Workshop Manual

Audi A2 2001 ➢

Motronic direct injection and ignition system (4-cyl.)									
Engine ID	BAD								

Edition 10.2015

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List of Workshop Manual Repair Groups

Repair Group

24 - Mixture preparation - injection

28 - Ignition system

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

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24 – Mixture preparation - injection

1 Safety precautions

(ARL004438; Edition 10.2015)

⇒ “1.1 Safety precautions when working on the fuel supply system”, page 1

⇒ “1.2 Safety precautions when using testers and measuring instruments during a road test”, page 1

⇒ “1.3 Safety precautions when working on the ignition system”, page 2

1.1 Safety precautions when working on the fuel supply system

Risk of injury - fuel system operates under high pressure

The fuel system is pressurised. There is a risk of injury as fuel may spray out.

Before opening the fuel system:

– Put on safety goggles.

– Put on protective gloves.

– Release pressure (wrap clean cloth around connection and open connection carefully).

Risk of fire due to escaping fuel

If the battery is connected, the door contact switch activates the fuel pump when the driver's door is opened. Escaping fuel may ignite, causing a fire.

– Before opening the fuel system, disconnect power supply to fuel pump.

1.2 Safety precautions when using testers and measuring instruments during a road test

Risk of injury if test equipment is not secured

If an accident occurs and the front passenger's airbag is triggered, test equipment which is not secured adequately may be catapulted through the vehicle with potentially serious consequences.

– Secure test equipment on the rear seat with a strap.

Or

– Have a second mechanic operate test equipment on the rear seat.

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1.3 Safety precautions when working on the ignition system

Risk of injury caused by electric shock

When the engine is running, there are high voltage levels in the ignition system. There is a risk of electric shock when touching the ignition system!

– Never touch or disconnect ignition wiring when the engine is running or being turned at cranking speed.

Risk of damage to components

Washing the engine or connecting/disconnecting electrical wiring may result in components being damaged if the engine is running.

– Switch off ignition before connecting/disconnecting electrical wiring.

– Switch off ignition before cleaning engine.

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2 Repair instructions

⇒ “2.1 Rules for cleanliness”, page 3

⇒ “2.2 Foreign particles in engine”, page 3

⇒ “2.3 Contact corrosion”, page 3

⇒ “2.4 Routing and attachment of pipes, hoses and wiring”, page 4

⇒ “2.5 Checking vacuum system”, page 4

2.1 Rules for cleanliness

Even small amounts of dirt can cause malfunctions. For this reason, please observe the following rules when working on the fuel supply system, turbocharger and injection system:

- Carefully clean connection points and the surrounding area with engine cleaner or brake cleaner and dry thoroughly before opening.
- Immediately seal open lines and connections with clean plugs, for example from engine bung set - VAS 6122- .
- Place parts that have been removed on a clean surface and cover them over. Use only lint-free cloths.
- Carefully cover or seal open components if repairs cannot be carried out immediately.
- Only install clean components; replacement parts should only be unpacked immediately prior to installation. Do not use parts that have not been stored in their packing (e.g. in tool boxes etc.).
- When the system is open, do not work with compressed air and do not move the vehicle.
- Make sure that no fuel runs onto the fuel hoses. Should this occur, the fuel hoses must be cleaned again immediately.
- Protect unplugged electrical connectors against dirt and moisture and make sure connections are dry when attaching.

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2.2 Foreign particles in engine

When performing assembly work on the engine, all open passages in the intake and exhaust systems must be sealed with suitable plugs (e.g. from engine bung set - VAS 6122-) to prevent foreign particles from entering the engine.

2.3 Contact corrosion

Contact corrosion can occur if unsuitable fasteners are used (e.g. bolts, nuts, washers, etc.).

For this reason, only fasteners with a special surface coating are used.

Additionally, all rubber and plastic parts and all adhesives are made of non-conductive materials.

Always install new parts if you are not sure whether used parts can be re-fitted ⇒ Electronic parts catalogue .

Note the following:

- We recommend using only genuine replacement parts; these have been tested and are compatible with aluminium.
- We recommend the use of Audi accessories.

- Damage caused by contact corrosion is not covered under warranty.

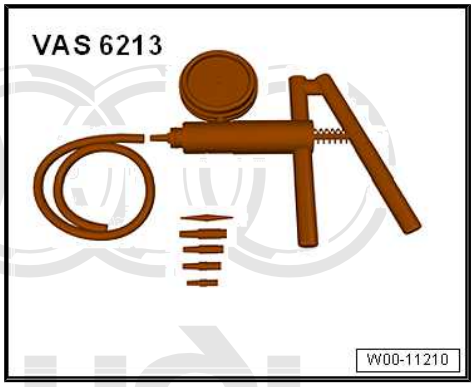
2.4 Routing and attachment of pipes, hoses and wiring

- Mark fuel lines, hydraulic lines, vacuum lines, lines for activated charcoal filter and electrical wiring etc. before removal so they can be re-installed in the original positions and correctly connected. Make sketches or take photographs if necessary.
- To prevent damaging pipes, hoses and wiring, ensure sufficient clearance from all moving or hot components in engine compartment (little space in engine compartment).

2.5 Checking vacuum system

Special tools and workshop equipment required

- Hand vacuum pump - VAS 6213-



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Procedure

– Check all vacuum lines in the complete vacuum system for:
- Cracks
- Traces of animal bites
- Kinked or crushed lines
- Lines porous or leaking

– Check vacuum line to solenoid valve and from solenoid valve to corresponding component.

– If an entry is stored in the event memory, check all vacuum lines leading to the corresponding component and also check the remaining vacuum lines leading to other components.

– If it is not possible to build up pressure with the hand vacuum pump - VAS 6213- or if the pressure drops again immediately, check the hand vacuum pump and connecting hoses for leaks.

3 Servicing Motronic injection system

⇒ “3.1 Technical data”, page 5

⇒ “3.2 Overview of fitting locations”, page 5

⇒ “3.3 Removing and installing injection system components”, page 10

⇒ “3.4 Dismantling and assembling intake manifold (part 1)”, page 12

⇒ “3.5 Dismantling and assembling intake manifold (part 2)”, page 13

⇒ “3.6 Fuel rail with high-pressure injectors”, page 15

⇒ “3.7 Removing and installing fuel pressure regulator and fuel metering valve”, page 16

⇒ “3.8 Wiring and component check with test box V.A.G 1598/31 ”, page 17

⇒ “3.9 Renewing engine control unit J220 ”, page 18

⇒ “3.10 Removing and installing intake manifold”, page 19

⇒ “3.11 Removing and installing high-pressure injectors”, page 23

⇒ “3.12 Renewing O-ring and teflon ring for high-pressure injector”, page 24

⇒ “3.13 Removing and installing high-pressure fuel pump”, page 26

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3.1 Technical data

Engine code	BAD 1.6 ltr. 81 kW (FSI engine)
Idling speed [1] is not adjustable; controlled by the idling speed stabilisation	600 ... 720 rpm
Speed governing by closing throttle valve	6600 rpm
Fuel pressure at idling speed	approx. 70 bar

1) Up-to-date specifications: ⇒ Exhaust emissions test binder

Note

The abbreviation FSI stands for fuel stratified injection.

3.2 Overview of fitting locations

Components A to G are not shown in the overview.

