

Audi 100 1991 ➤

Diesel direct injection and glow plug system (TDI 5-cylinder)

Engine ID	AAT	ABP	AEL						
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List of Workshop Manual Repair GroupsList of Workshop Manual
Repair GroupsList of Workshop Manual Repair Groups

Audi 100 1991 ➤

Diesel direct injection and glow plug system (TDI 5-cylinder)

Repair Group

01 - Self-diagnosis

23 - Mixture preparation, Injection

28 - Ignition system



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

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01 - Self-diagnosis

1 - Self-diagnosis

1.1 - Self-diagnosis

1.2 - Technical data of self-diagnosis

Features

- ◆ Data is transferred between control unit and vehicle diagnostic, testing and information system VAS 5051 in "self-diagnosis" mode.
- ◆ Fault memory: Non-volatile memory (max. 5 different faults) 1)
 - 1) Erased after 50th engine start if fault has not reoccurred.

1.3 - Safety precautions

Pay attention to the following if testers and measuring instruments have to be used in the course of a test drive:

Attention:

- ◆ **Always attach testers and measuring instruments to back seat and have them operated from there by a second person.**
- ◆ **If testers and measuring instruments were to be operated from front passenger's seat, person sitting there could suffer injury in the event of an accident due to triggering of front passenger's airbag.**

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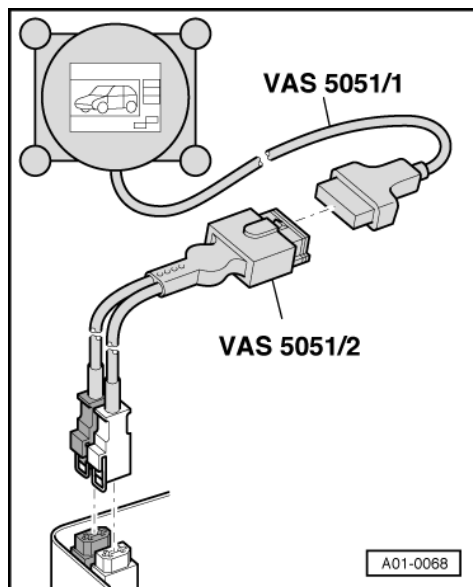
1.4 - Connecting up vehicle diagnostic, testing and information system VAS 5051 and selecting functions

Test requirements:

- Battery voltage at least 12.7 V
- Fuses for engine electronics OK

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

- Earth connections to engine and gearbox OK



Sequence of operations

- Detach cover from auxiliary relay carrier I in plenum chamber on left.
- -> Use diagnostic wire VAS 5051/1 and diagnostic adapter VAS 5051/2 to connect up vehicle diagnostic, testing and information system VAS 5051.

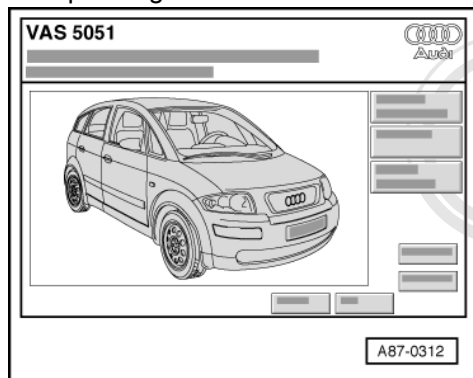
Attention:

Follow safety precautions => Page 1 .

Note:

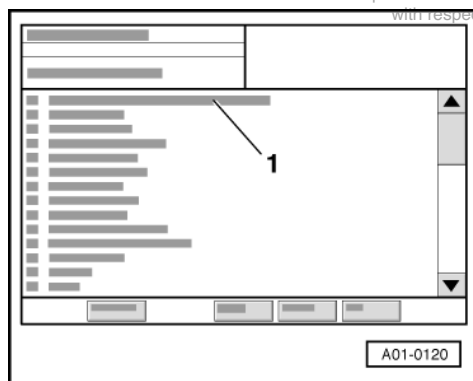
If fault message appears on display:

=> Operating instructions for vehicle diagnostic, testing and information system VAS 5051



-> Readout on VAS 5051:

- Touch "Vehicle self-diagnosis" key.

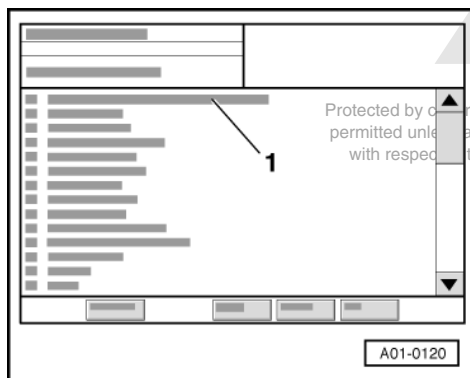


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-> Readout on VAS 5051:

Note:

Touching "00 - Interrogate fault memory - entire system" in list -1- implements the automatic test sequence, i.e. fault memory interrogation takes place for all vehicle systems with self-diagnosis capability.



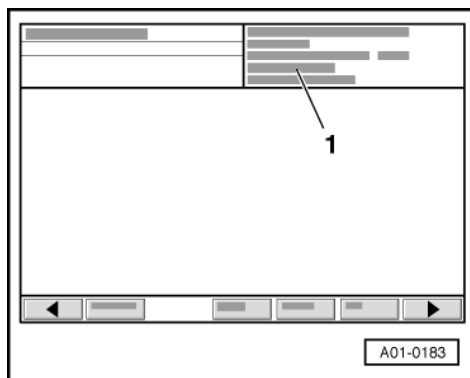
-> Readout on VAS 5051:

Depending on desired function => "Diagnosis functions" table, Page 5 :

- Switch on ignition.

Or

- Start engine.
- From list -1- select vehicle system "01 - Engine electronics".



- Wait until next readout appears.

-> Readout on VAS 5051:

- 1 - Engine control unit identification => from Page 3
- 2 - List of available functions => Page 5

1.5 - Control unit identification, engine code ABP

Engine control unit identification (example)	
01 - Engine electronics	Vehicle system



Engine control unit identification (example)	
443907401..	Part No.; Assignment => Parts List
2.5l 1) R5 2) EDC 3) A25 4) D14 5)	1) Engine capacity 2) In-line engine, 5-cyl. 3) Electronic Diesel Control 4) Emissions standard 5) Data level (software version) of control unit
Code 0	The control unit cannot be coded
Dealership number 0	

Date of introduction-	Description
to 07.92	- Without EGR, without air flow meter, without catalytic converter

1.6 - Control unit identification, engine code AAT 1st control unit version

Engine control unit identification (example)	
01 - Engine electronics	Vehicle system
4A0907401..	Part No.; Assignment => Parts List
2.5l 1) R5 2) EDC 3) A23 4) D14 5)	1) Engine capacity 2) In-line engine, 5-cyl. 3) Electronic Diesel Control 4) Emissions standard 5) Data level (software version) of control unit
Code 0	The control unit cannot be coded
Dealership number 0	

Date of introduction-	Description
to 06.94	- EGR; air flow meter; catalytic converter - Injection pump with slide travel potentiometer -G99

1.7 - Control unit identification, engine code AAT 2nd control unit version

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Engine control unit identification (example)	
01 - Engine electronics	Vehicle system
4A0907401..	Part No.; Assignment => Parts List
2.5l 1) R5 2) EDC 3) AG 4) D12 5)	1) Engine capacity 2) In-line engine, 5-cyl. 3) Electronic Diesel Control 4) - AG = Automatic gearbox 5) - No readout = manual gearbox Data level (software version) of control unit
Code 0	The control unit cannot be coded
Dealership number 0	

Date of introduction-	Description
from 06.94 (Audi A6)	- EGR; air flow meter; catalytic converter - Injection pump with modulating piston movement sender -G149

1.8 - Control unit identification, engine code AAT 3rd control unit version, AEL

Engine control unit identification (example)	
01 - Engine electronics	Vehicle system
4A0907401..	Part No.; Assignment => Parts List
2.5l 1) R5/2VT 2) EDC 3) AT 4) D03 5)	1) Engine capacity 2) In-line engine, 5-cyl./2-valve turbo 3) Electronic Diesel Control 4) - AT = automatic gearbox 5) - HS = manual gearbox Data level (software version) of control unit
Code 0	The control unit cannot be coded
Dealership number 0	

Date of introduction-	Description
AAT from 07.94	- Engine cover - EGR; air flow meter; catalytic converter - Injection pump with modulating piston movement sender -G149 - Expanded self-diagnosis
AEL from 10.94	- Engine cover - EGR; air flow meter; catalytic converter - Injection pump with modulating piston movement sender -G149

1.9 - Diagnostic functions

Diagnostic functions	Ignition on, engine stopped	Engine idling	Vehicle in operation	Page
02 Interrogate fault memory	no	yes	yes	6
03 Final control diagnosis	yes	yes	no	18
04 Basic setting 1)	no	yes	no	25
05 Erase fault memory	yes	yes	yes	7
06 End output	yes	yes	yes	8
08 Read measured value block	yes	yes	yes	27
11 Login procedure	yes	no	no	133

1) Not in vehicles with engine code ABP



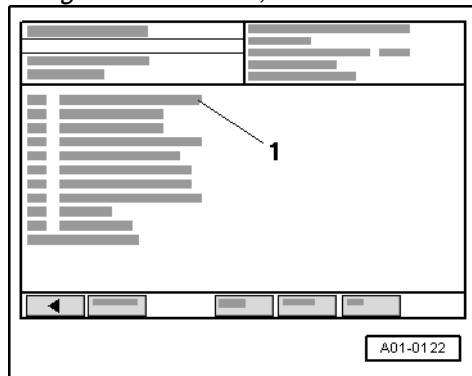
2 - Interrogating and erasing fault memory

2.1 - Interrogating and erasing fault memory

- Connect up vehicle diagnostic, testing and information system VAS 5051 => Page **1** and select vehicle system "01 - Engine electronics" from list. Engine should be idling.

Note:

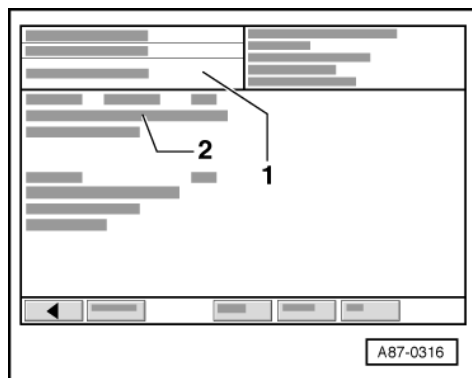
If engine will not start, crank it with starter for at least 5 seconds and then always leave ignition switched on.



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-> Readout on VAS 5051:

- From list -1- select diagnostic function "02 - Interrogate fault memory".



-> Readout on VAS 5051:

- 1 - Content of fault memory:
 - 0 faults detected
- Or
- X faults detected
- 2 - Fault
 - Fault code
 - Fault location
 - Type of fault



A - Faults detected:

- Print out information on screen or self-diagnosis log.
- Terminate function "02 - Interrogate fault memory" by touching ◀ key.

-> Readout on VAS 5051:

- Eliminate fault(s) in line with fault table => Page 9 .
- Select diagnostic function "02 - Interrogate fault memory" again in list and erase fault memory => Page 7 .
- Select diagnostic function "06 - End output" in list => Page 8 .

B - No fault detected:

- Select diagnostic function "06 - End output" in list => Page 8 .

Note:

In the event of problems not detected by self-diagnosis:

- Perform final control diagnosis => Page 65 .

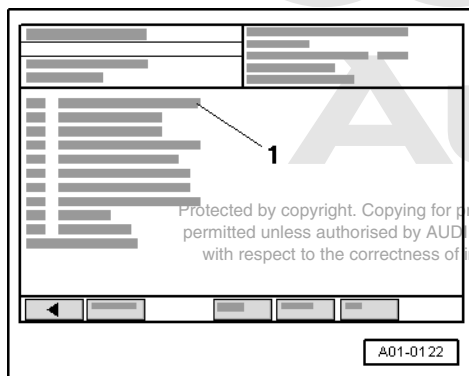
2.2 - Erase fault memory

Note:

If fault memory cannot be erased, interrogate fault memory again and eliminate fault.

Requirements:

- Fault memory interrogated=> Page 6
- All faults eliminated

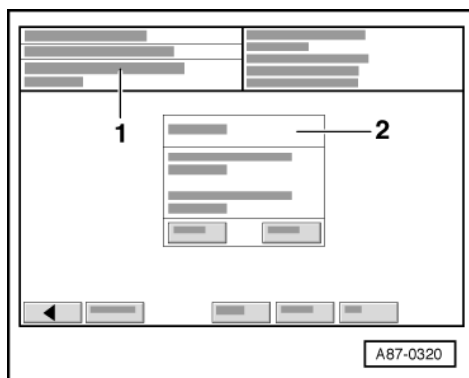


Sequence of operations

After fault memory interrogation:

-> Readout on VAS 5051:

- From list -1- select diagnostic function "05 - Erase fault memory".





-> Readout on VAS 5051:

- 1 - - No readout (prior to erasing)
- Or
- Fault memory erased

Note:

If the following message appears in display zone -1-: "Fault memory not yet interrogated", this means that sequence of operations has not been precisely observed. Fault memory cannot be erased until it has been interrogated.

2 - Note:

Is function to be implemented?

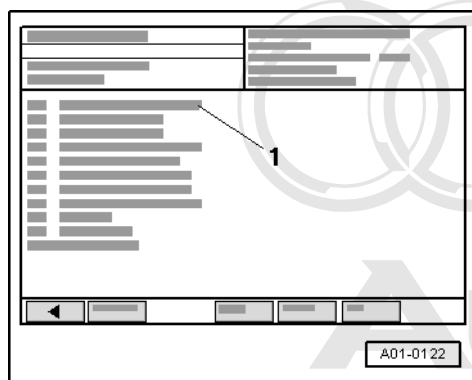
Note: Data will be erased!

- Touch "OK" key on display -2-.
- Terminate function "05 - Erase fault memory" by touching ◀ key.
- Interrogate fault memory again on completion of repair work and erase it as necessary.

Note:

This erases faults stored during fault elimination e.g. on account of connectors being unplugged.

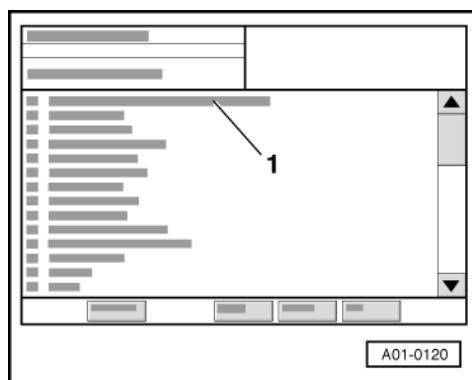
2.3 - End output



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-> Readout on VAS 5051:

- From list -1- select diagnostic function "06 - End output".



-> Readout on VAS 5051:

- Switch off ignition and unplug diagnostic connector when this display appears.

2.4 - Fault table

Notes:

- ♦ Faults occurring in monitored sensors or components are stored in fault memory together with an indication of the type of fault.
- ♦ The fault table is arranged according to the 5-digit fault codes on the left.
- ♦ If a stored fault does not reoccur within the next 50 engine starts, the fault code is erased automatically.
- ♦ Sporadic faults are marked "sporadic" on the display. "Sporadic" faults are faults which only occur occasionally.
- ♦ Do not immediately replace components indicated as being defective by VAS 5051, but rather: Start by checking wiring and connectors to these components in line with current flow diagram. Also use current flow diagram to check earth connections. This is particularly important if faults are output as being "sporadic".

Readout on VAS 5051	Possible cause of trouble	Possible effects	Remedy
00281 Road speed sender -G681) Implausible signal	- Speedometer sender -G22 defective - Speedometer -G21 defective - Open circuit in wiring or short circuit between speedometer sender and speedometer - Open circuit in wiring or short circuit between dash panel insert and engine control unit	- Reduced power output - No air conditioner function - Load change jolt	- Check vehicle speed signal => Page 126 - Eliminate open circuit in wiring or short circuit
	- Signal input in engine control unit defective (control unit defective)		- Replace control unit => Page 72

1) Wrong fault text displayed.- Correct readout:

Speedometer sender -G22
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Implausible signal

Note on fault code 00281:

Start by checking whether speed displayed is OK. If not, fault can be ignored.

Readout on VAS 5051	Possible cause of trouble	Possible effects	Remedy
00513 Engine speed sender -G28 Implausible signal	- -G28 loose/defective - Gap between -G28 and ring gear of flywheel greater than 1.2 mm - Chipped teeth at flywheel ring gear	- Starting problems - Engine knocking - Loss of power - No readout on rev counter - Oil warning lamp lit	- Detach sump and check sender wheel - Check flywheel
	- -G28 defective	- Hydraulic engine mountings not switching	- Check -G28 => Page 93



Input open	- Open circuit in screen wiring		- Check wiring to -G28 => Page 94
	- Open circuit in wiring/short circuit		- Eliminate open circuit in wiring/short circuit
	- -G28 defective		- Check -G28 => Page 93

Note:

If fault 00542: "Needle lift sender -G80, Implausible signal" is displayed in addition to fault 00513, the engine control unit is defective. Replace engine control unit =>Page 72.

Readout on VAS 5051	Possible cause of trouble	Possible effects	Remedy
00519 Intake manifold pressure sender -G71			
Signal too small Short to positive	- Open circuit in wiring/short circuit - -G71 defective	- Loss of power	- -G71 => 5-cyl. Diesel Engine, Mechanics (2.5 l engine); Rep.Gr. 21
Implausible signal	- Difference between air pressure and charge pressure at idle		- Check hose connections to -G71
Signal too large Open circuit/short to earth	- Charge pressure too high - Open circuit in wiring - -G71 defective	- Abrupt loss of power on acceleration and reduced power	- Checking charge pressure system => 5-cyl. Diesel Engine, Mechanics (2.5 l engine); Rep.Gr. 21
Control difference	- =>Fault code 00575		

Note:

If fault 65535: "Control unit defective" is displayed in addition to fault 00519: "Intake manifold pressure sender, implausible signal", the engine control unit is defective. Replace engine control unit =>Page 72.

Readout on VAS 5051	Possible cause of trouble	Possible effects	Remedy
00522 Coolant temperature sender -G62			
Signal too small Short to earth	- Short to earth - Loose contact/corrosion caused by moisture in connector - -G62 defective	- Cold starting problems below - 20 °C - Black smoke on starting above +10 °C	- Check -G62 => Page 103
Signal too large Open circuit/short to positive	- Open circuit in wiring or short to positive - -G62 defective		

Readout on VAS 5051	Possible cause of trouble	Possible effects	Remedy
00523 Intake air temperature sender -G42			
Signal too small Short to earth	- Short to earth - Loose contact/corrosion caused by moisture in connector - -G42 defective	- Possible jolting when starting-off from cold	- Check -G42 => Page 100

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Open circuit/short to positive	- Open circuit in wiring or short to positive		
Signal too large	- -G42 defective		

Readout on VAS 5051	Possible cause of trouble	Possible effects	Remedy
00526 Brake light switch -F Implausible signal	- Switch incorrectly set - Interchanged -F and -F47 connectors - Open circuit in wiring - -F or -F47 defective - Fuse defective - Both brake lights defective	- Sometimes no throttle response, complete loss of power - Glow period warning lamp flashes - No cruise control function	- Check and adjust -F and -F47=>Page 106 - Check brake light
00532 Supply voltage Signal too small	- Control unit connected whilst ignition switched on		- Erase fault memory and continue to monitor vehicle
	- Battery low - Open circuit in wiring/ short circuit - Excess voltage protection relay -J249 or diesel direct injection relay -J322 defective-	- Various driveability problems - Engine cuts out (safety shut-off)	- Check power supply for diesel direct injection system =>Page 83

Readout on VAS 5051	Possible cause of trouble	Possible effects	Remedy
00539 Fuel temperature sender -G81 Signal too small Short to earth	- Fuel too hot - -G81 defective - Short to earth - Fuel preheating defective or non-return valve between filter and tank in return pipe installed wrong way round	- Reduced power - Uneven idling	- Check -G81 => Page 80
Signal too large Open circuit/short to positive	- Open circuit in wiring or short to positive - -G81 defective - 7-pin injection pump connector unplugged	- Faults 00541: "Slide travel potentiometer -G99", signal too large, and 00765: "Modulating piston movement sender -G149" are additionally displayed. - Engine cuts out	- Check injection pump connector

Readout on VAS 5051	Possible cause of trouble	Possible effects	Remedy
00541 Slide travel potentiometer -G99			



Signal too small	- Open circuit in wiring or short to earth - -G99 defective	- Jolting of engine - Rough engine running, misfiring - Engine cuts out	- Check -G99 => Page 110
Signal too large	- Open circuit in wiring or short to positive - -G99 defective - 7-pin injection pump connector unplugged	- Fault 00539: "Fuel temperature sender -G81", signal too large, is additionally displayed.	- Check injection pump connector
Continued ▼			

Readout on VAS 5051	Possible cause of trouble	Possible effects	Remedy
00541 Slide travel potentiometer -G99 Implausible signal	(Fault 00541 continued) - Incorrect quantity adjuster setting - Needle lift sender -G80 defective	- Engine jolting in overrun - Fault 00542: "Needle lift sender -G80", implausible signal, is additionally displayed. - Misfiring while driving	- Replace injection pump => Page 57 - Replace -G80
00542 Needle lift sender -G80 Input open Short to earth Open circuit/short to positive	- Open circuit in wiring/short circuit - -G80 defective Continued ▼	- Warning lamp lit or glow period warning lamp flashing - Reduced power - Rough engine running	- Check -G80 => Page 95

Readout on VAS 5051	Possible cause of trouble	Possible effects	Remedy
00542 Needle lift sender -G80 Implausible signal	(Fault 00542 continued) - Fuel supply (was) interrupted: Tank run empty, supply pipe or filter clogged, system drawing in air - Wheel of engine speed sender -G28 bent or loose - Injection pump defective Continued ▼	- Misfiring, jolting - Fault 00550 "Injection commencement regulation, control difference" may be stored - Misfiring at exactly 3000 rpm - Fault 01268 "Metering control, control difference" stored - Rough engine running, misfiring - No throttle response after overrun	- Check fuel system - Detach sump and check sender wheel - Replace injection pump => Page 57, do not replace needle lift sender -G80

Readout on VAS 5051	Possible cause of trouble	Possible effects	Remedy
00542 Needle lift sender -G80	(Fault 00542 continued)		

Implausible signal	- -G80 defective	- Misfiring, jolting (particularly at higher engine speeds)	- Replace -G80
	- Signal input in engine control unit defective (control unit defective)	- Only if fault 00513: "Engine speed sender" additionally stored - Rough engine running, misfiring, black smoke	- Replace control unit => Page 72

Readout on VAS 5051	Possible cause of trouble	Possible effects	Remedy
00550 Injection commencement control Control difference	- Commencement of injection not OK	- Loss of power at higher engine speeds - Engine starting problems	- Check and adjust commencement of injection => Page 65
	- Control range of injection pump blocked (dirt, swarf)	- Loss of power at higher engine speeds	- Check injection timing control range=> Page 75
	- Fuel supply (was) interrupted: Tank run empty, supply pipe or filter clogged, system drawing in air Continued ▼	- Fault 00542 "Needle lift sender, implausible signal" may be stored	- Check fuel system

Readout on VAS 5051	Possible cause of trouble	Possible effects	Remedy
00550 Injection commencement control Control difference	(Fault 00550 continued)		
	- Open circuit in wiring to commencement of injection valve -N108	- Engine knocks at idle as commencement of injection constantly "advanced" - Possibly fault 00526: "Brake pedal switch -F", implausible signal, or 00741: "Brake pedal monitoring, implausible signal" stored	- Check -N108 => Page 77 - Check fuse
	- Commencement of injection valve -N108 worn	- Constant commencement of injection not possible in "Basic setting" (fluctuation of more than 10 in display in zone 2) - Rough engine running, lack of power	- Replace -N108

Readout on VAS 5051	Possible cause of trouble	Possible effects	Remedy
00552 Air-flow meter potentiometer - G19 Implausible signal	- Incorrect EGR vacuum hose connection or mechanical EGR valve constantly open	- Uneven idling, lack of power	- Check vacuum hoses => 5-cyl. Diesel Engine, Mechanics (2.5 l engine); Rep.Gr. 21



	- Brake pedal monitoring implausible	- Fault 00526: "Brake pedal switch -F", implausible signal, or 00741: "Brake pedal monitoring, implausible signal" additionally stored - Sometimes no throttle response, complete loss of power - Glow period warning lamp flashes	- Do not replace air flow meter -G19 Check and adjust brake light switch -F and brake pedal switch -F47=>Page 106
	Continued ▼		

Readout on VAS 5051	Possible cause of trouble	Possible effects	Remedy
00552 Air-flow meter potentiometer -G19	(Fault 00552 continued)		
Implausible signal	- -G19 defective	- Lack of power, jolting	- Replace -G19
Signal too small Open circuit/short to earth	- -G19 defective - Open circuit in wiring or short to earth	- Reduced power - Black smoke may occur on accelerating from low engine speeds	- Check -G19 => Page 97
Signal too large Open circuit/short to positive	- Open circuit in wiring or short to positive - -G19 defective		

Readout on VAS 5051	Possible cause of trouble	Possible effects	Remedy
00560 Exhaust gas recirculation system			
Control difference	- Vacuum hoses leaking or dropped off	- Sudden loss of power, even after a lengthy period of driving (control unit limits injection quantity)	- Check vacuum hoses => 5-cyl. Diesel Engine, Mechanics (2.5 l engine); Rep.Gr. 21
	- Exhaust gas recirculation valve -N18 defective - Mechanical EGR valve sticking		- Checking EGR system => 5-cyl. Diesel Engine, Mechanics (2.5 l engine); Rep.Gr. 26
	- Control unit defective (only part no. 4A0 907 401 with data level D24)	- Rough engine running, lack of power, jolting - Readout in measured value block 000, display zone 10 greater than 150 at idle	- Replace control unit => Page 72

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Readout on VAS 5051	Possible cause of trouble	Possible effects	Remedy
00575 Intake manifold pressure Control difference	- Charge pressure too high	- Sudden loss of power during acceleration	- Check charge pressure => 5-cyl. Diesel Engine, Mechanics (2.5 l engine); Rep.Gr. 21

	- Charge pressure control hoses interchanged, not attached, clogged, leaking - Hose connection to intake manifold pressure sender - G71	- Reduced power	- Check hoses => 5-cyl. Diesel Engine, Mechanics (2.5 l engine); Rep.Gr. 21
--	--	-----------------	--

Readout on VAS 5051	Possible cause of trouble	Possible effects	Remedy
00625 Vehicle speed signal Implausible signal	- Open circuit in wiring between speedometer sender -G22 and dash panel insert - -G22 defective - Speedometer -G21 defective - Open circuit in wiring between dash panel insert and engine control unit	- No cruise control function - No air conditioner function - Possible load change jolts	- Check vehicle speed signal => Page 126 - Check speedometer sender -G22 - => Electrical System; Repair Group 90; Dash panel insert; Checking speedometer sender- Dash panel insert; Checking speedometer sender-
00668 Vehicle voltage terminal 30 Signal too small	- Battery low - Diesel direct injection system relay -J322 sticking - Open circuit in wiring	- Various driveability problems - Engine will not start (safety shut-off)	- Check power supply for diesel direct injection system =>Page 83

Readout on VAS 5051	Possible cause of trouble	Possible effects	Remedy
00671 CCS switch -E45 Undefined switch status	- Open circuit in wiring/ short circuit - -E45 defective	- No cruise control function	- Check cruise control system => Page 131
00741 Brake pedal monitoring Implausible signal	- Switch incorrectly set - Interchanged -F and -F47 connectors - Open circuit in wiring - -F or -F47 defective - Fuse defective - Both brake lights defective	- Sometimes no throttle response, complete loss of power - Glow period warning lamp flashes - No cruise control function	- Check and adjust -F and -F47=>Page 106 - Check brake light

Readout on VAS 5051	Possible cause of trouble	Possible effects	Remedy
00765 Modulating piston movement sender -G149	- Open circuit in wiring/ short circuit - -G149 defective	- Engine running problems - Engine cuts out	- Check -G149 => Page 112
	- 7-pin injection pump connector unplugged	- Several faults stored - Engine cuts out	- Check injection pump connector



Implausible signal	- Incorrect quantity adjuster setting	- Jolting of engine in overrun	- Replace injection pump => Page 57
	- Needle lift sender - G80 defective (fault 00542 "Needle lift sender, implausible signal" usually stored as well)	- Short misfires while driving	- Replace needle lift sender -G80

Readout on VAS 5051	Possible cause of trouble	Possible effects	Remedy
00777 Accelerator position sender - G79			
Signal too large	- Open circuit in wiring - -G79 defective	- Safety speed reduction to approx. 1100 rpm 1)	- Checking accelerator position sender => Page 118
Implausible signal	- Open circuit in wiring/short circuit - -G79 defective	- Safety speed reduction to approx. 1400 rpm 2)	
Signal too small	- Open circuit in wiring/short circuit		

1) Vehicles with engine codes ABP and AAT 1st control unit version; Engine control unit identification => from Page 3

2) Vehicles with engine code AAT from 2nd control unit version and AEL; Engine control unit identification=>from Page 3

Readout on VAS 5051	Possible cause of trouble	Possible effects	Remedy
00819 Fault source 0333 (info from literature) Supply voltage relay term. 30 Output not switched/short to earth	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. - Diesel direct injection system relay -J322 defective (sticking) - Short circuit	- Engine cuts out (safety shut-off)	- Check wiring and relay
01054 Voltage supply relay terminal 30 -J317 Output not switched/short to earth			

Readout on VAS 5051	Possible cause of trouble	Possible effects	Remedy
01117 Load signal for alternator terminal DF Implausible signal	- Open circuit in wiring or short circuit	- Additional heater not working	- Checking wiring
01237 Fuel cut-off valve -N109 Mechanical fault	- -N109 defective, leaking or sticking	- Reduced power - Engine cuts out	- Perform final control diagnosis => Page 18
Implausible signal	- Open circuit in wiring or short to earth	- Engine cuts out	- Checking wiring

Open circuit/short to earth	- -N109 defective		
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Readout on VAS 5051	Possible cause of trouble	Possible effects	Remedy
01242 Output stages in control unit Implausible signal Open circuit/short to positive	- Commencement of injection valve -N108 defective	- Fault 00550 "Injection commencement regulation, control difference" stored	- Perform final control diagnosis => Page 18
	- Charge pressure control solenoid valve -N75 defective	- Reduced charge pressure	
	- Exhaust gas recirculation valve -N18 defective	- No EGR	
	- Short to positive in wiring to glow period warning lamp -K29	- Failure of glow period warning lamp	- Perform final control diagnosis => Page 149
	- Glow plug relay -J52 defective	- Cold starting problems at low ambient temperatures	- Perform final control diagnosis => Page 143

Readout on VAS 5051	Possible cause of trouble	Possible effects	Remedy
01268 Metering control -N146 Control difference Implausible signal	- Open circuit in wiring/short circuit	- Jolting, misfiring	- Check -N146=>Page 112
	- Quantity adjuster stiff or sticking		- Replace injection pump => Page 57
	- Implausible signal from slide travel potentiometer -G99 1) or from modulating piston movement sender -G149 2)	- No throttle response after overrun	

1) Vehicles with engine codes ABP and AAT 1st control unit version; Engine control unit identification => from Page 3

2) Vehicles with engine code AAT from 2nd control unit version and AEL; Engine control unit identification=>from Page 3

Readout on VAS 5051	Possible cause of trouble	Possible effects	Remedy
17978 Engine control unit disabled	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. - Attempted manipulation - Short circuit in communication wire	- Engine starts and immediately cuts out again	- Adapt engine electronics control unit to immobilizer control unit => Electrical System; Repair Group 01; Self-diagnosis Self-diagnosis - Check electronic immobilizer => Electrical System; Repair Group 96



	- Immobilizer control unit defective/not installed		
--	--	--	--

Readout on VAS 5051	Possible cause of trouble	Possible effects	Remedy
65535 Control unit defective	- Internal fault in control unit	- Engine running problems - Engine cuts out	- Replace control unit => Page 72
	- Communication problem with engine control unit	- None	- Erase fault memory and continue to monitor vehicle

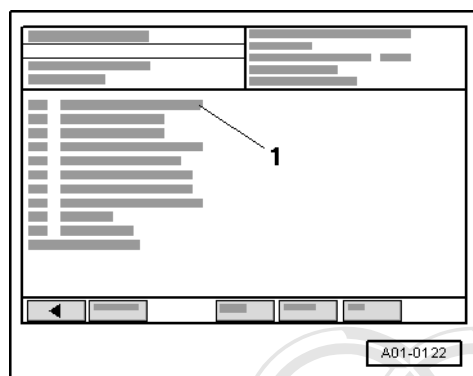
3 - Final control diagnosis

3.1 - Final control diagnosis

Vehicles with engine code ABP:

The final control diagnosis function actuates the following components in the stated sequence:

Actuation sequence
1 Commencement of injection valve -N108
2 Fuel cut-off valve -N109
3 Charge pressure control solenoid valve -N75

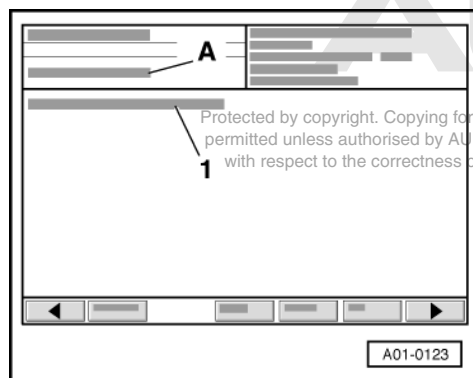


Sequence of operations

- Connect up vehicle diagnostic, testing and information system VAS 5051 => Page 1 and select vehicle system "01 - Engine electronics" from list. Engine must be idling.

-> Readout on VAS 5051:

- From list -1- select diagnostic function "03 - Final control diagnosis".



Actuation of commencement of injection valve

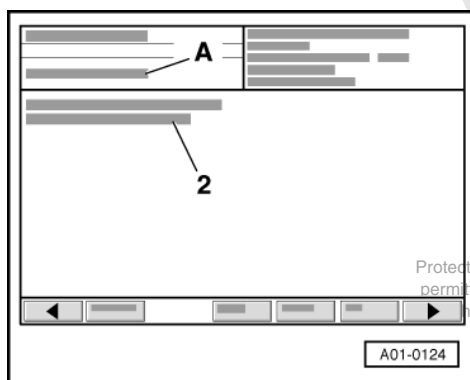
-> Readout on VAS 5051:

- A - 1st control element in test
- 1 - Commencement of injection valve -N108

- ◆ This valve is actuated intermittently until ▶ key is touched to select next control element.
- ◆ The injection timing control switches between "advanced" and "retarded", indicated by an audible change in the combustion sound (knocking).

If combustion noise is not heard to change:

- Checking injection timing control range => Page 75



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Actuation of fuel cut-off valve

- Touch ▶ key.

-> Readout on VAS 5051:

- A - 2nd control element in test
- 2 - Fuel cut-off valve -N109

- ◆ The engine must stop within 10 seconds.

If engine does not cut out:

- Leave engine idling.
- Unplug electrical connector from fuel cut-off valve.
- Place wire aside, with insulation attached.
- Floor the accelerator pedal (full throttle) and at the same time touch the ▶ key.

If the display indicates the next control element, the fuel cut-off valve is OK.

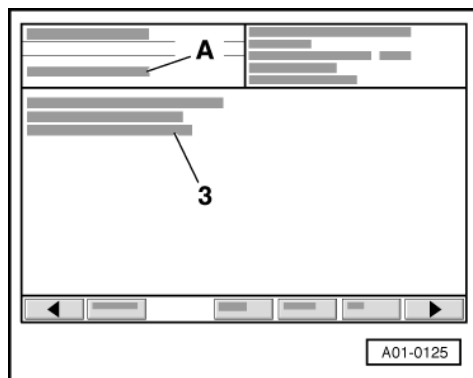
- Continue with final control diagnosis.

If a fault message appears on the display, such as "Function unknown or cannot be executed at the moment":

- Replace the fuel cut-off valve.

Note:

The reason for the engine not stopping is: Because the ignition is not switched off in final control diagnosis and the quantity adjuster is not set to zero delivery, the engine may continue running with a residual amount of fuel from the fuel cut-off valve.



Actuation of charge pressure control solenoid valve

- Touch ▶ key.

-> Readout on VAS 5051:

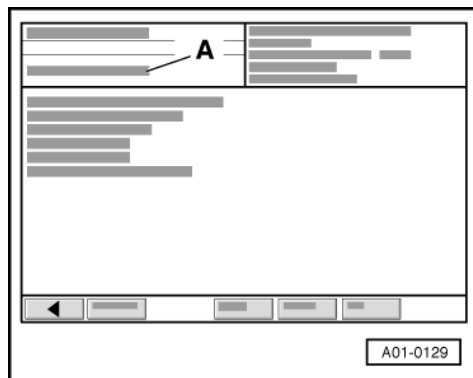
- A - 3rd control element in test
- 3 - Charge pressure control solenoid valve -N75

- ♦ This valve is actuated intermittently until ▶ key is touched to terminate final control diagnosis.

If solenoid valve does not click:

- Check charge pressure control solenoid valve -N75.

=> 5-cyl. Diesel Engine, Mechanics (2.5 l engine); Repair Group 21; Checking charge air system with turbo-charger Checking charge air system with turbocharger



- Touch ▶ key.

-> Readout on VAS 5051:

- A - Control element test ended

- Terminate function "03 - Final control diagnosis" by touching ◀ key.

Vehicles with engine codes AAT, AEL:

Test requirements for vehicles with air conditioner:

- Vehicle at ambient temperature (more than +15 °C)
- Air conditioner on
- Minimum temperature and maximum blower speed preselected

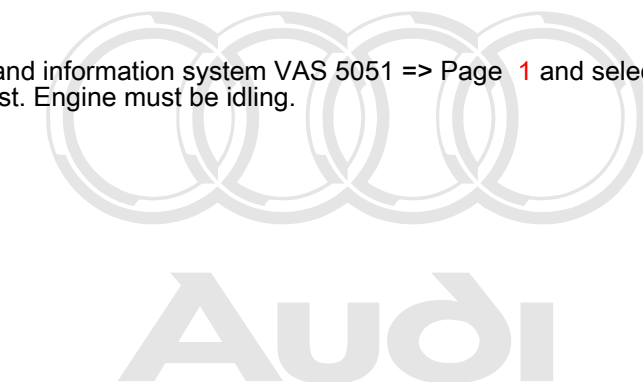
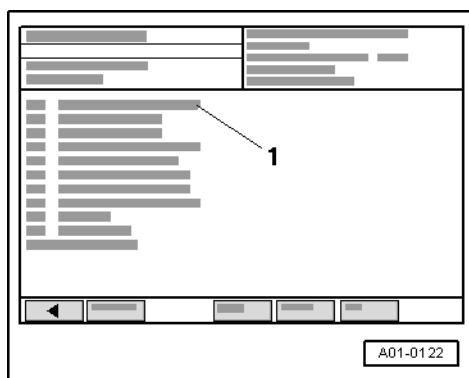


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Actuation sequence	
1	Commencement of injection valve -N108
2	Exhaust gas recirculation valve -N18
3	Air conditioner compressor shut-off
4	Fuel cut-off valve -N109
5	Charge pressure control solenoid valve -N75
6	Glow plug relay -J52
7	Glow period warning lamp -K29

Sequence of operations

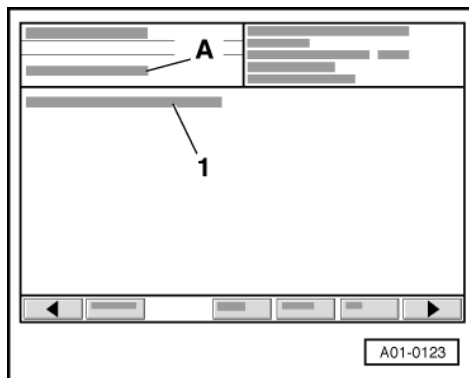
- Connect up vehicle diagnostic, testing and information system VAS 5051 => Page **1** and select vehicle system "01 - Engine electronics" from list. Engine must be idling.



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-> Readout on VAS 5051:

- From list -1- select diagnostic function "03 - Final control diagnosis".



