

Audi A4 1995 ➤

**Motronic Fuel Injection and Ignition System (4-cyl)
Turbo**

Engine ID	AWT								
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List of Workshop Manual Repair GroupsList of Workshop Manual
Repair GroupsList of Workshop Manual Repair Groups

Audi A4 1995 ➤

Motronic Fuel Injection and Ignition System (4-cyl) Turbo

Repair Group

01 - Self-diagnosis

24 - 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 for the Motronic system

1.1 - Self-diagnosis for the Motronic system

1.2 - Technical self-diagnosis data

Features

- ♦ The data transfer between control unit and vehicle diagnostic, testing and information system VAS 5051 or fault reader V.A.G 1551 takes place in "Rapid data transfer" mode.
- ♦ The fault memory is a non-volatile memory and thus independent of the power supply.
- ♦ Faults related to EPC are additionally indicated by the warning lamp for the electronic throttle control ("EPC warning lamp") which is situated in the dash panel insert.
- ♦ If the engine control unit detects faults which result in deterioration of exhaust emissions, these faults will be indicated by illumination of exhaust gas warning lamp-K83. Significance of exhaust warning lamp -K83 => Page 56 .
- ♦ Each time after erasing the fault memory the readiness code must be renewed => Page 28 .

1.3 - Safety precautions

Note the following points if testers and measuring instruments have to be used during a road test:

Important:

- ♦ 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 diagnosis, measurement and information system VAS 5051 or fault reader V.A.G 1551 and selecting functions

Test requirements:

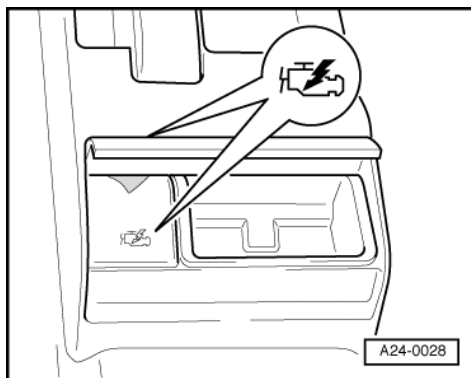
- Fuses for engine electronics OK.

=> Current Flow Diagrams, Electrical Fault-Finding and Fitting Locations

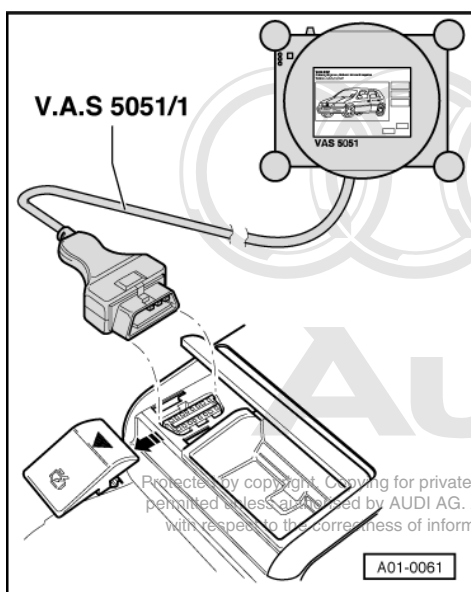
- Fuel pump relay OK; checking =>Page 73 .
- Battery voltage at least 12.7 V.
- Earth connections on engine and gearbox OK.



Procedure



- -> Open rear ashtray and remove cover for diagnostic connector.



- -> Connect up vehicle diagnostic, testing and information system VAS 5051 with diagnostic cable VAS 5051/1. Alternatively, connect fault reader V.A.G 1551 with diagnostic cable V.A.G 1551/3A.

Important:

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 diagnostic, testing and information system VAS 5051, follow the procedures described in equipment's operating instructions.

-> Indicated on 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:

- Perform fault-finding in line with "Diagnostic wire fault finding instructions".

=> Current Flow Diagrams, Electrical Fault-Finding and Fitting Locations

Depending on required function => "Available functions" table, 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 indicated on display:

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.

- Enter "01" 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:

4B0906018R 1.8litres R4/5VT G
 0002 ☐
 Coding 11501 WSC 12345

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)

- 4B0906018R	Part-No.; assignment => Parts List
- 1.8l	Engine capacity
- R4/5VT	In line engine, 4 cylinders, 5 valves, turbo
- "G" or no display	Vehicle with or without cruise control
- 0002	Control unit software version
- Code 11501	Control unit code
- WSC 12345	Workshop Code of V.A.G 1551 with which encoding was last performed

- Press the =>key.

-> Indicated on display (function selection):

Rapid data transfer HELP
 Select function XX

Notes:

- ♦ The control unit identification can be displayed again by entering function "01" for "Interrogating control unit version" and confirming with the Q key.

Rapid data transfer HELP
 No reply from control unit



-> When adjacent display appears:

- Perform fault-finding in line with "Diagnostic wire fault finding instructions".

=> Current Flow Diagrams, Electrical Fault-Finding and Fitting Locations

Rapid data transfer HELP
K-wire not switching to earth

Rapid data transfer HELP
K-wire not switched to positive

Rapid data transfer HELP
Communication problem

Available functions

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Vehicle diagnostic, 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	3
02	Interrogating fault memory	no	yes	yes	4
03	Final control diagnosis	yes	no	no	19
04	Basic setting	yes	yes	yes	23
05	Erasing fault memory	yes	yes	yes	4
06	End of output	yes	yes	yes	5
07	Encoding control unit	yes	no	no	24
08	Reading measured value block	yes	yes	yes	25

2 - Interrogating and erasing fault memory

2.1 - Interrogating and erasing fault memory

- 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 should be idling.

Note:

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

-> When indicated on display:

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 the $\Rightarrow$ key.

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 .

Important tips:

- ♦ If no fault is stored in the fault memory the fault memory should not be erased unnecessarily as the readiness code is reset.
- ♦ If the fault memory is erased the readiness code must be produced again => Page 28 .
- Press the $\Rightarrow$ 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:

Important:
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 the $\Rightarrow$ 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.

- If the fault memory is erased the readiness code must be produced again => Page 28 .

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:

- ♦ If faults occur in the monitored sensors and components, these are stored in the fault memory together with an indication of type of fault.
- ♦ Faults related to EPC are additionally indicated by the warning lamp for the electronic throttle control ("EPC warning lamp") which is situated in the dash panel insert. Notes on EPC system =>Page 108 .
- ♦ Faults which cause the exhaust emission to deteriorate are displayed with an exhaust warning lamp in the dash panel insert. Notes on exhaust warning lamp =>Page 56 .
- ♦ The fault table is sorted according to the 5 digit fault code on the left.
- ♦ If a stored fault does not appear within the next 40 engine starts, the fault code will be automatically erased.
- ♦ Sporadic faults are marked "SP" (sporadic fault) on the V.A.G 1551 display. The word "sporadic" signifies individually occurring, random faults.
- ♦ Do not immediately replace components indicated as faulty by the V.A.G 1551 but first check the wiring and connectors of these components against the current flow diagram. Also check the earth connections against current flow diagram. This is particularly relevant for faults recorded as "occurring sporadically" (SP).
- ♦ If the connector is pulled off the engine control unit or if the battery is disconnected, all the stored values in the control unit will be erased. However, the contents of the fault memory are retained. If the engine is then started, it may run rough for a short period. In this case, the engine should be run at idle for a few minutes until the learning process is concluded.
- ♦ After erasing the fault memory =>Page 28 .

2.3 - Fault codes 16395 - 17624

Fault code		Fault readout	Fault remedy
SAE	V.A.G		
	16395	Bank 1, early camshaft adjustment Specified value not achieved 1)	=> 4-cylinder engine (5-valve turbo); Mechanical components; Repair group 15; Check camshaft adjustment
	16396	Bank 1, camshaft adjustment Specified value not achieved 1)	
	16485	Air mass meter -G70 Implausible signal 1)	- Check air mass meter => Page 77
P0102	16486	Air mass meter -G70 Signal too small 1)	
P0103	16487	Air mass meter -G70 Signal too great 1)	

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Fault code		Fault readout	Fault remedy
	16490	manifold pressure/air pressure =>-G71/-F96 Implausible signal 1) 2)	=> 4-cylinder Engine (5-valve Turbo), Mechanical components; Repair group 21; Checking charge air system with exhaust gas turbocharger

1) When this fault occurs within three vehicle cycles (engine running at least 5 seconds) the engine control unit switches on the exhaust warning lamp in dash panel insert. Notes on exhaust warning lamp => Page 56.

2) The intake manifold pressure is determined by the boost pressure sender -G31 (in place of displayed -G71), the air pressure is determined by the altitude sender -F96 (in engine control unit).

Fault code		Fault readout	Fault remedy
SAE	V.A.G		
P0112	16496	Intake air temperature sender - G42 Signal too small 1)	- Checking the intake air temperature sender =>Page 152
P0113	16497	Intake air temperature sender - G42 Signal too great 1)	
P0116	16500	Coolant temperature sender -G62 Implausible signal 1)	- Test coolant temperature sensor =>Page 158
P0117	16501	Coolant temperature sender -G62 Signal too small 1)	
P0118	16502	Coolant temperature sender -G62 Signal too great 1)	

1) When this fault occurs within three vehicle cycles (engine running at least 5 seconds) the engine control unit switches on the exhaust warning lamp in dash panel insert. Notes on exhaust warning lamp => Page 56.

Fault code		Fault readout	Fault remedy
SAE	V.A.G		
P0130	16514	Bank1, probe 1 Electrical fault in current circuit 1)	- Check lambda probe and lambda control upstream of catalytic converter => Page 83
P0131	16515	Bank1, probe 1 Voltage too low 1)	
P0132	16516	Bank1, probe 1 Voltage too high 1)	
	16517	Bank1, probe 1 Signal too slow 1)	
P0134	16518	Bank1, probe 1 No activity 1)	
	16519	Bank1, probe 1 Heating circuit Electrical fault 1)	

1) When this fault occurs within three vehicle cycles (engine running at least 5 seconds) the engine control unit switches on the exhaust warning lamp in dash panel insert. Notes on exhaust warning lamp => Page 56.

Fault code		Fault readout	Fault remedy
SAE	V.A.G		
	16520	Bank1, probe 2 Electrical fault in current circuit 1)	- Check lambda probe and lambda control downstream of catalytic converter => Page 94



Fault code		Fault readout	Fault remedy
	16521	Bank1, probe 2 Voltage too low 1)	
P0138	16522	Bank1, probe 2 Voltage too high 1)	
P0139	16523	Bank1, probe 2 Signal too slow 1)	
P0140	16524	Bank1, probe 2 No activity 1)	
P0236	16620	Boost pressure sender -G31 Implausible signal 1)	=> 4-cylinder Engine (5-valve Turbo), Mechanical components; Repair group 21; Checking charge air system with exhaust gas turbocharger
P0237	16621	Boost pressure sender -G31 Signal too small 1)	
P0238	16622	Boost pressure sender -G31 Signal too great 1)	

1) When this fault occurs within three vehicle cycles (engine running at least 5 seconds) the engine control unit switches on the exhaust warning lamp in dash panel insert. Notes on exhaust warning lamp => Page 56.

Fault code		Fault readout	Fault remedy
SAE	V.A.G		
P0300	16684	Misfire detected 1)	- Check the fuel pressure => Page 63
	16685	Cyl. 1 misfire detected 1)	- Test spark plugs and ignition wiring
P0302	16686	Cyl. 2 misfire detected 1)	- Ignition coils with output stages Checking => Page 141
P0303	16687	Cyl. 3 misfire detected 1)	- Check misfire detection => Page 170
P0304	16688	Cyl. 4 misfire detected 1)	- Refuel the vehicle
P0321	16705	Engine speed sender -G28 Implausible signal 1)	- Checking engine speed sender => Page 155
P0322	16706	Engine speed sender -G28 no signal 1) 3)	

1) When this fault occurs within three vehicle cycles (engine running at least 5 seconds) the engine control unit switches on the exhaust warning lamp in dash panel insert. Notes on exhaust warning lamp => Page 56.

3) With this fault, engine control unit switches on EPC warning lamp in dash panel insert. Notes on EPC warning lamp => Page 109.

Fault code		Fault readout	Fault remedy
SAE	V.A.G		
P0327	16711	Knock sensor 1 -G61 Signal too small 1)	- Check knock sensor => Page 164
P0328	16712	Knock sensor 1 -G61 Signal too great 1)	
P0332	16716	Knock sensor 2 -G66 Signal too small 1)	
P0333	16717	Knock sensor 2 -G66 Signal too great 1)	
P0341	16725	Camshaft position sensor => sender -G40 Implausible signal 1)	- Check Hall sender => Page 167
P0342	16726	Camshaft position sensor => sender -G40 Signal too small 1)	

Fault code		Fault readout	Fault remedy
P0343	16727	Camshaft position sensor => sender -G40 Signal too great 1)	

1) When this fault occurs within three vehicle cycles (engine running at least 5 seconds) the engine control unit switches on the exhaust warning lamp in dash panel insert. Notes on exhaust warning lamp => Page 56 .

Fault code		Fault readout	Fault remedy
SAE	V.A.G		
P0411	16795	Secondary air system Throughput faulty 1)	=> 4-cylinder engine (5-valve turbo), Mechanical components; Repair group 26; Check secondary air system Check hose connections (valve for secondary air inlet); Check intake system for leakages (unmetered air) => Page 81
P0420	16804	Bank1, catalytic converter system Too inefficient 1)	- Produce readiness code => Page 28 . If the same fault is displayed again replace the front catalytic converter Bank. => 4-cylinder engine (5-valve turbo), Mechanical components; Repair group 26; Removing and installing parts of exhaust system Removing and installing parts of exhaust system
P0422	16806	Bank1, main catalytic converter Too inefficient	
P0441	16825	Fuel tank breather system Throughput faulty 1)	- Check solenoid valve 1 for active carbon canister => Page 105

1) When this fault occurs within three vehicle cycles (engine running at least 5 seconds) the engine control unit switches on the exhaust warning lamp in dash panel insert. Notes on exhaust warning lamp => Page 56 .

Fault code		Fault readout	Fault remedy
SAE	V.A.G		
P0501	16885	Vehicle speed signal Implausible signal 1)	- Check speed signal =>Page 129
P0506	16890	Idling speed regulation Engine speed below specified value 1)	- Check throttle valve control unit =>Page 110
P0507	16891	Idling speed regulation Engine speed above specified value	
P0560	16944	Voltage supply Implausible signal	- Check supply voltage for engine control unit => Page 161
P0562	16946	Voltage supply Voltage too low	
P0563	16947	Voltage supply Voltage too high	
P0571	16955	Brake light switch -F4) Implausible signal	- Check brake light switch and brake pedal switch => Page 121

1) When this fault occurs within three vehicle cycles (engine running at least 5 seconds) the engine control unit switches on the exhaust warning lamp in dash panel insert. Notes on exhaust warning lamp => Page 56 .

4) The brake pedal switch -F47 is monitored in addition to the brake light switch -F47.



Fault code		Fault readout	Fault remedy
SAE	V.A.G		
P0601	16985	Control unit defective 1)	- Replace control unit => Page 54
P0604	16988	Control unit defective 1)	
P0605	16989	Control unit defective 1)	
P0606	16990	Control unit faulty	
	17069	Main relay => -J271 Open circuit 1)	- Check power supply relay -J271 for Motronic => Page 147
P0686	17070	Main relay => -J271 Short to earth 1)	
P0687	17071	Main relay => -J271 Short to positive 1)	
P0688	17072	Main relay, load circuit => -J271 Open circuit 1) 3)	

1) When this fault occurs within three vehicle cycles (engine running at least 5 seconds) the engine control unit switches on the exhaust warning lamp in dash panel insert. Notes on exhaust warning lamp => Page 56.

3) With this fault, engine control unit switches on EPC warning lamp in dash panel insert. Notes on EPC warning lamp => Page 109.

Fault code		Fault readout	Fault remedy
SAE	V.A.G		
P1102	17510	Bank1, probe 1, heating circuit Short to positive 1)	- Lambda probe heating upstream of catalytic converter: Checking => Page 91
P1103	17511	Bank1, probe 1, heating circuit Too inefficient 1)	- Check lambda probe heating downstream of catalytic converter => Page 100
P1105	17513	Bank1, probe 1, heating circuit Short to positive 1)	
P1111	17519	Lambda control Bank1 System too lean	- Check lambda control upstream of catalytic converter=>Page 83
P1112	17520	Lambda control Bank1 System too rich	
P1113	17521	Bank1, probe 1 Internal resistance too high	- First check signal wires for contact resistances => Page 87 ; if there are no contact resistances: Fit a new lambda probe
P1114	17522	Bank1, probe 2 Internal resistance too high 1)	- First check signal wires for contact resistances => Page 99 ; if there are no contact resistances: Fit a new lambda probe

1) When this fault occurs within three vehicle cycles (engine running at least 5 seconds) the engine control unit switches on the exhaust warning lamp in dash panel insert. Notes on exhaust warning lamp => Page 56.

Fault code		Fault readout	Fault remedy
SAE	V.A.G		
P1115	17523	Bank1, probe 1, heating circuit Short to earth 1)	- Check lambda probe heating upstream of catalytic converter => Page 91
P1116	17524	Bank1, probe 1, heating circuit Open circuit 1)	
P1117	17525	Bank1, probe 2, heating circuit Short to earth 1)	- Check lambda probe heating downstream of catalytic converter => Page 100

Fault code		Fault readout	Fault remedy
P1118	17526	Bank1, probe 2, heating circuit Open circuit 1)	

1) When this fault occurs within three vehicle cycles (engine running at least 5 seconds) the engine control unit switches on the exhaust warning lamp in dash panel insert. Notes on exhaust warning lamp => Page 56 .

Fault code		Fault readout	Fault remedy
SAE	V.A.G		
P1127	17535	Bank1, mixture adaption (mult.) System too rich	- Test drive vehicle (fuel in oil) Check fuel system pressure => Page 81
P1128	17536	Bank1, mixture adaption (mult.) System too lean	- Check lambda probe upstream of catalytic converter =>Page 63

Note:

mult. = multiplicative means that the fault occurs throughout the entire speed range and load range.

Fault code		Fault readout	Fault remedy
SAE	V.A.G		
P1136	17544	Bank1, mixture adaption (add.) System too lean	- Test drive vehicle (fuel in oil) Check fuel system pressure => Page 81
P1137	17545	Bank1, mixture adaption (add.) System too rich	- Check lambda probes downstream of catalytic converter =>Page 105
P1143	17551	Load recognition Control limit exceeded 1)	- Check air mass meter => Page 110

1) When this fault occurs within three vehicle cycles (engine running at least 5 seconds) the engine control unit switches on the exhaust warning lamp in dash panel insert. Notes on exhaust warning lamp => Page 56 .

Note:

add. = additive means that fault only has effect during idling

Fault code		Fault readout	Fault remedy
SAE	V.A.G		
P1149	17557	Lambda control Bank1 Implausible control value	- Check lambda probe learned values and lambda control =>Page 81
P1171	17579	Angle sender 2 for throttle valve actuator -G188 Implausible signal 1) 3)	- Check angle sender for throttle valve actuator => Page 113
P1172	17580	Angle sender 2 for throttle valve actuator -G188 Signal too small 1) 3)	



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Fault code		Fault readout	Fault remedy
P1173	17581	Angle sender 2 for throttle valve actuator -G188 Signal too great 1) 3)	

1) When this fault occurs within three vehicle cycles (engine running at least 5 seconds) the engine control unit switches on the exhaust warning lamp in dash panel insert. Notes on exhaust warning lamp => Page 56.

3) With this fault, engine control unit switches on EPC warning lamp in dash panel insert. Notes on exhaust warning lamp =>Page 109.

Fault code		Fault readout	Fault remedy
SAE	V.A.G		
P1176	17584	Bank1, lambda correction downstream of cat Control limit achieved1)	- Check lambda probe ageing of lambda probe upstream of catalytic converter=> Page 94
P1198	17606	Bank1, probe 2, heating circuit Electrical fault	- Check lambda probe heating downstream of catalytic converter => Page 100
P1213	17621	Injector, cylinder 1 -N30 Short to positive 1)	- Check injectors =>Page 63
P1214	17622	Injector, cylinder 2 -N31 Short to positive 1)	
P1215	17623	Injector, cylinder 3 -N32 Short to positive 1)	
P1216	17624	Injector, cylinder 4 -N33 Short to positive 1)	

1) When this fault occurs within three vehicle cycles (engine running at least 5 seconds) the engine control unit switches on the exhaust warning lamp in dash panel insert. Notes on exhaust warning lamp => Page 56.

2.4 - Fault codes 17633 - 18261

Fault code		Fault readout	Fault remedy
SAE	V.A.G		
P1225	17633	Injector, cylinder 1 -N30 Short to earth 1)	- Check injectors =>Page 63
P1226	17634	Injector, cylinder 2 -N31 Short to earth 1)	
P1227	17635	Injector, cylinder 3 -N32 Short to earth 1)	
P1228	17636	Injector, cylinder 4 -N33 Short to earth 1)	

1) When this fault occurs within three vehicle cycles (engine running at least 5 seconds) the engine control unit switches on the exhaust warning lamp in dash panel insert. Notes on exhaust warning lamp => Page 56.

Fault code		Fault readout	Fault remedy
SAE	V.A.G		
P1237	17645	Injector, cylinder 1 -N30 Open circuit 1)	- Check injectors =>Page 63

Fault code		Fault readout	Fault remedy
P1238	17646	Injector, cylinder 2 -N31 Open circuit 1)	
P1239	17647	Injector, cylinder 3 -N32 Open circuit 1)	
P1240	17648	Injector, cylinder 4 -N33 Open circuit 1)	
P1250	17658	Fuel level too low	- Follow-on fault =>Note Refuel vehicle, erase fault memory Interrogate fault memory of dash panel insert => Electrical System; Repair group 01; Dash panel insert self-diagnosis Dash panel insert self-diagnosis

1) When this fault occurs within three vehicle cycles (engine running at least 5 seconds) the engine control unit switches on the exhaust warning lamp in dash panel insert. Notes on exhaust warning lamp => Page 56 .

Note:

The fault "Fuel level too low" is stored only in conjunction with misfiring or faults concerning lambda control if too little fuel is or was in the tank. The fault is stored in the control unit as static fault and is not set as a sporadic fault even if the vehicle is refuelled in the meantime.

Fault code		Fault readout	Fault remedy
SAE	V.A.G		
P1287	17695	Air recirculation valve for turbo-charger -N249 Open circuit 1)	=> 4-cylinder Engine (5-valve Turbo), Mechanical components; Repair group 21; Checking charge air system with exhaust gas turbocharger
P1288	17696	Air recirculation valve for turbo-charger -N249 Short to positive 1)	
P1289	17697	Air recirculation valve for turbo-charger -N249 Short to earth 1)	
P1297	17705	Connection loader-throttle valve Loss of pressure	=> 4-cylinder Engine (5-valve Turbo), Mechanical components; Repair group 21; Checking charge air system with exhaust gas turbocharger

1) When this fault occurs within three vehicle cycles (engine running at least 5 seconds) the engine control unit switches on the exhaust warning lamp in dash panel insert. Notes on exhaust warning lamp => Page 56 .

Fault code		Fault readout	Fault remedy
SAE	V.A.G		
P1325	17733	Knock control, cylinder 1 Control limit reached	- Check knock control => Page 162
P1326	17734	Knock control, cylinder 2 Control limit reached	
P1327	17735	Knock control, cylinder 3 Control limit reached	
P1328	17736	Knock control, cylinder 4 Control limit reached	

Fault code		Fault readout	Fault remedy
SAE	V.A.G		



Fault code		Fault readout	Fault remedy
P1335	17743	Engine torque monitoring 2 Control limit exceeded 1) 3)	- Excessive leakage, check intake air system for leaks (un-metered air) =>Page 152 - Check air mass meter => Page 158 - Check Hall sender => Page 167
P1336	17744	Engine torque monitoring Control limit exceeded	
P1337	17745	Bank1, camshaft position sensor => -G163 Short to earth 1)	
P1338	17746	Bank1, camshaft position sensor => -G163 Open circuit/short to positive 1)	

1) When this fault occurs within three vehicle cycles (engine running at least 5 seconds) the engine control unit switches on the exhaust warning lamp in dash panel insert. Notes on exhaust warning lamp => Page **56**.

3) With this fault, engine control unit switches on EPC warning lamp in dash panel insert. Notes on exhaust warning lamp =>Page **109**.

Fault code		Fault readout	Fault remedy
SAE	V.A.G		
P1340	17748	Camshaft/crankshaft position sensor Incorrect assignment 1)	- Remove hall sender and check whether the rotor ring was correctly mounted at the camshaft. (If not correctly installed, the detent lug is flattened when the securing bolt is tightened.) Additionally check control timing of engine => 4-cylinder engine (5-valve), Mechanical components; Repair group 13; Dismantling and assembling engine; Removing and installing toothed belt Dismantling and assembling engine; Removing and installing toothed belt - Ignition coils with output stages Checking => Page 141
P1355	17763	Ignition actuation cyl. 1 Open circuit 1)	
P1356	17764	Ignition actuation cyl. 1 Short to positive 1)	
P1357	17765	Ignition actuation cyl. 1 Short to earth 1)	
P1358	17766	Ignition actuation cyl. 2 Open circuit 1)	

1) When this fault occurs within three vehicle cycles (engine running at least 5 seconds) the engine control unit switches on the exhaust warning lamp in dash panel insert. Notes on exhaust warning lamp => Page **56**.

Fault code		Fault readout	Fault remedy
SAE	V.A.G		
P1359	17767	Ignition actuation cyl. 2 Short to positive 1)	- Ignition coils with output stages Checking => Page 141
P1359	17767	Ignition actuation cyl. 2 Short to positive 1)	
P1360	17768	Ignition actuation cyl. 2 Short to earth 1)	
P1361	17769	Ignition actuation cyl. 3 Open circuit 1)	
P1362	17770	Ignition actuation cyl. 3 Short to positive 1)	
P1363	17771	Ignition actuation cyl. 3 Short to earth 1)	

P1364	17772	Ignition actuation cyl. 4 Open circuit 1)	
P1365	17773	Ignition actuation cyl. 4 Short to positive 1)	
P1366	17774	Ignition actuation cyl. 4 Short to earth 1)	

1) When this fault occurs within three vehicle cycles (engine running at least 5 seconds) the engine control unit switches on the exhaust warning lamp in dash panel insert. Notes on exhaust warning lamp => Page 56 .

Fault code		Fault readout	Fault remedy
SAE	V.A.G		
P1386	17794	Control unit defective 1)	- Replace engine control unit => Page 54
P1387	17795	Control unit defective 1)	
P1388	17796	Control unit defective 1) 3)	
P1410	17818	Tank breather valve -N80 Short to positive 1)	- Check solenoid valve 1 for active carbon canister => Page 105
P1421	17829	Secondary air inlet valve -N112 Short to earth 1)	=> 4-cylinder engine (5-valve turbo), Mechanical components; Repair group 26; Check secondary air system
P1422	17830	Secondary air inlet valve -N112 Short to positive 1)	

1) When this fault occurs within three vehicle cycles (engine running at least 5 seconds) the engine control unit switches on the exhaust warning lamp in dash panel insert. Notes on exhaust warning lamp => Page 56 .

3) With this fault, engine control unit switches on EPC warning lamp in dash panel insert. Notes on exhaust warning lamp =>Page 109 .

Fault code		Fault readout	Fault remedy
SAE	V.A.G		
	17832	Bank1, secondary air system Leak recognised 1)	- Check hose connections and components of the secondary air system => 4-cylinder engine (5-valve turbo), Mechanical components; Repair group 26; Check secondary air system
P1425	17833	Tank breather valve -N80 Short to earth 1)	- Check solenoid valve 1 for active carbon canister => Page 105
P1426	17834	Tank breather valve -N80 Open circuit 1)	
P1432	17840	Secondary air inlet valve -N112 Open circuit 1)	=> 4-cylinder engine (5-valve turbo), Mechanical components; Repair group 26; Check secondary air system
P1433	17841	Secondary air pump relay -J229 Open circuit 1)	
P1434	17842	Secondary air pump relay -J229 Short to positive 1)	
P1435	17843	Secondary air pump relay -J229 Short to earth 1)	

1) When this fault occurs within three vehicle cycles (engine running at least 5 seconds) the engine control unit switches on the exhaust warning lamp in dash panel insert. Notes on exhaust warning lamp => Page 56 .

Fault code		Fault readout	Fault remedy
SAE	V.A.G		



Fault code		Fault readout	Fault remedy
P1501	17909	Fuel pump relay -J17 Short to earth 1)	- Check fuel pump relay =>Page 73
P1502	17910	Fuel pump relay -J17 Short to positive 1)	
P1519	17927	Bank1, camshaft adjustment Fault 1)	=> 4-cylinder engine (5-valve turbo), Mechanical components; Repair group 15; Check camshaft adjustment
	17931	Crash signal from airbag control unit Implausible signal 5)	
P1529	17937	Camshaft timing control Short to positive 1)	=> 4-cylinder engine (5-valve turbo), Mechanical components; Repair group 15; Check camshaft adjustment
P1530	17938	Camshaft timing control Short to earth 1)	
P1531	17939	Camshaft timing control Open circuit 1)	

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1) When this fault occurs within three vehicle cycles (engine running at least 5 seconds) the engine control unit switches on the exhaust warning lamp in dash panel insert. Notes on exhaust warning lamp => Page **56**.

5) The fault is stored with the relevant signal from airbag control unit.

Fault code		Fault readout	Fault remedy
SAE	V.A.G		
P1539	17947	Clutch pedal switch -F36 Implausible signal 1)	- Test clutch pedal switch =>Page 125
	17908	Fuel pump relay -J17 Open circuit 1)	
P1542	17950	Angle sender for throttle valve actuator -G187 Implausible signal 1) 3)	- Check angle sender for throttle valve actuator => Page 113
P1543	17951	Angle sender for throttle valve actuator -G187 Signal too small 1) 3)	
P1544	17952	Angle sender for throttle valve actuator -G187 Signal too great 1) 3)	
P1545	17953	Throttle valve control Malfunction 1) 3)	- Check throttle valve control unit =>Page 110

1) When this fault occurs within three vehicle cycles (engine running at least 5 seconds) the engine control unit switches on the exhaust warning lamp in dash panel insert. Notes on exhaust warning lamp => Page **56**.

3) With this fault, engine control unit switches on EPC warning lamp in dash panel insert. Notes on exhaust warning lamp =>Page **109**.

Fault code		Fault readout	Fault remedy
SAE	V.A.G		
P1546	17954	Boost pressure control solenoid valve -N75 Short to positive	=> 4-cylinder Engine (5-valve Turbo), Mechanical components; Repair group 21; Checking charge air system with exhaust gas turbocharger
P1547	17955	Boost pressure control solenoid valve -N75 Short to earth	

Fault code		Fault readout	Fault remedy
P1548	17956	Boost pressure control solenoid valve -N75 Open circuit.	
P1550	17958	Boost pressure Control difference	
P1555	17963	Maximum boost pressure exceeded	
P1556	17964	Boost pressure control Control limit not reached	
P1557	17965	Boost pressure control Control limit exceeded	

Fault code		Fault readout	Fault remedy
SAE	V.A.G		
P1558	17966	Throttle valve drive G186 Electrical fault in circuit 1) 3)	Check throttle valve control unit =>Page 110
P1559	17967	Throttle valve control unit -J338 Fault in basic setting 1)	- Perform adaption =>Page 110
P1560	17968	Maximum engine speed exceeded	- Rectify mechanical damage
P1564	17972	Throttle valve control unit -J338 Undervoltage during basic setting	- Charge battery, repeat basic setting
P1565	17973	Throttle valve control unit -J338 Lower stop not reached 1) 3)	- Check control unit=>Page 110
P1568	17976	Throttle valve control unit -J338 Mechanical fault 1) 3)	

1) When this fault occurs within three vehicle cycles (engine running at least 5 seconds) the engine control unit switches on the exhaust warning lamp in dash panel insert. Notes on exhaust warning lamp => Page 56 .

3) With this fault, engine control unit switches on EPC warning lamp in dash panel insert. Notes on EPC warning lamp =>Page 109 .

Fault code		Fault readout	Fault remedy
SAE	V.A.G		
P1569	17977	CCS Switch -E45 Implausible signal	=> Electrical System; Repair group 01; Self-diagnosis for the cruise control system (CCS)
P1570	17978	and the engine control unit disabled	- Adjust electronic immobiliser to match the engine control unit => Electrical System; Repair group 01; Immobiliser self-diagnosis
P1579	17987	Throttle valve control unit -J338 Adaption not started	- Perform adaption of throttle valve control unit in accordance with preconditions => Page 110
P1602	18010	Voltage supply, terminal 30 Voltage too low	- Check voltage supply for engine control unit => Page 161

Fault code		Fault readout	Fault remedy
SAE	V.A.G		
P1603	18011	Control unit defective 1)	- Replace engine control unit => Page 54
P1604	18012	Control unit defective 1) 3)	



Fault code		Fault readout	Fault remedy
P1606	18014	Rough-road detection/engine specified torque from ABS control unit Electrical fault in circuit	- Check the data exchange between engine control unit and other CAN-control units =>Page 132
P1609	18017	Crash cut-off was activated (crash caused) 6)	=> Body, Self-diagnosis; Repair group 01; Self-diagnosis of airbag system After final control diagnosis of airbag system erase fault memory of the engine control unit =>Page 4

1) When this fault occurs within three vehicle cycles (engine running at least 5 seconds) the engine control unit switches on the exhaust warning lamp in dash panel insert. Notes on exhaust warning lamp => Page 56.

3) With this fault, engine control unit switches on EPC warning lamp in dash panel insert. Notes on EPC warning lamp =>Page 109.

6) The fault is stored with the relevant signal from airbag control unit, also with final control diagnosis of the airbag system.

Fault code		Fault readout	Fault remedy
SAE	V.A.G		
	18018	Control unit faulty	- Replace engine control unit => Page 54
P1612	18020	Engine control unit incorrectly coded 1)	- Code engine control unit =>Page 24
P1624	18032	Request fault lamp on, active 7)	- Exhaust-relevant fault of gearbox control unit Read out fault memory of gearbox control unit => Automatic gearbox 01V, Self-diagnosis; Repair group 01
P1626	18034	Drive data bus No message from gearbox control unit-SG 1)	- Check data exchange between engine control unit and other CAN-control units =>Page 132

1) When this fault occurs within three vehicle cycles (engine running at least 5 seconds) the engine control unit switches on the exhaust warning lamp in dash panel insert. Notes on exhaust warning lamp => Page 56.

7) The gearbox control unit has recognised a fault which causes the exhaust emissions of the engine to deteriorate. The fault message is sent by the gearbox control unit to the engine control unit which now switches on the fault lamp for self-diagnosis -K83. Notes on fault lamp for self-diagnosis -K83 => Page 56. At the same time the message P1624 is displayed in the engine control unit as an indication that the fault lamp for self-diagnosis -K83 was not switched on due to an engine problem but due to a gearbox problem.

Fault code		Fault readout	Fault remedy
SAE	V.A.G		
P1630	18038	Accelerator position sender -G79 Signal too small 1) 3)	- Checking accelerator position sender =>Page 116
P1631	18039	Accelerator position sender -G79 Signal too great 1) 3)	
P1633	18041	Accelerator position sender 2 -G185 Signal too small 1) 3)	
P1634	18042	Accelerator position sender 2 -G185 Signal too great 1) 3)	

Fault code		Fault readout	Fault remedy
P1639	18047	Sender 1/2 for gas pedal position -G79+G185 Implausible signal 1) 3)	

1) When this fault occurs within three vehicle cycles (engine running at least 5 seconds) the engine control unit switches on the exhaust warning lamp in dash panel insert. Notes on exhaust warning lamp => Page 56 .

3) With this fault, engine control unit switches on EPC warning lamp in dash panel insert. Notes on EPC warning lamp =>Page 109 .

Fault code		Fault readout	Fault remedy
SAE	V.A.G		
P1640	18048	Control unit defective 1)	- Replace engine control unit => Page 54
P1648	18056	Drive data bus defective 1)	- Check data exchange between engine control unit and other CAN-control units =>Page 132
P1649	18057	Drive data bus No message from ABS control unit	
P1650	18058	Drive data bus No message from dash panel	
	18085	Read out fault memory of dash panel insert	=> Electrical system; Repair group 01; Dash panel insert self-diagnosis
P1682	18090	Drive data bus Implausible message from ABS-SG	- Check data exchange between engine control unit and other CAN-control units =>Page 132
P1853	18261	Drive Data bus Implausible message from ABS-SG	

1) When this fault occurs within three vehicle cycles (engine running at least 5 seconds) the engine control unit switches on the exhaust warning lamp in dash panel insert. Notes on exhaust warning lamp => Page 56 .

3 - Final control diagnosis

3.1 - Final control diagnosis

Notes:

- ◆ The final control diagnosis can only be performed with the engine stopped and the ignition switched on.
- ◆ The electric fuel pump runs throughout the final control diagnosis.
- ◆ During actuator diagnosis, the individual actuators (with the exception of the injectors) are operated in turn for about one minute unless the next actuator is selected by pressing the ➔ key.
- ◆ The control elements can be checked acoustically or by way of touch.
- ◆ The final control diagnosis is terminated if the engine is started or if an engine speed pulse is detected.
- ◆ Before restarting the final control diagnosis the engine must be started and the ignition switched off and on again.

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

Actuation sequence
1 Solenoid valve 1 for activated charcoal filter -N80
2 Secondary air inlet valve -N112
3 Secondary air pump relay -J299
4 Boost pressure control solenoid valve -N75



Actuation sequence
5 Camshaft timing control
6 Air recirculation valve for turbocharger -N249
7 Injector, cylinder 1 N30
8 Injector, cylinder 3 N32
9 Injector, cylinder 4 N33
10 Injector, cylinder 2 N31

Test requirements:

- Fuses for engine electronics OK

=> Current Flow Diagrams, Electrical Fault-Finding and Fitting Locations

Test 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 ignition must be switched on.

-> When indicated on display:

Rapid data transfer **HELP**
Select function XX

- Enter "03" to select the function "Final control diagnosis".

-> Indicated on display:

Rapid data transfer **Q**
03 - Final control diagnosis

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Actuation of activated charcoal filter system solenoid valve (tank breather valve)

- Confirm entry with Q key.

Note:

*Fuel pump relay should pull, fuel pump should run, flow noise at fuel pressure regulator is clearly audible. If fuel pump does not run, check actuation =>Page **75**.*

-> Display:

(or display: Tank breather valve -N80)

Final control diagnosis
Solenoid valve 1 for activated carbon
canister -N80

- ♦ This valve is actuated (clicks) for approx. one minute if the operation is not switched to the next actuator by pressing the ➡ key.

If the valve is not actuated (does not click).

- Check the activated charcoal filter system solenoid valve 1 -N80 =>Page **105** .

Actuation of secondary air inlet valve

- Press the ➡key.

-> Indicated on display:

Final control diagnosis
Secondary air inlet valve -N112

- ♦ This valve is actuated (clicks) for approx. one minute if the operation is not switched to the next actuator by pressing the ⇒ key.

If the valve is not actuated (does not click).

- Check secondary air inlet valve -N112:

=> 4-cylinder engine (5-valve turbo), Mechanical components; Repair group 26; Check secondary air system
Check secondary air system

Actuation of secondary air pump relay

- Press the ⇒key.

-> Display:

Final control diagnosis
Secondary air pump relay -J299

- ♦ If secondary air pump relay -J299 (in triple relay carrier in electronics box plenum chamber left, position 2) switches on the engine for the secondary air pump -V101 in approx. 1 minute intervals on and off if it has not been advanced to the next control element by pressing the ⇒key.

If secondary air pump does not run intermittently:

- Check secondary air pump relay -J299:

=> 4-cylinder engine (5-valve turbo), Mechanical components; Repair group 26; Check secondary air system
Check secondary air system

Solenoid valve for boost pressure limitation -N75 defective

- Press the ⇒key.

-> Display:

Final control diagnosis
Solenoid valve for boost pressure
control -N75

- ♦ This valve is actuated (clicks) for approx. one minute if the operation is not switched to the next actuator by pressing the ⇒ key.

If the valve is not actuated (does not click).

=> 4-cylinder Engine (5-valve Turbo), Mechanical components; Repair group 21; Checking charge air system with exhaust gas turbocharger
Checking charge air system with exhaust gas turbocharger

Actuation of camshaft adjustment valves

- Press the ⇒key.

-> Display:

Final control diagnosis
Camshaft timing control

- ♦ This valve is actuated (clicks) for approx. one minute if the operation is not switched to the next actuator by pressing the ⇒ key.

If the valve is not actuated (does not click).

- Check camshaft adjustment valves:

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=> 4-cylinder engine (5-valve turbo), Mechanical components; Repair group 15; Check camshaft adjustment
Check camshaft adjustment

Actuating air recirculation valve for turbocharger

- Press the ➡key.

-> Display:

Final control diagnosis
Air recirculation valve for turbocharger
-N249

- ♦ This valve is actuated (clicks) for approx. one minute if the operation is not switched to the next actuator by pressing the ➡ key.

If the valve is not actuated (does not click).

=> 4-cylinder Engine (5-valve Turbo), Mechanical components; Repair group 21; Checking charge air system with exhaust gas turbocharger
Checking charge air system with exhaust gas turbocharger

Actuate injectors

Note:

The injectors are actuated according to the ignition sequence: Cyl. 1, cyl. 3, cyl. 4, cyl. 2.

- Press the ➡key.

-> Display:

Final control diagnosis
Injector, cylinder 1 -N30

- Press the ➡key.

-> Display:

Final control diagnosis
Injector, cylinder 1 -N30

- ♦ After pressing the ➡key the injector must click five times.

- Use this procedure to check all the injectors in sequence.

If one of the injectors is not actuated (does not click):

- Check injectors =>Page 63 .
- Press the ➡key after actuating the last injector (cylinder 2).

-> Indicated on display:

Final control diagnosis
END

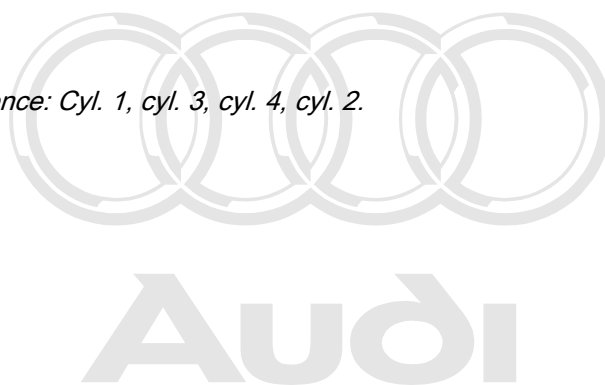
- Press the ➡key.

-> Indicated on display (function selection):

Rapid data transfer HELP
Select function XX

Note:

Before restarting the final control diagnosis the engine must be started and the ignition switched off and on again.



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4 - Basic setting

4.1 - Basic setting

With engine stopped and ignition switched on, the following operation can be carried out with the "Function 04" basic setting:

- ♦ Adaption of the throttle valve control unit to the engine control unit => Display group 060 (=Page 110)
- ♦ Vehicles with automatic gearbox: Adaption of kickdown function of accelerator position sender to engine control unit => Display group 063 (=Page 119)

With the engine running, the following operations can be performed with the basic setting function:

- ♦ Adaption process of the Lambda control =>Page 84

Test conditions for operations with engine running

- No faults stored in fault memory
- Coolant temperature at least 80 °C.
- Electrical consumers switched off (radiator fan must not run during the test)
- Air conditioning switched off.
- Vehicles with automatic gearbox: Selector lever in position P or N

Test sequence

- Connect vehicle diagnostic, testing 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 ignition must be switched on.

or, after each required process:

- Start the engine.

