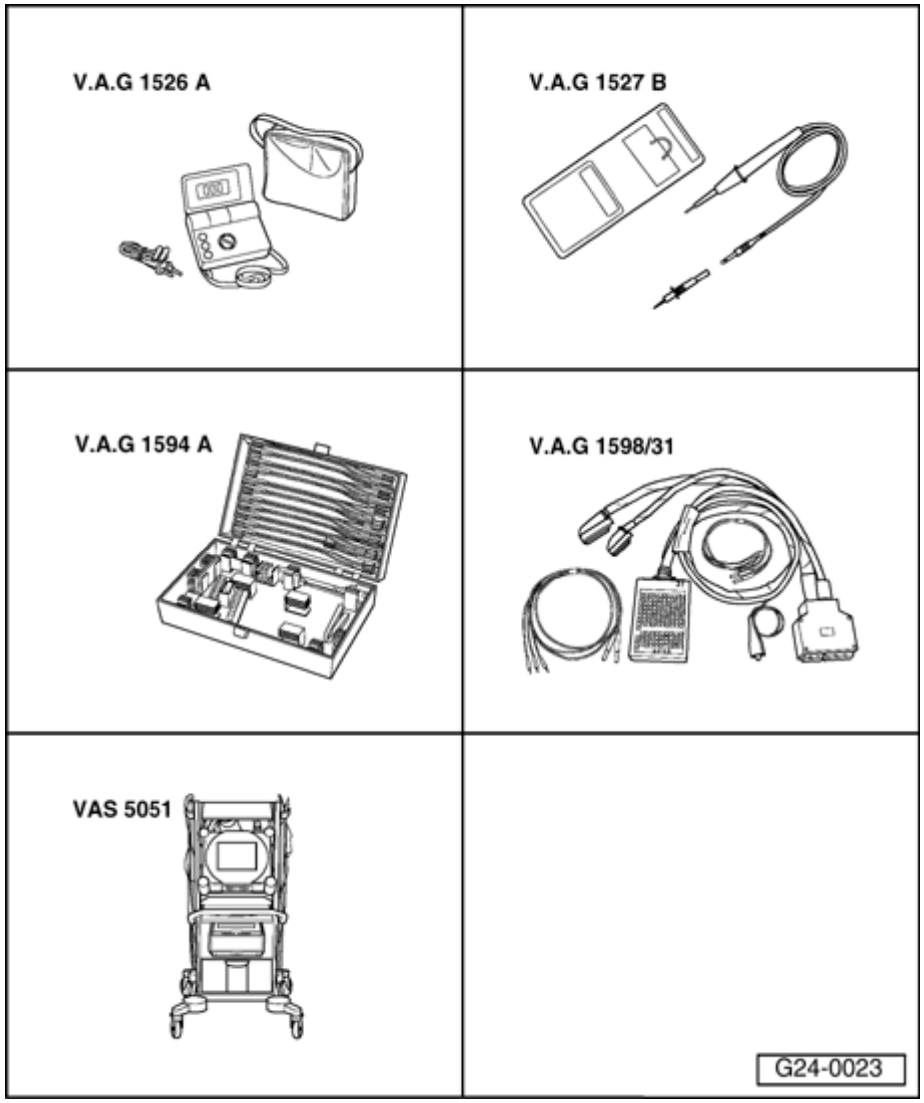
24-165



Additional signals, testing

Special Tools and Equipment

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

- or

- VAG1551 with VAG1551/3B

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 ECM, do not connect ECM ⇒ Page 24-17 .

- 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 binder*

- Repair open circuit or short circuit if necessary.

24-167

Consumption signal for on board computer, checking

Notes:

- *The consumption signal is calculated by the ECM from the injection time and directed to the on board computer via terminal 81 of the ECM.*

- *Consumption signal, checking*

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations binder*

24-168

Vehicle speed signal, checking

Notes:

- *The vehicle speed signal is generated by the Vehicle Speed Sensor (VSS) -G68- (at transmission) and 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:

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations binder*

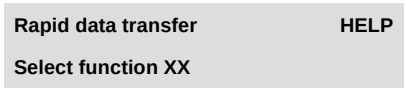
Test sequence

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

Engine must run at idle for this.