Part I

A - Brake pedal switch - F47-

- ❑ In footwell on pedal bracket near brake pedal

B - Diagnostic connector

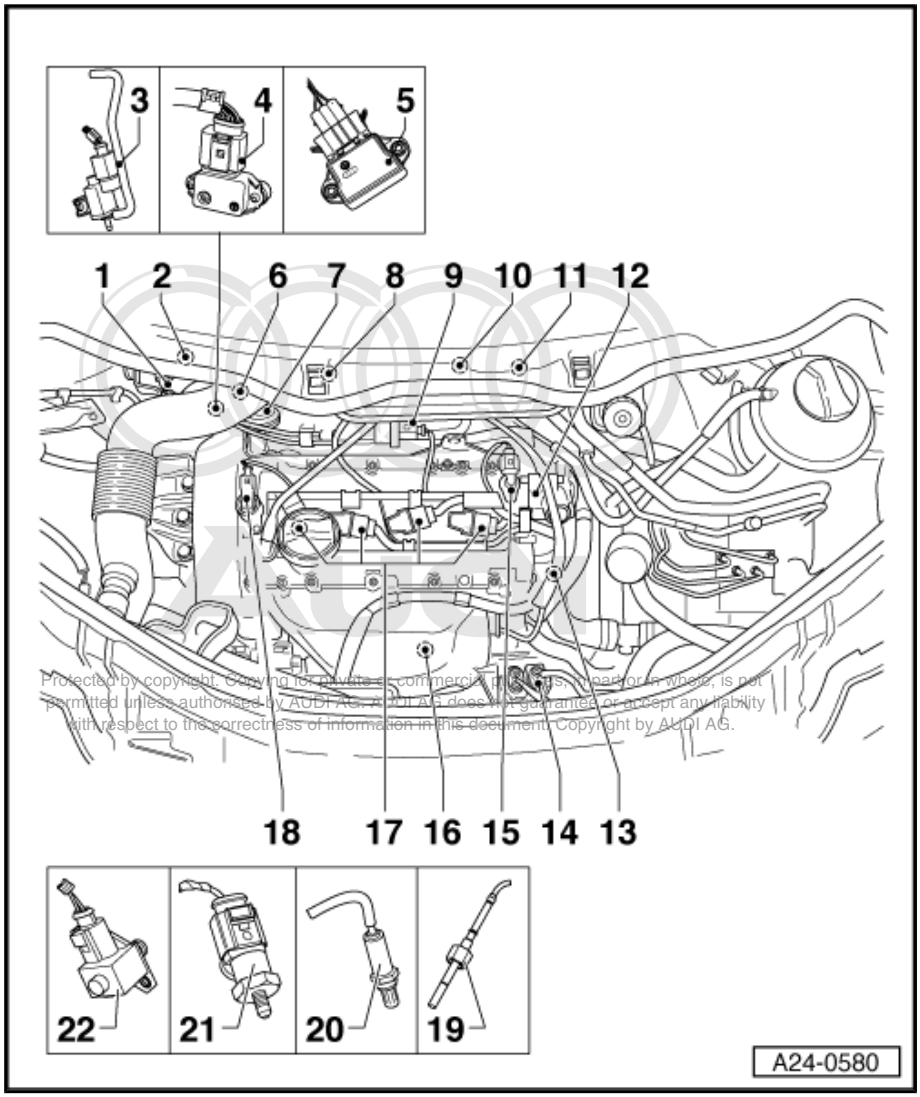
- ❑ In driver's knee restraint

C - Fuel pump relay - J17-

- ❑ 6+6-position relay carrier (left footwell, relay position 5)
⇒ Fig. ""6+6-position relay carrier (in left footwell)"" , page 10

D - Main relay - J271-

- ❑ 3-position relay carrier (left footwell, relay position 1)
⇒ Fig. ""3-position relay carrier (in left footwell)"" , page 10



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Part II

E - Motronic control unit - J220-

- ❑ Fitting location
  ⇒ Fig. “”, page 10

F - Control unit for NOx sender - J583-

- ❑ Fitting location
  ⇒ Fig. “”, page 10

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

- ❑ In footwell on accelerator pedal (both senders are accommodated in one housing)

1 - Fuel pressure regulator

- ❑ Fitting location
  ⇒ Fig. “”, page 8

2 - Fuel metering valve - N290-

- ❑ Fitting location
  ⇒ page 8

3 - Intake manifold flap valve - N316-

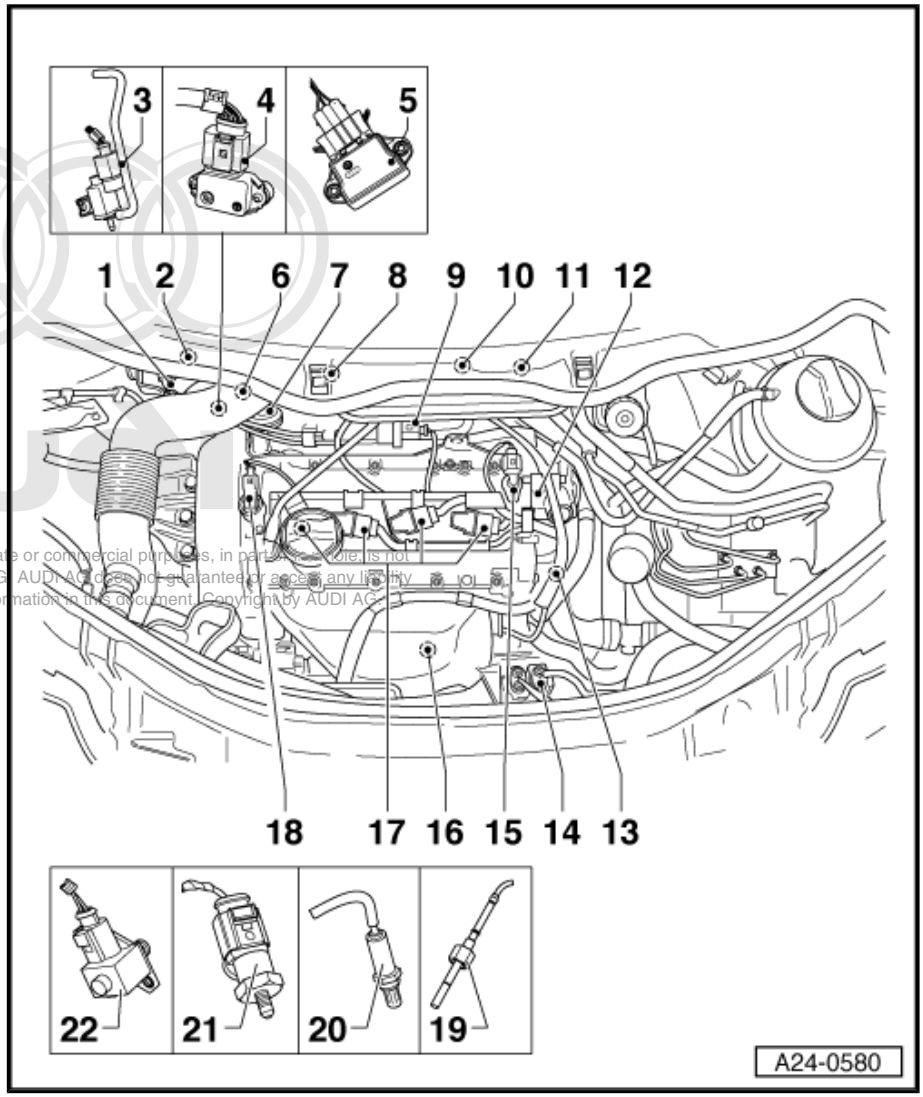
- ❑ Fitting location
  ⇒ Fig. “”, page 8

4 - Intake manifold pressure sender - G71-

- ❑ Fitting location
  ⇒ Fig. “”, page 8

5 - Intake manifold flap potentiometer - G336-

- ❑ Fitting location



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⇒ Fig. ""“ , page 8

6 - Engine speed sender - G28-

7 - Vacuum unit

8 - Air mass meter - G70- with intake air temperature sender - G42-

9 - Activated charcoal filter solenoid valve 1 - N80-

10 - Throttle valve module - J338-

11 - Exhaust gas recirculation valve - N18- with exhaust gas recirculation potentiometer - G212-

12 - High-pressure fuel pump

13 - Coolant temperature sender - G62-

14 - Radiator activation control unit

15 - Hall sender - G40-

16 - Lambda probe - G39- , Lambda probe heater - Z19-

- ❑ Fitting location ⇒ Fig. ""“ , page 9

17 - Ignition coils with output stages

18 - Camshaft control valve 1 - N205-

19 - Exhaust gas temperature sender 1 - G235-

- ❑ Fitting location ⇒ Fig. ""“ , page 9

20 - NOx sender - G295-

- ❑ Fitting location ⇒ Fig. ""“ , page 9

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21 - Fuel pressure sender - G247-

- ❑ Fitting location ⇒ Fig. ""Bottom section of intake manifold"“ , page 9

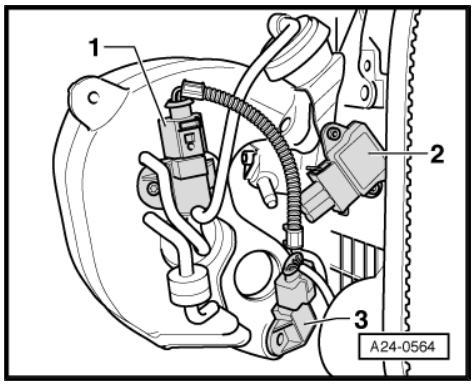
22 - Fuel pressure regulating valve - N276-

- ❑ Fitting location ⇒ Fig. ""Bottom section of intake manifold"“ , page 9

1- Intake manifold flap valve - N316-

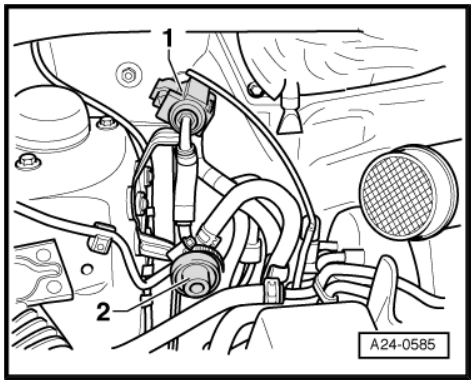
2- Intake manifold flap potentiometer - G336-

3- Intake manifold pressure sender - G71-



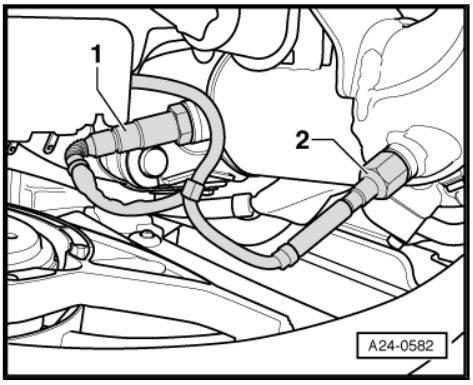
1- Fuel metering valve - N290-

2- Fuel pressure regulator



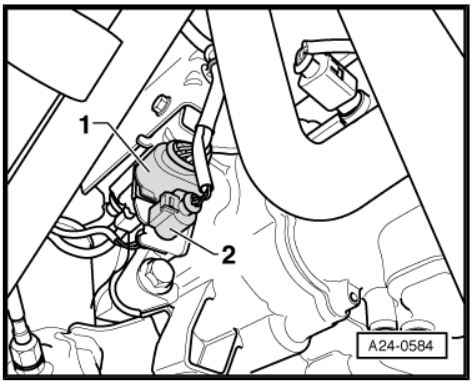
1- Lambda probe - G39- with Lambda probe heater - Z19-

