Audi A8 1994 ➢

Automatic gearbox 01F and 01K, Self-diagnosis									
Gearbox ID	CMN	CMK							

Edition 09.1998

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Audi A8 1994 ➤

Automatic gearbox 01F and 01K, Self-diagnosis

Repair Group

01 - Self-diagnosis, Electrical test

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.

Contents

01 - Self-diagnosis, Electrical test

1 - Self-diagnosis function

1.1 - Self-diagnosis function

The automatic gearbox is controlled electro-hydraulically.

The control unit for the automatic gearbox -J217 is supplied with information from components which influence gear selection. On the basis of this information, it generates signals to control the relevant solenoid valves in the valve body. The solenoid valves direct the fluid pressure produced by the ATF pump to close the appropriate clutches or brakes in the gearbox.

Fault detection by gearbox control unit

The term "self-diagnosis" relates to the electrical and electronic components of the control system.

The automatic gearbox control unit -J217 is equipped with a fault memory so that in the event of an electrical/ electronic component failure or an open circuit, the cause of the fault can be determined quickly. Faults are detected via electrical signals and stored in the fault memory.

The control unit for the automatic gearbox -J217 will diagnose and store particular faults under various conditions.
Fault table=>Page 20 .

If faults occur in the monitored sensors or components, they are stored in the memory together with an indication of the location and nature of the fault.

If a fault occurs it is first stored as a static fault. If this fault does not occur again it is classified as a sporadic fault (or "SP").

Faults which are stored as sporadic faults in the fault memory are displayed as such when the fault memory is interrogated with V.A.G 1551. In this case, "/SP" appears on the right of the display. If the printer is switched on it will print out "sporadic fault" after the fault is identified.

Faults which are stored in the memory as sporadic faults will be automatically erased after 20 cold starts (and subsequent gearbox warm-up).

The self-diagnosis functions are only available with the vehicle diagnostics, testing and information system VAS 5051 (or with fault reader V.A.G 1551) in operating mode 1, "Rapid data transfer".

For a list of functions that can be performed with fault reader=>List of selectable functions, Page 18 .

Safety functions of gearbox control unit

In the event of failure of one or more components or sensors, the automatic gearbox control unit -J217 activates the appropriate emergency or back-up running mode. In this way, the system ensures damage-free operation of the automatic gearbox, although gear-shifting may be impaired when the gearbox is operating in back-up mode.

- If certain faults should occur (=>table, Page 2) and the gearbox control unit is active, the gearbox will initially remain in the gear which is currently engaged. As soon as the situation permits (i.e. when there is no risk of any safety hazard or damage to the gearbox), the gearbox control unit will shift gradually from whatever forward gear is engaged into second gear.
- After the engine is started again, the gearbox control unit will return to its normal running mode until a fault occurs.

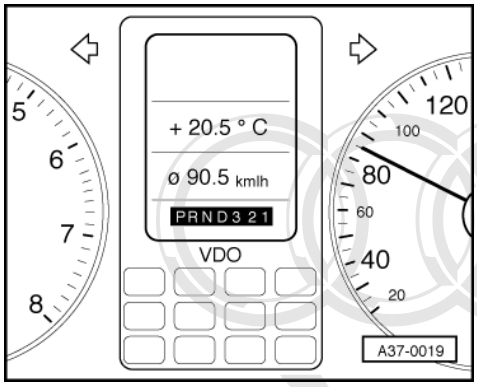
Faults that lead to a shift into second gear:

Fault code	
00652	Gear monitoring

- If critical faults should occur (=>table, Page 2) the gearbox will operate in emergency running mode. If this occurs while driving, the gearbox will shift into 4th gear, remaining in this gear until the vehicle has come to a complete stop.
- After restarting the engine the vehicle can be driven in 2nd gear with the selector lever in D, 3, 2 or 1.

Emergency running mode with activated control unit

- No electrical current in solenoid valves.
- Reverse gear lock is not active, i.e. it would be possible to shift directly into reverse while driving forwards, which would damage the gearbox.
- When driving, the gearbox shifts from all forward gears into 4th.



- After restarting the engine, the gearbox will engage 2nd gear when the selector lever is in "D".
- Maximum shifting pressure on power transmission elements.
- It is possible to shift into reverse gear. Selector lever lock is active (in "P" and "N").
- -> All segments of gear display are fully illuminated.

Emergency running mode with control unit not activated

If a failure should occur in the automatic gearbox control unit -J217 (e.g. power failure or an electrical connector come loose), the gearbox will immediately operate in "Emergency running mode with control unit not activated".

- No electrical current in solenoid valves.
- Reverse gear lock is not active, i.e. it would be possible to shift directly into reverse while driving forwards, which would damage the gearbox.
- When driving, the gearbox shifts from all forward gears into 4th.
- After restarting the engine, the gearbox will engage 2nd gear when the selector lever is in "D".
- Maximum shifting pressure on power transmission elements.
- It is possible to shift into reverse gear. Selector lever lock is inactive (in "P" and "N").
- No segments on gear display are illuminated.
- The gearbox control unit is not functioning at all, i.e. it is impossible to call up self-diagnosis.

Faults leading to emergency running:

Fault code	
00258	Solenoid valve 1 -N88
00260	Solenoid valve 2 -N89
00262	Solenoid valve 3 -N90
00264	Solenoid valve 4 -N91
00293	Multi-function switch -F125
00297	Gearbox speed sender -G38
00529	Speed information missing (engine rpm)

Fault code	
00532	Supply voltage
00543	Maximum revs exceeded
00597	Differing wheel speed impulses 1)
65535	Control unit defective

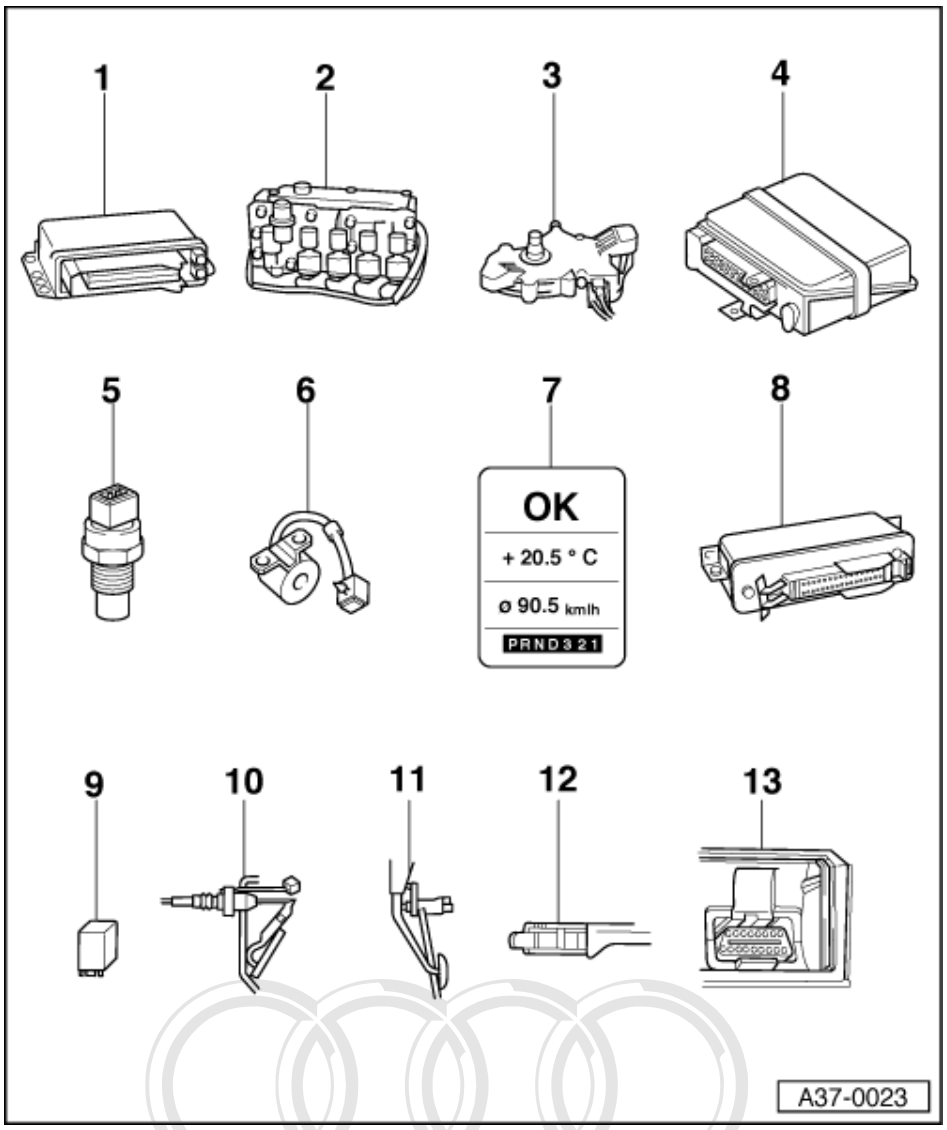
1) Emergency running mode engaged only if selector lever is in positions "P" or "N".

1.2 - Technical data of self-diagnosis

Fault memory	
- Permanent memory	yes
Data output	
- Rapid data transfer - Flash code output	yes no
Final control diagnosis	yes
Basic setting	no
Coding control unit	no
Reading measured value block	yes
Electrical/electronic components and their fitting locations	=> Page 4

2 - Electrical/electronic components and their fitting locations

2.1 - Electrical/electronic components and their fitting locations



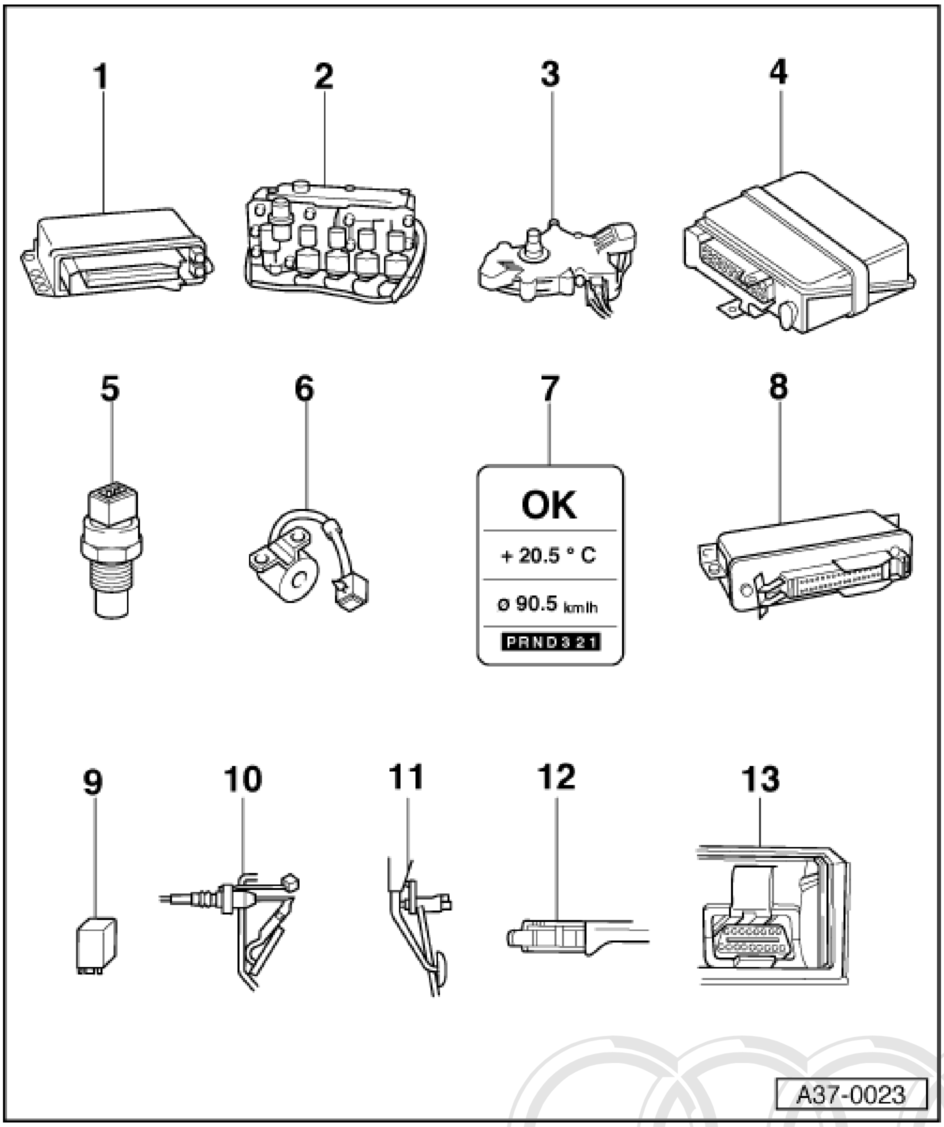
Note:

Vehicle allocation and fitting locations

=> Current flow diagrams, Electrical fault finding and Fitting locations

1 Automatic gearbox control unit -J217

- In electronics box in plenum chamber (right side)
- Tested via self-diagnosis
  =>from Page 19
- Removing and installing
  =>Page 11
- Unplugging connector
  =>Page 13

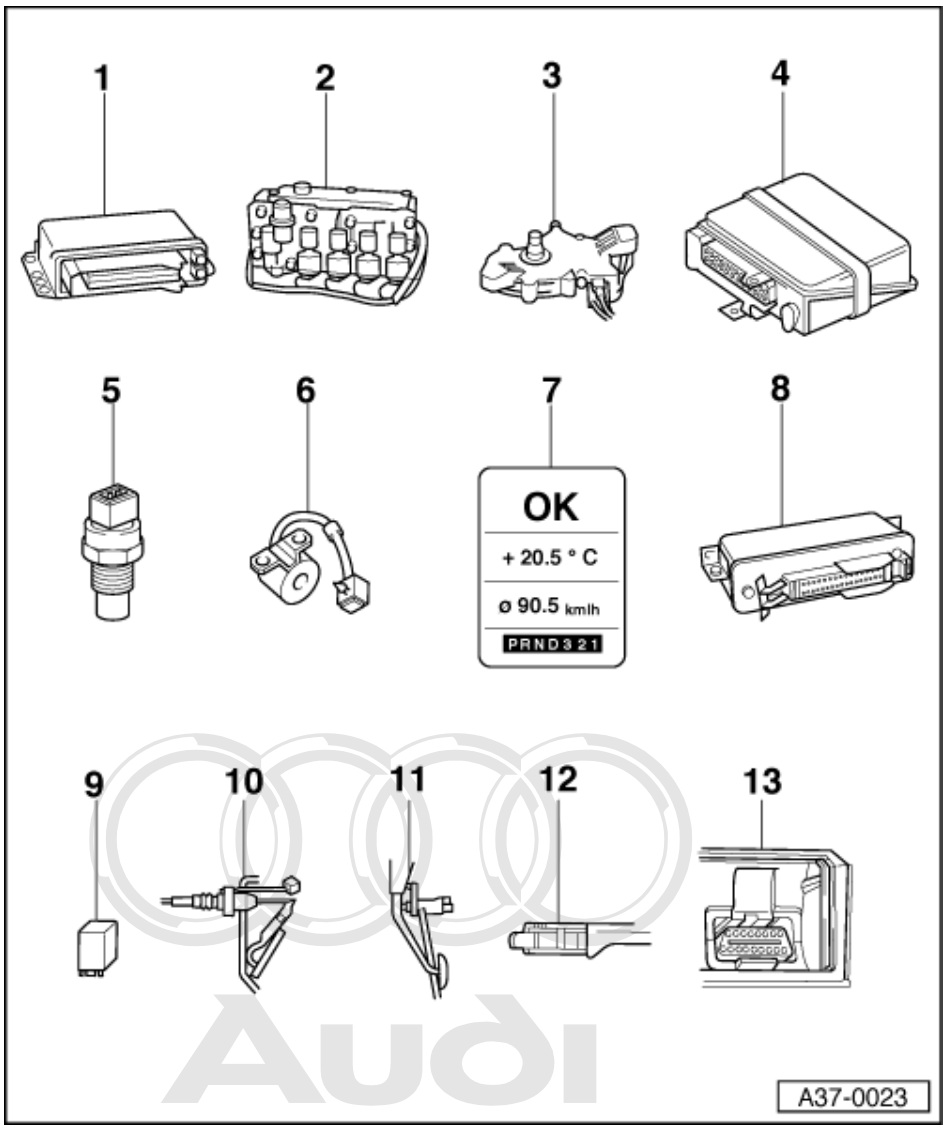


2 Valve body

- Fitting location: under gearbox oil pan
- Solenoid valves -N88, -N89, -N90, -N91 secured to valve body
- Gear oil temperature sender (ATF) -G93 incorporated in wiring harness inside gearbox.
- Components are checked electrically via self-diagnosis.
- Removing and installing:

=> Automatic gearbox 01F, Four-wheel drive; Repair group 38; Removing and installing oil pan, ATF screen and valve body; Removing and installing valve body Removing and installing oil pan, ATF screen and valve body Removing and installing valve body

=> Automatic gearbox 01K, Front-wheel drive; Repair group 38; Removing and installing oil pan, ATF screen and valve body; Removing and installing valve body Removing and installing oil pan, ATF screen and valve body Removing and installing valve body



3 Multi-function switch -F125

- Fitting location: on gearbox, left side
- Tested via self-diagnosis
  =>from Page 19
- Removing and installing:

