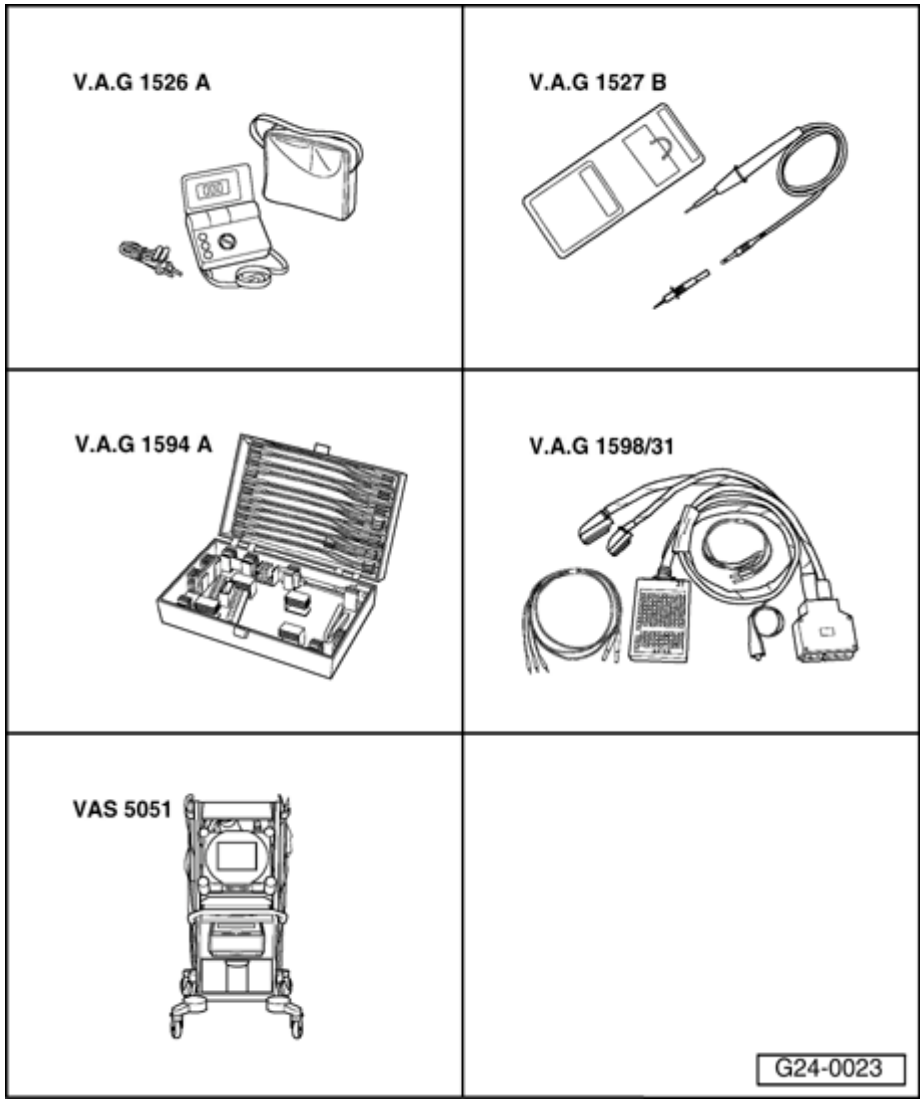
24-163



Additional signals, checking

Special Tools and Equipment

- VAG1526A
- VAG1527B
- VAG1594A
- VAG1598/31
- VAS5051 with VAG5051/1

Engine speed signal, checking

Note:

The engine speed signal is output at terminal 37 of the Engine Control Module (ECM). The signal is used, among other things, for RPM display in the instrument cluster.

- Connect VAG1598/31 test box at wiring harness to Engine Control Module (ECM), do not connect ECM ⇒ Page 24-19 .

- Check the following wire connection for open circuit and short circuit to Ground (GND) and B+:

Test box VAG1598/31 Socket	Instrument cluster Terminal
37	⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

- Repair open circuit or short circuit if necessary.

