

Audi 100 1991 ➤

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KE Motronic Injection and Ignition System (4-valve)

Engine ID ACE

Edition 02.1992

List of Workshop Manual Repair GroupsList of Workshop Manual Repair GroupsList of Workshop Manual Repair Groups Audi 100 1991 ➤

KE Motronic Injection and Ignition System (4-valve)

Repair Group

01 - Self-diagnosis

25 - Mixture preparation, Injection

28 - Ignition system

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Technical information should always be available to the foremen and mechanics, because their careful and constant adherence to the instructions is essential to ensure vehicle road-worthiness and safety. In addition, the normal basic safety precautions for working on motor vehicles must, as a matter of course, be observed.

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01 - Self-diagnosis

1 - Self-diagnosis

1.1 - Self-diagnosis

1.2 - Technical data of self-diagnosis

- ♦ The data transfer between control unit and vehicle diagnosis, measurement and information system VAS 5051 or fault reader V.A.G 1551 takes place in "Rapid data transfer" mode.
- ♦ The fault memory is designed as a non-volatile memory. It is however dependent on the power supply. Disconnecting the permanent positive supply erases the fault memory of the engine control unit.

1.3 - Safety precautions

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Note the following points on vehicles equipped with a passenger airbag when carrying out a road test which involves use of testing and measuring equipment:

Attention!

- ♦ Always attach testers and measuring instruments to the back seat and have a second person operate them from there.
- ♦ If test equipment were operated from the front passenger seat, the person sitting there could be injured if the front passenger airbag were triggered in the event of an accident.

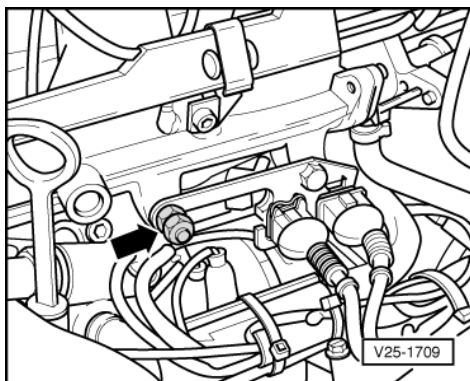
1.4 - Connecting vehicle diagnostic, testing and information system VAS 5051 or fault reader V.A.G 1551 and selecting functions

Test requirements:

- Supply voltage of vehicle electrical system OK
- Fuses for engine electronics OK

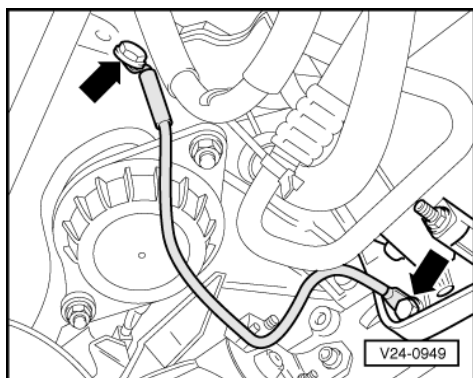
=> "Current Flow Diagrams, Electrical Fault-finding and Fitting Locations" binder

- Fuel pump relay OK; checking =>Page 38 .
- Earth connections checked.

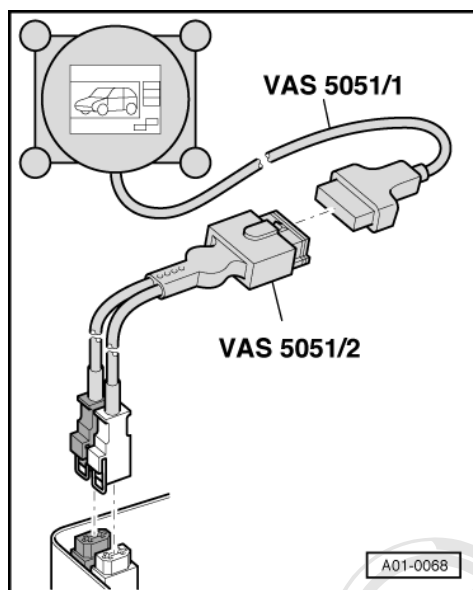




- Test following earth connections for corrosion and poor connection before interrogating fault memory, final control diagnosis, engine basic settings, test of wiring and also before replacing components:
- ♦ -> Earth attachment point at left of intake manifold -arrow-.



- ♦ -> Battery earth strap and earth strap between engine and longitudinal member -arrows- (shown from vehicle underside).
- Repair any damaged earth connections.
- Remove cover from additional relay carrier I on left of plenum chamber.



- -> Connect the vehicle diagnosis, testing and information system VAS 5051 using diagnostic cable VAS 5051/1 and diagnosis adapter VAS 5051/2. Alternatively, connect fault reader V.A.G 1551 using diagnostic cable V.A.G 1551/1.

Attention!
Pay attention to the safety precautions => Page **1** .

Note:

The following describes self-diagnosis using the fault reader V.A.G 1551 only.

When using the vehicle diagnosis, measurement and information system VAS 5051, follow the procedures described in equipment's operating instructions.

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- Make sure that ignition is switched off, then connect black connector to black diagnostic connection.

-> Display:

V.A.G SELF DIAGNOSIS HELP
1 - Rapid data transfer 1)
2 - Flash code output 1)

- 1) appears alternately

Note:

If the display remains blank, test voltage supply to black diagnostic connector => Page 23.

- Connect white connector to white diagnostic connection (blue connector not required)

Depending upon the desired function => Table "Available Functions", Page 4 :

- Switch the ignition on.
- or
- Start the engine.
- Switch on the fault reader printer with the print key. The indicator lamp in the key must light up.
- Press key 1 for "Rapid data transfer".

-> When adjacent display appears:

Rapid data transfer HELP
Enter address word XX

Note:

Address word 00 is used to start the automatic test sequence i.e. interrogation of fault memories in all vehicle systems with self-diagnosis capability in vehicle with rapid data transfer.

- Press keys 0 and 1 for address word "Engine electronics" and confirm entry with Q key.

-> The fault reader V.A.G 1551 display will show the control unit identification. For example:

4A0907404B 2.0 l R4 MK 4Valve D00
Code 00

Note:

The control unit identification can be printed out by pressing the PRINT key on fault reader V.A.G 1551.

Control unit identification (example)

- 4A0 907.404 B	Part No.; assignment => Parts List
- 2.0l	Engine capacity
- R4	Type of engine (4 cyl. in-line engine)
- MK	Injection and ignition system
- 4 valve	4-valve
- D00	Control unit data status (software type)
- Code 00	Coding of control unit=>Page 17

- Press =>key.

-> Display readout (function selection):

Rapid data transfer HELP
Select function XX

**Notes:**

- ♦ After entering the function "01" for "Interrogating control unit version" and confirming with the Q key, you may display the control unit identification again.

Rapid data transfer HELP
Control unit does not answer.

-> When adjacent display appears:

- Print out possible cause of trouble by pressing HELP key.

Rapid data transfer HELP
L wire not switching to earth

Check white diagnostic connector wiring => Page 23 .

Rapid data transfer HELP
L wire not switching to positive

Vehicles with KE Motronic self-diagnosis only: Check the earth connections to the engine control unit => Page 139 .

Rapid data transfer HELP
K wire not switching to earth

Rapid data transfer HELP
K wire not switched to positive

Rapid data transfer
Communication problem

-> If this display appears when starting or during the program, faults have occurred and data exchange between fault reader V.A.G 1551 and the engine control unit is no longer possible.

- After rectifying the faults, enter "01" again for address word "Engine electronics" => Page 1 .

Available functions

Connecting vehicle diagnosis, measurement and information system VAS 5051 or fault reader V.A.G 1551		Ignition on, engine stopped	Engine idling	Vehicle running	Page
Address words					
01	Engine electronics	yes	yes	yes	1
00	Automatic test sequence	yes	yes	yes	3
Functions					
01	Check control unit version	yes	yes	yes	1
02	Interrogate fault memory	yes	yes	yes	5
03	Final control diagnosis	yes	no	no	13
04	Basic setting	no	yes	no	16
05	Erase fault memory	yes	yes	yes	5
06	End of output	yes	yes	yes	6
08	Reading measured value block	yes	yes	yes	19

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2 - Interrogating and erasing fault memory

2.1 - Interrogating and erasing fault memory

- Take the vehicle for a test drive. Conditions:
 - Duration at least 5 minutes
 - Coolant temperature at least 80 °C
 - Engine speed greater than 3000 rpm
 - Accelerator fully depressed for a short time
- Leave engine running after test drive.

Note:

If the engine will not start, crank it for at least 5 seconds with the starter and then always leave the ignition on.

- Connect up vehicle diagnosis, measurement and information system VAS 5051 or fault reader V.A.G 1551 and select engine electronics control unit with "Address word" 01 => Page 1.

-> When adjacent display appears:

Rapid data transfer HELP
Select function XX

- Enter "02" for the function "Interrogate fault memory" and confirm entry with Q key.

-> When adjacent display appears:

No fault recognised!

- Press →key.

Note:

If problems have been reported but no faults are detected by the self-diagnosis:

=> Binder "Fault recognition engine".

or

-> When adjacent display appears:

X fault(s) detected

The stored faults are displayed and printed in sequence when the printer is switched on.

- Locate and eliminate faults listed on printout as per fault table => Page 6.
- Press →key.

-> When adjacent display appears:

Rapid data transfer HELP
Select function XX

- Enter "05" for the function "Erase fault memory" and confirm entry with Q key.

Notes:

-> When adjacent display appears:

Attention!
Fault memory has not been interrogated

Sequence has not been correctly followed.

- Interrogate fault memory.



The fault memory will also not be erased if :

- ♦ The ignition has been switched off after interrogating the fault memory.
- ♦ A static fault has not been rectified.

-> When adjacent display appears:

Rapid data transfer
Fault memory is erased

- Press =>key.
- Interrogate fault memory again after carrying out the repairs.

Note:

This erases faults that have been stored whilst the fault was being rectified, for example, faults that have arisen as a result of connectors being detached.

- Take the vehicle for a test drive. Conditions:
 - Duration at least 5 minutes
 - Coolant temperature at least 80 °C
 - Engine speed greater than 3000 rpm
 - Accelerator fully depressed for a short time
- Enter "00" for address word "Automatic test sequence" and confirm entry with Q key.

End of output

-> When adjacent display appears:

Rapid data transfer HELP
Select function XX

- Enter "06" for "End output" function and confirm entry with Q key.

-> When adjacent display appears:

Rapid data transfer HELP
Enter address word XX

- Switch off ignition and detach diagnostic connector.

2.2 - Fault table

Notes:

- ♦ The fault table is sorted according to the 5 digit fault code on the left.
- ♦ Before renewing components shown as being faulty, check the wiring and connectors to these components and the earth connections using the current flow diagram. This is particularly relevant for faults recorded as "occurring sporadically" (SP).
- ♦ If a fault occurs more than once it is stored as a static fault. If the fault does not occur anymore after a certain period of time it is converted to a sporadic fault. Sporadic faults which no longer occur after 5 activation cycles are erased automatically.
- ♦ Sporadic faults are faults which only occur occasionally (sporadic = at irregular intervals, intermittently).
- ♦ If the engine is switched off after the test drive and before interrogating the fault memory, all existing faults will be displayed as sporadic faults. If a fault occurs only occasionally or if the fault memory is not erased after the repair has been carried out, the fault will also appear on the display as a "sporadic fault". "/SP" appears on the right of the V.A.G 1551 display.

V.A.G 1551 printout	Possible causes of fault	Possible effects	Fault remedy
00281 for road speed sender -G68			

V.A.G 1551 printout	Possible causes of fault	Possible effects	Fault remedy
No signal	- Speedometer -G21 defective		- Fault finding according to current flow diagram
	- Speedometer sender -G22 defective		- Check speedometer sender -G22 => Electrical System; Repair Group 90; Testing components of dash panel insert; Testing speedometer sender Testing components of dash panel insert; Testing speedometer sender
	- Open circuit		- Test speed signal => Page 114
	- Faulty signal input in engine control unit (control unit defective)		- Replacing engine control unit => Page 34 .

V.A.G 1551 printout 00514 Ignition timing sender -G4 No signal	Possible causes of fault	Possible effects	Fault remedy
	- Checking ignition timing - -G4 wrongly installed		- Check installation position of -G4: Clamping lugs must face ignition distributor
	- Open circuit or short to earth between -G4 and engine control unit		- Check -G4 =>Page 134 Rectify open circuit or short circuit.
	- -G4 defective		- Perform visual inspection
	- Spark plugs, spark plug connectors, ignition lines, distributor caps or distributor runners defective		
	- Faulty signal input in engine control unit (control unit defective)		- Replace engine control unit => Page 34 .

V.A.G 1551 printout	Possible causes of fault	Possible effects	Fault remedy
00515 Hall sender -G40 No signal	- Fault in power supply or earth supply for -G40 - Open circuit or short to earth between -G40 and engine control unit	- Engine will not start	- Check -G40 =>Page 144 Rectify open circuit or short circuit.
	- -G40 defective		- Replacing engine control unit => Page 34 .
	- Faulty signal input in engine control unit (control unit defective)		

V.A.G 1551 printout 00516 Idling switch -F60 Open circuit / short to positive	Possible causes of fault	Possible effects	Fault remedy
	- Throttle valve sticking - -F60 defective	- Increased idling speed with cold start, decreases with increasing temperature	- Check idling switch => Page 54 .



V.A.G 1551 printout	Possible causes of fault	Possible effects	Fault remedy
	- Open circuit or short to positive between -F60 and engine control unit - Throttle cable setting - Floor mat pressing down on accelerator pedal		- Rectify open circuit or short circuit. - Adjust throttle cable => Fuel Supply System - Fuel Engines; Repair Group 20; Servicing accelerator mechanism; Adjusting throttle cable Servicing accelerator mechanism; Adjusting throttle cable
	Continued ▼		

V.A.G 1551 printout	Possible causes of fault	Possible effects	Fault remedy
00516 Idling switch -F60 Short to earth	(Fault 00516 continued) - Short to earth between -F60 and engine control unit - Moisture in connector of -F60 - -F60 defective - Faulty signal input in engine control unit (control unit defective)		- Check idling switch => Page 54 Rectify short circuit - Replacing engine control unit => Page 34

V.A.G 1551 printout	Possible causes of fault	Possible effects	Fault remedy
00517 Full throttle switch -F81 Short to earth	- Short to earth between -F81 and engine control unit - Moisture in connector of -F81 - -F81 defective - Faulty signal input in engine control unit (control unit defective)		- Check full throttle switch => Page 54 . Rectify short circuit - Replacing engine control unit => Page 34 .

V.A.G 1551 printout	Possible causes of fault	Possible effects	Fault remedy
00520 Air mass/air flow meter -G70/-G19 Open circuit/short to earth 1) Open circuit/short to positive 1)	- Open circuit or short to positive between -G19 and engine control unit - Fault in earth supply for -G19 - Air flow meter potentiometer -G19 defective - Unmetered air in intake area	- Engine sows	- Check potentiometer for air flow meter -G19 => Page 59 Rectify open circuit or short circuit. - Test for leaks (unmetered air) in intake air system =>Page 66 .

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1) One of these displays appears in addition to component concerned.

V.A.G 1551 printout	Possible causes of fault	Possible effects	Fault remedy
00522 Coolant temperature sender -G62 Open circuit/short to positive 1) Open circuit/short to earth 1)	- Open circuit or short circuit to earth or positive between -G62 and engine control unit - Earth supply to -G62 defective - Moisture or corrosion in connector plug - -G62 defective - Faulty signal input in engine control unit (control unit defective)	- Cold starting problems - Engine running problems when warm	- Check sensor for intake air temperature=> Page 136 . - Rectify open circuit or short circuit. - Replacing engine control unit => Page 34 .

1) One of these displays appears in addition to component concerned.

V.A.G 1551 printout	Possible causes of fault	Possible effects	Fault remedy
00524 Knock sensor 1 -G61 No signal	- Knock sensor 1 -G61 loose - Corrosion due to dampness in connector - Open circuit or short to positive between -G61 and engine control unit - Short circuit between -G61 and earth or to screening - -G61 defective - Faulty signal input in engine control unit (control unit defective)	- High fuel consumption - Loss of power	- Tighten knock sensor to 20 Nm - Check -G61 =>Page 142 - Rectify open circuit or short circuit. - Replacing engine control unit => Page 34 .

V.A.G 1551 printout	Possible causes of fault	Possible effects	Fault remedy
00525 Lambda probe -G39 No signal	- Short to earth or short to screening in lambda probe signal line - Lambda probe heater -Z19 not operating - -G39 defective	- Exhaust not OK - Idling speed control switches to open loop control	- Read measured value block, display zone 6 =>Page 19 - Rectify open circuit or short circuit. - Testing lambda probe heater -Z19 => Page 104 - Check lambda probe -G39 and lambda control =>Page 102

V.A.G 1551 printout	Possible causes of fault	Possible effects	Fault remedy
00533 Idling speed regulation			



V.A.G 1551 printout	Possible causes of fault	Possible effects	Fault remedy
Adaptation limit not reached 1)	- Basic throttle valve setting	- Idling speed too high	- Perform basic setting of throttle valve => Page 65
Adaptation limit exceeded 1)	- Ignition point set incorrectly		- Checking ignition point => Page 126
	- Activated charcoal filter system solenoid 1 -N80 leaking, constantly open		- Check activated charcoal filter system solenoid 1 -N80 for leaks => Page 108
	- Unmetered air in intake area		- Checking for leaks (unmetered air) in intake air system =>Page 66
	- Voltage of air flow potentiometer -G19 outside of tolerance		- Checking potentiometer for air flow meter -G19 => Page 59
	- Vehicles with air conditioner: No climate compressor switch-off signal		- Check air conditioner compressor shutoff =>Page 113

1) One of these displays appears in addition to component concerned.

V.A.G 1551 printout	Possible causes of fault	Possible effects	Fault remedy
00535 First knock regulation Control limit exceeded	- Poor quality fuel (less than RON 91)	- Slight power loss	- Refuel with fuel of at least 95 RON
	- Knock sensor 1 -G61 loose	- Max. speed too low	- Tighten knock sensor to 20 Nm
	- Open circuit in screening for knock sensor -G61		- Check -G61 =>Page 142 Rectify open circuit in wiring
	- Abnormal engine noises (ancillaries loose) caused by mechanical damage, e.g. slackened bolted connections, fractured securing bolts or split/fractured brackets of components on engine		- Rectify mechanical damage
	Continued ▼		

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V.A.G 1551 printout	Possible causes of fault	Possible effects	Fault remedy
00535 First knock regulation Control limit exceeded	(Fault 00535 continued)		
	- Knock control in engine control unit faulty (engine control unit faulty)		- Replacing engine control unit => Page 34
	- Ignition point too soon		- Test ignition timing and set, if necessary => Page 126
	- Engine pings, knocks (e.g. oil combustion because of defective piston/injected quantity too low)		- Check compression pressure => 4-cylinder Fuel Injection Engine (4-valve), Mechanical Components; Repair Group 15; Removing and installing cylinder head; Testing compression pressure 89

V.A.G 1551 printout	Possible causes of fault	Possible effects	Fault remedy
00537			

V.A.G 1551 printout	Possible causes of fault	Possible effects	Fault remedy
Lambda control Control limit exceeded	- CO content not in specification	- Soot deposits on spark plugs - CO upstream of catalytic converter greater than 1.2 % vol.	- Read measured value block, display zone 7 =>Page 19
	- Short circuit of lambda probe signal wiring - -G39 defective		- Checking lambda probe and lambda control =>Page 102 Rectify short circuit
	- Cold start valve -N17 leaking		- Test cold start valve -N17 => Page 44
	- Fuel system pressure too low		- Check fuel system pressure => Page 84
	- Activated charcoal filter system solenoid 1 -N80 leaking, constantly open Continued ▼		- Check activated charcoal filter system solenoid 1 -N80 for leaks=> Page 108

V.A.G 1551 printout	Possible causes of fault	Possible effects	Fault remedy
00537 Lambda control Control limit exceeded	(Fault 00537 continued) Unmetered air at mixture control unit	Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted. All rights reserved by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.	- Checking for leaks (unmetered air) in intake air system =>Page 66
	- Earth supply between engine control unit contact 35 and intake manifold		- Checking earth supply =>Page 141
00540 Knock sensor 2 -G66 No signal	=>Knock sensor 1 -G61 Fault code 00524	=>Knock sensor 1 -G61 Fault code 00524	=>Knock sensor 1 -G61 Fault code 00524

V.A.G 1551 printout	Possible causes of fault	Possible effects	Fault remedy
00587 Adjusting limit Mixture control unit Adaptation limit exceeded	- Idling setting not O.K.		- Checking idling, CO content and ignition point => Page 78
	- Earth supply between engine control unit contact 35 and intake manifold		- Checking earth supply =>Page 141
	- Unmetered air in intake area Continued ▼		- Checking for leaks (unmetered air) in intake air system =>Page 66

V.A.G 1551 printout	Possible causes of fault	Possible effects	Fault remedy
00587 Adjustment limit Mixture control unit Lower adaptation limit exceeded	(Fault 00587 continued) - Idling setting not O.K.		- Checking idling, CO content and ignition point => Page 78



V.A.G 1551 printout	Possible causes of fault	Possible effects	Fault remedy
	- Cold start valve -N17 leaking		- Test cold start valve -N17 => Page 44
	- Activated charcoal filter system solenoid 1 -N80 leaking, constantly open		- Checking activated charcoal filter system solenoid 1 -N80 for leaks => Page 108
	- Injector not closing		- Checking injector => Page 89

V.A.G 1551 printout	Possible causes of fault	Possible effects	Fault remedy
01257 Idling stabilisation valve - N71 Short to positive 1) Open circuit/short to earth 1)	- Open circuit or short to earth or positive in wiring between - N71 and engine control unit	- Engine sags	- Check -N71 => Page 50 Rectify open circuit or short circuit.
	- -N71 defective		
	- Signal output in engine control unit defective (control unit defective)		- Replacing engine control unit => Page 34 .

1) One of these displays appears in addition to component concerned.

V.A.G 1551 printout	Possible causes of fault	Possible effects	Fault remedy
17978 Engine control unit disabled	- Fault in immobiliser system	- Engine does not start (cuts out after one second)	- Interrogate fault memory of immobiliser => Electrical System; Repair Group 01; Immobiliser self-diagnosis; Interrogating fault memory Immobiliser self-diagnosis; Interrogating fault memory
	- Immobiliser control unit not adapted to engine control unit		- Adapt control units => Electrical System; Repair Group 01; Self-diagnosis; Adaptation procedure after renewing engine control unit Self-diagnosis; Adaptation procedure after renewing engine control unit
	- Open circuit between immobiliser control unit and engine control unit		- Rectify open circuit in wiring => "Current Flow Diagrams, Electrical Fault-finding and Fitting Locations" binder

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V.A.G 1551 printout	Possible causes of fault	Possible effects	Fault remedy
65535 Control unit faulty	- Earth connections to engine control unit	- Engine will not start	- Checking earth connections =>Page 139
	- Fuse (in red holder in electronic box in passenger footwell) defective		- Check fuse

V.A.G 1551 printout	Possible causes of fault	Possible effects	Fault remedy
	- Internal fault in control unit	- Engine running problems - Engine cuts out	- Replace engine control unit => Page 34

3 - Final control diagnosis

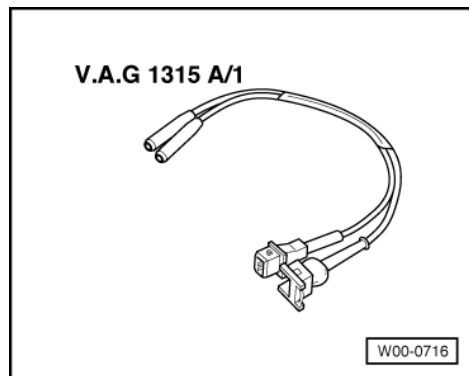
3.1 - Final control diagnosis

Notes:

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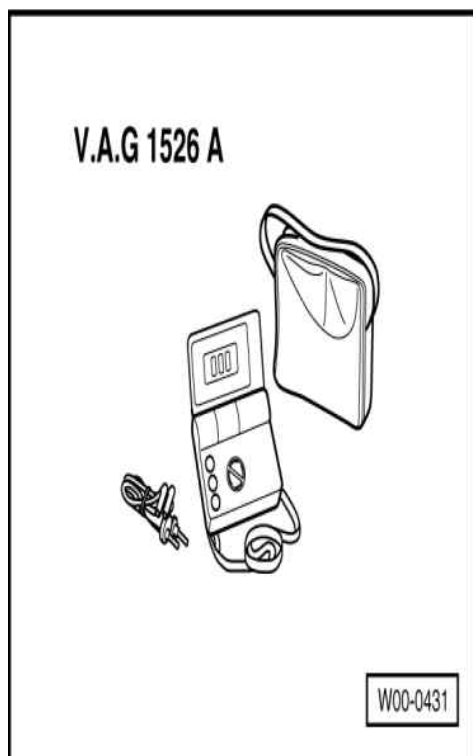
- ◆ The final control diagnosis can only be performed with the engine stopped and the ignition switched on.
- ◆ The final control diagnosis is terminated if the engine is started or if an engine speed pulse is detected.
- ◆ The control elements can be checked acoustically or by way of touch.
- ◆ During the final control diagnosis, individual control elements continue to be actuated until the test program is advanced to the next control element by pressing the ➔ key. In contrast to this the cold start valve -N17 is only activated for 10 seconds.
- ◆ The pressure regulator -N73 is checked during the final control diagnosis by measuring pressure regulator current. To measure the pressure regulator current the differential pressure regulator must be prepared for testing => Page 13 .
- ◆ To repeat the final control diagnosis, the ignition must be switched off and on again.

3.2 - Preparing differential pressure regulator for pressure regulator measurement



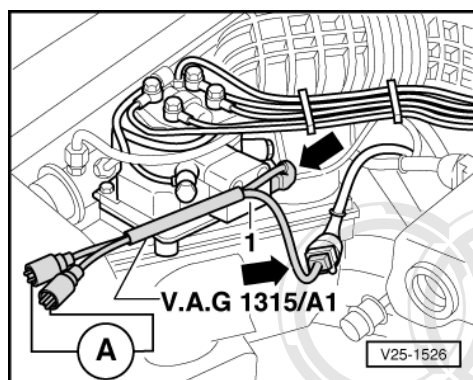
Special tools and workshop equipment required

- ◆ Test lead V.A.G 1315A/1



- ♦ Hand-held multimeter V.A.G 1526 A

Prerequisite:



- Differential pressure regulator OK, testing =>Page 63 .

Work sequence

- Pull connector of pressure regulator.
- -> Switch multimeter to measuring range 200 mA and connect with measuring line V.A.G 1315A/1 between pressure regulator -1- and connector of pressure regulator -arrows-.

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3.3 - Performing final control diagnosis

Prerequisite:

- Check idling switch and full throttle switch OK => Page 55 .

The final control diagnosis activates the following components in the stated order:

Actuation sequence
1 Pressure regulator -N73
2 Solenoid valve 1 for activated charcoal filter -N80
3 Idling stabilisation valve -N71
4 Cold start valve -N17

- Connect vehicle diagnosis, measurement and information system VAS 5051 or fault reader V.A.G 1551 and select engine electronics control unit with "Address word" 01 => Page 1 .
Engine must not be running.

-> When adjacent display appears:

Rapid data transfer HELP
Select function XX

- Enter "03" for the "Final control diagnosis" function and confirm entry with Q key.

-> When adjacent display appears:

Final control diagnosis
Pressure regulator -N73

- Read pressure regulator at multi-meter.
- Specification: 0 ... 100 mA fluctuating

If the specification is not obtained:

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- Checking pressure regulator =>Page 63 .
- Press =>key.

-> When adjacent display appears:

Final control diagnosis
Solenoid valve 1 for activated charcoal
filter -N80

The injector valve should click.

If the injector does not click:

- Check the activated charcoal filter system solenoid valve 1 -N80 =>Page 107 .
- Press =>key.

-> When adjacent display appears:

Final control diagnosis
Idling stabilisation valve -N71

The idling speed stabilisation valve must click.

If the injector does not click:

- Check idling stabilisation valve -N71 => Page 50 .
- Press =>key.

-> When adjacent display appears:

Final control diagnosis
Cold start valve -N17

- Slightly open throttle valve.

The valve must click for 10 seconds.

**Note:**

Press the ➔ key no later than after the cold start valve has operated two or three times.

If the injector does not click:

- Check the cold start valve -N17 => Page 44 .
- Press ➔key.

-> Display readout (function selection):

Rapid data transfer	HELP
Select function XX	

4 - Basic setting

4.1 - Basic setting

In the basic setting the engine control unit carries out the following functions:

- ♦ The digital idling stabilisation is blocked.
- ♦ The ACF valve is closed.

Test requirements:

- Coolant temperature at least 85 °C.
- Engine speed less than 2000 rpm
- Electrical consumers switched off (radiator fan must not run during the test)
- Air conditioner switched off.
- No faults stored in fault memory

Work sequence

- Connect up vehicle diagnosis, measurement and information system VAS 5051 or fault reader V.A.G 1551 and select engine electronics control unit with "Address word" 01 => Page 1 .
For this purpose, the engine must be running at idle speed

-> When adjacent display appears:

Rapid data transfer	HELP
Select function XX	

- Enter "04" to select "Start basic setting" and confirm with Q key.

-> When adjacent display appears:

Basic setting	Q
Enter Display Group number XXX	

- Enter "000" for "Display group number 000" and confirm entry with Q key.

-> The readout in display group number 000 appears in 10 display zones; explanation => Page 17 .

System in basic setting 0									
1	2	3	4	5	6				
7	8	9	10						

Note:

If the printer is switched on, the current readout in the display can be printed out on the record slip by pressing the print key.

- If the specifications are achieved in all the display zones, press the ➔key and end the output => Page 6 .

Display group 000

System in basic setting 0										⇒	* indicated on display	Specification	Corresponds to
1	2	3	4	5	6	7	8	9	10		Display zone not used.		
											Sum of values of operating status => Page 20	5	
											Speed signal	0	
											Lambda adaptation	78 ... 228	-10 ... +10 mA
											Lambda control (must fluctuate)	0 ... 255	
											Ignore idling speed stabilisation, condition integrator	0 ... 255	
											Idling speed stabilisation, basic air adaptation	0 ... 24 or 232 ... 255	
											Engine speed	34 ... 41	800 ... 1000 rpm
											Engine load; ignore	25 ... 70	
											Coolant temperature	56 ... 39	+ 85 ... 100 °C

The evaluation of the individual measuring value is carried out, where appropriate in function "Read measured value block" => Page 19.

5 - Encoding control unit

5.1 - Encoding control unit

Note:

-> If the control unit identification displays a code that does not correspond to the vehicle, it is then necessary to code the control unit.

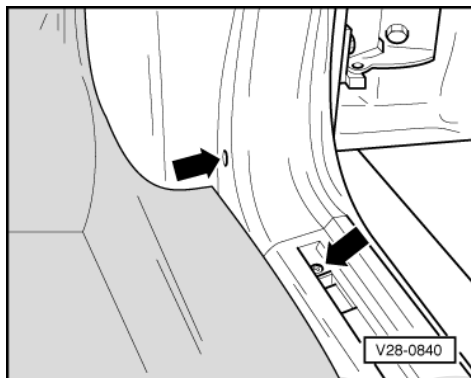
4A0907404B 2,0 l R4 MK 4Valve D00
Code 00

Encoding variations

Coding	For vehicles	Bridge between contacts of coding connector
00	with manual gearbox	No

If the appropriate coding is not displayed:

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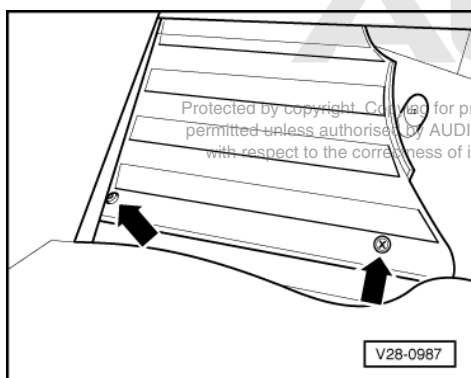


- -> Remove the lower part of the right A pillar trim and the front door sill panel tread strip

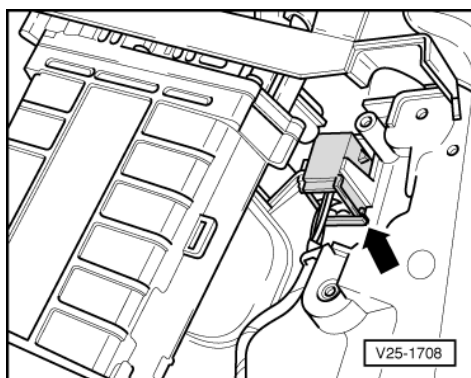
=> General Body Assembly; Repair Group 70; Trim panels; Removing and installing A-pillar trim Trim panels
Removing and installing A-pillar trim

=> General Body Assembly; Repair Group 70; Trim panels; Removing and installing inner sill panel Trim panels
Removing and installing inner sill panel

- Pull back floor covering at front of right-hand footwell. (If necessary, cut open the perforated seam on the left with a knife.)



- -> Unscrew bolts -arrows- for electronics box cover.
- Carefully detach upper and lower sections of cover.



- > All contacts of the coding plug -arrow- must be open.

- If necessary, remove conductor bridge between the contacts of the coding plug.
- With vehicle diagnostic, testing and information system VAS 5051 or fault reader V.A.G 1551 still connected ask for repeat of display of the control unit identification after entering function "01" for "Interrogate control unit version" and confirm with Q key.

-> The display of the fault reader unit V.A.G 1551 shows the control unit encoding, e.g.:

4A0907404B 2.0 l R4 MK 4Valve
D00 ☐
Code 00

If the appropriate coding is not displayed:

- Test the wiring connection of the coding connector => Page 25 .

6 - Reading measured value block

6.1 - Reading measured value block

Test requirements:

- Coolant temperature at least 85 °C.
- Accelerator pedal not depressed.
- Electrical consumers switched off (radiator fan must not run during the test)
- Air conditioner switched off.
- No faults stored in fault memory

Work sequence

- Connect up vehicle diagnosis, measurement and information system VAS 5051 or fault reader V.A.G 1551 and select engine electronics control unit with "Address word" 01 => Page 1 .
For this purpose, the engine must be running at idle speed

-> When adjacent display appears:

Rapid data transfer HELP
Select function XX

- Switch on the fault reader printer with the print key. The indicator lamp in the key must light up.
- Enter "08" to select the function "Reading measured value block" and confirm entry with Q key.

-> When adjacent display appears:

Reading measured value block Q
Enter Display Group number XXX

- Enter "000" for "Display group number 000" and confirm entry with Q key.

-> Display for display group 000:

Read measurement block 0
1 2 3 4 5 6 7
8 9 10

Notes:

- ◆ In display group 000 the measured values are shown in decimal form.
- ◆ If the printer is switched on, the current display can be printed out on the record slip.
- If the specifications are achieved in all the display zones, press the ➡key and end the output => Page 6 .
- If the specifications are not achieved in display group 000 => test table, Page 20 .

Display group 000

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Reading measured value block ➡ indicated on display Specification Corresponds to											
1	2	3	4	5	6	7	8	9	10		



Ignition timing (ignore, must not be used for ignition adjustment)		
Sum of values of operating status => Page 20	5	
Speed signal	0	
Lambda adaptation	78 ... 228	-10 ... +10 mA
Lambda control (must fluctuate)	0 ... 255	
Ignore idling speed stabilisation, condition integrator	0 ... 255	
Idling stabilisation, basic air adaptation	0 ... 24 or 232 ... 255	
Engine speed	34 ... 41	800 ... 1000 rpm
Engine load; ignore	25 ... 70	
Coolant temperature	56 ... 39	+ 85 ... 100 °C

Meaning of figures in display zone 9:

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Value	Operating status
1	Idling switch closed
2	Closed full throttle switch
4	Vehicle with manual gearbox
8	A/C compressor switched on
64	Acceleration enrichment active (only with cold engine)
128	Thrust switch-off active

Note:

The engine load operating status is shown added on.

- ♦ Example idling speed:
Idling switch closed 1
Vehicle with manual gearbox + 4
Sum = 5

Test table, display group 000

Display zone	Readout on V.A.G 1551	Cause of fault	Fault remedy
1	Deviation from tolerance range	- Coolant temperature sender -G62 defective - Wiring fault between coolant temperature sender -G62 and engine control unit.	- Interrogate fault memory =>Page 136
2	...	Ignore	

Display zone	Readout on V.A.G 1551	Cause of fault	Fault remedy
3	Deviation from tolerance range	- Air intake system drawing in large quantities of unmetered air - Ignition point set incorrectly	- Check air intake system for leaks (unmetered air) =>Page 5 - Checking ignition point => Page 126

Display zone	Readout on V.A.G 1551	Cause of fault	Fault remedy
		- Throttle cable setting	- Adjust throttle cable => Fuel Supply System - Petrol Engines; Repair Group 20; Servicing accelerator mechanism; Adjusting throttle cable Servicing accelerator mechanism; Adjusting throttle cable
		- Basic throttle valve setting	- Basic setting of throttle valve => Page 65
		- Idling stabilisation valve -N71 is sticking or stiff	- Perform final control diagnosis =>Page 50 .
		- Activated charcoal filter system solenoid 1 -N80 leaking, constantly open	- Checking activated charcoal filter system solenoid 1 -N80 for leaks => Page 108

Display zone	Readout on V.A.G 1551	Cause of fault	Fault remedy
4	Deviation from tolerance range	- Vacuum hose to or from valve for idling speed stabilisation -N71 leaking	- Interrogate fault memory =>Page 5
5	...	Ignore	
6	Display not fluctuating	- Open circuit or short circuit to earth or positive - Lambda probe defective	- Interrogate fault memory =>Page 102

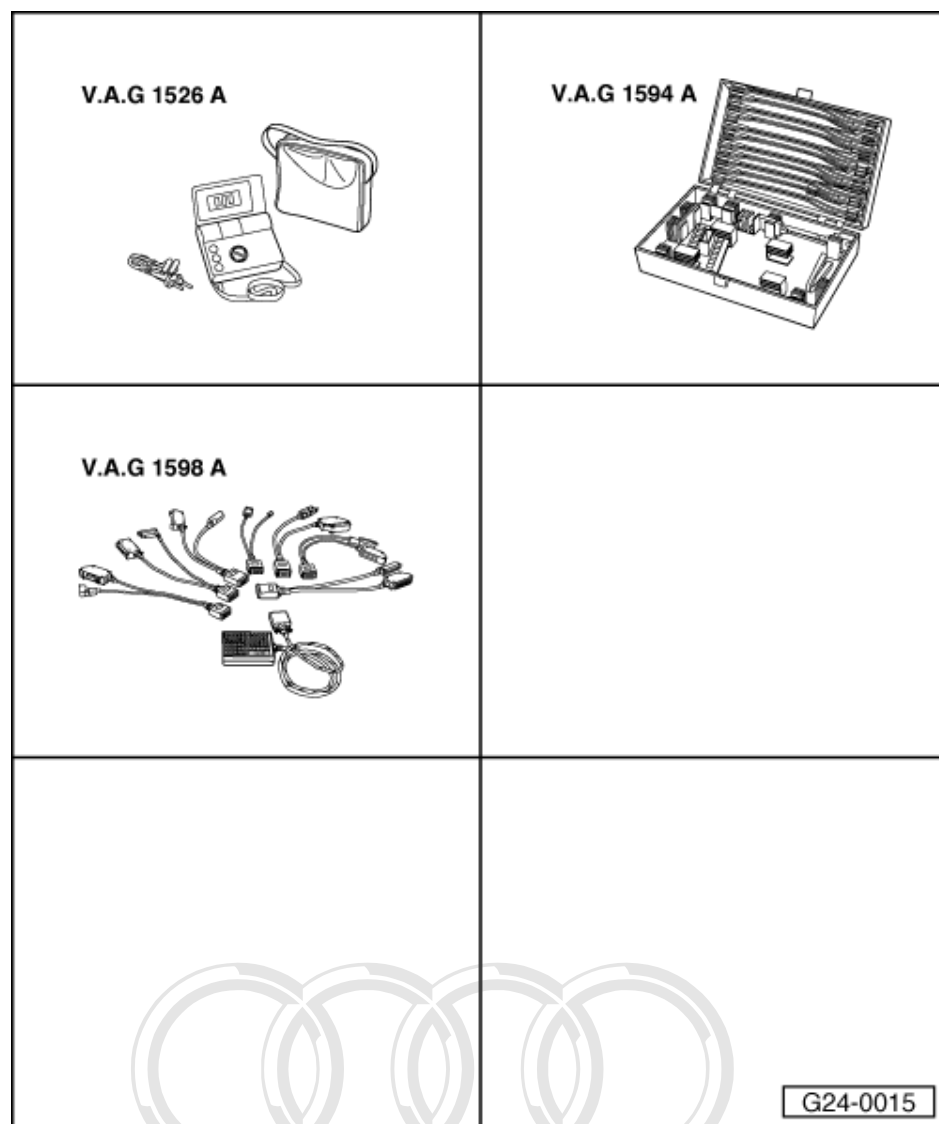
Display zone	Readout on V.A.G 1551	Cause of fault	Fault remedy
7	Deviating from tolerance range	- Injector defective	- Check injectors =>Page 89
		- Defective spark plug	- Test spark plugs
		- Large quantity of unmetered air	- Eliminate cause
		- Earth supply between engine control unit contact 35 and intake manifold	- Earth supply between engine control unit contact 35 and intake manifold => Page 141
		- Solenoid valve 1 for activated charcoal filter -N80	- Perform final control diagnosis => Page 107
		- Lambda probe defective	- Interrogate fault memory =>Page 102
		- Lambda probe heater -Z19 defective	- Test lambda probe heater -Z19 => Page 104
		- Coolant temperature sender -G62 defective	- Interrogate fault memory =>Page 136

Display zone	Readout on V.A.G 1551	Cause of fault	Fault remedy
8	...	Ignore	
9	smaller or greater than 5	- Idling switch -F60 or full throttle switch -F81 defective	- Check and adjust idling switch -F60 and full throttle switch -F81 => Page 55
		- Earth supply to engine control unit contact 34	- Check earth supply to engine control unit contact 34 => Page 139 onwards
10	...	Ignore	



7 - Testing diagnostic connector wiring connections

7.1 - Testing diagnostic connector wiring connections

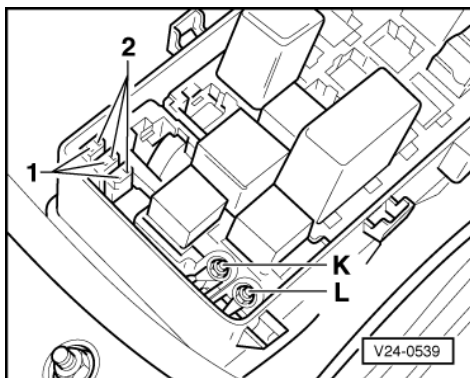


Special tools and workshop equipment required

- ♦ V.A.G 1526 A
- ♦ V.A.G 1594 A
- ♦ V.A.G 1598 A
- ♦ V.A.G 1598/3

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Switch off ignition before checking wiring

7.2 - Testing voltage supply to black diagnostic connector



-> Installation position of diagnostic sockets: In auxiliary relay carrier I in the left plenum chamber

Contact assignment for black diagnostic connector:

- 1 - Earth
- 2 - Terminal 30 (protected by fuse S19)

- Connect multimeter as follows to measure voltage:

Black diagnostic connector Contact	Measure to
1	Battery positive
2	Car body earth point

- Specification: approx. battery voltage

If the specified values are not obtained:

- Rectify any open/short circuit as necessary.