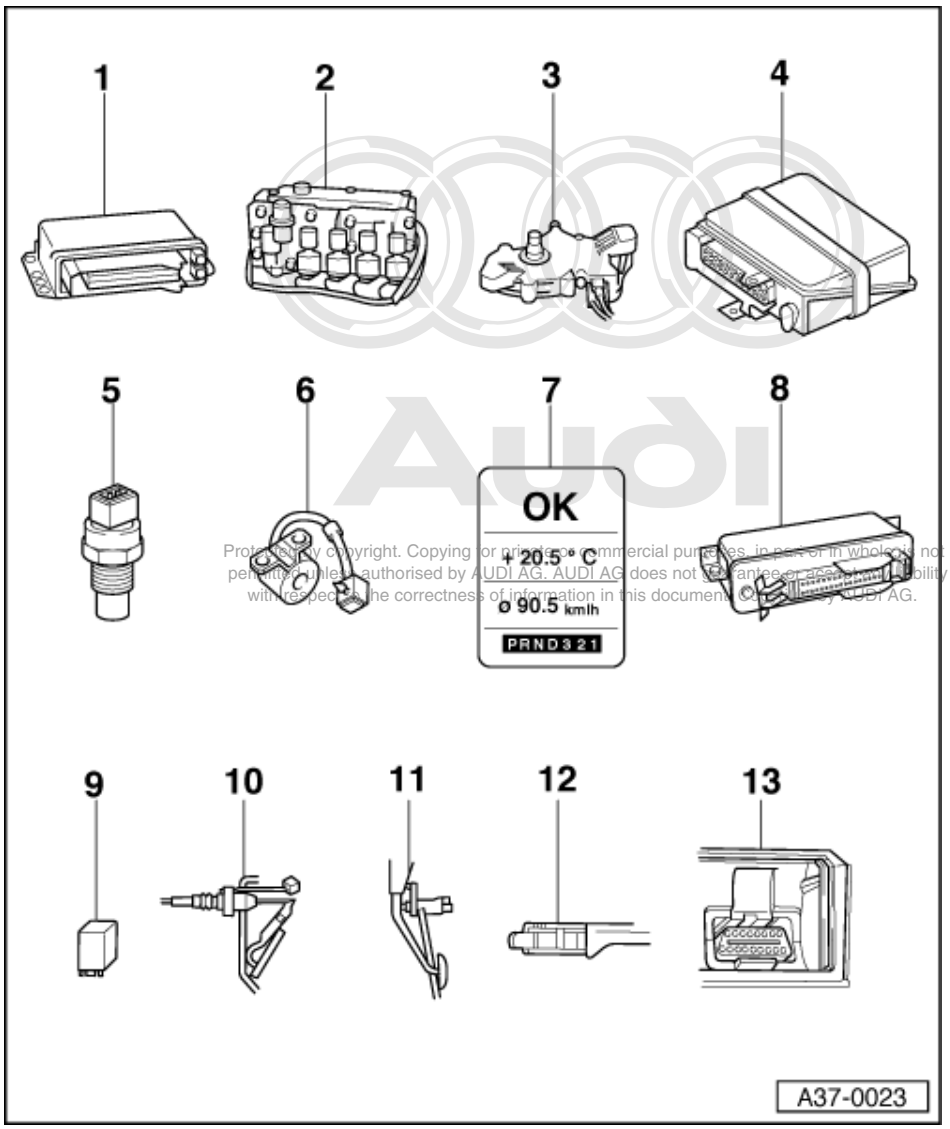
=> Automatic gearbox 01F, Four-wheel drive; Repair group 37; Dismantling and assembling gearbox; Removing and installing multi-function switch -F125 Dismantling and assembling gearbox Removing and installing multi-function switch -F125

=> Automatic gearbox 01K, Front-wheel drive; Repair group 37; Dismantling and assembling gearbox; Removing and installing multi-function switch -F125 Dismantling and assembling gearbox Removing and installing multi-function switch -F125

4 Engine control unit

- In electronics box in plenum chamber (on right)
- Removing and installing:

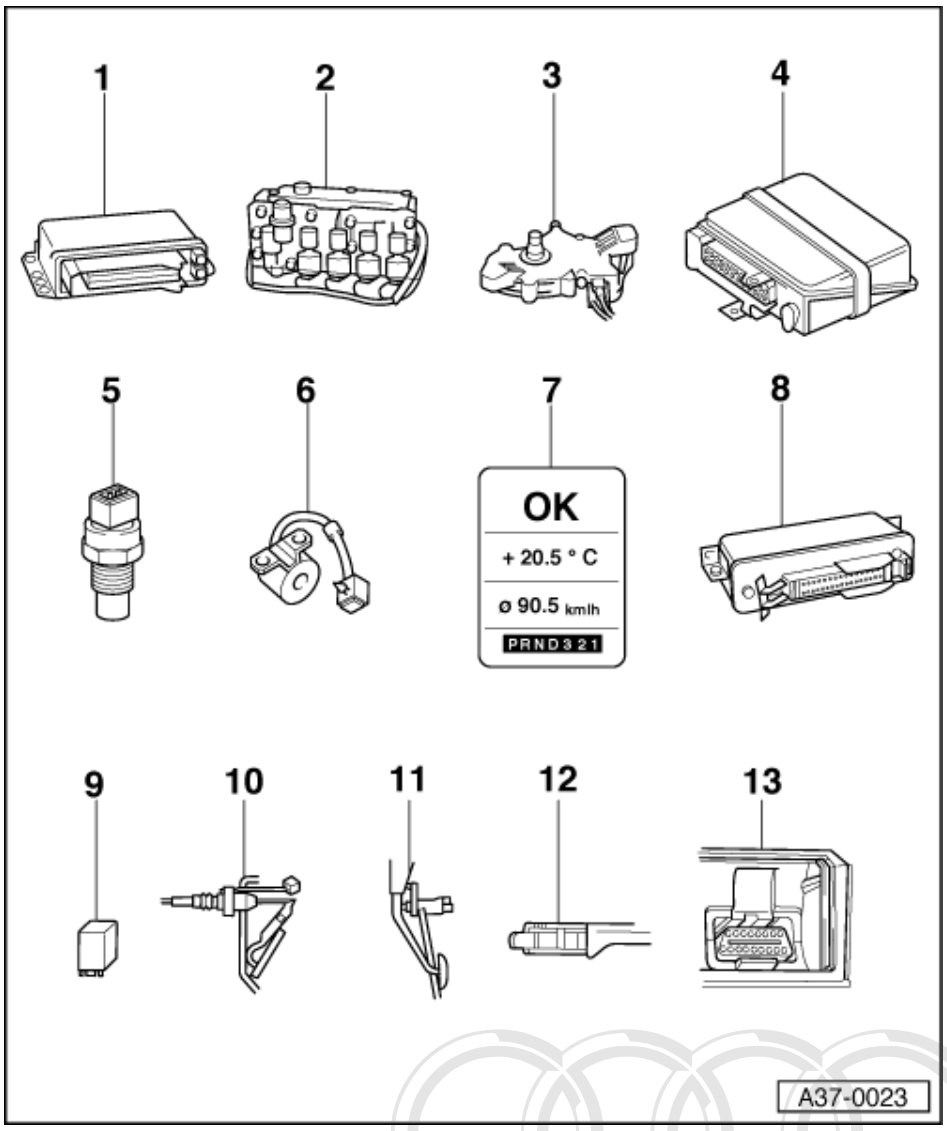
=> MPI Injection and ignition system; Repair group 24; Servicing multi-point injection system; Renewing engine control unit Servicing multi-point injection system Renewing engine control unit



5 Gearbox speed sender -G38

- Installed only on automatic gearbox 01K
- Fitting location: at top of gearbox
- Checked by self-diagnosis
- Dirt adhering to sender affects proper operation; clean if necessary
- Removing and installing:

=> Automatic gearbox 01K, Front-wheel drive; Repair group 38; Removing and installing gearbox speed sender -G38 Removing and installing gearbox speed sender -G38

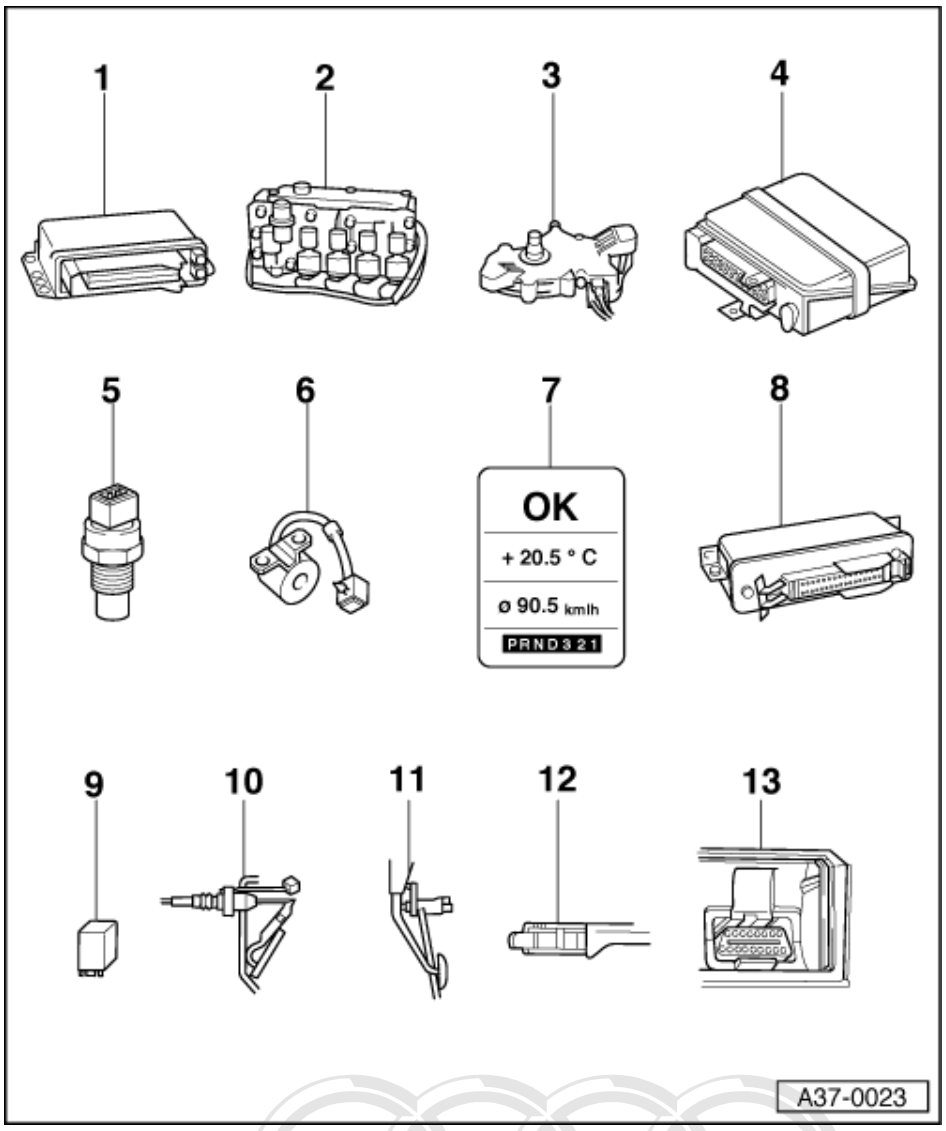


6 Selector lever lock solenoid -N110

- Fitting location: on front section of shift mechanism
- For testing:=>Read measured value block (from Page 41
- Removing and installing:

=> Automatic gearbox 01F, Four-wheel drive; Repair group 37; Servicing shift mechanism; Dismantling and assembling shift mechanism Servicing shift mechanism Dismantling and assembling shift mechanism

=> Automatic gearbox 01K, Front-wheel drive; Repair group 37; Servicing shift mechanism; Dismantling and assembling shift mechanism Servicing shift mechanism Dismantling and assembling shift mechanism



7 Gear display -G96

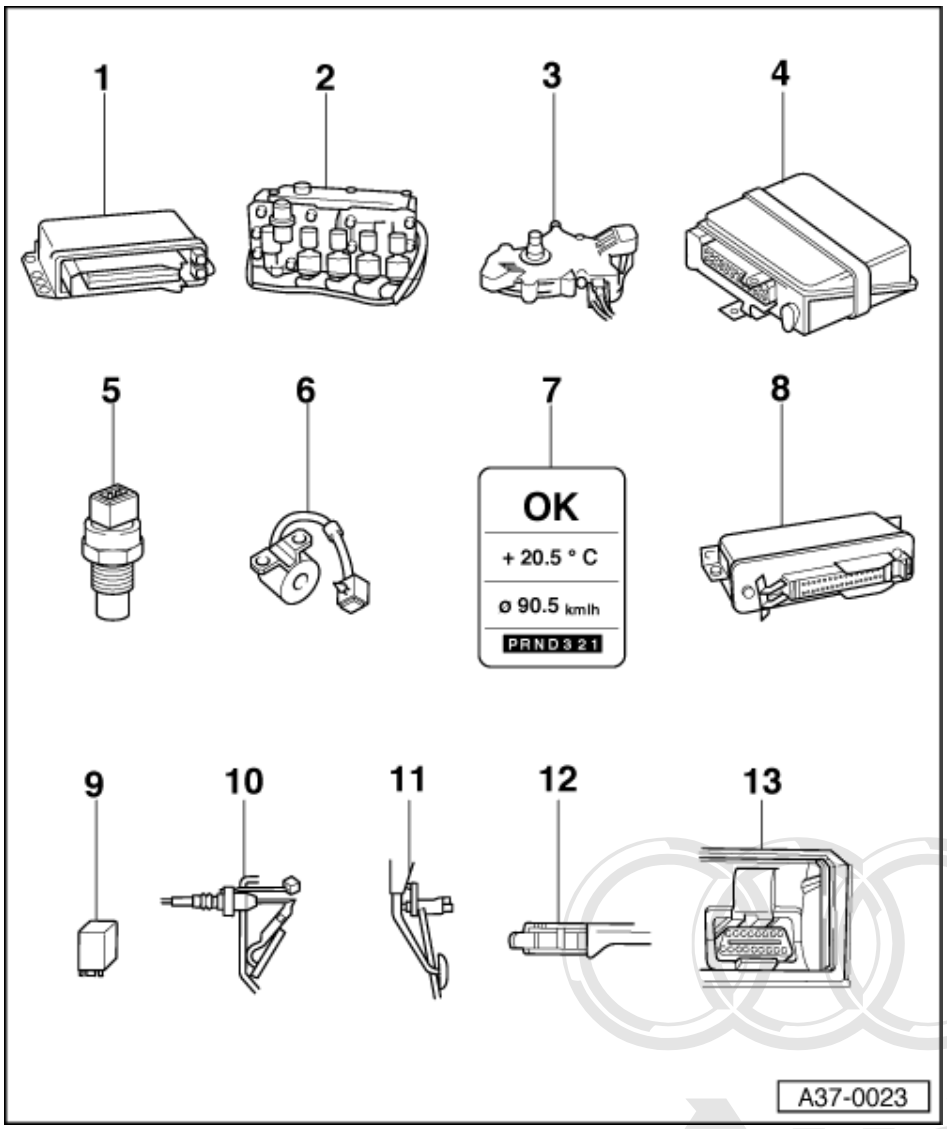
- Fitting location: in dash panel insert
- If the gear display does not light up, this indicates the gearbox is in emergency running mode and the gearbox control unit isnotin operation.
- If all segments of the gear display light up together, this indicates the gearbox is in emergency running mode and the gearbox control unit is in operation.

8 ABS control unit -J104

- Fitting location on LHD vehicles: behind storage compartment on driver's side.
- Fitting location on RHD vehicles: in the electronics box in plenum chamber (on right).
- Tested via self-diagnosis

9 Starter inhibitor and reversing light relay -J226

- Fitting location: in central electrics, relay position 4.



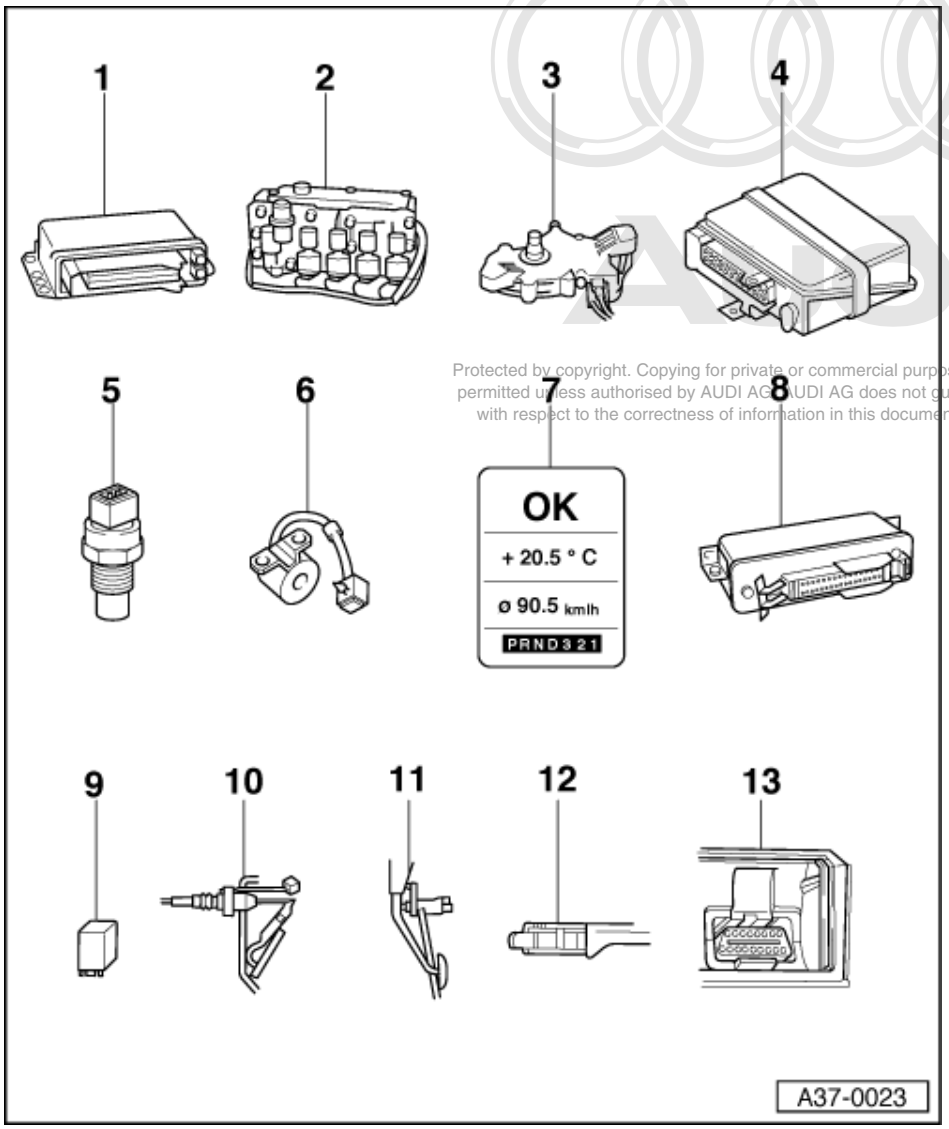
10 Kickdown switch -F8-

- Fitting location: on throttle valve unit
- Adjusting (also replacing)
  =>Page 13
- Testing:=>Read measured value block (from Page 41

11 Brake light switch -F

- Fitting location: in pedal cluster
- For testing:=>Read measured value block (from Page 41
- Removing and installing:

=> Running gear, Front- and Four-wheel drive; Repair group 46; Assembly overview of pedal cluster Assembly overview of pedal cluster



12 Cruise control switch -E45

- Fitting location: incorporated in steering column switch
- For testing refer to the electrical test=>from Page 41
- Removing and installing:

=> Electrical system; Repair group 94; Servicing steering column switch; Removing and installing steering column switch Servicing steering column switch Removing and installing steering column switch

13 Diagnosis connection

- Fitting location: underneath ashtray
- Connecting vehicle diagnostic, testing and information system VAS 5051 (or fault reader V.A.G 1551) and selecting functions
  => Page 16

2.2 - Removing and installing automatic gearbox control unit -J217

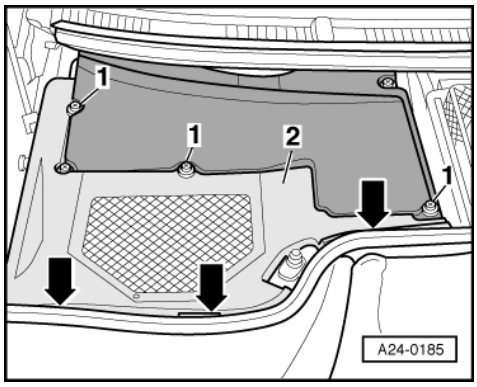
Notes:

- If a test indicates that the gearbox control unit is defective and requires replacement, first interrogate(=>Page 32)the fault memory, then repeat the test.