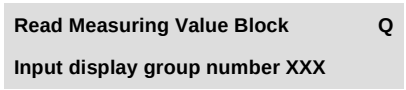
WARNING!

Observe safety precautions to reduce the risk of accidents during road test ⇒ Page 24-1 .



When indicated on display:

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



When indicated on display:

- Press buttons -0-, -0- and -5- to select "display group number 005" and press -Q- button to confirm input.

Indicated on display:

- 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 ECM, do not connect ECM ⇒ Page 24-17 .

- 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).

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 binder*

- Repair open circuit or short circuit if necessary.

24-171

Wire for fuel level signal, checking

Notes:

- *The Engine Control Module (ECM) receives the fuel level signal from the instrument cluster.*
- *The processed signal enters at terminal 30 of the ECM and is used to determine the cause of certain recognized malfunctions (e.g. combustion misfires).*

- Connect VAG1598/31 test box at wiring harness to ECM, do not connect ECM ⇒ Page 24-17 .

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

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

- Repair open circuit or short circuit if necessary.

24-172

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 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)*

Test requirements:

- A/C system OK
- No DTCs in DTC memory of Engine Control Module (ECM).

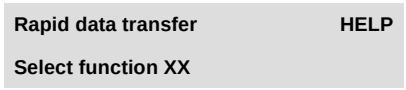
- Vehicle at room temperature (warmer than +15 °C).

24-173

Test sequence

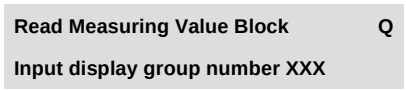
- Connect VAS5051 tester or VAG1551 scan tool and select the control module for engine electronics using "address word" 01 ⇒ Page 01-9 .

Engine must run at idle for this.



➢ When indicated on display:

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



➢ When indicated on display:

- Press buttons -0-, -5- and -0- to select "display group number 050" and press -Q- button to confirm input.

➢ Indicated on display: (1 thru 4 = display fields)

- 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).

  - 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 ECM, do not connect ECM ⇒ Page 24-17 .

- 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 binder*

- 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*

24-175

A/C system signal, checking

The A/C system signal notifies the Engine Control Module (ECM), that the A/C system requires a higher idle speed to achieve the desired interior temperature (regardless of whether heating or cooling is required).

The increase in idle speed based on presence of the A/C system signal is control module dependent and occurs only in vehicles with All Wheel Drive (AWD) and manual transmission.

Test sequence

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

  Engine must run at idle for this.

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.

24-176

If specified values are not obtained:

Read Measuring Value Block Q

Input display group number XXX

When indicated on display:

- Press buttons -0-, -5- and -6- to select "display group number 056" and press -Q- button to confirm input.
- Switch on A/C system, press "Auto" button and select the lowest temperature.
- Check indications in display field 3 and 4.

	Display fields			
	1	2	3	4
Display group 056: Idle stabilization with engine at idle and operating temperature				
Display	xxx /min	xxx /min	**---**	**---**
Indicated	Engine speed (actual)	Engine speed (specified)	**A/C readiness**	**A/C compressor**
Functional range			**A/C - LOW** **A/C - HIGH**	**Compr. OFF** **Compr. ON**
Specified value	720 to 820 RPM [1)] 630 to 730 RPM [2)]	760 RPM [1)] 680 RPM [2)]	**A/C - HIGH**	**Compr. ON**

[1)] Front Wheel Drive Vehicles

[2)] All-Wheel Drive Vehicles

- Connect VAG1598/31 test box at wiring harness to ECM, do not connect ECM ⇒ Page 24-17 .

24-177

- 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
40	⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations binder*

- 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*

24-178

Brake light switch and brake pedal switch, checking

Note:

For safety reasons, the instruction from the accelerator pedal sensor (potentiometer) to the ECM to open the throttle valve is suppressed when brake is being operated. This requires the brake light switch signal and also the brake pedal switch signal in the control module.

