

Repair Manual Audi A6 2005 >

Fuel Injection and Ignition									
Engine ID	AUK	BKH							

Edition 03.2008



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.



List of Workshop Manual Repair Groups

Repair Group

24 - Fuel injection system

28 - Ignition system



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.



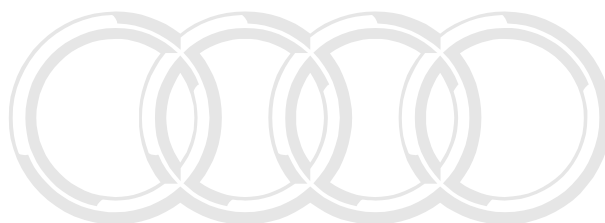
Technical information should always be available to the foremen and mechanics, because their careful and constant adherence to the instructions is essential to ensure vehicle road-worthiness and safety. In addition, the normal basic safety precautions for working on motor vehicles must, as a matter of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

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

Contents

24 - Fuel injection system	1
1 General Information	1
1.1 Safety Precautions	1
1.2 Clean Working Conditions	2
1.3 High-Pressure Fuel Injection System, Pressure Relief	2
1.4 Fuel System Bleeding	5
2 Description and Operation	6
2.1 Fuel Injection System Component Location	6
2.2 Air Filter Assembly Overview	15
2.3 Upper Intake Manifold Assembly Overview	16
2.4 Lower Intake Manifold Assembly Overview	18
3 Specifications	20
3.1 Fastener Tightening Specifications	20
3.2 Technical Data	20
4 Diagnosis and Testing	21
4.1 Fuel and Residual Pressure before High Pressure Pump, Checking	21
4.2 Wiring and Components, Checking with Test Box VAG 1598/42	24
5 Removal and Installation	27
5.1 Air Filter Element	27
5.2 Upper Intake Manifold	29
5.3 Lower Intake Manifold with Fuel Rail	32
5.4 Fuel Injectors	35
5.5 High Pressure Pump	38
5.6 Engine Control Module	41
5.7 Oxygen Sensor before Catalytic Converter, Bank 1	44
5.8 Oxygen Sensor before Catalytic Converter, Bank 2	46
5.9 Oxygen Sensor after Catalytic Converter, Bank 1	47
5.10 Oxygen Sensor after Catalytic Converter, Bank 2	49
6 Special Tools	51
28 - Ignition system	54
1 General Information	54
1.1 Safety Precautions	54
1.2 Ignition System General Information	54
2 Specifications	56
2.1 Technical Data	56
3 Removal and Installation	57
3.1 Ignition Coils	57
4 Special Tools	60

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless expressly permitted 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.



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.



24 – Fuel injection system

1 General Information

⇒ [“1.1 Safety Precautions”, page 1](#)

⇒ [“1.2 Clean Working Conditions”, page 2](#)

⇒ [“1.3 High-Pressure Fuel Injection System, Pressure Relief”, page 2](#)

⇒ [“1.4 Fuel System Bleeding”, page 5](#)

1.1 Safety Precautions

To Reduce the Risk of Personal Injury and/or Damage to the Fuel Injection and Ignition System, Always Observe the Following



WARNING 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 system is under high pressure! Before opening high pressure components of the fuel injection system, pressure must be relieved to residual pressure ⇒ [page 2](#).***
- ◆ ***Then wrap a clean rag around the connection and relieve residual pressure by carefully loosening the connection.***

- ◆ The ignition must be switched off before connecting or disconnecting injection and ignition system wiring or tester cables.
- ◆ It is possible that the control module will recognize a malfunction and store a DTC during some tests. Therefore, when all tests and repairs are completed, the DTC memory must be checked and, if necessary, erased. After DTC memory is erased, a readiness code must be generated for the engine control module using operating mode “Guided Fault-Finding”.
- ◆ Clean engine only with ignition switched off.



Caution

- ◆ ***The battery must only be disconnected and connected with the ignition switched off, since the Engine Control Module (ECM) can otherwise be damaged.***
- ◆ ***Observe safety precautions when disconnecting the battery ⇒ [Electrical Equipment; Rep. Gr. 27; Removal and Installation](#).***

**Observe the Following if Test and Measuring Instruments are Required During a Test Drive****WARNING**

- ◆ *Test and measuring equipment must always be secured to the rear seat and be operated from there by a second person.*
- ◆ *If test and measuring instruments are operated from the front passenger's seat and the vehicle is involved in an accident, there is a possibility that the person sitting in this seat may receive serious injuries when the airbag is triggered.*

1.2 Clean Working Conditions

Even minor contaminations can lead to malfunctions in the fuel injection system. When working on the fuel supply/injection system, pay careful attention to the following rules of cleanliness:

- ◆ Before loosening, connections and surrounding areas must be cleaned thoroughly with engine or brake cleaner, and then cleaned area must be dried completely.
- ◆ Plug open lines and connections immediately with appropriate protective caps.
- ◆ Place parts that have been removed on a clean surface and cover them. Do not use fluffy cloths!
- ◆ Only install clean components: Only unpack replacement parts immediately prior to installation. Do not use parts that have been stored unpackaged (e.g. in tool boxes etc.).
- ◆ When the system is open: Do not work with compressed air. Do not move vehicle unless absolutely necessary.

1.3 High-Pressure Fuel Injection System, Pressure Relief

- ◆ The fuel injection system is separated into a high-pressure section (max. approximately 110 bar) and a low-pressure section (approximately 6 bar).
- ◆ Before opening the high-pressure section - e.g. removing the high-pressure pump, fuel rail, fuel injectors, the motor for intake manifold runner control valve or any other component or fuel line that is located in the high-pressure section of the fuel injection system - the fuel pressure in the high-pressure section must be relieved to a residual pressure of approximately 8 bar. The procedure for this is as follows.

Special tools and workshop equipment required

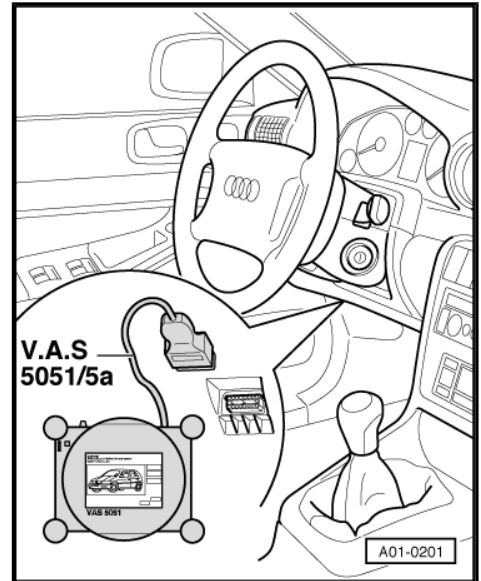
- ◆ Vehicle diagnostic, testing and information system -VAS 5051- with diagnostic cable -VAS 5051/5A-

Work Procedure

- Start engine and run at idle speed.

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.

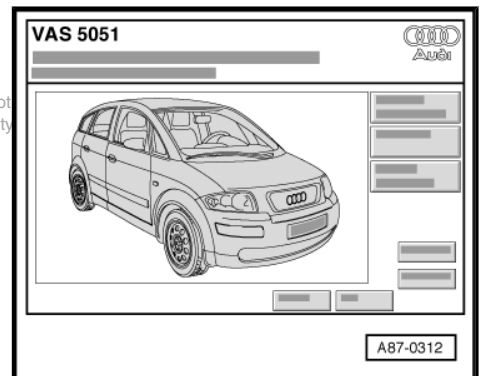
- Connect vehicle diagnosis, testing and information system - VAS 5051- with diagnostic cable -VAS 5051/5A- .



Display on -VAS 5051- :

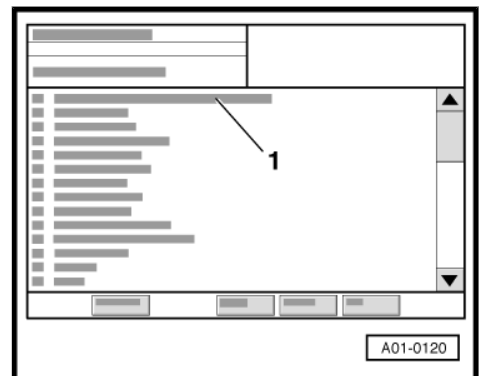
- Click on **Vehicle Self-Diagnosis** button.

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.




Display on -VAS 5051- :

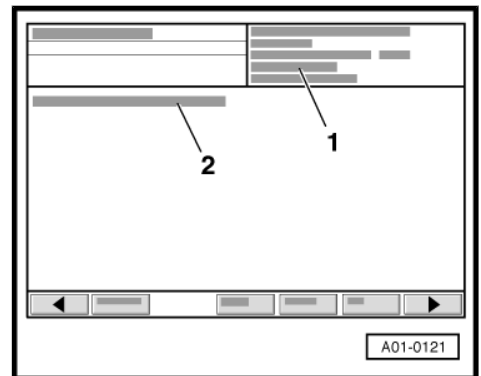
- In selection -1-, press vehicle system "01 - Engine electronics".
- Wait until next display appears.



Display on -VAS 5051- :

1 - Control module identification of Engine Control Module (ECM)

- Click on  button.



Display on -VAS 5051- :

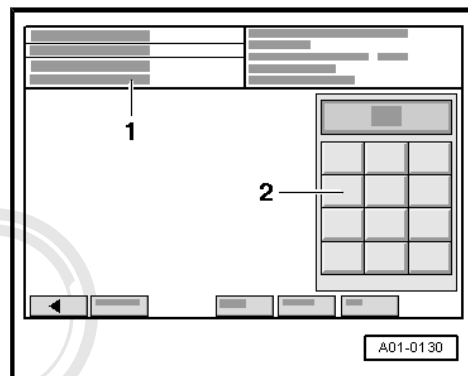
1 - Selection of diagnostic functions

- In selection -1-, press diagnostic function "04- Basic Setting".



Display on -VAS 5051- :

- Select "140" in button field -2- for "display group 140" and confirm input by pressing button.

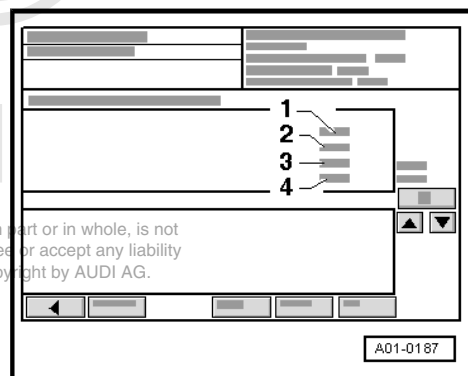


Display on -VAS 5051- :

Example:

- 1 - 42%
- 2 - 39.76 bar
- 3 - 40.63 bar
- 4 - Inactive

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.



- Activate basic setting by pressing button .

Display on -VAS 5051- :

Example:

- 1 - 0%
- 2 - 0 bar
- 3 - 5.46 bar
- 4 - Lower

The fuel rail will continue to be filled with fuel, but it will no longer be under high pressure.

Now components or lines can be opened. A clean rag must be placed around connection points. Escaping fuel must be absorbed.

- In operating mode "Guided Fault-Finding", generate readiness code for Engine Control Module (ECM) → Vehicle diagnosis, testing and information system VAS 5051.



1.4 Fuel System Bleeding

To prevent damage to catalytic converter the fuel system must be bled after repair work on fuel lines or on fuel filter.

Work procedure

- Start engine and let engine run a few minutes at average RPM and then turn off again.

Note

At the beginning, engine may run roughly due to air in fuel supply system.

- Check fuel supply system for leaks.
- Check DTC memory and, if necessary, erase.
- Then perform a road test with at least one acceleration at Wide Open Throttle (WOT), then fuel supply system must be checked again for leaks.
- Check DTC memory and, if necessary, erase it. After DTC memory is erased, a readiness code must be generated for the engine control module using operating mode “Guided Fault-Finding” ⇒ Vehicle diagnosis, testing and information system VAS 5051.

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 Description and Operation

⇒ [“2.1 Fuel Injection System Component Location”, page 6](#)

⇒ [“2.2 Air Filter Assembly Overview”, page 15](#)

⇒ [“2.3 Upper Intake Manifold Assembly Overview”, page 16](#)

⇒ [“2.4 Lower Intake Manifold Assembly Overview”, page 18](#)

2.1 Fuel Injection System Component Location

Engine Compartment, Right

1 - Right electro-hydraulic engine mount solenoid valve - N145-

- Component location ⇒ [page 13](#)

2 - Intake air switch-over valve -N335-

- Component location ⇒ [page 14](#)

3 - Camshaft Position (CMP) sensor 3 -G300-

- Component location ⇒ [page 12](#)

4 - Oxygen sensor -G39-

- Component location ⇒ [page 11](#)

- Connector location ⇒ [page 10](#)

- Removing and installing ⇒ [page 44](#) .

5 - Oxygen Sensor (O2S) behind Three Way Catalytic Converter (TWC) -G130-

- Component location ⇒ [page 11](#)

- Connector location ⇒ [page 10](#)

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

6 - SIMOS control module - J361-

- Component location ⇒ [page 9](#)

- Removing and installing ⇒ [page 41](#) .

- After replacement, adapt throttle valve control module in operating mode “Guided Fault-Finding” in “Adapting throttle valve control module”

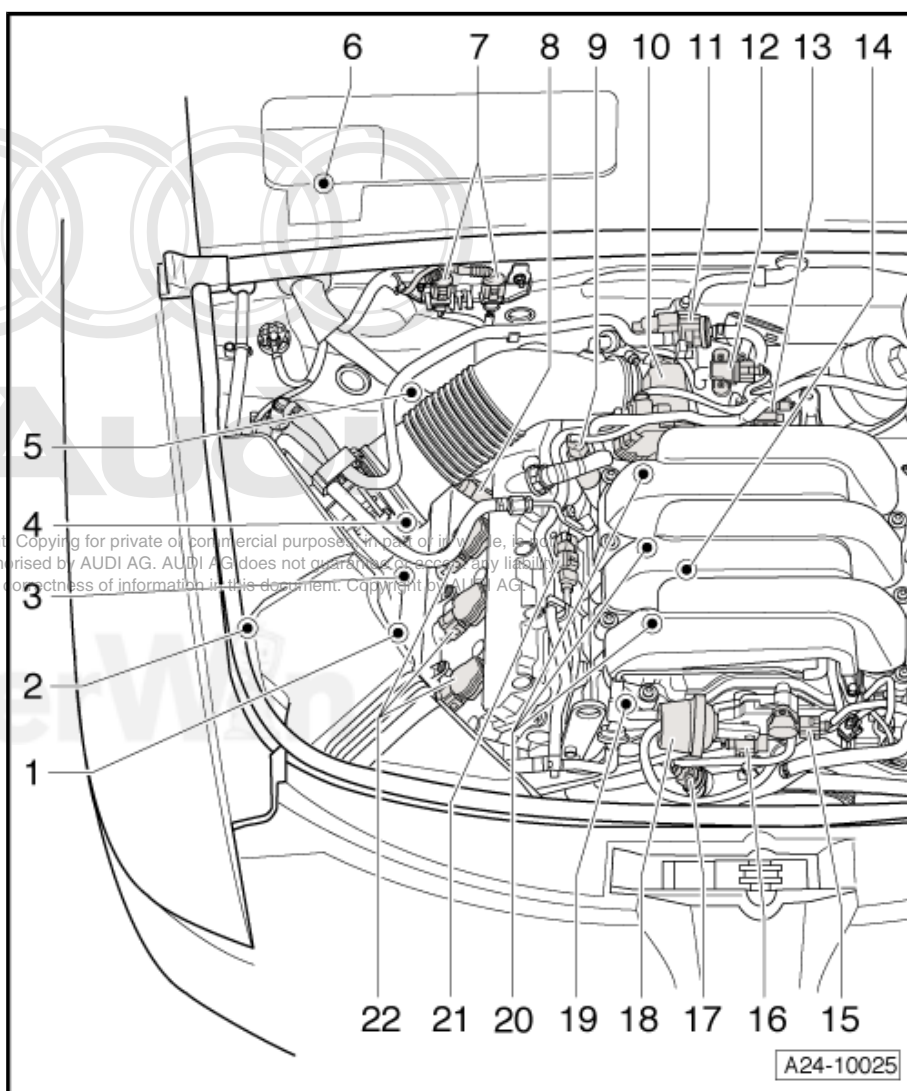
- After replacement on vehicles with automatic transmissions, also perform kick-down adaptation in operating mode “Guided Fault-Finding” in “Kick-down adaptation”

7 - Right holder for connectors

- Connector locations ⇒ [page 10](#)

8 - Camshaft adjustment valve 1 (exhaust) -N318-

- Component location ⇒ [page 12](#)



9 - Camshaft adjustment valve 1 -N205-

- Component location ⇒ [page 12](#)

10 - Throttle valve control module -J338-

- After replacement, adapt in operating mode “Guided Fault-Finding” in “Adapting throttle valve control module”

11 - Evaporative emission (EVAP) canister purge solenoid valve -N80-

12 - Intake Air Temperature (IAT) sensor -G42- / Manifold Absolute Pressure (MAP) sensor -G71-

- Component location ⇒ [page 13](#)

13 - Intake Manifold Runner Control (IMRC) valve -N316-

Component location ⇒ [page 13](#)

Printed 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.

14 - Knock sensor 1 -G61- 20 Nm

- Component location ⇒ [page 14](#)
- Connector location ⇒ [page 12](#)

15 - Intake Manifold Tuning (IMT) valve position sensor -G513-

- Component location ⇒ [page 12](#)

16 - Change over valve for intake manifold flap -N239-

- Component location ⇒ [page 12](#)

17 - Engine Coolant Temperature (ECT) sensor -G62-

- Component location ⇒ [page 12](#)

18 - Actuator for intake manifold change over

19 - Intake manifold runner position sensor -G336-

- Component location ⇒ [page 14](#)
- After replacing, adapt in “Guided Fault Finding” operating mode under “Adapting intake manifold runner position sensor”

20 - Fuel injectors, cylinder bank 1

- Cylinder 1 fuel injector -N30-
- Cylinder 2 fuel injector -N31-
- Cylinder 3 fuel injector -N32-
- Removing and installing ⇒ [page 35](#) .

21 - Camshaft Position (CMP) sensor -G40-

- Component location ⇒ [page 12](#)

22 - Ignition coils, cylinder bank 1

- Ignition coil 1 with power output stage -N70-
- Ignition coil 2 with power output stage -N127-
- Ignition coil 3 with power output stage -N291-
- Removing and installing ⇒ [page 57](#) .

Engine Compartment, Left

1 - Fuel injectors, cylinder bank 2

- Cylinder 4 fuel injector - N33-
- Cylinder 5 fuel injector - N83-
- Cylinder 6 fuel injector - N84-
- Removing and installing ⇒ [page 35](#) .