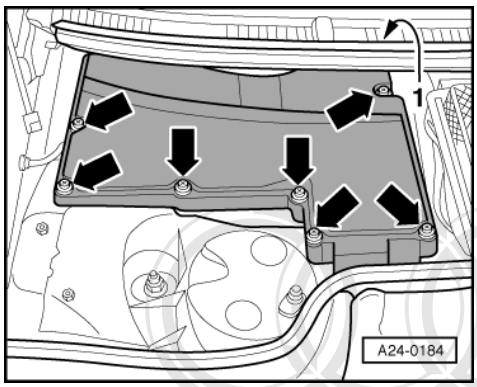
- Replace the gearbox control unit only after a repeated test again indicates that the gearbox control unit is defective.

Removing

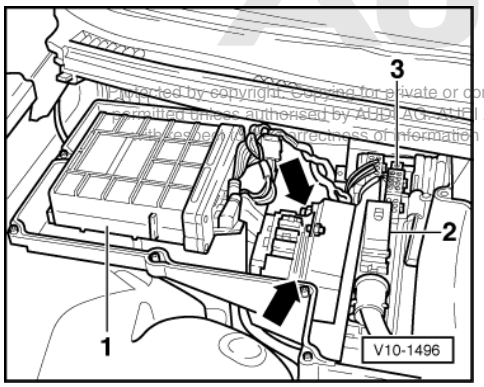
- Switch off ignition.



- -> Loosen cross-head screws -1- on electronics box in plenum chamber
- Unclip plenum chamber cover (front section) -2- at bulkhead -arrows-.
- Take off plenum chamber cover.



- -> Pry out cover -1- in scuttle panel trim and loosen rear cross-head screw -arrow in top-right corner-.
- Loosen the remaining cross-head screws -arrows-.
- Remove cover on electronics box in plenum chamber.



- -> Release catch on connector -2- and unplug connector from gearbox control unit=>Page 13 .
- Unscrew gearbox control unit from electronics box -arrows-.

Note:

Always make sure that the ignition is switched off before disconnecting or connecting the connectors for the control unit.

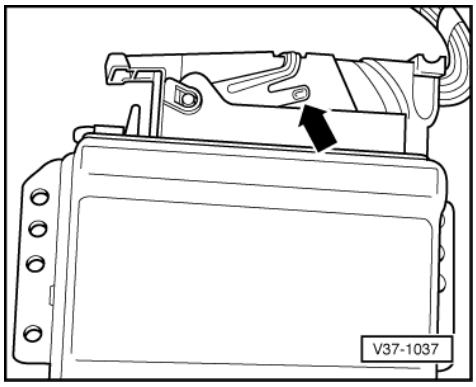
Installing

Installation is carried out in the reverse order. When doing this, note the following:

- Check whether there is moisture in the electronics box and seal any cracks or openings.
- Check wiring.
- Interrogate fault memory in gearbox control unit=>Page 19 .

Unplugging connector on automatic gearbox control unit -J217

- Switch off ignition and wait approx. 30 seconds.



- -> Press lock in direction of arrow to release connector.

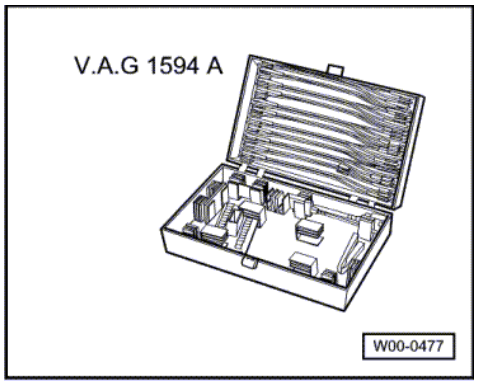
2.3 - Adjusting kickdown switch -F8

Note:

Location: the kickdown switch is securedon the throttle valve unit.

Special tools and workshop equipment required

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



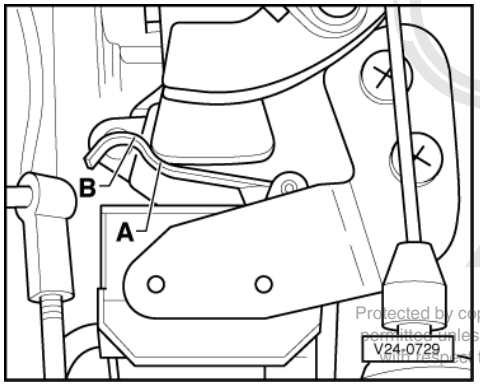
- Adapter set V.A.G 1594 A

Work sequence

- Before adjusting kickdown switch, check adjustment of throttle cable

=> Fuel supply system, Petrol engines; Repair group 20; Servicing accelerator mechanism on vehicles with mechanical accelerator linkage Servicing accelerator mechanism on vehicles with mechanical accelerator linkage

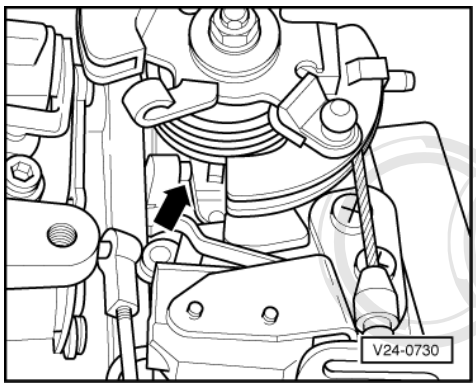
- Detach intake silencer.
- Unplug 2-pin connector from kickdown switch.
- Connect multimeter (resistance measurement range) between contacts 1 and 2 of connection on kickdown switch.
  - Specification: ∞ ω (no continuity)



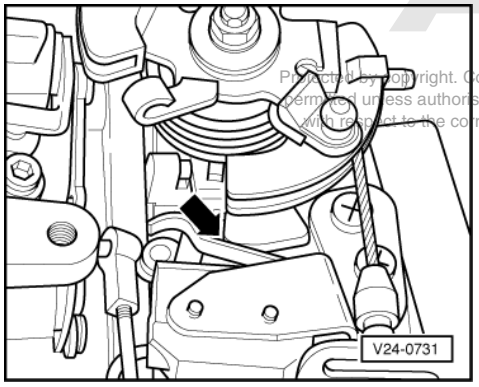
- -> Slowly press accelerator pedal down to the floor: the kickdown switch should be actuated when the lever on the switch is pressed down by the throttle valve cam between points A and B.
  - Specification: 0 ω

If the specifications are not met:

- Loosen securing bolts of kickdown switch.



- -> Push throttle valve lever by hand to full throttle stop -arrow-.



- -> Adjust kickdown switch so that the lever of the kickdown switch is in contact with the throttle valve cam -arrow-.
- Tighten securing bolts and secure with sealing paint.

3 - Performing self-diagnosis

3.1 - Performing self-diagnosis

3.2 - Safety precautions

Note the following points if test equipment has to be used during a road test:

Warning
- **Test equipment must always be secured on the rear seat and operated from the rear seat by a second person.**
- **If test equipment is operated from the front passenger seat, the occupant could be injured by the passenger's airbag in an accident.**

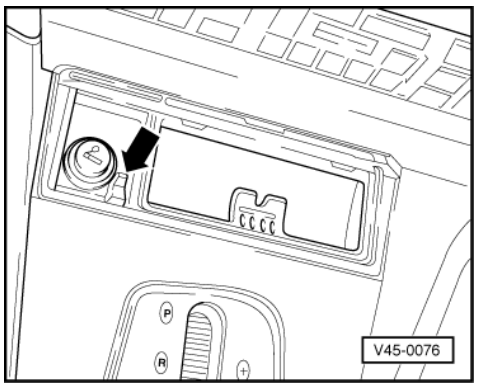
3.3 - Connecting vehicle diagnostic, testing and information system VAS 5051 (or fault reader V.A.G 1551) and selecting functions

Requirements for test:

- Vehicle voltage supply okay.
- Voltage supply and fuses for each system okay.
- Earth connections for gearbox okay.

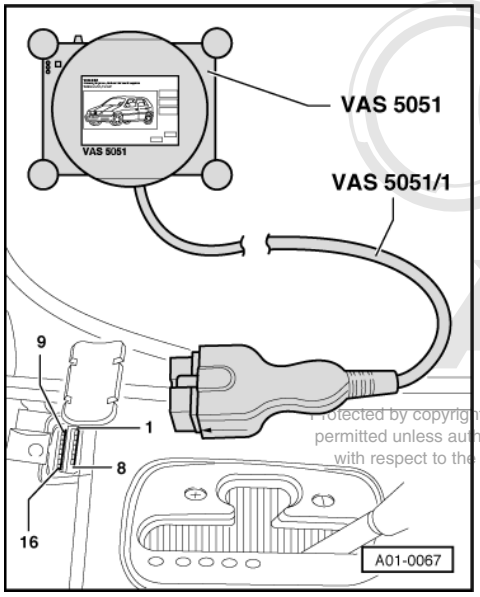
=> Current flow diagrams, Electrical fault finding and Fitting locations

- Multi-function switch -F125 okay, engine speed under 2000 rpm.
  Selector lever must be in position P or N for all functions except for "Reading measured value block".
- Handbrake applied.



Work sequence

- -> Release ashtray in centre console by pressing the small lever -arrow-.
- Take ashtray out of centre console and remove cover for diagnostic connector.



- -> Connect up vehicle diagnostic, testing and information system VAS 5051 with diagnostic cable VAS 5051/1. Alternatively, connect fault reader V.A.G 1551 using diagnostic cable V.A.G 1551/3A.

Warning:
- **When carrying out road tests using vehicle diagnostic, testing and information system VAS 5051 or fault reader V.A.G**
- **Always follow the safety precautions => Page 15 .**

-> Indicated on display:

```
V.A.G - SELF DIAGNOSIS     HELP
1 - Rapid data transfer 1)
2 - Flash code output 1)
```

1) appears alternately

Note:

If the display remains blank:

=> Fault reader operating instructions

- Switch on ignition.
- Press brake pedal once.
- Switch on fault reader printer with the print key. The warning lamp in key must light up.
- Press key 1 for "Rapid data transfer".

-> Indicated on display:

```
Rapid data transfer      HELP
Insert address word XX
```

Note:

Address word 00 is used to start the automatic test sequence (i.e. interrogation of fault memories of all vehicle systems with self-diagnosis capability in "Rapid data transfer" mode).

- Press keys 0 and 2 for address word "Gearbox electronics" and confirm entry with Q key.

-> The fault reader V.A.G 1551 display will show the control unit identification. For example:


```
4D0927156F   AG4 Gearbox 01K D03
Coding 00000
```

Note:

The control unit identification can be printed out by pressing the PRINT key on fault reader V.A.G 1551.

Control unit identification (example):

- 4D0 927 156 F	Part No.; Allocation => Parts catalogue
- AG4 Gearbox	Automatic gearbox
- 01K:	4-Speed 01K
- D03	Data status (Software type) of control unit
- Coding 00000	Control unit coding

- Press the ⇒key.

-> Indicated on display (function selection):

```
Rapid data transfer      HELP
Select function XX
```

Notes:

- By entering "01" ("Interrogate control unit version") and confirming with the Q key, the control unit identification can be displayed again.
- ```
  Rapid data transfer      HELP
  Control unit does not answer!
  ```

  -> If this display appears:

- Print out the possible fault causes by pressing the HELP key.
- Test supply voltage of automatic gearbox control unit -J217 =>Electrical test from Page 41 .
- Perform electrical test of multi-function switch -F125 (=>from Page 49) and check its adjustmentposition.

=> Automatic gearbox 01F, Four-wheel drive; Repair group 37; Dismantling and assembling gearbox; Adjusting multi-function switch -F125 Dismantling and assembling gearbox Adjusting multi-function switch -F125

=> Automatic gearbox 01K, Front-wheel drive; Repair group 37; Dismantling and assembling gearbox; Adjusting multi-function switch -F125 Dismantling and assembling gearbox Adjusting multi-function switch -F125

- If automatic gearbox control unit -J217 is defective =>Fault table from Page 20 under fault code 65535 "Control unit faulty!"
- Once the possible faults have been rectified, press the 0 and 2 keys for "Gearbox electronics" and confirm entry with the Q key.

-> If this display appears:

```
Rapid data transfer      HELP
Fault in communication build up
```

or

```
Rapid data transfer      HELP
L wire not switching to earth
```


or

```
Rapid data transfer      HELP
L wire not switching to positive
```

or

```
Rapid data transfer      HELP
K wire not switching to earth
```

or

```
Rapid data transfer      HELP
K wire not switching to positive
```

- Print out a list of possible fault causes by pressing the HELP key.
- Test wiring of diagnostic connector according to current flow diagram=>Page 67 .
- After rectifying possible faults, press the keys 0 and 2 for "Gearbox electronics" and confirm entry with the Q key.

3.4 - List of selectable functions:
```

02 -	Interrogate fault memory	19
03 -	Final control diagnosis	30
05 -	Erase fault memory	32
06 -	End output	
08 -	Read measured value block	33

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

After a function has been interrogated, the V.A.G 1551 returns to the following start position:

-> Indicated on display (function selection):

```
Rapid data transfer      HELP
Select function XX
```

4 - Interrogating fault memory

4.1 - Interrogating fault memory

- Connect vehicle diagnostic, testing and information system VAS 5051 (or fault reader V.A.G 1551) and select gearbox electronics control unit by entering address word "02"=>Page 16 .
  When doing this, the ignition must be on.

-> Indicated on display:

```
Rapid data transfer      HELP
Select function XX
```

- Press brake pedal once.

Note:

The fault "00526 Brake light switch -F" will be displayed when the ignition is switched on. If the brake light switch is okay, this display will then be erased the first time the brake pedal is depressed.

- Press keys 0 and 2 for the function "Interrogate fault memory" and confirm entry with Q key.

-> Indicated on display:

```
No fault recognised
```

- Press the ⇒key.

or

-> Indicated on display:

```
X faults recognised
```

If the printer on the fault reader is switched on, the stored faults will be displayed and printed out in sequence.

- After the last fault has been displayed and printed out, press the ⇒key.

-> Indicated on display:

```
Rapid data transfer      HELP
Select function XX
```

- Rectify printed faults according to fault table (=>Page 32)

After the fault memory has been interrogated, the V.A.G 1551 returns to the following start position:

-> Indicated on display (function selection):

