Workshop Manual
FABIA 2000 ➢

1.0/37; 1.4/44; 1.4/50 Engine, Fuel injection Edition 08.99									
Engine code	**ARV**	**AQV**	**AZE**	**AZF**	**AME**	**ATZ**	**AQW**		

Printed in Czech Republic
S00.5308.00.20

Printed in Czech Republic
S00.5308.00.20

List of Supplements to Workshop Manual

FABIA 2000 ➤

1.0/37; 1.4/44; 1.4/50 Engine, Fuel injection

Edition 08.99

Supple-ment	Edition	Subject	Article Number
	08.99	Basic Edition	S00.5308.00.20
1	08.00	Supplement to Basic Edition	S00.5308.01.20
2	03.01	Modifications in Rep. Gr. 01 and 24	S00.5308.02.20

Table of Contents

01 – Self-diagnosis

24 – Fuel Formation, Injection

01 – Self-diagnosis

01-1 Self-diagnosis I

Note!

The self-diagnosis monitors only a part of the injection and ignition system.

Operation

The engine control unit is equipped with a fault memory. The fault memory is designed as a permanent memory.

If malfunctions occur in the monitored sensors or components, they are stored in the fault memory with indication of the fault type.

Faults that only occur temporarily (sporadically) are displayed with the suffix „/SP“. Possible causes of sporadic faults are e.g. a loose contact or a momentary line interruption. If a sporadic fault no longer occurs after 40 engine starts, it is erased from the fault memory.

The stored faults can be read out with the vehicle system tester -V.A.G 1552- using programme card -5.0- and higher version or fault reader -V.A.G 1551- using programme card -8.0- and higher version or vehicle system tester - V.A.S 5051- ⇒ **01-1** page 2.

After the fault(s) has(have) been removed the fault memory must be erased ⇒ **01-1** page 2.

Note!

The following description only relates to the vehicle system tester -V.A.G 1552-.

Technical data of self-diagnosis

Equipment

Engine code letters	ARV	AME	AZE	ATZ	AQV	AQW	AZF
Displacement	1.0 l	1.4 l	1.4 l	1.4 l	1.0 l	1.4 l	1.4 l
System denomination	SIMOS 3PB			SIMOS 3PA			
Emission levels in accordance with	EU 2 standard			D 4 standard	EU 4 standard	EU 4 standard	EU 4 standard
Self-diagnosis	yes			yes			
Electronic throttle system	yes			yes			
Lambda control	1 Lambda probe			2 Lambda probes			
Knock control	yes			yes			
Exhaust gas recirculation	no			no			

Interrogating control unit version

The control unit version is displayed when you connect the vehicle system tester -V.A.G 1552- and select the control unit for the engine electronics ⇒ **01-1** page 2.

Available functions when using the vehicle system tester -V.A.G 1552-

The preconditions for selecting the desired functions are given in the following table.

Operation		Precondition		
		Engine not running, ignition switched on	Engine idling	Normal driving
01	Interrogating control unit version	yes	yes	yes
02	Interrogating fault memory	yes [a)]	yes	yes
03	Final control diagnosis	yes	no	no
04	Basic setting	yes [b)]	yes	no
05	Erasing fault memory	yes	yes	no
06	Ending output	yes	yes	yes
07	Coding control unit	yes	no	no
08	Reading measured value block	yes	yes	yes
11	Login procedure	yes	no	no

a) Only to be carried out with the ignition switched on and if the engine does not start (activate starter for at least 6 seconds).

b) To be carried out after the following operations: Replacing engine control unit, throttle valve control unit or engine, or disconnecting battery.

Connecting vehicle system tester -V.A.G 1552- and selecting the control unit for engine electronics

Special tools, test and measuring equipment and auxiliary items required

- Vehicle system tester -V.A.G 1552-
- Diagnostic cable -V.A.G 1551/3, 3A, 3B oder 3C-

Test conditions

- Battery voltage at least 11.5 V
- Earth connection to engine and gearbox O.K.
- Fuses according to current flow diagram O.K.

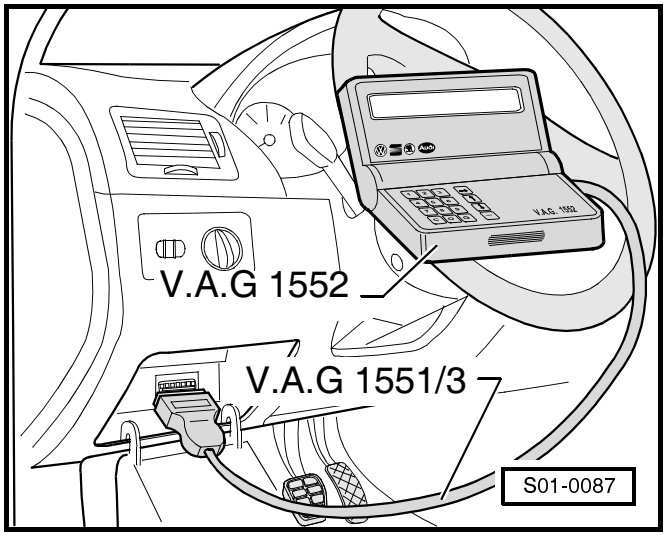
Procedure

The connector is located behind the storage area on the driver's side.

– Unclip the cover and fold down.

– Connect vehicle system tester - V.A.G 1552- with the corresponding diagnostic cable. ►

Once the vehicle system tester has been connected:



– Switch on ignition or start engine depending on the desired function ⇒ **01-1** page 2.

Note!

- *If the read-outs as shown in the work sequence are not displayed: ⇒ Operating instructions of the vehicle system tester.*
- *If because of an input error „data transfer fault“ is displayed, remove the cable from the vehicle system tester, re-connect and repeat the steps.*

Readout on display:

```
Vehicle system test                    HELP
Enter address word XX
```

Note!

Operate the vehicle system tester by following the indication on the display:

– Press 0 and 1 for address word „engine electronics“ and confirm with Q.

The vehicle system tester -V.A.G 1552 - displays the control unit identifications, e. g.:

```
047906033  1.41  SIMOS 3PB  G00HS0G41 ->
Coding 00071                    WSC XXXXX
```

- 047906033 = Part No. of the control unit (for current control unit version see Parts List)
- 1.4 ltr. = engine displacement
- SIMOS 3PB = System designation
- CC = Cruise control system activated (only on vehicles with cruise control system)
- HS = manual gearbox
- 0G41 = Software number
- Coding 00071 = Coding of the control unit
- WSC XXXXX = Workshop code

– Press →.

Readout on display:

```
Vehicle system test                    HELP
Select function XX
```

– Further procedure, see repair sequences.

Interrogating and erasing fault memory

– Press 0 and 2 for the function „Interrogate fault memory“ and confirm the entry with Q.

The display shows the number of faults stored in the memory or „no fault detected“ will be displayed.

```
X faults detected!
```

If one or several faults are stored:

Press key → to display the stored faults consecutively.

– Rectify the faults displayed by referring to the fault table ⇒ Chap. 01-2; ⇒ Chap. 01-3.

Note!

If the ignition is switched off during „Interrogating fault memory“ and „Erasing fault memory“, the fault memory is not erased.

– Select function 05 „Erase fault memory“ and confirm with Q.

```
Vehicle system test                    ->
Fault memory erased!
```

– Select function 06 „End output“ and switch ignition off.

– Once the fault has been corrected perform a test drive.

Note!

Comply with the safety instructions for test drives ⇒ Chap. 24-1.

During the test drive the following operating conditions must be fulfilled:

- The coolant temperature should rise beyond 80°C.
- Once the temperature has been reached the following operating conditions must be reached a number of times:

  Idling speed
  partial load
  enrichment
  full load
  trailing throttle

- In case of „full load“ the speed should be increased beyond 3500 rpm.

– Once again interrogate the fault memory of the engine control unit again ⇒ **01-1** page 3.

– Generate readiness code ⇒ Chap. 01-4.

If no fault is stored:

– Select function 06 „End output“ and confirm entry with Q.

Performing final control diagnosis

With the actuator diagnosis the following parts are activated in the sequence indicated:

1. Fuel pump relay -J17-
2. Solenoid valve 1 for activated charcoal filter -N80-
3. Secondary air inlet valve -N112- a)
4. Secondary air pump relay -J299- a)

a) Disregard display

Note!

- *The actuator diagnosis can only be carried out when the engine is not running and the ignition is switched on.*
- *The final control diagnosis is aborted when the engine is started or when a moment of momentum is detected.*
- *The actuators are tested acoustically or by touch.*
- *If the final control diagnosis must be repeated wirthout the engine being started in the meantime, switch off ignition for about 20 seconds.*

Test conditions

- Fuses according to current flow diagram O.K.

Special tools, test and measuring equipment and auxiliary items required

- Vehicle system tester -V.A.G 1552-
- Diagnostic cable -V.A.G 1551/3, 3A, 3B oder 3C-

Procedure

– Connect vehicle system tester - V.A.G 1552-. Switch on the ignition and select the engine control unit with „Address word“ 01.

– Select function 03 „final control diagnosis“.

Readout on display:

```
Final control diagnosis                ->
Fuel pump relay-J17
```

The fuel pump relay (on the relay plate, relay position 15) must click until the next actuator is activated by pressing (→).

Note!

During activation of the fuel pump relay the fuel pump should also be heard to run at intervals.

If the relay does not click:

– Test the fuel pump relay ⇒ Chap. 24-2.

– Press (→).

Readout on display:

```
Final control diagnosis                ->
Sol. valve 1 for act. char. filter -N80
```

The solenoid valve (left next to coolant reservoir) must continue clicking until the next actuator is actuated by pressing (→).

If the solenoid valve does not click:

– Testing solenoid valve 1 for activated charcoal filter - N80- ⇒ Chap. 24-6.

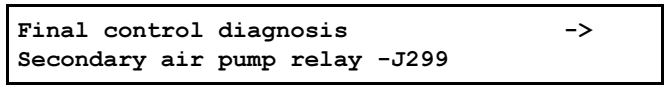
– Press (→).

Readout on display:

```
Final control diagnosis                ->
Secondary air inlet valve -N112
```

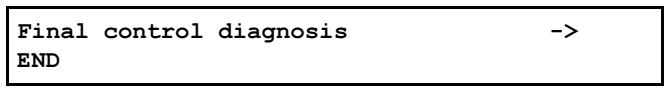
– Ignore display and press (→).

Readout on display:



– Ignore display and press (→).

Readout on display:



– Select function 06 „End output“ and switch off ignition.

–

Note!

Switch off ignition after having completed the final control diagnosis. If you do not switch off the ignition before again starting the engine, the engine will not start as the injectors and the ignition transformer will not be operated.

01-2 Self-diagnosis II

Fault codes 16500 ... 16990

Note!

- *The fault table is ordered according to the 5-digit fault code on the left.*
- *The SAE code to the right of the fault code (e.g. P0107) need not be taken into account, at present applicable for USA only*
- *Explanations on fault types (e.g. „interruption/short-circuit to earth“) ⇒ Operating instructions of vehicle system tester.*
- *If parts are output as faulty: First check the cables and connectors to these parts as well as the earth leads of the system by referring to the current diagram. Only if no fault is detected here should the part be replaced. This applies in particular for faults that are output as „ sporadically occurred “(SP) faults.*
- *If the display reads vehicle system tester -V.A.G 1552- „look up information in the documentation“, the required text is to be found in the fault table according to the fault code.*

Read-out on -V.A.G 1552-		Possible causes of fault	Possible effects	Rectifying fault
16496 Intake air temperature sender -G42 a)	Signal too small	♦ Short-circuit to earth ♦ Intake manifold temperature sender -G72- defective	♦ Emergency running mode, engine control unit operates with replacement temperature in function of the coolant temperature	– Reading measured value block, display group 004, display field 4 ⇒ Chap. 01-5. – Inspecting Intake manifold temperature sender -G72- ⇒ Chap. 24-2.
16497 Intake air temperature sender -G42 a)	Signal too high	♦ Short-circuit to positive terminal ♦ Line interruption ♦ Intake manifold temperature sender -G72- defective	♦ Emergency running mode, engine control unit operates with replacement temperature in function of the coolant temperature	– Reading measured value block, display group 004, display field 4 ⇒ Chap. 01-5. – Inspecting Intake manifold temperature sender -G72- ⇒ Chap. 24-2.

Read-out on -V.A.G 1552-		Possible causes of fault	Possible effects	Rectifying fault
16500 Sender for coolant temperature -G62 [a)]	Implausible signal	♦ Sender for coolant temperature -G62- supplies implausible signal caused by loose contact or corrosion due to humidity in the connector ♦ -G62- defective ♦ Signal input in engine control unit defective (control unit defective)	♦ Cold-start difficulties at very low temperatures ♦ Poor driveability during warm-up ♦ Increased fuel consumption ♦ Increased emission levels	– Reading measured value block, display group 004, display field 3 ⇒ Chap. 01-5. – Testing coolant temperature sender -G62- ⇒ Chap. 24-2. – Replacing engine control unit ⇒ Chap. 24-8.
16501 Sender for coolant temperature -G62 [a)]	Signal too small	♦ Short-circuit to earth ♦ Sender for coolant temperature -G62- defective	♦ Cold-start difficulties at very low temperatures ♦ Poor driveability during warm-up ♦ Increased fuel consumption ♦ Increased emission levels	– Reading measured value block, display group 004, display field 3 ⇒ Chap. 01-5. – Testing coolant temperature sender -G62- ⇒ Chap. 24-2.
16502 Sender for coolant temperature -G62 [a)]	Signal too great	♦ Short-circuit to positive terminal ♦ Line interruption ♦ Sender for coolant temperature -G62- defective	♦ Cold-start difficulties at very low temperatures ♦ Poor driveability during warm-up ♦ Increased fuel consumption ♦ Increased emission levels	– Reading measured value block, display group 004, display field 3 ⇒ Chap. 01-5. – Testing coolant temperature sender -G62- ⇒ Chap. 24-2.

[a)] As soon as one of the faults is detected, the control unit uses a replacement value from the model sequence stored in the control unit.

Read-out on -V.A.G 1552-		Possible causes of fault	Possible effects	Rectifying fault
16514 Bank1-probe1	electr. fault in the circuit	♦ Line interruption or short-circuit to earth or positive ♦ Lambda probe for catalyst defective	♦ no lambda control ♦ Poor idling ♦ Emission levels NOK ♦ Increased fuel consumption	– Inspecting lambda control ⇒ Chap. 24-5. – Testing lambda probe before catalyst ⇒ Chap. 24-5. – Remove short-circuit or line interruption ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations.
16515 Bank1-probe1	Voltage too low	♦ Short-circuit of the lambda probe signal line to earth or to shielding ♦ Short-circuit of the lambda probe reference earth line to earth or to shielding ♦ Lambda probe for catalyst defective	♦ no lambda control ♦ Poor idling ♦ Emission levels NOK ♦ Increased fuel consumption	– Reading measured value block, display group 030 ⇒ Chap. 01-5. – Reading measured value block, display group 031 ⇒ Chap. 01-5. – Inspecting lambda control ⇒ Chap. 24-5. – Testing lambda probe before catalyst ⇒ Chap. 24-5. – Remove short-circuit or line interruption ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations.
16516 Bank1-probe1	Voltage too high	♦ Short-ciruit of signal line to positive ♦ Lambda probe for catalyst defective	♦ Lambda control goes into operation ♦ Poor idling	– Inspecting lambda control ⇒ Chap. 24-5. – Testing lambda probe before catalyst ⇒ Chap. 24-5. – Remove short-circuit or line interruption ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations.
16517 Bank1-probe1	Signal too slow	♦ Lambda probe for catalyst defective	♦ no lambda control ♦ Poor idling ♦ Emission levels NOK ♦ Increased fuel consumption	– Inspecting lambda control ⇒ Chap. 24-5 – Testing lambda probe before catalyst ⇒ Chap. 24-5. – Inspecting catalyst efficiency ⇒ Chap. 24-5.

Read-out on -V.A.G 1552-		Possible causes of fault	Possible effects	Rectifying fault
16518 Bank1-probe1	No activity	♦ Lambda probe before catalyst defective (dirty) ♦ Line interruption between probe heater and engine control unit ♦ Lambda probe heater does not operate	♦ Increased fuel consumption ♦ Emission levels NOK ♦ Sooting of spark plugs	– Reading measured value block, display group 030 ⇒ Chap. 01-5. – Reading measured value block, display group 031 ⇒ Chap. 01-5. – Testing lambda probe heating before catalyst ⇒ Chap. 24-5.
16521 Bank1-probe2	Voltage too low	♦ Short-circuit of the lambda probe signal line to earth or to shielding ♦ Short-circuit of the lambda probe reference earth line to earth or to shielding ♦ Lambda probe after catalyst defective	♦ no lambda control ♦ Poor idling ♦ Emission levels NOK ♦ Increased fuel consumption	– Inspecting lambda control ⇒ Chap. 24-5. – Testing lambda probe after catalyst ⇒ Chap. 24-5. – Testing lambda probe heating after catalyst ⇒ Chap. 24-5.
16522 Bank1-probe2	Voltage too high	♦ Short-ciruit of signal line to positive ♦ Lambda probe after catalyst defective	♦ no lambda control ♦ Poor idling	– Inspecting lambda control ⇒ Chap. 24-5. – Testing lambda probe after catalyst ⇒ Chap. 24-5. – Testing lambda probe heating after catalyst ⇒ Chap. 24-5.
16524 Bank1-probe2	No activity	♦ Lambda probe after catalyst defective ♦ Residues in lambda probe	♦ no lambda control ♦ Poor idling	– Inspecting lambda control ⇒ Chap. 24-5. – Testing lambda probe heating after catalyst ⇒ Chap. 24-5.
16554 Bank1, fuel measuring system	Malfunction	♦ Fuel system defective ♦ Injection valves defective ♦ fuel filter with pressure control valve defective	♦ Engine does not start ♦ Increased emission levels ♦ poor starting	– Testing injection valves ⇒ Chap. 24-3. – Testing fuel pump ⇒ 1.0/37; 1.4/44; 1.4/50 Engine -Mechanics; Rep. Gr. 20. – Inspecting fuel filter with pressure control valve ⇒ Chap. 24-2. – Testing intake system for tightness ⇒ Chap. 24-4. – Inspecting exhaust system for tightness ⇒ 1.0/37; 1.4/44; 1.4/50 Engine -Mechanics; Rep. Gr. 26.

Read-out on -V.A.G 1552-		Possible causes of fault	Possible effects	Rectifying fault
16555 Bank1, fuel measuring system	System too poor	♦ Fuel system defective ♦ Lambda probe defective	♦ no lambda control ♦ Poor idling ♦ Emission levels NOK ♦ Increased fuel consumption	– Reading measured value block, display group 030 ⇒ Chap. 01-5. – Reading measured value block, display group 031 ⇒ Chap. 01-5. – Inspecting lambda control ⇒ Chap. 24-5. – Inspecting fuel filter with pressure control valve ⇒ Chap. 24-2.
16556 Bank1, fuel measuring system	System too rich	♦ Fuel system defective ♦ Lambda probe defective	♦ no lambda control ♦ Poor idling	– Reading measured value block, display group 030 ⇒ Chap. 01-5. – Inspecting lambda control ⇒ Chap. 24-5. – Inspecting fuel filter with pressure control valve ⇒ Chap. 24-2.
16684 Combustion misfiring detected		♦ Injection valves defective ♦ Ignition terminal defective	♦ Poor performance ♦ Emission levels NOK ♦ Increased fuel consumption ♦ Catalyst overheated or damaged	– Testing injection valves ⇒ Chap. 24-3. – Testing ignition leads and spark plugs ⇒ Chap. 28-1. – Inspecting ignition terminal ⇒ Chap. 28-2. – Inspecting misfiring detection ⇒ Chap. 28-2.
16685 Cyl. 1 combustion misfiring detected		see fault code 16684		
16686 Cyl. 2 combustion misfirings detected		see fault code 16684		
16687 Cyl. 3 combustion misfirings detected		see fault code 16684		
16688 Cyl. 4 combustion misfirings detected		see fault code 16684		

Read-out on -V.A.G 1552-		Possible causes of fault	Possible effects	Rectifying fault
16705 Engine speed sender -G28	Implausible signal	♦ Engine speed sender -G28- loose	♦ Engine misfiring	– Inspecting Engine speed sender -G28- ⇒ Chap. 28-2.
16706 Engine speed sender -G28	No signal	♦ Signal line is interrupted or short-circuited to earth or pos. ♦ Earth lead is interrupted or short-circuited to pos. ♦ -G28- is loose or defective ♦ Line interruption to shielding of -G28- ♦ Signal input in engine control unit defective (control unit defective)	♦ Engine does not start ♦ Engine stalls	– Inspecting Engine speed sender -G28- ⇒ Chap. 28-2. – Remove line interruption or short-circuit ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations. – Replacing engine control unit ⇒ Chap. 24-8.
16711 Knock sensor 1 -G61	Signal too small	♦ Knock sensor defective ♦ Line short-circuit to earth	♦ Increased fuel consumption ♦ Poor performance	– Inspecting knock sensor 1 -G61- ⇒ Chap. 28-2.
16712 Knock sensor 1 -G61	Signal too great	♦ Knock sensor defective ♦ Line short-cicuit to pos.	♦ Increased fuel consumption ♦ Poor performance	– Inspecting knock sensor 1 -G61- ⇒ Chap. 28-2.

Read-out on -V.A.G 1552-		Possible causes of fault	Possible effects	Rectifying fault
16719 Engine speed sender -G28	Malfunction	♦ Signal line is interrupted or short-circuited to earth or short-circuit to pos. ♦ Earth lead is interrupted or short-circuited to pos. ♦ -G28- is loose or defective ♦ Line interruption to shielding of -G28- ♦ Signal input in engine control unit defective (control unit defective)	♦ Engine does not start ♦ Engine stalls	– Inspecting Engine speed sender -G28- ⇒ Chap. 28-2. – Remove line interruption or short-circuit ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations. – Replacing engine control unit ⇒ Chap. 24-8.
16725 Camshaft pos. sensor => Sender -G40 a)	Implausible signal	♦ Voltage supply or earth distribution to -G163- a) defective ♦ -G163- defective ♦ Line interruption or short-circuit to earth and positive in the signal line between -G163- and the engine control unit	♦ Engine does not reach maximum speed ♦ Poor performance ♦ Starting problems ♦ Valve control noisy, reduced engine performance	– Read measured value block, display group 012, check values in display fields 3 and 4 ⇒ Chap. 01-5. – Inspecting camshaft position sensor -G163- ⇒ Chap. 28-2. – Remove line interruption or short-circuit according to Current Flow Diagram ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations.

a) The camshaft position sensor -G163- and the camshaft pos. sensor => sender -G40- are identical to the Hall sender -G40-.

Read-out on -V.A.G 1552-		Possible causes of fault	Possible effects	Rectifying fault
16726 Camshaft pos. sensor => Sender -G40 a)	Signal too small	♦ -G163- defective ♦ important transition impedances in the plug connections (corrosion)	♦ Engine does not reach maximum speed ♦ Poor performance ♦ Starting problems	– Inspecting camshaft position sensor -G163- ⇒ Chap. 28-2. – Inspecting wiring or cabling to -G163- ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations
16804 Bank 1, catalyst system	Efficiency too low	♦ Catalyst defective ♦ Unmetered air in exhaust system between the lambda probes	♦ Exhaust emissions warning lamp -K83- lights up	– Generating readiness code ⇒ Chap. 01-4. – Inspecting exhaust system for tightness or checking for damage between both lambda probes ⇒ 1.0/37; 1.4/44; 1.4/50 Engine - Mechanics; Rep. Gr. 26.
16825 Tank ventilation system	Flow rate incorrect	♦ -N80- defective ♦ Line interruption or short-circuit	♦ irregular idling ♦ Smell of fuel	– Inspecting solenoid valve 1 for activated charcoal filter system -N80- ⇒ Chap. 01-1 and ⇒ 1.0/37; 1.4/44; 1.4/50 Engine-Mechanics; Rep. Gr. 20. – Inspecting the hoses and connecting tubes from the fuel tank to the throttle valve control unit ⇒ 1.0/37; 1.4/44; 1.4/50 Engine-Mechanics; Rep. Gr. 20. – Remove line interruption or short-circuit according to Current Flow Diagram ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations.
16845 Fuel gauge signal	Implausible signal	♦ Fuel gauge sender -G- defective ♦ Line interruption or short-circuit between fuel gauge sender -G- and dash panel insert ♦ Data BUS defective ♦ Dash panel insert defective	♦ Fuel gauge N.O.K.	– Inspecting fuel gauge sender -G- ⇒ Electrical System; Rep. Gr. 90 – Checking data Bus ⇒ Chap. 24-9 – Inspecting dash panel insert ⇒ Electrical System; Rep. Gr. 90

Read-out on -V.A.G 1552-		Possible causes of fault	Possible effects	Rectifying fault
16885 Vehicle speed signal	Implausible signal	♦ Speedometer sender -G22- defective ♦ Line interruption or short-circuit between Speedometer sender -G22- and dash panel insert ♦ Data BUS defective ♦ Dash panel insert defective	♦ Speed display NOK ♦ Cruise control system not operational ♦ Malfunction on systems using the speed signal ♦ Air conditioning cut-off not operational under full load	– Reading measured value block, display group 005, checking values in display field 3 ⇒ Chap. 01-5. – Testing speed signal ⇒ Chap. 24-9. – Checking data Bus ⇒ Chap. 24-9 – Inspecting dash panel insert ⇒ Electrical System; Rep. Gr. 90
16890 Idling control	Speed under nominal value	♦ Throttle valve positioner jams ♦ Air filter blocked	♦ Poor vehicle handling ♦ Increased fuel consumption	– Inspecting throttle valve control unit -J338- ⇒ Chap. 24-7. – Inspecting air intake system for tightness (unmetered air) ⇒ Chap. 24-4.
16891 Idling control	Speed above nominal value	♦ Unmetered air to throttle valve ♦ Injection valve defective	♦ Smell of fuel	– Inspecting throttle valve control unit -J338- ⇒ Chap. 24-7. – Testing injection valves ⇒ Chap. 24-3.
16955 Brake light switch -F	Implausible signal	♦ Brake light switch defective ♦ Line interruption or short-circuit to positive or earth between the brake light switch and the engine control unit	♦ no brake light ♦ Engine speed fluctuations during braking	– Inspecting brake light switch -F- ⇒ Chap. 24-9. – Remove line interruption or short-circuit according to Current Flow Diagram ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations.
16984 Data bus drive	missing message	♦ Fault in data BUS wiring ♦ data-bus compatible control unit defective	♦ Poor vehicle handling	– Check data BUS ⇒ Chap. 24-9. – Read out fault memory of all control units.
16985 Control unit defective		♦ 4AV control unit defective	♦ Engine does not start	– Replacing engine control unit ⇒ Chap. 24-8.
16988 Control unit defective		♦ 4AV control unit defective	♦ Engine does not start	– Replacing engine control unit ⇒ Chap. 24-8.
16990 Control unit defective		♦ 4AV control unit defective	♦ Engine does not start	– Replacing engine control unit ⇒ Chap. 24-8.

01-3 Self-diagnosis III

Fault codes 17510 ... 18058

Readout on -V.A.G 1552-		Possible causes of fault	Possible effects	Rectifying fault
17510 Bank 1 - probe 1, heating circuit	Short circuit to positive	♦ Line short-circuit to positive in the line from the engine control unit to the lambda probe before the catalyst ♦ Power output stage in engine control unit defective (engine control unit defective) ♦ Lambda probe for catalyst defective	♦ irregular idling ♦ Emission levels NOK	– Testing lambda probe heating before catalyst ⇒ Chap. 24-5. – Remove short-circuit according to Current Flow Diagram ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations. – Replace engine control unit ⇒ Chap. 24-8. – Replacing lambda probe before catalyst ⇒ 1.0/37; 1.4/44; 1.4/50 Engine-Mechanics; Rep. Gr. 26.
17511 Bank 1 - probe 1, heating circuit	Output too low	♦ Line interruption in the line from the engine control unit to the lambda probe ♦ Power output stage in engine control unit defective (engine control unit defective) ♦ Lambda probe for catalyst defective	♦ irregular idling ♦ Emission levels NOK	– Testing lambda probe heating ⇒ Chap. 24-5. – Remove line interruption according to Current Flow Diagram ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations. – Replace engine control unit ⇒ Chap. 24-8. – Replacing lambda probe before catalyst ⇒ 1.0/37; 1.4/44; 1.4/50 Engine-Mechanics; Rep. Gr. 26.
17513 Bank 1 - probe 2, heating circuit	Short circuit to positive	♦ Short-circuit to positive in the line from the engine control unit to the lambda probe after the catalyst ♦ Power output stage in engine control unit defective (engine control unit defective) ♦ Lambda probe after catalyst defective	♦ irregular idling ♦ Emission levels NOK ♦ Lambda probe heating after catalyst not operational	– Testing lambda probe heating after catalyst ⇒ Chap. 24-5. – Replace engine control unit ⇒ Chap. 24-8. – Replacing lambda probe after catalyst ⇒ 1.0/37; 1.4/44; 1.4/50 Engine-Mechanics; Rep. Gr. 26.

Readout on -V.A.G 1552-		Possible causes of fault	Possible effects	Rectifying fault
17523 Bank 1 - probe 1, heating circuit	Short circuit to earth	♦ Line short-circuit to earth in the line from the engine control unit to the lambda probe ♦ Power output stage in engine control unit defective (engine control unit defective) ♦ Lambda probe for catalyst defective	♦ irregular idling ♦ Emission levels NOK	– Testing lambda probe heating before catalyst ⇒ Chap. 24-5. – Replace engine control unit ⇒ Chap. 24-8. – Replacing lambda probe before catalyst ⇒ 1.0/37; 1.4/44; 1.4/50 Engine-Mechanics; Rep. Gr. 26.
17524 Bank 1 - probe 1, heating circuit	Open circuit	♦ Line interruption in the line from the engine control unit to the lambda probe ♦ Power output stage in engine control unit defective (engine control unit defective) ♦ Lambda probe for catalyst defective	♦ irregular idling ♦ Emission levels NOK	– Testing lambda probe heating before catalyst ⇒ Chap. 24-5. – Remove line interruption according to Current Flow Diagram ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations. – Replace engine control unit ⇒ Chap. 24-8. – Replacing lambda probe before catalyst ⇒ 1.0/37; 1.4/44; 1.4/50 Engine-Mechanics; Rep. Gr. 26.
17525 Bank 1 - probe 2, heating circuit	Short circuit to earth	♦ Short-circuit to earth in the line from the engine control unit to the lambda probe after the catalyst ♦ Power output stage in engine control unit defective (engine control unit defective) ♦ Lambda probe after catalyst defective	♦ irregular idling ♦ Emission levels NOK ♦ Lambda probe heating after catalyst not operational	– Testing lambda probe heating after catalyst ⇒ Chap. 24-5. – Replace engine control unit ⇒ Chap. 24-8. – Replacing lambda probe after catalyst ⇒ 1.0/37; 1.4/44; 1.4/50 Engine-Mechanics; Rep. Gr. 26.
17526 Bank 1 - probe 2, heating circuit	Open circuit	♦ Interruption in the line from the engine control unit to the lambda probe after catalyst ♦ Power output stage in engine control unit defective (engine control unit defective) ♦ Lambda probe after catalyst defective	♦ irregular idling ♦ Emission levels NOK ♦ Lambda probe heating after catalyst not operational	– Testing lambda probe heating after catalyst ⇒ Chap. 24-5. – Replace engine control unit ⇒ Chap. 24-8. – Replacing lambda probe after catalyst ⇒ 1.0/37; 1.4/44; 1.4/50 Engine-Mechanics; Rep. Gr. 26.

Readout on -V.A.G 1552-		Possible causes of fault	Possible effects	Rectifying fault
17549 Load detection	implausible value	♦ Intake system not tight	♦ reduced performance	– Test intake system for tightness (unmetered air) ⇒ Chap. 24-4. – Erase the fault memory and carry out test drive.
17563 Intake manifold pressure sender -G71	Short circuit to positive	♦ Line has short-circuit to positive ♦ -G71- defective	♦ Increased emission levels ♦ poor throttle response ♦ Rough load alteration	– Inspecting Intake manifold pressure sender -G71- ⇒ Chap. 24-2. – Test intake system for tightness (unmetered air) ⇒ Chap. 24-4.
17564 Intake manifold pressure sender -G71	Open circuit/ Short-circuit to earth	♦ Line interruption ♦ Line has short-circuit to earth ♦ -G71- defective	♦ Increased emission levels ♦ poor throttle response ♦ Rough load alteration	– Inspecting Intake manifold pressure sender -G71- ⇒ Chap. 24-2. – Test intake system for tightness (unmetered air) ⇒ Chap. 24-4.
17568 Intake manifold temp. sender -G72	Short circuit to earth	♦ Short-circuit to earth in the line connection between intake manifold temperature sender -G72- and the engine control unit ♦ -G72- defective ♦ Signal input in engine control unit defective (control unit defective)	♦ Emergency running mode, engine control unit operates with replacement temperature in function of the coolant temperature	– Reading measured value block, display group 004, checking values in display field 4 ⇒ Chap. 01-5. – Inspecting Intake manifold temperature sender -G72- ⇒ Chap. 24-2. – Replace engine control unit ⇒ Chap. 24-8.
17569 Intake manifold temp. sender -G72	Open circuit/ Short circuit to positive	♦ Line interruption or short-circuit to positive term. in the line connection between intake manifold temperature sender -G72- and the engine control unit ♦ -G72- defective ♦ Earth distribution to -G72- defective ♦ Signal input in engine control unit defective (control unit defective)	♦ Emergency running mode, engine control unit operates with replacement temperature in function of the coolant temperature	– Reading measured value block, display group 004, checking values in display field 4 ⇒ Chap. 01-5. – Inspecting Intake manifold temperature sender -G72- ⇒ Chap. 24-2. – Replace engine control unit ⇒ Chap. 24-8.