=> "Current Flow Diagrams, Electrical Fault-finding and Fitting Locations" binder

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7.3 - Testing wiring between "white" diagnostic connector and engine control unit

Note:

This check has to be performed if one of the following displays appears on the connected fault reader V.A.G 1551.

-> **Display:**

Rapid data transfer
Communication problem

or

Rapid data transfer HELP
K wire not switching to earth

or



Rapid data transfer *HELP*
K wire not switched to positive

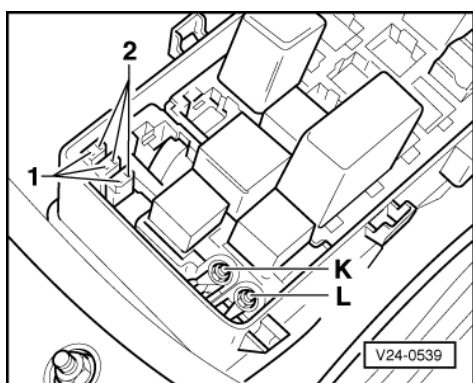
or

Rapid data transfer *HELP*
L wire not switching to earth

or

Rapid data transfer *HELP*
L wire not switching to positive

The wiring between the "white" diagnostic connector and engine control unit is routed via junctions K and L.



-> Location of diagnostic connectors and wiring junctions K and L: In auxiliary relay carrier I in the left plenum chamber

Checking K and L wires

Notes:

- ♦ If wires of different colours are connected to junction K, determine the wire colour:
=> "Current Flow Diagrams, Electrical Fault-finding and Fitting Locations" binder
- ♦ If wires of the same colour are connected to wiring junction K, determine wire assignment using test box V.A.G 1598 A (resistance measurement).

In this case proceed as follows for the fault finding:

- One by one, disconnect the wire connections of the other vehicle systems with self-diagnosis from junction K.
- After connector to specific vehicle system has been detached, enter address word "01" again for engine electronics after switching on ignition.

If engine control unit identification is then displayed:

- After switching on the ignition enter address word "00" for automatic test sequence to determine to which control unit the disconnect wires belongs.
- Check or replace diagnostic wiring of disconnected control unit.

If the control unit identification is again not displayed:

- Remove engine control unit => Page 34 .

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- With the ignition switched off, use adapter V.A.G 1598/3 to connect test box V.A.G 1598 A to plug connection of engine control unit (control unit remains disconnected) => Page 33 .
- Check for open circuit and short to earth/positive or earth in the following wiring connections:

White diagnosis connector contact	Wiring junction	Test box V.A.G 1598 A socket
1	L	22
2	K	1

- Rectify any open/short circuit as necessary.

=> "Current Flow Diagrams, Electrical Fault-finding and Fitting Locations" binder

Note:

Proceed in the same way to test the L wire.

7.4 - Testing cable connection of coding connector

The following test must only be carried out when the correct coding is not displayed despite code plug not being used at display of fault reader V.A.G 1551.

- With the ignition switched off, use adapter V.A.G 1598/3 to connect test box V.A.G 1598 A to plug connection of engine control unit (control unit remains disconnected) => Page 33 .
- Check the following wiring connections for short circuit to earth and positive:

Coding plug contact	Test box V.A.G 1598 A socket
5	20

- Eliminate short circuit, if necessary

=> "Current Flow Diagrams, Electrical Fault-finding and Fitting Locations" binder

If the wiring connection is OK, but the correct coding still does not appear in the display of fault reader V.A.G 1551:

- Fit a new engine control unit => Page 34 .



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25 - Mixture preparation, Injection

1 - Servicing KE fuel injection system

1.1 - Servicing KE fuel injection system

1.2 - Safety precautions

Important:

The fuel system is pressurised. Before opening the system place a cloth around the connection. Then release pressure by carefully loosening the connection.

To prevent injuries to persons and/or damage to the fuel injection and ignition system, the following must be noted:

- ♦ Do not touch or disconnect ignition wiring when the engine is running or at starter speed.
- ♦ Always switch off the ignition before connecting or disconnecting ignition system wiring. This also applies to HT cables and measuring instrument leads.
- ♦ If the engine is to be turned at starter speed, without starting, e.g. when checking compressions, unplug the connector from the power output stage at the ignition coil and remove fuse 17. After completing the work, interrogate the fault memory.
- ♦ For assisted starts with a rapid charging unit the maximum permissible voltage is 16.5 V and the maximum charging time is 1 minute.
- ♦ Always switch off the ignition before washing the engine.
- ♦ Always switch off the ignition before connecting or disconnecting the battery, otherwise the engine control unit may be damaged.
- ♦ Always use adapter set V.A.G 1594 A for connecting up measuring instruments (e.g. voltage tester V.A.G 1527 B, hand-held multimeter V.A.G 1526 A etc.)

Note the following points on vehicles equipped with a passenger airbag when carrying out a road test which involves use of testing and measuring equipment:

Attention!

- ♦ **Always attach testers and measuring instruments to the back seat and have a second person operate them from there.**
- ♦ **If test equipment were operated from the front passenger seat, the person sitting there could be injured if the front passenger airbag were triggered in the event of an accident.**

1.3 - Rules for cleanliness

When working on the fuel supply/injection system, pay careful attention to the following 6 cleanliness rules:

- ♦ Thoroughly clean all unions and the adjacent areas before disconnecting.
- ♦ Place removed parts on a clean surface and cover. Use lint-free cloths.
- ♦ Carefully cover or seal open components if repairs cannot be carried out immediately.
- ♦ Only install clean components:
Only remove replacement parts from packaging immediately prior to installation.
Do not use parts that have been stored loose (e.g. in tool boxes etc.).
- ♦ When the system is open:
Do not work with compressed air if this can be avoided.

- Do not move vehicle unless absolutely necessary.
- ◆ Separated electrical connections:
Protect from dirt and moisture.
Make sure connections are dry when attaching.

1.4 - Technical data

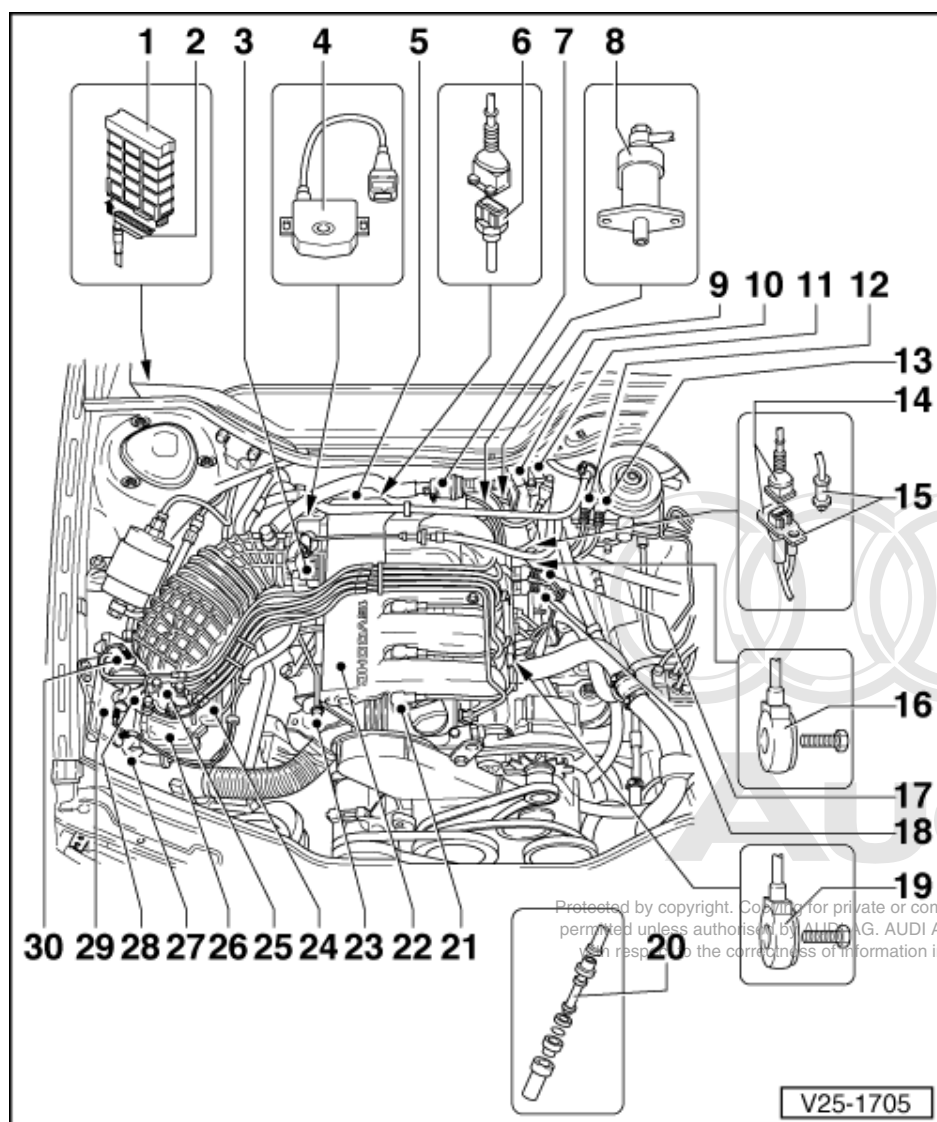
Engine code letters		ACE (2.0 l / 103 kW engine)
Engine control unit	Part no.	=>Parts list
	Engine speed limitation	7000 rpm
Idling speed adjustment	Not adjustable - controlled by the idling speed stabilisation	800 ... 1000 rpm 1).
CO-content	Control value	0.2 ... 1.2 % by vol.
System pressure		6.1 ... 6.6 bar
Differential pressure	Connector disconnected from differential pressure regulator	0.3 ... 0.5 bar below system pressure
	Connector plugged into differential pressure regulator	1.3 ... 1.6 bar below system pressure
Holding pressure	after 10 minutes	3.3 bar
	after 20 minutes	3.2 bar
Injectors	Spray pressure	3.7 ... 4.8 bar

1) Current values:

=> "Exhaust emission test" binder

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1.5 - Fitting locations overview



1 KE Motronic control unit -J204

- ◆ In electrical box in passenger footwell
- ◆ Removing and installing
=> Page 34

2 Connector

- ◆ For KE Motronic control unit
- ◆ After 30 seconds pull off or plug in connector after switching off of ignition

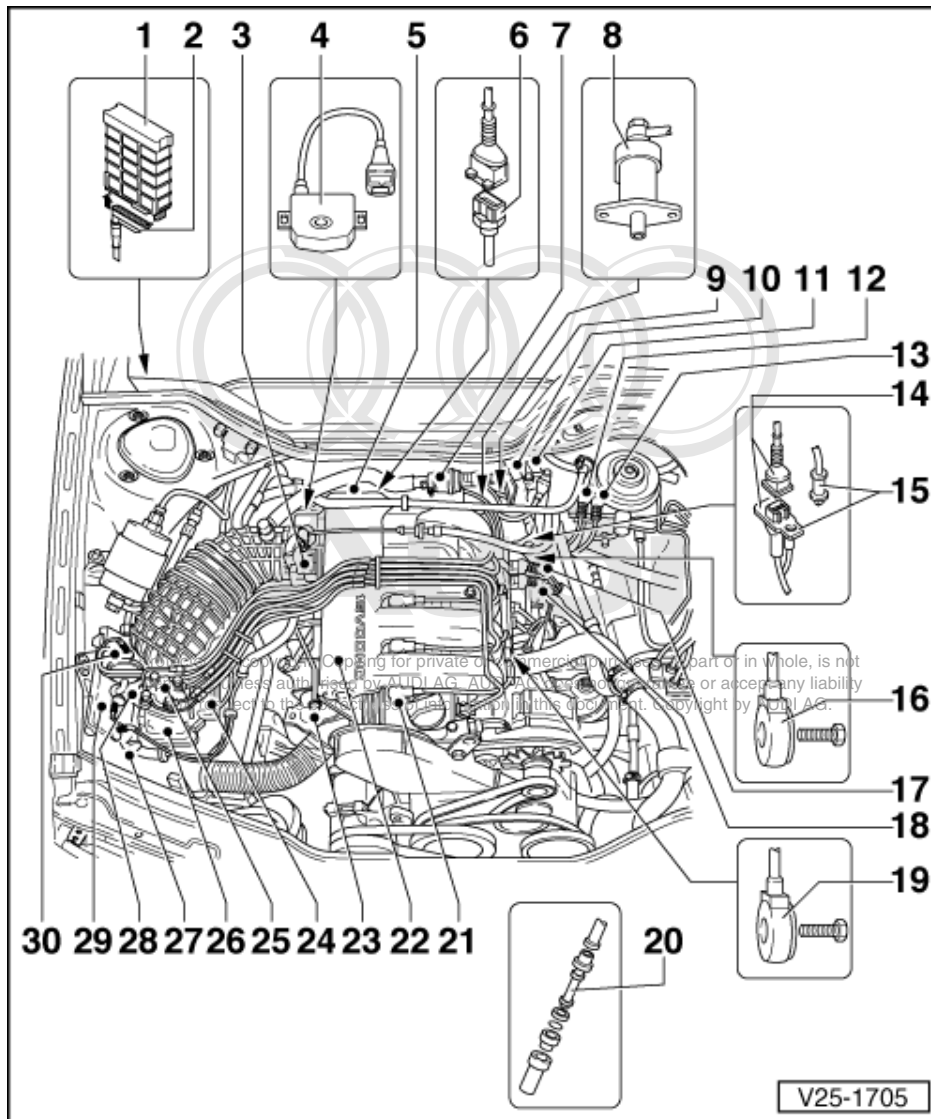
3 Throttle valve connection

4 Idling switch -F60 and full throttle switch -F81

- ◆ Checking =>Page 54

5 Distributor -O

- ◆ With Hall sender -G40



6 Coolant temperature sender -G62

- ♦ Resistance values
=> Page **136**

7 Idling stabilisation valve - N71

- ♦ Checking => Page **50**

8 Cold start valve -N17

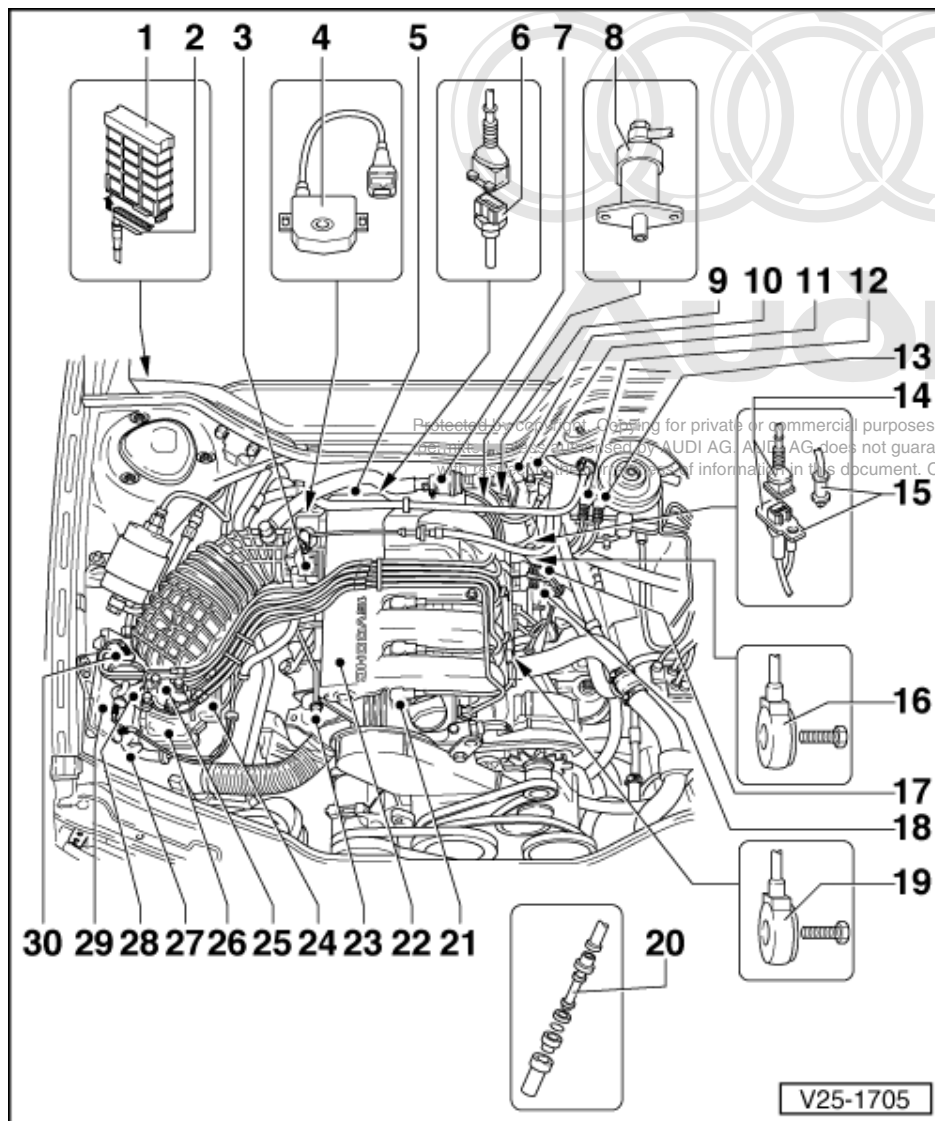
- ♦ Checking => Page **44**
- ♦ Attach with 10 Nm to intake manifold
- ♦ Screw on fuel line with 15 Nm

9 Ignition timing sender -G4

- ♦ Onto ignition line cylinder 4
- ♦ Installation position: Clamping lugs face ignition distributor

10 Output stage for ignition coil

- ♦ Checking => Page **130**
- ♦ Cannot be renewed separately



11 Ignition coil

- ♦ Checking => Page **128**

12 Connector

- ♦ Green
- ♦ For knock sensor 1 -G61

13 Connector

- ♦ Blue
- ♦ For knock sensor 2 -G66

14 Connector

- ♦ For lambda probe heater

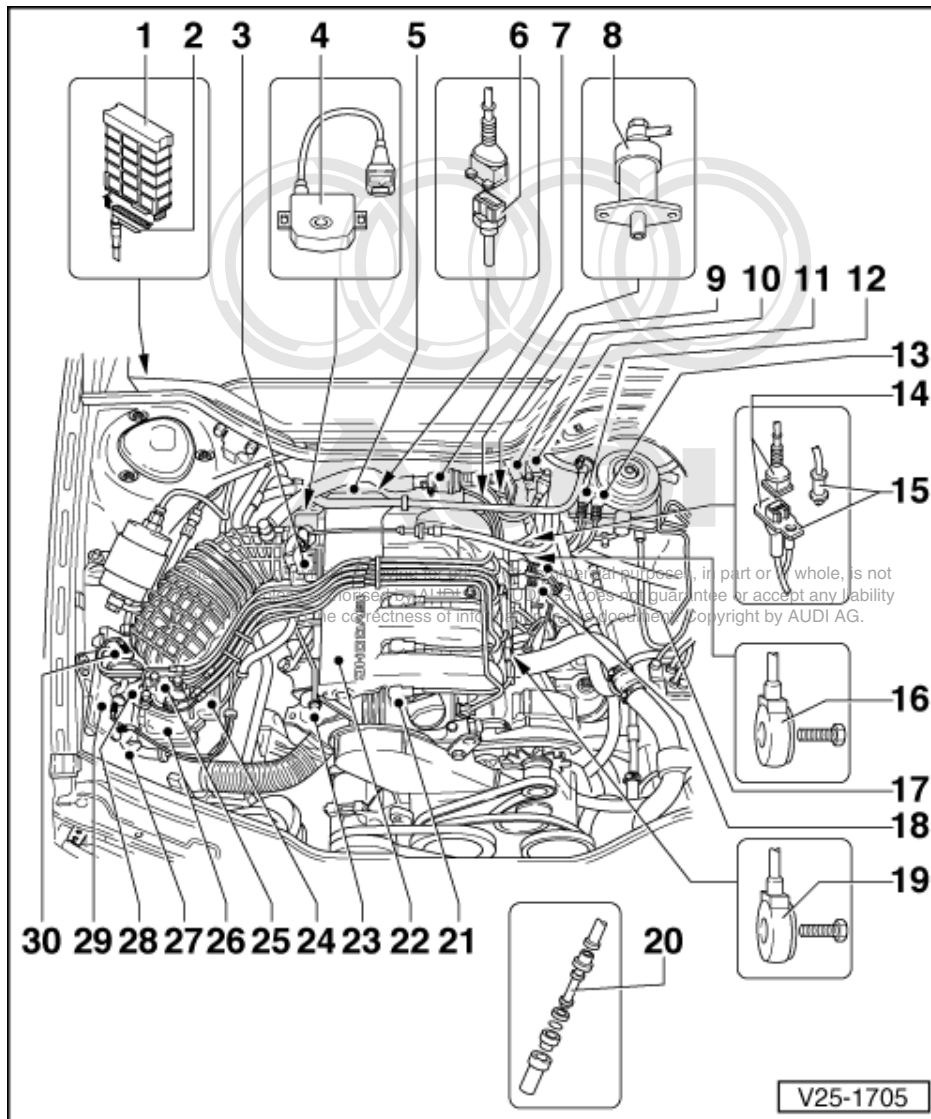
15 Connector

- ♦ For lambda probe -G39

16 Knock sensor 2 -G66

17 Connector

- ♦ For ignition timing sender -G4



18 Connector

- ♦ For coolant temperature sender -G62

19 Knock sensor 1 -G61

20 Injector

- ♦ Checking => Page 89

21 Spark plug - 30 Nm

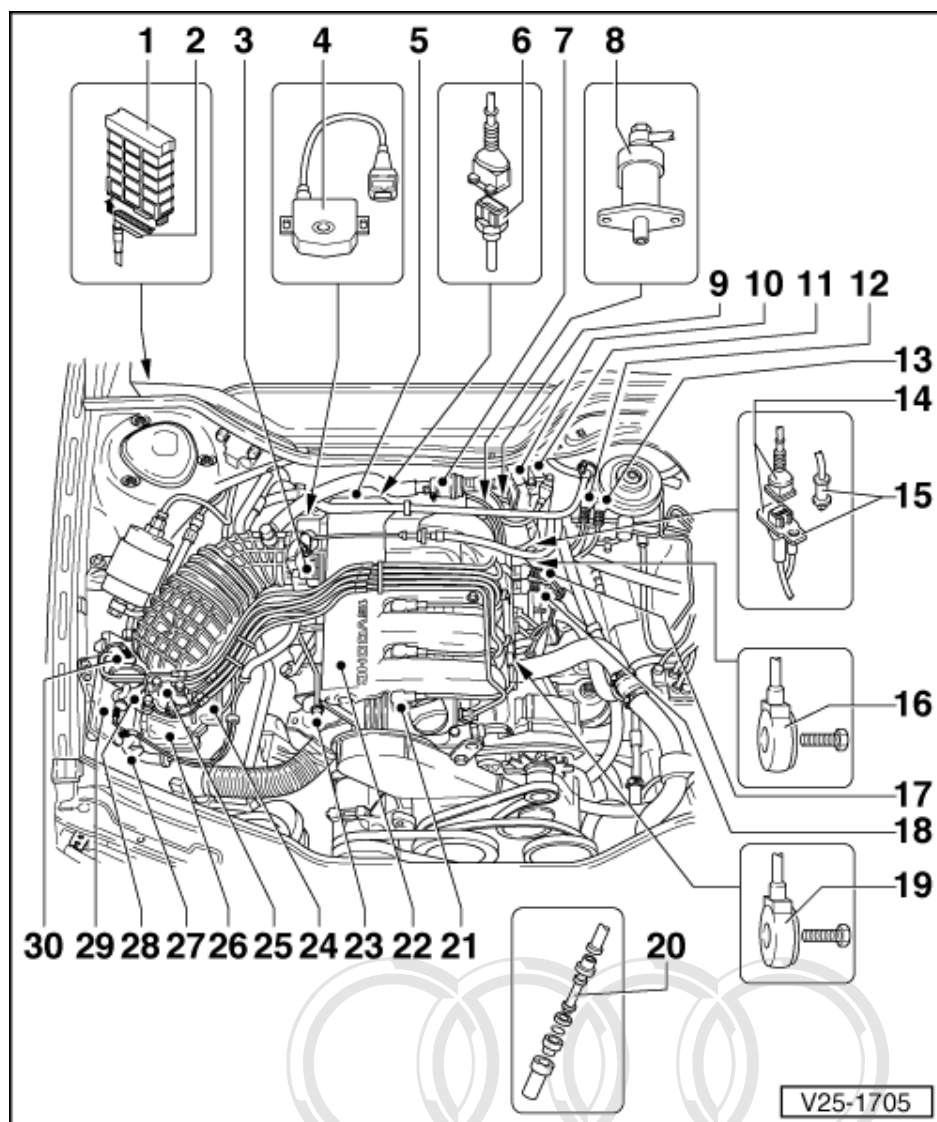
22 Intake manifold

23 CO measuring pipe

- ♦ With locking cap

24 Pressure regulator -N73

- ♦ Checking =>Page 63
- ♦ Check system pressure, differential pressure and holding pressure
=> Page 84



25 Fuel quantity separator

26 Air flow meter

27 Solenoid valve 1 for activated charcoal filter -N80

- ♦ Checking =>Page 107

28 Air flow meter potentiometer -G19

- ♦ Checking =>Page 59

29 Air cleaner

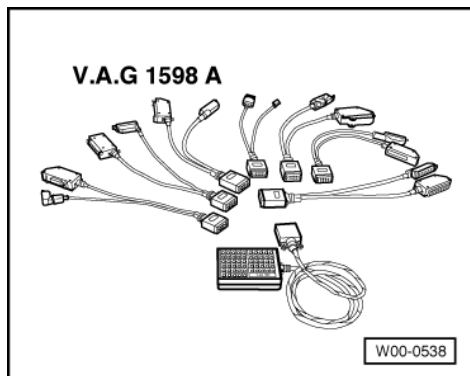
- ♦ With control valve for intake air preheating

30 Fuel pressure regulator

- ♦ Check system pressure, differential pressure and holding pressure
=> Page 84

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1.6 - Checking wiring and components with test box V.A.G 1598



Special tools and workshop equipment required

- ◆ V.A.G 1598 A
- ◆ V.A.G 1598/3

Notes:

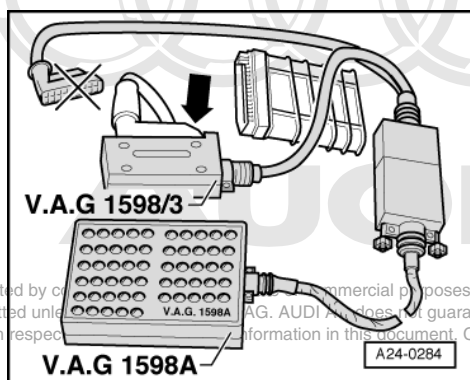
- ◆ Allow 30 seconds after switching off ignition before detaching or attaching connector of engine control unit.
- ◆ Test box V.A.G 1598 A must not be connected when performing diagnosis with fault reader V.A.G 1551.
- ◆ To connect the test equipment to the test box, use auxiliary cables from adapter cable set V.A.G 1594 A.

Important:

To prevent damage to the electronic components, select appropriate measuring range before connecting the measuring cables and observe the test requirements.

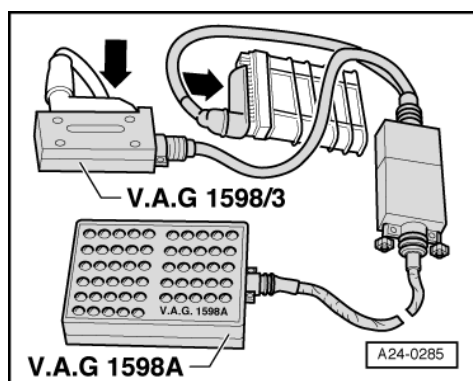
Work sequence

- Switch ignition off.
- Remove engine control unit => Page 34 .



-> Checks on assignment at connector of engine control unit

- Connect test box V.A.G 1598 A with adapter V.A.G 1598/3 to connector for engine control unit only (control unit remains free).

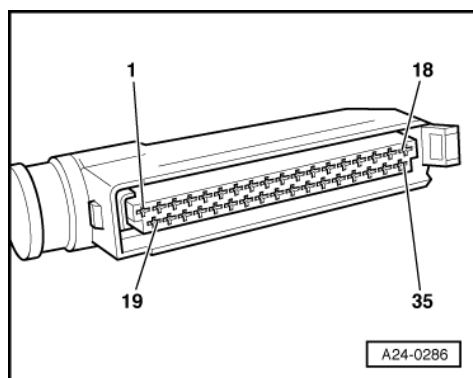


-> Checks with engine control unit connected

- Additionally connect test box V.A.G 1598 A with adapter V.A.G 1598/3 to control unit.

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Notes:

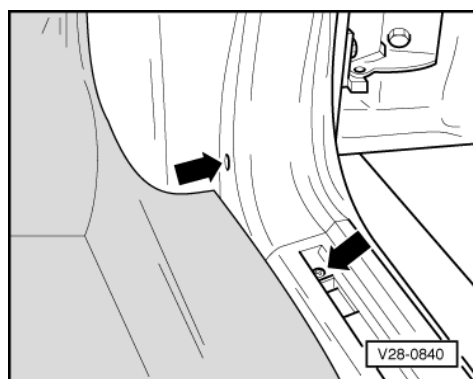


- ♦ -> Contact assignment at connector of engine control unit
- ♦ The contact layout is identical to the socket layout on test box V.A.G 1598 A.
- Carry out test as described in the appropriate repair procedures.

1.7 - Renewing engine control unit

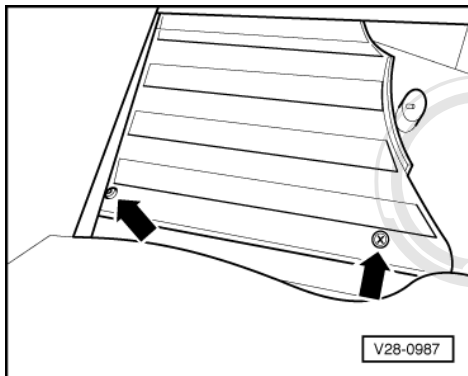
Fitting location => Fitting locations overview, Page **28**

Removing

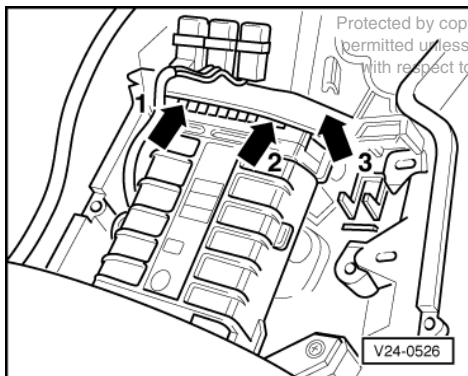


- Switch ignition off.

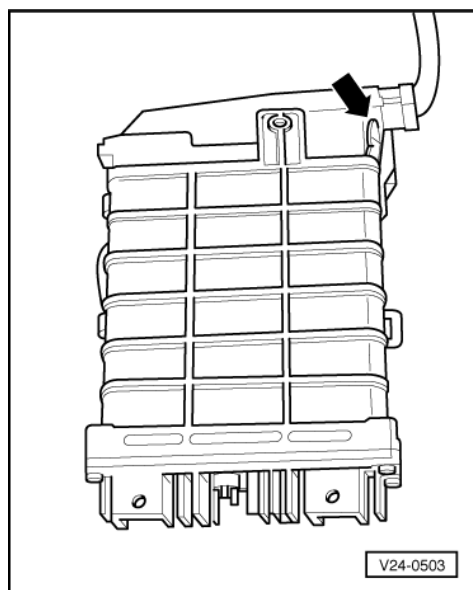
- -> Remove the lower part of the right A pillar trim and the front door sill panel tread strip
- => General Body Assembly; Repair Group 70; Trim panels; Removing and installing A- pillar trim Trim panels
Removing and installing A- pillar trim
- => General Body Assembly; Repair Group 70; Trim Panels; Removing and installing inner sill panel Trim Panels
Removing and installing inner sill panel
- Pull back floor covering at front of right-hand footwell. (If necessary, cut open the perforated seam on the left with a knife.)



- -> Unscrew bolts -arrows- for electronics box cover.
- Carefully detach upper and lower sections of cover.



- -> Pull out the cross strut -arrow 3- with the attached parts.
- Twist out bolts -arrow 1- and -arrow 2-.
- Unscrew the engine control unit from the electronics box in the right footwell -arrows-.
- Take out engine control unit.



- -> Disengage retainer clip and unplug control unit connector in the direction of the arrow.

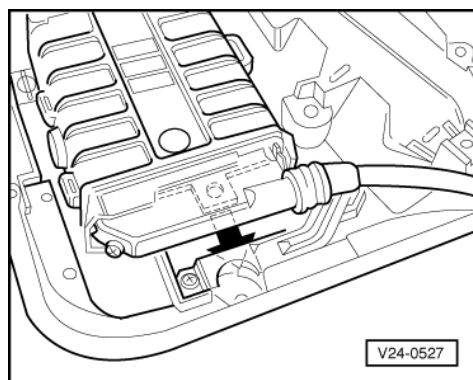
Note:

Allow 30 seconds after switching off ignition before detaching or attaching connector of control unit.

Installing

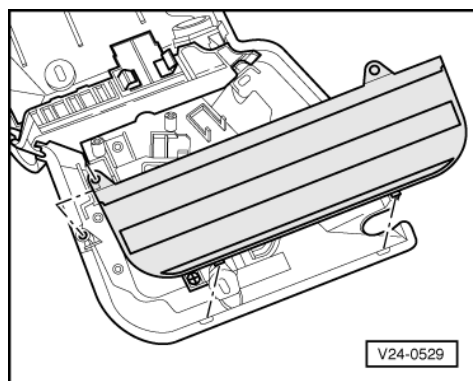
Installation is carried out in the reverse order, when doing this note the following:

Note:



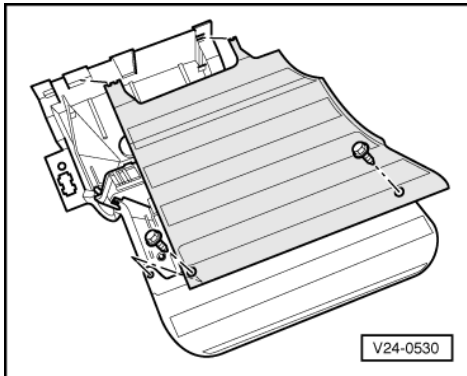
Wait 30 seconds after switching off ignition before detaching or attaching connector of control unit.

- -> Push the lug of the control unit into the fixture of the electronics box.



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- -> Guide the bottom cover part into both openings of the electronics box in the right footwell.



- -> Attach the top cover part into both openings of the electronics box in the right footwell.
- Interrogate fault memory and erase it => Page 5.

Vehicles with immobiliser:

- Adapt engine electronics control unit to the immobiliser control unit:

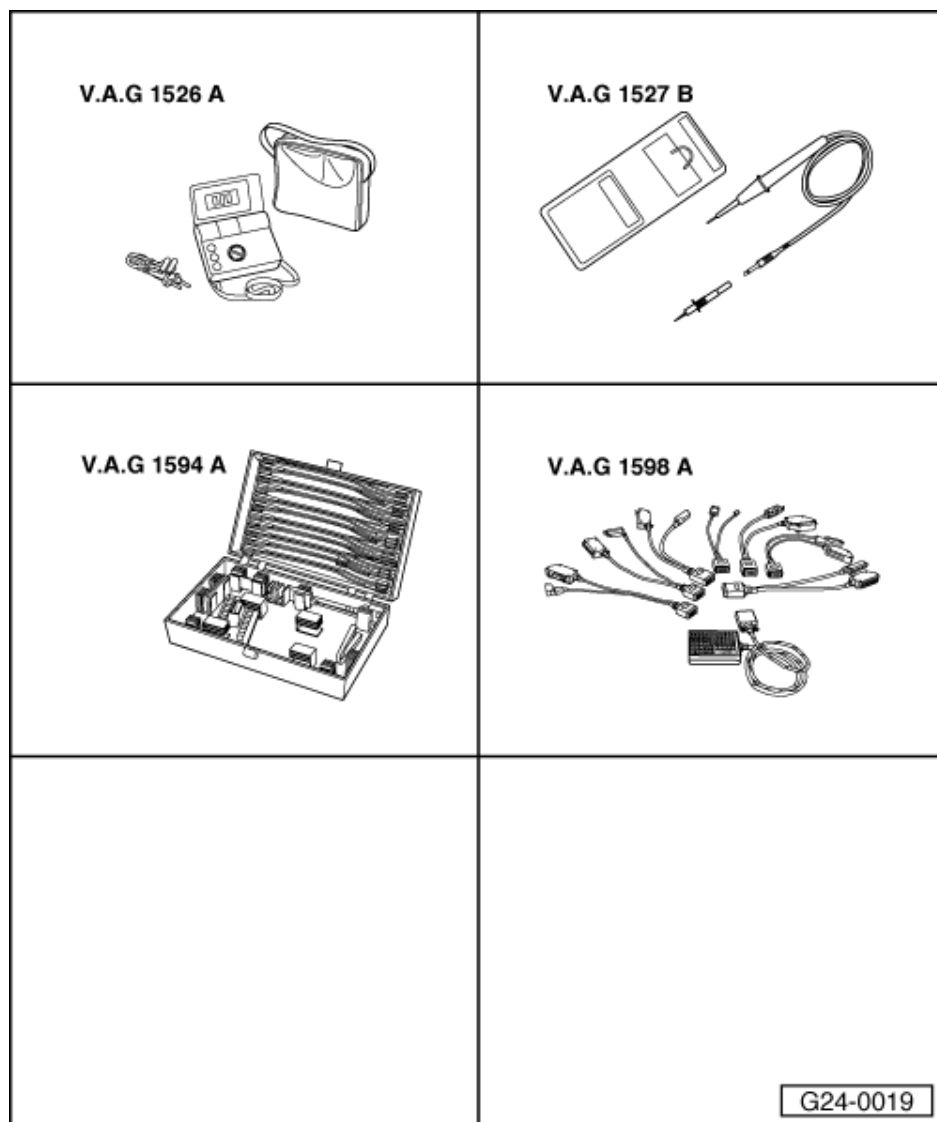
=> Electrical System; Repair Group 01; Self-diagnosis; Adaptation procedure after renewing engine control unit
Self-diagnosis Adaptation procedure after renewing engine control unit



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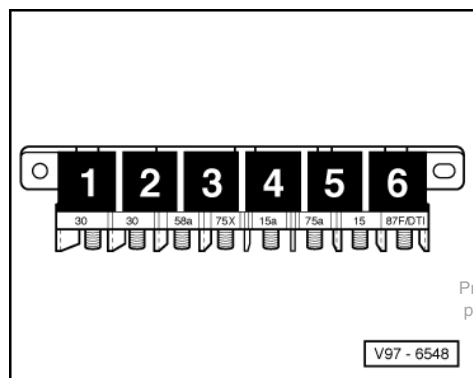


1.8 - Fuel pump relay -J17 and actuation



Special tools and workshop equipment required

- ♦ V.A.G 1526 A
- ♦ V.A.G 1527 B
- ♦ V.A.G 1594 A
- ♦ V.A.G 1598 A
- ♦ V.A.G 1598/3



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Note:

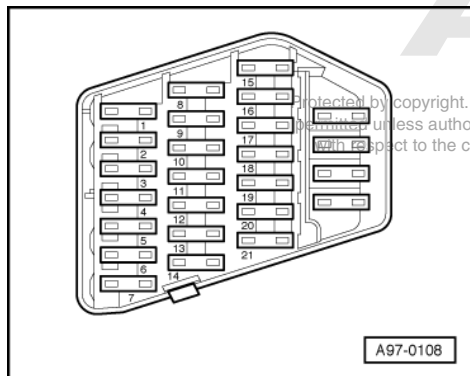
-> Fitting location of fuel pump relay: On central electrics below dash panel on left, contact point 6

Test requirements:

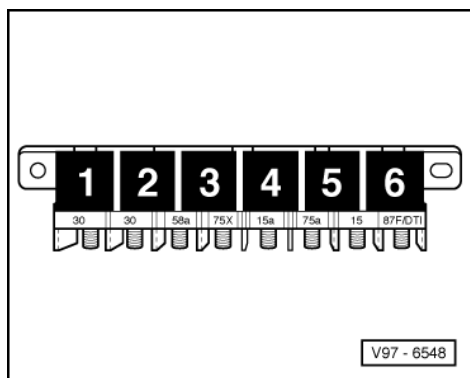
- Battery voltage at least 11 V

Functional check of fuel pump relay

- Take off the cover of the left fuse holder.



- -> Pull out fuse S17.
- Connect voltage tester V.A.G 1527 B between one of the contacts of fuse S17 and engine earth.
- Operate starter briefly.



- -> The fuel pump relay (in central electrics on left below the dash panel, position 6) must actuate visually and audibly and the LED must light up.

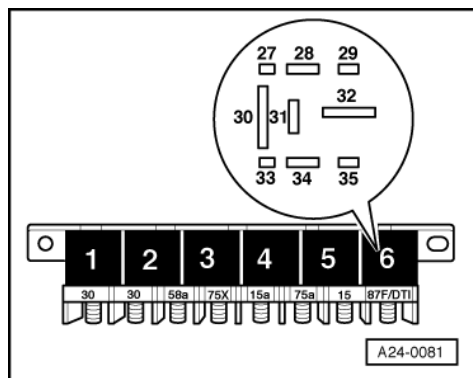
If the relay does not respond:

- Test actuation => Page 42

If the relay responds, but the LED does not light up:

- Repeat the test at the other contact for fuse S17.

