Workshop Manual

Audi A8 2003 ➢

Direct petrol injection and ignition system (8-cyl. 4.2 ltr. 4-valve)									
Engine ID	BVJ								

Edition 05.2009

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

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

Repair Group

24 - Mixture preparation - injection

28 - Ignition system

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

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.

All rights reserved.
No reproduction without prior agreement from publisher.

Copyright © 2010 Audi AG, Ingolstadt

Contents

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

24 – Mixture preparation - injection

1 Safety precautions and rules for cleanliness

1.1 General notes on self-diagnosis

- The engine control unit has a fault memory.
- Before carrying out any repairs or Fault Finding, the fault memory must be interrogated.
- The vacuum hoses and connections must be checked (to prevent unmetered air).
- Fuel hoses in engine compartment must only be secured with spring-type clips. O-type clips or screw-type clips must not be used.
- A voltage of at least 11.5 V is required for proper operation of the electrical components.
- Do not use sealants containing silicone. Particles of silicone drawn into the engine will not be burnt in the engine and will damage the Lambda probe.
- The vehicles are fitted with a crash/fuel shut-off system. This function is designed to reduce the risk of a vehicle fire after a crash by deactivating the fuel pump via the fuel pump relay.
- At the same time, this system also improves the engine's starting performance. When the driver's door is opened, the fuel pump is activated for approx. 2 seconds in order to build up pressure in the fuel system; observe safety precautions ⇒ page 1 .

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information. Copyright by AUDI AG.

1.2 Safety precautions

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

WARNING

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

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

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

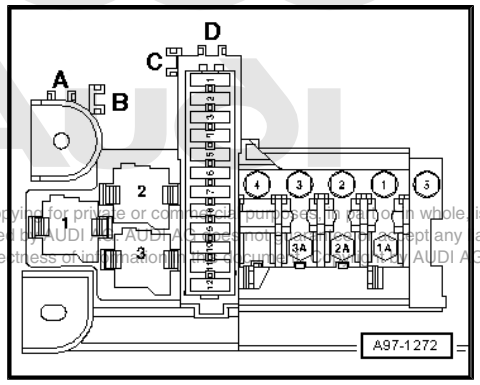
To prevent injuries to persons and/or damage to the fuel injection and ignition system, the following must be noted:

WARNING

- *The fuel system operates under high pressure. The pressure in the high-pressure part of the injection system must be reduced to a residual pressure prior to opening the system ⇒ page 3 .*
- *A clean cloth must then be wrapped around the connection and the residual pressure dissipated by carefully loosening the connection.*

Caution

- *Always switch off the ignition before connecting or disconnecting the battery, otherwise the engine control unit may be damaged.*
- *Observe notes on procedure for disconnecting the battery ⇒ Rep. Gr. 27 .*



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information. © AUDI AG.

- If the battery is NOT disconnected, fuse in -relay and fuse holder in luggage compartment (right-side)- for the fuel pump control unit -J538- must be removed as a precautionary measure before opening the fuel system, because the fuel pump will otherwise be activated by the contact switch on the driver's door.
- Persons wearing a cardiac pacemaker must at all times maintain a safe distance from high-voltage components such as the ignition system and gas-discharge headlights.
- Do not open any fuel line connections while the engine is running.
- Always switch off the ignition before connecting or disconnecting injection or ignition system wiring or tester cables.
- If the engine is to be operated at cranking speed without it starting (e.g. compression test), unplug the connectors from the ignition coils and remove the fuse for the electric fuel pump.
- Certain tests may lead to a fault being detected by the control unit and stored. The fault memory should therefore be interrogated and (if necessary) erased after completing the tests and any repair work that may be required.
- Always switch off the ignition before cleaning the engine.
- Always switch off the ignition before connecting or disconnecting the battery, otherwise the engine control unit may be damaged.

1.3 Rules for cleanliness when working on the injection system

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

- Carefully clean connection points and the surrounding area with engine cleaner or brake cleaner and dry thoroughly before opening.

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

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

Caution

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

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

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Special tools and workshop equipment required

- Vehicle diagnostic, testing and information system -VAS 5051B-

Reducing fuel pressure in high-pressure section

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

– Start engine and run at idling speed.

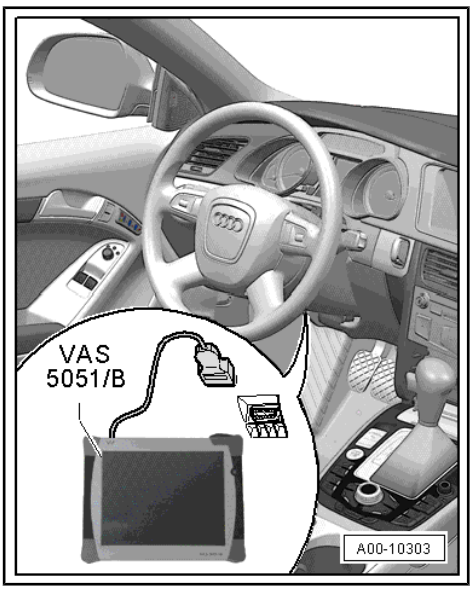
– Select “Engine electronics” in vehicle self-diagnosis.

– Then select function read “Measured values”.

– Select measured value block 140.

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

- Specification: between 35 and 45 bar

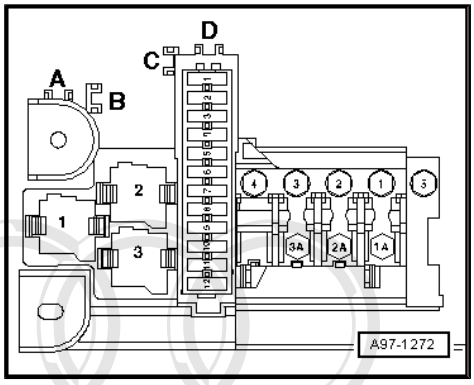


– With engine idling, pull out fuse in -relay and fuse holder in luggage compartment (right-side)- for fuel pump control unit -J538- ; refer to ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.

– Observe fuel pressure displayed on tester.

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

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



Note

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

WARNING

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

- ***Wear safety goggles and protective clothing when opening the fuel system.***
- ***Before opening the high-pressure section of the fuel system, place a clean cloth around the connection to catch escaping fuel.***

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

Additional steps required

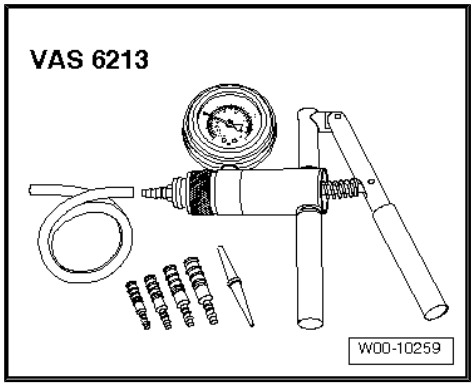
– Re-install fuse in -relay and fuse holder in luggage compartment (right-side)- for fuel pump control unit -J538- .

– Erase fault memory and generate readiness code in engine control unit using “Guided Functions” mode of vehicle diagnostic, testing and information system -VAS 5051B- .

1.5 Checking vacuum system

Special tools and workshop equipment required

- Hand vacuum pump -VAS 6213-



Procedure

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

Copyright by AUDI AG.
This document is protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

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

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

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

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

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

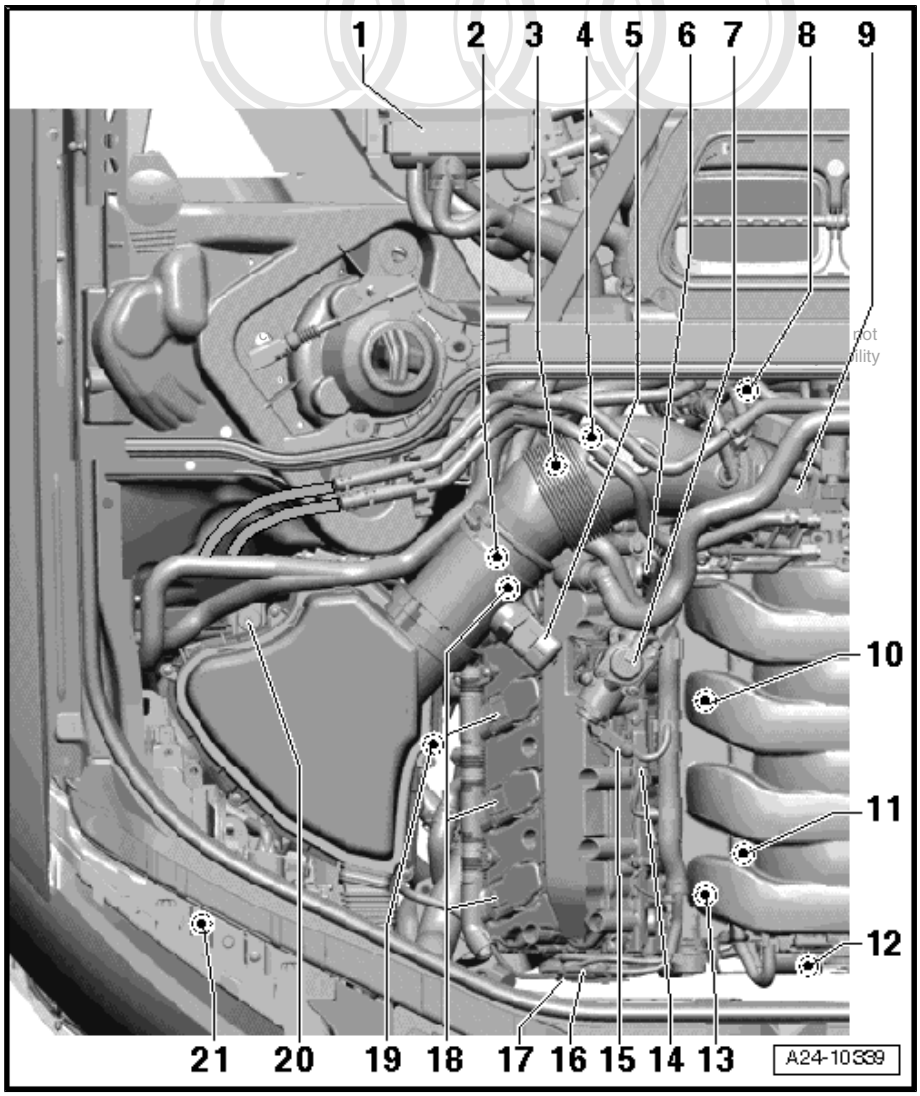
2 Injection system

2.1 Technical data

Engine data	4.2 ltr. / 4V / 257 kW engine
Idling speed (not adjustable)	approx. 650 rpm 1)
Fuel pressure after high-pressure pump	18 ... 120 bar
Fuel pressure before high-pressure pump	approx. 6 bar
• 1) Depending on demands placed on engine control unit.	

2.2 Overview of fitting locations

Engine compartment (right-side)



1 - Engine control unit -J623-

- ❑ Fitting location ⇒ page 10
- ❑ Removing and installing ⇒ page 71

2 - Exhaust camshaft control valve 1 -N318-

3 - Combination valve for secondary air system

- ❑ Cylinder bank 1 (right-side)
- ❑ Removing, installing and testing ⇒ Rep. Gr. 26

4 - Coolant temperature sender -G62-

- ❑ Fitting location ⇒ page 13
- ❑ Removing and installing ⇒ Rep. Gr. 19

5 - Air mass meter -G70- / intake air temperature sender -G42-

- ❑ Removing and installing ⇒ page 21

6 - Camshaft control valve 1 -N205-

- ❑ Fitting location ⇒ page 14

7 - High-pressure pump

- ❑ With fuel metering valve -N290-
- ❑ Fitting location ⇒ page 17
- ❑ Removing and installing ⇒ page 63

8 - Electrical connectors

- ❑ For Lambda probe before catalytic converter -G39- with Lambda probe heater -Z19-

- For Lambda probe after catalytic converter -G130- with Lambda probe 1 heater after catalytic converter -Z29-
- Fitting location ⇒ page 12

9 - Throttle valve module -J338-

- After renewing throttle valve module -J338- , select “Adapt throttle valve module” in “Guided Functions” mode

10 - Knock sensor 2 -G66-

- Fitting location ⇒ page 14
- Electrical connector ⇒ page 16
- 20 Nm

11 - Fuel pressure sender -G247-

- Fitting location ⇒ page 14
- 25 Nm
- Lubricate threads lightly with clean oil

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

12 - Components at front of engine

- Fitting location ⇒ page 16
- Intake manifold flap motor -V157-
- In model year 2009 intake manifold flap motor -V157- is replaced with intake manifold flap valve -N316-
- Intake manifold flap potentiometer -G336-
- Variable intake manifold motor -V183-
- In model year 2009 variable intake manifold motor -V183- is replaced with variable intake manifold change-over valve -N156-
- Intake manifold flap potentiometer 2 -G512-
- Electrical connector for knock sensor 1 -G61-
- Electrical connector for knock sensor 2 -G66-
- Electrical connector for knock sensor 3 -G198-
- Electrical connector for knock sensor 4 -G199-

13 - Knock sensor 1 -G61-

- Fitting location ⇒ page 14
- Electrical connector ⇒ page 16
- 20 Nm

14 - Hall sender -G40-

- Fitting location ⇒ page 14

15 - Fuel metering valve -N290-

- Fitting location ⇒ page 17

16 - Electrical connector for knock sensor 1 -G61-

- Fitting location ⇒ page 16

17 - Electrical connector for knock sensor 2 -G66-

- Fitting location ⇒ page 16

18 - Ignition coils for cylinder bank 1

- Ignition coil 1 with output stage -N70-
- Ignition coil 2 with output stage -N127-
- Ignition coil 3 with output stage -N291-
- Ignition coil 4 with output stage -N292-
- Removing and installing ⇒ page 78

19 - Hall sender 3 -G300-

- Secured to outside of cylinder head
- Fitting location ⇒ page 14

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

- For fitting location refer to exploded view of air cleaner ⇒ page 18

21 - Secondary air pump motor -V101-

- At front right, beneath headlight.
- Removing and installing ⇒ Rep. Gr. 26

Engine compartment (left-side)

1 - High-pressure pump

- With fuel metering valve 2 -N402-
- Fitting location ⇒ page 17
- Removing and installing ⇒ page 63

2 - Fuel pressure sender for low pressure -G410-

- Fitting location ⇒ page 17
- Fitting location changes in model year 2009 ⇒ page 15

3 - Electrical connectors

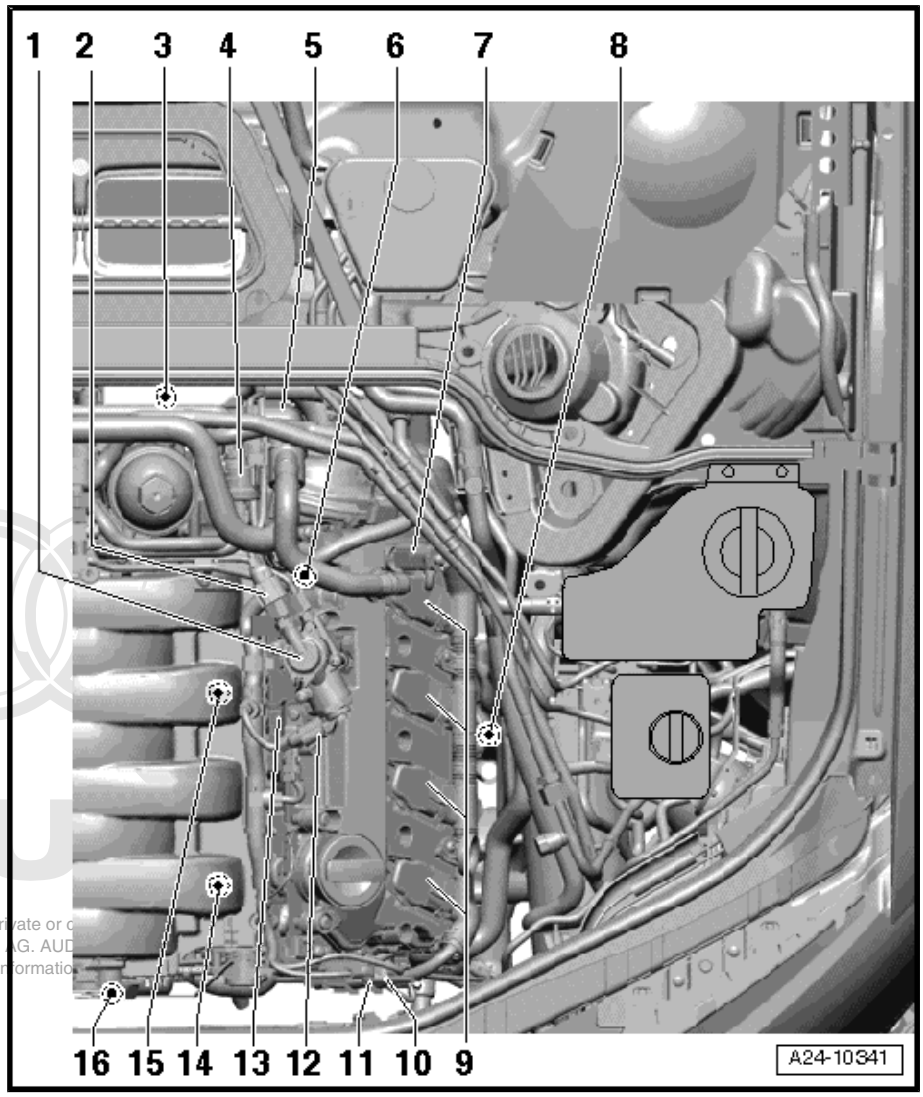
- For Lambda probe 2 before catalytic converter -G108- with Lambda probe 2 heater -Z28-
- For Lambda probe 2 after catalytic converter -G131- with Lambda probe 2 heater after catalytic converter -Z30-
- Fitting location ⇒ page 12

4 - Activated charcoal filter solenoid valve 1 -N80-

- Activated charcoal filter solenoid valve 2 -N115- (only on USA vehicles)

5 - Combination valve for secondary air system

- Cylinder bank 2 (left-side)
- Removing, installing and testing ⇒ Rep. Gr. 26



6 - Camshaft control valve 2 -N208-

- Fitting location ⇒ page 15

7 - Exhaust camshaft control valve 2 -N319-

- Fitting location ⇒ page 14

8 - Hall sender 4 -G301-

- Fitting location ⇒ page 14

9 - Ignition coils for cylinder bank 2

- Ignition coil 5 with output stage -N323-
- Ignition coil 6 with output stage -N324-

Copyright AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness and completeness of information.

- ❑ Ignition coil 7 with output stage -N325-
- ❑ Ignition coil 8 with output stage -N326-
- ❑ Fitting location ⇒ page 14
- ❑ Removing and installing ⇒ page 78

10 - Electrical connector for knock sensor 3 -G198-

- ❑ Fitting location ⇒ page 16

11 - Electrical connector for knock sensor 4 -G199-

- ❑ Fitting location ⇒ page 16

12 - Fuel metering valve 2 -N402-

- ❑ Combined with high-pressure pump in one unit
- ❑ Fitting location ⇒ page 17

13 - Hall sender 2 -G163-

- ❑ Fitting location ⇒ page 15

14 - Knock sensor 3 -G198-

- ❑ Fitting location ⇒ page 15
- ❑ 20 Nm

15 - Knock sensor 4 -G199-

- ❑ Fitting location ⇒ page 15
- ❑ 20 Nm

16 - Components at front of engine

- ❑ Fitting location ⇒ page 16
- ❑ Intake manifold flap motor -V157- or intake manifold flap valve -N316-
- ❑ Intake manifold flap potentiometer -G336-
- ❑ Variable intake manifold motor -V183- or intake manifold flap valve -N316-
- ❑ Intake manifold flap potentiometer 2 -G512-
- ❑ Electrical connector for knock sensor 1 -G61-
- ❑ Electrical connector for knock sensor 2 -G66-
- ❑ Electrical connector for knock sensor 3 -G198-
- ❑ Electrical connector for knock sensor 4 -G199-

A - Engine speed sender -G28-

- ❑ Fitting location ⇒ page 13

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

- ❑ In footwell on accelerator pedal (both senders are accommodated in one housing)
- ❑ Fitting location ⇒ page 11
- ❑ Removing and installing ⇒ Rep. Gr. 20

C - Kickdown switch -F8-

- ❑ In footwell on accelerator pedal
- ❑ Fitting location ⇒ page 12
- ❑ Removing and installing ⇒ Rep. Gr. 20

D - Brake light switch -F- / brake pedal switch -F47-

- ❑ In footwell on brake pedal
- ❑ Fitting location ⇒ page 12

E - Clutch pedal switch -F36-

- ❑ In footwell on clutch pedal

F - Fuel pump control unit -J538-

- ❑ Fitting location ⇒ page 12
- ❑ Removing, installing and testing ⇒ Rep. Gr. 20

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

G - Oil pressure switch -F1-

- ❑ Fitting location ⇒ page 16
- ❑ Removing, installing and testing ⇒ Rep. Gr. 17

H - Lambda probe before catalytic converter -G39- with Lambda probe heater -Z19-

- ❑ Fitting location of electrical connector ⇒ page 12
- ❑ Fitting location of Lambda probe ⇒ page 13
- ❑ Removing and installing ⇒ page 66
- ❑ 55 Nm

I - Lambda probe 2 before catalytic converter -G108- with Lambda probe 2 heater -Z28-

- ❑ Fitting location of electrical connector ⇒ page 12
- ❑ Fitting location of Lambda probe ⇒ page 13
- ❑ Removing and installing ⇒ page 68
- ❑ 55 Nm

Copyright by AUDI AG. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

J - Lambda probe after catalytic converter -G130- with Lambda probe 1 heater after catalytic converter -Z29-

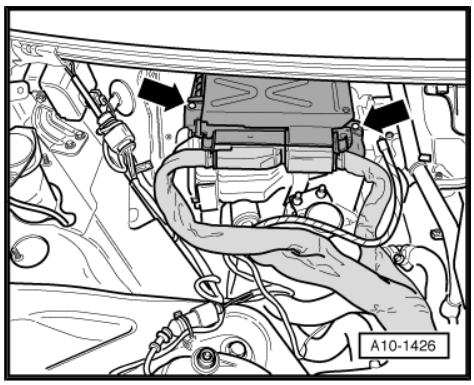
- ❑ Fitting location of electrical connector ⇒ page 12
- ❑ Fitting location of Lambda probe ⇒ page 13
- ❑ Removing and installing ⇒ page 66
- ❑ 55 Nm

K - Lambda probe 2 after catalytic converter -G131- with Lambda probe 2 heater after catalytic converter -Z30-

- ❑ Fitting location of electrical connector ⇒ page 12
- ❑ Fitting location of Lambda probe ⇒ page 13
- ❑ Removing and installing ⇒ page 68
- ❑ 55 Nm

Fitting location of engine control unit -J623-

Removing and installing ⇒ page 71



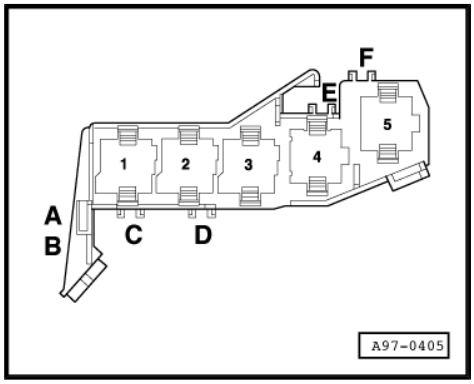
Relay and fuse holder in footwell (right-side)

2 - Starter motor relay -J53-

3 - Starter motor relay 2 -J695-

4 - Fuel pump relay -J17-

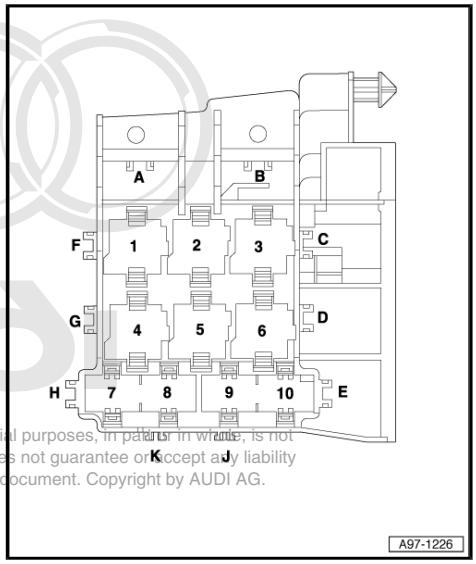
Refer to ⇒ Current flow diagrams, Electrical fault finding and Fitting locations



Relay and fuse holder behind dash panel (left-side)

3 - Terminal 15 voltage supply relay -J329-

Refer to ⇒ Current flow diagrams, Electrical fault finding and Fitting locations



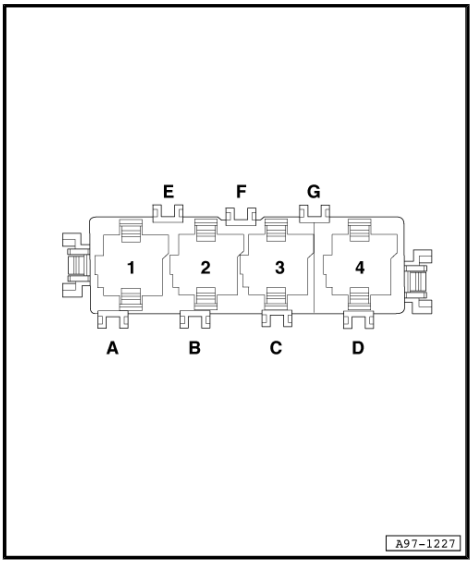
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

4-position relay carrier in electronics box in plenum chamber

1 - Secondary air pump relay -J299-

2 - Motronic current supply relay -J271-

Refer to ⇒ Current flow diagrams, Electrical fault finding and Fitting locations

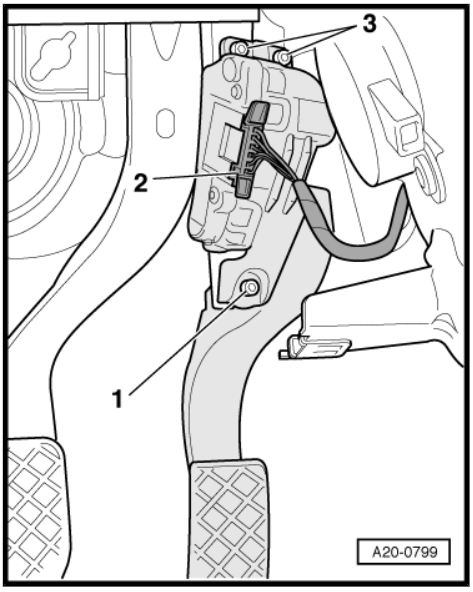


Fitting location of accelerator position sender -G79- / accelerator position sender 2 -G185-

♦ Removing and installing ⇒ Rep. Gr. 20

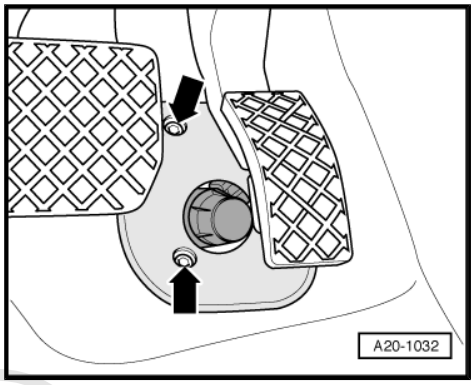
Note

The accelerator position sender -G79- and accelerator position sender 2- -G185- are integrated in the accelerator pedal module and cannot be renewed individually.



