

# <u>Golf 1998</u> ≻

Automatic gearbox 01M self-diagnosis									
Gearbox ID	DMN	DMP	DTB	DTH	DQE	DYQ	DVH	DVJ	DVK
	ECN	ECK	ECM	ECP	ECQ	ECR	EFB	ECV	ENZ
	ELS	ELT	ERX	ELU	ELV	ELW	ELY	ELZ	ESE
	EPA	EPB	EPC	ESF	ESJ	FDH	EPJ	FCZ	FDA
	FDB	FDC	FDD	FDE	FDF	FDG	EPK	EPL	EPD
	EPS	EPN	EPP	ECT	ERQ	EPH	EPG		

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Automatic gearbox 01M self-diagnosis

Repair Group

01 - Self-diagnosis, Electrical check

Technical information should always be available to the foremen and mechanics, because their careful and constant adherence to the instructions is essential to ensure vehicle road-worthiness and safety. In addition, the normal basic safety precautions for working on motor vehicles must, as a matter of course, be observed.

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## 01 - Self-diagnosis, Electrical check

### 1 - Self-diagnosis function

### 1.1 - Self-diagnosis function

The automatic gearbox is controlled electro-hydraulically.

The term "self-diagnosis" is specifically for the electronic/electric control.

### Additional information

- ◆ Workshop Manual Golf 1998 ◆, Automatic gearbox 01M
- Self-study programmes No.172, 186.

### Control unit -J217- with driving situation gear changes (Fuzzy Logic)

Determining the driving situation and driving resistance dependent gear change point happens automatically.

#### Advantages:

- · Gear changes will be consumption orientated
- Maximum engine output is always available
- Individual adaption of gear change points in all driving situations
- Gear change points are infinitely variable

#### Gear change point variations for gradients

An additional gear change map automatically selects gear changes for gradients dependent upon accelerator pedal position and driving speed.

- Gear change map for extreme uphill stretches is matched to engine output
- Gear change map for extreme downhill stretches is matched to the braking effect of the engine

#### Vehicles with data BUS

Comprehensive information on the "data bus" is given in self study programme No. 186.

Advantages:

- Rapid data transfer between the control units
- Less wiring in vehicle

#### Safety functions of gearbox control unit

The automatic control unit -J217- receives information from components that effect selection of gears and passes the information on to solenoid valves that control the valves in the valve body.

The control unit is equipped with a fault memory so that in the event of an electronic/electrical component failure or on open circuit the fault can be determined quickly. Fault are recognized by electrical signals and stored in the fault memory.

If faults occur in the monitored sensors or components, these are stored in the memory together with an indication of the type of fault.

Faults which only occur once, are known as sporadic faults (temporary). Sporadic faults are additionally identified as such.



After analysing the information the automatic gearbox control unit distinguishes between sporadic and static (permanent) faults => Fault table, from page 21 and stores these.

If faults do not reoccur within min. 5 km (3 miles) or 6 minutes max. 20 km (12 miles) or 24 minutes, they are stored as sporadic faults.

Electrical faults that affect vehicle performance can be determined with the fault reader V.A.G 1551.

The possibilities offered by self-diagnosis can only be fully exploited with operating mode 1 "Rapid data transfer" of fault reader V.A.G 1551.

Functions which the fault reader V.A.G 1551 can register => page 20, List of selectable functions.

#### Safety functions of gearbox control unit

If critical faults occur when driving, the gearbox will continue to operate in an emergency running mode. If the fault occurs in "D", "3" or "2", then 3rd gear emergency mode is activated.

If the fault occurs in "1","P", "N" or "R" then the emergency running mode for that stage is activated.

If the engine is started again in the emergency running mode and the fault occurs when selector lever is in position "D", "3" or "2" then 3rd gear is activated hydraulically, until the fault is rectified.

For faults which can lead to emergency running:

The gearbox will remain in emergency running mode; until the fault is no longer recognized by the control unit over a predetermined period.

#### Faults which may lead to emergency running:

Open circuit in wiring, short-circuit, electrical or hydraulic components defective.

Wiring open circuit and/or data Bus wiring short circuit.

#### Gearbox control unit fault recognition

If a fault exists it is stored as a static fault. If the fault no longer exists after a predetermined period or distance travelled, it is considered a sporadic fault.

Faults which are stored in the memory as sporadically occurring faults, will be displayed as "sporadic faults" when retrieved by fault reader V.A.G 1551. "SP" appears on the right of the display in such cases. If the printer is switched on, "sporadic faults" are printed out after the fault is addressed.

Faults which are stored in the memory as sporadically occurring faults are automatically erased after 1,000 km (625 miles) or 20 hours.

Inoperative Data bus signals will be detected by the control unit on vehicles equipped with Data bus. Defective Data bus wiring e.g. open circuits can be directly detected. Conclusions cannot be drawn as to where the Data bus wiring is defective, until all control unit fault memories have been interrogated.

### Fault reader V.A.G 1551

- The display group numbers will be 3 digits from July 1996 (up-to-date V.A.G 1551 programme card).
- From July 1997 a further number on the right next to the fault code will be displayed/printed-out when
  interrogating the fault memory (up-to-date programme card version of V.A.G 1551). This number indicates
  the type of fault, which is also given again in words under the affected component.

### 1.2 - Technical data of self-diagnosis

Memory	
-Permanent memory	yes
Data output - Rapid data transfer	yes
Data transfer between the control units via: - Data BUS - Exception: 1.4 ltr. / 55 kW engine	yes no
Final control diagnosis	no
Basic setting	yes
Coding control unit	no
Reading measured value block	yes
Electric/electronic components and fit- ting locations	=> Page 4

### 1.3 - Self-diagnosis - Guide

Fault finding with fault reader V.A.G 1551 on "Automatic gearbox"



Volkswagen Technical Site: http://vwts.ru http://vwts.info





If after completing the self-diagnosis the automatic gearbox continues to operate with faults, then continue fault finding using fault finding programme. => "Fault finding" binder. Power transmission; No. 14

## 2 - Locations of electrical/electronic components

2.1 - Locations of electrical/electronic components



Location => Page 16

- Removing => Page 16 Installing => Page 17 ٠
- ٠
- Checked by self-diagnosis => Carrying out self-diagnosis, Page 18 ٠

### 2 Engine control unit

- Location and removing and installing =>Fig. 1
- Location => Fig. 1

If engine or gearbox control units are replaced, the system must be brought to basic setting => page 27, Initiating basic setting.

- 3 Diagnostic connection
  - Location => Fig. 2



- Valve chest 4
  - Location => Fig. 3
  - The solenoid valves -N88-, -N89-, -N90-, -N91-, -N92-, -N93- and -N94- are attached to the valve body The valves are checked by self-diagnosis
- 5 Conductor strip with integrated gearbox oil temperature sender (ATF) -G93-
  - Location => Fig. 4
  - Removing and installing =>Fig. 5
  - -G93- is checked by self-diagnosis ٠
- 6 Multifunction switch -F125-
  - Location and removing and installing =>Fig. 6 -F125- is checked by self-diagnosis
  - ٠



### 7 Gearbox speed sender -G38-

- Location and removing and installing =>Fig. 14 -G38- is checked by self-diagnosis
- ٠



#### Road speed sender -G68-8

- Location and removing and installing =>Fig. 15 -G68- is checked by self-diagnosis ٠
- 9 Throttle valve potentiometer -G69-
  - The signal of throttle valve potentiometer is checked by self-diagnosis. ٠
  - Location, further information on potentiometer and removing and installing => Fig. 8

### 10 Solenoid for selector lever lock -N110-

- Location and removing and installing =>Fig. 11 The solenoid is checked by self-diagnosis
- Can be checked in measured value block => page 39

### 11 Selector lever position display -Y5-

Location => Fig. 7



### 12 Cruise control switch -E45-

- Location and removing and installing =>Fig. 10 Can be checked by reading measured value block => Page 28

### 13 Kickdown switch -F8-

- Location, further information on kick-down switch and removing and installing => Fig. 9
  Can be checked electrically => page 28

### 14 Brake light switch -F-

- Location and removing and installing =>Fig. 12
  Can be checked electrically => page 28

#### 15 Relay for starter lock-out and reversing light -J226-

Location => Fig. 13





### -> Fig.1 Engine control unit

Location: The control unit is located in plenum chamber.

### Removing and installing control unit

=> Repair group 24 or 25



-> Fig.2 Diagnosis connections

Location: The diagnosis connection -arrow- is located behind the cover above the ashtray.



### -> Fig.3 Valve body

Location: The valve body is located above oil pan.

The solenoid valves -N88-, -N89-, -N90-, -N91-, -N92-, -N93- and -N94- are attached to the valve body.

### Removing and installing valve body

=> Repair group 38; Removing and installing valve chest Removing and installing valve chest

in booklet:

◆ Workshop Manual Golf 1998 ►, Automatic gearbox 01M



### -> Fig. 4 Conductor strip with integrated gearbox oil temperature sender (ATF) -G93-

Location: The conductor strip is located in the oil pan on the valve chest.



### -> Fig.5 Removing and installing conductor strip

The conductor strip can be changed with gearbox installed without removing the valve body.

Do not kink or damage the conductor strip.

### Removing and installing conductor strip

- Separate connector at gearbox and remove retaining clamp, drain ATF remove oil pan then remove cable guide.
- Lever conductor strip off solenoid valve in direction of arrow with special tool 3373.

