Electronic engine power control (E-Gas), checking

E-Gas system, function

For E-Gas, the throttle valve is not operated by a cable from the accelerator pedal. There is no mechanical connection between the accelerator pedal and the throttle valve.

The position of the accelerator pedal is communicated to the Engine Control Module (ECM) via two sensors for accelerator pedal position (variable resistances; stored in one housing) that are connected with the accelerator pedal.

The accelerator pedal position (driver's intention) is a main input unit for the ECM.

Operation of the throttle valve occurs via an electric motor (throttle valve actuator) in the throttle valve control module. This is true across the entire engine speed and engine load spectrum.

The throttle valve is operated by the throttle valve actuator according to the instructions of the ECM.

With ignition switched on and engine off, the ECM activates the throttle valve actuator precisely according to the sensor for accelerator

pedal position. This means, if the accelerator pedal is depressed half way, the throttle valve actuator opens the throttle valve to the same degree; i.e. throttle valve would be opened half way.

24-135

With engine running (under load), the ECM can open or close the throttle valve independently of the sensor for accelerator pedal position.

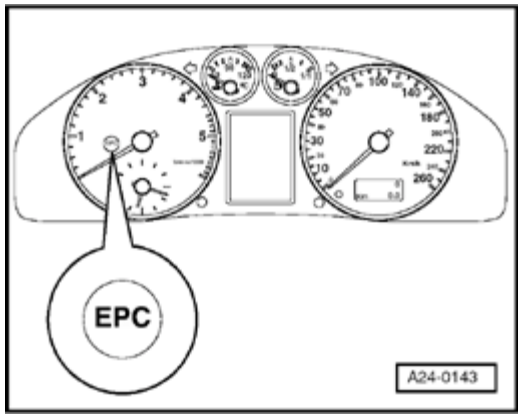
This means, for example, that the throttle valve could be fully opened even though the accelerator pedal has only been depressed half way. This has the advantage of preventing torque losses at the throttle valve.

In addition to this, it results in significantly better values relative to emissions and consumption under certain load conditions.

It would be incorrect to think that "E-Gas" consists of only one or two component. E-Gas is much more of a system containing all components that contribute to recognizing, controlling and monitoring the position of the throttle valve, e.g. sensor for accelerator pedal position, throttle valve control module, EPC warning lamp, Engine Control Module (ECM).

Electronic Power Control (EPC) warning lamp -K132- in instrument cluster, significance

"EPC" is an abbreviation and stands for Electronic Power Control (E-gas).



Installation location of EPC warning lamp

Engine Control Module (ECM) checks all components that are important for function of the E-Gas system after ignition is switched on.

The Engine Control Module (ECM) switches on the EPC warning lamp after ignition is switched on. Shortly after engine is started, the EPC warning lamp will go out. This requires, first of all, that the Engine Control Module (ECM) does not detect a malfunction in the E-gas system and, secondly, that activation of the lamp by the Engine Control Module (ECM) is OK.

If malfunctions are recognized in the E-Gas system during operation of the engine, the ECM switches on the EPC warning lamp in instrument cluster. (These malfunctions are listed in the DTC table). An entry is made in DTC memory at the same time.