Kickdown switch -F8-

- Removing and installing ⇒ Rep. Gr. 20

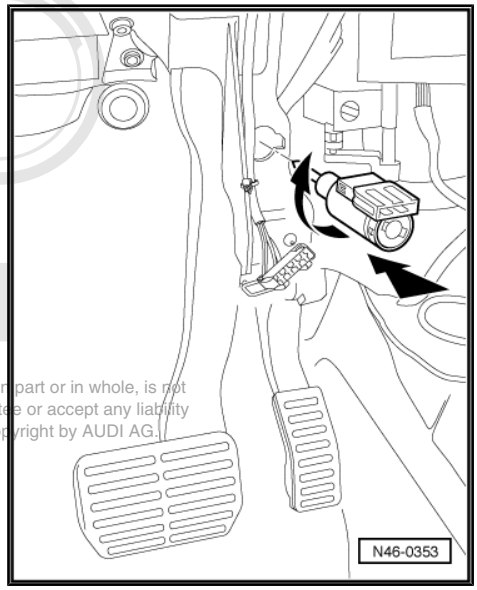


Fitting location of brake light switch -F- / brake pedal switch -F47-

- For removing and installing refer to Brake system ⇒ Rep. Gr. 45 .

Note

Switches must not be installed more than once, otherwise they may not fit securely.



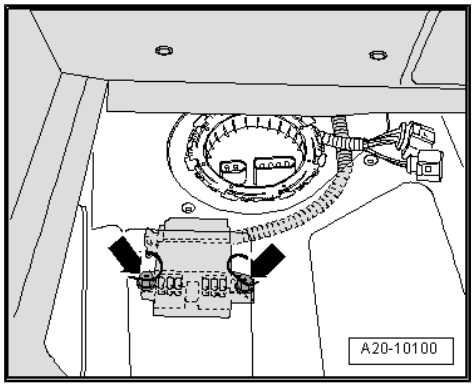
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Fuel pump control unit -J538-

Fitting location under floor panel in luggage compartment (left-side)

Securing bolts -arrows-

Removing and installing ⇒ Rep. Gr. 20



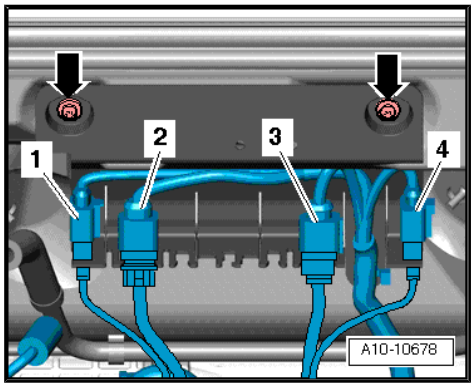
Connectors for Lambda probes

1 - To Lambda probe -G39-

2 - To Lambda probe after catalytic converter -G130-

3 - To Lambda probe 2 -G108-

4 - To Lambda probe 2 after catalytic converter -G131-

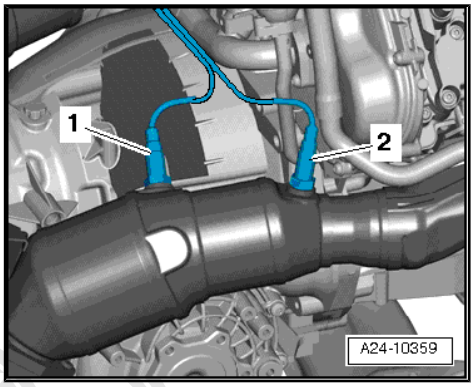


Fitting location of Lambda probes on cylinder bank 1 (right-side)

1 - Lambda probe after catalytic converter -G130-

2 - Lambda probe -G39-

Tightening torque: 55 Nm

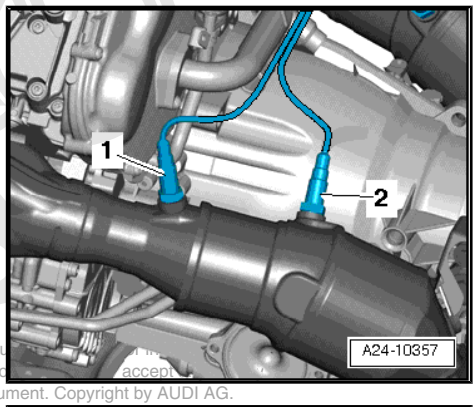


Fitting location of Lambda probes on cylinder bank 2 (left-side)

1 - Lambda probe 2 -G108-

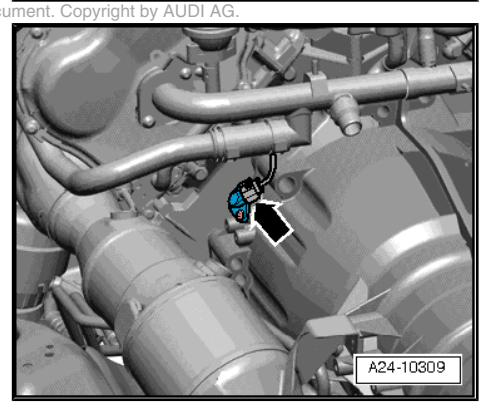
2 - Lambda probe 2 after catalytic converter -G131-

Tightening torque: 55 Nm



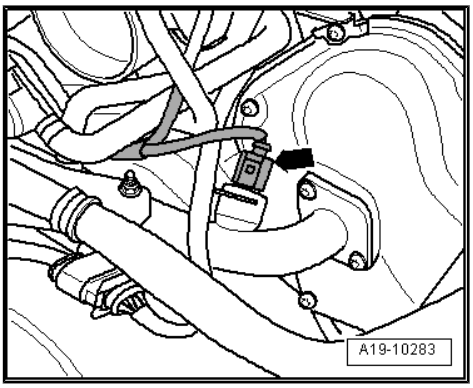
Protected by copyright. Copying for private or commercial pu
permitted unless authorised by AUDI AG. AUDI AG does no
with respect to the correctness of information in this document. Copyright by AUDI AG.

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

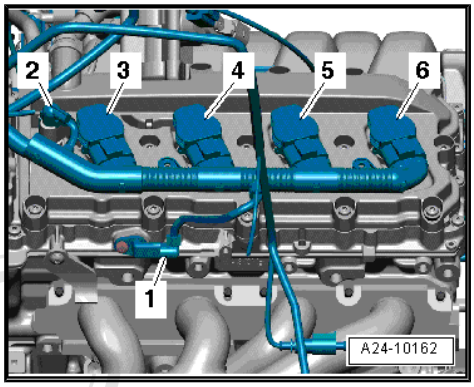


Fitting location of coolant temperature sender -G62- -arrow-

- On rear coolant pipe (right-side) -arrow-.
- Removing and installing ⇒ Rep. Gr. 19

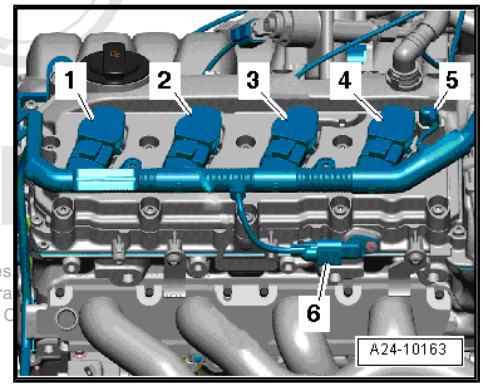


Fitting locations on cylinder bank 1 (right-side)



1 - Hall sender 3 -G300-
2 - Exhaust camshaft control valve 1 -N318-
3 - Ignition coil 4 with output stage -N292-
4 - Ignition coil 3 with output stage -N291-
5 - Ignition coil 2 with output stage -N127-
6 - Ignition coil 1 with output stage -N70-

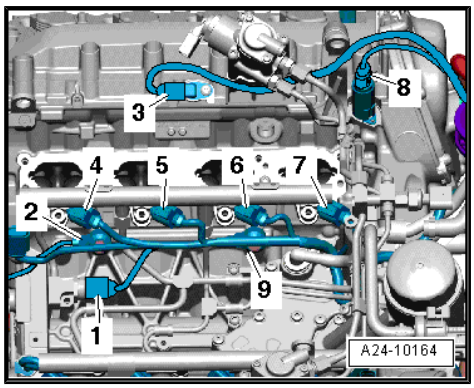
Fitting locations on cylinder bank 2 (left-side)



1 - Ignition coil 5 with output stage -N323-
2 - Ignition coil 6 with output stage -N324-
3 - Ignition coil 7 with output stage -N325-
4 - Ignition coil 8 with output stage -N326-
5 - Exhaust camshaft control valve 2 -N319-
6 - Hall sender 4 -G301-

Protected by copyright. Copying for private or commercial purposes
permitted unless authorised by AUDI AG. AUDI AG does not guara
with respect to the correctness of information in this document. C

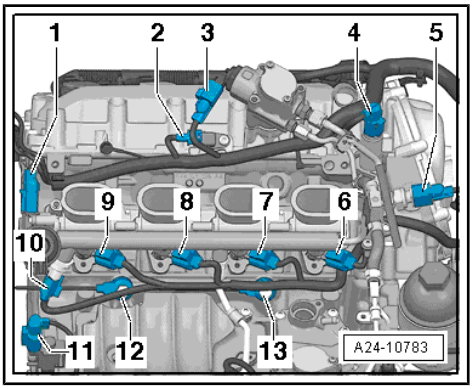
Fitting locations: components on inside of right cylinder head



1 - Fuel pressure sender -G247-
2 - Knock sensor 1 -G61-
3 - Hall sender -G40-
4 - Injector, cylinder 1 -N30-
5 - Injector, cylinder 2 -N31-
6 - Injector, cylinder 3 -N32-
7 - Injector, cylinder 4 -N33-
8 - Camshaft control valve 1 -N205-
9 - Knock sensor 2 -G66-

For fitting locations of components on inside of cylinder head, right-side (gradual introduction from model year 2009 onwards), see next illustration.

Fitting locations on inside of cylinder head, right-side (gradual introduction from model year 2009 onwards)



1 - Intake manifold flap potentiometer -G336-

2 - Hall sender -G40-

3 - Fuel metering valve -N290-

4 - Camshaft control valve 1 -N205-

5 - Fuel pressure sender for low pressure -G410-

6 - Injector, cylinder 1 -N30-

7 - Injector, cylinder 2 -N31-

8 - Injector, cylinder 3 -N32-

9 - Injector, cylinder 4 -N33-

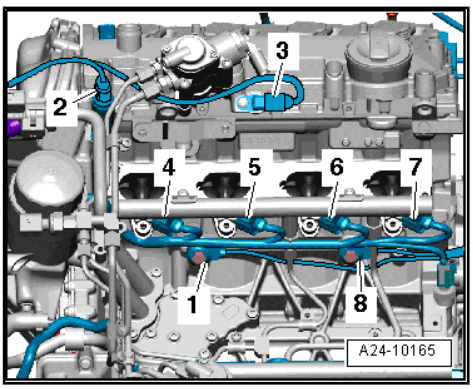
10 - Fuel pressure sender -G247-

11 - Intake manifold flap valve -N316-

12 - Knock sensor 1 -G61-

13 - Knock sensor 2 -G66-

Fitting locations: components on inside of left cylinder head



1 - Knock sensor 4 -G199-

2 - Camshaft control valve 2 -N208-

3 - Hall sender 2 -G163-

4 - Injector, cylinder 8 -N86-

5 - Injector, cylinder 7 -N85-

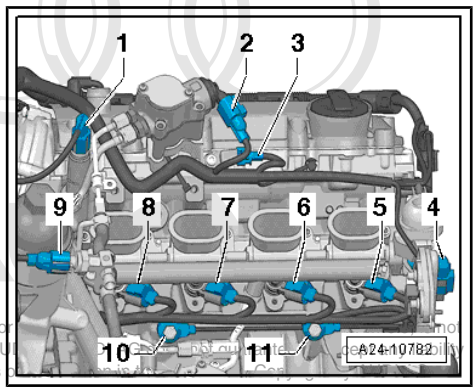
6 - Injector, cylinder 6 -N84-

7 - Injector, cylinder 5 -N83-

8 - Knock sensor 3 -G198-

For fitting locations of components on inside of cylinder head, left-side (gradual introduction from model year 2009 onwards), see next illustration.

Fitting locations on inside of cylinder head, left-side (gradual introduction from model year 2009 onwards)



1 - Camshaft control valve 2 -N208-

2 - Fuel metering valve 2 -N402- (screwed into high-pressure pump)

3 - Hall sender 2 -G163-

4 - Intake manifold flap potentiometer 2 -G512-

5 - Injector, cylinder 5 -N83-

6 - Injector, cylinder 6 -N84-

7 - Injector, cylinder 7 -N85-

8 - Injector, cylinder 8 -N86-

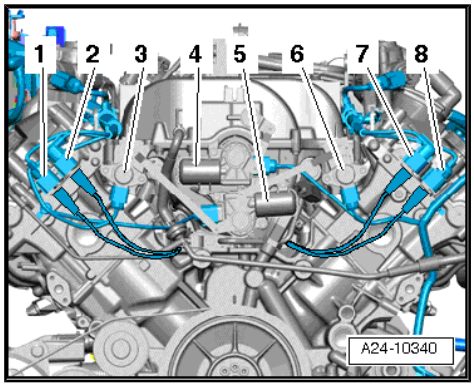
9 - Fuel pressure sender for low pressure -G410-

10 - Knock sensor 4 -G199-

11 - Knock sensor 3 -G198-

Protected by copyright. Copying for
permitted unless authorised by AU
with respect to the correctness

Fitting location: at front of engine



1 - Knock sensor 2 -G66- (brown connector)

2 - Knock sensor 1 -G61- (black connector)

3 - Intake manifold flap potentiometer -G336-

4 - Variable intake manifold motor -V183- (black connector)

5 - Intake manifold flap motor -V157- (brown connector)

6 - Intake manifold flap potentiometer 2 -G512-

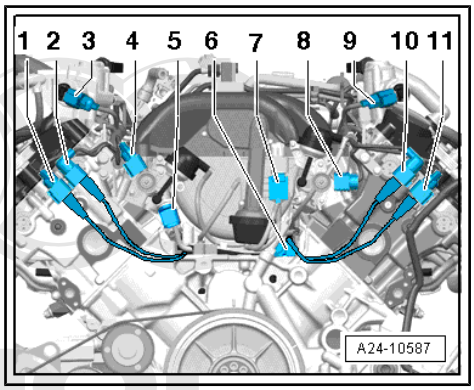
7 - Knock sensor 4 -G199- (black connector)

8 - Knock sensor 3 -G198- (brown connector)

In model year 2009, -items 4 and 5- are replaced with vacuum-controlled valves (see following illustration).

- Intake manifold flap motor -V157- is replaced with intake manifold flap valve -N316- .
- Variable intake manifold motor -V183- is replaced with variable intake manifold change-over valve -N156- .

Fitting locations at front of engine (gradual introduction of modification in model year 2009)



1 - Knock sensor 2 -G66- (brown connector)

2 - Knock sensor 1 -G61- (black connector)

3 - Fuel pressure sender for low pressure -G410-

4 - Intake manifold flap potentiometer -G336-

5 - Fuel pressure sender -G247-

6 - Intake manifold flap valve -N316- (CVTS tumble flaps)

7 - Variable intake manifold change-over valve -N156-

8 - Intake manifold flap potentiometer 2 -G512-

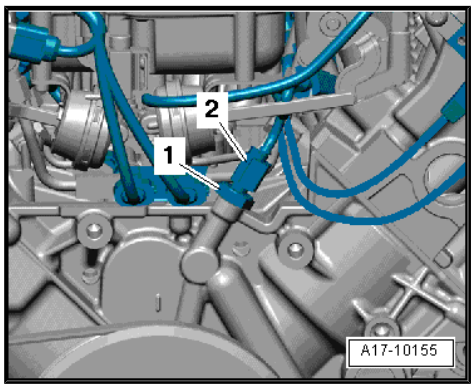
9 - Fuel metering valve -N290-

10 - Knock sensor 4 -G199- (black connector)

11 - Knock sensor 3 -G198- (brown connector)

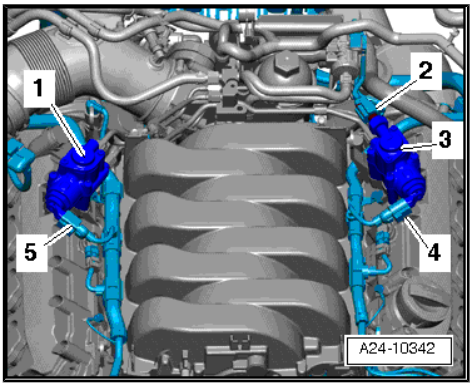
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Oil pressure switch -F1- -1- and electrical connector -2-



Removing, installing and testing ⇒ Rep. Gr. 17

Fitting location of high-pressure fuel pumps



1 - High-pressure pump on right side (cylinder bank 1)

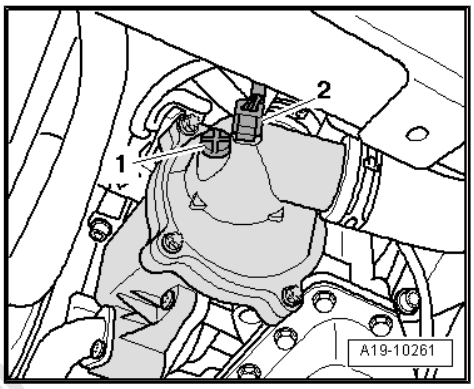
2 - Fuel pressure sender for low pressure -G410-

3 - High-pressure pump on left side (cylinder bank 2)

4 - Fuel metering valve 2 -N402-

5 - Fuel metering valve -N290-

Fitting location of map-controlled engine cooling system thermostat -F265-



- On engine (front left).

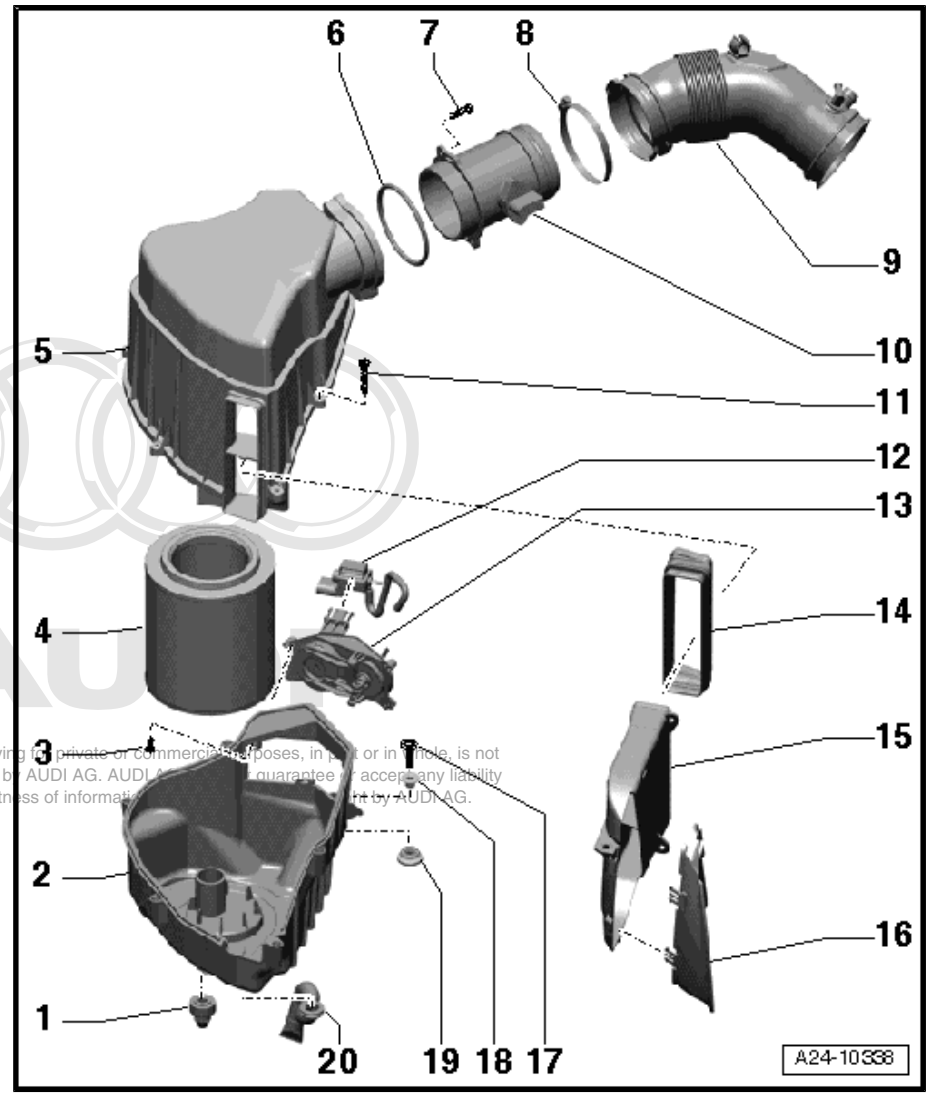
2 - Map-controlled engine cooling system thermostat -F265-

Note

Disregard -item 1-.

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

2.3 Air cleaner - exploded view



1 - Grommet

2 - Air cleaner (bottom section)

- ❑ Clean any salt residue, leaves and dirt out of air cleaner (bottom section)
- ❑ Important: Check for dirt in water drain and clean as required
- ❑ Removing air cleaner (bottom section) ⇒ page 19

3 - Bolt

- ❑ For flap for variable intake manifold change-over valve -N335-

4 - Air filter element

- ❑ Always use genuine part for air filter element
- ❑ Maintenance intervals ⇒ Maintenance ; Booklet 404
- ❑ Removing and installing ⇒ page 19
- ❑ Also clean snow screen (if fitted)

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information contained in this document by AUDI AG.

5 - Air cleaner (top section)

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

6 - O-ring

- ❑ Renew if damaged

7 - Bolts

- ❑ 1.5 Nm

8 - Hose clip

9 - Air hose

- ❑ To throttle valve module -J338-

10 - Air mass meter

- ❑ Removing and installing air mass meter -G70- with intake air temperature sender -G42- ⇒ page 21

11 - Bolt

- ❑ 1.5 Nm

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

13 - Flap for variable intake manifold change-over valve

14 - Air duct

- ❑ Clean dirt and leaves out of air duct

15 - Air duct

- ❑ To lock carrier
- ❑ Clean dirt and leaves out of air duct

16 - Air duct

- ❑ To lock carrier
- ❑ Clean dirt and leaves out of air duct

17 - Bolt

18 - Bush

19 - Rubber grommet

20 - Bush

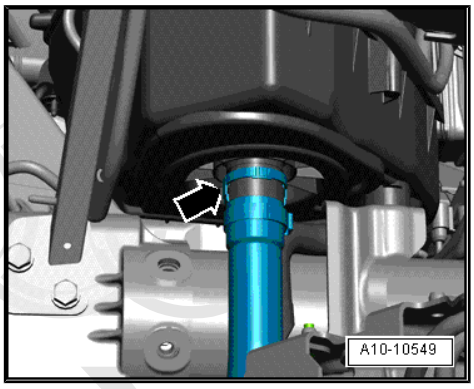
21 - Water drain hose

- ❑ Clean any leaves and dirt out of water drain hose

Removing air cleaner (bottom section)

Remove wheel housing liner (right-side).

Disconnect air hose -arrow- at bottom of air cleaner (bottom section).



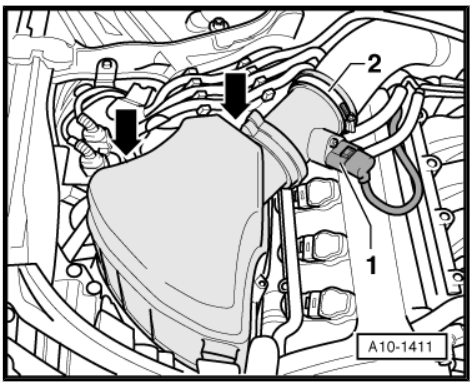
2.4 Removing and installing air filter element

Removing

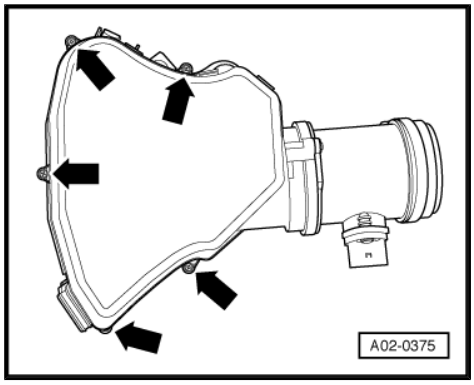
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

– Open hose clip -2- and disconnect air intake hose from air cleaner housing.

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



– Unscrew bolts -arrows- from air cleaner housing and detach air cleaner housing (top section).
– Pull out air filter element.
– Cover the open air cleaner housing with a clean cloth.



Note

Make sure no dirt gets into the air cleaner housing.

Installing

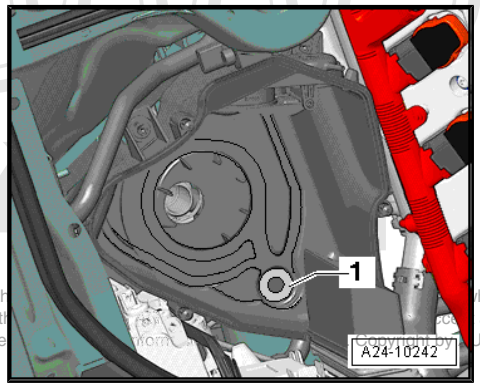
Installation is carried out in the reverse order; note the following:

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

Note

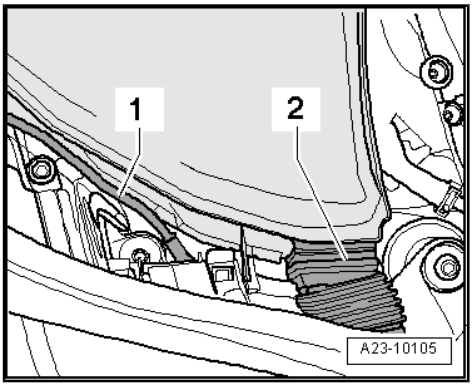
- *If the air filter element is very dirty or wet, dirt or water could reach the air mass meter and affect the air mass value. This would lead to loss of power, since a smaller injection quantity is calculated.*
- *Always use genuine part for air filter element.*
- *The air cleaner housing MUST be clean.*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

– Blow out water drain (small hole in bottom section of air cleaner -1-) 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 sealing lip and air duct -2- are positioned properly to prevent “unmetered air” from being drawn in).



Protected by copyright
permitted unless auth
respect to the
whole, is not
any liability
UDI AG.

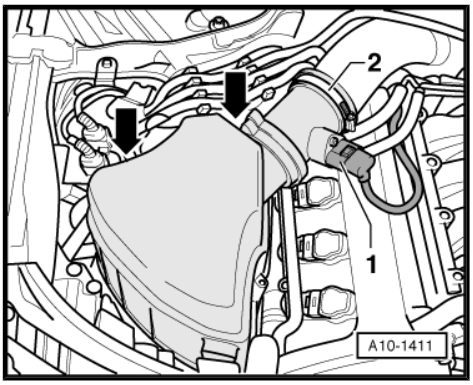
– Make sure that the electrical wiring -1- does not become trapped in the air cleaner housing when fitting top section of air cleaner housing.
– Make sure that air intake hose is seated securely between air mass meter -G70- and throttle valve module -J338- .



