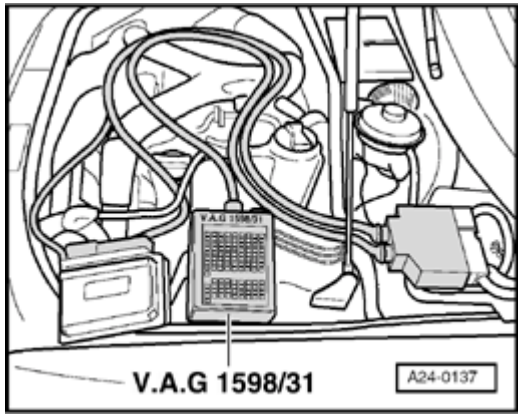
Additional signals, checking

Engine speed (RPM) signal, checking

Note:

The engine speed signal is taken from terminal 37 on the Engine Control Module (ECM). The signal is used for various functions including the RPM display in the instrument cluster.



- Connect VAG1598/31 test box to wiring harness for engine control module. Do not connect to the engine control module itself ⇒ Page 24-20 .
- Check wiring from test box socket 37 to instrument cluster according to wiring diagram for an open circuit.

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

24-180

Fuel consumption signal for on-board computer, checking

Notes:

- *The fuel consumption signal is calculated by the engine control module (on the basis of the injection period) and passed on to the on-board computer. The fuel consumption signal is taken from terminal 81 on the Engine Control Module (ECM).*

- *Checking fuel consumption signal*

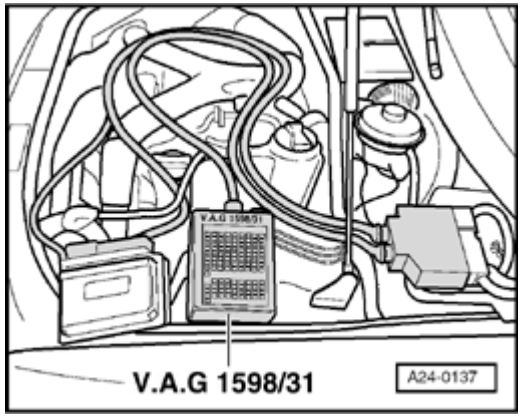
⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

24-181

Coolant temperature signal, checking

Notes:

- *The engine control module receives the coolant temperature signal from the instrument cluster. When the signal is received, the charge pressure is reduced to prevent the engine from overheating.*



- Connect VAG1598/31 test box to wiring harness for engine control module. Do not connect to the engine control module itself ⇒ Page 24-20 .
- Check wiring from test box socket 19 to instrument cluster according to wiring diagram for an open circuit.

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

24-182

Vehicle Speed Signal (VSS), checking

Notes:

- *The vehicle speed signal is generated by the Vehicle Speed Sensor (VSS) -G68 (on the transmission) and is processed in the instrument cluster.*

- *The processed signal goes to terminal 54 on the engine control module and is used for Idle Air Control (IAC) and for the damping of load change jolts when changing gear.*

- Start engine.

- Connect vehicle diagnostic, testing and information system VAS 5051 or VAG1551 scan tool and select engine electronics control module by entering address word "01" ⇒ Page 01-9 .

- Select "Read measured value block" (function 08) and Display Group 5.

Indicated on display:

Warning!

- ***During a road test in an airbag equipped vehicle, VAG1551 must***

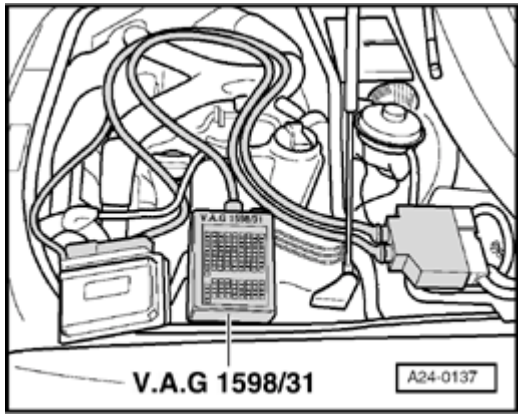
always be fastened to and operated from the rear seat by a second technician.

- ***When driving or riding in an airbag equipped vehicle, NEVER hold the scan tool or other test equipment in your hands or lap while in motion. Objects between you and and the airbag increase the risk of injury in an accident.***

24-183

- Take vehicle for a test drive and check whether vehicle speed appears in display field 3.

- If vehicle speed does not appear, raise the vehicle (preferably using a lift) until front left wheel is clear of the ground.



