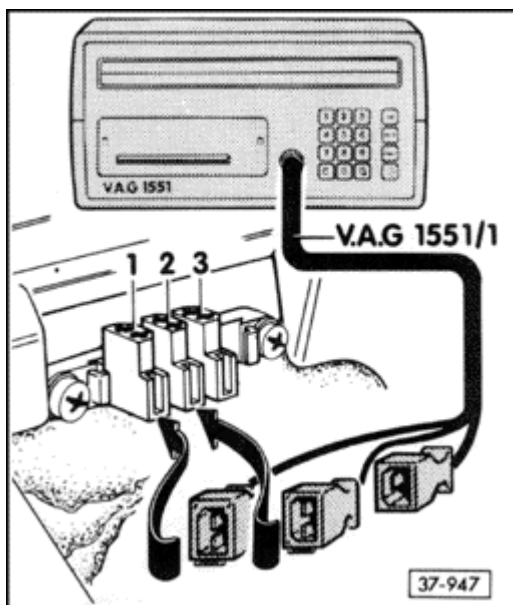
Volkswagen B3 Passat

Diagnosis, Fault Memory - Passat

Tester VAG 1551, connecting (Page D3-30-1)

Requirements

- battery voltage **OK**
- fuses **14** and **21 OK**
- ground connections on transmission and at left of relay panel **OK**
- selector lever in "N" position
- parking brake **ON**
- switch **OFF** ignition
- remove shift lever knob
- remove console cover



- connect diagnostic cable **VAG 1551/1** for tester **VAG 1551**:
 - black plug (voltage supply) on black terminal **1** in vehicle
 - white plug on white terminal **2**
 - blue plug not used

VAG Self Diagnosis	HELP
1 Rapid data transfer	

- information is displayed alternately on **VAG 1551** as shown

VAG Self Diagnosis	HELP
2 Flash code output	

Note

*For additional operating instructions push the **HELP** key.*

If no display appears, check the voltage supply to the tester.

The ➡ key advances the program to the next display.

Volkswagen B3 Passat

Diagnosis, Fault Memory - Passat

Reading/erasing Fault memory using VAG 1551 (Page D3-40-1)

After connecting the tester the following operating modes appear alternately:

1 Rapid data transfer

and

2 Blink code output

Note

Press the **PRINT** button for a complete printout of fault functions.

- select operating mode **1**, Rapid data transfer
- switch ignition **ON**

Rapid data transfer	HELP
Insert address word XX	

- read display:
- press keys **0** and **2** (this selects program **02** for "transmission electronics")

Rapid data transfer	Q
02 transmission electronics	

- read display:
- press **Q** key to enter input

095927731 F Digimat	0569
Code 127	WSC131071

- read display showing **ECU** identification
- establish E-prom level of Digimat ECU installed in vehicle by noting four-digit number following word "Digimat"
 - press ➡ key

ECU does not respond!	HELP
-----------------------	------

If display appears as shown

- press **HELP** key to print out a list of possible faults (after eliminating causes of failure, input **02** address word again)

Note

If **ECU does not respond!** appears again:

- check for open circuits on diagnosis connector - see wiring diagram
- see fault chart under fault code **65535** - control unit defective

Volkswagen B3 Passat

Diagnosis, Fault Memory - Passat

Reading/erasing Fault memory using VAG 1551 (Page D3-40-2)

Rapid data transfer Select function xx	HELP
---	------

- read display
- press **0** and **2** key (this selects program **02** for checking Fault memory)

Rapid data transfer 02 Check fault memory	Q
--	---

- read display
- press **Q** key to enter input

2 faults recognized! (Example)

- read display showing number of faults
or

No fault recognized! (Example)

The stored faults are indicated and printed out one after another

- after last fault has been displayed, press ➡ key
- eliminate faults per fault chart, [section D3-50](#)

Rapid data transfer Select function XX	HELP
---	------

- read display
- press **0** and **5** key (this selects program **05** for erasing Fault memory)

Rapid data transfer 05 Erase Fault memory	Q
--	---

- read display
- press **Q** key to enter input

Note

*If the engine is started or the ignition switched **OFF** between reading and erasing the Fault memory, no erasure of the memory will take place. Remember to read the Fault memory first, then erase*

Rapid data transfer Fault memory is erased

- read display
 - Fault memory is now erased

Note

After reading and erasing the Fault memory, road test the vehicle and recall the Fault memory again.

*When reading the Fault memory again, "**No fault recognized**" must appear*

- press ➡ key

Volkswagen B3 Passat
Diagnosis, Fault Memory - Passat
Fault code troubleshooting chart (Page D3-50-1)

Fault code troubleshooting chart

Listed below are all the possible transmission faults that can be recognized by the automatic transmission ECU (**J 217**) and displayed by the **VAG 1551** Diagnostic Tester.

If faults occur only occasionally or if the Fault memory was not erased after elimination of the fault, those faults will be displayed as sporadically occurring faults. Sporadic faults are shown with an "SP/" at the right side of the display.