If the locating points are damaged the valve body must be exchanged.

Installation is performed in the reverse order.

Do not kink or damage the conductor strip.



### Removing and installing valve body

=> Repair group 38; Removing and installing valve chest Removing and installing valve chest

in booklet:

◆ Workshop Manual Golf 1998 ▶, Automatic gearbox 01M



-> Fig.6 Multi-function switch -F125-

Location: The multi-function switch is located on rear of gearbox.

### Removing and installing multi-function switch

- Switch off ignition, open bonnet.
- Pull connector off multi-function switch.
- Remove bolt and retainer.
- Remove multi-function switch.
- Renew seal.



Installation is performed in the reverse order.

- Tighten bolt to10 Nm .

### -> Fig.7 Selector lever position display -Y5-

Location: Selector lever position display (arrow) is located in combi-instrument.

### Removing and installing selector lever position display.

=> Repair group 90; Removing and installing dash panel insert Removing and installing dash panel insert



-> Fig.8 Throttle valve potentiometer -G69-

Locations:

On a petrol engine the potentiometer is a component part of the throttle valve control part -J338-. It can be found on the throttle valve housing (engine).

On a Diesel engine the "Throttle valve signal" is generated in the sender for accelerator pedal position -G79-. The sender can be found near the accelerator pedal.

For self-diagnosis:

The throttle valve potentiometer is one of the engine control unit sensors. However the gearbox control unit also requires the throttle valve potentiometer signal.

For this reason the signal from the engine control unit is transmitted to the automatic gearbox control unit.

On vehicles with Data bus the automatic gearbox control unit receives the throttle valve potentiometer signal from the Data bus.

On vehicles without Data bus the signal is made available via a wire from the engine control unit.

The self-diagnosis of the automatic gearbox only checks the signal, not the potentiometer! On vehicles without Data bus the wire for the signal is also checked.

The signal can only be read-out in measured value block.

=> Read measured value block => Page 28; Display group number 001 and 003

It is therefore imperative that the self-diagnosis of the engine control unit is also carried out when the selfdiagnosis indicates that the throttle valve potentiometer is faulty.

### Checking and adjusting or removing and installing throttle valve potentiometer

Petrol engine

=> Repair group 24; depending on engine code depending on engine code

Diesel engine

=> Repair group 20





### -> Fig.9 Kickdown switch -F8-

### Locations:

The kickdown switch (arrow) is integrated into accelerator cable and is located on bulkhead in engine compartment.

On vehicles which do not have an accelerator cable the kick-down signal is generated in the sender for accelerator pedal position -G79-. The sender can be found close to the accelerator pedal.

For self-diagnosis:

On these vehicles the kick-down switch signal is transmitted from the engine control unit to the automatic gearbox control unit.

On vehicles with Data bus the automatic gearbox control unit receives the kick-down signal from the Data bus.

On vehicles without Data bus the signal is received via a wire from the engine control unit.

### Removing and installing kickdown switch

Petrol engine

On a petrol engine the accelerator cable must be removed to be able to remove and install the kick-down switch, then readjust cable.
 => Repair group 20; Adjusting accelerator cable Diesel engine
 => Repair group 20

=> Repair group 20; Adjusting accelerator cable Adjusting accelerator cable

Diesel engine

=> Repair group 20



### -> Fig.10 Cruise control system switch -E45-

Location: Cruise control switch is located on steering column switch.

### Removing and installing cruise control switch

=> Servicing steering column switch; Repair group 94



### -> Fig.11 Selector lever lock solenoid -N110-

Location: The selector lever lock solenoid -arrow- is located in the selector lever housing.

### Removing and installing selector lever lock solenoid

=> Repair group 37; Servicing selector lever mechanism Servicing selector lever mechanism in booklet:

◆ Workshop Manual Golf 1998 ►, Automatic gearbox 01M



### -> Fig.12 Brake light switch -F-

Location: Brake light switch (arrow) is located on pedal cluster.

### Removing and installing brake light switch

=> Repair group 47; Assembly overview: Pedal cluster, brake pedal Assembly overview: Pedal cluster, brake pedal



### -> Fig.13 Relay for starter inhibitor and reversing light -J226-

Location: Relay located on additional relay carrier under dash panel, left. Relay is marked with number "150" (arrow).





### -> Fig.14 Gearbox speed sender -G38-

Location: The gearbox speed sender -arrow- is located on top of gearbox.

- Removing and installing gearbox speed sender
- Switch off ignition, open bonnet.
- Pull connector off sender.
- Remove bolt and pull sender out.
- Renew seal.

### Installation is performed in the reverse order.

- Tighten bolt to 10 Nm.



-> Fig.15 Road speed sender -G68-

Location: The road speed sender -arrow- is located on top of gearbox. When the gearbox is installed the sender is covered by the left assembly mounting. **Removing and installing road speed sender** 

### Additional information

◆ Workshop Manual Golf 1998 ►, Automatic gearbox 01M

### Special tools, testers and auxiliary items

- ◆ Workshop Manual Golf 1998 ►, Automatic gearbox 01M
- => Repair group 37; Removing and installing gearbox Removing and installing gearbox
- Obtain radio code on vehicles with coded radio.
- With the ignition switched off disconnect the battery earth strap and remove battery.
- Remove air cleaner.



- -> Fit support bar 10-222 A with legs 10-222 A/1 (6-cyl. engine adapter 10-222 A/3) and support engine/ gearbox in this position.
- Remove bracket for power assisted steering pressure hose.



- -> Do not remove the bolts for the gearbox carrier -arrows- until the gearbox has been supported.



- -> Remove pendulum support -arrows-.



- -> Lower gearbox approx. 60 mm -a-.
- Pull black connector off sender.
- Remove bolt and pull sender -1- out.
- Renew seal.

Installation is performed in the reverse order.

- Tighten bolt to 10 Nm.

### **Tightening torques**

=> Repair group 37; Removing and installing gearbox Removing and installing gearbox



in booklet:

◆ Workshop Manual Golf 1998 ►, Automatic gearbox 01M



Location of control unit for automatic gearbox -J217-

-> The control unit -arrow- is located in plenum chamber centre/right.



#### **Removing control unit**

- Switch off ignition, open bonnet.
- Remove wiper arms and cowl panel:

=> Electrical system; Repair group 94; Windscreen wiper system; Removing and installing windscreen wiper system Removing and installing windscreen wiper system

- -> Release multi-pin connector, then pull connector off control unit.

0	$\mathbb{N}$
	OB AL
KE CON	
	A37-0210
-//	

-> Remove screws -arrows-.

Remove control unit.



### Installing control unit

Installation is performed in the reverse order.

- -> Locate multi-pin connector on control unit -J217- pins (arrows) then lock multi-pin connector. Performing self-diagnosis => Page 17 . Initiating basic setting => Page 27 .

## 3 - Performing self-diagnosis

### 3.1 - Performing self-diagnosis



### Special tools, testers and auxiliary items

V.A.G 1551 Fault reader





V.A.G 1551/3A Cable

#### Additional information

- Workshop Manual Golf 1998 ä, Automatic gearbox 01M
- Binder: "Current flow diagrams, Electrical fault finding and Fitting locations Golf 1998 .
- Technical service handbook
- ٠ Parts catalogue

### 3.2 - Connecting fault reader V.A.G 1551 and selecting functions

### Safety precautions

Observe following if test and measuring instruments are required during a test drive:

Test and measuring instruments must be secured to rear seat and operated by a 2nd person from this location.

If test and measuring instruments are operated from front passenger's seat and the vehicle is involved in an accident, there is a possibility that the person sitting in this seat may receive serious injuries when the airbag is triggered.

### Test conditions:

- Vehicle voltage supply in order. Fuses No. 07, 11, 15 and 31 in order.
- Fuse in main fuse box (110 amps.) in order.
- Earth connections for gearbox in order. .
- Selector lever in position "P" and handbrake applied.
- Check earth connections for corrosion and poor contact; repair if necessary.

Earth connecting points are located in plenum chamber and below the battery in engine compartment.



- Check battery earth strap and earth strap between battery and gearbox.
- -> Remove diagnostic connection cover -1-
- With ignition switched off, connect fault reader V.A.G 1551 with diagnosis cable V.A.G 1551/3A.

-> Indicated on display:					
V.A.G - SELF-DIAGNOSIS 1 - Rapid data transferl) 2 - Flash code outputl)	HELP				

- appears alternately 1)
- Additional operating instructions can be called up by pressing the HELP key of V.A.G 1551.
- The  $\Rightarrow$  key is used for advancing within the programme sequence.

• An automatic check (keys 00) can be carried out in the operating mode 1 "Rapid data transfer". Then all vehicle control units will be interrogated automatically.

=> Fault reader V.A.G 1551 operating instructions.

- Switch on ignition.
- Switch on printer with the Print key (indicator lamp in key lights up).
- Press key 1 for "Rapid data transfer" mode.

-> Indi	-> Indicated on display:				
Rapid Enter	data transfer address word XX	HELP			

- Press keys 0 and 2. (Enter the address word "gearbox electronics" with 02.)

2029

-> Indicated on display:

Rapid data 02 Gearbox	transfer electronics	Q	
--------------------------	-------------------------	---	--

- Confirm entry with key Q.

