

Workshop Manual Audi A3 1997 ➤

Automatic gearbox 09A, self-diagnosis

Edition 12.2010



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List of Workshop Manual Repair Groups

Repair Group

01 - Self-diagnosis, electrical checks



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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 checks

1 Self-diagnosis

1.1 Self-diagnosis function

General notes

- ◆ The automatic gearbox is controlled by an electronic/hydraulic system.
- ◆ The term „self-diagnosis“ relates specifically to the electrical/electronic control functions.
- Always perform the self-diagnosis routine before commencing fault finding.

Fault detection by gearbox control unit

The automatic gearbox control unit -J217- has an event memory in order to identify the fault quickly if an electrical or electronic component fails or an open circuit is detected in the wiring. Faults are detected by means of electrical signals and stored in the event memory.

- ◆ The automatic gearbox control unit -J217- detects any faults which occur while the vehicle is being driven and stores them in an event memory ⇒ [page 12](#) .
- ◆ After processing the information, the control unit distinguishes between sporadic faults and faults which are currently present (static faults) and stores them as such.
- ◆ If a fault is no longer present after a certain period or mileage, it will be converted to a sporadic fault.
- ◆ A fault will also be converted to sporadic if the event memory is not erased after completing a repair.
- ◆ When the event memory is interrogated, sporadically occurring faults will be displayed as „sporadic“ on the vehicle diagnostic tester .
- ◆ If the sporadic fault is no longer present after a predetermined time or after driving a certain distance, the fault is erased in the event memory.

Additionally required information

- ◆ Workshop Manual Audi A3 1997 ► Automatic gearbox 09A
- ◆ ⇒ Current flow diagrams, Electrical fault finding and Fitting locations
- ◆ ⇒ Self-study programme No. 186 ; The CAN data bus and
⇒ Self-study programme No. 232 ; 5-speed automatic gearbox 09A/09B

1.2 Functions of automatic gearbox control unit -J217-

The automatic gearbox control unit -J217- receives signals from the components that influence gear selection and passes on this information to solenoid valves that control the valves in the valve body.

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Automatic gearbox control unit -J217- with flexible gearshift functions (fuzzy logic)

The gear change points are calculated automatically (depending on the driving situation and the resistance to motion).

Advantages:

- Gear changes are consumption-orientated
- Maximum engine performance is always available
- Gear-change points are adapted individually in all driving situations
- Gear-change points are infinitely variable

Hill program - gear changes are varied as required for uphill and downhill gradients

An additional gear-change map automatically selects gear changes for gradients depending on accelerator pedal position and driving speed.

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

Vehicles with TDI engine (stationary decoupling)

For enhanced comfort on these vehicles the automatic gearbox control unit -J217- can engage neutral when the vehicle is stationary with the selector lever in position „D“ or „R“, the engine idling and the brake pedal depressed.

1.3 Safety functions of automatic gearbox control unit -J217-

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If faults occur while driving, the automatic gearbox control unit -J217- can activate back-up functions or "emergency running programs". These backup functions may affect the function and smoothness of the gear changes.

Depending on the „severity“ of the fault, the control unit can react by:

- ◆ Controlling gear changes according to engine speed only,
- ◆ Controlling gear changes with increased pressure, which will be felt by the driver as „hard“ gearshifts with a noticeable jolt,
- ◆ Or by engaging 4th gear with torque converter slip (4H).

The gearbox will continue to run in the back-up mode until the fault is rectified or no longer detected by the control unit over a predetermined period.

Faults in event memory which can activate back-up mode

- ◆ Open circuit in wiring, short circuit, electrical or hydraulic components defective
- ◆ Open circuit and/or fault in CAN bus wiring

Renewing control units

If the engine or gearbox control unit is renewed, the system must be reset to the basic setting ⇒ [page 22](#) .

2 Electrical/electronic components and fitting locations

1 - Automatic gearbox control unit -J217-

- ☐ Fitting location
⇒ [page 5](#)
- ☐ Removing and installing
⇒ [page 6](#)
- ☐ Checked via self-diagnosis ⇒ [page 8](#)
- ☐ Control unit transmits and receives data via CAN bus ⇒ [page 41](#)

2 - Engine control unit

- ☐ Fitting location
⇒ [page 4](#)
- ☐ Removing and installing
⇒ [Rep. gr. 23 or Rep. gr. 24](#)
- ☐ Control unit transmits and receives data via CAN bus ⇒ [page 41](#)
- ☐ If engine or gearbox control unit is renewed, system must be reset to basic setting
⇒ [page 22](#)

3 - Dash panel insert with data bus diagnostic interface -J533-

- ☐ With selector lever position display
- ☐ Control unit transmits and receives data via CAN bus ⇒ [page 41](#)

4 - 16-pin connector -T16- (diagnostic connection)

- ☐ Fitting location
⇒ [page 5](#)

5 - Multifunction switch -F125-

- ☐ Removing and installing, adjusting ⇒ [Rep. gr. 38](#)
- ☐ Checked via self-diagnosis

6 - Intermediate shaft speed sender -G265-

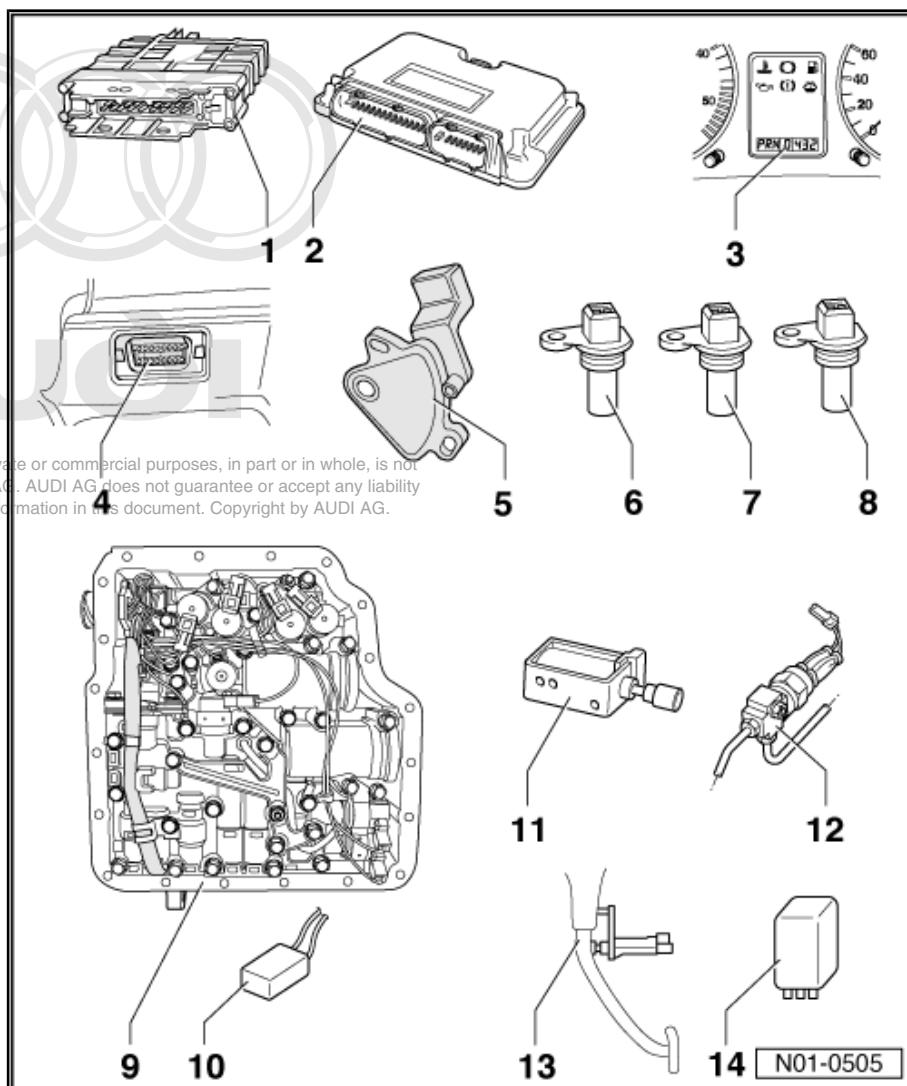
- ☐ Fitting location: in gearbox
- ☐ Picks up signal on spur gear A
- ☐ Checked via self-diagnosis

7 - Vehicle speed sender -G68-

- ☐ Fitting location: in gearbox
- ☐ Picks up gearbox output speed (road speed)
- ☐ Checked via self-diagnosis

8 - Gearbox input speed sender -G182-

- ☐ Fitting location: in gearbox
- ☐ Picks up gearbox input speed (turbine shaft)
- ☐ Checked via self-diagnosis



9 - Valve body

- ☐ Fitting location: in gearbox ⇒ Rep. gr. 38
- ☐ Following components are attached to valve body:
 - ◆ Solenoid valve 1 -N88-
 - ◆ Solenoid valve 2 -N89-
 - ◆ Solenoid valve 3 -N90-
 - ◆ Solenoid valve 4 -N91-
 - ◆ Solenoid valve 5 -N92-
 - ◆ Solenoid valve 6 -N93-
 - ◆ Solenoid valve 8 -N281-
 - ◆ Solenoid valve 10 -N283-
 - ☐ All components are checked via self-diagnosis

10 - Gearbox oil temperature sender (ATF) -G93-

- ☐ Fitting location: in gearbox

11 - Selector lever lock solenoid -N110-

- ☐ Fitting location, removing and installing ⇒ Rep. gr. 37
- ☐ Checked via self-diagnosis
- ☐ Can be checked by measured values ⇒ [page 23](#) and in electrical check ⇒ [page 33](#)

12 - Brake pressure switch -F270-

- ☐ Fitting location: switch is located on bulkhead in brake pipe to front wheel (right-side)
- ☐ Signal can be tested by measured values ⇒ [page 23](#)

13 - Brake light switch -F-

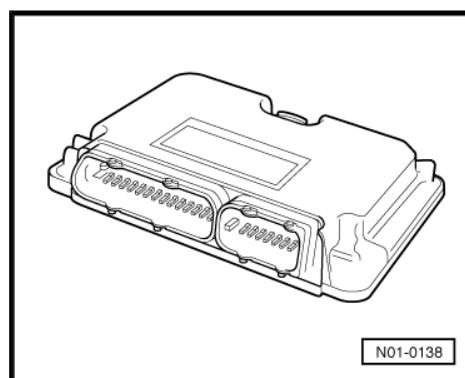
- ☐ Fitting location ⇒ [page 5](#)
- ☐ Removing and installing ⇒ Brake system; Rep. gr. 45
- ☐ Can be checked by measured values ⇒ [page 23](#) and in electrical check ⇒ [page 33](#)

14 - Starter inhibitor and reversing light relay -J226-

- ☐ Fitting location: In central electrics ⇒ Current flow diagrams, Electrical fault finding and Fitting locations

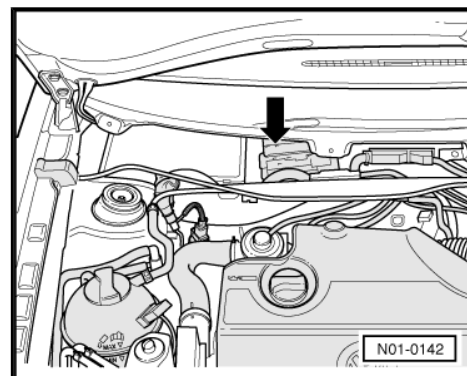
Fitting location of engine control unit

- ◆ In plenum chamber
- ◆ If the engine control unit is renewed, the kickdown function must be re-adapted ⇒ Rep. gr. 20 .