If LED still does not light up:

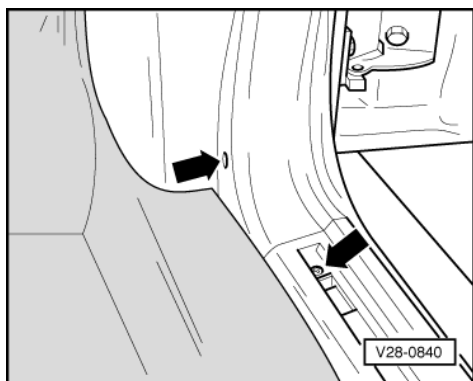


- Disconnect fuel pump relay.
- -> Check for open circuit according to current flow diagram:

Central electrics, position 6 contact	Fuse
30	S17

If connection is OK:

- Replace the fuel pump relay -J17.

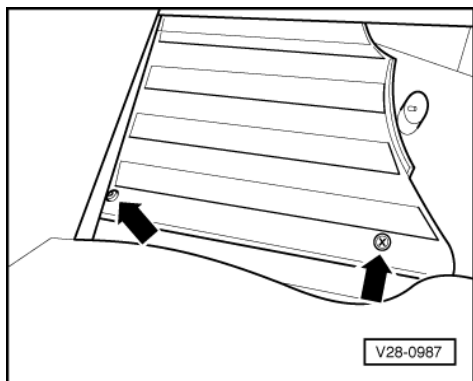


- Re-insert the fuel pump relay and fuse S17.
- -> Remove the lower part of the right A pillar trim and the front door sill panel tread strip

=> General Body Assembly; Repair Group 70; Trim panels; Removing and installing A-pillar trim Trim panels
Removing and installing A-pillar trim

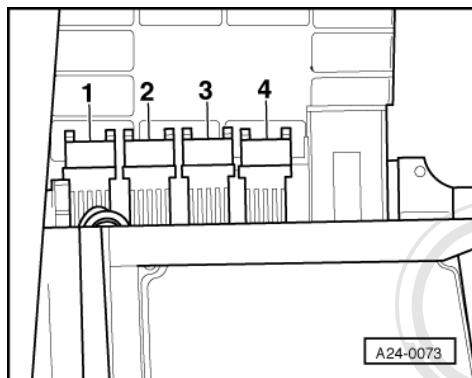
=> General Body Assembly; Repair Group 70; Trim Panels; Removing and installing inner sill panel Trim Panels
Removing and installing inner sill panel

- Pull back floor covering at front of right-hand footwell. (If necessary, cut open the perforated seam on the left with a knife.)

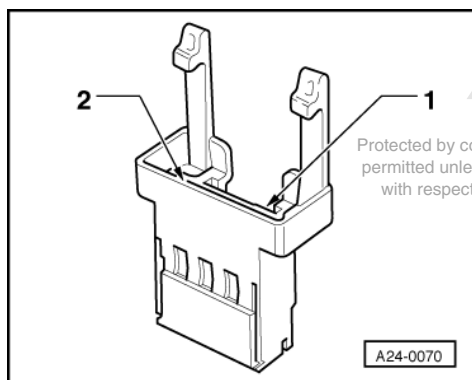


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- -> Unscrew bolts -arrows- for electronics box cover.
- Carefully detach upper and lower sections of cover.



- -> Pull out the fuse S73 in the black bracket in the electronics box of passenger footwell.

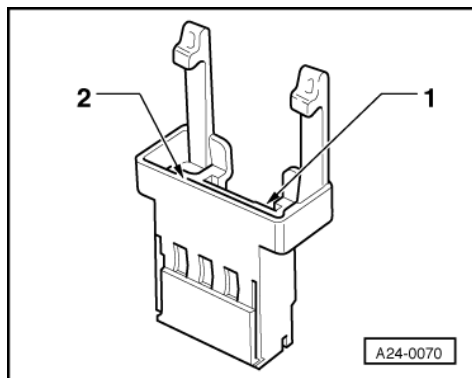


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- -> Connect voltage tester V.A.G 1527 B with auxiliary wire from V.A.G 1594 A between earth and contact -1- for fuse S73 in the black holder.
- Operate starter briefly.
 - The fuel pump relay (in central electrics on left below the dash panel, position 6) must actuate visually and audibly and the LED must light up.

If the relay does not respond:

- Test actuation => Page 42



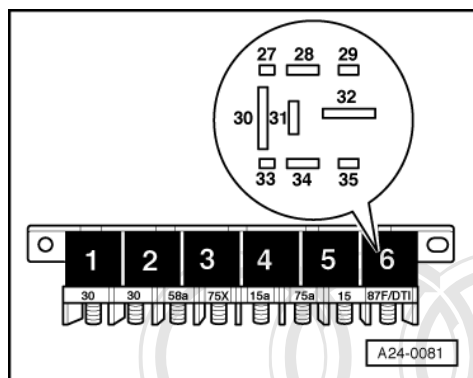
If the relay operates, but the LED does not come on:

- -> Repeat the check at contact -2- for fuse S73 in black bracket.

If LED still does not light:



- Disconnect fuel pump relay.



- -> Referring to the current flow diagram test the wiring connection between fuel pump relay base contact 31 and fuse S73 in the black holder for open circuit
- Rectify open circuit, if necessary

If the wiring is OK:

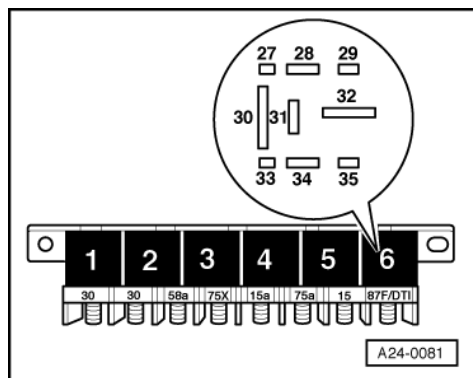
- Replace the fuel pump relay -J17.
- Re-insert the fuel pump relay and fuse S73 in the black holder.

Checking the power supply and actuation of the fuel pump relay

- Remove cover from additional relay carrier I on left of plenum chamber.
- Disconnect fuel pump relay.

Checking power supply

- Switch the ignition on.



- -> Connect up multimeter as follows to measure voltage.

Central electrics, position 6 Contacts	Specification
28 + 34	approx. battery voltage
32 + 34	approx. battery voltage

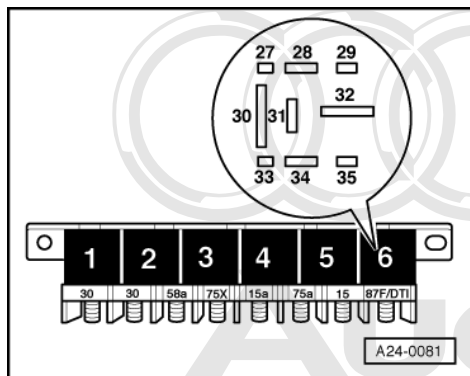
- Switch ignition off.

If the specified values are not obtained:

- Check the wiring connections.

=> "Current Flow Diagrams, Electrical Fault-finding and Fitting Locations" binder

Checking actuation



- -> Connect voltage tester V.A.G 1527 B as follows:

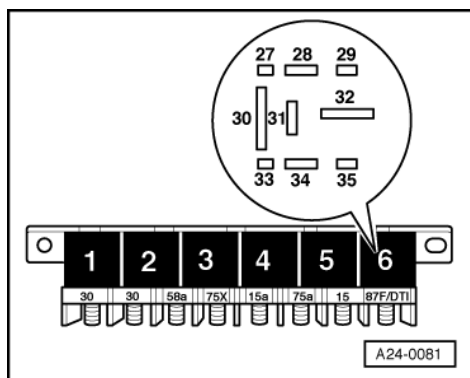
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Fuel pump relay base	
contact	contact
28	29

- Switch the ignition on.
 - The LED should come on for about 1 second
- Operate starter.
 - The LED should come on and remain on during the starting operation.

If the LED does not light up:

- With the ignition switched off, use adapter V.A.G 1598/3 to connect test box V.A.G 1598 A to plug connection of engine control unit (control unit remains disconnected) => Page 33 .



- -> Check for open circuit and short to positive or earth in the following wiring connection:

Central electrics, position 6 contact	Test box V.A.G 1598 A socket
29	12

- Rectify any open/short circuit as necessary.

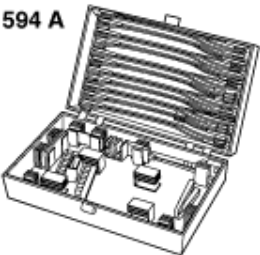
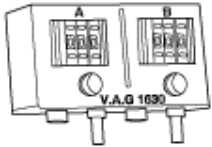
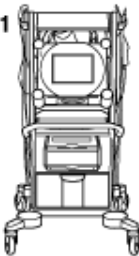
=> "Current Flow Diagrams, Electrical Fault-finding and Fitting Locations" binder

If no fault is found:

- Replace the fuel pump relay -J17.



1.9 - Test cold start valve -N17

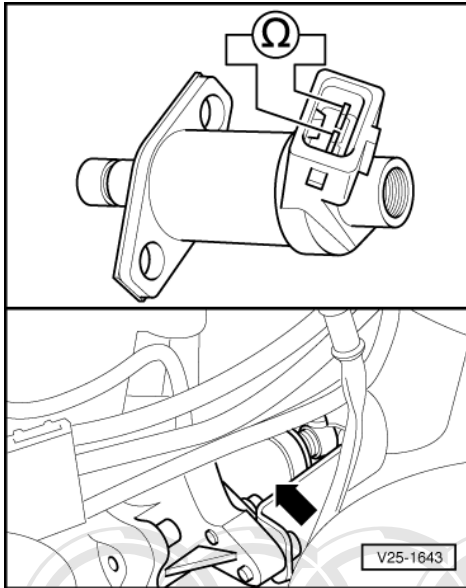
V.A.G 1526 A 	V.A.G 1527 B  Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.
V.A.G 1594 A 	V.A.G 1598 A 
V.A.G 1630 	VAS 5051  G24-0038

Special tools and workshop equipment required

- ♦ V.A.G 1526 A
- ♦ V.A.G 1527 B
- ♦ V.A.G 1594 A
- ♦ V.A.G 1598 A
- ♦ V.A.G 1598/3
- ♦ V.A.G 1630
- ♦ VAS 5051 with VAS 5051/1 and VAS 5051/2

or

- ♦ V.A.G 1551 with V.A.G 1551/1



Fitting location => Fitting locations overview, Page 28

Checking baffle plate

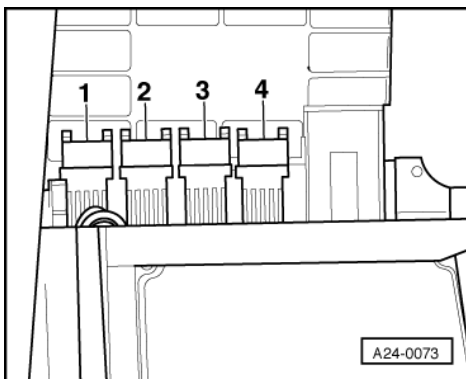
- -> Pull connector off cold start valve -arrow-.
- Connect multimeter to valve to measure resistance.
 - Specification: 8 ... 13 Ω

If the specification is not obtained:

- Replace the cold start valve

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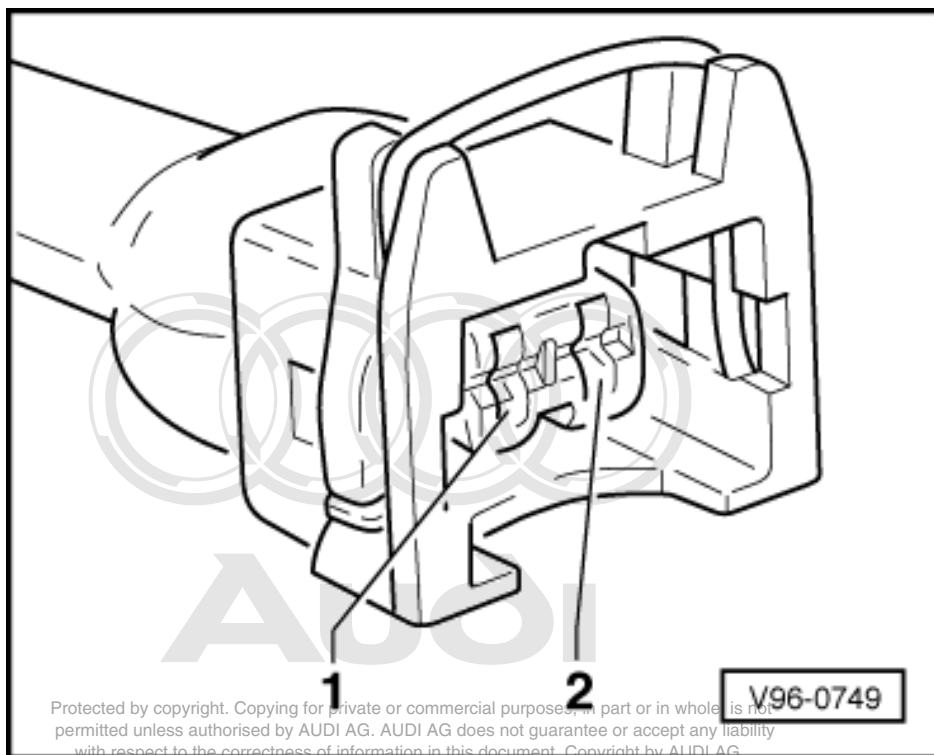
If the cold start valve does not react with final control diagnosis:



Checking power supply

Test requirements:

- -> Fuse S75 in brown holder in electronics box in passenger footwell OK
- Pull connector off cold start valve.



- -> Connect up multimeter as follows to measure voltage.

Connector contact	Measure to
1	Engine earth

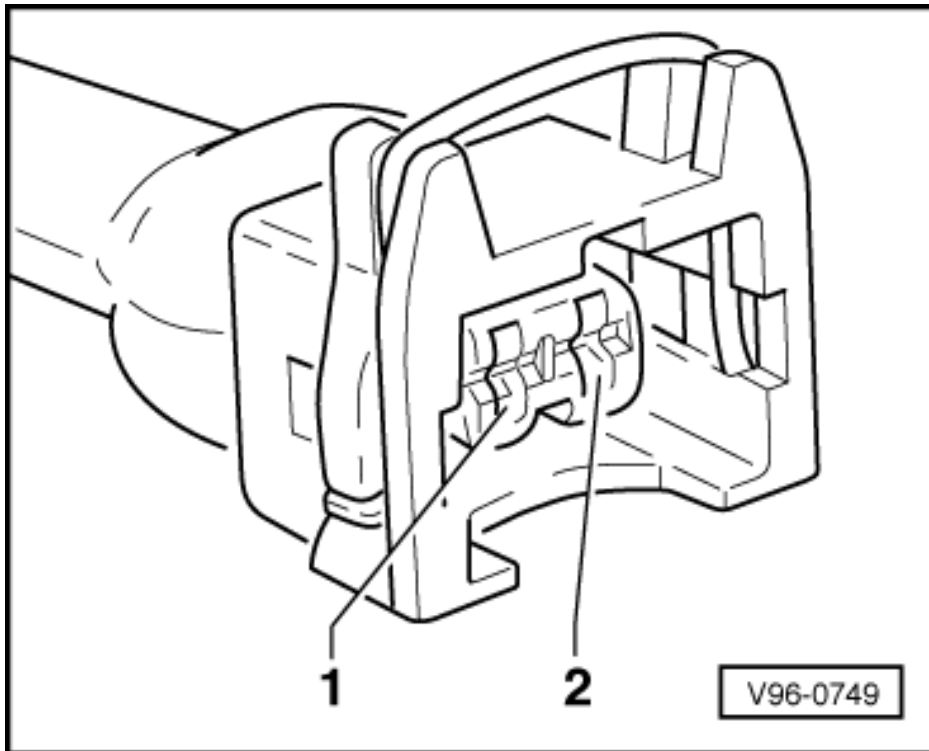
- Switch the ignition on.
 - Specification: approx. battery voltage

If the specification is not obtained:

- Eliminate open circuit or short circuit using the current flow diagram.

If the specification is obtained:

- Check actuation.



Checking actuation

- -> Connect up voltage tester V.A.G 1527 B between contacts 1 and 2.
- Start final control diagnosis and actuate cold start valve -N17 => Page 13 .
- Slightly open throttle valve.
 - The LED should flash.

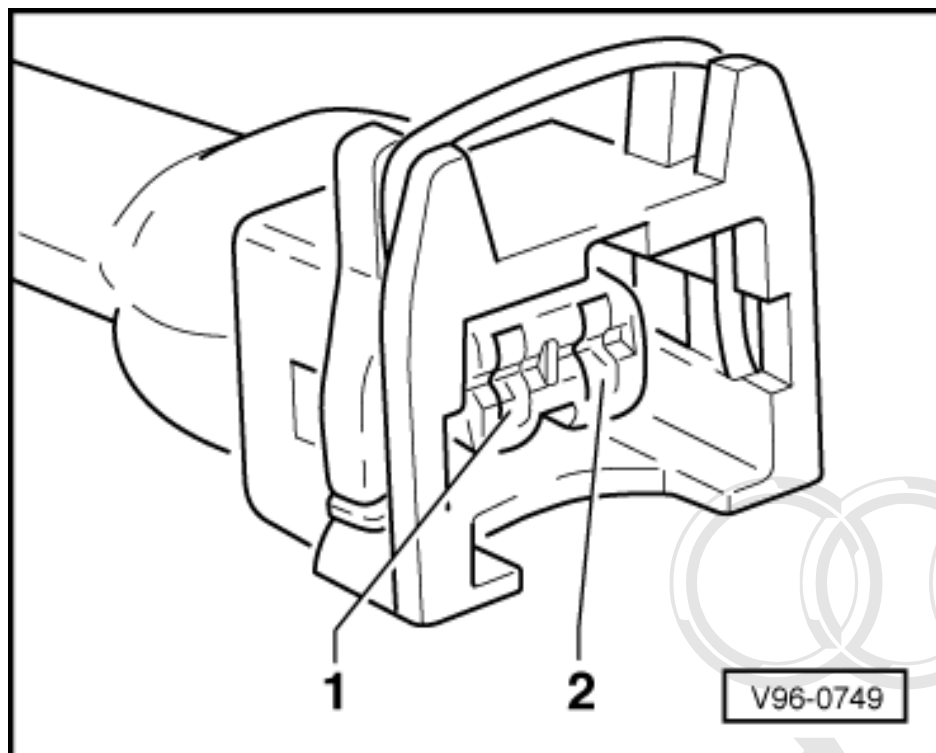
If the specification is obtained:

- Replace the cold start valve

If the specification is not obtained:

- With the ignition switched off, use adapter V.A.G 1598/3 to connect test box V.A.G 1598 A to plug connection of engine control unit (control unit remains disconnected) => Page 33 .

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- -> Check for open circuit and short to positive or earth in the following wiring connection:

Connector contact	Test box V.A.G 1598 A socket
2	16

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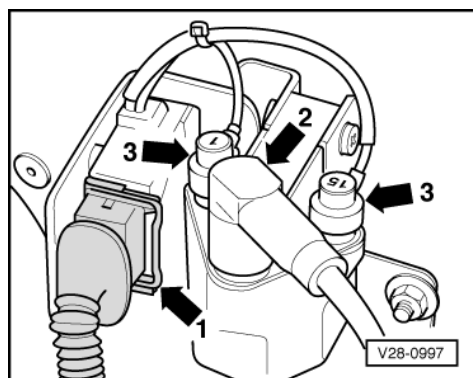
- Rectify any open/short circuit as necessary.

=> "Current Flow Diagrams, Electrical Fault-finding and Fitting Locations" binder

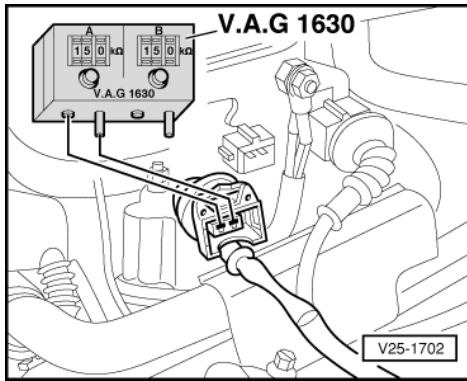
If the wiring is OK and no activation is carried out:

- Fit a new engine control unit => Page 34 .

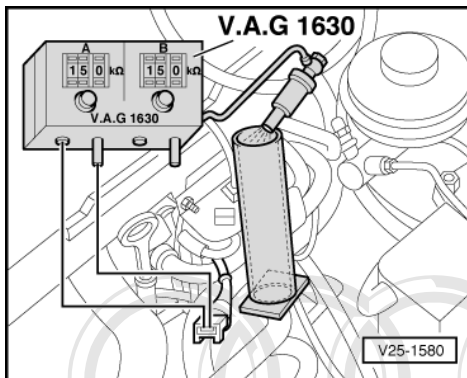
Testing spray pattern, injection time and absence of leaks of cold start valve



- -> Unplug connector -arrow 1- from output stage.
- Pull off air intake elbow at throttle valve body.



- -> Unplug connector on coolant temperature sender.

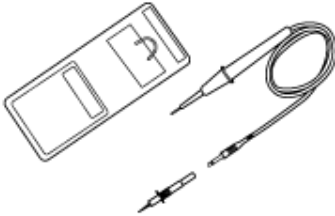
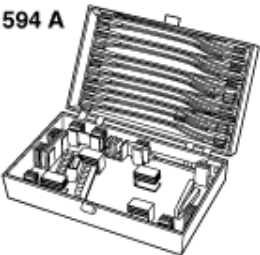
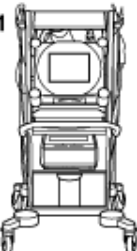


- -> Connect side A of digital potentiometer V.A.G 1630 with the disconnected connector of the coolant temperature sender.
- Adjust side A of the V.A.G 1630 to 15 kΩ.
- Remove cold start valve with connected fuel line from intake manifold and hold into a measuring glass.
- Operate starter.
 - The cold start valve must have a tapered pulsating spray for approx. 8 seconds.
- Dry off the cold start valve at the nozzle.
 - There should be no drips from the cold start valve within 1 minute. The cold start valve must not be moist on the outside.

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1.10 - Checking idling stabilisation valve -N71

V.A.G 1526 A 	V.A.G 1527 B 
V.A.G 1594 A 	V.A.G 1598 A 
VAS 5051 	G24-0018

Special tools and workshop equipment required

- ♦ V.A.G 1526 A
- ♦ V.A.G 1527 B
- ♦ V.A.G 1594 A
- ♦ V.A.G 1598 A
- ♦ V.A.G 1598/3
- ♦ VAS 5051 with VAS 5051/1 and VAS 5051/2

or

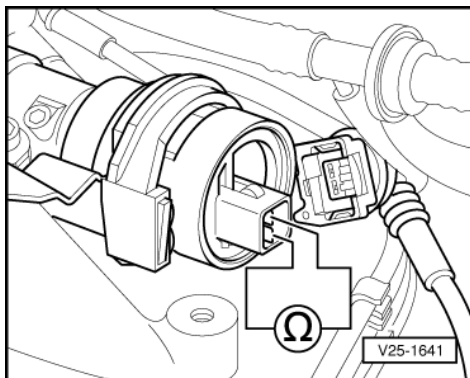
- ♦ V.A.G 1551 with V.A.G 1551/1

Fitting location => Fitting locations overview, Page 28

Checking baffle plate

- Switch ignition off.
- Pull connector off idling stabilisation valve.

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- -> Connect multimeter to injector to measure resistance.
- Specification: 4 ... 12 Ω

Note:

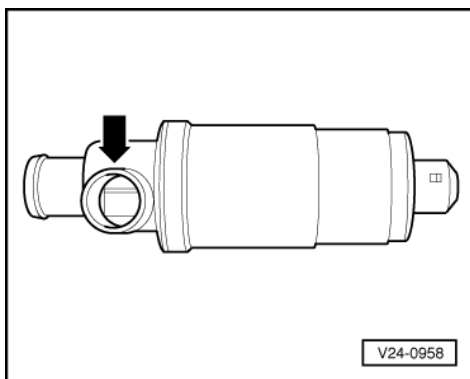
Resistance is in the lower tolerance range at ambient temperature and in the upper tolerance range when the engine is warm.

If the specification is not obtained:

- Renew idling stabilisation valve.

Mechanical checking

- Remove idling stabilisation valve



- -> Check piston slide -arrow- for scoring (visual inspection).

Note:

Never use a screwdriver or similar tool to move the piston slide when checking for freedom of movement.

- Attach connector to removed idle stabilisation valve
- Switch the ignition on.
- Start final control diagnosis and actuate the idling speed stabilisation -N71 => Page 13 .
- Check whether piston slide moves properly from stop to stop.

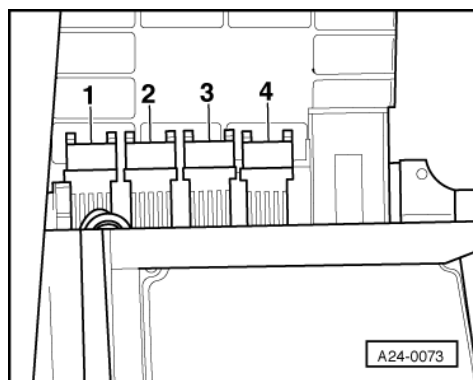
If scoring is found which impairs freedom of movement or if piston slide does not move freely (sticking, sluggish or not full range of travel):

- Renew idling stabilisation valve.

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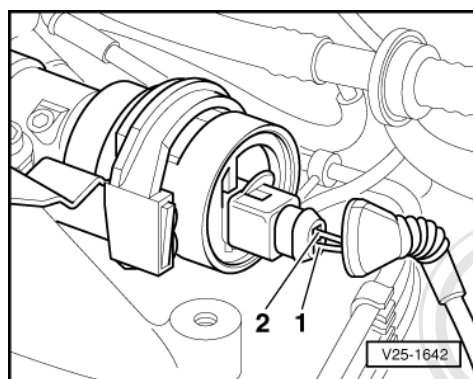
If idling stabilisation valve does not react in final control diagnosis:

Checking power supply



Test requirements:

- > Fuse S75 in brown holder in electronics box in passenger footwell OK
- Push back rubber grommet of plug for valve for idling speed stabilisation. However, connector remains plugged in.



- -> Connect up multimeter as follows to measure voltage.

Connector contact	Measure to
1	Engine earth

- Switch the ignition on.
- Specification: approx. battery voltage

If the specification is not obtained: Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

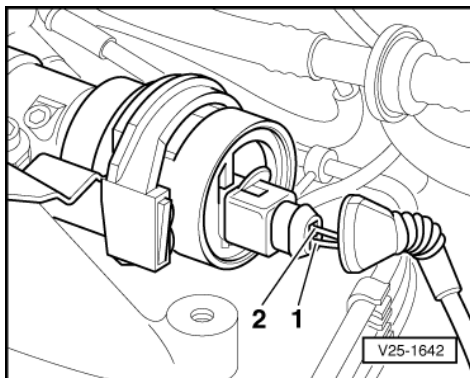
- Eliminate open circuit or short circuit using the current flow diagram.

If the specification is obtained:

- Check actuation.

Checking actuation

- Push back rubber grommet of plug for valve for idling speed stabilisation. However, connector remains plugged in.



- -> Connect up voltage tester V.A.G 1527 B between contacts 1 and 2.
- Start final control diagnosis and actuate the idling speed stabilisation -N71 => Page 13 .
 - The LED should flash.

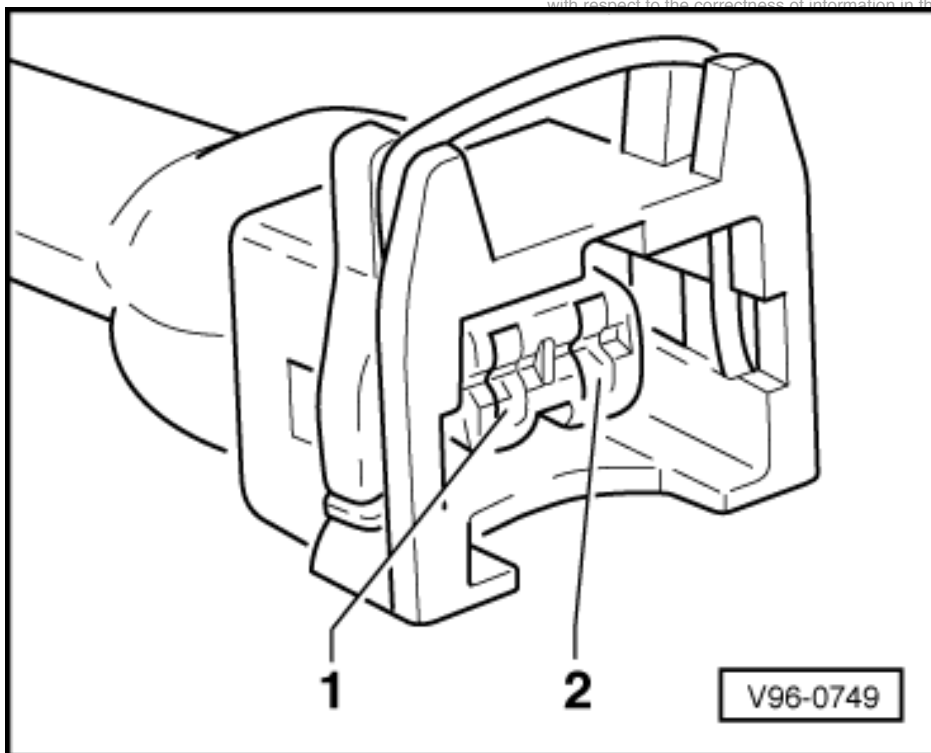
If the specification is obtained:

- Renew idling stabilisation valve.

If the specification is not obtained:

- With the ignition switched off, use adapter V.A.G 1598/3 to connect test box V.A.G 1598 A to plug connection of engine control unit (control unit remains disconnected) => Page 33

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- -> Check for open circuit and short to positive or earth in the following wiring connection:

Connector contact	Test box V.A.G 1598 A socket
2	17

- Rectify any open/short circuit as necessary.

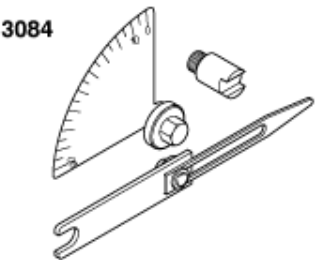
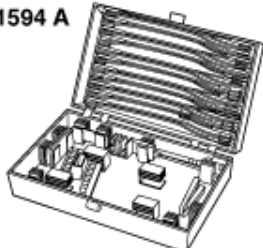
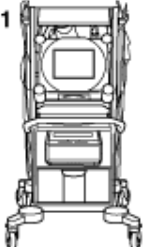
=> "Current Flow Diagrams, Electrical Fault-finding and Fitting Locations" binder



If the wiring is OK and no activation is carried out:

- Fit a new engine control unit => Page 34 .

1.11 - Checking and adjusting idling switch -F60 and full throttle switch -F81

 3084	 V.A.G 1526 A
 V.A.G 1594 A	 V.A.G 1598 A
 VAS 5051	Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG. G25-0010

Special tools and workshop equipment required

- ♦ Angle reader 3084
- ♦ V.A.G 1526 A
- ♦ V.A.G 1594 A
- ♦ V.A.G 1598 A
- ♦ V.A.G 1598/3
- ♦ VAS 5051 with VAS 5051/1 and VAS 5051/2

or

- ♦ V.A.G 1551 with V.A.G 1551/1
- ♦ Feeler gauge

Fitting location => Fitting locations overview, Page 28

Note:

Idling switch -F60 and full throttle switch -F81 have a common connector.

Test requirements:

- Basic setting of throttle valve OK; check => Page 65.

Test sequence

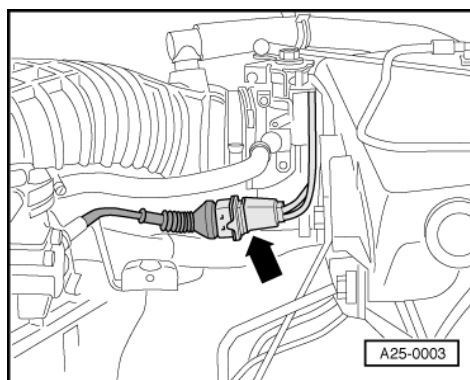
Read measured value block 0									
1	2	3	4	5	6	7	8		
9	10								

- > Read measured value block, display group 000, ignition switched on =>Page 19.
- Check display in display zone 9.
 - Specification: 5
- Slightly open throttle valve.
 - The value must drop to 4
- Window between throttle valve stop and adjustment screw 0.15 ... 0.50 mm (measured with feeler gauge)
- Press throttle valve lever into full throttle.
 - Value must increase to 6

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If the display changes sooner or later:

- Adjust idling switch => Page 57.



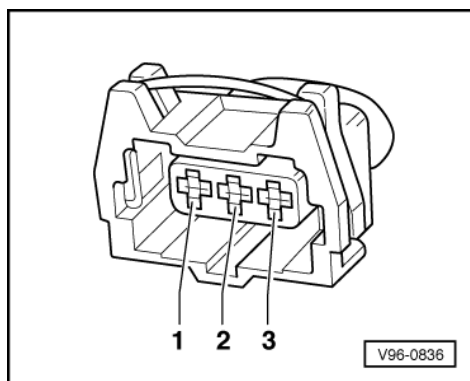
If the display does not change:

Checking wiring

- -> Pull connector off throttle valve -arrow-.

Note:

Idling switch -F60 and full throttle switch -F81 have a common connector.





- -> Connect up multimeter as follows to measure voltage.

Connector contact	Measure to
2	Battery positive

- Specification: approx. battery voltage

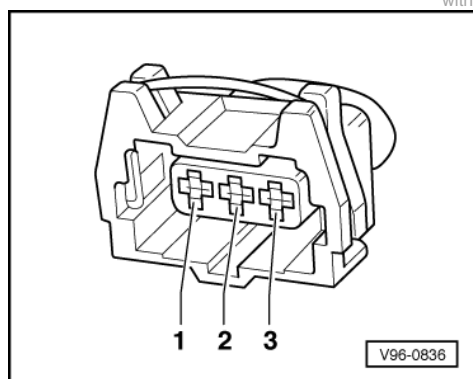
If the specification is not obtained:

- Eliminate open circuit or short circuit using the current flow diagram.

If the specification is obtained:

- With the ignition switched off, use adapter V.A.G 1598/3 to connect test box V.A.G 1598 A to plug connection of engine control unit (control unit remains disconnected) => Page 33

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- -> Check for open circuit and short to positive or earth in the following wiring connections:

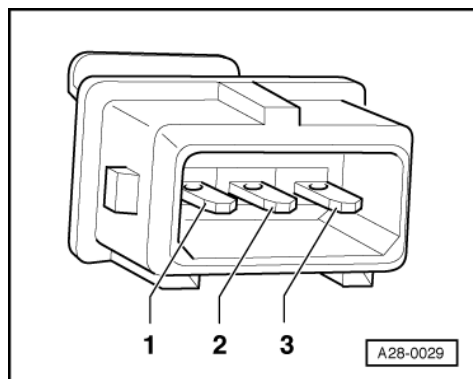
Connector contact	Test box V.A.G 1598 A socket
1	28
3	32

- Rectify any open/short circuit as necessary.

=> "Current Flow Diagrams, Electrical Fault-finding and Fitting Locations" binder

Adjust idling switch -F60

- Remove the throttle valve unit.

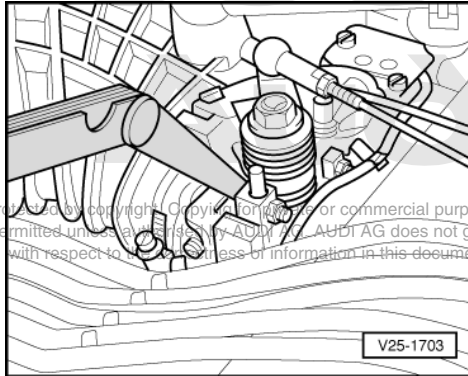


- -> Connect multimeter between contacts 1 and 2 to measure resistance.

- Slacken bolts of idling switch and adjust switching point by pushing switch into longitudinal slots.

Feeler gauge not inserted:

- Specification: 0 ω



-> Feeler gauge 0.3 mm inserted:

- Specification: $\infty\omega$ (no continuity)

If the specified values are attained:

- Tighten fastening bolts and secure with locking paint.

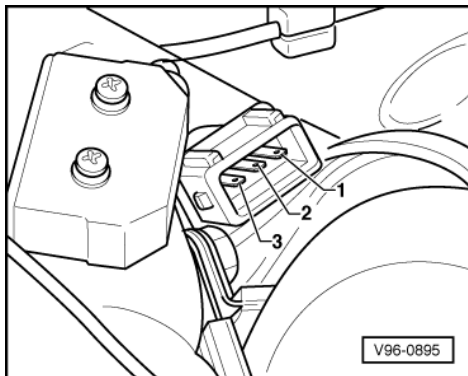
If the specified values are not obtained:

- Replace and adjust idling switch -F60 and full throttle switch -F81

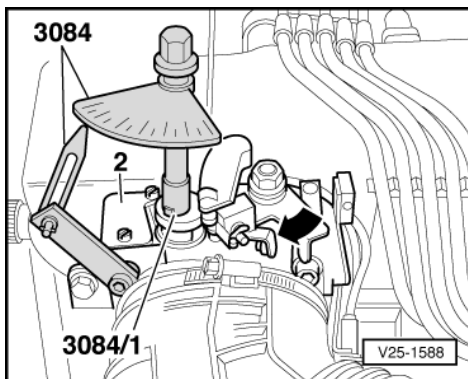
Note:

If a defect is detected on one of the switches always replace both switches.

Adjust full throttle switch -F81



- -> Connect multimeter between contacts 2 and 3 to measure resistance.





- -> Secure pointer for angle reader 3084 to throttle valve part.
- Open throttle valves and secure graduated disc for angle reader 3084 with the solenoid adapter 3084/1 to throttle valve shaft of 2nd stage.
- Slacken bolts of full throttle switch and adjust switching point by pushing switch into longitudinal slots.
- Press throttle valve lever to full throttle arrow and set degree disc to "0".
- Close throttle valve approx. 30° and again push slowly in direction of full throttle stop until full throttle switch -1- switches on.
 - Specification: 0 ω
 - at switching point $10 \pm 2^\circ$ before full load stop

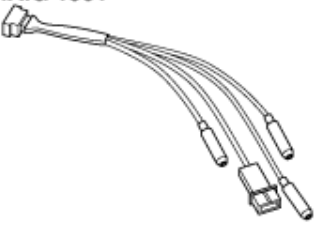
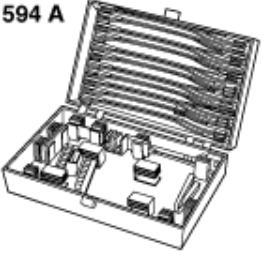
If the specification is obtained:

- Tighten fastening bolts and secure with locking paint.

If the specification is not obtained:

- Replace and adjust idling switch -F60 and full throttle switch -F81

1.12 - Checking air flow meter potentiometer -G19

V.A.G 1501 	V.A.G 1526 A 
V.A.G 1594 A 	V.A.G 1598 A 
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Special tools and workshop equipment required

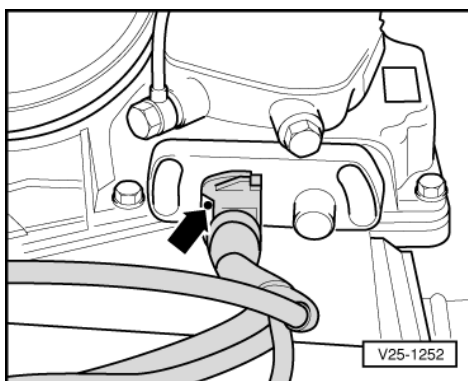
- ◆ V.A.G 1501
- ◆ V.A.G 1526 A
- ◆ V.A.G 1594 A
- ◆ V.A.G 1598 A
- ◆ V.A.G 1598/3

Fitting location => Fitting locations overview, Page 28

Checking baffle plate

Test requirements:

- Baffle plate in resting position



- -> Unplug connector -arrow- from potentiometer.
- Connect multimeter for measuring resistance between contacts 1 and 2 on potentiometer.
 - Specification: 4.5 ... 5.5 kw
- Connect multimeter for measuring resistance between contacts 1 and 3 on potentiometer.
 - Specification: 3.8 ... 4.2 kw

If the specified values are not obtained:

- Renew air flow meter.

Note:

The potentiometer for air flow meter -G19 can only be replaced together with air flow meter.

Checking wiring

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- Pull connector off potentiometer.
- Check for open circuit and short to positive or earth in the following wiring connections:

Connector contact	Measure to
3	Engine earth

- Rectify any open/short circuit as necessary.
- With the ignition switched off, use adapter V.A.G 1598/3 to connect test box V.A.G 1598 A to plug connection of engine control unit (control unit remains disconnected) => Page 33 .
- Check for open circuit and short to earth/positive or earth in the following wiring connections:

Connector contact	Test box V.A.G 1598 A socket
1	26

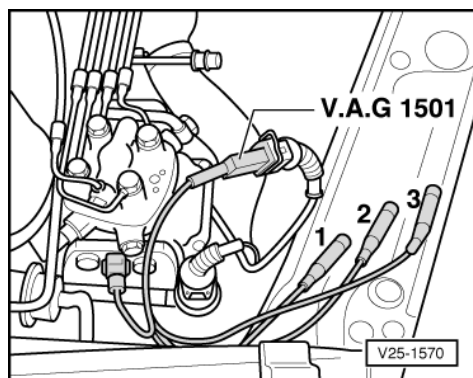
Connector contact	Test box V.A.G 1598 A socket
2	23

- Rectify any open/short circuit as necessary.

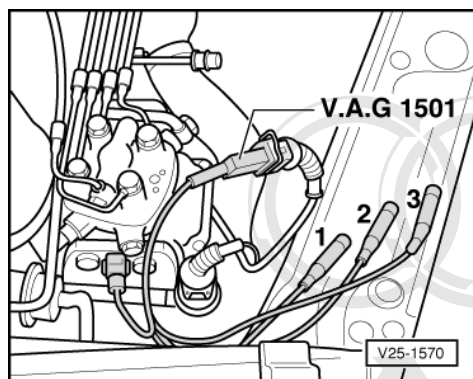
Check potentiometer with engine running

Test requirements:

- Coolant temperature at least 85 °C.
- Electrical consumers switched off (radiator fan must not run during the test)
- Air conditioner switched off.