#### Example:

-> Indicated on display:					
01M927733BB	AG4 Gearbox 01M				
Coding 00000	WSC 00000				

The control unit identification, the coding and the dealership number of the V.A.G 1551 are displayed:

#### Control unit identification

Depending upon build level (programme level) the control unit can indicate a different control unit identification, to that shown in the example. Allocation of control unit => Parts catalogue.

- 01M 927 733 BB: Part No.
- AG4 Gearbox 01M: 4-speed automatic gearbox 01M
- 2029:EPROM (Programme level)
- Coding 00000: is not required at present.
- WSC 00000: V.A.G 1551 dealership number with which the last coding was performed.

-> Indicated on display:

Control unit does not answer! HELP

- By pressing the HELP key, a list of possible fault causes is printed out.
- After eliminating the possible causes of faults, again enter the address word 02 for "gearbox electronics" and confirm.

If "Control unit does not answer!" again appears:

-> Indica	ated o	n dis	play:		
Control	unit	does	not	answer!	HELP

Check control unit voltage supply.

- Perform test step 1 => Page 39, Electrical check.
- Check wiring connections to diagnostic sockets

=> "Current flow diagrams, Electrical fault finding and Fitting locations" binder, Golf 1998ä.

- => Fault table, page 21 under fault code 65535 control unit faulty!
- Press ⇒ key.

-> Indicated on display:



HELP Rapid data transfer Select function XX

After the HELP key is pressed, a list of the possible functions is printed out.

### 3.3 - List of selectable functions

	Page
01 - Interrogate control unit version => Perform- ing self-diagnosis	18
02 - Interrogate fault memory	20
04 - Initiate basic setting	27
05 - Erase fault memory	26
06 - End output	
08 - Read measured value block	28

Further functions, which can be printed out by pressing the HELP key, need not be considered.

After interrogating a function the V.A.G 1551 returns to the following start position:

-> Indicated on display:			
Rapid data transfer Select function XX	HELP		

### 3.4 - Interrogating fault memory

Connect fault reader V.A.G 1551 and enter address word "02 Gearbox electronics" and advance until "Select function XX" appears in the display => from page 18.

-> Indicated on display:

Rapid data trans	fer	HELP
Select function	XX	

Press keys 0 and 2. (The function "Interrogate fault memory" is selected with 02).



Confirm entry with key Q.

-> The number of stored faults or "No fault recognised" appears in the display. X Faults recognised!

The stored faults are displayed in turn and printed out.

After the last fault has been displayed and printed out, the faults should be rectified as described in the fault table => from page 21.

Press  $\Rightarrow$  key.

-> Indicated on display:

Rapid data transfer	HELP
Select function XX	

After interrogating the fault memory and rectifying the faults:

- Erase fault memory => Page 26.

### 3.5 - Fault table

- All the possible faults which are recognised by the automatic gearbox control unit -J217- and displayed on the V.A.G 1551 with the printer switched on when the fault memory is interrogated, are listed below grouped according to the fault code number.
- If faults occur only occasionally or if the fault memory was not erased after rectifying the faults, these faults will be displayed as "sporadic faults" for a stipulated period of time =>Gearbox control unit fault recognition, Page 2.
- If components are indicated as being faulty during fault memory interrogation, additionally test wiring to the components for short and open circuits according to current flow diagram =>"Current flow diagrams, Electrical fault finding and Fitting locations" binder, Golf 1998 ►.
- The fault code and the type of fault in numbers is printed out in the "rapid data transfer" mode only when the printer of V.A.G 1551 is switched on.
- Example: Fault code (5-position) 65535 XYZ (type of fault 3 digits)
  When the 7.0 programme card is introduced a further number (XYZ) will be printed out on the right next to the fault code. This number indicates the type of fault, which is also given again in words below the affected component. It has been decided not to explain this three-digit number in the table. It signifies the type of fault which is also shown in words below the component.

Output on printer V.A.G 1551	
No fault recognised!	If "No fault recognised" appears after performing repairs, the self-diagnosis is completed. In the event that the automatic gearbox does not operate properly despite self-diagnosis, carry out repairs as per fault finding programme. => "Fault finding, Power transmission" binder, No. 14

V.A.G 1551 print-out (=> Page <mark>21</mark> )	Possible cause of fault	Rectifying fault
00258	Wiring open or short circuit	<ul> <li>Check wiring and connections according to current flow diagram2)</li> </ul>
Solenoid valve 1 -N88-	Solenoid valve 1 -N88- defective	- Read measured value block =>page 28 ; display group number 004
Open circuit1) Short to earth1) Open circuit/short to earth1) Short to positive1)		
00260	Wiring open or short circuit	- Check wiring and connections according to current flow diagram2)
Solenoid valve 2 -N89-	Solenoid valve 2 -N89- defective	- Read measured value block =>page 28 ; display group number 004
Open circuit1) Short to earth1) Open circuit/short to earth1) Short to positive1)		

1) One of these displays appears in addition to relevant component.

2) First check connections for contact corrosion or water ingress and renew if necessary. If solenoid faults are displayed then especially check the 10 pin connector on gearbox between valve body conductor strip and wiring loom.

V.A.G 1551 print-out (=> Page 21)	Possible cause of fault	Rectifying fault
00262	Wiring open or short circuit	- Check wiring and connections according to current flow diagram2)



Solenoid valve 3 -N90-	Solenoid valve 3 -N90- defective	- Read measured value block =>page 28 ; display group number 004
Open circuit1) Short to earth1) Open circuit/short to earth1) Short to positive1)		
00264	Wiring open or short circuit	- Check wiring and connections according to current flow diagram2)
Solenoid valve 4 -N91-	Solenoid valve 4 -N91- defective	- Read measured value block =>page 28 ; display group number 004
Open circuit1) Short to earth1) Open circuit/short to earth1) Short to positive1)		

1) One of these displays appears in addition to relevant component.

2) First check connections for contact corrosion or water ingress and renew if necessary. If solenoid faults are displayed then especially check the 10 pin connector on gearbox between valve body conductor strip and wiring loom.

V.A.G 1551 print-out (=> Page 21)	Possible cause of fault	Rectifying fault
00266	Wiring open or short circuit	<ul> <li>Check wiring and connections according to current flow diagram2)</li> </ul>
Solenoid valve 5 -N92-	Solenoid valve 5 -N92- defective	- Read measured value block =>page <mark>28</mark> ; display group number 004
Open circuit1) Short to earth1) Open circuit/short to earth1) Short to positive1)		
00268	Wiring open or short circuit	<ul> <li>Check wiring and connections according to current flow diagram2)</li> </ul>
Solenoid valve 6 -N93-	Solenoid valve 6 -N93- defective	- Read measured value block =>page <mark>28</mark> ; display group number 002
Open circuit1) Short to earth1) Open circuit/short to earth1) Short to positive1)		

1) One of these displays appears in addition to relevant component.

2) First check connections for contact corrosion or water ingress and renew if necessary. If solenoid faults are displayed then especially check the 10 pin connector on gearbox between valve body conductor strip and wiring loom.

V.A.G 1551 print-out (=> Page 21)	Possible cause of fault	Rectifying fault
00270	Wiring open or short circuit	<ul> <li>Check wiring and connections ac- cording to CFD 2)</li> </ul>
Solenoid valve 7 -N94-	Solenoid valve 7 -N94- defective	<ul> <li>Read measured value block =&gt;page</li> <li>28 ; display group number 004</li> </ul>
Open circuit1)		
Open circuit/short to earth1)		
Short to positive1)		
00281	Wiring open circuit	

Road speed sender -G68-	Road speed sender -G68- defective	- Read measured value block =>page
No signal		28 ; display group number 002

1) One of these displays appears in addition to relevant component.

2) First check connections for contact corrosion or water ingress and renew if necessary. If solenoid faults are displayed then especially check the 10 pin connector on gearbox between valve body conductor strip and wiring loom.

V.A.G 1551 print-out (=> Page <mark>21</mark> )	Possible cause of fault	Rectifying fault
00293 Multi-function switch -F125-	Wiring open circuit	<ul> <li>First check multi-function switch connector for contact corrosion or water ingress, renew if necessary</li> <li>Page 10, Fig. 6.</li> </ul>
Undefined switch condition	Multi-function switch -F125- defec- tive	- Read measured value block =>Page 28 ; display group num- ber 001
00297	Wiring open circuit	<ul> <li>First check sender connector for contact corrosion or water ingress, renew if necessary =&gt;Page 14, Fig. 14</li> </ul>
Gearbox speed sender -G38- No signal1)	Gearbox speed sender -G38- defec- tive	- Perform electrical check =>from page 39
Implausible signal1)	If the control unit recognises an im- plausible signal, the connectors for gearbox speed sender -G38- and road speed sender -G68- are inter- changed	

1) One of these displays appears in addition to relevant component.

V.A.G 1551 print-out (=> Page 21 )	Possible cause of fault	Rectifying fault
00300	Wiring open circuit	
Gearbox oil temperature sender -G93-1) No fault type recognised	Gearbox oil temperature sender -G93- defective	<ul> <li>First check connectors for contact corrosion or water in- gress, renew if necessary. If the solenoid valves are indi- cated as being faulty pay spe- cial attention to the 10-pin connector between conductor strip/valve chest and wiring harness on the gearbox.</li> <li>Read measured value block</li> </ul>
		=> Page 28 ; display group number 005

1) A faulty ATF temperature sender is indicated.