2.5 Removing and installing air mass meter -G70-

Removing

– Unplug electrical connector at air mass meter -G70- -1-.
– Unscrew both bolts from air mass meter -G70- .
– Open hose clip and carefully pull air mass meter -G70- out of guide on air cleaner housing.



Installing

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

Note

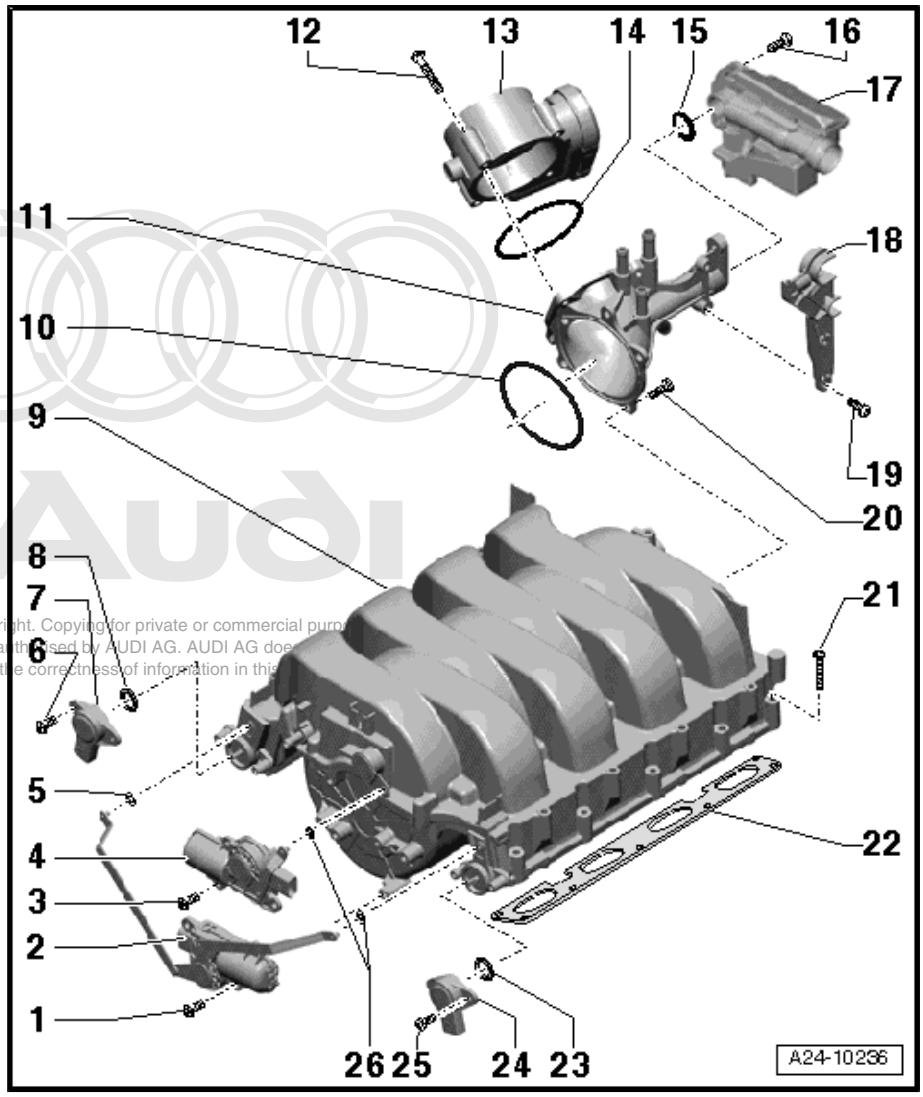
- *If the air filter element is very dirty or wet, dirt or water could reach the air mass meter -G70- and affect the air mass value. This would lead to loss of power, since a smaller injection quantity is calculated.*
- *Always use genuine part for air filter element.*
- *Use a silicone-free lubricant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

– Check for salt residue, dirt and leaves in air mass meter and air intake hose (engine intake side).
– Check for dirt in air duct leading to air filter element. If necessary, clean salt residue, dirt and leaves out of air cleaner housing (top and bottom sections); wash out or use a vacuum cleaner as required. Removing and installing air cleaner ⇒ page 19 .
– If air filter element has been removed, clean water drain hose in air cleaner (bottom section).
– Align seal in slot on air cleaner housing and carefully push air mass meter -G70- into air cleaner housing.

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

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

2.6 Intake manifold (magnesium) - exploded view



1 - Bolt

- ❑ 9 Nm

2 - Intake manifold flap motor -V157-

- ❑ In model year 2009 intake manifold flap motor -V157- is replaced with intake manifold flap valve -N316- (see intake manifold (plastic) - exploded view ⇒ page 37)

3 - Bolt

- ❑ 9 Nm

4 - Variable intake manifold motor -V183-

- ❑ In model year 2009 variable intake manifold motor -V183- is replaced with variable intake manifold changeover valve -N156- (see intake manifold (plastic) - exploded view ⇒ page 37)

5 - Circlip

6 - Bolt

- ❑ 2.5 Nm

7 - Intake manifold flap potentiometer -G336-

- ❑ Cylinder bank 1
- ❑ After renewing, perform “Adaption” in “Guided Functions”, vehicle diagnostic, testing and information system -VAS 5051B- .

8 - Seal

- ❑ Renew if damaged
- ❑ Open side faces towards intake manifold flap potentiometer -G336-

9 - Intake manifold

- ❑ Removing and installing ⇒ page 24

10 - O-ring

- ❑ Renew

11 - Connection for intake manifold

12 - Bolt

- ❑ 9 Nm

13 - Throttle valve module -J338-

- ❑ After renewing, perform “Adaption” in “Guided Functions”, vehicle diagnostic, testing and information system -VAS 5051B- .

14 - O-ring

- ❑ Renew

Copyright. Copying for private or commercial purp
not permitted unless authorised by AUDI AG. AUDI AG doe
with respect to the correctness of information in this

15 - O-ring

- ❑ Renew

16 - Bolt

- ❑ 9 Nm

17 - Pressure control valve for crankcase breather system

18 - Bracket

- ❑ For vacuum hose

19 - Bolt

- ❑ 9 Nm

20 - Bolt

- ❑ 9 Nm

21 - Bolts

- ❑ For tightening torque and tightening sequence, refer to ⇒ page 23

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

22 - Gaskets for intake manifold

- ❑ Renew

23 - Seal

- ❑ Renew if damaged
- ❑ Open side faces towards intake manifold flap potentiometer 2 -G512-

24 - Intake manifold flap potentiometer 2 -G512-

- ❑ Cylinder bank 2
- ❑ After renewing, perform “Adaption” in “Guided Functions”, vehicle diagnostic, testing and information system -VAS 5051B- .

25 - Bolt

- ❑ 2.5 Nm

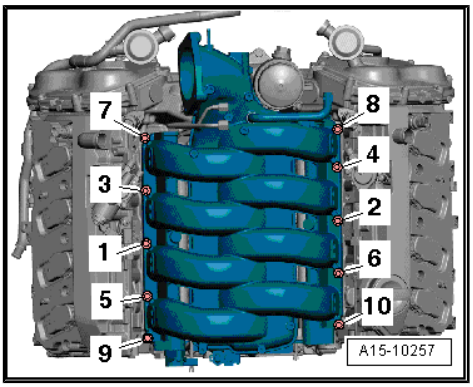
26 - Circlip

Tightening sequence for intake manifold

– Tighten bolts for intake manifold in the sequence -1 to 10-.

♦ Tighten initially to 8 Nm.

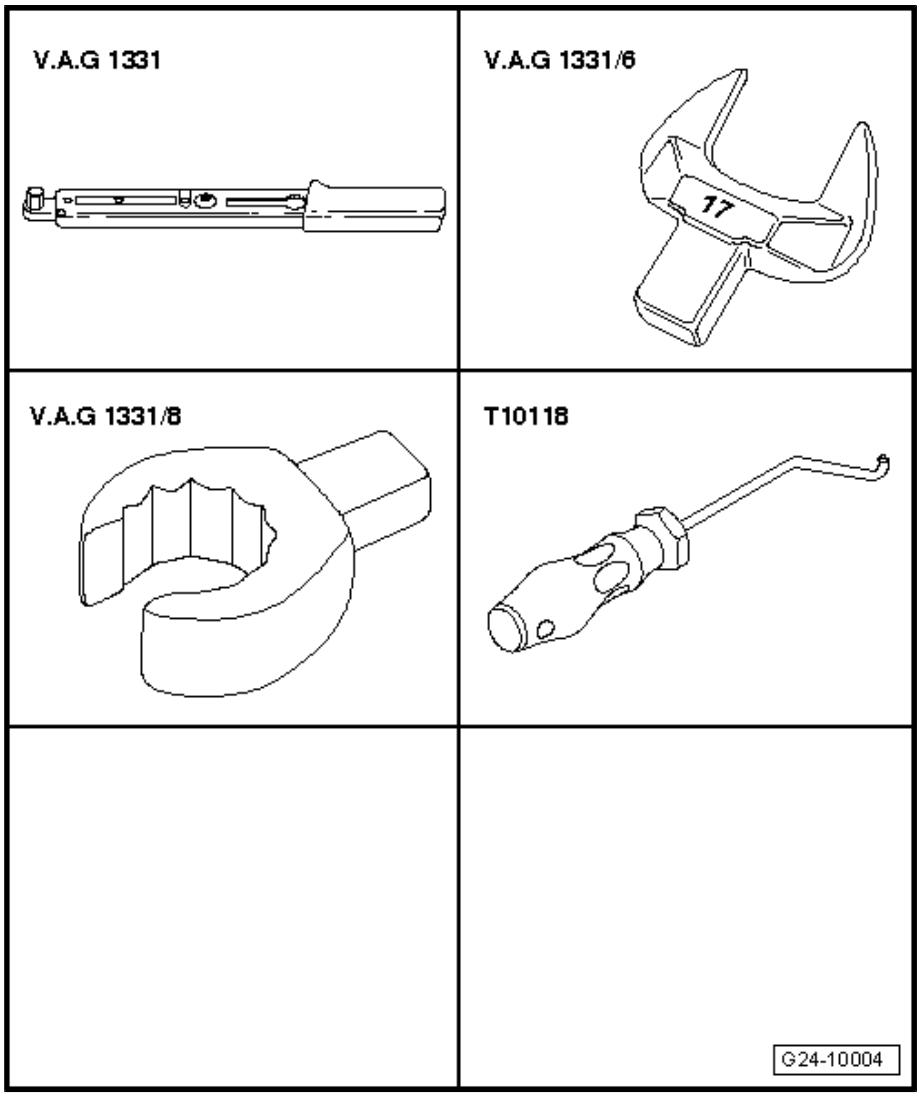
♦ Subsequently tighten to 9 Nm and then tighten 90° further.



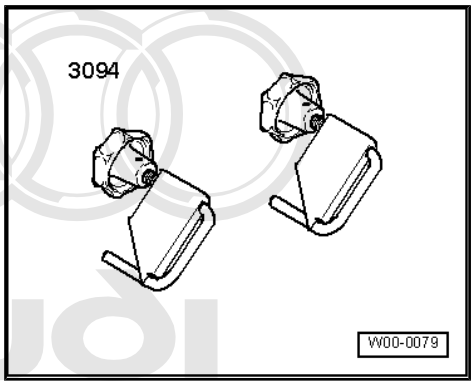
2.6.1 Removing and installing intake manifold

Special tools and workshop equipment required

- Torque wrench -V.A.G 1331-
- Tool insert AF 17 -V.A.G 1331/6-
- Socket insert AF 14, flared ring spanner -V.A.G 1331/8-
- Assembly tool -T10118-



- Hose clamps for hoses up to 25 mm -3094-



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Removing

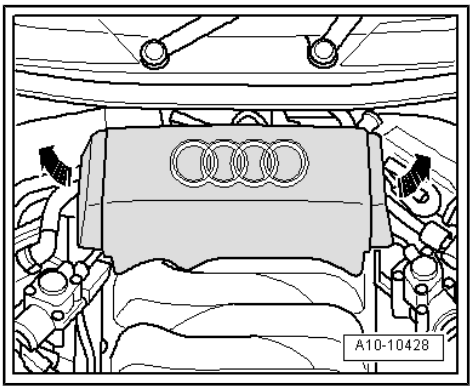
WARNING

- *The fuel system operates under high pressure. The pressure in the high-pressure part of the injection system must be reduced to a residual pressure prior to opening the system ⇒ page 3 .*
- *A clean cloth must then be wrapped around the connection and the residual pressure dissipated by carefully loosening the connection.*

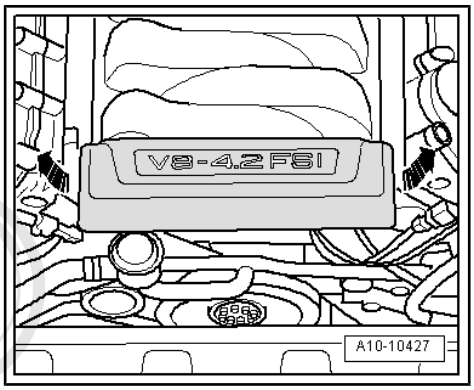
Note

All cable ties which are released or cut open when removing must be fitted in the same position when installing.

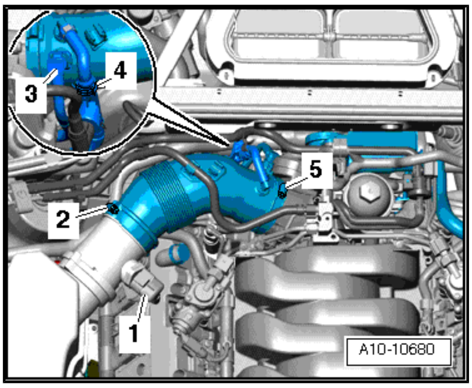
– Pull off engine cover panel (rear) -arrows-.



– Pull off engine cover panel (front) -arrows-.



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



– Move fuel line and vacuum line going to activated charcoal filter clear at air intake hose.

Note

Disregard -item 1-.

– Detach vacuum line -4- at air intake hose.

Rest-of-world vehicles:

– Disconnect hose -3- for crankcase breather system from air hose by pressing release tabs.

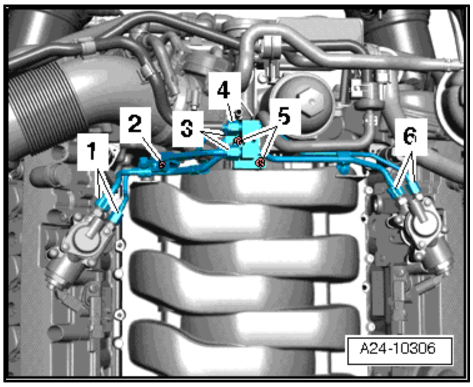
– Release hose clips -2- and -5- and remove air intake hose.

USA models:

– Release hose clips -2- and -5- and move air intake hose clear to one side (crankcase breather hose -3- remains connected).

Caution

Do not open hose connection -3- on USA models.



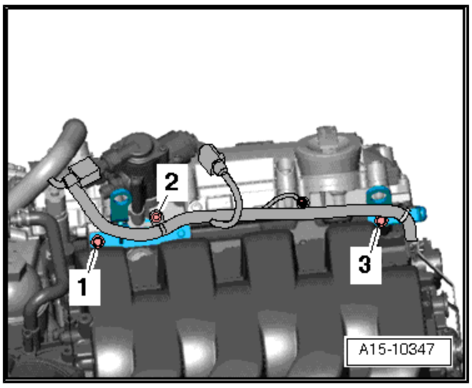
– Disconnect fuel lines -1, 3, 4, 6-.

– Remove bolts -2- and -5- and detach fuel rail with high-pressure pipes.

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

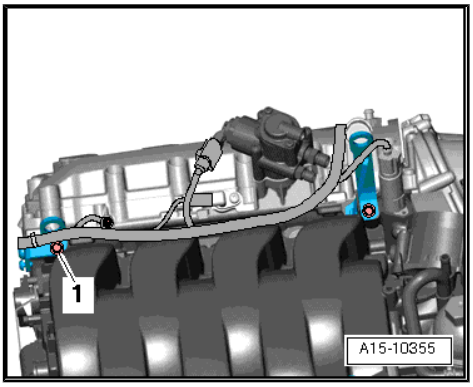
– Unscrew bolt -2-, move wiring harness clear and press towards the left.

– Unscrew bolt -1- and remove engine lifting eye (rear left).

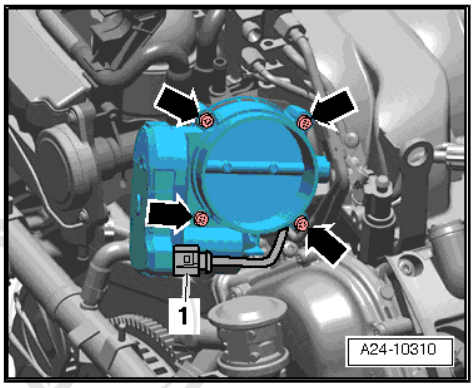


– Unscrew bolt -3- and remove engine lifting eye (front left).

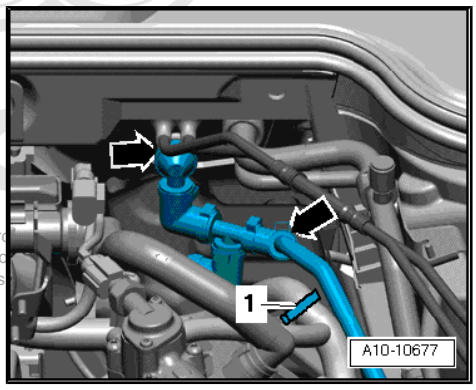
– Unscrew bolt -1- and remove engine lifting eye (front right).
– Move wiring harness clear and press towards the right.



– Unplug electrical connector -1- at throttle valve module - J338- .
– Unscrew bolts -arrows- and remove throttle valve module - J338- .



– Detach vacuum lines -arrows- going to brake servo.
– Move vacuum lines clear to one side.



Note

Disregard -item 1-.

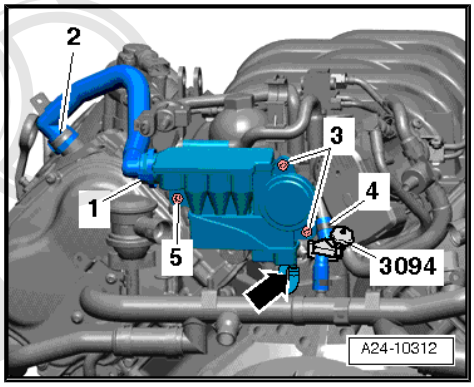
Protected by copyright. Copying for private or commerc
permitted unless authorised by AUDI AG. AUDI AG do
with respect to the correctness of information in this

WARNING

Hot steam or hot coolant can escape when expansion tank is opened; cover filler cap with cloth and open carefully.

– Open filler cap on coolant expansion tank.

– Detach crankcase breather hose at the points marked with -item 1- and -item 2- (press release tabs).
– Clamp off coolant hose -4- using hose clamp (up to 25 mm) -3094- and detach coolant hose from intake manifold connection.
– Slacken bolt -5- a few turns.
– Unscrew bolts -3- and carefully remove pressure control valve for crankcase breather system from intake manifold connection.



Note

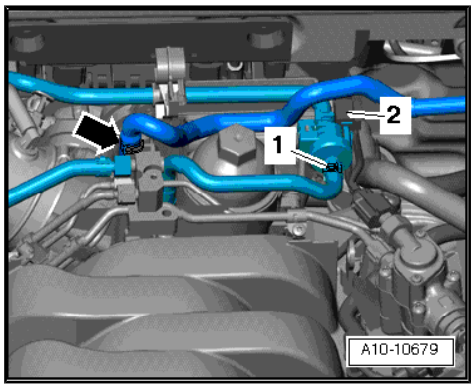
♦ *Disregard -arrow-.*
♦ *Shown from rear with engine removed for illustration purposes.*

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

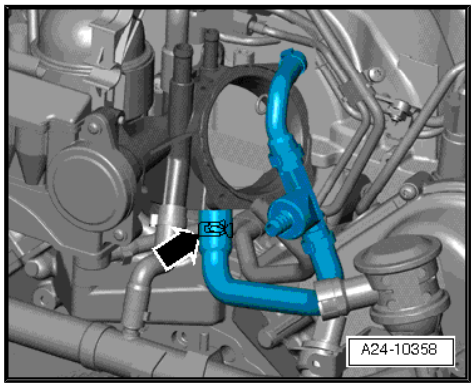
Note

Lay a cloth under the intake manifold connection to catch escaping coolant.

– Unplug electrical connector -2- at activated charcoal filter solenoid valve 1 -N80- and detach vacuum hose -1-.
– Detach activated charcoal filter solenoid valve 1 -N80- from bracket and move it clear to the side with hose still attached.
– Detach coolant hose -arrow- and move clear to one side.

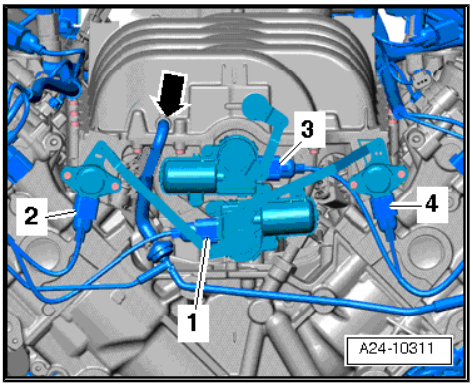


– Detach vacuum hose -arrow- going to intake manifold connection.

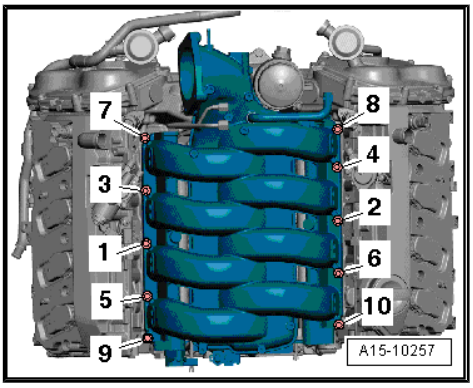


– Detach vacuum hose -arrow-.
– Unplug electrical connectors at:

1 - Intake manifold flap motor -V157- (brown connector)
2 - Intake manifold flap potentiometer -G336-
3 - Variable intake manifold motor -V183- (black connector)
4 - Intake manifold flap potentiometer 2 -G512-

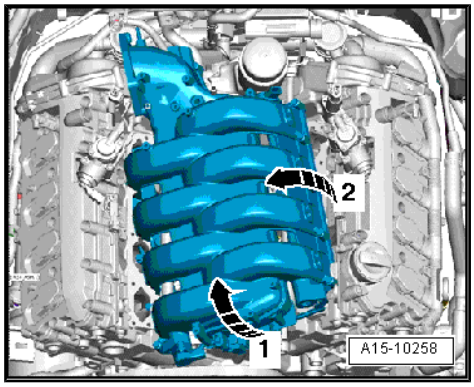


– Remove intake manifold bolts in the sequence -10 ... 1-.



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

– To prevent scratches, mask off intake manifold in vicinity of high-pressure pipes with adhesive tape.
– First lift up intake manifold at the front -arrow 1-.
– Then pivot out intake manifold below high-pressure fuel pipes towards right side of vehicle -arrow 2-.
– Remove intake manifold from engine compartment.



Note

Seal intake ports on cylinder heads with clean cloths.

Installing

Note

- *Renew gaskets, seals and O-rings.*
- *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Parts catalogue.*
- *Fit all cable ties in the original positions when installing.*

- Tightening torques: refer to exploded view of intake manifold ⇒ page 22 .
- Tightening torques: refer to exploded view of fuel rail with injectors ⇒ page 31 .

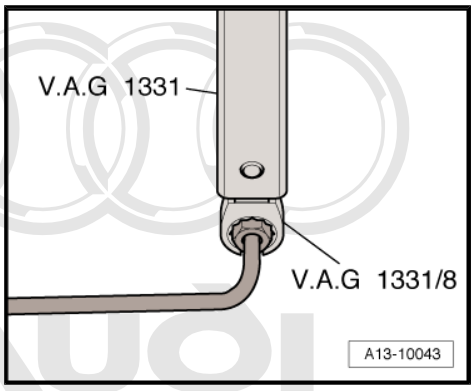
Installation is carried out in the reverse order; note the following:

Note

- *The connections of the high-pressure pipes must not be damaged.*
- *Do not attempt to bend high-pressure pipes to a different shape.*

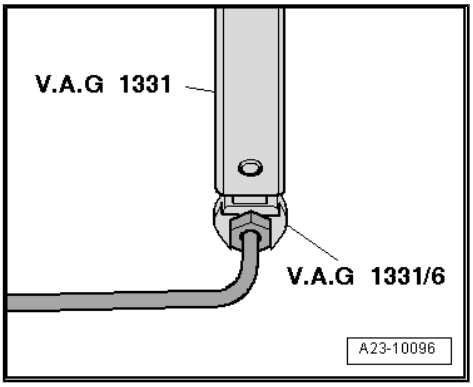
– Tighten union nuts on high-pressure pipes hand-tight initially.
– Ensure that high-pressure pipes are not under tension.

– To tighten union nuts (14 mm) for high-pressure pipes, use torque wrench -V.A.G 1331- with socket insert AF 14, flared ring spanner -V.A.G 1331/8- .



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- To tighten union nuts (17 mm) for high-pressure pipes, use torque wrench -V.A.G 1331- with tool insert (17 mm) -V.A.G 1331/6- .
- Do not install mounting brackets until high-pressure pipes have been finally secured.
- Observe notes on procedures required after connecting battery ⇒ Rep. Gr. 27 .
- If necessary, fill up with coolant ⇒ Rep. Gr. 19 .



