



## Workshop Manual

Audi A4 2008 ➤

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Audi A5 Cabriolet 2009 ➤

Audi A5 Coupé 2008 ➤

Direct petrol injection and ignition system (4-cyl. 1.8 ltr.  
4-valve turbo with timing chain)

|           |          |          |          |          |          |          |  |  |  |
|-----------|----------|----------|----------|----------|----------|----------|--|--|--|
| Engine ID | CAB<br>A | CAB<br>B | CDH<br>A | CDH<br>B | CCU<br>A | CAB<br>D |  |  |  |
|-----------|----------|----------|----------|----------|----------|----------|--|--|--|

Edition 10.2011

## List of Workshop Manual Repair Groups

### Repair Group

24 - Mixture preparation - injection

28 - Ignition system



# Audi

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

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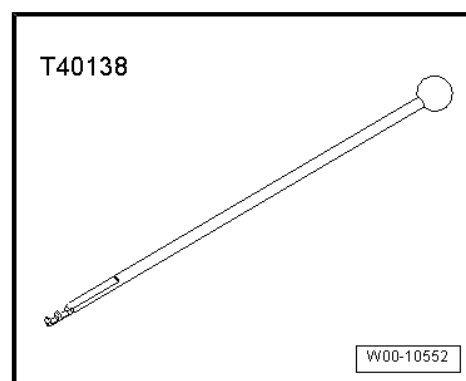
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## 24 – Mixture preparation - injection

### 1 Safety precautions and rules for cleanliness

#### 1.1 General notes on self-diagnosis

- ◆ The engine control unit has a self-diagnosis capability. Interrogate the event memory before carrying out repairs. The vacuum hoses and connections must be checked (to prevent unmetered air).
- ◆ Fuel hoses in engine compartment must only be secured with spring-type clips. O-type clips 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 reduces the risk of a vehicle fire after a crash. The fuel pump relay deactivates the fuel pump.
- ◆ At the same time, this system also improves the engine's starting performance. Each time the driver's door is opened, the fuel pump is activated for 2 seconds. Initial fuel pressure will then build up. Observe safety precautions ➔ [page 1](#).
- ◆ Use release tool -T40138- to unplug connectors that cannot be accessed easily.



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

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.***

***Persons sitting in the front passenger's seat could be injured if the airbag is triggered in an accident.***

- ***The use of test equipment while driving causes distraction.***
- ***There is an increased risk of injury if test equipment is not secured.***
- ◆ ***Test equipment must always be secured on the rear seat with a strap and operated from the rear seat by a second person.***

### 1.3 Safety precautions for vehicles with start/stop system



#### WARNING

*Risk of injury due to automatic engine start on vehicles with start/stop system.*

- ◆ *On vehicles with activated start/stop system (this is indicated by a message in the instrument cluster display), the engine may start automatically on demand.*
- ◆ *Therefore it is important to ensure that the start/stop system is deactivated when performing repairs (switch off ignition, if required switch on ignition again).*

### 1.4 Safety precautions when working on the fuel system



#### WARNING

*The fuel system operates at extremely high pressure. This can cause injury.*

- ◆ *The fuel system is pressurised. The fuel pressure in the high-pressure section 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. 7 bar) to dissipate.*



#### Caution

*To prevent irreparable damage to the electronic components when disconnecting the battery:*

- ◆ *Observe notes on procedure for disconnecting the battery.*

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## 1.5 Rules for cleanliness and instructions for working on fuel system

When working on the fuel system note the following warnings:



### WARNING

- ◆ *If the battery is not disconnected, the fuse 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.*
- ◆ *The fuel system is pressurised. The fuel pressure in the high-pressure section 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. 7 bar) to dissipate.*



### Note

*Removing the fuse (located in fuse carrier in dash panel on driver's side) will interrupt the power supply from »terminal 30« for the fuel pump control unit -J538- . ➔ Current flow diagrams, Electrical fault finding and Fitting locations*

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

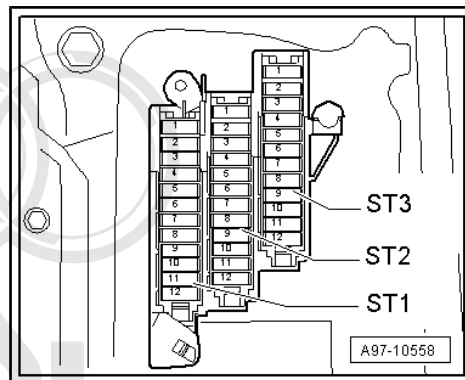
- ◆ Carefully clean connection points and the surrounding area with engine cleaner or brake cleaner and dry thoroughly before opening.
- ◆ Plug open lines and connections with suitable protective caps immediately.
- ◆ Place parts that have been removed on a clean surface and cover them over. Do not use fluffy 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.

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## 1.6 Safety precautions when working on the ignition system

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

- ◆ 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 event memory should therefore be interrogated and (if necessary) erased after completing the tests and any repair work that may be required.
- ◆ If the event memory has been erased, you must generate the readiness code again.
- ◆ Always switch off the ignition before cleaning the engine.
- ◆ 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- .



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### Note

- ◆ The fuse is located in the fuse holder in the dash panel.
- ◆ Removing the fuse (located in fuse carrier in dash panel on driver's side) will interrupt the power supply from »terminal 30« for the fuel pump control unit -J538- . ➔ Current flow diagrams, Electrical fault finding and Fitting locations

## 1.7 Reducing pressure in high-pressure section of injection system



### WARNING

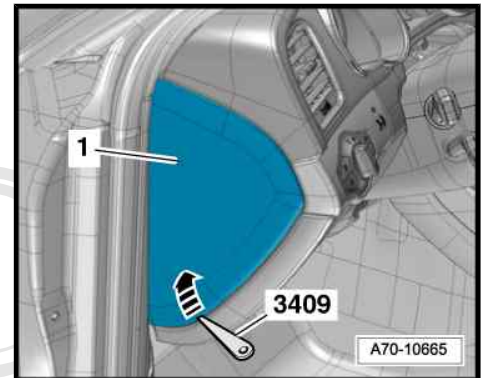
*The fuel system operates at extremely high pressure. This can cause injury.*

- ◆ The injection system consists of a high-pressure section (maximum approx. 140 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 a ➔ Vehicle diagnostic tester.

- Start engine and run at idling speed.
- Select „Engine electronics“ in vehicle self-diagnosis.
- Then select „Measured values“.
- Select „Fuel pressure“ from the list.
- With the engine idling, the fuel pressure displayed will be between 30 and 40 bar.
- Pry off cover -1- on left side/right side of dash panel using removal wedge -3409- -arrow- or similar.



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- With engine idling, pull out fuse for fuel pump control unit - J538- in fuse carrier in dash panel (driver's side) ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.



### Note

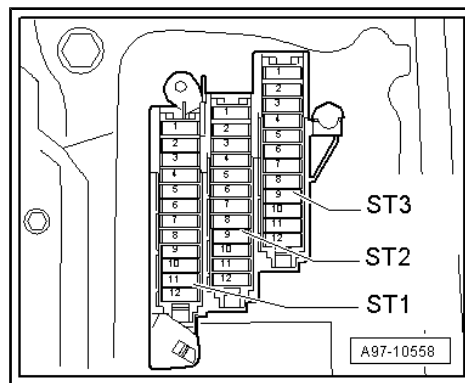
*Removing the fuse will interrupt the voltage supply »terminal 30« for the fuel pump control unit -J538- .*

- Observe fuel pressure displayed on diagnostic system.
- 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

***There is a risk of injury: avoid skin contact with fuel.***

- ◆ ***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.***
- ◆ ***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.



### Note

*The pressure will increase again due to the effect of residual heat if the high-pressure system is not opened immediately.*

### Additional steps required

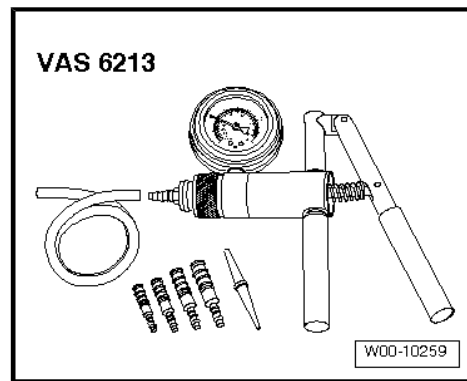
- Refit fuse.
- Erase event memory and generate readiness code in engine control unit in „Guided Functions“ mode.

## 1.8 Checking vacuum system

### Special tools and workshop equipment required

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◆ Hand vacuum pump -VAS 6213-



**Procedure**

- Check all vacuum lines in the complete vacuum system for:

- ◆ Cracks
- ◆ Traces of animal bites
- ◆ Kinked or crushed lines
- ◆ Lines porous or leaking

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

- If a fault is stored in the event memory, check all vacuum lines leading to the corresponding component, and also check the remaining vacuum lines leading to other components.

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

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## 2 Injection system

### 2.1 Technical data

| Engine data                                                                                                                    |                                                                                                                         | 1.8 ltr. turbo FSI engine |
|--------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|---------------------------|
| Idling speed is not adjustable (controlled by 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 according to requirements by electric fuel pump in fuel tank) | 3.0 ... 10.5 bar          |
| Pressure in high-pressure fuel circuit (generated by mechanical single-plunger pump) at a coolant temperature of approx. 85°C. |                                                                                                                         | 25 ... 150 bar            |

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### 2.2 Overview of fitting locations

Components A to I are not shown in the overview.

# **1 - Lambda probe -G39- and Lambda probe heater -Z19-**

- ☐ Fitting location  
⇒ [page 16](#)
- ☐ Removing and installing  
⇒ [page 53](#)

# **2 - Lambda probe after catalytic converter -G130- and Lambda probe heater 1 after catalytic converter -Z29-**

- ☐ Fitting location  
⇒ [page 16](#)
- ☐ Removing and installing  
⇒ [page 54](#)

# **3 - Fuel pressure regulating valve -N276-**

- ☐ Fitting location  
⇒ [page 14](#)

# **4 - High-pressure pump**

- ☐ Removing and installing  
⇒ [page 14](#)

# **5 - Vacuum unit for air flow control flaps (intake manifold flaps)**

- ☐ Fitting location  
⇒ [page 13](#)

# **6 - Intake manifold flap valve -N316-**

- ☐ Fitting location  
⇒ [page 13](#)

# **7 - Engine speed sender -G28-**

- ☐ Fitting location  
⇒ [page 14](#)
- ☐ 4.5 Nm

# **8 - Activated charcoal filter solenoid valve 1 -N80-**

# **9 - 6-pin connectors**

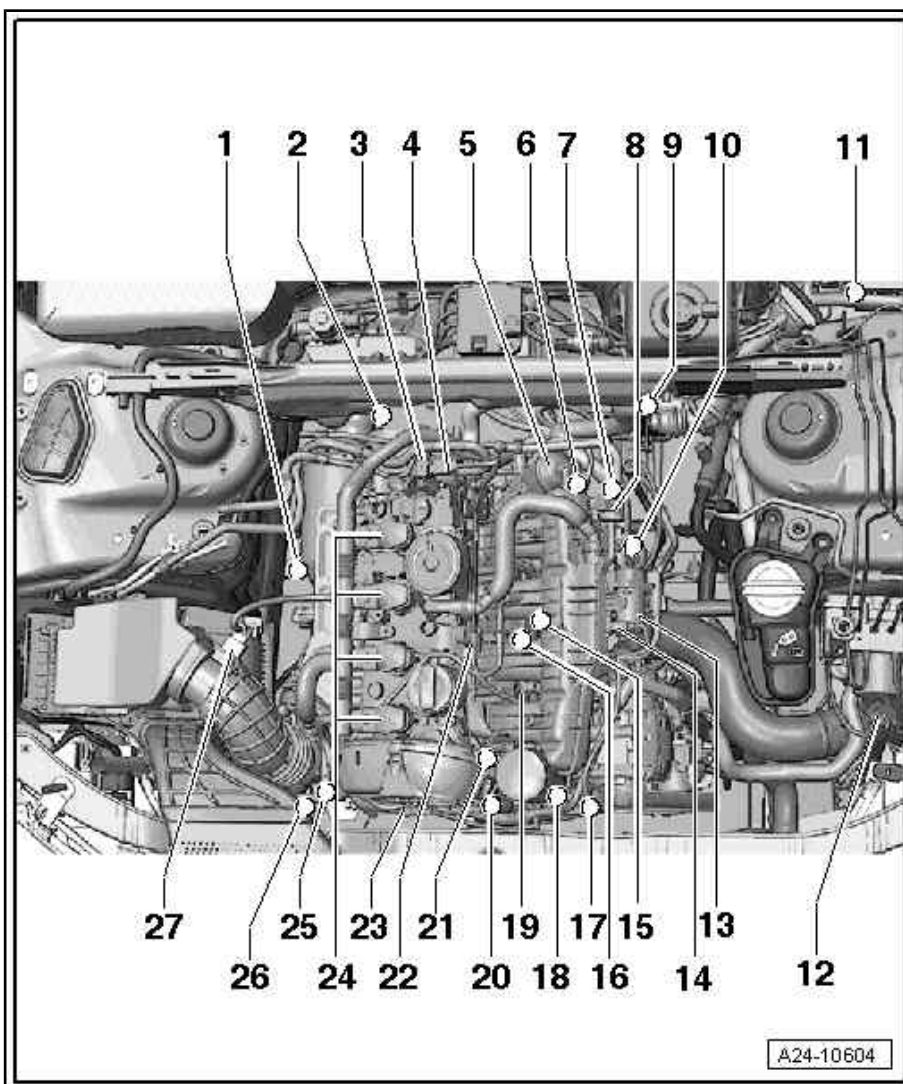
- ☐ For Lambda probe -G39- and Lambda probe heater -Z19- (black)
- ☐ Lambda probe after catalytic converter -G130- and Lambda probe 1 heater after catalytic converter -Z29- (brown connector)
- ☐ Fitting location ⇒ [page 16](#)

# **10 - Electrical connectors for**

- ☐ Knock sensor 1 -G61-
- ☐ Intake manifold flap valve -N316-
- ☐ Fuel pressure sender -G247-
- ☐ Intake manifold flap potentiometer -G336-
- ☐ Coolant temperature sender -G62-
- ☐ Hall sender -G40-
- ☐ Injectors -N30- ... -N33-
- ☐ Fitting location ⇒ [page 14](#)

# **11 - Engine control unit -J623-**

- ☐ Fitting location ⇒ [page 11](#)
- ☐ Removing and installing ⇒ [page 58](#)



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## 12 - Charge pressure sender -G31-

- ☐ Fitting location ⇒ [page 15](#)
- ☐ Removing and installing ⇒ Rep. gr. 21

## 13 - Throttle valve module -J338- , throttle valve drive (electric throttle operation) -G186-

- ☐ Throttle valve drive angle sender 1 -G187- and throttle valve drive angle sender 2 -G188-
- ☐ Throttle valve module -J338- must always be re-adapted to engine control unit -J623- after removal and installation or if it has been renewed
- ☐ Fitting location ⇒ [page 15](#)

## 14 - Intake air temperature sender -G42-

- ☐ Fitting location ⇒ [page 15](#)

## 15 - Knock sensor 1 -G61-

- ☐ To remove, first remove coolant pump with thermostat
- ☐ 20 Nm
- ☐ Removing and installing ⇒ [page 65](#)

## 16 - Coolant temperature sender -G62-

- ☐ Fitting location ⇒ [page 15](#)

## 17 - Valve for oil pressure control -N428-

- ☐ Fitting location ⇒ [page 16](#)
- ☐ Removing and installing ⇒ Rep. gr. 17

## 18 - Oil pressure switch for reduced oil pressure -F378-

- ☐ Fitting location ⇒ [page 16](#)
- ☐ Removing and installing ⇒ Rep. gr. 17

## 19 - Fuel pressure sender -G247-

- ☐ Fitting location ⇒ [page 13](#)
- ☐ Removing and installing ⇒ [page 41](#)

## 20 - Oil pressure switch -F22-

- ☐ Fitting location ⇒ [page 16](#)
- ☐ Removing, installing and testing ⇒ Rep. gr. 17

## 21 - Intake manifold flap potentiometer -G336-

- ☐ Fitting location ⇒ [page 13](#)

## 22 - Hall sender -G40- (camshaft position sensor)

- ☐ Fitting location ⇒ [page 14](#)

## 23 - Camshaft control valve 1 -N205-

- ☐ Fitting location ⇒ [page 15](#)
- ☐ Removing and installing ⇒ Rep. gr. 15

## 24 - Ignition coils with output stages

- ☐ Fitting location ⇒ [page 13](#)
- ☐ Puller -T40039- is required for removing ignition coils from cylinder head.
- ☐ Removing and installing ⇒ [page 64](#)

## 25 - Turbocharger air recirculation valve -N249-

- ☐ Located directly on turbocharger ⇒ [page 17](#)
- ☐ Removing and installing ⇒ Rep. gr. 21

## 26 - Charge pressure control solenoid valve -N75-

- ☐ Located directly on turbocharger ⇒ [page 17](#)
- ☐ Removing and installing ⇒ Rep. gr. 21

## 27 - Air mass meter -G70-

- ☐ Removing and installing ⇒ [page 47](#)

**A - Diagnostic connector**

- ☐ In driver's knee restraint

**B - Fuel pump control unit -J538-**

- ☐ Fitting location ⇒ [page 12](#)
- ☐ Removing and installing ⇒ Rep. gr. 20

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

- ☐ Fitting location ⇒ [page 12](#)
- ☐ In footwell on brake pedal
- ☐ Removing and installing ⇒ Rep. gr. 45

**D - Clutch position sender -G476-**

- ☐ Only fitted on vehicles with manual gearbox
- ☐ Fitting location ⇒ [page 12](#)

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

- ☐ Fitting location ⇒ [page 12](#)
- ☐ On accelerator pedal (both senders are accommodated in one housing)
- ☐ Removing and installing ⇒ Rep. gr. 20

**F - Radiator fan control unit -J293-**

- ☐ Incorporated in radiator fan

**G - Injectors**

- ☐ In fuel rail
- ☐ Injector, cylinder 1 -N30-
- ☐ Injector, cylinder 2 -N31-
- ☐ Injector, cylinder 3 -N32-
- ☐ Injector, cylinder 4 -N33-
- ☐ Removing and installing ⇒ [page 36](#)