-> When indicated on display:

Rapid data transfer	HELP
Select function XX	

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

-> When indicated on display:

Basic setting	Q
Enter display group number XXX	

- Enter the required display group number.

Example:

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

Note:

After the display group number is selected, the active carbon canister valve is closed and the air conditioner compressor is switched off.

-> Display:

System in basic setting 0							Q
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.
- ♦ To change to another display group, proceed as follows:

Display group	V.A.G 1551	VAS 5051
Higher	Press key 3	Press s key
Lower	Press key 1	Press t key

- If all the display zones show the specified values, press the ⇒ key.

-> Indicated on display (function selection):

Rapid data transfer HELP
Select function XX

Display group 000 (decimal readouts)									
▪ Engine idling (coolant temperature not less than 80 °C)									
1	2	3	4	5	6	7	8	9	10
▪ Display zones									
Learned value for mixture formation partial load							Specified value		Corresponds to
							103...153		-10...10%
Learned value for mixture formation idling							78...178		-10...10%
Control value for mixture formation							103...153		-10...10%
Learned value for torque loss at idle							113...143		-3...3%
Idling torque							106...189		-4.3...12.2%
Throttle valve angle							1...7		0.4...2.75%
voltage							142...207		10..14.5 V:
Engine speed (idling speed)							74...86		740...860 rpm
▪ FRONT-WHEEL DRIVE							76...88		760...880 rpm
▪ Four-wheel drive running gear									
Engine load (no consumption units)							17...40		13...30%
Coolant temperature (requirement for basic setting)							180...205		80...105 °C

5 - Encoding control unit

5.1 - Encoding control unit

- 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 ignition must be switched on.

-> When indicated on display:

Rapid data transfer HELP
Select function XX

- Enter "07" for the function "Encode control unit" and confirm entry with Q key.

-> When adjacent display appears:

Code control unit Q
Enter code number XXXXX (0-32000)

- Enter the control unit code in accordance with the encoding table => Page 25 .

Key to code

XX		Country/emissions
	X	Drive/auxiliary functions
	X	Gearbox

	X	Model
--	---	-------

Example of encoding	
11501	EU4 (exhaust emission standard), front wheel drive with TCS/ESP, 5-gear manual gearbox, Audi A4

- Confirm entry with Q key.

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

4B0906018R	1.8litres R4/5VT	G
0002	□	
Coding 11501	WSC 12345	

- Press the ⇒key.

-> Indicated on display (function selection):

Rapid data transfer	HELP
Select function XX	

5.2 - Encoding table

Country/emissions	11	EU4 (exhaust emission standard)
Drive/auxiliary functions	0	Front-wheel drive without traction control system/ESP
	2	4-wheel drive without traction control system
	5	Front wheel drive with traction control system/ESP
	7	Four-wheel drive with electronic stability program
Gearbox	0	5-Speed Manual Gearbox
	5	Automatic gearbox 01V
Model	1	Audi A4

6 - Reading measured value block

6.1 - Reading measured value block

Test requirements:

- Coolant temperature at least 80 °C
- Electrical consumers switched off (radiator fan must not run during the test)
- Air conditioning switched off.

Test 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 indicated on display:

Rapid data transfer	HELP
Select function XX	

- Enter "08" to select the function "Reading measured value block" and confirm entry with Q key.



-> When indicated on display:

Reading measured value block Q
Enter display group number XXX

- Enter desired display group in three digits and confirm input with Q key.

Note:

The choice of display group depends on the particular functions and components to be tested.

-> Display for display group 000:

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

-> Display for display group 001 (example):

Read measured value block 1
1 2 3 4

Notes:

- ♦ If the printer is switched on, the current display can be printed out on the record slip.
- ♦ To change to another display group, proceed as follows:

Display group	V.A.G 1551	VAS 5051
Higher	Press key 3	Press s key
Lower	Press key 1	Press s key

7 - Readiness code

7.1 - Readiness code

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The readiness code appears as an 8-digit display in measured value block 086, display zone 1. Each of the 8 digits is allocated to a certain exhaust relevant system.

With a test sequence which must be run through in its entirety the self-diagnosis checks the function of each of these systems and sets the allocated position in the 8-digit display from "1" to "0" after test has been successful.

If the readiness code was produced after successful test sequence it reads "0 0 0 0 0 0 0 0" (measured value block 086, display zone 1).

If an individual test was completed but not "satisfactory" a fault is stored in the fault memory. Interrogating fault memory
=>Page 4 .

The readiness code is set back to

"0 1 1 0 1 1 0 1" when:

- ♦ The fault memory was erased,
- ♦ The voltage supply to the engine control unit has been interrupted (e.g. the connector detached, battery disconnected).
- ♦ A new engine control unit is installed.

In this case the readiness code should be produced again =>Page 28 .

Note:

When driving with varying loads the exhaust relevant tests are initiated by the control unit and the readiness code produces itself. In this case the concluding control possibility is omitted, i.e. it is not obvious whether the vehicle was handed over to the customer without any faults.

7.2 - Read out readiness code

Test sequence

- Connect diagnostic, testing 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 ignition must be switched on.
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-> When indicated on display:

Rapid data transfer HELP
Select function XX

- 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 "086" for "display group number 086" and confirm entry with Q key.

-> Display readout:

Read measured value block 86
1 2 3 4

- Check readiness code in display zone 1
 - Specified value: 0 0 0 0 0 0 0

	Display zones			
	1	2	3	4
Display group 086:				
Display	0 0 0 0 0 0 0	X X X X X X X	X X X X X X X	
Display	Ready Bits completed tests	completed individual tests	completed individual tests	
Range	1 = not completed 0 = completed	1 = not completed 0 = completed	1 = not completed 0 = completed	
Specified value	0 0 0 0 0 0 0	X X X X X X X	X X X X X X X	
Note:	Significance of readiness code => Page 27			

Note on display zone 1:

The display zone 1 is most important. This display shows which system was checked by the self-diagnosis since last erasing the fault memory or after using a new control unit. After erasing the fault memory all checkable values are set to "1". After successful completion of the tests the values are set to "0".

X	X	X	X	X	X	X	X	Notes on display group 086, display zone 1
								Catalytic converter-Diagnosis - Display 0 = Test was carried out - Display 1 = Test was not carried out (produce readiness code - => Page 28)



Display always 0			
Activated charcoal filter system			
- Display 0 = Test was carried out			
- Display 1 = Test was not carried out (produce readiness code			
- => Page 28)			
Secondary air system			
- Display 0 = Test was carried out			
- Display 1 = Test was not carried out (produce readiness code			
- => Page 28)			
Display always 0			
Lambda probes			
- Display 0 = Test was carried out			
- Display 1 = Test was not carried out (produce readiness code			
- => Page 28)			
Lambda probe heater			
- Display 0 = Test was carried out			
- Display 1 = Test was not carried out (produce readiness code			
- => Page 28)			
Display always 0			

Note:

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Only if all display digits are set to "0" in display zone 1 the readiness code was produced

If the specified value "0 0 0 0 0 0 0" is reached in display zone 1:

- Press the =>key.

-> Indicated on display (function selection):

Rapid data transfer HELP
Select function XX

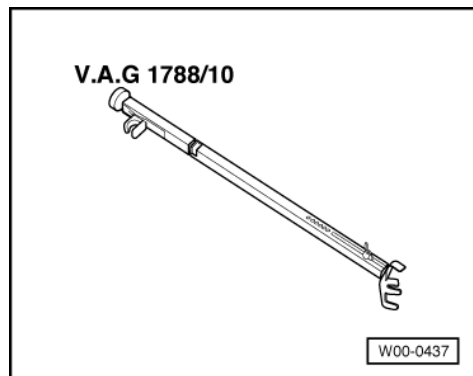
- Interrogate content of fault memory =>Page 4 ; there must not be any stored faults.

If specified value is not attained:

- Produce the readiness code => Page 28 .

7.3 - Produce readiness code

Special tools and workshop equipment required



- ♦ Speed adjuster V.A.G 1788/10

Preconditions:

- Vehicle stationary.
- Vehicles with automatic gearbox: Selector lever in position P or N
- Electrical consumers switched off (radiator fan must not run during the test)
- Air conditioning switched off.
- Coolant temperature at least 80 °C=> display group 004, display zone 3. Important: Run engine warm possibly through test drive.

Important note:

If the test result "OK" is displayed immediately within a test step after selecting the display group the test has already run and the next operating step can be carried out.

Operating step 1: Interrogating fault memory

Test conditions:

- Engine stopped, ignition switched on
- Connect vehicle diagnostic, testing and information system VAS 5051 or fault reader V.A.G 1551 and select engine electronics control unit with "Address word" 01 => Page 1

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-> 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.

-> The display shows the number of stored faults or "No fault detected!".

X fault(s) detected

If no fault is stored:

- Rectify any faults and erase the fault memory. Perform a road test and interrogate the fault memory again as a check.

If no fault is stored:

- Press the =>key.

Operating step 2: Erasing fault memory

Test conditions:

- Engine stopped, ignition switched on

-> 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.

Note:

When erasing the fault memory the readiness code is reset and therefore must be produced again.

-> When indicated on display:

Rapid data transfer
Fault memory is erased



- Press the ➡key.

Adaption of throttle valve control unit to the engine control unit

Test conditions:

- Engine stopped, ignition switched on

-> 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 "060" for "display group number 060" and confirm entry with Q key.

-> Display readout:

System in basic setting 60
1 2 3 4

- Check specified values in display zones 3 and 4:

	Display zones			
	1	2	3	4
Display group 060: Adaption of throttle valve control unit				
Display	xx %	xx %	x	---
Display	Throttle valve angle (angle sender 1)	Throttle valve angle (angle sender 2)	Learning stage counter	Adaption status
Range			0...8	ADP process running ADP OK ERROR
Specified value	3...93 %	97...3 %	8	ADP OK
Note:			After adaption the learning stage counter reaches figure 8. (Figures may be skipped)	If "ERROR" is displayed: Interrogate fault memory => Page 112

Note on display zone 3:

During adaption different figures are shown in display zone 3 which illustrate the relevant adaption condition. The deciding factor is not how the learning stage counter (display zone 3) behaves during the adaption process, but that specified value in display zone 4 of specified value "ADP OK" has been attained after adaption.

If specified value "ADP OK" is attained:

- Press C key.

Operating step 4: Adapt kickdown function 1)

- 1) Only on vehicles with automatic gearbox.

Test conditions:

- Engine stopped, ignition switched on

-> When indicated on display:

Basic setting Q
Enter display group number XXX

- Enter "063" for "display group number 063" and confirm entry with Q key.

-> Display readout:

System in basic setting 63
1 2 3 4

Note:

You will now be instructed to: "Confirm kickdown".

- Fully depress accelerator pedal beyond kickdown point and keep it pressed.

Note:

During adaption the kick-down point "Kick-down ADP is running" is displayed on V.A.G 1551. After successful adaption of the kick-down point the V.A.G 1551 shows "Kick-down ADP OK".

- Check specified value in display zone 4:

	Display zones			
	1	2	3	4
Display group 063: Adaption of kickdown function				
Display	xx %	xx %	Kickdown	---
Display	Sender 1 for accelerator pedal position	Adapted kickdown value sender 1 for accelerator pedal position	Kickdown	Adaption status
Range			Kickdown	Starting ADP process running ADP OK ERROR
Specified value	79...94 %	79...94 %	Kickdown	ADP OK
Note:				If "ERROR" is displayed: Interrogate fault memory => Page 4 .

Note on display zone 4:

If "ERROR" can be displayed, if e.g. accelerator pedal is not pressed when instructed by tester, or if accelerator pedal was released while adaption was already running but process was not yet complete.

In both cases it is necessary to exit the "Basic setting" mode and restart the adaption process afresh.

If specified value "ADP OK" is attained:

- Press C key.

Operating step 5: Check operating status of lambda control

- Start the engine (in vehicle with manual gearbox: press clutch pedal).

Note:

If necessary, reselect the engine control unit with "address word" 01 after starting the engine and initiate function "basic setting" with "04".

- Adjust speedometer V.A.G 1788/10 on accelerator pedal and increase speed to 2600 rpm.

**Test conditions:**

- Engine runs at 2600 rpm.

-> When adjacent display appears:

Basic setting Q
Enter display group number XXX

- Enter "030" for "display group number 030" and confirm entry with Q key.

-> When adjacent display appears:

System in basic setting 30
1 2 3 4

- Check lambda probe status in display zones 1 to 2.

Note:

Several minutes may pass until reaching a diagnostic result.

	Display zones			
	1	2	3	4
Display group 030: Lambda probe status				
Display	X X X		X X X	
Display	Lambda probe status, bank 1, probe 1		Lambda probe status, bank 1, probe 2	
Range	0 = off 1 = on		0 = off 1 = on	
Specified value	1 1 1		1 1 0	

Significance of 3-digit readout of display group 030			
X	X	X	Display zones 1 and 2
		X	Lambda control 0 = not active, 1 = active
	X		Lambda probe condition: 0 = not active, 1 = active
X			Condition of lambda probe heating: 0 = not active, 1 = active

Notes:

- The first digit of the 3-digit display (heating) fluctuates between 0 and 1 at certain operating points.
- The lambda control of lambda probe downstream of catalytic converter (bank 1, probe 2) is not active without engine load, i.e. the display of the 3-digit display is 0.
- Only continue with the test if the displays have reached "111" in display zone 1 and "110" in display zone 2 at least once.

Operating step 6: Diagnosis of ageing of lambda probe upstream of catalytic converter**Test conditions:**

- Engine continues running at 2600 rpm.

-> When indicated on display:

Basic setting Q
Enter display group number XXX

- Enter "034" for "display group number 034" and confirm entry with Q key.

-> Display readout:

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System in basic setting 34
 1 2 3 4

- Check specified value in display zone 4:

Note:

Several minutes may pass until reaching a diagnostic result.

	Display zones			
	1	2	3	4
Display group 034: Diagnosis Lambda probe ageing, lambda probe upstream of catalytic converter (bank 1)				
Display	xxxx rpm	xxx °C	x.x	---
Display	Engine speed	Exhaust gas temperature	Dynamics factor	Diagnosis status
Range				Test OFF Test ON B1-P1 OK B1-P1 not OK
Specified value	2600 rpm	greater than 350 °C	0.5...2.5	B1-P1 OK
Note:				If "B1-S1 not OK" is displayed: Interrogate fault memory => Page 4.

If specified value "B1-S1 OK" is attained:

- Press C key.

Operating step 7: Diagnosis of lambda probe condition downstream of catalytic converter

Test conditions:

- Engine continues running at 2600 rpm.

-> When adjacent display appears:

Basic setting 36
 Enter display group number xxx

- Enter "036" for "display group number 036" and confirm entry with Q key.

-> Display readout:

System in basic setting 36
 1 2 3 4

- Check specified value in display zone 2:

	Display zones			
	1	2	3	4
Display group 036: Lambda probe condition downstream of catalytic converter (Bank 1)				
Display	x.xxx V	---		
Display	Lambda probes-voltage Bank 1, probe 2	Diagnosis status		
Range		Test OFF Test ON B1-P2 OK B1-P2 not OK		
Specified value	0.100...0.950 V:	B1-P2 OK		



Display zones			
Note:		If "B1-S2 not OK" is displayed: Interrogate fault memory =>Page 4	

If specified value "B1-P2 OK" is attained:

- Press C key.

Operating step 8: Diagnosis of lambda control system

Test conditions:

- Engine continues running at 2600 rpm.

-> When indicated on display:

Basic setting Q
Enter display group number XXX

- Enter "037" for "display group number 037" and confirm entry with Q key.

-> Display readout:

System in basic setting 37
1 2 3 4

- Check specified value in display zone 4:

Display zones				
	1	2	3	4
Display group 037: Lambda control system diagnosis (bank 1)				
Display	xxx %	x.xxx V	x.xx	---
Display	Load	Lambda probe-voltage Bank 1, probe 2	Lambda correction value between Bank 1, Probe 1 and Bank 1, Probe 2	Diagnosis status
Range				Test OFF Test ON Syst. OK Syst. not OK
Specified value	13...40 %	0.100...0.950 V:	lower than 0.02	Syst. OK
Note:				IF "Syst. not OK" is displayed: Interrogate fault memory =>Page 4

If specified value "Syst. OK" is attained:

- Press C key.

Operating step 9: Diagnosis of ageing of lambda probes downstream of catalytic converter

Test conditions:

- Engine continues running at 2600 rpm.

-> When indicated on display:

Basic setting Q
Enter display group number XXX

- Enter "043" for "display group number 043" and confirm entry with Q key.

-> Display readout:

System in basic setting 43
1 2 3 4

- Check specified value in display zone 4:

	Display zones			
	1	2	3	4
Display group 043: Diagnosis Lambda probe ageing, lambda probe downstream of catalytic converter (bank 1)				
Display	xxxx rpm	xxx °C	x.xxx V	---
Display	Engine speed	Exhaust gas temperature	Lambda probe-voltage Bank 1, probe 2	Diagnosis status
Range				Test OFF Test ON B1-P2 OK B1-P2 not OK
Specified value	2600 rpm	greater than 350 °C	0.100...0.950 V:	B1-P2 OK
Note:				If "B1-S2 not OK" is displayed: Interrogate fault memory =>Page 4

If specified value "B1-P2 OK" is attained:

- Press C key.

Operating step 10: Diagnosis catalytic converter

Test conditions:

- Engine continues running at 2600 rpm.

-> When indicated on display:

Basic setting Q
Enter display group number XXX

- Enter "046" for "display group number 046" and confirm entry with Q key.

-> Display readout:

System in basic setting 46
1 2 3 4

- Check specified values in display zones 2 and 4:

Note:

The time of the test of the catalytic converter diagnosis is approx. 60 seconds.

	Display zones			
	1	2	3	4
Display group 046: Diagnosis catalytic converter (Bank 1)				
Display	xxxx rpm	xxx °C	x.xx	---
Display	Engine speed	Exhaust gas temperature	Measurement Cat conversion	Diagnosis status
Range			0...8	Test OFF Test ON Cat B1 OK Cat B1 not OK

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	Display zones			
Specified value	2600 rpm	550...700 °C	higher than 1.0	Cat B1 OK
Note:		As long as the exhaust temperature is not within the specified range the test is not initiated. If necessary, increase or decrease speed.		If "Cat B1. not OK" is displayed: Interrogate fault memory => Page 4 . If no fault is stored replace the catalytic converter.

If the specified value "Cat B1 OK" is attained:

- Press C key.

Operating step 11: Diagnosis of fuel tank breather valve

- Remove speedometer V.A.G 1788/10 and let engine run at idling speed.

Test conditions:

- Engine running at idling speed

-> When indicated on display:

Basic setting Q
Enter display group number XXX

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- Enter "070" for "display group number 070" and confirm entry with Q key.

-> Display readout:

System in basic setting 70
1 2 3 4

- Check specified value in display zone 4:

Note:

If the test is not initiated or if the display jumps from "Test ON" to Test "OFF" accelerate briefly, test is repeated.

	Display zones			
	1	2	3	4
Display group 070: Diagnosis fuel tank breather valve				
Display	xx %	xx %		---
Display	Degree of opening of fuel tank breather valve	Lambda control Diagnosis value		Diagnosis status
Range				Test OFF Test ON TEV OK TEV not OK Termination
Specified value	0...99 %	less than -7 % or greater than 7%		TEV OK
Note:			If "TEV. not OK" is displayed: Interrogate fault memory => Page 105	

If specified value "TEV OK" is attained:

- Press C key.

Operating step 12: Diagnosis of secondary air system

Test conditions:

- Engine running at idling speed

Note:

If the diagnosis of the secondary air system the secondary air pump runs several seconds.

-> When adjacent display appears:

Basic setting Q
 Enter display group number XXX

- Enter "077" for "display group number 077" and confirm entry with Q key.

-> Display readout:

System in basic setting 77
 1 2 3 4

- Abruptly floor the accelerator pedal and release again (brief burst of throttle). 2500 rpm.
- Check specified value in display zone 4:

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Note:

The time of the test of the secondary air system is approx. 60 seconds.

	Display zones			
	1	2	3	4
Display group 077: Diagnosis secondary air system (Bank 1)				
Display	xxxx rpm	xx.x g/s	xx %	---
Display	Engine speed	Air mass	Relative air mass Bank 1, secondary air system	Diagnosis status
Range				Test OFF Test ON Syst. OK Syst. not OK Termination
Specified value	Front: 740..860 rpm four-wheel drive: 760..880 rpm	2..0.5 g/s	greater than -20 %	Syst. OK
Note:				If "Syst. not OK" is displayed: Interrogate fault memory =>Page 4

If specified value "Syst. OK" is attained:

- Press the =>key.

-> Display readout (function selection):

Rapid data transfer HELP
 Select function XX

Operating step 13: Read out readiness code

- Read out readiness code => Page 27 .



24 - Mixture preparation, Injection

1 - Servicing Motronic injection system

1.1 - Servicing Motronic injection system

1.2 - Safety precautions

Note the following points if testers and measuring instruments have to be used during a road test:

Important:

- ♦ **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.**

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

- ♦ Always switch off the ignition before connecting or disconnecting injection or ignition system wiring or tester cables.
- ♦ To run engine at starting speed without actually starting it (for example, in order to test compression), unplug connector from the output stage of the ignition coils and also the connectors on the injectors.
- ♦ In the case of some tests, a fault may be recognised and stored by the control unit. At the end of all tests and repairs, therefore, the fault memory should be interrogated and, if necessary, erased. After erasing the fault memory the readiness code must be renewed => Page 28 .
- ♦ 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.

Important:

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

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 toolboxes 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.

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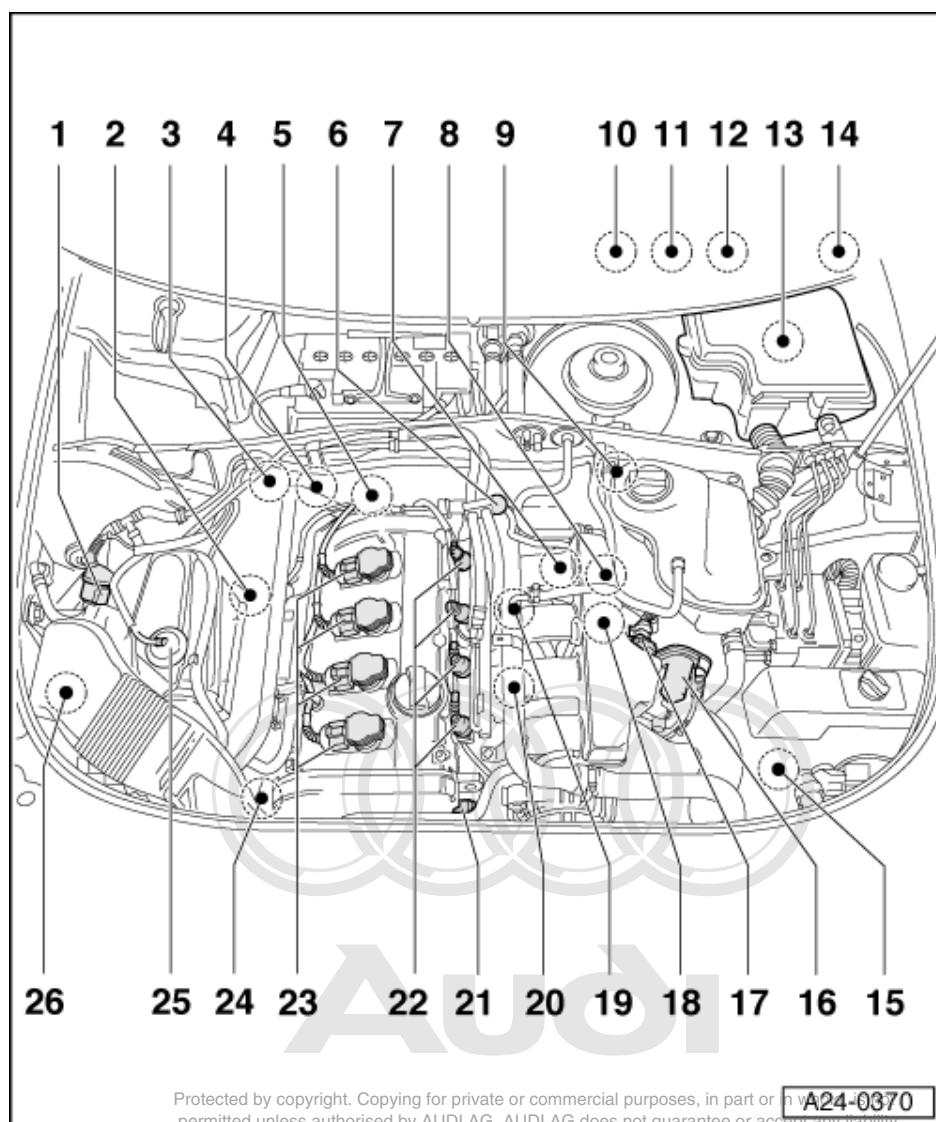
Make sure connections are dry when attaching.

1.4 - Technical data

Engine code letters		AWT (1.8 litre / 5V / 110 kW-engine)
Idling speed	FRONT-WHEEL DRIVE	740...860 rpm
Not adjustable - controlled by the idling speed stabilisation	four-wheel drive running gear	760...880 rpm
Engine speed limitation by deactivation of injectors		6800 rpm
Fuel pressure at idling speed	Vacuum hose connected	approx. 3.5 bars
	Vacuum hose detached	approx. 4.0 bars
Holding pressure after 10 minutes		at least 2.5 bar
Injectors	Spray pattern	Two-hole nozzle / same for all injectors
	Injection quantity (30 s)	135 ±10 ml
	Resistance (ambient temperature)	12...13 Ω



1.5 - Fitting locations overview

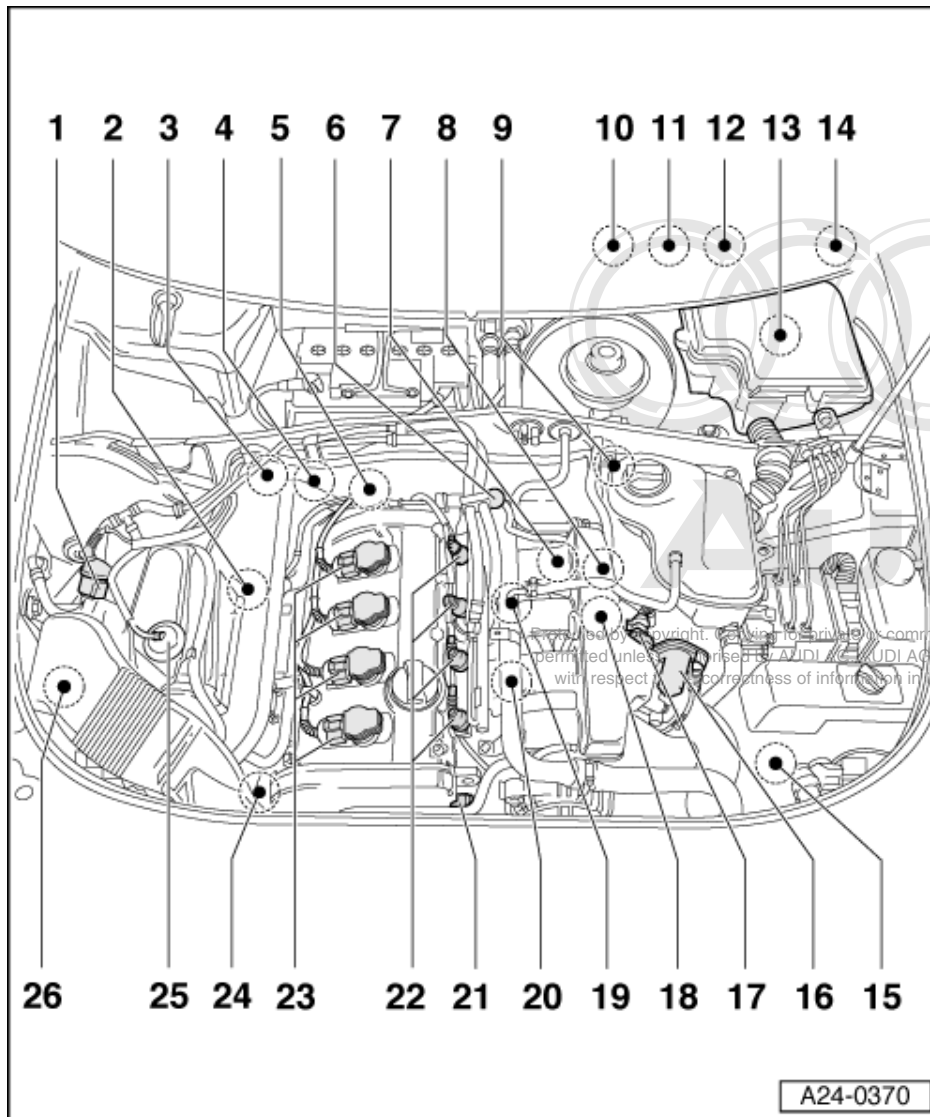


1 Solenoid valve 1 for activated charcoal filter -N80

- ♦ Checking =>Page **105**

2 Lambda probe upstream of catalytic converter -G39 - 55Nm

- ♦ Constant lambda probe
- ♦ Check lambda probe and lambda control upstream of catalytic converter => Page **83**
- ♦ Check lambda probe ageing upstream of catalytic converter=> Page **88**
- ♦ Check lambda probe heating upstream of catalytic converter => Page **91**
- ♦ Removing and installing
=>Page **103**



3 Check lambda probe downstream of catalytic converter -G130 - 55Nm

- ♦ Check lambda probe and lambda control downstream of catalytic converter => Page 94
- ♦ Check lambda probe heating downstream of catalytic converter => Page 100
- ♦ Removing and installing
=>Page 103

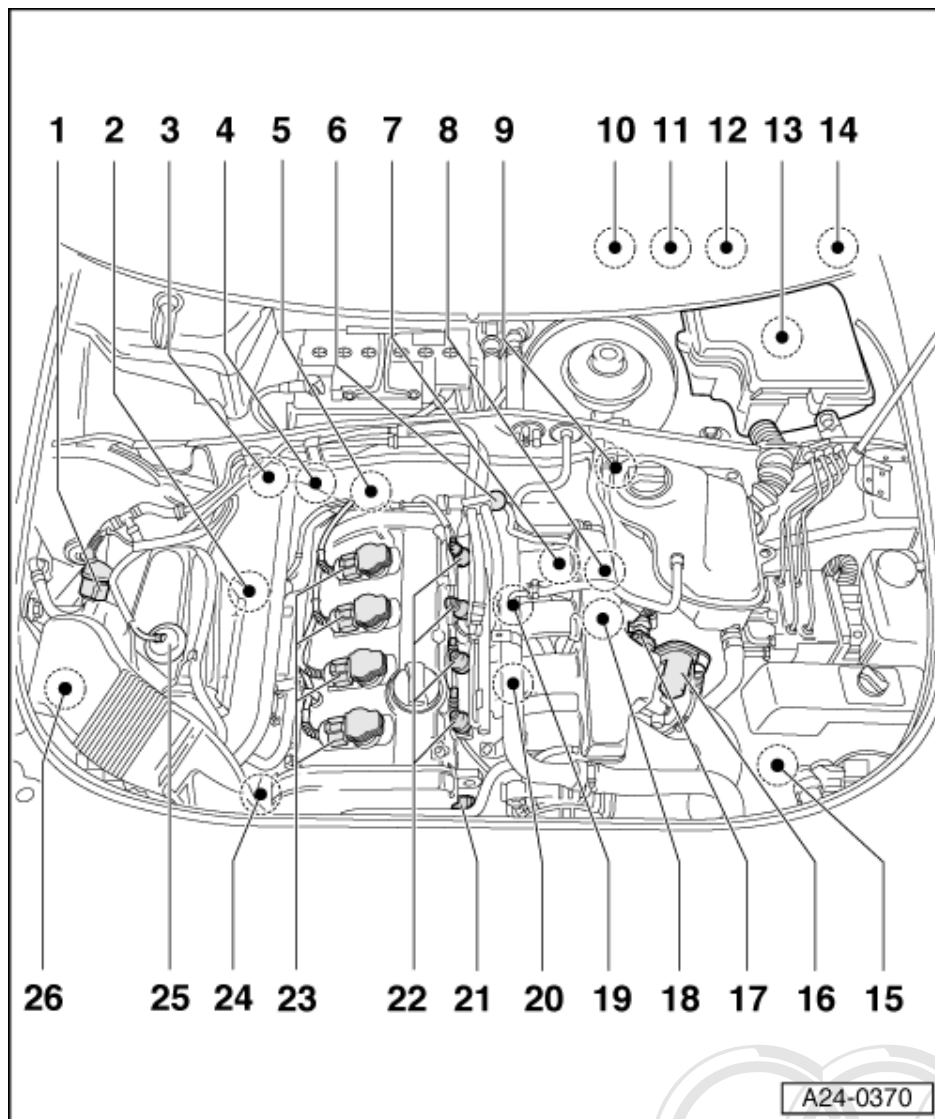
4 Combi valve for secondary air inlet

- ♦ Checking, removing and installing:

=> 4-cylinder engine (5-valve turbo), Mechanical components; Repair group 26; Check secondary air system
Check secondary air system

5 Coolant temperature sender -G62

- ♦ Checking =>Page 158

**6 Fuel pressure regulator**

- ♦ Checking => Page 59

7 Engine speed sender -G28

- ♦ Checking => Page 155

8 Checking secondary air inlet valve -N112

- ♦ Fitting location => Fig. 49
- ♦ Checking:

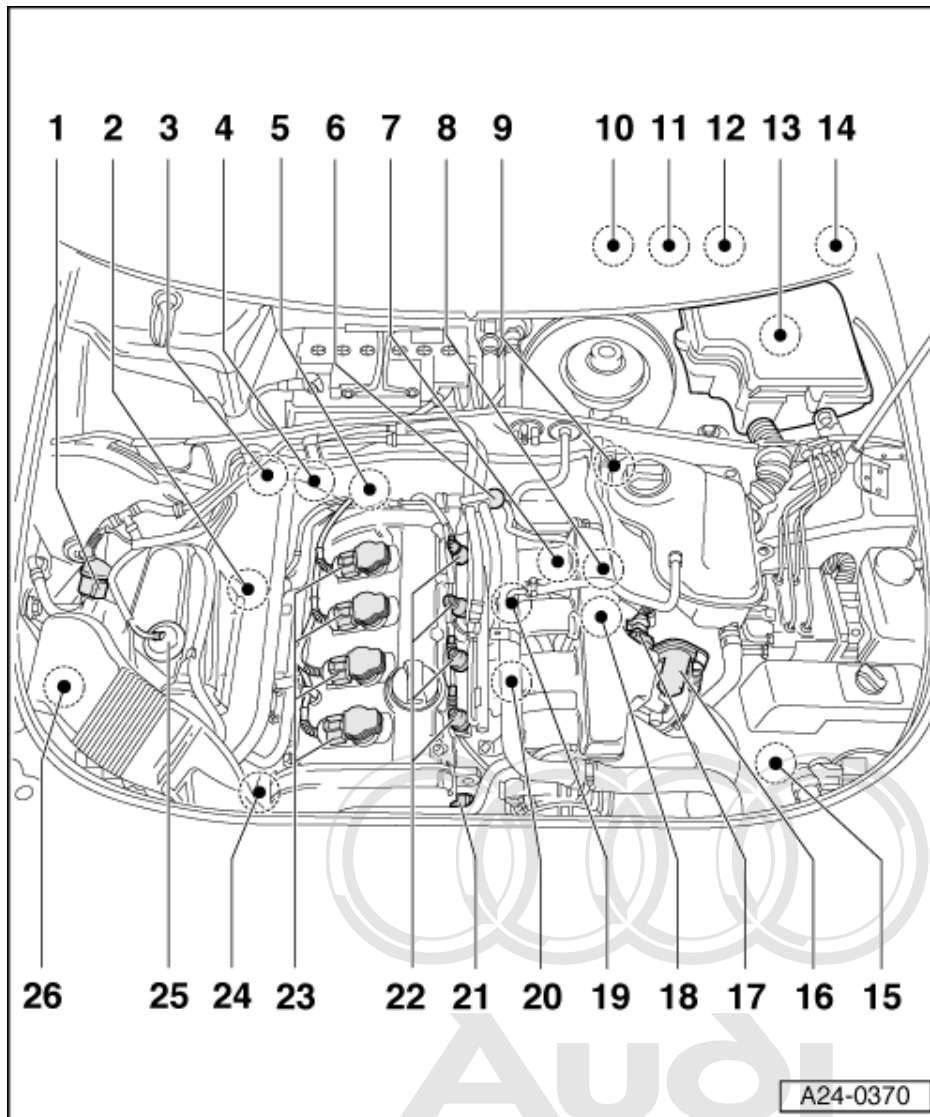
=> 4-cylinder engine (5-valve turbo), Mechanical components; Repair group 26; Check secondary air system
Check secondary air system

- ♦ Connector green

9 Bracket for connectors

- ♦ Fitting location => Fig. 48
- ♦ Accessible with coolant expansion tank removed and moved to side

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10 Instrument cluster:

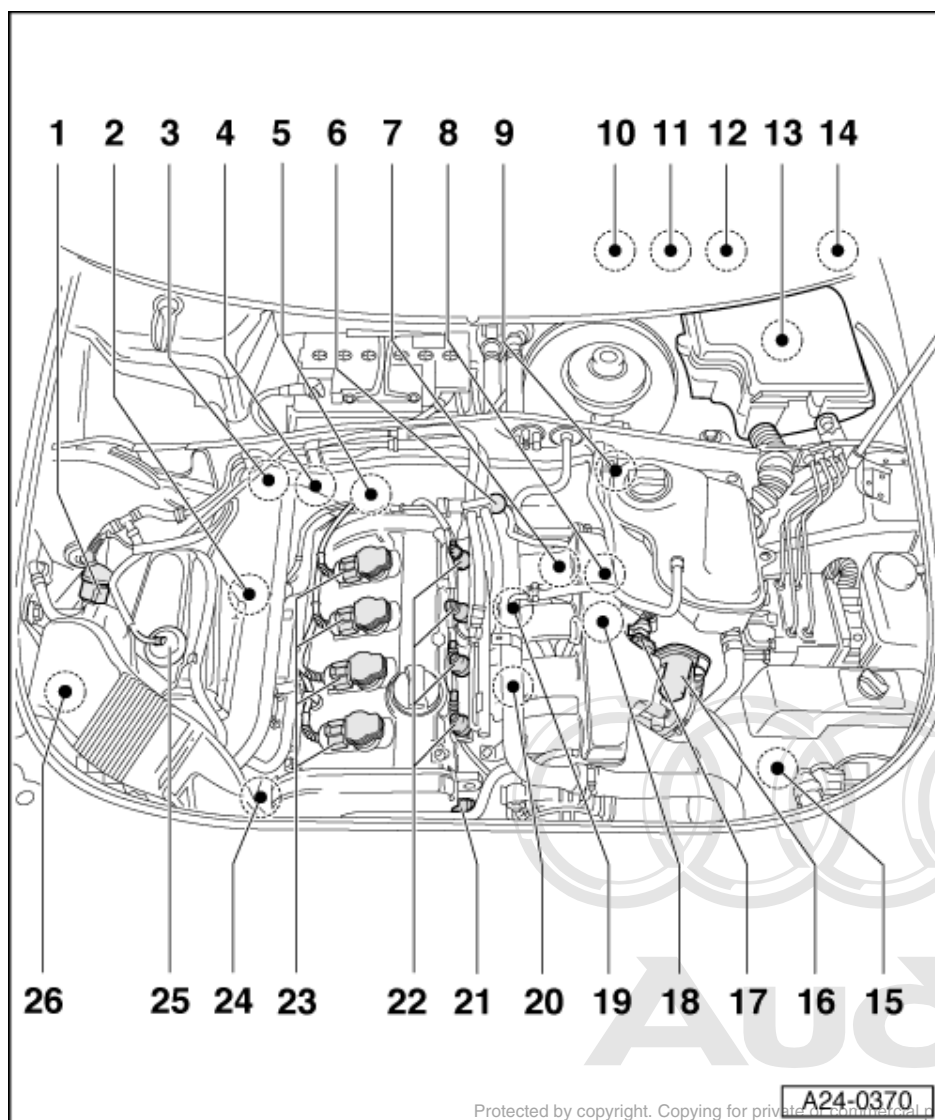
- ♦ With fault lamp for electronic throttle -K132 ("EPC" warning lamp). Notes on EPC warning lamp =>Page 109 .
- ♦ With exhaust warning lamp -K83. Notes on exhaust warning lamp =>Page 56

11 Gas pedal position sender -G79 and sender 2 for gas pedal position -G185

- ♦ Fitting location => Fig. 50
- ♦ Checking =>Page 116
- ♦ Adapt kickdown function=>Page 119

12 Brake light switch - F and brake pedal switch -F47

- ♦ Fitting location => Fig. 49

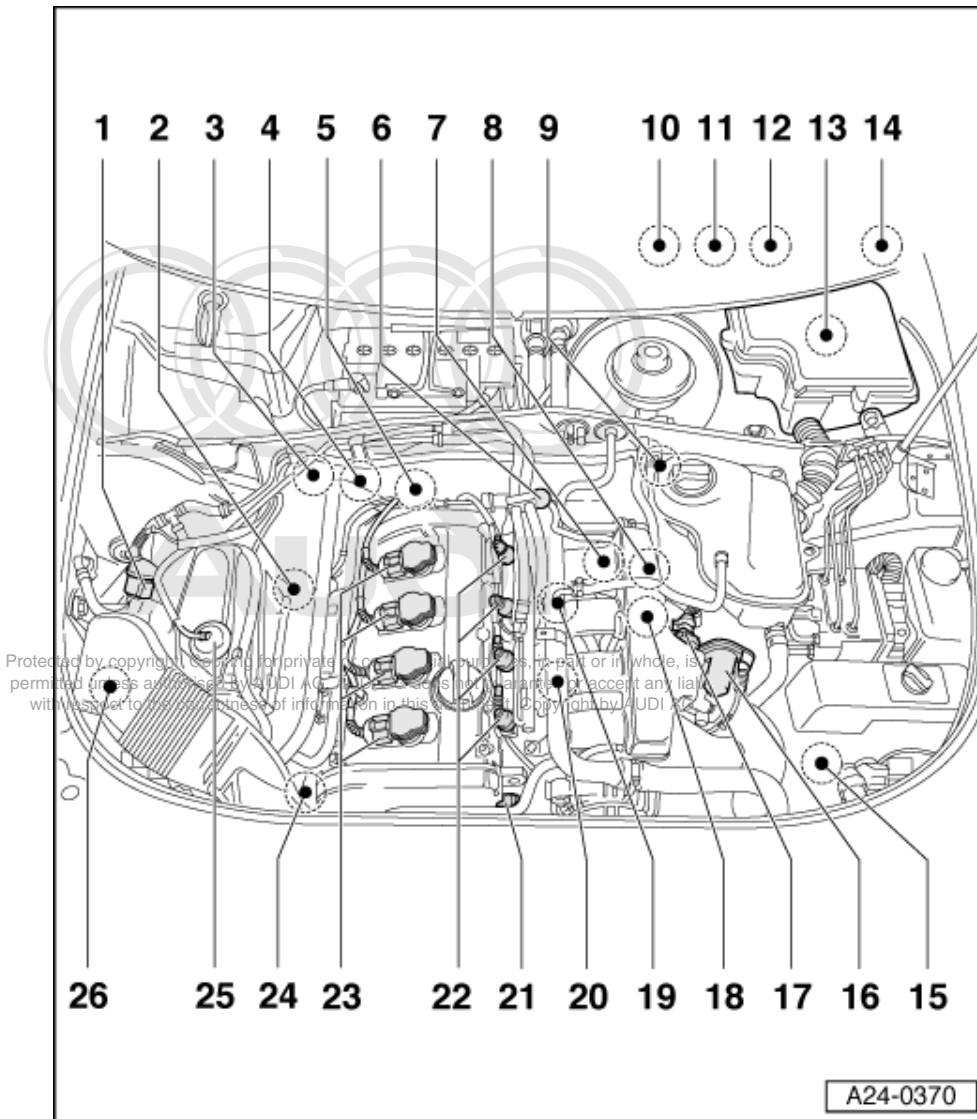


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13 Electronics box in plenum chamber