2.6.2 Fuel rail with injectors - exploded view

1 - Radial compensation element
- ❑ Renew if damaged
- ❑ Clip onto support ring ⇒ Item 6 (page 31)

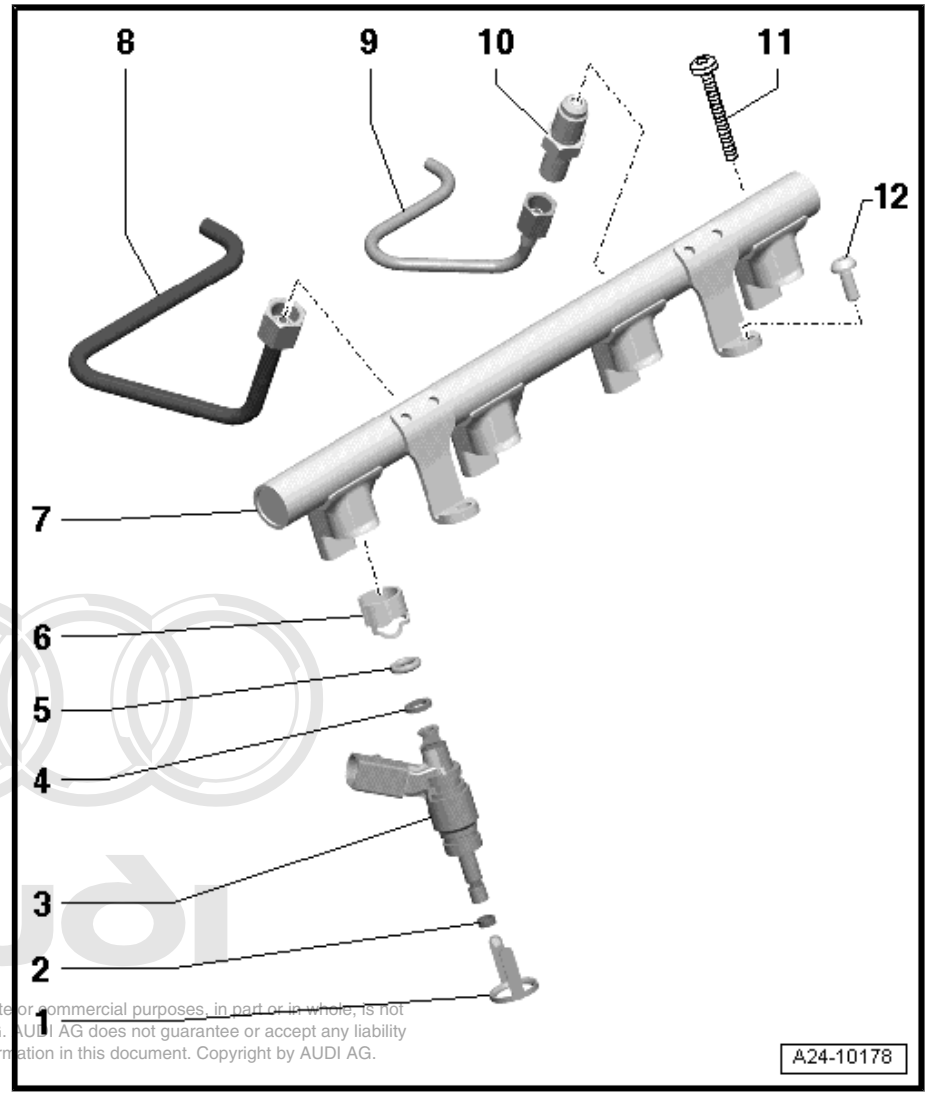
2 - Combustion chamber ring seal
- ❑ Do not apply grease to ring seal or use any other lubricants
- ❑ Renew

3 - Injector
- ❑ Removing and installing ⇒ page 33

4 - Spacer ring
- ❑ Renew if damaged

5 - O-ring
- ❑ Renew
- ❑ Lubricate lightly with clean engine oil

6 - Support ring
- ❑ Renew
- ❑ Via this support ring, the fuel rail exerts the clamping force that holds the injector in the cylinder head



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

7 - Fuel rail

8 - High-pressure pipe

> **WARNING**
>
> *The pressure in the high-pressure part of the injection system must be reduced to a residual pressure prior to opening the system ⇒ page 3 .*
>
> *A clean cloth must then be wrapped around the connection and the residual pressure dissipated by carefully loosening the connection.*

- ❑ Connections must not be damaged
- ❑ Do not alter shape
- ❑ 25 Nm

9 - High-pressure pipe

> **WARNING**
>
> *The pressure in the high-pressure part of the injection system must be reduced to a residual pressure prior to opening the system ⇒ page 3 .*
>
> *A clean cloth must then be wrapped around the connection and the residual pressure dissipated by carefully loosening the connection.*

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- ❑ Connections must not be damaged
- ❑ Do not alter shape
- ❑ 25 Nm

10 - Pressure relief valve, 140 bar

- ❑ For high-pressure pipe
- ❑ 25 Nm

11 - Bolt

- ❑ 9 Nm
- ❑ Tighten in stages and in diagonal sequence

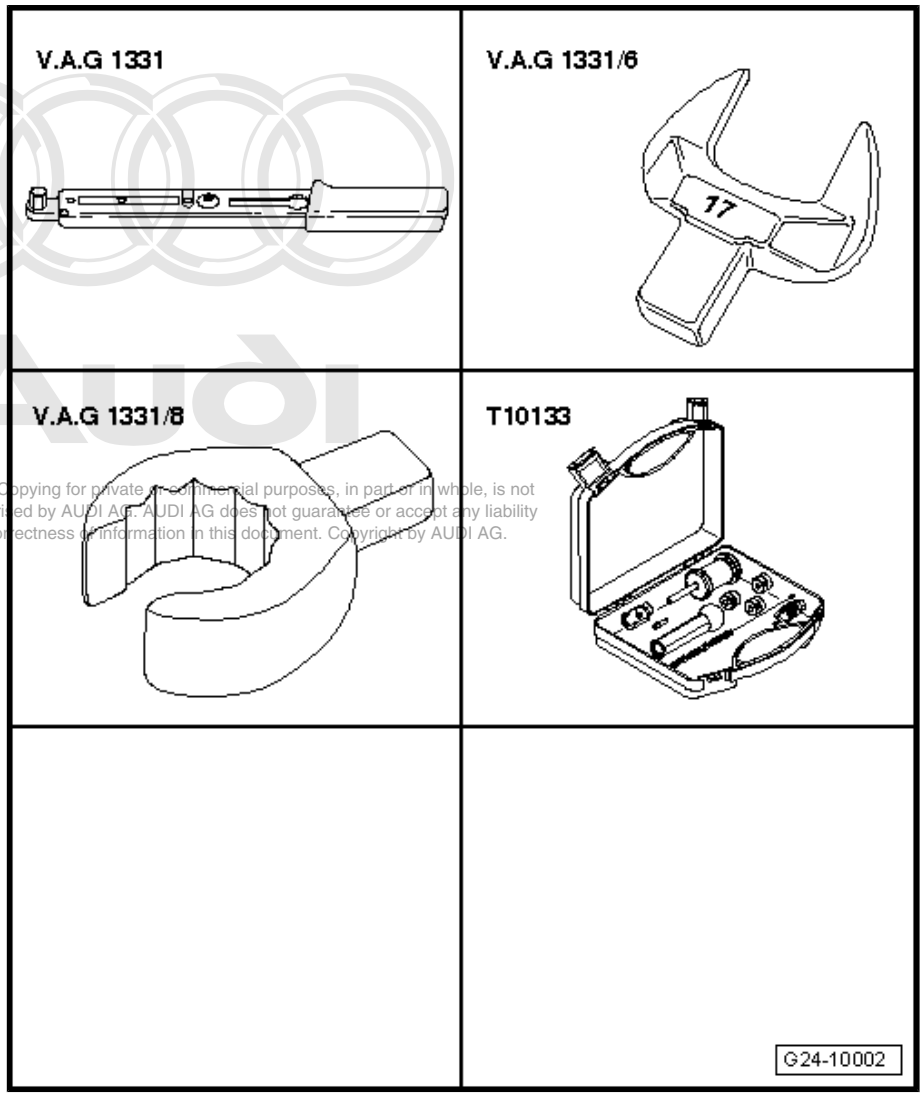
12 - Bolt

- ❑ 9 Nm
- ❑ Tighten in stages and in diagonal sequence

2.6.3 Removing and installing injectors

Special tools and workshop equipment required

- Torque wrench -V.A.G 1331-
- Tool insert AF 17 -V.A.G 1331/6-
- Socket insert AF 14, flared ring spanner -V.A.G 1331/8-
- Tool set for FSI engines - T10133-



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Removing

WARNING

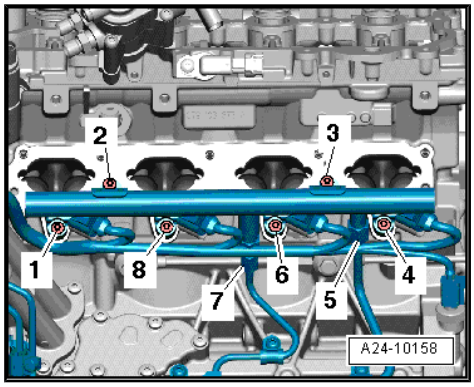
- *The fuel system operates under high pressure. The pressure in the high-pressure part of the injection system must be reduced to a residual pressure prior to opening the system ⇒ page 3 .*
- *A clean cloth must then be wrapped around the connection and the residual pressure dissipated by carefully loosening the connection.*

– Remove intake manifold ⇒ page 24 .

Note

Seal off the injector openings in the cylinder heads with clean cloths.

– Unplug electrical connectors at injectors.
– Unscrew high-pressure pipe -5- at connection on fuel rail.
– Unscrew high-pressure pipe -7- at connection on fuel rail. To do so, counterhold at hexagon flats with an open-end spanner and slacken union nut.
– Remove bolts -1, 2, 3, 4, 6 and 8-.



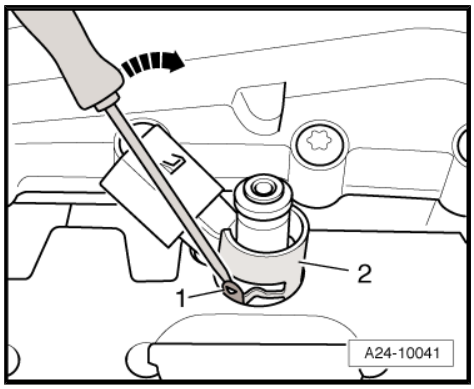
Note

Do not attempt to bend high-pressure pipes to a different shape.

– Pull off fuel rail together with injectors.

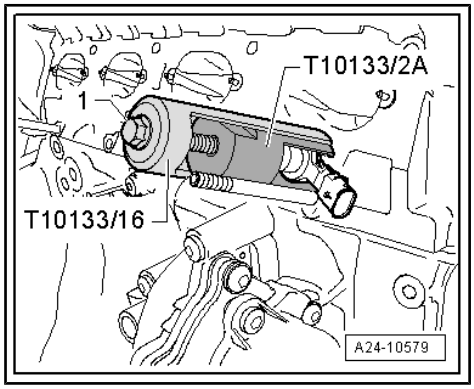
If injectors cannot be pulled out of cylinder head by hand, proceed as follows:

– Use a screwdriver to bend retainer tabs -1- of radial compensation element to side -arrow- and pull support ring -2- off injector.
– Remove O-ring from injector.



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

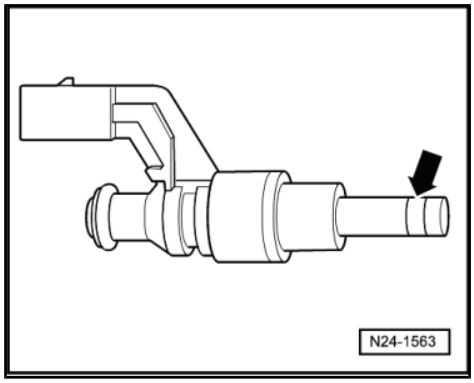
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



Note

When inserting the puller, there is a risk of destroying the radial compensation element due to the retainer tabs breaking.

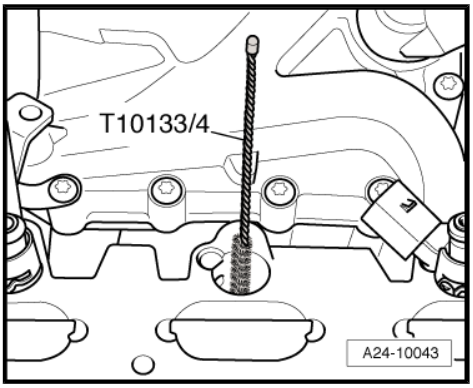
– Carefully remove old combustion chamber ring seal -arrow-. To do so, cut open ring using knife or prise open ring with small screwdriver and then pull off forwards.
– Take care not to damage groove on injector. The injector must be renewed if the groove is damaged.



Installing

Note

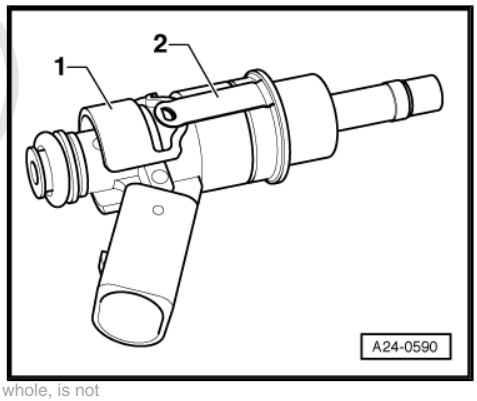
- *Renew combustion chamber ring seal and O-ring.*
- *Renew spacer ring if damaged.*
- *Lightly lubricate O-rings for injectors with clean engine oil.*
- *The injector pipes must be re-installed on the same cylinders.*



– Clean bore in cylinder head with nylon cylinder brush - T10133/4- .

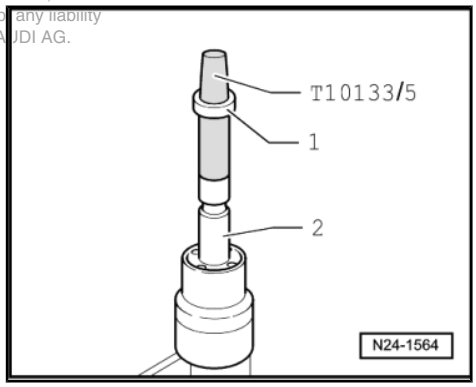
– Clip radial compensation element -1- into support ring -2-.

– When re-installing an injector, clean any combustion residue off groove for combustion chamber ring seal and injector stem with a clean cloth.



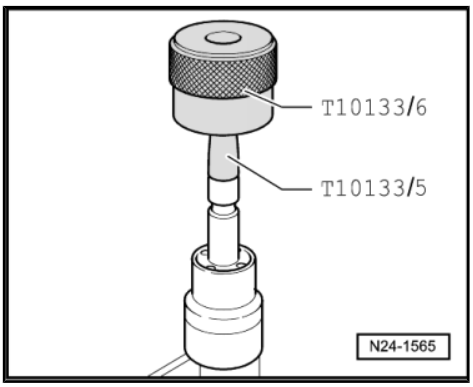
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

– Fit assembly cone -T10133/5- with new combustion chamber ring seal -1- onto injector -2-.



– Push combustion chamber ring seal onto assembly cone - T10133/5- as far as it will go using assembly sleeve - T10133/6- .

– Turn assembly sleeve -T10133/6- upside down and push combustion chamber ring seal into sealing ring groove.

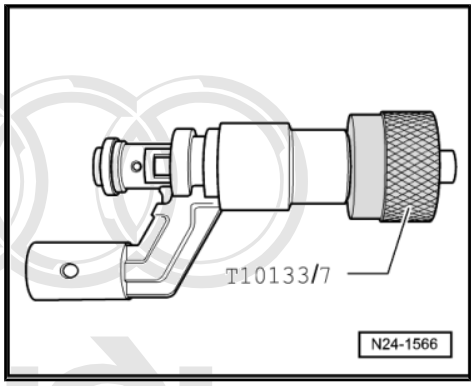


Note

The combustion chamber ring seal is widened when it is pushed onto the injector. After pushing it on, it therefore has to be compressed again. This is done in two stages, as described below.

– Push calibration sleeve -T10133/7- onto injector as far as it will go and simultaneously turn it slightly (approx. 180°).

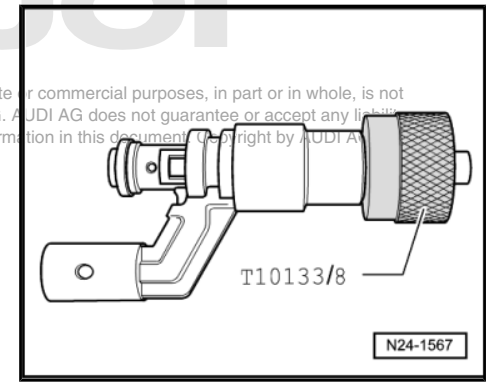
– Pull calibration sleeve -T10133/7- off again by turning it in the opposite direction.



– Push calibration sleeve -T10133/8- onto injector as far as it will go and simultaneously turn it slightly (approx. 180°).

– Pull calibration sleeve -T10133/8- off again by turning it in the opposite direction.

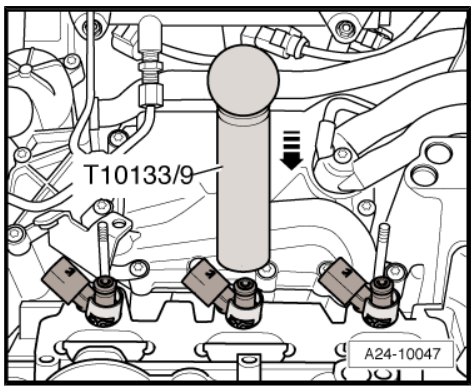
– Lubricate new O-ring lightly with clean engine oil before installing.



Note

The combustion chamber ring seal must not be lubricated.

– Use assembly tool -T10133/9- to push injector as far as it will go into hole in cylinder head.



Note

It should be possible to insert the injector easily. If necessary wait until the combustion chamber ring seal has contracted sufficiently.

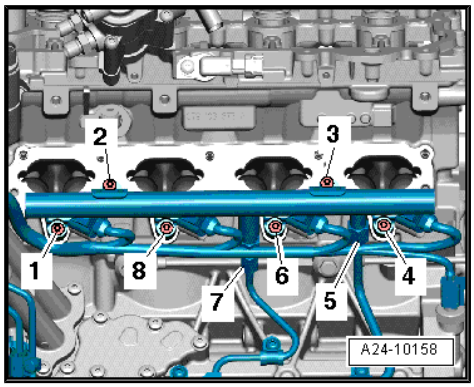
– Make sure injector is in correct installation position in cylinder head:

• Electrical connector of injector must engage in recess in cylinder head.

– Press fuel rail evenly onto injectors.

– Tighten bolts -1, 2, 3, 4, 6 and 8- in diagonal sequence and in stages.

• Tightening torque: refer to exploded view of fuel rail with injectors ⇒ page 31



Copyright by AUDI AG. Duplication for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG

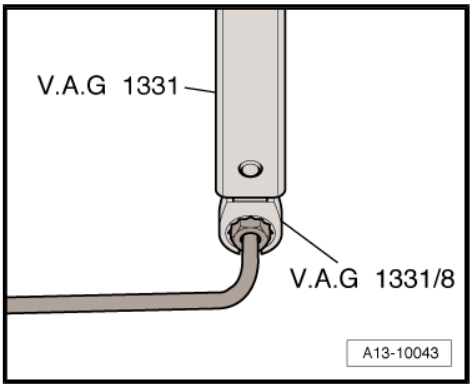
Note

- *The connections of the high-pressure pipes must not be damaged.*
- *Do not attempt to bend high-pressure pipes to a different shape.*

– Tighten union nuts on high-pressure pipes hand-tight initially.

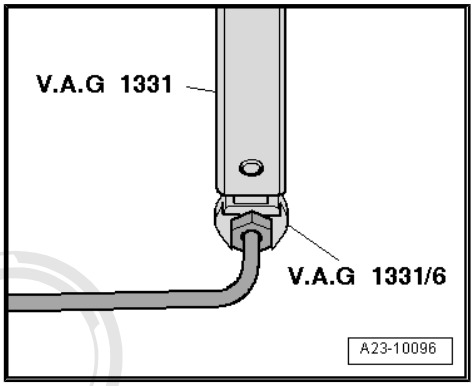
– Ensure that high-pressure pipes are not under tension.

– To tighten union nut (14 mm) for high-pressure pipe, use torque wrench -V.A.G 1331- with socket insert AF 14, flared ring spanner -V.A.G 1331/8- .



– To tighten union nut (17 mm) for high-pressure pipe, use torque wrench -V.A.G 1331- with tool insert (17 mm) -V.A.G 1331/6- .

– Do not install mounting brackets until high-pressure pipes have been finally secured.



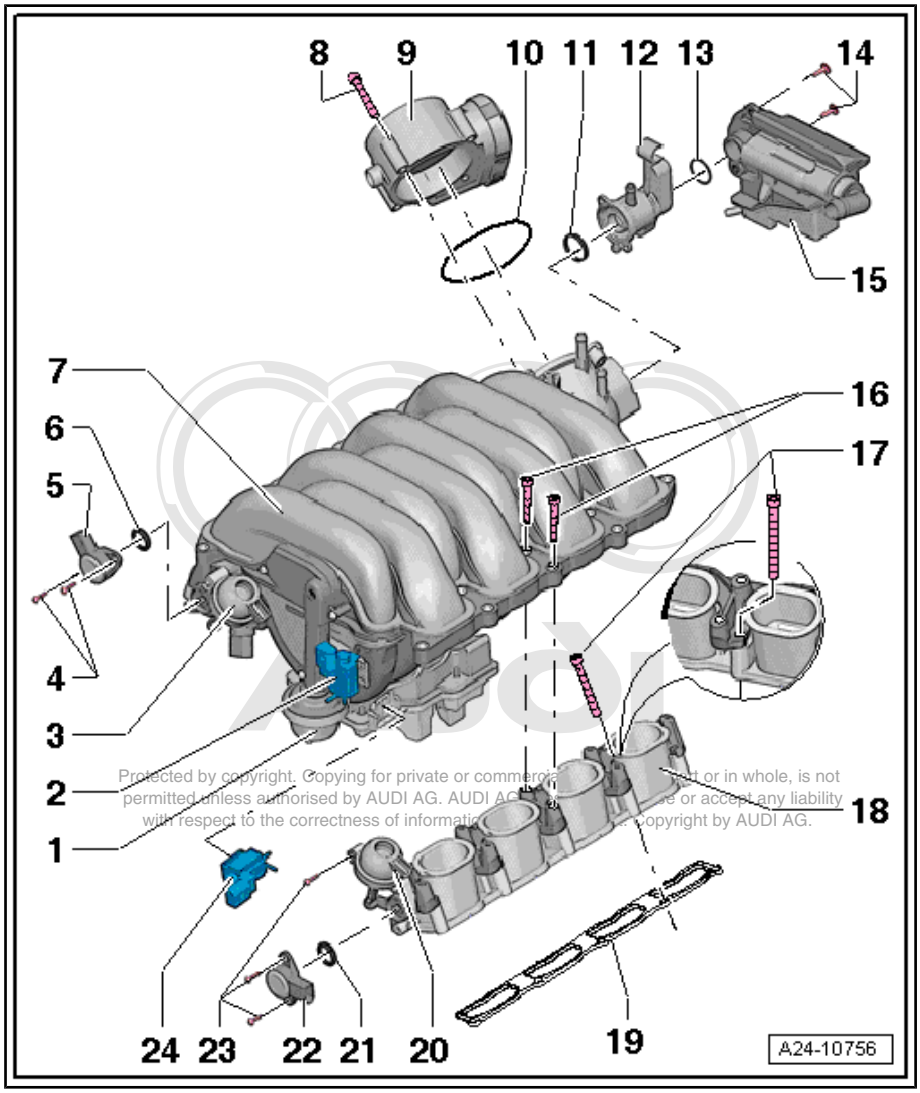
Perform further installation in reverse order, paying attention to the following:

– Install intake manifold ⇒ page 24 .

2.7 Intake manifold (plastic - gradual introduction from model year 2009 onwards) - exploded view

From model year 2009 onwards, a plastic intake manifold is installed (a combination is possible in model year 2009).

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



1 - Vacuum unit for intake manifold change-over

2 - Variable intake manifold change-over valve -N156-

3 - Vacuum unit for intake manifold flaps (cylinder bank 1)

- ❑ For CVTS tumble flaps (cylinder bank 1)

4 - Bolt

- ❑ 2.5 Nm

5 - Intake manifold flap potentiometer -G336-

- ❑ Cylinder bank 1
- ❑ After renewing, perform “Adaption” in “Guided Functions”, vehicle diagnostic, testing and information system -VAS 5051B- .

6 - Seal

- ❑ Renew if damaged
- ❑ Open side faces towards potentiometer

7 - Intake manifold

- ❑ Removing and installing ⇒ page 40

8 - Bolt

- ❑ 9 Nm

9 - Throttle valve module -J338-

- ❑ After renewing, perform “Adaption” in “Guided Functions”, vehicle diagnostic, testing and information system -VAS 5051B- .

10 - O-ring

- ❑ Renew

11 - O-ring

- ❑ Renew

12 - Adapter for crankcase breather system

- ❑ Tighten to 2.5 Nm

13 - O-ring

- ❑ Renew

14 - Bolt

- ❑ 9 Nm

15 - Pressure control valve for crankcase breather system

16 - Bolts for intake manifold

- ❑ For tightening torque and tightening sequence, refer to ⇒ page 39

17 - Bolts for intake manifold (bottom section)

- ❑ For tightening torque and tightening sequence, refer to ⇒ page 39

18 - Intake manifold (bottom section)

19 - Intake manifold gasket

- ❑ Renew

20 - Vacuum unit for intake manifold flaps (cylinder bank 2)

- ❑ For CVTS tumble flaps (cylinder bank 2)

21 - Seal

- ❑ Renew if damaged
- ❑ Open side faces towards potentiometer

22 - Intake manifold flap potentiometer 2 -G512-

- ❑ Cylinder bank 2
- ❑ After renewing, perform “Adaption” in “Guided Functions”, vehicle diagnostic, testing and information system -VAS 5051B- .

23 - Bolt

- ❑ 2.5 Nm

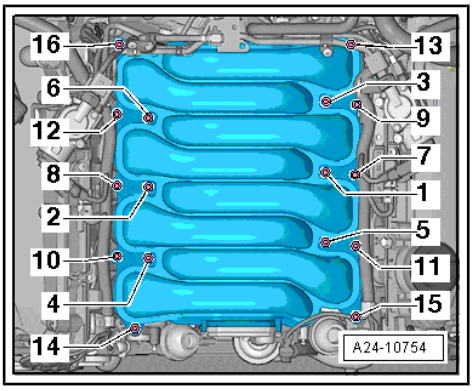
24 - Intake manifold flap valve -N316-

Tightening torque and tightening sequence for intake manifold

– Tighten bolts for intake manifold in the sequence -1 to 16-.

♦ Tighten initially to 8 Nm

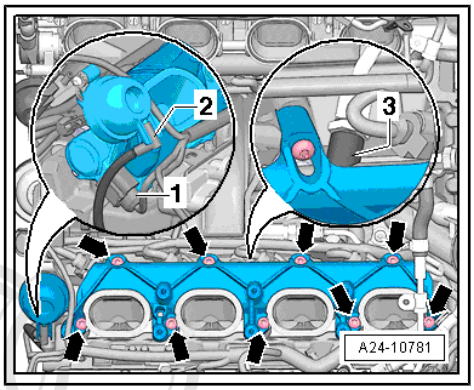
♦ Subsequently tighten to 11 Nm



Intake manifold (bottom section) - tightening torque

– Tighten bolts -arrows- for intake manifold (bottom section) in diagonal sequence and in stages.