**H - Continued coolant circulation pump -V51-**

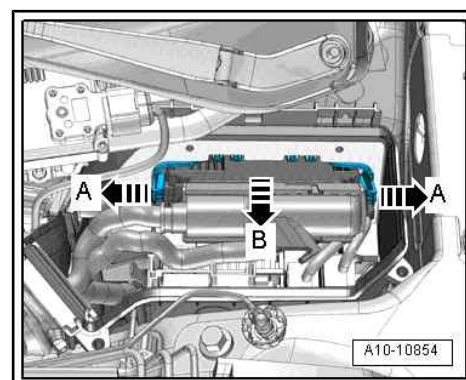
- ☐ For hot countries only
- ☐ Fitting location ⇒ [page 12](#)
- ☐ Removing and installing ⇒ Rep. gr. 19

**I - Left electrohydraulic engine mounting solenoid valve -N144-**

- ☐ Not installed in all vehicles (depends on gearbox type)

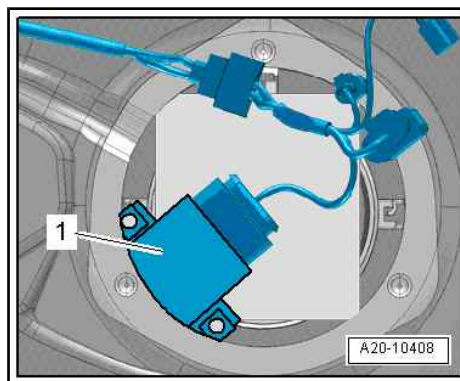
**Engine control unit -J623-**

- ◆ In left electronics box in engine compartment



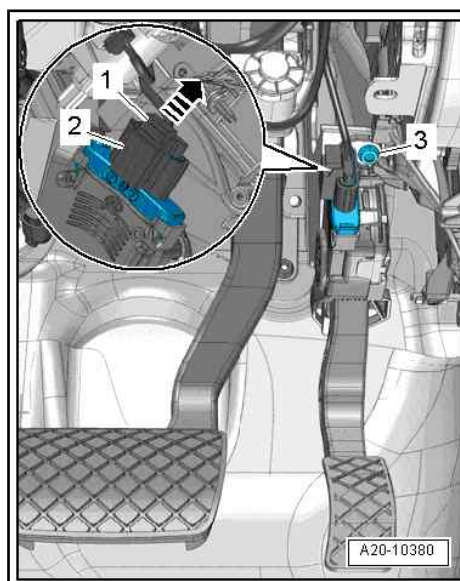
## Fuel pump control unit -J538- -1-

Removing and installing ⇒ Rep. gr. 20



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

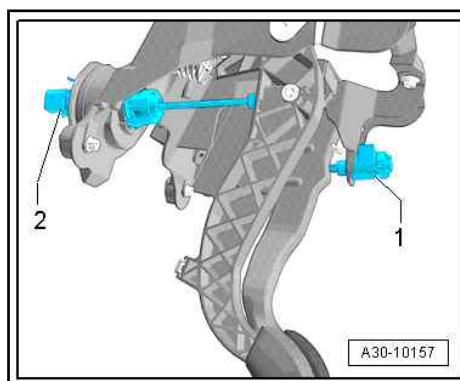
2 - Electrical connector



## Clutch position sender -G476- -2-

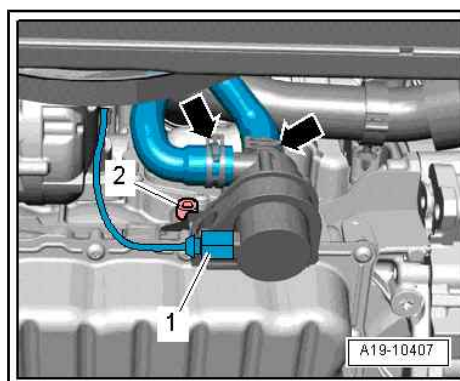
Integrated functions: clutch pedal switch for engine start -F194- and clutch pedal switch -F36- (manual gearbox only)

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



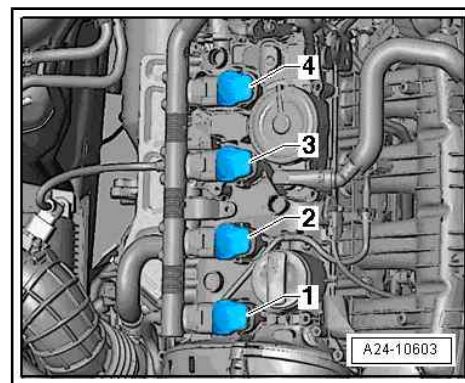
## Continued coolant circulation pump -V51-

1 - Electrical connector for continued coolant circulation pump - V51-



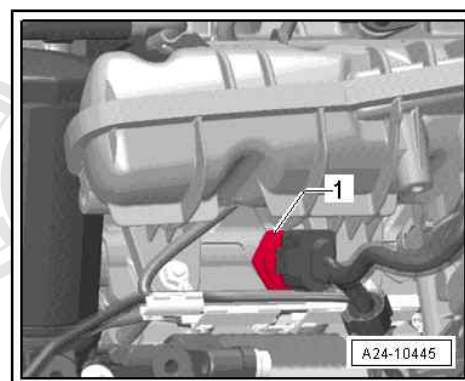
### Ignition coils

- 1 - Ignition coil 1 with output stage -N70-
- 2 - Ignition coil 2 with output stage -N127-
- 3 - Ignition coil 3 with output stage -N291-
- 4 - Ignition coil 4 with output stage -N292-



### Fuel pressure sender -G247- -1-

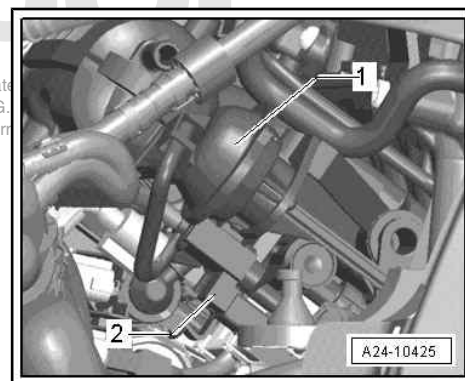
- Make sure that connecting piece is tightened to specified torque „25 Nm“ before installing fuel pressure sender -G247-



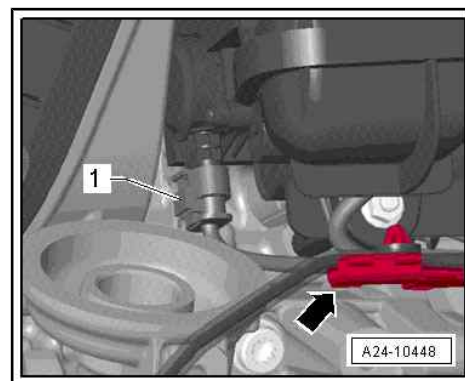
### Intake manifold flap valve -N316- -2-

- 1 - Vacuum unit for intake manifold flaps

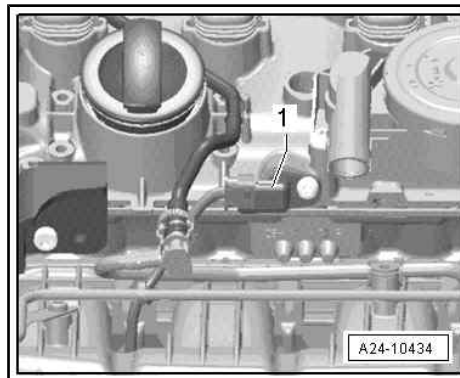
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### Intake manifold flap potentiometer -G336- -1-

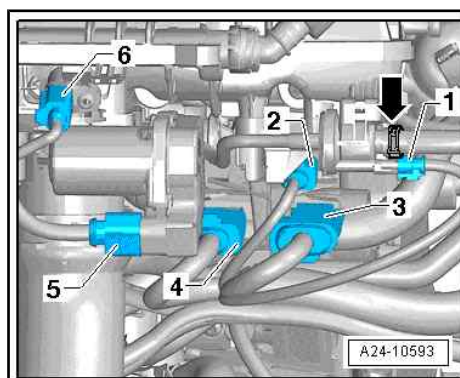


## Hall sender -G40- -1-



## Electrical connectors

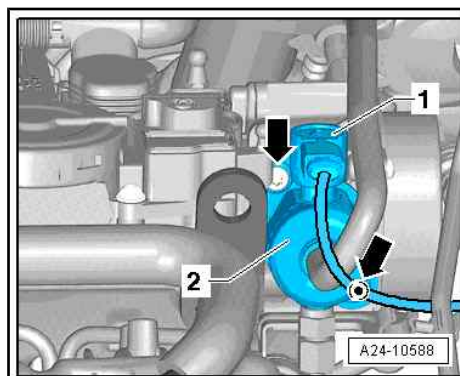
- 1 - From activated charcoal filter solenoid valve 1 -N80-
- 2 - From knock sensor 1 -G61-
- 3 - (14-pin connector) from intake manifold flap valve -N316- , fuel pressure sender -G247- , intake manifold flap potentiometer -G336- , coolant temperature sender -G62- and Hall sender -G40-
- 4 - (8-pin) from injectors -N30-...-N33-
- 5 - From throttle valve module -J338-
- 6 - From intake air temperature sender -G42-



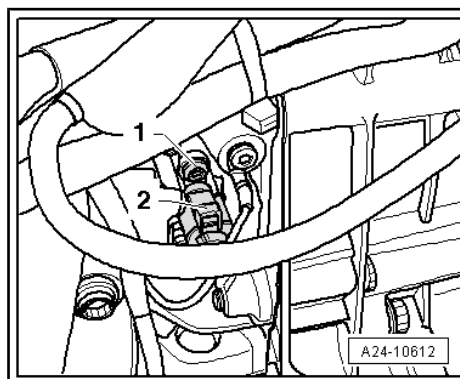
## High-pressure pump

- 1 - Fuel pressure regulating valve -N276-
- 2 - High-pressure pump
- -Arrows- denote securing bolts

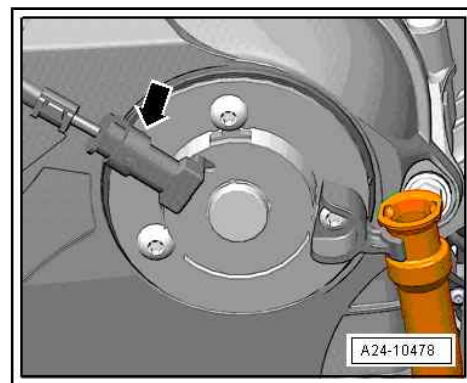
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## Engine speed sender -G28- -2-



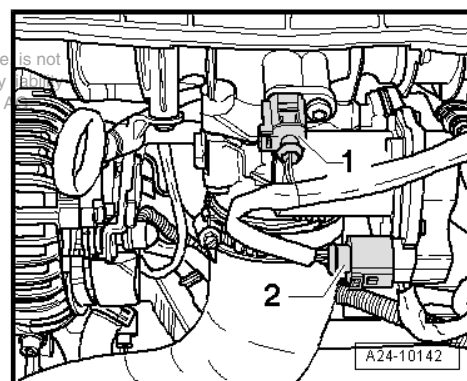
## Camshaft control valve 1 -N205- -arrow-



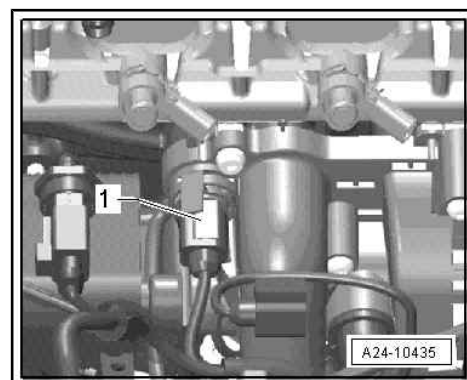
## Components

1 - Intake air temperature sender -G42-

2 - Throttle valve module -J338-

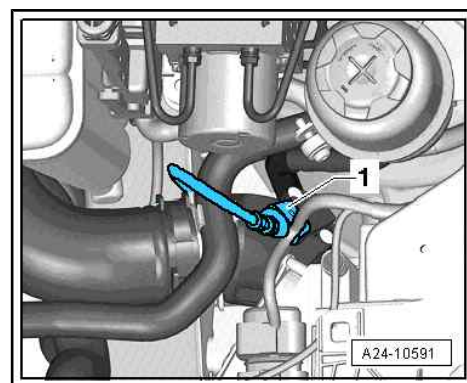


## Coolant temperature sender -G62- -1-



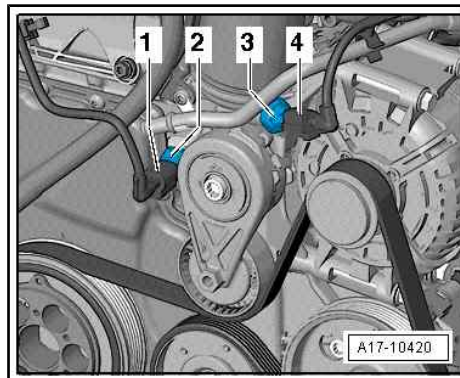
## Charge pressure sender -G31- -1-

– Removing and installing ⇒ Rep. gr. 21

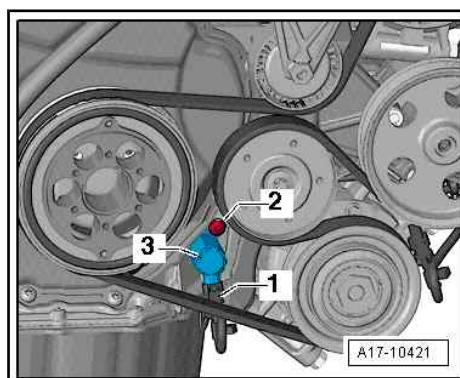


### Oil pressure switch

- 2 - Oil pressure switch -F22-
- 3 - Oil pressure switch for reduced oil pressure -F378-

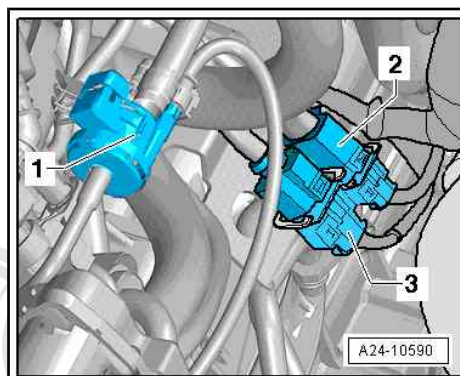


### Valve for oil pressure control -N428- -3-



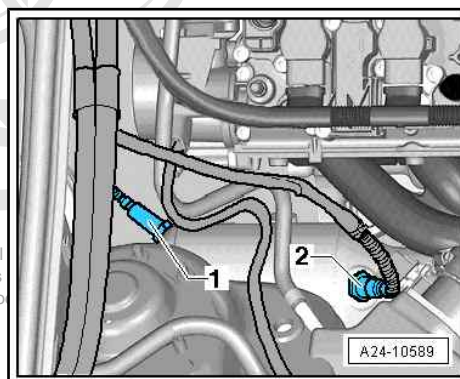
### Component and electrical connectors

- 1 - Activated charcoal filter solenoid valve 1 -N80-
- 2 - Lambda probe after catalytic converter -G130- and Lambda probe heater 1 after catalytic converter -Z29-
- 3 - Lambda probe -G39- and Lambda probe heater -Z19-



### Lambda probes

- 1 - Lambda probe after catalytic converter -G130- and Lambda probe heater 1 after catalytic converter -Z29-
- 2 - Lambda probe -G39- and Lambda probe heater -Z19-



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## Components on turbocharger

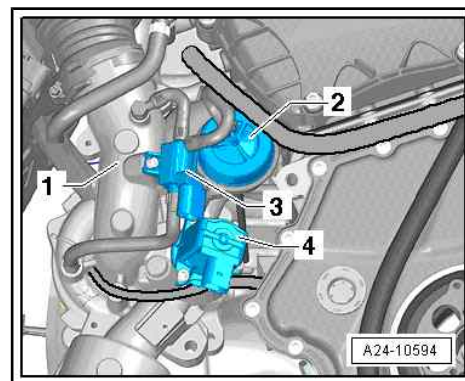
1 - Turbocharger

2 - Vacuum unit for turbocharger; checking, adjusting, removing and installing ⇒ Rep. gr. 21

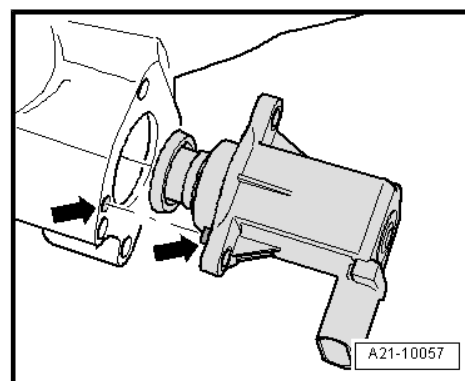
3 - Charge pressure control solenoid valve -N75-

4 - Turbocharger air recirculation valve -N249- (note installation position, refer to next illustration)

For removing and installing components on turbocharger, refer to  
⇒ Rep. gr. 21 .