Readout on -V.A.G 1552-		Possible causes of fault	Possible effects	Rectifying fault
17579 TV drive angle sender 2 -G188	Implausible signal	♦ -G188- defective/ loose contact in plug connection for throttle valve control unit -J338- ♦ Signal input in the engine control unit defective (engine control unit defective) ♦ incorrect plug assignment	♦ Engine runs in emergency operation programme ♦ reduced performance ♦ irregular idling	– Inspect throttle valve control unit -J338- ⇒ Chap. 24-7. – Replace engine control unit ⇒ Chap. 24-8.
17580 TV drive angle sender 2 -G188	Signal too low	♦ Line interruption or short-circuit to earth in the signal line from -G188- to the engine control unit	♦ Engine runs in emergency operation programme ♦ changed idling speed	– Inspect throttle valve control unit -J338- ⇒ Chap. 24-7.
17581 TV drive angle sender 2 -G188	Signal too high	♦ Line interruption in the earth line from -G188- to the engine control unit	♦ Engine runs in emergency operation programme ♦ Cold start problems ♦ Cold idling problems	– Inspect throttle valve control unit -J338- ⇒ Chap. 24-7.
17584 Bank 1 lambda correction after catalyst	Regulating limit reached	♦ Lambda probe after catalyst defective	♦ Emission levels NOK ♦ Poor idling ♦ Poor vehicle handling	– Test intake system for tightness (unmetered air) ⇒ Chap. 24-4. – Test lambda control and lambda probe downstream of catalytic converter ⇒ Chap. 24-5 – Testing lambda probe heating after catalyst ⇒ Chap. 24-5.
17621 Injector cyl. 1 - N30	Short circuit to positive	♦ -N30- defective ♦ Line has short-circuit to positive	♦ Increased emission levels ♦ poor starting ♦ Poor vehicle handling ♦ poor throttle response ♦ irregular idling	– Inspect injectors ⇒ Chap. 24-3.
17622 Injector cyl. 2 - N31	Short circuit to positive	♦ -N31- defective ♦ Line has short-circuit to positive		
17623 Injector cyl. 3 - N32	Short circuit to positive	♦ -N32- defective ♦ Line has short-circuit to positive		
17624 Injector cyl. 4 - N33	Short circuit to positive	♦ -N33- defective ♦ Line has short-circuit to positive		

Readout on -V.A.G 1552-		Possible causes of fault	Possible effects	Rectifying fault
17633 Injector cyl. 1 - N30	Short circuit to earth	♦ -N30- defective ♦ Short circuit to earth	♦ Increased emission levels ♦ poor starting ♦ Poor vehicle handling ♦ poor throttle response ♦ irregular idling	– Inspect injectors ⇒ Chap. 24-3.
17634 Injector cyl. 2 - N31	Short circuit to earth	♦ -N31- defective ♦ Short circuit to earth		
17635 Injector cyl. 3 - N32	Short circuit to earth	♦ -N32- defective ♦ Short circuit to earth		
17636 Injector cyl. 4 - N33	Short circuit to earth	♦ -N33- defective ♦ Short circuit to earth		
17645 Injector cyl. 1 - N30	Open circuit	♦ -N30- defective ♦ Line interruption	♦ Increased emission levels ♦ poor starting ♦ Poor vehicle handling ♦ poor throttle response ♦ irregular idling	– Inspect injectors ⇒ Chap. 24-3.
17646 Injector cyl. 2 - N31	Open circuit	♦ -N31- defective ♦ Line interruption		
17647 Injector cyl. 3 - N32	Open circuit	♦ -N32- defective ♦ Line interruption		
17648 Injector cyl. 4 - N33	Open circuit	♦ -N33- defective ♦ Line interruption		
17658 Fuel level	too low	♦ Tank empty ♦ Fuel gauge sender -G- defective ♦ Line interruption or short-circuit between fuel gauge sender -G- and dash panel insert ♦ Data BUS defective ♦ Dash panel insert defective	♦ Fuel gauge N.O.K. ♦ Vehicle „jerks“ during driving	– Fill up vehicle. – Inspecting fuel gauge sender -G- ⇒ Electrical System; Rep. Gr. 90.

Readout on -V.A.G 1552-		Possible causes of fault	Possible effects	Rectifying fault
17743 Engine torque monitoring 2	Regulating limit exceeded	♦ Intake system not tight ♦ Throttle valve control unit -J338- defective or accelerator pedal position sender -G79-, -G185- defective	♦ Engine runs in emergency operation programme ♦ changed idling speed	– Testing intake system for tightness ⇒ Chap. 24-4. – Inspect accelerator pedal position sender -G79 -, -G185- ⇒ Chap. 24-7. – Inspect throttle valve control unit -J338- ⇒ Chap. 24-7.
17744 Engine torque monitoring	Regulating limit exceeded	♦ Intake system not tight ♦ Throttle valve control unit -J338- defective or accelerator pedal position sender -G79-, -G185- defective	♦ Engine runs in emergency operation programme ♦ changed idling speed	– Testing intake system for tightness ⇒ Chap. 24-4. – Inspect accelerator pedal position sender -G79 -, -G185- ⇒ Chap. 24-7. – Inspect throttle valve control unit -J338- ⇒ Chap. 24-7.
17746 Bank1, camshaft pos. sensor => -G163 [a)]	Open circuit/ Short circuit to positive	♦ Signal input in engine control unit defective (control unit defective) ♦ -G163- defective ♦ Loose contact ♦ Line interruption or short-circuit to positive or earth in the signal line between -G163- and the engine control unit	♦ Engine does not reach maximum speed ♦ Poor performance ♦ Starting problems	– Inspecting camshaft position sensor -G163- ⇒ Chap. 28-2. – Remove open circuit in wiring or short circuit according to current flow diagram ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations.

[a)] The camshaft position sensor - G163- is identical to the Hall sender -G40-.

Readout on -V.A.G 1552-		Possible causes of fault	Possible effects	Rectifying fault
17748 Camshaft position/crankshaft position sensor	Incorrect assignment	♦ Sensor signal outside tolerance field		– Inspecting camshaft position sensor -G163 - ⇒ Chap. 28-2. – Inspecting Engine speed sender -G28- ⇒ Chap. 28-2. – Test timing ⇒ Engine, Mechanical Components; Rep. Gr. 15.
17764 Ignition control cyl. 1	Short circuit to positive	♦ Ignition terminal (ignition transformer with power transformer) -N152- defective ♦ Line has short-circuit to positive	♦ Engine stalls ♦ Engine jerks	– Inspecting ignition terminal ⇒ Chap. 28-1. – Remove open circuit in wiring or short circuit according to current flow diagram ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations.
17765 Ignition control cyl. 1	Short circuit to earth	♦ Ignition terminal (ignition transformer with power transformer) -N152- defective ♦ Line has short-circuit to earth	♦ Engine stalls ♦ Engine jerks	– Inspecting ignition terminal ⇒ Chap. 28-1. – Remove open circuit in wiring or short circuit according to current flow diagram ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations.
17767 Ignition control cyl. 2	Short circuit to positive	♦ Ignition terminal (ignition transformer with power transformer) -N152- defective ♦ Line has short-circuit to positive	♦ Engine stalls ♦ Engine jerks	– Inspecting ignition terminal ⇒ Chap. 28-1. – Remove open circuit in wiring or short circuit according to current flow diagram ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations.
17768 Ignition control cyl. 2	Short circuit to earth	♦ Ignition terminal (ignition transformer with power transformer) -N152- defective ♦ Line has short-circuit to earth	♦ Engine stalls ♦ Engine jerks	– Inspecting ignition terminal ⇒ Chap. 28-1. – Remove open circuit in wiring or short circuit according to current flow diagram ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations.
17794 Control unit defective		♦ Engine control unit defective	♦ Engine does not start	– Replace engine control unit ⇒ Chap. 24-8.

Readout on -V.A.G 1552-		Possible causes of fault	Possible effects	Rectifying fault
17796 Control unit defective		♦ Engine control unit defective	♦ Engine does not start	– Replace engine control unit ⇒ Chap. 24-8.
17805 Rotor for engine speed	Adaption limit reached	♦ Rotor (flywheel) defective	♦ Engine misfiring	– Inspecting Engine speed sender -G28- ⇒ Chap. 28-2. – Test flywheel ⇒ 1.0/37; 1.4/44, 1.4/50 Engine - Mechanical Components; Rep. Gr. 13.
17818 Tank vent valve -N80	Short circuit to positive	♦ Short circuit to positive between activated charcoal filter system solenoid valve -N80- and engine control unit ♦ -N80- defective	♦ Vehicle may possibly smell of fuel	– Test activated charcoal filter system solenoid valve -N80- ⇒ Chap. 01-6.
17833 Tank vent valve -N80	Short circuit to earth	♦ Short circuit to earth between activated charcoal filter system solenoid valve -N80- and engine control unit ♦ -N80- defective	♦ possible jerking in partial load region	– Test activated charcoal filter system solenoid valve -N80- ⇒ Chap. 01-6.
17834 Tank vent valve -N80	Open circuit	♦ Open circuit in wiring between activated charcoal filter system solenoid valve -N80- and fuse ♦ Open circuit in wiring between -N80- and engine control unit ♦ Fuse defective ♦ -N80- defective	♦ possible jerking in partial load region	– Test fuse ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations. – Test activated charcoal filter system solenoid valve -N80- ⇒ Chap. 01-6. – Remove open circuit in wiring or short circuit according to current flow diagram ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations.
17909 Fuel pump relay -J17	Short circuit to earth	♦ -J17- defective ♦ Short circuit to earth	♦ Engine does not start	– Test fuel pump relay -J17- ⇒ Chap. 01-1.
17910 Fuel pump relay -J17	Short circuit to positive	♦ -J17- defective ♦ Short circuit to positive	♦ Engine does not start	– Test fuel pump relay -J17- ⇒ Chap. 01-1.

Readout on -V.A.G 1552-		Possible causes of fault	Possible effects	Rectifying fault
17915 Idling air system-initialisation value	bottom limit reached	♦ Intake system not tight ♦ Throttle valve control unit -J338- or accelerator pedal position sender -G79-, -G185 - defective	♦ irregular idling ♦ changed idling speed	– inspecting idling speed ⇒ Chap. 24-4. – Inspecting air intake system for tightness (unmetered air) ⇒ Chap. 24-4. – Inspect accelerator pedal position sender -G79-, -G185- ⇒ Chap. 24-7. – Inspect throttle valve control unit -J338- ⇒ Chap. 24-7.
17916 Idling air system-initialisation value	top limit reached	♦ Line interruption ♦ Throttle valve control unit -J338- or accelerator pedal position sender -G79-, -G185 - defective	♦ irregular idling ♦ changed idling speed	– inspecting idling speed ⇒ Chap. 24-4. – Inspecting air intake system for tightness (unmetered air) ⇒ Chap. 24-4. – Inspect accelerator pedal position sender -G79-, -G185- ⇒ Chap. 24-7. – Inspect throttle valve control unit -J338- ⇒ Chap. 24-7.
17950 TV drive angle sender -G187	Implausible signal	♦ -G187- defective/ loose contact in plug connection for throttle valve control unit -J338- ♦ Signal input in the engine control unit defective (engine control unit defective) ♦ incorrect plug assignment	♦ Engine runs in emergency operation programme ♦ reduced performance ♦ irregular idling	– Inspect throttle valve control unit -J338- ⇒ Chap. 24-7. – Replace engine control unit ⇒ Chap. 24-8.
17951 TV drive angle sender -G187	Signal too low	♦ Line interruption or short-circuit to earth in the signal line from -G187- to the engine control unit	♦ Engine runs in emergency operation programme ♦ changed idling speed	– Inspect throttle valve control unit -J338- ⇒ Chap. 24-7.
17952 TV drive angle sender -G187	Signal too high	♦ Line interruption in the earth line from -G187- to the engine control unit	♦ Engine runs in emergency operation programme ♦ Cold start problems ♦ Cold idling problems	– Inspecting throttle valve control unit -J338- ⇒ Chap. 24-7.

Readout on -V.A.G 1552-		Possible causes of fault	Possible effects	Rectifying fault
17953 Throttle valve control	Malfunction	♦ Voltage supply or earth distribution for throttle valve potentiometer -G187/ G188- and throttle valve positioner - G186- defective ♦ Interruption in the signal line for -G187/ G188- and -G186- ♦ Throttle valve stiff or dirty	♦ increased idling speed ♦ Load alteration shock when releasing the accelerator ♦ Engine runs in emergency operation programme	– Inspecting throttle valve control unit -J338- ⇒ Chap. 24-7.
17966 Throttle valve drive -G186	elec. fault in the circuit	♦ Line interruption or short-circuit to pos. term. ♦ Line has short-circuit to earth ♦ -G186- defective	♦ Engine runs in emergency operation programme	– Inspecting throttle valve control unit -J338- ⇒ Chap. 24-7.
17967 Throttle valve control unit - J338	Incorrect basic setting	♦ Adaptation of the throttle valve control unit not carried out	♦ Engine runs in emergency operation programme	– Perform adaptation of the throttle valve control unit -J338- ⇒ Chap. 24-8.
17972 Throttle valve control unit - J338	Undervoltage on basic setting	♦ Voltage under 11.5 V during basic setting	♦ Engine runs in emergency operation programme	– Inspecting throttle valve control unit -J338- ⇒ Chap. 24-7.
17973 Throttle valve control unit - J338	Bottom limit not reached	♦ Throttle valve jams ♦ Throttle valve positioner jams/mechanically damaged	♦ Starting problems ♦ poor throttle response ♦ Starting problems	– Check throttle valve for damage or dirt. – Inspect throttle valve control unit -J338- ⇒ Chap. 24-7.

Readout on -V.A.G 1552-		Possible causes of fault	Possible effects	Rectifying fault
17976 Throttle valve control unit - J338	Mechanical fault	♦ Throttle valve jams ♦ Throttle valve positioner jams/mechanically damaged	♦ Starting problems ♦ poor throttle response ♦ Starting problems	– Check throttle valve for damage or dirt. – Inspect throttle valve control unit -J338- ⇒ Chap. 24-7.
17977 Cruise control system switch - E45	Implausible signal	♦ CC system switch -E45- defective ♦ Wiring to CC system switch -E45- defective ♦ Vehicle voltage control unit -J519- defective	♦ Cruise control system not operational	– Inspecting cruise control system ⇒ Chap. 24-8. – Inspecting vehicle voltage control unit -J519- ⇒ Electrical System; Rep. Gr. 90.
17978 Engine control unit blocked [a]		♦ Start attempt with unauthorised key ♦ Manipulation attempt ♦ Short-circuit in communication cable ♦ incorrect coding ♦ fault in the immobilizer system ♦ Dash panel insert defective [b] ♦ Engine control system replaced and not adapted to immobilizer	♦ Engine starts and stops immediately	– Adapt the 4AV control unit to the electronic immobiliser ⇒ Electrical System; Rep. Gr. 96. – Check electronic immobiliser ⇒ Electrical System; Rep. Gr. 96.

[a] When attempting to start with a non-adapted key a static fault is stored in the memory. If a subsequent start attempt occurs with an adpated key the fault is changed to a sporadic fault.

[b] The immobilizer control electronics are located in the dash panel insert and can easily be replaced individually.

Readout on -V.A.G 1552-		Possible causes of fault	Possible effects	Rectifying fault
17987 Throttle valve control unit - J338	Adaption not started	♦ incorrect plug assignment on throttle valve control unit ♦ Throttle valve control unit -J338- defective ♦ Signal input in the engine control unit defective (engine control unit defective)	♦ Engine runs in emergency operation programme ♦ irregular idling	– Inspect plug assignment on the throttle valve control unit -J338- ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations. – Inspect throttle valve control unit -J338- ⇒ Chap. 24-7. – Replace engine control unit ⇒ Chap. 24-8.
18010 Voltage supply tml. 30	Voltage too low	♦ Battery voltage below 11.5 V ♦ AC generator defective ♦ Line interruption	♦ Engine stalls	– Check battery charge state ⇒ Electrical System; Rep. Gr. 27. – Test alternator ⇒ Electrical System; Rep. Gr. 27. – Remove line interruption according to Current Flow Diagram ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations.
18011 Control unit defective		♦ Engine control unit defective	♦ Engine does not start	– Replace engine control unit ⇒ Chap. 24-8.
18020 Engine control unit	Incorrectly coded	♦ incorrect coding	♦ Engine does not start	– Code engine control unit ⇒ Chap. 24-8.
18038 Accelerator pedal position sender -G79	Signal too low	♦ Line interruption or short-circuit to earth ♦ -G79- defective	♦ Engine runs in emergency operation programme at increased idling speed	– Inspect accelerator pedal position sender -G79- ⇒ Chap. 24-7.
18039 Accelerator pedal position sender -G79	Signal too high	♦ Short circuit to positive ♦ -G79- defective	♦ Engine runs in emergency operation programme at increased idling speed	– Inspect accelerator pedal position sender -G79- ⇒ Chap. 24-7.
18041 Accelerator pedal position sender 2 -G185	Signal too low	♦ Line interruption or short-circuit to earth ♦ -G185- defective	♦ Engine runs in emergency operation programme at increased idling speed	– Inspect accelerator pedal position sender -2- -G185- ⇒ Chap. 24-7.
18042 Accelerator pedal position sender 2 -G185	Signal too high	♦ Short circuit to positive ♦ -G185- defective	♦ Engine runs in emergency operation programme at increased idling speed	– Inspect accelerator pedal position sender -2- -G185- ⇒ Chap. 24-7.
18043 Databus drive	missing message from AC CU	♦ Fault in databus wiring ♦ wrong or faulty air conditioning control unit -J301-	♦ Poor vehicle handling ♦ Air conditioning system inadequate or dead	– Test CAN databus ⇒ Chap. 24-9 – Inspect air conditioning control unit -J301- ⇒ Heating, Air Conditioning; Rep. Gr. 01.

Readout on -V.A.G 1552-		Possible causes of fault	Possible effects	Rectifying fault
18044 Databus drive	Missing message from airbag CU	♦ Fault in databus wiring ♦ wrong or defective airbag CU	♦ Poor vehicle handling ♦ Airbag system faulty	– Test CAN databus ⇒ Chap. 24-9 – Test airbag control unit ⇒ Body Fitting Work; Rep. Gr. 01.
18045 Databus drive	missing message form electron. CU	♦ Fault in databus wiring ♦ Wrong or faulty vehicle voltage control unit -J519-	♦ Poor vehicle handling	– Test CAN databus ⇒ Chap. 24-9 – Inspecting vehicle voltage control unit -J519- ⇒ Electrical System; Rep. Gr. 90.
18047 1/2 for accelerator pedal position sender -G79+G185	Implausible signal	♦ Line interruption ♦ -G79- and -G185- defective	♦ Engine runs in emergency operation programme at increased idling speed	– Inspect accelerator pedal position sender -G79-, -G185- ⇒ Chap. 24-7.
18048 Control unit defective		♦ Engine control unit defective	♦ Engine does not start	– Replace engine control unit ⇒ Chap. 24-8.
18056 Databus drive	defective	♦ Fault in databus wiring ♦ Control units on data BUS defective	♦ Poor vehicle handling	– Test CAN databus ⇒ Chap. 24-9
18057 Databus drive	Missing message from ABS CU	♦ Fault in databus wiring to ABS control unit ♦ incorrect or defective ABS control unit	♦ Poor vehicle handling ♦ ABS system faulty	– Test CAN databus ⇒ Chap. 24-9 – Inspecting ABS control unit -J104- ⇒ Running Gear; Rep. Gr. 45.
18058 Databus drive	Missing message from combiinstrument	♦ Fault in databus wiring ♦ wrong or defective dash panel insert	♦ no speed indication ♦ Poor vehicle handling	– Test CAN databus ⇒ Chap. 24-9 – Test dash panel insert ⇒ Electrical System; Rep. Gr. 90.
18088 Non-resetable emergency running mode active		♦ Throttle valve control unit -J338- defective ♦ Accelerator pedal position sender -G79-, -G185- defective	♦ Engine runs in emergency operation programme	– Inspect throttle valve control unit -J338- ⇒ Chap. 24-7. – Inspect accelerator pedal position sender -G79-, -G185- ⇒ Chap. 24-7.
18097 Databus drive	Implausible signal from electron. CU	♦ Fault in CAN bus dataline ♦ Wrong or faulty vehicle voltage control unit -J519-	♦ Poor vehicle handling	– Test CAN databus ⇒ Chap. 24-9 – Inspecting vehicle voltage control unit -J519- ⇒ Electrical System; Rep. Gr. 90.

01-4 Self-diagnosis IV

Readiness code

Operation

The Readiness code is an 8-digit number code indicating the status of the diagnoses relevant for the exhaust gas.

If a system diagnosis (e.g. catalyst inspection) has been performed with success, the relevant position in the number code switches from 1 to 0.

Diagnoses are performed at regular intervals during normal driving. If repairs have been done on a system relevant for the exhaust gas it is recommended to generate the Readiness Code as this guarantees that these systems operate according to the specifications. If a fault is detected during the diagnosis it is entered in the fault memory.

The Readiness Code is erased whenever the fault memory is erased or if the power supply is interrupted.

Reading Readiness code

Special tools, test and measuring equipment and auxiliary items required

- Vehicle system tester -V.A.G 1552-
- Diagnostic cable -V.A.G 1551/3- or -V.A.G 1551/3A- or -V.A.G 1551/3B-

Work sequence

– Connect vehicle system tester -V.A.G 1552-. Switch on the ignition and select the engine control unit with „Address word“ 01 ⇒ Chap. 01-1.

– Press [1] and [5] for the function „Readiness code“ and confirm the entry with [Q].

If all diagnoses have been performed successfully, the display must indicate:

```
Readiness code                          ->
00000000 - Test complete
```

– Press [→].

– Press [0] and [6] for the function „End output“ and confirm the entry with [Q].

Read-out on display:

```
Readiness code                          ->
00101101 - Test not complete
```

If one of the foreseen diagnoses was not completed successfully.

– Press [→].

– Generate the Readiness code ⇒ **01-4** page 2.

Meaning of the 8-digit number block for the Readiness code:

X	X	X	X	X	X	X	X	Diagnosis function
0								Exhaust gas recirculation (not available/always 0)
	0							Lambda probes-heating
		0						Lambda probes
			0					Air conditioning (currently no diagnosis/always 0)
				0				Secondary air injection system (not available/always 0)
					0			Activated charcoal filter system (tank ventilation system)
						0		Catalyst heating (currently no diagnosis/always 0)
							0	Catalytic converter

Generating Readiness Code

Special tools, test and measuring equipment and auxiliary items required

- Vehicle system tester -V.A.G 1552-
- Diagnostic cable -V.A.G 1551/3- or -V.A.G 1551/3A- or -V.A.G 1551/3B-

Test conditions

- Vehicle stopped.
- All electrical consumers such as e.g. light and rear window heater must be switched off.
- On vehicles with an automatic gearbox the selector lever must be in position „P“ or „N“.
- The cooling temperature must be of at least 80°C ⇒ display group 04, display field 3.
- Intake air temperature must be below 60 °C ⇒ display group 04, display field 4.

Work sequence

– Connect vehicle system tester -V.A.G 1552-. Leave the engine on and select the engine control unit with „Address word“ 01 ⇒ Chap. 01-1.

Work step 1: Interrogating fault memory

– Press [0] and [2] for the function „Interrogate fault memory“ and confirm the entry with [Q].

The display shows the number of faults stored in the memory or „no fault detected“.

If a fault is stored in the memory:

– Refer to the fault table to remove the printed faults ⇒ Chap. 01-2.

If no fault is stored in the memory:

– Press [→].

Work step 2: Erasing fault memory

– Press 0 and 5 for the function „Erase fault memory“ and confirm the entry with Q.

Note!

The Readiness Code is reset or erased whenever the fault memory is erased.

Read-out on display:

```
Vehicle system test                  ->
Fault memory erased
```

Note!

If the ignition has been switched off between „interrogate fault memory“ and „erase fault memory“, the fault memory will not be erased.

– Press →.

Work step 3: Diagnosis of lambda probe before catalyst (ageing test)

– Press 0 and 4 for the function „Initiating basic setting“ and confirm the entry with Q.

Read-out on display:

```
Basic setting
Enter display group number XXX
```

– Press 0, 3 and 4 for „display group number 34“ and confirm the entry with Q.

Read-out on display:

```
System in basic setting        34     ->
800/min    320 °C    3.468    Test OFF
```

– Operate brake pedal

The engine control unit raises the engine speed to approx. 1400 rpm.

– Maintain this high engine speed until the display readout in display field 4 switches from „Test OFF“ to „Test ON“. The cat. temperature in display field 2 must be of at least 400 °C.

Note!

This may take a few mlnutes.

– Continue running the engine at this high speed until the nominal value „B1-S1 O.K.“ is read out in display field 4.

If the display does not occur as described:

– Interrogating fault memory ⇒ Chap. 01-1.

If the display occurs as described:

– Press →.

The engine speed drops to idling speed.

– Press 0, 3 and 0 for „display group number 30“ and confirm the entry with Q.

Read-out on display:

```
System in basic setting        30     →
  111       110
```

– Test the status of the lambda control before catalyst (display field 1).

  Nominal value: 111

– Test the status of the lambda control after catalyst (display field 2):

  Nominal value: 11X

If the nominal values are not reached:

– Interrogate fault memory ⇒ Chap. 01-1.

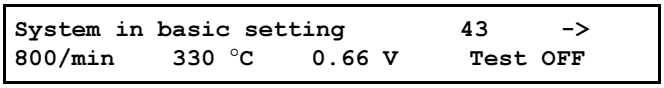
If the nominal values are reached:

– Press [→].

Work step 4: Diagnosis of lambda probe after catalyst (ageing test)

– Press [0], [4] and [3] for the function „display group number 43“ and confirm the entry with [Q].

Read-out on display:



– Operate brake pedal.

The engine control unit raises the engine speed to approx. 1400 rpm.

– Maintain this high engine speed until the display read-out in display field 4 switches from „Test OFF“ to „Test ON“. The cat. temperature in display field 2 must be of at least 400 °C.
– Maintain the speed until nominal value „B1-S2 O.K.“ is read out in display field 4.

If the nominal values are not reached:

– Interrogate fault memory ⇒ Chap. 01-1.

If the nominal values are reached:

– Press [→].

Work step 5: Diagnosis of catalyst efficiency

Note!

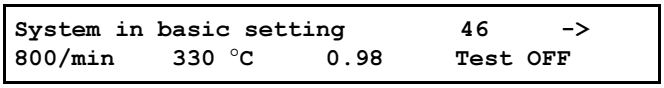
Diagnosis is only ended after the lambda probe ageing diagnosis has been successfully completed.

– Press [0] and [4] for the function „Initiating basic setting“ and confirm the entry with [Q].

Read-out on display:

– Press [0], [4] and [6] for „display group number 46“ and confirm the entry with [Q].

Read-out on display:



– Operate brake pedal.

The engine control unit raises the engine speed to approx. 1400 rpm.

– Maintain this high engine speed until the display read-out in display field 4 switches from „Test OFF“ to „Test ON“. The cat. temperature in display field 2 must be of at least 400 °C.
– Continue running the engine at this high speed until the nominal value „Cat. B1 O.K.“ is read out in display field 4.

Note!

This may take a few minutes.

If the display does not occur as described:

– Interrogating fault memory ⇒ Chap. 01-1.

If the display occurs as described:

– Press →.

The engine speed drops to idling speed.

Work step 6: Diagnosis of activated charcoal filter system

– Press 0 and 4 for the function „Initiating basic setting“ and confirm the entry with Q.

Read-out on display:

```
Basic setting
Enter display group number XXX
```

– Press 0, 7 and 0 for „display group number 70“ and confirm the entry with Q.

Read-out on display:

```
System in basic setting          70     ->
 0.0%        2.3%        0.3%      Test OFF
```

Note!

During this diagnosis no engine load must be generated as otherwise the diagnosis will be aborted; diagnosis can only be initiated again after an acceleration.

If the diagnosis is initiated by the engine control unit the display in display field 4 will switch from „Test OFF“ to „Test ON“.

– Run the engine in idle until the nominal value „TEV OK“ is displayed in display field 4.

If the display does not occur as described:

– Interrogating fault memory ⇒ Chap. 01-1.

If the display occurs as described:

– Press →.
– Read-out Readiness code ⇒ **01-4** page 1.

01-5 Self-diagnosis V

Reading measured value block

Special tools, test and measuring equipment and auxiliary items required

- Vehicle system tester -V.A.G 1552-
- Diagnostic cable -V.A.G 1551/3- or -V.A.G 1551/3A- or -V.A.G 1551/3B-

Test conditions

- The coolant temperature must be at least 80 °C.
- All electrical consumers such as e.g. rear window heater must be switched off.

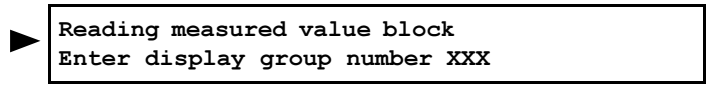
Work sequence

– Connect vehicle system tester -V.A.G 1552-. Leave the engine on and select the engine control unit with „Address word“ 01 ⇒ Chap. 01-1.

Read-out on display:

– Press 0 and 8 for the function „Reading measured value block“ and confirm the entry with Q.

Read-out on display:



– Enter display group ⇒ **01-5** page 2.

Display groups

Display group 000 in idle (engine warm, coolant temperature not below 80 °C)

Reading measured value block 0										< Read-out on display		
x	x	x	x	x	x	x	x	x	x			
1	2	3	4	5	6	7	8	9	10	< Display fields	Nominal value	corresponds to
										Initialisation value of the fuel preparation under partial load	115…141	-5…+5 %
										Initialisation value of the fuel preparation in idle	125…131	-2,25…+3 ms
										Control value of the fuel preparation	102…154	-10…+10 %
										Initialisation value idle stabilizer	115…141	-5…+5 %
										Idling regulator	115…141	-5…+5 %
										Throttle valve angle 1.0 ltr. engine 1.4 ltr. engine	 2…10 3…12	 1…5° 1,5…6°
										Vehicle voltage	120…144	11,4… 14.4 V
										Engine speed (idling speed) 1.0 ltr. engine 1.4 ltr. engine	 20…24 23…27	 630 …770 rpm 730 …870 rpm
										Disregard display	---	---
										Coolant temperature	171…217	80…115 °C

Analysis: Display group 000, display field 1 - Coolant temperature

Display -V.A.G 1552-	Possible cause of fault	Rectifying fault
less than 171	♦ Engine too cold ♦ Sender for coolant temperature -G62- or Wiring to engine control unit defective	– if necessary perform test drive – Inspecting coolant temperature sender -G62- ⇒ Chap. 24-4
above 217	♦ Radiator dirty ♦ Radiator fan not operational ♦ Coolant regulator (thermostat) defective ♦ Sender for coolant temperature -G62- or Wiring to engine control unit defective	– Clean radiator – Testing function of the radiator fan – Inspect coolant regulator (thermostat) – Inspecting Coolant temperature sender -G62- ⇒ Chap. 24-2

Analysis: Display group 000, display field 3 - Engine speed (idling speed)

Display -V.A.G 1552-	Possible cause of fault	Rectifying fault
below 20 or 23	♦ Throttle valve control unit -J338- blocks or is defective	– Inspecting throttle valve control unit -J338- ⇒ Chap. 24-7
above 24 or 27	♦ Throttle valve control unit -J338- blocks or is defective ♦ large unmetered air volume (cannot be compensated (equalised) by idle stabilizer)	– Inspecting throttle valve control unit -J338- ⇒ Chap. 24-7 – Testing intake system for tightness ⇒ Chap. 24-5

Analysis: Display group 000, display field 4 - Vehicle voltage

Display -V.A.G 1552-	Possible cause of fault	Rectifying fault
less than 120	♦ AC generator defective, battery heavily discharged ♦ Battery heavily loaded just after start by a high charge current or by auxiliary equipment ♦ Transition resistance in the power supply or earth connection for engine control unit ♦ Current consumption with ignition off	– Check voltage, charge battery ⇒ Electrical System; Rep. Gr. 27 – Increase speed for a few minutes and disconnect auxiliary consumers – Inspecting the engine control unit power supply ⇒ Chap. 24-8 – Eliminate current consumption
above 144	♦ Voltage regulator on AC generator defective ♦ Overvoltage due to starting aid or quick charger	– Inspecting AC generator ⇒ Electrical System; Rep. Gr. 27 – Interrogating fault memory ⇒ Chap. 01-1

Analysis: Display group 000, display field 5 - Throttle valve angle

Display -V.A.G 1552-	Possible cause of fault	Rectifying fault
below 2 or 3	♦ Throttle valve potentiometer or throttle valve control unit -J338- defective or incorrectly set ♦ Unmetered air between the intake manifold and the air filter (results in higher idling speed as the throttle valve control unit attempts to reduce the increased idling speed to the nominal idling speed)	– Inspecting throttle valve control unit -J338- ⇒ Chap. 24-7 – Testing intake system for tightness ⇒ Chap. 24-5
above 10 or 12	♦ Adaptation of the throttle valve control unit -J338- not carried out ♦ Throttle valve potentiometer or throttle valve control unit -J338- defective or incorrectly set ♦ Throttle valve blocked	– Perform adaptation of the throttle valve control unit -J338- ⇒ Chap. 24-8 – Inspecting throttle valve control unit -J338- ⇒ Chap. 24-7

Analysis: Display group 000, display field 6 - Idling regulator

Display -V.A.G 1552-	Possible cause of fault	Rectifying fault
below 115 above 141	Throttle valve potentiometer or throttle valve control unit -J338- defective or incorrectly set	– Inspecting throttle valve control unit -J338- ⇒ Chap. 24-7 – Perform adaptation of the throttle valve control unit -J338-

Display group 001 in idle (engine warm, coolant temperature not below 80 °C)

Reading measured value block 1 →				< Read-out on display		
xxx rpm	xxx.x °C	xx.x %	xxxxxxxx			
1	2	3	4	< Display fields	Nominal value	Analysis
				Setting condition for basic setting	1x111111	⇒ **01-5** page 4
				Lambda control before catalyst	-10,0…+10,0 %	⇒ **01-5** page 4
				Coolant temperature	80,0…115.0 °C	---
				Engine speed (idling speed) 1.0 ltr. engine 1.4 ltr. engine	 630 …770 rpm 730 …870 rpm	---

Analysis: Display group 001, display field 3 - Lambda control before catalyst

Display -V.A.G 1552-	Possible cause of fault	Rectifying fault
outside the tolerance range	Minimum range: Air-fuel mixture too rich, the lambda control leans the mixture Plus range: Air-fuel mixture too lean, lambda control enriches	– wait 30 seconds until the display has stabilised
	Unmetered air	– Testing intake system for tightness ⇒ Chap. 24-5
	Injection valve defective	– Inspecting injection valves ⇒ Chap. 24-3.