If defective components are found, also check the wiring to the components for short or open circuits using the wiring diagram.

Volkswagen B3 Passat
Diagnosis, Fault Memory - Passat
Fault code troubleshooting chart (Page D3-50-2)

VAG 1551 display Fault code/Blink code	Possible causes	Repair
0000 4444 No fault recognized	If after repair "no fault" appears, self-diagnosis has ended. If after repair, transmission does not function properly, conduct repairs per repair manual	
00258 1113 Solenoid valve 1 N 88 open circuit short to ground	Open circuit or short circuit in wiring (K1 clutch, reverse gear brake B1) Defective solenoid valve 1	Check wiring, connections and solenoid test step no. 6* Replace valve body
00260 1121 Solenoid valve 2 N 89 open circuit short to ground	Open circuit or short circuit in wiring (B2 brake) Defective solenoid valve 2	Check wiring, connections and solenoid test step no. 7* Replace valve body
00262 1123 Solenoid valve 3 N 90 open circuit short to ground	Open circuit or short circuit in wiring (K3 clutch) Defective solenoid valve 3	Check wiring, connections and solenoid test step no. 8* Replace valve body
00263 1124 Transmission 0107	Mechanical/hydraulic fault Defective clutch or valve body	Read measuring value block in whichever gear fault occurs Replace valve body or clutch
00264 1131 Solenoid valve 4 N 91 open circuit short to ground	Open circuit or short circuit in wiring (K2 clutch) Defective solenoid valve 4	Check wiring, connections and solenoid test step no. 9* Replace valve body
00266 1133 Solenoid valve 5 N 92 open circuit short to ground	Open circuit or short circuit in wiring (B1 brake) Defective solenoid valve 5	Check wiring, connections and solenoid test step no. 10* Replace valve body
00268 1141 Solenoid valve 6 N 93 open circuit short to ground	Open circuit or short circuit in wiring (Modulator valve — main pressure in valve body) Defective solenoid valve 6	Check wiring, connections and solenoid Read measuring valve test step no. 11* Replace valve body

* See [section D3-100](#), Electrical testing.

Volkswagen B3 Passat
Diagnosis, Fault Memory - Passat
Fault code troubleshooting chart (Page D3-50-3)

VAG 1551 display Fault code/Blink code	Possible causes	Repair
00270 1143 Solenoid valve 7 N 94	Open circuit or short circuit in wiring (valve body pressure) Defective solenoid valve 7	Check wiring, connections and solenoid test step no. 12* Replace valve body
00281 1231 Vehicle speed sensor G 68 No signal	Open circuit in wiring Defective vehicle speed sensor	Check wiring, connections and speed sensor Read measuring value test step no. 15* Replace vehicle speed sensor
00293 1314 Multifunction switch F 125	Open circuit in wiring Defective multifunction switch	Check wiring and connections Read measuring value test step no. 5* Replace multifunction switch
00296 1323 Kickdown switch F 8	Open circuit in wiring Defective throttle valve potentiometer Defective kickdown switch	Check wiring and connections Read measuring value test step no. 14* and check throttle valve potentiometer test step no. 2* Replace accelerator cable
00299 1332 Trans-program switch E 122 short circuit	Short circuit Defective program switch	Check wiring and connections Read measuring value test step no. 16** Replace program switch
00300 1333 ATF temperature sender G 93 No fault code recognized	Open circuit Defective ATF temperature sender	Check wiring and connections Read measuring value test step no. 17* Replace valve body
00526 2131 Brake light switch F No fault identified	Open circuit Defective brake light switch	Check wiring and connections Read measuring value block test step no. 4* Replace brake light switch

* See [section D3-100](#), Electrical testing.

Volkswagen B3 Passat
Diagnosis, Fault Memory - Passat
Fault code troubleshooting chart (Page D3-50-4)

VAG 1551 display Fault code/Blink code	Possible causes	Repair
00529 2122 Engine speed signal missing	Open circuit	Check wiring and connections Check engine ECU
00518 2212 Throttle valve potentiometer G 69	Open circuit or short circuit Defective throttle valve potentiometer	Check wiring and connections Read measuring value Test step no. 2* Replace throttle valve potentiometer Return system to basic setting
00532 2234 Supply voltage Voltage for all values too low	Defective battery Supply voltage NOT OK	Check battery voltage, replace if necessary Read individual measuring values Check supply voltage to ECU (J 217) Test step no. 1
00596 Short between solenoid wires	Break in wiring or short to ground	Check wiring and connections Perform Test Steps 6 through 12 and number 17
01236 4314 Selector lever lock solenoid N 110 Open circuit* short to ground*	Open circuit or short circuit in wiring Defective interlock solenoid switch	Check wiring, connections and solenoid Test step no. 3* and 12* Replace shift interlock solenoid switch
00545 2314 Engine/transmission electrical connection	Open circuit or short circuit in wiring No connection between engine/transmission control unit	Check wiring and connections Read individual measuring values If necessary, replace engine control unit Return system to basic setting
65535 1111 Control unit (J 217)	Electrical interferences from outside sources or poor ground connection Defective control unit	Check wiring and connections Test step no. 1* Replace control unit if necessary Return system to basic setting

* See [section D3-100](#), Electrical testing.