**Pay attention to installation position of turbocharger air recirculation valve -N249-**



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## 3 Air cleaner

### 3.1 Air cleaner - exploded view

1 - Hose clip

2 - Air hose

3 - Hose clip

4 - Air duct

- ☐ Clipped into air cleaner housing
- ☐ Clean dirt and leaves out of air duct

5 - Air duct

- ☐ Clean dirt and leaves out of air duct

6 - Air duct

- ☐ Secure to lock carrier (2 Nm)
- ☐ Clean dirt and leaves out of air duct

7 - Rubber grommet

8 - Water drain hose

- ☐ Important: Clean any leaves and dirt out of water drain hose

9 - Guide for water drain hose

10 - Hot air intake (countries with cold climates only)

- ☐ Slide hot air intake into air cleaner as far as stop; then turn clockwise until it engages noticeably

11 - Air cleaner (bottom section)

- ☐ Clean any salt residue, leaves and dirt out of air cleaner (bottom section)
- ☐ Important: Check for dirt in water drain and clean as required

12 - Retainer for air cleaner (bottom section)

- ☐ Must engage positively
- ☐ Do not use any lubricants

13 - Variable intake manifold change-over valve -N335-

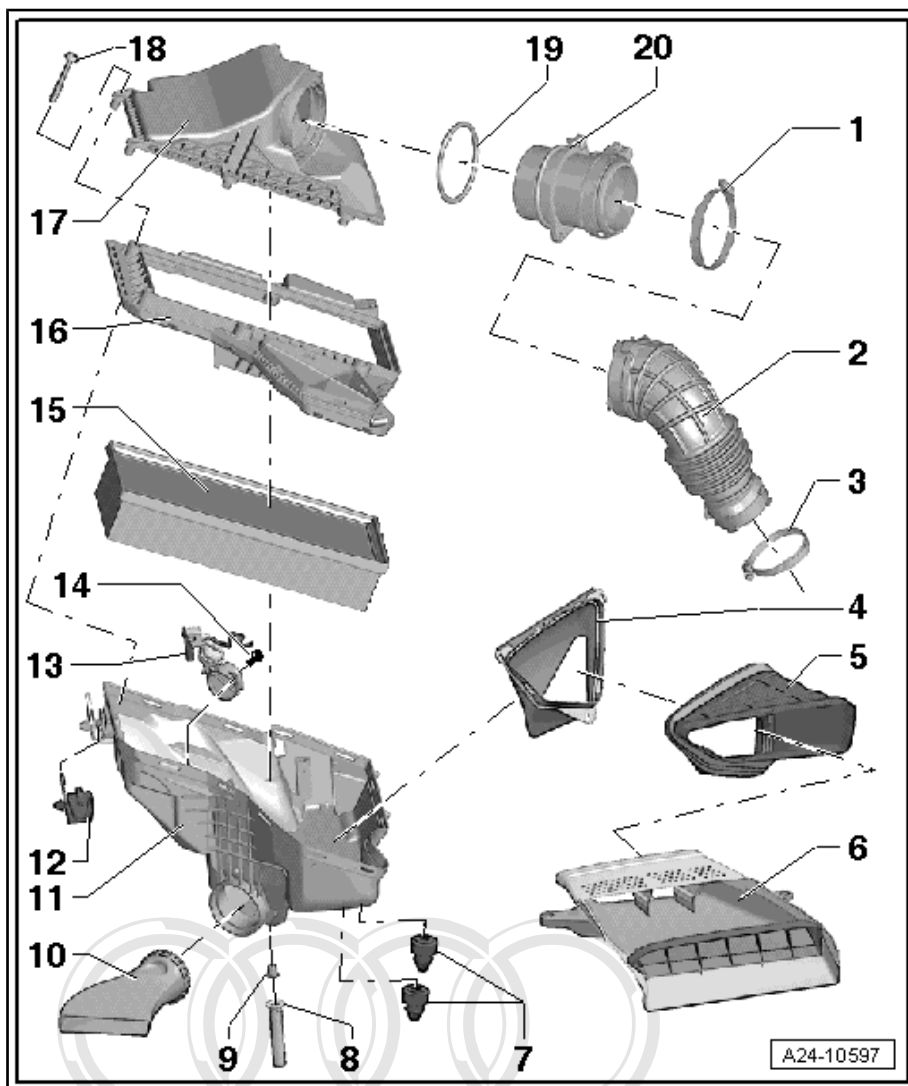
- ☐ Bypass flap and variable intake manifold change-over valve -N335- are not installed on certain equipment versions or on vehicles for certain export markets

14 - Bolt

- ☐ Only if variable intake manifold change-over valve -N335- is fitted

15 - Air filter element

- ☐ Always use genuine part for air filter element
- ☐ Maintenance intervals ⇒ Maintenance ; Booklet 812
- ☐ Removing and installing ⇒ [page 19](#)



- ☐ Also clean snow screen (if fitted)

#### 16 - Frame insert for air cleaner (bottom section)

#### 17 - Air cleaner (top section)

- ☐ Clean any salt residue, leaves and dirt out of air cleaner (top section)

#### 18 - Bolt

#### 19 - O-ring

- ☐ Renew if damaged

#### 20 - Air mass meter

- ☐ Removing and installing air mass meter -G70- with intake air temperature sender -G42- ➔ [page 47](#)

### 3.2 Removing and installing engine cover panel

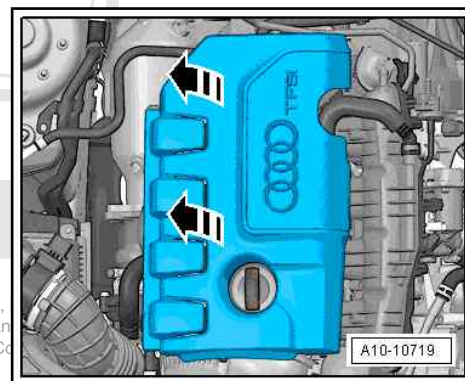
#### Removing

- Pull engine cover panel carefully off retaining pins. Do not jerk the cover panel away, and do not try to pull on one side only.

#### Installing

- To avoid damage, do not strike the engine cover panel with your fist or with any kind of tool.
- Position engine cover panel on engine (note locations of oil filler neck and oil dipstick).
- Press engine cover panel with both hands into the rubber grommets.

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### 3.3 Removing and installing air filter element

#### Removing air filter element

- Unplug electrical connector -1- at air mass meter -G70- .

- Release hose clip -2- securing air hose (going to turbocharger) and disconnect hose from air mass meter -G70- .
- Remove all bolts -arrows- from air cleaner (top section) and lift out air cleaner (top section).
- Take out old filter element.

### Installing air filter element

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.*
- ◆ *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.*
- ◆ *Both sections of 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.*

- Blow out water drain -arrow- in air cleaner (bottom section) with compressed air.

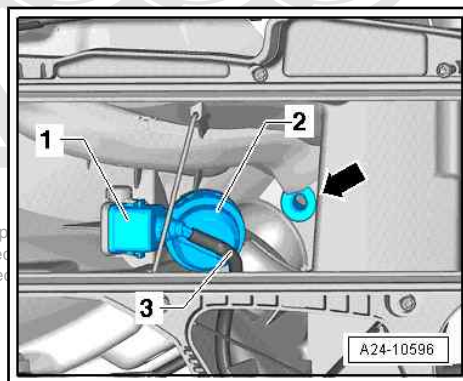
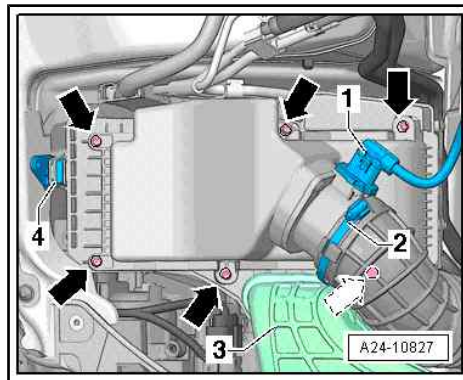


#### Note

Disregard items 1, 2 and 3.

- 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.
- If fitted, re-connect vacuum hose at variable intake manifold change-over valve -N335- .
- 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- .

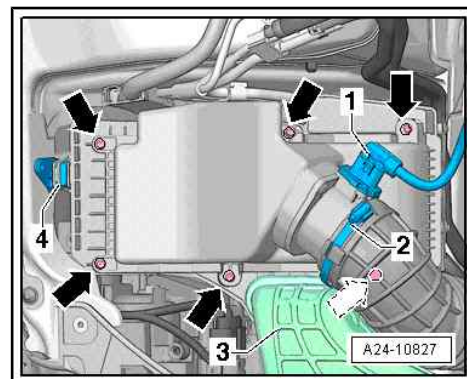
The remaining installation steps are carried out in the reverse sequence.



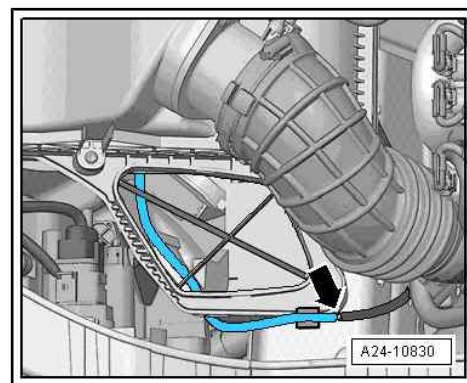
### 3.4 Removing air cleaner housing

#### Removing

- Unplug electrical connector -1- at air mass meter -G70- .
- Release hose clip -2- securing air hose (going to turbocharger) and disconnect hose from air mass meter -G70- .
- Remove air duct -3-.



- Detach vacuum hose -arrow- (if fitted).



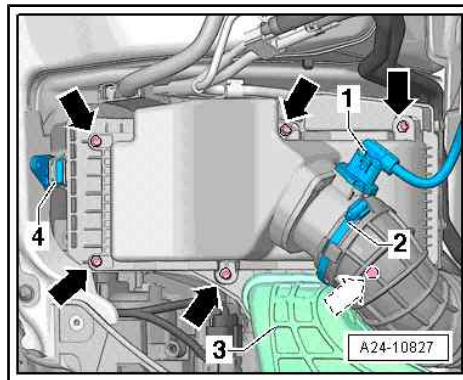
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- Release retainer -4- for bottom section of air cleaner (press in rubber on left and right side and pull upwards).



#### Note

- ◆ *These components (bypass flap with variable intake manifold change-over valve -N335- -1-) are not installed on certain equipment versions or on vehicles for certain export markets.*
- ◆ *Do not use lubricant when installing retainer.*
- Disconnect electrical connector at variable intake manifold change-over valve -N335- (if fitted).
- Carefully take out complete air cleaner housing.



#### Installing

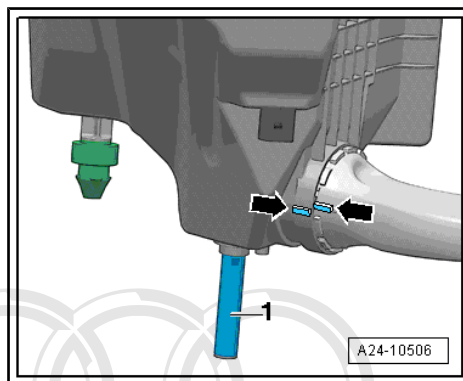
To ensure the proper function of the air mass meter -G70- it is important to observe the following instructions.



#### 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*

- If warm air intake hose is fitted (for countries with cold climates only), make sure that air intake connection has engaged properly -arrows- (pay attention to markings).
- Check water drain hose -1- in air cleaner (bottom section) for dirt and other obstructions (clean if necessary).
- 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 in air duct leading to air filter element.
- Re-attach electrical connector at variable intake manifold change-over valve -N335- (if fitted).
- Re-install air cleaner (bottom section).



#### Note

*The water drain hose must be routed straight downwards without kinks.*

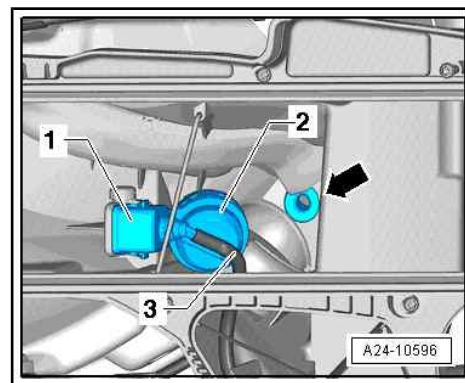
- Slide vacuum hose -3- (if fitted) back onto connection of variable intake manifold change-over valve -N335- -1-.
- Fit the top section of the air cleaner carefully on the bottom section, without using force.



**Note**

*Before tightening bolts, make sure that top section of air cleaner is inserted into groove on bottom section of air cleaner (to prevent air leaks).*

- Then screw top section of air cleaner back onto bottom section.
- Ensure secure fit of intake hose at air mass meter -G70- .
- Re-connect electrical connector at air mass meter -G70- .
- The remaining installation steps are carried out in the reverse sequence.



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## 4 Intake manifold

### 4.1 Intake manifold - exploded view

#### 1 - Screw for intake air temperature sender -G42-

- ☐ 5 Nm

#### 2 - Intake air temperature sender -G42-

#### 3 - Activated charcoal filter solenoid valve 1 -N80-

- ☐ With dual non-return valve

#### 4 - Intake manifold

- ☐ Removing and installing  
⇒ [page 26](#)

#### 5 - Vacuum unit for air flow control flaps (intake manifold flaps)

#### 6 - Intake manifold flap valve - N316-

#### 7 - Injectors

- ☐ Renew O-ring and teflon ring
- ☐ Ensure correct installation position.
- ☐ Removing and installing  
⇒ [page 36](#)

#### 8 - Intake manifold support

#### 9 - Bolt

- ☐ For intake manifold support
- ☐ 23 Nm

#### 10 - Securing nut for intake manifold support

- ☐ 10 Nm

#### 11 - Bolts for throttle valve module -J338-

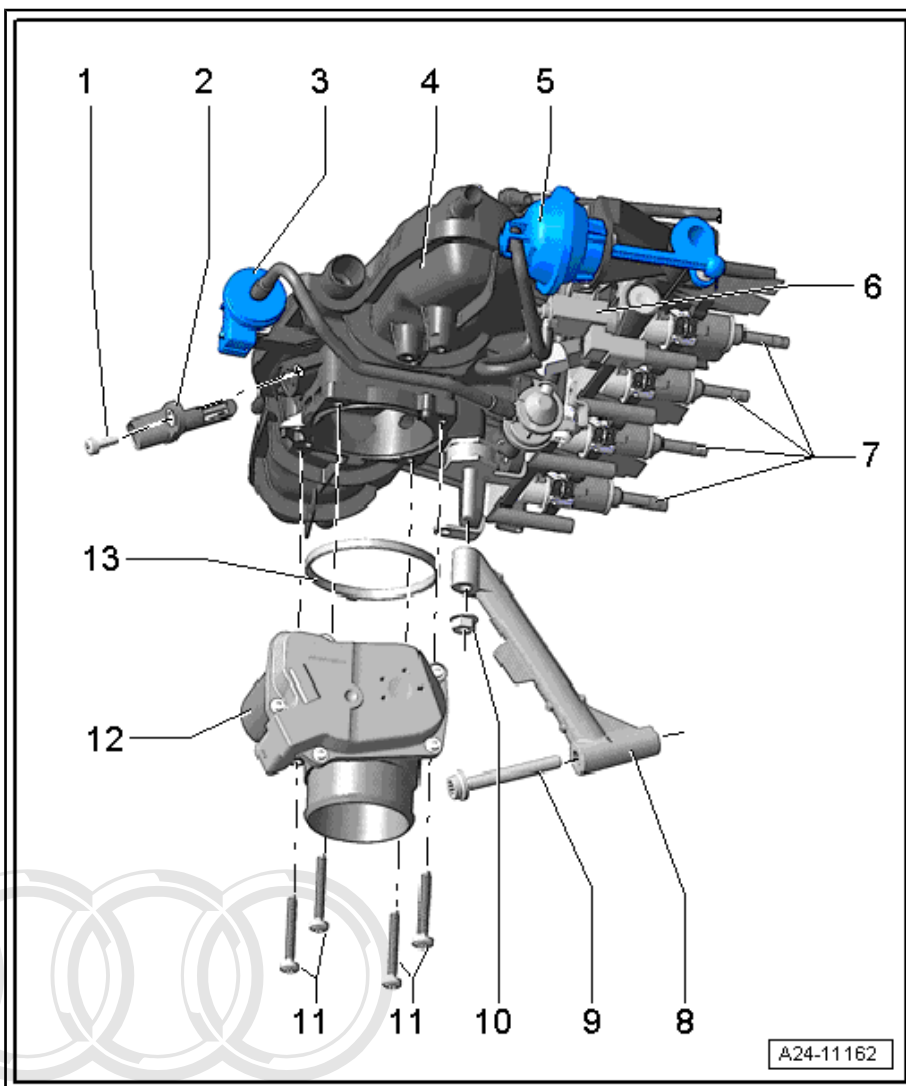
- ☐ 10 Nm

#### 12 - 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-
- ☐ Throttle valve module -J338- must be re-adapted to engine control unit -J623- after removal and installation or if it has been renewed, see vehicle diagnostic, testing and information system -VAS 5051B- „Guided Functions“

#### 13 - Seal

- ☐ Renew



## 4.2 Fuel rail - exploded view

### 1 - Injector

- ☐ With combustion chamber ring seal (teflon ring seal): always renew
- ☐ Renew O-rings
- ☐ Ensure correct installation position.
- ☐ Removing and installing  
⇒ [page 36](#)

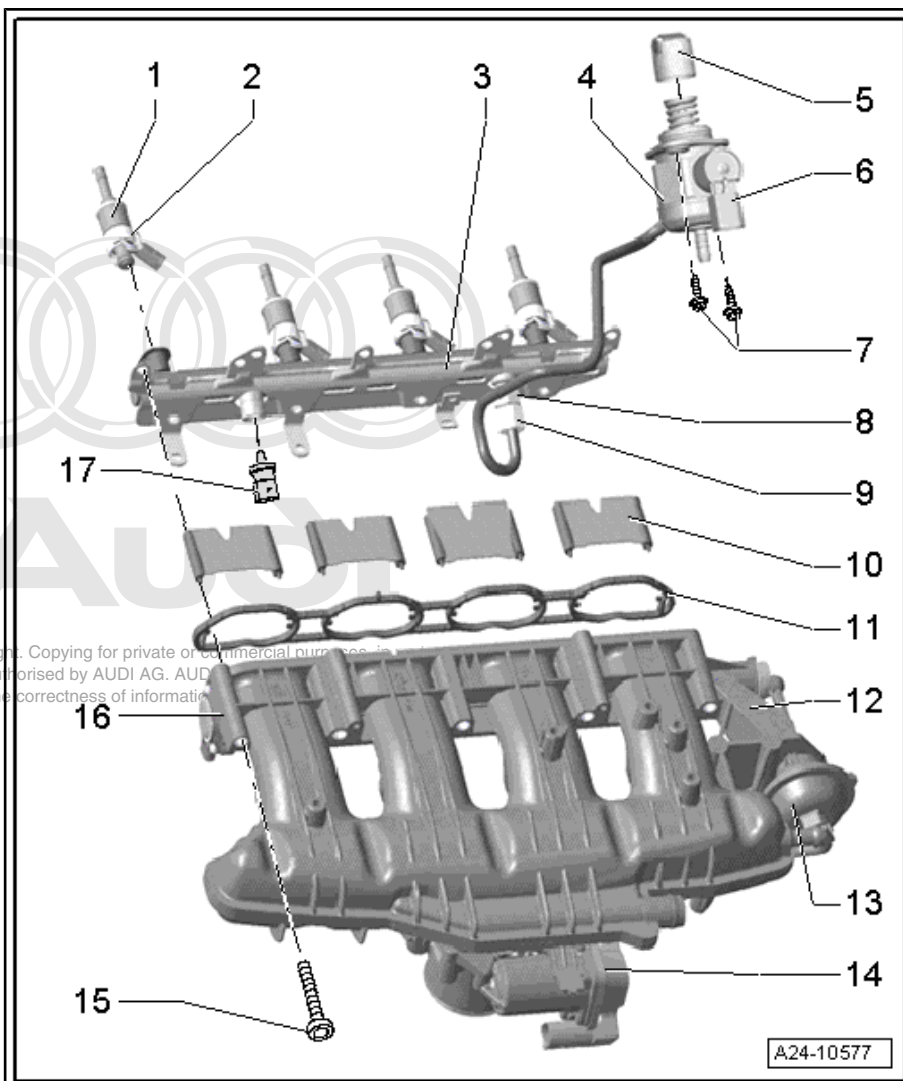
### 2 - Support ring

### 3 - Fuel rail

- ☐ Removing and installing  
⇒ [page 30](#)

### 4 - High-pressure pump

- ☐ With fuel pressure regulating valve -N276-
- ☐ An electric fuel pump (fitted in fuel tank) supplies fuel to the mechanical high-pressure pump
- ☐ 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 33](#)



### 5 - Roller tappet

### 6 - Fuel pressure regulating valve -N276-

### 7 - Bolts for high-pressure pump

- ☐ Renew
- ☐ 8 Nm + 90°

### 8 - Connecting piece for fuel supply line at fuel rail

- ☐ Renew
- ☐ 25 Nm

### 9 - Union nut for fuel supply line

- ☐ 20 Nm

### 10 - Air flow control flaps (intake manifold flaps)

### 11 - Gasket

- ☐ Renew

### 12 - Intake manifold

- ☐ Removing and installing ⇒ [page 26](#)

### 13 - Vacuum unit for air flow control flaps (intake manifold flaps)

### 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-
- ☐ Throttle valve module -J338- must always be re-adapted to engine control unit -J623- after removal and installation or if it has been renewed. Use ⇒ Vehicle diagnostic tester in „Guided Functions“ mode.
- ☐ 7 Nm

### 15 - Bolts for intake manifold

- ☐ 9 Nm

### 16 - Intake manifold flap potentiometer -G336-

- ☐ After intake manifold flap potentiometer -G336- or intake manifold has been removed and installed or renewed, intake manifold flap potentiometer -G336- must be adapted to engine control unit -J623- . Use ⇒ Vehicle diagnostic tester in „Guided Functions“ mode.

