

## Workshop Manual

### Audi A3 2004 ➤

### Audi A3 Sportback 2005 ➤

**TDI injection and glow plug system (4-cyl. 2.0 ltr. unit injector, 4-valve)**

|           |     |     |     |     |  |  |  |  |  |
|-----------|-----|-----|-----|-----|--|--|--|--|--|
| Engine ID | BKD | BMN | BUY | AZV |  |  |  |  |  |
|-----------|-----|-----|-----|-----|--|--|--|--|--|

Edition 02.2015



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## List of Workshop Manual Repair Groups

### Repair Group

23 - Mixture preparation - injection

28 - Glow plug system



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

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Audi A3 2004 ► , Audi A3 Sportback 2005 ►

**Audi** TDI injection and glow plug system (4-cyl. 2.0 ltr. unit injector, 4-valve) - Edition 02.2015

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## 23 – Mixture preparation - injection

### 1 Servicing diesel direct injection system

(ARL004171; Edition 02.2015)

#### 1.1 Safety precautions when working on the fuel supply system

When working on the fuel system note the following warnings:



##### WARNING

***Risk of injury - fuel system operates under pressure.***

- ◆ ***Wrap a clean cloth around the connection before opening the fuel system. Then release pressure by carefully loosening the connection.***

- ◆ ***Wear protective gloves.***

- ◆ ***Wear safety goggles.***

***The fuel can become extremely hot. This can cause injuries.***

- ◆ ***In extreme cases the temperature of the fuel lines and the fuel can be up to 100 °C after the engine is switched off. Allow the fuel to cool down before disconnecting the lines - danger of scalding.***

- ◆ ***Wear protective gloves.***

- ◆ ***Wear safety goggles.***

Observe the following points to prevent personal injuries and damage to the injection and glow plug system:

- ◆ Persons wearing a cardiac pacemaker must at all times maintain a safe distance from high-voltage components such as injectors and gas-discharge headlights.
- ◆ Always switch off the ignition before connecting or disconnecting tester cables or electrical wiring for the injection or glow plug system.
- ◆ Do not open any fuel line connections while the engine is running.
- ◆ Always switch off ignition before washing engine.
- ◆ Erase any entries in event memory resulting from repairs  
⇒ Vehicle diagnostic tester, Guided Functions, then In-  
terrogate event memory.



##### Caution

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

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

- ◆ ***Always switch off the ignition before disconnecting the battery ⇒ Electrical system; Rep. gr. 27 ; Battery; Disconnecting and connecting battery .***

## 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.*

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## 1.3 Safety precautions when working on the cooling system

When working on the cooling system note the following warnings:



### WARNING

*Hot steam/hot coolant can escape - risk of scalding.*

- ◆ *The cooling system is under pressure when the engine is hot.*
- ◆ *To allow pressure to dissipate, cover filler cap on coolant expansion tank with cloth and open carefully.*



### Caution

*Overheating can occur if the filler cap is not fitted properly.*

- ◆ *The filler cap must engage positively and audibly when it is closed.*

## 1.4 Safety precautions when working on the exhaust system



### WARNING

*Please note the following warnings when working on all parts of the exhaust system:*

- ◆ *Wear gloves (e.g. rubber, not textile) and safety goggles to avoid contact with eyes and skin - risk of injury.*
- ◆ *Do not dismantle exhaust gas temperature sender - risk of injury.*



#### Caution

**Avoid damage to flexible joint.**

- ◆ **Do not bend flexible joint more than 10°.**
- ◆ **Install flexible joint so that it is not under tension.**
- ◆ **Take care not to damage wire mesh on flexible joint.**

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## 1.5 Rules for cleanliness

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

- ◆ Carefully clean connection points and the surrounding area with engine cleaner or brake cleaner and dry thoroughly before opening.
- ◆ Immediately seal open lines and connections with clean plugs, for example from engine bung set - VAS 6122- .
- ◆ Do not remove sealing caps from components until immediately prior to installation. Keep components that are to be re-used in new, sealable plastic bags.
- ◆ Place parts that have been removed on a clean surface and cover them over. Do not use fluffy cloths.
- ◆ Carefully cover or seal open components if repairs cannot be carried out immediately.
- ◆ Only install clean components; replacement parts should only be unpacked immediately prior to installation. Do not use parts that have not been stored in the proper packaging (e.g. in tool boxes etc.).
- ◆ When the system is open: Do not work with compressed air. Do not move the vehicle unless absolutely necessary.
- ◆ Make sure that no fuel runs onto the fuel hoses. Should this occur, the fuel hoses must be cleaned again immediately.
- ◆ Also ensure that no diesel fuel comes into contact with the coolant hoses. Should this occur, the hoses must be cleaned immediately. Damaged hoses must be renewed.
- ◆ Protect unplugged electrical connectors against dirt and moisture and make sure connections are dry when attaching.

## 1.6 Installing radiators and condensers

Even when the radiator, condenser and charge air cooler are correctly installed, slight impressions may be visible on the fins of these components. This does not mean that the components are damaged. If the fins are only very slightly distorted, this does not justify renewal of the radiator, charge air cooler or condenser.

## 1.7 Overview of fitting locations (AZV, BKD)



#### Note

*Some components are located beneath the engine cover panel. For removal refer to version 1 ➔ [page 5](#) and version 2 ➔ [page 6](#).*

## 1 - Unit injectors and glow plugs

- ☐ Unit injector solenoid valve, No. 1 cyl. - N240-
- ☐ Unit injector solenoid valve, No. 2 cyl. - N241-
- ☐ Unit injector solenoid valve, No. 3 cyl. - N242-
- ☐ Unit injector solenoid valve, No. 4 cyl. - N243-
- ☐ Removing and installing unit injectors  
⇒ [page 33](#)
- ☐ Glow plug 1 - Q10-
- ☐ Glow plug 2 - Q11-
- ☐ Glow plug 3 - Q12-
- ☐ Glow plug 4 - Q13-
- ☐ Removing and installing glow plugs ⇒ [page 52](#)

## 2 - Engine control unit

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

## 3 - Changeover flap for exhaust gas recirculation

## 4 - Multi-pin connector

- ☐ For unit injectors and glow plugs

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- ☐ Fitting location  
⇒ [page 6](#)

## 5 - Solenoid valve block

- ☐ With exhaust gas recirculation valve - N18-
- ☐ With exhaust gas recirculation cooler change-over valve - N345-
- ☐ Fitting location ⇒ [page 6](#)

## 6 - Exhaust emissions warning lamp - K83-

- ☐ In instrument cluster

## 7 - Accelerator position sender - G79- with accelerator position sender 2 - G185-

- ☐ Fitting location ⇒ [page 6](#)
- ☐ Removing and installing ⇒ Rep. gr. 20

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

- ☐ Fitting location:

Vehicles up to approx. 11.2005 ⇒ [page 7](#)

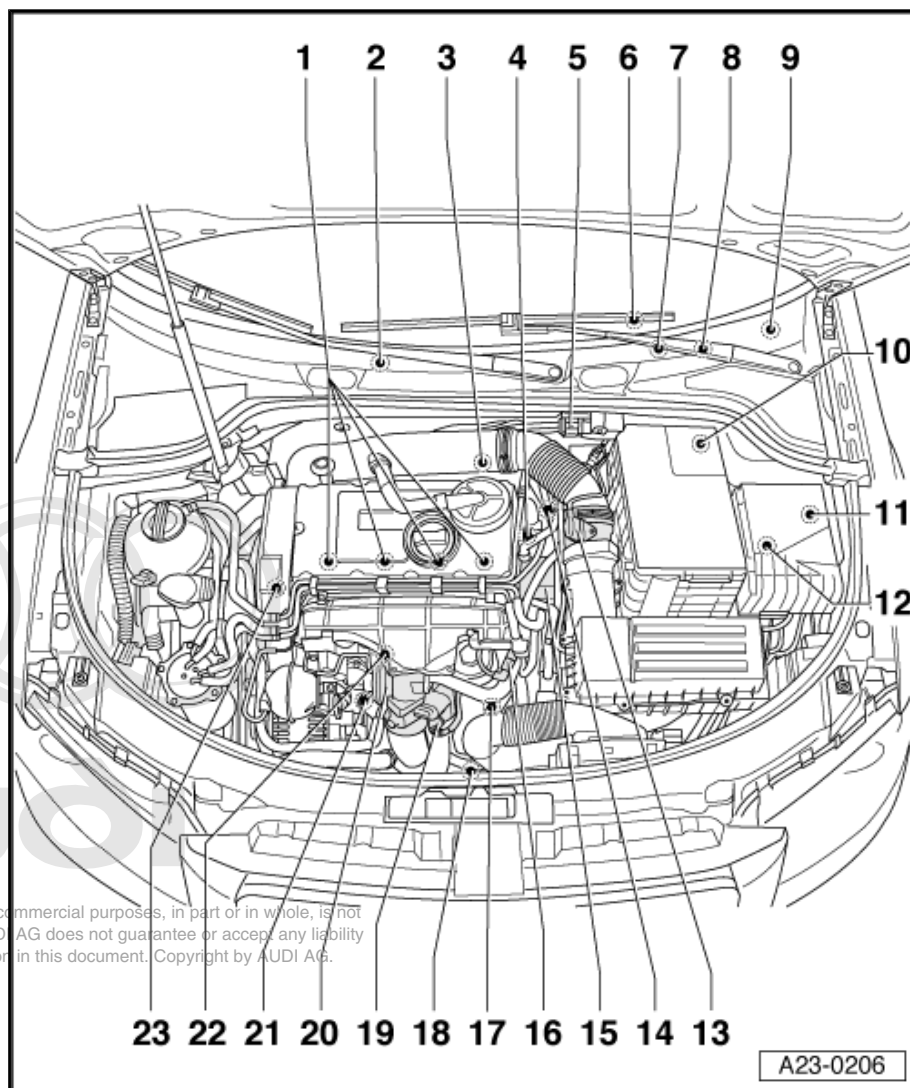
Vehicles from approx. 11.2005 onwards ⇒ [page 7](#) (gradual introduction)

## 9 - 5-position relay carrier in dash panel on driver's side (bottom left)

- ☐ With fuel pump relay - J17-
- ☐ For identification of socket position refer to ⇒ Current flow diagrams, Electrical fault finding and Fitting locations

## 10 - Clutch position sender - G476-

- ☐ Fitting location ⇒ [page 7](#)



#### 11 - Automatic glow period control unit - J179-

- ☐ Fitting location ➔ [page 7](#)

#### 12 - Relay and fuse holder in electronics box in engine compartment

- ☐ With terminal 30 voltage supply relay - J317-
- ☐ With terminal 15 voltage supply relay - J329-
- ☐ For identification of socket position refer to ➔ Current flow diagrams, Electrical fault finding and Fitting locations

#### 13 - Air mass meter - G70-

#### 14 - Coolant temperature sender - G62-

- ☐ Fitting location ➔ [page 8](#)
- ☐ If necessary release pressure in cooling system before removing

#### 15 - Tandem pump

- ☐ Removing, installing and checking ➔ Rep. gr. 20

#### 16 - Fuel temperature sender - G81-

- ☐ Fitting location ➔ [page 8](#)

#### 17 - Engine speed sender - G28-

- ☐ Fitting location ➔ [page 8](#)
- ☐ Removing and installing ➔ [page 58](#)

#### 18 - Charge pressure sender - G31- with intake air temperature sender - G42-

- ☐ Fitting location ➔ [page 8](#)
- ☐ Removing and installing ➔ [page 30](#)

#### 19 - Intake manifold flap motor - V157-

- ☐ Fitting location ➔ [page 9](#)

#### 20 - Mechanical exhaust gas recirculation valve

#### 21 - Radiator outlet coolant temperature sender - G83-

- ☐ Fitting location ➔ [page 9](#)

#### 22 - 3-pin connector

- ☐ For Hall sender - G40-
- ☐ Fitting location ➔ [page 9](#)

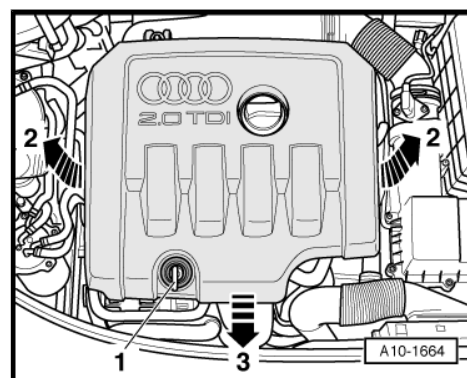
#### 23 - Hall sender - G40-

- ☐ For camshaft position
- ☐ Fitting location ➔ [page 9](#)

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#### Removing engine cover panel - version 1

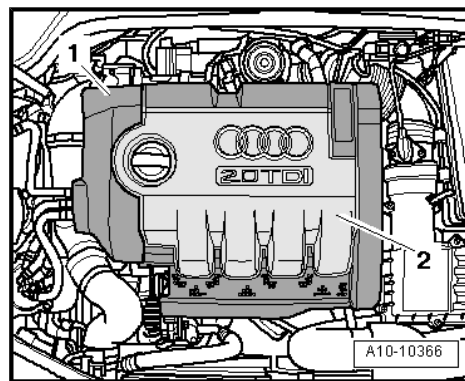
- Pull dipstick -1- out of guide tube.
- Lift engine cover panel at sides -arrows 2- and pull off towards front -arrow 3-.
- Re-insert dipstick in guide tube.





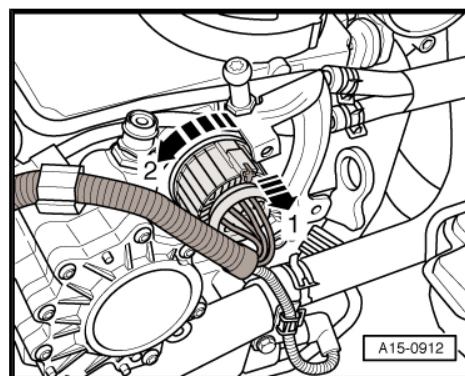
### Removing engine cover panel - version 2

- Lift off engine cover panel (outside -1- and inside -2-) by pulling up evenly.



### Fitting location of multi-pin connector for unit injectors and glow plugs

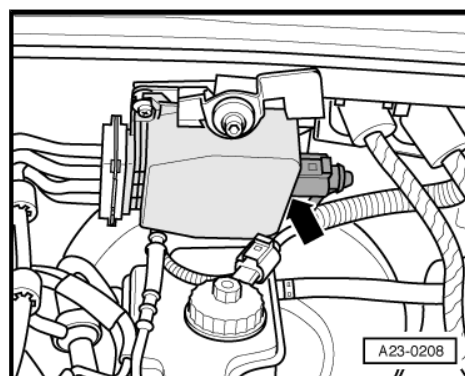
- ◆ To disconnect, pull release pin -arrow 1- and slacken knurled nut -arrow 2-.



### Fitting location of solenoid valve block

- ◆ At plenum chamber partition panel (left-side)

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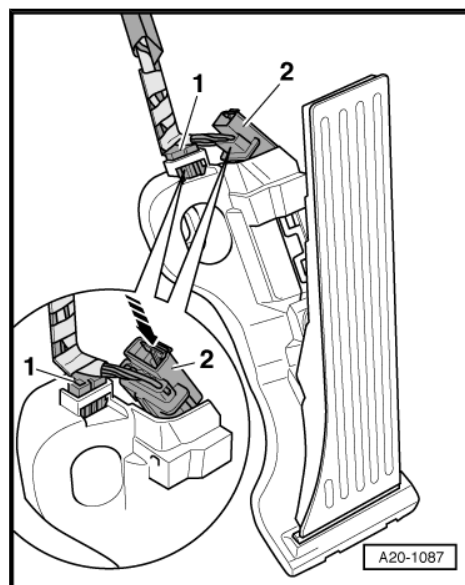
### Fitting location of accelerator position sender - G79- with accelerator position sender 2 - G185-

- ◆ To detach the electrical connection -2-, press the release tab and pull off the cable guide -1-.



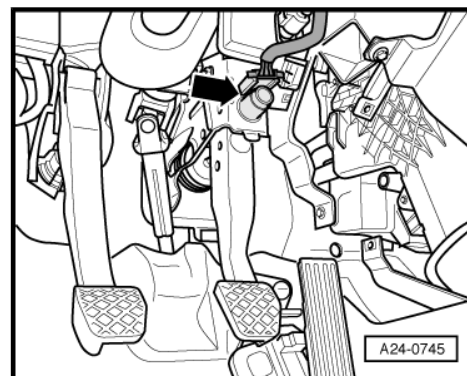
#### Note

*Diagram shows set-up on left-hand drive vehicles.*



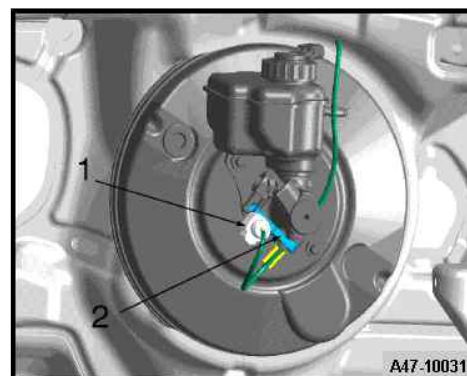
**Fitting location of brake light switch - F- and brake pedal switch - F63- up to approx. 11.2005**

- ◆ On pedal bracket -arrow-
- ◆ Removing and installing ⇒ Rep. gr. 46



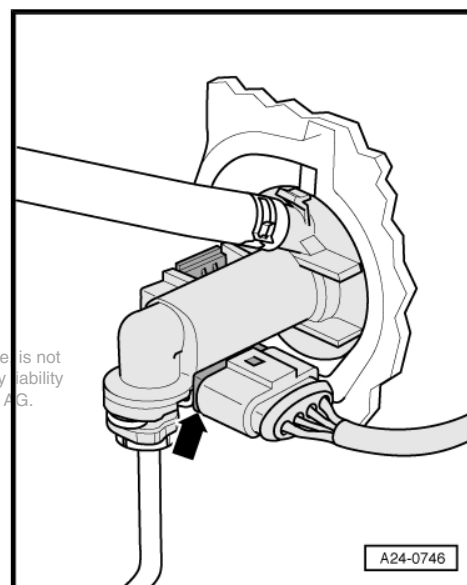
**Fitting location of brake light switch - F- and brake pedal switch - F63- from approx. 11.2005 onwards (gradual introduction)**

- ◆ On brake master cylinder in engine compartment
- ◆ Removing and installing ⇒ Rep. gr. 46
- 1 - Electrical connector
- 2 - Brake light switch - F- / brake pedal switch - F63-



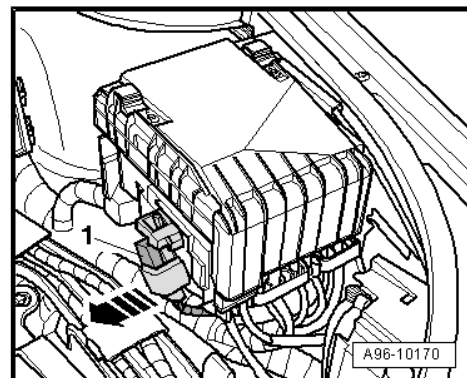
**Fitting location of clutch position sender - G476-**

- ◆ On clutch master cylinder -arrow-.
- ◆ Removing and installing ⇒ Rep. gr. 30



**Fitting location of automatic glow period control unit - J179-**

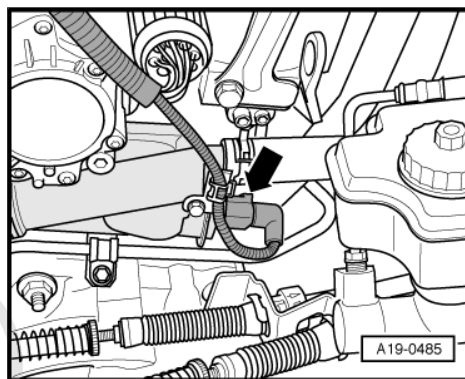
- ◆ -Item 1- on relay carrier below electronics box in engine compartment.
- ◆ Removing and installing ⇒ [page 56](#)



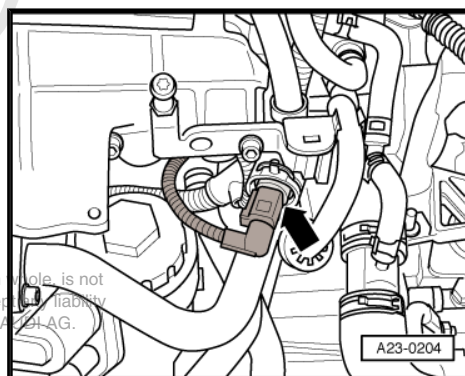
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**Fitting location of coolant temperature sender - G62-**