Analysis: Display group 001, display field 4 - Setting condition for basic setting

Meaning, if display positions = 1								
X	X	X	X	X	X	X	X	Operating position
1								No fault detected in self-diagnosis
	1							Disregard display
		1						Air conditioning compressor off
			1					Idling switch closed
				1				Lambda control: O.K.
					1			Throttle valve shut
						1		Speed below 2000 rpm
							1	Coolant temperature minimum 80 °C

Display group 002 in idle (engine warm, coolant temperature not below 80 °C)

Reading measured value block 2 →				< Read-out on display		
xxx rpm	xxx.x %	x.x ms	xxx mbar			
1	2	3	4	< Display fields	Nominal value	Analysis
				Disregard display	---	---
				average injection period	2,0…5.5 ms	⇒ **01-5** page 5
				Disregard display	---	---
				Engine speed (idling speed) 1.0 ltr. engine 1.4 ltr. engine	 630 …770 rpm 730 …870 rpm	---

Analysis: Display group 002, display field 3 - Injection period

Display -V.A.G 1552-	Possible cause of fault	Rectifying fault
less than 2.0 ms	♦ high fuel volume from the activated charcoal filter system ♦ Incorrect injection valve with too great flow rate fitted	– Testing activated charcoal filter system solenoid valve 1 -N80- ⇒ Chap. 01-1 – Testing injection valves ⇒ Chap. 24-3
above 5.5 ms	♦ increased engine load due to electrical consumers (air conditioning system, fog lights etc.)	– eliminate increased load (air conditioning, fog lights etc.)

Display group 003 in idle (engine warm, coolant temperature not below 80 °C)

Reading measured value block 3 →				< Read-out on display		
xxx rpm	xxx mbar	x.x %	xx.x ° b. TDC			
1	2	3	4	< Display fields	Nominal value	Analysis
				Ignition angle (actual value)	2.0 °a. TDC… 13.0 °b. TDC	---
				Throttle valve angle 1.0 ltr. engine 1.4 ltr. engine	 1,0…5,0 % 1,5…6,0 %	---
				Intake manifold pressure 1.0l ltr. engine 1.4 ltr. engine	 300...550 mbar 350...600 mbar	---
				Engine speed (idling speed) 1.0 ltr. engine 1.4 ltr. engine	 630 …770 rpm 730 …870 rpm	---

Display group 004 in idle (engine warm, coolant temperature not below 80 °C)

Reading measured value block 4 →				< Read-out on display		
xxx rpm	xx.x V	xxx.x °C	xxx.x °C			
1	2	3	4	< Display fields	Nominal value	Analysis
				Intake manifold temperature	-45,0…105 °C	---
				Coolant temperature	80,0…115.0 °C	---
				Supply voltage of the engine control unit	11,4…14.4 V	---
				Engine speed (idling speed) 1.0 ltr. engine 1.4 ltr. engine	 630 …770 rpm 730 …870 rpm	---

Display group 005 in idle (engine warm, coolant temperature not below 80 °C)

Reading measured value block 5 →				< Read-out on display		
xxx rpm	xxx.x %	xxx km/h	Text			
1	2	3	4	< Display fields	Nominal value	Analysis
				Operating condition (idling, enrichment, partial load, full load, trailing throttle)	Idling	---
				Vehicle speed	0 km/h	---
				Disregard display	---	---
				Engine speed (idling speed) 1.0 ltr. engine 1.4 ltr. engine	 630 …770 rpm 730 …870 rpm	---

Display group 011 in idle (engine warm, coolant temperature not below 80 °C)

Reading measured value block 11 →				< Read-out on display		
xxx rpm	xxx.x °C	xxx.x °C	xx.x ° b. TDC			
1	2	3	4	< Display fields	Nominal value	Analysis
				Ignition angle (actual value)	2.0 °a. TDC… 13.0 °b. TDC	---
				Intake manifold temperature	-45,0…105 °C	---
				Coolant temperature	80,0…115.0 °C	---
				Engine speed (idling speed) 1.0 ltr. engine 1.4 ltr. engine	 630 …770 rpm 730 …870 rpm	---

Display group 012 in idle (engine warm, coolant temperature not below 80 °C)

Reading measured value block 12 →				< Read-out on display		
xxx rpm	xxx %	xx	xx			
1	2	3	4	< Display fields	Nominal value	Analysis
				No. of the crankshaft gear for camshaft pressure change high - low [a]	85…91	---
				No. of the crankshaft gear for camshaft pressure change low - high [a]	25…31	---
				Disregard display	---	---
				Engine speed (idling speed) 1.0 ltr. engine 1.4 ltr. engine	 630 …770 rpm 730 …870 rpm	---

[a] If the value is outside the tolerance and if fault 16725 or 17748 has been stored in the fault memory, the voltage of the timing chain must be checked (on engines with high mileage).

Display group 020 in idle (engine warm, coolant temperature not below 80 °C)

Reading measured value block 20 →				< Read-out on display		
xx.x ° b.TDC	xx.x ° b.TDC	xx.x ° b.TDC	xx.x ° b.TDC			
1	2	3	4	< Display fields	Nominal value	Analysis
				Ignition angle relief cyl. 4	0…15.0 ° b.TDC	⇒ **01-5** page 7
				Ignition angle relief cyl. 3	0…15.0 ° b.TDC	⇒ **01-5** page 7
				Ignition angle relief cyl. 2	0…15.0 ° b.TDC	⇒ **01-5** page 7
				Ignition angle relief cyl. 1	0…15.0 ° b.TDC	⇒ **01-5** page 7

Analysis: Display group 020, display fields 1 through 4 - Ignition angle relief

Display -V.A.G 1552-	Possible cause of fault	Rectifying fault
all cylinders above 15° b. TDC	♦ Knock sensor -G61- defective	– Inspecting knock sensor 1 -G61- ⇒ Chap. 28-2
	♦ Plug connection at knock sensor -G61- corroded	– Release knock sensor -G61- and tighten to 20 Nm
	♦ Component parts on engine loose	– Attach component parts
	♦ poor fuel quality	– Change fuel type
one cylinder clearly deviates from the others	♦ Plug connection at knock sensor -G61- corroded	– Inspecting knock sensor -G61- ⇒ Chap. 28-2
	♦ Engine damage	– Testing compression pressure ⇒ 1.0/37; 1.4/44; 1.4/50 Engine -Mechanics; Rep. Gr. 15
	♦ Component parts on engine loose	– Attach component parts

Display group 026 in idle (engine warm, coolant temperature not below 80 °C)

Reading measured value block 26 →				< Read-out on display		
x.xxx V	x.xxx V	x.xxx V	x.xxx V			
1	2	3	4	< Display fields	Nominal value	Analysis
				Knock sensor voltage signal cyl. 4	0,2…2.0 V	---
				Knock sensor voltage signal cyl. 3	0,2…2.0 V	---
				Knock sensor voltage signal cyl. 2	0,2…2.0 V	---
				Knock sensor voltage signal cyl. 1	0,2…2.0 V	---

Display group 028 in idle (engine warm, coolant temperature not below 80 °C)

Reading measured value block 28 →				< Read-out on display		
xxx rpm	xxx %	xxx.x °C	Text			
1	2	3	4	< Display fields	Nominal value	Analysis
				Result knock control (Test ON / Test OFF / Syst. O.K. / Syst. N.O.K.)	Syst O.K.	---
				Coolant temperature	80,0…115.0 °C	---
				Disregard display	---	---
				Engine speed (idling speed) 1.0 ltr. engine 1.4 ltr. engine	 630 …770 rpm 730 …870 rpm	---

Display group 030 in idle (engine warm, coolant temperature not below 80 °C)

Reading measured value block 30 →				< Read-out on display		
xxx	xxx					
1	2	3	4	< Display fields	Nominal value	Analysis
				no display	---	---
				no display	---	---
				Status of lambda probe after catalyst [a]	11X	⇒ **01-5** page 9
				Status lambda probe before catalyst	111	⇒ **01-5** page 8

[a] only on engines complying with D 4 standard/EU 4 standard

Analysis: Display group 030, display field 1 - Status of lambda probe before catalyst

Meaning, if display positions = 1			
X	**X**	**X**	**Operating position**
1			Status of the lambda probe heater
	1		Operation of the lambda probe
		1	Lambda control active

Analysis: Display group 030, display field 2 - Status of lambda probe after catalyst

Meaning, if display positions = 1			
X	X	X	Operating position
1			Status of the lambda probe heater
	1		Operation of the lambda probe
		1	Disregard display

Display group 031 in idle (engine warm, coolant temperature not below 80 °C)

Engines complying with EU 2 standard

Reading measured value block 31 → x.xx V x.xx V				< Read-out on display		
1	2	3	4	< Display fields	Nominal value	Analysis
				no display	---	---
			no display		---	---
		Disregard display			---	---
	Lambda probe voltage before catalyst				0,00…1.00 V	⇒ **01-5** page 10

Analysis of display group 031, display field 1 - Lambda probe voltage before catalyst

Display field 1	Possible cause of fault	Rectifying fault
constant 0.00…0.30 V or constant 0.70…1.00 V	♦ large volume of unmetered air ♦ Spark plug defective ♦ Injection valve defective ♦ Sender for coolant temperature -G62- defective ♦ Activated charcoal filter solenoid valve defective ♦ Lambda probe heater before catalyst not operational ♦ Lambda probe before catalyst defective/ dirty	– Inspecting intake system for tightness (unmetered air) ⇒ Chap. 24-4. – Inspecting spark plugs – Inspecting cruise control system ⇒ Chap. 24-3. – Testing coolant temperature sender -G62- ⇒ Chap. 24-2. – Inspecting tank ventilation ⇒ Chap. 24-6. – Testing lambda probe signal before catalyst ⇒ Chap. 24-5.
constant 1.00 V	Short-circuit to positive terminal in: ♦ Lambda probe before catalyst ♦ Lambda probe wire ♦ Earth lead ♦ Engine control unit	– Lambda probe signal before catalyst ⇒ Chap. 24-5
between 0.40…0.50 V	Line interruption in: ♦ Lambda probe before catalyst ♦ Lambda probe wire ♦ Earth lead ♦ Engine control unit	– Lambda probe signal before catalyst ⇒ Chap. 24-5
constant 0.00 V	Short-circuit to earth in: ♦ Lambda probe before catalyst ♦ Lambda probe wire ♦ Engine control unit	– Lambda probe signal before catalyst ⇒ Chap. 24-5

Display group 031 in idle (engine warm, coolant temperature not below 80 °C)

Engines complying with D 4 standard/EU 4 standard

Reading measured value block 31 → x.xxxx x.xxxx				< Read-out on display		
1	2	3	4	< Display fields	Nominal value	Analysis
				no display	---	---
			no display		---	---
		Lambda nominal value Bank 1			0,9900…1,0100	---
	Lambda actual value Bank 1				0,9600…1,0400	---

Display group 033 in idle (engine warm, coolant temperature not below 80 °C)

Reading measured value block 33 → xx.x % / x.xxx V				< Read-out on display		
1	2	3	4	< Display fields	Nominal value	Analysis
				no display	---	---
			no display		---	---
		Disregard display			---	---
	Lambda control before catalyst				-10,0…10,0 %	⇒ **01-5** page 4

Display group 034 diagnosis of lambda probe before catalyst (ageing test)

Engines complying with D 4 standard/EU 4 standard

Mode basic setting 04

Actuate brake pedal, engine running at high idling speed

Reading measured value block 34 → xxxx rpm / xxxx °C / x.xxx / Text				< Read-out on display		
1	2	3	4	< Display fields	Nominal value	Analysis
				Result of ageing test of the lambda probe before catalyst (Test OFF / Test ON / B1 S1 O.K. / B1 S1 N.O.K.)	B1-S1 O.K.	---
			Disregard display		-	---
		Catalyst temperature			min. 400 °C	---
	Engine speed 1.0 ltr. engine 1.4 ltr. engine				1100…1700 rpm	---

Display group 043 diagnosis of lambda probe after catalyst (ageing test)

Engines complying with D 4 standard/EU 4 standard

Mode basic setting 04

Actuate brake pedal, engine running at high idling speed

Reading measured value block 43 →				< Read-out on display		
xxxx rpm	xxxx °C	x.xx V	Text			
1	2	3	4	< Display fields	Nominal value	Analysis
				Result of ageing test of the lambda probe after catalyst (Test OFF / Test ON / B1 S2 O.K. / B1 S2 N.O.K.)	B1-S2 O.K.	---
				Lambda probe voltage lambda probe after catalyst	0.00...1.00 V	---
				Catalyst temperature	min. 400 °C	---
				Engine speed 1.0 ltr. engine 1.4 ltr. engine	1100…1700 rpm	---

Display group 046 diagnosis of catalyst efficiency

Engines complying with D 4 standard/EU 4 standard

Mode basic setting 04

Actuate brake pedal, engine running at high idling speed

Reading measured value block 46 →				< Read-out on display		
xxxx rpm	xxxx °C	x.xx	Text			
1	2	3	4	< Display fields	Nominal value	Analysis
				Result of catalyst inspection (TEST OFF/TEST ON/Cat. B1 O.K./Cat. B1 N.O.K.)	Cat. B1 O.K.	---
				Catalyst efficiency	0,50...1,00	---
				Catalyst temperature	min. 400 °C	---
				Engine speed 1.0 ltr. engine 1.4 ltr. engine	1100…1700 rpm	---

Display group 050 in idle (engine warm, coolant temperature not below 80 °C)

Reading measured value block 50 →				< Read-out on display		
xxx rpm	xxx rpm	Text	Text			
1	2	3	4	< Display fields	Nominal value	Analysis
				Air conditioning compressor on, off	Compr. OFF	---
			Disregard display		---	---
		Engine speed (idling speed nominal value) 1.0 ltr. engine 1.4 ltr. engine			700 rpm 800 rpm	---
	Engine speed (idling speed) 1.0 ltr. engine 1.4 ltr. engine				630 …770 rpm 730 …870 rpm	---

Display group 054 in idle (engine warm, coolant temperature not below 80 °C)

Reading measured value block 54 →				< Read-out on display		
xxx rpm	Text	xx.x %	x.x %			
1	2	3	4	< Display fields	Nominal value	Analysis
				Disregard display	---	---
			Sender 1 for accelerator pedal position		10,0...20,0 %	---
		Operating condition (idling, enrichment, partial load, full load, overrun fuel cut-off)			Idling	---
	Engine speed (idling speed) 1.0 ltr. engine 1.4 ltr. engine				630 …770 rpm 730 …870 rpm	---

Display group 066 cruise control system (only on vehicles with cruise control system)

Reading measured value block 66 →				< Read-out on display		
xxx km/h	xxxx	xxx km/h	xxxx			
1	2	3	4	< Display fields	Nominal value	Analysis
				Switch position of the CCS control switch [a]	-	
			Driving speed (nominal); last value stored by the CCS		-	---
		Switch position of brake, clutch and CCS			0000	⇒ **01-5** page 14
	Driving speed (actual)				xxx km/h	---

[a] no diagnosis possible as yet.

Analysis: Display group 066, display field 2 - Switch for brake, clutch and CCS

X	X	X	X	Meaning, if display positions = 1
1				Cruise control system deactivated
	1			Clutch pressed (on autom. gear-box: Brake pressed)
		1		Brake pressed (brake pedal switch)
			1	Brake pressed (brake light switch)

Inspecting clutch pedal switch ⇒ Chap. 24-9

Testing brake light switch and brake pedal switch ⇒ Chap. 24-9

Inspecting cruise control system ⇒ Chap. 24-9

24 – Fuel preparation, injection

24-1 Fuel Injection System

Safety measures

⚠ Warning!

The fuel system is under pressure! Place a cloth around the connecting point before releasing hose connections or when opening the system. Then reduce the pressure by carefully removing the hose or cap.

Observe the following points to prevent injury to persons and/or damage to the injection and ignition system:

- Do not touch or remove ignition leads with the engine running or at start speed.
- Do not disconnect and connect wires of the injection and ignition system and measuring device wires unless the ignition is switched off.
- To operate the engine at start speed without the engine starting (e.g. testing compression pressure), unplug connectors from the ignition unit and connectors from the injectors. After performing the work interrogate fault memory and erase.
- Do not carry out engine wash unless the ignition is switched off.
- Switch off the ignition before disconnecting and connecting the battery, as this may damage the 4AV control unit.

If test and measuring devices are required during test drives observe the following:

- Always secure the test and measuring devices on the rear seat and have a second person operate them there. If the test and measuring devices are operated from the passenger seat the passenger could be injured by the release of the passenger airbag in the event of an accident.

Cleanliness rules

Carefully observe the following rules for cleanliness when working on the fuel supply/injection system:

- Thoroughly clean the connection points and their surroundings before releasing.
- Place removed parts on a clean surface and cover. Do not use fuzzy cloths!
- Carefully cover or close opened components if the repair is not completed immediately.

- Only install clean parts: Remove spare parts from their wrapping immediately before fitting. Do not use parts which have been stored unwrapped (e.g. in tool boxes and the like).
- When the system is open: Avoid using compressed air. Avoid moving the vehicle.
- Electrical plug connections which have been separated: Protect from dirt and moisture. Plug together only if dry.

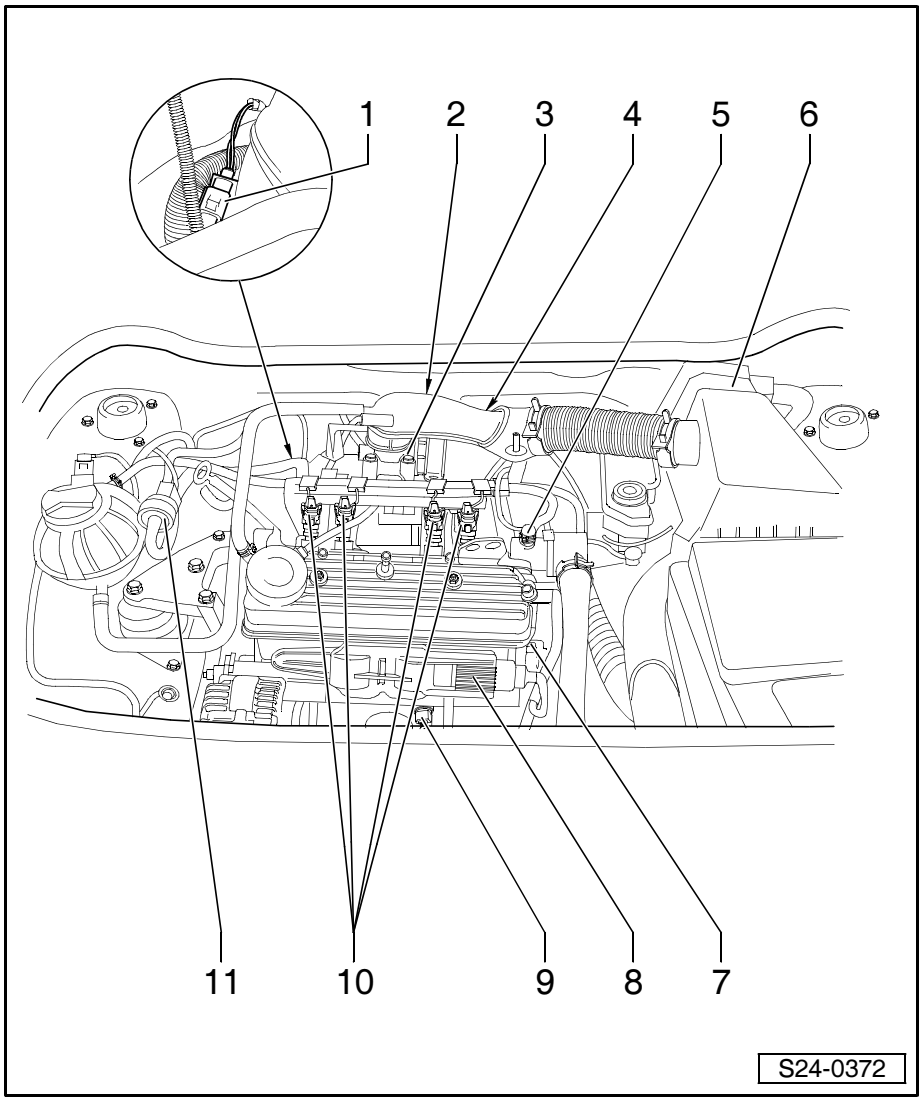
Technical data

Engine identification characters		ARV, AQV	AME, ATZ, AQW, AZE, AZF
Displacement		1.0 l	1.4 l
Idling speed [a]		630…770 rpm	730…870 rpm
Speed limiter by disconnecting the injectors		approx. 5800 rpm	approx. 5800 rpm
Fuel pressure at idling speed		approx. 0.3 MPa (3 bar)	approx. 0.3 MPa (3 bar)
Injection valve	Injection jet	equal for all valves	equal for all valves
	Resistance (ambient temperature) [b]	14...20 Ω	14...20 Ω

[a] Speed not adjustable

[b] If the engine is warm the resistance of the injection valves increases by approx. 4…6Ω.

Overview of fitting location



1 - Plug connection
- ❑ for lambda probe -G39- and heating for lambda probe -Z19- before catalyst
- ❑ 4 pin: on engines complying with EU 2 standard
- ❑ 6 pin: on engines complying with D 4 standard/EU 4 standard

2 - Intake manifold pressure sender -G71- with intake manifold temperature sender -G72-
- ❑ under throttle valve

3 - Throttle valve control unit -J338-
- ❑ with throttle valve drive -G186-, throttle valve drive angle sender 1 -G187- and throttle valve drive angle sender 2 -G188-.

4 - Knock sensor 1 -G61-
- ❑ in cylinder block, on left below exhaust manifold

5 - Sender for coolant temperature -G62-

6 - Engine control unit -J361-
- ❑ at bulkhead plenum chamber

7 - Engine speed sender -G28-
- ❑ in gearbox housing

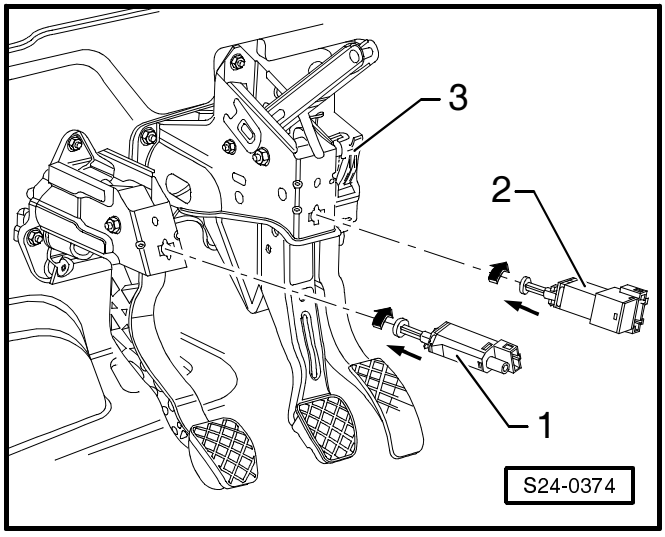
8 - Ignition terminal -N152- (ignition transformer with power amplifier)

9 - Camshaft position sensor -G163-
- ❑ in cylinder pad

10 - Injection valve -N30...N33-

11 - Activated charcoal filter system solenoid valve 1 -N80-

Fig. 1: Overview of fitting location of pedal assembly ➢



1 - Clutch pedal switch -F36-

2 - Brake light switch -F- and Brake pedal switch -F47-

3 - Accelerator pedal position sender -G79- and accelerator pedal position sender 2 -G185-

Fig. 2: Fitting location of EPC warning lamp -arrow- (fault lamp for electronic power control -K132-)

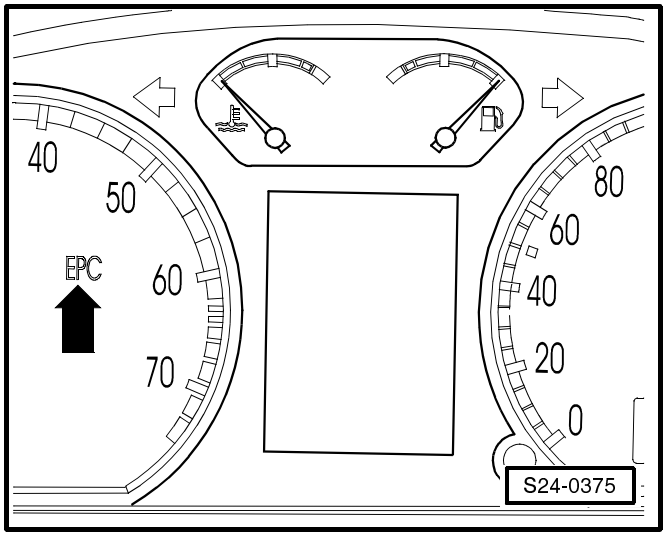
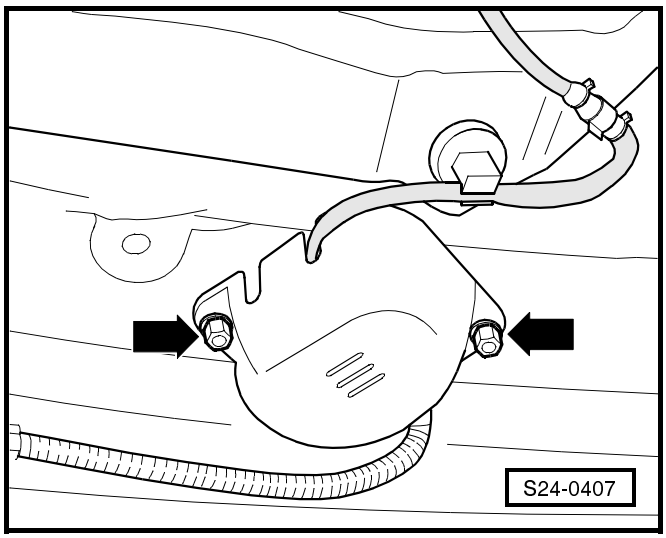


Fig. 3: Fitting location 4-pin plug connection for lambda probe and lambda probe heating after catalyst (only on engines complying with D 4 standard/EU 4 standard)



The 4-pin plug connection for lambda probe after catalyst -G130- and heater for lambda probe -Z29- can be reached by unscrewing the protective cover -arrows-.

General notes on the injection system

Repairing the ignition ⇒ Rep. Gr. 28.

The 4AV control unit is equipped with a self-diagnosis. Before repairs as well as for fault finding first interrogate the fault memory. Also check the vacuum hoses and connections (unmetered air).

Components marked with an * are checked by self-diagnosis ⇒ Chap. 01-1.

Components marked with ** can be checked with the final control diagnosis ⇒ Chap. 01-1.

A minimum voltage of 11.5 V is required for the perfect functioning of the electric components.

If after fault finding, repair or inspection of components the engine starts briefly and then stops, it is possible that the immobiliser blocks the 4AV control unit. Then interrogate the fault memory and if necessary adapt the control unit.

Certain inspections may cause the control unit to detect and store a fault. It is therefore necessary to interrogate the fault memory after having completed all inspections and repairs, and if necessary erase ⇒ Chap. 01-1.