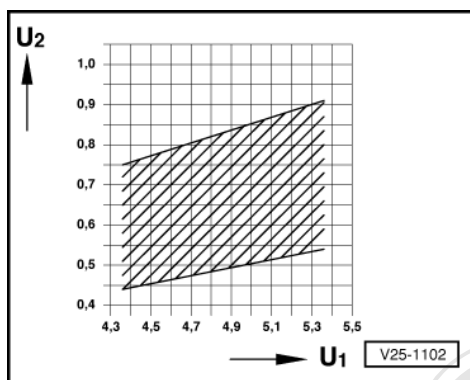


- Pull connector off potentiometer.
- -> Connect test lead V.A.G 1501 between potentiometer for air flow meter and connector.
- Connect multimeter for voltage reading between contacts 1 and 3 of test lead V.A.G 1501.
- Switch the ignition on.
 - Specification: 4.35 ... 5.35 V
- Read supply voltage (U1) on multimeter and note value.
- Switch ignition off.



- -> Connect multimeter for voltage measurement between contacts 2 and 3 of test lead V.A.G 1501.
- Start engine and run at idling speed for 2 minutes.
- Read output voltage (U2) on multimeter and note value.

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U1 - -> Supply voltage between contact 1 + 3
U2 - Output voltage at idling speed
between contact 2 + 3

- Compare output voltage (U2) under consideration of supply voltage (U1).
- Specification: Voltages in shaded area

If output voltage is below tolerance limit there are leaks between air flow meter and cylinder head.

- Check intake system for leaks (unmetered air) => Page 66 .

If the output voltage is above the tolerance limit the throttle valves allow too much air to pass through.

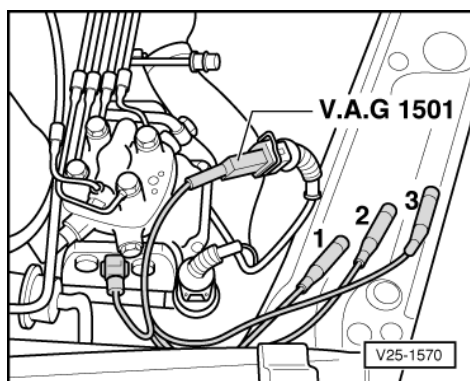
- Check whether throttle valves return to idling position. If necessary, renew throttle valve bodies.

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Check and adjust potentiometer with engine not running

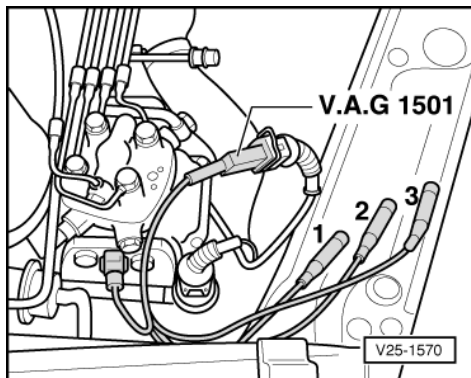
Notes:

- ◆ The potentiometer has been set accurately at the factory. Therefore the securing bolts are secured with sealing compound or securing plugs.
- ◆ Only carry out this test when the problem "Increased surging idling speed" or the fault 00520 "air mass meter -G70/-G19 was not eliminated.

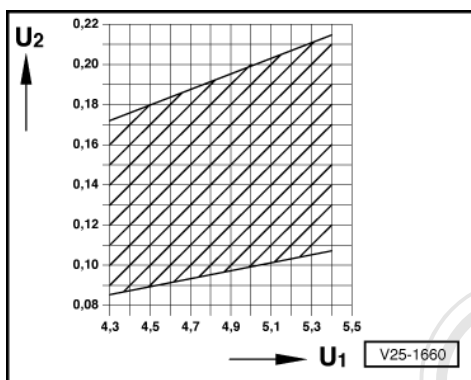


Test requirements:

- Check resting position and idling run of baffle plate OK => Page 94
- -> Test lead V.A.G 1501 is connected between potentiometer for air flow meter and connector.
- Connect multimeter for voltage reading between contacts 1 and 3 of test lead V.A.G 1501.
- Switch the ignition on.



- Specification: 4.35 ... 5.35 V
- Read supply voltage (U1) on multimeter and note value.
- Switch ignition off.
- > Connect multimeter for voltage measurement between contacts 2 and 3 of test lead V.A.G 1501.
- Switch the ignition on.
- Read supply voltage (U2) on multimeter and note value.



- U1 - -> Supply voltage between contact 1 + 3
- U2 - Output voltage at idling speed between contact 2 + 3

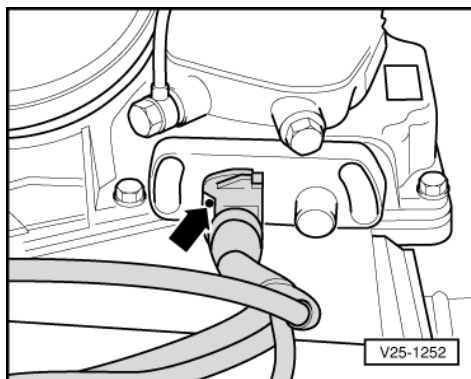
- Compare output voltage (U2) under consideration of supply voltage (U1).
- Specification: Voltages in shaded area

If the output voltage is slightly outside the tolerance:

- Adjust potentiometer with the trimming bolt.

Readjust potentiometer with trimming screw

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- -> Carefully remove sealing compound over trimming bolt -arrow-.

- Turn trimming bolt at the potentiometer in such a way that the output voltage (U2) is in the middle of the tolerance range under consideration of the supply voltage (U1).

Note:

When problem "Speed of rolling vehicle too high" occurs try to achieve a setting above the centre range.

- Reseal trimming screw with silicone adhesive compound.

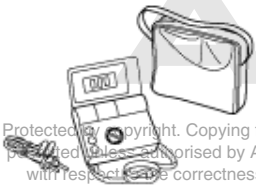
If no correction is possible:

- Renew air flow meter.

Note:

The potentiometer for air flow meter -G19 can only be replaced together with air flow meter.

1.13 - Check pressure regulator -N73

V.A.G 1526 A 	V.A.G 1594 A 
V.A.G 1598 A 	
	G24-0015

Special tools and workshop equipment required

- ♦ V.A.G 1526 A
- ♦ V.A.G 1594 A
- ♦ V.A.G 1598 A
- ♦ V.A.G 1598/3

Fitting location => Fitting locations overview, Page 28

If specification was not achieved with final control diagnosis => Page 15 :

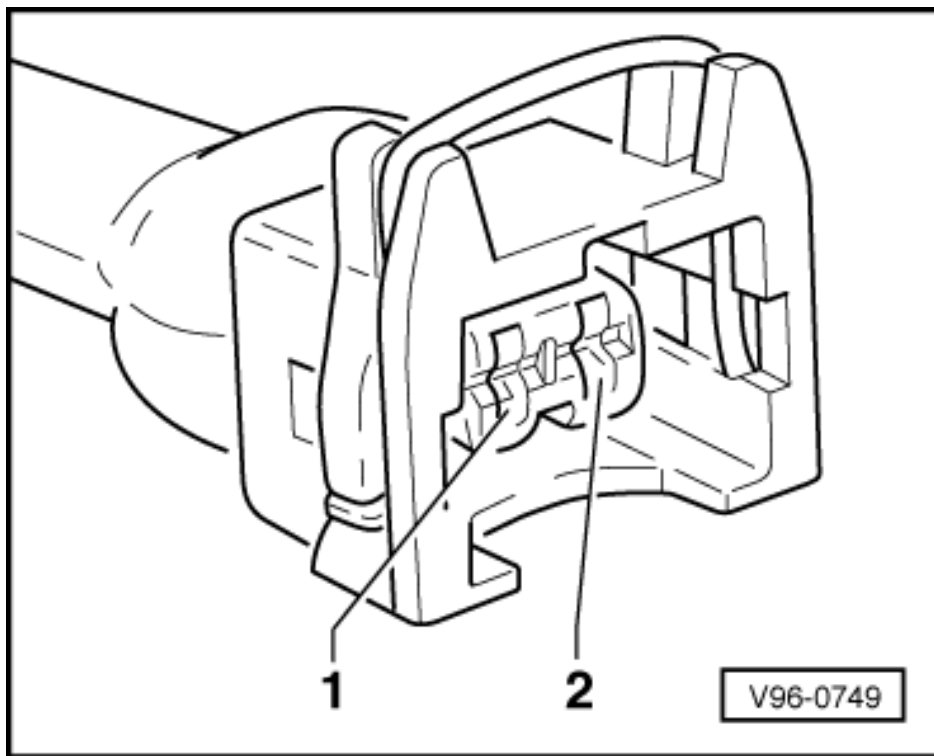
Checking baffle plate

- Unplug connector of pressure regulator.
- Connect multimeter to valve to measure resistance.
 - Specification: 15 ... 25 ω

If the specification is not obtained:

- Check actuation.

Checking actuation Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not
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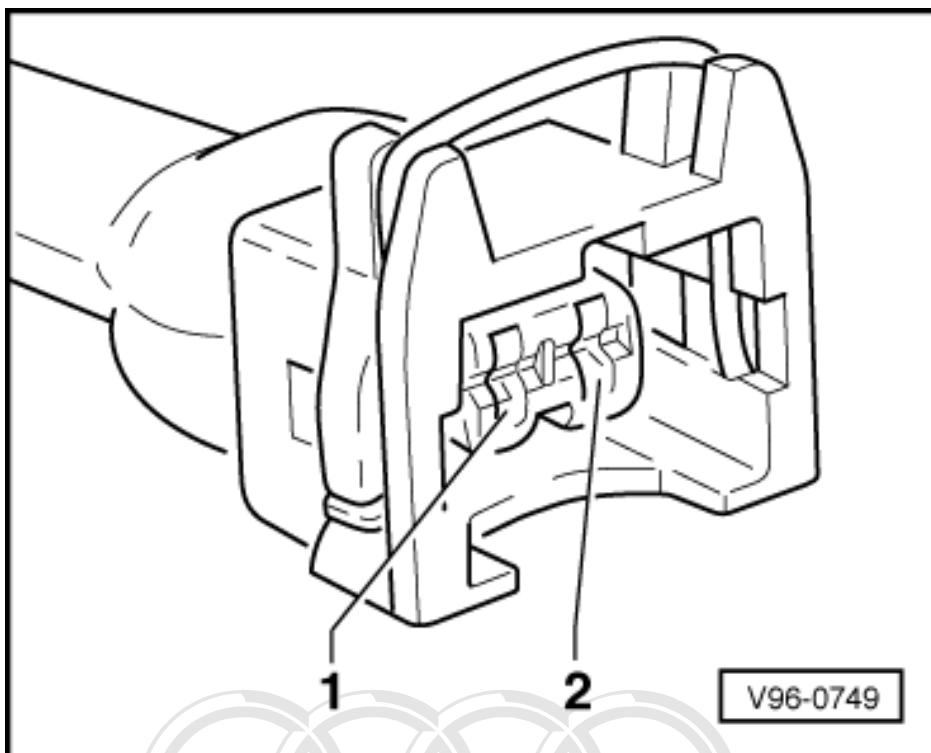
- -> Connect multimeter between contacts 1 and 2 to measure voltage.
 - Specification: 4.5 ... 5.0 V

If the specification is obtained:

- Replace pressure regulator -N73.

If the specification is not obtained:

- With the ignition switched off, use adapter V.A.G 1598/3 to connect test box V.A.G 1598 A to plug connection of engine control unit (control unit remains disconnected) => Page 33 .



- -> Check for open circuit and short to positive or earth in the following wiring connections:

Connector contact	Test box V.A.G 1598 A socket
1	4
2	5

- Rectify any open/short circuit as necessary.

=> "Current Flow Diagrams, Electrical Fault-finding and Fitting Locations" binder

If no wiring fault is detected:

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- Fit a new engine control unit => Page 34 .

1.14 - Basic throttle valve setting

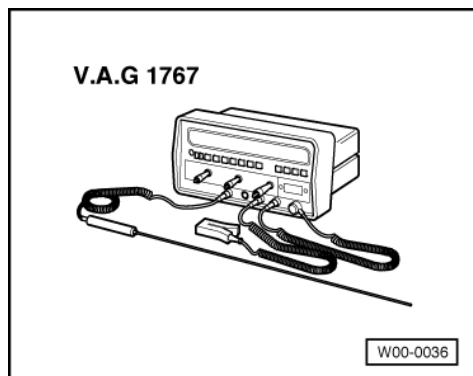
Note:

The limiting screw position is set at the factory and must not be altered. If the bolt was turned by mistake the throttle valve part must be replaced.



1.15 - Checking intake air system for leaks (unmetered air)

Special tools and workshop equipment required

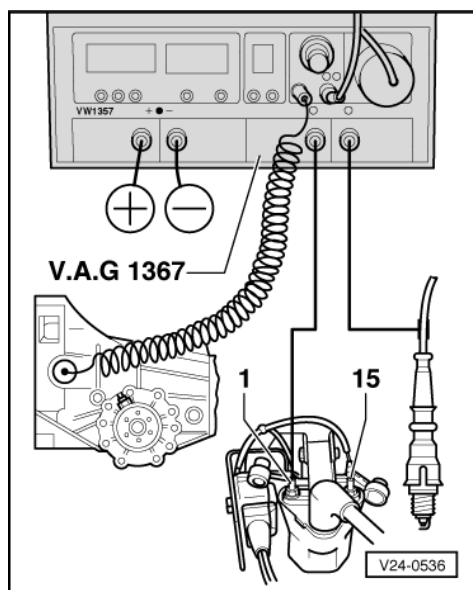


- ♦ Ignition tester V.A.G 1767 or V.A.G 1367 with HT pick-up clamp V.A.G 1367/8
- ♦ Engine leak detector spray G 001 800 A1

Notes:

- ♦ The vacuum in the intake system will cause the leak detector spray to be drawn in with the unmetered air. The leak detector spray reduces the ignitability of the mixture. This leads to a drop in engine speed and to a significant increase of the CO content.
- ♦ The safety precautions listed on the container must be adhered to.

Test sequence



- -> Connect ignition tester V.A.G 1767 (or V.A.G 1367) with ignition switched off:

=> Operating instructions

- Start engine and run at idling speed.
- Read off the idling speed on the ignition tester V.A.G 1767 (or V.A.G 1367).
- Systematically spray parts of the intake system with engine leak detector spray.

If engine speed does not change:

- Switch ignition off.

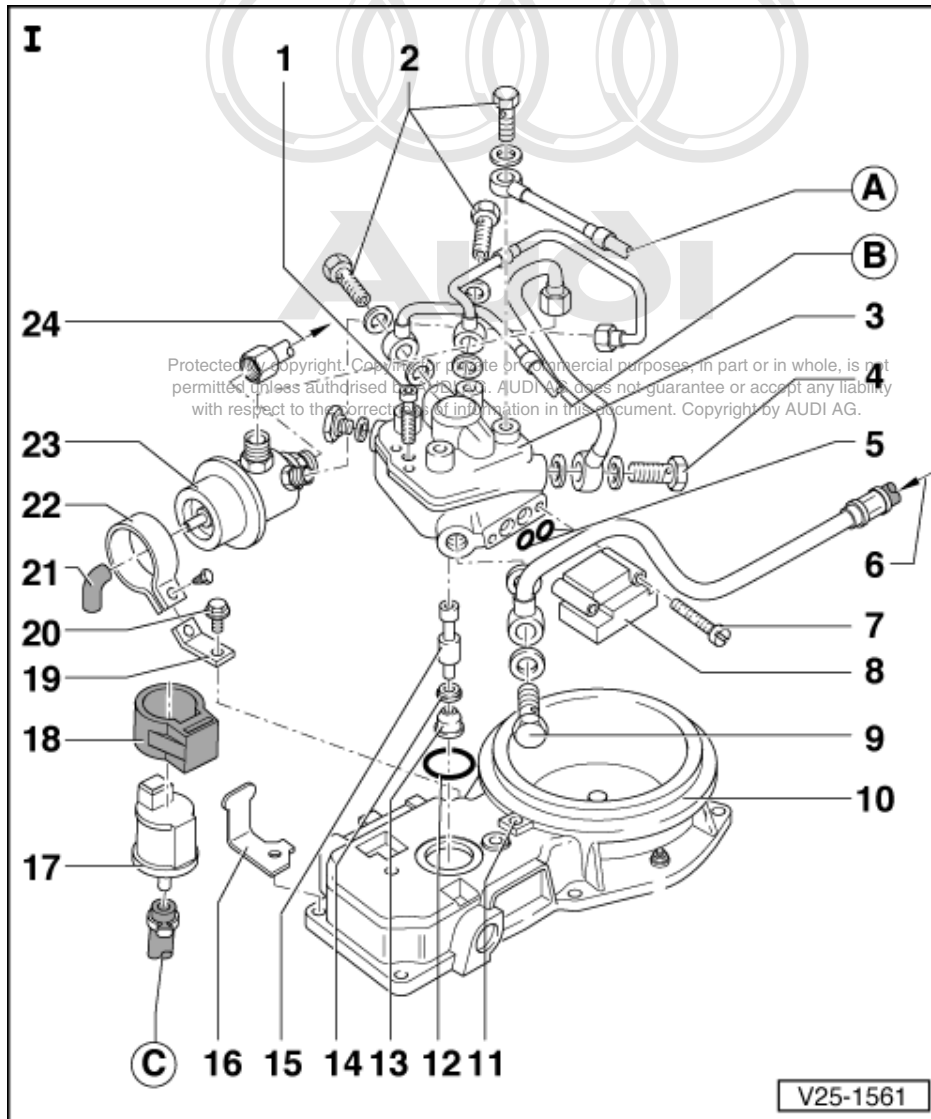
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If engine speed drops:

- Switch ignition off.
- Check sprayed areas of intake system for leaks and rectify if necessary.

2 - Servicing fuel system

2.1 - Servicing fuel system



2.2 - Fuel distributor - overview

- A - => page 72
- B - => page 72
- C - => page 72

1 3.5 Nm.

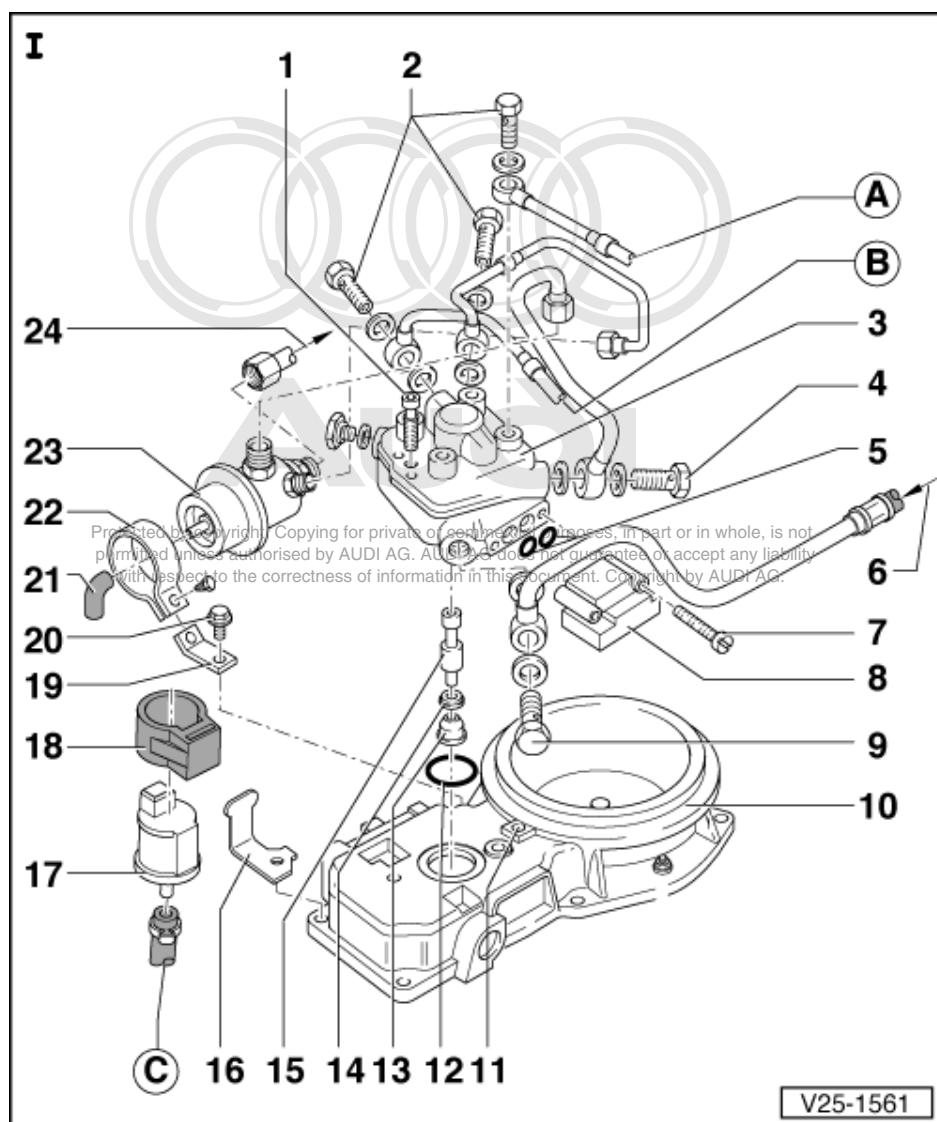
2 10 Nm.

3 Fuel distributor

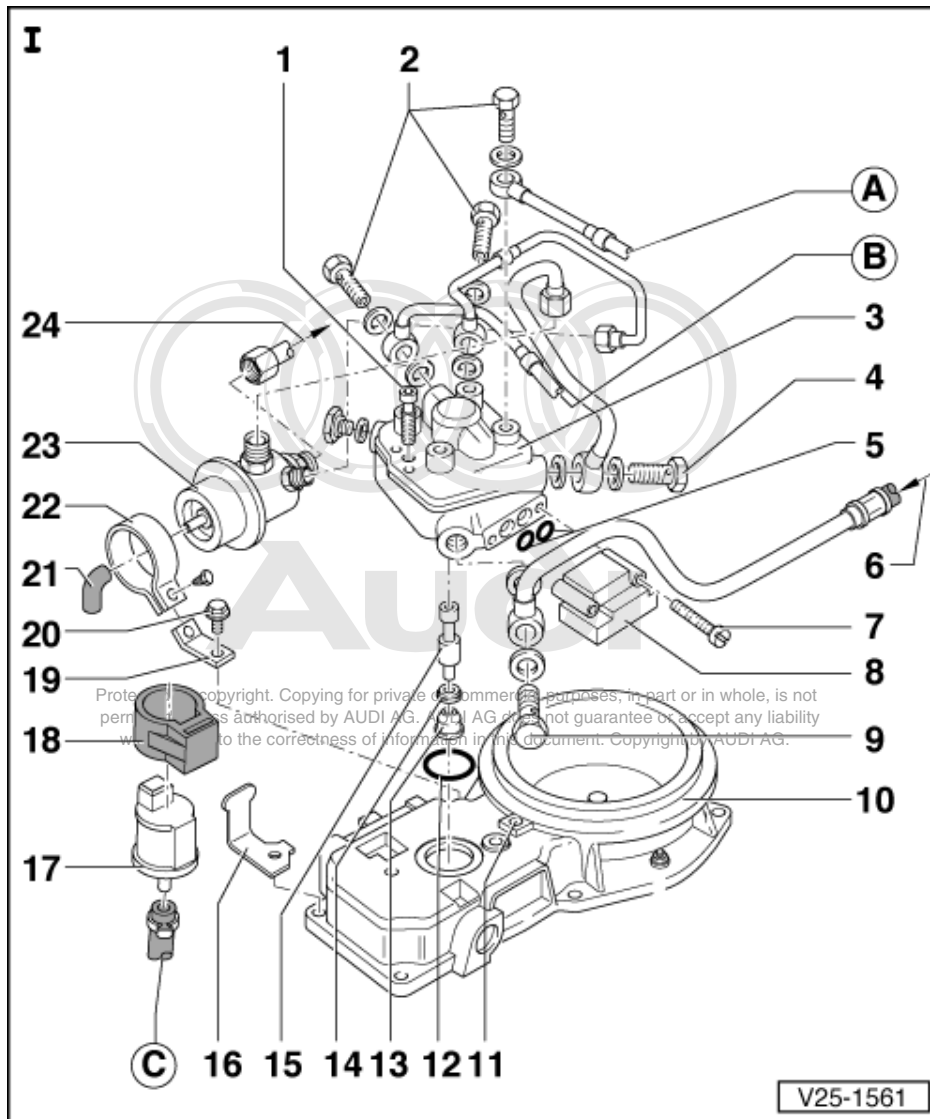
- ♦ Checking => injection tolerance idling, Page 91



- ♦ After check idling path of baffle plate; if necessary, adjust => Page 94



- 4 20 Nm
- 5 O-ring
 - ♦ Replace
- 6 Fuel feed pipe
 - ♦ From fuel tank
- 7 Bolt
 - ♦ Anti magnetic
- 8 Pressure regulator -N73
 - ♦ Checking =>Page 63
 - ♦ Checking system pressure, differential pressure and holding pressure=> Page 84
- 9 20 Nm.
 - ♦ Screw in banjo bolt instead of minifilter when there are problems with driving



10 Air flow meter

- ♦ Check adjustment lever and control piston => Page 93
- ♦ Check and adjust resting position and idling path of baffle plate => Page 94
- ♦ Check air flow meter potentiometer -G19=> Page 59

11 Securing plug

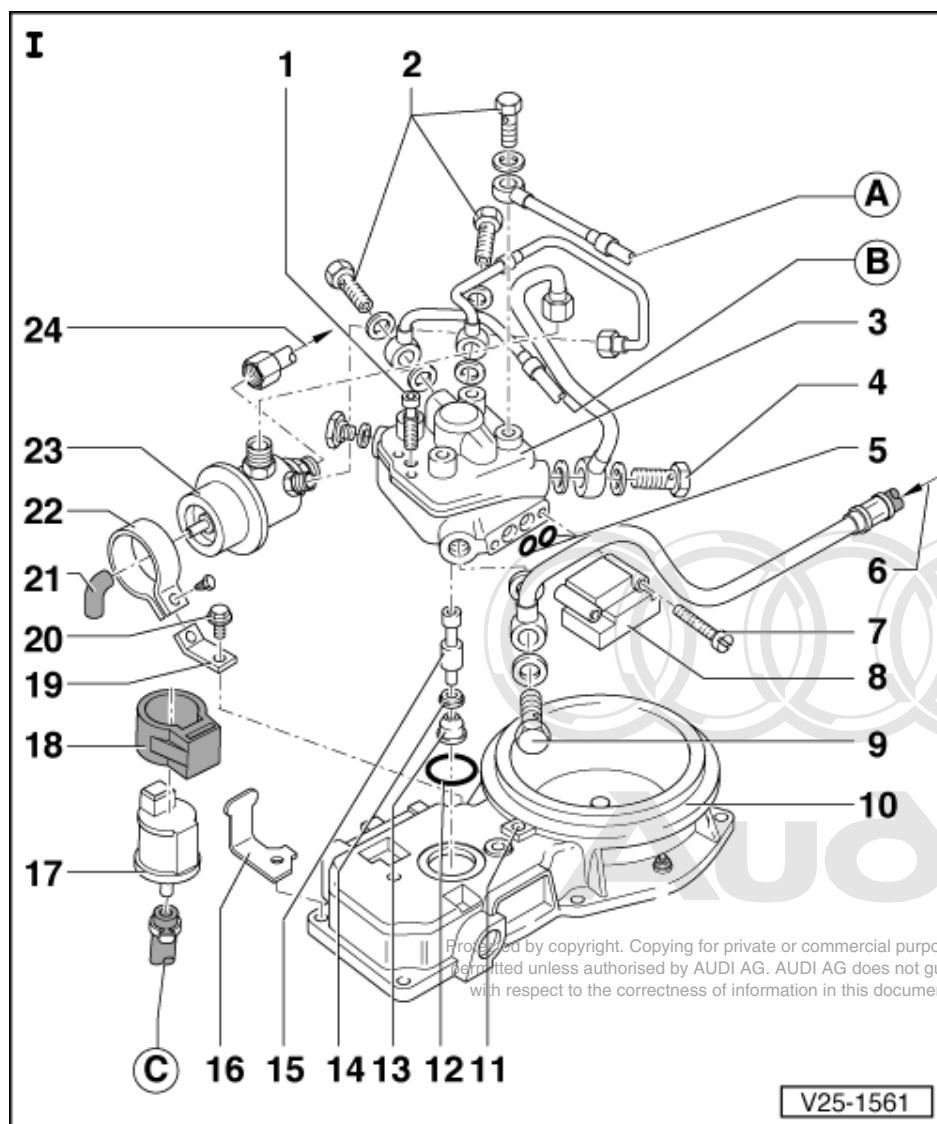
- ♦ Take out before adjusting
- ♦ Check idling speed and CO content =>Page 78

12 O-ring

- ♦ Replace

13 Stop bolt

- ♦ For control piston
- ♦ Adjusting =>Page 97

**14 Sealing ring**

- ♦ Installation position: smaller diameter faces control piston
- ♦ Only seals when baffle plate is in resting position

15 Control piston

- ♦ Check adjustment lever and control piston => Page 93

16 Bracket

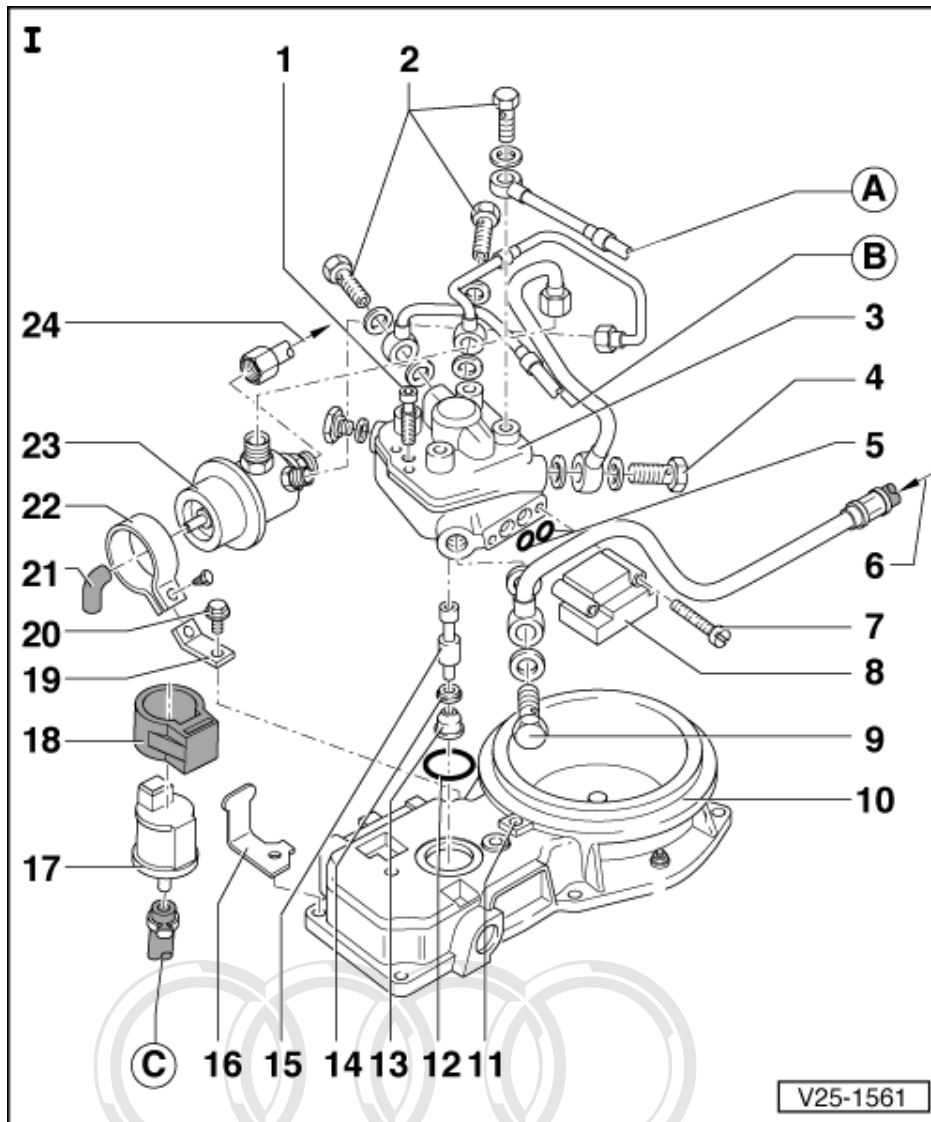
- ♦ For solenoid valve 1 for activated charcoal filter -N80

17 Solenoid valve 1 for activated charcoal filter -N80

- ♦ Checking =>Page 107

18 Rubber bracket

- ♦ For solenoid valve 1 for activated charcoal filter -N80



19 Bracket

- ♦ For fuel pressure regulator
- ♦ Attached to air flow meter

20 3.5 Nm

21 Breather pipe

- ♦ To top of air cleaner

22 Bracket

- ♦ For fuel pressure regulator
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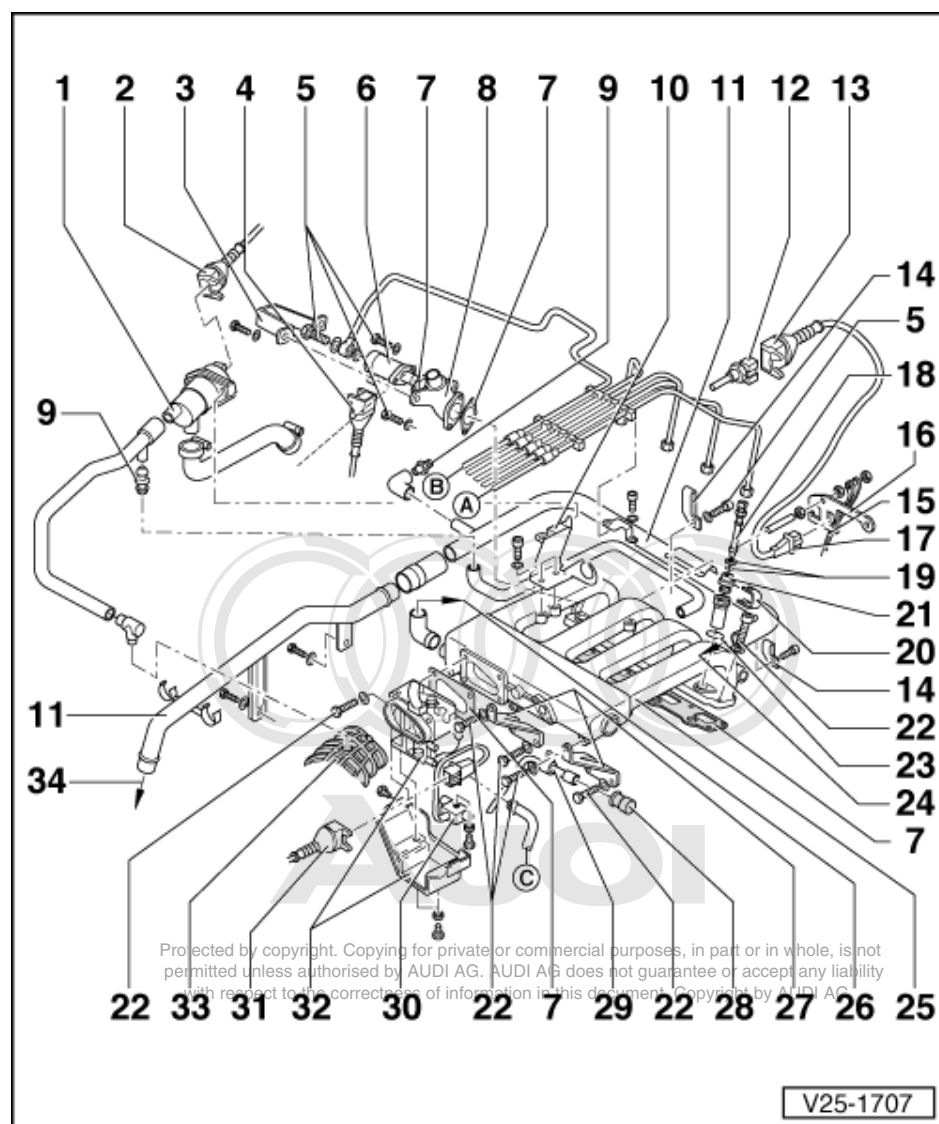
23 Fuel pressure regulator

- ♦ Checking system pressure, differential pressure and holding pressure=> Page 84

24 Fuel return line

- ♦ To fuel tank

2.3 - Removing and installing injection system components



A - => Page 67

B - => Page 67

C - => Page 67

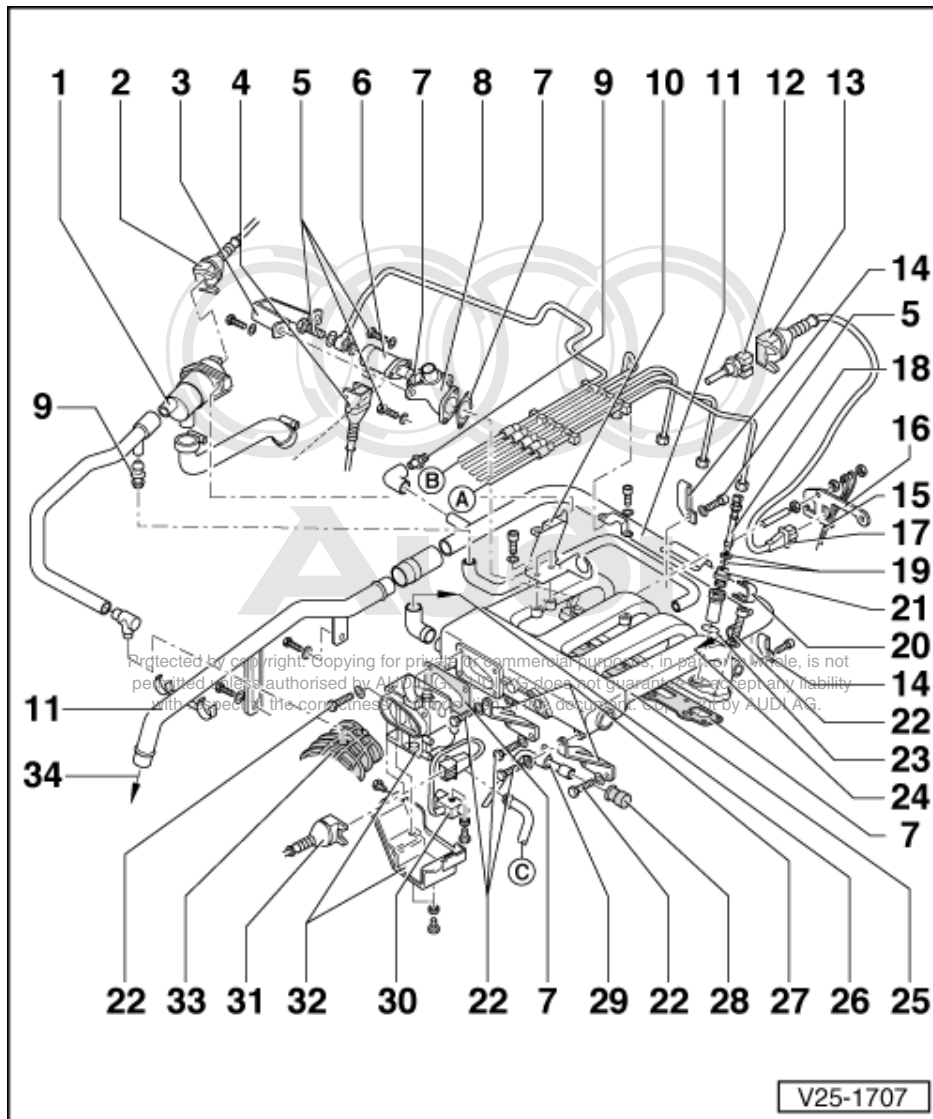
1 Idling stabilisation valve -N71

- ♦ Checking => Page 50

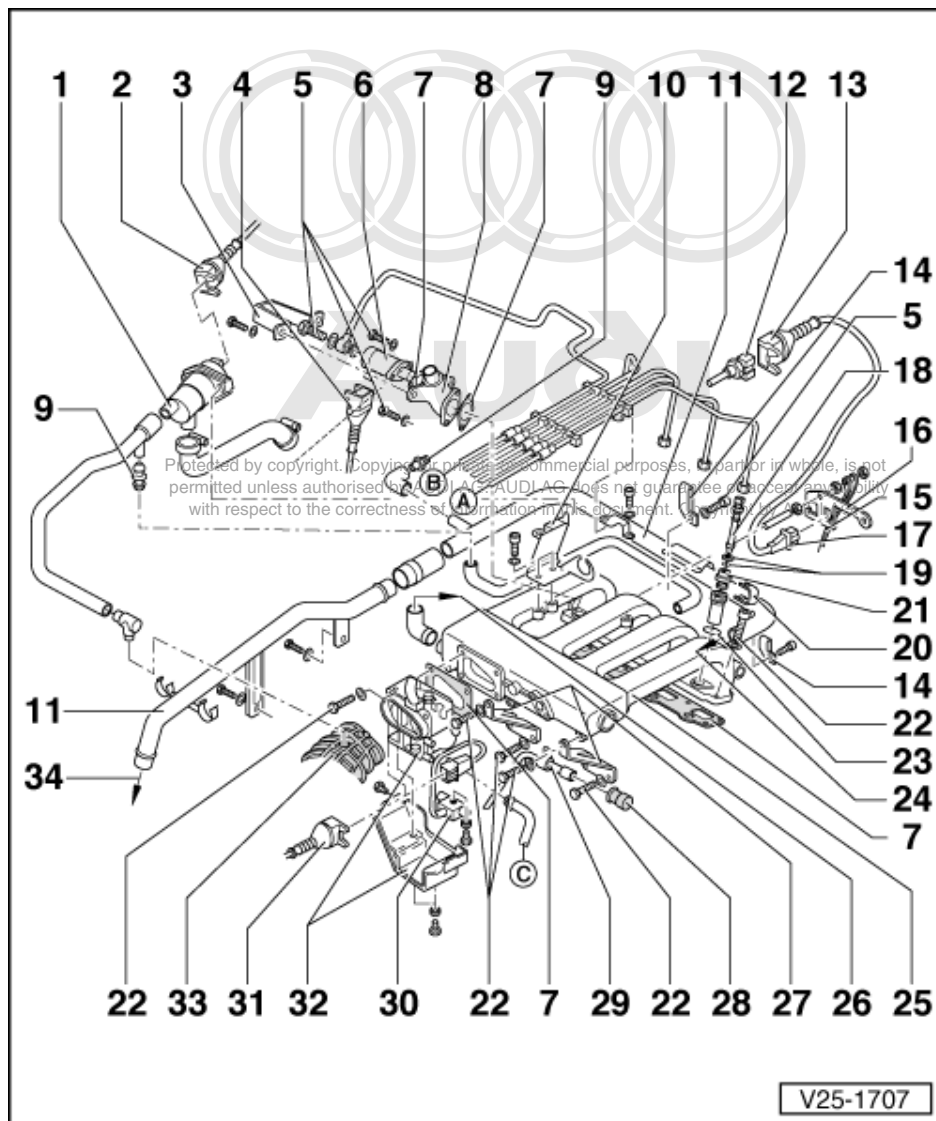
2 Connector

- ♦ For idling stabilisation valve -N71

3 Guard clip



- 4 Connector**
 - ♦ For cold start valve -N17
- 5 10 Nm**
- 6 Cold start valve -N17**
 - ♦ Checking => Page **44**
 - ♦ Attach with 10 Nm to intake manifold
 - ♦ Bolt on fuel line with 15 Nm
- 7 Gasket**
 - ♦ Replace
- 8 Pipe union**
- 9 Connector**
 - ♦ With calibration
- 10 Support bracket**
 - ♦ For throttle cable