- ◆ On engine (left).
- ◆ Removing and installing ⇒ Rep. gr. 19

**Fitting location of fuel temperature sender - G81-**

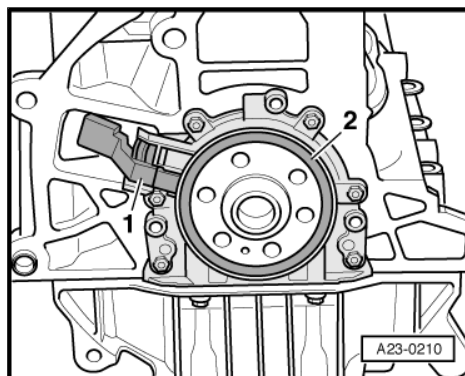
- ◆ At front of engine



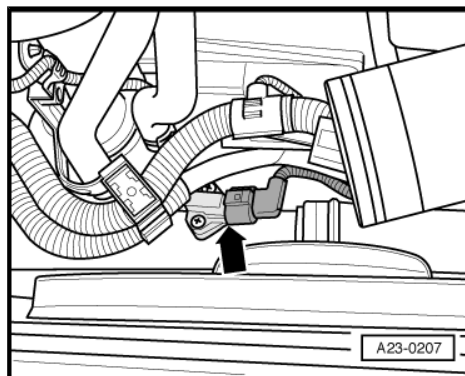
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**Fitting location of engine speed sender - G28-**

- ◆ On flywheel side of engine
- ◆ Removing and installing ⇒ [page 29](#)
- 1 - Engine speed sender - G28-
- 2 - Sender wheel

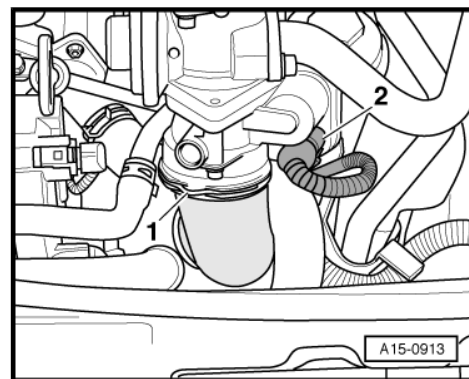
**Fitting location of charge pressure sender - G31- with intake air temperature sender - G42-**

- ◆ In air pipe (front) behind radiator.
- ◆ Removing and installing ⇒ [page 30](#)



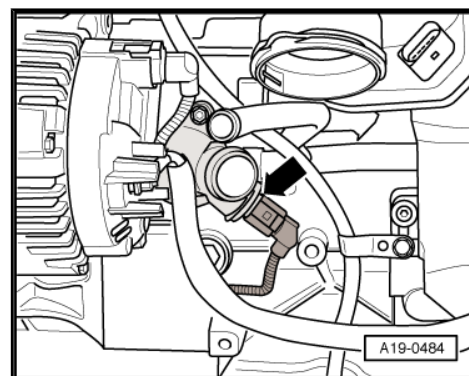
### Fitting location of intake manifold flap motor - V157-

- ◆ At front on intake manifold.
- ◆ Removing and installing ⇒ [page 24](#)
- 1 - Intake manifold flap motor - V157-
- 2 - Electrical connector



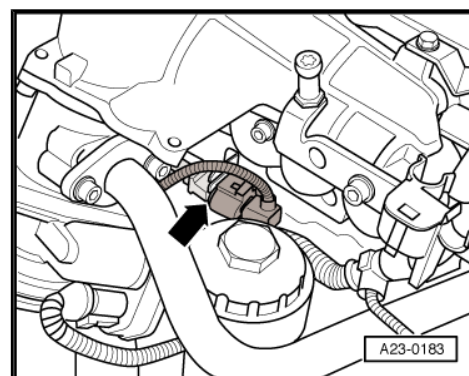
### Fitting location of radiator outlet coolant temperature sender - G83-

- ◆ On engine (front right).



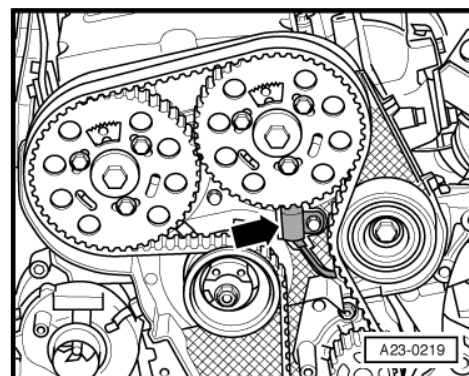
### Fitting location of 3-pin connector for Hall sender - G40-

- ◆ On front of engine under intake manifold.



### Fitting location of Hall sender - G40-

- ◆ On right of engine on inlet camshaft sprocket.



## 1.8 Overview of fitting locations (BMN, BUY)



### Note

Some components are located beneath the engine cover panel. For removal refer to ⇒ [page 12](#).

**1 - Exhaust gas pressure sensor 1 - G450-**

- ☐ Fitting location  
⇒ [page 14](#)
- ☐ Removing and installing  
⇒ [page 50](#)

**2 - Lambda probe - G39- with Lambda probe heater - Z19-**

- ☐ Fitting location  
⇒ [page 14](#)
- ☐ Removing and installing  
⇒ [page 49](#)

**3 - Engine control unit**

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

**4 - Temperature sender after particulate filter - G527-**

- ☐ Fitting location  
⇒ [page 14](#)
- ☐ Removing and installing  
⇒ Rep. gr. 26

**5 - Exhaust gas recirculation cooler change-over valve - N345-**

- ☐ Fitting location  
⇒ [page 16](#)

**6 - Temperature sender before particulate filter - G506-**

- ☐ Fitting location  
⇒ [page 14](#)

**7 - Unit injectors and glow plugs**

- ☐ Unit injector solenoid valve, No. 1 cyl. - N240-
- ☐ Unit injector solenoid valve, No. 2 cyl. - N241-
- ☐ Unit injector solenoid valve, No. 3 cyl. - N242-
- ☐ Unit injector solenoid valve, No. 4 cyl. - N243-
- ☐ Removing and installing unit injectors ⇒ [page 33](#)
- ☐ Glow plug 1 - Q10-
- ☐ Glow plug 2 - Q11-
- ☐ Glow plug 3 - Q12-
- ☐ Glow plug 4 - Q13-
- ☐ Removing and installing glow plugs ⇒ [page 52](#)

**8 - Position sender for charge pressure positioner - G581-**
**9 - Exhaust gas temperature sender 1 - G235-**

- ☐ Fitting location ⇒ [page 14](#)

**10 - Charge pressure control solenoid valve - N75-**

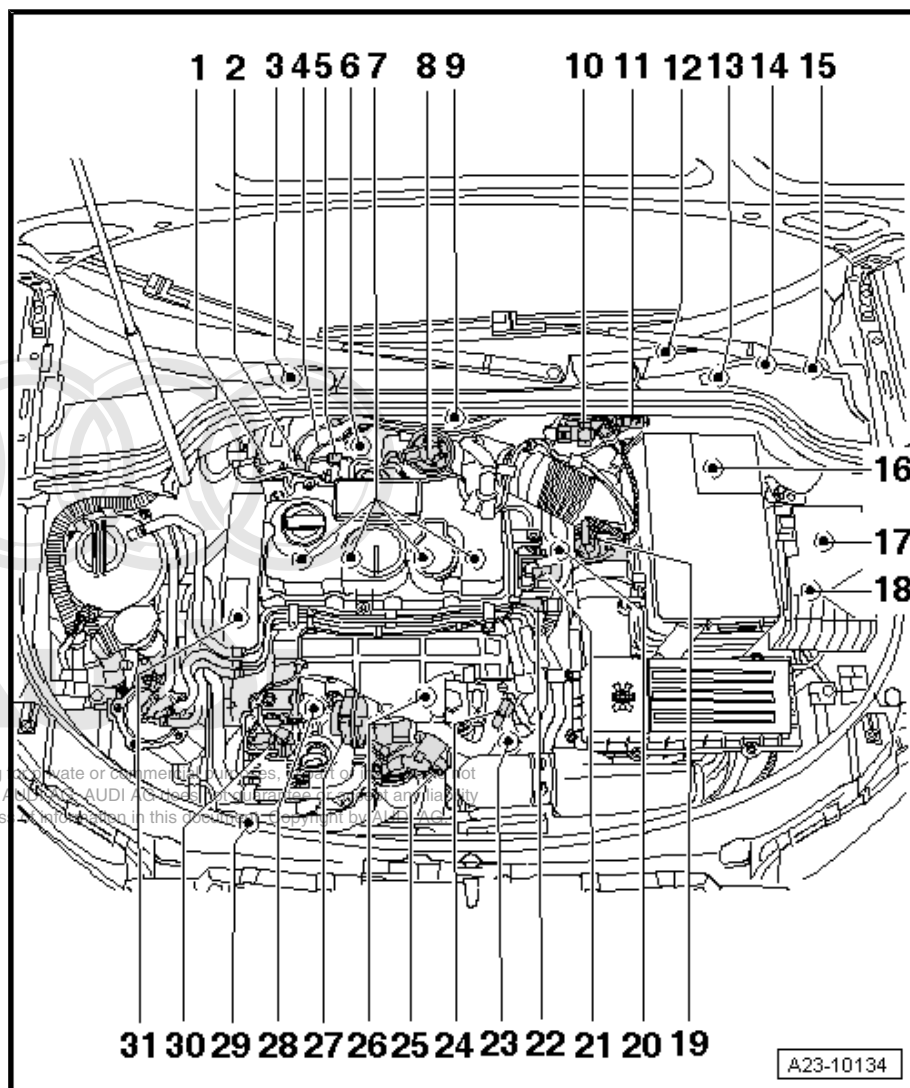
- ☐ Fitting location ⇒ [page 14](#)

**11 - Electrical connectors at plenum chamber partition panel (left-side)**

- ☐ Fitting location ⇒ [page 14](#)

**12 - Exhaust emissions warning lamp - K83-**

- ☐ In instrument cluster



**13 - Accelerator position sender - G79- with accelerator position sender 2 - G185-**

- ☐ Fitting location ➔ [page 12](#)

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

- ☐ Fitting location:

Vehicles up to approx. 11.2005 ➔ [page 13](#)

Vehicles from approx. 11.2005 onwards (gradual introduction) ➔ [page 13](#)

**15 - 5-position relay carrier in dash panel on driver's side (bottom left)**

- ☐ With fuel pump relay - J17-
- ☐ With terminal 15 voltage supply relay 2 - J681-
- ☐ With terminal 50 voltage supply relay - J682-
- ☐ For identification of socket position refer to ➔ Current flow diagrams, Electrical fault finding and Fitting locations

**16 - Clutch position sender - G476-**

- ☐ Fitting location ➔ [page 13](#)

**17 - Relay and fuse holder in electronics box in engine compartment**

- ☐ With terminal 30 voltage supply relay - J317-
- ☐ With terminal 15 voltage supply relay - J329-
- ☐ For identification of socket position refer to ➔ Current flow diagrams, Electrical fault finding and Fitting locations

**18 - Automatic glow period control unit - J179-**

- ☐ Fitting location ➔ [page 13](#)

**19 - Air mass meter - G70-**

**20 - Coolant temperature sender - G62-**

- ☐ Fitting location ➔ [page 15](#)
- ☐ If necessary release pressure in cooling system before removing

**21 - Tandem pump**

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**Removing, installing and checking ➔ Rep. gr. 20**

**22 - Multi-pin connector**

- ☐ For unit injectors and glow plugs
- ☐ Fitting location ➔ [page 12](#)

**23 - Engine speed sender - G28-**

- ☐ Fitting location ➔ [page 15](#)
- ☐ Removing and installing ➔ [page 29](#)

**24 - Fuel temperature sender - G81-**

- ☐ Fitting location ➔ [page 15](#)

**25 - Intake manifold flap motor - V157-**

- ☐ Fitting location ➔ [page 16](#)

**26 - 3-pin connector**

- ☐ For Hall sender - G40-
- ☐ Fitting location ➔ [page 17](#)

**27 - Exhaust gas recirculation valve - N18- with exhaust gas recirculation potentiometer - G212-**

- ☐ Fitting location ➔ [page 16](#)

**28 - Radiator outlet coolant temperature sender - G83-**

- ☐ Fitting location ➔ [page 9](#)

**29 - Charge pressure sender - G31- with intake air temperature sender - G42-**

- ☐ Fitting location ➔ [page 15](#)



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

### 30 - Intake manifold flap valve - N316-

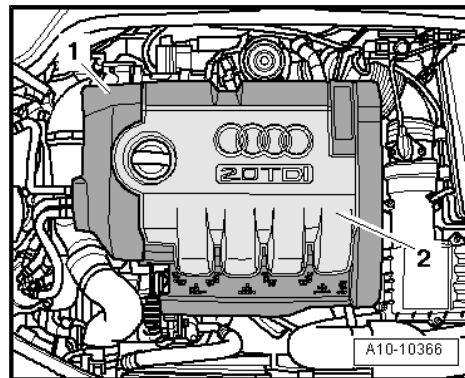
- ❑ Fitting location ⇒ [page 16](#)

### 31 - Hall sender - G40-

- ❑ For camshaft position
- ❑ Fitting location ⇒ [page 17](#)

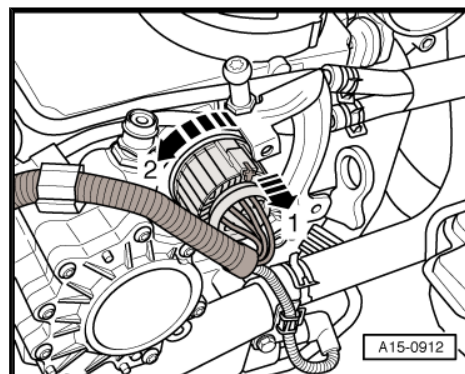
### Removing engine cover panel

- Lift off engine cover panel (outside -1- and inside -2-) by pulling up evenly.



### Fitting location of multi-pin connector for unit injectors and glow plugs

- ◆ To disconnect, pull release pin -arrow 1- and slacken knurled nut -arrow 2-.



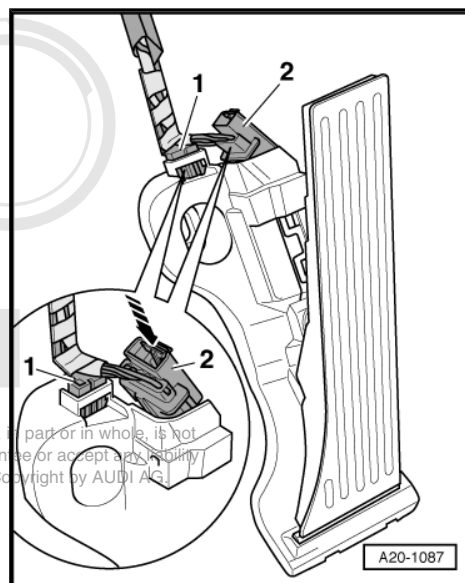
### Fitting location of accelerator position sender - G79- with accelerator position sender 2 - G185-

- ◆ To unplug the electrical connector -2- press the release tab and pull off the cable guide -1-.
- ◆ Removing and installing ⇒ Rep. gr. 20



#### Note

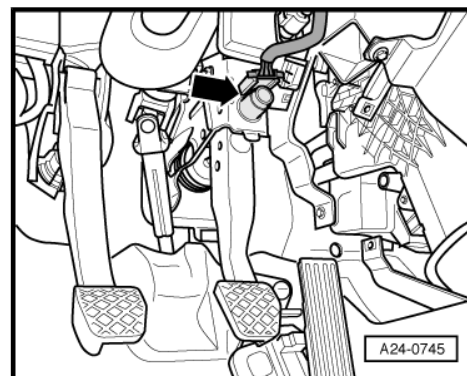
Diagram shows set-up on left-hand drive vehicles.



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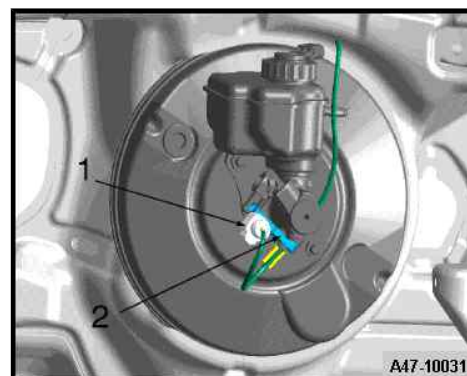
**Fitting location of brake light switch - F- and brake pedal switch - F63- up to approx. 11.2005**

- ◆ On pedal bracket -arrow-
- ◆ Removing and installing ⇒ Rep. gr. 46



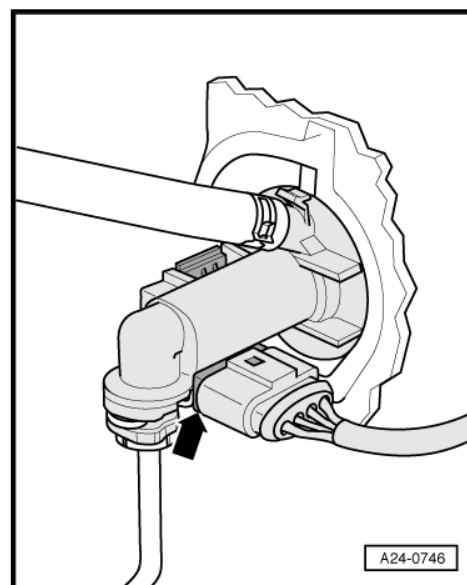
**Fitting location of brake light switch - F- and brake pedal switch - F63- from approx. 11.2005 onwards (gradual introduction)**

- ◆ On brake master cylinder in engine compartment
- ◆ Removing and installing ⇒ Rep. gr. 46
- 1 - Electrical connector
- 2 - Brake light switch - F- / brake pedal switch - F63-



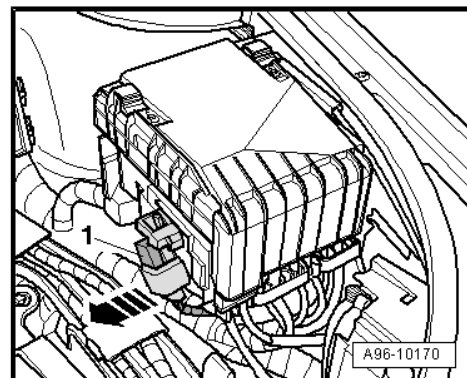
**Fitting location of clutch position sender - G476-**

- ◆ On clutch master cylinder -arrow-
- ◆ Removing and installing ⇒ Rep. gr. 30



**Fitting location of automatic glow period control unit - J179-**

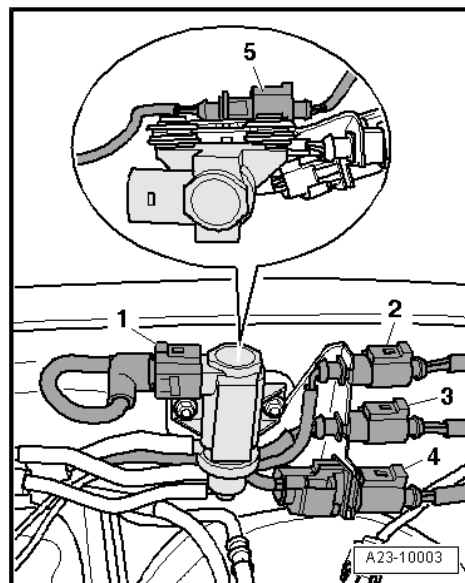
- ◆ -Item 1- on relay carrier below electronics box in engine compartment.
- ◆ Removing and installing ⇒ [page 56](#)



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**Fitting locations at plenum chamber partition panel (left-side)**

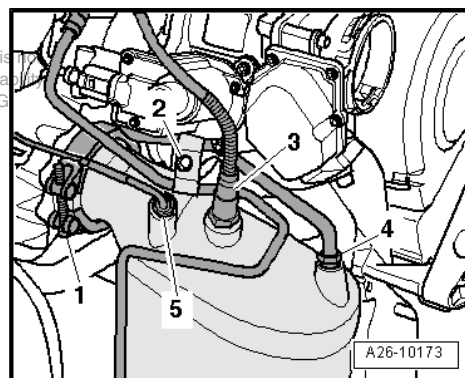
- 1 - Charge pressure control solenoid valve - N75-
- 2 - Electrical connector (orange) for temperature sender after particulate filter - G527-
- 3 - Electrical connector (black) for exhaust gas temperature sender 1 - G235-
- 4 - Electrical connector (black) for Lambda probe - G39-
- 5 - Electrical connector (brown) for temperature sender before particulate filter - G506-


**Fitting locations of components on top of particulate filter**

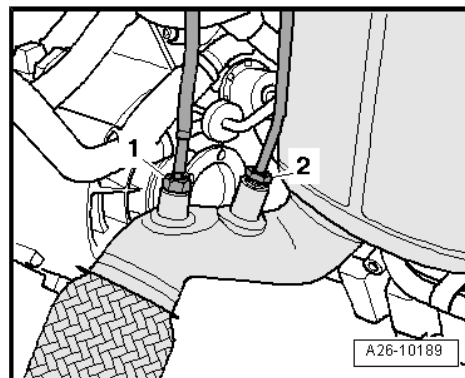
- 3 - Lambda probe - G39- with Lambda probe heater - Z19-; removing and installing ⇒ [page 49](#)
- 4 - Pressure pipe going to exhaust gas pressure sensor 1 - G450-
- 5 - Temperature sender before particulate filter - G506-; removing and installing ⇒ Rep. gr. 26


**Note**

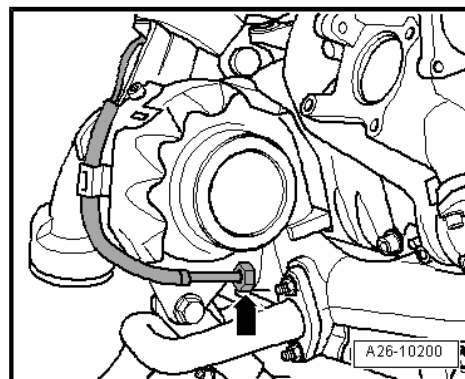
Disregard items -1- and -2-.