Actuation of commencement of injection valve

-> Readout on VAS 5051:

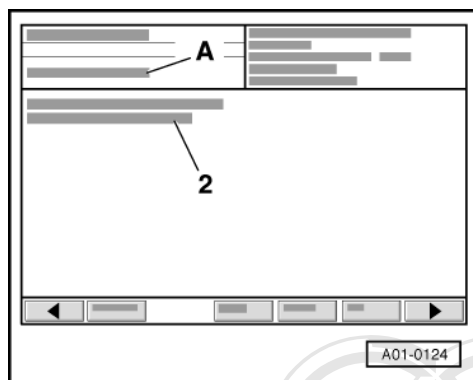
- A - 1st control element in test
- 1 - Commencement of injection valve -N108

- ◆ This valve is actuated intermittently until ▶key is touched to select next control element.
- ◆ The injection timing control switches between "advanced" and "retarded", indicated by an audible change in the combustion sound (knocking).

If combustion noise is not heard to change:



- Checking injection timing control range => Page **75**



Actuation of exhaust gas recirculation valve

- Touch ▶ key.

-> Readout on VAS 5051:

- A - 2nd control element in test
- 2 - EGR valve -N18

- ♦ This valve is actuated intermittently until ▶key is touched to select next control element.

Notes:

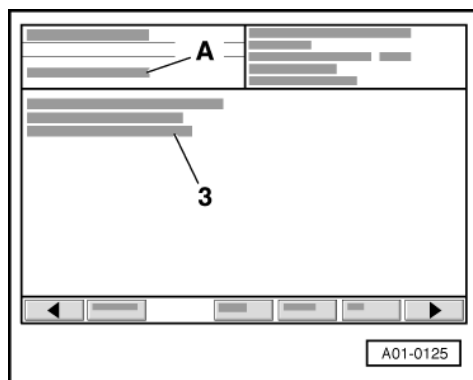
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- ♦ Clicking of valve cannot be heard on account of engine noise and can therefore only be established by way of touch.
- ♦ Any piston movement at mechanical EGR valve is clearly visible at slot on side.

If valve is not actuated (does not click):

- Check exhaust gas recirculation valve -N18.

=> 5-cyl. Diesel Engine, Mechanics (2.5 l engine); Repair Group 26; EGR system EGR system



Actuation of air conditioner compressor shut-off

- Touch ▶ key.

-> Readout on VAS 5051:

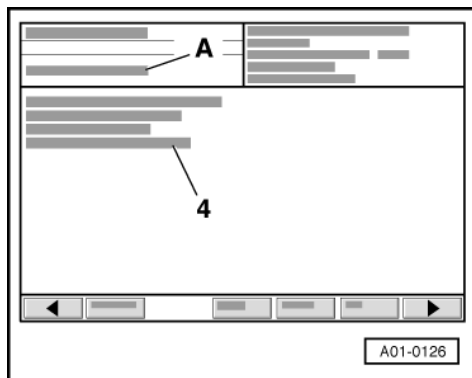
- A - 3rd control element in test

3 - Air conditioner compressor shut-off

- ◆ A check is made on air conditioner compressor shut-off.
- ◆ Test step is called up even if vehicle is not fitted with an air conditioner.
- ◆ Air conditioner compressor must come to a halt within 5 seconds (visual inspection) and then start up every 5 seconds and come to a halt again.

If air conditioner compressor is not shut off:

- Checking air conditioner compressor shut-off => Page **123**.



Actuation of fuel cut-off valve

- Touch ▶ key.

-> Readout on VAS 5051:

- A - 4th control element in test
- 4 - Fuel cut-off valve -N109

- ◆ The engine must stop within 10 seconds.

If engine does not cut out:

- Leave engine idling.
- Unplug electrical connector from fuel cut-off valve.
- Place wire aside, with insulation attached.
- Floor the accelerator pedal (full throttle) and at the same time touch the ▶ key.

If the display indicates the next control element, the fuel cut-off valve is OK.

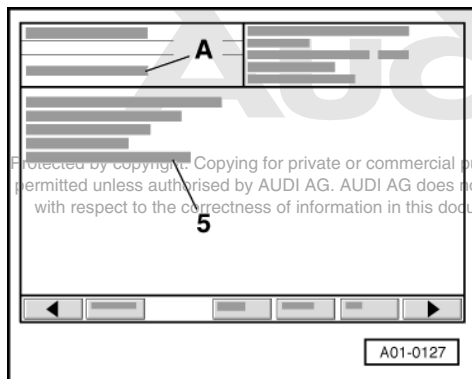
- Continue with final control diagnosis.

If a fault message appears on the display, such as "Function unknown or cannot be executed at the moment":

- Replace the fuel cut-off valve.

Note:

The reason for the engine not stopping is: Because the ignition is not switched off in final control diagnosis and the quantity adjuster is not set to zero delivery, the engine may continue running with a residual amount of fuel from the fuel cut-off valve.



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Actuation of charge pressure control solenoid valve

- Touch ▶ key.

-> Readout on VAS 5051:

- A - 5th control element in test
- 5 - Charge pressure control solenoid valve -N75

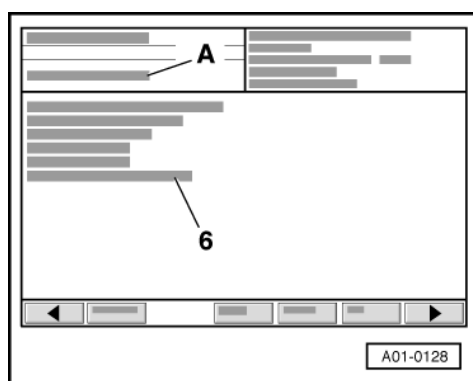
- ♦ This valve is actuated intermittently until ▶key is touched to select next control element.

If solenoid valve does not click:

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- Check charge pressure control solenoid valve -N75.

=> 5-cyl. Diesel Engine, Mechanics (2.5 l engine); Repair Group 21; Checking charge air system with turbo-charger Checking charge air system with turbocharger



Actuation of glow plug relay

- Touch ▶ key.

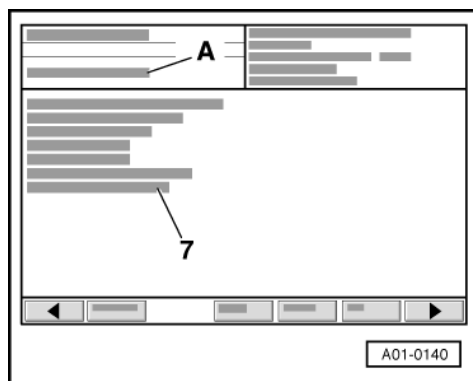
-> Readout on VAS 5051:

- A - 6th control element in test
- 6 - Glow plug relay -J52

- ♦ Glow plug relay -J52 (in central electrics underneath dash panel on driver's side, socket 6) is energized and deenergized (clicks) until ▶ key is touched to select next control element.
- ♦ On account of the high current input of the glow plugs, relay energization/deenergization can also be seen from interior lighting becoming brighter/dimmer.

If relay does not click:

- Check glow plug relay -J52 => Page 145 .



Actuation of glow period warning lamp

- Touch ▶ key.

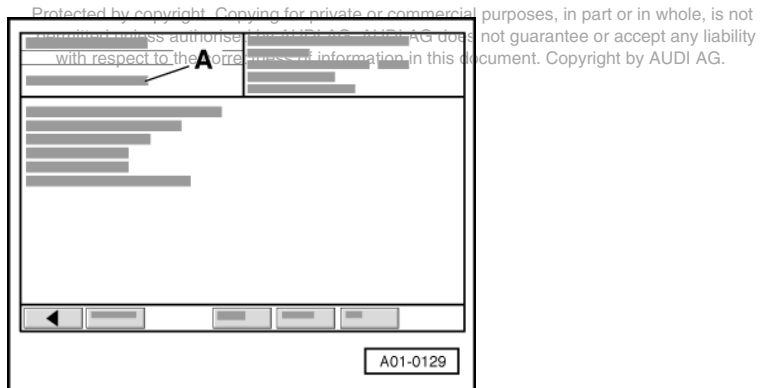
-> Readout on VAS 5051:

- A - 7th control element in test
- 7 - Glow period warning lamp -K29

- ♦ The warning lamp is actuated intermittently (flashes) until ▶ key is touched to terminate final control diagnosis.

If warning lamp is not actuated (does not flash):

- Check glow period warning lamp -K29 => Page 149 .



- Touch ▶ key.

-> Readout on VAS 5051:

- A - Control element test ended

- Terminate function "03 - Final control diagnosis" by touching ◀ key.

4 - Basic setting

4.1 - Basic setting

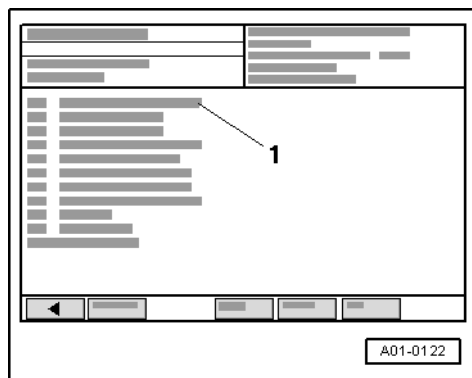
Vehicles with engine codes AAT, AEL:

Note:

Basic setting function is used for dynamic checking of commencement of injection. Commencement of injection valve -N108 is constantly actuated to "retard" injection timing control.

Test requirements:

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

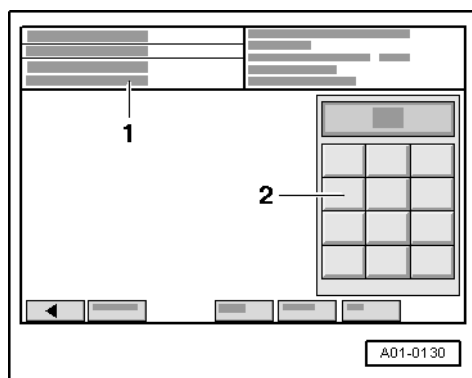


Sequence of operations

- Connect up vehicle diagnostic, testing and information system VAS 5051 => Page **1** and select vehicle system "01 - Engine electronics" from list. Engine must be idling.

-> Readout on VAS 5051:

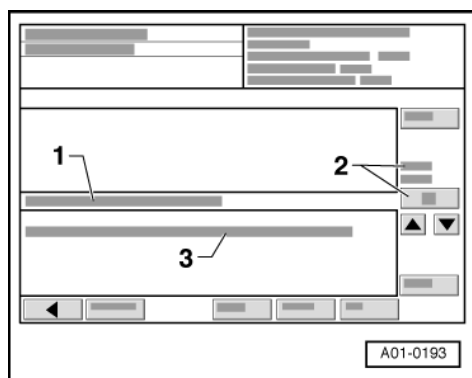
- From list -1- select diagnostic function "04 - Basic setting".



-> Readout on VAS 5051:

- 1 - Enter display group

- Use keypad -2- to enter "000" for "Display group number 000" and confirm by touching Q key.



-> Indicated on VAS 5051 for display group 000:

- 1 - Basic setting
- 2 - Display group 0

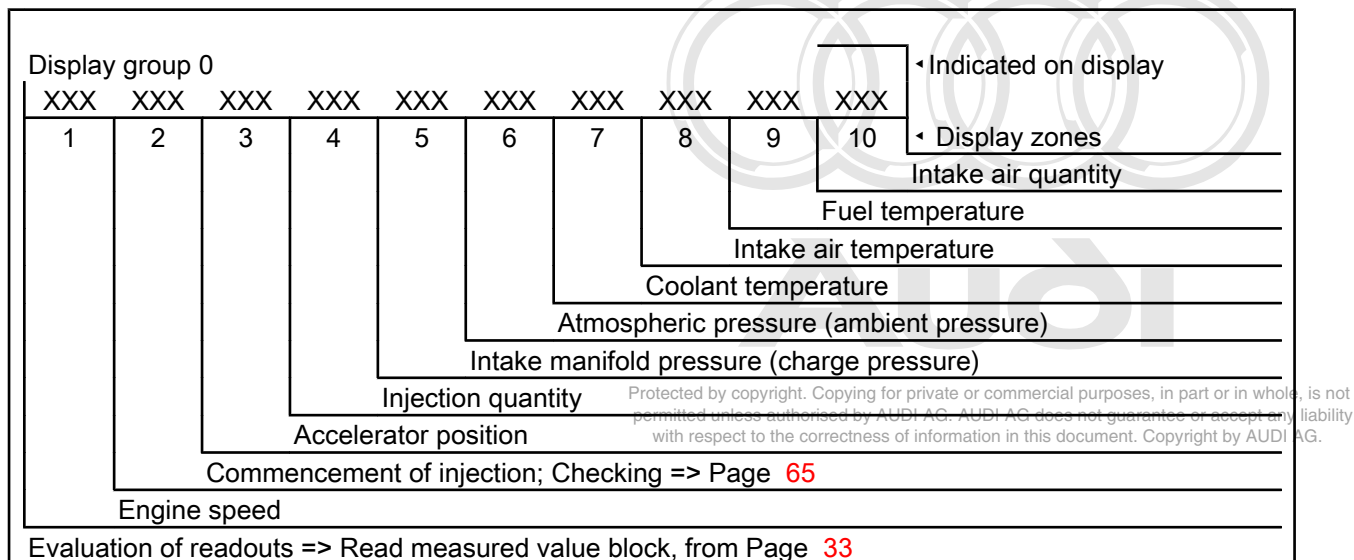


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3 - Display zone 1 2 3 4 5 6 7 8 9 10

Note:

In vehicles with engine code AAT 3rd control unit version and with engine code AEL, the engine speed in the basic setting is increased to 1200 and 1000 rpm respectively (depending on software version).



- Terminate function "04 - Basic setting" by touching ◀ key.

5 - Reading measured value block

5.1 - Reading measured value block

Test requirements:

- Electrical consumers off (radiator fan must not run during test)
- Air conditioner switched off
- Vehicles with automatic gearbox: Selector lever set to P or N
- No faults stored in fault memory



Sequence of operations

- Connect up vehicle diagnostic, testing and information system VAS 5051 => Page 1 and select vehicle system "01 - Engine electronics" from list. Ignition must be on.

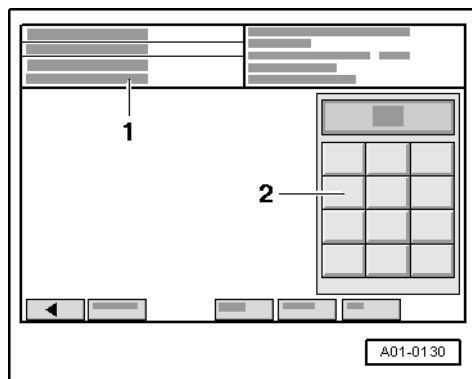


Or, depending on desired operation:

- Start engine.

-> Readout on VAS 5051:

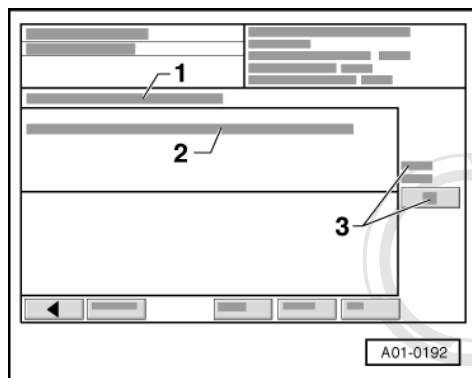
- From list -1- select diagnostic function "08 - Read measured value block".



-> Readout on VAS 5051:

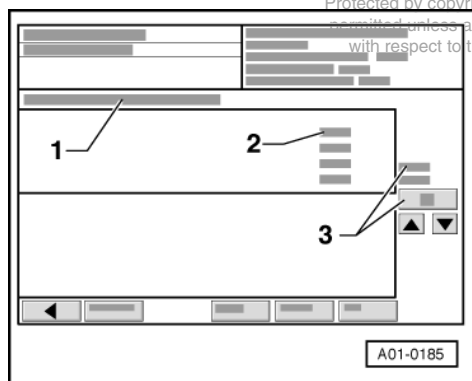
- 1 - Enter display group

- Use keypad -2- to enter required three-digit display group number =>List of display groups, Page 29 and confirm entry by touching Q key.



-> Indicated on VAS 5051 for display group 000:

- 1 - Read measured value block
- 2 - Display zone 1 2 3 4 5 6 7 8 9 10
- 3 - Display group 0



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-> Indicated on VAS 5051 for display group 001 ... 255:

- 1 - Read measured value block
- 2 - Display zone 1
- Display zone 2
- Display zone 3
- Display zone 4
- 3 - Display group X

Notes:

- ◆ Display remains blank if a display zone is not used.
- ◆ Proceed as follows to switch to a different display group:

Display group	VAS 5051
Up	Press ▲ key
Down	Press ▼ key

- Terminate function "08 - Read measured value block" by touching ◀ key.

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5.2 - Performing test drive at full throttle

Some measured value blocks must be read at full throttle during a test drive. Pay attention to the following:

Attention:

- ◆ **Always attach testers and measuring instruments to back seat and have them operated from there by a second person.**
- ◆ **If testers and measuring instruments were to be operated from front passenger's seat, person sitting there could suffer injury in the event of an accident due to triggering of front passenger's airbag.**

Test requirement:

- Coolant temperature at least 80 °C

Test sequence

- Accelerate the vehicle in 3rd gear (engine code AEL: in 4th; with automatic transmission: in gear 2) at full throttle (without kickdown) from overrun while a second mechanic observes the rev counter.
- At 3000 rpm the second mechanic presses the Print button on the VAS 5051.

5.3 - List of display groups

Display group number	Display zone	Designation
000	1	Engine speed
General	2	Commencement of injection
Vehicle -	3	Accelerator position
Checking	4	Injection quantity
	5	Intake manifold pressure (charge pressure)
	6	Atmospheric pressure (ambient pressure)
	7	Coolant temperature
	8	Intake air temperature



Display group number	Display zone	Designation
	9	Fuel temperature
	10	- Voltage of slide travel potentiometer -G99 1) - Intake air quantity 2)

- 1) Vehicles with engine code ABP
2) Vehicles with engine codes AAT, AEL

Display group number	Display zone	Designation
001 3) Injection quantity	1	Engine speed
	2	Injection quantity
	3	Voltage of modulating piston movement sender -G149
	4	Coolant temperature
002 3) Idling speed	1	Engine speed
	2	Accelerator position
	3	Operating status: X X 1 Air conditioner signal on X 1 X Idling speed switch closed 1 X X Air conditioner requests higher cooling or heat output-
	4	Coolant temperature

- 3) Vehicles with engine code AAT from 3rd control unit version and AEL; Engine control unit identification=>from Page 3

Display group number	Display zone	Designation
003 3) Exhaust gas recirculation	1	Engine speed
	2	Intake air quantity (specified)
	3	Intake air quantity (actual)
	4	Duty cycle (actuation) of exhaust gas recirculation valve -N18
004 3) Commencement of injection	1	Engine speed
	2	Commencement of injection (specified)
	3	Commencement of injection (actual)
	4	Duty cycle (actuation) of commencement of injection valve -N108
005 3) Starting conditions	1	Engine speed
	2	Starting injection quantity (stored from last start)
	3	Commencement of injection
	4	Coolant temperature

- 3) Vehicles with engine code AAT from 3rd control unit version and AEL; Engine control unit identification=>from Page 3

Display group number	Display zone	Designation
006 3) Switch-settings	1	Vehicle speed
	2	Brake pedal monitoring: X X 1 Brake light switch -F closed X 1 X Brake pedal switch -F47 open 1 X X Clutch pedal switch -F36 open
	3	Cruise control system (CCS) operating element:

Display group number	Display zone	Designation
Continued ▼		X X X X X 1 CCS on
		X X X X 1 X CCS off with memory
		X X X 1 X X Deceleration
		X X 1 X X X Reactivation/acceleration
		X 1 X X X X Brake pedal pressed
		1 X X X X X Clutch pedal pressed

3) Vehicles with engine code AAT from 3rd control unit version and AEL; Engine control unit identification=>from Page **3**

Display group number	Display zone	Designation
006 3) Switch- settings	4	Cruise control system operating status: 0 Control unit with CCS function 1 CCS off 2 Acceleration 4 Deceleration 8 Reactivation 1 6 Brake pressed 3 2 Steady vehicle speed 6 4 Ignore 1 2 8 Ignore 2 5 5 Control unit with no CCS function

3) Vehicles with engine code AAT from 3rd control unit version and AEL; Engine control unit identification=>from Page **3**

Display group number	Display zone	Designation
007 3) Temperatures	1	Fuel temperature
	2	Intake air temperature
	3	No readout
	4	Coolant temperature
008 3) Injection quantity - limitation	2	Engine speed Desired injection quantity (specified by driver via accelerator pedal)
	3	Injection quantity limitation via engine speed (torque limitation)
	4	Injection quantity limitation on account of intake air quantity (avoidance of smoke)
009 3) Injection quantity - limitation	1	Engine speed
	2	Injection quantity (cruise control active)
	3	Injection quantity limitation by automatic gearbox during gear shifting
	4	Emergency quantity (modulating piston movement sender -G149 voltage)

3) Vehicles with engine code AAT from 3rd control unit version and AEL; Engine control unit identification=>from Page **3**

Display group number	Display zone	Designation
010 3) Air quantities	1	Intake air quantity
	2	Atmospheric pressure (ambient pressure)



Display group number	Display zone	Designation
011 3) Charge pressure control	3	Intake manifold pressure (charge pressure)
	4	Accelerator position
	1	Engine speed
	2	Charge pressure (specified)
012 3) Glow plug system	3	Charge pressure (actual)
	4	Duty cycle (actuation) of charge-pressure control solenoid valve -N75
	1	Display can be ignored
	2	Glow period (seconds)
	3	Control unit supply voltage
	4	Coolant temperature

3) Vehicles with engine code AAT from 3rd control unit version and AEL; Engine control unit identification=>from Page **3**

Display group number	Display zone	Designation
013 3) Idling speed-smooth running control	1	Variation in injected fuel quantity between cylinders 5 and 4
	2	Variation in injected fuel quantity between cylinders 3 and 4
	3	Variation in injected fuel quantity between cylinders 1 and 4
	4	Variation in injected fuel quantity between cylinders 2 and 4
014 Vacant		No readout
015 3) Fuel consumption	1	Engine speed
	2	Injection quantity (actual)
	3	Fuel consumption
	4	Desired injection quantity (specified by driver via accelerator pedal)

3) Vehicles with engine code AAT from 3rd control unit version and AEL; Engine control unit identification=>from Page **3**

5.4 - Specified readouts for engine code ABP

Display group 000 with ignition on and engine stopped

Display zone 1 ... 5 Display group 0										Indicated on display
XX	XXX	XXX	XX	XXX	XXX	XX	XXX	XXX	XXX	
1	2	3	4	5	6	7	8	9	10	Display zones
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Display zones 6 ... 10 => Page 33										
Intake manifold pressure (charge pressure): Compare display zone 5 with display zone 6. The pressure readouts must roughly match. If they do not, check intake manifold pressure sender -G71 1)										
Injection quantity: 0										
Accelerator pedal position: Press down slowly. The readout must rise steadily up to 255. If it does not, check accelerator pedal sender -G79 => Page 118										
Commencement of injection: Readout is undefined; ignore										

Engine speed: 0
1)Checking intake manifold pressure sender -G71 => 5-cyl. Diesel Engine, Mechanics (2.5 l engine); Rep.Gr. 21

Display zone 6 ... 10									
Display group 0									
XX XXX XXX XX XXX XXX XX XXX XXX XXX									
1	2	3	4	5	6	7	8	9	10
◀ Indicated on display									
◀ Display zones									
Slide travel potentiometer: Starting injection quantity (coolant controlled) greater than 120; 50 s after ignition on read-out returns to 20 ... 40									
Fuel temperature: 90 at approx. 20 °C, no specification									
Intake air temperature: 195 at approx. 20 °C, no specification									
Coolant temperature: 195 at approx. 20 °C, no specification									
Atmospheric pressure (ambient pressure): 117 at approx. 1000 mbar, no specification									
Display zones 1 ... 5 => Page 32									

Display group 000 at idle (warm engine, coolant temperature at least 80 °C)

Display group 0									
XXX XXX XXX XXX XXX XXX XXX XXX XXX XXX									
1	2	3	4	5	6	7	8	9	10
◀ Indicated on display									
◀ Display zones									
Slide travel potentiometer: 75 ... 100 OK									
Fuel temperature: 175 at approx. 55 °C, no specification									
Intake air temperature: 177 at approx. 30 °C, no specification									
Coolant temperature: 62 at approx. 90 °C, no specification									
Atmospheric pressure (ambient pressure): 117 at approx. 1000 mbar, no specification									
Intake manifold pressure (charge pressure): Must roughly match display zone 6									
Injection quantity: 5 ... 25 OK									
Accelerator pedal position: 0 (not pressed)									
Commencement of injection: 70 ... 84 OK									
▪ If outside tolerance: Check commencement of injection and adjust as necessary => Page 64 .									
Engine speed: 37 ... 39 OK									

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5.5 - Specified readouts for engine code AAT up to 2nd control unit version

Display group 000 with ignition on and engine stopped

--



Display group 0										◀ Indicated on display
XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	◀ Display zones
1	2	3	4	5	6	7	8	9	10	Intake air quantity: Readout is undefined; ignore
										Fuel temperature: 90 at approx. 20 °C, no specification
										Intake air temperature: 195 at approx. 20 °C, no specification
										Coolant temperature: 195 at approx. 20 °C, no specification
										Atmospheric pressure (ambient pressure): 240 at approx. 1000 mbar, no specification
										Intake manifold pressure (charge pressure): 117 at approx. 1000 mbar, no specification
										Injection quantity: 0
Accelerator pedal position: Press down slowly. The readout must rise steadily up to 255. If it does not, check accelerator pedal sender -G79 => Page 118										
Commencement of injection: Readout is undefined; ignore										
Engine speed: 0										

Display group 000 at idle (warm engine, coolant temperature at least 80 °C)

Display group 0										◀ Indicated on display
XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	◀ Display zones
1	2	3	4	5	6	7	8	9	10	Intake air quantity: 41 ... 75 OK ▪ If outside tolerance, briefly press accelerator pedal. If reading still does not match specification: Check exhaust gas recirculation system1
										Fuel temperature: 175 at approx. 55 °C, no specification
										Intake air temperature: 177 at approx. 30 °C, no specification
										Coolant temperature: 62 at approx. 90 °C, no specification
										Atmospheric pressure (ambient pressure): 240 at approx. 1000 mbar, no specification
										Intake manifold pressure (charge pressure): 117 at approx. 1000 mbar, no specification
										Injection quantity: 5 ... 25 OK
Accelerator pedal position: 0 (not pressed)										
Commencement of injection: 45 ... 60 OK ▪ If outside tolerance: Check commencement of injection and adjust as necessary => Page 65.										
Engine speed: 33 ... 36 OK										
1)Checking EGR system: => 5-cyl. Diesel Engine, Mechanics (2.5 l engine); Repair Group 26; EGR system										

Display group 000 at full throttle (test drive, coolant temperature at least 80 °C)

Attention: Heed instructions for test drive at full throttle => Page **29**.

Display zone 1 ... 5										• Indicated on display
Display group 0										
XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	• Display zones
1	2	3	4	5	6	7	8	9	10	
Display zones 6 ... 10 => Page 35										
Intake manifold pressure (charge pressure): 210 ... 235 (1.72 ... 1.92 bar) OK										
▪ If outside tolerance: Check charge pressure system2										
Injection quantity: 115 ... 125 (full throttle quantity) OK										
▪ 80 emergency injection quantity, control unit has detected system fault										
Accelerator pedal position: 255 (floored)										
Commencement of injection: 190 ... 210 (dependent on engine speed) OK										
▪ If outside tolerance: Check injection control => Page 75										
Engine speed: 140 ... 190 (readout 190 corresponds to 4400 rpm; not to be exceeded, engine is governed)										
2) Checking charge pressure system										
=> 5-cyl. Diesel Engine, Mechanics (2.5 l engine); Rep.Gr. 21										

Display zone 6 ... 10										Indicated on display
Display group 0										
XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	Display zones
1	2	3	4	5	6	7	8	9	10	
Intake air quantity: at least 190 OK										▪ Less than 190: Check air flow meter =>Page 97
Fuel temperature: Ignore										
Intake air temperature: Ignore										
Coolant temperature: Ignore										
Atmospheric pressure (ambient pressure): Ignore										
Display zones 1 ... 5 => Page 35										

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5.6 - Specified readouts for engine code AAT as from 3rd control unit version and AEL

Display group 000 with ignition on and engine stopped

Display group 0										Indicated on display
XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	
1	2	3	4	5	6	7	8	9	10	Display zones



										Intake air quantity: Readout is undefined; ignore
										Fuel temperature: 90 at approx. 20 °C, no specification
										Intake air temperature: 195 at approx. 20 °C, no specification
										Coolant temperature: 195 at approx. 20 °C, no specification
										Atmospheric pressure (ambient pressure): 240 at approx. 1000 mbar, no specification
										Intake manifold pressure (charge pressure): 117 at approx. 1000 mbar, no specification
										Injection quantity: 0
										Accelerator pedal position: Press down slowly. The readout must rise steadily up to 255. If it does not, check accelerator pedal sender -G79 => Page 118
										Commencement of injection: Readout is undefined; ignore
										Engine speed: 0

Display group 000 at idle (warm engine, coolant temperature at least 80 °C)

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Display group 0										◀ Indicated on display
XXX XXX XXX XXX XXX XXX XXX XXX XXX										
1	2	3	4	5	6	7	8	9	10	◀ Display zones
										Intake air quantity: 41 ... 75 OK
										▪ If outside tolerance, briefly press accelerator pedal. If reading still does not match specification: Check exhaust gas recirculation system1
										Fuel temperature: 175 at approx. 55 °C, no specification
										Intake air temperature: 177 at approx. 30 °C, no specification
										Coolant temperature: 62 at approx. 90 °C, no specification
										Atmospheric pressure (ambient pressure): 240 at approx. 1000 mbar, no specification
										Intake manifold pressure (charge pressure): 117 at approx. 1000 mbar, no specification
										Injection quantity: 5 ... 25 OK
										Accelerator pedal position: 0 (not pressed)
										Commencement of injection: 45 ... 60 OK
										▪ If outside tolerance: Check commencement of injection and adjust as necessary => Page 65 .
										Engine speed
										▪ Manual gearbox: 33 ... 36 OK
										▪ Automatic gearbox: 30 ... 33 OK
										1)Checking EGR system:
										=> 5-cyl. Diesel Engine, Mechanics (2.5 l engine); Repair Group 26; EGR system

Display group 000 at full throttle (test drive, coolant temperature at least 80 °C)

Attention: Heed instructions for test drive at full throttle => Page 29.

Display zone 1 ... 5										Indicated on display
Display group 0										
XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	Display zones
1	2	3	4	5	6	7	8	9	10	
Display zones 6 ... 10 => Page 37										
Intake manifold pressure (charge pressure)										
▪ AAT: 168 ... 187 (1.72 ... 1.92 bar) OK										
▪ AEL: 168 ... 194 (1.72 ... 1.92 bar) OK										
▪ If outside tolerance: Check charge pressure system2										
Injection quantity (full throttle quantity)										
▪ AAT: 115 ... 125 OK										
▪ AEL: 135 ... 150 OK										
▪ 80: Emergency injection quantity - control unit has detected system fault										
Accelerator pedal position: 255 (floored)										
Commencement of injection (dependent on engine speed)										
▪ AAT: 190 ... 210 OK										
▪ AEL: 160 ... 210 OK										
▪ If outside tolerance: Check injection control => Page 75										
Engine speed: 140 ... 190 (readout 190 corresponds to 4400 rpm; not to be exceeded, engine is governed)										
2) Checking charge pressure system										
=> 5-cyl. Diesel Engine, Mechanics (2.5 l engine); Rep.Gr. 21										

Display zone 6 ... 10										Indicated on display
Display group 0										
XXX XXX XXX XXX XXX XXX XXX XXX XXX XXX										Display zones
1	2	3	4	5	6	7	8	9	10	
										Intake air quantity: at least 190 OK ▪ Less than 190: Check air flow meter =>Page 97
										Fuel temperature: Ignore
										Intake air temperature: Ignore
										Coolant temperature: Ignore
										Atmospheric pressure (ambient pressure): Ignore
Display zones 1 ... 5 => Page 37										

Display group 001 injection pump at idle (warm engine, coolant temperature at least 80 °C)

Display group 1				Indicated on display
XXXX rpm	XX.X mg/S	X,XXX V	XXX.X °C	
				Coolant temperature: 80...100 °C: OK ▪ Less than 80 °C: Warm up engine



		Voltage of slide travel potentiometer -G149: 1,250 ... 1,750 V OK ▪ Less than 1,250 V: ▪ Injection pump setting too rich - replace injection pump ▪ Greater than 1,750 V: ▪ Engine too cold - warm up ▪ Injection pump setting too lean - replace injection pump
		Injection quantity: 2.0 ... 10.0 mg/S OK ▪ Less than 2.0 mg/S: ▪ Injection pump setting too rich - replace injection pump ▪ Greater than 10.0 mg/S: ▪ Engine too cold - warm up ▪ Injection pump setting too lean - replace injection pump
	Engine speed	
	▪ Manual gearbox: 750 ... 800 rpm OK	
	▪ Automatic gearbox: 690 ... 750 rpm OK	

Display group 004 injection pump at idle (warm engine, coolant temperature at least 80 °C)

Display zone 1 ... 2			
Display group 4			
XXXX rpm	X.X °b.TDC	X.X °b.TDC	XX %
			▪ Indicated on display
			▪ Display zones 1 ... 4
			Display zones 3 and 4 => Page 38
			Commencement of injection specified by control unit:- 1°a.TDC ... 2°b.TDC OK
			▪ Advanced 2 °b.TDC: Engine too cold - warm up
			Engine speed
			▪ Manual gearbox: 750 ... 800 rpm OK
			▪ Automatic gearbox: 690 ... 750 rpm OK

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Display zone 3 ... 4			
Display group 4			
XXXX rpm	X.X °b.TDC	X.X °b.TDC	XX %
			▪ Indicated on display
			▪ Display zones 1 ... 4
			Duty cycle (actuation) of commencement of injection valve:
			4 ... 40 % OK
			▪ Greater than 40 %: Injection pump setting retarded - check commencement of injection =>Page 65
			Actual commencement of injection:- 1°after TDC...2°before TDC OK
			▪ Retarded 1 °a.TDC:
			▪ Extremely retarded injection pump setting,
			▪ Injection timing control blocked,
			▪ Commencement of injection valve defective - check timing range
			▪ => Page 75
			▪ Advanced 2 °b.TDC:
			▪ Engine too cold - warm up
			▪ Injection pump setting advanced too far
			▪ Commencement of injection valve defective - check timing range
			▪ => Page 75
			Display zones 1 and 2 => Page 38

Display group 002 at idle (warm engine, coolant temperature at least 80 °C)

Display group 2				• Indicated on display
XXXX rpm	X.X %	X X X	XX.X °C	• Display zones 1 ... 4
				Coolant temperature: 80...100 °C: OK • Less than 80 °C: Warm up engine
				Operating status: • XX1: Air conditioner compressor on • X1X: Idling speed switch closed • 1XX: Idling speed increased due to: Switch-on of air conditioner
				Accelerator pedal position: 0.0 %: OK • Greater than 0.0 %: • Accelerator position sender -G79 incorrectly set or defective, • Open circuit in wiring - check accelerator pedal sender -G79 => Page 118
				Engine speed • Manual gearbox: 750 ... 800 rpm OK • Automatic gearbox: 690 ... 750 rpm OK

Display group 003 exhaust gas recirculation at idle (warm engine, coolant temperature at least 80 °C)

Display group 3				• Indicated on display
XXXX rpm	XXX mg/S	XXX mg/S	XX %	• Display zones 1 ... 4
				Duty cycle (actuation) of EGR valve: 14 ... 75 % OK
				Actual intake air quantity:- 210 ... 370 mg/S OK • If outside tolerance, briefly press accelerator pedal. If reading still does not match specification: • Less than 210 mg/S: • Unmetered air in intake system, • excessive exhaust gas recirculation - check1) • Greater than 370 mg/S: • Engine too cold - warm up • Insufficient exhaust gas recirculation - check1)
				Air quantity specified by control unit:- 210 ... 370 mg/S OK • Greater than 370 mg/S: Engine too cold - warm up
				Engine speed • Manual gearbox: 750 ... 800 rpm OK • Automatic gearbox: 690 ... 750 rpm OK
				1)Checking EGR system: => 5-cyl. Diesel Engine, Mechanics (2.5 l engine); Repair Group 26; EGR system

Display group 008 at full throttle (test drive, coolant temperature at least 80 °C), engine code AAT

Attention: Heed instructions for test drive at full throttle => Page 29.

Display group 8				• Indicated on display
XXXX rpm	XX.X mg/S	XX.X mg/S	XX.X mg/S	• Display zones 1 ... 4



		Injection quantity limitation on account of air quantity detected (avoidance of smoke): 35 ... 45 mg/S OK ▪ Less than 35 mg/S: ▪ Insufficient air quantity detected - check air flow meter ▪ => Page 97 . ▪ Exhaust gas recirculation at full throttle - check EGR system1). ▪ Intake air temperature too high
		Injection quantity limitation on account of engine speed (torque limitation): 37 ... 42 mg/S: OK ▪ Less than 37 mg/S: Engine speed too high or too low ▪ Greater than 42 mg/S: Increased injection quantity due to tuning
		Desired injection quantity (accelerator pedal position): at least 42 mg/S OK ▪ Less than 42 mg/S: ▪ Accelerator pedal not floored. ▪ Accelerator position sender -G79 incorrectly set or defective - check accelerator pedal sender -G79 => Page 118
		Engine speed 2800...4000 rpm OK
		1)Checking EGR system: => 5-cyl. Diesel Engine, Mechanics (2.5 l engine); Repair Group 26; EGR system

Display group 008 at full throttle (test drive, coolant temperature at least 80 °C), engine code AEL

Attention: Heed instructions for test drive at full throttle => Page 29 .

Display group 8		▪ Indicated on display
XXXX rpm XX.X mg/S XX.X mg/S XX.X mg/S		▪ Display zones 1 ... 4
		Injection quantity limitation on account of air quantity detected (avoidance of smoke): 44 ... 48 mg/S OK ▪ Less than 44 mg/S: ▪ Insufficient air quantity detected - check air flow meter => Page 97 . ▪ Exhaust gas recirculation at full throttle - check EGR system1). ▪ Intake air temperature too high
		Injection quantity limitation on account of engine speed (torque limitation): 43 ... 46 mg/S: OK ▪ Less than 43 mg/S: Engine speed too high or too low ▪ Greater than 46 mg/S: Increased injection quantity due to tuning
		Desired injection quantity (accelerator pedal position): at least 48 mg/S OK ▪ Less than 48 mg/S: ▪ Accelerator pedal not floored. ▪ Accelerator position sender -G79 incorrectly set or defective - check accelerator pedal sender -G79 => Page 118
		Engine speed 2800...4000 rpm OK
		1)Checking EGR system: => 5-cyl. Diesel Engine, Mechanics (2.5 l engine); Repair Group 26; EGR system

Display group 011 charge pressure control at full throttle (test drive, coolant temperature at least +80 °C)

Attention: Heed instructions for test drive at full throttle => Page 29 .

Display group 11		▪ Indicated on display
XXXX rpm XXXX mbar XXXX mbar XX %		▪ Display zones 1 ... 4
		Duty cycle (actuation) of charge-pressure control solenoid valve -N75: 30 ... 80% OK

		Actual charge pressure 1720 ... - 1920 mbar: OK ▪ Less than 1720 mbar or greater than 1920 mbar: ▪ Charge pressure control defective, ▪ Turbocharger defective - check charge pressure control2)
		Charge pressure specified by control unit:- 1720 ... 1920 mbar OK ▪ Greater than 1920 mbar: Increased charge pressure due to tuning
		Engine speed: 2800 ... 3500 rpm OK
2) Checking charge pressure control: => 5-cyl. Diesel Engine, Mechanics (2.5 l engine); Repair Group 21; Checking charge air system with turbocharger--		

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23 - Mixture preparation, Injection

1 - Servicing diesel direct-injection system

1.1 - Servicing diesel direct-injection system

1.2 - Safety precautions

Heed the following so as to avoid possible injury and/or the destruction of the injection and glow plug system:

- ♦ Always switch off ignition before disconnecting and connecting glow plug and injection system wires (also applies to measuring instrument leads).
- ♦ To run engine at starting speed without firing, e.g. to check compression, unplug connector from injection pump.
- ♦ Certain tests may lead to a fault being detected by the control unit and stored. The fault memory is therefore to be interrogated and if necessary erased on completion of all tests and repair work.
- ♦ Before disconnecting battery, establish code for radio sets with anti-theft encoding.
- ♦ Always switch off ignition before disconnecting and connecting battery so as not to damage engine control unit.
- ♦ For connection of measuring instruments (e.g. voltage tester V.A.G 1527 B, portable multimeter V.A.G 1526 A), always make use of adapter set V.A.G 1594 A.