2- Exhaust gas temperature sender 1 - G235-



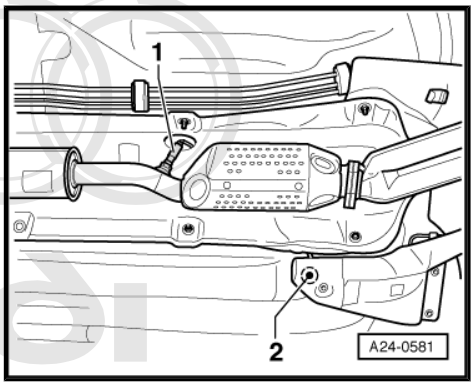
1- Connector for Lambda probe

2- Connector for exhaust gas temperature sender



1- NOx sender - G295-

2- Cable guide to passenger compartment



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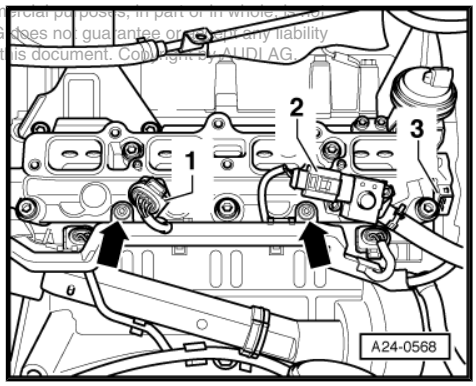
Bottom section of intake manifold

1- Fuel pressure sender - G247-

2- Fuel pressure regulating valve - N276-

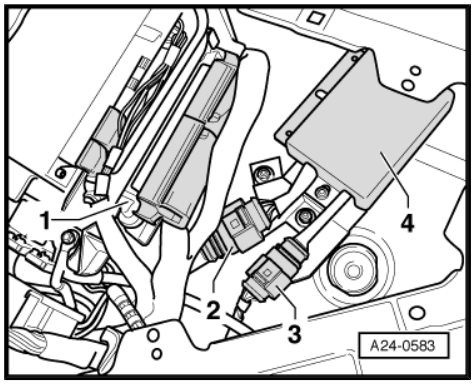


1- Motronic control unit - J220-

2- NOx sender - G295-

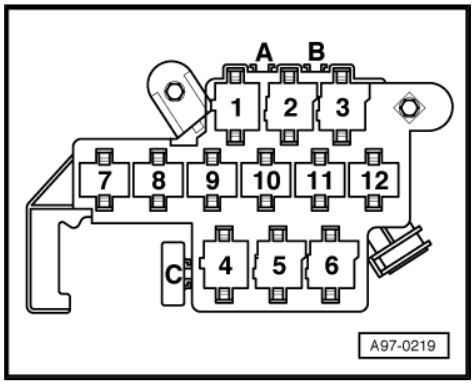
3- To engine control unit

4- Control unit for NOx sender - J583-



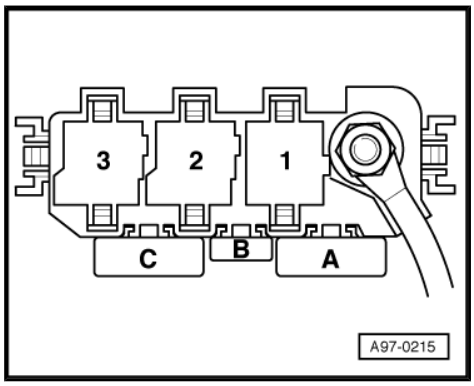
6+6-position relay carrier (in left footwell)

Relay carrier 5- fuel pump relay - J17-



3-position relay carrier (in left footwell)

Relay carrier 1- main relay - J271-



3.3 Removing and installing injection system components

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1 - Bottom section of intake manifold

2 - Bolt

- ❑ 20 Nm

3 - Bolt

- ❑ 20 Nm

4 - Intake manifold

- ❑ Removing and installing ⇒ “3.10 Removing and installing intake manifold”, page 19