**Fitting locations of components on underside of particulate filter**

- 1 - Temperature sender after particulate filter - G527-; removing and installing ⇒ Rep. gr. 26
- 2 - Pressure pipe going to exhaust gas pressure sensor 1 - G450-

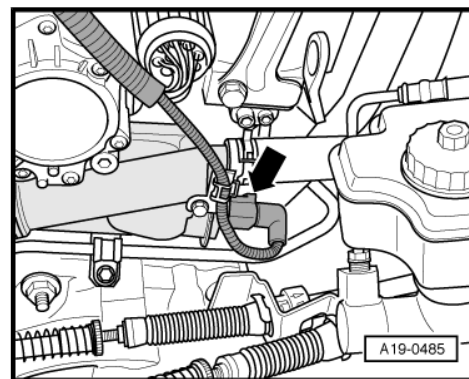

**Fitting location of exhaust gas temperature sender 1 - G235-**

- ◆ On turbocharger
- ◆ Removing and installing ⇒ Rep. gr. 26



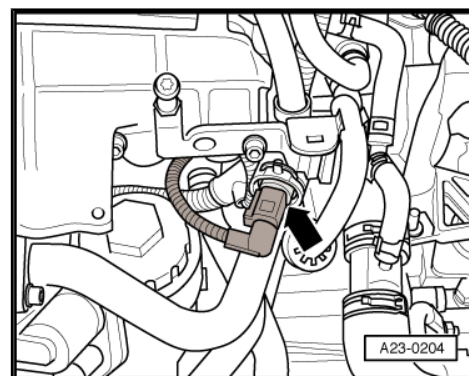
#### Fitting location of coolant temperature sender - G62-

- ◆ On engine (left).
- ◆ Removing and installing ⇒ Rep. gr. 19



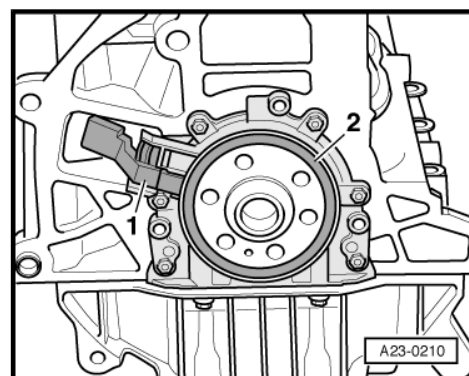
#### Fitting location of fuel temperature sender - G81-

- ◆ At front of engine
- ◆ Removing and installing ⇒ Rep. gr. 19



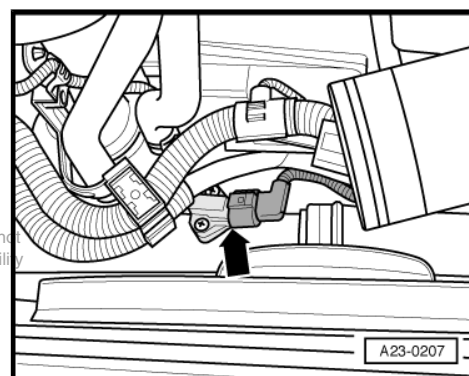
#### Fitting location of engine speed sender - G28-

- ◆ On flywheel side of engine
- 1 - Engine speed sender - G28-
- 2 - Sender wheel



#### Fitting location of charge pressure sender - G31- with intake air temperature sender - G42-

- ◆ In air pipe (front) behind radiator.



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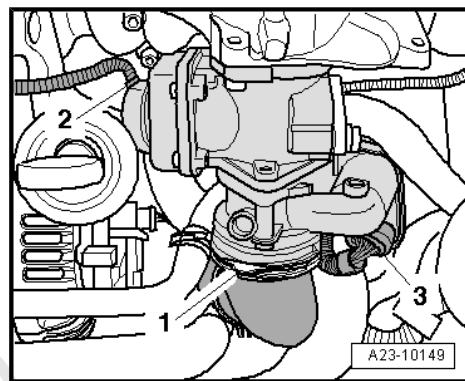
### Fitting location of intake manifold flap motor - V157- and exhaust gas recirculation valve - N18- with exhaust gas recirculation potentiometer - G212-

- ◆ At front on intake manifold.
- ◆ Removing and installing exhaust gas recirculation valve - N18- with exhaust gas recirculation potentiometer - G212- -item 2- ➔ Rep. gr. 26 .
- ◆ Removing and installing intake manifold flap motor - V157- -item 3- ➔ [page 27](#) .



#### Note

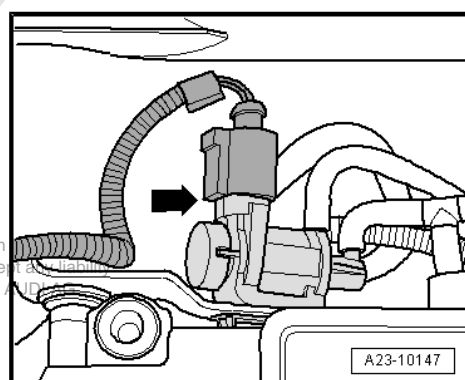
Disregard -item 1-.



### Fitting location of exhaust gas recirculation cooler change-over valve - N345-

- ◆ On rear of cylinder head.

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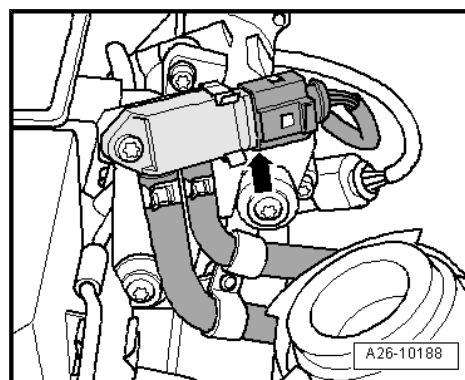
### Fitting location of exhaust gas pressure sensor 1 - G450-

- ◆ On rear of cylinder head -arrow-.
- ◆ Removing and installing ➔ [page 50](#)



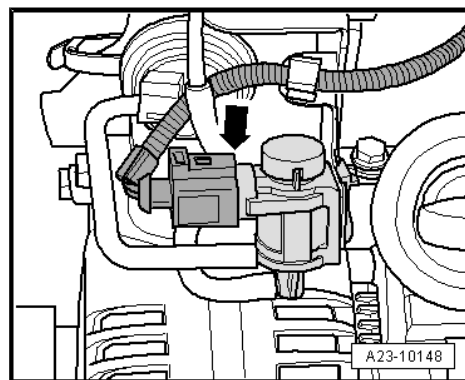
#### Note

Shown from rear with engine removed for illustration purposes.



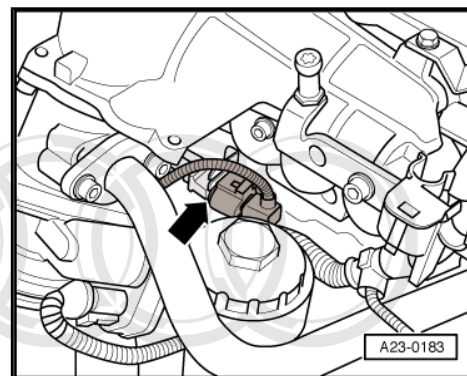
### Fitting location of intake manifold flap valve - N316-

- ◆ At front right of intake manifold -arrow-.



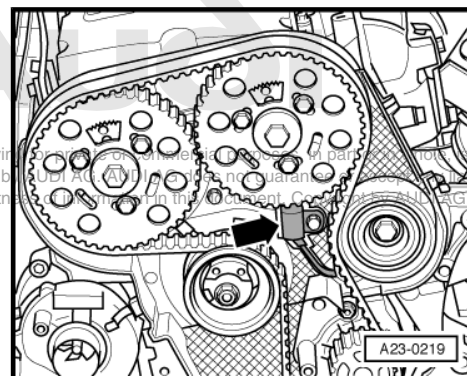
### Fitting location of 3-pin connector for Hall sender - G40-

- ◆ At front of engine below intake manifold -arrow-



### Fitting location of Hall sender - G40-

- ◆ At camshaft sprocket on right side of engine -arrow-



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## 1.9 Air cleaner - exploded view

**1 - Air hose**

- ☐ To turbocharger

**2 - Air mass meter - G70-**

- ☐ Removing and installing  
⇒ [page 21](#)

**3 - O-ring**

- ☐ Renew if damaged

**4 - 8 Nm**
**5 - Air cleaner (top section)**
**6 - 8 Nm**
**7 - Breather hose**

- ☐ For solenoid valves

**8 - Air filter element**

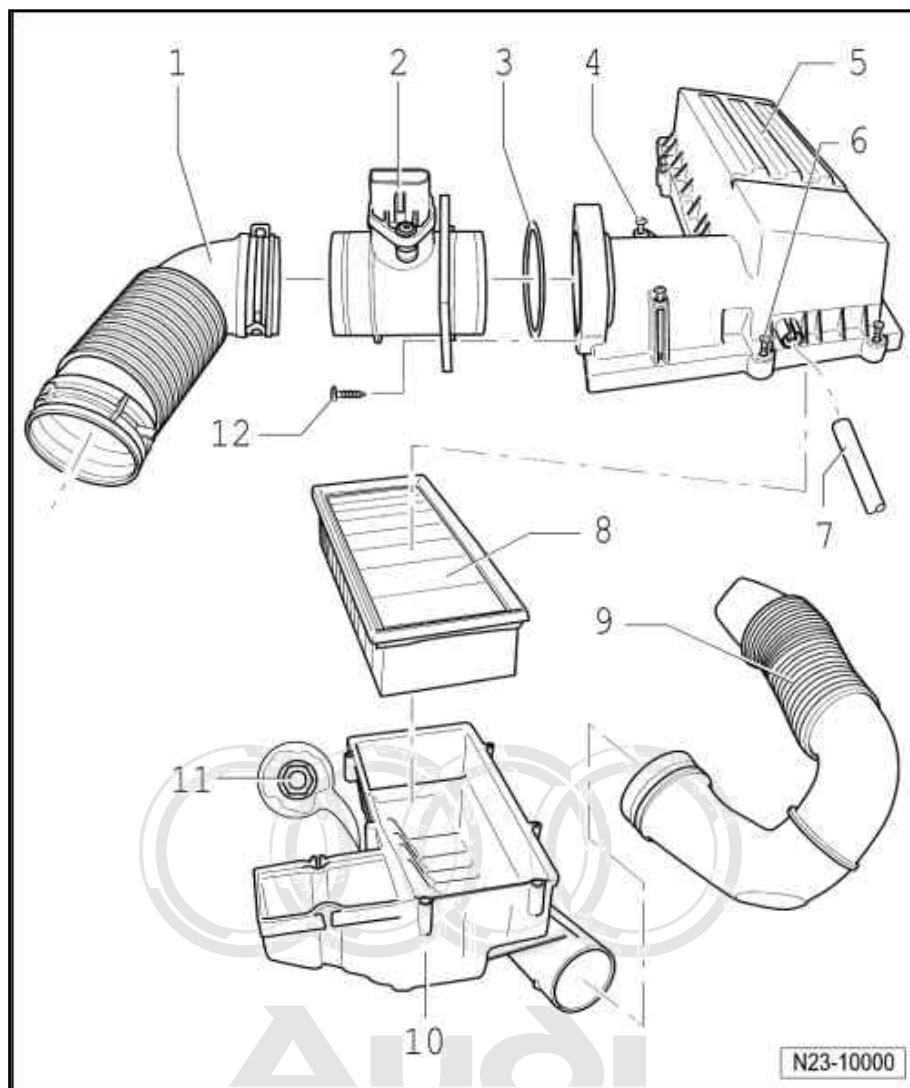
- ☐ Observe change intervals ⇒ Maintenance ; Booklet 808
- ☐ Removing and installing  
⇒ [page 18](#)

**9 - Air duct**

- ☐ To lock carrier
- ☐ Clean out dirt, leaves and salt deposits

**10 - Air cleaner (bottom section)**

- ☐ Clean out dirt, leaves and salt deposits

**11 - 10 Nm**
**12 - 1.5 Nm**


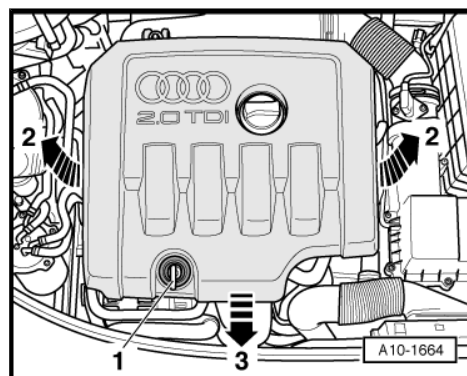
## 1.10 Removing and installing air filter element

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### Removing

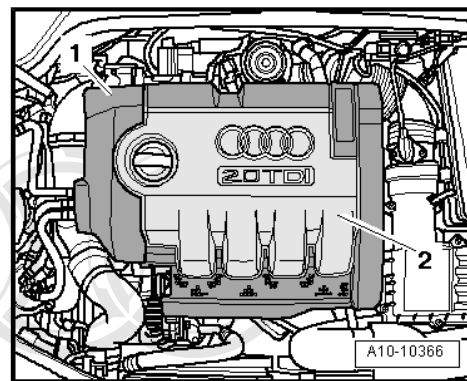
#### Engine cover panel (version 1):

- Pull dipstick -1- out of guide tube.
- Lift engine cover panel at sides -arrows 2- and pull off towards front -arrow 3-.
- Re-insert dipstick in guide tube.



### Engine cover panel (version 2):

- Lift off engine cover panel (outside -1- and inside -2-) by pulling up evenly.



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### Both versions:

- Unscrew bolts -arrows- and lift out air cleaner (top section).
- Take out air filter element.

### Installing

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



### Note

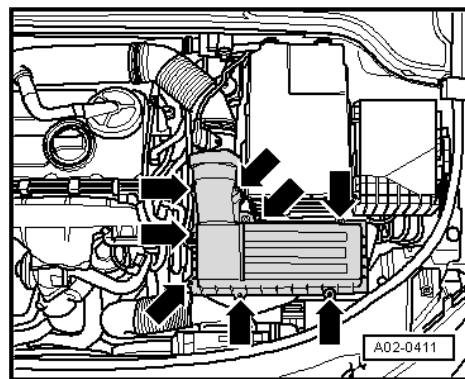
- ◆ *If the air filter element is very dirty or wet, dirt or water could reach the air mass meter and affect the air mass value. This would lead to loss of power, since a smaller injection quantity is calculated.*
- ◆ *Always use genuine part for air filter element.*
- ◆ *Hose connections and hoses for charge air system must be free of oil and grease before assembly. Do not use any lubricants containing silicone when assembling.*
- ◆ *The air cleaner housing MUST be clean.*
- ◆ *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Parts catalogue .*
- ◆ *To prevent malfunctions, cover all critical parts of the engine air intake tract (air mass meter, intake pipes, etc.) with a clean cloth when blowing out the air cleaner housing with compressed air.*

- ◆ *Please observe requirements for disposal.*

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- Blow out water drain (small hole in bottom section of air cleaner) with compressed air.
- Clean salt residue, dirt and leaves out of air cleaner housing (top and bottom sections); use a vacuum cleaner if necessary.
- Check for salt residue, dirt and leaves in air mass meter and air hose (engine intake side).
- Check for dirt and leaves in air duct going from lock carrier to air cleaner housing.
- When installing the air filter element, check that it is properly centred in the retainer in the air cleaner (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.

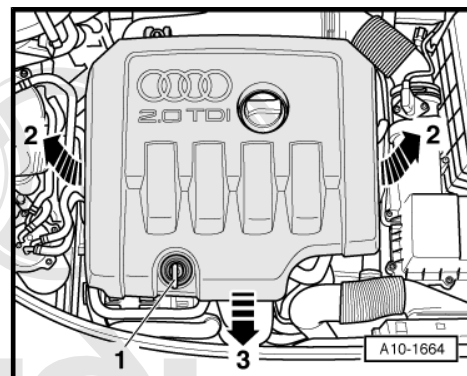


## 1.11 Removing and installing air mass meter - G70-

### Removing

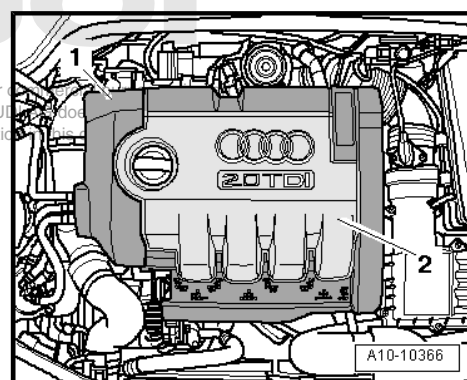
#### Engine cover panel (version 1):

- Pull dipstick -1- out of guide tube.
- Lift engine cover panel at sides -arrows 2- and pull off towards front -arrow 3-.
- Re-insert dipstick in guide tube.



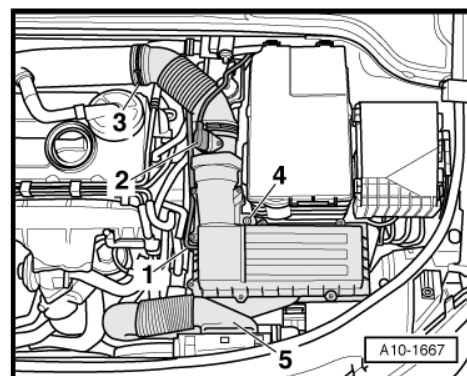
#### Engine cover panel (version 2):

- Lift off engine cover panel (outside -1- and inside -2-) by pulling up evenly.



#### Both versions:

- Pull off front seal at lock carrier.
- Unplug electrical connector -2- at air mass meter - G70- .
- Detach vent hose -1- and air hoses -3- and -5-.
- Unscrew bolt -4- and remove air cleaner housing.



- Unscrew two securing bolts -arrows- on air mass meter - G70- .
- Then carefully pull air mass meter - G70- out of guide on air cleaner housing.

### Installing

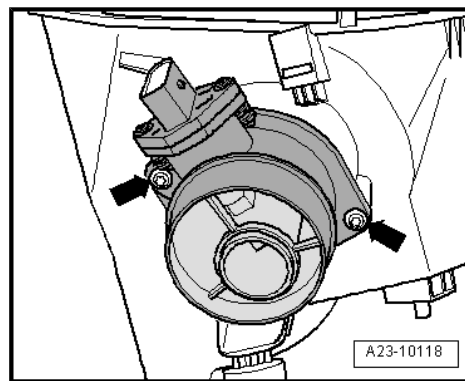
To ensure the proper function of the air mass meter it is important to observe the following notes and instructions.