- ◆ Fitting locations => Fig. 50
- ◆ Fitting location for engine control unit -J220 with integrated altitude sender -F96
- ◆ Check power supply to engine control unit => Page 161 .
- ◆ Procedure following interruption of voltage supply => Page 54
- ◆ Replace engine control unit => Page 54
- ◆ Fitting location for secondary air pump relay -J299
- ◆ Check secondary air pump relay -J299:

=> 4-cylinder engine (5-valve turbo), Mechanical components; Repair group 26; Check secondary air system
Check secondary air system



- ♦ Fitting location for power supply relay for Motronic -J271
- ♦ Check power supply relay for Motronic -J271 =>Page 147
- ♦ Fitting location for fuse S130 for secondary air pump

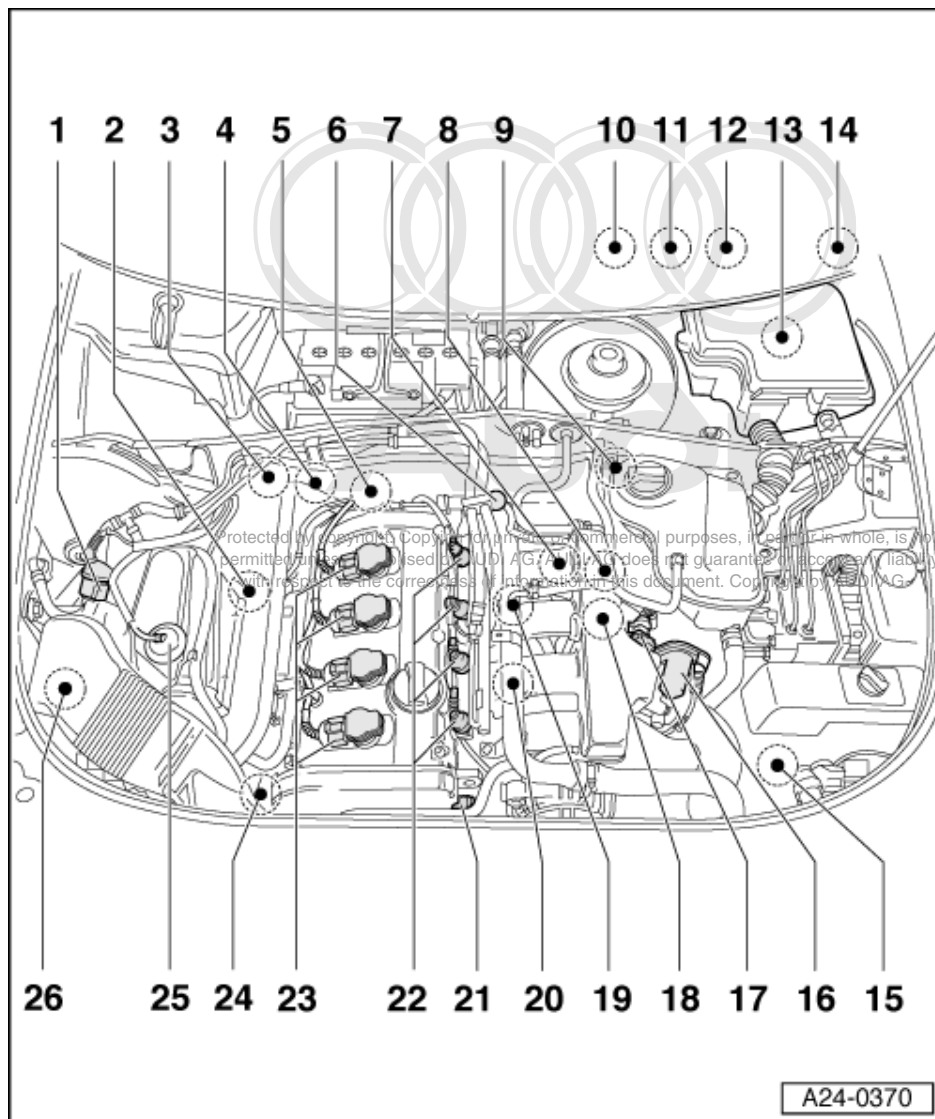
14 Clutch pedal switch -F36

- ♦ Fitting location => Fig. 49

15 Boost pressure sender -G31

- ♦ Fitting location =>Fig. 51
- ♦ Checking:

=> 4-cylinder Engine (5-valve Turbo), Mechanical components; Repair group 21; Checking charge air system with exhaust gas turbocharger Checking charge air system with exhaust gas turbocharger



16 Throttle valve control unit -J338

- ♦ With throttle valve drive -G186, angle sender for throttle valve drive -G187 and angle sender 2 for throttle valve drive -G188
- ♦ Checking => Page **110**

17 Intake air temperature sender -G42

- ♦ Checking =>Page **152**

18 Air recirculation valve for turbocharger -N249

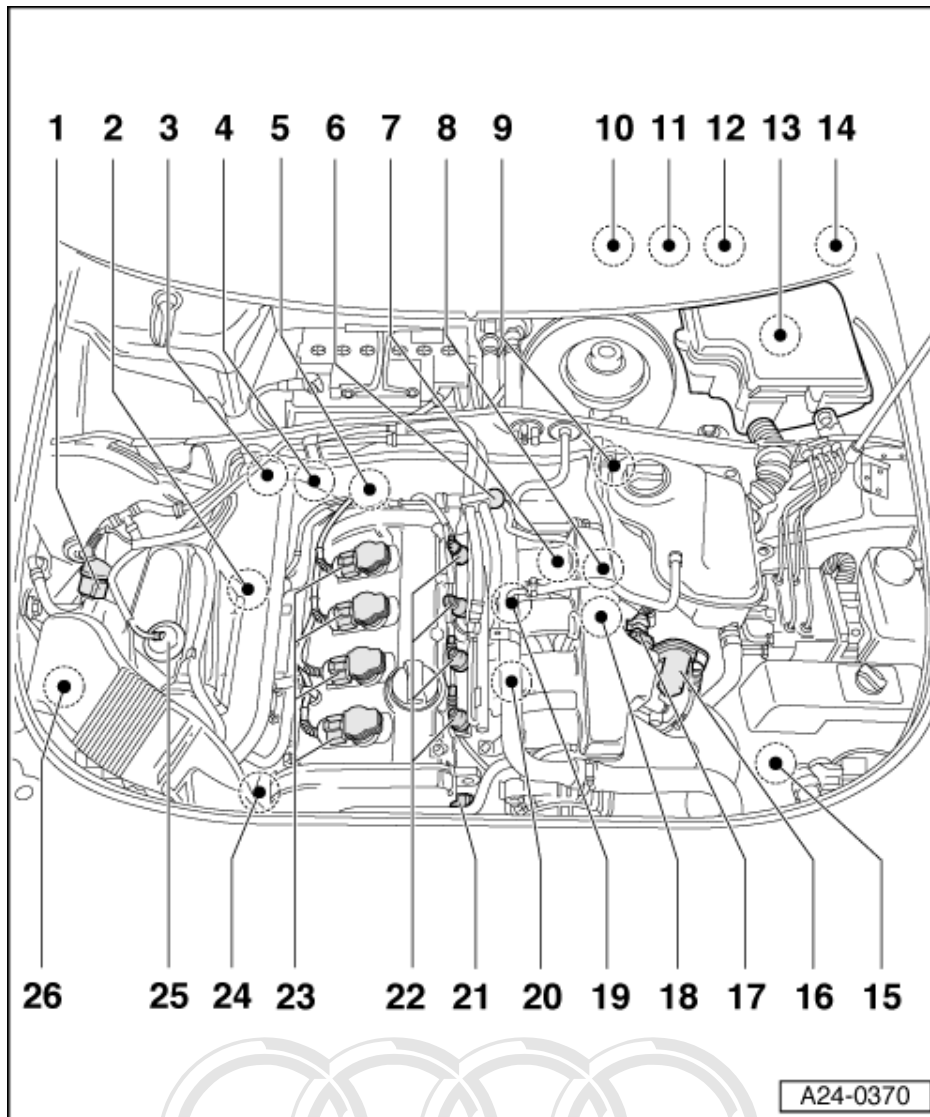
- ♦ Fitting location =>Fig. **49**
- ♦ Connector blue

19 Knock sensor 1 -G61

20 Knock sensor 2 -G66

21 Hall sender -G40

- ♦ Checking => Page **167**



22 Injector -N30...-N33

- ♦ Checking => Page 63
- ♦ Removing and installing
=>Page 70

23 Ignition coils -N, -N128, -N158, -N163

- ♦ Checking =>Page 141

24 Boost pressure control solenoid valve -N75

- ♦ Checking:

=> 4-cylinder Engine (5-valve Turbo), Mechanical components; Repair group 21; Checking charge air system with exhaust gas turbocharger. Checking charge air system with exhaust gas turbocharger

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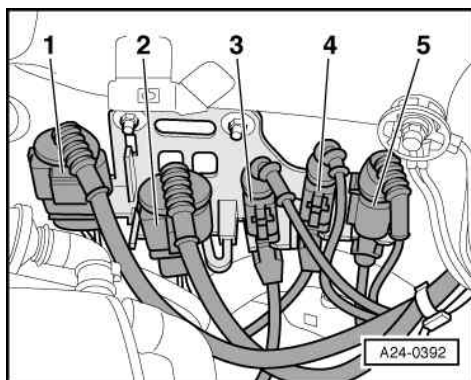
25 Air mass meter -G70

- ♦ Checking =>Page 77

26 Secondary air pump motor -V101

- ♦ Checking:

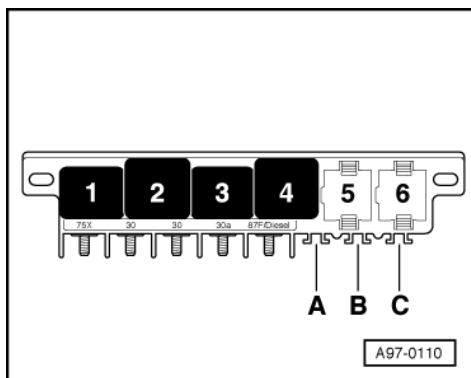
=> 4-cylinder engine (5-valve turbo), Mechanical components; Repair group 26; Check secondary air system
Check secondary air system



-> Fig.1 Fitting location for connectors

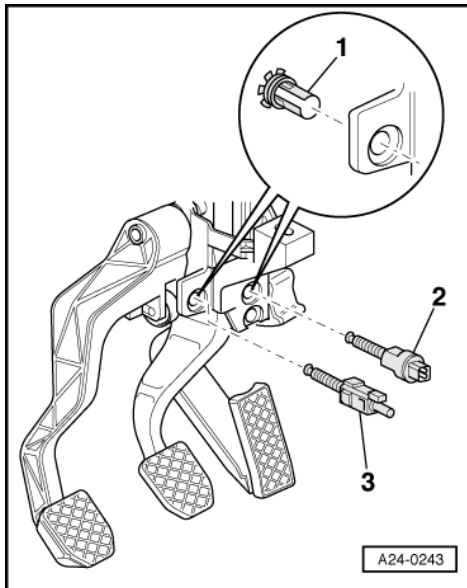
The following connections are located underneath the coolant expansion tank:

- Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted without express written permission of Audi AG. Audi AG does not guarantee or accept any liability for errors or omissions.
- 1 - 4-pin connector, brown
for lambda probe downstream of catalytic converter -G130 and heater for lambda probe -Z29 (bank 1, probe 2)
 - 2 - 6-pin connector, black
for lambda probe downstream of catalytic converter -G39 and heater for lambda probe -Z19 (bank 1, probe 1)
 - 3 - 3-pin connector, grey
for engine speed sender -G28
 - 4 - 3-pin connector, blue
For knock sensor 2 -G66
 - 5 - 3-pin connector, green
for knock sensor 1 -G61



-> Fig.2 Fitting location for secondary air inlet valve -J17

Fuel pump relay -J17 on central electrics in driver's left footwell, position 4.



-> Fig.3 Fitting location for brake light switch -F and brake pedal switch -F47, clutch pedal switch -F36

- 1 - Clip
- 2 - Clutch pedal switch -F36
- 3 - Brake light switch -F, brake pedal switch -F47

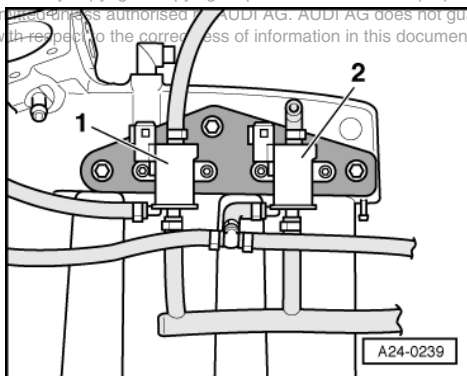
Note:

Switch must only be installed once in order to ensure that it is sufficiently tight.

Adjust switch:

=> Brake systems; Repair group 46; Removing and installing brake pedal Removing and installing brake pedal

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-> Fig.4 Installation position secondary air inlet valve

-N112 and air recirculation valve for turbocharger

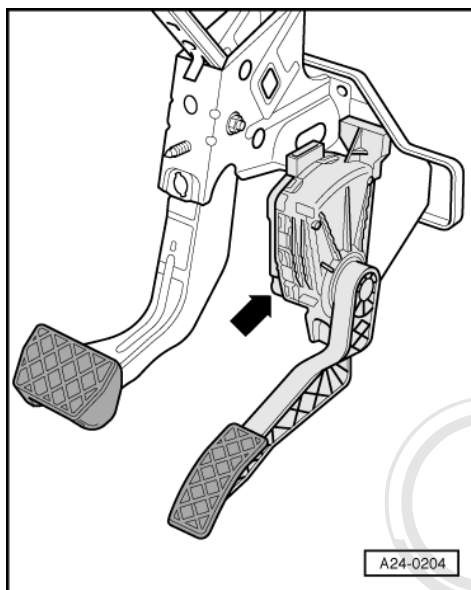
-N249

♦ Location: underneath intake pipe

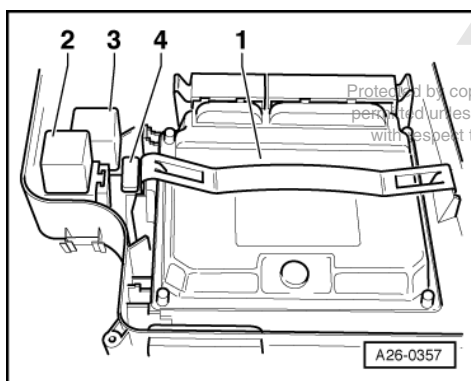
- 1 - Air recirculation for turbocharger -N249
- 2 - Secondary air inlet valve -N112

Note:

The illustration shows bottom view of intake pipe.

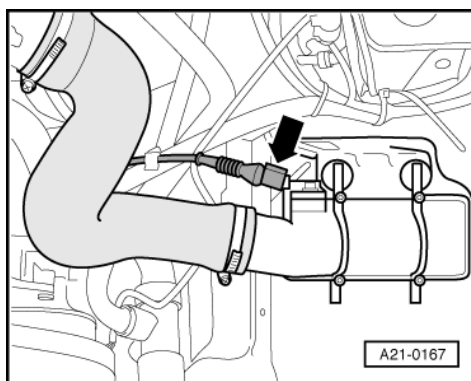


-> Fig.5 Installation position for accelerator pedal position sender -G79 and sender 2 for accelerator pedal position -G185



-> Fig.6 Fitting locations in electronics box (plenum chamber)

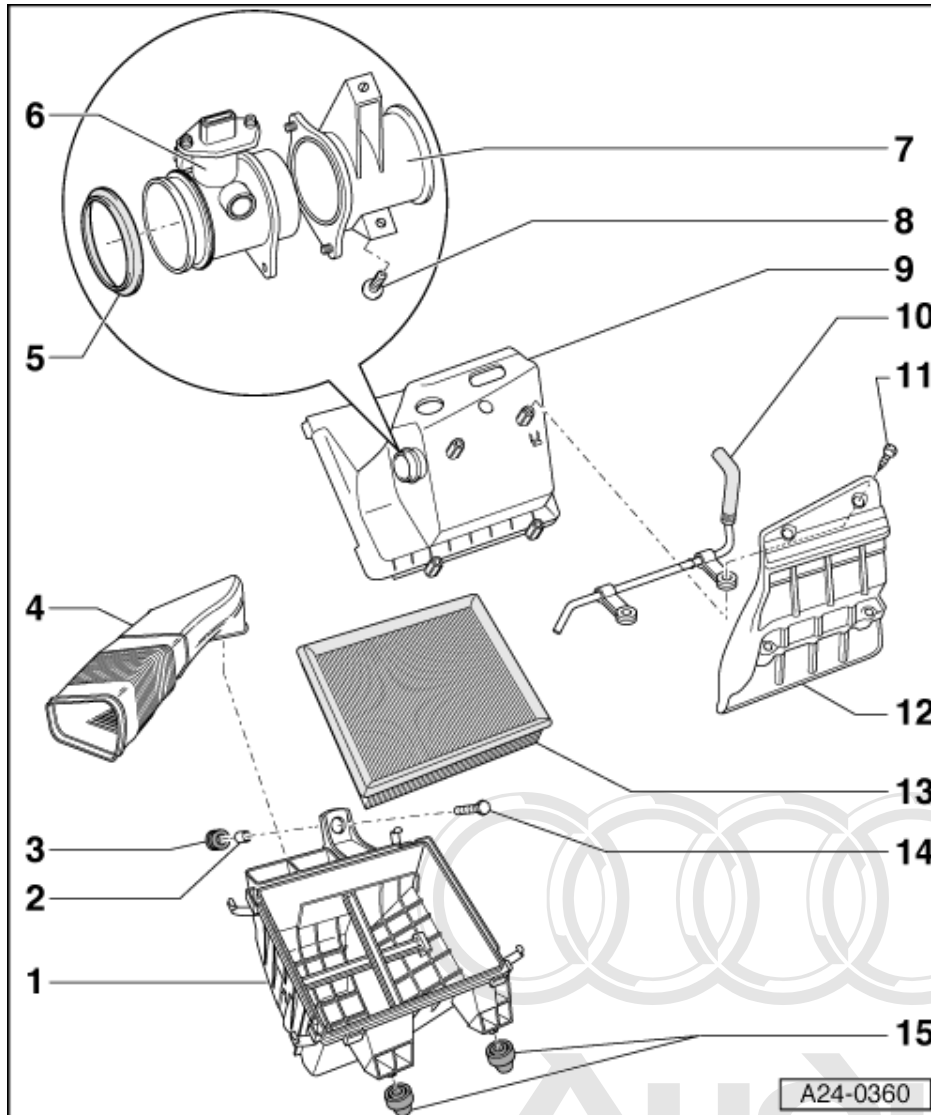
- 1 - Engine control unit
- 2 - Secondary air pump relay -J299
- 3 - Power supply relay for Motronic -J271
- 4 - Fuse S130 for secondary air pump



-> Fig.7 Fitting location boost pressure sender -G31

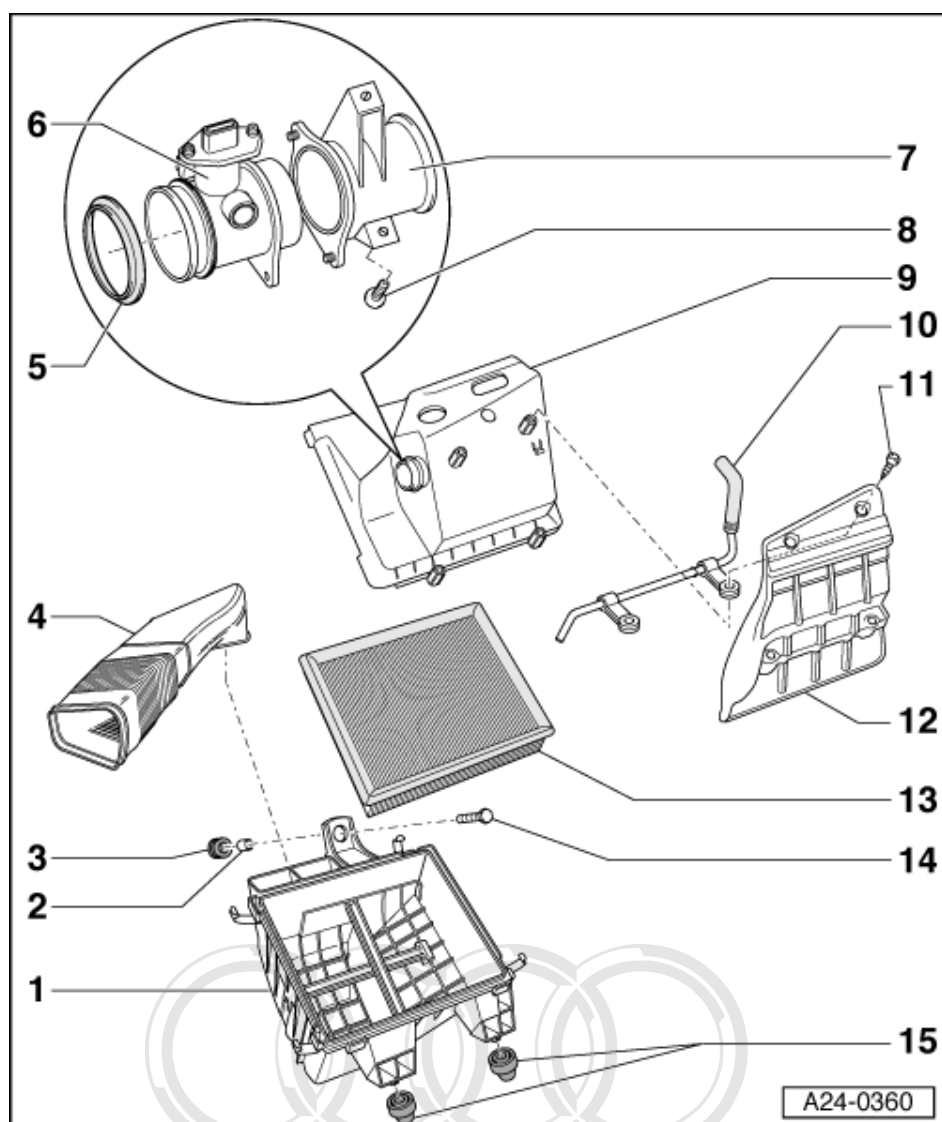
Boost pressure sender -G31 -arrow- screwed into top of charge air cooler.

1.6 - Dismantling and assembling air cleaner



- 1 Air filter - Lower part of housing
- 2 Sleeve
- 3 Rubber grommet
- 4 Air duct
 - ♦ To lock carrier
- 5 Sealing ring
- 6 Air mass meter -G70
 - ♦ Checking =>Page 77
- 7 Air duct
- 8 6 Nm
- 9 Air filter - Upper part of housing

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**10 Wiring**

- ♦ For activated charcoal canister system

11 10 Nm**12 Heat shield****13 Filter element**

- ♦ Observe change intervals

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=> Maintenance manual

14 10 Nm**15 Rubber grommet****1.7 - Wiring and component check with test box V.A.G 1598/31****Notes:**

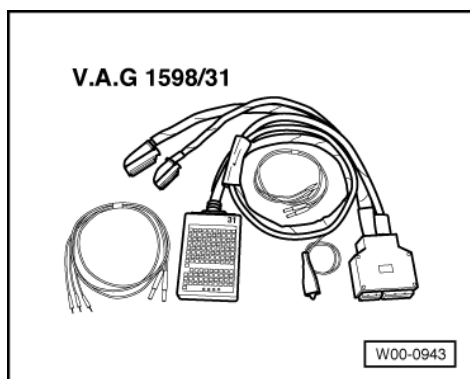
- ♦ The test box V.A.G 1598/31 is designed in such a way that it can be connected simultaneously to the engine control unit wiring harness and to the engine control unit itself.
- ♦ This has the advantage that the electronic motor control system remains fully functional when the test box is connected (for example, for measuring signals when the engine is running).

- ◆ Whether the engine control unit has to be additionally connected to the test box or not is described in the respective test procedures.
- ◆ 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.)

Important:

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

Special tools and workshop equipment required

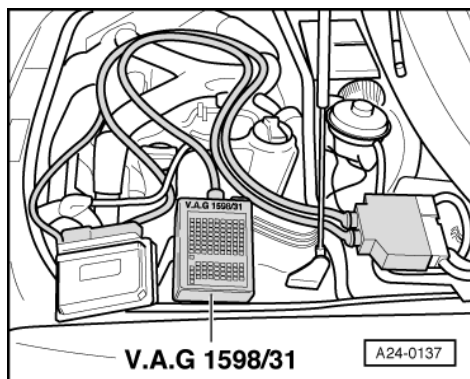


- ◆ V.A.G 1598/31

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Procedure

- Switch ignition off.



- Remove engine control unit => Page 54 .
- -> Connect V.A.G 1598/31 test box to connector on wiring harness. The earth clip on the test box (not visible in the illustration) has to be connected to earth. Whether or not the engine control unit has to be additionally connected to the test box is described in the respective test procedures.
- Carry out test as described in the appropriate repair procedures.

Important note:

After reinstalling the engine control unit the following operations must be performed:

- Perform adaption of throttle valve control unit -J338 => Page 110 .
- Adaption of kickdown function on vehicles with automatic gearbox =>Page 119 .
- Interrogate fault memory and erase, if necessary => Page 4 .
- If fault memory is erased the readiness code must be produced again => Page 28 .



Note:

In the first adaption phase irregular idling and slight jolting when driving are possible.

1.8 - Procedure following interruption of voltage supply

Important note:

After reconnecting the voltage supply the following operations must be performed:

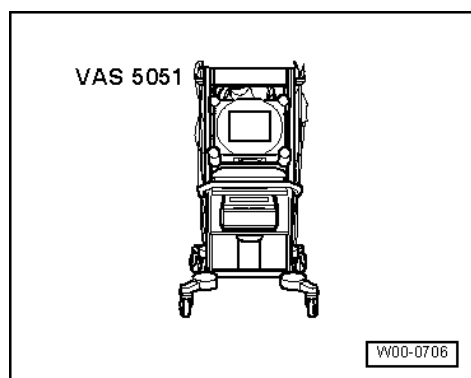
- Perform adaption of throttle valve control unit -J338 => Page 110 .
- Adaption of kickdown function on vehicles with automatic gearbox =>Page 119 .
- Interrogate fault memory and erase, if necessary => Page 4 .
- If fault memory is erased the readiness code must be produced again => Page 28 .

Note:

In the first adaption phase irregular idling and slight jolting when driving are possible.

1.9 - Renewing engine control unit

Special tools and workshop equipment required



- ♦ VAS 5051 with VAS 5051/1

or

- ♦ V.A.G 1551 with V.A.G 1551/3 A

Removing

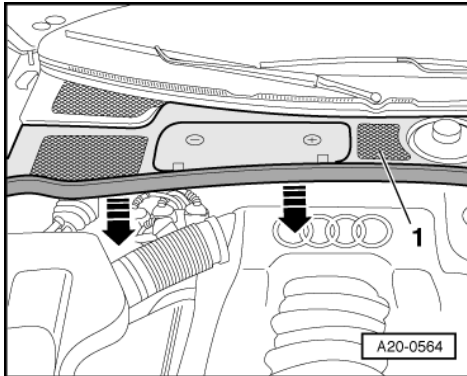
- Connect vehicle diagnostic, testing and information system VAS 5051 or fault reader V.A.G 1551 and select engine electronics control unit with "Address word" 01 => Page 1
For this purpose, the ignition must be switched on.

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

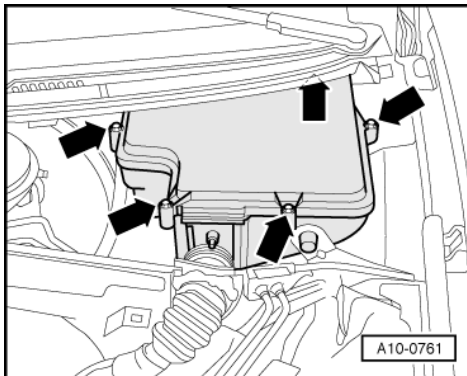
4B0906018R	1.8 litre R4/5VT
0002	□
Coding 11501	WSC 12345

- Always start by displaying and printing out the control unit identification => Page 3 .

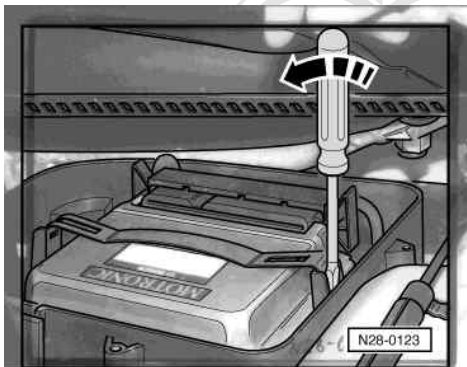
- Compare code to encoding versions => Page 25 .
- Switch ignition off.



- -> Remove rubber seal from plenum chamber cover in direction of arrow.
- Remove plenum chamber cover -1- from the front.

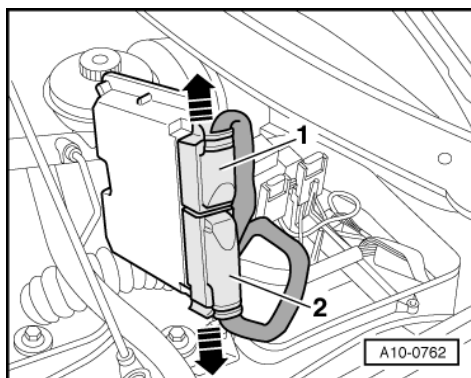


- -> Remove cover for electronics box (plenum chamber) -arrows-.



- -> Carefully lever off the retainer bar with a screwdriver -arrow-.

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- -> Detach connector catch -arrows- and pull off control unit connectors -1- and -2-.

Note:

When the engine control unit is disconnected, the learned values are erased but the contents of the fault memory remain intact.

- Take out engine control unit.

Installing

Installation is carried out in the reverse order; note the following:

Important note:

After installing the new engine control unit, the following operations must be performed:

- Interrogate fault memory and erase, if necessary => Page 4 .
- Perform adaption of throttle valve control unit -J338 => Page 110 .
- Note instructions for encoding new engine control unit => Page 24 .
- In vehicles with cruise control (recognisable from steering column switch), this should be freed in engine control unit:

=> Electrical System; Repair group 01; Self-diagnosis for the cruise control system (CCS) Self-diagnosis for the cruise control system (CCS)

- Adaption of kickdown function on vehicles with automatic gearbox =>Page 119 .
- Adapt immobiliser to engine control unit.

=> Electrical system; Repair group 01; Immobiliser self-diagnosis alternating code; Adaption after replacement of the engine control unit Immobiliser self-diagnosis alternating code Adaption after replacement of the engine control unit

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- Produce readiness code => Page 28 .

Note:

In the first adaption phase irregular idling and slight jolting when driving are possible.

1.10 - Exhaust warning lamp -K83 in dash panel insert

If the engine control unit detect faults which result in deterioration of exhaust emissions, these faults will be indicated by illumination of exhaust gas warning lamp.

After switching on the ignition the engine control unit switches on the EPC warning lamp. Shortly after starting the engine the exhaust warning lamp goes out if the engine control unit does not detect a fault through which the exhaust emissions deteriorate and if the actuation of the lamp is ok from the engine control unit.

If faults which cause the exhaust emission to deteriorate are detected when operating the engine the engine control unit switches on the exhaust warning lamp. (These faults are listed in the fault table). At the same time, an entry is made in the engine control unit fault memory.

When switched on, the exhaust gas warning lamp may flash or illuminate constantly. In any case the fault memory must be interrogated => Page 4

Continuous:

A fault is present which causes deterioration of the exhaust emission. Interrogate fault memory for Motronic-control unit or automatic gearbox (if available).

If there is a drive problem or a customer query and the exhaust warning lamp is not illuminated the fault memory must be interrogated. Faults which do not switch on the exhaust warning lamp immediately but only after recognising the fault after restarting the engine can also be stored.

Flashing:

A fault is present which under these driving conditions will cause damage to the catalytic converter (e.g. mis-firing). In this case driving may only continue at reduced power.

1.11 - Check exhaust warning lamp -K83

Functional check on control lamp

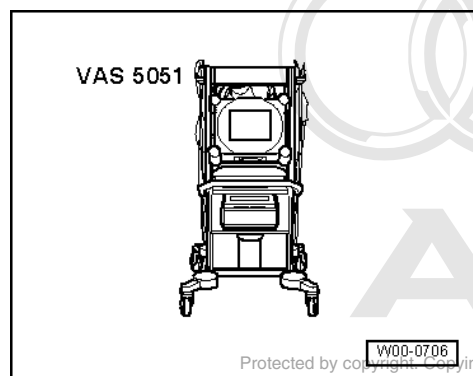
- Switch the ignition on.
 - The fault lamp for self-diagnosis (exhaust warning lamp) must illuminate.
- Start the engine.
 - Shortly after starting the engine the exhaust warning lamp goes out if no exhaust emission relevant fault is stored in the fault memory.

Note:

The switch-on signal for the fault lamp is transfer via CAN bus to the dash panel insert by the engine control unit. Check the data exchange between engine control unit and other CAN-control units =>Page 132

1.12 - Checking idling speed

Special tools and workshop equipment required



- ◆ VAS 5051 with VAS 5051/1

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or

- ♦ V.A.G 1551 with V.A.G 1551/3 A

Test requirements:

- No leaks in exhaust system.
- Coolant temperature at least 80 °C.
- Electrical consumers switched off (radiator fan must not run during the test).
- Air conditioning switched off.
- Pressure gauge not connected.
- Vehicles with automatic gearbox: Selector lever in position P or N.

Notes:

- ♦ The idling speed cannot be adjusted.
- ♦ The idling speed is tested during the basic setting of the engine.
- ♦ During basic setting, the solenoid valve for the active carbon canister (valve -N80) is closed and the air conditioner compressor is switched off.

Test sequence

- Interrogate fault memory => Page 4 . 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.
- Leave engine idling.

Important:
The electric radiator fan should not be running.

-> When indicated on display:

Rapid data transfer HELP
Select function XX

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

-> When indicated on display:

Starting basic setting Q
Enter display group number XXX

- Enter "056" for "display group number 056" and confirm entry with Q key.

-> When adjacent display appears:

System in basic setting 56
1 2 3 4

- Check whether the engine speed in the display zone 1 (actual speed) is within the permitted tolerance range.

	Display zones			
	1	2	3	4
Display group 056: Idling speed stabilisation at operating temperature				
Display	xxx rpm	xxx rpm	x.x %	X X X X X
Display	Engine speed (actual)	Engine speed (specified)	Idling speed control Change in torque	Operating conditions
Specified value	Front: 740..860 rpm four-wheel drive: 760..880 rpm	Front: 800 rpm four-wheel drive: 820 rpm	x.x %	0 0 0 0 0

Display zones				
Note:	If specified value not attained =>Page 59			Significance of figures =>Page 59

Notes:

- ♦ The engine speed in display zone 1 (actual speed) is the actual engine speed.
- ♦ The engine speed in display zone 2 (specified speed) is a theoretical value calculated by the engine control unit.
- ♦ During idling, the engine control unit always tries to adapt the actual engine speed to the specified engine speed.
- ♦ This means that during idling the actual engine speed must always approximate to the specified engine speed.
- ♦ Display zones three and four are there for information but are irrelevant to the control of the engine idling speed.

If specified value is attained:

- Press the =>key.

-> Indicated on display (function selection):

Rapid data transfer	HELP
Select function XX	

If specified value is not attained:

- Interrogate fault memory again =>Page 4 .
- If fault memory is erased the readiness code must be produced again => Page 28 .

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:

- Check induction system for unmetered air => Page 81 .
- Check throttle valve control unit =>Page 110 .
- Check solenoid valve for active carbon canister continuously open, check =>Page 105 .
- Perform adaption of throttle valve control unit =>Page 110 .

Significance of 5-digit readout of display group 056

x	x	x	x	x	Display zone 4
				0	Air conditioner compressor: 0 = air conditioner compressor off; 1 = air conditioner compressor on
			0		Manual gearbox: Display always 0 Gear with automatic gearbox: 0 = Selector lever in P or N; 1 = Selector lever in 2/3/4/D/R
		0			Display always 0
	0				Display always 0
0					Display always 0

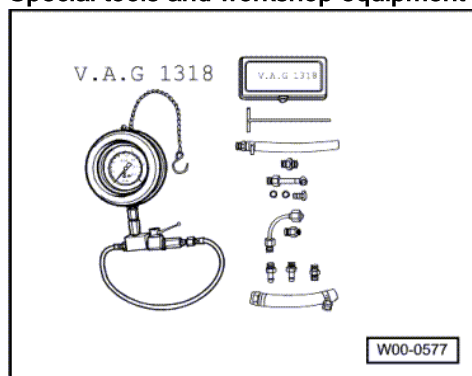
1.13 - Checking system pressure, fuel pressure regulator and holding pressure

Note:

Fuel pressure regulator regulates fuel pressure as a function of intake pressure. As a result, the pressure drop at the injectors remains constant for each engine speed and load range.



Special tools and workshop equipment required



- ♦ V.A.G 1318
- ♦ V.A.G 1318 with V.A.G 1318/11, V.A.G 1318/12 and V.A.G 1318/13

Test requirements:

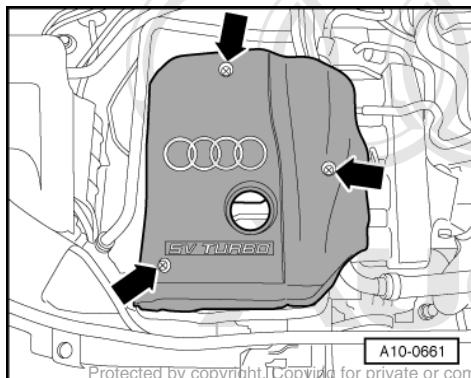
- Fuel pump relay OK; checking =>Page **73** .
- Fuel pump OK; checking:

=> Fuel Supply - Petrol Engines; Repair group 20

- Fuel filter OK
- Battery voltage at least 12.7 V
- Vehicles with automatic gearbox: Selector lever in position P or N

Check system pressure

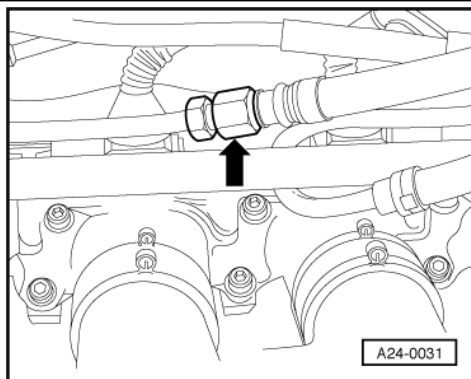
- Briefly open the fuel tank filler cap (to release pressure).



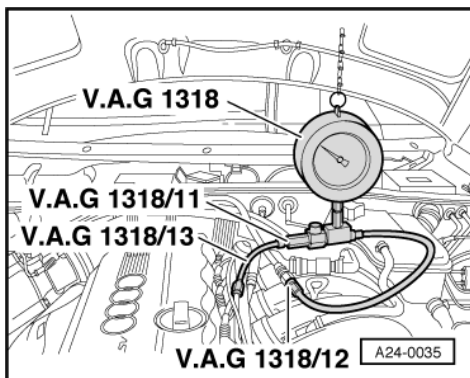
- -> Remove engine cover -arrows-
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Important:

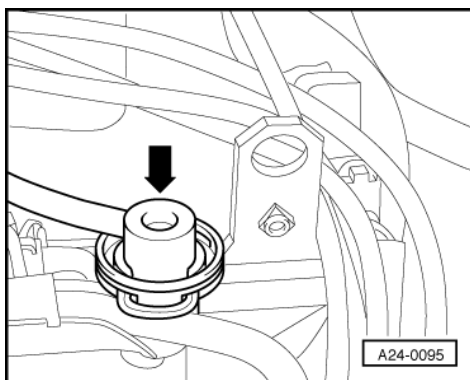
The fuel system is pressurised! Before opening the system place a cloth around the connection. Then release pressure by carefully loosening the connection.



- -> Open the screw connection -arrow- and catch escaping fuel in a cloth.
- Connect pressure gauge V.A.G 1318 to fuel supply pipe using adapters 1318/11, 1318/12 and 1318/13.



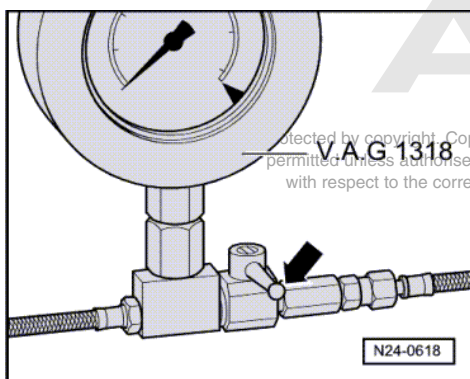
- -> Open cut-off valve on pressure gauge. The lever points in the direction of flow.
- Start the engine and run at idling speed.
- Measure the fuel pressure.
 - Specified value: approx. 3.5 bars



- -> Pull vacuum hose off fuel pressure regulator.
 - The fuel pressure should rise to approx. 4.0 bars.
- Switch ignition off.
- Check leak tightness and holding pressure by watching the gauge indicator fall.
 - After 10 minutes the remaining pressure should be at least 2.5 bar excess pressure

If the holding pressure drops below 2.5 bars:

- Start the engine and run at idling speed.



- -> Allow the pressure to build up, then switch off the ignition. At the same time close the cut off valve on the pressure gauge V.A.G 1318 (valve lever at right angles to direction of flow -arrow-).
- Observe pressure drop on gauge.



If the pressure now does not drop:

- Check fuel pump non return valve.

If the pressure drops again:

- Open cut-off valve on pressure gauge. The lever points in the direction of flow.
- Start the engine and run at idling speed.
- Allow the pressure to build up, then switch off the ignition. At the same time pinch the return hose (with blue marking) firmly together.

If the pressure now does not drop:

- Renew the fuel pressure regulator.

If the pressure drops again:

- Check pipe connections, O-rings on fuel manifold and injectors for leaks.
- Check pressure gauge for leaks.

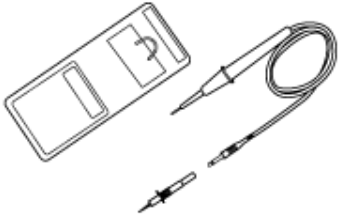
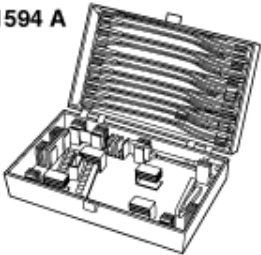
Note:

Before removing the pressure gauge, release the fuel pressure by opening the cut off valve. When doing this hold a container over the connection.