- Connect VAG1598/31 test box to wiring harness for engine control module. Do not connect to the engine control module itself ⇒ Page 24-20 .
- Connect diode test lamp between socket 3 (B+) and socket 54 (vehicle speed signal).
- Switch ignition on and turn front left wheel by hand.

  The diode test lamp should flash (very brief flashes).
- If diode test lamp does not flash, check for open circuit or short to B+ or Ground (GND) in wiring between instrument panel and terminal 54 on engine control module connector.

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

Fuel tank level signal, checking

Note:

- *The Engine Control Module (ECM) receives the fuel tank level signal from the instrument cluster.*
- *The processed signal enters on terminal 30 the Engine Control Module (ECM) and is used to determine certain malfunctions (e.g.: misfire)*

- Connect VAG1598/31 test box to wiring harness for engine control module. Do not connect to the engine control module itself ⇒ Page 24-20 .

- Check wiring from test box socket 30 to instrument cluster according to wiring diagram for an open circuit and short circuit to B+/Ground (GND).

24-185

Brake light switch -F and brake pedal switch -F47, checking

- Connect vehicle diagnostic, testing and information system VAS 5051 or VAG1551 scan tool and select engine electronics control module by entering address word "01" ⇒ Page 01-9 .

When doing this the ignition must be switched on.

Rapid data transfer **HELP**

Select function XX

Indicated on display

- Press buttons -0- and -8- to select function "Read Measuring Value Block" and confirm entry with -Q- button.

Read Measuring Value Block

Input display group number XXX

Indicated on display

- Press buttons -0-, -6- and -6- to select "display group number 066" and confirm entry with -Q- button.

24-186

➢ Indicated on display

- Observe brake light/brake pedal switch in display field 2.

	Display fields			
	1	2	3	4
Display Group 066: Signals to engine control module				
Display	xxx km/h	**X X X X**	xxx km/h	0 0 0 0
Indicates	Actual speed	**Switch positions**	Specified speed	Switch positions
Work range		**XX00** **XX11**		
Specified value		**XX00** **Brake pedal not depressed** **XX11** **Brake pedal depressed**		
Note		**Value:** **X = insignificant** **The switch points are offset**		

24-187

If display does not appear as described:

Check switch

- Remove storage compartment on driver's side.

⇒ *Repair Manual, Body Interior, Repair Group 68*

- Disconnect harness connector on brake light/brake pedal switch.

- Connect hand-held multimeter for resistance measurement between terminals 1 and 2.

Note:

The connector slots are marked on the back side of the connector.

24-188

- Specified value: ∞ Ω (no continuity)

- Depress brake pedal.

  - Specified value: approx.: 0 Ω

- Connect hand-held multimeter for resistance measurement between terminals 3 and 4.

  - Specified value: approx.: 0 Ω

- Depress brake pedal.

  - Specified value: ∞ Ω (no continuity)

If specifications are not obtained:

- Check adjustment or replace brake light/brake pedal switch.

24-189

If specifications are not met:

Check voltage supply

- Connect VAG1527 B between following sockets on harness connector:

Harness connector terminal	Measure against
1	Ground (GND)

- The LED must come on

Harness connector terminal	Measure against
3	Ground (GND)

- Switch ignition on.

- The LED must come on

If LED does not come on:

- Check wiring connection from terminal 1 or 3 of connector for open circuit (fuse) or short circuit to Ground (GND).

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

- If necessary eliminate open circuit or short circuit to Ground (GND)

If LED comes on:

Check activation

- Connect VAG1598/31 test box to wiring harness for engine control module. Do not connect to the engine control module itself ⇒ Page 24-20 .

Test the following wiring connections for open circuits and short to B+ or Ground (GND):

Harness connector terminal	VAG1598/31 test box, socket
2	56
4	55

- Repair any open/short circuit as necessary.

24-191

Clutch Vacuum Vent Valve Switch -F36, checking

Note:

This signal is used to avoid RPM over-oscillation and load change impacts when changing gears and is also used for the cruise control system.

Test sequence

- Connect vehicle diagnostic, testing and information system VAS 5051 or VAG1551 scan tool and select engine electronics control module by entering address word "01" ⇒ Page 01-9 .

When doing this the ignition must be switched on.

Rapid data transfer HELP **Select function XX**	Indicated on display

- Press buttons -0- and -8- to select function "Read Measuring Value Block" and confirm entry with -Q- button.

Read Measuring Value Block **Input display group number XXX**	Indicated on display

- Press buttons -0-, -6- and -6- to select "display group number 066" and confirm entry with -Q- button.