24-165

Vehicle speed signal, checking

Notes:

- *The vehicle speed signal is generated by the speedometer Vehicle Speed Sensor (VSS) - G22- (at transmission) and is processed in the instrument cluster.*

- *The processed signal enters at terminal 54 of the ECM and is used for idle stabilization and tip-in shock reduction during shifting.*

Test requirement:

- Function and display of speedometer OK.
  Troubleshooting:

⇒ *Repair Manual, Electrical Equipment, Repair Group 90; Instrument cluster; Speed signal, checking*

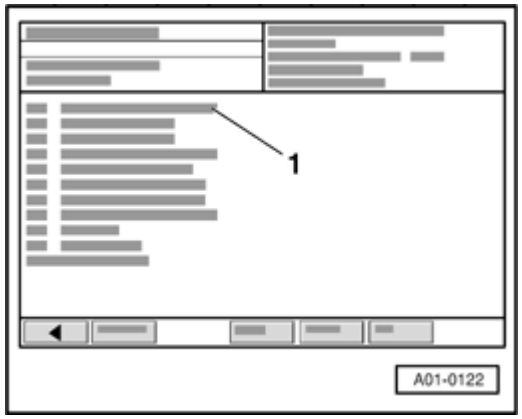
Test sequence

WARNING!

To reduce the risk of accident during road tests, always observe safety precautions ⇒ ***Page 24-1 .***

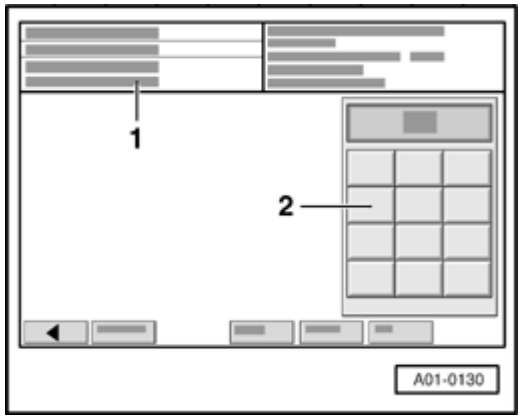
- Connect VAS5051 tester ⇒ Page 01-7 and select vehicle system "01 - Engine electronics". Engine must run at idle for this.

24-166



➢ Display on VAS5051:

- Select diagnostic function "08 - Read Measuring Value Block" in selection -1-.



➢ Display on VAS5051:

1 - Enter display group Max. input value = 255

- Select function "005" in button field -2- for "display group number 005" and press Q button to confirm input.

24-167

➢ Display on VAS5051:

- Determining via road test whether vehicle speed is displayed in display field -3-.
- If vehicle speed is not display, lift vehicle -if possible using a vehicle lift- until front left wheel is free.
- Connect VAG1598/31 test box at wiring harness to Engine Control Module (ECM), do not connect ECM ⇒ Page 24-19 .
- Connect VAG1527B voltage tester to sockets 3 (B+) and 54 (VSS) of VAG1598/31 test box.
- Switch ignition on and turn front left wheel by hand.
  - ♦ LED must blink (very brief blink signal).

24-168

If LED does not blink:

- Check the following wire connection for open circuit and short circuit to Ground (GND) and B+:

Test box VAG1598/31 Socket	Instrument cluster Terminal
54	⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

- Repair open circuit or short circuit if necessary.

24-169

A/C compressor shut-off, checking

Notes:

- *The A/C compressor signal communicates to the ECM that the compressor will be switched on in 140 ms.*
- *The Engine Control Module (ECM) can switch off the A/C compressor via the same wire connection.*
- *Engine Control Module (ECM) switches off A/C compressor:*
  - *during hard acceleration (Wide Open Throttle 1st gear)*
  - *in emergency mode (emergency operation)*
  - *after initiating basic setting (function 04)*

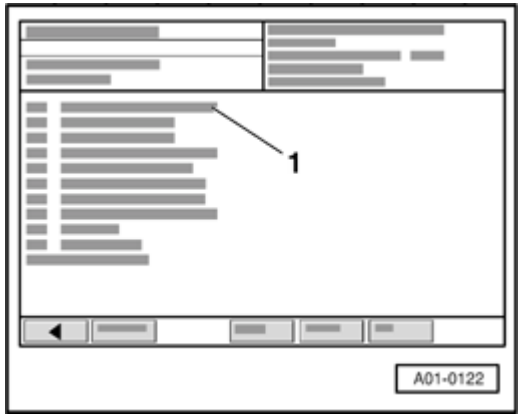
24-170

Test requirements:

- A/C system OK
- No DTCs in DTC memory of Engine Control Module (ECM).
- Vehicle at room temperature (warmer than +15 ° C).