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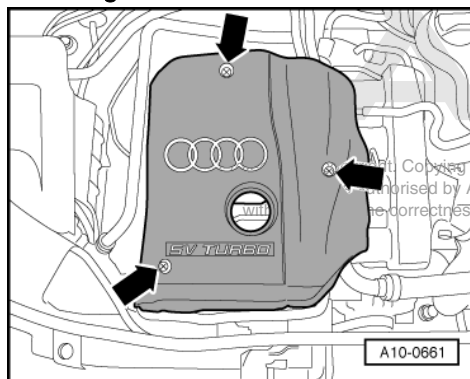
1.14 - Checking injectors

V.A.G 1526 A 	V.A.G 1527 B 
V.A.G 1594 A 	V.A.G 1598/31 
	G24-0022

Special tools and workshop equipment required

- ◆ V.A.G 1526 A
- ◆ V.A.G 1527 B
- ◆ V.A.G 1594 A
- ◆ V.A.G 1598/31

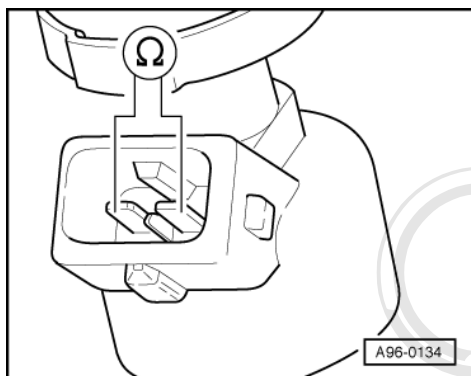
Checking internal resistance



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- -> Remove engine cover -arrows-.
- Remove connector from the injector which is to be tested.



- -> Connect multimeter to injector to measure resistance.
- Specified value: 12...13 Ω (at room temperature)

If specified value is not attained:

- Renew injector.

If specified value is attained:

- Check the power supply.
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Checking power supply

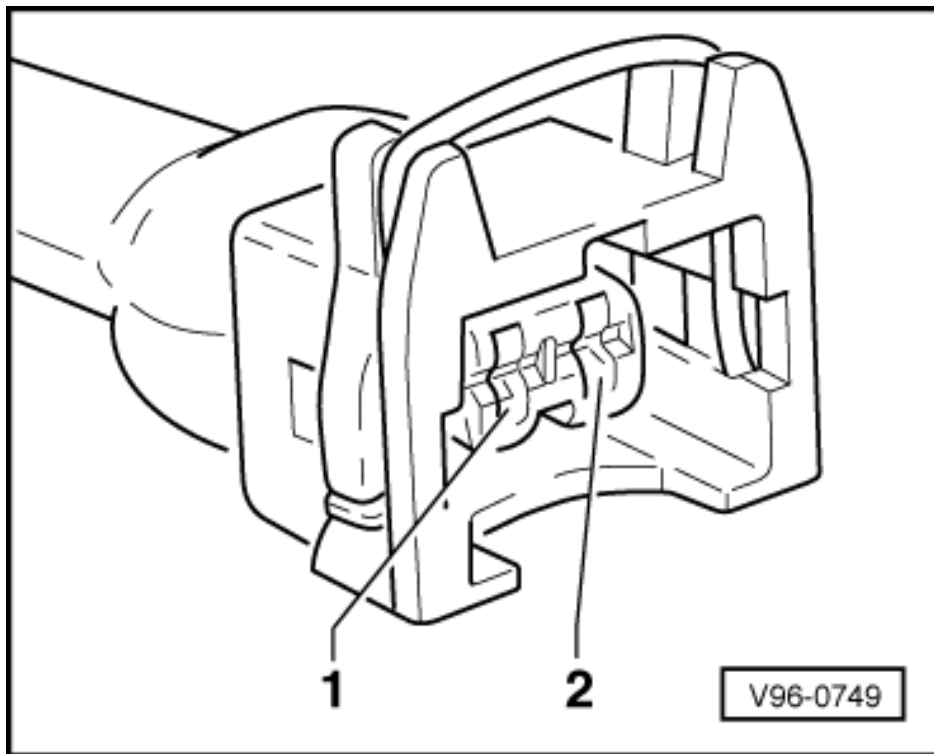
Test requirements:

- Fuse for injectors OK.

=> Current Flow Diagrams, Electrical Fault-Finding and Fitting Locations

- Fuel pump relay OK; checking =>Page **73** .

- Unplug connector on injector to be checked.



- -> 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:

- Check wiring connection between contact 1 and fuse for injector for open circuit:

=> Current Flow Diagrams, Electrical Fault-Finding and Fitting Locations

- Rectify open circuit, if necessary

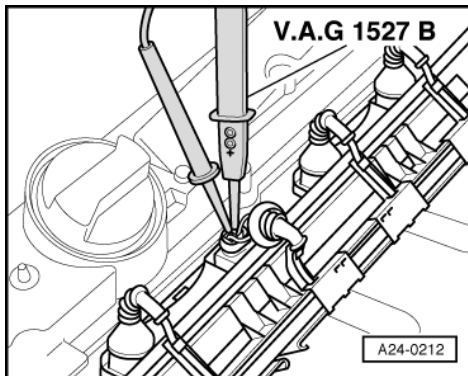
If the LED lights up:

- Check injector actuation

Checking actuation

Test requirements:

- Internal resistance of the valve OK
- Push back rubber grommet of plug of injector but leave plug attached.



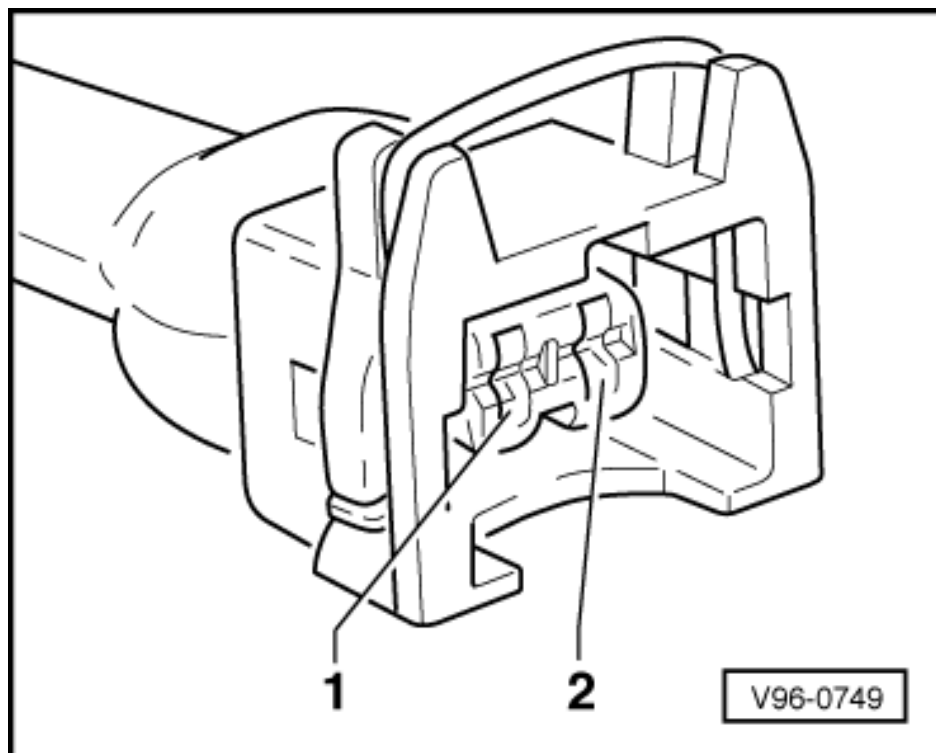
- -> Connect up voltage tester V.A.G 1527 B between receptacles 2 (signal) and 1 (positive).
- Operate the starter briefly (the engine may start).
 - The LED should flash.

Note:

Voltage testers with a low current draw continue to glow faintly between actuation from the engine control unit (rather than extinguishing completely) and become slightly brighter when actuated.

If LED does not flash:

- Connect the V.A.G 1598/31 test box to wiring harness leading to engine control unit; the engine control unit should not be connected => Page 52 .



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

Cylinder	Injector connector contact	Test box V.A.G 1598/31
1	2	96
2	2	89
3	2	97
4	2	88

- Rectify any open/short circuit as necessary.

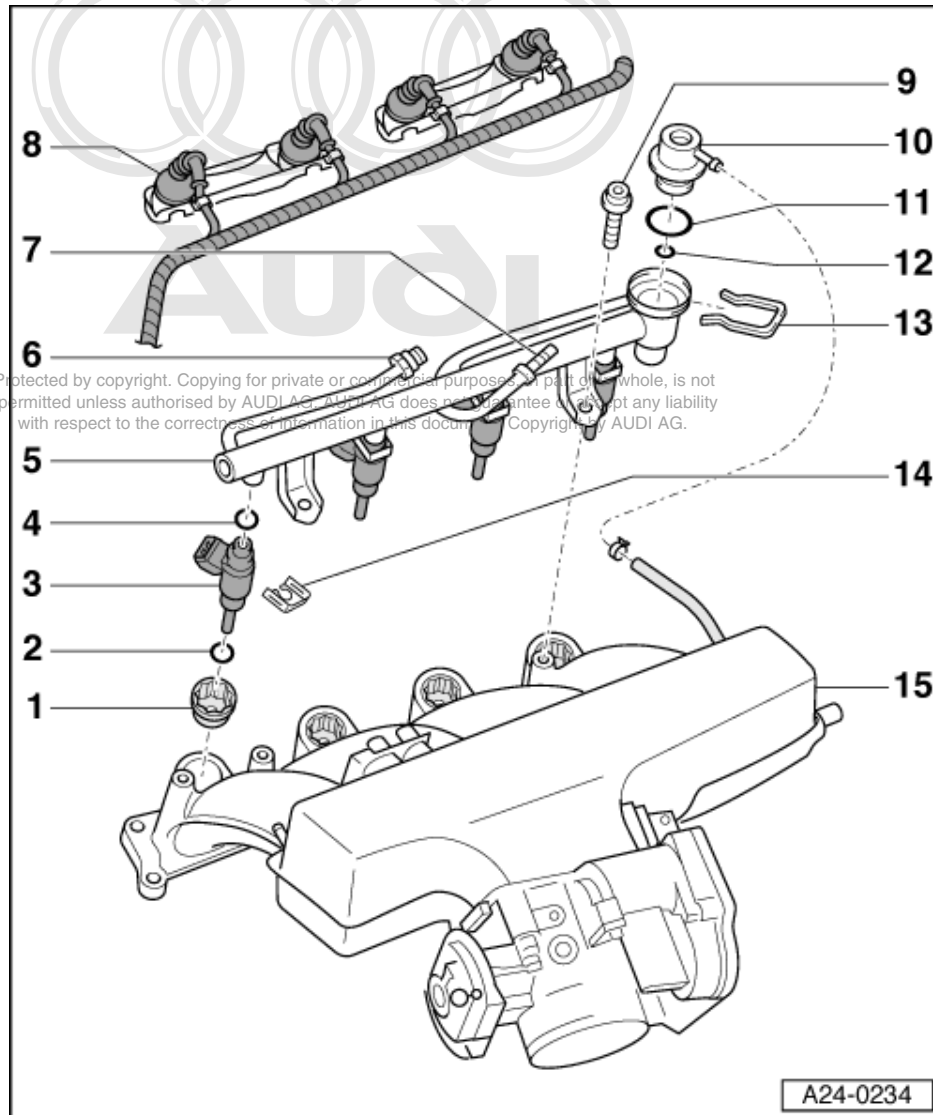
If the wiring is OK:

- Fit a new engine control unit => Page 54 .

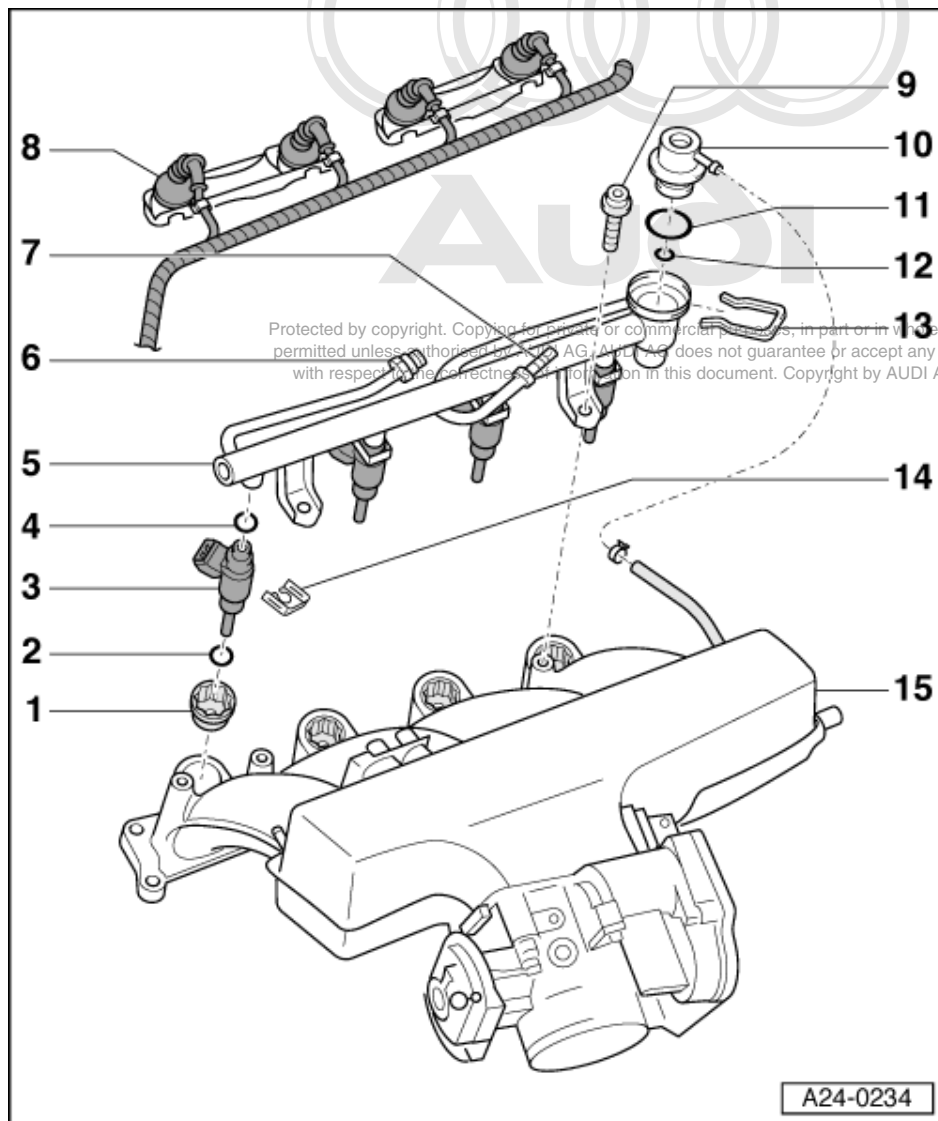


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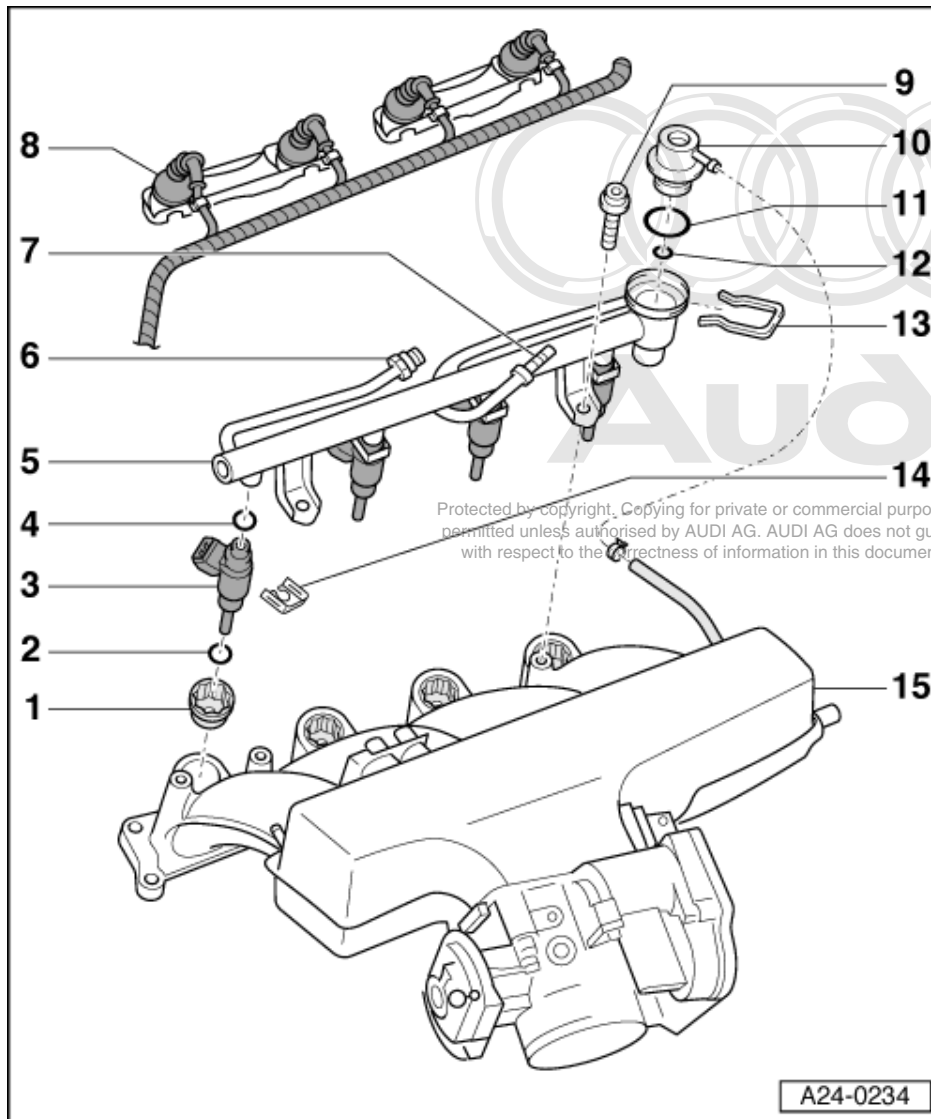
1.15 - Dismantling and assembling fuel manifold with injectors



- 1 **Insert for injector -3 Nm**
 - ♦ Install with locking fluid D 000 600 A2
- 2 **O-ring**
 - ♦ Removing and installing
=>Page 70
 - ♦ Replace
 - ♦ Moisten with clean engine oil.
- 3 **Injector -N30...-N33**
 - ♦ Removing and installing
=>Page 70



- 4 O-ring**
- ♦ Removing and installing
=>Page **70**
 - ♦ Replace
 - ♦ Moisten with clean engine oil.
- 5 Fuel manifold**
- 6 Fuel feed pipe**
- ♦ Tighten to 25 Nm
- 7 Fuel return pipe**
- 8 Connector**
- ♦ For injectors
 - ♦ 4 pieces
- 9 Hexagon socket-head bolt - 10Nm**
- 10 Fuel pressure regulator**



11 O-ring

- ◆ Replace

12 O-ring

- ◆ Replace

13 Bracket

- ◆ for fuel pressure regulator

14 Bracket

- ◆ Ensure it is positioned correctly on injector and fuel manifold

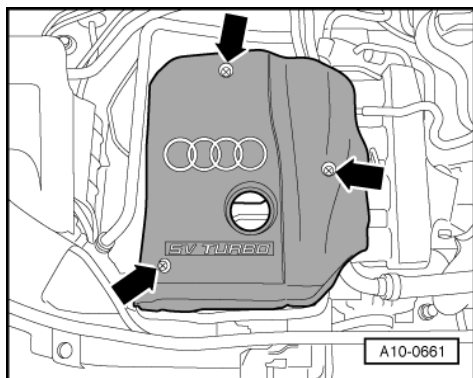
15 Intake manifold

- ◆ With throttle valve control part -J338
- ◆ With intake air temperature sender -G42
- ◆ Removing:

=> 4-cylinder engine (5-valve turbo), Mechanical components; Repair group 15; Removing and installing cylinder head; Removing and installing intake pipe Removing and installing cylinder head Removing and installing intake pipe



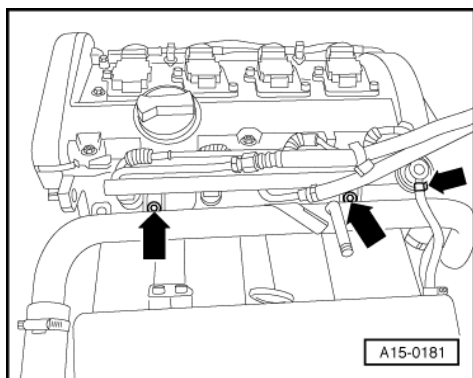
1.16 - Remove and install injectors



- -> Remove engine cover -arrows-.

- Disconnect wires/unplug connectors from:

- Injectors -N30, -N31, -N32, -N33
- Intake air temperature sender -G42
- Hall sender -G40
- Throttle valve control unit -J338



- -> Unscrew retaining bolts for fuel manifold and pull vacuum line off fuel pressure regulator -arrows-.

- Pull fuel manifold together with injectors off intake manifold and place it on a clean cloth at the back of the engine compartment.

Important:

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

- Pull off retainer and detach injector.

Note:

Replacement of fuel manifold involves detaching fuel hoses.

Install in reverse order, paying attention to the following:

- Renew the O-rings at all opened connections. (when renewing the front O-ring, ensure that the plastic cap is not removed from the injector head. The O-ring must be pulled off over the plastic cap).
- Moisten the O-rings with clean engine oil.
- Make sure that the injectors are installed in the correct positions.
- Check to make sure that the retainer clamps are properly seated.



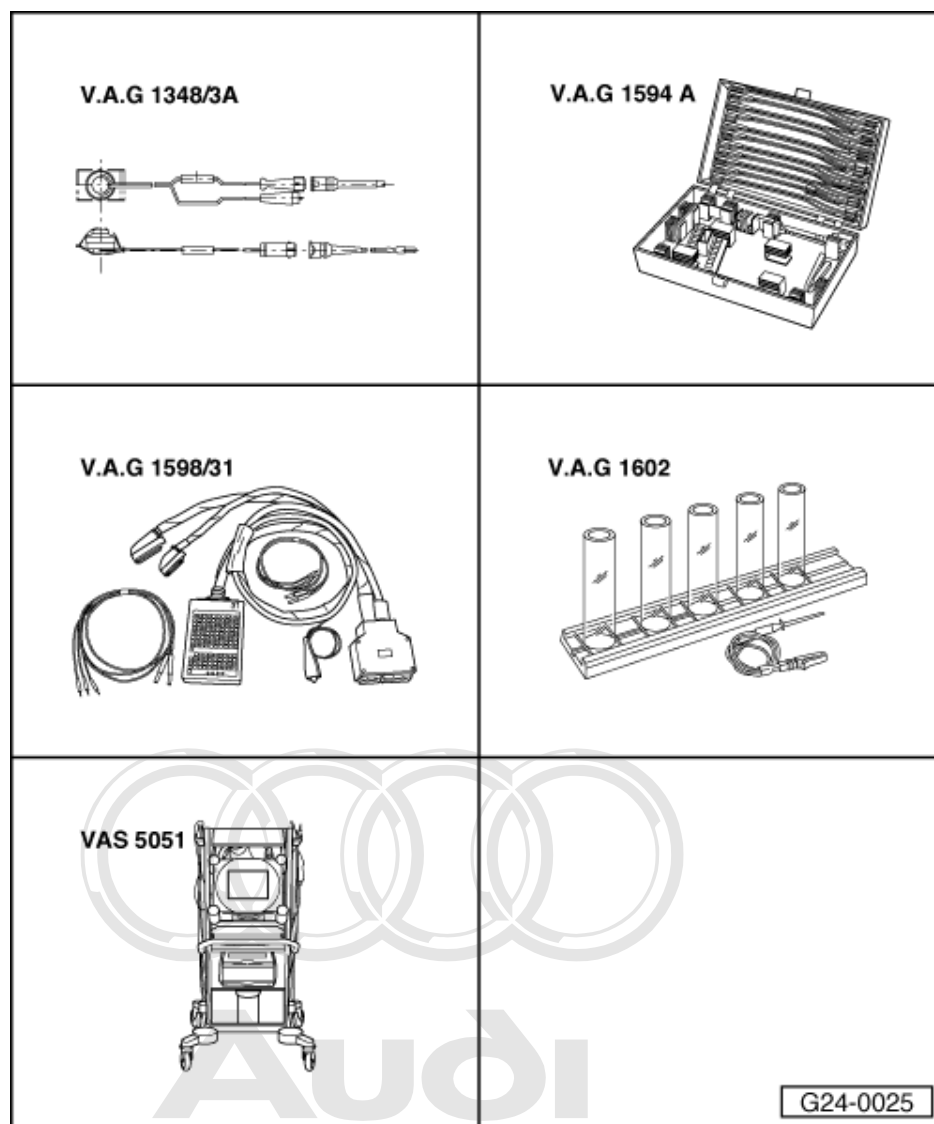
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- Position fuel manifold with secured injectors on intake manifold and press evenly into place.

Tightening torque

Component	Nm
Fuel manifold to intake manifold	10

1.17 - Testing injection quantity, leak tightness and spray pattern of injectors



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Special tools and workshop equipment required

- ◆ V.A.G 1348/3A
- ◆ V.A.G 1594 A
- ◆ V.A.G 1598/31
- ◆ V.A.G 1602
- ◆ VAS 5051 with VAS 5051/1

or

- ◆ V.A.G 1551 with V.A.G 1551/3 A

Test requirements:

- Fuel pressure OK, checking =>Page 59 .

Test sequence

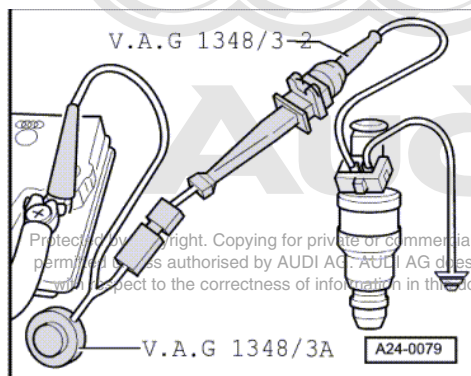
- Remove fuel manifold with injectors fitted from intake manifold => Page 70 . Fuel hoses remain connected.
- Connect the V.A.G 1598/31 test box to wiring harness leading to engine control unit; the engine control unit should not be connected => Page 52 .

Leak test

- Jumper contacts 1 and 65 at test box with leads from adapter set V.A.G 1594A.
- Switch the ignition on.
 - The fuel pump should run.
- Check injectors for leaks (visual check). When the fuel pump is running, only 1 or 2 drops a minute should escape from each injector.
- If the fuel loss is greater switch off fuel pump (remove cable bridge) and replace defective injector => Page 70 .

Checking injection quantity

- Place the injector which is to be tested into measuring glass of injection quantity tester V.A.G 1602.



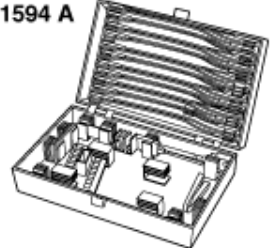
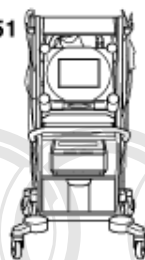
- > Connect one of the injector contacts to the engine earth using a test cable and crocodile clip from V.A.G 1594 A.
- Connect second contact of injector with remote control V.A.G 1348/3A, adapter lead V.A.G 1348/3-2 and auxiliary cable to positive.
- Jumper contacts 1 and 65 at test box with leads from adapter set V.A.G 1594A.
- Jumper contacts 1 and 65 at test box with leads from adapter set V.A.G 1594A.
- Switch the ignition on.
 - The fuel pump should run.
- Activate remote control V.A.G 1348/3A for 30 seconds.
- Perform measurements on all injectors.
- Once all four injectors have been actuated, place measuring glasses on a level surface.
 - Specified value per injector: 135 ±10 ml
- If measured values for one or more injectors are outside tolerance, switch off fuel pump (switch off ignition) and replace defective injector => Page 70 .
- If the measured values for all the injectors are outside the tolerance range, check the fuel pressure => Page 59 .

Note:

When checking the injection quantity, also check the spray pattern. The spray pattern should be the same for all the injectors.

- Install injectors with fuel manifold => Page 70 .

1.18 - Fuel pump relay -J17 and actuation

V.A.G 1526 A 	V.A.G 1594 A 
V.A.G 1598/31 	VAS 5051 
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Special tools and workshop equipment required

- ◆ V.A.G 1526 A
- ◆ V.A.G 1594 A
- ◆ V.A.G 1598/31
- ◆ VAS 5051 with VAS 5051/1

or

- ◆ V.A.G 1551 with V.A.G 1551/3 A

Fitting location => Fitting location overview Page **40**

The fuel pump and certain components of the injection system are supplied with power by way of the fuel pump relay -J17.

The fuel pump relay -J17 is only energised when the engine is running, i.e. the relay is only connected to earth (via the engine control unit) when engine speed pulses are detected in the engine control unit.

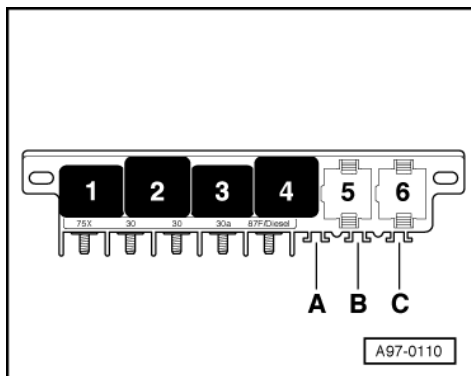


Test requirements:

- Battery voltage at least 12.7 V

Functional check of fuel pump relay

- Remove driver's storage compartment.
- Connect vehicle diagnostic, testing 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 ignition must be switched on.
- Initiate final control diagnosis =>Page 19 and actuate ACF solenoid valve -N80.



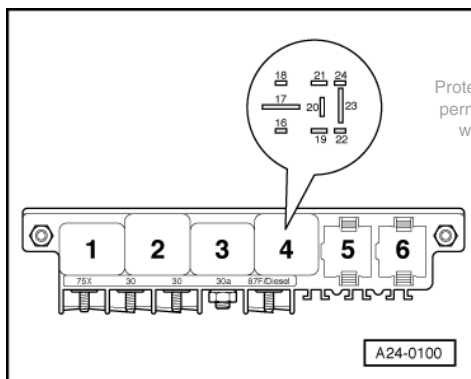
- -> Fuel pump relay (in the central electric's, electronics box, passenger's footwell, position 4) should pull and fuel pump should run.

A - If relay does not respond:

- Check voltage supply of fuel pump relay => Page 74 .
- Check actuation of fuel pump relay=>Page 75 .

B - If relay is energised but fuel pump does not run:

- Check voltage supply for fuel pump and components (via fuel pump relay) =>Page 76 .



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Checking voltage supply of fuel pump relay

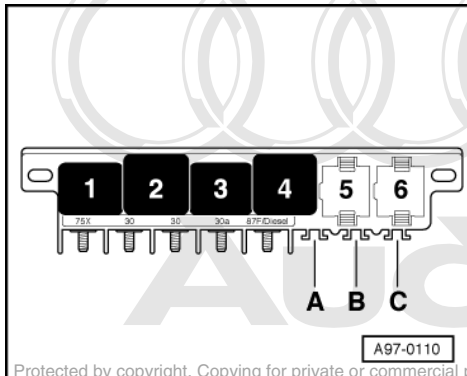
- Disconnect fuel pump relay.
- -> Connect the multimeter to contact 17 of relay socket and earth to measure voltage.
 - Specified value: approx. battery voltage

If specified value is not attained:

- Replace central electric's.

Checking actuation of fuel pump relay

- Switch ignition off.
- Connect the V.A.G 1598/31 test box to wiring harness leading to engine control unit; the engine control unit should not be connected => Page 52 .
- Switch the ignition on.
- Jumper contacts 1 and 65 at test box with leads from adapter set V.A.G 1594A.



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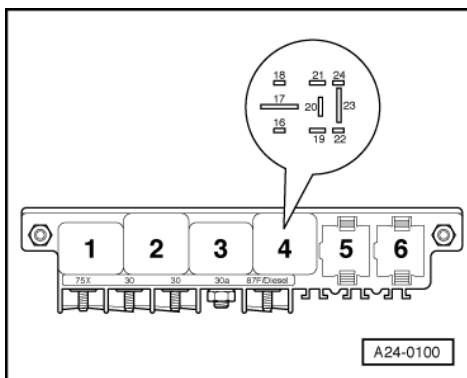
-> Fuel pump relay (on central electrics in passenger's footwell, position 4) must be energised.

If the relay pulls now, but not during final control diagnosis:

- Fit a new engine control unit => Page 54 .

If the relay does not pick up:

- Switch ignition off.
- Disconnect cable link.
- Disconnect fuel pump relay.



- -> Connect multimeter as follows to measure voltage.

Central electrics In driver's footwell on left, position 4 contact	Measure to
19	Engine earth

- Switch the ignition on.
 - Specified value: approx. battery voltage

If specified value is not attained:

- Check the wiring connections.

=> Current Flow Diagrams, Electrical Fault-Finding and Fitting Locations



If specified value is attained:

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

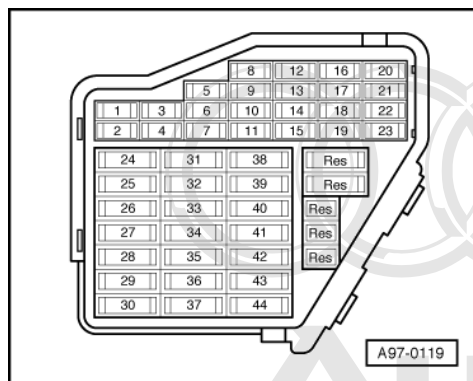
Central electrics In driver's footwell on left, position 4 contact	Test box V.A.G 1598/31 Socket
16	65

- Rectify any open/short circuit as necessary.

If no fault is found:

- Replace the fuel pump relay -J17.
- Reconnect engine control unit.

Checking voltage supply of fuel pump and components



- -> Disconnect fuses S228, S229 and S234 (positions 28, 32 and 34) in fuse holder.
- Initiate final control diagnosis =>Page 19 and actuate ACF solenoid valve -N80.
- To measure the voltage, connect multimeter to earth and to one of the contacts of the following fuses in the fuse holder.

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Securing clip	Specified value at one of the contacts
S228	approx. battery voltage
S232	approx. battery voltage
S234	approx. battery voltage

If specified values are not attained:

- Repeat the test at the other contact of the fuse base.

If the specifications are still not attained:

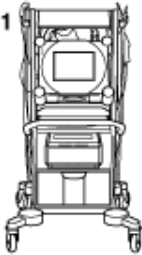
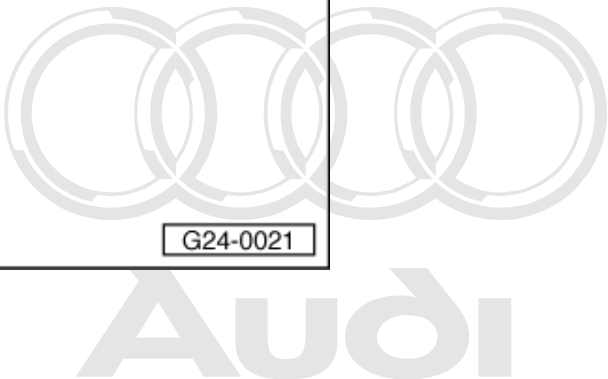
- Check the wiring connections.

=> Current Flow Diagrams, Electrical Fault-Finding and Fitting Locations

If no fault is found:

- Replace the fuel pump relay -J17.
- Reinsert the fuses.

1.19 - Checking air mass meter -G70

V.A.G 1526 A 	V.A.G 1594 A 
V.A.G 1598/31 	VAS 5051 
	 G24-0021

Special tools and workshop equipment required

- ◆ V.A.G 1526 A
- ◆ V.A.G 1594 A
- ◆ V.A.G 1598/31
- ◆ VAS 5051 with VAS 5051/1

or

- ◆ V.A.G 1551 with V.A.G 1551/3 A

Fitting location => Fitting location overview Page **40**

Test requirements:

- Coolant temperature at least 80 °C.
- Electrical consumers switched off (radiator fan must not run during the test)
- Air conditioning switched off.

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**checking function**

- Connect vehicle diagnostic, testing 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 indicated on display:

Rapid data transfer HELP
Select function XX

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

-> When indicated on display:

Basic setting Q
Enter display group number XXX

- Enter "002" for "display group number 002" and confirm entry with Q key.

-> When indicated on display:

System in basic setting 2
1 2 3 4

- Check specified results for recorded load.

	Display zones			
	1	2	3	4
Display group 002: Intake airflow at idle and operating temperature				
Display	xxx rpm	xxx %	xx.x ms	xxx.x g/s
Display	Engine speed	Load	Average injection period	Air mass
Specified value	Front: 740...860 rpm four-wheel drive: 820...880 rpm	15...35 %	1.0...4.0 ms	2.0...40.5 g/s
Note:	---	---	If specified value is not attained: Evaluation => Page 78	

If specified value is attained:

- Press the =>key.

-> Indicated on display (function selection):

Rapid data transfer HELP
Select function XX

Interpreting display group 002

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Display zone: 3	Possible causes of fault	Fault remedy
Less than 1.0 ms	- Lower values can only occur when vehicle is on overrun	
Greater than 4.0 ms	- Engine load from ancillaries	- Eliminate load (air conditioner system/ power steering/alternator)
	- Poor idling (not running on all cylinders)	- Test spark plugs Check injectors => Page 63
	- Throttle valve control unit -J338 defective	- Check throttle valve control unit =>Page 110 .
Display zone: 4	Possible causes of fault	Fault remedy

Less than 2.0 g/s	- Large quantity of unmetered air between intake manifold and air mass meter - Voltage supply to air mass meter or wiring to engine control unit	- Check for leaks (unmetered air) in intake air system =>Page 79
Greater than 4.5 g/s	- Engine load from ancillaries	- Eliminate load (air conditioner system/ power steering/alternator)
	- Voltage supply to air mass meter or wiring to engine control unit	- Check voltage supply and/or wiring => Page 79

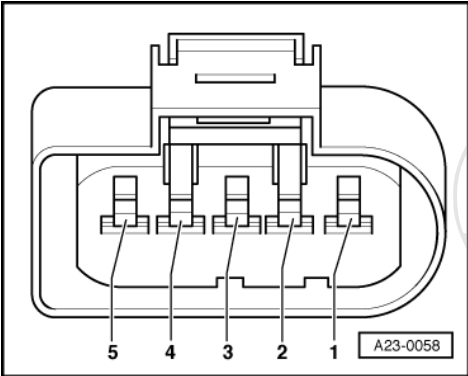
Testing voltage supply to air mass meter

Test requirements:

- Fuse for air mass meter OK.
- => Current Flow Diagrams, Electrical Fault-Finding and Fitting Locations
- Fuel pump relay OK; checking =>Page 73 .

Note:
Voltage supply to air mass meter is from fuel pump relay.

- Disconnect connector from intake air mass meter.



- -> Connect multimeter as follows to measure voltage.

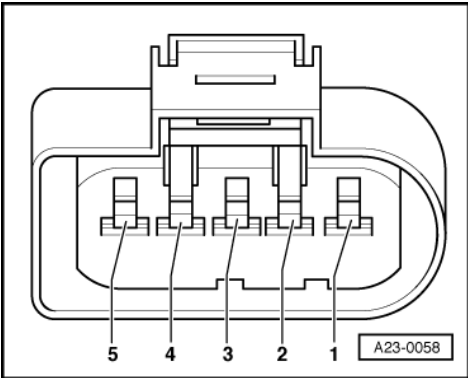
Connector contact	Measure to
2	Engine earth

- Operate the starter briefly (the engine may start).
- Specified value: approx. battery voltage

If specified value is not attained:

- Check the wiring from contact 2 on the connector via the fuse to the fuel pump relay for open circuit or short to earth:

- => Current Flow Diagrams, Electrical Fault-Finding and Fitting Locations
- Rectify any open/short circuit as necessary.





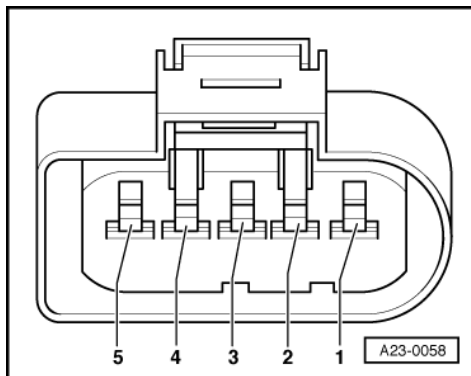
- -> Connect hand-held multimeter to contact 2 and contact 3 of the connector to measure voltage.
- Operate the starter briefly (the engine may start).
 - Specified value: approx. battery voltage

Note:

Engine control unit earth is present at contact 3 of the connector.

If specified value is not attained:

- Check the wiring connections
=>Page 80 .



- -> Connect hand-held multimeter to contact 3 and contact 4 of the connector to measure voltage.
- Specified value: approx. 5 V

If specified value is not attained:

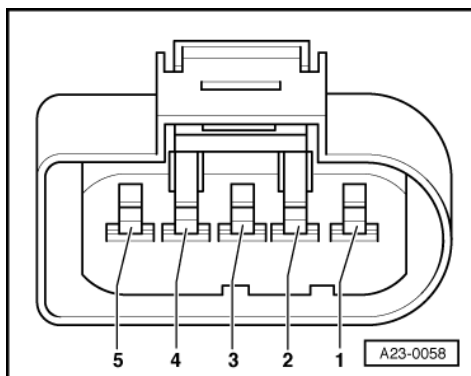
- Check the wiring connections
=>Page 80 .

Check wiring to air mass meter

Note:

The signal wire is also checked during the wiring check.

- Connect the V.A.G 1598/31 test box to wiring harness leading to engine control unit; the engine control unit should not be connected => Page 52 .



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

Connector contact	Test box V.A.G 1598/31 Socket
3	27



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Connector contact	Test box V.A.G 1598/31 Socket
4	53
5	29

- Rectify any open/short circuit as necessary.
- Additionally check all wires for short to one another.

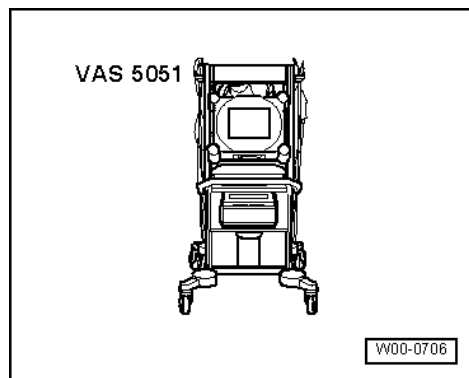
If the wiring is OK:

- Renew air mass meter -G70.

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

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Special tools, workshop equipment and other items required



- ◆ VAS 5051 with VAS 5051/1
- or
- ◆ V.A.G 1551 with V.A.G 1551/3 A
- ◆ 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 vehicle diagnostic, testing 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 indicated on display:

Rapid data transfer HELP
Select function XX

- Enter "08" to select the function "Reading measured value block" and confirm entry with Q key.

