Workshop Manual

Audi TT 2007 ➢

Direct petrol injection and ignition system (4-cyl. 2.0 ltr. 4-valve turbo)									
Engine ID	BWA	BPY	CDL B	CDL A	CDM A				

Edition 01.2008

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

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

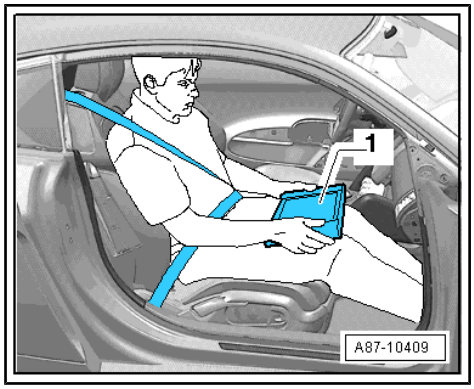
1 Safety precautions and rules for cleanliness

1.1 General notes on self-diagnosis

- The engine control unit has a self-diagnosis capability. Before carrying out repairs and fault finding the fault memory must be interrogated. The vacuum hoses and connections must also be checked (unmetered air).
- Fuel hoses in engine compartment must only be secured with spring-type clips. Clamping-type or screw-type clips must not be used.
- A voltage of at least 11.5 V is required for proper operation of the electrical components.
- Do not use sealants containing silicone. Particles of silicone drawn into the engine will not be burnt in the engine and will damage the Lambda probe.
- The vehicles are fitted with a crash/fuel shut-off system. This system is designed to reduce the risk of a vehicle fire after a crash by deactivating the fuel pump via the fuel pump relay.
- At the same time, this system also improves the engine's starting performance. When the driver's door is opened, the fuel pump is activated for 2 seconds in order to build up pressure in the fuel system ⇒ page 2 .

1.2 Safety precautions

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



WARNING

Accidents can be caused if the driver is distracted by test equipment while road-testing, or if test equipment is not properly secured.

Injuries can also be caused if the passenger's airbag is triggered in a collision.

- *The use of test equipment while driving causes distraction.*
- *There is an increased risk of injury if test equipment is not secured.*

◆ *Move the passenger's seat back as far as it will go.*

◆ *Use only vehicle diagnosis and service information system -VAS 5052- or diagnosis system -VAS 5053- .*

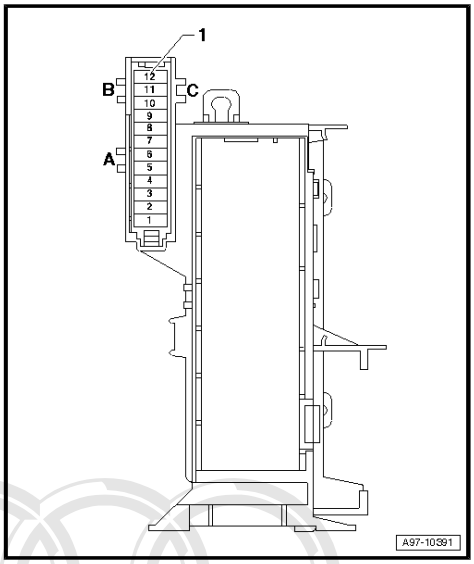
◆ *The test equipment -1- must rest flat on the passenger's thighs (as shown in illustration) and must be operated by the passenger.*

WARNING

The fuel system is pressurised. The fuel pressure in the high-pressure part of the injection system must be reduced to a residual pressure prior to opening; for procedure see ⇒ page 4 .

The connection must be opened immediately after reducing the pressure; wrap a cloth around the connection and allow the residual pressure (approx. 6 bar) to dissipate.

To avoid any risk of injuries to persons and/or damage to the fuel injection and ignition system, always observe the following safety precautions.



- For safety reasons, the battery must be disconnected before opening the fuel system to prevent the fuel pump from being activated by the contact switch on the driver's door.
- Persons wearing a cardiac pacemaker must at all times maintain a safe distance from high-voltage components such as the ignition system and gas-discharge headlights.
- Do not open any fuel line connections while the engine is running.
- Always switch off the ignition before connecting or disconnecting injection or ignition system wiring or tester cables.
- If engine is to be operated at cranking speed without it starting (e.g. compression test), unplug connectors from ignition coils and remove fuse for electric fuel pump.
- Certain tests may lead to a fault being detected by the control unit and stored. The fault memory should therefore be interrogated and (if necessary) erased after completing the tests and any repair work that may be required.
- If the fault memory has been erased, you must generate the readiness code again.
- 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.
- If the engine has to be operated at the starting speed without actually starting (e.g. to test compression pressure), detach the four connectors from the ignition coils using assembly tool -T40039- ⇒ page 64 . Also remove fuse for fuel pump control unit -J538- .

Note

- *The fuse is located in the fuse holder in the luggage compartment (right-side).*
- *Removing fuse -SF 6- will interrupt the voltage supply "terminal 30" for the fuel pump control unit -J538- .*

1.3 Rules for cleanliness and instructions for working on fuel system

Even small amounts of dirt can cause faults in the injection system. When working on the fuel supply/injection system, pay careful attention to the following basic rules:

- Carefully clean connection points and the surrounding area with engine cleaner or brake cleaner and dry thoroughly before opening.
- Plug open lines and connections with suitable protective caps immediately.
- Place parts that have been removed on a clean surface and cover them over. Use only lint-free cloths.
- Only install clean components; replacement parts should only be unpacked immediately prior to installation. Do not use parts that have been previously unpacked and stored away loose (e.g. in toolboxes, etc.).
- When the system is open: Do not work with compressed air. Do not move the vehicle unless absolutely necessary.

1.4 Important: Required procedure prior to opening high-pressure injection system

Caution

The injection system consists of a high-pressure section (maximum approx. 150 bar) and a low-pressure section (approx. 7 bar).

Prior to opening the high-pressure section (e.g. when removing the high-pressure pump, fuel rail, injectors, fuel pipes or fuel pressure sender -G247-, the fuel pressure in the high-pressure section must be reduced to a residual pressure of approx. 7 bar. The procedure is described below.

Reducing fuel pressure in high-pressure section

– Connect up the vehicle diagnostic, testing and information system -VAS 5051B- .

– Start engine and run at idling speed.

– Select “Engine electronics” in vehicle self-diagnosis.

– Then select function read “Measured values”.

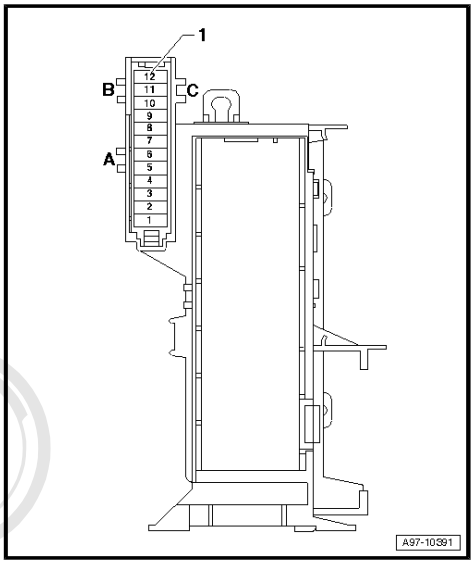
– Select measured value block 140.

– With engine idling the fuel pressure is displayed in zone 3.

◆ Specification: between 45 and 55 bar

– The fuse is located in the fuse holder in the luggage compartment (right-side).

– With engine idling, pull out fuse -SF 6- for fuel pump control unit -J538- .



Note

Removing fuse -SF 6- will interrupt the voltage supply “terminal 30” for the fuel pump control unit -J538- .

– Observe fuel pressure displayed on tester.

• The fuel pressure will decrease very quickly because the mechanical high-pressure pump is no longer being supplied with fuel by the fuel system pressurisation pump -G6- .

– Switch off ignition as soon as fuel pressure has dropped to approx. 8 bar.

Note

Fuel pressure must not fall below 6 bar, otherwise the engine will stall (this could damage the catalytic converter).

WARNING

The fuel lines are still filled with fuel, however the fuel is no longer under high pressure. Wear safety goggles and protective clothing when opening the fuel system to avoid possible injury and skin contact.

Before opening the high-pressure section, wrap a cloth around the connection.

– The high-pressure system must be opened “immediately” after reducing the fuel pressure; wrap a clean cloth around the connection. Catch the escaping fuel.

The following operations must be performed after completing repair work:

– Refit fuse.

– Erase fault memory and generate readiness code in engine control unit in “Guided Functions” mode, using vehicle diagnostic and service information system -VAS 5052 A- .

2 Injection system

2.1 Technical data

Engine data		2.0 ltr. turbo FSI engine
Idling speed is not adjustable; controlled by the idling speed stabilisation		640 ... 800 rpm
Maximum rpm governed by deactivation of fuel injectors		6500 rpm
Fuel pressure	Initial fuel pressure up to high-pressure pump (generated by electric fuel pump in fuel tank)	approx. 6.0 bar (identical for all operating conditions)
	Pressure in high-pressure fuel circuit (generated by mechanical single-plunger pump) at a coolant temperature of approx. 85°C.	approx. 50 bar at idling speed approx. 110 bar in certain parts of operating range.

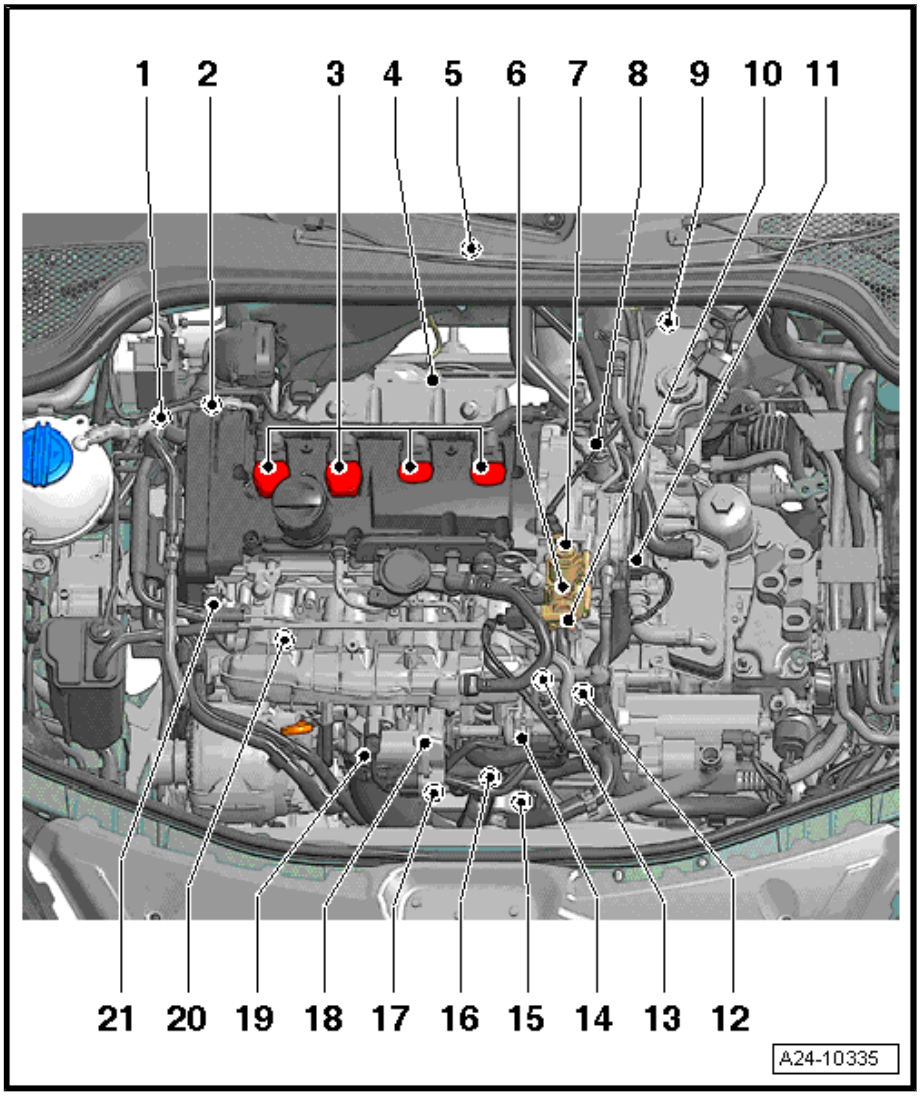
2.2 Overviews - fitting locations

Overview of fitting locations - engines with code letters BWA and BPY ⇒ page 6

Overview of fitting locations - engines with code letters CDLA, CDLB and CDMA ⇒ page 9

2.2.1 Overview of fitting locations - engines with code letters BWA and BPY

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



1 - Solenoid valve for charge pressure control -N75-

- ❑ Located directly on turbocharger ⇒ page 17

2 - Turbocharger air recirculation valve -N249-

- ❑ Located directly on turbocharger ⇒ page 17

3 - Ignition coils with output stages

- ❑ Removing and installing ⇒ page 64
- ❑ Ignition coil 1 with output stage -N70-
- ❑ Ignition coil 2 with output stage -N127-
- ❑ Ignition coil 3 with output stage -N291-
- ❑ Ignition coil 4 with output stage -N292-
- ❑ Puller -T40039- is required for removing ignition coils from cylinder head.

4 - Lambda probe -G39- and Lambda probe heater -Z19-

- ❑ Fitting location ⇒ page 16
- ❑ Removing and installing ⇒ page 52

5 - Engine control unit -J623-

- ❑ Removing and installing ⇒ page 57

6 - Single-plunger high-pressure pump

- ❑ Removing and installing ⇒ page 42

7 - Fuel pressure regulating valve -N276-

8 - Inlet camshaft control valve 1 -N205-

- ❑ Removing and installing ⇒ Rep. Gr. 15

9 - 6-pin connector

- ❑ For Lambda probe -G39- and Lambda probe heater -Z19- (black) ⇒ page 16

10 - Fuel pressure sender for low pressure -G410-

- ❑ 15 Nm

11 - Coolant temperature sender -G62-

- ❑ Fitting location ⇒ page 13

12 - Engine speed sender -G28-

- ❑ Oil pressure sender -G10-
- ❑ Electrical connectors for knock sensor 1 -G61- and for knock sensor 2 -G66-
- ❑ Fitting location ⇒ page 15

13 - Intake manifold flap motor -V157- with intake manifold flap potentiometer -G336-

- ❑ After the fuel rail has been removed or renewed, intake manifold flap potentiometer -G336- must be adapted to the engine control unit -J623- ; see vehicle diagnostic and service information system -VAS 5052- , “Guided Functions”
- ❑ Removing and installing ⇒ page 49

14 - Activated charcoal filter solenoid valve 1 -N80-

15 - Charge pressure sender -G31-

- Fitting location ⇒ page 15

16 - Connector

- For Hall sender -G40- and fuel pressure sender -G247-
- Fitting location ⇒ page 15

17 - 8-pin connector for injectors

- Fitting location ⇒ page 15

18 - Throttle valve module -J338- , throttle valve drive for electric throttle -G186-

- Throttle valve drive angle sender 1 for electric throttle -G187- and throttle valve drive angle sender 2 for electric throttle -G188-
- After the throttle valve module -J338- has been renewed, it must be adapted to the engine control unit -J623- , see vehicle diagnostic and service information system -VAS 5052- “Guided Functions”

19 - Intake air temperature sender -G42-

20 - Fuel pressure sender -G247-

- 22 Nm
- Fitting location ⇒ page 13
- Removing and installing ⇒ page 36

21 - Hall sender -G40- (camshaft position sensor)

- Electrical connector ⇒ page 13

A - Air mass meter -G70-

- In air cleaner (top section) ⇒ page 14
- Removing and installing ⇒ page 22

B - Fuel pump control unit -J538-

- ⇒ page 14
- Adaption of fuel pump must be performed after renewing fuel pump control unit -J538- . Basic setting, measured value block 103, see ⇒ Rep. Gr. 20 or via vehicle diagnosis and service information system -VAS 5052- “Guided Functions”

C - Brake light switch - F- and brake pedal switch -F63-

- Fitting location ⇒ page 15
- Removing and installing ⇒ Rep. Gr. 45

D - Accelerator position sender -G79- and accelerator position sender 2 -G185-

- Fitting location ⇒ page 12
- On accelerator pedal (both senders are accommodated in one housing)
- If accelerator pedal module or engine control unit is renewed, kick-down function must be adapted on vehicles with automatic gearbox
- Removing and installing ⇒ Rep. Gr. 20

E - Clutch position sender -G476-

- Fitting location ⇒ page 14
- Removing and installing, see Power transmission, clutch ⇒ Rep. Gr. 30

F - Relay and fuse holder in electronics box

- Relay and fuse assignment see ⇒ Current flow diagrams, Electrical fault finding and Fitting locations

G - Radiator fan control unit -J293-

- Fitting location ⇒ page 16

H - Injectors

- In fuel rail
- Removing and installing ⇒ page 44
- Injector, cylinder 1 -N30-

- ❑ Injector, cylinder 2 -N31-
- ❑ Injector, cylinder 3 -N32-
- ❑ Injector, cylinder 4 -N33-

The fuel injectors are high-pressure injectors. They inject fuel at high pressure (maximum approx. 110 bar) directly into the cylinder.

I - Lambda probe after catalytic converter -G130- and Lambda probe heater 1 after catalytic converter -Z29-

- ❑ Fitting location ⇒ page 17
- ❑ Removing and installing ⇒ page 53

J - Knock sensor 1 -G61-

- ❑ For cylinders 1 and 2
- ❑ 20 Nm
- ❑ Fitting location ⇒ page 15

K - Knock sensor 2 -G66-

- ❑ For cylinders 3 and 4
- ❑ 20 Nm
- ❑ Fitting location ⇒ page 15

L - Oil pressure switch -F1-

- ❑ Fitting location ⇒ page 15
- ❑ Removing, installing and testing ⇒ Rep. Gr. 17

M - Radiator outlet coolant temperature sender -G83-

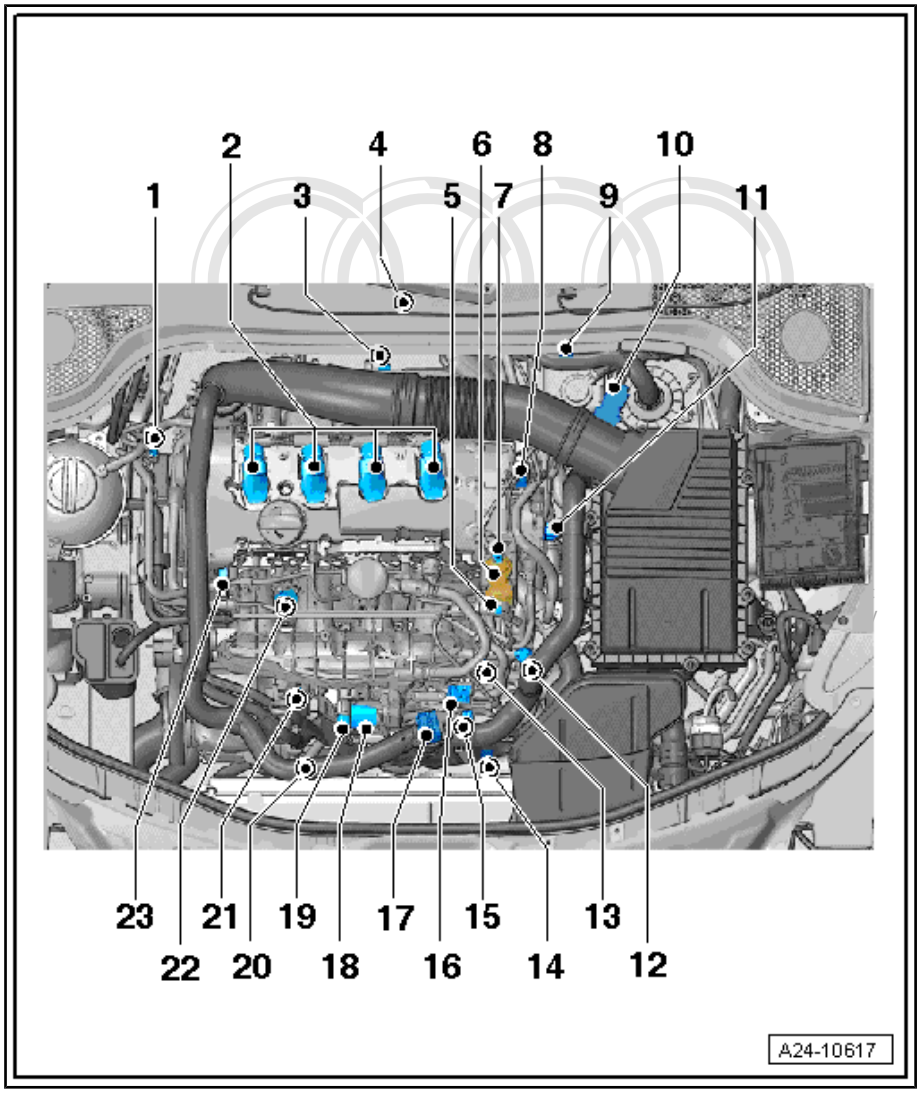
- ❑ Fitting location ⇒ page 13

N - Continued coolant circulation pump -V51-

- ❑ Fitting location ⇒ page 16

2.2.2 Overview of fitting locations - engines with code letters CDLA, CDLB and CDMA

Components A to L are not shown in the overview.



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- Removing and installing ⇒ page 64
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- Puller -T40039- is required for removing ignition coils from cylinder head.