2 - Intake manifold runner position sensor 2 -G512-

- Component location ⇒ [page 14](#)
- After replacing, adapt in "Guided Fault Finding" operating mode under "Adapting intake manifold runner position sensor"

3 - Engine speed (RPM) sensor -G28-

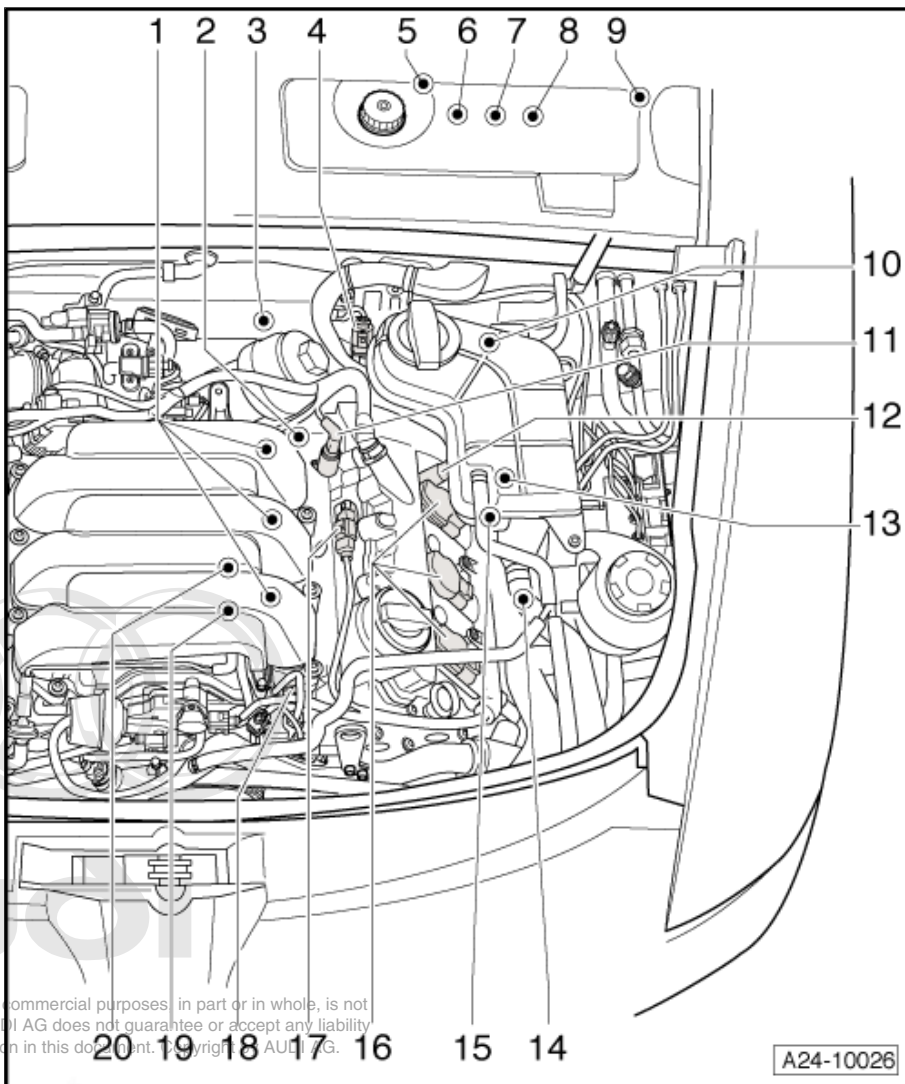
- Component location ⇒ [page 14](#)

4 - Left holder for connectors

- Connector locations ⇒ [page 11](#)

5 - Instrument cluster

- With Malfunction Indicator Lamp (MIL) -K83- and Electronic Power Control (EPC) warning lamp -K132-



6 - Throttle Position (TP) sensor -G79- / accelerator pedal position sensor 2 -G185-

- In accelerator pedal module, component location ⇒ [page 10](#)

7 - Brake light switch -F- / Brake pedal switch -F47-

- Component location ⇒ [page 10](#)

8 - Clutch pedal starter interlock switch -F194- and clutch position sensor -G476-

- Component location ⇒ [page 10](#)

9 - Relay box

10 - Oxygen Sensor (O2S) 2 behind Three Way Catalytic Converter (TWC) -G131-

- Component location ⇒ [page 11](#)
- Connector location ⇒ [page 11](#)

11 - Camshaft adjustment valve 2 -N208-

Component location ⇒ [page 12](#)

12 - Camshaft adjustment valve 2 (exhaust) -N319-

- Component location ⇒ [page 12](#)

13 - Heated Oxygen Sensor (HO2S) 2 -G108-

- Component location ⇒ [page 11](#)
- Connector location ⇒ [page 11](#)

Protected by copyright. Publishing for private or commercial purposes, in part or in whole, is not permitted without the 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 © Audi AG.

A24-10026

14 - Left electro-hydraulic engine mount solenoid valve -N144-

- ❑ Component location ⇒ [page 13](#)

15 - Camshaft Position (CMP) sensor 4 -G301-

- ❑ Component location ⇒ [page 12](#)

16 - Ignition coils, cylinder bank 2

- ❑ Ignition coil 4 with power output stage -N292-
- ❑ Ignition coil 5 with power output stage -N323-
- ❑ Ignition coil 6 with power output stage -N324-
- ❑ Removing and installing ⇒ [page 57](#) .

17 - Camshaft Position (CMP) sensor 2 -G163-

- ❑ Component location ⇒ [page 12](#)

18 - High pressure pump

- ❑ With low fuel pressure sensor -G410- and fuel metering valve -N290-

- ❑ Component location:

Older version ⇒ [page 13](#)

New version ⇒ [page 13](#)

19 - Fuel pressure sensor -G247-

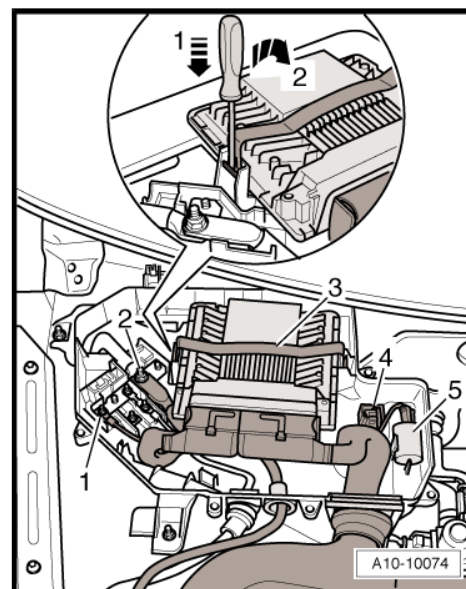
- ❑ Component location ⇒ [page 14](#)

20 - Knock sensor 2 -G66- 20 Nm

- ❑ Component location ⇒ [page 14](#)
- ❑ Connector location ⇒ [page 12](#)

Component Location of SIMOS Control Module -J361-

- ◆ In E-box in engine compartment, right





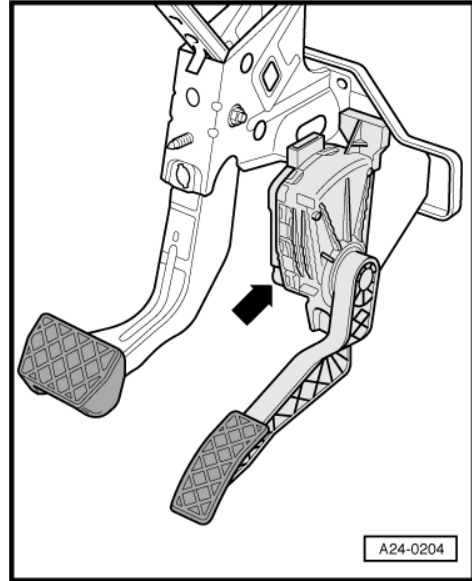
Component Location of Throttle Position (TP) Sensor -G79- / Accelerator Pedal Position Sensor 2 -G185-

◆ In accelerator pedal module -arrow-



Note

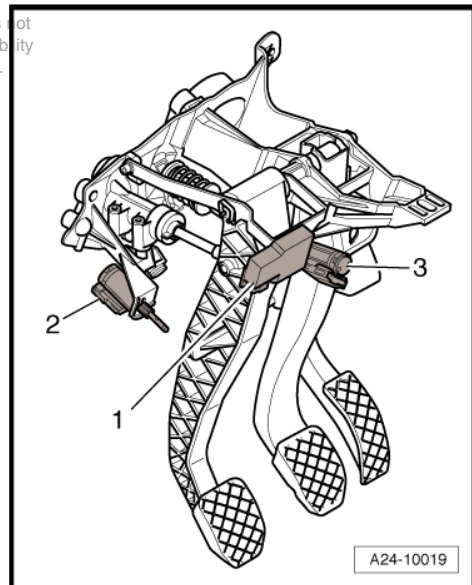
The Throttle Position (TP) sensor -G79- and accelerator pedal position sensor 2 -G185- are integrated in the gas pedal module and cannot be replaced individually.



Component Location of Brake Light Switch -F- / Brake Pedal Switch -F47-, Clutch Pedal Starter Interlock Switch -F194- and Clutch Position Sensor -G476-

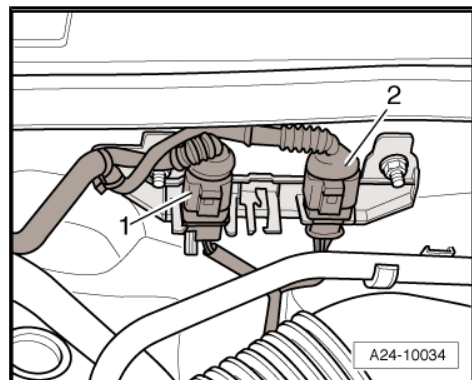
◆ On pedal bracket.

- 1 - Clutch position sensor -G476-
- 2 - Clutch pedal starter interlock switch -F194-
- 3 - Brake light switch -F- / Brake pedal switch -F47-



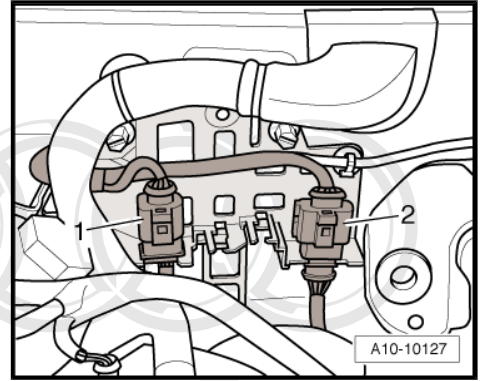
Component Location of Right Holder for Connectors on Bulkhead

- 1 - To Heated Oxygen Sensor (HO2S) -G39-
- 2 - To Oxygen Sensor (O2S) behind Three Way Catalytic Converter (TWC) -G130-



Component Location of Left Holder for Connectors on Bulkhead

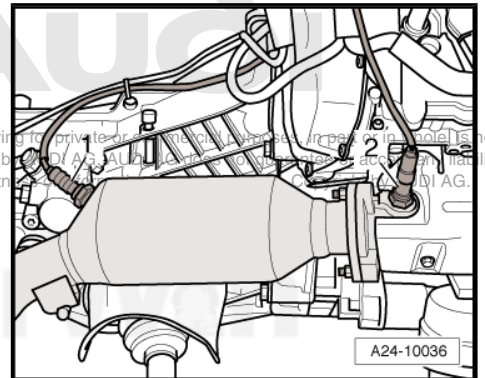
- 1 - To Heated Oxygen Sensor (HO2S) 2 -G108-
- 2 - To Oxygen Sensor (O2S) 2 behind Three Way Catalytic Converter (TWC) -G131-



Component Location of Oxygen Sensors, Cylinder Bank 1 (Right)

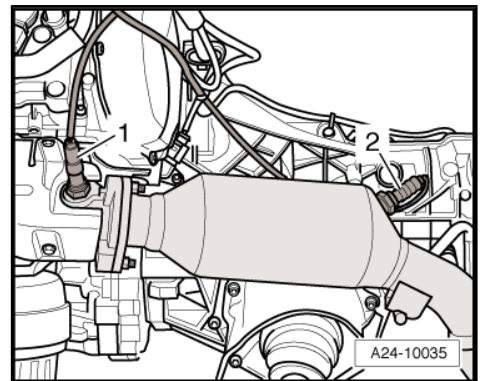
- 1 - Oxygen Sensor (O2S) behind Three Way Catalytic Converter (TWC) -G130-
- 2 - Oxygen sensor -G39-

Protected by copyright. Copying for private or non-commercial use without permission is not permitted unless authorised by Audi AG. All rights reserved. Audi AG.



Component Location of Oxygen Sensors, Cylinder Bank 2 (Left)

- 1 - Heated Oxygen Sensor (HO2S) 2 -G108-
- 2 - Oxygen Sensor (O2S) 2 behind Three Way Catalytic Converter (TWC) -G131-

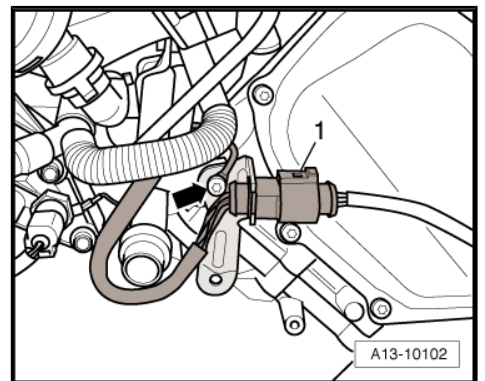


Component Location of Electrical Connectors on Right Rear of Engine

- 1 - To fuel injectors, cylinder bank 1

 **Note**

-Arrow- indicates ground (GND) point



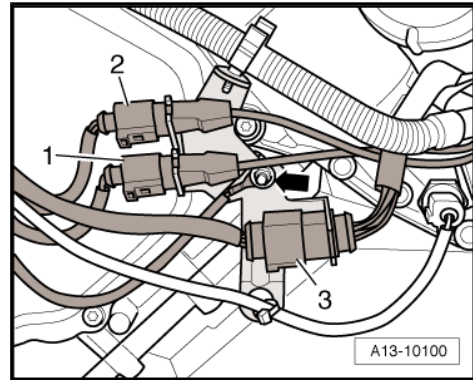
Component Location of Electrical Connectors on Left Rear of Engine

- 1 - Green; to Knock Sensor (KS) 1 -G61-
- 2 - Grey; to Knock sensor (KS) 2 -G66-
- 3 - To cylinder bank 2 fuel injectors and to fuel pressure sensor -G247-



Note

-Arrow- indicates ground (GND) point



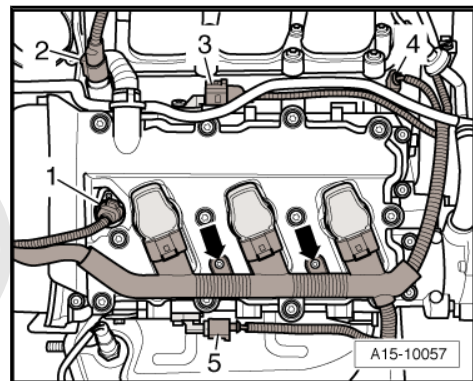
Component Location of Sensor and Valve for Camshaft Adjustment, Bank 1

- 1 - Camshaft adjustment valve 1 (exhaust) -N318-
- 2 - Camshaft adjustment valve 1 -N205-
- 3 - Camshaft Position (CMP) sensor -G40-
- 4 - Intake manifold runner position sensor -G336-
- 5 - Camshaft Position (CMP) sensor 3 -G300-



Note

Ignore -arrows-.



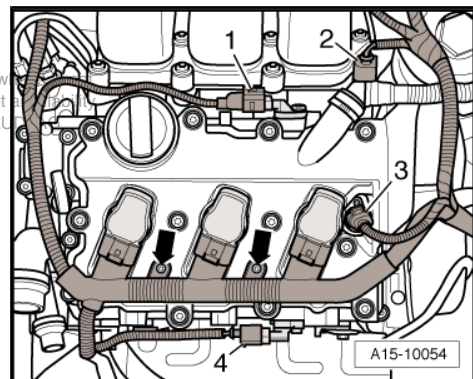
Location of Sensor and Valve for Camshaft Adjustment, Bank 2

- 1 - Camshaft Position (CMP) sensor 2 -G163-
- 2 - Camshaft adjustment valve 2 -N208-
- 3 - Camshaft adjustment valve 2 (exhaust) -N319-
- 4 - Camshaft Position (CMP) sensor 4 -G301-



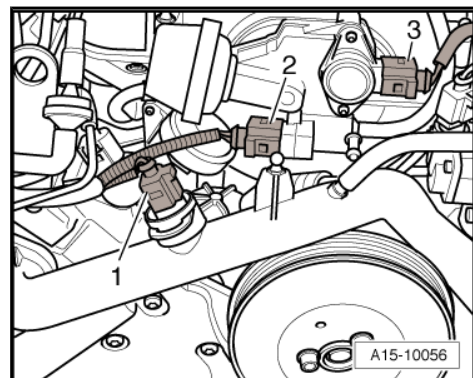
Note

Ignore -arrows-.



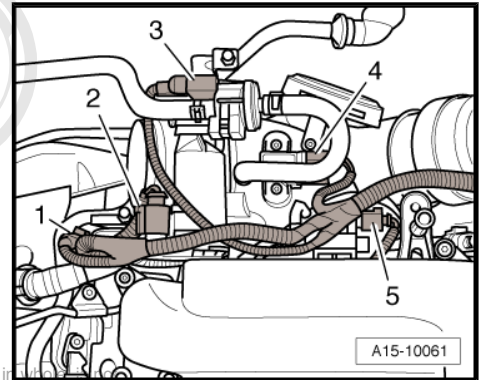
Component Location Front of Engine

- 1 - Engine Coolant Temperature (ECT) sensor -G62-
- 2 - Change over valve for intake manifold flap -N239-
- 3 - Intake Manifold Tuning (IMT) valve position sensor -G513-



Component Location on Rear of Intake Manifold

- 1 - Camshaft adjustment valve 1 -N205-
- 2 - Throttle valve control module -J338-
- 3 - Evaporative emission (EVAP) canister purge solenoid valve -N80-
- 4 - Intake Air Temperature (IAT) sensor -G42- / Manifold Absolute Pressure (MAP) sensor -G71-
- 5 - Intake Manifold Runner Control (IMRC) valve -N316-



Protected by copyright. Copying for private or commercial purposes, in part or in full, is prohibited without the prior written permission of Audi AG. Audi AG does not guarantee or accept any liability for the content of this document. Copyright by Audi AG.

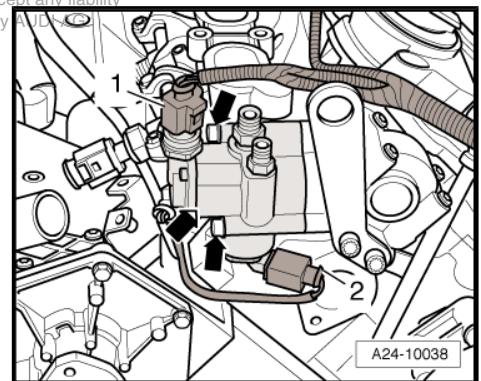
Component Location of High Pressure Pump - Older Version

- 1 - Low fuel pressure sensor -G410-
- 2 - Fuel metering valve -N290-



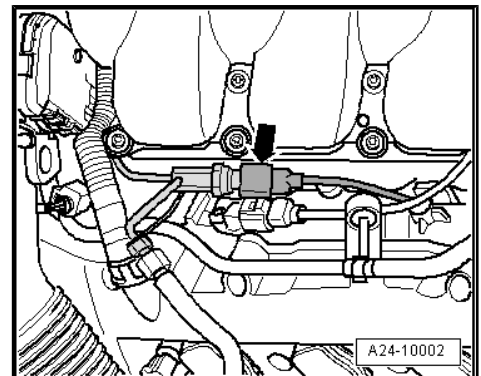
Note

Ignore -arrows-.



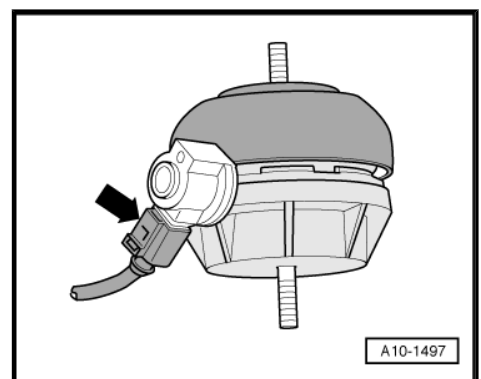
Component Location of low fuel pressure sensor -G410- - New Version

- ◆ On right cylinder head -arrow-.



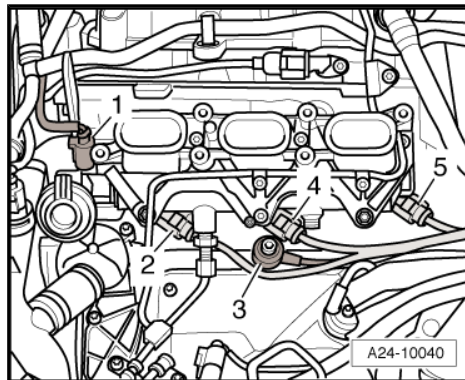
Component Location of Left Electro-Hydraulic Engine Mount Solenoid Valve -N144- or Right Electro-Hydraulic Engine Mount Solenoid Valve -N145-

- ◆ On left and right engine mounts -arrow-.

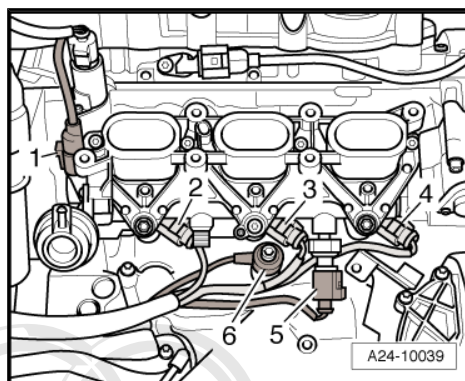


Component Location Under Intake Manifold, Cylinder Bank 1 (Right)

- 1 - Intake manifold runner position sensor -G336-
- 2 - Cylinder 1 fuel injector -N30-
- 3 - Knock sensor 1 -G61-
- 4 - Cylinder 2 fuel injector -N31-
- 5 - Cylinder 3 fuel injector -N32-

**Component Location Under Intake Manifold, Cylinder Bank 2 (Left)**

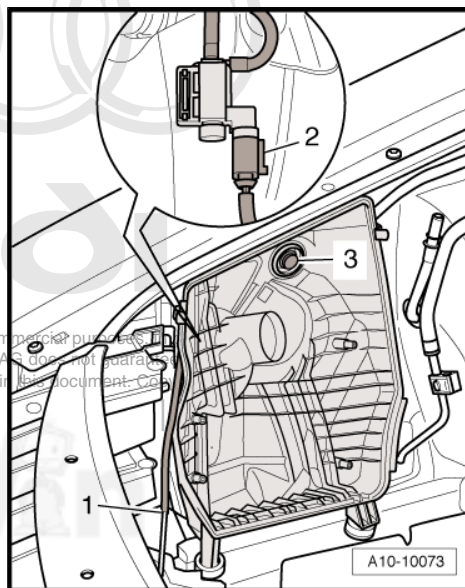
- 1 - Intake manifold runner position sensor 2 -G512-
- 2 - Cylinder 6 fuel injector -N84-
- 3 - Cylinder 5 fuel injector -N83-
- 4 - Cylinder 4 fuel injector -N33-
- 5 - Fuel pressure sensor -G247-
- 6 - Knock sensor 2 -G66-

**Component Location of Intake Air Switch-Over Valve -N335-**

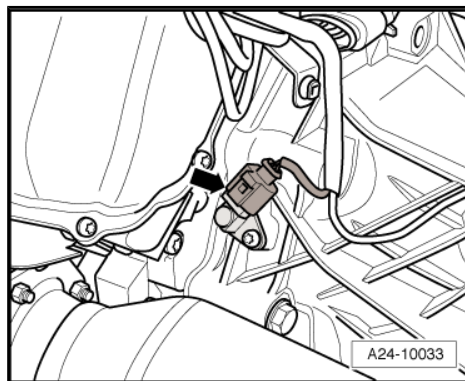
- 2 - Intake air switch-over valve -N335-

**Note**

Ignore -1- and -3-.