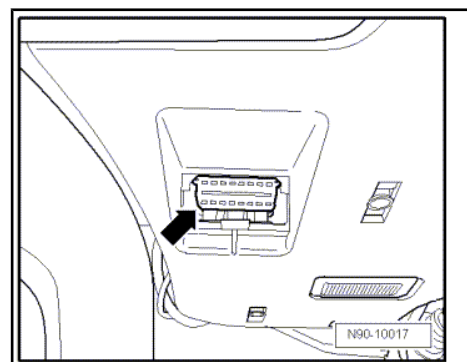
Fitting location of automatic gearbox control unit -J217-

- ◆ In plenum chamber (centre/right)



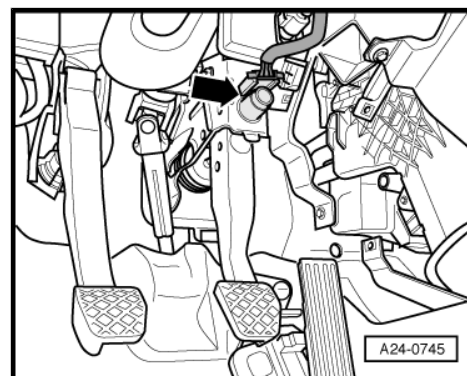
Fitting location of 16-pin connector -T16- (diagnostic connection)

- ◆ In front knee bolster (left-side)



Fitting location of brake light switch -F-

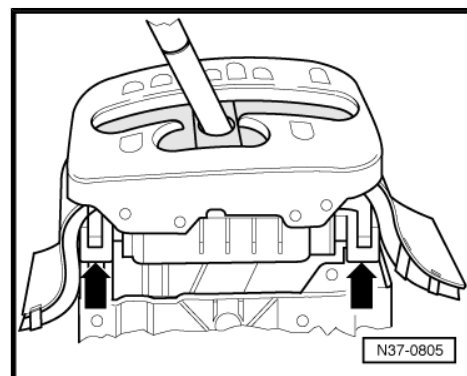
- ◆ On pedal cluster



Fitting location of tiptronic switch -F189-

- ◆ Integrated in printed circuit of symbol panel in selector mechanism cover
- ◆ If the switch malfunctions, the symbol panel with printed circuit must be renewed ⇒ Rep. gr. 37
- ◆ Can be checked by measured values ⇒ [page 23](#) and in electrical check ⇒ [page 33](#).

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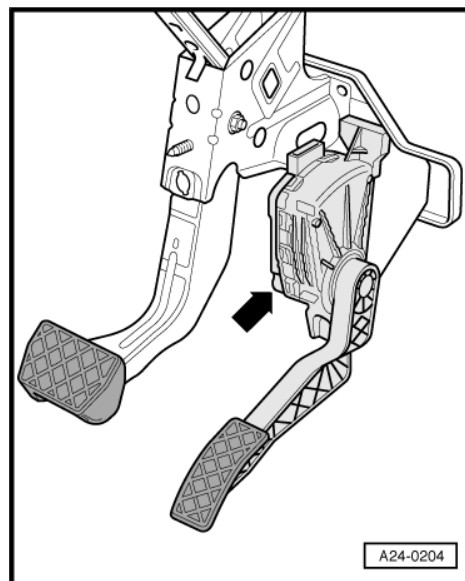
Fitting location of kickdown switch -F8-



Note

A specific value for the accelerator position sender -G79- and (if fitted) the accelerator position sender 2 -G185- is stored in the engine control unit.

- ◆ Fitting location: the accelerator position sender(s) are integrated in the accelerator pedal module -arrow-.
- ◆ Removing and installing, adaption ⇒ Rep. gr. 20
- ◆ Can be checked by measured values ⇒ [page 23](#) and in electrical check ⇒ [page 33](#).



2.1 Removing and installing automatic gearbox control unit -J217-

Removing

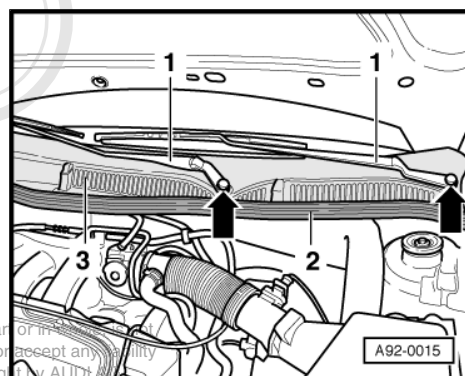
- Remove wiper arms -1- ⇒ Electrical system; Rep. gr. 92.
- Pull off seal -2- for plenum chamber cover.
- Raise plenum chamber cover -3- until it is possible to disconnect washer fluid hose going to washer jets.
- If fitted, unplug electrical connector at washer jets.



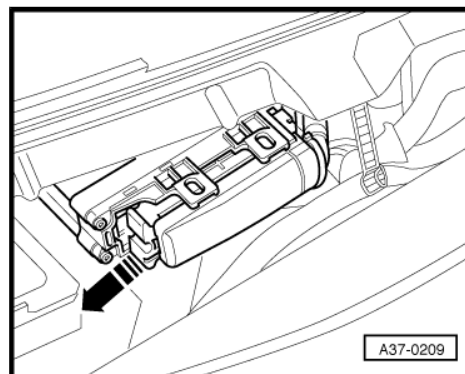
Caution

Risk of damage to plenum chamber cover.

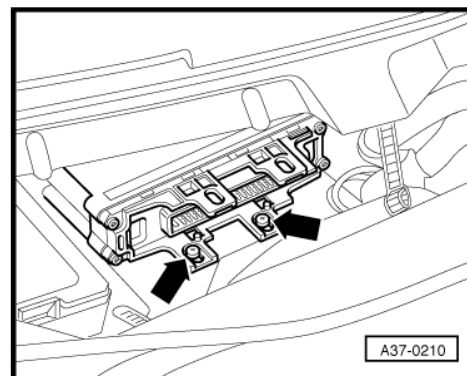
- ◆ Apply a small quantity of soap solution to transition between windscreen and plenum chamber cover. Then, starting at edge of windscreen, pull plenum chamber cover vertically up and out of retainer at windscreen.



- Pull off plenum chamber cover.
- Switch off ignition, release multi-pin connector in direction of -arrow- and unplug from automatic gearbox control unit -J217-.



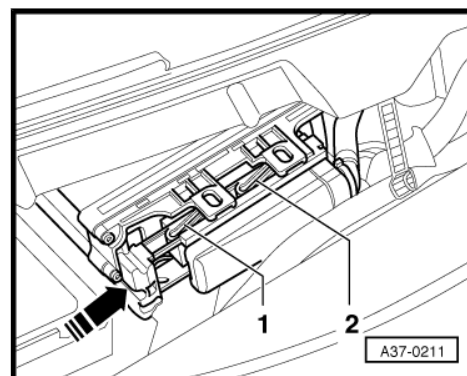
- Loosen bolts -arrows- and pull off automatic gearbox control unit -J217- .



Installing

The remaining installation steps are carried out in the reverse sequence; note the following points:

- Secure automatic gearbox control unit -J217- .
- Slide guides -1- and -2- on multi-pin connector onto pins of control unit. Then secure catch on connector in direction of -arrow-.
- Install wiper arms -1- ⇒ Electrical system; Rep. gr. 92 .
- Perform self-diagnosis ⇒ [page 8](#) .
- If control unit has been renewed, initiate basic setting ⇒ [page 22](#) .



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3 Performing self-diagnosis

3.1 Safety precautions

Observe the following precautions if test equipment has to be used when road-testing the vehicle.



WARNING

Accidents can be caused if the driver is distracted by test equipment or if test equipment is not secured.

Injuries can also be caused if the passenger's airbag is triggered in a collision.

- *The use of test equipment while driving causes distraction.*
- *There is an increased risk of injury if test equipment is not secured.*
- ◆ *Always secure testing equipment to the rear seat with a strap and have them operated from there by a second person.*

Observe the following precautions to avoid possible injury and/or damage to electrical and electronic components:

- ◆ Switch off ignition before disconnecting and connecting electrical wiring (this also applies to wiring for testing equipment).
- ◆ During some of the tests the control unit may detect a fault and store it in the memory. The event memory should therefore be interrogated and, if necessary, erased after completing all tests and repair work.

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Caution

When disconnecting the battery there is a risk of serious damage to electronic components:

- ◆ *Observe the correct procedure for disconnecting the battery.*
- ◆ *On vehicles with telematics: activate service mode of telematics control unit before disconnecting battery ⇒ Rep. gr. 91.*
- ◆ *Always switch off the ignition before disconnecting the battery ⇒ Electrical system; Rep. gr. 27.*

3.2 Connecting vehicle diagnostic tester and selecting functions

Procedure

- Selector lever in position „P“ or „N“ and handbrake applied.
- Vehicle power supply OK.
- Fuses OK ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.
- Earth connections for gearbox OK.

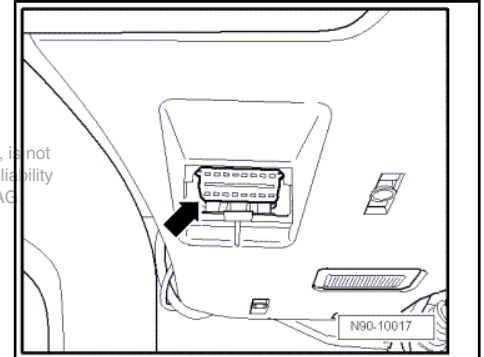
- Check earth connections for corrosion and poor contact, repair if necessary ➔ Current flow diagrams, Electrical fault finding and Fitting locations.
- Check battery earth strap and earth strap between battery and gearbox.
- With ignition switched off, connect vehicle diagnostic tester to diagnostic connection using diagnostic cable.



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Observe safety precautions ➔ page 8



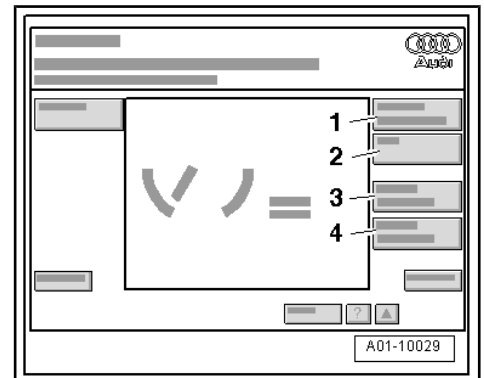
 Note

If a fault message appears on the display ➔ operating instructions for vehicle diagnostic tester.

- Switch on ignition.
- or
- Start engine.

Tester display (example):

- In menu touch **Vehicle self-diagnosis** button -item 1-.

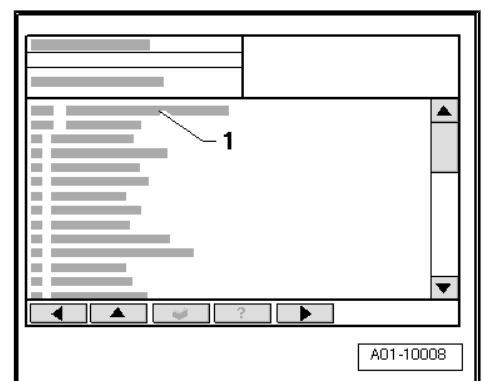


Tester display (example):

- From menu -1-, select vehicle system „02 - Gearbox electronics“ and advance by pressing  button.

 Note

By selecting „Collective services“ and advancing with the  button, you can proceed to the diagnostic function „Interrogate event memory - complete system“. This function will interrogate the event memories of all vehicle systems with self-diagnosis capability.