Pay attention to the following if testers and measuring instruments have to be used in the course of a test drive:

Attention:

- ♦ **Always attach testers and measuring instruments to back seat and have them operated from there by a second person.**
- ♦ **If testers and measuring instruments were to be operated from front passenger's seat, person sitting there could suffer injury in the event of an accident due to triggering of front passenger's airbag.**

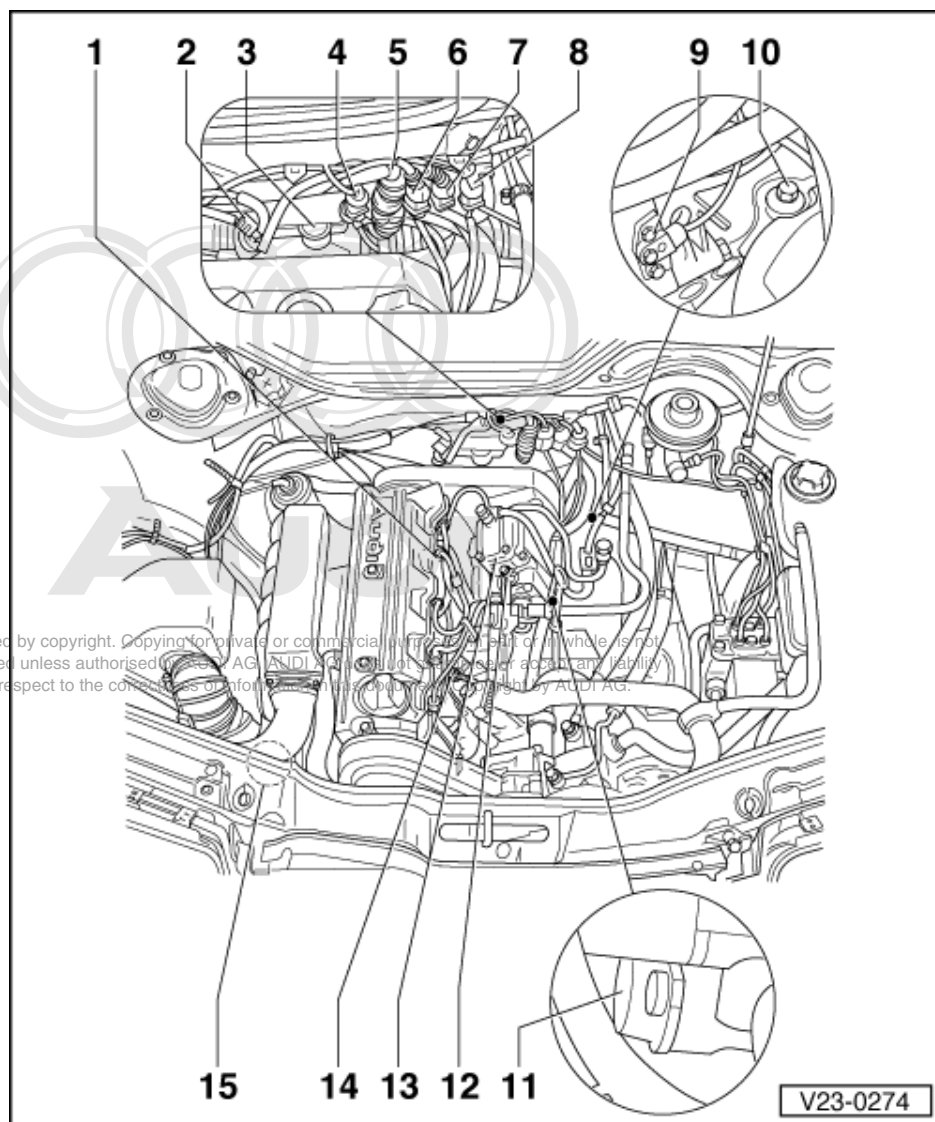
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1.3 - Rules for cleanliness

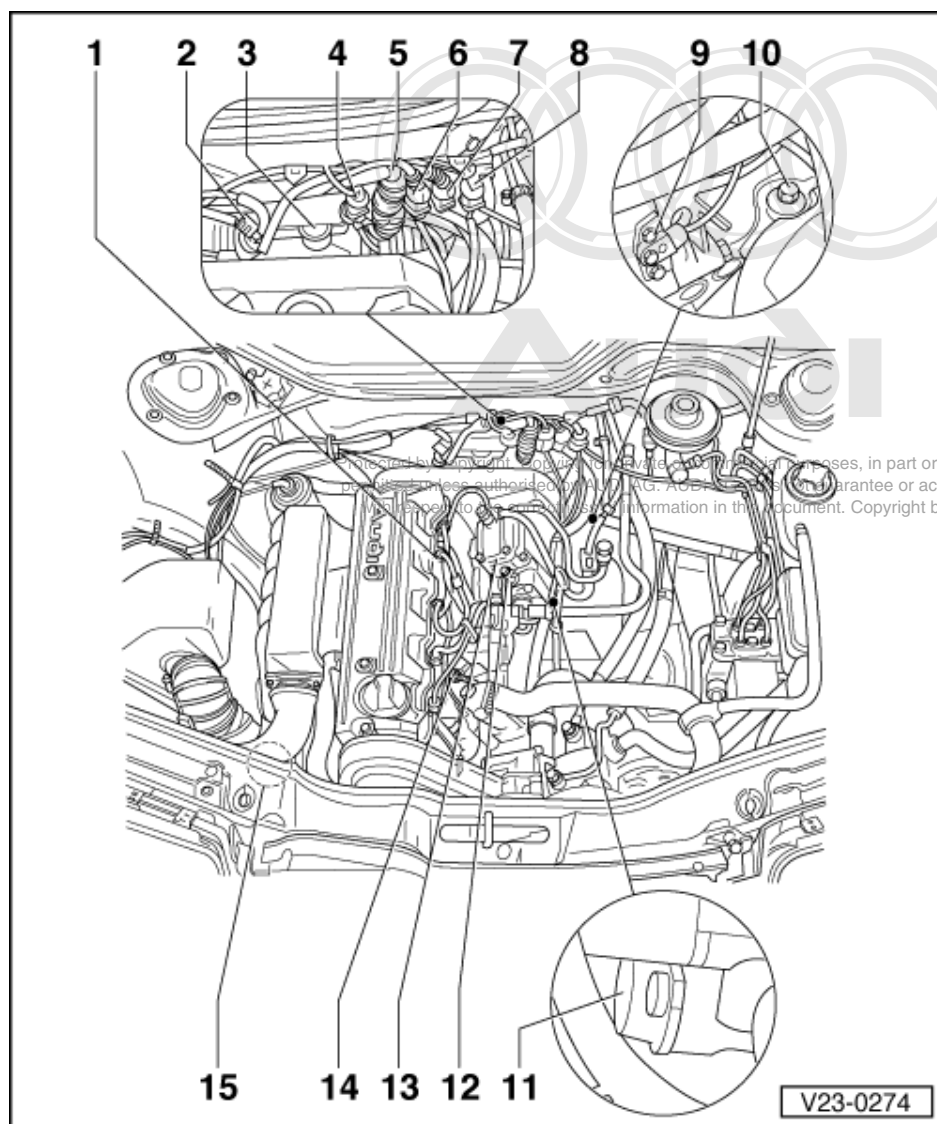
When working on fuel supply/injection system, pay careful attention to the following rules:

- ♦ Carefully clean all joints and adjacent areas before disconnecting.
- ♦ Place parts removed on a clean surface and cover them over. Make use of sheeting or paper. Do not use fluffy cloths.
- ♦ Carefully cover or seal opened components if repairs are not to be performed immediately.
- ♦ Only install clean components:
Do not remove replacement parts from wrapping until immediately prior to installation.
Do not use parts that have been stored loose (e.g. in tool boxes).
- ♦ When system is open:
Do not work with compressed air if at all possible.
Do not move vehicle unless absolutely necessary.
- ♦ Care is also to be taken to ensure that diesel fuel does not run onto the coolant hoses. If necessary, hoses must be cleaned immediately. Damaged hoses are to be replaced.

1.4 - Exploded view of fitting locations - engine code ABP



- Diesel direct injection system control unit -J248
- ♦ In electronics box in passenger's footwell
- Excess voltage protection relay -J249
- ♦ On auxiliary relay carrier III in footwell on passenger side, socket 1
- Glow plug strip fuse -S39
- ♦ In electronics box in passenger's footwell
- Glow plug relay -J52
- ♦ Central electrics beneath dash panel on left, socket 6



- **Clutch pedal switch -F36**

◆ On pedal bracket

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

◆ On pedal bracket

- **Accelerator position sender -G79**

◆ On bearing pedestal for throttle control

1 Injector

◆ For cylinder 4 with needle lift sender -G80

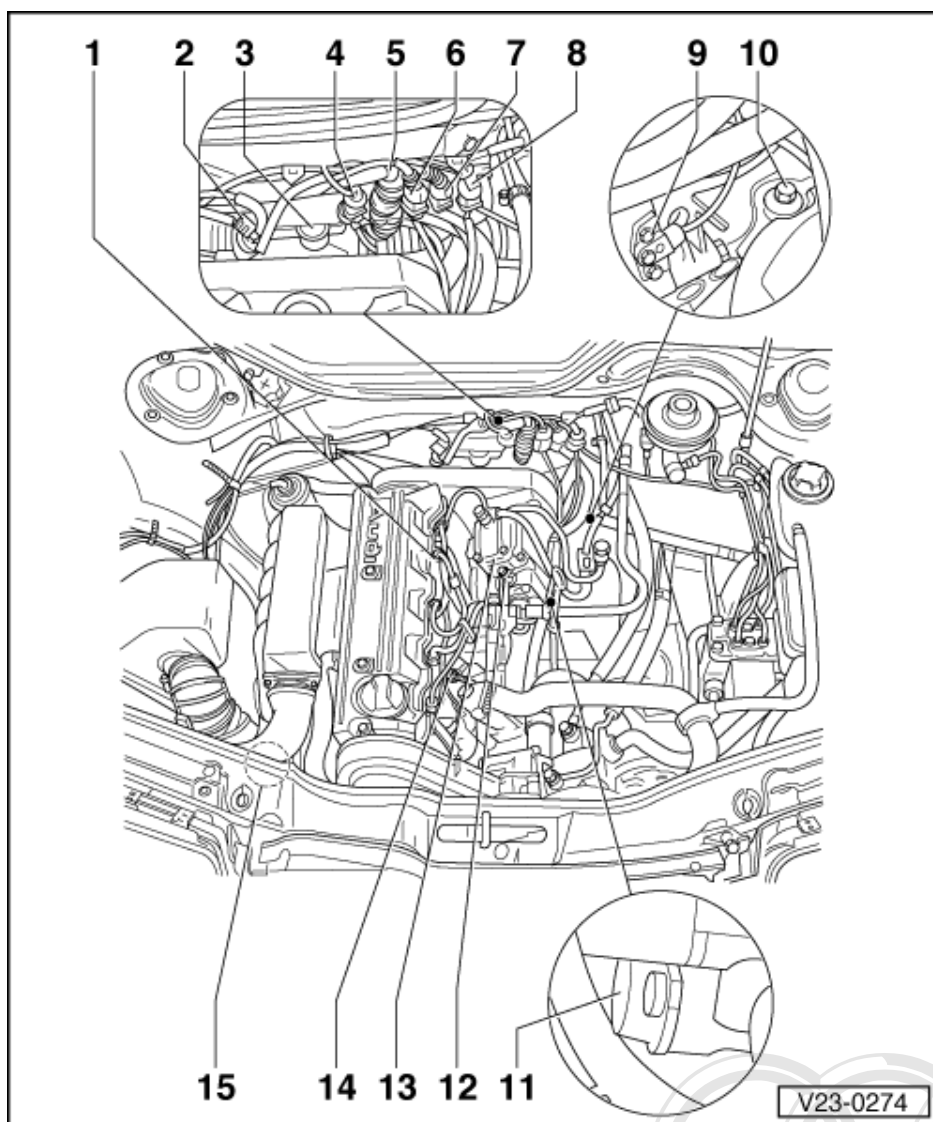
2 Charge pressure control solenoid valve -N75

3 Intake manifold pressure sender -G71

4 Connector

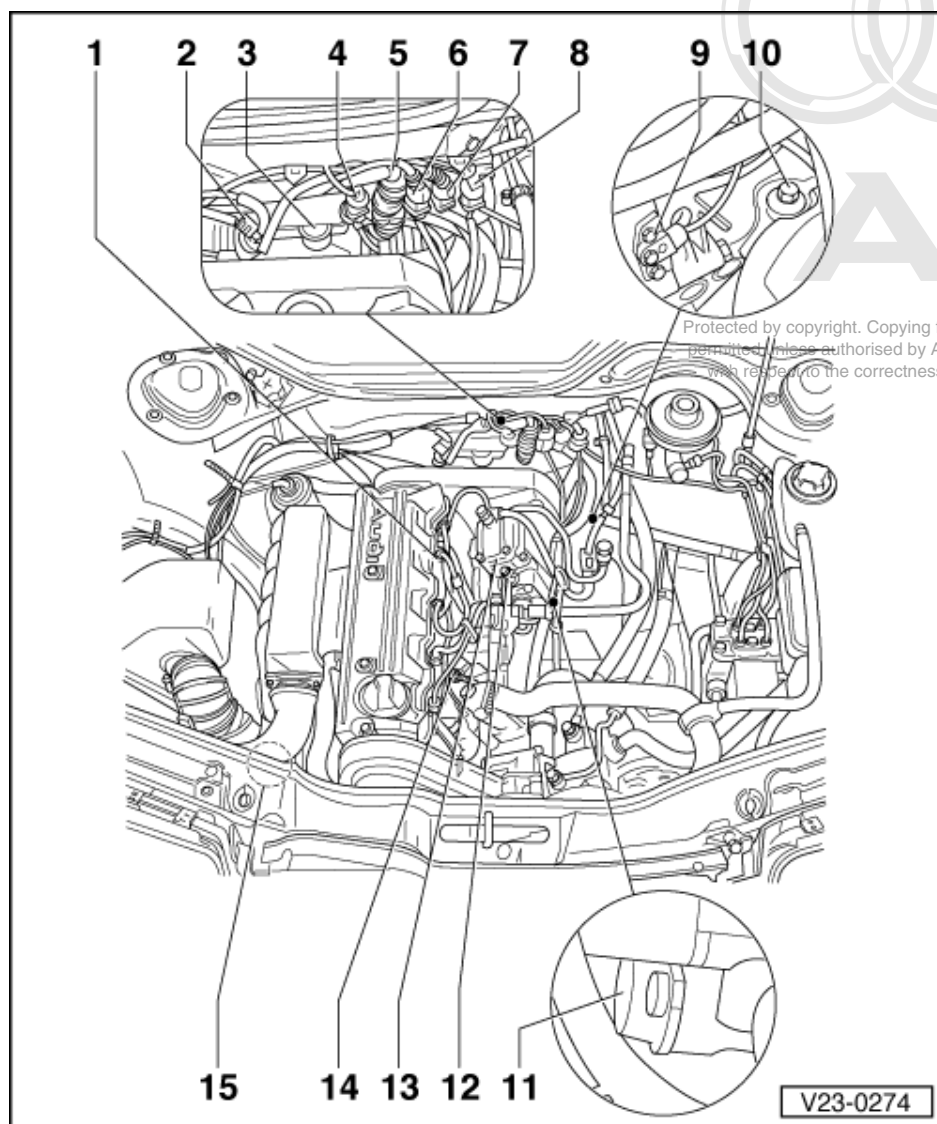
◆ White

◆ For commencement of injection valve -N108



- 5 Connector**
 - ◆ For injection pump
- 6 Connector**
 - ◆ Grey
 - ◆ For engine speed sender -G28
- 7 Connector**
 - ◆ Brown
 - ◆ For needle lift sender -G80
- 8 Connector**
 - ◆ Black
 - ◆ For water separator sender -G63
- 9 Engine speed sender -G28**
- 10 Speedometer sender -G22**
- 11 Commencement of injection valve -N108**

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12 Fuel cut-off valve -N109

13 Injection pump

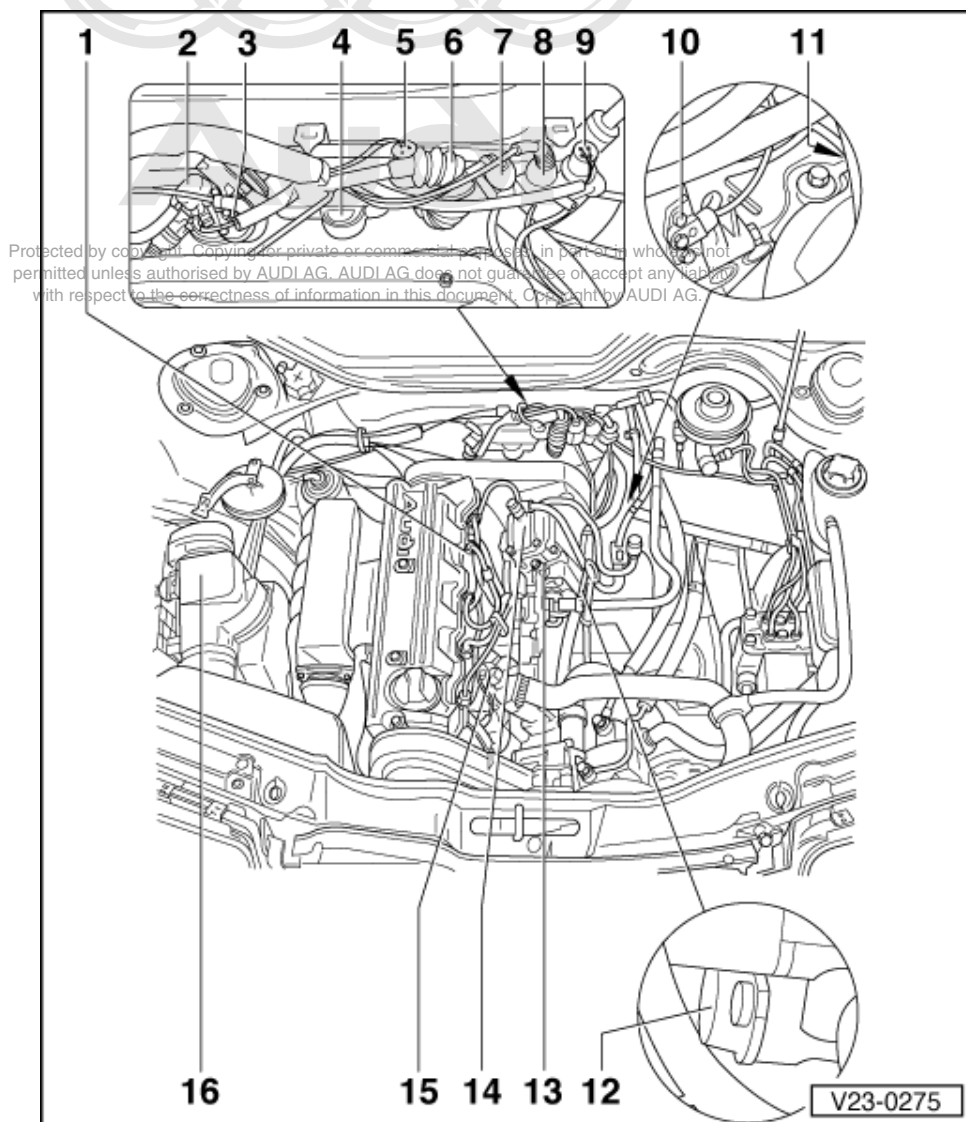
- ♦ With quantity adjuster -N146
- ♦ With fuel temperature sender -G81
- ♦ With slide travel potentiometer -G99

14 Coolant temperature sender -G62

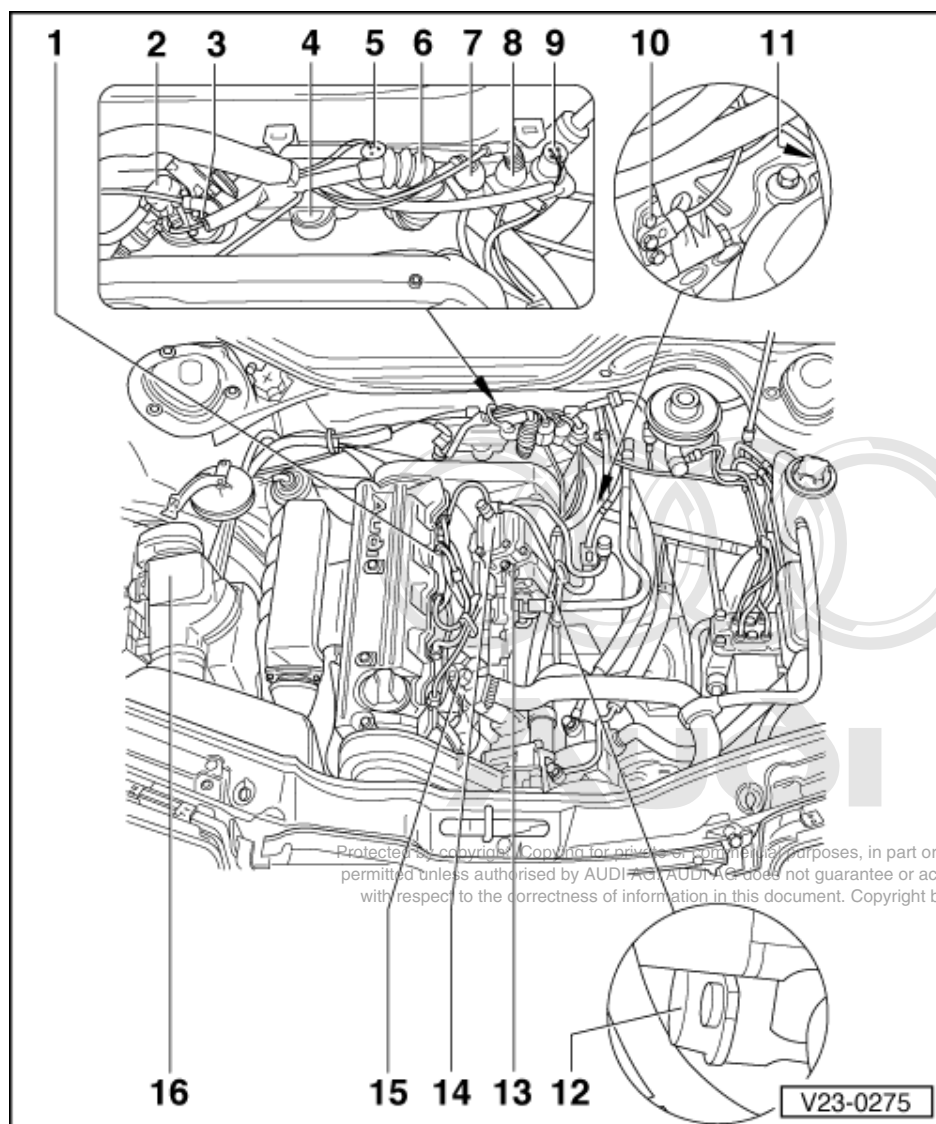
15 Intake air temperature sender -G42

- ♦ On charge air cooler

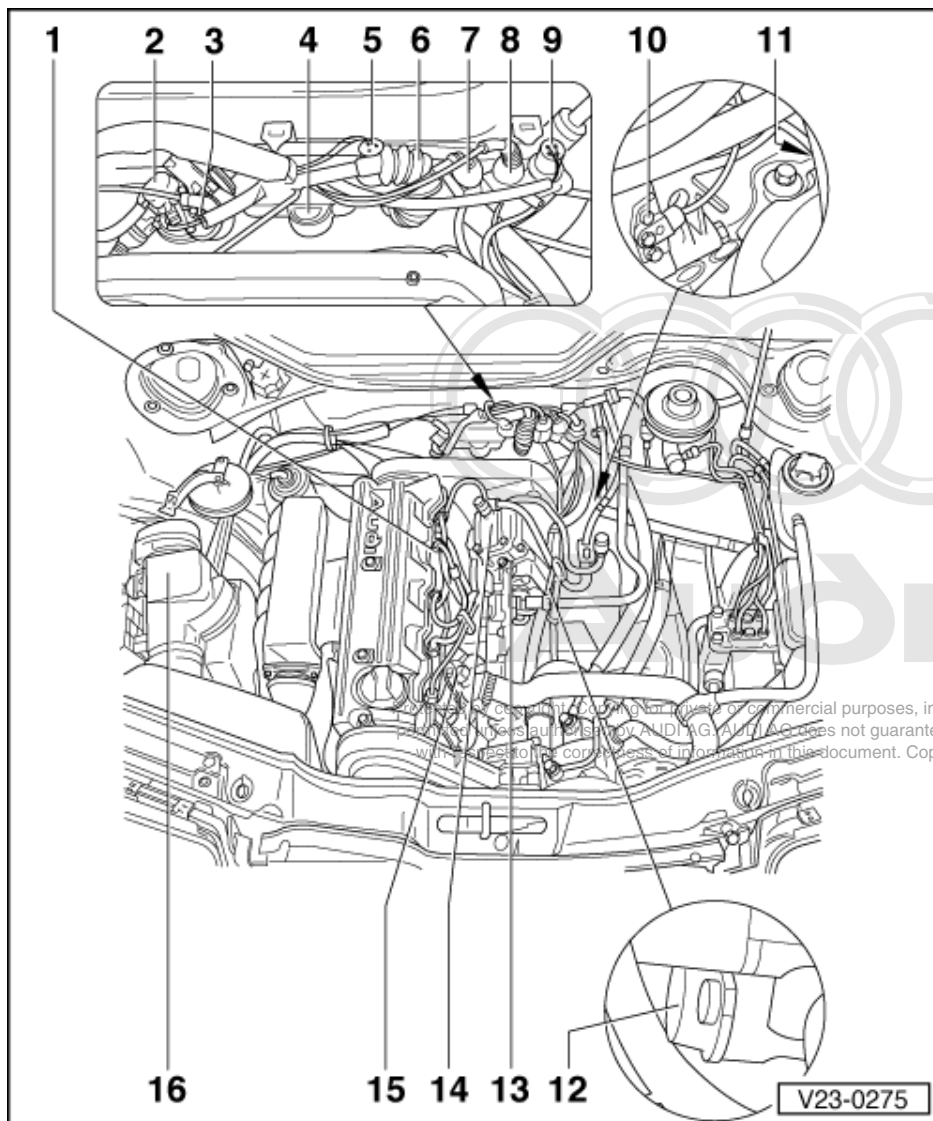
1.5 - Exploded view of fitting locations - engine codes AAT, AEL



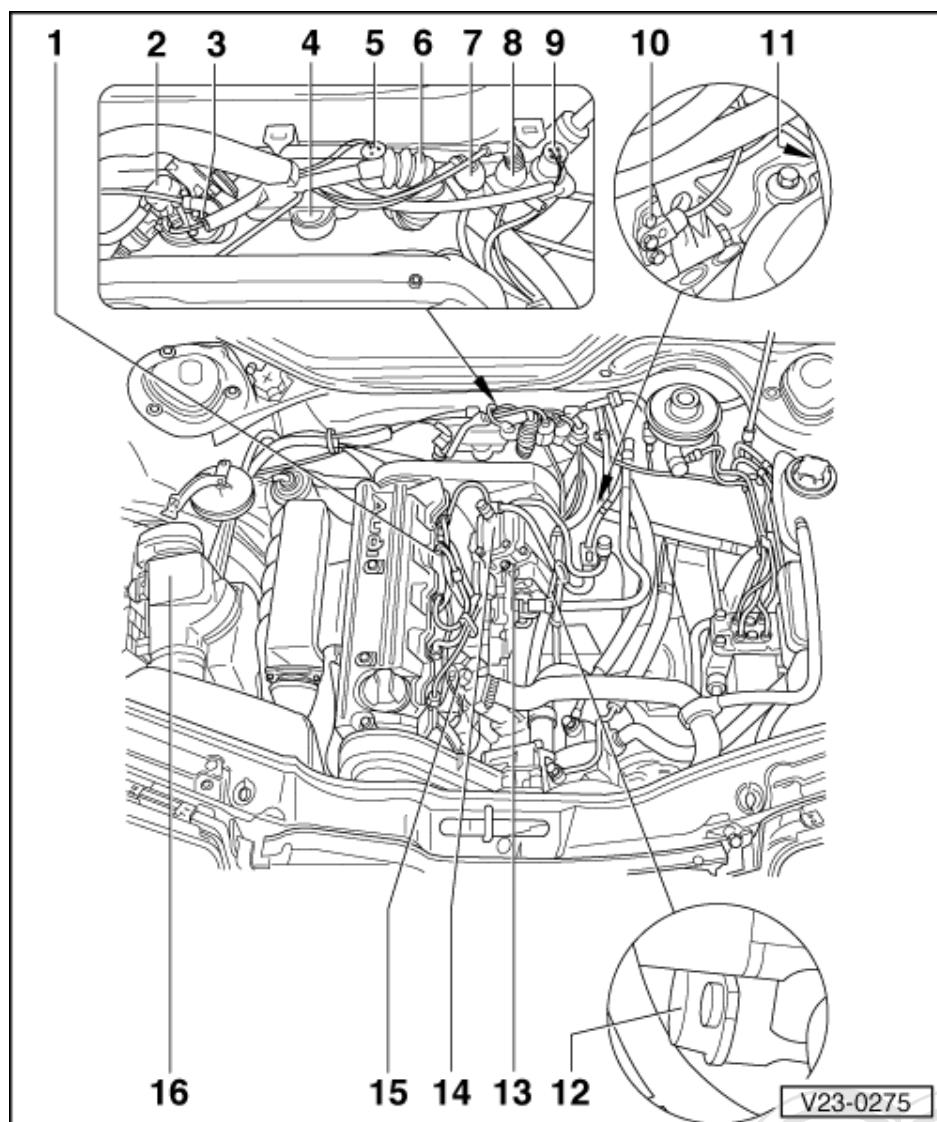
- Diesel direct injection system control unit -J248
 - ♦ In electronics box in passenger's footwell
- Excess voltage protection relay -J249 (to 05.94)
 - ♦ On auxiliary relay carrier III in footwell on passenger side, socket 1
- Diesel direct injection system relay -J322 (from 05.94)
 - ♦ On auxiliary relay carrier III in footwell on passenger side, socket 5



- **Glow plug strip fuse -S39**
- ♦ In electronics box in passenger's footwell
- **Glow plug relay -J52**
- ♦ Central electrics beneath dash panel on left, socket 6
- **Clutch pedal switch -F36**
- ♦ On pedal bracket
- **Brake light switch -F and brake pedal switch -F47**
- ♦ On pedal bracket
- **Accelerator position sender -G79**
- ♦ On bearing pedestal for throttle control



- 1 Injector**
 - ♦ For cylinder 4 with needle lift sender -G80
- 2 Exhaust gas recirculation valve -N18**
 - ♦ From 02.93 on air cleaner
- 3 Charge pressure control solenoid valve -N75**
- 4 Intake manifold pressure sender -G71**
- 5 Connector**
 - ♦ White
 - ♦ For commencement of injection valve -N108
- 6 Connector**
 - ♦ For injection pump
- 7 Connector**
 - ♦ Grey
 - ♦ For engine speed sender -G28



8 Connector

- ◆ Brown
- ◆ For needle lift sender -G80

9 Connector

- ◆ Black
- ◆ For water separator sender -G63
- ◆ Only in vehicles with engine code AAT 1st control unit version; engine control unit identification=>from Page 01-5

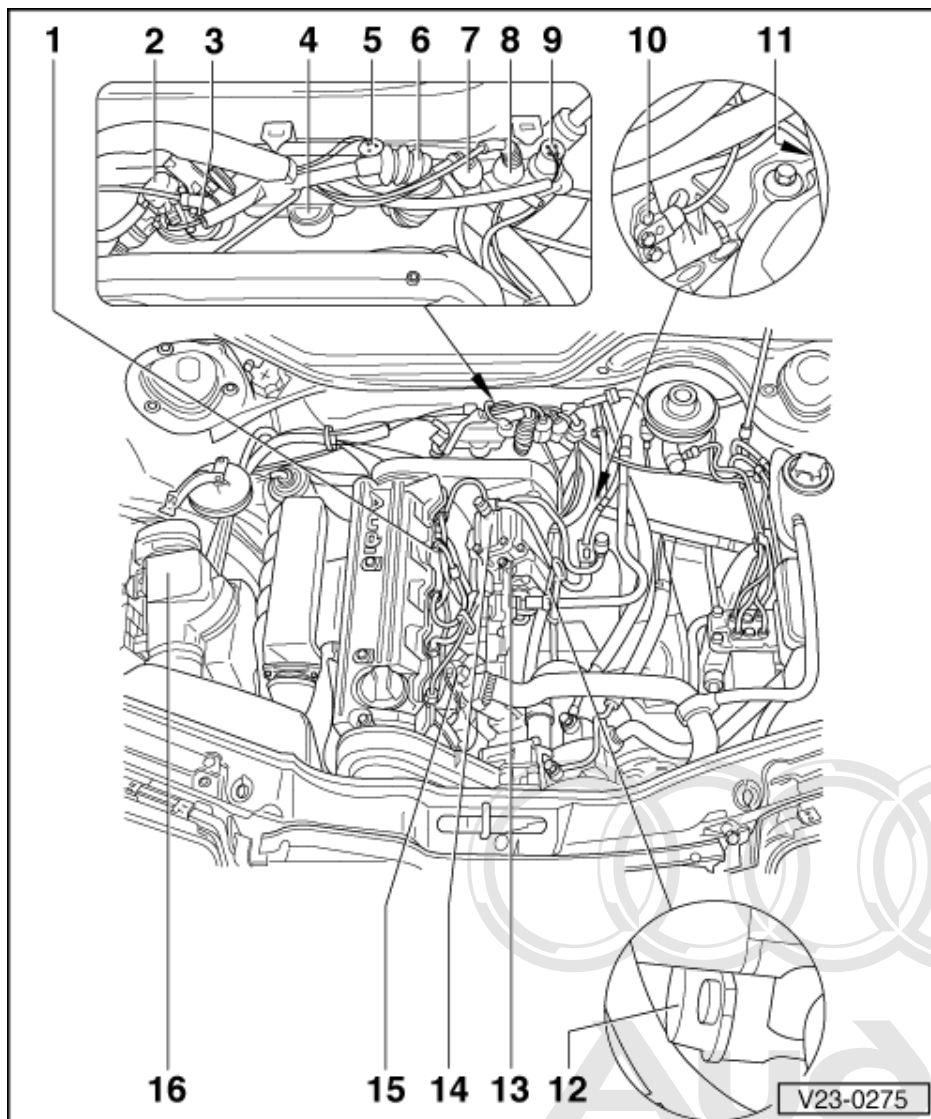
10 Engine speed sender -G28

11 Speedometer sender -G22

12 Commencement of injection valve -N108

13 Fuel cut-off valve -N109

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14 Injection pump

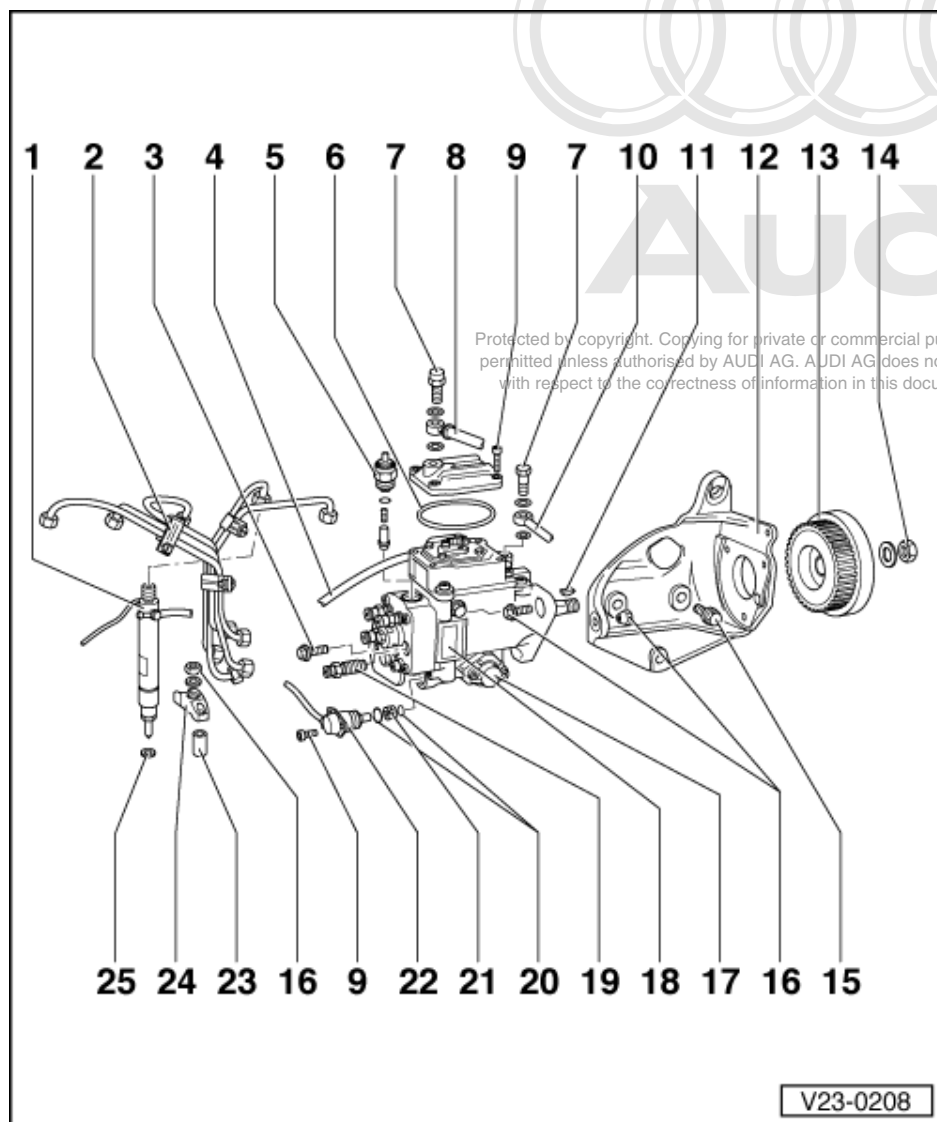
- ♦ With quantity adjuster -N146
- ♦ With fuel temperature sender -G81
- ♦ In vehicles with engine code AAT 1st control unit version with slide travel potentiometer -G99
- ♦ In vehicles with engine code AAT from 2nd control unit version and AEL with modulating piston movement sender -G149
- ♦ Engine control unit identification
 => from Page 01-5

15 Coolant temperature sender -G62

16 Air flow meter- -G19

- ♦ With intake air temperature sender -G42

1.6 - Servicing fuel injection system



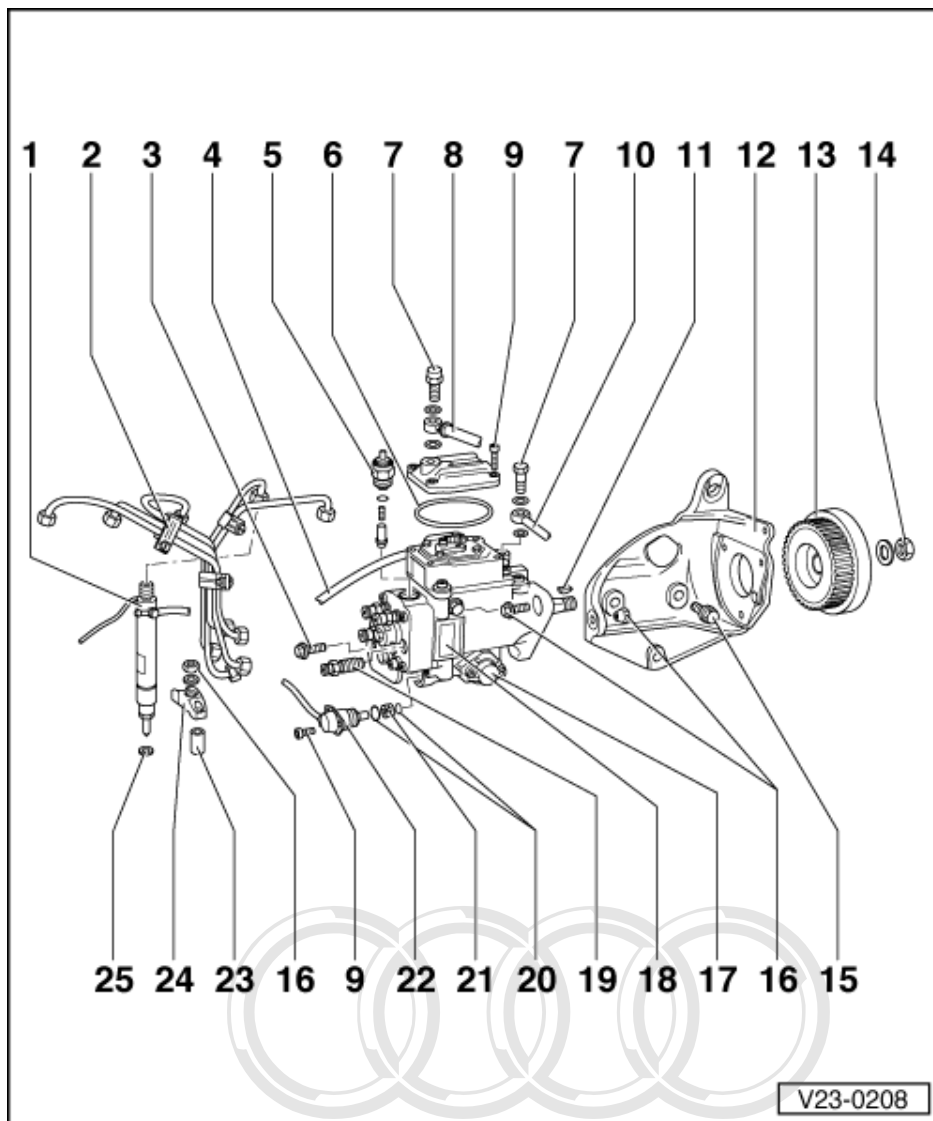
Notes:

- ♦ Heed safety precautions => Page 42 .
- ♦ Observe rules for cleanliness=>Page 42 .
- ♦ Always replace sealing rings.
- ♦ Tensioning toothed belt

=> 5-cyl. Diesel Engine, Mechanics (2.5 l engine); Rep.Gr. 13

1 Injector

- ♦ Removing and installing=>Page 68
- ♦ Checking =>Page 70
- ♦ For cylinder 4 with needle lift sender -G80, checking => Page 95



2 Injector pipes

- ◆ Use open ring spanner 3035 to remove
- ◆ Always remove entire set of pipes
- ◆ Never alter shape
- ◆ Tighten to 25 Nm

3 30 Nm

4 Fuel line

- ◆ For injection pump quantity adjuster

5 Fuel cut-off valve -N109

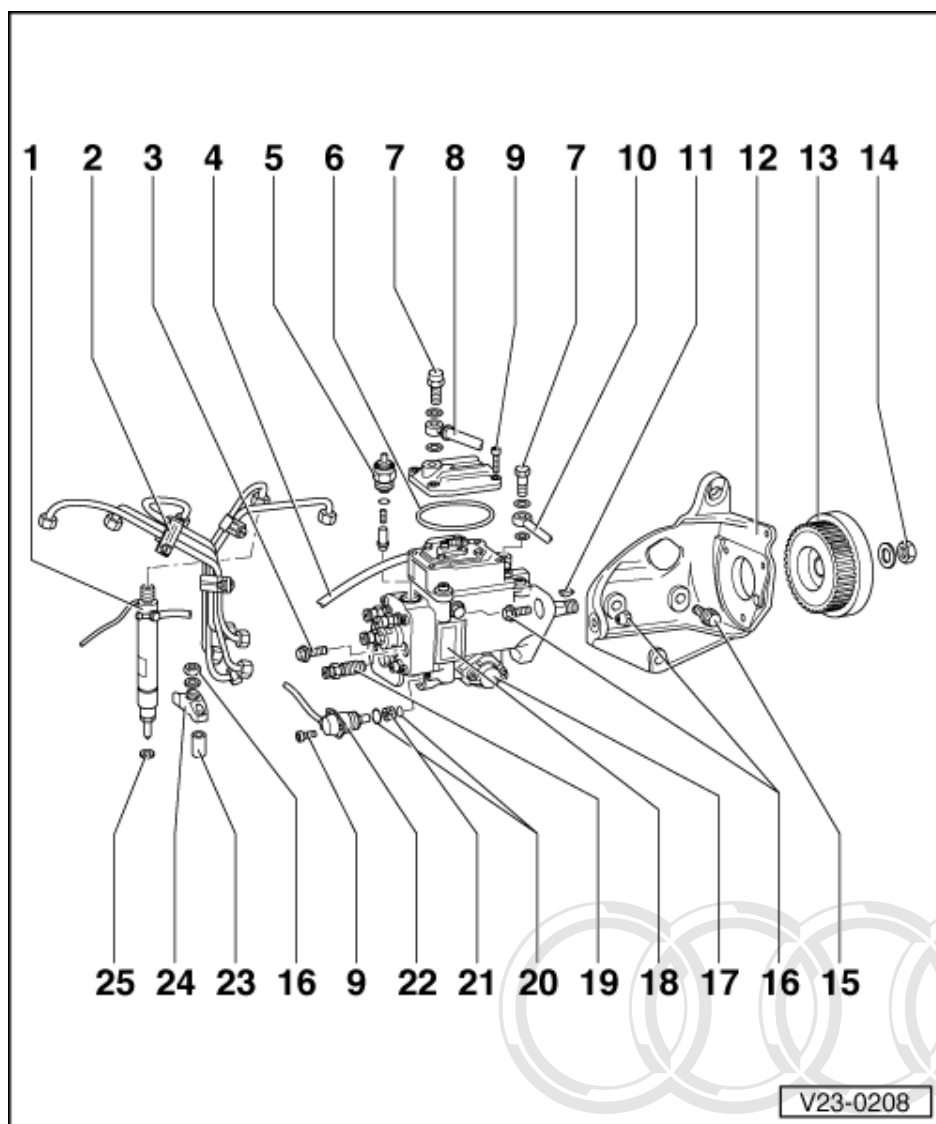
- ◆ Tighten to 40 Nm
- ◆ Checking => Final control diagnosis, Page 18

6 Oil seal

- ◆ Replace

7 Banjo bolt, 20 Nm

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8 Return hose

- ♦ To fuel filter

9 10 Nm

10 Supply hose

- ♦ From fuel filter

11 Woodruff key

- ♦ Check installation position before fitting injection pump sprocket

12 Bracket

13 Injection pump sprocket

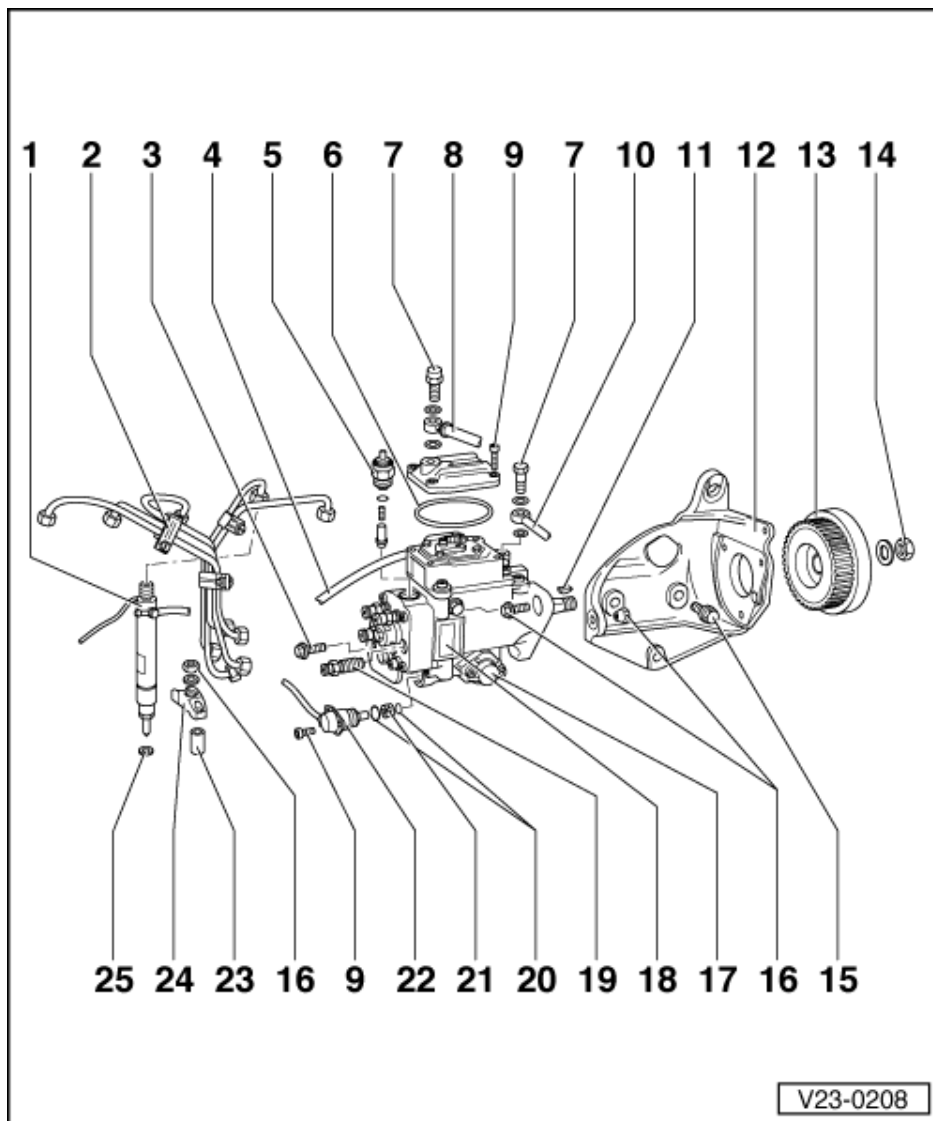
- ♦ Removing and installing => Removing/installing and adjusting injection pump, Page 57

14 50 Nm

15 45 Nm

16 20 Nm

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17 Cover for injection timing control

- ♦ Replacing O-ring in the event of leakage =>Page 70

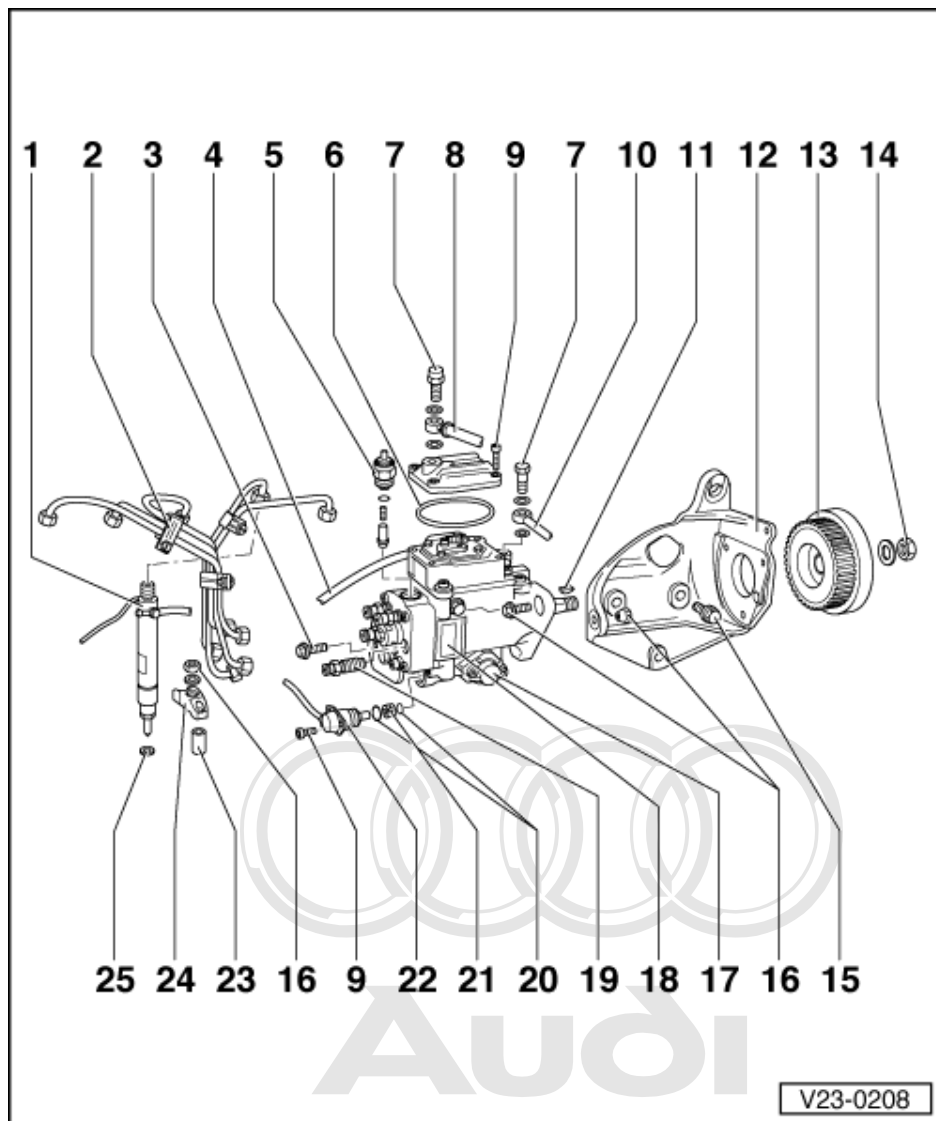
18 Injection pump

- ♦ With quantity adjuster -N146
- ♦ With fuel temperature sender -G81
- ♦ In vehicles with engine code AAT 1st control unit version with slide travel potentiometer -G99
- ♦ In vehicles with engine code AAT from 2nd control unit version and AEL with modulating piston movement sender -G149
- ♦ Engine control unit identification
 => from Page 01-5

19 Constant pressure valve

- ♦ Tighten to 45 Nm

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20 O-ring

- ♦ Replace if damaged

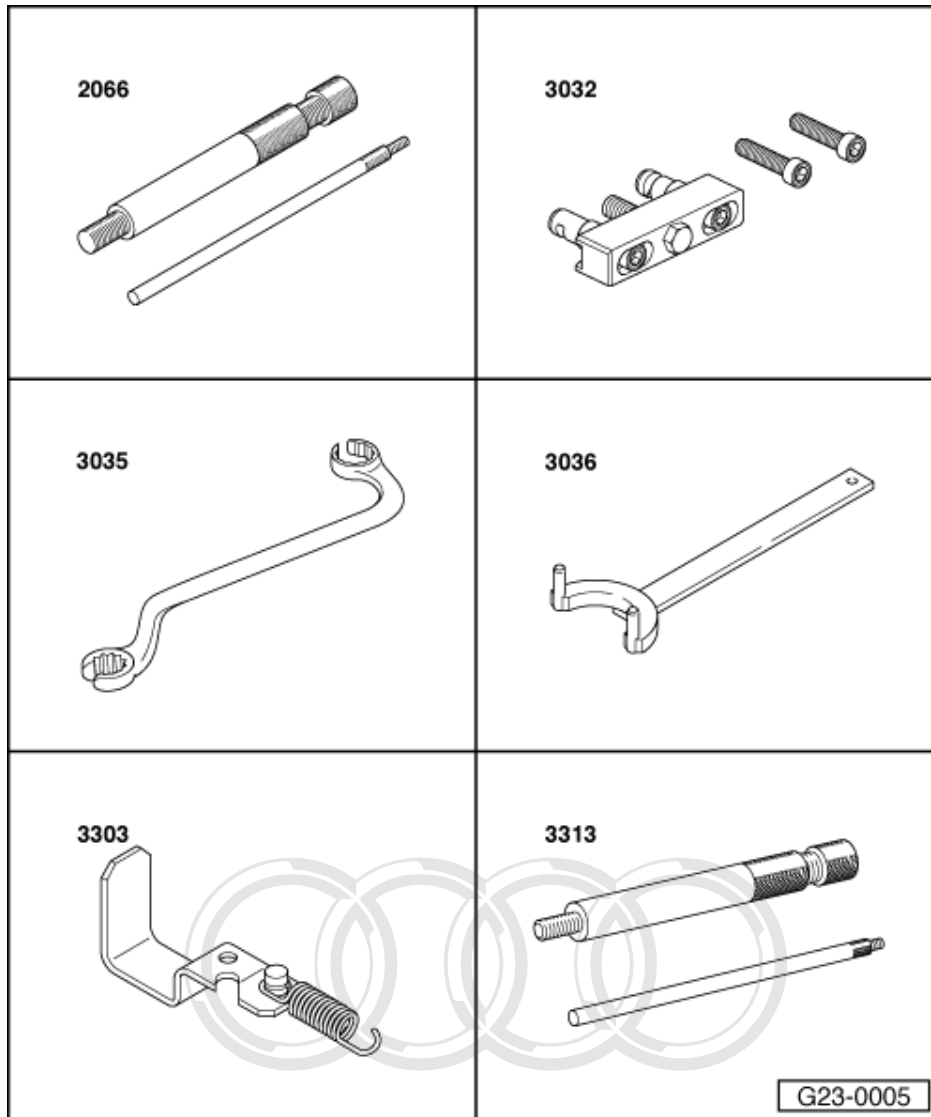
21 Strainer
22 Commencement of injection valve -N108

- ♦ Checking =>Page **77**

23 Mounting bracket
24 Frame
25 Copper gasket

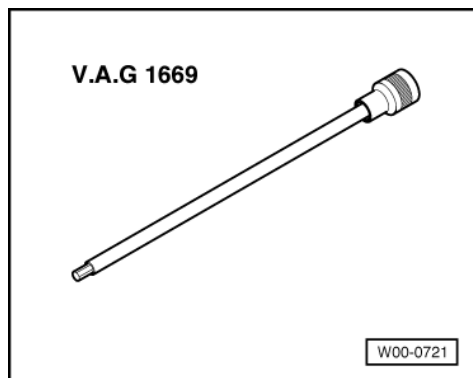
- ♦ Replace

1.7 - Removing, installing and adjusting injection pump

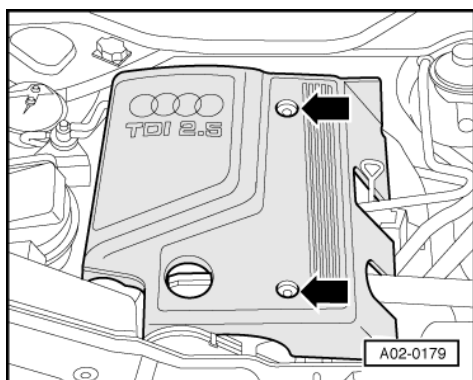


Special tools and workshop equipment required

- ◆ Adapter for dial gauge 2066
- ◆ Puller 3032
- ◆ Ring spanner 3035
- ◆ Counterhold 3036
- ◆ Tensioner 3303
- ◆ Adapter 3313



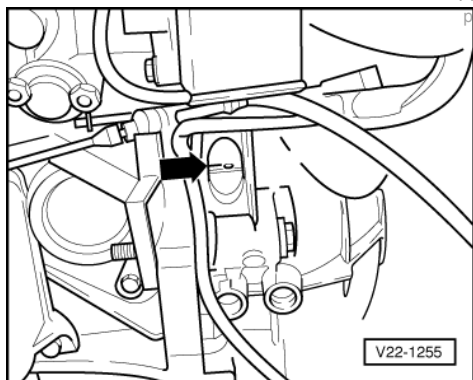
- ♦ Socket V.A.G 1669
- ♦ Dial gauge



Removing

Audi A6:

- -> Remove engine cover -arrows-.



All:

- Remove injection pump drive toothed belt guard.

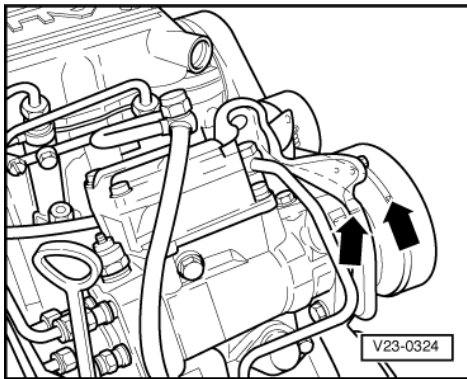
Note:

There is a hexagon socket fitting (width 32) on the hydraulic pump to turn the engine over.

- -> Rotate crankshaft to cylinder 1 TDC -arrow-.
- Mark -O- on flywheel must be beneath edge in inspection hole ...



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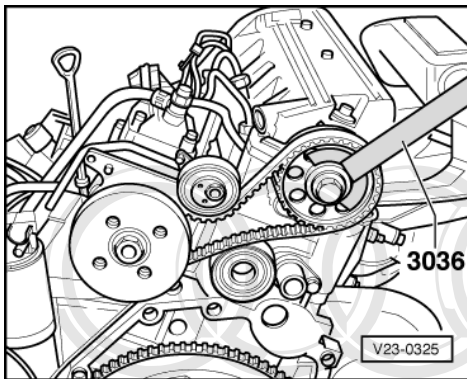


- -> ... At the same time, the positions of the marks on the injection pump sprocket and on the injection pump must match -arrows-.

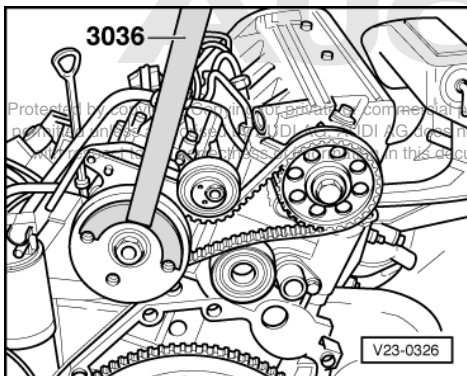
Notes:

- ◆ If the marks do not match, turn the crankshaft one more revolution.
- ◆ There is a hexagon socket fitting (width 32) on the hydraulic pump to turn the engine over.
- ◆ Turning crankshaft to cylinder 1 TDC with engine removed

=> 5-cyl. Diesel Engine, Mechanics (2.5 l engine); Rep.Gr. 13; Dismantling and assembling engine Dismantling and assembling engine

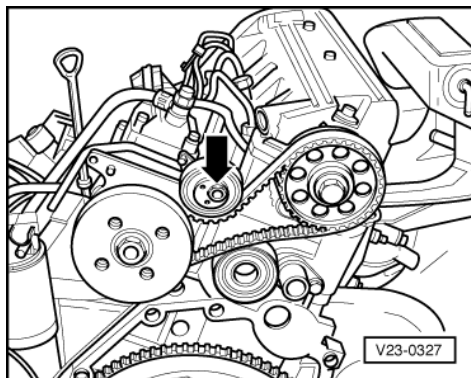


- -> Slacken off nut for injection pump drive wheel approx. 1 turn, using counterhold 3036.

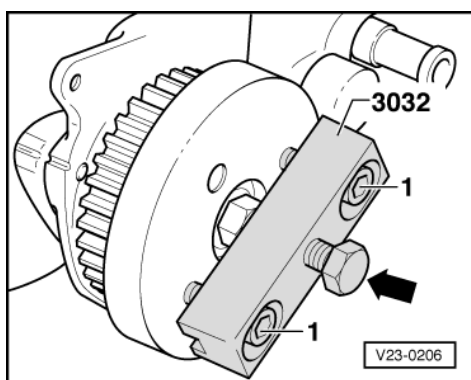


- -> Slacken off nut for injection pump sprocket approx. 1 turn, use counterhold 3036 when doing so.

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- Mark direction of toothed belt with chalk or felt-tip pen.
- -> Slacken nut -arrow- of tensioning roller approx. 1 turn.
- Detach toothed belt.



- -> In place of the puller, screw 2 cylinder bolts 3032/13 -item 1- into the tapped holes in the injection pump sprocket.
- Slacken off injection pump sprocket with puller.

Notes:

- ♦ Do not strike spindle to slacken off injection pump sprocket.
- ♦ Take care not to lose Woodruff key when detaching injection pump sprocket.
- Unscrew nut and detach injection pump sprocket.
- Unbolt fuel supply and return pipes from injection pump.
- Use open ring spanner 3035 to unscrew injector pipes.

Note:

Always remove entire set of pipes. Never alter shape.

- Disconnect electric wire for cut-out.
- Unplug electrical connectors for quantity adjuster and commencement of injection valve from connector strip on bulkhead and lever connectors out of connector strip.
- Screw out bolts of injection pump at front of bracket.
- Unscrew fixing bolts from rear support using V.A.G 1669.
- Detach injection pump.

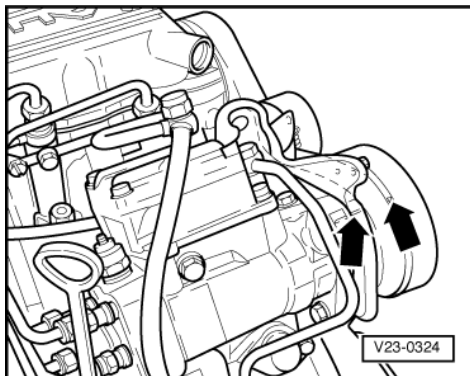
Installing

- Crankshaft at cylinder 1 TDC => Page 58 .
- Camshaft drive timing OK

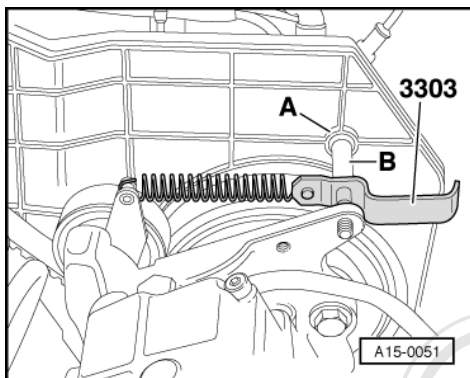
=> 5-cyl. Diesel Engine, Mechanics (2.5 l engine); Rep.Gr. 13; Dismantling and assembling engine Dismantling and assembling engine

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- Centrally align injection pump in elongated holes of bracket.
- Tighten injection pump securing bolts to 25 Nm.
- Install injection pump sprocket. Tighten nut to 50 Nm, using counterhold 3036.

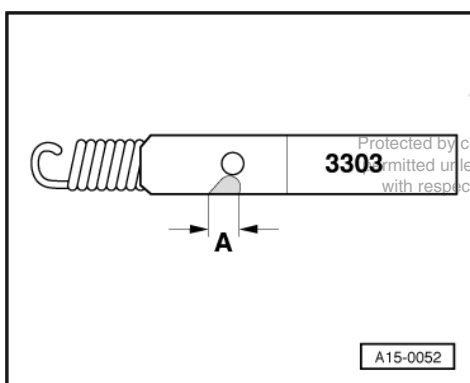


- -> Rotate injection pump sprocket so marks on injection pump sprocket and on injection pump are opposite each other -arrows-.



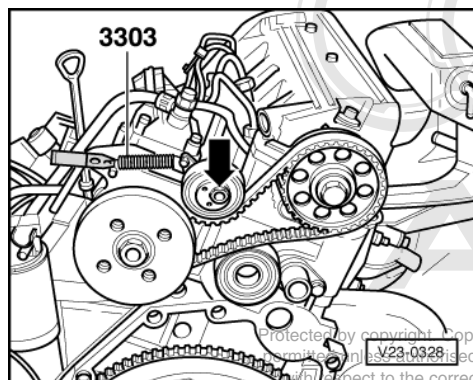
Audi A6:

- -> Unscrew nut -A- from rear injection pump toothed belt guard.
- Push toothed belt guard and sleeve -B- back towards rear.



Note:

-> On the Audi A6, in order to attach the tensioner without removing the stud you need to file down the tensioner (shaded area) as shown in the illustration.



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All:

- -> Slacken nut -arrow- of tensioning roller approx. 1 turn.
- Move the tensioning roller to make sure it is running smoothly, and free it up as necessary.

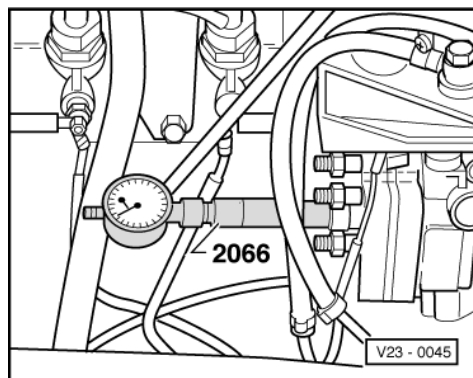
Notes:

- ♦ Before mounting the toothed belt, make sure the tensioning roller eccentric is rotated such that the tensioning lever presses the roller against the toothed belt when the spring is inserted in tensioner 3303.
- ♦ The spring of the tensioner 3303 automatically sets the correct belt tension when the tensioning roller is released.
- Fit toothed belt (paying attention to direction).
- Bolt the injection pump drive wheel loosely onto the camshaft.
 - The drive wheel must be rotatable by hand on the camshaft without tilting
- Insert spring into tensioner 3303.
- Rotate crankshaft approx. half a turn in running direction.
- Tighten tensioning roller nut to 45 Nm.
- Detach tensioner 3303.

Adjusting

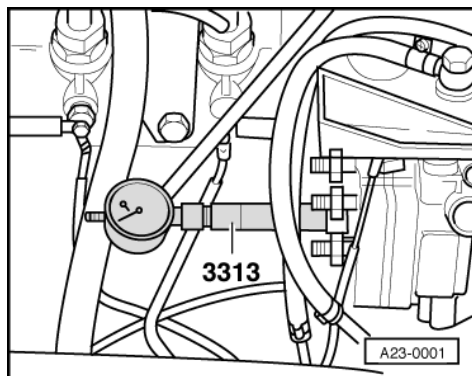
Requirements:

- Mechanical basic setting of engine OK
- Toothed belt tension OK (both toothed belts)
- Engine in TDC position
- Screw out screw plug at injection pump.



Screw plug with sealing ring:

- -> Screw in adapter 2066 for dial gauge in place of screw plug.

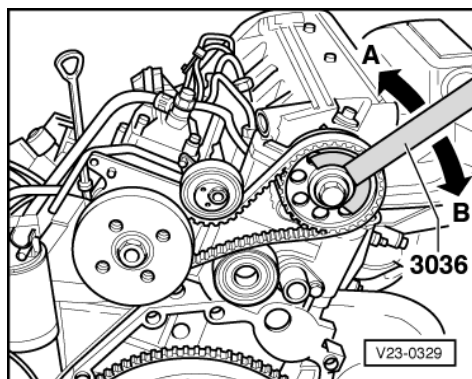


Screw plug with conical sealing seat:

- -> Screw in adapter 3313 for dial gauge in place of screw plug.

All:

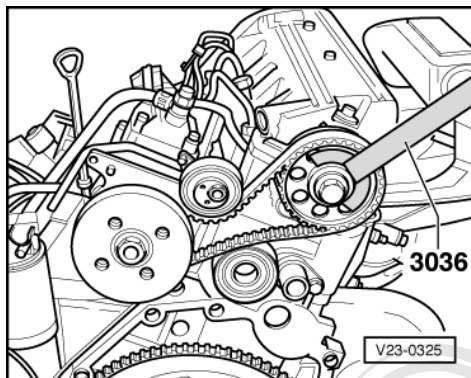
- Screw threaded end of adapter stem firmly into dial gauge (small version, measuring range 0 ... 3 mm).
- Insert dial gauge with stem in adapter.
- Set dial gauge to 2 mm initial tension and tighten clamping nut of adapter.



- -> Rotate drive wheel with counterhold 3036 slowly in -direction of arrow B- until pointer of dial gauge stops moving, i.e. high-pressure piston of injection pump is at bottom dead centre.

Notes:

- ♦ In this process the pointer must rotate anti-clockwise until it is at bottom dead centre.
- ♦ If the pointer rotates clockwise, bottom dead centre has already been passed. In this case rotate the drive wheel in -direction of arrow A- until the pointer stops moving.
- Set measurement scale to "0".
- Rotate drive wheel with counterhold 3036 slowly in -direction of arrow A- until the pointer on the dial gauge indicates the following "correction value":
 - Engine code ABP: 0.42 mm stroke
 - Engine codes AAT, AEL: 0.32 mm stroke



- -> Tighten nut of injection pump drive wheel on camshaft to 160 Nm using counterhold 3036.
- Turn the engine two crankshaft turns by hand in the running direction of the engine until the -O- mark on the flywheel is flush with the reference mark.

Note:

There is a hexagon socket fitting (width 32) on the hydraulic pump to turn the engine over.

- Read commencement of injection off dial gauge.
 - Engine code ABP: 0.35 ± 0.02 mm/stroke
 - Engine codes AAT, AEL: 0.25 ± 0.02 mm/stroke

Notes:

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- ♦ Owing to the toothed belt slip, the setting now indicated differs from the correction value.
- ♦ Adjustment is not necessary if test specification is within specified tolerance.
- ♦ Adjustment must be performed if test specification is outside tolerance. The setting value applies.

- Tighten screw plug to 25 Nm.

Notes:

- ♦ In the case of screw plugs with sealing ring, the sealing ring must always be replaced.
- ♦ Take care not to interchange banjo bolts for supply and return pipe.

- Connect injector pipes, fuel supply pipe and return pipes and electric wiring.
- Bleed fuel system:

=> Fuel Supply System - Diesel Engines; Repair Group 20

- Install injection pump toothed belt guard.

Vehicles with engine codes AAT, AEL:

- Dynamically check and adjust commencement of injection
=> Page 65 .

1.8 - Statically check commencement of injection - engine code ABP

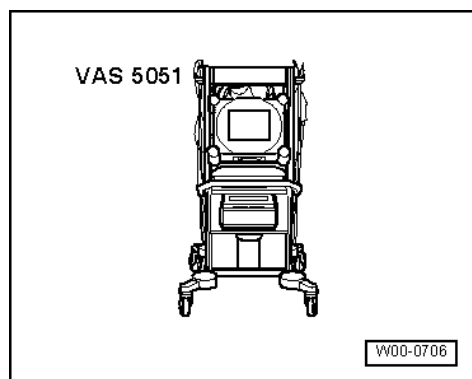
Notes:

- ♦ Commencement of injection is always to be checked and if necessary adjusted after replacing toothed belt and unfastening bolted joints at injection pump or toothed belt sprockets.
- ♦ It is only necessary to carry out a static check of commencement of injection on engines with engine code ABP. For the other engines a dynamic check can be carried out.
- ♦ The steps involved are set out under "Removing and installing injection pump" => Page 57 .

1.9 - Dynamic checking and adjustment of start of injection - engine codes AAT, AEL

Notes:

- ♦ Commencement of injection is always to be checked and if necessary adjusted after replacing toothed belt and unfastening bolted joints at injection pump or toothed belt sprockets.
- ♦ Dynamic checking of commencement of injection is only possible in function 04 "Basic setting" as commencement of injection valve is constantly actuated during this function and injection timing control is thus "retarded".

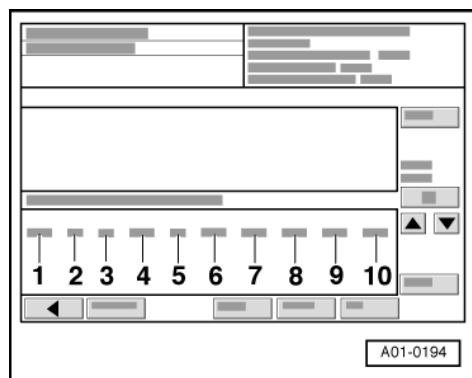


Special tools and workshop equipment required

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

Test requirements:

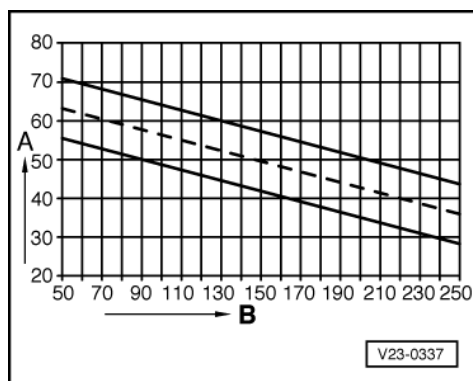
- Mechanical basic setting of engine OK
- Toothed belt tension OK (both toothed belts)



Test sequence

- Initiate basic setting, display group 003, engine idling => Page 25
- > Readout on VAS 5051:
 - Observe display in zone 7 (coolant temperature).
 - Specification: Less than 70 (corresponding to 85 °C)
 - Do not continue with test until coolant temperature has been attained.

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Vehicles with engine code AAT up to 2nd control unit version 1):

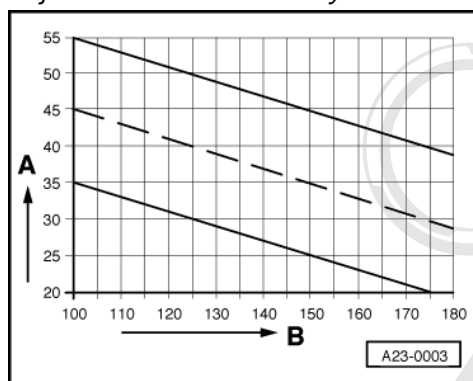
- 1) Engine control unit identification => from Page 01-5
- Idling speed is not increased

Commencement of injection in display zone 2 is governed by fuel temperature in display zone 9.

- A - -> Display zone 2: Commencement of injection
B - Display zone 9: Fuel temperature

Note:

Adjustment is not necessary if commencement of injection is within specification range when checked.



Vehicles with engine code AAT up to 3rd control unit version, AEL 1):

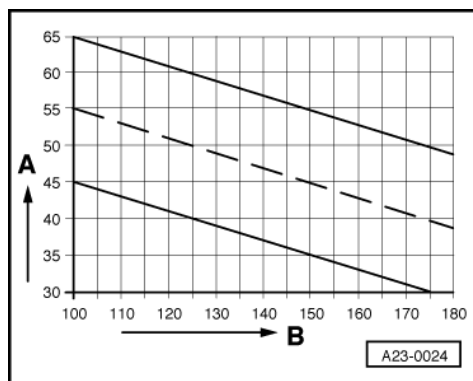
- 1) Engine control unit identification => from Page 01-5
- Idling speed is increased to 1200 rpm (depending on software version)

Commencement of injection in display zone 2 is governed by fuel temperature in display zone 9.

- A - -> Display zone 2: Commencement of injection
B - Display zone 9: Fuel temperature

Note:

Adjustment is not necessary if commencement of injection is within specification range when checked.



- Idling speed is increased to 1000 rpm (depending on software version)

Commencement of injection in display zone 2 is governed by fuel temperature in display zone 9.

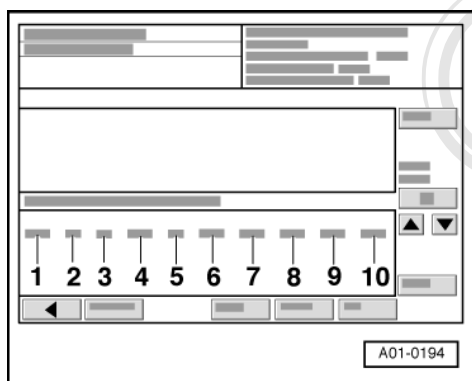
- A - -> Display zone 2: Commencement of injection
- B - Display zone 9: Fuel temperature

Note:

Adjustment is not necessary if commencement of injection is within specification range when checked.

All:

- Adjust injection pump as follows if commencement of injection is outside specified range.
- Slacken off bolts of injection pump by approx. 1 turn. Slacken off most readily accessible bolt last.
- Slacken fixing bolts on rear support using V.A.G 1669.
- Keep injection pump pre-tensioned by hand in adjustment direction.
- Carefully slacken off last bolt such that pump can be turned slightly.
- Turn injection pump in direction of engine rotation if injection is commenced too soon or in opposite direction if commencement is retarded too far.
- Retighten bolt.