Test sequence

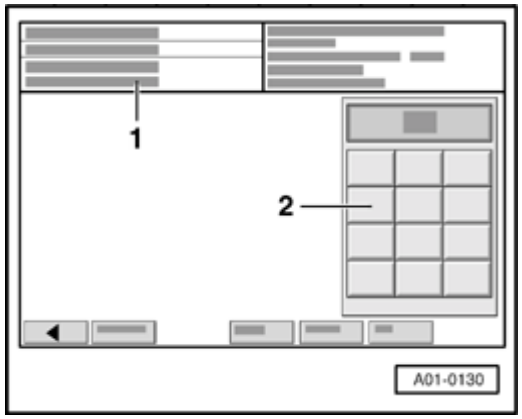
- Connect VAS5051 tester ⇒ Page 01-7 and select vehicle system "01 - Engine electronics". Engine must run at idle for this.



➢ Display on VAS5051:

- Select diagnostic function "08 - Read Measuring Value Block" in selection -1-.

24-171



Display on VAS5051:

1 - Enter display group Max. input value = 255

- Select function "050" in button field -2- for "display group number 050" and press Q button to confirm input.

Display on VAS5051:

- Switch A/C system off.
  - ♦ Specified value in display field -4-: Compr. OFF
- Switch A/C system on using "Auto" button and adjust A/C system to maximum cooling or heating power. Compressor must run.
  - ♦ Specified value in display field -4-: Compr. ON
- Depress gas pedal completely (swiftly) and then release it (brief acceleration).

24-172

Display on VAS5051:

- Specified value in display field -4-: Indication jumps for a few seconds from "Compr. ON" to "Compr. OFF" (compressor is switched off when vehicle accelerates).

If indications do not resemble description:

- Connect VAG1598/31 test box at wiring harness to Engine Control Module (ECM), do not connect ECM ⇒ Page 24-19 .
- Check the following wire connection for open circuit and short circuit to Ground (GND) and B+:

Test box VAG1598/31 Socket	A/C control head -E87- Terminal
41	⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

- Repair open circuit or short circuit if necessary.
- If there are no malfunctions in the wiring, check function of A/C system.

⇒ *Repair Manual, Heating & Air Conditioning, Repair Group 01; On Board Diagnostic (OBD) of A/C system*

Wire for crash signal, checking

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

When the airbag control module sends the crash signal to the ECM (during an accident or when output DTM is being performed for the airbag system), the ECM switches the Fuel Pump (FP) off. This means that the engine will stop running but can be started again afterward (e.g. to remove vehicle from danger).

- Connect VAG1598/31 test box at wiring harness to Engine Control Module (ECM), do not connect ECM ⇒ Page 24-19 .

- Check the following wire connection for open circuit and short circuit to Ground (GND) and B+:

Test box VAG1598/31 Socket	Control module for Airbag -J234- Terminal
67	⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

24-174

- Repair open circuit or short circuit if necessary.

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

If no malfunctions are found in wire:

- Check DTC memory of control module for airbag:

⇒ *Repair Manual, Body On Board Diagnostic (OBD), Repair Group 01; On Board Diagnostic (OBD) of airbag system BAE (basic trigger unit) with side airbag; DTC memory, checking*

24-175

Consumption signal for board computer, checking

Note:

The consumption signal is transferred from the Engine Control Module (ECM) to the instrument cluster via CAN-bus. Check data exchange between Engine Control Module (ECM) and other CAN capable control modules ⇒ *Page 24-178*

Wire for fuel level signal, checking

Notes:

- *The signal helps with cause localization when certain malfunctions are recognized (e.g. combustion misfires).*

- *The fuel level signal is transferred from the instrument cluster to the Engine Control Module (ECM) via CAN-bus. Check data exchange between Engine Control Module (ECM) and other CAN capable control modules* ⇒ *Page 24-178*

24-177

Signal for rough terrain recognition, checking

Notes:

- *When the ABS/EDL control module recognizes that a wheel is spinning, the ABS/EDL control module generates the rough terrain signal. When the Engine Control Module (ECM) recognizes the rough terrain signal, combustion misfire recognition is switched off in the Engine Control Module (ECM).*

- *Only check the rough terrain signal if the malfunction "18014 (P1606) rough terrain info/engine torque from ABS cont. mod. Electrical malfunction in circuit" is stored DTC memory. It is possible that the malfunction "Combustion misfire" is also stored in DTC memory as a side effect and it can be disregarded.*

- *The rough terrain signal is transferred from the ABS/EDL control module to the Engine Control Module (ECM) via CAN-bus. Check data exchange between Engine Control Module (ECM) and other CAN capable control modules* ⇒ *Page 24-178*

24-178

Data transfer between Engine Control Module (ECM) and CAN-bus capable control modules, checking

