Audi A4 2001 ➢

Simos injection and ignition system (4-cyl.)									
Engine ID	ALZ								

Edition 10.2001

List of Workshop Manual Repair GroupsList of Workshop Manual Repair GroupsList of Workshop Manual Repair Groups

Audi A4 2001 ➤

Simos injection and ignition system (4-cyl.)

Repair Group

24 - Mixture preparation, Injection

28 - Ignition system

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.

Contents

24 - Mixture preparation, Injection

1 - Servicing Simos injection system

1.1 - Servicing Simos injection system

1.2 - Safety precautions

Note the following points if test equipment has to be used during a road test:

Warning
- **Test equipment must always be secured on the rear seat and operated from the rear seat by a second person.**
- **If test equipment is operated from the front passenger seat, the occupant could be injured by the passenger's airbag in an accident.**

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

- Always switch off the ignition before connecting or disconnecting injection or ignition system wiring or tester cables.

- In order to run the engine at starting speed without actually starting it (for example, to test compression), unplug the connectors on the ignition coils and also the connectors on the injectors.
- During some of the tests the control unit may identify and record faults. The fault memory should therefore be interrogated and (if necessary) erased after completing the tests and any repair work that may be required.
- Always switch off the ignition before cleaning the engine.
- Always switch off the ignition before connecting or disconnecting the battery, otherwise the engine control unit may be damaged.

Warning
Fuel system is under pressure. Before opening the system place a cloth around the connection. Then release pressure by carefully loosening the connection.

1.3 - Rules for cleanliness

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

- Thoroughly clean all unions and the adjacent areas before disconnecting.
- Place parts that have been removed on a clean surface and cover them over. Do not use fluffy cloths.
- Carefully cover or seal opened components if the repair cannot be completed immediately.
- Only install clean components:
  Only unpack replacement parts immediately prior to installation.
  Do not use parts that have been stored loose (e.g. in tool boxes etc.).
- When the system is open:
  Do not work with compressed air if this can be avoided.
  Do not move vehicle unless absolutely necessary.
- Electrical connectors:
  Protect against dirt and moisture when disconnected.

Make sure they are dry before re-connecting.

1.4 - Technical data

Engine code		ALZ (1.6 ltr / 75 kW engine) emission standard EU IV
Idling speed1) Not adjustable - controlled by idling speed stabilisation		700 ... 840 rpm
Engine rpm limiter1) closes throttle valve shuts off injectors		6500 rpm 6800 rpm
Fuel pressure at idling speed	Vacuum hose connected	approx. 3.5 bar
	Vacuum hose disconnected	approx. 4.0 bar
Holding pressure after 10 minutes		at least 2.5 bar
Injectors	Spray pattern	same on all injectors
	Injection qty. (30 sec.)	85... 105 ml
	Resistance (room temperature)	14 ... 17 ω

1) For updates, see Exhaust Emissions Test

1.5 - Fitting locations overview

Components A to E are not shown in the exploded view.

A - Accelerator pedal position sender (-G79) and accelerator pedal position sender 2 (-G185)

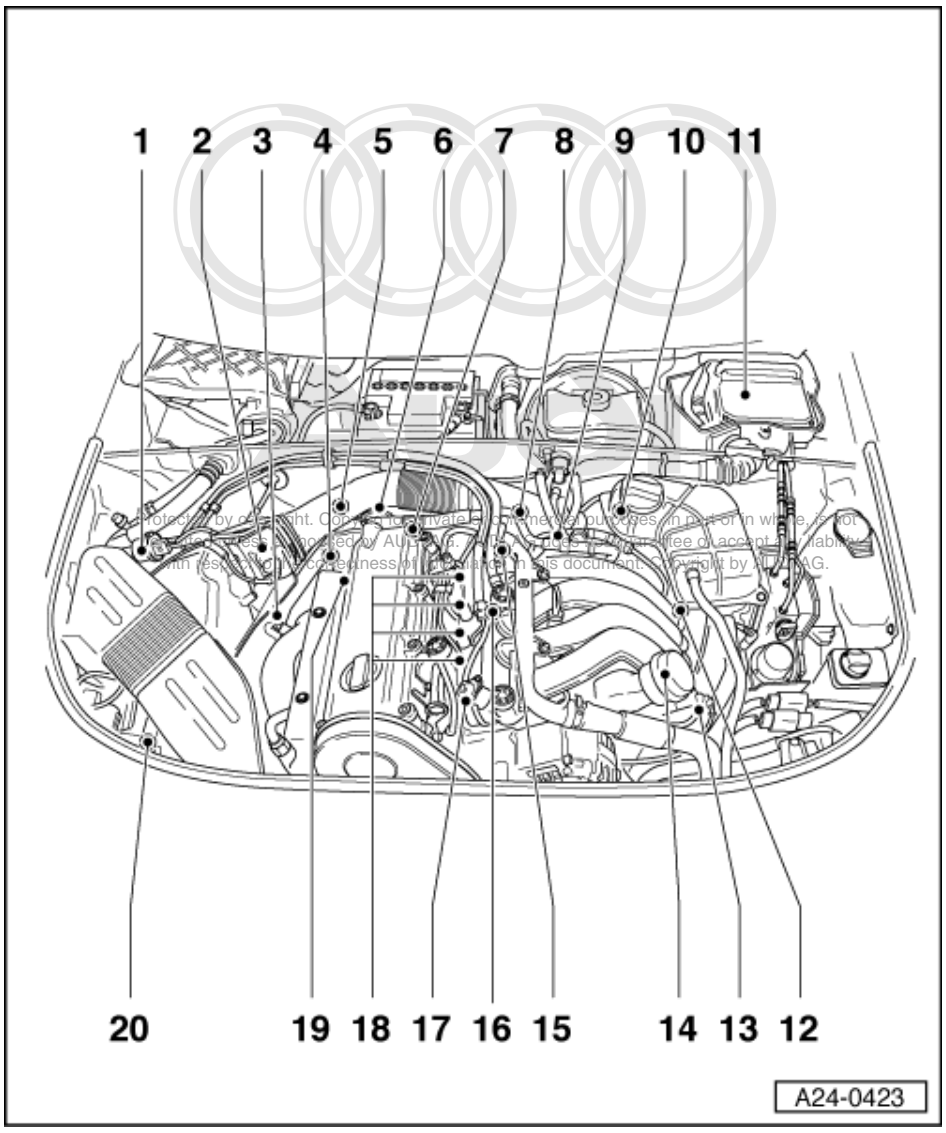
- In footwell on accelerator pedal

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

- In footwell on brake pedal
- Combined in one component

C - Clutch pedal switch -F36

- In footwell on clutchpedal



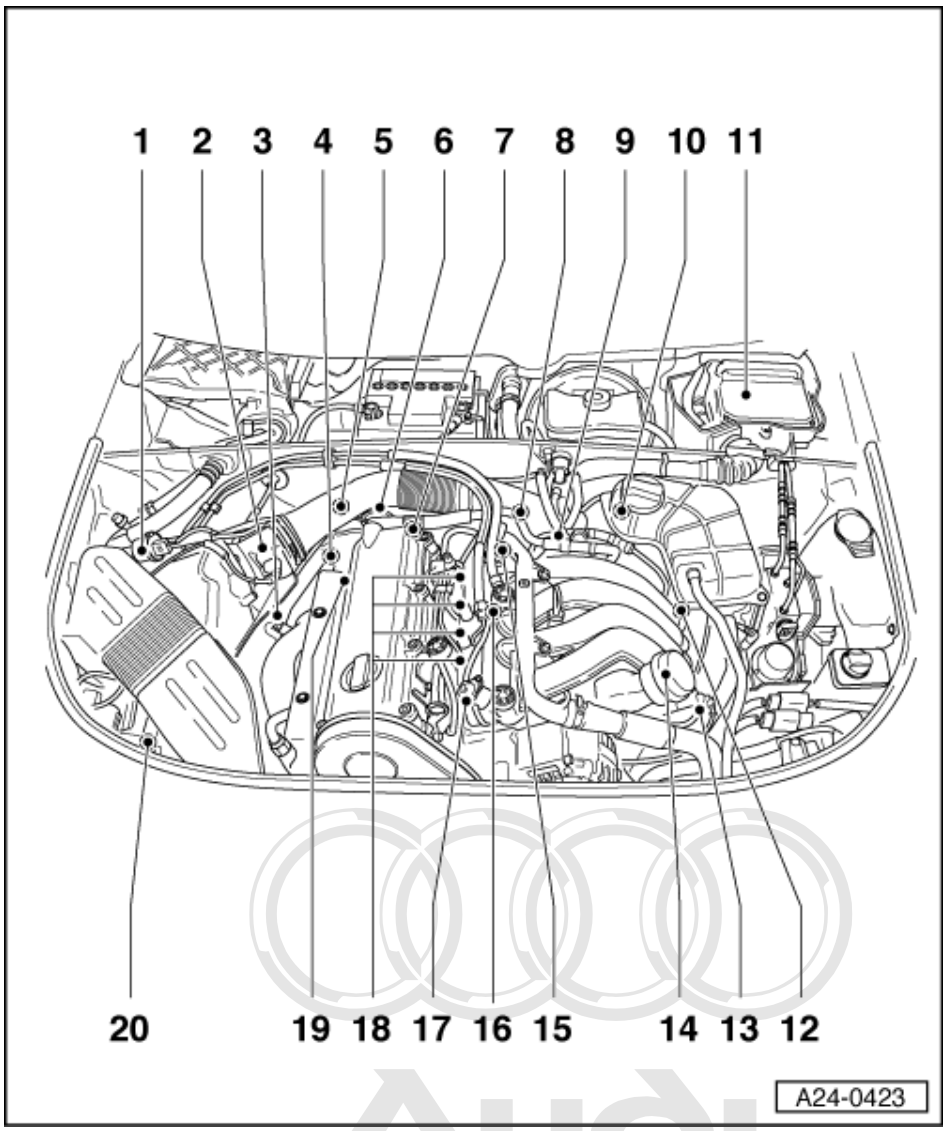
D - Electronic power control fault lamp -K132