5 - Bolt

- ❑ 20 Nm

6 - Bolt

- ❑ 20 Nm

7 - Gasket

- ❑ Renew

8 - O-ring

- ❑ Renew if damaged

9 - Bolt

- ❑ 20 Nm

10 - High-pressure fuel pipe

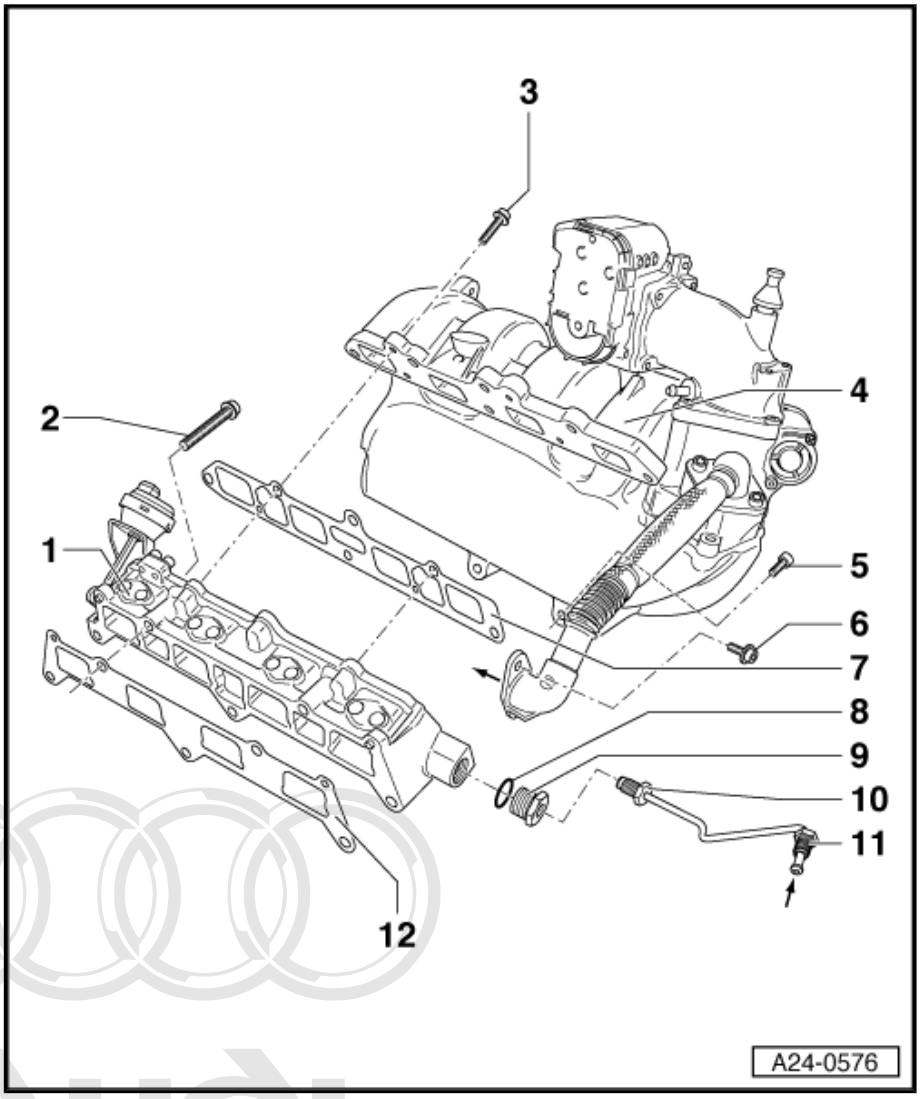
- ❑ Connection on fuel rail

11 - High-pressure fuel pipe

- ❑ Connection on high-pressure fuel pump

12 - Gasket

- ❑ Renew



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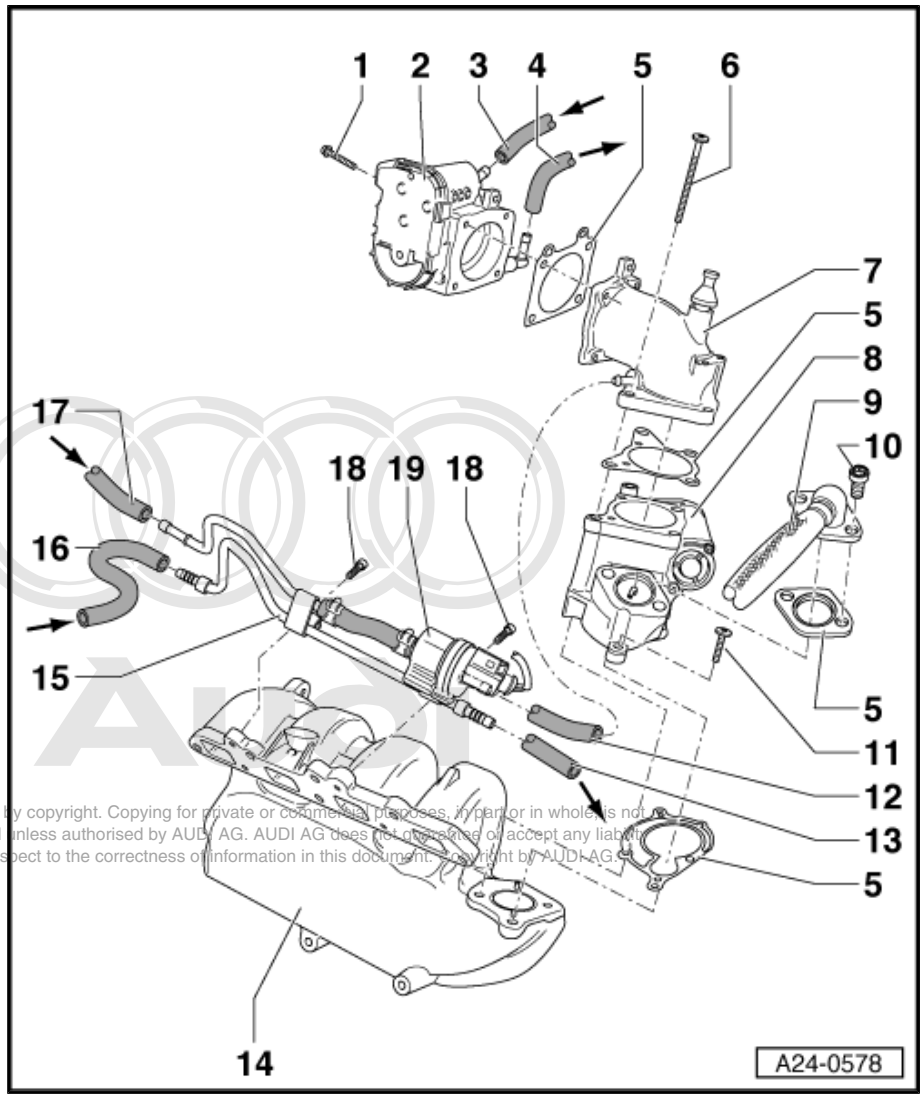
3.4 Dismantling and assembling intake manifold (part 1)



1 - Bolt
- ❑ 10 Nm

2 - Throttle valve module - J338-

3 - Coolant supply line

4 - Coolant return line

5 - Gasket
- ❑ Renew
- ❑ Note installation position

6 - Bolt
- ❑ 5 Nm

7 - Intake manifold connection
- ❑ Between throttle valve module and exhaust gas recirculation valve

8 - Exhaust gas recirculation valve - N18- with exhaust gas recirculation potentiometer - G212-
- ❑ Adaption must be performed after renewing exhaust gas recirculation valve
- ❑ Use ⇒ Vehicle diagnostic tester

9 - Connecting pipe for exhaust gas recirculation

10 - Bolt
- ❑ 16 Nm

11 - Bolt
- ❑ 10 Nm

12 - Connecting hose
- ❑ To intake manifold connection

13 - Fuel line
- ❑ To high-pressure fuel pump

14 - Intake manifold

15 - Fuel pipe

16 - Fuel line
- ❑ From T-piece

17 - Vent hose
- ❑ From activated charcoal filter

18 - Bolt
- ❑ 15 Nm

19 - Activated charcoal filter solenoid valve 1 - N80-

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3.5 Dismantling and assembling intake manifold (part 2)

1 - Bolt
- ❑ 20 Nm

2 - Intake manifold

3 - Bolt
- ❑ 20 Nm

4 - Bolt
- ❑ 10 Nm

5 - Fuel pressure regulating valve - N276-
- ❑ Fitting location ⇒ Fig. ""Bottom section of intake manifold"" , page 9

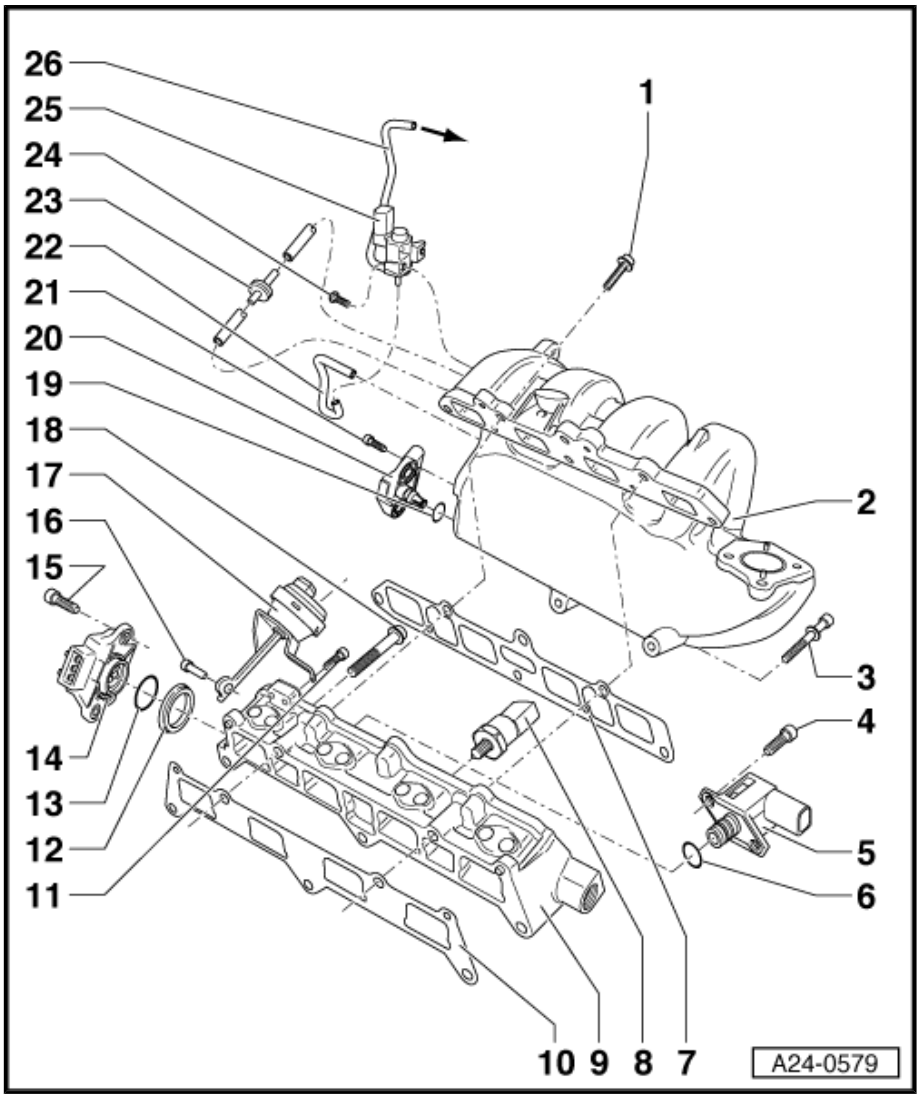
6 - O-ring
- ❑ Renew if damaged

7 - Gasket
- ❑ Renew
- ❑ Note installation position

8 - Fuel pressure sender - G247-
- ❑ Fitting location ⇒ Fig. ""Bottom section of intake manifold"" , page 9