Read Measuring Value Block 66 →	Indicated on display

1	2	3	4

- Observe clutch vacuum vent switch switch in display field 2.

24-192

	Display fields			
	1	2	3	4
Display Group 066: Signals to engine control module				
Display	xxx km/h	**X X X X**	xxx km/h	0 0 0 0
Indicates	Actual speed	**Switch positions**	Specified speed	Switch positions
Work range		**X0XX** **X1XX**		
Specified value		**X0XX** **Clutch pedal not depressed** **X1XX** **Clutch pedal depressed**		
Note		**Value:** **X = insignificant**		

24-193

If display does not appear as described:

Check switch

- Remove storage compartment on driver's side.

⇒ *Repair Manual, Body Interior, Repair Group 68*

- Disconnect harness connector on clutch switch.

- Connect hand-held multimeter for resistance measurement between terminals 1 and 2.

Note:

The connector slots are marked on the back side of the connector.

  - ♦ Specified value: approx.: 0 Ω

- Depress clutch pedal.

  - ♦ Specified value: ∞ Ω (no continuity)

If specifications are not obtained:

- Replace clutch vacuum vent valve switch.

If specification is obtained:

Check voltage supply

- Connect VAG1527 B between following sockets on harness connector:

Harness connector terminal	Measure against
2	Ground (GND)

- Switch ignition on.

  - The LED must come on

If LED does not come on:

- Check wire connection from terminal 2 of connector for open circuit (fuse) or short circuit to Ground (GND).

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

- If necessary eliminate open circuit or short circuit to Ground (GND)

If LED comes on:

Check activation

- Connect VAG1598/31 test box to wiring harness for engine control module. Do not connect to the engine control module itself ⇒ Page 24-20 .

Test the following wiring connections for open circuits and short to B+ or Ground (GND):

Harness connector terminal	VAG1598/31 test box, socket
1	39

- Repair any open/short circuit as necessary.

Crash signal, checking

The Engine Control Module (ECM) receives the crash signal ("Crash shut-down activated") from the airbag control module.

If the airbag control module sends the crash signal to the ECM (if an accident occurred or if a output Diagnostic Test Mode (DTM) was carried out), the ECM shuts off the fuel pump, that means the engine stalls, however, afterwards the engine can be started again (e.g. when removing the vehicle from the accident area)

The ECM cannot switch off the fuel pump during an accident if the malfunction "Crash Signal from Airbag Control Unit/Range Performance" from the airbag control module is sent to ECM. The engine control module cannot recognize the crash signal from the airbag control module; e.g.: if the wiring between the ECM and the airbag control module is faulty.

- Connect VAG1598/31 test box to wiring harness for engine control module. Do not connect to the engine control module itself ⇒ Page 24-20 .

24-197

Test the following wiring connections for open circuit and/or short to B+ or Ground (GND) and open circuit.

VAG1598/31 test box, socket	Airbag control module, contact
67	⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

Resistance in wiring: max. 1.5 ohm

Eliminate open circuit or short circuit.

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

If no malfunctions are found in wiring: Check DTC memory of airbag control module.

24-198

Signal for rough road recognition from ABS/EDL control module, checking

Note:

- *The ABS/EDL control module generates the rough road signal if it recognizes wheel spin on a wheel. The Engine Control Module (ECM) switches off the misfire recognition once the rough road signal is recognized by the ECM.*
- *The rough road signal should only be checked if the malfunction (P1606) 18014 "Rough Road Spec Engine Torque ABS-ECU/Electrical Malfunction" is stored in the DTC memory. It is possible that the malfunction "Misfiring" is also stored in DTC memory, however this is then a sequence error and should be ignored.*
- *The wiring and the rough road signal is monitored by the ECM.*

24-199

Test conditions

- Control module coding OK ⇒ Page 01-93 .

Test sequence

- Connect VAG1598/31 test box to wiring harness for engine control module. Do not connect to the engine control module itself ⇒ Page 24-20 .

- Check wire from test box socket 74 to ABS Control Module according to wiring diagram for short circuit or open circuit.

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

24-200

If no malfunction is detected:

- Replace ABS control module.

If, after the ABS control module has been replaced the malfunction appears again:

- Replace Engine Control Module (ECM) ⇒ Page 24-24 .