11 Connection pipe

12 Coolant temperature sender -G62

- ◆ Resistance values
=> Page 136
- ◆ Tighten to 25 Nm

13 Connector

- ◆ For coolant temperature sender -G62

14 Fastener

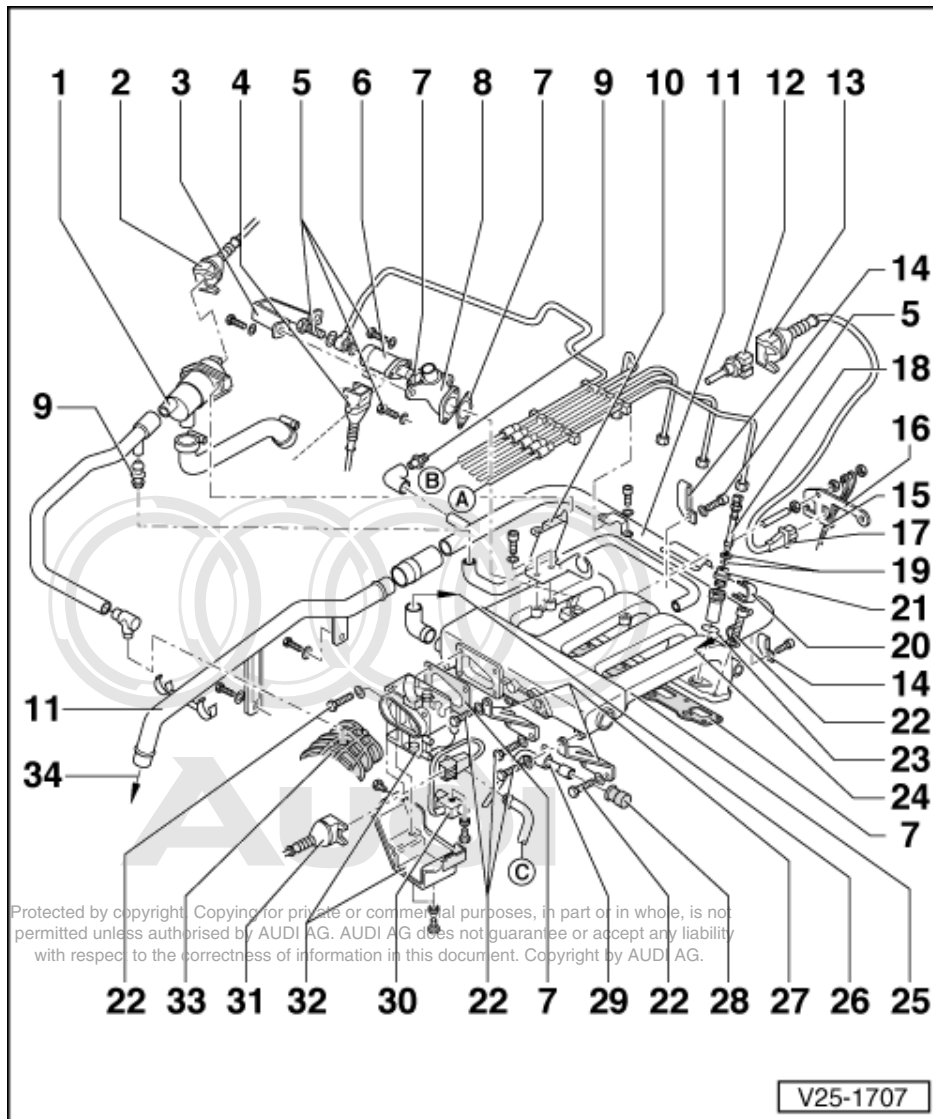
- ◆ For cable guide of ignition lines

15 Earth connections

- ◆ For engine control unit

16 Bracket for connectors

- ◆ For coolant temperature sender -G62
- ◆ For ignition timing sender -G4



17 Connector

- ♦ For ignition timing sender -G4

18 Injector

- ♦ Checking => Page 89

19 O-rings

- ♦ Replace

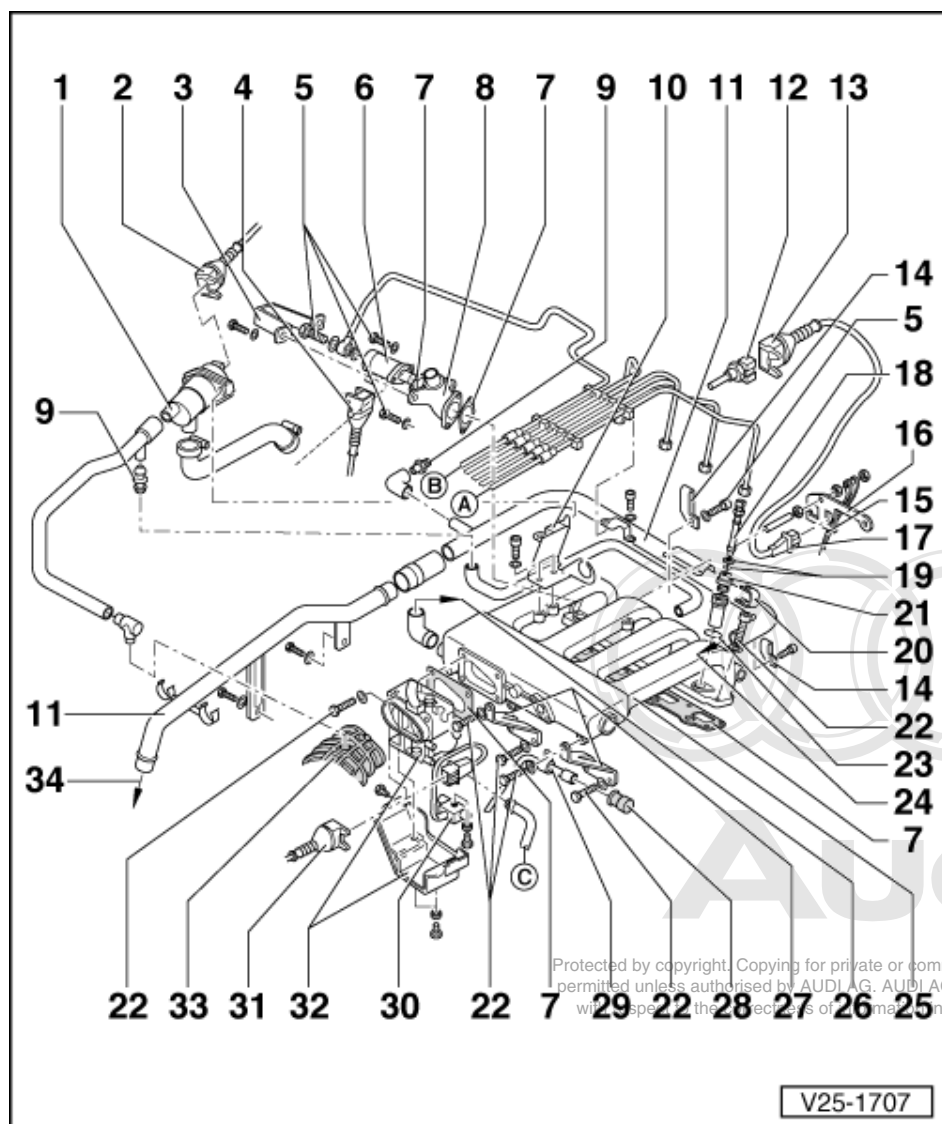
20 Bracket

- ♦ For injector

21 Use for injector

- ♦ Removing and installing with special tool 3135
- ♦ Insert upper part with locking fluid "D 000 600 A2" and tighten to 20 Nm

22 20 Nm



23 O-ring

- ◆ Replace

24 For bleeding of crank case

25 Intake manifold

26 To brake servo

27 Support

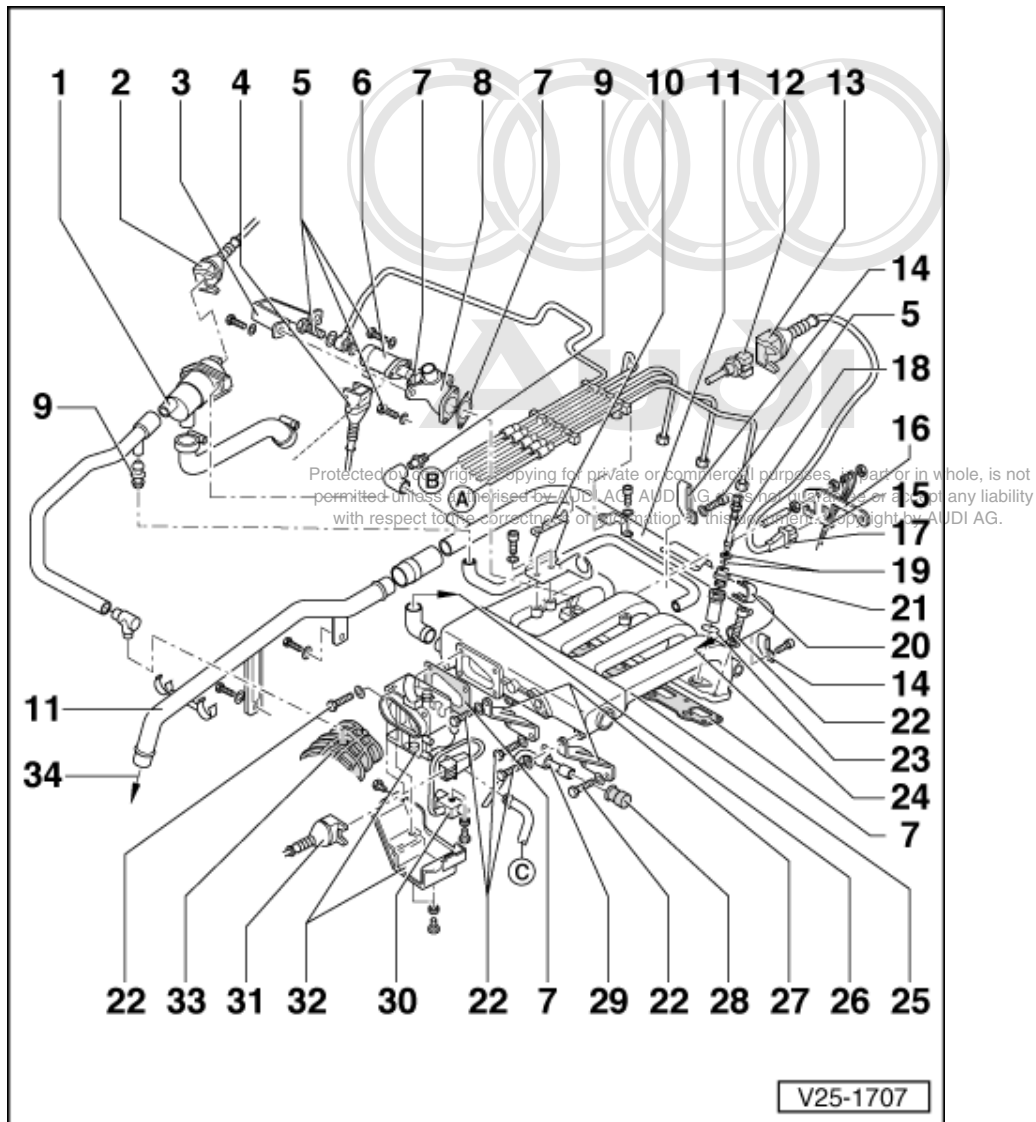
- ◆ For intake manifold

28 Cap

29 CO measuring pipe

30 Idling switch -F60 and full throttle switch -F81

- ◆ Checking =>Page 55
- ◆ Adjust idling switch -F60 =>Page 56
- ◆ Adjust full throttle switch -F81 =>Page 57



31 Connector

- ♦ For idling switch -F60 and full throttle switch -F81

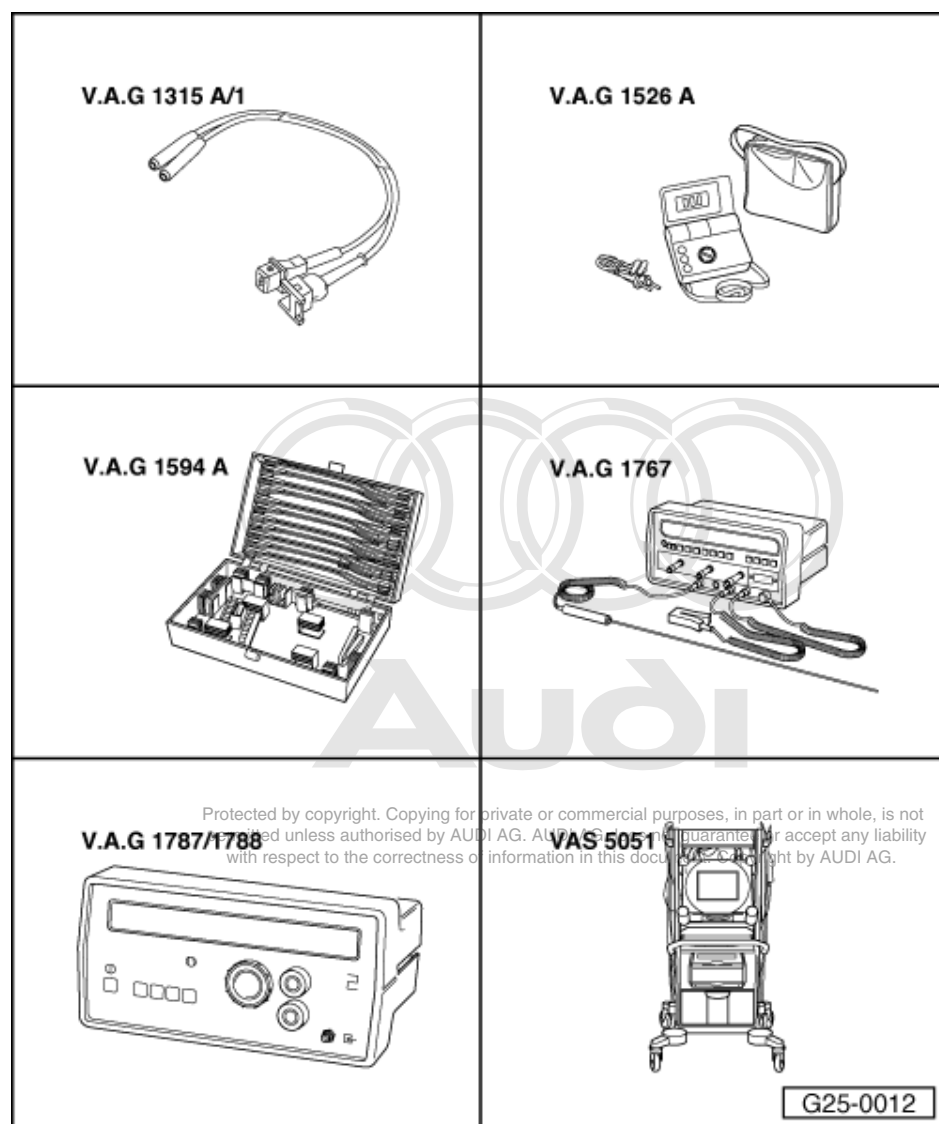
32 Throttle valve connection

- ♦ With heat shield

33 Air intake elbow

34 To air cleaner

2.4 - Checking idling speed, CO content and ignition point



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Special tools and workshop equipment required

- ♦ V.A.G 1315A/1
- ♦ V.A.G 1318/3
- ♦ V.A.G 1526 A
- ♦ V.A.G 1594 A
- ♦ V.A.G 1767 or V.A.G 1367 with V.A.G 1367/8
- ♦ V.A.G 1788
- ♦ VAS 5051 with VAS 5051/1 and VAS 5051/2

or

- ♦ V.A.G 1551 with V.A.G 1551/1

Notes:

- ♦ The idling speed cannot be adjusted.
- ♦ The idling speed is tested during the basic setting of the engine.

Test requirements:

- No leaks in exhaust system

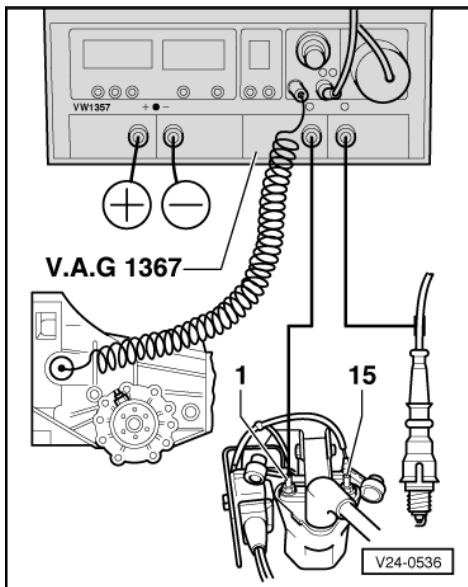
- Coolant temperature at least 85 °C.
- Electrical consumers switched off (radiator fan must not run during the test)
- Air conditioner switched off.
- Accelerator cable correctly adjusted

=> Fuel Supply System - Petrol Engines; Repair Group 20; Servicing accelerator mechanism; Adjusting throttle cable
Servicing accelerator mechanism Adjusting throttle cable

- Pressure gauge not connected.
- Lambda control OK
- In case injection lines were slackened or replaced: Rev engine several times to 3000 rpm and let it run at idling speed for at least 2 minutes.

Connecting test equipment

- Connect up vehicle diagnosis, measurement and information system VAS 5051 or fault reader V.A.G 1551 and select engine electronics control unit with "Address word" 01 => Page 1 .
For this purpose, the engine must be running at idle speed
- Interrogate fault memory => Page 5 . The fault memory must be clear. If necessary, rectify any faults and erase the fault memory. Switch off the engine, then start up again. Take vehicle for a test drive and interrogate the fault memory again to make sure it is clear.



- Connect exhaust fume tester V.A.G 1788.

=> Operating instructions

- Insert measuring probe into exhaust pipe.
- -> Connect ignition tester V.A.G 1767 (or V.A.G 1367) with ignition switched off:

=> Operating instructions

Notes:

- ♦ The TDC sender of ignition tester V.A.G 1367 must be inserted into the gearbox housing as far as the stop.
- ♦ The ignition timing is indicated directly on V.A.G 1767 (or V.A.G 1367). It is not necessary to use a strobe light aimed at the timing notches.
- ♦ If the trigger pliers are not sufficiently opened (e.g. by pulling too strongly on the spiral wire) error messages can be displayed on ignition tester V.A.G 1767.

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System in basic setting 0
1 2 3 4 5 6 7 8 9 10

- > Initiate basic setting, display group 000=>Page 16 .
- Check display in display zone 9.

- Specification: 5

If the specification is not obtained:

- Check idling switch -F60
=> Page 55.

If the specification is obtained:

- Read off the ignition point on the ignition tester V.A.G 1767 (or V.A.G 1367).
 - Test value 4 ... 8o: Before TDC.

Note:

If the ignition timing displayed is not within the tolerance range, you first of all have to set the ignition timing before testing idling speed so long as the system is still in "Basic setting 1".

- Set the ignition timing point by turning the ignition distributor on.
- Read off the idling speed on the ignition tester V.A.G 1767 (or V.A.G 1367).
 - Specification: 800 ... 1000/min 1)
- Read CO content at exhaust fume tester.
 - Specification: 0.2 ... 1.2 Vol. % 1)

1) Current values:

=> "Exhaust emission test" binder

If the specified values are attained:

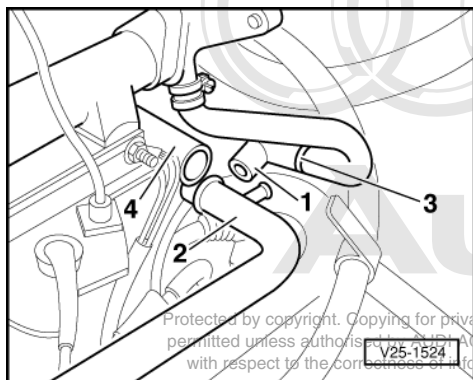
- To quit the basic setting, press the =>key.

-> When adjacent display appears:

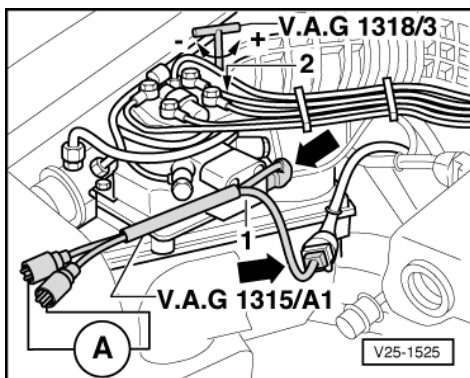
Rapid data transfer HELP
Select function XX

- Enter "06" for "End output" function and confirm entry with Q key.

If the CO value is outside the tolerance:



- Switch ignition off.
- -> Pull bleeder hose -1- off crank case-bleeder pipe -2-.
- The connecting piece -3- must remain in the bleeder tube with calibrated boring.
- Pull crank case bleeder tube out of connecting hose -4- so that only fresh air is being taken in.
- Pull off connector of pressure regulator.



- -> Switch multimeter to measuring range 200 mA and connect with measuring line V.A.G 1315A/1 between pressure regulator -1- and connector of pressure regulator -arrows-.
- Switch the ignition on.
 - The pressure regulator current must be in positive range 90 ... 110 mA.

If the control current is in negative range:

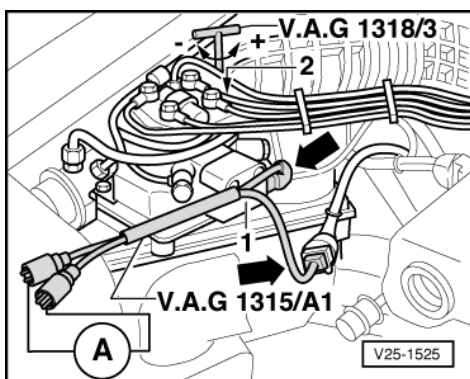
- Exchange connections at V.A.G 1315 A/1.
- Start engine and run at idling speed.

System in basic setting 0

1	2	3	4	5	6	7	8
9	10						

-> Initiate basic setting, display group 000=>Page 16 .

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- -> Set control current at adjusting bolt -2- with V.A.G 1318/3.
- Setting: 2.5 ± 2.5 mA (fluctuating)

Note:

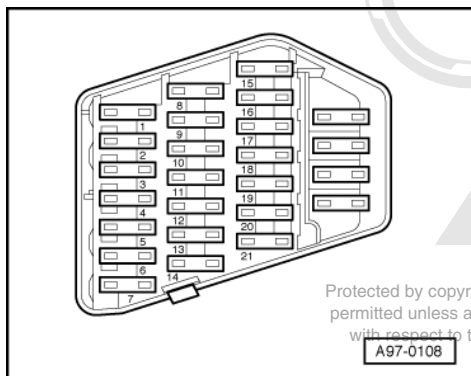
- ♦ If control current does not fluctuate check lambda probe -G39 and lambda control => Page 102 .
- ♦ When adjusting control current do not press adjusting key, do not accelerate with adjusting key inserted.
- ♦ Remove adjusting key after each adjustment procedure and accelerate briefly before the control current can be read at idling speed.
- To quit the basic setting, press the =>key.
- Interrogate fault memory and erase it => page 5 .

If the idling speed is too high or too low and there are no faults recorded in the fault memory, carry out the following tests marked with a dot:

- Test idling switch =>page 54 .
- Check vacuum connections (unmetered air) => Page 116 .
- Test for leaks (unmetered air) in intake air system => Page 66 .
- Perform final control diagnosis => Page 13 .



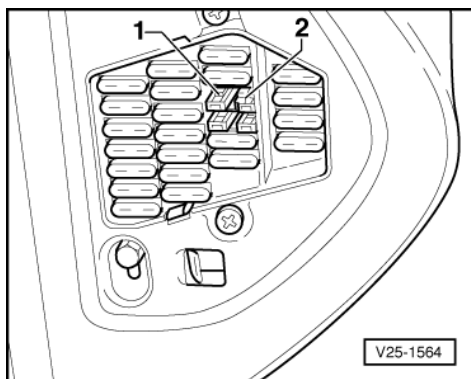
2.5 - Connecting remote control V.A.G 1348/3A with adapter cable V.A.G 1348/3-2



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Work sequence

- Take off the cover of the left fuse holder.
- -> Pull out fuse S17.



- -> Connect remote control V.A.G 1348/3A with adapter line V.A.G 1348/3-2 at rear contact -2- of the securing foot.
- Connect clamp to vehicle battery (+).

Note:

In vehicles with air conditioner connect clamp to vehicle battery (+).

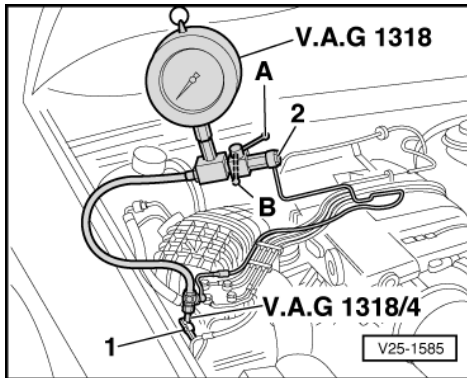
2.6 - Connecting pressure meter V.A.G 1318 with test adapter 1318/4.

Attention!

The fuel system is pressurised! Before opening the system place a cloth around the connection. Then release pressure by carefully loosening the connection.

Note:

Always use new sealing rings.



- -> Connect pressure meter V.A.G 1318 with test adapter 1318/4 at measuring point -1- of the fuel distributor.
- Unscrew line from cold start valve and connect it to pressure meter V.A.G 1318; move lever at pressure meter in position -open- (lever for through flow direction).

Position of cut-off valve:

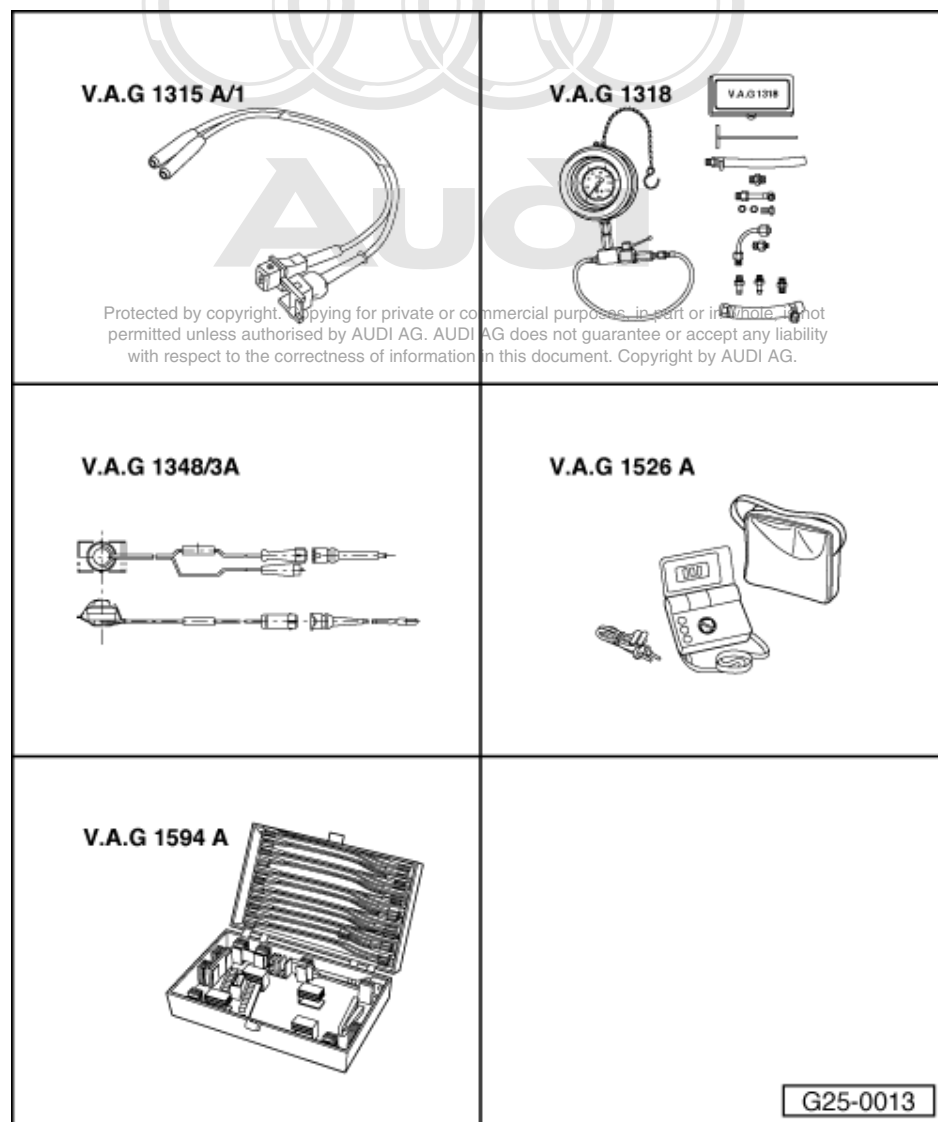
- A - Open
- B - Closed



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2.7 - Checking system pressure, differential pressure and holding pressure



Special tools and workshop equipment required

- ♦ V.A.G 1315 A/1
- ♦ V.A.G 1318
- ♦ V.A.G 1318/4
- ♦ V.A.G 1348/3A with V.A.G 1348/3-2
- ♦ V.A.G 1526 A
- ♦ V.A.G 1594 A
- ♦ Measuring unit, fuel resistant

Test requirements:

- Battery voltage at least 11 V
- Fuel pump relay OK; checking =>Page 38 .
- Fuel pump OK; checking:

=> Fuel Supply - Petrol Engines; Repair Group 20; Fuel supply Fuel supply

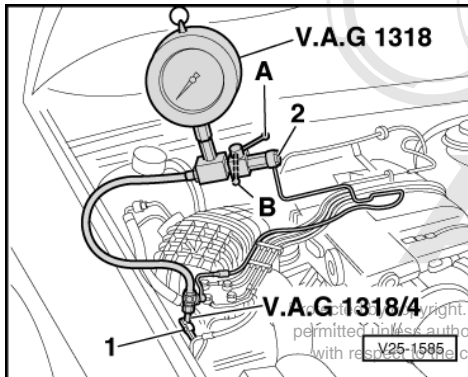
- Fuel filter OK
- Remote control V.A.G 1348/3A connected with adapter cable V.A.G 1348/3-2 => Page 82 .

- Pressure meter V.A.G 1318 connected with pressure adapter 1318/4 => Page **82** .

Important:

The fuel system is pressurised. Before opening the system place a cloth around the connection. Then release pressure by carefully loosening the connection.

Checking system pressure and fuel pressure regulator



- -> Open cut-off valve of pressure meter V.A.G 1318 -Position A-.
- Press remote control switch.
 - Specification: 6.1 ... 6.6 bar

If the specification is not obtained:

- Replace fuel pressure regulator

If specification is exceeded:

- Separate return hose from pressure regulator at connection return hose/line and hold into a container.
- Repeat test.

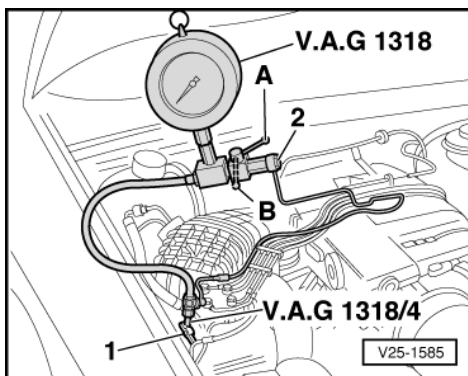
If the specification is attained:

- Check that return line is not blocked.

If specification is again exceeded:

- Replace fuel pressure regulator

Check differential pressure

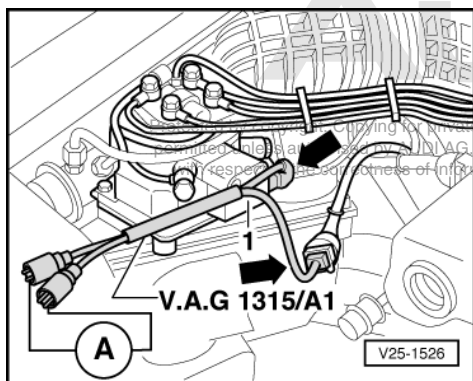


- -> Close cut-off valve of pressure meter V.A.G 1318 -Position B-.
- Unplug connector of pressure regulator.
- Press remote control switch.
 - Specification differential pressure:

0.3 ... 0.5 bar below system pressure

If specification not attained or exceeded:

- Unscrew thin line from fuel pressure regulator and hold into a measuring unit.
- Close free connection with fuel pressure controller.
- Press remote control switch for 1 minute.
 - Specification over flow quantity: 130 ... 150 cm³
- If necessary, renew pressure regulator.
- Screw thin line back onto fuel pressure regulator.



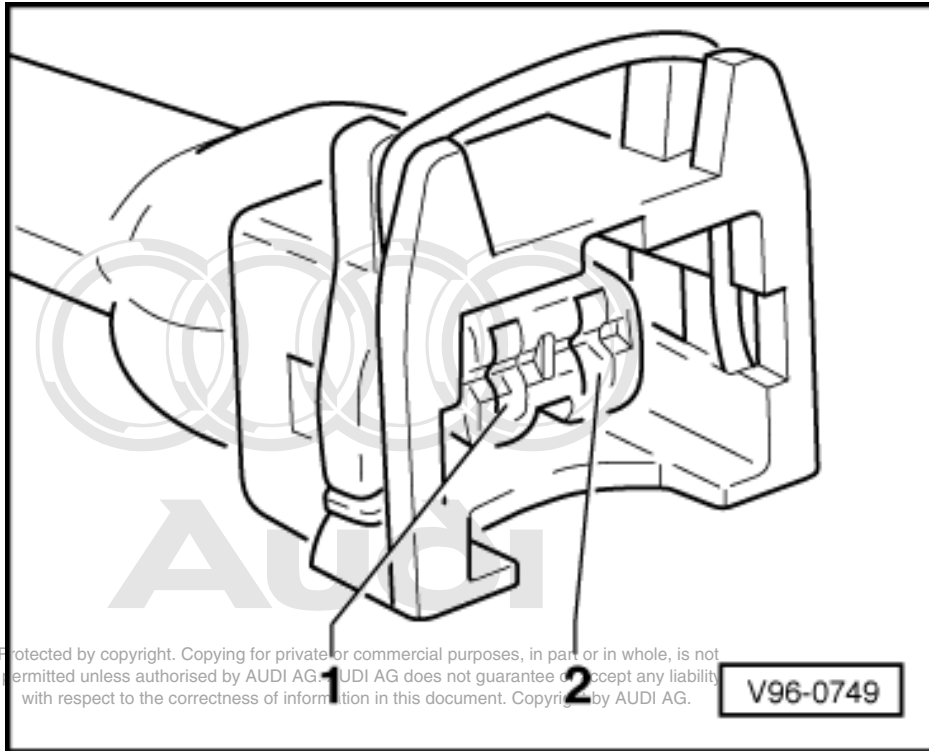
- -> Switch multimeter to measuring range 200 mA and connect with measuring line V.A.G 1315A/1 between pressure regulator -1- and connector of pressure regulator -arrows-.
- Switch the ignition on.
- Press remote control switch.
 - Specification differential pressure: 1.3 ... 1.6 bar below system pressure
 - Specification pressure regulator current: 90 ... 110 mA

If specification for differential pressure is not attained or exceeded:

- Replace pressure regulator -N73.

If the specification for differential pressure and pressure setting current is not attained or exceeded:

- -> With the ignition switched off, use adapter V.A.G 1598/3 to connect test box V.A.G 1598 A to plug connection of engine control unit (control unit remains disconnected) => Page 33 .



- -> Check for open circuit and short to positive or earth in the following wiring connections:

Connector contact	Test box V.A.G 1598 A socket
1	4
2	5

- Rectify any open/short circuit as necessary.

=> "Current Flow Diagrams, Electrical Fault-finding and Fitting Locations" binder

If no wiring fault is detected:

- Fit a new engine control unit => Page 34 .

Checking holding pressure:

Note:

Carry out the following test on vehicles with hot start problems only.

- Press switch on remote control for approx. 5 seconds.
- Check holding pressure at pressure gauge.
 - After 10 minutes the remaining pressure should be at least 3.3 bar.
 - After 20 minutes the remaining pressure should be at least 3.2 bar.

If the pressure does not drop below the minimum values, the following faults are possible:

- ◆ Non-return valve in fuel pump defective:

=> Fuel Supply - Petrol Engines; Repair Group 20; Fuel supply Fuel supply

- ◆ Idling path of baffle plate not OK, check => Page 94 .
- ◆ Check connections of injection and fuel lines at fuel distributor for leaks.



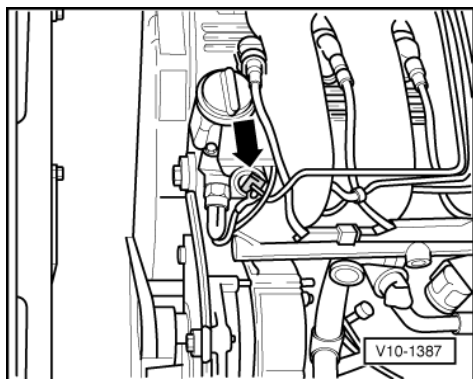
- ♦ Fuel pressure regulator defective

Note:

Before removing the pressure gauge, release fuel pressure at the gauge.

2.8 - Removing and installing injectors

Removing



- -> Disconnect connectors -arrow- at the connection injectors/fuel lines.
- Pull the injectors with connected fuel lines out of the intake manifold.

Note:

Ensure that fuel lines are not kinked.

- If the injector is to be replaced it must be removed from the injection line.

Important:

The fuel system is pressurised. Before opening the system place a cloth around the connection. Then release pressure by carefully loosening the connection.

- Remove upper and lower O-rings from injector.

Installing

Installation is carried out in the reverse order, when doing this note the following:

Note:

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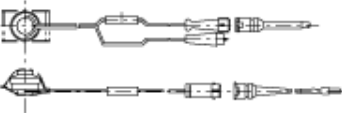
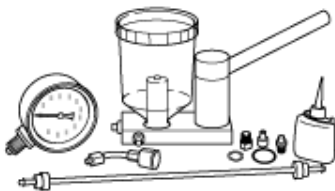
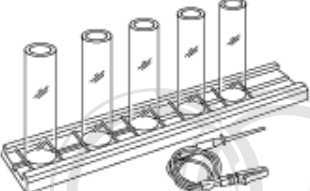
Fit new O-rings.

- Moisten O-rings at injectors lightly with clean engine oil.

Tightening torque

Component	Nm
Injection line at injector	20

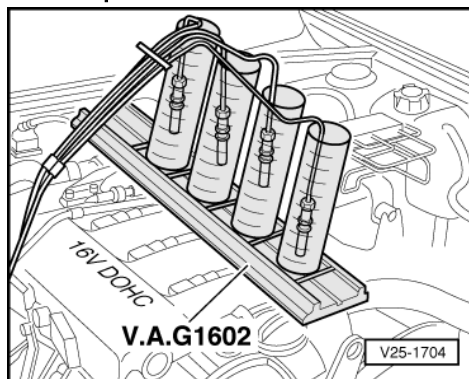
2.9 - Checking injectors

V.A.G 1348 	V.A.G 1348/3A 
V.A.G 1349 	V.A.G 1602 
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Special tools and workshop equipment required

- ♦ V.A.G 1348/1A from V.A.G 1348
- ♦ V.A.G 1348/3A with V.A.G 1348/3-2
- ♦ V.A.G 1349
- ♦ V.A.G 1602

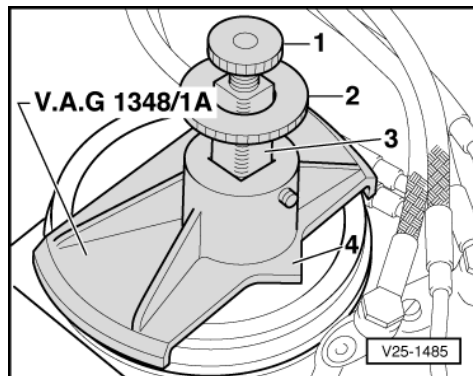
Test sequence



- Remove injectors => Page 88 .
- -> Insert injectors into the openings in the measuring appliance V.A.G 1602.

Note:

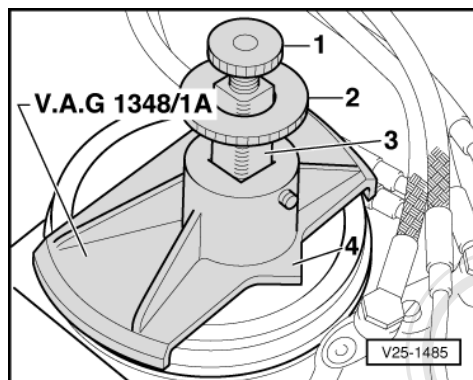
Ensure that fuel lines are routed without any kinks; if necessary, remove from holding brackets.



- -> Turn adjustment bolt -1- and knurled head nut -2- at V.A.G 1348/1A in upper final position and pull slider -3- upwards.
- Attach V.A.G 1348/1A in such a way onto the edge of the air flow meter that the tip -4- faces in direction of fuel distributor.
- Push slider -3- in until stop.
- Hold baffle plate manually in resting position.
- Screw in adjustment bolt -1- in until the solenoid foot is resting on the securing bolt of the baffle plate.