- In instrument cluster

E - Exhaust emissions warning lamp -K83 MIL (Malfunction Indicator Lamp)

- In instrument cluster

1 Activated charcoal filter solenoid valve 1 -N80
2 Air mass meter -G70



3 Lambda probe (before catalytic converter) -G39

4 Lambda probe (after catalytic converter) -G130

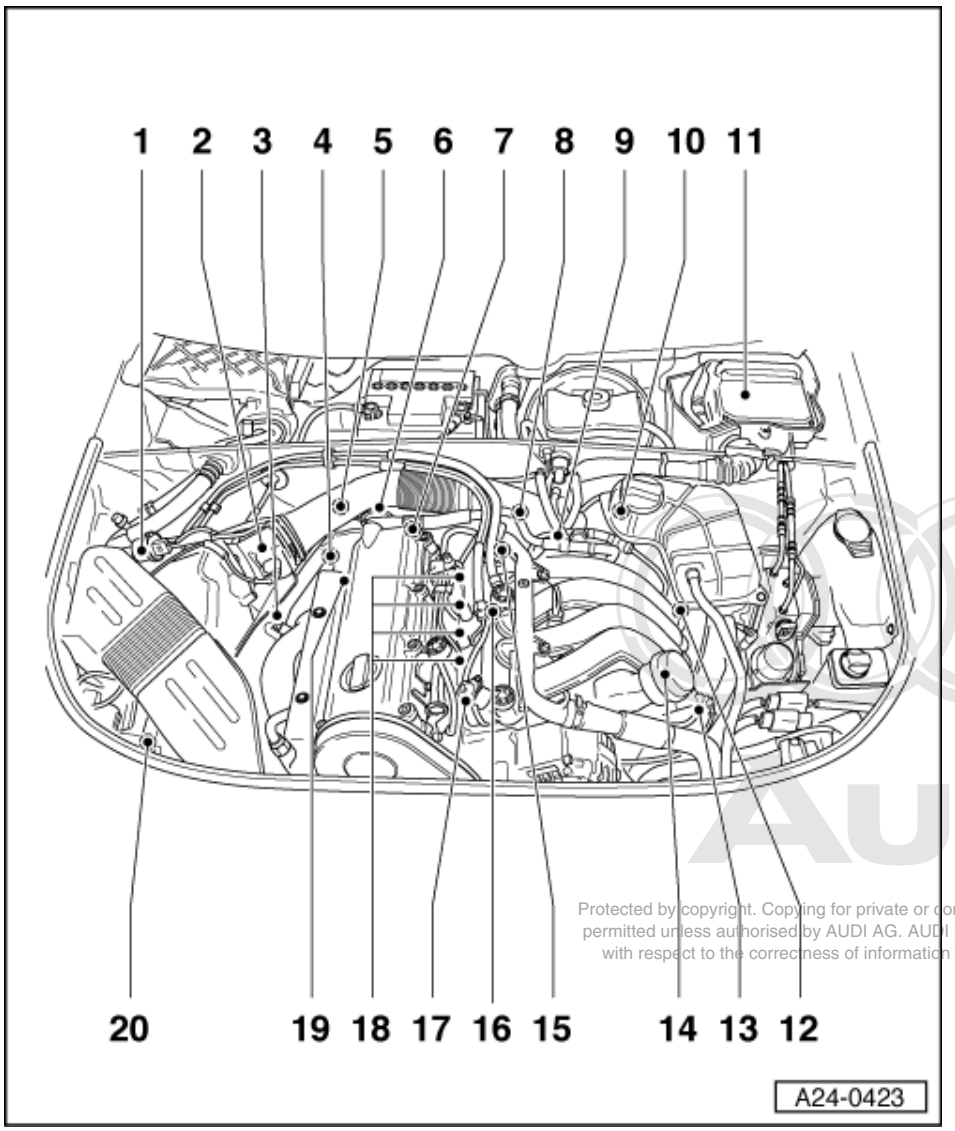
5 Exhaust gas recirculation valve -N18

6 Combination valve for secondary air system

7 Coolant temperature sender -G62

8 Ignition coils (N and N128) with output stage (N122)

- Tightening torque for securing bolts: 9 Nm.

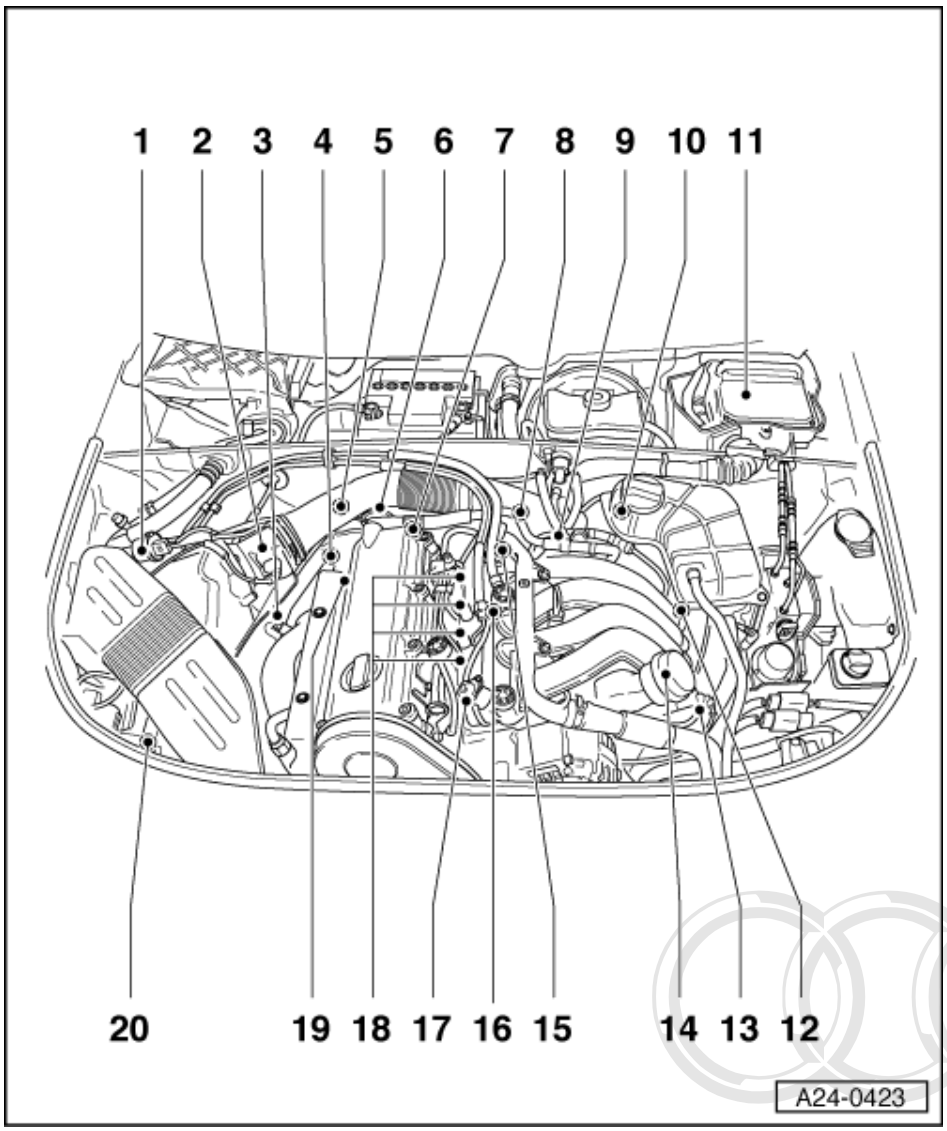


9 Throttle valve control part -J338

- With throttle valve drive -G186, angle sender for throttle valve drive -G187 and angle sender 2 for throttle valve drive -G188