24-201

Data exchange between Engine/ABS/ Transmission control module, checking

Notes:

- *The data exchange between the various control modules is carried out via a bus system.*
- *The term "Bus" refers to a system for transmitting and distributing data.*
- *The wires which connect the control modules and convey the data between them are called data wires.*
- *Data is transmitted via data wires in serial, i.e. in a specific order to the connected control modules.*

24-202

Checking bus system

The principle of the test is independent of the number of control modules/systems connected to the CAN-bus.

The DTC table suggested checking the data exchange between the Engine Control Module (ECM) and CAN capable control modules.

- Start engine (if engine will not start, switch ignition on).

- Connect VAS5051 tester or VAG1551 scan tool and select the control module for engine electronics using "address word" 01 ⇒ Page 01-9 .

Rapid data transfer	**HELP**
Select function XX	

When indicated on display:

- Press buttons -0- and -8- to select "Read Measuring Value Block" and press -Q- button to confirm input.

Read measuring value block	**Q**
Enter display group number XXX	

When indicated on display:

- Press buttons -1-, -2- and -5- to select "display group number 125" and press -Q- button to confirm input.

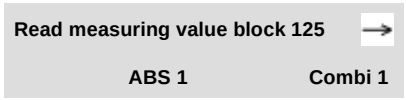
24-203

When indicated on display:

- Check indications in display fields 1 through 4.

  CAN capable control modules connected to the Engine Control Module (ECM) are indicated:

  - No indication (display field empty): Control module not CAN-capable
  - Indication 1: CAN capable control module is connected to databus
  - Indication 0: CAN capable control module is not connected to databus (e.g. in case of malfunction)



Example:

Note:

Display group 125 indicates all systems that communicate with the Engine Control Module (ECM) via the CAN-bus. (In this example, the ABS control module and the instrument cluster). If these systems are not installed, the display fields in display group 125 that are intended for them will be empty. Display field 1 will indicate "Transmission 1" and display field 4 will indicate "A/C 1" if these systems are communicated with the Engine Control Module (ECM) via the CAN-bus.

24-204

- Check under display group 126 in the same manner.

Note:

Display group 126 indicates all other systems that communicate with the Engine Control Module (ECM) via the CAN-bus. If these systems are not installed, the display fields that are intended for them will be empty.

The following systems will be indicated in display group 126, assuming they are communicating with the Engine Control Module (ECM) via the CAN-bus:

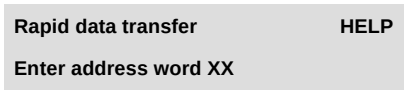
Display field 1: automatic distance control; indication: "Distance 1".

Display field 2: Steering angle sensor; indication: "Steering angle 1"

Display field 3: Airbag; indication: "Airbag 1".

Display field 4: System voltage; indication: "cnt. ELEC 1".

- Press → button.



When indicated on display:

24-205

- Press button 0- twice to select "Automatic test sequence", address word 00. Press -Q- button to confirm input.

  - DTC memory of all OBD capable systems in the vehicle will be checked.

When a control module responds with its identification, the display indicates the number of stored errors or indicates "no malfunctions recognized".

DTCs stored in the system are indicated in sequence and printed out. Then the VAG1551 scan tool sends the next address word.

VAG - On Board Diagnostic (OBD) HELP

1- Rapid data transfer*

2- Blink code output*

The automatic test sequence is over when the following indication appears on the display:

If a malfunction related to the"powertrain databus" or the "CAN-bus" is indicated:

- Check whether the Engine Control Module (ECM) and other CAN capable control modules installed are appropriate for this vehicle (part no. and coding).

If the correct control modules are installed:

- Check to be sure the multi-pin connectors of the control modules are securely connected.

If multi-pin connectors are properly secured:

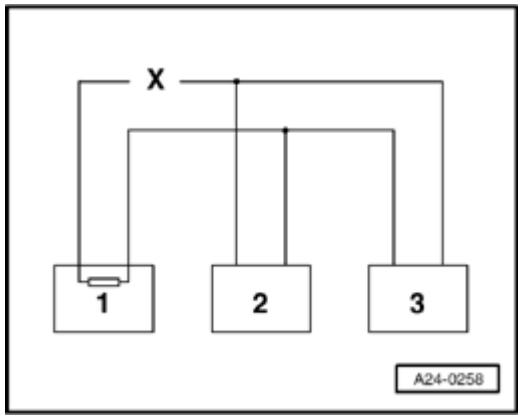
- Check CAN-bus system as described in repair manual ⇒ Page 24-202 .

The following trouble shooting procedure is recommended if three or more control modules communicate via a "two-wire bus system".

- Read out malfunctions stored in the control modules.