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- Fitting location ⇒ page 16
- Removing and installing ⇒ page 52

4 - Engine control unit -J623-

- Removing and installing ⇒ page 57

5 - Fuel pressure sender for low pressure -G410-

- 15 Nm

6 - Single-plunger high-pressure pump

- Removing and installing ⇒ page 42

7 - Fuel pressure regulating valve -N276-

8 - Inlet camshaft control valve 1 -N205-

- Removing and installing ⇒ Rep. Gr. 15

9 - 6-pin connector

- For Lambda probe -G39- and Lambda probe heater -Z19- (black) ⇒ page 16

10 - Air mass meter -G70-

- Removing and installing ⇒ page 26

11 - Coolant temperature sender -G62-

- Fitting location ⇒ page 13

12 - Engine speed sender -G28-

- Electrical connectors for knock sensor 1 -G61- and for knock sensor 2 -G66-
- Fitting location ⇒ page 15

13 - Intake manifold flap motor -V157- with intake manifold flap potentiometer -G336-

- After the fuel rail has been removed or renewed, intake manifold flap potentiometer -G336- must be adapted to the engine control unit -J623- ; see vehicle diagnostic and service information system -VAS 5052- , “Guided Functions”
- Removing and installing ⇒ page 49

14 - Charge pressure sender -G31-

- Fitting location ⇒ page 15

15 - Electrical connectors

- For injectors, Hall sender -G40- and fuel pressure sender -G247-
- Fitting location ⇒ page 15

16 - Activated charcoal filter solenoid valve 1 -N80-

- Fitting location ⇒ page 18

17 - Turbocharger air recirculation valve -N249-

- Fitting location ⇒ page 18
- Removing and installing ⇒ Rep. Gr. 21

18 - Throttle valve module -J338- , throttle valve drive for electric throttle operation -G186-

- Throttle valve drive angle sender 1 for electric throttle -G187- and throttle valve drive angle sender 2 for electric throttle -G188-
- After the throttle valve module -J338- has been renewed, it must be adapted to the engine control unit -J623- , see vehicle diagnostic and service information system -VAS 5052- “Guided Functions”

19 - Intake air temperature sender -G42-

20 - Continued coolant circulation pump -V51-

- Fitting location ⇒ page 16

21 - Radiator outlet coolant temperature sender -G83-

- Fitting location ⇒ page 13

22 - Fuel pressure sender -G247-

- 22 Nm
- Fitting location ⇒ page 13
- Removing and installing ⇒ page 36

23 - Hall sender -G40- (camshaft position sensor)

- Fitting location ⇒ page 13

A - Fuel pump control unit -J538-

- Fitting location ⇒ page 14
- Adaption of fuel pump must be performed after renewing fuel pump control unit -J538- . Basic setting for measured value block 103, see ⇒ Rep. Gr. 20 or via vehicle diagnosis and service information system -VAS 5052- “Guided Functions”

B - Brake light switch - F- and brake pedal switch -F63-

- Fitting location ⇒ page 15
- Removing and installing ⇒ Rep. Gr. 45

C - Accelerator position sender -G79- and accelerator position sender 2 -G185-

- Fitting location ⇒ page 12
- On accelerator pedal (both senders are accommodated in one housing)
- If accelerator pedal module or engine control unit is renewed, kick-down function must be adapted on vehicles with automatic gearbox
- Removing and installing ⇒ Rep. Gr. 20

D - Clutch position sender -G476-

- Fitting location ⇒ page 14
- Removing and installing, see Power transmission, clutch ⇒ Rep. Gr. 30

E - Relay and fuse holder in electronics box

- Relay and fuse assignment see ⇒ Current flow diagrams, Electrical fault finding and Fitting locations

F - Radiator fan control unit -J293-

- Fitting location ⇒ page 16

G - Injectors

- In fuel rail
- Removing and installing ⇒ page 44
- Injector, cylinder 1 -N30-
- Injector, cylinder 2 -N31-
- Injector, cylinder 3 -N32-
- Injector, cylinder 4 -N33-

The fuel injectors are high-pressure injectors. They inject fuel at high pressure (maximum approx. 110 bar) directly into the cylinder.

H - Lambda probe after catalytic converter -G130- and Lambda probe heater 1 after catalytic converter -Z29-

- Fitting location ⇒ page 17
- Removing and installing ⇒ page 53

I - Knock sensor 1 -G61-

- For cylinders 1 and 2
- 20 Nm
- Fitting location ⇒ page 15

J - Knock sensor 2 -G66-

- For cylinders 3 and 4
- 20 Nm
- Fitting location ⇒ page 15

K - Oil pressure switch -F1-

- Fitting location ⇒ page 15
- Removing, installing and testing ⇒ Rep. Gr. 17

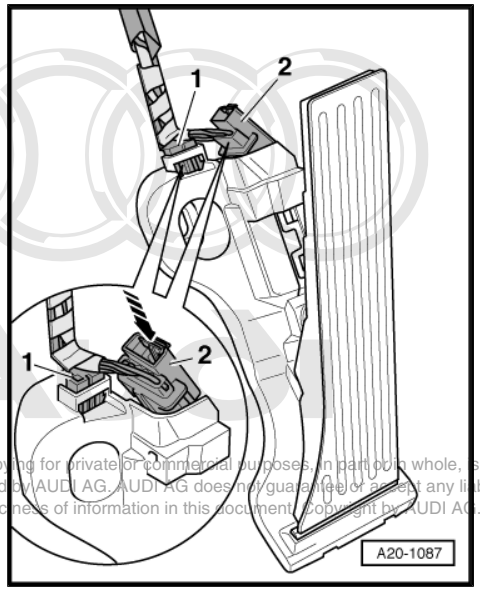
L - Exhaust flap 1 valve -N321-

- Fitting location ⇒ page 19

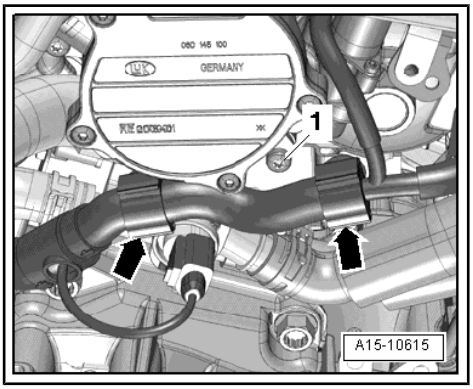
Accelerator position sender -G79- and accelerator position sender 2 -G185-

2 - Electrical connector for accelerator pedal module

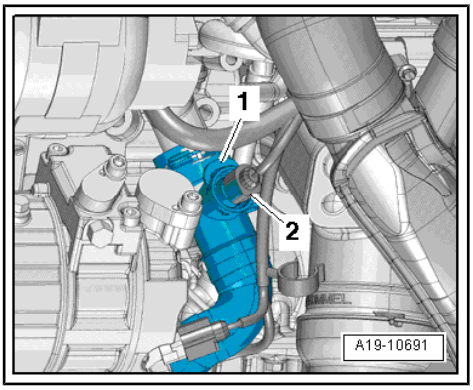
Removing and installing ⇒ Rep. Gr. 20



Coolant temperature sender -G62- -1-

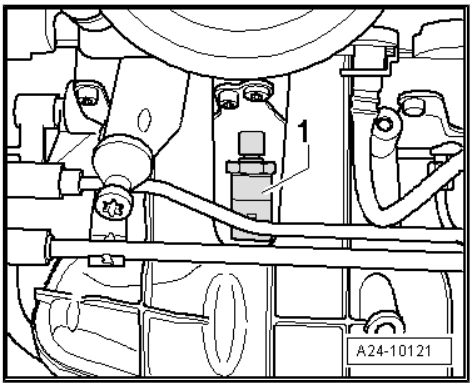


Radiator outlet coolant temperature sender -G83- -1-

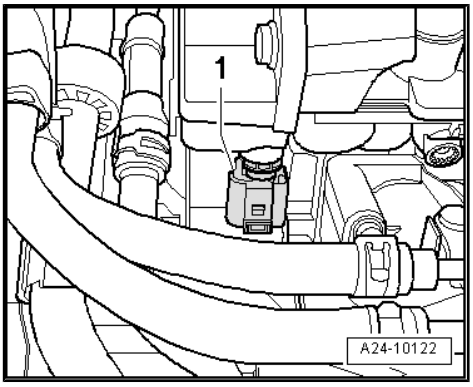


Fuel pressure sender -G247- -1-

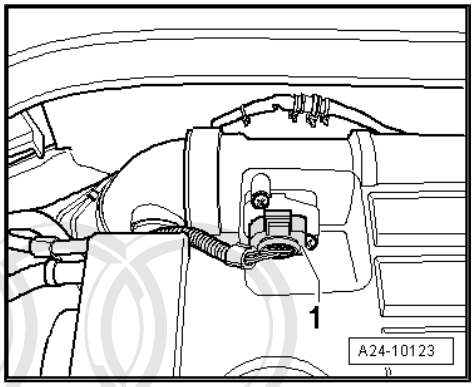
- Removing and installing ⇒ page 36



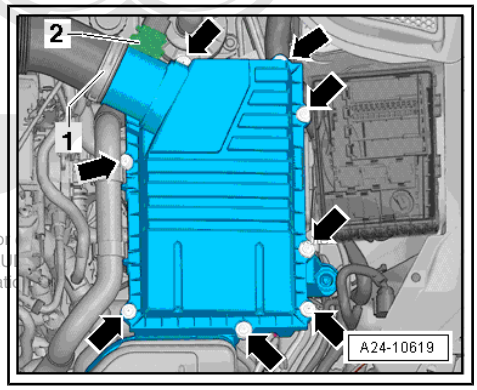
Hall sender -G40- -1-



Air mass meter -G70- -1- “engines with code letters BWA and BPY”

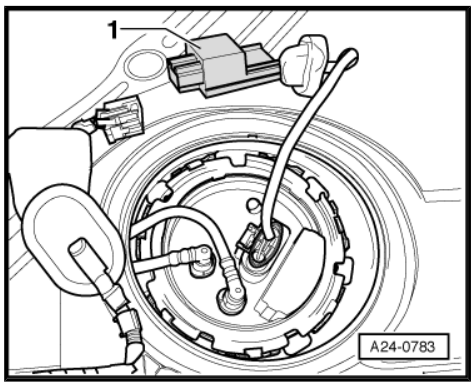


Air mass meter -G70- -1- “engines with code letters CDLA, CDLB and CDMA”



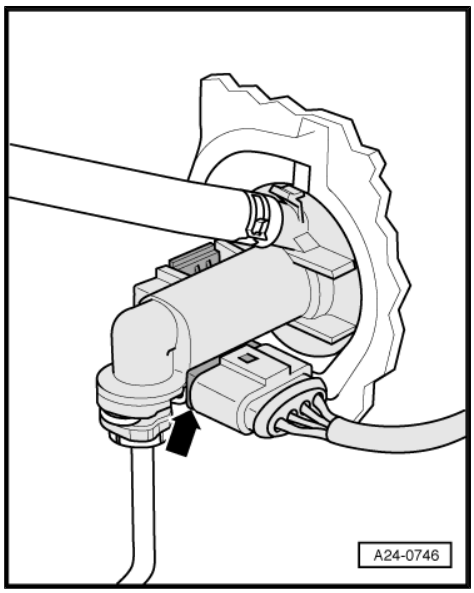
Fuel pump control unit -J538- -1-

- Adaption of fuel pump must be performed after renewing fuel pump control unit -J538- . Basic setting, measured value block 103, refer to ⇒ Rep. Gr. 20



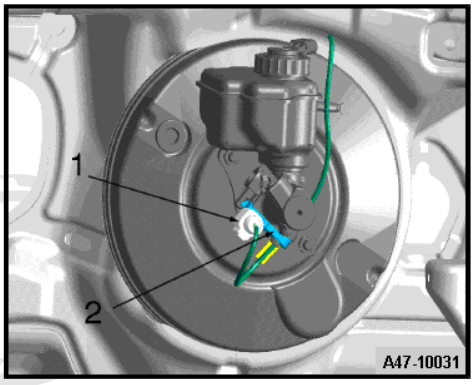
Clutch position sender -G476-

Removing and installing, see Power transmission, clutch ⇒ Rep. Gr. 30



Brake light switch -F- and brake pedal switch -F63-

Removing and installing ⇒ Rep. Gr. 45



Electrical connectors

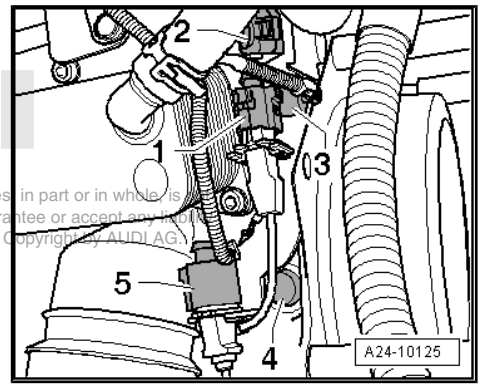
1 - 3-pin connector (green) for knock sensor 1 -G61-

2 - 3-pin connector (brown) for knock sensor 2 -G66-

3 - Oil pressure switch -F1-

4 - Engine speed sender -G28-

5 - 3-pin electrical connector (grey) for engine speed sender -G28-



Fitting locations of components below intake manifold

1 - Knock sensor 1 -G61-

2 - Knock sensor 2 -G66-

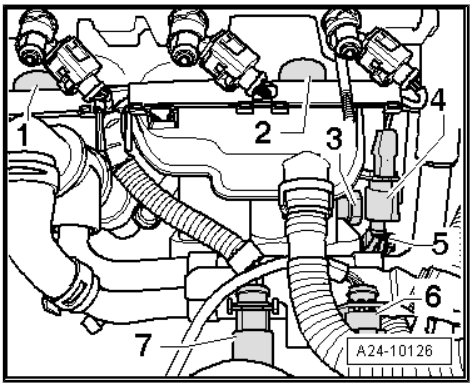
3 - Oil pressure switch -F1-

4 - 3-pin connector (brown) for knock sensor 2 -G66-

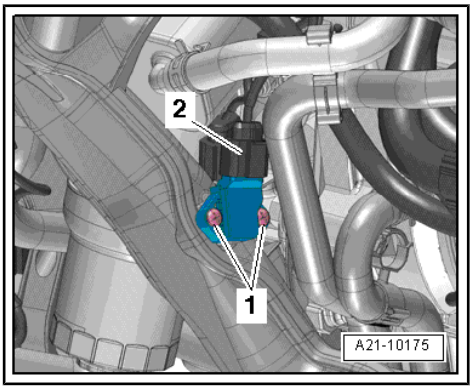
5 - 3-pin electrical connector (grey) for engine speed sender -G28-

6 - Electrical connector for Hall sender -G40- and fuel pressure sender -G247-

7 - 8-pin connector for injectors

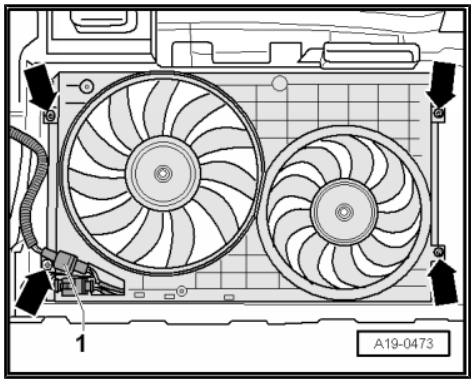


Charge air pressure sender -G31- -2-



Radiator fan control unit -J293-

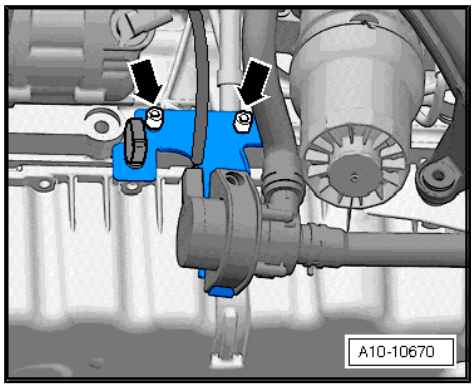
1 - Connector for radiator fan control unit -J293-



Note

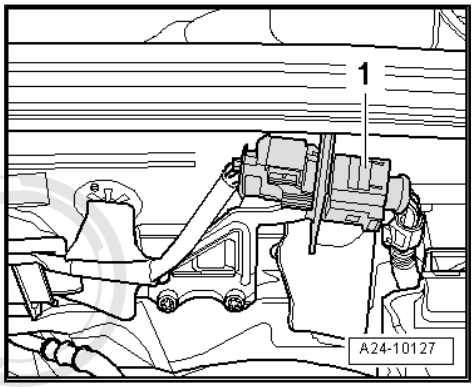
The radiator fan control unit -J293- is integrated into the radiator fan -V7- .

Continued coolant circulation pump -V51-

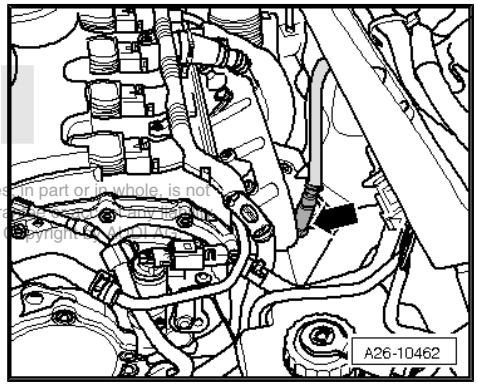


Electrical connector -arrow-

- Lambda probe -G39- and Lambda probe heater -Z19-

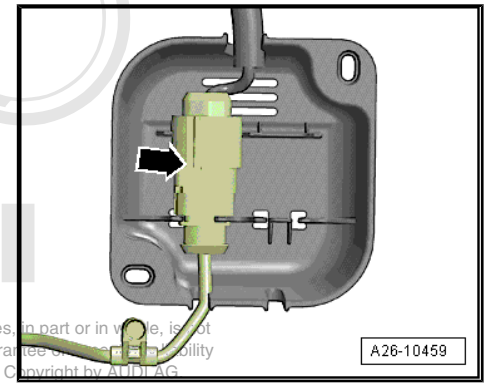


Lambda probe -G39- -arrow-



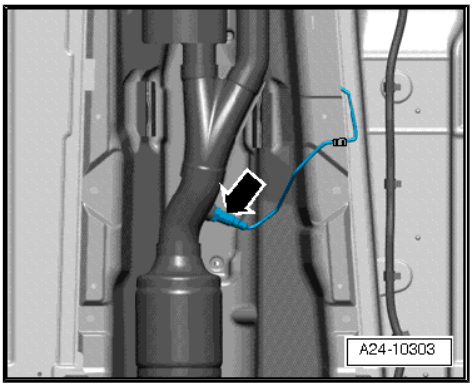
Electrical connector -arrow-

- Lambda probe, after catalytic converter -G130- and Lambda probe heater 1, after catalytic converter -Z29- on right-side underbody



Lambda probe after catalytic converter -arrow-

- Lambda probe, after catalytic converter -G130- and Lambda probe heater 1, after catalytic converter -Z29-

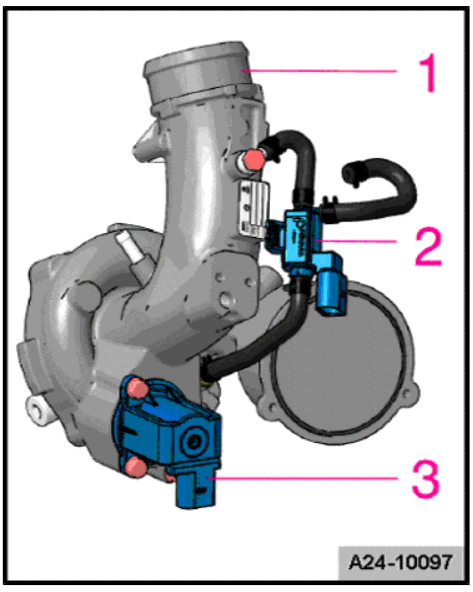


Components on turbocharger "engines with code letters BWA and BPY"

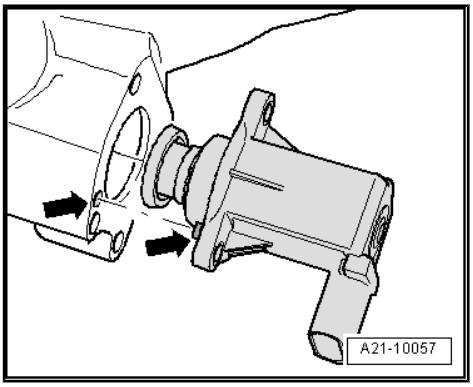
1 - Removing and installing turbocharger ⇒ Rep. Gr. 21

2 - Tighten charge pressure control solenoid valve -N75- to 3 Nm

3 - Tighten turbocharger air recirculation valve -N249- to 7 Nm (note installation position, refer to next illustration)



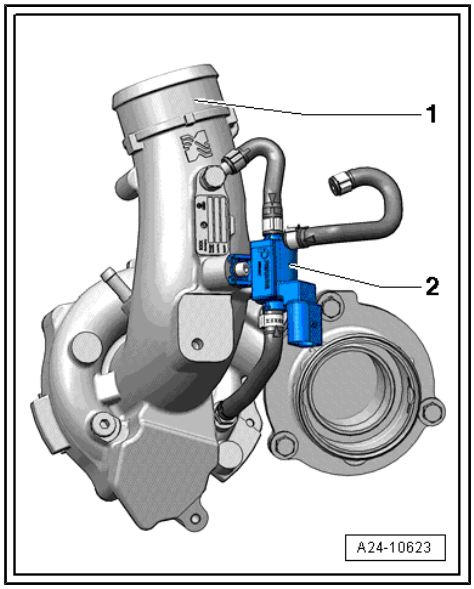
Note installation position of turbocharger air recirculation valve -N249- "engines with code letters BWA and BPY"



Component on turbocharger “engines with code letters CDLA, CDLB and CDMA”

1 - Removing and installing turbocharger ⇒ Rep. Gr. 21

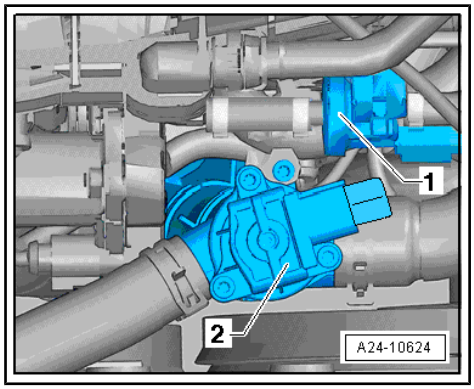
2 - Tighten charge pressure control solenoid valve -N75- to 3 Nm



Turbocharger air recirculation valve -N249- -2- “engines with code letters CDLA, CDLB and CDMA”

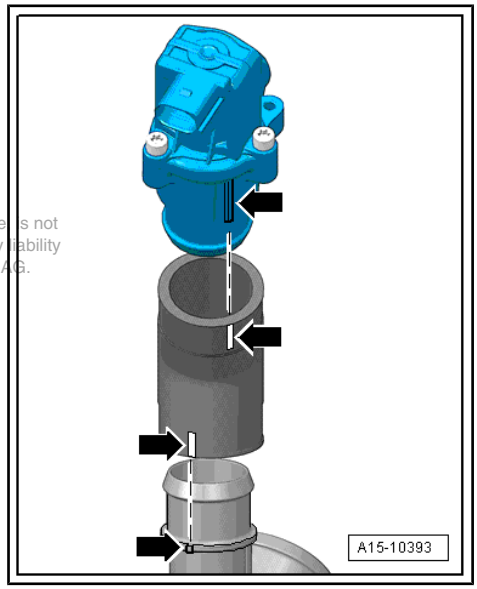
1 - Activated charcoal filter solenoid valve 1 -N80-

2 - Turbocharger air recirculation valve -N249-



Note installation position of turbocharger air recirculation valve -N249- “engines with code letters CDLA, CDLB and CDMA”

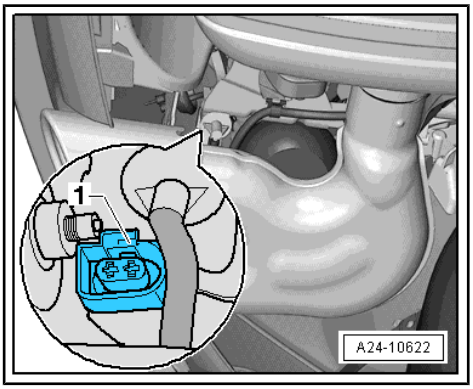
The marks -arrows- must align.