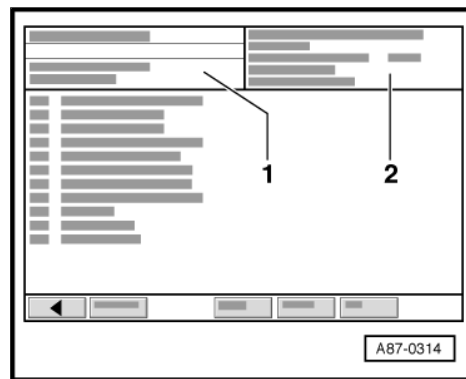


- Wait until next screen display appears.

Tester display (example):

2 - Control unit identification of gearbox control unit

Control unit identification of gearbox control unit (example)	
02 - Gearbox electronics	Vehicle system
09A 927 750..	Part No.; For correct version, refer to ⇒ Electronic parts catalogue
AG5 gearbox 09A	5-speed automatic gearbox 09A
0004	Control unit software version (data level)
00000	Control unit coding (not required)
Workshop code 12345	Workshop code of vehicle diagnostic tester which was used to perform the last coding



If readout „Vehicle system not available“ appears in display zone -1-:

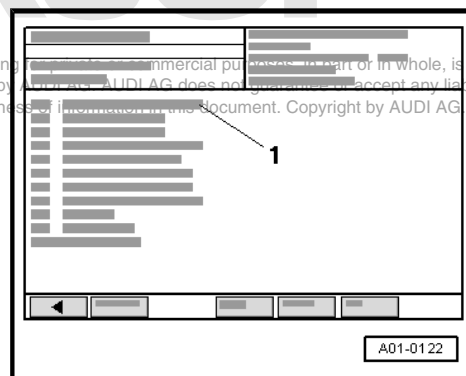
- Check:
- ◆ Voltage supply to diagnostic connection ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.
- ◆ Wiring connections from diagnostic connection to automatic gearbox control unit -J217- ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.

3.3 List of selectable functions

- The following diagnostic functions shown in display -1- are available:

Diagnostic function	Page
Interrogate event memory	⇒ page 11
Basic setting	⇒ page 22
Erase event memory	⇒ page 20
End output	⇒ page 21
Measured values	⇒ page 23

All other diagnostic functions displayed cannot be selected or can be disregarded here.



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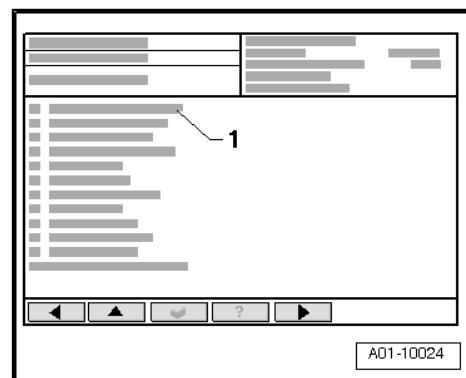
4 Interrogating event memory

4.1 Interrogating event memory

- With ignition switched off, connect vehicle diagnostic tester to diagnostic connection using diagnostic cable ⇒ [page 8](#) .
- Select vehicle system „02 - Gearbox electronics“. The ignition must be switched on.

Tester display (example):

- From menu -1-, select diagnostic function „Interrogate event memory“ and advance by pressing  button.



Tester display (example):

- | | |
|-----------------------------|--|
| -1- Content of event memory | 0 faults detected
or
X faults detected |
| -2- Fault entry | Fault code
Fault location
Fault type |

A - If one or more faults have been detected:

- Print out information on screen or self-diagnosis log.
- Exit function „Interrogate event memory“ by touching  button.



Tester display (example):

- Rectify fault(s) according to fault tables ⇒ [page 12](#) .
- Once again select diagnostic function „Interrogate event memory“ from menu -1- and erase event memory ⇒ [page 20](#) .
- From menu -1- select diagnostic function „End output“ ⇒ [page 21](#) .

B - If no fault has been detected:

- Exit function „Interrogate event memory“ by touching  button.
- Select diagnostic function „End output“ ⇒ [page 21](#) from menu.



4.2 Fault tables



Note

- ◆ The following tables lists all the possible faults which can be detected by the automatic gearbox control unit -J217- and are displayed on the vehicle diagnostic tester when the event memory is interrogated.
- ◆ The content of the event memory is retained until the memory is erased; erasing event memory ⇒ [page 20](#).
- ◆ The fault table is sorted according to the 5-digit fault code in the left-hand column.
- ◆ Sporadic faults (which occur intermittently) are displayed as „sporadic“.
- ◆ Components that are indicated as being faulty by the vehicle diagnostic tester should not be renewed immediately. Always start by checking the wiring and connectors to these components according to the current flow diagram. Also check the earth connections according to the current flow diagram. This is particularly important for faults displayed as „sporadic“.

4.3 Fault tables: Fault codes 00258 to 00532

Fault code 00258

Display on vehicle diagnostic tester	Possible cause of fault	How to rectify fault
00258 Solenoid valve 1 -N88- Short to earth Open circuit / short to positive	◆ Open circuit or short to earth or positive in wiring ◆ Solenoid valve 1 -N88- defective	– Check wiring and connectors according to current flow diagram. Also check for contact corrosion or moisture, especially at connector on top of gearbox and on wiring harness for solenoid valves – Read measured values, display group 004 ⇒ page 23 – Perform electrical check, test step No. 7 ⇒ page 38

Fault code 00260

Display on vehicle diagnostic tester	Possible cause of fault	How to rectify fault
00260 Solenoid valve 2 -N89- Short to earth Open circuit / short to positive Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.	◆ Open circuit or short to earth or positive in wiring ◆ Solenoid valve 2 -N89- defective	– Check wiring and connectors according to current flow diagram. Also check for contact corrosion or moisture, especially at connector on top of gearbox and on wiring harness for solenoid valves – Read measured values, display group 004 ⇒ page 23 – Perform electrical check, test step No. 8 ⇒ page 38

Fault code 00262

Display on vehicle diagnostic tester	Possible cause of fault	How to rectify fault
00262 Solenoid valve 3 -N90- Short to earth Open circuit / short to positive	◆ Open circuit or short to earth or positive in wiring ◆ Solenoid valve 3 -N90- defective	– Check wiring and connectors according to current flow diagram. Also check for contact corrosion or moisture, especially at connector on top of gearbox and on wiring harness for solenoid valves – Read measured values, display group 004 ⇒ page 23 – Perform electrical check, test step No. 9 ⇒ page 38

Fault code 00264

Display on vehicle diagnostic tester	Possible cause of fault	How to rectify fault
00264 Solenoid valve 4 -N91- Short to earth Open circuit / short to positive	◆ Open circuit or short to earth or positive in wiring ◆ Solenoid valve 4 -N91- defective	– Check wiring and connectors according to current flow diagram. Also check for contact corrosion or moisture, especially at connector on top of gearbox and on wiring harness for solenoid valves – Read measured values, display group 003 ⇒ page 23 – Read measured values, display group 007 ⇒ page 31 – Perform electrical check, test step No. 10 ⇒ page 39

Fault code 00266

Display on vehicle diagnostic tester	Possible cause of fault	How to rectify fault
00266 Solenoid valve 5 -N92- Short to earth Open circuit / short to positive	◆ Open circuit or short to earth or positive in wiring ◆ Solenoid valve 5 -N92- defective	– Check wiring and connectors according to current flow diagram. Also check for contact corrosion or moisture, especially at connector on top of gearbox and on wiring harness for solenoid valves – Read measured values, display group 004 ⇒ page 23 – Perform electrical check, test step No. 11 ⇒ page 39

Fault code 00268

Display on vehicle diagnostic tester	Possible cause of fault	How to rectify fault
00268 Solenoid valve 6 -N93- Short to earth Open circuit / short to positive	◆ Open circuit or short to earth or positive in wiring	– Check wiring and connectors according to current flow diagram. Also check for contact corrosion or moisture, especially at connector on top of gearbox and on wiring harness for solenoid valves

Display on vehicle diagnostic tester	Possible cause of fault	How to rectify fault
	◆ Solenoid valve 6 -N93- defective	– Read measured values, display group 002 ⇒ page 23 – Perform electrical check, test step No. 12 ⇒ page 39

Fault code 00281

Display on vehicle diagnostic tester	Possible cause of fault	How to rectify fault
00281 Vehicle speed sender -G68- No signal	◆ Connector not plugged in ◆ Open circuit or short to earth or positive in wiring ◆ Vehicle speed sender -G68- defective	– Check multi-pin connector for contact corrosion and moisture – Check wiring and connector according to current flow diagram – Read measured values, display group 001 ⇒ page 23 – Perform electrical check, test step No. 5 ⇒ page 38

Fault code 00293

Display on vehicle diagnostic tester	Possible cause of fault	How to rectify fault
00293 Multi-function switch -F125- Undefined switch status	◆ Connector not plugged in ◆ Open circuit or short to earth or positive in wiring ◆ Multi-function switch -F125- defective	– Check wiring and connector according to current flow diagram. Also check connector for contact corrosion or moisture – Read measured values, display group 004 ⇒ page 23

Fault code 00296

Display on vehicle diagnostic tester	Possible cause of fault	How to rectify fault
00296 Kickdown switch -F8- Short to earth Implausible signal	◆ Open circuit or short to earth in wiring ◆ Signal is transmitted continuously from electronic throttle although accelerator is not fully depressed	– Check wiring and connectors according to current flow diagram. Also check for contact corrosion or moisture, especially at connector on top of gearbox – Read measured values, display group 004 ⇒ page 23

Fault code 00300

Display on vehicle diagnostic tester	Possible cause of fault	How to rectify fault
00300 Gearbox oil temperature sender (ATF) -G93- Open circuit / short to positive	◆ Open circuit or short to positive in wiring	– Check wiring and connectors according to current flow diagram. Also check for contact corrosion or moisture

Display on vehicle diagnostic tester	Possible cause of fault	How to rectify fault
	◆ Gearbox oil temperature sender -G93- defective	– Read measured values, display group 002 ⇒ page 23 – Perform electrical check, test step No. 16 ⇒ page 40 – Renew gearbox oil temperature sender -G93- ⇒ Rep. gr. 38

Fault code 00347

Display on vehicle diagnostic tester	Possible cause of fault	How to rectify fault
00347 Solenoid valve 8 -N281- Short to earth Open circuit / short to positive	◆ Open circuit or short to earth or positive in wiring ◆ Solenoid valve 8 -N281- defective	– Check wiring and connectors according to current flow diagram. Also check for contact corrosion or moisture, especially at connector on top of gearbox and on wiring harness for solenoid valves – Read measured values, display group 004 ⇒ page 23 – Perform electrical check, test step No. 13 ⇒ page 39

Fault code 00348

Display on vehicle diagnostic tester	Possible cause of fault	How to rectify fault
00348 Solenoid valve 9 -N282- Short to earth Open circuit / short to positive	◆ Open circuit or short to earth or positive in wiring ◆ Solenoid valve 9 -N282- defective	– Check wiring and connectors according to current flow diagram. Also check for contact corrosion or moisture, especially at connector on top of gearbox and on wiring harness for solenoid valves – Read measured values, display group 004 ⇒ page 23 – Perform electrical check, test step No. 14 ⇒ page 39

Fault code 00349

Display on vehicle diagnostic tester	Possible cause of fault	How to rectify fault
00349 Solenoid valve 10 -N283- Short to earth Open circuit / short to positive	◆ Open circuit or short to earth or positive in wiring ◆ Solenoid valve 10 -N283- defective	– Check wiring and connectors according to current flow diagram. Also check for contact corrosion or moisture, especially at connector on top of gearbox and on wiring harness for solenoid valves – Read measured values, display group 008 ⇒ page 23 – Perform electrical check, test step No. 15 ⇒ page 40