• 10 Nm



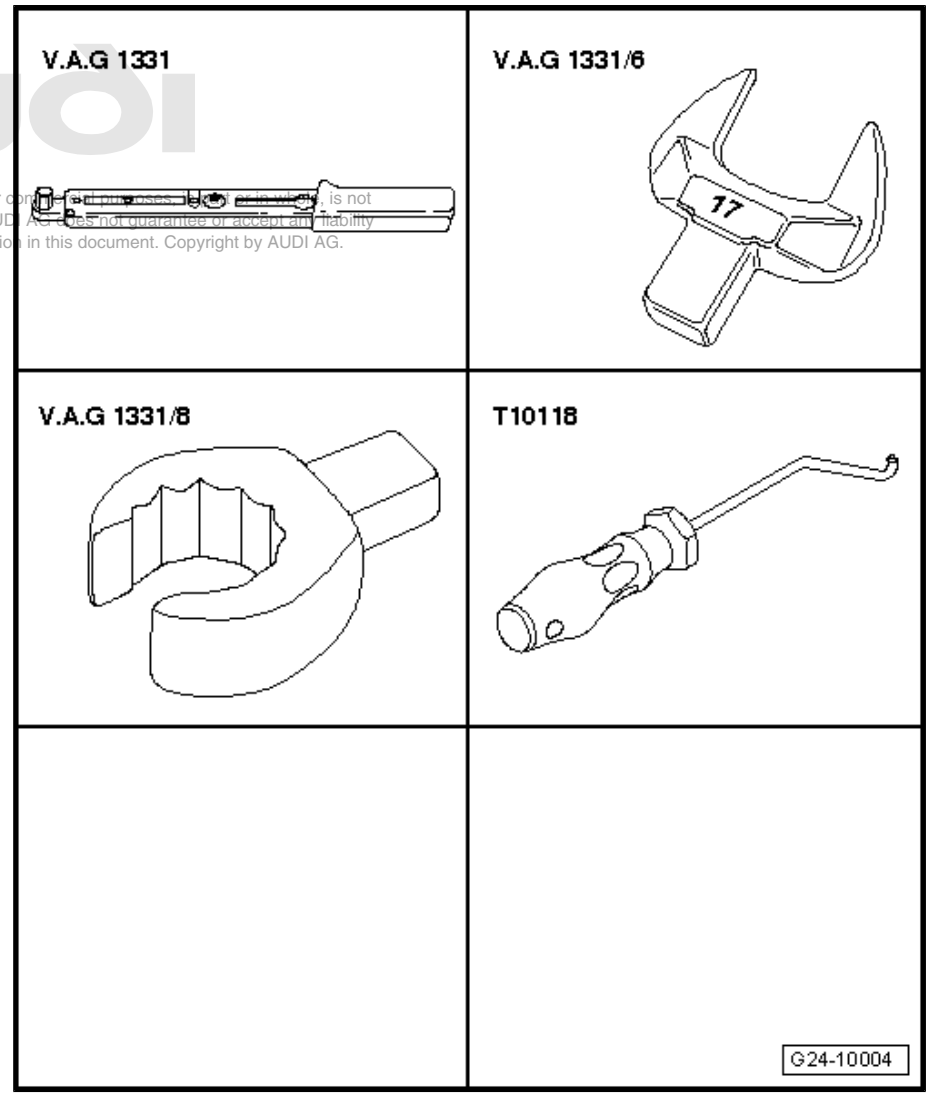
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

2.7.1 Removing and installing intake manifold

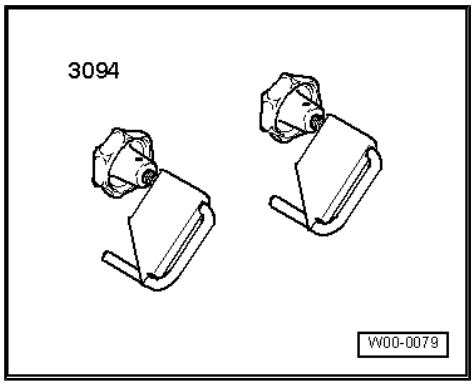
Special tools and workshop equipment required

- Torque wrench -V.A.G 1331-
- Tool insert AF 17 -V.A.G 1331/6-
- Socket insert AF 14, flared ring spanner -V.A.G 1331/8-
- Assembly tool -T10118-

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



- Hose clamps for hoses up to 25 mm -3094-



Removing

WARNING

- *The fuel system operates under high pressure. The pressure in the high-pressure part of the injection system must be reduced to a residual pressure prior to opening the system ⇒ page 3 .*
- *A clean cloth must then be wrapped around the connection and the residual pressure dissipated by carefully loosening the connection.*

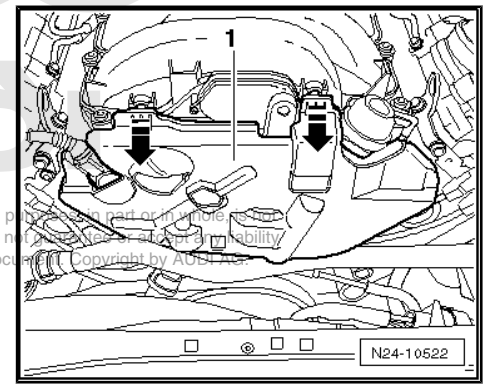
Note

All cable ties which are released or cut open when removing must be fitted in the same position when installing.

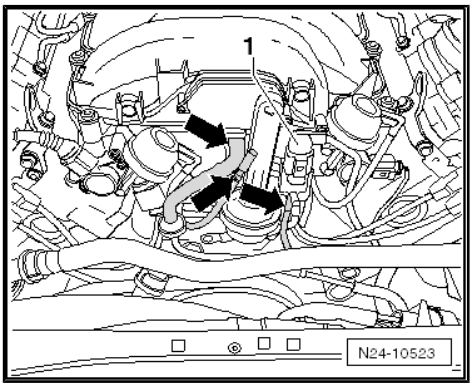
– Disconnect earth wire at battery with ignition switched off.

– Pull off engine cover panel.

– Pull cover -1- towards front and lift off.

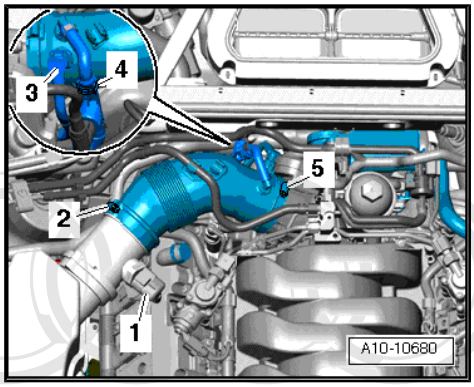


– Unplug electrical connector -1- and detach vacuum lines -arrows-.



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

– Detach vacuum line -4- at air intake hose.



Note

Disregard -item 1-.

Rest-of-world vehicles:

– Disconnect hose -3- for crankcase breather system from air hose by pressing release tabs.

– Release hose clips -2- and -5- and remove air intake hose.

USA models:

– Release hose clips -2- and -5- and move air intake hose clear to one side (crankcase breather hose -3- remains connected).

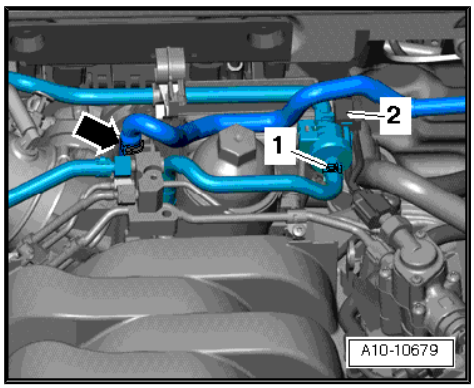
Caution

Do not open hose connection -3- on USA models.

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

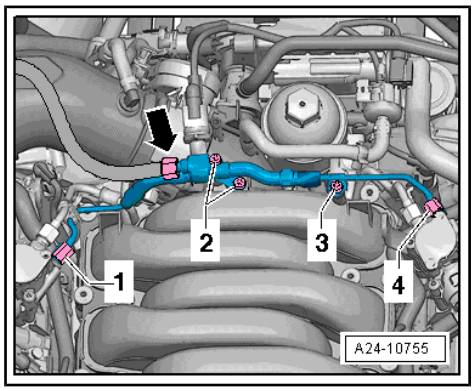
– Unplug electrical connector -2- at activated charcoal filter solenoid valve 1 -N80- and detach vacuum hose -1-.

– Detach activated charcoal filter solenoid valve 1 -N80- from bracket and move it clear to the side with hose still attached.



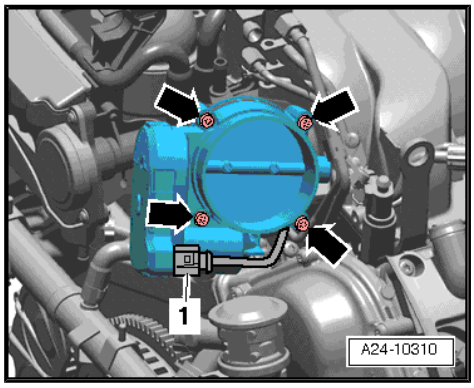
– Disconnect fuel lines -1 and 4- at high-pressure pumps.

– Remove bolts -2 and 3-.

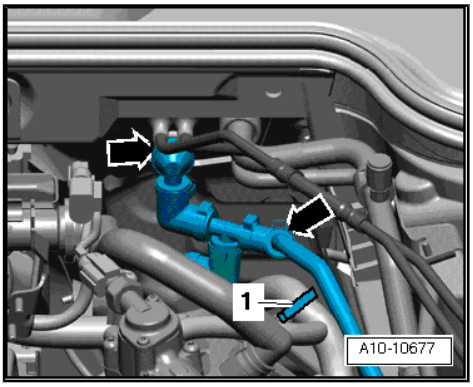


– Unplug electrical connector -1- at throttle valve module - J338- .

– Unscrew bolts -arrows- and remove throttle valve module - J338- .



– Detach vacuum lines -arrows- going to brake servo.
– Move vacuum lines clear to one side.



Note

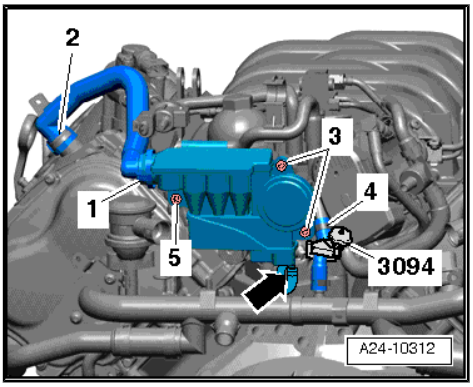
Disregard -item 1-.

WARNING

Hot steam or hot coolant can escape when expansion tank is opened; cover filler cap with cloth and open carefully.

– Open filler cap on coolant expansion tank.

– Detach crankcase breather hose at the points marked with -item 1- and -item 2- (press release tabs).
– Clamp off coolant hose -4- using hose clamp -3094- and detach coolant hose from intake manifold connection.
– Slacken bolt -5- a few turns.
– Unscrew bolts -3- and carefully remove pressure control valve for crankcase breather system from intake manifold connection.



Note

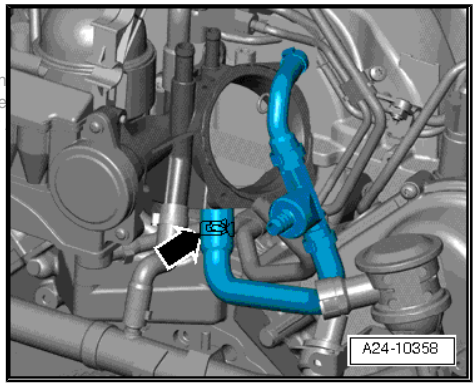
- *Disregard -arrow-.*
- *Shown from rear with engine removed for illustration purposes.*

Note

Lay a cloth under the intake manifold connection to catch escaping coolant.

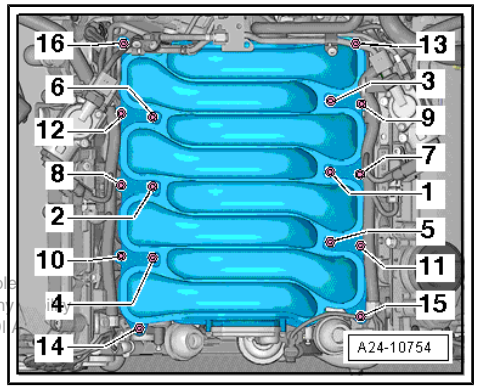
– Detach coolant hose -arrow- and move clear to one side.

– Detach vacuum hose -arrow- going to intake manifold connection.



Protected by copyright. Copying for private or commercial purposes, in part or in
permitted unless authorised by AUDI AG. AUDI AG does not guarantee or acce
with respect to the correctness of information in this document. Copyright by

– Remove bolts for intake manifold in the sequence -16 to 1-.
– Remove intake manifold from engine compartment.



Note

Seal intake ports on cylinder heads with clean cloths.

Installing

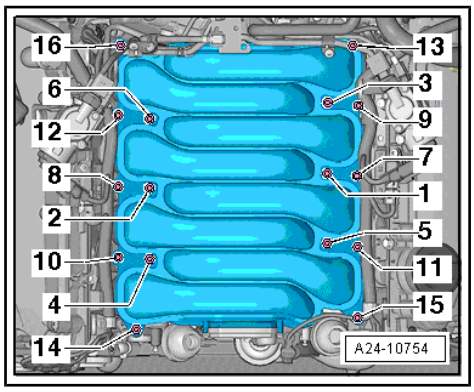
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Note

- *Renew gaskets, seals and O-rings.*
- *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Parts catalogue.*
- *Fit all cable ties in the original positions when installing.*

– Check seals in intake manifold for damage and make sure they are positioned correctly.
– Make sure that hoses and wires are not trapped.

– Tighten bolts for intake manifold in the sequence -1 to 16-.



- Tightening torques: refer to exploded view of intake manifold ⇒ page 37 .
- Tightening torques: refer to exploded view of fuel rail with injectors ⇒ page 46 .

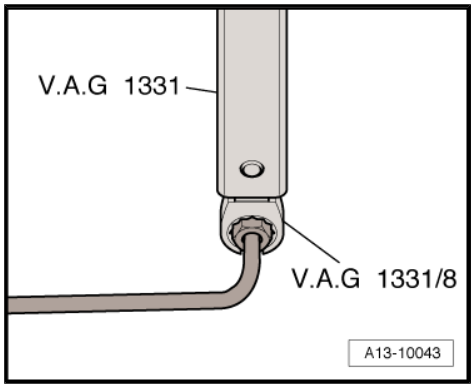
The remaining installation steps are carried out in the reverse sequence.

Note

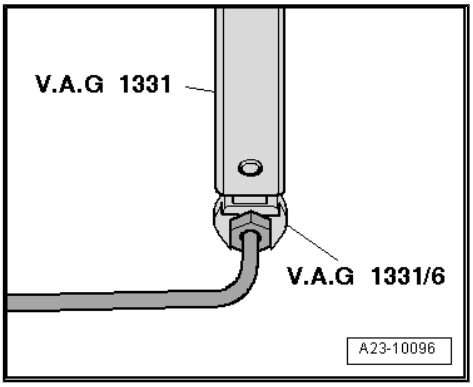
- *The connections of the high-pressure pipes must not be damaged.*
- *Do not attempt to bend high-pressure pipes to a different shape.*

– Tighten union nuts on high-pressure pipes hand-tight initially.
– Ensure that high-pressure pipes are not under tension.

– To tighten union nuts (14 mm) for high-pressure pipes, use torque wrench -V.A.G 1331- with socket insert AF 14, flared ring spanner -V.A.G 1331/8- .

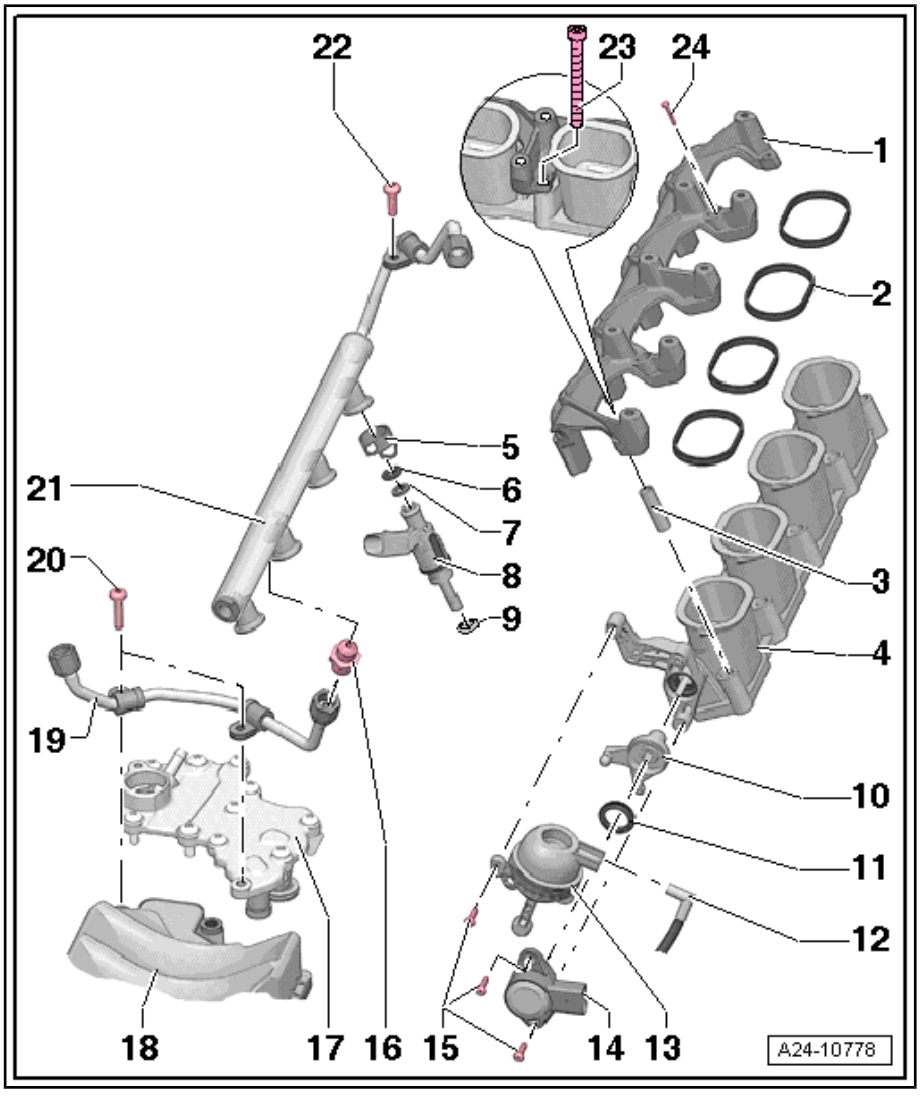


– To tighten union nuts (17 mm) for high-pressure pipes, use torque wrench -V.A.G 1331- with tool insert (17 mm) -V.A.G 1331/6- .
– Do not install mounting brackets until high-pressure pipes have been finally secured.
– Observe notes on procedures required after connecting battery ⇒ Rep. Gr. 27 .
– If necessary, fill up with coolant ⇒ Rep. Gr. 19 .



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

2.7.2 Intake manifold (bottom section) with fuel rail - exploded view



1 - Bracket
- ❑ For flange and fuel rail

2 - Seal
- ❑ Renew

3 - Sleeve

4 - Intake manifold (bottom section)
- ❑ When installing intake manifold (bottom section), intake manifold flaps must be in output position (intake channel fully open)
- ❑ Removing and installing ⇒ page 47
- ❑ 9 Nm

5 - Support ring
- ❑ Renew if damaged
- ❑ When installing, make sure it is seated correctly

6 - O-ring
- ❑ Renew
- ❑ Lubricate lightly with clean engine oil

7 - Spacer ring
- ❑ Renew if damaged

8 - Injector
- ❑ Removing and installing ⇒ page 50

9 - Combustion chamber ring seal
- ❑ Do not apply grease to ring seal or use any other lubricants
- ❑ Renew

10 - Operating lever
- ❑ For vacuum unit

11 - Seal
- ❑ Renew if damaged

- ❑ When renewing lever out with screwdriver
- ❑ Press in by hand

12 - Vacuum hose

- ❑ From intake manifold flap valve -N316-

13 - Vacuum unit for actuating intake manifold flaps

14 - Intake manifold flap potentiometer 2 -G512-

15 - Bolts

- ❑ 2.5 Nm

16 - Threaded connection

- ❑ 40 Nm

17 - Cover

- ❑ For spray nozzle valve and oil retention valve
- ❑ Removing and installing ⇒ Rep. Gr. 17

18 - Vacuum reservoir

19 - High-pressure fuel pipe

20 - Bolts

- ❑ 9 Nm

21 - Fuel rail

22 - Bolts

- ❑ 9 Nm

23 - Bolts

- ❑ 9 Nm

24 - Bolts

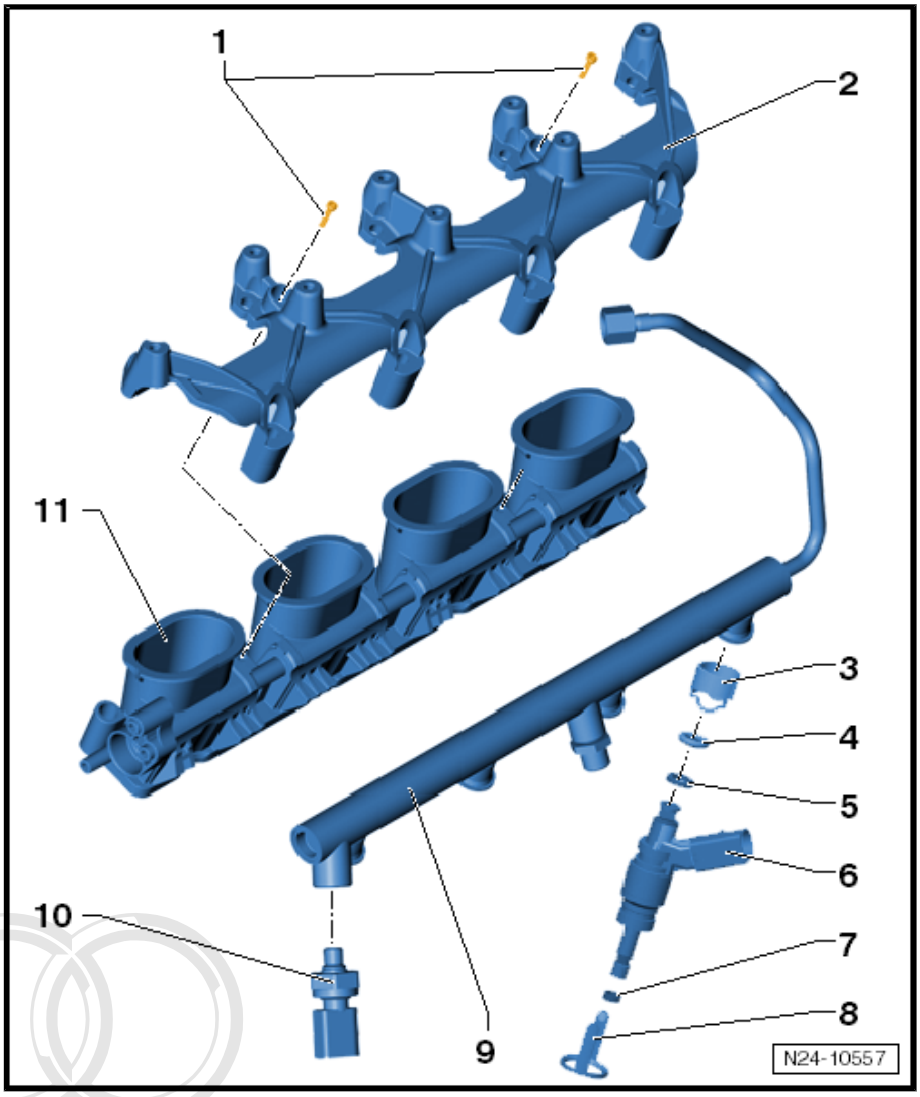
- ❑ 0.3 Nm

2.7.3 Injectors and fuel rail - exploded view

Note

The illustration shows the fuel rail (right-side) for cylinder bank 1.

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



1 - Bolts
- ❑ 0.3 Nm

2 - Bracket
- ❑ For flange and fuel rail

3 - Radial compensation element
- ❑ Renew if damaged
- ❑ Clip onto support ring ⇒ Item 8 (page 47)

4 - O-ring
- ❑ Renew
- ❑ Lubricate lightly with clean engine oil

5 - Spacer ring
- ❑ Renew if damaged

6 - Injector
- ❑ Removing and installing ⇒ page 50

7 - Combustion chamber ring seal
- ❑ Do not apply grease to ring seal or use any other lubricants
- ❑ Renewing ⇒ page 50

8 - Support ring
- ❑ Renew
- ❑ Via this support ring, the fuel rail exerts the clamping force that holds the injector in the cylinder head

9 - Fuel rail
- ❑ Removing and installing ⇒ page 50

10 - Fuel pressure sender -G247-
- ❑ 25 Nm
- ❑ Lubricate threads lightly with clean oil

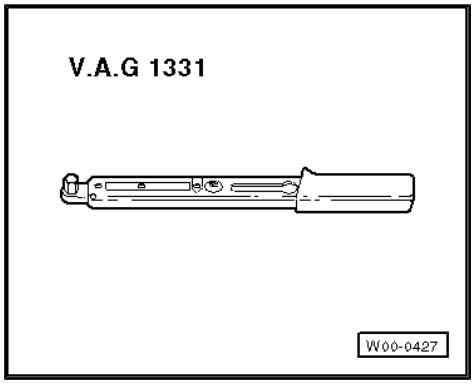
11 - Intake manifold (bottom section)
- ❑ Removing and installing ⇒ page 47
- ❑ 9 Nm

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

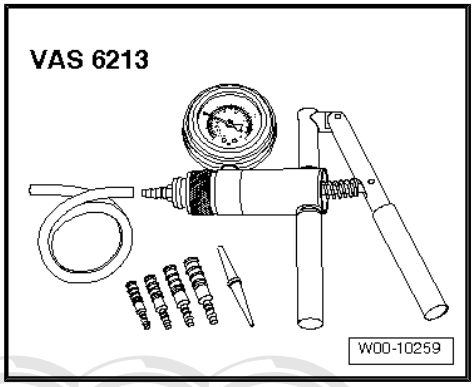
2.7.4 Removing and installing intake manifold (bottom section) with fuel rail

Special tools and workshop equipment required

- Torque wrench -V.A.G 1331-



- Tool insert (open-end ring spanner, 17 mm) -V.A.G 1331/2-
- Hand vacuum pump -VAS 6213-



Removing

Note

The following description shows the removal and installation of the bottom section of the intake manifold (left-side). The procedure for the other side is more or less identical.

WARNING

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

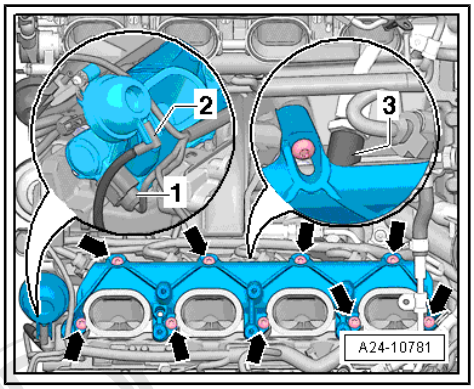
- ***The fuel pressure in the high-pressure section of the injection system must be reduced to a residual pressure prior to opening the system ⇒ page 3 .***

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

– Reduce fuel pressure in high-pressure section of injection system ⇒ page 3 .
– Detach vacuum hose from vacuum unit for intake manifold flaps.
– Unscrew union nut for high-pressure fuel pipe at high-pressure pump (counterhold threaded connection).
– Unplug electrical connector -1- at intake manifold flap potentiometer and pull off vacuum hose -2-.

– Unscrew union nut -3- (counterhold threaded connection).

– Remove bolts -arrows- and detach intake manifold (bottom section) with fuel rail.



Caution

Risk of damage to engine.