Note

Replace the control unit and return system to basic setting only after determining and eliminating all possible mechanical and hydraulic faults.

Volkswagen B3 Passat
Diagnosis, Fault Memory - Passat
Fault code troubleshooting chart (Page D3-50-5)

VAG 1551 display Fault code/Blink code	Possible causes	Repair
00638 N/A Engine/transmission electrical connection 2 *Break *Short to ground	Break in wiring or short to ground Engine/transmission control unit disconnected	Check wires and terminal connections Read measuring value block, see page D3-75-1 If necessary replace engine control unit, see Repair Group 24 Return system to basic setting, see page D3-70-1
00641 N/A ATF — Temperature Signal too large	Transmission fluid temperature exceeds max. of 148°C (299°F) Towing load of vehicle too high ATF-level not OK Note If ATF — temperature too high, transmission will switch into next lowest gear	Check ATF level Read measuring value block and read ATF temperature, see page D3-80-1
00652 N/A Gear monitoring Implausible sound	Electrical/hydraulic fault Clutch or valve body defective	Read measuring value block to determine in which gear the fault occurs, see page D3-80-1 Replace valve body, see Repair Group 38 Replace clutch, see Repair Group 37
00660 N/A Kickdown switch/throttle potentiometer Implausible signal	Break in wiring Throttle potentiometer (G 69) defective Kickdown switch (F8) defective	Check wiring and connectors Read measuring value block, see page D3-75-1 See page D3-100-3 , perform test step 14 and throttle potentiometer test step 2 Adjust or replace accelerator cable, see Repair Group 20, Fuel supply

* One of these indicators will appear in addition to display.

Volkswagen B3 Passat

Diagnosis, Fault Memory - Passat

Erasing Fault memory using VAG 1551 (Page D3-60-1)

Requirements

- Fault memory has been read and any faults eliminated

Rapid data transfer
Select function xx

- read display:
- press **0** and **5** key (this selects the program **05** for clearing the Fault memory)
- enter input with **Q** key

Rapid data transfer
Erase Fault memory

- read display:
- if the ignition was switched **OFF** or the engine allowed to run between Fault memory reading and erasing, the display will read:

Attention!
Fault memory was not interrogated

and Fault memory must be read and erased again

- after erasing Fault memory, test drive vehicle and repeat self diagnosis procedure by reading Fault memory; following must be displayed:

No fault recognized

- press ➡ key

Volkswagen B3 Passat

Diagnosis, Fault Memory - Passat

Automatic transmission 096, returning to basic setting (Page D3-70-1)

Rapid data transfer	HELP
Select function XX	

- with system in program **02** for transmission electronics, read display:
- press **0** and **4** key (this selects program **04** for "basic setting")

Rapid data transfer	Q
04 Start basic setting	

- read display
- press **Q** key to enter input

Start basic setting	HELP
Input display group number	XX

- read display (appears with program card /2 only)
- press key **0** and **0**
- push accelerator pedal to kickdown position and hold for three seconds
- release accelerator pedal and press **Q** key

System in basic setting

- read display
- press ➡ key

The system is now returned to the basic setting.

Volkswagen B3 Passat

Diagnosis, Fault Memory - Passat

Measuring value block, reading (Page D3-75-1)

(E-prom level: up to 0508)

Rapid data transfer	HELP
Select function	XX

- read display
- press keys **0** and **8** (this selects function **08** for reading measuring value block)

Rapid data transfer	Q
08	read measuring value block

- read display
- press **Q** key to enter input

Read measuring value block	HELP
Input display group number	XX

- read display
- press **0** key two times
- press **Q** key to enter input


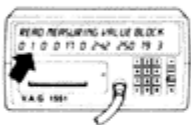


Read measuring value block
0 1 0 0 17 0 242 250 19 3

- read display

The ten value readouts shown correspond in order to the ten **channel** numbers in the chart that follows this page.

- observe values shown on tester and compare with values in chart
- if specified values appear in all channels press ➡ key; problem has not been found using this test sequence
- if specified values are not observed, conduct return to basic setting (see [section D3-70](#) in Repair Manual) and follow instructions in chart for further testing to locate source of problem (see Repair Manual [section D3-100](#) for electrical test steps)

Volkswagen B3 Passat
Diagnosis, Fault Memory - Passat
Measuring value block, reading (Page D3-75-2)






Channel number	Designation	Conditions	VAG 1551 display value	If specified value NOT obtained
1 	Road speed	transmission in D	driven speed in Km/h	Speedometer and VAG 1551 readings may deviate slightly
2 	Throttle potentiometer	engine OFF idle position full throttle position	0-2 253-255	1. Check position of throttle 2. Adjust throttle potentiometer or accelerator cable — replace if necessary 3. Return system to basic setting
3 	Multifunction switch	vehicle stationary, engine OFF , selector lever in: N, P D, 3, 2, 1 R	0 1 255	Check multifunction switch (F 125)
4 	Selector lever position	selector in position: 1 2 3 D R N, P	1 2 3 or 4 5 255 0	1. Check multifunction switch (F 125) 2. Note test step 5*

* See section [D3-100](#), electrical test steps.