00518 Throttle valve potentiometer -G69- Signal outside tolerance	Wiring open or short circuit Control unit for engine or throt- tle valve potentiometer -G69- (in throttle valve control part or in accelerator pedal positioner - G79-) defective	<ul> <li>Observe notes on =&gt;Page 11.</li> <li>If this fault is indicated, the engine control unit self-diagnosis must always be performed</li> <li>=&gt; Repair group 01 for relevant engine code</li> <li>If additionally faults:</li> <li>00638 or 01312 or 01314</li> <li>are displayed, these must be rectified first</li> <li>Read measured value block</li> <li>=&gt;Page 28; display group</li> <li>numbers 001 and 003</li> </ul>
---	--	--

Output on printer V.A.G 1551	Possible cause of fault	Rectifying fault
00529	Wiring open circuit	<ul> <li>If additionally faults:</li> <li>01312 or 01314</li> <li>are displayed, these must be rectified first</li> <li>Check wiring and connectors accord- ing to current flow diagram, including Data bus wiring</li> </ul>
Speed information missing		<ul> <li>Read measured value block =&gt;page 28; display group numbers 003 Check engine control unit =&gt; Repair group 01 for relevant en- gine code</li> </ul>
00532	Battery defective	- Test battery voltage => Repair group 27
Supply voltage	Insufficient system voltage for valves	<ul> <li>Read measured value block =&gt;page</li> <li>28 ; display group number 002</li> </ul>

V.A.G 1551 print-out (=> Page <mark>21</mark> )	Possible cause of fault	Rectifying fault
00545	Wiring open or short circuit	- If additionally the faults: 01312 or 01314 are displayed, these must be rectified first Check wiring and connectors according to current flow dia- gram, including Data bus wiring
Engine/gearbox electrical connection Open circuit1) Short to earth1) Open circuit/short to earth1)	No engine/gearbox control unit connection The signal for influencing the ignition timing point is not transferred or transferred er- roneously between engine and gearbox control unit	- Read measured value block =>Page 27

1) One of these displays appears in addition to relevant component.

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00638	Wiring open or short circuit	- If additionally the faults: 01312 or 01314 are displayed, these must be rectified first Check wiring and connectors according to current flow dia- gram, including Data bus wiring
Engine/gearbox electrical connection 2 No signal	No engine/gearbox control unit connection Throttle valve signal not transferred to gearbox con- trol unit	- Read measured value block =>Page 27

V.A.G 1551 print-out (=> Page 21)	Possible cause of fault	Rectifying fault
00641	Gearbox becomes too hot, max. 148°C. If ATF temperature is too high, gearbox shifts down into next lower gear.	<ul> <li>Check ATF level</li> <li>Repair group 37; Checking and topping up ATF level 28; display group number 005; read off ATF temperature</li> </ul>
ATF temperature	Trailer load of vehicle too high	- Observe fault finding programme No. 14 => Fault finding binder; Power transmis- sion; No. 14
Signal too large1) No fault recognised1)	ATF level not in order Gearbox oil temperature sender (ATF) defective	<ul> <li>Replace conductor strip</li> <li>Removing and installing conductor strip</li> <li>Page 9</li> </ul>

1) One of these displays appears in addition to relevant component.

V.A.G 1551 print-out (=> Page <mark>21</mark> )	Possible cause of fault	Rectifying fault
00652 Gear monitoring	Electrical/hydraulic fault Clutch or valve chest defective	- Read measured value block =>Page 28; display group number 004 and establish by driving in which gear the fault occurs
Implausible signal		
00660	Open circuit in wiring	<ul> <li>Check wiring and connections according to CFD</li> </ul>
Kickdown switch/throttle valve potentiome- ter	Throttle valve potentiometer - G69- defective	- If additionally the faults: 01312 or 01314 are displayed, these must be rectified first Perform repairs as described in "Rectifying fault" 00518 -Throttle valve potentiometer -G69-
Implausible signal	Kickdown switch -F8- defec- tive	<ul> <li>Read measured value block</li> <li>&gt;page 28; display group</li> <li>number 001</li> </ul>

V.A.G 1551 print-out (=> Page <mark>21</mark> )	Possible cause of fault	Rectifying fault
01192 Torque converter lock-up clutch mechanical fault	Torque converter lock-up clutch slipping Valve body defective	- Check torque converter lock-up clutch slip Read measured value block =>Page 28 ; display group number 007
01236		

Volkswagen Technical Site: http://vwts.ru http://vwts.info



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Selector lever lock solenoid -N110-	Wiring open circuit or short to earth Selector lever lock solenoid -N110-	<ul> <li>Read measured value block</li> <li>&gt;Page 28; display group number</li></ul>
Open circuit/short to earth	defective	005
01312 Drive train data bus defective1) no communication1)	Data bus wiring/connectors defec- tive	- Check data bus wiring and connec- tors using current flow diagram

### 1) One of these displays appears in addition to relevant component.

V.A.G 1551 print-out (=> Page 21)	Possible cause of fault	Rectifying fault
01314		
Engine control unit no communication	Data bus wiring/connectors defective Fault in system: Engine	<ul> <li>Check Data bus wiring and connectors according to current flow diagram</li> <li>Check engine control unit</li> <li>Repair group 01 for relevant engine code</li> </ul>
01316		
Brake control unit No communication	Data bus wiring/connectors defective Fault in system: ABS	<ul> <li>Check Data bus wiring and connectors according to current flow diagram</li> <li>Check ABS control unit</li> <li>Repair group 01 for relevant ABS system</li> </ul>

Output on printer V.A.G 1551	Possible cause of fault	Rectifying fault	
65535 Control unit defective	Control white 1947 defective	- Renew control unit => page 4	
Control unit defective	Control unit -J217- defective	<ul> <li>Initiate basic setting</li> <li>&gt;page 27</li> </ul>	

The control unit -J217- should not be renewed until the possible cause of the fault has been determined and the following faults have been rectified:

- mechanical faults
- hydraulic faults
- all affected electrical/electronic components and cable connections.

### 3.6 - Erasing fault memory

### Requirement:

• Fault memory interrogated => page 20.

### After fault memory has been interrogated:

```
-> Indicated on display:
```

Rapid data trans	fer	HELP
Select function	XX	

- Press keys 0 and 5. (The function "Erase fault memory" is entered with 05.)

### -> Indicated on display:

Rap	pid dat	ta trai	nsfer	Q	
05	Erase	fault	memory		

- Confirm entry with key Q.

-> Indicated on display:

Warning! Fault memory was not interrogated.

If the ignition was switched off e.g. between interrogating the fault memory and erasing fault memory, the fault memory is then not erased.

- Adhere strictly to the sequence of operations, i.e. first of all interrogate fault memory.

-> Indicated on display:				
Rapid	data transfer			
Fault	memory is erased!			

(The fault memory will be erased approx. 5 seconds. after the display appears.)

The fault memory is now erased.

Wait about 1 minute before again interrogating the fault memory.

-> Indicated on display: System cannot be interrogated!

-> Print out with printer switched on:

```
1 Fault recognized !
00811 3333
System cannot be interrogated
```

Control unit -J217- was not given sufficient time to recognize faults.

- Wait about 1 minute before again interrogating the fault memory.
- After interrogating and erasing the fault memory, carry out a test drive and again interrogate the fault memory.

When the fault memory is interrogated, the following display should appear:

"No fault recognized!"

### 3.7 - Initiating basic setting

The basic setting should be initiated after performing the following repairs:

- Exchanging engine
- Replacing engine control unit
- Altering throttle valve
- Adjusting throttle valve (setting idling speed).
- Replacing throttle valve potentiometer -G69-
- Altering throttle valve potentiometer -G69- setting e.g. when adjusting idling switch (engine)
- Replacing automatic gearbox control unit -J217-
- Connect fault reader V.A.G 1551 and enter address word "02 Gearbox electronics" and advance until "Select function XX" appears in the display => from page 18.

-> Indicated on display:				
Rapid data transfer Select function XX	HELP			

- Press keys 0 and 4. (The function "Initiating basic setting" is selected with 04).



Accelerator pedal must remain in idling position.

-> Indicated on display:					
Rapid data transfer 04 - Basic setting	Q				

- Confirm entry with key Q.

-> Indicated on display:						
Basic	setting	HI	ELP			
Enter	display	group	number	XXX		

- Press key 0, 0 and 0.
- Confirm entry with key Q.

-> Indicated on display:					
System i	n basic setting	0			

The system is now in the basic setting.

- Depress accelerator pedal as far as kickdown and hold in this position for 3 seconds.
- Press key ⇒.

-> Indicated on display:

### 3.8 - Read measured value block

#### Additional information

- ◆ Binder: "Current flow diagrams, Electrical fault finding and Fitting locations Golf 1998 ▶
- Connect fault reader V.A.G 1551 and enter address word "02 Gearbox electronics" and advance until "Select function XX" indicated on display => from page 18.

-> Indicated on display:					
Rapid data transfer Select function XX	HELP				

- Press keys 0 and 8. (The function "Read measured value block" is selected with 08.)

-> Indicated on display:					
Rapid data transfer	Q				
08 - Read measured value	block				

- Confirm entry with key Q.