- *Block off the intake ports with clean cloths to prevent small objects from dropping into the engine through the intake ports in the cylinder heads.*

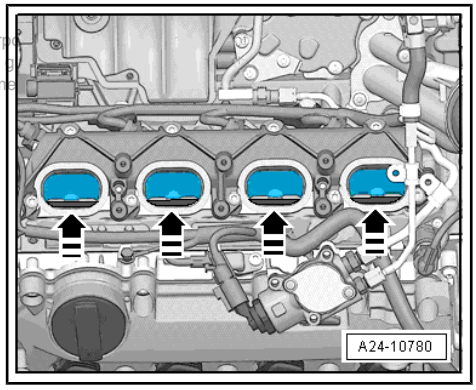
Installing

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

Note

- *Renew gaskets and O-rings.*
- *Lubricate O-rings of injectors lightly with clean engine oil.*

When installing intake manifold (bottom section) move intake manifold flaps in direction of -arrow-.

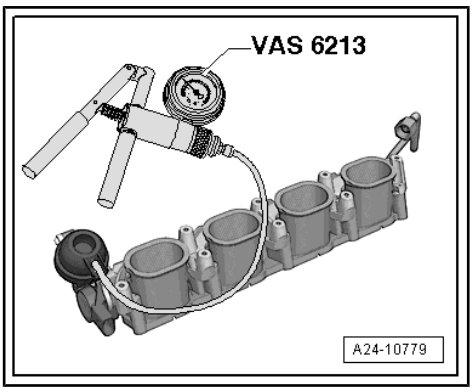


Protected by copyright. Copying for private or commercial purp
permitted unless authorised by AUDI AG. AUDI AG does not g
with respect to the correctness of information in this docume

– Connect hand vacuum pump -VAS 6213- to connection for vacuum unit for intake manifold flaps, as shown in illustration.

– Use hand vacuum pump to generate vacuum.

• This will cause the intake manifold flaps to open.



Note

If the intake manifold flaps are not opened, they can catch on the guide plates in the cylinder head when the intake manifold (bottom section) is installed.

– Then press intake manifold (bottom section) evenly onto injectors.

– Tighten bolts for intake manifold (bottom section) in diagonal sequence to specified torque.

• Tightening torque: refer to intake manifold - exploded view ⇒ page 37

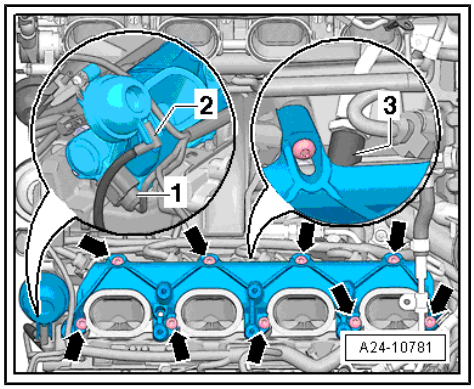
– Detach hand vacuum pump from connection for vacuum unit for intake manifold flaps.

– Tighten union nut for high-pressure fuel pipe at high-pressure pump (counterhold threaded connection).

– Tighten union nut -3- (counterhold threaded connection).

• Tightening torque: refer to high-pressure pump - exploded view ⇒ page 61 .

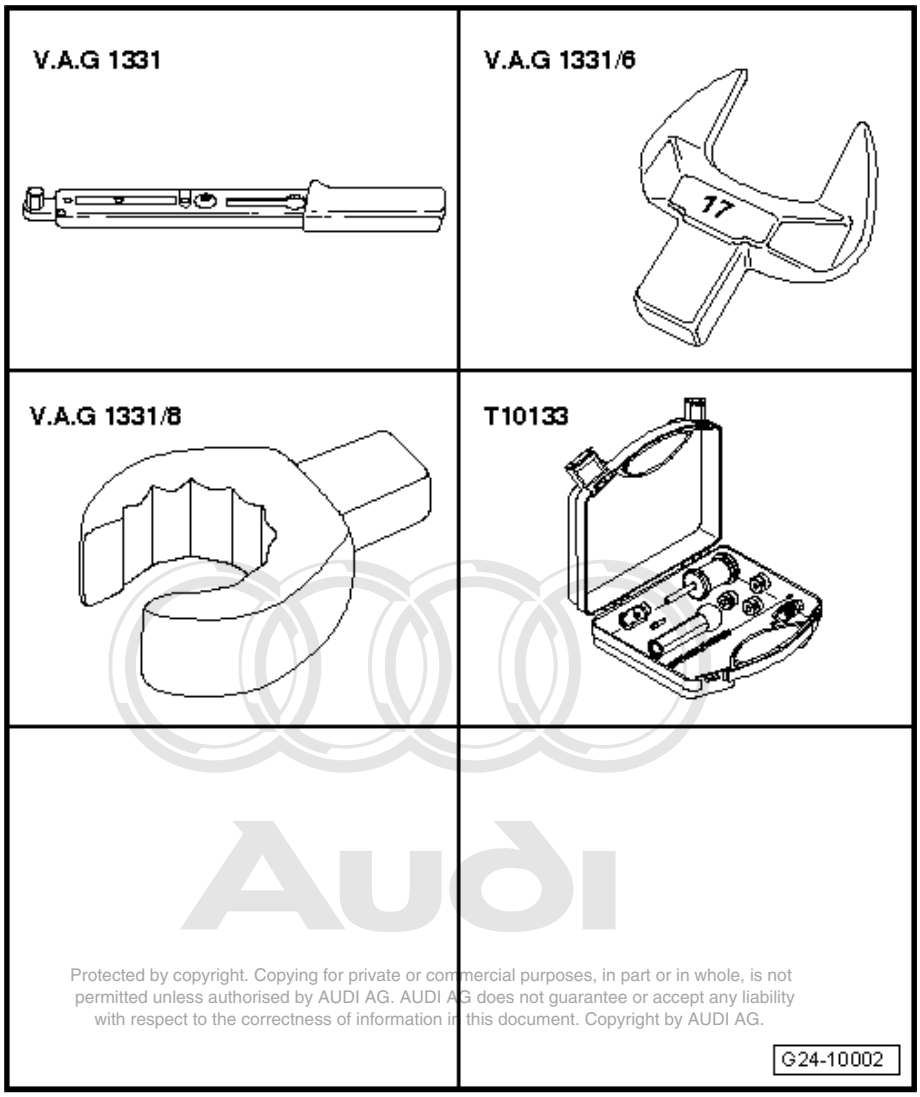
– Ensure that high-pressure pipe is not under tension.



2.7.5 Removing and installing injectors

Special tools and workshop equipment required

- Torque wrench -V.A.G 1331-
- Tool insert AF 17 -V.A.G 1331/6-
- Socket insert AF 14, flared ring spanner -V.A.G 1331/8-
- Tool set for FSI engines -T10133-



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Removing

Note

The following description is for removing and installing the injectors on the left side (cylinder bank 2).

WARNING

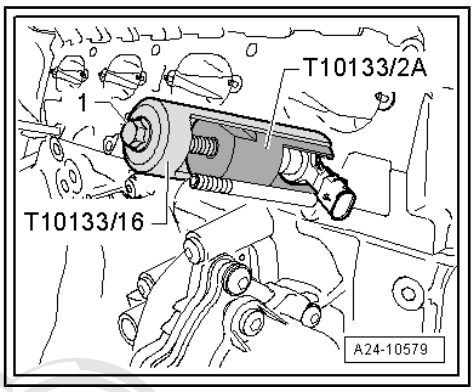
- *The fuel system operates under high pressure. The pressure in the high-pressure part of the injection system must be reduced to a residual pressure prior to opening the system ⇒ page 3 .*
- *A clean cloth must then be wrapped around the connection and the residual pressure dissipated by carefully loosening the connection.*

– Remove intake manifold ⇒ page 40 .

– Remove intake manifold (bottom section) on relevant side ⇒ page 47 .

– Guide puller -T10133/2A- into groove on injector.

– Then attach removal tool -T10133/16- and pull out injector by turning bolt -1-.

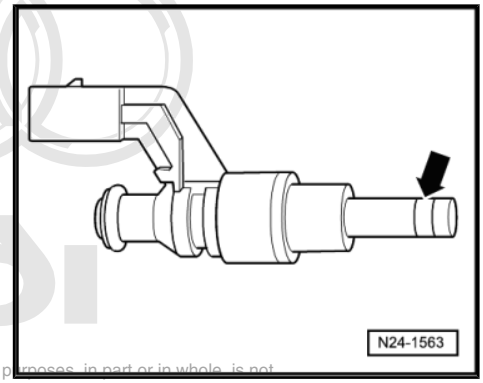


Note

When inserting the puller, there is a risk of destroying the radial compensation element due to the retainer tabs breaking.

– Carefully remove old combustion chamber ring seal -arrow-. To do so, cut open ring using knife or prise open ring with small screwdriver and then pull off forwards.

– Take care not to damage groove on injector. The injector must be renewed if the groove is damaged.



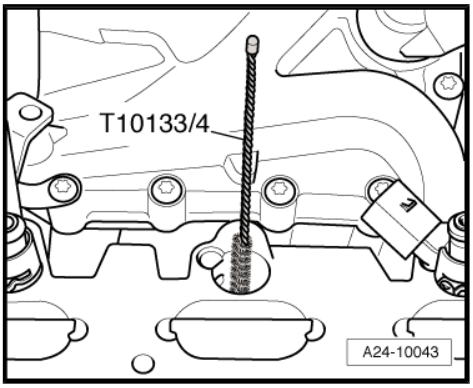
Installing

Note

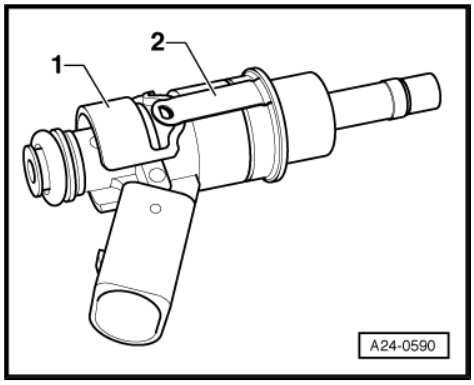
- *Renew combustion chamber ring seal and O-ring.*
- *Renew spacer ring if damaged.*
- *Lightly lubricate O-rings for injectors with clean engine oil.*
- *The injectors must be re-installed on the same cylinders.*

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

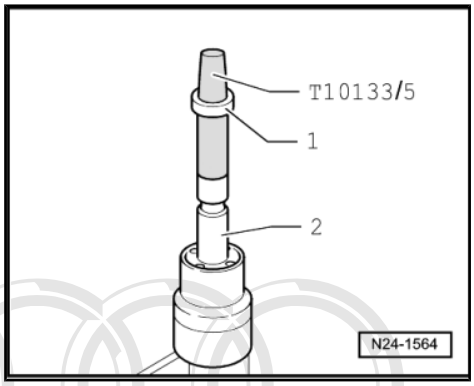
– Clean bore in cylinder head with nylon cylinder brush - T10133/4- .



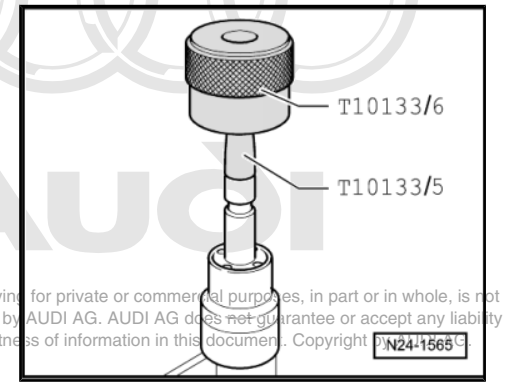
– Clip radial compensation element -1- into support ring -2-.
– When re-installing an injector, clean any combustion residue off groove for combustion chamber ring seal and injector stem with a clean cloth.



– Fit assembly cone -T10133/5- with new combustion chamber ring seal -1- onto injector -2-.



– Push combustion chamber ring seal onto assembly cone -T10133/5- as far as it will go using assembly sleeve -T10133/6- .
– Turn assembly sleeve -T10133/6- upside down and push combustion chamber ring seal into sealing ring groove.

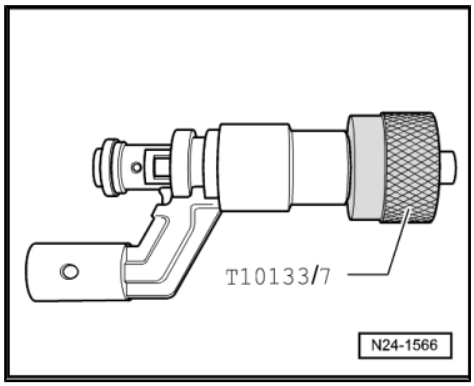


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

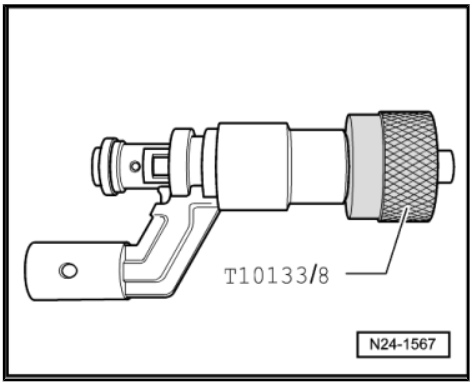
Note

The combustion chamber ring seal is widened when it is pushed onto the injector. After pushing it on, it therefore has to be compressed again. This is done in two stages, as described below.

– Push calibration sleeve -T10133/7- onto injector as far as it will go and simultaneously turn it slightly (approx. 180°).
– Pull calibration sleeve -T10133/7- off again by turning it in the opposite direction.



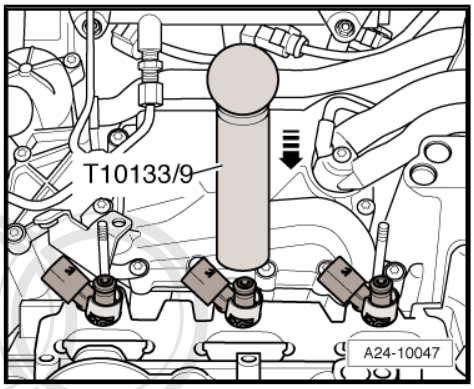
– Push calibration sleeve -T10133/8- onto injector as far as it will go and simultaneously turn it slightly (approx. 180°).
– Pull calibration sleeve -T10133/8- off again by turning it in the opposite direction.



Note

The combustion chamber ring seal must not be lubricated.

– Use assembly tool -T10133/9- to push injector as far as it will go into hole in cylinder head.



Note

It should be possible to insert the injector easily. If necessary wait until the combustion chamber ring seal has contracted sufficiently.

– Make sure injector is in correct installation position in cylinder head:
• Electrical connector of injector must engage in recess in cylinder head.
• Coat O-rings of injectors with clean engine oil to facilitate insertion into fuel rail.
• Renew all seals.

Perform further installation in reverse order, paying attention to the following:

• Tightening torque: Intake manifold - exploded view ⇒ page 37

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Note

♦ *The connections of the high-pressure pipes must not be damaged.*
♦ *Do not attempt to bend high-pressure pipes to a different shape.*

– Do not install mounting brackets until high-pressure pipes have been finally secured.
– Install relevant bottom section of intake manifold ⇒ page 47 .
– Install intake manifold ⇒ page 40 .

2.7.6 Connection diagram for vacuum hoses at intake manifold (plastic)

1 - Vacuum hose with non-return valve

2 - Vacuum unit for intake manifold flap

- ❑ For cylinder bank 1
- ❑ Check with hand vacuum pump -VAS 6213-

3 - Vacuum unit for intake manifold flap 2

- ❑ For cylinder bank 2
- ❑ Check with hand vacuum pump -VAS 6213-

4 - Variable intake manifold change-over valve -N156-

5 - Vacuum unit for intake manifold change-over

- ❑ Check with hand vacuum pump -VAS 6213-

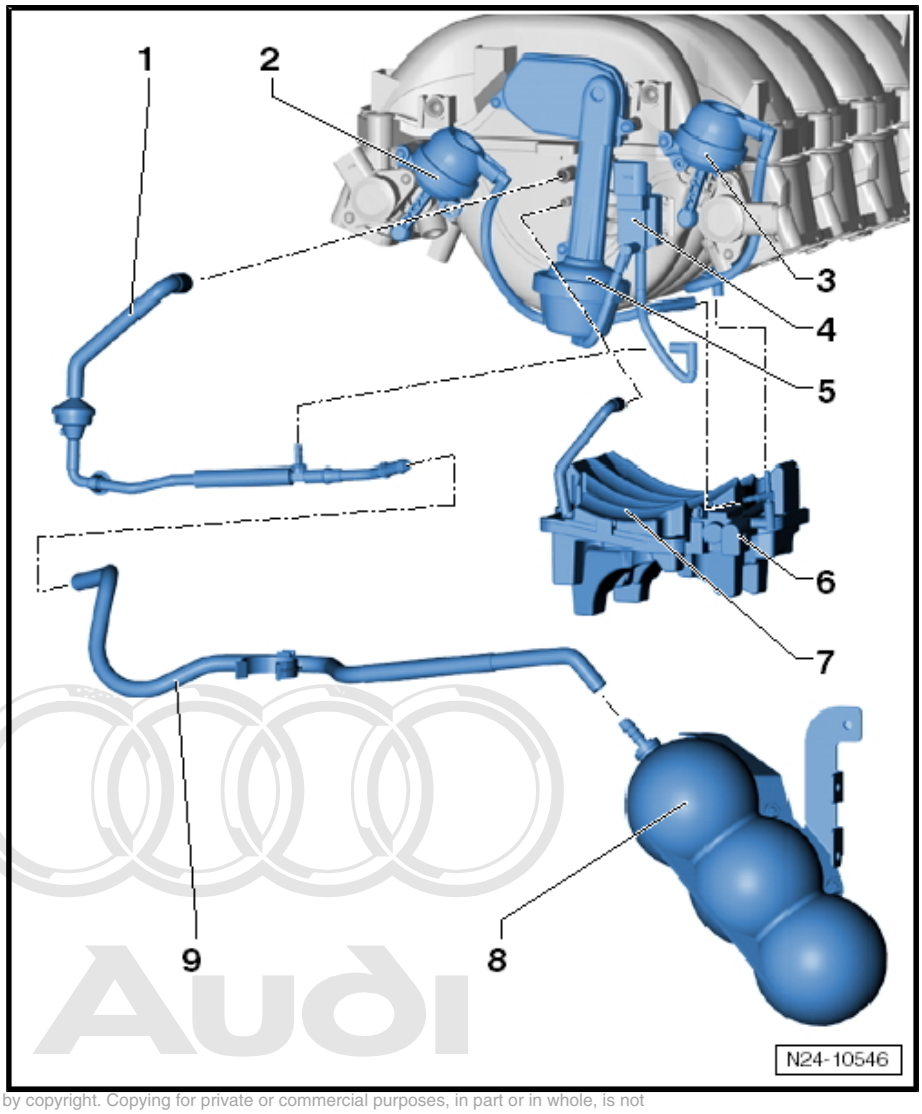
6 - Intake manifold flap valve -N316-

- ❑ Take out intake manifold for removal and installation

7 - Vacuum reservoir

- ❑ Fitting location: beneath intake manifold
- ❑ Take out intake manifold for removal and installation

8 - Vacuum reservoir



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

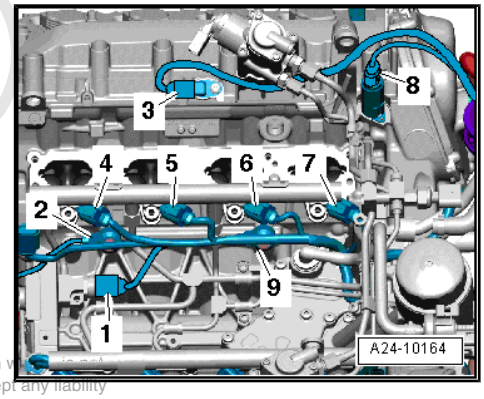
2.8 Removing and installing fuel pressure sender -G247-

Removing

– Remove intake manifold.

– Loosen union nut securing high-pressure pipe to fuel rail.

– Unscrew bolt from fuel pressure sender -G247- -1-.



Note

Fitting location may differ on vehicles from model year 2009.

– Detach fuel pressure sender -G247- with high-pressure pipe.

Note

Do not attempt to bend high-pressure pipes to a different shape.

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Installing

– Tighten fuel pressure sender -G247- .

Note

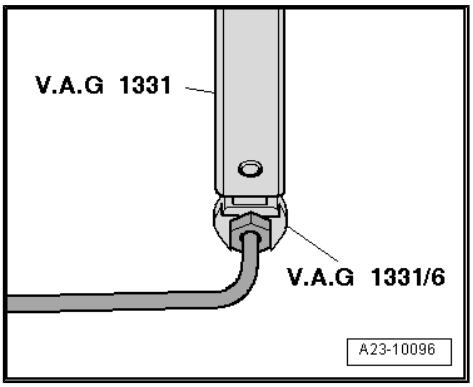
- *The connections -arrows- of the high-pressure pipe must not be damaged.*
- *Do not attempt to bend high-pressure pipe to a different shape.*

– Tighten union nut on high-pressure pipe hand-tight initially.

– Ensure that high-pressure pipe is not under tension.

- Tightening torque: refer to overview of fitting locations ⇒ page 6 .

– To tighten union nut (17 mm) for high-pressure pipe, use torque wrench -V.A.G 1331- with tool insert (17 mm) -V.A.G 1331/6- .



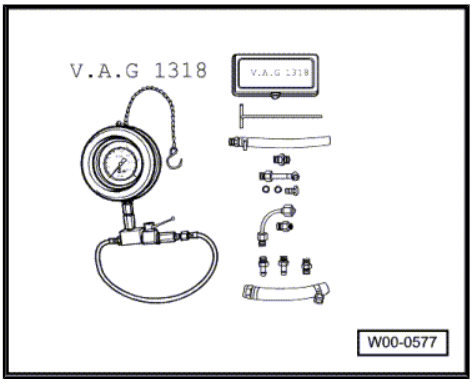
The remaining installation steps are carried out in the reverse sequence.

– Install intake manifold.

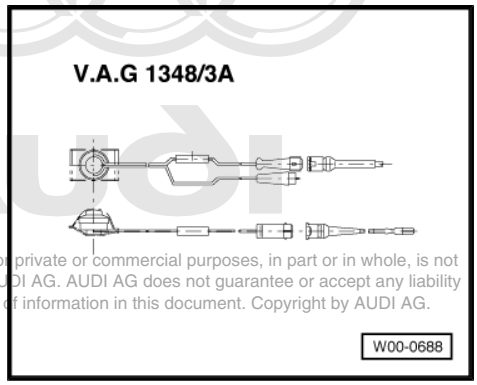
2.9 Checking fuel pressure and residual pressure (up to high-pressure pump)

Special tools and workshop equipment required

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



- Adapter set -V.A.G 1318/10-12-
- Auxiliary measuring set -V.A.G 1594C-
- Remote control -V.A.G 1348/3A- for V.A.G 1348 with adapter cable -V.A.G 1348/3-3-



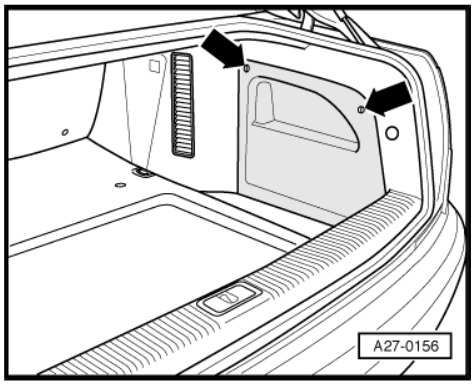
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- Fuel-resistant measuring container
- Protective gloves

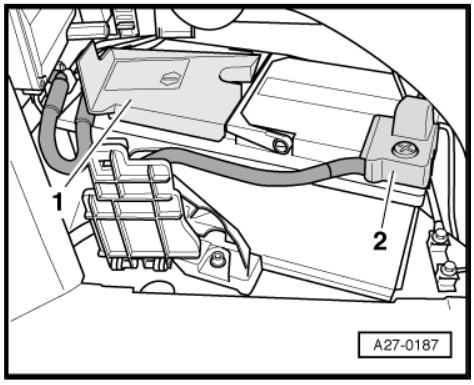
Checking fuel pressure:

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

– Remove luggage compartment side trim cover (right-side) -arrows-.



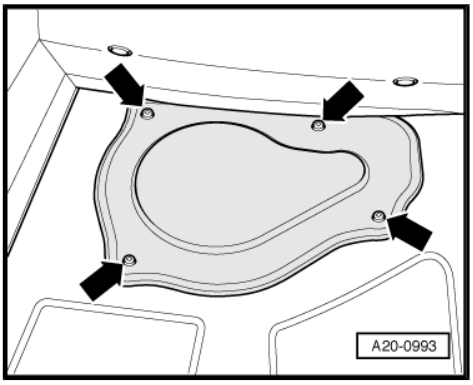
– Remove cover -2- over battery.



Note

Disregard -item 1-.

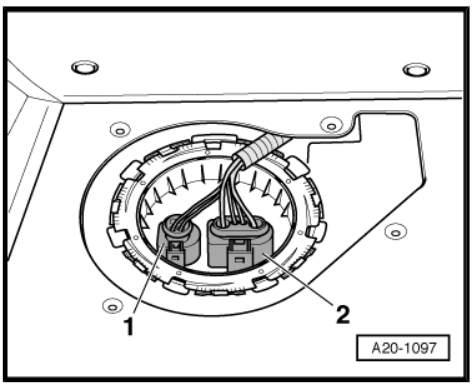
– Remove lining for luggage compartment floor.
– Detach cover for flange (left-side) -arrows-.



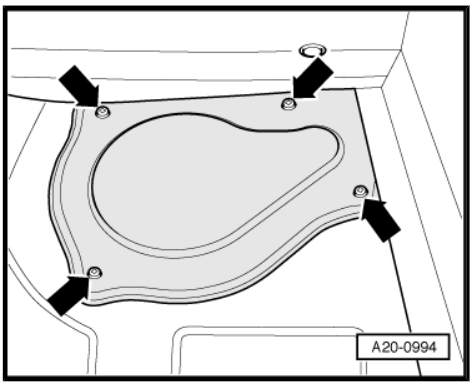
– Unplug electrical connector -2- on flange (left-side).

Note

Disregard -item 1-.



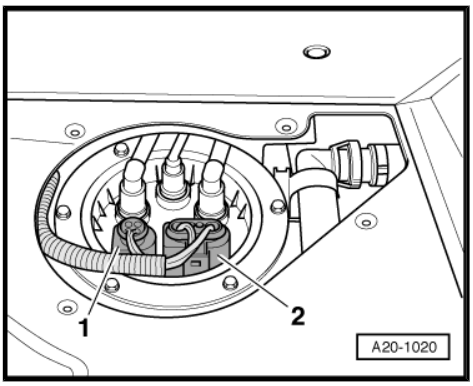
– Unscrew cover for flange (right-side) -arrows-.



– Unplug electrical connector -2- on flange (right-side).

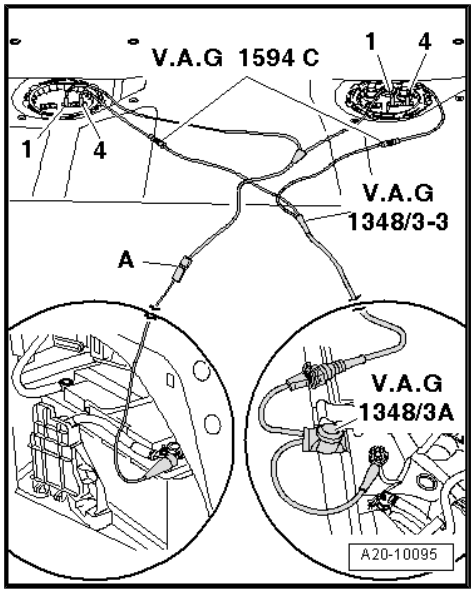
Note

Disregard -item 1-.