** The readout "4" indicates shift range 3 mechanical, readout "5" indicates shift range 4 mechanical

Volkswagen B3 Passat
Diagnosis, Fault Memory - Passat
Measuring value block, reading (Page D3-75-3)


Measuring value block (continued)

Channel number	Designation	Conditions	VAG 1551 display value	If specified value not obtained
5 		not currently used	ignore readout displayed in this channel	—
6 		not currently used	ignore readout displayed in this channel	—
7 	Switch inputs to ECU	vehicle stationary and selector lever in D	original value: min. 240 max. 254	
		depress brake pedal	+ 1 from original value	Note test step 4*
		depress accelerator pedal to kickdown	– 32 from original value	Note test step 14*
		press “S” switch and hold momentarily	– 16 from original value	Note test step 16*
8 		not currently used	ignore readout displayed in this channel	—
9 	Throttle potentiometer G 69 input to ECU	vehicle stationary, engine OFF	no throttle min. 8	When accelerating, numerical value must increase consistently. If numerical value decreases replace throttle potentiometer
		full throttle	max. 240 Note 0 to 255 corresponds to a range of 0 to 5 volts.	

* See section [D3-100](#), electrical test steps.

Volkswagen B3 Passat
 Diagnosis, Fault Memory - Passat
 Measuring value block, reading (Page D3-75-4)

Measuring value block (continued)

Channel number	Designation	Conditions	VAG 1551 display value	If specified value not obtained
10 	Engine RPM	vehicle stationary, engine running at idle Note To obtain this reading, reprogram tester to 08 after starting engine. The display goes blank over 2000 RPM and returns to " Select function XX " or shows " No signal from control unit "	28 (at idle) Note 28 corresponds to 840 RPM which is 1 = 30 RPM	If necessary, adjust per Repair Manual

Volkswagen B3 Passat

Diagnosis, Fault Memory - Passat

Function 08, Measuring value block, reading (Page D3-80-1)

E-prom level: 0509 or above

Rapid data transfer Select function xx	HELP
---	------

- with system in program **02** for transmission electronics, read display
- press keys **0** and **8** (this selects function **08** for reading measuring value block)

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

- read display
- press **Q** key to enter input

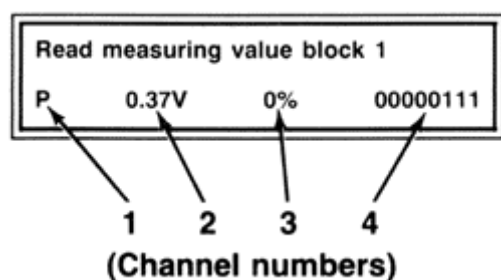
Read measuring value block Input display group number XX	HELP
---	------

- read display

Note

The measuring block values can only be read with the tester program card /2 installed.

- press keys **0** and **1** (this selects group number **01** and displays values corresponding to group **01** in following chart)



- press **Q** key to enter input
- read display
- press ➡ key
- repeat group number entry for remaining groups (**02** through **05**) and press **print** key after each new display appears to print a record of diagnosis

Note

*Press keys **0** and **8** again before entering the next group number.*

- see specified values on following pages
- if specified values appear on all channels press ➡ key; the problem has not been found using this test sequence
- if specified values are not observed, conduct return to basic setting and follow instructions in chart for further testing

Volkswagen B3 Passat

Diagnosis, Fault Memory - Passat

Function 08, Measuring value block, reading (Page D3-80-2)

Measuring value block, overview

Read measuring value block	1	Group number	Channel number	Designation
P 0.39V 0% 00100111		01	1	Selector lever position
			2	Throttle valve potentiometer voltage
			3	Accelerator pedal
			4	Switch positions
Read measuring value block	2	02	1	Actual current of solenoid valve 6, (N 93)
0.983A 0.996A 12.00V 2.48V			2	Specified current of solenoid valve 6, (N 93)
			3	Battery voltage
			4	Voltage at vehicle speed sensor, (G 68)
Read Measuring value block	3	03	1	Vehicle speed
0 km/h 90/min 0 0%			2	Engine RPM
			3	Drive range
			4	Accelerator pedal value
Read measuring value block	4	04	1	Shift valves
1001 00 0 P 0km/h			2	Drive range
			3	Selector lever position
			4	Vehicle speed
Read measuring value block	5	05	1	ATF temperature
37°C 0011001 0 90/min			2	Switch openings
			3	Drive range
			4	Engine RPM

Note

Group numbers **01**, **02**, **03** and **05** are to be used for diagnosis.

Group number **04** is for reference only.