-> Indicated on display:

```
Read measured value block
Enter display group number XXX
```

Enter display group number => List of selectable display group numbers, Page 29.

```
- Confirm entry with key Q.
```

```
Read measured value block 1 \Box 1 \Box 2 3 \Box 4
```

-> There are always 4 display zones in the measured value block (if necessary in physical quantities). Decoding the individual values in display zones 1 to 4 =>Test table page 30.

#### List of selectable display group numbers

Indicated on display (example)						
Display zones: 1 2 3 4 ï ï ï ï	Display group No.	Display zone	Description			
Read measured value block 1⇒ P 0.8 V 0 % 00000111	001	1 2 3 4	Selector lever position Throttle valve potentiometer voltage Accelerator pedal value Switch positions			
Read measured value block 2⇒ 0.983 A 0.985 A 12.76 V 2.50 V	002	1 2 3 4	Solenoid valve 6 -N93- actual current Solenoid valve 6 -N93- specified current Battery voltage Voltage at road speed sender -G68-			
Read measured value block 3⇒ 0 km/h 900 rpm 0 0 %	003	1 2 3 4	Speed Engine speed Gear selected Accelerator pedal value			
Read measured value block 4⇒ 1000 00 0 P 0 km/h	004	1 2 3 4	Solenoid valves Gear selected Selector lever position Speed			
Read measured value block 5⇒ 40°C 0011011 0 900 rpm	005	1 2 3 4	ATF temperature Selector output Gear to be selected Engine speed			
Display zones: 1 2 3 4 ï ï ï ï	Display group No.	Display zone	Description			
Read measured value block 6⇒	006	1 2 3 4	Can be disregarded			
Read measured value block 7⇒ 1H+/-200 rpm 900 rpm 0 %	007	1 2 3 4	Gear selected (+ or - sign relates to display zone 2) Lock-up clutch slip Engine speed Accelerator pedal value			
Read measured value block 8⇒	008	1 2 3 4	Can be disregarded			

If the printer is switched on, the current display is printed out on the log. If the specified values are obtained in all the display zones:

٠

Press key  $\Rightarrow$ .

-> Indicated on display:

Rapid data transfer Select function XX HELP



### 3.9 - Test table

Display Group No.	Display zone	Designation	Test condit	ions	Specified readout on V.A.G 1551	Rectifying fault
001	1	Selector lever position - Multi-function switch - F125-	Stationary	Р	Р	- Check and adjust se- lector lever cable
			Selector	R	R	=> Repair group 37
			lever	Ν	N	
			in	D	D	
				3	3	- Check multi-function switch => Perform elec- trical test, from page 39
				2	2	
cont'd				1	1	

Display Group No.	Display zone	Designation	Test conditions	Specified readout on V.A.G 1551	Rectifying fault
001	2	01 2 Vehicles without Data bus 1) Throttle valve potenti- ometer voltage -G69-	Idling min. Idling max. • Engine switch- ed off • Ignition switch- ed on	0.156 V 0.8 V1)	When accelerating from idling to full throttle, volt- age figure constantly in- creases Initiate basic setting =>Page 27 Perform self-diagnosis for relevant engine
			Full throttle min. Full throttle max.	3.5 V 4.680 V	<ul> <li>Adjusting/renewing throttle valve potentiom- eter</li> <li>Repair group 24 to 25 27</li> </ul>
		Vehicles with Data bus 1) Throttle valve potenti- ometer signal -G69-	Idling	0 V	When accelerating from idling to full throttle, volt- age figure constantly in- creases Initiate basic setting =>Page 27
Cont'd			Full throttle max.	5 V	<ul> <li>Perform self-diagnosis for relevant engine Adjust throttle valve po- tentiometer, renew if necessary</li> <li>Repair group 24 to 25</li> </ul>

1) Observe notes on =>Page 11.

Group No.	Display zone	Designation	Test conditions	Specified readout on V.A.G 1551	Rectifying fault
001	3	Accelerator pedal value 1)	Stationary Idling	01 %	When accelerating from idling to full throt- tle, % figure constantly increases



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Group No.	Display zone	Designa	ation	Test	conditions	Specified readout on V.A.G 1551	Rectifying fault
					Full throttle	99100 %	- Initiate basic setting =>Page 27
	4	Switch posit Brake light switch -F-	ions Display 1	Brake	Operated	1	- Check brake light switch -F- => Perform electrical tests,from page 39
					Not operat- ed	0	
		Traction control sys- tem	2		Activated	1	Can be disre- garded
cont'd					Not activa- ted	0	

1) Observe notes on =>Page 11.

Group No.	Display zone	Designation	Test conditions	Specified readout on V.A.G 1551	Rectifying fault
001	4	Display 3		0	Can be disregarded
				1	
		Kickdown Display 4 switch	Kickdown Operated	1	Vehicles with acceler- ator cable: Check kickdown switch =>Perform electrical test, from Page 39
	nt'd		Not operat- ed	0	Vehicles without ac- celerator cable: Perform self-diagno- sis for relevant engine Check wiring and connectors according to current flow dia- gram, including Data bus wiring

Group No.	Display zone	Designa	tion	Test co	nditions	Specified readout on V.A.G 1551	Rectifying fault
001	4	Multifunction switch	Display 5	Selector lever in	R, N, D, 3, 2	1	- Check and adjust se- lector lever cable => Repair group 37
		-F125-			P, 1	0	
			6		P, R, 2, 1	1	
					N, D, 3	0	
			7		P, R, N, D	1	- Check multi-function switch -F125- => Per- form electrical test, from Page <u>39</u>
					3, 2, 1	0	
			8		P, R, N,	1	



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Group No.	Display zone	Designation	Test conditions	Specified readout on V.A.G 1551	Rectifying fault
			D, 3, 2, 1	0	

Group No.	Display zone	Designation	Test conditions	Specified readout on V.A.G 1551	Rectifying fault
002	1	Solenoid valve 6 - N93- actual current	<ul> <li>Selector lever in "I</li> <li>Stationary</li> <li>Full throttle</li> </ul>	J" 0.0 A	Note the following when fault finding: Ac- tual current and speci- fied current must not deviate more than 0.050 A from one an- other.
			Idling ma	K. 1.1 A	The specifications shown here are the maximum values.
	2	Solenoid valve 6 - N93- specified cur- rent	<ul> <li>Selector lever in "I</li> <li>Stationary</li> <li>Full throttle</li> </ul>	I" 0.0 A	Initiate basic setting =>Page 27
			Idling ma	к. 1.1 A	- Check solenoid valve -N93- => Perform elec- trical check, from Page 39
	3	Battery voltage	Stationary min.	10.8 V	- Check battery, renew if necessary Check voltage supply to control unit -J217-=> Perform electrical check, from page 39
Cont'd			max.	16.0 V	- Renew gear- box control unit -J217- => Page 27

Group No.	Display zone	Designation	Test cond	itions	Specified read- out on V.A.G 1551	Rectifying fault
002	4	Road speed sender -G68-	Stationary	min.	2.20 V	- Check road speed sender -G68- =>Perform electrical check, from page 39
				max.	2.52 V	
003	1	Vehicle speed	Driving1)		km/h	Speedometer reading and readout on V.A.G 1551 may differ slightly.
Cont'd	2	Engine speed	With engine	running	rpm	- Perform self-diagnosis for relevant engine Check wiring and con- nectors according to cur- rent flow diagram, includ- ing Data bus wiring

1) When driving, a second mechanic is needed for reading the specified values.

Group No.	Display zone	Designation	Test conditions		Specified read- out on V.A.G 1551	Rectifying fault
003	3	Gear selected	Driving1) Neutral		0	- Check solenoid valves => Perform electrical check, from page 39
					R	
				1 hydraulic	1	
			1 mechanical	1M		
			2 hydraulic		2H	
				2 mechanical	2M	
				3 hydraulic	3 H	
				3 mechanical	3M	
				4 hydraulic	4H	
				4 mechanical	4M	
	4	Accelerator pedal value	dal Driving1) Idling		01 %	When accelerating from idling to full throt- tle, % figure constantly increases
				Full throttle	99100 %	- Initiate basic setting =>Page 27

1) When driving, a second mechanic is needed for reading the specified values.

### Reading measured value block; Display group number 004; "Checking solenoid valves whilst driving"

- The solenoid valves can be checked whilst driving via "Read measured value block 08"; "display group number 004".
- The table shows the solenoid valves -N88-, -N89- and -N90- (displays 1 to 3) as activated in each selector lever position. These solenoid valves control the shifting valves for the relevant gears.
- The solenoid valve -N91- activates the lock-up clutch modulation valve and is not covered here.
- The solenoid valves -N92- and -N94- are supplementary valves which affect gear shifts and are only controlled during gear shifts and displayed in zones 5 and 6. They can show "0" or "1" depending on the driving situation.
- At the start of a test drive the selector lever can be in position "1". Then during the drive it can be shifted progressively into position "D".
   The mechanical gear "M" is not always engaged. The control unit can engage this gear dependent upon the
- The mechanical gear "M" is not always engaged. The control unit can engage this gear dependent upon the driving situation. The lock-up clutch can be checked in display group number 005.
- V.A.G 1551 display zone 1 has 6 characters (0000 00) and is read as follows:

Display on	Display zone 1:								
V.A.G 1551	Display 1	Display 2	Display 3	Display 4	Display 5	Display 6			
	Solenoid valve 1	Solenoid valve 2	Solenoid valve 3	Solenoid valve 4	Solenoid valve 5	Solenoid valve 7			
1551	-N88-	-N89-	-N90-	-N91- (can be disre- garded)	-N92-	-N94-			

Non-activated solenoid valves display "0" and activated solenoid valves display "1".