### 17 - Fuel pressure sender -G247-

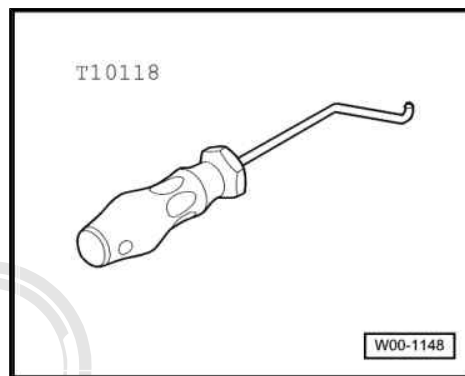
- ☐ 27 Nm
- ☐ Lubricate threads lightly with clean engine oil
- ☐ Always renew connecting piece and tighten to 25 Nm
- ☐ Removing and installing ⇒ [page 41](#)

## 4.3 Removing and installing intake manifold with fuel rail

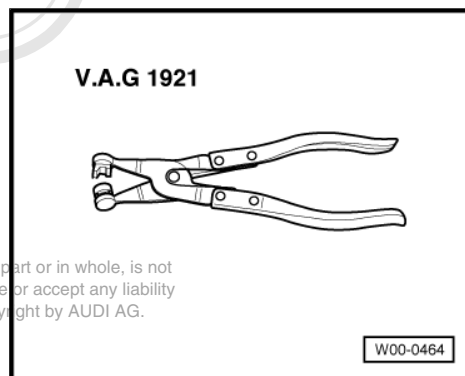
After the fuel rail has been removed or renewed, intake manifold flap potentiometer -G336- must be adapted to engine control unit -J623- . Use ⇒ Vehicle diagnostic tester in „Guided Functions“ mode.

### Special tools and workshop equipment required

- ◆ Assembly tool -T10118-

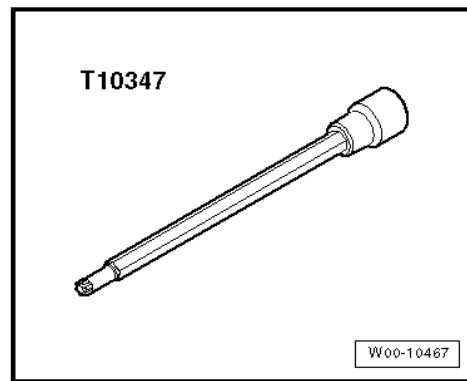


- ◆ Hose clip pliers -V.A.G 1921-



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◆ Socket Torx T30 -T10347-



Removing



Note

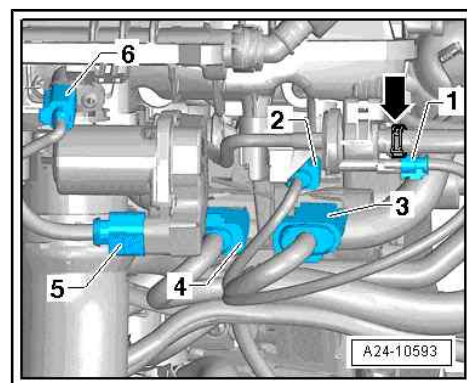
- ◆ *The injectors can only be accessed after the intake manifold and the fuel rail with the air flow control flaps have been removed.*
- ◆ *The combustion chamber ring seal (teflon) and the O-ring must be renewed.*
- ◆ *Intake manifold - exploded view ➔ [page 24](#)*
- ◆ *Fuel rail - exploded view ➔ [page 25](#)*



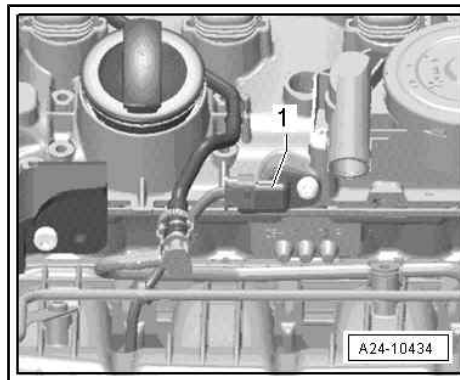
**WARNING**

***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](#).***

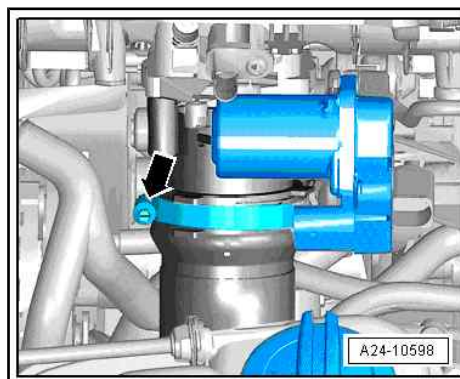
- Disconnect negative terminal from battery.
- Remove engine cover panel ➔ [page 19](#) .
- Disconnect vacuum line -arrow- leading to activated charcoal filter.
- Unplug following electrical connectors:
  - 1 - Activated charcoal filter solenoid valve 1 -N80-
  - 2 - From knock sensor 1 -G61-
  - 3 - From intake manifold flap valve -N316- , fuel pressure sender -G247- and Hall sender -G40-
  - 4 - From injectors
  - 5 - Throttle valve module -J338-
  - 6 - Intake air temperature sender -G42-



Unplug electrical connector -1- at Hall sender -G40- .



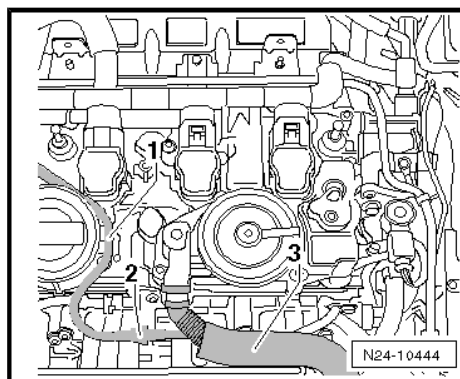
- Open hose clip -arrow- securing air intake hose and disconnect hose downwards from throttle valve module -J338- .



- Disconnect vacuum line -1- at connection -2-.
- Remove crankcase breather hose -3-.



**Note**

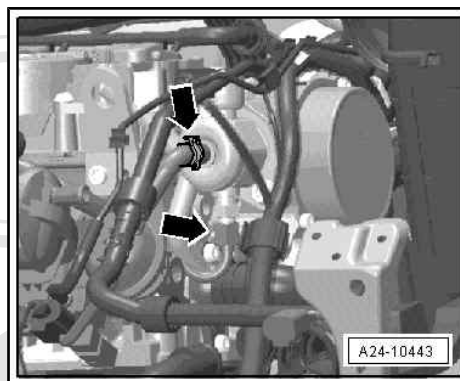


- Release spring-type clip -top arrow- and detach fuel supply hose from high-pressure pump.
- Unscrew union nut for high-pressure pipe -bottom arrow- at high-pressure pump.



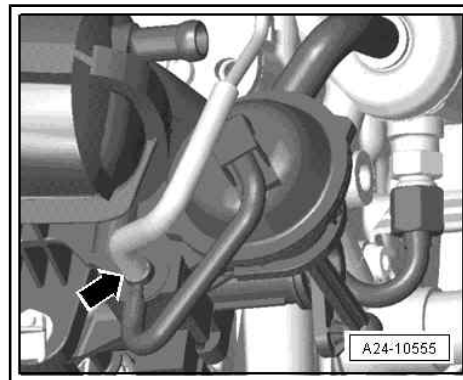
**Note**

- ◆ *The fuel system must not be under pressure.*
- ◆ *Use a clean cloth to catch escaping fuel.*
- ◆ *Seal off open connections with clean caps. Make sure no dirt gets into the fuel system.*

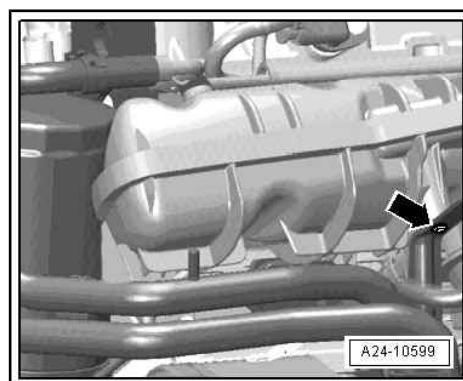


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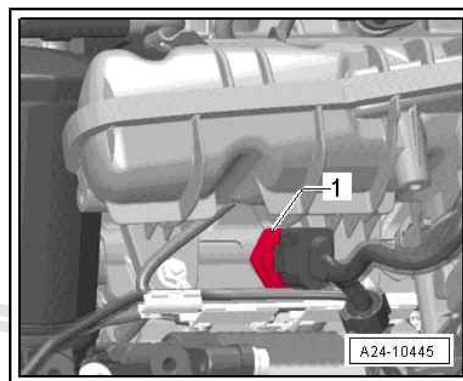
- Disconnect vacuum line -arrow- at intake manifold flap valve -N316- .



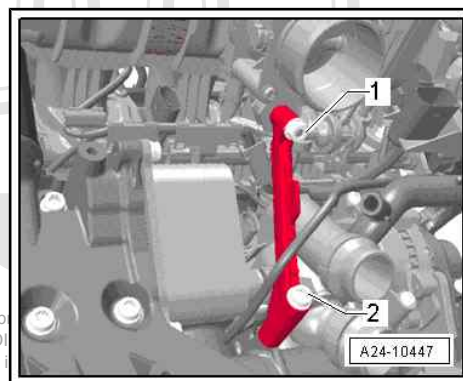
- Remove bolt -arrow- for coolant line from intake manifold.



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



- Slightly loosen securing nut -1- and remove bolt -2-.



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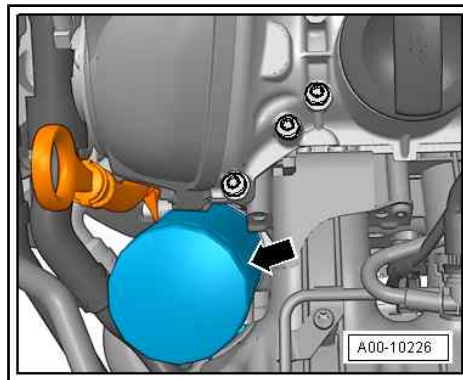
- Loosen oil filter with Hazet strap wrench -2171-1- or with oil filter tool -3417- and remove oil filter.
- Unscrew bolts from intake manifold using socket Torx T30 - T10347- .



#### Note

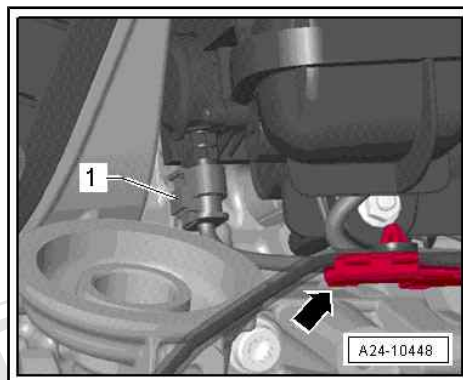
*To remove the bolts that cannot be accessed if you do not have socket Torx T30 -T10347- , the throttle valve module -J338- must be removed.*

- Carefully pull intake manifold and fuel rail slightly away from cylinder head.
- Unplug electrical connector -1- from intake manifold flap potentiometer -G336- and then detach intake manifold.



#### Note

- ♦ *The injectors can remain in the fuel rail.*
- ♦ *Block off intake ports with a clean cloth.*
- Disconnect intake manifold from fuel rail ➔ [page 30](#) .



#### Installing



#### Note

*Make sure that injectors are installed correctly.*

- Fit intake manifold onto studs (left and right) on cylinder head.
- The remaining installation steps are carried out in the reverse sequence.
- Tightening torque: intake manifold - exploded view  
➔ [page 24](#)
- Tightening torque: fuel rail - exploded view ➔ [page 25](#)

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## 4.4 Removing and installing fuel rail

After the fuel rail has been removed or renewed, intake manifold flap potentiometer -G336- must be adapted to engine control unit -J623- .



#### Note

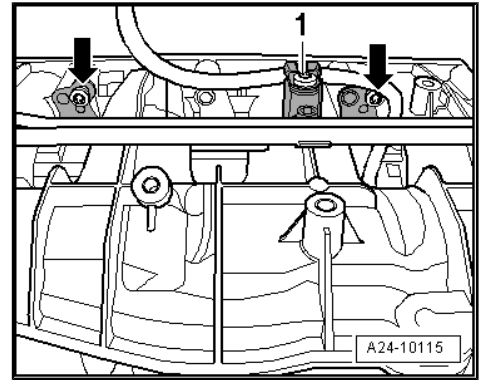
*Intake manifold must be removed; refer to ➔ [page 26](#) for removal procedure.*

- Release hose clip -1-.
- Remove hoses from activated charcoal filter.
- Disconnect fuel pipe at fuel rail.

- Unscrew two bolts -arrows- on fuel rail.
- Detach fuel rail from intake manifold.

#### Installing

- Always renew both connecting pieces for fuel supply line.
- Connect fuel pipe.
- Re-connect electrical connectors.
- Install intake manifold ➔ [page 26](#) .
- Tightening torque: intake manifold - exploded view  
➔ [page 24](#)
- Tightening torque: fuel rail - exploded view ➔ [page 25](#)
- Install in reverse order.



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## 5 High-pressure pump

### 5.1 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](#)*

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#### 1 - Fuel supply line from tank

#### 2 - Bolt for high-pressure pump

- ☐ Renew
- ☐ 8 Nm + 90°

#### 3 - High-pressure pump

- ☐ An electric fuel pump (fitted in fuel tank) supplies fuel to the mechanical high-pressure pump
- ☐ 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 33](#)

#### 4 - O-ring

- ☐ Renew

#### 5 - Roller tappet

- ☐ May remain lodged inside vacuum pump after removal of high-pressure pump

#### 6 - Connecting piece

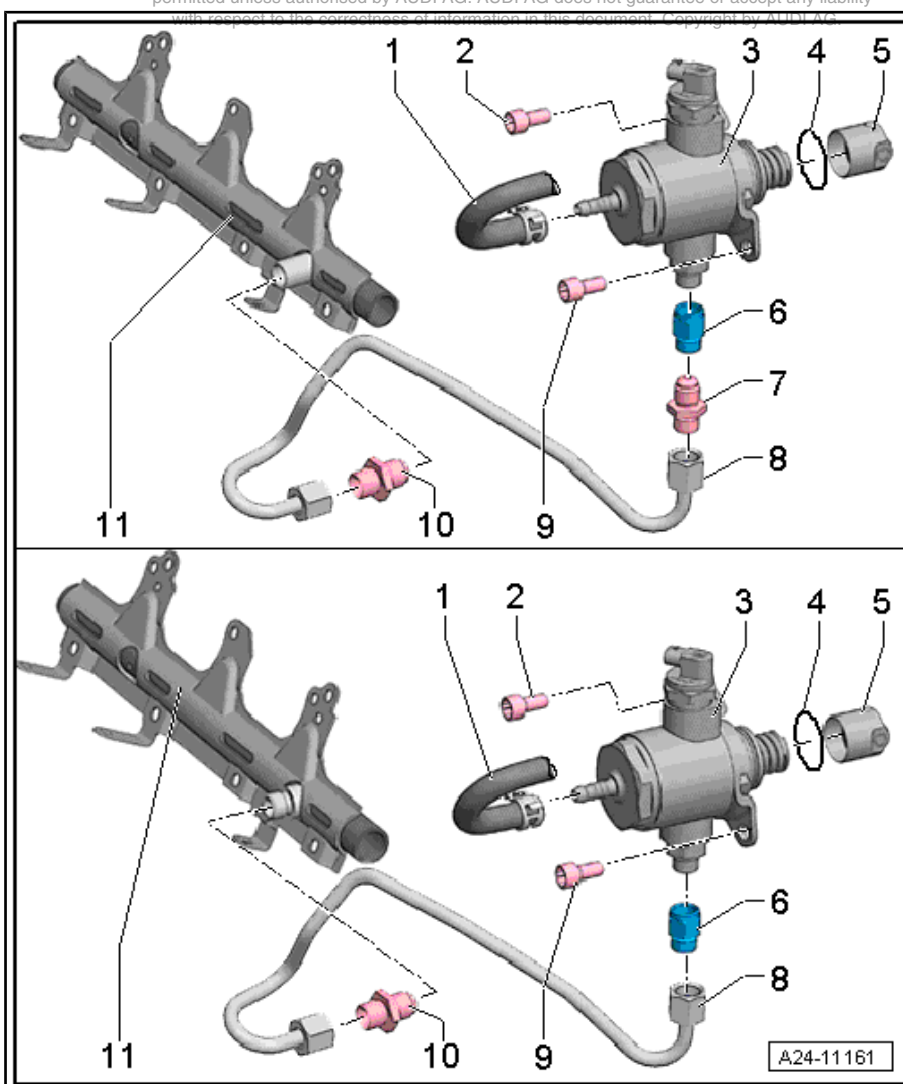
- ☐ Not available as replacement part, part of high-pressure pump
- ☐ Do not loosen

#### 7 - Adapter

- ☐ An adapter may be fitted between connecting piece and fuel supply line on some versions
- ☐ If fitted, adapter must be renewed; refer to ➤ Electronic parts catalogue
- ☐ 25 Nm

#### 8 - High-pressure fuel pipe

- ☐ Fuel pipe must be free of tension when installed.