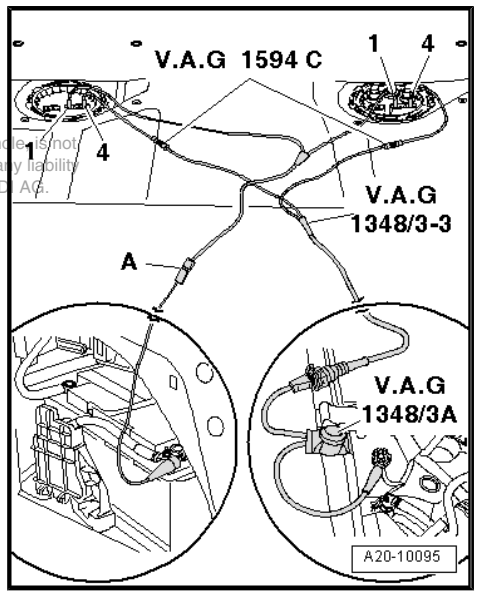


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

– Connect remote control -V.A.G 1348/3A- for V.A.G 1348 with adapter cable -V.A.G 1348/3-3- to contact -4- (earth) of fuel delivery unit (left-side) and fuel delivery unit (right-side) using test leads from auxiliary measuring set -V.A.G 1594C- .
– Move switch of remote control -V.A.G 1348/3A- for V.A.G 1348 to front of engine compartment.
– Connect crocodile clip to earth point in engine compartment.

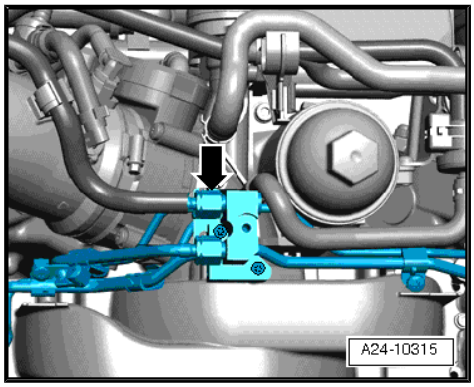


– Connect contact -1- (positive) of fuel delivery unit (left-side) and fuel delivery unit (right-side) to vehicle battery “+” via an improvised test lead. For safety reasons an in-line fuse -A- (10 A) must be connected into the lead.
– Remove filler cap from fuel filler neck.
– Pull off engine cover panel (rear) -arrows-.



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

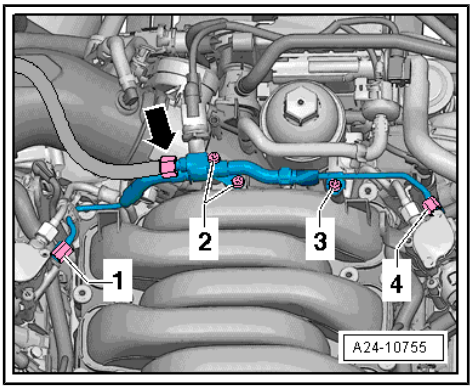
Disconnecting fuel supply pipe -arrow- from connecting piece (engines with magnesium intake manifolds)



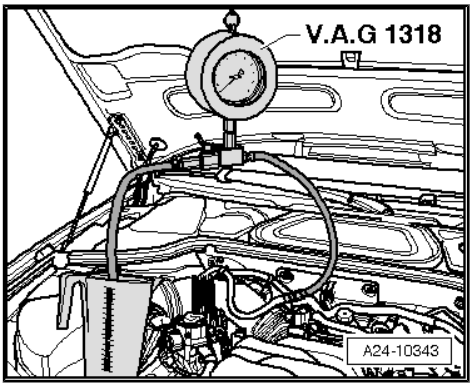
Disconnecting fuel supply pipe -arrow- from connecting piece (engines with plastic intake manifolds)

WARNING

The fuel system is pressurised. Before opening the system place a clean cloth around the connection. Then release pressure by carefully loosening the connection.



– Connect K-Jetronic pressure tester -V.A.G 1318- with adapter from adapter set -V.A.G 1318/10-12- to fuel line.
– Fit auxiliary hose to K-Jetronic pressure tester -V.A.G 1318- and hold it in a container.
– Open cut-off valve on pressure tester.
• Lever points in direction of flow.
– Bleed fuel system by pressing remote control switch briefly.



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

– Close cut-off valve on pressure gauge.

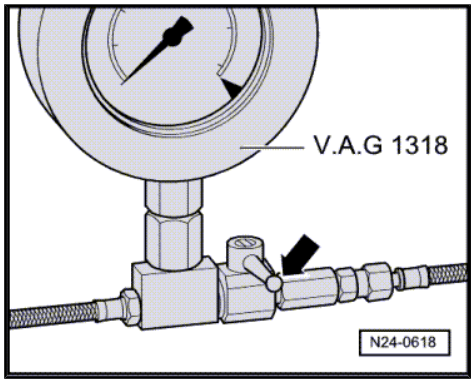
• Lever is at right angle to direction of flow -arrow-.

– Press switch on remote control until pressure gauge shows no further increase in pressure.

• Specification: approx. 5.5 bar (4.5 ... 6.5 bar)

If specification is not obtained:

– Check fuel delivery rate of individual fuel pumps ⇒ Rep. Gr. 20 .



Checking residual pressure:

– Check for leaks and check residual pressure by watching drop in pressure on pressure tester.

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

If the residual pressure drops below 3 bar:

♦ Check union between pressure gauge and fuel line for leaks.

♦ Test pressure gauge for leaks.

♦ Check fuel lines and their connections for leaks.

♦ Check fuel delivery rate of individual fuel pumps ⇒ Rep. Gr. 20 .

♦ Renew fuel filter with integral fuel pressure regulator ⇒ Rep. Gr. 20 .

♦ Non-return valve in one of the two fuel pumps is defective ⇒ Rep. Gr. 20 .

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

– Switch off ignition.

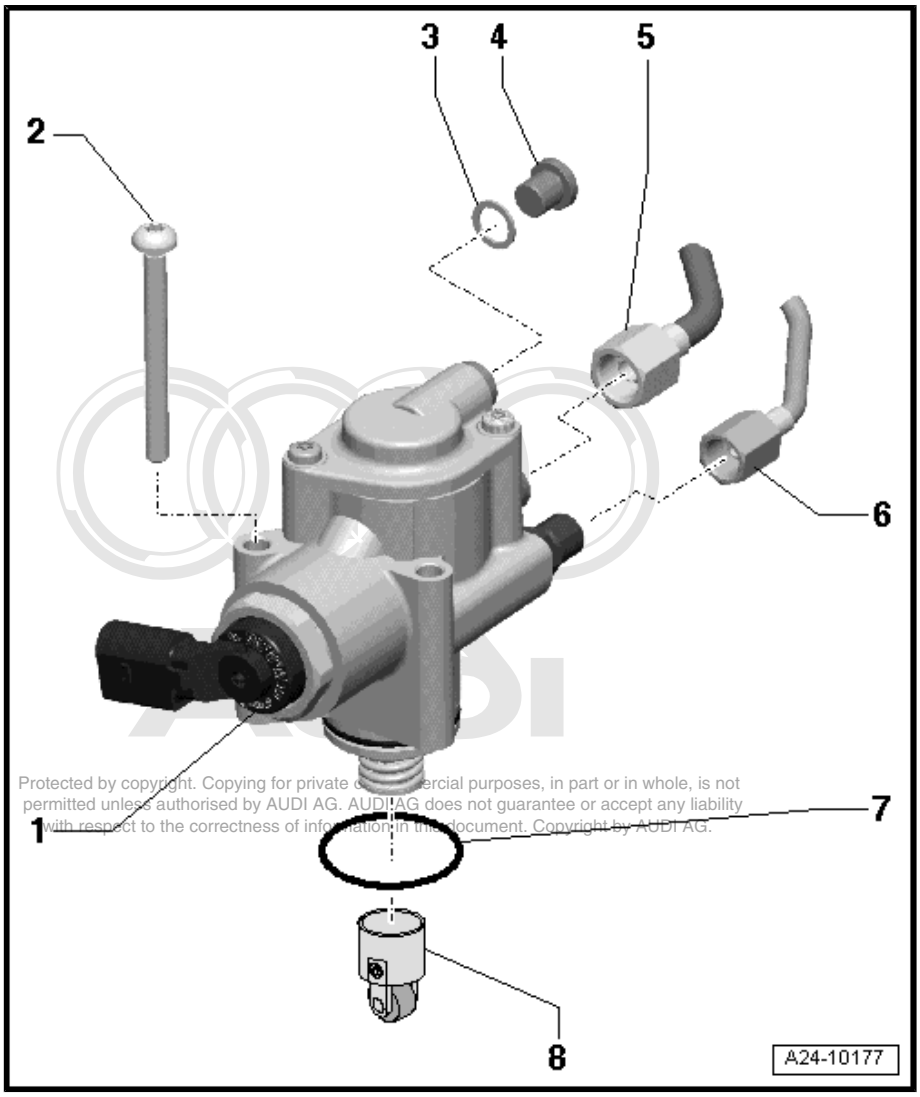
Note

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

– Secure fuel supply pipe to connecting piece again.

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

2.10 High-pressure pump - exploded view



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

1 - High-pressure pump

- ❑ Fuel metering valve - N290- is installed in high-pressure pump on right-side (cylinder bank 1).
- ❑ Fuel metering valve 2 - N402- is installed in high-pressure pump on left-side (cylinder bank 2).
- ❑ Removing and installing ⇒ page 63

2 - Bolt

- ❑ 9 Nm

3 - Seal

- ❑ Renew

4 - Screw plug

- ❑ 10 Nm
- ❑ On left high-pressure pump (cylinder bank 2), fuel pressure sender for low pressure -G410- is fitted at this location (up to model year 2009)

5 - High-pressure pipe

WARNING

The pressure in the high-pressure part of the injection system must be reduced to a residual pressure prior to opening the system ⇒ page 3 .

A clean cloth must then be wrapped around the connection and the residual pressure dissipated by carefully loosening the connection.

Observe notes on procedure for disconnecting the battery ⇒ Rep. Gr. 27 .

- ❑ Before loosening, first disconnect earth wire at battery with ignition switched off
- ❑ Connections must not be damaged
- ❑ Do not alter shape
- ❑ 25 Nm

6 - Fuel supply pipe

> **WARNING**
>
> *The pressure in the high-pressure part of the injection system must be reduced to a residual pressure prior to opening the system ⇒ page 3 .*
>
> *A clean cloth must then be wrapped around the connection and the residual pressure dissipated by carefully loosening the connection.*
>
> *Observe notes on procedure for disconnecting the battery ⇒ Rep. Gr. 27 .*

- ❑ Before loosening, first disconnect earth wire at battery with ignition switched off
- ❑ Connections must not be damaged
- ❑ Do not alter shape
- ❑ 25 Nm

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

7 - O-ring

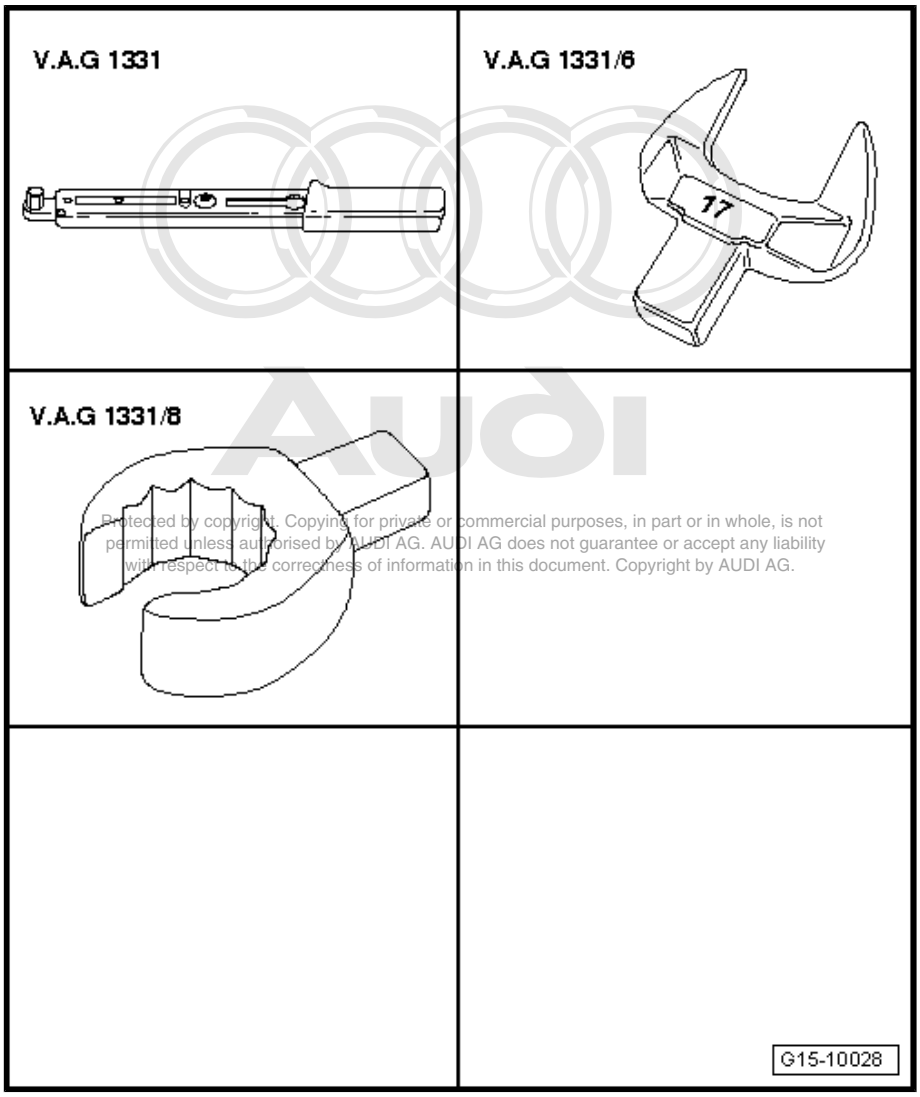
- ❑ Renew

8 - Roller tappet

2.11 Removing and installing high-pressure pump

Special tools and workshop equipment required

- Torque wrench -V.A.G 1331-
- Tool insert AF 17 -V.A.G 1331/6-
- Socket insert AF 14, flared ring spanner -V.A.G 1331/8-



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Removing

Note

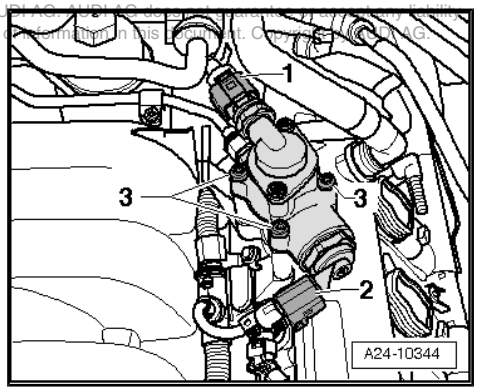
The following description is for removing and installing the high-pressure pump on the left side.

WARNING

- *The fuel system operates under high pressure. The pressure in the high-pressure part of the injection system must be reduced to a residual pressure prior to opening the system ⇒ page 3 .*
- *A clean cloth must then be wrapped around the connection and the residual pressure dissipated by carefully loosening the connection.*
- *Observe notes on procedure for disconnecting the battery ⇒ Rep. Gr. 27 .*

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

– Disconnect earth wire at battery with ignition switched off.
– Pull off engine cover panel (rear).
– Unplug electrical connectors for fuel pressure sender for low pressure -G410- -1- and fuel metering valve 2 -N402- -2-.



Note

Fitting location of fuel pressure sender for low pressure -G410- : in high-pressure pump only up to model year 2009.

– Detach both union nuts for fuel lines.
– Remove bolts -3-.

Note

Do not attempt to bend high-pressure pipes to a different shape.

– Carefully pull out high-pressure pump.
– Pull roller tappet out of cylinder head.

Installing

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

Note

Renew O-ring.

– Fit roller tappet in cylinder head.
– Only lift high-pressure pipes slightly to fit the high-pressure pump.
– Fit high-pressure pump in cylinder head and secure in position.

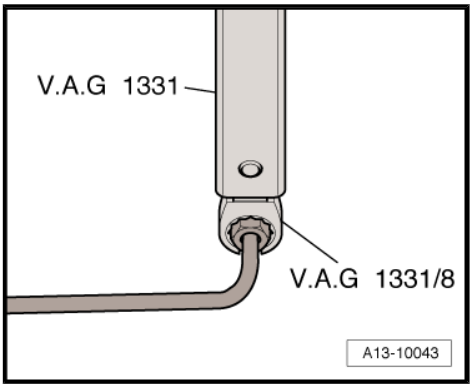
Note

- *The connections of the high-pressure pipes must not be damaged.*
- *Do not attempt to bend high-pressure pipes to a different shape.*

– Tighten union nuts on high-pressure pipes hand-tight initially.

– Ensure that high-pressure pipes are not under tension.

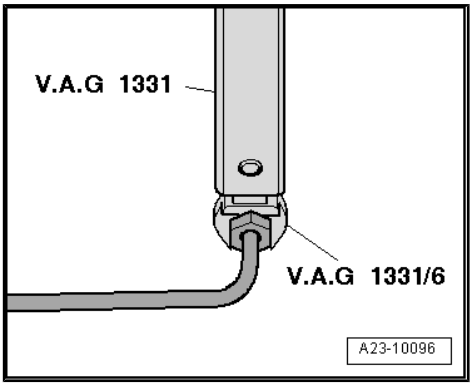
– To tighten union nut (14 mm) for high-pressure pipe, use torque wrench -V.A.G 1331- with socket insert AF 14, flared ring spanner -V.A.G 1331/8- .



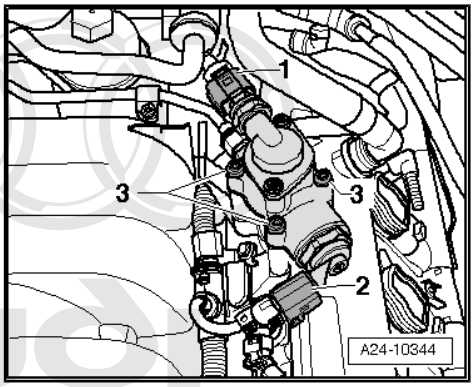
– To tighten union nut (17 mm) for high-pressure pipe, use torque wrench -V.A.G 1331- with tool insert (17 mm) -V.A.G 1331/6- .

– For tightening torques refer to exploded view of high-pressure pump ⇒ page 61 .

– Observe notes on procedures required after connecting battery ⇒ Rep. Gr. 27 .



– Reattach electrical connectors for fuel pressure sender for low pressure -G410- -1- and fuel metering valve 2 -N402- -2-.



Note

Check fuel system for leaks.

2.12 Lambda probes - overview

Copyright by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AU with respect to the correctness of informat

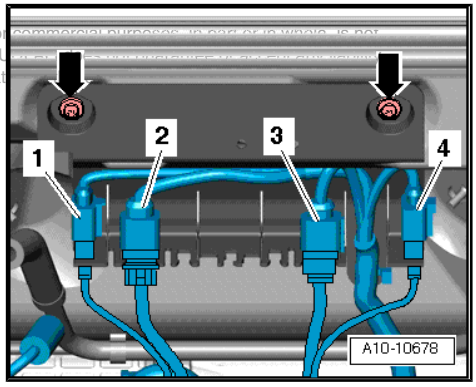
Connectors for Lambda probes

1 - To Lambda probe -G39-

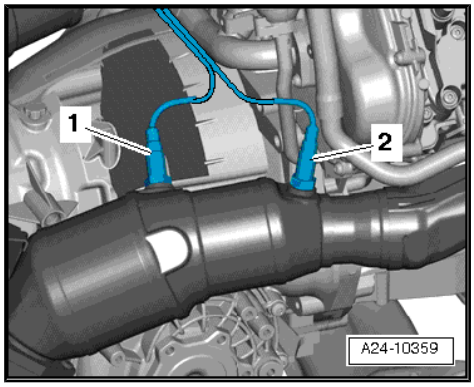
2 - To Lambda probe after catalytic converter -G130-

3 - To Lambda probe 2 -G108-

4 - To Lambda probe 2 after catalytic converter -G131-



Lambda probes, cylinder bank 1 (right-side)



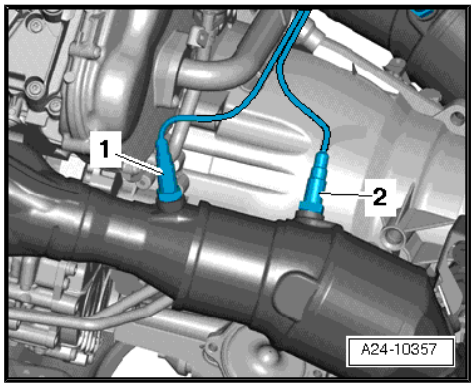
1 - Lambda probe after catalytic converter -G130-

2 - Lambda probe -G39-

Removing and installing ⇒ page 66

Tightening torque: 55 Nm

Lambda probes, cylinder bank 2 (left-side)



1 - Lambda probe 2 -G108-

2 - Lambda probe 2 after catalytic converter -G131-

Removing and installing ⇒ page 68

Tightening torque: 55 Nm

Note

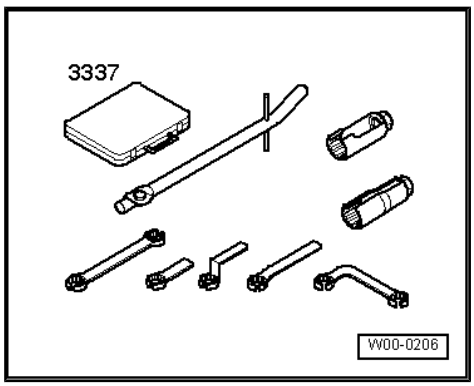
- *Threads of new Lambda probes are already coated with assembly paste; the paste must not get into the slots on the probe body.*
- *In the case of a used Lambda probe grease only the thread with high-temperature paste. The paste must not get into the slots on the probe body. High-temperature paste ⇒ Parts catalogue*
- *When installing, it is important to re-attach the Lambda probe wiring at the same locations to prevent it from coming into contact with the exhaust pipe.*

2.13 Removing and installing Lambda probe before catalytic converter -G39- and Lambda probe after catalytic converter -G130- (cylinder bank 1)

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Special tools and workshop equipment required

- Lambda probe open ring spanner set -3337-



Removing

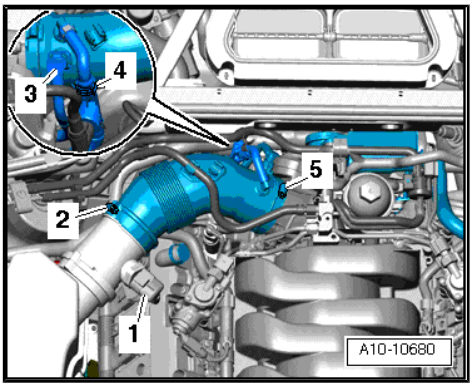
Note

All cable ties which are released or cut open when removing must be fitted in the same position when installing.

– Pull off engine cover panel (rear).

– Move fuel line and line going to activated charcoal filter clear at air intake hose.

– Detach vacuum line -4- at air intake hose.



Rest-of-world vehicles:

– Disconnect hose -3- for crankcase breather system from air hose by pressing release tabs.

– Release hose clips -2- and -5- and remove air intake hose.

USA models:

– Release hose clips -2- and -5- and move air intake hose clear to one side (crankcase breather hose -3- remains connected).

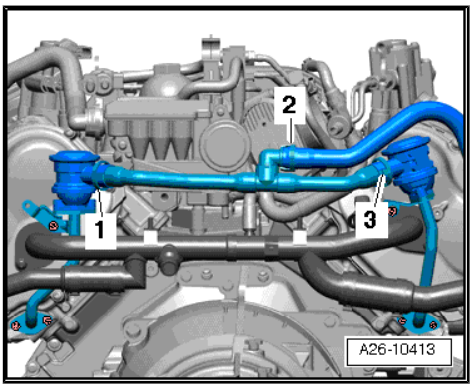
Caution

Do not open hose connection -3- on USA models.

Note

Disregard -item 1-.

– Detach air hose for secondary air system by pressing release tabs at ends of hose -1 ... 3-.



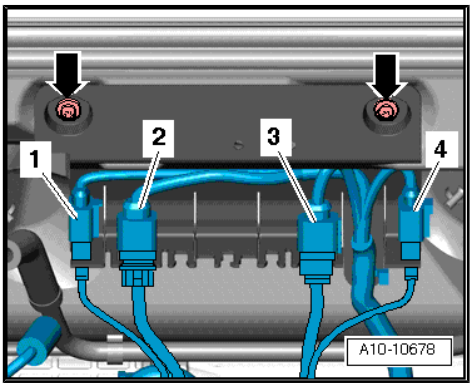
Note

Shown from rear with engine removed for illustration purposes.

– Take corresponding electrical connector out of bracket and unplug it.

1 - To Lambda probe -G39-

2 - To Lambda probe after catalytic converter -G130-



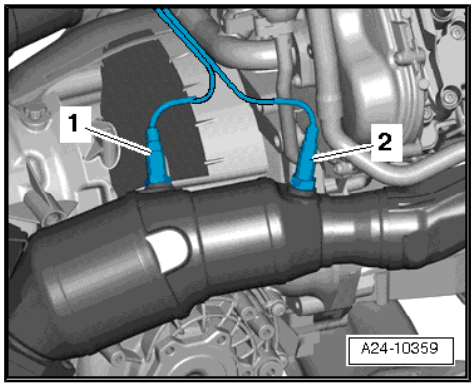
– Move electrical wiring to Lambda probes clear.

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Note

-Arrows- and -items marked 3 and 4- can be disregarded.

– Unscrew Lambda probe -G39- -item 2- and Lambda probe after catalytic converter -G130- -item 1- using a tool from the 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 probe body. High-temperature paste ⇒ Parts catalogue*
- *When installing, the Lambda probe wire must always be reattached at the same locations to prevent it from coming into contact with the exhaust pipe.*
- *Fit all cable ties in the original positions when installing.*

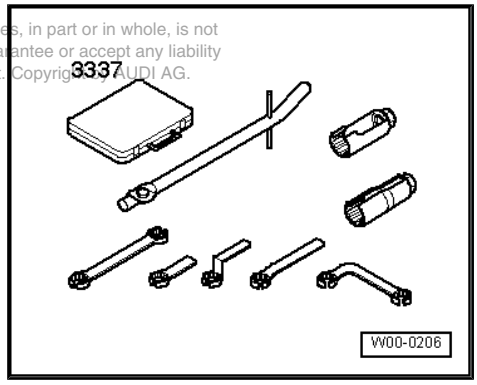
• Tightening torque: refer to exploded view of Lambda probes ⇒ page 65 .