Fault code 00350

Display on vehicle diagnostic tester	Possible cause of fault	How to rectify fault
00350 Earth return wire, modulation valves Output does not switch / short to positive	♦ Open circuit or short to positive in wiring ♦ Automatic gearbox control unit - J217- defective	– Check wiring and connectors according to current flow diagram. Also check for contact corrosion or moisture, especially at connector on top of gearbox and on wiring harness for solenoid valves – Renew automatic gearbox control unit -J217- ➔ page 6 – Reset system to basic setting ➔ page 22

Fault code 00351

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Display on vehicle diagnostic tester	Possible cause of fault	How to rectify fault
00351 Intermediate shaft speed sender - G265- No signal	♦ Open circuit or short circuit in wiring ♦ Intermediate shaft speed sender -G265- defective	– Check wiring and connectors according to current flow diagram. Also check for contact corrosion or moisture, especially at connector on top of gearbox – Read measured values, display group 007 ➔ page 23 – Perform electrical check, test step No. 17 ➔ page 40

Fault code 00529

Display on vehicle diagnostic tester	Possible cause of fault	How to rectify fault
00529 Speed information missing No signal	♦ The engine control unit identifies the signal as faulty and then sends it to the CAN bus	– Rectify fault as described for fault codes 01312 ➔ page 18 , 01314 ➔ page 18 – Interrogate event memory of engine control unit and rectify faults ➔ Rep. gr. 01 – Read measured values, display group 001 ➔ page 23 – Check wiring and connectors according to current flow diagram. Also check for contact corrosion or moisture

Fault code 00532

Display on vehicle diagnostic tester	Possible cause of fault	How to rectify fault
00532 Voltage supply	♦ Battery voltage less than 8 V after engine is started ♦ Insufficient supply voltage for solenoid valves	– Check battery voltage – Read measured values, display group 002 ➔ page 23

4.4 Fault tables: Fault codes 00652 to 65535

Fault code 00652

Display on vehicle diagnostic tester	Possible cause of fault	How to rectify fault
00652 Gear monitoring Implausible signal Mechanical fault	◆ Electrical/hydraulic fault ◆ Clutch or valve body defective	– Read measured values, display group 001 ⇒ page 23 and road test vehicle to determine in which gear fault occurs – Only renew clutches or valve body after having rectified all possible causes of fault listed here

Fault code 00777

Display on vehicle diagnostic tester	Possible cause of fault	How to rectify fault
00777 Accelerator position sender -G79- No signal	◆ The engine control unit identifies the signal as faulty and then sends it to the CAN bus	– Interrogate event memory of engine control unit and rectify faults ⇒ Rep. gr. 01 – Check wiring and connectors according to current flow diagram. Also check for contact corrosion or moisture – Read measured value block 002 ⇒ page 23 – Refer to notes on CAN bus ⇒ page 41

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Fault code 01045

Display on vehicle diagnostic tester	Possible cause of fault	How to rectify fault
01045 Tiptronic switch -F189- Implausible signal	◆ Open circuit in wiring ◆ tiptronic switch -F189-	– Check wiring and connectors according to current flow diagram. Also check for contact corrosion or moisture – Read measured values, display group 005 ⇒ page 23

Fault code 01166

Display on vehicle diagnostic tester	Possible cause of fault	How to rectify fault
01166 No signal Implausible signal Signal outside tolerance	◆ The engine control unit identifies the signal as faulty and then sends it to the CAN bus	– Interrogate event memory of engine control unit and rectify faults ⇒ Rep. gr. 01

**Fault code 01192**

Display on vehicle diagnostic tester	Possible cause of fault	How to rectify fault
01192 Torque converter lock-up clutch Mechanical fault Defective	◆ Torque converter lock-up clutch defective or worn ◆ Valve body defective	– Check torque converter lock-up clutch slip – Read measured values, display group 003 ➔ page 23

Fault code 01236

Display on vehicle diagnostic tester	Possible cause of fault	How to rectify fault
01236 Selector lever lock solenoid -N110- Short to earth Open circuit / short to positive	◆ Open circuit or short to earth or positive in wiring ◆ Selector lever lock solenoid - N110- defective	– Check wiring and connectors according to current flow diagram – Read measured values, display group 004 ➔ page 23 – Perform electrical check, test step No. 2 ➔ page 37

Fault code 01312

Display on vehicle diagnostic tester	Possible cause of fault	How to rectify fault
01312 Drive train data bus defective No communication	◆ CAN bus wiring / connectors defective	– Read measured values, display group 125 ➔ page 23

Fault code 01314

Display on vehicle diagnostic tester	Possible cause of fault	How to rectify fault
01314 Engine control unit No communication Wrong equipment	◆ CAN bus wiring / connectors defective ◆ Incorrect or incorrectly coded engine control unit	– Read measured values, display group 125 ➔ page 23 – Check engine control unit and encode if necessary ➔ Rep. gr. 01

Fault code 01316

Display on vehicle diagnostic tester	Possible cause of fault	How to rectify fault
01316 Brake control unit No communication	◆ CAN bus wiring / connectors defective	– Read measured values, display group 125 ➔ page 23

Fault code 018108

Display on vehicle diagnostic tester	Possible cause of fault	How to rectify fault
018108 Brake pressure switch -F270- Implausible signal	◆ Open circuit in wiring ◆ Brake pressure switch -F270- defective	– Read measured values, display group 004 ➔ page 23

Fault code 17101 / P0717

Display on vehicle diagnostic tester	Possible cause of fault	How to rectify fault
17101 P0717 Gearbox input speed sender - G182-	◆ Open circuit or short to earth or positive in wiring ◆ Screening for wiring to gearbox input speed sender -G182- defective ◆ Gearbox input speed sender - G182- defective	- Check wiring and connectors according to current flow diagram - Read measured values, display group 001 ➤ page 23 - Perform electrical check, test step No. 6 ➤ page 38 - Renew gearbox input speed sender -G182- ➤ Rep. gr. 38
No signal	◆ Engine speed signal or gearbox speed signal defective ◆ Multi-function switch -F125- defective ◆ ATF level not OK ◆ Torque converter defective ◆ Clutches or brakes slipping ◆ Solenoid valve sticking	- Rectify fault as described for fault codes 00529 ➤ page 16 , 00293 ➤ page 14 - Check ATF level ➤ Rep. gr. 37 - Read measured values, display group 007 ➤ page 23 and road test vehicle to determine which components are defective or not being activated

Fault code 65535

Display on vehicle diagnostic tester	Possible cause of fault	How to rectify fault
65535 Control unit defective	◆ Automatic gearbox control unit - J217- defective	- Check gearbox for mechanical and hydraulic faults - Check electrical/electronic components and wiring - Renew automatic gearbox control unit -J217- - Perform basic setting ➤ page 22 .

5 Erasing event memory



Note

If event memory cannot be erased, interrogate event memory once again and rectify any faults.

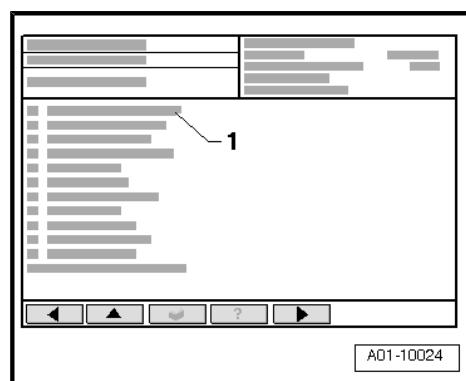
Requirements

- Event memory has been interrogated ⇒ [page 11](#) .
- All faults rectified.

After interrogating event memory:

Tester display (example):

- From menu -1-, select diagnostic function „Erase event memory“ and advance by pressing button.



Tester display (example):

- 1 - No display (before erasing memory) or
- Event memory erased



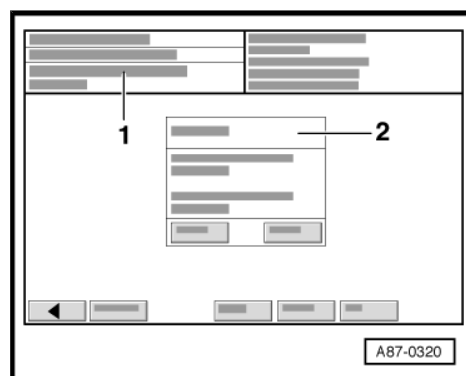
Note

If the following message appears in display zone -1-: „Event memory has not yet been interrogated“, the procedure was not performed properly. The event memory must first be interrogated before it can be erased.

2 - Note: Do you want to perform this function? Note: Data will be erased.

- Touch button in display -2-.

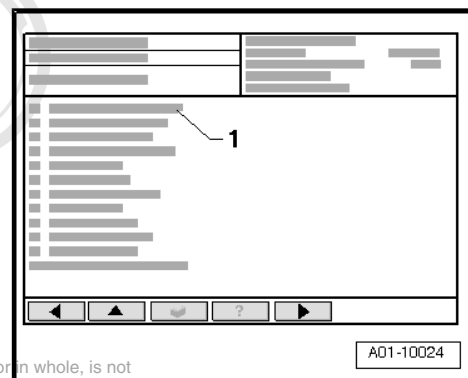
- Exit function „Erase event memory“ by touching button.



6 Ending output

Tester display (example):

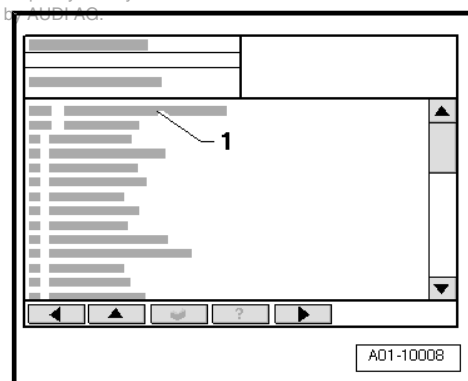
- From menu -1-, select diagnostic function „End output“ and advance by pressing  button.



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Tester display (example):

- When this display appears, switch off ignition and unplug diagnostic connector.



7 Initiating basic setting

After carrying out the following repair work always perform basic setting:

- ◆ Installing new engine
- ◆ Installing new gearbox
- ◆ Renewing or coding engine control unit
- ◆ Removing and installing accelerator pedal module
- ◆ Renewing automatic gearbox control unit -J217-

Requirements

- Voltage supply OK and all electrical equipment has been switched off
- Event memory interrogated, any faults rectified and event memory erased

Procedure

- With ignition switched off, connect vehicle diagnostic tester to diagnostic connection using diagnostic cable [page 8](#).
- Select vehicle system „02 - Gearbox electronics“. The ignition must be switched on.

Tester display (example):

- From menu -1-, select diagnostic function „Basic setting“ and advance by pressing  button.



Note

Accelerator pedal must remain in idling position.

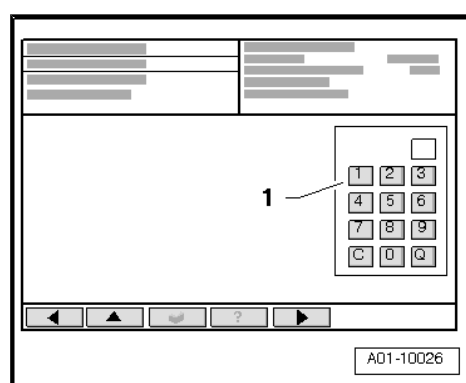


Tester display (example):

- Using keypad -1- press button  for „Display group 000“ and confirm entry by pressing  button.

System is now in basic setting.

- Press down accelerator pedal as far as kick-down and hold in this position for 3 seconds.
- End function „Basic setting“ by touching  button.



8 Measured values

The control unit can provide a large number of measured values delivering information on the operating status of the system and/or the sensors connected to it. In many cases the transferred measured values can be used to assist fault finding and to rectify faults. As all these measured values cannot be evaluated at the same time, they are summarised in individual display groups, which can be selected via display group numbers.