### Note

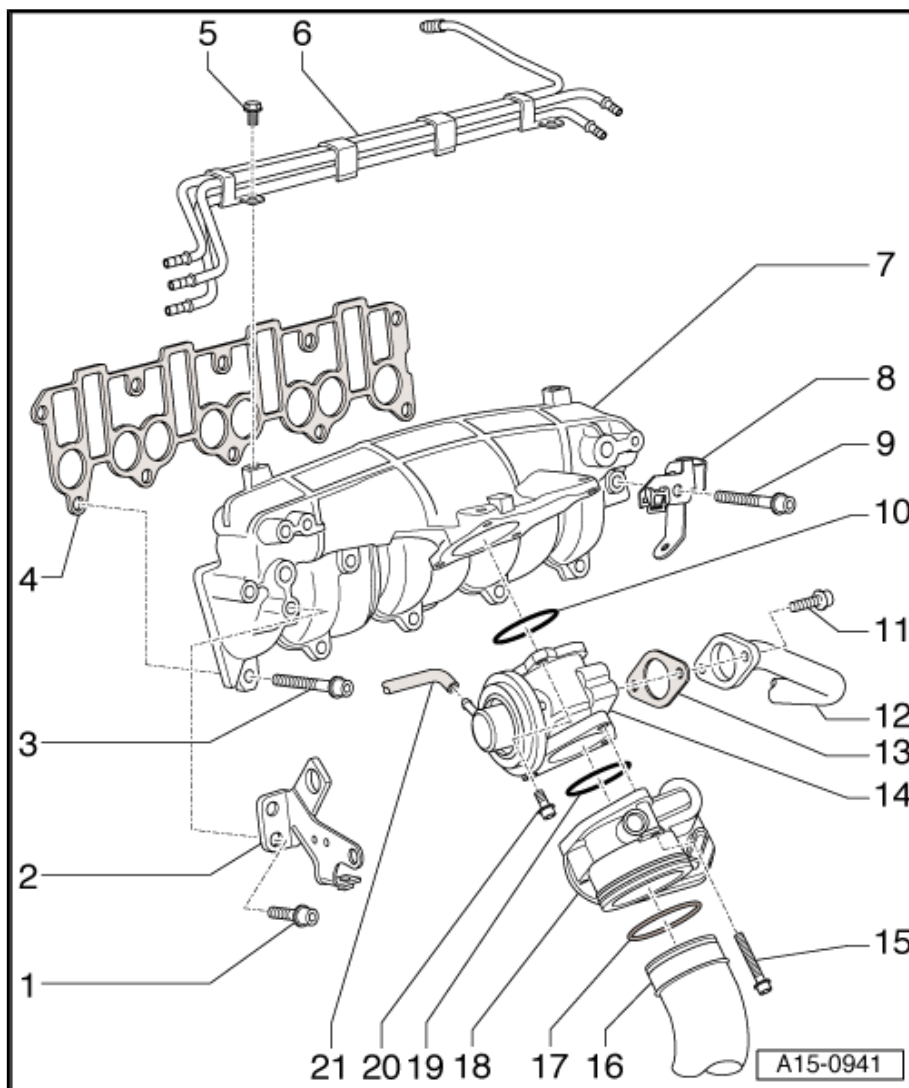
- ◆ *If the air filter element is very dirty or wet, dirt or water could reach the air mass meter and affect the air mass value. This would lead to loss of power, since a smaller injection quantity is calculated.*
- ◆ *Always use genuine part for air filter element.*
- ◆ *Use silicone-free lubricant when fitting 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 hose (engine intake side).
- Check for dirt in air duct leading to air filter element. Clean salt residue, dirt and leaves out of top and bottom sections of air cleaner housing (wash out or vacuum out if necessary). Removing and installing air filter element ⇒ [page 18](#)

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



## 1.12 Intake manifold for vehicles with engine codes AZV, BKD - exploded view

- 1 - 22 Nm
- 2 - Lifting eye
- 3 - 22 Nm
- 4 - Gasket
  - ☐ Renew
- 5 - 10 Nm
- 6 - Pipes
  - ☐ For fuel and coolant
- 7 - Intake manifold
  - ☐ Removing and installing  
⇒ [page 25](#)
- 8 - Bracket
  - ☐ For wiring harness
- 9 - 22 Nm
- 10 - O-ring
  - ☐ Renew
- 11 - 22 Nm
- 12 - Connecting pipe
  - ☐ For exhaust gas recirculation
- 13 - Gasket
  - ☐ Renew
- 14 - Mechanical exhaust gas recirculation valve
- 15 - 10 Nm
- 16 - Air pipe
- 17 - Seal
  - ☐ Renew
- 18 - Intake manifold flap motor - V157-
  - ☐ Removing and installing ⇒ [page 24](#)
- 19 - O-ring
  - ☐ Renew
- 20 - 10 Nm
- 21 - Vacuum hose
  - ☐ To solenoid valve block



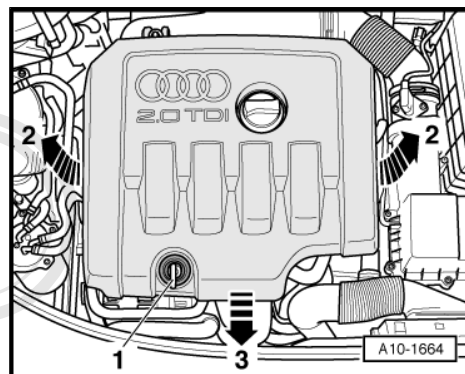
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## 1.13 Removing and installing intake manifold flap motor - V157- - vehicles with engine codes AZV, BKD

### Removing

#### Engine cover panel (version 1):

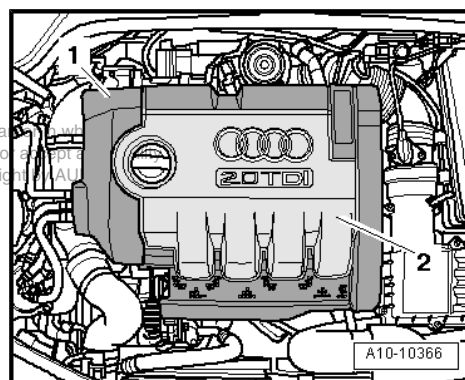
- Pull dipstick -1- out of guide tube.
- Lift engine cover panel at sides -arrows 2- and pull off towards front -arrow 3-.
- Re-insert dipstick in guide tube.



#### Engine cover panel (version 2):

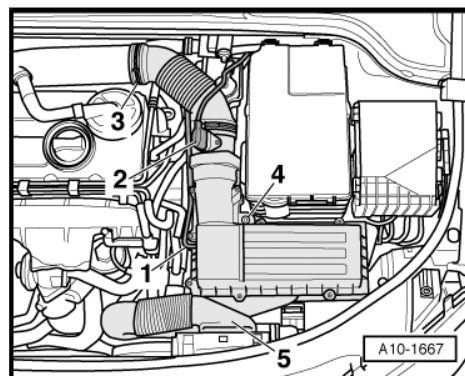
- Lift off engine cover panel (outside -1- and inside -2-) by pulling up evenly.

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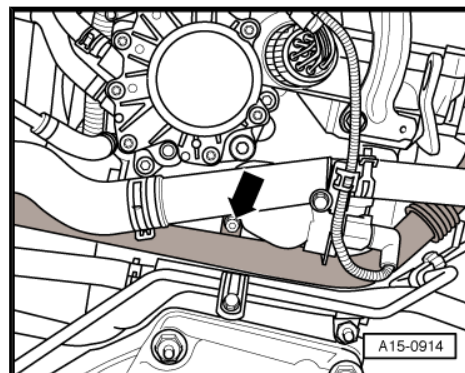


#### Both versions:

- Pull off front seal at lock carrier.
- Unplug electrical connector -2- at air mass meter - G70- .
- Detach vent hose -1- and air hoses -3- and -5-.
- Unscrew bolt -4- and remove air cleaner housing.



- Unscrew retaining lug for connecting pipe -arrow-.



- Detach electrical connector -6- at intake manifold flap motor - V157- .
- Detach front air intake hose from intake manifold flap motor - V157- by lifting retaining clip -1- slightly.
- Unbolt intake manifold flap motor - V157- from mechanical exhaust gas recirculation valve.

### Installing

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



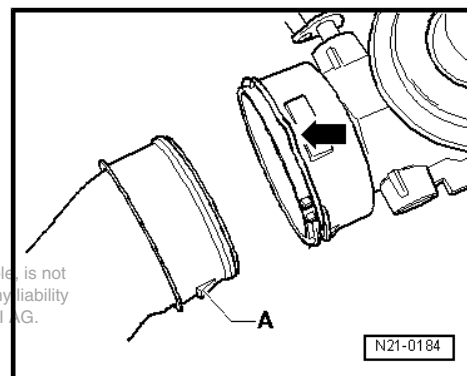
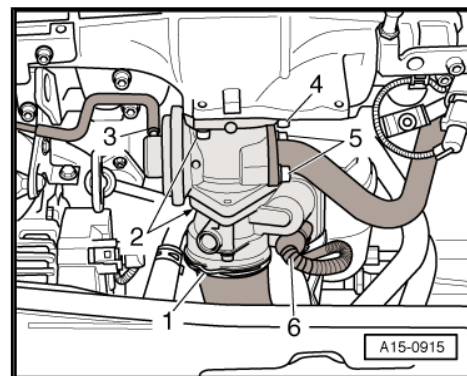
### Note

- ◆ *Renew gaskets and seals.*
- ◆ *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Parts catalogue .*
- When installing air pipes/air intake hoses with plug-in connectors, ensure that the securing clip -arrow- engages audibly in the retaining lug -A-.

### Tightening torques

- ◆ Intake manifold for vehicles with engine codes AZV, BKD - exploded view  
 ⇒ ["1.12 Intake manifold for vehicles with engine codes AZV, BKD - exploded view", page 22](#)

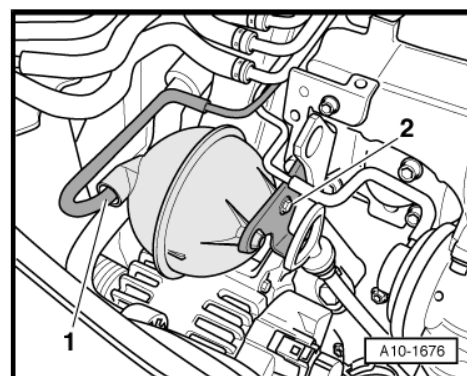
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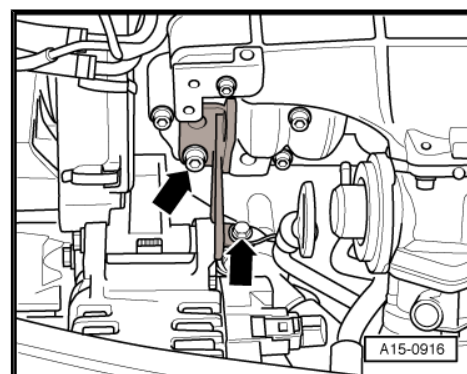
## 1.14 Removing and installing intake manifold - vehicles with engine codes AZV, BKD

### Removing

- Remove intake manifold flap motor - V157- ⇒ [page 24](#) .
- Detach vacuum hose -1-.
- Unscrew bolt -2- and remove vacuum reservoir from bracket.



- Remove bolts -arrows-.
- Remove right engine lifting eye.

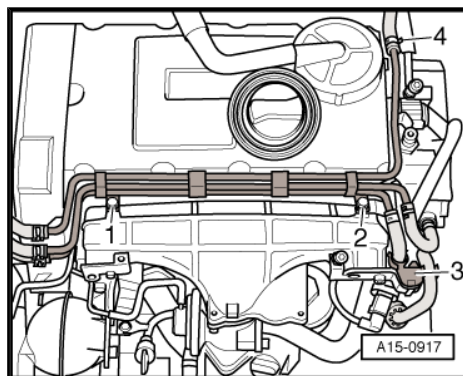


- Unclip bracket -3- for fuel hoses on left engine lifting eye.
- Remove bolts -1- and -2-.



### Note

Disregard -item 4-.



- Remove intake manifold -arrows-.



### Note

The centre top bolt is located inside the intake manifold.

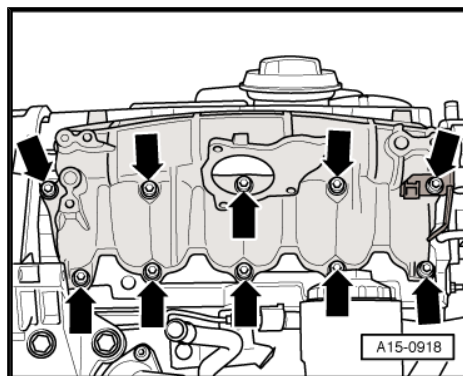
### Installing

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



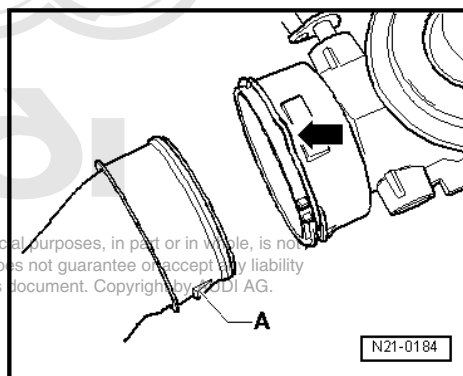
### Note

- ◆ Renew gaskets and seals.
- ◆ Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Parts catalogue .
- Install intake manifold flap motor - V157- ⇒ [page 24](#) .
- When installing air pipes/air intake hoses with plug-in connectors, ensure that the securing clip -arrow- engages audibly in the retaining lug -A-.



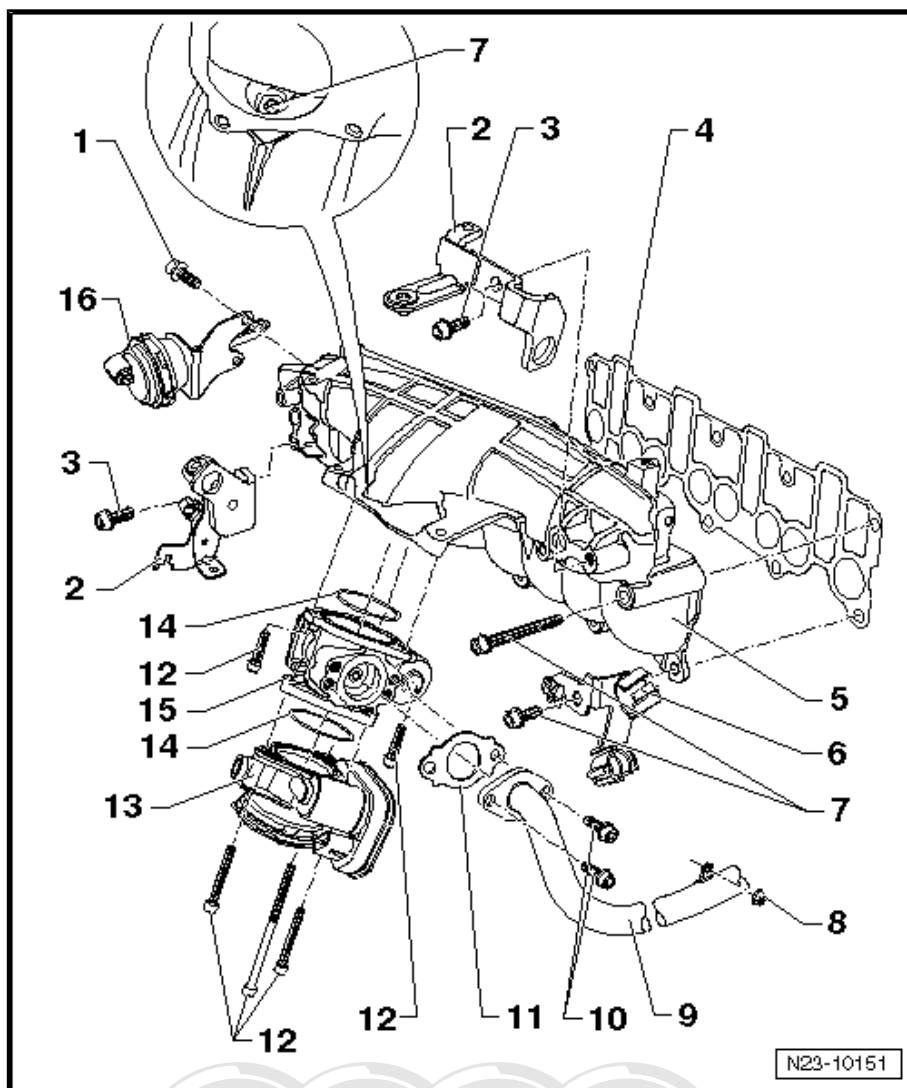
### Tightening torques

| Component                                                         | Nm |
|-------------------------------------------------------------------|----|
| Intake manifold to cylinder head                                  | 22 |
| Fuel pipes to intake manifold                                     | 10 |
| Engine lifting eye to intake manifold                             | 22 |
| Guide tube for oil dipstick to engine lifting eye                 | 10 |
| Mechanical exhaust gas recirculation valve to intake manifold     | 10 |
| EGR connecting pipe to mechanical exhaust gas recirculation valve | 22 |
| Connecting pipe for exhaust gas recirculation to connection       | 10 |



## 1.15 Intake manifold for vehicles with engine codes BMN, BUY - exploded view

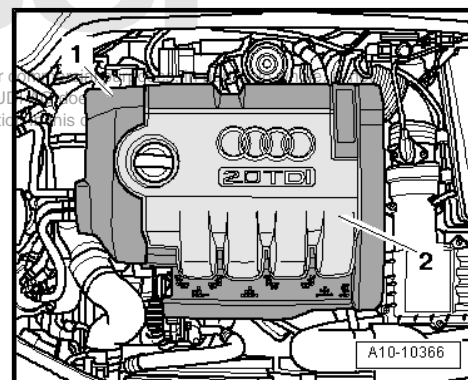
- 1 - 10 Nm
- 2 - Bracket
- 3 - 22 Nm
- 4 - Gasket
  - ☐ Renew
- 5 - Intake manifold
  - ☐ With air flow control
- 6 - Cable retainer
- 7 - 22 Nm
- 8 - 10 Nm
- 9 - Connecting pipe
  - ☐ To exhaust gas recirculation cooler
- 10 - 22 Nm
- 11 - Gasket
  - ☐ Renew
- 12 - 10 Nm
- 13 - Intake manifold flap motor - V157-
  - ☐ Removing and installing  
⇒ [page 27](#)
- 14 - O-ring
  - ☐ Renew
- 15 - Exhaust gas recirculation valve - N18- with exhaust gas recirculation potentiometer - G212-
  - ☐ Removing and installing  
⇒ Rep. gr. 26
- 16 - Vacuum unit
  - ☐ For air flow control



## 1.16 Removing and installing intake manifold flap motor - V157- - vehicles with engine codes BMN, BUY

### Removing

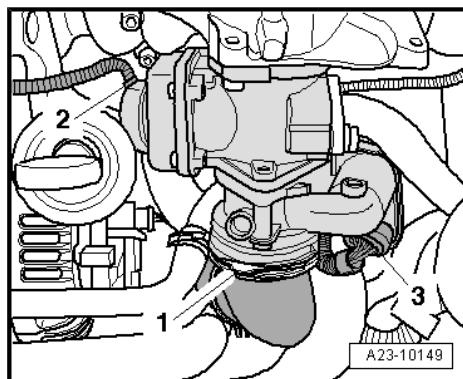
- Lift off outer engine cover panel -1- by pulling up evenly



- Remove air intake hose at intake manifold flap motor - V157- by lifting retaining clip -1- slightly.
- Unplug electrical connector for intake manifold flap motor - V157- -item 3-.


**Note**

Disregard -item 2-.



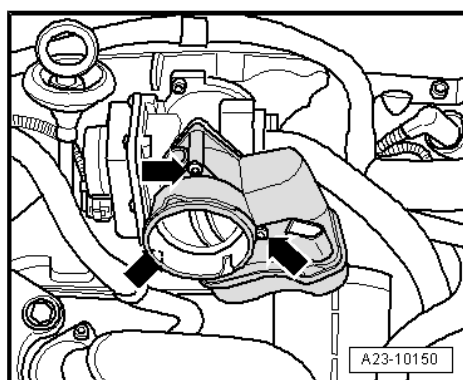
- Remove bolts -arrows- and detach intake manifold flap motor - V157- .

**Installing**

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


**Note**

Renew O-ring.

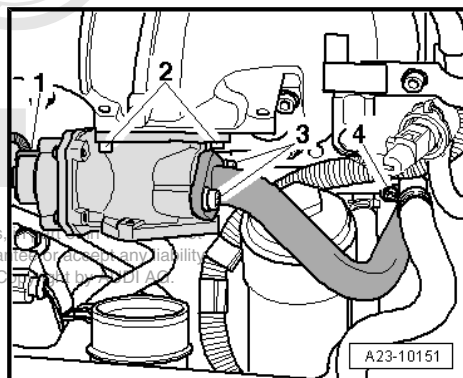

**Tightening torque**

| Component                                                                    | Nm |
|------------------------------------------------------------------------------|----|
| Intake manifold flap motor - V157- to exhaust gas recirculation valve - N18- | 10 |

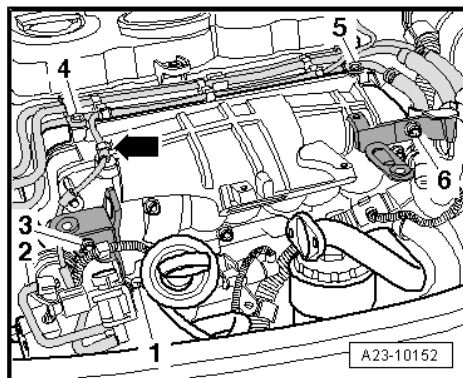
## 1.17 Removing and installing intake manifold - vehicles with engine codes BMN, BUY

**Removing**

- Remove intake manifold flap motor - V157- ➔ [page 27](#) .
- Unplug electrical connector -1- at exhaust gas recirculation valve - N18- with exhaust gas recirculation potentiometer - G212- .
- Unscrew bolts -2, 3, 4- and detach exhaust gas recirculation valve - N18- with exhaust gas recirculation potentiometer - G212- .