9 - Bottom section of intake manifold

10 - Gasket
- ❑ Renew
- ❑ Note installation posi-



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tion

11 - Bolt

- ❑ 10 Nm

12 - Seal

- ❑ Renew if damaged

13 - O-ring

- ❑ Renew if damaged

14 - Intake manifold flap potentiometer - G336-

- ❑ Fitting location ⇒ Fig. “”“” , page 8

15 - Bolt

- ❑ 1.5 Nm

16 - Plastic wedge

- ❑ Renew

17 - Vacuum unit

18 - Bolt

- ❑ 20 Nm

19 - O-ring

- ❑ Renew if damaged

20 - Intake manifold pressure sender - G71-

- ❑ Fitting location ⇒ Fig. “”“” , page 8

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21 - Bolt

- ❑ 4.5 Nm

22 - Vacuum hose

- ❑ Between intake manifold flap valve for air distribution and intake manifold

23 - Non-return valve

- ❑ Black side faces downwards

24 - Bolt

- ❑ 3.5 Nm

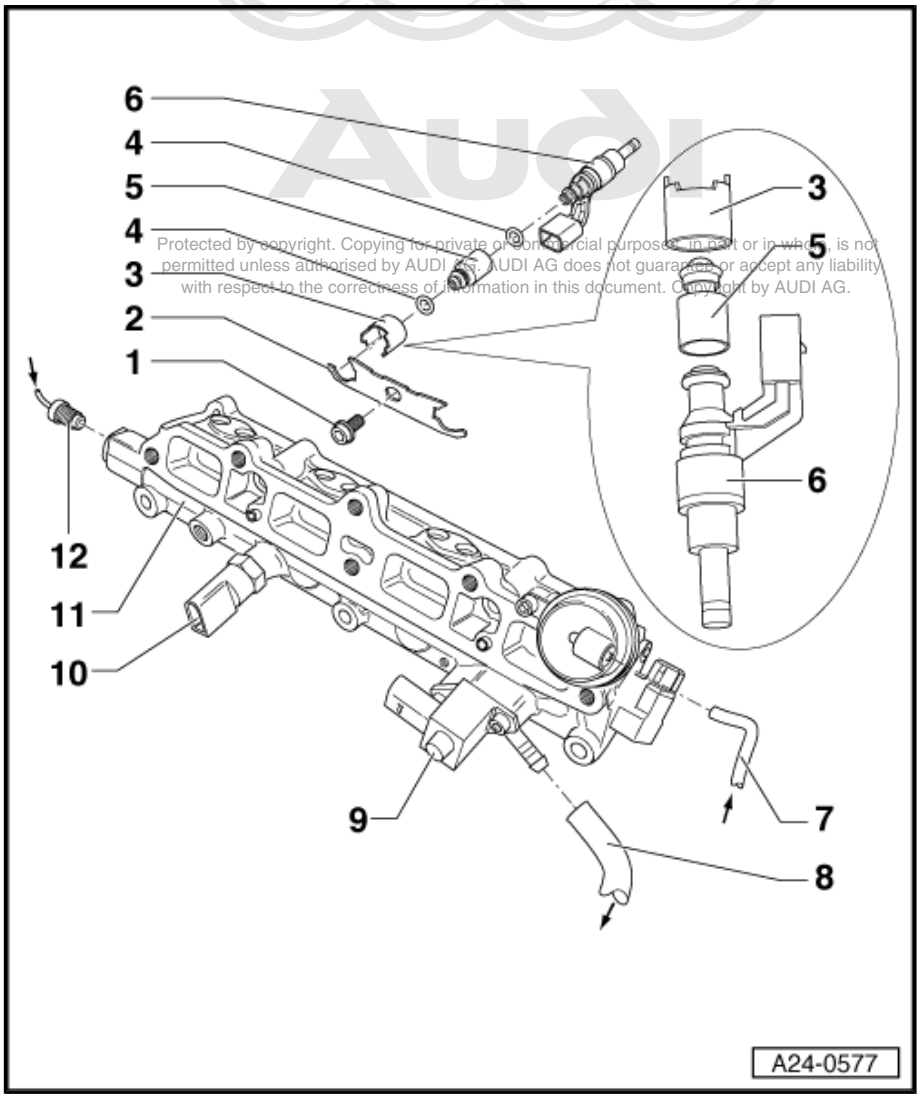
25 - Intake manifold flap valve - N316-

- ❑ Fitting location ⇒ Fig. “”“” , page 8

26 - Vacuum hose

- ❑ Between intake manifold flap valve for air distribution and vacuum unit

3.6 Fuel rail with high-pressure injectors



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1 - Bolt

- ❑ 20 Nm

2 - Bracket for injectors

- ❑ Note installation position
- ❑ Renew if damaged

3 - Support

- ❑ Ensure correct positioning on injector and bracket for injectors

4 - O-ring

- ❑ Renew
- ❑ Before installing, lubricate lightly with clean engine oil

5 - Spacer sleeve

6 - Injector, cylinder 1 - N30- ... injector, cylinder 4 - N33-

7 - Vacuum hose

- ❑ Between vacuum unit and intake manifold flap valve - N316-

8 - Fuel return line

- ❑ Blue marking
- ❑ Secure with spring-type clip
- ❑ Check that it is securely seated

9 - Fuel pressure regulating valve - N276-

- ❑ Fitting location ⇒ Fig. ""Bottom section of intake manifold"" , page 9

10 - Fuel pressure sender - G247-

- ❑ Fitting location ⇒ Fig. ""Bottom section of intake manifold"" , page 9

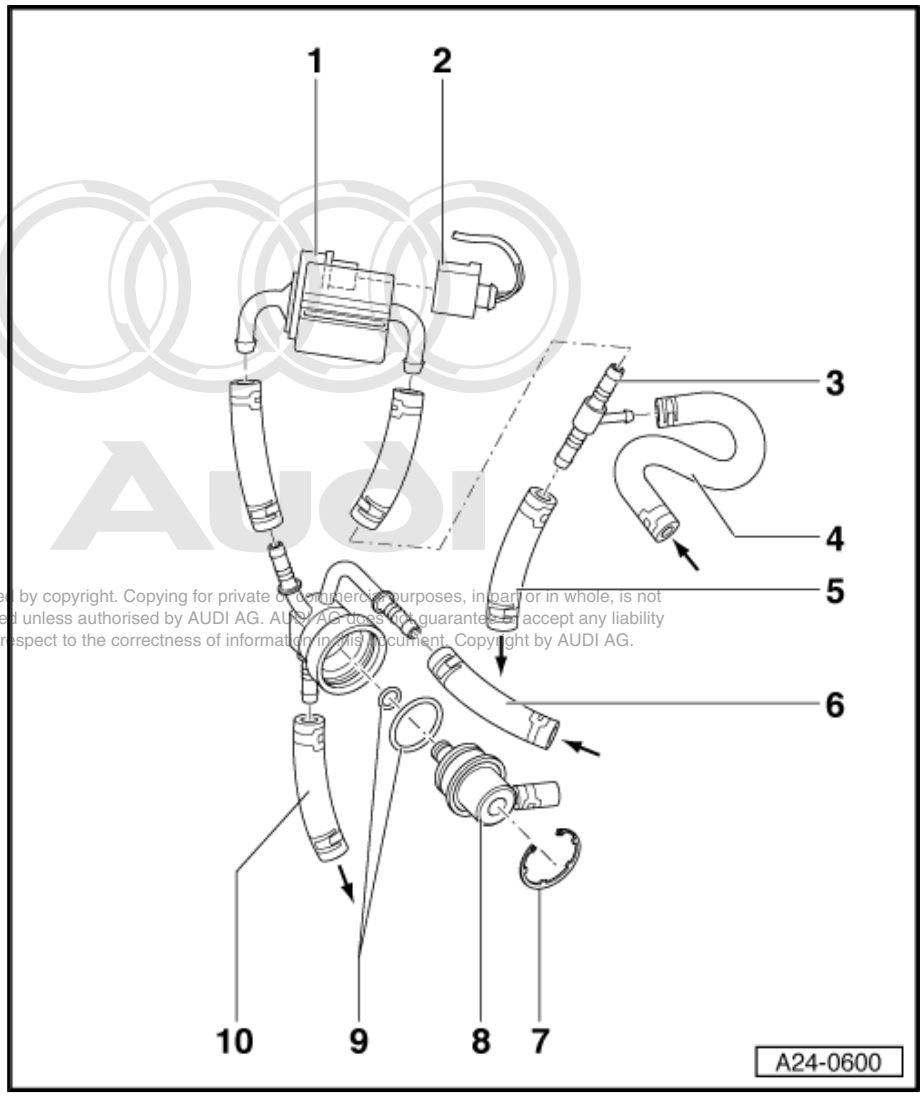
11 - Bottom section of intake manifold

- ❑ If bottom section of intake manifold is being renewed, intake manifold flaps must be adapted (self-diagnosis - Basic setting, measured value block 142)
- ❑ Use ⇒ Vehicle diagnostic tester

12 - High-pressure fuel pipe

- ❑ Between fuel rail and high-pressure fuel pump

3.7 Removing and installing fuel pressure regulator and fuel metering valve



1 - Fuel metering valve - N290-

2 - Connector

- Black, 2-pin

3 - T-piece

4 - Fuel supply line

- From fuel tank
- Secure with spring-type clips
- Check that it is securely seated

5 - Fuel supply line

- To metal fuel line
- Secure with spring-type clips
- Check that it is securely seated

6 - Fuel return line

- From fuel pressure regulating valve - N276-
- Secure with spring-type clips
- Check that it is securely seated
- Blue marking

7 - Circlip

8 - Fuel pressure regulator

9 - O-ring

- Renew if damaged

10 - Fuel return line

- To fuel tank
- Blue marking
- Secure with spring-type clips
- Check that it is securely seated

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

Note

- *The checks should be carried out using hand-held multimeter -V.A.G 1526- or multimeter -V.A.G 1715- together with diode test lamp -V.A.G 1527- .*
- *To connect the testers to test box -V.A.G 1598/31- , always use the adapter leads from adapter set -V.A.G 1594- .*
- *When the connectors are unplugged from the engine control unit, the learnt values are erased, but the contents of the event memory remain intact.*
- *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.*
- *The advantage of this is that the electronic engine control system remains fully functional when the test box is connected (for example, for measuring signals when the engine is running).*
- *The relevant test procedure will state whether it is necessary to also connect the engine control unit to the test box.*

WARNING

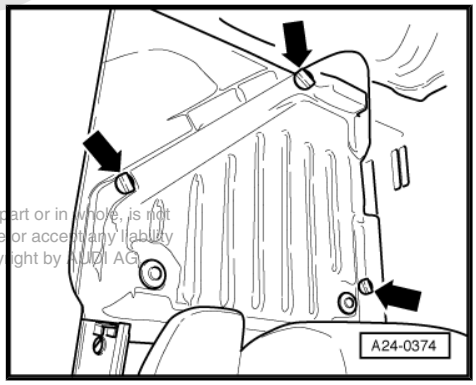
To avoid irreparably damaging the electronic components, select the appropriate measuring range before connecting the measuring cables and observe the test requirements.