8.1 Reading measured values

- With ignition switched off, connect vehicle diagnostic tester to diagnostic connection using diagnostic cable ➔ [page 8](#).
- Select vehicle system „02 - Gearbox electronics“. The ignition must be switched on.

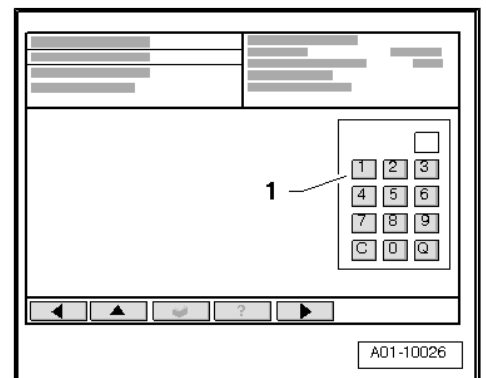
Tester display (example):

- From menu -1-, select diagnostic function „Measured values“ and advance by pressing  button.



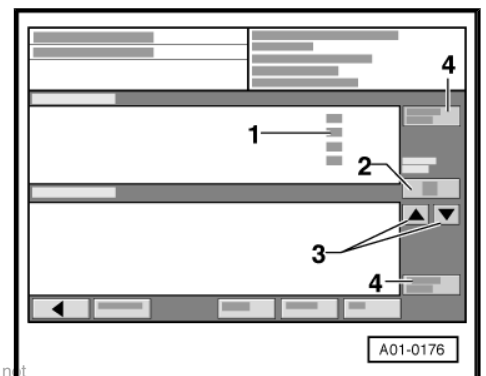
Tester display (example):

- Use keypad -2- to enter required „display group number“ ➔ [page 23](#) and confirm entry by touching  button.



Tester display (example):

- 1 - Display zones 1 ... 4. If a display zone is vacant, there is no display on this line.
 - 2 - The selected display group is indicated in this field.
 - 3 - Touch these buttons to switch to other display groups.
 - 4 - Touch these buttons to change to a different function (e.g. from „Read measured value block“ to „Basic setting“ and vice versa).
- Exit from diagnostic function „Measured values“ by touching  button.



8.2 List of available display groups

Display group	Display zone	Designation	Further details
001	1	Vehicle speed sender -G68-	➔ page 24
	2	Gearbox input speed sender -G182- (turbine rpm)	

Display group	Display zone	Designation	Further details
	3	Engine speed	
	4	Gear engaged	
002	1	Accelerator pedal value (signal from engine control unit)	⇒ page 25
	2	Solenoid valve 6 -N93- (controls ATF main pressure)	
	3	ATF temperature	
	4	Battery voltage	
003	1	Speed	⇒ page 26
	2	Accelerator pedal value (signal from engine control unit)	
	3	Gear engaged	
	4	Solenoid valve 4 -N91- (controls lock-up clutch)	
004	1	Multifunction switch -F125-	⇒ page 26
	2	Multifunction switch (8-digit display)	
	3	Switch outputs (8-digit display)	
	4	Switch positions (8-digit display)	
005	1	Multifunction switch -F125-	⇒ page 29
	2	tiptronic switch -F189-	
	3	Gear engaged	
	4	Switch positions of tiptronic switch -F189- , multifunction switch -F125-	
006		Display zones 1 ... 4 can be disregarded	
007	1	Engine speed	⇒ page 31
	2	Gearbox input speed sender -G182- (turbine rpm)	
	3	Intermediate shaft speed sender -G265-	
	4	Vehicle speed sender -G68-	
008	1	Accelerator pedal value (signal from engine control unit)	⇒ page 31
	2	Solenoid valve 6 -N93- (controls ATF main pressure)	
	3	Solenoid valve 10 -N283- (controls pressure of 2nd and 4th gear brake)	
	4	Gear engaged	
125	1	Engine control unit on CAN bus	⇒ page 31
	2	ABS control unit on CAN bus	
	3	Disregard	
	4	Disregard	

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8.3 Test table

Display group 001

Display zones	Explanatory notes
1 ... km/h	Vehicle speed when driving. A second mechanic is required for reading out the values ⇒ page 8 . Speedometer reading and values on display of vehicle diagnostic tester may differ slightly If no value is displayed: – Check vehicle speed sender -G68- , perform electrical check, test step No. 5 ⇒ page 38
2 ... rpm	Gearbox input speed sender -G182- (turbine rpm when driving). A second mechanic is required for reading out the values ⇒ page 8 If no value or an implausible value is displayed: – Check gearbox input speed sender -G182- ⇒ page 38
3 ... rpm	Engine speed with engine running. Rev. counter reading and values on vehicle diagnostic tester may differ slightly.

Display zones		Explanatory notes
		If no value or an implausible value is displayed: – Perform self-diagnosis of engine control unit ⇒ Rep. gr. 01 – Check wiring according to current flow diagram – Check CAN bus ⇒ page 42
4		Gear engaged (when driving). A second mechanic is required for reading out the values ⇒ page 8 • Selector lever in „D“ or „R“ • Neutral (brake pedal depressed) • Reverse (up to approx. 10 km/h) • 1 Hydraulic • 2 Hydraulic • 2 Mechanical • 3 Hydraulic • 3 Mechanical • 4 Hydraulic • 4 Mechanical • 5 Hydraulic • 5 Mechanical If the display readout does not appear as described: – Check solenoid valves: perform electrical check, from test step No. 7 onwards ⇒ page 38
	1	
	1	
	1H	
	2H	
	2M	
	3H	
	3M	
	4H	
	4M	
	5H	
	5M	

Display group 002

Display zones		Explanatory notes
1	... %	Accelerator pedal value with vehicle stationary and engine switched off (signal from CAN bus). % value increases continuously as accelerator is pressed down to full throttle Specification: • At idling position: 0 ... 1 % • At full throttle position: 90 % • At kickdown position: 99 % If the display readout does not appear as described: – Initiate basic setting ⇒ page 22 – Perform self-diagnosis of engine control unit ⇒ Rep. gr. 01 – Check wiring according to current flow diagram – Check CAN bus ⇒ page 42
2	... %	Solenoid valve 6 -N93- (controls ATF main pressure), vehicle stationary Specification: • At full throttle: 88 ... 100 % • At idling position: 0 ... 25 %



Display zones		Explanatory notes
		If the display readout does not appear as described: – Perform electrical check, test step No. 11 ⇒ page 39 – Reset system to basic setting ⇒ page 22
3	... °C	ATF temperature with vehicle stationary and engine running (from gearbox oil temperature sender -G93- (ATF)). The temperature is only displayed accurately above approx. 30 °C If an implausible value is displayed: – Check gearbox oil temperature sender -G93- , perform electrical check, test step No. 16 ⇒ page 40 – If display continuously shows –55°C irrespective of ATF temperature: open circuit in wiring or gearbox oil temperature sender -G93- defective
4	... V	Battery voltage, vehicle stationary Specification: • At least 10.8 V • Maximum 16.0 V If the specified value is not displayed: – Check battery voltage in measured values of any vehicle control unit and compare values – Check voltage supply of automatic gearbox control unit -J217- , perform electrical check, test step No. 1 ⇒ page 37

Display group 003

Display zones		Explanatory notes
1	... km/h	Road speed ⇒ page 24 , display group 001, display zone 1
2	... %	Accelerator pedal value ⇒ page 25 , display group 002, display zone 1
3	...	Gear engaged ⇒ page 24 , display group 001, display zone 4
4	... %	Solenoid valve 4 -N91- (controls lock-up clutch), when driving. A second mechanic is required for reading out the values ⇒ page 8 Specification: • Hydraulic gear: 4 ... 6 % • Mechanical gear: 94 ... 96 % If the specified value is not displayed: – Check solenoid valve 4 -N91- , perform electrical check, test step No. 10 ⇒ page 39

Display zones 1 and 2 in display group 004

Display zones		Explanatory notes
1	P	Multi-function switch -F125- , vehicle stationary
	R	• Selector lever in position „P“
	N	• Selector lever in position „R“
	D	• Selector lever in position „N“
	4	• Selector lever in position „D“
	3	• Selector lever in position „4“

Display zones		Explanatory notes
	2	- Selector lever in position „2“ If the display readout does not appear as described: - Rectify fault as described for fault code 00293 ➤ page 14
	T	Selector lever in tiptronic gate
	T+	Selector lever moved to +
	T–	- Selector lever moved to – If the display readout does not appear as described: - Read measured values, display group 005 ➤ page 29
2	00001010	Multi-function switch -F125-, vehicle stationary Selector lever in position „P“
	00000010	Selector lever in position „R“
	00000110	Selector lever in position „N“
	00000100	Selector lever in position „D“
	01000100	Selector lever in tiptronic gate
	01100100	tiptronic upshift button pressed (selector lever moved to +)
	11000100	tiptronic downshift button pressed (selector lever moved to –)
	00000101	Selector lever in position „4“
	00000001	Selector lever in position „3“
	00001001	- Selector lever in position „2“ If the display readout does not appear as described: - Rectify fault as described for fault code 00293 ➤ page 14

Display zone 3 in display group 004

Display	Explanatory notes
1	Switch outputs Ignition timing variation or injection quantity reduction (TDI) to reduce engine torque during a gearshift (while driving). A second mechanic is required for reading out the values ➤ page 8 0 = Switched off 1 = Switched on If the display readout does not appear as described: - Check wiring according to current flow diagram - Check CAN bus ➤ page 42
2	Air conditioner compressor shut-off function when kickdown is operated while driving. A second mechanic is required for reading out the values ➤ page 8 0 = Not shut off 1 = Is shut off during kickdown If the display readout does not appear as described: - Check wiring according to current flow diagram - Check air conditioner ➤ Rep. gr. 01

Display	Explanatory notes
3	Kickdown signal (from CAN bus), vehicle stationary and accelerator fully depressed 0 = Not recognised 1 = Kick-down operated If the display readout does not appear as described: – Perform self-diagnosis of engine control unit ⇒ Rep. gr. 01 – Check wiring according to current flow diagram – Check CAN bus ⇒ page 42
4	Stationary decoupling; only on vehicles with stationary decoupling feature (TDI). A second mechanic is required for reading out the values ⇒ page 8 0 = Gearbox is decoupled 1 = Gearbox is not decoupled If the display readout does not appear as described: – Check wiring according to current flow diagram
5	Brake pressure switch -F270- , vehicle stationary; only on vehicles with stationary decoupling feature (TDI) 0 = No pressure in vehicle brake system 1 = Brake pedal depressed If the display readout does not appear as described: – Check wiring according to current flow diagram
6	Traction control system (ASR) 0 = Inactive 1 = Active Can be ignored
7	Brake test switch 0 = Brake pedal not depressed 1 = Brake pedal depressed If the display readout does not appear as described: – Perform self-diagnosis of engine control unit ⇒ Rep. gr. 01 – Check wiring according to current flow diagram – Check CAN bus ⇒ page 42
8	Brake light switch -F- , vehicle stationary 0 = Brake pedal not depressed 1 = Brake pedal depressed If the display readout does not appear as described: – Check brake light switch -F- , perform electrical check, test step No. 3 ⇒ page 37

Display zone 4 in display group 004

Display	Explanatory notes
1	Solenoid valve 4 -N91- ⇒ page 26 , display group 003, display zone 4
2	Selector lever lock solenoid -N110- , only in selector lever positions „P“ and „N“ 0 = Not switched on 1 = Switched on