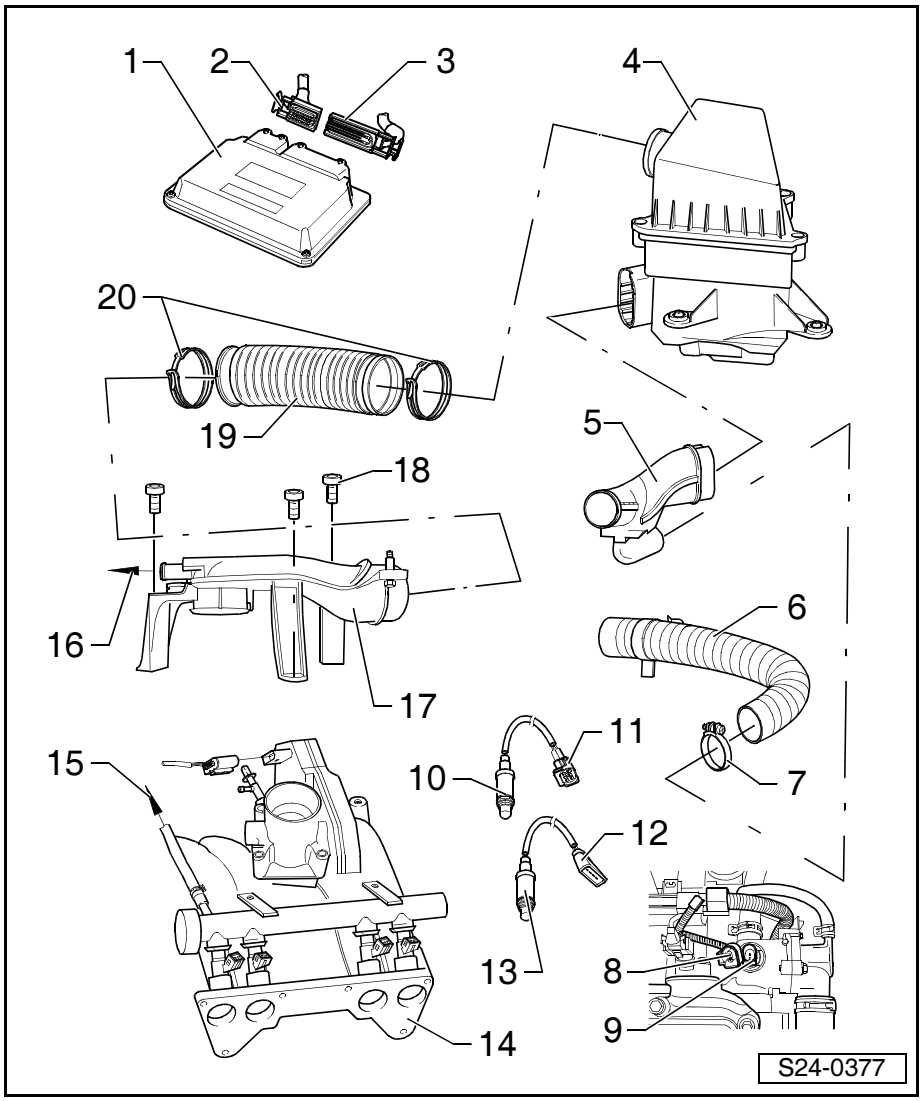
Safety measures ⇒ **24-1** page 1

Cleanliness rules ⇒ **24-1** page 1

Technical data ⇒ **24-1** page 2

Test data, spark plugs ⇒ Chap. 28-1

Removing and installing parts of the injection system



1 - 4AV Control unit -J361-*
- ❑ Fitting location: Bulkhead plenum chamber
- ❑ clipped into holder
- ❑ replacing ⇒ Chap. 24-8

2 - Connector, 40 pins
- ❑ Insert or remove plug when the ignition is switched off.
- ❑ unlock to remove

3 - Connector, 81 pins
- ❑ Insert or remove plug when the ignition is switched off.
- ❑ unlock to remove

4 - Air filter
- ❑ disassembling and assembling ⇒ **24-1** page 8
- ❑ removing and installing ⇒ **24-1** page 8

5 - Air intake pipe with control flap

6 - Hot-air intake hose

7 - Screw clamps, 2 Nm

8 - Connector
- ❑ for coolant temperature sender -G62-

9 - coolant temperature sender -G62-*
- ❑ before removing, if necessary reduce pressure in cooling system
- ❑ inspecting ⇒ Chap. 24-2

10 - Lambda probe -G39-*, 50 Nm
- ❑ Fitting location: exhaust tube front
- ❑ Only grease the thread with -G 052 112 A3 -; -G 052 112 A3 - must not come into contact with the slots of the probe body
- ❑ use ring spanner (e.g. -3337-) for removing and installing
- ❑ Inspecting lambda control ⇒ Chap. 24-5

11 - Connector
- ❑ for lambda probe and lambda probe heating before catalyst
- ❑ 4 pin: on engines complying with EU 2 standard
- ❑ 6 pin: on engines complying with D 4 standard/EU 4 standard

12 - Connector, 4 pin:
- ❑ for lambda probe and lambda probe heating after catalyst (only on engines complying with D 4 standard/EU 4 standard)

13 - Lambda probe -G130-*, 50 Nm

(only on engines complying with D 4 standard/EU 4 standard)
- ❑ Fitting location: in exhaust pipe after catalyst
- ❑ Only grease the thread with -G 052 112 A3 -; -G 052 112 A3 - must not come into contact with the slots of the probe body
- ❑ use ring spanner for removing and installing
- ❑ Testing lambda probe after catalyst ⇒ Chap. 24-5

14 - Intake manifold
- ❑ disassembling and assembling ⇒ **24-1** page 7

15 - Fuel-intake hose
- ❑ white marking
- ❑ secure on fuel rail with spring strap clamps

16 - from crankcase ventilation

17 - Air intake pipe
- ❑ via the throttle valve control unit

18 - 8 Nm

19 - Air intake hose

20 - Spring strap clip
- ❑ disassemble and assemble with pliers for spring strap clamps

Disassembling and assembling fuel distributor with injectors

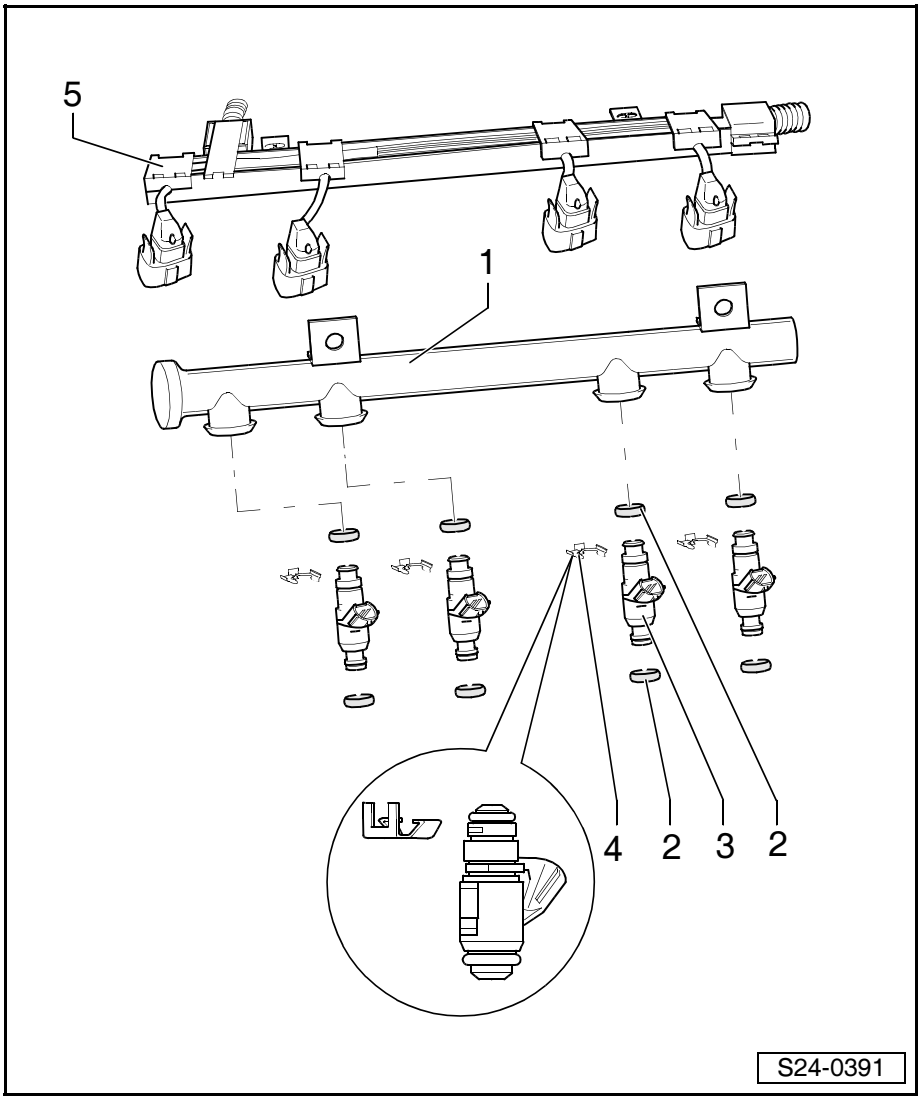
1 - Fuel distributor

2 - O-ring
- ❑ replace if damaged

3 - Injection valve -N30...N33-*
- ❑ inspecting ⇒ Chap. 24-3
- ❑ Resistor 14...20 Ω

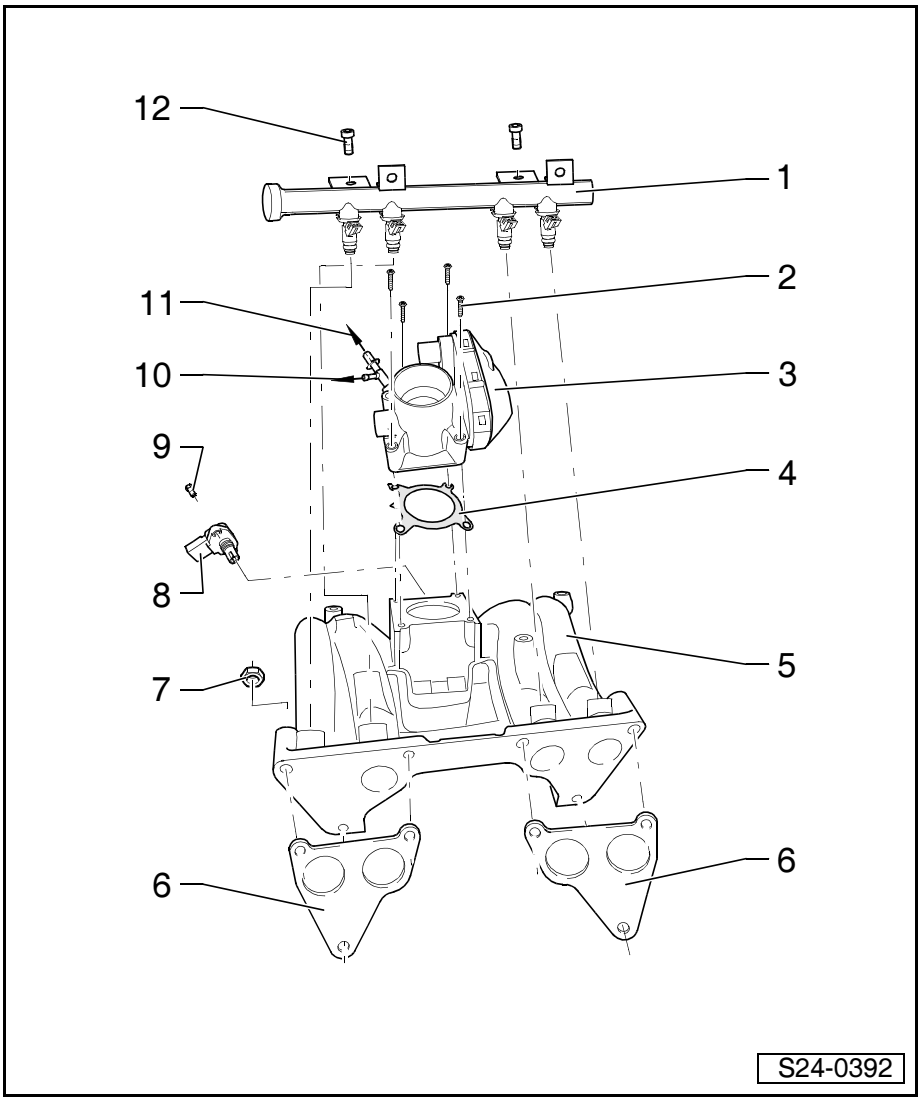
4 - Retaining clip
- ❑ check tightness on injector and fuel distributor

5 - Edge connector
- ❑ for injection valves, throttle valve control unit and intake manifold pressure and temperature sender



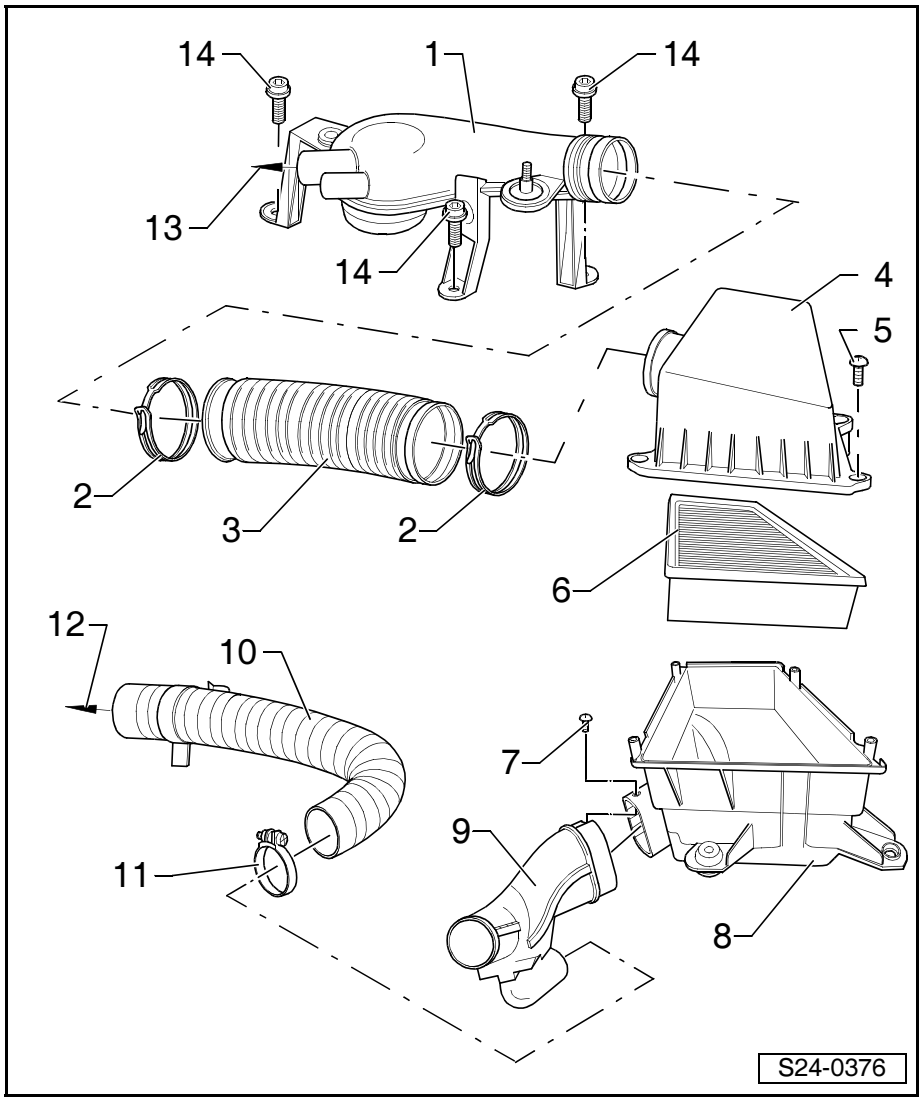
Disassembling and assembling intake manifold

- **1 - Fuel distributor**
  - ❑ disassembling and assembling ⇒ **24-1** page 6
- **2 - 10 Nm**
- **3 - Throttle valve control unit -J338-***
  - ❑ inspecting ⇒ Chap. 24-7
  - ❑ with throttle valve drive -G186-, throttle valve drive angle sender 1 -G187- and throttle valve drive angle sender 2 -G188-.
- **4 - Gasket**
  - ❑ replace
- **5 - Intake manifold**
- **6 - Gasket**
  - ❑ replace
- **7 - 25 Nm**
- **8 - Intake manifold pressure sender -G71-* with intake manifold temperature sender -G72-**
- **9 - 10 Nm**
- **10 - for crankcase ventilation**
- **11 - for Activated charcoal filter system solenoid valve 1 -N80-**
  - ❑ Activated charcoal filter system ⇒ 1.0/37; 1.4/44, 1.4/50 Engine, Mechanics; Rep. Gr. 20
- **12 - 20 Nm**



Disassembling and assembling the air filter

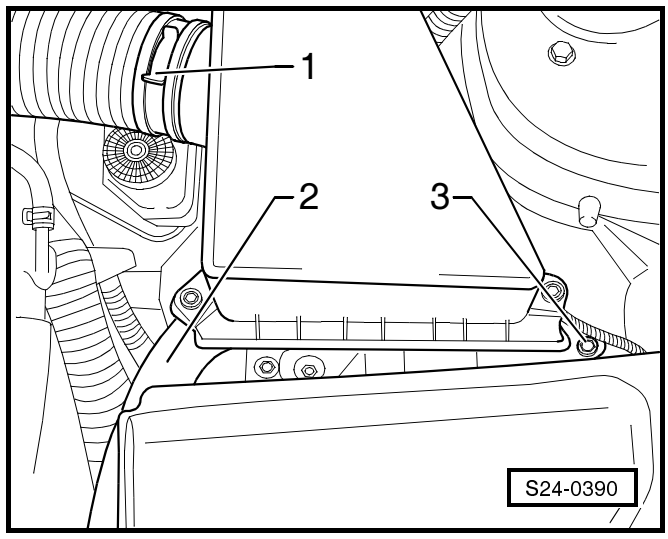
1 - Air intake pipe
2 - Spring strap clip
3 - Air intake hose
4 - Air filter top part
5 - 10 Nm
6 - Filter insert
7 - 4 Nm
8 - Air filter bottom part
9 - Air intake pipe with control flap
10 - Hot-air intake hose
11 - Screw clamps, 2 Nm
12 - for crankcase ventilation
13 - 8 Nm



Removing and installing air filter

Removing

- Release the spring strap clamp -1- from the intake hose and remove from air filter.
- Remove the air intake pipe with control flap -2- from the air filter.
- Unscrew the fixing screw -3- from the air filter (tightening torque 8 Nm).
- Carefully remove air filter from the top.



Installing

Note!

Pay attention to the correct positioning of the mounting buffer on the bottom part of the air filter (front and rear side).

Installation of the air filter occurs in reverse order.

24-2 Testing components

Testing lines and components with test box -V.A.G 1598/31-

The test box -V.A.G 1598/31- is designed in such a way that it can be simultaneously connected to the wiring loom of the engine control unit and to the actual engine control unit.

The advantage being that the electronic engine control remains fully operational with the test boxconnected (e.g. measuring signals while the engine is running).

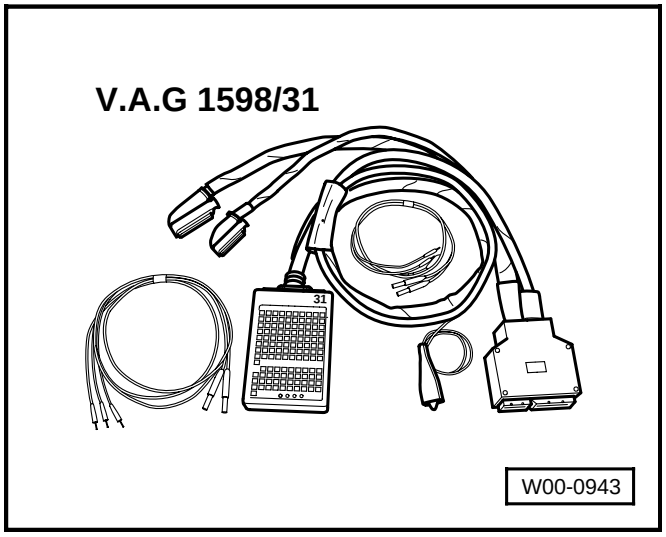
Whether or not the engine control unit must also be connected to the test box is described in the relevant test sequences.

To connect the measuring tools (e.g. handheld multimeter -V.A.G 1526 A- etc.) always use measuring tool set -V.A.G 1594 A-.

The contact numbers of the connectors and the bush numbers of the test box -V.A.G 1598/31- correspond.

Special tools, test and measuring equipment and auxiliary items required

- Test box -V.A.G 1598/31-



Caution!

To avoid damaging the electronic components, switch on the relevant measuring range before connecting the measuring cables and comply with the test conditions.

– Switch off the ignition.

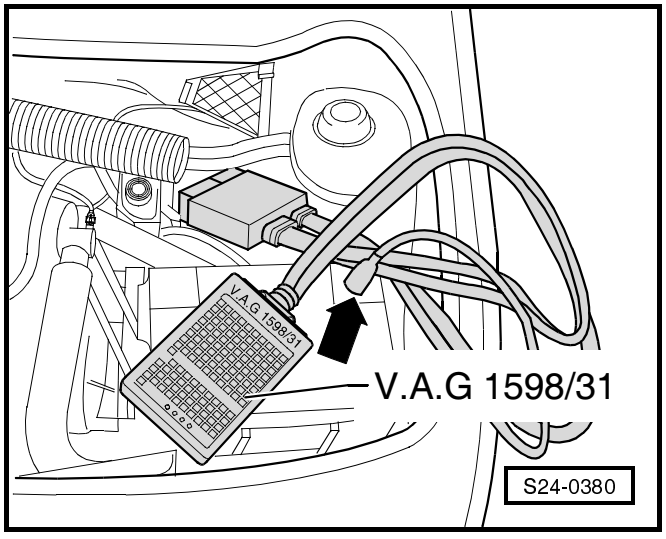
– Remove the air filter ⇒ Chap. 24-1.

– Release the plug latches and remove the control unit plugs from the engine control unit.

– Connect the test box -V.A.G 1598/31- to both connectors of the wiring loom. The earth clip -arrow- of the test box must be connected to the negative battery terminal.

  Whether or not the engine control unit must also be connected to the test box is described in the relevant test sequences.

– Perform test as described in the relevant repair sequences.



Note!

After re-connecting the engine control unit, interrogate and if necessary erase fault memory ⇒ Chap.01-1.

Testing fuel pump relay -J17-

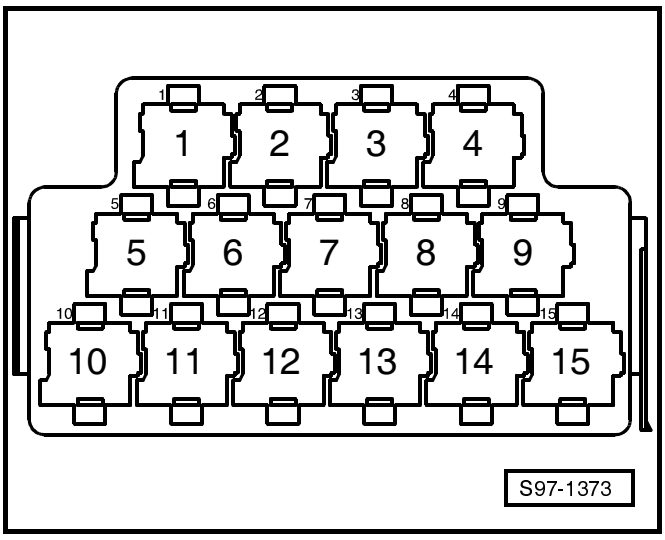
The power supply of the fuel pump and some components of the injection system occurs via fuel pump relay -J17-.

Fitting location:

The fuel pump relay -J17- is located on the relay carrier ► on the left in the driver's footwell.

➢ 01.00 plug location 15

02.00 ➢ Plug location 4



Special tools, test and measuring equipment and auxiliary items required

- Vehicle system tester -V.A.G 1552-
- Diagnostic cable -V.A.G 1551/3- or -V.A.G 1551/3A- or -V.A.G 1551/3B-
- Hand multimeter (e.g. -V.A.G 1526 A-)
- Adapter cable set (e.g. -V.A.G 1594 A-)
- Test box -V.A.G 1598/31-

Test condition

- Battery voltage at least 11.5 V

Inspect proper operation

– Remove the bottom part of the dash panel on the driver's side ⇒ Body Work; Rep. Gr. 70.

– Connect vehicle system tester -V.A.G 1552-. Switch on the ignition and select the engine control unit with „Address word“ 01 ⇒ Chap. 01-1.

– Initiate final control diagnosis ⇒ Chap. 01-1 and control the fuel pump relay -J17-.

The fuel pump relay must be activated and the fuel pump must run.

If the relay is not activated:

– Test control of fuel pump relay -J17- ⇒ **24-2** page 2.

If the fuel pump does not run:

– Check power supply of fuel pump and connected components (via the fuel pump relay) ⇒ **24-2** page 3.

– Testing fuel pump ⇒ 1.0/37; 1.4/44; 1.4/50 Engine - Mechanics; Rep. Gr. 20.

Test control

– Switch off the ignition.

– Connect the test box -V.A.G 1598/31- to the wiring loom on the engine control unit ⇒ **24-2** page 1.

– Using an adpater cable from -V.A.G 1594 A- interconnect bush 80 and bush 2 of the test box.

– Switch on the ignition.

The fuel pump relay must be activated.

If the relay is now activated but did not open during the final control diagnosis:

– Replace the motronic control unit ⇒ Chap. 24-8.

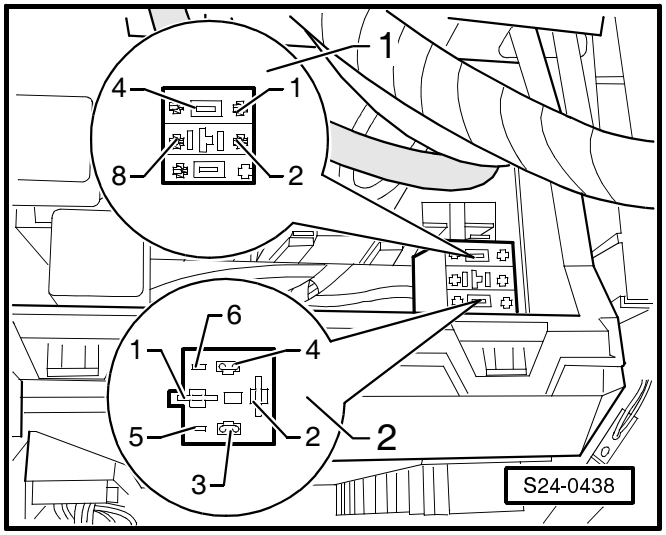
If the relay is not activated:

– Switch off the ignition.
– Remove the fuel pump relay from the relay base.

  ➤ 01.00 Relay base 1

  02.00 ➤ Relay base 2

– Connect the multimeter for voltage measurement consecutively to contact 2 (➤ 01.00) or contact 1 (02.00➤) and earth as well as contact 4 (➤ 01.00) or contact 3 (02.00➤) and the earth of the relay carrier.



– Switch on the ignition.

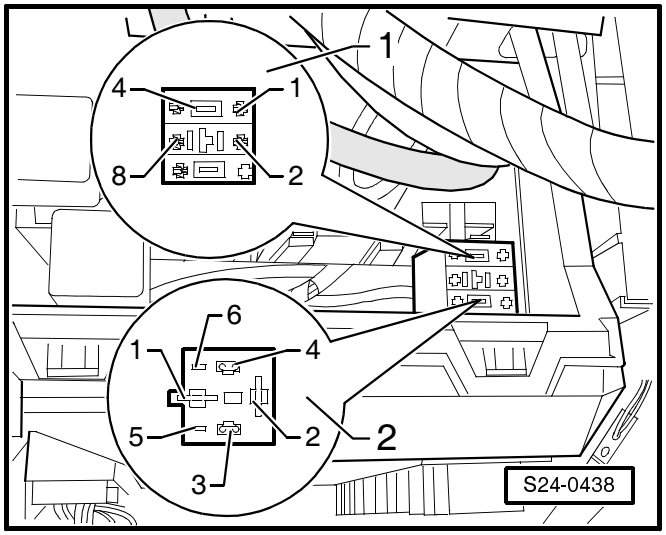
  Nominal value: approx. battery voltage

If the nominal values are not reached:

– Check the wiring ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations.

If the nominal values are reached:

– Switch off the ignition.
– Check the following wiring for interruption or short-circuit to earth or positive:

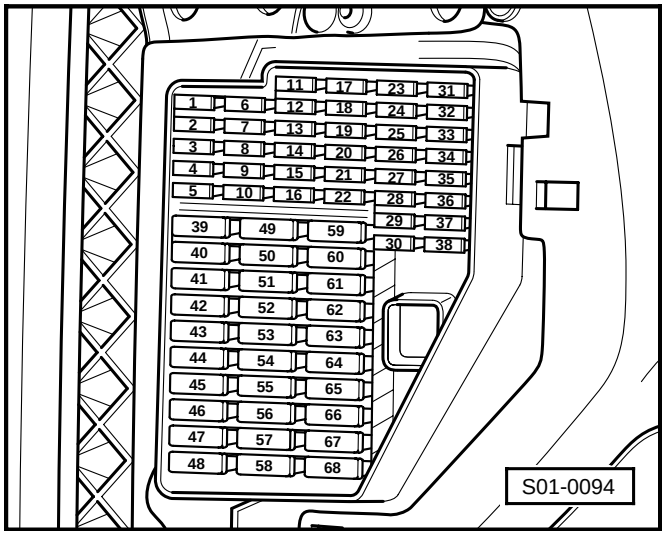


Relay carrier in left driver's footwell, relay base, contact		test box -V.A.G 1598/31- contact
➤ 01.00	1	80
02.00 ➤	5	80

– if necessary eliminate wire interruption or short-circuit.
– If the wiring is O.K. replace the fuel pump relay -J17-.

Inspecting voltage supply on fuel pump and components

– Pull out fuses No. 9, 24, 35 and 61 from the fuse holder.



– Initiate final control diagnosis ⇒ Chap. 01-1 and control the fuel pump relay -J17-.
– Connect the multimeter for voltage measurement to earth and to a contact of the following fuses in the fuse holder.

Retaining clip	Nominal value on one of the contacts
9	approx. battery voltage
24	approx. battery voltage
35	approx. battery voltage
61	approx. battery voltage

If the nominal values are not reached:

– Repeat test on the other contact of the fuse base.

If the nominal values are again not reached:

– Check the wiring ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations.
– If the wiring is O.K. replace the fuel pump relay -J17-.
– Re-insert the fuses.

Testing Intake manifold pressure sender -G71-

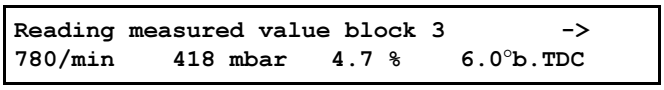
Special tools, test and measuring equipment and auxiliary items required

- Vehicle system tester -V.A.G 1552-
- Diagnostic cable -V.A.G 1551/3- or -V.A.G 1551/3A- or -V.A.G 1551/3B-
- Hand multimeter (e.g. -V.A.G 1526 A-)
- Adapter cable set (e.g. -V.A.G 1594 A-)
- Test box -V.A.G 1598/31-

Test sequence

– Connect vehicle system tester -V.A.G 1552-. Leave the engine on and select the engine control unit with „Address word“ 01 ⇒ Chap. 01-1.
– Select function 08 „read measured value block“ and display group number 003.

Read-out on display:

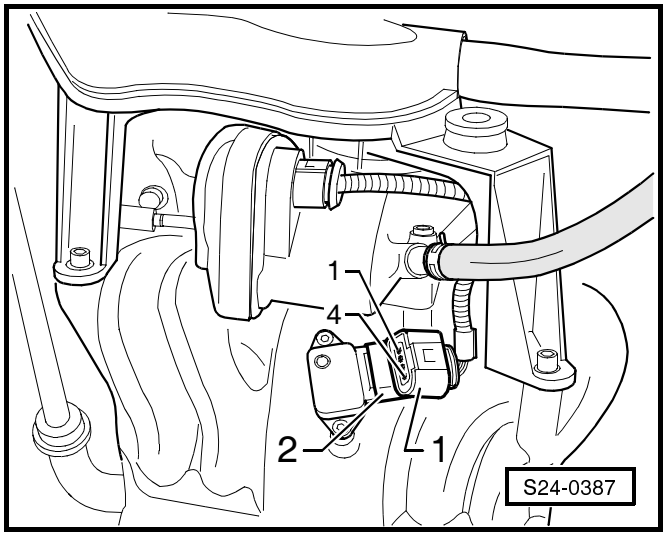


– Read off intake manifold pressure in display field 2.

Nominal value:
1.0 ltr./engine: 300 to 550 mbar
1.4 ltr. engine: 350 to 600 mbar

If the nominal values are not reached:

– Select function 06 „End output“ and confirm entry with Q.
– Switch off the ignition.
– Remove plug -1- from the intake manifold pressure sender -G71- with intake manifold temperature sender -G72- -2-.
– Switch on the ignition.



– Connect the multimeter for voltage measurement as follows:

4-pin plug on wiring loom, contact	Nominal value
3 + 4	approx. 5 V
3 + earth	approx. 5 V

If the nominal values are reached:

– Check the wiring for short-circuit to pos. term.

If no short-circuit is found:

– Replace theintake manifold pressure sender -G71- with the intake manifold temperature sender -G72- ⇒ Chap. 24-1.

If the nominal values are not reached:

– Switch off the ignition.

– Connect the test box -V.A.G 1598/31- to the wiring loom on the engine control unit ⇒ **24-2** page 1.

– Check the following wires for interruption or short-circuit to earth or positive:

4-pin plug on wiring loom, contact	test box -V.A.G 1598/31-, bush
3	96
4	95

– Also test the wires for short-circuits.

– if necessary eliminate wire interruption or short-circuit.

If the wires are not found to be faulty:

– Replace the motronic control unit ⇒ Chap. 24-8.

Testing Intake manifold temperature sender -G72-

Special tools, test and measuring equipment and auxiliary items required

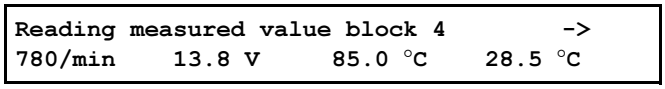
- Vehicle system tester -V.A.G 1552-
- Diagnostic cable -V.A.G 1551/3- or -V.A.G 1551/3A- or -V.A.G 1551/3B-
- Hand multimeter (e.g. -V.A.G 1526 A-)
- Adapter cable set (e.g. -V.A.G 1594 A-)
- Test box -V.A.G 1598/31-
- Refrigerant spray (commercially available)

Test sequence

– Connect vehicle system tester -V.A.G 1552-. Leave the engine on and select the engine control unit with „Address word“ 01 ⇒ Chap. 01-1.

– Select function 08 „read measured value block“ and display group number 004.

Read-out on display:



– Read off intake manifold temperature in display field 4.

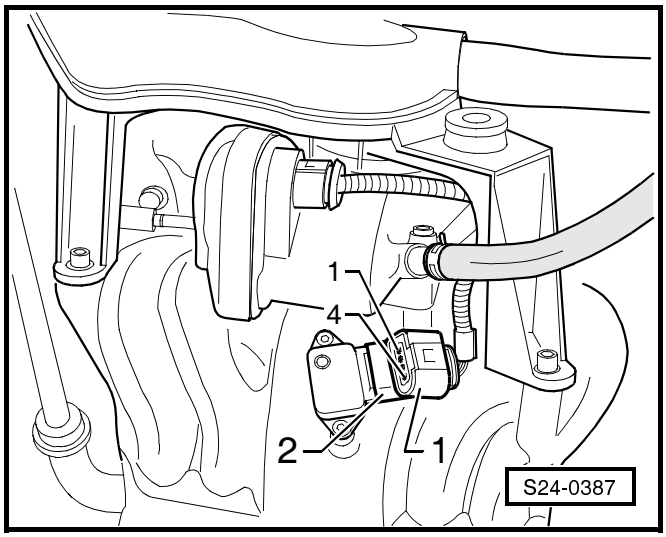
  Nominal value: approx. ambient temperature

– Remove the intake manifold temperature sender -G72- with the intake manifold pressure sender -G71- (plug remains in position).
– Note down the intake manifold temperature value in display field 4.
– Spray the sender with a commercially available refrigerant spray and while doing so observe the temperature value.

The temperature value must drop.