10 4 pin connector

- For lambda probe (after catalytic converter) -G130 and lambda probe heating -Z29 (brown)
- For lambda probe (before catalytic converter) -G39 and lambda probe heating -Z19 (black)
- For engine speed sender -G28 (grey)
- For knock sensor 1 -G61 (green)
- Fitting location
  => Fig. 8



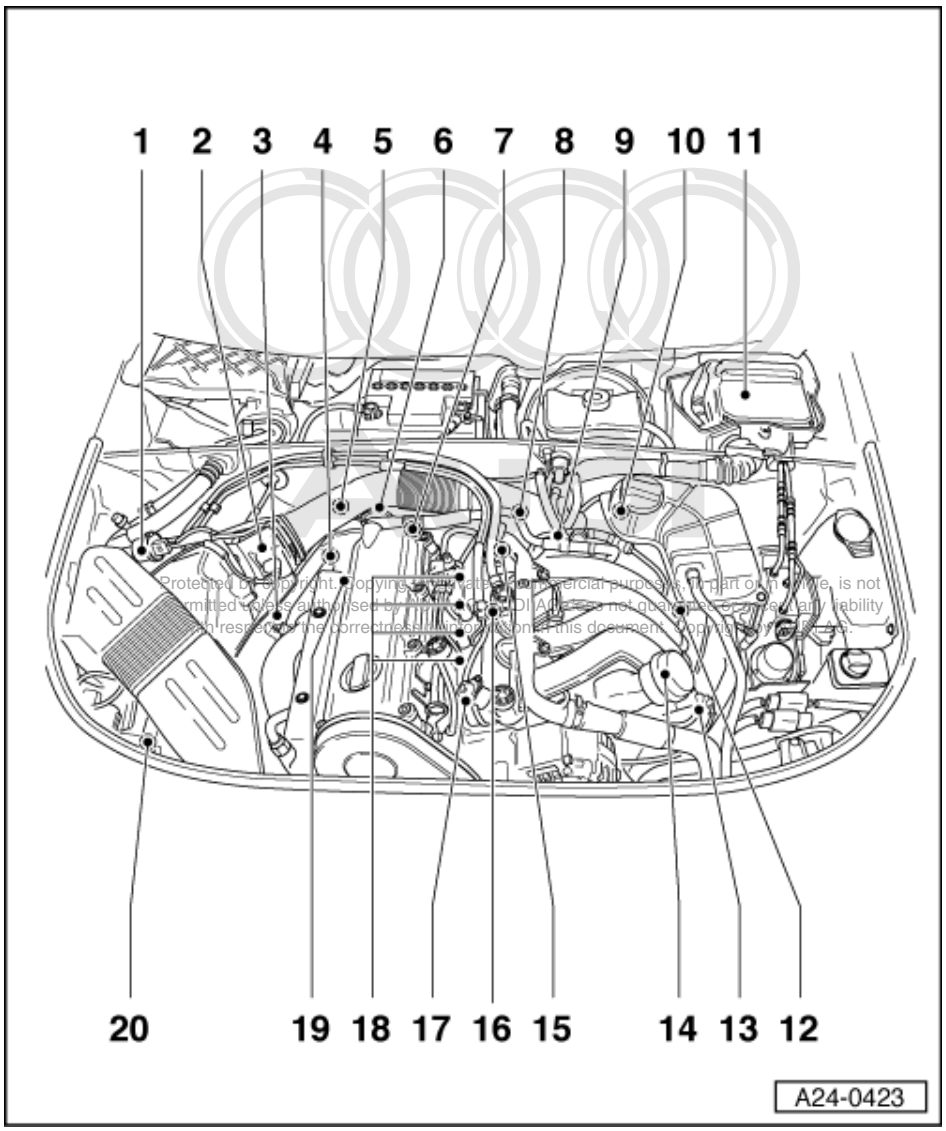
11 Engine control unit -J361

- Engine control unit -J361
- Control unit for automatic gearbox
- Secondary air pump relay -J299
- Current supply relay (terminal 15) -J363 for engine control unit

12 Secondary air inlet valve -N112

13 Intake manifold change-over valve -N156

14 Vacuum unit for intake manifold change-over function



15 Engine speed sender -G28

16 Knock sensor 1 -G61

17 Fuel pressure regulator

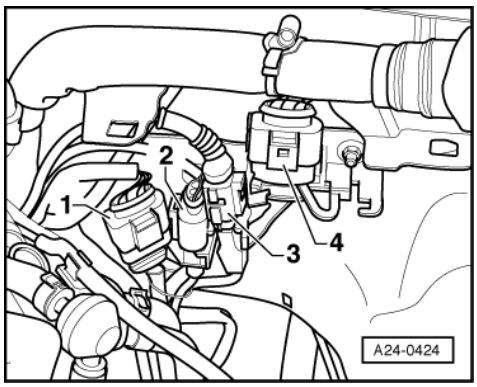
18 Injectors (N30...N33)

19 3 pin connector

- For phase sensor (Hall sender) -G40

20 Secondary air pump motor -V101

- Below longitudinal member

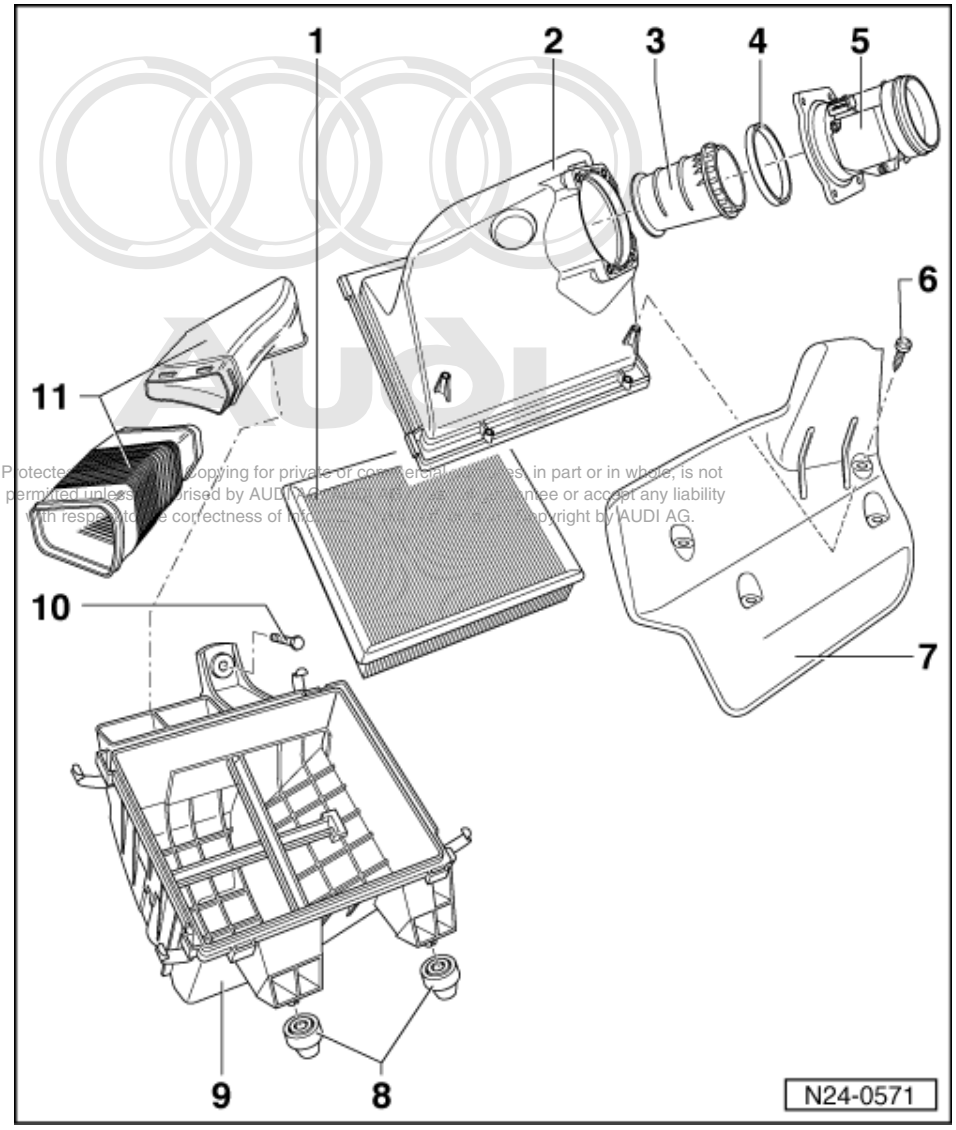


-> Fig.1 Fitting location of connectors

The following connectors are located underneath the coolant expansion tank:

1 - For lambda probe 1, (after catalytic converter) and heating (black)
2 - For engine speed sender -G28 (grey)
3 - For knock sensor 1 -G61 (green)
4 - For lambda probe 2, (before catalytic converter) and heating (brown)

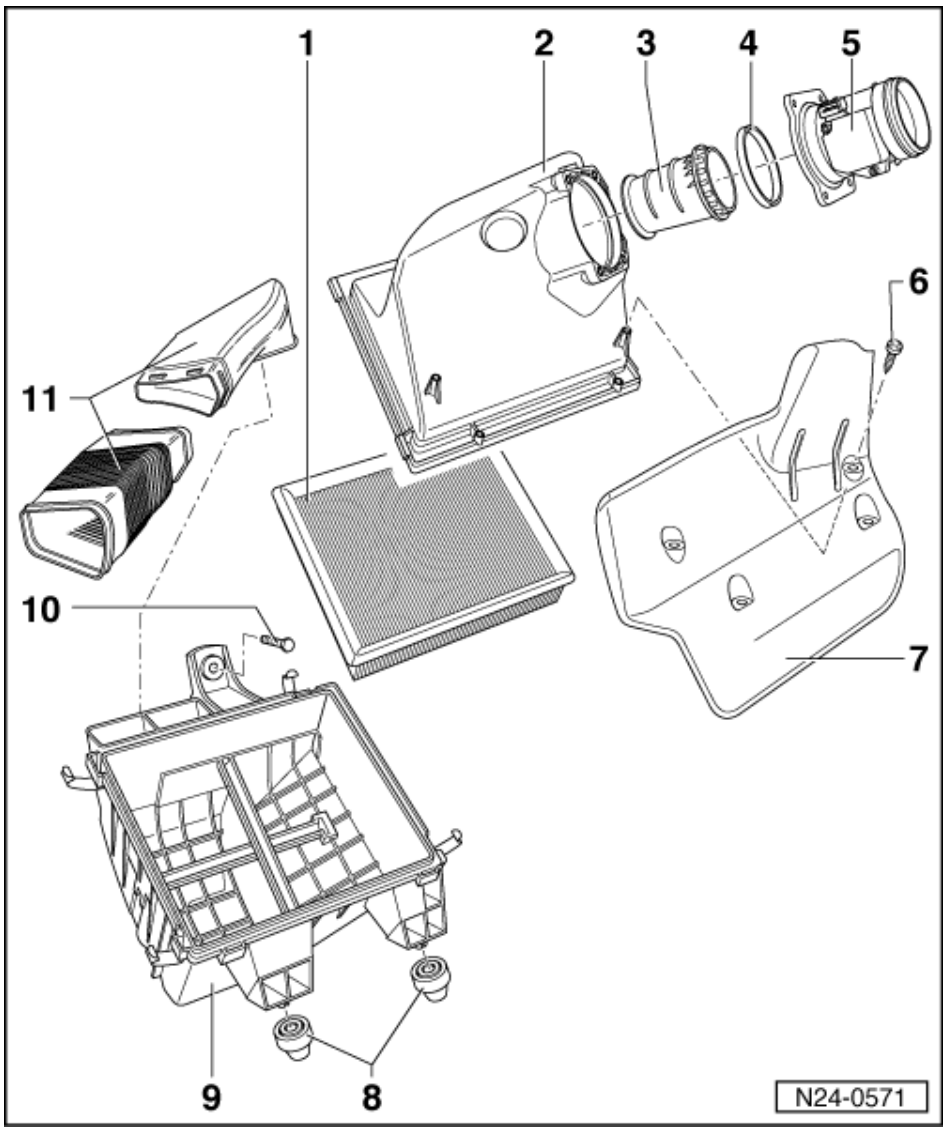
1.6 - Dismantling and assembling air cleaner



1 Filter element
2 Air cleaner upper part
3 Air duct
4 Gasket
- Renew if damaged

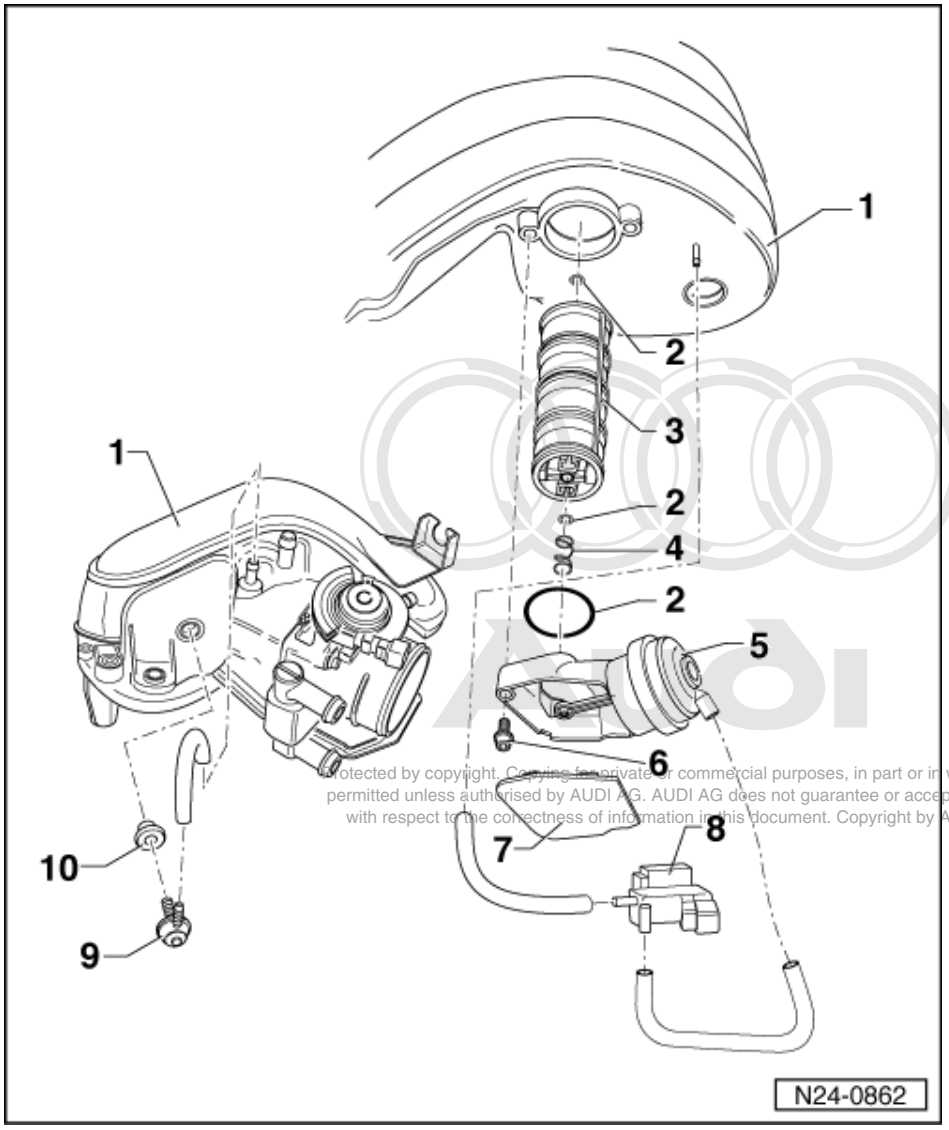
5 Air mass meter -G70
- With intake air temperature sender -G42
- Tighten securing bolts to 6 Nm