-> Readout on VAS 5051:

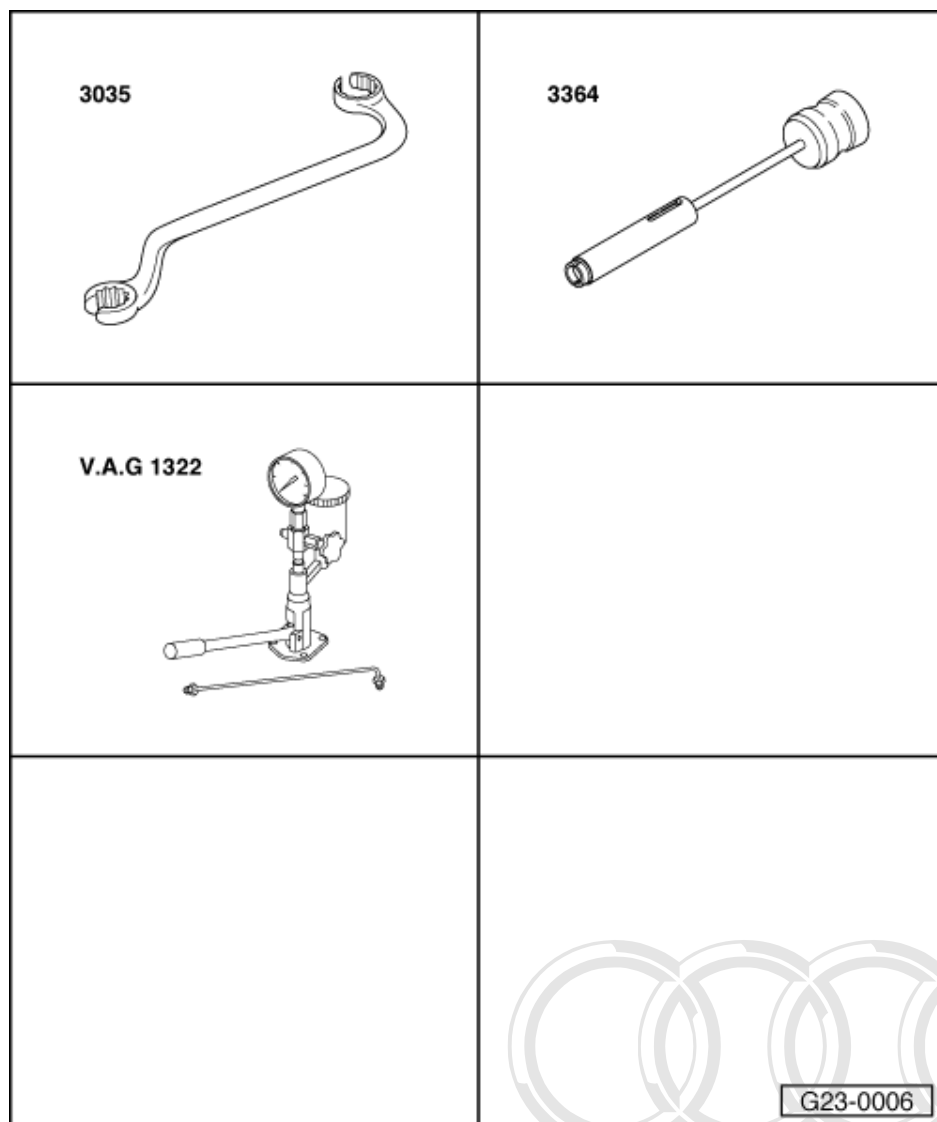
- Observe value in display zone 2 and repeat adjustment procedure if necessary until readout remains in specified range.
- Tighten injection pump securing bolts to 25 Nm.

Note:

Following dynamic adjustment of injection pump, always detach injector pipes at injection pump and retighten to 25 Nm. This ensures that the pipes are not subject to stress and avoids the possibility of fatigue fracture.

- Terminate function "04 - Basic setting" by touching ◀ key.
- Touch "06 - End output".
- Switch off ignition.

1.10 - Removing, installing and checking injectors



Special tools and workshop equipment required

- ♦ Ring spanner 3035
- ♦ Puller 3364
- ♦ Injector tester V.A.G 1322 with pressure line V.A.G 1322/2

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Defective injectors cause the following problems:

- ♦ Loss of power
- ♦ Excessive formation of black exhaust fumes
- ♦ Increased amount of blue smoke on cold starting
- ♦ High fuel consumption
- ♦ Overheating of engine
- ♦ Knocking in one or more cylinders
- ♦ Misfiring

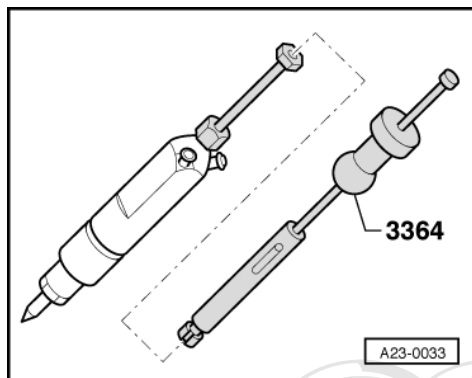
Removing

- Use open ring spanner 3035 to unscrew injector pipes.

Note:

Always remove entire set of pipes. Never alter shape.

- Unfasten nut, detach retainer and take out injector.



Note:

Make the following tool to deal with seized injectors:

- Saw off injector pipe approx. 5 cm after injector union nut.
- Attach M6 nut to sawn-off section of pipe by brazing.
- Thoroughly clean improvised tool as dirt would render injector unusable.
- -> Screw union nut of improvised tool onto seized injector and apply special tool 3364 at brazed-on nut.

Installing

Note:

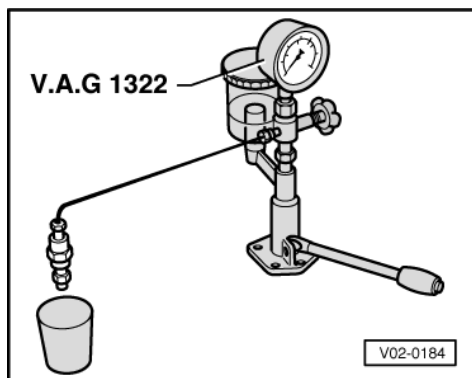
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Always replace copper seal between cylinder head and injectors.

- Insert injectors.
- Make sure mounting brackets are correctly positioned in cylinder head.
- Insert retainer.

Tightening torques

Component	Nm
Injector pipes	25
Frame nut	20





Checking

In the event of problems with the injectors, replacement is the only course of action, as neither pressure adjustment nor servicing is possible.

-> Check injectors with V.A.G 1322 and pressure pipe V.A.G 1322/2.

Attention:

When checking injectors, make sure fuel spray jet does not strike hands, as the high pressure would cause it to penetrate the skin and possibly result in serious injury.

Checking spray pressure

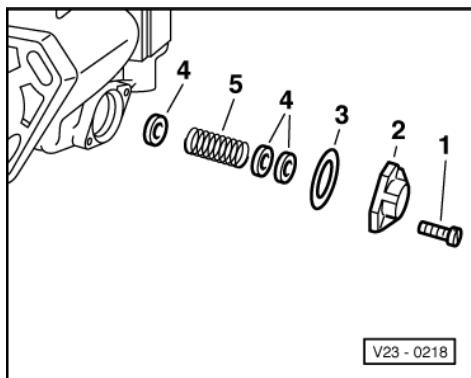
- Pressure gauge switched on
- Slowly depress pump lever. Take spray pressure reading on commencement. Replace injector if spray pressure deviates from specification.

Engine codes	Specification New injectors	Wear limit
ABP	190 ... 195 bar	165 bar
AAT, AEL	190 ... 200 bar	170 bar

Leak test

- Pressure gauge switched on
- Slowly depress pump lever and maintain pressure of approx. 150 bar for 10 seconds. When doing so, there should be no dribbling of fuel from injector orifice.
- Replace injector in the event of leakage.

1.11 - Replacing O-ring at injection timing control cover

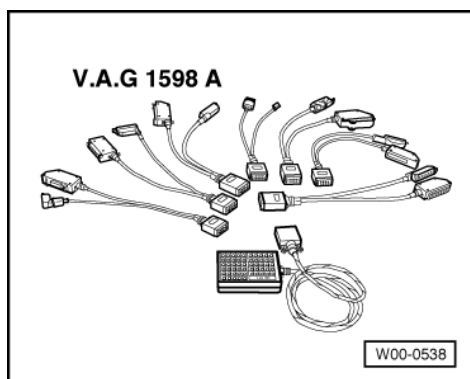


- Place clean cloth beneath injection pump.
- -> Screw out bolts -1-.
- Detach and clean cover -2-.
- Replace O-ring -3- and fit cover with existing shims -4-.

5 - Spring

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1.12 - Wiring and component check with test box V.A.G 1598 A and adapter 1598/5



Special tools and workshop equipment required

- ♦ V.A.G 1598 with V.A.G 1598/5

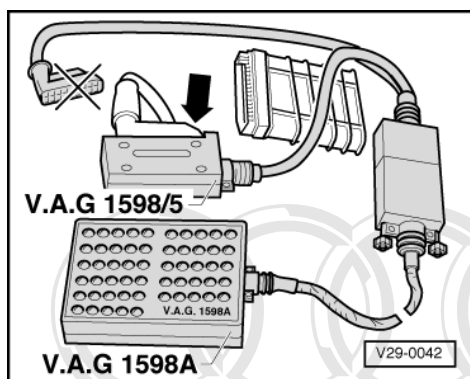
Notes:

- ♦ Always switch off ignition before disconnecting or connecting the engine control unit connector.
- ♦ For connection of measuring instruments (e.g. voltage tester V.A.G 1527 B, portable multimeter V.A.G 1526 A), always make use of adapter set V.A.G 1594 A.

Attention:

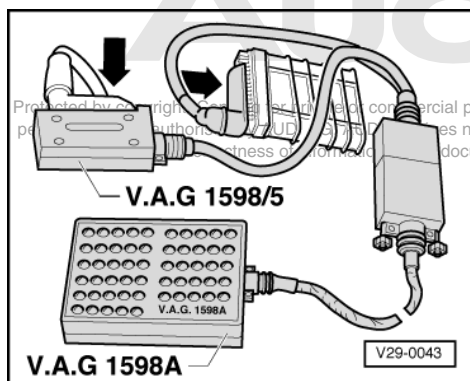
So as not to destroy electronic components, select required measuring range before connecting test leads and observe test conditions.

- Switch off ignition.
- Remove engine control unit => Page 73 .



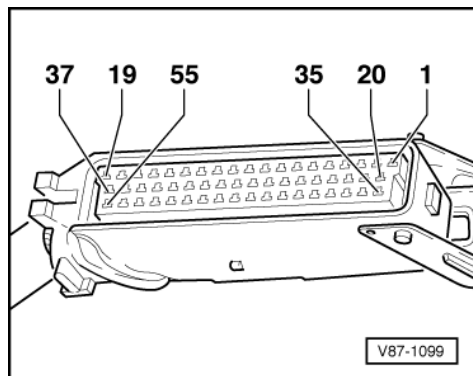
-> Tests at connector of diesel direct injection system control unit -J248.

- With ignition switched off, use adapter V.A.G 1598/5 to connect test box V.A.G 1598A to engine control unit connector only (not to control unit).



-> Tests with diesel direct injection system control unit -J248 connected

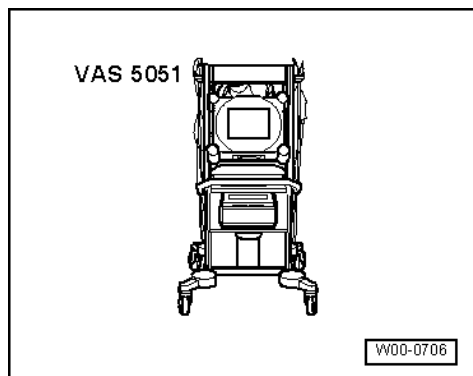
- Additionally connect test box V.A.G 1598 A to control unit using adapter V.A.G 1598/5.



Notes:

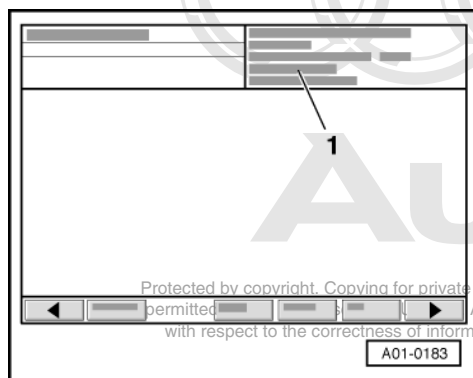
- ♦ -> Contact assignment for servicing at connector of diesel direct injection system control unit -J248.
- ♦ Contact assignment is identical to socket assignment of test box V.A.G 1598 A.
- Perform testing as described in appropriate repair operations.

1.13 - Replace engine control unit



Special tools and workshop equipment required

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



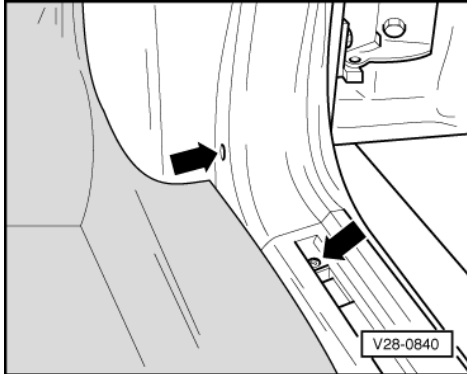
Removing

- Connect up vehicle diagnostic, testing and information system VAS 5051 => Page 1 and select vehicle system "01 - Engine electronics" from list. Ignition must be on.

-> Readout on VAS 5051:

1 - Engine control unit identification => from Page 3

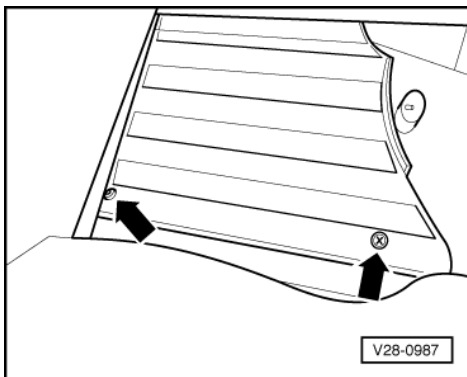
- Always start by displaying control unit identification and printing it out.
- Switch off ignition.



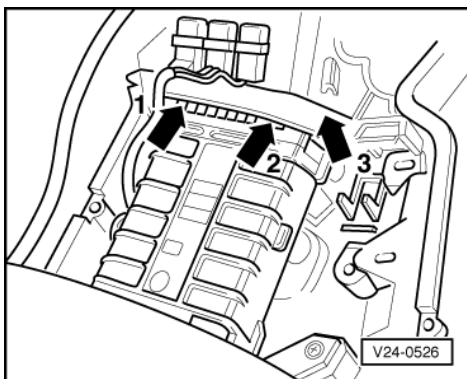
- -> Remove bottom right A-pillar trim and right sill panel trim in area of front door.

=> General Body Repairs; Repair Group 70; Trims and covers; Trims and covers

- Fold back floor covering in front right footwell (if necessary, use knife to cut open perforated seam on left).



- -> Screw out bolts for cover of electronics box -arrows-.
- Carefully disengage upper and lower cover section.

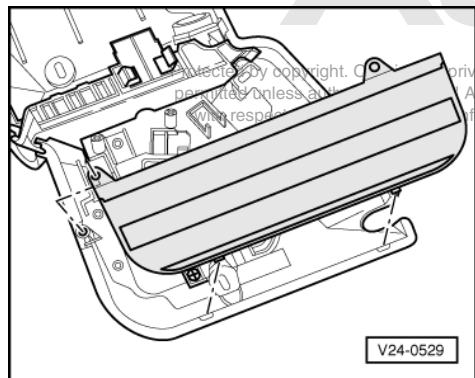




- -> Pull out transverse brace -3- with attachments.
- Screw out bolts -1- and -2-.
- Take out engine control unit.
- Unplug control unit connectors after releasing clips.

Note:

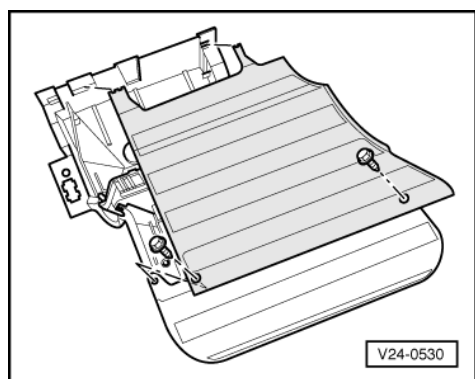
Control unit connector is only to be unplugged or attached 30 seconds after switching off ignition.



Installing

Install in reverse order, paying attention to the following:

- -> Guide lower cover section into both openings of electronics box in footwell on right.



- -> Engage upper cover section in both openings of electronics box in footwell on right.

Note:

Control unit connector is only to be unplugged or attached 30 seconds after switching off ignition.

Important:

The following steps must be performed after installing new engine control unit:

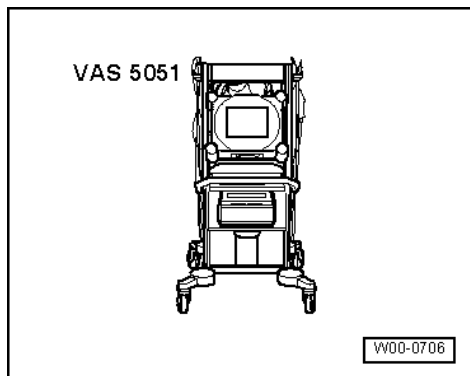
- Interrogate and if necessary erase fault memory => Page 6 .
- On vehicles with cruise control system (can be seen from steering column switch) release cruise control system in engine control unit => Page 133 .
- Vehicles with engine code AAT 3rd control unit version and AEL: Adapt immobilizer to engine control unit.

=> Electrical System; Repair Group 01; Self-diagnosis; Adaption on replacement of engine control unit Self-diagnosis Adaption on replacement of engine control unit

2 - Checking injection control

2.1 - Checking injection control

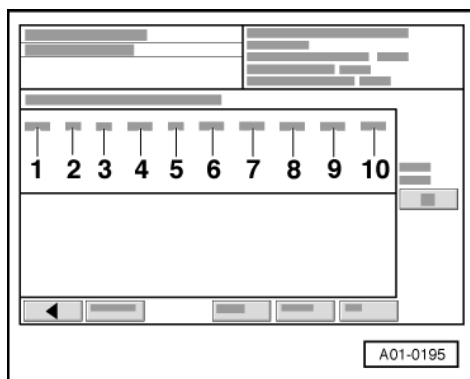
2.2 - Checking injection timing control range



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Special tools and workshop equipment required

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



Test sequence

Vehicles with engine code ABP:

Test requirements:

- Commencement of injection statically tested => Page 64
- Final control diagnosis carried out
- Read measured value block, display group 000, engine idling
=> Page 27 .
- > Readout on VAS 5051:
- Unplug connector to commencement of injection valve -N108 =>Exploded view of fitting locations -item 44 .

Note:

Fault 00550 and possibly fault 00741 is stored in the fault memory.



- Check display in zone -2-.
 - Readout must run up to 255

Note:

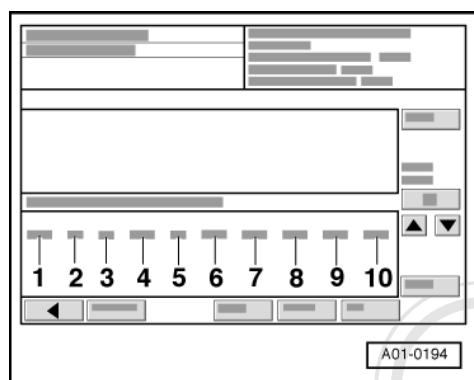
Voltage interruption closes commencement of injection valve. Pressure inside pump can no longer be reduced and full pressure acts on injection timing control plunger. Injection timing control switches to "advanced" stop.

If reading does not match specification:

- Replace injection pump => Page 57 .

If reading matches specification:

- Terminate function "08 - Read measured value block" by touching ↵ key.
- Plug in connector.
- Interrogate and erase fault memory => Page 6 .



Vehicles with engine codes AAT, AEL:

Test requirements:

- Commencement of injection dynamically tested => Page 65
- Final control diagnosis carried out
- Initiate basic setting, display group 003, engine idling => Page 25 .

-> Readout on 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.

- Unplug connector to commencement of injection valve -N108 => Exploded view of fitting locations -item 49 .

Note:

Fault 00550 and possibly fault 00741 is stored in the fault memory.

- Check display in zone -2-.
 - Readout must run up to 225

Note:

Voltage interruption closes commencement of injection valve. Pressure inside pump can no longer be reduced and full pressure acts on injection timing control plunger. Injection timing control switches to "advanced" stop.

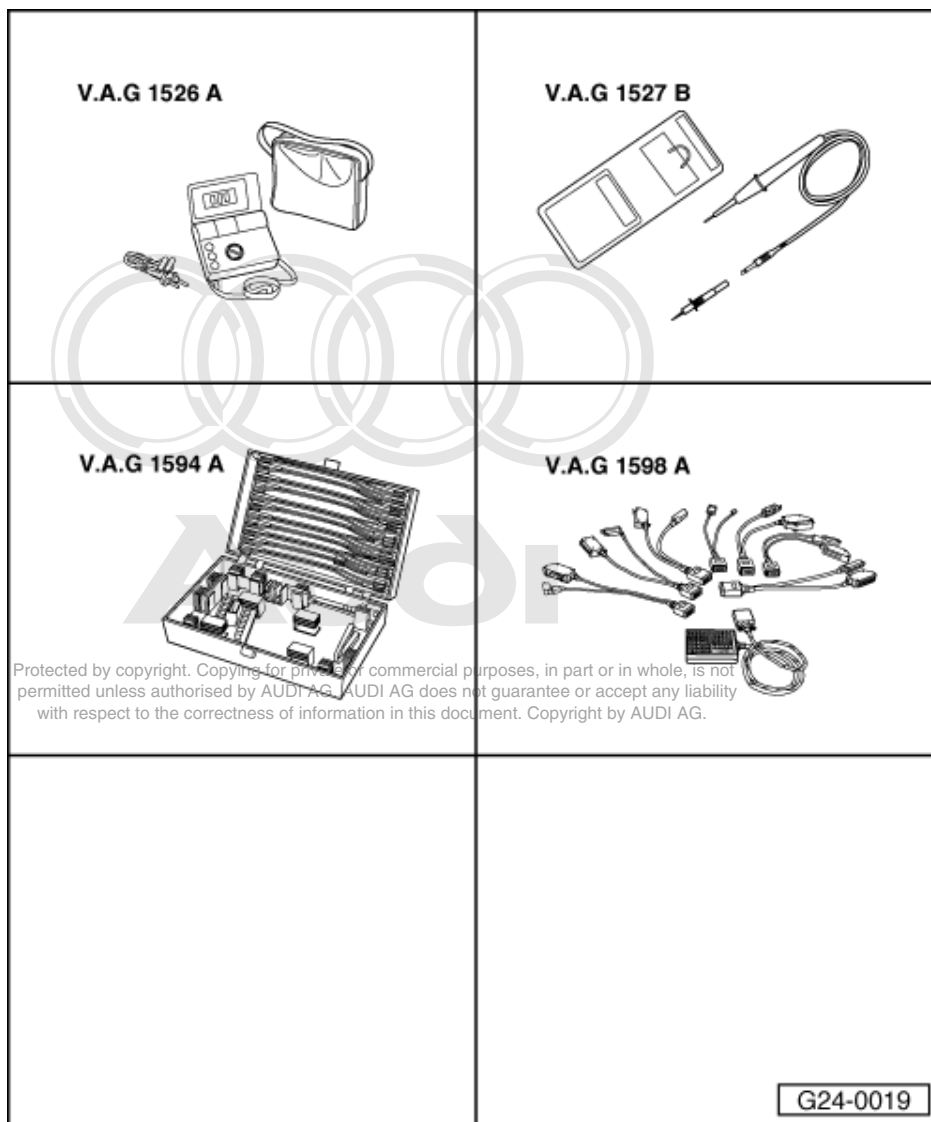
If reading does not match specification:

- Replace injection pump => Page 57 .

If reading matches specification:

- Terminate function "04 - Basic setting" by touching ◀ key.
- Plug in connector.
- Interrogate and erase fault memory => Page 6 .

2.3 - Checking commencement of injection valve -N108



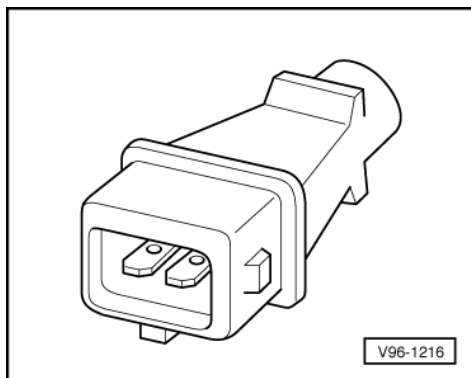
Special tools and workshop equipment required

- ♦ V.A.G 1526 A
- ♦ V.A.G 1527 B
- ♦ V.A.G 1594 A
- ♦ V.A.G 1598 with V.A.G 1598/5

Test sequence

- Switch off ignition.

- Unplug connector to commencement of injection valve -N108=>Exploded view of fitting locations -item **49**.

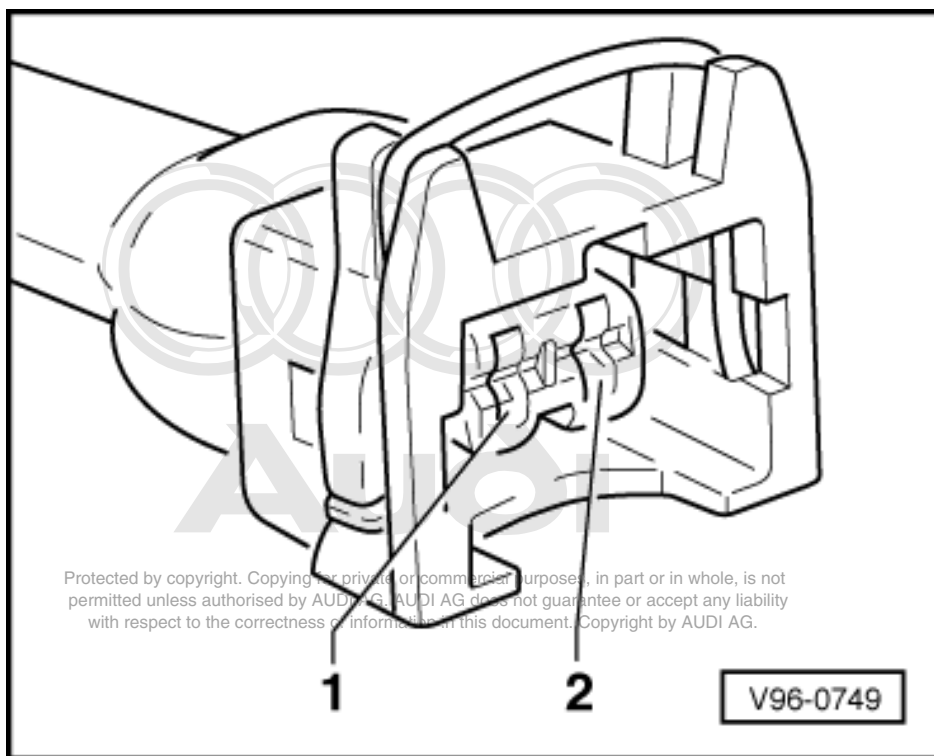


Checking internal resistance

- -> Connect up multimeter for resistance measurement between contacts 1 and 2.
- Specification: 14 ... 18 ω

If reading does not match specification:

- Replace commencement of injection valve -N108 => Exploded view of fitting locations -item **50**.



Checking power supply

- -> Connect up multimeter for voltage measurement as follows.

Connector Contact	Measure to
-------------------	------------

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

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

If reading does not match specification:

- Use current flow diagram to eliminate open circuit in wiring/short circuit.

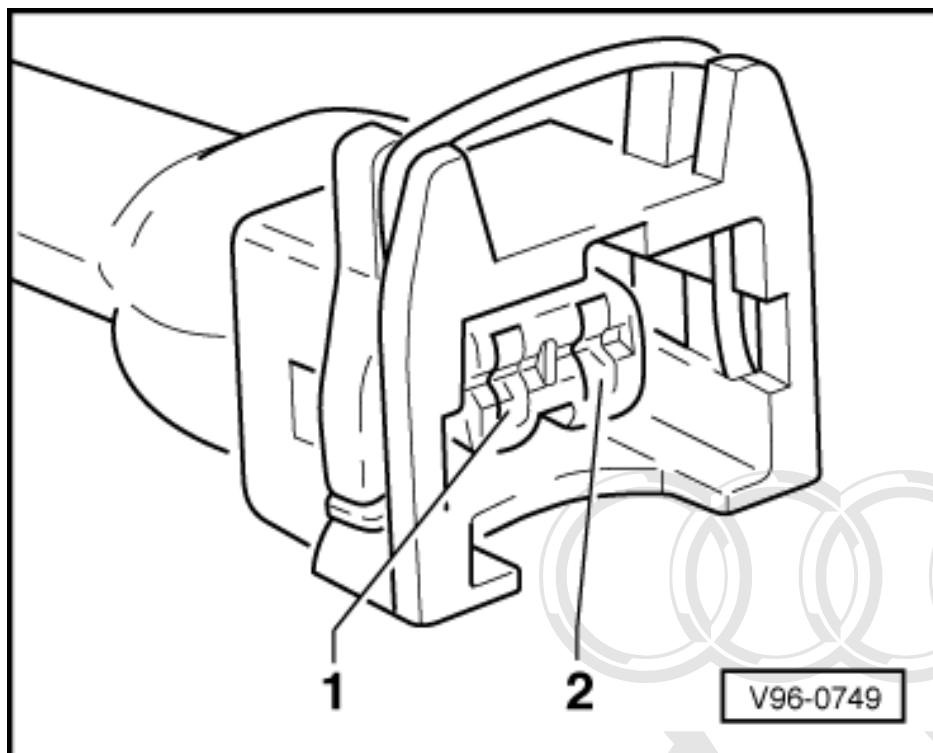
Checking actuation

- Push back rubber grommet on connector for commencement of injection valve but leave connector attached.
- Connect up voltage tester V.A.G 1527 B between the contacts.
- Initiate final control diagnosis => Page 18 and actuate commencement of injection valve -N108.
 - LED of voltage tester must flash

Note:

Voltage testers with a low current input do not go out completely between actuation of engine control unit, but rather continue to glow slightly and become distinctly brighter on actuation.

- Terminate function "03 - Final control diagnosis" by touching ◀ key.
- Touch "06 - End output".



If LED does not flash or if it is permanently lit:

- With ignition switched off, use adapter V.A.G 1598/5 to connect test box V.A.G 1598A to engine control unit connector only (not to control unit) => Page 71
- -> Check for open circuit and short to earth/positive in the following wiring.

Connector Contact	Test box V.A.G 1598 A Socket
2	10

- Use current flow diagram to eliminate open circuit in wiring/short circuit.



If no fault is found in wiring:

- Replace engine control unit => Page 72 .

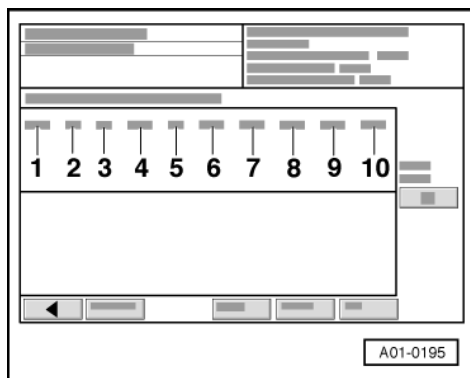
2.4 - Checking fuel-temperature sender -G81



Special tools and workshop equipment required

- ♦ V.A.G 1526 A
- ♦ V.A.G 1594 A
- ♦ V.A.G 1598 with V.A.G 1598/5
- ♦ VAS 5051 with VAS 5051/1 and VAS 5051/2

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Test sequence

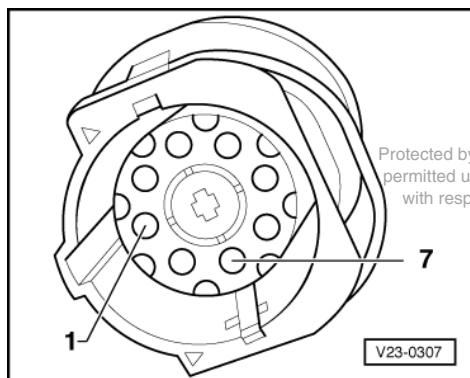
- Read measured value block, display group 000, ignition on
=> Page **27** .

-> Readout on VAS 5051:

- Check display in zone -9-.

Display zone 9	Temperature in °C
0	-20
23	-10
47	0
70	10
116	30
163	50
209	70
255	90

- Terminate function "08 - Read measured value block" by touching ◀ key.
- Touch "06 - End output".
- Switch off ignition.



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If no realistic readout is displayed:

- Unplug connector from injection pump=>Exploded view of fitting locations -item **49** .
- With ignition switched off, use adapter V.A.G 1598/5 to connect test box V.A.G 1598A to engine control unit connector only (not to control unit) => Page **71** .
- -> Check for open circuit and short to earth/positive in the following wiring.



Connector Contact	Test box V.A.G 1598 A Socket
5	13
6	35

- Use current flow diagram to eliminate open circuit in wiring/short circuit.

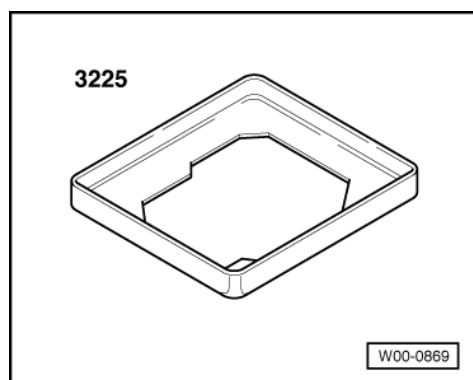
If no fault is found in wiring:

- Replace fuel temperature sender => Page 82 .

2.5 - Removing and installing fuel temperature sender -G81

Note:

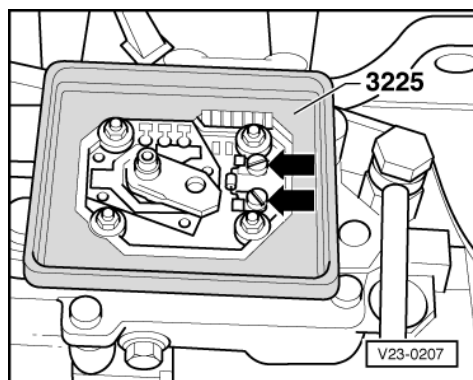
When working on the quantity adjuster the highest levels of cleanliness must be ensured. Cleaning agents must not be used.



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Special tools and workshop equipment required

- ♦ Collar 3225



Removing

- Detach pump cover from injection pump.
- -> Mount collar 3225 on quantity adjuster.
- Screw out bolts -arrows-.
- Remove fuel temperature sender -G81.

Installing

Install in reverse order.

3 - Checking control unit input variables

3.1 - Checking control unit input variables

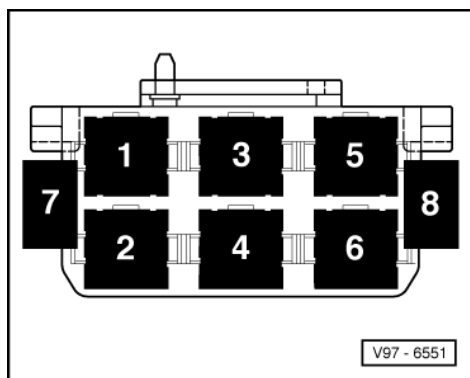
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3.2 - Checking power supply for diesel direct injection system

Up to 06.94 voltage is supplied to the injection system with the ignition on via the excess voltage protection relay -J249; as from 06.94 it is supplied via the diesel direct injection system relay -J322.

Relay -J249 or -J322 as appropriate only closes when voltage is applied via terminal 15 to the diesel direct injection system control unit.

- ◆ Relay -J249 is actuated directly (terminal 15 from central electrics and earth from earth connection in engine compartment wiring harness).
- ◆ Relay -J322 is only connected to earth (via the diesel direct injection system control unit) when voltage is applied to the control unit via terminal 15.



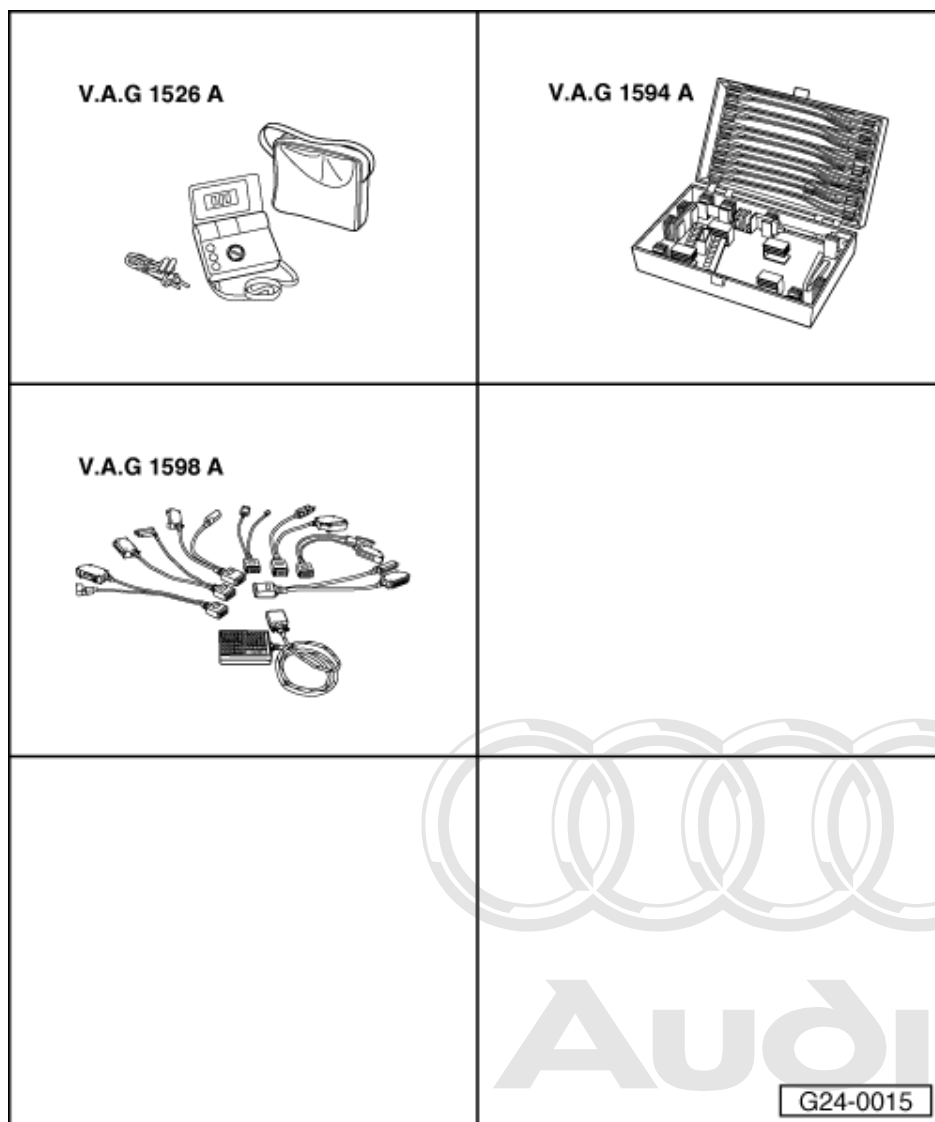
Note:

Fitting location of relays on auxiliary relay carrier III in passenger side footwell:

- ◆ To 06.94: Excess voltage protection relay -J249 at socket 1.
- ◆ From 06.94: Diesel direct injection system relay -J322 at socket 5.



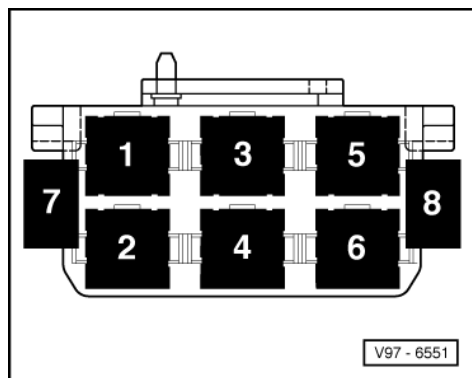
3.3 - Checking voltage supply to diesel direct injection system - vehicles up to 06.94



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Special tools and workshop equipment required

- ♦ V.A.G 1526 A
- ♦ V.A.G 1594 A
- ♦ V.A.G 1598 with V.A.G 1598/5



Checking voltage supply to excess voltage protection relay -J249

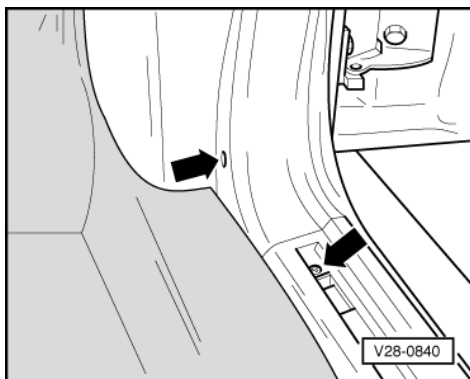
Test requirement:

- Battery voltage at least 12.7 V
- Switch on ignition.
 - -> Excess voltage protection relay -J249 at socket 1 on auxiliary relay carrier III, in passenger side footwell, must pick up (click)

Note:

Clicking of relay is not easy to hear and can best be established by way of touch.