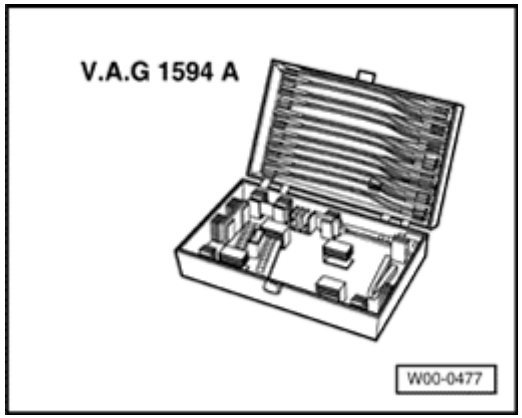
24-137

Electronic Power Control (EPC) warning lamp -K132-, checking

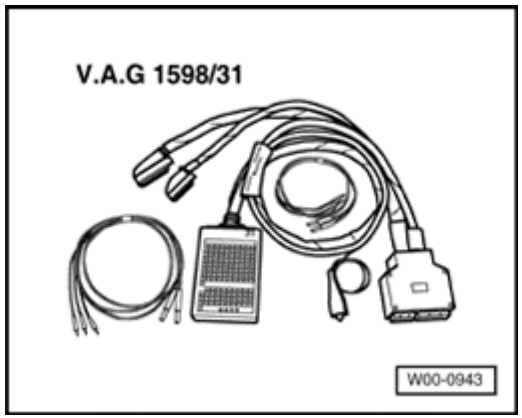
Note:

The fault light for power accelerator activation - K132- is also called the EPC warning lamp.

Special Tools and Equipment



- VAG1594A



- VAG1598/31

24-138

Function test of warning lamp

- Switch ignition on.

  - Engine Control Module (ECM) switches EPC lamp on.

- Start engine.

  - Shortly after engine is started, the EPC warning lamp will go out if there are not malfunctions stored in DTC memory that relate to the E-gas system

A- Fault light for power accelerator activation -K132- does not light up

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

- Bridge sockets 1 and 48 of test box.

- Switch ignition on.

  - Warning lamp must light up.

If warning lamp does not light up:

- Switch ignition off.

- Remove instrument cluster:

⇒ *Repair Manual, Electrical Equipment, Repair Group 90, Instrument cluster, removing and installing*

- Check the following wire connection for open circuit and short circuit to B+:

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

- Repair open circuit or short circuit if necessary.

If wire connection is OK:

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

B- Fault light for power accelerator activation -K132- lights up constantly

- Check DTC memory of Engine Control Module (ECM).

If no DTCs are stored:

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

- Remove instrument cluster:

⇒ *Repair Manual, Electrical Equipment, Repair Group 90, Instrument cluster, removing and installing*

- Check the following wire connection for short circuit to Ground (GND):

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

	Locations binder

- Repair short circuit if necessary.

If wire connection is OK:

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

24-141

Throttle valve control module -J338-, checking

The following components are located in the housing for the throttle valve control module:

- Throttle drive (power accelerator actuation) -G186-. (This is an electric motor that is activated by the ECM. This electric motor opens the throttle valve against spring pressure.)
- Angle sensor -1- for throttle drive (power accelerator actuation) -G187-
- Angle sensor -2- for throttle drive (power accelerator actuation) -G188-

Notes:

- *The housing for the throttle valve control module must not be opened.*
- *The angle sensors are designed as potentiometers (variable resistances). They communicate the position of the throttle valve to the Engine Control Module (ECM) fully independent of each other.*
- *The potentiometers cannot be mechanically*

adjusted. Adjustment is performed in basic setting (function 04) using the VAS5051 tester or the VAG1551 Scan Tool (ST).

24-142

Throttle valve control module, adapting

The adaptation teaches the Engine Control Module (ECM) various positions of the throttle valve when the ignition is on and the engine is stopped. These positions are stored in the control module The return communication regarding the position of the throttle valve occurs via the two angle sensors for throttle drive.

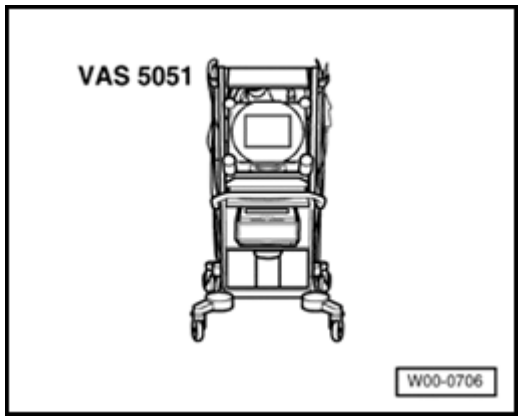
An adaptation must always be performed when the throttle valve control module -J338- or the Engine Control Module (ECM) are removed and installed (or replaced) or if voltage supply to the Engine Control Module (ECM) is interrupted.