-> When indicated on display:

Reading measured value block Q
Enter display group number XXX



- Enter "001" for "Display group number 001" and confirm entry with Q key.

-> Indicated on display:
(1...4 = display zones)

Read measured value block 1			
1	2	3	4

- Note engine speed in display zone 1.
- Systematically spray parts of the intake system with engine leak detector spray.

If engine speed drops:

- Check sprayed areas of intake system for leaks and rectify if necessary.
- Press the ⇒key.

-> Indicated on display (function selection):

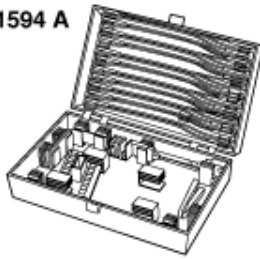
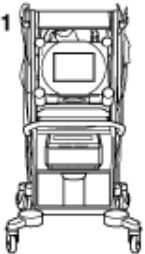
Rapid data transfer	HELP
Select function xx	

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

2 - Checking lambda control

2.1 - Checking lambda control

V.A.G 1526 A 	V.A.G 1594 A 
V.A.G 1598/31 	VAS 5051 
	G24-0021

2.2 - Checking lambda probe and lambda control before catalytic converter

Special tools and workshop equipment required

- ♦ V.A.G 1526 A
- ♦ V.A.G 1594 A
- ♦ V.A.G 1598/31
- ♦ VAS 5051 with VAS 5051/1

or

- ♦ V.A.G 1551 with V.A.G 1551/3 A

Test requirements:

- No leaks in exhaust system.

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- Coolant temperature at least 80 °C.

Test 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 indicated on display:

Rapid data transfer HELP
Select function XX

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

-> When indicated on display:

Basic setting Q
Enter display group number XXX

- Enter "030" for "display group number 030" and confirm entry with Q key.
- Check specified value in display zone 1.

Notes:

- ♦ By increasing the engine speed the specified values are achieved quicker.
- ♦ The "lambda probe status" indicates the condition of the lambda control and the lambda probes.

	Display zones			
	1	2	3	4
Display group 030: Lambda probe status				
Display	X X X	X X X		
Display	Lambda probe status, bank 1, probe 1	Lambda probe status, bank 2, probe 1		
Range	0 = off 1 = on	0 = off 1 = on		
Specified value	1 1 1	1 1 0		
Note:	If specified value not attained =>Page 84			

Significance of 3-digit readout of display group 030			
X	X	X	Display zones 1 and 2:
		X	Lambda control 0 = not active, 1 = active
	X		Lambda probe condition: 0 = not active, 1 = active
X			Condition of lambda probe heating: 0 = not active, 1 = active

Note:

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The first digit of the 3-digit display (heating) fluctuates between 0 and 1.

- Only continue the test if the display in display zone 1 has reached "111" at least once.

Checking lambda probe learned values and lambda control

- Press C key.

-> When indicated on display:

Basic setting Q
Enter display group number XXX

- Enter "032" for "display group number 032" and confirm entry with Q key.

-> When adjacent display appears:

System in basic setting 32
1 2 3 4

- Check lambda learned values in display zones 1 and 2:

	Display zones			
	1	2	3	4
Display group 032: Lambda learned values				
Display	xx.x %	xx.x %		
Display	Lambda learned value Bank 1, probe 1 at idle (additive)	Lambda learned value Bank 1, probe 1 on part throttle (multiplicative)		
Specified value	-6.0...6.0 %	-10.0...10.0 %		
Note:	If specified value not attained =>Page 86			

- Press C key.

-> When adjacent display appears:

Basic setting Q
Enter display group number XXX

- Enter "033" for "display group number 033" and confirm entry with Q key.

-> When indicated on display:

System in basic setting 33
1 2 3 4

- Check the lambda control in display zones 1 and 2.

	Display zones			
	1	2	3	4
Display group 033: Lambda control				
Display	xx.x %	x.xxx V		
Display	Lambda control Bank 1, probe 1	Lambda probe voltage Bank1, Probe 1		
Specified value	In range -10.0...10.0 % value must fluctuate at least 2 %	0.130...3.600 V		
Note:	If specified value is not attained => Contin- uationPage 85			If specified value is not achieved => Evalua- tion display group 033, Page 86

Note on display zone 2:

Indicated is the lambda probe voltage signal which was prepared and smoothed in the engine control unit. 1.5 V in the display corresponds to Lambda 1.

(cont.)

If the specified result is not achieved in display zone 1, or if the value does not fluctuate by at least 2%:

- Perform test drive to free Lambda from any possible residues and repeat the test.



If the specified result is not achieved in display zone 1, or if the value does not fluctuate by at least 2%, even after the test drive:

- Check the basic voltage => Page 86
- Check the Lambda probe heating upstream of catalytic converter => Page 91 .
- Check the lambda probe upstream of catalytic converter for ageing =>Page 88 .

Interpreting display group 032

Display zone: 1 / 2	Possible causes of fault	Fault remedy
Lambda learned values below specified range	- Leak in intake area (pressure side between turbocharger and intake pipe)	- Check intake system for leaks and rectify unmetered air =>Page 81
	- Oil dilution	- Carry out oil change or drive vehicle fairly fast on out-of-town roads
	- High oil consumption	
	- Air mass meter defective	- Test air mass meter =>Page 77
	- Solenoid valve for active carbon canister stuck open	- Check solenoid valve for activated charcoal canister =>Page 105
	- Fuel pressure too high	- Check fuel pressure regulator =>Page 59
	- Injector not closing	- Check injectors => Page 63
	- Lambda probe heating defective - Lambda probe defective	- Check Lambda probe heating =>Page 91

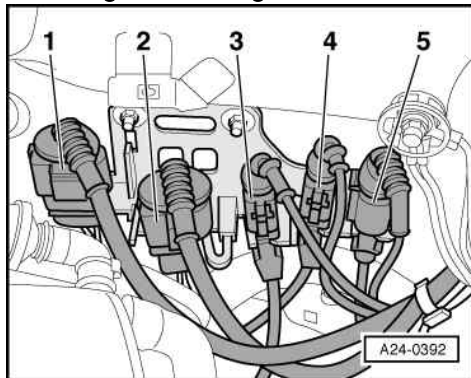
Interpreting display group 032

Display zone: 1 / 2	Possible causes of fault	Fault remedy
Lambda learned values above specified range	- Unmetered air in intake area	- Check intake system for leaks and rectify unmetered air =>Page 81
	- Fuel pressure too low	- Check fuel pressure regulator =>Page 59
	- Air mass meter defective	- Test air mass meter =>Page 77
	- Lambda probe heating defective - Lambda probe defective	- Check Lambda probe heating =>Page 91
	- Injector only opens partially or not at all	- Check injectors => Page 63
	- Activated charcoal filter system solenoid valve sticking	- Check solenoid valve for activated charcoal canister =>Page 105

Interpreting display group 033

Display zone: 2	Possible causes of fault	Fault remedy
Greater than 4.800 V	- Short to positive in wiring between lambda probe and control unit - Lambda probe defective	- Check lambda probe wiring of lambda probe before catalytic converter =>Page 87
Less than 0.130 V	- Short to earth in wiring between lambda probe and control unit - Lambda probe defective	- Replace lambda probe upstream of catalytic converter

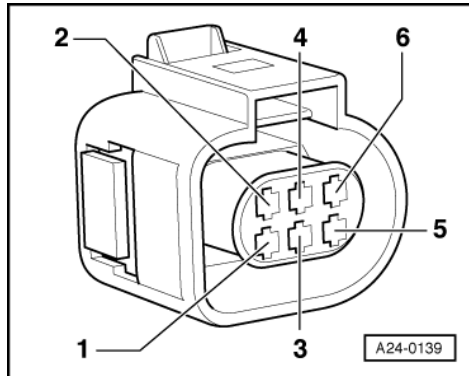
Checking basic voltage



- -> Unplug 6-pin connector (black) -2- to lambda probe upstream of catalytic converter -G39.

Note:

To gain access to the connector screw out coolant expansion tank bolts and swivel expansion tank aside. Fuel hoses remain connected.



- -> Connect multimeter between contacts 1 and 5 to measure voltage.
- Switch the ignition on.
 - Specified value: 0.400...0.500 V
- Switch ignition off.

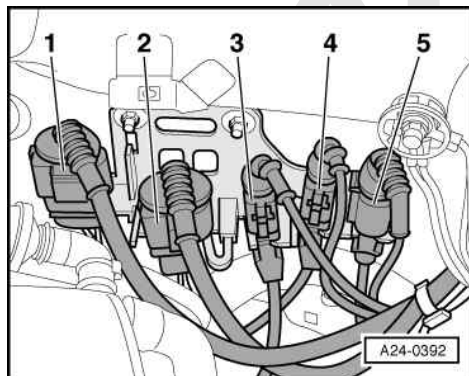
If specified value is not attained:

- Check the Lambda probe lines.

If specified value is attained:

- Replace the lambda probe upstream of catalytic converter -G39.

Check lambda probe wiring

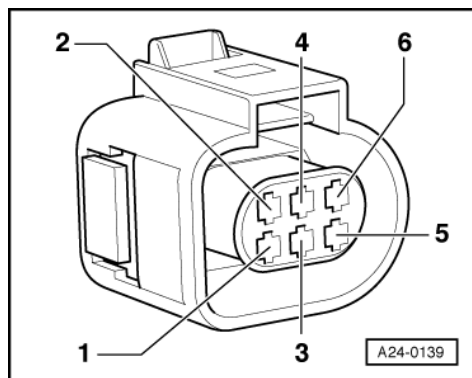


- -> Unplug 6-pin connector (black) -2- to lambda probe upstream of catalytic converter -G39.

Note:

To gain access to the connector screw out coolant expansion tank bolts and swivel expansion tank aside. Fuel hoses remain connected.

- Connect the V.A.G 1598/31 test box to wiring harness leading to engine control unit; the engine control unit should not be connected => Page 52 .



- -> Test for open circuit in the following wiring connections.

Connector contact	Test box V.A.G 1598/31 Socket
1	70
2	71
5	51
6	52

- Rectify open circuit, if necessary

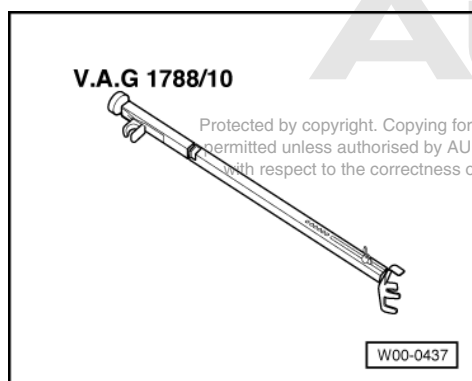
=> Current Flow Diagrams, Electrical Fault-Finding and Fitting Locations

- Check for shorts between the two lines.

If the wiring is OK:

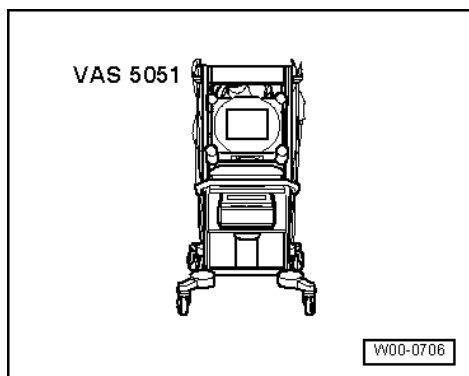
- Fit a new engine control unit => Page 54 .

2.3 - Check lambda probe ageing upstream of catalytic converter



Special tools and workshop equipment required

- ♦ -> V.A.G 1788/10 speedometer



- ♦ VAS 5051 with VAS 5051/1

or

- ♦ V.A.G 1551 with V.A.G 1551/3 A

Test requirements:

- Coolant temperature at least 80 °C.

Test 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
Select function XX

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

-> When indicated on display:

Basic setting Q
Enter display group number XXX

- Enter "034" for "display group number 034" and confirm entry with Q key.

-> Display readout:

System in basic setting 34
1 2 3 4

- Set engine speed to 2300...0.2800 rpm using engine speed controller V.A.G 1788/10.
- Check specified value in display zone 4:

Note:

This process can take a few minutes.

	Display zones			
	1	2	3	4
Display group 034: Diagnosis lambda probe ageing				
Display	xxxx rpm	xxx °C	x.x	---
Display	Engine speed	Exhaust gas temperature	Dynamics factor	Diagnosis status



Range	Display zones			
				Test OFF Test ON B1-P1 OK B1-P1 not OK
Specified value	2300...2800 rpm	greater than 350 °C	0.5...2.5	B1-P1 OK
Note:			If specified value is not attained => ContinuePage 90	

Note on display zone 2:

Calculated value from engine speed and load.

Note on display zones 3 and 4:

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The dynamics factor is the characteristic for the ageing of the lambda probe. The lower the dynamics factor the more advanced is the ageing of the lambda probe.

(cont.)

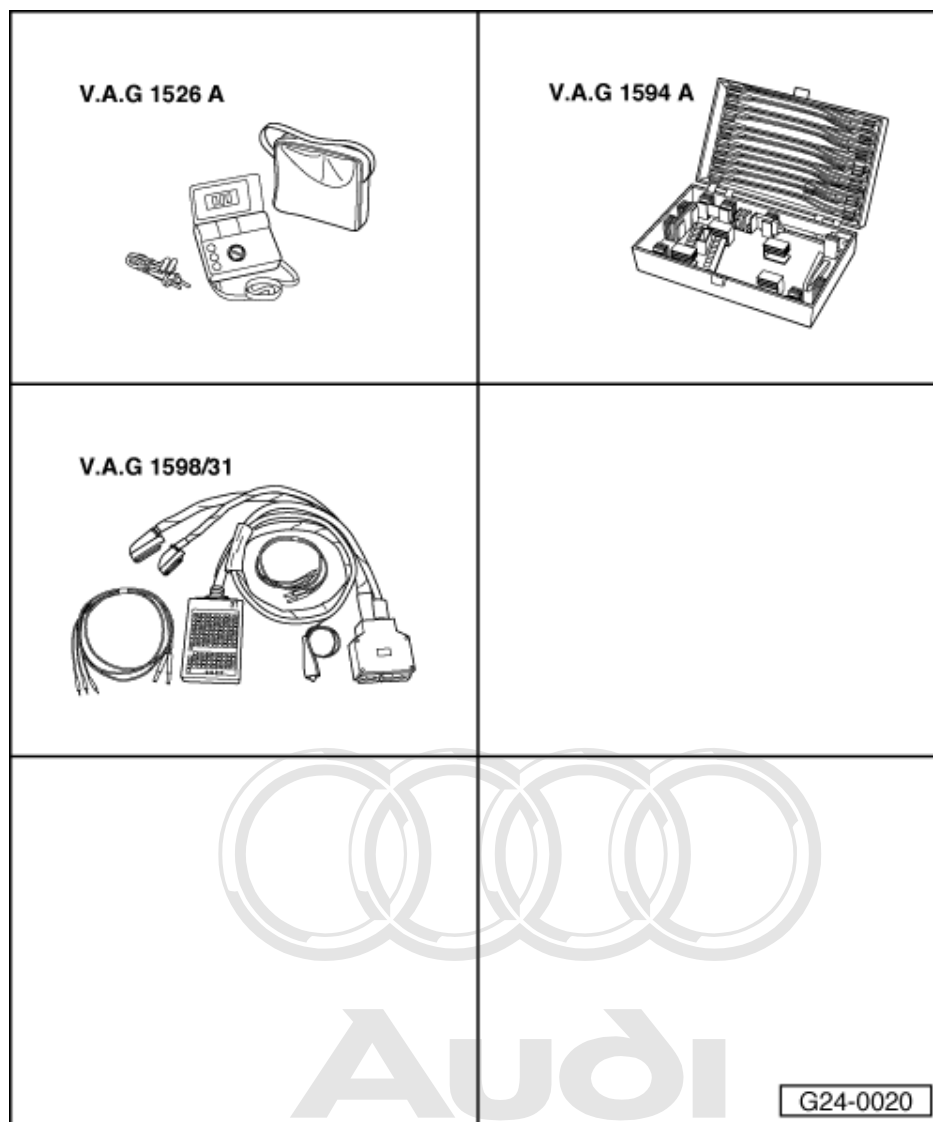
If specified value in display zone 3 or 4 is not attained:

- Perform test drive to free Lambda from any possible residues and repeat the test.

If specified value in display zone 3 or 4 is not attained, even after a test drive has been performed:

- Replace the lambda probe 1 upstream of catalytic converter -G39.

2.4 - Lambda probe heater Check -Z19 for lambda probe upstream of catalytic converter



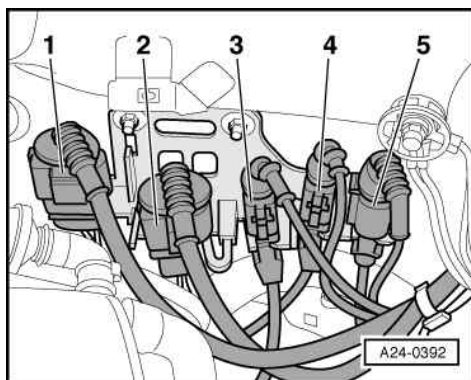
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Special tools and workshop equipment required

- ♦ V.A.G 1526 A
- ♦ V.A.G 1594 A
- ♦ V.A.G 1598/31

Test requirements:

- Coolant temperature at least 80 °C.



- Fuse for Lambda probe heating OK.

=> Current Flow Diagrams, Electrical Fault-Finding and Fitting Locations

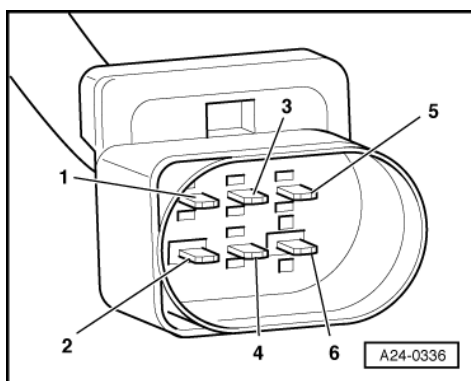
Test sequence

- -> Unplug 6-pin connector (black) -2- to lambda probe upstream of catalytic converter -G39.

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Note:

To gain access to the connector screw out coolant expansion tank bolts and swivel expansion tank aside. Fuel hoses remain connected.



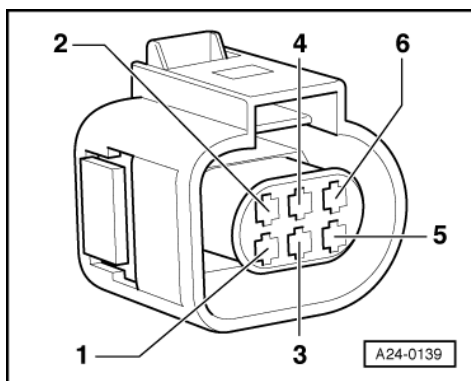
- -> Connect multimeter between contacts 3 and 4 to measure resistance.
- Specified value at room temperature 2.5...10 ω

If specified value is not attained:

- Replace the lambda probe 1 upstream of catalytic converter -G39.

If specified value is attained:

- Check the voltage supply to the Lambda probe heating.



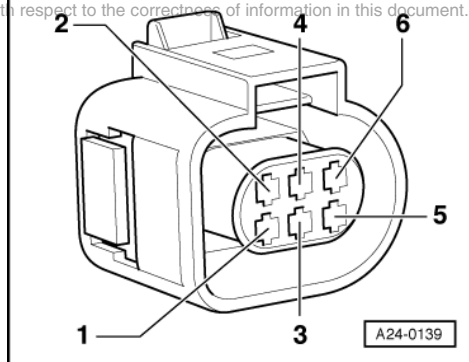
Checking voltage supply for lambda probe heating

- -> Connect multimeter between contacts 3 and 4 to measure voltage.
- Start the engine.
 - Specified value: approx. battery voltage

Note:

Points at which Lambda probe heating is switched on and off by engine control unit can be observed in "Reading measured value block" function, display group number 041 and display zone 2.

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If no voltage is present:

- -> Connect multimeter as follows to measure voltage.

Connector contact	Measure to
3 (positive)	Vehicle earth

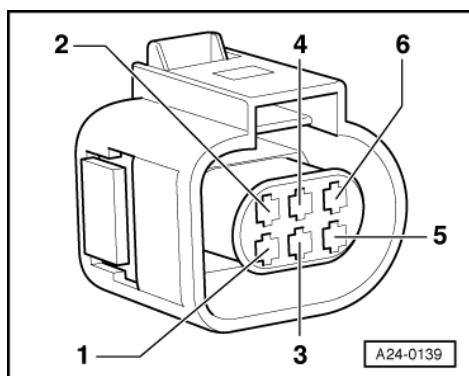
- Operate starter briefly.
 - Specified value: approx. battery voltage

If no voltage is present:

- Check the wiring from contact 3 on the connector via the fuse to the fuel pump relay for an open circuit:

=> Current Flow Diagrams, Electrical Fault-Finding and Fitting Locations

If voltage supply is OK:



- -> Connect multimeter as follows to measure voltage:

Connector contact	Measure to
4 (earth actuation by engine control unit)	Battery positive

- Start the engine.
- Specified value: approx. battery voltage

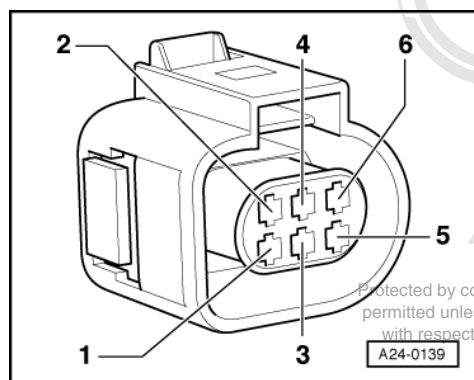
Note:

Points at which Lambda probe heating is switched on and off by engine control unit can be observed in "Reading measured value block" function, display group number 041 and display zone 2.

- Switch ignition off.

If no voltage is present:

- Connect the V.A.G 1598/31 test box to wiring harness leading to engine control unit; the engine control unit should not be connected => Page 52 .



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- -> Check for open circuit in the following wiring connections:

Connector contact	Test box V.A.G 1598/31 Socket
4	5

- Rectify open circuit, if necessary

=> Current Flow Diagrams, Electrical Fault-Finding and Fitting Locations

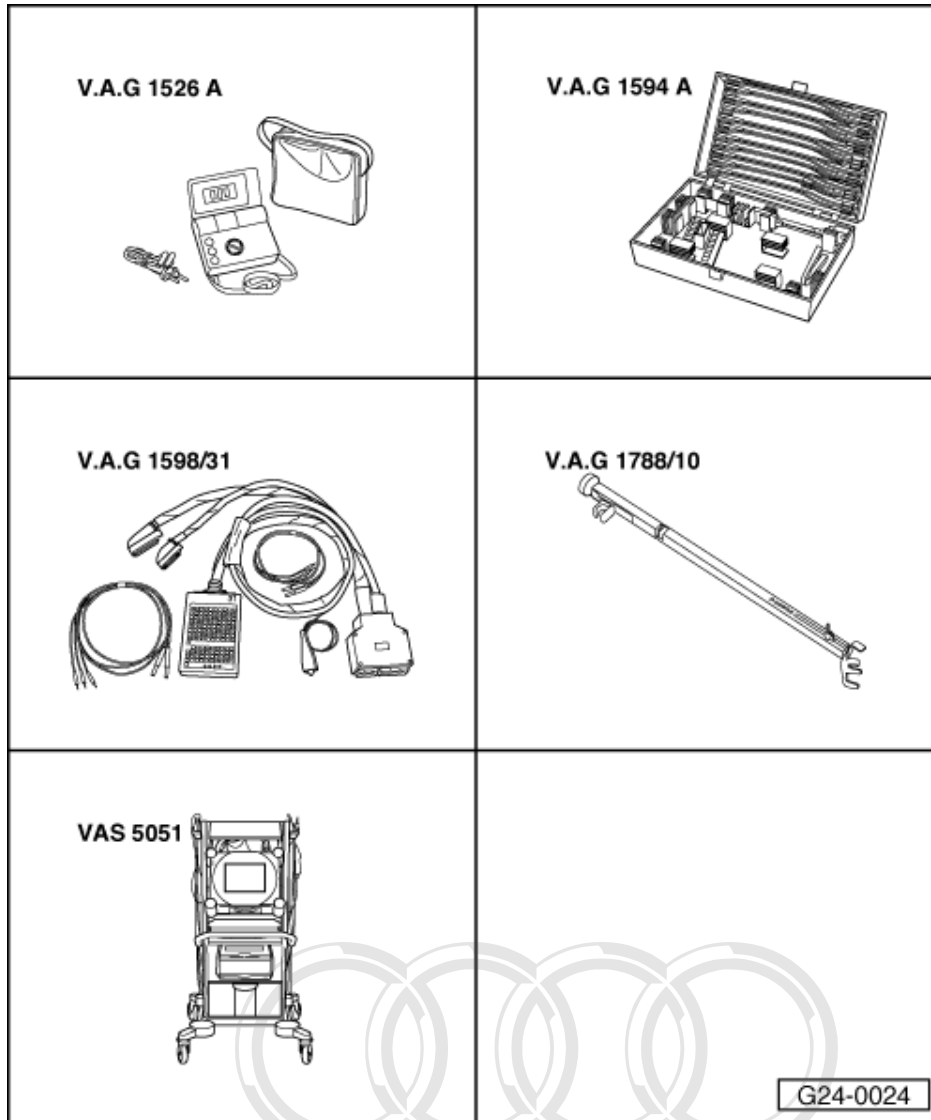
If wiring is OK but there is no earth supply for the Lambda probe heating:

- Fit a new engine control unit => Page 54 .

2.5 - Check lambda probe and lambda control downstream of catalytic converter

Note:

The lambda probe upstream of catalytic converter (Bank 1, probe 1) changes to Lambda 1. If this lambda probe is damaged, e.g. through contamination or overheating, the control value can be changed. Deviations from Lambda 1 is recorded by the lambda probe downstream of the catalytic converter (Bank 1, Probe 2). If these deviations are recognised downwards or upwards it influences the control upstream of the catalytic converter in such a way that it is generally raised or lowered accordingly.



Special tools and workshop equipment required

- ◆ V.A.G 1526 A
- ◆ V.A.G 1594 A
- ◆ V.A.G 1598/31
- ◆ V.A.G 1788/10
- ◆ VAS 5051 with VAS 5051/1

or

- ◆ V.A.G 1551 with V.A.G 1551/3 A

Test requirements:

- No leaks in exhaust system.
- Coolant temperature at least 80 °C.

Test 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



- Adjust speedometer V.A.G 1788/10 on accelerator pedal and increase speed to 2600 rpm.

Test conditions:

- Engine runs at 2600 rpm.

-> When indicated on display:

Rapid data transfer HELP
Select function XX

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

-> When indicated on display:

Basic setting Q
Enter display group number XXX

- Enter "030" for "display group number 030" and confirm entry with Q key.
- Check Lambda probe status in display zone 2.

Note:

The "lambda probe status" indicates the condition of the lambda control and the lambda probes.

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	Display zones			
	1	2	3	4
Display group 030: Lambda status at idle				
Display	X X X	X X X		
Display	Lambda probe status, bank1, probe 1	Lambda probe status Bank1, probe 2		
Range	0 = off 1 = on	0 = off 1 = on		
Specified value	1 1 1	1 1 0		
Note:	If specified value not attained =>Page 100			

Significance of 3-digit readout of display group 030			
X	X	X	Display zones 1 and 2:
		X	Lambda control 0 = not active, 1 = active
	X		Lambda probe condition: 0 = not active, 1 = active
X			Condition of lambda probe heating: 0 = not active, 1 = active

Notes:

- ♦ The first digit of the 3-digit display (heating) fluctuates between 0 and 1.
 - ♦ The lambda control of the lambda probe downstream of catalytic converter (B1-S2) is inactive without engine load.
- Only continue the test if the display in display zone 2 has reached "110" at least once.

Checking lambda control after catalytic converter**Test conditions:**

- Engine continues running at 2600 rpm.
- Press C key.

-> When indicated on display:

Basic setting Q
Enter display group number XXX

- Enter "037" for "display group number 037" and confirm entry with Q key.

-> Display readout:

System in basic setting 37
1 2 3 4

- Check lambda probe voltage in display zone 2.
- Check lambda correction value in display zone 3 and the diagnosis result in display zone 4.

	Display zones			
	1	2	3	4
Display group 037: Diagnosis lambda control system				
Display	xxx %	x.xxx V	x.xx	---
Display	Engine load	Lambda probe voltage Bank1, probe 2	Lambda correction value between Bank1, Probe 1 and Bank1, Probe 2	Diagnosis status
Range				Test OFF Test ON Syst. OK Syst. not OK
Specified value	13...40 %	0.100...0.950 V:	lower than 0.02	Syst. OK
Note:		If specified value is not attained: Evaluation =>Page 97		If "Syst. not OK" is displayed: Interrogate fault memory =>Page 4

Note on display zone 2:

The lambda probe voltage Bank 1, probe 2 should be kept as constant as possible. Strong voltage fluctuations indicate a damaged catalytic converter.

Interpreting display group 037

Display zone: 2	Possible causes of fault	Fault remedy
(constant approx. 0.450 V)	- Open circuit in line 4 between lambda probe and control unit - Open circuit in line 3 between lambda probe and control unit	- Check basic voltage => Page 98
Greater than 0.950 V	- Short to positive in line 4 between lambda probe and control unit	
Less than 0.100 V	- Short to earth in line 4 between lambda probe and control unit	- Check lambda probe wiring downstream from catalytic converter =>Page 99

(cont.)

If specified value in display zone 3 or 4 is not attained:

- Perform test drive to free Lambda from any possible residues and repeat the test.



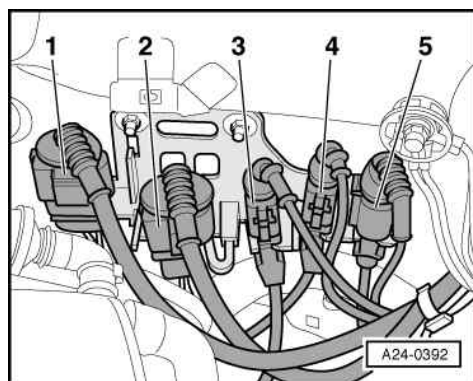
If specified value in display zone 3 or 4 is not attained, even after a test drive has been performed:

- Replace the lambda probe upstream of catalytic converter -G39.

Note:

If the lambda probe voltage is OK and the lambda correction value is still above 0.02 even after test drive was performed it indicates an aged lambda probe upstream of catalytic converter.

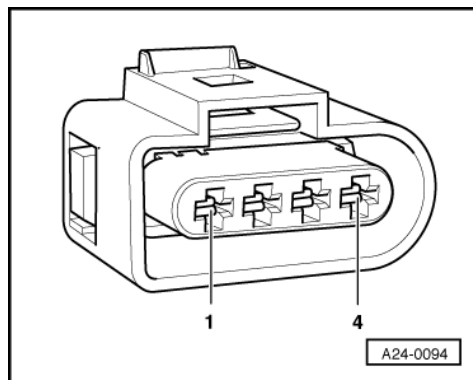
Checking basic voltage



- -> Unplug 4-pin connector -1- (brown) to lambda probe upstream of catalytic converter -G130.

Note:

To gain access to the connector screw out coolant expansion tank bolts and swivel expansion tank aside. Fuel hoses remain connected.



- -> Connect multimeter between contacts 3 and 4 to measure voltage.
- Switch the ignition on.
 - Specified value: 0.400...0.500 V
- Switch ignition off.

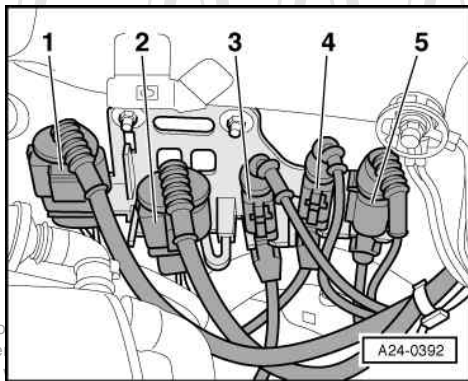
If specified value is not attained:

- Check the Lambda probe lines.

If specified value is attained:

- Replace lambda probe downstream of catalytic converter -G130.

Check lambda probe wiring

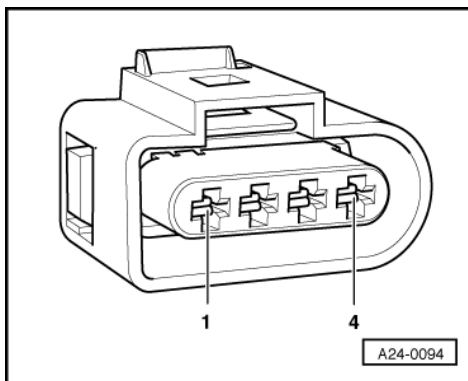


- -> Unplug 4-pin connector -1- (brown) to lambda probe upstream of catalytic converter -G130.

Note:

To gain access to the connector screw out coolant expansion tank bolts and swivel expansion tank aside. Fuel hoses remain connected.

- Connect the V.A.G 1598/31 test box to wiring harness leading to engine control unit; the engine control unit should not be connected => Page 52 .



- -> Test for open circuit in the following wiring connections.

Connector contact	Test box V.A.G 1598/31 Socket
3	68
4	69

- Rectify open circuit, if necessary

=> Current Flow Diagrams, Electrical Fault-Finding and Fitting Locations

- Check for shorts between the two lines.

If the wiring is OK:

- Fit a new engine control unit => Page 54 .



2.6 - Lambda probe heater Check for lambda probe -Z29 downstream of catalytic converter

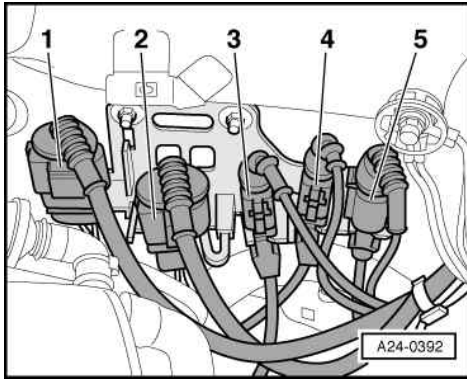
V.A.G 1526 A 	V.A.G 1594 A 
V.A.G 1598/31 	
	G24-0020

Special tools and workshop equipment required

- ♦ V.A.G 1526 A
- ♦ V.A.G 1594 A
- ♦ V.A.G 1598/31

Test requirements:

- Coolant temperature at least 80 °C.



- Fuse for Lambda probe heating OK.

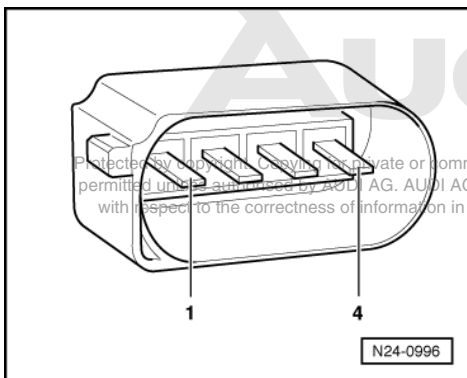
=> Current Flow Diagrams, Electrical Fault-Finding and Fitting Locations

Test sequence

- -> Unplug 4-pin connector -1- (brown) to lambda probe upstream of catalytic converter -G130.

Note:

To gain access to the connector screw out coolant expansion tank bolts and swivel expansion tank aside. Fuel hoses remain connected.



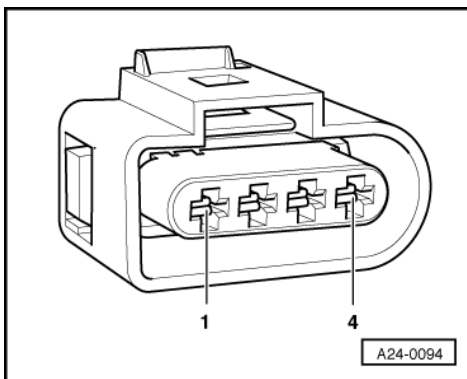
- -> Connect multimeter between contacts 1 and 2 to measure resistance.
- Specified value at room temperature 6.4...47.5 Ω

If specified value is not attained:

- Replace lambda probe downstream of catalytic converter -G130.

If specified value is attained:

- Check the voltage supply to the Lambda probe heating.



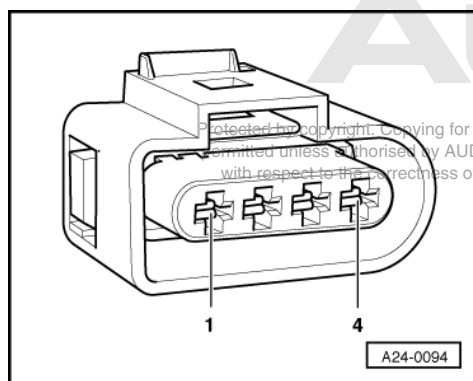


Checking voltage supply for lambda probe heating

- -> Connect multimeter between contacts 1 (positive) and 2 (earth) to measure voltage.
- Start the engine.
 - Specified value: approx. battery voltage

Note:

Points at which Lambda probe heating is switched on and off by engine control unit can be observed in "Reading measured value block" function, display group number 041 and display zone 4.



If no voltage is present:

- -> Connect multimeter as follows to measure voltage:

Connector contact	Measure to
1 (positive)	Vehicle earth

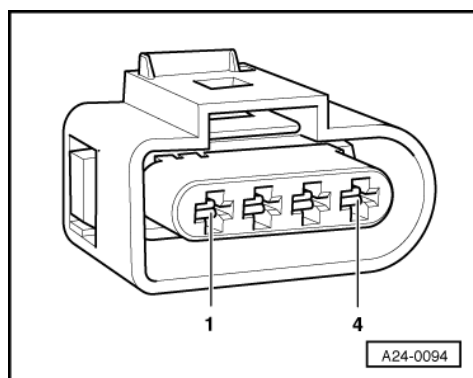
- Operate starter briefly.
 - Specified value: approx. battery voltage

If no voltage is present:

- Check the wiring from contact 1 on the connector via the fuse to the fuel pump relay for an open circuit:

=> Current Flow Diagrams, Electrical Fault-Finding and Fitting Locations

If voltage supply is OK:



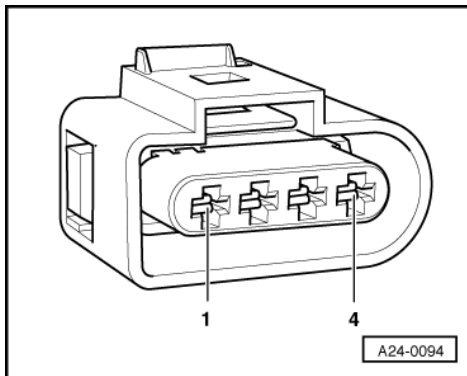
- -> Connect multimeter as follows to measure voltage:

Connector contact	Measure to
2 (earth actuation by engine control unit)	Battery positive

- Start the engine.
 - Specified value: approx. battery voltage, may fluctuate
- Switch ignition off.

If no voltage is present:

- Connect the V.A.G 1598/31 test box to wiring harness leading to engine control unit; the engine control unit should not be connected => Page 52 .



- -> Check for open circuit in the following wiring connections:

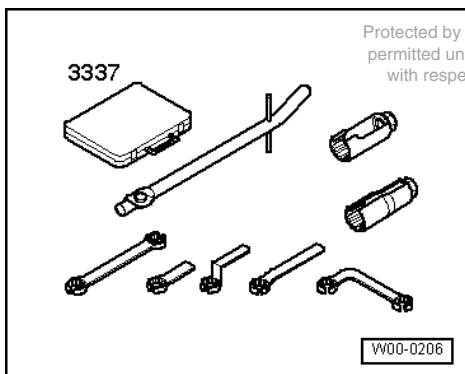
Connector contact	Test box V.A.G 1598/31 Socket
2	63

- Rectify open circuit, if necessary

If wiring is OK but there is no earth supply for the Lambda probe heating:

- Fit a new engine control unit => Page 54 .

2.7 - Removing and installing lambda probe



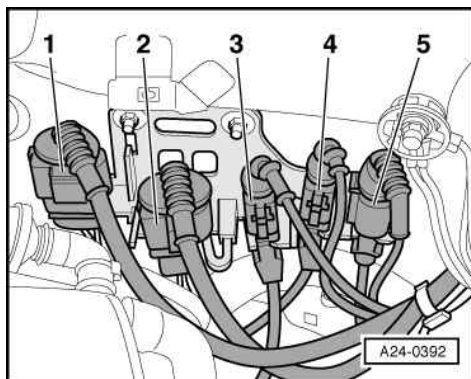
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Special tools, workshop equipment and other items required

- ◆ Box wrench set 3337
- ◆ High temperature lubricant G 052 112 A3



Procedure



- -> Unplug connector for lambda probe and expose wiring.

- 1 - (brown) to lambda probe upstream of catalytic converter -G130
- 2 - (black) to lambda probe upstream of catalytic converter -G39

Note:

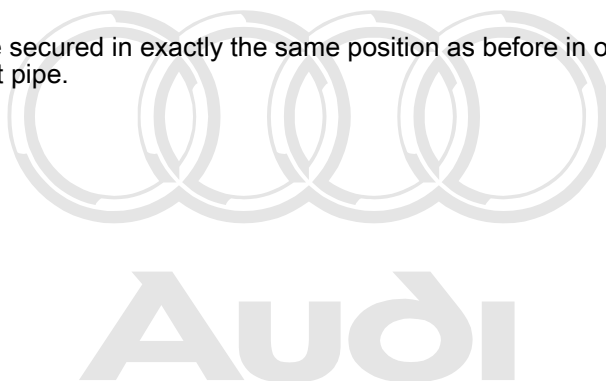
To gain access to the connector screw out coolant expansion tank bolts and swivel expansion tank aside. Fuel hoses remain connected.

- Screw out Lambda probe using special tool 3337.

When installing, note the following points:

Notes:

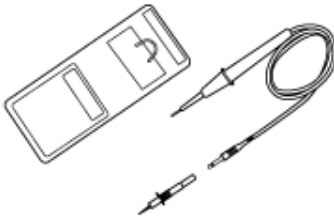
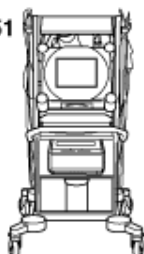
- ♦ The screw thread on the lambda probe is coated with assembly paste. This paste must not be allowed to penetrate the openings on the probe.
- ♦ Tightening torque 55 Nm.
- ♦ When installing, the lambda probe wire must be secured in exactly the same position as before in order to avoid contact between the wire and the exhaust pipe.



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3 - Checking fuel tank breather

3.1 - Checking fuel tank breather

V.A.G 1526 A 	V.A.G 1527 B 
V.A.G 1594 A 	V.A.G 1598/31 
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. G24-0023

3.2 - 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 1598/31
- ♦ VAS 5051 with VAS 5051/1

or

- ♦ V.A.G 1551 with V.A.G 1551/3 A



Testing for leaks

ACF solenoid valve -N80 remains closed when deenergised.

- Disconnect hoses from ACF valve but leave the electrical connector plugged in.
- Connect auxiliary hose to one connection of ACF valve.
- 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 ignition must be switched on.
- Initiate final control diagnosis and actuate ACF solenoid valve -N80 =>Page **19** .

-> Indicated on display:
(or display: Tank breather valve -N80)

Final control diagnosis
Solenoid valve 1 for activated carbon
canister -N80

- ♦ The valve should click...
- ♦ ...and should open and close (check by blowing into the auxiliary hose).