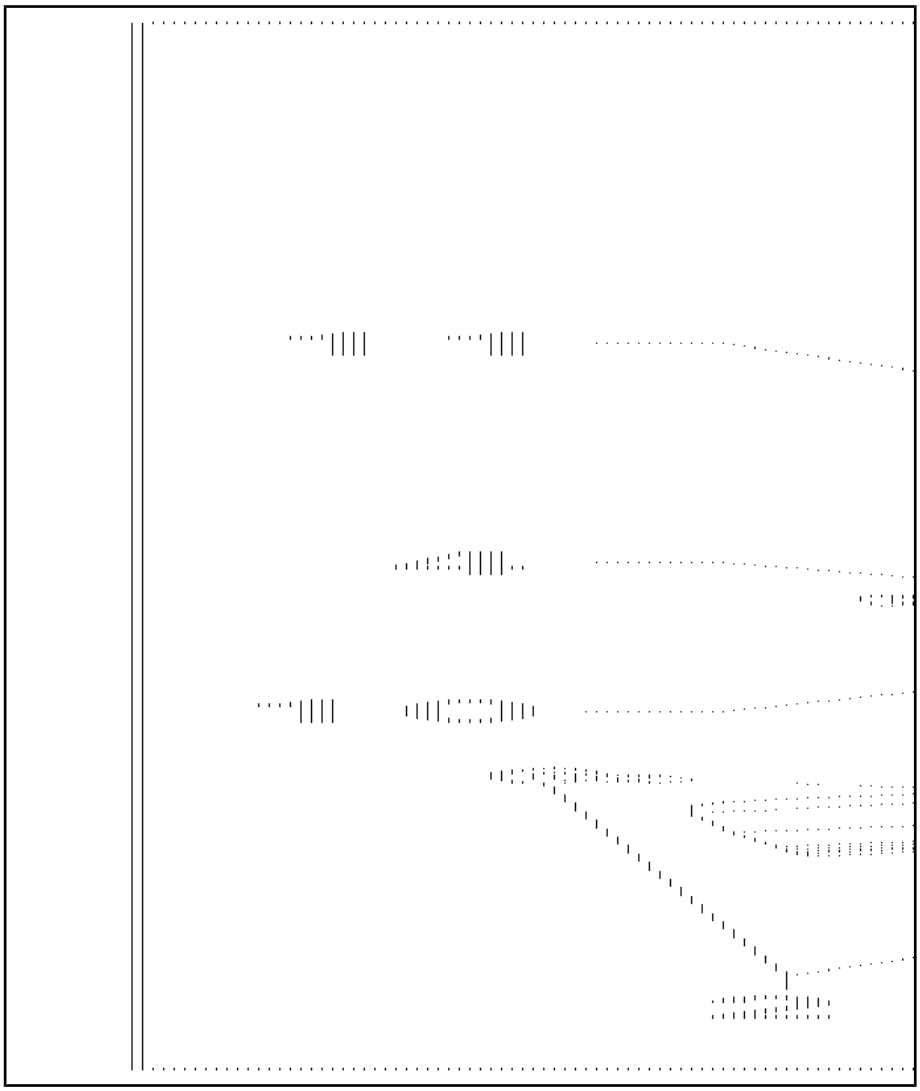
Exhaust flap 1 valve -N321-

1 - Electrical connector for exhaust flap 1 valve -N321-

Checking vacuum unit for exhaust flap ⇒ Rep. Gr. 26



2.3 Air cleaner / engine cover panel - exploded view (engines with code letters BWA and BPY)



1 - Air mass meter -G70-

- ❑ Removing and installing ⇒ page 22

2 - 3 Nm

3 - Air cleaner housing (top section/engine cover panel)

- ❑ Clean any salt deposits or leaves and dirt out of air cleaner housing (top section)

4 - Spring-type clip

5 - Intake air duct

- ❑ To air cleaner housing
- ❑ Clean any leaves and dirt out of intake air duct

6 - Filter element

- ❑ Always use genuine part for air filter element
- ❑ Removing and installing ⇒ page 20
- ❑ Observe change intervals ⇒ Maintenance ; Booklet 810

7 - Air cleaner housing (bottom section)

- ❑ Clean any salt deposits or leaves and dirt out of air cleaner housing (bottom section)

8 - 3 Nm

9 - Heat shield

10 - Rubber sleeve

- ❑ Note assembly markings

11 - Air hose

- ❑ Note assembly markings
- ❑ To turbocharger
- ❑ Check air intake hose for dirt and leaves

2.4 Removing and installing engine cover panel with air filter element - engines with code letters BWA and BPY

The air filter element is integrated in the engine cover panel.

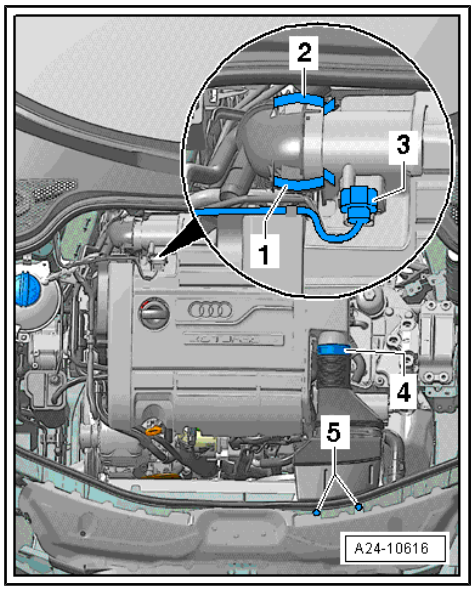
Removing engine cover panel

– Unplug electrical connector -3- at air mass meter -G70- .

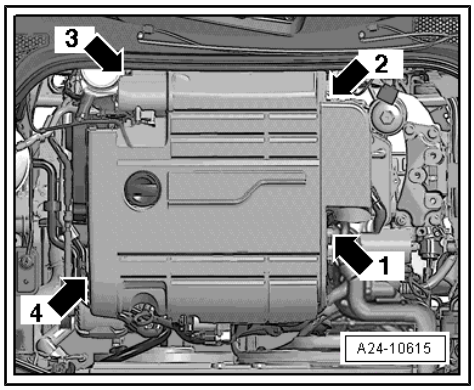
– Open clamps -1 and 2- and disconnect air intake hose from air mass meter.

– Detach air intake connection at lock carrier -5-.

– Release spring-type clip -4- and detach air intake hose from engine cover panel.



– Carefully pull engine cover panel off positions -1 - 2 - 3 - 4- one after the other.



Caution

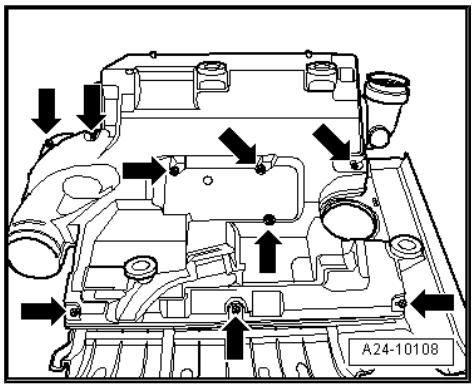
Always observe sequence (risk of breaking engine cover panel).

– Cover open intake hose with a clean cloth.

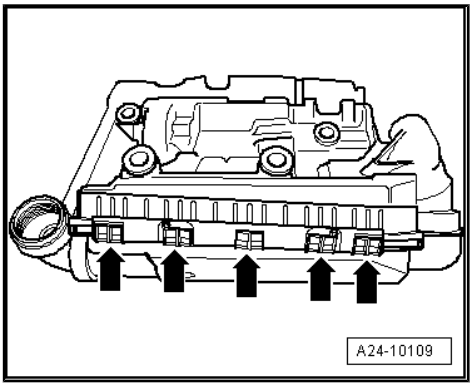
Removing air filter element

– Remove all bolts -arrows-.

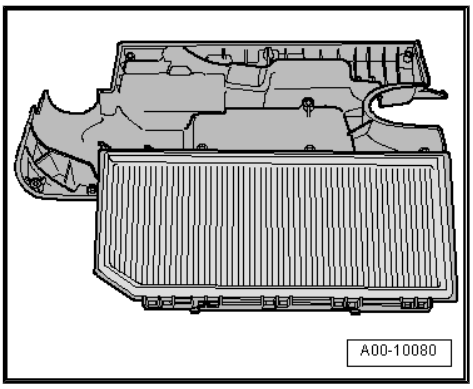
– Unbolt heat shield.



– Open engine cover panel (note retainers -arrows-).



– Pull air filter element out of engine cover panel.



Installing air filter element

Note

- *Always use genuine part for air filter element.*
- *Hose connections and hoses for charge air system must be free of oil and grease before assembly. Do not use any lubricants containing silicone when assembling.*
- *The air cleaner housing must be clean.*
- *Secure all hose connections with the correct type of hose clips (same as original equipment): ⇒ Parts catalogue*
- *To prevent malfunctions, cover all critical parts of the engine air intake tract (air mass meter, intake pipes, etc.) with a clean cloth when blowing out the air cleaner housing with compressed air.*
- *Please observe requirements for disposal.*

– Check for salt residue, dirt and leaves in air mass meter and air intake hose (engine intake side).

– Check for dirt in air intake hose from air duct.

– When installing the air filter element, check that it is properly centred in the retainer in the air cleaner (bottom section).

– Fit the top section of the air cleaner carefully on the bottom section, without using force. Make sure the top section of the air cleaner is fitted straight on the air filter element (note position of sealing lip on air filter element).

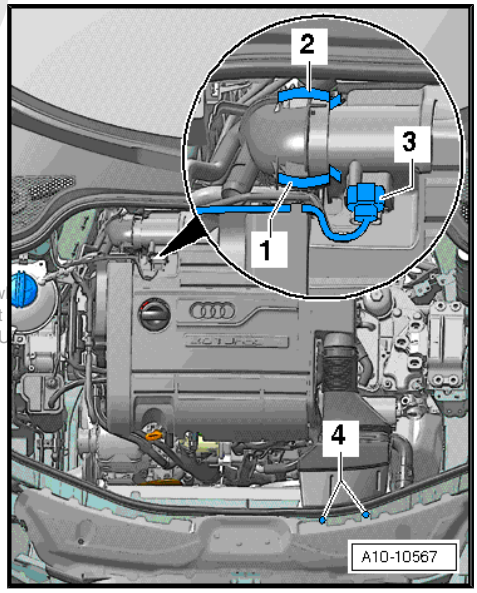
– Ensure secure fit of intake hose at air mass meter -G70- .

The remaining installation steps are carried out in the reverse sequence.

2.5 Removing and installing air mass meter -G70- - engines with code letters BWA and BPY

– Unplug electrical connector -3- at air mass meter -G70- .

– Unscrew both bolts from air mass meter -G70- and carefully pull air mass meter -G70- out of guide on air cleaner housing.



Installing

To ensure the proper function of the air mass meter -G70- it is important to observe the following notes and instructions.

Note

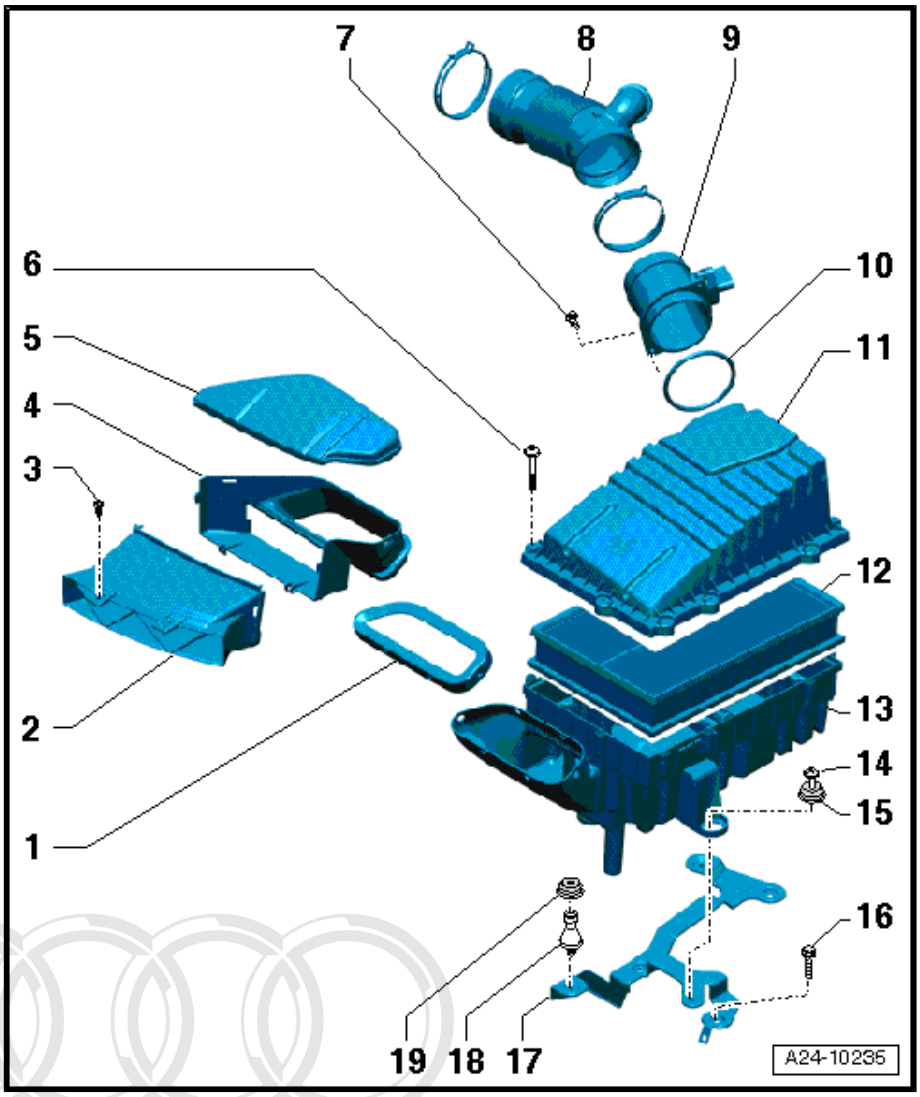
- *If the air filter element is very dirty or wet, dirt or water could reach the air mass meter -G70- and affect the air mass value. This would lead to loss of power, since a smaller injection quantity is calculated.*
- *Always use genuine part for air filter element.*
- *Use a silicone-free lubricant when installing the intake hose.*
- *Secure all hose connections with the correct type of hose clips (same as original equipment): ⇒ Parts catalogue*

– Check for salt residue, dirt and leaves in air mass meter and air intake hose (engine intake side).

– Check for dirt in air duct leading to air filter element. If necessary, clean salt residue, dirt and leaves out of air cleaner housing (top and bottom sections); wash out or use a vacuum cleaner as required. Removing and installing air cleaner ⇒ page 20

The remaining installation steps are carried out in the reverse sequence.

2.6 Air cleaner - exploded view (engines with code letters CDLA, CDLB and CDMA)



1 - Gasket
- ❑ Clipped into air cleaner housing (bottom section)

2 - Front air duct
- ❑ Clean out dirt, leaves and salt deposits

3 - Bolt
- ❑ 2 Nm

4 - Lower part of air duct
- ❑ Clean out dirt, leaves and salt deposits

5 - Air duct cover

6 - Bolt
- ❑ 5 Nm

7 - Bolt
- ❑ 3 Nm

8 - Air hose

9 - Air mass meter -G70-
- ❑ Removing and installing ⇒ page 26

10 - Seal
- ❑ Renew if damaged

11 - Air cleaner housing (top section)
- ❑ Clean any salt deposits or leaves and dirt out of air cleaner housing (top section)

12 - Air filter element
- ❑ Removing and installing ⇒ page 24
- ❑ Always use genuine part for air filter element
- ❑ Observe change intervals ⇒ Maintenance ; Booklet 810

13 - Air cleaner housing (bottom section)
- ❑ Clean any salt deposits or leaves and dirt out of air cleaner housing (bottom section)
- ❑ Removing and installing ⇒ page 25
- ❑ Clean out dirt, leaves and salt deposits

14 - Bolt
- ❑ 10 Nm

15 - Rubber grommet

16 - Bolt
- ❑ 10 Nm

17 - Bracket for air cleaner housing

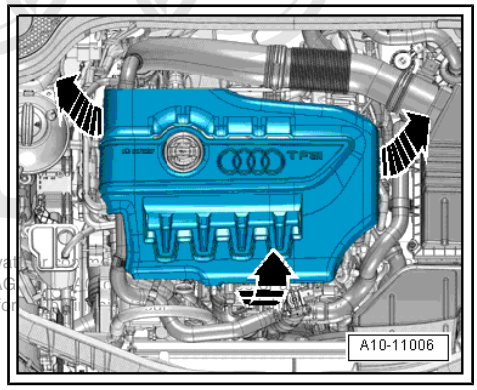
18 - Retaining peg
- ❑ 10 Nm

19 - Rubber grommet

2.7 Removing and installing engine cover panel - engines with code letters CDLA, CDLB and CDMA

Removing

– Carefully pull off engine cover panel -arrows-. Do not jerk the cover panel away, and do not try to pull on one side only.



Installing

– Press engine cover panel back carefully into its retainers.

– To avoid damage, do not strike the engine cover panel with your fist or with any kind of tool.

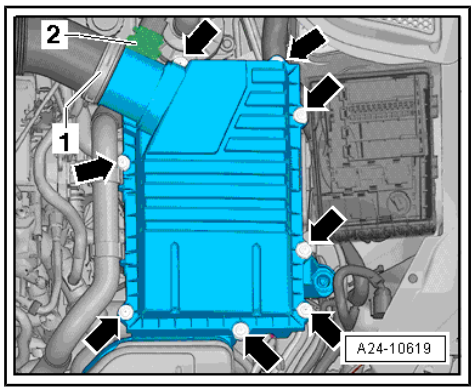
2.8 Removing and installing air filter element - engines with code letters CDLA, CDLB and CDMA

Removing

– Detach air intake hose -1- at air mass meter -G70- .

– Unplug electrical connector -2- at air mass meter -G70- .

– Detach air cleaner housing (top section) -arrows- and take out air filter element.



Installing

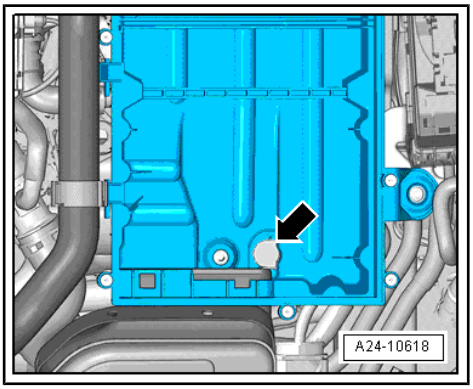
Installation is carried out in the reverse order; note the following:

To ensure the proper function of the air mass meter it is important to observe the following notes and instructions.