**Component Location of Engine Speed (RPM) Sensor -G28-**

- ◆ At left front of transmission housing -arrow-.



Protected by copyright. Copying for private or commercial purposes is not permitted unless authorised by AUDI AG. AUDI AG does not warrant the accuracy with respect to the correctness of information in this document. Copyright © 2008 Audi AG

2.2 Air Filter Assembly Overview

1 - Water drain

- Check for contamination and clean if necessary (note valve)
- Water drain hose must be fully functional

2 - Air flap positioner -V63-

3 - Air filter housing, lower

- Clean air filter housing-lower part of salt residue, dirt and leaves
- Check water drain for contamination and clean if necessary (note valve)

4 - Rubber grommet

5 - Air duct

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

6 - 1.5 Nm

7 - Air duct

- Clean air duct of dirt and leaves

8 - Connection

9 - Air duct hose to throttle valve control module -J338-

- With resonator

10 - Wiring router

11 - O-ring

- Replace

12 - 1.5 Nm

- For securing air filter insert -15-

13 - Air filter housing, upper

- Clean air filter housing-upper part of salt residue, dirt and leaves

14 - Air duct

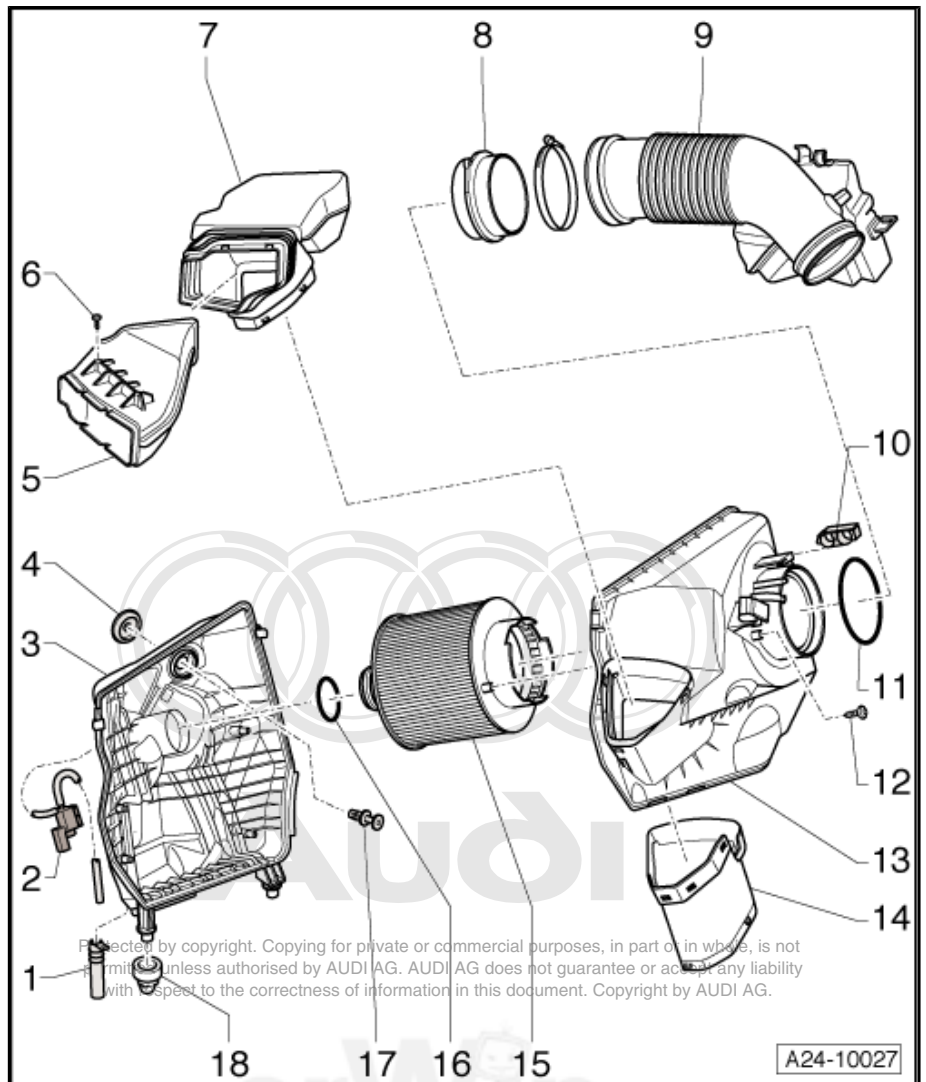
- Clipped into upper part of air filter housing
- Clean air duct of dirt and leaves

15 - Air filter element

- Always use a genuine air filter element
- Removing and installing ⇒ [page 27](#) .
- Maintenance intervals ⇒ Maintenance ; Booklet 405
- Clean snow screen also (if present)

16 - O-ring

- Replace



- 17 - Spreader clip
- 18 - Grommet

2.3 Upper Intake Manifold Assembly Overview

1 - Intake Manifold Tuning (IMT) valve position sensor - G513-

2 - 2.5 Nm

3 - 2.5 Nm

4 - Actuator for intake manifold change over

- Installed location of tooth segments for variable intake manifold ⇒ [page 17](#)
- As replacement part together with -24-

5 - Seal

- Replace if damaged
- Lift out with screwdriver to replace
- Press in by hand

6 - Ball pin, 2.5 Nm

7 - Intake manifold, upper

- Removing and installing ⇒ [page 29](#).

8 - Throttle valve control module -J338-

9 - 5 Nm

10 - Wire harness retainer

11 - Seal

- Replace

12 - Intake Manifold Runner Control (IMRC) valve -N316-

13 - 2.5 Nm

14 - Intake Air Temperature (IAT) sensor -G42- / Manifold Absolute Pressure (MAP) sensor -G71-

15 - O-ring

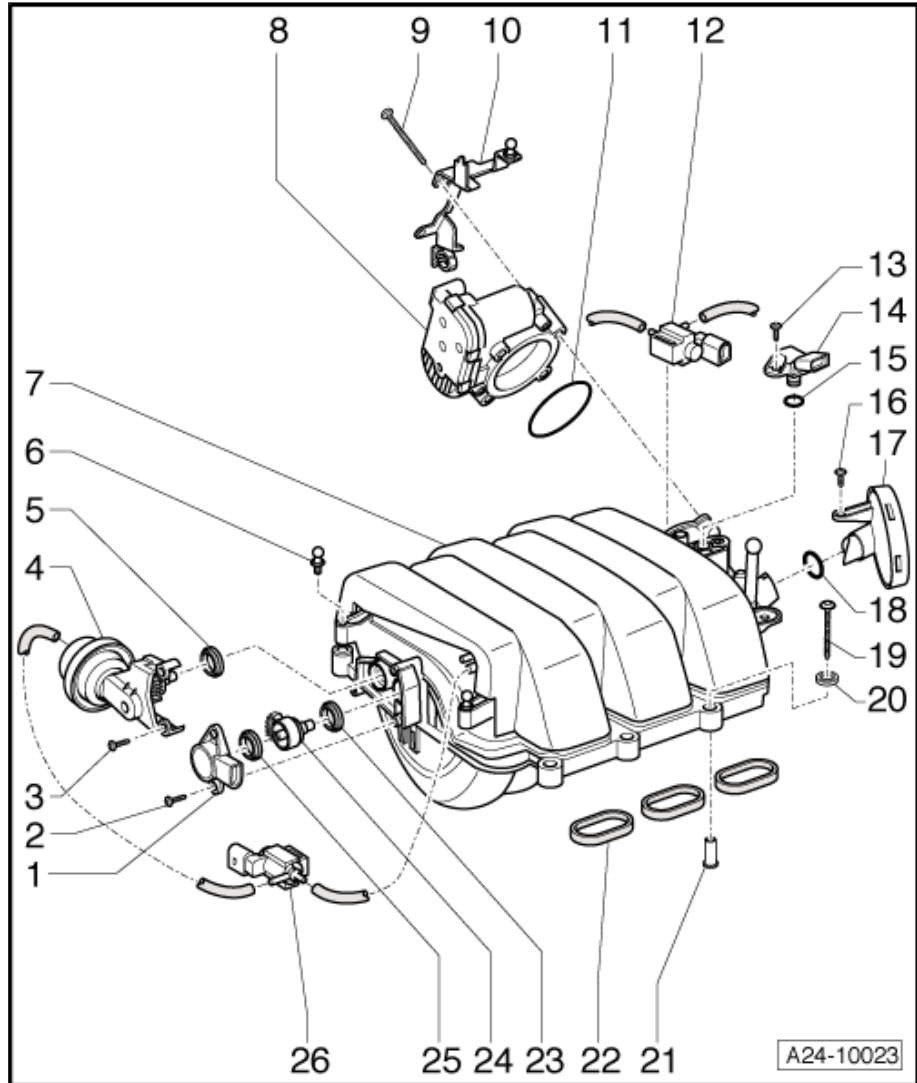
- Replace

16 - 2.5 Nm

17 - Crankcase housing ventilation pressure regulator valve

18 - O-ring

- Replace



19 - 6 Nm

20 - Washer

21 - Sleeve

22 - Seals

- Replace

23 - Seal

- Replace if damaged
- Lift out with screwdriver to replace
- Press in by hand

24 - Lever with tooth segment

- For variable intake manifold
- Installed location of tooth segments => [page 17](#)
- As replacement part together with -4-

25 - Seal

- Replace if damaged
- Lift out with screwdriver to replace
- Press in by hand

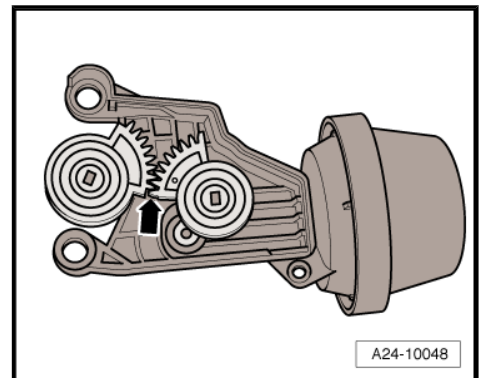
26 - Change over valve for intake manifold flap -N239-

Installed Location of Tooth Segments for Variable Intake Manifold

- The lower edges of tooth segments must be flush with one another -arrows-.



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.

erWin 

2.4 Lower Intake Manifold Assembly Overview

1 - Intake manifold, lower

- Removing and installing ⇒ [page 32](#) .
- After installation, adapt both intake manifold runner position sensors in operating mode "Guided Fault-Finding" in "Adapting intake manifold runner position sensor"

2 - Fuel rail

3 - Fuel pressure sensor - G247-

4 - High-pressure line

WARNING

Before opening high pressure components of the fuel injection system, pressure must be relieved to residual pressure ⇒ [page 2](#) .

Then wrap a clean rag around the connection and relieve residual pressure by carefully loosening the connection.

- Do not change bend shape
- Tighten high-pressure lines ⇒ [page 34](#) .

5 - 10 Nm

6 - Sleeve

7 - 10 Nm

8 - 2.5 Nm

9 - 10 Nm

10 - Retaining bracket for fuel rail

11 - Vacuum actuator for intake manifold runner control

12 - Vacuum hose

- To Intake Manifold Runner Control (IMRC) valve -N316-

13 - 2.5 Nm

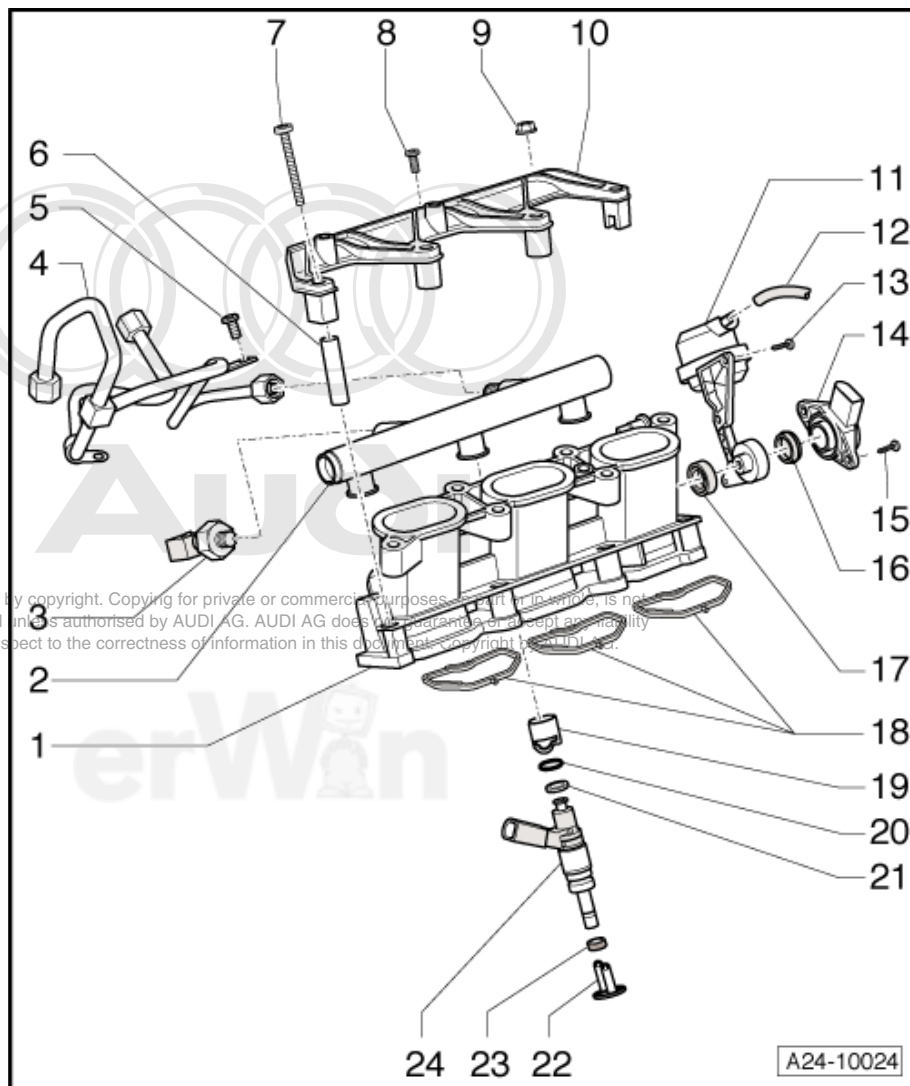
14 - Intake manifold runner position sensor

- Left intake manifold runner position sensor 2 -G512- , right intake manifold runner position sensor -G336-

15 - 2.5 Nm

16 - Seal

- Replace if damaged
- Lift out with screwdriver to replace
- Press in by hand



17 - Seal

- Replace if damaged
- Lift out with screwdriver to replace
- Press in by hand

18 - Seals

- Replace

19 - Support ring

- Make sure it is seated properly
- The fuel rail wields force via support ring to hold fuel injector tightly in cylinder head.

20 - O-ring

- Replace
- Moisten with clean engine oil

21 - Spacer ring

- Replace if damaged

22 - Radial adjustment

- Replace if damaged
- Clip with support ring -19-

23 - Combustion chamber seal

- Replacing ⇒ ["5.4 Fuel Injectors", page 35](#) .

24 - Fuel injector

Removing and installing ⇒ [page 35](#) .



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.



3 Specifications

⇒ "3.1 Fastener Tightening Specifications", page 20

⇒ "3.2 Technical Data", page 20

3.1 Fastener Tightening Specifications

Components	Bolt Size	Nm
Air Duct to Intake Manifold Clamp		10
Fuel Line to Fuel Rail Union Nut		28
High Pressure Line to		
– High Pressure Pump		25
– Fuel Rail		25
High Pressure Pump to Cylinder Head Bolt		10
Holding Plate to		
– Air Duct		10
– Intake Manifold		10
Hose Clamp 9 mm Wide		3
Intake Manifold Lower to Cylinder Head Bolt		10
Intake Manifold Upper to Intake Manifold Lower Bolt ¹⁾		6
Knock Sensor		20
Oxygen Sensor		55

- ¹⁾ Tighten diagonally in stages.

3.2 Technical Data

Engine code	BKH (3.2 l / 4V / 188 kW engine)
Idle speed ¹⁾	650 to 750/min
Fuel pressure before high-pressure pump	approximately 6 bar positive pressure
Fuel pressure after high-pressure pump	approximately 35 bar positive pressure
<ul style="list-style-type: none"> • ¹⁾ Not adjustable. 	



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 Diagnosis and Testing

⇒ [“4.1 Fuel and Residual Pressure before High Pressure Pump, Checking”, page 21](#)

⇒ [“4.2 Wiring and Components, Checking with Test Box VAG 1598/42”, page 24](#)

4.1 Fuel and Residual Pressure before High Pressure Pump, Checking

Special tools and workshop equipment required

- ◆ Pressure gauge K-Jetronic -V.A.G 1318-
- ◆ Pressure gauge adapter -V.A.G 1318/10-12-
- ◆ Remote control -V.A.G 1348/3A- with adapter cable -V.A.G 1348/3-3-
- ◆ Measuring container, fuel-resistant

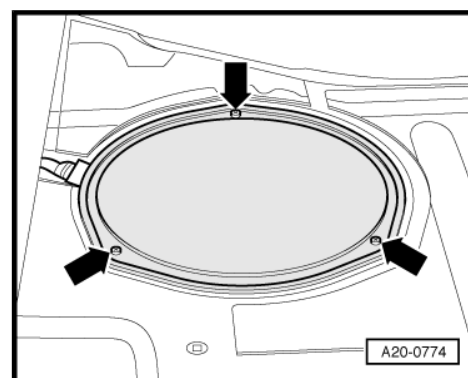
Test Conditions

- Battery voltage at least 12.5 V.
- Fuel filter OK.
- Fuel tank at least $\frac{1}{4}$ filled.
- Fuel Pump (FP) control module -J538- OK; checking ⇒ Fuel Supply System; Rep. Gr. 20 ; Diagnosis and Testing .
- Ignition switched off.

Checking Fuel Pressure

With Front Wheel Drive

- Fold forward right backrest of rear seat, if necessary.
- Remove luggage compartment floor trim.
- Remove cover for locking flange -arrows-.

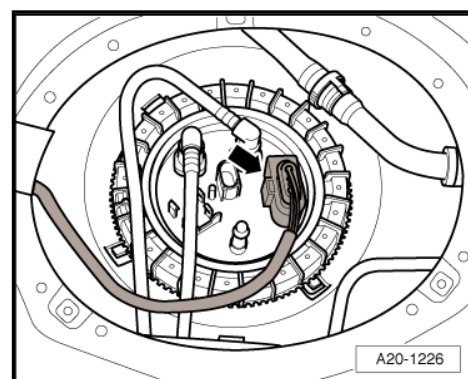


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

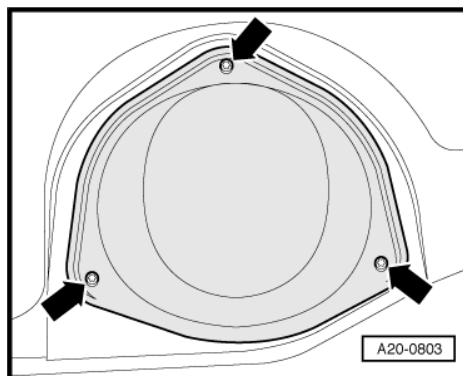
- Carefully release and disconnect electrical harness connector -arrow- at locking flange.