Volkswagen B3 Passat
Diagnosis, Fault Memory - Passat
Function 08, Measuring value block, reading (Page D3-80-3)

Measuring block values

Group number	Channel number	Test requirements		VAG 1551 display (specified value)	If test results NOT within specifications
01	1 Multi-function switch	vehicle stationary, selector lever in:	P	P	Check multifunction switch (F 125) VAG 1598 test step 5*
			R	R	
			N	N	
			D	D	
			3	3	
			2	2	
			1	1	
	2 Throttle potentiometer	vehicle stationary	idle	min. 0.156 Volts	When accelerating from closed throttle to full throttle, the voltage value must increase
			full throttle	max. 4.680 Volts	
	3	vehicle stationary	idle	0 to 1%	Check throttle valve potentiometer (G 69) The % value must increase If adjusted or replaced return system to basic setting
			full throttle	99 to 100%	
	4 Inputs to Digimat ECU	1 Brake	activated	1	VAG 1598 test step 4*
			not activated	0	
		2 Limited-slip control	activated	1	Not applicable
			not activated	0	
		3 Program switch	activated	1	VAG 1598 test step 16*
			not activated	0	
		4 Kickdown switch	activated	1	VAG 1598 test step 14*
			not activated	0	
		5 Selector lever	R, N, D, 3, 2	1	Check multifunction switch (F 125)
			P, 1	0	
		6 Selector lever	P, R, 2, 1	1	VAG 1598 test step 5*
			N, D, 3	0	
		7 Selector lever	P, R, N, D	1	
			3, 2, 1	0	
		8 Selector lever	P, R, N	1	
			D, 3, 2, 1	0	

* See [section D3-100](#), Electrical test steps.

Volkswagen B3 Passat

Diagnosis, Fault Memory - Passat

Function 08, Measuring value block, reading (Page D3-80-4)

Group number	Channel number	Test requirements	VAG 1551 display (specified value)	If test results NOT within specifications
02 Modulator valve	1	full throttle	min. 0.0 Amps	VAG 1598 test step 11*
		vehicle stationary idle	max. 1.1 Amps	
	2	full throttle	min. 0.0 Amps	
		vehicle stationary idle	max. 1.0 Amps	
03 Inputs from ECU to valve body	3	vehicle stationary	min. 10.8 Volts max. 16 Volts	Check battery, replace if necessary
	4	vehicle stationary	min. 2.20 Volts max. 2.52 Volts	VAG 1598 test step 15*
	1	in driving mode**	driven speed in km/h	Speedometer and VAG 1551 readings may deviate slightly
	2	engine running	engine RPM	Adjust per repair manual, see Engine section
	3	neutral	O	Check solenoid valves VAG 1598 test steps 6* to 12*
		reverse	R	
		1 (hydraulic)	1	
		2 (hydraulic)	2	
		3 (hydraulic)	3H	
		3 (mechanical)	3M	
		4 (mechanical)	4	
	4	idle	0 to 1	Check throttle valve potentiometer (G 69) The % value must increase If adjusted or replaced return system to basic setting
		in driving mode** full throttle	99 to 100	

* See [section D3-100](#), Electrical test steps.

** **CAUTION!**

Use a second person to read displayed values when in the driving mode.

Note

When test conditions specify "in driving mode," the selector lever handle and cover assembly must be removed and the handle reinstalled. After testing reinstall the cover assembly and secure the handle set screw with **AMV 200 000**.

Volkswagen B3 Passat

Diagnosis, Fault Memory - Passat

Function 08, Measuring value block, reading (Page D3-80-5)

Group number	Channel number	Test requirements	VAG 1551 display (specified value)	If test results NOT within specifications
04	1 Valve actuation	in driving mode**		Individual solenoid valves will be switched depending on drive condition VAG 1598 test steps 6* to 10* and 12*
		switched	1	
		(N 88) not switched	0	
		switched	1	
		(N 89) not switched	0	
		switched	1	
		(N 90) not switched	0	
		switched	1	
		(N 91) not switched	0	
		switched	1	
		(N 92) not switched	0	
		switched	1	
		(N 94) not switched	0	
	2 Signal to solenoid valves	neutral	O	Check solenoid valves VAG 1598 test steps 6* to 12*
		reverse	R	
		1 (hydraulic)	1	
		2 (hydraulic)	2	
		3 (hydraulic)	3H	
		3 (mechanical)	3M	
		4 (mechanical)	4	
	3 Multi-function switch	P	P	Check multifunction switch (F 125) VAG 1598 test step 5*
		R	R	
		N	N	
		D	D	
		3	3	
		2	2	
		1	1	
	4	in driving mode**	driven speed in km/h	Speedometer and VAG 1551 readings may deviate slightly

* See [section D3-100](#), Electrical test steps.

** **CAUTION!**

Use a second person to read displayed values when in the driving mode.