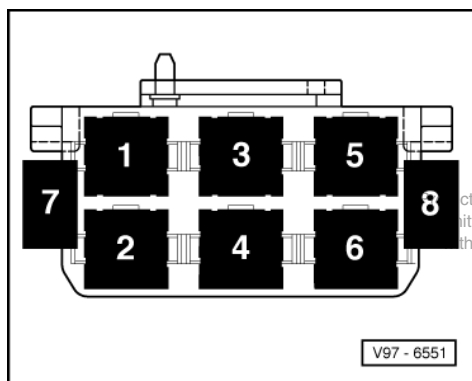
- Switch off ignition.



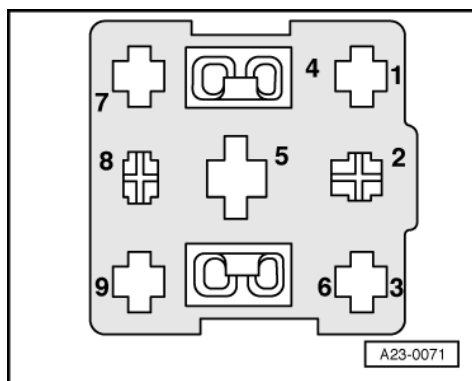
If relay does not pick up:

- -> Remove bottom right A-pillar trim and right sill panel trim in area of front door.

=> General Body Repairs; Repair Group 70; Trims and covers; Trims and covers



- -> Remove relay from socket 1 of auxiliary relay carrier III in passenger side footwell.

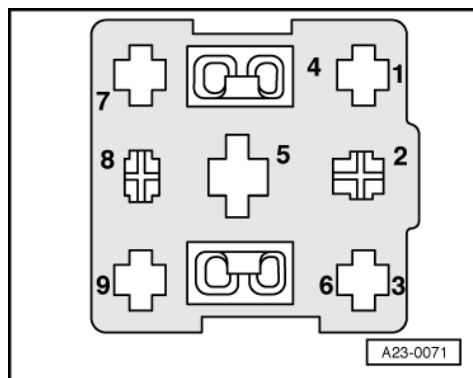


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- -> Connect up multimeter for voltage measurement as follows.

Auxiliary relay carrier III in passenger side footwell, socket 1 Contact	Measure to
8	Engine earth
2	Battery positive

- Specification: approx. battery voltage



- -> Connect up multimeter for voltage measurement as follows.

Auxiliary relay carrier III in passenger side footwell, socket 1 Contact	Measure to
6	Engine earth

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

If reading does not match specification:

- Use current flow diagram to eliminate open circuit in wiring.

If no fault is found:

- Replace excess voltage protection relay -J249.

Checking voltage supply/terminal 15 of diesel direct injection system control unit -J248 and excess voltage protection relay -J249

- Excess voltage protection relay -J249 OK
- Reinsert relay.
- With ignition switched off, use adapter V.A.G 1598/5 to connect test box V.A.G 1598A to engine control unit connector only (not to control unit) => Page 71 .
- Connect up multimeter for voltage measurement as follows.

Vehicles up to 07.92:

Test box V.A.G 1598 A Socket	Measure to
15	Engine earth
16	Engine earth
17	Engine earth

Vehicles as from 08.92:

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

All:

- Switch on ignition.
 - Specification: approx. battery voltage in each case
- Switch off ignition.
- Connect up multimeter for voltage measurement as follows.

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

- Specification: approx. battery voltage in each case

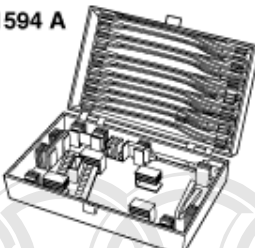
If a reading does not match specification:

- Use current flow diagram to eliminate open circuit in wiring/short circuit.

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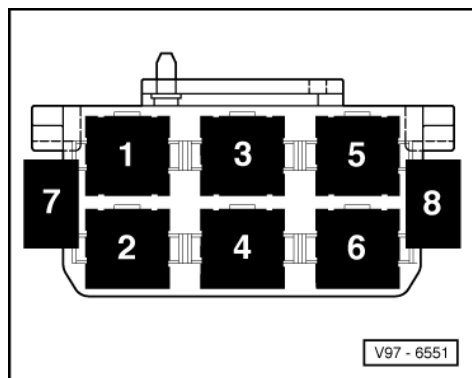


3.4 - Checking voltage supply to diesel direct injection system - vehicles as from 06.94

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

Special tools and workshop equipment required

- ♦ V.A.G 1526 A
- ♦ V.A.G 1594 A
- ♦ V.A.G 1598 with V.A.G 1598/5



Checking voltage supply to diesel direct injection system relay -J322

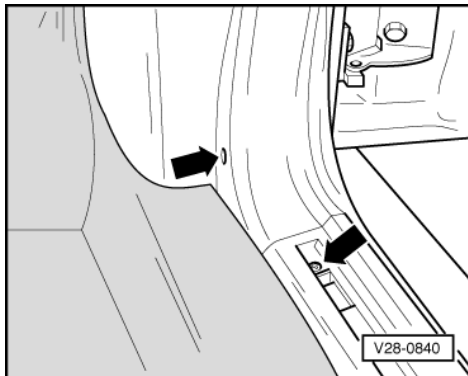
Test requirement:

- Battery voltage at least 12.7 V
- Switch on ignition.
 - -> Diesel direct injection system relay -J322 at socket 5 on auxiliary relay carrier III, in passenger side footwell, must pick up (click)

Note:

Clicking of relay is not easy to hear and can best be established by way of touch.

- Switch off ignition.

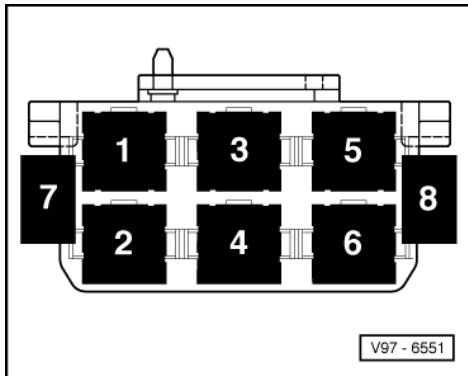


If relay does not pick up:

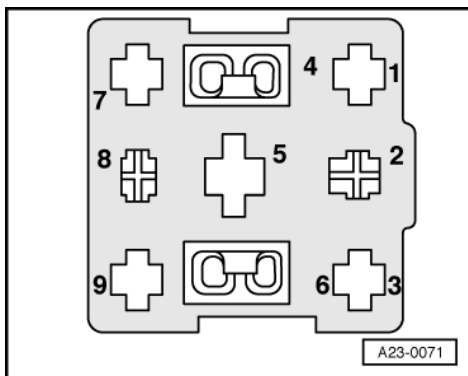
- -> Remove bottom right A-pillar trim and right sill panel trim in area of front door.

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=> General Body Repairs; Repair Group 70; Trims and covers; Trims and covers



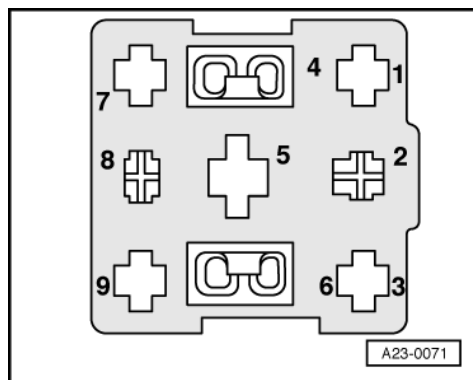
- -> Remove relay from socket 5 of auxiliary relay carrier III in passenger side footwell.



- -> Connect up multimeter for voltage measurement as follows.

Auxiliary relay carrier III in passenger side footwell, socket 5 Contact	Measure to
2	Engine earth

- Specification: approx. battery voltage



- -> Connect up multimeter for voltage measurement as follows.

Auxiliary relay carrier III in passenger side footwell, socket 5 Contact	Measure to
1	Engine earth

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

If readings do not match specifications:

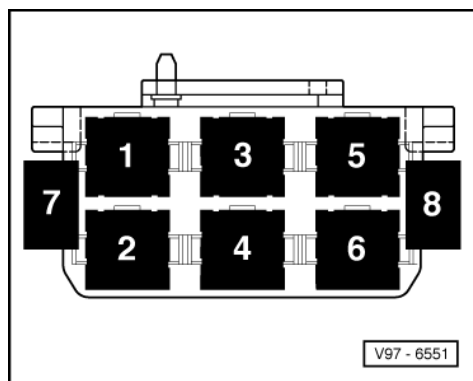
- Use current flow diagram to eliminate open circuit in wiring.

If readings match specifications:

- Connect up multimeter for voltage measurement as follows.

Auxiliary relay carrier III in passenger side footwell, socket 5 Contact	Measure to
4	Battery positive

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



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If reading does not match specification:

Checking switched earth connection of diesel direct injection system relay -J322

- Reinsert relay.
- Switch on ignition.
 - -> Diesel direct injection system relay -J322 at socket 5 on auxiliary relay carrier III, in passenger side footwell, must pick up (click)

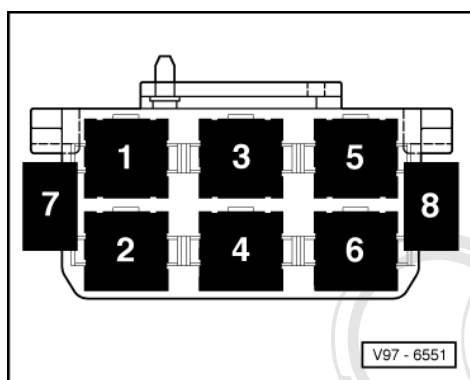
Note:

Clicking of relay is not easy to hear and can best be established by way of touch.

- Switch off ignition.

If relay does not pick up:

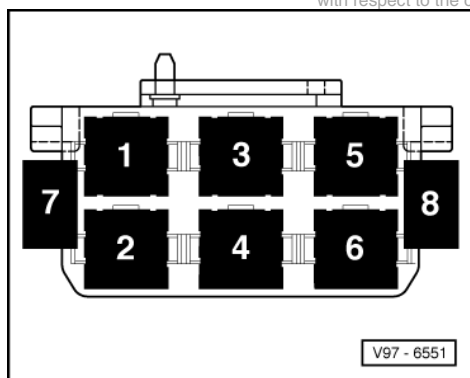
- With ignition switched off, use adapter V.A.G 1598/5 to connect test box V.A.G 1598A to engine control unit connector only (not to control unit) => Page **71**.
- Use an auxiliary lead from V.A.G 1594 A to interconnect socket 15 and socket 19 of test box.



- Switch on ignition.
 - -> Diesel direct injection system relay -J322 at socket 5 on auxiliary relay carrier III, in passenger side footwell, must pick up (click)
- Switch off ignition.

If relay now picks up, but not with control unit connected:

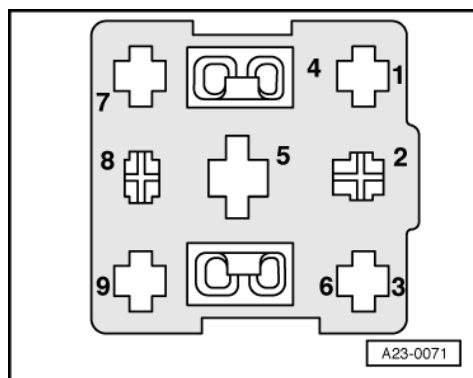
- Check whether battery voltage is connected to terminal 55 of engine control unit when ignition is on => Page **92**. If it is:
- Replace engine control unit => Page **72**.



If relay does not pick up:



- -> Remove relay from socket 5 of auxiliary relay carrier III in passenger side footwell.



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- -> Check for open circuit and short to earth/positive in the following wiring.

Auxiliary relay carrier III in passenger side footwell, socket 5 Contact	Test box V.A.G 1598 A Socket
4	15

- Use current flow diagram to eliminate open circuit in wiring/short circuit.

Checking voltage supply to diesel direct injection system control unit -J248

- Diesel direct injection system relay -J322 OK
- Reinsert relay.
- With ignition switched off, use adapter V.A.G 1598/5 to connect test box V.A.G 1598A to engine control unit connector only (not to control unit) => Page 71 .
- Connect up multimeter for voltage measurement as follows.

Test box V.A.G 1598 A Socket	Measure to
16	Engine earth
17	Engine earth
55	Engine earth

- Switch on ignition.
 - Specification: approx. battery voltage in each case
- Switch off ignition.
- Connect up multimeter for voltage measurement as follows.

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

- Specification: approx. battery voltage in each case

If a reading does not match specification:

- Use current flow diagram to eliminate open circuit in wiring/short circuit.

3.5 - Checking engine speed sender -G28

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

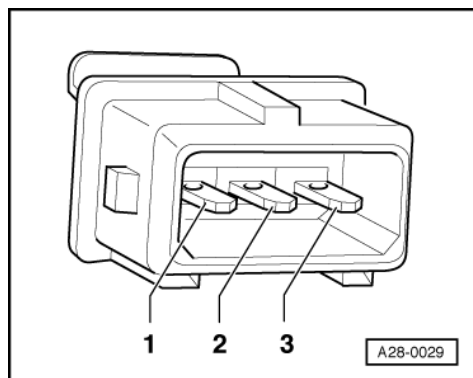
Special tools and workshop equipment required

- ◆ V.A.G 1526 A
- ◆ V.A.G 1594 A
- ◆ V.A.G 1598 with V.A.G 1598/5

Test sequence

- Switch off ignition.
- Unplug connector of engine speed sender -G28 => Exploded view of fitting locations -item 50.

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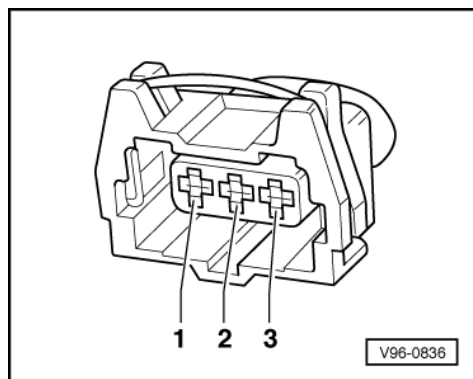
Checking internal resistance

- -> Connect up multimeter for resistance measurement between contacts 1 and 2 at sender.
- Specification: approx. 1 kΩ

If reading does not match specification:

- Replace engine speed sender.

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Check wiring

Note:

Checking is only necessary if fault 00513: "Engine speed sender, input open or no signal" has been stored in fault memory. "Implausible signal" fault is stored if signal is not always applied or if it is unclear although wiring is OK.

- With ignition switched off, use adapter V.A.G 1598/5 to connect test box V.A.G 1598A to engine control unit connector only (not to control unit) => Page 71.
- -> Check for open circuit and short to earth/positive in the following wiring.

Connector Contact	Test box V.A.G 1598 A Socket
1	13
2	47

- Check all wires for mutual short circuit.
- Use current flow diagram to eliminate open circuit in wiring/short circuit.

3.6 - Checking needle lift sender -G80

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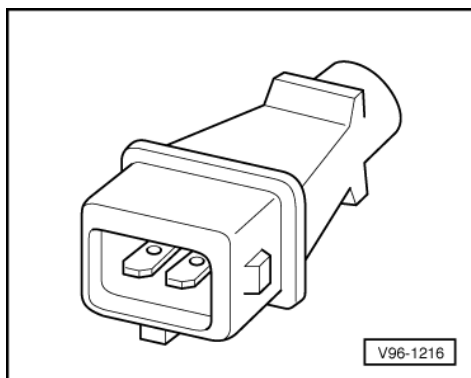
Special tools and workshop equipment required

- ◆ V.A.G 1526 A
- ◆ V.A.G 1594 A
- ◆ V.A.G 1598 with V.A.G 1598/5

Needle lift sender signal is required for determining commencement of injection. In the event of failure, commencement of injection is subject to open-loop control (as a function of engine speed and load), as opposed to closed-loop control (as a function of engine speed, load and temperature) in normal operation.

Test sequence

- Switch off ignition.
- Unplug connector of needle lift sender -G80 => Exploded view of fitting locations -item **50** .

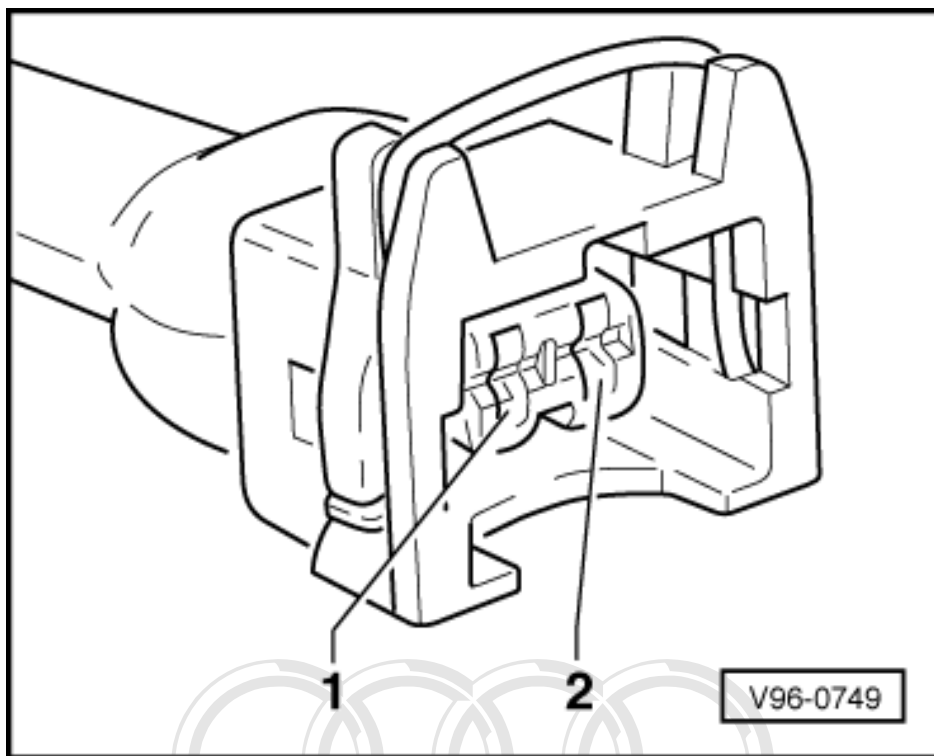


Checking internal resistance

- -> Connect multimeter to sender for resistance measurement.
- Specification: 90 ...115 ω (when engine is hot, resistance may be as much as 20 ω higher)

If reading does not match specification:

- Replace the injector for cylinder 4 with needle lift sender -G80.



Check wiring

- With ignition switched off, use adapter V.A.G 1598/5 to connect test box V.A.G 1598A to engine control unit connector only (not to control unit) => Page 71.
- -> Check for open circuit and short to earth/positive in the following wiring.

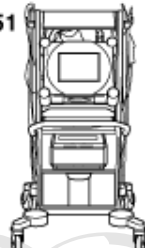
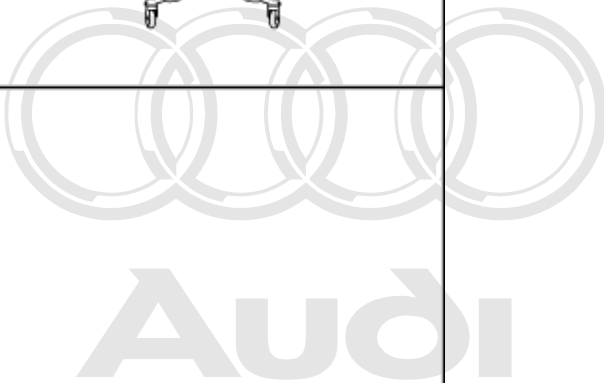
Connector Contact	Test box V.A.G 1598 A Socket
1	5

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Connector Contact	Test box V.A.G 1598 A Socket
2	12

- Check both wires for mutual short circuit.
- Use current flow diagram to eliminate open circuit in wiring/short circuit.

3.7 - Checking air flow meter -G19 - engine codes AAT, AEL

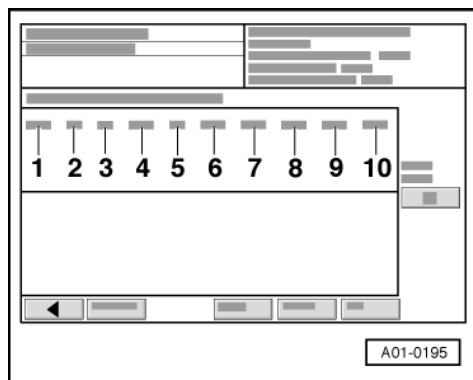
V.A.G 1526 A 	V.A.G 1594 A 
V.A.G 1598 A 	VAS 5051 
	

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G24-0017

Special tools and workshop equipment required

- ♦ V.A.G 1526 A
- ♦ V.A.G 1594 A
- ♦ V.A.G 1598 with V.A.G 1598/5
- ♦ VAS 5051 with VAS 5051/1 and VAS 5051/2



Test sequence

- Read measured value block, display group 000, ignition on
=> Page 27 .

-> Readout on VAS 5051:

- Check display in zone -10-.
 - Specification: 41 ... 75

If reading does not match specification:

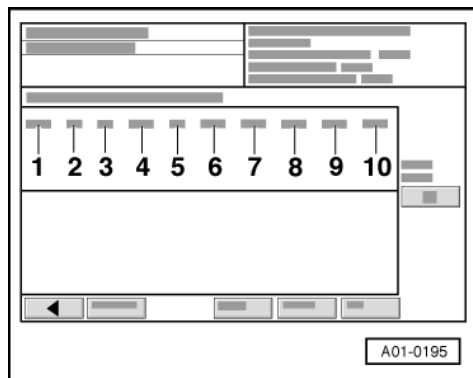
- Check exhaust gas recirculation.

=> 5-cyl. Diesel Engine, Mechanics (2.5 l engine); Repair Group 26; EGR system EGR system

Attention:

To avoid risk of accident when performing measurement and test drives, pay attention to safety precautions
=> Page 42 .

- Accelerate vehicle in 3rd gear from 1500 rpm at full throttle while a second mechanic observes the rev counter.
- At 3000 rpm the second mechanic presses the Print button on the VAS 5051.



-> Readout on VAS 5051:

- Check display in zone -3-.
 - Specification: 255 (accelerator pedal floored)

Note:

If the readout is less than 255, the accelerator pedal was not floored.

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- Repeat test and accelerate vehicle at full throttle.
- Check display in zone -10-:
 - Specification: min. 190 (provided charge pressure OK)

If reading does not match specification:

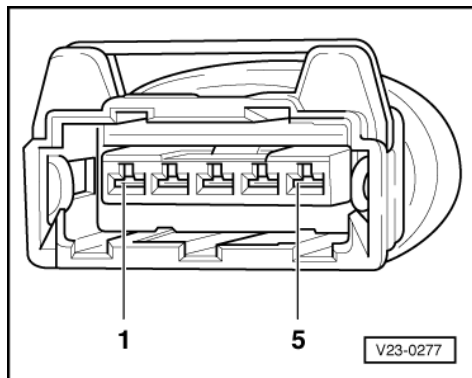
- Replace air flow meter -G19.

If reading matches specification:

- Terminate function "08 - Read measured value block" by touching $\blacktriangle$ key.
- Touch "06 - End output".
- Switch off ignition.

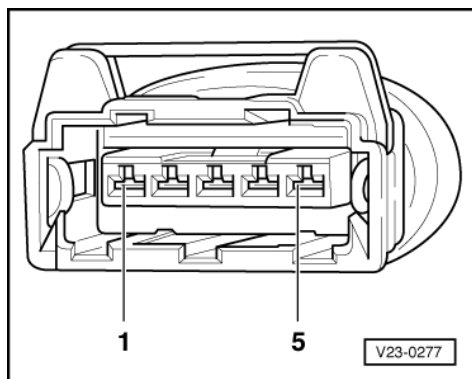
If a constant 139 is displayed:

- Use current flow diagram to check for open circuit/short circuit in wiring between air flow meter and engine control unit.
- Use current flow diagram to eliminate open circuit in wiring/short circuit.



Checking power supply

- Unplug connector of air flow meter -G19 => Exploded view of fitting locations -item **51**.
- -> Connect up multimeter for voltage measurement between contacts 3 and 4 of connector.
- Switch on ignition.
 - Specification: approx. 5 V
- Switch off ignition.



If reading does not match specification:

Check wiring

- With ignition switched off, use adapter V.A.G 1598/5 to connect test box V.A.G 1598A to engine control unit connector only (not to control unit) => Page **71**.

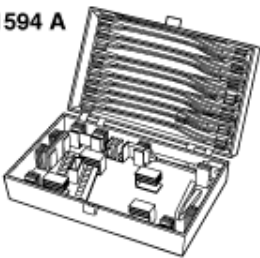
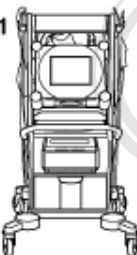


- -> Check for open circuit and short to earth/positive in the following wiring.

Connector Contact	Test box V.A.G 1598 A Socket
1	52
2	38
3	34
4	13

- Use current flow diagram to eliminate open circuit in wiring/short circuit.

3.8 - Checking intake air temperature sender -G42

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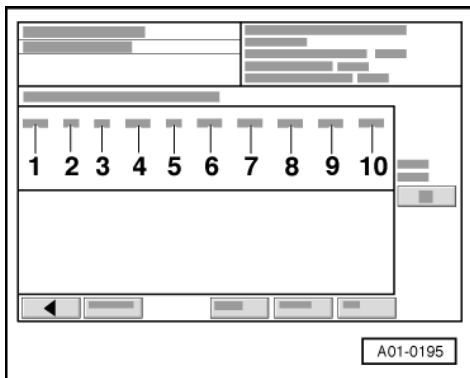
Special tools and workshop equipment required

- ♦ V.A.G 1526 A
- ♦ V.A.G 1594 A
- ♦ V.A.G 1598 with V.A.G 1598/5
- ♦ VAS 5051 with VAS 5051/1 and

VAS 5051/2

In engines with engine code ABP the intake air temperature sender is a separate component => Exploded view of fitting locations -item **46** .

In engines with engine codes AAT and AEL, the intake air temperature sender -G42 is integrated into the air flow meter -G19.



Test sequence

- Read measured value block, display group 000, ignition on
=> Page **27** .

-> Readout on VAS 5051:

- Check display in zone -8-.

Specification	Temperature in C°
243	-20
236	-10
226	0
211	+10
196	+20
177	+30
155	+40

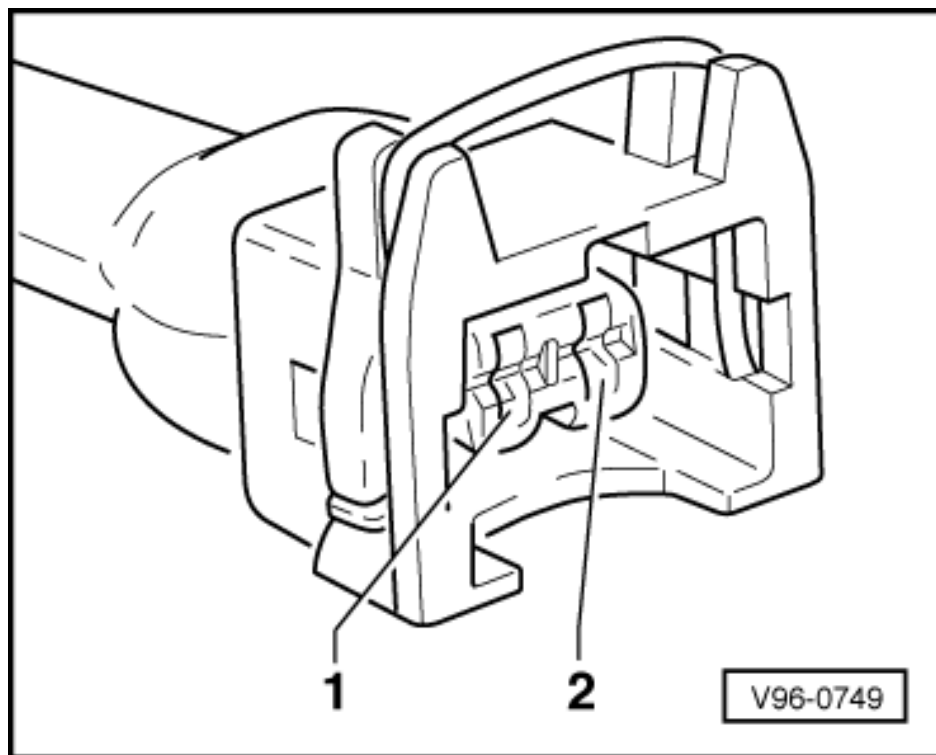
- Terminate function "08 - Read measured value block" by touching ◀ key.
- Touch "06 - End output".
- Switch off ignition.

If display in zone 8 is not realistic:

- With ignition switched off, use adapter V.A.G 1598/5 to connect test box V.A.G 1598A to engine control unit connector only (not to control unit) => Page **71** .



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Vehicles with engine code ABP:

- Unplug connector of intake air temperature sender -G42 => Exploded view of fitting locations -item 46 .-
- -> Check for open circuit and short to earth/positive in the following wiring.

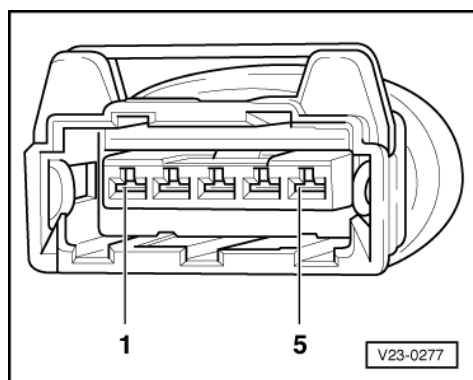
Connector Contact	Test box V.A.G 1598 A Socket
1	52
2	13

- Use current flow diagram to eliminate open circuit in wiring/short circuit.

If no fault is found in wiring:

- Replace intake air temperature sender -G42.

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Vehicles with engine codes AAT, AEL:

- Unplug connector of air flow meter -G19 => Exploded view of fitting locations -item 51 .

- -> Check for open circuit and short to earth/positive in the following wiring.

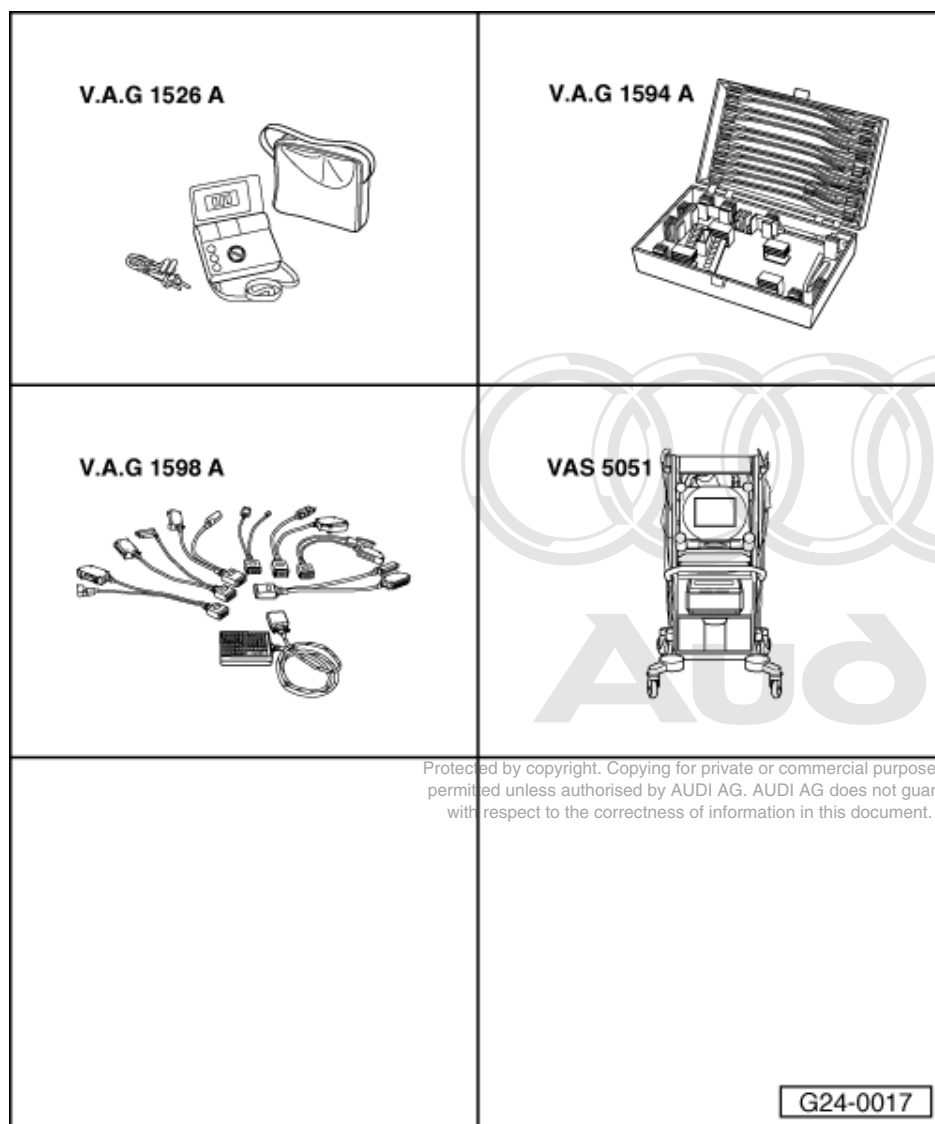
Connector Contact	Test box V.A.G 1598 A Socket
1	52
4	13

- Use current flow diagram to eliminate open circuit in wiring/short circuit.

If no fault is found in wiring:

- Replace air flow meter -G19.

3.9 - Checking coolant temperature sender -G62

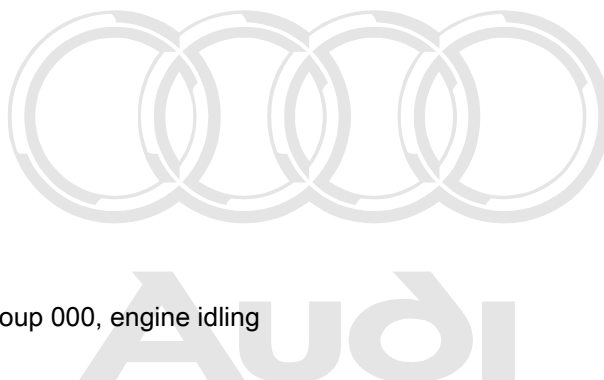
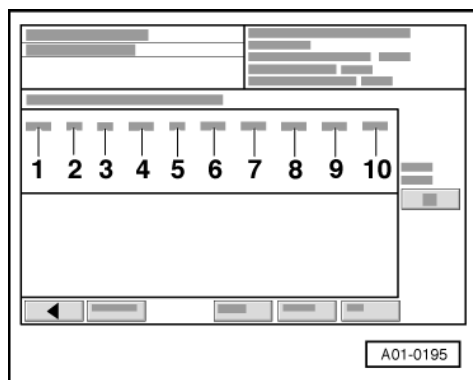


Special tools and workshop equipment required

- ◆ V.A.G 1526 A
- ◆ V.A.G 1594 A
- ◆ V.A.G 1598 with V.A.G 1598/5
- ◆ VAS 5051 with VAS 5051/1 and



VAS 5051/2



Test sequence

- Read measured value block, display group 000, engine idling
=> Page **27**.

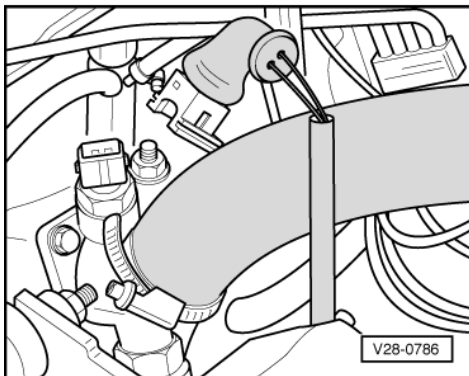
-> Readout on VAS 5051:

- Check display in zone -7-.

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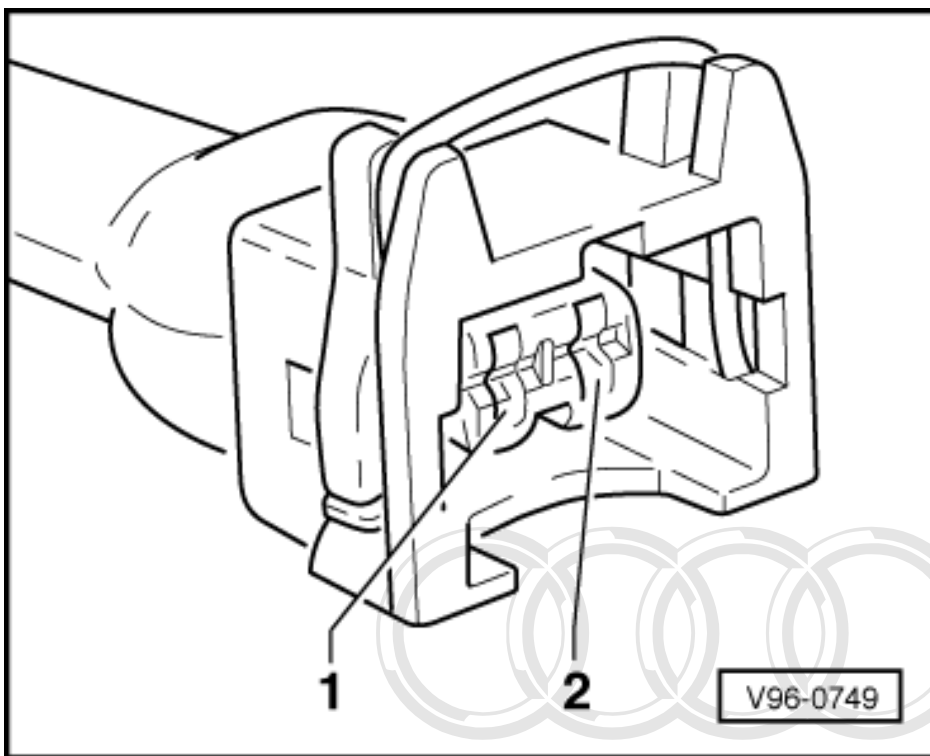
Specification	Temperature in C°
243	-20
236	-10
226	0
211	+10
196	+20
177	+30
155	+40
134	+50
113	+60
94	+70
77	+80
62	+90
50	+100

- Terminate function "08 - Read measured value block" by touching ◀ key.
- Touch "06 - End output".
- Switch off ignition.



If display in zone 7 is not realistic:

- -> Unplug connector from coolant temperature sender -G62.
- With ignition switched off, use adapter V.A.G 1598/5 to connect test box V.A.G 1598A to engine control unit connector only (not to control unit) => Page 71 .



- -> Check for open circuit and short to earth/positive in the following wiring.

Connector Contact	Test box V.A.G 1598 A Socket
1	53
2	13

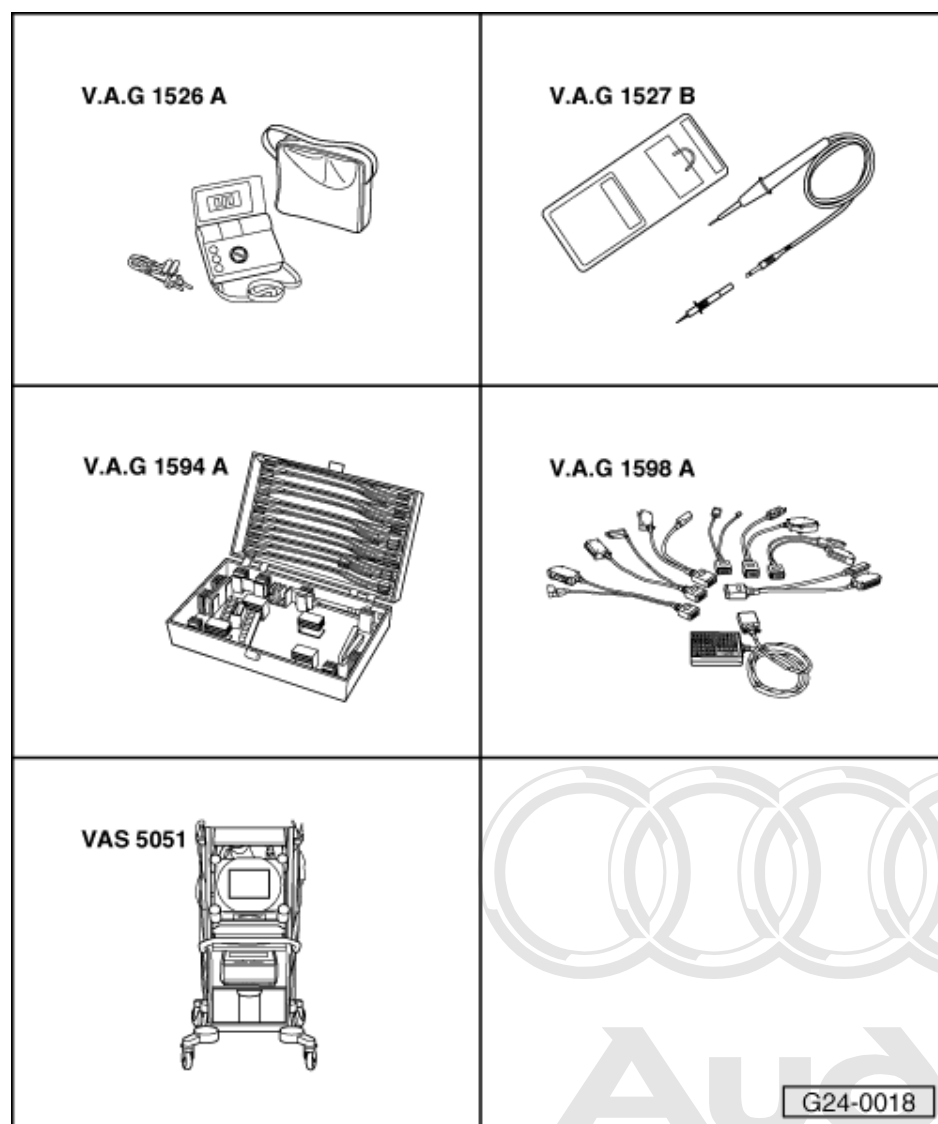
- Check both wires for mutual short circuit.
- Use current flow diagram to eliminate open circuit in wiring/short circuit.