- Disconnect vacuum hose -2- leading to vacuum unit for air flow control.
- Move vacuum hose clear -arrow- at retaining clip.
- Remove bolts -1, 3, 4, 5, 6-.



- Remove intake manifold -arrows-.



#### Note

*The centre top bolt is located inside the intake manifold.*

#### Installing

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

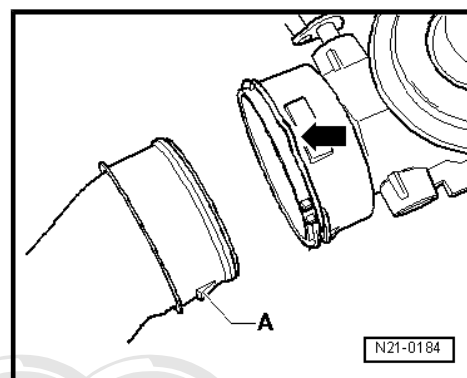
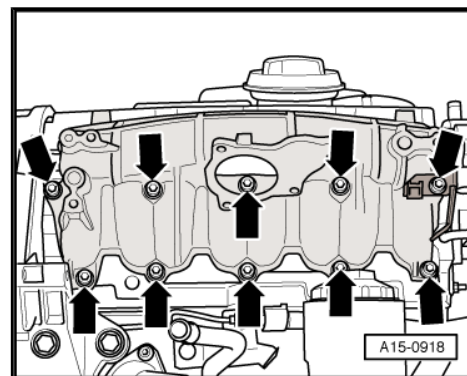


#### Note

- ◆ *Renew gaskets and seals.*
- ◆ *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Parts catalogue .*
- Install intake manifold flap motor - V157- ⇒ [page 27](#) .
- When installing air pipes/air intake hoses with plug-in connectors, ensure that the securing clip -arrow- engages audibly in the retaining lug -A-.

#### Tightening torques

| Component                                                                                                          | Nm |
|--------------------------------------------------------------------------------------------------------------------|----|
| Intake manifold to cylinder head                                                                                   | 22 |
| Fuel pipes to intake manifold                                                                                      | 10 |
| Engine lifting eye to intake manifold                                                                              | 22 |
| Guide tube for oil dipstick to engine lifting eye                                                                  | 10 |
| Exhaust gas recirculation valve - N18- with exhaust gas recirculation potentiometer - G212- to intake manifold     | 10 |
| EGR connecting pipe to exhaust gas recirculation valve - N18- with exhaust gas recirculation potentiometer - G212- | 22 |
| EGR connecting pipe to engine                                                                                      | 10 |



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

#### Removing

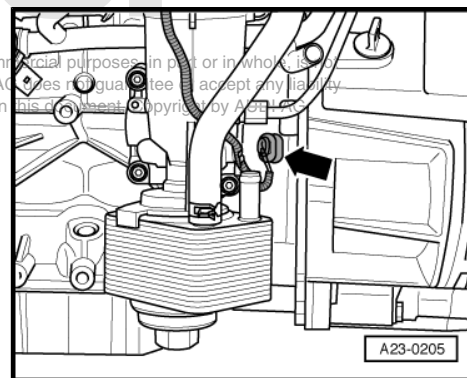
- Remove oil filter bracket ⇒ Rep. gr. 17.
- Unplug electrical connector at engine speed sender - G28- -arrow- using assembly tool - T10118- .



#### 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.*

- Move wiring clear.



- Unscrew securing bolt -2- for engine speed sender - G28-  
-item 1-.

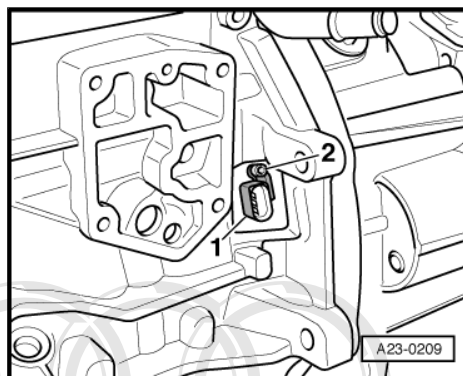
### Installing

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

- Install oil filter bracket ⇒ Rep. gr. 17 .

### Tightening torque

| Component                                    | Nm  |
|----------------------------------------------|-----|
| Engine speed sender - G28- to cylinder block | 4.5 |



## 1.19 Removing and installing sender wheel for engine speed sender - G28-

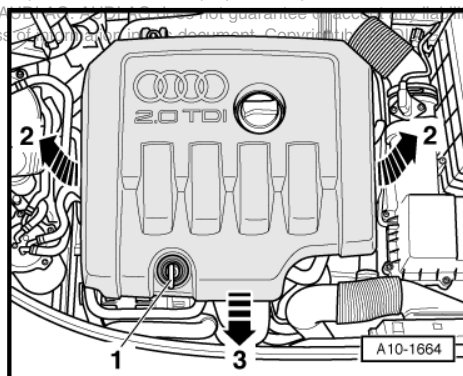
The sender wheel for engine speed sender - G28- is removed and installed together with the rear sealing flange ⇒ Rep. gr. 13 .

## 1.20 Removing and installing charge pressure sender - G31- with intake air temperature sender - G42-

### Removing

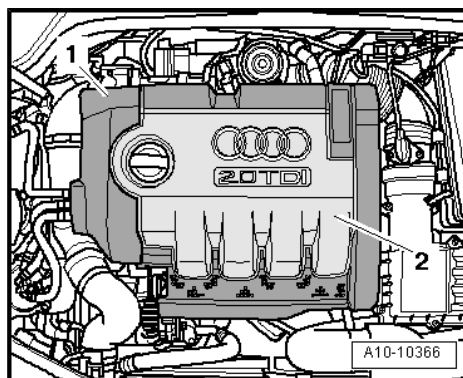
#### Engine cover panel (version 1):

- Pull dipstick -1- out of guide tube.
- Lift engine cover panel at sides -arrows 2- and pull off towards front -arrow 3-.
- Re-insert dipstick in guide tube.



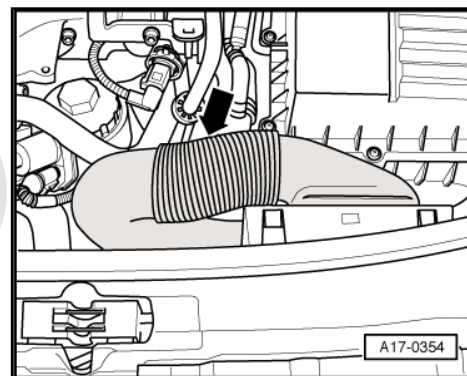
#### Engine cover panel (version 2):

- Lift off engine cover panel (outside -1- and inside -2-) by pulling up evenly.



**Both versions:**

- Remove air intake hose -arrow- from between lock carrier and air cleaner housing.



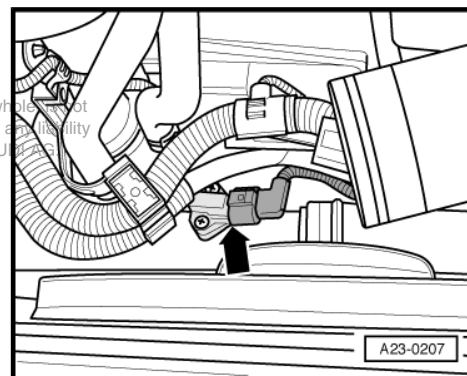
- Unplug electrical connector -arrow-.
- Unscrew two securing bolts.

**Installing**

Install in reverse order.

**Tightening torque**

| Component                                                                              | Nm |
|----------------------------------------------------------------------------------------|----|
| Charge pressure sender - G31- with intake air<br>temperature sender - G42- to air pipe | 8  |



## 1.21 Servicing unit injectors



**Note**

Observe rules for cleanliness ⇒ [page 3](#) .

1 - 3 Nm + 90° (1/4 turn), + 180° (1/2 turn) further

- ☐ Use special wrench (long reach) - T10054- when removing
- ☐ Renew

2 - Rocker arm shaft

- ☐ With rocker arms
- ☐ Removing and installing ⇒ [page 33](#)

3 - 20 Nm + 90° (1/4 turn) further

- ☐ Renew

4 - Adjuster screw

- ☐ Renew

5 - Lock nut

6 - Unit injector

- ☐ Removing and installing ⇒ [page 33](#)
- ☐ Before installation oil O-rings and guide in cylinder head

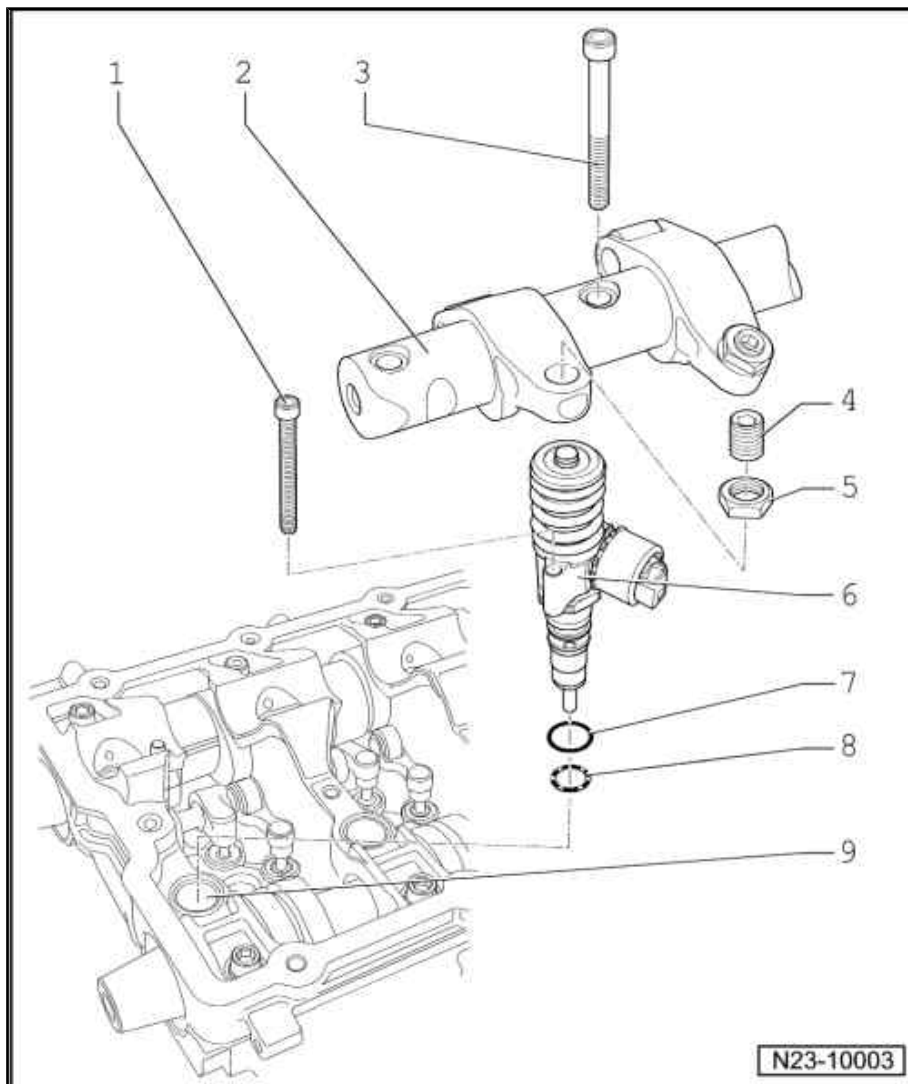
7 - O-ring

- ☐ Renewing ⇒ [page 38](#)

8 - O-ring

- ☐ Renewing ⇒ [page 38](#)

9 - Cylinder head

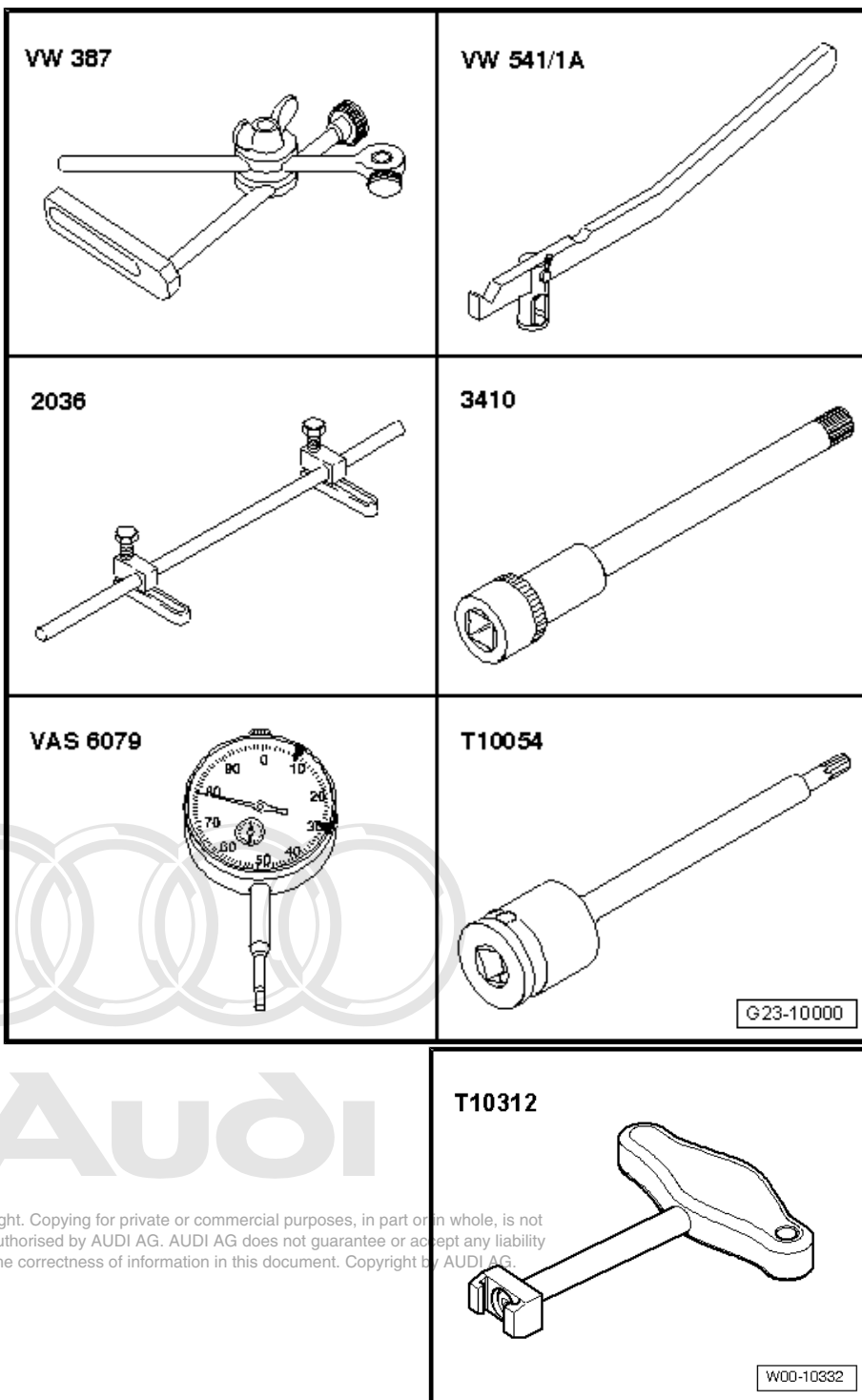


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## 1.22 Removing and installing unit injectors

### Special tools and workshop equipment required

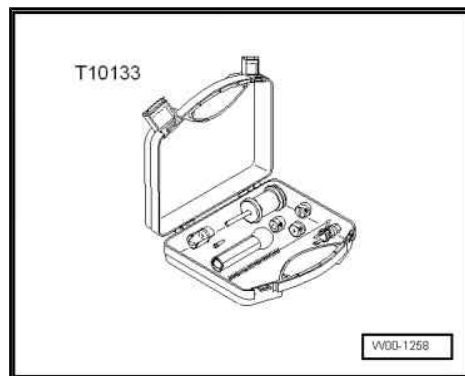
- ◆ Universal dial gauge bracket - VW 387-
- ◆ Valve lever - VW 541/1 A- with press tool for VW 541 / 1 A and 2037 - VW 541/5-
- ◆ Valve assembly device - 2036- with securing plates -2036 / 1-
- ◆ Socket XZN 10 - 3410-
- ◆ Dial gauge - VAS 6079-
- ◆ Special wrench, long reach - T10054-
- ◆ Puller - T10312-



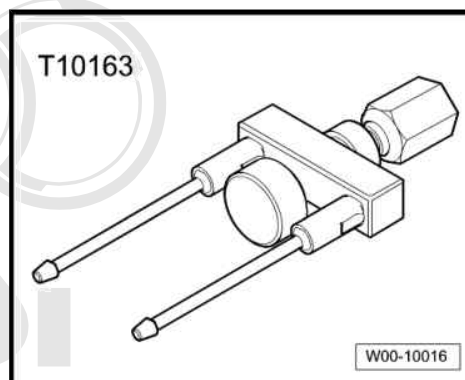
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- ◆ Screw striker - T10133/3- from tool set for FSI engines - T10133-

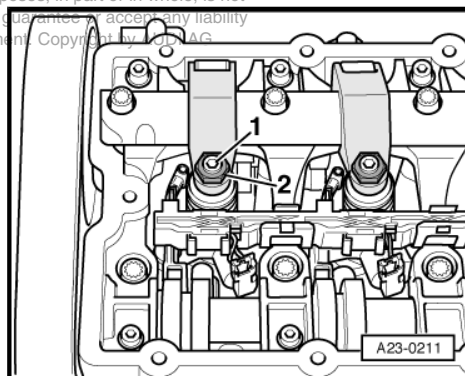


- ◆ Puller - T10163-



## Removing

- Remove cylinder head cover ⇒ Rep. gr. 15 .
- Loosen the lock nuts -2- of the adjuster screws -1- on all unit injectors.
- Unscrew the adjuster screws until each rocker arm touches the tappet spring of the unit injector.



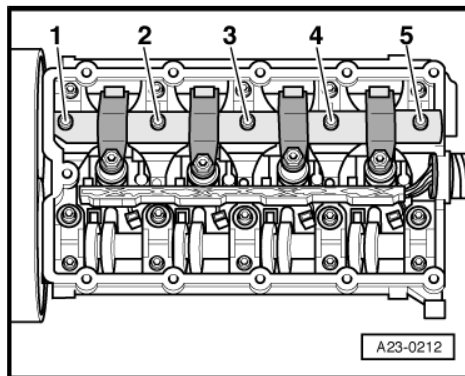
- Unscrew bolts -1, 3, 5- using socket - 3410- .
- Unscrew bolts -2- and -4- using socket - 3410- alternately in several stages.



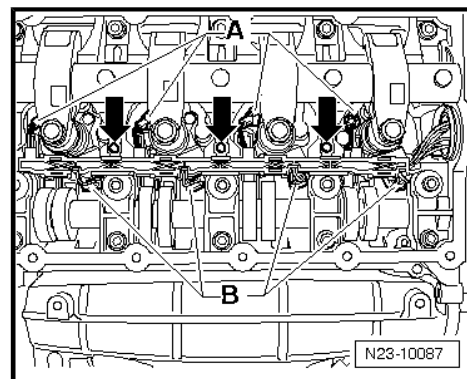
## Note

*Do not pull bolts out of rocker arm shaft so that components remain attached to shaft. If necessary mark position on rocker arm.*

- Detach rocker arm shaft.



- Detach electrical connectors at glow plugs -A-.
- Working from the side, slide puller - T10312- onto electrical connector -B- on unit injector.

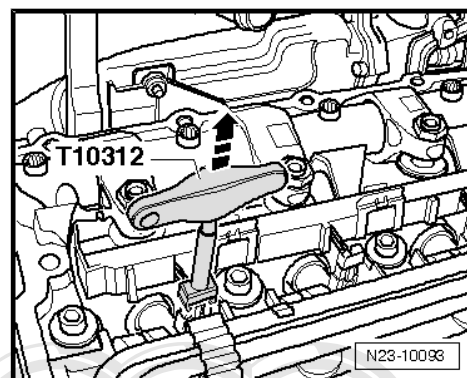


- Pull off electrical connector using puller - T10312- -arrow-.