6 2 Nm
7 Heat shield



8 Packing
9 Air cleaner lower part
10 20 Nm
11 Air ducting
- To lock carrier

1.7 - Removing and installing parts of intake manifold change-over

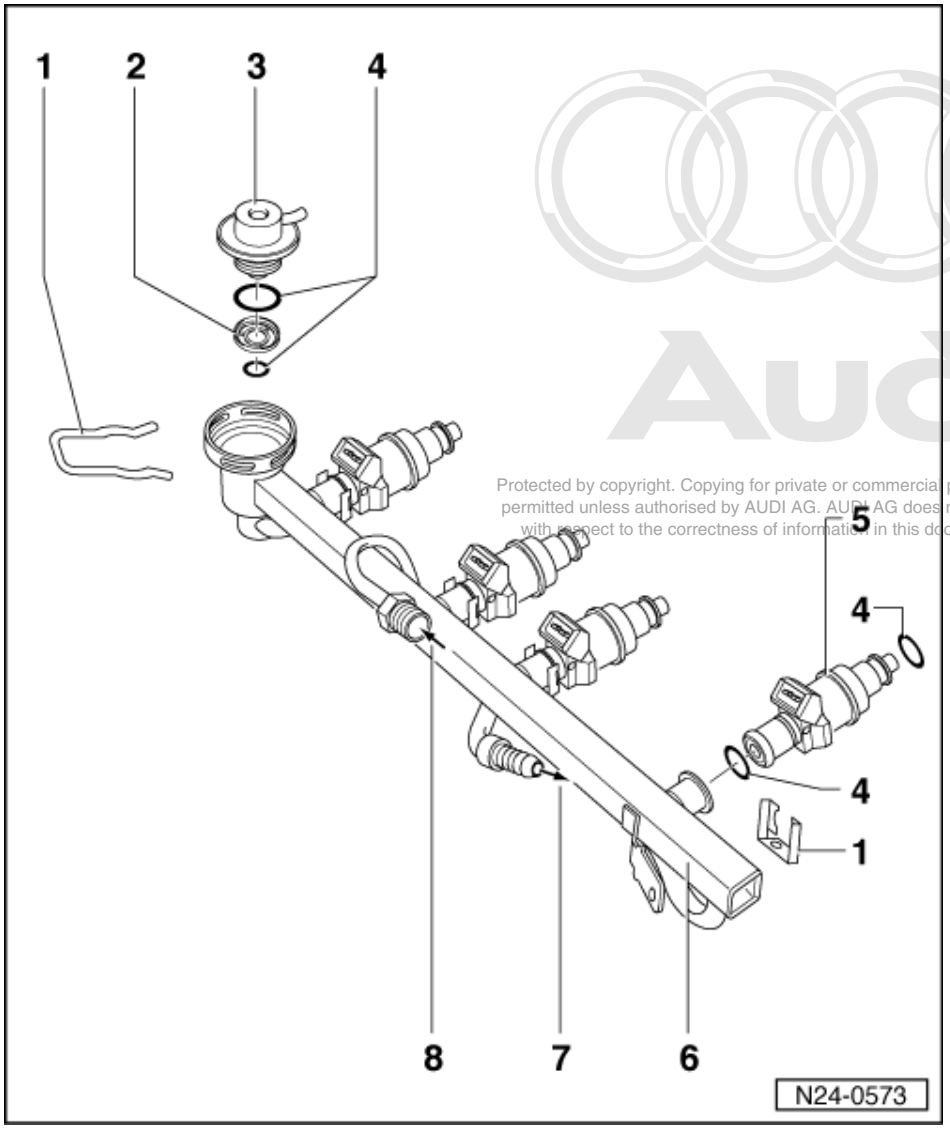


1 Intake manifold
2 Seal
- Renew if damaged

3 Change-over barrel
4 Spring
5 Vacuum control element
6 10 Nm
7 Cover
8 Intake manifold change-over valve (N156)
9 Non-return valve
- Installation position: Grey side faces intake manifold

10 Rubber grommet

1.8 - Dismantling and assembling fuel rail



1 Retaining clip
- Check securely seated

2 Strainer

3 Fuel pressure regulator

4 O-ring
- Renew if damaged

5 Injectors (N30...N33)

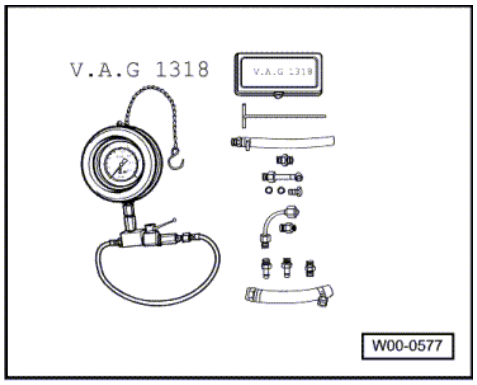
6 Fuel rail

7 Return flow connection

8 Supply connection

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

Special tools and workshop equipment required



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

Note:

The fuel pressure regulator regulates the fuel pressure according to the intake manifold pressure. This ensures that the drop in pressure at the injectors remains the same throughout all engine speed and engine load ranges.

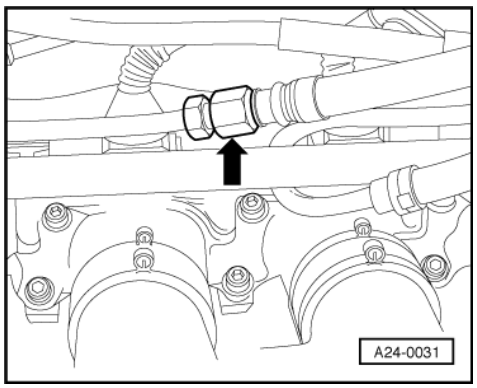
Requirements for test:

- Fuel pump relay OK
- Fuel filter OK
- Battery voltage not less than 11 V

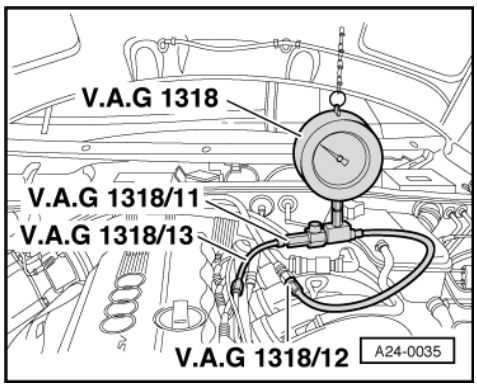
Warning
Fuel system is under pressure. Before opening the system place a cloth around the connection. Then release pressure by carefully loosening the connection.

Testing system pressure

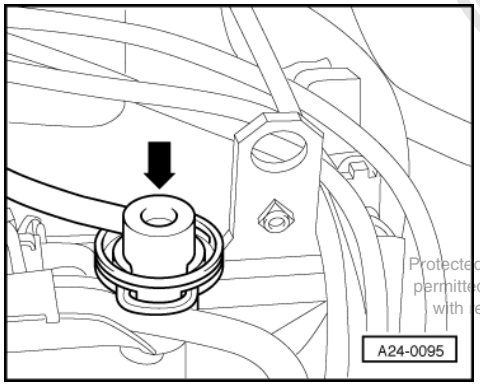
- Briefly open fuel tank filler cap (to release pressure).
- Remove engine cover panels.



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



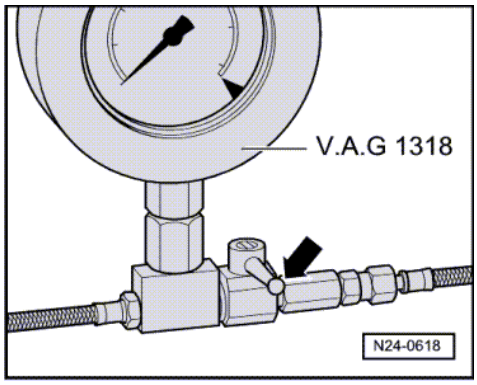
- -> Open cut-off valve on pressure gauge (valve handle points in direction of flow).
- Start the engine and run at idling speed.
- Measure fuel pressure.
  - Specification: approx. 3.5 bar



- -> Disconnect vacuum hose from fuel pressure regulator.
  - The fuel pressure should rise to approx. 4.0 bar.
- Switch off ignition.
- Check leak-tightness and holding pressure by watching the drop in pressure on the pressure gauge.
  - After 10 minutes there should still be a pressure of at least 2.5 bar.

If the holding pressure drops below 2.5 bar:

- Start the engine and run at idling speed.



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

If the pressure does not drop:

- Check fuel pump non-return valve.

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

If the pressure does not drop:
- Renew fuel pressure regulator.

If the pressure drops again:
- Check pipe connections, O-rings on fuel manifold and injectors for leaks.
- Check pressure gauge for leaks.
- Re-connect the vacuum hose to the fuel pressure regulator.

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

1.10 - Checking injection quantity, leak-tightness and spray pattern of injectors

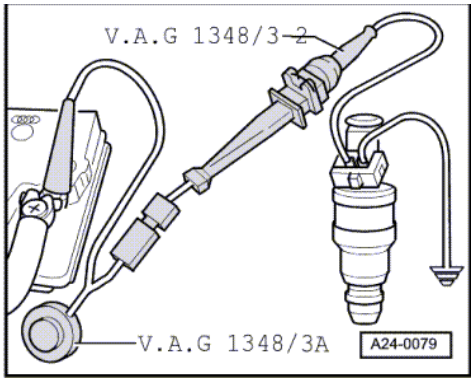
Test requirement:
- Fuel pressure OK

Test sequence
- Remove fuel rail (together with injectors) from intake manifold. Do not disconnect the fuel hoses.
- Connect test box V.A.G 1598/31 to wiring harness for engine control unit. Do not connect to the engine control unit itself.
  => Page 17 .
- Bridge contacts 1 and 80 on the test box using test leads from adapter set V.A.G 1594 A. (This creates an earth connection to one side of the fuel pump relay coil.)

Testing for leaks
- Switch ignition on.