With All Wheel Drive

- Remove rear seat bench ⇒ Body Interior; Rep. Gr. 72 ; Removal and Installation

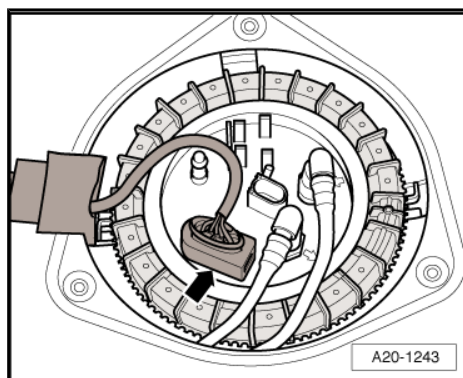


- Remove cover for right locking flange -arrows-.



- Carefully release and disconnect electrical harness connector -arrow- at locking flange.

Continuation for All



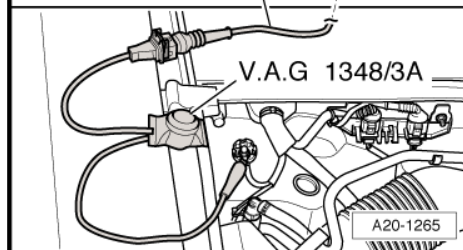
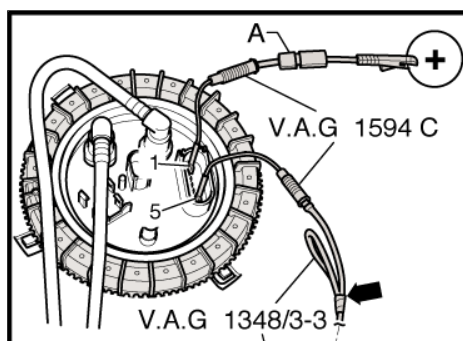
- Connect remote control -V.A.G 1348/3A- with adapter cable -V.A.G 1348/3-3- with an adapter cable from connector test set -V.A.G 1594C- at terminal -5-.

- Cover 2nd connector terminal of adapter cable -V.A.G 1348/3-3- with insulating tape to prevent short circuit -arrow-.

- Route remote control -V.A.G 1348/3A- switch forward in engine compartment.

- Connect alligator clip to ground (GND) point in engine compartment.

- Connect contact -1- to battery “+” using a self-made adapter cable.



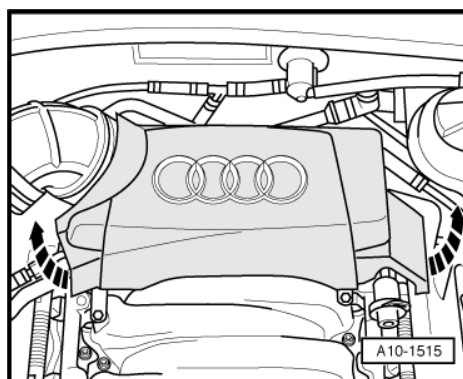
i Note

For safety reasons, install a fuse -A- in the cable.

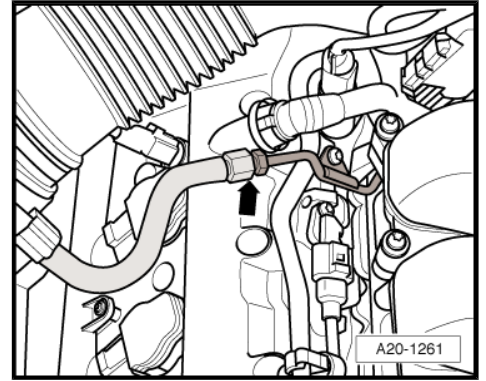
- Remove rear engine cover -arrows-.

! WARNING

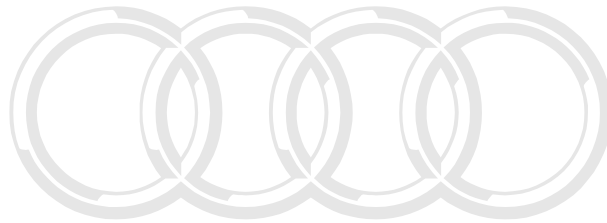
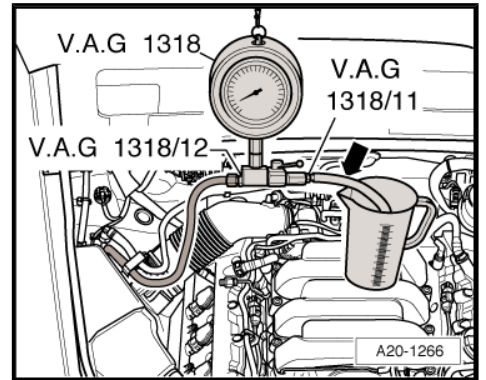
- ◆ **Fuel system is under high pressure! Before opening high pressure components of the fuel injection system, pressure must be relieved to residual pressure ⇒ [page 2](#) .**
- ◆ **Then wrap a clean cloth around the connection and relieve residual pressure by carefully loosening the connection.**



- Disconnect fuel line -arrow-.



- Connect fuel inj. pressure gauge-CIS -V.A.G 1318- with adapter -V.A.G 1318/11- and -V.A.G 1318/12- in fuel line.
- Connect assisting hose -arrow- to pressure gauge and hold it in a measuring container.
- Open shut-off valve of pressure gauge. The lever points in direction of flow.
- Bleed fuel system, by briefly pressing remote control.



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.





- Close shut-off valve of pressure gauge. Lever stands perpendicular to direction of flow -arrow-.
- Hold switch of remote control until no more pressure increase is observed on fuel pressure gauge.
- Specified value: approximately 6 bar positive pressure

If specification is not obtained:

- Check delivery quantity of Fuel Pump (FP) ⇒ Fuel Supply System; Rep. Gr. 20 ; Diagnosis and Testing .

Checking Residual Pressure

- Check for leaks and for residual pressure by observing the pressure loss on the pressure gauge.
- After 10 minutes there must be a residual pressure of at least 3.75 bar.

The holding pressure drops below 3.75 bar:

- ◆ Check connection between fuel pressure gauge and fuel line for leaks.
- ◆ Check pressure gauge for leaks.
- ◆ Check fuel lines and their connections for leaks.
- ◆ Replace fuel filter with integrated fuel pressure regulator ⇒ Fuel Supply System; Rep. Gr. 20 ; Removal and Installation .
- ◆ Replace fuel pump ⇒ Fuel Supply System; Rep. Gr. 20 ; Removal and Installation .

Assembly is in reverse order of removal, note the following:



Note

Before disconnecting pressure gauge, release pressure by opening shut-off valve. Hold a container in front of connection for this.

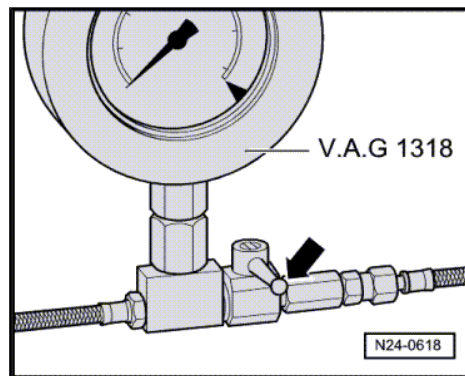
Tightening Specifications

Component	Nm
Fuel line to fuel rail	28

4.2 Wiring and Components, Checking with Test Box VAG 1598/42

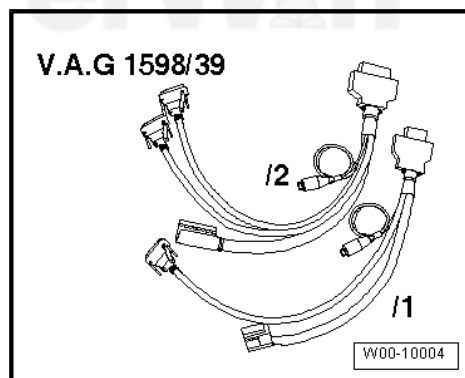
Special tools and workshop equipment required

- ◆ Adapter cable -V.A.G 1598/39-

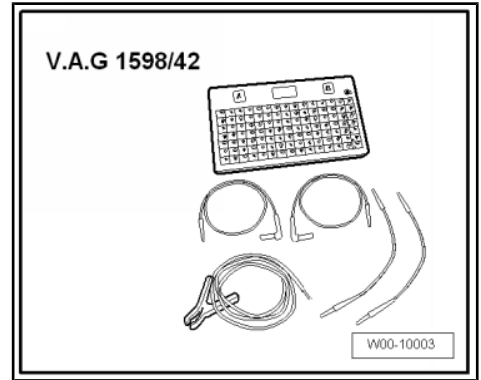


Audi

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.

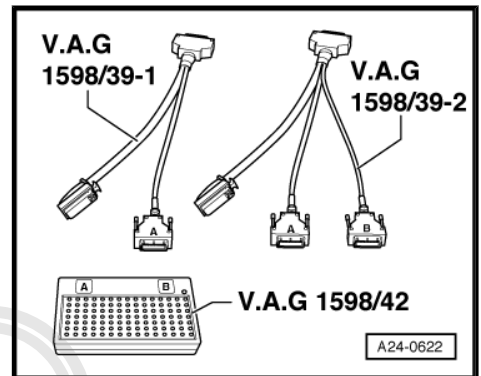


◆ Test box -V.A.G 1598/42-




 Note

- ◆ The test box -V.A.G 1598/42- is designed with 105 terminals. It can be connected to the engine control module (ECM) via 2 different adapter cables.
- ◆ The Engine Control Module (ECM) is connected to the vehicle electrical harness via a 60 pin connector and a 94 pin connector.
- ◆ For testing at the 60 pin connector, the adapter cable -V.A.G 1598/39-1- is connected to the test box with connector "A". Components of the 60 pin harness connection ⇒ Wiring diagrams, Troubleshooting & Component locations.
- ◆ For testing at the 94 pin connector, the adapter cable -V.A.G 1598/39-2- is connected to the test box with connectors "A" and "B". Components of the 94 pin harness connection ⇒ Wiring diagrams, Troubleshooting & Component locations.
- ◆ The test box -V.A.G 1598/42- is designed so that it can be connected simultaneously to the engine control module harness and the engine control module itself. This is advantageous because electronic engine control remains fully functional (e.g. measurement of signals with engine running) when the test box is attached.
- ◆ The procedure will indicate whether the engine control module is to remain connected to the test box or not.
- ◆ To connect measuring instruments (e.g. voltage tester -V.A.G 1527B-, multimeter -V.A.G 1526C- etc.) always use connector test set -V.A.G 1594C-.



The Engine Control Module (ECM) must be removed to disconnect the ECM harness connectors ⇒ [page 41](#) .

 **Caution**

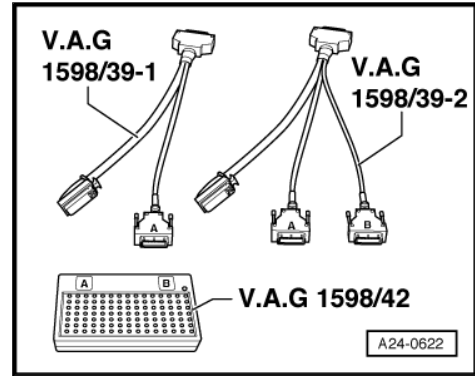
To avoid damaging electronic components, set measuring range before connecting test leads and observe all test requirements.



- Connect test box -V.A.G 1598/42- to wiring harness with adapter lead -V.A.G 1598/39-1- or adapter lead -V.A.G 1598/39-2- . Clamp test box ground (GND) clip to battery negative terminal. The procedure will indicate whether engine control module is to be connected to test box or not.
- Perform test as described in corresponding repair procedure.
- After completing test, install Engine Control Module (ECM)
⇒ [page 41](#) .

After installing Engine Control Module (ECM), the following work steps must be performed:

- Check DTC memory and, if necessary, erase it. After DTC memory is erased, a readiness code must be generated for engine control module using operating mode "Guided Fault-Finding" ⇒ Vehicle diagnosis, testing and information system VAS 5051.



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.



5 Removal and Installation

⇒ [“5.1 Air Filter Element”, page 27](#)

⇒ [“5.2 Upper Intake Manifold”, page 29](#)

⇒ [“5.3 Lower Intake Manifold with Fuel Rail”, page 32](#)

⇒ [“5.4 Fuel Injectors”, page 35](#)

⇒ [“5.5 High Pressure Pump”, page 38](#)

⇒ [“5.6 Engine Control Module”, page 41](#)

⇒ [“5.7 Oxygen Sensor before Catalytic Converter, Bank 1”, page 44](#)

⇒ [“5.8 Oxygen Sensor before Catalytic Converter, Bank 2”, page 46](#)

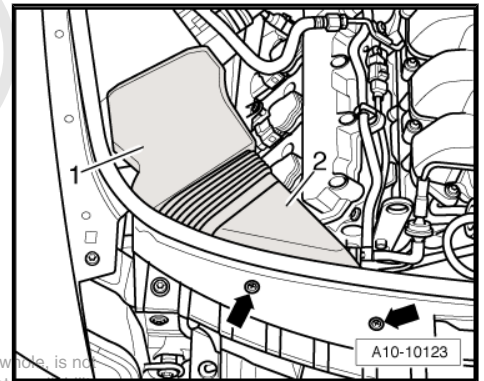
⇒ [“5.9 Oxygen Sensor after Catalytic Converter, Bank 1”, page 47](#)

⇒ [“5.10 Oxygen Sensor after Catalytic Converter, Bank 2”, page 49](#)

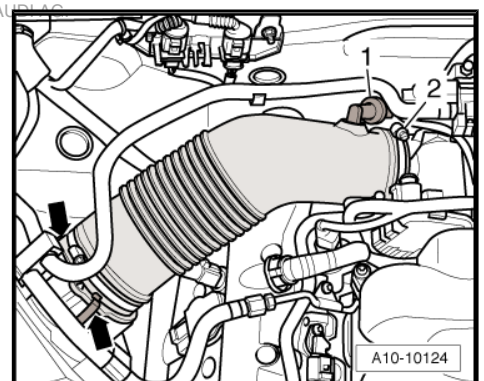
5.1 Air Filter Element

Removing

- Remove bolts -arrows-.
- Remove air duct -1- and -2-.

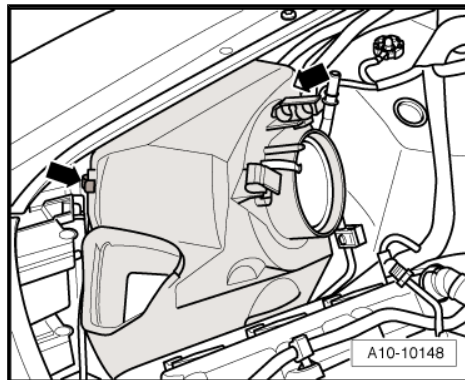


- Disconnect check valve -1- from connection at air duct hose.
- Remove air duct hose, thereby loosening hose clamp -2- and opening clips -arrows-.



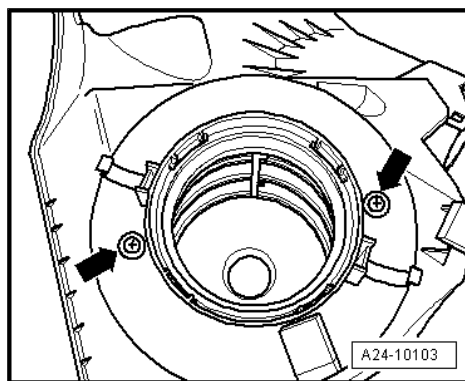


- Open clips -arrows- on upper part of filter housing and remove that part.



- Remove 2 bolts -arrows- from air filter element.

Removing Air Filter Housing, Lower



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.



- Disconnect vacuum line -1-.
- Remove pin from spreader clips -3-.
- Remove lower part of air filter housing and, on backside, disconnect electrical connection -2- at intake air switch-over valve -N335- .

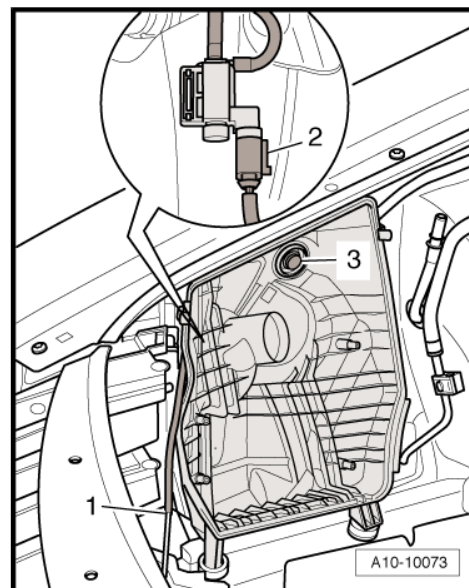
Installing

Note

- ◆ *Always use an original equipment air filter element.*
- ◆ *Hose connections and hoses in intake area must be free of oil and grease before installing. When installing, do not use any lubricants containing silicone.*
- ◆ *Air filter housing must always be clean.*
- ◆ *Secure all hose connections using hose clamps appropriate for model type ⇒ Parts catalog .*
- ◆ *Note the following when blowing out air filter housing with compressed air: To prevent malfunctions, cover critical air flow engine components such as air duct pipes, etc. with a clean cloth.*

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

- ◆ **Observe disposal regulations!**
- Check water drain hose in lower part of air filter for dirt and contamination (clean if necessary).
- Clean air filter housing (upper and lower sections) of salt residue, dirt or leaves (use vacuum cleaner if necessary).
- Check air duct hose (clean air side) for salt residue, dirt and leaves.
- Check intake ducting up to air filter element for dirt.
- Make sure that air filter element is properly centered when placed into mounting of lower part of air filter housing.
- Set upper part of air filter housing onto lower part of air filter housing, without using much force. When doing this, make sure that the upper part of air filter housing is not placed crooked onto air filter element. Pay attention to sealing lip of air filter element (false air).
- Then attach upper part of air filter housing to lower part.
- Further installation is in reverse order of removal.



5.2 Upper Intake Manifold

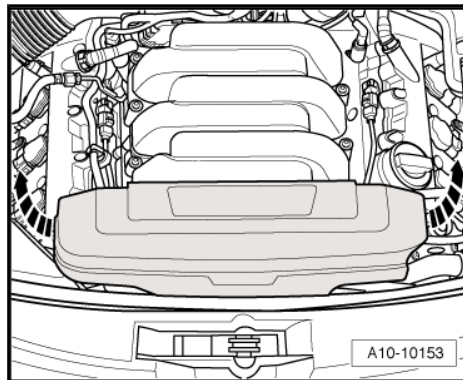
Removing

Note

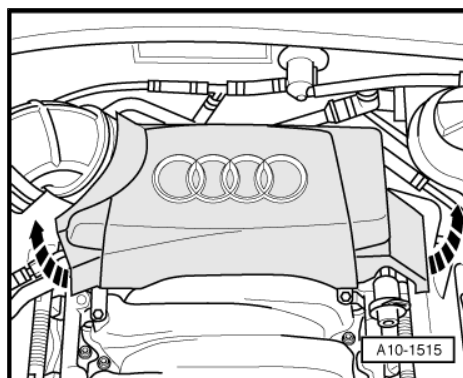
All cable ties which are opened or cut open when removing, must be replaced in the same position when installing.



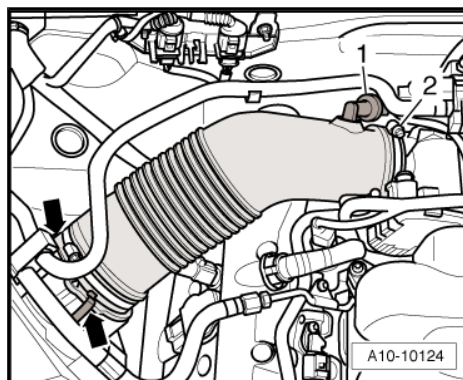
- Remove front engine cover -arrows-.



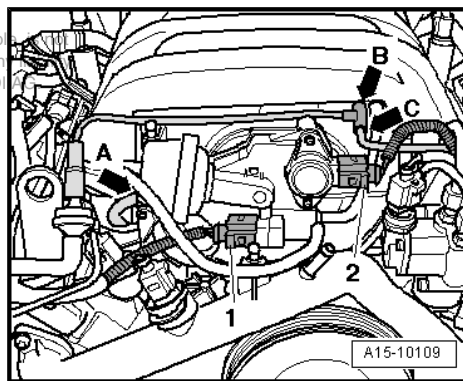
- Remove rear engine cover -arrows-.



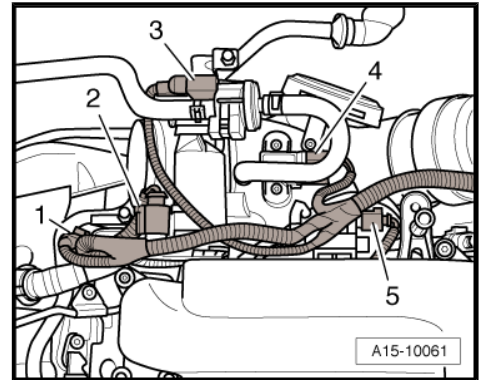
- Disconnect check valve -1- from air duct hose.
- Remove air duct hose, thereby loosening hose clamp -2- and opening clips -arrows-.