If the injector does not click:

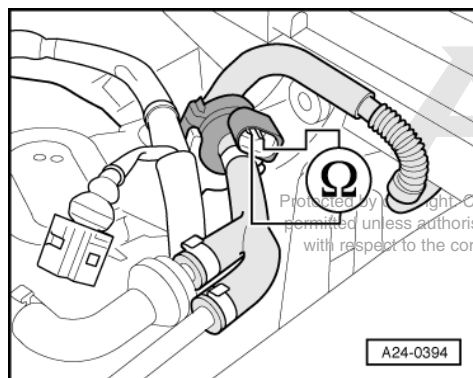
- Checking internal resistance to ACF valve.

If valve does not open or close properly:

- Replace -N80solenoid valve for active carbon canister.

Checking internal resistance

- Unplug connector on ACF valve.



- -> Connect multimeter to injector to measure resistance.
- Specified value: 22...30 Ω

If specified value is not attained:

- Replace -N80solenoid valve for active carbon canister.

If specified value is attained:

- Check the voltage supply =>Page **106** .

Checking power supply

Test requirements:

- Fuse for ACF valve OK.

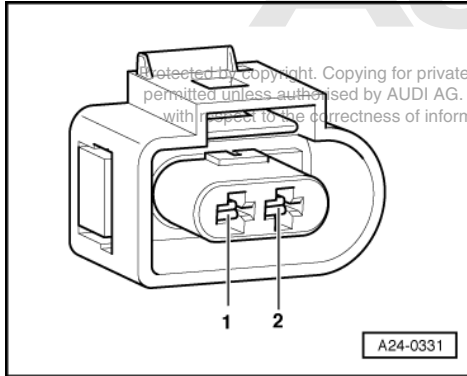
=> Current Flow Diagrams, Electrical Fault-Finding and Fitting Locations

- Fuel pump relay OK; checking =>Page 73 .

Note:

The ACF valve receives its power supply via the fuel pump relay.

- Unplug connector on ACF valve.



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

Connector contact	Measure to
1	Engine earth

- Operate the starter briefly (the engine may start).
 - The LED should light up.

If the LED does not light up:

- Check the wiring from contact 1 on the connector via the fuse to the fuel pump relay for an open circuit:

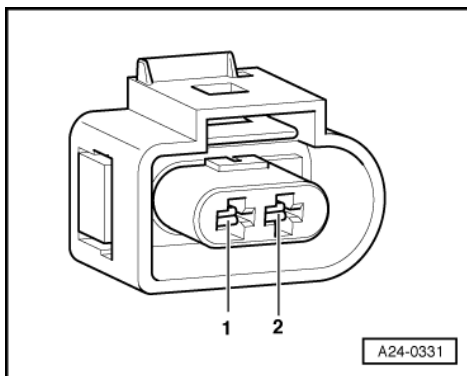
=> Current Flow Diagrams, Electrical Fault-Finding and Fitting Locations

- Rectify open circuit, if necessary

If the LED lights up:

- Check actuation.

Checking actuation



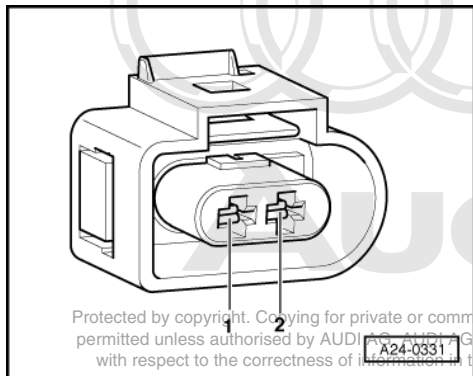
- -> Connect voltage tester V.A.G 1527 B to contacts 1 (positive) and 2 of the connector.
- Initiate final control diagnosis and actuate ACF solenoid valve -N80 =>Page 19 .



- The LED should flash.

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

- Connect the V.A.G 1598/31 test box to wiring harness leading to engine control unit; the engine control unit should not be connected => Page 52 .



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

Connector contact	Test box V.A.G 1598/31 Socket
2	64

- Rectify any open/short circuit as necessary.

If the wiring is OK:

- Fit a new engine control unit => Page 54 .

4 - Checking electronic engine power control (electronic throttle)

4.1 - Checking electronic engine power control (electronic throttle)

4.2 - Function of the electronic throttle system

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

The position of the accelerator pedal is communicated to the engine control unit by two accelerator position sensors (variable resistances located in a single housing) connected to the accelerator pedal.

The position of the accelerator pedal (decided by the driver) is one of the main input parameters to the engine control unit.

The throttle valve is actuated, over the full range of engine speed and power, by an electric motor (throttle valve actuator) in the throttle valve control unit.

The throttle valve actuator moves the throttle valve as instructed by the engine control unit.

With the ignition switched on and the engine not running, the engine control unit controls the throttle valve precisely in accordance with the signals from the accelerator position senders. This means that when the ac-

celerator is pressed half way down, the throttle valve actuator opens the throttle valve to an equivalent extent; the throttle valve is then about half open.

When the engine is running (and under load), the engine control unit can open and close the throttle valve independently of the accelerator position senders.

As an example, the throttle valve can be fully open even though the accelerator pedal is only pressed half way down. This has the advantage of preventing throttle losses at the throttle valve.

Under certain engine load conditions, markedly improved emission and consumption figures are also attained.

The engine torque necessary can be provided by the engine control unit by an optimum combination of throttle opening and boost pressure.

The electronic control system does not simply consist of one or two components but is, rather, a system which includes all the components which contribute to determining the position of the throttle valve and to controlling and monitoring this position. These components include, for example, the throttle valve control unit, the EPC warning lamp, the engine control unit...

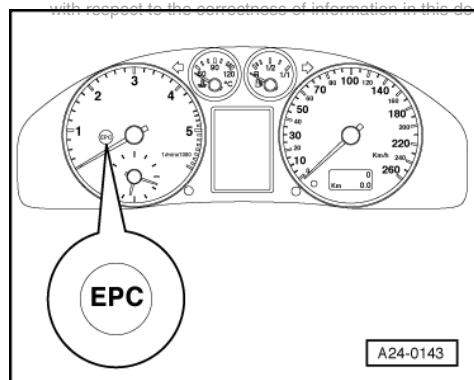
4.3 - Fault lamp for electronic throttle in dash panel insert

Note:

The electronic throttle control fault lamp -K132 is also known as the EPC warning lamp.

"EPC" is an abbreviation for Electronic Power Control and refers to the electronic throttle control system.

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-> Location of the EPC warning lamp

When the ignition is switched on, the engine control unit checks all the components of importance to the electronic throttle system.

After switching on the ignition the engine control unit switches on the EPC warning lamp. The EPC lamp goes out shortly after starting the engine, if, on the one hand, the engine control unit does not detect any faults in the EPC system, and, on the other, if actuation of the lamp by the engine control unit is OK.

If a fault is detected in the electronic throttle system while the engine is running, the engine control unit switches on the EPC warning lamp. (These faults are listed in the fault table). At the same time, an entry is made in the engine control unit fault memory.



4.4 - Check electronic throttle control fault lamp -K132

Functional check on control lamp

- Switch the ignition on.
 - The engine control unit switches on the EPC lamp.
- Start the engine.
 - Shortly after starting the engine the exhaust warning lamp goes out if no fault in relation of the electronic throttle is stored in the fault memory.

Note:

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*The switch-on signal for the fault lamp is transfer via CAN bus to the dash panel insert by the engine control unit. Check the data exchange between engine control unit and other CAN-control units =>Page **132***

4.5 - Checking throttle valve control unit -J338

The following components are located in the housing of the throttle valve control unit.

- ♦ Throttle valve drive -G186 (This is an electric motor which is activated by the engine control unit. This electric motor opens the throttle valve against the force of a spring).
- ♦ Angle sender 1 for throttle valve drive -G187
- ♦ Angle sender 2 for throttle valve drive -G188

Notes:

- ♦ Housing of throttle valve control unit must not be opened.
- ♦ The angle senders are in the form of potentiometers (variable resistances). They provide the position of the throttle valve to the engine control unit completely independently of one another.
- ♦ The potentiometers cannot be adjusted mechanically. The settings are made as part of basic setting (function 04) using the vehicle diagnosis, measurement and information system VAS 5051 or the fault reader V.A.G 1551.

4.6 - Performing adaption of throttle valve control unit

The adaption process enables the engine control unit to learn the various positions of the throttle valve control unit with the ignition switched on and the engine not running. these positions are stored in the control unit. The feedback signal indicating the position of the throttle valve comes from the two throttle valve drive angle senders.

If the throttle valve unit -J338 or the engine control unit are remove and installed or replaced or if the voltage supply from the engine control unit is interrupted an adaption must always be performed.

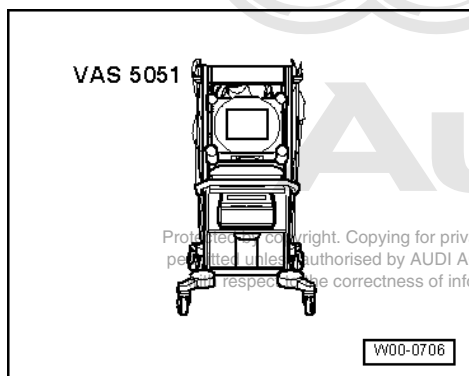
The learning process (adaption process) is performed:

- ♦ Automatically if the ignition is switched on once for at least 10 seconds without actuating the starter or the accelerator pedal and the engine control unit recognises "Learning requirement". In this case, however, it is not obvious whether the adaption process was successful or not. Learning demand is recognised if stored voltage values from the angle senders do not coincide with current measured voltage values in a certain tolerance band.
- ♦ By initiating the basic setting (Function 04) of display group 060 with ignition switched on.

Note:

Engine will not start during automatic adaption.

Special tools and workshop equipment required



- ♦ VAS 5051 with VAS 5051/1

or

- ♦ V.A.G 1551 with V.A.G 1551/3 A

Preconditions:

- No fault recorded in fault memory, interrogate fault memory =>Page 4 .
- Engine stopped, ignition switched on.
- Accelerator pedal not depressed.
- Coolant temperature 10...95 °C.
- Intake air temperature 10...90 °C.
- Voltage supply to engine control unit greater than 12.7 V, Testing =>Page 161 .

Procedure

- Connect vehicle diagnostic, testing 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 ignition must be switched on.

-> 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 "060" for "display group number 060" and confirm entry with Q key.

After the Q key is pressed, the throttle valve actuator is first disconnected from the electricity supply.

In this condition, the throttle valve is pulled into an emergency running position by a mechanical spring which is located in the throttle valve control unit. The values supplied by the two angle senders in this emergency running position are stored in the engine control unit.

The throttle valve is then opened by a predetermined amount. When this value is reached, the throttle valve actuator is again disconnected from the electricity supply. The mechanical spring should then close the throttle valve to the previously learnt emergency running position within a specified period of time (spring test).

The throttle valve actuator then closes the throttle valve; the values supplied by the angle sensors in the throttle valve control unit are stored in the engine control unit.



If the engine control unit disconnects the throttle valve actuator from the electricity supply while the vehicle is being driven, the result will be an increased and fluctuating idling speed and a very poor throttle response.

-> Display readout:

System basic setting 60
1 2 3 4

- Check specified values for throttle valve control unit in display zones 3 and 4.

	Display zones			
	1	2	3	4
Display group 060: Adaption of throttle valve control unit				
Display	xx %	xx %	x	---
Display	Throttle valve angle (angle sender 1)	Throttle valve angle (angle sender 2)	Learning stage counter	Adaption status
Range			0...8	ADP process running ADP OK ERROR
Specified value	3...93 %	97...3 %	8	ADP OK
Note:			After adaption the learning stage counter reaches figure 8. (Figures may be skipped)	If "ERROR" is displayed: Interrogate fault memory =>Page 112

Note:

"ADP" in display zone 4 stands for "Adaption".

Note:

If the adaption is interrupted by the control unit, the reason could be one of the following:

- ♦ The throttle valve cannot close completely (e.g. dirt).
- ♦ The battery voltage is too low.
- ♦ Throttle valve control unit or wiring is defective.
- ♦ Engine was started or accelerator was actuated during the adaption process.
- ♦ Distortion of throttle valve housing (check screw connection).

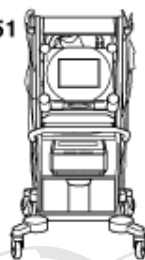
When adaption process is interrupted, message "Function is unknown or cannot be carried out at the moment" is displayed on tester. The next time the ignition is switched on (for several seconds), the adaption process is automatically performed again.

- End the engine basic setting by pressing the ⇒ key.

-> Display readout (function selection):

Rapid data transfer HELP
Select function XX

4.7 - Checking angle sender for throttle valve actuator

V.A.G 1526 A 	V.A.G 1594 A 
V.A.G 1598/31 	VAS 5051 
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Special tools and workshop equipment required

- ◆ V.A.G 1526 A
- ◆ V.A.G 1594 A
- ◆ V.A.G 1598/31
- ◆ VAS 5051 with VAS 5051/1

or

- ◆ V.A.G 1551 with V.A.G 1551/3 A

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

Test sequence

- Connect vehicle diagnostic, testing 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 ignition must be switched on.

-> When adjacent display appears:



Rapid data transfer HELP
Select function XX

- 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 "062" for "display group number 062" and confirm entry with Q key.

-> Indicated on display:

Read measured value block 62
1 2 3 4

- Check specified values for electronic throttle potentiometer voltages in display zones 1 and 2.

	Display zones			
	1	2	3	4
Display group 062: Electronic throttle potentiometer voltages				
Display	xx %	xx %	xx %	xx %
Display	Throttle valve angle (angle sender 1)	Throttle valve angle (angle sender 2)	Sender 1 for accelerator pedal posi- tion	Sender 2 for accelerator pedal posi- tion
Specified value	3...93 %	97...3 %	12...97 %	4...49 %

Note:

The engine control unit converts and displays the voltage readings from the angle senders as percentages of 5 V. (A 5 Volt supply corresponds to 100%).

- Observe readouts in display zones 1 and 2.
- Slowly depress accelerator pedal.

Percentage displayed in zone 1 should rise evenly. The tolerance range from 3...0.93 % is not fully utilised.

Percentage displayed in zone 2 should fall evenly. The tolerance range from 97...0.3 % is not fully utilised.

Notes:

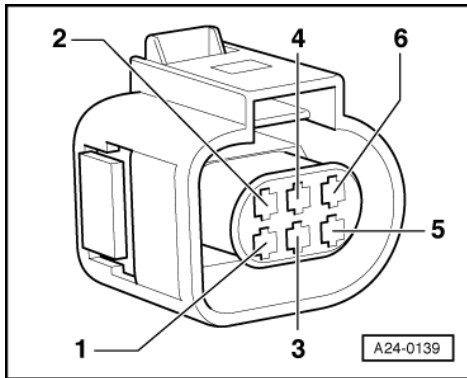
- ♦ The reason why the value in display zone 1 rises and that in zone 2 falls is that the potentiometers (angle senders) in the throttle valve control unit operate in opposite directions.
- ♦ This means that the voltage picked off by one of the angle senders runs in the direction of 5 V. (As the throttle is opened, the voltage becomes greater and the percentage increases).
- ♦ The voltage picked off by the angle sender 2 runs from 5 V in the direction of 0 V. (As the throttle is opened, the voltage becomes smaller and the percentage decreases).

If the displays are not as described:

- Check throttle valve control unit voltage supply and wiring =>Page 114 . Pay particular attention to connectors, which may be detached or corroded.
- Check the accelerator position senders
=>Page 116 .

Checking the voltage supply to the throttle valve control unit.

- Unplug the connector from the throttle valve control unit.
- Switch the ignition on.



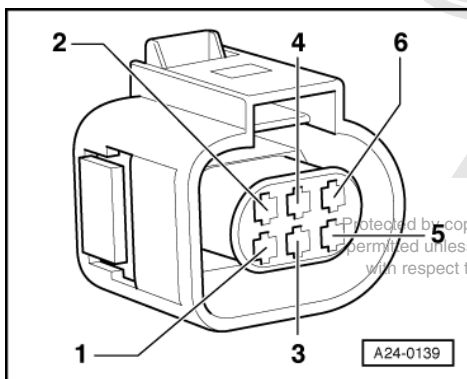
- -> Connect multimeter as follows to measure voltage:

Connector contact	Specified value
2 + earth	approx. 5 V
2 + 6	approx. 5 V

If specified values are not attained:

- Check wiring between engine control unit and throttle valve control unit =>Page 115 .

Checking wiring



- -> Unplug the connector from the throttle valve control unit.
- Connect the V.A.G 1598/31 test box to wiring harness leading to engine control unit; the engine control unit should not be connected => Page 52 .
- Check for open circuit and short to earth/positive or earth in the following wiring connections:

Connector contact	Test box V.A.G 1598/31 Socket
1	92
2	83
3	117
4	84
5	118
6	91

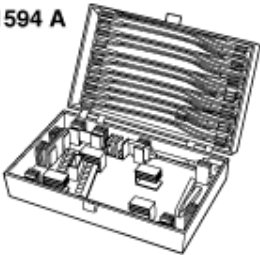
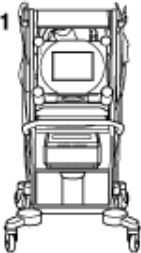
- Rectify any open/short circuit as necessary.

If no wiring fault is detected:

- Replace throttle valve control unit



4.8 - Checking accelerator position sender

V.A.G 1526 A 	V.A.G 1594 A 
V.A.G 1598/31 	VAS 5051 
	G24-0021

Special tools and workshop equipment required

- ♦ V.A.G 1526 A
- ♦ V.A.G 1594 A
- ♦ V.A.G 1598/31
- ♦ VAS 5051 with VAS 5051/1

or

- ♦ V.A.G 1551 with V.A.G 1551/3 A

Both accelerator pedal position sensors -G79 and -G185 are located on the accelerator pedal and completely independently signal the driver's requirements to the engine control unit. Both senders are located in one housing.

Test sequence

- Connect vehicle diagnostic, testing 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 ignition must be switched on.

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-> When indicated on display:

Rapid data transfer HELP
Select function XX

- Enter "08" to select the function "Reading measured value block" and confirm entry with Q key.

-> When indicated on display:

Reading measured value block Q
Enter display group number XXX

- Enter "062" for "display group number 062" and confirm entry with Q key.

-> Indicated on display:

Read measured value block 62
1 2 3 4

- Check specified values for electronic throttle potentiometer voltages in display zones 3 and 4.

	Display zones			
	1	2	3	4
Display group 062: Electronic throttle potentiometer voltages				
Display	xx %	xx %	xx %	xx %
Display	Throttle valve angle (angle sender 1)	Throttle valve angle (angle sender 2)	Sender 1 for accelerator pedal posi- tion	Sender 2 for accelerator pedal posi- tion
Specified value	3...93 %	97...3 %	12...97 %	4...49 %

Note:

The engine control unit converts and displays the voltage readings from the angle senders as percentages of 5 V. (A 5 Volt supply corresponds to 100%).

- Observe readouts in display zones 3 and 4.
- Slowly depress accelerator pedal.

Percentage displayed in zone 3 should rise evenly. The tolerance range from 12...97% is not fully utilised.

Percentage displayed in zone 4 should also rise evenly. The tolerance range from 4...49 % is not fully utilised.

Note:

The value displayed in zone 3 must always be about twice as large as that in zone 4.

If the displays are not as described:

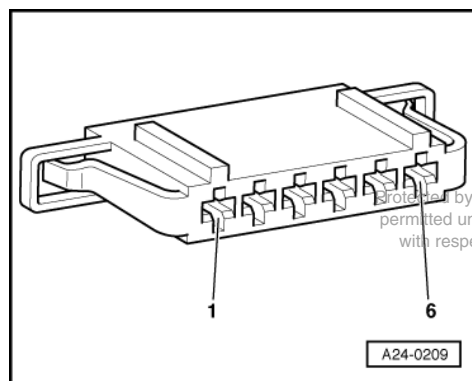
- Check voltage supply and wiring for accelerator position sensor => Page 24-141.

Checking voltage supply for accelerator position senders

- Remove driver's storage compartment.

=> General Body Assembly - Interior; Repair group 68; Dash panel; Removing driver's shelf Dash panel Re-
moving driver's shelf

- Disconnect connector for accelerator position sensors.
- Switch the ignition on.



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- -> Connect multimeter as follows to measure voltage:

Connector contact	Specified value
1 + earth	approx. 5 V
1 + 5	approx. 5 V
2 + earth	approx. 5 V
2 + 3	approx. 5 V

If specified values are attained:

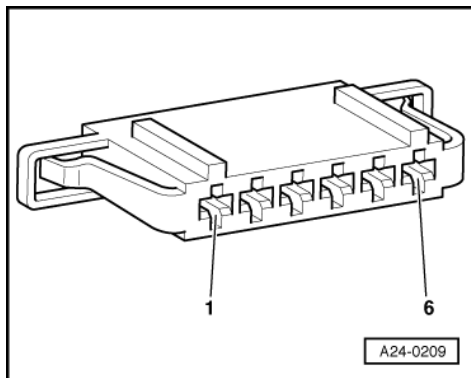
- Additionally check signal wires.

If specified values are not attained:

- Check wiring between engine control unit and accelerator position senders.

Checking wiring

- Connect the V.A.G 1598/31 test box to wiring harness leading to engine control unit; the engine control unit should not be connected => Page 52 .



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

Connector contact	Test box V.A.G 1598/31 Socket
1	72
2	73
3	36
4	35
5	33
6	34

- Rectify any open/short circuit as necessary.

If no wiring fault is detected:

- Replace accelerator position senders

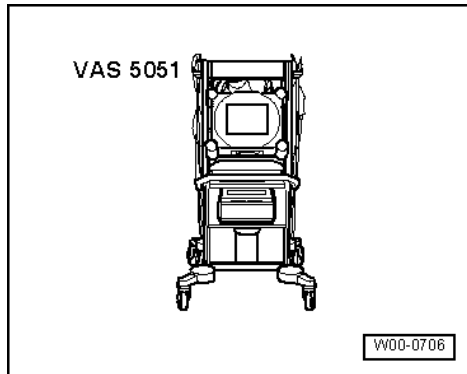
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=> Fuel supply system - Petrol engines, Repair group 20; Servicing throttle mechanism - front and four-wheel drive Servicing throttle mechanism - front and four-wheel drive

4.9 - Adapt kickdown function

If accelerator pedal position sender or engine control unit is replaced kickdown function must be learnt on vehicles with automatic gearbox.

Special tools and workshop equipment required



- ♦ VAS 5051 with VAS 5051/1
- or
- ♦ V.A.G 1551 with V.A.G 1551/3 A

Preconditions:

- No fault recorded in fault memory, interrogate fault memory =>Page 4 .
- Engine stopped, ignition switched on

Procedure

- Connect vehicle diagnostic, testing 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 ignition must be switched on.

-> When indicated on display:

Rapid data transfer	HELP
Select function XX	

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

-> When indicated on display:

Basic setting	Q
Enter display group number XXX	

- Enter "063" for "display group number 063" and confirm entry with Q key.

-> Display readout:

System in basic setting 63			
1	2	3	4

Note:

You will now be instructed to: "Confirm kickdown".

- Fully depress accelerator pedal beyond kickdown point and keep it pressed.

**Note:**

During adaption the kick-down point "Kick-down ADP is running" is displayed on V.A.G 1551. After successful adaption of the kick-down point the V.A.G 1551 shows "Kick-down ADP OK".

- Check specified value in display zone 4:

	Display zones			
	1	2	3	4
Display group 063: Adapting kickdown function				
Display	xx %	xx %	Kickdown	---
Display	Sender 1 for accelerator pedal position	Learned kickdown value sender 1 for accelerator pedal position	Kickdown	Adaption status
Range	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		Kickdown	Starting ADP process running ADP OK ERROR
Specified value		79...94 %	Kickdown	ADP OK
Note:				If "ERROR" is displayed: Interrogate fault memory => Page 4.

Notes:

- ♦ "ADP" in display zone 4 stands for adaption.
- ♦ If "ERROR" can be displayed, if e.g. accelerator pedal is not pressed when instructed by tester, or if accelerator pedal was released while adaption was already running but process was not yet complete. In both cases it is necessary to exit the "Basic setting" mode and restart the adaption process afresh =>Page 119.

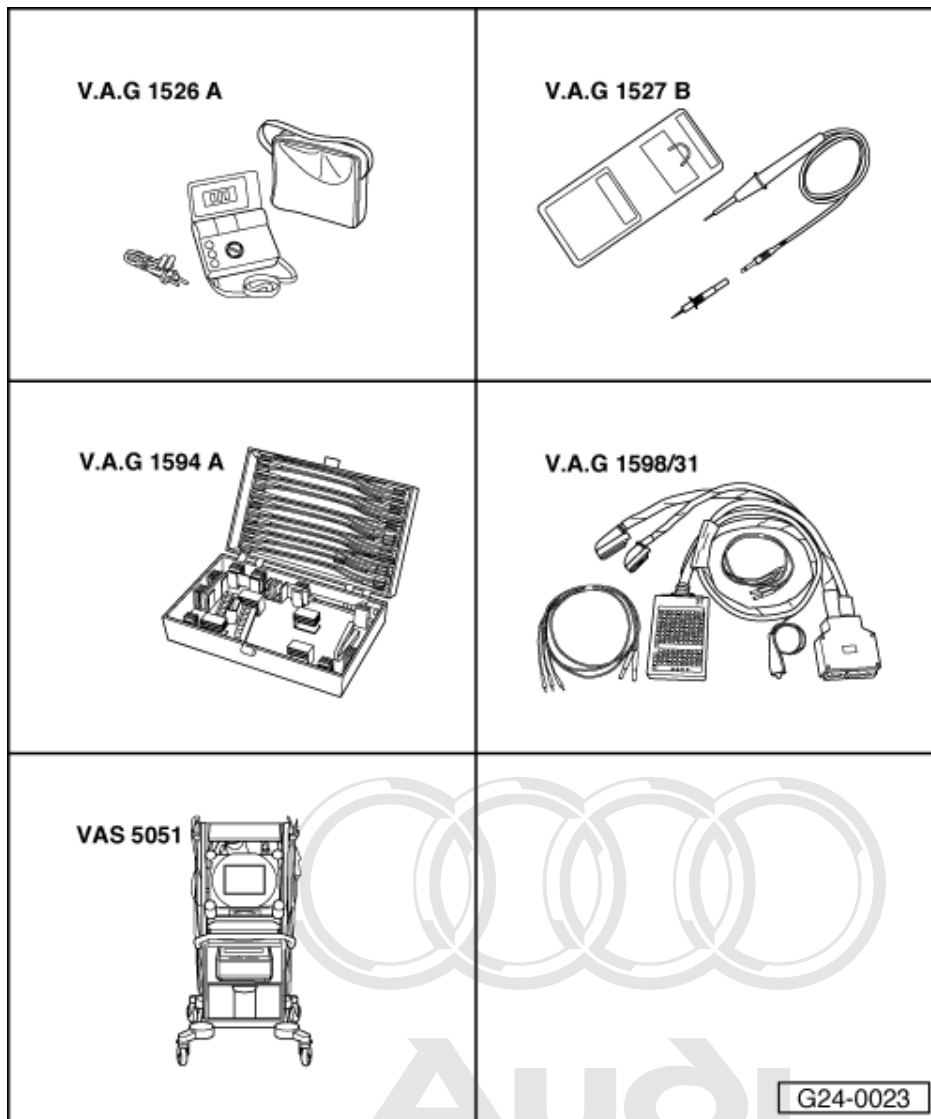
If specified value "ADP OK" is attained:

- Press the ➡key.

-> Display readout (function selection):

Rapid data transfer	HELP
Select function XX	

4.10 - Checking brake light switch and brake pedal switch



Special tools and workshop equipment required

- ◆ V.A.G 1526 A
- ◆ V.A.G 1527 B
- ◆ V.A.G 1594 A
- ◆ V.A.G 1598/31
- ◆ VAS 5051 with VAS 5051/1

or

- ◆ V.A.G 1551 with V.A.G 1551/3 A

Note:

Command from accelerator pedal sender (potentiometer) to engine control unit for opening throttle valve is suppressed for safety reasons when brake is pressed. To do this the control unit requires signals from both the brake light switch and the brake pedal switch.

If the brakes are actuated when the accelerator pedal is held at a constant position, the engine speed is immediately reduced to idling speed. Incorrectly adjusted switches may lead to unwanted regulating actions.

**Test sequence**

- Connect vehicle diagnostic, testing 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 ignition must be switched on.

-> When indicated on display:

Rapid data transfer HELP
Select function XX

- 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 "066" for "display group number 066" and confirm entry with Q key.

-> Indicated on display:

Read measured value block 66
1 2 3 4

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

	Display zones			
	1	2	3	4
Display group 066: Signals to engine control unit				
Display	xxx km/h	XXXXXXXXX	xxx km/h	XXXXXXXXX
Display	ACTUAL speed	Switch settings	SPECIFIED speed	Switch settings
Range		XXXXXX00 XXXXXX11		
Specified value		XXXXXX00 (with brake pedal not pressed)		
		XXXXXX11 (with brake pedal pressed)		
Note:		Value: X = no meaning. Switching points are slightly offset		

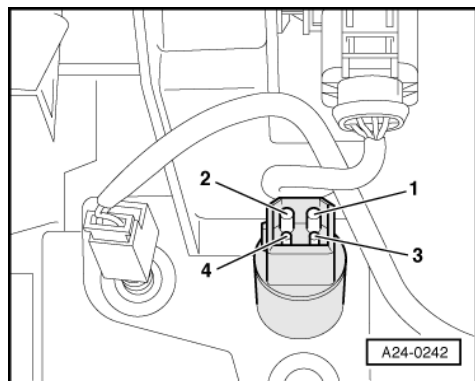
If the display is not as described:

Checking switch

- Remove driver's storage compartment.

=> General Body Assembly - Interior; Repair group 68; Dash panel; Removing driver's shelf Dash panel Re-

- Unplug connector from brake light/brake pedal switch.



- -> Connect multimeter between contacts 1 and 2 to measure resistance.
 - Specified value: $\infty\omega$ (no continuity)
- Press brake pedal.
 - Specified value: approx. 0 ω
- Connect multimeter between contacts 3 and 4 to measure resistance.
 - Specified value: approx. 0 ω
- Press brake pedal.
 - Specified value: $\infty\omega$ (no continuity)

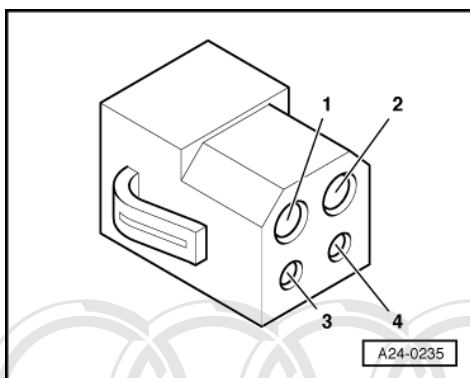
If specified values are not attained:

- Replace brake light/brake pedal switch.

If specified values are attained:

- Check the power supply.

Checking power supply



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

Connector contact	Measure to
1	Car body earth point

- The LED should light up.

Connector contact	Measure to
3	Car body earth point

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

If the LED does not light up:

- Check the wiring between contact 1 and 3 of connector for open circuit/short to earth:

=> Current Flow Diagrams, Electrical Fault-Finding and Fitting Locations

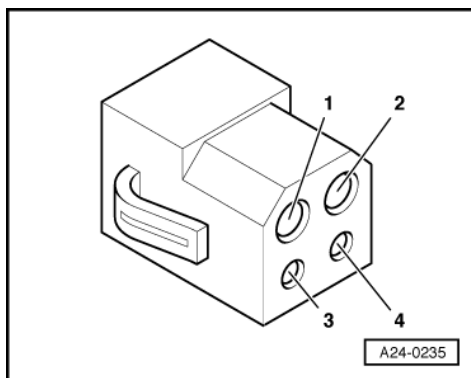
- Rectify any open/short circuit as necessary.

If the LED lights up:

- Check actuation.

Checking actuation

- Connect the V.A.G 1598/31 test box to wiring harness leading to engine control unit; the engine control unit should not be connected => Page 52 .



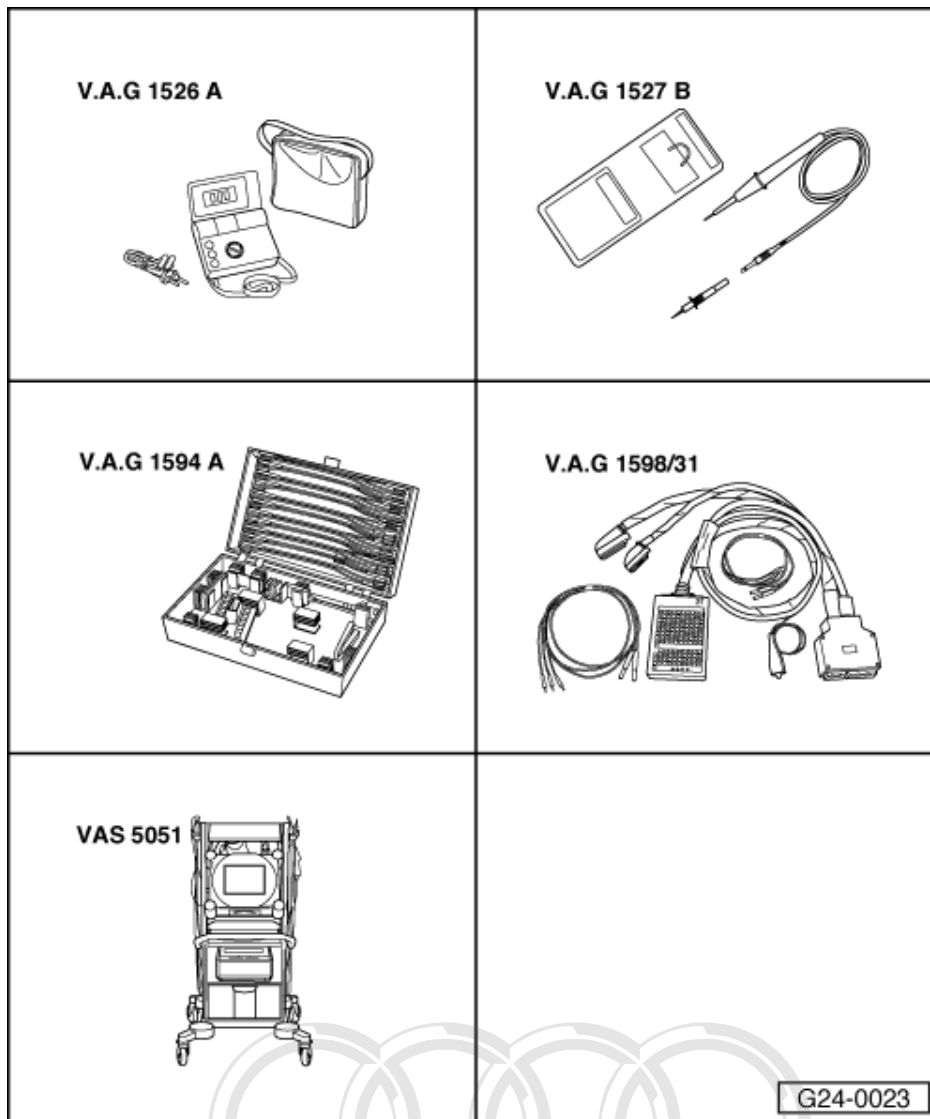
- -> Check for open circuit and short to positive or earth in the following wiring connections:

Connector contact	Test box V.A.G 1598/31 Socket
2	56
4	55

- Rectify any open/short circuit as necessary.

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4.11 - Checking clutch pedal switch -F36



Special tools and workshop equipment required

- ◆ V.A.G 1526 A
- ◆ V.A.G 1527 B
- ◆ V.A.G 1594 A
- ◆ V.A.G 1598/31
- ◆ VAS 5051 with VAS 5051/1

or

- ◆ V.A.G 1551 with V.A.G 1551/3 A

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Note:

This signal is designed to prevent speed overshoots and jerkiness on switching from throttle open to throttle closed and vice versa when disengaging clutch. It is needed for the cruise control system.

Test sequence

- Connect vehicle diagnostic, testing 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 ignition must be switched on.

-> When indicated on display:

Rapid data transfer HELP
Select function XX

- Enter "08" to select the function "Reading measured value block" and confirm entry with Q key.

-> When indicated on display:

Reading measured value block Q
Enter display group number XXX

- Enter "066" for "display group number 066" and confirm entry with Q key.

-> Indicated on display:

Read measured value block 66
1 2 3 4

- Check clutch pedal switch in display zone 2.

	Display zones			
	1	2	3	4
Display group 066: Signals to engine control unit				
Display	xxx km/h	XXXXXXXX	xxx km/h	XXXXXXXX
Display	ACTUAL speed	Switch settings	SPECIFIED speed	Switch settings
Range		XXXXX0XX XXXXX1XX		
Specified value		XXXXX0XX (clutch pedal not pressed)		
		XXXXX1XX (clutch pedal pressed)		
Note:		Value: X = no meaning		

If the display is not as described:

Checking switch

- Remove driver's storage compartment.

=> General Body Assembly - Interior; Repair group 68; Dash panel; Removing driver's shelf Dash panel Removing driver's shelf

- Unplug the connector from clutch pedal switch.
- Connect multimeter between contacts 1 and 2 to measure resistance.
 - Specified value: approx. 0 ω
- Operate clutch pedal.
 - Specified value: $\infty \omega$ (no continuity)

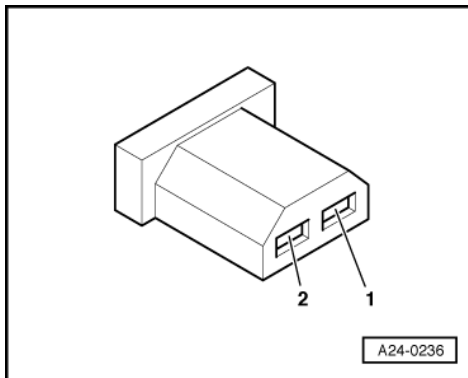
If specified value is not attained:

- Replace clutch pedal switch.

If specified value is attained:

- Check the power supply.

Checking power supply



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

Connector contact	Measure to
1	Car body earth point

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

If the LED does not light up:

- Check the wiring from contact 1 of the connector to fuse for open circuit:

=> Current Flow Diagrams, Electrical Fault-Finding and Fitting Locations

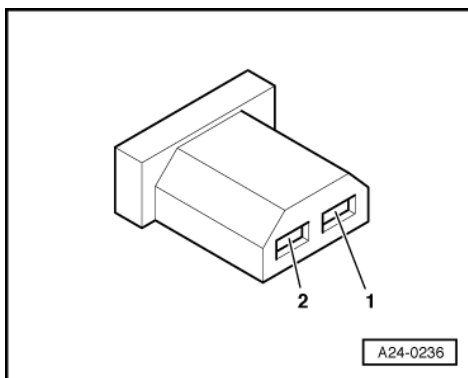
- Rectify open circuit, if necessary

If the LED lights up:

- Check actuation.

Checking actuation

- Connect the V.A.G 1598/31 test box to wiring harness leading to engine control unit; the engine control unit should not be connected => Page 52 .



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

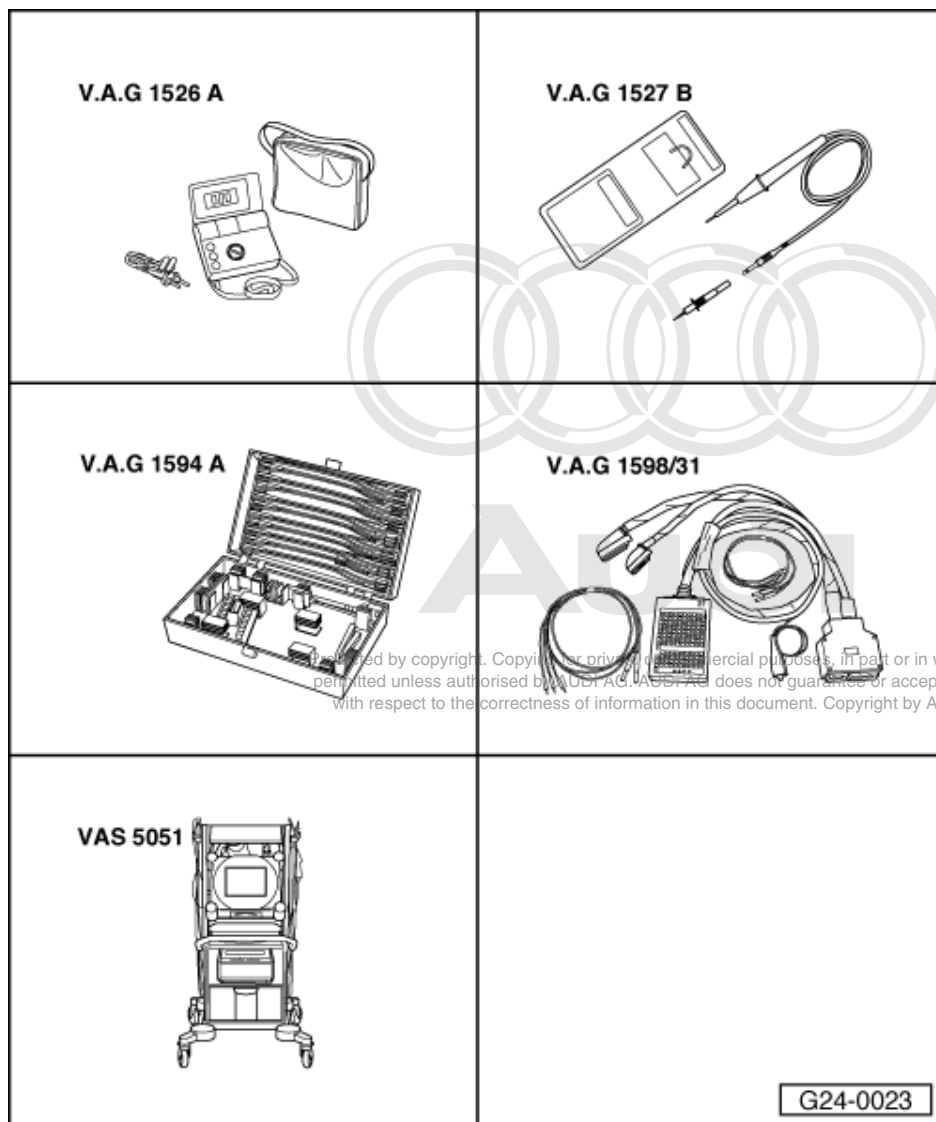
Connector contact	Test box V.A.G 1598/31 Socket
2	39

- Rectify any open/short circuit as necessary.



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 1598/31
- ♦ VAS 5051 with VAS 5051/1

or

- ♦ V.A.G 1551 with V.A.G 1551/3 A

5.2 - Checking engine speed signal

Note:

The engine speed signal is taken from contact 37 of the engine control unit. The signal is used, among other things, for the engine speed display in the dash panel insert.

- Connect the V.A.G 1598/31 test box to wiring harness leading to engine control unit; the engine control unit should not be connected => Page 52 .
- Check for open circuit and short to positive or earth in the following wiring connections:

Test box V.A.G 1598/31 Socket	Instrument cluster: contact
37	=> Current Flow Diagrams, Electrical Fault-Finding and Fitting Locations

- Rectify any open/short circuit as necessary.