All solenoid valves are checked via self-diagnosis => Interrogating fault memory, Page 20.



### Checking solenoid valves, whilst driving

Group No.	Display zone	Designation	Test cor Selector	nditions · lever in:	Specified readout on V.A.G 1551	Rectifying fault
004	1	Solenoid valves/indica- ted on		Ρ	101000	Solenoid valves are se- lected according to driv- ing condition
		V.A.G 1551 display		R1)	001000	- Perform
				Ν	101000	electrical check
		-N88- Display 1	D1)	1H	001000	=>from page 39
		-N89- Display 2		1M	001000	- Continue fault finding according to fault finding programme
		-N90- Display 3		2H	011000	
		-N91- Display 4		2M	011000	=> "Fault finding.
		-N92- Display 5		3H	000001	Power trans- mission"; No. 14
		-N94- Display 6		3M	000001	]
				4H	1 1 0 0 01	
con	tinued			4M	1 1 0 0 01	

1) Whilst driving with gears selected a second mechanic is required for reading the specified values.

Group No.	Display zone	Designation	Test cor Selecto	nditions r lever in:	Specified readout on V.A.G 1551	Rectifying fault
004	1	Solenoid valves/indica- ted on	31)	1H	0 0 1 0 00	Solenoid valves are se- lected according to driv- ing condition
		V.A.G 1551:		1M	001000	- Perform
		-N88- Display 1		2H	011000	electrical check
		-N89- Display 2		2M	011000	=>from page 39
		-N90- Display 3		3H	000001	- Continue fault finding accord- ing to
		-N91- Display 4		3M	000001	fault finding pro- gramme
		-N92- Display 5	21)	1H	001000	=>"Fault finding.
		-N94- Display 6		1M	001000	Power transmission"; No. 14
				2H	011000	
				2M	011000	
			11)	1H	001000	
				1M	001000	

1) Whilst driving with gears selected a second mechanic is required for reading the specified values.

Group No.	Display zone	Designation	Test	conditions	Specified read- out on V.A.G 1551	Rectifying fault
004	2	Gear selected	Driving1) Neutral		0	- Check solenoid valves => Perform electrical check, from page 39
				Reverse	R	
				1 hydraulic	1	
				1 mechanical	1M	
				2 hydraulic	2H	
				2 mechanical	2M	
				3 hydraulic	3 H	
				3 mechanical	3M	
				4 hydraulic	4H	
cont'd				4 mechanical	4M	

1) When driving, a second mechanic is needed for reading the specified values.

Group No.	Display zone	Designation	Test con	ditions	Specified readout on V.A.G 1551	Rectifying fault	
004	3	Selector lever posi- tion	Driving1)	Р	Р	<ul> <li>Check and adjust se- lector lever cable</li> <li>Repair group 37</li> </ul>	
				R	R		
				Ν	Ν		
				D	D		
				3	3	- Check multi-function switch =>Perform electrical check, from Page 39	
				2	2		
				1	1		
	4	Vehicle speed	Speed at whi is being drive	ch vehicle en1)	kph	The speedometer reading and readout on V.A.G 1551 may differ slightly	

1) When driving, a second mechanic is needed for reading the specified values.

Group No.	Display zone	Designation	Test conditions	Specified readout on V.A.G 1551	Rectifying fault
005	1	ATF temperature, ATF level is checked at ap- prox. 35°C - 45°C	Stationary with en- gine running. The ex- act temperature is displayed from ap- prox. 30°C	°C	- Check gearbox oil temperature sender - G93- => Perform elec- trical check, from page 39



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	2	Shift outputs	Driving1) Ignition timing influ- ence or injection quantity influence (only operative during a gear shift)		- Check wiring and connectors according to current flow dia- gram, including Data bus wiring Check engine control unit => Repair group 01
		Display 12)	is switched on	1	- Renew engine con- trol unit if necessary
			is switched off	0	- Renew gearbox con- trol unit -J217- => Page 4
		22)	was switched on	1	- Initiate basic setting =>Page 27
co	ont'd		was switched off	0	

1) When driving, a second mechanic is needed for reading the specified values.

2) V.A.G 1551 must always show the same number "1" or "0" in displays 1 and 2.

Group No.	Display zone	Designation	Test conditions	Specified read out V.A.G 1551	Rectifying fault
005	2	Shift outputs	Selector lever lock sole- noid -N110-		
		Display 3	is switched on	1	- Check selector lever lock solenoid -N110- => Per- form electrical check, from page 39
			is switched off	0	
		4	switched on	1	
			switched off	0	
			Cruise control system		- Check wiring and con- nectors according to cur- rent flow diagram, includ- ing Data bus wiring
		5	switched on	1	<ul> <li>Check cruise control system</li> <li>Binder "Current flow diagrams, Electrical fault finding and Fitting locations</li> <li>Golf 1998 ä"</li> </ul>
cont'd			switched off	0	

Group No.	Display zone	Designation	Test o	onditions	Specified readout on V.A.G 1551	Rectifying fault
005	2	Shift outputs Display 6	Air condi- tioner	was switched off	1	Check wiring according to current flow diagram
				was not switched off	0	- Check air conditioner => Repair Group 87
		7	Park/Neutral Selector leve	signal r in		- Check wiring on basis of current flow diagram
				P, N	1	
				R	0	



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Group No.	Display zone	Designation	Test conditions	Specified readout on V.A.G 1551	Rectifying fault
cont'd.			D, 3, 2, 1	1/0	Selector lever positions D, 3, 2, 1 can be disregarded

Group No.	Display zone	Designation	Test	conditions	Specified readout on V.A.G 1551	Rectifying fault
005	3	Gear to be selected	Driving1)	Neutral	0	- Check solenoid valves => Perform electrical test, from page <u>39</u>
				Reverse	R	
				1 hydraulic	1H	- If gearshifts do not oc- cur, a clutch or brake may be defective
				1 mechanical	1M	
				2 hydraulic	2Н	=> "Fault finding" bind- er, Power transmis- sion, No. 14
				2 mechanical	2M	
				3 hydraulic	3 H	- Renew gearbox con- trol unit -J217- => page 4
				3 mechanical	3M	
				4 hydraulic	4H	
				4 mechanical	4M	

1) When driving, a second mechanic is needed for reading the specified values.

Group No.	Display zone	Designation	Test conditions	Specified readout on V.A.G 1551	Rectifying fault
005	4	Engine speed	Driving1) with engine running	rpm	- Perform self-diagnosis for relevant engine Check wiring and connectors according to current flow dia- gram, including Data bus wir- ing
006			Can be dis	sregarded	

1) When driving, a second mechanic is needed for reading the specified values.

Group No.	Display zone	Designation	Test conditions	Specified readout on V.A.G 1551	Rectifying fault
007	1	Gear selected1)	Neutral	0	- Check solenoid valves => perform electrical check, from page 39
			Reverse	R	- If gearshifts do not occur, a clutch or brake may be defec- tive
			1 hydraulic	1H+/-	=> "Fault finding" binder, Pow- er transmission, No. 14
			1 mechanical	1M+/-	- Replace gearbox control unit -J217- => Page 4



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Group No.	Display zone	Designation	Test conditions	Specified readout on V.A.G 1551	Rectifying fault
			2 hydraulic	2H +/-	Note:
			2 mechanical	2M +/-	The + (or -) sign
			3 hydraulic	3 H +/-	relates to the
			3 mechanical	3M +/-	speed information
			4 hydraulic	4H +/-	In display zone 2.
cont'd			4 mechanical	4M +/-	

1) When driving, a second mechanic is needed for reading the specified values.

Group No.	Display zone	Designation	Test co	onditions	Specified readout on V.A.G 1551	Rectifying fault
007	2	Torque converter lock-up clutch slip	Whilst driv- ing1) with engine running	In the hydraul- ic gears2)	0 stall speed	- Check wiring ac- cording to current flow diagram
		Solenoid valve 4 - N91- is activated	Torque con- verter lock- up clutch closed	Engine speed: 2000 3000 rpm in the me- chanical gears 3)	0 130 rpm	- Check solenoid valves 4 -N91- => Perform electrical checks, from page 39 Check gearbox => Repair group 37; Checking gearbox when clutch slipping or burned

1) When driving, a second mechanic is needed for reading the specified values.

2) The torque converter lock-up clutch must be open!

It is open when in display zone 1 "H" = hydraulic with slip is displayed. Additionally the character "+ or -" is displayed. "+" signifies that the engine speed (pump speed) is greater than turbine speed, vehicle under traction.

"-" signifies that the engine speed is less than turbine speed, vehicle in overrun.

3) The gear shift must be completed. The torque converter lock-up clutch must be closed and the accelerator pedal value held constant (gears will be mechanically activated "M").