- ☐ 20 Nm

#### 9 - Bolt for high-pressure pump

- ☐ Renew
- ☐ 8 Nm + 90°

#### 10 - Connecting piece for fuel supply line at fuel rail

- ☐ Renew
- ☐ 25 Nm

#### 11 - Fuel rail

- ☐ Removing and installing ➔ [page 30](#)

## 5.2 Removing and installing high-pressure pump

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### WARNING

*Fuel system operates under high pressure. Always dissipate fuel pressure prior to opening fuel system. For procedure, refer to ➔ [page 4](#)*

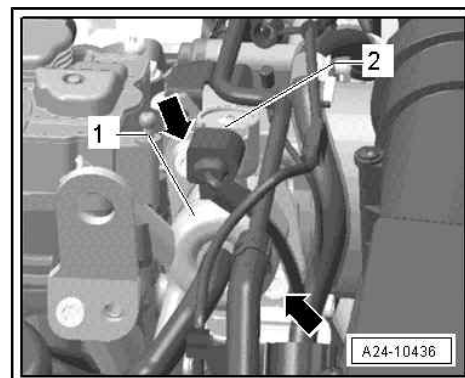


### Note

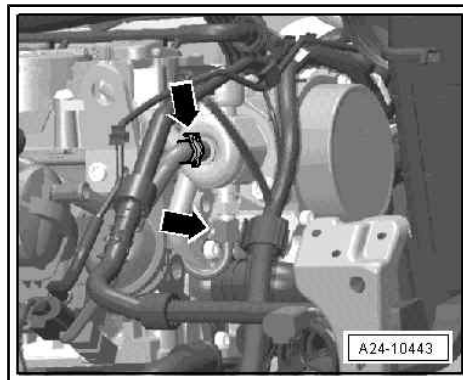
- ◆ *The high-pressure pump must only be removed when the engine is cold.*
- ◆ *When installing the high-pressure fuel pump, it is essential to ensure that no dirt enters the fuel system.*
- ◆ *Use a cloth to catch escaping fuel.*
- ◆ *The O-ring must always be renewed.*
- ◆ *Always ensure that the high-pressure fuel pipes are free of tension when tightening the connections.*

### Removing

- Remove engine cover panel.
- Detach electrical connector -2- from fuel pressure regulating valve -N276- .



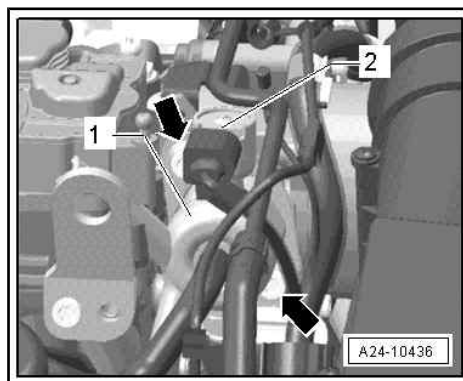
- Disconnect both fuel lines -arrows-.



- Remove 2 bolts -arrows-.
- Carefully pull out high-pressure fuel pump. It is possible that the roller tappet may remain lodged in the vacuum pump.

#### Installing

- Renew O-ring for high-pressure pump.
- Fit roller tappet in vacuum pump (check roller tappet for damage first).



#### Note

- ♦ *The roller tappet must be positioned at the lowest point when installing the high-pressure pump.*
- ♦ *If the old high-pressure pump is re-installed, or if a used pump is installed, the connecting piece on the pump for the fuel supply line must be renewed. Refer to high-pressure pump - exploded view (item 11) ➔ [page 32](#) .*

- Turn crankshaft until roller tappet is positioned at lowest point.
- Fit high-pressure pump in vacuum pump and secure in position.
- Tighten bolts hand-tight.
- Renew connecting piece at high-pressure pump.

- Tightening torque: refer to exploded view of high-pressure pump ➔ [page 32](#) .

- Now tighten bolts in diagonal sequence to specified torque, refer to high-pressure pump - exploded view ➔ [page 32](#) .
- 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): Intake manifold - exploded view ➔ [page 24](#) .

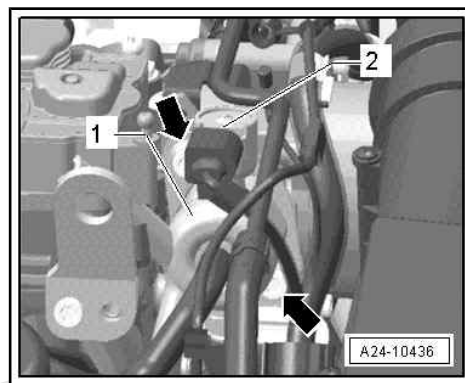
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- Re-attach electrical connector -2- for fuel pressure regulating valve -N276- .
- Put back fuse if it has been removed.



**Note**

*Check fuel system for leaks.*



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## 6 Injectors

### 6.1 Removing and installing injectors

#### Special tools and workshop equipment required

- ◆ Tool kit with puller -T10133-



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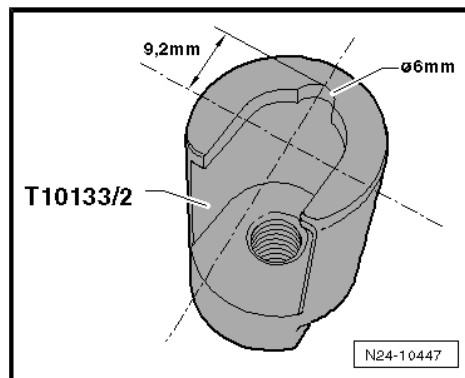


#### Note

*Puller T10133/2 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 puller T10133/2 to make it equivalent to puller T10133/2 A

- 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.



#### Special tools and workshop equipment required

- ◆ Round file, approx. 6 mm

#### Removing

- Remove engine cover panel ➤ [page 19](#) .
- Remove intake manifold and fuel rail ➤ [page 26](#) .

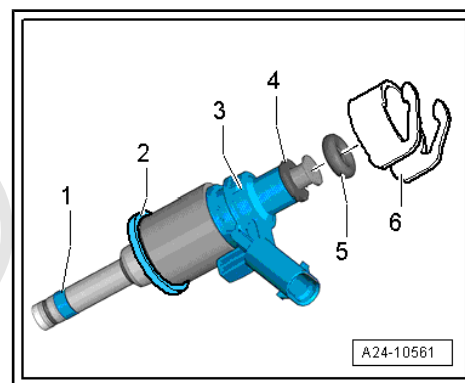
#### Removing injectors (from fuel rail)

Carefully pull injectors out of fuel rail.

## Removing injectors (from cylinder head)

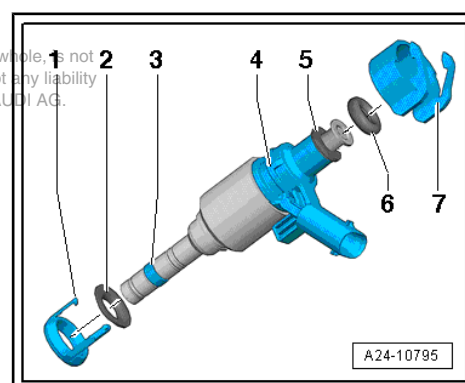
### Injector (old version)

- 1 - Combustion chamber ring seal (teflon ring seal) - renew; when fitting, do not grease ring or use any other lubricant
- 2 - Support ring is replaced by intermediate ring; see next illustration ➔ [page 37](#)
- 3 - 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, the fuel rail exerts the force which holds the injector in the cylinder head)



### Injector (new version)

- 1 - Intermediate ring (renew)
- 2 - Retainer
- 3 - Combustion chamber ring seal (teflon ring seal) - renew; when fitting, do not grease ring or use any other lubricant
- 4 - Injector
- 5 - Spacer ring (renew if damaged)
- 6 - O-ring (renew; apply thin coating of clean engine oil prior to installation)
- 7 - Support ring (via this support ring, fuel rail exerts force which secures injector in cylinder head)

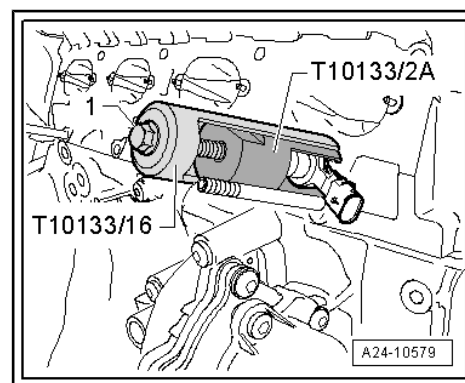


- Cover open inlet ports with a clean cloth.
- Unplug electrical connector at injector that is to be removed.
- Guide puller -T10133/2A- into groove on injector.
- Then attach removal tool -T10133/16- and pull out injector by turning bolt -1-.



#### Note

*The combustion chamber ring seal must always be renewed before the injector is re-installed ➔ [page 37](#).*



## 6.1.1 Renewing combustion chamber ring seal (teflon ring seal)



#### Note

*The combustion chamber ring seal must always be renewed before the injector is re-installed.*

- 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 en-

sure 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.

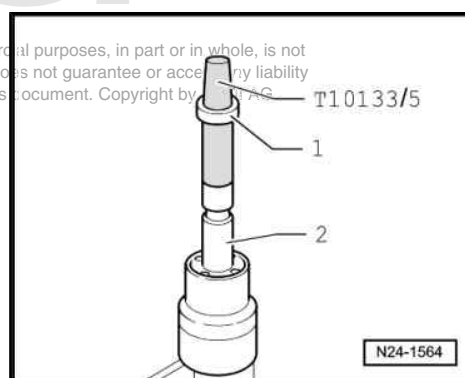


#### Note

*The illustration shows an injector with „offset connector“.*

- Fit assembly cone -T10133/5- with new teflon ring -1- onto in-  
jector -2-.

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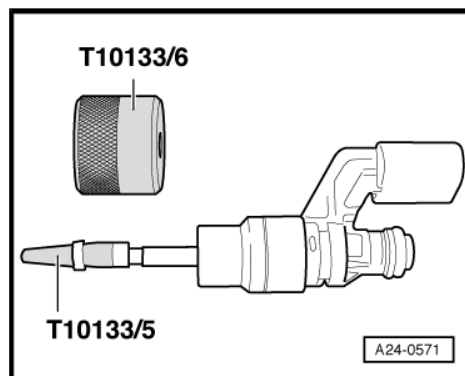


- Use assembly sleeve -T10133/6- to press teflon ring further onto assembly cone -T10133/5- until it seats in groove. Do not use any lubricants during this procedure.



#### Note

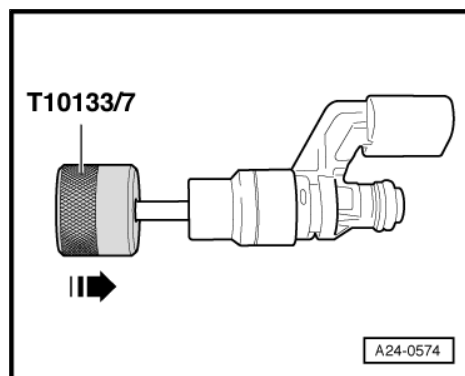
- ◆ *The teflon ring is widened as it is pushed onto the injector. The teflon ring must therefore be compressed again after it has been fitted.*
- ◆ *The procedure is divided into two steps and is described below.*



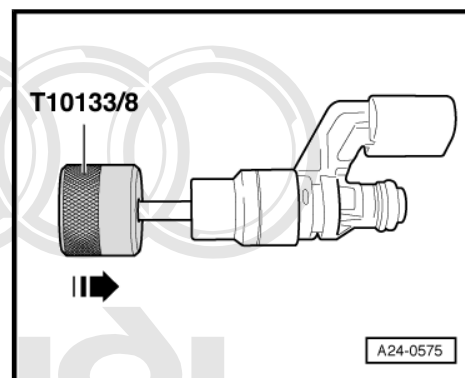
Step 1 of teflon ring calibration is performed with calibration sleeve -T10133/7- .

- 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 calibration is performed 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.

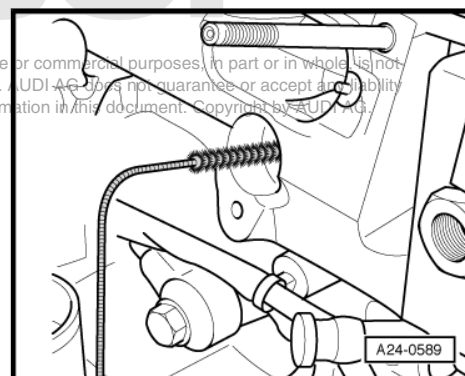


- Use supplied nylon brush -T10133/4- to thoroughly clean holes for injectors in cylinder head prior to installing injectors.



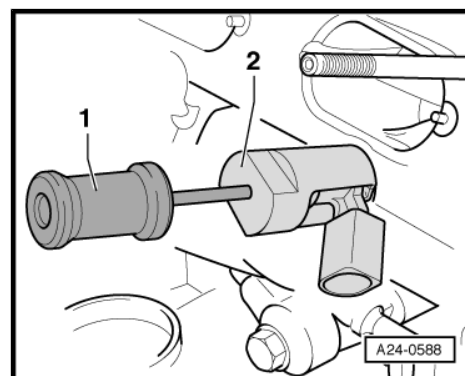
#### Note

- ◆ *The teflon seal on the injector must not be oiled or greased.*
- ◆ *Make sure that there is no cleaning fluid or oil in the holes in the cylinder head when installing the injectors.*
- Push injector by hand as far as it will go into aperture in cylinder head (do not use oil or grease). Ensure that the injector is properly seated in the cylinder head.



#### Note

- ◆ *It should be possible to insert injector easily. If necessary wait until the combustion chamber ring seal has contracted sufficiently.*
- ◆ *Note correct installation position and ensure that injectors are properly seated in cylinder head.*
- ◆ *If the injector cannot be pushed in by hand, use puller -T10133/2A- -2- with striker -T10133/3- to insert the injector.*
- The remaining installation steps are carried out in the reverse sequence.



#### It is important to observe the following points:

- 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 26](#) .

## 6.2 Cleaning injectors

### Special tools and workshop equipment required

- ◆ Ultrasonic cleaning unit -VAS 6418-
- ◆ Mounting plate for injection modules -VAS 6418/1-
- ◆ For cleaning fluid refer to electronic parts catalogue.

### Cleaning

- Remove injectors ➔ [page 36](#) .



## Note

*Observe safety precautions and operating instructions for ultrasonic unit.*

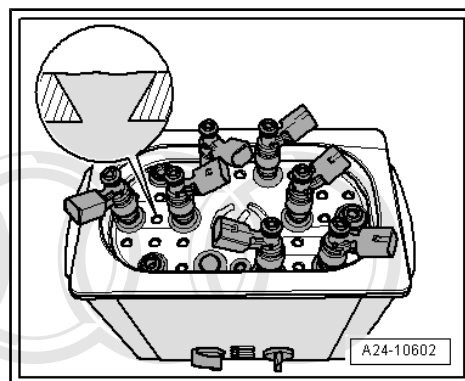
- Ultrasonic unit must be filled with cleaning fluid.



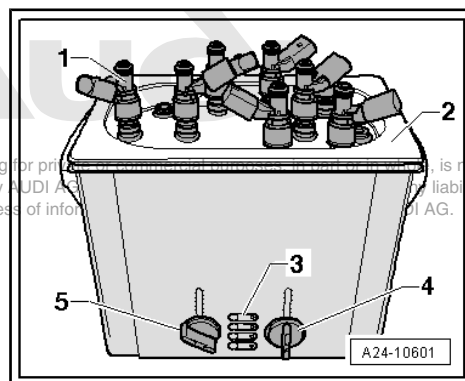
## Note

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

- Insert injectors -1- all the way into mounting plate for injection modules -VAS 6418/1- -2-.



- Immerse injectors together with mounting plate for injection modules -VAS 6418/1- into cleaning fluid.
- 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 has been reached.*

- After cleaning, always renew combustion chamber ring seal (teflon ring seal) for each injector ➔ [page 37](#) .
- Then re-install injectors ➔ [page 36](#) .

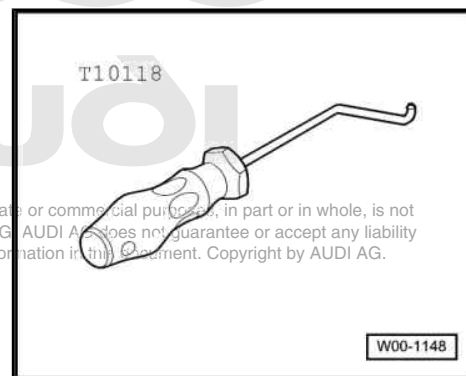
## 7 Components of injection system

### 7.1 Removing and installing fuel pressure sender -G247-

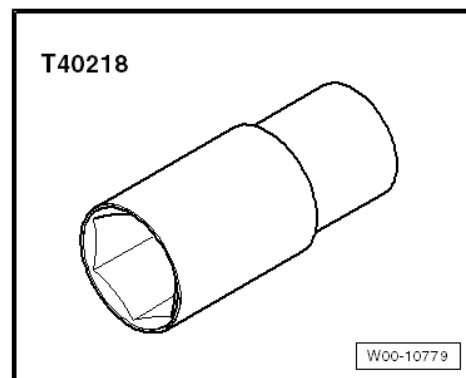
If the fuel pressure sender -G247- fails, the fuel pressure regulating valve -N276- is switched off, the electric fuel pump is fully activated and the engine is operated with the fuel pressure which remains. This will reduce engine torque considerably.