```
Rapid data transfer     HELP
Select function XX
```

4.2 - Fault table

Note:

- This table lists all possible faults which can be recognised by the automatic gearbox control unit -J217 and displayed on the VAS 5051 or V.A.G 1551 when the fault memory is interrogated. The faults are grouped according to the fault code.
- The fault table is arranged according to the 5-digit fault codes in the left-hand column.
- If faults occur only occasionally or the fault memory has not been erased after a fault has been rectified, these faults will be displayed over a specific period of time as "sporadic faults". Please see Fault detection by gearbox control unit=>Page 1
- Components that are indicated as being faulty by the V.A.G 1551 should not be replaced immediately.
  - Always start by checking the wiring and connectors for the component using the current flow diagram.
  - Also test the earth connections using the current flow diagram. This is particularly important in the case of sporadic
  faults (indicated by the letters "SP"on the fault reader display).

=> Current flow diagrams, Electrical fault finding and Fitting locations

- If the fault table refers to "Read measured value block" or "Electrical test", perform only the test step listed for the relevant component.

Printout on V.A.G 1551 printer	
No fault recognised!	If "No fault recognised" appears after repairs have been performed, the self-diagnosis is completed. If the automatic gearbox still does not shift gears properly, even though no faults are displayed: Interrogate control unit identification =>Page 30 Continue fault-finding procedure according to Fault finding program => "Fault finding, Power transmission" binder

Printout on V.A.G 1551 printer	Possible cause of fault	How to rectify fault
00258 Solenoid 1 -N88 Open circuit 1) Short to earth 1) Short to positive 1)	- Open circuit or short to earth/positive - Solenoid valve 1 -N88 defective	- Check wiring and connections according to current flow diagrams 2) - Read measured value block =>from Page 41

1) One of these displays will appear in addition to the name of the component.

2) First check connections for contact corrosion or moisture and replace if necessary. If solenoid faults are displayed, then especially check the 8-pin connector on gearbox between valve body and wiring harness.

Note for fault code 00258:

Short to positive is tested with the ignition on. All faults are recognised during operation.

Printout on V.A.G 1551 printer	Possible cause of fault	How to rectify fault
00260 Solenoid 2 -N89	- Open circuit or short to earth/positive	- Check wiring and connections according to current flow diagram 2)

Open circuit 1) Short to earth 1) Short to positive 1)	- Solenoid valve 2 -N89 defective	- Read measured value block =>from Page 41

1) One of these displays will appear in addition to the name of the component.

2) First check connections for contact corrosion or moisture and replace if necessary. If solenoid faults are displayed, then especially check the 8-pin connector on gearbox between valve body and wiring harness.

Note for fault code 00260:

Short to positive is tested with the ignition on. All faults are recognised during operation.

Printout on V.A.G. 1551 printer	Possible cause of fault	How to rectify fault
00262 Solenoid 3 -N90	- Open circuit or short to earth	- Check wiring and connections according to current flow diagram 2)
Open circuit 1) Short to earth 1) Short to positive 1)	- Solenoid valve 3 -N90 defective	- Read measured value block => from Page 41

1) One of these displays will appear in addition to the name of the component.

2) First check connections for contact corrosion or moisture and replace if necessary. If solenoid faults are displayed, then especially check the 8-pin connector on gearbox between valve body and wiring harness.

Note for fault code 00262:

Short to positive is tested with the ignition on. All faults are recognised during operation.

Printout on V.A.G 1551 printer	Possible cause of fault	How to rectify fault
00264 Solenoid 4 -N91	- Open circuit or short to earth	- Check wiring and connections according to current flow diagram 2)
Open circuit 1) Short to earth 1) Short to positive 1)	- Solenoid valve 4 -N91 defective	- Read measured value block =>from Page 41

1) One of these displays will appear in addition to the name of the component.

2) First check connections for contact corrosion or moisture and replace if necessary. If solenoid faults are displayed, then especially check the 8-pin connector on gearbox between valve body and wiring harness.

Printout on V.A.G 1551 printer	Possible cause of fault	How to rectify fault
00283 Speed sensor front left -G47	- Defect in wiring between gearbox control unit and ABS control unit -J104	- Read measured value block =>from Page 41 1)
Implausible signal	- Open circuit between ABS control unit and speed sensor; fuse for ABS control unit defective; dirty rotor; wheel bearing play too large; or speed sensor not installed properly - Wrong ABS control unit installed	- Rectifying fault => Running gear, Self-diagnosis; Repair group 01

1) First check connections for contact corrosion or moisture. Replace if necessary.

Notes for fault code 00283:

- Fault can only occur in gearbox 01F
- This fault will only be detected if:

there is no signal from the relevant speed sensor for at least 0.4 seconds or the signal is implausible, and the remaining three speed sensors indicate an almost identical speed.

Printout on V.A.G 1551 printer	Possible cause of fault	How to rectify fault
00285 Speed sensor front right -G45 Implausible signal	- Defect in wiring between gearbox control unit and ABS control unit -J104 - Open circuit between ABS control unit and speed sensor; fuse for ABS control unit defective; dirty rotor; wheel bearing play too large; or speed sensor not installed properly - Wrong ABS control unit installed	- Read measured value block =>fromPage 41 1) - Rectifying fault => Running gear, Self-diagnosis; Repair group 01

1) First check connections for contact corrosion or moisture. Replace if necessary.

Notes for fault code 00285:

- Fault can only occur in gearbox 01F
- This fault will only be recognised if:
  there is no signal from the relevant speed sensor for at least 0.4 seconds or the signal is implausible, and the remaining three speed sensors indicate an almost identical speed.

Printout on V.A.G 1551 printer	Possible cause of fault	How to rectify fault
00287 Speed sensor rear right -G44 Implausible signal	- Defect in wiring between gearbox control unit and ABS control unit -J104 - Open circuit between ABS control unit and speed sensor; fuse for ABS control unit defective; dirty rotor; wheel bearing play too large; or speed sensor not installed properly - Wrong ABS control unit installed	- Read measured value block =>fromPage 41 1) - Rectifying fault => Running gear, Self-diagnosis; Repair group 01

1) First check connections for contact corrosion or moisture. Replace if necessary.

Notes for fault code 00287:

- Fault can only occur in gearbox 01F
- This fault will only be detected if:
  there is no signal from the relevant speed sensor for at least 0.4 seconds or the signal is implausible, and the remaining three speed sensors indicate an almost identical speed.

Printout on V.A.G 1551 printer	Possible cause of fault	How to rectify fault
00290 Speed sensor rear left -G46 Implausible signal	- Defect in wiring between gearbox control unit and ABS control unit -J104 - Open circuit between ABS control unit and speed sensor; fuse for ABS control unit defective; dirty rotor; wheel bearing play too large; or speed sensor not installed properly - Wrong ABS control unit installed	- Read measured value block =>fromPage 41 1) - Rectifying fault => Running gear, Self-diagnosis; Repair group 01

1) First check connections for contact corrosion or moisture. Replace if necessary.

Notes for fault code 00290:

- Fault can only occur in gearbox 01F
- This fault will only be detected if:

there is no signal from the relevant speed sensor for at least 0.4 seconds or the signal is implausible, and the remaining three speed sensors indicate an almost identical speed.

Printout on V.A.G 1551 printer	Possible cause of fault	How to rectify fault
00293 Multi-function switch -F125 Implausible signal	- Open circuit or short to earth/positive - Voltage supply to multi-function switch -F125 interrupted - Selector lever cable not adjusted properly Continued on next page ▼	- Check wiring and connections according to current flow diagram 1) - Read measured value block =>fromPage 33 Adjust selector lever cable => Automatic gearbox 01K, Front-wheel drive; Repair group 37; Servicing shift mechanism; Adjusting selector lever cable Servicing shift mechanism; Adjusting selector lever cable

1) First check connections for contact corrosion or moisture. Replace if necessary.

Note for fault code 00293:

This fault is detected if all three wiring connections from the gearbox control unit to the multi-function switch -F125 register less than 3 V.

Printout on V.A.G 1551 printer	Possible cause of fault	How to rectify fault
00293 Multi-function switch -F125	(Fault 00293 continued) - Multi-function switch -F125 not adjusted properly	- Adjust multi-function switch => Automatic gearbox 01F, Four-wheel drive; Repair group 37; Dismantling and assembling gearbox; Adjusting multi-function switch -F125 Dismantling and assembling gearbox; Adjusting multi-function switch -F125
Implausible signal	- Multi-function switch -F125 defective - Connector to multi-function switch -F125 not plugged in	- Perform electrical test =>fromPage 41 Replace multi-function switch if necessary => Automatic gearbox 01F, Four-wheel drive; Repair group 37; Dismantling and assembling gearbox; Removing and installing multi-function switch -F125 Dismantling and assembling gearbox; Removing and installing multi-function switch -F125

Printout on V.A.G 1551 printer	Possible cause of fault	How to rectify fault
00296 Kickdown switch -F8 Short to earth	- Short to earth between kickdown switch -F8 and gearbox control unit - Open circuit between kickdown switch -F8 and gearbox control unit - Kickdown switch -F8 not adjusted properly - Kickdown switch -F8 defective	- Check wiring and connections according to current flow diagram1) - Read measured value block =>fromPage 33 - Adjust kickdown switch =>Page 41

	- Throttle cable not adjusted properly	- Adjust or replace throttle cable => Fuel supply system, Petrol engines; Repair group 20; Servicing accelerator mechanism on vehicles with mechanical accelerator linkage Servicing accelerator mechanism on vehicles with mechanical accelerator linkage

1) First check connections for contact corrosion or moisture. Replace if necessary.

Notes for fault code 00296:

- Conditions of fault detection: throttle valve signal okay, throttle valve value less than 25% and earthed connection at input on gearbox control unit (equivalent to kickdown signal).
- A short to positive or an open circuit between the kickdown switch -F8 and the gearbox control unit cannot be recognised by self-diagnosis.

Printout on V.A.G 1551 printer	Possible cause of fault	How to rectify fault
00297 Gearbox speed sender -G38	- Open circuit in gearbox speed sender -G38 - Open circuit in screening for gearbox speed sender -G38	- Check wiring and connections according to current flow diagram1) Read measured value block =>fromPage 33
No signal	- Gearbox speed sender -G38 dirty or defective - Screening for gearbox speed sender -G38 defective	- Perform electrical test =>fromPage 41 Clean or replace gearbox speed sender -G38. => Automatic gearbox 01K, Front-wheel drive; Repair group 38; Removing and installing gearbox speed sender -G38 Removing and installing gearbox speed sender -G38
	- Drive wheel for gearbox speed sender -G38 defective or broken	=> Automatic gearbox 01K, Front-wheel drive; Repair group 39; Servicing final drive

1) First check connections for contact corrosion or moisture. Replace if necessary.

Notes for fault code 00297:

- Fault only occurs in gearbox 01K.
- Loss of voltage is detected by self-diagnosis.

Printout on V.A.G 1551 printer	Possible cause of fault	How to rectify fault
00300 Gearbox oil temperature sender -G93	- Open circuit/Short	- Check wiring and connections according to current flow diagram3)
Short to earth 1) Open circuit/Short to positive 2)	- Gearbox oil (ATF) temperature sender -G93 defective	- Read measured value block =>fromPage 41

	- ATF level not OK	- Check ATF level => Automatic gearbox 01F, Four-wheel drive; Repair group 37; Checking ATF level and changing ATF; Checking ATF level Checking ATF level and changing ATF; Checking ATF level ▪ Gearbox oil temperature sender -G93 is incorporated in wiring harness inside gearbox.

1) Additional indication of fault: ATF temperature indicated below -50°C.

2) Additional indication of fault: ATF temperature indicated over 180°C.

3) First check 8-pin connector on gearbox between valve body and wiring harness for contact corrosion or moisture. Replace if necessary.

Printout on V.A.G 1551 printer	Possible cause of fault	How to rectify fault
00518 Throttle valve potentiometer -G69 Implausible signal 1)	- Wiring connection between throttle valve potentiometer -G69 and engine control unit defective or faulty contact	- Fault rectification according to fault codes 16504, 16505, 16506 and 16507 of engine control unit. - Interrogate fault memory => MPI injection and ignition system; Repair group 01; Interrogating and erasing fault memory 41

1) Fault memory of engine control unit indicates whether signal is "too large" or "too small".

Notes for fault code 00518:

- The signal from the throttle valve potentiometer -G69 is transmitted digitally via the engine control unit to the gearbox control unit
- Condition for fault recognition: if the gearbox control unit detects the voltage as being too high or too low for at least 1 second.

Printout on V.A.G 1551 printer	Possible cause of fault	How to rectify fault
00526 Brake light switch -F Implausible signal	- Brake light switch -F defective - Open circuit or short to earth/positive between gearbox control unit and brake light switch -F.	- Check wiring and connections according to current flow diagram - Read measured value block =>from-Page 41 Replace brake light switch -F if necessary

Notes for fault code 00526:

- The fault is always displayed when the ignition is turned on and is then cancelled by pressing the brake pedal once, providing brake light switch -F is okay.
- Before interrogating fault memory, press the brake pedal briefly once to erase the displayed fault.

Printout on V.A.G 1551 printer	Possible cause of fault	How to rectify fault
00529 Speed information missing	- Defect in wiring between engine or gearbox control units or rev counter - Short in rev counter	- Check wiring and connections according to current flow diagram Read measured value block =>fromPage 33
Open circuit/Short to earth1) Short to positive1) Implausible signal1)	- Engine speed signal is falsified by incorrectly installed wiring (e.g. for a retrofitted telephone)	- Perform electrical test =>fromPage 41

	- Engine speed sender -G28 defective - Engine control unit defective	- Interrogate fault memory and if necessary, rectify fault in accordance with engine control unit fault code 16706. => MPI injection and ignition system; Repair group 01; Interrogating and erasing fault memory Interrogating and erasing fault memory

1) One of these displays will appear in addition to the name of the component.

Notes for fault code 00529:

- Engine speed signal transmitted digitally to gearbox control unit via engine control unit.
- Fault detection is based on a plausibility test in relation to the fuel consumption signal (or throttle valve value if the fuel consumption signal is not available)
- Condition for fault detection: gearbox control unit detects an engine speed of less than 100 rpm for at least 1 second while vehicle is being driven.

Printout on V.A.G 1551 printer	Possible cause of fault	How to rectify fault
00532 Supply voltage	- On-board voltage below 9 V	- Test electrical system and repair if necessary.
Open circuit/Short to earth 1)2) Signal too small1)2)	- Defect in voltage supply wiring for gearbox control unit or solenoid valves. - Alternator defective - Current draw with "ignition off" - Faulty earth connection for gearbox control unit	- Read measured value block =>fromPage 41
Output does not switch/Short to positive 1)3) Output does not switch/Short to earth 1)3)	- Voltage supply to solenoid valves cut off. - Relay or transistor in gearbox control unit (for voltage supply to solenoid valves) defective	- Perform electrical test =>fromPage 41 .Replace gearbox control unit if necessary

1) One of these displays will appear in addition to the name of the component.

2) Condition for fault detection: detected engine speed over 1600 rpm and supply voltage to gearbox control unit less than 9 V for at least 2 seconds.

3) Condition for fault detection: short to positive/earth at contact (on gearbox control unit) for supply voltage to solenoid valves.

Printout on V.A.G 1551 printer	Possible cause of fault	How to rectify fault
00545 Engine/Gearbox electrical connection	- Ignition has been switched on with engine control unit connector unplugged	▪ No fault rectification required
(Ignition timing retard)	- Defect in wiring between engine and gearbox control units	- Check wiring and electrical connectors according to current flow diagram
Open circuit/Short to earth1) Short to positive1)		- Read measured value block =>from Page 41

	- Engine control unit defective	- Test engine control unit => MPI Injection and ignition system; Repair group 01; Interrogating and erasing fault memory Interrogating and erasing fault memory

1) One of these displays will appear in addition to the name of the component.

Note for fault code 00545:

The self-diagnosis system monitors the wiring to the engine control unit which transmits the signal requiring ignition retardation or a reduction of injection quantity during a gearshift.

Printout on V.A.G 1551 printer	Possible cause of fault	How to rectify fault
00548 Voltage supply for fault memory Open circuit/Short to earth	- Defective fuse - Wiring defect in supply voltage from terminal 30 - Faulty earth connection on gearbox control unit	- Check wiring and connectors according to current flow diagram - Perform electrical test =>fromPage 41

Notes for fault code 00548:

- If there is an on-board voltage failure (terminal 30), learned and stored values will be lost, i.e. the gearbox control unit must "re-learn" these values after the car is started again. Gearshift quality may be impaired until this process is completed.
- If there is a cut-off in the permanent positive supply, any faults detected by self-diagnosis may be lost after the ignition is turned off.

Printout on V.A.G 1551 printer	Possible cause of fault	How to rectify fault
00549 Consumption signal	- Connectors between engine and gearbox control units detached or defective	- Check wiring and connectors according to current flow diagram
Short to earth1) Open circuit/Short to positive1)	- Defect in wiring between engine and gearbox control units or on-board computer	- Read measured value block =>fromPage 41
	- Signal is lost because of defect in on-board computer	- Rectify fault in dash panel insert => Electrical system; Repair group 90; Dash panel insert Dash panel insert
	- Short in wiring between engine control unit and on-board computer - Engine control unit defective	- Check engine control unit => MPI Injection and ignition system; Repair group 01; Interrogating and erasing fault memory Interrogating and erasing fault memory

1) One of these displays will appear in addition to the name of the component.

Notes for fault code 00549:

Condition for fault detection: gearbox control unit detects no fuel consumption signal for at least 2.5 seconds while vehicle is being driven. Signals for engine speed and throttle valve are okay.

Printout on V.A.G 1551 printer	Possible cause of fault	How to rectify fault

00638 Engine/Gearbox electrical connection 2	- Connectors of wiring between engine and gearbox control units detached or defective - Defect in wiring between engine and gearbox control units	- Check wiring and connectors according to current flow diagram Read measured value block =>fromPage 33
Open circuit/Short to earth1) Short to positive1)	- Throttle valve signal not transmitted to gearbox control unit	- Perform electrical test =>fromPage 41
	- No signal from engine control unit	- Check engine control unit => MPI Injection and ignition system; Repair group 01; Interrogating and erasing fault memory Interrogating and erasing fault memory

1) One of these displays will appear in addition to the name of the component.

Notes for fault code 00638:

- Digital signal transmitted from throttle valve potentiometer -G69 to gearbox control unit via engine control unit.
- Condition for fault detection: the gearbox control unit does not detect any signal for at least 1 second. Detected engine speed is greater than 600 rpm.

Printout on V.A.G 1551 printer	Possible cause of fault	How to rectify fault
00652 Gear monitoring	- Wrong gearbox control unit installed	- Interrogate control unit identification =>Page 18
Implausible signal	- Engine control unit wrongly coded	- Interrogate control unit identification and coding => MPI Injection and ignition system; Repair group 01; Interrogating and erasing fault memory Interrogating and erasing fault memory
	- Engine speed or gearbox output speed faulty and not detected by self-diagnosis	- Rectify fault as described for fault code 00529, 00283, 00285, 00287 or 00290.
	- Multi-function switch -F125 defective and not detected by self-diagnosis	- Rectify fault as described for fault code 00293
	- Selector lever has been shifted into position N while car was being driven	▪ No fault to rectify: the selector lever may not be engaged in positions N or P while car is being driven.
	Continued ▾	

Notes for fault code 00652:

The ratio of engine speed to gearbox output speed (wheel speed) is implausible for the gear which is currently engaged.

Printout on V.A.G 1551 printer	Possible cause of fault	How to rectify fault
00652 Gear monitoring	(Fault 00652continued) - ATF level not OK	- Check ATF level => Automatic gearbox 01F, Four-wheel drive; Repair group 37; Checking ATF level and changing ATF; Checking ATF level Checking ATF level and changing ATF; Checking ATF level

Implausible signal	- Wrong or defective torque converter - Defective valve body or solenoid valves - Brakes or clutches slipping Continued ▼	- Check torque converter code Perform final control diagnosis =>Page 33 ▪ Black and burned ATF may indicate a worn clutch or brake.

Printout on V.A.G 1551 printer	Possible cause of fault	How to rectify fault
00652 Gear monitoring Implausible signal	(Fault 00652continued) - Open circuit between ABS control unit and speed sensor; fuse for ABS control unit defective 1) - At least two speed sensors defective 1) - Wrong ABS control unit installed 1)	Rectifying fault => Running gear, Self-diagnosis; Repair group 01

1) Only on gearbox 01F.

Printout on V.A.G 1551 printer	Possible cause of fault	How to rectify fault
00753 Elec. connections wheel speed impulse	- Defect in wiring between gearbox control unit and ABS control unit -J104	- Read measured value block =>fromPage 41 1)
Implausible signal	- Defect in voltage supply to speed sensor outputs or ABS control unit. - Wrong ABS control unit installed	- Rectifying fault => Running gear, Self-diagnosis; Repair group 01

1) First check connectors for contact corrosion or moisture and replace if necessary.

Notes for fault code 00753:

- Fault can only occur in gearbox 01F.
- This fault will only be recognised if none of the 4 wheel speed impulses is detected by the gearbox control unit while vehicle is being driven. This means there is either an open circuit or other fault affecting all four wheel speed sensors.

Printout on V.A.G 1551 printer	Possible cause of fault	How to rectify fault
65535 Control unit defective	- Automatic gearbox control unit -J217 defective	- Replace control unit =>Page 4

Notes for fault code 65535:

The automatic gearbox control unit -J217 should only be replaced after the possible cause of the fault has been determined and the following faults have been eliminated:

- mechanical faults;
- hydraulic faults;
- affected electric/electronic components and wiring connections;
- moisture in electronics box or gearbox control unit.

5 - Final control diagnosis

5.1 - Final control diagnosis

Notes:

- Final control diagnosis can only be performed if the selector lever is in position P or N, the engine is not running and the vehicle is stationary.
- Final control diagnosis is interrupted if the engine is started, or if a wheel speed signal or a gearbox speed signal is detected.
- During final control diagnosis the control elements are tested by listening for the clicking sound they make when they are switched on and off. Avoid any background noise during this test, as the clicking sound is otherwise difficult to hear.
- It is only possible to perform a complete final control diagnosis procedure once the ignition has been switched on.
- During the final control diagnosis the individual control elements are activated for 30 seconds each. If the ⇒ key is not pressed within this 30-second period, the following display will appear:

-> Indicated on display:

```
Function is unknown or
cannot be carried out at the moment
```

- To continue the final control diagnosis, press the⇒key and start the programme sequence again.
- To repeat the final control diagnosis, it is necessary to switch the ignition off and then on again.

	Activation sequence
1	Solenoid valve 1 -N88
2	Solenoid valve 2 -N89
3	Solenoid valve 3 -N90
4	Solenoid valve 4 -N91
5	Relay (cruise control)
6	Kickdown switch -F8 (kickdown for air conditioner)
7	Relay for solenoid valves

Work sequence

- Connect vehicle diagnostic, testing and information system VAS 5051 (or fault reader V.A.G 1551) and select gearbox electronics control unit by entering address word "02" (=>Page 16 .)
  When doing this the ignition must be switched on.

-> Indicated on display:

```
Rapid data transfer      HELP
Select function XX
```

- Press keys 0 and 3 for the function "Final control diagnosis" and confirm entry with Q key.

-> Indicated on display:

```
Final control diagnosis
Solenoid 1 -N88
```

The solenoid valve should click.

If the solenoid valve does not click:

- Check component(=>electrical test from Page 61 .
- Press the⇒key within 30 seconds to advance to the next control element.

-> Indicated on display:

```
Final control diagnosis
Solenoid 2 -N89
```

The solenoid valve should click.

If the solenoid valve does not click:

- Check component(=>electrical test from Page 61 .
- Press the⇒key within 30 seconds to advance to the next control element.

-> Indicated on display:

```
Final control diagnosis
Solenoid 3 -N90
```

The solenoid valve should click.

If the solenoid valve does not click:

- Check component(=>electrical test from Page 61 .
- Press the⇒key within 30 seconds to advance to the next control element.
- Connect voltage tester V.A.G 1527 B => testing activation of solenoid valves, Page 61 .

-> Indicated on display:

```
Final control diagnosis
Solenoid 4 -N91
```

The LED should flash

If the LED does not flash or if it lights up continuously:

- Check component(=>electrical test from Page 61 .
- Press the⇒key within 30 seconds to advance to the next control element.

-> Indicated on display

```
Final control diagnosis
Relay
```

Note:

The cruise control system relay is activated in the gearbox control unit.

The relay should click.

If the relay does not click:

- Perform electrical test=> from Page 41 .
- Press the⇒key within 30 seconds to advance to the next control element.

-> Indicated on display:

```
Final control diagnosis
Kickdown switch -F8
```


Notes:

- This test activates the air conditioner cut-off function in the gearbox control unit, not kickdown switch -F8.
- This display can be disregarded.
- Checking function of kickdown switch -F8:
  => Electrical test from Page 41 .

- Press the⇒key within 30 seconds to advance to the next control element.

-> Indicated on display:

```
Final control diagnosis
Solenoid relay
```

The relay should click.

If the relay does not click:

- Perform electrical test (=> from Page 63 .

-> Indicated on display:

```
Function is unknown or
cannot be carried out at the moment
```

- Press the⇒key to terminate final control diagnosis.

-> Indicated on display (function selection):

```
Rapid data transfer      HELP
Select function XX
```

6 - Erasing fault memory

6.1 - Erasing fault memory

Requirement for test:

- Fault memory interrogated=>Page 19 .

After interrogating fault memory:

-> Indicated on display:

```
Rapid data transfer      HELP
Select function XX
```

- Press keys 0 and 5 for the function "Erase fault memory" and confirm entry with Q key.

-> Indicated on display:

```
Rapid data transfer
Fault memory is erased!
```

The fault memory will only be erased approx. 5 seconds after this display appears.

- Press ⇒key.
- After interrogating and erasing fault memory, take vehicle for a road test and interrogate fault memory again.
- After completing repair work, interrogate the fault memory again.

Note:

This has the effect of erasing any faults that may have been stored while carrying out repairs (e.g. as a result of unplugging connectors).

Notes for fault displays:

-> Indicated on display:

```
Attention!
Fault memory is not interrogated
```

This means that the proper sequence of steps was not followed.

- Interrogate fault memory.

In the following cases the fault memory is not erased:

- If the ignition was switched off after interrogating the fault memory
- If an existing static fault was not rectified

-> If the display appears:

```
System not ready for interrogation
```

- Make sure the printer is switched on and wait for the printout.

-> If a fault has been indicated on the printout:

```
1 fault recognised
00811     3333
System not ready for interrogation
```

The gearbox control unit was not given enough time to detect any faults.

- Wait about 1 minute before interrogating the fault memory again.

7 - Reading measured value block

7.1 - Reading measured value block

Notes:

- Engine speed must not exceed 2000 rpm. If this limit is exceeded, the "Read measured value block" function will be terminated.
- In such a case, after reading measured value block, interrogate the fault memory of the control units for the engine and gearbox and erase if necessary. Interrogating fault memory (=>Page 32 .

To avoid any risk of accident, observe the safety precautions when using test instruments while road testing the vehicle =>

Work sequence

- Connect vehicle diagnostic, testing and information system VAS 5051 (or fault reader V.A.G 1551) and select gearbox electronics control unit by entering address word "02" (=>Page 16 .)
  When doing this the ignition must be switched on.

-> Indicated on display:

```
Rapid data transfer      HELP
Select function XX
```

- Switch on fault reader printer with the print key. The warning lamp in key should light up.

- Enter "08" to select the function "Read measured value block" and confirm entry with Q key.

-> Indicated on display:

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

- Enter the required display group number (=> Display group overview, Page 34).
- Confirm input with Q key.

-> Indicated on display (example) for Display Group 001:

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

Notes:

- For an explanation of the values in each display zone
  =>Test table Page 35 .
- If the printer is switched on, the current display can be printed out.
- Other display groups can be selected as follows:

Display group	V.A.G 1551	VAS 5051
Higher	Press key 3	Press skey
Lower	Press key 1	Press tkey

- If all the display zones show the specified values, press the ⇒ key.

-> Indicated on display (function selection):