Group No.	Display zone	Designation	Test conditions	Specified read- out on V.A.G 1551	Rectifying fault
007	3	Engine speed	With engine run- ning	rpm	- If necessary tune en- gine => Repair group 24 or 25
	4	Accelerator pedal val- ue	Idling	01 %	When accelerating from idling to full throttle the percentage value con- stantly increases
			Full throttle	99100 %	- Initiate basic setting =>Page <mark>27</mark>
008			Can be disregard	led	

### 4 - Gearbox: Electrical check

### 4.1 - Gearbox: Electrical check



### Special tools, testers and auxiliary items

- V.A.G 1526 A Hand multimeter ٠
- V.A.G 1594 A Adapter set V.A.G 1598/18 Test box
- ٠

### Additional information required

- Workshop Manual Golf 1998 ►, automatic gearbox 01M Binder: "Current flow diagrams, Electrical fault finding and Fitting locations Golf 1998 ►" ٠

### Test requirements:

- Battery voltage in order.
- Vehicle voltage supply in order.
- Fuses No. 7, 11, 15 and 31 in order. Fuse in main fuse box (110 amps.) in order. ٠



• Earth connections for gearbox in order.

Earth connecting points are located in plenum chamber and below the battery in engine compartment.

Check battery earth strap and earth strap between battery and gearbox.

Electric/electronic components and Fitting locations from => Page 4

### 4.2 - Electrical check



- Switch off ignition, open bonnet.
- -> Release multi-pin connector, then pull connector off control unit.



- -> Fit test box V.A.G 1598/18 onto multi-pin connector (1) and lock, in direction of arrow (2).

Using test box V.A.G 1598/18 the wiring can be checked according to current flow diagram.

- Before connecting the test leads the correct measuring range on tester must be adjusted. Otherwise the electronic components can be destroyed !
- Use the hand multimeter V.A.G 1526 with auxiliary cables from V.A.G 1594 for testing.
- The specified values are valid for an ambient temperature from 0 °C...40 °C.
- If the readings obtained differ from the specified values, determine fault on the basis of the current flow diagram.
- If the readings obtained differ only slightly from the specified values, clean sockets and connectors of the testers and test leads and repeat test. Before replacing the particular components, test wiring and connections and, particularly if specified values are below 10 ω, repeat resistance measurement on component.



### After electrical checks

- -> Locate multi-pin connector on control unit -J217- pins (arrows) then lock multi-pin connector. Performing self-diagnosis => Page 17 . Initiating basic setting => Page 27 .

### Control unit -J217- multi-pin connector (68 pin) assignment (sockets on V.A.G 1598/18)

1- Earth (terminal 31)	20- Road speed sender -G68-
2- Vacant	21- Gearbox speed sender -G38-
3- Data bus Low input and output signals	22- Solenoid valve 6 -N93- supply voltage
4- Vacant	23- Supply voltage (terminal 15)
5- Throttle valve potentiometer signal -G69-1)	24- Diagnosis K-wire
6- Gearbox oil temperature (ATF) sender -G9	3- 25- Data bus High input and output signals
7- Vacant	26- Data bus screening, vacant if the core of the Data bus wiring is interwoven
8- Only vehicles with Tiptronic: Shift up	27- Vacant
9- Solenoid valve 3 -N90-	28- Throttle valve potentiometer -G69- earth1)
10- Solenoid valve 7 -N94-	29- Selector lever lock solenoid -N110-
11- Park/neutral signal	30- Vacant
12- Kickdown for air conditioner 1)	31- Demand: Radiator fan
13- Ignition timing influence 1)	32- Vacant
14- Vacant	33- Vacant
15- Brake light switch -F- signal voltage	34- Vacant
16- Kickdown switch -F8-	35- Vacant
17- Vacant	36- Vacant
18- Multi-function switch -F125- (pin 5)	37- Vacant
19- TD (revolution) signal 1)	38- Vacant

1) Only used on vehicles without Data bus. On vehicles with Data bus these chambers are not used. The control unit then receives this information from the Data bus, or sends the information or the Data bus (3 + 25).

39- Tiptronic gate switch, or vacant	54- Solenoid valve 2 - N89-
40- Multi-function switch -	55- Solenoid valve 1 -
F125- (pin 2)	N88-
41- Load signal from en-	56- Solenoid valve 5 -
gine control unit 1)	N92-
42- Vacant	57- Selector lever display
43- Road speed sender -	58- Solenoid valve 6 -
G68- (screening)	N93-



44- Gearbox speed sender -G38- (screening)	59- Vacant, or brake pressure switch
45- Supply voltage (termi- nal 30)	60- Vacant
46- Vacant	61- Cruise control system (output) 1)
47- Solenoid valve 4 -N91-	62- Multi-function switch - F125- (pin 6)
48- Freewheel lock (only on Syncro vehicles)	63- Multi-function switch - F125- (pin 1)
49- Vacant	64- Vacant
50- Throttle valve potenti- ometer -G69- (5 volt)1)	65- Road speed sender - G68-
51- Vacant or diagnostic lamp OBDII fault	66- Gearbox speed send- er -G38-
52- Only vehicles with Tip- tronic: shift down	67- Solenoid valves volt- age supply
53- Vacant	68- Vacant

1) Only used on vehicles without Data bus. On vehicles with Data bus these chambers are not used. The control unit then receives this information from the Data bus, or sends the information or the Data bus (3 + 25).

### List of test steps

Only perform test steps for the relevant component as listed in fault finding table and measured value block.

Component checked		Component checked	
Supply voltage from control unit -J217-	- Perform test step 1	Kick-down switch -F8-	- Perform test step 10
Brake light switch -F-	- Perform test step 2	Selector lever lock solenoid - N110-	- Perform test step 11
Solenoid valve 1 -N88-	- Perform test step 3	Gearbox oil temperature sender -G93- (ATF)	- Perform test step 12
Solenoid valve 2 -N89-	- Perform test step 4	Road speed sender -G68-	- Perform test step 13
Solenoid valve 3 -N90	- Perform test step 5	Gearbox oil temperature sender -G93- (ATF)	- Perform test step 14
Solenoid valve 4 -N91-	- Perform test step 6	Multi-function switch -F125-	- Perform test step 15
Solenoid valve 5 -N92-	- Perform test step 7		
Solenoid valve 6 -N93-	- Perform test step 8		
Solenoid valve 7 -N94-	- Perform test step 9		

### 4.3 - Test table

Switch to voltage measuring range 20 V					
Test step	V.A.G 1598/18 sockets	Test of	<ul> <li>Test conditions</li> <li>Additional operations</li> </ul>	Specified value	Rectifying fault



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1	23 + 1 45 +1	Supply voltage from control unit -J217-	<ul> <li>Ignition switched on</li> </ul>	approx. battery voltage	- Check wiring according to cur- rent flow dia- gram Check wire from contact 1 to earth Check wire from contact 23 to ter- minal 15 (fuse No. 31) - Check wire from contact 45 to terminal 30
2	15 + 1	Brake light switch -F-	<ul> <li>Ignition switched on</li> <li>Brake pedal not de- pressed</li> </ul>	Less than 1 V	- Check wiring using current flow diagram
			- Brake pedal depressed	approx. battery voltage	- Renew brake light switch -F- and adjust if necessary

Switch to resistance measuring range 200 $\omega$					
Test step	V.A.G 1598/18 sockets	Test of	<ul> <li>Test conditions</li> <li>Additional operations</li> </ul>	Specified value	Rectifying fault
3	55 + 67	Solenoid valve	<ul> <li>Ignition switched off</li> </ul>	55 to 65 ω	
	55 + 1 67 + 1	-N88-	<ul> <li>Ignition switched off Switch V.A.G 1526 to great- est ω range</li> </ul>	infinite ω	- Check wiring ac- cording to current flow diagram
4	54 + 67	Solenoid valve	<ul> <li>Ignition switched off</li> </ul>	55 to 65 ω	
	54 + 1 67 + 1	-N89-	<ul> <li>Ignition switched off Switch V.A.G 1526 to great- est ω range</li> </ul>	infinite ω	- Check conductor strip according to current flow dia- gram
5	9 + 67	Solenoid valve	<ul> <li>Ignition switched off</li> </ul>	55 to 65 ω	- Renew conduc- tor strip
	9 + 1 67 + 1	-N90-	<ul> <li>Ignition switched off Switch V.A.G 1526 to great- est ω range</li> </ul>	infinite $\omega$	=> Removing and installing conduc- tor strip =>Page 9
6	47 + 67	Solenoid valve	<ul> <li>Ignition switched off</li> </ul>	4.5 to 6.5 ω	- Renewing valve body
	47 + 1 67 + 1	-N91-	<ul> <li>Ignition switched off Switch V.A.G 1526 to great- est ω range</li> </ul>	infinite $\omega$	=> Repair group 38; Removing and installing valve body

	Switch to resistance measuring range 200 $\omega$					
Test step	V.A.G 1598/18 sockets	Test of	<ul> <li>Test conditions</li> <li>Additional operations</li> </ul>	Specified value	Rectifying fault	
7	56 + 67	Solenoid valve 5	<ul> <li>Ignition switched off</li> </ul>	55 to 65 ω		
	56 + 1 67 + 1	-N92-	<ul> <li>Ignition switched off Switch V.A.G 1526 to great- est ω range</li> </ul>	infinite ω	<ul> <li>Check wiring ac- cording to current flow diagram</li> </ul>	



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8	58 + 22	Solenoid valve 6	<ul> <li>Ignition switched off</li> </ul>	4.5 to 6.5 ω	- Check conductor strip according to current flow dia- gram
	58 + 1 22 + 1	-N93-	<ul> <li>Ignition switched off Switch V.A.G 1526 to great- est ω range</li> </ul>	infinite ω	- Renew conduc- tor strip Removing and in- stalling conductor strip =>Page 9
9	10 + 67	Solenoid valve 7	<ul> <li>Ignition switched off</li> </ul>	55 to 65 ω	- Renew valve chest
	10 + 1 67 + 1	-N94-	<ul> <li>Ignition switched off Switch V.A.G 1526 to great- est ω range</li> </ul>	infinite ω	=> Repair group 38; Removing and installing valve chest