#### Special tools and workshop equipment required

- ◆ Assembly tool -T10118-



- ◆ Bit (27 mm) -T40218- or commercially available socket (27 mm)



#### Removing

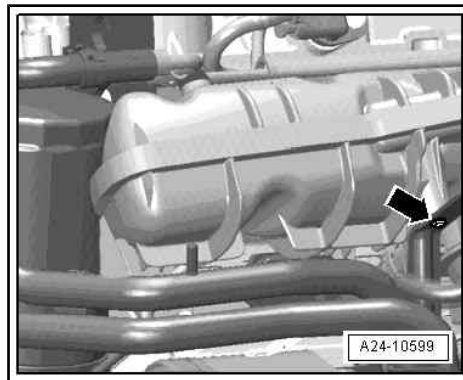
- Carefully pull off engine cover panel.



#### 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](#).*

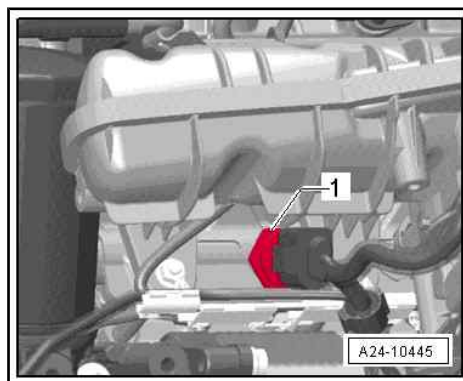
- Remove bolt -arrow- for coolant line from intake manifold.



- Release connector on fuel pressure sender -G247- -1- using assembly tool -T10118- .
- Unscrew fuel pressure sender -G247- -1- using bit, 27mm - T40218- .

#### Installing

- Install in reverse order.
- Make sure that connecting piece is tightened to specified torque before installing fuel pressure sender -G247- .
- Tightening torque for connecting piece: Fuel rail - exploded view ➔ [page 25](#)
- Tightening torque for fuel pressure sender -G247- : Fuel rail - exploded view ➔ [page 25](#)



## 7.2 Checking fuel pressure sender -G247-

#### Special tools and workshop equipment required

- ◆ Pressure sensor tester -VAS 6394-
- ◆ Adapter -VAS 6394/2-
- ◆ Test instrument adapter -VAS 5570-
- ◆ Torque wrench -V.A.G 1331-
- ◆ Vehicle diagnostic tester

#### Procedure:

- 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](#) .*

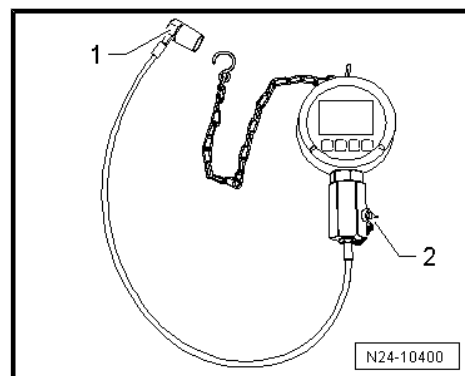
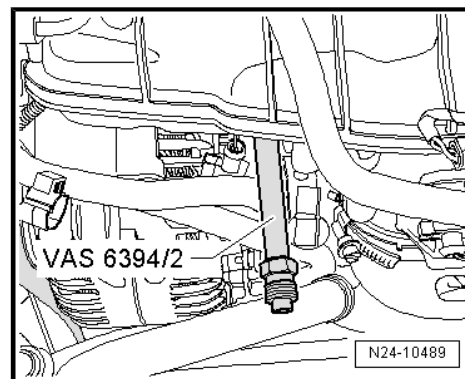
- Remove fuel pressure sender -G247- ➔ [page 41](#) .

- Screw in adapter -VAS 6394/2- in place of fuel pressure sender -G247- and tighten adapter with the same torque as that specified for fuel pressure sender -G247- .
- ◆ Tightening torque: fuel rail - exploded view ➔ [page 25](#)

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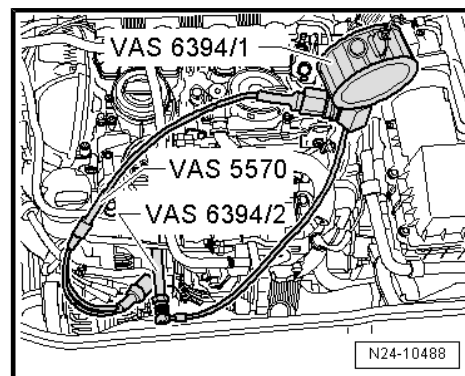
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- Unscrew plug -2- on pressure gauge -VAS 6394/1- and screw removed fuel pressure sender -G247- into opening. Tighten to torque specified for fuel pressure sender.



- Use test instrument adapter -VAS 5570- to make electrical connection between vehicle and fuel pressure sender -G247- .
- Connect a ➔ Vehicle diagnostic tester.
- Switch on ignition.
- Select „Engine electronics“ in vehicle self-diagnosis.
- Then select „Measured values“.
- Select „Fuel pressure“ from the list.

Display zone 3 shows the actual pressure value being transmitted to the engine control unit by the fuel pressure sender -G247- .



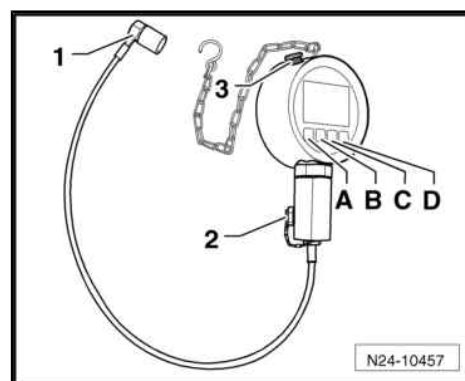
- Switch on pressure gauge -VAS 6394/1- by pressing button -A- once briefly.



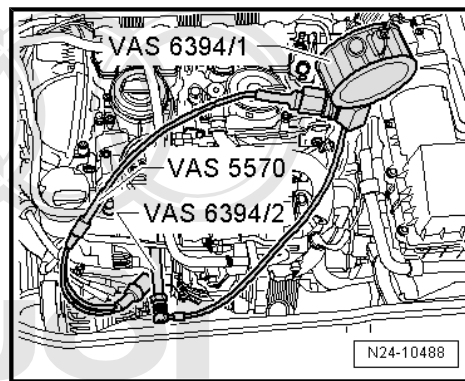
#### Note

*You can press and hold button -A- for 2 seconds to switch on the illumination for 20 seconds.*

Pressure gauge -VAS 6394/1- should indicate 0 bar. If this is not the case, press button -C- once briefly to zero the tester.



- Connect pressure line of pressure gauge -VAS 6394/1- to adapter -VAS 6394/2- .
- Start engine.
- Compare the pressure indicated by pressure gauge -VAS 6394/1- with the actual pressure value on the vehicle diagnosis, testing and information system -VAS 5051B- .
- The pressure readings must not deviate by more than 5 bar.
- If the deviation is more than 5 bar, test a new fuel pressure sender -G247- .



#### 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 .**

- Screw a new fuel pressure sender -G247- into pressure gauge -VAS 6394/1- .
- Repeat the test with the new fuel pressure sender -G247- and compare the two pressure values.

#### If the two values still do not agree:

- Check the electrical connection between the fuel pressure sender -G247- and the engine control unit; refer to ➔ Current flow diagrams, Electrical fault finding and Fitting locations.

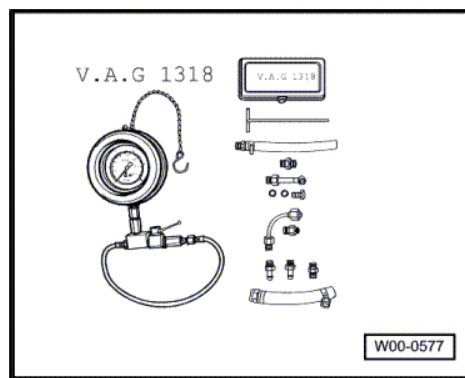
#### If the values agree:

- Install the new fuel pressure sender -G247- ➔ page 41 .

## 7.3 Checking residual pressure in fuel system (up to high-pressure pump)

### Special tools and workshop equipment required

- ♦ K-Jetronic pressure tester -V.A.G 1318-



- ♦ Fuel-resistant measuring container
- ♦ Protective gloves

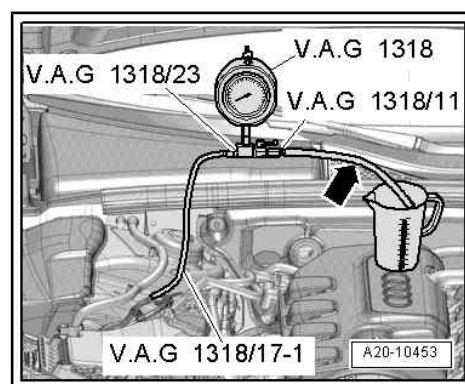
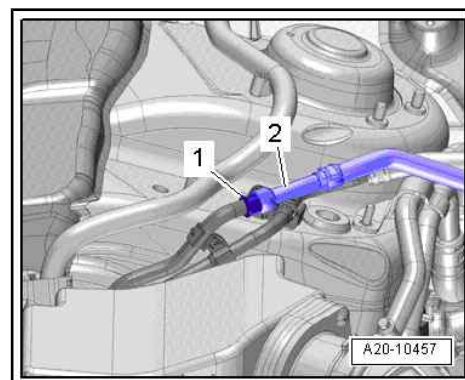
#### Test conditions:

- Battery voltage at least 12.5 V.
- Fuel filter OK.
- Fuel tank at least 1/4 full.
- Fuel pump control unit -J538- OK.

- Ignition off.

### Checking fuel pressure

- Remove rear seat bench ⇒ Rep. gr. 72 .
- Disconnect fuel line -2- by pulling release ring -1-.
- Screw connector -V.A.G 1318/23- and adapter -V.A.G 1318/17-1- onto K-Jetronic pressure tester -V.A.G 1318- .
- Fit adapter -V.A.G 1318/17-1- onto disconnected fuel supply line.
- Screw adapter -V.A.G 1318/11- onto K-Jetronic pressure tester -V.A.G 1318- .
- Fit auxiliary hose -arrow- onto pressure tester and hold it in a container.



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- Close cut-off valve on pressure tester.
- Lever is at right angle to direction of flow -arrow-.
- Connect a vehicle diagnostic tester.
- Select „Engine electronics“ in vehicle self-diagnosis.
- Then select „Final control diagnosis“.
- Select „Fuel pump electronics“ from list and press „start“.



#### Note

*This function activates the fuel pump.*

- Read off fuel pressure on K-Jetronic pressure tester -V.A.G 1318- .
- Specification: 5 to 8 bar
- End this function when fuel pressure stops rising on K-Jetronic pressure tester -V.A.G 1318- .

If specification is not obtained:

**Check fuel delivery rate of individual fuel pumps ➔ Rep. gr. 20 .**

#### Checking residual pressure

- Check system for leaks and check 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 pressure tester and fuel line for leaks.
- ◆ Check pressure tester for leaks.
- ◆ Check fuel lines and their connections for leaks.
- ◆ Check delivery rate of fuel pump ➔ Rep. gr. 20 .
- ◆ Renew fuel filter with integrated fuel pressure regulator ➔ Rep. gr. 20 .
- ◆ Non-return valve of fuel pump is defective ➔ Rep. gr. 20 .

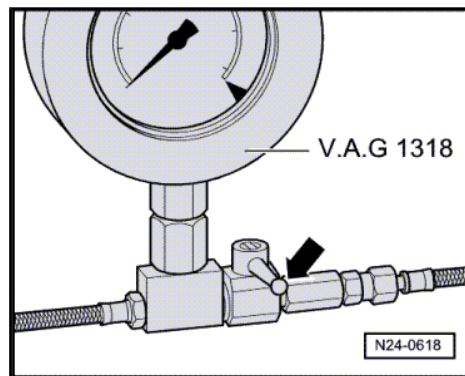
Assembly is carried out in the reverse order; note the following:

- Switch off ignition.



#### Note

*Before removing pressure tester, release fuel pressure by opening cut-off valve. Hold a container under the connection.*

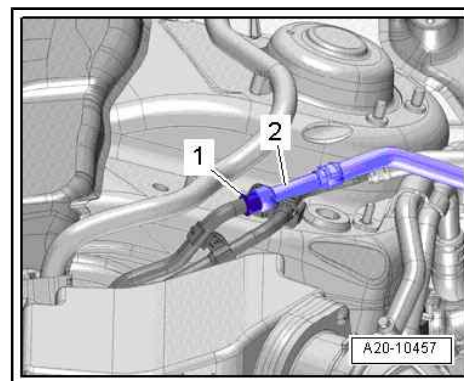


- Reconnect fuel supply line -arrow- (make sure that all parts are clean).



#### Note

Check fuel system for leaks.



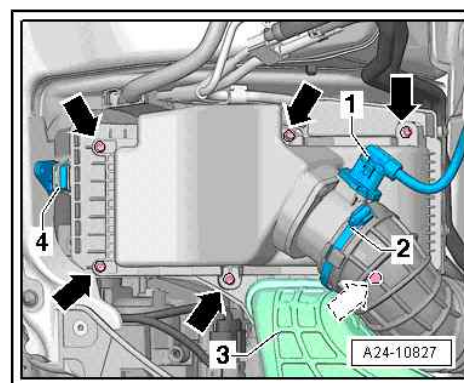
## 7.4 Removing and installing air mass meter -G70-

### Removing

- Unplug electrical connector -1- at air mass meter -G70- .
- Release hose clip securing air hose -2- (going to turbocharger) and disconnect hose from air mass meter -G70- .
- Unscrew both bolts from air mass meter -G70- .
- Then 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 air 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 19](#) .

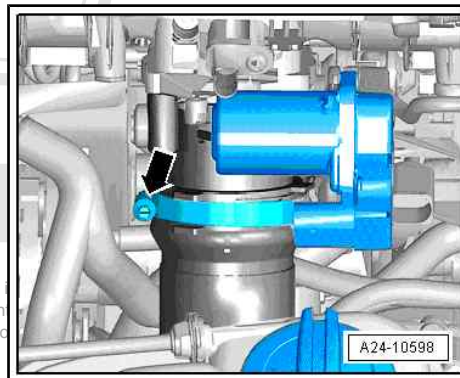
The remaining installation steps are carried out in the reverse sequence.

## 7.5 Removing and installing throttle valve module -J338-

### Removing

- Remove engine cover panel.

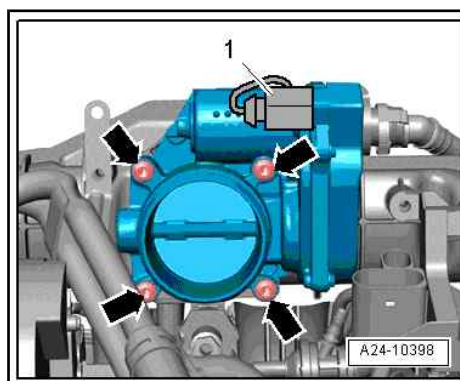
- Open hose clip -arrow- securing air intake hose and disconnect hose downwards from throttle valve module -J338- .
- Unplug electrical connector -1- from throttle valve module -J338- .



- Remove the four bolts -arrows- from throttle valve module -J338- and detach throttle valve module -J338- .

### Installing

- Install in reverse order.
- Clean sealing surface for seal.
- Renew seal.
- Tightening torques: intake manifold - exploded view  
⇒ [page 24](#) .
- After throttle valve module -J338- has been renewed, it must be re-adapted to engine control unit -J623- , see ⇒ Vehicle diagnostic tester „Guided Functions“.



## 7.6 Cleaning throttle valve module -J338-



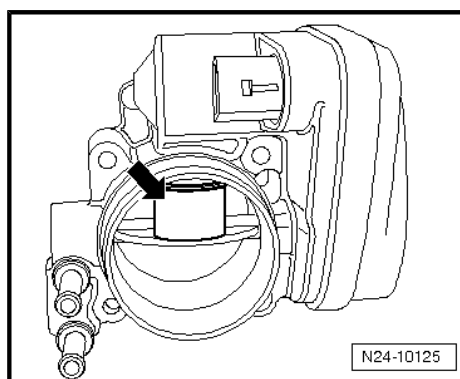
### Note

- ♦ *The throttle valve module must be adapted if a new engine control unit -J623- is installed.*
- ♦ *Take care not to scratch the throttle valve housing when cleaning it.*
- Remove throttle valve module -J338- ⇒ [page 47](#) .
- Open throttle valve by hand and block it in the open position with a suitable object (e.g. plastic or wooden wedge) -arrow-.

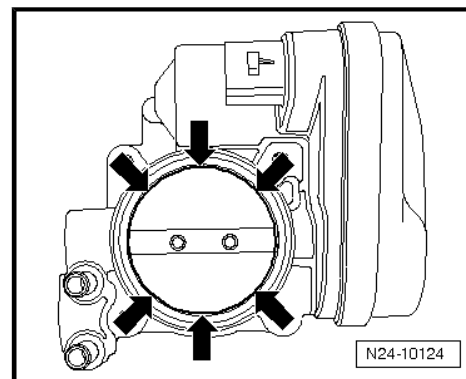


### WARNING

**Acetone is highly flammable. Please observe all accident prevention regulations and safety precautions when handling flammable liquids. Do not use compressed air when cleaning the throttle valve. Wear safety goggles and protective clothing to avoid possible injury and skin contact.**



- Clean throttle valve housing thoroughly, especially around the points -arrows- where the throttle valve closes, using commercially available acetone and a small brush.
- Wipe out throttle valve housing with a lint-free cloth.
- Allow acetone to evaporate completely and re-install throttle valve module after cleaning.
- Erase learnt values and adapt engine control unit -J623- to throttle valve module using a vehicle diagnostic tester.

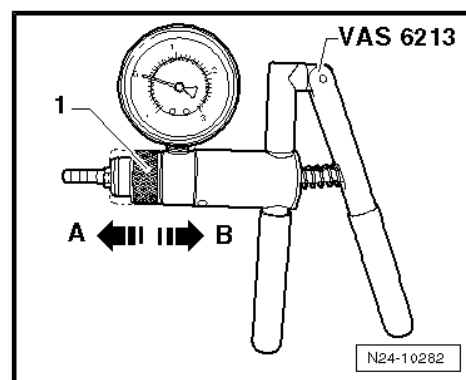


## 7.7 Checking intake manifold change-over function

Only perform this test if there is a loss of engine torque (poor flexibility or lack of pulling power).