Connecting test box -V.A.G 1598/31- to engine control unit

– Lift floor covering in left footwell ⇒ Body Repairs; Rep. gr. 70 ; Removing and installing floor covering .

– Release retaining bolts -arrow- on cover.

– Detach cover.



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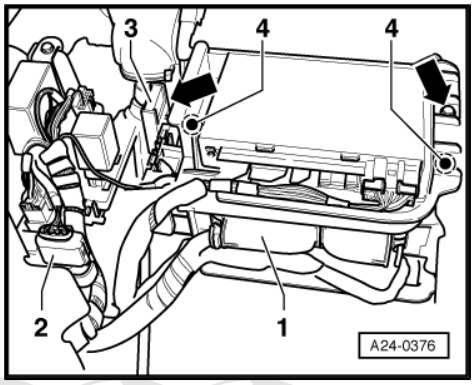
– Release connectors from engine control unit -1- and unplug.

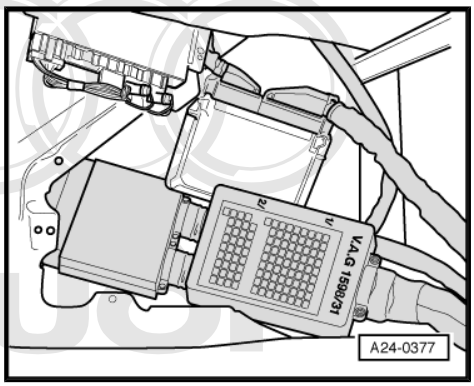


– Connect test adapter -V.A.G 1598/31- to wiring harness connector. Earth clip must be connected to earth.
– Carry out test as described in appropriate repair procedures.

Use ⇒ Vehicle diagnostic tester.

Perform the following operations after re-connecting engine control unit:

– Interrogate event memory and erase if necessary.



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3.9 Renewing engine control unit -J220-

Special tools and workshop equipment required

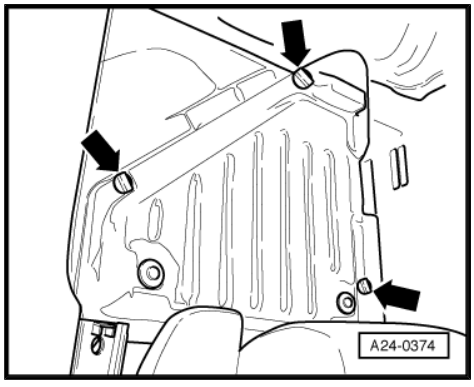
♦ Vehicle diagnostic tester

Note

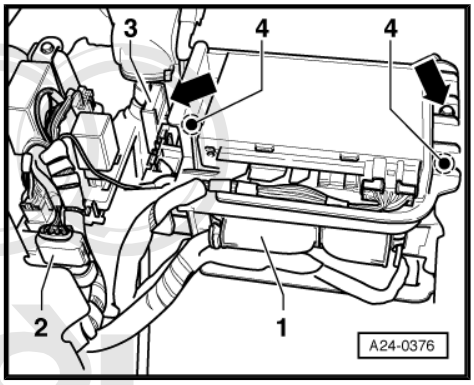
When the connectors are unplugged from the engine control unit, the learnt values are erased, but the contents of the event memory remain intact.

Removing

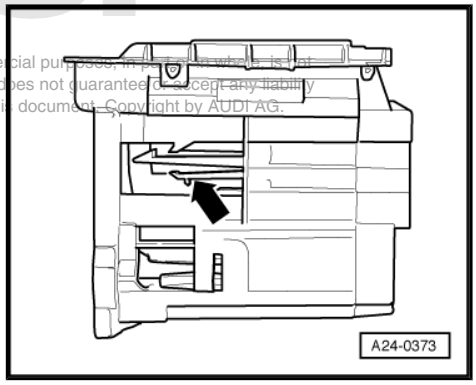
– Connect ⇒ Vehicle diagnostic tester and select vehicle system “01 - Engine electronics”. The ignition must be switched on.
– Always start by displaying the control unit identification and printing it out.
– Switch off ignition.
– Lift floor covering in left footwell ⇒ Body Repairs; Rep. gr. 70 ; Removing and installing floor covering .
– Release retaining bolts -arrow- on cover.
– Detach cover.
– Remove fuse holder -3-.



– Loosen bolts -arrow- and carefully remove control unit support.
– Carefully take out engine control unit -1- (push the retaining clips -4- in direction of arrow) -see next illustration-.



– Release retaining clip for engine control unit.
– Release and unplug connectors from control unit.



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Installing

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

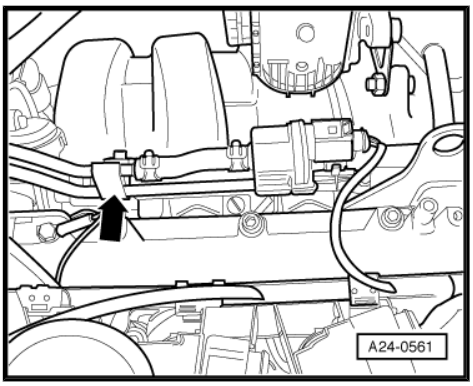
The following steps must be performed after connecting new engine control unit:

– Activate engine control unit in “Guided Fault Finding” under diagnosis option “Replace engine control unit”.

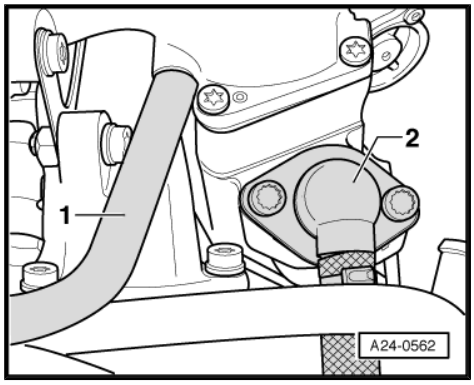
Use ⇒ Vehicle diagnostic tester.

3.10 Removing and installing intake manifold

– Remove fresh air intake duct ⇒ Heating, air conditioning system; Rep gr. 80; Checking, removing and installing fresh air intake duct (in the engine compartment) .
– Remove air pipe between air filter and air mass meter using special tool -V.A.G 1921- (hose clip pliers).
– Unplug connectors from throttle valve module, air mass meter, potentiometer for exhaust gas recirculation valve and activated charcoal filter solenoid valve 1.
– Remove both bolts -arrow- for fuel lines and detach activated charcoal filter solenoid valve 1 from intake manifold.



– Disconnect hose from intake connecting pipe -1-.
– Remove exhaust gas recirculation hose -2-.



Caution

Take care to keep components clean.

- *Observe rules for cleanliness when working on the fuel supply system ⇒ "2.1 Rules for cleanliness", page 3 .*

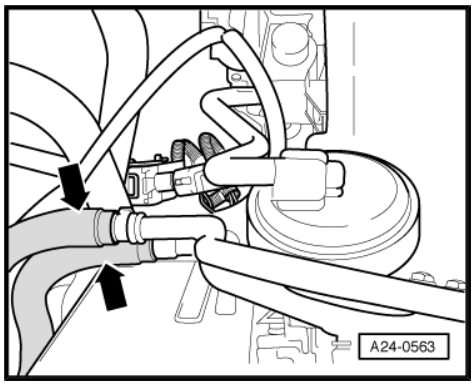
Risk of injury - fuel system operates under high pressure

The fuel system is pressurised. There is a risk of injury as fuel may spray out.

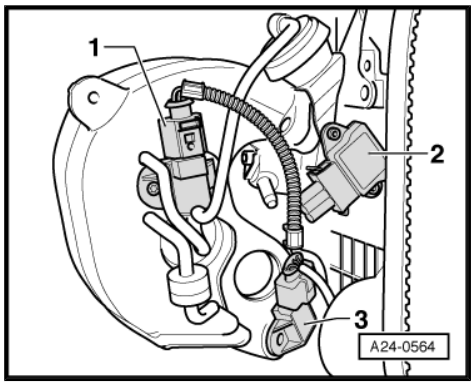
Before opening the fuel system:

– Put on safety goggles.
– Put on protective gloves.
– Release pressure (wrap clean cloth around connection and open connection carefully).

– Disconnect both hoses -arrows- from fuel lines.
– Disconnect hose from vacuum unit.



– Remove connectors from intake manifold flap valve for air distribution -1-, intake manifold flap potentiometer -2- and intake manifold pressure sender -3-.



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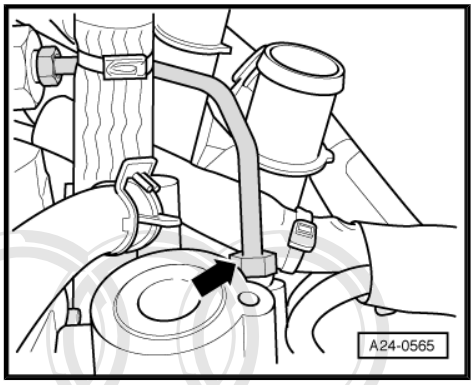
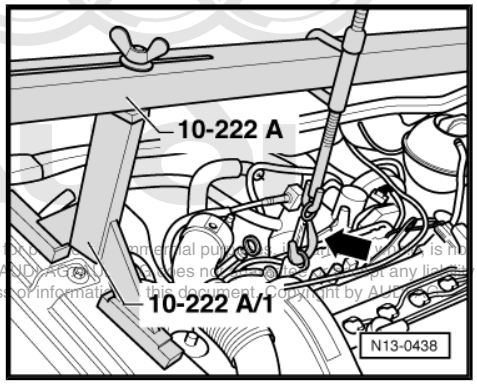
– Remove high-pressure fuel line at high-pressure fuel pump -arrow- and at fuel rail (bottom section of intake manifold).
– Unscrew all hexagon socket bolts from intake manifold.