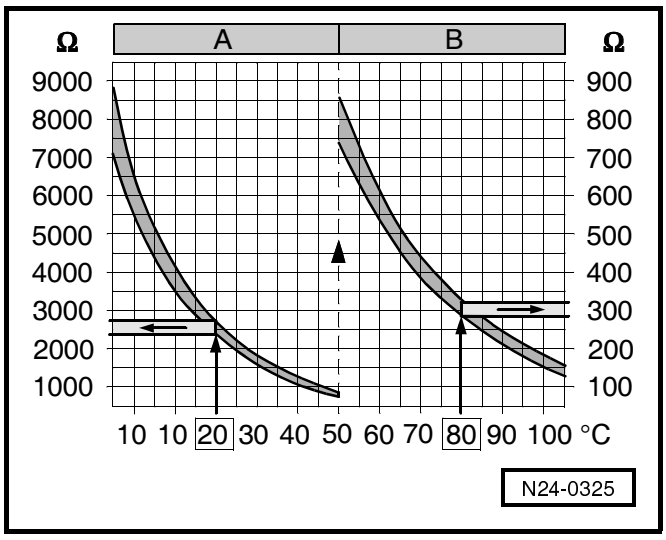
If the nominal values are not reached:

– Select function 06 „End output“ and confirm entry with Q.
– Remove plug -1- from the intake manifold temperature sender -G72- with intake manifold pressure sender -G71- -2-.



– Connect the multimeter to measure the resistance on contacts 1 and 2 of the sender -2-.

Nominal value see diagram:



Range -A- indicates the resistance values for the temperature range 0.…50 °C.

Range -B- indicates the resistance values for the temperature range 50.…100 °C.

Read out examples:

- 20 °C corresponds to a resistance of 2340…2680 Ω
- 80 °C corresponds to a resistance of 290…330 Ω

If the nominal value is not reached:

– Replace theintake manifold temperature sender -G72- with the intake manifold pressure sender -G71- ⇒ Chap. 24-1.

If the nominal value is reached:

– Connect the test box -V.A.G 1598/31- to the wiring loom on the engine control unit ⇒ **24-2** page 1.
– Check the following wires for interruption or short-circuit to earth or positive:

4-pin plug on wiring loom, contact	test box -V.A.G 1598/31-, bush
1	107
2	93

– Also test the wires for short-circuits.

– if necessary eliminate wire interruption or short-circuit.

If no fault is found:

– Replace the motronic control unit ⇒ Chap. 24-8.

Testing Coolant temperature sender -G62-

Special tools, test and measuring equipment and auxiliary items required

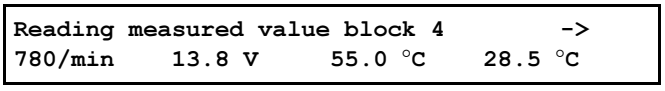
- Vehicle system tester -V.A.G 1552-
- Diagnostic cable -V.A.G 1551/3- or -V.A.G 1551/3A- or -V.A.G 1551/3B-
- Hand multimeter (e.g. -V.A.G 1526 A-)
- Adapter cable set (e.g. -V.A.G 1594 A-)
- Test box -V.A.G 1598/31-

Test sequence

– Connect vehicle system tester -V.A.G 1552-. Leave the engine on and select the engine control unit with „Address word“ 01 ⇒ Chap. 01-1.

– Select function 08 „read measured value block“ and display group number 004.

Read-out on display:



– Read off coolant temperature in display field 3.

Nominal value: the temperature reading must rise evenly

Note!

- *If the display on the vehicle system tester is around 2…5 °C, this is dependent on the control unit and does not indicate a defective sender.*
- *If defects in the engine running are found in certain temperature ranges and if the temperature value does not rise without interruption, the temperature signal is temporarily interrupted and the sender must be replaced.*

In the event of a fault approx. -40.5 °C or 139.5 °C is displayed instead.

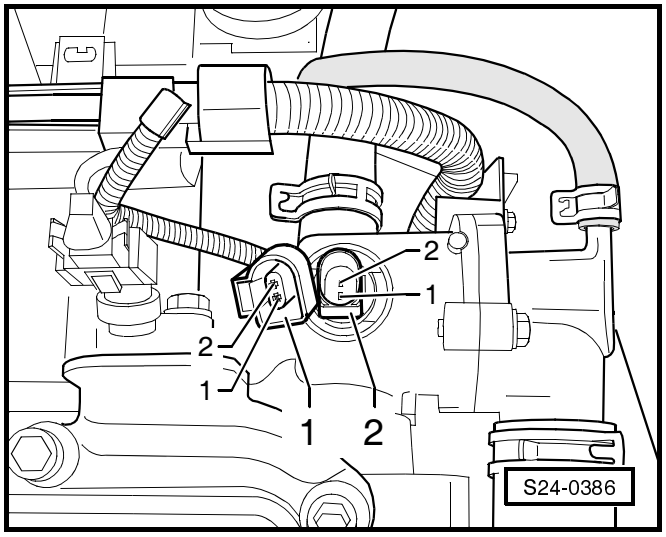
If no realistic value is displayed in display field 3 or if approx. -40.5 °C or 139.5 °C is displayed instead:

– Select function 06 „End output“ and confirm entry with Q.

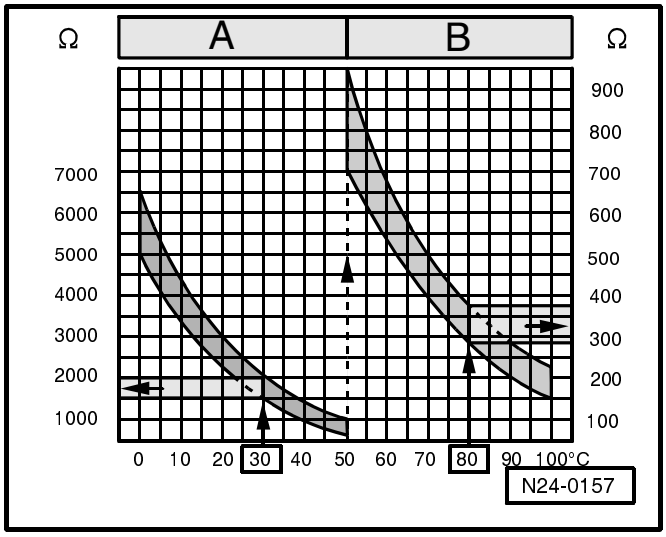
– Switch off the ignition.

– Disconnect plug -1- from Coolant temperature sender -G62- -2-.

– Connect the multimeter to measure the resistance on both contacts of the Coolant temperature sender -G62- -2-.



Nominal value see diagram:



Range -A- indicates the resistance values for the temperature range 0…50 °C, range -B- indicates the values for temperature range 50…100 °C.

Read out examples:

- 30 °C corresponds to a resistance of 1500…2000Ω
- 80 °C corresponds to a resistance of 275…375 Ω

If the nominal value is not reached:

– Replace the Coolant temperature sender -G62-.

If the nominal value is reached:

– Connect the test box -V.A.G 1598/31- to the wiring loom on the engine control unit ⇒ **24-2** page 1.
– Check the following wires for interruption or short-circuit to earth or positive:

2-pin plug on wiring loom, contact	Test box -V.A.G 1598/ 31-, bush
1	104
2	83

– Also test the wires for short-circuits.
– if necessary eliminate wire interruption or short-circuit.

If no fault is found:

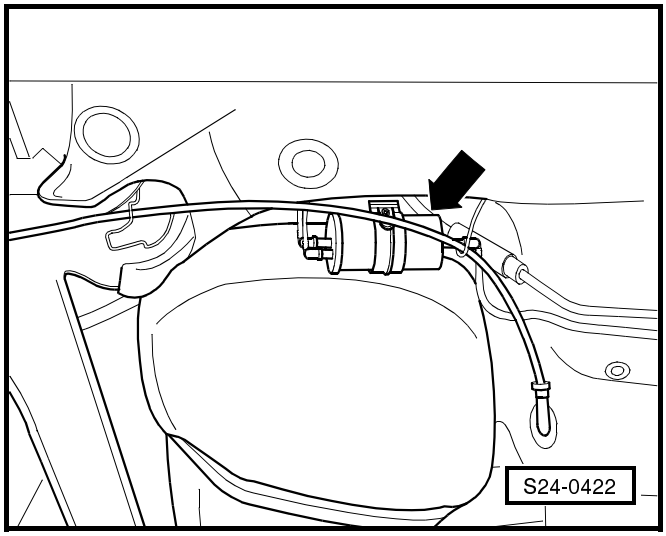
– Replace the motronic control unit ⇒ Chap. 24-8.

Inspecting fuel filter with pressure control valve

The fuel filter and the pressure control valve are integrated in a component.

Fitting location:

The fuel filter with pressure control valve -arrow- is located on the right of the fuel tank.



Special tools, test and measuring equipment and auxiliary items required

- Pressure gauge appliance(e.g. -V.A.G 1318 -)
- Adapter (e.g. -V.A.G 1318/10 -)
- Adapter (e.g. -V.A.G 1318/11 -)
- Adapter (e.g. -V.A.G 1318/16 -)

Test conditions

- Fuel pump relay O.K., inspecting ⇒ Chap. 01-1
- Testing flow rate of the fuel pump O.K. ⇒ 1.0/37; 1.4/44; 1.4/50 Engine -Mechanics; Rep. Gr. 20
- Line connections or fuel lines from the fuel filter with pressure control valve to fuel rail O.K.

Test sequence

Warning!

The fuel system is under pressure! Place a cloth around the connecting point before releasing hose connections or when opening the system. Then reduce the pressure by carefully removing the hose or cap.

– Remove fuel feed line -1- from the connection to the fuel rail -2- and connect to pressure gauge appliance -V.A.G 1318- mit Adapter -V.A.G 1318/16- und -V.A.G 1318/11-.

– Connect the pressure gauge appliance -V.A.G 1318- to the fuel rail -2- with Adapter -V.A.G 1318/10-. Open the shutoff cock of the pressure gauge appliance (lever in flow dircetion -arrow-).

– Start engine and run in idle.

– Measure fuel pressure.

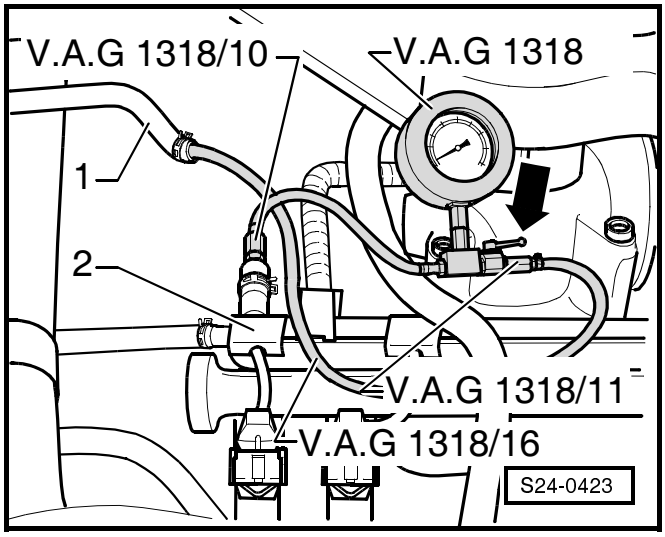
  Nominal value: 2.9 bar... 3.1 bar (0.29 MPa...0.31 MPa)

If the nominal value is not reached:

– Testing fuel pump ⇒ 1.0/37; 1.4/44; 1.4/50 Engine - Mechanics; Rep. Gr. 20

If the fuel pump is O.K.

– Replace fuel filter with pressure control valve ⇒ 1.0/37; 1.4/44; 1.4/50 Engine - Mechanics; Rep. Gr. 20



Note!

Before removing the pressure gauge appliance reduce fuel pressure by opening the shutoff cock. While doing so grip vessel before the connection.

24-3 Testing injection valves

Inspecting the voltage supply, control and resistances of the injectors

Special tools, test and measuring equipment and auxiliary items required

- Hand multimeter (e.g. -V.A.G 1526 A-)
- Diode test lamp (e.g. -V.A.G 1527 B-)
- Adapter cable set (e.g. -V.A.G 1594 A-)
- Test box -V.A.G 1598/31-

Test conditions

- Fuse No. 35, O.K.
- Earth connections between the engine (on clutch housing) and body (under battery) must be O.K.
- Battery voltage at least 11.5 V
- Inspecting Engine speed sender O.K. ⇒ Chap. 28-2
- Fuel pump relay O.K., inspecting ⇒ Chap. 24-2

Test sequence

– Remove engine cover as follows:

- Release logo -2- and cap -3-.
- Release nuts -4- (5 Nm).
- Pull out oil dipstick -6-.
- Remove engine cover -1- towards the top (do not unscrew cap -5-).

– Unplug connector -1- from the injectors -2-.

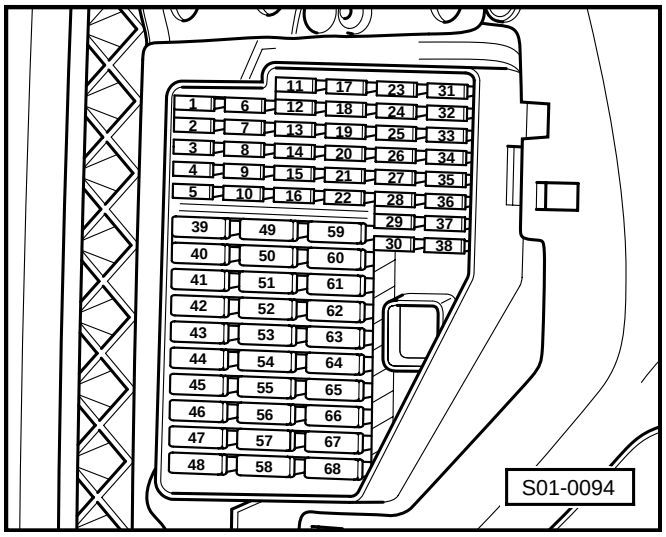
– Connect the diode test lamp with the adapter cables of -V.A.G 1594 A- to the contacts of the plug connection of cylinder 1.

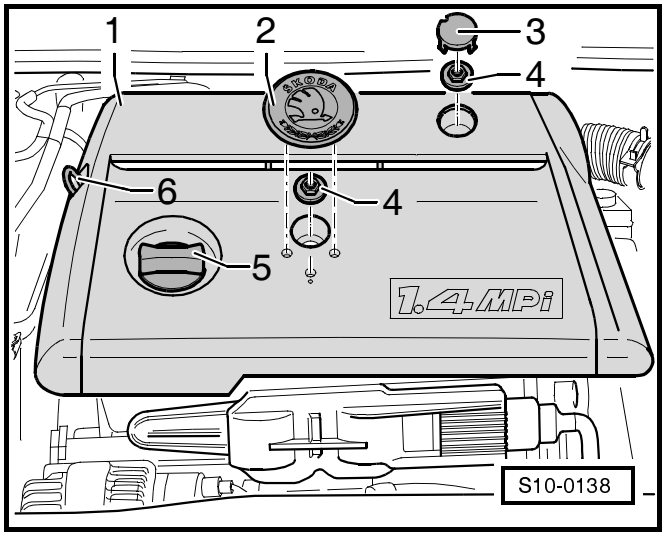
– Activate the starter.

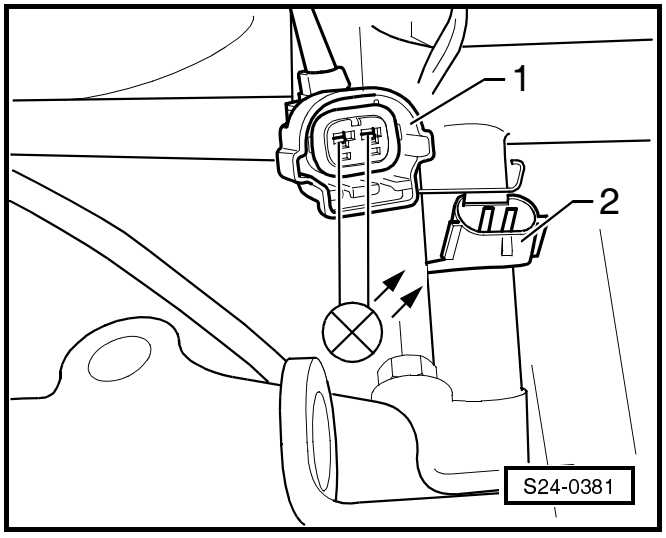
The diode test lamp must flicker.

– Repeat the test on the plug connections of the injection valves on cylinder 2…4.

If the diode test lamp does not flicker:







– Connect the diode test lamp to the plug of the injection valve to be tested contact 1 and earth.
– Activate the starter.

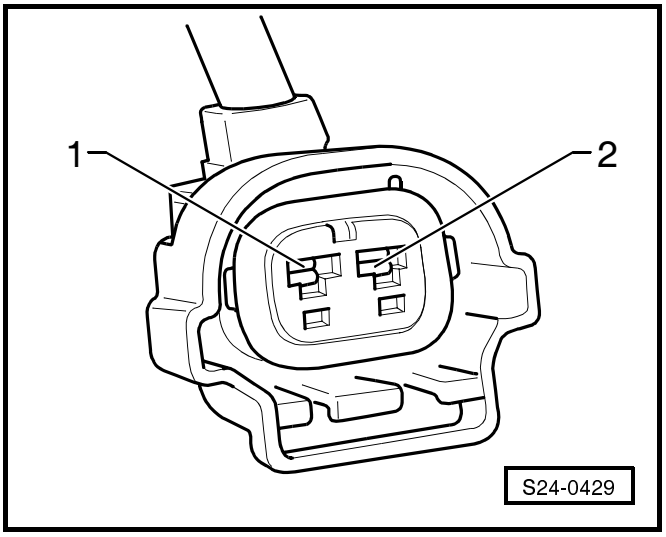
The diode test lamp must light up.

If the diode test lamp does not light up:

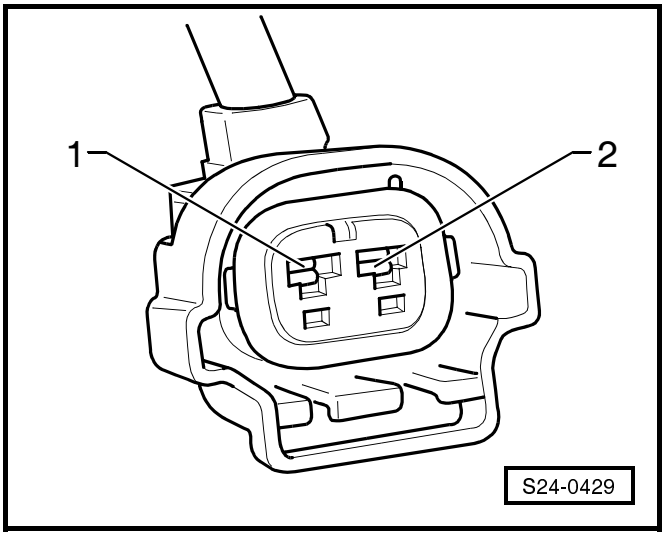
– Inspect line connection between contact 1 and fuse No. 35 for interruption ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations.
– if necessary eliminate open circuit.

If no fault was detected:

– Switch off the ignition.
– Connect the test box -V.A.G 1598/31- to the wiring loom on the engine control unit ⇒ Chap. 24-2.
– Test the wiring between the test box and the plug connections of the injection valves for interruption according to the Current Flow Diagram:



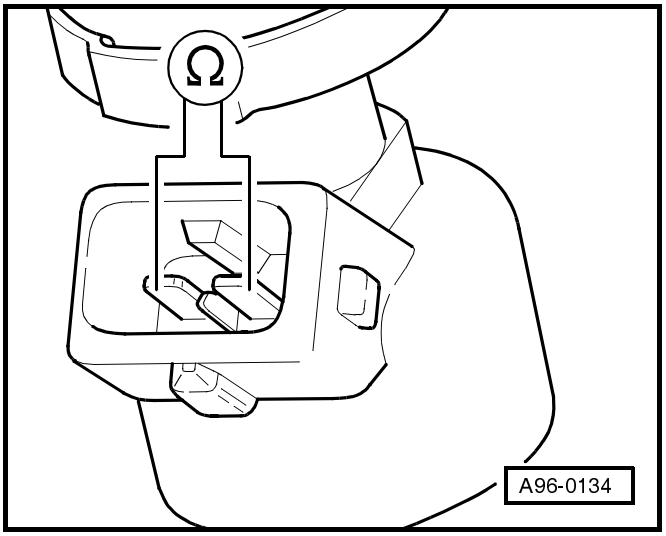
Plug connection on cylinder	Contact	Bush
1	2	88
2	2	87
3	2	85
4	2	86



– Also additionally test the wires for short-circuits relatively to one another and to pos. term.

If the wires are not found to be faulty:

– Test the resistance of the injection valves between the contacts.



Nominal value: 14…20 Ω

If the nominal value is not reached:

– Replace the injection valve(s).

Inspecting the injection rate, tightness and jet formation of the injectors

Special tools, test and measuring equipment and auxiliary items required

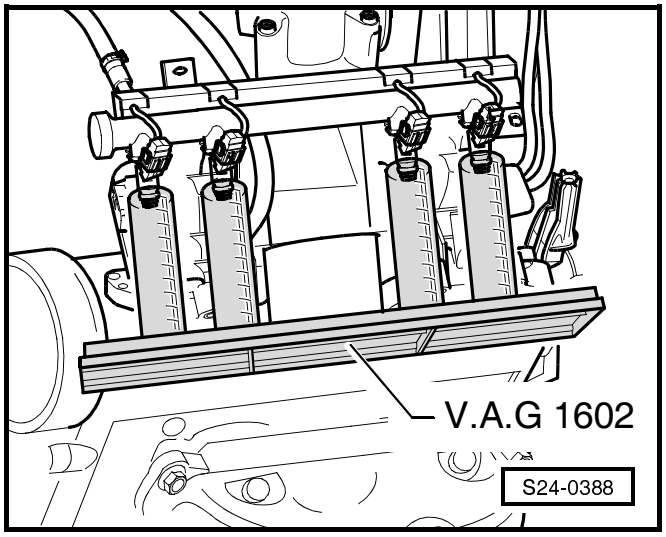
- Remote control -V.A.G 1348/3A-
- Adapter cable -V.A.G 1348/3-2-
- Injection rate tester, (e. g. -V.A.G 1602-)
- Adapter cable set (e.g. -V.A.G 1594 A-)

Test condition

- Fuel filter with pressure control valve O.K., inspecting ⇒ Chap. 24-2
- Fuel pump relay O.K., inspecting ⇒ Chap. 24-2

Check tightness

– Remove the fuel rail with incorporated injectors from the intake manifold ⇒ Chap. 24-1. The fuel hoses remain connected.
– Hold the inejctors in the injection rate tester. ►
– Initiate final control diagnosis and control the fuel pump relay -J17- ⇒ Chap. 01-1.
– Testing the tightness of the injectors (visual inspection).



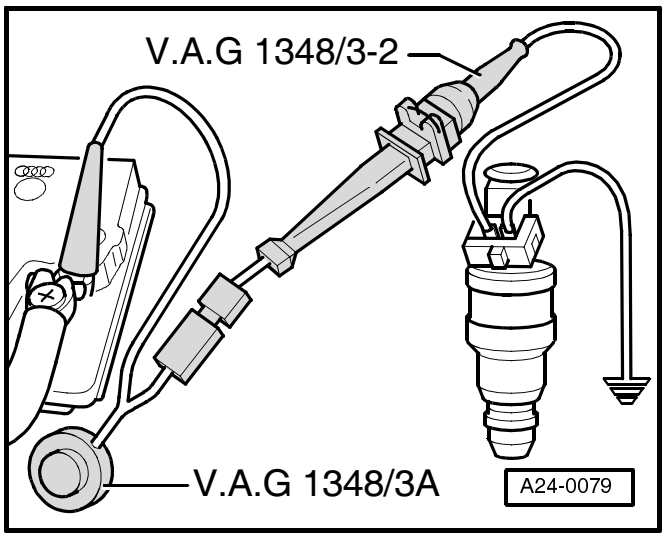
With the fuel pump running per valve only 1…2 drops may escape per minute.

If the fuel loss is greater:

– Adjust fuel pump (terminate final control diagnosis) and replace defective injector ⇒ Chap. 24-1.

Testing injection rate

– Place the injector to be tested in a graduated measuring glass of the injection rate tester.
– Connect one contact of the injector with the test cable and alligator clip from (e.g. -V.A.G 1594 A -) to the engine mass. ►
– Connec the second contact of the injector with remote control -V.A.G 1348/3A -, adapter cable -V.A.G 1348/3-2 - and auxiliary cable to pos. term.
– Initiate final control diagnosis ⇒ Chap. 01-1 and control the fuel pump relay -J17-.



The fuel pump must run.

– Activate remote control -V.A.G 1348/3A - for 30 seconds.
– Perform the measurement on all injectors.
– Once all four injectors have been driven, position the graduated measuring glasses on an even base.

  Nominal value per injection valve: 145 ± 12 ml

– If the measured value of one or more injectors is outside the tolerance value, disconnect the fuel pump (terminate final control diagnosis) and replace the defective injector ⇒ Chap. 24-3.

Note!

When testing the injection rate also check the jet formation. The jet must be the same for all valves.

– Remove the injectors with the fuel rail ⇒ Chap. 24-1.

24-4 Inspecting functions

Testing idling speed

Note!

- *The idling speed cannot be adjusted.*
- *The idling speed is checked during the basic setting of the engine.*
- *During the basic setting the activated charcoal filter system soldenoid valve -N80- is closed and the air conditioning compressor is deactivated.*

Special tools, test and measuring equipment and auxiliary items required

- Vehicle system tester -V.A.G 1552-
- Diagnostic cable -V.A.G 1551/3- or -V.A.G 1551/3A- or -V.A.G 1551/3B-

Test conditions

- Exhaust system shut
- Coolant temperature minimum 80 °C
- Electrical consumers must be disconnected (the radiator cooling fan must be off during this test)

Test sequence

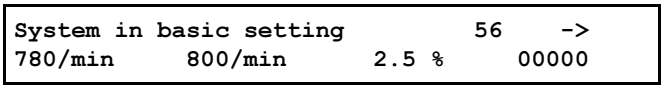
– Connect vehicle system tester -V.A.G 1552-. Leave the engine on and select the engine control unit with „Address word“ 01 ⇒ Chap. 01-1.

– Interrogate fault memory ⇒ Chap. 01-1. No fault must have been stored, if necessary eliminate fault, erase fault memory, adjust engine and start again, perform a test drive and control by again interrogating the fault memory.

– Allow engine to run.

– Select function 04 „basic setting“ and display group number 056.

Read-out on display:



– Check whether the actual idling speed in display field 1 (actual speed) corresponds with the value in display field 2 (nominal speed).

Tolerance: ±10 rpm

Note!

- *The speed in display field 1 (actual speed) is indeed the actual engine speed.*
- *The speed in display field 2 (nominal speed) is the theoretical speed calculated by the engine control unit.*
- *In idle the engine control unit always attempts to adapt the (actual) speed to the specified speed (nominal).*

- *This means that in idle the speed (actual) must always approximately correspond to the speed (nominal).*
- *Display fields 3 and 4 serve as information and are not relevant for the inspection of the idling speed.*

If the nominal value is reached:

– Press (→).

Read-out on display:

```
Vehicle system test                    HELP
Select function XX
```

If the nominal value is not reached:

– Interrogate fault memory again ⇒ Chap. 01-1.

If the idling speed is too high or too low and if there is no fault in the fault memory, perform the following inspections:

- Test unmetered air in the intake system ⇒ **24-4** page 4
- Inspecting throttle valve control unit ⇒ Chap. 24-7.
- Testing activated charcoal filter system solenoid valve -N80- ⇒ Chap. 24-6
- Perform adaptation of the throttle valve control unit ⇒ Chap. 24-8
- Testing the engine operating conditions ⇒ **24-4** page 2

Testing the engine operating conditions

The inspection focuses on whether the engine control unit -J361- recognises the engine operating conditions.

Special tools, test and measuring equipment and auxiliary items required

- Vehicle system tester -V.A.G 1552-
- Diagnostic cable -V.A.G 1551/3- or -V.A.G 1551/3A- or -V.A.G 1551/3B-

Test condition

- Coolant temperature minimum 80 °C

Test sequence

– Connect vehicle system tester -V.A.G 1552-. Leave the engine on and select the engine control unit with „Address word“ 01 ⇒ Chap. 01-1.

– Select function 08 „read measured value block“ and display group number 001.

Read-out on display:

```
Reading measured value block 1         ->
780/min     85.0 °C      5 %     1011111
```

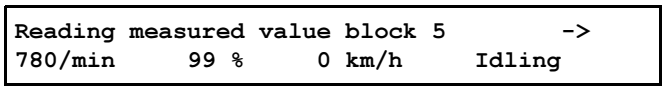
– In display field 2 check whether the coolant temperature is above 80 °C.

– Switch in display group 005 as follows:

– Press (C).

– Press 0, 0 and 5 for „display group number 005“ and confirm with Q.

Read-out on display:



Engine operating condition (display group 4):

- Idling:

  In idle operation display field 4 must display „idle“.

- Partial load:

– Accelerate constantly.

  Display field 4 must display „partial load“.

- Trailing throttle:

– Increase the speed to above 3000 rpm.

– Suddenly release the accelerator pedal.

  Display field 4 must display „trailing throttle“.

Note!

Below 1400 rpm idling is again recognized.

- Enrichment and full load:

– Briefly apply full throttle

  Display field 4 must briefly display „enrich.“ and subsequently „full load“.

Note!

- *To obtain display „full load“, it may be necessary to perform a test drive.*
- *A second mechanic is required for the test drive.*
- *Comply with the applicable safety instructions for test drives ⇒ Chap. 24-1.*

Warning!

Secure the vehicle system tester to the rear seat and operate from that position.

– Select function 06 „End output“ and confirm entry with Q.

If the nominal values are not reached:

– Interrogate fault memory, correct fault if applicable and then erase the fault memory ⇒ Chap 01-1.

– Inspect the accelerator pedal position sender -G79- ⇒ Chap. 24-7.

– Inspect the throttle valve control unit -J338- ⇒ Chap. 24-7.

Testing the intake system for tightness (unmetered air)

Special tools, test and measuring equipment and auxiliary items required

- Vehicle system tester -V.A.G 1552-
- Diagnostic cable -V.A.G 1551/3- or -V.A.G 1551/3A- or -V.A.G 1551/3B-
- Engine leak search spray -G 001 800 A1-

Test condition

- Coolant temperature minimum 80 °C

Test sequence

Note!

- *Because of the vacuum in the intake system the leak search spray is sucked in with the unmetered air. The leak search spray reduces the ignition performance of the mixture. This results in a drop in engine speed and a change in the lambda control value.*
- *You must comply with the safety instructions on the box.*

– Connect vehicle system tester -V.A.G 1552-. Leave the engine on and select the engine control unit with „Address word“ 01 ⇒ Chap. 01-1.

– Select function 08 „read measured value block“ and display group number 001.

Read-out on display:

```
Reading measured value block 1         ->
780/min    85.0 °C     -60 %    10111111
```

– Observe and take down the display values in display field 1 (engine speed) and display field 3 (lambda control before catalyst).

– Systematically spray parts of the intake system with engine leak search spray.

If the engine speed drops or if the lambda control changes:

– Check the sprayed part of the intake system for leakage and eliminate leak.

– Select function 06 „End output“ and confirm entry with Q.

24-5 Lambda control

The lambda probe compares the oxygen content of the air with the residual oxygen in the exhaust gas and supplies a voltage signal to the control unit.

Other information:

- Self Study Programme 35 - 1.4 l - 16 V 55/74 kW Petrol Engines
- Self Study Programme 39 - EOBD for Petrol Engines

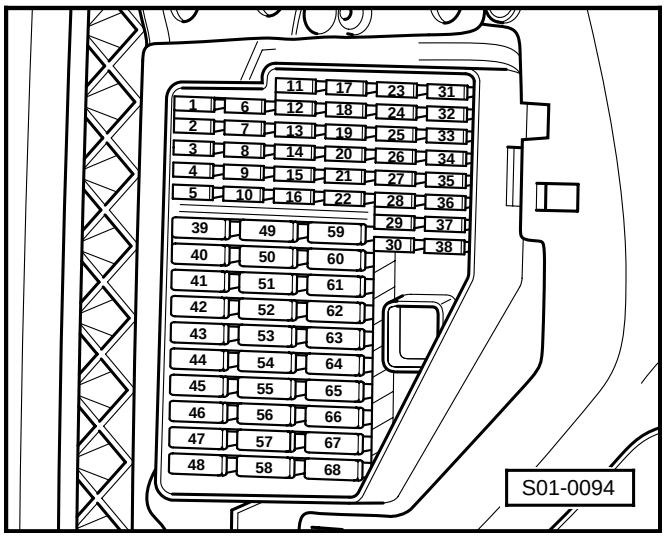
Testing lambda probe and lambda control (engines conforming to EU 2)

Special tools, test and measuring equipment and auxiliary items required

- Vehicle system tester -V.A.G 1552-
- Diagnostic cable -V.A.G 1551/3, 3A, 3B nebo 3C-
- Hand multimeter (e.g. -V.A.G 1526 A-)
- Measuring tool set (e.g. -V.A.G 1594 A-)

Test conditions

- Fuel pump relay o.k., inspecting ⇒ Chap. 24-2
- Fuse 9 o.k.
- Coolant temperature minimum 80 °C
- No leaks in exhaust system between catalytic converter and cylinder head



Inspect proper operation

– Check display groups 030, 031, 032 and 033 ⇒ Chap. 01-5.