Volkswagen B3 Passat

Diagnosis, Fault Memory - Passat

Function 08, Measuring value block, reading (Page D3-80-6)

Group number	Channel number	Test requirements	VAG 1551 display (specified value)	If test results NOT within specifications
05	1	vehicle stationary with engine running	°C (display appears at approximately 60°C)	Check ATF level at a temperature of 60° to 80°C VAG 1598 test step 17*
	2 Engine management	in driving mode** (1-7) 1-2 <div>0 0 1 1 0 0 1</div> <p>These two binary digits represent the signal level of the output of the Digimat ECU and the input to the CIS-E Motronic ECU that controls the firing angle retard when the transmission is shifting. These digits should always be the same. "1" when the transmission is shifting and "0" at all other times. This condition occurs very rapidly so when everything is working properly a change in level from 0 to 1 will probably not be seen. An error in this signal for a minimum of two seconds will cause a fault to be stored in the Digimat ECU.</p>		Check harness routing per wiring diagram Replace engine or transmission control unit (J 217)
	Shift lock solenoid	3-4 <div>0 0 1 1 0 0 1</div> <p>These two binary bits indicate the status of the signal to the shift lock solenoid. Both bits should be the same for correct operation of the system. A "1" indicates the lock is engaged and a "0" indicates disengagement. This signal will activate when the brake is depressed.</p>		Check harness routing per wiring diagram Replace solenoid for shift lock VAG 1598 test step 3*
	Cruise control power	5 <div>0 0 1 1 0 0 1</div> <p>This binary bit indicates when power is applied to the cruise control ECU. When the vehicle speed first exceeds 30 km the Digimat ECU turns on the power to the cruise control this is indicated by a "1". This bit will remain at "1" until the ignition switch is recycled off and on.</p>		Check cruise control wiring

* See [section D3-100](#), Electrical test steps.

** See "CAUTION" note on previous page.

Volkswagen B3 Passat

Diagnosis, Fault Memory - Passat

Function 08, Measuring value block, reading (Page D3-80-7)

Group number	Channel number	Test requirements	VAG 1551 display (specified value)	If test results NOT within specifications
	Air conditioning clutch	0 0 1 1 0 0 1 This binary bit indicates when the Digimat ECU disengages the air conditioning compressor clutch. When the clutch is disengaged the bit will be a "1". This can be observed by depressing the pedal to kickdown while driving. This bit is normally a "0".		Check harness routing per wiring diagram Check air conditioning per repair manual
	Ⓐ ECO/Sport mode (1990) -or- Ⓑ Selector lever position (1991)	0 0 1 1 0 0 1 Ⓐ ECO/Sport mode (model year 1990) This binary bit indicates the status of the ECO/Sport mode for model year 1990 only Ⓑ Shift lever position (model year 1991) This binary bit indicates the shift lever position in model year 1991 vehicles P, N = 1 R, D, 3, 2, 1, = 0		See Group 01, channel 1
	3 Signals to valve body	in driving mode**	neutral O reverse R 1 (hydraulic) 1 2 (hydraulic) 2 3 (hydraulic) 3H 3 (mechanical) 3M 4 (mechanical) 4	If shifting does not occur, clutch or brake may be defective Replace control unit (J 217) VAG 1598 test step 12*
	4 Engine RPM	in driving mode**	Engine RPM	Check engine specifications

* See [section D3-100](#), Electrical test steps.

CAUTION!

Use a second person to read displayed values when in the driving mode.

Volkswagen B3 Passat

Diagnosis, Fault Memory - Passat

Function 09, Individual measuring values, reading (Page D3-90-1)

E-prom level: 0509 or above

Rapid data transfer Select function XX	HELP
---	------

- with system in program **02** for transmission electronics, read display:
- press keys **0** and **9** (this selects function **09** for reading individual test values)

Rapid data transfer 09 Read individual measuring value	Q
---	---

- display reads
- press **Q** key to enter input

Read individual measuring value Feed in channel number XX
--

- display reads:
- press keys to input channel number of desired readout:
 - 00** test opening for solenoid valves (**N 88, N 89, N 90**) (not currently used)
 - 01** test opening for solenoid valves (**N 91, N 92, N 94**) (not currently used)
 - 02** voltage for transmission speed sender
 - 03** ATF temperature
 - 04** test opening for solenoid valve (**N 93**)
 - 05** battery voltage
 - 06** not used
 - 07** voltage of throttle potentiometer
- press **Q** key to enter input

Read individual measuring value Channel 03 measuring value 2

- display reads:

Note

*Press keys **0** and **9** again before entering the next channel number.*

- see specified values on following pages
- if specified values are obtained, press ➡ button

Volkswagen B3 Passat

Diagnosis, Fault Memory - Passat

Function 09, Individual measuring values, reading (Page D3-90-2)

Individual measuring values

Channel number	Designation	Conditions	VAG 1551 display value	If specified value not obtained
00	Test opening for solenoid valves (N 88, N 89, N 90)	not currently used	—	—
01	Test opening for solenoid valves (N 91, N 92, N 94)	not currently used	—	—
02	Transmission speed sender (G 68)	vehicle stationary	minimum 112 maximum 133	VAG 1598 test step 15*
03	ATF temperature	vehicle stationary with engine running		The ATF temperature must be 60-80°C when checking the ATF level VAG 1598 test step 17*
		approximately 20°C	2	
		approximately 60°C	12	
		approximately 80°C	24	
04	Solenoid valve 6 (N 93)	full throttle	minimum 0 maximum 10	VAG 1598 test step 11*
	Modulator valve	idle	minimum 220 maximum 240	
05	Battery voltage	maximum 16V	255	Check battery and replace if necessary
		minimum 10.8V	172	
06	Not used	—	—	—
07	Throttle potentiometer (G 69)	full throttle	maximum 240	VAG 1598 test step 2*
		idle	minimum 8	

* See [section D3-100](#), Electrical test steps.