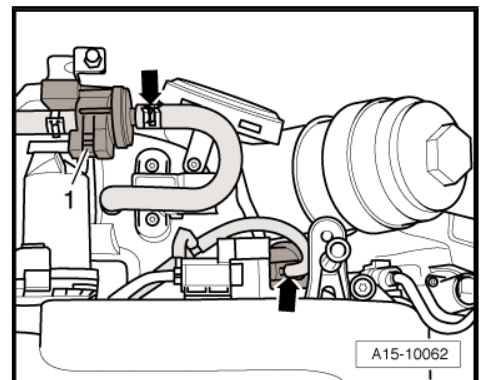
- Disconnect electrical harness connectors.
- 1 - Change over valve for intake manifold flap -N239-
- 2 - Intake Manifold Tuning (IMT) valve position sensor -G513-
- Remove vacuum lines -arrow A- and -arrow B-.



- Disconnect vacuum hose -arrow C- at leak detection pump.
- Disconnect electrical harness connectors.
- 1 - Camshaft adjustment valve 1 -N205-
- 2 - Throttle valve control module -J338-
- 3 - Evaporative emission (EVAP) canister purge solenoid valve -N80-
- 4 - Intake Air Temperature (IAT) sensor -G42- / Manifold Absolute Pressure (MAP) sensor -G71-
- 5 - Intake Manifold Runner Control (IMRC) valve -N316-
- Free up wiring harness.



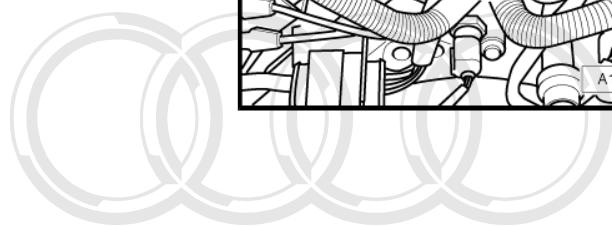
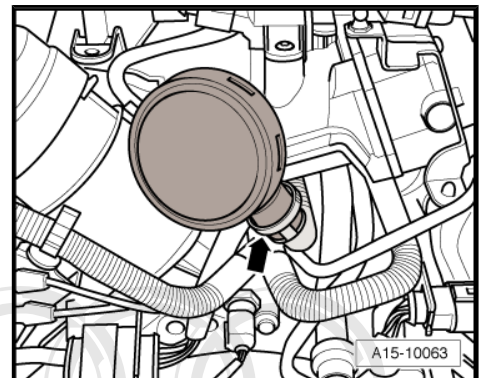
- Disconnect vacuum hoses -arrows-.
- Remove Evaporative emission (EVAP) canister purge regulator valve -N80- -1- from throttle valve control module -J338- .



- Disconnect crankcase breather hose at pressure regulator valve -arrow-.

i Note

To improve clarity, the engine is removed shown from the rear.



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.

erWin

- Remove bolts -arrows- and remove intake manifold upper.

**Note**

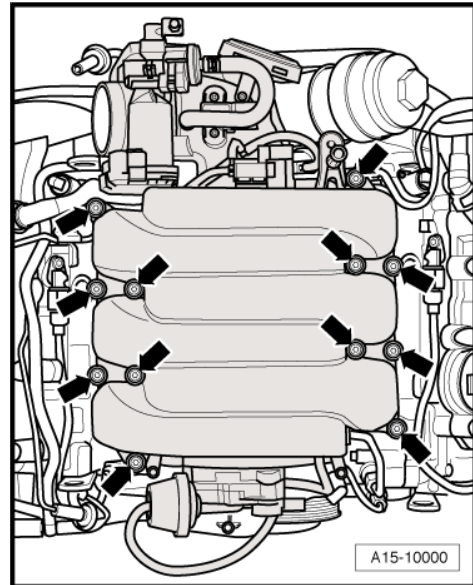
Plug the intake ports of the cylinder head with clean rags.

Installing

Installation is in reverse order of removal, note the following:

**Note**

- ◆ Replace gaskets and O-rings.
- ◆ During installation, all cable ties must be reinstalled at the same location.
- ◆ Secure all hose connections using hose clamps appropriate for the model type ⇒ Parts catalog .

**Tightening Specifications**

Component	Nm
Intake manifold upper-part to intake manifold lower-part	6 ¹⁾
Hose clamps 9 mm wide	3
• ¹⁾ Tighten diagonally in stages.	

5.3 Lower Intake Manifold with Fuel Rail

Special tools and workshop equipment required

- ◆ Socket 14 mm -3150-
- ◆ Torque wrench -V.A.G 1331-
- ◆ Ratchet -V.A.G 1331/1-
- ◆ Open end wrench socket 17 mm -V.A.G 1331/2-
- ◆ SW 14 socket, open ring -V.A.G 1331/8-
- ◆ Socket -T40055-
- ◆ Hand vacuum pump -VAS 6213-

Removing**Note**

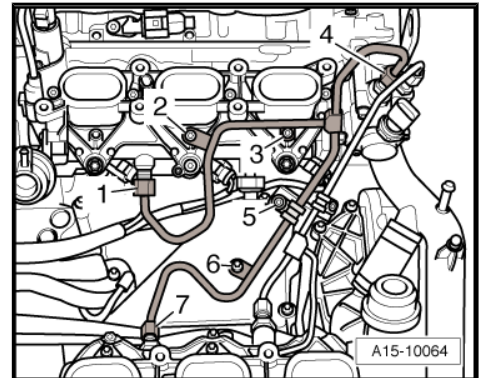
The following removal and installation procedure is for the left intake manifold, lower. The procedure for the other side is identical.

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.

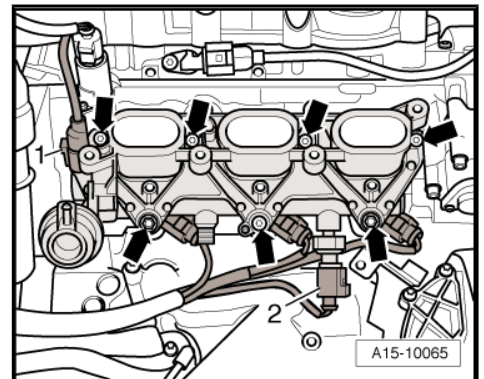
**WARNING**

- ◆ Fuel system is under high pressure! Before opening high pressure components of the fuel injection system, pressure must be relieved to residual pressure ⇒ page 2 .
- ◆ Then wrap a clean rag around the connection and relieve residual pressure by carefully loosening the connection.

- Remove intake manifold upper => [page 29](#) .
- Remove high-pressure line, thereby removing bolts and union nuts -1 through 7-.



- Disconnect electrical harness connectors:
 - 1 - Intake manifold runner position sensor 2 -G512-
 - 2 - Fuel pressure sensor -G247-
- Remove bolts and nuts -arrows- and remove intake manifold lower with fuel rail.



i Note

Plug intake ports of the cylinder head with clean rags.

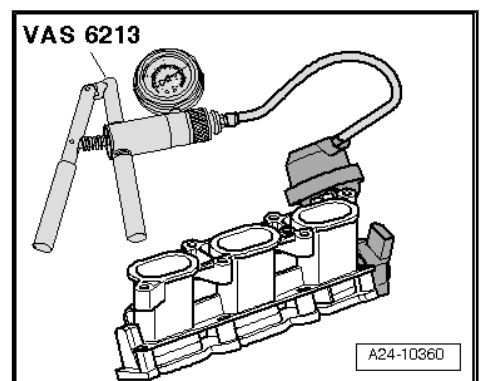
Installing

Installation is in reverse order of removal, note the following:

i Note

- ◆ *Replace gaskets and O-rings.*
- ◆ *Lightly lubricate fuel injector O-rings with clean engine oil.*

- Connect hand vacuum pump -VAS 6213- to intake manifold runner control vacuum actuator, as shown in illustration.
- Generate vacuum using hand vacuum pump.
- The intake flaps are opened.



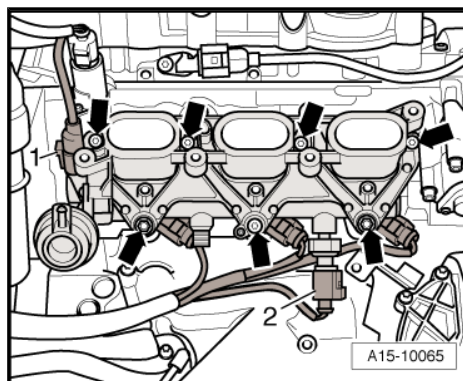
i Note

If the intake flaps are not opened, they could have seized when installing the intake manifold lower to the cylinder head.

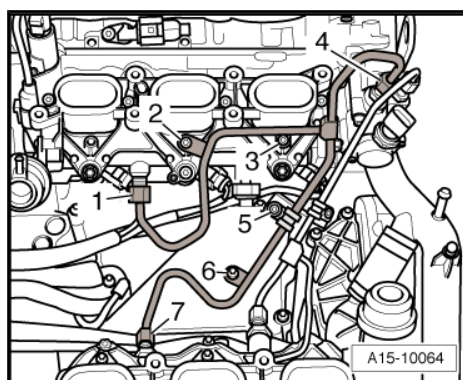
- Install intake manifold lower and press fuel rail evenly onto fuel injectors.



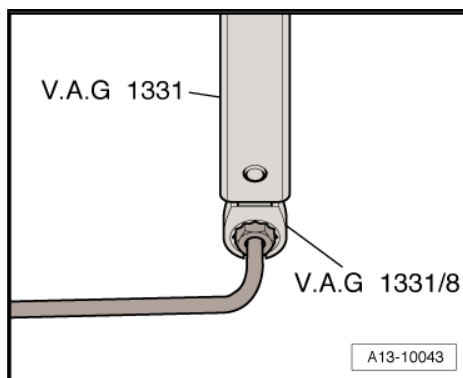
- Fasten bolts -arrows- for intake manifold lower in a diagonal sequence and in stages.
- Remove hand vacuum pump from intake manifold runner control vacuum actuator.
- Connect electrical harness connectors -1- and -2-.



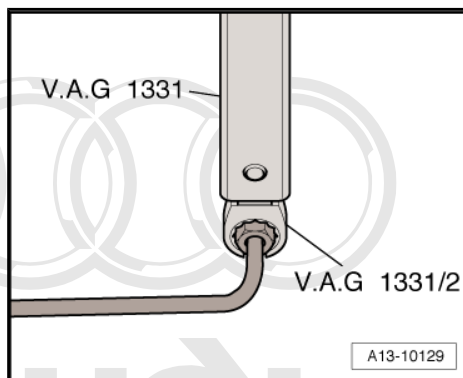
- Hand-tighten union nuts of high-pressure lines -1-, -4- and -7-.
- Make sure high-pressure lines are seated free of stress.



- To tighten SW 14 high pressure line at fuel rail, use torque wrench -V.A.G 1331- with socket insert AF 14, open ring -V.A.G 1331/8- .

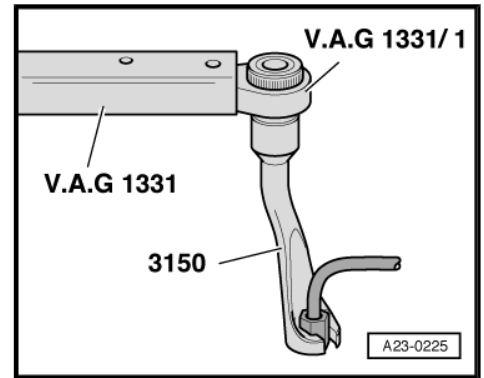


- To fasten high-pressure line (17 mm) to fuel rail, use torque wrench -V.A.G 1331- with Socket Insert AF 17 -V.A.G 1331/2- .

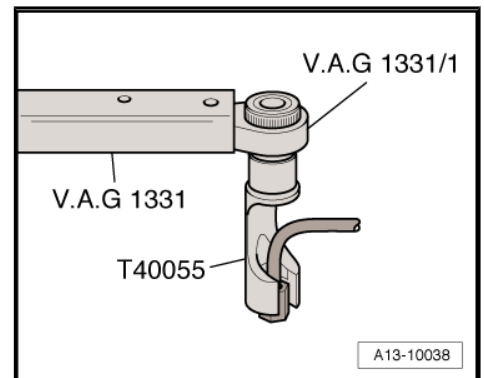


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- To fasten high-pressure line (14 mm) at high pressure pump use torque wrench -V.A.G 1331- with ratchet -V.A.G 1331/1- and socket 14 mm -3150- .



- To fasten high-pressure line (17 mm) to high pressure pump, use torque wrench -V.A.G 1331- with reversible ratchet -V.A.G 1331/1- and socket -T40055- .



Tightening Specifications

Component	Nm
Intake manifold lower-part to cylinder head	10
High pressure lines to High pressure pump	25
Fuel rail	25

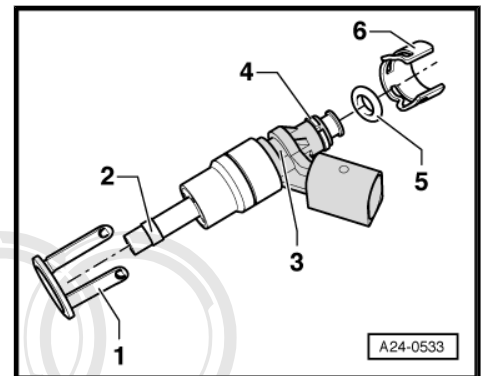
5.4 Fuel Injectors

Special tools and workshop equipment required

- ◆ Tool set -T10133-

High-Pressure Fuel Injector - Component Overview

- 1 - Radial adjustment - Replace if damaged
- 2 - Combustion chamber seal (Teflon seal) - replace, the seal must not be greased or be handled with any other lubricant during installation
- 3 - Groove on fuel injector
- 4 - Spacer ring - Replace if damaged
- 5 - O-ring - replace, lightly coat with clean engine oil during installation
- 6 - Support ring - fuel rail wields force via support ring to hold fuel injector tightly in cylinder head



Removing



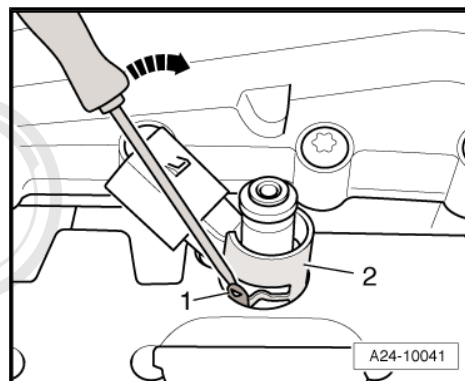
WARNING

- ◆ **Fuel system is under high pressure! Before opening high pressure components of the fuel injection system, pressure must be relieved to residual pressure ⇒ page 2.**
- ◆ **Then wrap a clean rag around the connection and relieve residual pressure by carefully loosening the connection.**

- Remove upper part of intake manifold ⇒ page 29 .
- Remove corresponding intake manifold lower-part ⇒ page 32 .

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

- Using a screwdriver, bend retaining tabs -1- of radial adjustment aside -arrow- and pull support ring -2- from fuel injector.

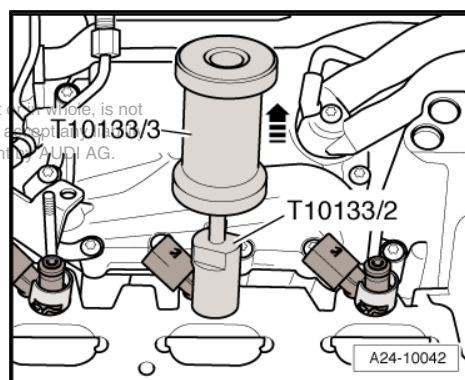


- Attach slide wrench -T10133/3- with adapter -T10133/2- .
- Guide puller -T10133/2- into groove on fuel injector and carefully drive fuel injector out.



Note

When setting the puller in place, the radial adjustment can be destroyed, because the retaining tabs break.



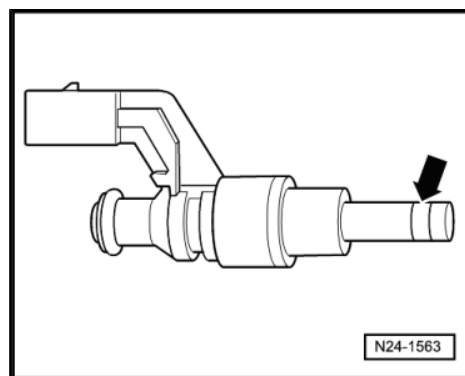
- Carefully remove old combustion chamber seal -arrow-, thereby cutting seal open with a knife or spreading seal open with a small screwdriver and pulling it forward and off.
- Make sure that the groove of fuel injector does not become damaged. If groove is damaged, fuel injector must be replaced.

Installing

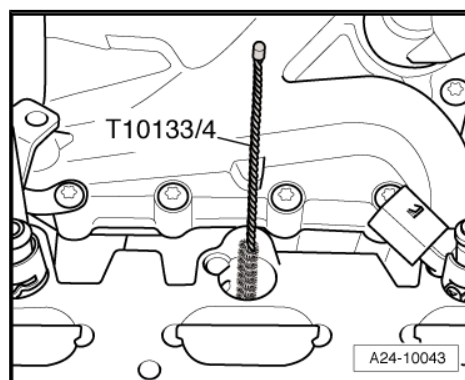


Note

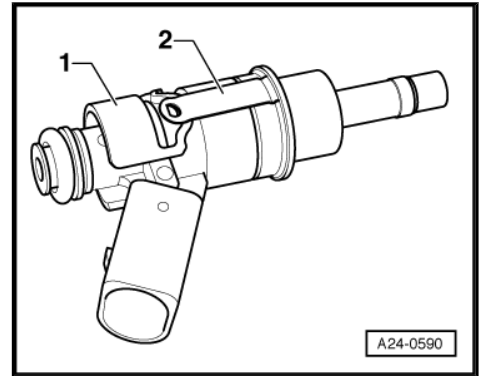
- ◆ Replace combustion chamber seal and O-ring.
- ◆ Replace spacer ring if damaged.
- ◆ Lightly moisten fuel injector O-rings with clean engine oil.
- ◆ Re-insert injector lines at same cylinder.



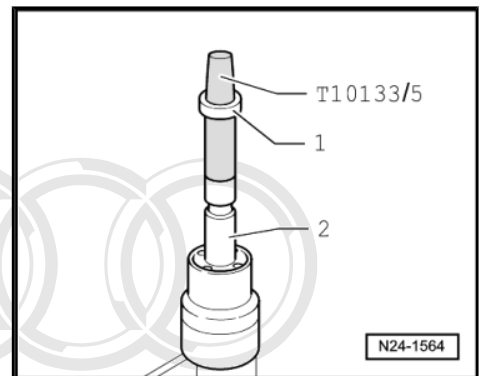
- Clean bore in cylinder head with nylon cylinder brush -T10133/4- .



- Clip radial adjustment -1- to support ring -2-.
- When reinstalling a fuel injector, use a clean cloth to clean combustion residue from groove for combustion chamber seal and shaft of fuel injector.



- Place assembly cone -T10133/5- with new combustion chamber seal -1- on fuel injector -2-.

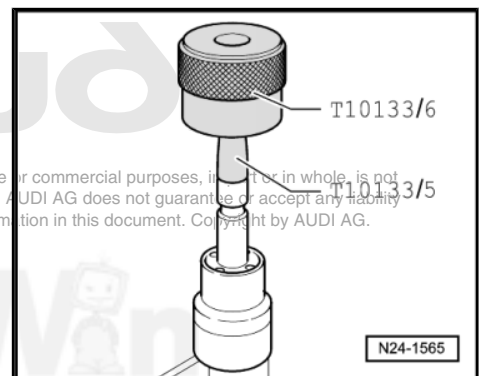


- Slide combustion chamber seal as far possible onto assembly cone -T10133/5- using assembly sleeve -T10133/6- .
- Turn assembly sleeve -T10133/6- around and slide combustion chamber seal into groove.

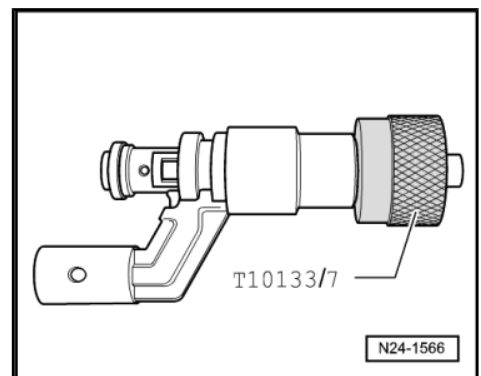
 **Note**

When pushing the combustion chamber seal onto the fuel injector, the seal spreads open. Therefore after pushing it on, it must be tightened again in 2 steps, as follows.

Protected by copyright. Copying for private or commercial purposes, in whole or in part, 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.