### Special tools and workshop equipment required

- ◆ Hand vacuum pump -VAS 6213-



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### Test condition

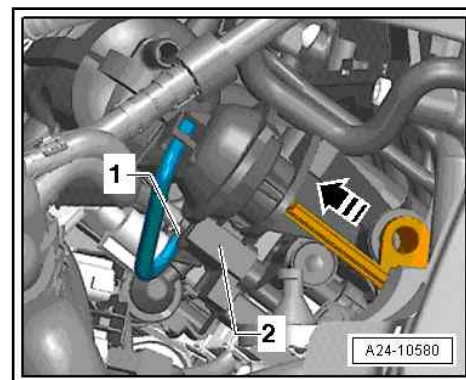
- ◆ Intake manifold flap valve -N316- has been checked with a vehicle diagnostic tester.

Perform the following steps if the intake manifold flap valve -N316- is OK.

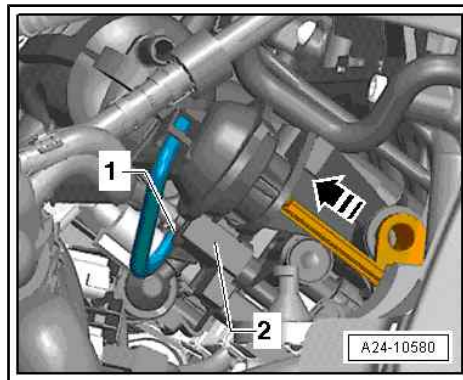
- Carefully pull off engine cover panel.
- Start engine and run at idling speed.
- Have a second mechanic rev up engine quickly (short burst of throttle) and observe vacuum unit for intake manifold change-over.
- The vacuum unit should pick up -arrow-.

If the change-over does not operate as described:

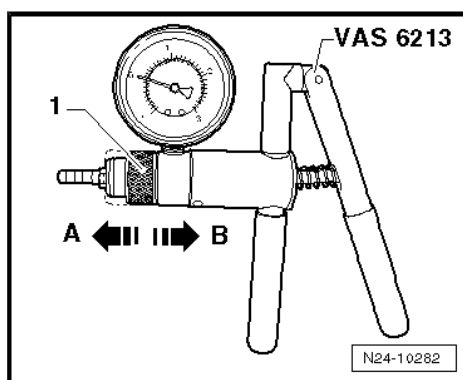
- Check vacuum system for leaks.
- Check that change-over mechanism moves freely by moving linkage manually.
- Check proper connection of vacuum lines.
- Check vacuum hoses for porosity.



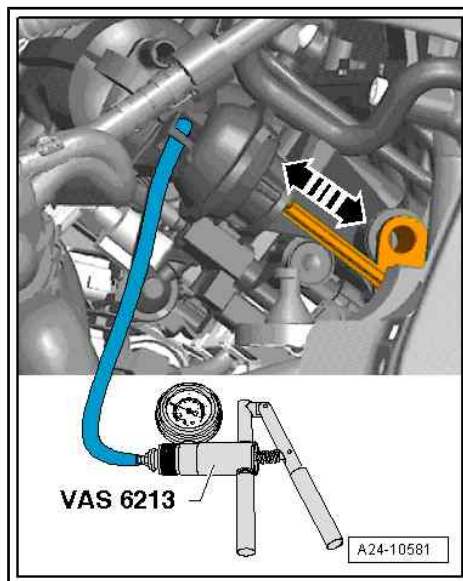
- Detach vacuum hose -1- from intake manifold flap valve -N316- -2-.



- Move adjuster ring -1- on hand vacuum pump -VAS 6213- to position -A- to select "vacuum".



- Connect hand vacuum pump -VAS 6213- to vacuum unit for intake manifold flap valve -N316- .
- Operate the hand vacuum pump -VAS 6213- several times. Linkage should move in both directions (arrows).
- If vacuum unit does not move, renew vacuum unit.



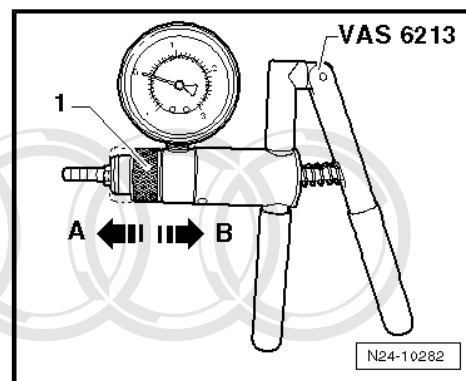
## 7.8 Checking dual non-return valve

Special tools and workshop equipment required



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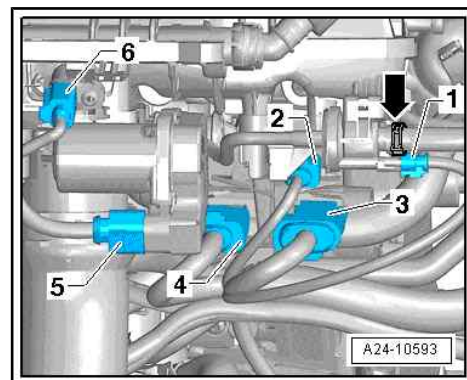
◆ Hand vacuum pump -VAS 6213-



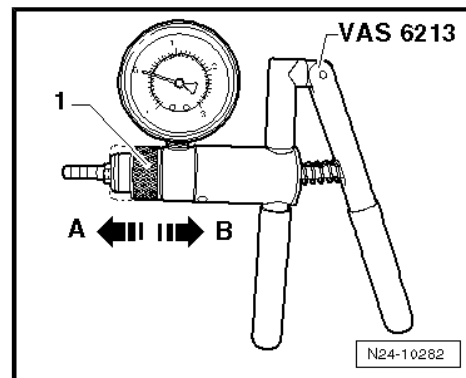
◆ Auxiliary measuring set -V.A.G 1594C-

**Test condition**

- Activated charcoal filter solenoid valve 1 -N80- has been checked with a vehicle diagnostic tester and is OK.
- Carefully pull off engine cover panel.
- Unplug connector -1- and detach breather hose -arrow- from activated charcoal filter solenoid valve 1 -N80- .



- Move adjuster ring -1- on hand vacuum pump -VAS 6213- to position -A- to select "vacuum".



- Connect hand vacuum pump -VAS 6213- to activated charcoal filter solenoid valve 1 -N80- .
- Connect contacts of activated charcoal filter solenoid valve 1 -N80- -1- to battery using test leads. This will open activated charcoal filter solenoid valve 1 -N80- .

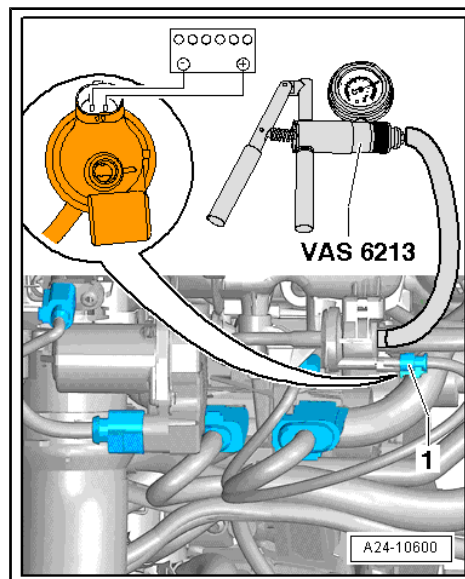
Then immediately operate hand vacuum pump -VAS 6213- several times.

- Vacuum is built up.
- Again disconnect battery to cut off current supply.

If vacuum does not build up:

- Renew dual non-return valve -1-.

Dual non-return valve, activated charcoal filter solenoid valve 1 -N80- and plastic hoses are combined as one unit and can only be renewed together.



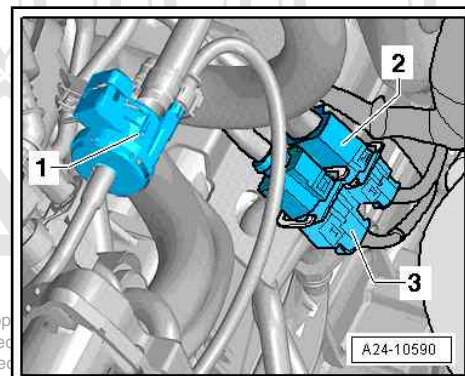
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## 8 Lambda probes

### 8.1 Lambda probes - overview

#### Electrical connectors for Lambda probes

- 1 - Activated charcoal filter solenoid valve 1 -N80-
- 2 - Lambda probe after catalytic converter -G130- and Lambda probe heater 1 after catalytic converter -Z29-
- 3 - Lambda probe -G39- and Lambda probe heater -Z19-



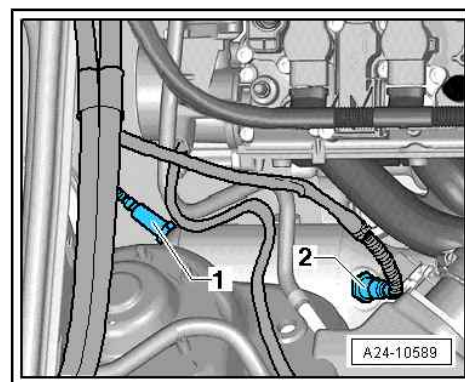
#### Lambda probes

- 1 - Lambda probe after catalytic converter -G130- and Lambda probe heater 1 after catalytic converter -Z29-
- 2 - Lambda probe -G39- and Lambda probe heater -Z19-
- Tightening torque: 55 Nm



#### Note

- ◆ *New Lambda probes are coated with an assembly paste. The paste must not get into the slots on the Lambda 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 Lambda probe body. High-temperature paste → Parts catalogue*
- ◆ *When installing, it is important to re-attach the Lambda probe wiring at the same locations to prevent it from coming into contact with the exhaust pipe.*



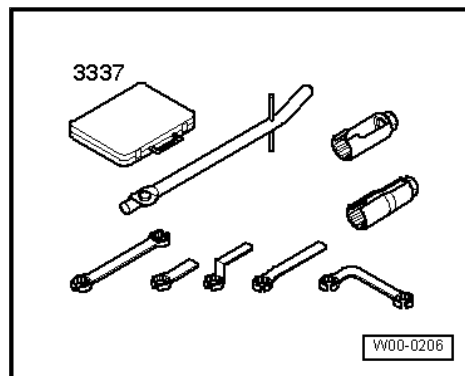
Removing and installing Lambda probe -G39- and Lambda probe heater -Z19- ➔ [„8.1 Lambda probes - overview“, page 53](#) .

Removing and installing Lambda probe after catalytic converter -G130- and Lambda probe 1 heater after catalytic converter -Z29- ➔ [„8.3 Removing and installing Lambda probe after catalytic converter G130 and Lambda probe 1 heater after catalytic converter Z29“, page 54](#)

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

Special tools and workshop equipment required

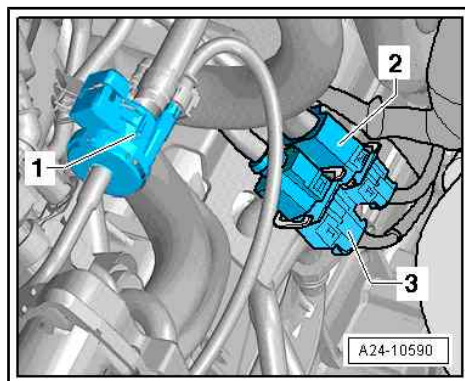
◆ Lambda probe open ring spanner set -3337-



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## Removing

- Unplug electrical connector -3- for Lambda probe -G39- and Lambda probe heater -Z19- .



- Unscrew Lambda probe -G39- -2- using tool from Lambda probe open ring spanner set -3337- .

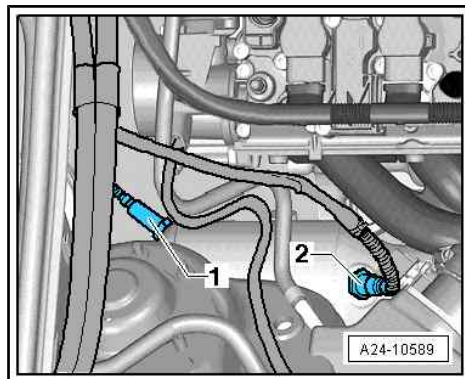
## Installing

When installing, note the following:



### Note

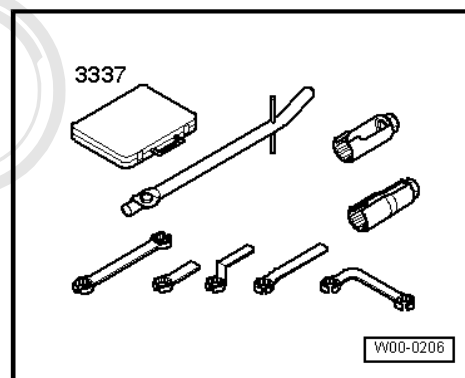
- ◆ *New Lambda probes are coated with an assembly paste. The paste must not get into the slots on the Lambda probe body.*
- ◆ *In the case of a used Lambda probe grease only the thread with high-temperature paste. The paste must not get into the slots on the Lambda probe body. High-temperature paste → Parts catalogue*
- ◆ *When installing, it is important to re-attach the Lambda probe wiring at the same locations to prevent it from coming into contact with the exhaust pipe.*
- Tightening torque: refer to overview of Lambda probes  
⇒ [page 53](#) .



## 8.3 Removing and installing Lambda probe after catalytic converter -G130- and Lambda probe 1 heater after catalytic converter -Z29-

Special tools and workshop equipment required

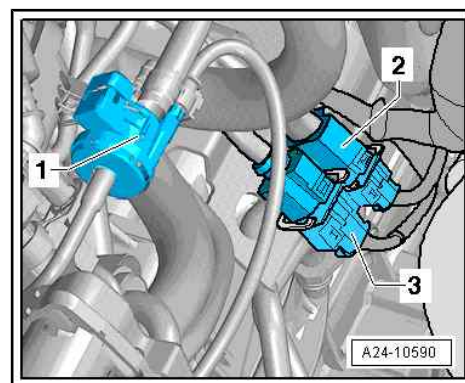
- ◆ Lambda probe open ring spanner set -3337-



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## Removing

- Unplug electrical connector -2- for Lambda probe after catalytic converter -G130- and Lambda probe 1 heater after catalytic converter -Z29- .



- Unscrew Lambda probe after catalytic converter -G130- -1- using tool from Lambda probe open ring spanner set -3337- .

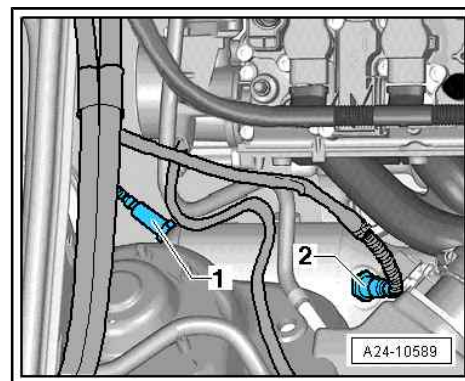
## Installing

When installing, note the following:



### Note

- ◆ *New Lambda probes are coated with an assembly paste. The paste must not get into the slots on the Lambda 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 Lambda probe body. High-temperature paste ⇒ Parts catalogue*
- ◆ *When installing, it is important to re-attach the Lambda probe wiring at the same locations to prevent it from coming into contact with the exhaust pipe.*
- Tightening torque: refer to overview of Lambda probes  
 ⇒ [page 53](#) .

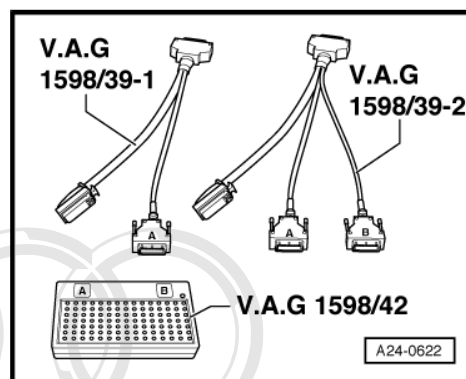


## 9 Engine control unit

### 9.1 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-



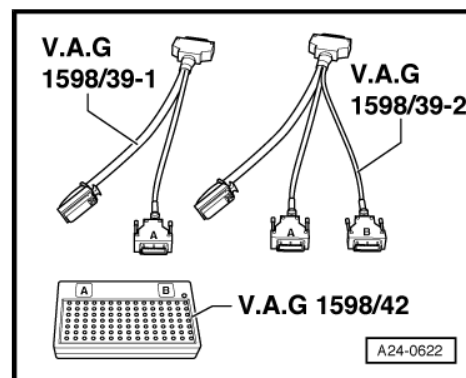
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## Note

- ◆ The test box has 105 sockets. 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 cable -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 cable -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.

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## WARNING

**To prevent irreparable 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 58](#) .
- Connect test box -V.A.G 1598/42- to wiring harness with adapter cable -V.A.G 1598/39-1- or adapter cable -V.A.G 1598/39-2- . Connect earth clip of test box to negative terminal of battery. 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.

The procedure required after connecting the new engine control unit is described in the Guided Fault Finding or Guided Functions.



#### Note

After completion of the Guided Fault Finding routine, the tester will attempt to erase the event memories of all control units. If this is not successful, the remaining faults registered in the memories must be rectified until all faults can be erased.

## 9.2 Renewing engine control unit -J623-

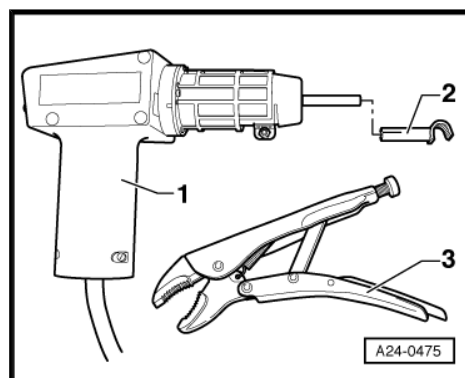


#### Note

Not every engine control unit is bolted to a protective housing. Whether a protective housing is fitted depends on the engine/gearbox combination.