Note

- *If the air filter element is very dirty or wet, dirt or water could reach the air mass meter and affect the air mass value. This would lead to loss of power, since a smaller injection quantity is calculated.*
- *Always use genuine part for air filter element.*
- *The air cleaner housing MUST be clean.*
- *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*
- *To prevent malfunctions, cover all critical parts of the engine air intake tract (air mass meter, intake pipes, etc.) with a clean cloth when blowing out the air cleaner housing with compressed air.*
- *Please observe requirements for disposal.*

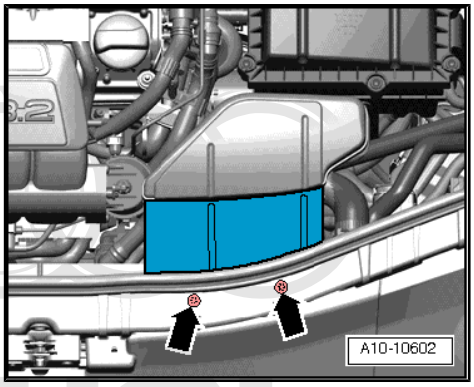
– Blow out water drain (small hole in bottom section of air cleaner housing) with compressed air.
– Clean salt residue, dirt and leaves out of air cleaner housing (top and bottom sections); use a vacuum cleaner if necessary.
– Check for salt residue, dirt and leaves in air mass meter and air intake hose (engine intake side).
– Check for dirt and leaves in air duct going from lock carrier to air cleaner housing.
– When installing the air filter element, check that it is properly centred in the retainer in the air cleaner housing (bottom section).
– Fit the top section of the air cleaner housing carefully on the bottom section, without using force. Make sure the top section of the air cleaner housing is fitted straight on the air filter element (note position of sealing lip on air filter element).
– Ensure secure fit of intake hose at air mass meter.
♦ Tightening torque: refer to air cleaner - exploded view ⇒ page 23



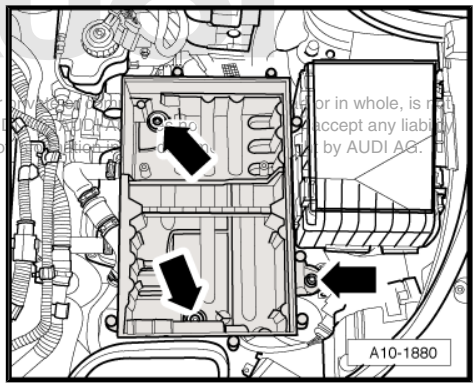
2.9 Removing and installing air cleaner housing - engines with code letters CDLA, CDLB and CDMA

Removing

– Remove air filter element ⇒ page 24 .
– Unscrew bolts -arrows- and remove air duct.



– Unscrew air cleaner housing (lower section) -arrows-.



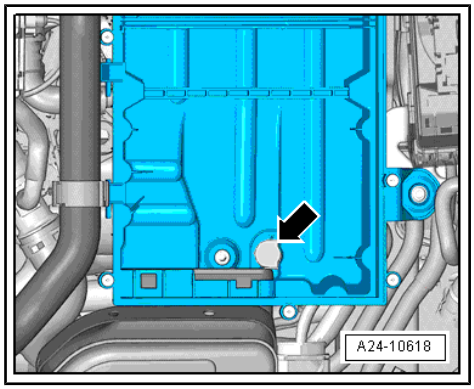
Installing

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

Note

♦ *The air cleaner housing MUST be clean.*
♦ *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*
♦ *To prevent malfunctions, cover all critical parts of the engine air intake tract (air mass meter, intake pipes, etc.) with a clean cloth when blowing out the air cleaner housing with compressed air.*

– Blow out water drain (small hole in bottom section of air cleaner housing) with compressed air.
– Clean salt residue, dirt and leaves out of air cleaner housing (top and bottom sections); use a vacuum cleaner if necessary.
– Check for salt residue, dirt and leaves in air mass meter and air intake hose (engine intake side).
– Check for dirt and leaves in air duct going from lock carrier to air cleaner housing.
– Fit the top section of the air cleaner housing carefully on the bottom section, without using force. Make sure the top section of the air cleaner housing is fitted straight on the air filter element (note position of sealing lip on air filter element).

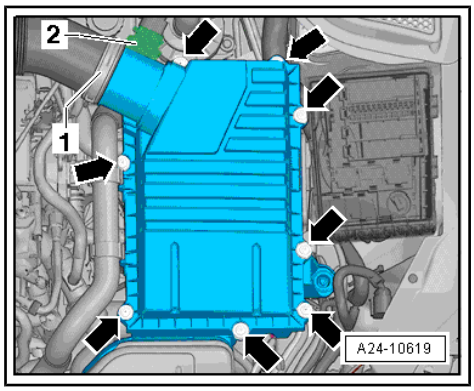


♦ Tightening torque: refer to air cleaner - exploded view
⇒ page 23

2.10 Removing and installing air mass meter -G70- - engines with code letters CDLA, CDLB and CDMA

Removing

– Detach electrical connector -2- for air mass meter -G70- .



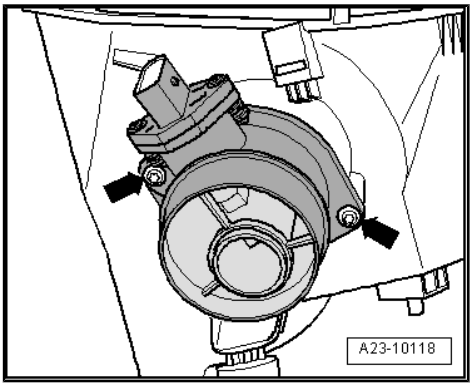
Note

Disregard arrows.

– Loosen hose clip -1- and detach air intake hose.

– Remove bolts -arrows-.

– Then carefully pull air mass meter -G70- out of guide on air cleaner housing (top section).



Installing

- Tightening torque ⇒ page 23

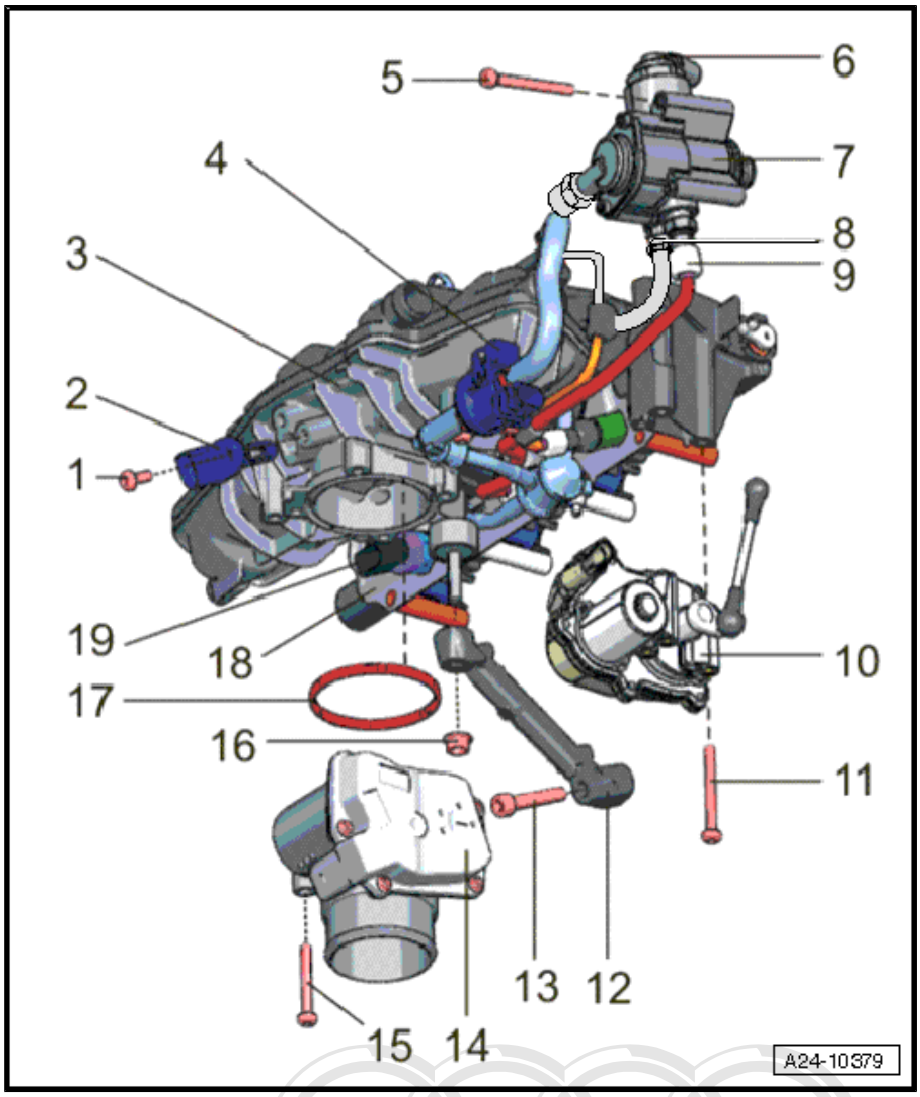
Installation is carried out in the reverse order; note the following.

To ensure the proper function of the air mass meter it is important to observe the following notes and instructions.

Note

- *Renew O-ring.*
- *If the air filter element is very dirty or wet, dirt or water could reach the air mass meter and affect the air mass value. This would lead to loss of power, since a smaller injection quantity is calculated.*
- *Always use genuine part for air filter element.*
- *Use silicone-free lubricant when fitting air intake hose.*
- *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*

2.11 Intake manifold - exploded view



1 - Screw for intake air temperature sender -G42-

- ❑ 5 Nm

2 - Intake air temperature sender -G42-

3 - Intake manifold

- ❑ Removing and installing ⇒ page 31

4 - Activated charcoal filter solenoid valve 1 -N80-

5 - Bolt for single-plunger high-pressure pump

- ❑ 3 x
- ❑ 10 Nm

6 - Fuel pressure regulating valve -N276-

7 - Mechanical single-plunger high-pressure pump

- ❑ With fuel pressure regulating valve -N276- and fuel pressure sender, low pressure -G410-
- ❑ An electric fuel pump (fitted in fuel tank) supplies fuel to the mechanical high-pressure pump at a pressure of approx. 6 bar.
- ❑ When installing the high-pressure fuel pump, it is essential to ensure that no dirt enters the fuel system.
- ❑ The fuel system must not be under pressure; procedure for reducing fuel pressure ⇒ page 4
- ❑ Fuel pipes must be free of tension when installed.
- ❑ Removing and installing ⇒ page 42

8 - Connection for fuel return pipe to fuel tank

- ❑ Fuel pipe must be free of tension when installed (make sure all parts are clean)

9 - Fuel supply pipe to fuel rail

- ❑ Renew connecting piece
- ❑ Tighten connecting piece to 30 Nm
- ❑ Fuel line must be free of tension when installed (make sure all parts are clean); tightening torque: 27 Nm

10 - Intake manifold flap motor -V157- with intake manifold flap potentiometer -G336-

- ❑ After the fuel rail has been renewed, intake manifold flap potentiometer -G336- must be adapted to the engine control unit with the vehicle diagnostic and service information system -VAS 5052- , “Guided Functions”
- ❑ Removing and installing ⇒ page 49

11 - Bolt for intake manifold flap motor -V157- with intake manifold flap potentiometer -G336-

- ❑ 7 Nm

12 - Intake manifold support

13 - Bolt for intake manifold support

- ❑ 23 Nm

14 - Throttle valve module -J338- , throttle valve drive for electric throttle -G186-

- ❑ Throttle valve drive angle sender 1 for electric throttle -G187- and throttle valve drive angle sender 2 for electric throttle -G188-
- ❑ After the throttle valve module -J338- has been renewed, it must be adapted to the engine control unit -J623- , see vehicle diagnostic and service information system -VAS 5052- “Guided Functions”

15 - Bolt for throttle valve module -J338-

- ❑ 4 x
- ❑ 7 Nm

16 - Securing nut for intake manifold support

- ❑ 10 Nm

17 - Seal

- ❑ Renew

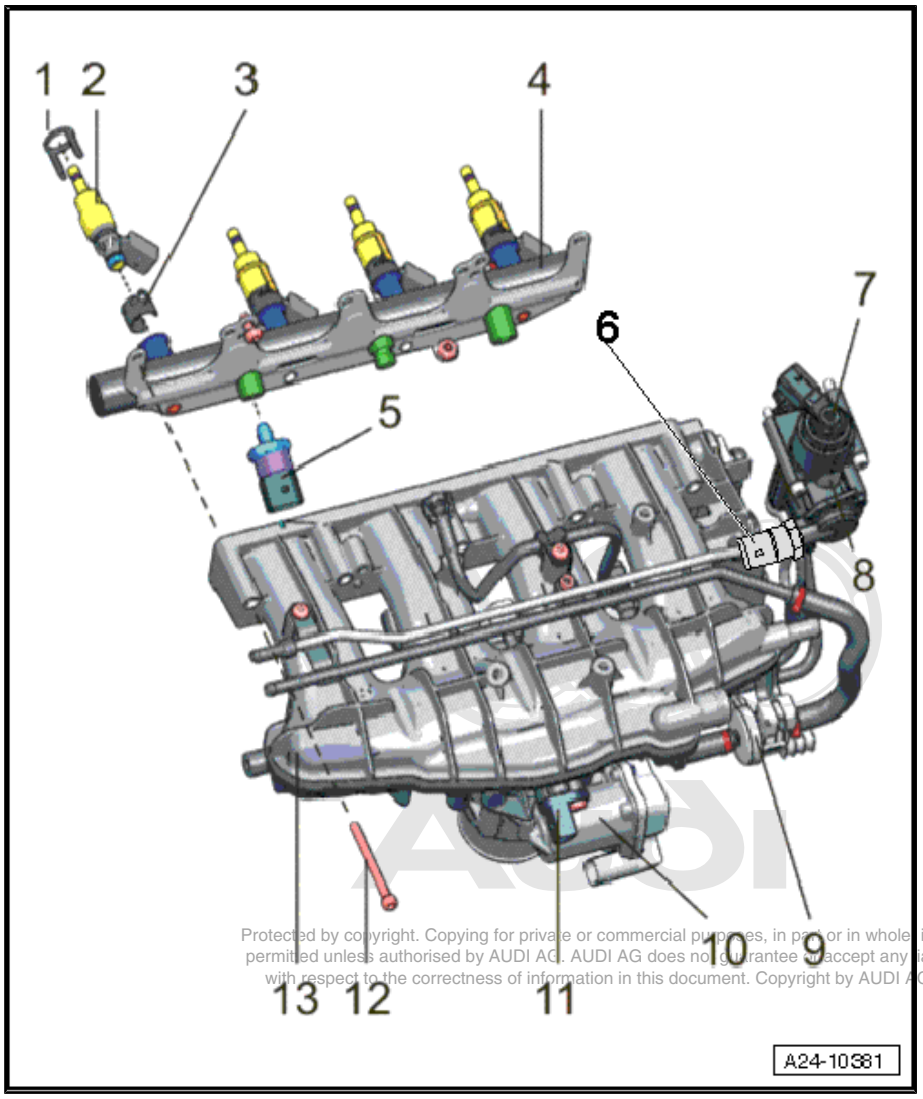
18 - Fuel rail

- ❑ Removing and installing ⇒ page 31

19 - Fuel pressure sender -G247-

- ❑ 20 Nm

2.12 Fuel rail - exploded view



1 - Radial compensation element

- ❑ Renew if damaged

2 - Injector

- ❑ With combustion chamber ring seal (teflon ring seal): always renew
- ❑ Renew O-rings
- ❑ Ensure correct installation position.
- ❑ Removing and installing ⇒ page 44

3 - Support ring

4 - Fuel rail

- ❑ Removing and installing ⇒ page 31

5 - Fuel pressure sender -G247-

- ❑ 22 Nm
- ❑ Tighten connecting piece to 30 Nm

6 - Fuel pressure sender for low pressure -G410-

7 - Fuel pressure regulating valve -N276-

8 - Mechanical single-plunger high-pressure pump

- ❑ With fuel pressure regulating valve -N276- and fuel pressure sender, low pressure -G410-
- ❑ An electric fuel pump (fitted in fuel tank) supplies fuel to the mechanical high-pressure pump at a pressure of approx. 6 bar.
- ❑ When installing the high-pressure fuel pump, it is essential to ensure that no dirt enters the fuel system.
- ❑ The fuel system must not be under pressure when installing the high-pressure pump; procedure for reducing fuel pressure ⇒ page 4
- ❑ Fuel pipes must be free of tension when installed.
- ❑ Removing and installing ⇒ page 42

9 - Activated charcoal filter solenoid valve 1 -N80-

10 - Throttle valve module -J338- , throttle valve drive for electric throttle -G186-

- ❑ Throttle valve drive angle sender 1 for electric throttle -G187- and throttle valve drive angle sender 2 for electric throttle -G188-
- ❑ After the throttle valve module -J338- has been renewed, it must be adapted to the engine control unit -J623- , see vehicle diagnostic and service information system -VAS 5052- “Guided Functions”

11 - Intake air temperature sender 2 -G299-

- ❑ 5 Nm

12 - Bolts for intake manifold

- ❑ 9 Nm

13 - Intake manifold

❑ Removing and installing ⇒ page 31

2.13 Removing and installing intake manifold with fuel rail

After the fuel rail has been renewed, intake manifold flap potentiometer -G336- must be adapted to the engine control unit -J623- , see vehicle diagnostic and service information system -VAS 5052- , “Guided Functions”

Note

- *The injectors can only be accessed after removal of the intake manifold and fuel rail with air flow control flap. (Additional or fewer steps may be required depending on the model.)*
- *The combustion chamber (teflon) ring seal and the O-ring must always be renewed.*
- *Intake manifold - exploded view ⇒ page 28*
- *Fuel rail - exploded view ⇒ page 30*

Removing

– Remove engine cover panel.

WARNING

The fuel system is pressurised. The fuel pressure in the high-pressure part of the injection system must be reduced to a residual pressure prior to opening; for procedure see ⇒ page 4 .

– Unplug all electrical connectors as necessary.

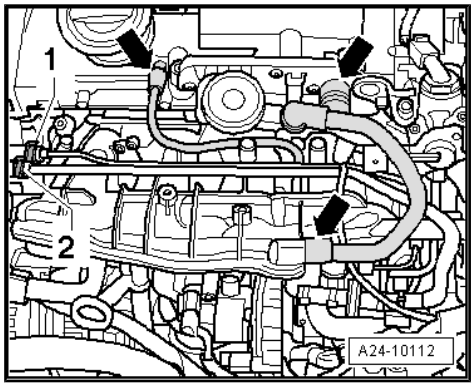
– Disconnect vacuum hose between intake manifold and vacuum pump at intake manifold.

Note

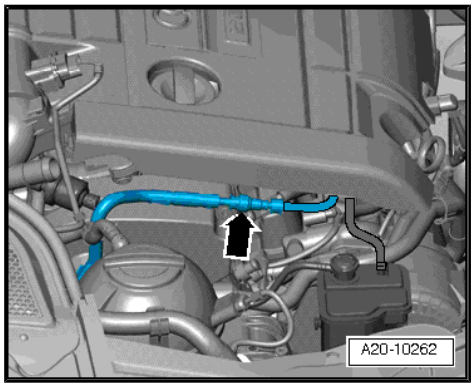
- *This vacuum hose and the vacuum pump (located at rear of cylinder head) are only fitted on vehicles with automatic gearbox.*
- *Ignore items marked 1 and 2 in illustration.*

– Disconnect hose connections -arrows- at cylinder head cover.

– Disconnect vacuum line -2- leading to activated charcoal filter.



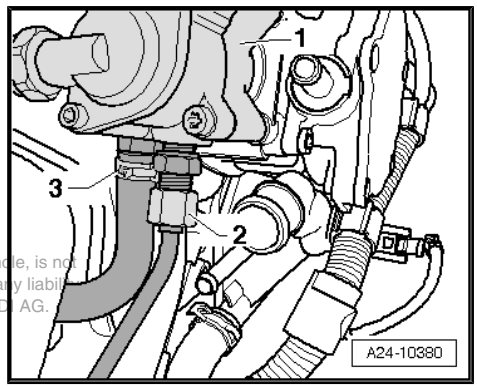
– Disconnect fuel supply pipe -arrow-.



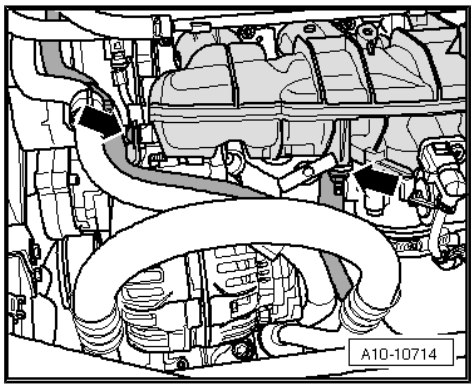
Note

The fuel system must not be under pressure.

– Open both fuel pipe connections -2 and 3- at high-pressure pump.

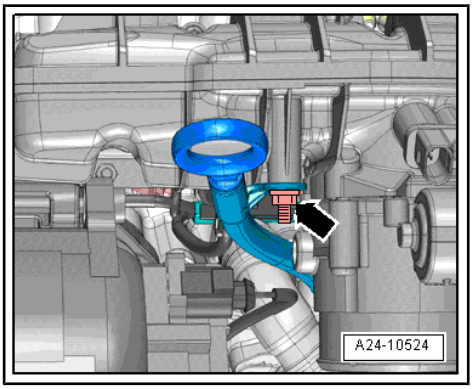


– Unscrew bolt and nut -arrows- and press coolant pipe (front right) to one side (coolant hoses remain attached).



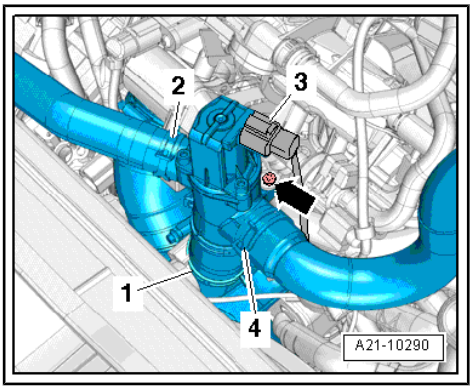
– Remove bolt -arrow- for dipstick guide tube.