If brake pedal is operated with accelerator pedal constantly depressed, engine is immediately regulated down to idle speed. A faulty switch can lead to undesired regulation.

Test sequence

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

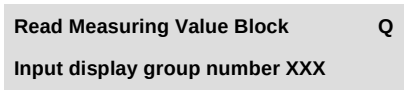
  Ignition must remain switched on for this.

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.

24-179



- When indicated on display:

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

- Indicated on display:

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

	Display fields			
	1	2	3	4
Display group 066: Signals to Engine Control Module (ECM)				
Display	xxx km/h	**XXXX**	xxx km/h	XXXX
Indicated	ACTUAL speed	**Switch positions**	SPECIFIED speed	Switch positions
Functional range		**XX00** **XX11**		
Specified value		**XX00** **(with brake pedal not operated)** **XX11** **(with brake pedal operated)**		
Notes		**Value:** **X = no significance.**		

		Switch points slightly offset		

24-180

If indications do not resemble description:

Check switch

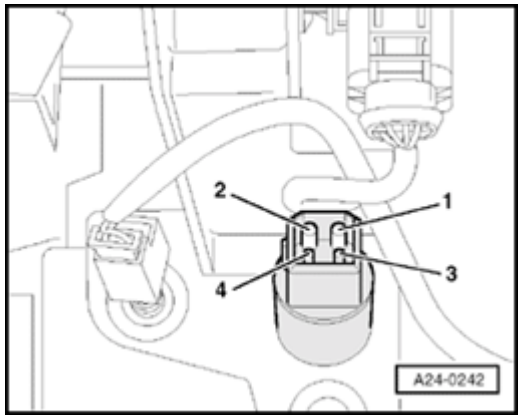
- Remove driver-side storage compartment.

⇒ *Repair Manual, Body-Interior, Repair Group 68; Instrument Panel; Removing Driver-Side Storage Compartment*

- Disconnect harness connector at brake light switch and brake pedal switch.

Note:

Connector sockets are marked on the back side of the connector.



- Connect multimeter between terminal 1 and 2 for resistance measurement.
  - Specification: ∞ Ω (no continuity)
- Depress accelerator pedal.
  - Specification: approx. 0 Ω
- Connect multimeter between terminal 3 and 4 for resistance measurement.
  - Specification: approx. 0 Ω

- Depress accelerator pedal.
  - Specification: ∞ Ω (no continuity)

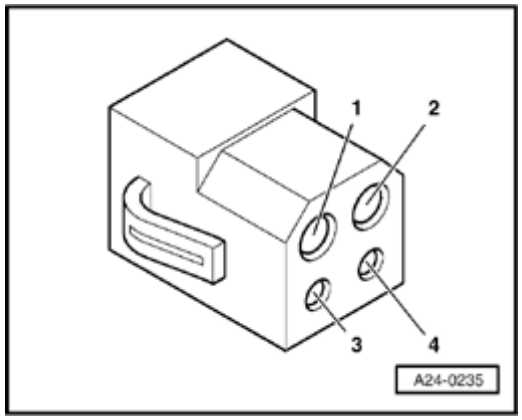
24-181

If specified values are not obtained:

- Check adjustment of switch or
- Replace brake light switch / brake pedal switch.

If specified values are obtained:

Checking voltage supply



- Connect VAG1527B voltage tester as follows:

Harness connector Terminal	Measure to
1	Chassis Ground (GND)

♦ LED must light up.

- Switch ignition on.

Harness connector Terminal	Measure to
3	Chassis Ground (GND)

♦ LED must light up.

If LED does not light up:

- Check wire connection from terminal 1 or 3 of connector for open circuit and short circuit to Ground (GND):

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations binder*

- Repair open circuit or short circuit if necessary.

If LED lights up:

Checking activation

- Connect VAG1598/31 test box at wiring harness to ECM, do not connect ECM ⇒ Page 24-17 .

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

Harness connector Terminal	VAG1598/31 test box Socket
2	56
4	55

- Repair open circuit or short circuit if necessary.