The learning process (adaptation) occurs:

- automatically if the ignition is switched on for at least 10 seconds without operating starter and accelerator pedal and the Engine Control Module (ECM) recognizes "adaptation required". (There will be no notification of whether adaptation was successful or not however). Adaptation required is recognized if stored voltage values from the angle sensors do not match actual measured voltage values within a certain tolerance range.

- via initiation of basic setting (function 04) display group 060 with ignition on.

24-143



Note:

Engine will not start during automatic adaptation.

Special Tools and Equipment

- VAS5051 with VAG5051/1

or

- VAG1551 with VAG1551/3B

Requirements

- No DTCs in DTC memory, check DTC memory ⇒ Page 01-15 .
- Engine not running, ignition switched on.
- Accelerator pedal not depressed.
- Coolant temperature 10 to 95 °C.
- Intake air temperature 10 to 90 °C.
- Supply voltage for ECM larger than 12.7 V; checking ⇒ Page 28-30 .

Procedure

- 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 -4- to select "Initiate basic setting" and press -Q- button to confirm input.

Basic Setting **Q**
Input display group number XXX

When indicated on display:

- Press buttons -0-, -6- and -0- to select "display group number 060" and press -Q- button to confirm input.

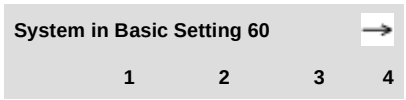
After pressing Q-button, throttle valve actuator will be switched on without current.

In this condition, the throttle valve will be drawn into an emergency position by a mechanical spring, which is located in the throttle valve control module. The values supplied by the two angle sensors in this emergency position are stored by the Engine Control Module (ECM).

Next, the throttle valve is opened by a certain value. If this value is reached, the throttle valve actuator is once again de-energized. Now, the mechanical spring must close the throttle valve to the previously learned emergency position within a specified time (spring test).

Then, the throttle valve is closed by the throttle valve actuator; the values supplied by the angle sensors in the throttle valve control unit are stored by the Engine Control Module (ECM).

If Engine Control Module (ECM) should de-energize throttle valve actuator during driving operation, this is expressed by an increased, surging idle speed (RPM). The engine accepts gas only after great delay.



When indicated on display:

- Check specified values for throttle valve control module in display fields 3 and 4.

	Display fields			
	1	2	3	4
Display group 060: Adaptation of throttle valve control module				
Display	xx %	xx %	**x**	**---**
Indicated	Throttle valve angle (angle sensor 1)	Throttle valve angle (angle sensor 2)	**Adaptation step counter**	**Adaptation condition**
Functional range	0 to 100%	0 to 100 %	**0 to 8**	**ADP in progress** **ADP OK** **ADP ERROR**
Specified value	3 to 93 %	97 to 3 %	**8**	**ADP OK**
Notes			**After adaptation, the adaptation step counter reaches the number 8 (it is OK for numbers to be skipped).**	**If "ADP ERROR." is displayed: Check DTC memory ⇒ Page 01-15 .** **If specified value is not obtained: ⇒Note, page ⇒ Page 24-147 .**

Note for display field 3:

Different numbers are shown in display field 3 during adaptation that represent the current adaptation condition. It is not particularly important how the adaptation step counter (display field 3) behaves during adaptation, but rather that display field

4 indicates the specification "ADP OK" after adaptation.

24-147

Note:

The control module can abort adaptation for the following reasons:

- *Throttle valve cannot be closed completely (e.g. contamination)*
- *Battery voltage is too low.*
- *Throttle valve control module or wire connection is faulty.*
- *Engine is started during adaptation or accelerator pedal is operated.*
- *Tension of throttle valve housing (check bolts)*

After termination, tester displays "Function is unknown or cannot be performed at the moment". The next time the ignition is switched on (several seconds), adaptation will be automatically repeated.