Note:
After the ignition is switched on the fuel pump will run continuously even when the engine has not been started. This is because the fuel pump relay is connected to positive via the central electrics unit when the ignition is switched on and to earth via the bridge connection in the test box.
- Check injectors for leaks (visual check). When the fuel pump is running, only 1 or 2 drops should escape per minute from each injector.
- If a greater amount of fuel escapes, switch off the fuel pump (turn off ignition) and replace the faulty injector following the notes on => Page 16 .

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



- -> Connect one of the injector contacts to engine earth using test lead and crocodile clamp from V.A.G 1594 A.
- Connect second injector contact to positive using remote control V.A.G 1348/3 A, adapter cable V.A.G 1348/3-2 and auxiliary cable.
- Switch ignition on.
  - The fuel pump should run.
- Activate remote control V.A.G 1348/3A for 30 seconds.
- Carry out measurement on all injectors.

- Once all four injectors have been actuated, place measuring glasses on a level surface.
  - Specification for each injector: 85...105ml
- If the measured value for one or more of the injectors is outside the tolerance range, switch off the fuel pump (by turning off ignition) and replace the defective injector.

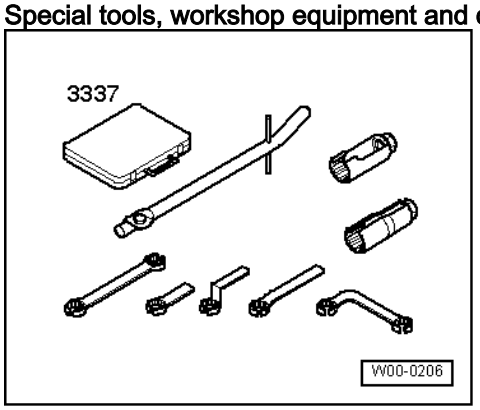
Note:
When checking the injection quantity, also check the spray pattern. The spray pattern should be the same for all the injectors.
- Install injectors together with fuel rail, noting the following points.

- Renew the O-rings at all opened connections. (When renewing the front O-ring, make sure not to remove the plastic cap from the injector head. The O-ring must be pulled off over the plastic cap.)

- Moisten the O-rings with clean engine oil.
- Make sure that the injectors are installed in the correct positions.
- Check to make sure that the retainer clamps are properly seated.
- Position fuel rail together with injectors (properly secured) against intake manifold and press into place evenly all round.

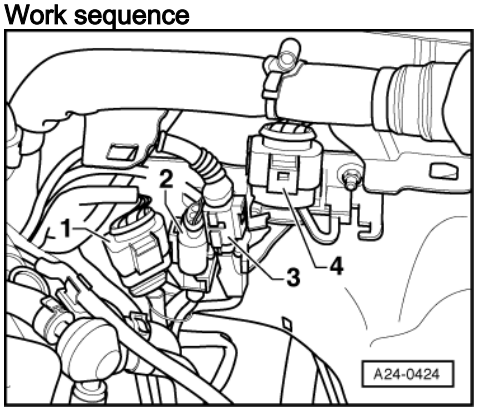
1.11 - Removing and installing lambda probe

Special tools, workshop equipment and other materials required



- Ring spanner set 3337
- Hot paste G 052 112 A3

Work sequence



- -> Unplug 4-pin connector for lambda probe and move wiring clear.

  1 - (black) for lambda probe (before catalytic converter) -G39
  4 - (brown) for lambda probe (after catalytic converter) -G130

- Unscrew lambda probe using special tool 3337.

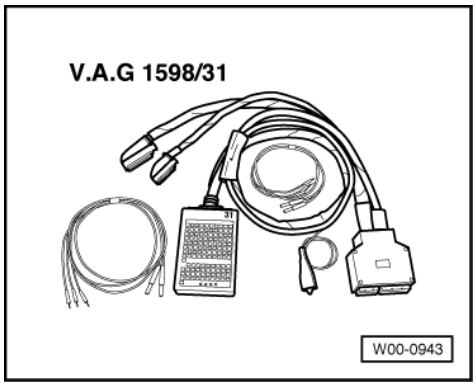
When installing, note the following points:

Notes:

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

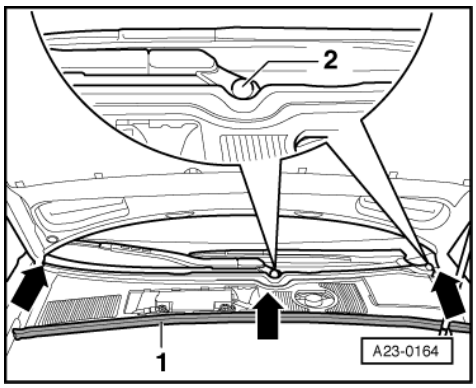
1.12 - Wiring and component check with test box V.A.G 1598/31

Notes:

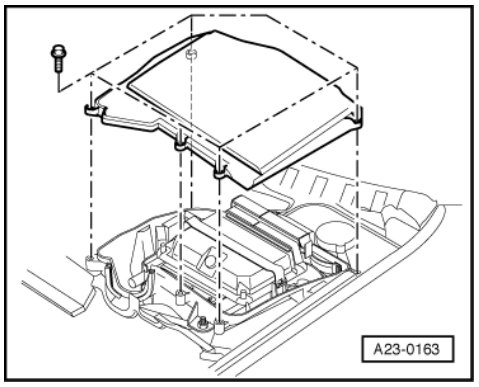


- Test box V.A.G 1598/31 is designed so that it can be connected to the wiring harness for the engine control unit and to the engine control unit itself at the same time.
- This has the advantage of enabling the engine management system to remain fully operational even with the test box connected (for example, when testing signals while the engine is running).
- The instructions for performing the individual tests indicate whether or not the engine control unit itself also needs to be connected to the test box.
- If the engine control unit has a protective metal casing, this must be detached from the control unit in order to connect the test box.
  Refer to => Page 21 for the necessary procedure.
  The metal casing must be re-fitted after completing the repair.

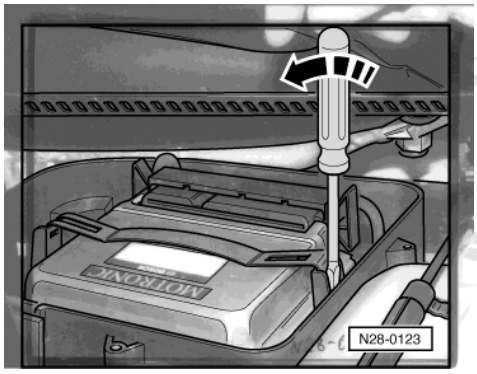
Removing engine control unit



- Switch off ignition.
- -> Pull off rubber seal -1- from plenum chamber to the front.
- Detach plenum chamber cover.
- Remove both windscreen wiper arms -2- (mark positions before removal).
- Unclip scuttle panel trim (see arrows).

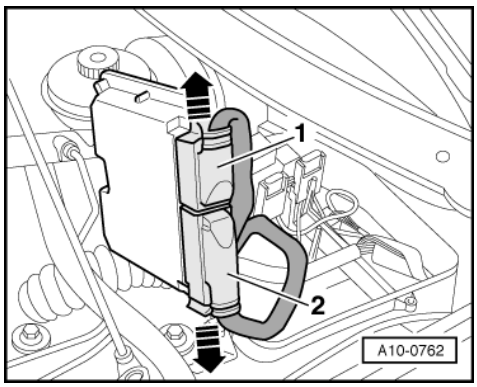


- -> Remove control unit housing cover.

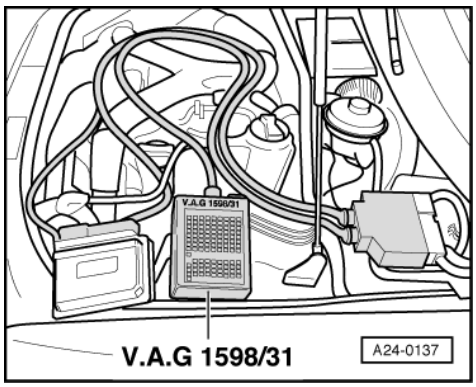


- -> Carefully lever off the retainer bar with a screwdriver -arrow-.

Warning!
To prevent damage to the electronic components, switch to the respective measuring range before connecting the measuring cable and observe the test prerequisites.



- -> Release retainer catch -arrows- and unplug connectors -1- and -2- from control unit.
- Take out engine control unit.



- -> Connect test box V.A.G 1598/31 to wiring harness connector. Also connect earth clamp on test box to battery negative terminal. The instructions for performing the individual tests indicate whether or not the engine control unit itself also needs to be connected to the test box.
- Carry out test as described in the repair instructions.

Perform the following work after reconnecting engine control unit:

- Interrogate fault memory and erase if necessary

=> VAS 5051 vehicle diagnostic, testing and information system

1.13 - Renewing engine control unit

The following procedure applies to engine control units not fitted with a protective metal casing. Refer to => Page 21 for engine control units with protective metal casing.