Display	Explanatory notes
	If the display readout does not appear as described: – Check selector lever lock solenoid -N110-, perform electrical check, test step No. 2 ➤ page 37
3	Solenoid valve 9 -N282- („B2“ and stationary decoupling), when driving. A second mechanic is required for reading out the values ➤ page 8 • 0 = Not activated • 1 = Activated If the display readout does not appear as described: – Check solenoid valve 9 -N282-, perform electrical check, test step No. 14 ➤ page 39
4	Solenoid valve 8 -N281- (1st - 4th gear, reverse and „B3“), when driving. A second mechanic is required for reading out the values ➤ page 8 • 0 = Not activated • 1 = Activated If the display readout does not appear as described: – Check solenoid valve 8 -N281-, perform electrical check, test step No. 13 ➤ page 39
5	Solenoid valve 3 -N90- („K1“ and reverse gear lock), when driving. A second mechanic is required for reading out the values ➤ page 8 • 0 = Not activated • 1 = Activated If the display readout does not appear as described: – Check solenoid valve 3 -N90-, perform electrical check, test step No. 9 ➤ page 38
6	Solenoid valve 5 -N92- (1st, 4th, 5th and reverse gear), when driving. A second mechanic is required for reading out the values ➤ page 8 • 0 = Not activated • 1 = Activated – Check solenoid valve 5 -N92-, perform electrical check, test step No. 11 ➤ page 39
7	Solenoid valve 2 -N89- (1st - 3rd and reverse gear), when driving. A second mechanic is required for reading out the values ➤ page 8 • 0 = Not activated • 1 = Activated If the display readout does not appear as described: – Check solenoid valve 2 -N89-, perform electrical check, test step No. 8 ➤ page 38
8	Solenoid valve 1 -N88- (1st, 2nd, 5th and reverse gear), when driving. A second mechanic is required for reading out the values ➤ page 8 • 0 = Not activated • 1 = Activated If the display readout does not appear as described: – Check solenoid valve 1 -N88-, perform electrical check, test step No. 7 ➤ page 38

Display zones 1, 2 in display group 005

Display zones	Explanatory notes
1	Selector lever position, vehicle stationary



Display zones		Explanatory notes
	P	• Selector lever in position „P“
	R	• Selector lever in position „R“
	N	• Selector lever in position „N“
	D	• Selector lever in position „D“
	T	• Selector lever in tiptronic gate
	4	• Selector lever in position „4“
	3	• Selector lever in position „3“
	2	• Selector lever in position „2“
		If the display readout does not appear as described: – Rectify fault as described for fault code 00293 ⇒ page 14
2	TIP M	tiptronic switch -F189- (actual tiptronic position), when driving. A second mechanic is required for reading out the values ⇒ page 8 • Selector lever in tiptronic gate
	TIP +	• Selector lever moved to +
	TIP –	• Selector lever moved to – If the display readout does not appear as described: – Check adjustment of multi-function switch -F125- ⇒ Rep. gr. 38 – Check wiring according to current flow diagram
	TIP ERR	If this display appears and multifunction switch -F125- is OK: – Renew tiptronic switch -F189- ⇒ Rep. gr. 38

Display zones 3, 4 in display group 005

Display zones		Explanatory notes
3	0	Gear engaged, vehicle stationary • Selector lever in „P“ or „N“
	R	Gear engaged (when driving). A second mechanic is required for reading out the values ⇒ page 8 • Selector lever in „R“
	0	• Selector lever in „D“
	1H	• 1 Hydraulic
	2H	• 2 Hydraulic
	2M	• 2 Mechanical
	3H	• 3 Hydraulic
	3M	• 3 Mechanical
	4H	• 4 Hydraulic
	4M	• 4 Mechanical
	5H	• 5 Hydraulic

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Display zones		Explanatory notes
	5M	5 Mechanical If the display readout does not appear as described: - Check solenoid valves: perform electrical check, from test step No. 7 onwards ⇒ page 38 - Rectify fault as described for fault code 00293 ⇒ page 14
4	010 0110	tiptronic switch -F189- (1st - 3rd digits; 4th digit is not displayed) Multifunction switch -F125- (5th - 8th digits) Can be disregarded

Display group 006

Display zones 1 ... 4 can be disregarded

Display group 007

Display zones		Explanatory notes
1	... rpm	Engine speed ⇒ page 24 , display group 001, display zone 3
2	... rpm	Gearbox input speed sender -G182- (turbine rpm) ⇒ page 24 , display group 001, display zone 2
3	... rpm	Intermediate shaft speed sender -G265- , when driving. A second mechanic is required for reading out the values ⇒ page 8 If no value or an implausible value is displayed: – Check intermediate shaft speed sender -G265- , perform electrical check, test step No. 17 ⇒ page 40
4	... km/h	Road speed ⇒ page 24 , display group 001, display zone 1

Display group 008

Display zones		Explanatory notes
1	... %	Accelerator pedal value ⇒ page 25 , display group 002, display zone 1
2	... %	Solenoid valve 6 -N93- (controls ATF main pressure) ⇒ page 25 , display group 002, display zone 2
3	... %	Solenoid valve 10 -N283- (brake pressure „B2“), vehicle stationary Specification: - At full throttle: 88 ... 100 % - At idling position: 0 ... 30 % If no value or an implausible value is displayed: – Check solenoid valve 10 -N283- , perform electrical check, test step No. 15 ⇒ page 40
4	...	Gear engaged ⇒ page 24 , display group 001, display zone 4

Display group 125

Display zones		Explanatory notes
1	MOTOR 1	Engine control unit - Is communicating via CAN bus - Please refer to notes ⇒ page 41 .



Display zones		Explanatory notes
	MOTOR 0	• No exchange of data – Perform self-diagnosis of engine control unit ⇒ Rep. gr. 01 – Check wiring according to current flow diagram – Check CAN bus ⇒ page 42
2	ABS 1	ABS control unit -J104- • Is communicating via CAN bus Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorized by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG. – Please refer to notes ⇒ page 41 .
	ABS 0	
		• No exchange of data – Perform self-diagnosis of ABS control unit ⇒ Rep. gr. 01 – Check wiring according to current flow diagram – Check CAN bus ⇒ page 42
3		Display zone can be disregarded
4		Display zone can be disregarded

9 Electrical check

Special tools and workshop equipment required

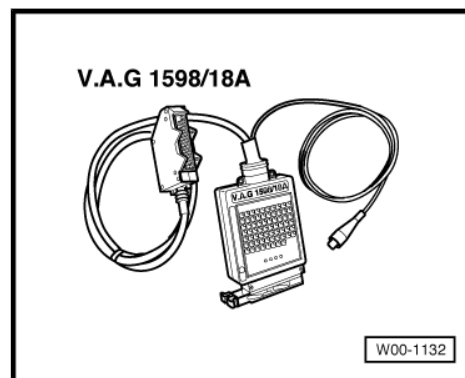
- ◆ Hand-held multimeter -V.A.G 1526E-



- ◆ Auxiliary measuring set -V.A.G 1594C- or



- ◆ Adapter cable, (68-pin) -V.A.G 1598/18A-



- ◆ Vehicle diagnostic tester

The test steps apply to:

- ◆ Vehicles for which self-diagnosis does not indicate the source of the fault. In this case it is necessary to perform the complete electrical check.
- ◆ Vehicles for which self-diagnosis indicates the specific source of the fault. Then only perform the test steps recommended in the fault table (selective fault-finding).

Requirements

- Vehicle voltage supply OK.
- Fuses OK ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.

- Earth connections have been checked for corrosion and poor contact ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.
- Battery earth strap and earth strap between gearbox and body have been checked for corrosion and poor contact.
- All electrical equipment has been switched off.

9.1 Connecting adapter cable, (68-pin) - V.A.G 1598/18A- (test box) to automatic gearbox control unit -J217-

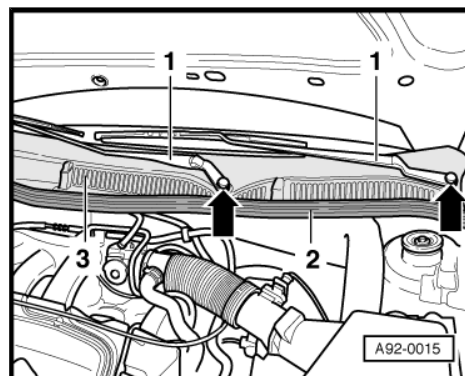
- Remove wiper arms -1- ⇒ Electrical system; Rep. gr. 92 .
- Pull off seal -2- for plenum chamber cover.
- Raise plenum chamber cover -3- until it is possible to disconnect washer fluid hose going to washer jets.
- If fitted, unplug electrical connector at washer jets.



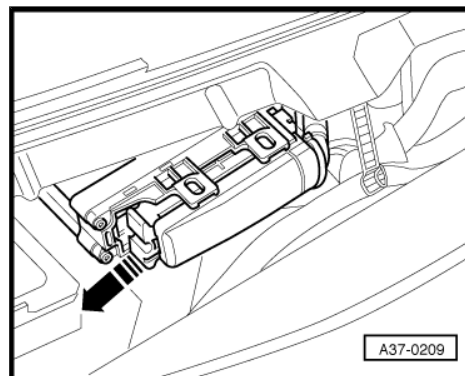
Caution

Risk of damage to plenum chamber cover.

- ◆ **Apply a small quantity of soap solution to transition between windscreen and plenum chamber cover. Then, starting at edge of windscreen, pull plenum chamber cover vertically up and out of retainer at windscreen.**



- Pull off plenum chamber cover.
- Switch off ignition, release multi-pin connector in direction of -arrow- and unplug from automatic gearbox control unit -J217-

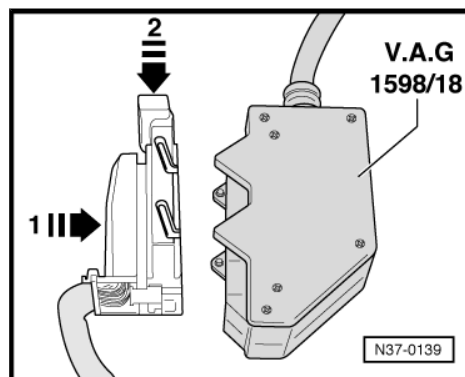


- Connect adapter cable, (68-pin) -V.A.G 1598/18A- (test box) to disconnected multi-pin connector for automatic gearbox control unit -J217- .



Caution

To avoid damaging the electronic components, always select the appropriate measuring range on the tester before connecting the test leads and observe the test requirements.

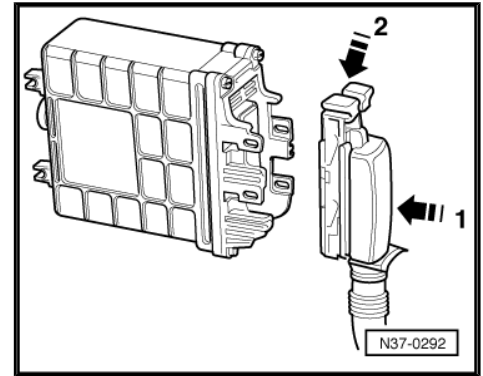


- Carry out all the test steps listed in the column headed „Fault rectification if readout does not match specification“.
- Only perform the test steps recommended in the fault table (selective fault-finding).

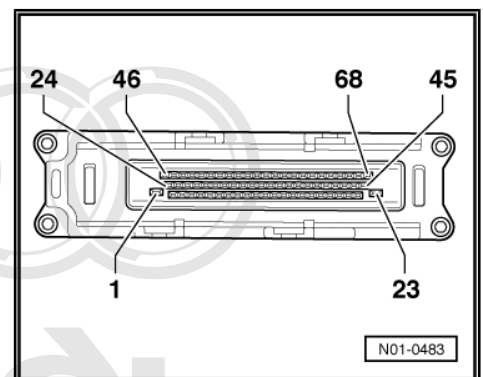
- After completing electrical check, reconnect multi-pin connector to automatic gearbox control unit -J217- and lock connector -arrows 1 and 2-.