– Fit support bracket -10 - 222 A- with adapters -10 - 222 A/1-.



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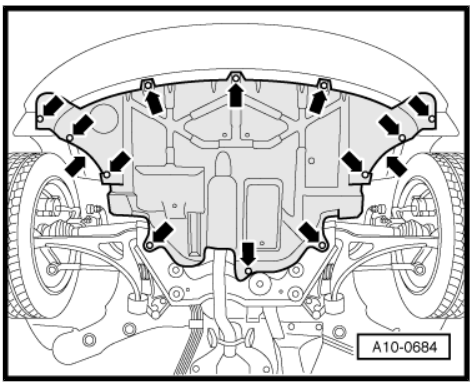
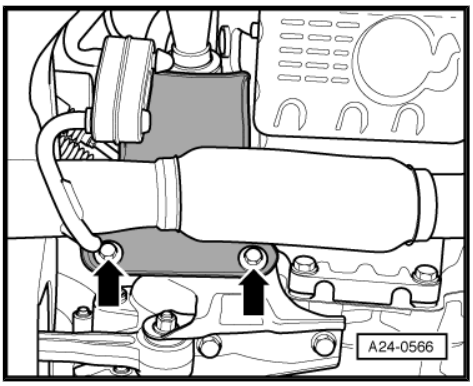
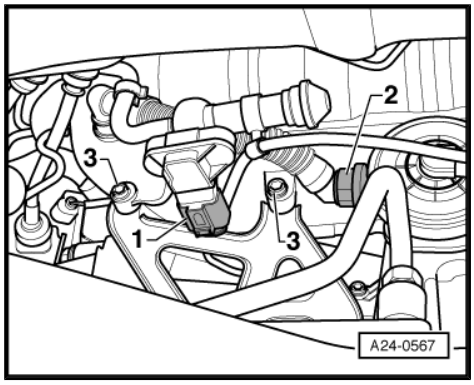
– Remove noise insulation -arrows-.



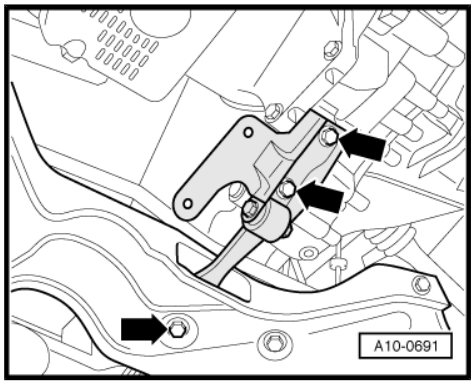
– Remove heat shield -arrows-.



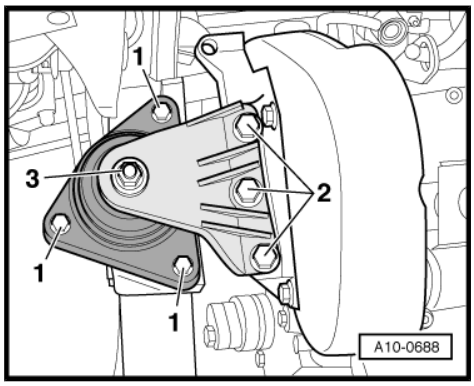
– Unplug connector from brake servo pressure sensor -1-.
– Disconnect hose from crankcase heater -2-.
– Unscrew the two bolts -3-.



– Remove pendulum support -arrows-.



– Unscrew the three bolts -2- from engine mounting.



Note

Central bolt -3- must not be slackened.

– Lower engine slightly to remove intake manifold.

Install in reverse order.

Important: the following points must always be observed.

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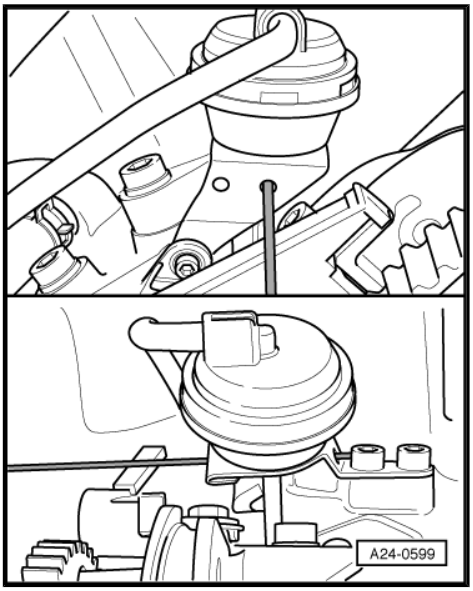
- Renew all seals and gaskets
- Before fitting bottom section of intake manifold, insert a suitable tool through opening in bracket and linkage of vacuum unit to lift intake manifold flaps (it will otherwise not be possible to adjust intake manifold flaps). Remove tool again after bottom section of intake manifold has been installed.
- If bottom section of intake manifold is being renewed, intake manifold flaps must be adapted (self-diagnosis - Basic setting, measured value block 142). Use ⇒ Vehicle diagnostic tester
- Coat O-rings of high-pressure injectors with clean oil. This will make them easier to insert into bottom section of intake manifold.



Refer to overviews for tightening torques:

- Removing and installing injection system components ⇒ "3.3 Removing and installing injection system components", page 10
- Dismantling and assembling intake manifold ⇒ "3.4 Dismantling and assembling intake manifold (part 1)", page 12
- Dismantling and assembling fuel rail with high-pressure injectors ⇒ "3.6 Fuel rail with high-pressure injectors", page 15

3.11 Removing and installing high-pressure injectors

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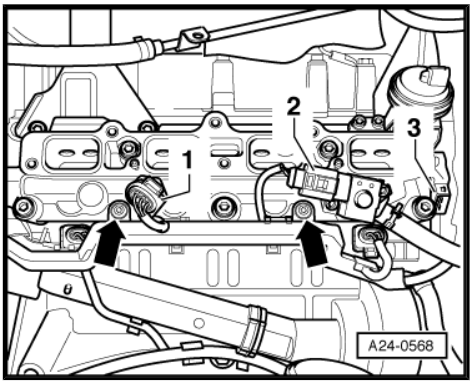
Note

- ♦ *Engines are seen from rear for better clarity.*
- ♦ *You will require the tool box containing special tool -T10133- to renew the injectors.*

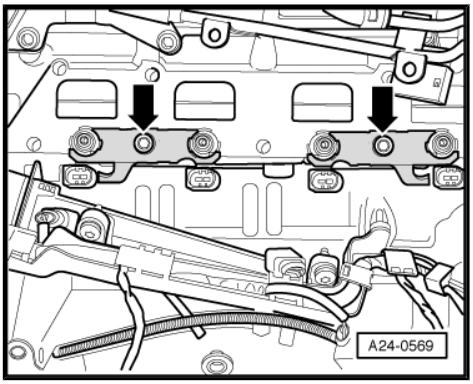
– Remove the two bolts -arrows-.

– Remove connectors from fuel pressure sender -1-, fuel pressure regulating valve -2-, intake manifold flap potentiometer -3- and the four injectors.

– Remove hexagon bolts from bottom section of intake manifold and, at the same time, carefully detach bottom section of intake manifold.

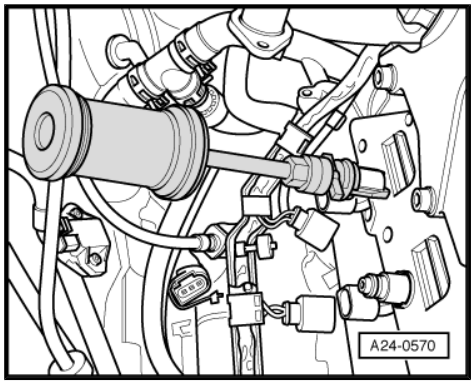


– Unscrew bracket for injectors -arrows- and remove support above injector.



– Fit puller -T10133/1- onto injector using striker -T10133/3- and carefully knock injector out.

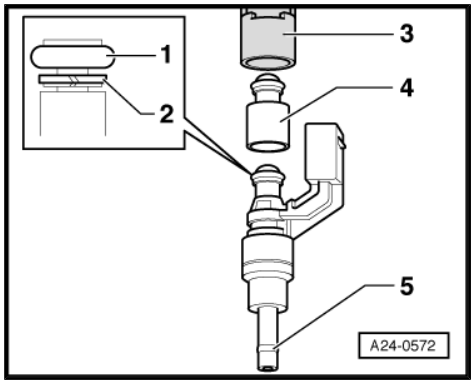
Install in reverse order.



Note

Check and renew seals before re-installing injectors
⇒ "3.12 Renewing O-ring and teflon ring for high-pressure injector", page 24 .