#### Note

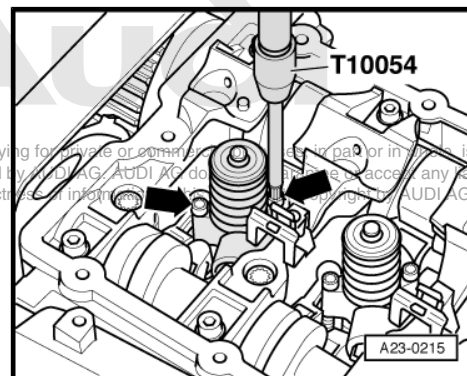
*Puller - T10312- must be used to unplug electrical connectors on piezo unit injectors.*



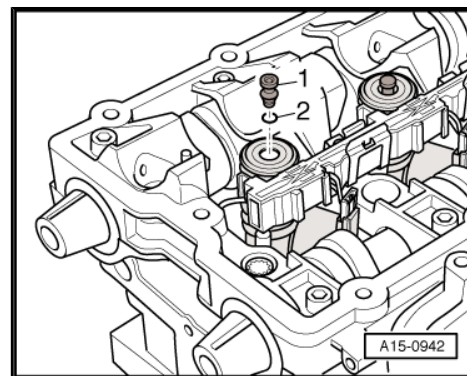
#### Caution

*Only slacken or tighten the bolts at the retaining clips when removing and installing unit injectors. If the electrical wiring harness is released from the retaining clips, the clips will become bent and this may lead to a break in the wiring because of the increased amount of play.*

- Remove bolts -arrows- at retaining clips and move entire electrical wiring harness clear to one side.
- Unscrew bolts -arrows- with special wrench (long reach) - T10054- .



- Pull out ball stud -1- from unit injector to be removed.



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- Insert puller - T10163- in bolt holes on unit injector.
- Turn spindle -A- down lightly onto the unit injector. Hand-tighten lock nut -B-.
- By tapping gently with screw striker -T10133/3- , lift the unit injector upwards out of its seat in the cylinder head.



### Note

Mark cylinder numbers of unit injectors for re-installation.

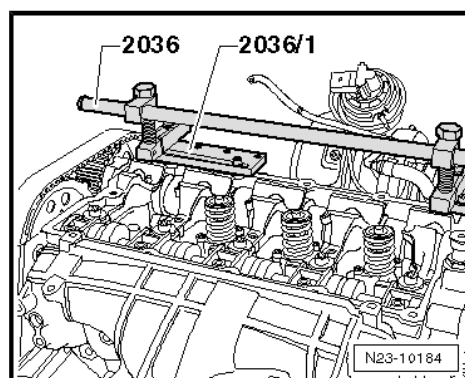
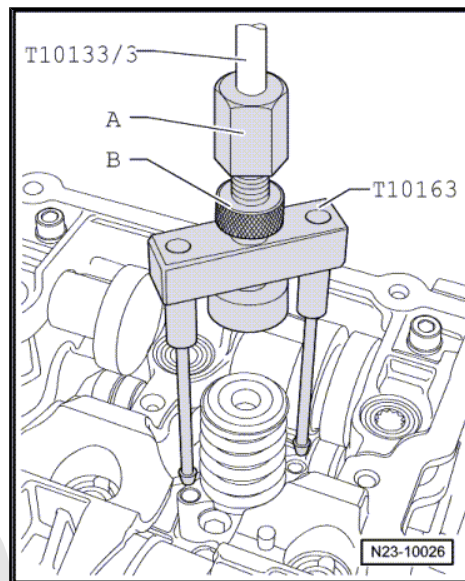
## Installing and adjusting



### Note

- ◆ Renew bolts on unit injectors.
- ◆ Before installation oil O-rings and guide in cylinder head.
- ◆ New unit injectors are supplied with new O-rings.
- ◆ When installing a new unit injector, you must also renew the appropriate adjuster screw in rocker arm.
- ◆ When re-installing the old unit injector, you must replace the O-rings ⇒ [page 38](#) .
- ◆ Whenever an operation requires adjustment of a unit injector, the adjuster screw in the rocker arm and the ball stud of the unit injector must be cleaned and examined for signs of wear. Ball stud and adjuster screw must be renewed if signs of wear are found.
- ◆ Grease the contact surfaces between the ball stud and adjuster screw with grease for clutch plate splines - G 000 100- (contact surfaces do not have to be greased when using new ball studs).

- Before installing unit injector check that both O-rings are properly seated.
  - The O-rings must not be twisted.
  - The O-ring marked white is located in the lower groove on the unit injector.
- Lubricate seals and body of unit injector.
- Check seat of unit injector in cylinder head for dirt and any foreign particles (metal shavings/carbon etc.) and blow out with compressed air if necessary.
- Insert unit injector very carefully into cylinder head seat.
- Fit valve assembly device - 2036- with securing plates -2036/1- onto retaining frame of cylinder head as shown.



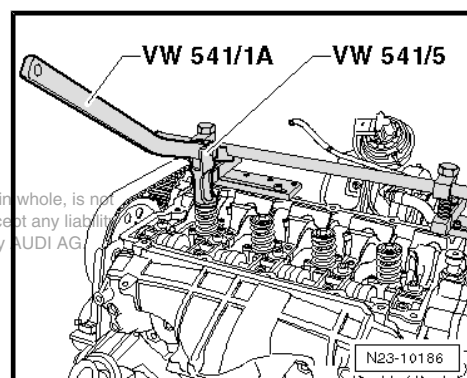
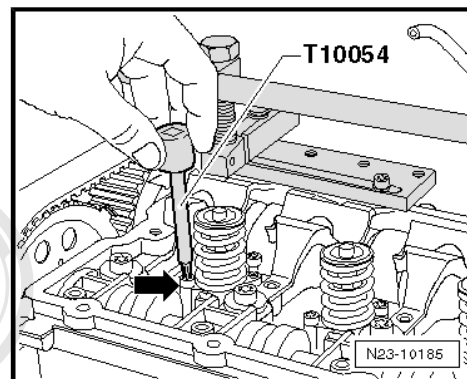


### Caution

*If the unit injector is pulled down by the securing bolts, there is a danger that the unit injector will be drawn into its seat at an angle. This may subsequently lead to engine running problems and starting problems. For this reason the unit injector must be pressed into its seat first and may be tightened only then.*

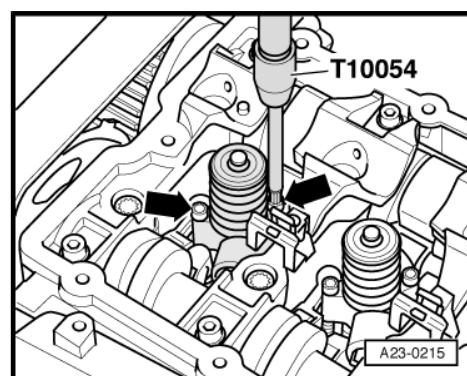
- Insert new securing bolts and carefully screw in by hand without applying force until they make contact -arrow-.
- Then fit valve lever - VW 541/1 A- using press tool -VW 541/5- .
- Carefully press unit injector into its seat using valve lever - VW 541/1 A- while keeping the force applied.
- Then screw in securing bolts for unit injector by hand without applying force using special wrench (long reach) - T10054- until they make contact.

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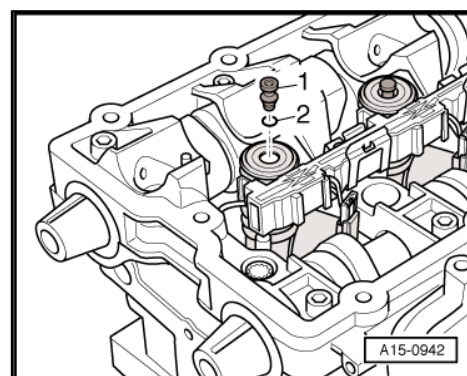


- Tighten bolts for unit injectors -arrows- as follows:

1. Tighten with torque wrench to 3 Nm.
2. Turn 90° (1/4 turn) further using a rigid wrench.
3. Turn 180° (1/2 turn) further using a rigid wrench.

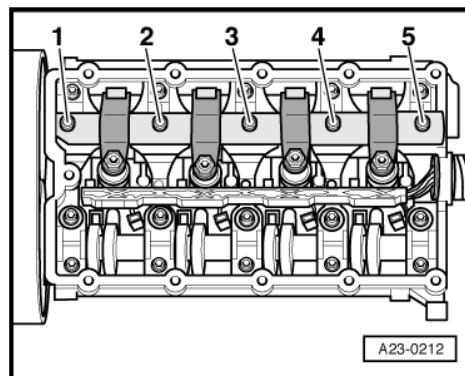


- Before installing rocker arm shaft, check that all ball studs -1- and O-rings -2- are fitted in unit injectors.

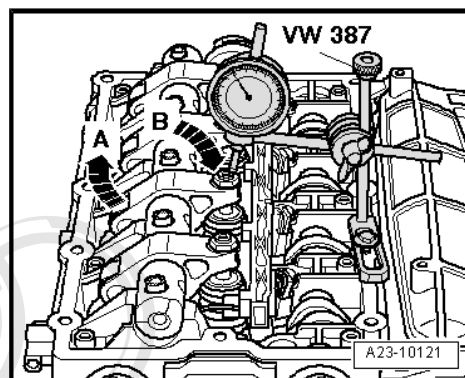


– Secure the rocker arm shaft as follows:

1. Tighten bolts -2- and -4- alternately in several stages until rocker arm shaft lies on bearing frame.
2. Tighten bolts -1-, -3- and -5- to 20 Nm + 90° (1/4 turn).
3. Tighten bolts -2- and -4- to 20 Nm + 90° (1/4 turn).



- Apply dial gauge - VAS 6079- to adjuster screw of unit injector, as shown in illustration.
- Turn crankshaft in direction of engine rotation until roller of rocker arm is located at tip of drive cam.
- Roller side of rocker arm -arrow A- is at highest point.
- Dial gauge -arrow B- is at lowest point.
- Remove dial gauge.
- Now turn the adjuster screw into rocker arm until significant resistance can be felt (unit injector is at limit stop).

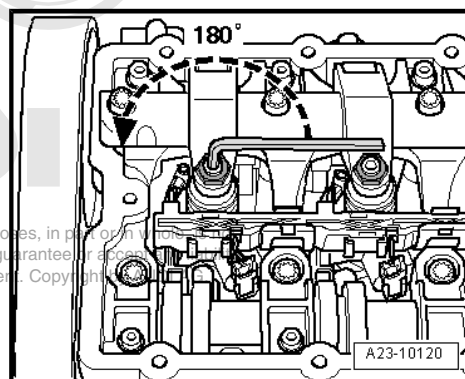


- Turn adjuster screw 180° back off stop.
- Hold adjuster screw in this position and tighten lock nut to 30 Nm.

Remaining installation steps are carried out in reverse sequence; note the following:

- Install cylinder head cover ⇒ Rep. gr. 15 .

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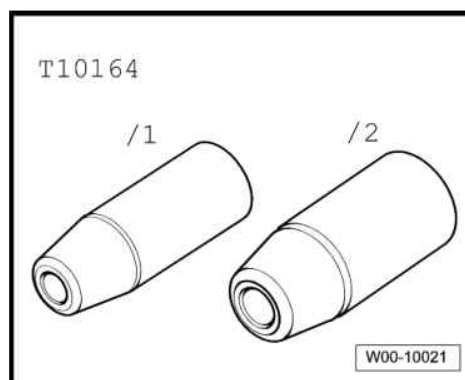


## 1.23 Renewing O-rings for unit injectors

Special tools for unit injectors with solenoid valve:

Special tools and workshop equipment required

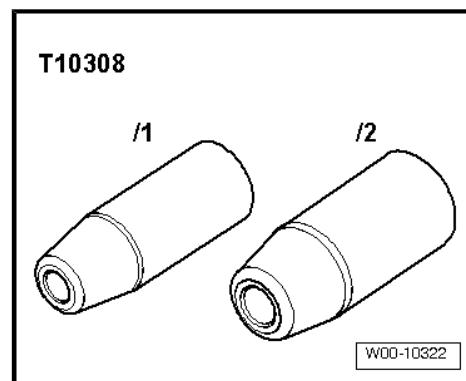
- ◆ Assembly sleeves - T10164-



Special tools for piezo-type unit injectors (these can be identified from octagonal fitting at end of injector body):

Special tools and workshop equipment required

◆ Assembly sleeves - T10308-



**Removing**

- Remove unit injector ➔ [page 33](#) .
- Pry old O-rings very carefully off unit injector using a suitable tool of soft material.
- Important: Ensure that no burrs are formed at the O-ring seats.

**Installing**



**Note**

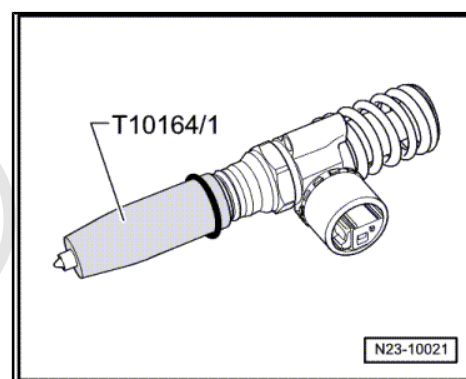
- ◆ *Always use the assembly sleeves to fit the O-rings. There is a danger of damaging the O-rings if the sleeves are not used. The procedure is the same for both types of assembly sleeve.*
- ◆ *Take care to ensure correct allocation of O-rings to grooves.*
- ◆ *Prevent the O-rings from rolling when sliding them on. The O-rings must not be twisted when seated in the groove on the unit injector.*
- Clean seating grooves for O-rings on unit injector very carefully.
- Fit assembly sleeve - T10164/1- or assembly sleeve - T10308/1- onto unit injector, pushing it on as far as the stop.



**Note**

*Push the O-rings into position when assembling: do not roll them on. They must not be twisted when seated in the groove on the unit injector.*

- Push upper (thicker) O-ring carefully onto assembly sleeve and into groove on unit injector.
- Remove assembly sleeve.

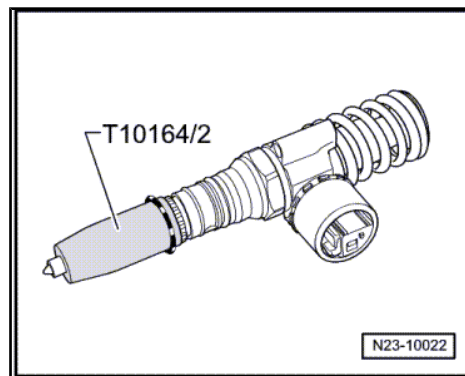


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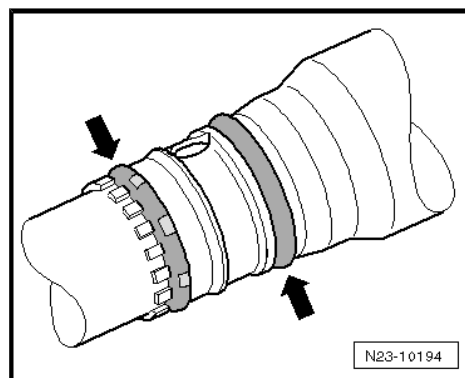
- Fit assembly sleeve - T10164/2- or assembly sleeve - T10308/2- onto unit injector, pushing it on as far as the stop.
- Push the middle, thinner O-ring carefully onto the assembly sleeve and into the seat on the unit injector.

Unit injectors with solenoid valve ➔ [page 40](#)

Piezo-type unit injectors (these can be identified from octagonal fitting at end of injector body) ➔ [page 40](#)

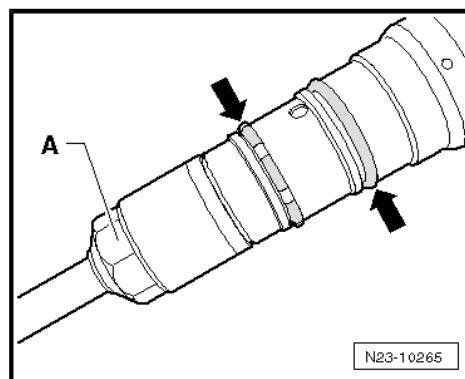


**Position of O-rings -arrows- for unit injectors with solenoid valve**



**Position of O-rings -arrows- for piezo-type unit injectors (these can be identified from octagonal fitting -A- at end of injector body)**

- Remove assembly sleeve.
- Install unit injector ➔ [page 33](#) .



## 1.24 Cleaning unit injectors (BMN, BUY)

### Special tools and workshop equipment required

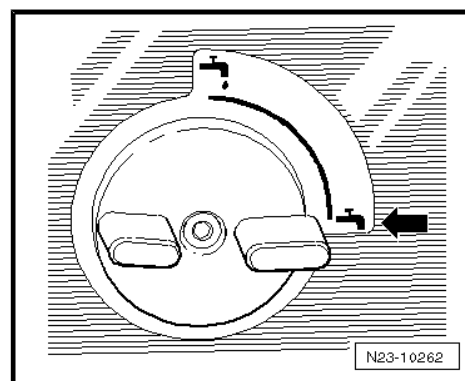
- ◆ Ultrasonic cleaning unit - VAS 6418-
- ◆ Mounting plate for diesel injectors - VAS 6418/3-
- ◆ Cleaning solution for unit injector - D 600 300 A2-

 **Note**

- ◆ *Mounting plate for diesel injectors - VAS 6418/3- must be used to clean unit injectors. Never immerse the complete unit injector in the cleaning solution.*
- ◆ *The unit injectors must be brought into service on the day on which they were cleaned in order to rule out the possibility of corrosion being caused by the cleaning solution.*
- ◆ *To reduce the time required to heat the cleaning solution, it is recommended to add warm tap water and put the lid onto the cleaning unit.*
- ◆ *Change the cleaning solution once a week and clean a maximum of five sets of unit injectors per bath.*
- ◆ *Top up evaporated cleaning solution with tap water.*
- ◆ *Do not clean any other components in the cleaning solution.*
- ◆ *Do not use wire brushes, abrasive tools or similar to clean the outside of the unit injectors mechanically.*
- ◆ *Renew O-rings, ball studs, adjuster screws and securing bolts.*

**Procedure**

- Close drain tap -arrow- on ultrasonic cleaning unit - VAS 6418- (located on right side of housing).
- Fill cleaning unit with 1980 ml of tap water and 220 ml of cleaning solution - D 600 300 A2- .

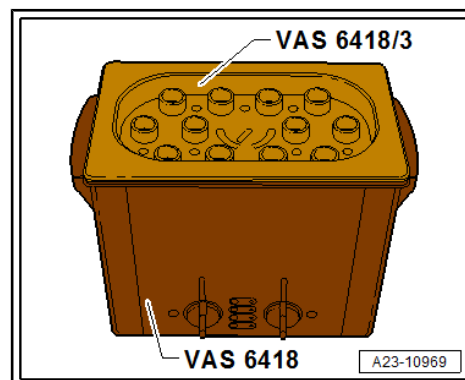


- Place mounting plate for diesel injectors - VAS 6418/3- on top of cleaning unit.

 **WARNING**

*The ideal fluid level is approx. 1-4 mm above the base of the mounting plate. The ultrasonic cleaning unit - VAS 6418- can be damaged if the fluid level is too low.*

*It is important to read the safety notes in the operating instructions before switching on the ultrasonic cleaning unit - VAS 6418- .*



- Insert unit injectors into receptacles on mounting plate for diesel injectors - VAS 6418/3- .

- Switch on cleaning unit by pressing **on/off** button -C-.
- Turn rotary temperature control -B- until LED for heating temperature is at 70 °C.
- Turn rotary control for operating time -A- to “∞” -arrow- (continuous operation).
- Press **▶** -D- button for longer than 2 seconds to start unit running.



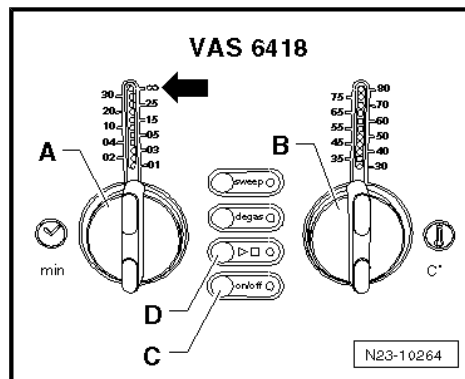
### Note

- ◆ *The temperature-controlled cleaning process is now started. While the fluid is being heated, the ultrasound is activated at intervals in order to circulate the cleaning solution. The ultrasound is activated continuously when the preselected temperature is reached.*
  - ◆ *The actual cleaning process commences when the temperature reaches at least 70 °C and must last for at least 90 minutes.*
- After 90 minutes, switch off cleaning process by pressing **▶** button -D-.
  - Remove unit injectors from mounting plate. Allow unit injectors to dry in ambient air for max. 1 hour.
  - Re-install unit injectors ➔ [page 33](#) .