 Note

- ◆ For testing use vehicle diagnostic tester with test leads from -V.A.G 1594 C-.
- ◆ The socket designations of the adapter cable, (68-pin) -V.A.G 1598/18A- (test box) are identical to the contact designations of the automatic gearbox control unit -J217- in the current flow diagram.
- ◆ Adhere to correct test procedure to avoid damage to the system. Apart from the connectors listed in the test table, no other bridges may be connected.
- ◆ The given specifications are valid for an ambient temperature from 0 ... 40 °C.
- ◆ If the measured values differ from the specifications, determine fault using current flow diagram.
- ◆ If the measured values differ only slightly from the specifications, clean sockets and connectors of the testers and test leads (use contact spray -G 000 700 04-) and repeat test.
- ◆ Before renewing components it is necessary to check the wiring and connectors first. Particularly if specifications are below 10 Ω, repeat resistance measurement at component.



68-pin connector on automatic gearbox control unit -J217- / sockets on adapter cable, (68-pin) -V.A.G 1598/18A- (test box)



1 - Earth (terminal 31)	35 - Vehicle speed sender -G68-
2 - Vacant	36 - Vehicle speed sender -G68-
3 - Vacant	37 - Vehicle speed sender -G68- (screening)
4 - Vacant	38 - Vacant
5 - Diagnosis K wire	39 - Vacant
6 - Selector lever lock solenoid -N110-	40 - Multifunction switch -F125-
7 - Intermediate shaft speed sender -G265- (screening)	41 - Multifunction switch -F125-
8 - Vacant	42 - Vacant
9 - Gearbox input speed sender -G182-	43 - Vacant
10 - Gearbox input speed sender -G182-	44 - Vacant
11 - Gearbox input speed sender -G182- (screening)	45 - Voltage supply (terminal 15)
12 - Vacant	46 - Solenoid valve 8 -N281-
13 - Vacant	47 - Vacant
14 - Vacant	48 - Solenoid valve 1 -N88-

15 - CAN bus High input and output signals	49 - Solenoid valve 2 -N89-
16 - CAN bus Low input and output signals	50 - Solenoid valve 5 -N92-
17 - Brake pressure switch -F270- (only on vehicles with stationary decoupling feature)	51 - Solenoid valve 9 -N282-
18 - Multifunction switch -F125-	52 - Vacant
19 - Multifunction switch -F125-	53 - Vacant
20 - Kickdown switch -F8- (vacant on vehicles with TDI engine or electronic throttle)	54 - Park/Neutral signal to starter inhibitor and reversing light relay -J226-
21 - Brake light switch -F-	55 - Vacant
22 - Voltage supply (terminal 30)	56 - Road speed (output for instrument cluster)
23 - Vacant	57 - Vacant
24 - Earth (terminal 31)	58 - Vacant
25 - Solenoid valve 4 -N91-	59 - Vacant
26 - Solenoid valve 3 -N90-	60 - Gate switch for tiptronic gate
27 - Vacant	61 - tiptronic upshift
28 - Intermediate shaft speed sender -G265-	62 - tiptronic downshift
29 - Intermediate shaft speed sender -G265-	63 - Road speed (output for engine)
30 - Vacant (for A/C kickdown)	64 - Earth return wire (for valve diagnosis)
31 - Vacant	65 - Solenoid valve 10 -N283-
32 - Vacant	66 - Solenoid valve 6 -N93-
33 - Gearbox oil temperature sender -G93-	67 - Vacant
34 - Gearbox oil temperature sender -G93-	68 - Voltage supply (terminal 15)

9.2 Test table

Overview of test steps

Component to be checked	Test step
Voltage supply for automatic gearbox control unit - J217-	– Perform test step No. 1 ⇒ page 37
Selector lever lock solenoid -N110-	– Perform test step No. 2 ⇒ page 37
Brake light switch -F-	– Perform test step No. 3 ⇒ page 37
Vehicle speed sender -G68-	– Perform test step No. 5 ⇒ page 38
Gearbox input speed sender -G182-	– Perform test step No. 6 ⇒ page 38
Solenoid valve 1 -N88-	– Perform test step No. 7 ⇒ page 38
Solenoid valve 2 -N89-	– Perform test step No. 8 ⇒ page 38
Solenoid valve 3 -N90-	– Perform test step No. 9 ⇒ page 38
Solenoid valve 4 -N91-	– Perform test step No. 10 ⇒ page 39
Solenoid valve 5 -N92-	– Perform test step No. 11 ⇒ page 39
Solenoid valve 6 -N93-	– Perform test step No. 12 ⇒ page 39
Solenoid valve 8 -N281-	– Perform test step No. 13 ⇒ page 39
Solenoid valve 9 -N282-	– Perform test step No. 14 ⇒ page 39
Solenoid valve 10 -N283-	– Perform test step No. 15 ⇒ page 40
Gearbox oil temperature sender -G93-	– Perform test step No. 16 ⇒ page 40
Intermediate shaft speed sender -G265-	– Perform test step No. 17 ⇒ page 40

Test step No. 1

-V.A.G 1598/18A- sockets	Items tested	Test conditions and additional steps	Specification	Fault rectification if readout does not match specification
45 + 1 68 + 1	Voltage supply for automatic gearbox control unit -J217-	- Ignition switched on - Switch to voltage measuring range	Approx. battery voltage	- Check wiring according to current flow diagram: - From contact 1 to earth - From contact 45 + 68 to terminal 15, central electrics
22 + 1 22 + 24		Ignition switched off		- Check wiring according to current flow diagram: - From contact 1 to earth - From contact 22 to terminal 30, central electrics

Test step No. 2

-V.A.G 1598/18A- sockets	Items tested	Test conditions and additional steps	Specification	Fault rectification if readout does not match specification
6 + 1	Voltage supply for selector lever lock solenoid -N110-	- Ignition switched off - Switch to voltage measuring range - Ignition switched on	0 V Approx. battery voltage	Check wiring according to current flow diagram
Bridge 6 + 1	Function of selector lever lock solenoid -N110-	- Disconnect hand-held multimeter -V.A.G 1526E- - Ignition switched on - Connect bridge with test leads from auxiliary measuring set -V.A.G 1594C-	Solenoid should click audibly	Renew selector lever lock solenoid -N110- ⇒ Rep. gr. 37

Test step No. 3

-V.A.G 1598/18A- sockets	Items tested	Test conditions and additional steps	Specification	Fault rectification if readout does not match specification
21 + 1	Brake light switch -F-	- Switched to voltage measuring range - Brake pedal not depressed - Brake pedal depressed	0 V Approx. battery voltage	- Check wiring according to current flow diagram - Check brake light switch ⇒ Running gear, self-diagnosis; Rep. gr. 01

Test step No. 5

-V.A.G 1598/18A- sockets	Items tested	Test conditions and additional steps	Specification	Fault rectification if readout does not match specification
35 + 36	Vehicle speed sender -G68-	Switched to resistance measuring range	Min. 0.4 kΩ Max. 0.6 kΩ	- Check wiring according to current flow diagram - Renew vehicle speed sender -G68-

Test step No. 6

-V.A.G 1598/18A- sockets	Items tested	Test conditions and additional steps	Specification	Fault rectification if readout does not match specification
9 + 10	Gearbox input speed sender -G182-	Switched to resistance measuring range	Min. 0.4 kΩ Max. 0.6 kΩ	- Check wiring according to current flow diagram - Renew gearbox input speed sender -G182-

Test step No. 7

-V.A.G 1598/18A- sockets	Items tested	Test conditions and additional steps	Specification	Fault rectification if readout does not match specification
48 + 1	Solenoid valve 1 -N88-	- Ignition switched off - Switch to resistance measuring range	9 ... 24 Ω	Check wiring according to current flow diagram, renew solenoid valve 1 -N88- if necessary

Test step No. 8

-V.A.G 1598/18A- sockets	Items tested	Test conditions and additional steps	Specification	Fault rectification if readout does not match specification
49 + 1	Solenoid valve 2 -N89-	- Ignition switched off - Switch to resistance measuring range	9 ... 24 Ω	Check wiring according to current flow diagram, renew solenoid valve 2 -N89- if necessary

Test step No. 9

-V.A.G 1598/18A- sockets	Items tested	Test conditions and additional steps	Specification	Fault rectification if readout does not match specification
26 + 1	Solenoid valve 3 -N90-	- Ignition switched off - Switch to resistance measuring range	9 ... 24 Ω	Check wiring according to current flow diagram, renew solenoid valve 3 -N90- if necessary

Test step No. 10

-V.A.G 1598/18A- sockets	Items tested	Test conditions and additional steps	Specification	Fault rectification if readout does not match specification
25 + 1	Solenoid valve 4 - N91-	• Ignition switched off – Switch to resistance measuring range	9 ... 24 Ω	– Check wiring according to current flow diagram, renew solenoid valve 4 -N91- if necessary

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Test step No. 11

-V.A.G 1598/18A- sockets	Items tested	Test conditions and additional steps	Specification	Fault rectification if readout does not match specification
50 + 1	Solenoid valve 5 - N92-	• Ignition switched off – Switch to resistance measuring range	9 ... 24 Ω	– Check wiring according to current flow diagram, renew solenoid valve 5 -N92- if necessary

Test step No. 12

-V.A.G 1598/18A- sockets	Items tested	Test conditions and additional steps	Specification	Fault rectification if readout does not match specification
66 + 1	Solenoid valve 6 - N93-	• Ignition switched off – Switch to resistance measuring range	1 ... 10 Ω	– Check wiring according to current flow diagram, renew solenoid valve 6 -N93- if necessary

Test step No. 13

-V.A.G 1598/20- sockets	Items tested	Test conditions and additional steps	Specification	Fault rectification if readout does not match specification
46 + 1	Solenoid valve 8 - N281-	• Ignition switched off – Switch to resistance measuring range	9 ... 24 Ω	– Check wiring according to current flow diagram, renew solenoid valve 8 -N281- if necessary

Test step No. 14

-V.A.G 1598/20- sockets	Items tested	Test conditions and additional steps	Specification	Fault rectification if readout does not match specification
51 + 1	Solenoid valve 9 - N282-	• Ignition switched off – Switch to resistance measuring range	9 ... 24 Ω	– Check wiring according to current flow diagram, renew solenoid valve 9 -N282- if necessary



Test step No. 15

-V.A.G 1598/18A- sockets	Items tested	Test conditions and additional steps	Specification	Fault rectification if readout does not match specification
65 + 1	Solenoid valve 10 -N283-	• Ignition switched off – Switch to resistance measuring range	1 ... 15 Ω	– Check wiring according to current flow diagram, renew solenoid valve 10 -N283- if necessary

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Test step No. 16

-V.A.G 1598/18A- sockets	Items tested	Test conditions and additional steps	Specification	Fault rectification if readout does not match specification
33 + 34	Gearbox oil temperature sender - G93-	• Switched to resistance measuring range – Measure ATF temperature		
		Approx. 30 °C	2.2 k Ω	– Check wiring according to current flow diagram
		Approx. 70 °C	0.5 k Ω	
		Approx. 110 °C	0.2 k Ω	

Test step No. 17

-V.A.G 1598/18A- sockets	Items tested	Test conditions and additional steps	Specification	Fault rectification if readout does not match specification
28 + 29	Intermediate shaft speed sender -G265-	• Switched to resistance measuring range	Min. 0.4 k Ω	– Check wiring according to current flow diagram
			Max. 0.6 k Ω	– Renew intermediate shaft speed sender -G265-

10 CAN bus

10.1 CAN bus

A detailed description of the function of the „CAN bus“ can be found in the ⇒ Self-study programme No. 186 ; The CAN data bus .