Note:

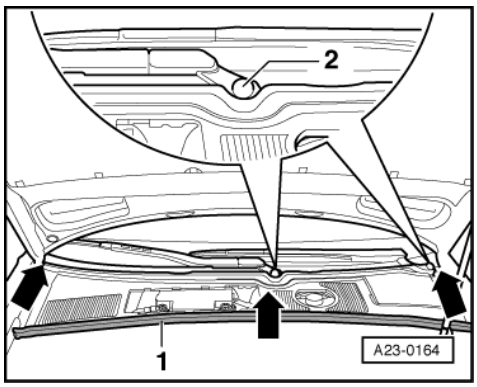
When the engine control unit is disconnected the learned values are erased but the contents of the fault memory remain intact.

Removing engine control unit

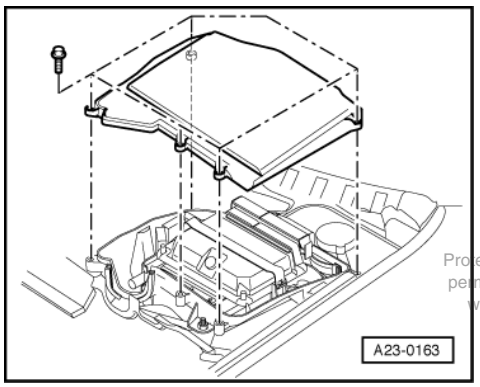
- Connect vehicle diagnostic, testing and information system VAS 5051 with diagnosis lead VAS 5051/1 and select address word "01" for engine electronics control unit. The ignition should be switched on.

-> The display of fault reader VAS 5051 will show the control unit identification and coding -2-.

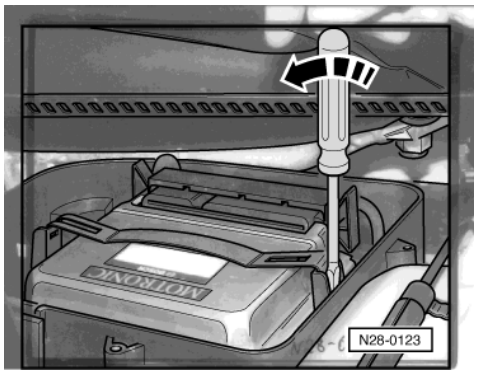
- Always start by calling up and printing out the control unit identification.
- Switch off ignition.



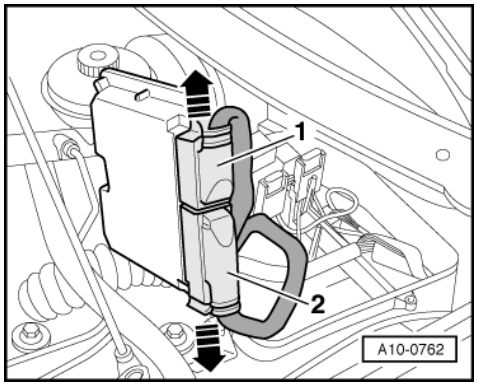
- -> Pull off rubber seal -1- from plenum chamber to the front.
- Take off plenum chamber cover.
- Remove both windscreen wiper arms -2- (mark positions before removal).
- Unclip scuttle panel trim (see arrows).



- -> Remove control unit housing cover.



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



- -> Release retainer catch -arrows- and unplug connectors -1- and -2- from control unit.
- Remove engine control unit and fit a new control unit.

Installing engine control unit

Installation is performed in the reverse sequence.

The following step needsto be performed after connecting the new engine control unit:

- Activate the engine control unit via the "Guided fault finding" function (diagnosis object "Renewing engine control unit").

For this step use vehicle diagnostic, testing and information system VAS 5051.

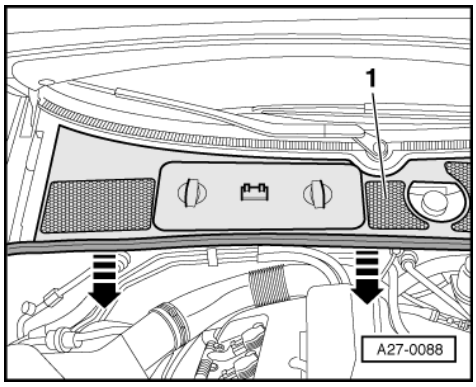
Procedure for replacing an engine control unit with a bolted protective metal casing

Removing

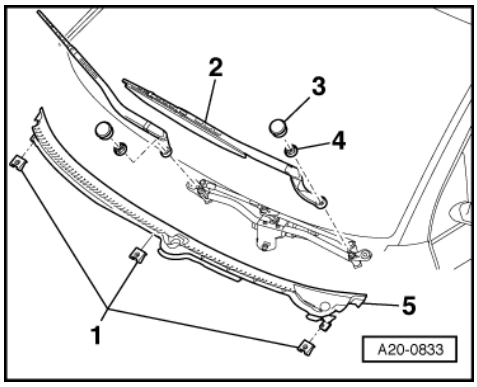
- Connect the vehicle diagnostic, test and information system VAS 5051 and select the vehicle system "01 - Engine electronics". When doing this the ignition must be on.

-> The display on vehicle diagnostic, test and information system VAS 5051 will show the control unit identification and the coding -2-.

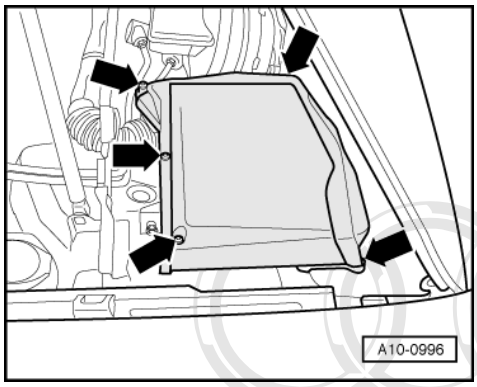
- Always start by calling up and printing out the control unit identification.
- Switch off ignition.



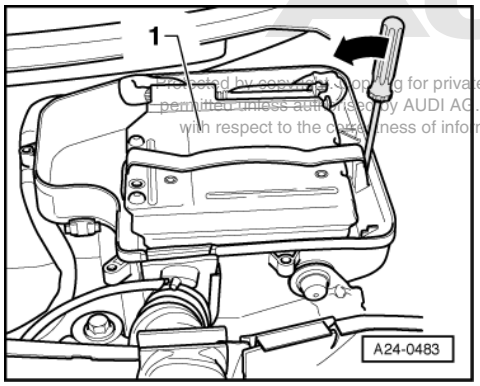
- -> Remove rubber seal from plenum chamber in direction of arrow-.
- Remove plenum chamber cover -1- from the front.



- -> Lever off cover caps -3- (2x) with a screwdriver.
- Loosen hexagon nuts -4- several turns.
- Disengage wiper arms -2- from their shafts by lifting them gently.
- Remove hexagon nuts completely and take off wiper arms.
- Pull off securing clips -1- and remove scuttle panel grille -5-.



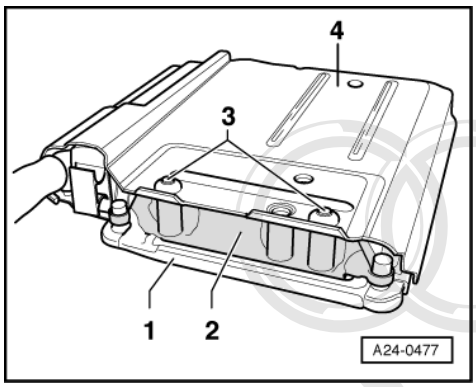
- -> Remove cover for electronics box in plenum chamber -arrows-.



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

Note:

Item -1- in the illustration shows the engine control unit with protective metal casing.

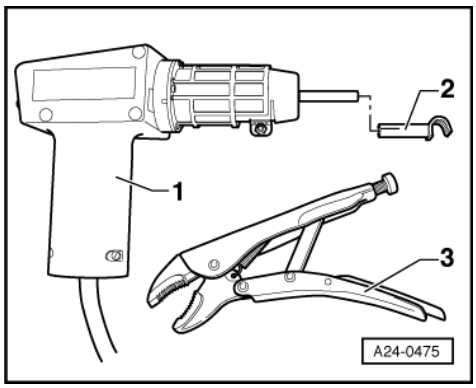


-> As a deterrent against unauthorised access to the connectors on the engine control unit, the control unit -1- is bolted to a metal casing -4- by means of shear bolts -3- and a locking plate -2-.

The threads of the shear bolts are additionally coated with a thread-locking compound to make them more difficult to remove.