If no fault is found in wiring:

- Replace coolant temperature sender.

3.10 - Checking brake light switch and brake pedal switch



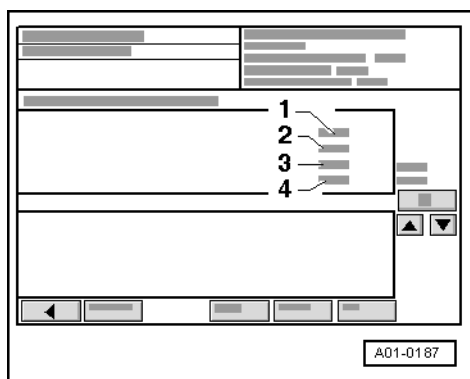
Special tools and workshop equipment required

- ♦ V.A.G 1526 A
- ♦ V.A.G 1527 B
- ♦ V.A.G 1594 A
- ♦ V.A.G 1598 with V.A.G 1598/5
- ♦ VAS 5051 with VAS 5051/1 and VAS 5051/2

Note:

With brake pressed, command from accelerator pedal sender (potentiometer) to engine control unit for increasing engine speed is suppressed for safety reasons. The control unit requires the brake light switch and brake pedal switch signals for this purpose.

If the brake is actuated with the accelerator pedal constantly pressed, the engine speed is immediately regulated to idling speed. A defective switch can lead to unintentional speed regulation.



Vehicles with engine code AAT up to 3rd control unit version, AEL1):

- 1) Engine control unit identification => from Page 01-5
- Read measured value block, display group 006, ignition on
=> Page 27 .
- > Readout on VAS 5051:
 - Check display in zone -2-.
 - Specification: 0 0 0
 - Slowly floor brake pedal.
 - Specification: 0 1 1
 - Both readouts must switch from 0 to 1 simultaneously
 - Allow brake pedal to slowly return to rest position.
 - Specification: 0 0 0
 - Both readouts must switch back from 1 to 0 simultaneously
 - Terminate function "08 - Read measured value block" by touching **◀** key.
 - Touch "06 - End output".
 - Switch off ignition.

If readout is not as described:

- Check switches and voltage supply.

All:

Checking switch

- Remove driver's storage compartment.
- => General Body Repairs; Repair Group 70; Dash Panel Dash Panel
- Unplug connector from brake light/brake pedal switch.
- Connect up multimeter to measure resistance between contacts on brake light switch.
 - Specification: $\infty \omega$ (no continuity)
- Press brake pedal.
 - Specification: approx. 0 ω
- Connect up multimeter to measure resistance between contacts on brake pedal switch.
 - Specification: approx. 0 ω
- Press brake pedal.
 - Specification: $\infty \omega$ (no continuity)

If readings do not match specifications:



- Replace brake light switch -F or brake pedal switch -F47 in footwell on brake pedal.

=> Brake System; Repair Group 46

- Check whether both switches switch simultaneously.

If the two switches do not switch simultaneously:

- Turn until switching points coincide. If necessary, hold retaining clip with pointed-nose pliers.

Notes:

- ♦ Brake pedal return force with engine running is far less than when engine is stopped (brake servo). Stems must also be firmly pressed into switches when engine is running and brake is not pressed.
- ♦ In the event of sporadic speed regulation, screw switches further into pedal bracket and repeat check.

If readings match specifications:

Checking power supply

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

Brake light switch connector Contact	Measure to
1	Body earth

- LED must light

Brake pedal switch connector Contact	Measure to
2	Body earth

- Switch on ignition.
 - LED must light
- Switch off ignition.

If LED does not light:

- Use current flow diagram to eliminate open circuit in wiring.

If LED lights:

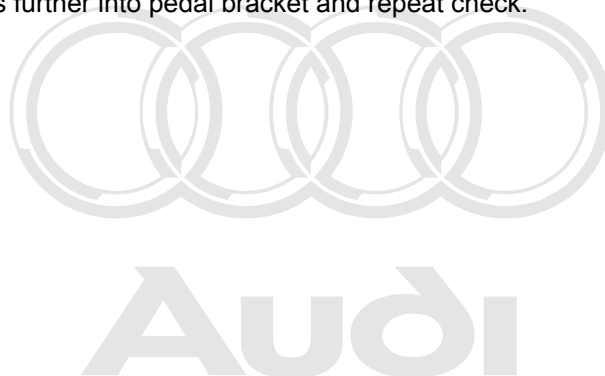
Checking wiring

- With ignition switched off, use adapter V.A.G 1598/5 to connect test box V.A.G 1598A to engine control unit connector only (not to control unit) => Page **71**.
- Check for open circuit and short to earth/positive in the following wiring:

Vehicles with engine code ABP:

Brake light switch connector Contact	Test box V.A.G 1598 A Socket
2	26

Brake pedal switch connector Contact	Test box V.A.G 1598 A Socket
1	31



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Vehicles with engine codes AAT, AEL:

Brake light switch connector Contact	Test box V.A.G 1598 A Socket
2	31
Brake pedal switch connector Contact	Test box V.A.G 1598 A Socket
1	26

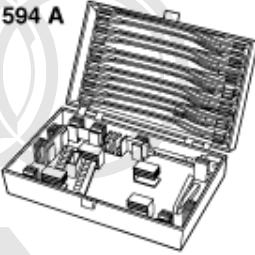
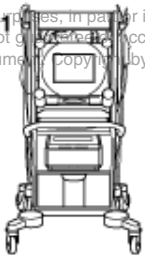
All:

- Use current flow diagram to eliminate open circuit in wiring/short circuit.

If no fault is found:

- Replace engine control unit => Page **72** .

3.11 - Checking slide travel potentiometer -G99 - engine codes ABP and AAT 1st control unit version

V.A.G 1526 A 	V.A.G 1594 A 
V.A.G 1598 A 	VAS 5051 
G24-0017	



Note:

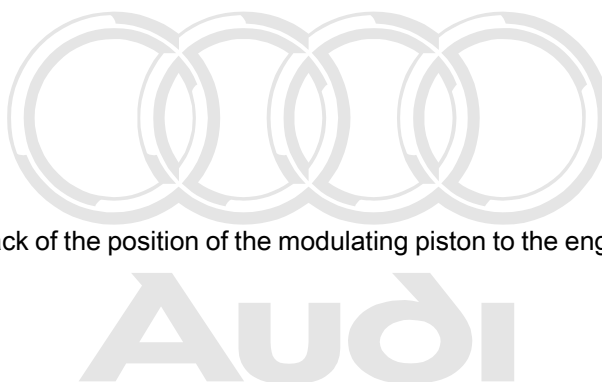
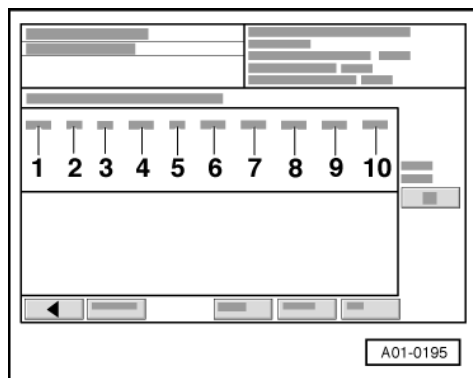
Engine control unit identification

=> from Page 3.

Special tools and workshop equipment required

- ♦ V.A.G 1526 A
- ♦ V.A.G 1594 A
- ♦ V.A.G 1598 with V.A.G 1598/5
- ♦ VAS 5051 with VAS 5051/1 and VAS 5051/2

The slide travel potentiometer is responsible for feedback of the position of the modulating piston to the engine control unit, i.e. it determines the injection quantity.



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Test sequence

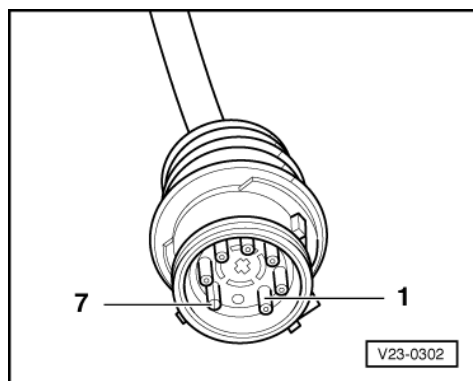
- Read measured value block, display group 000, engine idling
=> Page 27.

-> Readout on VAS 5051:

- Observe display in zone 7 (coolant temperature).
 - Specification: Less than 77 (corresponding to 80 °C)
- Do not continue with test until coolant temperature has been attained.
- Check display in zone -4-.
 - Specification: 5 ... 25
- Terminate function "08 - Read measured value block" by touching ◀ key.
- Touch "06 - End output".
- Switch off ignition.

If reading does not match specification:

- Replace injection pump => Page 57.



If reading matches specification:

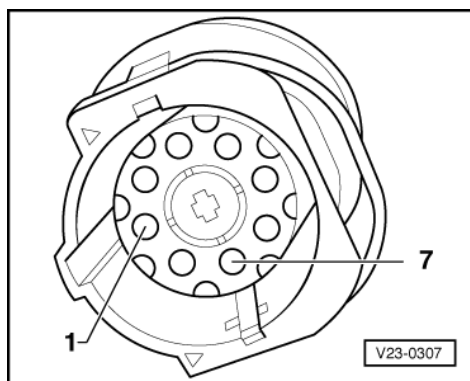
Checking internal resistance

- Unplug connector from injection pump=>Exploded view of fitting locations -item 49 .
- -> Connect up multimeter to measure resistance as follows.

Connector Contact	Specification
1 + 3	0.5 ... 2.0 k ω
2 + 3	1.0 ... 3.0 k ω

If readings do not match specifications:

- Replace injection pump => Page 57 .



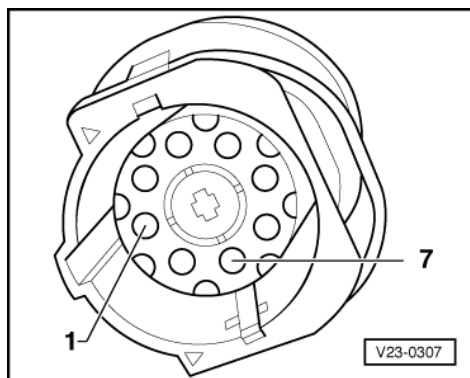
If readings match specifications:

Checking power supply

- -> Connect up multimeter for voltage measurement as follows.

Connector Contact	Measure to
2	Engine earth

- Switch on ignition.
- Specification: approx. 5 V
- Switch off ignition.



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If reading does not match specification:



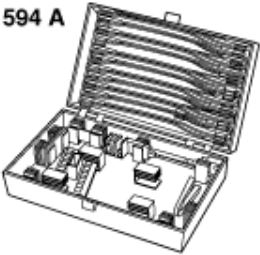
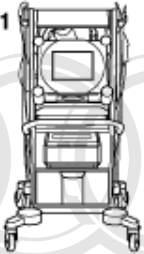
Checking wiring

- With ignition switched off, use adapter V.A.G 1598/5 to connect test box V.A.G 1598A to engine control unit connector only (not to control unit) => Page 71.
- -> Check for open circuit and short to earth/positive in the following wiring.

Connector Contact	Test box V.A.G 1598 A Socket
1	21
2	39
3	14

- Check all wires for mutual short circuit.
- Use current flow diagram to eliminate open circuit in wiring/short circuit.

3.12 - Checking modulating piston movement sender -G149 - engine code AAT as from 2nd control unit version and AEL

V.A.G 1526 A 	V.A.G 1594 A 
V.A.G 1598 A 	VAS 5051 
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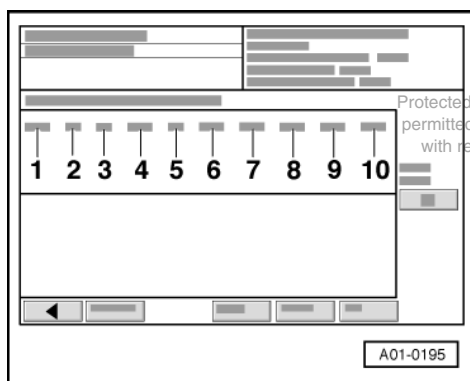
Note:

Engine control unit identification => from Page **3**.

Special tools and workshop equipment required

- ◆ V.A.G 1526 A
- ◆ V.A.G 1594 A
- ◆ V.A.G 1598 with V.A.G 1598/5
- ◆ VAS 5051 with VAS 5051/1 and VAS 5051/2

The modulating piston movement sender is responsible for feedback of the position of the modulating piston to the engine control unit, i.e. it determines the injection quantity.



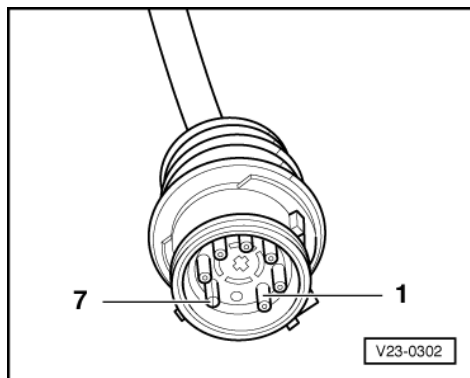
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Test sequence

- Read measured value block, display group 000, engine idling
=> Page **27**.
- > Readout on VAS 5051:
 - Observe display in zone 7 (coolant temperature).
 - Specification: Less than 77 (corresponding to 80 °C)
 - Do not continue with test until coolant temperature has been attained.
 - Check display in zone -4-.
 - Specification: 5 ... 25
 - Terminate function "08 - Read measured value block" by touching ◀ key.
 - Touch "06 - End output".
 - Switch off ignition.

If reading does not match specification:

- Replace injection pump => Page **57**.



If reading matches specification:

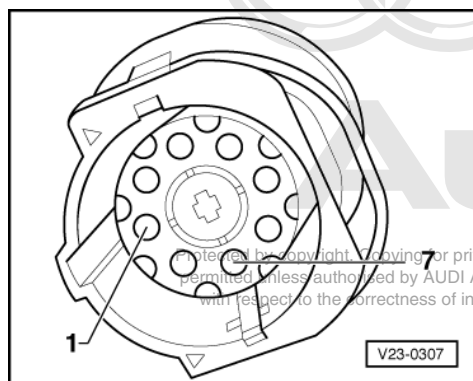
Checking internal resistance

- Unplug connector from injection pump =>Exploded view of fitting locations -item 49 .
- -> Connect up multimeter to measure resistance as follows.

Connector Contact	Specification
1 + 3	4.9 ... 7.5 ω
2 + 3	4.9 ... 7.5 ω

If readings do not match specifications:

- Replace injection pump => Page 57 .



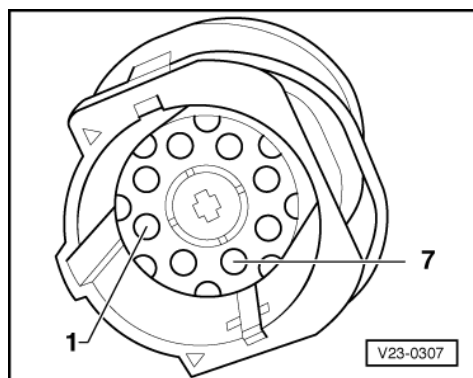
If readings match specifications:

Checking power supply

- -> Connect up multimeter for voltage measurement as follows.

Connector Contact	Measure to
1	Engine earth
2	Engine earth

- Switch on ignition.
- Specification: each approx. 2.5 V
- Switch off ignition.



If readings do not match specifications:

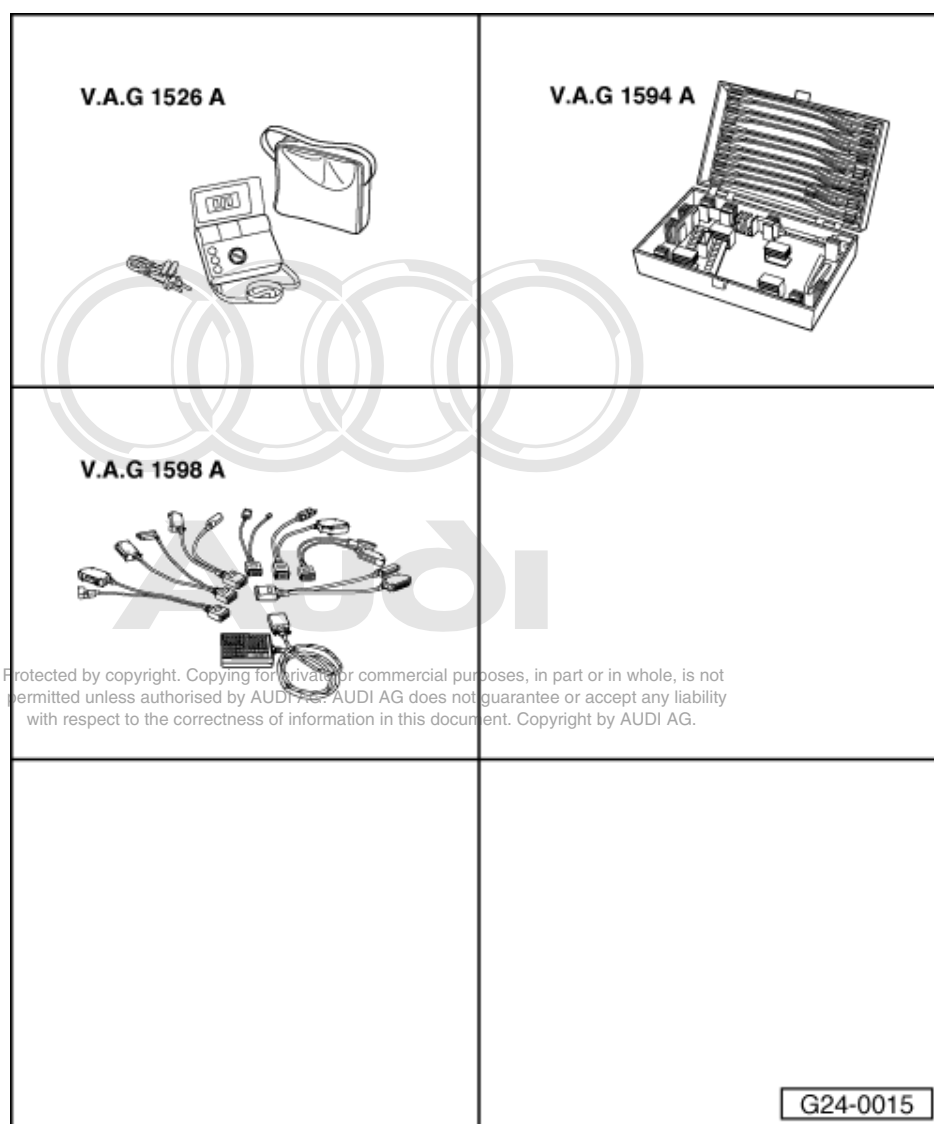
Checking wiring

- With ignition switched off, use adapter V.A.G 1598/5 to connect test box V.A.G 1598A to engine control unit connector only (not to control unit) => Page **71**.
- -> Check for open circuit and short to earth/positive in the following wiring.

Connector Contact	Test box V.A.G 1598 A Socket
1	21
2	39
3	14

- Check all wires for mutual short circuit.
- Use current flow diagram to eliminate open circuit in wiring/short circuit.

3.13 - Checking quantity adjuster -N146



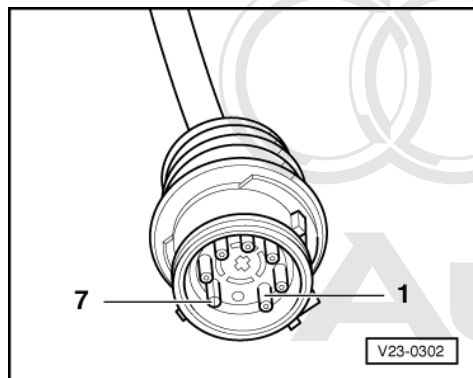
Special tools and workshop equipment required

- ◆ V.A.G 1526 A
- ◆ V.A.G 1594 A



- ♦ V.A.G 1598 with V.A.G 1598/5

The quantity adjuster is an electromagnetic rotary actuator which is activated by the control unit by means of a specific duty cycle. The eccentric shaft of the quantity adjuster moves the modulating piston on the high-pressure piston and thus determines the injection quantity.



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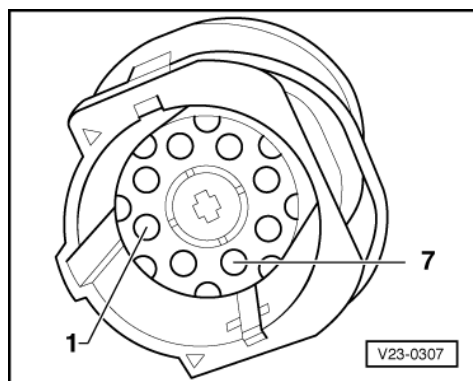
Checking internal resistance

- Unplug connector from injection pump=>Exploded view of fitting locations -item 49 .
- -> Connect up multimeter to measure resistance as follows.

Connector Contact	Specification
4 + 7	0.4 ... 1.1 ω

If reading does not match specification:

- Replace injection pump => Page 57 .



If reading matches specification:

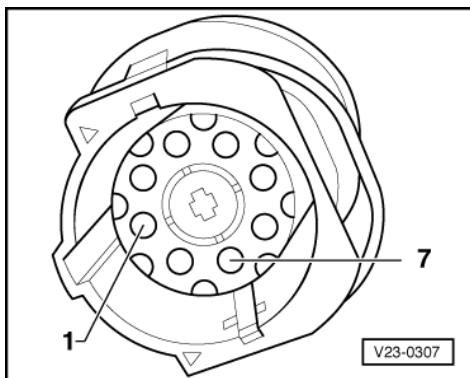
Checking power supply

- -> Connect up multimeter for voltage measurement as follows.

Connector Contact	Measure to
7	Engine earth

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

- Switch off ignition.



If reading does not match specification:

Checking wiring

- With ignition switched off, use adapter V.A.G 1598/5 to connect test box V.A.G 1598A to engine control unit connector only (not to control unit) => Page 71 .
- -> Check for open circuit and short to earth/positive in the following wiring.

Connector Contact	Test box V.A.G 1598 A Socket
4	1
	2
7	15 1)
	16
	17

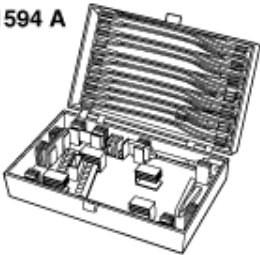
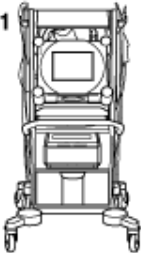
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1) Vehicles up to 07.92

- Check all wires for mutual short circuit.
- Use current flow diagram to eliminate open circuit in wiring/short circuit.



3.14 - Check accelerator position sender -G79

V.A.G 1526 A 	V.A.G 1594 A 
V.A.G 1598 A 	VAS 5051 
	G24-0017

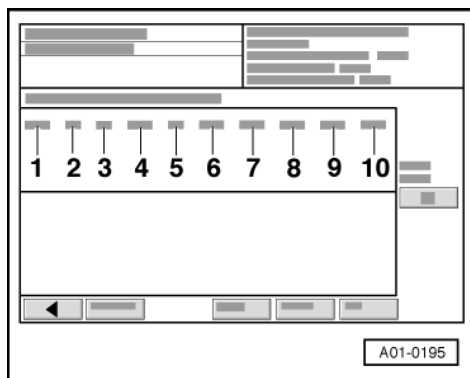
Special tools and workshop equipment required

- ♦ V.A.G 1526 A
- ♦ V.A.G 1594 A
- ♦ V.A.G 1598 with V.A.G 1598/5
- ♦ VAS 5051 with VAS 5051/1 and VAS 5051/2

The accelerator pedal sender -G79 is located on the accelerator pedal, and transmits the pedal position to the control unit.



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Test sequence

- Read measured value block, display group 000, ignition on
=> Page **27** .

-> Readout on VAS 5051:

- Check display in zone -3-.
 - Specification: 0.0 % (accelerator pedal not pressed)
- Slowly floor accelerator pedal.
 - Specification: Readout must rise steadily up to 255 (with accelerator pedal floored).

In vehicle with automatic gearbox, the contact point of the kickdown switch must be clearly discernible before full throttle is reached.

- If the specified initial or final value is not reached, adjust the accelerator pedal sender -G79.

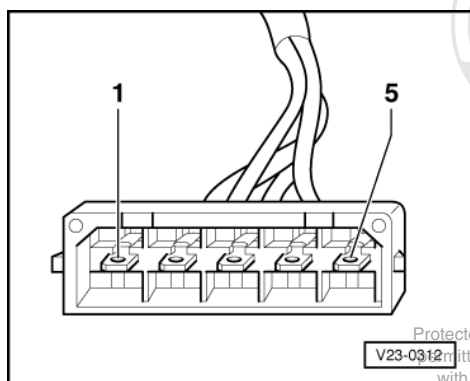
=> Fuel Supply System - Diesel Engines; Repair Group 20

If display does not change or only irregularly:

- Terminate function "08 - Read measured value block" by touching ◀ key.
- Touch "06 - End output".
- Switch off ignition.
- Remove driver's storage compartment.

=> General Body Repairs; Repair Group 70; Dash Panel Dash Panel

- Unplug connector of accelerator position sender -G79 from accelerator pedal in footwell.



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Vehicles with engine code ABP, AAT 1st control unit version 1):

- 1) Engine control unit identification => from Page 01-5

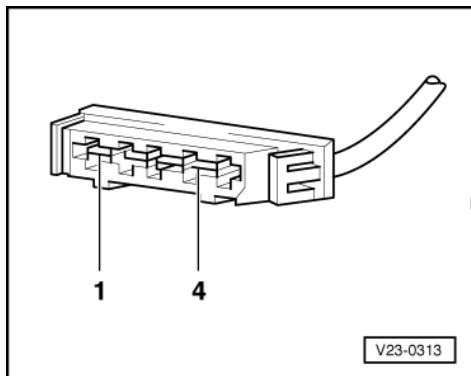


- -> Connect up multimeter to measure resistance as follows.

Contacts	Accelerator pedal	Specification
1 + 3	not pressed	0.8 ... 1.4 kΩ
2 + 3	not pressed	0.8 ... 1.4 kΩ
4 + 3	not pressed	0.8 ... 1.2 kΩ
	pressed	∞ Ω

If readings do not match specifications:

- Replace accelerator position sender -G79.

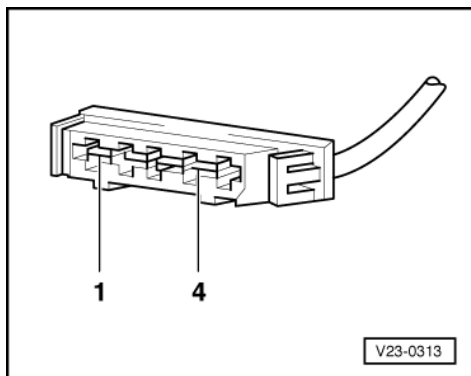


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If readings match specifications:

Checking power supply

- -> Connect up multimeter for voltage measurement between contacts 2 and 3 of connector.
- Switch on ignition.
 - Specification: approx. 5 V
- Switch off ignition.



If reading does not match specification:

Checking wiring

- With ignition switched off, use adapter V.A.G 1598/5 to connect test box V.A.G 1598A to engine control unit connector only (not to control unit) => Page 71.
- -> Check for open circuit and short to earth/positive in the following wiring.

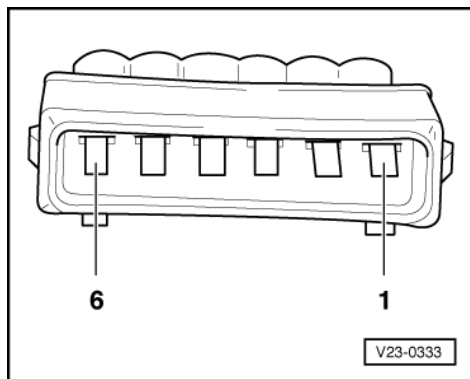
Connector Contact	Test box V.A.G 1598 A Socket
1	37
2	33

Connector Contact	Test box V.A.G 1598 A Socket
3	14
4	25

- Use current flow diagram to eliminate open circuit in wiring/short circuit.

If no fault is found:

- Replace engine control unit => Page 72 .



Vehicles with engine code AAT as from 2nd control unit version, AEL 1):

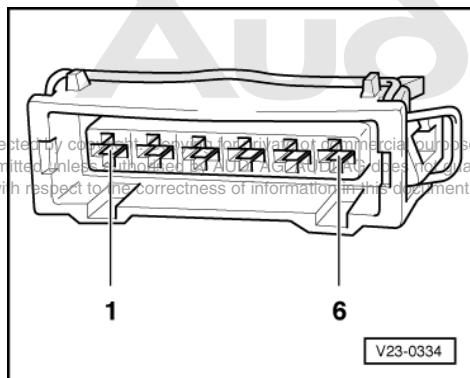
- 1) Engine control unit identification => from Page 01-5
- -> Connect up multimeter to measure resistance as follows.

Contacts	Accelerator pedal	Specification
1 + 3	not pressed	0.8 ... 1.4 kΩ
2 + 3	not pressed	0.8 ... 1.4 kΩ
4 + 6	not pressed	0.8 ... 1.2 kΩ
	pressed	∞ Ω
5 + 6 1)	not pressed	∞ Ω
	floored	0.8 ... 1.2 kΩ

- 1) Only vehicles with automatic gearbox

If readings do not match specifications:

- Replace accelerator position sender -G79.



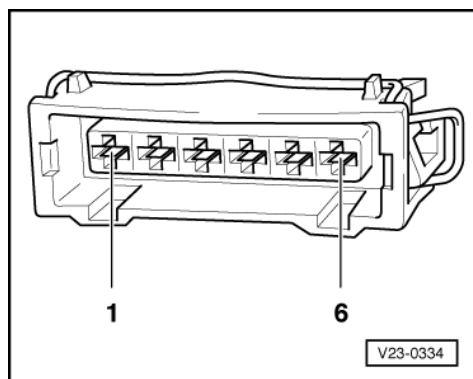
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If readings match specifications:

Checking power supply

- -> Connect up multimeter for voltage measurement between contacts 2 and 3 of connector.
- Switch on ignition.
 - Specification: approx. 5 V
- Switch off ignition.



If reading does not match specification:

Checking wiring

- With ignition switched off, use adapter V.A.G 1598/5 to connect test box V.A.G 1598A to engine control unit connector only (not to control unit) => Page 71 .
- -> Check for open circuit and short to earth/positive in the following wiring.

Connector Contact	Test box V.A.G 1598 A Socket
1	37
2	33
3	13
4	25
6	18
	19

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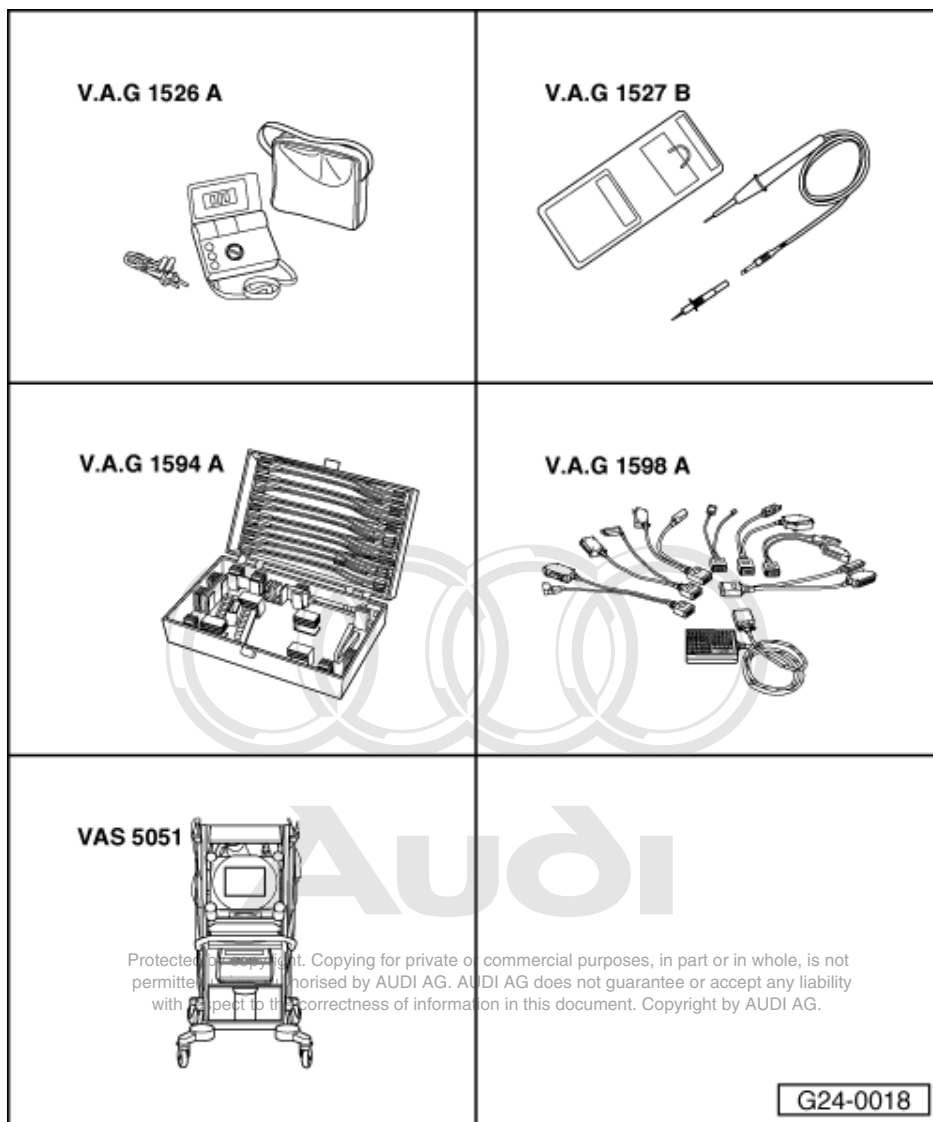
- Use current flow diagram to eliminate open circuit in wiring/short circuit.

If no fault is found:

- Replace engine control unit => Page 72 .

4 - Checking additional signals

4.1 - Checking additional signals



4.2 - Checking air conditioner compressor shut-off

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 with V.A.G 1598/5
- ◆ VAS 5051 with VAS 5051/1 and VAS 5051/2



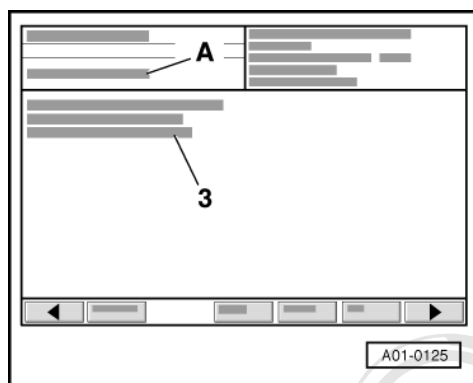
Vehicles with engine codes AAT, AEL:

The engine control unit only shuts off the air conditioner compressor in vehicles with engine codes AAT and AEL, and in the following circumstances:

- ♦ In the event of rapid acceleration from low vehicle speed (detected via change in angle at accelerator position sender -G79 and vehicle speed signal)
- ♦ In emergency running mode (limp-home)
- ♦ At coolant temperatures above 108 °C
- ♦ For approx. 6 seconds following each start

Test requirements:

- Air conditioner OK
- Air conditioner on
- No faults stored in fault memory



Test sequence

- Initiate final control diagnosis => Page 18 and activate air conditioner compressor shut-off.

-> Readout on VAS 5051:

- A - 3rd control element in test
- 3 - Air conditioner compressor shut-off

- ♦ Air conditioner compressor must come to a halt within 5 seconds (visual inspection) and then start up every 5 seconds and come to a halt again.

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- Terminate function "03 - Final control diagnosis" by touching * key.
- Touch "06 - End output".
- Switch off ignition.

If air conditioner compressor is not shut off:

- With ignition switched off, use adapter V.A.G 1598/5 to connect test box V.A.G 1598 A to engine control unit connector and also to actual engine control unit => Page 71 .
- Connect up voltage tester V.A.G 1527 B as follows.

Engine codes	V.A.G 1598 A Socket
AAT 1st control unit version 1)	23 + 18
AAT as from 2nd control unit version1), AEL	46 + 18

- 1) Engine control unit identification => from Page 01-5

- Start engine and let it idle.
 - The LED on the voltage tester must light up about 6 seconds after starting.
- Rapidly floor the accelerator pedal from the idle position.
 - The LED on the voltage tester must go out for up to 10 seconds.

If the LED does not light for 6 seconds after starting the engine:

- Use current flow diagram to check for open circuit/short to earth.

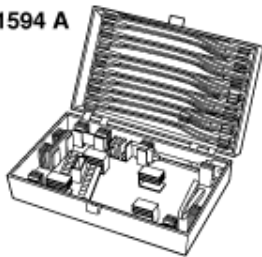
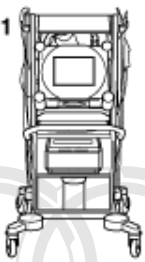
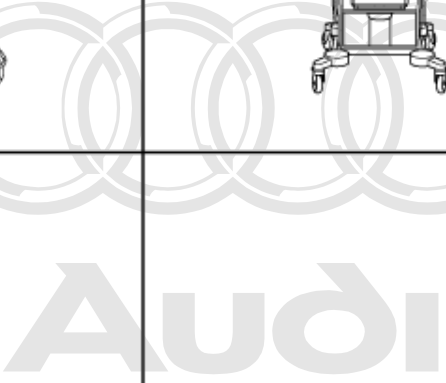
If the LED lights as soon as the ignition is switched on or does not go out when the accelerator pedal is depressed rapidly from the idle position:

- Use current flow diagram to check for short to positive.

If no fault is found in wiring:

- Replace engine control unit => Page **72**.

4.3 - Checking vehicle speed signal

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

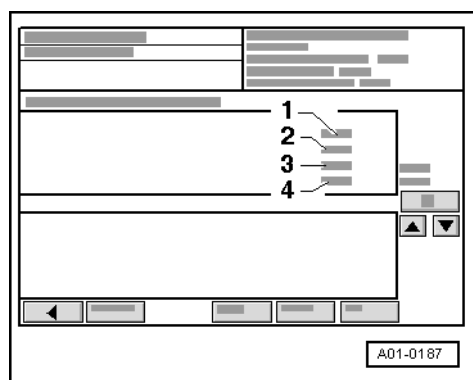
- ♦ V.A.G 1526 A
- ♦ V.A.G 1594 A
- ♦ V.A.G 1598 with V.A.G 1598/5
- ♦ VAS 5051 with VAS 5051/1 and VAS 5051/2

The vehicle speed signal is required for air conditioner compressor shut-off on acceleration, for the cruise control system and to enhance ride comfort (surge damping).

Test requirement:

- Speedometer OK; checking:

=> Electrical System; Repair Group 90; Dash panel insert; Checking road speed signal- Dash panel insert
Checking road speed signal-

**Vehicles with engine code AAT up to 3rd control unit version, AEL1):**

- 1) Engine control unit identification => from Page 01-5

Attention:

To avoid risk of accident when performing measurement and test drives, pay attention to safety precautions
=> Page 42.

- Read measured value block, display group 006, engine idling
=> Page 27.