Step required only for engines with code letters CDLA, CDLB and CDMA



– Unplug electrical connector -3-.
– Remove bolt -arrow-.
– Detach hose -2-.
– Loosen hose clip -1-, pull turbocharger air recirculation valve -N249- off air pipe and move clear (hose -4- remains connected).

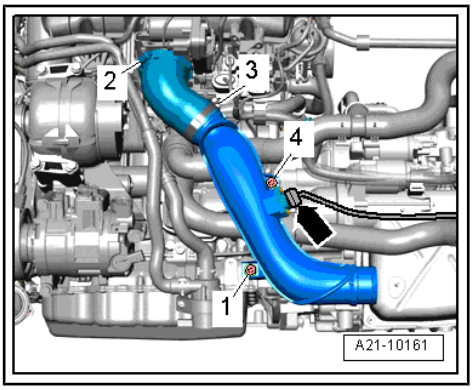
All engine codes



– Loosen hose clip -2- and detach air pipe from throttle valve module -J338- .

Note

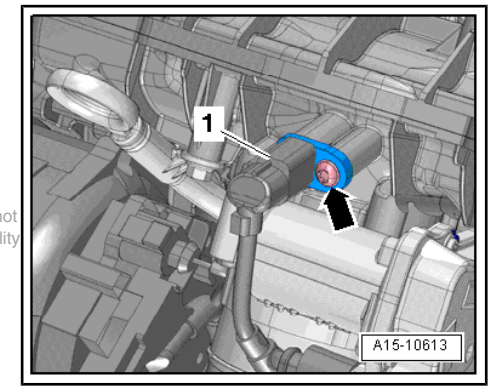
Disregard -items 1, 3 and 4-.



– Unplug electrical connector -1- at intake air temperature sender -G42- .

Note

Ignore -arrow-.



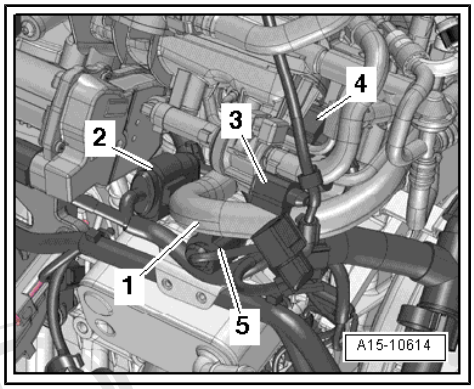
– Unplug electrical connectors:

2 - For injectors (remove electrical connectors from bracket)

3 - For activated charcoal filter solenoid valve 1 -N80-

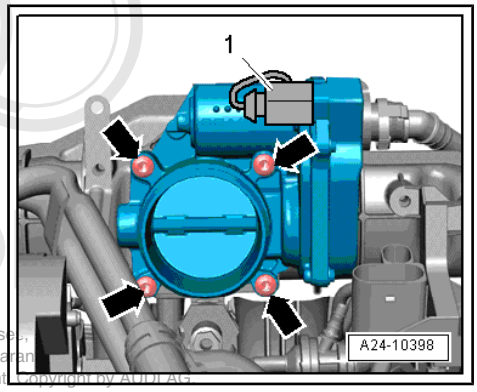
4 - Intake manifold flap motor -V157-

5 - For fuel pressure sender -G247- and Hall sender -G40- (remove electrical connectors from bracket)

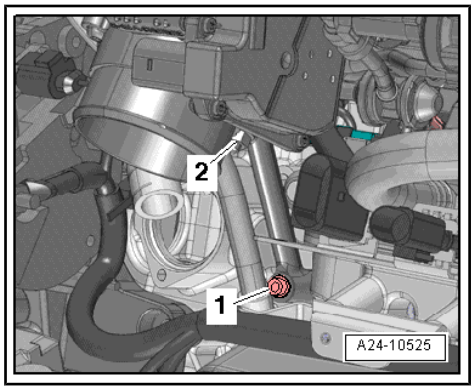


– Unplug electrical connector -1-.

– Remove bolts -arrows- and detach throttle valve module -J338- .



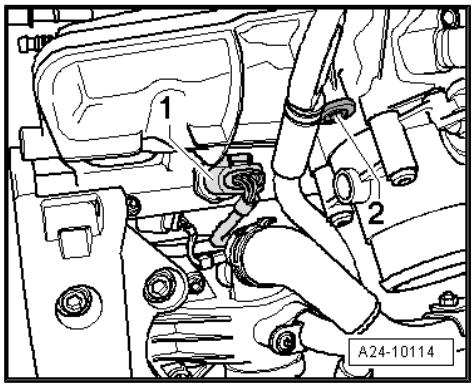
– Unscrew nut -2- and bolt -1- and remove support for intake manifold.



– Unplug electrical connector -1- at fuel pressure sender -G247- .

– Unscrew all bolts from intake manifold.

– Carefully pull intake manifold and fuel rail off cylinder head.



Note

The injectors can remain in the fuel rail.

– Removing and installing fuel rail ⇒ page 35

Installing

– Install in reverse order.

♦ Tightening torques: refer to intake manifold - exploded view ⇒ page 28

♦ Tightening torques: refer to fuel rail - exploded view ⇒ page 30

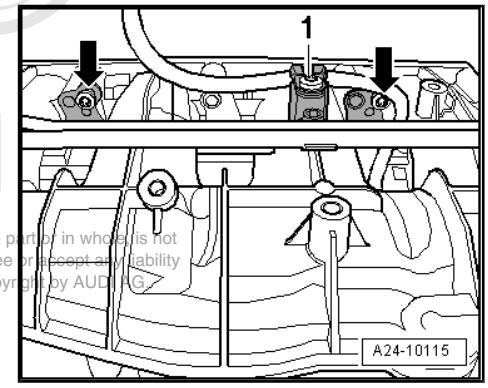
2.13.1 Removing and installing fuel rail

If the fuel rail has been renewed, intake manifold flap potentiometer -G336- must be adapted to the engine control unit -J623- , see vehicle diagnostic and service information system -VAS 5052- , “Guided Functions”

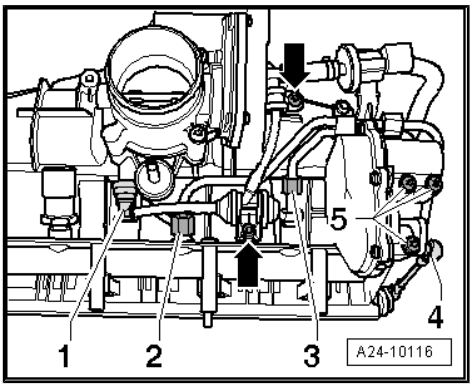
Note

Intake manifold must be removed; removing intake manifold ⇒ page 31 .

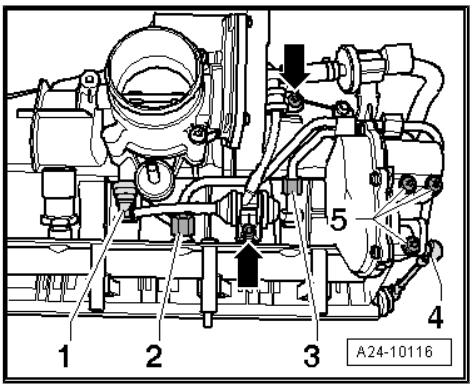
– Remove hoses from activated charcoal filter.
– To do this, unfasten hose clip -1-.
– Unscrew two bolts -arrows- on fuel rail.
– Detach hose connection -1- from intake manifold and unscrew two bolts -arrows-.



– Disconnect fuel pipes -2 and 3-.
– Carefully pry off linkage from intake manifold flap motor -V157- -4-.



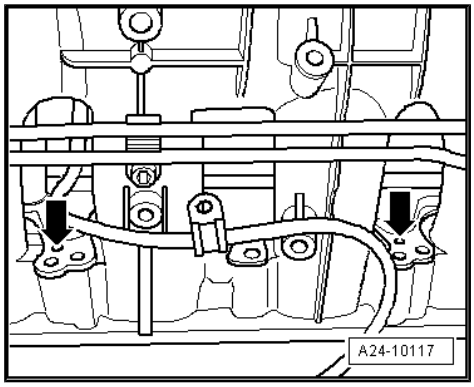
– Unbolt intake manifold flap motor -V157- -5-.



– Pry fuel rail over retaining lugs -arrows- on intake manifold.
– Pull fuel rail off intake manifold.

Installing

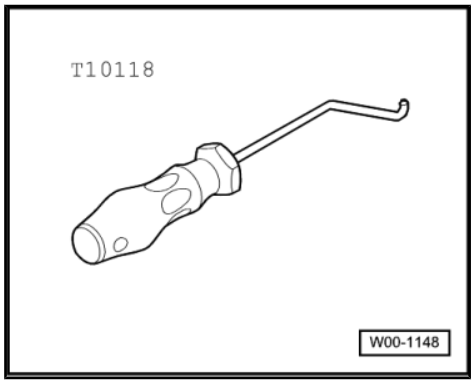
– Install in reverse order.
– Installing intake manifold ⇒ page 31



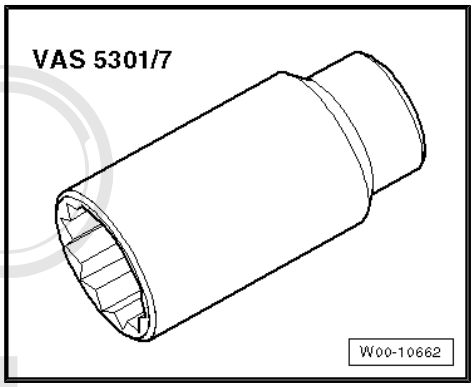
2.14 Removing and installing fuel pressure sender -G247-

Special tools and workshop equipment required

♦ Assembly tool -T10118-



♦ Double hexagon socket, 27 mm -VAS 5301/7-

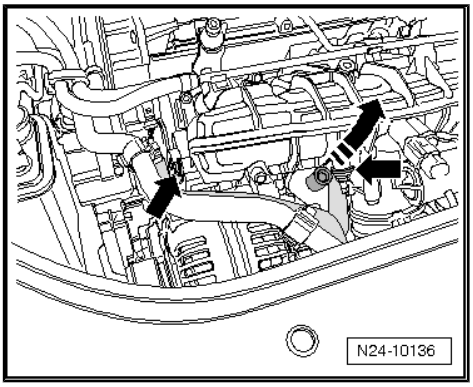


Removing:

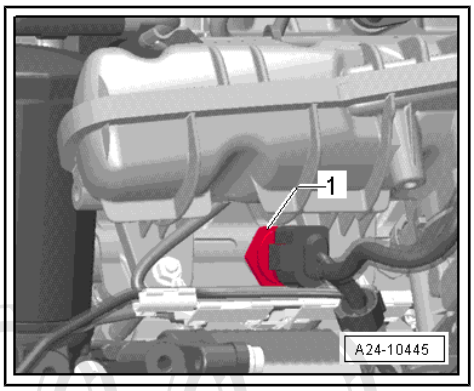
WARNING

The fuel system is pressurised. The fuel pressure in the high-pressure part of the injection system must be reduced to a residual pressure prior to opening; for procedure see ⇒ page 4 .

– Detach coolant pipe and dipstick guide tube from intake manifold -arrows- and pull dipstick guide tube upwards off engine.
– Release connector on fuel pressure sender -G247- using assembly tool -T10118- .



– Unscrew fuel pressure sender -G247- using double hexagon socket, 27 mm -VAS 5301/7- .



Installing:

– Install in reverse order.
– Make sure that connecting piece is tightened to specified torque “30 Nm” before installing fuel pressure sender -G247- .
♦ Tightening torque for fuel pressure sender -G247- , refer to fuel rail - exploded view ⇒ page 30 .

2.15 Checking fuel pressure (low pressure) up to high-pressure pump

Note

♦ *Control unit for electric fuel pump OK.*
♦ *Fuel pump OK.*
♦ *Fuel filter OK*
♦ *Battery voltage at least 11 Volt*

– Switch on ignition.
– Connect vehicle diagnosis and service information system - VAS 5052- and select engine control unit.
– Select “Engine electronics” in vehicle self-diagnosis.
– Then select function read “Measured values”.
– Select measured value block 103.
– With ignition on, the fuel pressure (low pressure) is indicated in display zone 1.

Note

When the ignition is switched off and on, the control unit for the electric fuel pump -J538- will activate the fuel pump for several seconds.

– Measure the fuel pressure (low pressure).
♦ Specification: approx. 6 bar (5 ... 7 bar)

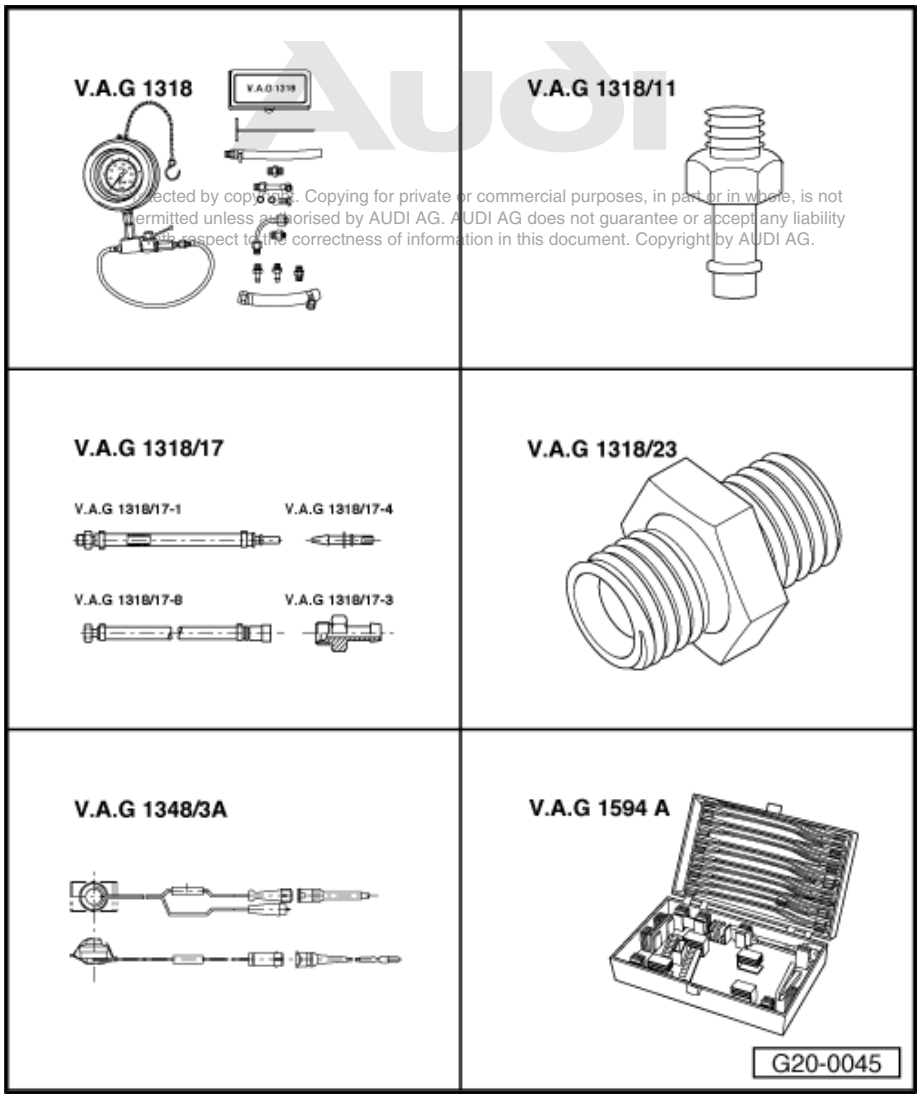
– If reading does not match specification, check delivery rate of electric fuel pump ⇒ Rep. Gr. 20 .

– Check fuel pressure and residual pressure using K-Jetronic pressure tester -V.A.G 1318- ⇒ page 38 .

2.16 Checking fuel pressure and residual pressure (up to high-pressure pump)

Special tools and workshop equipment required

- K-Jetronic pressure tester -V.A.G 1318-
- Adapter -V.A.G 1318/11-
- Adapter -V.A.G 1318/17-1- from adapter set -V.A.G 1318/17-
- Connector -V.A.G 1318/23-
- Remote control -V.A.G 1348/3 A- with adapter cable -V.A.G 1348/3-3-
- Auxiliary measuring set -V.A.G 1594 C- or -V.A.G 1594 A-
- Fuel-resistant measuring container



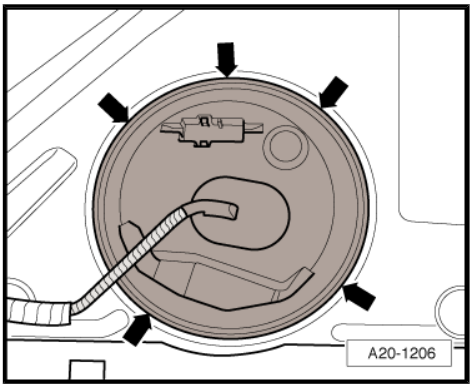
Test conditions

- Battery voltage at least 12.5 V
- Fuel filter OK
- Fuel tank at least $^1/_4$ full.
- Fuel pump control unit -J538- OK (check)
- Ignition off.

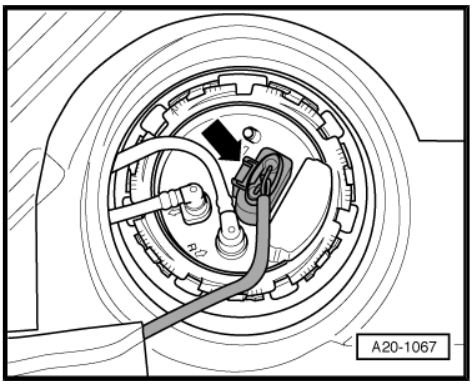
Test sequence

– Remove rear seat ⇒ General body repairs, interior; Rep. Gr. 72 .

– Unclip the retaining tabs -arrows- for the flange cover.



– Unplug electrical connector -arrow- at flange.



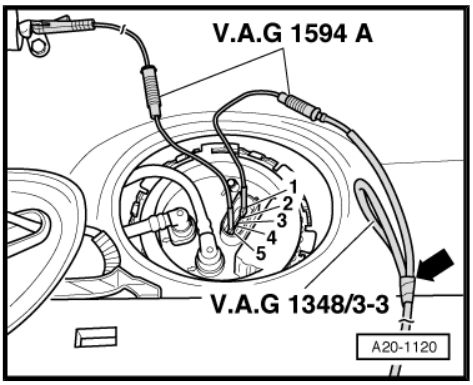
– Connect remote control -V.A.G 1348/3 A- with adapter cable -V.A.G 1348/3-3- to contact -1- using a test lead from auxiliary measuring set -V.A.G 1594 C- .

– Tape off 2nd connector contact of the adapter cable -V.A.G 1348/3-3- with insulating tape -arrow- to prevent short circuits.

– Connect contact -5- to the body (earth) using a test lead from auxiliary measuring set -V.A.G 1594 C- .

– Connect crocodile clamp to positive (+) terminal of battery.

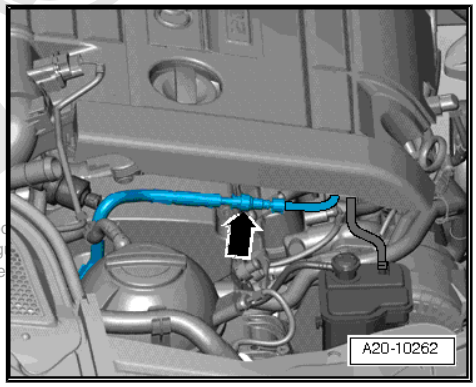
– Remove filler cap from fuel filler neck.



WARNING

Fuel system is pressurised (low pressure). Wear safety goggles and protective clothing to avoid possible injury and skin contact. Before opening the fuel system, wrap a cloth around the connection. Then dissipate residual pressure by carefully detaching the connection.

– Disconnect fuel supply pipe -arrow-.



– Screw connector -V.A.G 1318/23- and adapter -V.A.G 1318/17-1- onto K-Jetronic tester -V.A.G 1318- .

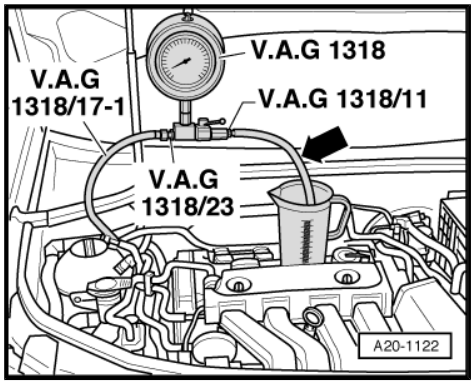
– Fit adapter -V.A.G 1318/17-1- onto the disconnected fuel supply pipe.

– Screw adapter -V.A.G 1318/11- onto K-Jetronic tester -V.A.G 1318- .

– Attach test hose -arrow- and hold end of hose in measuring container.

– Open cut-off valve on K-Jetronic pressure tester -V.A.G 1318- . Lever must point in direction of flow.

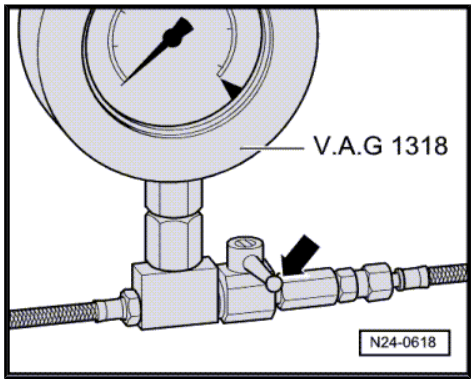
– Bleed fuel system by pressing remote control button briefly.



– Close cut-off valve on K-Jetronic pressure tester -V.A.G 1318- . Lever is at right angle to direction of flow -arrow-.

– Press and hold remote control switch until K-Jetronic pressure tester -V.A.G 1318- shows no further increase in pressure.