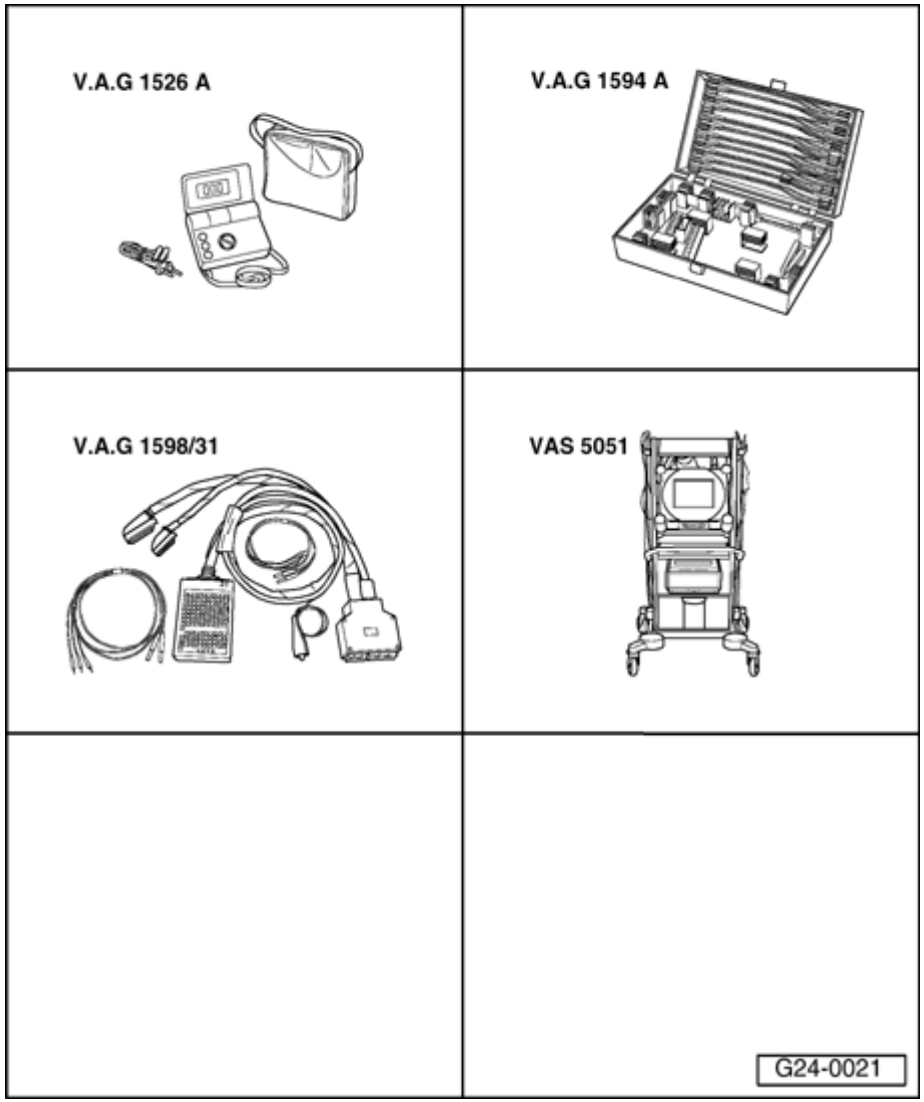
- End basic adjustment of the engine by pressing the→ key.

Rapid data transfer **HELP**

Indicated on display (function selection):

Select function XX

24-148



Angle sensor -1- for throttle drive, checking

Special Tools and Equipment

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

- or

- VAG1551 with VAG1551/3B

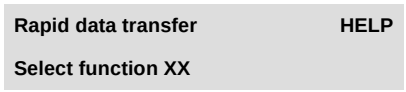
24-149

Angle sensor 1 for throttle drive (power accelerator actuation) -G187- and angle sensor 1 for throttle drive (power accelerator actuation) -G188- inform the Engine Control Module (ECM) about the position of the throttle valve. Both angle sensors are located in the throttle valve control module.

Test sequence

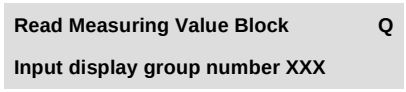
- Connect VAS5051 tester or VAG1551 scan tool and select the control module for engine electronics using "address word" 01 ⇒ Page 01-9 .