-> Readout on VAS 5051:

- Perform test drive.
- Check display in zone 1.

- Specification: Current vehicle speed must be displayed (comparison with speedometer)
Terminate function "08 - Read measured value block" by touching ◀ key.
Touch "06 - End output".
Switch off ignition.

All:

- With ignition switched off, use adapter V.A.G 1598/5 to connect test box V.A.G 1598 A to engine control unit connector and also to actual engine control unit => Page 71.
- Connect voltage tester V.A.G 1527 B to sockets 15 (positive) and 29 (vehicle speed signal) of test box V.A.G 1598 A.
- Raise vehicle (if at all possible using lifting platform) until front left wheel is free to turn.
- Switch on ignition.
- Turn front left wheel.

- LED must flash

If LED does not flash:

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

Test box V.A.G 1598 A Socket	Dash panel insert Contact
29	=> Current Flow Diagrams, Electrical Fault-finding and Fitting Locations binder

- Use current flow diagram to eliminate open circuit in wiring/short circuit.

If no fault is found in wiring:

- Detach adapter V.A.G 1598/5 from engine control unit.

If LED now flashes:

- Replace engine control unit => Page **72**.

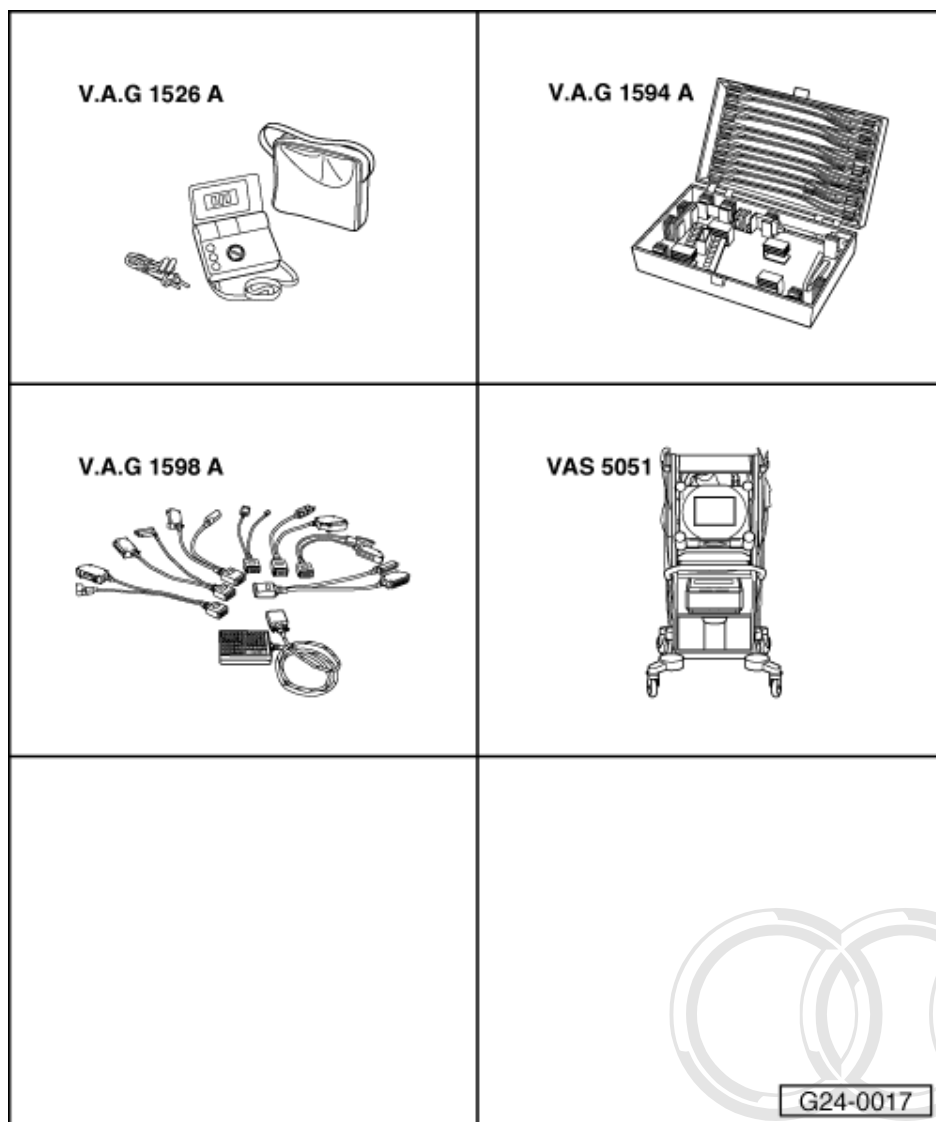
If LED still does not flash:

- Identify all components making use of vehicle speed signal (e.g. radio, automatic gearbox, air conditioner), consecutively disconnect them from dash panel insert and repeat test until cause has been established.

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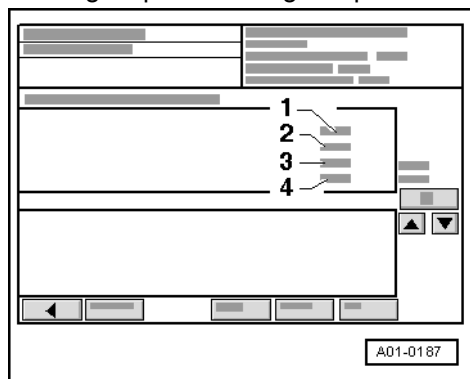
4.4 - Checking clutch pedal switch -F36



Special tools and workshop equipment required

- ♦ V.A.G 1526 A
- ♦ V.A.G 1594 A
- ♦ V.A.G 1598 with V.A.G 1598/5
- ♦ VAS 5051 with VAS 5051/1 and VAS 5051/2

This signal prevents engine speed overshoots and load change jolts on disengaging the clutch



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Vehicles with engine code AAT up to 3rd control unit version, AEL1):

- 1) Engine control unit identification => from Page 01-5
- Read measured value block, display group 006, ignition on
=> Page 27 .

-> Readout on VAS 5051:

- Check display in zone -2-.
 - Specification: 0 0 0
- Press clutch pedal.
 - Specification: 1 0 0
- Terminate function "08 - Read measured value block" by touching ◀ key.
- Touch "06 - End output".
- Switch off ignition.

If readout is not as described:

- Check switch and voltage supply.

All:

Checking switch

- Remove driver's storage compartment.

=> General Body Repairs; Repair Group 70; Dash Panel Dash Panel

- Unplug connector from clutch pedal switch.
- Connect up multimeter to measure resistance between both contacts on clutch pedal switch.
 - Specification: approx. 0 ω
- Press clutch pedal.
 - Specification: ∞ ω (no continuity)

If reading does not match specification:

- Replace clutch pedal switch F36 on clutch pedal in footwell.

=> Manual Gearbox; Repair Group 30

If reading matches specification:

Checking power supply

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

Clutch pedal switch connector Contact	Measure to
2	Body earth

- Switch on ignition.
 - LED must light
- Switch off ignition.

If LED does not light:

- Eliminate open circuit in wiring if necessary.

If LED lights:



Check wiring

- With ignition switched off, use adapter V.A.G 1598/5 to connect test box V.A.G 1598A to engine control unit connector only (not to control unit) => Page 71 .
- Check for open circuit and short to earth/positive in the following wiring:

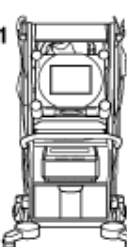
Clutch pedal switch connector Contact	Test box V.A.G 1598 A Socket
1	28

- Use current flow diagram to eliminate open circuit in wiring/short circuit.

If no fault is found:

- Replace engine control unit => Page 72 .

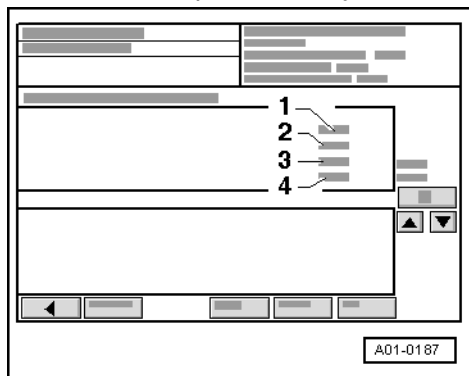
4.5 - Checking cruise control system (CCS)

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V.A.G 1598 A 	VAS 5051 
	G24-0017

Special tools and workshop equipment required

- ◆ V.A.G 1526 A
- ◆ V.A.G 1594 A
- ◆ V.A.G 1598 with V.A.G 1598/5
- ◆ VAS 5051 with VAS 5051/1 and VAS 5051/2

With the exception of the operating switch, there are no components specific to the cruise control system; all functions are implemented by the diesel direct injection system.



Vehicles with engine code AAT up to 3rd control unit version, AEL1):

- 1) Engine control unit identification => from Page 01-5
- Read measured value block, display group 006, ignition on
=> Page 27.

-> Readout on VAS 5051:

- Check display in zone -4-.
- Specification: 0

Note:

If value displayed in zone 4 is 255:

- Activate cruise control system => Page 133

Vehicles with automatic gearbox:

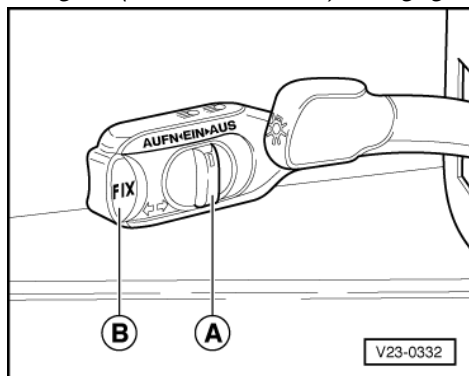
Attention:

Before working on the vehicle with the engine running and in gear, engage the parking brake.

- Perform test drive, exceeding a speed of 30 km/h once. Then leave engine running and selector lever set to 2, 3 or D.
- Apply parking brake.

Note:

On vehicles with automatic gearbox, cruise control system switch is only supplied with power at speeds in excess of 30 km/h and with selector lever set to 2, 3 or D. Power supply is then maintained even at idle, provided that gear (other than 1 or R) is engaged.



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- -> Check display in zone 3 in corresponding switch position.

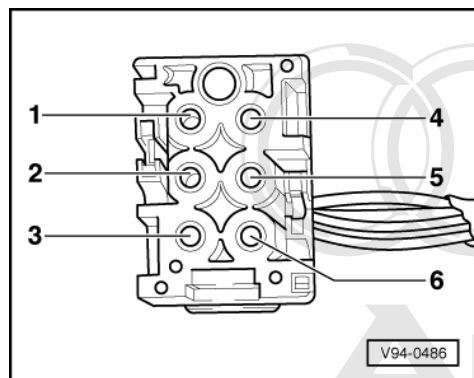
Test condition	Display zone 3
Switch A set to "OFF", engaged	000000
Switch A set to "OFF", before engagement point	000011
Switch A set to "ON"	000001
Switch A set to "ACTIV"	001001
Switch B pressed	000101
Brake pressed	010001
Clutch pressed	100001

- Terminate function "08 - Read measured value block" by touching ◀ key.
- Touch "06 - End output".
- Switch off ignition.

If readings do not match specifications:

- With ignition switched off, use adapter V.A.G 1598/5 to connect test box V.A.G 1598A to engine control unit connector only (not to control unit) => Page 71 .
- Unplug connector at CCS switch.

=> Electrical System; Repair Group 94; Servicing steering column switch Servicing steering column switch



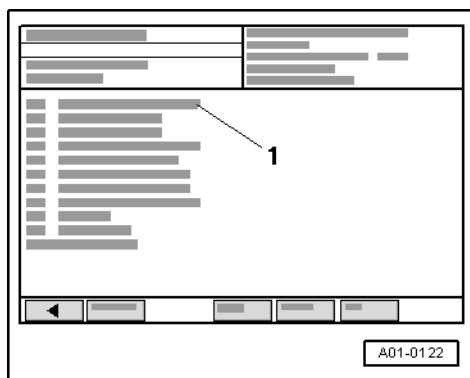
- -> Check for open circuit and short to earth/positive in the following wiring.

Connector Contact	Test box V.A.G 1598 A Socket
1	30
2	45
3	48
4	24
5 1)	To fuse 64
5 2)	To gearbox control unit
6	24

- 1) Vehicles with manual gearbox.
 - 2) Vehicles with automatic gearbox.
- Use current flow diagram to eliminate open circuit in wiring/short circuit.

If no fault is found in wiring:

- Replace cruise control switch.

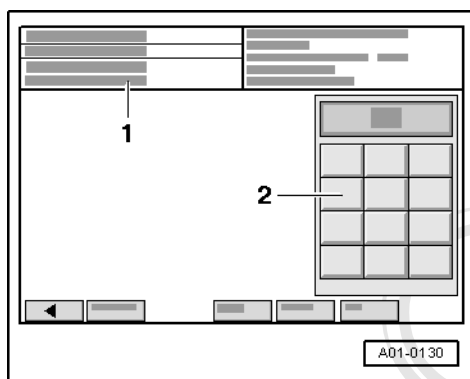


Activating cruise control system

- Connect up vehicle diagnostic, testing and information system VAS 5051 => Page 1 and select vehicle system "01 - Engine electronics" from list. Ignition must be on.

-> Readout on VAS 5051:

- From list -1- select diagnostic function "11 - Login procedure".



-> Readout on VAS 5051:

- 1 - Enter code word

Activating CCS:

- Use keypad -2- to enter "11463" and confirm entry by touching Q key.

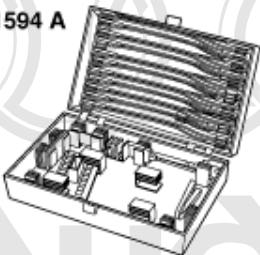
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Deactivating CCS:

- Use keypad -2- to enter "16167" and confirm entry by touching Q key.
- Terminate function "11 - Login procedure" by touching ◀ key.
- Touch "06 - End output".
- Switch off ignition.



4.6 - Checking engine speed signal

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

Special tools and workshop equipment required

- ♦ V.A.G 1526 A
- ♦ V.A.G 1594 A
- ♦ V.A.G 1598 with V.A.G 1598/5

Notes:

- ♦ The test is only necessary if there is no readout on the rev counter.
- ♦ The engine speed signal is required for the rev counter, automatic gearbox and hydraulic engine mounting.

Test sequence

- With ignition switched off, use adapter V.A.G 1598/5 to connect test box V.A.G 1598 A to engine control unit connector and also to actual engine control unit => Page 71.
- Connect multimeter to measure voltage at sockets 18 (earth) and 50 (signal) of test box V.A.G 1598 A.
- Remove dash panel insert.

=> Electrical System; Repair Group 90; Dash panel insert; Removing and installing dash panel insert
Dash panel insert Removing and installing dash panel insert

- Unplug the green 26-pin connector.
- Start engine and let it idle.
 - Specification: Approx. 4.5 ... 6 V

If reading matches specification:

- Eliminate fault in dash panel insert.

=> Electrical System; Repair Group 90; Checking components of dash panel insert; Checking engine speed signal
Checking components of dash panel insert Checking engine speed signal

If reading does not match specification:

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

Test box V.A.G 1598 A Socket	Dash panel insert Contact
50	=> Current Flow Diagrams, Electrical Fault-finding and Fitting Locations binder

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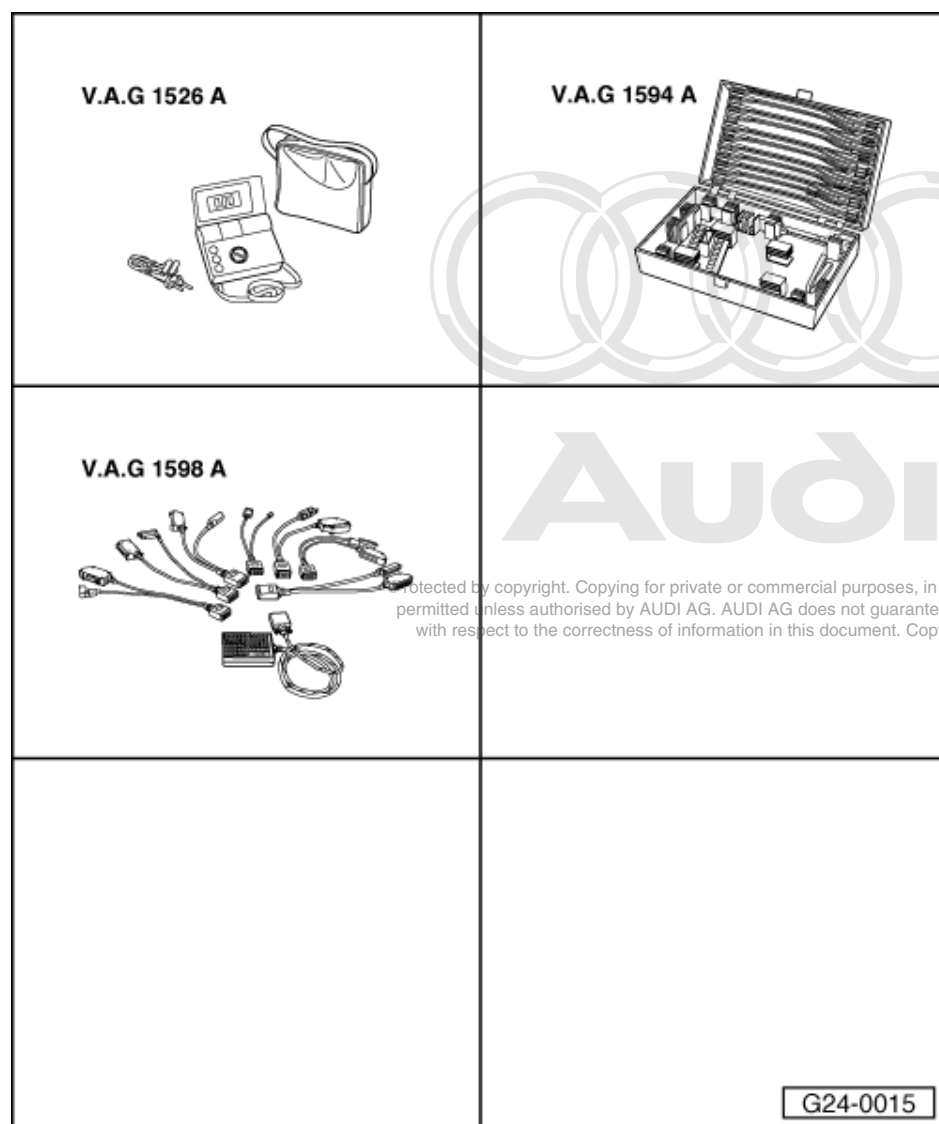
- Use current flow diagram to eliminate open circuit in wiring/short circuit.

If no fault is found in wiring:

- Replace engine control unit => Page **72** .



4.7 - Checking consumption signal for on-board computer



Special tools and workshop equipment required

- ♦ V.A.G 1526 A
- ♦ V.A.G 1594 A
- ♦ V.A.G 1598 with V.A.G 1598/5

Note:

This signal is required for the on-board computer fuel consumption indicator and for the automatic gearbox.

Test sequence

- With ignition switched off, use adapter V.A.G 1598/5 to connect test box V.A.G 1598 A to engine control unit connector and also to actual engine control unit => Page 71.
- Connect up multimeter to measure voltage between contacts 18 (earth) and 49 (signal) on test box.
- Start the engine and vary the engine speed continuously between 1000 and 4000 rpm.
 - Specification: 0.3 ... 7.0 V (depending on engine speed)

If the readout matches the specification but the consumption signal on the on-board computer or on the gearbox control unit is faulty:

- Use current flow diagram to check wiring for open circuit.

If no fault is found in wiring:

- Find the fault in the dash panel insert or in the gearbox control unit.

If reading does not match specification:

- Unplug the 10-pin connector from the on-board computer.

If reading now matches specification:

- Find fault in dash panel insert.

If reading does not match specification:

- Unplug connector from gearbox control unit.

=> Automatic Gearbox; Repair Group 37

If reading now matches specification:

- Find fault in gearbox control unit.

If reading does not match specification:

- Use current flow diagram to check wiring for short to earth or positive.

If no fault is found in wiring:

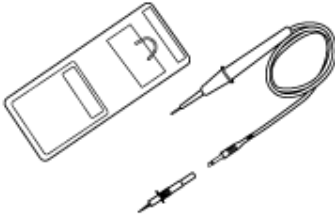
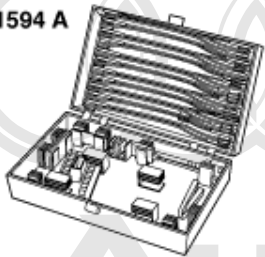
- Replace engine control unit => Page **72** .



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4.8 - Checking wiring to gearbox control unit

V.A.G 1526 A 	V.A.G 1527 B 
V.A.G 1594 A 	V.A.G 1598 A 
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G24-0019	

Special tools and workshop equipment required

- ♦ V.A.G 1526 A
- ♦ V.A.G 1527 B
- ♦ V.A.G 1594 A
- ♦ V.A.G 1598 with V.A.G 1598/5

A - Signal for gearshift

Notes:

- ♦ Perform the following test only if fault 00545: "Engine/gearbox electrical connection" is indicated.
- ♦ This signal briefly retards the ignition timing on changing gear to reduce gearshift jolt.
- With ignition switched off, use adapter V.A.G 1598/5 to connect test box V.A.G 1598 A to engine control unit connector and also to actual engine control unit => Page 71.
- Connect up voltage tester V.A.G. 1527 B between sockets 18 (earth) and 43 (signal) on test box.
- Switch on ignition.
 - LED must light

If LED lights:

- Perform the dynamic test => Page 139 .

If LED does not light:

- Unplug connector from gearbox control unit.

=> Automatic Gearbox; Repair Group 37

If LED now lights:

- Find fault in gearbox control unit.

If LED still does not light:

- Use current flow diagram to check wiring between engine control unit and gearbox control unit for shorting.-

If no fault is found in wiring:

- Replace engine control unit => Page 72 .

Dynamic testing

Attention:

To avoid risk of accident when performing measurement and test drives, pay attention to safety precautions
=> Page 42 .

- Perform test drive.
 - The LED must go out briefly during gear shifting.

If LED does not go out:

- Use current flow diagram to check wiring between engine control unit and gearbox control unit for open circuit or short to positive.

If no fault is found in wiring:

- Find fault in gearbox control unit.

B - Signal for accelerator pedal position

Notes:

- ◆ Perform the following test only if fault 00638: "Engine/gearbox electrical connection 2" is indicated.
- ◆ This signal is required for load-dependent calculation of the shift points.
- With ignition switched off, use adapter V.A.G 1598/5 to connect test box V.A.G 1598 A to engine control unit connector and also to actual engine control unit => Page 71 .
- Connect up multimeter to measure voltage between contacts 18 (earth) and 40 (signal) on test box.
- Switch on ignition.
 - Specification: 0.4 ... 0.8 V
- Slowly floor accelerator pedal.
 - Specification: Steadily rising up to 8.5 ... 10 V

If readout is not as described:

- Unplug connector from gearbox control unit.



=> Automatic Gearbox; Repair Group 37

If readings now match specifications:

- Find fault in gearbox control unit.

If readings still do not match specifications:

- Use current flow diagram to check wiring between engine control unit and gearbox control unit for open circuit or short to positive.

If no fault is found in wiring:

- Check accelerator pedal position sender => Page **118** .

If accelerator pedal sender is OK:

- Replace engine control unit => Page **72** .

C - Signal for engine speed

Notes:

- ♦ Perform the following test only if fault 00529: "Engine speed information, engine speed" is indicated.
- ♦ This signal is required to calculate the gear shift comfort.
- Perform the signal test=>Checking engine speed signal, Page **134** .

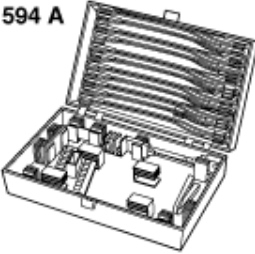
D - Signal for engine torque

Notes:

- ♦ Perform the following test only if fault 00549: "Consumption signal" is indicated.
- ♦ This signal is required to calculate the gear shift comfort.
- Perform the signal test => Checking consumption signal for on-board computer, Page **136** .

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4.9 - Checking self-diagnosis fault warning lamp -K83 - engine codes ABP and AAT up to 2nd control unit version

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

Note:

Engine control unit identification

=> from Page **3**.

Special tools and workshop equipment required

- ♦ V.A.G 1526 A
- ♦ V.A.G 1594 A
- ♦ V.A.G 1598 with V.A.G 1598/5

Test sequence

- With ignition switched off, use adapter V.A.G 1598/5 to connect test box V.A.G 1598A to engine control unit connector only (not to control unit) => Page **71**.
- Use an auxiliary lead from V.A.G 1594 A to interconnect socket 4 and socket 18 of test box.
- Switch on ignition.

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- The self-diagnosis warning lamp -K83 must light up

If warning lamp does not light:

- Use current flow diagram to check for open circuit/short in wiring.

If no fault is found in wiring:

- Find fault in dash panel insert.



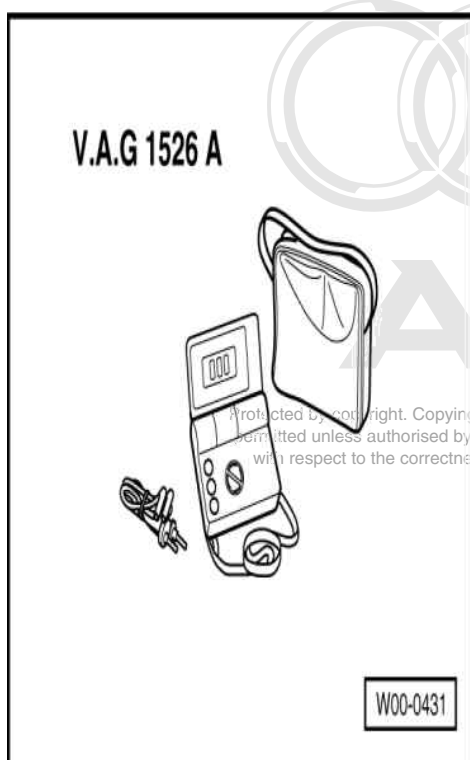
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28 - Ignition system

1 - Checking glow plug system

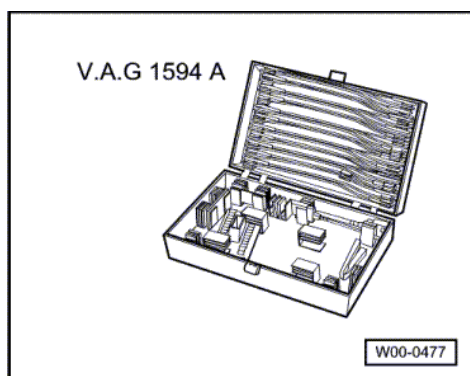
1.1 - Checking glow plug system

1.2 - Function test



Special tools and workshop equipment required

- ♦ V.A.G 1526 A

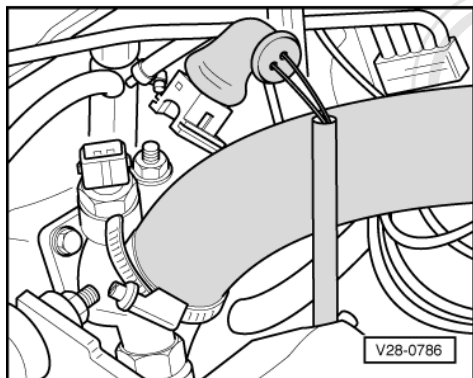


- ♦ V.A.G 1594 A



Test requirements:

- Battery voltage at least 12.7 V
- Diesel direct injection system control unit -J248 OK



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Test sequence

- -> Unplug connector from coolant temperature sender -G62.

Note:

Unplugging connector from coolant temperature sender -G62 simulates "cold" engine status and results in corresponding preheating when ignition is switched on.

- Unplug connectors from glow plugs.
- Connect up multimeter to measure voltage between a glow plug connector and engine earth.
- Switch on ignition.
 - Specification: approx. battery voltage for roughly 20 seconds

Notes:

- ♦ Glow period warning lamp -K29 must light during simulated preheating.
- ♦ If this is not the case, check glow period warning lamp -K29
=> Page 149 .

- Switch off ignition.

If reading does not match specification:

- Check fuse for glow plugs in electronics box in footwell on passenger side.

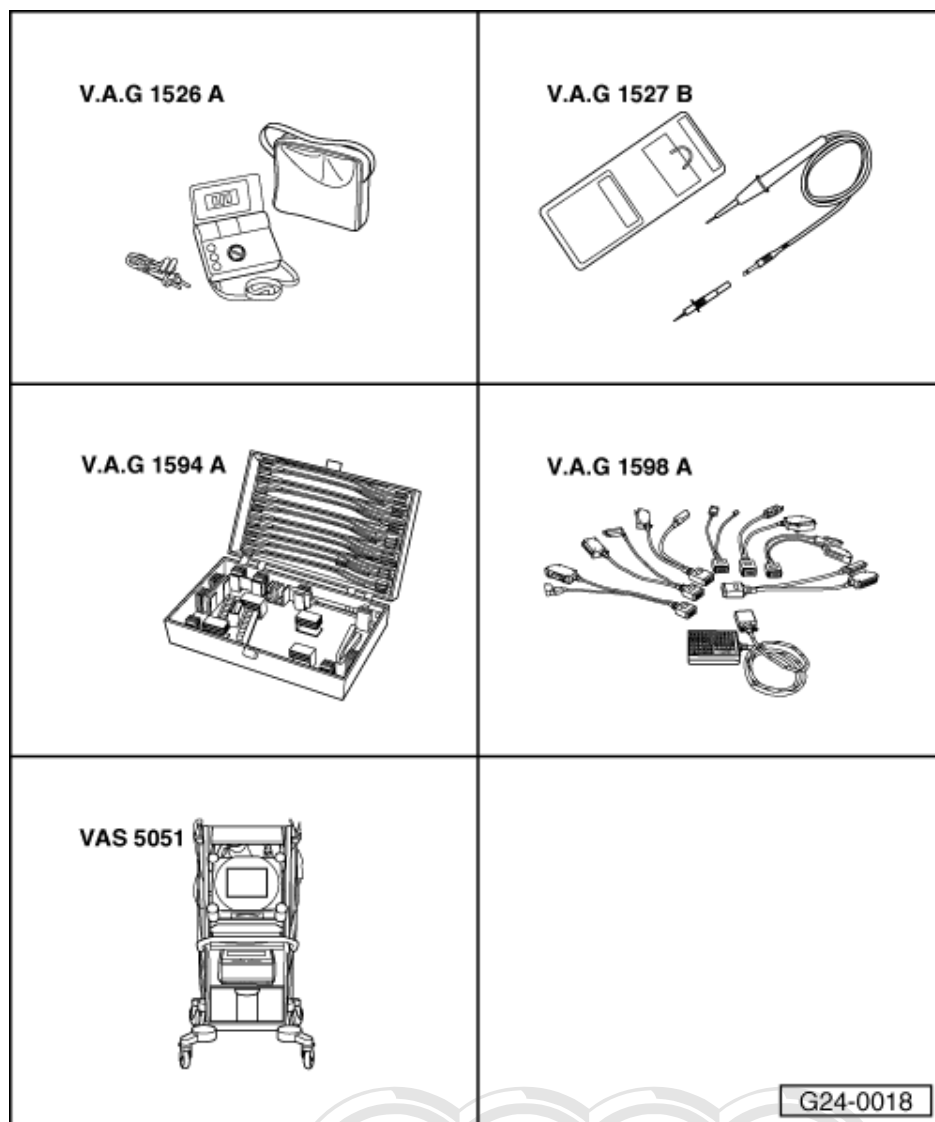
If fuse for glow plugs is OK:

- Check glow plug relay=> Page 145 .

If no fault is found but engine only starts after several seconds at very low temperatures:

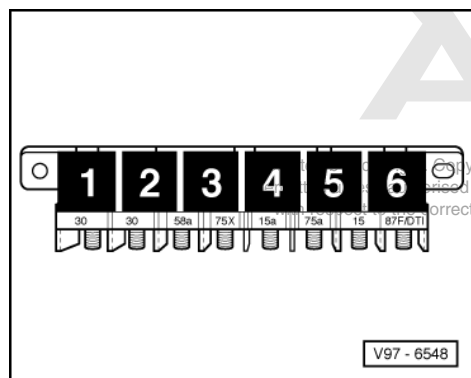
- Check glow plugs => Page 148 .

1.3 - Checking glow plug relay -J52 and actuation



Special tools and workshop equipment required

- ◆ V.A.G 1526 A
- ◆ V.A.G 1527 B
- ◆ V.A.G 1594 A
- ◆ V.A.G 1598 with V.A.G 1598/5
- ◆ VAS 5051 with VAS 5051/1 and VAS 5051/2



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**Note:**

-> Glow plug relay -J52 is located at socket 4 in the central electrics underneath the dash panel on the driver's side.

Test requirement:

- Battery voltage at least 12.7 V

Checking operation of glow plug relay

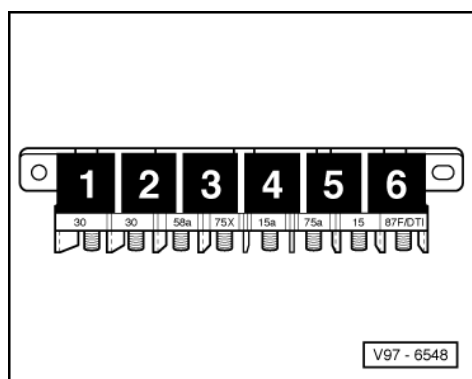
- Unplug connectors from glow plugs.
- Connect up voltage tester V.A.G 1527 B to one glow plug connector and engine earth.
- Remove driver's storage compartment.

=> General Body Repairs; Repair Group 70; Dash Panel Dash Panel

- Connect up vehicle diagnostic, testing and information system VAS 5051 => Page 1 and select vehicle system "01 - Engine electronics" from list. Ignition must be on.
- Initiate final control diagnosis and actuate glow plug relay
=> Page 18 .
 - Glow plug relay pick-up must be heard and felt; LED must light
- Terminate function "03 - Final control diagnosis" by touching ◀ key.
- Touch "06 - End output".
- Switch off ignition.

A - If relay does not pick up:

- Check power supply of glow plug relay => Page 146 .
- Check actuation of glow plug relay => Page 147 .



B - If relay is energized but LED does not light:

- -> Remove relay (socket 6) from central electrics underneath dash panel on driver's side.
- Check wiring from relay socket terminal 30/87 via fuse for glow plugs S39 (in electronics box in footwell on passenger side) to glow plugs.
- Check power supply of glow plug relay => Page 146 .

Checking power supply of glow plug relay

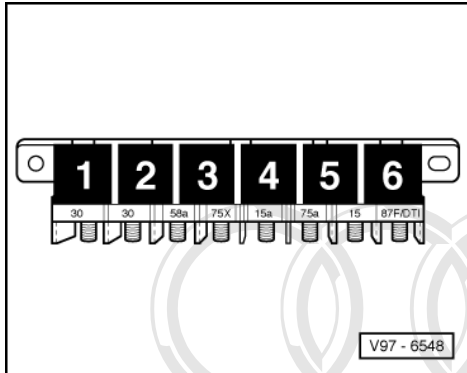
- Connect up multimeter to measure voltage at contact 32/30 of relay socket and earth.
 - Specification: approx. battery voltage
- Connect up multimeter to measure voltage at contact 28/15 of relay socket and earth.
 - Specification: approx. battery voltage
- Switch on ignition.
- Switch off ignition.

If readings do not match specifications:

- Replace central electrics.

Checking switched earth connection of glow plug relay

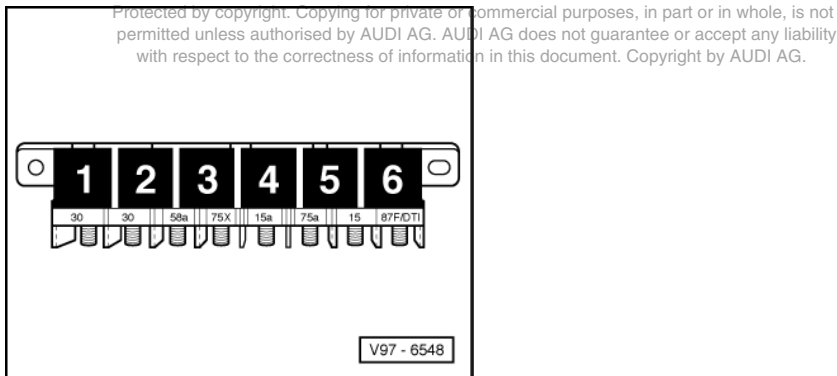
- Voltage supply to glow plug relay -J51 OK
- Reinsert relay.
- With ignition switched off, use adapter V.A.G 1598/5 to connect test box V.A.G 1598A to engine control unit connector only (not to control unit) => Page 71 .
- Use leads from adapter set V.A.G 1594 A to jumper contacts 8 and 18 at test box.



- Switch on ignition.
 - -> Glow plug relay (in central electrics underneath dash panel in driver's side footwell, socket 6) must pick up

If relay now picks up, but not during final control diagnosis:

- Replace engine control unit => Page 72 .



If relay does not pick up:

- Switch off ignition.
- Disconnect cable jumper.
- -> Remove relay (socket 6) from central electrics underneath dash panel on driver's side.
- Check for open circuit and short to earth/positive in the following wiring:

Central electrics underneath dash panel on driver's side, socket 6	Test box V.A.G 1598 A
Contact	Socket
29/S	8

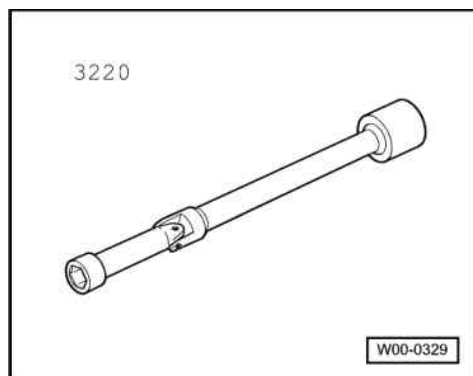
- Use current flow diagram to eliminate open circuit in wiring/short circuit.



If no fault is found:

- Replace glow plug relay.
- Reconnect engine control unit.

1.4 - Checking glow plugs



Special tools and workshop equipment required

- ♦ Jointed spanner 3220
- ♦ 2 test leads, minimum cross section 2.5 mm²

Test sequence

- Switch off ignition.
- Use jointed spanner 3220 to remove glow plugs.
- Place glow plug to be checked on a fireproof surface.
- Connect glow plug pin to positive terminal of a charged 12 V battery.
- Connect glow plug thread to negative terminal of battery.

Notes:

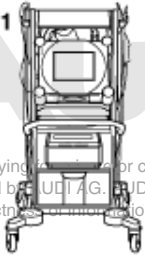
- ♦ For connection of glow plug, use wires with a minimum cross section of 2.5 mm².
- ♦ The wires must be provided with robust terminals.

- Observe glow plug operation.
- Replace glow plug if it does not glow or if only a part of the element glows.

Tightening torque

Component	Nm
Glow plugs	15

1.5 - Checking glow period warning lamp -K29

V.A.G 1526 A 	V.A.G 1594 A 
V.A.G 1598 A 	VAS 5051 
	G24-0017

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Special tools and workshop equipment required

- ◆ V.A.G 1526 A
- ◆ V.A.G 1594 A
- ◆ V.A.G 1598 with V.A.G 1598/5
- ◆ VAS 5051 with VAS 5051/1 and VAS 5051/2

Vehicles with engine codes AAT, AEL:

- Initiate final control diagnosis and actuate glow period warning lamp -K29 => Page 18 .
- ◆ The warning lamp is actuated intermittently (flashes) until ▶ key is touched to terminate final control diagnosis.
- Terminate function "03 - Final control diagnosis" by touching ◀ key.
- Touch "06 - End output".
- Switch off ignition.



All:

If warning lamp does not light:

- Check bulb for glow period warning lamp -K29 in dash panel insert.

=> Electrical System; Repair Group 90; Dash panel insert; Assignment of bulbs in dash panel insert Dash panel insert Assignment of bulbs in dash panel insert

Check wiring if bulb in dash panel insert is OK.

- With ignition switched off, use adapter V.A.G 1598/5 to connect test box V.A.G 1598 A to engine control unit connector and also to actual engine control unit => Page **71** .
- Use an auxiliary lead from V.A.G 1594 A to interconnect socket 11 and socket 18 of test box.
- Switch on ignition.
 - Glow period warning lamp -K29 must light

If warning lamp does not light:

- Use current flow diagram to eliminate open circuit in wiring/short circuit.
- If wiring is OK, then fault is to be found in dash panel insert.

=> Electrical System; Repair Group 90; Dash Panel Insert Dash Panel Insert



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