24-183

Clutch vacuum vent valve switch -F36-, checking

Note:

This signal helps prevent excessive RPM oscillations and tip-in shocks when clutch is disengaged and is required for the cruise control system.

Test sequence

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

  Ignition must remain switched on for this.

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 **Input display group number XXX**	When indicated on display:

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

Read Measuring Value Block 66 →	Indicated on display:

1	2	3	4

- Check Clutch Pedal Position (CPP) switch in display field 2.

24-184

	Display fields			
	1	2	3	4
Display group 066: Signals to Engine Control Module (ECM)				
Display	xxx km/h	**XXXX**	xxx km/h	XXXX
Indicated	ACTUAL speed	**Switch positions**	SPECIFIED speed	Switch positions
Functional range		**X0XX** **X1XX**		
Specified value		**X0XX** **(at clutch pedal not operated)**		
		X1XX **(at clutch pedal operated)**		
Notes		**Value:** **X = no significance**		

24-185

If indications do not resemble description:

Check switch

- Remove driver-side storage compartment.

⇒ *Repair Manual, Body-Interior, Repair Group 68; Instrument Panel; Removing Driver-Side Storage Compartment*

- Disconnect harness connector at Clutch Pedal Position (CPP) switch.

Note:

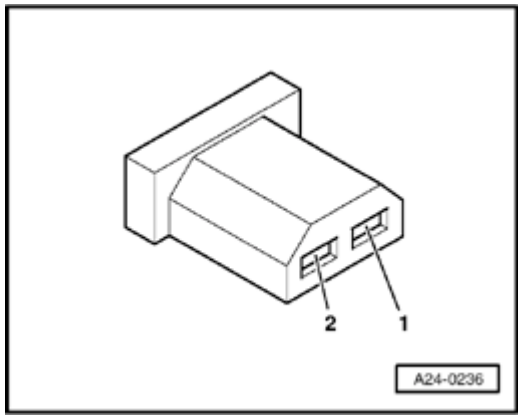
Connector sockets are marked on the back side of the connector.

- Connect multimeter between terminal 1 and 2 for resistance measurement.
  - Specification: approx. 0 Ω
- Depress clutch pedal.
  - Specification: ∞ Ω (no continuity)

If specified value is not obtained:

- Check adjustment of switch or
- Replace Clutch Pedal Position (CPP) switch.

24-186



If specified value is obtained:

Checking voltage supply

- Connect VAG1527B voltage tester as follows:

Harness connector Terminal	Measure to
1	Chassis Ground (GND)

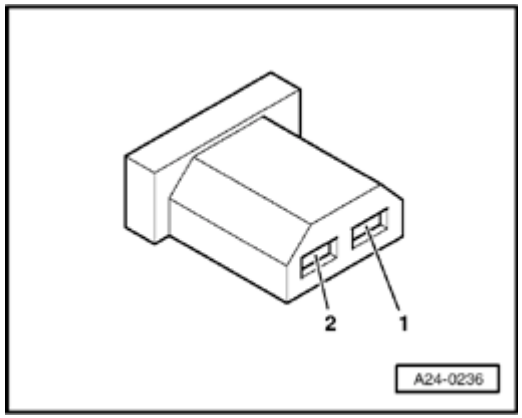
- Switch ignition on.
  - ♦ LED must light up.

If LED does not light up:

- Check wire connection from terminal 1 of connector to fuse for open circuit and short circuit to Ground (GND):

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations binder*

24-187



If LED lights up:

Checking activation

- Connect VAG1598/31 test box at wiring harness to ECM, do not connect ECM ⇒ Page 24-17 .

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

Harness connector Terminal	VAG1598/31 test box Socket
2	39

- Repair open circuit or short circuit if necessary.

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 ECM, do not connect ECM ⇒ Page 24-17

- 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 binder*

24-189

- Repair open circuit or short circuit if necessary.

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations binder*

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*

24-190

Rough terrain signal from ABS/EDL control module, 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 wire connection and rough terrain signal are monitored by the Engine Control Module (ECM).*

24-191

Test requirement:

- Control module coding OK ⇒ Page 01-71 .