```
Rapid data transfer      HELP
Select function XX
```

7.2 - Display group overview

Note:

The display group number 000 does not represent any display and should therefore not be selected.

Indicated on display (example)	Display group No.	Display zone	Description
Read measured value block 1 ⇒ 900 rpm 2.16 l/h 0 rpm 0 1 0	001	1 2 3 4	Engine speed Fuel consumption signal Gearbox speed Solenoid valves
Read measured value block 2 ⇒ 5 % 12 % 100000 13.5 V	002	1 2 3 4	Accelerator pedal value Throttle valve angle Switch position Supply voltage of final control elements
Read measured value block 3 ⇒ D 011 100000 S1	003	1 2 3 4	Selector lever position Position of multi-function switch Switch position Current gearshift map

Indicated on display (example)	Display group No.	Display zone	Designation
Read measured value block 4 ⇒ 0.2 A 5 2.16 l/h 45 °C	004	1 2 3 4	Pressure control current Engine torque Fuel consumption signal ATF temperature
Read measured value block 5 ⇒ 5 rpm 5 rpm 5 rpm	005	1 2 3 4	Wheel speed (front left) Wheel speed (front right) Wheel speed (rear right) Wheel speed (rear left)

Test table

Display group No.	Display zone	Designation	Test conditions	Specified read-out on V.A.G 1551	Fault rectification if readout does not match specification
001 (Cntd) ▼	1	Engine speed	Engine running	...rpm (at least 30 rpm) Value increases steadily in proportion to engine speed	- Perform electrical test => from Page 20 , fault codes 00529 and 00543 Interrogate fault memory of engine control unit => MPI Injection and ignition system; Repair group 01; Interrogating and erasing fault memory Interrogating and erasing fault memory

Display group No.	Display zone	Designation	Test conditions	Specified readout on V.A.G 1551	Fault rectification if readout does not match specification
001	2	Fuel consumption signal 1)	Vehicle being driven	... l/h	- Perform electrical test => Page 20 , fault code 00549
(Cntd) ▼	3	Gearbox speed	Vehicle being driven (with engine running)	.../min	▪ Value must increase steadily in proportion to increasing vehicle speed. Perform electrical test => from Page 20 , fault code 00297

1) Signal corresponds to the opening time of injectors in milliseconds.

Notes for gearbox speed:

- With gearbox 01F, an average of the four speed sensors will be displayed.
- With gearbox 01K, the detected speed of the gearbox speed sender -G38 will be displayed.

Display group No.	Display zone	Designation	Test conditions	Specified readout on V.A.G 1551			Fault rectification if readout does not match specification
001	4	Solenoid valves	Vehicle being driven	N90	N89	N88	▪ The back-up programs activated by the gearbox control unit can block gearshifts.
			1st gear	0	1	0	▪ If gears do not shift but the selected shifts are displayed, then there may be a defect in the gearbox hydraulics
			2nd gear	0	1	1	=> "Fault finding, Power transmission" binder Perform final control diagnosis => Page 30

Display group No.	Display zone	Designation	Test conditions	Specified readout on V.A.G 1551			Fault rectification if readout does not match specification
			3rd gear	0	0	1	- Perform electrical test => from Page 41
			4th gear	0	0	0	- => Fault table from Page 20 , fault codes 00258, 00260 and 00262

Note for solenoid valves:

Inactive solenoid valves are displayed as "0" and active solenoid valves as "1".

Display group No.	Display zone	Designation	Test conditions		Specified readout on V.A.G 1551	Fault rectification if readout does not match specification
002	1	Accelerator pedal value	Vehicle stationary	Accelerator pedal at idling position	0 ...5 %	▪ The % value rises continuously when accelerating from idling speed to full throttle.
				Accelerator pedal at full throttle position	95 ...100 %	- => Fault table from Page 20 , fault codes 00518 and 00638
	2	Throttle valve angle	Vehicle stationary	Accelerator pedal at idling position	10 ...15 %	- Perform electrical test => from Page 41
(Cntd.) ▼				Accelerator pedal at full throttle position	80 ... 90 %	▪ Maximum value => MPI Injection and ignition system; Repair group 01; Reading measured value block Reading measured value block

Display group No.	Display zone	Designation	Test conditions		Specified readout on V.A.G 1551	Fault rectification if readout does not match specification
002	3	Switch positions 1)				
		Brake light switch -F Display 1	Brake	Operated	1	- => Fault table from Page 20 , fault code 00526
				Not operated	0	- Test brake light switch -F =>Electrical test from Page 41
		Kickdown switch 2	Kickdown Activated		1	- Test kickdown switch F8 =>Electrical test from Page 41

Display group No.	Display zone	Designation	Test conditions	Specified readout on V.A.G 1551	Fault rectification if readout does not match specification
(Cntd.) ▼		-F8	Not activated	0	

1) The readout on the V.A.G 1551 in display zone 3 consists of 6 digits, e.g. 100000. The first digit from the left (Display 1) refers to the brake light switch -F. The second digit (Display 2) refers to the kickdown switch -F8, etc.

Display group No.	Display zone	Designation	Test conditions		Specified readout on V.A.G 1551	Fault rectification if readout does not match specification
002	3	Cruise control system Display 3	Vehicle speed ≥30 km/h	Activated D, 3, 2 1)	0	- Perform electrical test =>from Page 41 ▪ Only for vehicles with CCS.
				Not activated P, R, N, 1 1)	1	
(Cntd.) ▼		A/C kickdown2) 4			-	▪ Disregard.

1) For this test, the selector lever must be moved into the appropriate gear positions.

2) A/C switched off when kickdown is activated

Display group No.	Display zone	Designation	Test conditions		Specified readout on V.A.G 1551	Fault rectification if readout does not match specification
002	3	Instant gearshift map selection Display 5		Active	1	▪ Disregard.
				Inactive	0	
		Engine torque reduction 1) 6	Vehicle being driven	Active	1	- Check wiring connection according to current flow diagram; identification of contacts=>Electrical test from Page 41
				Inactive	0	- => Fault table from Page 20 , fault code 00545
	4	Supply voltage of control elements	Ignition on		Approx. battery voltage	- Check voltage supply for gearbox control unit and solenoid valves =>Electrical test from Page 41

1) Retardation of ignition timing or reduction of injection quantity during a shift. (Depending on the situation, engine torque reduction may only be active for a very brief period. Since the data transmission to the V.A.G 1551 is relatively slow, the display may not register the engine torque reduction signal under certain circumstances.)

Display group No.	Display zone	Designation	Test conditions		Specified readout on V.A.G 1551	Fault rectification if readout does not match specification
003	1	Selector lever position	Vehicle stationary	Selector lever engaged in: P R N	P R N	- Test multi-function switch -F125 => Display zone 2 Check wiring connection and component =>electrical test from Page 41 Make sure position matches display in dash panel insert.
(Cntd.) ▼				D 3 2 1	D 3 2 1	- Adjust selector lever cable if necessary => Automatic gearbox 01F, Four-wheel drive; Repair group 37; Servicing shift mechanism; Adjusting selector lever cable Servicing shift mechanism; Adjusting selector lever cable

Note for selector lever position:

Selector lever positions are detected by multi-function switch -F125.

Display group No.	Display zone	Designation	Test conditions		Specified readout on V.A.G 1551	Fault rectification if readout does not match specification
003	2	Multi-function switch -F125	Vehicle stationary	Selector lever position	2 3 4 1)	- Check wiring connection and component =>electrical test from Page 41
				P R	1 0 0 1 1 0	- Check selector lever position Make sure position matches display in dash panel insert
(Cntd.) ▼				N D 3 2 1	0 1 0 0 1 1 1 1 1 1 0 1 0 0 1	- Adjust selector lever cable if necessary => Automatic gearbox 01F, Four-wheel drive; Repair group 37; Servicing shift mechanism; Adjusting selector lever cable Servicing shift mechanism; Adjusting selector lever cable

1) Contacts on connector for multi-function switch -F125. Identification of contacts=>Illustration on Page 46 .

Note for multi-function switch -F125:

The input signals from the multi-function switch -F125 can be tested via the gearbox control unit.

Display group No.	Display zone	Designation	Test conditions	Specified readout on V.A.G 1551	Fault rectification if readout does not match specification
003	2	Multi-function switch - F125	If fault occurs	0 0 0	- => Fault table from Page 20 , fault code 00293
	3	Switch position	=> Display group 002, Display zone 3		
	4	Currently activated gearshift map S1 = Cautious driving style S5 = Sporty driving style S6 = Warming up	Vehicle is being driven (engine running)	min: S1 max: S6	▪ The S6 warm-up program is activated each time the engine is started if gear oil (ATF) temperature is below 71 °C. After approx. 1 minute, it will switch to any gearshift map from S1 to S5.

Display group No.	Display zone	Designation	Test conditions	Specified readout on V.A.G 1551	Fault rectification if readout does not match specification
004 (Cntd.) ▼	1	Pressure valve control current -N91	Engine running Stall-speed:	min: 0.1 A Approx. 0.7 A max: 1.1 A	- Perform final control diagnosis => Page 30 - Check wiring connection and component =>electrical test from Page 20 , fault code 00264

Notes for pressure valve control current -N91:

- High current = low modulation pressure (e.g. when driving at a low engine speed and with low engine torque).
- Low current = high modulation pressure (e.g. when driving at a high engine speed and with high engine torque).

Display group No.	Display zone	Designation	Test conditions	Specified readout on V.A.G 1551	Fault rectification if readout does not meet specification
004	2	Engine torque	Vehicle being driven	Value increases in proportion to torque	▪ Engine torque is calculated by the gearbox control unit from the fuel consumption and engine speed signals.
	3	Fuel consumption signal	=>Display group 001, display zone 2		
	4	ATF temperature	stationary with engine running	...°C	- Check wiring connection and component =>electrical test from Page 20 , fault code 00300

Note for ATF temperature:

- If the readout is constantly below - 50°C, there is probably a short to earth in the wiring connection of the gearbox oil (ATF) temperature sender -G93.

- If the readout is constantly above + 180 °C, there is probably an open circuit or a short to positive in the wiring connection of the gearbox oil (ATF) temperature sender -G93.

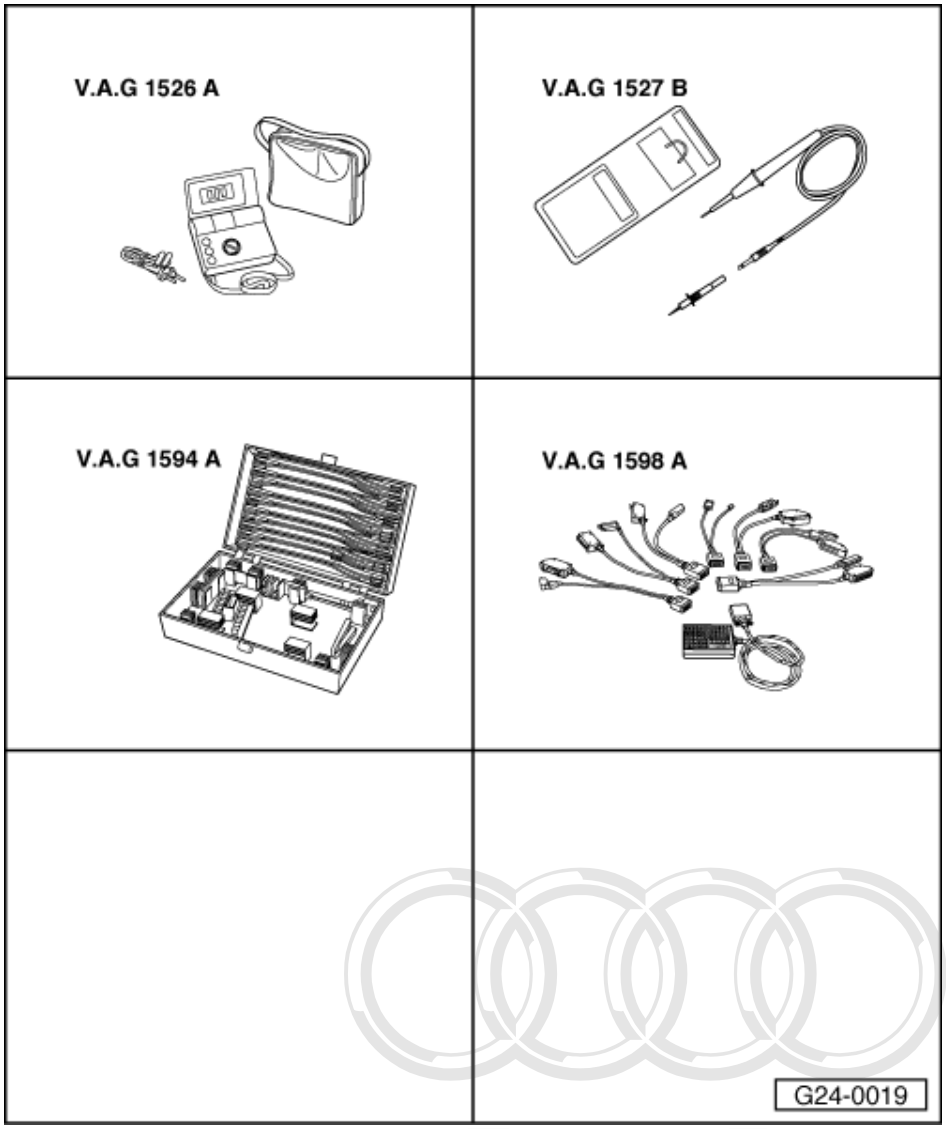
Display group No.	Display zone	Designation	Test conditions	Specified read-out on V.A.G 1551	Fault rectification if read-out does not match specification
005	1	Wheel speed (front left)	Vehicle is being driven	.../rpm (min: 0 rpm)	▪ Wheel speeds should rise and decrease steadily in proportion to driving speed - Check wiring connections =>Electrical test from Page 41 - => Fault table from Page 20 , fault codes 00283, 00285, 00287 and 00290
	2	Wheel speed (front right)			
	3	Wheel speed (rear right)			
	4	Wheel speed (rear left)			

Note for wheel speed:

On gearbox 01K, the gearbox speed from gearbox speed sender -G38 will be displayed in this display group No.

8 - Electrical test

8.1 - Electrical test



Special tools and workshop equipment required

- V.A.G 1526 A
- V.A.G 1527 B
- V.A.G 1594 A
- V.A.G 1598 A with V.A.G 1598/5

- Only carry out the relevant test steps for each component or connector (targeted approach).
- Carry out all the steps listed in the column "Fault rectification if readout does not match specification".

Notes:

- The given specified values are valid for an ambient temperature anywhere between0and40°C.
- If the readings obtained differ from the specified values, determine fault on the basis of the current flow diagram.

=> Current flow diagrams, Electrical fault finding and Fitting locations

- 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 10ω,repeat resistance measurement on component.
- If a connector is unplugged while the ignition is on, a fault could be recorded in the gearbox control unit. After completing the test and with connectors plugged in, erase the fault memory=>Page 32 .

Warning!
To avoid damaging the electronic components, always set the tester to the correct measuring range before connecting the test leads.

Requirements for test:

- Battery voltage okay
- Fuses okay

=> Current flow diagrams, Electrical fault finding and Fitting locations

- Earth connections for gearbox and gearbox control unit okay.

=> Current flow diagrams, Electrical fault finding and Fitting locations

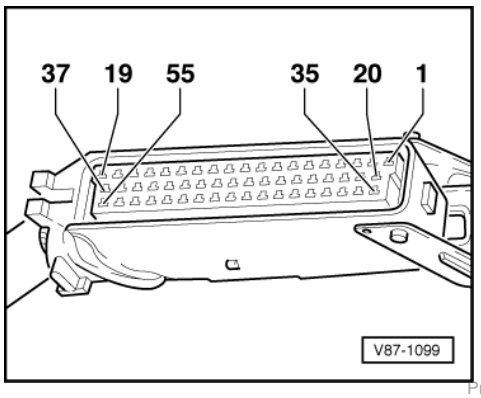
8.2 - Connecting test box V.A.G 1598 A

Notes:

- Test box V.A.G 1598 A must be disconnected when performing the diagnosis with fault reader V.A.G 1551.
- Wait for 30 seconds after the ignition has been switched off before unplugging the connector for automatic gearbox control unit -J217.
- By unplugging the connector for the automatic gearbox control unit -J217, the permanent positive supply will be cut off, thus the permanent memory will be erased.

- Turn ignition off.
- Remove automatic gearbox control unit -J217 =>Page 11 .
- Unplug connector on automatic gearbox control unit -J217 =>Page 13 .
- Connect test box V.A.G 1598 A with adapter lead V.A.G 1598/5 to connector on the gearbox wiring harness and to automatic gearbox control unit -J217.

Note:



-> The pin numbering on the connector for automatic gearbox control unit -J217 is identical to the numbering of the test box sockets.

Requirements for test:

- Measuring resistance:
  Adapter V.A.G 1598/5 removed from gearbox control unit

- Measuring voltage:
  Adapter V.A.G 1598/5 connected to gearbox control unit.

8.3 - Test table

Identification of contacts on control unit and 55-pin connector; sockets on V.A.G 1598 A.

1 - Supply voltage (terminal 15)	10 - Vacant
2 - Gearbox speed sender -G38 1)	11 - Front left wheel speed signal from -G47 2)
3 - Engine speed signal	12 - Rear right wheel speed signal from -G44 2)
4 - Solenoid for selector lever lock -N110 and control unit for selector lever lock -J221.	13 - A/C shut-off when kickdown is activated.
5 - Solenoid valve 1 -N88	14 - Multi-function switch -F125
6 - Solenoid valve 4 -N91 (pressure control valve)	15 - Vacant
7 - Earth	16 - Vacant
8 - Vacant	17 - Voltage supply (only in vehicles with cruise control system)
9 - Vacant	18 - Vacant
(Cntd.) ▾	

1) Only on gearbox 01K

2) Only on gearbox 01F

19 - Supply voltage for solenoid valves	30 - Front right wheel speed signal from -G45 2)
20 - Gearbox speed sender -G38 (screening) 1)	31 - Gear display -G96
21 - Fuel consumption signal	32 - Ignition timing retard/Injection quantity reduction
22 - Vacant	33 - Multi-function switch -F125
23 - Vacant	34 - Vacant
24 - Solenoid valve 2 -N89	35 - Vacant
25 - Vacant	36 - Vacant
26 - Vacant	37 - Vacant
27 - Vacant	38 - Gearbox speed sender -G38 1)
28 - Vacant	39 - Supply voltage (terminal 30)
29 - Vacant	40 - Input signal from ABS (EDL) control unit 1)
(Cntd.) ▾	

1) Only on gearbox 01K.

2) Only on gearbox 01F

41 - Kickdown signal	49 - Vacant
42 - Solenoid valve 3 -N90	50 - Multi-function switch -F125
43 - Vacant	51 - K-wire for diagnosis
44 - Gearbox oil (ATF) temperature sender -G93	52 - Vacant
45 - Vacant	53 - Vacant
46 - Gearbox oil (ATF) temperature sender -G93	54 - Output signal for cruise control system
47 - Accelerator pedal value from engine control unit	55 - Vacant

48 - Rear left wheel speed signal from -G46 2)	

1) Only on gearbox 01K.

2) Only on gearbox 01F

Overview of test steps

Perform only those steps listed for the relevant component in the fault table and measured value block.

Component to be tested	Test steps to be performed	Component to be tested	Test steps to be performed
Supply voltage to control unit -J217	▪ Test steps 1, 2 and 3	Input signal to ABS (EDS) control unit	▪ Test step 16
Solenoid for selector lever lock -N110	▪ Test steps 28 and 29	Gear display -G96	▪ Test step 23
Brake light switch -F	▪ Test steps 7	Engine speed	▪ Test steps 26 and 27
Multi-function switch -F125	▪ Test steps 4, 5 and 6	Kickdown switch -F8	▪ Test steps 9 and 30
Solenoid valve 1 -N88	▪ Test step 17	Gearbox speed sender -G38	▪ Test step 11
Solenoid valve 2 -N89	▪ Test step 18	Speed sensors -G44 ... -G47	▪ Test steps 12, 13, 14 and 15
Solenoid valve 3 -N90	▪ Test step 19	Gearbox oil (ATF) temperature sender -G93)	▪ Test step 10
Solenoid valve 4 -N91	▪ Test steps 20 and 21	Electrical connection between engine and gearbox	▪ Test step 22
Fuel consumption signal	▪ Test step 27	Input signal for accelerator pedal value (throttle)	▪ Test step 24
Cruise control system (CCS)	▪ Test step 8		

Test steps, Part I

Notes and test requirements=>Page 41 .

Switch to voltage measuring range					
Test step	V.A.G 1598 A sockets	Test of	▪ Test requirements - Additional steps	Specification	Fault rectification if readout does not match specification
1	1 + 7	Supply voltage (terminal 15)	▪ Control unit -J217 disconnected ▪ Ignition on	Approx. battery voltage	- Perform test step 3 Check wiring connections according to current flow diagram
2	39 + 7	Supply voltage (terminal 30)	▪ Control unit -J217 disconnected ▪ Battery voltage okay	Approx. battery voltage	- Perform test step 3 Check wiring connections according to current flow diagram
Switch to resistance measuring range					