In order to unplug the connectors from the engine control unit (for instance when connecting the test box or replacing the control unit), the control unit must be separated from the protective casing. The required procedure is described below:

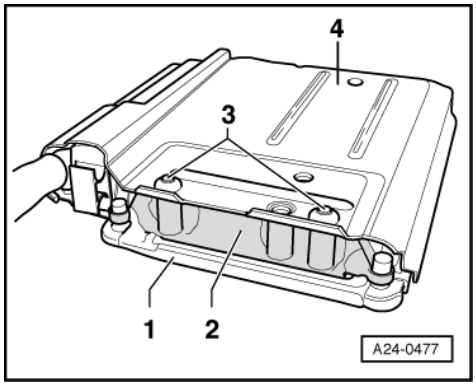
The following tools are required:



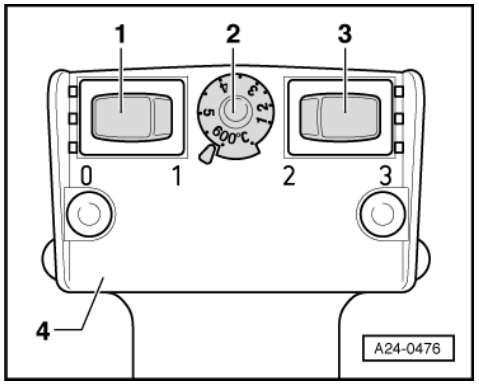
- -> Hot-air blower -1- (from wiring repair set VAS 1978)
- Nozzle attachment -2- (also included in wiring repair set VAS 1978)
- A normal (commercially available) vice-grip wrench

Procedure:

Caution
Keep exactly to the following procedure to avoid damage (burning) to the wiring, connectors, insulation or the control units. Follow the operating instructions supplied with the hot-air blower.



- -> Pivot engine control unit with protective casing towards engine compartment so that locking plate (Item -2- in illustration) is visible. Place a clean cloth under engine control unit with protective casing.

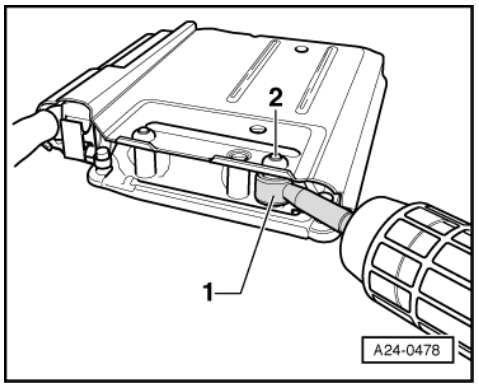


- -> Set controls on hot-air blower as shown in illustration:
  temperature control -2- to maximum heat and two-stage air delivery switch -3- to setting 3.

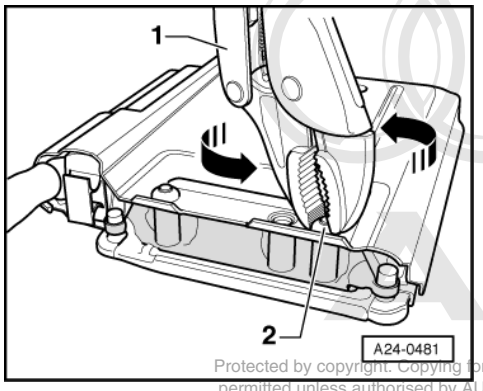
Note:

In the next step the blower is used to heat the threads for the shear bolts in the locking plate. This reduces the effect of the thread-locking compound so the bolts can then be removed more easily.

Warning
When the threads in the locking plate are heated up, this also heats the shear bolts and parts of the metal casing. Take care not to burn your hands. Also make sure that, as far as possible, you only apply heat to the threads and not to the adjacent parts. Cover these up if necessary.

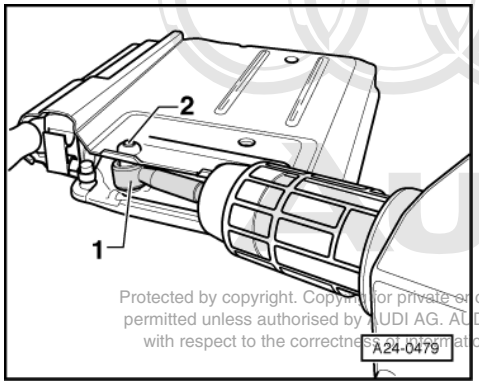


- -> Apply nozzle -1- of hot-air blower to the thread in the locking plate so that the nozzle surrounds the thread. You can let the nozzle rest against the top of the metal casing.
- Switch on the blower and apply heat to the thread for about 20 to 25 seconds.

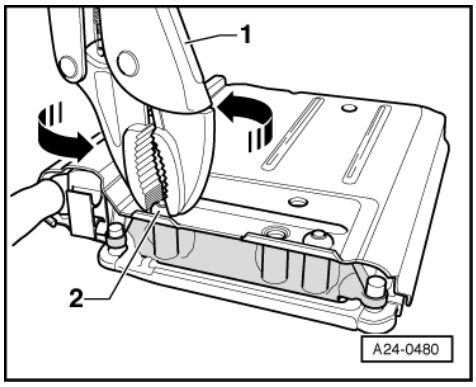


- -> Apply vice-grip wrench -1- to bolt head -2- and unscrew shear bolt in direction indicated (arrows).

Repeat the procedure for the second shear bolt. Be particularly careful here because the control unit connectors are very close to this bolt.



- -> Apply nozzle -1- of hot-air blower to the second thread in the locking plate so that the nozzle surrounds the thread. You can let the nozzle rest against the top of the metal casing.
- Switch on the blower and apply heat to the thread for about 20 to 25 seconds.



- -> Apply vice-grip wrench -1- to bolt head -2- and unscrew shear bolt in direction indicated (arrows).

The engine control unit can now be separated from the metal casing.

- Release connectors on engine control unit and unplug connectors.
- Take out the old engine control unit and install the new one.

Installing

After competing repair, install metal casing on engine control unit. Use new shear bolts.

Install in reverse sequence; note the following points:

The following step needsto beperformed after connecting the new engine control unit:

- Activate the engine control unit via the "Guided fault finding" function (diagnosis object "Renewing engine control unit").

For this step use vehicle diagnostic, testing and information system VAS 5051.

28 - Ignition system

1 - Testing ignition system

1.1 - Testing ignition system

1.2 - General notes on ignition system

- The engine control unit is equipped with self diagnosis.
- For trouble-free operation of the electrical components a voltage of at least 11.5 V is necessary.
- During some of the tests it is possible that the control unit will detect and record a fault. The fault memory must therefore be interrogated and if necessary erased when all tests and repair work have been completed.
- After completing fault finding, repairs or component tests, it is possible that the engine will start, run for a short period and then cut out. If this happens it may be that the immobilizer is blocking the engine control unit. In such cases the fault memory must be interrogated and if necessary the control unit must be adapted.

1.3 - Safety precautions

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

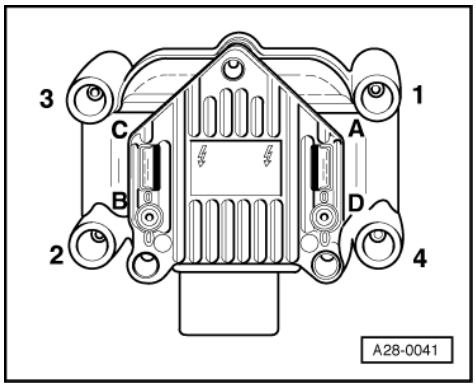
- Do not touch or disconnect ignition wiring when the engine is running or being turned at starter speed.
- The ignition must be switched off before disconnecting or connecting ignition system wiring and high-voltage cables for test instruments.
- In order to run the engine at starting speed without actually starting it (for example, to test compression), unplug the connectors on the ignition coils and also the connectors on the injectors. After completing the work, interrogate and erase the fault memory.
- The ignition must always be switched off when cleaning the engine.
- Always switch off the ignition before connecting or disconnecting the battery, otherwise the engine control unit may be damaged.

1.4 - Technical data for ignition system

Engine code letters	ALZ (1.6 ltr / 75 kW engine)
Idling speed 1) Not adjustable - controlled by the idling speed stabilisation	700...840 rpm
Engine rpm limiter 1) closes throttle valve shuts off injectors	6500 rpm 6800 rpm
Ignition timing is determined by the control unit. Ignition timing cannot be adjusted.	
Ignition system	Twin-spark ignition system with two ignition coils
Spark plug connectors	Resistance approx. 5 kω
Firing order	1-3-4-2

1) For updates, see Exhaust Emissions Test

1.5 - Designation of ignition coil terminals



- -> The diagram shows the ignition coil with its high voltage terminals From this diagram you can check whether the spark plug leads are connected to the ignition coil in the correct order. This also prevents wrong connections when replacing spark plug leads:

Ignition output "A" of ignition coil =>Cylinder 1

Ignition output "B" of ignition coil =>Cylinder 2

Ignition output "C" of ignition coil =>Cylinder 3

Ignition output "D" of ignition coil =>Cylinder 4