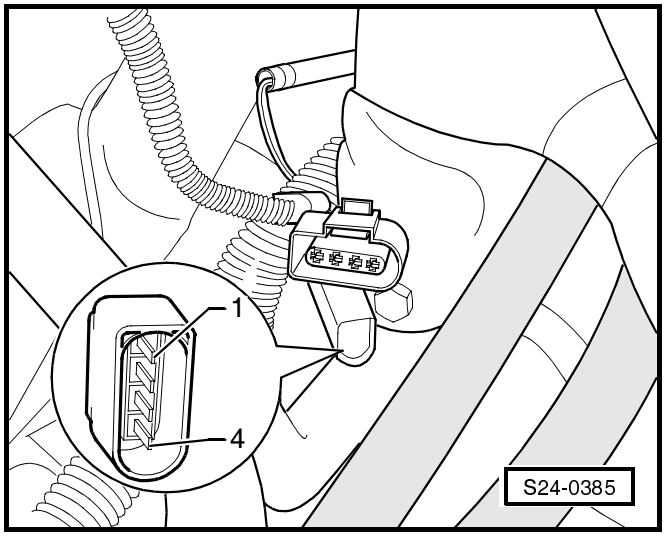
If the specified value is not reached:

– Perform a test drive to clear the lambda probe of possible residual values and repeat the test.

If the specification is also not shown in the display field after a test drive:

Testing heater

– Disconnect the 4-pin plug connector from the lambda probe -G39-.
– Perform an electrical continuity test (resistance measurement) using the handheld multimeter between contacts 1 and 2 of the connector.



Note!

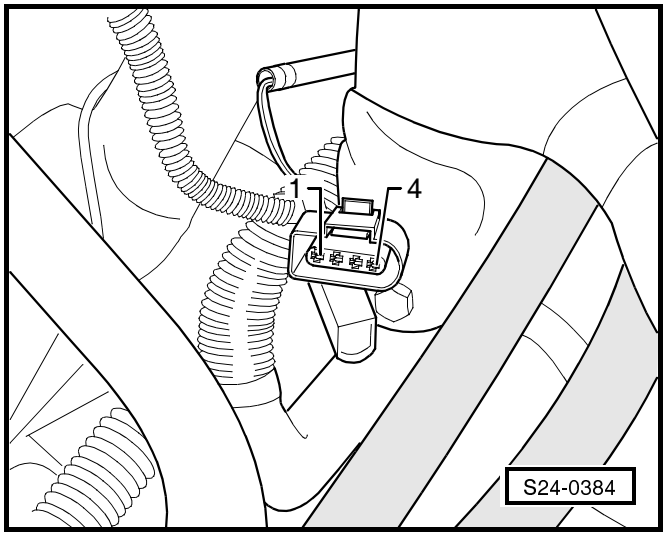
At ambient temperature (approx. 20 °C) the heating element resistance is of approx. 1 to 5 Ω. The resistance increases considerably even if the temperature rises only slightly.

– If there is an open circuit, replace the lambda probe -G39-.

If the heating element has continuity, test voltage supply for lambda probe heater -Z19- ⇒ Current Flow Diagrams, Fault Finding and Fitting Locations.

Test basic voltage

– Disconnect the 4-pin plug connector from the lambda probe.



– Connect handheld multimeter for voltage measurement to contacts 3 + 4.

– Switch on ignition.

Specified value: 0.40 to 0.50 V

– Switch off ignition.

If the specified value is not reached:

– Test cable of lambda probe before catalytic converter ⇒ Current Flow Diagrams, Fault Finding and Fitting Locations.

If the specified value is reached:

– Replace lambda probe ⇒ 1.0/37; 1.4/44; 1.4/50 Engine - Mechanical Components; Rep. Gr. 26.

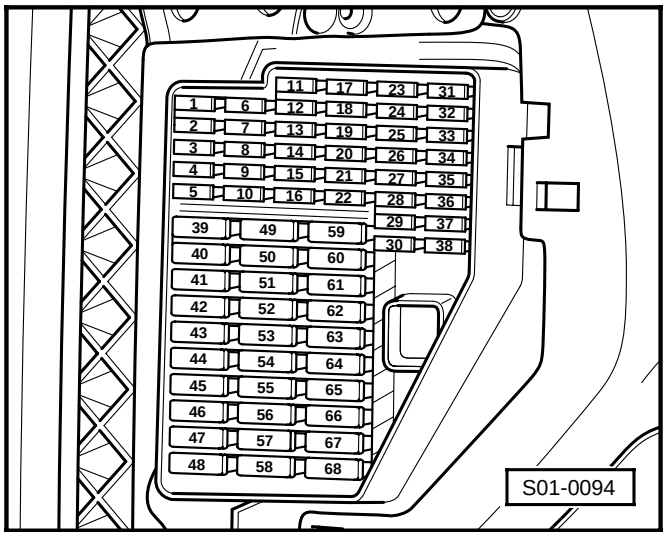
Testing lambda probe and lambda control before catalyst (engines conforming to D 4/EU 3/EU 4)

Special tools, test and measuring equipment and auxiliary items required

- Vehicle system tester -V.A.G 1552-
- Diagnostic cable -V.A.G 1551/3, 3A, 3B oder 3C-
- Hand multimeter (e.g. -V.A.G 1526 A-)
- Measuring tool set (e.g. -V.A.G 1594 A-)

Test conditions

- Fuel pump relay o.k., inspecting ⇒ Chap. 24-2
- Fuse 9 o.k.
- Coolant temperature minimum 80 °C
- No leaks in exhaust system between catalytic converter and cylinder head



Inspect proper operation

– Check display groups 030 and 034 ⇒ Chap. 01-5.

If the specified value is not reached:

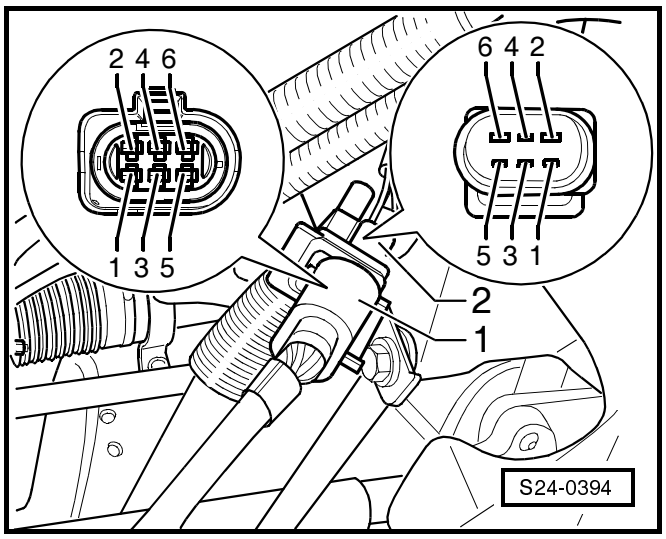
– Perform a test drive to clear the lambda probe of possible residual values and repeat the test.

If the specification is also not shown in the display field after a test drive:

Testing heater

– Separate 6-pin plug connection to lambda probe -G39-.

– Perform an electrical continuity test (resistance measurement) using the handheld multimeter between contacts 1 and 4 of the connector. ►



Note!

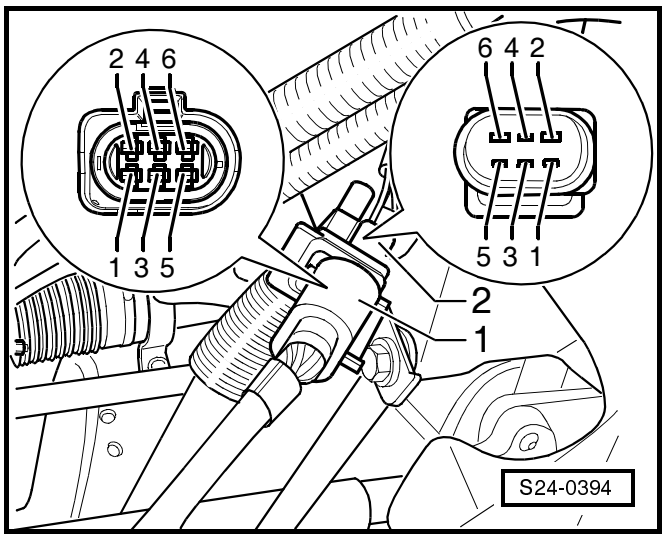
At room temperature (approx. 20 °C) the resistance of the heating element is approx. 1 to 5 Ω. The resistance increases considerably even if the temperature rises only slightly.

– If there is an open circuit, replace the lambda probe -G39-.

If the heating element has continuity, test voltage supply for lambda probe heater -Z19- ⇒ Current Flow Diagrams, Fault Finding and Fitting Locations.

Test basic voltage

– Separate 6-pin plug connection to lambda probe -G39-. ►



– Connect handheld multimeter for voltage measurement to contacts 1 + 5 of connector -1-.

– Leave engine on and measure the supply voltage.

Specified value: 0.40 to 00.50 V

– Switch off ignition.

If the specified value is not reached:

– Test cable of lambda probe before catalytic converter ⇒ Current Flow Diagrams, Fault Finding and Fitting Locations.

If the specified value is reached:

– Replace lambda probe -G39- ⇒ 1.0/37; 1.4/44; 1.4/50 Engine - Mechanical Components; Rep. Gr. 26.

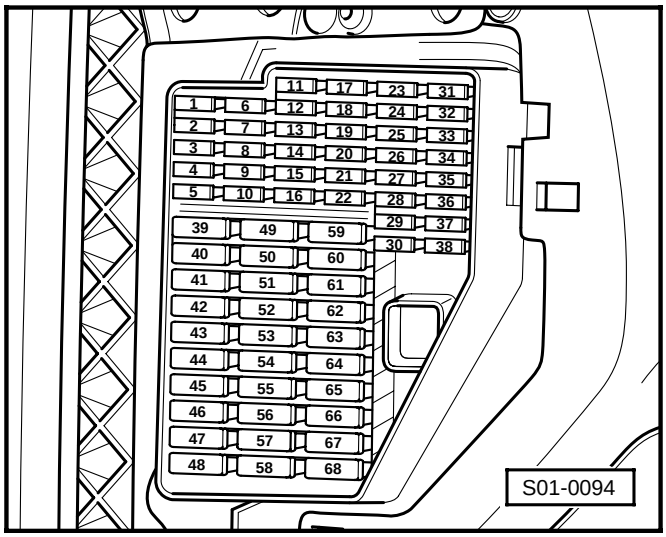
Testing lambda probe and lambda control after catalyst (engines conforming to D 4/EU 3/EU 4)

Special tools, test and measuring equipment and auxiliary items required

- Vehicle system tester -V.A.G 1552-
- Diagnostic cable -V.A.G 1551/3, 3A, 3B oder 3C-
- Hand multimeter (e.g. -V.A.G 1526 A-)
- Measuring tool set (e.g. -V.A.G 1594 A-)

Test conditions

- Fuel pump relay o.k., inspecting ⇒ Chap. 24-2
- Fuse 9 o.k.
- Coolant temperature minimum 80 °C
- No leaks in exhaust system between catalytic converter and cylinder head



Inspect proper operation

– Check display groups 030 and 043 ⇒ Chap. 01-5.

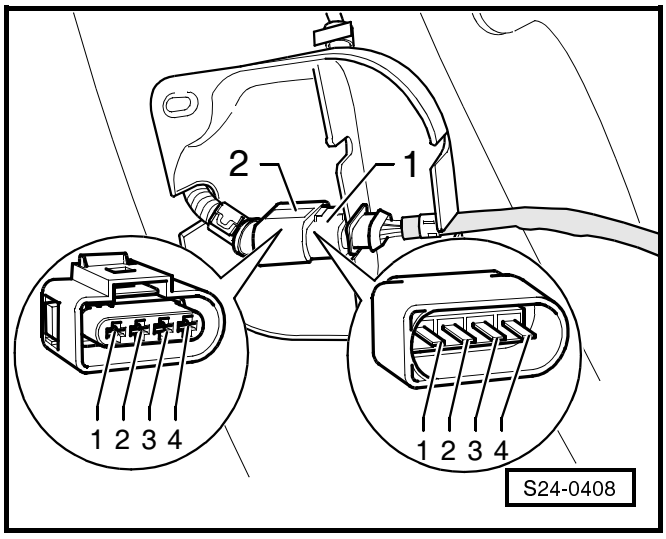
If the specified value is not reached:

– Perform a test drive to clear the lambda probe of possible residual values and repeat the test.

If the specification is also not shown in the display field after a test drive:

Testing heater

– Separate 4-pin plug connection to lambda probe -G130- after catalyst.
– Perform an electrical continuity test (resistance measurement) using the handheld multimeter between contacts 1 and 2 of the connector.



Note!

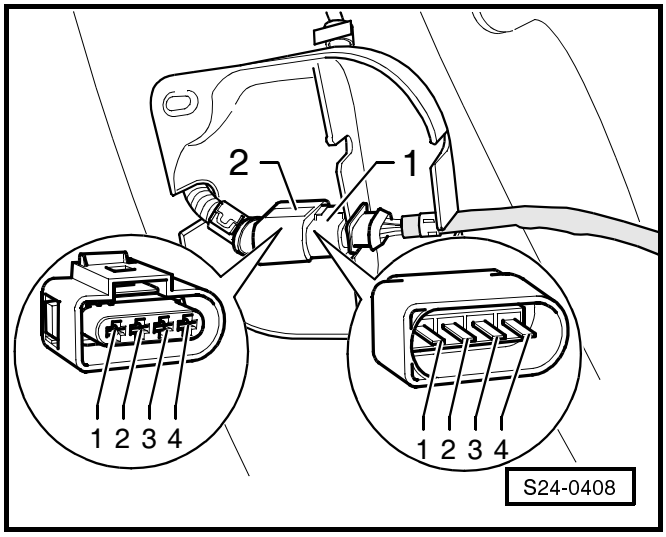
At ambient temperature (approx. 20 °C) the heating element resistance is of approx. 1 to 5 Ω. The resistance increases considerably even if the temperature rises only slightly.

– If there is an open circuit, replace the lambda probe -G130-.

If the heating element has continuity, test voltage supply for lambda probe heater -Z19- ⇒ Current Flow Diagrams, Fault Finding and Fitting Locations.

Test basic voltage

– Separate 4-pin plug connection to lambda probe -G130- after catalyst.
– Connect handheld multimeter for voltage measurement to contacts 3 + 4 of connector -2-.
– Leave engine on and measure the supply voltage.



Specified value: 0.400 to 0.500 V

– Switch off ignition.

If the specified value is not reached:

– Test cable of lambda probe after catalytic converter ⇒ Current Flow Diagrams, Fault Finding and Fitting Locations.

If the specified value is reached:

– Replace lambda probe -G130- after catalyst ⇒ 1.0/37; 1.4/44; 1.4/50 Engine - Mechanical Components; Rep. Gr. 26.

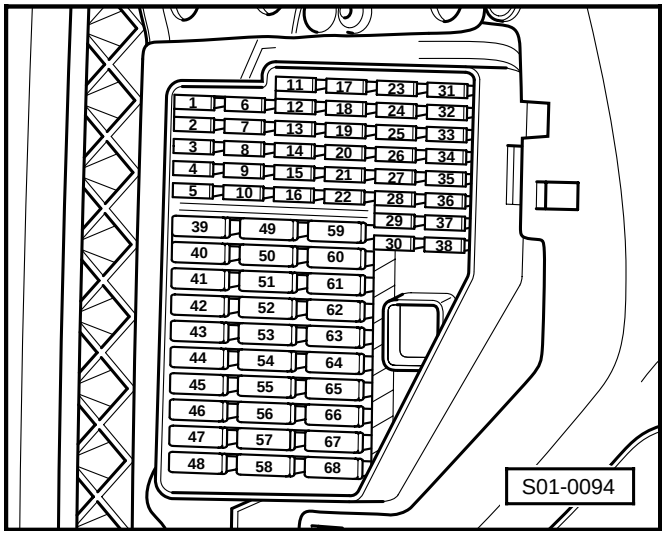
Testing catalyst efficiency (engines conforming to D 4/EU 3/EU 4)

Special tools, test and measuring equipment and auxiliary items required

- Vehicle system tester -V.A.G 1552-
- Diagnostic cable -V.A.G 1551/3, 3A, 3B oder 3C-

Test conditions

- Fuel pump relay o.k., inspecting ⇒ Chap. 24-2
- Fuse 9 o.k.
- Coolant temperature minimum 80 °C
- No leaks in exhaust system between catalytic converter and cylinder head



Inspect proper operation

– Check display group 046 ⇒ Chap. 01-5.

If the specified value is not reached:

– Interrogate fault memory ⇒ Chap. 01-1.

– Read out readiness code ⇒ Chap. 01-4.

– If the fault memory was erased or if the continuous voltage supply of the engine control unit was interrupted, it is then necessary to re-generate the readiness code ⇒ Chap. 01-4.

Note!

- *This test is intended for vehicles with electrical system control unit. It provides information on possible damage to the catalytic converter.*
- *If „CatR1 n.o.k.“ is shown in display field 4, it is not always necessary to replace the catalytic converter.*
- *Replace catalytic converter if it does not meet emission limits or if there is visible damage.*

If the catalytic converter does not meet the emission limits or if the catalytic converter has visible damage:

– Replace catalytic converter ⇒ 1.0/37; 1.4/44; 1.4/50 Engine - Mechanical Components; Rep. Gr. 26.

If „CatR1 o.k.“ is displayed:

– Select function 06 „End output“ and switch off ignition.

24-6 Tank ventilation

Inspecting Activated charcoal filter system solenoid valve 1 -N80-

Special tools, test and measuring equipment and auxiliary items required

- Vehicle system tester -V.A.G 1552-
- Diagnostic cable -V.A.G 1551/3- or -V.A.G 1551/3A- or -V.A.G 1551/3B-
- Hand multimeter (e.g. -V.A.G 1526 A-)
- Diode test lamp (e.g. -V.A.G 1527 B-)
- Adapter cable set (e.g. -V.A.G 1594 A-)
- Test box -V.A.G 1598/31-

Inspecting function of the activated charcoal filter system solenoid valve 1 -N80-

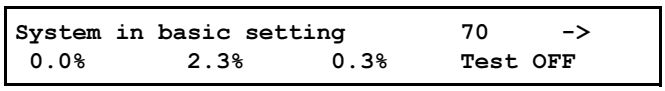
The functional test of the activated charcoal filter system solenoid valve 1 -N80- occurs in the final control diagnosis ⇒ Chap. 01-1.

Testing the operation of the activated charcoal filter system

The operation of the activated charcoal filter system (tank ventilation system) is tested in the „basic setting“ display group 070.

– Connect vehicle system tester -V.A.G 1552-. Leave the engine on and select the engine control unit with „Address word“ 01 ⇒ Chap. 01-1.
– Select function 04 „basic setting“ and display group number 070.

Read-out on display:



Note!

During this diagnosis no engine load must be generated as otherwise the diagnosis will be aborted; diagnosis can only be initiated again after an acceleration.

If the diagnosis is initiated by the engine control unit the display in display field 4 will switch from „Test OFF“ to „Test ON“.

– Run the engine in idle until the nominal value „TEV OK“ is displayed in display field 4.

If the display does not occur as described:

– Interrogate fault memory ⇒ Chap. 01-1.

If the display occurs as described:

– Press →
– Switch off the ignition.

Testing tightness

In dead condition the solenoid valve is closed.

– Remove the hose from the activated charcoal filter system solenoid valve 1 -N80-.
– Connect a suitable manometer and a compressed air device (air pump) to the solenoid valve.
– Generate a visible air pressure.
– Initiate final control diagnosis and select the activated charcoal filter system solenoid valve 1 -N80- ⇒ Chap. 01-1.
– When the solenoid valve is opened the displayed air pressure must drop and when it is closed it must clearly rise again, if not replace the solenoid valve.

Testing resistance

– Remove the plug from the activated charcoal filter system solenoid valve 1 -N80-.
– Perform a resistance measurement with the handheld multimeter between the valve contacts.

  Nominal value: 22...30 Ω.

– If the nominal value is not reached, replace the activated charcoal filter solenoid valve -N80-.

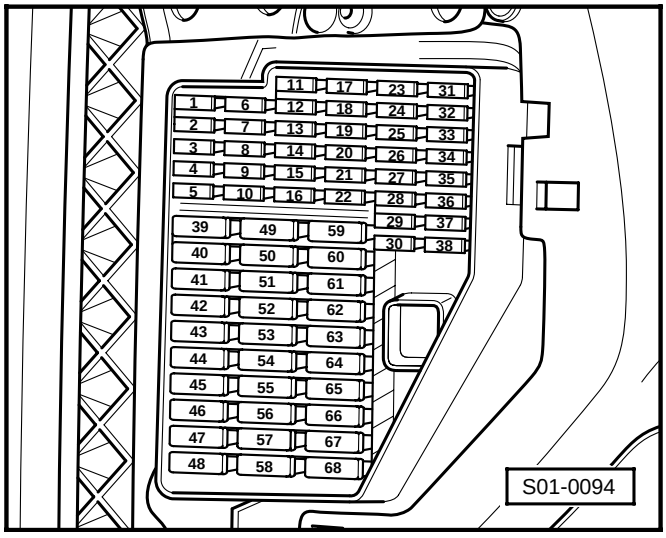
Checking voltage supply

Note!

The activated charcoal filter system solenoid valve 1 -N80- is supplied via the fuel pump relay.

Test conditions

- Fuel pump relay O.K., inspecting ⇒ Chap. 01-1



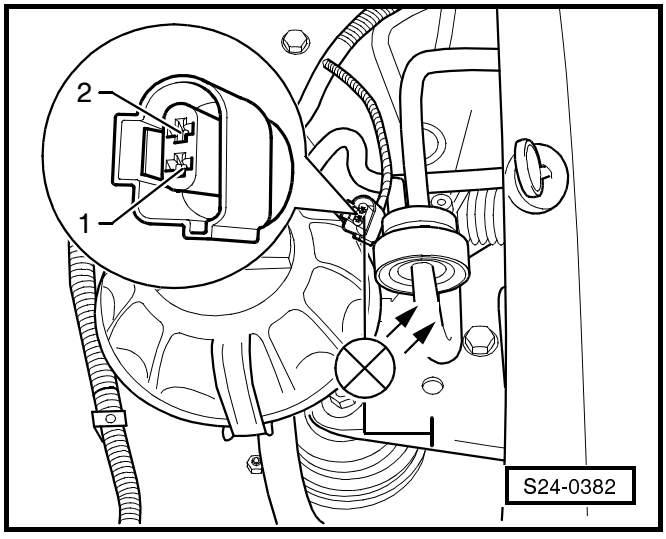
Test sequence

– Remove the plug from the activated charcoal filter system solenoid valve 1 -N80-.
– Connect the diode test lamp between contact 1 of the plug and the engine mass.
– Activate the starter.

The diode test lamp must light up.

If the diode test lamp does not light up:

– Check the continuity of the wiring from contact 1 to fuse No. 24, if necessary repair ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations.



Test control

– Connect the diode test lamp between contact 2 (earth control of the engine control unit) and contact 1 (pos. term, of the fuel pump relay) of the plug.

– Initiate final control diagnosis and select the activated charcoal filter system solenoid valve 1 -N80- ⇒ Chap. 01-1.

The diode test lamp must flash.

If the dioden test lamp does not flash or if it remains lit:

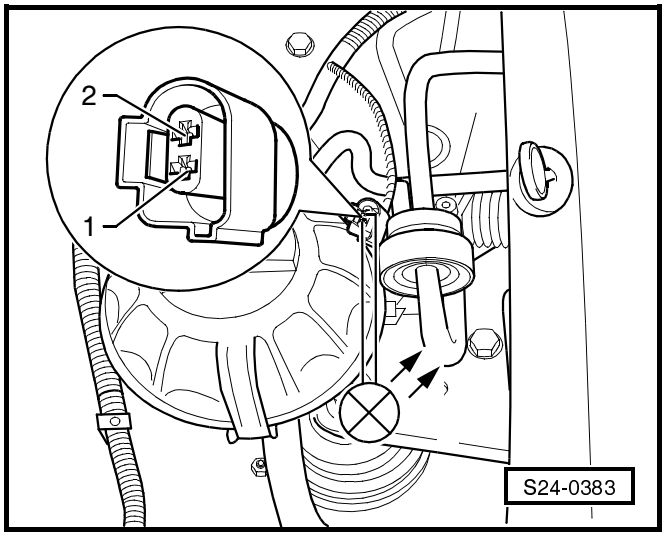
– Switch off the ignition.

– Connect the test box -V.A.G 1598/31- on the wiring loom to the engine control unit ⇒ Chap. 24-2.

– Test the wire from contact 2 of the plug on the activated charcoal filter system solenoid valve 1 -N80- to bush 61 of the test box for continuity as well as short-circuit to earth or pos. term.

If there is neither a line interruption nor a short-circuit:

– Replace the motronic control unit ⇒ Chap. 24-8.



24-7 Electronic Power Control (Electronic throttle)

Function of the Electronic Throttle System

On the electronic throttle system the throttle valve is not operated by a control cable connected to the accelerator pedal. There is no mechanical connection between the accelerator pedal and the throttle valve.

The position of the accelerator pedal is signalled by the engine control unit via two accelerator pedal position senders (variable resistors; located in a housing), which are connected to the accelerator pedal.

The accelerator pedal position (driver's instruction) is a main input dimension for the engine control unit.

The throttle valve is activated by an electric motor (throttle valve positioner) in the throttle valve control unit -J338-, over the full speed and load range. The throttle valve is activated by the throttle valve positioner according to the instructions of the engine control unit.

With the engine stopped and the ignition on the engine control unit controls the throttle valve positioner accurately according to the instructions of the accelerator pedal position sender. This means that if the accelerator pedal is half pressed the throttle valve positioner opens the throttle valve to the same extent, the throttle valve will thus be approximately half open.

With the engine running (under load) the engine control unit may open and close the throttle valve independently of the accelerator pedal position sender.

Thus e.g. the throttle valve may already be fully open even though the accelerator pedal is only half pressed. This offers the advantage that throttle losses on the throttle valve can be avoided. Moreover, under certain load conditions this may result in clearly improved values as concerns exhaust gas emission and fuel consumption.

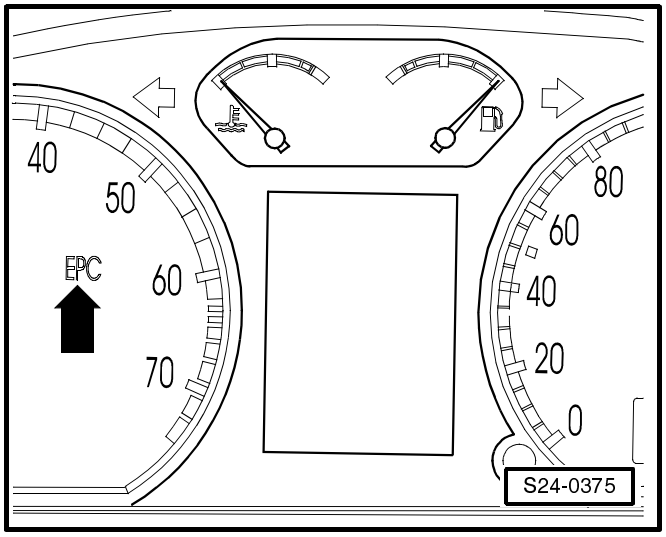
The required engine torque can be generated by the engine control unit via the optimum combination of throttle valve section and load pressure.

It would be wrong to assume that the „Electronic throttle system“ only consists of one or two components. The Electronic Throttle is a system that includes all the components, which contribute to determining, controlling and monitoring the position of the throttle valve (e.g. the accelerator pedal position sender, the throttle valve control unit, the EPC warning lamp, the engine control unit....).

Meaning of the EPC warning lamp (fault lamp for electric accelerator control -K132-) in the dash panel insert

„EPC“ is the abbreviation of Electronic Power Control.

Fitting location of the EPC warning lamp -arrow-



If during engine operation faults are detected in the Electronic throttle system, the engine control unit switches on the EPC lamp and stores this fault in the fault memory. In the event of a line interruption or a fault in the Electronic throttle system the engine switches to emergency operation. In emergency operation the engine runs at increased speed so that the customer is able to reach the next workshop. However, the accelerator pedal position senders no longer operate.

Functional test of the warning lamp

– Switch on the ignition.

The electronic power control fault lamp -K132- must light up.

If the electronic power control fault lamp -K132- does not light up with the ignition switched on.

– Inspect the dash panel insert and the electronic power control fault lamp -K132- ⇒ Electrical System; Rep. Gr. 90.

– Start engine and run in idle.

The electronic power control fault lamp -K132- must go out after a few seconds.

If the electronic power control fault lamp -K132- does not go out.

– Interrogate the fault memory of the engine control unit ⇒ Chap. 01-1 and if necessary eliminate the detected faults.

– Then erase the fault memory ⇒ Chap. 01-1.

If no fault is stored in the memory:

– Test the data BUS ⇒ Chap. 24-9; ⇒ Electrical System; Rep. Gr. 90.

Inspecting Throttle valve control unit -J338-

The housing of the throttle valve control unit -J338- contains the following components:

- Throttle valve drive -G186-. The electric motor driven by the engine control unit. This electric motor opens the throttle valve against a spring force.
- Angle sender 1 for throttle valve drive -G187-
- Angle sender 2 for throttle valve drive -G188-

Note!

- *The housing of the throttle valve control unit -J338- must not be opened.*
- *The angle senders are designed a potentiometers (variable resistors). They indicate the position of the throttle valve to the engine control unit fully independently from one another.*
- *The potentiometers cannot be mechanically adjusted. The settings occur in the basic setting (function 04) with the vehicle system tester -V.A.G 1552-.*

Special tools, test and measuring equipment and auxiliary items required

- Vehicle system tester -V.A.G 1552-
- Diagnostic cable -V.A.G 1551/3- or -V.A.G 1551/3A- or -V.A.G 1551/3B-
- Hand multimeter (e.g. -V.A.G 1526 A-)
- Adapter cable set (e.g. -V.A.G 1594 A-)
- Test box -V.A.G 1598/31-

Test conditions

- The throttle valve must neither be damaged nor dirty
- Coolant temperature minimum 80 °C.

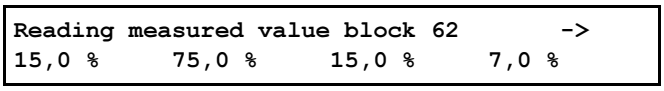
Testing angle sender for throttle valve drive

The throttle valve drive angle senders -G187- and -G188- inform the engine control unit of the position of the throttle valve. Both angle senders are located in the throttle valve control unit -J338-.

– Connect vehicle system tester -V.A.G 1552-. Switch on the ignition and select the engine control unit with „Address word“ 01 ⇒ Chap. 01-1.

– Select function 08 „read measured value block“ and display group number 062.

Read-out on display:



– Test the values for the electronic throttle potentiometer voltages.

Note!

The engine control unit translates the voltage values of the angle sender into a percentage applied to 5 Volts and indicates these percentage values (5 Volts power supply correspond to 100%).

– Observe display fields 1 and 2.

– Slowly press the accelerator pedal fully down.

The percentage indication in display field 1 must rise gradually. The tolerance range 0…100 % is not fully used up.

The percentage indication in display field 2 must drop gradually. The tolerance range 100…0 % is not fully used up.

Note!

- *The reason why the display in display field 1 rises and the display in display field 2 drops lies in the opposition of the potentiometer (angle sender) in the throttle valve control unit -J338-.*
- *This means that the voltage tapping of angle sender 1 runs towards the 5 Volts (the further the throttle valve is opened the greater the voltage; the percentage indication rises).*
- *The voltage tapping of angle sender 2 runs away from the 5 Volts towards 0 Volt (the further the throttle valve is opened the lower the voltage: the percentage indication drops).*

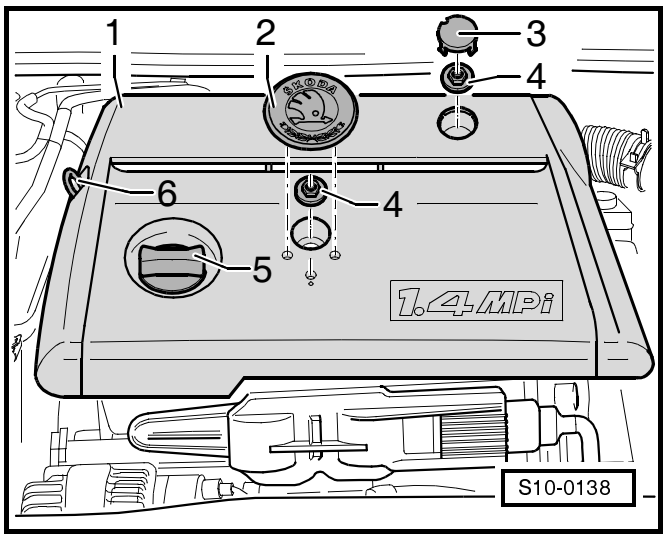
If the displays do not occur as described:

– Select function 06 „End output“ and confirm entry with Q.

– Switch off the ignition.