	Switch to resistance measuring range 200 $\omega$				
Test step	V.A.G 1598/18 sockets	Test of	<ul> <li>Test conditions</li> <li>Additional operations</li> </ul>	Specified value	Rectifying fault
10	1 + 16	Kickdown switch - F8-	<ul> <li>Ignition switched off Switch V.A.G 1526 to greatest ω range</li> </ul>	infinite ω	- Check wiring according to cur- rent flow dia- gram
		(can only be checked, when switch is integra- ted in accelerator cable)	<ul> <li>Accelerator pedal not depressed</li> </ul>		- Pull connector off switch, re- peat measure- ment on switch
			- Switch V.A.G 1526 to 200 ω range Depress accelerator as far as kickdown	less than 1.5 ω	- Adjust acceler- ator cable or re- new => Repair Group 20
11	23 + 29	Selector lever lock solenoid -N110-	<ul> <li>Ignition switched off</li> </ul>	12 to 15 ω	- Pull selector lever light con- nector off, re- peat measure- ment Check wiring ac- cording to cur- rent flow dia- gram Renew selector lever lock sole- noid -N110- => Repair group 37; Servicing se- lector mecha- nism

Switch to resistance measuring range 2 M $\omega$					
Test step	V.A.G 1598/18 sockets	Test of	<ul> <li>Test conditions</li> <li>Additional operations</li> </ul>	Specified value	Rectifying fault
12	6 + 67	Gearbox oil temperature sender -G93- (ATF)	<ul> <li>Ignition switched off</li> </ul>		- Check wiring according to cur- rent flow dia- gram Renew conduc- tor strip => Page 9
			<ul> <li>ATF temperature</li> </ul>		

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	approx. 20 °C	0.247 M ω	
	- Switch hand multimeter V.A.G 1526 to 200 K ω approx. 60° C	48.8 K ω 7.4 K ω	
	approx. 120° C		

Switch to resistance measuring range 20 K $\omega$					
Test step	V.A.G 1598/18 sockets	Test of	<ul> <li>Test conditions</li> <li>Additional operations</li> </ul>	Specified value	Rectifying fault
13	20 + 65	Road speed sender -G68-	<ul> <li>Ignition switched off</li> </ul>		- Pull connector off sender, repeat measurement on sender =>Page 14 , Fig. 15
			min.	0.8 Κ ω	- Check wiring from control unit to send- er according to cur- rent flow diagram
			max.	0.9 Κ ω	
14	21 + 66	21 + 66 Gearbox speed sender -G38-	<ul> <li>Ignition switched off</li> </ul>		- Pull connector off sender, repeat measurement on sender Page 14, Fig. 14 Check wiring from control unit to send- er according to cur- rent flow diagram
			min.	0.8 Κω	- Renew gearbox speed sender - G38- =>Page 14 , Fig. 14
			max.	0.9 Κ ω	

### Test step 15: Multi-function switch -F125-

- Pull connector off multi-function switch.



- -> Connector pin assignment
- 1 To Pin 63 of control unit connector
- 2 To Pin 40 of control unit connector
- 3 To pin Pin 1 of control unit connector (earth)



- 4 Vacant
- 5 To Pin 18 of control unit connector
- 6 To Pin 62 of control unit connector
- 7 To Pin 23 of control unit connector (voltage supply terminal 15)

Checking supply voltage.



- Connect test box V.A.G 1598/18.
- Switch to 20 V measuring range.
- Switch on ignition.
- -> Measure between contact 7 and contact 3 (earth) on connector detached from multi-function switch.

#### Specification: Battery voltage

- Measure from contact 7 of connector to socket 1 on1598/18 (earth).
- Measure from socket 23 (terminal 15) on 1598/18 to socket 1 on 1598/18 (earth).

Specification: Battery voltage

If the specifications are not obtained: Repair wiring using current flow diagram.

If the specifications are obtained: Check wiring further.

- Switch off ignition.
- Pull off relay for starter inhibitor and reversing light -J226-.
- Set multimeter to measuring range: Resistance measurement 200ω.

Check the wiring between the multi-pin connector on control unit and the connector on multi-function switch.

- Measure between sockets 1 and 18 on V.A.G 1598/18.

#### Specification: Infinityω



- Measure between sockets 23 and 18 on V.A.G 1598/18.

Specification: Infinity $\omega$ 

- -> Measure between socket 18 on V.A.G 1598/18 and contact 5 on connector.

Specification: Less than 1.5  $\boldsymbol{\omega}$ 

If the specifications are not obtained: Repair wiring using current flow diagram.

If the specifications are obtained: Check wiring further.

- Measure between sockets 1 and 63 on V.A.G 1598/18.

Specification: Infinityω



- Measure between sockets 23 and 63 on V.A.G 1598/18.

Specification: Infinity

- -> Measure between socket 63 on V.A.G 1598/18 and contact 1 on connector.

Specification: Less than  $1.5 \omega$ 

If the specifications are not obtained: Repair wiring using current flow diagram.

If the specifications are obtained: Check wiring further.

- Measure between sockets 1 and 62 on V.A.G 1598/18.

Specification: Infinityω



- Measure between sockets 23 and 62 on V.A.G 1598/18.

Specification: Infinityω

Volkswagen Technical Site: http://vwts.ru http://vwts.info



- -> Measure between socket 62 on V.A.G 1598/18 and contact 6 on connector.

Specification: Less than 1.5  $\boldsymbol{\omega}$ 

If the specifications are not obtained: Repair wiring using current flow diagram.

If the specifications are obtained: Check wiring further.

- Measure between sockets 1 and 40 on V.A.G 1598/18.

Specification: Infinityω



- Measure between sockets 23 and 40 on V.A.G 1598/18.

Specification: Infinityω

- -> Measure between socket 40 on V.A.G 1598/18 and contact 2 on connector.

Specification: Less than 1.5  $\boldsymbol{\omega}$ 

If the specifications are not obtained: Repair wiring using current flow diagram.

If the specifications are obtained: Replace multi-function switch =>Page 10.

- Install relay for starter inhibitor and reversing light -J226-.

### 5 - Definitions

### 5.1 - Definitions

These explanations refer only to this assembly group: Automatic gearbox 01M self-diagnosis. These definitions are not necessarily generally valid.

### ABS

Anti-locking brake system. Further information on the ABS can be found in the relevant self-study programmes.

### Display group number => Read measured value block

### Throttle valve control part

An engine component to stabilize the idling speed. The "throttle valve signal" originates from here. Further information on the throttle valve control unit can be found in self-study programme no.173.

#### Self-diagnosis

The capability of the control unit:

to recognise faults,

to react to faults,

to store faults,

to register faults and make them available in the measured value block.

#### Performing self-diagnosis

Connecting the fault reader to be able to interrogate the fault memory.

#### Influencing the quantity injected

The engine torque is reduced during the gear shift process by changing the quantity injected. Further information on this can be found in Self-study programme No. 172.

#### Performing electrical check

A targeted check of the electronic components by performing certain measurements.

#### Fuzzy logic

Monitors the actual driving situation. This item of software in the control unit replaces the previous programme switch. Further information on this can be found in self-study programme no. 172.

#### Data bus

Transportation of data. To do this the electrical signals are brought into a certain format (bus). Further information on this can be found in Self-study programme No. 186.

#### Data bus low (high)

The voltage used to transport the data is low (high). Further information on this can be found in self-study programme no. 186.

### Gearbox speed sender -G38-

The sender records the speed of the large sun-wheel in the planetary gearbox and transmits it to the automatic gearbox control unit. Further information on this can be found in Self-study programme No. 172.

#### Road speed sender -G68-

The sender records the speed of the output gear and transmits it to the automatic gearbox control unit (not to the speedometer). Further information on this can be found in self-study programme no. 172.

#### Initiating basic setting

The values learnt in the control unit are turned back to the initial values. Further information on this can be found in Self-study programme No. 172.

#### No communication

There is no connection for exchanging information between the control units.

#### Short to earth

Current flows -incorrectly- to earth without supplying a consumer.



### Short to positive

Current flows -incorrectly- to a live component without supplying a consumer.

### Read measured value block

The control unit can transfer a considerable amount of test data. This test data delivers information on the operational condition of the system and/or sensors connected to it. In many cases the transferred test data supports fault finding and fault rectification. The test data has been summarized into single display groups because all the information cannot be evaluated at the same time. The information can be selected via display group numbers.

### **Emergency running**

"Condition of the control unit" when certain faults are recognised in order to maintain driving safety, to protect the gearbox against damage and at the same time to ensure that driving characteristics are impaired as little as possible.

### Pendulum support

Designation of a part of the assembly mounting. Further information on this can be found in self-study programme no. 166.

### Sporadic

Happens occasionally

### TDC signal

The signal is used to calculate the engine speed.

### Infinity $\boldsymbol{\omega}$

The resistance is infinite, open circuit.

 $\omega$  = Ohm

### Ignition timing control

The engine torque is reduced during the gear shift process by changing the ignition timing. Further information on this can be found in Self-study programme No. 172.