3	7 + Earth	Earth connection	▪ Control unit -J217 disconnected ▪ Ignition off	≤1.5ω	- Check wiring according to current flow diagram

Switch to voltage measurement range					
Test step	**V.A.G 1598 A sockets**	**Test of**	**▪ Test requirements - Additional steps**	**Specification**	**Fault rectification if readout does not match specification**
4	7 + 50	Multi-function switch -F125	▪ Control unit -J217 disconnected ▪ Ignition on Selector lever in P, R, 3, 2	Approx. battery voltage	- If the value measured remains at <1 V:perform test step 5 Test wiring connection to multi-function switch => Page 63 If the measured values do not correspond to the selector lever position:
(Cntd.) ▼			- Selector lever in N, D, 1	< 1 V	- Adjust selector lever cable => Automatic gearbox 01F, Four-wheel drive; Repair group 37; Servicing shift mechanism; Adjusting selector lever cable Servicing shift mechanism; Adjusting selector lever cable Perform test step 6

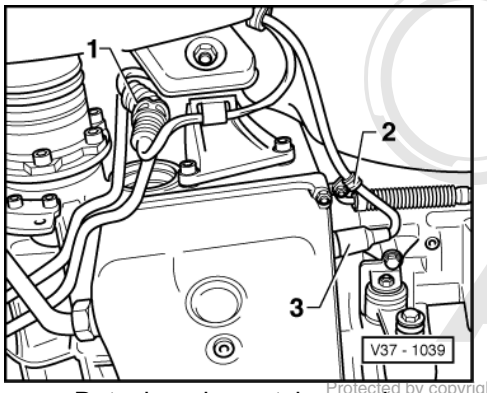
Switch to voltage measurement range					
Test step	**V.A.G 1598 A sockets**	**Test of**	**▪ Test requirements - Additional steps**	**Specification**	**Fault rectification if readout does not match specification**
4	7 + 14	Multi-function switch -F125	▪ Control unit -J217 disconnected ▪ Ignition on Selector lever in R, N, D, 3	Approx. battery voltage	- If the value measured remains at <1 V:perform test step 5 Test wiring of multi-function switch => Page 63 If the measured values do not correspond to the selector lever position:

Switch to voltage measurement range					
Test step	V.A.G 1598 A sockets	Test of	▪ Test requirements - Additional steps	Specification	Fault rectification if readout does not match specification
			- Selector lever in P, 2, 1	< 1 V	- Adjust selector lever cable => Automatic gearbox 01F, Four-wheel drive; Repair group 37; Servicing shift mechanism; Adjusting selector lever cable Servicing shift mechanism; Adjusting selector lever cable
	7 + 33		- Selector lever in D, 3, 2, 1	Approx. battery voltage	=> Automatic gearbox 01K, Front-wheel drive; Repair group 37; Servicing shift mechanism; Adjusting selector lever cable
			- Selector lever in P, R, N	< 1 V	- Perform test step 6

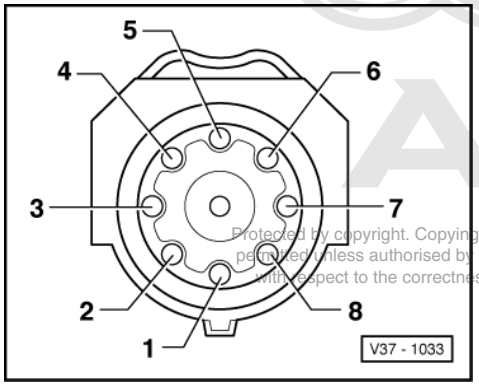
Switch to voltage measurement range					
Test step	Connector contact 1)	Test of	▪ Test requirements - Additional steps	Specification	Fault rectification if readout does not match specification
5	1 + 6	Voltage supply to multi-function switch -F125	▪ Ignition on	Approx. battery voltage	- Test wiring connection according to current flow diagram
	1 + 8				

1) Contacts of connector detached from multi-function switch -F125. For detaching connector on multi-function switch and identification of contacts=>Illustration on Page 46 .

Notes for test step 5:



- -> Detach spring catch securing connector -1- for multi-function switch.



- -> Identification of contacts on 8-pin connector (female) for multi-function switch -F125.
- Use adapter leads from V.A.G 1594 for testing.

Switch to resistance measurement range					
Test step	**Contacts on -F1251)**	**Test of**	**▪ Test requirements - Additional steps**	**Specification**	**Fault rectification if readout does not match specification**
6	1 +7 4 +5 3 +6 2 +8	Multi-function switch -F125	▪ Ignition off Selector lever in P, R, N, D, 3, 2, 1	∞ ω	- Check connector of multi-function switch for contact corrosion, moisture or loose fit. Replace multi-function switch -F125
(Cntd.) ▼	1 + 2		- Selector lever in P, R, 3, 2	≤ 10 ω	=> Automatic gearbox 01F, Four-wheel drive; Repair group 37; Dismantling and assembling gearbox; Removing and installing multi-function switch -F125
			- Selector lever in N, D, 1	∞ ω	=> Automatic gearbox 01K, Front-wheel drive; Repair group 37; Dismantling and assembling gearbox; Removing and installing multi-function switch -F125

1) Contacts on connector for multi-function switch -F125. For detaching connector on multi-function switch and identification of contacts=>Page 49 .

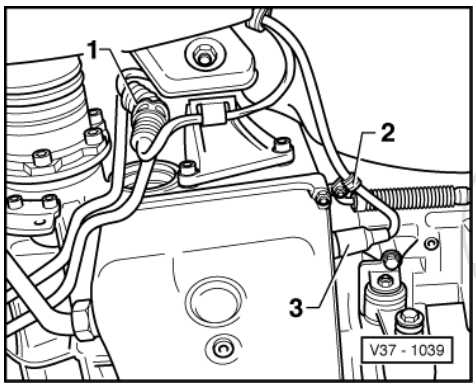
Switch to resistance measurement range					
Test step	**Contacts on -F1251)**	**Test of**	**▪ Test requirements - Additional steps**	**Specification**	**Fault rectification if readout does not match specification**
6	1 + 3	Multi-function switch -F125	▪ Ignition off Selector lever in R, N, D, 3	≤ 10 ω	- Check connector for multi-function switch for contact corrosion, moisture or loose fit.

Switch to resistance measurement range					
Test step	Contacts on -F1251)	Test of	▪ Test requirements - Additional steps	Specification	Fault rectification if readout does not match specification
			- Selector lever in P, 2, 1	∞ ω	- Replace multi-function switch -F125
	1 + 4		- Selector lever in D, 3, 2, 1	≤ 10 ω	=> Automatic gearbox 01F, Four-wheel drive; Repair group 37; Dismantling and assembling gearbox; Removing and installing multi-function switch -F125
(Cntd.) ▼			- Selector lever in P, R, N	∞ ω	=> Automatic gearbox 01K, Front-wheel drive; Repair group 37; Dismantling and assembling gearbox; Removing and installing multi-function switch -F125

1) Contacts on connector for multi-function switch -F125. For detaching connector on multi-function switch and identification of contacts=>Page 49 .

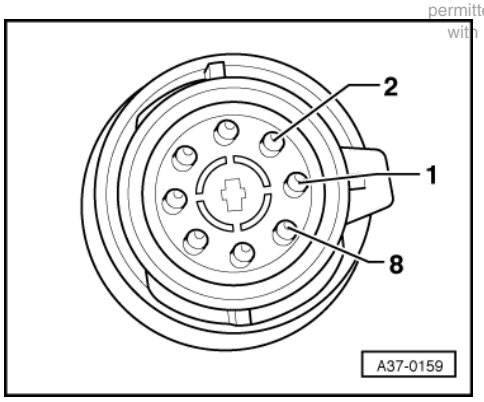
Switch to resistance measurement range 2 Mω					
Test step	Contacts on -F125 1)	Test of	▪ Test requirements - Additional steps	Specification	Fault rectification if readout does not match specification
6	7 +8	Multi-function switch -F125 (reversing lights)	▪ Ignition off Selector lever in R	≤ 10 ω	- Check connector of multi-function switch for contact corrosion, moisture or loose fit.
			- Selector lever in P, N, D, 3, 2, 1	∞ ω	- Replace multi-function switch -F125
	6 + 5	P/N-signal of multi-function switch	- Selector lever in P, N	≤ 10 ω	=> Automatic gearbox 01F, Four-wheel drive; Repair group 37; Dismantling and assembling gearbox; Removing and installing multi-function switch -F125
			- Selector lever in R, D, 3, 2, 1	∞ ω	=> Automatic gearbox 01K, Front-wheel drive; Repair group 37; Dismantling and assembling gearbox; Removing and installing multi-function switch -F125

1) Contacts on connector for multi-function switch -F125. For detaching connector on multi-function switch and identification of contacts=>Page 49 .



Notes for test step 6:

- -> Detach spring catch securing connector -1- for multi-function switch.



- -> Identification of contacts on connector (male) for multi-function switch -F125.

Switch to voltage measurement range					
Test step	V.A.G 1598 A sockets	Test of	▪ Test requirements - Additional steps	Specification	Fault rectification if readout does not match specification
7	4 + 7	Brake light switch -F	▪ Control unit -J217 disconnected Brake pedal not depressed	< 1 V	- Check wiring connection according to current flow diagram - Replace brake light switch => Running gear, Front and Four-wheel drive; Repair group 46; Pedal cluster - assembly overview Pedal cluster - assembly overview
			- Brake pedal depressed	Approx. battery voltage	

Switch to voltage measurement range					
Test step	V.A.G 1598 A sockets	Test of	▪ Test requirements - Additional steps	Specification	Fault rectification if readout does not match specification
8 (Cntd.) ▼	17 + 7	Voltage supply to cruise control system on -J217	▪ Control unit -J217 connected ▪ Ignition on	Approx. battery voltage	- Supply voltage for cruise control system is provided via gearbox control unit Check wiring connection according to current flow diagram.

Connect voltage tester V.A.G 1527 B					
Test step	V.A.G 1598 A sockets	Test of	▪ Test requirements - Additional steps	Specification	Fault rectification if readout does not match specification
8	xx 1) + 7	Activation of cruise control system (CCS)	▪ Final control analysis initiated and cruise control relay activated=>Page 30	LED flashes	- Check wiring connection according to current flow diagram Perform test on "output signal of cruise control system (CCS)"

Switch to voltage measurement range					
8	xx 1) + 7	Output signal for cruise control system (CCS)	▪ After ignition has been switched on, the vehicle reaches a speed of 30 km/h once. Selector lever in D, 3, 2	Approx. battery voltage	- Check wiring connection according to current flow diagram If test of wiring connection does not reveal any defects, replace gearbox control unit if necessary => Page 11

1) Contacts on cruise control system control unit -J213

=> Current flow diagrams, Electrical fault finding and Fitting locations

Switch to resistance measurement range					
Test step	V.A.G 1598 A sockets	Test of	▪ Test requirements - Additional steps	Specification	Fault rectification if readout does not match specification
9	7 + 41	Kickdown signal	▪ Ignition off ▪ Control unit -J217 disconnected Accelerator pedal not depressed	∞ω	- Test wiring according to current flow diagram Adjust or replace throttle cable as necessary

			- Accelerator pedal depressed to kick-down	≤ 1.5 ω	=> Adjust throttle cable => Fuel supply system, Petrol engines; Repair group 20; Servicing accelerator mechanism on vehicles with mechanical accelerator linkage Servicing accelerator mechanism on vehicles with mechanical accelerator linkage
10	46 + 44	Gearbox oil (ATF) temperature sender -G93	▪ Control unit -J217 disconnected ▪ Ignition off	0.5 ... 3 kω	- Test wiring according to current flow diagram Replace gearbox wiring harness
	46 + 7 44 + 7			∞ ω	

Switch to resistance measurement range					
Test step	**V.A.G 1598 A sockets**	**Test of**	**▪ Test requirements - Additional steps**	**Specification**	**Fault rectification if readout does not match specification**
11 1)	2 + 38	Gearbox speed sender -G38	▪ Control unit -J217 disconnected ▪ Ignition off	Approx. 1 kω	- Check wiring connection according to current flow diagram Replace gearbox speed sender -G38
	38 + 20 2 + 20			∞ω	=> Automatic gearbox 01K, Front-wheel drive; Repair group 38; Removing and installing gearbox speed sender

1) Only on gearbox 01K.

Switch to resistance measurement range					
Test step	**V.A.G 1598 A sockets**	**Test of**	**▪ Test requirements - Additional steps**	**Specification**	**Fault rectification if readout does not match specification**
12 2)	7 + 11	Front left speed sensor -G47	▪ Control unit -J217 disconnected ▪ Ignition off	∞ω	- The wiring connections to the ABS control unit -J104 are tested here
	xx1) + 11			≤1.5ω	- Test wiring according to current flow diagram
13 2)	7 + 30	Front right		∞ω	

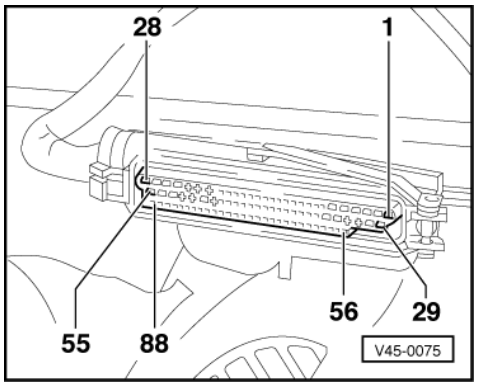
Switch to resistance measurement range					
Test step	V.A.G 1598 A sockets	Test of	▪ Test requirements - Additional steps	Specification	Fault rectification if readout does not match specification
	xx1) + 30	speed sensor - G45		≤1.5ω	
14 2)	7 + 48	Rear left		∞ω	
	xx1) + 48	speed sensor - G46		≤1.5ω	
15 2)	7 + 12	Rear right		∞ω	
	xx1) + 12	speed sensor - G44		≤1.5ω	
16 3)	7 + 40	Input signal to		∞ω	
	xx1) + 40	ABS (EDL) control unit		≤1.5ω	

1) Contact on detached connector of ABS control unit -J104=>Page 52 .

2) Only on gearbox 01F.

3) Only on gearbox 01K.

Notes for test steps 12 to 16:



- -> Identification of contacts on 88-pin connector for ABS control unit.
- Fitting location:
  behind storage compartment on driver's side (LHD vehicles);
  in E-box on right side of plenum chamber (RHD vehicles)

- Connect test box V.A.G 1598/20

=> Running gear, Self-diagnosis; Repair group 01; Electrical test Electrical test

- The numbering of the contacts on the connector and the sockets of test box V.A.G 1598/20 is the same.
- Contacts for wiring connections of gearbox control unit

=> Current flow diagrams, Electrical fault-finding and Fitting locations

Part II

Switch to resistance measurement range					
Test step	V.A.G 1598 A sockets	Test of	▪ Test requirements - Additional steps	Specification	Fault rectification if readout does not match specification
17	5 + 19	Solenoid valve 1 -N88	▪ Control unit -J217 disconnected ▪ Ignition off	30 ... 40 ω	- Test wiring between 8-pin connector and gearbox control unit=> Page 64
	5 + 1 5 + 7			∞ω	- Check wiring harness in gearbox=> Page 65
18	24 + 19	Solenoid valve 2 -N89	▪ Control unit -J217 disconnected ▪ Ignition off	30 ... 40 ω	- Test wiring between 8-pin connector and gearbox control unit=> Page 64
	24 + 1 24 + 7			∞ω	- Check wiring harness in gearbox=> Page 65

Notes for testing solenoid valves:

If the test results meet the given specifications but the solenoid valves do not react during final control analysis,test the activation of the solenoid valves (=>Page 61). If this test does not reveal any fault affecting the activation of the valve, replace the relevant solenoid valve or the valve body.

=> Automatic gearbox 01K, Front-wheel drive; Repair group 38; Removing and installing oil pan, ATF screen and valve body; Removing and installing valve body Removing and installing oil pan, ATF screen and valve body Removing and installing valve body

Switch to resistance measurement range					
Test step	V.A.G 1598 A sockets	Test of	▪ Test requirements - Additional steps	Specifications	Fault rectification if readout does not match specification
19	42 + 19	Solenoid valve 3 -N90	▪ Control unit -J217 disconnected ▪ Ignition off	30 ... 40 ω	- Test wiring between 8-pin connector and gearbox control unit=> Page 64
	42 + 1 42 + 7			∞ω	- Check wiring harness in gearbox=> Page 65

Notes for testing solenoid valves:

If the test results meet the given specifications but the solenoid valves do not react during final control analysis, test the activation of the solenoid valves (=>Page 61). If this test does not reveal any defect affecting the activation of the valve, replace the relevant solenoid valve or the valve body.

=> Automatic gearbox 01K, Front-wheel drive; Repair group 38; Removing and installing oil pan, ATF screen and valve body; Removing and installing valve body Removing and installing oil pan, ATF screen and valve body Removing and installing valve body

Connect voltage tester V.A.G 1527 B					
Test step	V.A.G 1598 A sockets	Test of	▪ Test requirements - Additional steps	Specification	Fault rectification if readout does not match specification
20	6 + 19	Activation of solenoid valve 4 - N91	▪ Control unit -J217 connected ▪ Ignition on ▪ Final control diagnosis initiated and solenoid valve 4 activated ▪ => from Page 30	LED flashes	- Perform test step 21

Switch to resistance measurement range					
Test step	V.A.G 1598 A sockets	Test of	▪ Test requirements - Additional steps	Specification	Fault rectification if readout does not match specification
21	6 + 19	Solenoid valve 4 -N91	▪ Control unit -J217 disconnected ▪ Ignition off	5 ... 8 ω	- Test wiring between 8-pin connector and gearbox control unit=> Page 64
	6 + 1 6 + 7			∞ω	- Check wiring harness in gearbox=> Page 65

Notes for testing solenoid valves:

If the test results meet the given specifications but the solenoid valves do not react during final control analysis, test the activation of the solenoid valves (=>Page 61). If this test does not reveal any defect affecting the activation of the valve, replace the relevant solenoid valve or the valve body.

=> Automatic gearbox 01K, Front-wheel drive; Repair group 38; Removing and installing oil pan, ATF screen and valve body; Removing and installing valve body Removing and installing oil pan, ATF screen and valve body Removing and installing valve body

Switch to resistance measurement range					
Test step	V.A.G 1598 A sockets	Test of	▪ Test requirements - Additional steps	Specification	Fault rectification if readout does not match specification
22	32 + xx 1)	Engine/gearbox electrical connection	▪ Control unit -J217 disconnected ▪ Ignition off	≤ 1.5ω	- Check wiring connection according to current flow diagram
	32 + 1 32 + 7		▪ Engine control unit disconnected	∞ ω	

1) Corresponding contacts of connector for engine control unit

=> Current flow diagrams, Electrical Fault finding and Fitting locations binder

Connect voltage tester V.A.G 1527 B					
Test step	V.A.G 1598 A sockets	Test of	▪ Test requirements - Additional steps	Specification	Fault rectification if readout does not match specification

23	1 + 31	Gear display - G96	▪ Control unit -J217 connected ▪ Multi-function switch - F125 okay ▪ Ignition on	LED should light up	- Test wiring connection according to current flow diagram Rectify any fault in dash panel insert => Electrical system; Repair group 90; Dash panel insert Dash panel insert

Note for testing gear display -G96:

Perform the test only if the selector lever position is not indicated on the gear display.

Connect voltage tester V.A.G 1527 B					
Test step	**V.A.G 1598 A sockets**	**Test of**	**▪ Test requirements - Additional steps**	**Specification**	**Fault rectification if readout does not match specification**
24	47 + 7	Input signal for accelerator pedal value (throttle valve)	▪ Ignition on ▪ Fault memory of engine control unit interrogated Depress accelerator pedal	LED should glow weakly and become brighter when the accelerator pedal is depressed.	- Test wiring according to current flow diagram Test throttle valve potentiometer => MPI Injection and ignition system; Repair group 24; Testing auxiliary signals; Testing output signal for throttle valve position Testing auxiliary signals; Testing output signal for throttle valve position

Note for testing input signal for accelerator pedal value:

If the test results match the specification but self-diagnosis and the measured value block indicate a signal malfunction, then the automatic gearbox control unit must be replaced=>Page 11 .

Test step	**V.A.G 1598 A sockets**	**Test of**	**▪ Test requirements - Additional steps**	**Specification**	**Fault rectification if readout does not match specification**
			or:		

24	47 + 7	Input signal for accelerator pedal value (throttle valve)	- V.A.G 1767 connected to earth (socket 7) using test leads from V.A.G 1594 A and to socket 47 via green plug. Accelerator pedal is not depressed	Signal ratioapprox. 13.0%	- Test wiring according to current flow diagram Test throttle valve potentiometer => MPI Injection and ignition system; Repair group 24; Testing auxiliary signals; Testing output signal for throttle valve position Testing auxiliary signals; Testing output signal for throttle valve position
			- Depress accelerator pedal to floor.	Signal ratioapprox. 83.0%	

Connect voltage tester V.A.G 1527 B					
Test step	**V.A.G 1598 A sockets**	**Test of**	**▪ Test requirements - Additional steps**	**Specification**	**Fault rectification if readout does not match specification**
25 (Cntd.) ▼	21 + 7	Fuel consumption signal	▪ Fault memory of engine control unit interrogated ▪ Engine idling Depress accelerator pedal	LED should flash slowly and weakly, becoming brighter and faster as engine speed increases	- If readout does not match specification, unplug connectors on dash panel insert and repeat test. If readout now matches specification, test dash panel insert and replace if necessary. Test activation of on-board computer => MPI Injection and ignition system; Repair group 24; Testing auxiliary signals; Testing fuel consumption signal of on-board computer Testing auxiliary signals; Testing fuel consumption signal of on-board computer - Test wiring according to current flow diagram

Note for testing fuel consumption signal:

If the test results match the specification but self-diagnosis and the measured value block indicate a signal malfunction, then the automatic gearbox control unit must be replaced=>Page 11 .

Test step	V.A.G 1598 A sockets	Test of	▪ Test requirements - Additional steps	Specification	Fault rectification if readout does not match specification
25	21 + 7	Fuel consumption signal	or: ▪ The V.A.G 1767 connected to earth (socket 7) using test leads from V.A.G 1594 A and to socket 21 via green plug. Accelerator pedal is not depressed	Signal ratio approx. 1.0%	- If readout does not match specification, unplug connectors on dash panel insert and repeat test. If readout now matches specification, test dash panel insert and replace if necessary.
			- Depress accelerator pedal to floor	Signal ratio approx. 23.0%	- Test activation of on-board computer => MPI Injection and ignition system; Repair group 24; Testing auxiliary signals; Testing fuel consumption signal for on-board computer Testing auxiliary signals; Testing fuel consumption signal for on-board computer Test wiring according to current flow diagram

Test step	V.A.G 1598 A Sockets	Test of	▪ Test requirements - Additional steps	Specification	Fault rectification if readout does not match specification

26		Input signal for engine speed	▪ Fault memory of engine control unit interrogated ▪ Selector lever in P or N ▪ Engine idling Depress accelerator pedal	Rpm indicated on rev counter matches actual engine speed	- Check wiring connection according to current flow diagram. Unplug gearbox control unit connector and repeat test. If engine speed is now indicated on the rev counter, replace gearbox control unit. If engine speed is not indicated on rev counter now, proceed with test step 27.

Switch to resistance measurement range					
Test step	**V.A.G 1598 A sockets**	**Test of**	**▪ Test requirements - Additional steps**	**Specification**	**Fault rectification if readout does not match specification**
27	3 + xx 1)	Wiring connection between gearbox control unit and engine control unit for engine speed input signal	▪ Ignition off ▪ Connectors on engine and gearbox control units, rev counter and (if necessary) other additional components unplugged as necessary - refer to current flow diagram. ▪ Adapter cable V.A.G 1598/5 connected only to wiring harness of gearbox control unit	≤ 1.5 ω	- Test wiring according to current flow diagram If readout matches specification in this test: Test activation of rev counter => Current flow diagrams, Electrical fault finding and Fitting locations binder
	3 + 7			∞ ω	

1) Corresponding contacts of connector for engine control unit

=> Current flow diagrams, Electrical fault finding and Fitting locations binder

Switch to resistance measurement range					
Test step	**Contacts on connector for - J2211)**	**Test of**	**▪ Test requirements - Additional steps**	**Specification**	**Fault rectification if readout does not match specification**
28	4 + 6	Voltage supply to selector lever lock control unit - J221	▪ Control unit -J217 disconnected ▪ Selector lever lock control unit -J221 disconnected Ignition on	Approx. battery voltage	- Check wiring connection according to current flow diagram
			- Ignition off	< 1 V	
	4 + 3 2)	Voltage supply when operating brake light switch -F	▪ Ignition turned on and then off Brake pedal depressed	Approx. battery voltage	- Check wiring connection according to current flow diagram

Switch to resistance measurement range					
Test step	Contacts on connector for - J2211)	Test of	▪ Test requirements - Additional steps	Specification	Fault rectification if readout does not match specification
(Cntd.) ▼			- Brake pedal not depressed	< 1 V	

1) Identification of contacts on connector for selector lever lock control unit -J221=>Page 60 .

2) Requirement for test: both brake lights must be okay.

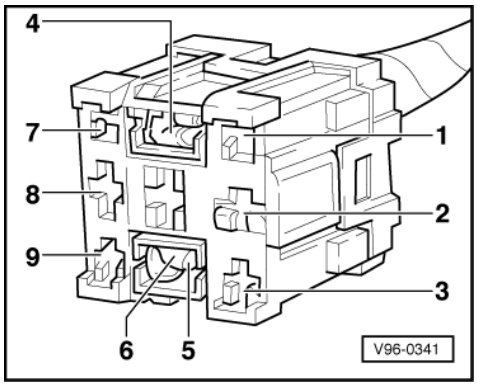
Switch to voltage measurement range					
Test step	Contacts on connector for - J2211)	Test of	▪ Test requirements - Additional steps	Specification	Fault rectification if readout does not match specification
28	6 + 2	Operation of P/N switch in multi-function switch - F125	▪ Ignition on Selector lever in P, N	Approx. battery voltage	- Check wiring connection according to current flow diagram
			- Selector lever in R, D, 3, 2, 1	< 1 V	- If necessary, disconnect relay for starter inhibitor and reversing lights -J226 and repeat measurement.

1) Identification of contacts on connector for selector lever lock control unit -J221=>Page 60 .

Switch to resistance measurement range					
Test step	Contacts on connector for -J2211)	Test of	▪ Test requirements - Additional steps	Specification	Fault rectification if readout does not match specification
29	8 + 3	Selector lever lock solenoid -N110	▪ Selector lever lock control unit -J221 disconnected	approx. 12.4 ω	- Check wiring connection according to current flow diagram Replace selector lever lock solenoid -N110 => Automatic gearbox 01F, Four-wheel drive; Repair group 37; Servicing shift mechanism; Dismantling and assembling shift mechanism Servicing shift mechanism; Dismantling and assembling shift mechanism

1) Identification of contacts on connector for selector lever lock control unit -J221=>Page 60 .

Notes for test steps 28 and 29:



- -> Identification of contacts on connector of disconnected selector lever lock control unit -J221
- Fitting location: relay carrier in electronics box (passenger's footwell), socket 11.

=> Current flow diagrams, Electrical fault finding and Fitting locations

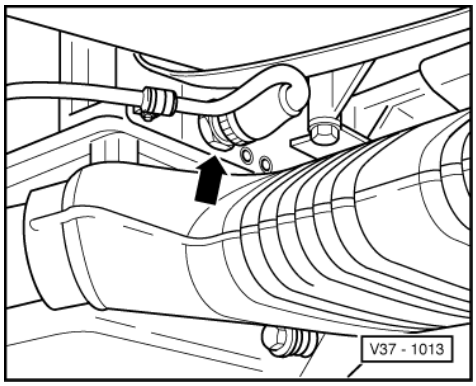
- If both brake light bulbs should fail, the selector lever lock will not work, i.e. the selector lever can be shifted out of P or N without the brake pedal being depressed.

Connect voltage tester V.A.G 1527 B					
Test step	V.A.G 1598 A sockets	Test of	▪ Test requirements - Additional steps	Specification	Fault rectification if readout does not match specification
30	13 + 7	Auxiliary A/C signal (during kick-down)	▪ Control unit -J217 connected ▪ Ignition on Final control diagnosis initiated and kickdown switch - F8 activated => from 30	LED light should flash	- Check wiring connection according to current flow diagram Test A/C operation => Air conditioner; Repair group 01; Interrogating fault memory Interrogating fault memory

8.4 - Unplugging 8-pin connector on gearbox

- If necessary, remove exhaust pipe with catalytic converter.

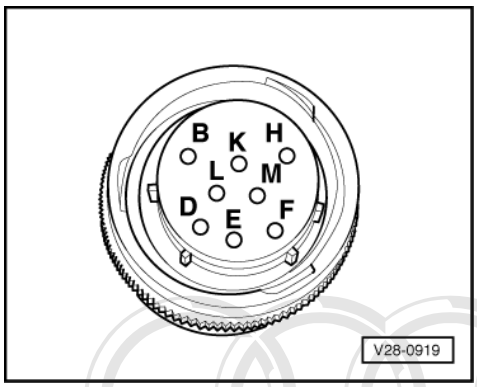
=> 6-Cylinder engine, Mechanics; Repair group 26; Removing and installing parts of exhaust system; Removing and installing left front exhaust pipe with catalytic converter. Removing and installing parts of exhaust system Removing and installing left front exhaust pipe with catalytic converter.



- -> Release bayonet fitting on 8-pin connector -arrow- by turning anti-clockwise. Remove connector from gearbox.

8.5 - Testing activation of solenoid valves

- Unplug 8-pin connector on gearbox=>Page 61 .
- Initiate final control diagnosis(=>Page 30) and activate the solenoid valve to be tested.

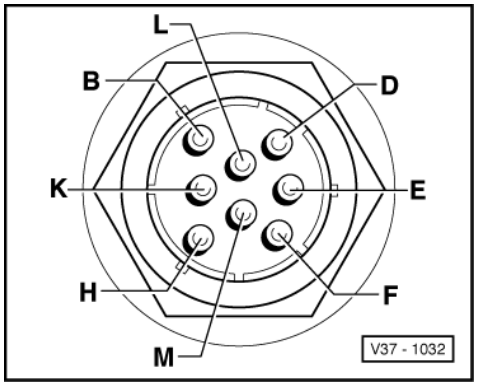


- -> Connect voltage tester V.A.G 1527 B as follows:

Component	Contacts on connector
Solenoid valve 1 -N88	M + H
Solenoid valve 2 -N89	M + K
Solenoid valve 3 -N90	M + L
Solenoid valve 4 -N91 1)	M + B

1) Observe test requirement(=>Page 62)

Test requirement for solenoid valve 4 -N91:



- To test the activation of solenoid valve 4 -N91, the contacts M and B on the female connector have to be connected to the contacts M and B of the corresponding male connector using test leads from V.A.G 1594. At the same time connect voltage tester V.A.G 1527 B in parallel (i.e. connect voltage tester between M and B).
- This test may also be performed with the connector plugged in and using the test box V.A.G 1598 A=>Electrical test, test step "Activating solenoid valve 4 -N91"from Page 44 .

When the solenoid valve is activated during final control diagnosis, the LED should flash.

If the LED does not flash:

- Test solenoid valve relay=>Page 63 .

If no fault is found:

- Check wiring connection between multiple connector of gearbox control unit and the 8-pin connector on gearbox=>Page 64 .
- If there is a defect in the activation of solenoid valve 4 -N91, also check wiring harness in gearbox=>Page 65 .

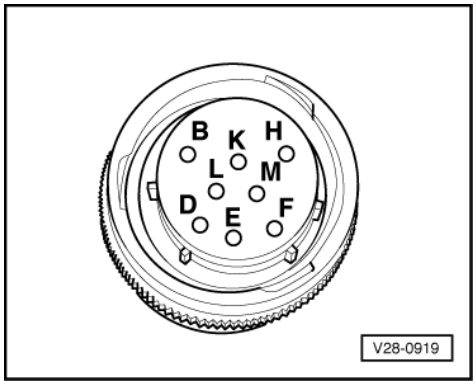
If no wiring fault is detected:

- Replace the automatic gearbox control unit -J217=>Page 11 .

- After completing test and reconnecting 8-pin connector, erase the fault memory=>Page 32 .

Testing solenoid valve relay

- Detach 8-pin connector on gearbox=>Page 61 .



- -> Connect voltage tester V.A.G 1527 B between contact M and earth on gearbox.
- Turn ignition on and initiate final control diagnosis=>Page 30 :
  - The LED should light up.

Note:

When the solenoid valve relay is activated during final control diagnosis, the LED should flash.

If the LED does not light up:

- Check wiring connection between multiple connector on gearbox control unit and the 8-pin connector on gearbox=>Page 64 .

If no wiring fault is detected:

- Replace the automatic gearbox control unit -J217=>Page 11 .
- After completing test and reconnecting 8-pin connector, erase the fault memory=>Page 32 .

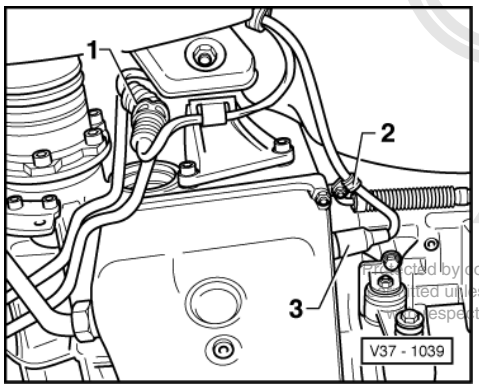
8.6 - Checking wiring connection between automatic gearbox control unit -J217 and gearbox

Requirements for test:

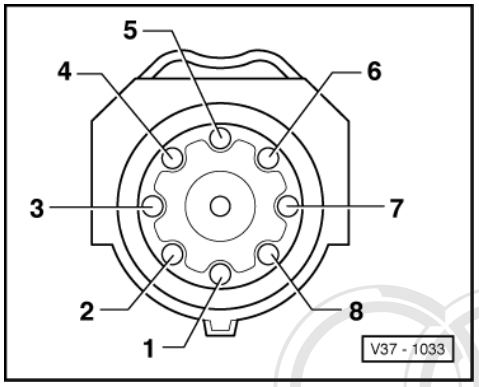
- Gearbox control unit disconnected
- Ignition off
- Test box V.A.G 1598 A connected to the already unplugged multiple connector on gearbox wiring harness via adapter lead V.A.G 1598/5

- Set down the test box outside of vehicle.

Checking wiring connection of multi-function switch -F125



- -> Release spring catch on connector -1- for multi-function switch -F125.



- -> Test wiring connections for open circuits and shorts to positive or earth.

=> Current flow diagrams, Electrical fault finding and Fitting locations

Note:

Pay special attention to possible contact corrosion, leaks and moisture in connectors.

If no wiring fault is detected:

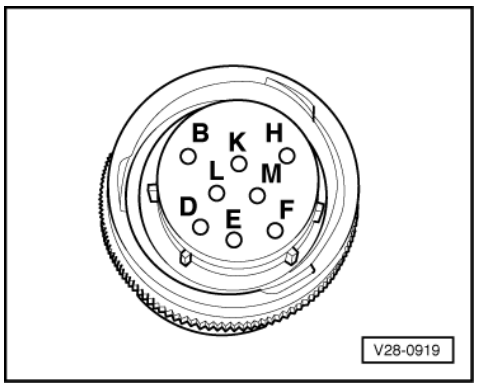
- Replace multi-function switch -F125:

=> Automatic gearbox 01F, Four-wheel drive, Repair group 37; Dismantling and assembling gearbox; Removing and installing multi-function switch -F125. Dismantling and assembling gearbox Removing and installing multi-function switch -F125.

=> Automatic gearbox 01K, Front-wheel drive; Repair group 37; Dismantling and assembling gearbox; Removing and installing multi-function switch -F125. Dismantling and assembling gearbox Removing and installing multi-function switch -F125.

Checking wiring connection of 8-pin connector on gearbox

- Detach 8-pin connector on gearbox=>Page 61 .



- -> Test for open circuit in the following wiring connections:

Connector contact	Test box V.A.G 1598/A socket
B	6
E	46
F	44
H	5
K	24

Connector contact	Test box V.A.G 1598/A socket
L	42
M	19

Note:

Pay special attention to any contact corrosion, leaks and moisture in connectors.

If no wiring fault is detected:

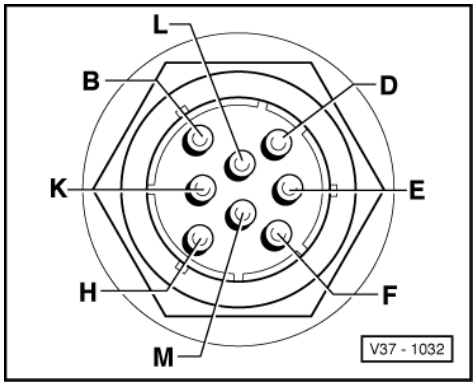
- Test wiring harness in gearbox=>Page 65 .

Testing wiring harness in gearbox

Note:

Perform this test if the solenoid valves do not click during final control diagnosis or the electrical test of the solenoid valves via test box V.A.G 1598 A detects a fault, but the wiring connections between the gearbox control unit and the 8-pin connector are okay.

- Detach 8-pin connector on gearbox=>Page 61 .



- -> Connect multimeter (resistance measurement range) as follows:

Component	Connector contacts	Specification ω
Solenoid valve 1 - N88	M + H	30 ... 40
Solenoid valve 2 - N89	M + K	30 ... 40
Solenoid valve 3 - N90	M + L	30 ... 40
Solenoid valve 4 - N91	M + B	5 ... 8
Gear oil temperature sender -G93 at approx. 20 °C	E + F	500 ... 3000 940

If a specification is not met:

- Detach wiring harness from relevant solenoid valve and test according to current flow diagram. If necessary, replace wiring harness.
- Measure resistance at solenoid valve again and replace valve or valve body if necessary.

=> Automatic gearbox 01F, Four-wheel drive; Repair group 38; Removing and installing oil pan, ATF screen and valve body; Removing and installing valve body Removing and installing oil pan, ATF screen and valve body Removing and installing valve body

=> Automatic gearbox 01K, Front-wheel drive; Repair group 38; Removing and installing oil pan, ATF screen and valve body; Removing and installing valve body Removing and installing oil pan, ATF screen and valve body Removing and installing valve body

8.7 - Testing output signal for gearshift

Note:

This signal enables smoother gearshifts by momentarily retarding the ignition timing.

- Interrogate fault memory of engine control unit

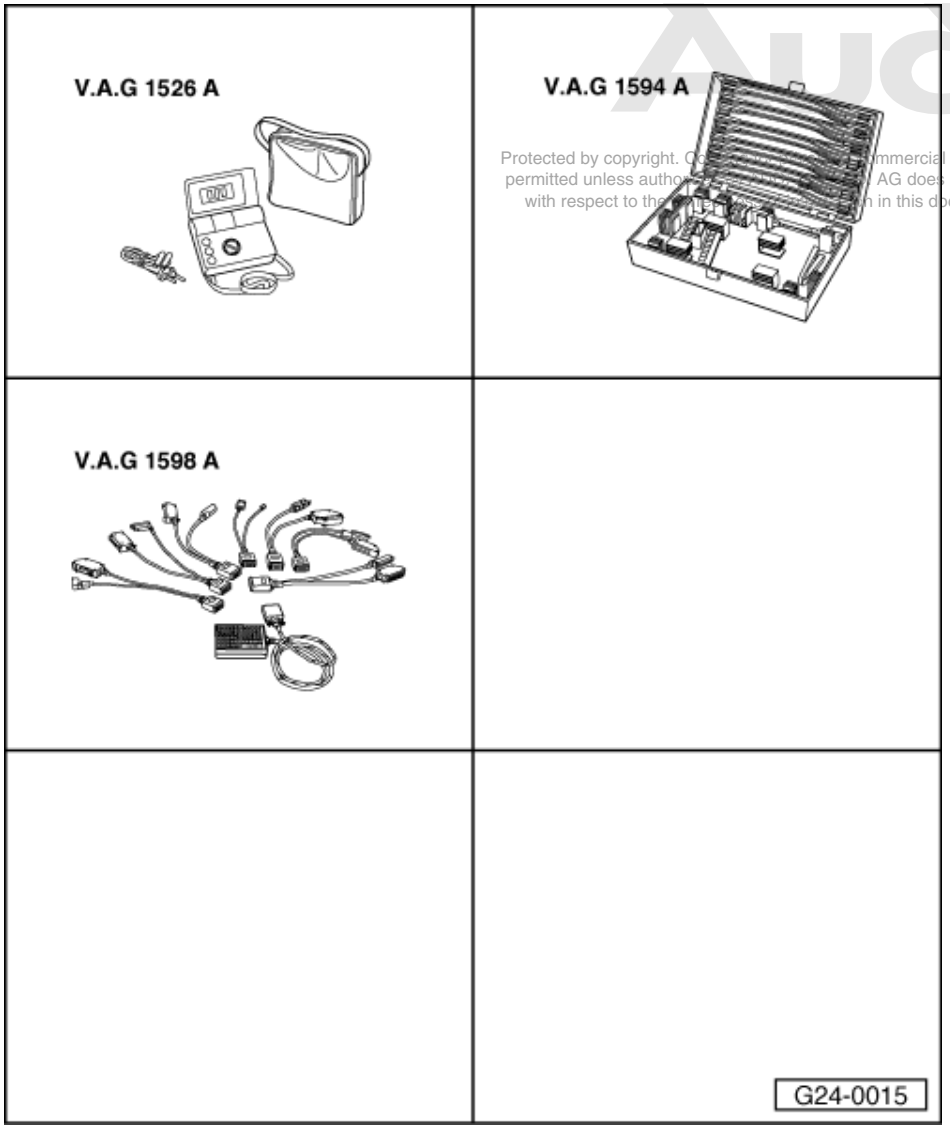
=> MPI Injection and ignition system; Repair group 01; Interrogating and erasing fault memory Interrogating and erasing fault memory

- Check wiring connection for gearbox control unit

=> MPI Injection and ignition system; Repair group 24; Auxiliary signals; Ignition timing retardation during gearshift Auxiliary signals Ignition timing retardation during gearshift

9 - Checking wiring of diagnostic connector

9.1 - Checking wiring of diagnostic connector



Special tools and workshop equipment required

- V.A.G 1526 A
- V.A.G 1594 A
- V.A.G 1598 A with V.A.G 1598/5

Test sequence

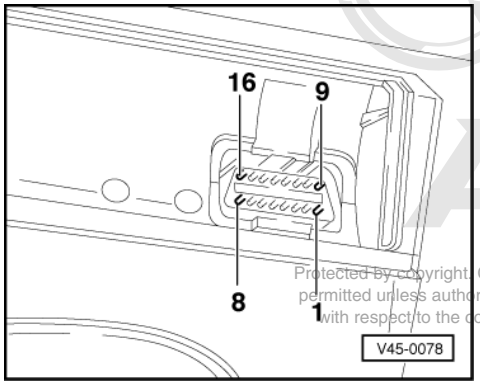
Caution Turn ignition off before checking wiring connections

Note:

The diagnostic connector is located in the front part of the centre console underneath the ashtray. The diagnosis lead (K wire) is connected via a junction point in the wiring harness:

=> Current flow diagrams, Electrical fault finding and Fitting locations

Identification of contacts in diagnostic connector



4 - -> Earth connection for V.A.G 1551/1552
7 - K wire
16 - Voltage supply to V.A.G 1551/1552

Note:

This test must be carried out if any of the following displays appears when fault reader V.A.G 1551 is connected:

-> If the following message appears on the display:

```
Rapid data transfer      HELP
Control unit does not answer!
```

or

```
Rapid data transfer      HELP
K wire not switching to earth
```

or

```
Rapid data transfer      HELP
K wire not switching to positive
```

- With the ignition switched off, connect test box V.A.G 1598/A using adapter V.A.G 1598/5 to connector of gearbox control unit
  =>Page 42 .
- Test for open circuit and short to earth or positive in the following wiring connections:

Diagnosis wire	Diagnostic connector Contact	Gearbox control unit Contact	Test box 1598 A Contact
K	7	51	51

Notes:

- Diagnosis wire K is linked to the various control units via a junction point in the wiring harness:

=> Current flow diagrams, Electrical fault finding and Fitting locations

-

```
Rapid data transfer
Fault in communication build up
```

-> If this message appears on the display when starting the diagnosis procedure or during self-diagnosis:
- Turn ignition off.
- One-by-one detach the connectors from the control units of other on-board systems with self-diagnosis capability.

- Each time after a connector for a specific vehicle system has been detached, turn on the ignition and re-enter address word "02" for gearbox electronics.
- If the control unit identification now appears on the display, fit a new control unit in place of the control unit which was last disconnected from the diagnosis lead.