• Specification: approx. 6 bar (4 ...8 bar)



If specification is not obtained:

– Check delivery rate of fuel pump ⇒ Fuel supply system, petrol engines; Rep. Gr. 20 .

Checking residual pressure

– Check leak-tightness and residual pressure by watching the drop in pressure on the K-Jetronic pressure tester -V.A.G 1318- .

• After 10 minutes pressure should still be at least 3 bar.

If the residual pressure drops below 3 bar:

♦ Check union between K-Jetronic pressure tester -V.A.G 1318- and fuel supply line for leaks.

♦ Check K-Jetronic pressure tester -V.A.G 1318- for leaks.

♦ Check fuel lines and their connections for leaks.

♦ Renew fuel filter with integrated fuel pressure regulator ⇒ Fuel supply system, petrol engines; Rep. Gr. 20 . Then repeat the test.

♦ If fuel filter is OK, renew fuel pump ⇒ Fuel supply system, petrol engines; Rep. Gr. 20 .

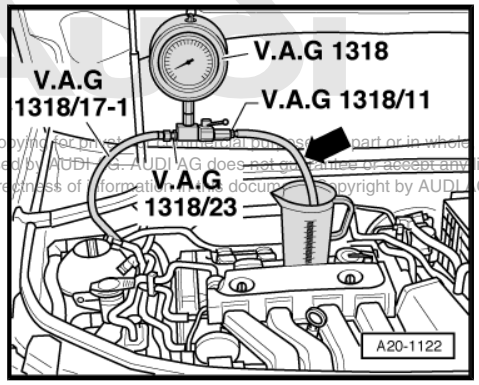
Assembly is carried out in the reverse order; note the following:

– The ignition must be switched off.

Note

Before removing the pressure tester, release the fuel pressure by opening the cut-off valve. Hold auxiliary hose in a container.

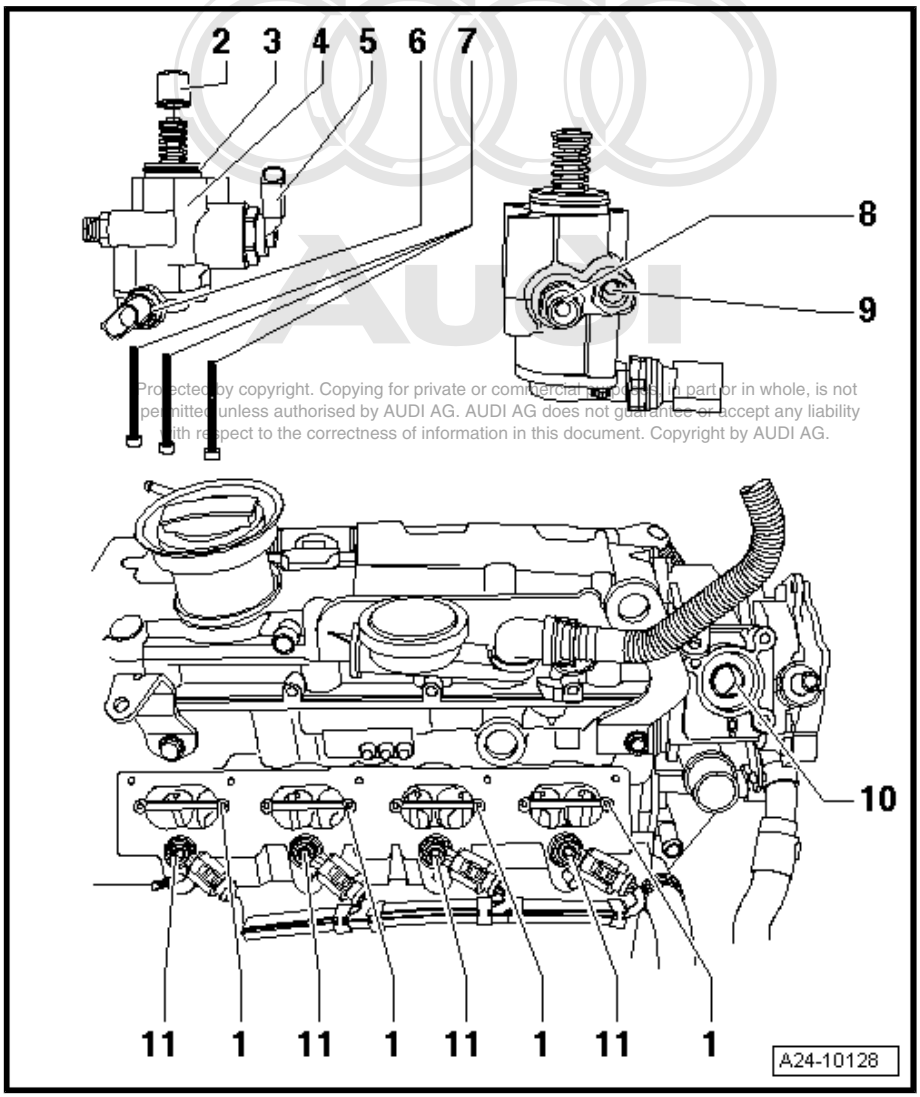
– Re-attach fuel supply line (make sure that all parts are clean and that there are no leaks).



2.17 High-pressure pump - exploded view

WARNING

Fuel system operates under high pressure. Always dissipate fuel pressure prior to opening fuel system. For procedure, refer to ⇒ page 4



1 - Air guide plates

- ❑ Removable
- ❑ Check for damage and correct fitting

2 - Sleeve

- ❑ May remain lodged in cylinder head when high-pressure pump is removed; it can be removed

3 - O-ring

- ❑ Renew

4 - Mechanical single-plunger high-pressure pump

- ❑ An electric fuel pump (fitted in fuel tank) supplies fuel to the mechanical high-pressure pump at a pressure of approx. 6 bar.
- ❑ When installing the high-pressure fuel pump, it is essential to ensure that no dirt enters the fuel system.
- ❑ The fuel system must not be under pressure; procedure for reducing fuel pressure ⇒ page 4
- ❑ Fuel pipes must be free of tension when installed.
- ❑ Removing and installing ⇒ page 42

5 - Fuel pressure regulating valve -N276-

6 - Fuel pressure sender for low pressure -G410-

- ❑ 15 Nm

7 - Securing bolts for high-pressure pump

- ❑ 10 Nm

8 - Connecting piece for fuel return pipe to fuel tank

- ❑ It is important to leave the old seal in the pump when replacing the threaded connection. When it is first installed at the supplier it becomes crushed and cannot be removed. For this reason, the threaded connection has a deformable sealing lip.

9 - Connecting piece for fuel supply pipe to fuel rail

- ❑ Renew connecting piece

- ❑ Tighten connecting piece to 30 Nm
- ❑ Union nut on fuel supply line must be free of tension when installed (make sure all parts are clean); tightening torque: 27 Nm

10 - Bore in cylinder head for high-pressure pump

11 - Injectors

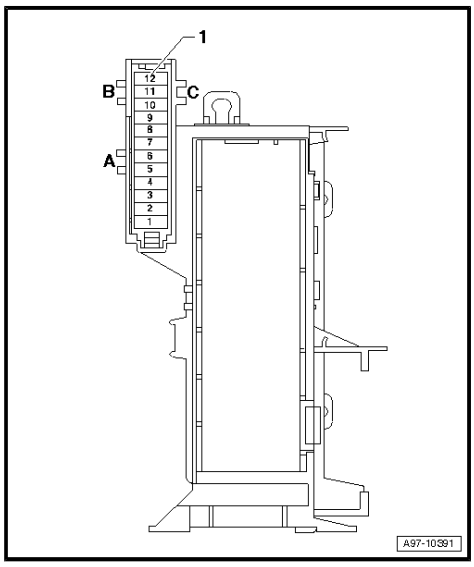
- ❑ Renew O-rings
- ❑ Ensure correct installation position.
- ❑ Removing and installing ⇒ page 44

2.18 Removing and installing high-pressure pump

WARNING

Fuel system operates under high pressure. Always dissipate fuel pressure prior to opening fuel system. For procedure, refer to ⇒ page 4

If the battery is not disconnected, the fuse -SF 6- for the fuel pump control unit -J538- must be removed as a precautionary measure before opening the fuel system, because the fuel pump will otherwise be activated by the contact switch on the driver's door.



Note

- ♦ *The fuse is located in the fuse holder in the luggage compartment (right-side).*
- ♦ *Removing fuse -SF 6- will interrupt the voltage supply "terminal 30" for the fuel pump control unit -J538- .*

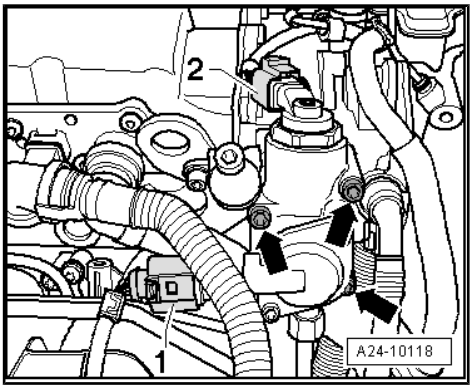
Note

- ♦ *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.*
- ♦ *The O-ring must always be renewed.*
- ♦ *Banjo bolt for fuel return line must always be renewed.*
- ♦ *Always ensure that the high-pressure fuel pipes are free of tension when tightening the connections.*

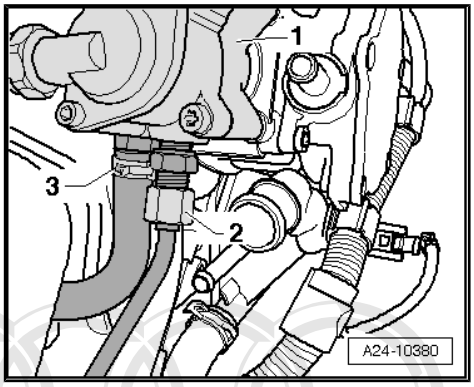
Removing

– Remove engine cover panel.

– Detach electrical connectors from fuel pressure sender (low pressure) -G410- -1- and fuel pressure regulating valve - N276- -2-.

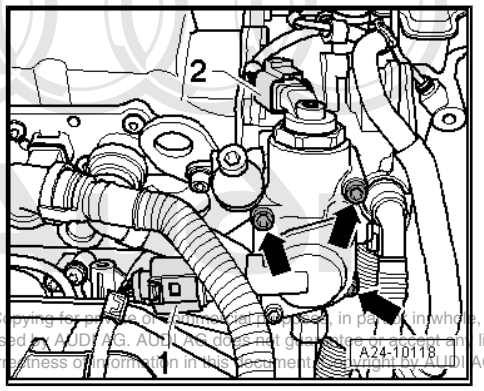


– Disconnect fuel pipes -2 and 3-.



– Remove 3 bolts -arrows-.

– Carefully pull out high-pressure fuel pump. It is possible that the sleeve may remain lodged in the cylinder head.



Installing

– Renew O-ring for high-pressure pump.

– Carefully fit high-pressure pump and sleeve in cylinder head bore (check sleeve for damage first).

– Tighten bolts hand-tight.

– Make sure that connecting pieces on high-pressure pump are tightened to specified torque before installing fuel lines.

♦ Tightening torque for connecting piece for fuel return line, refer to high-pressure pump - exploded view ⇒ page 41

♦ Tightening torque for connecting piece for fuel supply line, refer to high-pressure pump - exploded view ⇒ page 41

– Now tighten bolts to specified torque (it is important to tighten them alternately).

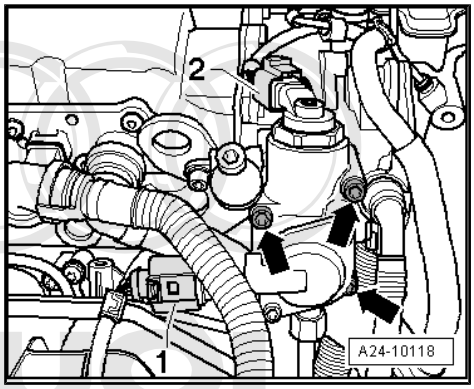
♦ Tightening torque: refer to exploded view of high-pressure pump ⇒ page 41 .

– Firmly fit hose for fuel return line onto connection (use hose clip). Align so that parts are free of tension.

– Tighten union nut on fuel supply line hand-tight. Align so that parts are free of tension.

♦ Tightening torque for fuel supply line (union nut), refer to high-pressure pump - exploded view ⇒ page 41 .

– Reattach electrical connectors for fuel pressure sender (low pressure) -G410- and fuel pressure regulating valve -N276- .
– Put back fuse if it has been removed.



Note

Check fuel system for leaks.

2.19 Removing and installing injectors

Removing

Remove intake manifold and fuel rail ⇒ page 31 .

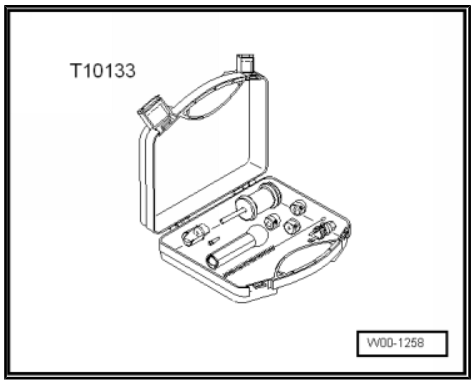
Removing injectors (from fuel rail)

Carefully pull injectors out of fuel rail.

Removing injectors (from cylinder head)

Special tools and workshop equipment required

♦ Tool kit with puller -T10133-



Note

Special tool T10133/2 (puller) has been modified and now has the designation puller T10133/2 A . If you have not yet received the new tool you can make the modification yourself.

Modifying special tool T10133/2 (puller) to make it equivalent to puller T10133/2 A

Special tools and workshop equipment required

♦ Round file, approx. 6 mm

– File out a semi-circular recess as shown in the illustration. The recess allows the tool to be pushed further onto the injector so the contact surface is increased.

– For identification purposes, mark the modified tool with the letter “A” after the tool number.

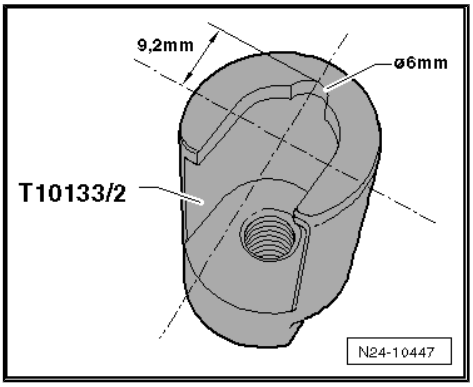


Illustration shows injector assembly:

1 - Radial compensation element, renew if damaged

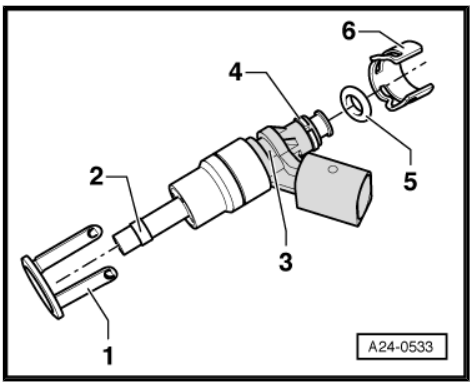
2 - Combustion chamber ring seal (teflon ring seal) - renew; when fitting, do not grease ring or use any other lubricant

3 - Groove on injector

4 - Spacer ring (renew if damaged)

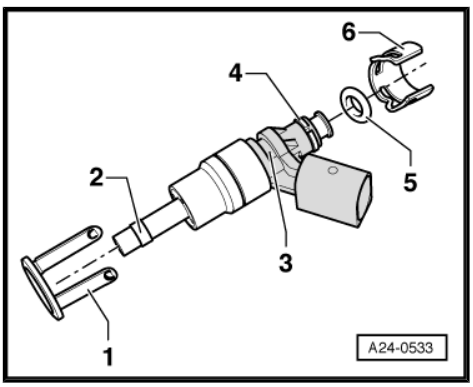
5 - O-ring (renew; apply thin coating of clean engine oil prior to installation)

6 - Support ring (via this support ring, fuel rail exerts force which secures injector in cylinder head)



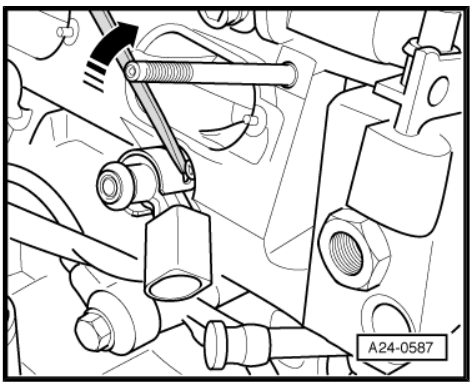
Note

The radial compensation element -1- is clipped into the support ring -6- with the injector fitted. To remove the injector, the support ring must be removed from the injector so that the puller - T10133/2- can be inserted into the groove on the injector -3-.

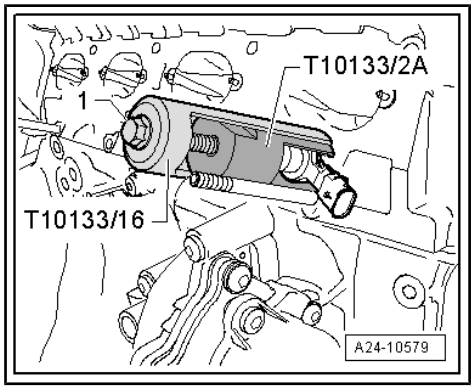


– Cover open inlet ports with a clean cloth.
– Unplug electrical connector at injector that is to be removed.

– Use a screwdriver to bend retainer tabs of radial compensation element to side, and pull support ring off injector.



– Apply puller -T10133/2A- to groove on injector.
– Then attach removal tool -T10133/16- and pull out injector by turning bolt -1-.



Note

The combustion chamber ring seal must always be renewed prior to reinstalling the high-pressure injector ⇒ page 46 .

2.19.1 Renewing combustion chamber ring seal (teflon ring seal)

Note

The combustion chamber ring seal must always be renewed prior to reinstalling the high-pressure injector.

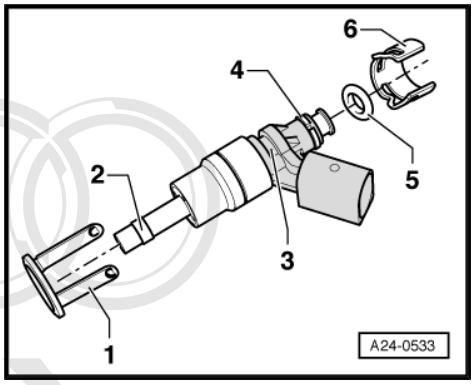


Illustration shows injector assembly:

1 - Radial compensation element, renew if damaged

2 - Combustion chamber ring seal (teflon ring seal) - renew; when fitting, do not grease ring or use any other lubricant

3 - Groove on injector

4 - Spacer ring (renew if damaged)

5 - O-ring (renew; apply thin coating of clean engine oil prior to installation)

6 - Support ring (via this support ring, fuel rail exerts force which secures injector in cylinder head)

– Carefully remove old teflon ring using suitable tools (e.g. cut open ring using razor blade, or prise open ring with small screwdriver and then pull off forwards). It is important to ensure that the groove and the continuous ridge in the bottom of the groove are not damaged.

Note

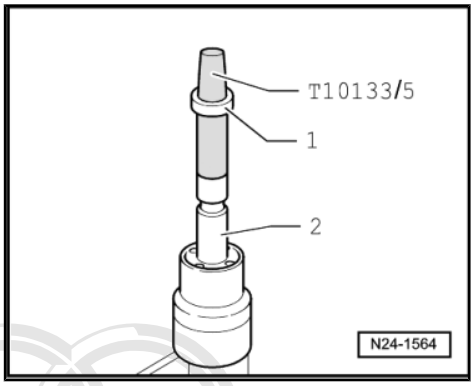
The injector must be renewed if the groove is damaged.

– Before new teflon ring is fitted, any combustion residue must be removed from ring groove and injector stem using a clean cloth.

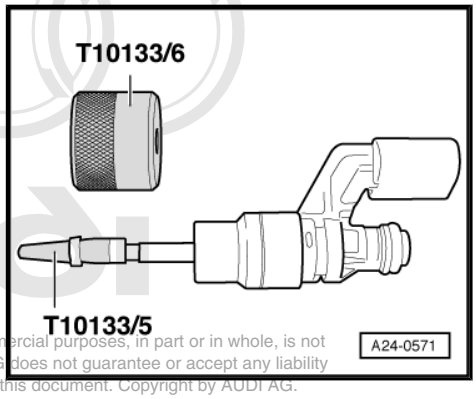
Note

The illustration shows an injector with “offset connector”. This can be ignored since it is not relevant when replacing the combustion chamber ring seal.

– Fit the assembly cone -T10133/5- with new teflon seal -1- onto the injector -2-.



– Use assembly sleeve -T10133/6- to press teflon ring seal further onto assembly cone -T10133/5- until it seats in groove. Do not use any lubricants during this procedure.

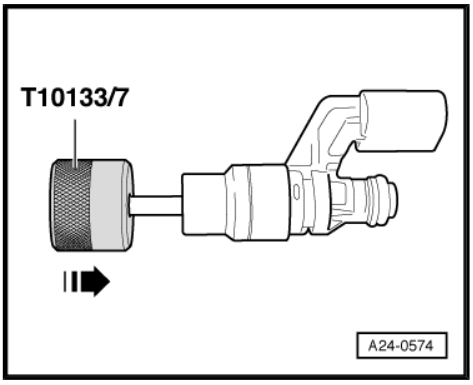


Note

The teflon ring is widened as it is pushed onto the injector. The teflon ring must therefore be compressed again after it has been fitted. This is done in two steps. The procedure is described below.