– Remove engine cover as follows: ►

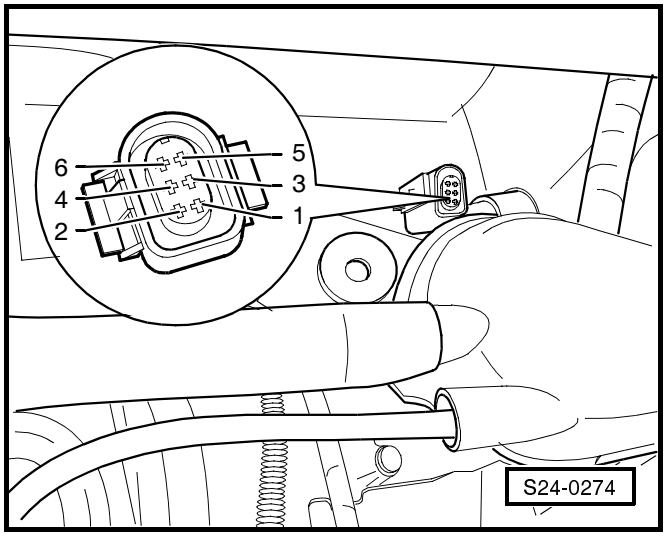
- Release logo -2- and cap -3-.
- Release nuts -4- (5 Nm).
- Pull out oil dipstick -6-.
- Remove engine cover -1- towards the top (do not unscrew cap -5-).



– Remove plug of the throttle valve control unit -J338-. ►

– Measure the throttle valve drive resistance on the throttle valve control unit -J338- between contacts 3+5.

Nominal value: 3…200 Ω



If the nominal value is not reached:

– Replace the throttle valve control unit -J338-

If the nominal value is reached:

– Test the voltage supply and the wiring of the throttle valve control unit -J338- ⇒ **24-7** page 4. Pay special attention to the plug connections that may be loose or corroded.

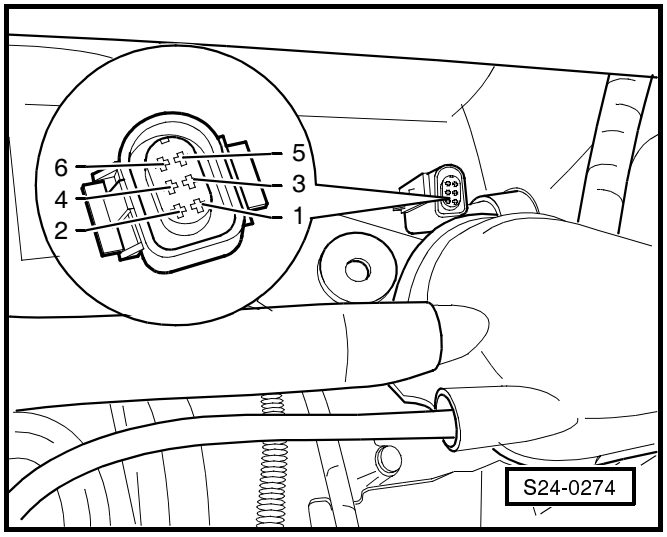
– Inspect the accelerator pedal position sender ⇒ **24-7** page 5.

Testing the voltage supply of the throttle valve control unit -J338-

– Remove plug of the throttle valve control unit -J338-.

– Switch on the ignition.

– Connect the handheld multimeter for voltage measurement as follows: ►



6-pin plug on wiring loom, contact	Nominal value
2 + earth	approx. 5 V
2 + 6	approx. 5 V

If the nominal values are reached:

– Also test the wiring from the engine control unit to the throttle valve control unit -J338- ⇒ **24-7** page 5.

If the nominal values are not reached:

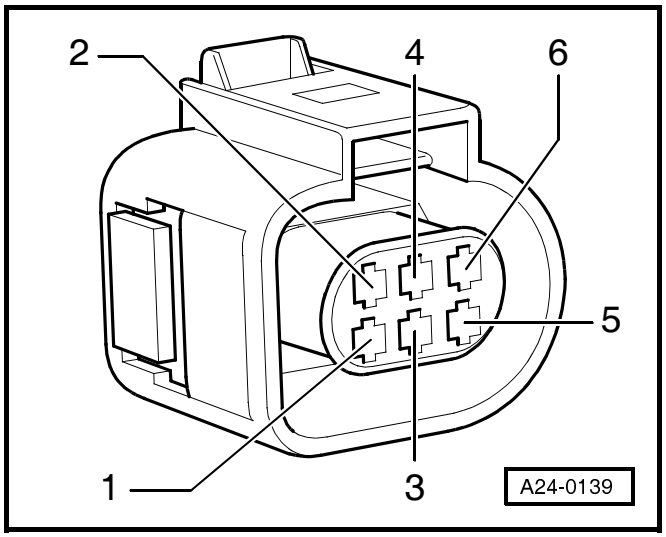
– Test the wiring from the engine control unit to the throttle valve control unit -J338- ⇒ **24-7** page 5.

Testing the wiring

– Remove plug of the throttle valve control unit -J338-.

– Connect the test box -V.A.G 1598/31- on the wiring loom to the engine control unit ⇒ Chap. 24-2.

– Check the following wires for interruption or short-circuit to earth or positive:



6-pin plug on wiring loom, contact	Test box -V.A.G 1598/31- bush
1	90
2	97
3	119
4	92
5	121
6	91

– Also test the wires for short-circuits.

– if necessary eliminate wire interruption or short-circuit.

If the wires are not found to be faulty:

– Test the power supply of the engine control unit ⇒ Chap. 24-8.

Testing Accelerator pedal position sender

The two accelerator pedal position senders -G79- and -G185- are located at the accelerator pedal and transmit the driver's instruction to the engine control unit fully independently of one another. Both senders are located in a housing.

Special tools, test and measuring equipment and auxiliary items required

- Vehicle system tester -V.A.G 1552-
- Diagnostic cable -V.A.G 1551/3- or -V.A.G 1551/3A- or -V.A.G 1551/3B-
- Hand multimeter (e.g. -V.A.G 1526 A-)

- Adapter cable set (e.g. -V.A.G 1594 A-)
- Test box -V.A.G 1598/31-

Inspect proper operation

– Connect vehicle system tester -V.A.G 1552-. Switch on the ignition and select the engine control unit with „Address word“ 01 ⇒ Chap. 01-1.

– Select function 08 „read measured value block“ and display group number 062.

Read-out on display:

```
Reading measured value block 62       ->
15,0 %     75,0 %     15,0 %     7,0 %
```

– Test the nominal values for the electronic throttle potentiometer voltages.

Note!

The engine control unit translates the voltage values of the sender into a percentage applied to 5 Volts and indicates these percentage values (5 Volts power supply correspond to 100%).

– Observe display fields 3 and 4.

– Slowly press the accelerator pedal fully down.

The percentage indication in display field 3 must rise gradually. The tolerance range 0…98 % is not fully used up.

The percentage indication in display field 4 must rise gradually. The tolerance range 0…49 % is not fully used up.

Note!

The value displayed in display field 3 must always be approximately double the value in display field 4.

If the displays do not occur as described:

– Test the voltage supply and the wiring of the accelerator pedal position sender ⇒ **24-7** page 6.

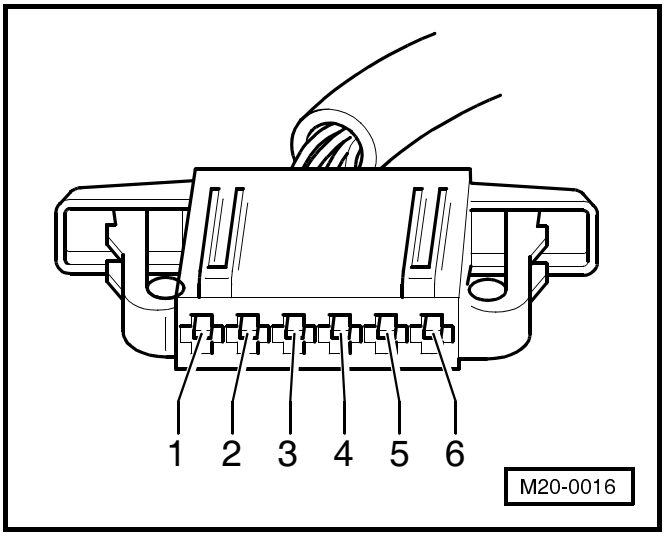
Testing the power supply of the Accelerator pedal position sender

– Remove the bottom part of the dash panel on the driver's side ⇒ Body Work; Rep. Gr. 70.

– Disconnect the plug connection of the accelerator pedal position sender.

– Switch on the ignition.

– Connect the handheld multimeter for voltage measurement as follows:



6-pin plug on wiring loom, contact	Nominal value
1 + earth	approx. 5 V
1 + 5	approx. 5 V
2 + earth	approx. 5 V
2 + 3	approx. 5 V

If the nominal values are reached:

– Also test the wiring from the engine control unit to the accelerator pedal position senders ⇒ **24-7** page 5.

If the nominal values are not reached:

– Test the wiring from the engine control unit to the accelerator pedal position senders ⇒ **24-7** page 5.

Testing the wiring

– Connect the test box -V.A.G 1598/31- on the wiring loom to the engine control unit ⇒ Chap. 24-2.

– Check the following wires for interruption or short-circuit to earth or positive:

6-pin plug on wiring loom, contact	Test box -V.A.G 1598/31- bush
1	19
2	18
3	50
4	51
5	45
6	64

– Also test the wires for short-circuits.

– if necessary eliminate wire interruption or short-circuit.

If the wires are not found to be faulty:

– Replace the accelerator pedal position sender.

24-8 Engine control unit

Operation

After analysing the input signals the engine control unit controls the

- injection
- Lambda control
- Ignition
- Tank ventilation
- Cruise control system
- Electronic power control
- Self-diagnosis

Replacing engine control unit

Special tools, test and measuring equipment and auxiliary items required

- Vehicle system tester -V.A.G 1552-
- Diagnostic cable -V.A.G 1551/3, 3A, 3B oder 3C-

Procedure

– Connect vehicle system tester - V.A.G 1552-. Then, switch the ignition on and select address word 01 „Engine electronics“ ⇒ Chap. 01-1.

The vehicle system tester -V.A.G 1552 - displays the control unit identification, e. g.: ►

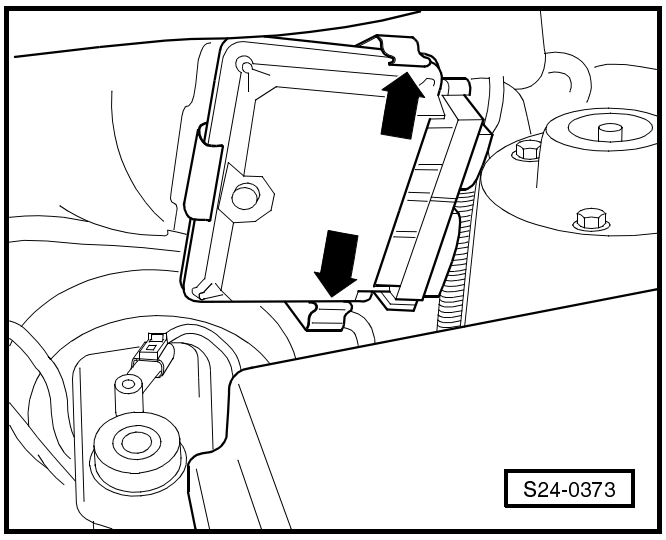
```
047906033  1.41  SIMOS 3PB   00HS0G41 ->
Coding 00071                   WSC XXXXX
```

– Take down the control unit identification.

– Select function 06 „End output“ and switch off ignition.

– Remove the air filter ⇒ Chap. 24-1.

– Press the clips -arrows- outwards and pull the engine control unit out sideways. ►



– Release the catches and unplug the control unit connectors from the engine control unit.

– Insert the new engine control unit.

After installing the 4AV control unit the following work steps must be performed:

– Code the engine control unit ⇒ **24-8** page 2.

– Adapt the engine control unit to the immobilizer control unit ⇒ Electrical System; Rep. Gr. 96.

– Perform adaptation of the throttle valve control unit -J338 - ⇒ **24-8** page 4.

– inspecting idling speed ⇒ Chap. 24-4.

– For vehicles with cruise control system: Activate the cruise control ⇒ **24-8** page 6.

– Interrogate the fault memory of the new engine control unit and if necessary erase the fault memory ⇒ Chap. 01-1.

– Perform a test drive.

Note!

Comply with the applicable safety instructions for test drives ⇒ Chap. 24-1.

During the test drive the following operating conditions must be fulfilled:

- The coolant temperature should rise beyond 80°C.
- Once the temperature has been reached the following operating conditions must be reached a number of times:

  Idling speed
  partial load
  enrichment
  full load
  trailing throttle

- In case of „full load“ the speed should be increased beyond 3500 rpm.

– Once again interrogate the fault memory of the engine control unit ⇒ Chap. 01-1.

Coding engine control unit

If the specific vehicle coding is not displayed or if the control unit was replaced, the control unit must be coded as follows.

Special tools, test and measuring equipment and auxiliary items required

- Vehicle system tester -V.A.G 1552-
- Diagnostic cable -V.A.G 1551/3, 3A, 3B oder 3C-

Procedure

– Connect vehicle system tester - V.A.G 1552-. Switch on the ignition and select the engine control unit with „Address word“ 01 ⇒ Chap. 01-1.

– Select function 07 „coding control unit“.

Readout on display:

```
Coding control unit
Enter code number   xxxxx (0 -32767)
```

– Enter code number as stated in the table of codes and confirm the entry with Q.

Table of codes:

00001	Manual gearbox
00011	Gearbox + ABS
00021	Gearbox + airbag
00031	Gearbox + ABS + airbag
00041	Gearbox + air conditioning
00051	Gearbox + air conditioning + ABS
00061	Gearbox + air conditioning + airbag
00071	Gearbox + air conditioning + ABS + airbag

The vehicle system tester -V.A.G 1552 - displays the control unit identification, e. g.:

►
```
047906033  1.41  SIMOS 3PB   00HS0G41 ->
Coding 00071                    WSC XXXXX
```

– Press key (→).

– Select function 06 „End output“ and switch off ignition.

–

Note!

- *The engine control unit stores the entered and displayed coding only after the ignition has been switched off for at least 25 seconds. Incorrect coding results in:*
- *poor driveability (jerking when changing gears, load alteration shock etc.)*
- *Increase in fuel consumption*
- *Increase in pollution*
- *Storage of non-existent faults in fault memory*
- *non-execution of functions (lambda control, activated charcoal filter system actuation, etc.)*

Testing voltage supply for control unit

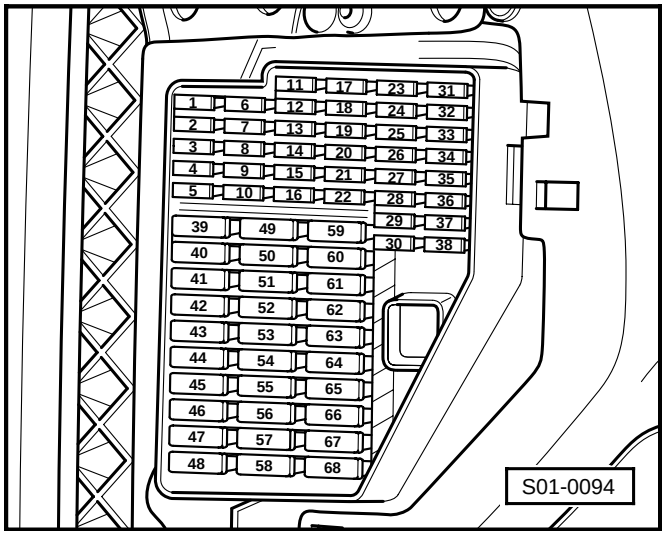
Special tools, test and measuring equipment and auxiliary items required

- Vehicle system tester -V.A.G 1552-
- Diagnostic cable -V.A.G 1551/3, 3A, 3B oder 3C-
- Hand multimeter (e.g. -V.A.G 1526 A-)
- Adapter cable set (e.g. -V.A.G 1594 A-)
- Test box -V.A.G 1598/31-

Test conditions

- Battery voltage at least 11.5 V
- AC generator O.K.
- Fuses Nos. 17 and 56 O.K.

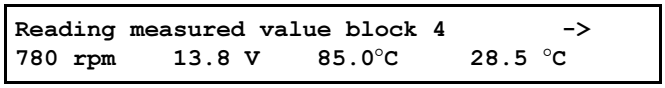
►



Test sequence

– Connect vehicle system tester - V.A.G 1552-. Switch on the ignition and select the engine control unit with „Address word“ 01 ⇒ Chap. 01-1.

– Select function 08 „Read measured value block“ and display group number 004.



– Read off value displayed in display field 2.

  Specified value: approx. battery voltage constant

– Select function 06 „End output“ and confirm entry with Q.

If the value displayed fluctuates or if the battery voltage is not reached:

– Switch off the ignition.

– Connect the test box -V.A.G 1598/31- on the wiring loom to the engine control unit ⇒ Chap. 24-2.

– Use handheld multimeter and adapter cables to measure the voltage between sockets 2 + 62 at the test box.

  Specified value: approx. battery voltage constant

– Switch on the ignition.

– Use handheld multimeter and adapter cables to measure the voltage between sockets 2 + 3 at the test box.

  Specified value: approx. battery voltage constant

– Repeat the measurements at sockets 1 + 62 and sockets 1 + 3.

If the specified values are not reached:

– Test the wiring according to the current flow diagram ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations.

Adapting the 4AV control unit to the throttle valve control unit -J338-

This adaptation teaches the engine control unit the various positions of the throttle valve with the ignition on and the engine stopped. These positions are stored in the control unit. The acknowledgement of the throttle valve position occurs via the two throttle valve drive angle senders.

Always perform an adaptation if the throttle valve control unit -J338- or the engine control unit is removed and installed or if it is replaced or if the voltage supply of the engine control unit is interrupted.

The learning process (adaptation) is performed:

- by initiating basic setting (function 04) display group 060 with the ignition on.
- automatically, when the ignition is switched on for at least 6 seconds without activating the starter and accelerator pedal and the engine control unit detects an „initialisation need“ (this does not show however whether the adaptation was successful or not). An initialisation need is detected if the stored angle sender voltage values do not correspond with the actually measured voltage values in a given tolerance range.

Note!

The engine does not start during the automatic adaptation.

Special tools, test and measuring equipment and auxiliary items required

- Vehicle system tester -V.A.G 1552-
- Diagnostic cable -V.A.G 1551/3, 3A, 3B oder 3C-

Test conditions

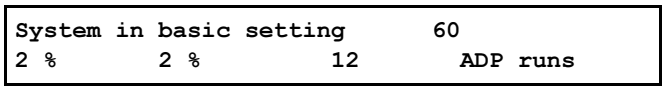
- No fault in fault memory, interrogating fault memory ⇒ Chap. 01-1
- All electrical consumers such as lights and rear window heater must be switched off
- The throttle valve must be in idling position
- Accelerator pedal not pressed
- Coolant temperature above 5 °C, but below 100 °C
- Intake air temperature below 100 °C
- Battery voltage at least 11.5 V
- For vehicles with cruise control system:

  Check whether the function is activated ⇒ Chap. 01-1. If „G“ does not appear in the control unit identification, the cruise control system should be activated ⇒ **24-8** page 6.

Procedure

– Connect vehicle system tester - V.A.G 1552-. Then, switch the ignition on and select address word 01 „Engine electronics“ ⇒ Chap. 01-1.

– Select function 04 „Basic setting“ and display group number 060.



After pressing Q, the throttle valve positioner is switched dead.

In this condition the throttle valve is drawn into emergency operation position by a mechanical spring located in the throttle valve control unit -J338-. The values generated by the two angle senders in this emergency position are stored by the engine control unit.

Subsequently the throttle valve is opened at a given value. If this value is reached, the throttle valve positioner is

again switched dead. Now the mechanical spring must close the throttle valve within a given period in the previously initialised emergency position (spring test).

The throttle valve is subsequently closed by the throttle valve positioner: the values sent by the angle sender to the throttle valve control unit -J338- are stored in the engine control unit.

If the engine control unit does not switch the throttle valve positioner dead when driving, this is indicated by a fast idling speed. The engine accelerates with a considerable delay.

```
System in basic setting      60
10.5 %    89.0 %       8       ADP runs
```

– Check the nominal value for the throttle valve control unit -J338- in display field 4.

```
System in basic setting      60
10.5 %    89.0 %       0       ADP o.k.
```

Specified value display field 4:

ADP runs
ADP O.K.

Note!

The abbreviation „ADP“ in display field 4 stands for „Adaption“, which in fact means adaptation.

If the adaptation is aborted by the control unit, this may be due to the following reasons:

- The throttle valve cannot be fully closed (e.g. dirt).
- The battery voltage is too low.
- The engine is started during the adaptation or the accelerator pedal is pressed.
- Warping of the throttle valve housing (check screwed connection).
- After the abortion the tester displays „function unknown or cannot be performed“. When the ignition is switched on again (a few seconds) the adaptation is automatically performed again.

– Select function 06 „End output“ and switch off ignition.

Activating and deactivating cruise control system (CC)

Special tools, test and measuring equipment and auxiliary items required

- Vehicle system tester -V.A.G 1552-
- Diagnostic cable -V.A.G 1551/3, 3A, 3B oder 3C-

Test condition

- No fault in fault memory, interrogating fault memory ⇒ Chap. 01-1

Procedure

– Connect vehicle system tester - V.A.G 1552-. Then, switch the ignition on and select address word 01 „Engine electronics“ ⇒ Chap. 01-1.

Readout on display:

```
047906033  1.41  SIMOS 3PB G00HS 0G41 ->
Coding 00071                   WSC XXXXX
```

If „G00HS“ is displayed the cruise control system is activated.

Readout on display:

```
047906033  1.41  SIMOS 3PB  00HS 0G41 ->
Coding 00071                   WSC XXXXX
```

If „00HS“ is displayed the cruise control system is not activated.

– Press (→).

Readout on display:

```
Vehicle system test                HELP
Select function XX
```

– Press (1) twice for the function „Log-in procedure“ and confirm the entry with (Q).

Readout on display:

```
Login procedure
Enter code number   XXXXX
```

– Enter code number according to the following table.

11463	Cruise control system activated
16167	Cruise control system deactivated

– Confirm entry with (Q).

– Select (0) (6) for the function „End output“ and switch the ignition off.

After activating the cruise control system perform a test drive as a functional test.

Testing cruise control system

Apart from the control switch on the steering column switch the cruise control system (CCS) has no other components. All functions are carried out by the engine control unit. The data from the operating switch to the engine control unit are transferred over the databus by the electrical system control unit -J519-. The CCS is activated from a vehicle speed of 30 km/h.

Note!

At present it is not yet possible to inspect the CC switch with the vehicle system tester -V.A.G 1552-.

Special tools, test and measuring equipment and auxiliary items required

- Vehicle system tester -V.A.G 1552-
- Diagnostic cable -V.A.G 1551/3, 3A, 3B oder 3C-
- Hand multimeter (e.g. -V.A.G 1526 A-)
- Adapter cable set (e.g. -V.A.G 1594 A-)
- Test box -V.A.G 1598/31-

Test conditions

- Fuse 28 O.K.
- Cruise control activated.

– Actuate cruise control system ⇒ **24-8** page 6.

Inspect proper operation

– Connect vehicle system tester - V.A.G 1552-. Leave the engine on and select address word 01 „Engine electronics“ ⇒ Chap. 01-1.

– Select function 08 „Read measured value block“ and display group 066.

Observe readout in display field 2. ►

```
Reading measured value block 66       ->
0 km/h      0000       0 km/h     0010
```

Specified value:

0XXX = CC is not deactivated

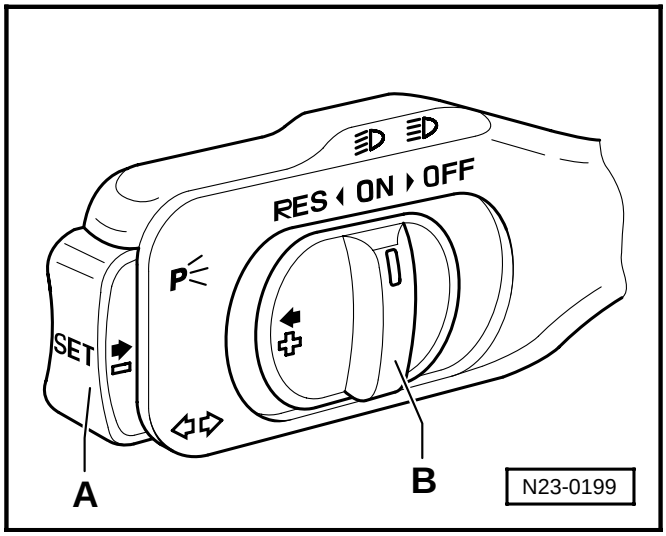
– If the display does not occur as described:

– Select function 06 „End output“ and confirm entry with Q.

– Switch off the ignition.

– Remove the trims of the steering column switch ⇒ Body Work; Rep. Gr. 70.

– Inspect the CC switch with the hand multimeter (resistance measurement) according to the following table: ►



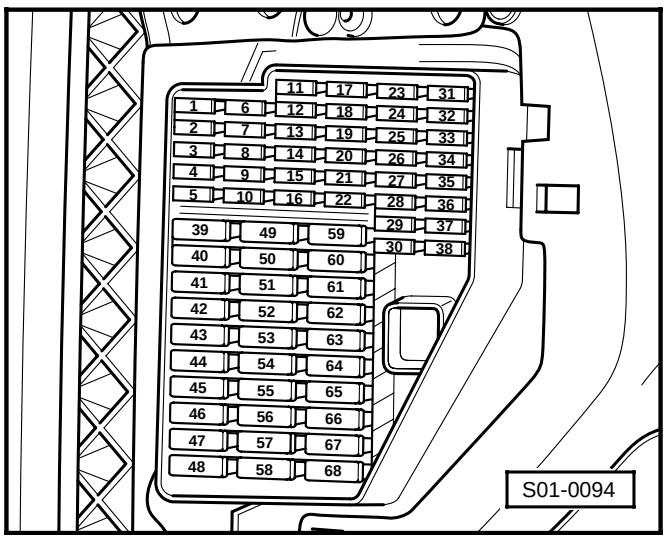
CCS switch	10-pin plug on CC switch, contact	Specification
Switch B on „ON“	4 + 5 6 + 7	max. 1.5 Ω
Switch B on „RES“	4 + 5 2 + 7 6 + 7	max. 1.5 Ω
Switch A pressed	3 + 7	max.1.5 Ω
Switch B switched to „OFF“	6 + 7 4 + 5	max. 1.5 Ω ∞ Ω
Switch B switched to „OFF“	6 + 7 2 + 7 4 + 5	∞ Ω

– Test the wires of the CCS switch to the vehicle voltage control unit -J519- according to the current flow diagram.

– Test the wire from the CCS switch to fuse 28 for interruption or short-circuit. ►

– Connect the test box -V.A.G 1598/31- on the wiring loom to the engine control unit ⇒ Chap. 24-2.

– Check the following wiring for open circuit or short circuit to earth or positive:



10-pin CC plug contact	Test box -V.A.G 1598/31-, bush
4	68
7	68

If the wires are not found to be faulty:

– Perform self-diagnosis of the vehicle voltage control unit -J519- ⇒ Electrical System; Rep. Gr. 90.
– Check data BUS ⇒ Chap. 24-9.

24-9 Testing auxiliary signals

Testing the signals of the air conditioning system and speed increase (only for 1.4 ltr. engines)

The air conditioning system is connected to the engine control unit via the data BUS. All signals of the air conditioning system to or from the engine control unit to the air conditioning system are transmitted via the data BUS.

Testing occurs via the „measured value blocks“ of the air conditioning system and engine control unit..

Special tools, test and measuring equipment and auxiliary items required

- Vehicle system tester -V.A.G 1552-
- Diagnostic cable -V.A.G 1551/3, 3A, 3B oder 3C-

Test condition

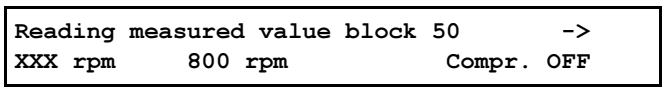
- No databus error ⇒ **24-9** page 5

Test sequence

– Connect vehicle system tester - V.A.G 1552-. Leave the engine on and select the engine control unit with „Address word“ 01 ⇒ Chap. 01-1.

– Select function 08 „Read measured value block“ and display group number 050.

– Observe data field 2 and 4:



Specified value: 800/min

Specified value: Compr. OFF

– Switch on the air conditioning system.

– Observe data field 2 and 4:

Specified value: 930/min

Specified value: Compr. ON

– If the readout in the display is not as described:

– Test the air conditioning system ⇒ Heating, Air Conditioning; Rep. Gr. 01.

– Test the CAN databus lines ⇒ **24-9** page 5.

Testing the speed signal

The speed signal is generated by the speedometer sender -G22- and is produced in the dash panel insert.

The processed signal passes to contact 9 of the engine control unit and is used for idling speed stabilisation and for damping load change jolts during gearshifts.

Special tools, test and measuring equipment and auxiliary items required

- Vehicle system tester -V.A.G 1552-
- Diagnostic cable -V.A.G 1551/3, 3A, 3B oder 3C-
- Diode test lamp (e.g. -V.A.G 1527 B-)
- Adapter cable set (e.g. -V.A.G 1594 A-)
- Test box -V.A.G 1598/31-

Test condition

- Operation and indication of speedometer o.k., testing ⇒ Electrical System; Rep. Gr. 90

Test sequence

Note!

- *The vehicle must be driven in order to test the speed signal. The assistance of a second person is required.*
- *Comply with the applicable safety instructions for test drives ⇒ Chap. 24-1.*

– Connect vehicle system tester - V.A.G 1552-. Leave the engine on and select address word 01 „Engine electronics“ ⇒ Chap. 01-1.

– Select function 08 „Read measured value block“ and display group number 005.

```
Reading measured value block 5        ->
780/min      15 %      0 km/h     Idling
```

– Determine by means of a test drive whether the driving speed is displayed in display field 3.

– Select function 06 „End output“ and switch off ignition.

If the driving speed is not displayed:

– Connect the test box -V.A.G 1598/31- to the wiring loom on the engine control unit ⇒ Chap. 24-2.

– Connect the diode test lamp between bush 3 (pos.) and bush 9 (speed signal) of the test box -V.A.G 1598/31-.

– Raise vehicle until the front left wheel is free.

– Switch on the ignition.

– Turn the left front wheel.

The diode test lamp must flash (very short signal).

If the diode test lamp does not flash:

– Test the cable for open circuit and short circuit to earth or positive ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations.

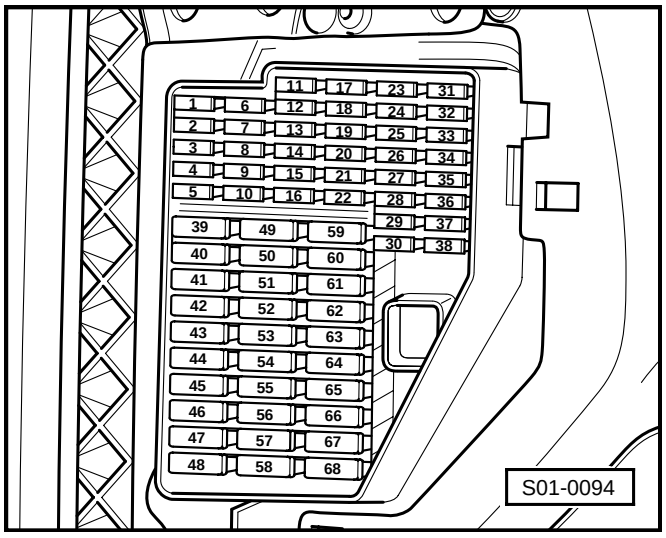
Test brake light switch -F- and brake pedal switch -F47-

Special tools, test and measuring equipment and auxiliary items required

- Vehicle system tester -V.A.G 1552-
- Diagnostic cable -V.A.G 1551/3, 3A, 3B oder 3C-
- Hand multimeter (e.g. -V.A.G 1526 A-)
- Adapter cable set (e.g. -V.A.G 1594 A-)
- Test box -V.A.G 1598/31-

Test condition

- Fuses Nos. 2 and 28 O.K.



Inspect proper operation

– Connect vehicle system tester - V.A.G 1552-. Then, switch the ignition on and select address word 01 „Engine electronics“ ⇒ Chap. 01-1.

– Select function 08 „Read measured value block“ and display group number 066.

```
Reading measured value block 66       ->
0 km/h      0000       0 km/h      0010
```

– Test the brake light/brake pedal switch in display field 2.

Specified value:

XX00 (if brake pedal not pressed)

XX11 (if brake pedal pressed)

– Select function 06 „End output“ and switch off ignition.

– If the display does not occur as described:

Testing switch

– Remove the bottom part of the dash panel on the driver's side ⇒ Body Work; Rep. Gr. 70.

– Remove the left footwell blower.

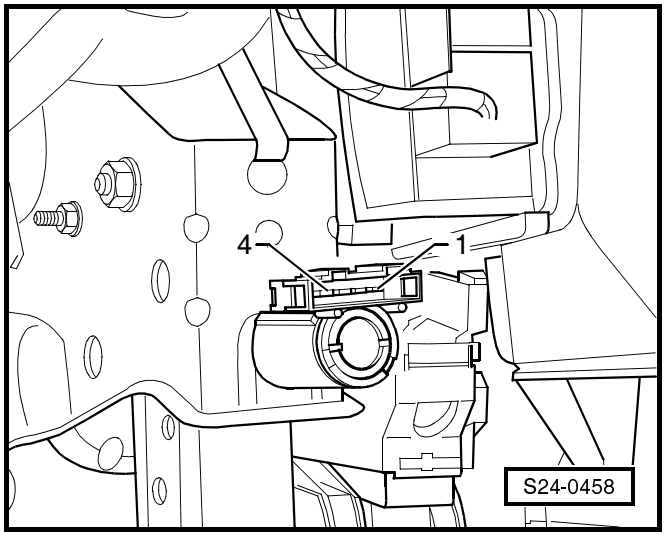
– Unplug the connector at the brake light/brake pedal switch.