Volkswagen B3 Passat

Diagnosis, Fault Memory - Passat

Automatic transmission 096, troubleshooting using electrical test steps (Page D3-100-1)

Testing equipment

- **VAG 1598**, Test box
- **VAG 1598/9**, adaptor
- **US 1119**, multi-meter

Testing

Perform only those recommended test steps from the fault chart, [section D3-50](#) (indicated *)

Requirements

- battery voltage **OK**
- fuse **14** and **21 OK**
- ground connections on transmission and at left of relay plate **OK**
- switch **OFF** ignition for all test steps
- disconnect multi-point connections from transmission ECU
- connect Test box **VAG 1598** and adaptor **VAG 1598/9** to the harness connector and ECU (**J 217**):
 - voltage test** - connect adaptor
VAG 1598/9 to ECU
 - resistance test** - disconnect adaptor
VAG 1598/9 from ECU
- ECU ground connections **OK**

CAUTION!

Switch multi-meter to appropriate range before connecting.

Note

*The sockets on the Test box **VAG 1598** are identical with the pin designations on the ECU (**J 217**).*

Volkswagen B3 Passat

Diagnosis, Fault Memory - Passat

Automatic transmission 096, troubleshooting using electrical test steps (Page D3-100-2)

- 1 Ground (terminal **31**)
- 2 Solenoid valve **4**, (**N 91**)
- 3 Solenoid valve **3**, (**N 90**)
- 4 not used
- 5 Park/neutral signal
- 6 K-wire of diagnosis
- 7 not used
- 8 Kickdown for A/C
- 9 Throttle valve potentiometer, (**G 69**), signal voltage
- 10 Throttle valve potentiometer, (**G 69**), voltage supply, 5 volt
- 11 not used
- 12 Bulb for program switch, (**E 122**) or selector lever display
- 13 Speed sensor, (**G 68**), shielding
- 14 L-wire of diagnosis
- 15 Multi-function switch, (**F 125**)
- 16 Multi-function switch, (**F 125**)
- 17 Kickdown switch, (**F 8**)
- 18 Supply voltage for solenoid valve
- 19 Supply voltage (terminal **15**)
- 20 Shift lock solenoid, (**N 110**)
- 21 Solenoid valve **7**, (**N 94**)
- 22 Solenoid valve **1**, (**N 88**)
- 23 Solenoid valve **2**, (**N 89**)
- 24 Solenoid valve **5**, (**N 92**)
- 25 Solenoid valve **6**, (**N 93**)
- 26 Brake light switch, (**F**)
- 27 Gas engine - engine speed sensor
- 28 Gas engine - ignition timing reference
- 29 Throttle valve potentiometer, (**G 69**), ground
- 30 ATF temperature
- 31 ATF temperature
- 32 Speed sensor, (**G 68**)
- 33 Speed sensor, (**G 68**)
- 34 Multi-function switch, (**F 125**)
- 35 Multi-function switch, (**F 125**)
- 36 Program switch, (**E 122**)
- 37 Idle switch
- 38 Cruise control

Volkswagen B3 Passat

Diagnosis, Fault Memory - Passat

Automatic transmission 096, troubleshooting using electrical test steps (Page D3-100-3)

Voltage tests

Test step	VAG 1598 terminals	Component to be tested	● Test conditions and additional steps	Specified value or results	If test results NOT within specs
1	19 + 1	Transmission ECU (J 217) voltage supply	● switch ignition ON	Battery voltage (approx.)	Check wire from terminal 1 to ground Check wire from terminal 19 for continuity with D/8 in relay panel
2	10 + 29	Throttle valve potentiometer (G 69)	● switch ignition ON ● disconnect throttle valve potentiometer no throttle full throttle	4.6 to 5 Volts	Replace ECU Return system to basic setting
	0.3 Volts (min.)			Calibrate throttle valve potentiometer; replace if necessary (see engine section)	
	4.5 Volts (max.)			Return system to basic setting	
3	19 + 20	Solenoid switch (N 110) for shift interlock	● switch ignition ON ● selector lever in P or N brakes applied	Battery voltage (approx.)	Replace ECU Return system to basic setting
				0 Volts	Check signal from brake light switch (F) — see test step no. 4. Replace ECU if necessary Return system to basic setting
4	26 + 1	Signal from brake light switch (F)	● switch ignition ON do NOT apply brakes brakes applied	0 Volts	Check brake light switch and wiring per wiring diagram
				Battery voltage (approx.)	