3.12 Renewing O-ring and teflon ring for high-pressure injector



- -1- Always renew O-ring
- -2- Only renew support ring if damaged
- -3- Retaining clip
- -4- Always renew O-ring for spacer sleeve
- -5- Always renew teflon ring

Renewing O-rings

Always renew O-rings for spacer sleeves and high-pressure injectors.

– Use clean engine oil to aid with installation.

Renewing support ring

Only renew support ring if it is damaged.

– To do so, rotate and pull support ring over collar (do not extend its diameter).

Note

Ensure correct installation position. Flat side without shoulder must face O-ring.

Renewing teflon ring

Teflon ring used to seal combustion chamber must always be renewed if high-pressure injector is reused.

– Carefully remove old teflon ring with a suitable tool. When doing so, ensure that the groove and the continuous ridge in the bottom of the groove are not damaged.

Note

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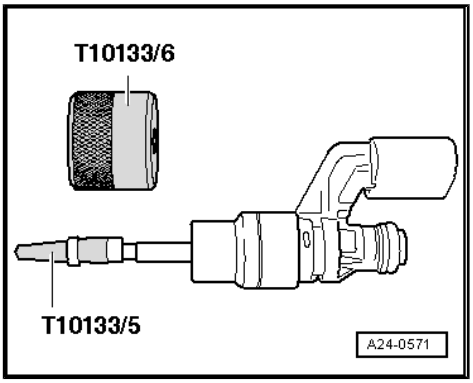
High-pressure injector must be renewed if groove is damaged.

– Before fitting new teflon ring, clean groove with a clean cloth. Remove any residue with a brush.

– Use assembly tool -T10133/5- and assembly sleeve -T10133/6- to fit new teflon ring.

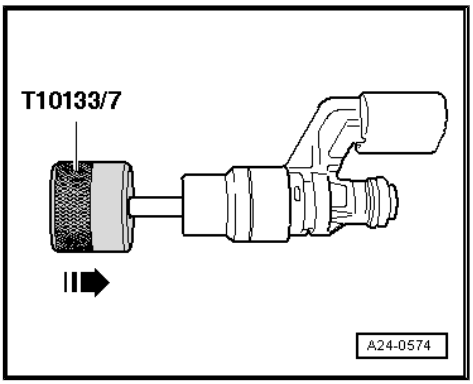
– Slide teflon ring over assembly tool and slide it into groove on high-pressure injector using assembly sleeve. Do not use lubricant.

Step 1 of teflon ring calibration (adaption) is done with special tool -T10133/7- .

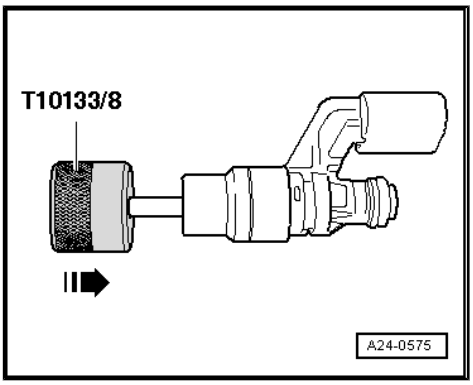


– Turn special tool (approx. 180°) while simultaneously sliding it over injector as far as it will go, applying moderate force. Then pull back to the original position, once again turning it 180°.

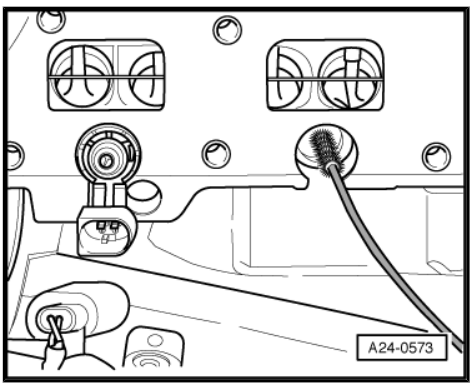
Step 2 of teflon ring calibration (adaption) is done with special tool -T10133/8- .



– Turn special tool (approx. 180°) while simultaneously sliding it over injector as far as it will go, applying moderate force. Then pull back to the original position, once again turning it 180°.



– Clean holes for high-pressure injectors in cylinder head with nylon brush -T10133/4- (cylinder 3 shown as example).



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3.13 Removing and installing high-pressure fuel pump

Note

- *The high-pressure fuel pump should only be removed and installed when the engine is cold.*
- *When installing the high-pressure fuel pump, it is essential to ensure that no dirt enters the fuel system.*
- *Use a cloth to catch escaping fuel.*

Removing

Caution

Take care to keep components clean.

- *Observe rules for cleanliness when working on the fuel supply system ⇒ "2.1 Rules for cleanliness", page 3 .*

Risk of injury - fuel system operates under high pressure

The fuel system is pressurised. There is a risk of injury as fuel may spray out.

Before opening the fuel system:

– Put on safety goggles.

– Put on protective gloves.

– Release pressure (wrap clean cloth around connection and open connection carefully).

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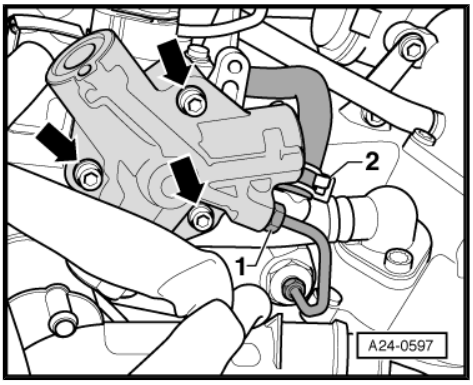
– Disconnect fuel supply line -2- from high-pressure fuel pump.
– Open connection for high-pressure fuel line -1- on high-pressure fuel pump and on fuel rail.
– Remove the three bolts -arrows-. If necessary, open cable ties securing wiring harness.
– Turn high-pressure fuel pump anti-clockwise until high-pressure line -2- can be disconnected from high-pressure fuel pump.
– Pull high-pressure fuel pump out of camshaft housing.

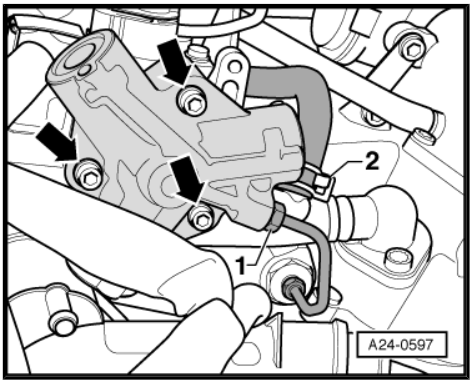


Installing

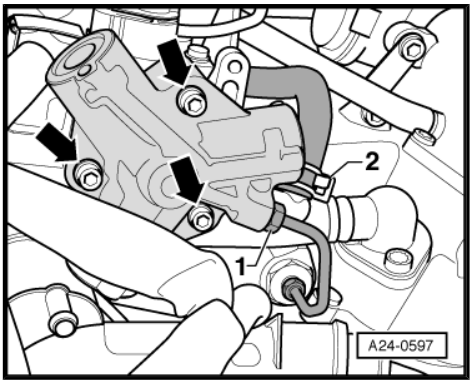
Note

- *O-ring for high-pressure fuel pump must always be renewed.*
- *High-pressure fuel line must always be renewed.*

– When installing high-pressure fuel pump in camshaft housing, pay attention to pin which must be guided into high-pressure fuel pump.
– Secure new high-pressure line at fuel rail hand-tight.
– Turn high-pressure fuel pump slightly anti-clockwise, then turn it clockwise while carefully guiding new high-pressure line into high-pressure fuel pump.
– Screw union screw -1- approx. 2 turns into high-pressure fuel pump.
– Tighten high-pressure fuel pump -arrows- with the three bolts. Tightening torque: 10 Nm
– Tighten high-pressure line. Tightening torque: 15 Nm



– Fit fuel supply line -2- back on high-pressure fuel pump. Make sure that hose clip is securely fitted.
– With engine idling, check high-pressure fuel pump and fuel lines for leaks.



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28 – Ignition system

1 Checking ignition system

1.1 Safety precautions when working on the ignition system

Risk of injury caused by electric shock

When the engine is running, there are high voltage levels in the ignition system. There is a risk of electric shock when touching the ignition system!

– Never touch or disconnect ignition wiring when the engine is running or being turned at cranking speed.

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Risk of damage to components

Washing the engine or connecting/disconnecting electrical wiring may result in components being damaged if the engine is running.

– Switch off ignition before connecting/disconnecting electrical wiring.

– Switch off ignition before cleaning engine.

1.2 Safety precautions when using testers and measuring instruments during a road test

Risk of injury if test equipment is not secured

If an accident occurs and the front passenger's airbag is triggered, test equipment which is not secured adequately may be catapulted through the vehicle with potentially serious consequences.

– Secure test equipment on the rear seat with a strap.

Or

– Have a second mechanic operate test equipment on the rear seat.

1.3 Technical data for ignition system

Engine code		BAD 1.6 ltr. 81kW
Ignition timing is determined by the control unit. Ignition timing cannot be adjusted.		
Ignition system		Multi-coil ignition system with 4 ignition coils (ignition coil and output stage combined in one component) connected directly to spark plugs via spark-plug connectors
Spark plugs	Part number and manufacturer details	See Parts catalogue
	Tightening torque	30 Nm

Engine code	BAD 1.6 ltr. 81kW
Firing order	1-3-4-2

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