Test sequence

- Switch ignition off.

- Connect VAG1598/31 test box at wiring harness to ECM, do not connect ECM ⇒ Page 24-17 .

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

Test box VAG1598/31 Socket	ABS control module (w/EDL) -J104- Terminal
74	⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations binder*

If no malfunctions are found in wire:

- Replace ABS control module.

If the malfunction is indicated again after

replacing the ABS control module:

- Replace Engine Control Module (ECM) ⇒ Page 24-21 .

24-192

Data transfer between Engine Control Module (ECM) and CAN 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 or VAG1551 scan tool and select the control module for engine electronics using "address word" 01 ⇒ Page 01-

9 .

Ignition must remain switched on for this.

24-193

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**
Input 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.
- 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

Note:

Measuring value blocks 125 and 126 indicate the components that are part of the powertrain data bus.

- Press →button.

24-194

Rapid data transfer HELP **Select function XX**	When indicated on display: - Press buttons -0- and -6- to select "End output" and press -Q- button to confirm input.
Rapid data transfer HELP **Insert address word XX**	When indicated on display: - 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.
V.A.G - ON BOARD DIAGNOSTIC 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).

24-195

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

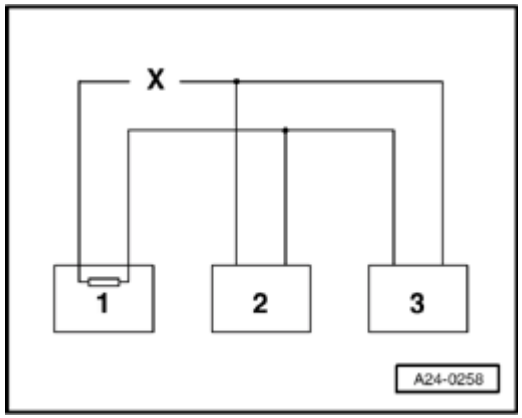
Checking a "two-line bus system"

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.



Example 1:

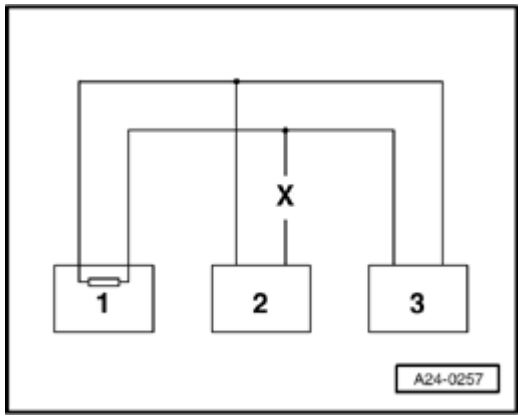
From the DTCs stored in the memories, you have determined that control module 1 is not communicating with control modules 2 and 3.

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 binder*

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



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 binder*

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

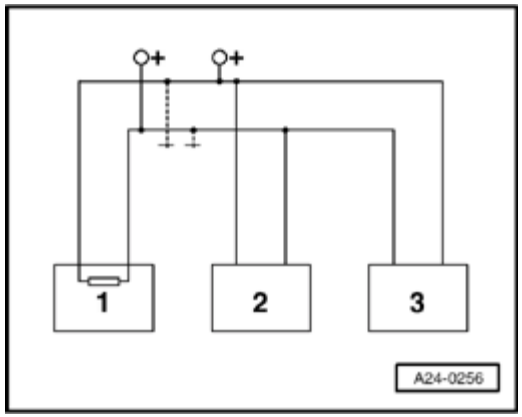
24-198

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 databus faulty
2	♦ Powertrain databus faulty
3	♦ Powertrain databus 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 binder*

24-199

If you cannot determine a cause for the DTC "Powertrain databus 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 then on.

- Leave ignition on for 10 seconds. Then, read the DTC memory of the control module you just connected.

- If the DTC "Powertrain databus malfunction" is displayed, replace the control module you just connected.

- If the DTC "Powertrain databus malfunction" is not displayed, connect the next control module and repeat the procedure.