Testing spray pattern and for leaks

- Connect remote control V.A.G 1348/3A with adapter cable V.A.G 1348/3-2 => Page 82 .

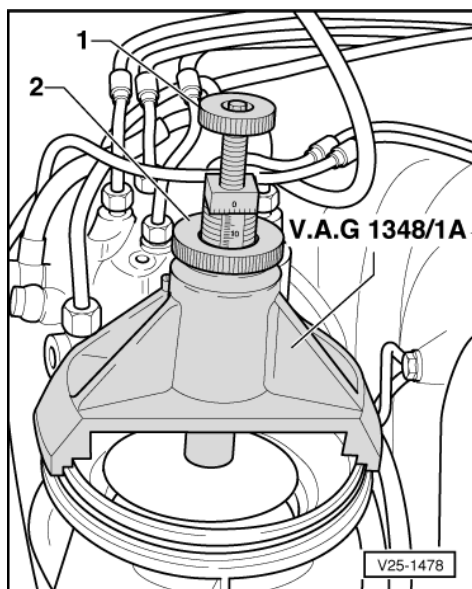


- -> Pull slider -3- completely upwards.
- Press remote control switch.
 - The injectors must eject in tapered spray pattern.
 - The spray pattern should be the same for all the valves.

If the spray pattern deviates at one valve:

- Lift baffle plate briefly and repeat test.
- Return baffle plate into resting position.
- Dry injectors at jets.
- Press remote control switch for 2 minutes.
 - There must be no drops emerging from the injectors within 2 minutes.
- Empty V.A.G 1602.

Checking injection tolerance idling speed



- -> Screw knurled head nut -2- downwards by 15 mm.
- Press remote control switch until a measuring glass is filled with 20 ml of fuel.
- Compare fuel quantities of the injectors.
 - Permissible deviation: max. 2.0 ml for all valves

Note:

Hold measuring device horizontally.

If the deviation is greater:

- Exchange injectors with the greatest and smallest injection quantity.
- Empty V.A.G 1602.
- Repeat test.

If the different fuel quantity has moved with the injector:

- ◆ Injector defective

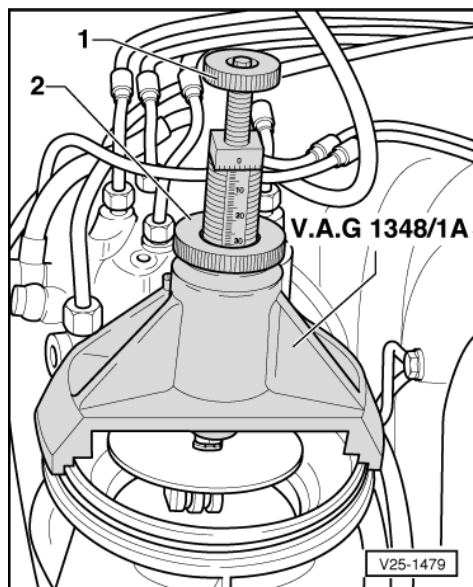
If the different fuel quantity remains the same at the same cylinder.

- ◆ Wiring to injector is tightened or fuel distributor is defective

Checking injection tolerance full load

- Empty V.A.G 1602.

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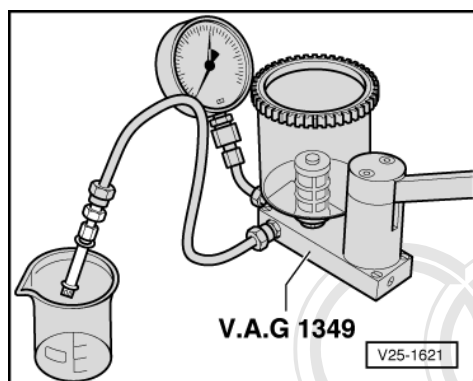
- -> Screw knurled head nut -2- downwards by 30 mm.
- Press remote control switch until a measuring glass is filled with 80 ml of fuel.
- Compare fuel quantities of the injectors.
 - Permissible deviation: max. 8.0 ml for all valves

Note:

Hold measuring device horizontally.

Checking spray pressure

- Separate fuel lines at the injector to be tested.



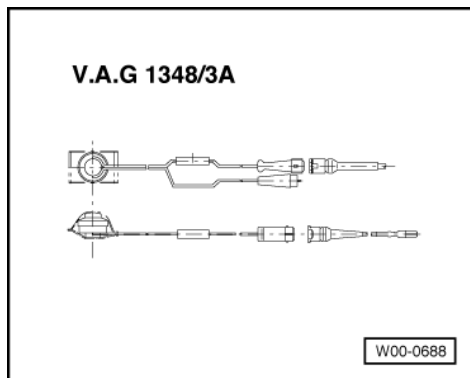
- -> Connect injector to V.A.G 1349.
- Bleed line to injector with union nut open by moving lever several times at V.A.G 1349.
- Tighten union nut.
- Bleed injector with 10 ... 15 rapid lever movements at V.A.G 1349.
- Open cut-off valve.
- Check spray pressure through slow lever movements.
 - Specification: 3.7 ... 4.8 bar

If the specification is not obtained:

- Replace injector.

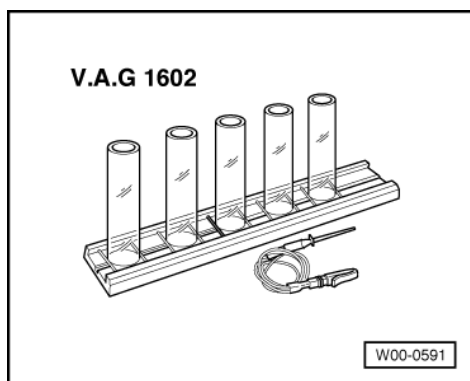
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2.10 - Checking adjustment lever and control piston



Special tools and workshop equipment required

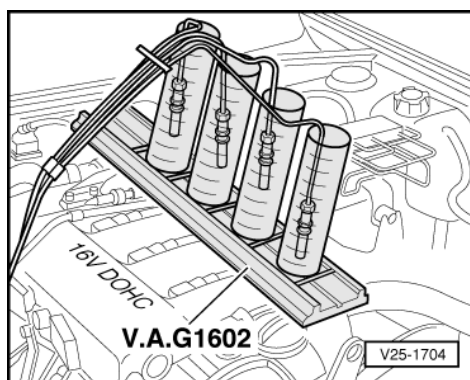
- ♦ V.A.G 1348/3A with V.A.G 1348/3-2



- ♦ V.A.G 1602

Test sequence

- Remove injectors => Page 88 .



- -> Insert injectors into the openings in the measuring appliance V.A.G 1602.

Note:

Ensure that fuel lines are routed without any kinks; if necessary, remove from holding brackets.

- Detach the air intake elbow.

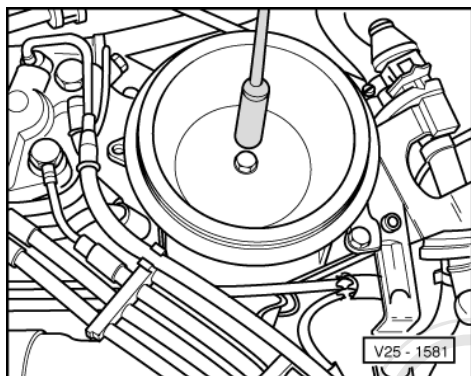


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- Operate starter approx. 10 seconds so that control pressure is built up.

or



- Press remote control switch approx. 10 seconds (connect remote control V.A.G 1348/3A with adapter line V.A.G 1348/3-2 => Page 82).
- -> Lift adjustment lever above baffle plate.
 - The lever must have an even resistance over the complete distance.
 - No resistance must be felt with rapid downward movement.
- If necessary, replace air flow meter.

If it is difficult to move lever upwards but it can be moved downward easily, the control piston sticks:

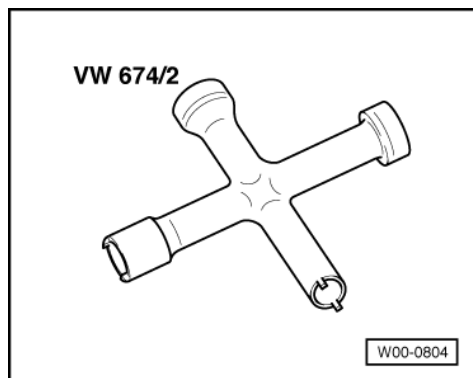
- Replace fuel distributor.

If the lever can only be moved upwards and downwards with difficulty:

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- Renew air flow meter.

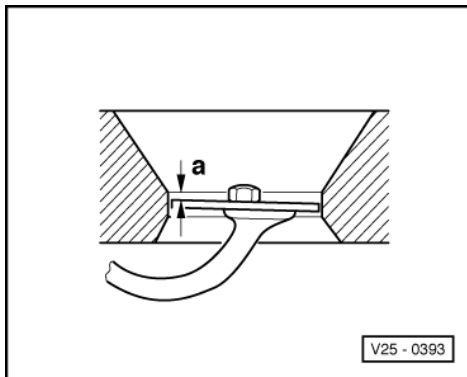
2.11 - Checking and adjusting resting position and idling run of baffle plate



Special tools and workshop equipment required

- ♦ Cross wrench VW 6742

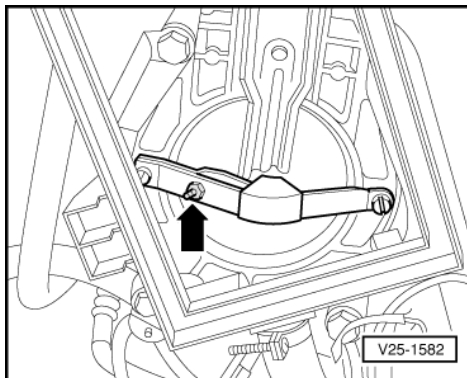
Check resting position



- -> The upper edge of the baffle plate must be below the tapered edge of the air funnel measure -a-.
- Dimension a = 1.9 +1.1 mm

Setting resting position

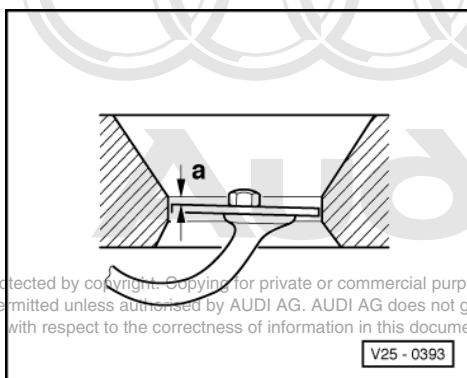
- Remove bottom part of air filter housing and remove filter insert.



- -> Adjust resting position of baffle plate at adjustment bolt -arrow- in such a way ...

Note:

Ensure that leaf spring is not damaged.



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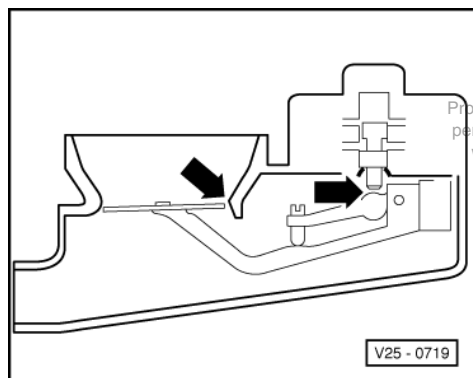
- -> ... that the upper edge of the baffle plate must be below the tapered edge of the air funnel measure -a-.
- Dimension a = 1.9 +1.1 mm



Checking idling of baffle plate

Test requirements:

- Resting position of baffle plate OK
- Check CO setting OK => Page 78 .



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-> The idling path is the clearance between control piston and adjusting lever -arrow left -, measured at the side of the baffle plate -arrow left- facing the quantity distributor.

- Operate starter approx. 10 seconds so that control pressure is built up.

or

- Press remote control switch approx. 10 seconds (connect remote control V.A.G 1348/3A with adapter line V.A.G 1348/3-2 => Page 82).
- Lift baffle plate slightly until a resistance can be felt.
 - Idling path min: 0.5 mm
 - Idling path max.: until tapered edge
 - Air funnel = 3 mm

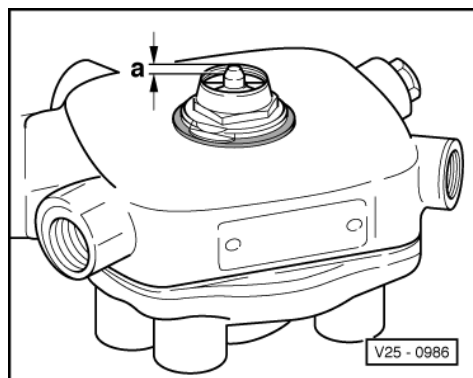
If the idling path is not OK:

- Adjust idling path at fuel distributor.

Adjust idling path at fuel distributor.

Prerequisite:

- CO setting OK; check => Page 78 .



- -> Adjust idling path of baffle plate with cross wrench VW 674/2 at the stop bolt for the control piston.

Alteration dimension -a-:

- Screw in = idling path greater
 - Screw out = idling path smaller
 - 1/4 rotation = approx. 1.3 mm at baffle plate
- Check idling speed, CO content and ignition point => Page 78

2.12 - Basic setting of adjustment lever

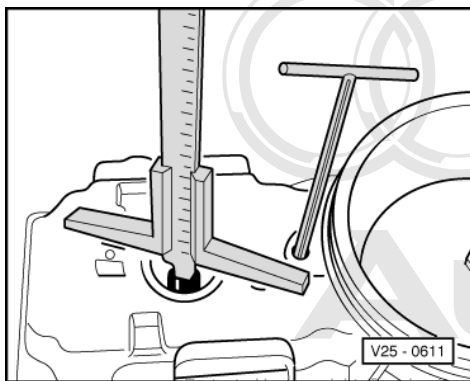
Note:

The basic setting of the adjustment lever is only required when replacing the fuel distributor or the air flow meter.

Special tools and workshop equipment required

- ◆ V.A.G 1318/3
- ◆ Depth gauge

Work sequence

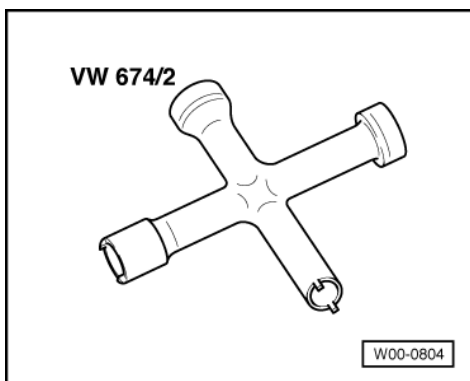


- -> Measure distance between contact surfaces for the fuel distributor at the air flow meter and the drum of the adjustment lever.
- Specification: 21.3 ± 0.1 mm
- If necessary, adjust distance at CO adjustment bolt.

Note:

This adjustment value loses its validity after setting the CO content (pressure regulator current) to specification.

2.13 - Removing and installing control piston



Special tools and workshop equipment required

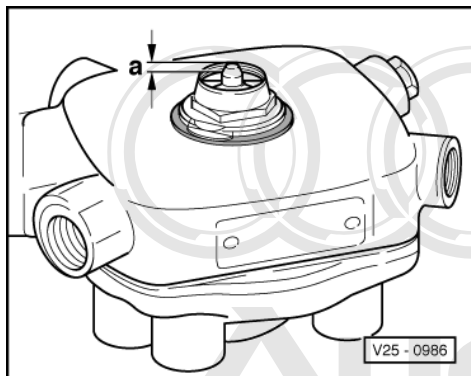
- ♦ Cross wrench VW 6742

Work sequence

Note:

The adjustment of the stop bolt is only required after replacing the seal for the control piston.

- Before twisting the stop bolt carry out the following steps:
 - Mark position of stop bolt with a needle.

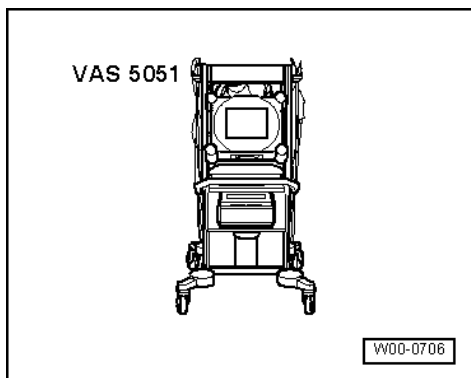


- -> Measure distance -a- between stop bolt and collar of the hexagon nut and note the value. Screw out stop bolt for the control piston with the tool VW 674/2.
- Clean control piston before inserting using fuel.
- Replace sealing rings for stop bolt.
 - Smaller $\varnothing$ of sealing ring face control piston
- Screw in stop bolt until noted value -a-
- Check resting position and idling path of baffle plate => Page 94 .

Notes:

- ♦ Mechanical cleaning of control piston is not permitted.
- ♦ If the control piston shows deep scoring or ease of movement is not achieved when cleaning with clean cleaning fuel the fuel distributor must be replaced.

2.14 - Checking cold acceleration enrichment and thrust switch-off



Special tools and workshop equipment required

- ♦ VAS 5051 with VAS 5051/1 and VAS 5051/2

or

- ♦ V.A.G 1551 with V.A.G 1551/1

Checking cold acceleration enrichment

Test requirements:

- Engine cold
- Air conditioner switched off.
- Check idling switch and full throttle switch OK => Page 55 .

Read measured value block 0								
1	2	3	4	5	6	7	8	
9	10							

-> Read measured value block, display group 000, engine at idling speed =>Page 19 .

Only continue with the check if the value of the display zone 1 is at least 96 (equals a coolant temperature lower than 60 oC).

- Check display in display zone 9.

- Specification: 5

Suddenly open throttle valves completely and release accelerator (throttle surge).

- The value must increase briefly to 70.

If the specification is not obtained:

- Check coolant temperature sender -G62=>Page 136 .

Checking thrust switch-off

Test requirements:

- Coolant temperature at least 60 oC.
- Air conditioner switched off.
- Check idling switch and full throttle switch OK => Page 55 .

Read measured value block 0								
1	2	3	4	5	6	7	8	
9	10							

-> Read measured value block, display group 000, engine at idling speed =>Page 19 .

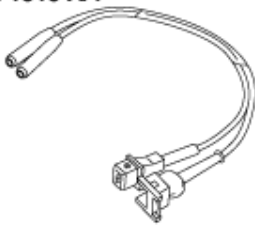
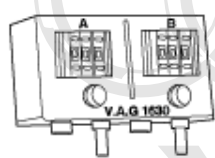
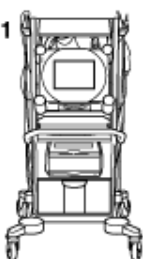
Only continue with the check if the value of the display zone 1 is at least 95 (equals a coolant temperature lower than 60 oC).

- Check display in display zone 9.
 - Specification: 5
- Increase engine speed to above 3000 rpm and release acceleration suddenly.
 - The value must increase briefly to 133.

If the specification is not obtained:

- Check coolant temperature sender -G62=>Page 136 .

2.15 - Checking late start and warm run enrichment

V.A.G 1315 A/1 	V.A.G 1526 A 
V.A.G 1594 A 	V.A.G 1630 
VAS 5051 	Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG. G25-0015

Special tools and workshop equipment required

- ♦ V.A.G 1315A/1
- ♦ V.A.G 1526 A
- ♦ V.A.G 1594 A
- ♦ V.A.G 1630
- ♦ VAS 5051 with VAS 5051/1 and VAS 5051/2

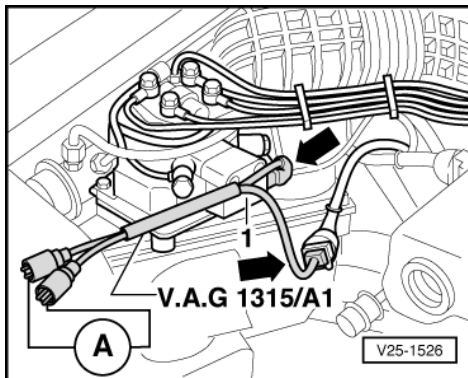
or

- ♦ V.A.G 1551 with V.A.G 1551/1

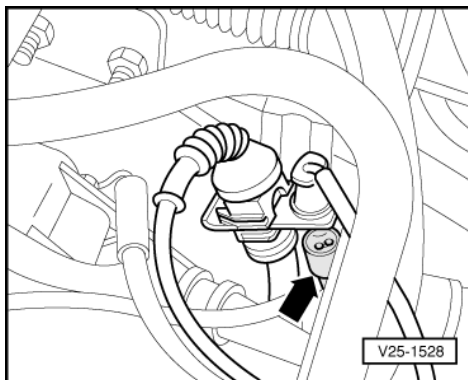
Test requirements:

- No faults stored in fault memory
- Coolant temperature at least 80 °C.

Test sequence

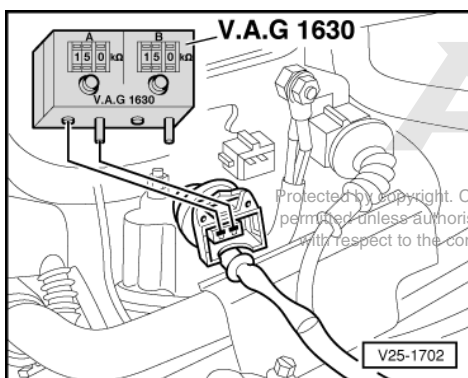


- Unplug connector of pressure regulator.
- -> Switch multimeter to measuring range 200 mA and connect with measuring line V.A.G 1315A/1 between pressure regulator -1- and connector of pressure regulator -arrows-.
- Switch the ignition on.
 - The pressure regulator current must be in positive range 90 ... 110 mA.



If the control current is in negative range:

- Exchange connections at V.A.G 1315 A/1.
- -> Unplug connector -arrow- for the signal wire of the lambda probe.
- Unplug connector on coolant temperature sender.



- -> Connect side A of digital potentiometer V.A.G 1630 with the disconnected connector of the coolant temperature sender.
- Adjust side A of the V.A.G 1630 to 2.5 kW
- Start engine and run at idling speed.
 - Specification for 6 ... 9 seconds. 12 ... 34 mA



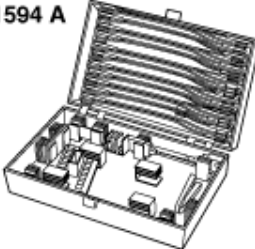
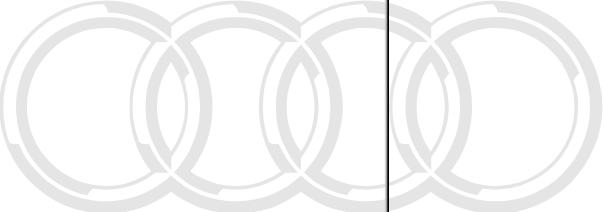
then decreasing by 14 ... 18 mA

If the specification is not obtained:

- Check pressure regulator =>Page 63 .

3 - Checking lambda control

3.1 - Checking lambda control

V.A.G 1526 A 	V.A.G 1594 A 
V.A.G 1598 A 	
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3.2 - Testing lambda probe -G39 and lambda control

Special tools and workshop equipment required

- ♦ V.A.G 1526 A
- ♦ V.A.G 1594 A
- ♦ V.A.G 1598 A

♦ V.A.G 1598/3

Test requirements:

- Coolant temperature at least 85 °C.
- Idling speed OK
- Check pressure regulator OK, testing =>Page 63 .
- No leak in exhaust system between catalytic converter and cylinder head.
- Lambda probe heater OK; testing => Page 104 .
- Check coolant temperature sensor -G62 OK =>Page 136 .

Test sequence

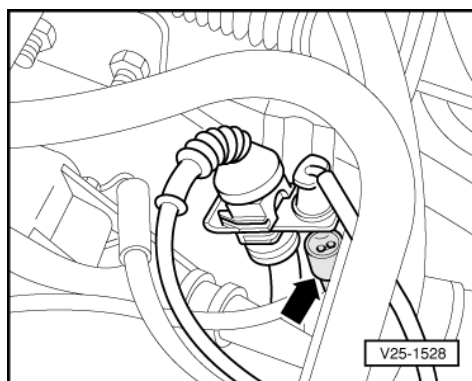
Read measured value block 0									
1	2	3	4	5	6	7	8		
9	10								

-> Read measured value block, display group 000, engine at idling speed =>Page 19 .

Only continue with the check if the value of the display zone 1 is at least 56 (equals a coolant temperature lower than 85 °C).

- Check display in display zone 6.
 - Specification: Display must fluctuate

If the display value does not fluctuate as indicated:



- -> Unplug connector -arrow- for the signal wire of the lambda probe.
- Connect multimeter between signal wire and engine earth to measure resistance.
 - Specification: ∞Ω (no continuity)

If the specification is not obtained:

- Fit a new Lambda probe.

If the specification is obtained:

- Connect up multimeter between connector of signal wire to engine control unit and engine earth to measure voltage.
- Switch the ignition on.
 - Specification: 400 ... 700 mV

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If the specification is not obtained:

- With the ignition switched off, use adapter V.A.G 1598/3 to connect test box V.A.G 1598 A to plug connection of engine control unit (control unit remains disconnected) => Page 33 .
- Check for open circuit and short to positive or earth in the following wiring connections:

Connector contact	Test box V.A.G 1598 A socket
Signal wire	7

- Rectify any open/short circuit as necessary.

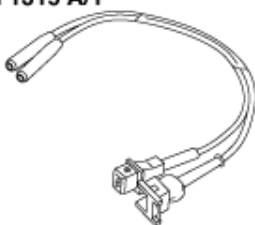
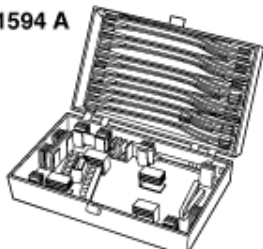
=> "Current Flow Diagrams, Electrical Fault-finding and Fitting Locations" binder

If the wiring is OK:

- Fit a new engine control unit => Page 34 .

3.3 - Testing lambda probe heater -Z19

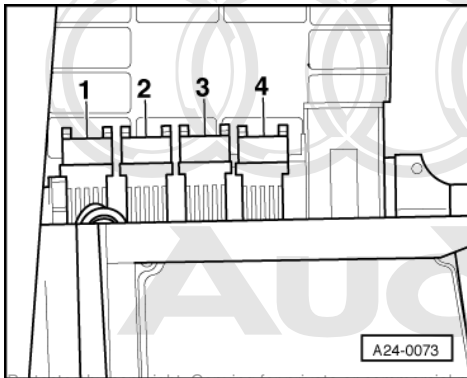
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V.A.G 1315 A/1 	V.A.G 1526 A 
V.A.G 1594 A 	
	G24-0014

Special tools and workshop equipment required

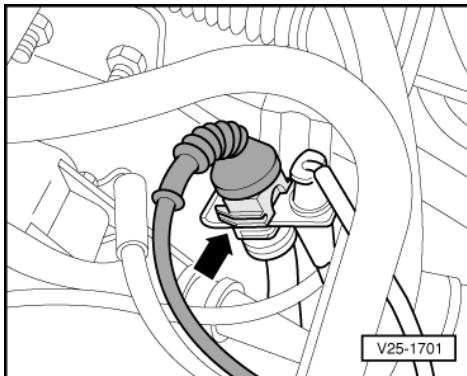
- ♦ V.A.G 1315 A/1
- ♦ V.A.G 1526 A
- ♦ V.A.G 1594 A

Test requirements:

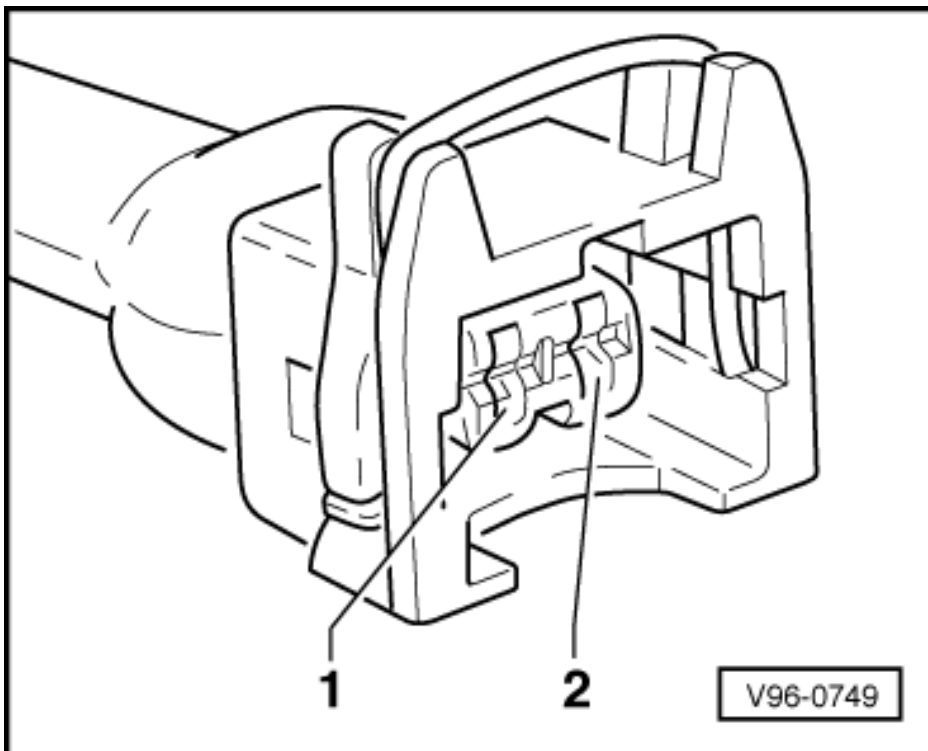


- > Fuse S73 in black holder in electronics box in passenger footwell OK
- Fuel pump relay OK; checking =>Page 38
- Engine cold

Test sequence



- -> Separate the plug connection -arrow- to the lambda probe heater.



- -> Connect multimeter between contacts 1 and 2 to measure voltage.
- Start engine and run at idling speed.
 - Specification: approx. battery voltage

If the specification is not obtained:

- Rectify open circuit.

=> "Current Flow Diagrams, Electrical Fault-finding and Fitting Locations" binder

If the specification is obtained:

- Connect auxiliary measurement lead V.A.G 1315 A/1 to the 2-way connector.
- Switch multimeter to 10 A measuring range (connect measurement lead to 10 A connection).
- Start engine and run at idling speed.
 - Specification: 0.5 ... 3.0 A

Note:

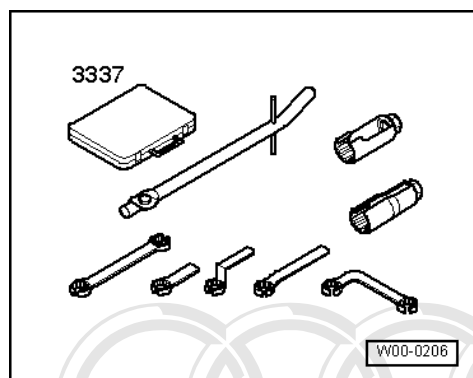
The current input decreases as the lambda probe becomes warmer.

If the specification is not obtained:

- Fit a new lambda probe.

3.4 - Removing and installing lambda probe

Special tools and workshop equipment required



- ♦ Set of ring spanners for lambda probe 3337
- ♦ Hot bolt paste G 052 112 A3

Work sequence

- Pull off the connectors for the lambda probe.
- Undo cable ties.
- Screw out lambda probe using special tool 3337.

When installing, note the following points:

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Notes:

- ♦ The screw thread on the lambda probe is coated with assembly paste. This paste must not be allowed to penetrate the openings on the probe.
- ♦ Tightening torque 55 Nm.

4 - Checking fuel tank breather

4.1 - Checking fuel tank breather



4.2 - Checking activated charcoal filter system solenoid valve 1 -N80

Special tools and workshop equipment required

- ◆ V.A.G 1526 A
- ◆ V.A.G 1527 B
- ◆ V.A.G 1594 A
- ◆ V.A.G 1598 A
- ◆ V.A.G 1598/3
- ◆ VAS 5051 with VAS 5051/1 and VAS 5051/2

or

- ◆ V.A.G 1551 with V.A.G 1551/1

Fitting location => Fitting locations overview, Page 28

Note:

The activated charcoal filter system solenoid valve 1 is also referred to in this context as fuel tank breather valve of ACF valve.

Testing for leaks

ACF solenoid valve -N80 remains closed when de-energised.

- Disconnect hoses from ACF valve but leave the electrical connector plugged in.
- Connect auxiliary hose to one connection of ACF valve.
- Start final control diagnosis =>Page 13 and actuate ACF solenoid -N80.

-> When adjacent display appears:

Final control diagnosis
Solenoid valve 1 for activated charcoal
filter -N80

The valve should click...

...and should open and close (check by blowing into the auxiliary hose).

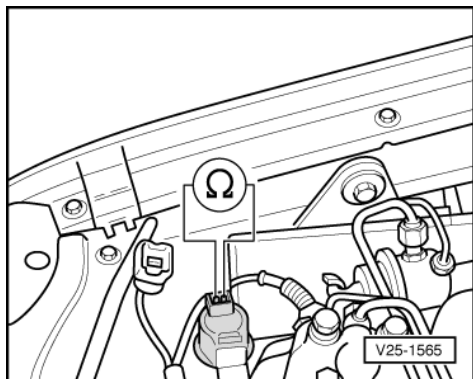
If valve does not open and close properly:

- Fit a new ACF valve.

If the solenoid valve does not react with final control diagnosis:

- Checking baffle plate to ACF valve.

Checking baffle plate



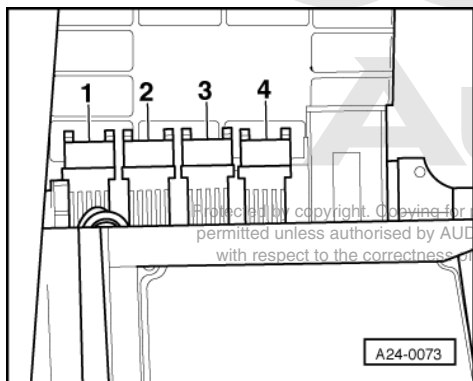
- Unplug connector on ACF valve.
- -> Connect multimeter to injector to measure resistance.
- Specification: 20 ... 28 ω

If the specification is not obtained:

- Fit a new ACF valve.

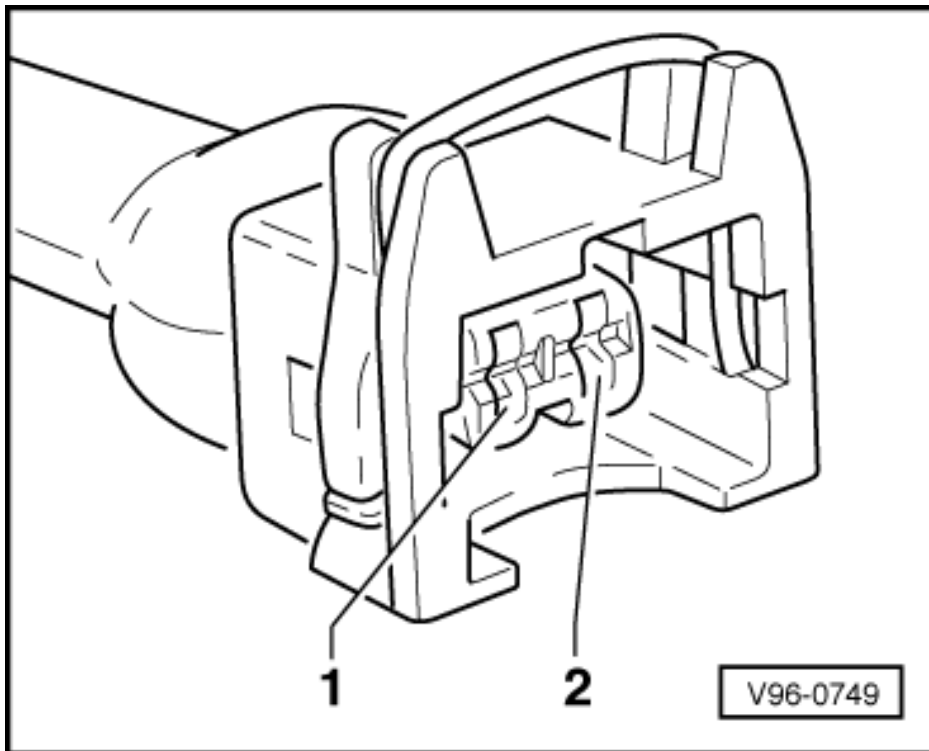
Checking power supply

Test requirements:



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- -> Fuse S75 in brown holder in electronics box in passenger footwell OK
- Unplug connector on ACF valve.



- -> Connect voltage tester V.A.G 1527 B as follows:

Connector contact	Measure to
1	Engine earth

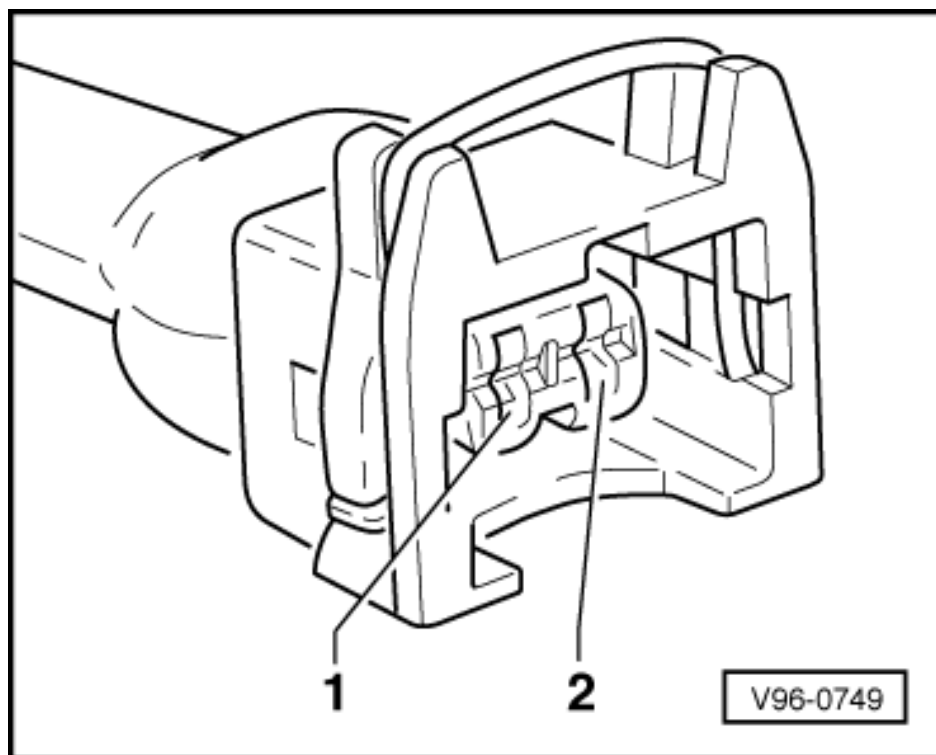
- Switch the ignition on.
 - The LED should light up.

If the LED does not light up:

- Eliminate open circuit or short circuit using the current flow diagram.

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Checking actuation



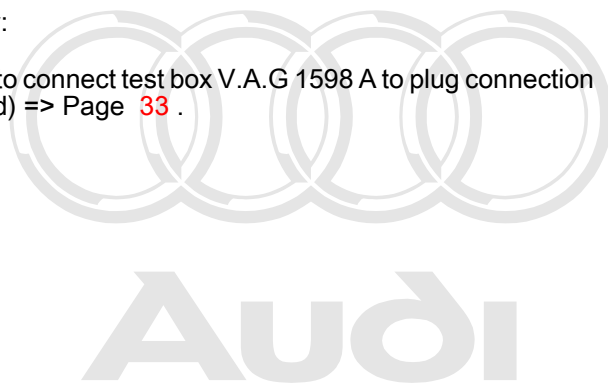
- Unplug connector on ACF valve.
- -> Connect up voltage tester V.A.G 1527 B between contacts 1 and 2.
- Start final control diagnosis and actuate ACF valve => Page 13 .
 - The LED should flash.

If LED does flash:

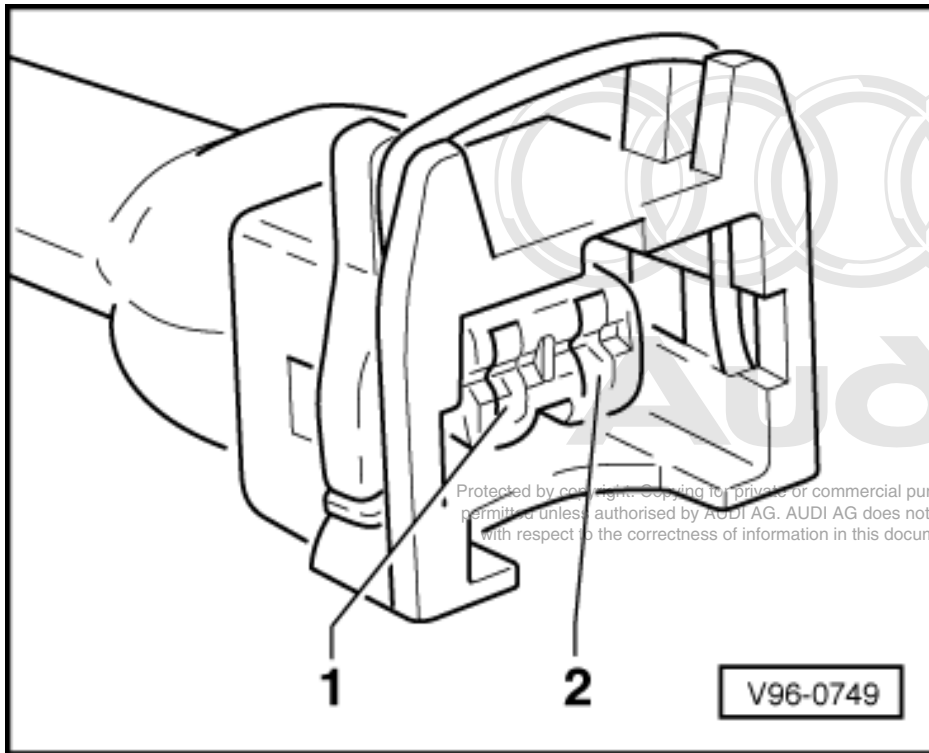
- Fit a new ACF valve.

If the LED lamp does not flash or if it lights up continuously:

- With the ignition switched off, use adapter V.A.G 1598/3 to connect test box V.A.G 1598 A to plug connection of engine control unit (control unit remains disconnected) => Page 33 .