  Ignition must remain switched on for this.



- 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-, -6- and -2- to select "display group number 062" and press -Q- button to confirm input.

- Indicated on display:

  - Check specified values for E-gas potentiometer voltages in display fields 1 and 2.

24-150

	Display fields			
	1	2	3	4
Display group 062: E-Gas potentiometer voltages				
Display	**xx %**	**xx %**	xx %	xx %
Indicated	**Throttle valve angle (angle sensor 1)**	**Throttle valve angle (angle sensor 2)**	Sensor for Pedal position	Sensor 2 for Pedal position
Specified value	**3 to 93 % (Idle value: 8 to 18 %)**	**97 to 3 % (Idle value: 80 to 90 %)**	12 to 97 %	4 to 49 %
Specified value	**3 to 93 %**	**97 to 3 %**	12 to 97 %	4 to 49 %

Note:

Engine Control Module (ECM) calculates the voltage values of the angle sensors in percent relative to 5 volts and displays these percentage values. (5 volts supply voltage represents 100 %).

- Observe display field 1 and 2.

- Slowly depress accelerator pedal completely.

Percent indication in display field 1 must rise uniformly. The tolerance range of 3 to 93% will

not be used completely during this.

Percent indication in display field 2 must decrease uniformly. The tolerance range of 97 to 3% will not be used completely during this.

24-151

Notes:

- *The reason why the value indicated in display field 1 climbs, while the value indicated in display field 2 decreases, has to do with the fact that the potentiometers (angle sensors) in the throttle valve control unit run in opposite directions.*

- *This means that the voltage tap of angle sensor 1 runs from 0 to 5 volts. (The more the throttle valve is opened, the larger the voltage; percent indication climbs).*

- *The voltage tap of angle sensor 2 runs from 5 to 0 volts. (The more the throttle valve is opened, the lower the voltage; the percentage decreases).*

If indications do not resemble description:

- Check voltage supply and wire connections of throttle valve control module ⇒ Page 24-152 . Pay particular attention to harness connectors that could be loose or corroded.

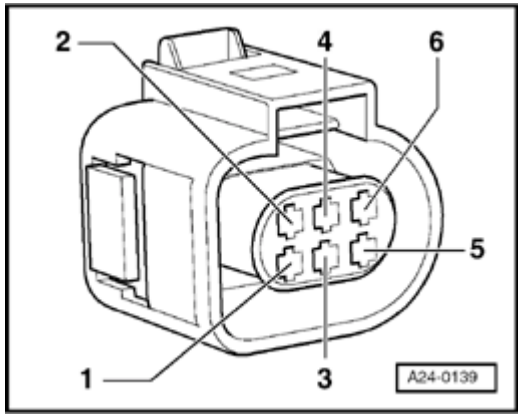
- Check accelerator pedal position sensor ⇒ Page 24-154 .

24-152

Check voltage supply throttle valve control module

- Pull connector (2) off throttle valve control module.

- Switch ignition on.



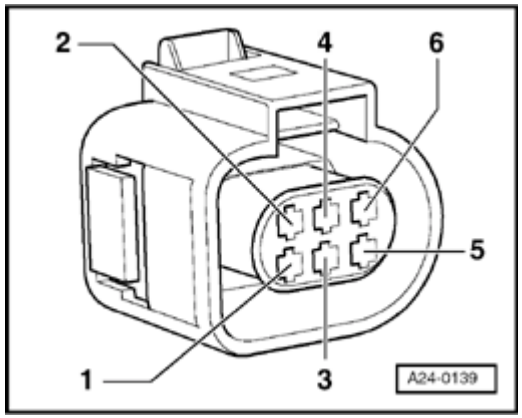
- Connect multimeter to the following connector terminals for voltage measurement:

Harness connector Terminal	Specified value
2 + Ground (GND)	about 5 V
2 + 6	about 5 V

If specified values are not obtained:

Check wire connections from Engine Control Module (ECM) to throttle valve control module ⇒ Page 24-153 .