### Caution

***The unit injectors must be brought into service on the day on which they were cleaned in order to rule out the possibility of corrosion being caused by the cleaning solution.***



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## 1.25 Electrical wiring harness for unit injectors and glow plugs - exploded view

# 1 - Electrical connector

- ☐ For glow plug connector

# 2 - Retaining clip



## Caution

*Only slacken or tighten the bolts at the retaining clips when removing and installing the electrical wiring harness. If the electrical wiring harness is released from the retaining clips, the clips will become bent and this may lead to a break in the wiring because of the increased amount of play.*

# 3 - 10 Nm

# 4 - Adapter ring

- ☐ Make sure it is correctly positioned when installing

# 5 - Main connector

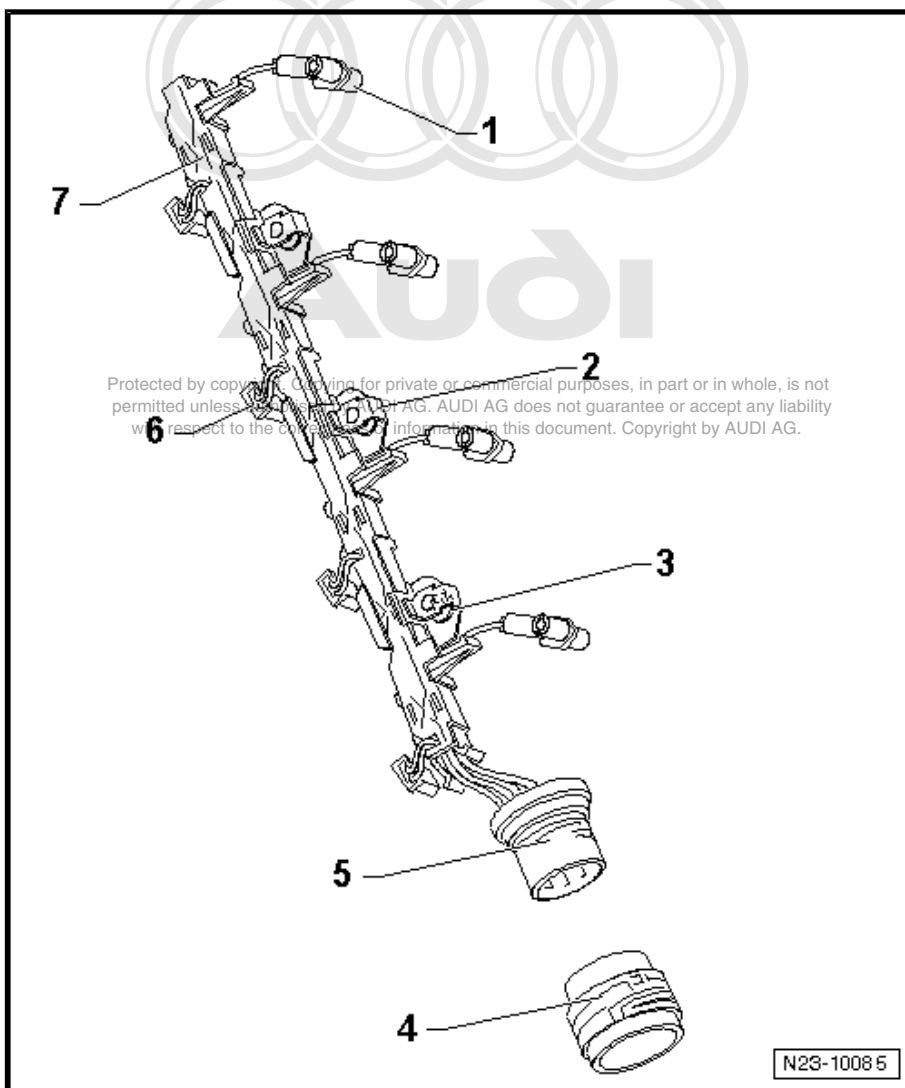
- ☐ Make sure it is correctly positioned when installing
- ☐ Note installation position of retaining clip  
⇒ [page 45](#)

# 6 - Electrical connector

- ☐ For unit injector
- ☐ To remove, use puller - T10312-

# 7 - Electrical wiring harness

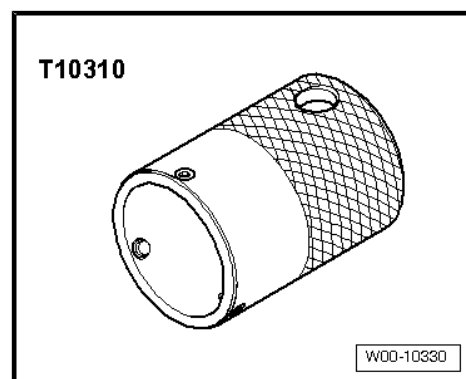
- ☐ Only fit or remove together with -item 2-



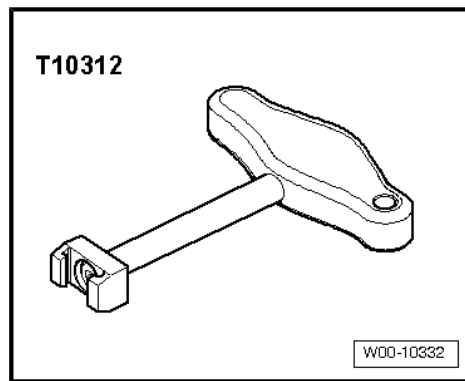
## 1.26 Removing and installing electrical wiring harness for unit injectors and glow plugs

### Special tools and workshop equipment required

- ◆ Special wrench - T10310-



# ♦ Puller - T10312-



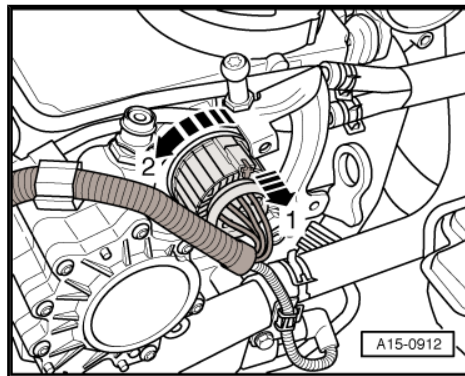
## Removing

- Remove air cleaner (top section)  
⇒ ["1.10 Removing and installing air filter element", page 18](#) .
- Remove cylinder head cover ⇒ Rep. gr. 15 .
- To unplug multi-pin connector for unit injectors and glow plugs, pull release pin -arrow 1- and slacken knurled nut -arrow 2-.



## Note

*Puller - T10312- must be used to unplug electrical connectors on piezo unit injectors.*

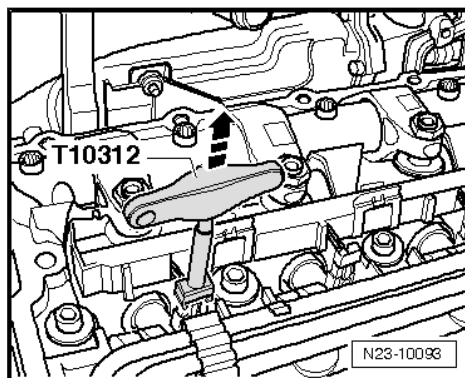


- Working from the side, slide puller - T10312- onto electrical connector on unit injector and pull off connector -arrow-.

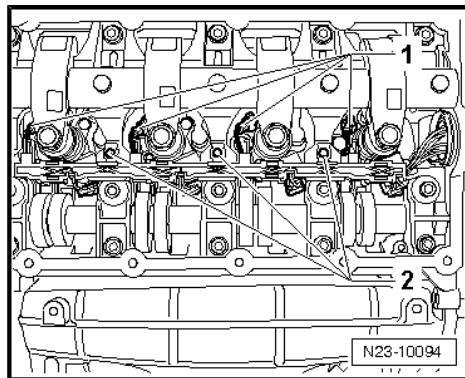


## Caution

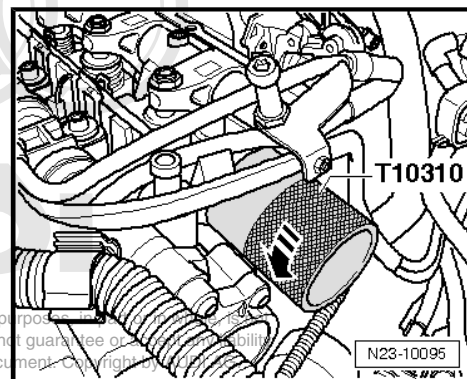
*Only slacken or tighten the bolts at the retaining clips when removing and installing the electrical wiring harness. If the electrical wiring harness is released from the retaining clips, the clips will become bent and this may lead to a break in the wiring because of the increased amount of play.*



- Unplug electrical connectors on glow plugs -1-.
- Remove bolts 2- at retaining clips and detach entire electrical wiring harness.



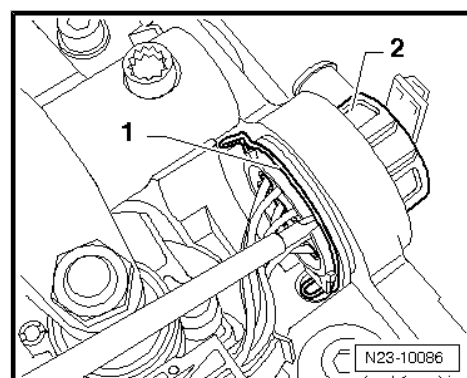
- Apply special wrench - T10310- to adapter ring and slacken by turning 90° in anti-clockwise direction -arrow-.



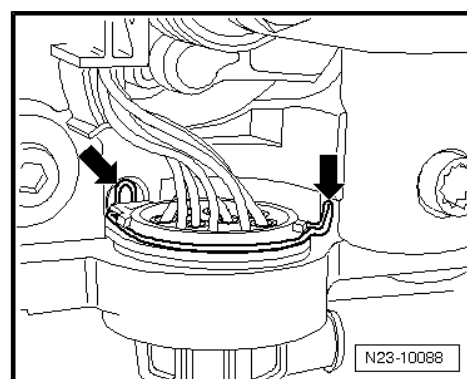
- Pull retaining clip -1- slightly upwards using a screwdriver and push through main connector -2- towards inside.

#### Installing

- Insert wiring harness and tighten bolts at retaining clips.



- Guide main connector through opening in bearing frame.
- Fit retaining clip.
- The lugs -arrows- must return to the position as shown in illustration.



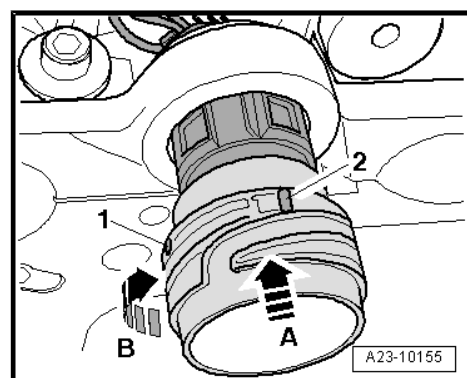
- Fit adapter ring at main connector -arrow A-.
- Long green line -2- faces upwards.
- Tighten adapter ring with special wrench - T10310- by turning 90° in clockwise direction -arrow B-.
- Short green line -1- now faces upwards.

Remaining installation steps are carried out in reverse sequence; note the following:

- Install cylinder head cover ⇒ Rep. gr. 15 .

#### Tightening torque

| Component                                  | Nm |
|--------------------------------------------|----|
| Electrical wiring harness to cylinder head | 10 |

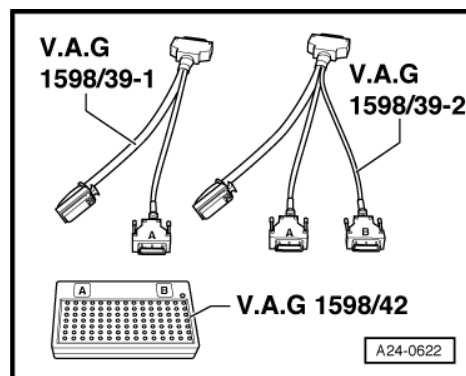


## 1.27 Wiring and component check with test box - V.A.G 1598/42-



### Note

- ♦ The test box - V.A.G 1598/42- has 105 sockets. It can be connected to the engine control unit via 2 different adapter cables.
- ♦ The engine control unit is connected to the vehicle's wiring harness via two connectors, one of which has 60 pins, the other has 94 pins.
- ♦ 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 instructions for performing the individual tests indicate whether or not the engine control unit itself also needs to be connected to the test box.
- ♦ Always use auxiliary measuring set - V.A.G 1527B- to connect test equipment (e.g. voltage tester - V.A.G 1526C- , hand-held multimeter - V.A.G 1594C- etc.).



The engine control unit has to be removed before connectors can be unplugged from engine control unit ⇒ [page 47](#) .



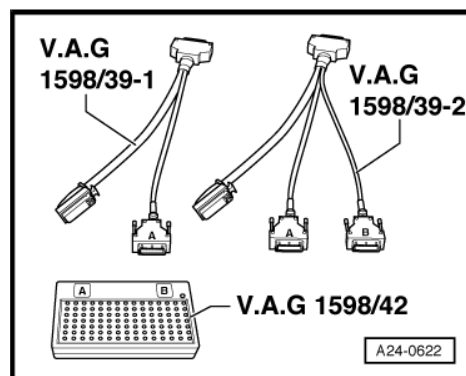
### Caution

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

- 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 relevant repair procedure.
- After completing tests re-install engine control unit ⇒ [page 49](#) .

After re-connecting the engine control unit the following operations must be performed:

- Interrogate event memory and erase if necessary ⇒ Vehicle diagnostic tester.

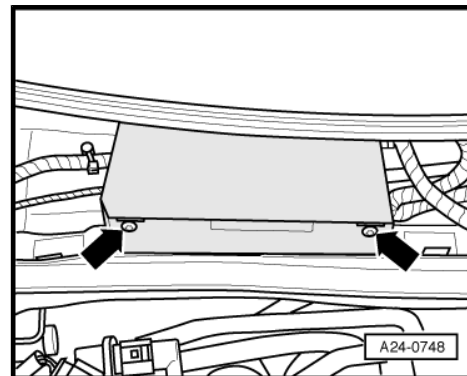


## 1.28 Removing and installing engine control unit



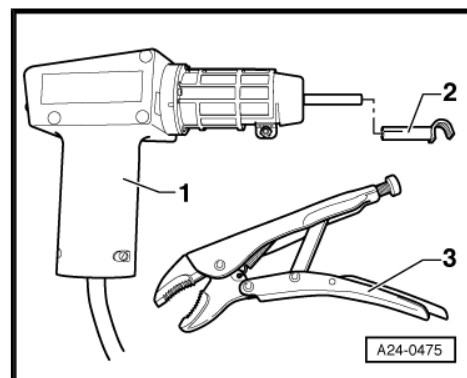
### Note

- ◆ The engine control unit is bolted to its protective housing. To make it more difficult to unscrew the shear bolts -arrows-, their threads have additionally been coated with locking fluid.
- ◆ The protective housing has to be removed before the connectors can be unplugged from the engine control unit (e.g. to connect the test box or renew the engine control unit).



### Special tools and workshop equipment required

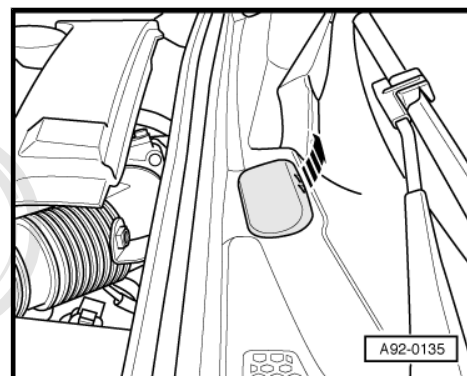
- ◆ Hot air blower - VAS 1978/14A- -item 1- with nozzle attachment -2- from wiring harness repair set - VAS 1978 B-



- ◆ Vice-grip pliers -3- (commercially available)

### Removing

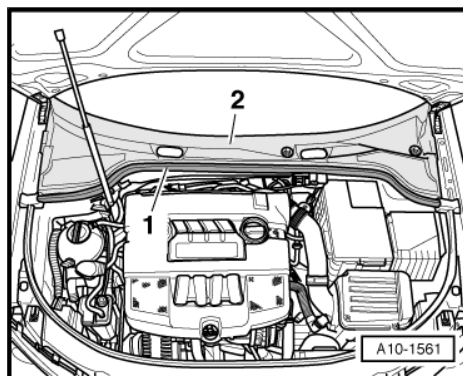
- When renewing the engine control unit, select the test procedure / function "Renew engine control unit" in "Guided Functions" ⇒ Vehicle diagnostic tester.
- Remove windscreen wiper arms ⇒ Rep. gr. 92 .
- Unclip washer jets -arrow-.
- Push washer jet through assembly opening back into plenum chamber, leaving hoses connected.



- Pull off rubber seal -1- on plenum chamber cover.
- Detach plenum chamber cover -2-.


**Caution**

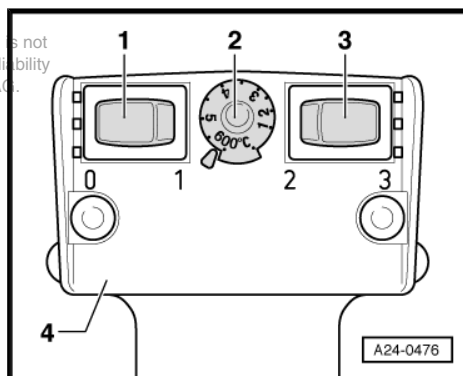
*The following procedure must be followed exactly to prevent any damage (burning) to wiring, connectors, insulation and control units. Observe operating instructions for hot air blower.*



- 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".

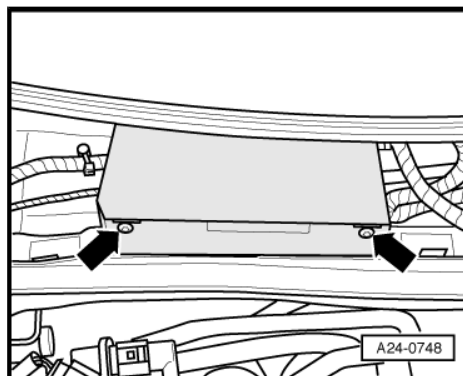

**Note**

- ◆ Then use hot air blower to heat threaded holes in protective housing into which shear bolts have been screwed. This reduces the inhibiting action of the locking fluid on the shear bolt threads and makes it easier to unscrew these bolts.
- ◆ Cover up all painted parts to avoid any damage caused by hot air blower or vice-grip pliers.


**WARNING**

*Parts of the protective housing will become very hot as a result of heating the shear bolts. Take care to avoid burns. Try to ensure that only the thread is heated and none of the nearby components. These should be covered if necessary.*

- Carry out the following operations on the two shear bolts -arrows-, one after the other.
- Place the nozzle of the hot air blower close to the shear bolt on the protective housing.
- Switch on the hot air blower and heat the bolt for approximately 20 ... 25 seconds.
- Then grasp the bolt head with the vice-grip pliers and unscrew the shear bolt.
- Take off the protective housing.

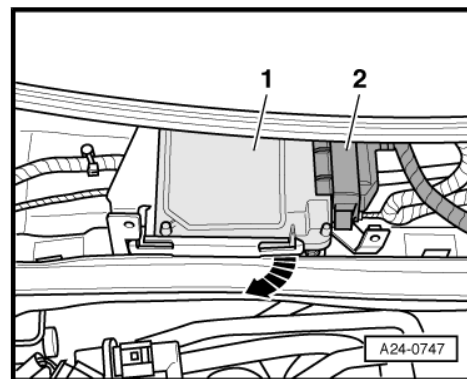


- Release and unplug front connector -2- on engine control unit.
- Release retaining clip -arrow-.
- Pull engine control unit -1- out of bracket.
- Release and unplug rear connector on engine control unit.



#### Note

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



#### Installing

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

- Protective housing must be fitted back on engine control unit.
- Clean threaded holes for shear bolts to remove any residue from locking fluid. This can be done using a thread tap.
- Use new shear bolts.
- Install windscreen wiper arms ⇒ Rep. gr. 92 .

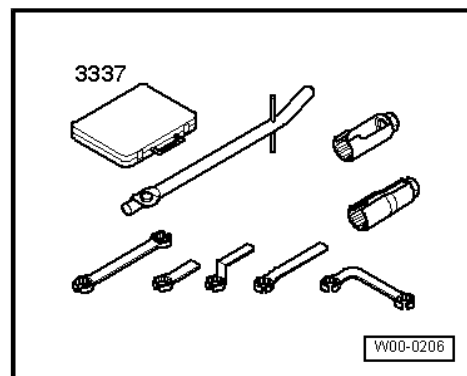
After installing a new engine control unit, the following operation must be performed:

- Activate engine control unit in “Guided Functions” under the test procedure / function “Renew engine control unit” ⇒ Vehicle diagnostic tester.