5.3 - Check vehicle speed signal

Notes:

- ♦ The speed signal is generated by the speedometer sender -G22 (at the gearbox) and processed in the dash panel insert.
- ♦ The processed signal goes to contact 54 on the engine control unit and is used for idling speed stabilisation and for the damping of load change jolts when changing gear.

Test requirements:

- Speedometer function and display OK, fault-finding:

=> Electrical System; Repair group 90; Dash panel insert; Checking vehicle speed signal Dash panel insert
Checking vehicle speed signal

Test sequence

- Connect vehicle diagnostic, testing 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.

Important:
To avoid danger of accident when performing measurement and test drives, heed safety precautions => Page 38 .

-> When indicated on display:

Rapid data transfer HELP
Select function XX

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Enter "08" to select the function "Reading measured value block" and confirm entry with Q key.

-> When indicated on display:

Reading measured value block Q
Enter display group number XXX

- Enter "005" for "display group number 005" and confirm entry with Q key.

-> Indicated on display:



Read measured value block 5
1 2 3 4

- Take vehicle for a test drive and check whether the vehicle speed appears in display zone 3.
- If the road speed does not appear, raise the vehicle (preferably using a lifting platform) until the front left wheel is clear of the ground.
- Connect the V.A.G 1598/31 test box to wiring harness leading to engine control unit; the engine control unit should not be connected => Page 52.
- Connect voltage tester V.A.G 1527 B to sockets 3 (positive) and 54 (vehicle speed signal) of test box V.A.G 1598/31.
- Switch on the ignition and turn the front left wheel by hand.
 - The diode test lamp should flash (very brief 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 1598/31 Socket	Instrument cluster: contact
54	=> Current Flow Diagrams, Electrical Fault-Finding and Fitting Locations

- Rectify any open/short circuit as necessary.

5.4 - Testing air conditioner compressor shut-off

Notes:

- ♦ The air conditioning compressor signal informs the engine control unit that the compressor will be switched on in 140 ms.
- ♦ The engine control unit can send a signal via the same wire to shut off the air conditioner compressor.
- ♦ The engine control unit will shut off the air conditioning compressor in the following cases:
 - During powerful acceleration (full throttle in first gear)
 - In the emergency programme (emergency running mode)
 - After initiating of basic setting (Function 04)

Test requirements:

- Air conditioning system OK
- No faults recorded in fault memory of engine control unit
- Vehicle at ambient temperature (warmer than + 15 °C)

Test sequence

- Connect the vehicle diagnostic, testing 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 "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 "050" for "display group number 050" and confirm with Q key.

-> Indicated on display:
(1...4 = display zones)

Read measured value block 50
1 2 3 4

- Switch off air conditioner.
 - Specified value for Display zone 4: Compr. OFF
- Switch on air conditioning with "auto" button and set air conditioning to maximum cooling/ heating. The compressor must run.
 - Specified value for Display zone 4: Compr. ENG.
- Abruptly floor the accelerator pedal and release again (brief burst of throttle).
 - Specification for display zone 4: Display switches for several seconds from "Compr. ON" to "Compr. OFF" (compressor shut-off on vehicle acceleration)

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If the readout in display zone is not as described:

- Connect the V.A.G 1598/31 test box to wiring harness leading to engine control unit; the engine control unit should not be connected => Page 52 .
- Check for open circuit and short to positive or earth in the following wiring connections:

Test box V.A.G 1598/31 Socket	operating and display unit -E87 contact
41	=> Current Flow Diagrams, Electrical Fault-Finding and Fitting Locations

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

=> Heating, Air Conditioner; Repair group 01; Self-diagnosis for air conditioner Self-diagnosis for air conditioner

5.5 - Check wiring for crash signal

The engine control unit receives the crash signal ("Crash cut-off was activated") from the airbag control unit.

The airbag control unit sends the crash signal to the engine control unit (during an accident or if a final control diagnosis is carried out relating to the airbag system), the engine control unit switches off the fuel pump, which stops the engine. It can however be restarted (e.g. to move vehicle out of danger area).

- Connect the V.A.G 1598/31 test box to wiring harness leading to engine control unit; the engine control unit should not be connected => Page 52 .
- Check for open circuit and short to positive or earth in the following wiring connections:

Test box V.A.G 1598/31 Socket	Control unit for Airbag -J234 contact
67	=> Current Flow Diagrams, Electrical Fault-Finding and Fitting Locations

- Rectify any open/short circuit as necessary.

=> Current Flow Diagrams, Electrical Fault-Finding and Fitting Locations

If no wiring fault is detected:

- Interrogate fault memory of airbag control unit:



=> Body, Self-diagnosis; Repair group 01; Self-diagnosis of airbag system BTU (Basic Triggering Unit) with side airbag; Interrogating fault memory Self-diagnosis of airbag system BTU (Basic Triggering Unit) with side airbag Interrogating fault memory

5.6 - Checking consumption signal for vehicle computer

Notes:

The consumption signal is transferred to the dash panel insert via CAN bus by the engine control unit. Check the data exchange between engine control unit and other CAN-control units =>Page 132

5.7 - Checking fuel level signal wiring

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Notes:

- ♦ The signal is used for finding the cause for certain recognised faults (e.g. misfiring).
- ♦ The signal for fuel tank level is transferred from the dash panel insert via CAN bus to the engine control unit. Check the data exchange between engine control unit and other CAN-control units =>Page 132

5.8 - Check signal for rough-road recognition

Notes:

- ♦ If the ABS/EDL control unit detects a spinning wheel, the ABS/EDL control unit generates the rough-road signal.
If the engine control unit detects the rough-road signal, the misfire detection is switched off in engine control unit.
- ♦ The rough-road signal must only be tested if the fault "18014 (P1606) Rough-road detection/engine specified torque ABS CU, electrical fault in circuit" is stored.
The possible additional fault "Misfire" is then a sequential fault and can be ignored.
- ♦ The rough- road signal is transferred to the engine control unit from the ABS/EDL control unit via the CAN bus. Check the data exchange between engine control unit and other CAN-control units =>Page 132

5.9 - Check the data exchange between engine control unit and other CAN-control units

Notes:

- ♦ Data is exchanged between individual control units by means of a bus system.
- ♦ "CAN bus" is used to describe a system that transports and distributes data.
- ♦ The wires between the control units that are used to transfer the data are known as signal wires.
- ♦ Data is transmitted via data wires in sequence, i.e. in a specific order to the connected control units (e.g. engine rpm and accelerator pedal position).

Testing the bus system

The fault table includes instructions to test the data exchange between engine control unit and CAN control units.

- Connect the vehicle diagnostic, testing 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 ignition must be switched on.

-> When adjacent display appears:

Rapid data transfer HELP
Select function XX

- Enter "08" to select the function "Reading measured value block" and confirm entry with Q key.

Note:

The measured value blocks 125 and 126 indicate CAN drive users.

-> When adjacent display appears:

Reading measured value block Q
Enter display group number XXX

- Enter "125" for "display group number 125" and confirm entry with Q key.

-> When indicated on display:

Read measured value block 125
1 2 3 4

- Check displays in display zones 1 to 4.

Displayed are the engine control unit CAN able control units:

- No display: Control unit not CAN able
- Display 1: Can-able control unit is participant of the Databus
- Display 0: Can-able control unit is not participant of the Databus

Read measured value block 126
1 2 3 4

- > Check under display group number 126 the same way.
- Press the =>key.

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-> 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

- Press the "0" key twice for the address word "automatic test sequence" and confirm entry with Q key.
- The fault memory interrogation of all vehicle systems capable of self-diagnosis is carried out

If a control unit answers with its identification, the number of faults stored or "No fault detected" appears on the display.

Any system faults stored will be displayed in sequence and printed out. The V.A.G 1551 will then transmit the next address word.

-> The automatic test sequence has ended when the following appears on the display:

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

If a fault is displayed relating to "Databus..." or "...CAN bus":

- Check whether this is the correct engine control unit for this vehicle and if further CAN control unit are installed (part no. and coding).

If the correct control units are installed:

- Check that multiple connectors for control units are properly seated.

If the multiple connectors are too tight:

- Check the CAN bus system.

Checking a "two-line bus system"

The communication between three or more control units is carried out over a "two-line bus system".

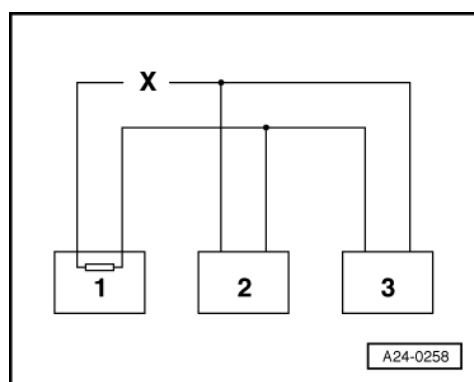
- Evaluate the faults stored in the control units.

Note:

This helps to localise line faults.

Example 1:

With the faults stored in the fault memories it can be seen that the control unit 1 does not communicate with control units 2 and 3.



Control unit	Faults stored in fault memory
1	- No message from control unit 2 - No message from control unit 3
2	- No message from control unit 1
3	- No message from control unit 1

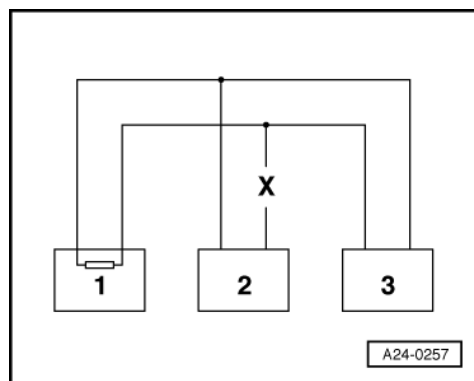
- Switch ignition off.
- Disconnect the control units connected to each other via the bus lines and investigate whether there is a short circuit between the bus lines.

=> Current Flow Diagrams, Electrical Fault-Finding and Fitting Locations

- If no fault can be detected in the bus lines exchange control unit 1.

Example 2:

With the faults stored in the fault memories it can be seen that the control unit 2 does not communicate with control units 1 and 3.



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Control unit	Faults stored in fault memory
1	- No message from control unit 2
2	- No message from control unit 1 - No message from control unit 3
3	- No message from control unit 2

- Switch ignition off.
- Disconnect the control units connected to each other via the bus lines and investigate whether there is a short circuit between the bus lines.

=> Current Flow Diagrams, Electrical Fault-Finding and Fitting Locations

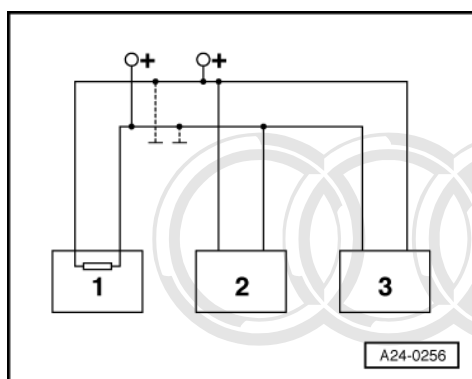
- If no fault can be detected in the bus lines exchange control unit 2.

Example 3:

With the faults stored in the fault memories it can be seen that there is no sending or receiving operation possible in any of the control units.

Control unit	Faults stored in fault memory
1	- Data bus drive defective
2	- Data bus drive defective
3	- Data bus drive defective

- Switch ignition off.



- -> Disconnect the control units that are linked by the bus wires and check for a short circuit to positive or mass between the bus wires.

=> Current Flow Diagrams, Electrical Fault-Finding and Fitting Locations

If cause of fault "Data bus drive defective" cannot be found in bus lines check whether one of the control units is responsible for the fault.

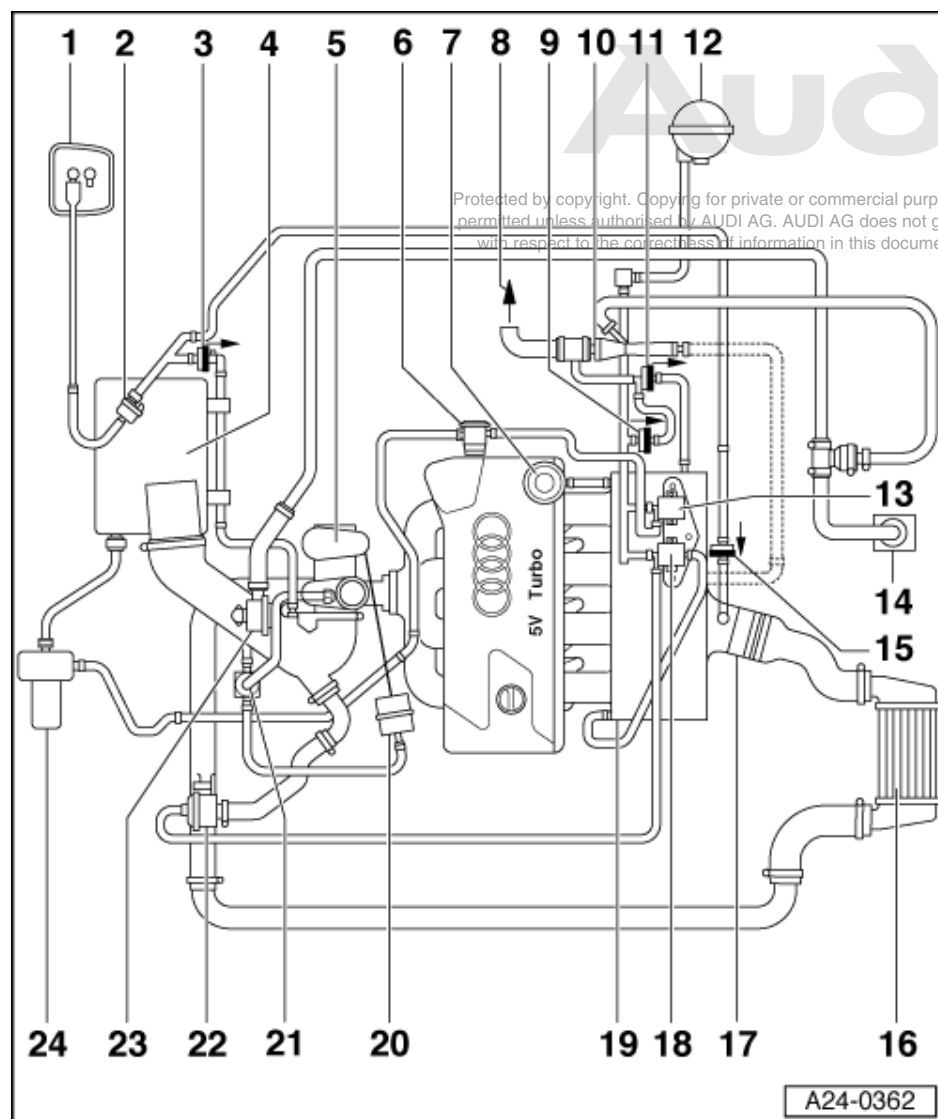
All the control units that communicate via the CAN data bus are still disconnected. Ignition is switched off.

- Connect one of the control units.
- Connect fault reader V.A.G 1551. Switch the ignition on and erase the fault memory of the control unit that has just been connected. Terminate fault readout by selecting function 06 "End output".
- Switch the ignition off and then on again.
- Leave the ignition switched on for 10 seconds. Then interrogate the fault memory of the control unit that has just been connected, using the fault reader.
- If the fault "Data bus drive defective" is now indicated, replace the control unit which has just been connected.
- If fault "Signal wire defect" is not read out, connect the next control unit and repeat the procedure.

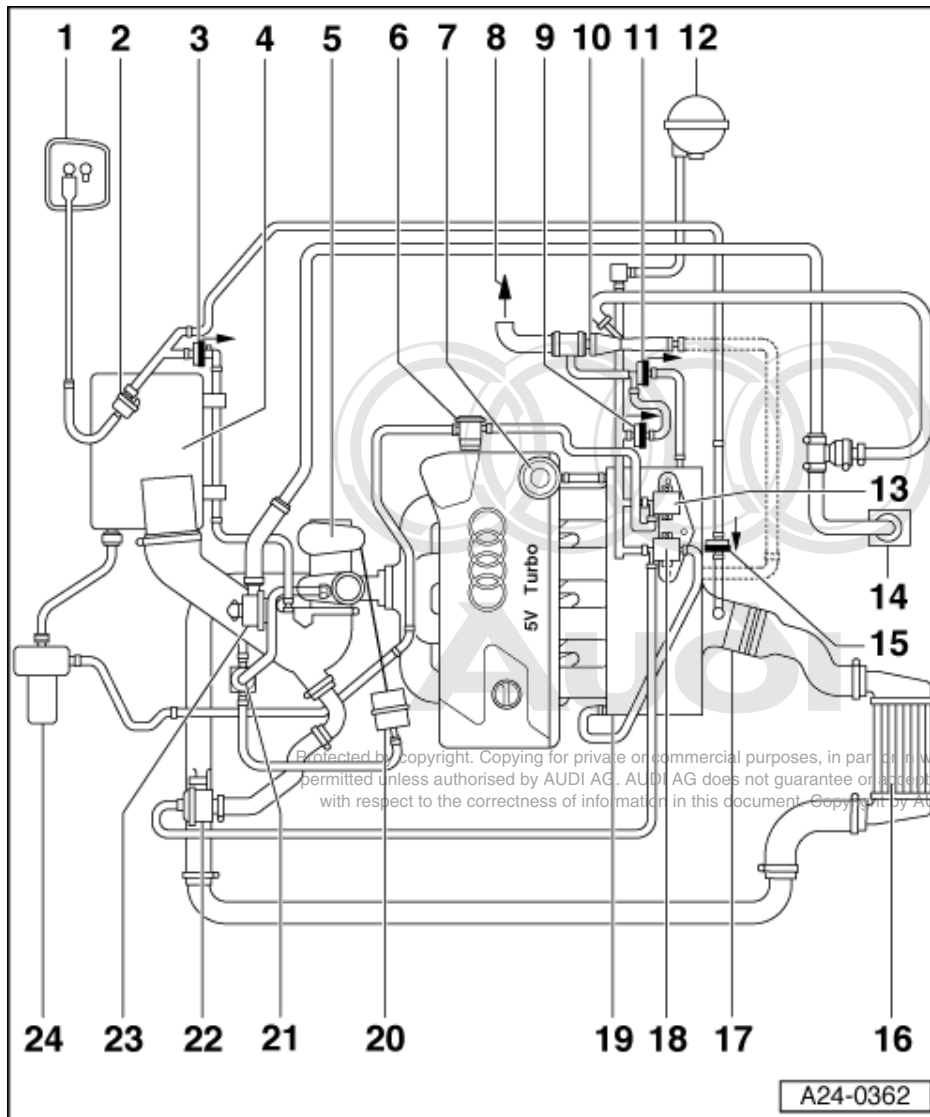


6 - Vacuum diagram

6.1 - Vacuum diagram



- 1 Activated charcoal filter
- 2 Solenoid valve 1 for activated charcoal filter -N80
- 3 Non return valve for ACF
 - ◆ Between ACF container and intake pipe upstream of exhaust turbocharger
 - ◆ Note installation position (light side/ dark side) as shown in Fig, arrow faces in direction of flow
- 4 Air cleaner
 - ◆ With air mass meter -G70
- 5 Turbocharger
- 6 Combi valve for secondary air inlet



7 Fuel pressure regulator

8 To brake servo

9 Non-return valve

- ♦ Between brake servo and intake pipe
- ♦ Note installation position (light side/ dark side) as shown in Fig, arrow faces in direction of flow

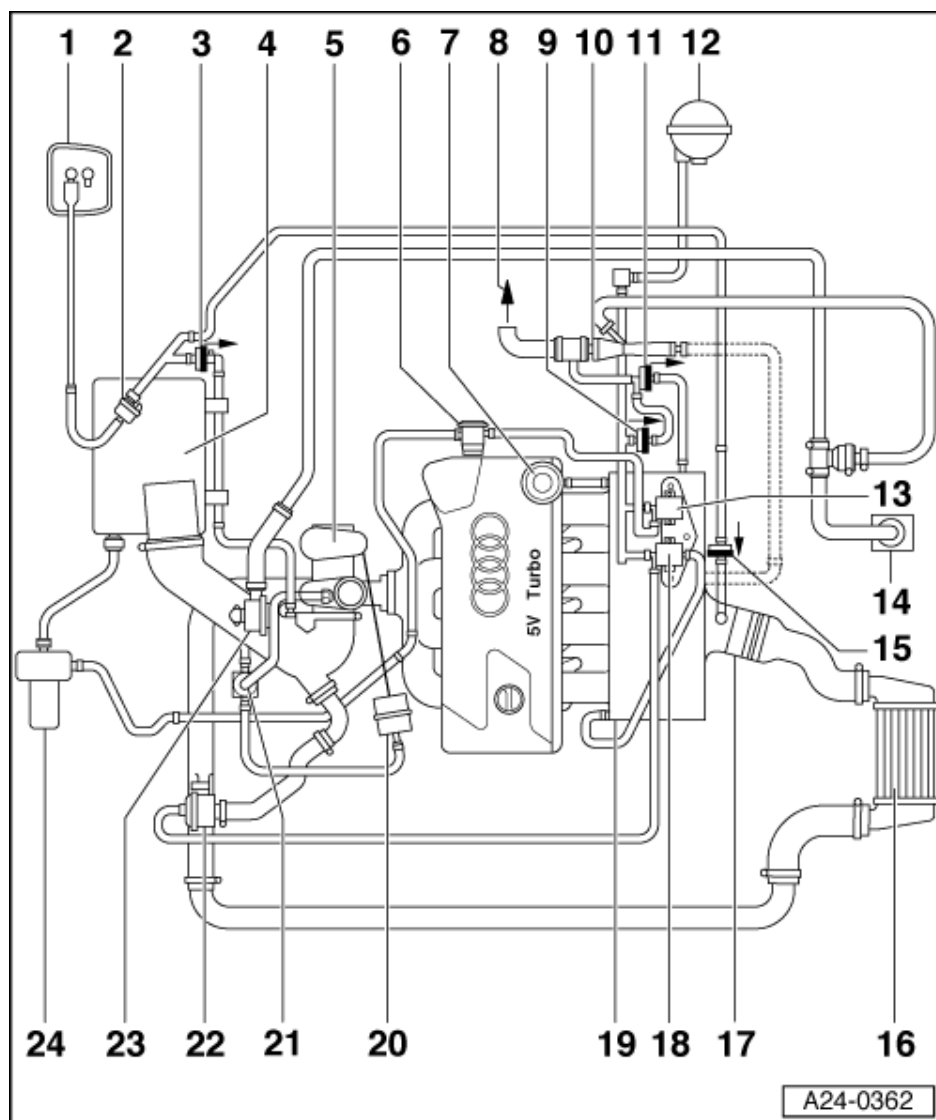
10 Suction jet pump

11 Non-return valve

- ♦ Between brake servo and intake pipe
- ♦ Note installation position (light side/ dark side) as shown in Fig, arrow faces in direction of flow

12 Vacuum reservoir

- ♦ Location: In front left wheel housing beneath wheel housing liner



**13 Checking secondary air inlet valve
-N112**

- ◆ Location: underneath the intake pipe

14 Crankcase breather

15 Non-return valve

- ◆ Between ACF container and intake pipe
- ◆ Note installation position (light side/ dark side) as shown in Fig, arrow faces in direction of flow

16 Charge air cooler

- ◆ With boost pressure sender -G31

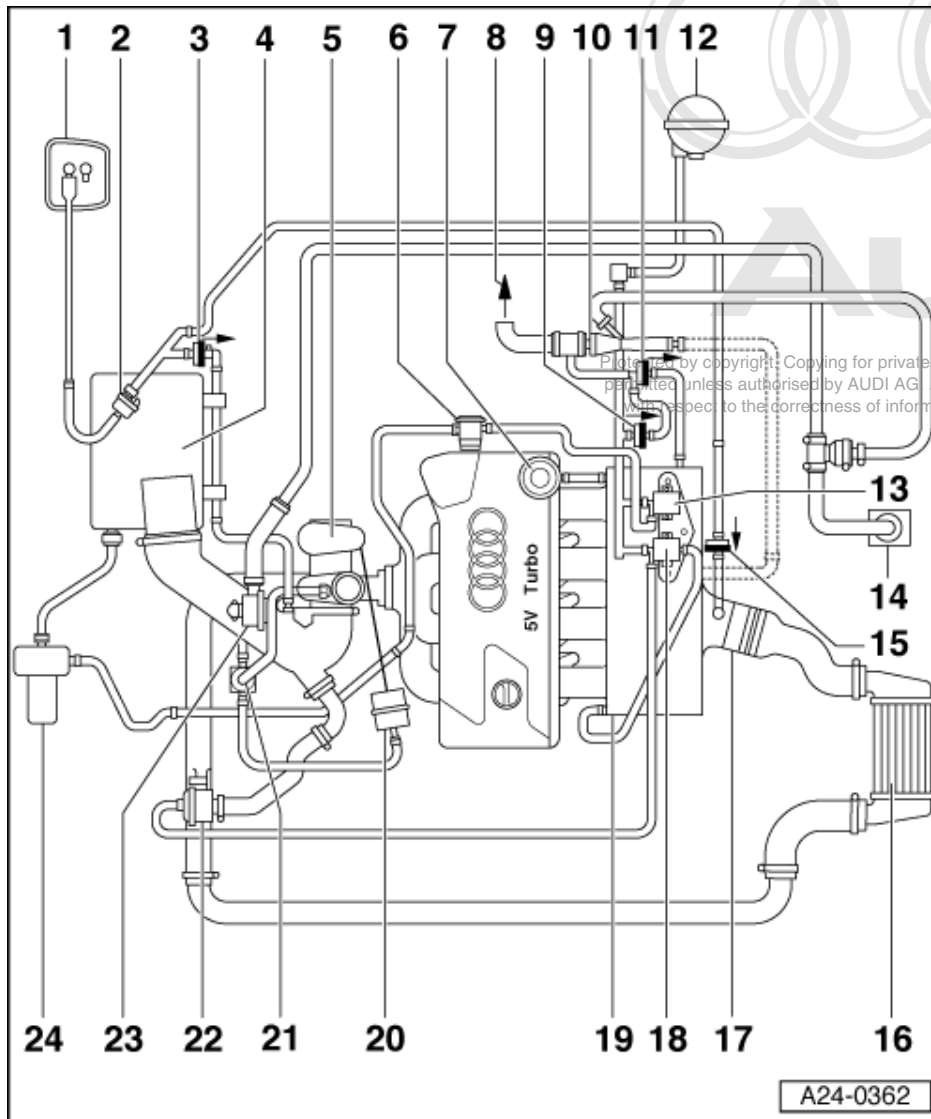
17 Throttle valve control unit -J338

18 Air recirculation valve for turbocharger -N249

- ◆ Location: underneath the intake pipe



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19 Intake manifold

- ♦ With intake air temperature sender -G42

20 Vacuum unit for boost pressure control

- ♦ When the combination valve opens the mechanical air pressure control valve in the exhaust turbocharger is opened and the secondary air is directly guided to the catalytic converter past the exhaust turbocharger

21 Boost pressure control solenoid valve -N75

22 Mechanical air recirculation valve

23 Crankcase breather pressure regulating valve

24 Secondary air pump motor -V101



28 - Ignition system

1 - Checking ignition system

1.1 - Checking ignition system

1.2 - General notes on ignition system

- ♦ Always switch off the ignition before connecting or disconnecting the battery, otherwise the engine control unit may be damaged.
- ♦ A voltage of at least 12.7 V is necessary for satisfactory functioning of the electrical components.
- ♦ In the case of some tests, a fault may be recognised and stored by the control unit. At the end of all tests and repairs, therefore, the fault memory should be interrogated and, if necessary, erased.
- ♦ If the engine starts briefly and then stops after fault search, repair or tests on components, this may be because the immobiliser is blocking the engine control unit. The fault memory must then be interrogated and, if necessary, adaption carried out on the control unit.

1.3 - 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.
- ♦ To run engine at starting speed without actually starting it (for example, in order to test compression), unplug connector from the output stage of the ignition coils and also the connectors on the injectors.
- ♦ In the case of some tests, a fault may be recognised and stored by the control unit. At the end of all tests and repairs, therefore, the fault memory should be interrogated and, if necessary, erased. After erasing the fault memory the readiness code must be renewed => Page 28.
- ♦ Always switch off the ignition before washing the engine.

1.4 - Technical data

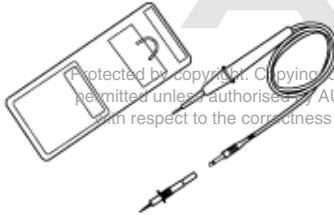
Engine code letters	AWT (1.8 litre / 5V / 110 kW-engine)
Idling speed Not adjustable - controlled by the idling speed stabilisation	Front wheel drive: 740...860 rpm Four wheel drive: 760...880 rpm
Engine speed limitation - shuts off injectors	6800 rpm
Ignition timing is determined by the control unit. Ignition timing cannot be adjusted.	
Ignition system	Individual coil system with 4 ignition coils (output stages integrated) connected directly to spark plugs via spark plug connectors
Ignition plugs 1)	Tightening torque: 30 Nm

Firing order	1-3-4-2
--------------	---------

1) Current values:

=> Exhaust Emissions Check binder

1.5 - Check ignition coils with output stages

V.A.G 1526 A 	V.A.G 1527 B 
V.A.G 1594 A 	V.A.G 1598/31 
	G24-0022

Special tools and workshop equipment required

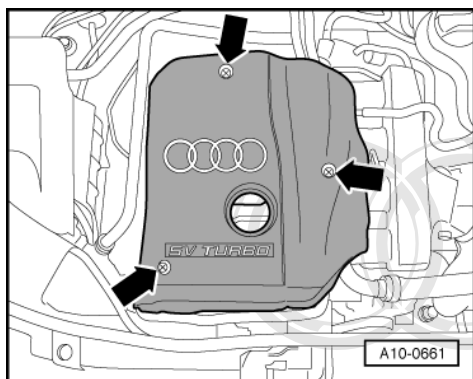
- ◆ V.A.G 1526 A
- ◆ V.A.G 1527 B
- ◆ V.A.G 1594 A
- ◆ V.A.G 1598/31



Test sequence

Note:

The ignition coil and the output stage is combined in a common component.



- -> Remove engine cover -arrows-.

Identify an inoperative or misfiring cylinder as follows:

- Check misfire detection => Page **170** .

If misfires are detected:

- Continue checking the indicated cylinder => "If the defective cylinder has been detected".

If no misfires were detected:

- Disconnect connectors from the injectors in sequence with the engine running, and observe how the engine runs.

or

- Compare the spark plugs of all cylinders with each other and check for soot on the electrodes.

If the defective cylinder has been identified:

- Replace the spark plug of the defective cylinder with one from another cylinder.

If the fault moves with the spark plug:

- Renew the spark plug.

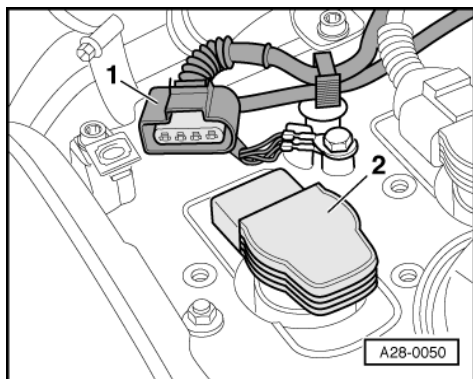
If the fault remains in the same cylinder:

- Interchange the ignition coil from the defective cylinder with one from another cylinder.

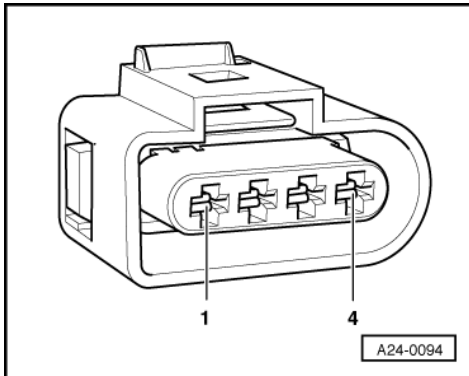
If the fault moves with the ignition coil:

- Replace the ignition coil.

Test earth connection



- -> Unplug 4-pin connector -1- from ignition coil -2-.



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

Connector contact	Measure to
2	Battery positive
4	Battery positive

- The LED should light up.

If the LED does not light up:

- Check the wiring connections.

=> Current Flow Diagrams, Electrical Fault-Finding and Fitting Locations

If the LED lights up:

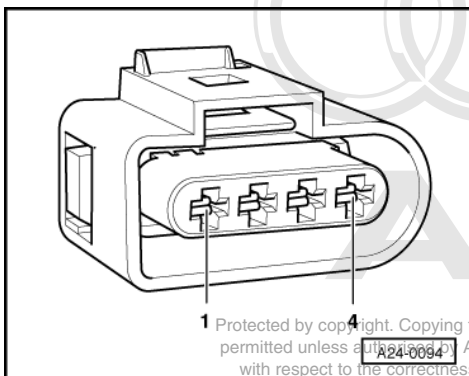
- Check the power supply.

Checking power supply

Test requirements:

- Fuses for engine electronics OK

=> Current Flow Diagrams, Electrical Fault-Finding and Fitting Locations



- -> Connect multimeter as follows to measure voltage:

Connector contact	Measure to
-------------------	------------



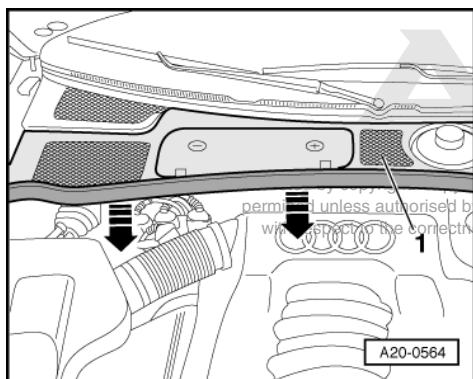
1	Engine earth
---	--------------

- Switch the ignition on.
 - Specified value: approx. battery voltage

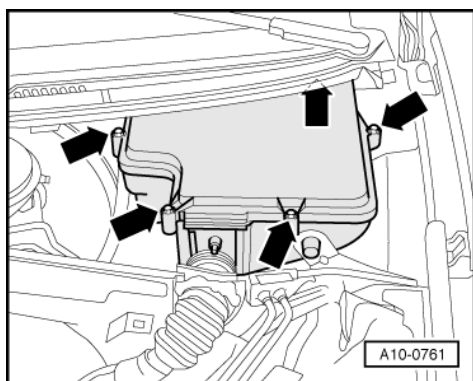
If specified value is attained:

- Check actuation of output stages => Page 145 .

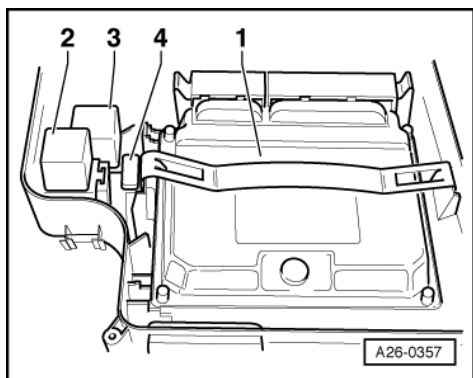
If specified value is not attained:



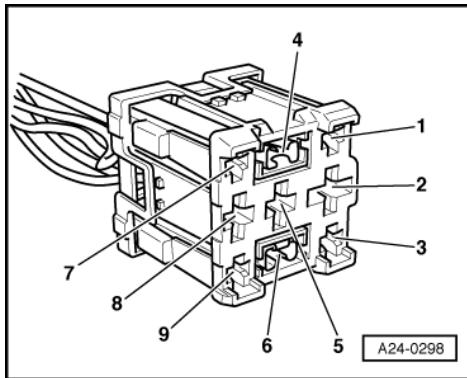
- -> Remove rubber seal from plenum chamber cover in direction of arrow.
- Remove plenum chamber cover -1- from the front.



- -> Remove cover for electronics box (plenum chamber) -arrows-.



- -> Pull off power supply relay -3-.
- Carry out the following tests (marked with dots):



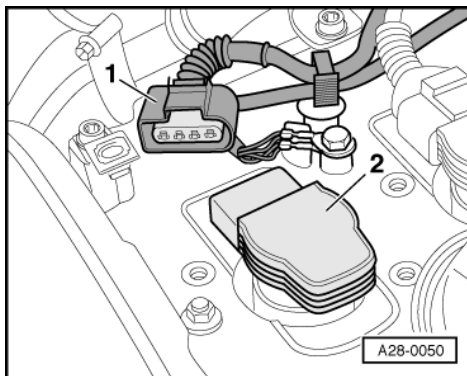
- -> Check the wiring of 3-pin relay carrier, position 2, contact 6 to connector of ignition coil contact 1.
- Check power supply relay for Motronic -J271 => Page 147 .

Checking actuation of power output stages

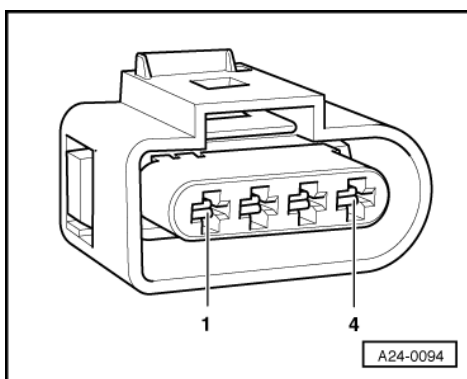
- Unplug connectors from all injectors.

Note:

It is important to ensure that no fuel is injected during the test, as this would damage the catalytic converter. Therefore, the connectors on the injectors must be unplugged.



- -> Unplug 4-pin connector -1- from ignition coil -2-.



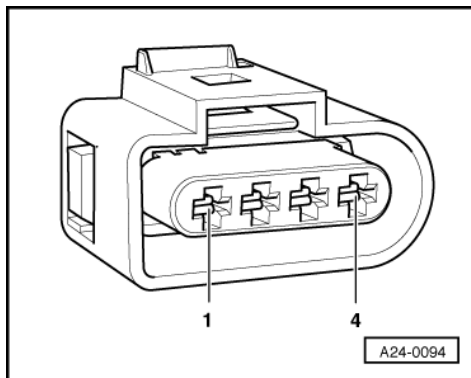
- -> Connect voltage tester V.A.G 1527 B to contacts 2 and 3 of the connector.
- Operate starter briefly.
- The diode test lamp should flash (very brief flash).

If specified values are not attained:

- Connect the V.A.G 1598/31 test box to wiring harness leading to engine control unit; the engine control unit should not be connected => Page 52 .



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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 1598/31 Socket
3 (cyl. 1)	102
3 (cyl. 2)	95
3 (cyl. 3)	103
3 (cyl. 4)	94

- Rectify any open/short circuit as necessary.

If no wiring fault is detected:

- Replace the common component ignition coil with output stage.



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1.6 - Check power supply relay for Motronic system -J271

V.A.G 1526 A 	V.A.G 1594 A 
V.A.G 1598/31 	
	G24-0020

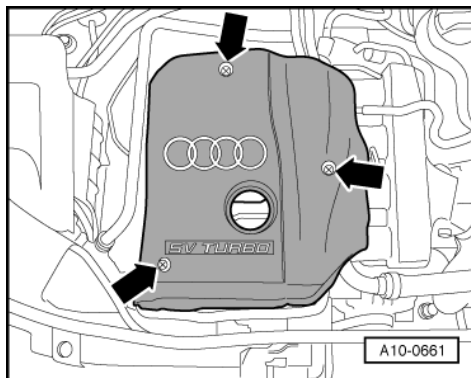
Special tools and workshop equipment required

- ◆ V.A.G 1526 A
- ◆ V.A.G 1594 A
- ◆ V.A.G 1598/31

Note:

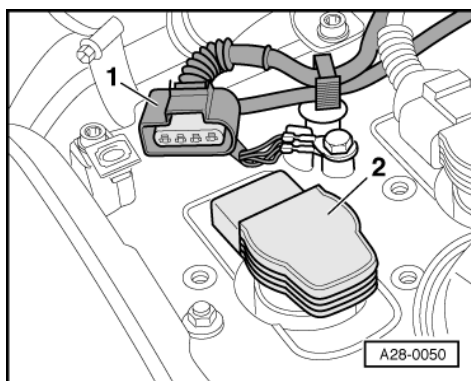
The power supply relay for Motronic -J271 supplies the ignition coils with output stages as well as the engine control unit on Pin 121 with power.

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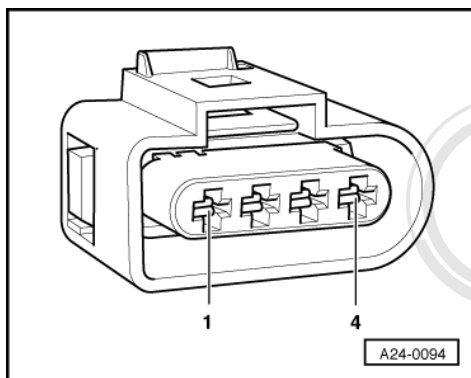


Test sequence

- -> Remove engine cover -arrows-.



- -> Unplug 4-pin connector -1- from one of the ignition coils -2-.



- -> Connect multimeter as follows to measure voltage.

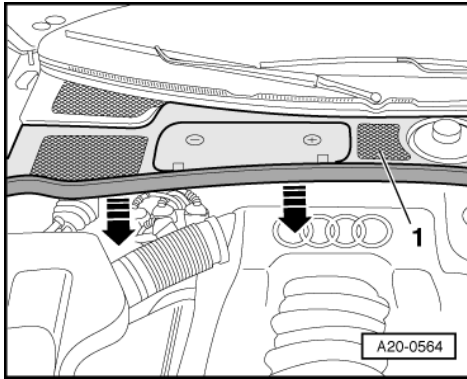
Connector contact	Measure to
1	Engine earth

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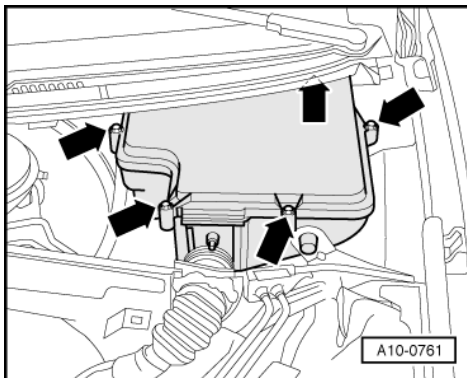
- Switch the ignition on.
 - Specified value: approx. battery voltage

If specified value is not attained:

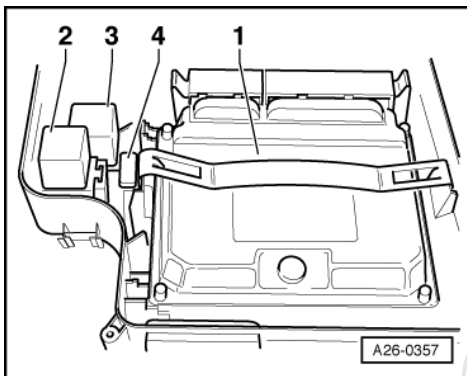
- Switch ignition off.



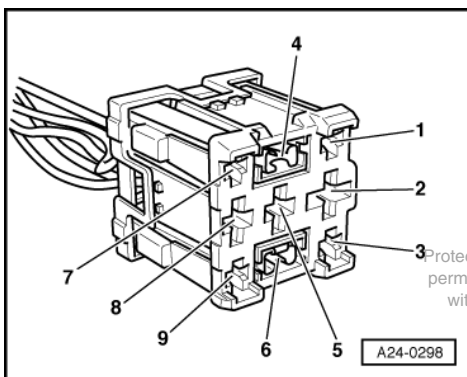
- -> Remove rubber seal from plenum chamber cover in direction of arrow.
- Remove plenum chamber cover -1- from the front.