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

– Slide calibration sleeve -T10133/7- onto injector as far as the stop by pressing lightly and turning approx. 180°. Pull calibration sleeve -T10133/7- off again by turning it in the opposite direction.

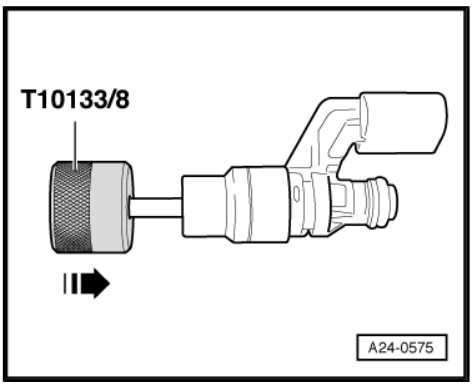


Step 2 of teflon ring seal calibration (adaption) is done with calibration sleeve -T10133/8- .

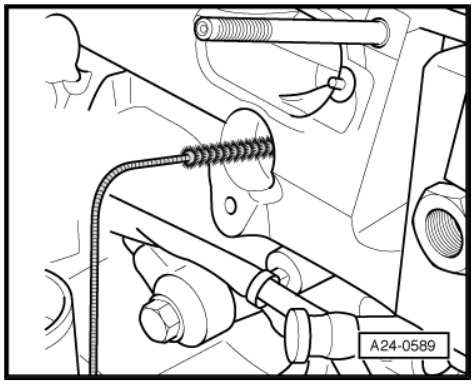
– Slide calibration sleeve -T10133/8- onto injector as far as the stop by pressing lightly and turning approx. 180°. Pull calibration sleeve -T10133/8- off again by turning it in the opposite direction.

– Fit new O-ring on injector. Lubricate O-ring lightly with clean engine oil before installing.

– The teflon ring must not be lubricated.



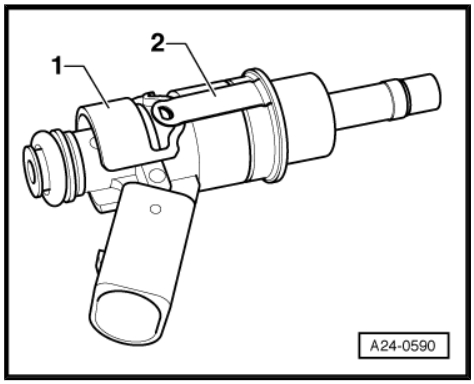
– Use supplied nylon brush -T10133/4- to thoroughly clean holes for injectors in cylinder head prior to installing injectors.



Note

An open inlet valve may prevent cleaning. If so, the engine must be cranked by hand by rotating the crankshaft with a spanner.

– Refit support ring -1- on injector and clip radial compensation element -2- onto support ring.

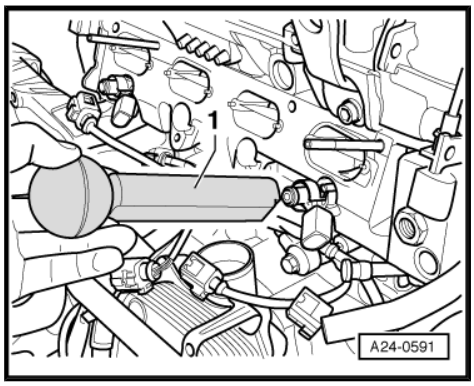


Note

- *The teflon seal on the injector must not be oiled or greased.*
- *Make sure there is no cleaning fluid or oil in the cylinder head bores when installing the injectors.*

– Use assembly tool -T10133/9- to push injector as far as it will go into hole in cylinder head. Ensure that the injector is properly seated in the cylinder head.

– The remaining installation steps are carried out in the reverse sequence.



Important: the following points must always be observed:

- The teflon seal on the injector must not be oiled or greased.
- Make sure there is no cleaning fluid or oil in the cylinder head bores when installing the injectors.
- Coat O-rings of high-pressure injectors with clean engine oil to facilitate insertion into fuel rail.
- Renew all seals.
- Fuel rail must be positioned on injectors and pressed in evenly.
- Install intake manifold with fuel rail ⇒ page 31 .

2.20 Cleaning injectors

– Remove injectors ⇒ page 44 .

Note

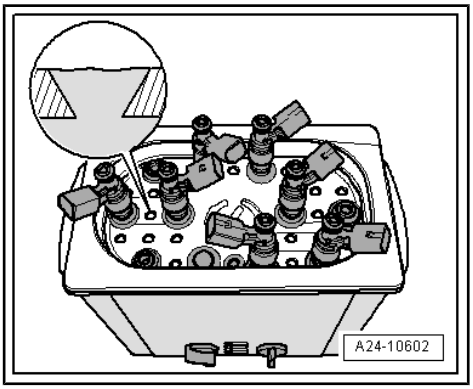
Observe safety precautions and operating instructions for ultrasonic unit.

– Fill up ultrasonic unit with cleaning agent supplied.

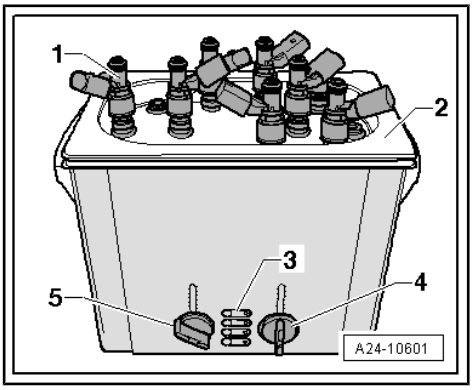
Note

Ultrasonic unit must be filled with cleaning agent up to top edge of apertures (see detail in illustration).

– Insert injectors -1- in retainer provided -2- as far as stop.



– Immerse injectors together with retainer into cleaning agent.
– Set rotary knob -4- to a temperature of 50°C.
– Select a cleaning time of 30 minutes with rotary knob -5-.
– Switch on ultrasonic unit with button -3-.



Note

The time set starts to elapse as soon as a cleaning temperature of 50°C is reached.

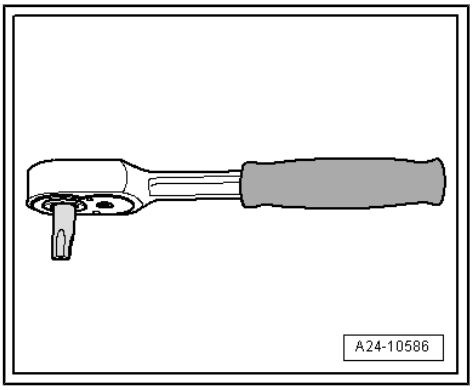
– After cleaning, always renew combustion chamber ring seal (teflon ring seal) for each injector ⇒ page 46 .
– Then re-install injectors ⇒ page 44 .

2.21 Removing and installing intake manifold flap motor -V157- with intake manifold flap potentiometer -G336- - engines with code letters BWA and BPY

For fitting location of intake manifold flap motor -V157- , refer to exploded view of intake manifold ⇒ page 28 .

Special tools and workshop equipment required

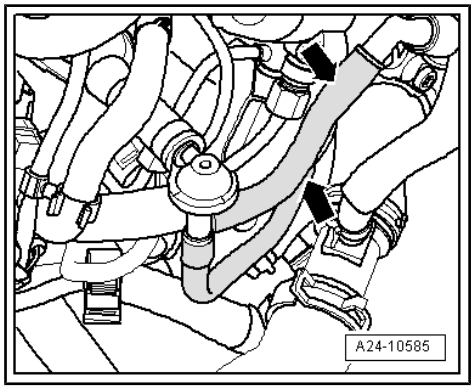
- Standard $^{1}/_{4}$ inch ratchet
- Torx insert 30



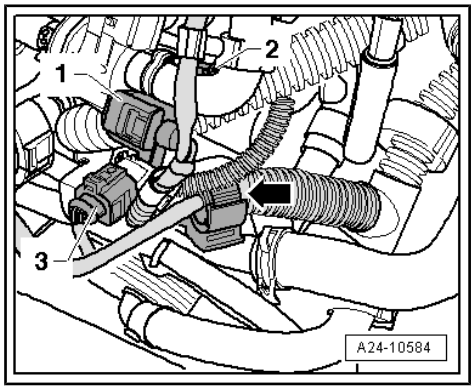
Removing

– Remove engine cover panel.

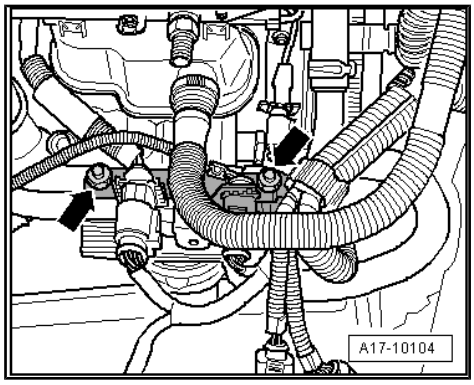
– Detach vacuum lines -arrows-.



– Remove bracket -arrow- for wiring harness
– Unplug electrical connectors connected to wiring harness and move wiring harness as far as necessary to one side.



– Unbolt bracket for connectors -arrows- from coolant pipe.

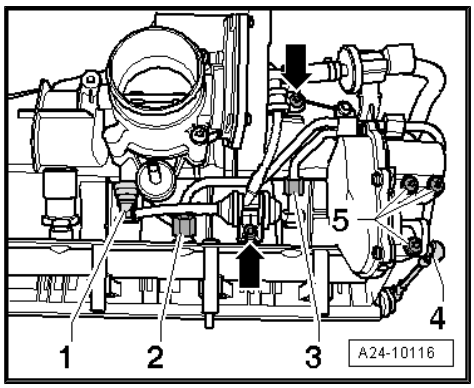


Note

The nut marked with the arrow on the left only has to loosened far enough to allow the bracket to be pivoted to the side.

– Carefully pry off linkage from intake manifold flap motor -V157- -4-.

– Unbolt intake manifold flap motor -V157- -5-.



Note

The illustration shows the intake manifold flap motor -V157- with the intake manifold removed.

Installing

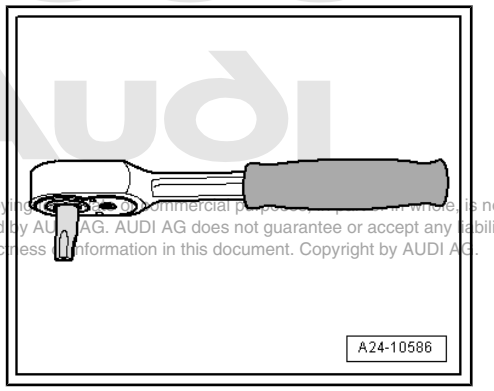
– Install in reverse order.
♦ Tightening torque: refer to intake manifold - exploded view ⇒ page 28

2.22 Removing and installing intake manifold flap motor -V157- with intake manifold flap potentiometer -G336- - engines with code letters CDLA, CDLB and CDMA

For fitting location of intake manifold flap motor -V157- , refer to exploded view of intake manifold ⇒ page 28 .

Special tools and workshop equipment required

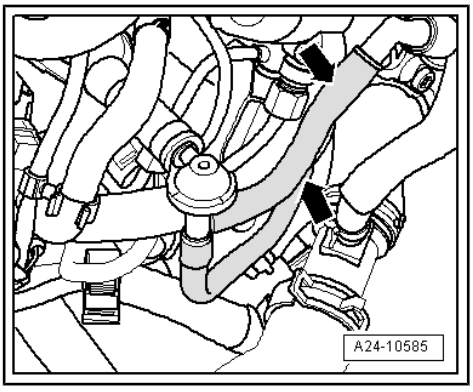
- Standard 1/4 inch ratchet
- Torx insert 30



Removing

– Remove engine cover panel.

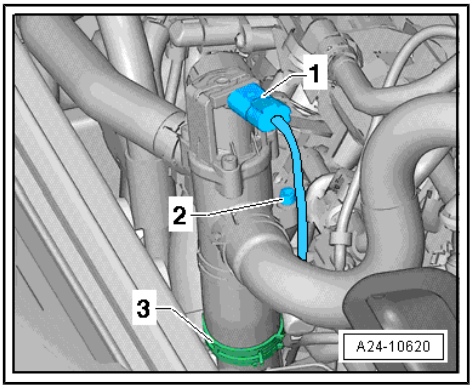
– Detach vacuum lines -arrows-.



– Unplug electrical connector at turbocharger air recirculation valve -N249- -1-.

– Remove bolt -2-.

– Release hose clip -3- and detach turbocharger air recirculation valve -N249- .



Note

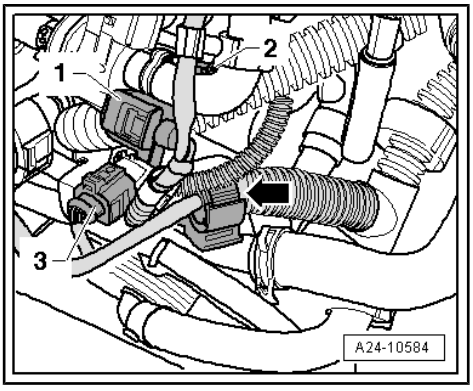
Cover opening of intake hose.

– Remove bracket -arrow- for wiring harness

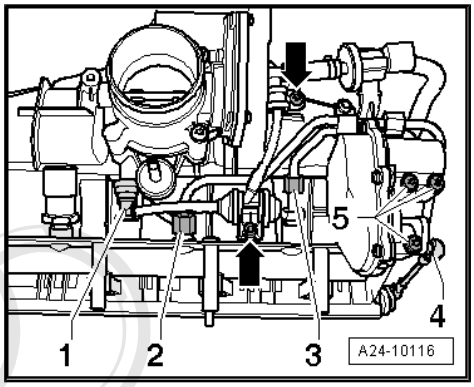
– Unplug electrical connectors connected to wiring harness and move wiring harness as far as necessary to one side.

– Pull bracket for connectors off coolant pipe.

– Carefully pry off linkage from intake manifold flap motor -V157- -4-.



– Unbolt intake manifold flap motor -V157- -5-.



Note

The illustration shows the intake manifold flap motor -V157- with the intake manifold removed.

Installing

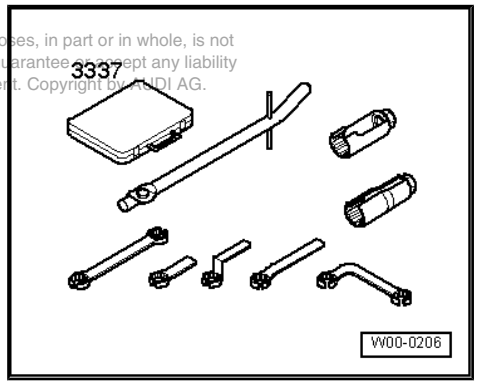
– Install in reverse order.

♦ Tightening torque: refer to intake manifold - exploded view ⇒ page 28

2.23 Removing and installing Lambda probe -G39- and Lambda probe heater -Z19- before catalytic converter

Special tools and workshop equipment required

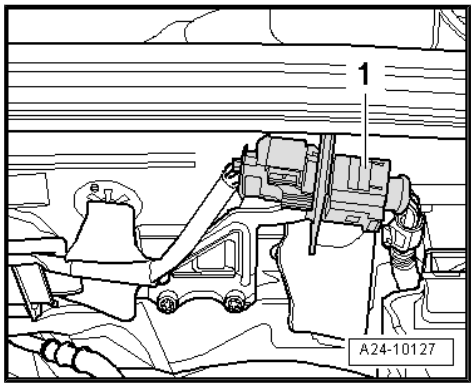
♦ Lambda probe open ring spanner set -3337-



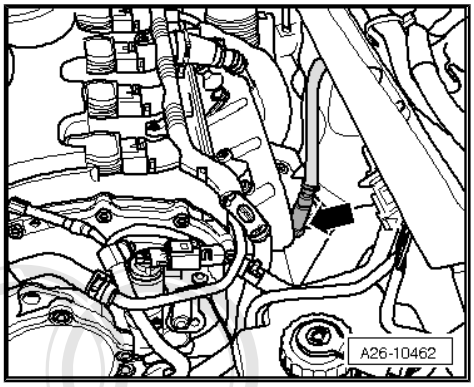
Removing Lambda probe

– Remove engine cover panel ⇒ page 20 .

– Unplug electrical connector -1- for Lambda probe -G39- and Lambda probe heater -Z19- .



– Unscrew Lambda probe -arrow- using tool from Lambda probe open ring spanner set -3337- -arrow-.



Installing Lambda probe

When installing, note the following:

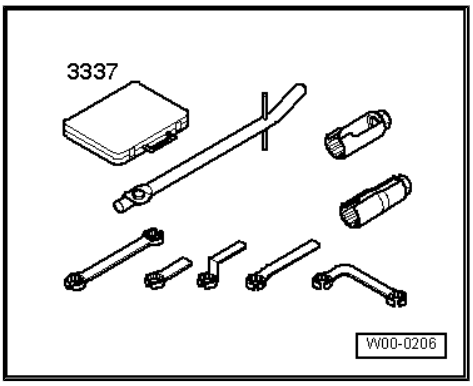
Note

- *Threads of new Lambda probes are already coated with assembly paste; the paste must not get into the slots on the probe body.*
- *In the case of a used Lambda probe grease only the thread with high-temperature paste. The paste must not get into the slots on the probe body. High-temperature paste ⇒ Parts catalogue*
- *When installing, the Lambda probe wire must always be reattached at the same locations to prevent it from coming into contact with the exhaust pipe.*
- *Tightening torque: 55 Nm.*

2.24 Removing and installing Lambda probe after catalytic converter -G130- and Lambda probe 1 heater, after catalytic converter -Z29-

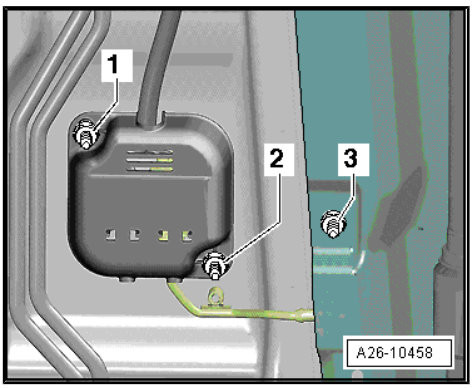
Special tools and workshop equipment required

- Lambda probe open ring spanner set -3337-

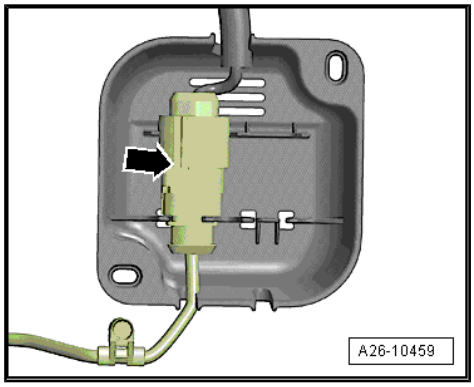


Removing Lambda probe

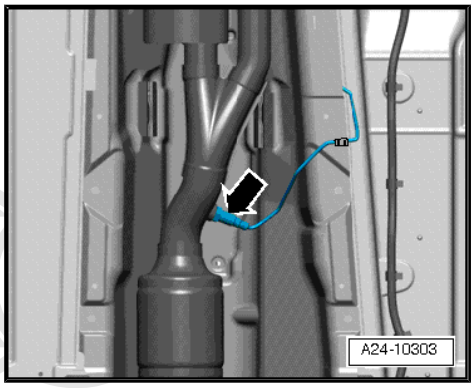
– Unscrew nuts -1 and 2- from cover.



– Detach cover and unplug electrical connector -arrow- for Lambda probe after catalytic converter -G130- and Lambda probe 1 heater, after catalytic converter -Z29- .



– Unscrew Lambda probe after catalytic converter -G130- and Lambda probe 1 heater, after catalytic converter -Z29- -arrow- using a tool from the Lambda probe open ring spanner set -3337- .



Installing Lambda probe

When installing, note the following:

Note

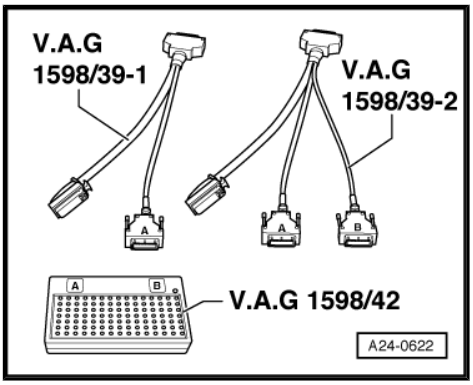
- *Threads of new Lambda probes are already coated with assembly paste; the paste must not get into the slots on the probe body.*
- *In the case of a used Lambda probe grease only the thread with high-temperature paste. The paste must not get into the slots on the probe body. High-temperature paste ⇒ Parts catalogue*
- *When installing, the Lambda probe wire must always be reattached at the same locations to prevent it from coming into contact with the exhaust pipe.*
- *Tightening torque: 55 Nm.*

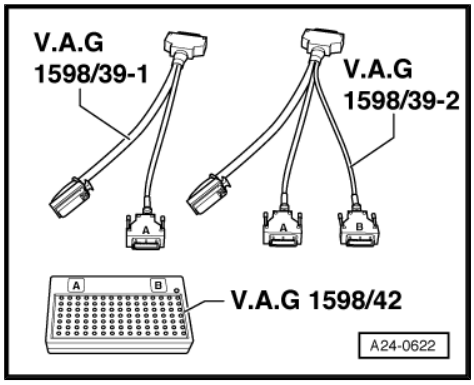
3 Engine control unit

3.1 Wiring and component check with test box -V.A.G 1598/42-

Special tools and workshop equipment required

- Adapter cable -V.A.G 1598/39-1-
- Adapter cable -V.A.G 1598/39-2-
- Test box -V.A.G 1598/42-





Note

- *The test box has 105 contacts. The connecting cable can be disconnected from the test box. This means that only the cable (and not the test box) has to be purchased for future engine control units with different types of connectors.*
- *The smaller of the two connectors on the engine control unit has the contacts 1 to 60. The larger of the two connectors has the contacts 1 to 94.*
- *To carry out tests on the 60-pin wiring harness connector, the adapter lead -V.A.G 1598/39-1- is connected to connector -A- on the test box. For components connected to 60-pin wiring harness connector ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.*
- *To carry out tests on the 94-pin wiring harness connector, the adapter lead -V.A.G 1598/39-2- must be connected to connectors -A- and -B- on the test box. For components connected to 94-pin wiring harness connector ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.*
- *The test box -V.A.G 1598/42- is designed so it can be connected both 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.*
- *Always use auxiliary measuring set -V.A.G 1594 C- to connect test equipment (e.g. voltage tester -V.A.G 1527 B- , hand-held multimeter -V.A.G 1526 C- etc.).*

WARNING

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

The engine control unit has to be removed before multi-pin connectors can be unplugged from engine control unit ⇒ page 57 .