Volkswagen B3 Passat

Diagnosis, Fault Memory - Passat

Automatic transmission 096, troubleshooting using electrical test steps (Page D3-100-4)

Resistance tests

Test step	VAG 1598 terminals	Component to be tested	• Test conditions and additional steps	Specified value or results	If test results NOT within specs
5	34 + 1	Multi-function switch (F 125)	• switch ignition ON move selector lever to positions N, D, and 3	4.5 to 5 Volts	Check wire routing per wiring diagram Replace multifunction switch
	15 + 1		move selector lever to position P and 1	0 to 0.8 Volts	
			move selector lever to position P, R, 2 and 1	4.5 to 5 Volts	
			move selector lever to position N, D and 3	0 to 0.8 Volts	
	35 + 1		move selector lever to position P, R, N and D	4.5 to 5 Volts	
			move selector lever to position 3, 2, and 1	0 to 0.8 Volts	
	16 + 1		move selector lever to position P, R, and N	approximate battery voltage	
			move selector lever to position D, 3, 2 and 1	0 to 0.8 Volts	
6	22 + 18	Solenoid valve 1 (N 88)	• switch ignition OFF	55-65 Ohms	Check harness per wiring diagram
	22 + 1		control unit (J 217) removed	∞ Ohms	Replace valve body
7	23 + 18	Solenoid valve 2 (N 89)	• switch ignition OFF	55-65 Ohms	Check harness per wiring diagram
	23 + 1		control unit (J 217) removed	∞ Ohms	Replace valve body

Volkswagen B3 Passat

Diagnosis, Fault Memory - Passat

Automatic transmission 096, troubleshooting using electrical test steps (Page D3-100-5)

Resistance tests

Test step	VAG 1598 terminals	Component to be tested	● Test conditions and additional steps	Specified value or results	If test results NOT within specs
8	3 + 18	Solenoid valve 3 (N 90)	● switch ignition OFF ECU (J 217) disconnected	55-65 Ohms	Check harness routing per wiring diagram
	3 + 1			∞ Ohms (open)	Replace valve body
9	2 + 18	Solenoid valve 4 (N 91)	● switch ignition OFF ECU (J 217) disconnected	55-65 Ohms	Check harness routing per wiring diagram
	2 + 1			∞ Ohms (open)	Replace valve body
10	24 + 18	Solenoid valve 5 (N 92)	● switch ignition OFF ECU (J 217) disconnected	55-65 Ohms	Check harness routing per wiring diagram
	24 + 1			∞ Ohms (open)	Replace valve body
11	25 + 18	Solenoid valve 6 (N 93)	● switch ignition OFF ECU (J 217) disconnected	4.5-6.5 Ohms	Check harness routing per wiring diagram
	25 + 1			∞ Ohms (open)	Replace valve body
12	21 + 18	Solenoid valve 7 (N 94)	● switch ignition OFF ECU (J 217) disconnected	55-65 Ohms	Check harness routing per wiring diagram
	21 + 1			∞ Ohms (open)	Replace valve body
13	19 + 20	Solenoid switch (N 110) for shift interlock	● switch ignition OFF ECU (J 217) disconnected	14-25 Ohms	Check harness routing per wiring diagram Replace magnet for shift interlock
14	1 + 17	Kickdown switch (F 8)	● switch ignition OFF ● ECU (J 217) disconnected do NOT press accelerator pedal depress accelerator fully	∞ Ohms (open)	Check harness routing per wiring diagram Adjust or replace accelerator cable
				less than 1.5 Ohms	

Volkswagen B3 Passat

Diagnosis, Fault Memory - Passat

Automatic transmission 096, troubleshooting using electrical test steps (Page D3-100-6)

Resistance tests

Test step	VAG 1598 terminals	Component to be tested	• Test conditions and additional steps	Specified value or results	If test results NOT within specs
15	32 + 33	Vehicle speed sensor (G 68)	<ul style="list-style-type: none"> • switch ignition OFF • ECU (J 217) disconnected • set US 1119 to 2 k Ohm scale 	800 to 830 Ohms	Check harness routing per wiring diagram Replace vehicle speed sensor
16	36 + 1	Program switch (E 122)	<ul style="list-style-type: none"> • switch ignition OFF • ECU (J 217) disconnected Program switch not activated	∞ Ohms (open)	Check harness routing per wiring diagram Replace program switch
			Program switch activated	less than 1.5 Ohms	
17	30 + 18	ATF temperature sensor (G 93)	<ul style="list-style-type: none"> • switch ignition OFF • ECU (J 217) disconnected set US 1119 to 2 Meg Ohm scale ATF temperature (approx.) 20°C (68°F) Set US 1119 to 200 k Ohm scale ATF temperature 60°C (140°F) ATF temperature 120°C (216°F)	0.247 Meg Ohm Approx 48,800 Ohms Approx 7400 Ohms	Check harness routing per wiring diagram Replace ATF temperature sensor