24-153



Checking wire connections

- Pull connector (2) off throttle valve control module.
- 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+:

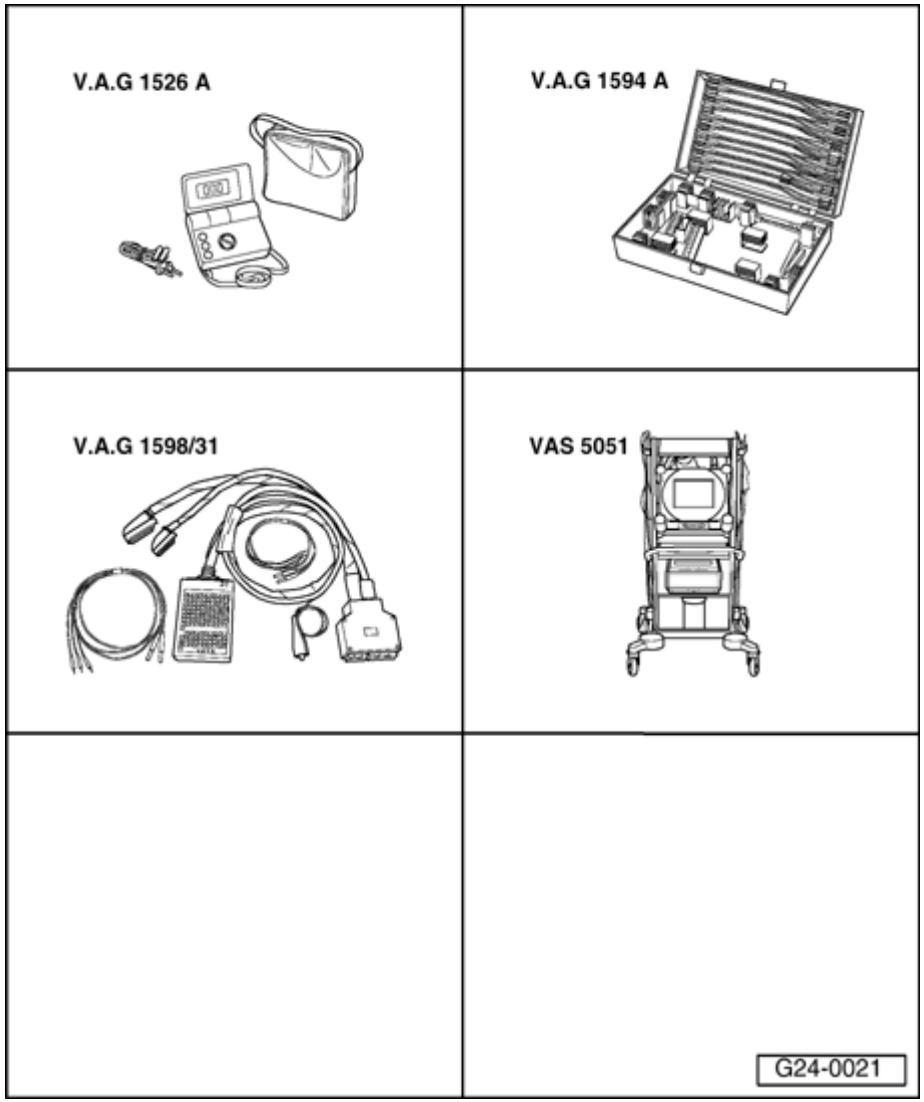
Harness connector Terminal	VAG1598/31 test box Socket
1	92
2	83
3	117
4	84
5	118
6	91

- Repair open circuit or short circuit if necessary.

If no malfunctions are found in wires:

- Replace throttle valve control module.

24-154



Throttle Position (TP) sensor, checking

Special Tools and Equipment

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

- or

- VAG1551 with VAG1551/3B

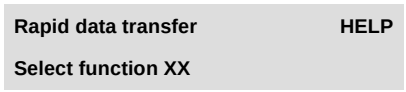
24-155

Both the Throttle Position (TP) sensor -G79- and the Sender -2- for accelerator pedal position -G185- are located at the accelerator pedal and communicate the driver's intentions to the ECM completely independently of each other. Both sensors are stored in one housing.