2.14 Removing and installing Lambda probe 2 before catalytic converter -G108- and Lambda probe after catalytic converter -G131- (cylinder bank 2)

Special tools and workshop equipment required

- Lambda probe open ring spanner set -3337-

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



Removing

Note

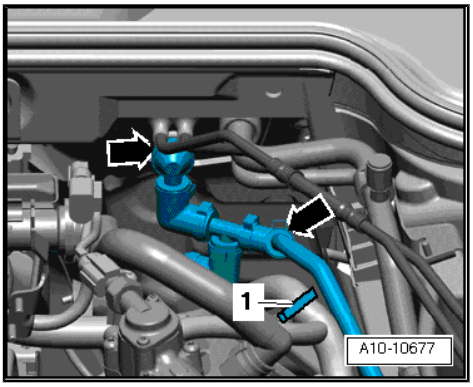
All cable ties which are released or cut open when removing must be fitted in the same position when installing.

– Pull off engine cover panel (rear).

– Detach vacuum lines -arrows- going to brake servo.

– Move vacuum lines clear to one side.

– Cut though cable tie -1- and move clear engine wiring harness at rear (pull wiring harness slightly to the right).

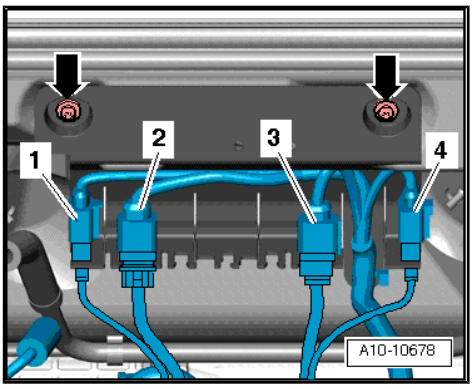


– Take corresponding electrical connector out of bracket and unplug it.

3 - To Lambda probe 2 -G108-

4 - To Lambda probe 2 after catalytic converter -G131-

– Move electrical wiring to Lambda probes clear.

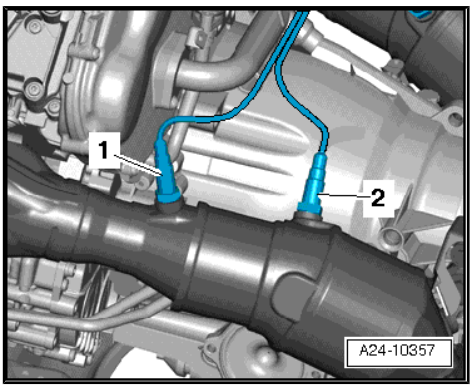


Note

-Arrows- and -items marked 1 and 2- can be disregarded.

– Unscrew Lambda probe 2 -G108- -item 1- using a tool from Lambda probe open ring spanner set -3337- .

– Unscrew Lambda probe 2 after catalytic converter -G131- -item 2- using a 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 probe body. High-temperature paste ⇒ Parts catalogue*
- *When installing, the Lambda probe wire must always be reattached at the same locations to prevent it from coming into contact with the exhaust pipe.*
- *Fit all cable ties in the original positions when installing.*

• Tightening torque: refer to exploded view of Lambda probes ⇒ page 65 .

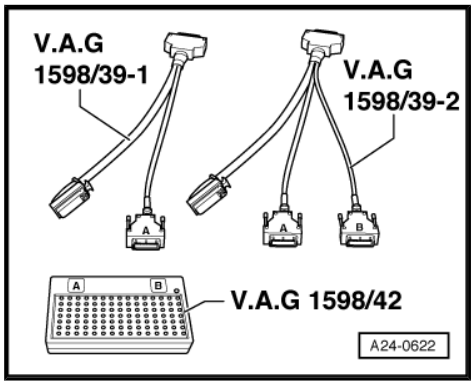
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

3 Engine control unit

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

Special tools and workshop equipment required

- Adapter cable -V.A.G 1598/39-
- 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).*
- *Always use auxiliary measuring set -V.A.G 1594C- to connect test equipment (e.g. voltage tester -V.A.G 1527B- , hand-held multimeter -V.A.G 1526C- etc.).*

The engine control unit has to be removed before multi-pin connectors can be unplugged from engine control unit ⇒ page 71 .

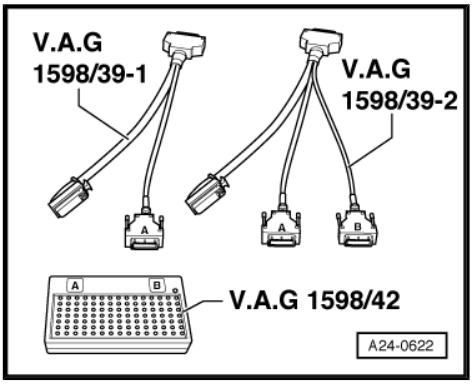
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

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.



Installing engine control unit:

Installation is performed in the reverse sequence.

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

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

– Always use new shear bolts.

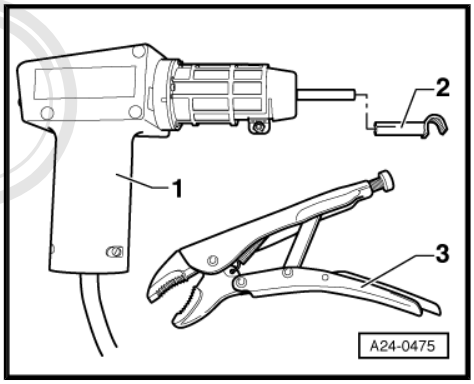
Note

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

3.2 Removing and installing engine control unit -J623-

Special tools and workshop equipment required

♦ Hot air blower 220 V/ 50 Hz -VAS 1978/14- -item 1- with nozzle attachment -2- from wiring harness repair set -VAS 1978A-

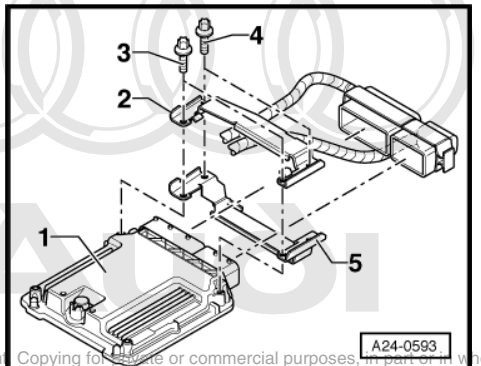


♦ Vice-grip pliers -3- (commercially available)

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted without the prior written consent of AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Note

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



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

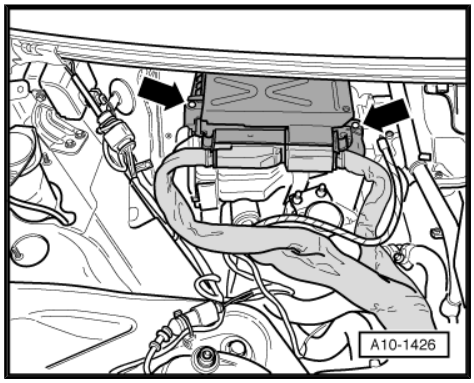
Removing

– When renewing engine control unit, select diagnosis object “Replace engine control unit” in “Guided Functions” on vehicle diagnostic, testing and information system -VAS 5051B- .

– Switch off ignition and remove ignition key.

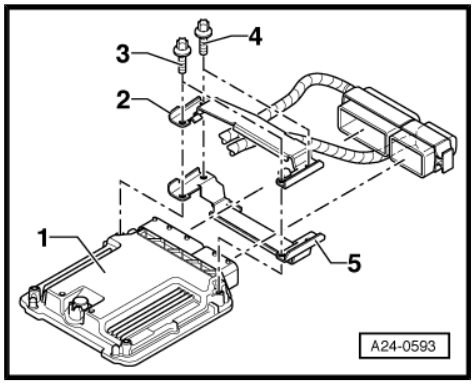
– Remove cover from plenum chamber (right-side).

– Remove engine control unit -J623- (unscrew bolts -arrows-).

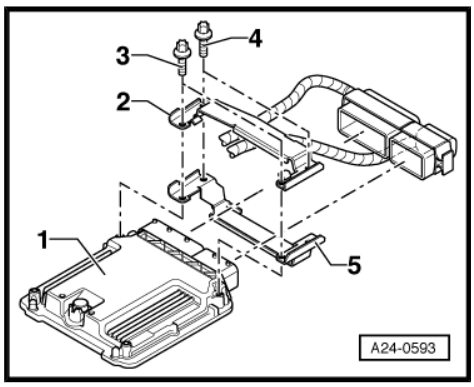


To help prevent unauthorised access to the connectors on the engine control unit, the control unit is secured by means of shear bolts to a locking plate and a metal casing.

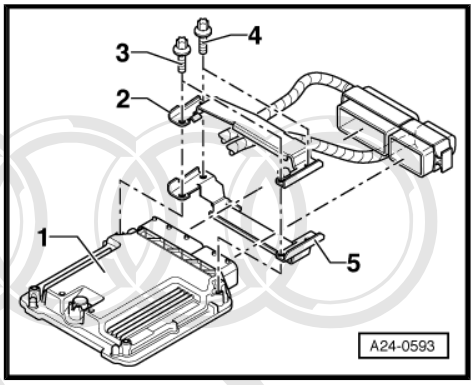
Remove engine control unit -J623- .



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



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

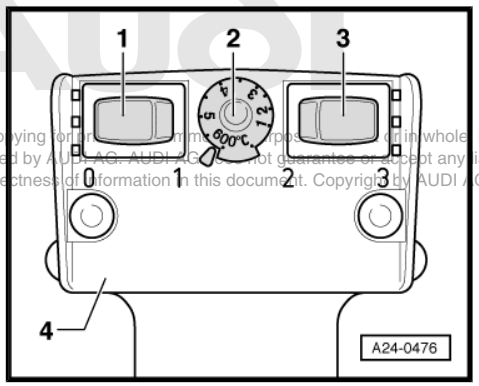


Select settings on hot air blower as shown in illustration, i.e. set temperature potentiometer -2- to maximum heat output and two-stage air flow switch -3- to position 3.

WARNING

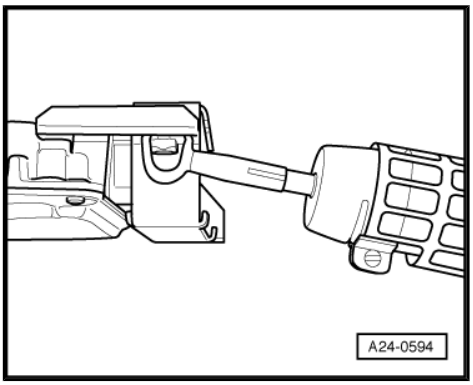
Heating the thread of the locking plate also heats up the shear bolts and parts of the metal housing. Take care to avoid burns. It is also important to ensure that only the thread is heated and none of the surrounding components if at all possible. These should be covered if necessary.

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

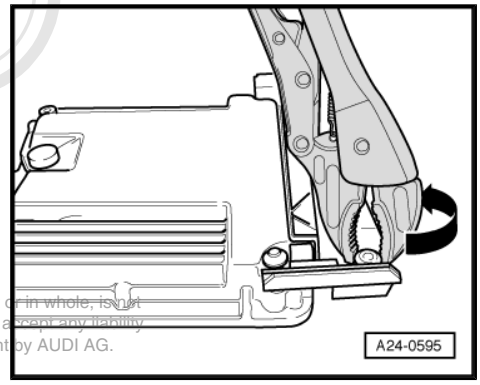


Apply heat to the threads of the shear bolts on the connector side as shown in the illustration.

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



- Unscrew shear bolts using vice-grip pliers (see arrow in illustration).
- The two shear bolts screwed into the engine control unit do not need to be heated. They can be removed without heating.
- Detach metal locking plate from connectors.
- Unscrew both securing bolts from engine control unit -J623- .
- Release connectors on engine control unit -J623- and unplug connectors.
- Take out old engine control unit -J623- and install new engine control unit -J623- .



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Installing

Installation is performed in the reverse sequence.

- After installation, the locking plate must be re-fitted on the engine control unit -J623- .
- Clean threaded holes for shear bolts to remove any residue from locking fluid. This can be done using a thread tap.
- Always use new shear bolts.
- Carefully clip cowl panel trim into retainer at windscreen.

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

28 – Ignition system

1 General notes and safety precautions

1.1 General notes on ignition system

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

Audi
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

1.2 Safety precautions

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

> ⚠ WARNING
>
> *Accidents can be caused if the driver is distracted by test equipment while road-testing, or if test equipment is not properly secured.*
>
> *Injuries can also be caused if the passenger's airbag is triggered in a collision.*
>
> - *The use of test equipment while driving causes distraction.*
> - *There is an increased risk of injury if test equipment is not secured.*
> - *Test equipment must always be secured on the rear seat with a strap and operated from the rear seat by a second person.*

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

- Do not touch or disconnect ignition wiring when the engine is running or being turned at starter speed.
- The ignition must be switched off before disconnecting or connecting ignition system wiring, high-voltage wires and test leads.
- If you want to crank the engine at starting speed without actually starting it (e.g. compression test), first unplug the connectors from the ignition coils and the injectors. After completing the work, interrogate and erase the fault memory.
- Always switch off the ignition before cleaning the engine.

- Always switch off the ignition before connecting or disconnecting the battery, otherwise the engine control unit may be damaged.

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

2 Servicing ignition system

2.1 Test data

Test data		4.2 ltr. / 4V / 257 kW engine
Idling speed (not adjustable)		approx. 650 rpm 1)
Ignition timing		Not adjustable (determined by control unit)
Ignition system		Multi-coil system with 8 ignition coils (output stages integrated) connected directly to spark plugs via spark plug connectors
Spark plugs	Designations	⇒ Data sheets for exhaust emission test
	Removing and installing	⇒ Maintenance ; Booklet 404
Firing order		1-5-4-8-6-3-7-2

• 1) Depending on demands placed on engine control unit.

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

2.2 Ignition system - exploded view

1 - Connector for ignition coil
- ❑ 4-pin

2 - Bolt
- ❑ 10 Nm

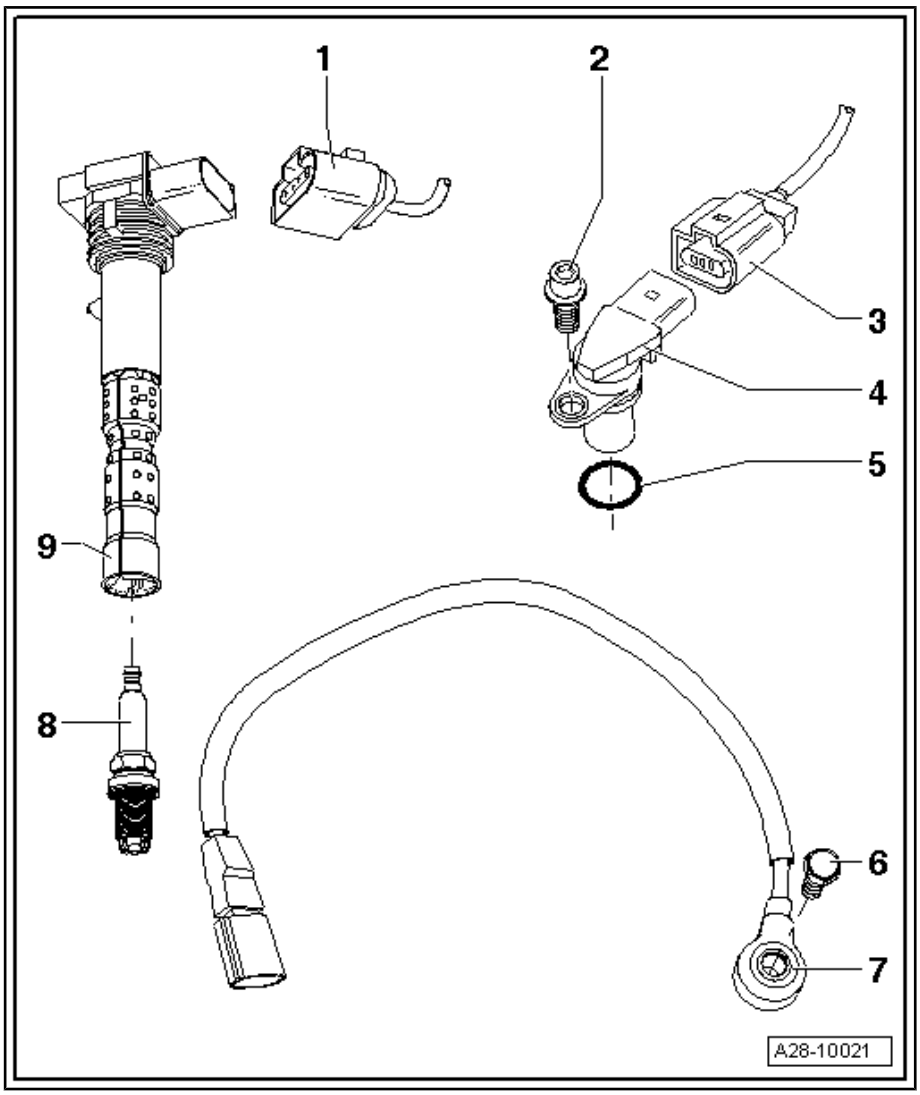
3 - 3-pin connector

4 - Hall sender
- ❑ Hall sender -G40- (cylinder bank 1)
- ❑ Hall sender 3 -G300- (cylinder bank 1)
- ❑ Hall sender 2 -G163- (cylinder bank 2)
- ❑ Hall sender 4 -G301- (cylinder bank 2)

5 - O-ring
- ❑ Renew if damaged
- ❑ Lubricate lightly with clean engine oil

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

7 - Knock sensors
- ❑ Contact surfaces between knock sensor and cylinder block must be free of corrosion, oil and grease.
- ❑ Knock sensor 1 -G61- (cylinder bank 1)



- ❑ Knock sensor 2 -G66- (cylinder bank 1)
- ❑ Knock sensor 3 -G198- (cylinder bank 2)
- ❑ Knock sensor 4 -G199- (cylinder bank 2)
- ❑ Removing and installing ⇒ page 78

8 - Spark plug

- ❑ Remove and install with spark plug socket and extension -3122 B- ⇒ Maintenance ; Booklet 404
- ❑ 30 Nm

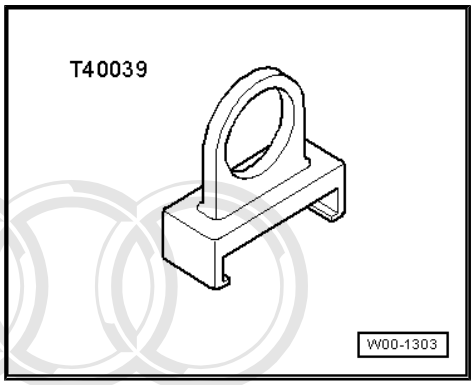
9 - Ignition coil

- ❑ Ignition coil 1 with output stage -N70-
- ❑ Ignition coil 2 with output stage -N127-
- ❑ Ignition coil 3 with output stage -N291-
- ❑ Ignition coil 4 with output stage -N292-
- ❑ Ignition coil 5 with output stage -N323-
- ❑ Ignition coil 6 with output stage -N324-
- ❑ Ignition coil 7 with output stage -N325-
- ❑ Ignition coil 8 with output stage -N326-
- ❑ Removing and installing ⇒ page 78
- ❑ Use puller -T40039- for removal

2.3 Removing and installing ignition coils

Special tools and workshop equipment required

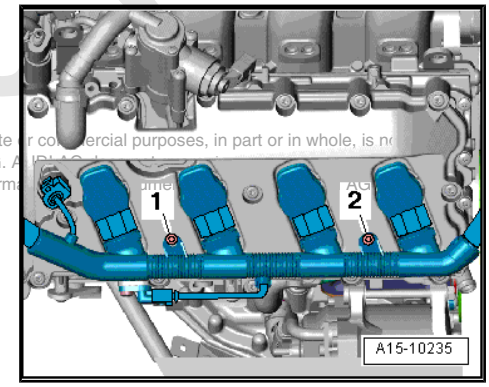
- ♦ Puller -T40039-



Removing from cylinders 1, 2 and 3 (cylinder bank 1):

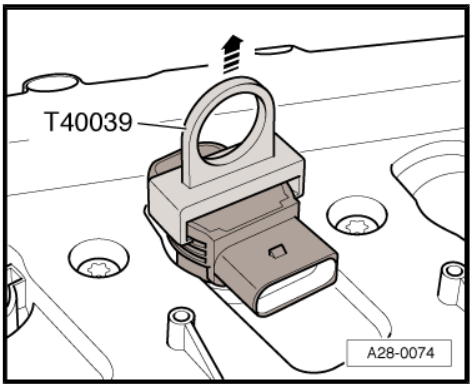
– Remove bolts -1- and -2-.

– Release electrical connectors and pull all connectors off ignition coils at the same time.



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information

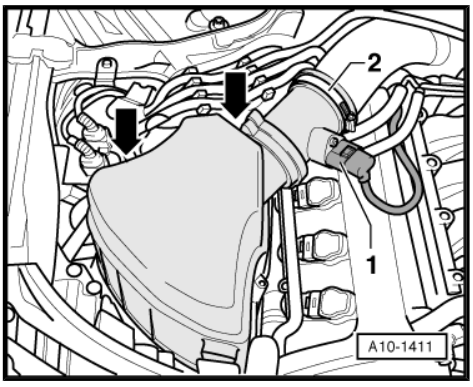
– Pull ignition coils out of spark plug apertures using puller -T40039- .



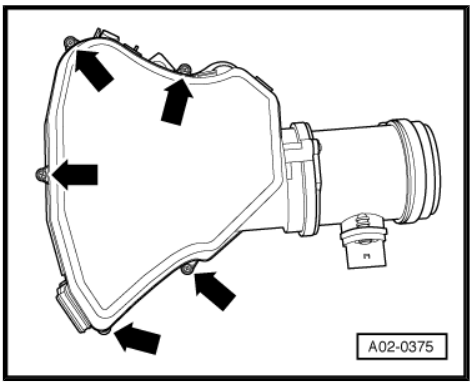
Removing from cylinder 4 (cylinder bank 1):

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

– Release hose clip -2-.

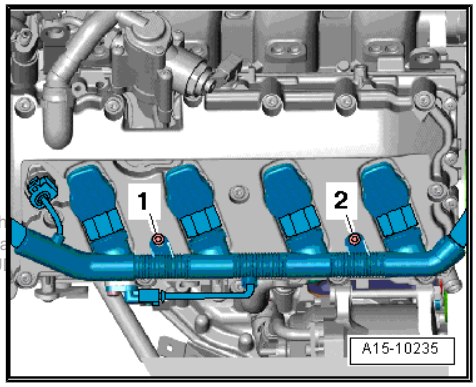


– Unscrew bolts -arrows- from air cleaner housing and detach top section of air cleaner housing.



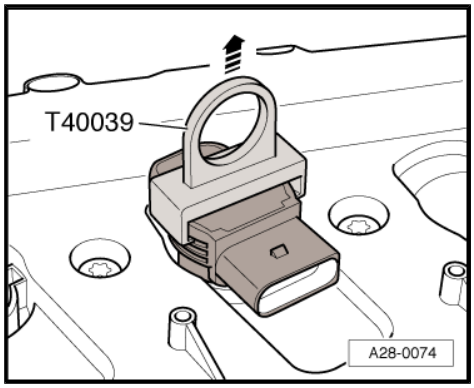
– Remove bolts -1- and -2-.

– Release electrical connectors and pull all connectors off ignition coils at the same time.



Protected by copyright. Copying for private or commercial purposes, in part or in wh
permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept a
with respect to the correctness of information in this document. Copyright by AU

– Pull ignition coil (cylinder 4) out with puller -T40039- .

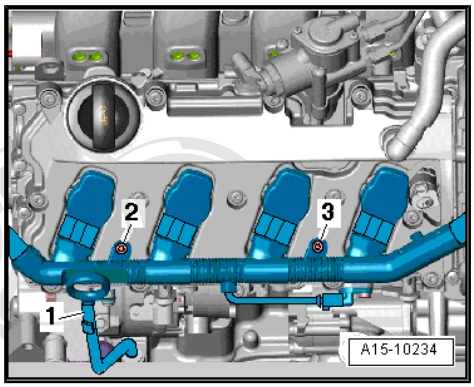


Removing from cylinders 5, 6, 7 and 8 (cylinder bank 2):

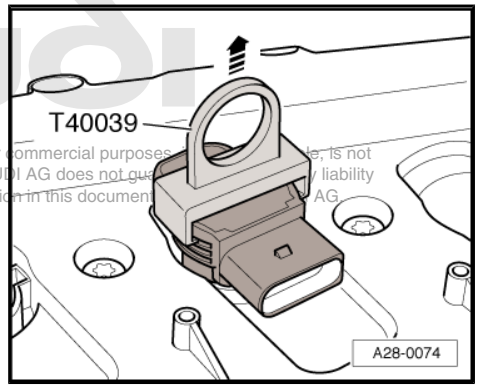
– Pull dipstick -1- out of guide tube.

– Remove bolts -2- and -3-.

– Release electrical connectors and pull all connectors off ignition coils at the same time.



– Pull ignition coils out of spark plug apertures using puller -T40039- .



Installing

– Fit all ignition coils loosely into spark plug holes.

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

– Press ignition coils onto spark plugs by hand evenly (do NOT use tool).

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

Tightening torque

Component	Nm
Wiring guide for ignition coils to cylinder head cover	5

2.4 Removing and installing knock sensors

WARNING

- *The fuel system operates under high pressure. The pressure in the high-pressure part of the injection system must be reduced to a residual pressure prior to opening the system ⇒ page 3 .*
- *A clean cloth must then be wrapped around the connection and the residual pressure dissipated by carefully loosening the connection.*

Removing

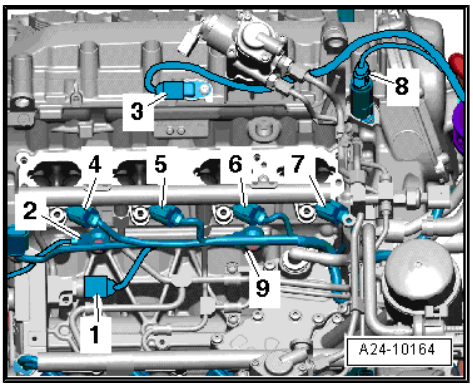
– Remove relevant intake manifold.

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

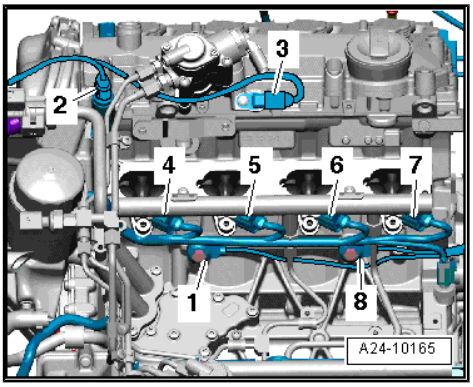
Vehicles with magnesium intake manifold ⇒ page 24 .

Vehicles with plastic intake manifold ⇒ page 40 .

– Remove knock sensor 1 -G61- -2- or knock sensor 2 -G66- -9-.



– Remove knock sensor 3 -G198- -8- or knock sensor 4 -G199- -1-.



Installing

– Secure relevant knock sensor (removed before) at fitting location.

- Tightening torque: refer to exploded view of ignition system ⇒ page 77 .

Note

The tightening torque influences the function of the knock sensor.

– Install relevant intake manifold.

Vehicles with magnesium intake manifold (magnesium) ⇒ page 24 .

Vehicles with plastic intake manifold ⇒ page 40 .

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.