– Connect the handheld multimeter for voltage measurement between contact 1 and 4.

Specified value: ∞ Ω

– Operate brake pedal.

Specified value: max. 1.5 Ω



– Connect the handheld multimeter for voltage measurement between contact 2 and 3.

Specified value: max. 1.5 Ω

– Operate brake pedal.

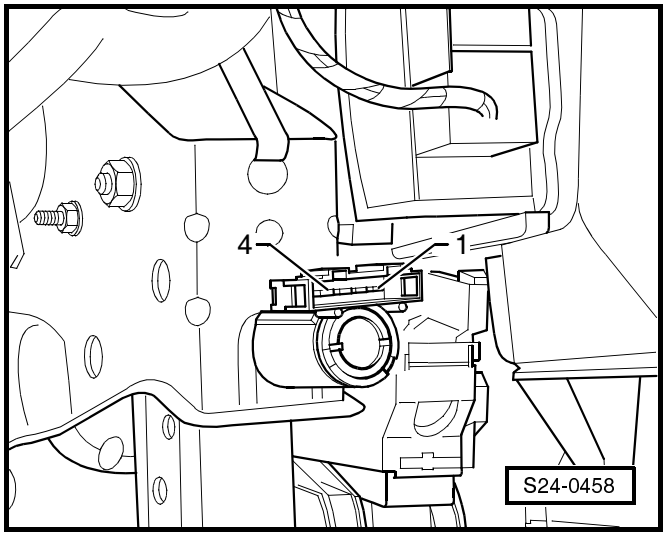
Specified value: ∞ Ω (no continuity)

If the specified values are not reached:

– Replace the brake light/brake pedal switch.

If the specified values are reached:

– Test the cable for open circuit and short circuit to earth or positive ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations.



Testing clutch pedal switch -F36-

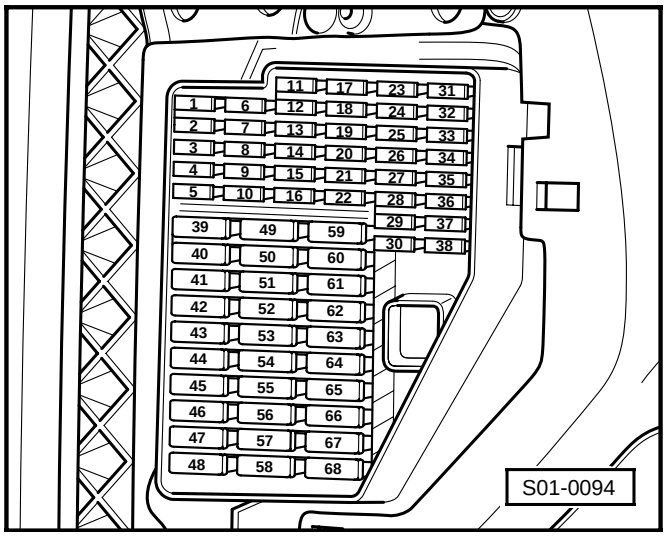
This signal is used for avoiding engine overrevving and load change jolts when the clutch is released.

Special tools, test and measuring equipment and auxiliary items required

- Vehicle system tester -V.A.G 1552-
- Diagnostic cable -V.A.G 1551/3, 3A, 3B oder 3C-
- Hand multimeter (e.g. -V.A.G 1526 A-)
- Adapter cable set (e.g. -V.A.G 1594 A-)
- Test box -V.A.G 1598/31-

Test condition

- Fuse 28 o.k.



Inspect proper operation

– Connect vehicle system tester - V.A.G 1552-. Then, switch the ignition on and select address word 01 „Engine electronics“ ⇒ Chap. 01-1.

– Select function 08 „Read measured value block“ and display group number 066.

Reading measured value block 66			->
0 km/h	0000	0 km/h	0010

– Test the clutch pedal switch in display field 2.

Specified value:

X0XX (if clutch pedal not pressed)

X1XX (if clutch pedal pressed)

– Select function 06 „End output“ and switch off ignition.

– If the readout in the display is not as described:

Testing switch

– Remove the bottom part of the dash panel on driver side ⇒ Body Fitting Work; Rep. Gr. 70.

– Unplug the connector at the clutch pedal switch.

– Connect the handheld multimeter for voltage measurement between contact 2 and +3.

  Specified value: max. 1.5 Ω

– Operate clutch pedal.

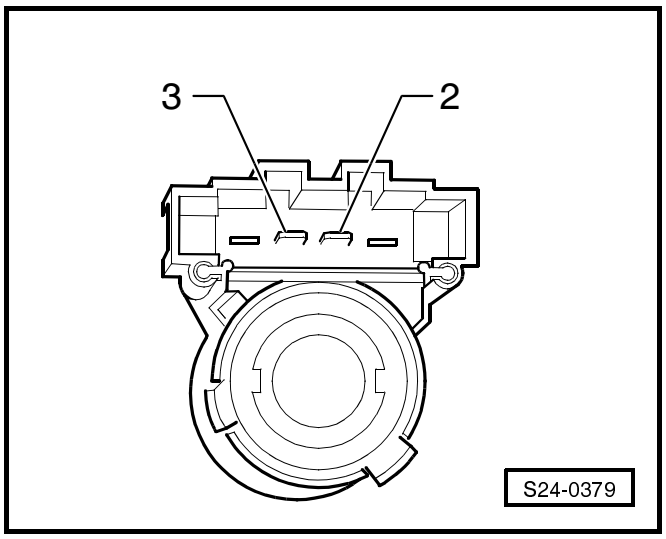
  Specified value: ∞ Ω (no continuity)

If the specified value is not reached:

– Replace the clutch pedal switch.

If the specified values are reached:

– Test the cable for open circuit and short circuit to earth or positive ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations.



Checking the data BUS

Operation

Two data BUS circuits with a different priority are integrated in the electrical system of the vehicle:

- Drive databus
- Data BUS Comfort version

Indication of which control unit is connected to the data BUS drive or data BUS Comfort: ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations; ⇒ Electrical System; Rep. Gr. 90

The control units are connected via two twisted data BUS cables (CAN_High and CAN_Low) and exchange information (messages). Both the engine control unit and the other control units detect missing information on the data BUS as faults.

Other information: ⇒ Self-study Programme No. 24; The CAN data bus

Special tools, test and measuring equipment and auxiliary items required

- Hand multimeter (e.g. -V.A.G 1526 A-)
- Adapter cable set (e.g. -V.A.G 1594 A-)
- Test box -V.A.G 1598/31-

Test conditions

- A data BUS fault was detected by the engine control unit.
- Coding of all control units O.K.

Test sequence

– Switch off the ignition.

– Unlock the connector of the engine control unit and unplug it.

– Connect the test box -V.A.G 1598/31- to the engine control unit ⇒ Chap. 24-2. The control unit wiring loom is not connected.
– Test the central terminating resistor in the engine control unit.
– Conduct a resistance measurement for this purpose between test box sockets 20 + 21.

  Specified value: 60…72 Ω

If the resistance is not within the specified range:

– Replace the motronic control unit ⇒ Chap. 24-8.

If the resistance is within the nominal value range:

– Test databus cables ⇒ Electrical System; Rep. Gr. 90.

28 – Ignition system

28-1 Ignition system

General notes on the ignition system

- The 4AV control unit is equipped with a self-diagnosis.
- A minimum voltage of 11.5 V is required for the perfect functioning of the electric components.
- Certain inspections may cause the control unit to detect and store a fault. It is therefore necessary to interrogate the fault memory after having completed all inspections and repairs, and if necessary delete.
- If after fault finding, repair or inspection of components the engine starts briefly and then stops, it is possible that the immobiliser blocks the 4AV control unit. Then interrogate the fault memory and if necessary adapt the control unit.

Safety measures

Observe the following points to prevent injury to persons and/or damage to the injection and ignition system:

- Do not touch or remove ignition leads with the engine running or at start speed.
- Only disconnect and connect wires of the injection and ignition system - and high-voltage and measuring device wires - when the ignition is switched off.
- To operate the engine at start speed without the engine starting (e.g. testing compression pressure), unplug connectors from the ignition unit and connectors from the injectors. After performing the work interrogate fault memory and erase.
- Do not carry out engine wash unless the ignition is switched off.
- Switch off the ignition before disconnecting and connecting the battery, as this may damage the 4AV control unit.

Test data, spark-plugs

Engine identification characters		**ARV, AQV**	**AME, ATZ, AQW, AZE, AZF**	
Idling speed		630…770 rpm	730…870 rpm	
Speed limiter		approx. 5800 rpm	approx. 5800 rpm	
Firing order		1-3-4-2	1-3-4-2	
Spark plugs	Part number	101000065AA	101000049AC	101000060AA
	Manufacturer code	NGK BKR 6ETA-10	Champion RC89 PYC	Brisk DR 15 TC
	Electrode spacing	0,9…1.1 mm	0,8…0.9 mm	0,75…0.85 mm
	Torque	20…30 Nm	20…30 Nm	

Removing and installing ignition system

1 - Ignition terminal
- ❑ with ignition transformer with power amplifier -N152-
- ❑ Inspecting ignition terminal ⇒ Chap. 28-2

2 - Spark plug, 20...30 Nm
- ❑ pay attention to tears, traces of leakage currents
- ❑ Check wear of contacts
- ❑ clean before installing
- ❑ use spark plug wrench (e.g. -3122 B-) for removing and installing

3 - Connector
- ❑ black, 4 pins
- ❑ for ignition terminal

4 - 5 Nm

5 - Shield

6 - 20 Nm
- ❑ The tightening torque influences the knock sensor function

7 - Knock sensor -G61-
- ❑ Contacts of connecting plug gilded
- ❑ inspecting ⇒ Chap. 28-2

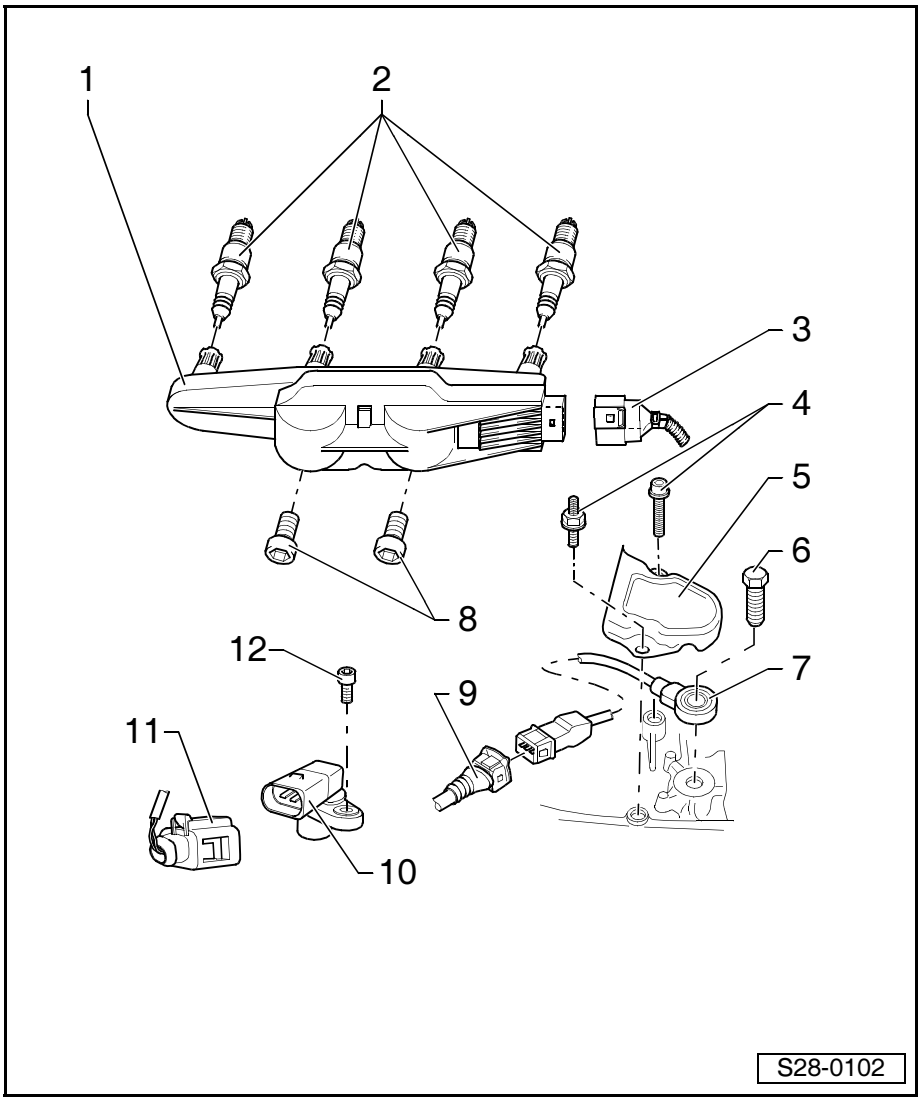
8 - 9 Nm

9 - Connector
- ❑ black, 3 pins
- ❑ for knock sensor -G61-

10 - Engine speed sender -G28-
- ❑ inspecting ⇒ Chap. 28-2

11 - Connector
- ❑ black, 2 pins
- ❑ for engine speed sender -G28-

12 - 10 Nm



28-2 Testing components and functions

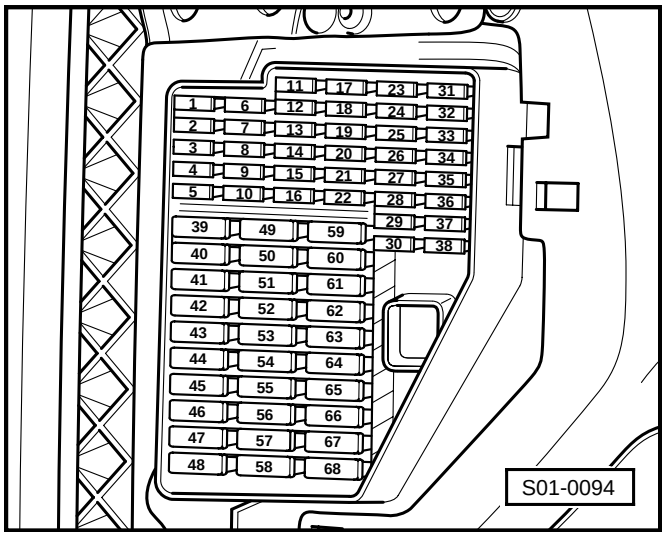
Inspecting ignition terminal

Special tools, test and measuring equipment and auxiliary items required

- Hand multimeter (e.g. -V.A.G 1526 A-)
- Diode test lamp (e.g. -V.A.G 1527 B-)
- Adapter cable set (e.g. -V.A.G 1594 A-)
- Test box -V.A.G 1598/31-

Test conditions

- Battery voltage must be of at least 11.5 V
- Testing engine speed sender O.K. ⇒ **28-2** page 5
- Fuse No. 52, O.K.

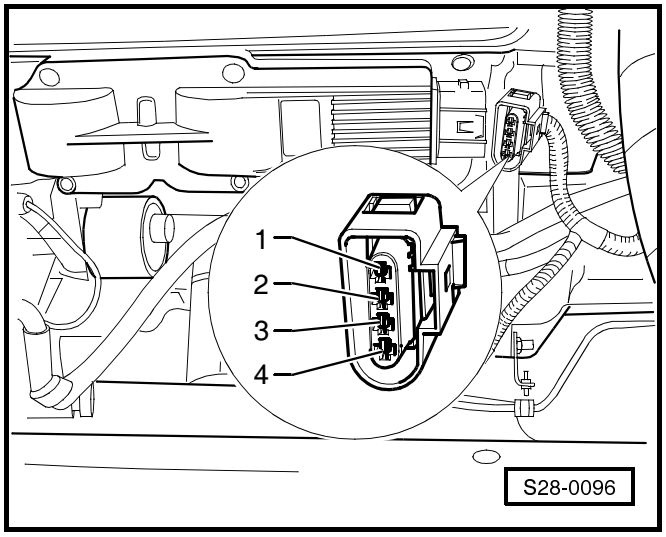


Note!

Ignition coils and power amplifier are a common component (ignition terminal) and cannot be replaced individually.

Checking voltage supply

– Remove 4-pin plug from the ignition terminal.



– Measure the power supply with the hand multimeter and adapter cables from -V.A.G 1594 A- between contacts 2 + 4 of the removed plug.

– Switch on the ignition.

Nominal value: approx. battery voltage

– Switch off the ignition.

If no voltage is present:

– Check the cable between 4-pin plug contact 4 and earth for interruption according to the Current Flow Diagram.

– Check the cable between 4-pin plug contact 4 and fuse 52 for interruption according to the Current Flow Diagram.

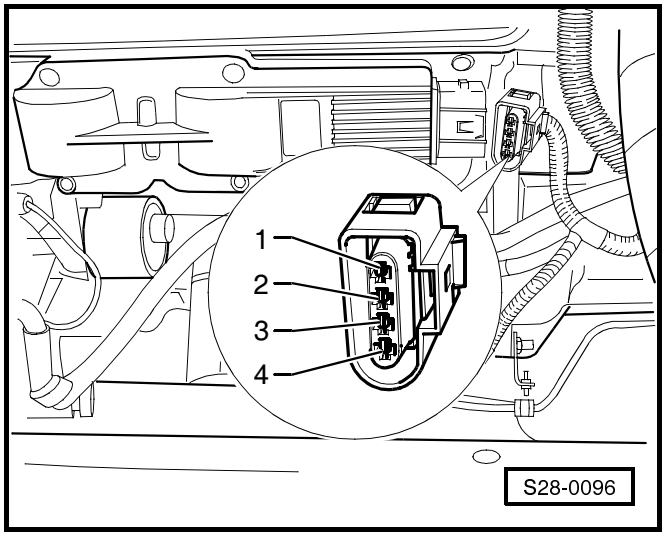
Test control

Caution!

During the following test do not touch the connecting parts of the ignition coils or the test cables.

– Remove the plug connectors from the injectors.

– Remove 4-pin plug from the ignition terminal.



– Connect the diode test lamp with adapter cables from -V.A.G 1594 A- to

  contacts 1 + 4 (ignition outlet 1)
  contacts 3 + 4 (ignition outlet 2)

  of the remove plug.

– Activate the starter and check the ignition signal of the engine control unit.

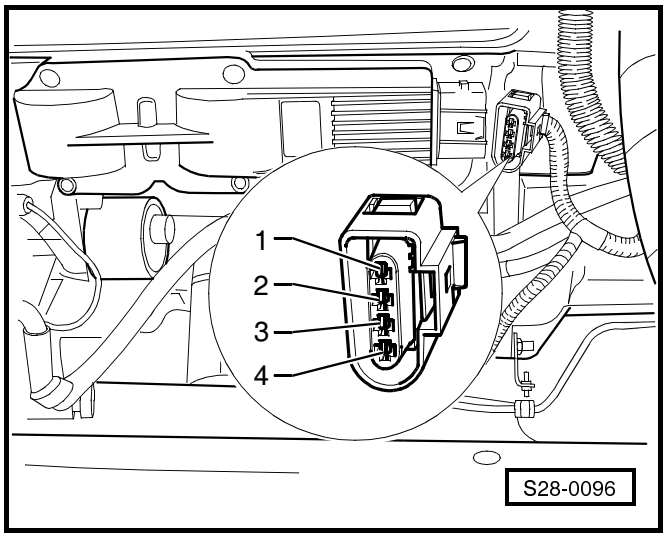
The LED must flicker.

– Switch off the ignition.

If the LED does not flash:

– Connect the test box -V.A.G 1598/31- to the wiring loom on the engine control unit ⇒ Chap. 24-2.

– Test the wiring between the test box and the 4-pin plug connection for interruption according to the Current Flow Diagram.



4-pin plug on wiring loom, contact	Test box -V.A.G 1598/ 31-, bush
1	112
3	113

– Also test the wires for short-circuits.

  Nominal value: ∞ Ω

If no fault is detected in the wiring and if there is a voltage between contact 2 + 4:

– Replace the engine control unit ⇒ Chap. 24-8.

If the wiring and the control are O.K. and there is a voltage between contact 2 + 4:

– Replace the ignition terminal ⇒ Chap. 28-1.

Inspecting thecamshaft position sensor -G163-

The camshaft position sensor -G163- indicates the ignition position for cylinder 1.

If it fails the knock control is deactivated and the ignition angle is slightly reduced as a cylinder assignment is no longer possible.

Without sensor signal the engine runs on and can be started again:

- In the event of a fault detection the engine control unit generates an ignition spark per cylinder for each crankshaft rotation.
- There is no noticeable effect on the injection if there is a displacement of an engine revolution. Instead of occurring with the injection valve open the injection occurs „pre-engaged“ (before the closed injection valve). This only has a very slight influence on the quality of the mixture formation.

Note!

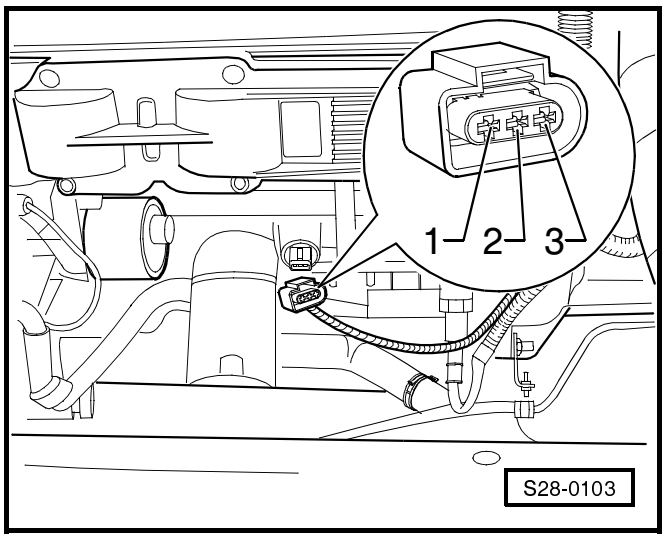
- *The camshaft position sensor -G163- is identical to the Hall sender -G40-.*
- *The correct setting of the timing can be checked in measured value block 012 ⇒ Chap. 01-5.*

Special tools, test and measuring equipment and auxiliary items required

- Hand multimeter (e.g. -V.A.G 1526 A-)
- Adapter cable set (e.g. -V.A.G 1594 A-)
- Test box -V.A.G 1598/31-

Test sequence

– Disconnect the plug from the camshaft position sensor -G163-. ►



– Switch on the ignition.

– Connect the handheld multimeter for voltage measurement as follows:

3-pin plug on wiring loom, contact	Nominal value
1 + earth	approx. 5 V
2 + earth	approx. 5 V
3 + battery pos. term.	approx. battery voltage

If the nominal values are not reached:

Switch off the ignition.

– Connect the test box -V.A.G 1598/31- to the wiring loom on the engine control unit ⇒ Chap. 24-2.

– Check the following wires for interruption:

3-pin plug on wiring loom, contact	Test box -V.A.G 1598/31- bush
1	89
2	105
3	111

– Also test the wires for short-circuits.

– if necessary eliminate wire interruption or short-circuit.

If the wires are not found to be faulty and if there was a voltage:

– Replace the camshaft position sensor -G163-.

If the wires are not found to be faulty and if there was no voltage:

– Replace the engine control unit ⇒ Chap. 24-8.

Testing knock sensor -G61-

Special tools, test and measuring equipment and auxiliary items required

- Hand multimeter (e.g. -V.A.G 1526 A-)
- Adapter cable set (e.g. -V.A.G 1594 A-)
- Test box -V.A.G 1598/31-

Note!

- *The actual knock sensor -G61- cannot be electrically tested.*
- *Only used gilded contacts to repair the cable plug for the knock sensor.*
- *The perfect functioning of the knock sensor requires an exact tightening torque of 20 Nm.*

Test condition

- Fault on knock sensor detected by self-diagnosis.

Inspect proper operation

– The functional test of the knock sensor -G61- and the knock control can be tested with the function „reading measured value block“, display groups 020, 026 and 028 ⇒ Chap. 01-5.

Checking wires

– Connect the test box -V.A.G 1598/31- to the wiring loom on the engine control unit ⇒ Chap. 24-2.

– Check the wiring of the knock sensor for short-circuits.

Bushes: 101 + 109

Nominal value: ∞ Ω

If no short-circuit is found:

– Disconnect the plug connection -arrow- of the knock-sensor -G61-.

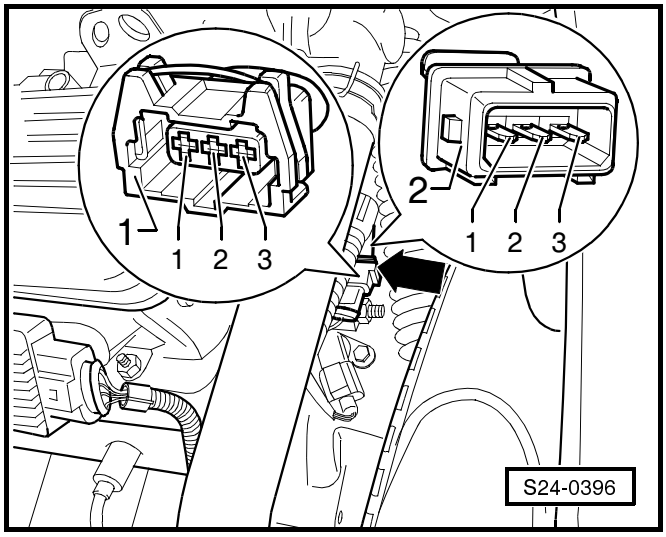
– Test the wiring between the test box and the plug connection -1- for interruption according to the Current Flow Diagram:

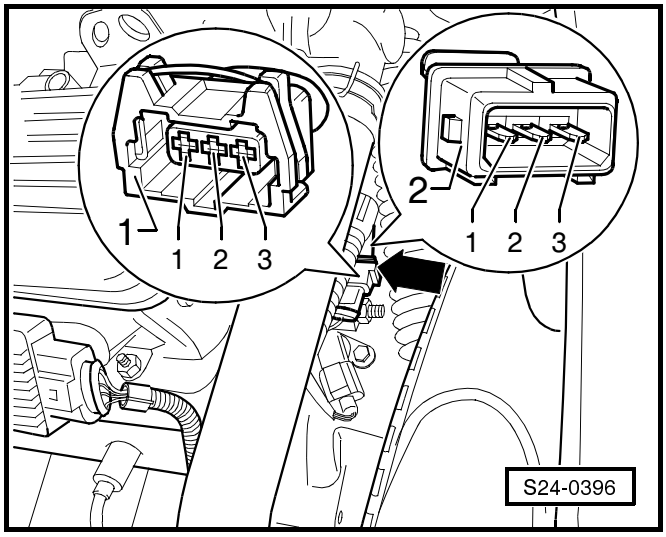
3-pin plug -1- on wiring loom, contact	Test box -V.A.G 1598/31-, bush
1	109
2	101
3	100

– Also test the wires for short-circuits.

– Measure the resistance between contacts 1 + 2, 1 + 3 and 2 + 3 on plug -2-.

Nominal value: ∞ Ω





If the wires are not found to be faulty:

– Release the knock sensor and tighten again to 20 Nm.

– Perform a test drive.

Note!

Comply with the applicable safety instructions for test drives ⇒ Chap. 24-1.

During the test drive the following operating conditions must be fulfilled:

- The coolant temperature should rise beyond 80°C.
- Once the temperature has been reached the following operating conditions must be reached a number of times:

  Idling speed
  partial load
  enrichment
  full load
  trailing throttle

- In case of „full load“ the speed should be increased beyond 3500 rpm.

– Again interrogate the fault memory.

If the complaint still exists:

– Replace the knock sensor -G61- ⇒ Chap. 24-1.

Testing Engine speed sender -G28-

If the signal of the -G28- fails while the engine is running, the engine will stop immediately. The engine control unit replaces the signal of the engine speed sender -G28- with the signal of the camshaft position sensor -G163-. The engine can be started again and runs in emergency programme at increased idling speed.

Note!

The correct setting of the timing can be checked in measured value block 012 ⇒ Chap. 01-5.

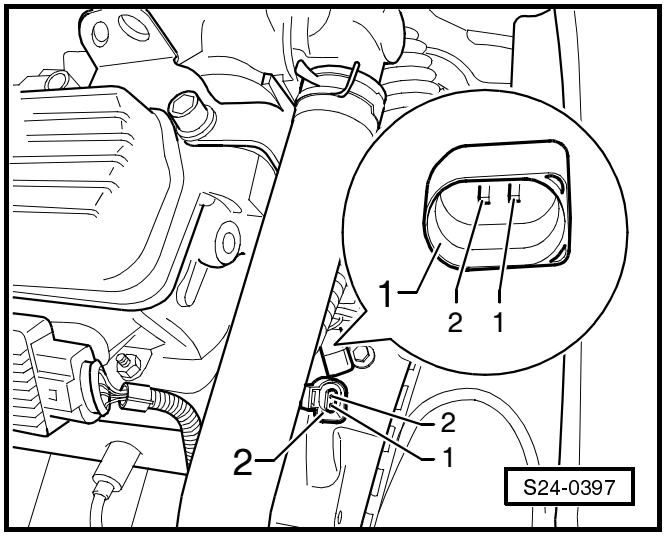
Special tools, test and measuring equipment and auxiliary items required

- Hand multimeter (e.g. -V.A.G 1526 A-)
- Adapter cable set (e.g. -V.A.G 1594 A-)
- Test box -V.A.G 1598/31-

Test sequence

– Before testing check the sender for correct installation and tight fit.

– Disconnect the 2-pin plug -2- from the engine speed sender -1-. ►



– Connect the handheld multimeter for resistance measurement between contact 1 and 2 to the sender -1-.

Nominal value: 400…640 Ω

Note!

The resistance value of the engine speed sender -G28- applies for a temperature of 20 °C. The resistance increases as the temperature rises.

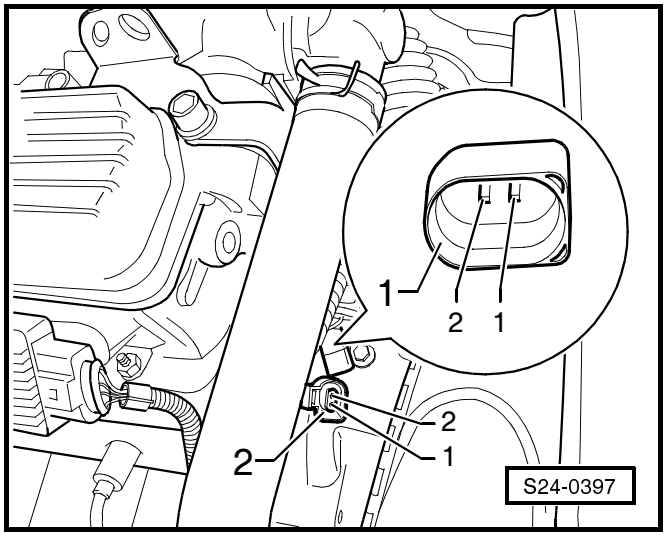
If the nominal value is not reached:

– Replace the engine speed sender.

If the nominal value is reached:

– Connect the test box -V.A.G 1598/31- to the wiring loom on the engine control unit ⇒ Chap. 24-2.

– Check the following wires for interruption or short-circuit to earth or positive:



2-pin plug -2- on wiring loom, contact	Test box -V.A.G 1598/31- bush
1	98
2	106

– if necessary eliminate wire interruption or short-circuit.

– Also check contacts 1 and 2 on bush 99 (shielding) for short-circuit.

If the wires are not found to be faulty:

– Remove the sender and check flywheel for tight fit, damage and concentricity.

If no fault can be found on the flywheel.

– Replace the engine control unit ⇒ Chap. 24-8.

Inspecting misfiring detection (only on engines complying with D 4 standard/EU 4 standard)

Special tools, test and measuring equipment and auxiliary items required

- Vehicle system tester -V.A.G 1552-
- Diagnostic cable -V.A.G 1551/3- or -V.A.G 1551/3A- or -V.A.G 1551/3B-

Test sequence

– Connect vehicle system tester -V.A.G 1552-. Leave the engine on and select the engine control unit with „Address word“ 01 ⇒ Chap. 01-1.

– Select function 08 „read measured value block“ and display group number 014.

– Read-out on display:

```
Reading measured value block 14       ->
 800 rpm      100.0 %      0      activated
```

– Check the sum of all misfirings since engine start in display field 3:

Nominal value: 0…10 (applies for max. 5 min after engine start)

– Check the status of misfiring detection in display field 4.

  Nominal value: activated

If the nominal values are reached:

– Select function 06 „End output“ and confirm entry with Q.
– Switch off the ignition.

If the nominal values are not reached:

– Check the spark plugs and ignition leads ⇒ Chap. 28-1.
– Inspect the injector valves ⇒ 24-3.