Test sequence

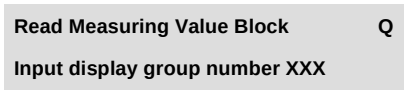
- Connect VAS5051 tester or VAG1551 scan tool and select the control module for engine electronics using "address word" 01 ⇒ Page 01-9 .

  Ignition must remain switched on for this.



➢ 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-, -6- and -2- to select "display group number 062" and press -Q- button to confirm input.

➢ Indicated on display:

- Check specified values for E-gas potentiometer voltages in display fields 3 and 4.

24-156

	Display fields			
	1	2	3	4
Display group 062: E-Gas potentiometer voltages				
Display	xx %	xx %	**xx %**	**xx %**
Indicated	Throttle valve angle (angle sensor 1)	Throttle valve angle (angle sensor 2)	**Sensor for Pedal position**	**Sensor 2 for Pedal position**
Functional range	0 to 100 %	0 to 100 %	**0 to 100 %**	**0 to 50 %**
Specified value	3 to 93 %	97 to 3 %	**12 to 97 % (Idle value: 8 to 18 %)**	**4 to 49 % (Idle value: 3 to 13 %)**

Note:

Engine Control Module (ECM) calculates the voltage values of the angle sensors in percent relative to 5 volts and displays these percentage values. (5 volts supply voltage represents 100 %).

- Observe display field 3 and 4.

- Slowly depress accelerator pedal completely.

Percent indication in display field 3 must rise uniformly. The tolerance range 12 to 97% is not used completely during this.

Percent indication in display field 4 must also rise uniformly. In the process, the tolerance range of 4 to 49% is not completely utilized.

24-157

Note:

The indicated value in display field 3 must always be about twice as large as the value in display field 4.

If indications do not resemble description:

- Check voltage supply and wire connections of sensor for accelerator pedal position ⇒ Page 24-158 .

24-158

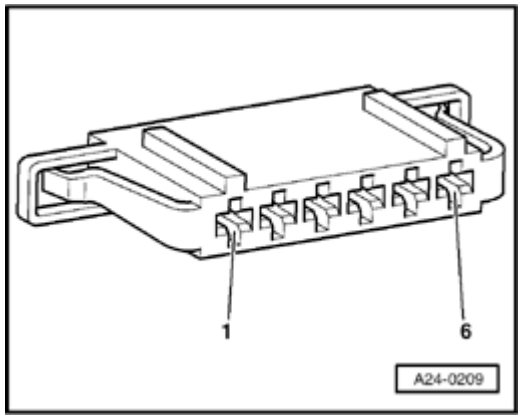
Checking voltage supply of Throttle Position (TP) sensor

- Remove driver-side storage compartment.

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

- Disconnect harness connector for accelerator pedal position sensor.

- Switch ignition on.



- Connect multimeter for voltage measurement as follows:

Harness connector Terminal	Specified value
1 + Ground (GND)	about 5 V
1 + 5	about 5 V
2 + Ground (GND)	about 5 V
2 + 3	about 5 V

If specified values are obtained:

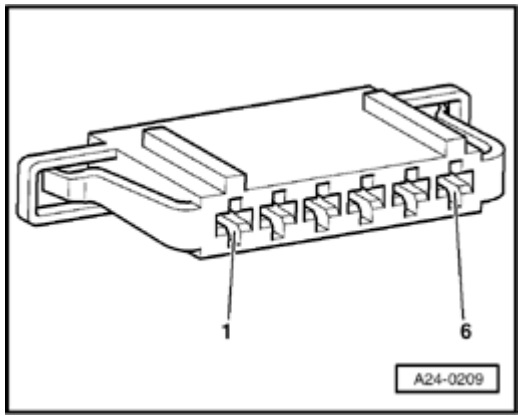
- Also check signal wires.

If specified values are not obtained:

- Check wire connections from Engine Control Module (ECM) to sensors for accelerator pedal position.