– Connect test box -V.A.G 1598/42- to wiring harness connector. The earth clip on the test box must be connected to the negative battery 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 appropriate repair procedures.

Installing engine control unit

Installation is performed in the reverse sequence.

– After installation, the locking plate must be re-fitted on the control unit.

– Clean threaded holes for shear bolts to remove any residue from locking fluid. This can be done using a thread tap.

– Always use new shear bolts.

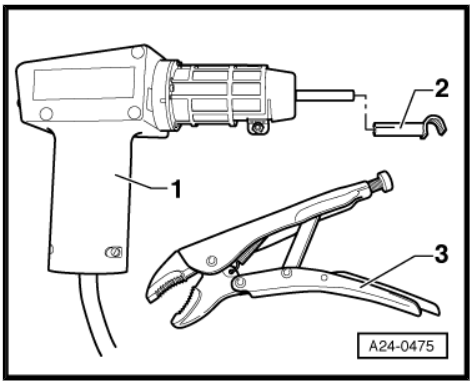
Perform the following after reconnecting engine control unit:

– Interrogate and, if necessary, erase fault memory.

3.2 Renewing engine control unit -J623-

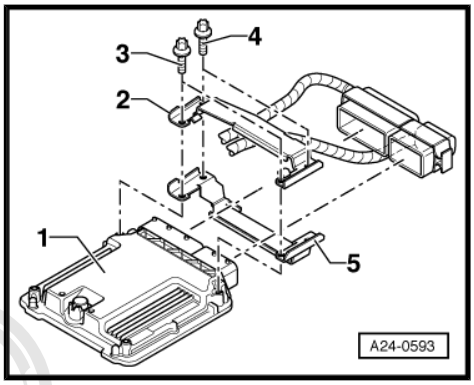
Special tools and workshop equipment required

- Hot air blower -1- from the wiring harness repair set -VAS 1978-



- Nozzle attachment -2- from the wiring harness repair set -VAS 1978-
- Commercially available vice grip pliers (mole grip) -3-
- Vehicle diagnostic, testing and information system -VAS 5051B-

The engine control unit -1- is bolted to the locking plates -2 and 5-. To make it more difficult to unscrew the shear bolts -4- for locking plate -2-, their threads have been coated with locking fluid.



The protective housing has to be removed before the connectors can be unplugged from the engine control unit (e.g. to connect the test box or renew the engine control unit).

Removing

– When renewing engine control unit, select diagnosis object “Renew engine control unit” in “Guided Functions” ⇒ Vehicle diagnosis, testing and information system VAS 5051.

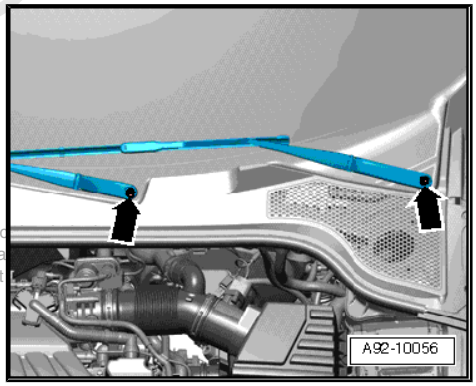
– Switch off ignition and remove ignition key.

– Lever off caps on windscreen wiper arms with a screwdriver.

– Loosen hexagon nuts -arrows- several turns.

– Loosen wiper arms from wiper shafts by tilting slightly.

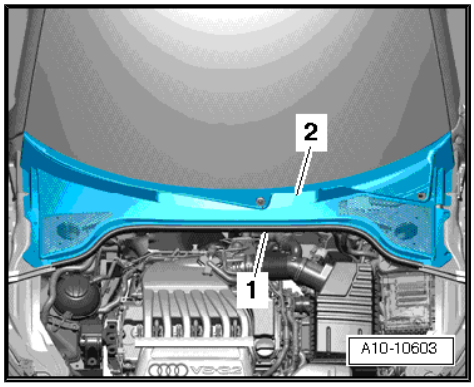
– Completely remove hexagon nuts and detach wiper arms from wiper shafts.



Note

If necessary, use puller -T10369- or a commercially available puller to remove wiper arms.

– Pull off rubber seal -1- and remove plenum chamber cover -2-.



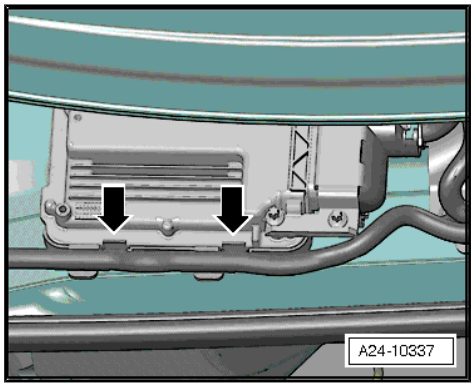
Note

- *Risk of damage to plenum chamber cover.*
- *Apply a small quantity of soap solution to transition between windscreen and plenum chamber cover -2-. Then, starting at edge of windscreen, carefully pull plenum chamber cover upwards off retainer at windscreen.*

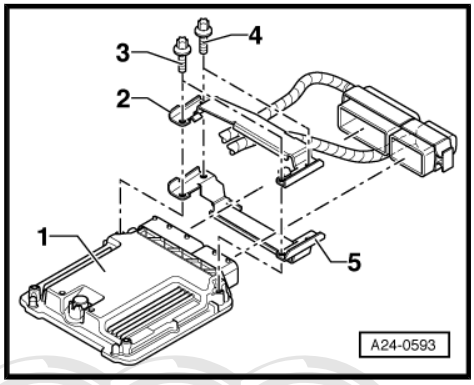
– Detach plenum chamber cover -2- by pulling it carefully off retainer at windscreen.

– Detach engine wiring harness (rear) at plenum chamber partition panel.

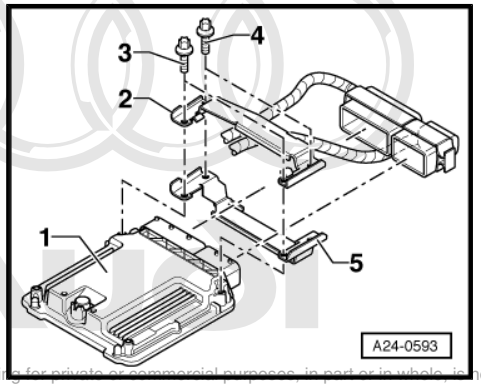
– Release clips -arrows- and remove engine control unit -J623- .



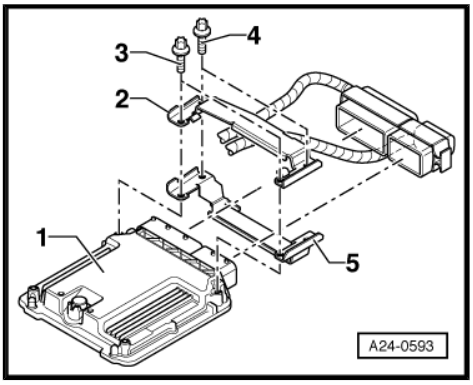
To help prevent unauthorised access to the connectors on the engine control unit, the control unit is secured by means of shear bolts to a locking plate and a metal casing.



The threads of the two shear bolts -4- which are not screwed into the engine control unit are secured with locking fluid. To unscrew these bolts, the threads must therefore be heated with the hot-air blower.



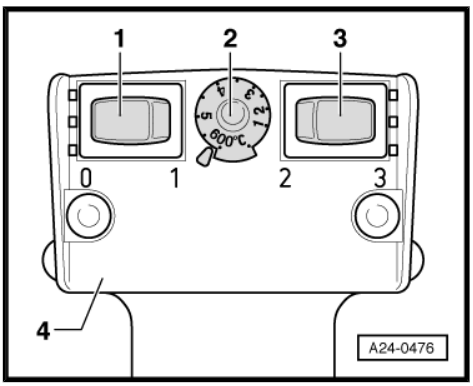
The threads of the two shear bolts -3- which are screwed into the engine control unit are not secured with locking fluid. Do not apply heat to the threads in the control unit housing; this is not necessary and would cause overheating of the control unit.



Select settings on hot air blower as shown in illustration, i.e. set temperature potentiometer -2- to maximum heat output and two-stage air flow switch -3- to position 3.

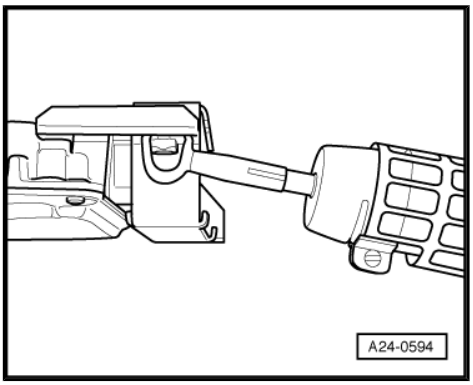
WARNING

Heating the thread of the locking plate also heats up the shear bolts and parts of the metal housing. Take care to avoid burns. It is also important to ensure that only the thread is heated and none of the surrounding components if at all possible. These should be covered if necessary.

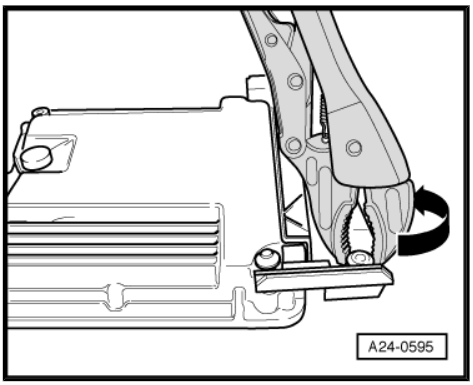


Apply heat to the threads of the shear bolts on the connector side as shown in the illustration.

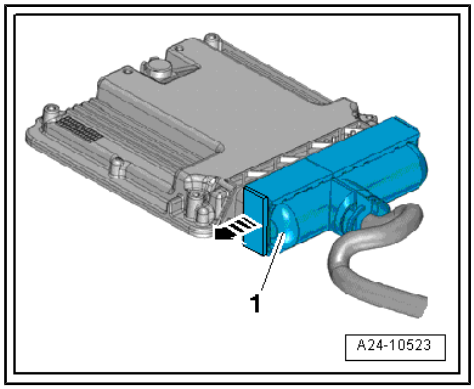
Switch on the hot air blower and heat the bolt for approximately 20 ... 30 seconds.



- Unscrew shear bolts using suitable vice-grip pliers (see arrow in illustration).
- The two shear bolts screwed into the engine control unit do not need to be heated. They can be removed without heating.
- Detach metal locking plate from connectors.
- Unscrew two bolts securing retainers for engine control unit -J623- .



– Release connectors on engine control unit -J623- and unplug connectors.
– Take out old engine control unit -J623- and install new engine control unit -J623- .



Installing engine control unit

Installation is performed in the reverse sequence.

– After installation, the locking plate must be re-fitted on the engine control unit -J623- .
– Clean threaded holes for shear bolts to remove any residue from locking fluid. This can be done using a thread tap.
– Always use new shear bolts.

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

– Activate engine control unit on vehicle diagnosis and service information system -VAS 5052- in “Guided Functions” mode, “J623 - Renew engine control unit, further steps”.

28 – Ignition system

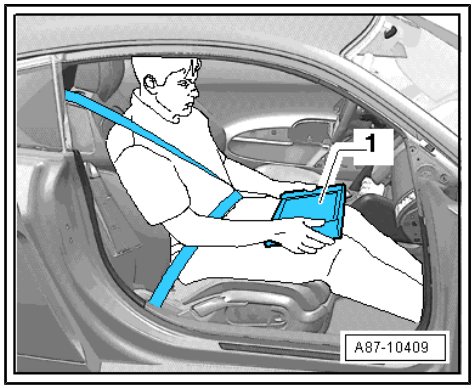
1 General notes and safety precautions

1.1 General notes on ignition system

- The engine control unit has a self-diagnosis capability.
- A voltage of at least 11.5 V is required for proper operation of the electrical components.
- Certain tests may lead to a fault being detected by the control unit and stored. The fault memory should therefore be interrogated and (if necessary) erased after completing the tests and any repair work that may be required.
- If the engine starts, runs for a short period and then cuts out after completing fault finding, repairs or component tests, this may be due to the immobiliser disabling the engine control unit. The fault memory must then be interrogated and, if necessary, the control unit must be adapted.

1.2 Safety precautions

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



WARNING

Accidents can be caused if the driver is distracted by test equipment while road-testing, or if test equipment is not properly secured.

Injuries can also be caused if the passenger's airbag is triggered in a collision.

- *The use of test equipment while driving causes distraction.*
- *There is an increased risk of injury if test equipment is not secured.*

◆ *Move the passenger's seat back as far as it will go.*

◆ *Use only vehicle diagnosis and service information system -VAS 5052- or diagnosis system -VAS 5053- .*

◆ *The test equipment -1- must rest flat on the passenger's thighs (as shown in illustration) and must be operated by the passenger.*

To avoid any risk of injuries to persons and/or damage to the fuel injection and ignition system, always observe the following safety precautions.

◆ 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, high-voltage wires and test leads.

◆ If you want to crank the engine at starting speed without actually starting it (e.g. compression test), first unplug the connectors from the ignition coils and the injectors. After completing the work, interrogate and erase the fault memory.

◆ 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.

2 Servicing ignition system

2.1 Test data

Engine data	2.0 ltr. / turbo FSI engine
Idling speed is not adjustable; controlled by the idling speed stabilisation	640...800 rpm
Engine speed limiter (deactivates injectors/closes throttle valve)	approx. 6,500 rpm
Ignition timing is determined by the control unit. Ignition timing cannot be adjusted.	
Ignition system	Multi-coil ignition system with 4 ignition coils (integrated output stages) connected directly to spark plugs via spark plug connectors; ignition coils can be pulled out of cylinder head using puller - T40039 -
Firing order	1-3-4-2

2.2 Ignition system - exploded view

1 - Knock sensor 1 -G61-
- ❑ Contacts gold-plated

2 - Knock sensor 2 -G66-
- ❑ Contacts gold-plated

3 - Ignition coil with output stage -(N70, N127, N291, N292)-
- ❑ Removing and installing ⇒ page 64
- ❑ Use puller -T40039- for removal

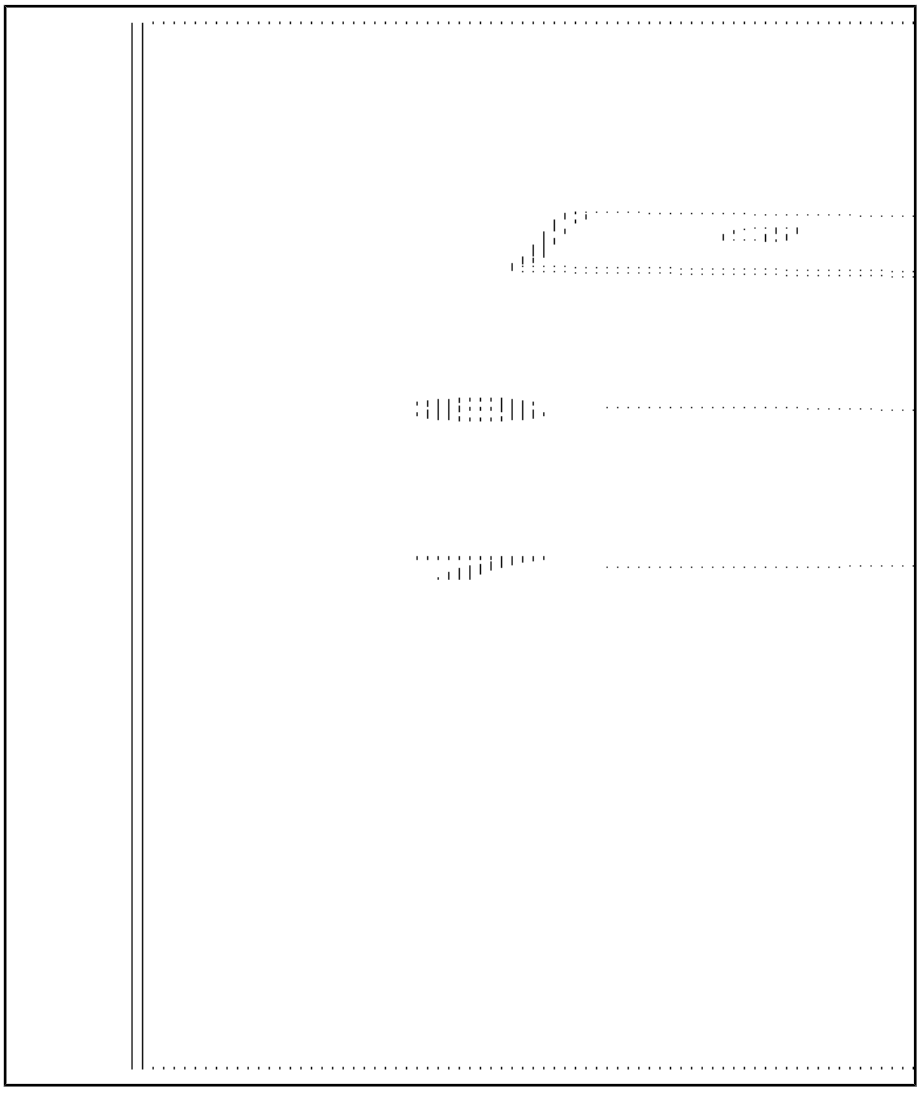
4 - Spark plug
- ❑ 30 Nm
- ❑ Use spark plug socket and extension -3122 B- for removal
- ❑ Removing and installing ⇒ Maintenance ; Booklet 810

5 - Bolt
- ❑ 20 Nm
- ❑ Tightening torque influences the function of the knock sensor

6 - Bolt
- ❑ 10 Nm

7 - Hall sender -G40-
- ❑ Contacts gold-plated

8 - O-ring
- ❑ Renew O-Ring if dam-

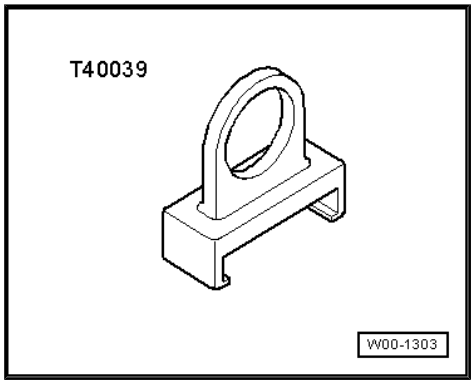


aged

2.3 Removing and installing ignition coils with output stages

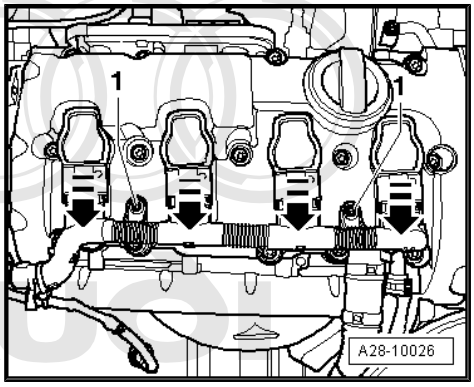
Special tools and workshop equipment required

- Puller -T40039-

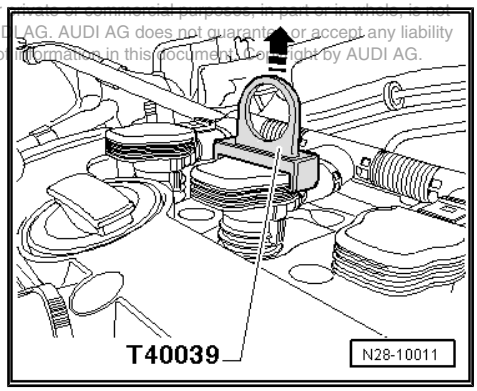


Removing:

– Unscrew two bolts -1- on connector rail.



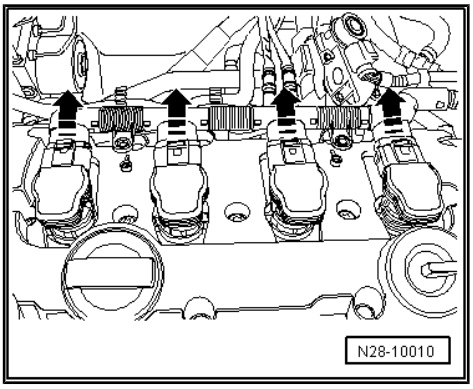
– Pull all ignition coils approx. 30 mm out of spark plug holes using puller -T40039- .



– Release connectors and unplug all connectors from the ignition coils at the same time.

Installing:

– Fit all ignition coils loosely into spark plug holes.



– Align the ignition coils with the connectors and attach all connectors onto ignition coils simultaneously.

– Press ignition coils onto spark plugs by hand with uniform pressure (do not use tool).