Notes:

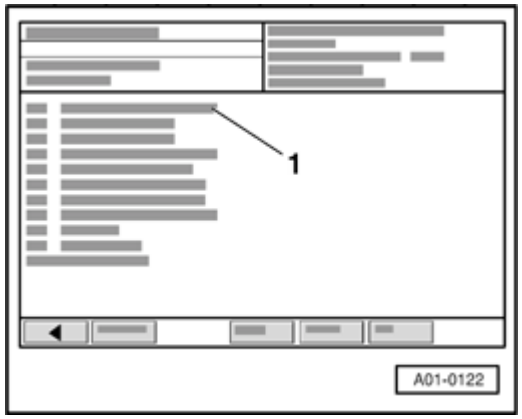
- *Data exchange between individual control modules occurs via a bus system.*
- *The term "CAN-bus" refers to a system that transports and distributes data.*
- *The wire connections between the control modules, via which data is transferred, are referred to as data wires.*
- *Data is transferred to the connected control modules serially (one after the other) via these data wires (i.e. engine speed, accelerator position).*

Checking bus system

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

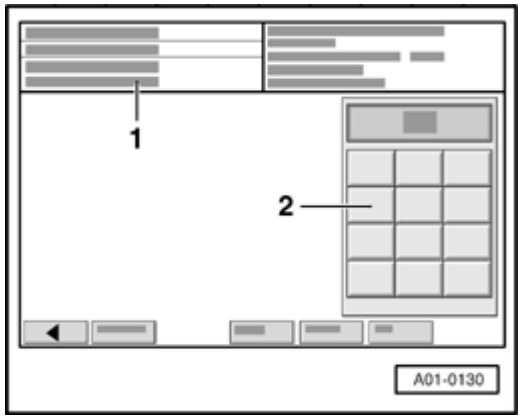
- Connect VAS5051 tester ⇒ Page 01-7 and select vehicle system "01 - Engine electronics". Ignition must remain switched on for this.

24-179



➢ Display on VAS5051:

- Select diagnostic function "08 - Read Measuring Value Block" in selection -1-.



➢ Display on VAS5051:

1 - Enter display group Max. input value = 255

Note:

Measuring value blocks 125 and 126 indicate the participants in the powertrain data-BUS.

- Select function "125" in button field -2- for "display group number 125" and press Q button to confirm input.

24-180

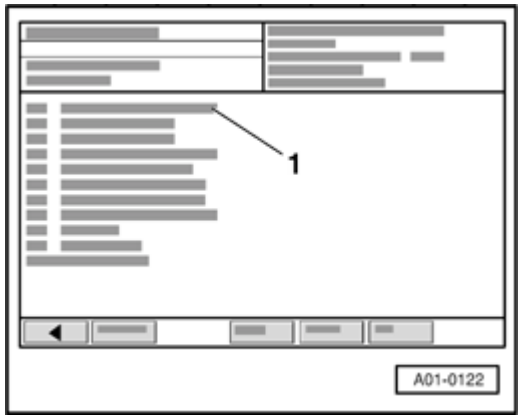
➢ Display on VAS5051:

- Check indications in display fields -1- through -4-.

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

  - ♦ No indication: 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

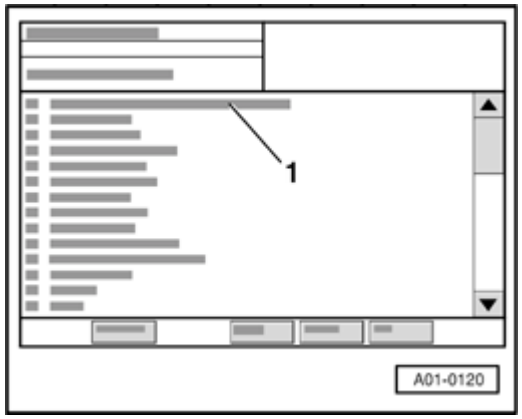
- Press ▲ button to change into display group 126.
- Check under display group 126 in the same manner.
- Press "08 - erase DTC memory" to end function ◀-button.



➢ Display on VAS5051:

- Select diagnostic function "06 - end output" in selection -1-.

24-181



➢ Display on VAS5051:

- In selection -1-, press diagnostic function "00 - Check DTC memory - complete system".
  - ♦ 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.

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.