- Press sizing sleeve -T10133/7- with a slight turning motion (approximately 180 degrees) onto fuel injector until it stops.
- Pull sizing sleeve -T10133/7- off again, turning it in opposite direction.

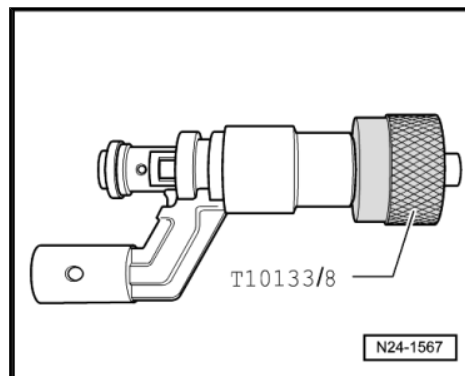




- Press sizing sleeve -T10133/8- with a slight turning motion (approximately 180 degrees) onto fuel injector until it stops.
- Pull sizing sleeve -T10133/8- off again, turning it in opposite direction.
- Moisten new O-ring 3 with clean engine oil before installing.

**Note**

The combustion chamber seal must not be oiled.

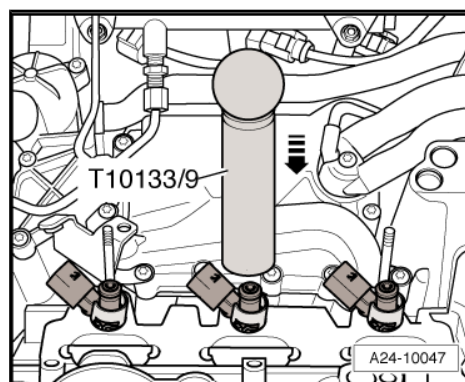


- Slide fuel injector into bore cylinder head as far as stop using assembly drift -T10133/9- .

**Note**

The fuel injector must not be difficult to install. If necessary, wait as the combustion chamber seal continues to pull itself together.

- Make sure fuel injectors are correctly positioned in cylinder head.
- The electrical connection of fuel injector must engage in intended recess of cylinder head.



Further installation is in reverse order of removal, note the following:

- Install intake manifold lower-part ⇒ [page 32](#) .
- Install intake manifold upper-part ⇒ [page 29](#) .

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.

5.5 High Pressure Pump

Special tools and workshop equipment required

- ◆ Socket 14 mm -3150-
- ◆ Torque wrench -V.A.G 1331-
- ◆ Ratchet -V.A.G 1331/1-
- ◆ Socket -T40055-

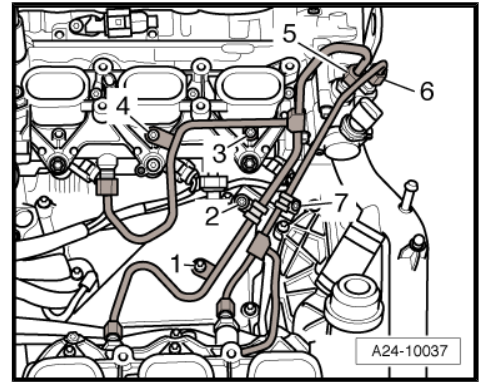
Removing

**WARNING**

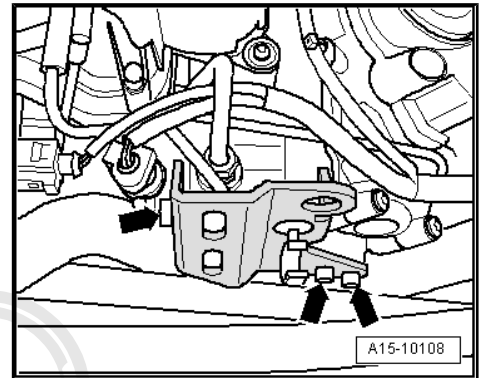
- ◆ **Fuel system is under high pressure! Before opening high pressure components of the fuel injection system, pressure must be relieved to residual pressure ⇒ [page 2](#) .**
- ◆ **Then wrap a clean rag around the connection and relieve residual pressure by carefully loosening the connection.**

- Drain coolant ⇒ Engine Mechanical; Rep. Gr. 19 ; General Information .
- Remove front coolant pipe ⇒ Engine Mechanical; Rep. Gr. 19 ; Removal and Installation .
- Remove upper part of intake manifold ⇒ [page 29](#) .

- Remove bolts -1 through 4- and -7-.
- Loosen union nuts -5- and -6-.



- If equipped, remove large lifting eye -arrows-.



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.

erWin 

- Disconnect electrical connectors -1- and -2-.

**Note**

-1- depending on version

- Remove bolts -arrows-.
- Carefully lift high pressure lines.

**Note**

Do not change bend shape.

- Remove high pressure pump with actuator.

Installing

Installation is in reverse order of removal, note the following:

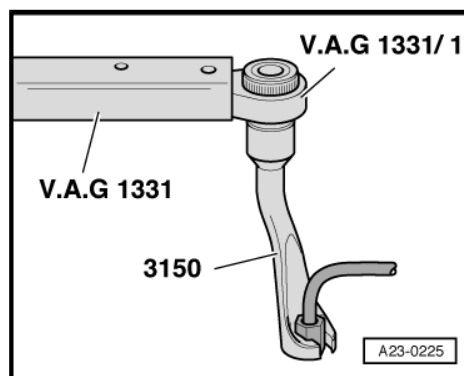
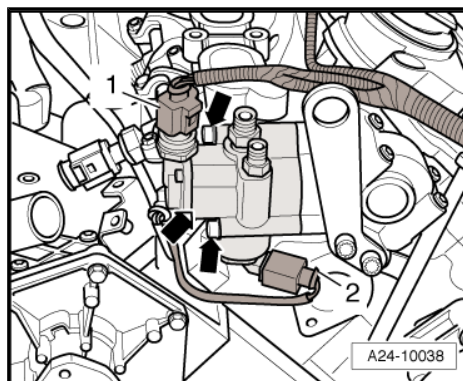
**Note**

Replace O-ring.

- To set high pressure pump in place, lift high pressure lines only slightly.

**Note**

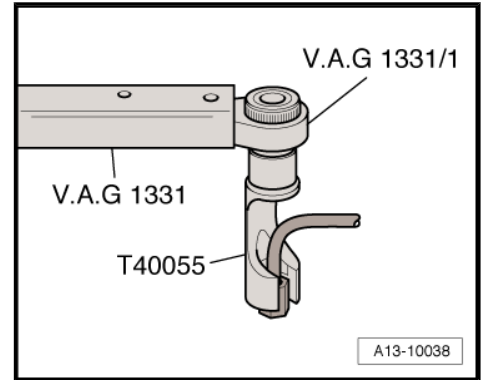
- ◆ *High pressure line connections must not show any signs of damage.*
- ◆ *Do not change bend shape of high pressure lines.*
- Place high pressure pump with actuator into cylinder head and fasten.
- Hand-tighten union nuts for high-pressure lines.
- Make sure high-pressure lines are seated free of stress.
- To fasten high-pressure line (14 mm) at high pressure pump use torque wrench V.A.G 1331- with ratchet V.A.G 1331/1- and socket 14 mm-3150-



- To fasten high-pressure line (17 mm) to high pressure pump, use torque wrench -V.A.G 1331- with reversible ratchet -V.A.G 1331/1- and socket -T40055- .
- Install intake manifold upper-part ⇒ [page 29](#) .
- Install front coolant pipe ⇒ Engine Mechanical; Rep. Gr. 19 ; Removal and Installation .
- Fill with coolant ⇒ Engine Mechanical; Rep. Gr. 19 ; General Information .

Tightening Specifications

Component	Nm
High pressure pump to cylinder head	10
High pressure lines to high pressure pump	25



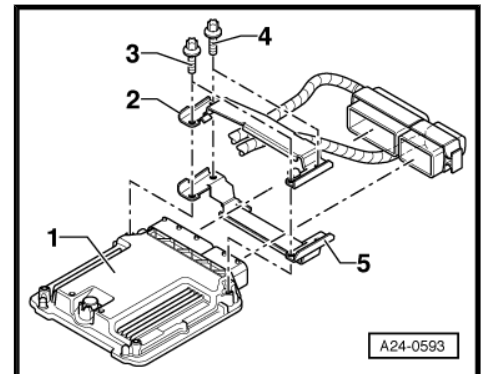
5.6 Engine Control Module

Special tools and workshop equipment required

- ◆ Heat gun 220 V/50 Hz -VAS 1978/14- -1- with nozzle attachment -2- from wiring harness repair kit -VAS 1978A-
- ◆ Locking pliers -3- (commercially available)

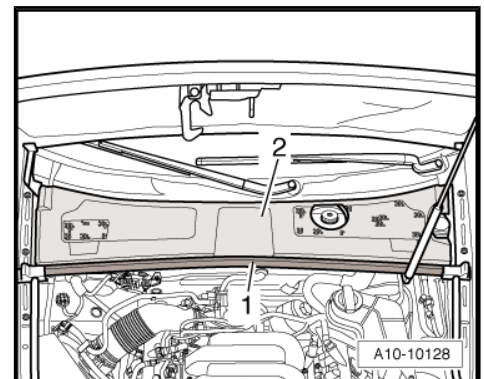
Note

- ◆ *The Engine Control Module (ECM) -1- is bolted to a protective housing -5-. To make removal of shear bolts -4- for retaining tabs -2- more difficult, the threads are coated with locking compound.*
- ◆ *To disconnect the connectors from the Engine Control Module (ECM) (e.g. to connect the test box or to replace the ECM), the protective housing must be removed.*



Removing

- If Engine Control Module (ECM) was replaced, select diagnostic object "Replacing Engine Control Module (ECM)" in "Guided Fault-Finding" ⇒ Vehicle diagnosis, testing and information system VAS 5051.
- Turn ignition and remove ignition key.
- Remove rubber seal -1- for plenum chamber cover.
- Remove plenum chamber cover -2-.





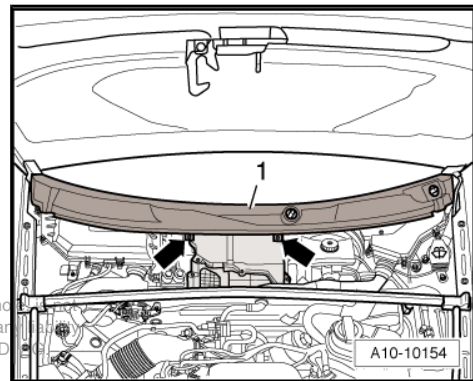
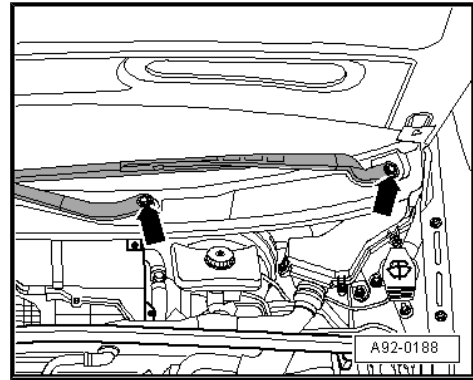
- Pry off caps on wiper arms using a screwdriver.
- Loosen nuts -arrows- by several turns.
- Loosen wiper arms by gently rocking wiper arm. Remove nuts and remove wiper arms.



Note

If wiper arm cannot be removed in this way, use a standard puller.

- Remove bolts -arrows- for cowl panel trim -1-.
- Pull cowl panel trim off from windshield.



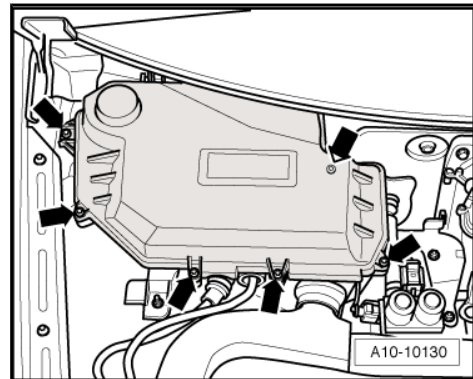
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- Remove bolts -arrows- and remove cover for E-box at right in engine compartment.



WARNING

The heater pump valve unit (left of E-box) becomes very hot during operation - Risk of burning!

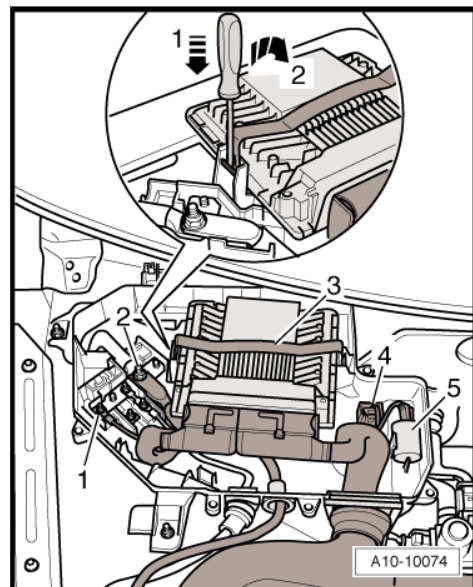


- Carefully pry off retaining clip -2- with a screwdriver -arrows 1 and 2- and remove ECM from E-box.



Caution

To avoid damage (burning) of wire connections and harness connectors, insulation and control modules, the following work steps must be adhered to exactly! Observe operating instructions for heat gun.



- Set adjustment on heat gun as shown in illustration, with temperature potentiometer -2- set to maximum heat and two-stage air flow switch -3- set to level "3".

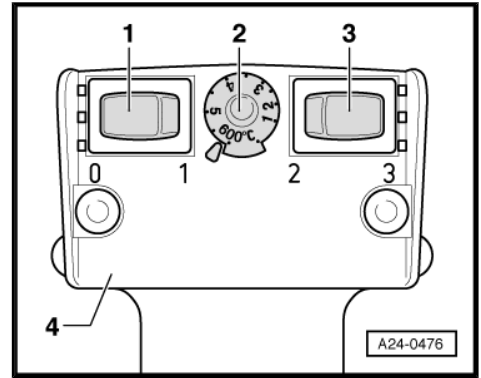
i Note

Next, the threads of the protective housing in which the shear bolts are threaded is heated using the heat gun. This step decreases the locking effect of the locking compound on the shear bolt thread, thus allowing the shear bolts to be removed more easily.

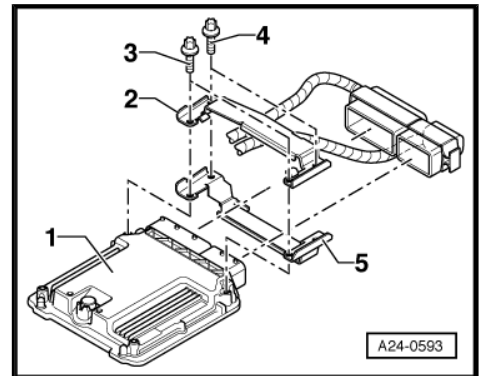
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG

! WARNING

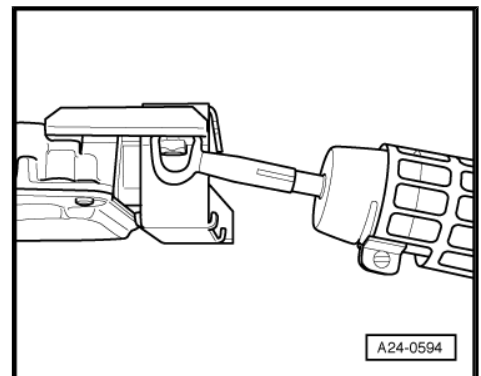
By heating the shear bolts, parts of the protective housing will become extremely hot. Do not burn yourself on this! Ensure only the shear bolts are heated and not any of the surrounding parts. Possibly cover these parts.



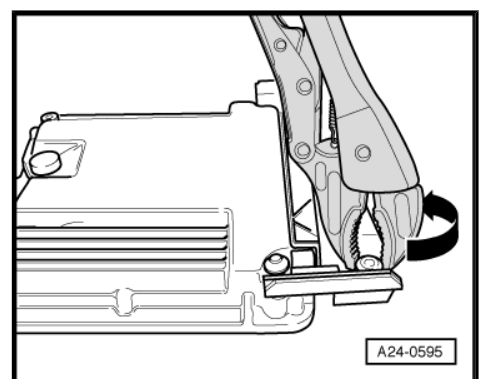
- Perform the following steps in order one after the other for both shear bolts -4-.



- Direct heat gun nozzle at protective housing shear bolts.
- Switch heat gun on and heat bolt for approximately 20 to 25 seconds.



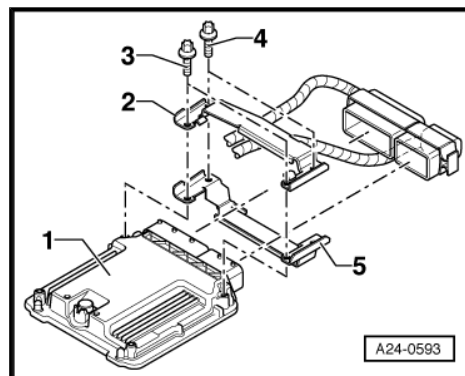
- Remove shear bolts with locking pliers -arrow-.



**Note**

The threads of both shear bolts -3- that are installed in the ECM are not coated with a locking compound. The threads in the ECM housing must not be heated and do not require to be heated (unintentional heating of the ECM).

- Remove both shear bolts -3-.
- Separate retaining tab -2- of control module connector.
- Release and pull off connectors from Engine Control Module (ECM).

**Note**

Adaptation values are erased when connectors are disconnected from the Engine Control Module (ECM), DTC memory content remains intact.

Installing

Installation is in reverse order of removal, note the following:

- The ECM must be equipped with protective housing again.
- Clean locking compound residue from shear bolt threaded holes. Cleaning can be performed with a thread cutter (tap).
- Use new shear bolts.

After installing a new Engine Control Module (ECM), the following work steps must be performed:

- Activate engine control module (ECM) in "Guided Fault-Finding" under "Replacing engine control module (ECM)" => Vehicle diagnosis, testing and information system VAS 5051.

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorized 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.

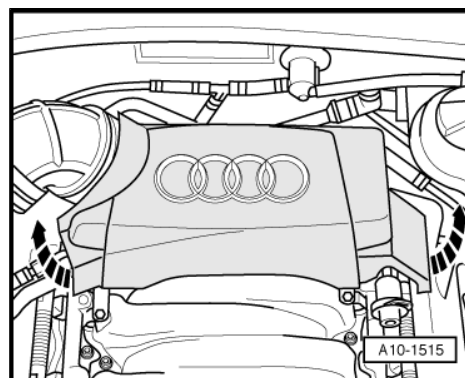
5.7 Oxygen Sensor before Catalytic Converter, Bank 1

Special tools and workshop equipment required

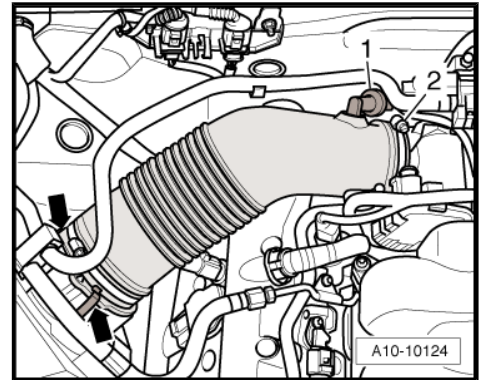
- ◆ Ring spanner 7-piece set for oxygen sensor -3337-

Removing

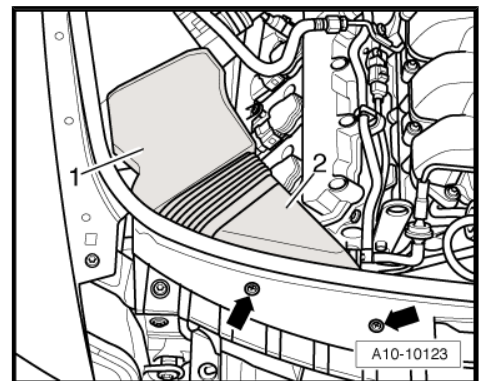
- Remove rear engine cover -arrows-.



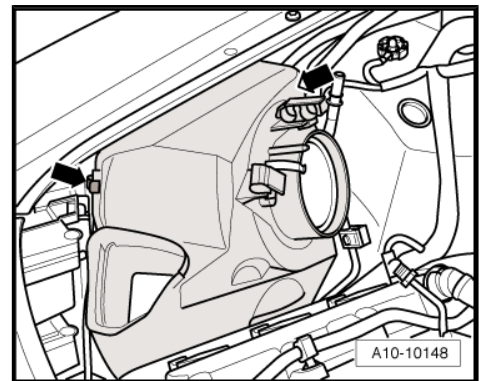
- Disconnect check valve -1- from air duct hose.
- Remove air duct hose, thereby loosening hose clamp -2- and opening clips -arrows-.



- Remove bolts -arrows-.
- Remove air duct -1- and -2-.