  This will help to identify a malfunction in the wiring.

24-207



Example 1

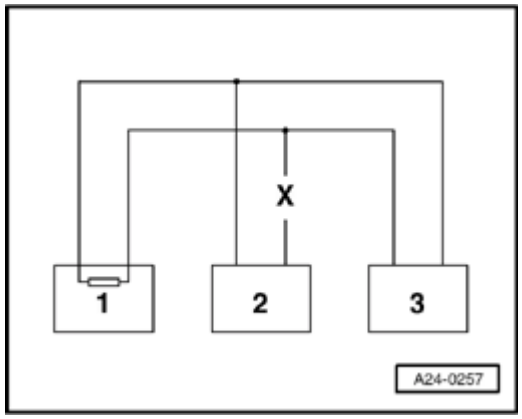
From the malfunctions present in the DTC memories, you can see that control module 1 has no connection to control modules 2 or 3.

Control module	Stored malfunctions in DTC memory:
1	♦ No message from control module 2 ♦ No message from control module 3
2	♦ No message from control module 1
3	♦ No message from control module 1

- Switch ignition off.
- Disconnect control modules that are linked by bus wires and check whether there is an open circuit in one of the bus wires

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

- If no malfunction can be identified in the bus wires replace control module 1.



Example 2

From the malfunctions present in the DTC memories, you can see that control module 2 has no connection to control modules 1 or 3.

Control module	Stored malfunctions in DTC memory:
1	♦ No message from control module 2
2	♦ No message from control module 1 ♦ No message from control module 3
3	♦ No message from control module 2

- Switch ignition off.
- Disconnect control modules that are linked by bus wires and check whether there is an open circuit in one of the bus wires

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

- If no malfunction can be identified in the bus wires replace control module 2.

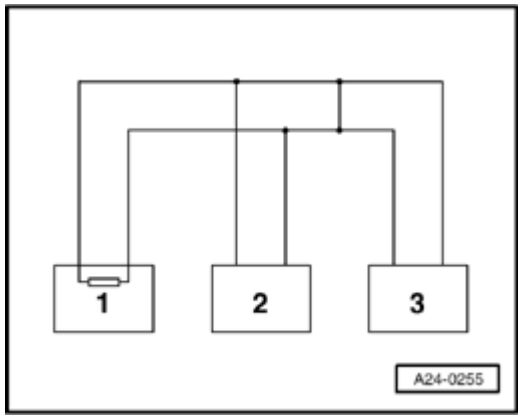
24-209

Example 3

From the malfunctions present in the DTC memories, you can see that none of the control modules are able to transmit or receive signals.

Control module	Stored malfunctions in DTC memory:
1	♦ Data Bus Powertrain Malfunction
2	♦ Data Bus Powertrain Malfunction
3	♦ Data Bus Powertrain Malfunction

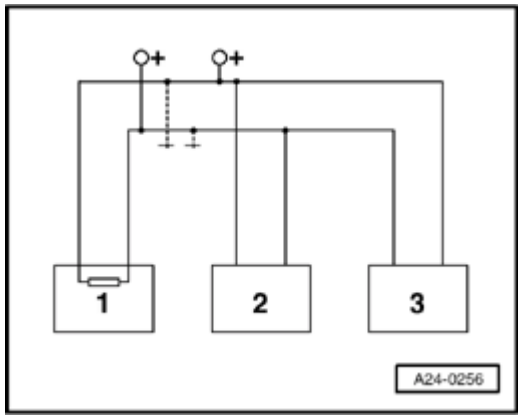
- Switch ignition off.



- Disconnect the control modules which are linked by the bus wires and check for a short circuit between the bus wires

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

24-210



- Check bus wires for short to B+ and short to Ground (GND).

If the cause of the malfunction "Data Bus Powertrain Malfunction" cannot be found in the data bus wires, check whether one of the control modules is causing the malfunction.

At this stage all the control modules which communicate via the CAN data bus are disconnected. The ignition is switched off.

24-211

- Connect one of the control modules.

- Connect VAG1551 scan tool. Switch ignition on and erase the DTC memory of the control module which has just been connected. End output from scan tool with function 06 "End Output."

- Switch ignition off and then on again.

- Leave ignition switched on for 10 seconds. Then check DTC memory of the control module that has just been connected, using the scan tool.

- If the malfunction "Data Bus Powertrain Malfunction" is now indicated, replace the control module which has just been connected.

- If malfunction "Data Bus Powertrain Malfunction" is not indicated, connect next control module, and repeat above procedure.