Advantages:

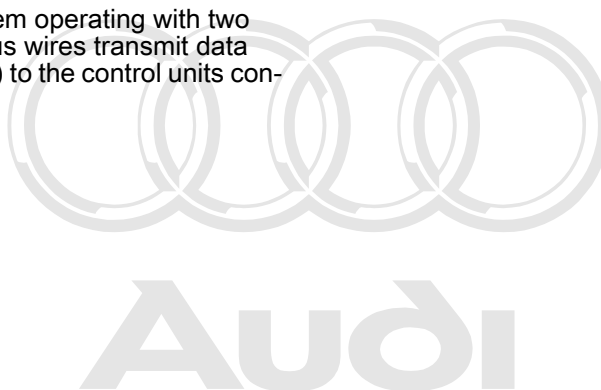
- Rapid data transfer between the control units
- Less wiring in vehicle

Bus:

Bus is the term used to describe a data transfer and distribution system.

CAN:

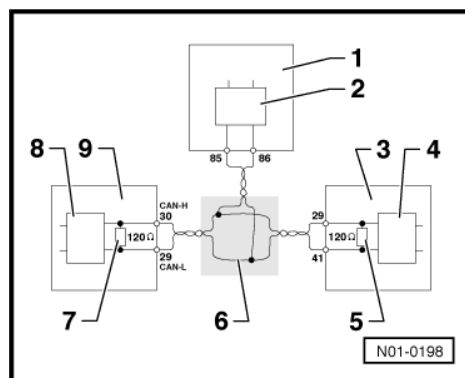
A Controller Area Network is a bus system operating with two wires. They are called bus wires. The bus wires transmit data signals in serial form (one after the other) to the control units connected to the system.



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The following control units communicate via the bus, i.e. data exchange between the various control units is carried out via the CAN data bus.

- 1 - Automatic gearbox control unit -J217-
- 2 - BUS driver
- 3 - Engine control unit
- 4 - BUS driver
- 5 - Terminal resistor
- 6 - Drivetrain data bus (CAN bus, twisted pair of wires)
- 7 - Terminal resistor
- 8 - BUS driver
- 9 - ABS control unit -J104-



The automatic gearbox control unit -J217- transmits signals onto the CAN bus and employs the signals it receives from the CAN bus. By means of the CAN bus it is able to exchange information (data signals) with the other control units.

Examples of signals from the CAN bus (transmitted from the engine control unit)

- ◆ Accelerator pedal position („throttle opening“)
- ◆ Kickdown
- ◆ Engine speed
- ◆ Engine torque

Examples of signals transmitted across the CAN bus (and employed by the engine control unit)

- ◆ Cruise control system
- ◆ Ignition timing control

Not only the engine control unit, but also other on-board control units communicate via the CAN bus as described in this example.

In many cases other systems require a specific coding. If these systems are incorrectly coded, faults will often arise which are registered in the event memory of the automatic gearbox control unit -J217- even though they do not actually originate from the automatic gearbox.

If the automatic gearbox control unit -J217- detects missing or faulty signals, it is possible that the CAN bus itself is defective, or the fault can originate from another system or its components.

For this reason it is important to run the self-diagnosis for the affected control units as well as for the system you are working on.

When checking the wiring according to the current flow diagram, make sure that the CAN bus wires are OK.

10.2 Checking a „two-wire bus system“

Test sequence

- Refer to the appropriate current flow diagram to check how many control units communicate via the bus.
- Connect vehicle diagnostic tester ⇒ [page 8](#) and select function „00 - Automatic test sequence“. The ignition must be switched on.
- Before checking the bus wires, make sure that there is no malfunction in any of the control units connected to the bus. A

malfunction will cause interference in the communication with other control units.

Note

In this context "malfunction" does not mean a fault occurring in the bus system itself, but refers to a fault which is impairing the correct functioning of a particular system (e.g. defective sensor). As a result of the malfunction, the bus system can no longer process the sensor signal for data transmission. Such a malfunction has an indirect influence on the bus system, as communication with the other control units requiring this particular sensor signal is impaired.

If a malfunction exists

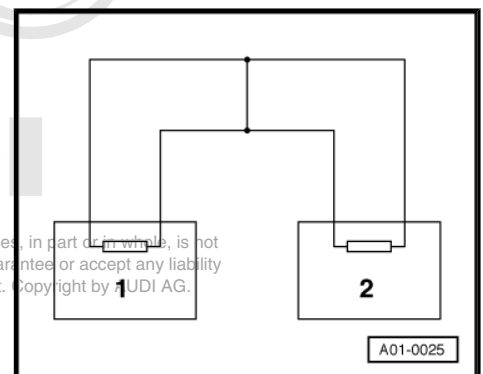
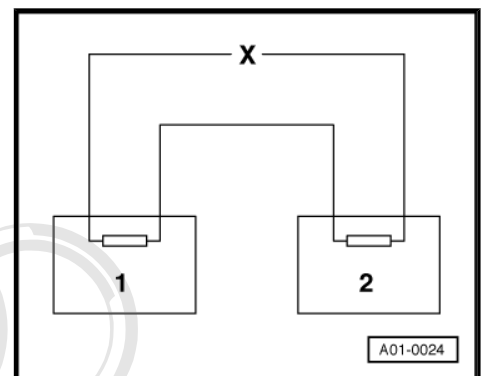
- Repair it first.
- Print out the fault list and erase the event memories of all control units, see „Interrogate event memory“ and „Erase event memory“ for each control unit.
- Select function „06 - End output“.
- Rectify malfunctions as described in the fault tables in the relevant Workshop Manuals.

Have all malfunctions been eliminated?

- If the communication between the control units is still not working properly, check the bus wires.
- When tracing faults in the bus wires, distinguish between two possible cases:
 - ◆ Two control units are communicating via a „two-wire bus system“ ➔ [page 43](#) .
 - ◆ Three or more control units are communicating via a „two-wire bus system“ ➔ [page 44](#) .

10.3 Two control units communicating via a „two-wire bus system“

- Switch off ignition.
- Detach the multi-pin connectors at both control units.
- Check whether there is an open circuit in one of the bus wires
➔ Current flow diagrams, Electrical fault finding and Fitting locations.
- Check whether there is a short circuit between the bus wires
➔ Current flow diagrams, Electrical fault finding and Fitting locations.



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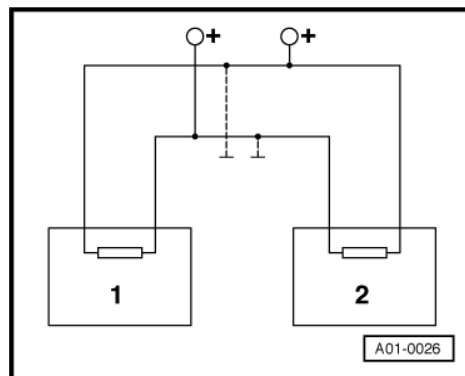
- Check whether there is a short to positive or short to earth in one of the bus wires.

If no fault is detected in the bus wires:

- As a trial measure, renew whichever control unit is easier (or less expensive) to change.

If the control units are still not communicating via the bus:

- Renew the second control unit.

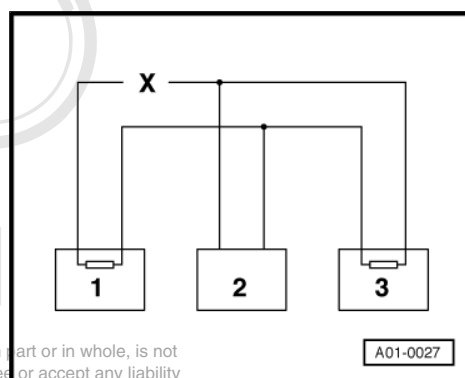


10.4 Three or more control units communicating via a „two-wire bus system“

Example 1:

From the entries in the event memories you can see that control unit -1- has no connection to control units -2- and -3-.

Control unit	Entry in event memory
-1-	◆ No message from control unit -2- ◆ No message from control unit -3-
-2-	◆ No message from control unit -1-
-3-	◆ No message from control unit -1-

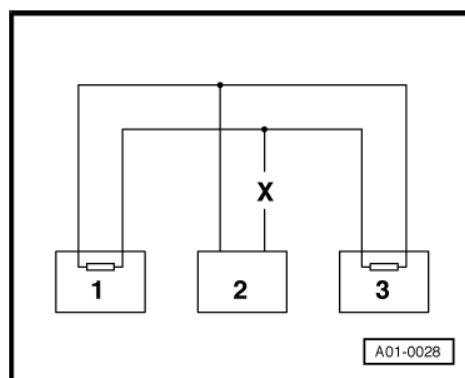


- Switch off ignition.
- Detach the electrical connectors at the control units which are linked by the bus wires and check whether there is an open circuit in one of the bus wires ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.

Example 2:

From the entries in the event memories you can see that control unit -2- has no connection to control units -1- and -3-.

Control unit	Entry in event memory
-1-	◆ No message from control unit -2-
-2-	◆ No message from control unit -1- ◆ No message from control unit -3-
-3-	◆ No message from control unit -2-



- Switch off ignition.
- Detach the electrical connectors at the control units which are linked by the bus wires and check whether there is an open circuit in one of the bus wires ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.

Example 3:

From the entries in the event memories, you can see that none of the control units are able to transmit or receive signals.

Control unit	Entry in event memory
-1-	◆ Control unit defective
-2-	◆ Control unit defective
-3-	◆ Control unit defective

- Switch off ignition.
- Detach the electrical connectors at the control units which are linked by the bus wires and check whether there is a short circuit between the bus wires ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.
- Check the bus wires for short to positive or earth.
- If the cause of the fault „control unit defective“ cannot be found in the bus wires, check whether one of the control units is causing the fault.
- The connectors at all control units which communicate via the CAN bus are detached.
- Ignition switched off.
- Connect one of the control units.
- Connect vehicle diagnostic tester ⇒ [page 8](#).
- Switch on ignition and select the relevant vehicle system.

Interrogate and erase the event memory of the control unit which has just been connected.

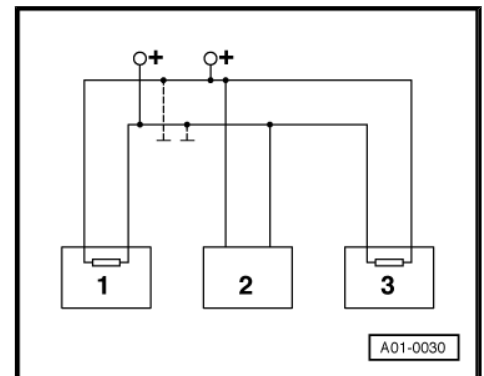
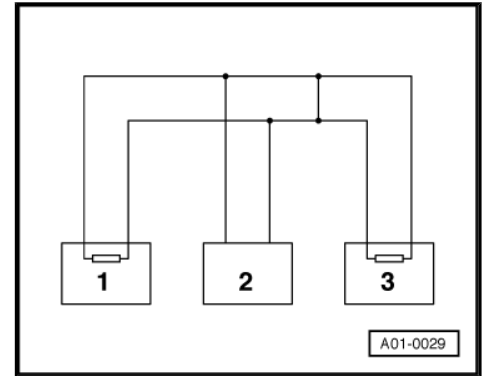
- Exit function „Erase event memory“ by touching  button.
- Select function „End output“.
- Switch ignition off and on again.
- Leave the ignition switched on for 10 seconds. Then interrogate the event memory of the control unit that has just been connected.

If the fault „control unit defective“ is displayed:

- Renew the control unit that has just been connected.

If the fault „control unit defective“ is not displayed:

- Connect the next control unit and repeat the above procedure.



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