24-182

If multi-pin connectors are properly secured:

- Check CAN bus system

Checking a "two-line bus system"

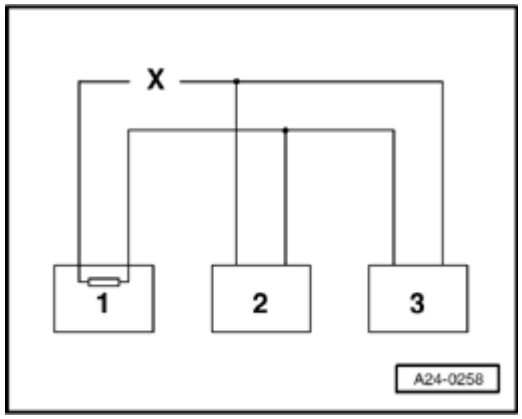
Three or more control modules are communicating across a "two-line bus system".

- Analyze the DTCs stored in the memories of the control modules.

Note:

This analysis will help you locate the cause of the line malfunction.

24-183



Example 1:

From the DTCs stored in the memories, you have determined that control module 1 is not communicating with control modules 2 and 3.

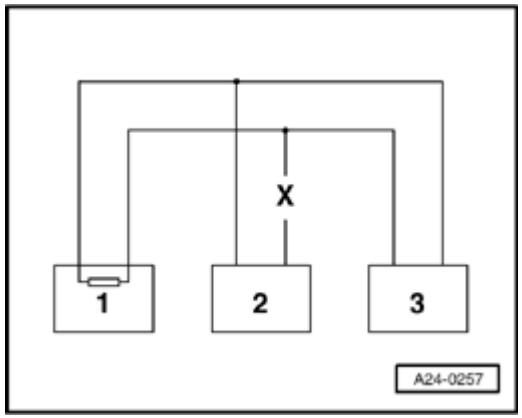
Control module	DTCs stored in DTC memories:
1	♦ Missing signal from control module 2 ♦ Missing signal from control module 3
2	♦ Missing signal from control module 1
3	♦ Missing signal from control module 1

- Switch ignition off.
- Disconnect the control modules connected across the bus wires and check the bus wires for an open circuit.

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

- Replace control module 1 if no malfunctions can be found in the bus wires.

24-184



Example 2:

From the DTCs stored in the memories, you have determined that control module 2 is not communicating with control modules 1 and 3.

Control module	DTCs stored in DTC memories:
1	♦ Missing signal from control module 2
2	♦ Missing signal from control module 1 ♦ Missing signal from control module 3
3	♦ Missing signal from control module 2

- Switch ignition off.
- Disconnect the control modules connected across the bus wires and check the bus wires for an open circuit.

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

- Replace control module 2 if no malfunctions can be found in the bus wires.

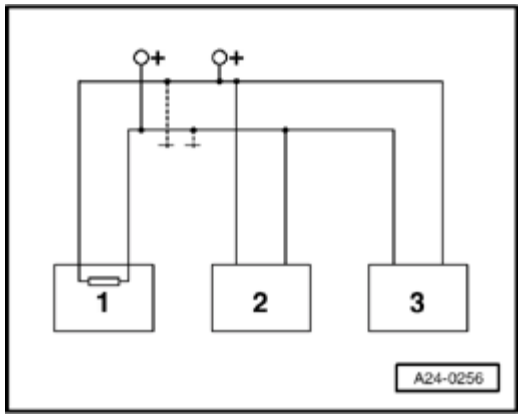
24-185

Example 3:

Using the DTCs stored in the memories, you have determined that none of the control modules are sending or receiving signals.

Control module	DTCs stored in DTC memories:
1	♦ Powertrain CAN-bus faulty
2	♦ Powertrain CAN-bus faulty
3	♦ Powertrain CAN-bus faulty

- Switch ignition off.



- Disconnect the control modules connected across the bus wires and check bus wires for a short circuit to B+ and Ground (GND).

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

24-186

If you cannot determine a cause for the DTC "Powertrain CAN-bus malfunction, check whether the DTC is caused by one of the control modules.

All control modules that use the CAN-bus are still disconnected. Ignition is switched off.

- Connect one of the control modules.
- Connect VAG 1551 scan tool. Switch ignition on, and erase the DTC memory of the control module you just connected. End scan tool output using the "End Output" function 06.
- Switch ignition off and on again.
- Leave ignition on for 10 seconds. Then, read the DTC memory of the control module you just connected.
- If the DTC "Powertrain CAN-bus malfunction" is displayed, replace the control module you just connected.
- If the DTC "Powertrain CAN-bus malfunction" is not displayed, connect the next control module and repeat the procedure.