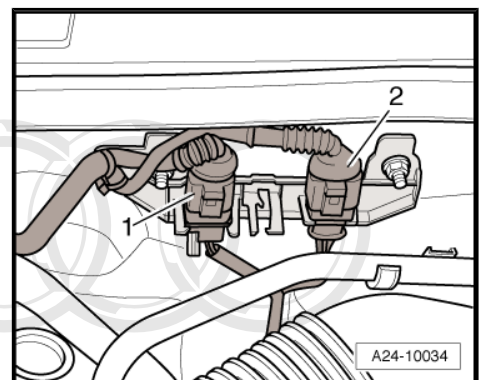
- Open clips -arrows- and remove upper part of air filter housing.



- Disconnect electrical harness connector -1- for Heated Oxygen Sensor (HO2S) -G39- and free up wire.

 **Note**

Ignore -2-.



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.

- Remove oxygen sensor -2- using ring spanner set -3337- .

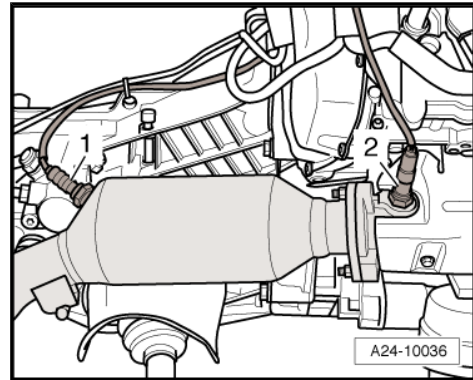
Installing

Installation is in reverse order of removal, note the following:



Note

- ◆ *New oxygen sensors are coated with assembly paste; the paste must not get into slots of oxygen sensor body.*
- ◆ *When reinstalling the previously used oxygen sensor, coat thread with hot bolt paste ⇒ Parts Catalog . Paste must not get on to slits of sensor body.*
- ◆ *Electrical wire of oxygen sensor must always be secured in the same position when installing so that contact with the exhaust pipe is avoided.*



Tightening Specifications

Component	Nm
Oxygen sensor in front exhaust pipe	55

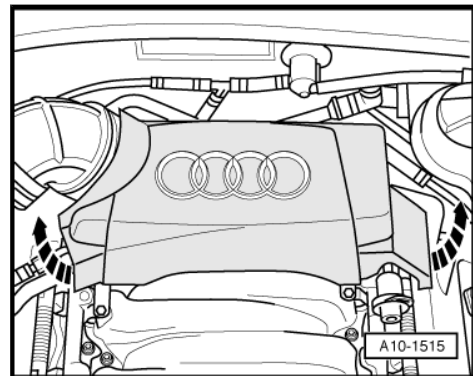
5.8 Oxygen Sensor before Catalytic Converter, Bank 2

Special tools and workshop equipment required

- ◆ Ring spanner 7-piece set for oxygen sensor -3337-

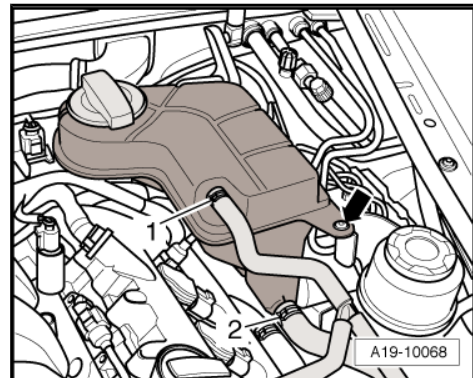
Removing

- Remove rear engine cover -arrows-.



- Remove coolant expansion tank -arrow-.
- Disconnect electrical connection from Engine Coolant Level (ECL) warning switch -F66- at bottom of coolant reservoir and set aside coolant reservoir with coolant hoses -1- and -2- connected.

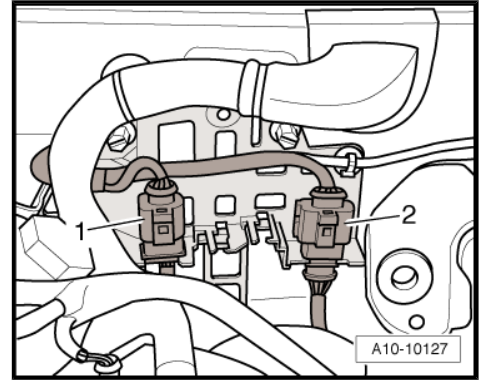
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



- Disconnect electrical harness connector -1- for Heated Oxygen Sensor (HO2S) 2 -G108- and free up wire.

i Note

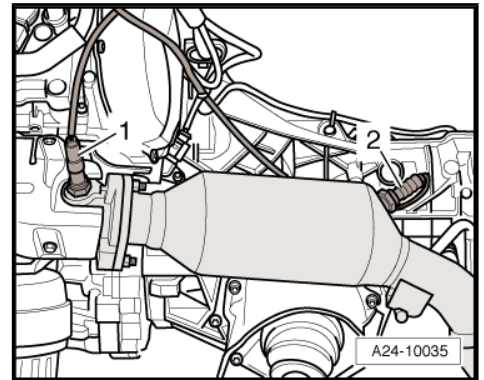
Ignore -2-.



- Remove oxygen sensor -1- using ring spanner set -3337-.

i Note

To improve clarity, the engine is shown removed.



Installing

Installation is in reverse order of removal, note the following:

i Note

- ◆ New oxygen sensors are coated with assembly paste; the paste must not get into slots of oxygen sensor body.
- ◆ When reinstalling the previously used oxygen sensor, coat thread with hot bolt paste ⇒ Parts Catalog . Paste must not get on to slits of sensor body.
- ◆ Wires of oxygen sensors must always be secured in the same position when installing so that contact with the exhaust pipe is avoided.

Tightening Specifications

Component	Nm
Oxygen sensor in front exhaust pipe	55

5.9 Oxygen Sensor after Catalytic Converter, Bank 1

Special tools and workshop equipment required

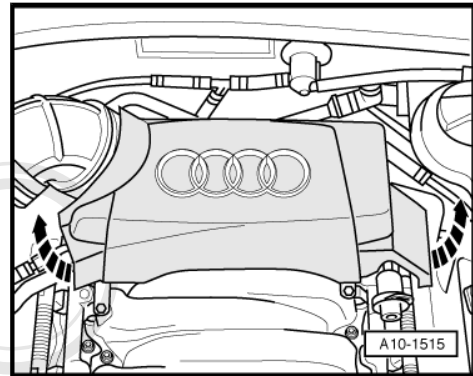
- ◆ Ring spanner 7-piece set for oxygen sensor -3337-

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.

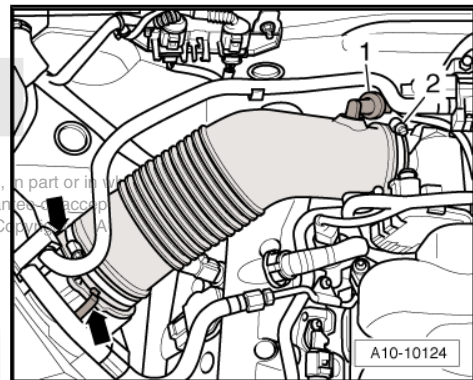
erWin

Removing

- Remove rear engine cover -arrows-.



- Disconnect check valve -1- from air duct hose.
- Remove air duct hose, thereby loosening hose clamp -2- and opening clips -arrows-.



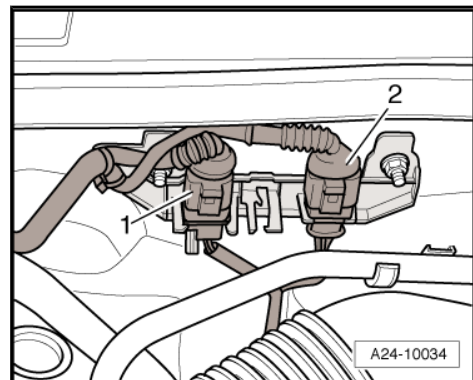
Protected by copyright. Copying for private or commercial purposes, in part or in full, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee the accuracy of the information with respect to the correctness of information in this document. Copyright © Audi AG 2008.

- Disconnect electrical harness connector -2- for Oxygen Sensor (O2S) behind Three Way Catalytic Converter (TWC) - G130- and free up wire.



Note

Ignore -1-.



- Remove oxygen sensor -1- using ring spanner set -3337- .

 **Note**

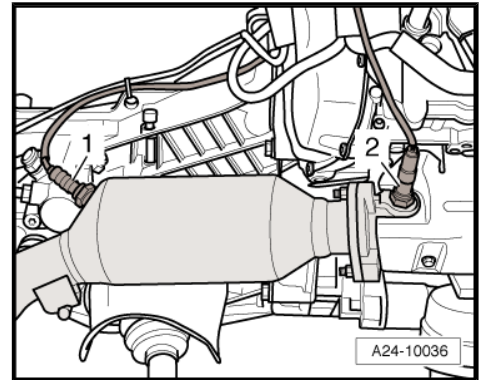
To improve clarity, the engine is shown removed.

Installing

Installation is in reverse order of removal, note the following:

 **Note**

- ◆ *Replace O-ring.*
- ◆ *New oxygen sensors are coated with assembly paste; the paste must not get into slots of oxygen sensor body.*
- ◆ *When reinstalling the previously used oxygen sensor, coat thread with hot bolt paste ⇒ Parts Catalog . Paste must not get on to slits of sensor body.*
- ◆ *Electrical wire of oxygen sensor must always be secured in the same position when installing so that contact with the exhaust pipe is avoided.*



Tightening Specifications

Component		Nm
Oxygen sensor in front exhaust pipe		55
Air duct to intake manifold		10
Holding plate to	Intake manifold	10
	Air duct	10

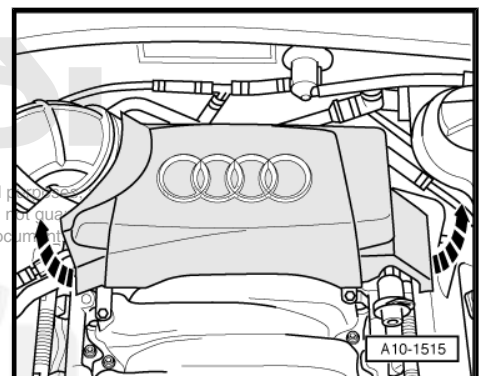
5.10 Oxygen Sensor after Catalytic Converter, Bank 2

Special tools and workshop equipment required

- ◆ Ring spanner 7-piece set for oxygen sensor -3337-

Removing

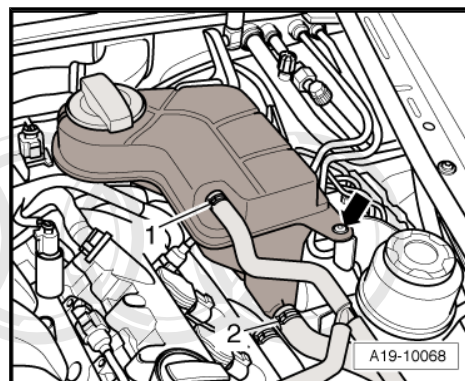
- Remove rear engine cover -arrows-.



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



- Remove coolant expansion tank -arrow-.
- Disconnect electrical connection from Engine Coolant Level (ECL) warning switch -F66- at bottom of coolant reservoir and set aside coolant reservoir with coolant hoses -1- and -2- connected.

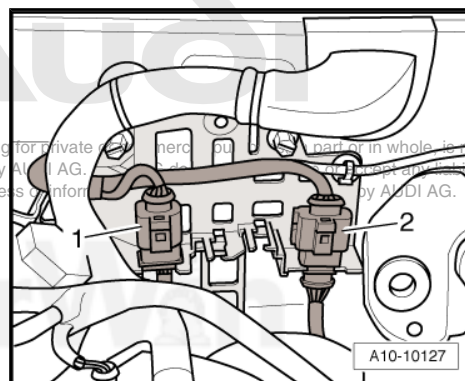


- Disconnect electrical harness connector -2- for Oxygen Sensor (O2S) 2 behind Three Way Catalytic Converter (TWC) - G131- and free up wire.

**Note**

Ignore -1-.

Protected by copyright. Copying for private use or for internal or external distribution, in whole or in part, is not permitted unless authorised by AUDI AG. Any other use without the express authorisation of AUDI AG, with respect to the correctness of information, is prohibited by AUDI AG.



- Remove oxygen sensor -2- using ring spanner set -3337-.

**Note**

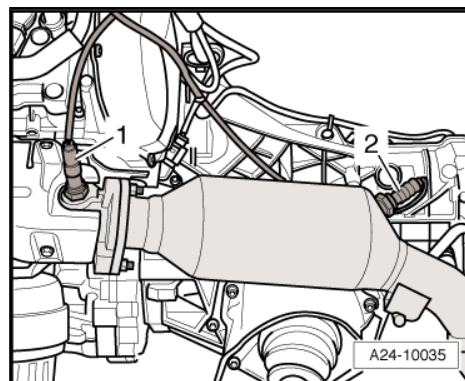
To improve clarity, the removed engine is shown.

Installing

Installation is in reverse order of removal, note the following:

**Note**

- ◆ Replace O-ring.
- ◆ New oxygen sensors are coated with assembly paste; the paste must not get into slots of oxygen sensor body.
- ◆ When reinstalling the previously used oxygen sensor, coat thread with hot bolt paste ⇒ Parts Catalog . Paste must not get on to slits of sensor body.
- ◆ Electrical wire of oxygen sensor must always be secured in the same position when installing so that contact with the exhaust pipe is avoided.

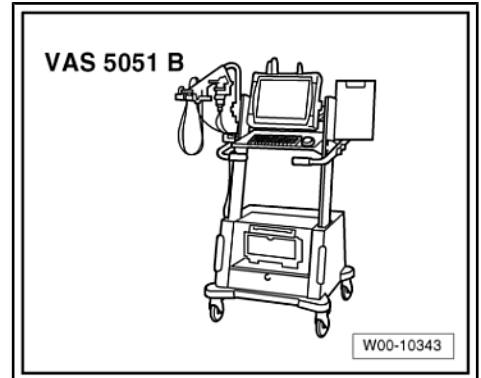
**Tightening Specifications**

Component	Nm
Oxygen sensor in front exhaust pipe	55

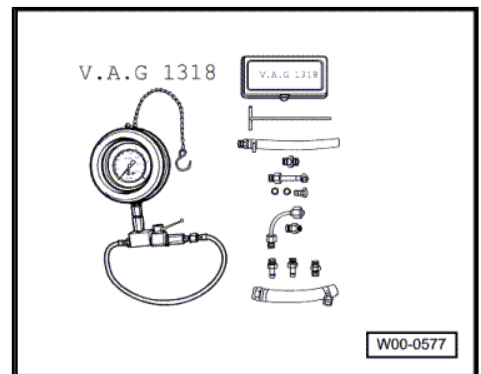
6 Special Tools

Special tools and workshop equipment required

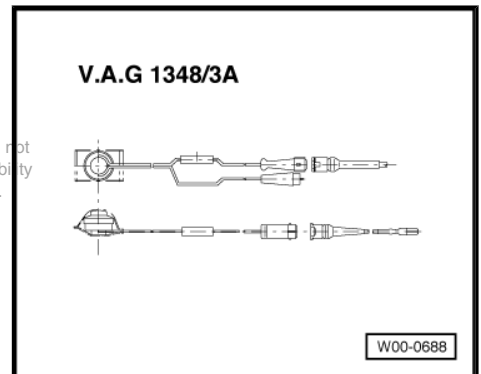
- ◆ Measuring container, fuel-resistant
- ◆ Vehicle diagnostic, testing and information system -VAS 5051- with diagnostic cable -VAS 5051/5A- (VAS 5051 B version shown as example only)



- ◆ Pressure gauge K-jetronic -V.A.G 1318-

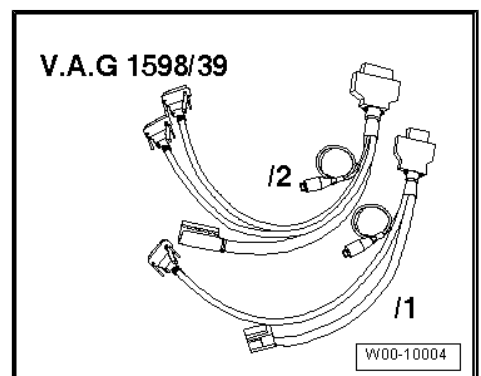


- ◆ Pressure gauge adapter -V.A.G 1318/10-12-
- ◆ Remote control -V.A.G 1348/3A- with adapter cable -V.A.G 1348/3-3-

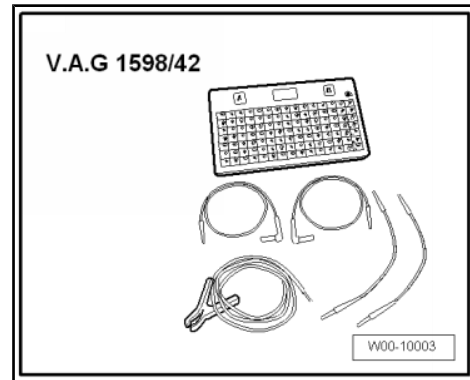


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

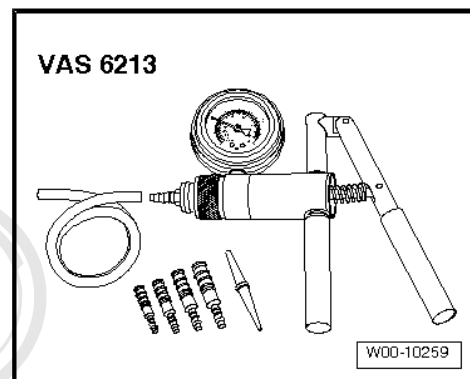
- ◆ Adapter cable -V.A.G 1598/39-



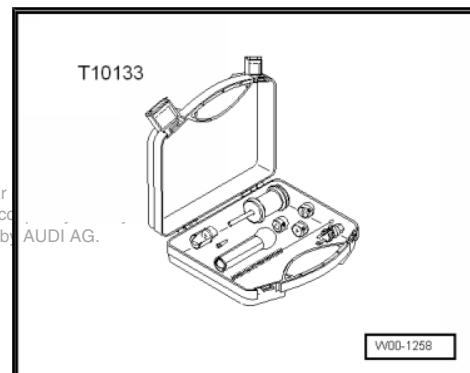
- ◆ Test box -V.A.G 1598/42-



- ◆ Hand vacuum pump -VAS 6213-

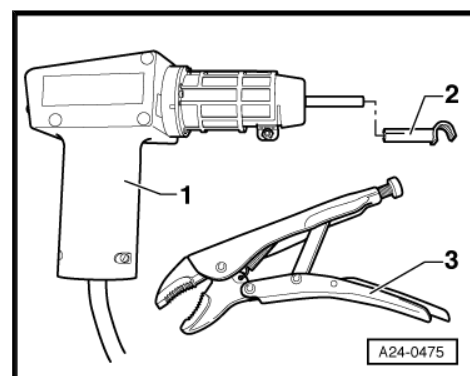


- ◆ Tool set -T10133-



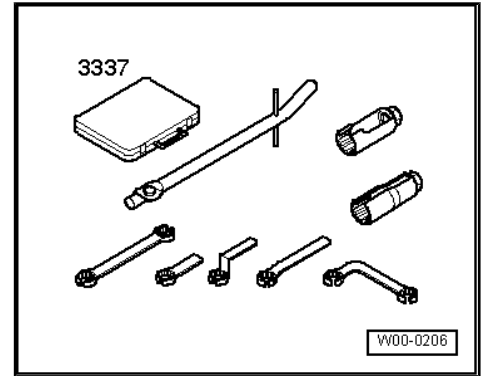
Protected by copyright. Copying for private or commercial purposes, in part or permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept responsibility with respect to the correctness of information in this document. Copyright by AUDI AG.