### 1.29 Removing and installing Lambda probe - G39- with Lambda probe heater - Z19-

#### Special tools and workshop equipment required

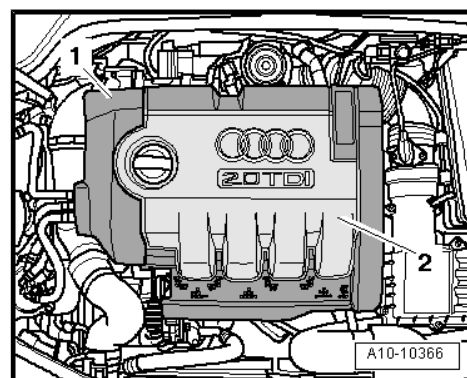
- ◆ Lambda probe open ring spanner set - 3337-



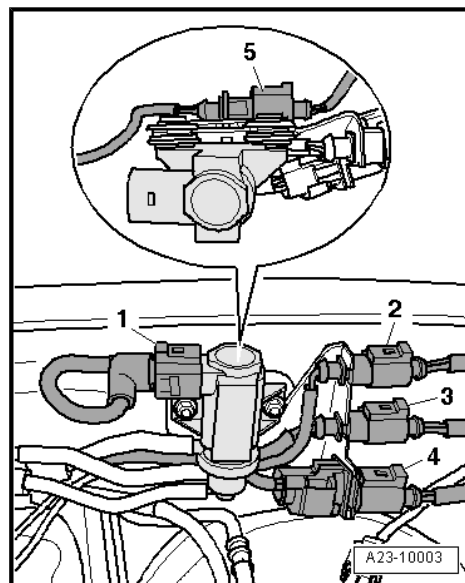
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#### Removing

- Lift off outer engine cover panel -1- by pulling up evenly.



- Unplug electrical connector -4- for Lambda probe - G39- and move wiring clear.



- Unscrew Lambda probe -3- using tool from Lambda probe open ring spanner set - 3337- .

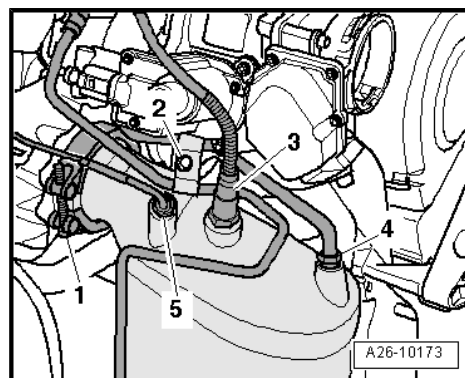
### Installing

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



#### Note

- ◆ *Threads of new Lambda probes are already coated with assembly paste; the paste must not get into the slots on the probe body.*
- ◆ *In the case of a used Lambda probe grease only the thread with high-temperature paste. The paste must not get into the slots on the Lambda probe body. For high-temperature paste refer to ➔ Electronic parts catalogue*
- ◆ *When installing, the Lambda probe wiring must always be re-attached at the same locations to prevent it from coming into contact with the exhaust pipe.*



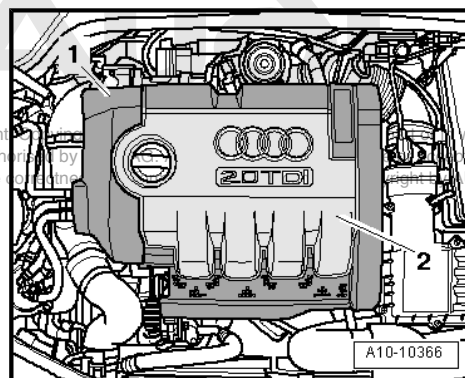
### Tightening torque

| Component                                 | Nm |
|-------------------------------------------|----|
| Lambda probe - G39- in particulate filter | 55 |

## 1.30 Removing and installing exhaust gas pressure sensor 1 - G450-

### Removing

- Lift off outer engine cover panel -1- by pulling up evenly.



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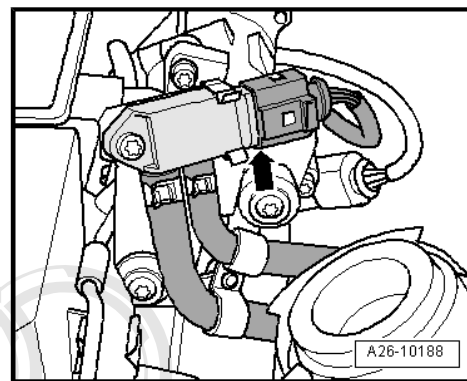
- Unplug electrical connector -arrow-.
- Unbolt pressure sensor from bracket.
- Identify hoses on exhaust gas pressure sensor 1 - G450-  
-item 1- for re-installation.



#### Note

*Shown from rear with engine removed for illustration purposes.*

- Release hose clips and spray both hoses with silicone-free lubricant.
- Carefully disconnect the hoses from their connections (take care to keep the hoses straight: the connections can break off easily).



#### Installing

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



#### Note

**Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Parts catalogue .**

- Blow through hoses (towards particulate filter) with compressed air.
- Connect hoses to exhaust gas pressure sensor 1 - G450- according to markings made earlier.

#### Tightening torque

| Component                                        | Nm |
|--------------------------------------------------|----|
| Exhaust gas pressure sensor 1 - G450- to bracket | 8  |

## 28 – Glow plug system

### 1 Glow plug system

#### 1.1 Removing and installing glow plugs

Engine codes AZV, BKD:

- ◆ These engines are fitted exclusively with metal glow plugs.

Removing and installing metal glow plugs ⇒ [page 55](#)

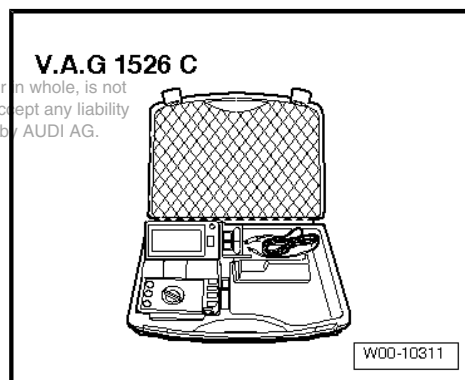
Engine codes BMN, BUY with diesel particulate filter

- ◆ These engines are fitted exclusively with ceramic glow plugs, which are colour-coded with a “white, or possibly silver-coloured” seal.

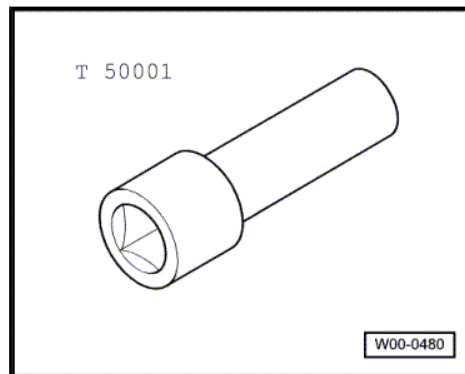
Special tools and workshop equipment required

- ◆ Hand-held multimeter - V.A.G 1526C-

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- ◆ Socket - T50001-



- ◆ Torque wrench
- ◆ Hose - N 020 150 05- approx. 250 mm long

## Removing ceramic glow plugs



### Caution

- ◆ *Due to the special properties of the material used, ceramic glow plugs are easily damaged and require extra care when handling and removing/installing.*
- ◆ *Transport and store only in original packaging or packed separately in bubble wrap.*
- ◆ *Do not remove new ceramic glow plugs from packaging until they are ready to be fitted.*
- ◆ *Ceramic glow plugs are sensitive to knocks and bending. For this reason, ceramic glow plugs which have been dropped (even from a height of only about 2 cm) must not be installed, even if no damage is apparent (hair-line cracks may not be visible).*
- ◆ *Always install a new ceramic glow plug if you are not sure the old one is in perfect condition.*
- ◆ *Damaged glow plugs (e.g. heater pin of the glow plug is damaged) will invariably cause engine damage.*
- ◆ *If the heater pin of the glow plug is damaged, the fragments must be removed from the combustion chamber before starting the engine for the first time, otherwise this will invariably cause mechanical damage (piston seizure). If necessary, the cylinder head must be removed.*
- ◆ *To check compression, select function "Self-diagnosis compatible systems" in "Guided Fault Finding" ⇒ Vehicle diagnostic tester.*
- ◆ *The ceramic glow plugs must not be removed when checking cylinder compression.*
- ◆ *The software of the engine control unit is specifically adapted to either the ceramic or the metal glow plugs, so it is important to install the correct type.*
- ◆ *Mixed installation of ceramic glow plugs and metal glow plugs on the same engine is not permissible.*

## Removing

- Before removal, the ceramic glow plugs must be burnt clean using the "Final control diagnosis" function ⇒ Vehicle diagnostic tester.
- Remove cylinder head cover ⇒ Rep. gr. 15
- Detach electrical connectors at glow plugs.



### Caution

*When loosening a ceramic glow plug, do not exceed the maximum release torque of 20 Nm. When loosening, always use socket - T50001- and a torque wrench.*

- Carefully slacken glow plug. Do not exceed the maximum release torque of 20 Nm.

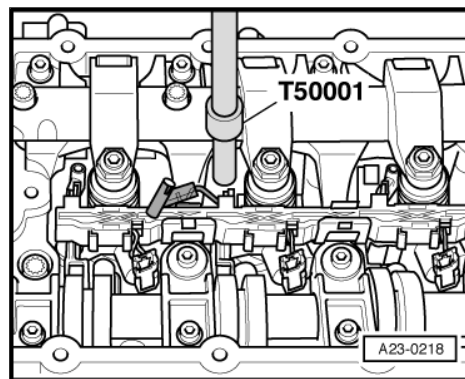
If the glow plug cannot be unscrewed with the maximum permitted torque of 20 Nm:

- Apply a suitable release agent (commercially available) and then try to unscrew the glow plug again.



#### Note

*If it is still not possible to slacken the glow plug with the maximum release torque of 20 Nm after applying the release agent, remove the cylinder head and then unscrew the glow plug.*



- Fit hose - N 020 150 05- (approx. 250 mm long) onto glow plug and unscrew glow plug, taking care to keep it straight.
- Carefully pull ceramic glow plug out from above using hose. Take care to prevent glow plug from contacting other parts.

#### Installing



#### Caution

- ♦ **IMPORTANT: always observe the precautions listed above.**
- ♦ **The threads in the cylinder head and on the ceramic glow plugs must be dry, and free of oil and grease.**

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- Clean combustion deposits out of glow plug openings in cylinder head before installing glow plugs.
- Screw in ceramic glow plugs finger-tight.



#### Caution

***It is most important to keep to the specified tightening torque for the glow plugs (threads dry, and free of oil and grease). The heater pins of the glow plugs can break if this torque setting is not observed, which would invariably cause engine damage.***

- ♦ Tightening torque: 12 Nm

Check function of ceramic glow plugs after installation and before starting engine for the first time.

- Connect multimeter (resistance test) to contact and body of glow plug.
- Specification: less than 1 Ω

If specification is exceeded (resistance more than 1 Ω):

- Remove ceramic glow plug again and check whether the heater pin is broken.



#### Caution

*If the heater pin is broken, the fragments must be completely removed from the combustion chamber before starting the engine for the first time, otherwise this will invariably cause mechanical damage (piston seizure). If necessary, the cylinder head must be removed.*

- Re-attach electrical connectors, making sure that they are securely seated.
- Additionally check ceramic glow plugs via self-diagnosis ⇒ Vehicle diagnostic tester.
- 1. Interrogate and erase event memory of engine control unit. Do not start engine.
- 2. Perform final control diagnosis.
- 3. Interrogate event memory of engine control unit once again. Do not start engine.



#### Note

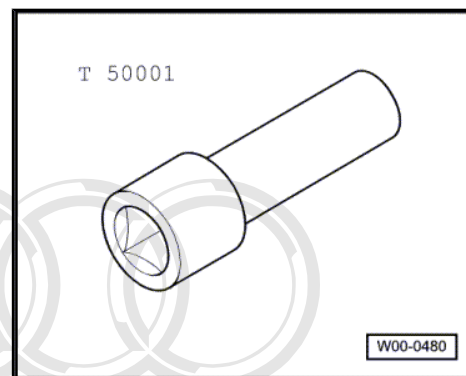
*The engine must not be started if the event memory has registered a fault relating to the ceramic glow plugs.*

- Check electrical wiring and connectors, make sure connectors are securely seated.

## 1.2 Removing and installing metal glow plugs

### Special tools and workshop equipment required

- ◆ Socket - T50001-



### Removing

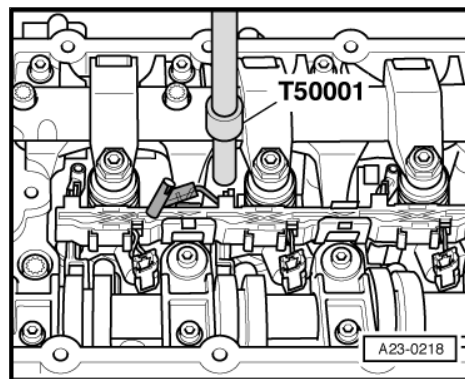
- Switch off ignition.
- Remove engine cover panel.
- Remove cylinder head cover ⇒ Rep. gr. 15.
- Detach electrical connectors at glow plugs.

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- Remove glow plugs using socket - T50001- .

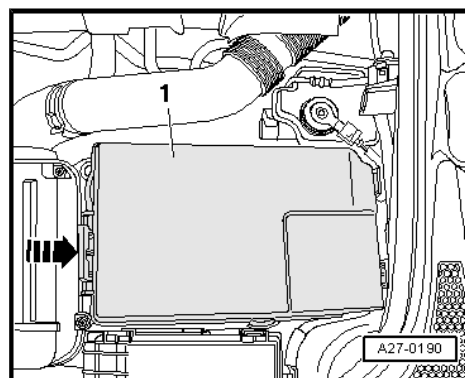
#### Installing

- To tighten the glow plugs use socket - T50001- with a suitable torque wrench.
- Then tighten glow plugs to specified torque.
- ◆ Tightening torque: 12 Nm
- Attach glow plug connectors correctly and make sure they are securely fitted.
- Install cylinder head cover ⇒ Rep. gr. 15 .

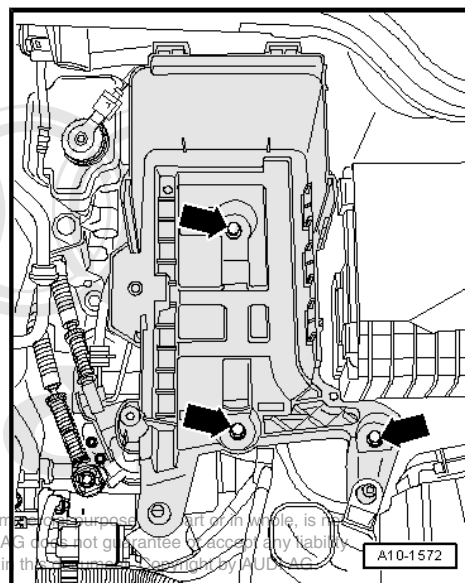


### 1.3 Removing and installing automatic glow period control unit - J179-

- Switch off ignition and remove ignition key.
- Remove cover -1- over battery; to do so, press release tab -arrow-.
- Remove battery ⇒ Rep. gr. 27 .



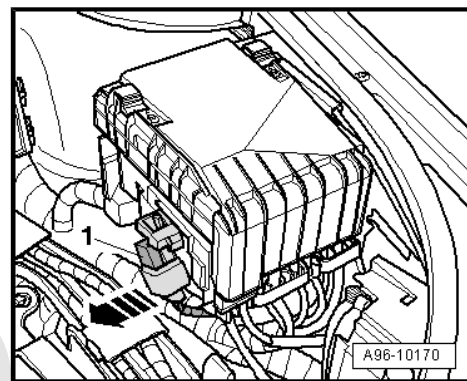
- Remove battery tray -arrows-.
- Detach battery tray from front of air duct.



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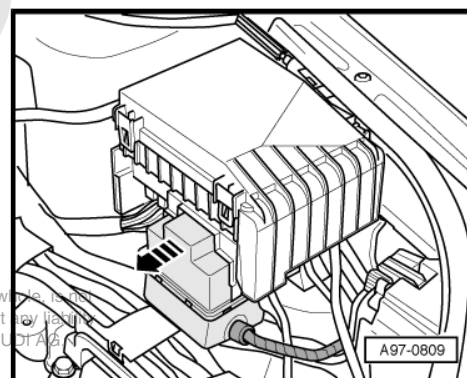
### Removing (version 1):

- Pull out the relay carrier from under the electronics box in engine compartment -arrow-.
- Pull automatic glow period control unit - J179- -item 1- out of relay carrier below electronics box in engine compartment.

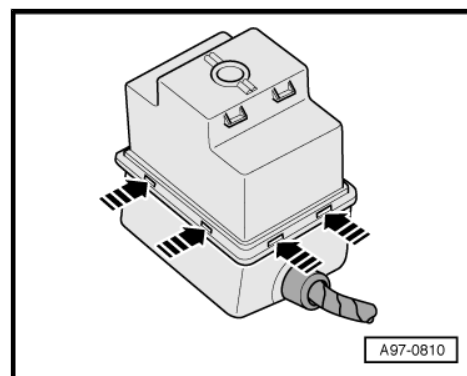


### Removing (version 2):

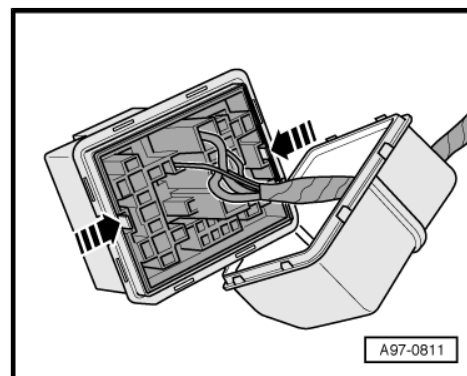
- Pull out the 6-position relay carrier from under the electronics box in engine compartment -arrow-.



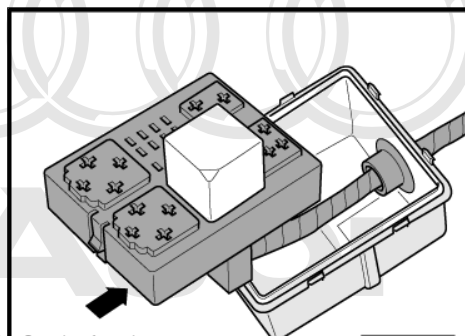
- Unclip the cover of 6-slot relay carrier -arrows-.



- Release retaining clips -arrows-.



- Remove 6-position relay carrier -arrow- from cover.



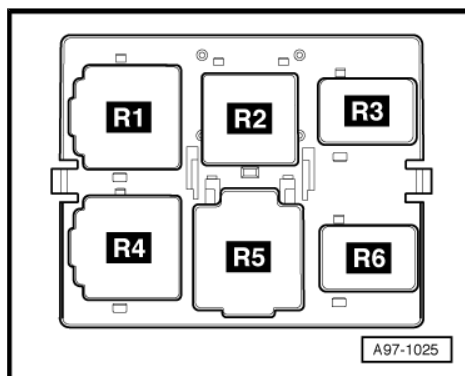
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- Detach automatic glow period control unit - J179- from slot -R2-.

### Installing

Install in reverse order.

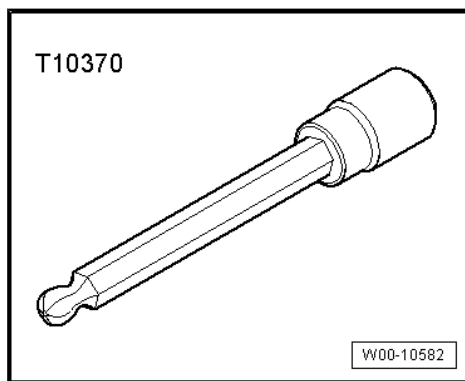
Additional steps must be performed when the battery is re-installed and connected ⇒ Rep. gr. 27 ; Disconnecting and connecting battery in engine compartment.



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

### Special tools and workshop equipment required

- ◆ Socket (4 mm) - T10370-



- ◆ or commercially available ball-head bit (5 mm)



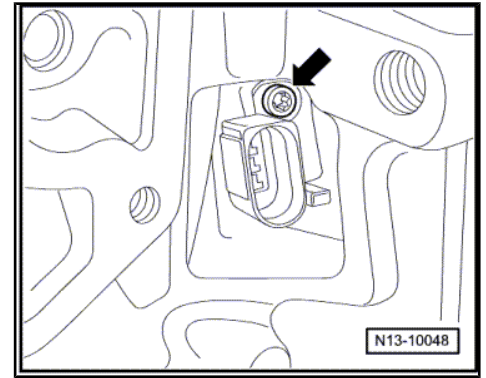
### Note

*Two different bolts are fitted; check which tool is required.*

- Remove noise insulation ⇒ General body repairs, exterior; Rep. gr. 66 ; Body - front; Noise insulation - exploded view .
- Use hose clamps to pinch off coolant hoses at engine oil cooler and detach hoses.
- Remove oil filter bracket.

- Unscrew securing bolt -arrow- and pull out engine speed sender - G28- .

Install in reverse order of removal. Note tightening torque of securing bolt for engine speed sender - G28- : 5 Nm.



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