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- -> Check for open circuit and short to positive or earth in the following wiring connection:

Connector contact	Test box V.A.G 1598 A socket
2	15

- Rectify any open/short circuit as necessary.

=> "Current Flow Diagrams, Electrical Fault-finding and Fitting Locations" binder

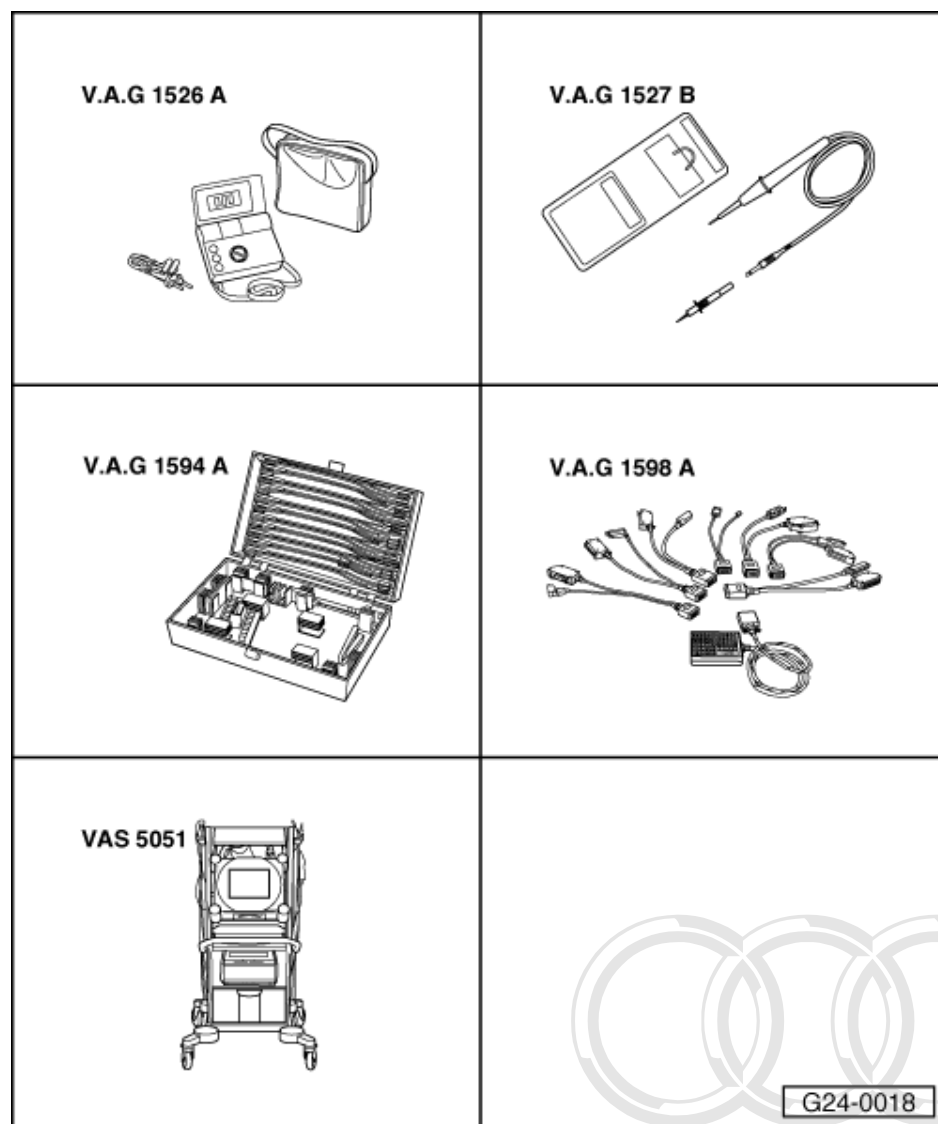
If the wiring is OK and no activation is carried out:

- Fit a new engine control unit => Page 34 .



5 - Checking auxiliary signals

5.1 - Checking auxiliary signals



Special tools and workshop equipment required

- ♦ V.A.G 1526 A
- ♦ V.A.G 1527 B
- ♦ V.A.G 1594 A
- ♦ V.A.G 1598 A
- ♦ V.A.G 1598/3
- ♦ VAS 5051 with VAS 5051/1 and VAS 5051/2

or

- ♦ V.A.G 1551 with V.A.G 1551/1

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5.2 - Checking the air conditioner compressor shutoff

Note:

The air conditioner compressor is shut off by the engine control unit on accelerating from standstill and from low vehicle speed for approx. 12 seconds. If the accelerator pedal is released sooner, the time is reduced to min. 3 seconds.

Test requirements:

- No faults stored in fault memory
- Vehicle at ambient temperature (warmer than + 15 °C)
- Air conditioner system OK

Test sequence

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- Start engine and run at idling speed.
- Switch on air conditioner system.
- Briefly operate full throttle, the engine must not reach its maximum revs.
 - Air conditioner compressor must stop for a few seconds (visual inspection)

If the conditioner compressor is not switched off:

Read measured value block 0								
1	2	3	4	5	6	7	8	
9	10							

- > Read measured value block, display group 000, engine at idling speed =>Page 19 .
- Check display in display zone 9.
 - Specification: 5
- Switch on air conditioner system.
 - The value must increase to 13.
- Briefly operate full throttle, the engine must not reach its maximum revs.
 - The value must drop briefly.

If the specification is not obtained:

- With the ignition switched off, use adapter V.A.G 1598/3 to connect test box V.A.G 1598 A to plug connection of engine control unit (control unit remains disconnected) => Page 33 .
- Check for open circuit and short to positive or earth in the following wiring connections:

Test box V.A.G 1598 A socket	Magnetic clutch control unit -J153 contact	Operating and dis- play unit -E87 contact
33	=> "Current Flow Diagrams, Electrical Fault-finding and Fitting Locations" binder	

- Rectify any open/short circuit as necessary.
- If there are no faults in the wiring, check the operation of air conditioner.

=> Heating, Air Conditioner; Repair Group 87; Air conditioner; Servicing components of the manually controlled air conditioner
Air conditioner Servicing components of the manually controlled air conditioner

=> Heating, Air Conditioner; Repair Group 87; Air conditioner; Components and control of the fully automatic air conditioner
Air conditioner Components and control of the fully automatic air conditioner



If both air conditioner and wiring OK:

- Fit a new engine control unit => Page 34 .

5.3 - Checking engine speed signal

Notes:

- ♦ The rev. counter in the dash panel insert is actuated by the control unit.
- ♦ Checking engine speed signal:

=> "Current Flow Diagrams, Electrical Fault-finding and Fitting Locations" binder

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5.4 - Checking consumption signal for vehicle computer

Notes:

- ♦ The consumption signal is calculated by the engine control unit from the injection period and relayed to the on-board computer.
- ♦ Checking fuel consumption signal

=> "Current Flow Diagrams, Electrical Fault-finding and Fitting Locations" binder

5.5 - Checking vehicle speed signal

Test requirements:

- Speedometer function and display OK

Test sequence

- Raise vehicle using a vehicle hoist until the front left wheel is off the ground.
- With the ignition switched off, use adapter V.A.G 1598/3 to connect test box V.A.G 1598 A to the plug connection of the engine control unit and also to the engine control unit => Page 33 .
- Connect voltage tester V.A.G 1527 B as follows:

Test box V.A.G 1598 A socket	Measure to
2	Battery positive

- Switch the ignition on.
 - The LED must light up dimly.
- Rotate the front left wheel.
 - The LED should flash.

If LED does not flash:

- Check for open circuit and short to positive or earth in the following wiring connections:

Test box V.A.G 1598 A socket	Dash panel insert contact
2	=> "Current Flow Diagrams, Electrical Fault-finding and Fitting Locations" binder

If no wiring fault is detected:

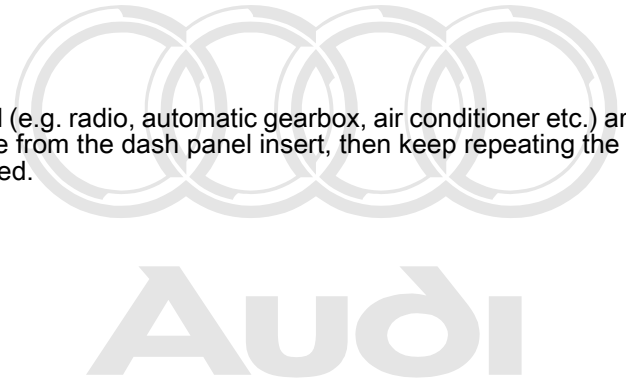
- Unplug adapter V.A.G 1598/3 from engine control unit.

If LED now flashes:

- Fit a new engine control unit => Page 34 .

If LED still does not flash:

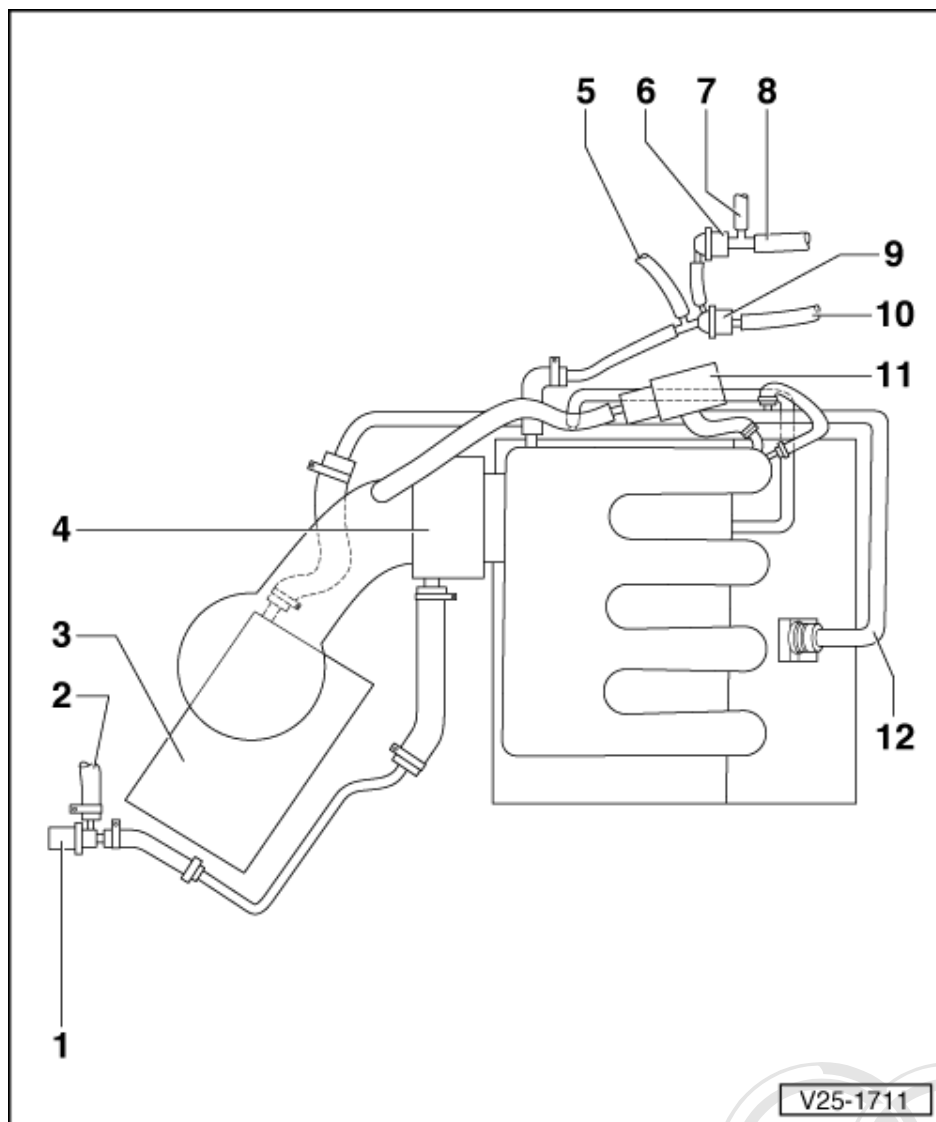
- Establish which "recipients" of the road speed signal (e.g. radio, automatic gearbox, air conditioner etc.) are using the speed signal, disconnect them one by one from the dash panel insert, then keep repeating the test until the cause of the problem has been identified.



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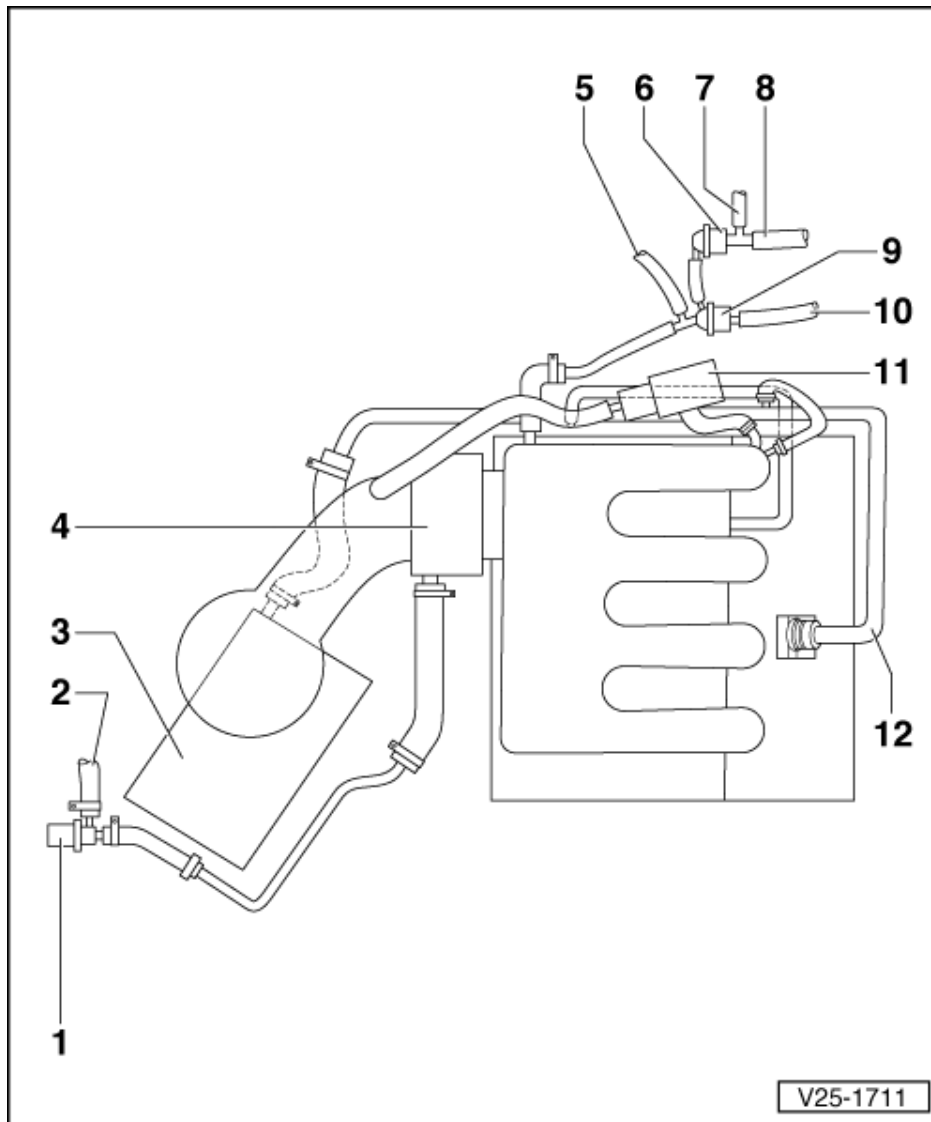
6 - Vacuum diagram

6.1 - Vacuum diagram



- 1 Solenoid valve 1 for activated charcoal filter -N80
- 2 From activated charcoal filter
- 3 Air cleaner housing
- 4 Throttle valve connection
- 5 Vacuum connection
 - ♦ For differential lock in vehicles with 4WD:
 - ♦ Closed with blind plug in vehicles with FWD
- 6 Non-return valve
 - ♦ For vehicles with air conditioner only

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- 7 To two-way valve**
 - ◆ For fresh air/recirculated air flap
 - ◆ For vehicles with air conditioner only
- 8 To vacuum reservoir**
 - ◆ For vehicles with air conditioner only
- 9 Non return valve**
- 10 To brake servo**
- 11 Idling stabilisation valve -N71**
- 12 Crankcase breather**

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28 - Ignition system

1 - Checking ignition system

1.1 - Checking ignition system

1.2 - Safety precautions

To prevent injuries to persons and/or damage to the fuel injection and ignition system, the following must be noted:

- Do not touch or disconnect ignition wiring when the engine is running or at starter speed.
- Always switch off the ignition before connecting or disconnecting ignition system wiring. This also applies to HT cables and measuring instrument leads.
- If the engine is to be turned at starter speed, without starting, e.g. when checking compressions, unplug the connector from the power output stage at the ignition coil and remove fuse 17. After completing the work, interrogate the fault memory.
- For assisted starts with a rapid charging unit the maximum permissible voltage is 16.5 V and the maximum charging time is 1 minute.
- Always switch off the ignition before washing the engine.
- Always switch off the ignition before connecting or disconnecting the battery, otherwise the engine control unit may be damaged.
- Vehicles that have an actual or suspected fault in the ignition system, must not be towed unless the connector at the power output stage is unplugged.
- Do not connect a capacitor to terminal 1 (-).
- Do not replace the distributor rotor 1 kw (Identification: R1) with a different type even for radio interference suppression.
- Always use adapter set V.A.G 1594 A for connecting up measuring instruments (e.g. voltage tester V.A.G 1527 B, hand-held multimeter V.A.G 1526 A etc.)

1.3 - Test data, spark plugs

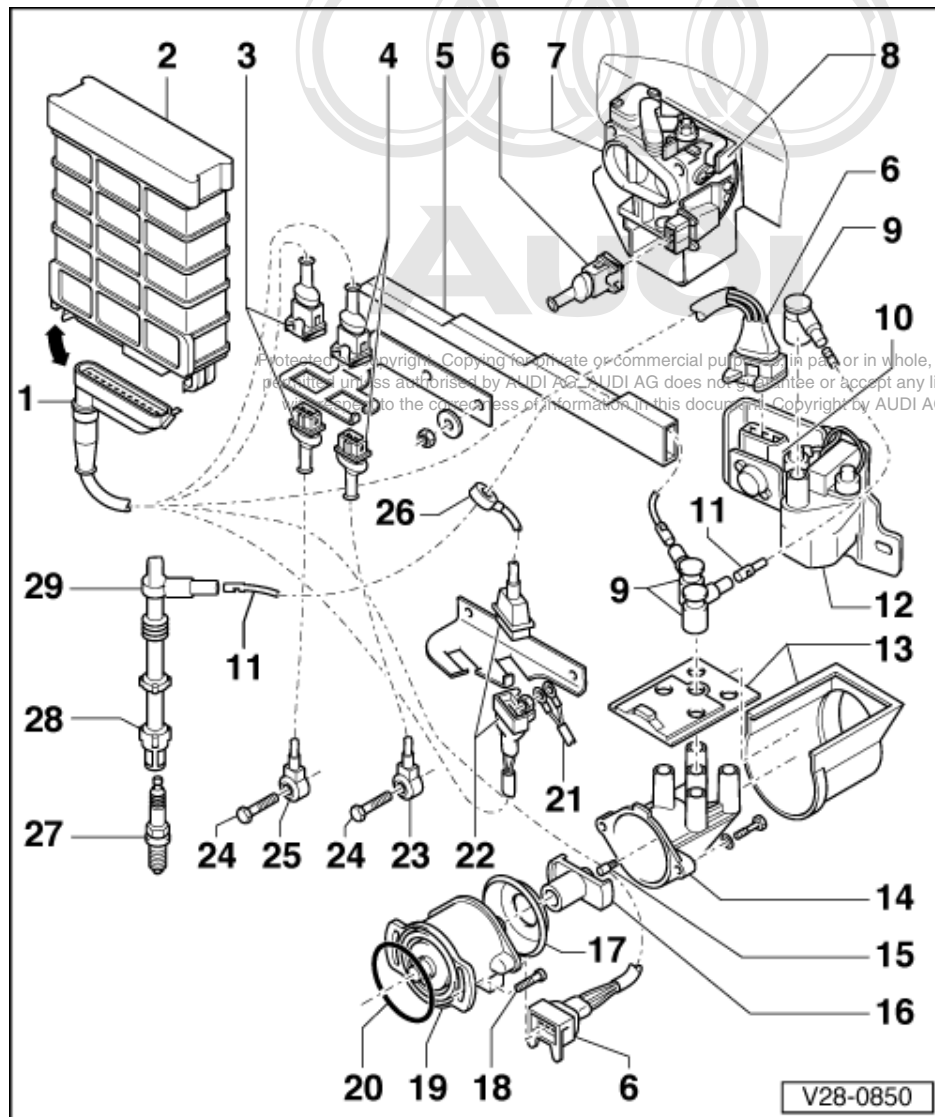
Engine code letters			ACE (2.0 l / 103 kW engine)
Engine control unit	Part no.		=>Parts list
Ignition timing 1)	Test value	o Before TDC.	4 ... 8
	Setting	o Before TDC.	6 ± 1
	Engine speed	rpm	800 ... 1000
Firing order			1-3-4-2
Spark plugs 2)	Tightening torque	Nm	30

1) Engine oil temperature min. 80 °C

2) Current values:

=> "Exhaust emission test" binder

1.4 - Servicing ignition system



1 Connector

- ◆ For KE Motronic control unit
- ◆ After 30 seconds pull off or plug in connector after switching off of ignition

2 KE Motronic control unit -J204

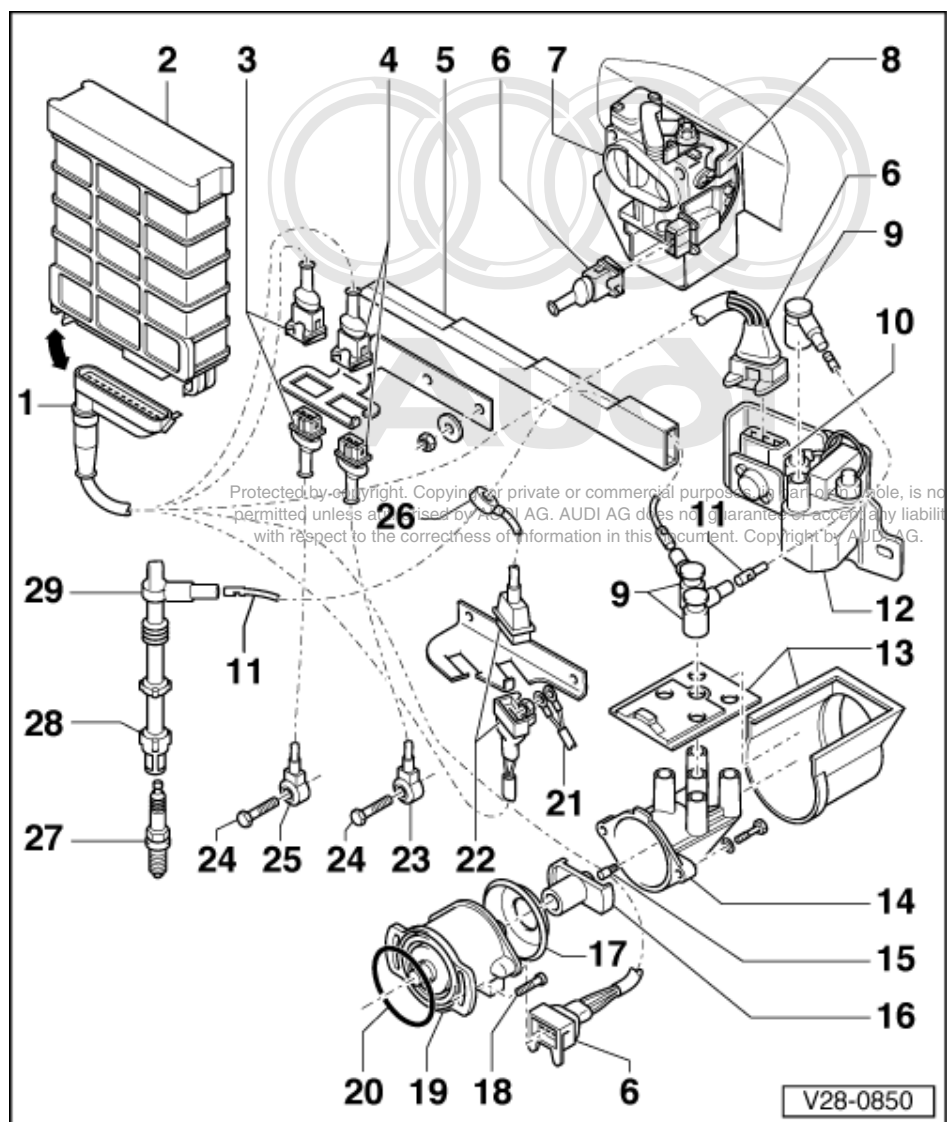
- ◆ In electrical box in passenger footwell
- ◆ Removing and installing
=> Page 34

3 Connector

- ◆ Green
- ◆ For knock sensor 1 -G61

4 Connector

- ◆ Blue
- ◆ For knock sensor 2 -G66

**5 Cable guide**

- ♦ For ignition wires
- ♦ Clamped to intake manifold

6 Connector**7 Throttle valve connection****8 Idling switch -F60 and full throttle switch -F81**

- ♦ Checking =>Page **54**

9 Suppressor

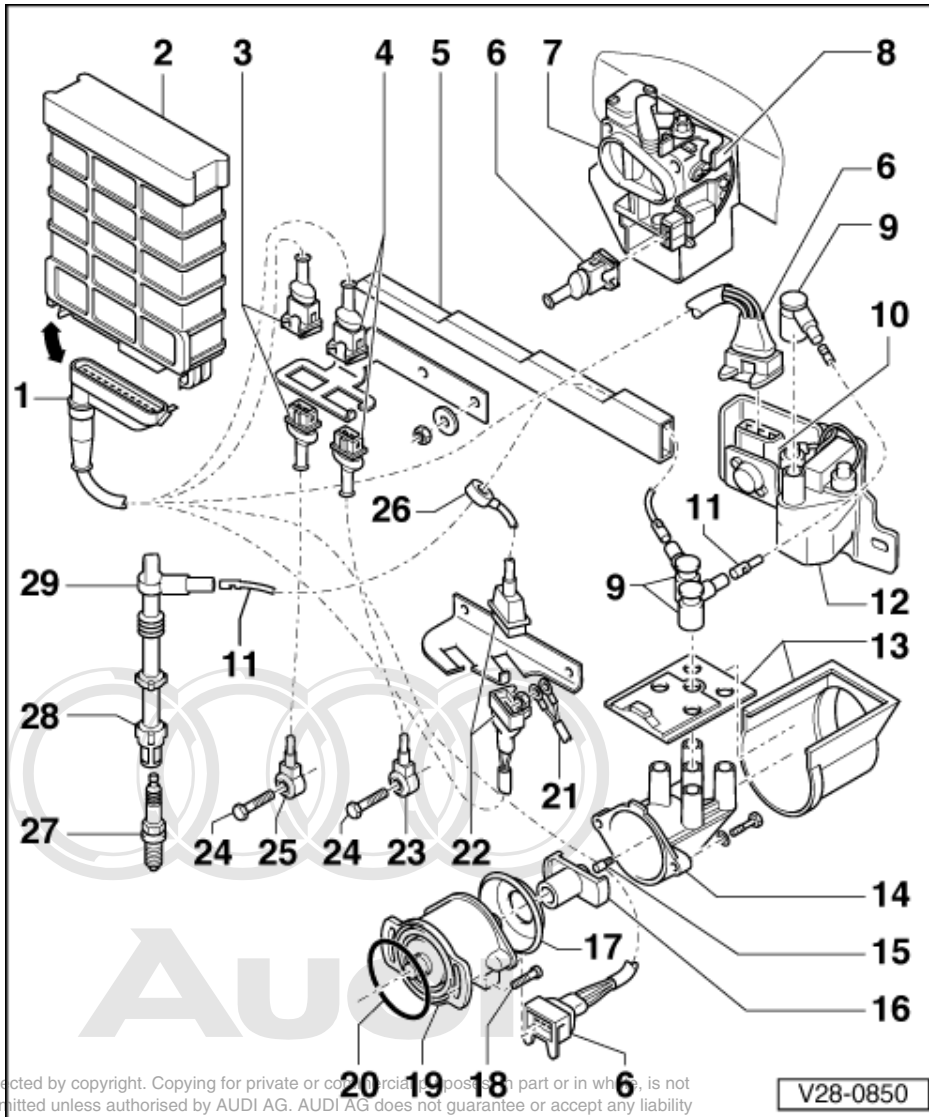
- ♦ 0.6...1.4 kw

10 Output stage for ignition coil

- ♦ Checking => Page **130**
- ♦ Cannot be renewed separately

11 Triggering cable

- ♦ Test for continuity



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12 Ignition coil

- ♦ Checking => Page 128

13 Screening

- ♦ For radio interference suppression

14 Distributor cap

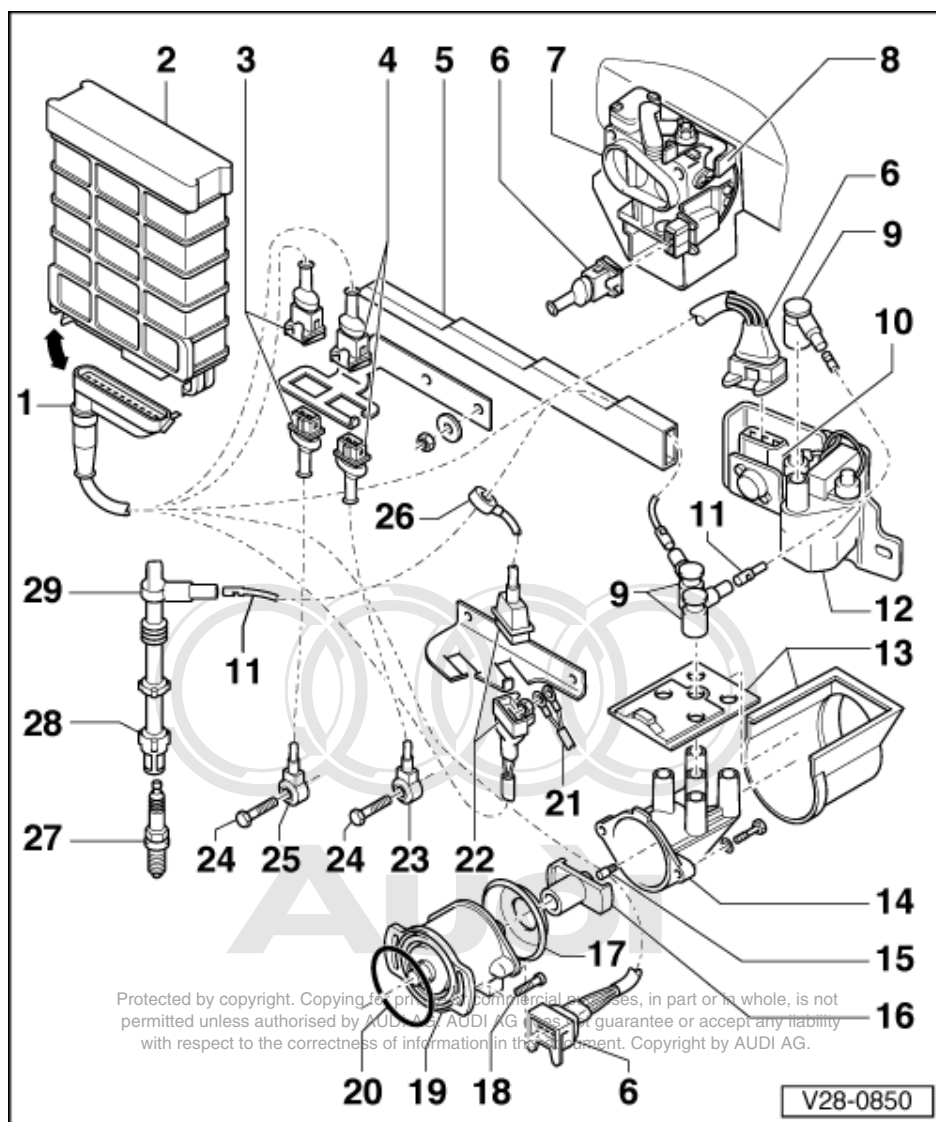
- ♦ Test for cracks and signs of tracking
- ♦ Test contact wear
- ♦ Clean before fitting

15 Carbon brush with spring

- ♦ Inspect for wear, damage and ease of movement

16 Rotor arm

- ♦ Identification: R1
- ♦ 0.6...1.4 kW
- ♦ Cannot be removed without destroying it
- ♦ Replacing => Page 125.



17 Dust cap

18 10 Nm.

19 Distributor

- ♦ Testing and setting ignition => Page 126
- ♦ Checking Hall sender => Page 144
- ♦ Dismantling and assembling => Page 124

20 O-ring

- ♦ Replace, if damaged

21 Earth connections

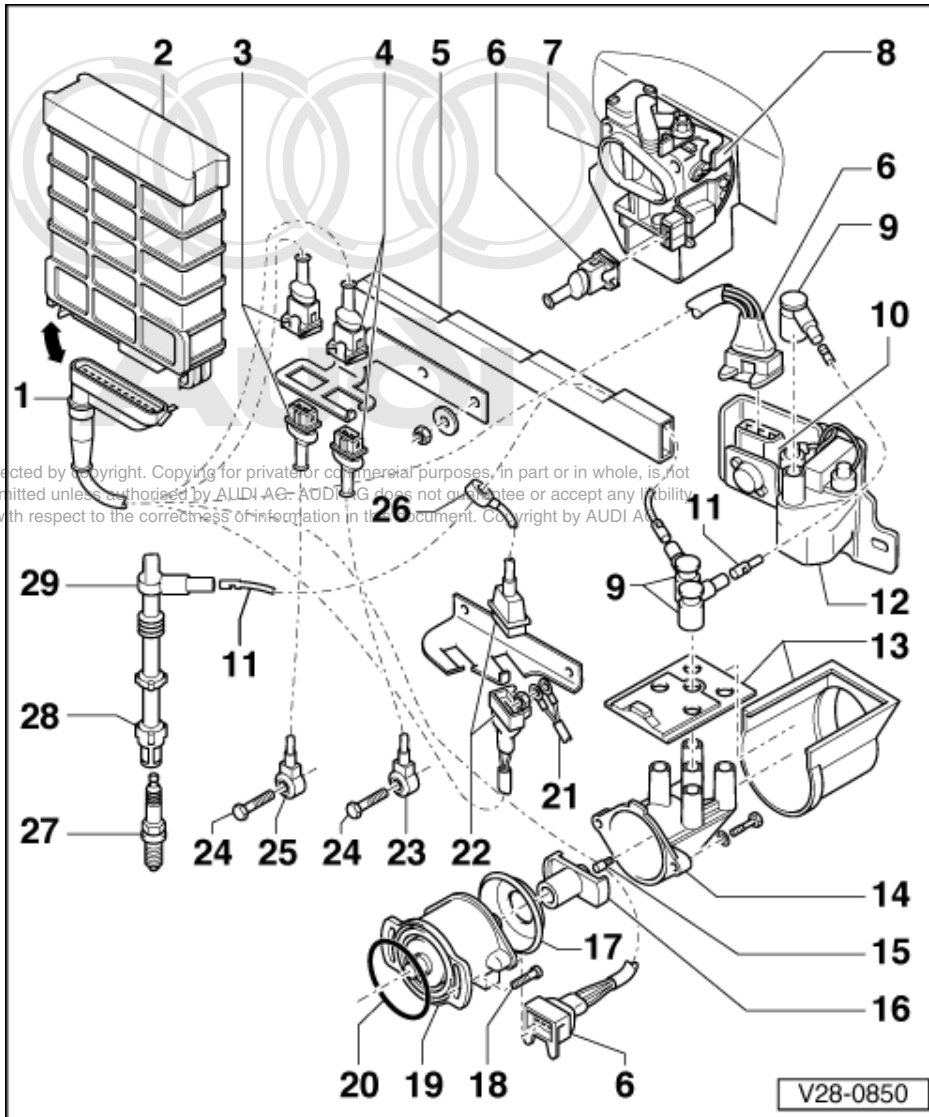
- ♦ For engine control unit

22 Connector

- ♦ For ignition timing sender -G4

23 Knock sensor 2 -G66

- ♦ Rear



24 20 Nm

- ◆ Tightening torque affects function of knock sensor

25 Knock sensor 1 -G61

- ◆ Front

26 Ignition timing sender -G4

- ◆ On ignition line cylinder 4
- ◆ Installation position: Clamping lugs face ignition distributor

27 Spark plug - 30 Nm

- ◆ Type and electrode gap

=> "Exhaust emission test" binder

- ◆ Use 3122 B to remove and install

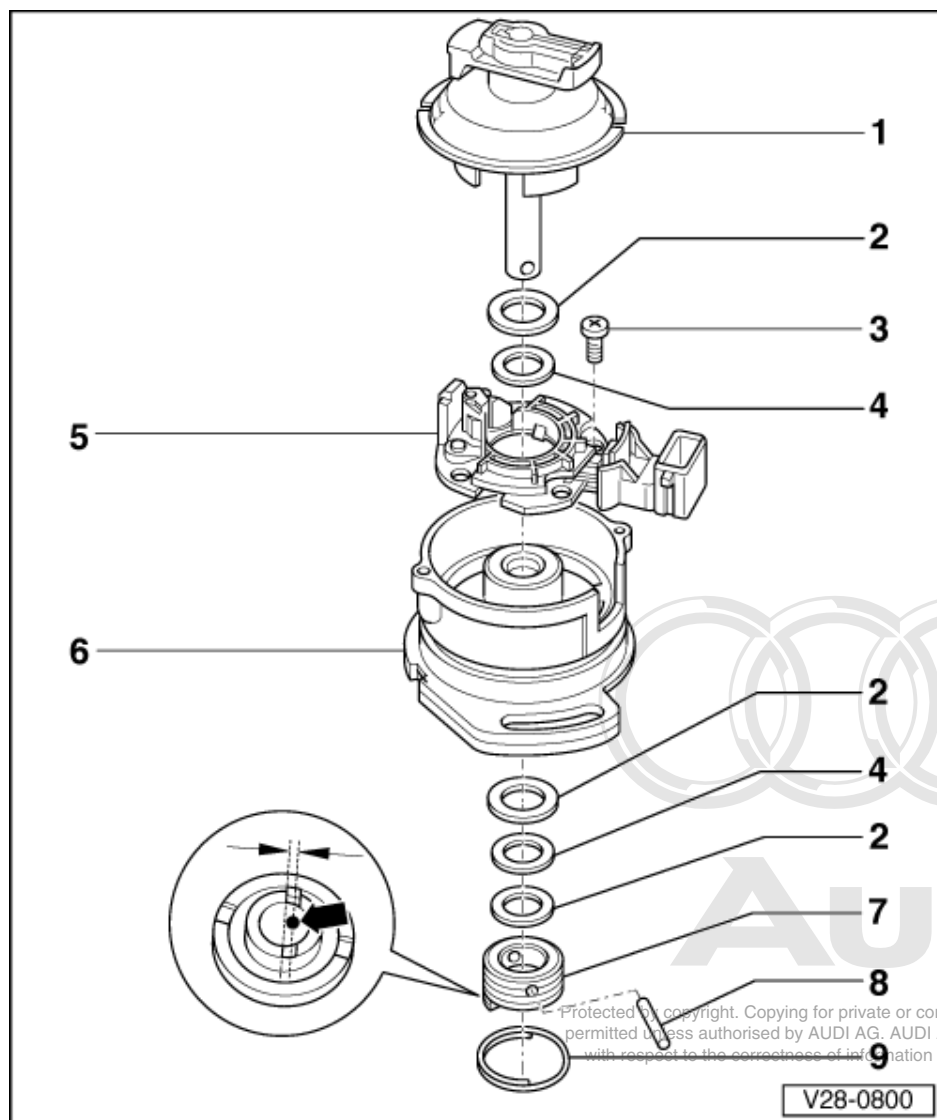
28 Spark plug connectors

- ◆ 4...6 kW

29 Pull out ring

- ◆ For spark plug connector

1.5 - Dismantling and assembling ignition distributor



1 Ignition distributor shaft

- ♦ With Hall sender rotor
- ♦ After removal of spring pin - 8 - pull out

2 Shim

3 Bolt

4 Plastic washer

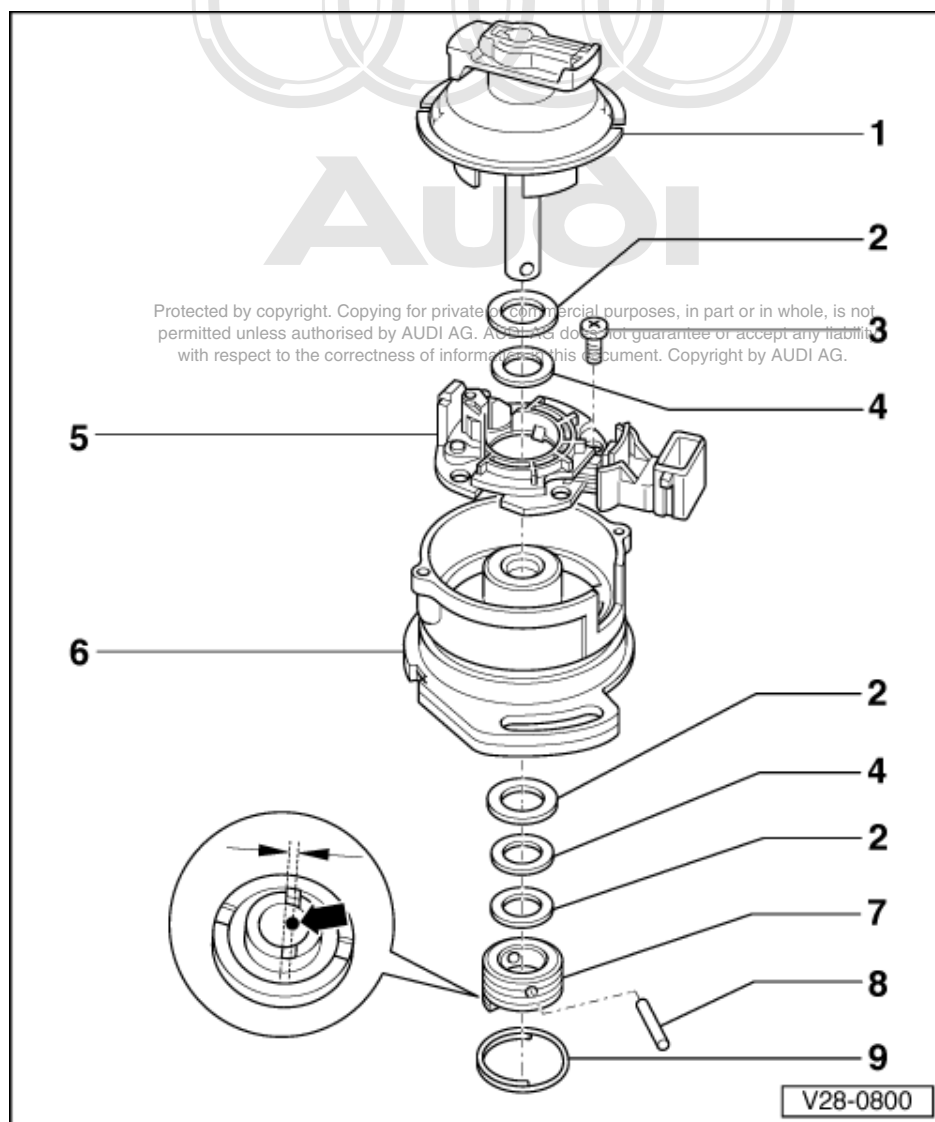
5 Hall sender -G40

- ♦ Checking => Page 144

6 Ignition distributor housing

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V28-0800

**7 Coupling**

- ♦ Before removal of carrier lug mark position to shaft - **1** - -arrow-

8 Spring pin**9 Securing spring****1.6 - Replacing ignition distributor runner**

The ignition distributor runner is bonded to the distributor shaft. When replacing, the old distributor runner must be destroyed.