- -> Remove cover for electronics box (plenum chamber) -arrows-.



- -> Pull off power supply relay -3-.



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- -> Check for open circuit in the following wiring according to wiring diagram:

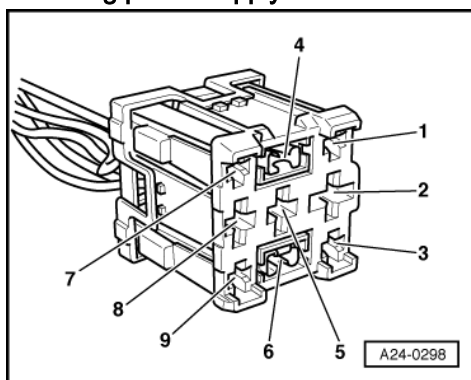
3-position relay carrier in E-box in plenum chamber, position 2 contact	Connection of ignition coils contact
6	1

- Rectify open circuit, if necessary

If the wiring is OK:

- Check the voltage supply of the power supply relay -J171 => Page 150 .
- Check the actuation of the power supply relay -J271 => Page 150 .

Checking power supply



- -> Connect multimeter as follows to measure voltage.

3-position relay carrier in E-box in plenum chamber, position 2 contact	Measure to
2	Engine earth
9	Engine earth

- Specified value: approx. battery voltage

If specified value is not attained:

- Carry out the following tests (marked with dots):
- Check the wiring between central electrics and power supply relay for open circuit.

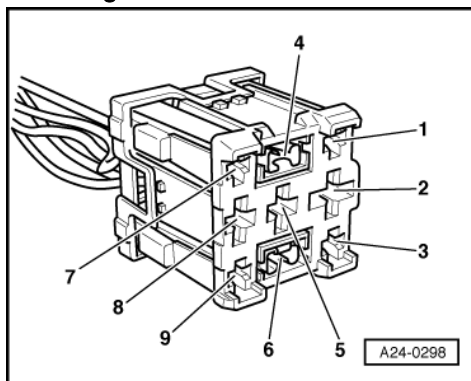
=> Current Flow Diagrams, Electrical Fault-Finding and Fitting Locations

If no wiring fault is detected:

- Replace central electric's.

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Checking actuation



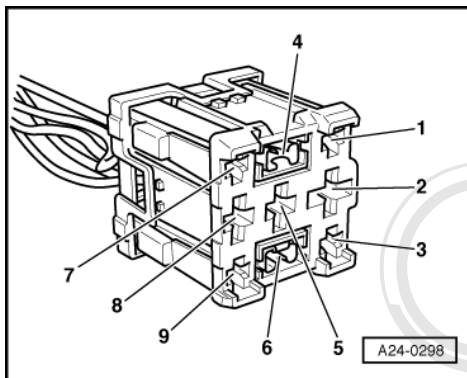
- -> Connect multimeter as follows to measure voltage.

3-position relay carrier in E-box in ple-num chamber, position 2 contact	Measure to
4	Battery positive

- Switch the ignition on.
 - Specified value: approx. battery voltage

If specified value is not attained:

- Switch ignition off.
- Connect the V.A.G 1598/31 test box to wiring harness leading to engine control unit; the engine control unit should not be connected => Page 52 .



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

Relay carrier under left cover at the bulkhead contact	Test box V.A.G 1598/31 Socket
4	21

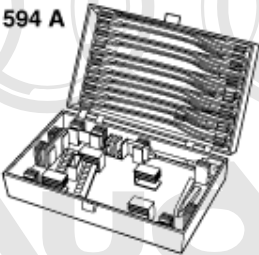
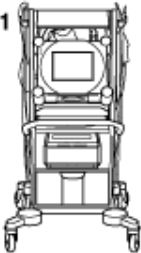
- Rectify any open/short circuit as necessary.

If no fault is found:

- Replace the power supply relay -J271.



1.7 - Checking intake air temperature sensor -G42

V.A.G 1526 A 	V.A.G 1594 A 
V.A.G 1598/31 	VAS 5051 
	G24-0021

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Special tools and workshop equipment required

- ♦ V.A.G 1526 A
- ♦ V.A.G 1594 A
- ♦ V.A.G 1598/31
- ♦ VAS 5051 with VAS 5051/1

or

- ♦ V.A.G 1551 with V.A.G 1551/3 A

Fitting location => Fitting location overview Page **40**

Test sequence

- Connect the vehicle diagnostic, testing 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 indicated on display:

Rapid data transfer HELP
Select function XX

- Enter "08" to select the function "Reading measured value block" and confirm entry with Q key.

-> When indicated on display:

Reading measured value block Q
Enter display group number XXX

- Enter "004" for "display group number 004" and confirm entry with Q key.

-> Indicated on display:

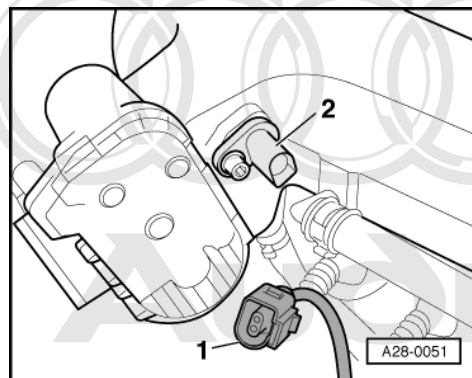
Read measured value block 4
1 2 3 4

- Check specified value for intake air temperature sender in display zone 4:

	Display zones			
	1	2	3	4
Display group 004: Intake air temperature with engine idling				
Display	xxxx rpm	xx.x V	xxx.x °C	xx.x °C
Display	Engine speed	Battery voltage	Coolant temperature	Intake air temperature
Range				-48.0...143.0 °C
Specified value	xxxx rpm	12.0....15.0 V:	80.0...110.0 °C	from ambient temperature up to 110 °C 1)

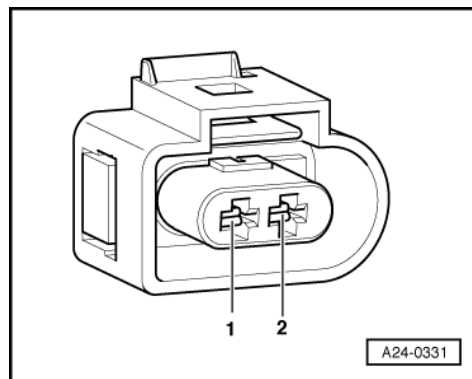
1) If a temperature is displayed which deviates greatly from the ambient temperature of the sender, check sender and sender wiring for contact resistances and open circuit.

Checking wiring



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- Connect the V.A.G 1598/31 test box to wiring harness leading to engine control unit; the engine control unit should not be connected => Page 52
- -> Unplug connector -1- at coolant temperature sender -G42 -2-.





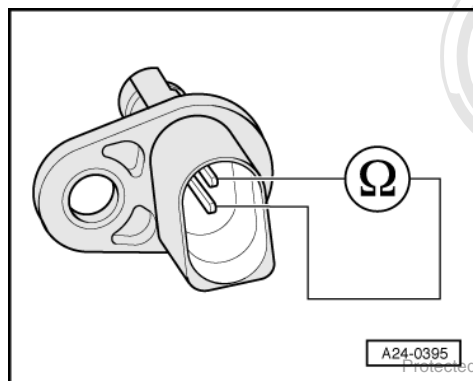
- -> Check for open circuit and short to positive or earth in the following wiring connections:

Connector contact	Test box V.A.G 1598/31 Socket
1	85
2	108

- Test for short circuits between the two wires.
- Rectify any open/short circuit as necessary.

If no wiring fault is detected:

Checking sender:



- -> Connect multimeter to sender to measure resistance.

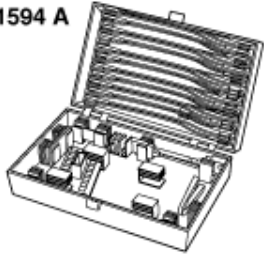
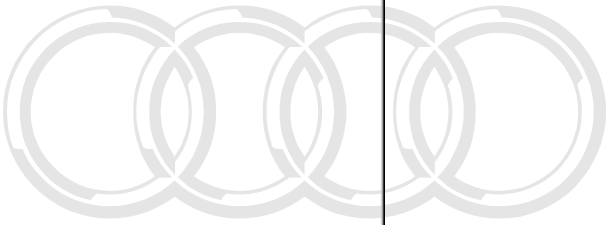
Specifications:

Temperature °C	Resistance kw
-20	approx. 13.8
0	approx. 5.5
20	approx. 2.4
40	approx. 1.1
60	approx. 0.6

If specified value is not attained:

- Replace intake air temperature sender.

1.8 - Checking engine speed sender -G28

V.A.G 1526 A 	V.A.G 1594 A 
V.A.G 1598/31 	
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Special tools and workshop equipment required

- ◆ V.A.G 1526 A
- ◆ V.A.G 1594 A
- ◆ V.A.G 1598/31

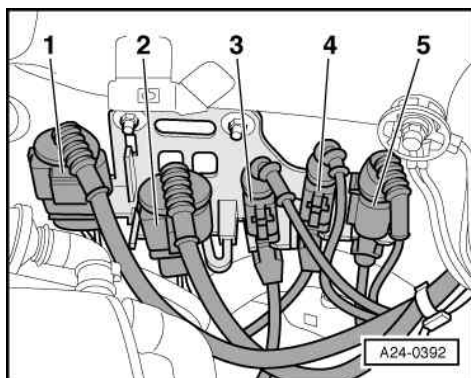
Fitting location => Fitting location overview Page **40**

Note:

The engine speed sender is a combined speed sender and reference mark sender. The engine cannot be started without a signal from the -G28 engine speed sender. If the signal from the -G28 engine speed sender fails while the engine is running, the engine will cut out immediately.

Test sequence

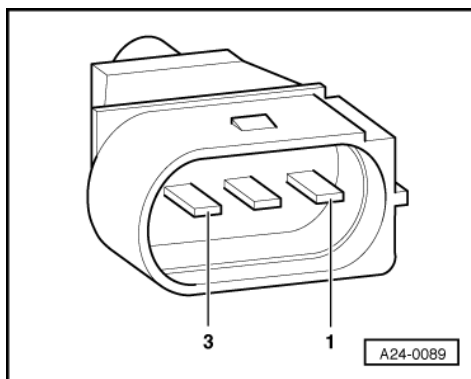
- Before carrying out the test, make sure that the sender is correctly installed and firmly seated.



- -> Detach connector of engine speed sender -G28 -Pos. 3- in engine compartment.

Note:

To gain access to the connector screw out coolant expansion tank bolts and swivel expansion tank aside. Fuel hoses remain connected.



- -> Connect multimeter between contacts 2 and 3 to measure resistance.
- Specified value: 730...1000 Ω

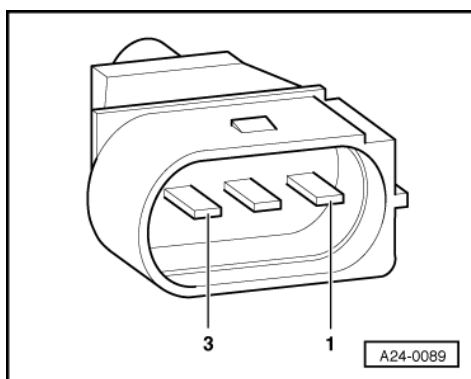
Note:

The resistance figure for the engine speed sender is associated with a temperature of 20 °C. The resistance increases with increasing temperature.

If specified value is not attained:

- Fit a new engine speed sender.

If specified value is attained:



- -> Connect multimeter between contacts 2 and 1 (screen) and 3 and 1 (screen) to measure resistance.



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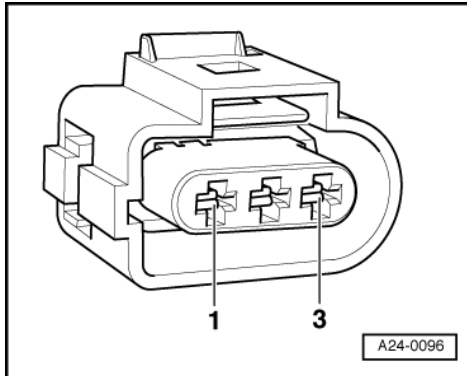
- Specified value: each case $\infty \omega$ (no continuity)

If specified value is not attained:

- Fit a new engine speed sender.

If specified value is attained:

- Connect the V.A.G 1598/31 test box to wiring harness leading to engine control unit; the engine control unit should not be connected => Page **52** .



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

Connector contact	Test box V.A.G 1598/31 Socket
1 (screening)	108
2 (earth)	90
3 (signal)	82

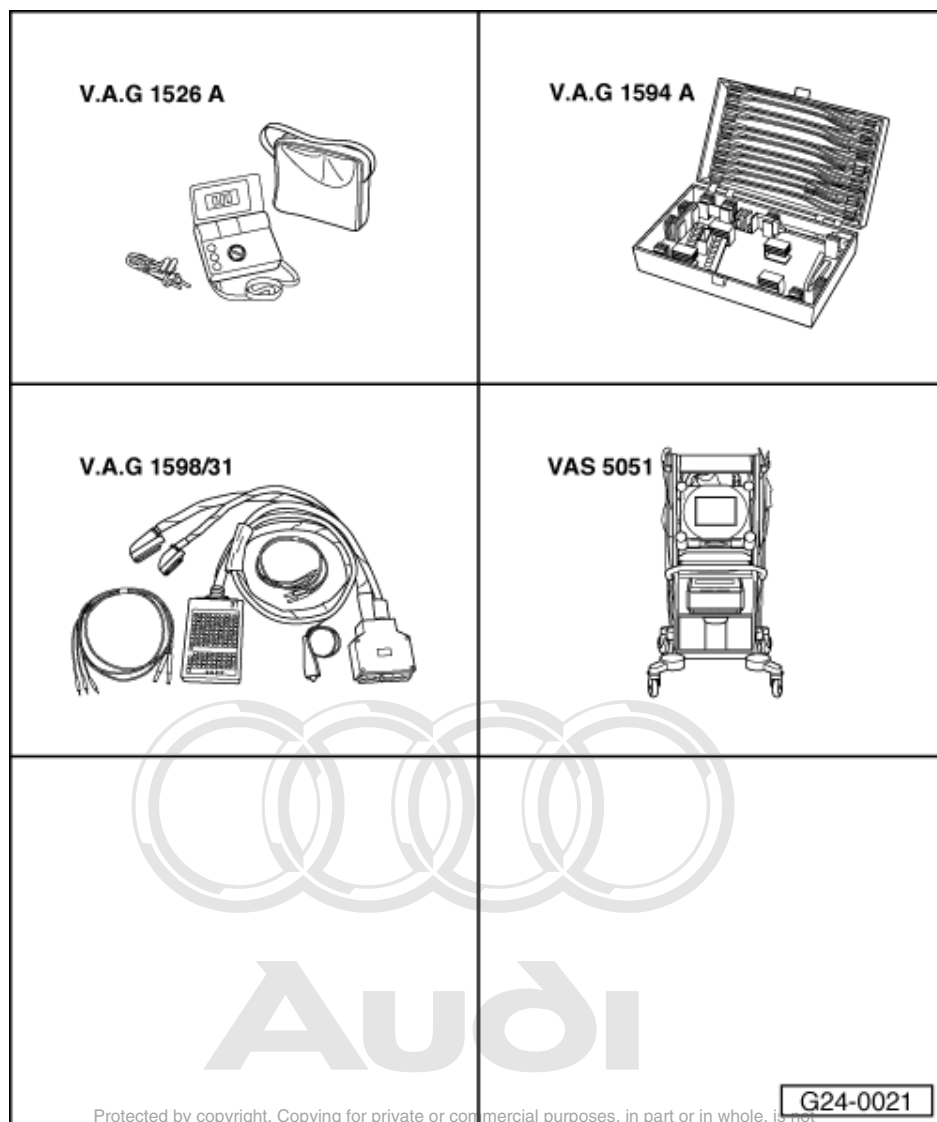
- Rectify any open/short circuit as necessary.

If no wiring fault is detected:

- Fit a new engine control unit => Page **54** .



1.9 - Checking coolant temperature sender -G62



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Special tools and workshop equipment required

- ♦ V.A.G 1526 A
- ♦ V.A.G 1594 A
- ♦ V.A.G 1598/31
- ♦ VAS 5051 with VAS 5051/1

or

- ♦ V.A.G 1551 with V.A.G 1551/3 A

Fitting location => Fitting location overview Page **40**

Test requirements:

- Engine cold

Test sequence

- Connect the vehicle diagnostic, testing 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 indicated on display:

Rapid data transfer HELP
Select function XX

- Enter "08" to select the function "Reading measured value block" and confirm entry with Q key.

-> When indicated on display:

Reading measured value block Q
Enter display group number XXX

- Enter "004" for "display group number 004" and confirm entry with Q key.

-> Indicated on display:

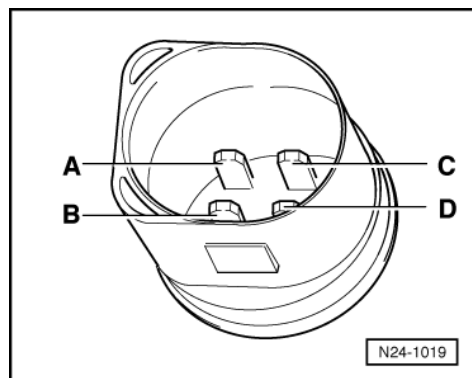
Read measured value block 4
1 2 3 4

- Check display in display zone 3.

	Display zones			
	1	2	3	4
Display group 004: Coolant temperature with engine idling				
Display	xxxx rpm	xx.x V	xxx.x °C	xx.x °C
Display	Engine speed	Battery voltage	Coolant temperature	Intake air temperature
Range			-48.0...143.0 °C	
Specified value	xxxx rpm	12.0....15.0 V:	The temperature reading should increase evenly	from ambient temperature up to 110 °C

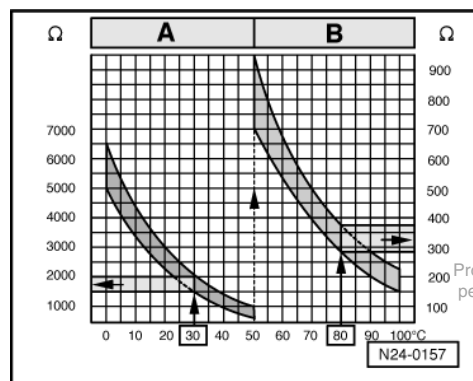
If display zone 3 shows an implausible value:

- Disconnect connector on coolant temperature sender.



- -> Connect multimeter to contacts C and D of sender to measure resistance.

Area A shows resistance values for temperature range 0...50 °C and area B the values for temperature range 50...100 °C.





-> Sample readings:

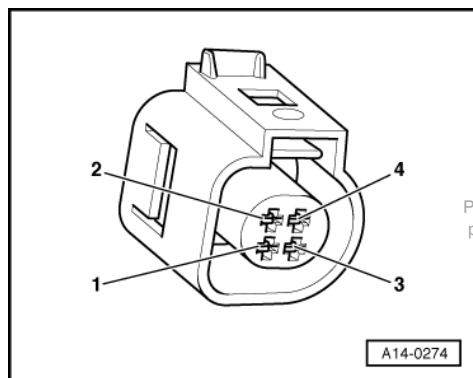
- ♦ 30 °C corresponds to a resistance of 1500...2000 ω
- ♦ 80 °C corresponds to a resistance of 275...375 ω

If specified value is not attained:

- Replace coolant temperature sender.

If specified value is attained:

- Connect the V.A.G 1598/31 test box to wiring harness leading to engine control unit; the engine control unit should not be connected => Page 52 .



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

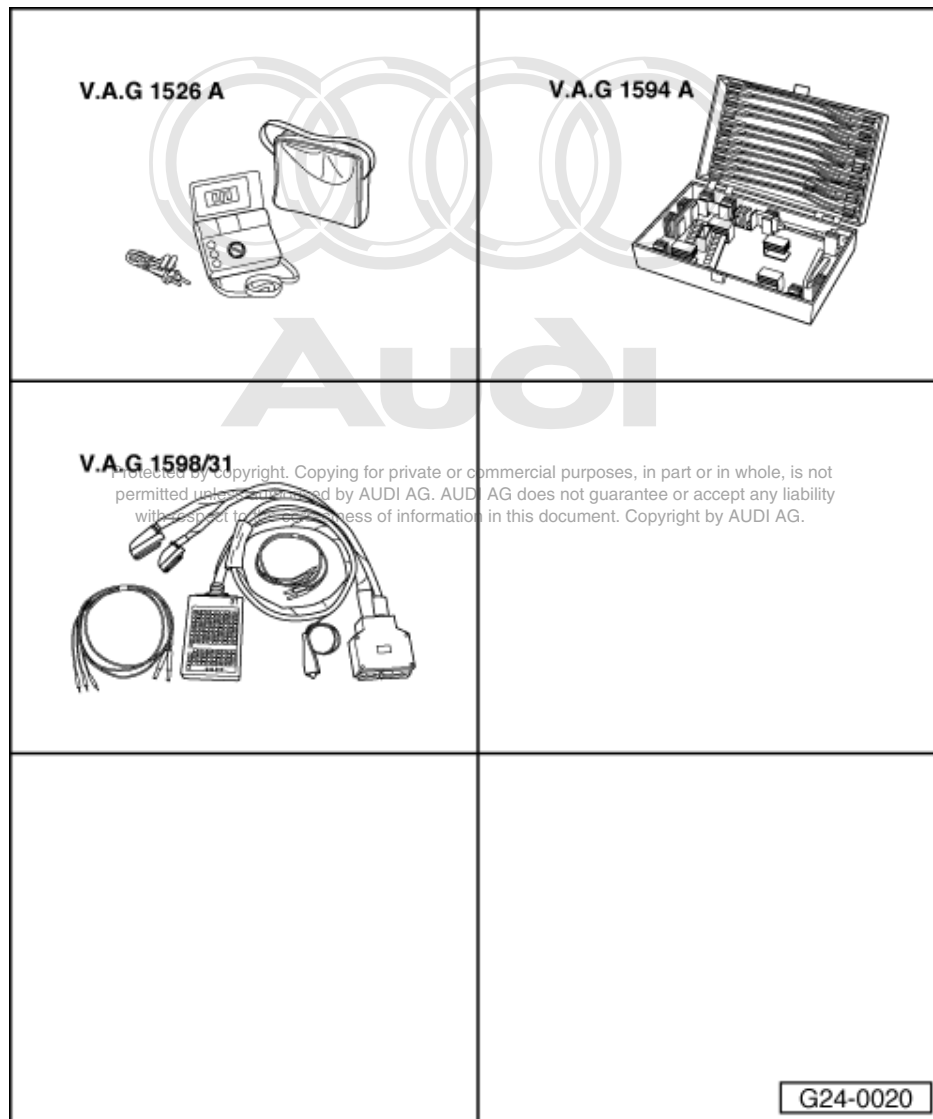
Connector contact	Test box V.A.G 1598/31 Socket
3	108
4 (signal)	93

- Test for short circuits between the two wires.
- Rectify any open/short circuit as necessary.

If no wiring fault is detected:

- Fit a new engine control unit => Page 54 .

1.10 - Checking control unit power supply



Special tools and workshop equipment required

- ◆ V.A.G 1526 A
- ◆ V.A.G 1594 A
- ◆ V.A.G 1598/31

Test requirements:

- Fuses for engine electronics OK

=> Current Flow Diagrams, Electrical Fault-Finding and Fitting Locations

- Battery voltage at least 12.7 V
- Alternator OK

Test sequence

- Connect the V.A.G 1598/31 test box to wiring harness leading to engine control unit; the engine control unit should not be connected => Page 52 .
- Switch the ignition on.



Notes:

- ♦ The positive voltage supply to the engine control unit is provided via contact 3 (terminal 15) and contact 62 (terminal 30).
- ♦ The earth connection to the engine control unit is provided via contact 1 and contact 2.

- Connect multimeter as follows to measure voltage:

Test box V.A.G 1598/31 Socket	Measure to
1	Battery positive
2	Battery positive
62	Engine earth

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

Test box V.A.G 1598/31 Socket	Measure to
3	Engine earth

- Switch the ignition on.
- Specified value: approx. battery voltage

If specified values are not attained:

- Check the wiring connections.

=> Current Flow Diagrams, Electrical Fault-Finding and Fitting Locations

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- Connect multimeter as follows to measure voltage:

Test box V.A.G 1598/31 Socket	Measure to
1211)	Engine earth

1) The power supply relay for Motronic -J271 carries voltage on terminal 121 of engine control units after switching of the ignition for up to 15 minutes.

- Switch the ignition on.
- Specified value: approx. battery voltage

If specified value is not attained:

- Check the wiring connections.

=> Current Flow Diagrams, Electrical Fault-Finding and Fitting Locations

- Check power supply relay for Motronic -J271 => Page 147 .

1.11 - Checking knock control stop

If a fault entry relating to "knock control stop reached" is made, carry out the following checks:

- Connect the vehicle diagnostic, testing 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 indicated on display:

Rapid data transfer HELP
 Select function XX

- Enter "08" to select the function "Reading measured value block" and confirm entry with Q key.

-> When indicated on display:

Reading measured value block Q
 Enter display group number XXX

- Enter "020" for "display group number 020" and confirm entry with Q key.

-> Display readout:

Read measured value block 20
 1 2 3 4

- Check display in all display zones.

	Display zones			
	1	2	3	4
Display group 020: Ignition knock control during driving				
Display	xx.x °KW	xx.x °KW	xx.x °KW	xx.x °KW
Display	Ignition angle retardation cylinder 1 through Knock control	Ignition angle retardation cylinder 2 through Knock control	Ignition angle retardation cylinder 3 through Knock control	Ignition angle retardation cylinder 4 through Knock control
Specified value	0...12 °KW	0...12 °KW	0...12 °KW	0...12 °KW
Note:	Evaluation => Page 163			

Note:

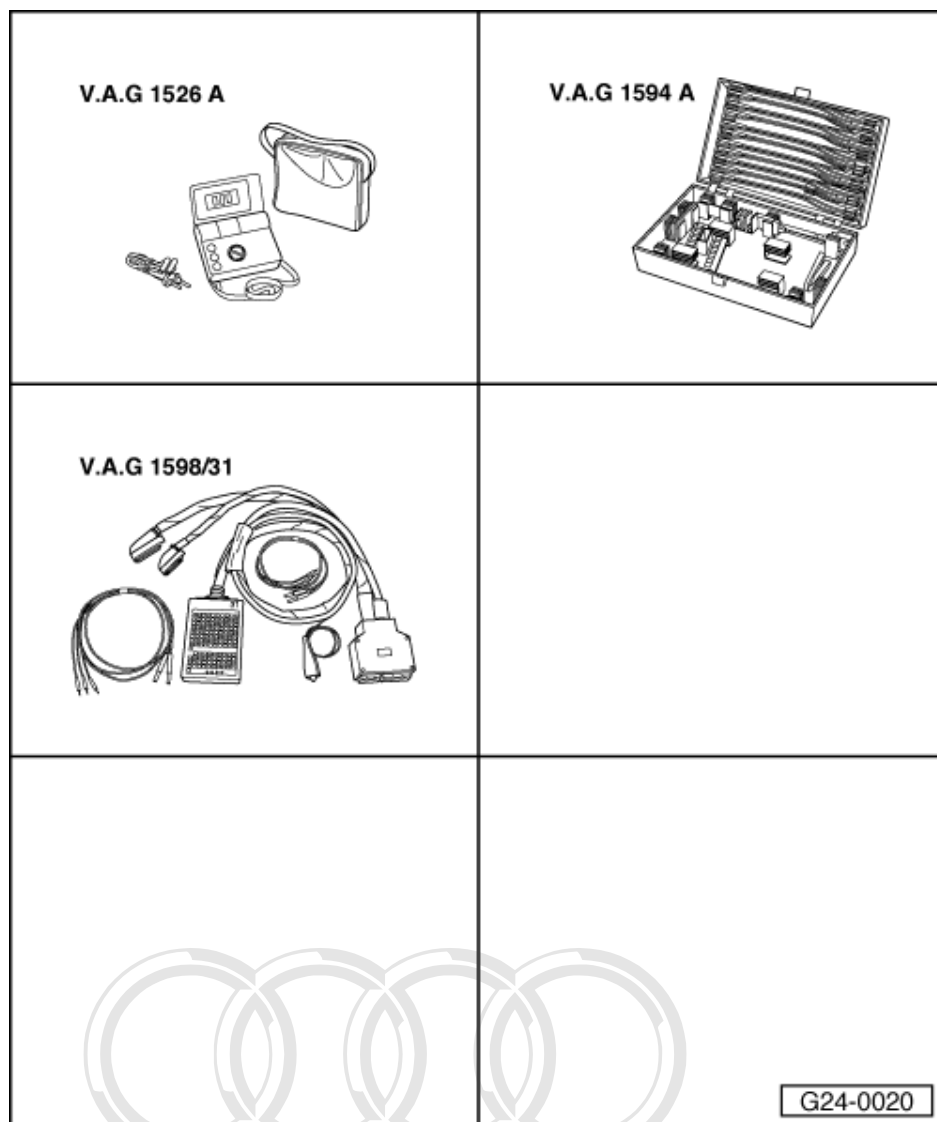
The indicated values in display zones 1 to 4 illustrate the actual ignition angle return through the knock sensor of the individual cylinders. The ignition angle retardation is carried out late in °KW (crankshaft degree).

Evaluation ignition angle retardation

Indicated on display	Possible causes of fault	Fault remedy
All cylinders greater than 12 °KW	- Knock sensor defective	- Check knock sensor => Page 164
	- Connector corroded	
	- Knock sensor incorrectly tightened	- Loosen knock sensor and tighten to 20 Nm
	- Loose components on engine	- Secure components
	- Poor fuel quality	- Change fuel quality (see operating instructions)
One cylinder deviates significantly from the others	- Connector corroded	- Check knock sensor => Page 164
	- Engine fault	- Check compression: => Repair group 15; Removing and installing cylinder head; Check compression Check compression
	- Loose components on engine	- Secure components



1.12 - Checking knock sensors



Special tools and workshop equipment required

- ♦ V.A.G 1526 A
- ♦ V.A.G 1594 A
- ♦ V.A.G 1598/31

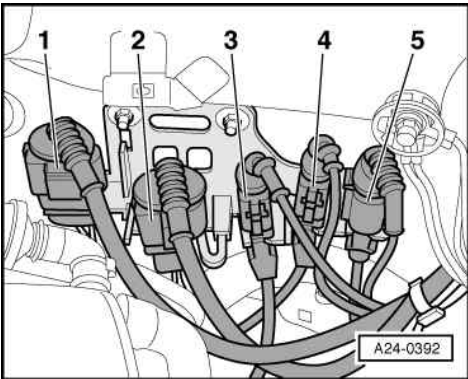
Fitting location => Fitting location overview Page **40**

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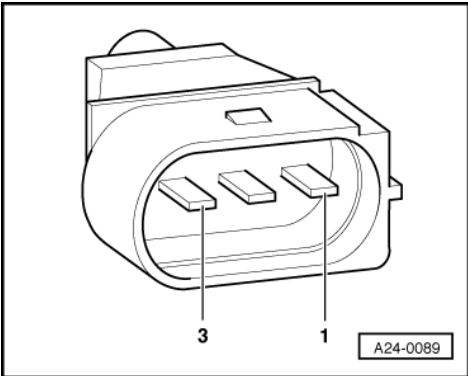
Notes:

- ♦ The knock sensors -G61 and -G62 cannot themselves be tested electrically.
- ♦ Use only gold-plated contacts when repairing the cable connectors for the knock sensors.
- ♦ To ensure that the knock sensors function properly it is important to keep exactly to the specified tightening torque of 20 Nm.
- ♦ Check connector between knock sensor and wiring harness for corrosion.

Testing knock sensor wiring



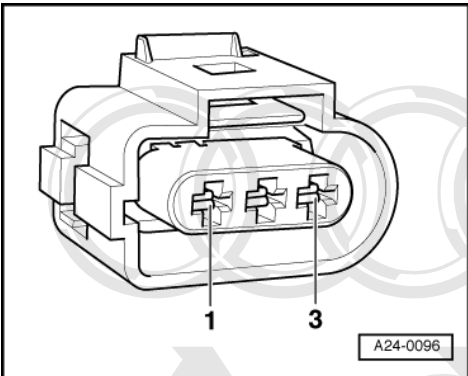
- -> Detach connector of knock sensor 1 -G61 -Pos. 5- or knock sensor 2 -G66 -Pos. 4- in engine compartment.



- -> Test for short between all three contacts in the knock sensor connector (contacts 1+2, 1+3, 2+3).
 - Specified value: $\infty \omega$ (no continuity) - the wiring must not be connected to each other
- If there is a connection between the contacts, fit a new knock sensor.
- If no short is found, check knock sensor wiring.

Checking wiring from knock sensors to engine control unit

- Connect the V.A.G 1598/31 test box to wiring harness leading to engine control unit; the engine control unit should not be connected => Page 52 .
- Check for open circuit and short to earth/positive or earth in the following wiring connections:



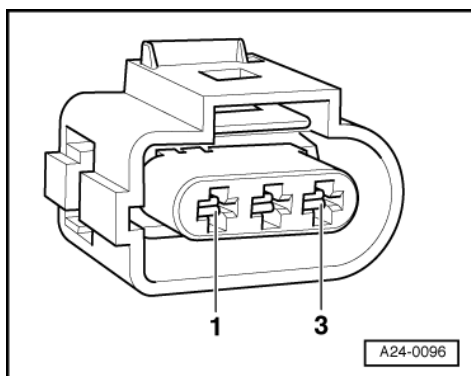
- -> Knock sensor 1 -G61 (cylinders 1/2)

Connector contact	Test box V.A.G 1598/31 Socket
1 (signal)	106
2 (earth)	99

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Connector contact	Test box V.A.G 1598/31 Socket
3 (screening)	108



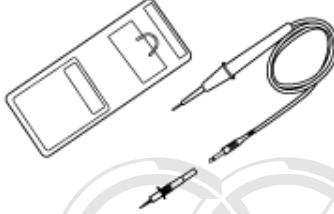
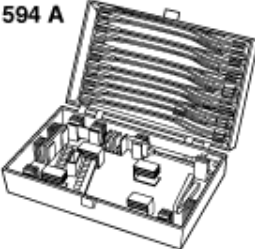
- -> Knock sensor 2 -G66 (cylinders 3/4)

Connector contact	Test box V.A.G 1598/31 Socket
1 (signal)	107
2 (earth)	99
3 (screening)	108

- Rectify any open/short circuit as necessary.

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1.13 - Checking Hall sender -G40

V.A.G 1526 A 	V.A.G 1527 B 
V.A.G 1594 A 	V.A.G 1598/31  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.
	G24-0022

Special tools and workshop equipment required

- ◆ V.A.G 1526 A
- ◆ V.A.G 1527 B
- ◆ V.A.G 1594 A
- ◆ V.A.G 1598/31

Fitting location => Fitting location overview Page **40**

The Hall sender indicates the ignition position for cylinder 1.

If the Hall sender fails to function, the knock control is switched off and the ignition timing is retarded slightly because the signals can no longer be assigned to the cylinders. Furthermore, the charger pressure of the turbocharger is lowered.

Even without a signal from the Hall sensor, the engine will continue to run and can also be re started.

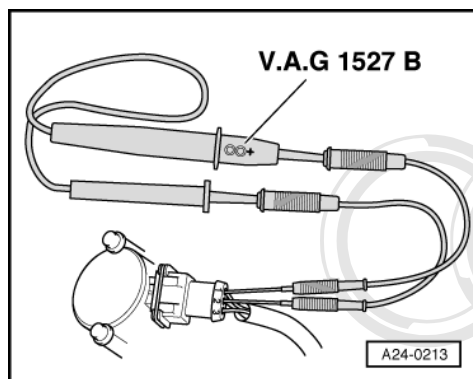
- ◆ When a fault is detected, the engine control unit produces one spark for each cylinder on every crankshaft revolution.



- ♦ The fact that the control unit is out of phase by one engine revolution does not have any noticeable effect on the injection system. If this happens, the fuel is injected "upstream" (before the closed inlet valve) instead of while the inlet valve is open. This has only a minor influence on the quality of the air/fuel mixture.

Checking actuation

- Where available, push back rubber grommet of plug of Hall sender back but leave connector attached.



- -> Connect voltage tester V.A.G 1527 B between receptacle 2 (Hall sensor signal) and receptacle 1 (positive).

Note:

Receptacles are numbered accordingly on the back of the connector.

- Operate the starter for a few seconds.
 - The LED should flash

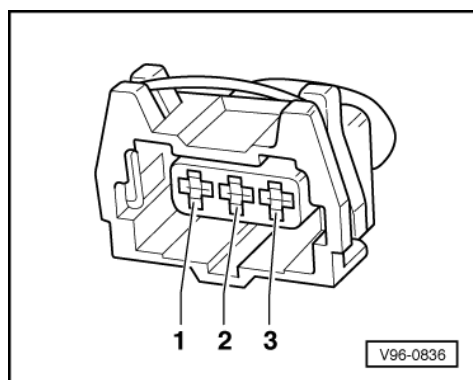
Note:

Voltage testers with a low current draw continue to glow faintly between actuation from the engine control unit (rather than extinguishing completely) and become much brighter when actuated.

If LED does not flash:

Checking power supply

- Unplug connector from Hall sender.



- -> Connect multimeter as follows to measure voltage:

Connector contact	Measure to
1	Engine earth

- Switch the ignition on.

- Specified value: approx. 5 V

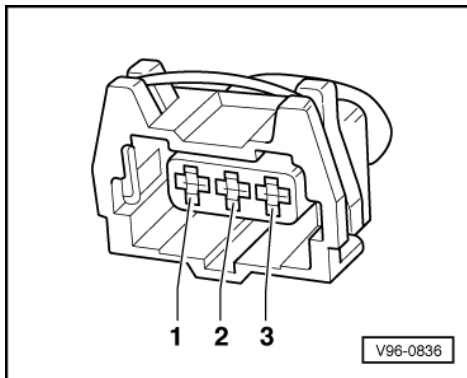
Checking signal wire

- Connect multimeter as follows to measure voltage:

Connector contact	Measure to
2	Engine earth

- Switch the ignition on.
- Specified value: approx. battery voltage

Checking earth wire



- -> 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.

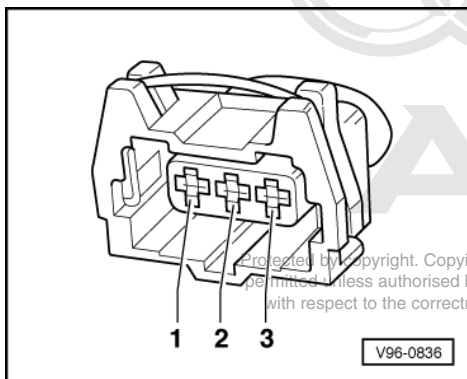
If the specified values are all achieved and the diode test lamp does not flash (measured between contacts 1 and 2 with starter connector attached),

- Fit a new Hall sender.

If specified values are not attained:

Checking the wiring between the Hall sender and engine control unit.

- Connect the V.A.G 1598/31 test box to wiring harness leading to engine control unit; the engine control unit should not be connected => Page 52 .



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

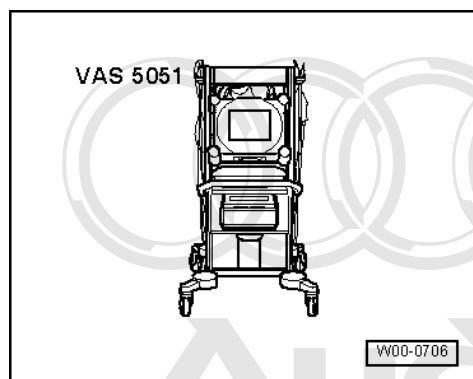
Connector contact	Test box V.A.G 1598/31 Socket
1 (positive)	98
2 (signal)	86
3 (earth)	108

- Rectify any open/short circuit as necessary.
- After a trial erasure of the fault memory is followed by the replaced indication of a fault relating to the camshaft sensor (Hall sender) although all previous tests were OK, the following faults are possible:
 - Rotor ring for Hall sender misaligned
- Unbolt the Hall sensor, then check to ensure that the rotor ring is correctly aligned on the camshaft.(if it is incorrectly installed, the catch will be pressed flat when the securing screw is tightened).
- If the position of rotor ring is OK, check the position of the camshaft in relation to the crankshaft.

=> 4-cylinder engine (5-valve turbo), Mechanical components; Repair group 15; Servicing valve drive Servicing valve drive

1.14 - Testing misfire detection

Special tools and workshop equipment required



- ♦ VAS 5051 with VAS 5051/1

or
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- ♦ V.A.G 1551 with V.A.G 1551/3 A

Test sequence

- Connect the vehicle diagnostic, testing 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 indicated on display:

Rapid data transfer	HELP
Select function XX	

- Enter "08" to select the function "Reading measured value block" and confirm entry with Q key.

-> When indicated on display:

Reading measured value block	Q
Enter display group number XXX	

- Enter "014" for "display group number 014" and confirm entry with Q key.

-> When indicated on display:

Read measured value block 14
1 2 3 4

- Test misfire detection.

	Display zones			
	1	2	3	4
Display group 014: Misfire detection				
Display	xxx rpm	xxx %	xxx	---
Display	Engine speed	Load	Sum misfire	Misfire detection
Range				activated blocked
Specified value	xxxx rpm	12.75...30 %	0	activated
Note:			If nominal value is exceeded: Check misfire of the individual cylinders => Page 171 .	If misfires are to be expected due to the operation (e.g. run- ning warm, push switch off) the misfire recognition is blocked

If specified value is attained:

- Press the =>key.

-> Indicated on display (function selection):

Rapid data transfer HELP
Select function XX

If specified value is not attained:

- Press C key.

Check misfire recognition of the individual cylinder

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-> When indicated on display:

Reading measured value block Q
Enter display group number XXX

- Enter "015" for "display group number 015" and confirm entry with Q key.

-> Display readout:

Read measured value block 15
1 2 3 4

- Check misfire recognition in display zones 1 to 4:

	Display zones			
	1	2	3	4
Display group 015: Misfire detection of cylinders 1, 2 and 3				
Display	xxx	xxx	xxx	---
Display	Number of misfires in cylinder 1	Number of misfires in cylinder 2	Number of misfires in cylinder 3	Misfire detection
Range				activated blocked
Specified value	0	0	0	activated



	Display zones	
Note:	If nominal value is exceeded: Evaluation => Page 172	---

- Press C key.

-> When indicated on display:

Reading measured value block Q
Enter display group number XXX

- Enter "016" for "display group number 016" and confirm entry with Q key.

-> Display readout:

Read measured value block 16
1 2 3 4

- Check specified values in display zones 1 and 4:

	Display zones			
	1	2	3	4
Display group 016: Misfire recognition of cylinder 4				
Display	xxx			---
Display	Number of misfires in cylinder 4			Misfire detection
Range				activated blocked
Specified value	0			activated
Note:	If nominal value is exceeded: Evaluation => Page 172			---

Evaluation display group 014, display zone 3 and display groups 015 and 016, display zones 1, 2 and 3

Display zone: 3	Possible causes of fault	Fault remedy
higher than 0	- Defective spark plug - Defective spark plug connector - Ignition coil or output stage defective	- Test spark plugs and ignition wiring Ignition coil with output stages Checking => Page 141
	- Injector defective	- Check injectors => Page 63

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