- ◆ Heat gun 220 V/50 Hz -VAS 1978/14- -1- with nozzle attachment -2- from wiring harness repair kit -VAS 1978A-



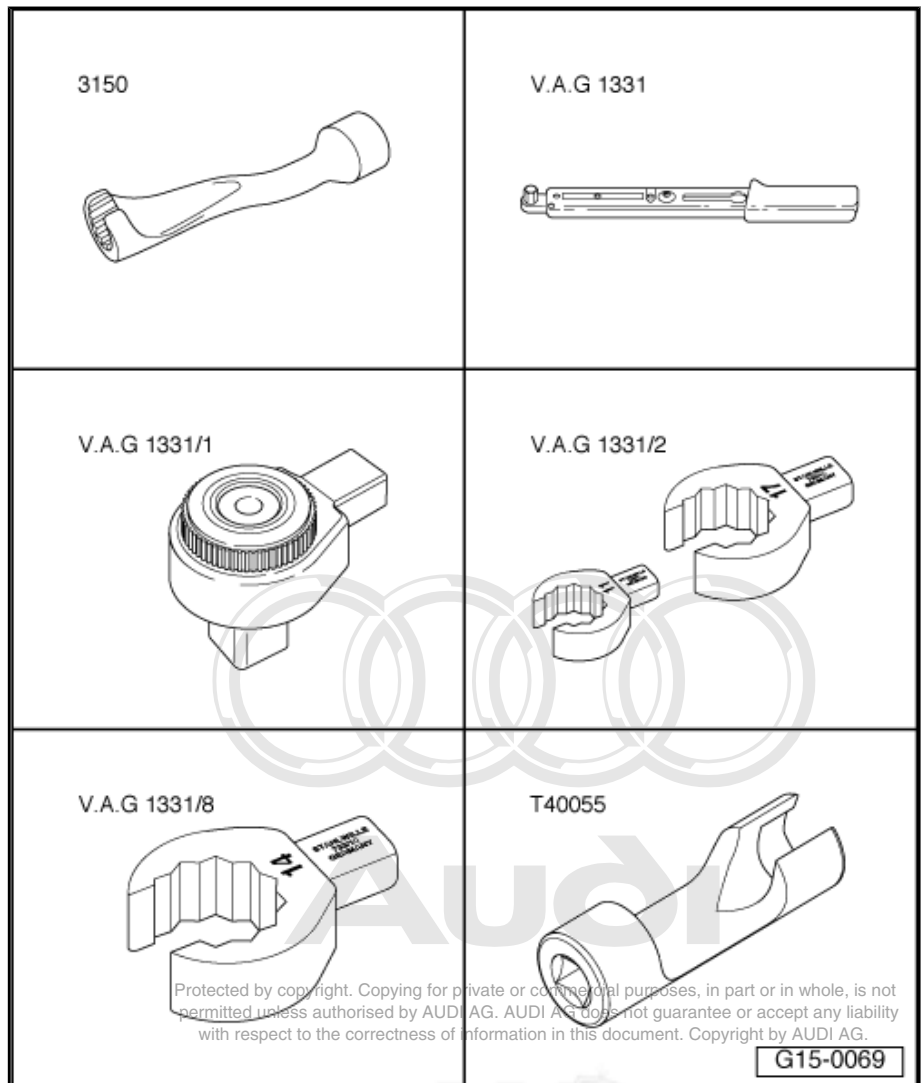
- ◆ Locking pliers -3- (commercially available)

- ◆ Ring spanner 7-piece set for oxygen sensor -3337-



Special tools and workshop equipment required

- ◆ Socket 14 mm -3150-
- ◆ Torque wrench -V.A.G 1331-
- ◆ Ratchet -V.A.G 1331/1-
- ◆ Open end wrench socket 17 mm -V.A.G 1331/2-
- ◆ SW 14 socket, open ring - V.A.G 1331/8-
- ◆ Socket -T40055-



28 – Ignition system

1 General Information

⇒ [“1.1 Safety Precautions”, page 54](#)

⇒ [“1.2 Ignition System General Information”, page 54](#)

1.1 Safety Precautions

If Special Testing Equipment is Required During Road Test, Note the Following



WARNING

- ◆ *Test and measuring equipment must always be secured to the rear seat and be operated from there by a second person.*
- ◆ *If test and measuring instruments are operated from the front passenger's seat and the vehicle is involved in an accident, there is a possibility that the person sitting in this seat may receive serious injuries when the airbag is triggered.*

To Reduce the Risk of Personal Injury and/or Damage to the Fuel Injection and Ignition System, Always Observe the Following

- ◆ Do not touch or disconnect wires of ignition system when engine is running or turning at starting RPM.
- ◆ Always switch ignition off before disconnecting or reconnecting wires for injection and ignition system, including high voltage wiring and test leads.
- ◆ If the engine is to be cranked at starting RPM without starting (e.g. during compression test), disconnect electrical connectors on ignition coils and on fuel injectors. After performing work, check and erase DTC memory.
- ◆ Clean engine only with ignition switched off.



Caution

- ◆ *The battery must only be disconnected and connected with the ignition switched off, since the Engine Control Module (ECM) can otherwise be damaged.*
- ◆ *Observe safety precautions when disconnecting the battery ⇒ Electrical Equipment; Rep. Gr. 27; Removal and Installation .*

1.2 Ignition System General Information

- ◆ For trouble-free operation of the electrical components a voltage of at least 12.5 V is necessary.
- ◆ It is possible that the control module will recognize a malfunction and store a DTC during some tests. Therefore after completing all checks and repairs the DTC memory must be checked and if necessary erased.
- ◆ If the engine only starts briefly and then turns off again after troubleshooting, repair or checking of the components, it may be that the immobilizer is blocking the Engine Control Module

(ECM). DTC memory must then be checked and if necessary, control module 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.





2 Specifications

⇒ "2.1 Technical Data", page 56

2.1 Technical Data

Engine code	BKH (3.2 l / 4V / 188 kW engine)
Engine idle speed	650 to 750 RPM (not adjustable)
Ignition timing	Not adjustable, regulated by control module
Ignition system	Single coil ignition system with 6 ignition coils (power output stages integrated) that are inserted directly on spark plugs.
Spark plugs	Tightening specification 30 Nm
Ignition sequence	1-4-3-6-2-5

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 Removal and Installation

⇒ "3.1 Ignition Coils", page 57

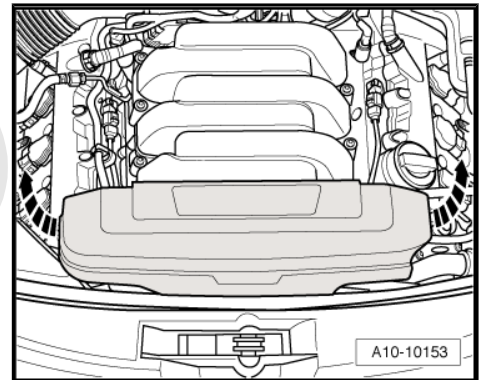
3.1 Ignition Coils

Special tools and workshop equipment required

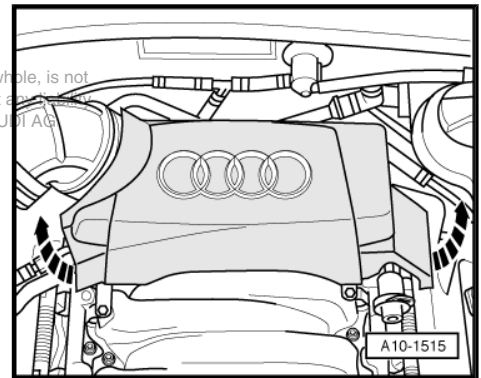
- ◆ Puller -T40039-

Removing

- Remove front engine cover -arrows-.

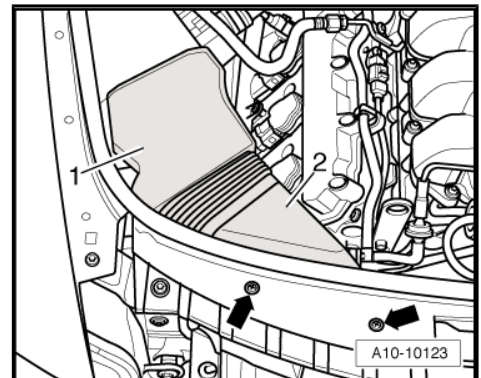


- Remove rear engine cover -arrows-.



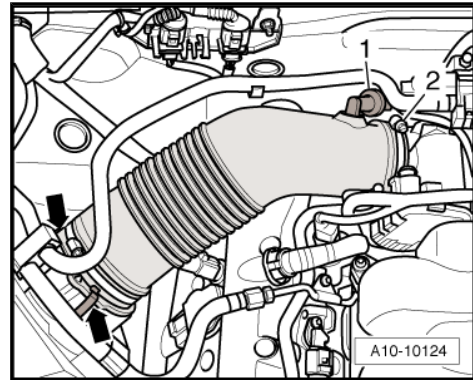
Cylinder Bank 1 (Right)

- Remove bolts -arrows-.
- Remove air duct -1- and -2-.





- Disconnect check valve -1- from air duct hose.
- Remove air duct hose, thereby loosening hose clamp -2- and opening clips -arrows-.

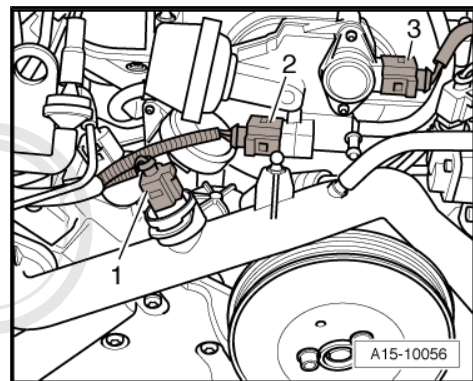


- Disconnect electrical connectors at Engine Coolant Temperature (ECT) sensor -G62- -1- and Intake manifold flap change over valve -N239- -2-.



Note

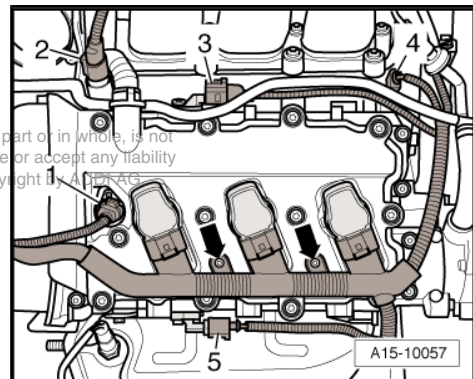
Ignore -3-.



- Disconnect electrical harness connectors.

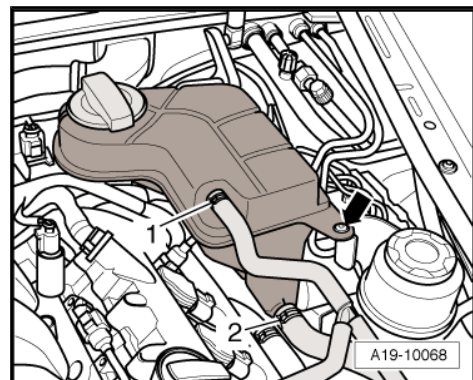
- 1 - Camshaft adjustment valve 1 (exhaust) -N318-
- 2 - Camshaft adjustment valve 1 -N205-
- 3 - Camshaft Position (CMP) sensor -G40-
- 4 - Intake manifold runner position sensor -G336-
- 5 - Camshaft Position (CMP) sensor 3 -G300-

- Remove bolts -arrows- and disconnect electrical connections at ignition coils.
- Set electrical wiring harness aside.

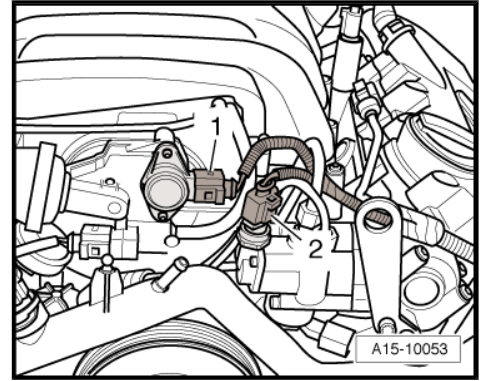


Cylinder Bank 2 (Left)

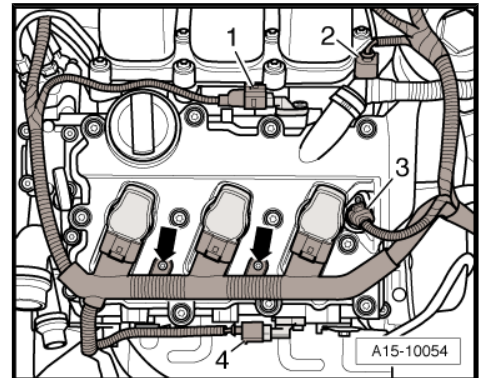
- Remove coolant expansion tank -arrow-.
- Disconnect electrical connection from Engine Coolant Level (ECL) warning switch -F66- at bottom of coolant reservoir and set aside coolant reservoir with coolant hoses -1- and -2- connected.



- Disconnect electrical connectors at Intake Manifold Tuning (IMT) valve position sensor -G513- -1- and at high pressure pump -2-.



- Disconnect electrical harness connectors.
- 1 - Camshaft Position (CMP) sensor 2 -G163-
- 2 - Camshaft adjustment valve 2 -N208-
- 3 - Camshaft adjustment valve 2 (exhaust) -N319-
- 4 - Camshaft Position (CMP) sensor 4 -G301-
- Remove bolts -arrows- and disconnect electrical connections at ignition coils.
- Set electrical wiring harness aside.

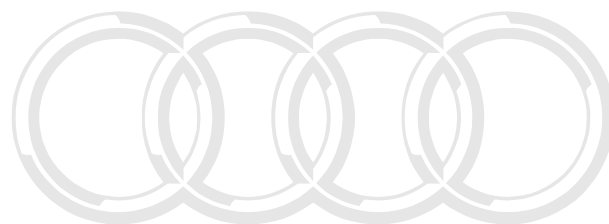
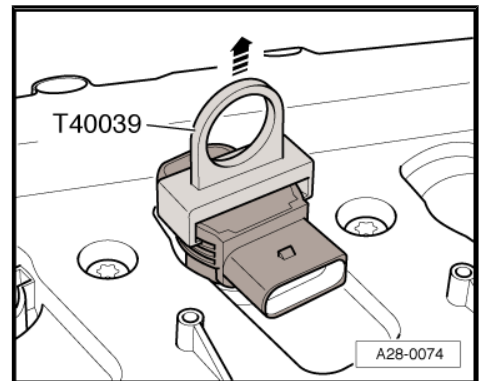


Continuation for Both Sides

- Remove ignition coils using ignition coil puller -T40039- .

Installing

Installation is in reverse order of removal.



Audi

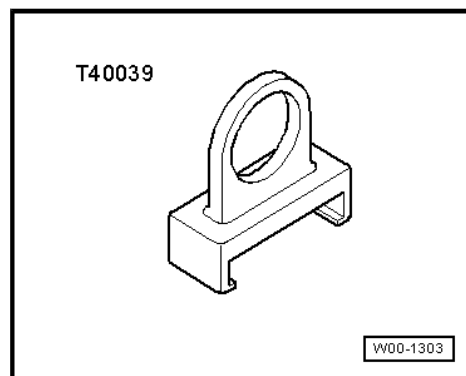
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



4 Special Tools

Special tools and workshop equipment required

- ◆ Puller -T40039-



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.

Cautions & Warnings

Please read these WARNINGS and CAUTIONS before proceeding with maintenance and repair work. You must answer that you have read and you understand these WARNINGS and CAUTIONS before you will be allowed to view this information.

- If you lack the skills, tools and equipment, or a suitable workshop for any procedure described in this manual, we suggest you leave such repairs to an authorized Audi retailer or other qualified shop. We especially urge you to consult an authorized Audi retailer before beginning repairs on any vehicle that may still be covered wholly or in part by any of the extensive warranties issued by Audi.
- Disconnect the battery negative terminal (ground strap) whenever you work on the fuel system or the electrical system. Do not smoke or work near heaters or other fire hazards. Keep an approved fire extinguisher handy.
- Audi is constantly improving its vehicles and sometimes these changes, both in parts and specifications, are made applicable to earlier models. Therefore, part numbers listed in this manual are for reference only. Always check with your authorized Audi retailer parts department for the latest information.
- Any time the battery has been disconnected on an automatic transmission vehicle, it will be necessary to reestablish Transmission Control Module (TCM) basic settings using the VAG 1551 Scan Tool (ST).
- Never work under a lifted vehicle unless it is solidly supported on stands designed for the purpose. Do not support a vehicle on cinder blocks, hollow tiles or other props that may crumble under continuous load. Never work under a vehicle that is supported solely by a jack. Never work under the vehicle while the engine is running.
- For vehicles equipped with an anti-theft radio, be sure of the correct radio activation code before disconnecting the battery or removing the radio. If the wrong code is entered when the power is restored, the radio may lock up and become inoperable, even if the correct code is used in a later attempt.
- If you are going to work under a vehicle on the ground, make sure that the ground is level. Block the wheels to keep the vehicle from rolling. Disconnect the battery negative terminal (ground strap) to prevent others from starting the vehicle while you are under it.
- Do not attempt to work on your vehicle if you do not feel well. You increase the danger of injury to yourself and others if you are tired, upset or have taken medicine or any other substances that may impair you or keep you from being fully alert.
- Never run the engine unless the work area is well ventilated. Carbon monoxide (CO) kills.
- Always observe good workshop practices. Wear goggles when you operate machine tools or work with acid. Wear goggles, gloves and other protective clothing whenever the job requires working with harmful substances.
- Tie long hair behind your head. Do not wear a necktie, a scarf, loose clothing, or a necklace when you work near machine tools or running engines. If your hair, clothing, or jewelry were to get caught in the machinery, severe injury could result.

Cautions & Warnings

- Do not re-use any fasteners that are worn or deformed in normal use. Some fasteners are designed to be used only once and are unreliable and may fail if used a second time. This includes, but is not limited to, nuts, bolts, washers, circlips and cotter pins. Always follow the recommendations in this manual - replace these fasteners with new parts where indicated, and any other time it is deemed necessary by inspection.
- Illuminate the work area adequately but safely. Use a portable safety light for working inside or under the vehicle. Make sure the bulb is enclosed by a wire cage. The hot filament of an accidentally broken bulb can ignite spilled fuel or oil.
- Friction materials such as brake pads and clutch discs may contain asbestos fibers. Do not create dust by grinding, sanding, or by cleaning with compressed air. Avoid breathing asbestos fibers and asbestos dust. Breathing asbestos can cause serious diseases such as asbestosis or cancer, and may result in death.
- Finger rings should be removed so that they cannot cause electrical shorts, get caught in running machinery, or be crushed by heavy parts.
- Before starting a job, make certain that you have all the necessary tools and parts on hand. Read all the instructions thoroughly, do not attempt shortcuts. Use tools that are appropriate to the work and use only replacement parts meeting Audi specifications. Makeshift tools, parts and procedures will not make good repairs.
- Catch draining fuel, oil or brake fluid in suitable containers. Do not use empty food or beverage containers that might mislead someone into drinking from them. Store flammable fluids away from fire hazards. Wipe up spills at once, but do not store the oily rags, which can ignite and burn spontaneously.
- Use pneumatic and electric tools only to loosen threaded parts and fasteners. Never use these tools to tighten fasteners, especially on light alloy parts. Always use a torque wrench to tighten fasteners to the tightening torque listed.
- Keep sparks, lighted matches, and open flame away from the top of the battery. If escaping hydrogen gas is ignited, it will ignite gas trapped in the cells and cause the battery to explode.
- Be mindful of the environment and ecology. Before you drain the crankcase, find out the proper way to dispose of the oil. Do not pour oil onto the ground, down a drain, or into a stream, pond, or lake. Consult local ordinances that govern the disposal of wastes.
- The air-conditioning (A/C) system is filled with a chemical refrigerant that is hazardous. The A/C system should be serviced only by trained automotive service technicians using approved refrigerant recovery/recycling equipment, trained in related safety precautions, and familiar with regulations governing the discharging and disposal of automotive chemical refrigerants.
- Before doing any electrical welding on vehicles equipped with anti-lock brakes (ABS), disconnect the battery negative terminal (ground strap) and the ABS control module connector.
- Do not expose any part of the A/C system to high temperatures such as open flame. Excessive heat will increase system pressure and may cause the system to burst.

Reproduction, distribution, or use 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.

Cautions & Warnings

- When boost-charging the battery, first remove the fuses for the Engine Control Module (ECM), the Transmission Control Module (TCM), the ABS control module, and the trip computer. In cases where one or more of these components is not separately fused, disconnect the control module connector(s).
- Some of the vehicles covered by this manual are equipped with a supplemental restraint system (SRS), that automatically deploys an airbag in the event of a frontal impact. The airbag is operated by an explosive device. Handled improperly or without adequate safeguards, it can be accidentally activated and cause serious personal injury. To guard against personal injury or airbag system failure, only trained Audi Service technicians should test, disassemble or service the airbag system.
- Do not quick-charge the battery (for boost starting) for longer than one minute, and do not exceed 16.5 volts at the battery with the boosting cables attached. Wait at least one minute before boosting the battery a second time.
- Never use a test light to conduct electrical tests of the airbag system. The system must only be tested by trained Audi Service technicians using the VAG 1551 Scan Tool (ST) or an approved equivalent. The airbag unit must never be electrically tested while it is not installed in the vehicle.
- Some aerosol tire inflators are highly flammable. Be extremely cautious when repairing a tire that may have been inflated using an aerosol tire inflator. Keep sparks, open flame or other sources of ignition away from the tire repair area. Inflate and deflate the tire at least four times before breaking the bead from the rim. Completely remove the tire from the rim before attempting any repair.
- When driving or riding in an airbag-equipped vehicle, never hold test equipment in your hands or lap while the vehicle is in motion. Objects between you and the airbag can increase the risk of injury in an accident.

I have read and I understand these Cautions and Warnings.



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.



erWin