Checking wire connections

- 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
1	72
2	73
3	36
4	35
5	33
6	34

- Repair open circuit or short circuit if necessary.

24-160

If no malfunctions are found in wires:

- Replace accelerator pedal position sensor.

⇒ *Repair Manual, Fuel Supply System, Repair Group 20*

Note:

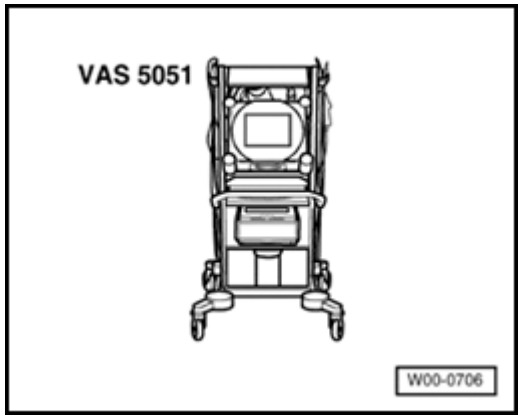
For vehicles with automatic transmission, the kick down function must be learned ⇒ *Page 24-161* .

24-161

Kick down function, adapting

If the sensor for accelerator pedal position or the Engine Control Module (ECM) is replaced on a vehicle with automatic/variable transmission, the kick down function must be learned by the ECM.

Special Tools and Equipment



- VAS5051 with VAG5051/1

  or

- VAG1551 with VAG1551/3B

Requirements

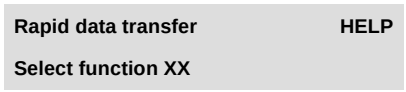
- No DTCs in DTC memory, check DTC memory ⇒ Page 01-15 .
- Engine not running, ignition switched on.

Procedure

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

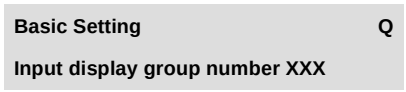
  Ignition must remain switched on for this.

24-162



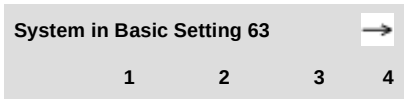
When indicated on display:

- Press buttons -0- and -4- to select "Initiate basic setting" and press -Q- button to confirm input.



When indicated on display:

- Press buttons -0-, -6- and -3- to select "display group number 063" and press -Q- button to confirm input.



When indicated on display:

Note:

There will be a prompt: "Activate kick-down"

- Depress accelerator pedal completely, past kick down point, and hold down.

Note:

During adaptation of the kick down point, the VAG1551 will display "Kick down ADP in progress". After successful adaptation of the kick down point, the VAG1551 will display "Kick down ADP OK".

- Check specified value in display field 4.

24-163

	Display fields			
	1	2	3	4
Display group 063: Kick down function, adapting				
Display	xx %	xx %	**Kick down**	**---**
Indicated	Sensor 1 for Pedal position	Sensor 2 for Pedal position	**Kick down**	**Adaptation condition**
Functional range	0 to 100 %	0 to 50 %	**Kick down**	**operate** **ADP in progress** **ADP OK** **ADP ERROR**
Specified value	12 to 97 %	4 to 49 %	**Kick down**	**ADP OK**
Notes				**If "ADP ERROR." is displayed: Check DTC memory ⇒ Page 01-15 .**

Notes:

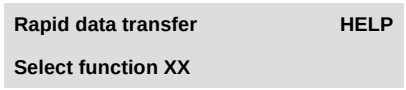
- *The abbreviation "ADP" in display field 4 stands for Adaptation.*
- *"ERROR" can be indicated, for example, if the accelerator pedal is not immediately pressed in response to a request by the tester or if the accelerator pedal is released while adaptation is running despite the fact that adaptation is not yet*

complete.In both cases, "Basic Setting" must be exited and the adaptation must be performed again ⇒ Page 24-161 .

24-164

If specified value "ADP OK" is obtained:

- Press →button.



Indicated on display (function selection):