Removing

- Squash the distributor runner with a pair of pliers.

Important:

The distributor runner must not be smashed. This could mean that distributor shaft or their bearing could be damaged.

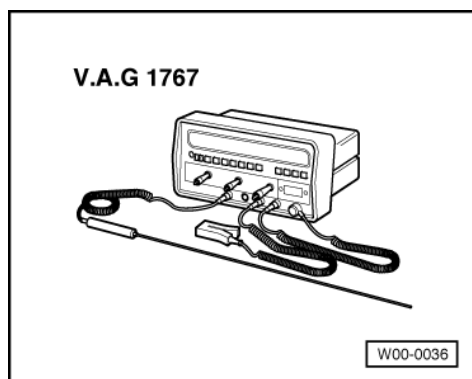
- Carefully remove residual parts from distributor shaft.



Installing

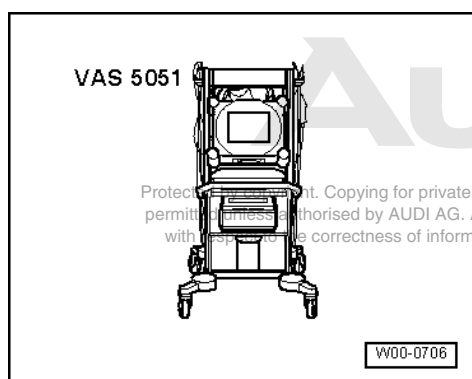
- Bond new distributor runner to distributor shaft with locking fluid AMV 101 A1.

1.7 - Testing and adjusting ignition timing



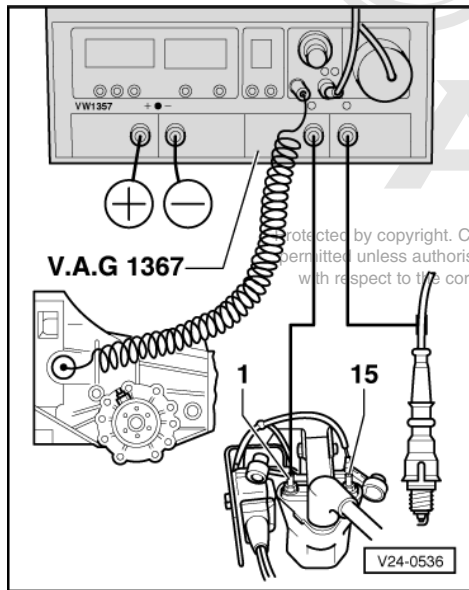
Special tools and workshop equipment required

- ♦ V.A.G 1767
- or
- ♦ V.A.G 1367 with V.A.G 1367/8



- ♦ VAS 5051 with VAS 5051/1 and VAS 5051/2
- or
- ♦ V.A.G 1551 with V.A.G 1551/1

Note:



Only set ignition timing if the timing point differs when testing idling speed => Page 78.

Test sequence

- -> Connect ignition tester V.A.G 1767 (or V.A.G 1367) with ignition switched off:

=> Operating instructions

Notes:

- ♦ The TDC sender of ignition tester V.A.G 1367 must be inserted into the gearbox housing as far as the stop.
- ♦ The ignition timing is indicated directly on V.A.G 1767 (or V.A.G 1367). It is not necessary to use a strobe light aimed at the timing notches.

- Interrogate fault memory and erase it => Page 5.

System in basic setting 0									
1	2	3	4	5	6	7	8		
9	10								

- > Initiate basic setting, display group 000=>Page 16.
- Read off the ignition point on the ignition tester V.A.G 1767 (or V.A.G 1367).
- Test value 4 ... 80 before TDC.

Note:

If the ignition timing displayed is not within the tolerance range, you first of all have to set the ignition timing before testing idling speed so long as the system is still in "Basic setting 0".

- Set the ignition timing point by turning the ignition distributor.
- Setting 6 ± 10 in front of OT
- Leave engine idling.
- Press ➡key.
- The ignition timing point may vary within the range 2 ... 100 before TDC

Note:

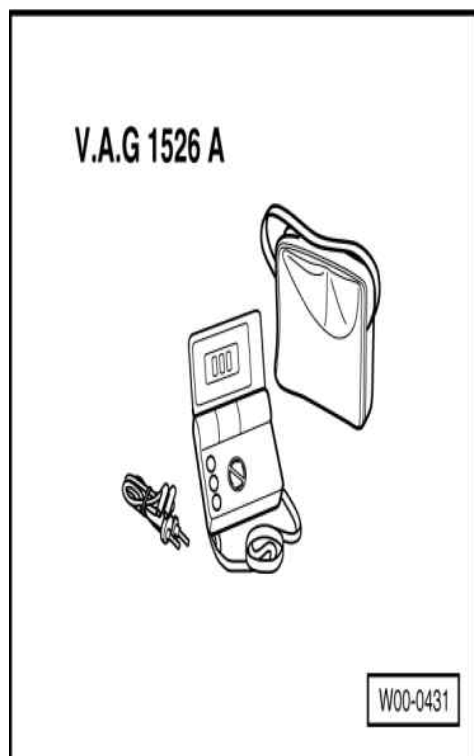
If the ignition point fluctuates heavily check tight seat of Hall sender.

- Test idling speed after setting the ignition timing => Page 78.

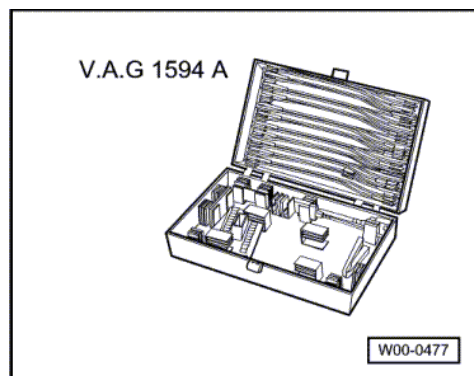


1.8 - Testing ignition coils

Special tools and workshop equipment required



♦ V.A.G 1526 A



♦ V.A.G 1594 A

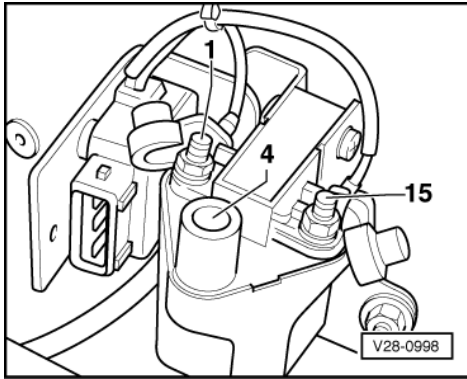
Notes:

- ♦ Inspect the wires between the power output stage and ignition coil for corrosion and damage.
- ♦ Testing output stage for ignition coil => Page **130**.

Test sequence

- Unplug the connector from the power output stage and the main ignition wire from the ignition coil.

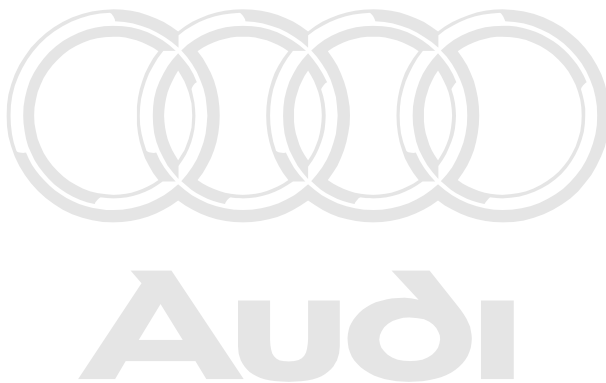
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- -> Use hand-held multimeter V.A.G 1526 to test primary resistance between terminals 1 and 15.
 - Specification: 0.5 ... 1.5 Ω
- Test secondary resistance with hand-held multimeter between terminals 4 and 15.
 - Specification: 5 ... 9 $k\Omega$

If a specification is not met:

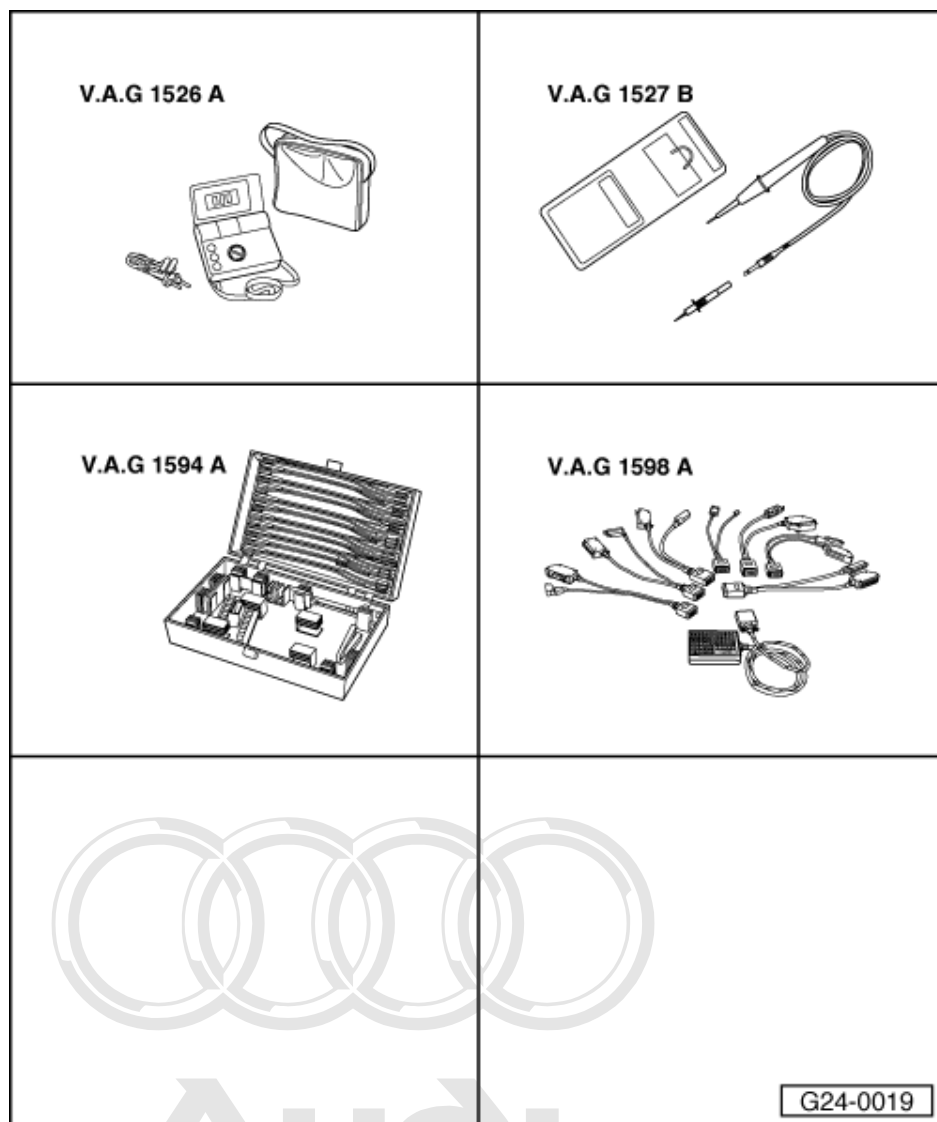
- Replace common component ignition coil with output stage.



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1.9 - Checking output stage for ignition coil

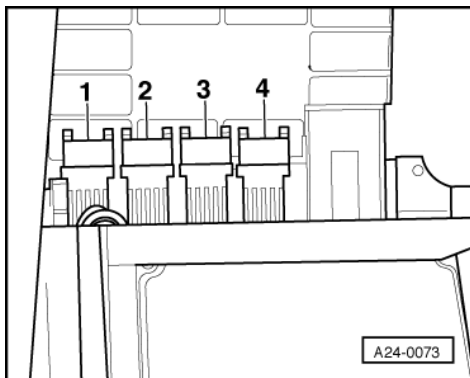


Special tools and workshop equipment required

- ◆ V.A.G 1526 A
- ◆ V.A.G 1527 B
- ◆ V.A.G 1594 A
- ◆ V.A.G 1598 A
- ◆ V.A.G 1598/3

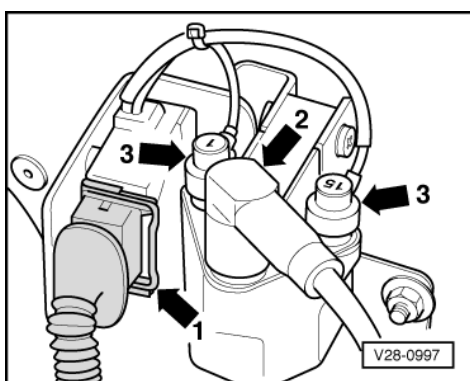
Test requirements:

- Ignition coil OK; checking =>Page 128 .

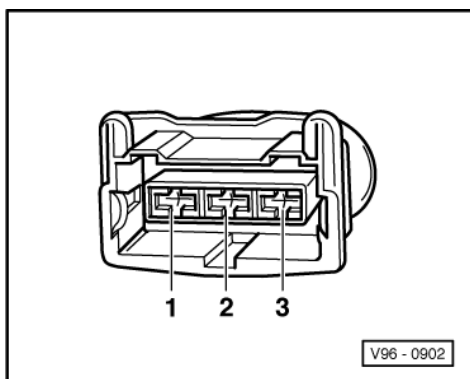


- -> Fuse in red holder in electronics box in passenger footwell OK

Checking power supply



- -> Unplug connector -arrow 1- from output stage.



- -> Connect multimeter between contacts 1 and 3 to measure voltage.
- Switch the ignition on.
 - Specification: approx. battery voltage

If the specification is not obtained:

- Connect multimeter as follows to measure voltage:

Connector contact	Measure to
1	Engine earth
3	Battery positive

- Switch the ignition on.

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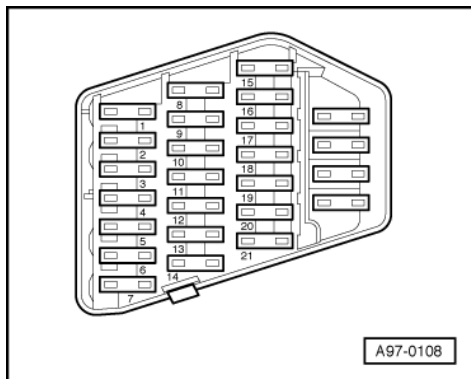


- Specification: approx. battery voltage

If the specification is not obtained:

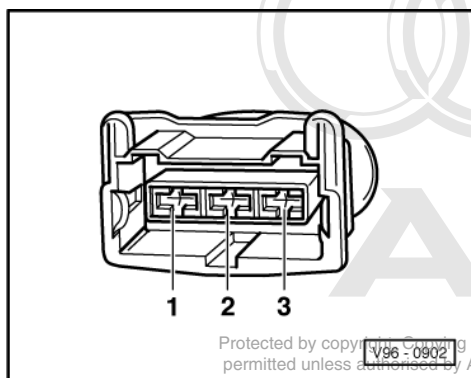
- Eliminate open circuit or short circuit using the current flow diagram.

Checking actuation



Test requirements:

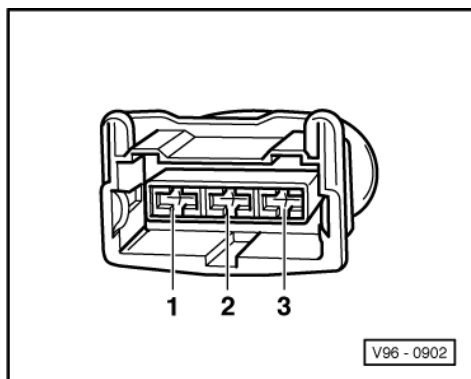
- Hall sender OK, checking => Page 144 .
- -> Pull out fuse S17.



- -> Connect up voltage tester V.A.G 1527 B between contacts 2 and 3.
- Operate starter.
 - The LED should flash.

If LED does not flash:

- With the ignition switched off, use adapter V.A.G 1598/3 to connect test box V.A.G 1598 A to plug connection of engine control unit (control unit remains disconnected) => Page 33 .



- -> Check for open circuit and short to positive or earth in the following wiring connection:

Connector contact	Test box V.A.G 1598 A socket
2	11

- Additionally check wires for short circuit between them.
- Rectify any open/short circuit as necessary.

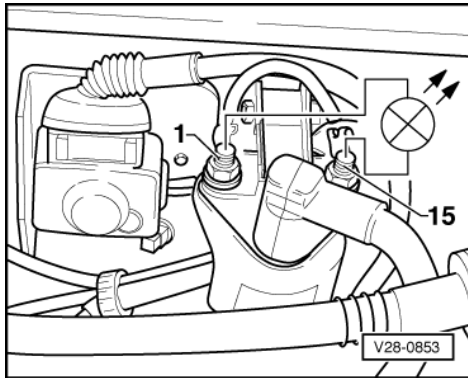
=> "Current Flow Diagrams, Electrical Fault-finding and Fitting Locations" binder

If the wiring is OK:

- Fit a new engine control unit => Page 34 .

If voltage supply and control is OK:

- Switch ignition off.
- Plug in the connector and the ignition wire at the ignition coil again.



- -> Connect voltage tester V.A.G 1527 B to contacts 1 and 15 on the ignition coil using auxiliary cables and clamps.

Important:
During the following test do not touch the terminals of the ignition coil or test wires.

- Operate starter.
- The LEDs should flash.

If LEDs do not flash:

- Replace common component ignition coil with output stage.

Audi

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1.10 - Checking ignition timing -G4

V.A.G 1526 A 	V.A.G 1594 A 
V.A.G 1598 A 	Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.
	G24-0015

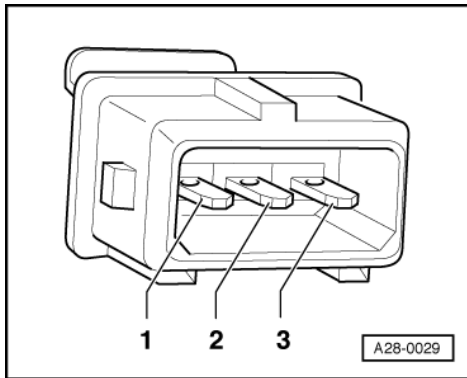
Special tools and workshop equipment required

- ♦ V.A.G 1526 A
- ♦ V.A.G 1594 A
- ♦ V.A.G 1598 A
- ♦ V.A.G 1598/3

Fitting location => Fitting locations overview, Page **28**

Checking baffle plate

- Pull black 3-way connector off ignition timing sender



- -> Connect multimeter between contacts 1 and 2 on sender to measure resistance.
- Specification: max. 2 ω

If the specification is not obtained:

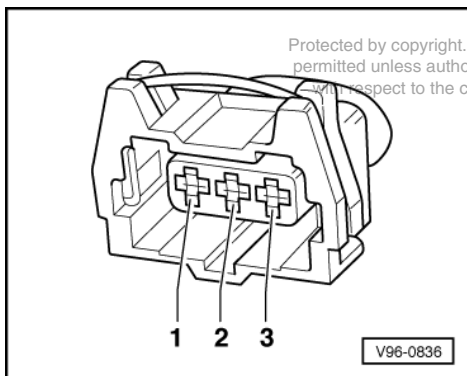
- Renew ignition timing sender.
- Connect multimeter between contacts 1 and 3 and 2 and 3 on sender to measure resistance.
- Specification: $\infty \omega$
(There must be no connection between any of the wires).

If the specified values are not obtained:

- Renew ignition timing sender.

Checking wiring

- With the ignition switched off, use adapter V.A.G 1598/3 to connect test box V.A.G 1598 A to plug connection of engine control unit (control unit remains disconnected) => Page 33 .



- -> Check for open circuit and short to positive or earth in the following wiring connections:

Connector contact	Measure to
1	Test box V.A.G 1598 A socket 29
2	
3 (screening)	Engine earth

- Rectify any open/short circuit as necessary.

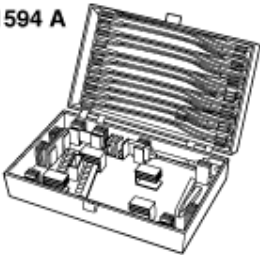
=> "Current Flow Diagrams, Electrical Fault-finding and Fitting Locations" binder

If no fault is found:

- Fit a new engine control unit => Page 34 .



1.11 - Checking coolant temperature sender -G62

V.A.G 1526 A 	V.A.G 1594 A 
V.A.G 1598 A 	
	G24-0015

Special tools and workshop equipment required

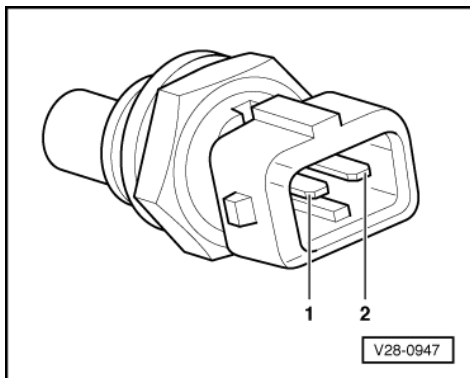
- ♦ V.A.G 1526 A
- ♦ V.A.G 1594 A
- ♦ V.A.G 1598 A
- ♦ V.A.G 1598/3

Fitting location => Fitting locations overview, Page **28**

Note:

Checking function=> Reading measured value block display group 000, Page **19**.

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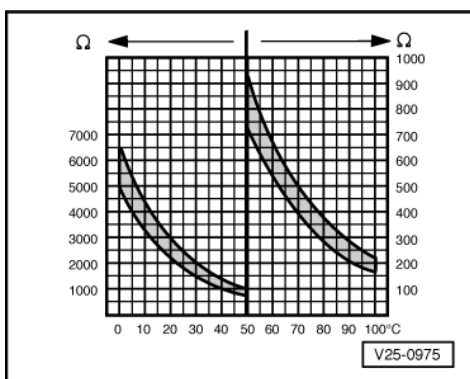


Checking baffle plate

- Unplug connector on coolant temperature sender.
- -> Connect multimeter between contacts 1 and 2 on sender to measure resistance.

Note:

The test can also be carried out at the intermediate plug on the left of the intake manifold.



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-> Specifications:

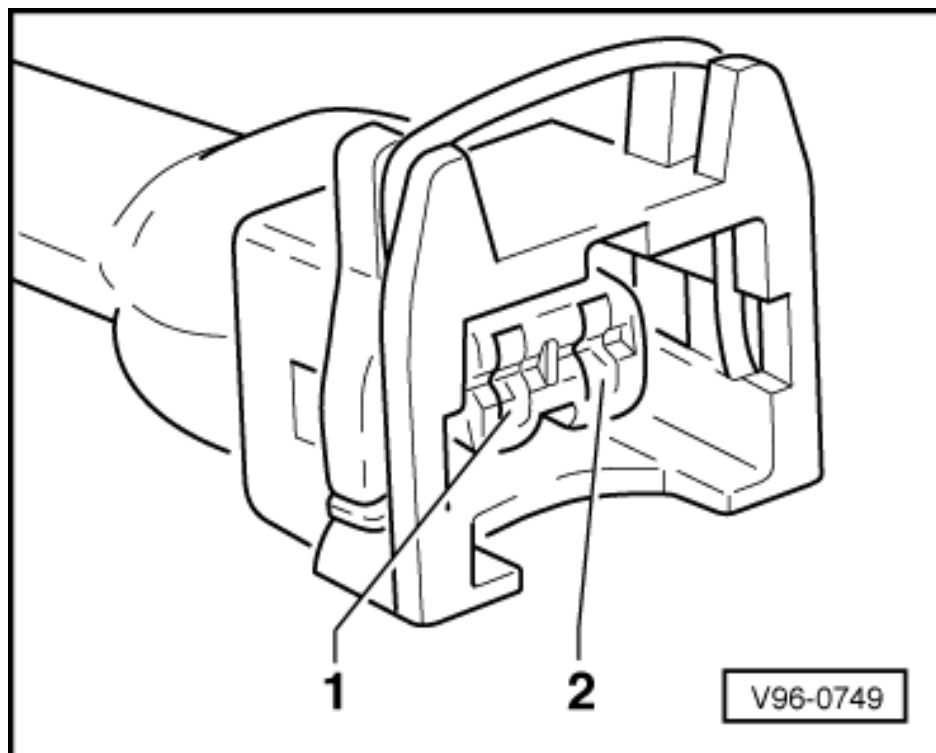
Coolant temperature	Resistance
approx. 20°C	approx. 2.5 kΩ
approx. 80°C	approx. 330 Ω

If the specified values are not obtained:

- Replace coolant temperature sender.

Checking wiring

- With the ignition switched off, use adapter V.A.G 1598/3 to connect test box V.A.G 1598 A to plug connection of engine control unit (control unit remains disconnected) => Page 33 .



- -> Check for open circuit and short to positive or earth in the following wiring connections:

Connector contact	Measure to
1	Engine earth
2	Test box V.A.G 1598 A socket 3

- Rectify any open/short circuit as necessary.

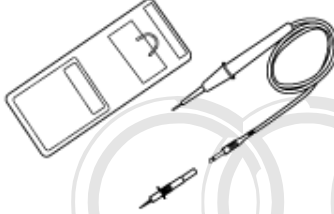
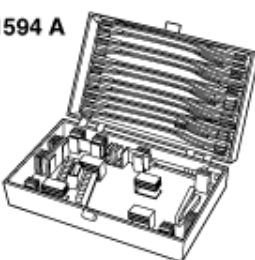
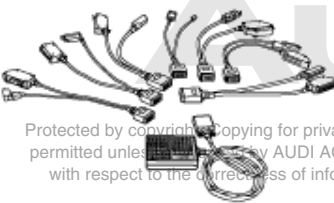
=> "Current Flow Diagrams, Electrical Fault-finding and Fitting Locations" binder

If no fault is found:

- Fit a new engine control unit => Page 34 .

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1.12 - Checking control unit power supply

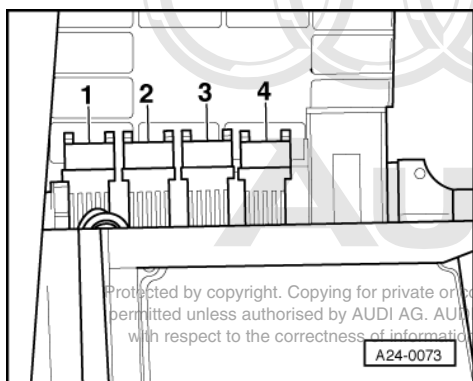
V.A.G 1526 A 	V.A.G 1527 B 
V.A.G 1594 A 	V.A.G 1598 A  Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorized by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.
	G24-0019

Special tools and workshop equipment required

- ♦ V.A.G 1526 A
- ♦ V.A.G 1527 B
- ♦ V.A.G 1594 A
- ♦ V.A.G 1598 A
- ♦ V.A.G 1598/3



Test requirements:



- -> Fuse in red holder in electronics box in passenger footwell OK
- Battery voltage at least 11 V
- Alternator OK

Test sequence

Notes:

- ♦ The positive voltage supply to the engine control unit is provided via contact 14 (terminal 15) and contact 19 (terminal 30).
- ♦ The earth connection to the engine control unit is provided via contact 18, 34 and 35.
- With the ignition switched off, use adapter V.A.G 1598/3 to connect test box V.A.G 1598 A to plug connection of engine control unit (control unit remains disconnected) => Page 33 .

Checking power supply

- Connect multimeter as follows to measure voltage:

Test box V.A.G 1598 A socket	Measure to
19	Engine earth

- Specification: approx. battery voltage
- Connect multimeter as follows to measure voltage:

Test box V.A.G 1598 A Socket	Measure to
14	Engine earth

- Switch the ignition on.
- Specification: approx. battery voltage

If a specification is not met:

- Check the wiring connections.

=> "Current Flow Diagrams, Electrical Fault-finding and Fitting Locations" binder

Checking earth supply

- Connect multimeter as follows to measure voltage:

Test box V.A.G 1598 A socket	Measure to
18	Battery positive

Test box V.A.G 1598 A socket	Measure to
34	Battery positive
35	Battery positive

- Specification: approx. battery voltage

If a specification is not met:

- Check the wiring connections.

=> "Current Flow Diagrams, Electrical Fault-finding and Fitting Locations" binder

Earth supply between engine control unit contact 35 and intake manifold

Note:

Carry out this test only when fault 00537 "Lambda control: control limit exceeded" or 00587 "Mixture control unit adjustment limit, adaptation limit exceeded" is shown when interrogating the fault memory.

- With the ignition switched off, use adapter V.A.G 1598/3 to connect test box V.A.G 1598 A to the plug connection of the engine control unit and also to the engine control unit => Page 33.
- Start engine and run at idling speed.

Note:

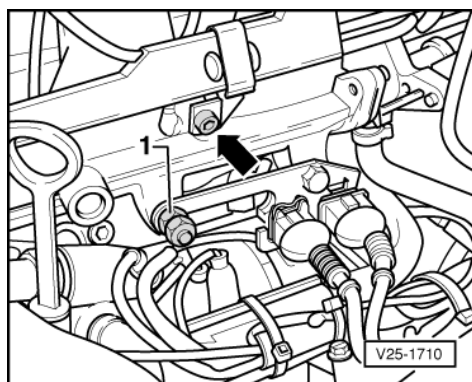
The connections must not be mixed up when the following test is carried out. Switch to measuring range 200 mV with a multimeter with several voltage measuring ranges. Otherwise the engine control unit may be destroyed.

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- Connect multimeter as follows to measure voltage:

Test box V.A.G 1598 A socket	Measure to
35	Engine earth at intake manifold

Note:



-> Connect second test wire directly to intake manifold -arrow- and not at earth connection point -1-.

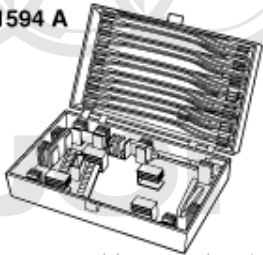
- Specification: max. 60 mV

If specification is exceeded:

- Check earth connection point -1- for corrosion and damaged connections and, if necessary, clean or repair.



1.13 - Checking knock sensors

V.A.G 1526 A 	V.A.G 1594 A 
V.A.G 1598 A 	
	G24-0015

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Special tools and workshop equipment required

- ♦ V.A.G 1526 A
- ♦ V.A.G 1594 A
- ♦ V.A.G 1598 A
- ♦ V.A.G 1598/3

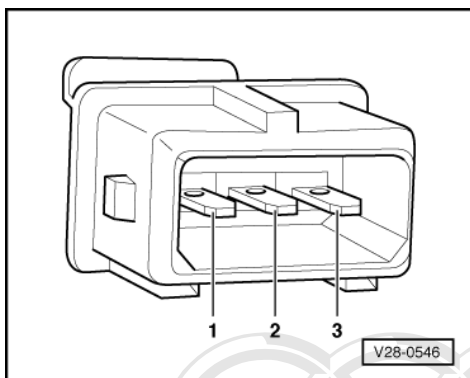
Fitting location => Fitting locations overview, Page **28**

Notes:

- ♦ It is not possible to carry out an electrical test of the knock sensors themselves (interrogating fault memory =>Page **5**).
- ♦ To ensure that the knock sensors function properly it is important to keep exactly to the specified tightening torque of 20 Nm.
- ♦ Inspect the plug connections for traces of corrosion.
- ♦ Use only gold plated contacts when repairing the contacts in the plug connectors for the knock sensors.

Testing knock sensor wiring

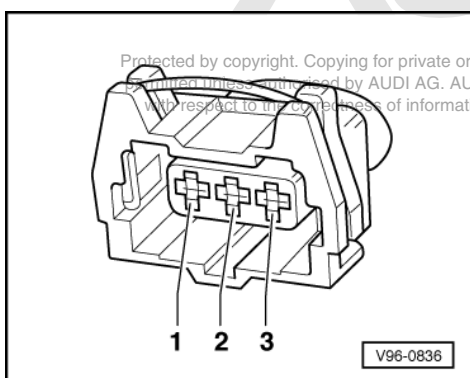
- Unplug the connector for the relevant knock sensor in the engine compartment.



- -> Connect multimeter between contacts of connection to measure resistance.
- Specification: $\infty \Omega$
(There must be no connection between any of the wires).
- If connection exists at the wire, replace the knock sensor.

Checking wiring from knock sensors to engine control unit

- With the ignition switched off, use adapter V.A.G 1598/3 to connect test box V.A.G 1598 A to plug connection of engine control unit (control unit remains disconnected) => Page 33.
- Check for open circuit and short to earth/positive or earth in the following wiring connections:



- -> Knock sensor 1 or 2

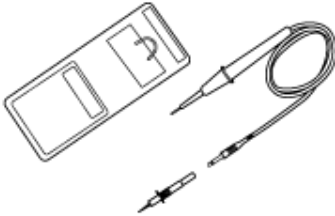
Connector contact	Measure to
1 (signal)	Test box V.A.G 1598 A
2 (earth)	Socket 6 or 24
3 (screening)	socket 8
	Engine earth

- Rectify any open/short circuit as necessary.

=> "Current Flow Diagrams, Electrical Fault-finding and Fitting Locations" binder



1.14 - Checking Hall sender -G40

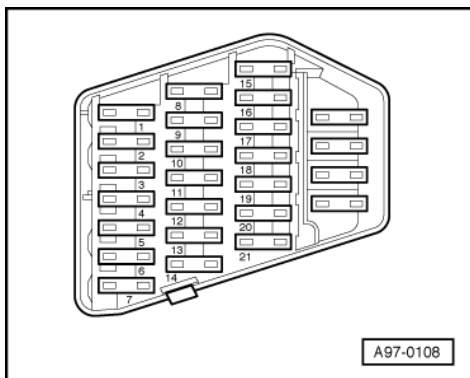
V.A.G 1526 A 	V.A.G 1527 B 
V.A.G 1594 A 	V.A.G 1598 A 
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Special tools and workshop equipment required

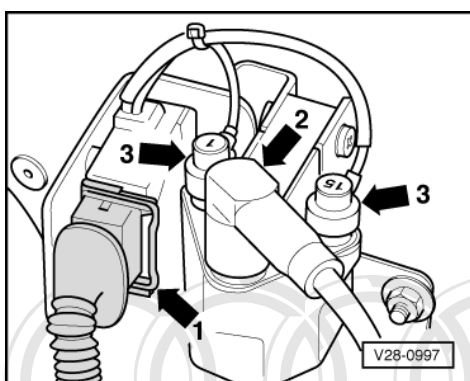
- ♦ V.A.G 1526 A
- ♦ V.A.G 1527 B
- ♦ V.A.G 1594 A
- ♦ V.A.G 1598 A
- ♦ V.A.G 1598/3

Fitting location => Fitting locations overview, Page **28**

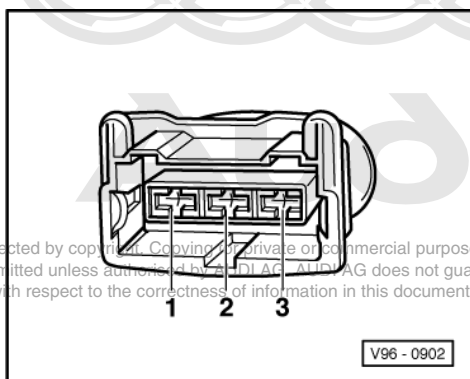
Test sequence



- -> Pull out fuse S17.



- -> Unplug connector -arrow 1- from output stage.



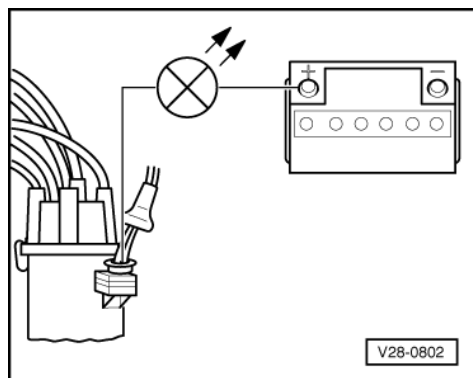
- -> Connect voltage tester V.A.G 1527 B as follows:

Connector contact	Measure to
2 (signal)	Engine earth

- Operate starter briefly.
- The LED should flash.

If LED does not flash:

- Push back rubber grommet from connector of Hall sender. However, connector remains plugged in.



- -> Connect voltage tester V.A.G 1527 B as follows:

Connector contact	Measure to
2 (signal)	Battery positive

Note:

Pin assignment is marked on back of connector.

- Operate starter briefly.
- The LED should flash.

Note:

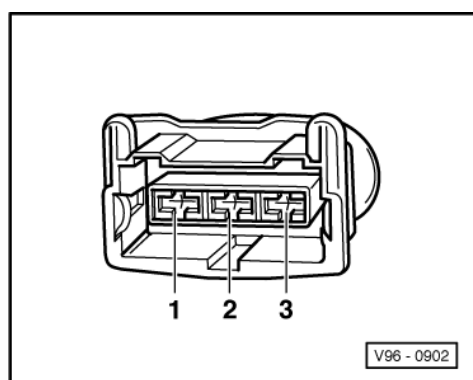
Voltage testers with a low current draw continue to glow faintly between impulses from the engine control unit (rather than going out completely) and become much brighter when receiving an impulse.

If LED does not flash:

- Check the power supply to Hall sender => Page 147

If LED now flashes:

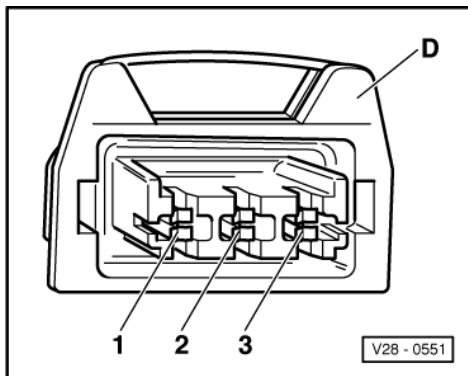
- With the ignition switched off, use adapter V.A.G 1598/3 to connect test box V.A.G 1598 A to plug connection of engine control unit (control unit remains disconnected) => Page 33 .



- -> Check for open circuit and short to positive or earth in the following wiring connection:

Connector of output stage contact	Test box V.A.G 1598 A socket
2	11

- Unplug the connector of the Hall sender at the ignition distributor.



- -> Check for open circuit and short to positive or earth in the following wiring connection:

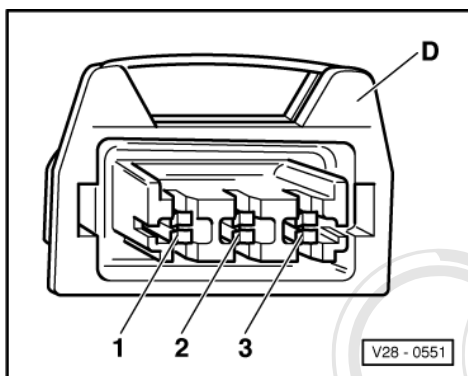
Connector of Hall sender contact	Test box V.A.G 1598 A socket
2	30

If no wiring fault is detected:

- Fit a new engine control unit => Page 34 .

Checking power supply

- Unplug the connector of the Hall sender at the ignition distributor.



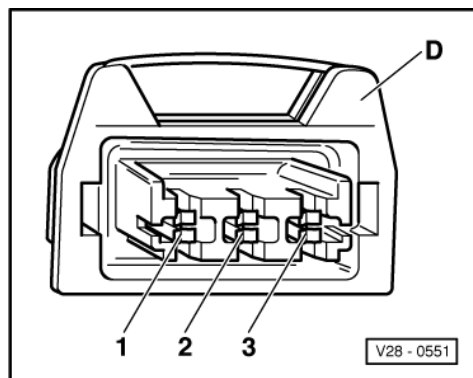
- -> Connect multimeter between contacts 3 (positive) and 1 (earth) to measure voltage.
- Switch the ignition on.
 - Specification: at least 9 V

If the specification is attained but the LED does not flash:

- Fit a new Hall sender.

If the specification is not obtained:

- With the ignition switched off, use adapter V.A.G 1598/3 to connect test box V.A.G 1598 A to plug connection of engine control unit (control unit remains disconnected) => Page 33 .



- -> Check the following wires for open circuit and short to positive or earth (or short circuit to each other):

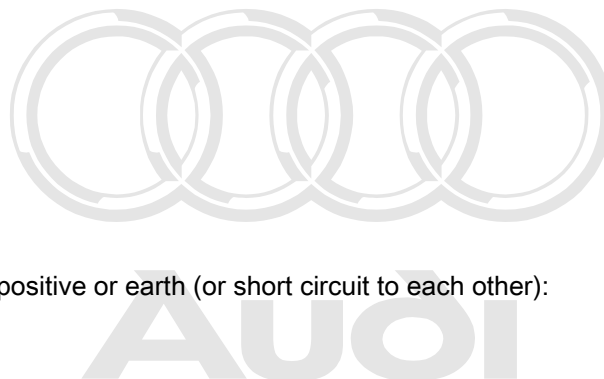
Connector contact	Measure to
3 (positive)	Test box V.A.G 1598 A socket 21
1 (earth)	Engine earth

- Rectify any open/short circuit as necessary.

=> "Current Flow Diagrams, Electrical Fault-finding and Fitting Locations" binder

If no wiring fault is detected:

- Fit a new engine control unit => Page 34 .



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