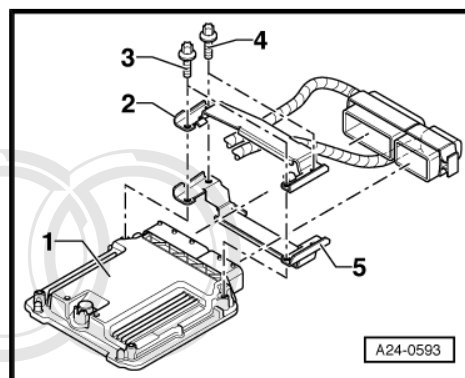
#### Special tools and workshop equipment required

- ◆ Hot air blower -VAS 1978/14A- -item 1- with nozzle attachment -2- from wiring harness repair set -VAS 1978 B-
- ◆ Small, commercially available mole grips -3-



#### Note

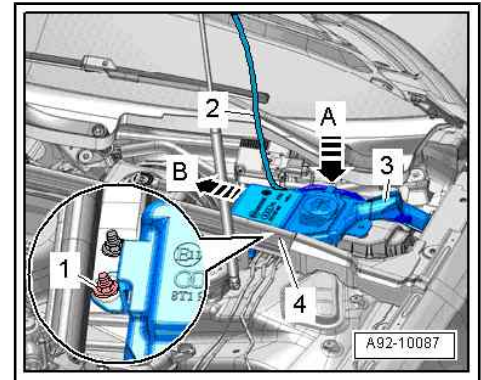
- ◆ The engine control unit -1- is bolted to a protective casing -2 and 5-. To make it more difficult to unscrew the shear bolts -4- for locking plate -2-, their threads have been coated with locking fluid.
- ◆ The metal housing has to be removed before the connectors can be unplugged from the engine control unit (e.g. to connect the test box or renew the engine control unit).



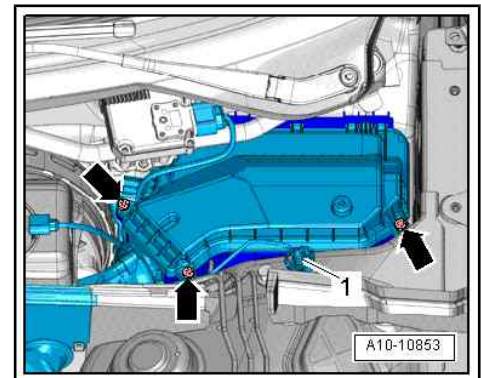
#### Removing

- When renewing engine control unit, select diagnosis object „Replace engine control unit“ in „Guided Functions“.
- Switch off ignition and remove ignition key.

- Slightly pull off rubber seal in front of nut -1- on plenum chamber cover.
- Unhook wiring harness -2- from retainers -A-.
- Remove nut -1-.
- Pull filler neck -3- with filler pipe out of washer fluid reservoir and through opening in body.

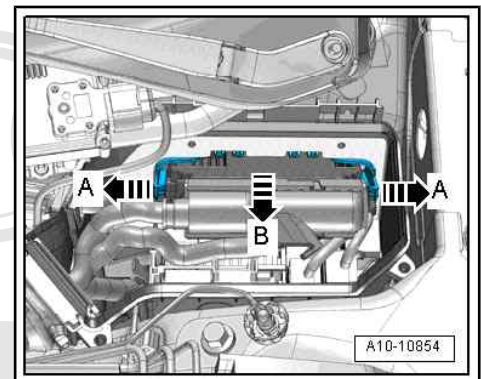


- Unscrew bolts -arrows- and take off cover for electronics box.



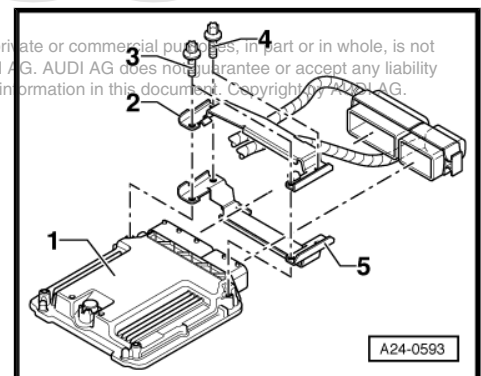
- Release retainers -arrows A- and pull out engine control unit -J623- -arrow B-.

Perform the following work steps if a protective housing is fitted:

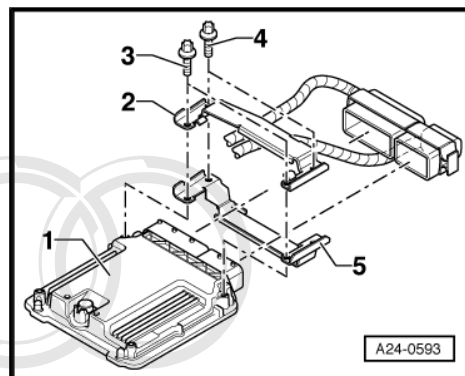


To help prevent unauthorised access to the connectors on the engine control unit, the engine control unit -1- is bolted to a protective housing -5- by means of shear bolts -3 and 4- and a locking plate -2-.

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 two 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.



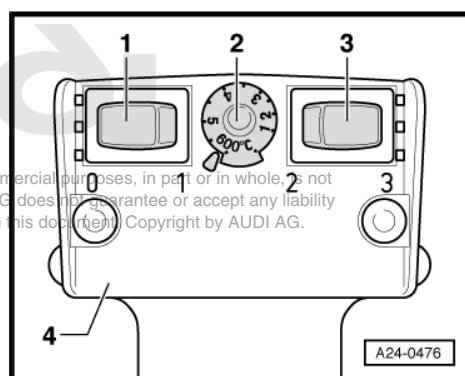
- Select settings on hot air blower as shown in illustration, i.e. set temperature potentiometer -2- to maximum heat output and two-stage air flow switch -3- to position 3.



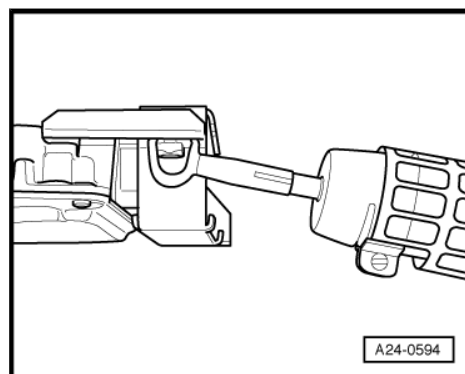
### WARNING

**The shear bolts and protective housing also become very hot when heating the threads of the locking mechanism. 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.**

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- Apply heat to the threads of the shear bolts on the connector side for approx. 25 to 30 seconds.
- Unscrew shear bolts using mole grips (see arrow in illustration).



- The two shear bolts screwed into the engine control unit do not need to be heated. They should be removed without being heated.
- Detach protective housing from control unit connectors.
- Release connectors on engine control unit and unplug connectors.
- Take out old engine control unit -J623- and install new engine control unit -J623- .

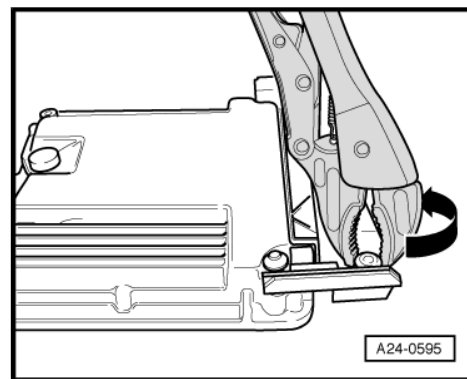
### Installing

Installation is performed in the reverse sequence.

- After installation, the protective housing 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.
- Tightening torque for bolts securing cover of electronics box: 3.5 Nm.

**After installing a new engine control unit, the following operation must be performed:**

- Activate engine control unit via a vehicle diagnostic tester in „Guided Functions“ mode, „Replace engine control unit“.



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## 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 event 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 immobilizer disabling the engine control unit. The event 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.*

*Persons sitting in the front passenger's seat could be injured if the airbag is triggered in an accident.*

- *The use of test equipment while driving causes distraction.*
- *There is an increased risk of injury if test equipment is not secured.*
- ◆ *Test equipment must always be secured on the rear seat with a strap and operated from the rear seat by a second person.*

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

- ◆ Do not touch or disconnect ignition wiring when the engine is running or being turned at starter speed.
- ◆ The ignition must be switched off before disconnecting or connecting ignition system wiring, 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 event memory.
- ◆ Always switch off the ignition before cleaning the engine.

## 2 Servicing ignition system

### 2.1 Test data

| Engine data                                                                               | 1.8 ltr. turbo FSI engine                                                                                                                                                                                                   |
|-------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Idling speed<br>is not adjustable; controlled by the idling speed<br>stabilisation        | 640...800 rpm                                                                                                                                                                                                               |
| Engine speed limiter (deactivates injectors/closes<br>throttle valve)                     | approx. 6,500 rpm                                                                                                                                                                                                           |
| Ignition timing is determined by the control unit.<br>Ignition timing cannot be adjusted. |                                                                                                                                                                                                                             |
| Ignition system                                                                           | Multi-coil ignition system with 4 ignition coils (integrated<br>output stages) connected directly to spark plugs via<br>spark plug connectors; ignition coils can be pulled out of<br>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
- ☐ Removing and installing  
⇒ [page 65](#)

#### 2 - Ignition coil with output stage

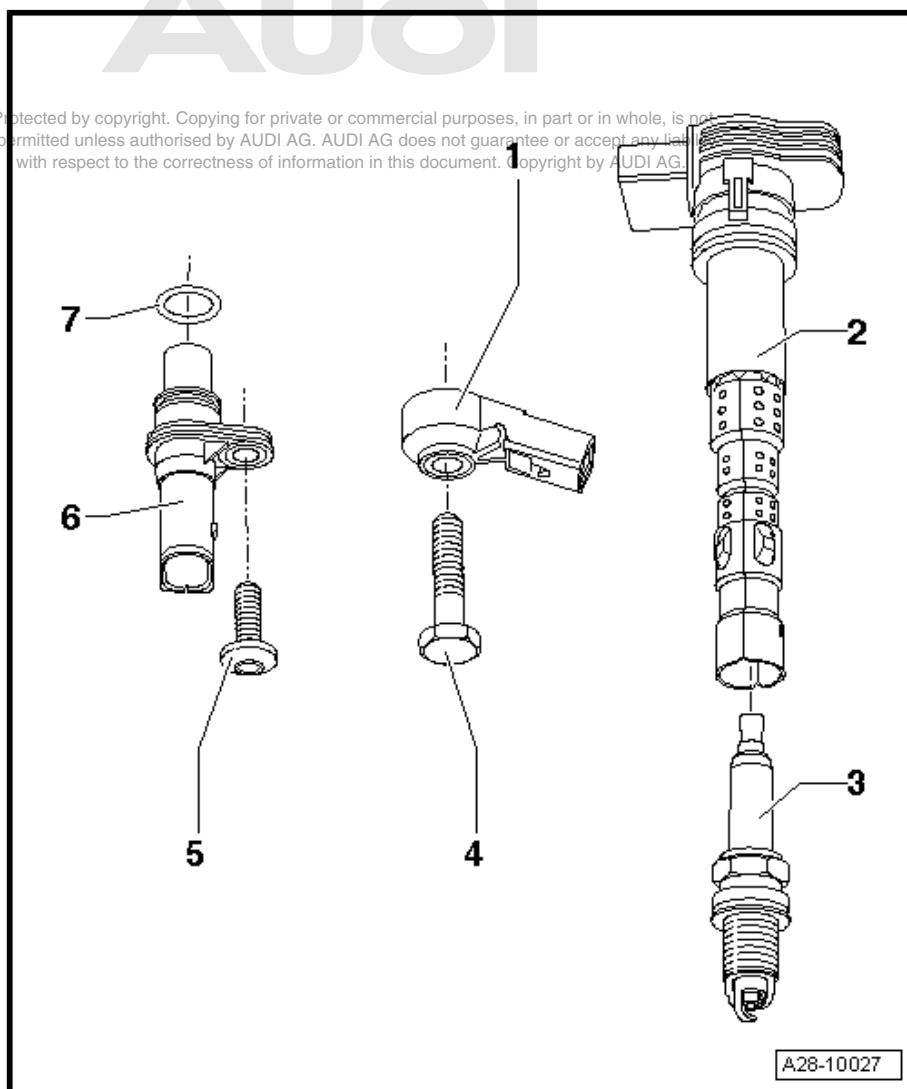
- ☐ Ignition coil 1 with output stage -N70-
- ☐ Ignition coil 2 with output stage -N127-
- ☐ Ignition coil 3 with output stage -N291-
- ☐ Ignition coil 4 with output stage -N292-
- ☐ Removing and installing  
⇒ [page 64](#)
- ☐ Use puller -T40039- for removal

#### 3 - Spark plug

- ☐ 30 Nm
- ☐ Removing and installing; A4 ⇒ Maintenance ; Booklet 812 , A5 ⇒ Maintenance ; Booklet 811 , A5 Cabriolet ⇒ Maintenance ; Booklet 818

#### 4 - Bolt

- ☐ Renew
- ☐ 20 Nm
- ☐ Tightening torque influences functions of knock sensor



## 5 - Bolt

- ☐ Renew
- ☐ 10 Nm

## 6 - Hall sender -G40-

- ☐ Contacts gold-plated

## 7 - O-ring

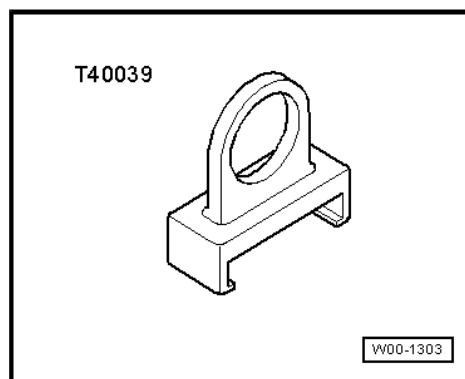
- ☐ Renew O-Ring if damaged

## 2.3 Removing and installing ignition coils with output stages

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### Special tools and workshop equipment required

- ◆ Puller -T40039-

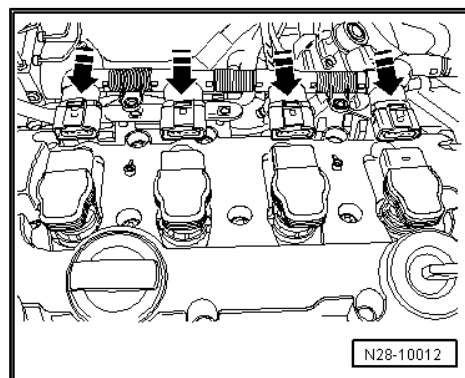
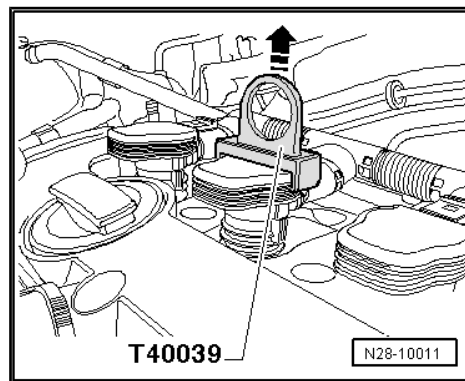


### Removing:

- Remove engine cover.
- Unscrew two bolts 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 any tools).



## 2.4 Removing knock sensor 1 -G61-

### Removing

- Unplug electrical connector -2- at knock sensor 1 -G61- .
- Remove coolant pump with thermostat ⇒ Engine, mechanics; Rep. gr. 19 .



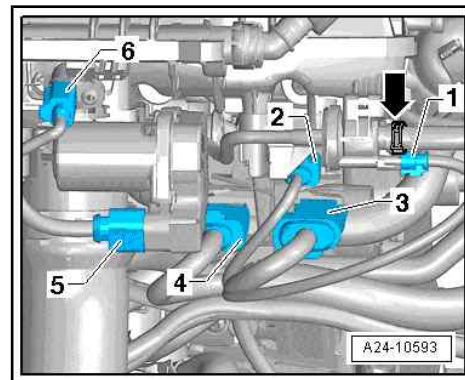
### Note

*Knock sensor 1 -G61- is located below the intake manifold and behind the coolant pump.*

- Unscrew knock sensor 1 -G61- .

### Installing

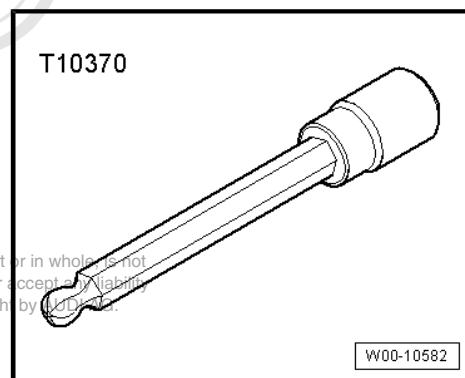
- Install in reverse order.
- Tightening torque: refer to exploded view of ignition system  
⇒ [page 63](#) .



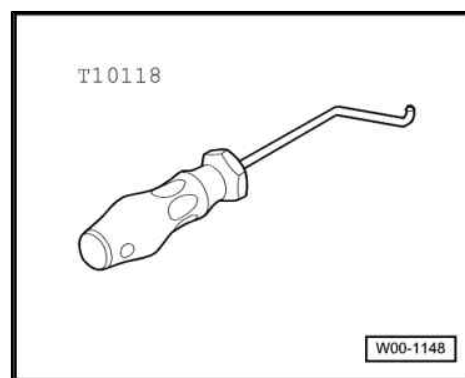
## 2.5 Removing and installing engine speed sender -G28-

### Special tools and workshop equipment required

- ◆ Socket (4 mm) -T10370-



- ◆ Assembly tool -T10118-



### Removing

- Unplug electrical connector at engine speed sender -G28- -2- using assembly tool -T10118- .

**Note**

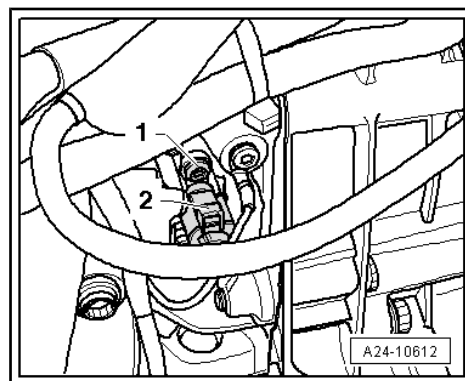
*To release electrical connector without assembly tool -T10118-, press connector on engine speed sender in with a screwdriver and at the same time lift release tab with a thin wire hook.*

- Unscrew securing bolt -1- using assembly tool -T10118- .

**Installing**

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

- Tightening torque: refer to overview of fitting locations  
⇒ [page 8](#) .



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